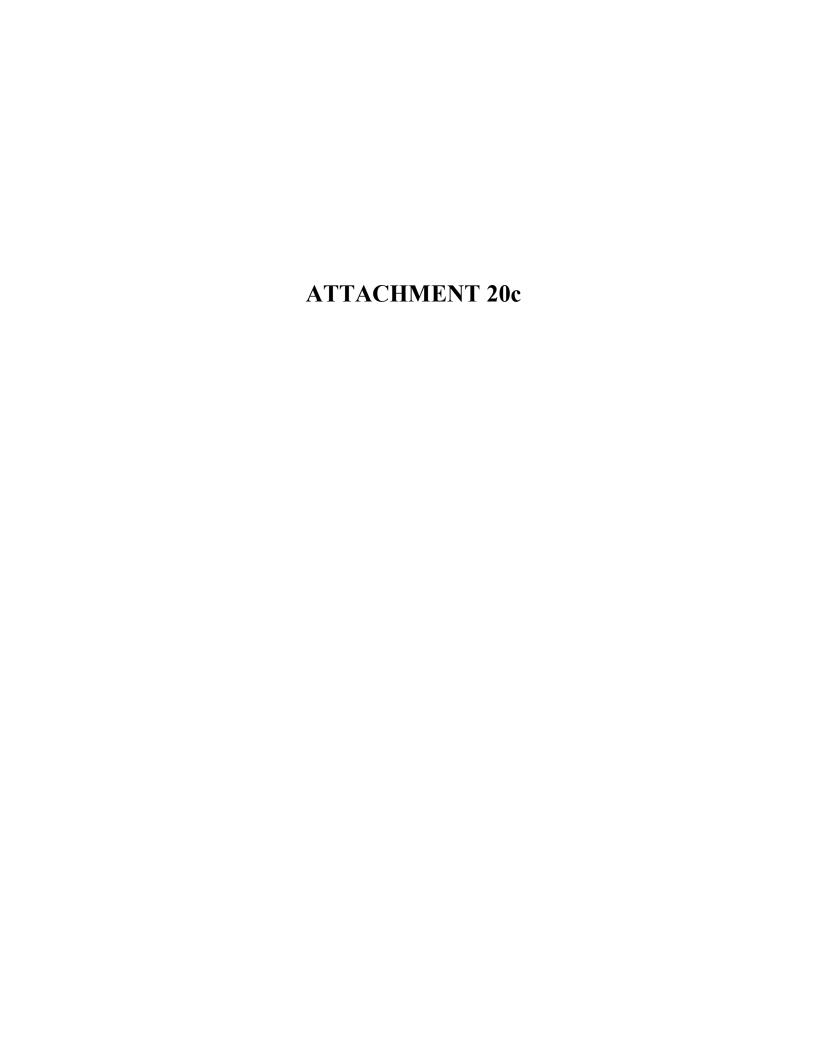
The follow	ving are attach	nments to the	testimony o	of Andrew Rehi





http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 17070059

Client Project: Dynegy - Vermillion Power Station

Report Date: 02-Aug-17

Lab ID: 17070059-013

Client Sample ID: MW8R

Matrix: GROUNDWATER

Collection Date: 07/13/2017 11:15

Matrix: GROUNDY	Collection Date: 0//13/2017 11:15							
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEAS	UREMENTS							
Depth to water from measuri	ng point	0		12.70	ft	1	07/13/2017 11:15	R235423
STANDARD METHOD 450	0-H B FIELD							
pH		1.00		8.78		1	07/13/2017 11:15	R235423
STANDARD METHODS 2	130 B FIELD							
Turbidity		1.0		2.7	NTU	1	07/13/2017 11:15	R235423
STANDARD METHODS 18	TH ED. 2580 B FIELD							
Oxidation-Reduction Potentia	al	-300		-231	mV	1	07/13/2017 11:15	R235423
STANDARD METHODS 25	510 B FIELD							
Conductivity		1		1730	μS/cm	1	07/13/2017 11:15	R235423
STANDARD METHODS 25	550 B FIELD							
Temperature		0		14.99	°C	1	07/13/2017 11:15	R235423
STANDARD METHODS 45	500-O G FIELD							
Oxygen, Dissolved		1.00		< 1.00	mg/L	1	07/13/2017 11:15	R235423
STANDARD METHODS 25	540 C (DISSOLVED)							
Total Dissolved Solids	NELAP	20		2040	mg/L	1	07/17/2017 15:02	R235310
STANDARD METHODS 45	500-NO3 F (TOTAL)							
Nitrogen, Nitrate (as N)	NELAP	0.050		< 0.050	mg/L	1	07/18/2017 15:09	R235311
SW-846 9036 (TOTAL)								
Sulfate	NELAP	500		1140	mg/L	50	07/17/2017 15:54	R235313
SW-846 9214 (DISSOLVE	D)							
Fluoride	NELAP	0.10		< 0.10	mg/L	1	07/14/2017 14:13	R235182
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		16	mg/L	1	07/14/2017 16:53	R235239
SW-846 3005A, 6020A, MI	ETALS BY ICPMS (DISS	OLVED)						
Arsenic	NELAP	0.0010		0.0070	mg/L	5	07/17/2017 17:03	132182
Barium	NFLAP	0 0010		0.0757	mg/L	5	07/17/2017 17:03	132182
Boron	NELAP	0.0250		47.7	mg/L	5	07/17/2017 17:03	132182
Iron	NELAP	0.0250		0.480	mg/L	5	07/17/2017 17:03	132182
Manganese	NELAP	0.0010		0.419	mg/L	5	07/17/2017 17:03	132182
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	07/17/2017 17:03	132182



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Client: Natural Resource Technology, Inc.

Work Order: 17070059

Client Project: Dynegy - Vermillion Power Station

Report Date: 02-Aug-17

Lab ID: 17070059-014

Client Sample ID: MW9

Matrix: GROUNDWATER Collection Date: 07/12/2017 0:00

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEAS	UREMENTS							
Depth to water from measuring	ng point	0		7.93	ft	11	07/12/2017 0.00	R235423



http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 17070059

Client Project: Dynegy - Vermillion Power Station

Report Date: 02-Aug-17

Lab ID: 17070059-015

Client Sample ID: MW19

Matrix: GROUNDWATER Collection Date: 07/13/2017 0:00

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEAS	SUREMENTS							
Depth to water from measur	ing point	0		7.10	ft	1	07/13/2017 0:00	R235423



http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 17070059

Client Project: Dynegy - Vermillion Power Station

Report Date: 02-Aug-17

Lab ID: 17070059-016

Client Sample ID: MW20

Matrix: GROUNDWATER Collection Date: 07/13/2017 14:09

Matrix: GROUNDWATER Conection Date: 07/13/2017 14:09					14.09			
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEAS	UREMENTS							
Depth to water from measuring	ng point	0		14.31	ft	1	07/13/2017 14:09	R235423
STANDARD METHOD 450	0-H B FIEL D							
pH		1.00		7.25		1	07/13/2017 14:09	R235423
STANDARD METHODS 2	130 B FIELD							
Turbidity		1.0		55.5	NTU	1	07/13/2017 14.09	R235423
STANDARD METHODS 18	TH ED. 2580 B FIELD							
Oxidation-Reduction Potentia	ıl .	-300		-34	mV	1	07/13/2017 14:09	R235423
STANDARD METHODS 25	10 B FIELD							
Conductivity		1		364	μS/cm	1	07/13/2017 14:09	R235423
STANDARD METHODS 25	50 B FIELD							
Temperature		0		20.54	°C	1	07/13/2017 14:09	R235423
STANDARD METHODS 45	00-O G FIELD	- Hadding down						
Oxygen, Dissolved		1.00		< 1.00	mg/L	1	07/13/2017 14:09	R235423
STANDARD METHODS 25	40 C (DISSOLVED)							
Total Dissolved Solids	NELAP	20		368	mg/L	1	07/17/2017 15:03	R235310
STANDARD METHODS 45	600-NO3 F (TOTAL)							
Nitrogen, Nitrate (as N)	NELAP	0.050		< 0.050	mg/L	1	07/18/2017 15:12	R235311
SW-846 9036 (TOTAL)								
Sulfate	NELAP	50		61	mg/L	5	07/15/2017 1:50	R235238
SW-846 9214 (DISSOLVEI	0)							
Fluoride	NELAP	0.10		< 0.10	mg/L	1	07/14/2017 14:15	R235182
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		< 5	mg/L	1	07/14/2017 17:01	R235239
SW-846 3005A, 6020A, ME	TALS BY ICPMS (DISS	OLVED)						
Arsenic	NELAP	0.0010		< 0.0010	mg/L	5	07/17/2017 17:11	132182
Barium	NELAP	0.0010		0.0149	mg/L	5	07/18/2017 14:34	132182
Boron	NELAP	0.0250		0.377	mg/L	5	07/18/2017 14:34	132182
Iron	NELAP	0.0250		0.247	mg/L	5	07/18/2017 14:34	132182
Manganese	NELAP	0.0010		- 0.0159	mg/L	5	07/18/2017 14:34	132182
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	07/17/2017 17:11	132182



#### http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 17070059

Client Project: Dynegy - Vermillion Power Station

Report Date: 02-Aug-17

Lab ID: 17070059-017

Client Sample ID: MW34

Matrix: GROUNDWATER Collection Date: 07/13/2017 15:01

1711 11 11 11 11 11 11 11 11 11 11 11 11								
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEAS	UREMENTS							-
Depth to water from measuring	ng point	0		14.12	ft	1	07/13/2017 15:01	R235423
STANDARD METHOD 450	0-H B FIELD							
pH		1.00		7.29		1	07/13/2017 15:01	R235423
STANDARD METHODS 2	130 B FIELD							
Turbidity		1.0		48.7	NTU	1	07/13/2017 15:01	R235423
STANDARD METHODS 18	TH ED. 2580 B FIELD							
Oxidation-Reduction Potentia	ıl	-300		-115	mV	1	07/13/2017 15:01	R235423
STANDARD METHODS 25	10 B FIELD							
Conductivity		1		618	μS/cm	1	07/13/2017 15:01	R235423
STANDARD METHODS 25	50 B FIELD							
Temperature		0		14.25	°C	1	07/13/2017 15:01	R235423
STANDARD METHODS 45	00-O G FIELD							
Oxygen, Dissolved	and the second	1.00		6.17	mg/L	1	07/13/2017 15:01	R235423
STANDARD METHODS 25	40 C (DISSOLVED)							
Total Dissolved Solids	NELAP	20		510	mg/L	1	07/17/2017 15:03	R235310
STANDARD METHODS 45	000-NO3 F (TOTAL)							
Nitrogen, Nitrate (as N)	NELAP	0.050		< 0.050	mg/L	1	07/18/2017 15:14	R235311
SW-846 9036 (TOTAL)								
Sulfate	NELAP	10		< 10	mg/L	1	07/14/2017 17:12	R235238
SW-846 9214 (DISSOLVE)	0)							
Fluoride	NELAP	0.10		0.68	mg/L	1	07/14/2017 14:17	R235182
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		33	mg/L	1	07/14/2017 17:09	R235239
SW-846 3005A, 6020A, ME	TALS BY ICPMS (DISS	SOLVED)						
Arsenic	NELAP	0.0010		0.0230	mg/L	5	07/17/2017 21:42	132209
Barium	NELAP	0.0010		0.147	mg/L	5	07/18/2017 14:59	132209
Boron	NELAP	0.0250		0.435	mg/L	5	07/17/2017 21:42	
Iron	NELAP	0.0250		5.22	mg/L	5	07/18/2017 14:59	
Manganese	NELAP	0.0010		0.0629	mg/L	5	07/18/2017 14:59	
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	07/17/2017 21:42	132209



#### http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 17070059

Client Project: Dynegy - Vermillion Power Station

Report Date: 02-Aug-17

Lab ID: 17070059-018

Client Sample ID: Field Blank

Matrix: GROUNDWATER Collection Date: 07/13/2017 16:20

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
STANDARD METHODS 254	40 C (DISSOLVED)							
Total Dissolved Solids	NFI AP	20		< 20	mg/L	1	07/17/2017 15:03	R235310
STANDARD METHODS 450	00-NO3 F (TOTAL)							
Nitrogen, Nitrate (as N)	NELAP	0.050		0.065	mg/L	1	07/18/2017 15:27	R235311
SW-846 9036 (TOTAL)								
Sulfate	NELAP	10		< 10	mg/L	1	07/14/2017 17.36	R235238
SW 846 9214 (DISSOLVED	)							
Fluoride	NELAP	0.10		< 0.10	mg/L	1	07/14/2017 14:24	R235182
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		< 5	mg/L	1	07/14/2017 17:33	R235239
SW-846 3005A, 6020A, ME	TALS BY ICPMS (DISS	OLVED)						
Arsenic	NELAP	0.0010		< 0.0010	mg/L	5	07/17/2017 21:50	132209
Barium	NELAP	0.0010		< 0.0010	mg/L	5	07/18/2017 15:07	132209
Boron	NELAP	0.0250		< 0.0250	mg/L	5	07/17/2017 21:50	132209
Iron	NELAP	0.0250		< 0.0250	mg/L	5	07/18/2017 15:07	132209
Manganese	NELAP	0.0010		< 0.0010	mg/L	5	07/18/2017 15:07	132209
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	07/17/2017 21:50	132209



http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 17070059

Client Project: Dynegy - Vermillion Power Station

Report Date: 02-Aug-17

Lab ID: 17070059-019

Client Sample ID: DUP1

Matrix: GROUNDWATER Collection Date: 07/13/2017 11:43

Matrix: GROUNDY	VATER	Collection Date: 0//13/2017 11:43							
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch	
<b>FIELD ELEVATION MEAS</b>	UREMENTS								
Depth to water from measuri	ng point	0		7.10	ft	1	07/13/2017 11:43	R235423	
STANDARD METHOD 450	0-H B FIELD								
pH		1.00		7.62		1	07/13/2017 11:43	R235423	
STANDARD METHODS 2	130 B FIELD								
Turbidity		1.0		5.5	NTU	1	07/13/2017 11:43	R235423	
STANDARD METHODS 18	TH FD. 2580 B FIFL D								
Oxidation-Reduction Potentia	ıl	-300		-142	mV	1	07/13/2017 11:43	R235423	
STANDARD METHODS 25	10 B FIELD								
Conductivity		1		803	μS/cm	1	07/13/2017 11:43	R235423	
STANDARD METHODS 25	550 B FIELD		3010						
Temperature		0		14.57	°C	1	07/13/2017 11:43	R235423	
STANDARD METHODS 45	000-O G FIELD								
Oxygen, Dissolved		1.00		< 1.00	mg/L	1	07/13/2017 11:43	R235423	
STANDARD METHODS 25	640 C (DISSOLVED)								
Total Dissolved Solids	NELAP	20		744	mg/L	1	07/17/2017 15:04	R235310	
STANDARD METHODS 45	600-NO3 F (TOTAL)								
Nitrogen, Nitrate (as N)	NELAP	0.050		< 0.050	mg/L	1	07/18/2017 15:29	R235311	
SW-846 9036 (TOTAL)									
Sulfate	NELAP	100		193	mg/L	10	07/14/2017 17:44	R235238	
SW-846 9214 (DISSOLVEI	D)								
Fluoride	NELAP	0.10		0.49	mg/L	1	07/14/2017 14:26	R235182	
SW-846 9251 (TOTAL)									
Chloride	NELAP	5		27	mg/L	1	07/14/2017 17:36	R235239	
SW-846 3005A, 6020A, ME	TALS BY ICPMS (DISS	OLVED)			-				
Arsenic	NELAP	0.0010		0.0077	mg/L	5	07/17/2017 21:59	132209	
Barium	NELAP	0.0010		0.200	mg/L	5	07/18/2017 15:32	132209	
Boron	NELAP	0.0250		5.04	mg/L	5	07/17/2017 21:59	132209	
Iron	NELAP	0.0250		2.68	mg/L	5	07/18/2017 15:32	132209	
Manganese	NELAP	0.0010		0.0489	mg/L	5	07/18/2017 15:32	132209	
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	07/17/2017 21:59	132209	



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Client: Natural Resource Technology, Inc.

Work Order: 17070059

Client Project: Dynegy - Vermillion Power Station

Report Date: 02-Aug-17

Lab ID: 17070059-020

Client Sample ID: DUP2

Matrix: GROUNDWATER Collection Date: 07/13/2017 13:06

Matrix: GROUNDY	VAILN	Confection Date: 07/15/2017 15:06							
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch	
FIELD ELEVATION MEAS	UREMENTS								
Depth to water from measuring	ng point	0		7.58	ft	1	07/13/2017 13:06	R235423	
STANDARD METHOD 450	0-H B FIELD								
pH		1.00		7.25		1	07/13/2017 13:06	R235423	
STANDARD METHODS 2	130 B FIELD								
Turbidity		1.0		2.3	NTU	1	07/13/2017 13:06	R235423	
STANDARD METHODS 18	TH ED. 2580 B FIELD								
Oxidation-Reduction Potentia	al.	-300		-74	mV	1	07/13/2017 13:06	R235423	
STANDARD METHODS 25	10 B FIELD	****							
Conductivity		1		558	µS/cm	1	07/13/2017 13:06	R235423	
STANDARD METHODS 25	550 B FIELD								
Temperature		0		16.48	°C	1	07/13/2017 13:06	R235423	
STANDARD METHODS 45	500-O G FIELD								
Oxygen, Dissolved		1.00		< 1.00	mg/L	1	07/13/2017 13:06	R235423	
STANDARD METHODS 25	640 C (DISSOLVED)								
Total Dissolved Solids	NELAP	20		520	mg/L	1	07/17/2017 15:04	R235310	
STANDARD METHODS 45	500-NO3 F (TOTAL)								
Nitrogen, Nitrate (as N)	NELAP	0.050		< 0.050	mg/L	1	07/18/2017 15:31	R235311	
SW-846 9036 (TOTAL)									
Sulfate	NELAP	50		97	mg/L	5	07/17/2017 15:57	R235313	
SW-846 9214 (DISSOLVEI	D)								
Fluoride	NELAP	0.10		0.11	mg/L	1	07/14/2017 14:33	R235182	
SW-846 9251 (TOTAL)									
Chloride	NELAP	5		7	mg/L	1	07/14/2017 17:44	R235239	
SW-846 3005A, 6020A, ME	TALS BY ICPMS (DISS	OLVED)							
Arsenic	NELAP	0.0010		< 0.0010	mg/L	5	07/17/2017 21:01	132209	
Barium	NELAP	0.0010		0.0615	mg/L	5	07/18/2017 15:40	132209	
Boron	NELAP	0.0250		0.149	mg/L	5	07/17/2017 21:01	132209	
Iron	NELAP	0.0250		0.0953	mg/L	5	07/18/2017 15:40	132209	
Manganese	NELAP	0.0010		0.213	mg/L	5	07/18/2017 15:40	132209	
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	07/17/2017 21:01	132209	



Client: Natural Resource Technology, Inc.

Client Project: Dynegy - Vermillion Power Station

# Sample Summary

http://www.teklabinc.com/

Work Order: 17070059 Report Date: 02-Aug-17

Lab Sample ID	Client Sample ID	Matrix	Fractions	Collection Date
17070059-001	MW1	Groundwater	4	07/13/2017 9:38
17070059-002	MW2	Groundwater	4	07/13/2017 10:17
17070059-003	MW7	Groundwater	4	07/12/2017 12:42
17070059-004	MW10	Groundwater	4	07/12/2017 18:07
17070059-005	MW17	Groundwater	4	07/12/2017 18:47
17070059-006	MW18	Groundwater	4	07/12/2017 19:09
17070059-007	MW21	Groundwater	4	07/13/2017 9:02
17070059-008	TW1	Groundwater	4	07/13/2017 0:00
17070059-009	MW3R	Groundwater	4	07/13/2017 11:43
17070059-010	MW4	Groundwater	4	07/13/2017 15:27
17070059-011	MW5	Groundwater	4	07/13/2017 12:21
17070059-012	MW6R	Groundwater	4	07/13/2017 13:06
17070059-013	MW8R	Groundwater	4	07/13/2017 11:15
17070059-014	MW9	Groundwater	1	07/12/2017 0:00
17070059-015	MW19	Groundwater	1	07/13/2017 0:00
17070059-016	MW20	Groundwater	4	07/13/2017 14:09
17070059-017	MW34	Groundwater	4	07/13/2017 15:01
17070059-018	Field Blank	Groundwater	4	07/13/2017 16:20
17070059-019	DUP1	Groundwater	4	07/13/2017 11:43
17070059-020	DUP2	Groundwater	4	07/13/2017 13:06



http://www.teklabinc.com/

Client: Natural Resource Technology, Inc. Work Order: 17070059

Client Project: Dynegy - Vermillion Power Station Report Date: 02-Aug-17

Sample ID	Client Sample ID	Collection Date	Received Date		
	Test Name			Prep Date/Time	Analysis Date/Time
17070059 001A	MW1	07/13/2017 9:38	07/13/2017 19:45		
	Field Flevation Measurements				07/13/2017 9-38
	Standard Method 4500-H B Field				07/13/2017 9:38
	Standard Methods 2130 B Field				07/13/2017 9.38
	Standard Methods 18th Ed. 2580 B Field				07/13/2017 9:38
	Standard Methods 2510 B Field				07/13/2017 9.38
	Standard Methods 2550 B Field				07/13/2017 9:38
	Standard Methods 4500-NO2 B (Total)				07/14/2017 16:14
	Standard Methods 4500-O G Field				07/13/2017 9:38
	SW-846 9036 (Total)				07/17/2017 15:46
	SW-846 9251 (Total)				07/14/2017 14:59
17070059-001B	MW1	07/13/2017 9:38	07/13/2017 19:45		
	Standard Methods 2540 C (Dissolved)				07/17/2017 14:58
	SW-846 9214 (Dissolved)				07/14/2017 13:45
17070059-001C	MW1	07/13/2017 9:38	07/13/2017 19:45		11.00 19576 ( 000.00
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			07/14/2017 11:43	07/17/2017 15:33
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			07/14/2017 11:43	07/18/2017 13:53
17070059-001D	MW1	07/13/2017 9:38	07/13/2017 19:45		
	Standard Methods 4500-NO3 F (Total)				07/18/2017 14:30
17070059-002A	MW2	07/13/2017 10:17	07/13/2017 19:45		0.000
	Field Elevation Measurements				07/13/2017 10:17
	Standard Method 4500-H B Field				07/13/2017 10:17
	Standard Methods 2130 B Field				07/13/2017 10:17
	Standard Methods 18th Ed. 2580 B Field				07/13/2017 10:17
	Standard Methods 2510 B Field				07/13/2017 10:17
	Standard Methods 2550 B Field				07/13/2017 10:17
	Standard Methods 4500-NO2 B (Total)				07/14/2017 16:15
	Standard Methods 4500 O G Field				07/13/2017 10:17
	\$W 846 9036 (Total)				07/15/2017 1 10
	SW 846 9251 (Total)				07/14/2017 15:08
17070059-002B	MW2	07/13/2017 10:17	07/13/2017 19:45		
	Standard Methods 2540 C (Dissolved)				07/17/2017 14:58
	SW-846 9214 (Dissolved)				07/14/2017 13:48
17070059-002C	MW2	07/13/2017 10:17	07/13/2017 19:45		2011/201/10.70
			200020-851 5016	07/14/2017 11 42	07/17/2017 19-22
17070059-002D	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)		07/13/2017 10:45	07/14/2017 11:43	07/17/2017 18:33
17070039-002D	MW2	07/13/2017 10:17	07/13/2017 19:45		
	Standard Methods 4500-NO3 F (Total)				07/18/2017 14:32



### http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 17070059

Client Project: Dynegy - Vermillion Power Station

Report Date: 02-Aug-17

Sample ID	Client Sample ID	Collection Date	Received Date		
www.components	Test Name			Prep Date/Time	Analysis Date/Time
17070059-004A	MW10	07/12/2017 18.07	07/13/2017 19.45		
	Field Elevation Measurements				0//12/201/18:0/
	Standard Method 4500-H B Field				07/12/2017 18:07
	Standard Methods 2130 B Field				07/12/2017 18:07
	Standard Methods 18th Ed. 2580 B Field				07/12/2017 18:07
	Standard Methods 2510 B Field				07/12/2017 18:07
	Standard Methods 2550 B Field				07/12/2017 18:07
	Standard Methods 4500-NO2 B (Total)				07/14/2017 16:15
	Standard Methods 4500-O G Field				07/12/2017 18:07
	SW-846 9036 (Total)				07/14/2017 15:24
	SW-846 9251 (Total)				07/14/2017 15:16
17070059-004B	MW10	07/12/2017 18:07	07/13/2017 19:45		
	Standard Methods 2540 C (Dissolved)				07/17/2017 14:59
	SW-846 9214 (Dissolved)				07/14/2017 13:50
17070059-004C	MW10	07/12/2017 18:07	07/13/2017 19:45		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			07/14/2017 11:43	07/17/2017 15:41
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			07/14/2017 11:43	07/18/2017 14:02
17070059-004D	MW10	07/12/2017 18:07	07/13/2017 19:45		
	Standard Methods 4500-NO3 F (Total)				07/18/2017 14:34
17070059-005A	MW17	07/12/2017 18:47	07/13/2017 19:45	/	# 21401abbb 3 1401
	Field Elevation Measurements				07/12/2017 18:47
	Standard Method 4500-H B Field				07/12/2017 18:47
	Standard Methods 2130 B Field				07/12/2017 18:47
	Standard Methods 18th Ed. 2580 B Field				07/12/2017 18:47
	Standard Methods 2510 B Field				07/12/2017 18:47
	Standard Methods 2550 B Field				07/12/2017 18:47
	Standard Methods 4500-NO2 B (Total)				07/14/2017 16:16
	Standard Methods 4500-O G Field				07/12/2017 18:47
	8W 846 9036 (Iotal)				0//1//2017 15:49
	SW-846 9251 (Total)				07/14/2017 15:40
17070059-005B	MW17	07/12/2017 18:47	07/13/2017 19:45		* 0.3 N.S. 12 ( 3.5572 )
	Standard Methods 2540 C (Dissolved)				07/17/2017 14:59
	SW-846 9214 (Dissolved)				07/14/2017 14:59
17070059-005C	SW-846 9214 (Dissolved) MW17	07/12/2017 19:47	07/13/2017 19:45		07/14/2017 13:53
17070039-0030		07/12/2017 18:47	07/13/2017 19:43		- Camabase Burst
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)		25436	07/14/2017 11:43	07/17/2017 15:49
17070059-005D	MW17	07/12/2017 18:47	07/13/2017 19:45		
	Standard Methods 4500-NO3 F (Total)				07/18/2017 14:52



#### http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 17070059

Client Project: Dynegy - Vermillion Power Station

Report Date: 02-Aug-17

Sample ID	Client Sample ID	Collection Date	Received Date		
	Test Name	- communication and the communication and th		Prep Date/Time	Analysis Date/Time
17070059-006A	MW18	07/12/2017 19:09	07/13/2017 19:45		
	Field Elevation Measurements				07/12/2017 19:09
	Standard Method 4500-H B Field				07/12/2017 19:09
	Standard Methods 2130 B Field				0 //12/201 / 19:09
	Standard Methods 18th Ed. 2580 B Field				07/12/2017 19:09
	Standard Methods 2510 B Field				07/12/2017 19:09
	Standard Methods 2550 B Field				07/12/2017 19:09
	Standard Methods 4500-NO2 B (Total)				07/14/2017 16:16
	Standard Methods 4500-O G Field				07/12/2017 19:09
	SW-846 9036 (Total)				07/15/2017 1:37
	SW-846 9251 (Total)				07/14/2017 15:48
17070059-006B	MW18	07/12/2017 19:09	07/13/2017 19:45		
	Standard Methods 2540 C (Dissolved)				07/17/2017 15:00
	SW-846 9214 (Dissolved)				07/14/2017 13:59
17070059-006C	MW18	07/12/2017 19:09	07/13/2017 19:45		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			07/14/2017 11:43	07/17/2017 16:14
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			07/14/2017 11:43	07/18/2017 14:10
17070059-006D	MW18	07/12/2017 19:09	07/13/2017 19:45		
	Standard Methods 4500-NO3 F (Total)				07/18/2017 14:54
17070059-007A	MW21	07/13/2017 9:02	07/13/2017 19:45		
	Field Elevation Measurements				07/13/2017 9:02
	Standard Method 4500-H B Field				07/13/2017 9:02
	Standard Methods 2130 B Field				07/13/2017 9:02
	Standard Methods 18th Ed. 2580 B Field				07/13/2017 9:02
	Standard Methods 2510 B Field				07/13/2017 9:02
	Standard Methods 2550 B Field				07/13/2017 9:02
	Standard Methods 4500-NO2 B (Total)				07/14/2017 16:16
	Standard Methods 4500-O G Field				07/13/2017 9:02
	SW-846 9036 (Total)				07/14/2017 15:59
	SW-846 9251 (Total)				07/14/2017 15:56
17070059-007B	MW21	07/13/2017 9:02	07/13/2017 19:45		
	Standard Methods 2540 C (Dissolved)				07/17/2017 15:00
	SW-846 9214 (Dissolved)				07/14/2017 14:01
17070059-007C	MW21	07/13/2017 9:02	07/13/2017 19:45		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			07/14/2017 11:43	07/17/2017 16:22
17070059-007D	MW21	07/13/2017 9:02	07/13/2017 19:45		
	Standard Methods 4500-NO3 F (Total)				07/18/2017 14:56



17070059-010C

17070059-010D

MW4

SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)

Standard Methods 4500-NO3 F (Total)

### **Dates Report**

#### http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 17070059

Client Project: Dynegy - Vermillion Power Station

Report Date: 02-Aug-17

Sample ID	Client Sample ID	Collection Date	Received Date		
	Test Name			Prep Date/Time	Analysis Date/Time
17070059-009A	MW3R	07/13/2017 11:43	07/13/2017 19:45		
	Field Elevation Measurements				07/13/2017 11:43
	Standard Method 4500-H B Field				07/13/2017 11:43
	Standard Methods 2130 B Field				07/13/2017 11.43
	Standard Methods 18th Ed. 2580 B Field				07/13/2017 11:43
	Standard Methods 2510 B Field				07/13/2017 11:43
	Standard Methods 2550 B Field				07/13/2017 11:43
	Standard Methods 4500-NO2 B (Total)				07/14/2017 16:16
	Standard Methods 4500-O G Field				07/13/2017 11:43
	SW-846 9036 (Total)				07/14/2017 16:12
	SW-846 9251 (Total)				07/14/2017 16:04
17070059-009B	MW3R	07/13/2017 11:43	07/13/2017 19:45		
	Standard Methods 2540 C (Dissolved)				07/17/2017 15:00
	SW-846 9214 (Dissolved)				07/14/2017 14:02
17070059-009C	MW3R	07/13/2017 11:43	07/13/2017 19:45		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			07/14/2017 11:43	07/17/2017 16:30
17070059-009D	MW3R	07/13/2017 11:43	07/13/2017 19:45		
	Standard Methods 4500-NO3 F (Total)				07/18/2017 14:58
17070059-010A	MW4	07/13/2017 15:27	07/13/2017 19:45		
	Field Elevation Measurements				07/13/2017 15:27
	Standard Method 4500-H B Field				07/13/2017 15:27
	Standard Methods 2130 B Field				07/13/2017 15:27
	Standard Methods 18th Ed. 2580 B Field				07/13/2017 15:27
	Standard Methods 2510 B Field				07/13/2017 15:27
	Standard Methods 2550 B Field				07/13/2017 15:27
	Standard Methods 4500-NO2 B (Total)				07/14/2017 16:17
	Standard Methods 4500-O G Field				07/13/2017 15:27
	SW-846 9036 (Total)				07/15/2017 1:39
	SW-846 9251 (Total)				07/14/2017 16:12
17070059-010B	MW4	07/13/2017 15:27	07/13/2017 19:45		
	Standard Methods 2540 C (Dissolved)				07/17/2017 15:01
	SW-846 9214 (Dissolved)				07/14/2017 14:04

07/13/2017 15:27

07/13/2017 15:27

07/13/2017 19:45

07/13/2017 19:45

07/14/2017 11:43

07/17/2017 16:39

07/18/2017 15:00



Client: Natural Resource Technology, Inc.

Client Project: Dynegy - Vermillion Power Station

### **Dates Report**

http://www.teklabinc.com/

Work Order: 17070059

Report Date: 02-Aug-17

Sample ID	Client Sample ID	Collection Date	Received Date		
	Test Name			Prep Date/Time	Analysis Date/Time
17070059-011A	MW5	07/13/2017 12:21	07/13/2017 19:45		
	Field Flevation Measurements				07/13/2017 12:21
	Standard Method 4500-H B Field				07/13/2017 12:21
	Standard Methods 2130 B Field				07/13/2017 12:21
	Standard Methods 18th Ed. 2580 B Field				07/13/2017 12:21
	Standard Methods 2510 B Field				07/13/2017 12.21
	Standard Methods 2550 B Field				07/13/2017 12:21
	Standard Methods 4500-NO2 B (Total)				07/14/2017 16:18
	Standard Methods 4500-O G Field				07/13/2017 12:21
	SW-846 9036 (Total)				07/14/2017 16:45
	SW-846 9251 (Total)				07/14/2017 16:37
17070059-011B	MW5	07/13/2017 12:21	07/13/2017 19:45		
	Standard Methods 2540 C (Dissolved)				07/17/2017 15:01
	SW-846 9214 (Dissolved)				07/14/2017 14:10
17070059-011C	MW5	07/13/2017 12:21	07/13/2017 19:45		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			07/14/2017 11:43	07/17/2017 16:47
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			07/14/2017 11:43	07/18/2017 14:18
17070059-011D	MW5	07/13/2017 12:21	07/13/2017 19:45		
	Standard Methods 4500-NO3 F (Total)				07/18/2017 15:05
17070059-012A	MW6R	07/13/2017 13:06	07/13/2017 19:45		2007261-0-0-0-1-0-1-0-
	Field Elevation Measurements				07/13/2017 13:06
	Standard Method 4500-H B Field				07/13/2017 13:06
	Standard Methods 2130 B Field				07/13/2017 13:06
	Standard Methods 18th Ed. 2580 B Field				07/13/2017 13:06
	Standard Methods 2510 B Field				07/13/2017 13:06
	Standard Methods 2550 B Field				07/13/2017 13:06
	Standard Methods 4500-NO2 B (Total)				07/14/2017 16:18
	Standard Methods 4500 O G Field				07/13/2017 13:06
	EW 846 9036 (Total)				07/15/2017 1:45
	SW-846 9251 (Total)				07/14/2017 16:45
17070059-012B	MW6R	07/13/2017 13:06	07/13/2017 19:45		
	Standard Methods 2540 C (Dissolved)				07/17/2017 15:02
	SW-846 9214 (Dissolved)				07/14/2017 14:11
17070059-012C	MW6R	07/13/2017 13:06	07/13/2017 19:45		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			07/14/2017 11:43	07/17/2017 16:55
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			07/14/2017 11:43	07/18/2017 14:26
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			07/14/2017 11:43	07/19/2017 14:56



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Client: Natural Resource Technology, Inc.

Work Order: 17070059

Client Project: Dynegy - Vermillion Power Station

Report Date: 02-Aug-17

Sample ID	Client Sample ID	Collection Date	Received Date		
	Test Name			Prep Date/Time	Analysis Date/Time
17070059-012D	MW6R	07/13/2017 13:06	07/13/2017 19:45		
	Standard Methods 4500-NO3 F (Total)				0//18/201/ 15:0/
17070059-013A	MW8R	07/13/2017 11:15	07/13/2017 19:45		
	Field Elevation Measurements				07/13/2017 11:15
	Standard Method 4500-H B Field				07/13/2017 11:15
	Standard Methods 2130 B Field				0//13/201/ 11:15
	Standard Methods 18th Ed. 2580 B Field				07/13/2017 11:15
	Standard Methods 2510 B Field				07/13/2017 11:15
	Standard Methods 2550 B Field				07/13/2017 11:15
	Standard Methods 4500-NO2 B (Total)				07/14/2017 16:19
	Standard Methods 4500-O G Field				07/13/2017 11:15
	SW-846 9036 (Total)				07/17/2017 15:54
	SW-846 9251 (Total)				07/14/2017 16:53
17070059-013B	MW8R	07/13/2017 11:15	07/13/2017 19:45		
	Standard Methods 2540 C (Dissolved)				07/17/2017 15:02
	SW-846 9214 (Dissolved)				07/14/2017 14:13
17070059-013C	MW8R	07/13/2017 11:15	07/13/2017 19:45		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			07/14/2017 11:43	07/17/2017 17:03
17070059-013D	MW8R	07/13/2017 11:15	07/13/2017 19:45		
	Standard Methods 4500-NO3 F (Total)				07/18/2017 15:09
17070059-014A	MW9	07/12/2017 0:00	07/13/2017 19:45		
	Field Flevation Measurements				07/12/2017 0:00
17070059-015A	MW19	07/13/2017 0:00	07/13/2017 19:45		7
	Field Elevation Measurements				07/13/2017 0:00
17070059-016A	MW20	07/13/2017 14:09	07/13/2017 19:45		722410410,711
	Field Elevation Measurements				07/13/2017 14:09
	Standard Method 4500-H B Field				07/13/2017 14:09
	Standard Methods 2130 B Field				07/13/2017 14:09
	Standard Methods 18th Ed. 2580 B Field				07/13/2017 14:09
	Standard Methods 2510 B Field				07/13/2017 14:09
	Standard Methods 2550 B Field				07/13/2017 14:09
	Standard Methods 4500-NO2 B (Total)				07/14/2017 16:19
	Standard Methods 4500-O G Field				07/13/2017 14:09
	SW-846 9036 (Total)				07/15/2017 1:50
	SW-846 9251 (Total)				07/14/2017 17:01
17070059-016B	MW20	07/13/2017 14:09	07/13/2017 19:45		U 1994 (17 1970



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Work Order: 17070059 Client: Natural Resource Technology, Inc. Client Project: Dynegy - Vermillion Power Station

Report	Date:	02-Aug-	17

ample ID	Client Sample ID	Collection Date	Received Date	5.000	
	Test Name			Prep Date/Time	Analysis Date/Time
	Standard Methods 2540 C (Dissolved)				07/17/2017 15:03
	SW-846 9214 (Dissolved)				07/14/2017 14:15
7070059-016C	MW20	07/13/2017 14:09	07/13/2017 19:45		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			07/14/2017 11:43	0//1//201/ 1/:11
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			07/14/2017 11:43	07/18/2017 14:34
7070059-016D	MW20	07/13/2017 14:09	07/13/2017 19:45		
	Standard Methods 4500-NO3 F (Total)				07/18/2017 15:12
17070059-017A	MW34	07/13/2017 15:01	07/13/2017 19:45		
	Field Elevation Measurements				07/13/2017 15:01
	Standard Method 4500-H B Field				07/13/2017 15:01
	Standard Methods 2130 B Field				07/13/2017 15:01
	Standard Methods 18th Ed. 2580 B Field				07/13/2017 15:01
	Standard Methods 2510 B Field				07/13/2017 15:01
	Standard Methods 2550 B Field				07/13/2017 15:01
	Standard Methods 4500-NO2 B (Total)				07/14/2017 16:19
	Standard Methods 4500-O G Field				07/13/2017 15:01
	SW-846 9036 (Total)				07/14/2017 17:12
	SW-846 9251 (Total)				07/14/2017 17:09
17070059-017B	MW34	07/13/2017 15:01	07/13/2017 19:45		
	Standard Methods 2540 C (Dissolved)				07/17/2017 15:03
	SW-846 9214 (Dissolved)				07/14/2017 14:17
7070059-017C	MW34	07/13/2017 15:01	07/13/2017 19:45		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			07/14/2017 17:23	07/17/2017 21:42
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			07/14/2017 17:23	07/18/2017 14:59
17070059-017D	MW34	07/13/2017 15:01	07/13/2017 19:45		
	Standard Methods 4500-NO3 F (Total)				07/18/2017 15:14
17070059-018A	Field Blank	07/13/2017 16:20	07/13/2017 19:45		
	Standard Methods 4500-NO2 B (Total)				07/14/2017 16:19
	SW-846 9036 (Total)				07/14/2017 17:36
	SW-846 9251 (Total)				07/14/2017 17:33
17070059-018B	Field Blank	07/13/2017 16:20	07/13/2017 19:45		
	Standard Methods 2540 C (Dissolved)				07/17/2017 15:03
	SW-846 9214 (Dissolved)				07/14/2017 14:24
17070059-018C	Field Blank	07/13/2017 16:20	07/13/2017 19:45		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			07/14/2017 17:23	07/17/2017 21:50
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			07/14/2017 17:23	07/18/2017 15:07



### http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 17070059

Client Project: Dynegy - Vermillion Power Station

Report Date: 02-Aug-17

Sample ID	Client Sample ID	Collection Date	Received Date	and the same of th	v 1076 vo 104.	
	Test Name			Prep Date/Time	Analysis Date/Time	
1/0/0059-018D	Field Blank	07/13/2017 16:20	07/13/2017 19:45			
	Standard Methods 4500-NO3 F (Total)				07/18/2017 15:27	
17070059-019A	DUP1	07/13/2017 11:43	07/13/2017 19:45			
	Field Elevation Measurements				07/13/2017 11:43	
	Standard Method 4500-H B Field				07/13/2017 11:43	
	Standard Methods 2130 B Field				07/13/2017 11:43	
	Standard Methods 18th Ed. 2580 B Field				07/13/2017 11:43	
	Standard Methods 2510 B Field				07/13/2017 11:43	
	Standard Methods 2550 B Field				07/13/2017 11:43	
	Standard Methods 4500-NO2 B (Total)				07/14/2017 16:20	
	Standard Methods 4500-O G Field				07/13/2017 11:43	
	SW-846 9036 (Total)				07/14/2017 17:44	
	SW-846 9251 (Total)				07/14/2017 17:36	
17070059-019B	DUPI	07/13/2017 11:43	07/13/2017 19:45			
	Standard Methods 2540 C (Dissolved)				07/17/2017 15:04	
	SW-846 9214 (Dissolved)				07/14/2017 14:26	
7070059-019C	DUP1	07/13/2017 11:43	07/13/2017 19:45			
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			07/14/2017 17:23	07/17/2017 21:59	
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			07/14/2017 17:23	07/18/2017 15:32	
17070059-019D	DUP1	07/13/2017 11:43	07/13/2017 19:45			
	Standard Methods 4500-NO3 F (Total)				07/18/2017 15:29	
17070059-020A	DUP2	07/13/2017 13:06	07/13/2017 19:45			
	Field Elevation Measurements				07/13/2017 13:06	
	Standard Method 4500-H B Field				07/13/2017 13:06	
	Standard Methods 2130 B Field				07/13/2017 13:06	
	Standard Methods 18th Ed. 2580 B Field				07/13/2017 13:06	
	Standard Methods 2510 B Field				07/13/2017 13:06	
	Standard Methods 2550 B Field				07/13/2017 13:06	
	Standard Methods 4500-NO2 B (Total)				0//14/201/ 16.20	
	Standard Methods 4500-O G Field				07/13/2017 13:06	
	SW-846 9036 (Total)				07/17/2017 15:57	
	SW-846 9251 (Total)				07/14/2017 17:44	
17070059-020B	DUP2	07/13/2017 13:06	07/13/2017 19:45			
	Standard Methods 2540 C (Dissolved)				07/17/2017 15:04	
	SW-846 9214 (Dissolved)				07/14/2017 14:33	
17070059-020C	DUP2	07/13/2017 13:06	07/13/2017 19:45			



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Client: Natural Resource Technology, Inc.

Work Order: 17070059

Client Project: Dynegy - Vermillion Power Station

Report Date: 02-Aug-17

Sample ID	Client Sample ID	<b>Collection Date</b>	Received Date		
	Test Name			Prep Date/Time	Analysis Date/Time
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			07/14/2017 17:23	07/18/2017 15:40
17070059-020D	DUP2	07/13/2017 13:06	07/13/2017 19:45		
	Standard Methods 4500-NO3 F (Total)				07/18/2017 15:31



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Client: Natural Resource Technology, Inc.

Work Order: 17070059

Client Project: Dynegy - Vermillion Power Station

Report Date: 02-Aug-17

H B FIELD									
e: LCS		Units							
									Date
I	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit		Analyzed
	1.00		1.01	7.000	0	100.1	99.1	100.9	07/12/2017
	1.00		6.98	7.000	0	99.7	99.1	100.9	07/13/2017
0 B FIELD									
e: LCS		Units µS/cm				-			Date
I	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
	1		1400	1409	0	99.4	90	110	07/13/2017
	1		1420	1409	0	100.8	90	110	07/12/2017
0 C (DISSO	LVED	k							
e: MBLK		Units mg/L							Date
I	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
	20		< 20						07/17/2017
	20		< 20						07/17/2017
	20		< 20						07/17/2017
e: LCS		Units mg/L							Date
I	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
	20		978	1000	0	97.8	90	110	07/17/2017
e: LCSQC		Units mg/L							Date
1	RI.	Qual	Result	Snike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
	20	* ****	970	1000	0	97.0	90	110	07/17/2017
	20		974	1000	0	97.4	90	110	07/17/2017
oe: MS		Units mg/L							Date
J	RL	Qual			SPK Ref Val	%REC	Low Limit	High I imit	Analyzed
	20		2530	500 0	2032	00 2	86	116	07/17/2017
		Units mg/L					RPC	Limit 5	
	O.T.	0 1	D 1	0 1	CDV Dat Val	0/ DEC	DDD Det	/al WPDD	Date Analyzed
	RI.	Qual	Result	Spike	orn het val	TOREC	KLD Ket /	ai %KPD	- iluly Lou
1 1 1	10 B FIELD pe: LCS  40 C (DISSO pe: MBLK  pe: LCS  pe: LCS  pe: LCSQC	Pe: LCS    RL	Pe: LCS Units  RL Qual  1.00 1.00  10 B FIELD  Pe: LCS Units µS/cm  RL Qual  1 1 1 1  40 C (DISSOLVED)  Pe: MBLK Units mg/L  RL Qual  20 20 20 20 20 20  Pe: LCS Units mg/L  RL Qual  20 20 20 20  Pe: LCS Units mg/L  RL Qual  20 20 20  Pe: LCS Units mg/L  RL Qual  20 20 20  Pe: LCS Units mg/L  RL Qual  20 20 20  Pe: LCSQC Units mg/L  RL Qual  20 20 20  Pe: MS Units mg/L  RL Qual  20 20  Pe: MS Units mg/L  RL Qual  20 20 20  Pe: MS Units mg/L  RL Qual	RL   Qual   Result   1.00   1.00   6.98	RL   Qual   Result   Spike	RL   Qual   Result   Spike   SPK Ref Val	Pee   LCS	Pee   LCS	Pee   LCS



http://www.teklabinc.com/

Work Order: 17070059 Client: Natural Resource Technology, Inc.

Client Project: Dynegy - Ver	million Powe	er Station			Report Date: 02-Aug-17			
STANDARD METHODS 2540 C	(DISSOLVE	ED)						
Batch R235310 SampType:		Units mg/L				RPD	Limit 5	
SampID: 17070059-012BDUP	To I	Oval	Result Spike	SPK Rof Val	%REC	RPD Ref \	/al %RPD	Date Analyzed
Analyses Total Dissolved Solids	RL 2	Qual	534	-1	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	524 0	1 89	07/17/2017
STANDARD METHODS 4500 N	IO2 B (TOTA	(L)						
Batch R235224 SampType: SampID: MBLK	MBLK	Units mg/L						Date
Analyses	RL	Qual	Result Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Nitrogen, Nitrite (as N) Nitrogen, Nitrite (as N)	0.0		< 0.05 < 0.05					07/14/2017 07/14/2017
Batch R235224 SampType: SampID: LCS	LCS	Units mg/L						Date
Analyses	RL	Qual	Result Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Nitrogen, Nitrite (as N)	0.0		0.50 0.4880	0	102.3	90	110	07/14/2017
Nitrogen, Nitrite (as N)	0.0	05	<b>0.50</b> 0.4880	0	102.3	90	110	07/14/201
<b>Batch R235224 SampType:</b> SampID: 17070059-011AMS	MS	Units mg/L			-0.55			Date
Analyses	RL	Qual	Result Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Nitrogen, Nitrite (as N)	0.0	05	<b>0.52</b> 0.5000	0	103.8	85	115	07/14/2017
<b>Batch R235224 SampType:</b> SampID: 17070059-011AMSD	MSD	Units mg/L				RPD	Limit 10	Date
Analyses	RL	Qual	Result Spike	SPK Ref Val	%REC	RPD Ref \	/al %RPD	Analyzed
Nitrogen, Nitrite (as N)	0.0	1701200	<b>0.50</b> 0.5000	0	99.2	0.5190	4.53	07/14/2017
STANDARD METHODS 4500-N	103 F (TOTA	AL)						
Batch R235311 SampType: SampID: ICB/MBLK		Units mg/L						Date Analyzed
Analyses Nitrogen, Nitrate (as N)	RL 0.05	Qual 50	Result Spike	SPK Ref Val	%REC	Low Limit	High Limit	07/18/201
					- W			
SW-846 9036 (TOTAL)	100						***************************************	****
Batch R235238 SampType: SampID: ICB/MBLK	MBLK	Units mg/L						Date
Analyses	RL	Qual	Result Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Sulfate		10	< 10					07/14/201
Batch R235238 SampType. SampID: ICV/LCS	LCS	Units mg/L						Date
Analyses	RL	Qual	Result Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Sulfate		10	20 20.00	0	102.0	90	110	07/14/201



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Client: Natural Resource Technology, Inc.

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SW-846 9036 (TOT	AL)										The state of
Batch R235313 SampID: ICB/MBLK	SampType:	MBLK		Units mg/L							Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%RLC	Low Limit	High Limit	Analyzed
Sulfate			10		< 10						0//1//201/
Batch R235313 SampID: ICV/LCS	SampType:	LCS		Units mg/L				·			Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Sulfate			10		20	20.00	0	101.3	90	110	07/17/2017
SW-846 9214 (DISS	SOLVED)										
Batch R235182 SampID: MBLK	SampType:	MBLK		Units mg/L							Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Fluoride		1	0.10		< 0.10						07/14/2017
Batch R235182 SampID: LCS	SampType:	LCS		Units mg/L							Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Fluoride			0.10		0.98	1.000	0	98.1	90	110	07/14/2017
Batch R235182 SampID: 17070059-	SampType: 005BMS	MS		Units mg/L							Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Fluoride			0.10		2.12	2.000	0.1700	97.4	85	115	07/14/2017
Batch R235182 SampID: 17070059-	SampType:	MSD		Units mg/L					RPD	Limit 10	Date
Analyses	11.40-110-1		RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref \	/al %RPD	Analyzed
Fluoride			0.10	Quai		2.000	0.1700	102.8	2.119	4.93	07/14/2017
Batch R235182 SampID: 17070059-	SampType: 019BMS	MS		Units mg/L							Date
Analyses			RL	Qual			SPK Ref Val			High Limit	Analyzed
Fluoride			0.10		2.56	2.000	0.4880	103.8	85	115	07/14/2017
Batch R235182	SampType:	MSD		Units mg/L					RPD	Limit 10	
SampID: 17070059- Analyses	019BMSD		RL	Qual	Regult	Spike	SPK Ref Val	%REC	RPD Ref \	/al %RPD	Date Analyzed
Fluoride			0.10	Vuui		2.000	0.4880	108.2	2.565	3.30	07/14/2017



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SW-846 9251 (TOTAL	L)										
Batch R235239 SampID: ICB/MBLK	ampType:	MBLK		Units mg/L			10.0				Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzec
Chloride			5		< 5						07/14/201
Batch R235239 SampID: ICV/LCS	ampType:	LCS		Units mg/L							Date
Analyses			RL	Qual	Result		SPK Ref Val		Low Limit	High Limit	Analyzed
Chloride			5		21	20.00	0	104.6	90	110	07/14/2017
Batch R235314 Sa SampID: ICB/MBLK	ampType:	MBLK		Units mg/L							Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Chloride			5		< 5						07/17/2017
Batch R235314 SampID: ICV/LCS	ampType:	LCS		Units mg/L							Date
Analyses			RL 5	Qual		Spike 20.00	SPK Ref Val	%REC 110.0	Low Limit	High Limit	Analyzed
SW-846 3005A, 6020 Batch 132182 Sa	ampType:		PIVIS (I	DISSULVED)							
SampID: MBLK-132182	Section of section 2	MIDER	Dī	Units mg/L	Decult	Snike	SPK Ref Val	%RFC	Low Limit	High Limit	Date Analyzed
Analyses	Section of section 2	WIDER	RL 0.0010	Units mg/L Qual			SPK Ref Val		Low Limit	High Limit	Analyzed
Analyses Arsenic	Section of section 2		0.0010		< 0.0010	.001000	0	0	-100	100	Analyzed
Analyses Arsenic Barium	Section of section 2		0.0010 0.0010		< 0.0010 3 < 0.0010 3	0.00100C 0.00100C	0	0	-100 -100	100 100	07/17/201 07/18/201
Analyses Arsenic Barium Boron	Section of section 2		0.0010 0.0010 0.0250		< 0.0010 1 < 0.0010 1 < 0.0250	).001000 ).001000 0.02500	0	0	-100	100	07/17/201 07/18/201 07/17/201
Analyses Arsenic Barium	Section of section 2		0.0010 0.0010		< 0.0010 3 < 0.0010 3	0.00100C 0.00100C 0.02500 0.02500	0 0 0	0 0 0	-100 -100 -100	100 100 100	07/17/201 07/18/201 07/17/201 07/17/201
Analyses Arsenic Barium Boron Boron	Section of section 2		0.0010 0.0010 0.0250 0.0250		< 0.0010 2 < 0.0010 2 < 0.0250 < 0.0250	0.00100C 0.00100C 0.02500 0.02500 0.02500	0 0 0 0	0 0 0 0	-100 -100 -100 -100	100 100 100 100	Analyzed 07/17/2011 07/18/2011 07/18/2011 07/18/2011
Analyses Arsenic Barium Boron Boron	Section of section 2		0.0010 0.0010 0.0250 0.0250 0.0250		< 0.0010 2 < 0.0010 2 < 0.0250 < 0.0250 < 0.0250	0.00100C 0.00100C 0.02500 0.02500 0.02500	0 0 0 0 0	0 0 0 0 0 34.5	-100 -100 -100 -100 -100	100 100 100 100 100	Analyzec 07/17/201 07/18/201 07/17/201 07/18/201 07/18/201 07/18/201
Analyses  Arsenic Barium Boron Boron Iron Manganese Selenium	2 SampType:		0.0010 0.0010 0.0250 0.0250 0.0250 0.0010		< 0.0010 : < 0.0010 : < 0.0250 < 0.0250 < 0.0250 < 0.0250 < 0.0010 : < 0.0010 :	0.00100C 0.00100C 0.02500 0.02500 0.02500 0.00100C 0.00100C	0 0 0 0 0 0	0 0 0 0 34.5 0	-100 -100 -100 -100 -100 -100	100 100 100 100 100 100	Analyzed 07/17/201 07/18/201 07/17/201 07/18/201 07/18/201 07/18/201 07/17/201
Analyses  Arsenic Barium Boron Boron Iron Manganese Selenium  Batch 132182	2 SampType:		0.0010 0.0010 0.0250 0.0250 0.0250 0.0010	Qual	< 0.0010 : < 0.0010 : < 0.0250 < 0.0250 < 0.0250 < 0.0250 < 0.0010 : < 0.0010 :	0.00100C 0.00100C 0.02500 0.02500 0.02500 0.00100C 0.00100C	0 0 0 0 0	0 0 0 0 34.5 0	-100 -100 -100 -100 -100 -100 -100	100 100 100 100 100 100	Analyzed 07/17/2017 07/18/2017 07/17/2017 07/18/2017 07/18/2017 07/18/2017
Analyses  Arsenic Barium Boron Boron Iron Manganese Selenium  Batch 132182 Sa SampID: LCS-132182	2 SampType:		0.0010 0.0010 0.0250 0.0250 0.0250 0.0250 0.0010	Qual Units mg/L	< 0.0010 : < 0.0010 : < 0.0250 < 0.0250 < 0.0250 < 0.0010 : < 0.0010 :  Result	0.00100C 0.00100C 0.02500 0.02500 0.02500 0.00100C 0.00100C Spike 0.5000	0 0 0 0 0 0	0 0 0 0 34.5 0 0	-100 -100 -100 -100 -100 -100 -100	100 100 100 100 100 100 100	Analyzed 07/17/201 07/18/201 07/18/201 07/18/201 07/18/201 07/18/201  07/17/201
Analyses  Arsenic Barium Boron Boron Iron Manganese Selenium  Batch 132182 SampID: LCS-132182 Analyses	2 SampType:		0.0010 0.0010 0.0250 0.0250 0.0250 0.0010 0.0010	Qual Units mg/L	<ul> <li>&lt; 0.0010 :</li> <li>&lt; 0.0250</li> <li>&lt; 0.0250</li> <li>&lt; 0.0010 :</li> <li>&lt; 0.0010 :</li> <li>&lt; 0.0010 :</li> <li>Result 0.481</li> <li>1.94</li> </ul>	0.00100C 0.00100C 0.02500 0.02500 0.02500 0.00100C 0.00100C Spike 0.5000 2.000	0 0 0 0 0 0 0	0 0 0 0 34.5 0 0	-100 -100 -100 -100 -100 -100 -100	100 100 100 100 100 100 100	Analyzed 07/17/201 07/18/201 07/18/201 07/18/201 07/18/201 07/18/201  Date Analyzed
Analyses  Arsenic Barium Boron Boron Iron Manganese Selenium  Batch 132182 SampID: LCS-132182  Analyses Arsonic	2 SampType:		0.0010 0.0010 0.0250 0.0250 0.0250 0.0010 0.0010	Qual Units mg/L	<ul> <li>&lt; 0.0010 :</li> <li>&lt; 0.0250</li> <li>&lt; 0.0250</li> <li>&lt; 0.0010 :</li> <li>&lt; 0.0010 :</li> <li>&lt; 0.0010 :</li> <li>&lt; 0.0481</li> <li>1.94</li> <li>0.496</li> </ul>	0.00100C 0.00100C 0.02500 0.02500 0.02500 0.00100C 0.00100C Spike 0.5000 2.000 0.5000	0 0 0 0 0 0 0 0	0 0 0 0 34.5 0 0	-100 -100 -100 -100 -100 -100 -100	100 100 100 100 100 100 100 High Limit	Analyzed 07/17/201 07/18/201 07/18/201 07/18/201 07/18/201 07/18/201 07/17/201  Date Analyzed 07/17/201 07/17/201
Analyses  Arsenic Barium Boron Boron Iron Manganese Selenium  Batch 132182 SampID: LCS-132182  Analyses Arsonic Barium	2 SampType:		0.0010 0.0010 0.0250 0.0250 0.0250 0.0010 0.0010	Qual Units mg/L	<ul> <li>&lt; 0.0010 :</li> <li>&lt; 0.0250</li> <li>&lt; 0.0250</li> <li>&lt; 0.0010 :</li> <li>&lt; 0.0010 :</li> <li>&lt; 0.0010 :</li> <li>&lt; 0.0481</li> <li>1.94</li> <li>0.496</li> </ul>	0.00100C 0.00100C 0.02500 0.02500 0.02500 0.00100C 0.00100C Spike 0.5000 2.000	0 0 0 0 0 0 0 0 SPK Ref Val 0	0 0 0 0 34.5 0 0 %REC 96.1 97.0	-100 -100 -100 -100 -100 -100 -100	100 100 100 100 100 100 100 High Limit 120 120	Analyzed 07/17/2011 07/18/2011 07/17/2011 07/18/2011 07/18/2011 07/18/2011 07/17/2011
Analyses  Arsenic Barium Boron Boron Iron Manganese Selenium  Batch 132182 SamplD: LCS-132182  Analyses Arsonic Barium Boron	2 SampType:		0.0010 0.0010 0.0250 0.0250 0.0250 0.0010 0.0010 RL 0.0010 0.0010 0.0010	Qual Units mg/L	<ul> <li>&lt; 0.0010</li> <li>&lt; 0.0250</li> <li>&lt; 0.0250</li> <li>&lt; 0.0250</li> <li>&lt; 0.0010</li> <li>&lt; 0.0010</li> <li>&lt; 0.0010</li> <li>Result</li> <li>0.481</li> <li>1.94</li> <li>0.496</li> <li>2.05</li> </ul>	0.00100C 0.00100C 0.02500 0.02500 0.02500 0.00100C 0.00100C Spike 0.5000 2.000 0.5000	0 0 0 0 0 0 0 SPK Ref Val 0 0	0 0 0 0 34.5 0 0 %REC 96.1 97.0 99.2	-100 -100 -100 -100 -100 -100 -100 L ow L imit 80 80 80	100 100 100 100 100 100 100 High Limit 120 120	Analyzec 07/17/201 07/18/201 07/18/201 07/18/201 07/18/201 07/18/201 07/17/201  Date Analyzec 07/17/201 07/17/201 07/17/201



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Work Order: 17070059

Client Project: Dynegy - Vermillion Power Station

Report Date: 02-Aug-17

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Batch 132182	SampType:	MS		Units mg/L							
SampID: 17070059-	002CMS										Date
Analyses			RI.	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Arsenic		1	0.0010		0.497	0.5000	0.008340	97.8	75	125	07/17/2017
Barium			0.0010		2.09	2.000	0.1556	96.6	15	125	07/17/2017
Boron			0.0250		0.780	0.5000	0.2894	98.1	75	125	07/17/2017
Iron			0.0250		2.45	2.000	0.4121	101.9	75	125	07/17/2017
Manganese		3	0.0010		0.570	0.5000	0.09090	95.8	75	125	07/17/2017
Selenium			0.0010		0.434	0.5000	0	86.8	75	125	07/17/2017
Batch 132182	SampType:	MSD		Units mg/L					RPD	Limit 20	
SampID: 17070059-	-002CMSD										Date
Analyses			RL	Oual	Result	Spike	SPK Ref Val	%REC	RPD Ref \	/al %RPD	Analyzed
Arsenic			0.0010			0.5000	0.008340	96.3	0.4971	1.43	07/17/2017
Barium		-1	0.0010		2.07	2.000	0.1556	95.5	2.087	1.00	07/17/2017
Boron		170	0.0250		0.746	0.5000	0.2894	91.3	0.7798	4.43	07/17/2017
Iron		-30	0.0250		2.46	2.000	0.4121	102.6	2.450	0.54	07/17/201
Manganese		10	0.0010		0.564	0.5000	0.09090	94.6	0.5698	1.05	07/17/2017
Selenium			0.0010		0.425	0.5000	0	85.1	0.4341	2.06	07/17/2017
Batch 132209	SampType:	MBLK		Units mg/L							1200
SampID: MBLK-132	209						52112011111	119,222	5 7-17-2	A CONTRACTOR	Date Analyzed
Analyses			RL	Qual	Result		SPK Ref Val		Low Limit	High Limit	Allalyzeu
111111111111111111111111111111111111111											
Arsenic			0.0010		< 0.0010			0	-100	100	
Arsenic Barium			0.0010 0.0010		< 0.0010	0.001000	0	0	-100	100	07/18/2017
Arsenic Barium Boron			0.0010 0.0010 0.0250		< 0.0010 3 < 0.0250	0.001000 0.02500	0	0	-100 -100	100 100	07/18/2017 07/17/2017
Arsenic Barium Boron Iron		1	0.0010 0.0010 0.0250 0.0250		< 0.0010 2 < 0.0250 < 0.0250	0.001000 0.02500 0.02500	0 0 0	0 0 0	-100 -100 -100	100 100 100	07/18/2017 07/17/2017 07/18/2017
Arsenic Barium Boron Iron Manganese		1	0.0010 0.0010 0.0250 0.0250 0.0010		< 0.0010 2 < 0.0250 < 0.0250 < 0.0010 2	0.001000 0.02500 0.02500 0.001000	0 0 0	0 0 0 0	-100 -100 -100 -100	100 100 100 100	07/17/2017 07/18/2017 07/17/2017 07/18/2017 07/18/2017
Arsenic Barium Boron Iron		1	0.0010 0.0010 0.0250 0.0250		< 0.0010 2 < 0.0250 < 0.0250	0.001000 0.02500 0.02500 0.001000	0 0 0	0 0 0	-100 -100 -100	100 100 100	07/18/2013 07/17/2013 07/18/2013 07/18/2013
Arsenic Barium Boron Iron Manganese	SampType: 09	1	0.0010 0.0010 0.0250 0.0250 0.0010	Units mg/L	< 0.0010 2 < 0.0250 < 0.0250 < 0.0010 2	0.001000 0.02500 0.02500 0.001000	0 0 0	0 0 0 0	-100 -100 -100 -100	100 100 100 100	07/18/2017 07/17/2017 07/18/2017
Arsenic Barium Boron Iron Manganese Selenium  Batch 132209		LCS	0.0010 0.0010 0.0250 0.0250 0.0010	Units mg/L Qual	< 0.0010 2 < 0.0250 < 0.0250 < 0.0010 2 < 0.0010 2	0.00100C 0.02500 0.02500 0.00100C 0.00100C	0 0 0 0	0 0 0 0 0	-100 -100 -100 -100	100 100 100 100 100	07/18/2013 07/17/2013 07/18/2013 07/18/2013 07/17/2013
Arsenic Barium Boron Iron Manganese Selenium  Batch 132209 SampID: LCS-13220		LCS	0.0010 0.0010 0.0250 0.0250 0.0010 0.0010		< 0.0010 2	0.00100C 0.02500 0.02500 0.00100C 0.00100C	0 0 0	0 0 0 0 0	-100 -100 -100 -100 -100	100 100 100 100 100	07/18/201' 07/17/201' 07/18/201' 07/18/201' 07/17/201'
Arsenic Barium Boron Iron Manganese Selenium  Batch 132209 SampID: LCS-13220 Analyses		LCS	0.0010 0.0010 0.0250 0.0250 0.0010 0.0010		< 0.0010 1 < 0.0250 < 0.0250 < 0.0010 1 < 0.0010 1	0.001000 0.02500 0.02500 0.001000 0.001000 Spike	0 0 0 0 0	0 0 0 0 0 0	-100 -100 -100 -100 -100	100 100 100 100 100 High Limit	07/18/201' 07/17/201' 07/18/201' 07/18/201 07/17/201 Date Analyzed
Arsenic Barium Boron Iron Manganese Selenium  Batch 132209 SampID: LCS-13220 Analyses Arsenic		LCS	0.0010 0.0010 0.0250 0.0250 0.0010 0.0010		< 0.0010 : < 0.0250 < 0.0250 < 0.0010 : < 0.0010 : < 0.0010 : < 0.0010 : < 0.471	0.001000 0.02500 0.02500 0.001000 0.001000 Spike 0.5000	0 0 0 0 0 SPK Ref Val	0 0 0 0 0 0 0 0 %REC	-100 -100 -100 -100 -100 Low Limit 80	100 100 100 100 100 High Limit	07/18/201' 07/18/201' 07/18/201' 07/18/201 07/17/201  Date Analyzec  07/17/201 07/17/201
Arsenic Barium Boron Iron Manganese Selenium  Batch 132209 SampID: LCS-13220 Analyses Arsenic Barium		LCS	0.0010 0.0010 0.0250 0.0250 0.0010 0.0010 RL 0.0010 0.0010		< 0.0010 1 < 0.0250 < 0.0250 < 0.0010 1 < 0.0010 1 Result 0.471 1.88 0.488	0.001000 0.02500 0.02500 0.001000 0.001000 Spike 0.5000 2.000	0 0 0 0 0 SPK Ref Val 0	0 0 0 0 0 0 0 0 %REC 94.1 94.1	-100 -100 -100 -100 -100 -100 Low Limit 80 80	100 100 100 100 100 High Limit 120 120	07/18/201' 07/18/201' 07/18/201' 07/18/201 07/17/201  Date Analyzed: 07/17/201 07/17/201
Arsenic Barium Boron Iron Manganese Selenium  Batch 132209 SampID: LCS-13220 Analyses Arsenic Barium Boron		LCS	0.0010 0.0010 0.0250 0.0250 0.0010 0.0010 RL 0.0010 0.0010 0.0010		< 0.0010 2 < 0.0250 < 0.0250 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.0010 2 < 0.	0.001000 0.02500 0.02500 0.001000 0.001000 Spike 0.5000 2.000 0.5000	0 0 0 0 0 SPK Ref Val 0 0	0 0 0 0 0 0 0 %REC 94.1 94.1 97.6	-100 -100 -100 -100 -100 -100 Low Limit 80 80 80	100 100 100 100 100 High Limit 120 120	07/18/201' 07/17/201' 07/18/201' 07/18/201' 07/17/201'



#### http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Client Project: Dynegy - Vermillion Power Station

Work Order: 17070059 Report Date: 02-Aug-17

<b>Batch 132209 SampT</b> SampID: 17070059-020CMS	South Sold		Units mg/L							Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzod
Arsenic		0.0010		0.478	0.5000	ō	95.7	75	125	07/17/2017
Barium		0.0010		1.99	2.000	0.06146	96 ?	75	125	07/18/2017
Boron		0.0250		0.643	0.5000	0.1490	98.9	75	125	07/17/2017
Iron		0.0250		2.02	2.000	0.09535	96.4	15	125	07/18/2017
Manganese		0.0010		0.683	0.5000	0.2128	94.1	75	125	07/18/2017
Selenium		0.0010		0.394	0.5000	0	78.7	75	125	07/17/2017
Batch 132209 SampT	ype: MSD		Units mg/L					RPD	Limit 20	
SampID: 17070059-020CMS	D									Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref V	al %RPD	Analyzed
Arsenic		0.0010		0.483	0.5000	0	96.5	0.4783	0.91	07/17/2017
Barium		0.0010		2.00	2.000	0.06146	97.0	1.986	0.79	07/18/2017
Boron		0.0250		0.659	0.5000	0.1490	102.0	0.6434	2.40	07/17/2017
Iron		0.0250		2.04	2.000	0.09535	97.3	2.023	0.87	07/18/2017
Manganese		0.0010		0.686	0.5000	0.2128	94.7	0.6833	0.41	07/18/2017
Selenium		0.0010		0.307	0.5000	0	79.3	0.3936	0.75	07/17/2017



Client: Natural Resource Technology, Inc.

Additional Nitric Acid was needed in MW5 upon arrival at the laboratory. AMD 7/14/17

### **Receiving Check List**

http://www.teklabinc.com/

Work Order: 17070059

Client Project: Dynegy - Vermillion Power Station Report Date: 02-Aug-17 Carrier: Joselen Simpson Received By: AMD Elizabeth a. Hurley Offalle Reviewed by: Completed by: On: On: 14-Jul-1/ 14-Jul-1/ Amber M. Dilallo Elizabeth A. Hurley Pages to follow: Chain of custody Extra pages included Shipping container/cooler in good condition? Yes V No 🗆 Not Present Temp °C 1.02 Type of thermal preservation? None Ice 🗸 Blue Ice Dry Ice Chain of custody present? 1 No Yes No 🗌 ~ Chain of custody signed when relinquished and received? Yes ~ No 🗌 Chain of custody agrees with sample labels? Yes Samples in proper container/bottle? Yes ~ ~ Sample containers intact? Yes No 🗌 Yes 🗸 Sufficient sample volume for indicated test? No Yes 🗸 All samples received within holding time? No 🗌 Field 🗸 Lab NA 🗌 Reported field parameters measured: No 🗌 Yes 🗸 Container/Temp Blank temperature in compliance? When thermal preservation is required, samples are compliant with a temperature between 0.1°C - 6.0°C, or when samples are received on ice the same day as collected. Yes \_ No 🗌 No VOA vials V Water - at least one vial per sample has zero headspace? Water - TOX containers have zero headspace? Yes 🗌 No 🗌 No TOX containers Yes No 🗸 Water - pH acceptable upon receipt? NA  $\square$ Yes No 🗌 NA 🗸 NPDES/CWA TCN interferences checked/treated in the field? Any No responses must be detailed below or on the COC.

CHAIN OF CUSTODY pg. i of 2 Work order # 17070059

TEKLAB, INC. 5445 Horseshoe Lake Road - Collinsville, IL 62234 - Phone: (618) 344-1004 - Fax: (618) 344-1005

Client:	Natural Resource	Technology, Inc	 >.						s	amţ	oles	on:	<b>1</b>	CE	a E	LUE	ICE	⊠ N	O ICE		1	υZ	°c			-		
Address:	2422 East Washin	gton Street													₿ F	IELD		•		FO	R LA	<u> 18 U</u>	SE C	)NL	<u>′</u>			
City / State	/ Zip Bloomington, IL 6	1704	_						L	ab N	Vote:	s: f	W	37% C	<b>;</b>													
Contact:	Steve Wiskes		Phone		(414	) 837-	3614		]				H	K	$\widetilde{\omega}'$	A) (	١											
E-Mail:	steve.wiskes@obg.com		Fax:	-			-				t Co			;														
Are these sample	s known to be involved in lit	igation? If yes,	a surcharge v	vill ap	ply		Yes	X No	. I								B Fe				. ~	au			<b>7</b> _			
,	s known to be hazardous?			á					1 7		NO 3	HII	ifl	e (	COL	Lec	Te	ე -	· (vi	60	C 1	<b>-</b> 7	7	7 JVW	,			
are there any requirements in the comm	uired reporting limits to be n nent section. 🏻 Yes 🏻 🎗	net on the reque	ested analysis	i?. II y	yes, į	piease	e prov	/iae	<b>I</b> '''	•																		
Proj	ject Name/Number		Sample	Colle	ecto	r's N	lam	<u>-</u>	十	N	IATE	łΧ					INC	ICA	TE A	NAI	LYS	IS R	EQU	EST	ED			
Dynegy - Vermillio	on Power Station	7	Mathis	J.	$ \overline{\varsigma} $	mls	lso:		0					Ī .	Diss	0	Ξi	Field	Field	Field	Field	<u>m</u>	อ็	2		٠		
	s Requested	Billing Inst						tainers	ē					Chloride		Dissolved	MS.	90	ᅌ	ld p	St. T	Field Turbidity :	/ De	Nitrate SM 49	Sulfate	TDS		
Standard	1-2 Day (100% Surcharge)		-	_			1		Ind	1 1					Fluoride	ved	ond 251	MS	B S	8+H WS H	emp		pth t	MS.	ate :	S MS		
Other	3 Day (50% Surcharge)			UNP	H2SO4		'		Groundwater					9251		Metals	Field Conductivity	SM 4500-0	ORP SM 2580-	рН SM 4500- Н+В	d Temperature	H W	o W	4500- E	9036	2540C		
Lab Use Only	Sample Identification	Date/Time	Sampled	,	à u				4						9214	als L	₹	9	80-	)0-	Jге	MS	Water	P		0		
(200ror,	MW1	7-13-7	0938	2	1 1				X					x	Х	X	Х	X	Х		Х	X	X	Х	i l	Х		
_002	MW2	7.13.17	1017	2	1 1				X					X	Х	Х	Х	Х	Х	Х	X	Х	X	Х	Х	Х		- ·
	MW7 🕱	7-12-1	7 1242	2	1 1				X					Х	Х	Х	Х	Х	X	Х	Х	X	Х	Х	Х	Х		
004	MW10	7.12.17	1807	2	1 1				X					Х	X	X	Х	X	Х	X	Х	Х	Х	Х	X	Х		ļ
	MW17	71217	1847	2	1 1				Х					Х	Х	Х	Х	X	Х	X	Х	Х	X	Х	Х	Х		
COL	MW18	7-12-17	1909	2	1 1				X			_		X	X	X	X	X	×	X	Х	Х	×	Х	X	X		
<u> </u>	MW21	7-13-17	0902	2	1 1				X					×	Х	X	Х	Х	Х	Х	X	X	Х	X	Х	X		
800	TW1	7-13-1	7	ш	1 1				X					Х	X	Х	X	Х	Х	×	X	X	Х	X	Х	X		Ĺ
0051	MW3R	713.17	1143	2	1 1				Х					Х	Х	X 	X	X	X	X	X	X	Х	X	Х	X		<u> </u>
Qio	MW4	7.13.17	1527	2	1 1				X			_		X	Х	X	Х	Х	X	Х	X	X	Х	X	Х	Х		
	Relinquished By			Da	te/T	ime			Ţ				R	eceiv	ed B	У				I			D	ate/T	ime			
aus	lip_		7.13.1	7_		19	145		7	<u>M</u>	M	1		<u> </u>	$\Omega$	<u>حز</u>	<u> </u>				71	13)		19	44	15	_	
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CHAIN OF CUSTODY pg. 2 of 2 Work order #17070059

TEKLAB, INC. 5445 Horseshoe Lake Road - Collinsville, IL 62234 - Phone: (618) 344-1004 - Fax: (618) 344-1005

								<del>-</del>				<u> </u>					<del></del>								
Client:	Natural Resource		Inc.						ımples o						圏 NG					°c					
Address:	2422 East Washi	ngton Street					<i></i>	Pr	eserved	in: 🗵	LAB	₩ F	IELD				<u>FOF</u>	<u>R LA</u>	B U	SE C	DNLY	<u>(</u>			
City / State		61704						La	b Notes:	:															
Contact:	Steve Wiskes		Phone:	(41	14) 837	7-3614																			
E-Mail:	steve.wiskes@obg.com		Fax:	_				CI	ient Con	ment	S														
Are these sample:	s known to be involved in li	fination2 If ve	s a surchame w	ill anniv	, П	Yes	⊠ No	n:-	solved Met			)20A	As Ba	B Fe	Mn S	ie.									
	s known to be hazardous?							l AV	1W9 *	dep	th a	nly	,												
Are there any requirements in the comm	uired reporting limits to be plent section.	met on the red No	quested analysis	?. If yes	, pleas	se prov	ride				•	7													
Proj	ect Name/Number		Sample (	ollec	tor's	Nam	е		MATRI	X				INI	ICA	TE A	NAL	YS	S R	QU	EST	ED			
Dynegy - Vermillio	n Power Station							6				Di	٥	Ţ	Fe	Field	듄	긆	뀨	ଜୁ	Z			$\Box$	_
	s Requested	Bifling In:	structions	# and	Туре с	of Con	tainers	Ϊ́			Chloride	Diss Fluoride	Dissolved	SM C	Fleid UU SM	오	ā l	ä. 2∃r	밥	GW Depth	trate	SLL	TDS		
Standard	1-2 Day (100% Surcharge)				_			Ind			ride	uori	ved	60nd	MS (	n To	H SN	emp	공통	43	ည်း	ate	MS	1	
Other	3 Day (50% Surcharge)			EONH	12SC			Groundwater	. }		9251	de 9%	Metals	Field Conductivity SM 2510-B	4500-	SM 2580-	/ 45	Field Temperature	호	to Water	Nitrate SM 4500-	Sulfate 9036	SM 2540C		
Lab Use Only	Sample Identification	Date/Ti	me Sampled	اسا	4		}	P	, } }			9214	is	₹	9	-08	8	16	ž	ater	위		()	1	
110100gg-	MW5	7.13.1	17 1221	2 1	1			Х			Х	Х	Х	X	Х	×	Х	Х	Х	Х	Х	Х	Х		
00	MW6R	7-13-1	7 1306	2 1	1	$\prod$	$\prod$	Х			X	Х	X	Х	Х	Х	Х	X	X	X	Х	X	Х		
013	MW8R	7.13.1		2 1	1	$\prod$	11	Х			X	Х	X	Х	X	×	X	X	X	X	Х	Х	X		
OIU	MW9 *	7.12.17		0			1-1-	Х			1									X					
015	MW19 <b>★</b>	7-13-1		0				Х			T						<u> </u>			Х					
016	MW20	7-13-1	1 (4 -) (*)		1		11	Х			X	Х	Х	Х	X	Х	Х	х	Х	х	х	х	х		
0n_	MW34	7-13-1	7 1501	2 1	1			Х		1-1-	X	Х	Х	Х	Х	X	Х	X	X	Х	Х	Х	Х		
018	Field Blank	7-13-1		2 1	1	1-1-	11	X		11	X.	X	X					$\neg \uparrow$			X	X	X		
09	DUP1	7-13-17		2 1	1	<del>                                     </del>	††	X		1-1-	X	X	X	X	X	X	X	×	х	Х	X	X	Х	$\rightarrow$	
_020_	DUP2	7-13-1		2 1	1		11	Х		1-1-	Х	х	Х	Х	x	X	Х	х	X	Х	X	Х	Х	-	
	Relinquished By	11171	<del>/_ /_/</del>	Date/	Time		<del></del> _	╁┈	<del></del>	<u></u>	leceiv	ed B	v	<u> </u>		لبب	<u> </u>			D	ate/T	ime			==
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e individual signing this agreement on behalf of the client, acknowledges that he/she has read and understands the terms and conditions of this reement, and that he/she has the authority to sign on behalf of the client. See www.teklabinc.com for terms and conditions.

# Monitoring Well Evaluation Checklist

Site Vermilion	Major well	s repairs* r	equired	Yes	No	NA
Inspection Date 7./3./7		n well integ			X	
Well Number Mull		J	•		<del>1</del>	
Stick-up Monitoring Wells					Comments	
1. Outer protective Casing	Yes	No	NA NA			
Not corroded		<u> </u>			·····	
Not dented		l	<del>                                     </del>			<del></del>
Not cracked			<del> </del>			
Not loose	-	<del> </del>	<del>[</del> ]			
	L	L	<u> </u>			
2. Inner casing	Yes	No	NA			
Not corroded						
Not dented		<del> </del>	<del>}</del>		<del> </del>	
Not cracked		<del></del>	<del> </del>			
Not loose		<b></b>	<del> </del>			
1100 10030	Yes	No	NA	<del></del>	***	
3. Are there weep holes in outer casing?	163	100	IN/A			
44. Weep holes able to drain?	<del> </del>	ļ <i>-C</i>	<del>  </del>			<del></del>
	<b></b>					
5. Is there a lockable cap present?		<del></del>	<u> </u>			
6. Is there a lock present?	<b></b>		<del>   </del>	····		
7. Bumper posts in good condition?	L					
Floring to the large						
Flushmount Monitoring Wells	Yes	No	NA			
8. Can the lid be secured tightly?	<b></b>					
9. Does the lid have a gasket that seals?					<del></del> .	
10. No water in the flushmount?						·
11. is the well cap lockable?	<u></u>					
12. Is there a lock present?	L					
All Monitoring Wells	Yes	No	NA			
Downhole Condition	ļ					
12. Water level measuring point clearly marked?						
13. No obstructions in well?	L					
14. No plant roots or vegetation in well?						
15. No sediment in bottom of well?						
If present, how much sediment?	ft					
16. Installed as total depth.	ft					
17. Measured total depth of well.	ft					
General Condition	Yes	No	NA	a comp		
18. Concrete pad installed?	<u> </u>		ll	enco as esta		
19 . Concrete pad	[		\\			
Slope away form casing?						
Not deteriorated?						
Not heaved or below surrounding grade?						
20. No surface seal settling?						
21. Well clearly visible and labeled?		···	1			
Comments:	——————————————————————————————————————	·	<del></del>			
Needs New Lock						<del></del>
	ns.	<del></del>				
* Major well repair are those that require a subcontra	actor or sepa	rate mobili	zation to cor	nplete		
				<del></del>		

### WELL DEVELOPMENT AND GROUNDWATER SAMPLING FIELD FORM

1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1					ROJECT IN	IFORMATIO	Assess of the				
	Site: Ve l	rmillor	·			Client:	NRT	•			
Project Num				Task#:		Start Date:	7.13.	17		Time:	09:9
Field Persor	nnel: T: Ma	this J.	SIMPSON			Finish Date:	<u> 7:13:</u>	17		Time;	0938
\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	NELL INFOR	RMATION				· 四個學為情	EVENT	TYPE			
	Well ID:	MWI		Well Develop	ment	M	Low-Flow / L	ow Stress Sar	npling		
С	asing ID:		anches	Well Volume	Approach Sar	mpling	Other (Specify	):			
	(4) L		WAT	ER QUALIT	Y INDICATO	R PARAMET	ERS (contii	าued)	ing the second	in the first of the second of	
		Volume	Depth to				SEC or	Dissolved			
Sampling	Time	Removed	Water	Drawdown	Temp.	pH	Cond.	Oxygen	Turbidity	ORP	Visual
Stage	(military)	(galions)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	(NTU)	(4,4)	Clarity
	09/9		77-67						ļ <u>,</u>		
	0922	. 13	18.19	1.12	18.91	7.52	1920	8.04	0	6	Clear
	0926	. 26	79.33	0.54	18.99	7.32	1950	7.81		42	clear
	0930	.39	79.82	0.49	18.88	7.23	1960	8.17	0.2	65	Char
	0934	.52	79.95	0.13	19.37	1.19	1940	7.02	0.2	75	clear
	0938	.65	80.00	0.05	19.34	7.18	2000	7.40	0.1	83	clear
						<u> </u>			<b></b>	<u> </u>	
						<u></u>					<u> </u>
<u> </u>	ļ <u> </u>			<u> </u>		<u> </u>			<u> </u>	<u> </u>	
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			NOTES (	continued)			***		ABBREVIA		
			- "					Cond Actual Condu FT BTOC - Feet Belov na - Not Applicable nm - Not Measured		ORP - Oxidation-Re SEC - Specific Elect SU - Standard Units Temp - Temperatum 'C - Degrees Gelciu	rical Sanductance
1								]			

Low-Flow Sampling For

Low-Flow Sampling Form

### **Monitoring Well Evaluation Checklist**

Site Vermilion	Major well	s repairs* r	equired	Yes	No	NA
Inspection Date 7./7./7	to maintair					
Well Number MINZ	to mannan		,. [		1	<u> </u>
11100						
Stick-up Monitoring Wells					Comments	
1. Outer protective Casing	Yes	No	NA NA			
Not corroded			'''-			
Not dented			<del>                                     </del>			· 1
Not cracked			<del>                                     </del>			<del></del>
Not loose				·		
Not loose			I			
2. Inner casing	Yes	No	NA			
Not corroded	163	140	110			
Not dented			<del> </del>			
Not cracked						
1			<del> </del>			
Not loose			<del>                                     </del>			
	Yes	No	NA			
3. Are there weep holes in outer casing?	ļ					
4. Weep holes able to drain?						
5. Is there a lockable cap present?						***
6. Is there a lock present?						
7. Bumper posts in good condition?						·
Flushmount Monitoring Wells	Yes	No	NA NA			
8. Can the lid be secured tightly?						
9. Does the lid have a gasket that seals?						
10. No water in the flushmount?						
11. Is the well cap lockable?						
12. Is there a lock present?						
All Monitoring Wells	Yes	No	NA			
Downhole Condition						
12. Water level measuring point clearly marked?						_
13. No obstructions in well?						
14. No plant roots or vegetation in well?						
15. No sediment in bottom of well?						
If present, how much sediment?	ft					
16. Installed as total depth.	ft					
17. Measured total depth of well.	ft					
		1				
General Condition	Yes	No.	NA			
18. Concrete pad installed?						
19 . Concrete pad						
Slope away form casing?					<del></del>	
Not deteriorated?		-				
Not heaved or below surrounding grade?						
20. No surface seal settling?	<b>—</b>	744	<del>                                     </del>	· <del>·······</del>	<del></del>	<del></del>
21. Well clearly visible and labeled?					<del></del> -	
•			J	<del></del>		
Comments:	1					
Needs Newlock instal	1801					
* Major well repair are those that require a subcon	tractor or con-	rata mobili	ration to co	mnlete		<u></u>
major wen repair are those that require a subcon	cractor or sepa	ate mobili	zation to col	ubiere		

P:\2200\2285\Deliverables\Sampling and Analysis Plans\Teklab Draft Provisional SAP\Appendix B - Field Forms\Monitoring Well Inspection Form

### WELL DEVELOPMENT AND GROUNDWATER SAMPLING FIELD FORM

a to jan to a straight	Salah a Kila	e a la servició de la companya de l La companya de la companya de	e territorio de la composición de la c		ROJECTIN	IFORMATION	Property in				
5	ite: /er	milion	,			Client:	NR"	me			
Project Numi	oer:			Task #:		Start Date:	7.13.	17		Time:	1001
Field Person	nel: <u>T-M</u> q	this J.	Simps	677		Finish Date:	7.13-	/フ		_ Time:	1017
V	ELL INFOF	RMATION				:法律学家政	EVENT	TYPE :			
		n412		Well Develop	ment			ow Stress Sar	npling		
Ca	ising ID:		ınches	Well Volume	Approach Sar	mpling	Other (Specify	):			
			WAT	ER QUALITY	INDICATO	R PARAMET	ERS (conti	nued)	Salar Carrier	1 10 100 10 4 7 7	
		Volume	Depth to				SEC or	Dissolved			
Sampling	Time	Removed	Water	Drawdown	Temp.	pH	Cond.	Oxygen	Turbidity	ORP	Visual
Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	(NTU)	(mv);	Clarity
	1001	0	18.60	0.00	78 78	0.70	1 16.00	1110	<del>                                     </del>		
	1005	.13	19.48	0.88	18:14	7,69	642	4.63	0.8	-88	Clear
	1009	.26	19.72	0.24	16-25	7.80	637	7.01	0.6	-126	clear
	1013	.39	20,02	0.30	16-42	7.82	632	2.5]	0.8	-136	clear
	1017	.52	20.25	0.23	16.32	7-83	623	1.86	1.0	- 141	clear
				<del></del>		<u> </u>		<del> </del>			
								<u> </u>			
				ļ							
						ļ					<u> </u>
											<u> </u>
										<u> </u>	<del> </del>
			·			ļ					<del> </del>
			i de di Lacilia		orani di seria di se	<u>                                     </u>	**************************************	and the second	re grado toro kitogoje	SUF SOFIA (SEA)	
		<u> </u>	NOTES (	continued)				Cond Actual Conduc	ABBREVIA	TIONS ORP - Oxidation-Per	
				•				FT BTOC - Feet Belov na - Not Applicable nm - Not Measured		SEC - Specific Elect SU - Standard Units Temp - Temperature To - Degrees Celcur	rical Cenductance

Low-Flow Sampling Form MW-1

### Monitoring Well Evaluation Checklist

Site Vermilion	Major well	s repairs*	required	Yes	No	NĄ			
Inspection Date 7:12-17	to maintain well integrity?								
Well Number MWZMW7									
Stick-up Monitoring Wells					Comments				
1. Outer protective Casing	Yes	No	NA		J=====================================				
Not corroded									
Not dented			1			1 '8175			
Not cracked	1-/-	}	<del> </del>		······································				
Not loose			<del></del>		<u> </u>				
Not loose	l	<u> </u>							
2 Inner casing	Yes	No	NA						
Not corroded					, T	· · · · · · · · · · · · · · · · · · ·			
Not dented			<del>1</del>			·			
Not cracked	<del></del>		<del> </del>	<u> </u>					
Not loose			┼		·				
1400 10036	Yes	No	NA NA	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,					
2 Are the manual balancia automorphism	162	IVO.	IVA						
3. Are there weep holes in outer casing?			+						
4. Weep holes able to drain?	<b></b>		+	·					
5. Is there a lockable cap present?			<del>  </del>						
6. is there a lock present?			1 /	Ock	cut of	4			
7. Bumper posts in good condition?									
Charles and Admittanting Miles		NI-	T 818 1	l					
Flushmount Monitoring Wells	Yes	_ No	NA.						
8. Can the IId be secured tightly?	gan		<del>                                     </del>			·			
9. Does the lid have a gasket that seals?	101								
10. No water in the flushmount?	<u></u>				<u></u>				
11. Is the well cap lockable?									
12. Is there a lock present?									
AM 30 - 154 - 254 - 304 - 11-	77-	Nie	T 3/A 1						
All Monitoring Wells	Yes	No	NA NA						
Downhole Condition	ļ		1			<u>.</u>			
12. Water level measuring point clearly marked?			<del></del>						
13. No obstructions in well?	<u> </u>		1						
14. No plant roots or vegetation in well?									
15. No sediment in bottom of well?			$\perp$						
If present, how much sediment?	ft								
16. Installed as total depth.	ft								
17. Measured total depth of well.	ft	,							
General Condition	Voc	N <sub>0</sub>	I NA						
General Condition	Yes	No	NA_						
18. Concrete pad installed?			<del> </del>						
19 . Concrete pad	ļ		<del>                                     </del>						
Slope away form casing?	ļ		1						
Not deteriorated?	<u> </u>		<del>                                     </del>						
Not heaved or below surrounding grade?						<del>,</del>			
20. No surface seal settling?			000			·			
21. Well clearly visible and labeled?			[0						
Comments:									
Needs new lock install	ec		ill dry	/ *		· · · · · · · · · · · · · · · · · · ·			
						•			
* Major well repair are those that require a subconti	ractor or sepa	rate mobil	ization to coi	mplete					

#### WELL DEVELOPMENT AND GROUNDWATER SAMPLING FIELD FORM

	Grade (Care			i i i i ju	PROJECT IN	FORMATION	N Section 1	Links arrive		entick with	
;	Site: <u>Ve l</u>	rmilion	<u>n</u>			Client:	NRT				
Project Num		<del>,</del>		Task #:		Start Date:	7.12	-17		_ Time: _	1242
	inel: $\mathcal{T}$ . $\mathcal{U}$		ISIM	P501		Finish Date:				_ Time: _	
	VELL INFOR	RMATION					EVENT	ГҮРЕ			
	Well ID:	MW7		Well Develop	ment			ow Stress San	mpling		
C	asing IC:		inches	Well Volume	Approach Sar	npling	Other (Specify)	:			
			WAT	ER QUALIT	Y INDICATO	R PARAMET	ERS (contin	nued)			
Sampling Stage	Time (military)	Volume Removed (gallons)	Depth to Water (Feet)	Drawdown (Feet)	Temp. (°C)	pH (SU)	SEC or Cond. (µs/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP (mV)	Visual Clarity
											Y**-
		-									
	<u>.</u>		NOTES (c	ontinued)					ABBREVIA		
* NO	5Amp	ce co	LLECTE	20 - W.	ell Di	ey gn	us	Cond Actual Conduc FT BTOC - Feet Below na - Not Applicable nm - Not Measured			31 <b>0</b>

Low-Flow Sampling Form MW-1



### Monitoring Well Evaluation Checklist

Site Vermillan	Major wells repairs* required Yes No NA to maintain well integrity?								
Inspection Date 7.12.17	to maintair	ı well integ	rity?	X					
Well Number MW/D			•						
Stick-up Monitoring Wells					Comments				
1. Outer protective Casing	Yes	No	NA						
Not corroded									
Not dented									
Not cracked		101				<del></del>			
Not loose	``								
			······································	***************		· · · · · · · · · · · · · · · · · · ·			
2. Inner casing	Yes	No	NA						
Not corroded									
Not dented									
Not cracked			1	****		·			
Not loose			<del> </del>						
	Yes	No	NA		····	<u></u>			
3. Are there weep holes in outer casing?			<del> </del>						
4. Weep holes able to drain?	<del> </del>								
5. Is there a lockable cap present?									
			ļ						
6. is there a lock present?	<u> </u>								
7. Bumper posts in good condition?		i							
El character & Marilla	<del></del>		1 314 1						
Flushmount Monitoring Wells	Yes	No	NA						
8. Can the lid be secured tightly?									
9. Does the lid have a gasket that seals?									
10. No water in the flushmount?									
11. is the well cap lockable?	]								
12. Is there a lock present?									
All Monitoring Wells	Yes	No	NA NA			s			
Downhole Condition									
12. Water level measuring point clearly marked?									
13. No obstructions in well?						,			
14. No plant roots or vegetation in well?									
15. No sediment in bottom of well?									
If present, how much sediment?	ft								
16. installed as total depth.	ft								
17. Measured total depth of well.	ft								
General Condition	Yes	No	NA						
18. Concrete pad Installed?									
19 . Concrete pad									
Slope away form casing?									
Not deteriorated?									
Not heaved or below surrounding grade?									
20. No surface seal settling?			<del>                                     </del>						
21. Well clearly visible and labeled?									
Comments:	i		·						
Needs now lock									
The state of the s						<del></del> .			
* Major well repair are those that require a subcont	ractor or sena	rate mobili	zation to cor	mplete					
The state of the s	v. scpa	, , 1100111							

- 20 to 10 to	galanta (a. 1. a.)	AND CONTRACT	1 ASA 31 ASB	一个学习	ROJECTIN	IFORMATIO	Assistant Control	<b>化</b> 加热性 医皮肤炎	KRAWAY.	A MARKET SALES THE STREET	2000年200日 2000年200日
	Site:@	rmilio	n			Client:	NR-				· <b>"</b>
Project Num				Task #:		Start Date:	7-12	-17		Time:	755
Field Persor	nnel: <u>T. M</u>	<u>Nathis</u>	J.Sim	25010		. Finish Date:	7-17	7-17		Time:	207
	NELL INFOR	RMATION				· 用有生命有	EVENT	TYPE			
		MWIO		Well Develop				ow Stress San	npling		
	asing ID:		inches	The second secon	Approach Sar		Other (Specify)				
1.36.55			WAT	ER QUALIT	INDICATO	R PARAMET	ERS (conti	nued)			
1		Volume	Depth to				SEC or	Dissolved			.,
Sampling	Time	Removed	₩ater	Drawdown	Temp.	pН	Cond.	Охудеп	Turbidity	ORP	√isuai
Stage	(military)	(galions)	(Feet)	(Feet)	(*C)	(SU)	(µs/cm)	(mg/ <u>L</u> )	(NTU)	(mV)	Clarity
	1755		49.89	_ <i>O</i>							<u> </u>
	1759	<u>*-13</u>	749-89	1.38	18.98	6:19	व्यष्ट	4.75	0	125	CLEAK
	1803	.26	51.27	0	18.10	6-78	999	4.86		124	Clear
	1807	.39	51.88	061	17.22	6.73	991	4.46	0,2	121	clear
			<u> </u>								
					<u> </u>						
			· · · · · · · · · · · · · · · · · · ·								
									<del>                                     </del>		
		in the second of	NOTES (6	ontinued)			1		ABBREVIA	TIONS	
*5127								Cond Actual Conduc FT BTOC - Feet Belov na - Not Applicable nm - Not Measured	ctivity	ORP - Oxidation-Redu SEC - Specific Electric SU - Standard Units Temp - Temperature "C - Degrees Celdus	

Low-Flow Sampling Form MW-1

Low-Flow Sampling Form

Site Vermilion	Major well	repairs* i	equired	Yes	No	NA
Inspection Date 7.12-17	to maintair			,	\ <u>\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\</u>	10/3
Well Number   M   M   M   M   M   M   M   M   M	to mantan	t As out 11 leaf	,,,,,,		1_2>	<u></u>
Trem training in the state of t						
Stick-up Monitoring Wells					Comments	
1. Outer protective Casing	Yes	No	NA I		COMMICHES	
Not corroded	163	110	<del>                                     </del>	<del></del>	<del></del>	
Not dented			<del> </del> -	<del></del> -		
Not cracked			1		<del></del>	
Not loose			<del> </del>			
Not loose			اا		· · · · · · · · · · · · · · · · · · ·	
2. Inner casing	Yes	No	NA			
Not corroded	163	110	1-11			
Not dented	<u> </u>		<del> </del>			
Not cracked	-6.		<del> </del>			
	<del></del>		<del> </del>	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	
Not loose			<del>]</del>			
2 A 4h ( -1 to to 2	Yes	No_	NA NA			
3. Are there weep holes in outer casing?	<u> </u>		<del>  </del>		<del></del> .	
4. Weep holes able to drain?	ļ					
5. Is there a lockable cap present?			ļ			
6. Is there a lock present?			<u> </u>			<del></del>
7. Bumper posts in good condition?		····	<u>l                                     </u>			
			<del></del>			
Flushmount Monitoring Wells	Yes	No	NA NA			
8. Can the lid be secured tightly?	<u></u>					
9. Does the lid have a gasket that seals?	<u>                                     </u>					
10. No water in the flushmount?						
11. Is the well cap lockable?						
12. Is there a lock present?						
All Monitoring Wells	Yes	No	NA			····
Downhole Condition						
12. Water level measuring point clearly marked	1?					
13. No obstructions in well?			اسسيا			
14. No plant roots or vegetation in well?						
15. No sediment in bottom of well?						
If present, how much sediment?	ft					
16. Installed as total depth.	ft					
17. Measured total depth of well.	ft					
,						
General Condition	Yes	No	NA			
18. Concrete pad installed?						
19 . Concrete pad						
Slope away form casing?						
Not deteriorated?						
Not heaved or below surrounding grade?				***************************************		
20. No surface seal settling?			Ţ			
21. Well clearly visible and labeled?				·····		
Comments:	<u> </u>	<i>'</i>	······································	<del></del> -		
		/		<u>-</u>	<u></u>	
			·····			
* Major well repair are those that require a sul	ocontractor or sepa	rate mobil	ization to co	mplete		

- 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	representation	indi 1 desert	31 8 1 1 N	空气型響度	ROJECTIN	IFORMATION	Armer of the	<b>列伊斯·李等</b>			The San Section
	Site: <u>// @</u>	vmi/i	5h			Client:	NRT				
Project Num		····		Task #:		Start Date:	7-17	1-17		Time:	1824
Field Persor	nel: T. mad	Mis J.	Simpson	h		Finish Date:	7-0	2-17		Time;	1847
1	NELL INFOR						EVENT	TYPE			
		MW17		Well Develop			Low-Flow / Low		mpling		
	asing ID:		anches		Approach Sar		Other (Specify)				
			WAT	ER QUÁLIT	YINDICATO	RPARAMET	ERS (contin	nued)			
		Volume	Depth to				SEC or	Dissolved			
Sampling	Time	Removed	Water	Drawdown	Temp.	pH	Cond.	Oxygen	Turbidity	ORP	Visual
Stage	(military)	(galions)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	(NTU)	(mV)	Clarity
<u></u>	1824	<u> </u>	38,54							<u> </u>	
	1828	.13	<u> 39.95</u>	1,41	20.31	6.94	1800	5.03	21.2		clear
	1832	. 26	40.41	0.46	20.10	6.92	1820	3.40	18.2	-15	clear
	1835	- 39	40.90	0.49	19.44	6.92	1830	2.56	15.6	-24	cleak
[	1839	-52	41.70	0.80	18.59	6.91	1820	1.81	12.0	-30	Clean
	1843	265	42.70	1.00	17.92	6-88	1810	1.68	11.1	-29	clear
	1847	.78	43.70	1.00	17.28	6.89	1800	1.66	9.5	-31	clear
	10-1-4-										
F										<u> </u>	
l					<u> </u>					<del> </del>	
<b> </b>			l		<del> </del>			<u> </u>			
					<del>                                     </del>						
			<del> </del>							<del></del>	
			-							<u> </u>	
a ja se sa sa sa		14 17 1 13 14 1	NOTES	continued)					ABBREVIA	TIONS	
	444		.,					Cond, - Actual Condu FT BTOC - Feet Belo na - Not Applicable nm - Not Measured	ctivity	ORP - Oxidation-Re SEC - Specific Elect SU - Standard Units Temp - Temp+ratum "C - Degrees Celcky	zica. Conductance
		•			,six						

Low-Flow Sampling Form

Low-Flow Sampling Form

site Vernilion	Major well	s repairs* r	equired	Yes	No	NA
Inspection Date 7.12.17	to maintair	well integ	rity?		X	
Well Number MW 18		•				
Stick-up Monitoring Wells					Comments	
1. Outer protective Casing	Yes	No	NA			
Not corroded		- 110	1			
Not dented			<del> </del>			
Not cracked			<del>                                     </del>			
Not loose			-			· ·
Not looke			<del></del>	<b></b> .		
2. Inner casing	1 1/2	41-	1 314			
1	Yes	No	NA NA			
Not corroded			<del> </del>			
Not dented			<del> </del>			
Not cracked			<u> </u>			
Not loose			<del>                                     </del>			
	Yes	No	NA NA			
3. Are there weep holes in outer casing?						
4. Weep holes able to drain?						
5. Is there a lockable cap present?						
6. Is there a lock present?						
7. Bumper posts in good condition?						
		······································	!			
Flushmount Monitoring Wells	Yes	No	NA			
8. Can the lid be secured tightly?						
9. Does the lid have a gasket that seals?						
110. No water in the flushmount?						
1						
11. is the well cap lockable?						
12. Is there a lock present?						
All Monitoring Wells	Yes	No	NA			
Downhole Condition	]		<del> </del> -		<u> </u>	
12. Water level measuring point clearly marked?			$\longrightarrow$			
13. No obstructions in well?						
14. No plant roots or vegetation in well?						
15. No sediment in bottom of well?						
If present, how much sediment?	ft					
16. installed as total depth.	ft				<b>*</b>	
17. Measured total depth of well.	ft					`
General Condition	Yes	No	NA			
18. Concrete pad installed?			[			
19 . Concrote pad						
Slope away form casing?						
Not deteriorated?			<u> </u>			·
Not lieaved or below surrounding grade?				······································		<del></del>
20. No surface seal settling?			<del>                                     </del>			
21. Well clearly visible and labeled?		<del></del> .	<del></del>			
Comments:			<del></del>			
- Cornateritor						
* Major well remain and the set that assistance with	otor or com-	ento matri	antion to a	mnloto		
* Major well repair are those that require a subcontra	ictor or sepa	rate mobili	zation to con	ubiete		

- 100 mg/mmg/	ing the second			<b>一种大学的</b>	ROJECTIN	FORMATION			B. Clark St. Co.	Albana del servicio suo	A ALL COMPANIES
	Site: /ox	rmilion	<u>^</u>			Client:	NRT	-			
Project Num				Task #:		Start Date:	7-12	-17		Time:	1853
Field Persor	nnel: T. M	athis c	- Simpso	h		Finish Date:	7-12	-17		Time:	1909
A A	NELL INFOR					. Vike registr	EVENT	TYPE			
		W/8		Well Develop				ow Stress San	npling	•	
	asing ID:		mches		Approach San	7	Other (Specify)				
	* .		WAT	ER QUALIT	R PARAMET	ERS (contii	nued)				
		Volume	Depth to				SEC or	Dissolved			
Sampling	Time	Removed	Water	Drawdown	Temp.	рH	Cond.	Oxygen	Turbidity	ORP	√isual
Stage	(military)	(galions)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	(NTU)	(mV)	Clarity
	1853	6	23.47						<u> </u>		<u> </u>
	1857	. 13	23:17	0	17.94	7.00	1580	5.29	16-9	30	clear
	W1901	.26	23.47	0	14.83	6.86	1600	2.06	12.9	23	Clear
	1905	.39	23.47	0	14.76	6.84	1530	1.75	10.0	23	clear
	1909	.52	23.47	0	15.28	6.83	1510	1-75	8.7	25	cleap
				<u> </u>			•				
	<u> </u>			ļ. <u>.                                   </u>							
											<u> </u>
			<u> </u>	<u></u>				·			
				]							<u> </u>
		_	NOTES (d	continued)					ABBREVIA	TIONS	76
* 1901 ·			<u> </u>					Cond Actual Conduc FT BYOC - Feet Below na - Not Applicable nm - Not Measured		ORP - Oxidation-Re SEC - Specific Elect SU - Standard Units Temp - Temperature *C - Degrees Celcu	ricalCencuctance
								ł			
L								<u> I</u>			

Low-Flow Sampling Form MW-1

Low-Flow Sampling Form

Site Vermilion	Major well:	s repairs* re	eguired	Yes	No	NA
Inspection Date 7-12-17	to maintair			· · · · ·	X	
Well Number MWZI				L	<u> </u>	<del></del>
Stick-up Monitoring Wells					Comments	5
1. Outer protective Casing	Yes	No	NA	1	<b>π ±</b> εξεξεί <b>Ψ</b> ' ζ Ψ '	•
Not corroded						
Not dented						
Not cracked				<del> </del>		
Not loose	ا مترکز ا					
	. ,	•	L .			
2. Inner casing	Yes	No	NA	1		
Not corroded				<b></b> _		
Not dented				<u> </u>	-	
Not cracked			*****			······································
Not loose						
1100 10000	Yes	No	NA NA			
3. Are there weep holes in outer casing?	163		1177			
4. Weep holes able to drain?						
5. Is there a lockable cap present?			<del></del>			
6. Is there a lock present?						
·	<del></del>					
7. Bumper posts in good condition?			<u> </u>	<u> </u>		
Chrohmanus 88-mitarin-185-W-		NI -	. NIA	l		
Flushmount Monitoring Wells	Yes	No	NA	ļ	<del></del>	
8. Can the lid be secured tightly?		<del></del>				
9. Does the lid have a gasket that seals?						
10. No water in the flushmount?						<del></del>
11. Is the well cap lockable?						
12. Is there a lock present?	<u> </u>			<u> </u>		
	r			1		
All Monitoring Wells	Yes	No	NA	ļ	····	
Downhole Condition					·	
12. Water level measuring point clearly marked?						······································
13. No obstructions in well?				<u> </u>	<del></del>	
14. No plant roots or vegetation in well?						
15. No sediment in bottom of well?				l <u></u>		
If present, how much sediment?	ft					
16. Installed as total depth.	ft					
17. Measured total depth of well.	ft					
	f			1		
General Condition	Yes	No	NA	ļ	· · · · · · · · · · · · · · · · · · ·	
18. Concrete pad installed?				<u> </u>		- A 11
19 . Concrete pad						
Slope away form casing?						
Not deteriorated?					E	12-A 95145 444A
Not heaved or below surrounding grade?						·
20. No surface seal settling?	<u> </u>		<u> </u>	Concre	te. 1.5	رهجم ه
21. Well clearly visible and labeled?						
Comments:						
heeds a new lock thista	led.					
7	- 6	ms_				
* Major well repair are those that require a subcontra	ctor or sepá	rate mobili	zation to co	mplete		

San San San San San San San San					PROJECTIN	IFORMATIO	NAME	75637			
	Site: <u>Ver</u>	milion		·		Client:	NAT				
Project Num				Task #:	<u> </u>	Start Date:	7.13.	17			842
Field Persor	nnel: TiMo	this J.	5)mpson	<u> </u>		Finish Date:	<u> 7.13</u>	.17		Time: 💇	702
1	WELL INFOR	RMATION				一贯多种设备	ÉVENT	TYPE			
		MWII		Well Develop				ow Stress San	npling		
	asing ID:		anches		Approach Sar		Other (Specify		Carronal design of a	) - 2014 a. 21 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	*
			WAT	ER QUALIT	Y INDICATO	R PARAMET	ERS (conti	nued)		Company Company Transport	
•		Volume	Depth to				SEC or	Dissolved	本		
Sampling	Time	Removed	Water	Drawdown	Temp.	pH	Cond.	Oxygen	Turbidity	ORP	Visual
Stage	(military)	(gailons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	(NTU)	(m\√)	Clarity
	0842	0	89.55			<u> </u>			5.6	1	
	0846	.13	91.25	1.70	15.06	7.37	608	9.03	1 X 9 60	-22	clear
	1850	-26	92.37	1.12	14.29	7.52	586	5.78	3.5.71	-63	clear
	0854	.39	93.12	0.75	14.62	7.61	580	3.63	3.0"	<u> </u>	clear
	0858	52	93.24	0.12	15.18	7.62	575	2.95	107	<u>ー</u> 87	c'ear
	0902	.65	93.24	$\alpha$	16.18	7.61	573	2-60	1.6	-88	cleap
									1	<del></del>	
		······································									
			i	· · · · · · · · · · · · · · · · · · ·				1			
	<del> </del>			<u> </u>							
			<u> </u>					·	<u> </u>	<del>,</del>	
	<del></del>			<del></del>				<u> </u>		<del></del>	
<b></b>		, , , , , , , , , , , , , , , , , , ,	<del></del>			<u> </u>		<u> </u>			<del>!</del>
			<del></del>			<u> </u>				<del></del>	
	· :		NOTES (	ontinued)		C.R. C. Mary			ABBREVIA	IONS	the property of the
Turb	5.6 5.0 3.0	Jus -					<u></u>	Cond Actual Condu- FT BTOC - Feet Below na - Not Applicable nm - Not Measured	ctivity	ORP - Oxidation-Redi SEC - Specific Electri SU - Standard Units Temp - Temperature "C - Degrees-Celoius	
,	1.7										

Low-Flow Sampling Form MW-1 Low-Flow Sampling Form

1/2 2 2 4 1 1 6 4					T 3	
Site <u>Vermillon</u>	· ·	s repairs* r	· •	Yes	No_	NA
Inspection Date 7. 3:17	to maintai	n well integ	rity? [			
Well Number TW						
Stick-up Monitoring Wells					Comments	
1. Outer protective Casing	Yes	No	NA			
Not corroded						·
Not dented		<del> </del>				
Not cracked						
Not loose			<del> </del>			
1100 10036		<u> </u>	l	•		
I Janor er de	1 3/	1 17-	N:A			
2. Inner casing	Yes	No	NA			
Not corroded		ļ				
Not dented	1		ļ			
Not cracked						
Not loose						
	Yes	No	NA			
3. Are there weep holes in outer casing?			<u>[</u> ].			
4. Weep holes able to drain?						
5. Is there a lockable cap present?						
6. Is there a lock present?						
7. Bumper posts in good condition?						
The sample posts in good container.		L	L			
Flushmount Monitoring Wells	Yes	No	NA _			
8. Can the lid be secured tightly?	162	140	<del>  ''`</del>		<del></del>	,·- <u>,</u> ·
_ ,	ļi		<del>                                     </del>			<del></del>
9. Does the lid have a gasket that seals?	ļ				<del></del>	
10. No water in the flushmount?						
11. Is the well cap lockable?						
12. Is there a lock present?	L					
All Monitoring Wells	Yes	No	NA NA			
Downhole Condition			1	·		
12. Water level measuring point clearly marked?						
13. No obstructions in well?						
14. No plant roots or vegetation in well?						
15. No sediment in bottom of well?						
If present, how much sediment?	ft					
16. Installed as total depth.	ft					
17. Measured total depth of well.	ft					
	<u> </u>	ļ				
General Condition	Yes	No /	NA			
18. Concrete pad installed?	103	<del></del>				
19 . Concrete pad			<del> </del>			
Slope away form casing?			<del>                                     </del>	· · · · · · · · · · · · · · · · · · ·		<del></del>
	ļ				<del></del>	
Not deteriorated?		<del></del>				<del></del>
Not heaved or below surrounding grade?	<b></b> _					<del></del>
20. No surface seal settling?			ļ			
21. Well clearly visible and labeled?			L			······································
Comments:						
	·				<del>, ,</del>	<u> </u>
* Major well repair are those that require a subcontr	actor or sepa	rate mobili	zation to cor	nplete	***************************************	

100			<u> </u>	r vivision p	ROJECTIN	IFORMATION	A Gorgens S	· 1963年 - 1985年			destruit de la compa
	Site: 📝 🗸	rmilia	n			Client:					
Project Num				Task #:		_ Start Date:	7. [2	3.17		Time:	
Field Persor	nnel:	Jathis ?	). Simp			Finish Date:	7.1	3-17		_ Time:	
V	WELL INFO	RMATION					EVEN	TTYPE	Tage and the same		
	Well ID:	TWI		Well Develop	ment		Low-Flow	/ Low Stress Sar	npling	,	
C	asing ID:		inches	Well Volume			Other (Spec				
	1992		WAT	ER QUALITY	YINDICATO	R PARAMET	ERS (cor	ıtinued)			
		Volume	Depth to				SEC or	Dissolved			
Sampling	Time	Removed	Water	Drawdown	Temp.	pH	Cond.	Oxygen	Turbidity	CRP	Visual
Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	(NTU)	(mV)	Clarity
		0_	4.60					<del></del>			<del> </del>
								<u> </u>	<u> </u>		
		ļ	******								
							·			<u> </u>	
				-				<del></del>		<del>                                     </del>	-
		<u> </u>				<u>                                     </u>					ļ <u>.</u>
		<del> </del>									
										<del> </del> -	<del> </del>
		<del> </del> -								1	<del>                                     </del>
										<del>                                     </del>	
		<del> </del>							<del></del>		
								· · · · · · · · · · · · · · · · · · ·			<del>                                     </del>
	<u> </u>	the set of	NOTES	continued)				in Burney (SA)	ABBREVIA	TIONS	
Un	iable	to Sav	nple.	- Charles dj.	<u></u>		······································	Cond Actual Condu FT 8TOC - Feet Belov ns - Not Applicable nm - Not Measured	divity	ORP - Oxdation-Rec SEC - Specific Electr SU - Standard Units Temp - Temperature 'C - Degrees Calcies	ical Conductance

Low-Flow Sampling Form

Low-Flow Sampling Form

Site Vermilion	Major well	c ranaire* r	equired	Yes No NA
Inspection Date /- (2.17)	to maintair			165 NO 17A
	to maintaii	i wen mireR	iity:	
Well Number				
Stick-up Monitoring Wells		r	<del></del>	<u>Comments</u>
1. Outer protective Casing	Yes	No	NA	
Not corroded				
Not dented				
Not cracked				
Not loose				
2. Inner casing	Yes	No	NA	
Not corroded			<u> </u>	
Not dented				
Not cracked		<del></del> -	<del>                                     </del>	-
Not loose			<del></del>	
Not loose	Yes	No	NA	
2 Are there were balled in automorphis 2	162	NO	IVA	
3. Are there weep holes in outer casing?			<del> </del> -	
4. Weep holes able to drain?				
5. Is there a lockable cap present?			ļ	
6. Is there a lock present?				
7. Bumper posts in good condition?	<u> </u>			
Flushmount Monitoring Wells	Yes	No	NA_	
8. Can the lid be secured tightly?			بحزر	
9. Does the lid have a gasket that seals?				
10. No water in the flushmount?				
11. Is the well cap lockable?				
12. Is there a lock present?				
,	i			
All Monitoring Wells	Yes	No	NA	
Downhole Condition	163			
12. Water level measuring point clearly marked?				
13. No obstructions in well?				
	ļ	<del></del> _		
14. No plant roots or vegetation in well?				
15. No sediment in bottom of well?	<u> </u>			
If present, how much sediment?	ft			
16. Installed as total depth.	ft			
17. Measured total depth of well.	ft			
General Condition	Yes	No	NA	
18. Concrete pad installed?			i	
19 . Concrete pad				
Slope away form casing?				
Not deteriorated?				
Not heaved or below surrounding grade?				
20. No surface seal settling?				
21. Well clearly visible and labeled?		······································		
Comments:			<u> </u>	
Needs new lock				
10 ceas 114 to Che				
* Major well repair are those that require a subcont	ractor or cons	rate mahili	zation to car	mnlote
major wen repair are mose mat require a subcont	ractor or sepa	rate Highli	eadon to col	uhiere

			Fr. T. St.		ROJECTIN	IFORMATIO	New Art		Contract Contract	and the contract of the con-	
	Site: /U	rmilior	1			Client:	NRT				
Project Num	ber:			Task #:		Start Date:	7-13.	17	-	Time:	122
Field Person	nel: <u>7. M</u> <i>o</i>	this J.	Simpson			. Finish Date:	<u>7.13:</u>	<u> 17</u>		ime:i	143
	VELL INFOR						EVENT	TYPE			property for Fire Co.
	Well ID: ///	W3R		Well Develop	ment	<b>⊠</b>		ow Stress Sar	npling		
	asing ID:		inches	Well Volume			Other (Specify			:	
			WAT	ER QUALIT	Y INDICATO	R PARAMET	ERS (conti	nued)			
		Volume	Depth to				SEC or	Dissolved			
Sampling	Time	Removed	Water	Drawdown	Temp.	pН	Cond,	Oxygen	Turbidity	ORP	Visual
Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	(NTU)	(mV)	Clarity
	1/22	0	7-10	ļ	1500	707	<u> </u>	2 1		(1/2)	
	1125	. 13	7.10	0	15.50	7.98	845	3.16	3.7	-117	clear
	1(28	.26	7-10	<u> </u>	14-63	1.81	801	1.63	8.0	-128	Clear
	1131	.39	7-10	<u> </u>	19.51	7.75	786	1.20	5.4	- (35	clear
	1134	.52	7,/0	0	19.41	1.7.1	789	1.12	7.4	-146	clear
	1/37	. 65	7.10	0	14.50	7.67	794	1.01	3.6	<u>-140</u>	clear
	1140	<u>.78</u>	7.10	٥	17.93	1.62	803	0.97	<u> </u>	1-142	clear
	1143	.91	7-10		14.57	7.62	803	0.96	5.5	<u> </u>	deal
							<u> </u>			<del> </del>	
				ļ			<u> </u>	<u> </u>			<u> </u>
				ļ		<u> </u>		<del> </del>			<u> </u>
				<u> </u>						<u> </u>	
										-	
					Charles Acces		The state of the s	i (Terson i di ding) (	<u> </u> 	Charge and a second of	
			NOTES (	ontinued)		31.40	*	Cond Actual Conduc	ABBREVIA	ORP - Oxidation-Rec	section Personalisa.
								FT BTOC - Fest Below ns - Not Applicable nm - Not Measured		SEC - Specific Electric SU - Standard Units Temp - Temperature	kal Conductance
								nm - Not Measured	<u></u>	Temp - Temperature *C - Degrees Celcus	
		· · · · · · · · · · · · · · · · · · ·					···			- <u></u>	

Low-Flow Sampling Form MW-1

Low-Flow Sampling Form

Site	Termilian	Maior well	s repairs* r	equired	Yes	Ng,	NA
Inspection Date	7./2.12		n well integ			T X	
Well Number	Man	to mantan	i wen integ		,		
-	MAN A						
Calala	un Branitaring Malla					Ca	
	up Monitoring Wells			1 1		Comments	
1. Outer protective	casing	Yes	No	NA			
Not corroded		<u> </u>		<u> </u>			
Not dented		<u> </u>	<u> </u>	ļ <u>l</u> .			
Not cracked				<b> </b>	·		
Not loose			<u> </u>	<u> </u>		<del></del> _	
				,			
2. Inner casing		Yeş_	No	NA NA			
Not corroded					<del></del>		
Not dented				<u>]</u>			
Not cracked							
Not loose							
		Yes	No	NA			
3. Are there weep l	noles in outer casing?		5/				
4. Weep holes able	<del>-</del>		8				
5. Is there a lockab				-			
6. Is there a lock pr	, .			-			
7. Bumper posts in							****
7. bumper posts in	good condition:	<u> </u>				····	• • • • • • • • • • • • • • • • • • • •
Eluchm	ount Manitaring Malls	Voc	Ma	NA .			
	ount Monitoring Wells	Yes	No	- \\\\-\\\-\			
8. Can the lid be se	_ ·				······	<u> </u>	
1	a gasket that seals?						
10. No water in the							·
11. is the well cap i							
12. Is there a lock p	resent?	<u> </u>					
	Monitoring Wells	Yes	No	NA NA			
Downhole Condition							
	asuring point clearly marked?						
13. No obstructions							
	or vegetation in well?						
15. No sediment in	bottom of well?						
If present, how	much sediment?	ft					
16. Installed as tota	ıl depth.	ft					
17. Measured total	depth of well.	ft					•
General Condition		Yes	No.	NA			
18 Concrete pad in	stalled?						
19 . Concrete pad							
Slope away forn	n casine?						
Not deteriorate	<del>-</del>						
î .	elow surrounding grade?				<del>)</del>	·	
20. No surface seal							
21. Well clearly visi			-	<del></del>		<del></del>	
Comments:	ore and tabeleds	L		<u> </u>			
	1601	<del></del>					
Needs h	ew 16CK						
* Major wall	are those that results a sub-suit	tractor or some	rata m-Liii	antion to ser	anieta		
wajor well repair	are those that require a subcont	ulactor or sepa	nate mobili	zation to con	ihiere		

er som er er er er				15 - C. W.	PROJECT IN	IFORMATIO!	Vien in the last	<b>的</b> 为中国	684000	<b>经</b> 有对核的	
	Site: /e	rmilio	· ハ			Client:	NKT				
Project Num	ber:			_ Task #:		Start Date:	7131	7		Time:	515
	nel: <u>7. Ma</u>		impson			Finish Date:	7.13-	17		_ Time:	527
1	NELL INFOR						EVENT	TYPE			and and the second
	Well ID:	NW4		Well Develop	ment			ow Stress Sar	npling		
	asing ID:	<u> </u>	mches		Approach Sar		Other (Specify				
	* # # 1 * * * * * * * * * * * * * * * * * * *		WAT	ER QUALIT	Y INDICATO	R PARAMET	ERS (conti	nued)			
		Volume	Depth to				SEC or	Dissolved			
Sampling	Time	Removed	Water	Drawdown	Temp.	рH	Cond.	Oxygen	Turbidity	ORP	Visuai
Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	(NTU)	(mV)	Clarity
	1515		7.40			<u> </u>					
	1518	.13	7.40	0	19.94	7.85	.455.	2.22	1.7	-108	CLEAR
	1521	.26	7.46	.06	19.91	7.76	441	1.45	1.5	-114	clear
	15-24	.39	7.46	0	19.83	7:74	438	1.15	1.5	- 117	clear
	1527	.52	7.46	0	19.49	7.72	448	1.15	1.3	-116	clear
						<u> </u>					
			1								
			i								
				<u> </u>					<del> </del>		
									<b>†</b>		
	<u> </u>		NOTES (	continued)					ABBREVIA	TIONS	
				<u></u>	<u>w'</u>			Cond, - Actual Condu FT BTOC - Feet Selo na - Not Applicable nm - Not Measured	ctivity	ORP - Codd ation-Red SEC - Specific Electric SU - Standard Units Temp - Temperature TC - Degrees Celcius	
			221								

Low-Flow Sampling Form

Low-Flow Sampling Form

Site /crmillon	Major well:	s repairs* r	equired	Yes	No	NA		
Inspection Date 7. [3.17	to maintair							
Well Number MWS					I?	<del></del>		
intro -								
Stick-up Monitoring Wells				<b>Comments</b>				
1. Outer protective Casing	Yes	No	NA					
Not corroded			<u> </u>					
Not dented					*****			
Not cracked				<del></del>	<del></del>			
Not loose			<b>1</b>					
		L						
2. Inner casing	Yes	No	NA					
Not corroded								
Not denled				·····		· · · · · · · · · · · · · · · · · · ·		
Not cracked	,							
Not loose			<u> </u>			<del></del>		
	Yes	No	NA					
3. Are there weep holes in outer casing?								
4. Weep holes able to drain?								
5. Is there a lockable cap present?								
6. Is there a lock present?						·········		
7. Bumper posts in good condition?								
			<u> </u>					
Flushmount Monitoring Wells	Yes	No	NA					
8. Can the lid be secured tightly?								
9. Does the lid have a gasket that seals?								
10. No water in the flushmount?								
11. Is the well cap lockable?			/					
12. Is there a lock present?								
All Monitoring Wells	Yes	No	NA					
Downhole Condition								
12. Water level measuring point clearly marked?								
13. No obstructions in well?								
14. No plant roots or vegetation in well?								
15. No sediment in bottom of well?								
If present, how much sediment?	ft							
16. Installed as total depth.	ft							
17. Measured total depth of well.	ft							
	F	· · · · · · · · · · · · · · · · · · ·	<del></del>	1				
General Condition	Yes	No	NA			T-4		
18. Concrete pad installed?	New York							
19 . Concrete pad	7			•	•			
Slope away form casing?								
Not deteriorated?			<u> </u>					
Not heaved or below surrounding grade?			ļ					
20. No surface seal settling?			ļ		<del></del>			
21. Well clearly visible and labeled?			J					
Comments:								
	· · · · · · · · · · · · · · · · · · ·			William Control		· · · · · · · · · · · · · · · · · · ·		
* Major well repair are those that require a subcont	ractor or sepa	rate mobil	ization to co	mplete		"mi		

				· 第二個學科	ROJECTIN	FORMATIO)	Ve State	的连续的	的表示。	ENERGY.	
;	Site: <u>/ @ /</u>	milio	$\sim$			Client:	NRT				
Project Num				Task #:		Start Date:	<u>7,13</u>	17		Time:	1205
Field Persor	<u>ک آل۔</u>	impson	<u>7. 17</u>	10/his		Finish Date:	<u> 7·13</u>	- 17		Time:	1221
٧	VELL INFOR	RMATION					EVENT	TYPE			
	Well ID:	U.5		Well Develop	ment	×	Low-Flow / Le	ow Stress Sar	npling		
C	asing ID:		inches	Well Volume	Approach Sar	npling 🔲	Other (Specify)	:			
			WAT	ER QUALIT	/ INDICATO	R PARAMET	ERS (conti	nued)		or o	
		Volume	Depth to				SEC or	Dissolved			
Sampling	Time	Removed	Water	Drawdown	Temp.	pΗ	Cond.	Oxygen	Turbidity	ORP	Visual
Stage	(militaryı	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	(NTU)	(m\/)	Cl∈rity
	1205	0	6.89				· · · · · · · · · · · · · · · · · · ·		\		
	1209	1/3.	6.89	<u>Q</u>	11.92	1.75	604	1.14	1.0	-5/	CEGR
	1213	,26	6.89	0	17.71	7.64	605	1-14	1,9	-53	cicar
	1217	,39	6.89	0	16.45	7.63	602	1.10	0.7	-51	clear
	1221	152	6.89	0	16.27	7-61	600	1.09	0.8	-49	clear
										<u> </u>	
		_									
									<u> </u>		
											,
										<u> </u>	
	<del></del>		NOTES (	continued)					ABBREVIA	TIONS	100
FT BTOC - Feet Below Top of Casing SEC  a= Not Applicable SU-  nm-Not Measured Tem								OPP - Oxidation-Re SEC - Specific Elect SU - Standard Units Temp - Temperatur C - Decrees Cectu	irical Conductance		
)											
1											
								1			

Low-Flow Sampling Form MW-1

Low-Flow Sampling Form

Site Vermilion	Major well	s repairs* r	equired	Yes	No	NA
Inspection Date 7. /2-17	to maintair	well integ	rity?		-	
Well Number NW 6R		J			·	
11100						
Stick-up Monitoring Wells					Comments	
1. Outer protective Casing	Yes	No	NA			
Not corroded	"3"		1111			
Not dented	<u>-</u> -					
Not cracked			1			
Not loose			ļ <del></del>			
Not loose	1	į	[]	***************************************		
2. Inner casing	Yes	No	NA			
Not corroded						
Not dented						
Not cracked				····		
Not loose						
	Yes	No	NA NA			
3. Are there weep holes in outer casing?						
4. Weep holes able to drain?						
5. Is there a lockable cap present?		New York				
6. Is there a lock present?		1				
7. Bumper posts in good condition?						
	<u> </u>		<u> </u>			
Flyshmount Monitoring Wells	Yes.	No	NA			
8. Can the lid be secured tightly?	10th					
9. Does the lid have a gasket that seals?	-					•
10. No water in the flushmount?					<del></del>	
11. is the well cap lockable?						
12. Is there a lock present?		7			· · ·	
12. Is there a lock present?						
All Branch vines 185 - II.		k1	NA 1			
All Monitoring Wells	Yes	No	NA			
Downhole Condition						
12. Water level measuring point clearly marked?		<del></del>				
13. No obstructions in well?				****	<u></u>	
14. No plant roots or vegetation in well?						
15. No sediment in bottom of well?						
If present, how much sediment?	ft					
16. installed as total depth.	ft					
17. Measured total depth of well.	ft					
General Condition	Yes	No	NA			
18. Concrete pad installed?						
19 Concrete pad		٠	<u> </u>			
Slope away form casing?			~			
Not deteriorated?						
Not heaved or below surrounding grade?				The transfer and advanced		
20. No surface seal settling?						
21. Well clearly visible and labeled?						
Comments:	<u></u>	-	·			14-1
Needs newlock					<del>12</del>	
* Major well repair are those that require a subcontr	actor or sena	rate mobili	zation to cor	nolete		
major wentepen die grose unactequire a subcolla	accor or scho	, are mount				

	man aft		i i		PROJECT IN	FORMATIO	Attaches to	SANCE CONTRACTOR	general services	iger kaltin (jór erákkult þeigi í þ kinn s	en production of the second
[	Site:	rmilic	n			Client:	NR				
Project Num	nber:			Task #:		Start Date:	7.13	3 · 17		Time:	1255
Field Persor	nnel: T_M	4this J	is mps	<i>8</i> /\		Finish Date:	7.13	17		_ Time:	1300
1	NELL INFOR				* . •		EVENT	TYPE	n de la companya de l		
	Well ID:	1W6R		Well Develop	ment	<u> </u>		ow Stress Sar	mpling		
С	asing ID:		inches		Approach San		Other (Specify				
		e de la companya de La companya de la co	WAT	ER QUALIT	Y INDICATO	R PARAMET	ERS (conti	nued)			
		Volume	Depth to				SEC or	Dissolved			
Sampling	Time	Removed	Water	Drawdown	Temp.	рH	Cond.	Oxygen	Turbidity	ORP	Visua.
Stage	(military)	(gations)	(Feet)	(Feet)	(*C)	(SU)	(µs/cm)	(mg/L)	(NTU)	(mV1	Clarity
	1256	0	7.58								·
	1258	.13	7.58	0	16.90	7.5 <i>5</i>	2-80	1.43.0	3.0	-54	clear
	1300	,26	758	0	16.85	7.36	561	1.27	1.8	-64	Clear
	1302	.39	7.58	0	17.02	7,29	557	1.23	2.4	-69	clear
	1304	o52	7-58	6	16.64	7,24	559	1.01	2.7	-72	<u>clear</u>
	1306	.65	7:58	0	16.48	7,25	558	0.94	2.3	1-74	clear
			•								
											· ;
			NOTES (	continued)		e de la companya de l			ABBREVIA	TIONS	
· · · · · · · · · · · · · · · · · · ·								Cond Actual Condu FT BTOC - Feet Belon na - Not Applicable nm - Not Measured	clivity	ORP - Oxidation-Re SEC - Specific Elec SU - Standard Units Temp - Temperatur "C - Degrees Selciu	irical Cosductance : e
	•			·		·					

Low-Flow Sampling Form

Site	Vermilian	Major woli	s repairs* r	equired	Yes	,No⁄	NA		
Inspection Date	7.12.17		n well integ		163	<del>  ````</del>	117		
Well Number	MINER	to manitan	is wen nire8	itys					
well Rumber 1	"IW & K								
						_			
1	up Monitoring Wells			γ	<u>Comments</u>				
1. Outer protective	Casing	Yes	No	NA					
Not corroded									
Not dented			\ <u> </u>	ľ					
Not cracked				<u> </u>					
Not loose									
ļ									
2. Inner casing		Yes	No	NA					
Not corroded					· · · · · · · · · · · · · · · · · · ·				
Not dented					****				
Not cracked			<del></del> -				<del></del>		
Not loose									
1400 10036		Yes	No	NA					
2 4	Canton and an article	res	INO	IVA					
1	oles in outer casing?				·····	<del></del>	·		
4. Weep holes able			ļ						
5. Is there a lockabl	· ·	/			·				
6. Is there a lock pro						····			
7. Bumper posts in	good condition?								
Flushme	ount Monitoring Wells	Yes	No	NA					
8. Can the lid be sed									
1	a gasket that seals?								
10. No water in the	_		<del></del>						
11. Is the well cap le		<b></b>							
12. Is there a lock p			<u> </u>						
12. IS there a lock p	resenti	L	ļ <u>.</u>						
ATT	Adaminantus tätalla	Yes	No	NA I					
1	Monitoring Wells	res	No	INA .		***************************************			
Downhole Condition				<del> </del>					
	asuring point clearly marked?	<u> </u>	<u> </u>						
13. No obstructions		ļ	ļ			···-			
	or vegetation in well?								
15. No sediment in						<del>,</del>			
1 ' '	much sediment?	ft							
16. Installed as tota	l depth.	ft	}						
17. Measured total	depth of well.	ft							
			•						
General Condition		Yes	No	NA					
18. Concrete pad In	stalled?	······································		1 1					
19 . Concrete pad		]	5						
Slope away form	n casing?								
Not deteriorated						· · · · · · · · · · · · · · · · · · ·			
	elow surrounding grade?								
		-	<del> </del> -						
20. No surface seal	_	<del></del>	<del> </del> -						
21. Well clearly visil	ole and labeled?		L	<u> </u>			···		
Comments:	<b></b>								
Needs	new lock				·		···-		
* Major well repair	are those that require a subconti	ractor or sepa	arate mobil	ization to co	mplete				

	r. I: T: Maf	milion his J.S	Simeson	Task #:		Client: Start Date:	NRT 7.13.1	7		Time: /0	35
Field Personne WE	: T. Mat	his J.S	timeson	Task #:		Start Date:	7.13.1	7		Time: ///	35
WE		his J.	imoson								
	Ti Biron		, , , , , , , , , , , , , , , , , , ,	<u></u>		Finish Date:	7.13.17	7		Time:	15
LAI	TT INLOK	MATION					EVENT	TYPE	CARREL CANADA		
VV	ell ID: //	W8R		Well Develop	ment			ow Stress Sam	pling		
Casi	ng ID;			Well Volume /		<u> </u>	Other (Specify)				
***	\$1.50 		WAT	ER QUALITY	INDICATO	R PARAMET	ERS (contir	nued)			
		Volume	Depth to				SEC or	Dissolved			Į.
Sampling	Time	Removed	Water	Drawdown	Temp.	рH	Cond.	Oxygen	Turbidity	ORP	Visual
Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	(NTU)	(m\/)	Clarity
	035	0	12.70	A 41	1-7 0 0	777	1100	A A /	<del>-11</del>	/:	
	1039	,13	12.91	0.2)	11.30	7.62	1180	2.26	<u> 5.7</u>	-//	CLEAR
	1043	,26	12.9/	-2	16.88	1.17	1590	1.59	5.8	-143	ckar
	047	, 39	12.91		15.99	7.98	16/0	1.23	5.0	-164	CleAR
	1051	.52	12.95	0.04	15.71	8.27	1730	1.06	4.7	-192	clear
	1055	.65	12.45	Q	15.37	8.45	1730	0.93	4.1	- 208	clear
	1059	.78	12.95	Ó	15.31	8.58	1740	0.89	3.3	211	clear
	1103	.91	12.73	0	15.16	<u> </u>	1776	0-83	2-7	- 224	c)ear
	1107	1,04	12.95	0	15.11	8.71	1740	0.96	4.9	-227	clear
		( f f	12.95	0	15.03	8 75	1790	0.97	3.5	-229	clear
	1112	1.30	12.95	0	17.79	8.78	1750	0.94	2.7	- 231	ceap
	-									<del>                                     </del>	<u></u> [: 
										<u> </u>	
. A	_		NOTES (c	ontinued)	\$ 11.0				ABBREVIA		
								Cond, - Actual Conduc FT BTOC - Feet Below na - Not Applicable nm - Not Measured		ORP - Oxidation-Reduce SEC - Specific Electric SU - Standard Units Tamp - Temperature *C - Degrees Colcks	

Low-Flow Sampling Form MVV-1

Low-Flow Sampling Form

site Vermilian	Major well	s repairs* i	equired	Yes	No	NA
Inspection Date 7.13-17	to maintair		-			
Well Number MWI9			,, ,		1	<del></del>
<u> </u>						
Stick-up Monitoring Wells					Comments	
1. Outer protective Casing	Yes	No	NA		ALL STREET, ST	
Not corroded	1 7				<u> </u>	
Not dented						
Not cracked					<u></u>	
Not loose						
Not loose		<u> </u>			• .	•
2. Inner casing	Yes	No	NA NA			
Not corroded					<del></del>	
Not dented ,					····	·
Not cracked						
Not loose						
Not loose	Yes	No	NA NA			
3. Are there weep holes in outer casing?	Tes	140	I NA			
4. Weep holes able to drain?	ļ					
1 · · · · · · · · · · · · · · · · · · ·						
5. Is there a lockable cap present?						
6. Is there a lock present?			<u> </u>			· · · · · · · · · · · · · · · · · · ·
7. Bumper posts in good condition?			<u> </u>			
Flushmount Monitoring Wells	Yes	No	l NA			
8. Can the lid be secured tightly?	165	NO	NA	·		
9. Does the lid have a gasket that seals?						
10. No water in the flushmount?	ļ					
(	<u> </u>					
11. Is the well cap lockable?	ļ					
12. Is there a lock present?	L					
All Monitoring Wells	Yes	No	NA I			
Downhole Condition	162	NO	11/4			
12. Water level measuring point clearly marked?			1	***********		<del></del>
13. No obstructions in well?						
14. No plant roots or vegetation in well?	<u> </u>					
15. No sediment in bottom of well?	-				<del></del>	
			L			
If present, how much sediment?	ft					
16. Installed as total depth.	ft					
17. Measured total depth of well.	ft					
General Condition	Yes	No	NA I			
18. Concrete pad installed?	103	140	1477		<del>.</del>	
19 . Concrete pad installed?	<del></del>					
l '						
Slope away form casing? Not deteriorated?						
		·····				
Not heaved or below surrounding grade?			ł		· · · · · · · · · · · · · · · · · · ·	
20. No surface seal settling?					<u> </u>	
21. Well clearly visible and labeled?		l				<del></del>
Comments:	<del>,</del>				<del> </del>	<del></del>
Needs New lock						
 				. 1 .	····	-
* Major well repair are those that require a subcont	ractor or sepa	rate mobili	zation to co	mplete		

				<del></del>	····	
Site Vermilion	Major wells			Yes	No	NA
Inspection Date <u>7./2./7</u>	to maintain	well integ	rity?	VV	OLEGA .	·
Well Number <u>MW9</u>				7	<i>V</i> '	
Stick-up Monitoring Wells					<u>Comments</u>	
1. Outer protective Casing	Yes	No	NA			
Not corroded						
Not dented						
Not cracked						1.
Not loose				Ver	1/005e	- 7
	1			7	<del>/</del>	
2. Inner casing	Yes	No	NA			
Not corroded			1,1,1			
Not dented					<u> </u>	
Not cracked						
Not loose					<u>, , , , , , , , , , , , , , , , , , , </u>	
Not loose	V <sub>2</sub>	B1 -	N. A			
2. And the consequence is the state of the consequence.	Yes	No	NA NA			
3. Are there weep holes in outer casing?					<del> </del>	
1. Weep holes able to drain?					<del>,</del>	
5. Is there a lockable cap present?				210	ne_	
6. Is there a lock present?						
7. Bumper posts in good condition?						
Flushmount Monitoring Wells	Yes	No	NA _			
8. Can the lid be secured tightly?						
9. Does the lid have a gasket that seals?						
10. No water in the flushmount?				, , <del>, , , , , , , , , , , , , , , , , </del>		· · · · · · · · · · · · · · · · · · ·
11. Is the well cap lockable?						
12. Is there a lock present?						
			· · · · · · · · · · · · · · · · · · ·			
All Monitoring Wells	Yes	No	NA			
Downhole Condition	1,05					·
12. Water level measuring point clearly marked?				<u> </u>		
13. No obstructions in well?						
14. No plant roots or vegetation in well?						
15. No sediment in bottom of well?	<u> </u>			···	<del></del>	<del></del>
If present, how much sediment?	ft			***************************************		
I	ft					
16. Installed as total depth.						
17. Measured total depth of well.	ft					
Comment Committee			1			
General Condition	Yes	No	NA NA			······································
18. Concrete pad installed?		<u></u>				**************************************
19 . Concrete pad			<u> </u>			
Slope away form casing?						
Not deteriorated?		rajovi i	[ [			
Not heaved or below surrounding grade?						
20. No surface seal settling?						•
21. We'll clearly visible and labeled?						
Comments:						
Needs lock						
* Major well repair are those that require a subcont	ractor or sopa	rate mobili	zation to co	mplete		

Site	Vermilian	Major well	s repairs* r	equired	Yes	No	NA
Inspection Date	VENTUITION	to maintair	-			•	
Well Number	M11 20				<u> </u>		L
	1.110						
Stic	k-up Monitoring Wells					Comments	
1. Outer protoctiv	<del></del>	Yes	No	NA	1		•
Not corroded							
Not dented				† · · · · · · · · · · · · · · · · · · ·		<del></del>	50 · <u></u>
Not cracked							
Not loose				·	<del></del>	······································	·
Not loose		<u> </u>		, L	<u> </u>		
2. Inner casing		Yes	No	NA	1		
Not corroded				1771			·
Not denled					<del></del>	· · · · · · · · · · · · · · · · · · ·	
Not cracked					<del> </del>	·	
Not loose		<del></del>		<del>                                     </del>			
Not loose		7/22	<b>N</b> 1-	NIA.	<u> </u>		
2 4 - 4	hataa ta autaa aaitaa 2	Yes	No	NA			
	holes in outer casing?	<u> </u>					
4. Weep holes abl		<b></b>				·····	
5. Is there a locka	* *						
6. Is there a lock p					eut	·····	
7. Bumper posts i	n good condition?						
				T	1		
	nount Monitoring Wells	Yes	No	NA			
8. Can the lid be s	= •						
	e a gasket that seals?						
10. No water in th							
11. Is the well cap						<u>-</u>	
12. Is there a lock	present?	L					
1							
	II Monitoring Wells	Yes	No	NA			
Downhole Condit							
	easuring point clearly marked?						~ ~
13. No obstruction	ns in well?						
14. No plant roots	or vegetation in well?	·		//			
15. No sediment i	n bottom of well?						
If present, how	/ much sediment?	ft					
16. Installed as to	tal depth.	ft					•
17. Measured tota	al depth of well.	ft					
ļ					_		
General Condition	า	Yes	No	NA			
18. Concrete pad	installed?						
19 . Concrete pad							
Slope away for	m casing?		1 11 2 11 11 11 11 11 11 11 11 11 11 11				
Not deteriorat							
1	below surrounding grade?						
20. No surface sea						·-···	. ,
21. Well clearly vis	——————————————————————————————————————						··········
Comments:							······································
0/22	c in lock installa	1					***
1 Veta	V- IOOK INGINIC	<del></del>					***************************************
* Major well repa	ir are those that require a subcontra	actor or sepa	rate mobil	ization to co	mplete		

	Ser Service	· · · · · · · · · · · · · · · · · · ·		.∡ÓSER UNA	FORMATION	V.			1.177 Y 1.172 Y 1.27	
ite: <u>Vev</u>	milion				Client:	<u>NRT</u>				
er:			Task #:		Start Date:	7 · /3	3 - 17		Time:	1320
nel: <u>7. //\</u> 0	MHIS J	Simpso	^		Finish Date:	7 - / -	3-17		_ Time: _=	1404
IELL INFOR	MATION				1/8/27/14/2015	EVENT	TYPE			
Well ID://	1W20		Well Develop	nkent		Low-Flow / L	ow Stress San	pling		,
sing ID:		inches	Well Volume	Approach San	npling 🗌	Other (Specify	):		, ,	
		WAT	ER QUALIT	Y INDICATO	RPARAMET	ERS (conti	nued)			
	Volume	Depth to				SEC or	Dissolved			
Time	Removed	Water	Drawdown	Temp.	pН	Cond.	Oxygen	Turbidity	ORP	Visuai
(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	(NTU)	(mV)	Clarity
1320	0	14.31								
1323		14.31	0							
1326	,26	14.31	0							
1329	.39	14 31	0							
1332		14.31	0	24.38	7.68	343	0.27	132	53	51- cloud
1335	.65	14.31	0	24.01	7.51	343	1.06	109	-48	st cloud
		14.31	0	23.65	7.44	341	1.00	108	-46	51.01040
1341	.91	14.31	0	23-14	7-44	341	1.57	50.1	-35	clear
345	.94	14.31	0	23.00	7.39	343	0.73	45.5	×36	clear
	1.07		0		7.36	344	0.70		-37	clear
	1.20		70			363	0.73	108	=37	clear
			O	20.14	7.49		2.18	72		cleen
			Ö	20.64	7.28	·-··		741	-3	clean
	1.59	14.31	0	20.75	7.25		0.69	70.7	-32	clear
		NCTES	continued)				Y to deposit	ABBREVIA	TIONS	ja sa
hs only	for f	irs+th	rce rea	ding de	ueto 5	ample	Cond Actual Conduc FT BTOC - Feet Below na - Not Applicable nm - Not Measured	tivity		fca: Conductance
	Time (military) 1320 1323 1324 1335 1338 1345 1348 1357 1400	Time Removed (gallons) 1320 O 1323 13 1324 26 1338 78 1345 94 1345 94 1345 94 1357 1-46 1400 1.59	Time   Volume   Peth to   Peth to	Time Removed (gallons) (Feet)	Column   C	Finish Date:   T.Mathis   J.Simpson   Finish Date:   FELL INFORMATION   Well ID:   MW20   Well Development   Well Volume Approach Sampling   WATER QUALITY INDICATOR PARAMET   Water   Drawdown   Temp.   pH   (military)   (gallons)   (Feet)   (Feet)   (°C)   (SU)     (320	Time   Removed   Peet   Peet	Time   Removed   Water   Drawdown   Temp.   PH   Cond.   Con	Time   Noting   Not	ELL INFORMATION

ow-Flow Sampling Form IW-1 Low-Flow Sampling Form

1 m	STARTED AND STATES				ROJECTIN	FORMATION			部隊は、いちに	A second	145 / 14:43 mg /
;	Site: Ver	rmilion	<u> </u>			Client:	NRT				
Project Num	ber:			Task#:		Start Date:	7.13			Time:	320
Field Persor	nnel: TrM	uthis:	J. Simf	son		Finish Date:.	7-12	3-17		Time:	1409
	VELL INFOR	RMATION				3,480,660	EVENT	TYPE			
	Well ID:	MW20		Well Develop	ment	1	Low-Flow / Lo	ow Stress Sar	npling		
C	asing ID:		inches 🔲	Well Volume	Approach San	npling 🔲	Other (Specify)				
	4.3		WAT	ER QUALIT	Y INDICATO	RPARAMET	ERS (conti	nued) 📜			
		Volume	Depth to				SEC or	Dissolved			_
Sampling	Time	Removed	Water	Drawdown	Temp.	pН	Cond.	Oxygen	Turbidity	CRP	V:sua
Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	(NTU)	(mV)	Carity
	1403	1.12	14-31	0_	20.85	7.22	371	0.64	45.9	-32	clear
	1406	1.85	14.31	0	20.73	7.25	368	0.6	47.3	-34	CRAK
	1409	1.98	14.31	0	20.54	7.25	364_	0.61	55.5	-34	CRAR
									ļ		
										ļ	
										ļ	
		Ì	l								
		1,744	NOTES (	ontinued)			* ***		ABBREVIA	TIONS	
			-					Cond Actual Condu FT BTOC - Feet Belon na - Not Applicable nm - Not Measured	ctivity	ORP - Oxidation-Red SEC - Specific Electr SU - Standard Units Temp - Temperature *C - Degrees Celclus	

Site Varmilion	_	s repairs* r		Yes	No	NA
Inspection Date 7./2 ·/7	to maintai	n well integ	rîty?			
Well Number Mw34						
Stick-up Monitoring Wells					Comments	
1. Outer protective Casing	Yes	No	NA			
Not corroded						
Not dented			Ţ			
Not cracked						
Not loose						
	<u> </u>	· · · · · · · · · · · · · · · · · · ·		<del></del>		
2. Inner casing	Yes	No	NA			
Not corroded				·····		
Not dented						
Not cracked			1 1		<del></del>	· · · · · · · · · · · · · · · · · · ·
Not loose			<del>  </del>			·
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Yes	No	NA NA			
3. Are there weep holes in outer casing?	, , , ,					
4. Weep holes able to drain?				<del></del>		
5. Is there a lockable cap present?						
6. Is there a lock present?			<del>                                     </del>			
7. Bumper posts in good condition?	<del></del>		<del>                                     </del>			
7. Bumper posts in good condition?	<u> </u>		<u></u>		<del></del>	
Flushmount Monitoring Wells	Yes	No	NA 🗵			
	162	INO	NA -			
8. Can the lid be secured tightly?						
9. Does the lid have a gasket that seals?	<u> </u>					
10. No water in the flushmount?	<u> </u>					
11. Is the well cap lockable?	ļ					·
12. Is there a lock present?						
A 11 A 4 2	V	4.1	1 314			
All Monitoring Wells	Yes	No	NA NA			
Downhole Condition			<del> </del>	· · · · · · · · · · · · · · · · · · ·		
12. Water level measuring point clearly marked?						
13. No obstructions in well?	<b> </b>					
14. No plant roots or vegetation in well?						
15. No sediment in bottom of well?						
If present, how much sediment?	ft					
16. Installed as total depth.	ft					
17. Measured total depth of well.	ft					
	<u> </u>					
General Condition	Yes	No	NA	<del></del>		
18. Concrete pad installed?						
19 . Concrete pad	<u> </u>		<u> </u>			
Slope away form casing?					<u>.</u>	
Not deteriorated?			<u>                                     </u>			
Not heaved or below surrounding grade?						
20. No surface seal settling?						
21. Well clearly visible and labeled?						
Comments:	<del></del>	· · · · · · · · · · · · · · · · · · ·				
	era estable consiste in the con-	: / Biolished Be	*** > 1 E 1 E 1 G · E *********************************		,	
* Major well repair are those that require a subcontr	actor or sepa	rate mobili	zation to con	plete		

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### WELL DEVELOPMENT AND GROUNDWATER SAMPLING FIELD FORM

	PACT PY		N.	SCOTO DE SOL	ROJECTIN	FORMATION	1887年1997年	同类概定的	<b>副秦阳</b> 时间 250	THE RESIDENCE	18 THE RESERVE OF THE PARTY.
	Site: /e	rmilio:	<u> </u>			Client:	NRT				
Project Num				Task #:		Start Date:		・1フ		Time:	1416
Field Persor	nnel: <u>T - M</u> ø	ethis_	J-5im	250 X		Finish Date:	<u></u>	- 17		Time:/	501
1	WELL INFOR	RMATION					EVENT	TYPE			
	Well ID: /	NW34		Well Develop	ment			ow Stress San	pling		
	asing ID:		inches	Well Volume	Approach Sam	npling	Other (Specify	):			
	- 1.5-1.1		WAT	ER QUALIT	Y INDICATOR	R PARAMET	ERS (conti	nued)			
		Volume	Depth to				SEC or	Dissolved			
Sampling	Time	Removed	Water	Drawdown	Temp.	pН	Cond.	Oxygen	Turbidity	ORF	√isua
Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	(NTU)	mV)	Clarity Clarity
	1416	$\frac{Q}{Q}$	14,12								
	14/9	,  3	14.24	0.12							
	1422	.26	14-24	0							
	1425	.39	14.27	. 03			····				
	1428	.52	14.27		16.44	7.22	610	1.39	259	-101	cloudy
	1431	, 65	MIS-77	0	15.68	7.26	615	1.39	243	-104	cloudy
	1434	_78_	14.54.27	. 07	15.33	7.27	619	1.06	222	-108	cloudy
	1437	.91	14.34	0	15.14	7.28	620	2.31	130	-111	clouder
	1440	1.04	14.37	.03	14.80	7.28	619	3.21	100	-112	cloudy
	1443	1.17	14.37		14.44	7.29	615	0.78	109	-114	Cloude
	1446	1.30	14.37	0	14.62	7.29	615	3.23	77.4	-115	cloudy
	1449	.43	14.37	0	13.98	7.29	621	3.59	66.0	-116	Clear
	1452	1.56	14.42	.05	13.46	7.29	622	3.46	56.0	-117	clean
	1455	1.69	14.42	40	13.83	7.35	627	1.54	49.0	-113	clear
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	lepth o	nly de	ne to	clarifi	4			Cond Actual Conduc FT BTOC - Feet Below na - Not Applicable nm - Not Measured	tivity	ORP - Oxidation-Redi SEC - Specific Electri SJ - Standard Units Temp - Temperature *C - Degrees Celcius	
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ļ		asing ID:				Approach Sar	<del> </del>	Other (Specify				
l		74.5		WAT	ER QUALIT	Y INDICATO	R PARAMET	ERS (conti	nued)			
ı			Volume	Depth to				SEC or	Dissolved			1
	Sampling	Time	Removed	Water	Drawdown	Temp.	pН	Cond.	Oxygen	Turbidity	ORP	Visual
, I	Stage	(mistary)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	(NTU)	(m\n/)	Clarity
m	1450	1458	1.82	14.42		13.89	7.31	622	5.83	49.3	1-119	Clear
m	19 1501	1501	1.95	14.42	0_	14.25	7.29	<u>le18</u>	6-17	48.7	1-115	Clear
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Low-Flow Sampling Form MW-1

Low-Flow Sampling Form

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:	Site: <u> </u>	rmilici	1			Client:	NRT				
Project Num				Task #:			7.13.1	i7		Time: 1	122
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٧	VELL INFO										
		1W3R		Well Develop				ow Stress San	npling		
C	asing ID:		inches	Well Volume	Approach San	npling	Other (Specify)	):			
	**		WA	TER QUALITY	/ INDICATO	RPARAMET	ERS (contir	nued)	k I		
		Volume	Depth to				SEC or	Dissolved			
Sampling	Time	Removed	Water	Drawdown	Temp.	рН	Cond.	Oxygen	Turbidity	ORP	Visual
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1000	的物质性的			注意:於其變數F	ROJECTIN	FORMATION	Man will be	物质聚盐剂	管理を作うで	37% or 1777-17	<b>学</b> 图 2015年1
;	Site: 💛 🛭	umili	cn			Client:	NR7				
Project Num				Task #:		Start Date:	7-13-	-17		_ Time _	1256
Field Persor	nnel: <u>F/ //</u>	athis	Jesiv	npson		Finish Date:	7-13	-17		Time	1306
	NELL INFO			enders of the serve			EVENT	TYPE		an ang ang ang ang ang ang ang ang ang a	
	Well ID:	MW6R		Well Develop				ow Stress San	npling		
			iaches	Well Volume			Other (Specify				
	. 1 <sup>74.4</sup>		WA	TER QUALITY	INDICATO	R PARAMET	ERS (conti	nued)			
Sampling Stage	Time (military)	Volume Removed (gallons)	Depth to Water (Feet)	Drawdown (Feet)	Temp.	pH (SU)	SEC or Cond. (µs/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	CRIP	Visual Clarity
Glage	1306	. 65	7.58	O	16.48	7.25	558	0.94	2.3	-74	clear
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Low-Flow Sampling Form MW-1

Low-Flow Sampling Form

# Field Calibration Form Groundwater Quality Meter

Serial Number	lity Meter Manufacture on potential, dissolved c	r/Model <u>HoozizA u S2</u> oxygen, pH, tubidity		;
Date of Calibration Check	Calibration Standard Concentration	Calibration Reading	Within +/_ 10% (yes or no)	Comments
7-12-17-	7.00 14	7.01	465	
1700	HeO .	14.01		
	10.00	9.99		
	1412 - Caus	1420		
	0 turi3	6.1	1/	
	100% 00	94.6%	YES	
7-12-17	3	4.04	1	
7-17-17	1412	1440		
	O TWEB	0.3		
	100% 100	103.4		
71317	7.00	6.98	485	
0630	4.00	400	í	
	10.00	10.02		
	1412	1400		
	i b	1 1.4		
	100%	101.10%	YES	
7-13-17	7.00	7.02	197	
1600	7.00 1412	1390		
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	100%	9817 16		
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September 22, 2017

Steve Wiskes Natural Resource Technology, Inc. 2.422 East Washington Street Suite 104

Bloomington, IL 61704 TEL: (414) 837-3614 FAX: (414) 837-3608

RE: Dynegy - Vermillion Power Station

Dear Steve Wiskes:

TEKLAB, INC received 20 samples on 9/14/2017 3:55:00 PM for the analysis presented in the following report.

Samples are analyzed on an as received basis unless otherwise requested and documented. The sample results contained in this report relate only to the requested analytes of interest as directed on the chain of custody. NELAP accredited fields of testing are indicated by the letters NELAP under the Certification column. Unless otherwise documented within this report, Teklab Inc. analyzes samples utilizing the most current methods in compliance with 40CFR. All tests are performed in the Collinsville, IL laboratory unless otherwise noted in the Case Narrative.

All quality control criteria applicable to the test methods employed for this project have been satisfactorily met and are in accordance with NELAP except where noted. The following report shall not be reproduced, except in full, without the written approval of Teklab, Inc.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Michael L. Austin Project Manager (618)344-1004 ex 16

MAustin@teklabinc.com



WorkOrder: 17090414

Page 1 of 41



# **Report Contents**

http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 17090414

Client Project: Dynegy - Vermillion Power Station

Report Date: 22-Sep-17

### This reporting package includes the following:

Cover Letter	1
Report Contents	2
Definitions	3
Case Narrative	4
Accreditations	5
Laboratory Results	6
Sample Summary	24
Dates Report	25
Quality Control Results	34
Receiving Check List	41
Chain of Custody	Appended



### **Definitions**

http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 17090414

Client Project: Dynegy - Vermillion Power Station

Report Date: 22-Sep-17

#### Abbr Definition

- CCV Continuing calibration verification is a check of a standard to determine the state of calibration of an instrument between recalibration.
  - DF Dilution factor is the dilution performed during analysis only and does not take into account any dilutions made during sample preparation. The reported result is final and includes all dilutions factors.
- DNI Did not ignite
- DUP I aboratory duplicate is an aliquot of a sample taken from the same container under laboratory conditions for independent processing and analysis independently of the original aliquot.
- ICV Initial calibration verification is a check of a standard to determine the state of calibration of an Instrument before sample analysis is initiated.
- IDPH IL Dept. of Public Health
- LCS Laboratory control sample, spiked with verified known amounts of analytes, is analyzed exactly like a sample to establish intra laboratory or analyst specific precision and bias or to assess the performance of all or a portion of the measurement system. The acceptable recovery range is in the QC Package (provided upon request).
- LCSD Laboratory control sample duplicate is a replicate laboratory control sample that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
- MBLK Method blank is a sample of a matrix similar to the batch of associated sample (when available) that is free from the analytes of interest and is processed simultaneously with and under the same conditions as samples through all steps of the analytical procedures, and in which no target analytes or interferences should present at concentrations that impact the analytical results for sample analyses.
- MDL Method detection limit means the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero.
- MS Matrix spike is an aliquot of matrix fortified (spiked) with known quantities of specific analytes that is subjected to the entire analytical procedures in order to determine the effect of the matrix on an approved test method's recovery system. The acceptable recovery range is listed in the QC Package (provided upon request).
- MSD Matrix spike duplicate means a replicate matrix spike that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
- MW Molecular weight
- ND Not Detected at the Reporting Limit
- NELAP NELAP Accredited
  - PQL Practical quantitation limit means the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operation conditions. The acceptable recovery range is listed in the QC Package (provided upon request).
  - RL The reporting limit the lowest level that the data is displayed in the final report. The reporting limit may vary according to customer request or sample dilution. The reporting limit may not be less than the MDL.
  - RPD Relative percent difference is a calculated difference between two recoveries (ie. MS/MSD). The acceptable recovery limit is listed in the QC Package (provided upon request).
  - SPK The spike is a known mass of target analyte added to a blank sample or sub-sample; used to determine recovery deficiency or for other quality control purposes.
  - Surr Surrogates are compounds which are similar to the analytes of interest in chemical composition and behavior in the analytical process, but which are not normally found in environmental samples.
  - TIC Tentatively identified compound: Analytes tentatively identified in the sample by using a library search. Only results not in the calibration standard will be reported as tentatively identified compounds. Results for tentatively identified compounds that are not present in the calibration standard, but are assigned a specific chemical name based upon the library search, are calculated using total peak areas from reconstructed ion chromatograms and a response factor of one. The nearest Internal Standard is used for the calculation. The results of any TICs must be considered estimated, and are flagged with a "T". If the estimated result is above the calibration range it is flagged "ET"
- TNTC Too numerous to count ( > 200 CFU )

#### Qualifiers

- # Unknown hydrocarbon
- E Value above quantitation range
- I Associated internal standard was outside method criteria
- ND Not Detected at the Reporting Limit
- S Spike Recovery outside recovery limits
- X Value exceeds Maximum Contaminant Level

- B Analyte detected in associated Method Blank
- H Holding times exceeded
- M Manual Integration used to determine area response
- R RPD outside accepted recovery limits
- T TIC(Tentatively identified compound)



### Case Narrative

http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 17090414

Client Project: Dynegy - Vermillion Power Station

Report Date: 22-Sep-17

Cooler Receipt Temp: 2.02 °C

An employee of Teklab, Inc. collected the sample(s).

MW7 could not be collected; the well was dry TW1 could not be collected; the well was inaccessable

### Locations

	Collinsville		Springfield	Kansas City		
Address	5445 Horseshoe Lake Road	Address	3920 Pintail Dr	Address	8421 Nieman Road	
	Collinsville, IL 62234-7425		Springfield, IL 62711-9415		Lenexa, KS 66214	
Phone	(618) 344-1004	Phone	(217) 698-1004	Phone	(913) 541-1998	
Fax	(618) 344-1005	Fax	(217) 698-1005	Fax	(913) 541-1998	
Email	jhriley@teklabinc.com	Email	KKlostermann@teklabinc.com	Email	jhriley@teklabinc.com	
	Collinsville Air		Chicago			
Address	5445 Horseshoe Lake Road	Address	1319 Butterfield Rd.			
	Collinsville, IL 62234-7425		Downers Grove, IL 60515			
Phone	(618) 344-1004	Phone	(630) 324-6855			
Fax	(618) 344-1005	Fax				
Email	EHurley@teklabinc.com	Email	jhriley@teklabinc.com			



## Accreditations

http://www.teklabinc.com/

Client:	Natural Resource Technology, Inc.	Work Order: 1	7090414
Client Project:	Dynegy - Vermillion Power Station	Report Date: 2	2-Sep-17

State	Dept	Cert#	NELAP	Exp Date	Lab
Illinois	IEPA	100226	NELAP	1/31/2018	Collinsville
Kansas	KDHE	E-10374	NELAP	4/30/2018	Collinsville
Louisiana	LDEQ	166493	NELAP	6/30/2018	Collinsville
Louisiana	LDEQ	166578	NELAP	6/30/2018	Collinsville
Texas	TCEQ	T104704515-12-1	NELAP	7/31/2018	Collinsville
Arkansas	ADEQ	88-0966		3/14/2018	Collinsville
Illinois	IDPH	17584		5/31/2019	Collinsville
Indiana	ISDH	C-IL-06		1/31/2018	Collinsville
Kentucky	KDEP	98006		12/31/2017	Collinsville
Kentucky	UST	0073		1/31/2018	Collinsville
Louisiana	LDPH	LA170027		12/31/2017	Collinsville
Missouri	MDNR	930		1/31/2018	Collinsville
Missouri	MDNR	00930		5/31/2017	Collinsville
Oklahoma	ODEQ	9978		8/31/2018	Collinsville
Tennessee	TDEC	04905		1/31/2018	Collinsville



# **Laboratory Results**

http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 17090414

Client Project: Dynegy - Vermillion Power Station

Report Date: 22-Sep-17

Lab ID: 17090414-001

Client Sample ID: MW1

Matrix: GROUNDWATER Collection Date: 09/13/2017 13:43

MARCHAN GROOMBY	Matrix: GROOMBUATER			Concertion Bate. 05/15/2017 15.45							
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch			
FIELD ELEVATION MEAS	UREMENTS										
Depth to water from measuring	ng point	O		78.92	ft	- 3)	09/13/2017 13.43	R237894			
STANDARD METHOD 450	0-H B FIELD										
рН		1.00		7.18		1	09/13/2017 13:43	R237894			
STANDARD METHODS 2	130 B FIELD										
Turbidity		1.0		< 1.0	NTU	1	09/13/2017 13:43	R237894			
STANDARD METHODS 18	TH ED. 2580 B FIELD										
Oxidation-Reduction Potentia	1	-300		105	mV	1	09/13/2017 13:43	R237894			
STANDARD METHODS 25	10 B FIELD										
Conductivity		1		1910	µS/cm	1	09/13/2017 13:43	R237894			
STANDARD METHODS 25	50 B FIELD										
Temperature		0		18.57	°C	1	09/13/2017 13:43	R237894			
STANDARD METHODS 45	00-O G FIELD										
Oxygen, Dissolved		1.00		5.97	mg/L	1	09/13/2017 13:43	R237894			
STANDARD METHODS 25	40 C (DISSOLVED)										
Total Dissolved Solids	NELAP	20		2040	mg/L	1	09/18/2017 15:19	R237825			
STANDARD METHODS 45	00-NO3 F (TOTAL)										
Nitrogen, Nitrate (as N)	NELAP	0.050		0.356	mg/L	1	09/15/2017 10:35	R237724			
SW-846 9036 (TOTAL)											
Sulfate	NELAP	500		995	mg/L	50	09/18/2017 19:04	R237776			
SW-846 9214 (DISSOLVED	0)										
Fluoride	NELAP	0.10		0.13	mg/L	1	09/15/2017 15:07	R237726			
SW-846 9251 (TOTAL)											
Chloride	NELAP	5		22	mg/L	1	09/18/2017 18:56	R237801			
SW-846 3005A, 6020A, ME	TALS BY ICPMS (DISS	OLVED)									
Arsenic	NELAP	0.0010		< 0.0010	mg/L	5	09/15/2017 22:53	134180			
Barium	NELAP	0.0010		0.0122	mg/L	5	09/15/2017 22:53	134180			
Boron	NELAP	0.0250		1.06	mg/L	5	09/15/2017 22:53	134180			
Iron	NELAP	0.0250		< 0.0250	mg/L	5	09/15/2017 22:53	134180			
Manganese	NELAP	0.0010		< 0.0010	mg/L	5	09/15/2017 22:53	134180			
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	09/15/2017 22:53	134180			



http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 17090414

Client Project: Dynegy - Vermillion Power Station

Report Date: 22-Sep-17

Lab ID: 17090414-002

Client Sample ID: MW2

Matrix: GROUNDWATER Collection Date: 09/14/2017 11:04

Matrix: GROUNDY	VATER			Conceilor	1 Date: 09/	17/2.017	11.07	
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEAS	UREMENTS							
Depth to water from measuri	ng point	0		19.19	ft	1	09/14/2017 11:04	R237894
STANDARD METHOD 450	0-H B FIELD							
рН		1.00		7.72		1	09/14/2017 11:04	R237894
STANDARD METHODS 2	130 B FIELD							
Turbidity		1.0		< 1.0	NTU	1	09/14/2017 11:04	R237894
STANDARD METHODS 18	TH ED. 2580 B FIELD							
Oxidation-Reduction Potentia	al	-300		-110	mV	1	09/14/2017 11:04	R237894
STANDARD METHODS 25	10 B FIELD							
Conductivity		1		699	μS/cm	1	09/14/2017 11:04	R237894
STANDARD METHODS 25	550 B FIELD							
Temperature		0		14.66	°C	1	09/14/2017 11:04	R237894
STANDARD METHODS 45	500-O G FIELD			224000				
Oxygen, Dissolved		1.00		< 1.00	mg/L	1	09/14/2017 11:04	R237894
STANDARD METHODS 25	540 C (DISSOLVED)	7 200						
Total Dissolved Solids	NELAP	20		530	mg/L	1	09/18/2017 15:19	R237825
STANDARD METHODS 45	500-NO3 F (TOTAL)							
Nitrogen, Nitrate (as N)	NELAP	0.050		< 0.050	mg/L	1	09/15/2017 10:37	R237724
SW-846 9036 (TOTAL)		7.000						
Sulfate	NELAP	10		20	mg/L	1	09/18/2017 19:07	R237776
SW-846 9214 (DISSOLVEI	D)							0.0000000000000000000000000000000000000
Fluoride	NELAP	0.10		0.62	mg/L	1	09/15/2017 15:13	R237726
SW-846 9251 (TOTAL)						-		
Chloride	NELAP	10		49	mg/L	2	09/18/2017 19:15	R237801
SW-846 3005A, 6020A, ME	ETALS BY ICPMS (DISS	OLVED)						
Arsenic	NELAP	0.0010		0.0077	mg/L	5	09/15/2017 23:01	134180
Barium	NELAP	0.0010		0.182	mg/L	5	09/15/2017 23:01	134180
Boron	NELAP	0.0250		0.260	mg/L	5	09/15/2017 23:01	134180
Iron	NELAP	0.0250		0.283	mg/L	5	09/15/2017 23:01	134180
Manganese	NELAP	0.0010		0.0920	mg/L	5	09/15/2017 23:01	134180
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	09/15/2017 23:01	134180



http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 17090414

Client Project: Dynegy - Vermillion Power Station

Report Date: 22-Sep-17

Lab ID: 17090414-004

Client Sample ID: MW10

Matrix: GROUNDWATER Collection Date: 09/14/2017 9:02

	211 = 11							
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
<b>FIELD ELEVATION MEAS</b>	UREMENTS							
Depth to water from measuring	ng point	0		50.95	ft	1	09/14/2017 9:02	R237894
STANDARD METHOD 450	0-H B FIELD						111111111111111111111111111111111111111	
pН		1.00		6.68		1	09/14/2017 9:02	R237894
STANDARD METHODS 2	130 B FIELD							
Turbidity		1.0		< 1.0	NTU	1	09/14/2017 9:02	R237894
STANDARD METHODS 18	TH ED. 2580 B FIELD							
Oxidation-Reduction Potentia	1	-300		137	mV	1	09/14/2017 9:02	R237894
STANDARD METHODS 25	10 B FIELD							
Conductivity		1		1110	μS/cm	1	09/14/2017 9:02	R237894
STANDARD METHODS 25	50 B FIELD							
Temperature	N. J. A.	0		14.80	°C	1	09/14/2017 9:02	R237894
STANDARD METHODS 45	00-O G FIELD							
Oxygen, Dissolved		1.00		6.63	mg/L	1	09/14/2017 9:02	R237894
STANDARD METHODS 25	40 C (DISSOLVED)							
Total Dissolved Solids	NELAP	20		1020	mg/L	1	09/18/2017 15:20	R237825
STANDARD METHODS 45	00-NO3 F (TOTAL)							
Nitrogen, Nitrate (as N)	NELAP	0.050		0.208	mg/L	1	09/15/2017 10:39	R237724
SW-846 9036 (TOTAL)								
Sulfate	NELAP	100		281	mg/L	10	09/18/2017 19:48	R237776
SW-846 9214 (DISSOLVE)	0)							
Fluoride	NELAP	0.10		0.15	mg/L	1	09/15/2017 15:15	R237726
SW-846 9251 (TOTAL)	Section 2							
Chloride	NELAP	5		8	mg/L	1	09/18/2017 19:39	R237801
SW-846 3005A, 6020A, ME	TALS BY ICPMS (DISS	SOLVED)						
Arsenic	NELAP	0.0010		< 0.0010	mg/L	5	09/15/2017 23:09	134180
Barium	NELAP	0.0010		0.0704	mg/L	5	09/15/2017 23:09	
Boron	NELAP	0.0250		0.0861	mg/L	5	09/15/2017 23:09	
Iron	NELAP	0.0250		< 0.0250	mg/L	5	09/15/2017 23:09	
Manganese	NELAP	0.0010		0.131	mg/L	5	09/15/2017 23:09	
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	09/15/2017 23:09	134180



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Client: Natural Resource Technology, Inc.

Work Order: 17090414

Client Project: Dynegy - Vermillion Power Station

Report Date: 22-Sep-17

Lab ID: 17090414-005

Client Sample ID: MW17

Matrix: GROUNDWATER Collection Date: 09/13/2017 14:12

Matrix: GROUNDW	MILK		Confection Date: 09/15/2017 14:12					
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEAS	UREMENTS							
Depth to water from measuring	ng point	0		39.55	ft	1	09/13/2017 14:12	R237894
STANDARD METHOD 450	0-H B FIELD							
pH		1.00		6.95		1	09/13/2017 14:12	R237894
STANDARD METHODS 2	130 B FIELD							
Turbidity		1.0		3.2	NTU	1	09/13/2017 14:12	R237894
STANDARD METHODS 18	TH ED. 2580 B FIELD						1//0-	
Oxidation-Reduction Potentia	d	-300		-38	mV	1	09/13/2017 14:12	R237894
STANDARD METHODS 25	10 B FIELD							
Conductivity		1		1880	μS/cm	1	09/13/2017 14:12	R237894
STANDARD METHODS 25	50 B FIELD							
Temperature		0		17.68	°C	1	09/13/2017 14:12	R237894
STANDARD METHODS 45	00-O G FIELD							
Oxygen, Dissolved		1.00		1.39	mg/L	1	09/13/2017 14:12	R237894
STANDARD METHODS 25	40 C (DISSOLVED)							
Total Dissolved Solids	NELAP	20		1970	mg/L	1	09/18/2017 15:20	R237825
STANDARD METHODS 45	00-NO3 F (TOTAL)							
Nitrogen, Nitrate (as N)	NELAP	0.050		0.275	mg/L	1	09/15/2017 10:44	R237724
SW-846 9036 (TOTAL)								
Sulfate	NELAP	500		1020	mg/L	50	09/18/2017 19:56	R237776
SW-846 9214 (DISSOLVE	0)							
Fluoride	NELAP	0.10		0.17	mg/L	1	09/15/2017 15:21	R237726
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		35	mg/L	1	09/18/2017 19:48	R237801
SW-846 3005A, 6020A, ME	TALS BY ICPMS (DISS	OLVED)						
Arsenic	NELAP	0.0010		0.0012	mg/L	5	09/15/2017 23:17	134180
Barium	NELAP	0.0010		0.0240	mg/L	5	09/15/2017 23:17	134180
Boron	NELAP	0.0250		5.24	mg/L	5	09/15/2017 23:17	134180
Iron	NELAP	0.0250		2.11	mg/L	5	09/15/2017 23:17	134180
Manganese	NELAP	0.0010		0.601	mg/L	5	09/15/2017 23:17	134180
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	09/15/2017 23:17	134180



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Client: Natural Resource Technology, Inc.

Work Order: 17090414

Client Project: Dynegy - Vermillion Power Station

Report Date: 22-Sep-17

Lab ID: 17090414-006

Client Sample ID: MW18

Matrix: GROUNDWATER

Collection Date: 09/13/2017 14:29

Matrix: GROUNDY	VAILK			Concentor	Date: 09/	13/2017	14.29	
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEAS	UREMENTS							
Depth to water from measuri	ng point	0		25.70	ſL	1	09/13/2017 14.29	R237894
STANDARD MFTHOD 450	0-H B FIFL D				310111111111111111111111111111111111111			
pH		1.00		6.88		1	09/13/2017 14 29	R237894
STANDARD METHODS 2	130 B FIELD							
Turbidity		1.0		< 1.0	NTU	1	09/13/2017 14:29	R237894
STANDARD METHODS 18	TH ED. 2580 B FIELD							
Oxidation-Reduction Potentia	al .	-300		27	mV	1	09/13/2017 14:29	R237894
STANDARD METHODS 25	10 B FIELD							
Conductivity		1		1620	μS/cm	1	09/13/2017 14:29	R237894
STANDARD METHODS 25	550 B FIELD							
Temperature		0		13.32	°C	1	09/13/2017 14:29	R237894
STANDARD METHODS 45	00-O G FIELD							
Oxygen, Dissolved		1.00		< 1.00	mg/L	1	09/13/2017 14:29	R237894
STANDARD METHODS 25	640 C (DISSOLVED)							
Total Dissolved Solids	NELAP	20		1650	mg/L	1	09/18/2017 15:21	R237825
STANDARD METHODS 45	500-NO3 F (TOTAL)							
Nitrogen, Nitrate (as N)	NELAP	0.050		< 0.050	mg/L	1	09/15/2017 10:46	R237724
SW-846 9036 (TOTAL)								
Sulfate	NELAP	200		784	mg/L	20	09/18/2017 20:04	R237776
SW-846 9214 (DISSOLVE)	D)							
Fluoride	NELAP	0.10		0.12	mg/L	1	09/15/2017 15:24	R237726
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		23	mg/L	1	09/18/2017 19:56	R237801
SW-846 3005A, 6020A, MI	ETALS BY ICPMS (DISS	OLVED)						
Arsenic	NELAP	0.0010		0.0014	mg/L	5	09/15/2017 23:26	134180
Barium	NELAP	0.0010		0.0161	mg/L	5	09/15/2017 23:26	134180
Boron	NELAP	0.0250		4.42	mg/L	5	09/15/2017 23:26	134180
Iron	NELAP	0.0250		0.0749	mg/L	5	09/15/2017 23:26	134180
Manganese	NELAP	0.0010		1.47	mg/L	5	09/15/2017 23:26	134180
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	09/15/2017 23:26	134180



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Client: Natural Resource Technology, Inc.

Work Order: 17090414

Client Project: Dynegy - Vermillion Power Station

Report Date: 22-Sep-17

Lab ID: 17090414-007

Client Sample ID: MW21

Matrix: GROUNDWATER Collection Date: 09/13/2017 13:15

Matrial GROOMBY	MILIX	Concetton Bate. 05/15/2017 15:15						
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEAS	UREMENTS							
Depth to water from measuring	ng point	0		90.04	ft	1	09/13/2017 13:15	R237894
STANDARD METHOD 450	0-H B FIELD							
pH		1.00		7.33		1	09/13/2017 13:15	R237894
STANDARD METHODS 2	130 B FIELD							
Turbidity		1.0		< 1.0	NTU	1	09/13/2017 13:15	R237894
STANDARD METHODS 18	TH ED. 2580 B FIELD							
Oxidation-Reduction Potentia	ıl	-300		-46	mV	1	09/13/2017 13:15	R237894
STANDARD METHODS 25	10 B FIELD							
Conductivity		1		516	μS/cm	1	09/13/2017 13:15	R237894
STANDARD METHODS 25	550 B FIELD							
Temperature		0		17.49	°C	1	09/13/2017 13:15	R237894
STANDARD METHODS 45	00-O G FIELD							
Oxygen, Dissolved		1.00		2.49	mg/L	1	09/13/2017 13:15	R237894
STANDARD METHODS 25	40 C (DISSOLVED)					100		
Total Dissolved Solids	NELAP	20		400	mg/L	1	09/18/2017 15:21	R237825
STANDARD METHODS 45	00-NO3 F (TOTAL)							
Nitrogen, Nitrate (as N)	NELAP	0.050		0.052	mg/L	1	09/15/2017 10:55	R237724
SW-846 9036 (TOTAL)								
Sulfate	NELAP	10	S	18	mg/L	1	09/18/2017 20:06	R237776
MS did not recover within cont	rol limits. Result is verified l	by re-analysis a	at a dilution	1.				
SW-846 9214 (DISSOLVEI	D)							
Fluoride	NELAP	0.10		1.16	mg/L	1	09/15/2017 15:26	R237726
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		< 5	mg/L	1	09/18/2017 20:04	R237801
SW-846 3005A, 6020A, ME	ETALS BY ICPMS (DISS	SOLVED)						
Arsenic	NELAP	0.0010		0.0305	mg/L	5	09/15/2017 23:34	134180
Barium	NELAP	0.0010		0.0898	mg/L	5	09/15/2017 23:34	134180
Boron	NELAP	0.0250		0.773	mg/L	5	09/15/2017 23:34	134180
Iron	NELAP	0.0250		0.327	mg/L	5	09/15/2017 23:34	134180
Manganese	NELAP	0.0010		0.113	mg/L	5	09/15/2017 23:34	
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	09/15/2017 23:34	134180



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Client: Natural Resource Technology, Inc.

Work Order: 17090414

Client Project: Dynegy - Vermillion Power Station

Report Date: 22-Sep-17

Lab ID: 17090414-009

Client Sample ID: MW3R

Matrix: GROUNDWATER Collection Date: 09/14/2017 10:18

	111-11					The second second	- Insulation - Insulation	
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEAS	UREMENTS							
Depth to water from measuring	ng point	0		8.17	ft	1	09/14/2017 10:18	R237894
STANDARD METHOD 450	0-H B FIELD							
pH		1.00		7.23		1	09/14/2017 10:18	R237894
STANDARD METHODS 2	130 B FIELD							
Turbidity		1.0		< 1.0	NTU	1	09/14/2017 10:18	R237894
STANDARD METHODS 18	TH ED. 2580 B FIELD							
Oxidation-Reduction Potentia	l	-300		-108	mV	1	09/14/2017 10:18	R237894
STANDARD METHODS 25	10 B FIELD							
Conductivity		1		806	μS/cm	1	09/14/2017 10:18	R237894
STANDARD METHODS 25	50 B FIELD							
Temperature		0		16.65	°C	1	09/14/2017 10:18	R237894
STANDARD METHODS 45	00-O G FIELD							
Oxygen, Dissolved		1.00		< 1.00	mg/L	1	09/14/2017 10:18	R237894
STANDARD METHODS 25	40 C (DISSOLVED)							
Total Dissolved Solids	NELAP	20		698	mg/L	1	09/18/2017 15:21	R237825
STANDARD METHODS 45	00-NO3 F (TOTAL)							
Nitrogen, Nitrate (as N)	NELAP	0.050		< 0.050	mg/L	1	09/15/2017 11:08	R237724
SW-846 9036 (TOTAL)								
Sulfate	NELAP	50		144	mg/L	5	09/18/2017 20:58	R237776
SW-846 9214 (DISSOLVED	0)							
Fluoride	NELAP	0.10		0.50	mg/L	1	09/15/2017 15:32	R237726
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		27	mg/L	1	09/18/2017 20:50	R237801
SW-846 3005A, 6020A, ME	TALS BY ICPMS (DISS	SOLVED)						
Arsenic	NELAP	0.0010		0.0077	mg/L	5	09/15/2017 23:42	134180
Barium	NELAP	0.0010		0.179	mg/L	5	09/15/2017 23:42	134180
Boron	NELAP	0.0250		3.70	mg/L	5	09/15/2017 23:42	134180
Iron	NELAP	0.0250		2.39	mg/L	5	09/15/2017 23:42	
Manganese	NELAP	0.0010		0.0413	mg/L	5	09/15/2017 23:42	
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	09/15/2017 23:42	134180



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Client: Natural Resource Technology, Inc.

Work Order: 17090414

Client Project: Dynegy - Vermillion Power Station

Report Date: 22-Sep-17

Lab ID: 17090414-010

Client Sample ID: MW4

Matrix: GROUNDWATER Collection Date: 09/13/2017 16:38

Matrix: GROUNDWATER Conection Date: 09/13/2017 10:36								
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEAS	UREMENTS							
Depth to water from measuring	ng point	0		8.34	ft	1	09/13/2017 16.38	R237804
STANDARD METHOD 450	0-H B FIELD							
pH		1.00		7.50		1	09/13/2017 16:38	R237894
STANDARD METHODS 2	130 B FIELD							
Turbidity		1.0		< 10	NTU	1	09/13/2017 16:38	R237894
STANDARD METHODS 18	TH ED. 2580 B FIELD							
Oxidation-Reduction Potentia	al	-300		-115	mV	1	09/13/2017 16:38	R237894
STANDARD METHODS 25	10 B FIELD							
Conductivity		î		507	μS/cm	1	09/13/2017 16:38	R237894
STANDARD METHODS 25	550 B FIELD							
Temperature		0		15.54	°C	1	09/13/2017 16:38	R237894
STANDARD METHODS 45	500-O G FIELD							
Oxygen, Dissolved		1.00		< 1.00	mg/L	1	09/13/2017 16:38	R237894
STANDARD METHODS 25	540 C (DISSOLVED)							
Total Dissolved Solids	NELAP	20		428	mg/L	1	09/18/2017 15:21	R237825
STANDARD METHODS 45	500-NO3 F (TOTAL)							
Nitrogen, Nitrate (as N)	NELAP	0.050		< 0.050	mg/L	1	09/15/2017 11:17	R237724
SW-846 9036 (TOTAL)								
Sulfate	NELAP	20		69	mg/L	2	09/18/2017 21:06	R237776
SW-846 9214 (DISSOLVE)	D)							
Fluoride	NELAP	0.10		0.30	mg/L	1	09/15/2017 15:35	R237726
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		11	mg/L	1	09/18/2017 20:58	R237801
SW-846 3005A, 6020A, ME	ETALS BY ICPMS (DISS	OLVED)						
Arsenic	NELAP	0.0010		0.0056	mg/L	5	09/15/2017 23:50	134180
Barium	NELAP	0.0010		0.271	mg/L	5	09/15/2017 23:50	134180
Boron	NELAP	0.0250		6.48	mg/L	5	09/15/2017 23:50	134180
Iron	NELAP	0.0250		0.915	mg/L	5	09/15/2017 23:50	134180
Manganese	NELAP	0.0010		0.547	mg/L	5	09/15/2017 23:50	134180
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	09/15/2017 23:50	134180



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Client: Natural Resource Technology, Inc.

Work Order: 17090414

Client Project: Dynegy - Vermillion Power Station

Report Date: 22-Sep-17

Lab ID: 17090414-011

Client Sample ID: MW5

Matrix: GROUNDWATER Collection Date: 09/14/2017 9:48

Matrix: GROONDY	VATER			Conceilor	1 Date. 03/	1 1/201/	5. 10	
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEAS	UREMENTS							
Depth to water from measuri	ng point	0		9.73	ft	1	09/14/2017 9:48	R237894
STANDARD METHOD 450	0-H B FIELD							
pll		1.00		7.26		1	09/14/2017 9:48	R237894
STANDARD METHODS 2	130 B FIELD							
Turbidity		1.0		< 1.0	NTU	1	09/14/2017 9:48	R237894
STANDARD METHODS 18	3TH ED. 2580 B FIELD							
Oxidation-Reduction Potentia	al	-300		68	mV	1	09/14/2017 9:48	R237894
STANDARD METHODS 25	510 B FIELD							
Conductivity		1		696	μS/cm	1	09/14/2017 9:48	R237894
STANDARD METHODS 25	550 B FIELD							
Temperature		0		15.21	°C	1	09/14/2017 9:48	R237894
STANDARD METHODS 45	500-O G FIELD							
Oxygen, Dissolved		1.00		< 1.00	mg/L	1	09/14/2017 9:48	R237894
STANDARD METHODS 25	540 C (DISSOLVED)							
Total Dissolved Solids	NELAP	20		634	mg/L	1	09/18/2017 15:22	R237825
STANDARD METHODS 45	500-NO3 F (TOTAL)							
Nitrogen, Nitrate (as N)	NELAP	0.050		< 0.050	mg/L	1	09/15/2017 11:19	R237724
SW-846 9036 (TOTAL)								
Sulfate	NELAP	100		262	mg/L	10	09/18/2017 21:30	R237776
SW-846 9214 (DISSOLVE	D)							
Fluoride	NELAP	0.10		0.51	mg/L	1	09/15/2017 15:38	R237726
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		12	mg/L	1	09/18/2017 21:22	R237801
SW-846 3005A, 6020A, M	ETALS BY ICPMS (DISS	OLVED)						
Arsenic	NELAP	0.0010		< 0.0010	mg/L	5	09/15/2017 23:58	134180
Barium	NELAP	0.0010		0.0248	mg/L	5	09/15/2017 23:58	134180
Boron	NELAP	0.0250		17.2	mg/L	5	09/15/2017 23:58	
Iron	NELAP	0.0250		< 0.0250	mg/L	5	09/15/2017 23:58	
Manganese	NELAP	0.0010		0.325	mg/L	5	09/15/2017 23:58	
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	09/15/2017 23:58	134180



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Client: Natural Resource Technology, Inc.

Work Order: 17090414

Client Project: Dynegy - Vermillion Power Station

Report Date: 22-Sep-17

Lab ID: 17090414-012

Client Sample ID: MW6R

Matrix: GROUNDWATER Collection Date: 09/13/2017 14:55

Matrix. GROUNDWATER Concentration Date: 03/13/2017 14:33								
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEAS	UREMENTS							
Depth to water from measuring	ng point	0		9.79	ft	1	09/13/2017 14:55	R237894
STANDARD METHOD 450	0-H B FIELD							
pH		1.00		6.93		1	09/13/2017 14:55	R237894
STANDARD METHODS 2	130 B FIELD							
Turbidity		1.0		< 1.0	NTU	1	09/13/2017 14:55	R237894
STANDARD METHODS 18	TH ED. 2580 B FIELD							
Oxidation-Reduction Potentia	il	-300		-44	mV	1	09/13/2017 14:55	R237894
STANDARD METHODS 25	10 B FIELD							
Conductivity		1		698	μS/cm	1	09/13/2017 14:55	R237894
STANDARD METHODS 25	50 B FIELD					-		
Temperature		0		15.19	°C	1	09/13/2017 14:55	R237894
STANDARD METHODS 45	00-O G FIELD							
Oxygen, Dissolved		1.00		< 1.00	mg/L	1	09/13/2017 14:55	R237894
STANDARD METHODS 25	40 C (DISSOLVED)							
Total Dissolved Solids	NELAP	20		546	mg/L	1	09/18/2017 15:22	R237825
STANDARD METHODS 45	00-NO3 F (TOTAL)							
Nitrogen, Nitrate (as N)	NELAP	0.050		< 0.050	mg/L	1	09/15/2017 11:21	R237724
SW-846 9036 (TOTAL)								
Sulfate	NELAP	20		68	mg/L	2	09/18/2017 21:38	R237776
SW-846 9214 (DISSOLVEI	0)							
Fluoride	NELAP	0.10		0.17	mg/L	1	09/15/2017 15:43	R237726
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		12	mg/L	1	09/18/2017 21:30	R237801
SW-846 3005A, 6020A, ME	ETALS BY ICPMS (DISS	OLVED)						
Arsenic	NELAP	0.0010		< 0.0010	mg/L	5	09/16/2017 0:07	134180
Barium	NELAP	0.0010		0.0807	mg/L	5	09/16/2017 0:07	134180
Boron	NELAP	0.0250		0.234	mg/L	5	09/19/2017 10:41	134180
Iron	NELAP	0.0250		0.0924	mg/L	5	09/16/2017 0:07	134180
Manganese	NELAP	0.0010		0.225	mg/L	5	09/16/2017 0:07	134180
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	09/16/2017 0:07	134180



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Client: Natural Resource Technology, Inc.

Work Order: 17090414

Client Project: Dynegy - Vermillion Power Station

Report Date: 22-Sep-17

Lab ID: 17090414-013

Client Sample ID: MW8R

Matrix: GROUNDWATER Collection Date: 09/14/2017 10:39

Matrix: GROUNDWATER Confection Date: (17) 17/2017					10.55			
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEAS	UREMENTS							
Depth to water from measuring	ng point	0		13.80	ft	1	09/14/2017 10:39	R237894
STANDARD METHOD 450	0-H B FIELD							
pH		1.00		8.37		1	09/14/2017 10:39	R237894
STANDARD METHODS 2	130 B FIELD							
Turbidity		10		< 1.0	NTU	1	09/14/2017 10:39	R237894
STANDARD METHODS 18	TH ED. 2580 B FIELD							
Oxidation-Reduction Potentia	al .	-300		-159	mV	1	09/14/2017 10:39	R237894
STANDARD METHODS 25	10 B FIELD							
Conductivity		1		1980	μS/cm	1	09/14/2017 10:39	R237894
STANDARD METHODS 25	550 B FIELD							
Temperature		0		14.73	°C	1	09/14/2017 10:39	R237894
STANDARD METHODS 45	00-O G FIELD							
Oxygen, Dissolved		1.00		4.96	mg/L	1	09/14/2017 10:39	R237894
STANDARD METHODS 25	640 C (DISSOLVED)							
Total Dissolved Solids	NELAP	20		2080	mg/L	1	09/18/2017 15:22	R237825
STANDARD METHODS 45	500-NO3 F (TOTAL)							
Nitrogen, Nitrate (as N)	NELAP	0.050		< 0.050	mg/L	1	09/15/2017 11:24	R237724
SW-846 9036 (TOTAL)								
Sulfate	NELAP	500		1210	mg/L	50	09/18/2017 21:46	R237776
SW-846 9214 (DISSOLVE)	D)							
Fluoride	NELAP	0.10		< 0.10	mg/L	1	09/15/2017 15:45	R237726
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		18	mg/L	1	09/18/2017 21:38	R237801
SW-846 3005A, 6020A, MI	ETALS BY ICPMS (DISS	OLVED)		100				
Arsenic	NELAP	0.0010		0.0098	mg/L	5	09/16/2017 0:31	134180
Barium	NELAP	0.0010		0.0464	mg/L	5	09/16/2017 0:31	134180
Boron	NELAP	1.00		52.8	mg/L	200	09/18/2017 18:47	
Iron	NELAP	0.0250		0.0610	mg/L	5	09/16/2017 0:31	134180
Manganese	NELAP	0.0010		0.0720	mg/L	5	09/16/2017 0:31	
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	09/16/2017 0:31	134180



Matrix: GROUNDWATER

#### **Laboratory Results**

http://www.teklabinc.com/

Client: Natural Resource Technology, Inc. Work Order: 17090414

Client Project: Dynegy - Vermillion Power Station Report Date: 22-Sep-17

Lab ID: 17090414-014 Client Sample ID: MW9

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEAS	UREMENTS							
FIELD ELEVATION MEASUREMENTS  Dopth to water from measuring point		0		10.09	ft	1	00/13/2017 11:42	R237894

Collection Date: 09/13/2017 11:42



http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 17090414

Client Project: Dynegy - Vermillion Power Station

Report Date: 22-Sep-17

Lab ID: 17090414-015

Client Sample ID: MW19

Matrix: GROUNDWATER Collection Date: 09/13/2017 11:48

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASI	JREMENIS							
Depth to water from measuring	IELD ELEVATION MEASUREMENTS Depth to water from measuring point			10.13	ft	1	09/13/2017 11:48	R237894



#### http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 17090414

Client Project: Dynegy - Vermillion Power Station

Report Date: 22-Sep-17

Lab ID: 17090414-016

Client Sample ID: MW20

Matrix: GROUNDWATER Collection Date: 09/13/2017 15:39

Matrix: GROUNDY	VALLE	Conection Date: (14) 15/2017 15:59							
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch	
FIELD ELEVATION MEAS	UREMENTS								
Depth to water from measuri	ng point	0		15.47	ft	1	09/13/2017 15:39	R237804	
STANDARD METHOD 450	0-H B FIELD								
pH		1.00		7.07		1	09/13/2017 15:39	R237894	
STANDARD METHODS 2	130 B FIELD								
Turbidity		1.0		10.0	NTU	1	09/13/2017 15:39	R237894	
STANDARD METHODS 18	BTH ED. 2580 B FIELD								
Oxidation-Reduction Potentia	al	-300		-27	mV	1	09/13/2017 15:39	R237894	
STANDARD METHODS 25	510 B FIELD								
Conductivity		1		487	μS/cm	1	09/13/2017 15:39	R237894	
STANDARD METHODS 25	550 B FIELD								
Temperature		0		13.56	°C	1	09/13/2017 15:39	R237894	
STANDARD METHODS 45	500-O G FIELD								
Oxygen, Dissolved		1.00		< 1.00	mg/L	1	09/13/2017 15:39	R237894	
STANDARD METHODS 25	540 C (DISSOLVED)								
Total Dissolved Solids	NELAP	20		392	mg/L	1	09/18/2017 15:22	R237825	
STANDARD METHODS 45	500-NO3 F (TOTAL)								
Nitrogen, Nitrate (as N)	NELAP	0.050		< 0.050	mg/L	1	09/15/2017 11:28	R237724	
SW-846 9036 (TOTAL)							3.00		
Sulfate	NELAP	20		60	mg/L	2	09/18/2017 21:54	R237776	
SW-846 9214 (DISSOLVE	D)								
Fluoride	NELAP	0.10		< 0.10	mg/L	1	09/15/2017 15:48	R237726	
SW-846 9251 (TOTAL)									
Chloride	NELAP	5		< 5	mg/L	1	09/18/2017 21:46	R237801	
SW-846 3005A, 6020A, MI	ETALS BY ICPMS (DISS	OLVED)							
Arsenic	NELAP	0.0010		< 0.0010	mg/L	5	09/16/2017 0:40	134180	
Barium	NELAP	0.0010		0.0229	mg/L	5	09/16/2017 0:40	134180	
Boron	NELAP	0.0250		0.422	rng/L	5	09/18/2017 19:44	134180	
Iron	NELAP	0.0250		0.321	mg/L	5	09/16/2017 0:40	134180	
Manganese	NELAP	0.0010		0.0293	mg/L	5	09/16/2017 0:40		
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	09/16/2017 0:40	134180	



http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 17090414

Client Project: Dynegy - Vermillion Power Station

Report Date: 22-Sep-17

Lab ID: 17090414-017

Client Sample ID: MW34

Matrix: GROUNDWATER Collection Date: 09/13/2017 16:13

Manix: GROONDY	Y/XILIX	Consection 17ates. 03/13/2017 10:13							
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch	
FIELD ELEVATION MEAS	UREMENTS		18/						
Depth to water from measuri	ng point	0		14.71	ft	1	09/13/2017 16:13	R237894	
STANDARD MFTHOD 450	00-H B FIFL D								
pH		1.00		7.00		1	09/13/2017 16:13	R237894	
STANDARD METHODS 2	130 B FIELD								
Turbidity		1.0		102	NTU	1	09/13/2017 16:13	R237894	
STANDARD METHODS 18	TH ED. 2580 B FIELD								
Oxidation-Reduction Potentia	al	-300		-111	mV	1	09/13/2017 16:13	R237894	
STANDARD METHODS 25	510 B FIELD								
Conductivity		1		679	μS/cm	1	09/13/2017 16:13	R237894	
STANDARD METHODS 25	550 B FIELD								
Temperature		0		12.71	°C	1	09/13/2017 16:13	R237894	
STANDARD METHODS 45	500-O G FIELD	-							
Oxygen, Dissolved		1.00		< 1.00	mg/L	1	09/13/2017 16:13	R237894	
STANDARD METHODS 25	540 C (DISSOLVED)								
Total Dissolved Solids	NELAP	20		494	mg/L	1	09/18/2017 16:02	R237825	
STANDARD METHODS 45	500-NO3 F (TOTAL)								
Nitrogen, Nitrate (as N)	NELAP	0.050		< 0.050	mg/L	1	09/15/2017 11:30	R237724	
SW-846 9036 (TOTAL)									
Sulfate	NELAP	10		< 10	mg/L	1	09/18/2017 21:57	R237776	
SW-846 9214 (DISSOLVE	D)								
Fluoride	NELAP	0.10		0.67	mg/L	1	09/15/2017 15:58	R237726	
SW-846 9251 (TOTAL)									
Chloride	NELAP	5		33	mg/L	1	09/18/2017 21:55	R237801	
SW-846 3005A, 6020A, MI	ETALS BY ICPMS (DISS	OLVED)							
Arsenic	NELAP	0.0010		0.0232	mg/L	5	09/16/2017 0:48	134180	
Barium	NELAP	0.0010		0.146	mg/L	5	09/16/2017 0:48	134180	
Boron	NELAP	0.0250		0.472	mg/L	5	09/18/2017 19:53	134180	
Iron	NELAP	0.0250		5.34	mg/L	5	09/16/2017 0:48	134180	
Manganese	NELAP	0.0010		0.0619	mg/L	5	09/16/2017 0:48	134180	
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	09/16/2017 0:48	134180	



http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 17090414

Client Project: Dynegy - Vermillion Power Station

Report Date: 22-Sep-17

Lab ID: 17090414-018

Client Sample ID: Field Blank

Matrix: GROUNDWATER Collection Date: 09/13/2017 17:00

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
STANDARD METHODS 254	40 C (DISSOLVED)							
Total Dissolved Solids	NELAP	20		< 20	mg/L	1	09/18/2017 16.03	R237825
STANDARD METHODS 45	00-NO3 F (TOTAL)							
Nitrogen, Nitrate (as N)	NELAP	0.060		0.853	mg/L	1	09/15/2017 11:32	R237724
SW-846 9036 (TOTAL)								
Sulfate	NELAP	10		< 10	mg/L	1	09/18/2017 22:00	R237776
SW-846 9214 (DISSOLVED	)							
Fluoride	NELAP	0.10		< 0.10	mg/L	1	09/15/2017 15:59	R237726
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		< 5	mg/L	1	09/18/2017 21:56	R237801
SW-846 3005A, 6020A, ME	TALS BY ICPMS (DISS	OLVED)						
Arsenic	NELAP	0.0010		< 0.0010	mg/L	5	09/16/2017 0:56	134180
Barium	NELAP	0.0010		< 0.0010	mg/L	5	09/16/2017 0:56	134180
Boron	NELAP	0.0250		< 0.0250	mg/L	5	09/18/2017 20:01	134180
Iron	NELAP	0.0250		< 0.0250	mg/L	5	09/16/2017 0:56	134180
Manganese	NELAP	0.0010		< 0.0010	mg/L	5	09/16/2017 0:56	134180
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	09/16/2017 0:56	134180



http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 17090414

Client Project: Dynegy - Vermillion Power Station

Report Date: 22-Sep-17

Lab ID: 17090414-019

Client Sample ID: DUP1

Matrix: GROUNDWATER Collection Date: 09/13/2017 14:29

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Ratch
FIELD ELEVATION MEAS		ALL .	Annı	Acoust	CHILD		zate manjibu	
Depth to water from measuring		0		25.70	ft	i	09/13/2017 14.20	R237894
STANDARD METHOD 450				20170			00,10,2011,11120	
pH	0-11 1/1 11 11 1/	1.00		6.88		1	09/13/2017 14.29	R237894
STANDARD METHODS 2	130 B FIELD							
Turbidity		1.0		< 1.0	NTU	1	09/13/2017 14:29	R237894
STANDARD METHODS 18	TH ED. 2580 B FIELD							
Oxidation-Reduction Potentia	ı	-300		27	mV	1	09/13/2017 14:29	R237894
STANDARD METHODS 25	10 B FIELD							
Conductivity		1		1620	μS/cm	1	09/13/2017 14:29	R237894
STANDARD METHODS 25	50 B FIELD							
Temperature		0		13.32	°C	1	09/13/2017 14:29	R237894
STANDARD METHODS 45	00-O G FIELD	4,0						
Oxygen, Dissolved		1.00		< 1.00	mg/L	1	09/13/2017 14:29	R237894
STANDARD METHODS 25	40 C (DISSOLVED)							
Total Dissolved Solids	NELAP	20		1640	mg/L	1	09/18/2017 16:03	R237825
STANDARD METHODS 45	00-NO3 F (TOTAL)							
Nitrogen, Nitrate (as N)	NELAP	0.050		< 0.050	mg/L	1	09/15/2017 11:46	R237724
SW-846 9036 (TOTAL)								
Sulfate	NELAP	200		789	mg/L	20	09/20/2017 13:08	R237876
SW-846 9214 (DISSOLVE)								
Fluoride	NELAP	0.10		0.12	mg/L	1	09/15/2017 16:02	R237726
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		23	mg/L	1	09/18/2017 22:16	R237801
SW-846 3005A, 6020A, ME	and the second s							
Arsenic	NELAP	0.0010		0.0013	mg/L	5	09/16/2017 1:04	
Barium	NELAP	0.0010		0.0161	mg/L	5	09/16/2017 1:04	412000000
Boron	NELAP	0.0250		4.44	mg/L	5	09/18/2017 20:09	9.5 (d) O/E
Iron	NELAP	0.0250		0.0728	mg/L	5	09/16/2017 1:04	
Manganese	NELAP	0.0010		1.46	mg/L	5	09/16/2017 1:04	
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	09/16/2017 1:04	134180

The follow	ving are attach	nments to the	testimony o	of Andrew Rehi





http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 17090414

Client Project: Dynegy - Vermillion Power Station

Report Date: 22-Sep-17

Lab ID: 17090414-020

Client Sample ID: DUP2

Matrix: GROUNDWATER Collection Date: 09/14/2017 9:48

Matrix. GROUNDY	VATER	Concetton Date: 03/14/2017 9.40							
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch	
FIELD ELEVATION MEAS	UREMENTS								
Depth to water from measuring	ng point	0		9.73	ft	1	00/14/2017 0.48	R237894	
STANDARD METHOD 450	0-H B FIELD								
рН		1.00		7.26		1.	09/14/2017 9:48	R237894	
STANDARD METIIODS 2	130 B FIELD		1000					9	
Turbidity		1.0		< 1.0	NTU	1	09/14/2017 9:48	R237894	
STANDARD METHODS 18	TH ED. 2580 B FIELD								
Oxidation-Reduction Potentia		-300		68	mV	1	09/14/2017 9:48	R237894	
STANDARD METHODS 25	10 B FIELD								
Conductivity		1		696	μS/cm	1	09/14/2017 9:48	R237894	
STANDARD METHODS 25	550 B FIELD	***							
Temperature		0		15.21	°C	1	09/14/2017 9:48	R237894	
STANDARD METHODS 45	00-O G FIELD								
Oxygen, Dissolved		1.00		< 1.00	mg/L	1	09/14/2017 9:48	R237894	
STANDARD METHODS 25	640 C (DISSOLVED)								
Total Dissolved Solids	NELAP	20		602	mg/L	1	09/18/2017 16:03	R237825	
STANDARD METHODS 45	00-NO3 F (TOTAL)	***************************************			***************************************				
Nitrogen, Nitrate (as N)	NELAP	0.050		< 0.050	mg/L	1	09/15/2017 11:48	R237724	
SW-846 9036 (TOTAL)									
Sulfate	NELAP	100		278	mg/L	10	09/20/2017 13:11	R237876	
SW-846 9214 (DISSOLVEI	D)								
Fluoride	NELAP	0.10		0.49	mg/L	1	09/15/2017 16:03	R237726	
SW-846 9251 (TOTAL)									
Chloride	NELAP	5		11	mg/L	1	09/18/2017 22:24	R237801	
SW-846 3005A, 6020A, ME	ETALS BY ICPMS (DISS	OLVED)							
Arsenic	NELAP	0.0010		< 0.0010	mg/L	5	09/16/2017 1:12	134180	
Barium	NELAP	0.0010		0.0252	mg/L	5	09/16/2017 1:12	134180	
Boron	NELAP	0.0250		20.8	mg/L	5	09/18/2017 20:17	134180	
Iron	NELAP	0.0250		< 0.0250	mg/L	5	09/16/2017 1:12	134180	
Manganese	NELAP	0.0010		0.327	mg/L	5	09/16/2017 1:12	134180	
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	09/16/2017 1:12	134180	



Client: Natural Resource Technology, Inc.

Client Project: Dynegy - Vermillion Power Station

# Sample Summary

http://www.teklabinc.com/

Work Order: 17090414

Lab Sample ID	Client Sample ID	Matrix	Fractions	<b>Collection Date</b>
17090414-001	MW1	Groundwater	4	09/13/2017 13:43
17090414-002	MW2	Groundwater	4	09/14/2017 11:04
17090414-003	MW7	Groundwater	4	09/13/2017 11:32
17090414-004	MW10	Groundwater	4	09/14/2017 9:02
17090414-005	MW17	Groundwater	4	09/13/2017 14:12
17090414-006	MW18	Groundwater	4	09/13/2017 14:29
17090414-007	MW21	Groundwater	4	09/13/2017 13:15
17090414-008	TW1	Groundwater	4	09/14/2017 0:00
17090414-009	MW3R	Groundwater	4	09/14/2017 10:18
17090414-010	MW4	Groundwater	4	09/13/2017 16:38
17090414-011	MW5	Groundwater	4	09/14/2017 9:48
17090414-012	MW6R	Groundwater	4	09/13/2017 14:55
17090414-013	MW8R	Groundwater	4	09/14/2017 10:39
17090414-014	MW9	Groundwater	1	09/13/2017 11:42
17090414-015	MW19	Groundwater	1	09/13/2017 11:48
17090414-016	MW20	Groundwater	4	09/13/2017 15:39
17090414-017	MW34	Groundwater	4	09/13/2017 16:13
17090414-018	Field Blank	Groundwater	4	09/13/2017 17:00
17090414-019	DUP1	Groundwater	4	09/13/2017 14:29
17090414-020	DUP2	Groundwater	4	09/14/2017 9:48



#### http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.
Client Project: Dynegy - Vermillion Power Station

Work Order: 17090414 Report Date: 22-Sep-17

Sample ID	Client Sample ID Test Name	Collection Date	Received Date	Prep Date/Time	Analysis Date/Time
17090414 001A	MW1	09/13/2017 13:43	09/14/2017 15:55	Frep Date/Time	Analysis Date/Time
17090414 001A		09/13/2017 13:43	09/14/2017 15:55		00/12/2017 12 12
	Field Elevation Measurements				09/13/2017 13:43
	Standard Method 4500 H B Field				09/13/2017 13:43
	Standard Methods 2130 B Field				09/13/2017 13:43
	Standard Methods 18th Ed. 2580 B Field				09/13/2017 13:43
	Standard Methods 2510 B Field				09/13/2017 13:43
	Standard Methods 2550 B Field				09/13/2017 13:43
	Standard Methods 4500-NO2 B (Total)				09/15/2017 11:22
	Standard Methods 4500-O G Field				09/13/2017 13:43
	SW-846 9036 (Total)				09/18/2017 19:04
17000414 001B	SW-846 9251 (Total)	00/12/2017 12 12	00/14/2017 15 57		09/18/2017 18:56
17090414-001B	MWI	09/13/2017 13:43	09/14/2017 15:55		
	Standard Methods 2540 C (Dissolved)				09/18/2017 15:19
	SW-846 9214 (Dissolved)				09/15/2017 15:07
17090414-001C	MW1	09/13/2017 13:43	09/14/2017 15:55		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			09/14/2017 16:52	09/15/2017 22:53
17090414-001D	MW1	09/13/2017 13:43	09/14/2017 15:55		
	Standard Methods 4500-NO3 F (Total)				09/15/2017 10:35
7090414-002A	MW2	09/14/2017 11:04	09/14/2017 15:55		
	Field Elevation Measurements				09/14/2017 11:04
	Standard Method 4500-H B Field				09/14/2017 11:04
	Standard Methods 2130 B Field				09/14/2017 11:04
	Standard Methods 18th Ed. 2580 B Field				09/14/2017 11:04
	Standard Methods 2510 B Field				09/14/2017 11:04
	Standard Methods 2550 B Field				09/14/2017 11:04
	Standard Methods 4500-NO2 B (Total)				09/15/2017 11:22
	Standard Methods 4500-O G Field				09/14/2017 11:04
	SW-846 9036 (Total)				09/18/2017 19:07
	SW-846 9251 (Total)				09/18/2017 19 15
17090414-002B	MW2	09/14/2017 11:04	09/14/2017 15:55		
	Standard Methods 2540 C (Dissolved)				09/18/2017 15:19
	SW-846 9214 (Dissolved)				09/15/2017 15:13
17090414-002C	MW2	09/14/2017 11:04	09/14/2017 15:55		The Manual Court
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			09/14/2017 16:52	09/15/2017 23.01
17090414-002D	MW2	09/14/2017 11:04	09/14/2017 15:55		



http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 17090414

Client Project: Dynegy - Vermillion Power Station

Sample ID	Client Sample ID	Collection Date	Received Date		
	Test Name			Prep Date/Time	Analysis Date/Time
17090414 004A	MW10	09/14/2017 9.02	09/14/2017 15:55		
	Field Elevation Measurements				09/14/2017 9.02
	Standard Method 4500-II B Field				09/14/2017 9:02
	Standard Methods 2130 B Field				09/14/2017 9:02
	Standard Methods 18th Ed. 2580 B Field				09/14/2017 9:02
	Standard Methods 2510 B Field				09/14/2017 9-02
	Standard Methods 2550 B Field				09/14/2017 9:02
	Standard Methods 4500-NO2 B (Total)				09/15/2017 11:23
	Standard Methods 4500-O G Field				09/14/2017 9:02
	SW-846 9036 (Total)				09/18/2017 19:48
	SW-846 9251 (Total)				09/18/201/ 19:39
17090414-004B	MW10	09/14/2017 9:02	09/14/2017 15:55		
	Standard Methods 2540 C (Dissolved)				09/18/2017 15:20
	SW-846 9214 (Dissolved)				09/15/2017 15:15
17090414-004C	MW10	09/14/2017 9:02	09/14/2017 15:55		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			09/14/2017 16:52	09/15/2017 23:09
17090414-004D	MW10	09/14/2017 9:02	09/14/2017 15:55		
	Standard Methods 4500-NO3 F (Total)				09/15/2017 10:39
17090414-005A	MW17	09/13/2017 14:12	09/14/2017 15:55		
	Field Elevation Measurements				09/13/2017 14:12
	Standard Method 4500-H B Field				09/13/2017 14:12
	Standard Methods 2130 B Field				09/13/2017 14:12
	Standard Methods 18th Ed. 2580 B Field				09/13/2017 14:12
	Standard Methods 2510 B Field				09/13/2017 14:12
	Standard Methods 2550 B Field				09/13/2017 14:12
	Standard Methods 4500-NO2 B (Total)				09/15/2017 11:24
	Standard Methods 4500-O G Field				09/13/2017 14:12
	SW-846 9036 (Total)				09/18/2017 19:56
	SW-846 9251 (Total)				09/18/2017 19:48
17090414-005B	MW17	09/13/2017 14:12	09/14/2017 15:55		
	Standard Methods 2540 C (Dissolved)				09/18/2017 15:20
	SW-846 9214 (Dissolved)				09/15/2017 15:21
17090414-005C	MW17	09/13/2017 14:12	09/14/2017 15:55		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			09/14/2017 16:52	09/15/2017 23:17
17090414-005D	MW17	09/13/2017 14:12	09/14/2017 15:55	57(THAST   10.02	
Carry Carry	Standard Methods 4500-NO3 F (Total)				09/15/2017 10:44
	Standard Michigas 4500-NO3 F (10tal)				09/13/2017 10:44



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Client: Natural Resource Technology, Inc.
Client Project: Dynegy - Vermillion Power Station

Work Order: 17090414 Report Date: 22-Sep-17

Sample ID	Client Sample ID Test Name	Collection Date	Received Date	Prep Date/Time	Analysis Date/Time
17090414-006A	MW18	09/13/2017 14:29	09/14/2017 15:55		
	Field Elevation Measurements				09/13/2017 14:29
	Standard Method 4500-H B Field				09/13/2017 14:29
	Standard Methods 2130 B Field				09/13/2017 14:29
	Standard Methods 18th Ed. 2580 B Field				09/13/2017 14:29
	Standard Methods 2510 B Field				09/13/2017 14:29
	Standard Methods 2550 B Field				09/13/2017 14:29
	Standard Methods 4500-NO2 B (Total)				09/15/2017 11:25
	Standard Methods 4500-O G Field				09/13/2017 14:29
	SW-846 9036 (Total)				09/18/2017 20:04
	SW-846 9251 (Total)				09/18/2017 19:56
17090414-006B	MW18	09/13/2017 14:29	09/14/2017 15:55		
	Standard Methods 2540 C (Dissolved)				09/18/2017 15:21
	SW-846 9214 (Dissolved)				09/15/2017 15:24
17090414-006C	MW18	09/13/2017 14:29	09/14/2017 15:55		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			09/14/2017 16:52	09/15/2017 23:26
17090414-006D	MW18	09/13/2017 14:29	09/14/2017 15:55		
	Standard Methods 4500-NO3 F (Total)				09/15/2017 10:46
17090414-007A	MW21	09/13/2017 13:15	09/14/2017 15:55		
	Field Elevation Measurements				09/13/2017 13:15
	Standard Method 4500-H B Field				09/13/2017 13:15
	Standard Methods 2130 B Field				09/13/2017 13:15
	Standard Methods 18th Ed. 2580 B Field				09/13/2017 13:15
	Standard Methods 2510 B Field				09/13/2017 13:15
	Standard Methods 2550 B Field				09/13/2017 13:15
	Standard Methods 4500-NO2 B (Total)				09/15/2017 11:26
	Standard Methods 4500-O G Field				09/13/2017 13:15
	SW-846 9036 (Total)				09/18/2017 20:06
	SW-846 9251 (Total)				09/18/2017 20:04
17090414-007B	MW21	09/13/2017 13:15	09/14/2017 15:55		
	Standard Methods 2540 C (Dissolved)				09/18/2017 15:21
	SW-846 9214 (Dissolved)				09/15/2017 15:26
17090414-007C	MW21	09/13/2017 13:15	09/14/2017 15:55		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			09/14/2017 16:52	09/15/2017 23.34
17090414-007D	MW21	09/13/2017 13:15	09/14/2017 15:55		
	Standard Methods 4500-NO3 F (Total)				09/15/2017 10:55



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Client: Natural Resource Technology, Inc.

Client Project: Dynegy - Vermillion Power Station

Work Order: 17090414
Report Date: 22-Sep-17

ample ID	Client Sample ID	Collection Date	Received Date		
	Test Name			Prep Date/Time	Analysis Date/Time
17090414 009A	MW3R	09/14/2017 10:18	09/14/2017 15:55		
	Field Elevation Measurements				09/14/2017 10:18
	Standard Method 4500-H B Field				09/14/201/ 10:18
	Standard Methods 2130 B Field				09/14/2017 10:18
	Standard Methods 18th Ed. 2580 B Field				09/14/2017 10:18
	Standard Methods 2510 B Field				09/14/2017 10:18
	Standard Methods 2550 B Field				09/14/2017 10:18
	Standard Methods 4500-NO2 B (Total)				09/15/2017 11:27
	Standard Methods 4500-O G Field				09/14/2017 10:18
	SW-846 9036 (Total)				09/18/2017 20:58
	SW-846 9251 (Total)				09/18/2017 20:50
17090414-009B	MW3R	09/14/2017 10:18	09/14/2017 15:55		
	Standard Methods 2540 C (Dissolved)				09/18/2017 15:21
	SW-846 9214 (Dissolved)				09/15/2017 15:32
17090414-009C	MW3R	09/14/2017 10:18	09/14/2017 15:55		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			09/14/2017 16:52	09/15/2017 23:42
7090414-009D	MW3R	09/14/2017 10:18	09/14/2017 15:55		
	Standard Methods 4500-NO3 F (Total)				09/15/2017 11:08
17090414-010A	MW4	09/13/2017 16:38	09/14/2017 15:55		
	Field Elevation Measurements				09/13/2017 16:38
	Standard Method 4500-H B Field				09/13/2017 16:38
	Standard Methods 2130 B Field				09/13/2017 16:38
	Standard Methods 18th Ed. 2580 B Field				09/13/2017 16:38
	Standard Methods 2510 B Field				09/13/2017 16:38
	Standard Methods 2550 B Field				09/13/2017 16:38
	Standard Methods 4500-NO2 B (Total)				09/15/2017 11:27
	Standard Methods 4500-O G Field				09/13/2017 16:38
	SW-846 9036 (Total)				09/18/2017 21:06
	SW-846 9251 (Total)				09/18/2017 20.58
17090414-010B	MW4	09/13/2017 16:38	09/14/2017 15:55		
	Standard Methods 2540 C (Dissolved)				09/18/2017 15:21
	SW-846 9214 (Dissolved)				09/15/2017 15:35
17090414-010C	MW4	09/13/2017 16:38	09/14/2017 15:55		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			09/14/2017 16.52	09/15/2017 23:50
17090414-010D	MW4	09/13/2017 16:38	09/14/2017 15:55		



Client: Natural Resource Technology, Inc.

Client Project: Dynegy - Vermillion Power Station

### **Dates Report**

http://www.teklabinc.com/

Work Order: 17090414

Sample ID	Client Sample ID	Collection Date	Received Date		
LIAAAIII AIII	Test Name	66/11/2017 6 46	00/11/2011/11/25	Prep Date/Time	Analysis Date/Time
1/090414-011A	MW5	09/14/2017 9:48	09/14/2017 15:55		
	Field Elevation Measurements				09/14/2017 9:48
	Standard Method 4500-II B Field				09/14/2017 9.48
	Standard Methods 2130 B Field				09/14/2017 9:48
	Standard Methods 18th Ed. 2580 B Field				09/14/2017 9:48
	Standard Methods 2510 B Field				09/14/2017 9:48
	Standard Methods 2550 B Field				09/14/2017 9:48
	Standard Methods 4500-NO2 B (Total)				09/15/2017 11:28
	Standard Methods 4500-O G Field				09/14/2017 9:48
	SW-846 9036 (Total)				09/18/2017 21:30
	SW-846 9251 (Total)				09/18/2017 21:22
17090414-011B	MW5	09/14/2017 9:48	09/14/2017 15:55		100
	Standard Methods 2540 C (Dissolved)				09/18/2017 15:22
	SW-846 9214 (Dissolved)				09/15/2017 15:38
17090414-011C	MW5	09/14/2017 9:48	09/14/2017 15:55		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			09/14/2017 16:52	09/15/2017 23:58
7090414-011D	MW5	09/14/2017 9:48	09/14/2017 15:55		
	Standard Methods 4500-NO3 F (Total)				09/15/2017 11:19
7090414-012A	MW6R	09/13/2017 14:55	09/14/2017 15:55		
	Field Elevation Measurements				09/13/2017 14:55
	Standard Method 4500-H B Field				09/13/2017 14:55
	Standard Methods 2130 B Field				09/13/2017 14:55
	Standard Methods 18th Ed. 2580 B Field				09/13/2017 14:55
	Standard Methods 2510 B Field				09/13/2017 14:55
	Standard Methods 2550 B Field				09/13/2017 14:55
	Standard Methods 4500-NO2 B (Total)				09/15/2017 11:29
	Standard Methods 4500-O G Field				09/13/2017 14:55
	SW-846 9036 (Total)				09/18/2017 21:38
	SW-846 9251 (Total)				09/18/2017 21:30
7090414-012B	MW6R	09/13/2017 14:55	09/14/2017 15:55		
	Standard Methods 2540 C (Dissolved)				09/18/2017 15:22
	SW-846 9214 (Dissolved)				09/15/2017 15:43
7090414-012C	MW6R	09/13/2017 14:55	09/14/2017 15:55		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			09/14/2017 16:52	09/16/2017 0:07
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			09/14/2017 16:52	09/19/2017 10:41
17090414-012D	MW6R	09/13/2017 14:55	09/14/2017 15:55		
	Standard Methods 4500-NO3 F (Total)				09/15/2017 11:21



Client: Natural Resource Technology, Inc.

Client Project: Dynegy - Vermillion Power Station

# **Dates Report**

http://www.teklabinc.com/

Work Order: 17090414

Sample ID	Client Sample ID	<b>Collection Date</b>	Received Date			
	Test Name		Marie III	Prep Date/Time	Analysis Date/Time	
I /090414-013A	MW8R	09/14/201/ 10:39	09/14/201/ 15:55			
	Field Elevation Measurements				09/14/2017 10:39	
	Standard Method 4500-H B Field				09/14/2017 10:39	
	Standard Methods 2130 B Field				09/14/2017 10:39	
	Standard Methods 18th Ed. 2580 B Field				09/14/2017 10:39	
	Standard Methods 2510 B Field				09/14/2017 10:39	
	Standard Methods 2550 B Field				09/14/2017 10:39	
	Standard Methods 4500-NO2 B (Total)				09/15/2017 11:29	
	Standard Methods 4500-O G Field				09/14/2017 10:39	
	SW-846 9036 (Total)				09/18/2017 21:46	
	SW-846 9251 (Total)				09/18/2017 21:38	
17090414-013B	MW8R	09/14/2017 10:39	09/14/2017 15:55			
	Standard Methods 2540 C (Dissolved)				09/18/2017 15:22	
	SW-846 9214 (Dissolved)				09/15/2017 15:45	
17090414-013C	MW8R	09/14/2017 10:39	09/14/2017 15:55			
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			09/14/2017 16:52	09/16/2017 0:31	
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			09/14/2017 16:52	09/18/2017 18:47	
17090414-013D	MW8R	09/14/2017 10:39	09/14/2017 15:55			
	Standard Methods 4500-NO3 F (Total)				09/15/2017 11:24	
17090414-014A	MW9	09/13/2017 11:42	09/14/2017 15:55		48723842687	
	Field Elevation Measurements				09/13/2017 11:42	
17090414-015A	MW19	09/13/2017 11:48	09/14/2017 15:55		***************************************	
	Field Elevation Measurements				09/13/2017 11:48	
17090414-016A	MW20	09/13/2017 15:39	09/14/2017 15:55		07/13/2017 11.40	
	Field Elevation Measurements	22/32/22/27/27/27/27/27/27/27/27/27/27/27/27	92/11/02/11/03/03	-	09/13/2017 15:39	
	Standard Method 4500-H B Field				09/13/2017 15:39	
	Standard Methods 2130 B Field				09/13/2017 15:39	
					09/13/2017 15:39	
	Standard Methods 18th Ed. 2580 B Field Standard Methods 2510 B Field				09/13/2017 15:39	
	Standard Methods 2510 B Field Standard Methods 2550 B Field				09/13/2017 15:39	
	Standard Methods 2550 B Field Standard Methods 4500-NO2 B (Total)				09/15/201 / 11:30	
	Standard Methods 4500-NO2 B (Total)				09/13/2017 11:30	
	SW-846 9036 (Total)				09/18/2017 13:54	
	SW-846 9251 (Total)				09/18/2017 21:46	
17090414-016B	MW20	09/13/2017 15:39	09/14/2017 15:55		57110/2017 21.70	
., 550 11 1-010D		02/15/2017 10:59	05/1 ((2017-15.55)		00/10/2017 15 25	
	Standard Methods 2540 C (Dissolved)				09/18/2017 15:22	



#### http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 17090414

Client Project: Dynegy - Vermillion Power Station

Report Date: 22-Sep-17

Sample ID	Client Sample ID	Collection Date	Received Date		V- 4 - 2 - 7 -
	Test Name			Prep Date/Time	Analysis Date/Time
17090414-016C	MW20	09/13/2017 15:39	09/14/2017 15.55		
	\$W-846 3005A, 6020A, Metals by ICPM\$ (Dissolved)			09/14/201 / 16:52	09/16/2017 0.40
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			09/14/2017 16:52	09/18/2017 19:44
17090414 016D	MW20	09/13/2017 15:39	09/14/2017 15:55		
	Standard Methods 4500-NO3 F (Iotal)				09/15/201/11:28
17090414-017A	MW34	09/13/2017 16:13	09/14/2017 15:55		
	Field Elevation Measurements				09/13/2017 16:13
	Standard Method 4500-H B Field				09/13/2017 16:13
	Standard Methods 2130 B Field				09/13/2017 16:13
	Standard Methods 18th Ed. 2580 B Field				09/13/2017 16:13
	Standard Methods 2510 B Field				09/13/2017 16:13
	Standard Methods 2550 B Field				09/13/2017 16:13
	Standard Methods 4500-NO2 B (Total)				09/15/2017 11:30
	Standard Methods 4500-O G Field				09/13/2017 16:13
	SW-846 9036 (Total)				09/18/2017 21:57
	SW-846 9251 (Total)				09/18/2017 21:55
17090414-017B	MW34	09/13/2017 16:13	09/14/2017 15:55		
	Standard Methods 2540 C (Dissolved)				09/18/2017 16:02
	SW-846 9214 (Dissolved)				09/15/2017 15:58
17090414-017C	MW34	09/13/2017 16:13	09/14/2017 15:55		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			09/14/2017 16:52	09/16/2017 0:48
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			09/14/2017 16:52	09/18/2017 19:53
17090414-017D	MW34	09/13/2017 16:13	09/14/2017 15:55		
	Standard Methods 4500-NO3 F (Total)				09/15/2017 11:30
17090414-018A	Field Blank	09/13/2017 17:00	09/14/2017 15:55		
	Standard Methods 4500-NO2 B (Total)				09/15/2017 11:31
	SW-846 9036 (Total)				09/18/2017 22:00
	SW-846 9251 (Total)				09/18/2017 21.56
17090414-018B	Field Blank	09/13/2017 17:00	09/14/2017 15:55		
	Standard Methods 2540 C (Dissolved)				09/18/2017 16:03
	SW-846 9214 (Dissolved)				09/15/2017 15:59
17090414 018C	Field Blank	09/13/2017 17:00	09/14/2017 15:55		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			09/14/2017 16:52	09/16/2017 0:56
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			09/14/2017 16:52	09/18/2017 20:01
17090414-018D	Field Blank	09/13/2017 17:00	09/14/2017 15:55		
	Standard Methods 4500-NO3 F (Total)				09/15/2017 11:32



http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Client Project: Dynegy - Vermillion Power Station

Work Order: 17090414

Sample ID	Client Sample ID	Collection Date	Received Date			
	Test Name			Prep Date/Time	Analysis Date/Time	
17090414 019A	DUPI	09/13/2017 14:29	09/14/2017 15:55			
	Field Elevation Measurements				09/13/2017 14:29	
	Standard Method 4500-H B Field				09/13/2017 14:29	
	Standard Methods 2130 B Field				09/13/2017 14:29	
	Standard Methods 18th Ed. 2580 B Field				09/13/2017 14:29	
	Standard Methods 2510 B Field				09/13/2017 14:29	
	Standard Methods 2550 B Field				09/13/2017 14:29	
	Standard Methods 4500-NO2 B (Total)				09/15/2017 11:32	
	Standard Methods 4500-O G Field				09/13/2017 14:29	
	SW-846 9036 (Total)				09/20/2017 13:08	
	SW-846 9251 (Total)				09/18/2017 22:16	
17090414-019B	DUP1	09/13/2017 14:29	09/14/2017 15:55			
	Standard Methods 2540 C (Dissolved)				09/18/2017 16:03	
	SW-846 9214 (Dissolved)				09/15/2017 16:02	
17090414-019C	DUPI	09/13/2017 14:29	09/14/2017 15:55			
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			09/14/2017 16:52	09/16/2017 1:04	
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			09/14/2017 16:52	09/18/2017 20:09	
17090414-019D	DUP1	09/13/2017 14:29	09/14/2017 15:55	.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Andreas Anna Control of the Control	
	Standard Methods 4500-NO3 F (Total)				09/15/2017 11:46	
17090414-020A	DUP2	09/14/2017 9:48	09/14/2017 15:55		03/12/2017 11.10	
	Field Elevation Measurements	7020200000	2012 (212 (210)		09/14/2017 9:48	
	Standard Method 4500-H B Field				09/14/2017 9:48	
	Standard Methods 2130 B Field				09/14/2017 9:48	
	Standard Methods 18th Ed. 2580 B Field				09/14/2017 9:48	
	Standard Methods 18th Ed. 2380 B Field Standard Methods 2510 B Field				09/14/2017 9:48	
	Standard Methods 2550 B Field				09/14/2017 9:48	
	Standard Methods 2550 B (Total)				09/15/2017 11:32	
	Standard Methods 4500-O G Field				09/14/2017 9:48	
	SW-846 9036 (Total)				09/20/2017 13 11	
	SW-846 9251 (Total)				09/18/2017 22:24	
17090414-020B	DUP2	09/14/2017 9:48	09/14/2017 15:55		03/16/2017 22:24	
		5212 11 2011 7 110	57,1 112017 15:55		00/10/2017 14 02	
	Standard Methods 2540 C (Dissolved)				09/18/2017 16:03	
17000414 0200	SW-846 9214 (Dissolved)	00/14/2017 0.49	00/14/2017 15:55		09/15/2017 16:03	
17090414-020C	DUP?	09/14/2017 9:48	09/14/2017 15:55			
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			09/14/2017 16:52	09/16/2017 1:12	
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			09/14/2017 16:52	09/18/2017 20:17	
17090414-020D	DUP2	09/14/2017 9:48	09/14/2017 15:55			



Sample ID

#### **Dates Report**

http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 17090414

Client Project: Dynegy - Vermillion Power Station

Report Date: 22-Sep-17

Client Sample ID Collection Date Received Date

Test Name Prep Date/Time Analysis Date/Time

Standard Methods 4500-NO3 F (Total) 09/15/2017 11:48



#### http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 17090414

Client Project: Dynegy - Vermillion Power Station

STANDARD METHO	D 4500-H I	B FIELD	) -								
	SampType:	LCS		Units							
SampID: LCS-R23789	4										Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
рН			1.00		7.00	7.000	0	100.0	99.1	100.9	09/13/2017
рН			1.00		7.00	7.000	O	100.0	99.1	100.9	09/14/2017
STANDARD METHO	DS 2510 B	FIELD							) (a. 0. 10. 10. 10. 10. 10. 10. 10. 10. 10.		
Batch R237894 S SampID: LCS-R23789	SampType: 4	LCS		Units µmhos/	cm						Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Conductivity			1		1410	1412	0	99.9	90	110	09/14/2017
Conductivity			1		1410	1412	0	99.9	90	110	09/13/2017
STANDARD METHO	DS 2540 C	(DISSO	DLVED)								
Batch R237825 S	SampType:	MBLK		Units mg/L							
SampID: MBLK											Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Total Dissolved Solid	is		20		< 20						09/18/2017
Total Dissolved Solid	is		20		< 20						09/18/2017
Total Dissolved Solid	is		20		< 20						09/18/2017
Batch R237825 S	SampType:	LCS		Units mg/L							
SampID: LCS											Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Total Dissolved Solid	is		20		980	1000	0	98.0	90	110	09/18/2017
Batch R237825 S	SampType:	LCSQC		Units mg/L							
SampID: LCSQC											Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Total Dissolved Solid	ds	-	20		976	1000	0	97.6	90	110	09/18/2017
Total Dissolved Solid	ds		20		962	1000	0	96.2	90	110	09/18/2017
Batch R237825 S SamplD: 17090414-00	SampType: 05BMS	MS		Units mg/L							Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Total Dissolved Solid	ls		20			500.0	1970	104 8	85	115	09/18/2017
Batch R237825 S	SampType:	MSD		Units mg/L					RPD	Limit 5	
SampID: 17090414-00	D5BMSD										Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref \	/al %RPD	Analyzed
Total Dissolved Solid	de		20			500.0	1970	107.6	2494	0.56	09/18/201



#### http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 17090414

Client Project: Dynegy - Vermillion Power Station

Report Date: 22-Sep-17

				-					
STANDARD METHODS 2540 (		DLVED					······		Name to the second seco
<b>Batch R237825 SampType:</b> SampID: 17090414-017BDUP	DUP		Units mg/L				RPD	Limit 5	2.45
		DE	/Sec.1	Thomas Carlo	SPK Ref Val	WELL	PPU PMU	/al %RPD	Date Analyzed
Analyses Total Dissolved Solids		RL 20	Qual	504	3 SEK LAI AN	MINEC	494.0	2.00	09/18/2017
Total Dissolved Colles		20		004			104.0	2.00	00/10/2017
STANDARD METHODS 4500-I	NO2 B (	TOTAL)							
Batch R237707 SampType: SampID: MBLK	MBLK		Units mg/L						Date
Analyses		RL	Qual	Result Spik	e SPIC Ref Val	%REC	Low Limit	I ligh Limit	Analyzed
Nitrogen, Nitrite (as N)		0.05		< 0.05					09/15/2017
Batch R237707 SampType: SampID: LCS	LCS		Units mg/L						Date
Analyses		RL	Qual	Result Spik	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Nitrogen, Nitrite (as N)		0.05		<b>0.50</b> 0.488	0	101.6	90	110	09/15/2017
Batch R237707 SampType: SampID: 17090414-004AMS	MS		Units mg/L						Date
Analyses		RL	Qual	Result Spik	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Nitrogen, Nitrite (as N)		0.05		<b>0.51</b> 0.500	0	101.6	85	115	09/15/2017
Batch R237707 SampType:	MSD		Units mg/L				RPD	Limit 10	
SampID: 17090414-004AMSD		DI	0 1	D 14 G 11	CDV Dof Val	0/ DEC	DDD Dof I	/al %RPD	Date Analyzed
Analyses Nitrogen, Nitrite (as N)		0.05	Qual	0.49 0.500	SPK Ref Val	97.8	0.5080	3.81	09/15/2017
		30467				2000	- 77.77	3777	54773193 11
<b>Batch R237707 SampType:</b> SampID: 17090414-011AMS	MS		Units mg/L						Date
Analyses		RL	Qual	Result Spik	e SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Nitrogen, Nitrite (as N)		0.05		<b>0.48</b> 0.500	0	95.0	85	115	09/15/2017
<b>Batch R237707 SampType:</b> SampID: 17090414-011AMSD	MSD		Units mg/L				RPD	Limit 10	Date
Analyses		RL	Qual	Result Spik	e SPK Ref Val	%REC	RPD Ref	/al %RPD	Analyzed
Nitrogen, Nitrite (as N)		0.05		<b>0.46</b> 0.500		93.0	0.4750	2.13	09/15/2017
STANDARD METHODS 4500-	NO3 F (1	TOTAL)							
Batch R237724 SampType: SampID: ICB/MBLK			Units mg/L						Date
Analyses		RL	Qual	Result Spik	e SPK Ref Val	%REC	Low Limit	High Limit	Analyzod
Nitrogen, Nitrate Nitrite (as N)		0.050		< 0.050					09/15/2017



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Client: Natural Resource Technology, Inc. Work Order: 17090414

Client Project: Dynegy - Vermillion Power Station Report Date: 22-Sep-17

STANDARD METH				11.00							
Batch R237724 SampID: ICV/LCS	SampType:	LCS		Units mg/L							Date
Analyses			RL	Qual	Result	Spike	SPK Rof Val	%REC	Low Limit	High Limit	Analyzed
Nitrogen, Nitrate-N	litrite (as N)		1.00		8.11	8.570	ō	94.6	90	110	09/15/2017
Batch R23//24 SampID: 17090414-	SampType: 006DMS	MS		Units mg/L							Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Nitrogen, Nitrate-N	litrite (as N)		0.050		0.285	0.2500	0	114.0	85	115	09/15/2017
Batch R237724 SampID: 17090414-	SampType: 006DMSD	MSD		Units mg/L					RPD	Limit 10	Date
Analyses			RL	Qual	Result	Snike	SPK Ref Val	%REC	RPD Ref \	/al %RPD	Analyzed
Nitrogen, Nitrate-N	litrite (as N)		0.050	Q uus	0.286		0	114.4	0.2850	0.35	09/15/2017
Batch R237724 SampID: 17090414-	SampType: 009DMS	MS		Units mg/L			00K D-4V-1	N/DE0	( 1	110-1-12	Date Analyzed
Analyses			RL	Qual			SPK Ref Val			High Limit	
Nitrogen, Nitrate-N	litrite (as N)		0.050		0.290	0.2500	0.02600	105.6	85	115	09/15/2017
Batch R237724	SampType:	MSD		Units mg/L					RPD	Limit 10	
SampID: 17090414- Analyses	009DMSD		RL	Qual	Result	Snike	SPK Ref Val	%REC	RPD Ref \	/al %RPD	Date Analyzed
Nitrogen, Nitrate-N	litrite (as N)		0.050			0.2500	0.02600	114.4	0.2900	7.31	09/15/2017
SW-846 9036 (TOT	TAL)										
Batch R237776 SampID: ICB/MBLK	SampType:	MBLK		Units mg/L			August and a	Resident.		- Mariana di Mariana d	Date
Analyses			RL	Qual		Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Sulfate			10		< 10						09/18/2017
Batch R237776 SampID: MBLK 134	SampType: 164	MBLK		Units mg/L			Z. Trans	and be			Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Sulfate			10		< 10						09/18/2017
Batch R237776 SampID: ICV/LCS	SampType:	LCS		Units mg/L							Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Sulfate			10		19	20.00	0	90.0	90	110	09/18/2017



#### http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 17090414

Client Project: Dynegy - Vermillion Power Station

Report Date: 22-Sep-17

SW-846 9036 (TOT		110		11-11-							
Batch R237776 SampID: 17090414-	SampType: 002AMS	MS		Units mg/L							Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%RFC	Low Limit	High Limit	Analyzed
Sulfate			10		29	10.00	20.02	87.8	85	115	09/18/2017
Batch R237776	SampType:	MSD		Units mg/L			100		RPD	Limit 10	A
SampID: 17090414-	002AMSD		DI	0.1	D 1	G 11	CDV Def Vel	N/DEC	DDD Deft	/-L 0/ DDD	Date Analyzed
Analyses			RL 10	Qual		10 00	SPK Ref Val			/al %RPD	09/18/2017
Sulfate			10		29	10 00	50 05	91 0	28 80	1 10	09/18/2017
Batch R237776 SampID: 17090414-	SampType: 007AMS	MS		Units mg/L							Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Sulfate			10	S		10.00	17.93	82.8	85	115	09/18/2017
Batch R237776 SampID: 17090414-	SampType: 007AMSD	MSD		Units mg/L					RPD	Limit 10	Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref \	/al %RPD	Analyzed
Sulfate			10		27	10.00	17.93	86.8	26.21	1.51	09/18/2017
Batch R237876 SampID: ICB/MBLK	SampType:	MBLK		Units mg/L							Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Sulfate			10		< 10						09/20/2017
Batch R237876 SampID: ICV/LCS	SampType:	LCS		Units mg/L							Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Sulfate			10		20	20.00	0	97.7	90	110	09/20/2017
SW-846 9214 (DIS	SOLVED)										
Batch R237726 SampID: MBLK	SampType:	MBLK		Units mg/L					. 7.4		Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Fluoride			0.10		< 0.10						09/15/2017
Batch R237726 SampID: LCS	SampType:	LCS		Units mg/L							Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Fluoride			0.10			1.000	0	101.4	90	110	09/15/2017



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Client: Natural Resource Technology, Inc. Work Order: 17090414

Client Project: Dynegy - Vermillion Power Station Report Date: 22-Sep-17

SW-846 9214 (DIS	SOLVED)										
Batch R237726 SampID: 17090414-	SampType: 001BMS	MS		Units mg/L							Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Fluoride			0.10		2.19	2.000	0.1330	102.8	85	115	09/15/2017
Batch R237726	&ampType:	MSD		Unite mg/L					RPD	Limit 10	-
SampID: 17090414-	001BMSD		515.			n.a.	55K5 414 (	NEC	BBC B ()	/- I A/BBD	Date Analyzod
Analyses			RL	Qual			SPK Ref Val			/al %RPD	
Fluoride			0.10		2.20	2.000	0.1330	103.6	2.190	0.68	09/15/2017
Batch R237726 SampID: 17090414-	SampType: 011BMS	MS		Units mg/L		***************************************					Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Fluoride			0.10		2.71	2.000	0.5110	110.0	85	115	09/15/2017
Batch R237726 SampID: 17090414-	SampType: 011BMSD	MSD		Units mg/L					RPD	Limit 10	Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	240 140 140 140 140	/al %RPD	Analyzed
Fluoride			0.10		2.78	2.000	0.5110	113.4	2.712	2.48	09/15/2017
SW-846 9251 (TOT	TAL)										
Batch R237801 SampID: ICB/MBLK	SampType:	MBLK		Units mg/L							Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Chloride			5		< 5						09/18/2017
Batch R237801 SampID: ICV/LCS	SampType:	LCS		Units mg/L							Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Chloride			5		21	20.00	0	103.9	90	110	09/18/2017
Batch R237801 SampID: 17090414-	SampType: -002AMS	MS		Units mg/L							Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Chloride			10			40.00	49.08	88.5	85	115	09/18/2017
Batch R237801	SampType:	MSD		Units mg/L					RPD	Limit 15	
SampID: 17090414-	-002AMSD										Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref	Val %RPD	Analyzed
Chloride			10		84	40.00	49.08	88.6	84.46	0.05	09/18/2017



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Client: Natural Resource Technology, Inc.

Work Order: 17090414

Client Project: Dynegy - Vermillion Power Station Report Date: 22-Sep-17

	COLUMN COLUMN	1200									
2000	ampType:	MS		Units mg/L							
SampID: 17090414-007	7AMS								4.50 (0.00)	THE STATE OF	Date Analyzed
Analyses			RL	Qual			SPK Ref Val			High Limit	1000000000
Chloride			5		22	20.00	2.250	97.8	85	115	09/18/2017
Batch R237801 SamplD: 17090414 007	ampType:	MSD		Units mg/L					RPD	Limit 15	
	ANIOD		DI	Oval	Damli	Colle	SPK Ref Val	%BEC	RPD Ref \	/al %RPD	Date Analyzed
Analyses Chloride			RL 5	Qual	Result 22	20.00	2.250	97.6	21.80	0.09	09/18/2017
Chloride			5		22	20.00	2.250	97.0	21.00	0.09	09/10/2017
Batch R237910 SampID: ICB/MBLK	атрТуре:	MBLK		Units mg/L							Date
Analyses			RL	Qual	Result	Snike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Chloride			5		< 5	- F					09/20/2017
Batch R237910 SampID: ICV/LCS	ampType:	LCS		Units mg/L							Date
Analyses			RL	Oual	Result	Snike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Chloride			5	Quai	20		0	102.0	90	110	09/20/2017
SW 846 30054 6020	A METAL	SRVI	DMC /	DISSOI VEDI							
SW-846 3005A, 6020			CPMS (I								
	ampType:		CPMS (I	OISSOLVED) Units mg/L							Date
Batch 134180 Sa	ampType:		CPMS (I		Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Batch 134180 SampID: MBLK-134180	ampType:			Units mg/L	Result			%REC	Low Limit	High Limit	
Batch 134180 SamplD: MBLK-134180 Analyses	ampType:		RL	Units mg/L		0.001000	0				Analyzed
Batch 134180 Sa SampID: MBLK-134180 Analyses Arsenic	ampType:		RL 0.0010	Units mg/L	< 0.0010	0.00100C 0.00100C	0	0	-100	100	Analyzed 09/15/2017
Batch 134180 Sa SamplD: MBLK-134180 Analyses Arsenic Barium	ampType:		RL 0.0010 0.0010	Units mg/L	< 0.0010 3	0.001000 0.001000 0.02500	0 0	0	-100 -100	100 100	Analyzed 09/15/2017 09/15/2017
Batch 134180 Sa SamplD: MBLK-134180 Analyses Arsenic Barium Boron	ampType:		RL 0.0010 0.0010 0.0250	Units mg/L	< 0.0010 1 < 0.0010 1 < 0.0250	0.00100C 0.00100C 0.02500 0.02500	0 0 0 0	0 0 0	-100 -100 -100	100 100 100	Analyzed 09/15/2017 09/15/2017 09/15/2017
Batch 134180 Sa SamplD: MBLK-134180 Analyses Arsenic Barium Boron Iron	ampType:		RL 0.0010 0.0010 0.0250 0.0250	Units mg/L	< 0.0010 2 < 0.0010 2 < 0.0250 < 0.0250	0.00100C 0.00100C 0.02500 0.02500 0.00100C	0 0 0 0	0 0 0 0	-100 -100 -100 -100	100 100 100 100	Analyzed 09/15/2017 09/15/2017 09/15/2017 09/15/2017
Batch 134180 Sa SamplD: MBLK-134180 Analyses Arsenic Barium Boron Iron Manganese Selenium	ampType:	MBLK	RL 0.0010 0.0010 0.0250 0.0250 0.0010	Units mg/L	< 0.0010 2 < 0.0010 2 < 0.0250 < 0.0250 < 0.0010 2	0.00100C 0.00100C 0.02500 0.02500 0.00100C	0 0 0 0	0 0 0 0	-100 -100 -100 -100 -100	100 100 100 100 100	Analyzed 09/15/2017 09/15/2017 09/15/2017 09/15/2017 09/15/2017
Batch 134180 Sa SamplD: MBLK-134180 Analyses Arsenic Barium Boron Iron Manganese Selenium  Batch 134180 Sa SamplD: LCS-134180	ampType: 0	MBLK	RL 0.0010 0.0010 0.0250 0.0250 0.0010 0.0010	Units mg/L Qual Units mg/L	< 0.0010 : < 0.0010 : < 0.0250 < 0.0250 < 0.0010 : < 0.0010 :	0.00100C 0.00100C 0.02500 0.02500 0.00100C 0.00100C	0 0 0 0 0	0 0 0 0 0 0	-100 -100 -100 -100 -100 -100	100 100 100 100 100	Analyzed 09/15/2017 09/15/2017 09/15/2017 09/15/2017 09/15/2017
Batch 134180 Sa SampID: MBLK-134180 Analyses Arsenic Barium Boron Iron Manganese Selenium	ampType: 0	MBLK	RL 0.0010 0.0010 0.0250 0.0250 0.0010	Units mg/L Qual	< 0.0010 < 0.0010 < 0.0250 < 0.0250 < 0.0010 < 0.0010	0.00100C 0.00100C 0.02500 0.02500 0.00100C 0.00100C	0 0 0 0	0 0 0 0 0 0	-100 -100 -100 -100 -100 -100	100 100 100 100 100 100	Analyzed 09/15/2017 09/15/2017 09/15/2017 09/15/2017 09/15/2017 09/15/2017
Batch 134180 Sa SampID: MBLK-134180 Analyses Arsenic Barium Boron Iron Manganese Selenium  Batch 134180 Sa SampID: LCS-134180 Analyses Arsenic	ampType: 0	MBLK	RL 0.0010 0.0010 0.0250 0.0250 0.0010 0.0010	Units mg/L Qual Units mg/L	< 0.0010 < 0.0010 < 0.0250 < 0.0250 < 0.0010 < 0.0010	0.001000 0.001000 0.02500 0.02500 0.001000 0.001000	0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0	-100 -100 -100 -100 -100 -100	100 100 100 100 100 100 100	Analyzed  09/15/2017  09/15/2017  09/15/2017  09/15/2017  09/15/2017  Date Analyzed  09/16/2017
Batch 134180 Sa SamplD: MBLK-134180 Analyses Arsenic Barium Boron Iron Manganese Selenium  Batch 134180 SamplD: LCS-134180 Analyses Arsenic Barium	ampType: 0	MBLK	RL 0.0010 0.0010 0.0250 0.0250 0.0010 0.0010	Units mg/L Qual Units mg/L	< 0.0010 : < 0.0010 : < 0.0250 < 0.0250 < 0.0010 : < 0.0010 : < 0.0010 : < 0.0010 : < 0.471	0.00100C 0.00100C 0.02500 0.02500 0.00100C 0.00100C Spike 0.5000 2.000	0 0 0 0 0 0 0 SPK Ref Val 0	0 0 0 0 0 0 0 0 0 %REC 94.2 94.7	-100 -100 -100 -100 -100 -100 Low Limit 80 80	100 100 100 100 100 100 100 High Limit	Analyzed  09/15/2017  09/15/2017  09/15/2017  09/15/2017  09/15/2017  Date Analyzed  09/16/2017  09/16/2017
Batch 134180 Sa SamplD: MBLK-134180 Analyses Arsenic Barium Boron Iron Manganese Selenium  Batch 134180 Sa SamplD: LCS-134180 Analyses Arsenic Barium Boron	ampType: 0	MBLK	RL 0.0010 0.0010 0.0250 0.0250 0.0010 0.0010 RL 0.0010 0.0010 0.00250	Units mg/L Qual Units mg/L	<ul> <li>&lt; 0.0010</li> <li>&lt; 0.0250</li> <li>&lt; 0.0250</li> <li>&lt; 0.0010</li> <li>&lt; 0.0010</li> <li>&lt; 0.0010</li> <li>Result</li> <li>0.471</li> <li>1.89</li> <li>0.496</li> </ul>	0.001000 0.001000 0.02500 0.02500 0.001000 0.001000 Spike 0.5000 2.000 0.5000	0 0 0 0 0 0 0 SPK Ref Val 0 0	0 0 0 0 0 0 0 0 %REC 94.2 94.7 99.2	-100 -100 -100 -100 -100 -100 Low Limit 80 80 80	100 100 100 100 100 100 100 High Limit 120 120	Analyzed  09/15/2017  09/15/2017  09/15/2017  09/15/2017  09/15/2017  Date Analyzed  09/16/2017  09/16/2017  09/18/2017
Batch 134180 Sa SamplD: MBLK-134180 Analyses Arsenic Barium Boron Iron Manganese Selenium  Batch 134180 SamplD: LCS-134180 Analyses Arsenic Barium	ampType: 0	MBLK	RL 0.0010 0.0010 0.0250 0.0250 0.0010 0.0010	Units mg/L Qual Units mg/L	<ul> <li>&lt; 0.0010</li> <li>&lt; 0.0250</li> <li>&lt; 0.0250</li> <li>&lt; 0.0010</li> <li>&lt; 0.0010</li> <li>&lt; 0.0010</li> <li></li> <li>Result</li> <li>0.471</li> <li>1.89</li> <li>0.496</li> <li>1.93</li> </ul>	0.00100C 0.00100C 0.02500 0.02500 0.00100C 0.00100C Spike 0.5000 2.000	0 0 0 0 0 0 0 SPK Ref Val 0	0 0 0 0 0 0 0 0 0 %REC 94.2 94.7	-100 -100 -100 -100 -100 -100 Low Limit 80 80	100 100 100 100 100 100 100 High Limit	Analyzed  09/15/2017  09/15/2017  09/15/2017  09/15/2017  09/15/2017  Date Analyzed  09/16/2017  09/16/2017



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Client: Natural Resource Technology, Inc.

Client Project: Dynegy - Vermillion Power Station

Work Order: 17090414

SW-846 3005A, 6020A, META	LS BY	ICPMS (	DISSOLVED)							
<b>Batch 134180 SampType:</b> SampID: 17090414-009CMS	MS		Units mg/L							Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%RFC	LowLimit	High Limit	Analyzed
Arsonio		0.0010		0.485	0.5000	0.007668	95.4	15	125	09/16/201
Barium		0.0010		2.04	2.000	0.1794	93.2	75	125	09/16/201
Boron		0.0250		4.17	0.5000	3.696	94.5	75	125	09/19/201
Iron		0.0250		4.24	2.000	2.386	92 9	75	125	09/16/201
Manganese		0.0010		0.499	0.5000	0.04135	91.5	75	125	09/16/201
Sclenium		0.0010		0.448	0.5000	0	89.5	75	125	09/16/201
Batch 134180 SampType:	MSD		Units mg/L					RPD	Limit 20	
SampID: 17090414-009CMSD										Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref V	al %RPD	Analyzed
Arsenic		0.0010	*	CO DO CO 45 CO	0.5000	0.007668	95.6	0.4849	0.19	09/16/201
Barium		0.0010		2.06	2.000	0.1794	94.2	2.043	0.97	09/16/201
Boron		0.0250			0.5000	3.696	111.0	4.169	1.96	09/19/201
Iron		0.0250		4.26	2.000	2.386	93.9	4.245	0.47	09/16/201
Manganese		0.0010		0.505	0.5000	0.04135	92.7	0.4991	1.11	09/16/201
Selenium		0.0010		0.457	0.5000	0	91.3	0.4476	1.99	09/16/201
Batch 134180 SampType: SampID: 17090414-017CMS	MS		Units mg/L							Date
Analyses		RL	Oual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Arsenic		0.0010			0.5000	0.02320	92.4	75	125	09/16/201
Barium		0.0010		1.98	2.000	0.1460	91.5	75	125	09/16/201
Boron		0.0250		0.957	0.5000	0.4718	97.0	75	125	09/18/201
Iron		0.0250		7.02	2.000	5.339	83.8	75	125	09/16/201
Manganese		0.0010		0.512	0.5000	0.06192	90.0	75	125	09/16/201
Selenium		0.0010		0.453	0.5000	0	90.6	75	125	09/16/201
Batch 134180 SampType:	MSD		Units mg/L					RPD	Limit 20	
SampID: 17090414-017CMSD										Date
Analyses		RL	Qual	Result	Snike	SPK Ref Val	%REC	RPD Ref \	/al %RPD	Analyzed
Arsenic		0.0010	4 444		0.5000	0.02320	93.2	0.4852	0.82	09/16/201
Barium		0.0010		40.00	2.000	0.1460	92.2	1.976	0.75	09/16/201
Boron		0.0250			0.5000	0.4718	94.3	0.9567	1.41	09/18/201
Iron		0.0250			2.000	5.339	82.4	7.016	0.40	09/16/201
Manganese		0.0010			0.5000	0.06192	90.4	0.5117	0.46	09/16/201
Selenium		0.0010		0.459		0	91.7	0.4532	1.17	09/16/201



# **Receiving Check List**

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Client: Natural Resource Technology, Inc.			Work O	rder: 17090	)414
lient Project: Dynegy - Vermillion Power Station	_		Report I	Date: 22-Se	p-17
Carrier: Tim Mathis	Reco	eived By: KF			
Completed by: Kallyn Foecke  14-Sep-17  Kalyn Foecke		Sen-17	Elizabeth A. Hurley	leg.	
Pages to follow: Chain of custody 2	Extra pages include	ed 30			
Shipping container/cooler in good condition?	Yes 🔽	No 🗌	Not Present	Temp °C	2.02
Type of thermal preservation?	None 🔲	Ice 🗹	Blue Ice	Dry Ice	
Chain of custody present?	Yes 🗹	No 📙			
Chain of custody signed when relinquished and received?	Yes 🗹	No 🗀			
Chain of custody agrees with sample labels?	Yes 🗹	No 🗀			
Samples in proper container/bottle?	Yes 🔽	No 🗀			
Sample containers intact?	Yes 🗹	No 📙			
Sufficient sample volume for indicated test?	Yes 🗹	No 📙			
All samples received within holding time?	Yes 🗹	No 📙			
Reported field parameters measured:	Field 🗹	Lab 🔲	NA 🗌		
Container/Temp Blank temperature in compliance?	Yes 🗸	No 🗀			
When thermal preservation is required, samples are complian 0.1°C - 6.0°C, or when samples are received on ice the same		re between			
Water – at least one vial per sample has zero headspace?	Yes 🗌	No 🗌	No VOA vials 🗸		
Water - TOX containers have zero headspace?	Yes	No 🗆	No TOX containers		
Water - pH acceptable upon receipt?	Yes 🗸	No 🗆	NA 🗆		
NPDES/CWA TCN interferences checked/treated in the field?	Yes	No 🗆	NA 🗹		
Any No responses n	nust be detailed be	elow or on the	COC.		

CHAIN OF CUSTODY pg. 1 of 2 Work order # 17090414

TEKLAB, INC. 5445 Horseshoe Lake Road - Collinsville, IL 62234 - Phone: (618) 344-1004 - Fax: (618) 344-1005

											_				-															_
Client:	Na	tural Resource	Technolog	gy, Inc.							-a		oles d		,					⊠ N	CICE			03	•					
Address:		22 East Washin	<u> </u>	et							Pr	rese	erved	in:	E L							<u>FOI</u>	<u>R L/</u>	AB U	SE (	<u>'_NC</u>	<u> </u>			
City / State	/Zip Blo	oomington, IL 6	1704								La	ab N	lotes	:		1	-Z,	N/k												
Contact:	Steve Wisl	kes		F	hone:		(414)	837-3	3614								. 6/													
E-Mail:	steve.wisk	es@obg.com		F	ax:	_					CI	ient	t Cor	nme	ents															
Are these sample Are these sample Are there any req limits in the comm	s known to l uired reporti	be hazardous? ing imits to be n	Yes Detention	X No			•			X No		ws	red Me icc S iver U wire	124						Mn \$	Se.									
Pro	ject Nam	e/Number		Sa	mple C	olle	cto	r's N	lame	<b>e</b>		M	IATR	ΙX					INE	ICA	TE /	NA	LYS	IS R	EQU	EST	ED			
Dynegy - Vermilli	on Power St	ation			T.~/c	4720	۵				۵ آ					0	Diss	, <u>D</u>	Fe.	Field DO SM 4500-	Field ORP	Fiel	⊱lel	Fiel	G₩	Nitrate SM 4500 NO3 F		<b>-</b>		
	s Reques		Billing	Instruct	tions	# an	d Ty	pe of	Cont	tainers	Groundwater					Chloride		Dissolved	; WS oo plet4	8	SR	Field pH SM 4500-	FleId Temperature	Field Turbidity SM 2130-B	Dep	rate N	Sulfate 9036	TDS S		
Standard	•					_   1	:  =				ndw					ide (	Fluoride	/ed	Conductivity	MS	P SN	HS I	mpe	irbid 30-	Ť	9M 03 £	ite 9	SM 2540C		
Other	3 Day (5	0% Surcharge)				UN ON	250			11	/ate			1		9251	e 9214	Metals	E CETV	4500	SM 2580-	450	o atu	E EV S	to Water	4500	036	5400		
Lab Use Only		Identification	Date	/Time Sar	ubtea													<u>s</u>		0				Ž	ter					
17090414	MW1		9-13-1	7 13	¥3	2 1	1 1				X					Х	Х	X	X	Х	Х	Х	×	Х	X	Х	Х	Х		
002	MW2		9.14	17 1	104	2 1	1 1				X					Х	X	X	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х		
003	MW7 🌾		9.13.		132	2 1	<u>  1</u>				X					Х	Х	Х	Х	X	Х	Х	X	Х	Х	Х	Х	Х		
004	MW10		9.14	17 0		2 1	1 1	П			Х					Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х		
2002	MW17			17/4/	,	2	1 1				Х					Х	Х	Х	х	Х	Х	Х	X	Х	Х	Х	Х	Х		
aa	MW18		9-13.		129	2	1 1	H			Х					Х	Х	X	X	X	х	X	Х	Х	Х	Х	Х	х		
007	MW21		9.13			2 ′	1	$\prod$			Х					Х	Х	X	Х	Х	Х	X	X	Х	X	Х	Х	X		
002	TW1	)	1	,		2 1	1 1				X					Х	Х	Х	X	Х	х	X	Х	X	Х	Х	Х	Х		
009	MW3R		9.14	17	1018	2 1	1 1				Х			$\top$	1	Х	х	X	Х	Х	X	Х	Х	Х	Х	Х	Х	х		
010	MW4		9.13			2 1	1 1	$\sqcap$			Х					Х	Х	Х	X	Х	х	Х	Х	Х	Х	Х	Х	х		
	Relinqu	ished By				Dat	te/Tî	me_		************	Ĺ				Re	çelv	ed B	y	<u> </u>			I	<del></del>	<u> </u>	D	ate."I	ime			===
	20C			5	- jef · j	7		255	سی				K	14	-t	4						ż	9/	14/1	7	15	55			
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				$\dashv$							<del>                                     </del>		_																· · ·	

CHAIN OF CUSTODY pg. 2 of 2 Work order # 17090414

TEKLAB, INC. 5445 Horseshoe Lake Road - Collinsville, IL 62234 - Phone: (618) 344-1004 - Fax: (618) 344-1005

Client:	Natural Resource T	echnology,	Inc.						Sa	mple	es o	n: [	Œ (C	E	29 B	LUE	ICE	⊠ N	O ICI		•		°C				
Address:	2422 East Washing	con Street		***					Pre	eser	ved	in:[	<u>w</u> L	ΑB	⊞ F	IELD	)			FO	R L	B U	SE (	)NL	<u>(</u>		
City / State /	Zip Bloomington, IL 61	704							La	b No	tes	:															
	Steve Wiskes		Phone	(	(414)	837-3	3614																				
E-Mail:	steve.wiskes@obg.com		Fax:	-					Cli	ent	Con	ıme	nts							· · · · · · · · · · · · · · · · · · ·							
Are these samples Are there any requi	known to be involved in litig known to be hazardous? ired reporting limits to be ment section.	Yes	No equested analysis	:?. If y	es, p		provi		Dis				CP/I	VIS 60	20A	As Ba	a B Fe										
Proje	ect Name/Number		Sample <sup>6</sup>	Colle	cto	r's N	lame	) 		MΑ	TRI	X					INE					S RI			ED		
Dynegy - Vermillion Power Station    Comparison   Compari																											
	Standard 1-2 Day (* 00% Surcharge) Other 3 Day (50% Surcharge)													de 9251	oride 9214	ed Metals	nductivity 510-8	SM 4500-0	6M 2580- B	SM 4500-	nperature 2550	bidity SM 30-B	h to Water	3M 4500− >3 €	e 9036	SM 2540C	
TARREST OF THE WORLD STORE STO	MW5	9-14-1		2 1	1 1	$\dagger \dagger$		╁┼╴	х		_	-		X	Х	x	х	X	X	X	X	х	X	Х	X	X	
02	MW6R	9.13/		2 1	1 1	††		<b> </b>	X					Х	Х	X	х	X	х	x	х	х	х	X	Х	X	
013	MW8R	9.14.1		2 1	1 1	$\top \uparrow$			X					Х	Х	Х	х	х	X	X	X	х	х	Х	Х	Х	
014	MW9	9-13-17		0		T	1		X														x				
012	MW19	2:3.17		0					Х														х				
OILS	MW20	9.131		2 1	1 1	$\prod$			Х					X	Х	Х	Х	Х	Х	×	X	Х	Х	Х	Х	X	
רוס	MW34	9.13.17	7 1613	2 1	1 1				X					X	Х	X	Х	X	Х	×	X	X	Х	X	X	Х	
Oi8	Field Blank	9.13.1	7 1700	$oldsymbol{ol}}}}}}}}}}}}}}}}}$	1 1				Х					Х	X	X								Х	Х	Х	
019	DUP1	9.13.17	1429	2 1					X					X	Х	X	Х	Х	Х	х	X	Х	Х	Х	Х	X	
<b>೦</b> ೩೦	DUP2	9.14.17	0948	2 1	1 1			<u> </u>	X					Х	Х	X	X	Х	Х	Х	X	X	Х	Х	Х	X	
	Relinquished By			Dat	te/Ti	_			ļ		<b>-</b> 1		<b>∕</b> ₹€	ceiv	ed B	у							D	ate/T	ime		
4			9.14.1	7		150	55		/	<u> </u>	ld	2	le .								91	14/1	7		<u>25</u>	2	
										•																	

The individual signing this agreement on behalf of the client, acknowledges that he/she has read and understands the terms and conditions of this agreement, and that he/she has the authority to sign on behalf of the client. See www.teklabinc.com for terms and conditions.

BottleOrder:

39591



Site Vernice Tax	Major well	ls repairs* r	equired	Yes	No	NA
Inspection Date uw I	to maintai	n well integ	rity?		Q	
Well Number <i>Q.13.17</i>			·			
1						
Stick-up Monitoring Wells	<u></u>				Comments	
1. Outer protective Casing	Yes	No	NA			
Not corroded	<u> </u>					
Not dented		<u></u>				
Not cracked			1			
Not loose	<u> </u>		<u> </u>			
İ						
2. Inner casing	Yes	No	NA			mbrating to the party
Not corroded	4				·	
Not dented		ļ	<u> </u>	·		
Not cracked						
Not loose	<u>U</u>					
	Yes	No	NA			
3. Are there weep holes in outer casing?		X				
4. Weep holes able to drain?						
5. Is there a lockable cap present?	7		7			
6. Is there a lock present?	X		<u> </u>			
7. Bumper posts in good condition?	φ					
-						
Flushmount Monitoring Wells	Yes	No	NA NA			
8. Can the lid be secured tightly?			4			
9. Does the lid have a gasket that seals?	L					
10. No water in the flushmount?						·
11. Is the well cap lockable?					·	
12. Is there a lock present?			V			
	<del> </del>		·			
All Monitoring Wells	Yes	No	NA .			
Downhole Condition	<u>~</u>		4			· · · · · · · · · · · · · · · · · · ·
12. Water level measuring point clearly mark	ed?					
13. No obstructions in well?						
14. No plant roots or vegetation in well?						
15. No sediment in bottom of well?			$\bigvee$		······································	
If present, how much sediment?	ft					
16. Installed as total depth.	ft					
17. Measured total depth of well.	ft					
General Condition	Yes	No	NA			
18. Concrete pad installed?	4					
19 . Concrete pad	<u></u>					···
Slope away form casing?						
Not deteriorated?					·····-	
Not heaved or below surrounding grade?						
20. No surface seal settling?			_			
21. Well clearly visible and labeled?	<u> </u>					••••••••••••••••••••••••••••••••••••••
Comments:					•	
······				.,		
* Major well repair are those that require a su	ubcontractor or sepa	rate mobili:	ation to con	nplete		

Site:	( / W. 10					the second secon		School-cachists		ef V in the control of	1,
	- your	cion					NRT				
Project Number:				_ Task #:		Start Date:				Time:	1331
Field Personnel:		- / cus	2			Finish Date:				Time:	1343
		MATION	30 NO 100 PM	And the service of th		water up the purior with	EVENT	TYPE	eggraphera (services la juli Military estatus	pater a constituent and	33.5
Well	ID:	+ MWI		Well Develop				ow Stress San		· · · · · · · · · · · · · · · · · · ·	
Casing l	ID:		inches	Well Volume	Approach Sai		Other (Specify)				
			WAT	TER QUALIT	YINDICATO	R PARAMET	ERS (contil	nued)	Andreas of the second	12.5	
e annia i	ime ilitary)	Volume Removed (gallons)	Depth to Water (Feet) 7-8-9-2	Drawdown (Feel)	Temp. (°C)	pH (SU)	SEC or Cond. (µs/cm)	Dissolved Oxygen (mg/L)	Turbicity (NTU)	ORP (mV)	Visual Clarity
	321	.13	79.70	.92	20.04	7.23	1750	6.07	0	85	CLEAK
133		.26	80.00	.30	19.23	7.00	1830	6.06	0	92	CLEAR
154		. 39	80.30	.30	19.05	7.18	1870	5,59	0	100	CLEASE
134		.62	80.50	, 20	18.57	7.18	1910	5.97	0	105	CLEAC
			NOTES	(continued)				Cong Actual Condu FT BTOC - Feet Belo nm - Not Measured		ORP - Oxidation-	Ufa

Low-Flow Sampling Form MW-1 Low-Flow Sampling Form

Site	VERMILION	Major wel	ls repairs*	required	Yes	No	NA
Inspection Date	9.14.17	to maintai	n well integ	grity?		$\sim$	
Well Number	mw 2						
1	up Monitoring Wells				_	Comments	
1. Outer protective	e Casing	Yes	No	NA			
Not corroded		K					
Not dented							
Not cracked				<u> </u>			
Not loose			<u> </u>	<u> </u>			
2. Inner casing		Yes	No	NA	I		
Not corroded		<del>×</del>	110	117		<del></del>	
Not dented		<del>                                   </del>			•		
Not cracked				<u> </u>			
Not loose				ļ-			
1100 10000		Yes	No	NA			w. <u>-</u> -
3. Are there ween h	noles in outer casing?			117			
4. Weep holes able	<del>-</del>	<del> </del>	<del> ^</del>	6			
5. Is there a lockabl							
6. Is there a lock pro		×					•
7. Bumper posts in							
r, campar posts in	Bood conditions			<u> </u>			
<u>Flushm</u>	ount Monitoring Wells	Yes	No	NA			
8. Can the lid be sed	cured tightly?			Ø			
9. Does the lid have	a gasket that seals?			,			
10. No water in the	flushmount?						···
11. is the well cap id	ockable?			V.			
12. Is there a lock p	resent?	,					
	Monitoring Wells	Yes	No	NA NA			
Downhole Conditio				x			
	suring point clearly marked?						
13. No obstructions						<del> </del>	
-	r vegetation in well?						
15. No sediment in I				V			<del></del>
if present, how r		ft					
16. Installed as total	-	ft					
17. Measured total	depth of well.	ft					
General Condition		Yes	No	NA			
18. Concrete pad ins	stalled?		X				
19 . Concrete pad				Ý	········		
Slope away form	casing?		,			Walter St. 2014 (1.2 Page 14.2 St. 2	····
Not deteriorated				1.			
	elow surrounding grade?						
20. No surface seal s				Ψ.			
21. Well clearly visib		X					
Comments:			<u>'</u>				
						T vie	
							······································
* Major well repair a	are those that require a subcont	ractor or sepa	rate mobiliz	ation to con	nplete		

					ROJECTIN	FORMATIO	N.		an Legister Legistra (A	STATE OF THE PARTY	Property of the second
	Site: <u>Vren</u>	15/700	/				NPT				
Project Num		1		Task #:			0.14.1	7		Time:	1019
	nel: <u>کنک</u>	1CYI8				Finish Date:		<del>Z</del>			104
	VELL INFOF		37.77				EVENT	INPE **	established the same of a	S. Charles Sandar	
	Well ID: Mi	رس		Well Develop		<b>Q</b>		ow Stress Sam			
С	asing ID:		inches	Well Volume	Approach Sar	npting	Other (Specify)				
			WAT	ER QUALIT	Y INDICATO	R PARAME	TERS (conti)	nűed)	ing a state of the	1 2 M	Marine Commission
		Volume	Depth to				SEC or	Dissolved			ĺ
Sampling	Time	Removed	Water	Drawdown	Temp.	pΗ	Cond.	Oxygen	Turbicity	ORP	Visua!
Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	(NTU)	(riv)	Clarity
	1658		19.19				<u> </u>				
	1055	0,26	20.60	1.41	15.05	7.90	691	0.29	0	- 38	CLEAK
	1058	0.39	21.05	.45	151479	7.82	686	0	0	- 98	CLEAR
	1101	0.52	21.45	.40	14,64	7.75	689	0	0	-107	CLEAR
	1/04	0.65	21.45	(2)	14.66	7-72	699	0	0	-110	CLEA:C
	<u> </u>								<u> </u>	<u> </u>	
							<u> </u>				
		<u> </u>		<u> </u>	·		<u> </u>		<u> </u>		
	l			<u> </u>							
				<u> </u>					<u> </u>		
				<u> </u>		<u></u>					
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			NOTES (	continued)	No Art at Home Transfer	right of the state			ABBREVIA	TICMS	
	· · · · · · · · · · · · · · · · · · ·			- <u> </u>				Cond Actual Condu FT BTOC - Feet Belo na - Not Applicable nm - Not Measured	ctivity	ORP - Oxidation-Ric SEC - Specific Elec SU - Standard Unit Temp - Temperatur "C - Degrees Celci	irica) Cenduciance ; ?e
1											

Low-Flow Sampling Form MW-1

Low-Flow Sampling Form

Site VERMELEON	Major well	s repairs* i	equired	Yes	No	NA
Inspection Date Q.14.17		n well integ	•			
Well Number			,,.	ι	. حم ۱	
Stick-up Monitoring Wells					Comments	
1. Outer protective Casing	Yes	No	T NA	1	comments	
Not corroded	<del>-/)</del>	100	1117			<del></del>
Not dented	1		<del> </del>			
Not cracked	<del></del>		<del> </del>			
Not loose	\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \		-			
1100 10000	<u> </u>	l	!			
2. Inner casing	Yes	No	NA NA			
Not corroded	7		ļ ;;;			
Not dented	) · · · · ·		· """			
Not cracked						
Not loose	<del>  ∀                                   </del>		ļ			
1100 10030	Yes	No	NA NA			
3. Are there weep holes in outer casing?	( )	110	11/1			
4. Weep holes able to drain?						
5. Is there a lockable cap present?	<del></del>					
6. Is there a lock present?						
I	<del></del>					· · · · · · · · · · · · · · · · · · ·
7. Bumper posts in good condition?	[]		<u> i</u>		·········	
Chrokensones & Comitonium \$440th	Va.	At -	NA I			
Flushmount Monitoring Wells	Yes	No	NA NA			
8. Can the lid be secured tightly?		#   ##### # ## ## ## ## ## ## ## ## ## #	Ψ.			
9. Does the lid have a gasket that seals?	ļ					
10. No water in the flushmount?						
11. is the well cap lockable?			\ <del>\</del>	· · · · · · · · · · · · · · · · · · ·	<del></del>	
12. Is there a lock present?	<u> </u>		L v l			
All Monitoring Wells	Yes	No	NA Ô			
Downhole Condition			8			
12. Water level measuring point clearly marked?					···	
13. No obstructions in well?						
14. No plant roots or vegetation in well?						
15. No sediment in bottom of well?	<b> </b>		ا ا			
If present, how much sediment?	ft					
16. Installed as total depth.	ft					
17. Measured total depth of well.	ft					
	r					
General Condition	Yes	No	NA			
18. Concrete pad installed?	4					
19 . Concrete pad						
Slope away form casing?		···			<del> </del>	
Not deteriorated?			•			
Not heaved or below surrounding grade?			dinamination communication ( ) - 1			- 5 = \$1
20. No surface seal settling?						
21. Well clearly visible and labeled?	7					
Comments:						
* Major well repair are those that require a subcontr	actor or separ	ate mobiliz	ation to cor	nplete		

	Site: Ven	) d A ***/ *** - 3 ·	<u> </u>	<u> </u>	Ar of Arabel School	رين مين <u>حين جين جين جين جين جين جين جين جين جين ج</u>		N. C.	1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	47 (7) (F.M.)	·
Project Num		MILLON	·	Task#.			ART 9.14-17		·		~~~
•	nnel:	Ruiss		1455 #	· · · · · · · · · · · · · · · · · · ·	Finish Date:	979-17	<u> </u>		_ime: _	0902
	WELL INFO		1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	Grape a state of the second second second		entanominator non	EVENTS	nyee 💥	agailghaeastan tain, agas at the		
<u> </u>	Well ID:	10		Well Develop			Low-Flow / 1	ow Stress San	nolina	<u>randon de la </u>	
С	asing ID:		inches	Well Volume			Other (Specify		Ihmid		
<del> </del>			WAT					nued)	Acres of the second		
	T	Volume	Depth to		MINDIOAGE	100000000000000000000000000000000000000	SEC or	Dissolved			
Sampling	Time	Removed	Water	Drawdown	Temp.	pН	Cond.	Oxygen	Turbidity	CRP	Visual
Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	(UTM)	(mV)	Clarity
	0858		50.95								
	0053	./3	52-15	1.20	15.05	6.54	1110	8.34	0	142	CLEAR
	0856	,26	52-75	,60	14.60	6.63	1110	7.81	0	140	CLEAR
	0859	139	53.20	,45	14.32	6-67	1110	7.40	2	138	CLEAN
	0902	.52	53.90	. 70	14.80	10.68	1110	663	0	137	CLEPTE
	<u> </u>		· · <u>- · · · · · · · · · · · · · · · · ·</u>	<u> </u>				<u> </u>			
	<u> </u>			<u> </u>			<u> </u>	<u> </u>		<u> </u>	
	<u> </u>			<u> </u>	<u> </u>			<u> </u>		<u> </u>	
	<u> </u>	<u> </u>		<u> </u>			<u> </u>				
	<u> </u>	<u> </u>		<u> </u>	<u> </u>	<u> </u>	<u> </u>		<u> </u>	<u> </u>	
				<u></u>	<u> </u>			<u> </u>			
				<u> </u>	<u> </u>		<u></u>		ļ	<u> </u>	
					<u> </u>						
. **:			NOTES (	continued)	সু-জেন্ত সংস্কৃতি হৈছিল। বিষয়	delig. Angelist.			ABBREVIA	TIONS	an katan ji nga ta Filipi Lila
								Cond Actual Condu FT BTOC - Feet Belo na - Not Applicable nm - Not Measured			eture
1											

Low-Flow Sampling Form MW-1

Low-Flow Sampling Form

Site	VERNILLON	Major wel	ls repairs*	required	Yes	No	NA
Inspection Date	9-13-17		n well inte	•		Q	
Well Number	17			., ., .	L	<u> </u>	***************************************
Stic	k-up Monitoring Wells					Comments	
1. Outer protectiv		Yes	No	NA	1		
Not corroded		Ø	1				
Not dented		]				·	
Not cracked		1 /	,		- Laboration Commission (200 Cl. Class. State.	A CONTRACTOR OF THE PARTY OF TH	
Not loose		<u> </u>		<u> </u>			
2. Inner casing		Yes	No	l NA	1		
Not corroded		3/	1.0	1			
Not dented				·   · - · · · · · · · · · · · · · · · ·			
Not cracked				-			
Not loose		11,				<del>.</del>	
1100 10030		Yes	No	NA			
3 Are there ween	holes in outer casing?	9	140	, NA			
4. Weep holes abi	=		<del> </del>				
5. Is there a lockat			<u> </u>	İ			
6. Is there a lock p		<del>                                     </del>		<del> </del>			
7. Bumper posts in		<del> \;</del>		<del> </del>	·····		
7. Bustipes posts in	good condition:	L					
Flushm	ount Monitoring Wells	Yes	No	NA			
8. Can the lid be se			110	<del>                                     </del>			
	e a gasket that seals?			<del>                                     </del>			
10. No water in the				<del>  </del>			
11. Is the well cap				<del>                                     </del>			
12. is there a lock				<del>                                      </del>			
LLI IS WILLIOUS ISOUR	, cocite	L		<u> </u>			
Al	Monitoring Wells	Yes	No	NA			
Downhole Condition				9			
	asuring point clearly marked?			1 1			· · · · · · · · · · · · · · · · · · ·
13. No obstruction							
	or vegetation in well?						
15. No sediment in	_			<b>├</b>			
	much sediment?	ft		·			
16. Installed as tota		ft					
17. Measured total		ft					
General Condition		Yes	No	NA			
18. Concrete pad in	Shallets:		140	AN			······································
19. Concrete pad ii	istalleu !	- <del>Y</del>					
Slope away forn	a casing?		-				
Not deteriorate		<del>   </del>	····				
	or elow surrounding grade?			<b></b>			
		1-1-1					
20. No surface seal 21. Well clearly visi							
z I. well cleany visi Comments:	ue allo labeleo (			LL			
comments:		<del></del>		····			
<u></u>							
* Major well renain	are those that require a subcont	ractor or cons	rate mobili-	ration to con	nnlate		
major well repair	are mose mar require a subcont	ractor or separ	ate mobili	Lation to Cor	uhiere		

			A		ROJECTIN	FORMATIO	1	erren territoria. A como territoria	Carried Control		The state of the s
;	Site: VEVLY.	10000					KJRT				
Project Num	*****		······································	Task #:			9.13.17			Time:	1357
Field Persor	nnel:フン	10117				Finish Date:					14/2
	MELL INFOR	RMATION	en en en en en en en en en en en en en e			THE PARTY MANY	EVENT	TYPE"	aller of the second	en enderskipe.	
	Well ID:	17		Well Develop	ment	4	Low-Flow / L	ow Stress San	npling		
C	asing ID:		inches		Approach Sar		Other (Specify		••		
	<u> </u>		TAW	ER QUALIT	YINDICATO	R PARAME	IERS (conti	nued)	ingerster er beforere i Ge		
Sampling Stage	Time (military)	Volume Removed (gallons)	Depth to Water (Feet)	Drawdown (Feet)	Temp.	pH (SU)	SEC or Cond. (µs/cm)	Dissolved Oxygen (mg/L)	Turbîdity (NTU)	ORP (mV)	Visual Clarity
0.230	1357	(82.10.10)	39.55	, , , , , , , , , , , , , , , , , , ,		(50)	(100.00.7)	(ing.z)	(1110)	(111-)	Olarity :
	1400	./3	40.40	.85	20.53	7.82	1790	3.92	1.8	110	CLENC
	1403	.26	40.90	.50	19.15	7-21	1800	2.59	1.9	82	LEGAR
	1406	.39	41.30	.40	18.86	7.02	1810	1.81	4.9	-20	CLEKE
	1409	.57	41.35	105	18.46	6.98	1830	1.44	4.2	-39	CLEAK
	1412	-65	41.90	. 55	17.48	6.45	1880	1.39	3.2	-38	CLEAL
	<del> </del>			<del> </del>	<u> </u>		<u> </u>	<del></del>	<del> </del>	<del> </del>	
	<del> </del>	<del> </del>	<u> </u>	<del>                                     </del>		<del> </del>	<del> </del>	<del> </del>	<del> </del>	<del> </del>	
	1			<del>}</del>		<del></del>			<u></u>	<del> </del>	
						· · · · · · · · · · · · · · · · · · ·					
	1								<u> </u>	<del>                                     </del>	
7.0	er i n		NOTES (	continued)	AMERICA ANTONIA	A STATE OF THE STA		Service Commence of the Service of t	ABBREVIA	JIONS	the second of the second
								Cond Actual Condu FT BTQC - Feet Belo na - Not Applicable nm - Not Measured			dure
								}			
1											

Low-Flow Sampling Form MW-1 Low-Flow Sampling Form

Site VERNELTON	Major wel	ls repairs* r	equired	Yes	No	NA
Inspection Date 9-13-17		in well integ		<u> </u>	Ø	
Well Number			,	L	.11	
Stick-up Monitoring Wells					Comments	
1. Outer protective Casing	Yes	No	NA	1		
Not corroded	V.		· · · · ·			· · · · · · · · · · · · · · · · · · ·
Not dented	<del> </del>		1	<u> </u>		
Not cracked		1		4		
Not loose	<del>- 6-</del>	Ì				
				L	· · · · · · · · · · · · · · · · · · ·	<u> </u>
2. Inner casing	Yes	No	NA .			
Not corroded	8		1			Sec milker transmission
Not dented	İ					<del></del>
Not cracked	1.			,		
Not loose	1 1//					
	Yes	No	NA NA			
3. Are there weep holes in outer casing?	X					
4. Weep holes able to drain?	1-1-					
5. Is there a lockable cap present?	11					
6. Is there a lock present?	<del></del>					***
7. Bumper posts in good condition?	<del> \/</del>					
7. Buttiper posts in good condition:		<u> </u>	<u></u>			
Flushmount Monitoring Wells	Yes	No	NA			
8. Can the lid be secured tightly?	163	IVO	7			
9. Does the lid have a gasket that seals?			[			
10. No water in the flushmount?	<del> </del>					
			<del>   </del>			
11. Is the well cap lockable?	·		<del>- \(\)</del>			
12. Is there a lock present?			$\perp \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad$		<del></del>	·
All Billionitaring 18/01/0	Yes	Na	AIA .			
All Monitoring Wells Downhole Condition	res	No	NA *(			
			*			
12. Water level measuring point clearly marked?						<del></del>
13. No obstructions in well?						
14. No plant roots or vegetation in well?						
15. No sediment in bottom of well?			<u> </u>			
If present, how much sediment?	ft					
16. Installed as total depth.	ft					
17. Measured total depth of well.	ft					
	<del></del>					
General Condition	Yes	No	NA		· · · · · · · · · · · · · · · · · · ·	
18. Concrete pad installed?	75					
19 . Concrete pad						
Slope away form casing?						
Not deteriorated?						
Not heaved or below surrounding grade?				····		
20. No surface seal settling?	1					
21. Well clearly visible and labeled?	<u> </u>					
Comments:				,		
* Major well repair are those that require a subcontra	actor or sepa	rate mobiliz	ation to con	nplete		

			and the second		ROJECTIN	FORMATIO	Ne Comment			<b>等等模型</b>	TOWN WEST
	Site: <u>UERA</u>						LRT				
Project Num				Task #:		Start Date:	9.13.17			Time:	1421
	nnel:	/ CUDI				Finish Date:				Time:	1429
N N	<b>NELL INFOR</b>	RMATION	y and a second second	Service of the servic		and the second second second second	EVENT	IYPE	en i Garaga de la como de la como de la como de la como de la como de la como de la como de la como de la como	and the second	
	Well ID:	18		Well Develop			Low-Flow / Lo			, W	i
С	asing ID:		inches	Well Volume	Approach Sar	mpling 🔲	Other (Specify	):			[
		· · · · · · · · · · · · · · · · · · ·	WAT	ER QUALIT	Y INDICATO	R PARAME	TERS (conti	nued)		and the Salah	7
Sampling Stage	Time (military)	Volume Removed (gallons;	Depth to Water (Feet)	Drawdown (Feet)	Temp.	pH (SU)	SEC or Cond. (µs/cm)	Dissolved Oxygen (mg/L)	Turbicity (NTU)	OR>	Visual Clarity
<u></u>	1423	,/3	25,70	0	17-29	7.05	1570	3.39	0	51	CLEAR
·	1425	.26	05.70	V	13.55	6.83	1440	0.27	10	26	CLEAK
<u> </u>	1427	1.39	25.70	0	13.38	6.89	1630	0.26	0	26	CLENIC
	1429	.52	23.70	0	13.32	6.88	1620	0.39	1 0	77	CLEAL
			NOTES	continued)				Cond Actual Condi FT BTQC - Feet Bek na - Not Applicable nm - Not Measured	uctivity	ORP - Oxidation-	ure

Low-Flow Sampling Form MW-1

Low-Flow Sampling Form

Site	NECUSION	Major well	s repairs* r	eguired	Yes	No	NA
Inspection Date	9.13-17	to maintai			- 100	9	
Well Number	21	1	,	,,.	<u> </u>	<del>1 </del>	·
Stick	-up Monitoring Wells					Comments	
1. Outer protective		Yes	No	NA	7	the miletonia de l'ind	
Not corroded		79					
Not dented		1		1			
Not cracked			V 1-4 4-4-4-1-1-1				· · · · · · · · · · · · · · · · · · ·
Not loose		Ú		1			
		1		······································			
2. inner casing		Yes	No	NA			
Not corroded		×	·	**************************************			
Not dented							
Not cracked							,
Not loose							
		Yes	No	NA			
3. Are there weep l	holes in outer casing?		Y		1.		
4. Weep holes able	to drain?			Y			******
5. Is there a lockab	le cap present?	×					
6. Is there a lock pr	esent?	7					
7. Bumper posts in		×		<u> </u>			
	_				······································		
<u>Flushm</u>	ount Monitoring Wells	Yes	No	NA	1		
8. Can the lid be se	cured tightly?			4			
9. Does the lid have	a gasket that seals?			ı			
10. No water in the	flushmount?						
11. is the well cap I	ockable?						
12. Is there a lock p	resent?			V			
-							
<u>All</u>	Monitoring Wells	Yes	No	NA	]		
Downhole Condition	on .			γρ			
12. Water level mea	asuring point clearly marked?			_ 1			
13. No obstructions	in well?						
14. No plant roots of	or vegetation in well?						
15. No sediment in	bottom of well?			_			
If present, how	much sediment?	ft					
16. installed as tota	l depth.	ft					
17. Measured total	depth of well.	ft					
					-		
<b>General Condition</b>		Yes	No	NA			
18. Concrete pad in	stalled?	8					
19 . Concrete pad							
Slope away form							
Not deteriorated							
Not heaved or b	elow surrounding grade?	4		_			
20. No surface seal :	settling?		γ		PAID	NSTUBLE	
21. Well clearly visit	ole and labeled?	7<					
Comments:							
* Major well repair	are those that require a subcont	ractor or sepai	rate mobiliz	ation to co	mplete		

					PROJECTII	VEORMATIC	)N	ing Bendantan sawa in in	residents in the section of the	makeus in a marent	AT ME A SET NOTE
,	Site: <u>V 54</u>	MELZON	<u> </u>				: JURT	<del></del>			
Project Num	ber	,		Task #:			: <u>9.13.1</u>	<del>7</del>		_ Time: _	1300
	nel: 7M /					_ Finish Date				. Time: _	1315
<u> </u>	NELL INFOR			and the second	eren encegationers						
	Well ID:	21		Well Develop				ow Stress San	npling		
С	asing ID:		inches	Well Volume			Other (Specify				
			W	ATER QUALIT	YINDICATO	OR PARAME	TERS (conti	nued)	A CONTRACTOR OF THE CONTRACTOR		
Sampling Stage	Time (military:	Volume Removed (gallons)	Depth to Water (Feet)		Temp.	pH · (su)	SEC or Cond. (µs/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP (mV)	Visual Clarity
	1300		90.04								
	1803	0.13	90.86	71	21.75	6.81	549	8.72	0	69	CLEAR
	1806	0.26	91.32	147	20.60	7-30	521	9.00	0	73	CLEAR
	1304	•39	92.08	. 76	19,00	7-35	500	5:63	0	14	CLENZ
	1312	2. ک	92-74	:64	18.15	7.30	516	3.60	0	-28	LIENK
	1315	:665	93.15	141	17-49	7-33	516	2.49	0	-46	CiEAK
									Other services of the section	Character State Control	
			NOTES	S (continued)				Cond Actual Condu FT BTOC - Feet Belo na - Not Applicable nm - Not Measured		ORP - Oxicatios-	bure .

Low-Flow Sampling Form

Low-Flow Sampling Form

Site VERYALLEUN	Major wells repairs* required Yes No					
Inspection Date 1.14.17		n well integ		·	6	
Well Number MW 32		_	•		L	
Stick-up Monitoring Wells					Comments	
1. Outer protective Casing	Yes	No	NA NA	]		
Not corroded	P		1		-	
Not dented						······
Not cracked			i			
Not loose						
1		•	•	•		
2. Inner casing	Yes	No	NA			
Not corroded	X					
Not dented						
Not cracked						
Not loose	3/1			***************************************		
	Yes	No	NA		-	
3. Are there weep holes in outer casing?	,	入				
4. Weep holes able to drain?			X		M	
5. Is there a lockable cap present?	K					
6. is there a lock present?	X					*
7. Bumper posts in good condition?	<del></del> -		X			1141
The sample posts in Bood solidition.						
Flushmount Monitoring Wells	Yes	No	NA			
8. Can the lid be secured tightly?	,		Q			
9. Does the lid have a gasket that seals?			- <del>  -  </del>			
10. No water in the flushmount?						
11. Is the well cap lockable?						
12. Is there a lock present?						
azi is there a lock present?						
All Monitoring Wells	Yes	No	NA			
Downhole Condition		110	<u>ح</u>		,	
12. Water level measuring point clearly marked?				·····		<del></del>
13. No obstructions in well?		····				
14. No plant roots or vegetation in well?						<del> </del>
15. No sediment in bottom of well?	<u> </u>					
If present, how much sediment?	ft		г <i>П</i> )—Т			
16. Installed as total depth.	ft					
17. Measured total depth of well.	ft					
17. Measured total depth of well.						
General Condition	Yes	No	NA			
18. Concrete pad installed?	103	<u>х</u>	100		· · · · · · · · · · · · · · · · · · ·	<del></del>
19 . Concrete pad		~	4			
Slope away form casing?		16 m to 14 · · · · · · · · · · · · · · · · · ·				
Not deteriorated?	-					
	<b> </b>					<del>"</del>
Not heaved or below surrounding grade? 20. No surface seal settling?			1			
	<del>                                     </del>		Ψ			
21. Well clearly visible and labeled?		-				
Comments:		<del>-,,,, ,</del>				
			·····			
* Major well renais are the that	vaatar as aas =	rata mahili-	ention to a	mploto		· ·
<ul> <li>Major well repair are those that require a subcont</li> </ul>	ractor or sepa	ate mobiliz	cation to cor	uhiere		

	***	7. 645 - 4		77 (F.FF	ROJECTIN	FORMATIO	New York		San Jana	A Section of	F7 - 5 4 - 25 19
;	Site:/ <i>Ell</i>	MILION		····		Client:	10127				
Project Num		1		Task #:		Start Date:	9-14-1	7		Time: /	U 3
Field Persor	nnel: Zan /	CUT8	·			Finish Date:	9-14-1	<u>z</u>			018
	VELL INFOR		1/2 2/4 PK B 1				EVENT	YPE	Salara Salara Salara Salara	and the state of t	1
	Well ID: 10	W3R		Well Develop	ment		J.ow-Flow / Lo	w Stress Sarr	pling		
C	asing ID:		inches		Approach Sar		Other (Specify)				i
			WAT	ER QUALIT	YINDICATO	R PARAME	ERS (contil	iued)	ige Section Security	100 000 000	
Sampling Stage	Time (military)	Volume Removed (gations)	Depth to Water (Feet)	Drawdown (Feet)	Temp. (°C)	pH (SU)	SEC or Cond. (µs/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP tanV)	Visual Clarity
	1003	1003	8:17								
	1006	100113	8.40	123	17-63	686	794	6.76	0	72-2	CLEAR
	1009	:26	8.40	0	17-32	7.02	794	3.73	0	- 75	CLEMIC
	1012	139	8.40	2	1699	7-15	788	1.85	0	- 25	CHERIC
	1015	.ઇચ	8.40	0	16.81	7-20	794	2.23	Ò	- 103	CLEAR
	1018	-65	8.40	0	16.65	7-23	806	2.67	0	-108	CLENZ
<u> </u>											
25 T T T	· · · · · · · · · · · · · · · · · · ·		NOTES (	continued)	The state of the s						
								Cond Actual Condu- FT BTOC - Feet Below na - Not Applicable nm - Not Measured		ORP - Oxoda Edn-Rec SEC - Specific Elect SU - Standard Units Temp - Temperature "C - Degrees Celcium	ical Conductance
			•								
							<u></u>		<u></u>		

Low-Flow Sampling Forms MW-1 Low-Flow Sampling Form

Site VERMITUN	Major wel	No	NA			
Inspection Date Q-13-77		n well integ	-	Yes	6	
Well Number awof	4- ///		····· ·	L	1 72 1	
<u> </u>						
Stick-up Monitoring Wells					Comments	
1. Outer protective Casing	Yes	No	NA	1	Sommettes	
Not corroded	3	1117	1971			
Not dented	i					
Not cracked	<del> </del>		<u> </u>			
Not loose			<u> </u>			
1100 10000	ı Ψ	l	t .	Ļ		
2. Inner casing	Yes	No	NA			
Not corroded			1			
Not dented				•		
Not cracked	<del>                                      </del>					
Not loose	1 1		]			
100 10030	Yes	No	NA NA			
3. Are there weep holes in outer casing?	162	4	NA.			
4. Weep holes able to drain?			X	,		
5. Is there a lockable cap present?			X	<del></del>		
6. Is there a lockable cap present?						
\$ · · · · · · · · · · · · · · · · · · ·	X		\ <u>v</u>			······································
7. Bumper posts in good condition?			<u> </u>			<b></b>
Flushus area & Annikavium Malla	V	N.a.	NTA I			
Flushmount Monitoring Wells	Yes	No	NA Ø		<del></del>	
8. Can the lid be secured tightly?			1			
9. Does the lid have a gasket that seals?						
10. No water in the flushmount?						···
11. Is the well cap lockable?			$- \forall - 1$			
12. Is there a lock present?						
A 11 m m ta ta F - 11 -	V 1					
All Monitoring Wells	Yes	No	NA 9		····	
Downhole Condition			<del>-</del>			<del></del>
12. Water level measuring point clearly marked?					<del></del>	
13. No obstructions in well?						
14. No plant roots or vegetation in well?	<del>-</del>		<del>\</del>			· · · · · · · · · · · · · · · · · · ·
15. No sediment in bottom of well?			<u> </u>			
if present, how much sediment?	ft					
16. Installed as total depth.	ft					
17. Measured total depth of well.	ft					
General Condition	1 V 1	NI.	NA			
	Yes	No -2	J)			
18. Concrete pad installed? 19 . Concrete pad			1			<del></del>
•						
Slope away form casing? Not deteriorated?	<del></del>		<del>   .  </del>		<del></del>	
	<b>  </b>					
Not heaved or below surrounding grade?			<del></del>			
20. No surface seal settling?	<b>V</b>		1		·	
21. Well clearly visible and labeled?	<u> </u>					···
Comments:						
						<u> </u>
* 8.5-1						
<ul> <li>Major well repair are those that require a subcont</li> </ul>	ractor or sepa	ate mobiliz	ation to con	npiete		***************************************

		1 3 8 8 1 4 5 1 1 1			ROJECTIN	FORMATION		Constitution of the second		<b>"新"等。</b>	* * * * * * * * * * * * * * * * * * *
	Site: <u>1/6/2</u> ,	MILCON			,		N25				
Project Num	ber:	<del></del>		Task #:	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		9.13-1	<del>7</del>		Time: 🔏	220
	nel: Tu					Finish Date:.					638
<u>`</u>	NELL INFOR	RMATION	and a w	Service Comments		and another while we en	EVENT	YPE	in a survival of the survival of	in the second section of	
	Well ID:	mast		Well Develop		<u> </u>	Low-Flow / Lo	ow Stress Sam	npling		
	asing ID;		inches	Well Volume	Approach San	npling 🗌	Other (Specify)	•			
			WAT	ER QUALIT	YINDICATO	R PARAMET	ERS (contil	ided)	an 2000 on the 1900 30	The second secon	
		Volume	Depth to				SEC or	Dissolved			
Sampling	Time	Removed	Water	Drawdown	Temp.	pН	Cond.	Oxygen	Turbidity	CRP	Visual
Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	(NTU)	(mV)	Clarity
	1620		8.34								
	1673	.13	8.90	.56	16.09	7-35	525	5,27	0	-25	CLERZ
	1626	.26	8.90	.0	15.68	7.38	508	2-36	0	-93	CLEAR
	1629	.39	8.90	0	15.58	7-0-4	508	0.80	0	-105	CLEAKE
	1632	.52	19.90	0	15,58	7.85	507	0,27	0	-//3	CUERZ
	1638	165	8.90	0	15,56	7.50	507	0.11	.0	-114	CLEAR
	1638	.78	8.90	0	15.54	7.50	507	0.09	0	-115	CLEAK
					<u> </u>						
				<u> </u>	<u> </u>	<u> </u>					
			<u> </u>			<u> </u>		<u> </u>	<u> </u>		:
						<u></u>		<u></u>			
					Ţ						<u> </u>
											Í
- 7 <b>v</b> 8 74			NOTES (	continued)	en die de seuschie	min			ABBREVIA	ATIONS	
					<del></del>			Cond Actual Condu FT BTOC - Feet Belor na - Not Applicable nm - Not Measured	ctivity	ORP - Oxdation-R	ctrical Conductance s
								1			

Low-Flow Sampling Form

Low-Flow Sampling Form

Site	VERNECTON	Major wel	s repairs* r	required	Yes	No	NA
Inspection Date	9.14.17		n well integ			0	
Well Number	mus			•	<b></b>	<u> </u>	
Stick	-up Monitoring Wells					Comments	
1. Outer protective		Yes	No	NA			
Not corroded	-	12	<del> </del>				-
Not dented							
Not cracked				<u> </u>		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	
Not loose				1			
			I	.1			
2. Inner casing		Yes	No	NA			
Not corroded		¥					· ,
Not dented							·
Not cracked				[			
Not loose							
		Yes	No	NA		-	
3. Are there ween i	noles in outer casing?	Ŧ.		<del>                                     </del>			
4. Weep holes able							
5. Is there a lockable		<del> }</del>					
6. Is there a lock pr		<del>      -   -                            </del>				<del></del>	
7. Bumper posts in			<u> </u>				
7. builiper posts in	good conditions			<u> </u>			
Fluchm	ount Monitoring Wells	Yes	No	NA			
8. Can the lid be see		163	140	X			
	e a gasket that seals?			1	<del></del>		
10. No water in the		-					
11. Is the well cap le						·	·
· ·			***************************************	<del></del>			
12. Is there a lock p	resentr			<u> </u>			
A II	Monitoring Wells	Yes	No	NA			
Downhole Condition		res	NO	Y.			
				1		······································	
	asuring point clearly marked?						
13. No obstructions							
	or vegetation in well?						
15. No sediment in		<u> </u>				<del> </del>	
If present, how i		ft					
16. Installed as tota	•	ft					
17. Measured total	depth of well.	ft					
C		V 3	N -	114			
General Condition	D 15	Yes	No	NA			
18. Concrete pad in:	stalled?	1-1-					
19 . Concrete pad		<del>                                     </del>					
Slope away form							
Not deteriorated		<b></b>					
	elow surrounding grade?						
20. No surface seal s	<del>-</del>	1-1-1					
21. Well clearly visib	ole and labeled?						
Comments:			······································				
				·		·····	
<u> </u>							
<ul> <li>Major well repair :</li> </ul>	are those that require a subcont	ractor or sepai	rate mobiliz	ation to con	nplete		

		indigitation to		1000000	ROJECTIN	FORMATIO	N. C.	The Sold			Property and the
,	Site: VE	MELTON				Client:	NOT				
Project Num				Task #:		Start Date:	9-14-1			Time:	0936
Field Persor	inel:	CHIL				Finish Date:	9.14.1	17		Time:	<i>5948</i>
* * * * * * * * * * * * * * * * * * *	VELL INFOR	RMATION	32.79	de la constante de la constante de la constante de la constante de la constante de la constante de la constante			EVENT		<u> </u>	Andreas September 1985 1985 1985 1985 1985 1985 1985 1985	
	Weil ID:	MUJOS		Well Develop			Low-Flow / Lo	ow Stress San	npling		
С	asing ID:		inches	Well Volume			Other (Specify)				
			WAT	ER QUALIT	YINDICATO	R PARAME	TERS (contil	nued)	in the second second		
		Volume	Depth to	Ţ -			SEC or	Dissolved			7
Sampling	Time	Removed	Water	Drawdown	Temp.	pH	Cond.	Oxygen	Turbicity	CRP	√isua
Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	(NTU)	(mV)	Clarity
	2936	0	9.73								
<b></b>	0939	13	9.7.7	0	15.66	7-01	689	0.79	0	105	CLEAR
	0942	126	9.73	0	15.40	7-/6	694	0.45	0	84	CUMP
	0948	139	9.73	0	15.31	7.22	695	0.28	. 0	72-2	CLEAR
	0948	153	9.73	D	15.21	7-26	196	0.30	0	68	CLEAR
			1								
			<u> </u>		1		<u> </u>				
											·
			į								
			1						<u> </u>		
	7										
		,									
									<del></del>		
200 60			NOTES (	continued)	usin 1865 (da nashu basili)	anger over the		28.39.73.9	ABBREVIA	TIONS	
		·	140 mon	oomenada),	**/			Cond, - Actual Condi	uctivity	ORP - Oxidation-R	teduction Potential
								FT BTOC - Feet Beld na - Not Applicable nm - Not Measured	ow Top of Casing	SEC - Specific Ele SU - Standard Uni Temp - Temperati 'C - Degrees Celo	life
1										O-Degrees Cerc	1945
			•					}			
1											
ł								1			

Low-Flow Sampling Form

Low-Flow Sampling Form

Site VERMILION	Major wells repairs* required Yes No					
Inspection Date 9-13-17		n well inter			P	
Well Number MWGR			-	•		
Stick-up Monitoring Wells	•			_	Comments	
1. Outer protective Casing	Yes	No	NA			
Not corroded	P					
Not dented						
Not cracked	<u> </u>					
Not loose	[ 0	l	Į	į		
2 January and the	1 5	f i.	1	ı		
2. Inner casing Not corroded	Yes	No	NA NA			
1	Ý		<u> </u>			· · · · · · · · · · · · · · · · · · ·
Not dented						<del></del>
Not cracked Not loose	<del> </del>		ļ			
Not loose				·		
3.4	Yes	No	NA NA			
3. Are there weep holes in outer casing?		χ	X			
4. Weep holes able to drain?			× -			
5. Is there a lockable cap present?	7					
6. Is there a lock present?	4	<del></del>		** ** :- P - :	F II - III - II - II - II - II - II - I	
7. Bumper posts in good condition?	¥		<u> </u>			
Flushmount Monitoring Wells	Yes	No	NA			
8. Can the lid be secured tightly?	103		8	<del></del>	<del></del>	
9. Does the lid have a gasket that seals?						
10. No water in the flushmount?						
11. Is the well cap lockable?					<del></del>	***************************************
12. Is there a lock present?						·····
			1	<del></del>		
All Monitoring Wells	Yes	No	NA			
Downhole Condition			Ø			
12. Water level measuring point clearly marked?			1			· · · · · · · · · · · · · · · · · · ·
13. No obstructions in well?						
14. No plant roots or vegetation in well?			1			
15. No sediment in bottom of well?						
If present, how much sediment?	ft		•			
16. Installed as total depth.	ft					
17. Measured total depth of well.	ft					
Ganaral Candition		, 81 _	Ara 3			
General Condition	Yes	No	NA			~~
18. Concrete pad installed?	1					
19 . Concrete pad	<del>                                     </del>					- book of
Slope away form casing?	<del>                                     </del>					·····
Not deteriorated?	<del>                                     </del>					
Not heaved or below surrounding grade?						
20. No surface seal settling?	<b>₩</b>					
21. Well clearly visible and labeled?						
Comments:						
Major well repair are those that require a subconti	ractor or cons	rate mobili-	ation to con	nniate		
major wen rehan are mose mar tedans a sancoun	actor or sebar	are illonilly	acion to cor	iihiara		

	SPECE OF BUILDING			2000年9月	ROJECTIN	FORMATIO	Voice in the second		Salar Silar	WELL STATE	THE THE STATE OF
;	Site: <u>V/6/</u>	2407500	<i></i>			. Client;	NRT				
Project Num				Task#:	·	Start Date:	9-13-17	7.		Time:	1445
	nnel:	/ CHIS				Finish Date:	9.13.17			Time:	1455
	WELL INFOR		32.34 (4.4)	gentra savegenrekentelgere)		tanditangkah paksa 1915 m	EVENT	TYPE	entransista en la companya de la companya de la companya de la companya de la companya de la companya de la co La companya de la n market year		
	Well ID: 100	WGR		Well Develop	ment	Z	Low-Flow / L	ow Stress San	npling	<del> </del>	
C	asing ID		inches	Well Volume	Approach Sa	mpling 🗌	Other (Specify	):			
			WAT	ER QUÂLIT	YINDICATO	R PARAME	IERS (conti	nued)			
Sampling Stage	Time (military)	Volume Removed (gallons)	Depth to Water (Feet)	Drawdown (Feet)	Temp.	pH (SU)	SEC or Cond. (µs/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP (nV)	Visual Clarity
	1446		9.74								
	1447	0,13	9.79	0	16,40	6.960	667	1-65	0	5	CLETE
	1449	0.26	2.79	0	15,31	6.88	690	0.65	0	-19	CLEAC
	1451	0.39	9-79	0	15,27	6.91	695	0.36	0	-33	LLEAK
	1453	0.52	9.79	0	15.24	6.92	698	0.20	0_	-41	CLEAL
	1455	0.65	9.79	0	15.19	4.93	698	0.13	0	-44	CLEAR
<u> </u>	<u> </u>			<u>                                     </u>	<u> </u>	<u> </u>	<u> </u>		<u> </u>	]	
	<u> </u>					<del></del>	<u> </u>		<u> </u>		
	<u> </u>	<del> </del>	<u> </u>			<del> </del>	<del></del>	<u> </u>	<del> </del>	- <del>  </del>	
	<u> </u>		<u> </u>	<del> </del>	<del> </del> -	<u> </u>	<u> </u>		<u> </u>	<del> </del>	
	<del> </del>		<u> </u>			<u> </u>	<del> </del>				
ļ <u></u>		<del></del>	<del> </del>	<del> </del>	<del> </del>	<del></del>	<del></del>	<del></del>	<del> </del>	<del></del>	
<u> </u>	-		<del>                                     </del>	<del> </del>		<del> </del>		<del></del>		<del>                                      </del>	-
	•			36 2406 CATALONE	THE SALES OF THE SALES	etakka in en arist.	1	NET REPORT THE	ABBREVI		
			NORES:(	continued):	<u> </u>			Cond Actual Cond FT BTOC - Feet Sek na - Not Applicable nm - Not Measured	ictlyity	ORP - Oxidation	ature

Low-Flow Sampling Form

Low-Flow Sampling Form

Site VELIVITATION	Major well	ls repairs* r	equired	Yes	No	NA	
Inspection Date 9./4./7	レー・ノアー to maintain well integrity?						
Well Number uw82			,	E 1000 mind-on (			
Stick-up Monitoring Wells					Comments		
1. Outer protective Casing	Yes	No	NA				
Not corroded	4,						
Not dented	1			·········			
Not cracked							
Not loose	1					· · · · · · · · · · · · · · · · · · ·	
	L		L				
2. Inner casing	Yes	No	NA				
Not corroded	Ψ						
Not dented	1			*			
Not cracked							
Not loose	₩ -						
	Yes	No	NA				
3. Are there weep holes in outer casing?	50/	7					
4. Weep holes able to drain?	- No.	<del>/</del>	χ		<del></del>		
le ( d )   1   1   1   1   1   1   1   1   1	X				,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	······································	
6. Is there a lock present?	<del>//\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\</del>						
7. Bumper posts in good condition?	1-7t/X	مسسد	X				
7. bumper posts in good condition:							
Flushmount Monitoring Wells	Yes	No	NA				
8. Can the lid be secured tightly?	163	110	- <del>'</del>				
9. Does the lid have a gasket that seals?			<del></del>		·	<del></del>	
10. No water in the flushmount?					<del></del> .		
11. Is the well cap lockable?							
12. Is there a lock present?							
12. is there a lock presentr							
All Monitoring Wells	Yes	No	NA				
Downhole Condition	162	110	4		<del></del>		
12. Water level measuring point clearly marked?					<del></del>		
13. No obstructions in well?							
14. No plant roots or vegetation in well?							
15. No sediment in bottom of well?	-		<del>- (b-  </del>				
If present, how much sediment?	ft		<del></del>	<del>_</del>			
16. installed as total depth.	ft						
17. Measured total depth of well.	ft						
17. Measured total depth of well.							
General Condition	Yes	No	NA				
18. Concrete pad installed?	163	4	(4/3				
19 . Concrete pad installed?	-		\A			· · · · · · · · · · · · · · · · · · ·	
Slope away form casing?	1	,	X)	•			
Not deteriorated?	<del></del>		<del></del>				
Not heaved or below surrounding grade?			<del>- V -  </del>				
	I	~	<u>}</u>				
20. No surface seal settling?	F -	. 1					
21. Well clearly visible and labeled?	<u> </u>						
Comments:				· · · · · · · · · · · · · · · · · · ·			
* Maior well renais no the that when a sub-	otor or core	rato mabili-	ation to see	nnlote		· · · · · · · · · · · · · · · · · · ·	
* Major well repair are those that require a subcontra	actor or sepa	rate MODINZ	ation to cor	uhiere			

		STORY OF		The state of the s	ROJECTIN	FORMATIO		STORY TO THE	dela maria	·····································	eran russ keer antig
	Site: <u>. ( <i>Jero</i></u>	אנדעדען					NET			<del></del>	
Project Num	***************************************			Task#:		Start Date:		2		Time: 2	635
Field Persor	nnel: <i>TZ</i> _	r / CNI				Finish Date:		-			2039
" " 1	WELL INFOR		7174	a salahir ang		en en en en en en en en en en en en en e	EVENT	TYPE	englagerrapis per principal di Principal di	en en en en en en en en en en en en en e	recent to the second
	Well ID: 44	W8K		Well Develop				ow Stress San			
C	asing ID:		inches	Well Volume	Approach San	npling 🔲	Other (Specify)	<u>):                                    </u>			
		_	WAT	ER QUALIT	YINDICATO	R PARAMET	ERS (conti)	nued)	ida. Maddania etambia		7
Sampling Stage	Time (military)	Volume Removed (gallons)	Depth to Water (Feet)	Drawdown (Feet)	Temp.	pH (SU)	SEC or Cond. (µs/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP (mV)	Visual Clarity
	1027	./3	13.80	0	14.93	7.92	1940	5,67	0	-/39	1.600
	1029	126	13.80	0	14.80	8.07	1970	5.65	0	<del></del>	CLEAR
	1031	139	13.80	<i>u</i>	14.74	8.18	1970	5.50	0	-144	CLERIZ
<del></del>	1033	.52	13.80	0	MISSET	ILEAUS		1		-///	
	1035	.65	13:80	0	14.80	8.30	1980	5.25	0	7/54	CLEAR
<u> </u>	160 3003	z · 78	13.80	0	14.75	8.33	1480	5.14	0	-156	CLEAR
	1039	.91	13:80	0	14.73	8.37	1980	4.86	0	-159	CLEAD
			NOTES:(	continued)	en jak sentra en en en en en en en en en en en en en	eng-		Cond Actual Cond. FTBTCC - Feet Belo ns - Not Applicable nm - Not Measured	idivity	ORP - Oxidation-R	ctrical Conductance is re

Low-Flow Sampling Form

Low-Flow Sampling Form

· · · · · · · · · · · · · · · · · · ·				P	ROJECT IN	FORMATION			Salara Cara Laboratoria		- T 4 - 3 B
S	ite: 1/E12	NELLUN					NRT				
Project Numb				Task #:		Start Date:	9.13-17	<u>-</u>		Time: 16	وا
Field Person	nel: <i>プ</i>	2- / CHE(	<u> </u>			Finish Date:_				Time:	
V	VELL INFOR	RMATION	,757.9 Fr. 6	to a supple specification of the supple specification of t		And the same	EVENT	YPE	established to the second seco	April 1975 Sept. 1	S
,	Well ID:	nw9		Well Develop				w Stress Sam			
Ca	asing ID:		inches	Well Volume	Approach Sar	mpling 🔲 '	Other (Specify)	<u>:</u>			
			WAT	ER QUALIT	INDICATO	R PARAMET	ERS (contit	iued)	No St. round in	de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la La companya de la	
Sampling	Time	Volume Removed	Depth to Water	Drawdown	Temp.	рН	SEC or Cond.	Dissolved Oxygen	Turbidity	ORF	Visual
Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	(NTU)	(mV)	Clarity
		70.07					······································				
						<del> </del>	· · · · · · · · · · · · · · · · · · ·				
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			<u> </u>			<u> </u>		ļ		<u> </u>	
		ļ	<u> </u>								
<b></b>			<u> </u>		<b></b>			<u> </u>		ļ	
			<u> </u>	<u> </u>	ļ	<u> </u>			ļ	ļ	<u> </u>
	1		<u> </u>			<del> </del>			<u> </u>	<del> </del>	
PG2 1.11			54 (9 to 10 48 500) to	· Acceptance	V-(1) #8 #1 # 1 # 1 #	September 1997		1 8 x 8 8 x 2 x 3 x 3 x 3 x 3	e de la company de la company de la company de la company de la company de la company de la company de la comp	CANADA CONTROL OF THE	\$100 to 100 to
		· .	NOTES (	continue <b>d</b> )		,		Cond Actual Condu	ABBREVIA	ORP - Oxedation-Res	ector Potential
		•	M	ONZY				FT BTQC - Feet Belon na - Not Applicable nm - Not Measured		SEC - Specific Election SU - Standard Units Temp- Temperature 'C - Degrees Celcius	ica. Conductance
			<b>O</b>								
				···			<u>.</u>				4

an K. Salah Salah Basi		editional and the second			ROJECTIN	FORMATION	V. Carlo	and the state of t	And the Bush		STOLL WITH	
	Site: 1/	ERMITE	<u>~</u>			Ćlient:	NRI					
Project Numl	ber:			Task #:		Start Date:	9-13-17			Time: /;	148	
Field Person	ne: <i>77</i> ∻	/ CHI	<u></u>			Finish Date:				Time:		
	VELL INFOF		Salan er w	A Company of Comp		Action States were	EVENT	YPE	e de la companya de la companya de la companya de la companya de la companya de la companya de la companya de La companya de la co	an maki dirigi		
	Well ID: M	v 19		Well Develop	ment	Low-Flow / Low Stress Sampling						
Ca	asing ID:		inches	Well Volume			Other (Specify)					
			WAT	ER QUALIT	INDICATO	R PARAMET	ERS (contin	iŭed)	Age Service Agent for the	And the second second		
		Volume	Depth to		i		SEC or	Dissolved				
Sampling	Time	Removed	Water	Drawdown	Temp.	Hq	Cond.	Oxygen	Turbidity	ORP	Visual	
Stage	(military)	(gallons)	(Feet)	(Feet)	(*C)	(su)	(µs/cm)	(mg/L)	(NTU)	(mV)	Clarity	
			10./3	ļ			ļ			ļ. <u></u>		
				<u> </u>								
						ļ	<u> </u>				<u> </u>	
				<u> </u>		<u> </u>				<u> </u>		
				<u> </u>							<u>                                     </u>	
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									<u> </u>			
				<u> </u>		<u> </u>						
				<u> </u>	<u> </u>					<u> </u>		
			NOTES (	continued)	भारत्य के अपने कारण के लिए हैं है जो के किया है जो की कारण के लिए हैं है	with the state of			ABBREVIA			
	DTW ONLY								ctivity w Top of Casing	ORF - Oxidation-Re SEC - Specific Best SU - Standard Units Temp - Temperatur "C - Degrees Gerciu	rica) Conductance	
								<del></del>				
L								<u></u>				

Low-Flow Semoting Form MW-1 Low-Flow Sampling Form

Site //erman	Major well	s repairs* r	equired	Yes	Νo	NA
Inspection Date 6.13.17		n well integ			Ø	
Well Number www		_	• •			
Stick-up Monitoring Wells					Comments	
1. Outer protective Casing	Yes	No	NA			
Not corroded	4					
Not dented	٦					
Not cracked						
Not loose	U					
	2/4/2/2/2/2/2/2/2/2/2/2/2/2/2/2/2/2/2/2					
2. Inner casing	Yes	No	NA			
Not corroded	*				•	
Not dented						
Not cracked						
Not loose	T.					
	Yes	No	NA			
3. Are there weep holes in outer casing?		γ-				
4. Weep holes able to drain?			У			
5. Is there a lockable cap present?	~		<u>†                                    </u>			
6. Is there a lock present?		-				
7. Bumper posts in good condition?	V					
grander began advantage.	<u> </u>		·		W. Julius	
Flushmount Monitoring Wells	Yes	No	NA			
8. Can the lid be secured tightly?			P			
9. Does the lid have a gasket that seals?				<u> </u>		
10. No water in the flushmount?						
11. Is the well cap lockable?	<b></b>					
12. Is there a lock present?						
12. 13 there a lock present:	1		<u>Г Д                                   </u>			·
All Monitoring Wells	Yes	No	NA			
Downhole Condition	105	110	4		<del></del>	
12. Water level measuring point clearly marked?		· · · · · · · · · · · · · · · · · · ·	<del>                                     </del>			
13. No obstructions in well?	J					
14. No plant roots or vegetation in well?			<del>                                     </del>			
15. No sediment in bottom of well?			1/			
If present, how much sediment?	ft					
16. Installed as total depth.	ft					
17. Measured total depth of well.	ft			•		
17. Measured total depth of well.	[					
General Condition	Yes	No	NA			
18. Concrete pad installed?	9					
19 . Concrete pad	<del>-</del>					
Slope away form casing?	<del>  \                                   </del>					
Not deteriorated?	<del>                                     </del>					
Not heaved or below surrounding grade?						
<del>-</del> -						
20. No surface seal settling?	<del>   /-  </del>				····	<del></del>
21. Well clearly visible and labeled? Comments:						
Comments.						
						<u></u>
* Major well repair are those that require a subcontr	actor or cons	rate mobili	ation to cor	nnlete		
iviajor well repair are those that require a subcontr	actor or sepa	rate mobili	Lation to COI	whiere		

	Site: 1/FD.	NILIOV				Client:	NRT	<u> </u>	A CONTRACTOR OF THE PARTY OF TH	. <u></u>	
Project Num		VILLE V		Task #:	<del></del>	Start Date:	9.131	<del></del>			
Field Persor		-/CUTP			····	Finish Date:	9.13.1			·	1539
	VELL INFOR			. And a problem of model freeze and			EVENT			Time:	7707
			<del></del>				2 4 19,45 164	29552. <u>s. x</u>	<u> </u>		
^		1W20	<del></del> }	Well Develop			Low-Flow / Lo		npling		
	asing ID:		inches		Approach San		Other (Specify)		Standing and section in	es proprietare programa Const.	wanter of the second
				TER QUALIT	YINDICATO	R PARAMET				- Modeling	
	l 	Volume	Depth to	1 .			SEC or	Dissolved	l		
Sampling	Time	Removed	Water	Drawdown	Temp,	pН	Cond.	Oxygen	Turbidity	ORP	Visual
Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(ha/cw)	(mg/L)	(NTU)	(mV)	Clarity
	1506		15.47	<del></del>					<del> </del>		
	1509	./3	1547	0	739/606		422	3.04	720	37	CLOUNT
	1512	.20	15.47	0	14.48	7.19	446	0.38	244	35	CLOUD
	1515	0-39	15.47	٥	14.05	7-12	459	0.02	150	02	BLICE
	15-18	0.52	15-47	<u> </u>	13.87	7.10	467	0	98.6	7	Cloco
	1521	0.65	15.47	د د	13.80	7-09	475	0	50.3	- 5	CLOUD
	1524	0.78	15747	<i>\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\</i>	13-74	7-08	477	0	41.4	-//	CLEAS
	1527	0.91	15.47	0	13.71	7.08	479	0	35.6	-14	LLEAZ
	1530	1.02	15.47		13.68	7.07	482	0	28.2	-19	CLEAK
	1533	1.15	15.17	0	13.65	7.07	484	0	24.7	- 23	CLERK
	1536	1.28	15:47	0	1358	7.07	485	0	15.4	-25	CLEAR
	1539	1.31	15.47	0	13.56	7.07	487	0	10.0	- スプ	CLEAR
	<u> </u>										
. <b></b>			NOTES	(continued)	Name of the second	neger over east.		NO PERSONAL PROPERTY.	ABBREVIA	TIONS	
			, , , , , , , , , , , , , , , , , , ,	- Carlotte - Carlotte		*		Cond Actual Cond FT BTOC - Feet Beld na - Not Applicable nm - Not Measured	uctivity	ORP - Oxidation-R	Cirical Conductance S re

Low-Flow Sampling Form

Low-Flow Sampling Form

Site <u>VEGRELOV</u>	Major well	s repairs* r	equired	Yes	No	NA
Inspection Date G. 12.17		n well integ		1,53	190	liv.
Well Number Mu34	to manicu.	11 44011 111605	,,,,,,	L	17-1	320000
SERVE !						
Stick-up Monitoring Wells					Comments	
1. Outer protective Casing	Yes	No	NA	7		
Not corroded	4					
Not dented			İ			
Not cracked				<u> </u>		
Not loose			<u> </u>			
		<u> </u>				
2. Inner casing	Yes	No	NA	1		
Not corroded	14					
Not dented			1			
Not cracked						
Not loose			i			
	Yes	No	NA			74. 74.
3. Are there weep holes in outer casing?		×		1		
4. Weep holes able to drain?			X			
5. Is there a lockable cap present?	7	***************************************	i			
6. Is there a lock present?	1	**********				
7. Bumper posts in good condition?					<del></del>	
	1		[			
Flushmount Monitoring Wells	Yes	No	NA	]		
8. Can the lid be secured tightly?			9			
9. Does the lid have a gasket that seals?			1			
10. No water in the flushmount?						***
11. Is the well cap lockable?			4 /			
12. Is there a lock present?			4/			
·	•	·····				
<b>All Monitoring Wells</b>	Yes	No	NA			
Downhole Condition			Ş			
12. Water level measuring point clearly marked?			1		***************************************	
13. No obstructions in well?						
14. No plant roots or vegetation in well?			N.			
15. No sediment in bottom of well?			, V.			
If present, how much sediment?	ft		•			
16. Installed as total depth.	ft					
17. Measured total depth of well.	ft					
	<del></del>	· · · · · · · · · · · · · · · · · · ·				
General Condition	Yes	No	NA			
18. Concrete pad installed?						
19 . Concrete pad				•		
Slope away form casing?						
Not deteriorated?				.,		
Not heaved or below surrounding grade?						
20. No surface seal settling?	71					
21. Well clearly visible and labeled?						
Comments:						
Major well repair are those that require a subcont	ractor or separ	ate mobiliz	ation to co	mplete	· · · · · · · · · · · · · · · · · · ·	

9	Site: 1/50	MITTEN			10 - 10 - 10 - 10 - 10 / 10 - 10 / 10 /		LRT	<u> </u>		<b>是4的发展</b>	
Project Numi		MILLIAN I		Task #:	<del></del> ~		91517	<del></del>			
Field Person		CUL		_ I don #		Finish Date:	91317	······································			1613
	VELL INFOR	MATION	. इ.च. १ जुल्ला स्टब्स	to ye, entertaining the all	17. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.	ations of new ord	EVENT	VBE:	الا الما الما الماد الماليسية ( الاما	kalmanati mid de karatina	*** ** * * * * *
	Well ID: U	7 7 7 7 7 7	<del></del>	Well Develop							
	asing ID:	WOT	inches	Well Volume			Low-Flow / Lo Other (Specify):		npiing		
7 7 7 7	aoing ib.								Selection of the second	and and the	A Market Control of the
		\ <u></u>		EKWOALI	MINDICALO	KHAKAME	TERS (contin		<u> </u>	<u> </u>	
Sampling	Time	Volume Removec	Depth to Water	Drawdown	Temp.	Ha	SEC or Cond.	Dissolved Oxygen	Turbidity	ORP	1.01
Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	(NTU)	(m\n	Visual Claritv
3-	1546	18-1011-7	14.71	1 7: 227		- (30)	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	(8,-2)	(110)	VIIIVI	Jianiy
	1549	0.13	1480	0,07,09	18.55	4.51	616	2-16	0	-18	CLEN
	1552	0,26	1480	U	14.24	6.77	670	0.13	10.8	-86	LIEAK
	1555	0.39	15.10	.30	12.98	1.88	676	0.02	20.4	-102	LLEAR
	1558	0.52	15.10	10	12.76	6.93	678	0.24	36.7	-107	CLEIK
	16-01	0.65	15.10	0	12.64	1.97	682	0.94	80.8	-112-	CIQUOT
	14.04	0.78	1510	0	1258	7.02	620	0.78	102	-116	CZOUD
	1607	2.41	15.10	0	1.	(SE) F1	an they	MELL	100		
	1610	102	15.10	0	12.45	7.01	678	1.23	102	-110	CLOUD
	1613	115	15.10	0	12.71	7.00	679	0.72	102	-111	Clou
	1.0				1261-7-	1					
						<u> </u>		<u> </u>	1		
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				<u>, (00,000,000,000,000,000,000,000,000,00</u>	<u></u>	· ·		Cond Actual Condo FT BTOC - Feet Bek na - Not Applicable nm - Not Measured	divity	ORF - Ozidation-R	cirical Conductance s re

Low-Flow Sampling Form

Low-Flow Sampling Form

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	Site: VERMI					. Client:					
Project Num				Task #:		Start Date:	9./3./7			Time:	1421
Field Person	-	LUEP				Finish Date:				Time:	1429
Y	VELL INFOR		,525,000	m		artificações paras provincias	EVENT	<b>YPE</b>	ensighted the market	Annagalistica	Term
	Well ID:	PI		Well Develop	ment		Low-Flow / Lo	w Stress San			
	asing ID:		inches	Well Volume			Other (Specify)				
•			WAT	ER QUALIT	YINDICATO	R PARAMET	ERS (contin	iued)	Section 2 . Grande		Same and the same
Sampling Stage	Time (military)	Volume Removed (gallons)	Depth to Water (Feet)	Drawdown (Feet)	Temp.	pH (SU)	SEC or Cond. (µs/cm)	Dissolved Oxygen (mg/L)	Turbid <sup>-</sup> ty (NTU)	ORP (mV;	Visua Clarity
	1421	.52	25.70	- 0	13-32	6.88	1620	0.39	0	27	CLEAR
			NOTES	continued)					ABEREVIA	FIGNS	
		•	NOIES	conunued):				Cond Actual Cond FF BTOC - Feel Belo na - Not Applicable nm - Not Messured	ictivity	ORP - Oxidation-R	curica: Conductance is tre

a solution		Carlos and		The state of the s	ROJECT IN	FORMATIO	V		Section Assessed		
	Site: <i>Jequ</i>	MIZEON				Client:					
Project Num				Task #:	<del></del>	Start Date:		<u> </u>		Time:	0936.
Field Person		JOHD				Finish Date:				. Time: <u></u>	948
Ý	VELL INFOR		73.00				EVENT	IXPE		ann alia Milas	
!		Ouf Z		Well Develop				ow Stress San	npling		
C	asing ID:		inches	Well Volume			Other (Specify)			<del></del>	4, 114
			WA	TER QUALIT	INDICATO	R PARAME	IERS (conti	rued)	and the second second		]
<del></del>	·	Volume	Depth to				SEC or	Dissolved			
Sampling	Time	Removed	Water	Drawdown	Temp.	pН	Cond.	Oxygen	Turbicity	CRP	Visual
Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	(NTL)	(7Vr)	Clarity
	0948	152	9.73	-	15,21	7-26	696	0.30	0	62	CLS, XL
		<u> </u>								<u> </u>	<del>                                     </del>
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			i							**************************************	
			NOTES	(continued)					ABBREVIA		
								Cond Actual Condu FT BTOC - Feet Belo na - Not Applicable nm - Not Measured		ORF - Oxidation-F SEC - Specific Ele SU - Standare Uni Temp - Temperati 'C - Degrees Celo	ocirical Conductance its are
								1			

Low-Flow Sampling Form MVV-1 Low-Flow Sampling Form

# Field Calibration Form Groundwater Quality Meter

		Groundwater Qual	lity Meter	
Groundwater Qua	lity Meter Manufacture	r/Model <u>KovIBX</u>		
Serial Number		- •		
oxidation/reducti	on potential, dissolved o	xygen, pH, tubidity		
		****		
Date of	Calibration Standard		Within +/_ 10%	
Calibration Check		Calibration Reading	(yes or no)	Comments
9.13.17	7.00	7.00	YES	
1230	۷.υ٧	4.W		441111111111111111111111111111111111111
	10.00	10,00		
	1412	3.40		
	0.0	0.0		
	100%	100 8 %	-LES	· · · · · · · · · · · · · · · · · · ·
CCU	7.00	7.04		
	1410	1450		· · · · · · · · · · · · · · · · · · ·
	0.0	1.0		
	100%	109.6%	· Por	
9-14-17	7.00	7.00 10.00	YE5	
0830	10.00			
	4.00	400		
	1412	1410 · 0,1		
			12/50	
Quera nous	100.0%	108%	Ü,F	
9-14-17 CCV	7.00	7.04	<del></del>	
14/2	1412 0-0	1440 0,8		
	100,0	109.8%		
	700.	107.0 10		
				· ·····
		-		
				***************************************
				,
	1			



November 30, 2017

Steve Wiskes Natural Resource Technology, Inc. 2422 East Washington Street Suite 104

Bloomington, IL 61704 TEL: (414) 837-3614 FAX: (414) 837-3608

RE: Dynegy - Vermillion Power Station

Dear Steve Wiskes:

TEKLAB, INC received 20 samples on 11/9/2017 12:20:00 PM for the analysis presented in the following report.

Samples are analyzed on an as received basis unless otherwise requested and documented. The sample results contained in this report relate only to the requested analytes of interest as directed on the chain of custody. NELAP accredited fields of testing are indicated by the letters NELAP under the Certification column. Unless otherwise documented within this report, Teklab Inc. analyzes samples utilizing the most current methods in compliance with 40CFR. All tests are performed in the Collinsville, IL laboratory unless otherwise noted in the Case Narrative.

All quality control criteria applicable to the test methods employed for this project have been satisfactorily met and are in accordance with NELAP except where noted. The following report shall not be reproduced, except in full, without the written approval of Teklab, Inc.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Michael L. Austin

Project Manager

(618)344-1004 ex 16

MAustin@teklabinc.com





# **Report Contents**

http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 17101691

Client Project: Dynegy - Vermillion Power Station

Report Date: 30-Nov-17

#### This reporting package includes the following:

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Report Contents	2
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Case Narrative	4
Accreditations	5
Laboratory Results	6
Sample Summary	24
Dates Report	25
Quality Control Results	34
Receiving Check List	42
Chain of Custody	Appended



#### **Definitions**

http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 17101691

Client Project: Dynegy - Vermillion Power Station

Report Date: 30-Nov-17

#### Abbr Definition

- CCV Continuing calibration verification is a check of a standard to determine the state of calibration of an instrument between recalibration.
- DF Dilution factor is the dilution performed during analysis only and does not take into account any dilutions made during sample preparation. The reported result is final and includes all dilutions factors.
- DNI Did not ignite
- DUP Laboratory duplicate is an aliquot of a sample taken from the same container under laboratory conditions for independent processing and analysis independently of the original aliquot.
- ICV Initial calibration verification is a check of a standard to determine the state of calibration of an instrument before sample analysis is initiated
- IDPI1 IL Dept. of Public Health
- LCS Laboratory control sample, spiked with verified known amounts of analytes, is analyzed exactly like a sample to establish intra-laboratory or analyst specific precision and bias or to assess the performance of all or a portion of the measurement system. The acceptable recovery range is in the QC Package (provided upon request).
- LCSD Laboratory control sample duplicate is a replicate laboratory control sample that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
- MBLK Method blank is a sample of a matrix similar to the batch of associated sample (when available) that is free from the analytes of interest and is processed simultaneously with and under the same conditions as samples through all steps of the analytical procedures, and in which no target analytes or interferences should present at concentrations that impact the analytical results for sample analyses.
- MDL Method detection limit means the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero.
- MS Matrix spike is an aliquot of matrix fortified (spiked) with known quantities of specific analytes that is subjected to the entire analytical procedures in order to determine the effect of the matrix on an approved test method's recovery system. The acceptable recovery range is listed in the QC Package (provided upon request).
- MSD Matrix spike duplicate means a replicate matrix spike that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
- MW Molecular weight
- ND Not Detected at the Reporting Limit

#### NELAP NELAP Accredited

- PQL Practical quantitation limit means the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operation conditions. The acceptable recovery range is listed in the QC Package (provided upon request).
- RL The reporting limit the lowest level that the data is displayed in the final report. The reporting limit may vary according to customer request or sample dilution. The reporting limit may not be less than the MDL.
- RPD Relative percent difference is a calculated difference between two recoveries (ie. MS/MSD). The acceptable recovery limit is listed in the QC Package (provided upon request).
- SPK The spike is a known mass of target analyte added to a blank sample or sub-sample; used to determine recovery deficiency or for other quality control purposes.
- Surr Surrogates are compounds which are similar to the analytes of interest in chemical composition and behavior in the analytical process, but which are not normally found in environmental samples.
- TIC Tentatively identified compound: Analytes tentatively identified in the sample by using a library search. Only results not in the calibration standard will be reported as tentatively identified compounds. Results for tentatively identified compounds that are not present in the calibration standard, but are assigned a specific chemical name based upon the library search, are calculated using total peak areas from reconstructed ion chromatograms and a response factor of one. The nearest Internal Standard is used for the calculation. The results of any TICs must be considered estimated, and are flagged with a "T". If the estimated result is above the calibration range it is flagged "ET"
- TNTC Too numerous to count ( > 200 CFU )

#### Qualifiers

- # Unknown hydrocarbon
- E Value above quantitation range
- I Associated internal standard was outside method criteria
- ND Not Detected at the Reporting Limit
- S Spike Recovery outside recovery limits
- X Value exceeds Maximum Contaminant Level

- B Analyte detected in associated Method Blank
- H Holding times exceeded
- M Manual Integration used to determine area response
- R RPD outside accepted recovery limits
- T TIC(Tentatively identified compound)



#### **Case Narrative**

http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 17101691

Client Project: Dynegy - Vermillion Power Station

Report Date: 30-Nov-17

Cooler Receipt Temp: 3.62 °C

An employee of Teklab, Inc. collected the sample(s).

MW7 could not be collected; the well was dry. TW1 could not be collect, the well no longer exists. TWM/EAII 11/9/1 /

#### Locations

	Collinsville		Springfield		Kansas City
Address	5445 Horseshoe Lake Road	Address	3920 Pintail Dr	Address	8421 Nieman Road
	Collinsville, IL 62234-7425		Springfield, IL 62711-9415		Lenexa, KS 66214
Phone	(618) 344-1004	Phone	(217) 698-1004	Phone	(913) 541-1998
Fax	(618) 344-1005	Fax	(217) 698-1005	Fax	(913) 541-1998
Email	jhriley@teklabinc.com	Email	KKlostermann@teklabinc.com	Email	jhriley@teklabinc.com
	Collinsville Air		Chicago		
Address	5445 Horseshoe Lake Road	Address	1319 Butterfield Rd.		
	Collinsville, IL 62234-7425		Downers Grove, IL 60515		
Phone	(618) 344-1004	Phone	(630) 324-6855		
Fax	(618) 344-1005	Fax			
Email	EHurley@teklabinc.com	Email	arenner@teklabinc.com		



#### Accreditations

http://www.teklabinc.com/

Work Order: 17101691

Client: Natural Resource Technology, Inc. Report Date: 30-Nov-17 Client Project: Dynegy - Vermillion Power Station

State	Dept	Cert#	NELAP	Exp Date	Lab
Illinois	IEPA	100226	NELAP	1/31/2018	Collinsville
Kansas	KDHF	E-10374	NEI AP	4/30/2018	Collinsville
Louisiana	LDEQ	166493	NELAP	6/30/2018	Collinsville
Louisiana	LDEQ	166578	NEL AP	6/30/2018	Collinsville
Texas	TCEQ	T104704515-12-1	NELAP	7/31/2018	Collmsville
Arkansas	ADEQ	88-0966		3/14/2018	Collinsville
Illinois	IDPH	17584		5/31/2019	Collinsville
Indiana	ISDH	C-IL-06		1/31/2018	Collinsville
Kentucky	KDEP	98006		12/31/2017	Collinsville
Kentucky	UST	0073		1/31/2018	Collinsville
Louisiana	LDPH	LA170027		12/31/2017	Collinsville
Missouri	MDNR	930		1/31/2018	Collinsville
Missouri	MDNR	00930		5/31/2017	Collinsville
Oklahoma	ODEQ	9978		8/31/2018	Collinsville
Tennessee	TDEC	04905		1/31/2018	Collinsville



http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 17101691

Client Project: Dynegy - Vermillion Power Station

Report Date: 30-Nov-17

Lab ID: 17101691-001

Client Sample ID: MW1

Matrix: GROUNDWATER Collection Date: 11/08/2017 10:42

MATTIX: GICOGIADA	VAILI			Concention	Date. 11/	00/2017	10.12	· · · · · · · · · · · · · · · · · · ·
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEAS	UREMENTS							
Depth to water from measuri	ng point	0		79.40	ft	1	11/08/2017 10:42	R240145
STANDARD METHOD 450	0-H B FIFL D							
рН		1.00		7.00		1	11/08/2017 10:42	R240145
STANDARD METHODS 2	130 B FIELD							
Turbidity		1.0		< 1.0	NTU	1	11/08/2017 10:42	R240145
STANDARD METHODS 18	BTH ED 2580 B FIELD							
Oxidation-Reduction Potentia	al	-300		139	mV	1	11/08/2017 10:42	R240145
STANDARD METHODS 25	510 B FIELD							
Conductivity		1		2210	μS/cm	1	11/08/2017 10:42	R240145
STANDARD METHODS 25	550 B FIELD							
Temperature		0		12.99	°C	1	11/08/2017 10:42	R240145
STANDARD METHODS 45	500-O G FIELD							
Oxygen, Dissolved		1.00		6.89	mg/L	1	11/08/2017 10:42	R240145
STANDARD METHODS 25	540 C (DISSOLVED)							
Total Dissolved Solids	NELAP	20		2070	mg/L	1	11/10/2017 17:09	R240031
STANDARD METHODS 45	500-NO3 F (TOTAL)							
Nitrogen, Nitrate (as N)	NELAP	0.050		0.376	mg/L	1	11/14/2017 12:55	R240076
SW-846 9036 (TOTAL)								
Sulfate	NELAP	500		1000	mg/L	50	11/10/2017 19:08	R240063
SW-846 9214 (DISSOLVE)	D)							
Fluoride	NELAP	0.10		0.13	mg/L	1	11/10/2017 15:21	R239991
SW-846 9251 (TOTAL)								
Chloride	NELAP	5	S	20	mg/L	1	11/10/2017 18:41	R239983
MS and/or MSD did not recove	er within control limits due to	matrix interfe	rence.					
SW-846 3005A, 6020A, MI	ETALS BY ICPMS (DISS	OLVED)						
Arsenic	NELAP	0.0010		< 0.0010	mg/L	5	11/14/2017 3:35	135725
Barium	NFL AP	0.0010		0.0118	mg/L	5	11/14/2017 3:35	135725
Boron	NELAP	0.0250		1.05	mg/L	5	11/15/2017 9:39	135725
Iron	NELAP	0.0250		< 0.0250	mg/L	5	11/14/2017 3:35	
Manganese	NELAP	0.0010		< 0.0010	mg/L	5	11/14/2017 3:35	
Selenium	NELAP	0.0010	1000	< 0.0010	mg/L	5	11/14/2017 3:35	135725



http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 17101691

Client Project: Dynegy - Vermillion Power Station

Report Date: 30-Nov-17

Lab ID: 17101691-002

Client Sample ID: MW2

Matrix: GROUNDWATER

Collection Date: 11/08/2017 11:42

Matrix. GROUNDY	· ·		Conection	i Date. 11/	06/201/	11,72		
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEAS	UREMENTS							
Depth to water from measuri	ng point	0		18.84	ft	1	11/08/2017 11:42	R240145
STANDARD METHOD 450	00-H B FIELD							
рН		1.00		7.72		1	11/08/2017 11.42	R240145
STANDARD METHODS 2	130 B FIELD							
Turbidity		1.0		< 1.0	NTU	1	11/08/2017 11:42	R240145
STANDARD METHODS 18	BTH ED. 2580 B FIELD							
Oxidation-Reduction Potentia	al	-300		-139	mV	1	11/08/2017 11:42	R240145
STANDARD METHODS 25	510 B FIELD							
Conductivity		1		796	μS/cm	1	11/08/2017 11:42	R240145
STANDARD METHODS 25	550 B FIELD							
Temperature		0		13.66	°C	1	11/08/2017 11:42	R240145
STANDARD METHODS 45	500-O G FIELD							
Oxygen, Dissolved		1.00		< 1.00	mg/L	1	11/08/2017 11:42	R240145
STANDARD METHODS 25	540 C (DISSOLVED)							
Total Dissolved Solids	NELAP	20		506	mg/L	1	11/10/2017 17:10	R240031
STANDARD METHODS 45	500-NO3 F (TOTAL)							
Nitrogen, Nitrate (as N)	NELAP	0.050		0.067	mg/L	1	11/14/2017 12:59	R240076
SW-846 9036 (TOTAL)								
Sulfate	NELAP	10		14	mg/L	1	11/10/2017 19:18	R240063
SW-846 9214 (DISSOLVE	D)							
Fluoride	NELAP	0.10		0.62	mg/L	1	11/10/2017 15:24	R239991
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		47	mg/L	1	11/10/2017 19:16	R239983
SW-846 3005A, 6020A, MI	ETALS BY ICPMS (DISS	OLVED)						
Arsenic	NELAP	0.0010		0.0062	mg/L	5	11/14/2017 3:44	135725
Barium	NELAP	0.0010		0.178	mg/L	5	11/14/2017 3:44	135725
Boron	NELAP	0.0250		0.309	mg/L	5	11/15/2017 9:50	135725
Iron	NELAP	0.0250		0.211	mg/L	5	11/14/2017 3:44	135725
Manganese	NELAP	0.0010		0.0903	mg/L	5	11/14/2017 3:44	135725
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	11/14/2017 3:44	135725



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Client: Natural Resource Technology, Inc.

Work Order: 17101691

Client Project: Dynegy - Vermillion Power Station

Report Date: 30-Nov-17

Lab ID: 17101691-004

Client Sample ID: MW10

Matrix: GROUNDWATER Collection Date: 11/08/2017 15:24

Analyses Certification RL		Concentor	i Date: 11/	00/2017	13.2-1			
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEAS								
Depth to water from measuri	ng point	0		51.76	ft	1	11/08/2017 15:24	R240145
STANDARD METHOD 450	0-H B FIFL D							
рН		1.00		6.86		1	11/08/2017 15:24	R240145
STANDARD METHODS 2	130 B FIELD							
Turbidity		1.0		< 1.0	NTU	1	11/08/2017 15:24	R240145
STANDARD METHODS 18	TH FD. 2580 B FIFLD							
Oxidation-Reduction Potentia	al	-300		84	mV	1	11/08/2017 15:24	R240145
STANDARD METHODS 25	10 B FIELD							
Conductivity	4944-77-411	1		1150	µS/cm	1	11/08/2017 15:24	R240145
STANDARD METHODS 25	550 B FIELD							
Temperature		0		13.11	°C	1	11/08/2017 15:24	R240145
STANDARD METHODS 45	500-O G FIELD							
Oxygen, Dissolved		1.00		4.26	mg/L	1	11/08/2017 15:24	R240145
STANDARD METHODS 25	540 C (DISSOLVED)							
Total Dissolved Solids	NELAP	20		900	mg/L	1	11/10/2017 17:10	R240031
STANDARD METHODS 45	500-NO3 F (TOTAL)							
Nitrogen, Nitrate (as N)	NELAP	0.050		0.404	mg/L	1	11/14/2017 13:01	R240076
SW-846 9036 (TOTAL)								
Sulfate	NELAP	100		269	mg/L	10	11/10/2017 19:32	R240063
SW-846 9214 (DISSOLVE	D)							
Fluoride	NELAP	0.10		0.14	mg/L	1	11/10/2017 15:31	R239991
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		7	mg/L	1	11/10/2017 19:24	R239983
SW-846 3005A, 6020A, MI	ETALS BY ICPMS (DISS	OLVED)						
Arsenic	NELAP	0.0010		< 0.0010	mg/L	5	11/14/2017 3:52	135725
Barium	NELAP	0.0010		0.0697	mg/L	5	11/14/2017 3:52	135725
Boron	NELAP	0.0250		0.0943	mg/L	5	11/15/2017 9:58	135725
Iron	NELAP	0.025	J	0.014	mg/L	5	11/14/2017 3:52	135725
Manganese	NELAP	0.0010		0.0954	mg/L	5	11/14/2017 3:52	135725
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	11/14/2017 3:52	135725



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Client: Natural Resource Technology, Inc.

Work Order: 17101691

Client Project: Dynegy - Vermillion Power Station

Report Date: 30-Nov-17

Lab ID: 17101691-005

Client Sample ID: MW17

Matrix: GROUNDWATER Collection Date: 11/08/2017 16:56

THE PART GROOTING	OTTEN			- DILLEGE	Date. 11/	00/201/	20100	
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEAS	UREMENTS							
Depth to water from measuring	ng point	0		39.65	ft	Ť.	11/08/2017 16:56	R240145
STANDARD METHOD 450	0-H B FIELD							
pH		1.00		G.84		1	11/08/2017 16:56	R240145
STANDARD METHODS 2	130 B FIELD							
Turbidity		1.0		20.7	NTU	1	11/08/2017 16:56	R240145
STANDARD METHODS 18	TH ED. 2580 B FIELD							
Oxidation-Reduction Potentia	ſ	-300		48	mV	1	11/08/2017 16:56	R240145
STANDARD METHODS 25	10 B FIELD							
Conductivity		1		1910	μS/cm	1	11/08/2017 16:56	R240145
STANDARD METHODS 25	50 B FIELD							
Temperature		0		11.81	°C	1	11/08/2017 16:56	R240145
STANDARD METHODS 45	00-O G FIELD							
Oxygen, Dissolved		1.00		6.48	mg/L	1	11/08/2017 16:56	R240145
STANDARD METHODS 25	40 C (DISSOLVED)							
Total Dissolved Solids	NELAP	20		2020	mg/L	1	11/10/2017 17:11	R240031
STANDARD METHODS 45	00-NO3 F (TOTAL)							
Nitrogen, Nitrate (as N)	NELAP	0.050		0.092	mg/L	1	11/14/2017 13:04	R240076
MS and/or MSD did not recove	r within control limits due to	matrix interfe	rence.					
SW-846 9036 (TOTAL)								
Sulfate	NELAP	500		1200	mg/L	50	11/10/2017 19:40	R240063
SW-846 9214 (DISSOLVE)	0)							
Fluoride	NELAP	0.10		0.13	mg/L	1	11/10/2017 15:33	R239991
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		6	mg/L	1	11/10/2017 19:32	R239983
SW-846 3005A, 6020A, ME	TALS BY ICPMS (DISS	OLVED)						
Arsenic	NELAP	0.0010	J	0.0007	mg/L	5	11/14/2017 4:00	135725
Barium	NELAP	0.0010		0.0299	mg/L	5	11/14/2017 4:00	135725
Boron	NELAP	0.0250		1.33	mg/L	5	11/15/2017 10:06	
Iron	NELAP	0.0250		1.03	mg/L	5	11/14/2017 4:00	
Manganese	NELAP	0.0010		0.0633	mg/L	5	11/14/2017 4:00	
Selenium	NELAP	0.0010		0.0031	mg/L	5	11/14/2017 4:00	135725



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Client: Natural Resource Technology, Inc.

Work Order: 17101691

Client Project: Dynegy - Vermillion Power Station

Report Date: 30-Nov-17

Lab ID: 17101691-006

Client Sample ID: MW18

Matrix: GROUNDWATER

Collection Date: 11/08/2017 17:10

Manix: Gr	COUND	WATER			Conection	i Date: 11/	00/201/	17.10	
Analy	/ses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATIO	N MEAS	SUREMENTS							
Depth to water from	n measur	ing point	0		26.80	ft	1	11/08/2017 17:10	R240145
STANDARD MFT	HOD 45	00-H B FIFLD							
рН			1.00		6.85		1	11/08/2017 17:10	R240145
STANDARD MET	HODS 2	2130 B FIELD							
Turbidity			1.0		< 1.0	NTU	1	11/08/2017 17:10	R240145
STANDARD MFT	HODS 1	8TH FD. 2580 B FIFL D							
Oxidation-Reduction	n Potenti	ial	-300		32	mV	1	11/08/2017 17:10	R240145
STANDARD MET	HODS 2	510 B FIELD							
Conductivity			1		1900	μS/cm	1	11/08/2017 17:10	R240145
STANDARD MET	HODS 2	550 B FIELD							
Temperature	1		0		12.17	°C	1	11/08/2017 17:10	R240145
STANDARD MET	HODS 4	500-O G FIELD							
Oxygen, Dissolved		4	1.00		< 1.00	mg/L	1	11/08/2017 17:10	R240145
STANDARD MET	HODS 2	540 C (DISSOLVED)							
Total Dissolved So	lids	NELAP	20		1710	mg/L	1	11/10/2017 17:12	R240031
STANDARD MET	HODS 4	500-NO3 F (TOTAL)							
Nitrogen, Nitrate (a	s N)	NELAP	0.050		0.058	mg/L	1	11/14/2017 13:23	R240076
SW-846 9036 (TO	TAL)	4" to				4			
Sulfate	٠.,	· · · NELAP	200		835	mg/L	20	11/10/2017 20:02	R240063
SW-846 9214 (DIS	SSOLVE	ED)							
Fluoride	1 .	NELAP	0.10		0.12	mg/L	1	11/10/2017 15:35	R239991
SW-846 9251 (TO	TAL)								
Chloride		NELAP	5		21	mg/L	1	11/10/2017 19:40	R239983
SW-846 3005A, 6	020A, M	IETALS BY ICPMS (DIS	SOLVED)						
Arsenic		NELAP	0.0010	9	0.0023	mg/L	5	11/14/2017 4:09	135725
Barium		NELAP	0.0010		0.0163	mg/L	5	11/14/2017 4:09	135725
Boron		NELAP	0.0250		3.40	mg/L	5	11/15/2017 10:15	
Iron		NELAP	0.0250		0.156	mg/L	5	11/14/2017 4:09	
Manganese		NELAP	0.0010		1.52	mg/L	5	11/14/2017 4:09	
Selenium		NELAP	0.0010		< 0.0010	mg/L	5	11/14/2017 4:09	135725



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Client: Natural Resource Technology, Inc.

Work Order: 17101691

Client Project: Dynegy - Vermillion Power Station

Report Date: 30-Nov-17

Lab ID: 17101691-007

Client Sample ID: MW21

Matrix: GROUNDWATER Collection Date: 11/08/2017 11:10

Matrix: GROONLY	WHITE GROUNDWATER			Consentor	i Date: 11/	11/08/2017 11.10			
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch	
FIELD ELEVATION MEAS	UREMENTS								
Depth to water from measuring	ng point	0		91.09	ft	1	11/08/2017 11:10	R240145	
STANDARD METHOD 450	0-H B FIELD								
рН		1.00		7.38		1	11/08/2017 11:10	R240145	
STANDARD METHODS 2	130 B FIELD								
Turbidity		1.0		< 1.0	NTU	1	11/08/2017 11:10	R240145	
STANDARD METHODS 18	TH ED. 2580 B FIELD				-				
Oxidation-Reduction Potentia	d	-300		-105	mV	1	11/08/2017 11:10	R240145	
STANDARD METHODS 25	10 B FIELD								
Conductivity		1		591	μS/cm	1	11/08/2017 11:10	R240145	
STANDARD METHODS 25	50 B FIELD								
Temperature		0		12.82	°C	1	11/08/2017 11:10	R240145	
STANDARD METHODS 45	00-O G FIELD								
Oxygen, Dissolved		1.00		< 1.00	mg/L	1	11/08/2017 11:10	R240145	
STANDARD METHODS 25	40 C (DISSOLVED)								
Total Dissolved Solids	NELAP	20		382	mg/L	1	11/10/2017 17:12	R240031	
STANDARD METHODS 45	00-NO3 F (TOTAL)								
Nitrogen, Nitrate (as N)	NELAP	0.050		0.503	mg/L	1	11/14/2017 13:26	R240076	
SW-846 9036 (TOTAL)									
Sulfate	NELAP	10	J	10	mg/L	1	11/10/2017 20:04	R240063	
SW-846 9214 (DISSOLVEI	0)								
Fluoride	NELAP	0.10		1.17	mg/L	1	11/10/2017 15:39	R239991	
SW-846 9251 (TOTAL)									
Chloride	NELAP	5	J	2	mg/L	1	11/10/2017 20:02	R239983	
SW-846 3005A, 6020A, ME	TALS BY ICPMS (DISS	OLVED)							
Arsenic	NELAP	0.0010		0.0313	mg/L	5	11/14/2017 4:17	135725	
Barium	NELAP	0.0010		0.0932	mg/L	5	11/14/2017 4:17	135725	
Boron	NELAP	0.0250		0.823	mg/L	5	11/15/2017 10:41	135725	
Iron	NELAP	0.0250		0.258	mg/L	5	11/14/2017 4:17	135725	
Manganese	NELAP	0.0010		0.113	mg/L	5	11/14/2017 4:17	135725	
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	11/14/2017 4:17	135725	



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Client: Natural Resource Technology, Inc.

Work Order: 17101691

Client Project: Dynegy - Vermillion Power Station

Report Date: 30-Nov-17

Lab ID: 17101691-009

Client Sample ID: MW3R

Matrix: GROUNDWATER Collection Date: 11/08/2017 12:39

Matrix: GROUNDY	VALLIX			Concention	Date: 11/	00/2017	12.39	
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEAS	UREMENTS							
Depth to water from measuri	ng point	0		8.71	ft.	1	11/08/2017 12:39	R240145
STANDARD METHOD 450	0-H B FIELD							
рН		1 00		7 37		1	11/08/2017 12:39	R240145
STANDARD METHODS 2	130 B FIELD							
Turbidity		1.0		5.2	NTU	1	11/08/2017 12:39	R240145
STANDARD METHODS 18	TH ED. 2580 B FIELD							
Oxidation-Reduction Potentia	al	-300		-137	mV	1	11/08/2017 12:39	R240145
STANDARD METHODS 25	510 B FIELD							
Conductivity		1		816	μS/cm	1	11/08/2017 12:39	R240145
STANDARD METHODS 25	550 B FIELD							
Temperature		0		14.91	°C	1	11/08/2017 12:39	R240145
STANDARD METHODS 45	500-O G FIELD							
Oxygen, Dissolved		1.00		< 1.00	mg/L	1	11/08/2017 12:39	R240145
STANDARD METHODS 25	540 C (DISSOLVED)							
Total Dissolved Solids	NELAP	20		606	mg/L	1	11/10/2017 17:12	R240031
STANDARD METHODS 45	500-NO3 F (TOTAL)							
Nitrogen, Nitrate (as N)	NELAP	0.050		0.130	mg/L	1	11/14/2017 13:28	R240076
SW-846 9036 (TOTAL)								
Sulfate	NELAP	50		70	mg/L	5	11/10/2017 20:12	R240063
SW-846 9214 (DISSOLVE)	D)							
Fluoride	NELAP	0.10		0.50	mg/L	1	11/10/2017 15:45	R239991
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		25	mg/L	1	11/10/2017 20:04	R239983
SW-846 3005A, 6020A, MI	ETALS BY ICPMS (DISS	OLVED)						
Arsenic	NELAP	0.0010		0.0074	mg/L	5	11/14/2017 4:25	135725
Barium	NELAP	0.0010		0.168	mg/L	5	11/14/2017 4:25	135725
Boron	NELAP	0.0250		3.15	mg/L	5	11/15/2017 10:49	135725
Iron	NELAP	0.0250		2.04	mg/L	5	11/14/2017 4:25	135725
Manganese	NELAP	0.0010		0.0407	mg/L	5	11/14/2017 4:25	
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	11/14/2017 4:25	135725



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Client: Natural Resource Technology, Inc.

Work Order: 17101691

Client Project: Dynegy - Vermillion Power Station

Report Date: 30-Nov-17

Lab ID: 17101691-010

Client Sample ID: MW4

Matrix: GROUNDWATER Collection Date: 11/08/2017 14:56

Analyses Certification R			Conection	Date: 11/	06/201/	14.50		
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEAS	UREMENTS							70.00
Depth to water from measuri	ng point	0		7.53	ſl	1	11/08/2017 14.56	R240145
STANDARD METHOD 450	0-H B FIELD							
рН		1.00		7.52		1	11/08/2017 14:56	R240145
STANDARD METHODS 2	130 B FIELD							
Turbidity		1.0		< 1.0	NTU	1	11/08/2017 14:56	R240145
STANDARD METHODS 18	TH ED. 2580 B FIELD							
Oxidation-Reduction Potentia	al	-300		-93	mV	1	11/08/2017 14:56	R240145
STANDARD METHODS 25	10 B FIELD							
Conductivity		1		535	µS/cm	1	11/08/2017 14:56	R240145
STANDARD METHODS 25	550 B FIELD							
Temperature		0		14.99	°C	1	11/08/2017 14:56	R240145
STANDARD METHODS 45	500-O G FIELD							
Oxygen, Dissolved		1.00		< 1.00	mg/L	1	11/08/2017 14:56	R240145
STANDARD METHODS 25	540 C (DISSOLVED)							
Total Dissolved Solids	NELAP	20		330	mg/L	1	11/10/2017 17:13	R240031
STANDARD METHODS 45	500-NO3 F (TOTAL)							
Nitrogen, Nitrate (as N)	NELAP	0.050	J	0.046	mg/L	1	11/14/2017 13:30	R240076
SW-846 9036 (TOTAL)								
Sulfate	NELAP	10		44	mg/L	1	11/10/2017 20:15	R240063
SW-846 9214 (DISSOLVE)	D)							
Fluoride	NELAP	0.10		0.32	mg/L	1	11/10/2017 15:47	R239991
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		9	mg/L	1	11/10/2017 20:13	R239983
SW-846 3005A, 6020A, MI	ETALS BY ICPMS (DISS	OLVED)						
Arsenic	NELAP	0.0010		0.0056	mg/L	5	11/14/2017 4:33	135725
Barium	NELAP	0.0010		0.260	mg/L	5	11/14/2017 4:33	135725
Boron	NELAP	0.0250		6.20	mg/L	5	11/15/2017 10:58	135725
Iron	NELAP	0.0250		0.880	mg/L	5	11/14/2017 4:33	135725
Manganese	NELAP	0.0010		0.547	mg/L	5	11/14/2017 4:33	135725
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	11/14/2017 4:33	135725



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Client: Natural Resource Technology, Inc.

Work Order: 17101691

Client Project: Dynegy - Vermillion Power Station

Report Date: 30-Nov-17

Lab ID: 17101691-011

Client Sample ID: MW5

Matrix: GROUNDWATER Collection Date: 11/08/2017 13:02

Analyses Certification RL		Concentor	Date: 11/	06/2017	13.02			
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEAS	UREMENTS							
Depth to water from measuri	ng point	0		7.31	ft	1	11/08/2017 13:02	R240145
STANDARD METHOD 450	0-H B FIELD							
pH		1.00		7.29		1	11/08/2017 13:02	R240145
STANDARD METHODS 2	130 B FIELD							
Turbidity		1.0		< 1.0	NTU	1	11/08/2017 13:02	R240145
STANDARD METHODS 18	TH ED. 2580 B FIELD							
Oxidation-Reduction Potentia	al	-300		17	mV	1	11/08/2017 13:02	R240145
STANDARD METHODS 25	10 B FIELD							
Conductivity		1		815	µS/cm	1	11/08/2017 13:02	R240145
STANDARD METHODS 25	550 B FIELD							
Temperature		0		14.66	°C	1	11/08/2017 13:02	R240145
STANDARD METHODS 45	500-O G FIELD							
Oxygen, Dissolved		1.00		< 1.00	mg/L	1	11/08/2017 13:02	R240145
STANDARD METHODS 25	540 C (DISSOLVED)							
Total Dissolved Solids	NELAP	20		362	mg/L	1	11/10/2017 17:13	R240031
STANDARD METHODS 45	500-NO3 F (TOTAL)							
Nitrogen, Nitrate (as N)	NELAP	0.050		0.163	mg/L	1	11/14/2017 13:34	R240076
SW-846 9036 (TOTAL)								
Sulfate	NELAP	100		291	mg/L	10	11/10/2017 20:29	R240063
SW-846 9214 (DISSOLVE)	D)							
Fluoride	NELAP	0.10		0.46	mg/L	1	11/10/2017 15:49	R239991
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		12	mg/L	1	11/10/2017 20:21	R239983
SW-846 3005A, 6020A, ME	ETALS BY ICPMS (DISS	OLVED)						
Arsenic	NELAP	0.0010		< 0.0010	mg/L	5	11/14/2017 4:42	135725
Barium	NELAP	0.0010		0.0286	mg/L	5	11/14/2017 4:42	135725
Boron	NELAP	0.0250		17.8	mg/L	5	11/14/2017 19:41	135725
Iron	NELAP	0.025	J	0.010	mg/L	5	11/14/2017 4:42	135725
Manganese	NELAP	0.0010		0.456	mg/L	5	11/14/2017 4:42	135725
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	11/14/2017 4:42	135725



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Client: Natural Resource Technology, Inc.

Work Order: 17101691

Client Project: Dynegy - Vermillion Power Station

Report Date: 30-Nov-17

Lab ID: 17101691-012

Client Sample ID: MW6R

Matrix: GROUNDWATER Collection Date: 11/08/2017 13:36

THERETE CHACACHALIAN	71111					ocques	DE Date Analysed F			
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch		
FIFLD FLEVATION MEAS	UREMENTS							340		
Depth to water from measuring	ng point	0		9.45	ft	1	11/08/2017 13:36	R240145		
STANDARD METIIOD 450	0-II B FIELD		***************************************							
pH		1 00		7.00		1	11/08/2017 13:36	R240145		
STANDARD METHODS 21	130 B FIELD									
Turbidity		1.0		< 1.0	NTU	1	11/08/2017 13:36	R240145		
STANDARD METHODS 18	TH ED. 2580 B FIELD									
Oxidation-Reduction Potentia		-300		-101	mV	1	11/08/2017 13:36	R240145		
STANDARD METHODS 25	10 B FIELD			2 1						
Conductivity	and the supplemental	1		845	μS/cm	1	11/08/2017 13:36	R240145		
STANDARD METHODS 25	50 B FIELD									
Temperature		0		14.71	°C	1	11/08/2017 13:36	R240145		
STANDARD METHODS 45	00-O G FIELD									
Oxygen, Dissolved		1.00		< 1.00	mg/L	1	11/08/2017 13:36	R240145		
STANDARD METHODS 25	40 C (DISSOLVED)									
Total Dissolved Solids	NELAP	20	Н	606	mg/L	1	11/21/2017 17:40	R240449		
Sample required re-analysis ou	t of hold time.									
STANDARD METHODS 45	00-NO3 F (TOTAL)									
Nitrogen, Nitrate (as N)	NELAP	0.050	J	0.044	mg/L	1	11/14/2017 13:37	R240076		
SW-846 9036 (TOTAL)										
Sulfate	NELAP	50		160	mg/L	5	11/13/2017 13:14	R240101		
SW-846 9214 (DISSOLVED	))									
Fluoride	NELAP	0.10		0.15	mg/L	1	11/10/2017 15:51	R239991		
SW-846 9251 (TOTAL)		***************************************								
Chloride	NELAP	5		7	mg/L	1	11/10/2017 20:29	R239983		
SW-846 3005A, 6020A, ME	TALS BY ICPMS (DISSO	DLVED)								
Arsenic	NELAP	0.0010		< 0.0010	mg/L	5	11/14/2017 5:07	135725		
Barium	NELAP	0.0010		0.0764	mg/L	5	11/14/2017 5:07	135725		
Boron	NELAP	0.0250		0.197	mg/L	5	11/14/2017 19:49	135725		
Iron	NELAP	0.0250		0.194	mg/L	5	11/14/2017 5:07	135725		
Manganese	NELAP	0.0010		0.258	mg/L	5	11/14/2017 5:07	135725		
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	11/14/2017 5:07	135725		



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Client: Natural Resource Technology, Inc.

Work Order: 17101691

Client Project: Dynegy - Vermillion Power Station

Report Date: 30-Nov-17

Lab ID: 17101691-013

Client Sample ID: MW8R

Matrix: GROUNDWATER Collection Date: 11/08/2017 12:20

Matrix: GROUNDWATER			Conection Date: 11/08/2017 12:20							
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch		
FIELD ELEVATION MEASU	IREMENTS									
Depth to water from measurin	g point	0		13.65	ft	1	11/08/2017 12:20	R240145		
STANDARD METIIOD 4500	II B FIELD									
рН		1.00		8.56		1	11/08/2017 12:20	R240145		
STANDARD METHODS 21	30 B FIELD									
Turbidity		1.0		< 1.0	NTU	1	11/08/2017 12:20	R240145		
STANDARD METHODS 18	TH ED. 2580 B FIELD									
Oxidation-Reduction Potential		-300		-97	mV	1	11/08/2017 12:20	R240145		
STANDARD METHODS 25	10 B FIELD									
Conductivity		1		2020	μS/cm	1	11/08/2017 12:20	R240145		
STANDARD METHODS 25	50 B FIELD									
Temperature		0		14.28	°C	1	11/08/2017 12:20	R240145		
STANDARD METHODS 450	00 O G FIELD									
Oxygen, Dissolved		1.00		< 1.00	mg/L	1	11/08/2017 12:20	R240145		
STANDARD METHODS 254	10 C (DISSOLVED)									
Total Dissolved Solids	NELAP	20		2040	mg/L	1	11/10/2017 17:14	R240031		
STANDARD METHODS 450	00-NO3 F (TOTAL)									
Nitrogen, Nitrate (as N)	NELAP	0.050		< 0.050	mg/L	1	11/14/2017 13:39	R240076		
SW-846 9036 (TOTAL)										
Sulfate	NELAP	500		1140	mg/L	50	11/10/2017 21:15	R240063		
SW-846 9214 (DISSOLVED	)									
Fluoride	NELAP	0.10		< 0.10	mg/L	1	11/10/2017 15:54	R239991		
SW-846 9251 (TOTAL)										
Chloride	NELAP	5		17	mg/L	1	11/10/2017 21:07	R239983		
SW-846 3005A, 6020A, ME	TALS BY ICPMS (DISS	SOLVED)								
Arsenic	NELAP	0.0010		0.0106	mg/L	5	11/14/2017 5:15	135725		
Barium	NELAP	0.0010		0.0476	mg/L	5	11/14/2017 5:15	135725		
Boron	NELAP	0.500	S	51.6	mg/L	100	11/15/2017 12:04	135725		
Iron	NELAP	0.0250		0.0377	mg/L	5	11/14/2017 5:15	135725		
Manganese	NELAP	0.0010		0.113	mg/L	5	11/14/2017 5:15	135725		
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	11/14/2017 5:15	135725		
MS QC limits for B are not appl	icable due to high sample/	spike ratio.								



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Client: Natural Resource Technology, Inc.

Work Order: 17101691

Client Project: Dynegy - Vermillion Power Station

Report Date: 30-Nov-17

Lab ID: 17101691-014

Client Sample ID: MW9

Matrix: GROUNDWATER Collection Date: 11/08/2017 13:20

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEAS	UREMENTS							
Depth to water from measuring	ng point	U		9.77	ft	1	11/08/2017 13:20	R240145



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Client: Natural Resource Technology, Inc.

Work Order: 17101691

Client Project: Dynegy - Vermillion Power Station

Report Date: 30-Nov-17

Lab ID: 17101691-015

Client Sample ID: MW19

Matrix: GROUNDWATER Collection Date: 11/08/2017 13:15

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MI	EASUREMENTS							
Depth to water from measuring point		0		0.67	ft	1	11/08/2017 13:15	R240145



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Client: Natural Resource Technology, Inc.

Work Order: 17101691

Client Project: Dynegy - Vermillion Power Station

Report Date: 30-Nov-17

Lab ID: 17101691-016

Client Sample ID: MW20

Matrix: GROUNDWATER Collection Date: 11/08/2017 14:05

Matrix: GROUNDWATER				Concention	Date. 11/	00/201/	17.05	
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
<b>FIELD ELEVATION MEAS</b>	UREMENTS							
Depth to water from measuring	ng point	0		15.06	ft	1	11/08/2017 14:05	R240145
STANDARD METHOD 450	0-H B FIELD							
pH		1.00		7.22		1	11/08/2017 14:05	R240145
STANDARD METHODS 2	130 B FIELD		3					
Turbidity		1.0		3.3	NTU	1	11/08/2017 14:05	R240145
STANDARD METHODS 18	TH ED. 2580 B FIELD							
Oxidation-Reduction Potentia	al	-300		-20	mV	1	11/08/2017 14:05	R240145
STANDARD METHODS 25	10 B FIELD							
Conductivity		1		527	μS/cm	1	11/08/2017 14:05	R240145
STANDARD METHODS 25	550 B FIELD							
Temperature		0		15.08	°C	1	11/08/2017 14:05	R240145
STANDARD METHODS 45	500-O G FIFL D							
Oxygen, Dissolved		1.00		< 1.00	mg/L	1	11/08/2017 14:05	R240145
STANDARD METHODS 25	640 C (DISSOLVED)							
Total Dissolved Solids	NELAP	20		372	mg/L	1	11/10/2017 17:14	R240031
STANDARD METHODS 45	500-NO3 F (TOTAL)							
Nitrogen, Nitrate (as N)	NELAP	0.050	J	0.011	mg/L	1	11/14/2017 13:41	R240076
SW-846 9036 (TOTAL)								
Sulfate	NELAP	20		58	mg/L	2	11/10/2017 21:23	R240063
SW-846 9214 (DISSOLVEI	D)							
Fluoride	NELAP	0.10	J	0.07	mg/L	1	11/10/2017 15:59	R239991
SW-846 9251 (TOTAL)		7 7 7 7 6 2						
Chloride	NELAP	5	J	4	mg/L	1	11/10/2017 21:15	R239983
SW-846 3005A, 6020A, ME	ETALS BY ICPMS (DISS	OLVED)						The same
Arsenic	NELAP	0.0010	J	0.0006	mg/L	5	11/14/2017 5:23	135725
Barium	NELAP	0.0010		0.0170	mg/L	5	11/14/2017 5:23	135725
Boron	NELAP	0.0250		0.531	mg/L	5	11/14/2017 20.06	135725
Iron	NELAP	0.0250		0.178	mg/L	5	11/14/2017 5:23	135725
Manganese	NELAP	0.0010		0.0283	mg/L	5	11/14/2017 5:23	135725
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	11/14/2017 5:23	135725



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Client: Natural Resource Technology, Inc.

Work Order: 17101691

Client Project: Dynegy - Vermillion Power Station

Report Date: 30-Nov-17

Lab ID: 17101691-017

Client Sample ID: MW34

Matrix: GROUNDWATER Collection Date: 11/08/2017 14:36

Matrix: GROUNDY	VAILK			Conection	Date: 11/	08/201/	14.30	
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEAS	UREMENTS							
Depth to water from measuri	ing point	0		14.57	ft	1	11/08/2017 14:36	R240145
STANDARD METHOD 450	00-II B FIELD							
pH		1.00		6.94		1	11/08/2017 14:36	R240145
STANDARD METHODS 2	130 B FIELD							
Turbidity		1.0		126	NTU	1	11/08/2017 14:36	R240145
STANDARD METHODS 18	8 TH ED. 2580 B FIELD		•					
Oxidation-Reduction Potentia	al	-300		-132	mV	1	11/08/2017 14:36	R240145
STANDARD METHODS 25	510 B FIELD							
Conductivity		1		772	μS/cm	1	11/08/2017 14:36	R240145
STANDARD METHODS 25	550 B FIELD							
Temperature		0		12.31	°C	1	11/08/2017 14:36	R240145
STANDARD METHODS 4	500-O G FIELD							
Oxygen, Dissolved		1.00		< 1.00	mg/L	1	11/08/2017 14:36	R240145
STANDARD METHODS 2	540 C (DISSOLVED)							
Total Dissolved Solids	NELAP	20		488	mg/L	1	11/10/2017 17:15	R240031
STANDARD METHODS 4	500-NO3 F (TOTAL)							
Nitrogen, Nitrate (as N)	NELAP	0.050	J	0.030	mg/L	1	11/14/2017 13:43	R240076
SW-846 9036 (TOTAL)								
Sulfate	NELAP	10		< 10	mg/L	1	11/10/2017 21:25	R240063
SW-846 9214 (DISSOLVE	D)							
Fluoride	NELAP	0.10		0.69	mg/L	1	11/10/2017 16:01	R239991
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		33	mg/L	1	11/10/2017 21:23	R239983
SW-846 3005A, 6020A, M	ETALS BY ICPMS (DISS	SOLVED)						
Arsenic	NELAP	0.0010		0.0229	mg/L	5	11/14/2017 5:32	135725
Barium	NELAP	0.0010		0.147	mg/L	5	11/14/2017 5:32	135725
Boron	NELAP	0.0250		0.518	mg/L	5	11/14/2017 20:14	
Iron	NELAP	0.0250		5.45	mg/L	5	11/14/2017 5:32	
Manganese	NELAP	0.0010		0.0618	mg/L	5	11/14/2017 5:32	
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	11/14/2017 5:32	135725



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Client: Natural Resource Technology, Inc.

Work Order: 17101691

Client Project: Dynegy - Vermillion Power Station

Report Date: 30-Nov-17

Lab ID: 17101691-018

Client Sample ID: Field Blank

Matrix: GROUNDWATER Collection Date: 11/08/2017 17:30

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
STANDARD METHODS 254	IO C (DISSOLVED)							
Total Dissolved Solids	NELAP	20	Ĵ	12	mg/L	1	11/10/2017 17:15	R240031
STANDARD METHODS 450	00 NO3 F (TOTAL)							
Nitrogen, Nitrate (as N)	NELAP	0.050		0.431	mg/L	1	11/14/2017 13:56	R240076
SW-846 9036 (TOTAL)								
Sulfate	NELAP	10		< 10	mg/L	1	11/10/2017 21:28	R240063
SW-846 9214 (DISSOLVED)								
Fluoride	NELAP	0.10		< 0.10	mg/L	1	11/10/2017 16:02	R239991
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		< 5	mg/L	1	11/10/2017 21:26	R239983
SW-846 3005A, 6020A, MET	TALS BY ICPMS (DISS	OLVED)						
Arsenic	NELAP	0.0010		< 0.0010	mg/L	5	11/14/2017 5:40	135725
Barium	NELAP	0.0010		< 0.0010	mg/L	5	11/14/2017 5:40	135725
Boron	NELAP	0.0250		< 0.0250	mg/L	5	11/15/2017 11:06	135725
Iron	NELAP	0.0250		< 0.0250	mg/L	5	11/14/2017 5:40	135725
Manganese	NELAP	0.0010		< 0.0010	mg/L	5	11/14/2017 5:40	135725
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	11/14/2017 5:40	135725



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Client: Natural Resource Technology, Inc.

Work Order: 17101691 Report Date: 30-Nov-17

Client Project: Dynegy - Vermillion Power Station
Lab ID: 17101691-019

Client Sample ID: DUP1

Matrix: GROUNDWATER

Collection Date: 11/08/2017 12:39

THE STATE OF THE S	WILL			Conceilor	i Linet. 11/	00/2017	12.00	
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEAS	UREMENTS							
Depth to water from measuri	ng point	0		8.71	ft	1	11/08/2017 12.39	R240145
STANDARD METHOD 450	0-H B FIELD		1111					
pH		1.00		7.37		1	11/08/2017 12:39	R240145
STANDARD METHODS 2	130 B FIELD							
Turbidity		1.0		5.2	NTU	1	11/08/2017 12:39	R240145
STANDARD METHODS 18	TH ED. 2580 B FIELD							
Oxidation-Reduction Potentia	al	-300		-137	mV	1	11/08/2017 12:39	R240145
STANDARD METHODS 25	510 B FIELD							
Conductivity		1		816	µS/cm	1	11/08/2017 12:39	R240145
STANDARD METHODS 25	550 B FIELD							
Temperature		0		14.91	°C	1	11/08/2017 12:39	R240145
STANDARD METHODS 45	500-O G FIELD							
Oxygen, Dissolved		1.00		< 1.00	mg/L	1	11/08/2017 12:39	R240145
STANDARD METHODS 25	540 C (DISSOLVED)							
Total Dissolved Solids	NELAP	20		602	mg/L	1	11/10/2017 17:16	R240031
STANDARD METHODS 45	500-NO3 F (TOTAL)							
Nitrogen, Nitrate (as N)	NELAP	0.050	J	0.039	mg/L	1	11/14/2017 14:21	R240076
SW-846 9036 (TOTAL)								
Sulfate	NELAP	50		80	mg/L	5	11/10/2017 21:52	R240063
SW-846 9214 (DISSOLVE)	D)							
Fluoride	NELAP	0.10		0.49	mg/L	1	11/10/2017 16:04	R239991
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		25	mg/L	1	11/10/2017 21:44	R239983
SW-846 3005A, 6020A, MI	ETALS BY ICPMS (DISS	OLVED)						
Arsenic	NELAP	0.0010		0.0068	mg/L	5	11/14/2017 5:48	135725
Barium	NELAP	0.0010		0.168	mg/L	5	11/14/2017 5:48	135725
Boron	NELAP	0.0250		3.13	mg/L	5	11/14/2017 20:31	135725
Iron	NELAP	0.0250		1.97	mg/L	5	11/14/2017 5:48	135725
Manganese	NELAP	0.0010		0.0389	mg/L	5	11/14/2017 5:48	
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	11/14/2017 5:48	135725



#### http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 17101691

Client Project: Dynegy - Vermillion Power Station

Report Date: 30-Nov-17

Lab ID: 17101691-020

Client Sample ID: DUP2

Matrix: GROUNDWATER Collection Date: 11/08/2017 13:36

A malaga:	Cartification	nr	Ougl	Devent	Thele	DF	Data Analysis I	Detal
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Daten
FIELD ELEVATION MEASU		0		0.45		4	11/00/0017 12:26	D040445
Depth to water from measuring		0		9.45	ft	1	11/08/2017 13:36	1(240145
STANDARD METHOD 4500	D-H B FIELD						44100100474000	50.00.00
pH		1.00		7.00		1	11/08/2017 13:36	R240145
STANDARD METHODS 21	30 B FIELD	24			Prime i	2		
Turbidity		1.0		< 1.0	NTU	1	11/08/2017 13:36	R240145
STANDARD METHODS 18								
Oxidation-Reduction Potential		-300		-101	mV	1	11/08/2017 13:36	R240145
STANDARD METHODS 25	10 B FIELD							
Conductivity		1		845	μS/cm	1	11/08/2017 13:36	R240145
STANDARD METHODS 25	50 B FIELD							
Temperature		0		14.71	°C	1	11/08/2017 13:36	R240145
STANDARD METHODS 45	00-O G FIELD							
Oxygen, Dissolved		1.00		< 1.00	mg/L	1	11/08/2017 13:36	R240145
STANDARD METHODS 25	40 C (DISSOLVED)							
Total Dissolved Solids	NELAP	20	RH	616	mg/L	1	11/21/2017 17:40	R240449
Sample required re-analysis ou	t of hold time.							
RPD for DUP was outside of Q	C limit due to sample compo	sition.						
STANDARD METHODS 45	00-NO3 F (TOTAL)							
Nitrogen, Nitrate (as N)	NELAP	0.050	J	0.048	mg/L	1	11/14/2017 14:01	R240076
SW-846 9036 (TOTAL)								
Sulfate	NELAP	50		152	mg/L	5	11/10/2017 22:06	R240063
SW-846 9214 (DISSOLVED	)							
Fluoride	NELAP	0.10		0.14	mg/L	1	11/10/2017 16:07	R239991
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		7	mg/L	1	11/10/2017 21:58	R239983
SW-846 3005A, 6020A, ME	TALS BY ICPMS (DISSO	OLVED)						
Arsenic	NELAP	0.0010		< 0.0010	mg/L	5	11/14/2017 5:57	135725
Barium	NELAP	0.0010		0.0759	mg/L	5	11/14/2017 5:57	135725
Boron	NELAP	0.0250		0.181	mg/L	5	11/14/2017 20:39	135725
Iron	NELAP	0.0250		0.190	mg/L	5	11/14/2017 5:57	135725
Manganese	NELAP	0.0010		0.255	mg/L	5	11/14/2017 5:57	135725
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	11/14/2017 5:57	135725



## Sample Summary

#### http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 17101691

Client Project: Dynegy - Vermillion Power Station

Report Date: 30-Nov-17

Lab Sample ID	Client Sample ID	Matrix	Fractions	<b>Collection Date</b>
17101691-001	MWI	Groundwater	4	11/08/2017 10:42
17101691-002	MW2	Groundwater	4	11/08/2017 11:42
17101691 003	MW7	Groundwater	4	11/08/2017 0:00
17101691 004	MW10	Groundwater	4	11/08/2017 15:24
17101691-005	MW17	Groundwater	4	11/08/2017 16:56
17101691-006	MW18	Groundwater	4	11/08/2017 17:10
17101691-007	MW21	Groundwater	4	11/08/2017 11:10
17101691-008	TWI	Groundwater	4	11/08/2017 0:00
17101691-009	MW3R	Groundwater	4	11/08/2017 12:39
17101691-010	MW4	Groundwater	4	11/08/2017 14:56
17101691-011	MW5	Groundwater	4	11/08/2017 13:02
17101691-012	MW6R	Groundwater	4	11/08/2017 13:36
17101691-013	MW8R	Groundwater	4	11/08/2017 12:20
17101691-014	MW9	Groundwater	1	11/08/2017 13:20
17101691-015	MW19	Groundwater	1	11/08/2017 13:15
17101691-016	MW20	Groundwater	4	11/08/2017 14:05
17101691-017	MW34	Groundwater	4	11/08/2017 14:36
17101691-018	Field Blank	Groundwater	4	11/08/2017 17:30
17101691-019	DUP1	Groundwater	4	11/08/2017 12:39
17101691-020	DUP2	Groundwater	4	11/08/2017 13:36



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Client: Natural Resource Technology, Inc.

Work Order: 17101691

Client Project: Dynegy - Vermillion Power Station

Report Date: 30-Nov-17

Sample ID	Client Sample ID	Collection Date	Received Date		4-1-1-2
1/101/01 001 4	Test Name	11/00/2015 10 42	11/00/2017 12 20	Prep Date/Time	Analysis Date/Time
17101691-001A	MWI	11/08/2017 10:42	11/09/2017 12:20		
	Field Elevation Measurements				11/08/2017 10:42
	Standard Method 4500-H B Field				11/08/2017 10:42
	Standard Methods 2130 B Field				11/08/2017 10:42
	Standard Methods 18th Ed. 2580 B Field				11/08/2017 10:42
	Standard Methods 2510 B Field				11/08/2017 10:42
	Standard Methods 2550 B Field				11/08/2017 10:42
	Standard Methods 4500-NO2 B (Total)				11/09/2017 16:41
	Standard Methods 4500-O G Field				11/08/2017 10:42
	SW-846 9036 (Total)				11/10/2017 19:08
	SW-846 9251 (Total)				11/10/2017 18:41
7101691-001B	MW1	11/08/2017 10:42	11/09/2017 12:20		
	Standard Methods 2540 C (Dissolved)				11/10/2017 17:09
	SW-846 9214 (Dissolved)				11/10/2017 15:21
17101691-001C	MW1	11/08/2017 10:42	11/09/2017 12:20		4 500 80 000 1000
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			11/09/2017 18:59	11/14/2017 3:35
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			11/09/2017 18:59	11/15/2017 9:39
17101691-001D	MW1	11/08/2017 10:42	11/09/2017 12:20	11/03/2017 10:05	
	Standard Methods 4500-NO3 F (Total)	3-9-31-377	300000000000000000000000000000000000000		11/14/2017 12:55
17101691-002A	MW2	11/08/2017 11:42	11/09/2017 12:20		11/11/2017 12:33
	Field Elevation Measurements				11/08/2017 11:42
	Standard Method 4500-H B Field				
	Standard Methods 2130 B Field				11/08/2017 11:42
					11/08/2017 11:42
	Standard Methods 18th Ed. 2580 B Field				11/08/2017 11:42
	Standard Methods 2510 B Field				11/08/2017 11:42
	Standard Methods 2550 B Field				11/08/2017 11:42
	Standard Methods 4500-NO2 B (Total)				11/09/2017 16:41
	Standard Methods 4500-O G Field				11/08/2017 11:42
	SW 846 9036 (Total)				11/10/2017 19:18
	SW-846 9251 (Total)				11/10/2017 19:16
17101691-002B	MW2	11/08/2017 11:42	11/09/2017 12:20		
	Standard Methods 2540 C (Dissolved)				11/10/2017 17:10
	SW-846 9214 (Dissolved)				11/10/2017 15:24
17101691 002C	MW2	11/08/2017 11:42	11/09/2017 12:20		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			11/09/2017 18:59	11/14/2017 3:44
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			11/09/2017 18:59	11/15/2017 9:50
17101691-002D	MW2	11/08/2017 11:42	11/09/2017 12:20		



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Client: Natural Resource Technology, Inc.

Work Order: 17101691

Client Project: Dynegy - Vermillion Power Station

Report Date: 30-Nov-17

ample ID	Client Sample ID	Collection Date	Received Date	Duan Date/Flore	Analysis Date/Fi
	Test Name			Prep Date/ Time	Analysis Date/Time
7101691-004A	Standard Methods 4500-NO3 F (Total) MW10	11/08/2017 15:24	11/09/2017 12:20		11/14/2017 12:59
7101081-00414		11/00/001/13/14	11/02/301/ 12/0		11/00/0010 17 31
	Field Elevation Measurements				11/08/2017 15:24
	Standard Method 4500-H B Field				11/08/2017 15:24
	Standard Methods 2130 B Field				11/08/2017 15:24
	Standard Methods 18th Ed 2580 B Field				11/08/2017 15:24
	Standard Methods 2510 B Field				11/08/2017 15:24
	Standard Methods 2550 B Field				11/08/2017 15:24
	Standard Methods 4500-NO2 B (Total)				11/09/2017 16:42
	Standard Methods 4500-O G Field				11/08/2017 15:24
	SW-846 9036 (Total)				11/10/2017 19:32
	SW-846 9251 (Total)				11/10/2017 19:24
17101691-004B	MW10	11/08/2017 15:24	11/09/2017 12:20		
	Standard Methods 2540 C (Dissolved)				11/10/2017 17:10
	SW-846 9214 (Dissolved)				11/10/2017 15:31
17101691-004C	MW10	11/08/2017 15:24	11/09/2017 12:20		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			11/09/2017 18:59	11/14/2017 3:52
7101691-004D	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			11/09/2017 18:59	11/15/2017 9:58
17101691-004D	MW10	11/08/2017 15:24	11/09/2017 12:20		
	Standard Methods 4500-NO3 F (Total)				11/14/2017 13:01
17101691-005A	MW17	11/08/2017 16:56	11/09/2017 12:20		
	Field Elevation Measurements				11/08/2017 16:56
	Standard Method 4500-H B Field				11/08/2017 16:56
7101691-004B 7101691-004C 7101691-005A	Standard Methods 2130 B Field				11/08/2017 16:56
	Standard Methods 18th Ed. 2580 B Field				11/08/2017 16:56
	Standard Methods 2510 B Field				11/08/2017 16:56
	Standard Methods 2550 B Field				11/08/2017 16:56
	Standard Methods 4500-NO2 B (Total)				11/09/2017 16:42
	Standard Methods 4500-O G Field				11/08/2017 16 56
	SW-846 9036 (Total)				11/10/2017 19:40
	SW-846 9251 (Total)				11/10/2017 19:32
17101691-005B	MW17	11/08/2017 16:56	11/09/2017 12:20		
	Standard Methods 2540 C (Dissolved)				11/10/2017 17:11
	SW-846 9214 (Dissolved)				11/10/2017 15:33
17101691-005C	MW17	11/08/2017 16:56	11/09/2017 12:20		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			11/09/2017 18:59	11/14/2017 4:00
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			11/09/2017 18:59	11/15/2017 10:06



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Client: Natural Resource Technology, Inc.

Client Project: Dynegy - Vermillion Power Station

Work Order: 17101691

Report Date: 30-Nov-17

Sample ID	Client Sample ID	Collection Date	Received Date			
	Test Name			Prep Date/Time	Analysis Date/Time	
17101691-005D	MW17	11/08/2017 16:56	11/09/2017 12:20			
	Standard Methods 4500 NO3 F (Total)				11/14/2017 13:04	
1/101691-006A	MW18	11/08/201/17:10	11/09/2017 12:20			
	Field Elevation Measurements				11/08/2017 17:10	
	Standard Method 4500-H B Field				11/08/2017 17:10	
	Standard Methods 2130 B Field				11/08/2017 17:10	
	Standard Methods 18th Ed. 2580 B Field				11/08/2017 17:10	
	Standard Methods 2510 B Field				11/08/2017 17:10	
	Standard Methods 2550 B Field				11/08/2017 17:10	
	Standard Methods 4500-NO2 B (Total)				11/09/2017 16:42	
	Standard Methods 4500-O G Field				11/08/2017 17:10	
	SW-846 9036 (Total)				11/10/2017 20:02	
	SW-846 9251 (Total)				11/10/2017 19:40	
17101691-006B	MW18	11/08/2017 17:10	11/09/2017 12:20			
	Standard Methods 2540 C (Dissolved)				11/10/2017 17:12	
	SW-846 9214 (Dissolved)				11/10/2017 15:35	
17101691-006C	MW18	11/08/2017 17:10	11/09/2017 12:20			
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			11/09/2017 18:59	11/14/2017 4:09	
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			11/09/2017 18:59	11/15/2017 10:15	
17101691-006D	MW18	11/08/2017 17:10	11/09/2017 12:20	11/03/2017 10:05		
	Standard Methods 4500-NO3 F (Total)				11/14/2017 13:23	
17101691-007A	MW21	11/08/2017 11:10	11/09/2017 12:20		atomicia to tenera	
	Field Elevation Measurements				11/08/2017 11:10	
	Standard Method 4500-H B Field				11/08/2017 11:10	
	Standard Methods 2130 B Field				11/08/2017 11:10	
	Standard Methods 18th Ed. 2580 B Field				11/08/2017 11:10	
	Standard Methods 2510 B Field				11/08/2017 11:10	
	Standard Methods 2550 B Field				11/08/2017 11:10	
	Standard Methods 4500 NO2 B (Total)				11/09/2017 16:43	
	Standard Methods 4500-O G Field				11/08/2017 11:10	
	SW-846 9036 (Total)				11/10/2017 20:04	
	SW-846 9251 (Total)				11/10/2017 20:02	
17101691-007B	MW21	11/08/201/ 11:10	11/09/2017 12:20		W. 12	
	Standard Methods 2540 C (Dissolved)				11/10/2017 17:12	
	SW-846 9214 (Dissolved)				11/10/2017 15:39	
17101601 0076	MW21	11/08/2017 11:10	11/09/2017 12:20			
17101691-007C						



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Client: Natural Resource Technology, Inc.

Work Order: 17101691

Client Project: Dynegy - Vermillion Power Station

Report Date: 30-Nov-17

Sample ID	Client Sample ID Test Name	Collection Date	Received Date	Prep Date/Time	Analysis Date/Time
	SW 846 3005A, 6020A, Metals by ICPMS (Dissolved)			11/09/2017 18.59	11/15/2017 10:41
17101691-007D	MW21	11/08/2017 11:10	11/09/2017 12:20		
	Standard Methods 4500-NO3 F (Total)				11/14/2017 13:26
17101691-009A	MW3R	11/08/2017 12:39	11/09/2017 12:20		***************************************
	Field Elevation Measurements				11/08/2017 12:39
	Standard Method 4500-H B Field				11/08/2017 12:39
	Standard Methods 2130 B Field				11/08/2017 12:39
	Standard Methods 18th Ed. 2580 B Field				11/08/2017 12:39
	Standard Methods 2510 B Field				11/08/2017 12:39
	Standard Methods 2510 B Field Standard Methods 2550 B Field				11/08/2017 12:39
	Standard Methods 4500-NO2 B (Total)				11/09/2017 16:43
	Standard Methods 4500-O G Field				11/08/2017 12:39
	SW-846 9036 (Total)				11/10/2017 20:12
	SW-846 9251 (Total)				11/10/2017 20:04
17101691-009B	MW3R	11/08/2017 12:39	11/09/2017 12:20		11/10/2017 20:04
	Standard Methods 2540 C (Dissolved)		541144601115101		11/10/2017 17:12
	SW-846 9214 (Dissolved)				11/10/2017 17:12
17101691-009C	MW3R	11/08/2017 12:39	11/09/2017 12:20		11/10/2017 15.45
17101031 0030		11/00/2017 12.55	11/09/2017 12:20	anatotici in	11/11/2017 105
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			11/09/2017 18:59	11/14/2017 4:25
17101601 0000	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)	11/00/2017 12:20	11/00/2017 12 20	11/09/2017 18:59	11/15/2017 10:49
17101691-009D	MW3R	11/08/2017 12:39	11/09/2017 12:20		
	Standard Methods 4500-NO3 F (Total)				11/14/2017 13:28
17101691-010A	MW4	11/08/2017 14.56	11/09/2017 12.20		
	Field Elevation Measurements				11/08/2017 14:56
	Standard Method 4500-H B Field				11/08/2017 14:56
	Standard Methods 2130 B Field				11/08/2017 14:56
	Standard Methods 18th Ed. 2580 B Field				11/08/2017 14:56
	Standard Methods 2510 B Field				11/08/2017 14:56
	Standard Methods 2550 B Field				11/08/2017 14:56
	Standard Methods 4500-NO2 B (Total)				11/09/2017 16:43
	Standard Methods 4500-O G Field				11/08/2017 14:56
	SW-846 9036 (Total)				11/10/2017 20:15
	SW-846 9251 (Total)				11/10/2017 20:13
17101691-010B	MW4	11/08/2017 14:56	11/09/2017 12:20		
	Standard Methods 2540 C (Dissolved)				11/10/2017 17:13
	SW-846 9214 (Dissolved)				11/10/2017 15:47
17101691-010C	MW4	11/08/2017 14:56	11/09/2017 12:20		



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Client: Natural Resource Technology, Inc.

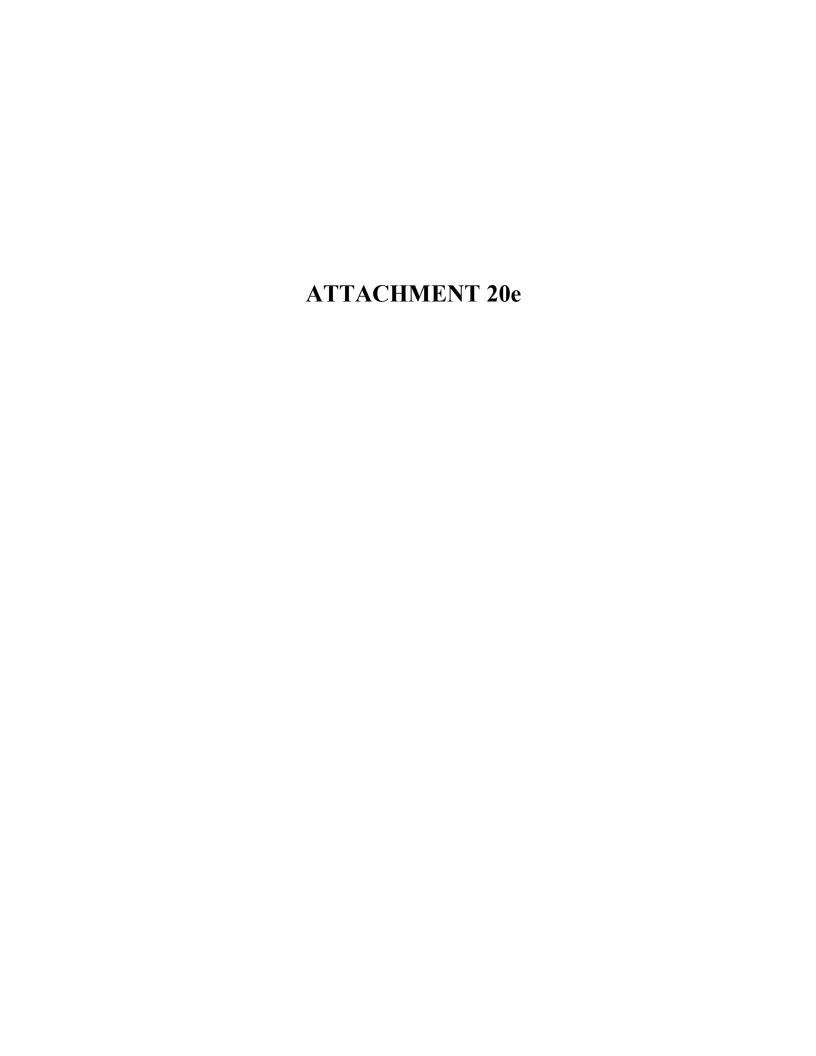
Work Order: 17101691

Client Project: Dynegy - Vermillion Power Station

Report Date: 30-Nov-17

Sample ID	Client Sample ID	Collection Date	Received Date		
	Test Name			Prep Date/Time	Analysis Date/Time
	SW-846-3005A, 6020A, Metals by ICPMS (Dissolved)			11/09/2017 18:50	11/14/2017 4:33
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			11/09/2017 18:59	11/15/2017 10:58
17101691 010D	MW4	11/08/2017 14:56	11/00/2017 12:20		
	Standard Methods 4500-NO3 F (Total)				11/14/2017 13:30
17101691-011A	MW5	11/08/2017 13:02	11/09/2017 12:20		
	Field Elevation Measurements				11/08/2017 13:02
	Standard Method 4500-H B Field				11/08/2017 13:02
	Standard Methods 2130 B Field				11/08/2017 13:02
	Standard Methods 18th Ed. 2580 B Field				11/08/2017 13:02
	Standard Methods 2510 B Field				11/08/2017 13:02
	Standard Methods 2550 B Field				11/08/2017 13:02
	Standard Methods 4500-NO2 B (Total)				11/09/2017 16:45
	Standard Methods 4500-O G Field				11/08/2017 13:02
	SW-846 9036 (Total)				11/10/2017 20:29
	SW-846 9251 (Total)				11/10/2017 20:21
17101691-011B	MW5	11/08/2017 13:02	11/09/2017 12:20		
	Standard Methods 2540 C (Dissolved)				11/10/2017 17:13
	SW-846 9214 (Dissolved)				11/10/2017 15:49
17101691-011C	MW5	11/08/2017 13:02	11/09/2017 12:20		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			11/09/2017 18:59	11/14/2017 4:42
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			11/09/2017 18:59	11/14/2017 19:41
17101691-011D	MW5	11/08/2017 13:02	11/09/2017 12:20		
	Standard Methods 4500-NO3 F (Total)				11/14/2017 13:34
17101691-012A	MW6R	11/08/2017 13:36	11/09/2017 12:20		
	Field Elevation Measurements				11/08/2017 13:36
	Standard Method 4500-H B Field				11/08/2017 13:36
	Standard Methods 2130 B Field				11/08/2017 13:36
	Standard Methods 18th Ed. 2580 B Field				11/08/2017 13:36
	Standard Methods 2510 B Field				11/08/2017 13:36
	Standard Methods 2550 B Field				11/08/2017 13:36
	Standard Methods 4500-NO2 B (Total)				11/09/2017 16:45
	Standard Methods 4500-O G Field				11/08/2017 13:36
	SW-846 9036 (Total)				11/13/2017 13:14
	SW 846 9251 (Total)				11/10/2017 20:29
17101691-012B	MW6R	11/08/2017 13:36	11/09/2017 12:20		
	Standard Methods 2540 C (Dissolved)				11/21/2017 17:40
	SW-846 9214 (Dissolved)				11/10/2017 15:51

The follow	ving are attach	nments to the	testimony o	of Andrew Rehi





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Client: Natural Resource Technology, Inc.

Client Project: Dynegy - Vermillion Power Station

Work Order: 17101691 Report Date: 30-Nov-17

Sample ID	Client Sample ID	Collection Date	Received Date			
	Test Name			Prep Date/Time	Analysis Date/Time	
7101691-012C	MW6R	11/08/2017 13:36	11/09/2017 12:20			
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			11/09/2017 18 59	11/14/2017 5.07	
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			11/09/2017 18:59	11/14/2017 19:49	
17101691-012D	MW6R	11/08/2017 13:36	11/09/2017 12:20			
	Standard Methods 4500-NO3 F (Total)				11/14/2017 13:37	
17101691-013A	MW8R	11/08/2017 12.20	11/09/2017 12.20			
	Field Elevation Measurements				11/08/2017 12:20	
	Standard Method 4500-H B Field				11/08/2017 12:20	
	Standard Methods 2130 B Field				11/08/2017 12:20	
	Standard Methods 18th Ed. 2580 B Field				11/08/2017 12:20	
	Standard Methods 2510 B Field				11/08/2017 12:20	
	Standard Methods 2550 B Field				11/08/2017 12:20	
	Standard Methods 4500-NO2 B (Total)				11/09/2017 16:46	
	Standard Methods 4500-O G Field				11/08/2017 12:20	
	SW-846 9036 (Total)				11/10/2017 21:15	
	SW-846 9251 (Total)				11/10/2017 21:07	
17101691-013B	MW8R	11/08/2017 12:20	11/09/2017 12:20			
	Standard Methods 2540 C (Dissolved)				11/10/2017 17:14	
	SW-846 9214 (Dissolved)				11/10/2017 15:54	
17101691-013C	MW8R	11/08/2017 12:20	11/09/2017 12:20			
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			11/09/2017 18:59	11/14/2017 5:15	
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			11/09/2017 18:59	11/15/2017 12:04	
17101691-013D	MW8R	11/08/2017 12:20	11/09/2017 12:20			
	Standard Methods 4500-NO3 F (Total)				11/14/2017 13:39	
17101691-014A	MW9	11/08/2017 13:20	11/09/2017 12:20			
	Field Elevation Measurements				11/08/2017 13:20	
17101691-015A	MW19	11/08/2017 13:15	11/09/2017 12:20			
	Field Elevation Measurements				11/08/2017 13:15	
17101691-016A	MW20	11/08/2017 14:05	11/09/2017 12:20			
	Field Elevation Measurements				11/08/2017 14:05	
	Standard Method 4500-H B Field				11/08/2017 14:05	
	Standard Methods 2130 B Field				11/08/2017 14:05	
	Standard Methods 18th Ed. 2580 B Field				11/08/2017 14:05	
	Standard Methods 2510 B Field				11/08/2017 14:05	
	Standard Methods 2550 B Field				11/08/2017 14:05	
	Standard Methods 4500-NO2 B (Total)				11/09/2017 16:46	



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Client: Natural Resource Technology, Inc.

Work Order: 17101691

Client Project: Dynegy - Vermillion Power Station

Report Date: 30-Nov-17

Sample ID	Client Sample ID Test Name	Collection Date	Received Date	Prep Date/Time	Analysis Date/Time	
	Standard Methods 4500-O G Field				11/08/2017 14:05	
	SW-846 9036 (Total)				11/10/2017 21:23	
	SW 846 9251 (Total)				11/10/2017 21:15	
17101691-016B	MW20	11/08/2017 14:05	11/09/2017 12:20			
	Standard Methods 2540 C (Dissolved)				11/10/2017 17:14	
	SW-846 9214 (Dissolved)				11/10/2017 15:59	
17101691-016C	MW20	11/08/2017 14:05	11/09/2017 12:20			
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			11/09/2017 18:59	11/14/2017 5:23	
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			11/09/2017 18:59	11/14/2017 20:06	
17101691-016D	MW20	11/08/2017 14:05	11/09/2017 12:20		VI 41 1 3 2 2	
	Standard Methods 4500-NO3 F (Total)				11/14/2017 13:41	
17101691-017A	MW34	11/08/2017 14:36	11/09/2017 12:20			
	Field Elevation Measurements				11/08/2017 14:36	
	Standard Method 4500-H B Field				11/08/2017 14:36	
	Standard Methods 2130 B Field				11/08/2017 14:36	
	Standard Methods 18th Ed. 2580 B Field				11/08/2017 14:36	
	Standard Methods 2510 B Field				11/08/2017 14:36	
	Standard Methods 2550 B Field				11/08/2017 14:36	
	Standard Methods 4500-NO2 B (Total)				11/09/2017 16:47	
	Standard Methods 4500-O G Field				11/08/2017 14:36	
	SW-846 9036 (Total)				11/10/2017 21:25	
	SW-846 9251 (Total)				11/10/2017 21:23	
1/101691-01/B	MW34	11/08/2017 14:36	11/09/2017 12:20			
	Standard Methods 2540 C (Dissolved)				11/10/2017 17:15	
	SW-846 9214 (Dissolved)				11/10/2017 16:01	
17101691-017C	MW34	11/08/2017 14:36	11/09/2017 12:20			
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			11/09/2017 18:59	11/14/2017 5:32	
	SW 846 3005A, 6020A, Metals by ICPMS (Dissolved)			11/09/2017 18:59	11/14/2017 20:14	
17101691 017D	MW34	11/08/2017 14:36	11/09/2017 12:20			
	Standard Methods 4500-NO3 F (Total)				11/14/2017 13:43	
17101691-018A	Field Blank	11/08/2017 17:30	11/09/2017 12:20			
	Standard Methods 4500-NO2 B (Total)				11/09/2017 16:47	
	SW-846 9036 (Total)				11/10/2017 21:28	
	SW-846 9251 (Total)				11/10/2017 21:26	
17101691-018B	Field Blank	11/08/2017 17:30	11/09/2017 12:20			
	Standard Methods 2540 C (Dissolved)				11/10/2017 17:15	



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Client: Natural Resource Technology, Inc.
Client Project: Dynegy - Vermillion Power Station

Work Order: 17101691

Report Date: 30-Nov-17

ample ID	Client Sample ID	Collection Date	Received Date	210000000000000000000000000000000000000	
	Test Name			Prep Date/Time	Analysis Date/Time
	SW 846 9214 (Dissolved)				11/10/2017 16:02
17101691-018C	Field Blank	11/08/2017 17:30	11/09/2017 12:20		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			11/09/2017 18:59	11/14/2017 5:40
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			11/09/2017 18:59	11/15/201 / 11:06
17101691-018D	Field Blank	11/08/2017 17:30	11/09/2017 12:20		
	Standard Methods 4500-NO3 F (Total)				11/14/2017 13.56
17101691-019A	DUP1	11/08/2017 12:39	11/09/2017 12:20		
	Field Elevation Measurements				11/08/2017 12:39
	Standard Method 4500-H B Field				11/08/2017 12:39
	Standard Methods 2130 B Field				11/08/2017 12:39
	Standard Methods 18th Ed. 2580 B Field				11/08/2017 12:39
	Standard Methods 2510 B Field				11/08/2017 12:39
	Standard Methods 2550 B Field				11/08/2017 12:39
	Standard Methods 4500-NO2 B (Total)				11/09/2017 16:47
	Standard Methods 4500-O G Field				11/08/2017 12:39
	SW-846 9036 (Total)				11/10/2017 21:52
	SW-846 9251 (Total)				11/10/2017 21:44
17101691-019B	DUP1	11/08/2017 12:39	11/09/2017 12:20		
	Standard Methods 2540 C (Dissolved)				11/10/2017 17:16
	SW-846 9214 (Dissolved)				11/10/2017 16:04
17101691-019C	DUP1	11/08/2017 12:39	11/09/2017 12:20		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			11/09/2017 18:59	11/14/2017 5:48
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			11/09/2017 18.59	11/14/2017 20:31
17101691-019D	DUPI	11/08/2017 12:39	11/09/2017 12:20	economic prop	
	Standard Methods 4500-NO3 F (Total)				11/14/2017 14:21
17101691-020A	DUP2	11/08/2017 13:36	11/09/2017 12:20		
	Field Elevation Measurements				11/08/2017 13:36
	Standard Method 4500-H B Field				11/08/2017 13:36
	Standard Methods 2130 B Field				11/08/201 / 13:36
	Standard Methods 18th Ed. 2580 B Field				11/08/2017 13:36
	Standard Methods 2510 B Field				11/08/2017 13:36
	Standard Methods 2550 B Field				11/08/2017 13:36
	Standard Methods 4500-NO2 B (Total)				11/09/2017 16:48
	Standard Methods 4500-O G Field				11/08/2017 13:36
	SW-846 9036 (Total)				11/10/2017 22:06
	SW-846 9251 (Total)				11/10/2017 21:58
17101691-020B	DUP2	11/08/2017 13:36	11/09/2017 12:20		



#### http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.
Client Project: Dynegy - Vermillion Power Station

Work Order: 17101691 Report Date: 30-Nov-17

Sample ID	Client Sample ID	Collection Date	Received Date		
	Test Name			Prep Date/Time	Analysis Date/Time
	Standard Methods 2540 C (Dissolved)				11/21/2017 17:40
	SW-846 9214 (Dissolved)				11/10/2017 16.07
17101691 020C	DUP2	11/08/2017 13:36	11/09/2017 12:20		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			11/09/2017 18:59	11/14/2017 5:57
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			11/09/2017 18:59	11/14/2017 20:39
17101691-020D	DUP2	11/08/2017 13:36	11/09/2017 12:20		
	Standard Methods 4500-NO3 F (Total)				11/14/2017 14:01



# **Quality Control Results**

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Client: Natural Resource Technology, Inc.

Work Order: 17101691

Client Project: Dynegy - Vermillion Power Station

Report Date: 30-Nov-17

STANDARD METHOD 4500-F	B FIEL	D	3100							
Batch R240145 SampType SampID: LCS-R240145	: LCS		Units							Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%RFC	Low Limit	High I imit	Analyzed
рН		1.00		7.01	7.000	Ö	100.1	99.1	100.9	11/08/201
STANDARD METHODS 2510	B FIELD	)							***	
Batch R240145 SampType SampID: LCS-R240145	: LCS		Units µmhos							Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Conductivity		1		1410	1412	0	99.9	90	110	11/08/2017
STANDARD METHODS 2540	C (DISS	OLVED								
Batch R240031 SampType SampID: MBLK	: MBLK		Units mg/L							Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Total Dissolved Solids		20		< 20						11/10/201
Total Dissolved Solids		20	J	14						11/10/201
Batch R240031 SampType SampID: LCS	: LCS		Units mg/L		and own			11000		Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Total Dissolved Solids		20		1000	1000	0	100.2	90	110	11/10/201
Batch R240031 SampType SampID: LCSQC	: LCSQ	С	Units mg/L							Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Total Dissolved Solids		20	Pri v	1020	1000	0	101.8	90	110	11/10/201
<b>Batch R240031 SampType</b> SampID: 17101691-005BMS	: MS		Units mg/L							Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Total Dissolved Solids		20			500.0	2018	87.2	85	115	11/10/201
Batch R240031 SampType SampID: 17101691-005BMSD	: MSD		Units mg/L					RPC	Limit 5	Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref	Val %RPD	Analyzed
Total Dissolved Solids		20			500.0	2018	87.6	2454	0.08	11/10/201
Batch R240031 SampType SampID: 17101691-017BDUP	: DUP		Units mg/L					RPD	Limit 5	Acre
		DI	Qual	Daniel	Cuit.	SPK Ref Val	%REC	RPD Ref V	Val %RPD	Date Analyzed
Analyses Total Dissolved Solids		RL 20	Qual	500	Spike	31 11 101 YUI	,u U	488.0	2.43	11/10/201
, Star Biodorrou Golius		20		300				400.0	2.40	11/10/20



## **Quality Control Results**

#### http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 17101691

Client Project: Dynegy - Vermillion Power Station

Report Date: 30-Nov-17

STANDARD MET	IODS 2540 C	DISSULVE	)							
Batch R240449 SampID: MBLK	SampType:	MBLK	Units mg/L							Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%KEC:	Low Limit	High Limit	Analyzed
Total Dissolved So	olids	20		14						11/21/2017
Total Dissolved So	olids	20	) J	14						11/21/2017
Total Dissolved So	olide	20	)	< 20						11/21/2017
Batch R240449 SampID: LCS	SampType:	LCS	Units mg/L				10.11.11			Date
Analyses		RL	Oual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Total Dissolved So	olids	20		984	1000	0	98.4	90	110	11/21/2017
Batch R240449 SampID: LCSQC	SampType:	LCSQC	Units mg/L			Up.al.				Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Total Dissolved So	olids	20	1	982	1000	0	98.2	90	110	11/21/2017
Total Dissolved So	olids	20	is.	978	1000	0	97.8	90	110	11/21/2017
Batch R240449 SampID: 17101691-	SampType: 012BDUP	DUP	Units mg/L					RPD Limit 5		Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref \	/al %RPD	Analyzed
Total Dissolved So	olids	20	Н	632				606.0	4.20	11/21/2017
Batch R240449	SampType:	DUP	Units mg/L					RPD	Limit 5	
SampID: 17101691- Analyses	-020BDUP	RL	Oual	Damle	Cuilea	SPK Ref Val	%REC	RPD Ref \	/al %RPD	Date Analyzed
Total Dissolved So	olids	20		512	Spike	OF ICTION VOI	701120	616.0	18,44	11/21/2017
STANDARD METH	IODS 4500-N	IO2 B (TOTA	<b>Y</b>							
Batch R239890 SampID: MBLK	SampType:		Units mg/L						11 1011	Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Nitrogen, Nitrite (a	s N)	0.05		< 0.05						11/09/2017
Nitrogen, Nitrite (a		0.05	i	< 0.05						11/09/2017
Batch R239890 SampID: LCS	SampType:	LCS	Units mg/L							Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Nitrogen, Nitrite (a	s N)	0.25			0.8950	0	98.9	90	110	11/09/2017
Nitrogen, Nitrite (a	s N)	0.25	5	0.88	0.8950	0	97.8	90	110	11/09/2017
Batch R239890 SampID: 17101691	SampType: -001AMS	MS	Units mg/L							Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Nitrogen, Nitrite (a	- 1.1	0.05			0.5000	0	97.6	85	115	11/09/2017



# **Quality Control Results**

#### http://www.teklabinc.com/

Client: Natural Resource Technology, Inc. Work Order: 17101691

Client Project: Dynegy - Vermillion Power Station Report Date: 30-Nov-17

STANDARD METHODS 4500-N	102 B (	TOTAL							76.10117-000	-1	
Batch R239890 SampType:	MSD		Units mg/L					RPD	Limit 10		
SampID: 17101691-001AMSD								RPD Ref Val %RPD		Date	
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC			Analyzed	
Nitrogen, Nitrite (as N)		0.05		0.49	0.5000	0	98.4	0.4880	0.82	11/09/2017	
Batch         R239890         SampType:           SampID:         17101691-013AMS	MS		Units mg/L							Date	
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed	
Nitrogon, Nitrito (as N)		0.05		0.49	0.5000	0	97.6	85	115	11/09/2017	
<b>Batch R239890 SampType:</b> SampID: 17101691-013AMSD	MSD		Units mg/L					RPD Limit 10		Date	
Analyses		RL	Qual	Pacult	Snike	SPK Ref Val	%RFC	RPD Ref \	/al %RPD	Analyzed	
Nitrogen, Nitrite (as N)		0.05	Quai		0.5000	0	99.0	0.4880	1.42	11/09/2017	
STANDARD METHODS 4500-N	102 E /	TOTAL \									
Batch R240076 SampType:		OTAL)	Units mg/L								
SampID: ICB/MBLK										Date	
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed	
Nitrogen, Nitrate-Nitrite (as N)		0.050		< 0.050						11/14/2017	
Batch R240076 SampType: SampID: ICV/LCS	LCS		Units mg/L							Date	
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed	
Nitrogen, Nitrate-Nitrite (as N)		1.00		8.72		0	101.7	90	110	11/14/2017	
<b>Batch R240076 SampType:</b> SampID: 17101691-005DMS	MS		Units mg/L							D.L.	
Analyses		RL	Qual	Dagult	Spika	SPK Ref Val	%RFC	I ow Limit	High Limit	Date Analyzed	
Nitrogen, Nitrate-Nitrite (as N)		0.050	S	0.393		0.09200	120.4	85	115	11/14/2017	
<b>Batch R240076 SampType:</b> SampID: 17101691-005DMSD	MSD		Units mg/L					RPD Limit 10		Date	
Analyses		RL	Qual	Result	Snike	SPK Ref Val	%REC	RPD Ref	Val %RPD	Analyzed	
Nitrogen, Nitrate-Nitrite (as N)		0.050	S	0.381			115.6	0.3930	3.10	11/14/201	
Batch R240663 SampType: SampID: ICB/MBLK	MBLK		Units mg/L							Date	
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed	
Nitrogen, Nitrate-Nitrite (as N)		0.050		< 0.050	- P					11/27/201	



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Client: Natural Resource Technology, Inc.

Work Order: 17101691

STANDARD METH			IOTAL)								
Batch R240663 SampID: ICV/LCS	SampType:	LCS		Units mg/L							Date
Analyses			KI	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Nitrogen, Nitrate-N	itrite (as N)		1 00		9.36	8 570	0	109 2	90	110	11/27/2017
SW-846 9036 (TOT	AL)										
Batch R240063 SamplD: ICB/MBLK	SampType:	MBLK		Units mg/L							Date
Analyses			RL	Qual	Result	Spike	SPK Rof Val	%REC	Low Limit	High Limit	Analyzed
Sulfate			10		< 10						11/10/2017
Batch R240063 SampID: ICV/LCS	SampType:	LCS		Units mg/L							Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Sulfate			10		18	20.00	0	92.5	90	110	11/10/2017
Batch R240063 SampID: 17101691-	SampType: 001AMS	MS		Units mg/L			Allo de servi		7.50	and ourse	Date
Analyses			RL	Qual			SPK Ref Val			High Limit	Analyzed
Sulfate			500		1510	500.0	1003	101.5	85	115	11/10/2017
Batch R240063 SampID: 17101691-	SampType: 001AMSD	MSD		Units mg/L					RPD	Limit 10	Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref \	/al %RPD	Analyzed
Sulfate			500		1490	500.0	1003	97.7	1510	1.26	11/10/2017
Batch R240101 SampID: ICB/MBLK	SampType:	MBLK		Units mg/L							Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Sulfate			10		< 10						11/13/2017
Batch R240101 SampID: ICV/LCS	SampType:	LCS		Units mg/L							Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Sulfate			10			20.00	0	99.9	90	110	11/13/2017
Batch R240101 SampID: 17101691-	SampType: 012AMS	MS		Units mg/L	-						Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Sulfate			50		210	50.00	159.8	100.5	85	115	11/13/2017



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Client: Natural Resource Technology, Inc.

Work Order: 17101691

, ,,										
SW-846 9036 (TOTAL)								- Market		
Batch R240101 SampType	: MSD		Units mg/L					RPD	Limit 10	
SampID: 17101691 012AMSD										Date
Analyses		RL	Qual		Spike				/al %RPD	Analyzed
Sulfate		50		210	50.00	159.8	101.0	210 1	0 11	11/13/2017
SW-846 9214 (DISSOLVED)										
Batch R239991 SampType SampID: MBLK	: MBLK		Units mg/L							Date
Analyses		RL	Qual	Result	Spike	3PK Ref Val	%REC	Low Limit	High Limit	Analyzed
Fluoride		0.10		< 0.10						11/10/2017
Batch R239991 SampType SampID: LCS	: LCS		Units mg/L							Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Fluoride		0.10	***************************************	0.98	1.000	0	97.6	90	110	11/10/2017
<b>Batch R239991 SampType</b> SampID: 17101691-002BMS	: MS		Units mg/L							Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Fluoride		0.10		2.71	2.000	0.6240	104.1	85	115	11/10/2017
<b>Batch R239991 SampType</b> SampID: 17101691-002BMSD	: MSD		Units mg/L					RPD	Limit 10	2
		pr	Overl	Dagula	C:1	SPK Ref Val	%PEC	PPD Pof \	/al %RPD	Date Analyzed
Analyses Fluoride		0.10	Qual		2.000	0.6240	108.6	2.706	3.24	11/10/2017
Batch R239991 SampType	: MS		Units mg/L							
SampID: 17101691-007BMS Analyses		RL	Qual	Recult	Snike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Fluoride		0.10	Quai		2.000	1.167	103.8	85	115	11/10/2017
Batch R239991 SampType	: MSD		Units mg/L					RPD	Limit 10	20.2
SampID: 17101691-007BMSD		75.7	0.1		G 11	CDV Def Vel	0/ DEC	DDD Det	/al 0/ DDD	Date Analyzed
Analyses Fluorido		RL 0.10	Qual		2.000	SPK Ref Val	106.7	3.242	Val %RPD 1.80	11/10/2017
CM 040 0004 /TOTAL										
SW-846 9251 (TOTAL)  Batch R239983 SampType	MRIK		Units mg/L							
SampID: ICB/MBLK	. mben		orms mg/L							Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Chloride		5		< 5						11/10/2017



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Client: Natural Resource Technology, Inc. Work Order: 17101691

SW-846 9251 (TOTA	AL)										
Batch R239983 SampID: ICV/LCS	Samp (ypo:	LCS		Units mg/L							Date
Analyses			RI	Qual	Result	Spike	SPK Ref Val	%RFC	l ow l imit	High Limit	Analyzed
Chloride			5		20	20.00	0	100 0	90	110	11/10/2017
Batch R239983 SampID: 17101691-0	SampType: 01AMS	MS		Units mg/L							Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Chloride			5		37	20.00	19 77	85 2	85	115	11/10/2017
Batch R239983 SampID: 17101691-0	SampType: 01AMSD	MSD		Units mg/L					RPD	Limit 15	Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref V	/al %RPD	Analyzed
Chloride			5	S		20.00	19.77	83.8	36.82	0.76	11/10/2017
Batch R239983 SampID: 17101691-0	SampType: 12AMS	MS		Units mg/L			Senior Miles				Date Analyzed
Analyses			RL	Qual			SPK Ref Val			High Limit	
Chloride			5		25	20.00	6.540	92.0	85	115	11/10/2017
Batch R239983 SampID: 17101691-0	SampType: 12AMSD	MSD		Units mg/L					RPD	Limit 15	Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref \	/al %RPD	Analyzed
Chloride			5	1		20.00	6.540	91.6	24.94	0.28	11/10/2017
Batch R240085 SampID: ICB/MBLK	SampType:	MBLK		Units mg/L							Date
Analyses	200000		RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Chloride			5		< 5						11/13/2017
Batch R240085 SampID: ICV/LCS	SampType:	LCS		Units mg/L							Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Chloride			5		21	20.00	0	105.6	90	110	11/13/2017
SW-846 3005A, 602	OA, METAL	S BY I	CPMS (	DISSOLVED)		ne de le le le le le le le le le le le le le	at Arlanda tarte a tarne di propriete e propriete de la constanta de la consta			or entre entre entre entre entre entre entre entre entre entre entre entre entre entre entre entre entre entre	
Batch 135725 : SampID: MBLK-1357;	SampType: 25	MBLK		Units mg/L							Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Arsenic			0.0010		< 0.0010			0	-100	100	11/14/2017
Barium			0.0010		< 0.0010	.001000	0	0	-100	100	11/14/2017
Boron			0.0250		< 0.0250	0.02500	0	0	-100	100	11/15/2017
Iron			0.0250		< 0.0250	0.02500	0	0	-100	100	11/14/2017
Manganese			0.0010		< 0.0010	0.001000	0	0	-100	100	11/14/2017
Selenium			0.0010		< 0.0010			0	-100	100	11/14/2017



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Client: Natural Resource Technology, Inc. Work Order: 17101691

Batch 135725	SampType:	LCS		Units mg/L							
SampID: LCS-13572	5										Date
Analyses			RL	Oual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Arsenic			0.0010			0.5000	0	92.4	80	120	11/14/201
Barium			0.0010		1.84	2.000	0	91.9	80	120	11/14/201
Boron			0.0250		0.473	0.5000	0	94.6	80	120	11/14/201
Iron			0.0250		1.79	2.000	0	89 3	80	120	11/14/201
Manganese			0.0010		0.474	0.5000	0	94.8	80	120	11/14/201
Selenium			0.0010		0.466	0.5000	0	93.3	80	120	11/14/201
Batch 135725 SampID: 17101691-0	SampType:	MS		Units mg/L							
Analyses	007 CIVIS		RL	Oual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Arsenic			0.0010		0.494	0.5000	0.03131	92.6	75	125	11/14/201
Barium			0.0010		1.91	2.000	0.09320	90.7	75	125	11/14/201
Boron			0.0250		1.25	0.5000	0.8229	86.4	75	125	11/14/201
Iron			0.0250		2.03	2.000	0.2576	88.8	75	125	11/14/201
Manganese			0.0010		0.573	0.5000	0.1127	92.0	75	125	11/14/201
Selenium			0.0010		0.437	0.5000	0	87.4	75	125	11/14/201
2000	SampType:	MSD		Units mg/L					RPD	Limit 20	
SamplD: 17101691-0	007CMSD		DI	0 1	D 1	0.1.	SPK Ref Val	% DEC	PPD Pof \	/al %RPD	Date Analyzed
Analyses			RL 0.0010	Qual		0.5000	0.03131	93.2	0.4941	0.62	11/14/201
Arsenic Barium			0.0010			2.000	0.03131	91.4	1.907	0.62	11/14/201
			0.0010			0.5000	0.8229	95.8	1.255	3.67	11/14/201
Boron Iron			0.0250			2.000	0.0229	89.3	2.034	0.44	11/14/201
Manganese			0.0230			0.5000	0.2370	92.9	0.5729	0.44	11/14/201
Selenium			0.0010			0.5000	0.1127	87.8	0.4370	0.51	11/14/201
Batch 135725	SampType:	MS		Units mg/L							
SampID: 17101691-0	Section of the second			-to some started							Date
Analyses			RL	Qual			SPK Ref Val			High Limit	Analyzed
Arsenic			0.0010			0.5000	0.01057	93.1	75	125	11/14/201
Barium			0.0010			2.000	0.04765	91.0	75	125	11/14/201
Boron			0.500	S	10.000	0.5000	51.59	-311.4	75	125	11/15/201
Iron			0.0250		1.80	2 000	0 03769	88.1	75	125	11/14/201
Manganese			0.0010		0.574	0.5000	0.1128	92.3	15	125	11/14/201
			0.0010			0.5000	0	91.9	75	125	11/14/201



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Client: Natural Resource Technology, Inc.

Client Project: Dynegy - Vermillion Power Station

Work Order: 17101691

Report Date: 30-Nov-17

Batch 135725 SampType:	MSD		Units mg/L					RPD LII	mlt 20	
SampID: 17101691-013CMSD										Date
Analyses		RI.	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Analyzed
Arsenic		0.0010		0.490	0.5000	0.01057	95.9	0.4761	2.91	11/14/2017
Barium		0.0010		1.85	2.000	0.04765	90.2	1.867	0.79	11/14/2017
Boron		0.500	S	51.1	0.5000	51.59	-90.1	50.04	2.19	11/15/2017
Iron		0.0250		1.86	2.000	0.03769	91.0	1.800	3.13	11/14/2017
Manganese		0.0010		0.586	0.5000	0.1128	94.6	0.5744	1.97	11/14/2017
Selenium		0.0010		0.475	0.5000	0	94.9	0.4594	3.26	11/14/2017



Client: Natural Resource Technology, Inc.

## **Receiving Check List**

http://www.teklabinc.com/

Work Order: 17101691

Client Project: Dynegy - Vermillion Power Station Report Date: 30-Nov-17 Carrier: Tim Mathis Received By: KF Elizabeth a Hurley Kalyn Forcke Reviewed by: Completed by: On: On: 09-Nov-17 09-Nov-17 Kalyn Foecke Elizabeth A. Hurley Extra pages included 34 Pages to follow: Chain of custody Yes No 🗌 Not Present Temp °C 3.62 Shipping container/cooler in good condition? Ice 🗸 Type of thermal preservation? Blue Ice Dry Ice None **V** No 🗌 Chain of custody present? Yes 1 Chain of custody signed when relinquished and received? Yes No L ~ Chain of custody agrees with sample labels? Yes Samples in proper container/bottle? ~ Yes Sample containers intact? Yes No No Sufficient sample volume for indicated test? Yes 1 1 No 🗌 All samples received within holding time? Yes Field V Lab NA 🗌 Reported field parameters measured: Yes 🗸 No 🗌 Container/Temp Blank temperature in compliance? When thermal preservation is required, samples are compliant with a temperature between 0.1°C - 6.0°C, or when samples are received on ice the same day as collected. No VOA vials 🗸 Water - at least one vial per sample has zero headspace? Yes \_ No L Water - TOX containers have zero headspace? Yes No 🗌 No TOX containers Yes 🗸 No 🗌 Water - pH acceptable upon receipt? Yes No 🗌 NA 🗸 NPDES/CWA TCN interferences checked/treated in the field?

Any No responses must be detailed below or on the COC.

CHAIN OF CUSTODY pg. 1 of 2 Work order # 1710 1091

TEKLAB, INC. 5445 Horseshoe Lake Road - Collinsville, IL 62234 - Phone: (618) 344-1004 - Fax: (618) 344-1005

Client:	Natural Resourc	e Technology	, Inc.							San	nple	s o	n: 🕽	() 10	Έ	₽ B	LUE	ICE	₽ N	O ICE	<del></del>	_3	و مو.	°c					
Address:	2422 East Wash	nington Street				.,			_	Pre	serv	/eđ	in: 🖺	j L	AB	D F	IELC	¥έ,;	cilio.	`	FO	R LA	B U	SE (	<u>ONL'</u>	<u>Y</u>			
City / State	/Zip Blocmington, iL	61704								Lab	No.	tes:	<b>Ж</b> 1	WE	LL	7516	Ν¢	45 t 641	N MPi	€.	mi	1-8.	17	_					1
Contact:	Steve Wiskes		Phone	:	(414	) 837	7-361	14					*1	EM.	POPA	YW	EU	No	برعا	GG.	Con	らごう	TM	16.8	77				
E-Mail:	steve.wiskes@obg.com		Fax:		_					Clie	ent C	om	mer	nts										***					
Are these samples	s known to be involved in s known to be hazardous uired reporting limits to be nent section.	? Yes met on the re	X No					ovide	No	Diss	olved	Meta	als: IC	CP/N	AS 60	20A	As B	a B Fe	Mn s	Se.									
Proj	ect Name/Number		Sample (	Col	lecte	or's	Nar	ne			МΑ	TRI	X					INC				LYS	SRE	QU	EST	ED			
Dynegy - Vermillio	on Power Station								_	0					_	Diss		Fig	Field	Гю	ei-J	Fie	Ξį	Ĝ.	z				
	s Requested	Billing I	nstructions	# =	nd T	уре	of Co	ntaine	rs	Groundwater					Chloride	S F	SSO	Field Conductivity SM 2510-B	DC.	o Ci	ld bl	id T	Field Turbidity SM 2130-B	/ Del	trate	Sulf	TDS		
	Standard 1-2 Day (100% Surcharge)  Other 3 Day (50% Surcharge)									힣					ride	Fluoride	Ved	250	MS	B ⊪Si	NS F	emp	130-	oth t	SM MS	ate (	. ×	ļ	
Other	<u></u>									vate	ĺ			Į	9251	je 92	Meta	윤	450	M 26	1 450	oratı 50	₽ \$\}	5	450 E	Sulfate 9036	SM 2540C		
Lab Use Only	Sample Identification	n Date/1	Time Sampled							er						9214	als.	₹	0		20-	Лe	×		Nitrale SM 4500- NO3 F		ဂ		
17101691-	MW1	1.8.1	7 1042	1_1	1					X					X	Х	X	Х	X	X	Х	Х	X	Х	X	X	X		
002	MW2	Ĭ	1142	2	1					X					Х	Х	Х	Х	Х	Х	Х	X	Х	X	X	Х	Х		
003	MW7 🔆	1		2	1	T				X					X	Х	X	X	X	Х	X	Х	X	X	Х	X	Х	i	
004	MW10	4	 ।ठ 24	2	1	i	Π			X					Х	Х	Х	Х	Х	Х	Х	Х	Х	X	Х	X	X		
005	MW17		1656	2	11	ī	17		Г	X					Х	Х	Χ	X	Х	X	Х	Х	X	Х	Х	Х	x		
200	MW18		1710	2	1	ī		_		X	7	1			Х	Х	X	Х	Х	Х	Х	Х	Х	X	Х	Х	Х		
000	MW21		1110	2	1	1		_	一	Х	_	<del>                                     </del>	-		Х	Х	Χ	Х	Х	Х	х	х	х	Х	х	х	X		
008	TW1 <b>-</b> ≱		110-78/	2	1		11	_		X		<del>                                     </del>	<del>  </del>		X	Х	Х	x	X	х	Х	X	Х	Х	Х	х	х		
009	MW3R		1239	2	1	r -	$\dagger$	_		x					Х	x	Х	X	X	X	X	X	X	X	X	Х	X		
	MW4	1	1466	2	1	_	† †	-	$\vdash$	X	+				X	х	Χ	X	X	х	Х	X	х	X	×	Х	х		
	Relinquished By		1130	<u></u>	ate/1	ime	<del></del>		_			<u> </u>	<u> </u>	I Re	ceiv	ed B	v	<u></u>			T	<u> </u>		D	ate/T	ime			
	Uto-		11.9-17		_	22				1	(a	e-D	1.8								1	1 0	m		1221				
			1//-/-								N.	<del></del>	<u>~\</u>			****				<u></u>	1		ـــاــــــــــــــــــــــــــــــــــ				<del></del>		
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The individual signing this agreement or behalf of the client, acknowledges that he/she has read and understands the terms and conditions of this agreement, and that he/she has the authority to sign on behalf of the client. See www.teklabinc.com for terms and conditions.

BostleOrder: 40609



# CHAIN OF CUSTODY

pg. 2 of 2 Work order#

TEKLAB, INC. 5445 Horseshoe Lake Road - Collinsville, IL 62234 - Phone: (618) 344-1004 - Fax: (618) 344-1005

Client:	Natural Resource	Technolog	ıy, Inc.						Sa	mpl	es o	n: [	3 IC	Έ	<b>҈</b> В	LUE	ICE	☑ N	O ICE				°C					
Address:	2422 East Washin	ngton Stree	et					****	Pr	esei	rved	in:[	∰ L	AB	F	IEL.C	)			<u>FO</u>	R L/	AB U	SE (	<u>'INC</u>	<u>Y</u>			
City / State	/Zip Bloomington, IL 6	51704							La	b N	otes:	;																,
Contact:	Steve Wiskes		Phone		(414)	837-	3614																					
E-Mail:	steve.wiskes@obg.com		Fax:	_					Cli	enf	Com	me	nte	<del></del> -														
	As the second for II			جرم الله	a la c	П	res 2	No	ŧ					VIS 60	20A	As B	a B Fe	Mn S	Se									
	s known to be involved in li s known to be hazardous?			ин ар	DIY	י נו	ies g	יאו נ																				
Are there any requ	uired reporting limits to be report section.	met on the		s?. If y	es, p	lease	provide	€																				
Proj	ect Name/Number		Sample	Colle	cto	r's N	lame			M	ATRI	X					INI	DICA				IS R	EQU	EST	ED			*******
Dynegy - Vermillio	on Power Station								O						Diss	D	ΞĘ	Field	Fiel	File	÷	ټ	e S	Z				
	s Requested	Billing	Instructions	# ar	id Ty	pe of	Contai	ners	ρ̈́	-				Chloride	S F	Dissolved	Field Co	20 F	유	ld bl	£ = 1	N H	\ [0]	trate	Sulf	SQ.		
<b></b>	1-2 Day (130% Surcharge)				_				ındı		ĺ			ride	uoric	ved	ond 251	NS (	₽ S G	H±H NS I	errip 25	130 E	PH t	DS SM	ate (	S W S		ŀ
Other	TDS SM 2540C   TDS SM 2540C   TDS SM 2540C   TDS SM 2540C   Sulfate 9036   Sulf																											
Lab Use Only	Results Requested Itandard 1-2 Day (130% Surcharge) Sulfate 9036  Results Requested Sulfate 9036 Field Dissolved Metals Diss Fluoride 9214 Chloride 9251  Ouse Only Sample Identification  Date/Time Sampled																											
17101691- 011	MW5	1-8-1	7 1302	2	1 1	Π			Х					Х	X	Х	Х	Х	Х	Х		X	X	Х	X	X		
nta	MW6R	1	1336	2	1 1			T	Х					Х	X	Х	X	Х	χ	Х	X	Х	Х	Х	Х	Х		
013	MW8R		1220	2	1 1				Х					Х	Х	Х	Х	Х	Х	Х	X	Х	Х	Х	Х	Х		
014	MW9		1320	0	1				Х			Ţ_											Х					
6(5	MW19		1315	0	$\top$	$\Box$	11		X												·		Х					
010	MW20		1408	2	1 1				Х	1		1-	1	X	X	×	X	X	×	×	Х	х	X	X	X	Х		
017	MW34	1	1436	2	1 1	$\top$	11	1	X	_		<del>                                     </del>		Х	X	Х	X	х	х	X	Х	X	X	X	Х	х		
018	Field Blank	1	17-30	2	1 1	$\sqcap$	11	$\top$	Х					Х	Х	х	-					-		Х	Х	Х		
[	DUP1	1-1-	:339	2	1 1		1	十	Х		_	<del> </del>		Х	Х	Х	X	х	X	Х	X	х	Х	х	Х	Х		
019	DUP2	11	1336	2	1 1	1 +	11	+	X		-	$\vdash$		Х	X	Х	X	X	X	X	, ×	x	X	Х	X	X	 I	
030	Relinquished By	<u> </u>	T		te/Ti				<u> </u>				Re	ceiv	ed B	v	<u> </u>	<u> </u>		<del>                                     </del>	<u></u>		<u> </u>	ate/T	ime			<u></u>
	76		11.9-17		123		***************************************			Kle	0/	Ž				3				1	iila	ln		) }				
			1//					····		<u>  _F_</u>										+				<u>- 0 0</u>				
									<del>                                     </del>											$\top$								
																				$\dagger$								

The individual signing this agreement on behalf of the client, acknowledges that he/she has read and understands the terms and conditions of this agreement, and that he/she has the authority to sign on behalf of the client. See www.teklabinc.com for terms and conditions.

BottleCrder: 4

40609



Site	VERMILLION	Major well	s repairs* r	equired	Yes	No	NA
Inspection Date	11.5.17		n well integ	•		× ×	1
Well Number	MW·1		J	•	<del>1</del>		. <del>1</del>
Stic	k-up Monitoring Wells					Comments	i
1. Outer protective	ve Casing	Yes	No	NA	7		
Not corroded	·	).					
Not dented		ı					
Not cracked						, , , , . , . , . , . , . , . , . , . ,	** · · · · · · · · · · · · · · · · · ·
Not loose		Įΰ	l		1		
			<u> </u>				
2. Inner casing		Yes	No	NA	]		
Not corroded		Х.					
Not dented		1					
Not cracked			<u></u>				
Not loose		U					
		Yes	No	NA			
3. Are there weep	o holes in outer casing?		λ				
4. Weep holes ab	le to drain?			Х			
5. Is there a locka	ble cap present?	X					
6. Is there a lock	present?	λ					
7. Bumper posts i	in good condition?			Х		•	·
•			· · · · · · · · · · · · · · · · · · ·		<b>-</b>		
	mount Monitoring Wells	Yes	No	NA	ļ		
8. Can the lid be s				ኢ			
	ve a gasket that seals?						
10. No water in ti							
11. Is the well cap				,			
12. is there a lock	present?			V	,		
			· · ·		7		
	All Monitoring Wells	Yes	No	NA	ļ		
Downhole Condi			<u> </u>	χ	<u> </u>		
9	neasuring point clearly marked?	·			ļ		
13. No obstructio			<u> </u>				
, , .	s or vegetation in well?		<u> </u>	₩			
•	in bottom of well?		<u> </u>		<u> </u>		
	w much sediment?	ft					
16. Installed as to		ft					
17. Measured tot	al depth of well.	ft	J				
General Conditio	n	Yes	No	NA	1		
18. Concrete pad		163	<del> </del>		<del> </del>	•	
19 . Concrete pad				.,	<del> </del>		
Slope away fo				<u> </u>	<u> </u>		
Not deteriora	=		<del> </del>				
1	r below surrounding grade?			V			-
20. No surface se		-					
	isible and labeled?	<del>  \ \ \</del>			<del> </del>		
Comments:	wine and lancica:	<u> </u>	<u> </u>	L.,			
comments.							· · · · · ·
* Major well rens	ir are those that require a subcont	tractor or sens	rate mobili	zation to co	omplete		
mentepe	are arose that require a subtom			-24,211 60 61			

45 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	e a te gar a tradition de la proposition participation de la proposition della proposition della proposition della proposition della proposition della proposition della proposition della proposition della proposition della proposition della proposition della proposition della proposition della proposition della proposition della proposition della proposition della propo	erin i dere	Service of the servic	STATE OF THE	ROJECTIN	IFORMATIO	N. C.				* 8 1
	Site: VERM	EUTON				Client:	NRT				
Project No		•		Task #:		Start Date:				Time:	1030
Field Pers	onnel:	u /JOEDAN				Finish Date:	168.17			Time:	1042
	WELL INFO	RMATION				Hall Mark Strain	EVENT	TYPE	ergene engligere. Se	and the same of the same of the same of the same of the same of the same of the same of the same of the same of	e specificación
	Well ID:	MWI		Well Develop	ment	72	Low-Flow / L	ow Stress San	npling		
	Casing ID:		anches	Well Volume	Approach Sai	mpling 🔲	Other (Specify	):		<b></b>	
· 1000 多线轮		1900年代表现	WAT	ER QUALIT	Y INDICATO	R PARAMET	FERS (conti	nued)	医糖酶 医脑线	•	
		Volume	Depth to				SEC or	Dissolved	,		
Sampling	Time	Removed	Water	Drawdown	Temp.	pН	Cond.	Oxygen	Turbidity	ORP	√isual
Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	' (טדט)	(mV)	Clarity
_	1030		79.40								
	1033	.13	80.75	1-35	13.63	6.70	2160	7-74	0	137	CLEAK
	1036	.26	81.55	• ১১০	13.28	6.94	2190	7.26	٥	135	CLEAK
	1039	. 39	82.20	- 65	13 · 14	6.99	2200	7.05	٥	136	CLEAR
	1042	.52	82.90	,70	12.99	7.00	2210	6-89	0	139	CLEAR
	Ĭ I						1				
	i l										
	1		<del> </del>			1					<del>                                     </del>
							† · · · · · · · · · · · · · · · · · · ·			i	<del> </del>
							<u> </u>				
	<del>                                     </del>	†	-	-		1				· · · · · · · · · · · · · · · · · · ·	
-	1		<u> </u>				<del>                                     </del>		<del></del>	<del> </del>	+
}			<u> </u>	<del> </del>	<u> </u>		<del> </del>	<del></del>	-		
	<u> </u>		<u> </u>	-		<del> </del>		<u> </u>	·		<del></del>
		A company of	. <u>"(                                   </u>	The state of the services of t		The state of the same	<del></del>	Cleania Nace Hotel	<u> </u> 	<u> </u>	<u> </u>
ļ <u>`</u>		**	NOTES (	continued)				Cond Actual Condu	ABBREVIA	ORP - Oxidation-R	
	ĺ							FT BTOC - Feet Belor		SEC - Specific Ele	cinical Conductance
		•						nm - Not Measured		SU - Standard Unit Temp - Temperatu *C - Degrees Celoi	re
										O- DEGRESS OFFI	
								ł			
								1			
			_								

Low Flow Sampling Form MW-1

Site <u>VERIFICON</u>	Major well	s гераігs* r	equired	Yes	No	NA
Inspection Date (1.8.17	to maintai	n well integ	rity?		٨	
Well Number www.Z			,			
Stick-up Monitoring Wells					Comments	
1. Outer protective Casing	Yes	No	NA			
Not corroded	¥					
Not dented	}					
Not cracked		,				
Not loose	(-					
				* **		
2. Inner casing	Yes	No	NA			
Not corroded	Ý					*****
Not dented						
Not cracked					· · · · · · · · · · · · · · · · · · ·	
Not loose						
	Yes	No	NA			
3. Are there weep holes in outer casing?		Х				
4. Weep holes able to drain?		- /-	X			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
5. Is there a lockable cap present?	×					
6. Is there a lock present?						
7. Bumper posts in good condition?	V					
,						
   Flushmount Monitoring Wells	Yes	No	NA			
8. Can the lid be secured tightly?	100	110	4		<del></del>	
9. Does the lid have a gasket that seals?	···		,			
10. No water in the flushmount?				<del></del>		
11. Is the well cap lockable?	-					.,
12. Is there a lock present?				·		
12. is there a lock present:			L			
All Monitoring Wells	Yes	No	NA			
Downhole Condition	163	140	Y			
12. Water level measuring point clearly marked?		***************************************				
13. No obstructions in well?		·				
14. No plant roots or vegetation in well?				,		
15. No sediment in bottom of well?	·		<del>- </del>		<del></del>	
If present, how much sediment?	ft		<u> </u>			
16. Installed as total depth.	ft					
17. Measured total depth of well.	ft					
147. Micabarea total depth of well.	11					
General Condition	Yes	No	NA			
18. Concrete pad installed?	1 € 3	× ×	140			
19 . Concrete pad			Α .			
Slope away form casing?			1			
Not deteriorated?		-		<del></del>		
Not heaved or below surrounding grade?  20. No surface seal settling?		<del></del>	<u> </u>			
-	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\					
21. Well clearly visible and labeled?	<b>X</b>					
Comments:					*******	
* 64-1				b-4		
*-Major-well-repair are those that require a subcontra	ictor or sepa	rate mobili	zation to col	npiete		

	in englisher			TRUMBY F	PROJECT IN	<b>FORMATIO</b>	N		Maria Maria		
	Site: ଏଛ	44mm	·				<u> xer</u>				
Project Nu	mber:			_ Task #:		Start Date:	11.8.17				134
		- 2051	7			Finish Date:	11.0-17			_ Time:)	142
	WELL INFO	RMATION				Marian statement	EVENT.	ГҮРЕ		makan wasin ing	
	Well ID:	MWIZ		Well Develop		74			npling		
	Casing ID:		inches	Well Volume	Approach Sai	mpling 🔲	Other (Specify)	):			
- 44		er samt salterige algebra	WA1	TER QUALIT	Y INDICATO	R PARAME	TERS (contil	nued)			
		Volume	Depth to				SEC or	Dissolved			
Sampling	Time	Removed	Water	Drawdown	Temp.	pН	Cond.	Oxygen	Turbidity	ORP	Visual
Stage	(miitary)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	¹ (NTU)	(m/y)	Clarity
	1(-34		18.84	ļ			ļ				
	1136	,\3	19.70	496	14.25	ጉ. ৮0	767	3-46	0.9	-82	CLERE
	[138	126	30.10	٥4،	13.74	7.69	789	0.60	0.6	- 116	CLEAR
	11-0	.39	20.10	0	13.69	7.72	791	81.0	0.4	-129	CLEAR
	1142	, 52	20.34	. 24	13.66	7.72	196	0	. 0	-139	CLEAIZ
											<u> </u>
								1			
			:								
			NOTES (	continued)					ABBREVIA	TIONS	**
						•		Cond Actual Conduc FT BTOC - Feet Belov na - Not Applicable nm - Not Measured	divity	ORP - Oxidation-Red SEC - Specific Elect SU - Standard Units Temp - Temperature "C - Degress Calcius	ical Coaductance
1											

Low-Flow Sampling Form:

Site WELLIATION	•	s repairs* r	•	Yes	No	NA
Inspection Date ((· 8·/3	to maintair	n well integ	rity?		9	
Well Number <u>WW-7</u>						
					_	
Stick-up Monitoring Wells		·			Comments	
1. Outer protective Casing	Yes	No	NA	<u></u>		
Not corroded	\ <u>\</u>				· · · · · · · · · · · · · · · · · · ·	
Not dented	<u> </u>					
Not cracked						
Not loose					<del> </del>	
2 Inner chains	Yes	No	NA			
2. Inner casing Not corroded	7	NO.	NM			
Not dented		1				
						<del>,</del>
Not cracked						
Not loose	<u> </u>	B.I	818			
	Yes	No	NA NA			
3. Are there weep holes in outer casing?	<b></b>	<u> </u>				
4. Weep holes able to drain?	<u> </u>		۴			
5. is there a lockable cap present?	1					
6. Is there a lock present?						
7. Bumper posts in good condition?						
Flushmount Monitoring Wells	Yes	No	NA			
8. Can the lid be secured tightly?	163	140	γ			
9. Does the lid have a gasket that seals?						
10. No water in the flushmount?			<del></del>			
			<del>,\</del>			
11. Is the well cap lockable?						
12. Is there a lock present?			L			
All Monitoring Wells	Yes	No	NA			
Downhole Condition			8			
12. Water level measuring point clearly marked?			1		·	
13. No obstructions in well?						
14. No plant roots or vegetation in well?						
15. No sediment in bottom of well?						
If present, how much sediment?	ft		L			
16. Installed as total depth.	ft					
17. Measured total depth of well.	ft					
	1	I				
General Condition	Yes	No	NA			
18. Concrete pad installed?		×				
19 . Concrete pad			.χ.			
Slope away form casing?						
Not deteriorated?						
Not heaved or below surrounding grade?						
20. No surface seal settling?	7	***				*******
21. Well clearly visible and labeled?	×	***************************************	***************************************			
Comments:	<del></del>					
					······································	
* Major well repair are those that require a subcontr	actor or sepa	rate mobili	zation to co	nplete		

P:\2200\2285\Deliverables\Sampling and Analysis Plans\Teklab Draft Provisional SAP\Appendix B - Field Forms\Monitoring Well Inspection Form

	CONTRACTOR SPECIAL SPE	alenti i kantan	and the second	F	ROJECTIN	FORMATION	Activities to the second	and the second	2047	***	
	Site: VERM	UTC2014		· · · · · · · · · · · · · · · · · · ·			NRT				
Project No		_/		Task #:		Start Date:				Time:	
Field Pers	onnel:	1000A	J			. Finish Date:_	11.8-17			Time:	
	WELL INFOR	RMATION	# . 12 . <del>**</del>			a kanggaran berata dari Kanggaran	EVENT:	ΓΥΡΈ	Programme in the party of	taga da Tarangan Li	era er
	Well IC: 10	107		Well Develop				ow Stress Sam	npling	· · · · · · · · · · · · · · · · · · ·	
`	Casing IC:	V=		Well Volume			Other (Specify)				
\$ 600 to	sa salajajaja		WAT	ER QUALITY	/ INDICATO	R PARAMET	ERS (conti	nued	er er i var er i i i i i i i i i i i i i i i i i i		
		Volume	Depth to		<u> </u>		SEC or	Dissolved		T ·	[
Sampling	Time	Removed	Water	Drawdown	Temp.	Hq	Cond.	Oxygen	Turbidity	ORP	'Jisual
Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	(NTU)	(mV)	Clarity
-											
		<u> </u>								-	
	i i										
	i l		***************************************								
<del></del>	<del>                                     </del>		<del>                                     </del>					<u> </u>			
	i i							1			
	İ		<u> </u>								
	<del>                                     </del>										
				·							<u> </u>
			NOTES	ontinued)		that the many		Section 2000	ABBREVIA	TIONS.	V
		,		<u> </u>			<u> </u>	Cond Actual Condu FT BTCC - Feet Belon na - Not Applicable nm - Not Measured	clivity	ORP - Oxidation-Red SEC - Specific Elects SU - Standard Units Temp - Temperature 'C - Degrees Celcius	ical Cranquetance
		į	ven Deg								
									27.11		

Low Flow Sampling Form

Site VERMONTON	Major well	s repairs* r	equired	Yes	No	NA
Inspection Date 11-5-17	****	n well integ			×	
Well Number www.lo		·	,		<u> </u>	•
Stick-up Monitoring Wells					Comments	
1. Outer protective Casing	Yes	No	NA			
Not corroded	$\varphi$				•	
Not dented	<u> </u>					
Not cracked	}					
Not loose		1				
NOT TOOSE	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	L	<u> </u>			
2. Inner casing	Yes	No	NA			
Not corroded	X)	110	147			
Not dented	<del></del>		<del> </del>	<del></del>		
Not cracked	<del>\\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ </del>		<del> </del>			
Not loose						
	Yes	No_	NA NA			
3. Are there weep holes in outer casing?		<i>∕</i> ε				
4. Weep holes able to drain?			۴			
5. Is there a lockable cap present?	82					
6. Is there a lock present?						
7. Bumper posts in good condition?	V					
·						
Flushmount Monitoring Wells	Yes	No	NA			
8. Can the lid be secured tightly?			\$			
9. Does the lid have a gasket that seals?			1			
10. No water in the flushmount?						
11. Is the well cap lockable?						
12. Is there a lock present?			₩			
	<u> </u>		<u></u>			
All Monitoring Wells	Yes	No	NA			
Downhole Condition			φ			
12. Water level measuring point clearly marked?			À			
13. No obstructions in well?						
14. No plant roots or vegetation in well?			-	Trible devices and a second of the	the second of th	
15. No sediment in bottom of well?			1-			
If present, how much sediment?	ft		<u> </u>		<del></del>	***************************************
16. Installed as total depth.	ft					
17. Measured total depth of well.	ft					
117. Weastred total depth of well.	11					
  General Condition	Yes	No	NA			
18. Concrete pad installed?	163	: 12	117			
19 . Concrete pad					-	
1						
Slope away form casing?	<del></del>					
Not deteriorated?	<del>                                     </del>		<del> </del>			
Not heaved or below surrounding grade?	<del>   -</del>					
20. No surface seal settling?	<del></del>			V////////		········
21. Well clearly visible and labeled?			L			
Comments:						
	<del></del>					
* Major well repair are those that require a subcontra	actor or sepa	rate mobili	zation to cor	nplete		

	CERCLE TO SERVE			72.70714	ROJECTIN	FORMATIO	Na :	early the law of				
	Site: VEKE	دريورراء				Client: NILT						
Project Nu	ımber:	_1		Task #:		Start Date:				Time:	1516	
Field Pers	onnel:	MIJORIAN	<u> </u>			Finish Date:	11877			Time:	1524	
	WELL INFOR	MATION	10 1 10 1 10 1 10 1 10 1 10 1 10 1 10		The state of	BAN SELVEN BURGE	EVENT T	YPE	**************************************	egyppinens, e.g.,	1 · · · · · · · · · · · · · · · · · · ·	
	Well ID: M	Wio		Well Develop	ment	1	Low-Flow / Lo		npling			
	Casing ID:		inches	Well Volume	Approach Sar	mpling	Other (Specify):					
No.		in strong	WAT	ER QUALITY	Y INDICATO	R PARAMET	ERS (contin	ued)				
		Volume	Depth to				SEC or	Dissolved				
Sampling		Removed	Water	Drawdown	Temp.	PΗ	Cond.	Oxygen	Turbidity	ORP	√isual	
Stage	(military)	(galions)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	' (NTU)	(mV)	Carity	
	1516		51-76									
	1518	-13	52.50	.74	13.68	697	1(70	6.55	0	68	CLEAR	
	1520	.26	52.90	.40	13.41	6.90	1130	5.25	0	75	CLEAR	
	1522	, 39	53.54	164	13.20	6.88	44/130	4.37	U	83	CUERZ	
	1524	·51	53.95	, ५।	13-11	6-86	1160	4-26	0	84	CLEAR	
										<u> </u>		
	·			<u> </u>								
11 × 14			NOTES (	continued)		there, who		g. P. Usika Mad	ABBREVIA	TIONS.	unicas augustas	
· , · ,					<u></u>	Cond Actual Conductivity FT BTOC - Feet Below Top of na - Not Applicable nm - Not Measured			clivity	ORP - Oxidation-Reduction Potential		

Low Flow Sampling Form MW-1

Site VEKMILIOU	Major well	s repairs* r	eauired	Yes	No	NA
Inspection Date 11-817		n well integ			<i>&gt;</i> ∞	
Well Number WW7	*- * <del>*</del>					
400017						
Stick-up Monitoring Wells					Comments	
1. Outer protective Casing	Ves	No	[ NA	1	COMMICIALS	
Not corroded	Yes	100	1173			
Not dented	<del></del>		<del>                                     </del>			
Not cracked	<del>                                     </del>	<del>                                     </del>	<u> </u>			
Not loose	1					
NOT loose		L	<u> </u>			
<b>.</b>		<del></del>	1	1		
2. Inner casing	Yes 70	No	NA			
Not corroded	1-7-	<u> </u>	<u> </u>			
Not dented						
Not cracked		ļ <u> </u>				
Not loose	V					***************************************
	Yes	No	NA			
3. Are there weep holes in outer casing?		Ø				
4. Weep holes able to drain?			P			
5. Is there a lockable cap present?	Ą					•
6. Is there a lock present?						
7. Bumper posts in good condition?	V					
		<u> </u>	I			
Flushmount Monitoring Wells	Yes	No	NA			
8. Can the lid be secured tightly?			φ			
9. Does the lid have a gasket that seals?						
10. No water in the flushmount?						
11. Is the well cap lockable?						
12. Is there a lock present?			<del>- L</del> -	. <u></u>		
122. Is there a lock present:		i				
All Branitaving traffs	Yes	No	NA			
All Monitoring Wells	163	NO	<del> </del>			
Downhole Condition			φ.			****
12. Water level measuring point clearly marked?						
13. No obstructions in well?						
14. No plant roots or vegetation in well?						
15. No sediment in bottom of well?			Ť			
If present, how much sediment?	ft	ł				
16. Installed as total depth.	ft	ł				
17. Measured total depth of well.	ft	ļ				
General Condition	Yes	No	NA			
18. Concrete pad installed?	Ψ					
19 . Concrete pad						
Slope away form casing?						
Not deteriorated?						
Not heaved or below surrounding grade?						
20. No surface seal settling?						
21. Well clearly visible and labeled?						
Comments:						
* Major well repair are those that require a subcontr	actor or sepa	rate mobili	zation to co	mplete		
	······································					

A STATE OF THE STATE OF	et va set se entanç <mark>a</mark>	Assistant Section	the a same of the	and a solution	ROJECTIN	FORMATION					
	Site: \\ \\ \\ \ \ \ \ \ \ \ \ \ \ \ \ \ \	MILTON				Client:	NRT				
Project Nu	mber:			Task #:	-		11-8-17			Time:	164c
Field Pers	onnel: 5	~/=01D4/	<i>,</i>			Finish Date:	11.8.17			Time:	1.56
238 53		ORMATION ∞			以为个多类	establisher see here. Geroof	EVENT.	TYPE		regionistic regions	
	Well ID:	MW17		Well Develop	ment	<b>Y</b>	Low-Flow / L	ow Stress Sam	pling		
	Casing ID:	, T	inches	Well Volume	Approach San	npling 🔲	Other (Specify)	):			
***	sa y hugig	人的其他被使某一	L - WAT	ER QUALIT	/ INDICATO	R PARAMET	ERS (conti	nued)	Taken ya Taken T	• 1	
		Volume	Depth to				SEC or	Dissolved			
Sampling	Time	Removed	Water	Drawdown	Temp.	pН	Cond.	Oxygen	Turbidity	ORP	Visual
Stage	(military)	(galions)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	' (NTU)	(mV)	Clarity
	1640		39.65								
	11046	.52	42.20	2-65	12.19	7.08	1900	6.76	99.7	29	CLOUDY
	1648	.65	43.90	1.70	12.04	6-90	1880	6-85	1(1	42	CLOUP
	1660	.78	44.80	.90	12,00	4.82	1890	6.86	670	50	CLEAR
	1652	<b>ં</b> 9ા	45,50	.70	11.27	6.85	(860	6.85	20.4	40	CLEAR
	1654	1:04	46.10	.60	11.81	6.87	1910	6.54	209	49	CLERC
,	1656	1,17	46.70	.60	11.81	6.84	1910	6.48	20.7	48	CLEAR
		• •	1						,,,,,		
						· · · · · · · · · · · · · · · · · · ·		1			
			<u> </u>								- <del></del>
			<del> </del>							<u> </u>	
			NOTES (	continued)				STATE AND PARTY.	ABBREVIA	TIONS,	
					·			Cond Actual Condu FT BTOC - Feet Belon na - Not Applicable nm - Not Measured	ctivity	ORP - Oxidation	rare .
								-			
	,										

Low Flow Sampling Form MW-1

Site JELMILTON	Major well	s repairs* r	eauired	Yos	No	NA
Inspection Date 11.817	to maintair				8	<del></del>
Well Number WW 18					<u> </u>	<u> </u>
Stick-up Monitoring Wells					Comments	
1. Outer protective Casing	Voc	No	NA I		Comments	
Not corroded	Yes	1110	140		<del></del>	
Not dented	-		<del>                                     </del>			
Not cracked	<del> </del>		-			
Not loose	<del>\ \'</del>	<del></del>	<u> </u>			
Not loose	L					HATTERSTONE CO. C. C. C. C. C. C. C. C. C. C. C. C. C.
2. Inner casing	Yes	No	NA			<del> </del>
Not corroded	P					
Not dented			ļi			
Not cracked	1,		<u> </u>			<del></del>
Not loose						
	Yes	No	NA			
3. Are there weep holes in outer casing?		4				
4. Weep holes able to drain?			y			
5. Is there a lockable cap present?	4					
6. Is there a lock present?						
7. Bumper posts in good condition?	<b>₩</b>					
Flushmount Monitoring Wells	Yes	No	NA			
8. Can the lid be secured tightly?			P			
9. Does the lid have a gasket that seals?						
10. No water in the flushmount?			<del>                                     </del>			
11. Is the well cap lockable?						
12. Is there a lock present?			<del>  \</del>			
12.13 there a fock present:	L		<u> </u>			
All Monitoring Wells	Yes	No	NA			
Downhole Condition	163	140	4			
12. Water level measuring point clearly marked?			1			
13 No obstructions in well?						
		u name				
14. No plant roots or vegetation in well?	<b> </b>		1/2			
15. No sediment in bottom of well?						
If present, how much sediment?	ft					
16. Installed as total depth.	ft					
17. Measured total depth of well.	ft					
			· · · · · · · · · · · · · · · · · · ·			
General Condition	Yes	No	NA			
18. Concrete pad installed?	*					
19 . Concrete pad						
Slope away form casing?						
Not deteriorated?						
Not heaved or below surrounding grade?						
20. No surface seal settling?						
21. Well clearly visible and labeled?	Y	,				
Comments:						
* Major well repair are those that require a subcontra	ctor or sepa	rate mobili	zation to cor	nplete		

P:\2200\2285\Deliverables\Sampling and Analysis Plans\Teklab Draft Provisional SAP\Appendix B - Field Forms\Monitoring Well Inspection Form

***	(1) 的 (1) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2	SALL BELLE			ROJECTIN	FORMATIO	Marie Same in the	22.	The second second		
	Site: UE	MILTON				Client:					
Project N	· · · · · · · · · · · · · · · · · · ·			Task #:	,	Start Date:		···.	<u> </u>	Time:	1702
Field Pers	onnel: Tw:	/socian	<u> </u>			Finish Date:	11.8.17			. Time:	1210
	WELL INFO	RMATION	7			(\$1) Share Mind Shir	EVENT	TYPE	**************************************	i partito de la comp	4.1
	Well ID:	MW 18		Well Develop			Low-Flow / Lo		npling		
	Casing ID:		inches	Well Volume	Approach San	npling 🗀	Other (Specify)	:			
***		election of the first field and the first	WA	TER QUALIT	/ INDICATO	RPARAMET	FERS (contin	nued)			19 T
		Volume	Depth to				SEC or	Dissolved			
Sampling	1 Ł	Removed	Water	Drawdown	Temp.	РН	Cond.	Oxygen	Turbidity	ORP	Visual
Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	, (NLN)	(m <sup>v</sup> )	Clarity
	1702	ļ	26.80	_							
	1704	,13	36.80	0	(2,73	6.96	1740	4.60	4.2	50	CLEAK
	1700	126	<i>26</i> -80		12.23	b. 88	1930	0	0.0	30	CLEAR
,	1708	139	26.80	0	12-17	6.84	1910	0	0	30	CLEAR
	1710	152	26.80	0	12.17	6.85	1900	0	0	34	CIERC
									<u> </u>		
							I				
			<del></del>								
	1		1								
			NOTES	(continued)			\$-47 T	Section of the sectio	ABBREVIA	TIONS	Sea Tree Tree
							· · · · · · · · · · · · · · · · · · ·	Cond Actual Condu FT BTOC - Feet Belor na - Not Applicable nm - Not Measured	clivity	ORP - Oxidation-Re SEC - Specific Elec SU - Standard Units Temp - Temperatur "C - Degrees Celox	duction Potential trical Conductance

Low Flow Sampling Form

Site	VERMELTON	Maior well	s repairs* r	equired	Yes	No	NA
Inspection Date	11.8.17		n well integ	•	100	<u> </u>	
Well Number	MMS(	to mamean		,,,,,		J	<u> </u>
	. 404.40.01						
Stick	k-up Monitoring Wells					Comments	
1. Outer protectiv		Yes	No	NA NA	]	MINISTRA	
Not corroded		X		1			
Not dented				-			
Not cracked		<del>  </del>	· · · · · · · · · · · · · · · · · · ·		-		
Not loose		<del>                                     </del>		-			·
			<u>!</u>	,L.,			
2. Inner casing		Yes	No	NA			
Not corroded		a a	7.5				·
Not dented	•	1					
Not cracked		<del></del>					
Not loose		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \				···	
1100 10030		Yes	No	NA NA			
3 Are there ween	holes in outer casing?	163	×	110			
4. Weep holes able			ν.	×	•		
5. Is there a lockat							
6. Is there a lock p		<u> </u>					
7. Bumper posts ir		Y		<del>  ,</del>			
v. bumper posts it	i good condition?		<u></u>	, k			
Flucho	anunt Adomitoving Molls	Yes	B1-	310			
	nount Monitoring Wells	Yes	No	NA .			•
8. Can the lid be se	- ,			4			
10. No water in the	re a gasket that seals?						
11. Is the well cap				\\			
12. Is there a lock	present			<u> </u>			
81	li Sānuitauium lātalia	I Van	NI.	NA I			
<u>الم</u> Downhole Conditi	ll Monitoring Wells	Yes	No	NA v			
				4			······
13. No obstruction	easuring point clearly marked?						
	or vegetation in well?			<del> </del>			
15. No sediment in							
•	much sediment?	ft					
16. Installed as tot		ft					
17. Measured tota	depth of well.	ft					
General Condition		[ V ]	81-	ALA .			
		Yes	No	NA			
18. Concrete pad in	nstandat	*					2 b 2000 anniabatur
19 . Concrete pad	m analus?						
Slope away for		X					
Not deteriorate		X			<del></del>		
	below surrounding grade?		<u> </u>	<u> </u>			
20. No surface sea			X			· · · · · · · · · · · · · · · · · · ·	
21. Well clearly vis	ible and labeled?	Υ					
Comments:		· · · · · · · · · · · · · · · · · · ·					
··········							
<b>.</b>							
T Major well repair	r are those that require a subcont	ractor or sepa	rate mobiliz	zation to cor	nplete		

	and market filter	<b>37.</b>	Aller or services		ROJECTIA	<b>IFORMATION</b>					
	Site: UEL	MELEON				Client:	NRT				
Project Ne				Task #:		Start Date:				Time:	162
Field Pers	onnel: Tim	JURDAN				Finish Date:			·	Time:	
	WELL INFOR	RMATION	operation the		NAME OF	Balanter (1988), sette Principal	EVENT	TYPE	* *	er year grown and the	; <del>***</del> ***
	Well ID: ╭√	1021		Well Develop	ment	اعجا	Low-Flow / L	ow Stress San	pling		
	Casing ID:	·	inches	Well Volume.	Approach Sa	mpling 🔲	Other (Specify	):			
×A*	e i vitografe:										
		Volume	Depth to				SEC or	Dissolved			
Sampling	Time	Removed	Water	Drawdowr	Temp.	pH	Cond.	Oxygen	Turbidity	ORP	√isual
Stage	(military)	(galions)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	, (NLN)	(mV)	Clarity
	1102		91.09	<u> </u>						<u> </u>	
	1104	.13	9785	1.76	1312	7.29	580	4-60	0.7	-27	CEAR
	1106	-26	94/14	1.29	12.76	7.36	<u>587</u>	1.00	4-1	-92	C_EAR
	1108	.39	94.85	2.71	12.78	7-46	590	0	2.3	-99	C-ENIZ
	1110	.52	94.45	٥	12.82	7.38	591	0	0.7	-105	CEAR
								<u> </u>			
			_								
			i								
	1		NOTES (	continued)		Richard Company		APL STATES AND	ABBREVIA	TIONS,	Seat Till.
								Cond Actual Condu FT BTOC - Feet Belon na - Not Applicable nm - Not Measured	clivity	ORP - Oxidation-R	ecuction Potential clacal Coccuctance s re
			_						`		

Low Flow Sampling Form

Site VERMELLON	Major wel	ls repairs*	required	Yes	No	NA
Inspection Date 11.8.17	to maintai		-		B	***
Well Number 140032		,	• .	L	<del>-1</del>	······································
Stick-up Monitoring Wells					Comments	
1. Outer protective Casing	Yes	No	NA.	1		
Not corroded	8					
Not dented	1	<del>                                     </del>				MARKET PROPERTY.
Not cracked						
Not loose	<b>├</b>		<b>-</b>			
1100 10030	<u> </u>	<u> </u>		<u> </u>		
2. Inner casing	Yes	No	NA NA	1		
Not corroded	p		1			
Not dented	1		<u> </u>	<del> </del>		
Not cracked	<del>                                     </del>					<del></del>
Not loose	<del>   - - -</del>					
1405 10026	Yes	NI-	NA NA		•	
3. A = 45 = = to 1 to 1 to 1 to 2	res	No		1		
3. Are there weep holes in outer casing?		Υ	<del> </del>			-
4. Weep holes able to drain?		<u> </u>	X			
5. Is there a lockable cap present?	χ.	ļ	1/m	TE		
6. Is there a lock present?	ኦ		1-4-			
7. Bumper posts in good condition?	×		<u> </u>			
	l	ı	T	7		
Flushmount Monitoring Wells	Yes	No_	NA NA		<del> </del>	
8. Can the lid be secured tightly?		ļ	×			
9. Does the lid have a gasket that seals?			<u> </u>			
10. No water in the flushmount?						
11. Is the well cap lockable?						
12. Is there a lock present?			<u> </u>			
	<del></del>			1		
All Monitoring Wells	Yes	No	NA NA			
Downhole Condition			100			
12. Water level measuring point clearly marked?			1			
13. No obstructions in well?						
14. No plant roots or vegetation in well?			4	•		
15. No sediment in bottom of well?						
If present, how much sediment?	ft					
16. Installed as total depth.	ft					
17. Measured total depth of well.	ft					
				1		
General Condition	Yes	No	NA			
18. Concrete pad installed?		<u>×</u> _				
19 . Concrete pad			φ			
Slope away form casing?			1 1			
Not deteriorated?						
Not heaved or below surrounding grade?			V			
20. No surface seal settling?	4					
21. Well clearly visible and labeled?	م					
Comments:						
				<del></del>		,
				<del></del>		
* Major well repair are those that require a subcont	tractor or sepa	rate mobil	ization to co	mplete		
· · · · · · · · · · · · · · · · · · ·						··

	Action in the Section		e fra Landari C. S. A.V.		ROJECTIN						
Designed \$1	Site: VER	MESTON		T1-4-		Client:				-	17.20
Project No	onnel: Tim	larne na L		_ Task #:		Start Date: Finish Date:	11.8.17	·		_ Time:	1229
			90° 1 90° 1 90° 1 1	eren e grazi	1200 24 10 10 C			Vertical and the second		Time:	15 <i>2c</i>
ar og vær dela et	WELL INFOR		1 1 1 1 1 1 1					TYPE			· ·
		4W032		Well Develop				ow Stress San	npling		
	Casing ID:	700	inches	Wel: Volume		<u> </u>	Other (Specify		9. or 1 10 142 .		
وه والدين			Z S WAT	ER QUALIT	YINDICATO	RPARAMET	ERS (conti	nued)			
		Volume	Depth to	<u> </u>			SEC or	Dissolved			
Sampling	1 1	Removed	Water	Drawdown	Temp.	рН	Cond.	Oxygen	Turbidity	ORF	Visual
Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	, (טדע)	(mV)	Clarity
	1729	1.7	8.71			ļ <u>-</u>	501.				1.5
<u></u>	1231	r(3	8.80	1.09	14-61	7.67	841	1.33	10.2	- 86	CLEARS
	1733	126	5.90	.10	14.59	7.43	841	0.56	10.0	-105	CLEAR
	1235	.39	8.95	.05	14.78	7.36	825	1.54	8.1	- 125	CLEAR
	1237	152	9.05	.10	14-87	7.37	819	0-64	8.1	-133	CLEAR
	1239	.64	9.10	.05	14-91	7.37	816	0.59	5,2	-137	CLEAR
	<u> </u>				<u> </u>			<del> </del>			
				1		ļ				ļ	
	<u> </u>			<del></del>				.			
	<u> </u>			<del></del>				ļ			
	<u> </u>	ļ	<u> </u>			<u></u>		ļ			1
	<del>                                     </del>					ļ <u>.</u>		<u> </u>		ļ	<u>_i</u>
						<del> </del>				ļ	
								10. 25.000 0 2.000			
		, a. A.	NOTES (	continued)					ABBREV A		
								Cond Actual Condu FT BTCC - Feet Belor na - Not Applicable nm - Not Measured		ORP - Oxidation-R SEC - Specific Elec SU - Standard Unit Temp - Temperass "C - Degrees Celci	ctificati Conditicance s re
						·					

Low-Flow Sampling Form MW-1

Site VELUTATO	Major wel	ls repairs* r	equired	Yes	No	NA
Inspection Date 11.8:17		n well integ		100	8	
Well Number U4W-04	to mame	ii ii iii iii ii ii	,.		1	
<u>1001.04</u>						
Stick-up Monitoring Wells					Comments	
1. Outer protective Casing	Yes	No	NA		-	
Not corroded	Ψ		'''			
Not dented	1			<u>.                                    </u>		
Not cracked		,	,			
Not loose	1					, , , , , , , , , , , , , , , , , , , ,
1100 10036		I	!l			
2. Inner casing	Yes	No	ÑĀ			
Not corroded	₩ Y		1			
Not dented	1	-		·		
Not cracked						
Not loose	<b>├</b> ──		<u>j</u>			
Not loose	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	N.a	81.0			
3 Ave there were held in enter region 3	Yes	No	NA NA			
3. Are there weep holes in outer casing?		γ.	ø			
4. Weep holes able to drain?			β			
5. Is there a lockable cap present?	$\beta$					
6. Is there a lock present?						
7. Bumper posts in good condition?	-Dar	<u> </u>	<u> </u>			
Phobosoma Advanta at Late It	V	I 31-				
Flushmount Monitoring Wells	Yes	No	NA IO	<del></del>		
8. Can the lid be secured tightly?			φ			
9. Does the lid have a gasket that seals?						
10. No water in the flushmount?						
11. Is the well cap lockable?			<u> </u>			
12. Is there a lock present?						
All Advates do - 14tollo	Vee	l Al-	N/A			
All Monitoring Wells	Yes	No	NA n			
Downhole Condition			<del></del>			
12. Water level measuring point clearly marked?						
13. No obstructions in well?						
14. No plant roots or vegetation in well?			<del>- V  </del>			
15. No sediment in bottom of well?				<del></del>		
If present, how much sediment?	ft					
16. Installed as total depth.	ft					
17. Measured total depth of well.	ft	]				
Congral Condition	V	No.	NA I			
General Condition	Yes	No	NA			
18. Concrete pad installed?		<u> </u>				
19 . Concrete pad		,	ď			
Slope away form casing?			<del>                                     </del>			
Not deteriorated?						
Not heaved or below surrounding grade?						
20. No surface seal settling?	X		· ·			
21. Well clearly visible and labeled?	X					
Comments:						
**************************************						
*-Major-well-repair-are-those that require-a-subcontra	actor or sepa	rate mobili	ration to cor	nplete		

- 一個學問的學	A CONTRACTOR		The same of the same		ROJECTII	NFORMATIO	N'			<u> </u>	+ 15
1	Site: JELA	KUTON				Client	NRI				
Project Nu				_ Task #:			11-8-17			Time:	1446
Field Pers	onnel:	150121742				_ Finish Date:	11-8-17			_ Time:	A 1480
v projekty zdane i ne. V	WELL INFO	RMATION	The second second				EVENT	TYPE		वर्ग विभाग भाग	
	Well ID: 1/4	moq		Well Develop	ment	M		ow Stress San	npling		
	Casing ID <sup>-</sup>		inches	Well Volume	Approach Sa	mpling	Other (Specify	):		<b></b> .	
a. The	WATER QUALITY INDICATOR PARAMETERS (continued)										
		Volume	Depth to		<b></b>		SEC or	Dissolved			
Sampling	1	Removed	Water	Drawdown	Temp.	pН	Cond.	Oxygen	Turbidity	ORP	√isual
Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	' (NTU)	(mV)	Clarity
	1446	: 7	7.53		<del></del>			10/		ļ <u>.</u> , .	
	1448	-13	7.95	.42	14.40	7-30	543	194	0	-34	CLEAR
	1450	.26	8.00	.05	14-65	7.45	542	0.66	0	-64	CLEAR
<u> </u>	1462	39	8.10	110	14.89	7.54	537	1.36	0	- 89	CIEAR
	1454	.52	8.15	-05	1494	7.52	538	:40	8	-92	CLEAR
	1456	-65	8.15	0	14-99	7-62	s 35	Ø	0	- 93	CLEAR
								<del> </del>		<del> </del>	
	!							<u> </u>			
							<u> </u>				
						ļ				ļ	
						<u> </u>				<u> </u>	
						<u> </u>					
	<u> - </u>	<u> </u>		<u> </u>				1			
	<u>                                     </u>	<u></u>		<u> </u>						<u> </u>	
		ter et it	NOTES (	continued)					ABBREVIA		-11
				Cond Actual Condu FT BTOC - Feet Belon na - Not Applicable nm - Not Measured	ctivity w Top of Casing	ORP - Oxidation-F SEC - Specific Ex SU - Standard Uni Temp - Temperar 'C - Decrees Celo	ure				
1										_	

ow Flow Sampling Form

Site	MATO S VELIMELTON	Major wells repairs* requi							
Inspection Date	ww.s	to maintai	n well integ	rity?		λ			
Well Number	11-8-17			·	<u> </u>		<del>'</del> ,		
Stic	k-up Monitoring Wells					Comments			
1. Outer protectly		Yes	No	NA					
Not corroded		٧					,,		
Not dented		,							
Not cracked			<del>                                     </del>		·				
Not loose		€	Ì			· · · da ·	***************************************		
			<del></del>						
2. Inner casing		Yes	No	NA					
Not corroded		\$							
Not dented	, and the second						· ·		
Not cracked									
Not loose		- *							
		Yes	No	NA					
3. Are there weer	holes in outer casing?		74						
4. Weep holes ab				ķ			wr		
5. Is there a locka		\$	<u> </u>	, ,					
6. Is there a lock		<del>                                     </del>	ļ						
	n good condition?						·		
, bumper posts i	ngood condition:	<u> </u>	L	l.,			•		
Flush	mount Monitoring Wells	Yes	No	NA					
8. Can the lid be s		103	10-	4	,				
i	ve a gasket that seals?			)					
10. No water in the	_	<u> </u>							
11. Is the well cap			<del></del>						
12. Is there a lock			<u></u>	-	<i></i>		***************************************		
12. IS there a lock	present:		l	V		<del></del>	****		
	All Monitoring Wells	Yes	No	NA					
Downhole Condit		163	140	مر					
1	easuring point clearly marked?					<del></del>			
13. No obstructio		<del></del>							
1	s or vegetation in well?	·							
1	n bottom of well?	<del></del>		\ <u>\</u>			***********		
	v much sediment?	ft				<del></del>	···		
16. Installed as to		ft							
17. Measured tot	•	ft	1						
17. Measured tot	ar depart of well.								
General Conditio	p	Yes	No	NA					
18. Concrete pad			110	110	<del></del>	·			
19 . Concrete pad		45							
Slope away fo		<del></del>							
Not deteriorate	=	<del></del>							
ļ				<del>                                     </del>					
	below surrounding grade?	<del>                                      </del>					···		
20. No surface sea		<b>-₩</b>							
}	sible and labeled?								
Comments:		<del></del>			<del></del>	<del></del>			
<u> </u>									
* 84-1	11								
iviajor well repa	ir are those that require a subcon	tractor or sepa	rate mobili	zation to coi	npiete				

	and the same of the		Sand Carlotte	and Andrews	ROJECTIN	FORMATIO	1	a series a series.		*		
[	Site: VELME	ことのこ				Client:	NRT					
Project Nu	ımber:			Task #:		Start Date:	<i>&amp;</i> ( <i>l-</i> &	17		Time:	1758	
Field Pers	onnel: Tim	F3232V		,			((-8-	17-		Time:	1302	
@ ## (* #.#)	WELL INFO	RMATION :			PROPERTY.	e Garage and State of the Control of	EVENT	TYPE	Maria II I I I I I I I I I I I I I I I I I	r garage and and and and and and and and and and	gradus gradus	
	Well ID:	MNOS		Well Develop	ment	Low-Flow / Low Stress Sampling						
	Casing ID:		inches	Well Volume	Approach Sar	ampling Other (Specify):						
oli alike	WATER QUALITY INDICATOR PARAMETERS (continued)											
		Volume	Depth to				SEC or	Disso ved				
Sampling		Removed	Water	Drawdown	Temp.	pН	Cond.	Oxygen	Turbidity	ORP	Visual	
Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	' (NTU)	(mV)	C'a-ty_	
	1254		7.31		***************************************							
	1256	.13	7.70	.39	14.70	7.32	791	0.33	0.8	24	CLEAR	
	1258	. 26	7.70	.0	14.66	7.29	810	0	<u></u>	į9	CLEAR	
	1360	. 39	7-70	0	14.67	7.30	818	0	0	17	CLERIZ	
	1302	.62	7.70	0	14.66	7,29	816	O	0	17	CLEAIZ	
										1		
_												
	İ		<del> </del>									
			NOTES (	continued)	Part part	10-18-7-47/3		# 1 m 4 5 % % 4 m 5	ABBREVIA	TIONS.		
	4 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 +					, ,,,,	,,	Cond Actual Condu FT BTOC - Feet Belo na - Not Applicable nm - Not Measured	ctivity	ORP - Oxidation-F	Reduction Poteatial conical Conductance its ure	

Low-Flow Sampling Form MW-1

Site VEYMELTON	Major well:	s repairs* r	equired	Yes	No	NA					
Inspection Date 11-8-14	to maintair	well integ	rity?		Ø						
Well Number HWOLR		•	,								
Stick-up Monitoring Wells											
1. Outer protective Casing	Yes	No	NA								
Not corroded	Y										
Not dented	}					*					
Not cracked		, .			***************************************						
Not loose											
				*****	H1007177 (Cod to 1007)						
2. Inner casing	Yes	No	NA								
Not corroded	Ø				" " " -						
Not dented	ì										
Not cracked			1								
Not loose	U										
	Yes	No	NA								
3. Are there weep holes in outer casing?		K									
4. Weep holes able to drain?			×								
5. Is there a lockable cap present?	\ <u>\</u>		<del>  '  </del>								
6. Is there a lock present?	\ <del>\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\</del>					***************************************					
· ·	<u>K</u>		Y X								
7. Bumper posts in good condition?											
Flushmount Monitoring Wells	Yes	No	NA								
8. Can the lid be secured tightly?	162	. 110	7								
9. Does the lid have a gasket that seals?						··					
10. No water in the flushmount?			<del></del>								
ł company of the comp											
11. Is the well cap lockable?	ļ		<del>  V  </del>								
12. Is there a lock present?			<u> </u>	<u></u>							
All Bancianium thintin	V-a	N	NA I								
All Monitoring Wells	Yes	No		<del></del> -							
Downhole Condition			<del>- /-</del>								
12. Water level measuring point clearly marked?					<del> </del>						
13. No obstructions in well?						<del></del>					
14. No plant roots or vegetation in well?			$-\psi$								
15. No sediment in bottom of well?			<u> </u>								
If present, how much sediment?	ft										
16. Installed as total depth.	ft	, ,									
17. Measured total depth of well.	ft										
General Condition	Yes	No	NA NA								
18. Concrete pad installed?	<i>y</i>										
19 . Concrete pad	-										
Slope away form casing?			<del> </del>	·							
Not deteriorated?			ļ	<del></del>	**************************************						
Not heaved or below surrounding grade?			<u> </u>	<u> </u>							
20. No surface seal settling?		,									
21. Well clearly visible and labeled?	L V		<u> </u>	······································	······································						
Comments:											
* Major-well-repair are those that require a subcontr	actor or sepa	rate mobili	zation to cor	mplete							

1. 精質性	图 "我们们会会		AND THE STATE OF THE PARTY.	CONTRACTOR PR	ROJECTIN	IFORMATIO	N.				
	Site: UER	45402				Client:	NRT				
Project Nu	ımber:			Task #:		Start Date:	11.8:17		<del></del>	Time:	1326
Field Pers	onnel:	- 302012				Finish Date:				Time:	1336
entified or -	WELL INFO		in the state of			· · · · · · · · · · · · · · · · · · ·	ÉVENT	TYPÉ	A SAN A MARKATAN	engeregrenzen er en er er er er er er er er er er er er er	7. 1 % 1. 1
		LW612		Well Develop		72		ow Stress San	npling		
	Casing ID:		nches	Well Volume	Approach Sar	mpling 🔲	Other (Specify	):			
in the control		ंस्टर के ईंग्ड्रेस <b>ह</b> ै.	WAT	ER QUALIT	/ INDICATO	R PARAME	TERS (conti	nued)			
Sampling	Time	Volume Removed	Depth to Water	Drawdown	Temp.	Hq	SEC or Cond.	Dissolved Oxygen	Turbidity	ORP	Visual
Sampling	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	(NTU)	(TIV)	Clarity
	1326	(g-zi-zi-z)	9.45		( - /	\ <u></u> ,	(I=7=0A	(3-2)	(1.10)	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	
	1328	-13	9.45	O	14.80	7-40	814	6-20	٥	-49	UEAR
	1330	,26	9.45	Ö	1467	7-10	847	0.30	Ö	-93	CLSHZ
	1332	i 301	9.45	0	14.68	7.61	850	2.53	٥	-97	CLEAR
	1334	152	9.45	O	14.69	6.99	848	0	O	-102	CERE
	1336	165	9.45	S	14.71	7.00	845	0	ಲ	-101	CLEAR
			NOTES (	continued)		180		Parkwent of a	ABBREV A	TIONS.	
			·					Cond Actual Conduc FT BTOC - Feet Belov na - Net Applicable nm - Net Measured	tivity	ORP - Oxidation-R	ctrical Consuctance s

Site	VERMELTON		s repairs* r		Yes	No	NA NA
Inspection Date	11.8.17	to maintai	n well integ	rity?		4	
Well Number	mwosk						general to 1
Stick	-up Monitoring Wells					Comments	
1. Outer protective	: Casing	Yes	No	NA			
Not corroded	_	Y					
Not dented							
Not cracked			·	7		***************************************	
Not loose		Ϋ́	ļ	<u> </u>			
		l	!	<u>L</u>	<u></u>		
2. Inner casing		Yes	No	NA			
Not corroded		8					
Not dented	•	1		]			
Not cracked		<del> </del>					
Not loose		<del></del> -					
1100 10030		Yes	No	NA			
2 Are there ween	holes in outer casing?	163	X	IVA			
4. Weep holes able	_			ď			
-							
5. Is there a lockab		٩					
6. Is there a lock pr							
7. Bumper posts in	good condition?	V					
Florefore		V	*1-	A.I.A.			
	ount Monitoring Wells	Yes	No	NA S			·
8. Can the lid be se							
	e a gasket that seals?						<del></del>
10. No water in the							
11. is the well cap							
12. Is there a lock p	presentr			<i>√</i>			·
	I Samulandina Matalla	V	A1-	N/A			
	Monitoring Wells	Yes	No	NA NA			
Downhole Condition		<del></del>		4			
	asuring point clearly marked?	<u> </u>		1		·····	
13. No obstruction							
1	or vegetation in well?			1			
15. No sediment in				V			
	much sediment?	ft					
16. Installed as total	•	ft					
17. Measured total	depth of well.	ft					
 				***			:
General Condition		Yes	No_	NA NA			
18. Concrete pad in	istalled?		٢				
19 . Concrete pad		<b> </b>		λο			
Slope away forr							
Not deteriorate				<b>→</b>			······································
1	pelow surrounding grade?			V		<del></del>	
20. No surface seal	<del>-</del>	<u> </u>			,		
21. Well clearly visi	ble and labeled?	<b>\( \gamma \)</b>					
Comments:							
<u> </u>							
* Ndaian wall	and the second s		unda un - latit				
iviajor well repair	are those that require a subcontra	actor or sepa	rate Mobiliz	ation to col	uhiere		

	1 3 3 7 - 1 1 3 1 3 1 3 1 3 1 5 1 5 1 5 1 5 1 5 1	rea mining	was in markets a	J. S. S. S. S. S. L. L.	ROJECT IN	FORMATIO	Andria direction in the	gerifer and the library	23547 Table 1			
	Ste: VEYAUT	EUTON				Client:	NRT					
Project Nu				Task #:		Start Date:				Time:	1202	
Field Perso	onnel:	KICKIDAN				Finish Date:	11-8-17			Time:	1776	
A. S. S. S. S. S. S. S. S. S. S. S. S. S.	WELL INFOF	RMATION					EVENT	TYPE	erioni in the Seatter	engligere verde i i i en G		
	Well ID: w	1W812		Well Develop	ment	$\boxtimes$		ow Stress Sam	pling	•		
(	Casing ID:		inches	Well Volume Approach Sampling Other (Specify):								
WATER QUALITY INDICATOR PARAMETERS (continued)										- · · · · · · · · · · · · · · · · · · ·		
		Volume	Depth to				SEC or	Dissolved				
Sampling	Time	Removed	Water	Drawdown	Temp.	pН	Cond.	Oxygen	Turbidity	ORP	Visual	
Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	' (NTU)	(mV)	Clarity	
	1262		كما . 13									
	1205	.13	13.90	.25	14.42	7.79	2030	1.40	O	-77	Creas	
	1208	طايج ,	13.95	.05	14.26	8,04	2040	0.20	٥	- 83	CLEAR	
	1211	139	13.95	0	14.29	8.26	2040	0	0	- 83	CLEAR	
	1214	, 53	i 3.95	0	14.28	8.44	2030	ಲ	0	-86	CLEAR	
	1217	. 65	13.95	0	14.31	8 54	2020	0	٥	-93	CLEAR	
	1220	.78	13.95	Ò	14.28	8.56	2020	0	0	_ 97	CLEAR	
											•	
	46. Yes		NOTES	(confinued)		Commence of the		Section in the second	ABBREVIA	TIONS		
			- The second sec			,		Cond Actual Condu FT BTOC - Feet Bolov na - Not Applicable nm - Not Measured	ctivity	ORP - Oxidation-Rec SEC - Specific Elect SU - Standard Units Temp - Temperatuse "C - Degrees Celcius	rical-Sendantance	

Low Flow Sampling Form

Site	UPPLHICION	Major well	s repairs* r	equired	Yes	No	NA
Inspection Date	168.14	to maintai	n well integ	rity?		70	
Well Number	<u> </u>		_			·	
Stick	-up Monitoring Wells					Comments	
1. Outer protective		Yes	No	NA			
Not corroded	-	W					
Not dented							
Not cracked							
Not loose		10	•			· · · · · · · · · · · · · · · · · · ·	
		<u> </u>		<u> </u>			
2. Inner casing		Yes	Νο	NA			
Not corroded		8					
Not dented	•						
Not cracked		1				<del></del>	
Not loose		\ \frac{1}{V}				,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	
		Yes	No	NA			
3. Are there ween	holes in outer casing?	103		<del>                                     </del>			
4. Weep holes able	<del>-</del>		<i>V</i>	Y			
5. Is there a lockab		7		<del>  '  </del>			
6. Is there a lock p	• •			<del> </del>			· · · · · · · · · · · · · · · · · · ·
7. Bumper posts in				<del>                                     </del>			
7. Bumper posts in	good collaidoll?			<u> </u>		-	
Eluche	sount Manitoring Molic	Vos	Nio	T NA T			
t	nount Monitoring Wells	Yes	No	NA			
8. Can the lid be se		···		2			
1	e a gasket that seals?			<del>                                     </del>	<del></del>		
10. No water in the		ļ					
11. Is the well cap		ļ		-			
12. Is there a lock p	oresent?						
				T1			
1	l Monitoring Wells	Yes	No	NA V			
Downhole Conditi			· · · · · · · · · · · · · · · · · · ·	~			
	asuring point clearly marked?						
13. No obstruction		***************************************					
	or vegetation in well?			<del>  \</del>			
15. No sediment in				1			
	much sediment?	ft					
16. Installed as tot	•	ft					
17. Measured tota	depth of well.	ft					
				r 1			ĺ
General Condition		Yes	No	NA NA		,	
18. Concrete pad it	nstalled?	<u>γ</u>					
19. Concrete pad							
Slope away for							
Not deteriorate							
	below surrounding grade?						
20. No surface seal	=						
21. Well clearly visi	ble and labeled?	.[					
Comments:							
		<u></u>					
* Major-well-repair	are those that require a subcontr	actor or sepa	rate mobili	zation to cor	nplete		

			Section 1998		PROJECT						The state of the s
Project No	Site: <u>1)Elu</u>	STON		Task #:		Chart Data	: NRT			*	
Field Pare	onnel: Tw/	Canasa				Start Date	11.8.17			Time:	
Ticla Tere	WELL INFOR		at the			_ Trinon Date	EVENT			_ IIII.G	
<u> </u>	Well ID: u			☐ Well Deve	<del></del>			ow Stress San	anline	···	· · · · · ·
	Casing ID:	<u>w4</u>	inches		ne Approach S	emnling	Other (Specify		npiing		**
a ja jarge		was some at a			ITY INDICAT					<del></del>	
		Volume			JI P INDICATO	OR FARAME.	SEC or	Dissolved		]	<del></del>
Sampling	Time	Removed	Depth to Water		vn Temp.	рН	Cond.	Oxygen	Turbidity	ORP	Visual
Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	' (UTU)	(m,v)	Carity
	1320		9.77						· · · · · · · · · · · · · · · · · · ·		
	<u> </u>										
		<u></u>	1		<u>.</u>	The Manager		: No. 21 4 20 4 30 4 30 4 30 4 30 4 30 4 30 4 30	Career Victor (Alicia)	G S March Color	<del>. L </del>
			NOTE	S (continue	4)	The State of		Cond Actual Conduc	ABBREVIA	TIONS ORP - Oxidation-R	
	DIW or	J67						FT BTOC - Feet Below na - Not Applicable nm - Not Measured			circal Conductance Is Ire
								1			

w-Flow Sampling Form

Site VERMENTON	Major wells	repairs* re	equired	Yes No NA				
Inspection Date 1897	to maintain	•	· .		Ø			
Well Number MW. 19			,. [		1 /	· · · · · · · · · · · · · · · · · · ·		
7-70-1								
Stick-up Monitoring Wells					Commonte			
1 Outer protective Casing	Yes	No	NA		Çomments			
Not corroded		ואט	- NA					
Not dented	8							
1		<del></del> -						
Not cracked	1	<del> </del>						
Not loose			l l					
2. Inner casing	Yes	No	NA NA					
Not corroded	P							
Not dented								
Not cracked								
Not loose			L					
	Yes	No	NA					
3. Are there weep holes in outer casing?		Υ						
4. Weep holes able to drain?			4					
5. Is there a lockable cap present?	R							
6. Is there a lock present?	8							
7. Bumper posts in good condition?	· v							
	<del> </del>	i						
Flushmount Monitoring Wells	Yes	No	NA					
8. Can the lid be secured tightly?		110	y)	***		•		
9. Does the lid have a gasket that seals?			4					
10. No water in the flushmount?								
11. Is the well cap lockable?								
•	<u> </u>		<del>\</del>	······································				
12. Is there a lock present?			<u> </u>					
A If N # * to * 147 11		No. 1	NIA I					
All Monitoring Wells	Yes	No	NA NA		<del> </del>			
Downhole Condition			-		_			
12. Water level measuring point clearly marked?								
13. No obstructions in well?								
14. No plant roots or vegetation in well?			—\ <sup>1</sup>	•				
15. No sediment in bottom of well?								
If present, how much sediment?	ft							
16. Installed as total depth.	ft							
17. Measured total depth of well.	ft							
General Condition	Yes	No	NA					
18. Concrete pad installed?	Ψ							
19 . Concrete pad								
Slope away form casing?								
Not deteriorated?								
Not heaved or below surrounding grade?								
20. No surface seal settling?	N i							
21. Well clearly visible and labeled?			- 05 2 #100-4					
Comments:	<u></u>	1				···		
	<del></del>		·· · · · · · · · · · · · · · · · · · ·					
				TO 1772 - 111.				
* Major well-repair are those that require a subcont	ractor or sensi	ate mobilis	ation to con	nplete				
major man repen are anose and require a subcome								

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	Site: () & Lu	MECIEN				Client:					
Project No	ımber	t		Task #:		Start Date:	11-8-17			ime:	1315
Field Pers	onnel: Tav (	TOUNAN				. Finish Date:		····		ime:	13(5)
Marie Comment	WELL INFOR	RMATION	er Addin		e in Lagrand States (1966). Alignoria	er en en ekset en bekom George	EVENT	TYPE		Maria Maria	
	Well IC: س	lw:A		Well Develop	ment		Low-Flow / L	ow Stress San	npling		
	Casing ID:		inches	Well Volume	Approach Sar	mpling 🔲	Other (Specify	):			
· waste	WATER QUALITY INDICATOR PARAMETERS (continued)										
		Volume	Depth to				SEC or	Dissolved			,
Sampling		Removed	Water	Drawdown	Temp,	рH	Cond.	Oxygen	Turbidity	ORP	∵isual
Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	' (NTU)	(mV)	Clarity
	1315		867								
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	!							<u> </u>			
			<u> </u>								
	<u>.</u>		NOTES (c	continued)					ABBREVIA		
	DIM ONI	Υ .				Cond Actual Conductivity ORP - Codulation-Reductice Potential FT BTOC - Feet Below Top of Casing SEC - Specific Electrical Corrouciance na - Not Applicable SU - Standard Units					

Low-Flow Sampling Form MW-1

## Monitoring Well Evaluation Checklist

Site	VENIMELEDY	Major wel	s repalis* i	equired	Yes	No	NA
Inspection Date	11.8.17		n well integ			6	
Well Number	MW ZU						·····
	Janua Da						
Stick	k-up Monitoring Wells					Comments	
1. Outer protectiv		Yes	No	NA			
Not corroded	<b>3</b>	X					
Not dented		Train i					
Not cracked		<del>                                     </del>	<del>                                     </del>				
Not loose			<u> </u>				
1100 10000							
2. Inner casing		Yes	No	NA			
Not corroded		P	<u></u>				
Not dented	•	1					
Not cracked		<del>   </del>			<del></del>		<del></del>
Not loose			<del></del>				
1401 10036		Yes	No No	NA NA			
3 Are there ween	holes in outer casing?	162		IVA			
4. Weep holes abl			<u> </u>	X			·
1		<del></del>		<u> </u>			
5. Is there a lockal	• •	<u> </u>					
6. Is there a lock p		<del>                                     </del>					
7. Bumper posts in	a good condition?						
Flucks	warret Adaptitaring Malla	. Voc	Na	N/A			
8. Can the lid be s	nount Monitoring Wells	Yes	No	NA Y			
	- ·			<u> </u>			
	e a gasket that seals?					· · · · · · · · · · · · · · · · · · ·	
10. No water in th							
11. Is the well cap					,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		
12. Is there a lock	presentr						
	II Bannitoring Molls	Yes	No	NA			
Downhole Conditi	Il Monitoring Wells	res	No		<u>.</u>		
1		ļ	·	¥	····		
13. No obstruction	easuring point clearly marked?						
3		-					
15. No sediment in	or vegetation in well?			<del>( ,  </del>	****		
· ·							
•	much sediment?	ft					
16. Installed as tot	•	ft					į
17. Measured tota	н аертп от weн.	ft	l				
General Condition		Yes	No	NA			
18. Concrete pad i		162	<u> </u>	1474		-	
19 . Concrete pad	alotalieu i						
Slope away for	en encing?			, ,			
Not deteriorate							
	below surrounding grade?	<del>                                     </del>	-	<u> </u>		····	
20. No surface sea		X					
21. Well clearly vis	sible and labeled!	<u> </u>					
Comments:							
						<del></del>	
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iviajor well repai	r are those that require a subcontr	actor or sepa	rate mobili	ation to cor	uhiere		

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	Site: V£2	といしけのと	2			Client:	NRI				
Project No				Task #;		Start Date:				Time: 12	22-
Field Pers	onnel: T.	2052D4/	2			Finish Date:	11817			_ Time:	1405
	WELL INFOR	MATION					EVENT	TYPE		Angre in pro-	
	Well ID; برا	(W/3+20		Well Develop	ment	Y	Low-Flow / Lo	ow Stress San	npling		
	Casing ID:	TMA	inches	Well Volume	Approach Sar	npling 🔲	Other (Specify)	):			
4.50		ti. Seriesia	WAT	ER QUALIT	Y INDICATO	R PARAMET	FERS (contin	nued)			
		Volume	Depth to				SEC or	Dissolved		:	
Sampling	1 1	Removed	Water	Drawdown	Temp.	рH	Cond.	Oxygen	Turbidity	ORP	Visual
Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	' (NTU)	(mV)	Clarity
	1357	. •3		100			11011	5.5			-
	1359	.13	15.23	1-00	s	7.34	494 2004	0.12	3-8	<u> ३५</u>	262
	1401	. 26 - 39	15.23	2	1235	7.24	华凯之	<u> </u>	3.9	- لو	CLEAR
ļ	[40,83	<del> </del>	15.23	ļ	15,14	7.21	521	<u> </u>	3.4	-14	CLEA12
	1405	.52	<u>15,25</u>	0	15.08	7.22	527	0	3.3	-20	CLEAR
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	1		NOTES (	continued)		Control of the second		Cond Actual Condu	ABBREVIA	ORP - Oxidation-R	Marchae Derocal of
								FT BTOC - Feet Belo na - Not Applicable nm - Not Measured		SEC - Specific Elec SU - Standard Unit Temp - Temperacu *C - Degrees Ceci	dincal Conductance s re
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1											
<u> </u>	1	".						J			<del>-</del>

Low-Flow Sampling Form MW-1

# Monitoring Well Evaluation Checklist

Site VERMETER	Major well:	s repairs* re	equired	Yes	No	NA
Inspection Date 11.8.17	to maintair	n well integr	rity?		b	
Well Number MW 34		-	,			
Stick-up Monitoring Wells					Comments	
1. Outer protective Casing	Yes	No	NA			
Not corroded	A					
Not dented	1	-				
Not cracked		,				
Not loose	7					
			<u> </u>			
2. Inner casing	Yes	No	NA			
Not corroded	7					
Not dented				•••		
Not cracked						•
Not loose	1			······································		
	Yes	No	NA			
3. Are there weep holes in outer casing?		X				
4. Weep holes able to drain?			>			
5. Is there a lockable cap present?	χ.		/-			
6. Is there a lock present?	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \					
7. Bumper posts in good condition?				****		
Flushmount Monitoring Wells	Yes	No	NA			
8. Can the lid be secured tightly?	163	110	<u>}</u>			
9. Does the lid have a gasket that seals?			<u> </u>			
10. No water in the flushmount?		·				
11. Is the well cap lockable?						
T T T T T T T T T T T T T T T T T T T						
12. Is there a lock present?	L					
All Monitoring Wells	Yes	No	NA NA			
Downhole Condition	163	140				
12. Water level measuring point clearly marked?			V			
13. No obstructions in well?	-					
14. No plant roots or vegetation in well?						
15. No sediment in bottom of well?				1	pre	······································
	-					
If present, how much sediment?	ft					
16. Installed as total depth.		4				
17. Measured total depth of well.	ft	ł				
General Condition	Vas	No	N/A	İ		
18. Concrete pad installed?	Yes	140	NA			
•	\ \ \	l I	: .	2m-mmaa		
19 . Concrete pad	<del>                                     </del>					
Slope away form casing?						
Not deteriorated?						
Not heaved or below surrounding grade?						
20. No surface seal settling?	<del></del>			<del></del> .		
21. Well clearly visible and labeled?	L	<u> </u>	L			
Comments:		<u> </u>				
* Major well repair are those that require a subcontr	actor or sepa	arate mobili	zation to co	mplete		

				THROUGHT BAT	ACCOUNT IN	FORMATION		<u></u>	<u> </u>			
	Site: UEVLY	STOWN .					NRT					
Project No		<b></b>		Task #;		Start Date:	11.8.17				412	
Field Pers	onnel: T~		7			Finish Date:	11.8.17	,		Time:		
Salar Salar	WELL INFOR	RMATION	140 Y				EVENT	TYPE	1 7. 37		14.	
	Well ID: _ พู	w-34		Well Develop	ment	[ <del>X</del> 4	Low-Flow / L	ow Stress Sam	pling			
	Casing ID:		inches	Well Volume	Approach Sar	npling 🔲	Other (Specify	):				
	4 1 27 1 MAY 189	to the state	WAT	ER QUALIT	Y INDICATO	R PARAMET	ERS (conti	nued)	.11		1.7	
	1	Volume	Depth to				SEC or	Dissolved				
Sampling	1 5	Removed	Water	Drawdown	Temp.	рH	Cond,	Oxygen	Turbidity	ORP	Visual	
Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	' (NTU)	(mV)	Clarity	
	1412		14.57									
	1414	.13	14.85	.32	13.70	6.96	744	.59	101-6	-69	CLOUN	
	1416	.26	.4-85	: O	12.62	7.14	780	1.24	37.5	-116	CLEAR	
	1418	.39	14.85	υ	12.41	7.18	782	1,24	34.8	-128	Citale	
	1420	.52	14.85	D	12.31	7.18	779	1.03	55.7	-134	CLEAR	
	1422	66،	14.86	0	12.24	3.19	779	1.04	105	-138	CLEHE	Croan
	1424	178	14-85	0	12.23	7.17-	777	0.97	124	- 141	CLANE	)
	1426	.91	14.85	0	17-20	7.17	774	0.78	126	- 142	CUTTE	
	1428	1:04	14.35	0	12.28	7.13	773	0.96	125	-139	CLEVIE	
	1430	1.17	14-85	0	12.37	7.07	773	0.50	119	-137	Cidna	1
	1432	1.30	14.85	ပ	12.40	b.98	743	0.42	17	-134	CLEAR	৬
	1434	1,43	14-85	0	12.40	6.92	773	0.15	192	-132	20007	•
	1436	1.50	14.85	0	12.31	6.94	772	0	١٦٢	- 132	CLUUDY	
			NOTES (	continued)				A to the broken which	ABBREVIA	TIONS		
<u> </u>			110120	Jordan, and a second			<u>.</u>	Cond Actual Conduc FT BTOC - Feet Below na - Not Applicable nm - Not Measured	livity	ORP - Oxidation-Redi SEC - Specific Electric SU - Standard Units Temp - Temperature		

ow Flow Sampling Form

	Property.	知为《一篇》的	The second second	<b>在影响的</b> [1]	ROJECTII	NFORMATIO	Ŋ				
	Site: UEU	MILTON				Client:	:				
Project N	ımber:			Task #:		Start Date:		<u> </u>		_ Time:	1556
Field Pers						_ Finish Date:		7-		_ Time:	1239
		RMATION	A. A. C. A. C. C. C. C. C. C. C. C. C. C. C. C. C.		四百年 宣誓		EVENT	TYPE		engres es en en es La companya	
	Well ID:	Dyp 1		Well Develop		<u> </u>		ow Stress San	npling		
	Casing ID:		inches	Well Volume			Other (Specify				
4.36		14 - 14 - 14 - 14 - 14 - 14 - 14 - 14 -	WAT	ER QUALIT	YINDICATO	R PARAME	TERS (conti	nued)			3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3
Sampling Stage	(milita:y)	Volume Removed (gallons)	Depth to Water (Feet)	Drawdown (Feet)	Temp. (*C)	pH (SU)	SEC or Cond. (µs/cm)	Dissolved Oxygen (mg/L)	Turbidity ' (NTU)	ORP (nV)	V:s∟al C arity
	1229	_	8.71								
	1239	A	9.10	. *	14.91	7-37	816	0.59	5.2	-137	(EAR
		_ ;									
							<u> </u>				
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	[,±, , , , , , , ]		ا در ميلونت نيزور	<u> </u>   <u>                                  </u>	gapaga daga	Di ak 25 ayak		g garangan sebaga		<u> </u>	v · · · · · ·
		Du	P	continued)	<u> </u>			Cond Actual Condu- FT BTOC - Feel Belon na - Not Applicable nm - Not Measured		ORP - Oxidation-R. SEC - Specific Elec SU - Steadard Units Temp - Temperatur 'C - Degrees Celci	eduction Potential crical Conductasce s

Low-Flow Sampling Form

Low-Flow Sampling Form

Page 2 of 2

or March		होत्र का रहे । इस्तर से		A STATE OF THE	ROJECTI	NFORMATION					* * * * * * * * * * * * * * * * * * * *
		RUATICE ON	)			_ Client:					
Project Nu	mber:			Task #:		_ Start Date:	11-8-	17		Time:	
Field Pers	onnel: 🔼	TERDA	J			_ Finish Date:_	11-8-	(7		_ Time:	
7,77	WELL INFO	DRMATION				প্রেপ্তর প্রতিকার জ্বাস্থার জন্ম বিভাগিক কল	EVENT	TYPE		ET PERSONNELS IN THE P	
	Well ID:	D482		Well Develop		<u> </u>	Low-Flow / L	ow Stress San	npling	· · · · · · · · · · · · · · · · · · ·	
	Casing ID:		inches	Well Volume	Approach Sa		Other (Specify		. •		
	11 A A	. 在"金数"基。	WAT	ER QUALIT	Y INDIGATO	R PARAMET	ERS (conti	nued)			
Sampling Stage		Volume Removed (gallons)	Depth to Water (Feet)	Drawdown (Feet)	Temp.	pH (SU)	SEC or Cond. (us/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP (mV)	Visual Clarity
	1326			· · · · · · · · · · · · · · · · · · ·					<u> </u>		
	1336	.65		,	14.71	7,00	8.45	0	. 0	~ [0]	CLEAR
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	1		NOTES (	confinued)		The property was the second			ABBREVIA		
		),0 Z						Cond Actual Condu FT BTOC - Feet Belon na - Not Applicable nm - Not Measared		ORP - Oxidation-Re SEC - Specific Elect SU - Standard Units Temp - Temperature *C - Degrees Celcu	ncal Coaducance
		Mr o							•		

Low Flow Sampling Farm MW 1

## Field Calibration Form Groundwater Quality Meter

	lity Meter Manufacture 1753   on potential, dissolved c	r/Model <u>U - 5600</u> oxygen, pH, tubidity	HOICEBN <del>-</del>	
Date of Calibration Check	Calibration Standard Concentration	Calibration Reading	Within +/_ 10% (yes or no)	Comments
	प. co	(f,CD	1985 0( 110) 12 (25)	Confinents
1360mn	G 200	7.01	7 67	
1 SCANNA	0.00	10.02		
	1412			
<del></del>	5 N74	1410	· .	
	100%+64.1% 00	104.1%	$\overline{}$	
	7.00	7.02	YES	
500000	1412	1370		
	D	0.6		
17	100%	108.9	. /	
	10076	(0 2 1	Ψ	
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			<u> </u>	



February 02, 2018

Steve Wiskes
Natural Resource Technology, Inc.
2422 East Washington Street
Suite 104
Bloomington, IL 61704
TEL. (414) 837-3614
FAX: (414) 837-3608



Dear Steve Wiskes:

TEKLAB, INC received 20 samples on 1/25/2018 9:00:00 AM for the analysis presented in the following report.

Samples are analyzed on an as received basis unless otherwise requested and documented. The sample results contained in this report relate only to the requested analytes of interest as directed on the chain of custody. NELAP accredited fields of testing are indicated by the letters NELAP under the Certification column. Unless otherwise documented within this report, Teklab Inc. analyzes samples utilizing the most current methods in compliance with 40CFR. All tests are performed in the Collinsville, IL laboratory unless otherwise noted in the Case Narrative.

All quality control criteria applicable to the test methods employed for this project have been satisfactorily met and are in accordance with NELAP except where noted. The following report shall not be reproduced, except in full, without the written approval of Teklab, Inc.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Michael L. Austin
Project Manager
(618)344-1004 ex 16
MAustin@teklabinc.com

Page 1 of 40



# **Report Contents**

## http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 18010005

Client Project: Dynegy - Vermillion Power Station

Report Date: 02-Feb-18

### This reporting package includes the following:

Cover Letter	1
Report Contents	2
Definitions	3
Case Narrative	4
Accreditations	5
Laboratory Results	6
Sample Summary	24
Dates Report	25
Quality Control Results	34
Receiving Check List	40
Chain of Custody	Appended



#### Definitions

http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 18010005

Client Project: Dynegy - Vermillion Power Station

Report Date: 02-Feb-18

#### Abbr Definition

- \* Analytes on report marked with an asterisk are not NELAP accredited
- CCV Continuing calibration verification is a check of a standard to determine the state of calibration of an instrument between recalibration.
- DF Dilution factor is the dilution performed during analysis only and does not take into account any dilutions made during sample preparation. The reported result is final and includes all dilutions factors.
- DNI Dld not lynlte
- DUP Laboratory duplicate is an aliquot of a sample taken from the same container under laboratory conditions for Independent processing and analysis independently of the original aliquot.
- ICV Initial calibration verification is a check of a standard to determine the state of calibration of an instrument before sample analysis is initiated.
- IDPH IL Dept. of Public Health
- LCS Laboratory control sample, spiked with verified known amounts of analytes, is analyzed exactly like a sample to establish intra laboratory or analyst specific precision and bias or to assess the performance of all or a portion of the measurement system. The acceptable recovery range is in the QC Package (provided upon request).
- LCSD Laboratory control sample duplicate is a replicate laboratory control sample that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
- MBLK Method blank is a sample of a matrix similar to the batch of associated sample (when available) that is free from the analytes of interest and is processed simultaneously with and under the same conditions as samples through all steps of the analytical procedures, and in which no target analytes or interferences should present at concentrations that impact the analytical results for sample analyses.
- MDL Method detection limit means the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero.
- MS Matrix spike is an aliquot of matrix fortified (spiked) with known quantities of specific analytes that is subjected to the entire analytical procedures in order to determine the effect of the matrix on an approved test method's recovery system. The acceptable recovery range is listed in the QC Package (provided upon request).
- MSD Matrix spike duplicate means a replicate matrix spike that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
- MW Molecular weight
- ND Not Detected at the Reporting Limit

#### NELAP NELAP Accredited

- PQL Practical quantitation limit means the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operation conditions. The acceptable recovery range is listed in the QC Package (provided upon request).
- RL The reporting limit the lowest level that the data is displayed in the final report. The reporting limit may vary according to customer request or sample dilution. The reporting limit may not be less than the MDL.
- RPD Relative percent difference is a calculated difference between two recoveries (ie. MS/MSD). The acceptable recovery limit is listed in the QC Package (provided upon request).
- SPK The spike is a known mass of target analyte added to a blank sample or sub-sample; used to determine recovery deficiency or for other quality control purposes.
- Surr Surrogates are compounds which are similar to the analytes of interest in chemical composition and behavior in the analytical process, but which are not normally found in environmental samples.
- TIC Tentatively identified compound: Analytes tentatively identified in the sample by using a library search. Only results not in the calibration standard will be reported as tentatively identified compounds. Results for tentatively identified compounds that are not present in the calibration standard, but are assigned a specific chemical name based upon the library search, are calculated using total peak areas from reconstructed ion chromatograms and a response factor of one. The nearest Internal Standard is used for the calculation. The results of any TICs must be considered estimated, and are flagged with a "T". If the estimated result is above the calibration range it is flagged "ET"
- TNTC Too numerous to count ( > 200 CFU )

#### Qualifiers

- # Unknown hydrocarbon
- E Value above quantitation range
- I Associated internal standard was outside method criteria
- M Manual Integration used to determine area response
- R RPD outside accepted recovery limits
- T TIC(Tentatively identified compound)

- B Analyte detected in associated Method Blank
- H Holding times exceeded
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike Recovery outside recovery limits
- X Value exceeds Maximum Contaminant Level



## Case Narrative

http://www.teklabinc.com/

Work Order: 18010005

Report Date: 02-Feb-18

Client: Natural Resource Technology, Inc.
Client Project: Dynegy - Vermillion Power Station

Cooler Receipt Temp: 4.22 °C

An employee of Teklab, Inc. collected the sample(s).

MW7 could not be collected; the well was dry. TW1 could not be collected; the well is no longer in service. JE/EAH 1/25/18

#### Locations

			Docutions		
	Collinsville		Springfield		Kansas City
Address	5445 Horseshoe Lake Road	Address	3920 Pintail Dr	Address	8421 Nieman Road
	Collinsville, IL 62234-7425		Springfield, IL 62711-9415		Lenexa, KS 66214
Phone	(618) 344-1004	Phone	(217) 698-1004	Phone	(913) 541-1998
Fax	(618) 344-1005	Fax	(217) 698-1005	Fax	(913) 541-1998
Email	jhriley@teklabinc.com	Email	KKlostermann@teklabinc.com	Email	jhriley@teklabinc.com
	Collinsville Air		Chicago		
Address	5445 Horseshoe Lake Road	Address	1319 Butterfield Rd.		
	Collinsville, IL 62234-7425		Downers Grove, IL 60515		
Phone	(618) 344-1004	Phone	(630) 324-6855		
Fax	(618) 344-1005	Fax			
Email	EHurley@teklabinc.com	Email	arenner@teklabinc.com		



## Accreditations

## http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 18010005

Client Project: Dynegy - Vermillion Power Station

Report Date: 02-Feb-18

State	Dept	Cert#	NELAP	Exp Date	Lab
Illinois	IEPA	100226	NELAP	1/31/2019	Collinsville
Kansas	KDHE	E-10374	NELAP	4/30/2018	Collinsville
Louisiana	LDEQ	166493	NELAP	6/30/2018	Collinsville
Louisiana	LDEQ	166578	NELAP	6/30/2018	Collinsville
Texas	TCEQ	T104704515-12-1	NELAP	7/31/2018	Collinsville
Arkansas	ADEQ	88-0966		3/14/2018	Collinsville
Illinois	IDPH	17584		5/31/2019	Collinsville
Indiana	ISDH	C-IL-06		1/31/2018	Collinsville
Kentucky	KDEP	98006		12/31/2018	Collinsville
Kentucky	UST	0073		1/31/2018	Collinsville
Louisiana	LDPH	LA170027		12/31/2018	Collinsville
Missouri	MDNR	930		1/31/2018	Collinsville
Missouri	MDNR	00930	5/31/2017		Collinsville
Oklahoma	ODEQ	9978	8/31/2018		Collinsville
Tennessee	TDEC	04905		1/31/2018	Collinsville



### http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 18010005

Client Project: Dynegy - Vermillion Power Station

Report Date: 02-Feb-18

Lab ID: 18010005-001

Client Sample ID: MW1

Matrix: GROUNDWATER Collection Date: 01/24/2018 15:33

THE STATE OF COURT	WATER			Conceilor	Date. OI	2 1/2010	, 10,00	
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEAS	UREMENTS							
Depth to water from measuring	ng point *	0		79 67	ft	1	01/24/2018 15:33	R242740
STANDARD METHOD 450	0 H B 2001 FIELD							
pH	*	1.00		6.93		1	01/24/2018 15.33	R242740
STANDARD METHODS 2	130 B FIELD							
Turbidity	*	1.0		< 1.0	NTU	1	01/24/2018 15:33	R242740
STANDARD METHODS 18	TH ED. 2580 B FIELD							
Oxidation-Reduction Potentia	al *	-300		64	mV	1	01/24/2018 15:33	R242740
STANDARD METHODS 25	10 B FIELD							
Conductivity	*	1		3450	µS/cm	1	01/24/2018 15:33	R242740
STANDARD METHODS 25	550 B FIELD							
Temperature	*	0		11.75	°C	1	01/24/2018 15:33	R242740
STANDARD METHODS 45	600-O G FIELD							
Oxygen, Dissolved	*	1.00		< 1.00	mg/L	1	01/24/2018 15:33	R242740
STANDARD METHODS 25	40 C (DISSOLVED) 199	7						
Total Dissolved Solids	NELAP	20		2080	mg/L	1	01/26/2018 13:54	R242841
STANDARD METHODS 45	600-NO3 F (TOTAL) 200	0						
Nitrogen, Nitrate (as N)	NELAP	0.050		0.349	mg/L	1	01/25/2018 12:19	R242739
SW-846 9036 (TOTAL)								
Sulfate	NELAP	500		1040	mg/L	50	01/26/2018 20:55	R242803
SW-846 9214 (DISSOLVEI	D)							
Fluoride	NELAP	0.10		0.13	mg/L	1	01/26/2018 15:52	R242801
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		21	mg/L	1	01/26/2018 20:47	R242805
SW-846 3005A, 6020A, ME	ETALS BY ICPMS (DISS	OLVED)						
Arsenic	NELAP	0.0010		< 0.0010	mg/L	5	01/25/2018 20:12	138377
Barium	NELAP	0.0010		0.0128	rng/L	5	01/25/2018 20.12	138377
Boron	NELAP	0.0250		1.49	mg/L	5	01/26/2018 12:10	138377
Iron	NELAP	0.0250		0.0542	mg/L	5	01/25/2018 20:12	
Manganese	NELAP	0.0010		0.0058	mg/L	5	01/25/2018 20:12	
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	01/25/2018 20:12	138377



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Client: Natural Resource Technology, Inc.

Work Order: 18010005

Client Project: Dynegy - Vermillion Power Station

Report Date: 02-Feb-18

Lab ID: 18010005-002

Client Sample ID: MW2

Matrix: GROUNDWATER Collection Date: 01/24/2018 16:32

THE THE GROOTER THE	TEIX		Concesson Date: 01/21/2010 10:32							
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch		
FIELD ELEVATION MEASUR	REMENIS									
Depth to water from measuring	point *	0		18 19	ft	1	01/24/2018 16:32	R242740		
STANDARD METIIOD 4500-	II B 2001 FIELD									
pH	*	1.00		7.40		4	01/24/2018 16:32	R242740		
STANDARD METHODS 213	0 B FIELD									
Turbidity	*	1.0		< 1.0	NTU	1	01/24/2018 16:32	R242740		
STANDARD METHODS 18TH	ED. 2580 B FIELD									
Oxidation-Reduction Potential	*	-300		-88	mV	1	01/24/2018 16:32	R242740		
STANDARD METHODS 2510	B FIELD									
Conductivity	*	1		1090	µS/cm	1	01/24/2018 16:32	R242740		
STANDARD METHODS 2550	B FIELD									
Temperature	*	0		12.66	°C	1	01/24/2018 16:32	R242740		
STANDARD METHODS 4500	-O G FIELD									
Oxygen, Dissolved	*	1.00		3.33	mg/L	1	01/24/2018 16:32	R242740		
STANDARD METHODS 2540	C (DISSOLVED) 199	7								
Total Dissolved Solids	NELAP	20		432	mg/L	1	01/26/2018 13:54	R242841		
STANDARD METHODS 4500	-NO3 F (TOTAL) 200	0								
Nitrogen, Nitrate (as N)	NELAP	0.050		0.065	mg/L	1	01/25/2018 12:21	R242739		
SW-846 9036 (TOTAL)										
Sulfate	NELAP	10		19	mg/L	1	01/26/2018 20:58	R242803		
SW-846 9214 (DISSOLVED)										
Fluoride	NELAP	0.10		0.57	mg/L	1	01/26/2018 15:53	R242801		
SW-846 9251 (TOTAL)										
Chloride	NELAP	10		45	mg/L	2	01/26/2018 21:06	R242805		
SW-846 3005A, 6020A, META	ALS BY ICPMS (DISS	OLVED)								
Arsenic	NELAP	0.0010		0.0097	mg/L	5	01/25/2018 20:20	138377		
Barium	NHI AP	0 0010		0 1/4	mg/L	5	01/25/2018 20:20	138377		
Boron	NELAP	0.0250		0.338	mg/L	5	01/26/2018 12.18			
Iron	NELAP	0.0250		0.245	mg/L	5	01/25/2018 20:20			
Manganese	NELAP	0.0010		0.0811	mg/L	5	01/25/2018 20:20			
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	01/25/2018 20:20	138377		



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Client: Natural Resource Technology, Inc.

Work Order: 18010005

Client Project: Dynegy - Vermillion Power Station

Report Date: 02-Feb-18

Lab ID: 18010005-004

Matrix: GROUNDWATER

Client Sample ID: MW10

Collection Date: 01/24/2018 16:59

Martin GROONDWATER						- 1/ 2010	10103	9 R242740 9 R242740 9 R242740 9 R242740 9 R242740 9 R242740 9 R242740 5 R242841 4 R242739 2 R242803 5 R242801 4 R242805 8 138377 8 138377 6 138377
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASU	REMENTS							
Depth to water from measuring	point *	0		52.00	ft	1	01/24/2018 16:59	R242740
STANDARD METHOD 4500	H B 2001 FIELD							
pН	*	1.00		7.01		1	01/24/2018 16:59	R242740
STANDARD METHODS 213	30 B FIELD							
Turbidity	*	1.0		9.5	NTU	1	01/24/2018 16:59	R242740
STANDARD METHODS 18T	H ED. 2680 B FIELD							
Oxidation-Reduction Potential	*	-300		50	mV	1	01/24/2018 16:59	R242740
STANDARD METHODS 251	0 B FIELD							
Conductivity	*	1		1490	μS/cm	1	01/24/2018 16:59	R242740
STANDARD METHODS 255	0 B FIELD							
Temperature	*	0		10.74	°C	1	01/24/2018 16:59	R242740
STANDARD METHODS 450	0-O G FIELD							
Oxygen, Dissolved	*	1.00		< 1.00	mg/L	1	01/24/2018 16:59	R242740
STANDARD METHODS 254	0 C (DISSOLVED) 199	7						
Total Dissolved Solids	NELAP	20		826	mg/L	1	01/26/2018 13:55	R242841
STANDARD METHODS 450	0-NO3 F (TOTAL) 200	0						
Nitrogen, Nitrate (as N)	NELAP	0.050		0.122	mg/L	1	01/25/2018 12:34	R242739
SW-846 9036 (TOTAL)								
Sulfate	NELAP	100		233	mg/L	10	01/26/2018 21:52	R242803
SW-846 9214 (DISSOLVED)								
Fluoride	NELAP	0.10		0.15	mg/L	1	01/26/2018 15:55	R242801
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		12	mg/L	1	01/26/2018 21:44	R242805
SW-846 3005A, 6020A, MET	TALS BY ICPMS (DISS	OLVED)						
Arsenic	NELAP	0.0010		< 0.0010	mg/L	5	01/25/2018 20:28	138377
Barium	NELAP	0.0010		0.0701	mg/L	5	01/25/2018 20:28	138377
Boron	NELAP	0.0250		0.108	mg/L	5	01/26/2018 12:26	138377
Iron	NELAP	0.025	J	0.011	mg/L	5	01/25/2018 20:28	138377
Manganese	NELAP	0.0010		0.0783	mg/L	5	01/25/2018 20:28	138377
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	01/25/2018 20:28	138377



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Client: Natural Resource Technology, Inc.

Work Order: 18010005

Client Project: Dynegy - Vermillion Power Station

Report Date: 02-Feb-18

Lab ID: 18010005-005

Client Sample ID: MW17

Matrix: GROUNDWATER Collection Date: 01/24/2018 11:51

Matrix: GROUNDY	VAILK			Conection	Date: 01/	24/2010	Conection Date: 01/24/2018 11.51				
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch			
FIELD ELEVATION MEAS	UREMENIS										
Depth to water from measuri	ng point *	0		38.98	ft	1	01/24/2018 11:51	R242740			
STANDARD METIIOD 450	0-II B 2001 FIELD										
pH	*	1.00		6.56		1	01/24/2018 11:51	R242740			
STANDARD METHODS 2	130 B FIELD										
Turbidity	*	1.0		7.7	NTU	1	01/24/2018 11:51	R242740			
STANDARD METHODS 18	TH ED. 2580 B FIELD										
Oxidation-Reduction Potentia	al *	-300		97	mV	1	01/24/2018 11:51	R242740			
STANDARD METHODS 25	10 B FIELD										
Conductivity	*	1		2490	μS/cm	1	01/24/2018 11:51	R242740			
STANDARD METHODS 25	550 B FIELD										
Temperature	*	0		9.97	°C	1	01/24/2018 11:51	R242740			
STANDARD METHODS 45	500-O G FIELD										
Oxygen, Dissolved	*	1.00		< 1.00	mg/L	1	01/24/2018 11:51	R242740			
STANDARD METHODS 25	540 C (DISSOLVED) 1997	7									
Total Dissolved Solids	NELAP	20		1630	mg/L	1	01/26/2018 13:56	R242841			
STANDARD METHODS 45	000-NO3 F (TOTAL) 200	0									
Nitrogen, Nitrate (as N)	NELAP	0.050	J	0.041	mg/L	1	01/25/2018 12:37	R242739			
SW-846 9036 (TOTAL)											
Sulfate	NELAP	500		976	mg/L	50	01/26/2018 22:00	R242803			
SW-846 9214 (DISSOLVE	D)										
Fluoride	NELAP	0.10		0.14	mg/L	1	01/26/2018 15:59	R242801			
SW-846 9251 (TOTAL)											
Chloride	NELAP	5		13	mg/L	1	01/26/2018 21:52	R242805			
SW-846 3005A, 6020A, MI	ETALS BY ICPMS (DISS	OLVED)									
Arsenic	NELAP	0.0010		0.0015	mg/L	5	01/25/2018 20:37	138377			
Barium	NELAP	0.0010		0.0286	mg/L	5	01/25/2018 20:37	138377			
Boron	NELAP	0.0250		2.25	mg/L	5	01/26/2018 12:34	138377			
Iron	NELAP	0.0250		1.66	mg/L	5	01/25/2018 20:37	138377			
Manganese	NELAP	0.0010		0.108	mg/L	5	01/25/2018 20:37	138377			
Selenium	NELAP	0.0010	J	0.0009	mg/L	5	01/25/2018 20:37	138377			



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Client: Natural Resource Technology, Inc.

Work Order: 18010005

Client Project: Dynegy - Vermillion Power Station

Report Date: 02-Feb-18

Lab ID: 18010005-006

Client Sample ID: MW18

Matrix: GROUNDWATER Collection Date: 01/24/2018 12:06

Matrix: GROUNDY	VATER			Conection	Date: 01/	24/2018	12:06	
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEAS	UREMENTS							
Depth to water from measuri	ng point *	0		27.80	ſl	1	01/24/2018 12.06	R242740
STANDARD METHOD 450	0-H B 2001 FIELD							
pll	*	1.00		6.55		1	01/24/2018 12:00	R242740
STANDARD METHODS 2	130 B FIELD							
Turbidity	*	1.0		< 1.0	NTU	1	01/24/2018 12:06	R242740
STANDARD METHODS 18	TH ED. 2580 B FIELD							
Oxidation-Reduction Potentia	al *	-300		79	mV	1	01/24/2018 12:06	R242740
STANDARD METHODS 25	510 B FIELD							
Conductivity	*	1		2700	µS/cm	1	01/24/2018 12:06	R242740
STANDARD METHODS 25	550 B FIELD							
Temperature	*	0		12.03	°C	1	01/24/2018 12:06	R242740
STANDARD METHODS 45	500-O G FIELD							
Oxygen, Dissolved	*	1.00		< 1.00	mg/L	1	01/24/2018 12:06	R242740
STANDARD METHODS 25	540 C (DISSOLVED) 199	7						
Total Dissolved Solids	NELAP	20		1590	mg/L	1	01/26/2018 13:56	R242841
STANDARD METHODS 45	500-NO3 F (TOTAL) 200	0						
Nitrogen, Nitrate (as N)	NELAP	0.050		< 0.050	mg/L	1	01/25/2018 12:39	R242739
SW-846 9036 (TOTAL)								
Sulfate	NELAP	200		749	mg/L	20	01/26/2018 22:21	R242803
SW-846 9214 (DISSOLVEI	D)							
Fluoride	NELAP	0.10		0.12	mg/L	1	01/26/2018 16:01	R242801
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		25	mg/L	1	01/26/2018 22:00	R242805
SW-846 3005A, 6020A, MI	ETALS BY ICPMS (DISS	OLVED)			7			
Arsenic	NELAP	0.0010		0.0013	mg/L	5	01/25/2018 20:45	138377
Barium	NELAP	0.0010		0.0171	mg/L	5	01/25/2018 20:45	138377
Boron	NELAP	0.0250		5.06	mg/L	5	01/26/2018 12:42	138377
Iron	NELAP	0.0250		0.0909	mg/L	5	01/25/2018 20:45	138377
Manganese	NELAP	0.0010		1.43	mg/L	5	01/25/2018 20:45	138377
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	01/25/2018 20:45	138377



http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 18010005

Client Project: Dynegy - Vermillion Power Station

Report Date: 02-Feb-18

Lab ID: 18010005-007

Client Sample ID: MW21

Matrix: GROUNDWATER Collection Date: 01/24/2018 15:55

The state of the s					Dute. 01/			
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUR	REMENTS							
Depth to water from measuring	point *	0		91.40	ft	1	01/24/2018 15:55	R242740
STANDARD METHOD 4500	H B 2001 FIELD							
pH	*	1.00		7.26		1	01/24/2018 15:55	R242740
STANDARD METHODS 213	0 B FIELD							
Turbidity	*	1.0		< 1.0	NTU	1	01/24/2018 15:55	R242740
STANDARD METHODS 18TH	H ED. 2580 B FIELD				,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			
Oxidation-Reduction Potential	*	-300		-53	mV	1	01/24/2018 15:55	R242740
STANDARD METHODS 2510	B FIELD							
Conductivity	*	1		843	μS/cm	1	01/24/2018 15:55	R242740
STANDARD METHODS 2550	B FIELD							
Temperature	*	0		11.58	°C	1	01/24/2018 15:55	R242740
STANDARD METHODS 4500	-O G FIELD							
Oxygen, Dissolved	*	1.00		< 1.00	mg/L	1	01/24/2018 15:55	R242740
STANDARD METHODS 2540	C (DISSOLVED) 199	7						
Total Dissolved Solids	NELAP	20		346	mg/L	1	01/26/2018 13:56	R242841
STANDARD METHODS 4500	-NO3 F (TOTAL) 200	0						
Nitrogen, Nitrate (as N)	NELAP	0.050	J	0.010	mg/L	1	01/25/2018 12:41	R242739
SW-846 9036 (TOTAL)								
Sulfate	NELAP	10		12	mg/L	1	01/26/2018 22:24	R242803
SW-846 9214 (DISSOLVED)								
Fluoride	NELAP	0.10		1.10	mg/L	1	01/26/2018 16:04	R242801
SW-846 9251 (TOTAL)								
Chloride	NELAP	5	J	2	mg/L	1	01/26/2018 22:22	R242805
SW-846 3005A, 6020A, MET.	ALS BY ICPMS (DISS	OLVED)						
Arsenic	NELAP	0.0010		0.0357	mg/L	5	01/25/2018 20:53	138377
Barium	NELAP	0.0010		0.101	mg/L	5	01/25/2018 20:53	138377
Boron	NELAP	0.0250		0.919	mg/L	5	01/26/2018 12:51	138377
Iron	NELAP	0.0250		0.418	mg/L	5	01/25/2018 20:53	138377
Manganese	NELAP	0.0010		0.111	mg/L	5	01/25/2018 20:53	138377
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	01/25/2018 20:53	138377



http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 18010005

Client Project: Dynegy - Vermillion Power Station

Report Date: 02-Feb-18

Lab ID: 18010005-009

Client Sample ID: MW3R

Matrix: GROUNDWATER Collection Date: 01/24/2018 14:48

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUR	EMENTS							
Depth to water from measuring p	point *	0		5.50	ft	1	01/24/2018 14:48	R242740
STANDARD METHOD 4500-H	H B 2001 FIFL D							*****
pH	*	1.00		6.95		1	01/24/2018 14:48	R242740
STANDARD METHODS 2130	B FIELD							
Turbidity	*	1.0		< 1.0	NTU	1	01/24/2018 14:48	R242740
STANDARD METHODS 18TH	ED. 2580 B FIELD							
Oxidation-Reduction Potential	*	-300		-58	mV	1	01/24/2018 14:48	R242740
STANDARD METHODS 2510	B FIELD							
Conductivity	*	1		1180	µS/cm	1	01/24/2018 14:48	R242740
STANDARD METHODS 2550	B FIELD							
Temperature	*	0		11.97	°C	1	01/24/2018 14:48	R242740
STANDARD METHODS 4500	-O G FIELD							
Oxygen, Dissolved	*	1.00		< 1.00	mg/L	1	01/24/2018 14:48	R242740
STANDARD METHODS 2540	C (DISSOLVED) 199	7						
Total Dissolved Solids	NELAP	20		542	mg/L	1	01/26/2018 13:57	R242841
STANDARD METHODS 4500	-NO3 F (TOTAL) 200	0						
Nitrogen, Nitrate (as N)	NELAP	0.050		0.053	mg/L	1	01/25/2018 12:45	R242739
SW-846 9036 (TOTAL)								
Sulfate	NELAP	50		55	mg/L	5	01/26/2018 22:32	R242803
SW-846 9214 (DISSOLVED)								
Fluoride	NELAP	0.10		0.48	mg/L	1	01/26/2018 16:07	R242801
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		26	mg/L	1	01/26/2018 22:25	R242805
SW-846 3005A, 6020A, META	ALS BY ICPMS (DISS	OLVED)						
Arsenic	NELAP	0.0010		0.0068	mg/L	5	01/25/2018 21:01	138377
Barium	NELAP	0.0010		0.162	mg/L	5	01/25/2018 21:01	
Boron	NELAP	0.0250		2.90	mg/L	5	01/26/2018 12:59	2.00
Iron	NELAP	0.0250		1.51	mg/L	5	01/25/2018 21:01	
Manganese	NELAP	0.0010		0.0369	mg/L	5	01/25/2018 21:01	
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	01/25/2018 21:01	138377



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Client: Natural Resource Technology, Inc.

Work Order: 18010005

Client Project: Dynegy - Vermillion Power Station

Report Date: 02-Feb-18

Lab ID: 18010005-010

Client Sample ID: MW4

Matrix: GROUNDWATER

Collection Date: 01/24/2018 13:34

Matrix: GROUNDY			Conection	Date: 01/	24/2010	13.34		
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEAS	UREMENTS							
Depth to water from measuring	ng point *	0		6.76	ft	1	01/24/2018 13:34	R242740
STANDARD METHOD 450	0-H B 2001 FIELD							
pH	*	1.00		6.91		1	01/24/2018 13:34	R242740
STANDARD METHODS 2	130 B FIELD							
Turbidity	*	1.0		< 1.0	NTU	1	01/24/2018 13:34	R242740
STANDARD METHODS 18	TH ED. 2580 B FIELD							
Oxidation-Reduction Potentia	al *	-300		2	mV	1	01/24/2018 13:34	R242740
STANDARD METHODS 25	510 B FIELD							
Conductivity	*	1		736	μS/cm	1	01/24/2018 13:34	R242740
STANDARD METHODS 25	550 B FIELD							
Temperature	*	0		10.08	°C	1	01/24/2018 13:34	R242740
STANDARD METHODS 45	500-O G FIELD							
Oxygen, Dissolved	*	1.00		< 1.00	mg/L	1	01/24/2018 13:34	R242740
STANDARD METHODS 25	540 C (DISSOLVED) 199	7						
Total Dissolved Solids	NELAP	20		338	mg/L	1	01/26/2018 13:57	R242841
STANDARD METHODS 45	500-NO3 F (TOTAL) 200	00						
Nitrogen, Nitrate (as N)	NELAP	0.050		< 0.050	mg/L	1	01/25/2018 12:55	R242739
SW-846 9036 (TOTAL)								
Sulfate	NELAP	10		32	mg/L	1	01/26/2018 22:35	R242803
SW-846 9214 (DISSOLVE)	D)							
Fluoride	NELAP	0.10		0.29	mg/L	1	01/26/2018 16:10	R242801
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		10	mg/L	1	01/26/2018 22:33	R242805
SW-846 3005A, 6020A, MI	ETALS BY ICPMS (DISS	OLVED)						
Arsenic	NELAP	0.0010		0.0052	mg/L	5	01/25/2018 21:10	138377
Barium	NELAP	0.0010		0.274	mg/L	5	01/25/2018 21:10	138377
Boron	NELAP	0.0250		5.48	mg/L	5	01/26/2018 13:07	138377
Iron	NELAP	0.0250		1.01	mg/L	5	01/25/2018 21:10	138377
Manganese	NELAP	0.0010		0.629	mg/L	5	01/25/2018 21:10	138377
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	01/25/2018 21:10	138377



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Client: Natural Resource Technology, Inc.

Work Order: 18010005

Client Project: Dynegy - Vermillion Power Station

Report Date: 02-Feb-18

Lab ID: 18010005-011

Client Sample ID: MW5

Matrix: GROUNDWA	ATER			Collection	Date: 01/	24/2018	14:25	
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASU	REMENTS							
Depth to water from measuring	point *	0		6.38	ft	1	01/24/2018 14:25	R242740
STANDARD METIIOD 4500-	-II B 2001 FIELD	***************************************						
pH	*	1.00		6.99		1	01/24/2018 14.25	R242740
STANDARD METHODS 213	30 B FIELD							
lurbidity	*	1.0		< 1.0	NIU	1	01/24/2018 14:25	R242740
STANDARD METHODS 18T	H ED. 2580 B FIELD							
Oxidation-Reduction Potential	*	-300		-35	mV	1	01/24/2018 14:25	R242740
STANDARD METHODS 251	0 B FIELD							
Conductivity	*	1		1050	μS/cm	1	01/24/2018 14:25	R242740
STANDARD METHODS 255	0 B FIELD							
Temperature	*	0		9.97	°C	1	01/24/2018 14:25	R242740
STANDARD METHODS 450	0-O G FIELD							
Oxygen, Dissolved	*	1.00		< 1.00	mg/L	1	01/24/2018 14:25	R242740
STANDARD METHODS 254	0 C (DISSOLVED) 199	7						
Total Dissolved Solids	NELAP	20		588	mg/L	1	01/26/2018 13:57	R242841
STANDARD METHODS 450	0-NO3 F (TOTAL) 200	00						
Nitrogen, Nitrate (as N)	NELAP	0.050		0.062	mg/L	1	01/25/2018 12:56	R242739
SW-846 9036 (TOTAL)								
Sulfate	NELAP	100		261	mg/L	10	01/26/2018 22:48	R242803
SW-846 9214 (DISSOLVED)								
Fluoride	NELAP	0.10		0.46	mg/L	1	01/26/2018 16:15	R242801
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		11	mg/L	1	01/26/2018 22:41	R242805
SW-846 3005A, 6020A, MET	TALS BY ICPMS (DISS	OLVED)						
Arsenic	NELAP	0.0010		< 0.0010	mg/L	5	01/25/2018 21:18	138377
Barium	NELAP	0.0010		0.0245	mg/L	5	01/25/2018 21:18	138377
Boron	NELAP	0.0250		18.3	mg/L	5	01/26/2018 13:15	138377
Iron	NELAP	0.0250		< 0.0250	mg/L	5	01/25/2018 21:18	138377
Manganese	NELAP	0.0010		0.362	mg/L	5	01/25/2018 21:18	138377
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	01/25/2018 21:18	138377



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Client: Natural Resource Technology, Inc.

Work Order: 18010005

Client Project: Dynegy - Vermillion Power Station

Report Date: 02-Feb-18

Lab ID: 18010005-012

Client Sample ID: MW6R

Matrix: GROUNDWATER Collection Date: 01/24/2018 13:55

Matrix. GROUNDWA	Concetion Bate: 01/24/2010 15:55							
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUR	REMENTS							
Depth to water from measuring	point *	0		5.15	ft	1	01/24/2018 13:55	R242740
STANDARD METHOD 4500-I	H B 2001 FIELD							
pH	*	1.00		6.76		1	01/24/2018 13:55	R242740
STANDARD METHODS 2130	0 B FIELD							
Turbidity	*	1.0		< 1.0	NTU	1	01/24/2018 13:55	R242740
STANDARD METHODS 18TH	ED. 2580 B FIELD							
Oxidation-Reduction Potential	*	-300		-69	mV	1	01/24/2018 13:55	R242740
STANDARD METHODS 2510	B FIELD							
Conductivity	*	1		1200	μS/cm	1	01/24/2018 13:55	R242740
STANDARD METHODS 2550	B FIELD							
Temperature	*	0		10.58	°C	1	01/24/2018 13:55	R242740
STANDARD METHODS 4500	-O G FIELD							
Oxygen, Dissolved	*	1.00		< 1.00	mg/L	1	01/24/2018 13:55	R242740
STANDARD METHODS 2540	C (DISSOLVED) 199	7						
Total Dissolved Solids	NELAP	20		578	mg/L	1	01/26/2018 13:58	R242841
STANDARD METHODS 4500	-NO3 F (TOTAL) 200	0						
Nitrogen, Nitrate (as N)	NELAP	0.050		< 0.050	mg/L	1	01/25/2018 12:59	R242739
SW-846 9036 (TOTAL)								
Sulfate	NELAP	50		103	mg/L	5	01/26/2018 22:56	R242803
SW-846 9214 (DISSOLVED)								
Fluoride	NELAP	0.10		0.13	mg/L	1	01/26/2018 16:19	R242801
SW-846 9251 (TOTAL)								-
Chloride	NELAP	5		7	mg/L	1	01/26/2018 22:49	R242805
SW-846 3005A, 6020A, META	ALS BY ICPMS (DISS	OLVED)						
Arsenic	NELAP	0.0010		< 0.0010	mg/L	5	01/25/2018 21:42	138377
Barium	NELAP	0.0010		0.0757	mg/L	6	01/25/2018 21:42	138377
Boron	NELAP	0.0250		0.166	mg/L	5	01/26/2018 14:22	138377
Iron	NELAP	0.0250		0.185	mg/L	5	01/25/2018 21:42	138377
Manganese	NELAP	0.0010		0.228	mg/L	5	01/25/2018 21:42	
Selenium	NELAP	0.0010		0.0027	mg/L	5	01/25/2018 21:42	138377



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Client: Natural Resource Technology, Inc.

Work Order: 18010005

Client Project: Dynegy - Vermillion Power Station

Report Date: 02-Feb-18

Lab ID: 18010005-013

Client Sample ID: MW8R

Matrix: GROUNDWATER Collection Date: 01/24/2018 15:05

The state of the s				A MARK CATAL	Markey Co. St. Co.	tent of the 1991 and the		
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUR	EMENTS							
Depth to water from measuring p	point *	0		12.74	ft	1	01/24/2018 15:05	R242740
STANDARD METIIOD 4500-I	I B 2001 FIELD							1 1
pH	*	1.00		6.88		1	01/24/2018 15:05	R242740
STANDARD METHODS 2130	B FIELD							
Turbidity	*	1.0		< 1.0	NTU	1	01/24/2018 15:05	R242740
STANDARD METHODS 18TH	ED. 2580 B FIELD							
Oxidation-Reduction Potential	*	-300		-20	mV	1	01/24/2018 15:05	R242740
STANDARD METHODS 2510	B FIELD							
Conductivity	*	1		1610	μS/cm	1	01/24/2018 15:05	R242740
STANDARD METHODS 2550	B FIELD							
Temperature	*	0		10.61	°C	1	01/24/2018 15:05	R242740
STANDARD METHODS 4500	-O G FIELD			3)1.300.11.300				
Oxygen, Dissolved	*	1.00		< 1.00	mg/L	1	01/24/2018 15:05	R242740
STANDARD METHODS 2540	C (DISSOLVED) 199	7						
Total Dissolved Solids	NELAP	20		1110	mg/L	1	01/26/2018 13:58	R242841
STANDARD METHODS 4500	-NO3 F (TOTAL) 200	0						
Nitrogen, Nitrate (as N)	NELAP	0.050		< 0.050	mg/L	1	01/25/2018 13:12	R242739
SW-846 9036 (TOTAL)								
Sulfate	NELAP	200		378	mg/L	20	01/29/2018 15:45	R242903
SW-846 9214 (DISSOLVED)								
Fluoride	NELAP	0.10	J	0.06	mg/L	1	01/26/2018 16:21	R242801
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		7	mg/L	1	01/29/2018 15:24	R242906
SW-846 3005A, 6020A, META	ALS BY ICPMS (DISS	OLVED)						
Arsenic	NELAP	0.0010		0.0134	mg/L	5	01/25/2018 21:51	138377
Barium	NELAP	0.0010		0.0684	mg/L	5	01/25/2018 21:51	138377
Boron	NELAP	0.0250		20.7	mg/L	5	01/26/2018 14:30	138377
Iron	NELAP	0.0250		1.03	mg/L	5	01/25/2018 21:51	
Manganese	NELAP	0.0010		0.343	mg/L	5	01/25/2018 21:51	
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	01/25/2018 21:51	138377



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Client: Natural Resource Technology, Inc.

Work Order: 18010005

Client Project: Dynegy - Vermillion Power Station

Report Date: 02-Feb-18

Lab ID: 18010005-014

Client Sample ID: MW9

Matrix: GROUNDWATER Collection Date: 01/24/2018 13:50

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIFLD FLEVATION MEASU	REMENTS							
Depth to water from measuring	point *	0		5.66	fl	1	01/24/2018 13:50	R242740



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Client: Natural Resource Technology, Inc.

Work Order: 18010005

Client Project: Dynegy - Vermillion Power Station

Report Date: 02-Feb-18

Lab ID: 18010005-015

Client Sample ID: MW19

Matrix: GROUNDWATER

Collection Date: 01/24/2018 13:55

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD FLEVATION MEASUREM	IENTS							
Depth to water from measuring poin	t *	0		6.28	ft	1	01/24/2018 13:55	R242740



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Client: Natural Resource Technology, Inc.

Work Order: 18010005

Client Project: Dynegy - Vermillion Power Station

Report Date: 02-Feb-18

Lab ID: 18010005-016

Client Sample ID: MW20

Matrix: GROUNDWATER

Collection Date: 01/24/2018 13:05

Matrix: GROUNDW	AILK			Conection	Date: 01/	24/2010	15.05	
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASU	JREMENTS							
Depth to water from measuring	g point *	0		14.36	ft	1	01/24/2018 13:05	R242740
STANDARD METHOD 4500	0-H B 2001 FIELD							
pH	*	1.00		6.66		1	01/24/2018 13:05	R242740
STANDARD METHODS 21	30 B FIELD							
Turbidity	•	1.0		< 1.0	NTU	1	01/24/2018 13:05	R242740
STANDARD METHODS 18	TH ED. 2580 B FIELD							
Oxidation-Reduction Potential	*	-300		0	mV	1	01/24/2018 13:05	R242740
STANDARD METHODS 25	10 B FIELD							
Conductivity	*	1		849	µS/cm	1	01/24/2018 13:05	R242740
STANDARD METHODS 25	50 B FIELD							
Temperature	*	0		10.95	°C	1	01/24/2018 13:05	R242740
STANDARD METHODS 450	00-O G FIELD							
Oxygen, Dissolved	*	1.00		< 1.00	mg/L	1	01/24/2018 13:05	R242740
STANDARD METHODS 254	40 C (DISSOLVED) 199	7					0.000,000	
Total Dissolved Solids	NELAP	20		366	mg/L	1	01/26/2018 13:58	R242841
STANDARD METHODS 45	00-NO3 F (TOTAL) 200	0						
Nitrogen, Nitrate (as N)	NELAP	0.050	J	0.010	mg/L	1	01/25/2018 13:14	R242739
SW-846 9036 (TOTAL)								
Sulfate	NELAP	20		73	mg/L	2	01/29/2018 15:53	R242903
SW-846 9214 (DISSOLVED	))							
Fluoride	NELAP	0.10	J	0.07	mg/L	1	01/26/2018 16:22	R242801
SW-846 9251 (TOTAL)								
Chloride	NELAP	5	J	4	mg/L	1	01/29/2018 15:45	R242906
SW-846 3005A, 6020A, ME	TALS BY ICPMS (DISS	OLVED)						
Arsenic	NELAP	0.0010	J	0.0005	mg/L	5	01/25/2018 21:59	138377
Barium	NELAP	0.0010		0.0192	mg/L	5	01/25/2018 21:59	138377
Boron	NELAP	0.0250		0.456	mg/L	5	01/29/2018 12:38	138377
Iron	NELAP	0.0250		0.316	mg/L	5	01/25/2018 21:59	138377
Manganese	NELAP	0.0010		0.0265	mg/L	5	01/25/2018 21:59	138377
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	01/25/2018 21:59	138377



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Client: Natural Resource Technology, Inc.

Work Order: 18010005

Client Project: Dynegy - Vermillion Power Station

Report Date: 02-Feb-18

Lab ID: 18010005-017

Client Sample ID: MW34

Matrix: GROUNDWATER Collection Date: 01/24/2018 12:38

THE RESERVE OF THE PARTY OF THE		1 4		THE THE PARTY	440000000000000000000000000000000000000	The state of the s		
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASU	JREMENIS							
Depth to water from measurin	g point *	0		15.15	ft	1	01/24/2018 12:38	R242740
STANDARD METHOD 4500	H B 2001 FIELD	***************************************	***************************************					
рН	<b>A</b>	1.00		6.58		1	01/24/2018 12.38	R242740
STANDARD METHODS 21	30 B FIELD							
Turbidity	*	1.0		33.4	NTU	1	01/24/2018 12:38	R242740
STANDARD METHODS 18	TH ED. 2580 B FIELD							
Oxidation-Reduction Potential	*	-300		-44	mV	1	01/24/2018 12:38	R242740
STANDARD METHODS 25	10 B FIELD							
Conductivity	*	1		1120	μS/cm	1	01/24/2018 12:38	R242740
STANDARD METHODS 25	50 B FIELD							
Temperature	*	0		10.87	°C	1	01/24/2018 12:38	R242740
STANDARD METHODS 450	00-O G FIELD					- "		
Oxygen, Dissolved	*	1.00		< 1.00	mg/L	1	01/24/2018 12:38	R242740
STANDARD METHODS 254	40 C (DISSOLVED) 199	7						
Total Dissolved Solids	NELAP	20		456	mg/L	1	01/26/2018 13:58	R242841
STANDARD METHODS 450	00-NO3 F (TOTAL) 200	0						
Nitrogen, Nitrate (as N)	NELAP	0.050		< 0.050	mg/L	1	01/25/2018 13:17	R242739
SW-846 9036 (TOTAL)	131							
Sulfate	NELAP	10		< 10	mg/L	1	01/29/2018 15:56	R242903
SW-846 9214 (DISSOLVED	)							
Fluoride	NELAP	0.10		0.61	mg/L	1	01/26/2018 16:24	R242801
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		33	mg/L	1	01/29/2018 15:54	R242906
SW-846 3005A, 6020A, ME	TALS BY ICPMS (DISS	OLVED)						
Arsenic	NELAP	0.0010		0.0233	mg/L	5	01/25/2018 22:07	138377
Barium	NELAP	0.0010		0.147	mg/L	5	01/25/2018 22:07	138377
Boron	NELAP	0.0250		0.557	mg/L	5	01/29/2018 12.46	138377
Iron	NELAP	0.0250		5.12	mg/L	5	01/25/2018 22:07	138377
Manganese	NELAP	0.0010		0.0618	mg/L	5	01/25/2018 22:07	2.4.4.4.6
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	01/25/2018 22:07	138377



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Client: Natural Resource Technology, Inc.

Work Order: 18010005

Client Project: Dynegy - Vermillion Power Station

Report Date: 02-Feb-18

Lab ID: 18010005-018

Client Sample ID: Field Blank

Matrix: GROUNDWATER Collection Date: 01/24/2018 15:39

MARIE GROOMEWA	VI LIV			v onvertor	Lines Of	Lyrord	Auto and	
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
STANDARD METHODS 254	0 C (DISSOLVED) 199	7						
Total Dissolved Solids	NELAP	20		< 20	mg/L	1	01/26/2018 13:59	R242841
STANDARD METHODS 450	0-NO3 F (TOTAL) 200	0						
Nitrogen, Nitrate (as N)	NELAP	0.050		< 0.050	mg/L	1	01/25/2018 13:21	R242739
SW-846 9036 (TOTAL)								
Sulfate	NELAP	10		< 10	mg/L	1	01/29/2018 16:00	R242903
SW-846 9214 (DISSOLVED)								
Fluoride	NELAP	0.10		< 0.10	mg/L	1	01/26/2018 16:25	R242801
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		< 5	mg/L	1	01/29/2018 15:59	R242906
SW-846 3005A, 6020A, MET	ALS BY ICPMS (DISS	OLVED)						
Arsenic	NELAP	0.0010		< 0.0010	mg/L	5	01/25/2018 22:15	138377
Barlum	NELAP	0.0010		< 0.0010	mg/L	5	01/25/2018 22:15	138377
Boron	NELAP	0.025	J	0.020	mg/L	5	01/26/2018 14:54	138377
Iron	NELAP	0.0250		< 0.0250	mg/L	5	01/25/2018 22:15	138377
Manganese	NELAP	0.0010		< 0.0010	mg/L	5	01/25/2018 22:15	138377
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	01/25/2018 22:15	138377



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Client: Natural Resource Technology, Inc.

Work Order: 18010005

Client Project: Dynegy - Vermillion Power Station

Report Date: 02-Feb-18

Lab ID: 18010005-019

Matrix: GROUNDWATER

Client Sample ID: DUP1

Collection Date: 01/24/2018 13:34

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Ratah
		, KL	Quai	Result	Units	DF	Date Analyzeu	Daten
FIELD ELEVATION MEASUR		0		0.70	4		04/04/04/0 0-00	10040740
Depth to water from measuring p		0		6.76	ft	1	01/24/2018 0:00	R242740
STANDARD METIIOD 4500 I	B 2001 FIELD	desc.		0.04				2010
pH	*	1.00		6.91		1	01/24/2018 13:34	R242740
STANDARD METHODS 2130	B FIELD							
Turbidity	*	1.0	-	< 1.0	NTU	1	01/24/2018 13:34	R242740
STANDARD METIIODS 18TH	ED. 2580 B FIELD							
Oxidation-Reduction Potential	*	-300		2	mV	1	01/24/2018 13:34	R242740
STANDARD METHODS 2510	B FIELD							
Conductivity	*	1		736	μS/cm	1	01/24/2018 13:34	R242740
STANDARD METHODS 2550	B FIELD							
Temperature	*	0		10.08	°C	1	01/24/2018 13:34	R242740
STANDARD METHODS 4500	O G FIFLD		- in					
Oxygen, Dissolved	*	1.00		< 1.00	mg/L	1	01/24/2018 13:34	R242740
STANDARD METHODS 2540	C (DISSOI VED) 199	7						
Total Dissolved Solids	NELAP	20		344	mg/L	1	01/26/2018 13:59	R242841
STANDARD METHODS 4500-	NO3 F (TOTAL) 200	0						
Nitrogen, Nitrate (as N)	NELAP	0.050		< 0.050	mg/L	1	01/25/2018 13:23	R242739
SW-846 9036 (TOTAL)	100							
Sulfate	NELAP	10		33	mg/L	1	01/29/2018 16:04	R242903
SW-846 9214 (DISSOLVED)								A SECON PARENCE
Fluoride	NELAP	0.10		0.26	mg/L	1	01/26/2018 16:27	R242801
SW-846 9251 (TOTAL)		2102						20-14-40
Chloride	NELAP	5		9	mg/L	1	01/29/2018 16:02	R242906
SW-846 3005A, 6020A, META					5-		0.120.2010 10102	1121200
Arsenic	NELAP	0.0010		0.0047	mg/L	5	01/25/2018 22:23	138377
Barium	NELAP	0.0010		0.252	mg/L	5	01/25/2018 22:23	120216
Boron	NELAP	0.0250	S	5.43	mg/L	5	01/26/2018 15.03	
Iron	NELAP	0.0250	0	1.01	mg/L	5	01/25/2018 13:03	
Manganese	NELAP	0.0230		0.582	mg/L	5	01/25/2018 22:23	
Selenium	NELAP	0.0010		< 0.0010	-	5	01/25/2018 22:23	
Seienium  Matrix spike control limits for B are				< 0.0010	mg/L	5	01/25/2016 22:23	1303//



http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 18010005

Client Project: Dynegy - Vermillion Power Station

Report Date: 02-Feb-18

Lab ID: 18010005-020

Client Sample ID: DUP2

Matrix: GROUNDWATER

Collection Date: 01/24/2018 13:55

Matrix: GROUNDW	MICK			Conection	Date: 01/	24/2010	13,33	
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIFLD FLEVATION MEAS	UREMENTS							
Depth to water from measuring	ng point *	0		5.15	ft	1	01/24/2018 0:00	R242740
STANDARD METHOD 450	0-H B 2001 FIELD							
pH	*	1.00		6.76		1	01/24/2018 13:55	R242740
STANDARD METHODS 2	130 B FIFLD							
Turbidity	*	1.0		< 1.0	NTU	1	01/24/2018 13:55	R242740
STANDARD METHODS 18	TH ED. 2580 B FIELD							
Oxidation-Reduction Potentia	d *	-300		-69	mV	1	01/24/2018 13:55	R242740
STANDARD METHODS 25	10 B FIELD							
Conductivity	*	1		1200	µS/cm	1	01/24/2018 13:55	R242740
STANDARD METHODS 25	50 B FIELD							
Temperature	*	0		10.58	°C	1	01/24/2018 13:55	R242740
STANDARD METHODS 45	00-O G FIELD							
Oxygen, Dissolved	*	1.00		< 1.00	mg/L	1	01/24/2018 13:55	R242740
STANDARD METHODS 25	40 C (DISSOLVED) 199	7						
Total Dissolved Solids	NELAP	20		586	mg/L	1	01/26/2018 13:59	R242841
STANDARD METHODS 45	00-NO3 F (TOTAL) 200	0						
Nitrogen, Nitrate (as N)	NELAP	0.050	J	0.016	mg/L	1	01/25/2018 13:25	R242739
SW-846 9036 (TOTAL)								
Sulfate	NELAP	100		115	mg/L	10	01/29/2018 16:47	R242903
SW-846 9214 (DISSOLVE)	0)							
Fluoride	NELAP	0.10		0.12	mg/L	1	01/26/2018 16:29	R242801
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		7	mg/L	1	01/29/2018 16:10	R242906
SW-846 3005A, 6020A, ME	TALS BY ICPMS (DISS	OLVED)						
Arsenic	NELAP	0.0010		< 0.0010	mg/L	5	01/25/2018 22:32	138377
Barium	NELAP	0.0010		0.0773	mg/L	5	01/25/2018 22:32	138377
Boron	NELAP	0.0250		0.206	mg/L	5	01/26/2018 15.11	1383//
Iron	NELAP	0.0250		0.189	mg/L	5	01/25/2018 22:32	138377
Manganese	NELAP	0.0010		0.228	mg/L	5	01/25/2018 22:32	
Selenium	NELAP	0.0010		0.0031	mg/L	5	01/25/2018 22:32	138377



# Sample Summary

http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 18010005

Client Project: Dynegy - Vermillion Power Station

Report Date: 02-Feb-18

Lab Sample ID	Client Sample ID	Matrix	Fractions	<b>Collection Date</b>
18010005 001	MW1	Groundwater	4	01/24/2018 15:33
18010005-002	MW2	Groundwater	4	01/24/2018 16:32
18010005-003	MW7	Groundwater	1	01/24/2018 0:00
18010005 004	MW10	Groundwater	4	01/24/2018 16:59
18010005-005	MW17	Groundwater	4	01/24/2018 11:51
18010005-006	MW18	Groundwater	4	01/24/2018 12:06
18010005-007	MW21	Groundwater	4	01/24/2018 15:55
18010005-008	TW1	Groundwater	1	01/24/2018 0:00
18010005-009	MW3R	Groundwater	4	01/24/2018 14:48
18010005-010	MW4	Groundwater	4	01/24/2018 13:34
18010005-011	MW5	Groundwater	4	01/24/2018 14:25
18010005-012	MW6R	Groundwater	4	01/24/2018 13:55
18010005-013	MW8R	Groundwater	4	01/24/2018 15:05
18010005-014	MW9	Groundwater	1	01/24/2018 13:50
18010005-015	MW19	Groundwater	1	01/24/2018 13:55
18010005-016	MW20	Groundwater	4	01/24/2018 13:05
18010005-017	MW34	Groundwater	4	01/24/2018 12:38
18010005-018	Field Blank	Groundwater	4	01/24/2018 15:39
18010005-019	DUP1	Groundwater	4	01/24/2018 13:34
18010005-020	DUP2	Groundwater	4	01/24/2018 13:55



http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Client Project: Dynegy - Vermillion Power Station

Work Order: 18010005 Report Date: 02-Feb-18

Sample ID	Client Sample ID	Collection Date	Received Date		
	Test Name			Prep Date/Time	Analysis Date/Time
18010005-001A	MWI	01/24/2018 15:33	01/25/2018 9:00		
	Field Elevation Measurements				01/24/2018 15:33
	Standard Method 4500-H B 2001 Field				01/24/2018 15:33
	Standard Methods 2130 B Field				01/24/2018 15:33
	Standard Methods 18th Ed. 2580 B Field				01/24/2018 15:33
	Standard Methods 2510 B Field				01/24/2018 15:33
	Standard Methods 2550 B Field				01/24/2018 15:33
	Standard Methods 4500-NO2 B (Total) 2000				01/25/2018 16:35
	Standard Methods 4500-O G Field				01/24/2018 15:33
	SW-846 9036 (Total)				01/26/2018 20:55
	SW-846 9251 (Total)				01/26/2018 20:47
18010005-001B	MW1	01/24/2018 15:33	01/25/2018 9:00		
	Standard Methods 2540 C (Dissolved) 1997				01/26/2018 13:54
	SW-846 9214 (Dissolved)				01/26/2018 15:52
18010005-001C	MWI	01/24/2018 15:33	01/25/2018 9:00		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			01/25/2018 9:46	01/25/2018 20:12
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			01/25/2018 9:46	01/26/2018 12:10
18010005-001D	MW1	01/24/2018 15:33	01/25/2018 9:00		34 94400
	Standard Methods 4500-NO3 F (Total) 2000				01/25/2018 12:19
18010005-002A	MW2	01/24/2018 16:32	01/25/2018 9:00		
	Field Elevation Measurements				01/24/2018 16:32
	Standard Method 4500-H B 2001 Field				01/24/2018 16:32
	Standard Methods 2130 B Field				01/24/2018 16:32
	Standard Methods 18th Ed. 2580 B Field				01/24/2018 16.32
	Standard Methods 2510 B Field				01/24/2018 16:32
	Standard Methods 2550 B Field				01/24/2018 16:32
	Standard Methods 4500-NO2 B (Total) 2000				01/25/2018 16:35
	Standard Methods 4500-O G Field				01/24/2018 16:32
	SW-846 9036 (Total)				01/26/2018 20:58
	SW-846 9251 (Total)				01/26/2018 21:06
18010005-002B	MW2	01/24/2018 16:32	01/25/2018 9:00		
	Standard Methods 2540 C (Dissolved) 1997				01/26/2018 13:54
	SW-846 9214 (Dissolved)				01/26/2018 15:53
18010005-002C	MW2	01/24/2018 16:32	01/25/2018 9:00		
	SW 846 3005A, 6020A, Metals by ICPMS (Dissolved)			01/25/2018 9:46	01/25/2018 20:20
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			01/25/2018 9:46	01/26/2018 12:18
18010005-002D	MW2	01/24/2018 16:32	01/25/2018 9:00	240000000000000000000000000000000000000	



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Client: Natural Resource Technology, Inc.
Client Project: Dynegy - Vermillion Power Station

Work Order: 18010005 Report Date: 02-Feb-18

Sample ID	Client Sample ID Test Name	Collection Date	Received Date	Prep Date/l'ime	Analysis Date/Time	
				Prep Date/11me		
CANALANA ANY	Standard Methods 4500-NO3 F (Total) 2000				01/25/2018 12:21	
18010005-004A	MW10	01/24/2018 16:59	01/25/2018 9:00			
	Field Elevation Measurements				01/24/2018 16:59	
	Standard Method 4500-H B 2001 Field				01/24/2018 16:59	
	Standard Methods 2130 B Field				01/24/2018 16:59	
	Standard Methods 18th Ed. 2580 B Field				01/24/2018 16:59	
	Standard Methods 2510 B Field				01/24/2018 16:59	
	Standard Methods 2550 B Field				01/24/2018 16:59	
	Standard Methods 4500-NO2 B (Total) 2000				01/25/2018 16:36	
	Standard Methods 4500-O G Field				01/24/2018 16:59	
	SW-846 9036 (Total)				01/26/2018 21:52	
	SW-846 9251 (Total)				01/26/2018 21:44	
8010005-004B	MW10	01/24/2018 16:59	01/25/2018 9:00			
	Standard Methods 2540 C (Dissolved) 1997				01/26/2018 13:55	
	SW-846 9214 (Dissolved)				01/26/2018 15:55	
8010005-004C	MW10	01/24/2018 16:59	01/25/2018 9:00			
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			01/25/2018 9:46	01/25/2018 20:28	
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			01/25/2018 9:46	01/26/2018 12:26	
18010005-004D	MW10	01/24/2018 16:59	01/25/2018 9:00	2 11000 1000 1000		
	Standard Methods 4500-NO3 F (Total) 2000				01/25/2018 12:34	
8010005-005A	MW17	01/24/2018 11:51	01/25/2018 9:00			
	Field Elevation Measurements				01/24/2018 11:51	
	Standard Method 4500-H B 2001 Field				01/24/2018 11:51	
	Standard Methods 2130 B Field				01/24/2018 11:51	
	Standard Methods 18th Ed. 2580 B Field				01/24/2018 11:51	
	Standard Methods 2510 B Field				01/24/2018 11:51	
	Standard Methods 2550 B Field				01/24/2018 11:51	
	Standard Methods 4500-NO2 B (Total) 2000				01/25/2018 16.36	
	Standard Methods 4500-O G Field				01/24/2018 11:51	
	SW-846 9036 (Total)				01/26/2018 22:00	
	SW-846 9251 (Total)				01/26/2018 21:52	
18010005-005B	MW17	01/24/2018 11:51	01/25/2018 9:00			
	Standard Methods 2540 C (Dissolved) 1997				01/26/2018 13:56	
	SW-846 9214 (Dissolved)				01/26/2018 15:59	
18010005-005C	MW17	01/24/2018 11:51	01/25/2018 9:00			
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			01/25/2018 9:46	01/25/2018 20:37	
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			9734 50350 5070 5075	01/26/2018 12:34	



http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 18010005

Client Project: Dynegy - Vermillion Power Station

Report Date: 02-Feb-18

ample ID	Client Sample ID	Collection Date	Received Date	Duran Date //mt	Analogia Decembra
	Test Name			Prep Date/Time	Analysis Date/Time
18010005-005D	MW17	01/24/2018 11:51	01/25/2018 9:00		
	Standard Methods 4500 NO3 F (Total) 2000				01/25/2018 12:37
18010005-006A	MW18	01/24/2018 12:06	01/25/2018 9:00		
	Field Elevation Measurements				01/24/2018 12:06
	Standard Method 4500-H B 2001 Field				01/24/2018 12:06
	Standard Methods 2130 B Field				01/24/2018 12:06
	Standard Methods 18th Ed. 2580 B Field				01/24/2018 12:06
	Standard Methods 2510 B Field				01/24/2018 12:06
	Standard Methods 2550 B Field				01/24/2018 12:06
	Standard Methods 4500-NO2 B (Total) 2000				01/25/2018 16:36
	Standard Methods 4500-O G Field				01/24/2018 12:06
	SW-846 9036 (Total)				01/26/2018 22:21
	SW-846 9251 (Total)				01/26/2018 22:00
18010005 006B	MW18	01/24/2018 12:06	01/25/2018 9:00		
	Standard Methods 2540 C (Dissolved) 1997				01/26/2018 13:56
	SW-846 9214 (Dissolved)				01/26/2018 16:01
18010005-006C	MW18	01/24/2018 12:06	01/25/2018 9:00		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			01/25/2018 9:46	01/25/2018 20:45
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			01/25/2018 9:46	01/26/2018 12:42
18010005-006D	MW18	01/24/2018 12:06	01/25/2018 9:00		
	Standard Methods 4500-NO3 F (Total) 2000				01/25/2018 12:39
18010005-007A	MW21	01/24/2018 15:55	01/25/2018 9:00		
	Field Elevation Measurements				01/24/2018 15:55
	Standard Method 4500-H B 2001 Field				01/24/2018 15:55
	Standard Methods 2130 B Field				01/24/2018 15:55
	Standard Methods 18th Ed. 2580 B Field				01/24/2018 15:55
	Standard Methods 2510 B Field				01/24/2018 15:55
	Standard Methods 2550 B Field				01/24/2018 15:55
	Standard Methods 4500-NO2 B (Total) 2000				01/25/2018 16:37
	Standard Methods 4500-O G Field				01/24/2018 15:55
	SW-846 9036 (Total)				01/26/2018 22:24
	SW-846 9251 (Total)				01/26/2018 22:22
18010005-007B	MW21	01/24/2018 15:55	01/25/2018 9:00		
	Standard Methods 2540 C (Dissolved) 1997				01/26/2018 13:56
	SW 846 9214 (Dissolved)				01/26/2018 16:04
18010005-007C	MW21	01/24/2018 15:55	01/25/2018 9:00		



## http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 18010005

Client Project: Dynegy - Vermillion Power Station

Report Date: 02-Feb-18

Sample ID	Client Sample ID	<b>Collection Date</b>	Received Date		
	Test Name			Prep Date/Time	Analysis Date/Time
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			01/25/2018 9:46	01/26/2018 12:51
8010005-007D	MW21	01/24/2018 15:55	01/25/2018 9:00		
	Standard Methods 4500 NO3 F (Total) 2000				01/25/2018 12:41
18010005-009A	MW3R	01/24/2018 14:48	01/25/2018 9:00		
	Field Elevation Measurements				01/24/2018 14:48
	Standard Method 4500-H B 2001 Field				01/24/2018 14:48
	Standard Methods 2130 B Field				01/24/2018 14:48
	Standard Methods 18th Ed. 2580 B Field				01/24/2018 14:48
	Standard Methods 2510 B Field				01/24/2018 14:48
	Standard Methods 2550 B Field				01/24/2018 14:48
	Standard Methods 4500-NO2 B (Total) 2000				01/25/2018 16:38
	Standard Methods 4500-O G Field				01/24/2018 14:48
	SW-846 9036 (Total)				01/26/2018 22:32
	SW-846 9251 (Total)				01/26/2018 22:25
18010005-009B	MW3R	01/24/2018 14:48	01/25/2018 9:00		
	Standard Methods 2540 C (Dissolved) 1997				01/26/2018 13:57
	SW-846 9214 (Dissolved)				01/26/2018 16:07
18010005-009C	MW3R	01/24/2018 14:48	01/25/2018 9:00		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			01/25/2018 9:46	01/25/2018 21:01
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			01/25/2018 9:46	01/26/2018 12:59
8010005-009D	MW3R	01/24/2018 14:48	01/25/2018 9:00	d supsitivity and the	
	Standard Methods 4500-NO3 F (Total) 2000				01/25/2018 12:45
18010005-010A	MW4	01/24/2018 13:34	01/25/2018 9:00		(23,21,002,33, 36,03)
	Field Elevation Measurements				01/24/2018 13:34
	Standard Method 4500-H B 2001 Field				01/24/2018 13:34
	Standard Methods 2130 B Field				01/24/2018 13:34
	Standard Methods 18th Ed. 2580 B Field				01/24/2018 13:34
	Standard Methods 2510 B Field				01/24/2018 13:34
	Standard Methods 2550 B Field				01/24/2018 13:34
	Standard Methods 2550 B (Total) 2000				01/25/2018 16:39
	Standard Methods 4500-O G Field				01/24/2018 13:34
	SW-846 9036 (Total)				01/26/2018 22:35
	SW-846 9251 (Total)				01/26/2018 22:33
18010005-010B	MW4	01/24/2018 13:34	01/25/2018 9:00		and and a say not had
0.000.000		and the second s			01/26/2019 12.57
	Standard Methods 2540 C (Dissolved) 1997 SW-846 9214 (Dissolved)				01/26/2018 13·57 01/26/2018 16:10
18010005-010C	SW-846 9214 (Dissolved) MW4	01/24/2018 13:34			01/20/2018 10:10



http://www.teklabinc.com/

Client: Natural Resource Technology, Inc. Work Order: 18010005

Client Project: Dynegy - Vermillion Power Station Report Date: 02-Feb-18

Sample ID	Client Sample ID	Collection Date	Received Date		
	Test Name		· · · · · · · · · · · · · · · · · · ·	Prep Date/Time	Analysis Date/Time
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			01/25/2018 9:46	01/25/2018 21:10
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			01/25/2018 9.46	01/26/2018 13.07
18010005-010D	MW4	01/24/2018 13:34	01/25/2018 9:00		
	Standard Methods 4500-NO3 F (Total) 2000				01/25/2018 12:55
18010005-011A	MW5	01/24/2018 14:25	01/25/2018 9.00		
	Field Elevation Measurements				01/24/2018 14:25
	Standard Method 4500-H B 2001 Field				01/24/2018 14:25
	Standard Methods 2130 B Field				01/24/2018 14:25
	Standard Methods 18th Ed. 2580 B Field				01/24/2018 14:25
	Standard Methods 2510 B Field				01/24/2018 14:25
	Standard Methods 2550 B Field				01/24/2018 14:25
	Standard Methods 4500-NO2 B (Total) 2000				01/25/2018 16:39
	Standard Methods 4500-O G Field				01/24/2018 14:25
	SW-846 9036 (Total)				01/26/2018 22:48
	SW-846 9251 (Total)				01/26/2018 22:41
18010005-011B	MW5	01/24/2018 14:25	01/25/2018 9:00		
	Standard Methods 2540 C (Dissolved) 1997				01/26/2018 13:57
	SW-846 9214 (Dissolved)				01/26/2018 16:15
18010005-011C	MW5	01/24/2018 14:25	01/25/2018 9:00		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			01/25/2018 9:46	01/25/2018 21:18
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			01/25/2018 9:46	01/26/2018 13:15
18010005-011D	MW5	01/24/2018 14:25	01/25/2018 9:00		
	Standard Methods 4500-NO3 F (Total) 2000				01/25/2018 12:56
18010005-012A	MW6R	01/24/2018 13:55	01/25/2018 9:00		
	Field Elevation Measurements				01/24/2018 13:55
	Standard Method 4500-H B 2001 Field				01/24/2018 13:55
	Standard Methods 2130 B Field				01/24/2018 13:55
	Standard Methods 18th Ed. 2580 B Field				01/24/2018 13:55
	Standard Methods 2510 B Field				01/24/2018 13:55
	Standard Methods 2550 B Field				01/24/2018 13:55
	Standard Methods 4500-NO2 B (Total) 2000				01/25/2018 16:40
	Standard Methods 4500-O G Field				01/24/2018 13:55
	SW-846 9036 (Total)				01/26/2018 22:56
	SW-846 9251 (Total)				01/26/2018 22:49
18010005-012B	MW6R	01/24/2018 13:55	01/25/2018 9:00		
	Standard Methods 2540 C (Dissolved) 1997				01/26/2018 13:58
	SW-846 9214 (Dissolved)				01/26/2018 16:19



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Client: Natural Resource Technology, Inc.

Work Order: 18010005

Client Project: Dynegy - Vermillion Power Station

Report Date: 02-Feb-18

Sample ID	Client Sample ID	Collection Date	Received Date		
	Test Name			Prep Date/Time	Analysis Date/Time
18010005-012C	MW6R	01/24/2018 13:55	01/25/2018 9:00		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			01/25/2018 9:46	01/25/2018 21:42
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			01/25/2018 9:46	01/26/2018 14.22
18010005-012D	MW6R	01/24/2018 13:55	01/25/2018 9:00		
	Standard Methods 4500-NO3 F (Total) 2000				01/25/2018 12:59
18010005-013A	MW8R	01/24/2018 15:05	01/25/2018 9:00		
	Field Elevation Measurements				01/24/2018 15;05
	Standard Method 4500-H B 2001 Field				01/24/2018 15:05
	Standard Methods 2130 B Field				01/24/2018 15:05
	Standard Methods 18th Ed. 2580 B Field				01/24/2018 15:05
	Standard Methods 2510 B Field				01/24/2018 15:05
	Standard Methods 2550 B Field				01/24/2018 15:05
	Standard Methods 4500-NO2 B (Total) 2000				01/25/2018 16:40
	Standard Methods 4500-O G Field				01/24/2018 15:05
	SW-846 9036 (Total)				01/29/2018 15:45
	SW-846 9251 (Total)				01/29/2018 15:24
18010005-013B	MW8R	01/24/2018 15:05	01/25/2018 9:00		
	Standard Methods 2540 C (Dissolved) 1997				01/26/2018 13:58
	SW-846 9214 (Dissolved)				01/26/2018 16:21
18010005-013C	MW8R	01/24/2018 15:05	01/25/2018 9:00		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			01/25/2018 9:46	01/25/2018 21:51
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			01/25/2018 9:46	01/26/2018 14:30
18010005-013D	MW8R	01/24/2018 15:05	01/25/2018 9:00		
	Standard Methods 4500-NO3 F (Total) 2000				01/25/2018 13:12
18010005-014A	MW9	01/24/2018 13:50	01/25/2018 9:00		
	Field Elevation Measurements				01/24/2018 13:50
18010005-015A	MW19	01/24/2018 13:55	01/25/2018 9:00		
	Field Elevation Measurements				01/24/2018 13:55
18010005-016A	MW20	01/24/2018 13:05	01/25/2018 9:00		
	Field Elevation Measurements				01/24/2018 13:05
	Standard Method 4500-H B 2001 Field				01/24/2018 13:05
	Standard Methods 2130 B Field				01/24/2018 13:05
	Standard Methods 18th Ed. 2580 B Field				01/24/2018 13:05
	Standard Methods 2510 B Field				01/24/2018 13:05
	Standard Methods 2550 B Field				01/24/2018 13:05
	Standard Methods 4500-NO2 B (Total) 2000				01/25/2018 16:40



http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 18010005

Client Project: Dynegy - Vermillion Power Station

Sample ID	Client Sample ID	Collection Date	Received Date	D /m:	
	Test Name		y a salamanyan	Prep Date/Time	Analysis Date/Time
	Standard Methods 4500 O G Field				01/24/2018 13:05
	SW-846 9036 (Total)				01/29/2018 15:53
	SW-846 9251 (Total)				01/29/2018 15:45
18010005-016B	MW20	01/24/2018 13:05	01/25/2018 9:00		
	Standard Methods 2540 C (Dissolved) 1997				01/26/2018 13:58
	SW-846 9214 (Dissolved)				01/26/2018 16:22
18010005-016C	MW20	01/24/2018 13:05	01/25/2018 9:00		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			01/25/2018 9:46	01/25/2018 21:59
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			01/25/2018 9:46	01/29/2018 12:38
18010005-016D	MW20	01/24/2018 13:05	01/25/2018 9:00		
	Standard Methods 4500-NO3 F (Total) 2000				01/25/2018 13:14
18010005-017A	MW34	01/24/2018 12:38	01/25/2018 9:00		
	Field Elevation Measurements				01/24/2018 12:38
	Standard Method 4500-H B 2001 Field				01/24/2018 12:38
	Standard Methods 2130 B Field				01/24/2018 12:38
	Standard Methods 18th Ed. 2580 B Field				01/24/2018 12:38
	Standard Methods 2510 B Field				01/24/2018 12:38
	Standard Methods 2550 B Field				01/24/2018 12:38
	Standard Methods 4500-NO2 B (Total) 2000				01/25/2018 16:41
	Standard Methods 4500-O G Field				01/24/2018 12:38
	SW-846 9036 (Total)				01/29/2018 15:56
	SW-846 9251 (Total)				01/29/2018 15:54
18010005-017B	MW34	01/24/2018 12:38	01/25/2018 9:00		
	Standard Methods 2540 C (Dissolved) 1997				01/26/2018 13:58
	SW-846 9214 (Dissolved)				01/26/2018 16:24
18010005-017C	MW34	01/24/2018 12:38	01/25/2018 9:00		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			01/25/2018 9:46	01/25/2018 22:07
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			01/25/2018 9:46	01/29/2018 12:46
18010005-017D	MW34	01/24/2018 12:38	01/25/2018 9:00	A Bullioned 14 (g)	
	Standard Methods 4500-NO3 F (Total) 2000				01/25/2018 13:17
18010005-018A	Field Blank	01/24/2018 15:39	01/25/2018 9:00		
	Standard Methods 4500-NO2 B (Total) 2000				01/25/2018 16:41
	SW-846 9036 (Total)				01/29/2018 16:00
	SW-846 9251 (Total)				01/29/2018 15:59
18010005-018B	Field Blank	01/24/2018 15:39	01/25/2018 9:00		3,127,2010 13,02
- 4 ( A B ) A B ( A B )		COLD HOUSE SELECT			01/26/2019 12:50
	Standard Methods 2540 C (Dissolved) 1997				01/26/2018 13:59



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Client: Natural Resource Technology, Inc.

Work Order: 18010005 Report Date: 02-Feb-18

Client Project: Dynegy - Vermillion Power Station

**Collection Date** Received Date Sample ID Client Sample ID Prep Date/Time Test Name Analysis Date/Time SW-846 9214 (Dissolved) 01/26/2018 16:25 18010005-018C Field Blank 01/24/2018 15:39 01/25/2018 9:00 SW 846 3005A, 6020A, Metals by ICPMS (Dissolved) 01/25/2018 22:15 01/25/2018 9:46 SW-846 3005A, 6020A, Metals by ICPMS (Dissolved) 01/25/2018 9:46 01/26/2018 14:54 18010005-018D 01/24/2018 15:39 01/25/2018 9:00 Field Blank Standard Methods 4500-NO3 F (Total) 2000 01/25/2018 13:21 18010005-019A DUP1 01/24/2018 13:34 01/25/2018 9:00 Field Elevation Measurements 01/24/2018 0:00 Standard Method 4500-H B 2001 Field 01/24/2018 13:34 Standard Methods 2130 B Field 01/24/2018 13:34 Standard Methods 18th Ed. 2580 B Field 01/24/2018 13:34 Standard Methods 2510 B Field 01/24/2018 13:34 Standard Methods 2550 B Field 01/24/2018 13:34 Standard Methods 4500-NO2 B (Total) 2000 01/25/2018 16:42 Standard Methods 4500-O G Field 01/24/2018 13:34 SW-846 9036 (Total) 01/29/2018 16:04 01/29/2018 16:02 SW-846 9251 (Total) 18010005-019B DUP1 01/24/2018 13:34 01/25/2018 9:00 Standard Methods 2540 C (Dissolved) 1997 01/26/2018 13:59 SW-846 9214 (Dissolved) 01/26/2018 16:27 18010005-019C DUP1 01/24/2018 13:34 01/25/2018 9:00 01/25/2018 22:23 SW-846 3005A, 6020A, Metals by ICPMS (Dissolved) 01/25/2018 9:46 SW-846 3005A, 6020A, Metals by ICPMS (Dissolved) 01/25/2018 9:46 01/26/2018 15:03 18010005-019D DUP1 01/24/2018 13:34 01/25/2018 9:00 Standard Methods 4500-NO3 F (Total) 2000 01/25/2018 13:23 18010005-020A DUP2 01/24/2018 13:55 01/25/2018 9:00 Field Elevation Measurements 01/24/2018 0:00 Standard Method 4500-H B 2001 Field 01/24/2018 13:55 Standard Methods 2130 B Field 01/24/2018 13:55 Standard Methods 18th Ed. 2580 B Field 01/24/2018 13:55 Standard Methods 2510 B Field 01/24/2018 13:55 Standard Methods 2550 B Field 01/24/2018 13:55 Standard Methods 4500-NO2 B (Total) 2000 01/25/2018 16:43 Standard Methods 4500-O G Field 01/24/2018 13:55 SW-846 9036 (Total) 01/29/2018 16:47 01/29/2018 16:10 SW-846 9251 (Total) 01/25/2018 9:00 18010005-020B DUP<sub>2</sub> 01/24/2018 13:55



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Client: Natural Resource Technology, Inc.

Work Order: 18010005

Client Project: Dynegy - Vermillion Power Station

Report Date: 02-Feb-18

Sample ID	Client Sample ID	Collection Date	Received Date		
	Test Name			Prep Date/Ilme	Analysis Date/I ime
	Standard Methods 2540 C (Dissolved) 1997				01/26/2018 13:59
	SW-846 9214 (Dissolved)				01/26/2018 16:29
18010005-020C	DUP2	01/24/2018 13:55	01/25/2018 9:00		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			01/25/2018 9:46	01/25/2018 22:32
	SW 846 3005A, 6020A, Metals by ICPMS (Dissolved)			01/25/2018 9:46	01/26/2018 15:11
18010005-020D	DUP2	01/24/2018 13:55	01/25/2018 9:00		
	Standard Methods 4500-NO3 F (Total) 2000				01/25/2018 13:25



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Client: Natural Resource Technology, Inc.

Work Order: 18010005

Client Project: Dynegy - Vermillion Power Station

D I I D242740 CompType	1.00	Units							
Batch R242740 SampType: SampID: LCS-R242740	LCS	Units							Date
Analyses	RI.	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
pH	1.0	00	7.00	7.000	0	100.0	99.1	100.9	01/24/2018
STANDARD METHODS 2510 E	3 FIELD								
Batch R242740 SampType: SampID: LCS-R242740	LCS	Units µmhos	/cm						Date
Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Conductivity		1	1410	1412	0	99.9	90	110	01/24/2018
STANDARD METHODS 2540 (	(DISSOLVE	ED) 1997							
Batch R242841 SampType: SampID: MBLK	MBLK	Units mg/L							Date
Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Total Dissolved Solids	2	20 J	16						01/26/2018
Total Dissolved Solids		20	< 20						01/26/201
Total Dissolved Solids	2	20 J	16						01/26/201
Batch R242841 SampType: SampID: LCS	LCS	Units mg/L							Date
Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Total Dissolved Solids	2	20	930	1000	0	93.0	90	110	01/26/201
Batch R242841 SampType: SampID: LCSQC	LCSQC	Units mg/L					- 6 7		Date
Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Total Dissolved Solids	2	20	930	1000	0	93.0	90	110	01/26/201
Total Dissolved Solids	.2	20	960	1000	0	96.0	90	110	01/26/201
Batch R242841 SampType: SampID: 18010005-007BMS	MS	Units mg/L							Date
Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Total Dissolved Solids	2	20	868	500.0	346.0	104.4	85	115	01/26/201
Batch R242841 SampType: SampID: 18010005-007BMSD	MSD	Units mg/L					RPD	Limit 5	Date
Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref	Val %RPD	Analyzed
Total Dissolved Solids		20		500.0	346.0	105.2	868.0	0.46	01/26/201
Batch R242841 SampType: SampID: 18010005-018BDUP	DUP	Units mg/L					RPD	) Limit 5	Date
					SPK Ref Val	21-12		Val %RPD	Analyze



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Client: Natural Resource Technology, Inc.

Work Order: 18010005

Client Project: Dynegy - Vermillion Power Station

Batch R242754	SampType:	MBLK		Units mg/L							
SampID: MBLK											Date
Analyses			KL	Qual	Result Sp	oike	SPK Ref Val	%REC	Low Limit	Fligh Limit	Analyzed
Nitrogen, Nitrite (as	N)		0.05		< 0.05 0.02	2500	0	0	100	100	01/25/2018
Nitrogen, Nitrite (as	N)		0.05		< 0.05 0.02	2500	0	0	-100	100	01/25/2018
Batch R242754 SampID: LCS	SampType:	LCS		Units mg/L							Date
Analyses			RL	Qual	Result Sp	oike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Nitrogen, Nitrite (as	N)		0.25		0.84 0.89	950	0	94.4	90	110	01/25/2018
Nitrogen, Nitrite (as	N)		0.25		<b>0.84</b> 0.89	950	0	94.4	90	110	01/25/2018
Batch R242754 SampID: 18010005-0	SampType: 09AMS	MS		Units mg/L							Date
Analyses			RL	Qual	Result Sp	oike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Nitrogen, Nitrite (as	N)		0.05	S	0.61 0.50		0	121.8	85	115	01/25/2018
Batch R242754 SamplD: 18010005-0	SampType: 09AMSD	MSD		Units mg/L					RPD	Limit 10	Date
Analyses			RL	Oual	Result Sn	nike	SPK Ref Val	%REC	RPD Ref \	/al %RPD	Analyzed
Nitrogen, Nitrite (as	N)		0.05	S	0.60 0.50	_	0	119.8	0.6090	1.66	01/25/2018
Batch R242754 SampID: 18010005-0	SampType: 20AMS	MS		Units mg/L							Date
Analyses			RL	Qual	Result Sp	oike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Nitrogen, Nitrite (as	N)		0.05	S	0.59 0.50	000	0	118.4	85	115	01/25/2018
Batch R242754 SampID: 18010005-0	SampTypo: 20AMSD	MSD		Units mg/L					RPD	Limit 10	Date
Analyses			RL	Qual	Result Sr	nike	SPK Ref Val	%REC	RPD Ref \	/al %RPD	Analyzed
Nitrogen, Nitrite (as	N)		0.05	S	0.61 0.5		0	121.4	0.5920	2.50	01/25/2018
STANDARD METHO	DDS 4500-N	103 F (1	TOTAL)	2000	inst.						
	SampType:			Units mg/L			Colonia Inter				Date
Analyses			RL	Qual			SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Nitrogen, Nitrate-Nit	trite (as N)		0.050		< 0.050 0.01	1000	0	0	-100	100	01/25/2018
Batch R242739 SampID: ICV/LCS	SampType:	LCS		Units mg/L							Date
Analyses			RL	Qual	Result Sp	oike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
	trite (as N)		1.00		9.21 8.5		0	107.5	90	110	01/25/2018



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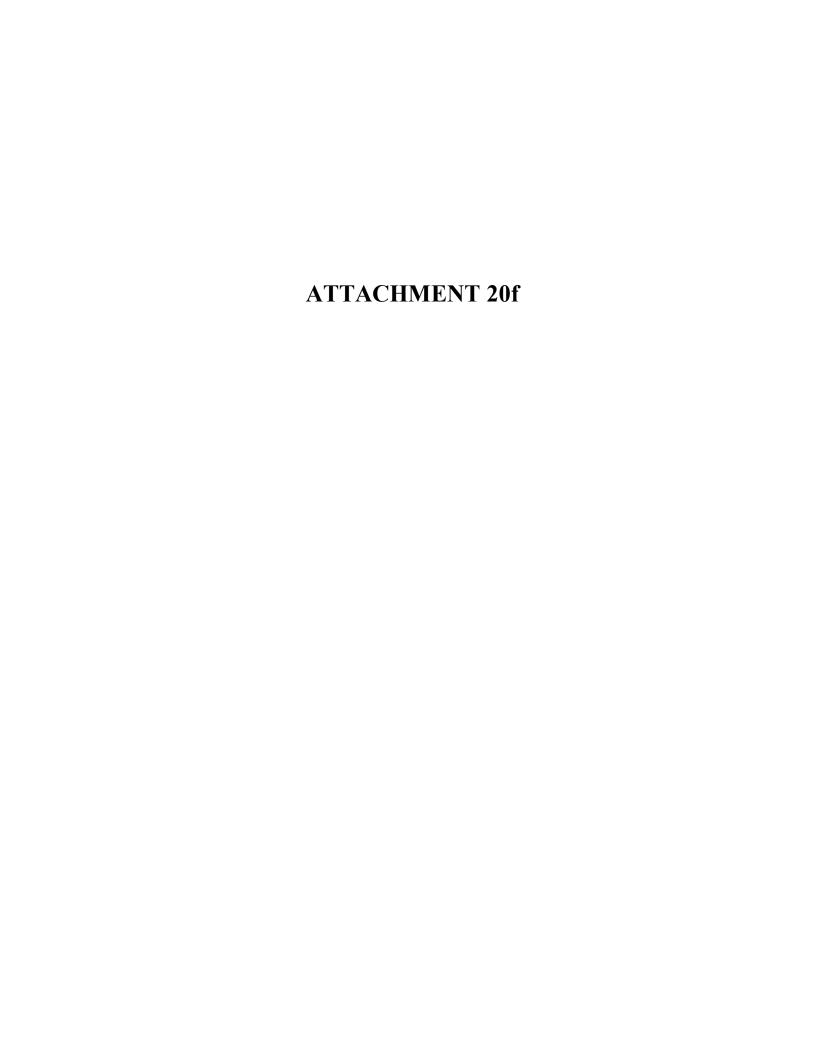
Client: Natural Resource Technology, Inc.

Work Order: 18010005

Client Project: Dynegy - Vermillion Power Station

Batch R242739 SampTy	pe: MS		Units mg/L							
SampID: 18010005-009DMS										Date
Analyses		KL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Nitrogen, Nitrate Nitrite (as I	N)	0.050		0.322	0.2500	0.05300	107.6	85	115	01/25/2018
Batch R242739 SampTy	pe: MSD		Units mg/L					RPD	Limit 10	
SampID: 18010005-009DMSI	)									Date
Analyses		RL	Qual			SPK Ref Val	%REC	RPD Ref V	'al %RPD	Analyzed
Nitrogen, Nitrate-Nitrite (as I	N)	0.050		0.310	0.2500	0.05300	102.8	0.3220	3.80	01/25/2018
SW-846 9036 (TOTAL)										
Batch R242803 SampTy SampID: ICB/MBLK	pe: MBLK		Units mg/L							Date
Analyses		RI.	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Sulfate		10		< 10	11-11-11-11-11-11-11-11-11-11-11-11-11-					01/26/2018
Batch R242803 SampTy SampID: ICV/LCS	pe: LCS		Units mg/L							Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Sulfate		10		19	20.00	0	94.7	90	110	01/26/2018
Batch R242803 SampTy SampID: 18010005-002AMS	/pe: MS		Units mg/L							Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Sulfate		10			10.00	19.49	93.8	85	115	01/26/2018
Batch R242803 SampTy SampID: 18010005-002AMSI	/pe: MSD		Units mg/L					RPD	Limit 10	Date
Analyses		RL	Oual	Result	Spike	SPK Ref Val	%REC	RPD Ref \	/al %RPD	Analyzed
Sulfate		10	Quui		10.00	19.49	91.3	28.87	0.87	01/26/2018
Batch R242903 SampTy SampID: ICB/MBLK	/pe: MBLK		Units mg/L				255			Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Sulfate		10		< 10						01/29/2018
Batch R242903 SampTy SampID: ICV/LCS	/pe: LCS		Units mg/L							Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Sulfate		10	-		20.00	0	92.8	90	110	01/29/2018

The follow	ving are attach	nments to the	testimony o	of Andrew Rehi





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Client: Natural Resource Technology, Inc.

Work Order: 18010005

Client Project: Dynegy - Vermillion Power Station

Batch R242801 SampID: MBLK	SampType:	MBLK		Units mg/L							Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%RLC	Low Limit	High Limit	Analyzed
Fluoride			0.10		< 0.10		2 30020				01/26/2018
Batch R242801 SampID: LCS	SampType:	LCS		Units mg/L							Date
Analyses			RL	Qual	21 1		SPK Rof Val	OL AND THE RESERVE	The second second	High Limit	Analyzed
Fluoride			0.10		0.90	1.000	0	90.2	90	110	01/26/2018
Batch R242801 SampID: 18010005-	SampType: 007BMS	MS		Units mg/L					- 000		Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Fluoride			0.10		3.13	2.000	1.099	101.6	85	115	01/26/2018
Batch R242801 SampID: 18010005-	SampType: 007BMSD	MSD		Units mg/L					RPD	Limit 10	Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref \	/al %RPD	Analyzed
Fluoride			0.10			2.000	1.099	107.6	3.132	3.70	01/26/2018
Batch R242801 SampID: 18010005- Analyses	SampType: 011BMS	MS	RL	Units mg/L Qual	Dagult	Snika	SPK Ref Val	%REC	I ow Limit	High Limit	Date Analyzed
Fluoride			0.10	Quai		2.000	0.4610	97.0	85	115	01/26/2018
							The Assistance				3477.3372.35
Batch R242801 SampID: 18010005-	SampType: 011BMSD	MSD		Units mg/L					RPD	Limit 10	Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref \	/al %RPD	Analyzed
Fluoride			0.10		2.49	2.000	0.4610	101.6	2.401	3.72	01/26/2018
SW-846 9251 (TOT	AL)									<del></del>	
Batch R242805 SampID: ICB/MBLK	SampType:	MBLK		Units mg/L							Date
Analyses			RI.	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Chloride			5		< 5	3.00				5400 1771	01/26/2018
Batch R242805 SampID: ICV/LCS	SampType:	LCS		Units mg/L							Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Chloride			5			20.00	0	101.2	90	110	01/26/2018



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Client: Natural Resource Technology, Inc.

Work Order: 18010005

Client Project: Dynegy - Vermillion Power Station

SW-846 9251 (TOTAL)											
Batch R242805 Sam SampID: 18010005-002Al	pType: MS	MS		Units mg/L							Date
Analyses			RI.	Qual	Result	Spike	EPK Itel Val	WREC	Low Limit	High Limit	Analyzed
Chloride			10			40.00	45.05	89.8	85	115	01/26/2018
Batch R242805 Sam	pType:	MSD		Units mg/L				- II A STATE OF THE STATE OF TH	RPD	Limit 15	
SampID: 18010005-002Al	MSD										Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref V	/al %RPD	Analyzed
Chloride			10		82	40.00	45.05	92.6	80.98	1.34	01/26/2018
Batch R242906 Sam SampID: ICB/MBLK	рТуре:	MBLK		Units mg/L							Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Chloride			5		< 5						01/29/2018
Batch R242906 Sam SampID: ICV/LCS	рТуре:	LCS		Units mg/L							Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Chloride			5			20.00	0	101.0	90	110	01/29/2018
SW-846 3005A, 6020A,	METAL	SBYI	CPMS (I	DISSOLVED)							
Batch 138377 Sam SampID: MBLK-138377	рТуре:	MBLK		Units mg/L							Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Arsenic			0.0010		< 0.0010			0	-100	100	01/25/2018
Barium			0.0010		< 0.0010	0.001000	0	0	-100	100	01/25/2018
Boron			0.0250		< 0.0250	0.02500	0	0	-100	100	01/26/2018
Iron			0.0250	J	0.0096	0 02500	0	38 4	-100	100	01/25/2018
Manganese			0.0010		< 0.0010	0.001000	U	O	-100	100	01/25/2018
Selenium			0.0010		< 0.0010	0.001000	0	0	-100	100	01/25/2018
<b>Batch 138377 Sam</b> SampID: LCS-138377	ірТуре:	LCS		Units mg/L							Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Arsenic			0.0010			0.5000	0	93.9	80	120	01/25/2018
Barium			0.0010		1.88	2.000	0	94.2	80	120	01/25/2018
Boron			0.0250			0.5000	0	94.0	80	120	01/25/2018
			0.0250		1 74	2.000	0	87.2	80	120	01/25/2018
Iron			0.0230		1.74	2.000		01.2	00	120	01/20/2010
Iron Manganese			0.0230			0.5000	0	95.9	80	120	01/25/2018



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Client: Natural Resource Technology, Inc.

Work Order: 18010005

Client Project: Dynegy - Vermillion Power Station

			CI IVIS (I	DISSOLVED)							
Batch 138377 SampID: 1801000	SampType:	MS		Units mg/L							(2.1.)
#0.000mmma. 4640-150-5	05-002CIVIS										Date Analyzed
Analyses			RL	Qual	***************************************		SPK Ref Val			High Limit	
Arsenic			0.0010			0.5000	0.009688	95.8	75	125	01/25/201
Barlum			0.0010			2.000	0.1737	94.6	75	125	01/25/201
Boron			0.0250			0.5000	0.3375	95.6	75	125	01/26/201
Iron			0.0250		1.95	2.000	0.2448	85.5	75	125	01/25/201
Manganese			0.0010		0.555	0.5000	0.08113	94.8	75	125	01/25/201
Selenium			0.0010		0.423	0.5000	0	84.7	75	125	01/25/201
Batch 138377	SampType:	MSD		Units mg/L					RPD	Limit 20	
SampID: 1801000	05-002CMSD										Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref \	/al %RPD	Analyzed
Arsenic			0.0010			0.5000	0.009688	93.4	0.4888	2.52	01/25/201
Barium			0.0010		2.03	2.000	0.1737	92.6	2.065	1.92	01/25/201
Boron			0.0250		0.786	0.5000	0.3375	89.6	0.8158	3.77	01/26/201
Iron			0.0250		1.90	2.000	0.2448	82.8	1.954	2.81	01/25/201
Manganese			0.0010		0.541	0.5000	0.08113	92.0	0.5551	2.51	01/25/201
Selenium			0.0010		0.417	0.5000	0	83 3	0 4235	1 62	01/25/201
de odo tingaya											
Batch 138377	SampType:	MS		Units mg/L						3,444	
3-013-1113-11	있는 물건들은 경기를 하다고	MS		Units mg/L							Date
Batch 138377 SampID: 1801000	있는 물건들은 경기를 하다고	MS	RL		Result		SPK Ref Val	%REC	Low Limit	High Limit	Date
Batch 138377	있는 물건들은 경기를 하다고	MS	RL 0.0010	Units mg/L Qual			SPK Ref Val 0.004707	%REC 93.1	Low Limit	High Limit	Date Analyzed
Batch 138377 SampID: 1801000 Analyses	있는 물건들은 경기를 하다고	MS			0.470	Spike					Date Analyzeo 01/25/201
Batch 138377 SampID: 1801000 Analyses Arsenic	있는 물건들은 경기를 하다고	MS	0.0010		0.470 2.11	Spike 0.5000 2.000	0.004707	93.1	75	125	Date Analyzec 01/25/201 01/25/201
Batch 138377 SampID: 1801000 Analyses Arsenic Barium	있는 물건들은 경기를 하다고	MS	0.0010 0.0010	Qual	0.470 2.11 5.65	Spike 0.5000	0.004707 0.2522	93.1 92.7	75 75	125 125	Date Analyzed 01/25/201 01/25/201 01/26/201
Batch 138377 SamplD: 1801000 Analyses Arsenic Barium Boron Iron	있는 물건들은 경기를 하다고	MS	0.0010 0.0010 0.0250 0.0250	Qual	0.470 2.11 5.65 2.60	Spike 0.5000 2.000 0.5000 2.000	0.004707 0.2522 5.426 1.011	93.1 92.7 44.8 79.3	75 75 75	125 125 125	Date Analyzed 01/25/201 01/25/201 01/26/201 01/25/201
Batch 138377 SampID: 1801000 Analyses Arsenic Barium Boron	있는 물건들은 경기를 하다고	MS	0.0010 0.0010 0.0250	Qual	0.470 2.11 5.65 2.60 1.04	Spike 0.5000 2.000 0.5000	0.004707 0.2522 5.426	93.1 92.7 44.8	75 75 75 75	125 125 125 125	
Batch 138377 SamplD: 1801000 Analyses Arsenic Barium Boron Iron Manganese	있는 물건들은 경기를 하다고		0.0010 0.0010 0.0250 0.0250 0.0010	Qual	0.470 2.11 5.65 2.60 1.04	Spike 0.5000 2.000 0.5000 2.000 0.5000	0.004707 0.2522 5.426 1.011 0.5816	93.1 92.7 44.8 79.3 91.5	75 75 75 75 75 75	125 125 125 125 125	Date Analyzec 01/25/201 01/25/201 01/26/201 01/25/201 01/25/201
Batch 138377 SamplD: 1801000 Analyses Arsenic Barium Boron Iron Manganese Selenium	SampType:		0.0010 0.0010 0.0250 0.0250 0.0010	Qual S	0.470 2.11 5.65 2.60 1.04	Spike 0.5000 2.000 0.5000 2.000 0.5000	0.004707 0.2522 5.426 1.011 0.5816	93.1 92.7 44.8 79.3 91.5	75 75 75 75 75 75	125 125 125 125 125 125 125	Date Analyzed 01/25/201 01/25/201 01/26/201 01/25/201 01/25/201
Batch 138377 SampID: 1801000 Analyses Arsenic Barium Boron Iron Manganese Selenium  Batch 138377 SampID: 1801000	SampType:		0.0010 0.0010 0.0250 0.0250 0.0010 0.0010	Qual S Units mg/L	0.470 2.11 5.65 2.60 1.04 0.462	Spike 0.5000 2.000 0.5000 2.000 0.5000 0.5000	0.004707 0.2522 5.426 1.011 0.5816 0	93.1 92.7 44.8 79.3 91.5 92.4	75 75 75 75 75 75 75	125 125 125 125 125 125 125	Date Analyzed 01/25/201 01/25/201 01/26/201 01/25/201 01/25/201
Batch 138377 SampID: 1801000 Analyses Arsenic Barium Boron Iron Manganese Selenium  Batch 138377	SampType:		0.0010 0.0010 0.0250 0.0250 0.0010	Qual S	0.470 2.11 5.65 2.60 1.04 0.462	Spike 0.5000 2.000 0.5000 2.000 0.5000 0.5000	0.004707 0.2522 5.426 1.011 0.5816	93.1 92.7 44.8 79.3 91.5 92.4	75 75 75 75 75 75 75	125 125 125 125 125 125 125 125	Date Analyzed 01/25/201 01/25/201 01/26/201 01/25/201 01/25/201
Batch 138377 SampID: 1801000 Analyses Arsenic Barium Boron Iron Manganese Selenium  Batch 138377 SampID: 1801000 Analyses Arsenic	SampType:		0.0010 0.0010 0.0250 0.0250 0.0010 0.0010	Qual S Units mg/L	0.470 2.11 5.65 2.60 1.04 0.462 Result	Spike 0.5000 2.000 0.5000 2.000 0.5000 0.5000	0.004707 0.2522 5.426 1.011 0.5816 0 SPK Ref Val	93.1 92.7 44.8 79.3 91.5 92.4 %REC 94.5	75 75 75 75 75 75 75 RPD	125 125 125 125 125 125 125 0 Limit 20	Date Analyzed 01/25/201 01/25/201 01/26/201 01/25/201 01/25/201 Date Analyzed
Batch 138377 SampID: 1801000 Analyses Arsenic Barium Boron Iron Manganese Selenium  Batch 138377 SampID: 1801000 Analyses Arsenic Barium	SampType:		0.0010 0.0010 0.0250 0.0250 0.0010 0.0010 RL 0.0010 0.0010	Qual S Units mg/L	0.470 2.11 5.65 2.60 1.04 0.462 Result 0.477 2.13	Spike 0.5000 2.000 0.5000 2.000 0.5000 0.5000  Spike 0.5000 2.000	0.004707 0.2522 5.426 1.011 0.5816 0 SPK Ref Val 0.004707 0.2522	93.1 92.7 44.8 79.3 91.5 92.4 %REC 94.5 93.7	75 75 75 75 75 75 75 RPD Ref V 0.4703 2.107	125 125 125 125 125 125 125 125 125 125	Date Analyzed 01/25/201 01/25/201 01/25/201 01/25/201 01/25/201 Date Analyzed 01/25/201
Batch 138377 SampID: 1801000 Analyses Arsenic Barium Boron Iron Manganese Selenium  Batch 138377 SampID: 1801000 Analyses Arsenic Barium Boron	SampType:		0.0010 0.0010 0.0250 0.0250 0.0010 0.0010 RL 0.0010 0.0010 0.00250	Qual S Units mg/L	0.470 2.11 5.65 2.60 1.04 0.462  Result 0.477 2.13 5.81	Spike 0.5000 2.000 0.5000 2.000 0.5000 0.5000 Spike 0.5000 2.000 0.5000	0.004707 0.2522 5.426 1.011 0.5816 0 SPK Ref Val 0.004707 0.2522 5.426	93.1 92.7 44.8 79.3 91.5 92.4 %REC 94.5 93.7 76.6	75 75 75 75 75 75 75 RPD Ref \ 0.4703 2.107 5.650	125 125 125 125 125 125 125 0 Limit <b>20</b> Val %RPD 1.50 0.87 2.77	Date Analyzed 01/25/201 01/25/201 01/25/201 01/25/201 01/25/201 Date Analyzed 01/25/201 01/25/201
Batch 138377 SampID: 1801000 Analyses Arsenic Barium Boron Iron Manganese Selenium  Batch 138377 SampID: 1801000 Analyses Arsenic Barium	SampType:		0.0010 0.0010 0.0250 0.0250 0.0010 0.0010 RL 0.0010 0.0010	Qual S Units mg/L	0.470 2.11 5.65 2.60 1.04 0.462  Result 0.477 2.13 5.81 2.61	Spike 0.5000 2.000 0.5000 2.000 0.5000 0.5000  Spike 0.5000 2.000	0.004707 0.2522 5.426 1.011 0.5816 0 SPK Ref Val 0.004707 0.2522	93.1 92.7 44.8 79.3 91.5 92.4 %REC 94.5 93.7	75 75 75 75 75 75 75 RPD Ref V 0.4703 2.107	125 125 125 125 125 125 125 125 125 125	Date Analyzed 01/25/201 01/25/201 01/26/201 01/25/201 01/25/201



Client: Natural Resource Technology, Inc.

NPDES/CWA TCN interferences checked/treated in the field?

#### Receiving Check List

http://www.teklabinc.com/

Work Order: 18010005

NA 🗸

Client Project: Dynegy - Vermillion Power Station Report Date: 02-Feb-18 Carrier: Jordan Evans Received By: AMD Elizabeth a Hurley Reviewed by: Completed by: Dr Ollan On: On: 25 Jan 18 25 Jan 18 Amber M Dilallo Elizabeth A Hurley Extra pages included 36 Pages to follow: Chain of custody No 🗌 Yes 🗸 Not Present Shipping container/cooler in good condition? Temp °C 4.22 Ice 🗸 Blue Ice Type of thermal preservation? None Dry Ice No 🗌 ~ Chain of custody present? Yes No 🗌 Yes 🗸 Chain of custody signed when relinquished and received? ~ No 🗌 Chain of custody agrees with sample labels? Yes 1 No 🗌 Samples in proper container/bottle? Yes 1 No 🗌 Yes Sample containers intact? **V** No 🗌 Sufficient sample volume for indicated test? Yes ~ All samples received within holding time? Yes NA 🗌 Field V Lab Reported field parameters measured: Yes 🗸 No 🗌 Container/Temp Blank temperature in compliance? When thermal preservation is required, samples are compliant with a temperature between 0.1°C - 6.0°C, or when samples are received on ice the same day as collected. No 🗌 No VOA vials 🗸 Water - at least one vial per sample has zero headspace? Yes Yes [ No 🗌 Water - TOX containers have zero headspace? No TOX containers Yes 🗸 No 🗌 NA 🗌 Water - pH acceptable upon receipt?

Yes

Any No responses must be detailed below or on the COC.

No 🗌

### **CHAIN OF CUSTODY**

pg. 1 of 2 Work order # 8010005

TEKLAB, INC. 5445 Horseshoe Lake Road - Collinsville, IL 62234 - Phone: (618) 344-1004 - Fax: (618) 344-1005

	Natural Resou	roo Toobaalo	av. Inc							T <sub>e</sub>		ples			ICE	<u>ন</u>	DI 11	E ICE	জিলী <b>ম</b>	in ici	= (	45	<u>.</u> نیرا	00					
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City / State	/ Z.IP	L 01/04			- (4	1.4\ 0:	27.20	24.4		La	ab i	Note	S: "	×	W	1	VO	lon	y er	in	5	eryi	C-e						
Contact:	Steve Wiskes		Phone	:	(4	14) 8	3/-30	714		匚			*	N	<i>\\\</i>	7	U	Jell	d	<u> </u>									
E-Mail:	steve.wiskes@obg con	n	Fax:									ıt Co						_		,									
Are these sample	s known to be involved i	in litigation? I	yes, a surcharge v	vill a	pply	, [	Ye	s (	No.	Dis	solv	ved M	ietals	s: ICF	/MS	020A	\ As	Ba B F	• Mn	Se,									
Are these sample	s known to pe hazardou	s? 🗌 Yes	X No							ł		•																	
Are there any required reporting limits to be met on the requested analysis?. If yes, please provide limits in the comment section $\prod_{i} \gamma_{es} = X_i N_c$									е																				
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Dynegy - Vermillio	on Power Station		T. Mathis	_	<u>J,</u>	Eva	n5			ြ					C	SSIO	۽ ا	Field Conductivity SM 2510-B Clocolund Matric	Fleld DO SM 4500-O	Field ORP SM 2580-	Fe	- i e	Field	G₩	¥		1		
	s Requested		Instructions	# 8	and	Туре	of C	onta	iners	Groundwater					Chloride	골	Cladelaco Mercan	E C	8	유	무	SIV d Te	2 =	GW Depth to Water	Nitrate SM 4500-	Sulfate 9036	TDS S		
	1-2 Day (100% Surcharge)	1			ᅟ	$\pm$				wbn							.   8		₹	B S	HS M	155 155 155 155 155 155 155 155 155 155	꼴	\ <u>\</u>	e SM z	ıte 9	SM 2		
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### **CHAIN OF CUSTODY**

pg. 2 of 2 Work order # 18010005

TEKLAB, INC. 5445 Horseshoe Lake Road - Collinsville, IL 62234 - Phone: (618) 344-1004 - Fax: (618) 344-1005

Client:	Natural	Resource Technolo	gy, Inc.		-				Т	San	nple	s o	ր։ 🖺	<u></u> 10	Έ	∰ B	LUE	ICE	R N	O ICE	:			°C				 
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City / State	/ Zin Bloom	ngton, IL 61704		···					-1	Lab																		
Contact:	Steve Wiskes		Phone	:	(414	837-	3614					_ •										`						
E-Mail:	steve.wiskes@d	obg.com	Fax:	•					_	Clic		`~	mai	ata											-	**************************************		
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Are there any requ	Are there any required reporting limits to be met on the requested analysis?. If yes, please provide imits in the commert section. Yes No																											
Project Name/Number Sample Collector's Name											MA	TRI	X					INC	)ICA			_	S RI		EST	ED	<u> </u>	
Dynegy - Vermillion Power Station 7, Mathis J. Evans										٦					_	Diss	0	<u>+</u>	Fie	Fiel	뀨	1	Field Turbidity SM	ଜୁ	Z			
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The individual signing this agreement on behalf of the client, acknowledges that he/she has read and understands the terms and conditions of this agreement, and that he/she has the authority to sign on behalf of the client. See www.teklabinc.com for terms and conditions.

BottleOrder:

41655



Site Vermillion	Major we	ls repairs*	required	Yes	No	NA
Inspection Date 1-24-18	to mainta	in well inter	grity?		,X	
Well Number Niv!					<u>-1- , ,</u>	
Stick-up Monitoring Wells					Comments	
1. Outer protective Casing	Yes	No	NA			
Not corroded	X					
Not dented		j.,				
Not cracked						
Not loose	<u>v</u>	<u> </u>				
2 Janes and a		T	1	}		
2. Inner casing Not corroded	Yes	No	NA			
Not dented		<b></b>	· · · · · · · · · · · · · · · · · · ·			
Not cracked					<del></del>	
Not loose			<del> </del>		*****	
Not loose		ļ	ALA .			
2 Are the second below to the second of the	Yes	No +	NA NA			
3. Are there weep holes in outer casing?		F	<del> </del>			
4. Weep holes able to drain?		<u> </u>	Υ .		·	
5. Is there a lockable cap present?	*	ļ				
6. Is there a lock present?	+		<del> </del>			
7. Bumper posts in good condition?		<u> </u>	<u> </u>			
Flushmount Monitoring Wells	Yes	No	NA			
8. Can the lid be secured tightly?	103		X			
9. Does the lid have a gasket that seals?			<del>                                     </del>			
10. No water in the flushmount?					·········	
11. Is the well cap lockable?				<del></del>	<del> </del>	
12. Is there a lock present?						
and the state of t	L		<u> </u>			
All Monitoring Wells	Yes	No	NA			
Downhole Condition			Х		**************************************	
12. Water level measuring point clearly marked?			)			
13. No obstructions in well?						
14. No plant roots or vegetation in well?				*		
15. No sediment in bottom of well?			4			
If present, how much sediment?	ft					
16. Installed as total depth.	ft					
17. Measured total depth of well.	ft					
General Condition	77	A1 -	1 1 1			
	Yes	No T	NA		•	
18. Concrete pad Installed? 19 . Concrete pad						
Slope away form casing?	<del> </del>					
Not deteriorated?						
	<del>                                     </del>					<del></del>
Not heaved or below surrounding grade? 20. No surface seal settling?						
20. No surface sear settling? 21. Well clearly visible and labeled?	<del>                                     </del>					
Comments:	4			<del> </del>		
Comments.			· · · · · · · · · · · · · · · · · · ·			
The state of the s			<del></del>			•
* Major well repair are those that require a subconti	ractor or sensi	rate mobilis	ation to com	nlete		
				.1.010		

8	Site:	Vermillion				Client:	NRT				
Project Num				Task #:		Start Date:	1-24-18	3		Time;	1525
ield Person	nel: T	Meith:s 3	Evons	·		Finish Date:	J-24-18	?		Time:	1533
<i>,</i>	VELL INFO	RMATION				er var kendere. Grij	EVEÑT 1	YPE	and the first of the second second second second second second second second second second second second second Second second second second second second second second second second second second second second second second	alaka karana da karana Karana	\$ 000 c To 100 c to 1
	Well ID:	Mw i		Well Develop	ment	ХÌ	Low-Flow / Lo	w Stress San		<del></del>	··-
C	asing ID:		inches	Well Volume			Other (Specify)				
24-47		San San San San San San San San San San	WAT	ER QUALITY	/ INDICATO	R PARAMET	ERS (contin	rued)	ভাগ কৰা জা নুন্ধ		
<u> </u>		Volume	Depth to	1		1	SEC or	Dissolved		T	
Sampling	Time	Removed	Water	Drawdown	Temp.	pH	Cond.	Oxygen	Turbidity	ORP	√isua.
Stage	(mititary)	(gallons)	(Feet)	(Feet)	(°C)	(\$ <u>U)</u>	(µs/cm)	(mg/L)	י (עדע)	(mV)	Clarity
	1525		79.67								:
	1527	-13	84,cz	4.35	10.दम	6.80	3546	O	7.7	65	C <b>E</b> EC/
	1529	ZĞ	34,70	, 68	11.52	6.90	3480	0	.7	62	Clear
	1531	.39	86.47	1.77	11.72	6.92	3460	ø	0	62	clear
	1533	, S.Z.	87.51	1,04	11:75	6.93	3450	0	0	64	clear
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		<del></del>	<del> </del>			<del> </del>		<u> </u>			
	<u> </u>		MOTER	continued)				कर इंग्लिस स्टब्स	ABBREV!	TIONS	حريب جابوت
		<u> </u>	Мол <i>со</i> (	солинаеа):			<u>· · · · · · · · · · · · · · · · · · · </u>	Cond Actual Condu FT BTOC - Feet Belo na - Not Applicable nm - Not Measured	ctivity	ORP + Oxidation-I	efê

Low Flew Sampling Form MW-1 Low-Flow Sampling Form

Page 2 of 2

Site	Vermillion		ls repairs* r	-	ed	Yes	No	NA
Inspection Date	1-24-18	to maintai	n well integ	rity?			χ	
Well Number	Muz							
	<u>-up Monitoring Wells</u>						<u>Comments</u>	
1. Outer protective	e Casing	Yes	No	1	NA			
Not corroded		X		<u> </u>				
Not dented		:-	**************************************	<u></u>			-	
Not cracked								
Not loose		₩	<u> </u>	<u> </u>				
			<del>,</del>			ı		
2. Inner casing		Yes	No	N	IA			
Not corroded	•			<u> </u>				
Not dented				ļ				
Not cracked				<u> </u>				
Not loose			·					<del></del>
2.4		Yes	No	N	A			
	holes in outer casing?	· .	<u> </u>	<b> </b>				
4. Weep holes able								
5. Is there a lockable						- W W W W W W W W.		
6. Is there a lock pr								
7. Bumper posts in	good condition?	<u> </u>						····
err								
1	ount Monitoring Wells	Yes	No	N.				
8. Can the lid be see	•	<u> </u>		4	X			
1	e a gasket that seals?						··	
10. No water in the								
11. is the well cap le								
12. Is there a lock p	resent?				<u> </u>			
All	Monitoring Wells	Yes	No	N.	<u></u>			
Downhole Condition		162	140					
	asuring point clearly marked?			$\rightarrow$	•			
13. No obstructions				-+				
	or vegetation in well?	<del> </del>				•		
15. No sediment in	<del>-</del> •	ļ		<del>-</del>	,			
	much sediment?	ft						
16. Installed as tota		ft						
17. Measured total	· ·	ft				•		
		L						
General Condition		Yes	No	N/	Α			
18. Concrete pad In	stalled?		Х				<del></del>	
19 . Concrete pad			İ	X	ľ			
Slope away form	casing?							· · · ·
Not deteriorated	•			1				
Not heaved or b	elow surrounding grade?							
20. No surface seal :	settling?			<del></del>	,			
21. Well clearly visib	ole and labeled?	1			$\neg \uparrow$			
Comments:		<del>1</del>						
* Major well repair	are those that require a subcontr	actor or separ	ate mobiliz	ation	to con	nplete		

8	Site: Vorn	rillion				Client.	NRT		· · · · · · · · · · · · · · · · · · ·		
roject Numi				Task #:		Start Date:	1-24-18	,	· · · · · · · · · · · · · · · · · · ·	Time:	<b>626</b>
ield Person		C Linta	Evens	• • • • • • • • • • • • • • • • • • • •		Finish Date:	1-24-			Time:	11,32
	VELL INFOR	MATION		Karagorana da part	<b>的数据的</b>	all the second second	EVENT	TYPE		Magazina da majara ka Seria	Service Comments
· · · · · · · · · · · · · · · · · · ·	Well ID: /	nwe		Well Develop				ow Stress San	nolina		<del></del>
Ca	asing ID;		inches	Well Volume			Other (Specify		r <b>5</b>		
	134.50	Alexander	WAT	ER QUALITY	/ INDICATO	RPARAMET	ERS (conti	nued)	en en e til og fly Station og sta		* 13 T
		Volume	Depth to				SEC or	Dissolved		T	
Sampling	Time	Removed	Water	Drawdown	Temp.	рH	Cond.	Oxygen	Turbidity	ORP	Visual
Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	· (NTU)	(mV)	Clarity
	1620		18,14								
	1622	13	20.34	7.2	12.01	7,02	1150	9.26	O	8	clear
Ī	1624	ء 'Zن	20,80	.46	[2.3]	7.19	1090	6.47	0	-50	clear
	1676	.39	21.10	.30	12,44	7.27	110	5.70	0	- 64	Cleor
	1628	ء 52 -	21.29	. 19	12.55	7,35	1/00	4,78	O	-75	Clear
	1630	. 65	21.78	.49	12.62	7.38	7090	4.13	0	-8z	Clear
	1632	. 78	Z1.95	.17	12.66	7.40	/090	3,33	0_	-88	Citty
Ī											
i i				Ţ <u></u>							
		3 3 8	NOTES (	continued)	english see se			The state of the s	ABBREVIA	TIONS	State of the state of
	<u> </u>			<i>1</i> -2-	<del> </del>	., <u>.</u>	······································	Cond Actual Condu FT BTOC - Feet Belo na - Not Applicable nm - Not Measured	clivity	ORP - Codd ation-	wre

Low-Flow Sampling Form

Low-Flow Sampling Form

Page 2 of 2

Site Vermillion	Major wells repairs* required Yes No					
Inspection Date  -24-19		n well integ	•		1	NA
Well Number MW7		.,		1	<del></del>	
7.004				,		
Stick-up Monitoring Wells					Comments	
1. Outer protective Casing	Yes	No	NA		comments	
Not corroded	X	NO	I NA			
Not dented	<del></del>	<del> </del>				<del></del>
Not cracked	<del>  </del>	<del> </del>	<u> </u>			
Not loose	<del></del>	<del> </del>				
NOT 1003C	L¥	<u> </u>				, , , , , , , , , , , , , , , , , , ,
2. Inner casing	Yes	No	NA			
Not corroded	1-17				•	, na
Not dented	<del></del>	<del>                                     </del>				
Not cracked	-	ļ			<del> </del>	
Not loose	<del>                                     </del>	-	<del></del>			
Not loose	I Y					
	Yes	No	NA			
3. Are there weep holes in outer casing?		X		·····		<del></del>
4. Weep holes able to drain?			X			
5. Is there a lockable cap present?	<u> </u>					
6. Is there a lock present?						
7. Bumper posts in good condition?						
<b></b> .	· · · · · · · · · · · · · · · · · · ·					
Flushmount Monitoring Wells	Yes	No	NA			
8. Can the lid be secured tightly?			Χ			
9. Does the lid have a gasket that seals?		·				
10. No water in the flushmount?				· · · · · · · · · · · · · · · · · · ·		
11. Is the well cap lockable?						
12. Is there a lock present?			(1/			
			<sub>1</sub>			
All Monitoring Wells	Yes	No	NA			
Downhole Condition			X			
12. Water level measuring point clearly marked?						
13. No obstructions in well?						
14. No plant roots or vegetation in well?			il			
15. No sediment in bottom of well?			\V			
If present, how much sediment?	ft					
16. Installed as total depth.	ft					
17. Measured total depth of well.	ft					
	r	· - · · · · · · · · · · · · · · · · · ·		•		
General Condition	Yes	No	NA			·
18. Concrete pad installed?	ļ	Χ				
19 . Concrete pad		,	X	MAR AND THE SECTION AND ADDRESS.	error recommends we never at beautiful manifely found. It	
Slope away form casing?						
Not deteriorated?						
Not heaved or below surrounding grade?						
20. No surface seal settling?			7/			
21. Well clearly visible and labeled?	X					
Comments.	· · · · · · · · · · · · · · · · · · ·	<del></del>		<del></del>		
With a state of the state of th					4114-1-1	
<ul> <li>Major well repair are those that require a subcont</li> </ul>	ractor or sepa	rate mobiliz	ation to cor	nplete		

n gaan oo aan oo			જીવ કર્યો <u>નુ</u>	alisate depuis dist	KOĴEC UÍV	IFORMATION		<b>於文字/家宝</b> 子(1			
Drain of Mr.	Site: V <sub>CC</sub>	MICCION		Tools #s		_ Client:		<u> </u>	***	~~·	
Project Nu Field Perso		Mathis .	J. Evans	Task #:		Start Date:	1-24-18			Time:	
				77.5 \$ 2.2 1.35 1.3	5.11 F. S. S. S. S. S. S. S. S. S. S. S. S. S.	Finish Date:				Time:	
\$760 LL 1975	WELL INFO						EVENT	TYPE			
	Well ID:	MW7		Well Develop				ow Stress Sam	npling		
- 1	Casing ID:		inches	Well Volume	Approach Sar	mpling 🔲	Other (Specify	):			
<b>美国,这些领人</b>	Park Bala	Policy of the	WAT	ER QUALITY	/ INDICATO	R PARAMET	ERS (conti	nued)			
		Volume	Depth to			1	SEC or	Dissolved			
Sampling	Time	Removed	Water	Drawdown	Temp.	pH	Cond.	Oxygen	Turbidity	ORP	√isual
Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	(NTU)	(mV)	Clarity
			Dry								
			1				:				
									·· <u>··</u>	1	
	<u> </u>									1	
<b></b>									<del></del> -	1	
				<u> </u>	_						
										-	
	-	<del>                                     </del>	<u> </u>		_			<del>                                     </del>		<u> </u>	<del> </del>
			-	<b>-</b>	<u></u> _					<del> </del>	<del></del>
<u> </u>		<del> </del>	<del> </del>					<del> </del>		<u> </u>	
								1		+	
	<del></del>	<del> </del>	<del> </del>							<del></del>	<u> </u>
<u> </u>		<del> </del>		<del> </del>		<del> </del>				-	
<del></del>		<u> </u>	<u> L</u>	100 200 000 000	<u> </u>	1		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 - 3 1 - 4 2 7 1 0 3 - 0 1 - 0		
en en en en en en en en en en en en en e	<u> </u>		NOTES (	continued)		•				TIONS	
								Cond Actual Conduct FT BTOC - Feet Below na - Not Applicable nm - Not Measured		OFF - Oxidation-Red SEC - Specific Electric SU - Standard Units Temp - Temperature *C - Degrees Celoius	

Low-Flow Sampling Form

Low-Flow Sampling Form

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Site Vermittien		Major wel	ls repairs* r	equired	Yes	No	NA
Inspection Date	1-24-18		n well integ			X	
Well Number	MW10			,		1	
Stick	-up Monitoring Wells					Comments	
1. Outer protective	•	Yes	No	NA I		<u>comments</u>	
Not corroded		X	1.0	<b></b>			
Not dented		1					
Not cracked			····				
Not loose							
1 110030		<u> </u>	<u> </u>	<u>L</u>			
2. Inner casing		Yes	No	NA NA			
Not corroded		X	1.10	1,7,			
Not dented		ì					
Not cracked			<u> </u>				
Not loose		<del>                                     </del>					
1.00		Yes	No	NA			
3 Are there ween	holes in outer casing?	105	X	****			
4. Weep holes able	<del>-</del>		<del> </del>	χ			
5. Is there a lockab		ĸ		- ^			
6. Is there a lock p	• •	<del>                                     </del>					
7. Bumper posts in							
7. Bumper posts ii.	i good condition:			L			
Flucha	nount Monitoring Wells	Yes	No	NA			
8. Can the lid be se		162	340	$\frac{100}{\chi}$			
	e a gasket that seals?			<del></del>			
10. No water in the							
11. Is the well cap							
12. is there a lock		<u> </u>				<del></del>	
12. IS there a lock	presentr	<u> </u>		N.			
	I Monitoring Wells	Yes	No	NA			
Downhole Conditi		162	NO	X			
1	easuring point clearly marked?						
13. No obstruction							
,	or vegetation in well?				····		
15. No sediment in	•	.,		1			
1	much sediment?	ft		¥			
16. Installed as tot		ft					
17. Measured tota		ft					
17. Weasured tota	deput of west.	11					
General Condition		Yes	No	NA			
18. Concrete pad i		X	110	U(A)			
19 . Concrete pad	nstanca;	<del>                                     </del>				<u> </u>	
Slope away for	m casing?		······································				
Not deteriorate							
i .	eur below surrounding grade?						
20. No surface sea					····		
2							
21. Well clearly vis	inic aun tancient						
Comments:							
		······				-A-T-T-Mandalina	
* Major wall	r aro those that require a subscrib	actor or com	rata mahili-	ration to so	nnleta		
iviajoi weli repal	r are those that require a subcontr	actor or sepa	rate modiliz	ration to cor	npiete		

7.97	Care Contraction	Series Comment	and the second	行動語を行うです。「F	ROJECTIN	IFORMATIO	V:				
	S∛te: Û	ler million				Client:	NRI				
Project Nu				Task #:		Start Date:				Time:	16 45
Field Pers	onnel: $\mathcal{I}$	<u> </u>	Excas			Finish Date:	1-24-1	8		Time:	10 59
100		DRMATION				region of the second	EVENT	TŸPE	· · · · · · · · · · · · · · · · · · ·	en de la companya de la companya de la companya de la companya de la companya de la companya de la companya de	All Arthurs (1997)
	Well ID:	Mwro		Well Develop	ment		Low-Flow / L	ow Stress San	npling		
	Casing ID:		inches	Well Volume	Approach Sai	mpling 🔲	Other (Specify	):			
		一种人物 电	WAT	ER QUALIT	/ INDICATO	R PARAMET	ERS (conti	nued)	· ·		
	!	Volume	Depth to				SEC or	Dissolved			
Sampling	Time	Removed	Water	Drawdown	Temp.	pН	Cond.	Oxygen	Turbidity	ORP	Visual
Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	(NTU)	(m/v)	Cla⊓ty
	1645		52.00								
	1649	.26	53.55	1.55	9.75	7,37	1490_	0	0	39	Clear
	1651	,39	53.89	.34	10.24	7.21	1450	$\sigma$	0	38	Cheer
	1653	·5Z	54,36	.47	10.43	7.14	1460	0	7.6	10	Clear
	1655	, 65	54,68	.32	10.55	7,06	14 80	0	18.7	44	Clear
	1657	.78	54.68	0	10.60	7,04	1490	0	15.5	48	Clear
	1654		54,68	0	10.74	7,01	1490	0	9.5	50	crear
										•	
								1			
	1										
		***************************************									
		<u> </u>	NOTES (	continued)	17 . 11				ABBREVIA	TIONS	e et de la companya d
		-				*		Cond Actual Condu FT BTOC - Feet Belon na - Not Applicable nm - Not Measured	clivity	ORP - Oxidation-R	ictrical Concuctance is ire

Low-Flow Sampling Form MW-1

Low-Flow Sampling Form

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Site	Varmillion	Major we	lls repairs*	required	Yes	No	NA
	<u>24-18</u>	to mainta	in well inte	grity?		×	
Well Number/	W 17						
	Monitoring Wells	<del></del>	· · · · · · · · · · · · · · · · · · ·		7	Comments	
1. Outer protective Cas	sing	Yes	No	NA			·
Not corroded		N X	N···			·	
Not dented		<u> </u>	ļ,	<del>- </del>			
Not cracked		X			1	······································	
Not loose			<u> </u>		<u> </u>		
2. Inner casing		Yes	No	NA NA	7 .		
Not corroded		1	1. 100	X			
Not dented	•	<del></del>		<del>                                     </del>	1		
Not cracked	•					<del></del>	
Not loose					1		
		Yes	No	NA.	<del> </del>	· · · · · · · · · · · · · · · · · · ·	
3. Are there weep hole	s in outer casing?	1.03	K	X	i		
4. Weep holes able to d				X			
5. Is there a lockable ca		×		'			
6. Is there a lock preser	· ·	×			ļ		
7. Bumper posts in good							
		<u> </u>	!	. 1	L.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	··· ·· · · · · · · · · · · · · · · · ·	
Flushmoun	t Monitoring Wells	Yes	No	NA			
8. Can the lid be secure	d tightly?			<u> </u>		•	
9. Does the lid have a gr	asket that seals?		-	Î.			
10. No water in the flus							
11. Is the well cap locka	ble?						
12. Is there a lock prese	nt?			4			
	nitoring Wells	· Yes	No	NA		· .	
Downhole Condition							
	ng point clearly marked?						
13. No obstructions in w							
14. No plant roots or ve					-		
15. No sediment in bott							
If present, how much		ft					
16. Installed as total dep		ft					
17. Measured total dept	th of well.	ft					
General Condition		Vo.	Ne	NA .			
General Condition 18. Concrete pad Installo	.un	Ye\$	No	INA .		· · ·	
19 . Concrete pad instant	au r	X				<del></del>	
Slope away form casi	(ng)	<del>  \ \ \</del>					
Not deteriorated?	ing:						
Not heaved or below	surrounding grade?	1-5-1					
20. No surface seal settli		X					* Approx. 4 &
20. No surface sear setti 21. Well clearly visible ar		<del> </del>					
comments:	to tabeleu (	<u> </u>					
							····
Major well renair are fl	hose that require a subcontr	actor or senar	ate mobiliz	ation to cor	nnlete		
	and to discount in						

*****	inger state have been a to be	STATES A ARREST		李泰纳·奇丁E	ROJECTIN	FORMATION		er og ere		and a second second	77
		Allios				Client:			· · · · · · · · · · · · · · · · · · ·		
Project N				Task #:		Start Date:	1-2	4-18		Time:	1052
Field Pers	onnel: <u> </u>	vans T.	Meth 15			Finish Date:				Time:	454 1151
1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	WELL INFOR	MATION		V V V V V V V V V V V V V V V V V V V		established in some of the	EVENT	YPE:		and a plant of the second	7-24-18
	Well ID:	Mw-17		Well Develop	ment			ow Stress San			
	Casing ID:		inches	Well Volume.	Approach Sar		Other (Specify)		<u> </u>		
the stange	Bar Jana Par	hall freeze and	WAT	ER QUALITY	y indicato	R PARAMET	ERS (conti	nued)	ANTERIOR ANTERIOR	1.00	, President de la companya de la com
		Volume	Depth to	,			SEC or	Dissolved .			
Sampling	l I	Removed	Water	Drawdown	Temp.	pH	Cond.	Oxygen	Turbidity	ORF	V≑sual
Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SįU)	(µs/cm)	(mg/L)	' (NTU)	(mV)	Carity
	1857		33.93	1 61						<u> </u>	<del></del>
	1100	.13	40. १८	1,94				<del> </del>		ļ	
	1106	25,	44.41	3.49			ļ	<u> </u>	<u> </u>	<u> </u>	
ļ	1/09	, <u>3</u> 9	44.27	1.86	<b></b> _	<u> </u>		<u></u>	<del> </del>	<u>                                     </u>	
<u> </u>	<del>                                     </del>	,65		1,73	<del> </del>	<del> </del>					<del></del>
<b></b>	1112	<del> </del>	49.71	1,71	il.OS	7,57	ZZZe	16.3	30,5	107	
	1115	,78	5229	7,58	11.51	7,8	2220	16,3 19,2	791	<del></del>	Gleer
	1118	, 91	53,15	.71:		6.56	ļ————	.37	·	169	SL Cloudy
	1121	1 . 74	53,86		11.05	<del></del>	2320	<del> </del>	119	167	St Cloude
	1124	j.07	54,17	,31	jc.15	6.80	<del></del>	<u> </u>	1/9	164	<u> </u>
	11/27	1.20	54,50		10.53	6,70	Z360 Z460	C	1/3	153	SL Jaudy
	1130	i.33	54,8¢	,44	10.43	10.64			35,6	145	St Clouds
ļ	1133	1.46	54,44	.09	16.41	6.61	Z470 Z446	0	<del></del>	134	Si cloudy
		1.59	55.03 * *********	No. of Concession, Name of Street, Name of Str	/c,3l		1		\ 57. <u>3</u>		S- Clouds
			NOTES (	continued)	<u> </u>	رفهاني والمجمد والمستروع والمنا	AVI.	Cond Actual Condu	and of the sales and the sales and the sales are		Reduction Potential
			•		•			FT BTOC - Feet Beking - Not Applicable num - Not Measured		SEC - Specific E SU - Standard U Temp - Tempera 'C - Degrees Ce	Restrical Conductance Inits Hure
				**							
L								1			

Low Flow Sampling Form

Low-Flow Sampling Form

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	er volge egner			使是被引于E	ROJECTIA	FORMATION		的是"是是是我		er en er ree de le	t flanderschafte verschaft.
	Site:	Vermillion				Client:					
Project No				Task #:		Start Date:	1-24-18			Time:	10 57
Field Pers	onnei:	S Evens T	Mahy			Finish Date:	}-ZV-13			Time:	450 115-1
September 19	WELLINE	ORMATION		TO A LANK THE MAKE THE PARTY OF	AND THE PROPERTY OF	ing a state of the	EVENTI	YPE	nder skingen som Skrandynere	garaga aga aga ga	24131 T.F.
	Well ID:	MW-17		Well Develop			Low-Flow / Lo				
	Casing ID:		inches	Well Volume	Approach Sa	mpling 🔲	Other (Specify)	:			
The same		八年的 中海海	· · · · · · · · · · · · · · · · · · ·	ER QUALIT	YINDIGATE	RPARAMET	ERS (contin	tued)	and the second s		g Horas German and All Sal
		Volume	Depth to				SEC or	Dissolved			
Sampling	Time	Removed	Water :	Drawdown	Temp.	Ηq	Cond.	Oxygen	Turbidity	ORP	Visual
Stage	(military		(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	, (NLn)	(mV)	Carity
	1134	1,72	55.25	.17	10.25	6.56	2440	0	46.8	ize	Clear
	1142	1.35	55.36		01.01	6.55	7460	C	32,4	//<	Clear_
	1195	1.98	55.4c	,64	10.06	6.55	Z480	0	19.4	105	clear
	1148	Z.11	55.45	,05	10:03	6,55	Z4 80	ে	16.6	100	clear
	1151	Z,24	55.48	5٥,	9.97	6.50	Z49c	<u>e</u>	7,7	97	((क्ल
		<u> </u>	<u> </u>								
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			NOTES (	continued)					ABBREVIA	TIONS.	erioritation <u>in transporter i</u>
		-						Cond Actual Condu FT BTOC - Feet Belo na - Not Applicable nm - Not Measured	iclivity	ORP - Oxidation	-Reduction Potential (lectrical Conductance inits ature
					•						

Low Flow Sampling Form

Low-Flow Sampling Form

Site Vermillies	Major wel	ls repairs*	required	Yes	No	NA
Inspection Date /-24-/8	to maintai	n well inte	grity?		X	
Well Number MW-18				<u></u>		· · · · · · · · · · · · · · · · · · ·
Stick-up Monitoring Wells					Comments	
1. Outer protective Casing	Yes	No	NA	1		
Not corroded	X					*******
Not dented			İ			
Not cracked		,				
Not foose	1					<del></del>
	<del></del>	A		<u> </u>	<del></del>	
2. Inner casing	Yes	No	NA	] .		
Not corroded	1/4		X	İ		,
Not dented						· · · · · · · · · · · · · · · · · · ·
Not cracked				i		
Not loose	7	•				
	Yes	No	NA		- · · · · · · · · · · · · · · · · · · ·	
3. Are there weep holes in outer casing?		Х				
4. Weep holes able to drain?			X			
5. Is there a lockable cap present?	7		<del>                                     </del>			
6. Is there a lock present?	<del> </del>	····			<u> </u>	
7. Bumper posts in good condition?	X-					
7. Sumper posts in good conditions	1			·		······································
Flushmount Monitoring Wells	Yes	No	l NA	i		
8. Can the lid be secured tightly?	162	140	INA †			
9. Does the lid have a gasket that seals?						
10. No water in the flushmount?		<del></del>	<del> </del>			
			<del></del>			· · · · · · · · · · · · · · · · · · ·
11. Is the well cap lockable?						
12. is there a lock present?	Ll		[ Y ]		·	
ATI BEAUTAA-1 188-11-	<del></del>		I 1			
All Monitoring Wells	Yes	No	NA +			
Downhole Condition	.			·	·	
2. Water level measuring point clearly marked?					·	
3. No obstructions in well?						
4. No plant roots or vegetation in well?	ļ					
.5. No sediment in bottom of well?			V			
If present, how much sediment?	ft			,		
.6. Installed as total depth.	ft					
7. Measured total depth of well.	ft					
ieneral Condition	Yes	No	NA .		· · · · · · · · · · · · · · · · · · ·	
8. Concrete pad installed?	1 1					
9 . Concrete pad	*					
Slope away form casing?	+					
Not deteriorated?	<u> </u>					
Not heaved or below surrounding grade?	4					
O. No surface seal settling?	<i>\</i>					
1. Well clearly visible and labeled?	X					
omments:						
				<del></del>		

		erional Lair Albertain		等原则是"DE	ROJECTIN	FORMATION			Land St. Land	Les por their	Profession And Profession
		ecmillion				Client:	NR				
Project No				Task #:		Start Date:		1-18		Time:	Z60
Field Pers			vans			Finish Date:	1-Z4			Time:	12 %
San Barrier Contract	WELL INFO	RMATION:	. 6.7.8 . 6.7.8	A SA COMPANY TANKS		enter de la companya de la companya de la companya de la companya de la companya de la companya de la companya Natura de la companya de la companya de la companya de la companya de la companya de la companya de la companya	EVENT	TYPE:		entroller of the median be	
	Well ID:	MW-18		Well Develop			Low-Flow / Lo	ow Stress San			
	Casing ID:		inches [	Well Volume			Other (Specify)				
ા પ્રાપ્યું છે.		· 1987 [16] [16] [16]	WAT	ER QUALIT	Y INDICATO	R PARAMET	ERS (contin	tued)	40.00	1 (4) (4) (4) (4) (4) (4) (4) (4) (4) (4)	Progress of the second
		Volume	Depth to				SEC or	Dissolved .			
Sampling	1 1	Removed	'Water	Drawdown	Temp.	PΗ	Cond.	Oxygen	Turbidity	ORP	Visual
Stage	(military)	. (gallons)	(Feet)	(Feet)	(°C)	(SįU)	(µs/cm)	(mg/L)	' (NTU)	(m <sub>2</sub> V)	Carity
	iZ∞		Z7.80	ļ		ļ,			<u></u>		clear
	iZcz	/13	27,80	6	11.89	6.54	Z746	C	0	86	
<u>.                                    </u>	1704	, 26	27,50	0	11,94	6.54	7.7zc	0	G	82	
	1Z0c	, 39	Z7,85	<u> </u>	17.03	6,55	2.700	0	0	79	₩
L	<u> </u>	<u> </u>		<del> </del>		<u> </u>	<u> </u>		ļ	<u> </u>	
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	<u> </u>	<u> </u>					<u> </u>	<u> </u>	<u> </u>		i
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	<u> </u>			<u> </u>			j				<u>:</u>
	<u> </u>				<u>]</u>	<u> </u>					
			KOTES (	continued)							
							Cond Actual Conductivity FT BTOC - Feet Below Top of Casing, Ina - Not Applicable Inm - Not Measured  Temp - Temperature  "C - Degrees Celoiss				

Low Flow Sampling Form

Site Vermiller	Major wel	ls repairs*	required	Yes	No	NA
Inspection Date 1-24-18	to maintai	n well integ	grity?		X	
Well Number / (W'C)			-		**************************************	
Stick-up Monitoring Wells					Comments	
1. Outer protective Casing	Yes	No	NA			
Not corroded	X					
Not dented						
Not cracked		,				
Not loose	1					· · · · · · · · · · · · · · · · · · ·
	L	L	1	ter om mind eres inneriomatomento) .	. 41 Par	
2. Inner casing	Yes	No	NA			
Not corroded	8					renava agri de
Not dented					····	
Not cracked	1					
Not loose	1		1	***************************************		
	Yes	No	NA			···
3. Are there weep holes in outer casing?		¥	1			
4. Weep holes able to drain?			<del>       </del>			
5. Is there a lockable cap present?	×		<del>  </del>	· · · · · · · · · · · · · · · · · · ·		
6. Is there a lock present?	<u> </u>				<del></del>	
7. Bumper posts in good condition?	×		<del>                                     </del>			
iv. pauther hosts in 8000 cottoirious			<u> </u>	· · · · · · · · · · · · · · · · · · ·		
Flushmount Monitoring Wells	Yes	No	NA			
8. Can the lid be secured tightly?	163	110	<del>  ''2- </del>			
9. Does the lid have a gasket that seals?			<del> </del>			
10. No water in the flushmount?			<del>                                     </del>			
11. Is the well cap lockable?			<del></del>			
12. Is there a lock present?			<del>                                     </del>			
121 is there a lock present:	L		1			
All Monitoring Wells	Yes	No	NA			
Downhole Condition	1	.10	X		——————————————————————————————————————	
12. Water level measuring point clearly marked?			1	• • •		
13. No obstructions in well?				<del></del>		
14. No plant roots or vegetation in well?				<del></del>		
15. No sediment in bottom of well?			<del>                                     </del>			<del></del>
If present, how much sediment?	ft		<u> </u>			
16. Installed as total depth.	ft					
17. Measured total depth of well.	ft					
17. Measured total depth of well.	[IL)					
General Condition	Yes	No	NA			
18. Concrete pad Installed?	7			······································	·	
19 . Concrete pad						
Slope away form casing?				<del> </del>		
Not deteriorated?	<del>  - </del>					
Not heaved or below surrounding grade?	<del> </del> - -					
20. No surface seal settling?	<del>                                     </del>					
21. Well clearly visible and labeled?	<del>  4  </del>					
Comments:				<del></del>		
Confidents,						
					<b>—————————————————————————————————————</b>	
* Major well repair are those that require a subcontr	actor or concr	ate mobilia	etion to com	ınlata		
	actor or separ	GCC THOUGHZ	anon to con	PICEC		

<b>"特别"</b>	tas e matinistrations	Silveril is	The Mark State	रहार कर विकास समिति । स्टब्स	tanggar Pa	ROJECTIN	NEORMATION		Every Land Bridge	the second of the second	arment in the service		
	Ste:	Vermi	Hien				Client:	NRT					
Project Nu			·		Task #:		_ Start Date:	i-24-i			Time	1547	
Field Pers	onnel:	1 Math	<u> </u>	Evons"			, Finish Date:	- 24 <i>-1</i>	<u> </u>		Time	1535	
28/4/2012 A	WELL IN			20 A A A A				EVENT	TYPE	in agents and the force	প্রকৃতির প্রক্রম (জ্বলার) প্রকৃতি	m promi Prigo	
	Well ID:	MW Z	<u> </u>		Well Develop		丛 Low-Flow / Low Stress Sampling						
	Casing ID:			inches	Well Volume	<del></del>		Other (Specify					
and the second	WATER QUALITY INDIGATOR PARAMETERS (continued)												
			olume	Depth to	1			SEC or	Dissolved				
Sampling	1 1	1	moved	Water	Drawdown	Temp,	рH	Cond.	Oxygen	Turbidity	ORP	Visual	
Stage	(military)	(9	ailons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	' (NTU)	(mV)	Clarity	
	1547			91,40		1: 44	<b>-</b>	884			-4		
<u> </u>	1551		<u> 26 </u>	95.1	3.7	11.24	7,22	-	0	0		Clear	
	1523		36	96.71	1.61	11.55	7.24	850	0	0	- 44	جاءوب	
	1555	_	52_	98.03	1.32	11.58	7.26	843	0	O	+53	Clear	
<u></u>													
	<u> </u>			ļ	_								
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<u> </u>	<u> </u>	····							ļ		<u> </u>		
	<u> </u>												
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	<u> </u>												
L	<u> </u>												
<u> </u>	<u> </u>			<u> </u>			<u> </u>				<u> </u>		
									<u> </u>		<u> </u>		
	ŀ			NOTES	(continued)	(Mary Carlotter Andrews)				ABBREVIA			
									Cond Actual Condu- FT BTOC - Feet Below na - Not Applicable nm - Not Measured			xe .	
		·											

Low Flow Sampling Foom MW 1

Site VO(M:11:0)	Maĵor wel	s repairs* r	equired	Yes	No	NA
Inspection Date 1-24-18	to maintai	n well integ	rity?		X	
Well Number MW3R					•	
***************************************						
Stick-up Monitoring Wells					Comments	
1. Outer protective Casing	Yes	No	NA			
Not corroded	X					
Not dented						
Not cracked						
Not loose	1					
	•				***************************************	
2. Inner casing	Yes	No	NA			
Not corroded	Х					
Not dented						
Not cracked				•		•••••
Not loose	1			•••		,
	Yes	No	NA			
3. Are there weep holes in outer casing?		1		:		
4. Weep holes able to drain?			X			
5. Is there a lockable cap present?	Х		<del>  ``                                  </del>		<del>.</del>	
6. Is there a lock present?	Υ Υ				<del></del>	
7. Bumper posts in good condition?						
			L			
Flushmount Monitoring Wells	Yes	No	NA			
8. Can the lid be secured tightly?	163	110	X		<del>.·</del>	
9. Does the lid have a gasket that seals?			1			······································
10. No water in the flushmount?						
11. Is the well cap lockable?						
· ·			<b>-</b>			····
12. Is there a lock present?			<u> </u>		<del></del>	
All Monitoring Wells	Yes	No	NA			
Downhole Condition	163	140	X			
12. Water level measuring point clearly marked?						
13. No obstructions in well?						
14. No plant roots or vegetation in well?						
15. No sediment in bottom of well?					······································	
	£4		Ψ			
If present, how much sediment?	ft ft					
16. Installed as total depth.						
17. Measured total depth of well.	ft					
General Condition	Yes	No	NA			
	res	χ	IVA			
18. Concrete pad installed?		χ	- j			
19 . Concrete pad			Χ			
Slope away form casing?			- X			
Not deteriorated?						
Not heaved or below surrounding grade?			<u>,                                    </u>	F 1 3 F 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	4 PE	
20. No surface seal settling?						
21. Well clearly visible and labeled?	<u> </u>	er dentembereden i 1911 - 1914				
Comments:						
		, , ,				
* Major well repair are those that require a subcontra	ctor or sepa	rate mobili	zation to coi	npiete	<del></del>	

	the transfer of the			<b>克克克克克</b>	ROJECTI	NFORMATION			The second of th		
	Ste: <u>i/</u> ∢	cmillio=				_ Client:	<u> </u>				
Project No				Task #:		_ Start Date:				Time	1440
Field Pers		Mathis	J Evens			_ Finish Date:.	1-27-18			_ Time:	ide है
5 A 18 18 18 11 11 11 11 11 11 11 11 11 11	WELLINF	ORMATION		A CONTRACTOR OF THE PERSON		Region for the second of the second	EVENT	TYPE	and the same of th	and all manages before a consideration	Control of the Contro
	Well ID:	MW3R		Well Develop	ment	K	Low-Flow / L	ow Stress San	npling		
	Casing ID:		inches 🗌	Well Volume			Other (Specify				
in margar		er the state of the second	WAT	ER QUALIT	Y INDIGATE	RPARAMET	ERS (conti	nued)			
		Volume	Depth to				SEC or	Dissolved			
Sampling	1 1	Removed	Water	Drawdown	Temp.	pН	Cond.	Oxygen	Turbidity	ORP	` <b>∀i</b> sual
Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	' (NTU)	(mV)	Clarity
	1450		5,5		4						
	1442	<u>. i3</u>	5,5	<u> </u>	10.95	6.83	illa0_	0	0	-/2	C/+ 12-
	1444	4٤,	5.5	C	11.59	6.89	1160	0	0	-4C	closs
<u></u>	1446	· 74	5,5	0	11.97	6,92	1170	. <u>C</u>	0	- 5'2	Ctar
	1448	, ,52	5,5	0	11.97	6.45	1180	G	G	-58	clear
<b></b>											
				<del> </del>							<u> </u>
<u> </u>				<u> </u>	·	1					
						1					
<u> </u>											
	<del>                                     </del>			ļ	ļ	ļ	ļ			ļ	
<u> </u>				<u> </u>					<u> </u>		
ļ	<u> </u>		6.85.5 (85.45)	uri de a sistema esta ante esta a sua	Page growth and a control of		1000	er geleg village in der village village in der	G PROBLEM GARDING TOWNS	Sample durante (S. C.)	
	-		NOTES (	continued)	<u> </u>				ABBREVIA		
				,				Cond Actual Condu FT BTOC - Feet Belo na - Not Applicable nm - Not Measured			use
			· · · · · · · · · · · · · · · · · · ·								

Low Flow Sampling Form

Site	Vermid ion	Major wel	ls repairs* ı	required	Yes	No	NA
Inspection Date	t-24-18	to maintai	n well integ	grity?		٨	
Well Number	Mwc4						
	-up Monitoring Wells					<b>Comments</b>	
1. Outer protective	e Casing	Yes	No	NA			
Not corroded		X		1			
Not dented					***************************************	D 6 HA	
Not cracked			<u> </u>				
Not loose		<u> </u>	<u> </u>	<u> </u>			
2. Inner casing		Yes	No	NA			
Not corroded		<u>x</u>		7,77		,	
Not dented		Î	<u> </u>	ļ		<del></del> -	
Not cracked							
Not loose			<del></del>				
1101 10030		Yes	No	NA			
3. Are there ween	holes in outer casing?	1,00	X				
4. Weep holes able		•		X			·
5. Is there a lockab		Х				·-···	
6. Is there a lock pr	* *	<u> </u>					
7. Bumper posts in		1		<del>                                     </del>			··
, partiper posts iii	good condition:			1			
<u>Flushm</u>	ount Monitoring Wells	Yes	No	NA			
8. Can the lid be se	cured tightly?			Χ			
9. Does the lid have	e a gasket that seals?						
10. No water in the	flushmount?						
11. is the well cap I	ockable?	_			_		
12. Is there a lock p	resent?			V			
A !!	Adamina Mialia	Von	No	NA 3			
	Monitoring Wells	Yes	No	NA V	<del></del>		
Downhole Condition				\\\			
13. No obstructions	asuring point clearly marked?						
						·- ·	
15. No sediment in	or vegetation in well?			<b>──</b> ₩	·		
	much sediment?	£1		· · · · · · · · · · · · · · · · · · ·			
16. Installed as tota		ft					
17. Measured total	•	ft			•		1
17. Measureu totar	depth of well.	16				•	į
General Condition		Yes	No	NA			
18. Concrete pad in	stalled?		Ϋ́				
19 . Concrete pad				Ÿ			
Slope away forn	n casing?						
Not deteriorate	45						
Not heaved or b	elow surrounding grade?			1	· · · · · · · · · · · · · · · · · · ·		
20. No surface seal				V			
21. Well clearly visil	ole and labeled?	Κ.					
Comments:							
<sup>*</sup> Major well repair	are those that require a subcontr	actor or sepa	rate mobiliz	ation to con	nplete		

	See the second		STATE OF THE STATE	海源机场门下	ROJECTIN	FORMATION					
	Site:	Vermillion		<del></del>		Client:	NRT				
Project N				_ Task #:		Start Date:	1-24-18	y		Time:	1318
Field Pers	onnel: <i>T</i>	Mathis 3	Evans			Finish Date:	1-24-18			Time:	1334
		ORMATION:	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	a in the second of the second	and the contraction		EVENT	TYPE	S. Chick of Congression	esterni veri anti dell'interi di seriti i di	erson kent i en er Skriver
	Well ID:	MWO4		Well Develop	ment	<u> X</u>	Low-Flow / Lo	ow Stress Sam	pling		
	Casing ID:		inches	Well Volume.			Other (Specify)				
		and distribution of	WAT	ER QUALIT	OTADIDATO	R PARAMET	ERS (contir	nued)			
		Volume	Depth to				SEC or	Dissalved			
Sampling	1 1	Removed	Water	Drawdown	Temp.	pΗ	Cond.	Oxygen	Turbidity	ORP	Visual
Stage	(military)	(gallons)	(Feet)	(Feet)	(*C)	(SU)	(µs/cm)	(mg/L)	' (NTU)	(Van)	Clarity
	1318		6,76								
	1322	. 26	7,30	,54			***			ļ,	
	1324	. 39	7, 3c	0	ી.4૦	6.44	743	C	0	61	Clear
	1326	JENS-42 52	7,3c	୍	9.86	6.66	739	O	C	39	Clear
	1328	55,65 July 55	7.30	0 .	9,96	6.74	7 35	O	¢.	Z4	clear
	1330	£4. 65 ,78	7,30	O	10.06	6.82	734	0	O	19	West
	1337	e91	7.30	0	10.09	6.87	728	¢!	0	3	dear
	1334	1, 64	7,30	Ö	10.08	6.91	736	Q	Q	て	Cter-
								<u> </u>		<u></u>	
			_								
			_								
7			NOTES (	continued)	Section 1		gar i sami i sanga T		ABBREVIA	TIONS,	Winds of the Control
				Cond Actual Conductivity FT BTOC - Peet Below Top of Casing na - Not Applicable nm - Not Measured  C - Degrees Calcies							

Low Flow Sampling Form MW-1

Site Vermillion	Major well	s repairs* r	equired •	Yes	No	NA
Inspection Date 1-24-18	to maintair	n well integ	grity?		X	
Well Number MWOS						
Stick-up Monitoring Wells				_	Comments	
1. Outer protective Casing	Yes	No	NA			
Not corroded	χ					
Not dented						
Not cracked						
Not loose	₩					
2. Inner casing	Yes	No	NA			
Not corroded	Х					
Not dented .	1					
Not cracked						
Not loose	$\overline{V}$					
	Yes	No	NA			
3. Are there weep holes in outer casing?		1				
4. Weep holes able to drain?			1			
5. Is there a lockable cap present?	į					
6. Is there a lock present?				•		10.1
7. Bumper posts in good condition?						
	<u></u>		· · · · · · · · · · · · · · · · · · ·			
Flushmount Monitoring Wells	Yes	No	NA			
8. Can the lid be secured tightly?			, X			······
9. Does the lid have a gasket that seals?						
10. No water in the flushmount?						
11. Is the well cap lockable?						
12. Is there a lock present?			<del>                                      </del>			· · · · · · · · · · · · · · · · · · ·
			L			
All Monitoring Wells	Yes	No	NA			
Downhole Condition			1	• • • • • •		
12. Water level measuring point clearly marked?			1		<u> </u>	
13. No obstructions in well?		_				
14. No plant roots or vegetation in well?						
15. No sediment in bottom of well?			1	<del></del>		
If present, how much sediment?	ft		·			
16. Installed as total depth.	ft					
17. Measured total depth of well.	ft					1
General Condition	Yes	No	NA			
18. Concrete pad installed?	4				·	···
19 . Concrete pad	<del>,</del>					
Slope away form casing?	<del>                                     </del>					
Not deteriorated?						
Not heaved or below surrounding grade?						
20. No surface seal settling?	<del>                                     </del>					THE PROPERTY SHAPE SHAPE .
21. Well clearly visible and labeled?	<del>                                     </del>			<del></del>	<del></del>	<del></del>
Comments:						
			****	<del></del>		
Major well repair are those that require a subcontra	actor or senar	ate mobiliz	ation to com	nlete	······································	
	- reprior achar	111001114	-6011 60 6011	.p.000		

"特別的	accoming the second		Section of	<b>"我要有36"</b> 。	ROJECTIN	FORMATIO	N. S. C.					
	Site: Ve	?cMillien		-		Client:	NRT					
Project Nu	ımber:			Task #:		Start Date:	-Z4-1	S		Time:	14:3	
Field Pers	onnel:T	Mc+n:s	J. Evens		·	Finish Date:	1-24-18	3		Time:	1425	
		ORMATION-	erm o e la regionalista. La regionalista	a San Andreas	e de la companya de la companya de la companya de la companya de la companya de la companya de la companya de La companya de la companya de la companya de la companya de la companya de la companya de la companya de la co	estes e a la lambay est est	EVENT	TYPE	on or or or or or or or or or or or or or	A Y	ng kang panggan ang panggan ang panggan ang panggan ang panggan ang panggan ang panggan ang panggan ang pangga Sanggan panggan ang panggan ang panggan ang panggan ang panggan ang panggan ang panggan ang panggan ang panggan	
	'Well ID:	Mwos		Well Develop	ment	Low-Flow / Low Stress Sampling						
	Casing ID:		stiches	Well Volume			Other (Specify)					
with.	WATER QUALITY INDICATOR PARAMETERS (continued)											
		Volume	Depth to	ļ			SEC or	Dissolved				
Sampling	1 1	Removed	Water	Drawdown	Temp.	рН	Cond.	Oxygen	Turbidity	ORP	∵∕isual	
Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	· (NTU)	(mV)	Clarity	
	1413	i	le,38	<del> </del>			ļ <u> </u>			L		
	1421	252	6,38	0	9.73	6.96	1050		G	-39	CIPE;	
	1423	.65	(4.38	Q	<b>Q</b> , 90	6.98	1050	0	O	-37	dese	
	1425	, 78	4.38	0	9.47	6.99	1650	0	0	-35	clear	
					L							
	1											
									<del> </del>			
-												
	: .		NOTES (	continued)				A STANFORM STANFORM	ABBREVIA	TIONS.	region to the second	
						Cond Actual Conductivity ORP - Oxidation-Re				corica. Consucrance is ure		

Low Flow Sampling Form MW-1

## Monitoring Well Evaluation Checklist

Site Vermittion	Major wel	ls repairs* r	equired	Yes	No	NA
Inspection Date 1-24-18		n well integ			X	
Well Number MWGR		_	•			
Stick up Monitoring Wells					Comments	
1. Outer protective Casing	Yes	No	NA	}		
Not corroded	Х					
Not dented			1	<u> </u>		<del></del>
Not cracked		,		. , ,	e generale and market and any enterprise on the grang	
Not loose						
	•	•	•	•		
2. Inner casing	Yes	No	NA NA			
Not corroded	X					
Not dented						*
Not cracked		İ				
Not loose						
	Yes	No	NA			
3. Are there weep holes in outer casing?		*				
4. Weep holes able to drain?		· · · · · · · · · · · · · · · · · · ·	X			
5. Is there a lockable cap present?	X		· · · · · · · · · · · · · · · · · · ·			
6. Is there a lock present?	X					-
7. Bumper posts in good condition?	<u> </u>				<del></del>	
, , so a condition,			l 1			
Flushmount Monitoring Wells	Yes	No	NA			
8. Can the lid be secured tightly?	100	110	Ϋ́			
9. Does the lid have a gasket that seals?			i			
10. No water in the flushmount?						
11. Is the well cap lockable?				<del> </del>		
12. Is there a lock present?					• • •	
112. 13 tilete a tock present:			Ψ			
All Monitoring Wells	Yes	No	NA			1
Downhole Condition	163	140	Y Y		·······	
12. Water level measuring point clearly marked?			- 1			
13. No obstructions in well?						
14. No plant roots or vegetation in well?			<del></del>	<u> </u>		
15. No sediment in bottom of well?						
If present, how much sediment?	ft					
16. Installed as total depth.	ft					
17. Measured total depth of well.	ft					
17. Measured total depth of well.						
General Condition	Yes	No	NA			
18. Concrete pad Installed?	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	110	(347)		- con the distribution of the contraction of the co	error common con con con
19 . Concrete pad	1-3-1					
Slope away form casing?	<del>                                     </del>					
Not deteriorated?	<del>                                     </del>					
Not heaved or below surrounding grade?	<del>                                      </del>				· · · · · · · · · · · · · · · · · · ·	
20. No surface seal settling?						
21. Well clearly visible and labeled?	<del>       </del>					
Comments:	<u> </u>					
Comments.						
* Major well repair are those that require a subcontr	actor or sens	rate mobilis	ation to con	nnlete		
major wenteban are those that require a subconti	accor or separ	ace modiliz	23011 10 101	ipicte		

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	Site:	lern	nillion				_ Client:	NRT				
Project No					Task#:	···	Start Date:				Time:	340
Field Pers	onnel:	7 /	Mathis T	Evans			Finish Date:.	1-24-18	>		Time:	1355
	WELL	NFOF	NOITAM				And the second second	EVENT	TYPE	entre en en en en	Agency of the color	y com a pro-
	Well ID	: <u>N</u>	WOORR		Well Develop	ment	X	Low-Flow / L	ow Stress Sam	npling		
ļ	Casing ID	i:	1-54.78	inches	Well Volume	Approach Sai	mpling 🔲	Other (Specify	):			
100			ile in the second	WÀT	ER QUALIT	YINDICATO	R PARAMET	ERS (conti	nued)		*. 1.	
	[ ]		Volume	Depth to				SEC or	Dissolved			
Sampling	1 1		Removed	Water	Drawdown	Temp.	pH	Cond.	Oxygen	Turbidity	ORF	Visual
Stage	(milit		(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	· (NTU)	(mV)	Clarity
	134			<u>5,15</u>			ļ <u>, ,</u>				ļ <u>.</u>	
	135		.13		0	9,97	6,74	1180	0	0	-35	Clear
	133		,26	<u> </u>	<u> </u>	10,39	6.75	1190	0	0	- 59	CHOI
	//3	<u> 55</u>	, '3 q	<u> </u>	5	10.58	6.76	1200	0	a	-64	1 jacor
	1	<del></del> -			<u> </u>		<u> </u>		<u> </u>			
				_								
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				NOTES (	continued)	Maria Ma				ABBREVIA	TIONS.	esta en esta esta esta en esta en esta en esta en esta en esta en esta en esta en esta en esta en esta en esta Esta en esta en esta en esta en esta en esta en esta en esta en esta en esta en esta en esta en esta en esta e
			•						Cond Actual Condu FT BTOC - Feet Belon na - Not Applicable nm - Not Measured	clivity	ORP - Oxidation-Pose - Oxidation-Pose - Specific Elec SU - Standard Unit Temp - Temperatu "C - Degrees Ceto	rtrica: Conspetance E
						•						
1												
<u></u>	<del>.  </del>								<del></del>			

Low Flow Sampling Form, MW41

## Monitoring Well Evaluation Checklist

Site Vermitten	e Vecnitton Major wells repairs* require								
Inspection Date /-24-/¥	to maintai	n well integ	grity?		X				
Well Number Nw 8K			-	***************************************		·····			
Stick-up Monitoring Wells				<u>Comments</u>					
1. Outer protective Casing	Yes	No	NA						
Not corroded	X								
Not dented			<u> </u>						
Not cracked									
Not loose	[ •	<u> </u>							
1									
2. Inner casing	Yes	No	NA						
Not corroded	X								
Not dented			<u>}</u>						
Not cracked · .									
Not loose	1								
	Yes	No	NA						
3. Are there weep holes in outer casing?		Χ							
4. Weep holes able to drain?			1						
5. Is there a lockable cap present?	X			"					
6. Is there a lock present?	X								
7. Bumper posts in good condition?	X								
·									
Flushmount Monitoring Wells	Yes	No	NA						
8. Can the lid be secured tightly?			χ						
9. Does the lid have a gasket that seals?	:		l						
10. No water in the flushmount?				·····					
11. Is the well cap lockable?									
12. Is there a lock present?		•	V						
All Monitoring Wells	Yes	No	NA						
Downhole Condition			X						
12. Water level measuring point clearly marked?			1						
13. No obstructions in well?									
14. No plant roots or vegetation in well?				•					
15. No sediment in bottom of well?			4						
If present, how much sediment?	ft								
16. Installed as total depth.	ft								
17. Measured total depth of well.	ft					j			
General Condition	Yes	No	NA						
18. Concrete pad installed?	1	X							
19 . Concrete pad			X						
Slope away form casing?			Χ						
Not deteriorated?			Ϋ́						
Not heaved or below surrounding grade?			χ						
20. No surface seal settling?			×						
21. Weli clearly visible and labeled?	X								
Comments:									
<ul> <li>Major well repair are those that require a subcontra</li> </ul>	ctor or sepai	ate mobiliz	ation to con	nplete					

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	Site: Vecn	illion				Client:	NRT				
Project N				_ Task #:		Start Date:	1-24-18			Time: . <sup>1</sup>	153
Field Pers	onnel: T. A	idhis J.	Erens			Finish Date:	1-24-18			Time:	58.5°
A Service Serv	WELL INFOR	MATION	* *	to a section of the file			EVENT	TYPE	and the second second	Tage - Co. Sec. 4 Tage 4	
	Well ID:	niu sł		Well Develop	ment	X	Low-Flow / Low	ow Stress San	pling		
	Casing ID:		inches 🔲	Well Volume.	Approach Sa	mpling 🔲	Other (Specify)	):			
Standing of	où vission	34. 20 miles · 数。	WAT	ER QUALITY	/ INDICATE	R PARAMET	ERS (conti	nued)			
		Volume	Depth to				SEC or	Dissolved			
Sampling		Removed	Water	Drawdown	Temp.	pН	Cond.	Oxygen	Turbidity	ORP	√isual
Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	, (NLN)	(mV)	Clarity
<u></u>	1453		12.74				<u></u>			36	
<u> </u>	1459	-3৭	12.74	0	10,45	7,08	1446	0	0	-0-23	Clear
	1501	٠5٢	12,74	c	0.60	6.96	1510	O	0	-Z¢	clear
	1503	. 65	12.74	0	10.61	6,92	1550	0	0	zo	rla:
	15c5	. 78	12.74	0	10.6	6.88	1610	0	0	-Z0	clear
		<u> </u>									
			_								
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		1									÷
			NOTES	continued)	graphic of the second	rice some some sign			ABBREVIA	TIONS	Marin Anglish
	1	· · · · · · · · · · · · · · · · · · ·		Lagy of Table 2 and Table 2 and Table 2	<u> </u>			Cond Actual Condu FT BTOC - Feel Belor na - Not Applicable nm - Not Measured	clivily	ORP - Oxidation-Rec SEC - Specific Electr SU - Standard Units Temp - Temperature "C - Degrees Celcies	ical Cerductance

## Monitoring Well Evaluation Checklist

Site	Vermillion	Major wel	ls repairs* ı	required	Yes	No	NA
Inspection Date		to maintai	n well integ	grity?		/	<del></del>
Well Number	MWOg						
Stick	k-up Monitoring Wells					Comments	
1. Outer protective	e Casing	Yes	No	NA			
Not corroded		×					
Not dented					7-11-226		<del>** * · · · · · · · · · · · · · · · · · </del>
Not cracked							
Not loose		1					
				*			
2. Inner casing		Yes	No	NA			
Not corroded		X					
Not dented							
Not cracked							***************************************
Not loose		1/					
		Yes	No	NA		-	
3. Are there weep	holes in outer casing?		Χ				
4. Weep holes able				1	<del></del>	··	
5. Is there a lockab		K		<del>                                     </del>			
6. Is there a lock p						······	
7. Bumper posts in					<del></del>		
· bumper posts in	good conditions		l,	<u> </u>			
Flushm	ount Monitoring Wells	Yes	No	NA			
8. Can the lid be se		163	110	X			
	e a gasket that seals?	<b> </b>					
10. No water in the	~						-
11. Is the well cap							
-				<del>                                     </del>			
12. Is there a lock p	préseuct					···········	
ΔI	Monitoring Wells	Yes	No	NA			
Downhole Condition		163	140	X			
	asuring point clearly marked?						
13. No obstruction		<u> </u>					
	or vegetation in well?				•		· · · · · ·
15. No sediment in	<del>-</del>						
	much sediment?			V			
16. Installed as total		ft					
	•						
17. Measured total	depth of well.	ft					
General Condition		Yes	No	NA			
18. Concrete pad ir	Sholleda.	\ \ \ \ \	NO	NA .			
19 . Concrete pad ii	istalieu :	1					
Slope away form	n ancina?	<del></del>			······································		
Not deteriorate							
	·						
	pelow surrounding grade?	J					
20. No surface seal		<del>     </del>					
21 Weli clearly visi	DIE SUG ISDEIEG!						
Comments:							
····				····			
k 84a2aa	and the parth of the second of						
iviajor well repair	are those that require a subcont	ractor or sepa	rate mobiliz	adon to con	ipiete		

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	Site: V	ermillion		<u>.</u>		_ Client.	NRT				
Project No				Task #:	T	Start Date:	j-24-				13 <i>5</i> °C
Field Pers	onnel: $\mathcal{T}$	Methis I	5/4,3			_ Finish Date: _	1-24-1	8		. 18110	/35°C
	WELL INFO	PRMATION:	7.42	er a samme de l'impression		eran eran eran eran eran eran eran eran	EVENT	TYPE		ing the second of the second o	3.
	Well ID:	MWOG		Well Develop	ment		Low-Flow / Lo	ow Stress Sam	pling		
	Casing ID:		riches	Well Volume	Approach Sa	mpling 🔲	Other (Specify)	):			
Service .		न व्यक्तिकेषि हुन	WAT	ER QUALIT	Y INDICATE	R PARAMET	ERS (contin	nued)	Acres 1		
		Volume	Depth to				SEC or	Dissolved			
Sampling	1 1	Removed	Water	Drawdown	Temp.	pН	Cond.	Oxygen	Turbidity	ORP	Visual
Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(ha/cw)	(mg/L)	' (NTU)	(mV)	Clarity
	1350		5.66							<u> </u>	
ļ	<u> </u>									<u> </u>	
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			<u> </u>	<b></b>						<u> </u>	
ļ	<u> </u>		<del>                                     </del>	ļ <u>-</u>						<del> </del>	_
	<del>                                     </del>	1						<u> </u>			
		<u> </u>		-		-				<u> </u>	
	-			<del> </del> -	<del> </del>					<u> </u>	
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		_	<del></del>								
						<del> </del>				<del> </del>	
<u> </u>	-			<del> </del>	<u></u>	<del></del>			<del> </del>	<del> </del>	
7. je	<u> </u>		I NOTES	continued)	1				ABBREVIA	TIONS	water the
	<u> </u>	<u> </u>	MOAES (	continued):		1000	va at ta Na	Cond Actual Conduc		ORP - Oxidation-R	eduction Potential
1	İ							FT BTOC - Feet Belov na - Not Applicable	Y Top of Casing	SEC - Specific Ele SU - Standard Uni	cuical Conductance s
		•						nm - Not Measured		Temp - Temperah *C - Degrees Celo	
				•							
<u> </u>	<u> </u>					····				•	

Low Flow Sampling Form MW-1

## Monitoring Well Evaluation Checklist

Site Vermillion	Major wel	s repairs*	Yes	No	NA	
Inspection Date 1-24-/8		n well inte			1 7	
Well Number Nuis	10 1110111101		J. 147 1		<u> </u>	
Stick-up Monitoring Wells					Comments	
1. Outer protective Casing	Yes	No	NA	1		
Not corroded	X					
Not dented			1			
Not cracked	<u> </u>					
Not loose	1/					
	L.			L		
2. Inner casing	Yes	No	NA			
Not corroded	X					
Not dented	1				<del></del>	
Not cracked				***************************************		<del></del>
Not loose			<u> </u>			
	Yes	No	NA			
3. Are there weep holes in outer casing?		X	<del> </del>			
4. Weep holes able to drain?	······································	<u> </u>	x			
5. Is there a lockable cap present?	Y		<u> </u>	······································	••••	
6. Is there a lock present?	7			<del></del>	<del></del>	
7. Bumper posts in good condition?					<del></del>	
			1			
Flushmount Monitoring Wells	Yes	No	NA NA			
8. Can the lid be secured tightly?	163		X			
9. Does the lid have a gasket that seals?						
10. No water in the flushmount?						
11. Is the well cap lockable?						
12. Is there a lock present?						
and there a lock presents						<u>.</u>
All Monitoring Wells	Yes	No	NA			
Downhole Condition	103		V V			
12. Water level measuring point clearly marked?			1			
13. No obstructions in well?						· · · · · · · · · · · · · · · · · · ·
14. No plant roots or vegetation in well?						·····
15. No sediment in bottom of well?			W			
If present, how much sediment?	ft					
16. Installed as total depth.	ft					
17. Measured total depth of well.	ft					
ar trousuited total depth of trem	<u>``</u>					
General Condition	Yes	No	NA			
18. Concrete pad installed?	1 7		/`		÷	· · · · · · · · · · · · · · · · · · ·
19 . Concrete pad	1					
Slope away form casing?	<del>-</del>					
Not deteriorated?	<del>  - </del>					•••
Not heaved or below surrounding grade?						
20. No surface seal settling?	[				<u></u>	
21. Well clearly visible and labeled?	<del>                                     </del>					
Comments:						
Sommetics.						
* Major well repair are those that require a subcont	ractor or com-	ata mahili	ation to ac-	anlata		
major well repair are those that reduce a subconti	actor or sebar	are monilly	ation to con	thiere		

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	Site:	Vermilli	0.5				_ Client:	NRT				
Project Nu					Task #:		Start Date:	1-2418			Time:	;355
Field Pers	onnel:	T Math;	ς -	S. Erans			Finish Date:	1-24-18			Time:	1355
a designation of the	WELLIN	IFORMAT			The commence of the control of the c		de d'agranda de la compansión de la comp	EVENT	TYPĒ	The grant of the second	andrei (1946) u demoni	
	Well ID:	Mwi	9		Well Develop			Low-Flow / L	ow Stress San	npling		
	Casing ID:			nches	Well Volume	Approach Sa	mpling	Other (Specify	):			
يُن مِن الله الله الله الله الله الله الله الل			A Alexander	- WA	TER QUALIT	LINDICATO	R PARAMET	ERS (conti	nued)			
		Vo	lume	Depth to				SEC or	Dissolved			
Sampling	1 1		noved	Water	Drawdown	Temp.	рН	Cond.	Oxygen	Turbidity	ORP	Visual
Stage	(milita		allons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	, (NLN)	(m,\)	Carty
	1335			ઇડ,હો	_		ļ				ļ	
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* 19 <sup>2</sup> A	i i			NOTES	(continued)	Sant Kalister		新加州		ABBREVIA		samen <u>i roje du</u> koloni. Li sameni <u>Lis</u>
									Cond Actual Conduc FT BTOC - Feet Belon na - Not Applicable nm - Not Measured		ORP - Oxidation-R SEC - Specific Ele SU - Standard Uni Temp - Temperatu "C - Degrees Celc	ctaca. Conquiciance is ire

Low Flow Sampling Form

## Monitoring Well Evaluation Checklist

Site Vermilion	Major well	s repairs*	equired	Yes	No	NA
Inspection Date 1-24-19	to maintair	-	,		X	
Well Number MWZO		•	• . • .			
Stick-up Monitoring Wells					Comments	
1. Outer protective Casing	Yes	No	NA			
Not corroded	X.					
Not dented	X			1		
Not cracked	Κ.	,		ACTOR OF THE PARTY	*** **********************************	
Not loose	Χ.					
2. Inner casing	Yes	No	NA			
Not corroded	X					
Not dented	< \					
Not cracked	Ϋ́					
Not loose	X					
	Yes	No	NA			
3. Are there weep holes in outer casing?		×				
4. Weep holes able to drain?			X,			
5. Is there a lockable cap present?	X					
6. Is there a lock present?	X					
7. Bumper posts in good condition?	X					
•						
Flushmount Monitoring Wells	Yes	No	NA			
8. Can the lid be secured tightly?			1 1			
9. Does the lid have a gasket that seals?						
10. No water in the flushmount?						
11. Is the well cap lockable?						
12. Is there a lock present?			V		-	
			·			
All Monitoring Wells	Yes	No	NA NA			
Downhole Condition			X		·	
12. Water level measuring point clearly marked?				<del></del>		
13. No obstructions in well?						
14. No plant roots or vegetation in well?			<del></del>			
15. No sediment in bottom of well?			<u> </u>			
If present, how much sediment?	ft					
16. Installed as total depth.	ft					
17. Measured total depth of well.	ft					
General Condition	Voc I	No	NA			
18. Concrete pad installed?	Yes	INO	INA	-		
19 . Concrete pad installed?	X					
Slope away form casing?	X					
Not deteriorated?	*					
Not heaved or below surrounding grade?	}					
20. No surface seal settling?	K		<u> </u>	<del> </del>	····	
20. No surface seaf settling? 21. Well clearly visible and labeled?	X   X	······································				
car. Well clearly visible and labeled?  Comments:	<u> </u>					
somments.						
Major well repair are those that require a subcont	ractor or const	ate mobili	ration to com	nlete		
wells. Activehen ete mose mer reduite a sopcont	incros of schall	are moning	adon to con	ibiere		

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	Site: 1/2	VM:Illies		···		Client	NRT	·			
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Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	· (NTU)	(mV)	Clarity
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					·						

Low Flow Sampling Form

## Monitoring Well Evaluation Checklist

Site Vermillion	Site Vernition Major wells repairs* required							
Inspection Date 1-24-14	to mainta	in well inte	grity?		Χ			
Well Number								
						•		
Stick-up Monitoring Wells				_	Comments			
1. Outer protective Casing	Yes	No	NA					
Not corroded	X							
Not dented								
Not cracked		7						
Not loose	<u> </u>							
				_				
2. Inner casing	Yes	No	NA	] .				
Not corroded	Υ.							
Not dented								
Not cracked .								
Not loose	V							
	Yes	No	NA					
3. Are there weep holes in outer casing?		<b>X</b>		1				
4. Weep holes able to drain?		1	X					
5. is there a lockable cap present?	X		<u> </u>					
6. Is there a lock present?	X							
7Bumper-posts in good condition?	× ×							
		1		<u> </u>				
Flushmount Monitoring Wells	Yes	No	NA NA	1				
8. Can the lid be secured tightly?		7.5	X		-			
9. Does the lid have a gasket that seals?		•	<del>                                     </del>	<u> </u>	W			
10. No water in the flushmount?			<del>                                     </del>					
11. Is the well cap lockable?				! !		· <del>-</del> ·····		
12. Is there a lock present?	-		<del>                                     </del>		····			
	L.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	L.,.,		<u> </u>	······································			
All Monitoring Wells	Yes	No	NA .	}				
Downhole Condition	163	140	1					
12. Water level measuring point clearly marked?	· <del> </del>		<del>                                     </del>					
13. No obstructions in well?			<del>                                     </del>		*	<del></del>		
14. No plant roots or vegetation in well?			<del>                                     </del>					
15. No sediment in bottom of well?			<del>                                     </del>					
If present, how much sediment?	ft		<u> </u>	•				
16. Installed as total depth.	ft							
17. Measured total depth of well.								
17. Measured total depth of well.	ft							
General Condition	Yes	No	NA .					
18. Concrete pad installed?	res X	INU	INA .		<del></del>			
19 . Concrete pad installed r								
	X	<del></del>				<del> </del>		
Slope away form casing? Not deteriorated?	\X							
	X				<del></del>			
Not heaved or below surrounding grade?				-1/24/20-21-000-0				
20. No surface seal settling?	1 3							
21. Well clearly visible and labeled?			L					
Comments:								
			,		<del></del>			
Major well repair are those that require a subcontra	actor or sepai	ate mobiliz	ration to cor	npiete				

4 15 66				THE PROPERTY OF LAND AND ADDRESS OF THE PROPERTY OF THE PROPER	ROJECTIN		Acres 2 Company	<b>在一直,在了</b> 是最	The state of the state of	The state of the s	
' <u> </u>		million				Client:					
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	Well ID:	MW34		Well Develop	ment	×	Low-Flow / Lo	ow Stress Sam	rpling		
	Casing ID:		inches		Approach San	npling	Other (Specify)	):			
ign y'd	Comment of the		WAT	ER QUALITY	Y INDICATO	R PARAMET	ERS (contin	nued)			
		Volume	Depth to				SEC or	Dissolved			
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	1230	.39		0	10,61	l <sub>0</sub> .5℃	11:50	0	77.9	-21	Clase
	1232	<u>•57</u>		G	10,70	<b>6.5</b> 3	1120	0	41.6	-29	Clear
	12.34	•65		0,	10,77	6,55	1(ZC :	0	34,6	-35	Cless/
	1236	.78		0	j0:8l	6.56	11 ZC	С	34,9	-4C	Clear
	1238	. ,91	$\downarrow$	0	10,87	<i>6.5</i> 8	1120	O.	33.4	-44	Clesz
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Low-Flow Sampling Form

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		Volume	Depth to				SEC or	Dissolved			
Sampling	Time	Removed	Water	Drawdown	Temp.	pН	Cond.	Oxygen	Turbidity	ORP	Visuai
Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	, (NLN)	(mV)	Carity
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Low Flow Sampling Form MW-1

Low-Flow Sampling Form

Page 2 of 2

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Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	, (NLN)	(m <sup>i</sup> v')	Clarity
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Low Flow Sampling Form MW-1

### Field Calibration Form Groundwater Quality Meter

Groundwater Quality Meter Manufacturer/Model Serial Number 3 β T 川 K い P い	Heriba	ńżς		
oxidation/reduction potential, dissolved oxygen, pl	i, tubidit	у		

Date of Calibration Check	Calibration Standard Concentration	Calibration Reading	Within +/_ 10% (yes or no)	Comments
1-24-18	4,60	41.cxs	\/e5	
	700	7.00		
	10.00	lo,ci		
	1412	14[0		
	0.0	0.0		
	100%	90.1%		
	7,00	7,05		
	1415	1450		
	0,0	<b>୦</b> .୩		
1	100%	102,4%	1	
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### INSTRUMENT CALIBRATION REPORT



## Pine Environmental Services LLC

10883 Metro Blvd Maryland Heights, MO 63043 Toll-free: (800) 242-3910

### Pine Environmental Services, Inc.

Instrument ID 21305
Description Horiba U-52

Calibrated 1/15/2018 5:09:57PM

Manufacturer Horiba Model Number U-5000

Serial Number/Lot 3BTHKUPU

Number

Location St. Louis

Department

State Certified

Status Pass

Temp °C 22.2

Humidity % 32

	- Annual	Calib	ration Specific	ations			
Group N	up#1 ame PH Accy Pct of Re	eading		Range Acc % Reading Acc % Plus/Minus	3.0000		
Nom In Val / In Val 7.00 / 7.00	<u>In Type</u> PH	<u>Out Val</u> 7.00	Out Type PH	<u>Fnd As</u> 6.99	<u>Lft As</u> 7.00	<u>Dev%</u> 0.00%	Pass/Fail Pass
4.00 / 4.00	PH	4.00	PH	4.10	4.00	0.00%	Pass
Group N	up # 2 fame Turbidity Accy Pct of Re		Range Acc % Reading Acc % Plus/Minus	3.0000		***************************************	
Nom In Val / In Val 0.00 / 0.00 800.00 / 800.00	<u>In Type</u> NTU NTU	Out Val 0.00 800.00	<u>Out Type</u> NTU NTU	Fnd As 3.60 832.00	Lft As 0.00 800.00	<u>Dev%</u> 0.00% 0.00%	Pass/Fail Pass Pass
Group N	up# 3 (ame Conduct) Accy Pct of Re	•		Range Acc % Reading Acc % Plus/Minus	3.0000		
Nom In Val / In Val 0.718 / 0.718	<u>In Type</u> ms/cm	<u>Out Val</u> 0.718	Out Type ms/cm	<u>Fnd As</u> 0.558	<u>Lft As</u> 0.718	<u>Dev%</u> 0.00%	Pass/Fail Pass
5.000 / 5.000 80.000 / 80.000	ms/cm ms/cm	5.000 80.000	ms/cm ms/cm	4.900 78.000	5.000 80.000	0.00% 0.00%	Pass Pass
Group N	up# 4 (ame Redox (C			Range Acc % Reading Acc % Plus/Minus	3.0000		
Nom In Val / In Val 240.00 / 240.00	<u>In Type</u> mv	Out Val 240.00	Out Type mv	<u>Fnd As</u> 251.00	<u>Lft As</u> 240.00	<u>Dev%</u> 0.00%	Pass/Fail Pass
Group N	up# 5 lame Disolved Accy Pct of Re	•	Range Acc % Rending Acc % Plus/Minus	3.0000		<u> </u>	

#### INSTRUMENT CALIBRATION REPORT



#### Pine Environmental Services LLC

10883 Metro Blvd Maryland Heights, MO 63043 Toll-free: (800) 242-3910

### Pine Environmental Services, Inc.

Instrument ID 21305
Description Horiba U-52

Calibrated 1/15/2018 5:09:57PM

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment Please call 800-301-9663 for Technical Assistance

## INSTRUMENT CALIBRATION REPORT



### Pine Environmental Services LLC

10883 Metro Blvd Maryland Heights, MO 63043 Toll-free: (800) 242-3910

### Pine Environmental Services, Inc.

Instrument ID 19277

Description Horiba U-52

Calibrated 1/15/2018 5:10:46PM

Manufacturer Horiba

Model Number U-52

Serial Number/ Lot PSN4WLPU

Number

Location St. Louis

Department

State Certified

Status Pass

Temp °C 22.2

Humidity % 32

#### Calibration Specifications

Group # 1

Group Name functionality test

Test Performed: Yes

As Found Result: Pass

As Left Result: Pass

#### Test Instruments Used During the Calibration

(As Of Cal Entry Date)

Test Standard ID Description

<u>Manufacturer</u>

Model Number

Serial Number /
Lot Number

Next Cal Date /
Last Cal Date / Expiration Date

**Opened Date** 

#### Notes about this calibration

Calibration Result Calibration Successful

Who Calibrated Chris Harkins

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment Please call 800-301-9663 for Technical Assistance



April 09, 2018

Steve Wiskes
Natural Resource Technology, Inc.
2422 East Washington Street
Suite 104
Bloomington, II 61/04
TEL. (414) 837-3614
FAX: (414) 837-3608

RE: Dynegy - Vermillion Power Station WorkOrder: 18030183

Dear Steve Wiskes:

TEKLAB, INC received 19 samples on 3/22/2018 8:20:00 PM for the analysis presented in the following report.

Samples are analyzed on an as received basis unless otherwise requested and documented. The sample results contained in this report relate only to the requested analytes of interest as directed on the chain of custody. NELAP accredited fields of testing are indicated by the letters NELAP under the Certification column. Unless otherwise documented within this report, Teklab Inc. analyzes samples utilizing the most current methods in compliance with 40CFR. All tests are performed in the Collinsville, IL laboratory unless otherwise noted in the Case Narrative.

All quality control criteria applicable to the test methods employed for this project have been satisfactorily met and are in accordance with NELAP except where noted. The following report shall not be reproduced, except in full, without the written approval of Teklab, Inc.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Michael L. Austin Project Manager (618)344-1004 ex 16 MAustin@teklabinc.com



# **Report Contents**

## http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 18030183

Client Project: Dynegy - Vermillion Power Station

Report Date: 09-Apr-18

## This reporting package includes the following:

Cover Letter	1
Report Contents	2
Definitions	3
Case Narrative	4
Accreditations	5
Laboratory Results	6
Sample Summary	24
Dates Report	25
Quality Control Results	34
Receiving Check List	41
Chain of Custody	Appended



#### **Definitions**

http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 18030183

Client Project: Dynegy - Vermillion Power Station

Report Date: 09-Apr-18

#### Abbr Definition

- \* Analytes on report marked with an asterisk are not NELAP accredited
- CCV Continuing calibration verification is a check of a standard to determine the state of calibration of an instrument between recalibration.
- DT Dilution factor is the dilution performed during analysis only and does not take into account any dilutions made during sample preparation. The reported result is final and includes all dilutions factors.
- DNI Did not ignite
- DUP Laboratory duplicate is an alliquot of a sample taken from the same container under laboratory conditions for independent processing and analysis independently of the original aliquot.
- ICV Initial calibration verification is a check of a standard to determine the state of calibration of an instrument before sample analysis is initiated.
- IDPH IL Dept. of Public Health
- LCS Laboratory control sample, spiked with verified known amounts of analytes, is analyzed exactly like a sample to establish Intra-laboratory or analyst specific precision and bias or to assess the performance of all or a portion of the measurement system. The acceptable recovery range is in the QC Package (provided upon request).
- LCSD Laboratory control sample duplicate is a replicate laboratory control sample that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
- MBLK Method blank is a sample of a matrix similar to the batch of associated sample (when available) that is free from the analytes of interest and is processed simultaneously with and under the same conditions as samples through all steps of the analytical procedures, and in which no target analytes or interferences should present at concentrations that impact the analytical results for sample analyses.
- MDL Method detection limit means the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero.
- MS Matrix spike is an aliquot of matrix fortified (spiked) with known quantities of specific analytes that is subjected to the entire analytical procedures in order to determine the effect of the matrix on an approved test method's recovery system. The acceptable recovery range is listed in the QC Package (provided upon request).
- MSD Matrix spike duplicate means a replicate matrix spike that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
- MW Molecular weight
- ND Not Detected at the Reporting Limit

#### NELAP NELAP Accredited

- PQL Practical quantitation limit means the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operation conditions. The acceptable recovery range is listed in the QC Package (provided upon request).
- RL The reporting limit the lowest level that the data is displayed in the final report. The reporting limit may vary according to customer request or sample dilution. The reporting limit may not be less than the MDL.
- RPD Relative percent difference is a calculated difference between two recoveries (ie. MS/MSD). The acceptable recovery limit is listed in the QC Package (provided upon request).
- SPK The spike is a known mass of target analyte added to a blank sample or sub-sample; used to determine recovery deficiency or for other quality control purposes
- Surr Surrogates are compounds which are similar to the analytes of interest in chemical composition and behavior in the analytical process, but which are not normally found in environmental samples.
- TIC Tentatively identified compound: Analytes tentatively identified in the sample by using a library search. Only results not in the calibration standard will be reported as tentatively identified compounds. Results for tentatively identified compounds that are not present in the calibration standard, but are assigned a specific chemical name based upon the library search, are calculated using total peak areas from reconstructed ion chromatograms and a response factor of one. The nearest Internal Standard is used for the calculation. The results of any TICs must be considered estimated, and are flagged with a "T". If the estimated result is above the calibration range it is flagged "ET"
- TNTC Too numerous to count ( > 200 CFU )

#### **Qualifiers**

- # Unknown hydrocarbon
- E Value above quantitation range
- I Associated internal standard was outside method criteria
- M Manual Integration used to determine area response
- R RPD outside accepted recovery limits
- T TIC(Tentatively identified compound)

- B Analyte detected in associated Method Blank
- H Holding times exceeded
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike Recovery outside recovery limits
- X Value exceeds Maximum Contaminant Level



## Case Narrative

#### http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.
Client Project: Dynegy - Vermillion Power Station

Work Order: 18030183 Report Date: 09-Apr-18

Cooler Receipt Temp: 5.42 °C

An employee of Teklab, Inc. collected the sample(s)

MW7 could not be collected; the well was dry. JE/EAH 3/23/18

#### Locations

	Collinsville		Springfield		Kansas City
Address	5445 Horseshoe Lake Road	Address	3920 Pintail Dr	Address	8421 Nieman Road
	Collinsville, IL 62234-7425		Springfield, IL 62711-9415		Lenexa, KS 66214
Phone	(618) 344-1004	Phone	(217) 698-1004	Phone	(913) 541-1998
Fax	(618) 344-1005	Fax	(217) 698-1005	Fax	(913) 541-1998
Email	jhriley@teklabinc.com	Email	KKlostermann@teklabinc.com	Email	jhriley@teklabinc.com
	Collinsville Air	4 1 2	Chicago		
Address	5445 Horseshoe Lake Road	Address	1319 Butterfield Rd.		
	Collinsville, IL 62234-7425		Downers Grove, IL 60515		
Phone	(618) 344-1004	Phone	(630) 324-6855		
Fax	(618) 344-1005	Fax			
Email	EHurley@teklabinc.com	Email	arenner@teklabinc.com		



## Accreditations

#### http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 18030183

Client Project: Dynegy - Vermillion Power Station

Report Date: 09-Apr-18

State	Dept	Cert #	NELAP	Exp Date	Lab
Illinois	IEPA	100226	NELAP	1/31/2019	Collinsville
Kansas	KDHE	E-103/4	NELAP	4/30/2018	Collinsville
Louisiana	LDEQ	166493	NELAP	6/30/2018	Collinsville
Louisiana	LDEQ	166578	NELAP	6/30/2018	Collinsville
Iexas	ICEQ	1104/04515-12-1	NELAP	7/31/2018	Collinsville
Arkansas	ADEQ	88 0966		3/14/2019	Collinsville
Illinois	IDPH	17584		5/31/2019	Collinsville
Indiana	ISDH	C-IL-06		1/31/2019	Collinsville
Kentucky	KDEP	98006		12/31/2018	Collinsville
Kentucky	UST	0073		1/31/2019	Collinsville
Louisiana	LDPH	LA170027		12/31/2018	Collinsville
Missouri	MDNR	930		1/31/2019	Collinsville
Missouri	MDNR	00930		5/31/2019	Collinsville
Oklahoma	ODEQ	9978		8/31/2018	Collinsville
Tennessee	TDEC	04905		1/31/2019	Collinsville



http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 18030183

Client Project: Dynegy - Vermillion Power Station

Report Date: 09-Apr-18

Lab ID: 18030183-001

Matrix: GROUNDWATER

Client Sample ID: MW1

Collection Date: 03/22/2018 13:39

Matrix. GROUNDWAT	LIX	Conection Date: 05/22/2010 15.59							
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch	
FIELD ELEVATION MEASUR	EMENTS								
Depth to water from measuring p	oint *	0		79.37	ft	1	03/22/2018 13:39	R245290	
STANDARD METHOD 4500-H	B 2001 FIELD								
рН	*	1.00		6.92		1	03/22/2018 13:39	R245290	
STANDARD METHODS 2130	B FIELD								
Turbidity	*	1.0		3.3	NTU	1	03/22/2018 13:39	R245290	
STANDARD METHODS 18TH	ED. 2580 B FIELD								
Oxidation-Reduction Potential	*	-300		77	mV	1	03/22/2018 13:39	R245290	
STANDARD METHODS 2510	B FIELD								
Conductivity	*	1		2820	μS/cm	1	03/22/2018 13:39	R245290	
STANDARD METHODS 2550	B FIELD								
Temperature	*	0		14.09	°C	1	03/22/2018 13:39	R245290	
STANDARD METHODS 4500-	O G FIELD						102 03400 0000	0.0000000000000000000000000000000000000	
Oxygen, Dissolved	*	1.00		1.02	mg/L	1	03/22/2018 13:39	R245290	
STANDARD METHODS 2540	C (DISSOLVED) 199	7					3883-5-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-		
Total Dissolved Solids	NELAP	20		2240	mg/L	1	03/23/2018 15:09	R245066	
STANDARD METHODS 4500-	NO3 F (TOTAL) 200	0							
Nitrogen, Nitrate (as N)	NELAP	0.050		0.289	mg/L	1	03/27/2018 14:02	R245123	
SW-846 9036 (TOTAL)									
Sulfate	NELAP	500		1280	mg/L	50	03/28/2018 19:20	R245223	
SW-846 9214 (DISSOLVED)									
Fluoride	NELAP	0.10		0.15	mg/L	1	03/23/2018 18:06	R245039	
SW-846 9251 (TOTAL)									
Chloride	NELAP	5		22	mg/L	1	03/28/2018 19:11	R245264	
SW-846 3005A, 6020A, META	LS BY ICPMS (DISS	OLVED)							
Arsenic	NELAP	0.0010		< 0.0010	mg/L	5	03/23/2018 22:21	140252	
Barium	NELAP	0.0010		0.0137	mg/L	6	03/26/2018 15:38	140252	
Boron	NELAP	0.0250	S	1.98	mg/L	5	03/27/2018 12:41	140252	
Iron	NELAP	0.0250		0.248	mg/L	5	03/27/2018 12:41	140252	
Manganese	NELAP	0.0010		0.0268	mg/L	5	03/26/2018 15:38	140252	
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	03/23/2018 22:21	140252	
B - Matrix interference present in s	ample. Verified by benc	h spike.			1766				



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Client: Natural Resource Technology, Inc.

Work Order: 18030183

Client Project: Dynegy - Vermillion Power Station

Report Date: 09-Apr-18

Lab ID: 18030183-002

Client Sample ID: MW2

Matrix: GROUNDWATER Collection Date: 03/22/2018 12:47

Matrix: GROUNDY	VATER	Collection Date: 03/22/2018 12:4/							
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch	
FIFLD FLEVATION MEAS	UREMENIS								
Depth to water from measuring	ng point *	0		18.90	ft	1	03/22/2018 12:47	R245290	
STANDARD METIIOD 450	0-II B 2001 FIELD								
pH	*	1.00		7.60		1	03/22/2018 12:47	R245290	
STANDARD METHODS 2	130 B FIELD								
Turbidity	*	1.0		< 1.0	NTU	1	03/22/2018 12:47	R245290	
STANDARD METHODS 18	TH ED. 2580 B FIELD								
Oxidation-Reduction Potentia	al *	-300		-144	mV	1	03/22/2018 12:47	R245290	
STANDARD METHODS 25	10 B FIELD								
Conductivity	*	1		862	µS/cm	1	03/22/2018 12:47	R245290	
STANDARD METHODS 25	550 B FIELD								
Temperature	*	0		14.22	°C	1	03/22/2018 12:47	R245290	
STANDARD METHODS 45	600-O G FIELD								
Oxygen, Dissolved	*	1.00		< 1.00	mg/L	1	03/22/2018 12:47	R245290	
STANDARD METHODS 25	540 C (DISSOLVED) 199	7							
Total Dissolved Solids	NELAP	20		506	mg/L	1	03/23/2018 15:09	R245066	
STANDARD METHODS 45	500-NO3 F (TOTAL) 200	0							
Nitrogen, Nitrate (as N)	NELAP	0.050		0.085	mg/L	1	03/27/2018 14:04	R245123	
SW-846 9036 (TOTAL)									
Sulfate	NELAP	50		85	mg/L	5	03/28/2018 15:03	R245223	
SW-846 9214 (DISSOLVE)	D)								
Fluoride	NELAP	0.10		0.66	mg/L	1	03/23/2018 18:07	R245039	
SW-846 9251 (TOTAL)									
Chloride	NELAP	10		33	mg/L	2	03/28/2018 14:36	R245264	
SW-846 3005A, 6020A, ME	ETALS BY ICPMS (DISS	OLVED)							
Arsenic	NELAP	0.0010		0.0107	mg/L	5	03/23/2018 22:45	140252	
Barium	NELAP	0.0010		0.174	mg/L	5	03/26/2018 15:47	140252	
Boron	NELAP	0.0250		0.273	mg/L	5	03/28/2018 13:09	140252	
Iron	NELAP	0.0250		0.982	mg/L	5	03/27/2018 12:49	140252	
Manganese	NELAP	0.0010		0.109	mg/L	5	03/26/2018 15:47	140252	
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	03/23/2018 22:45	140252	



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Client: Natural Resource Technology, Inc.

Work Order: 18030183

Client Project: Dynegy - Vermillion Power Station

Report Date: 09-Apr-18

Lab ID: 18030183-004

Client Sample ID: MW10

Matrix: GROUNDWATER

Collection Date: 03/22/2018 15:14

Matrix: GROUNDY	VATER	Collection Date: 03/22/2010 15.14							
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch	
FIELD ELEVATION MEAS	UREMENTS								
Depth to water from measuri	ng point *	0		50.84	fl	1	03/22/2018 15:14	R245290	
STANDARD METHOD 450	0-H B 2001 FIELD								
pH	*	1.00		6.81		1	03/22/2018 15:14	R245290	
STANDARD METHODS 2	130 B FIELD								
Turbidity	*	1.0		2.9	NTU	1	03/22/2018 15:14	R245290	
STANDARD METHODS 18	TH ED. 2580 B FIELD							HILLIAN A	
Oxidation-Reduction Potentia	al *	-300		74	mV	1	03/22/2018 15:14	R245290	
STANDARD METHODS 25	510 B FIELD								
Conductivity	*	1		1450	μS/cm	1	03/22/2018 15:14	R245290	
STANDARD METHODS 25	550 B FIELD		- 1						
Temperature	*	0		14.26	°C	1	03/22/2018 15:14	R245290	
STANDARD METHODS 45	500-O G FIELD			in data.					
Oxygen, Dissolved	*	1.00		< 1.00	mg/L	1	03/22/2018 15:14	R245290	
STANDARD METHODS 25	540 C (DISSOLVED) 199	7							
Total Dissolved Solids	NELAP	20		890	mg/L	1	03/23/2018 15:10	R245066	
STANDARD METHODS 45	500-NO3 F (TOTAL) 200	0							
Nitrogen, Nitrate (as N)	NELAP	0.050		0.115	mg/L	1	03/27/2018 14:13	R245123	
SW-846 9036 (TOTAL)									
Sulfate	NELAP	100		296	mg/L	10	03/28/2018 15:19	R245223	
SW-846 9214 (DISSOLVE)	D)								
Fluoride	NELAP	0.10		0.20	mg/L	1	03/23/2018 18:09	R245039	
SW-846 9251 (TOTAL)									
Chloride	NELAP	5		9	mg/L	1	03/28/2018 15:11	R245264	
SW-846 3005A, 6020A, MI	ETALS BY ICPMS (DISS	OLVED)							
Arsenic	NELAP	0.0010		< 0.0010	mg/L	5	03/23/2018 22:53	140252	
Barium	NELAP	0.0010		0.0890	mg/L	5	03/26/2018 15:55	140252	
Boron	NELAP	0.0250		0.0812	mg/L	5	03/27/2018 12:58	140252	
Iron	NELAP	0.0250		0.0272	mg/L	5	03/27/2018 12:58	140252	
Manganese	NELAP	0.0010		0.0327	mg/L	5	03/26/2018 15:55		
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	03/23/2018 22:53	140252	



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Client: Natural Resource Technology, Inc.

Work Order: 18030183

Client Project: Dynegy - Vermillion Power Station

Report Date: 09-Apr-18

Lab ID: 18030183-005

Client Sample ID: MW17

Matrix: GROUNDWATER Collection Date: 03/22/2018 8:44

TOTAL SERVICE STATE	17 -11.1		The character by the thirty of the first than the character of the charact								
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch			
FIELD ELEVATION MEASU	REMENIS										
Depth to water from measuring	point *	0		39.05	ft	1	03/22/2018 8:44	R245290			
STANDARD METIIOD 4500	-II B 2001 FIELD										
pH	*	1.00		6.86		1	03/22/2018 8:44	R245290			
STANDARD METHODS 21	30 B FIELD										
Turbidity	*	1.0		32.4	NTU	1	03/22/2018 8:44	R245290			
STANDARD METHODS 181	H ED. 2580 B FIELD										
Oxidation-Reduction Potential	*	-300		18	mV	1	03/22/2018 8:44	R245290			
STANDARD METHODS 251	0 B FIELD				~						
Conductivity	*	1		2850	μS/cm	1	03/22/2018 8:44	R245290			
STANDARD METHODS 255	0 B FIELD										
Temperature	*	0		12.44	°C	1	03/22/2018 8:44	R245290			
STANDARD METHODS 450	0-O G FIELD		A	*							
Oxygen, Dissolved	*	1.00		< 1.00	mg/L	1	03/22/2018 8:44	R245290			
STANDARD METHODS 254	O C (DISSOLVED) 199	7									
Total Dissolved Solids	NELAP	20		2090	mg/L	1	03/23/2018 15:10	R245066			
STANDARD METHODS 450	0-NO3 F (TOTAL) 200	0									
Nitrogen, Nitrate (as N)	NELAP	0.050		0.086	mg/L	1	03/27/2018 14:15	R245123			
SW-846 9036 (TOTAL)											
Sulfate	NELAP	500		1270	mg/L	50	03/28/2018 15:27	R245223			
SW-846 9214 (DISSOLVED)											
Fluoride	NELAP	0.10		0.23	mg/L	1	03/23/2018 18:10	R245039			
SW-846 9251 (TOTAL)											
Chloride	NELAP	5	_	26	mg/L	1	03/28/2018 15:19	R245264			
SW-846 3005A, 6020A, ME	TALS BY ICPMS (DISS	OLVED)									
Arsenic	NELAP	0.0010		0.0018	mg/L	5	03/23/2018 23:02	140252			
Barium	NFI AP	0.0010		0.0275	mg/L	5	03/26/2018 16:03	140252			
Boron	NELAP	0.0250		3.25	mg/L	5	03/27/2018 15:01	140252			
Iron	NELAP	0.0250		3.92	mg/L	5	03/27/2018 15:01				
Manganese	NELAP	0.0010		0.132	mg/L	5	03/26/2018 16:03				
Selenium	NELAP	0.0010		0.0012	mg/L	5	03/23/2018 23:02	140252			



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Client: Natural Resource Technology, Inc.

Work Order: 18030183

Client Project: Dynegy - Vermillion Power Station

Report Date: 09-Apr-18

Lab ID: 18030183-006

Client Sample ID: MW18

Matrix: GROUNDWATER

Collection Date: 03/22/2018 9:01

CHARLES GIVE ON	MILIX			C.OHCCIOI	Trate. (11)	22/20120	7107 E	
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASU	JREMENTS							
Depth to water from measuring	g point *	0		24.26	ft	1	03/22/2018 0:01	R245200
STANDARD METHOD 450	0-H B 2001 FIELD							
pH	*	1.00		6.87		1	03/22/2018 9:01	R245290
STANDARD METHODS 21	30 B FIELD							
Turbidity	*	1.0		< 1.0	NTU	1	03/22/2018 9:01	R245290
STANDARD METHODS 18	TH ED. 2580 B FIELD							
Oxidation-Reduction Potentia	*	-300		47	mV	1	03/22/2018 9:01	R245290
STANDARD METHODS 25	10 B FIELD							
Conductivity		1		2310	μS/cm	1	03/22/2018 9:01	R245290
STANDARD METHODS 25	50 B FIELD							
Temperature	*	0		13.34	°C	1	03/22/2018 9:01	R245290
STANDARD METHODS 45	00-O G FIELD							
Oxygen, Dissolved	*	1.00		< 1.00	mg/L	1	03/22/2018 9:01	R245290
STANDARD METHODS 25	40 C (DISSOLVED) 199	7						
Total Dissolved Solids	NELAP	20		1540	mg/L	1	03/23/2018 15:10	R245066
STANDARD METHODS 45	00-NO3 F (TOTAL) 200	0						
Nitrogen, Nitrate (as N)	NELAP	0.050		< 0.050	mg/L	1	03/27/2018 14:28	R245123
SW-846 9036 (TOTAL)								
Sulfate	NELAP	200		795	mg/L	20	03/28/2018 15:35	R245223
SW-846 9214 (DISSOLVED	))							
Fluoride	NELAP	0.10		0.14	mg/L	1	03/23/2018 18:12	R245039
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		24	mg/L	1	03/28/2018 15:27	R245264
SW-846 3005A, 6020A, ME	TALS BY ICPMS (DISS	OLVED)						
Arsenic	NELAP	0.0010		< 0.0010	mg/L	5	03/23/2018 23:10	140252
Barium	NELAP	0.0010		0.0150	mg/L	5	03/26/2018 16:11	140252
Boron	NELAP	0.0250		7.95	mg/L	5	03/27/2018 15:09	140252
Iron	NELAP	0.0250		0.0573	mg/L	5	03/27/2018 15:09	
Manganese	NELAP	0.0010		1.33	mg/L	5	03/26/2018 16:11	
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	03/23/2018 23:10	140252



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Client: Natural Resource Technology, Inc.

Work Order: 18030183

Client Project: Dynegy - Vermillion Power Station

Report Date: 09-Apr-18

Lab ID: 18030183-007

Client Sample ID: MW21

Matrix: GROUNDWATER Collection Date: 03/22/2018 13:08

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUR	EMENIS							
Depth to water from measuring p	oint *	0		91 25	ft	1	03/22/2018 13:08	R245290
STANDARD METHOD 4500-I	B 2001 FIELD							
pH	*	1.00		7.40		1	03/22/2018 13:08	R245290
STANDARD METHODS 2130	B FIELD							
Turbidity	*	1.0		< 1.0	NTU	1	03/22/2018 13:08	R245290
STANDARD METHODS 18TH	ED. 2580 B FIELD							
Oxidation-Reduction Potential	*	-300		-134	mV	1	03/22/2018 13.08	R245290
STANDARD METHODS 2510	B FIELD							
Conductivity	*	1		732	µS/cm	1	03/22/2018 13:08	R245290
STANDARD METHODS 2550	B FIELD							
Temperature	*	0		13.49	°C	1	03/22/2018 13:08	R245290
STANDARD METHODS 4500-	O G FIELD				-)			19.00
Oxygen, Dissolved	*	1.00		< 1.00	mg/L	1	03/22/2018 13:08	R245290
STANDARD METHODS 2540	C (DISSOLVED) 199	7						
Total Dissolved Solids	NELAP	20		390	mg/L	1	03/23/2018 15:11	R245066
STANDARD METHODS 4500-	NO3 F (TOTAL) 200	0						
Nitrogen, Nitrate (as N)	NELAP	0.050		< 0.050	mg/L	1	03/27/2018 14:30	R245123
SW-846 9036 (TOTAL)								
Sulfate	NELAP	10		22	mg/L	1	03/28/2018 15:38	R245223
SW-846 9214 (DISSOLVED)								
Fluoride	NELAP	0.10		1.10	mg/L	1	03/23/2018 18:16	R245039
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		< 5	mg/L	1	03/28/2018 15:35	R245264
SW-846 3005A, 6020A, META	LS BY ICPMS (DISS	OLVED)						
Arsenic	NELAP	0.0010		0.0322	mg/L	5	03/23/2018 23:18	140252
Barium	NELAP	0.0010		0.0909	mg/L	5	03/26/2018 16:19	140252
Boron	NELAP	0.0250		0.758	mg/L	5	03/27/2018 13.06	140252
Iron	NELAP	0.0250		0.683	mg/L	5	03/27/2018 13:06	
Manganese	NELAP	0.0010		0.110	mg/L	5	03/26/2018 16:19	
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	03/23/2018 23:18	140252



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Client: Natural Resource Technology, Inc.

Work Order: 18030183

Client Project: Dynegy - Vermillion Power Station

Report Date: 09-Apr-18

Lab ID: 18030183-008

Client Sample ID: MW3R

Matrix: GROUNDWATER Collection Date: 03/22/2018 12:13

Matrix. Checomity	AILK			Conceilor	Date. US	22/2010	12.15	
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
HILD FLEVATION MEASU	JREMENIS							
Depth to water from measuring	ng point *	0		7.71	ft	1	03/22/2018 12:13	R245290
STANDARD METHOD 450	0-H B 2001 FIELD							
рН	*	1.00		7.34		1	03/22/2018 12:13	R245290
STANDARD METHODS 21	130 B FIELD							
Turbidity	*	1.0		1.5	NTU	1	03/22/2018 12:13	R245290
STANDARD METHODS 18	TH ED. 2580 B FIELD							
Oxidation-Reduction Potentia	l *	-300		-128	mV	1	03/22/2018 12:13	R245290
STANDARD METHODS 25	10 B FIELD							
Conductivity	•	1		1070	µS/cm	1	03/22/2018 12:13	R245290
STANDARD METHODS 25	50 B FIELD							
Temperature	*	0		13.49	°C	1	03/22/2018 12:13	R245290
STANDARD METHODS 45	00-O G FIELD							
Oxygen, Dissolved	*	1.00		< 1.00	mg/L	-1-	03/22/2018 12:13	R245290
STANDARD METHODS 25	40 C (DISSOLVED) 199	97						
Total Dissolved Solids	NELAP	20		606	mg/L	1	03/23/2018 15:11	R245066
STANDARD METHODS 45	00-NO3 F (TOTAL) 200	00						
Nitrogen, Nitrate (as N)	NELAP	0.050		< 0.050	mg/L	1	03/27/2018 14:32	R245123
SW-846 9036 (TOTAL)								
Sulfate	NELAP	50		101	mg/L	5	03/28/2018 16:08	R245223
SW-846 9214 (DISSOLVED	0)							
Fluoride	NELAP	0.10		0.69	mg/L	1	03/23/2018 18:17	R245039
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		25	mg/L	1	03/28/2018 15:54	R245264
SW-846 3005A, 6020A, ME	TALS BY ICPMS (DISS	SOLVED)						
Arsenic	NELAP	0.0010		0.0061	mg/L	5	03/23/2018 23:26	140252
Barium	NELAP	0.0010		0 167	mg/L	5	03/26/2018 16:28	140252
Boron	NELAP	0.0250		3.33	mg/L	5	03/27/2018 13:14	
Iron	NELAP	0.0250		1.49	mg/L	5	03/27/2018 13:14	
Manganese	NELAP	0.0010		0.0366	mg/L	5	03/26/2018 16:28	
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	03/23/2018 23:26	140252



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Client: Natural Resource Technology, Inc.

Work Order: 18030183

Client Project: Dynegy - Vermillion Power Station

Report Date: 09-Apr-18

Lab ID: 18030183-009

Client Sample ID: MW4

Matrix: GROUNDWA	IER			Collection	Date: 03/	22/2018	10:55	
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
HELD ELEVATION MEASUR	EMENIS							
Depth to water from measuring	point *	0		6.35	ft	1	03/22/2018 10:55	R245290
STANDARD METHOD 4500 I	1 B 2001 FIELD							
pH	*	1.00		7.54		1	03/22/2018 10:55	R245290
STANDARD METHODS 2130	B FIELD							
Turbidity	*	1.0		< 1.0	NTU	1	03/22/2018 10:55	R245290
STANDARD METHODS 18TH	ED. 2580 B FIELD							
Oxidation-Reduction Potential	*	-300		-126	mV	1	03/22/2018 10:55	R245290
STANDARD METHODS 2510	B FIELD							
Conductivity	*	1		643	μS/cm	1	03/22/2018 10:55	R245290
STANDARD METHODS 2550	B FIELD							
Temperature	*	0		10.69	°C	1	03/22/2018 10:55	R245290
STANDARD METHODS 4500	-O G FIELD							
Oxygen, Dissolved	*	1.00		< 1.00	mg/L	1	03/22/2018 10:55	R245290
STANDARD METHODS 2540	C (DISSOLVED) 199	7						
Total Dissolved Solids	NELAP	20		370	mg/L	1	03/23/2018 15:11	R245066
STANDARD METHODS 4500	-NO3 F (TOTAL) 200	00						
Nitrogen, Nitrate (as N)	NELAP	0.050		< 0.050	mg/L	1	03/27/2018 14:37	R245123
SW-846 9036 (TOTAL)								
Sulfate	NELAP	10		47	mg/L	1	03/28/2018 16:10	R245223
SW-846 9214 (DISSOLVED)								
Fluoride	NELAP	0.10		0.54	mg/L	1	03/23/2018 18:19	R245039
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		9	mg/L	1	03/28/2018 16:08	R245264
SW-846 3005A, 6020A, META	ALS BY ICPMS (DISS	OLVED)		and the second				
Arsenic	NELAP	0.0010		0.0047	mg/L	5	03/23/2018 23:35	140252
Barium	NELAP	0.0010		0.246	mg/L	5	03/20/2018 10:30	140252
Boron	NELAP	0.0250		4.80	mg/L	5	03/27/2018 13:22	140252
Iron	NELAP	0.0250		0.974	mg/L	5	03/27/2018 13:22	140252
Manganese	NELAP	0.0010		0.595	mg/L	5	03/26/2018 16:36	140252
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	03/23/2018 23:35	140252



http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 18030183

Client Project: Dynegy - Vermillion Power Station

Report Date: 09-Apr-18

Lab ID: 18030183-010

Client Sample ID: MW5

Matrix: GROUNDWATER Collection Date: 03/22/2018 11:19

Matrix: GROUNDY	VATER			Conection	Date. 03/	22/2010	11.19	
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEAS	UREMEN18							
Depth to water from measuring	ng point *	0		6.43	ft	1	03/22/2018 11:19	R245290
STANDARD METIIOD 450	0-II B 2001 FIELD		***************************************					
pH	*	1.00		7.43		1	03/22/2018 11:19	R245290
STANDARD METHODS 2	130 B FIELD							
Turbidity	*	1.0		< 1.0	NTU	1	03/22/2018 11:19	R245290
STANDARD METHODS 18	TH ED. 2580 B FIELD							
Oxidation-Reduction Potentia	al *	-300		-16	mV	1	03/22/2018 11:19	R245290
STANDARD METHODS 25	510 B FIELD							
Conductivity	*	1		888	μS/cm	1	03/22/2018 11:19	R245290
STANDARD METHODS 25	550 B FIELD							
Temperature	*	0		10.73	°C	1	03/22/2018 11:19	R245290
STANDARD METHODS 45	500-O G FIELD							
Oxygen, Dissolved	*	1.00		< 1.00	mg/L	1	03/22/2018 11:19	R245290
STANDARD METHODS 25	540 C (DISSOLVED) 1997	7	)					
Total Dissolved Solids	NELAP	20		624	mg/L	1	03/23/2018 15:11	R245066
STANDARD METHODS 45	500-NO3 F (TOTAL) 2000	)						
Nitrogen, Nitrate (as N)	NELAP	0.050		< 0.050	mg/L	1	03/27/2018 14:39	R245123
SW-846 9036 (TOTAL)								
Sulfate	NELAP	100		281	mg/L	10	03/28/2018 16:24	R245223
SW-846 9214 (DISSOLVEI	D)							
Fluoride	NELAP	0.10		0.67	mg/L	1	03/23/2018 18:24	R245039
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		11	mg/L	1	03/28/2018 16:16	R245264
SW-846 3005A, 6020A, ME	ETALS BY ICPMS (DISSO	OLVED)						
Arsenic	NELAP	0.0010		< 0.0010	mg/L	5	03/23/2018 23:43	140252
Barium	NELAP	0.0010		0.0234	mg/L	5	03/26/2018 16:44	140252
Boron	NELAP	0.0250		16.7	mg/L	5	03/27/2018 15.17	140252
Iron	NELAP	0.0250		< 0.0250	mg/L	5	03/27/2018 15:17	140252
Manganese	NELAP	0.0010		0.358	mg/L	5	03/26/2018 16:44	140252
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	03/23/2018 23:43	140252



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Client: Natural Resource Technology, Inc.

Work Order: 18030183

Client Project: Dynegy - Vermillion Power Station

Report Date: 09-Apr-18

Lab ID: 18030183-011

Client Sample ID: MW6R

Matrix: GROUNDWATER Collection Date: 03/22/2018 9:25

Matrix: GROUNDW	ATEK	***************************************		Collection	1 Date: 03/	22/2018	9:25	
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEAS	UREMENTS							
Depth to water from measuring	ng point *	0		4.12	ft	1	03/22/2018 9:25	R245290
STANDARD METHOD 450	0 H B 2001 FIELD							
pH	*	1.00		7.09		1	03/22/2018 9:25	R245290
STANDARD METHODS 2	130 B FIELD							
Turbidity	*	1.0		1.5	NTU	1	03/22/2018 9:25	R245290
STANDARD METHODS 18	TH ED. 2580 B FIELD			CALCALOR MANAGEMENT				
Oxidation-Reduction Potentia	l *	-300		-121	mV	1	03/22/2018 9:25	R245290
STANDARD METHODS 25	10 B FIELD							
Conductivity	*	1		1040	μS/cm	1	03/22/2018 9:25	R245290
STANDARD METHODS 25	50 B FIELD							
Temperature	*	0		10.95	°C	1	03/22/2018 9:25	R245290
STANDARD METHODS 45	00-O G FIELD							
Oxygen, Dissolved	*	1.00		< 1.00	mg/L	1	03/22/2018 9:25	R245290
STANDARD METHODS 25	40 C (DISSOLVED) 199	7						
Total Dissolved Solids	NELAP	20		590	mg/L	1	03/23/2018 15:12	R245066
STANDARD METHODS 45	00-NO3 F (TOTAL) 200	0						
Nitrogen, Nitrate (as N)	NELAP	0.050		< 0.050	mg/L	1	03/27/2018 14:48	R245123
SW-846 9036 (TOTAL)								
Sulfate	NELAP	50		135	mg/L	5	03/28/2018 16:32	R245223
SW-846 9214 (DISSOLVEI	0)							
Fluoride	NELAP	0.10		0.22	mg/L	1	03/23/2018 18:26	R245039
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		6	mg/L	1	03/28/2018 16:24	R245264
SW-846 3005A, 6020A, ME	TALS BY ICPMS (DISS	OLVED)						
Arsenic	NELAP	0.0010		< 0.0010	mg/L	5	03/23/2018 23:51	140252
Barium	NELAP	0.0010		0.0948	mg/L	5	03/26/2018 17:09	140252
Boron	NELAP	0.0250		0.166	mg/L	5	03/28/2018 13:01	140252
Iron	NELAP	0.0250		0.118	mg/L	5	03/27/2018 13:30	140252
Manganese	NELAP	0.0010		0.149	mg/L	5	03/26/2018 17:09	140252
Selenium	NELAP	0.0010		0.0027	mg/L	5	03/23/2018 23:51	140252



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Client: Natural Resource Technology, Inc.

Work Order: 18030183

Client Project: Dynegy - Vermillion Power Station

Report Date: 09-Apr-18

Lab ID: 18030183-012

Client Sample ID: MW8R

Matrix: GROUNDWATFR Collection Date: 03/22/2018 11:58

The state of the s	1111					00/ 22/					
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch			
FIELD ELEVATION MEASUR	REMENTS										
Depth to water from measuring	point *	0		12.67	ft	1	03/22/2018 11:58	R245290			
STANDARD METHOD 4500-	I B 2001 FIELD										
pH	*	1.00		7.67		1	03/22/2018 11:58	R245290			
STANDARD METHODS 2130	) B FIELD										
Turbidity	*	1.0		1.6	NTU	1	03/22/2018 11:58	R245290			
STANDARD METHODS 18TH	ED. 2580 B FIELD										
Oxidation-Reduction Potential	*	-300		-54	mV	1	03/22/2018 11:58	R245290			
STANDARD METHODS 2510	B FIELD	10000		100							
Conductivity	*	1		2200	μS/cm	1	03/22/2018 11:58	R245290			
STANDARD METHODS 2550	B FIELD						Live Spart Court & State				
Temperature	*	0		11.79	°C	1	03/22/2018 11:58	R245290			
STANDARD METHODS 4500	-O G FIELD										
Oxygen, Dissolved	*	1.00		< 1.00	mg/L	1	03/22/2018 11:58	R245290			
STANDARD METHODS 2540	C (DISSOLVED) 199	7									
Total Dissolved Solids	NELAP	20		1700	mg/L	1	03/23/2018 15:12	R245066			
STANDARD METHODS 4500	-NO3 F (TOTAL) 200	0									
Nitrogen, Nitrate (as N)	NELAP	0.055		< 0.055	mg/L	1	03/27/2018 14:50	R245123			
Elevated reporting limit due to ma	trix interference.										
SW-846 9036 (TOTAL)											
Sulfate	NELAP	500		1010	mg/L	50	03/28/2018 16:59	R245223			
SW-846 9214 (DISSOLVED)											
Fluoride	NELAP	0.10		< 0.10	mg/L	1	03/23/2018 18:27	R245039			
SW-846 9251 (TOTAL)											
Chloride	NELAP	5		15	mg/L	1	03/28/2018 16:32	R245264			
SW-846 3005A, 6020A, META	ALS BY ICPMS (DISS	OLVED)									
Arsenic	NELAP	0.0010		0.0029	mg/L	5	03/23/2018 23:59	140252			
Barium	NELAP	0.0010		0.124	mg/L	5	03/26/2018 17:17	140252			
Boron	NELAP	0.0250		38.4	mg/L	5	03/27/2018 15:25	140252			
Iron	NELAP	0.0250		0.0406	mg/L	5	03/27/2018 15:25	140252			
Manganese	NELAP	0.0010		0.244	mg/L	5	03/26/2018 17:17	140252			
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	03/23/2018 23:59	140252			



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Client: Natural Resource Technology, Inc.

Work Order: 18030183

Client Project: Dynegy - Vermillion Power Station

Report Date: 09-Apr-18

Lab ID: 18030183-013

Client Sample ID: MW9

Matrix: GROUNDWATER

Collection Date: 03/22/2018 9:35

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUR	REMENTS							
Depth to water from measuring	point *	0		4.60	ft	1	03/22/2018 9:35	R245290



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Client: Natural Resource Technology, Inc.

Work Order: 18030183

Client Project: Dynegy - Vermillion Power Station

Report Date: 09-Apr-18

Lab ID: 18030183-014

Client Sample ID: MW19

Matrix: GROUNDWATER Collection Date: 03/22/2018 9:25

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
<b>FIELD ELEVATION MEASUREM</b>	ENTS							
Depth to water from measuring poin	t *	0		6.23	ft	1	03/22/2018 9:25	R245290



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Client: Natural Resource Technology, Inc.

Work Order: 18030183

Client Project: Dynegy - Vermillion Power Station

Report Date: 09-Apr-18

Lab ID: 18030183-015

Client Sample ID: MW20

Matrix: GROUNDWATER

Collection Date: 03/22/2018 9:58

Matrix. GROUNDY	Tatilis. GROUNDWATER Concetton Date. 03/22/2010 9.36							
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEAS	UREMENTS							
Depth to water from measuring	ng point *	0		13 09	ft	1	03/22/2018 9:58	R245290
STANDARD METHOD 450	0-H B 2001 FIELD							
pH	*	1.00		7.18		1	03/22/2018 9:58	R245290
STANDARD METHODS 2	130 B FIELD							
Turbidity	*	1.0		8.1	NTU	1	03/22/2018 9:58	R245290
STANDARD METHODS 18	TH ED. 2580 B FIELD		A STATE OF THE STA				DOLDER STREET, SEE STREET, SEE	
Oxidation-Reduction Potentia		-300		-31	mV	1	03/22/2018 9:58	R245290
STANDARD METHODS 25	10 B FIELD							
Conductivity	*	1		585	μS/cm	1	03/22/2018 9:58	R245290
STANDARD METHODS 25	50 B FIELD							
Temperature	*	0		10.55	°C	1	03/22/2018 9:58	R245290
STANDARD METHODS 45	00-O G FIELD							
Oxygen, Dissolved	*	1.00		< 1.00	mg/L	1	03/22/2018 9:58	R245290
STANDARD METHODS 25	40 C (DISSOLVED) 1997	7						
Total Dissolved Solids	NELAP	20		312	mg/L	1	03/23/2018 15:13	R245066
STANDARD METHODS 45	00-NO3 F (TOTAL) 200	0						
Nitrogen, Nitrate (as N)	NELAP	0.050		< 0.050	mg/L	1	03/27/2018 14:52	R245123
SW-846 9036 (TOTAL)								
Sulfate	NELAP	10		46	mg/L	1	03/28/2018 17:02	R245223
SW-846 9214 (DISSOLVEI	0)							
Fluoride	NELAP	0.10		< 0.10	mg/L	1	03/23/2018 18:28	R245039
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		< 5	mg/L	1	03/28/2018 16:59	R245264
SW-846 3005A, 6020A, ME	ETALS BY ICPMS (DISS	OLVED)						
Arsenic	NELAP	0.0010		< 0.0010	mg/L	5	03/24/2018 0:24	140252
Barium	NELAP	0.0010		0.0133	mg/L	5	03/26/2018 17:25	140252
Boron	NELAP	0.0250		0.262	mg/L	5	03/27/2018 13:39	140252
Iron	NELAP	0.0250		0.0991	mg/L	5	03/27/2018 13:39	
Manganese	NELAP	0.0010		0.0159	mg/L	5	03/26/2018 17:25	
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	03/24/2018 0:24	140252



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Client: Natural Resource Technology, Inc.

Work Order: 18030183

Client Project: Dynegy - Vermillion Power Station

Report Date: 09-Apr-18

Lab ID: 18030183-016

Client Sample ID: MW34

Matrix: GROUNDWATER Collection Date: 03/22/2018 10:32

Matrix. GROUNDWA	TIX: GROUNDWATER Conection Date: 03/22/2016 10:32							
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUR	EMENIS							
Depth to water from measuring p	point *	0		13.99	ft	1	03/22/2018 10:32	R245290
STANDARD METHOD 4500-	1 B 2001 FIELD							
pH	*	1.00		7.18		1	03/22/2018 10:32	R245290
STANDARD METHODS 2130	B FIELD							
Turbidity	*	1.0		52.1	NTU	1	03/22/2018 10:32	R245290
STANDARD METHODS 18TH	ED. 2580 B FIELD							
Oxidation-Reduction Potential	*	-300		-153	mV	1	03/22/2018 10:32	R245290
STANDARD METHODS 2510	B FIELD							
Conductivity	*	1		954	µS/cm	1	03/22/2018 10:32	R245290
STANDARD METHODS 2550	B FIELD							
Temperature	*	0		12.27	°C	1	03/22/2018 10:32	R245290
STANDARD METHODS 4500	-O G FIELD						return b 110 at 100 at	
Oxygen, Dissolved	*	1.00		< 1.00	mg/L	1	03/22/2018 10:32	R245290
STANDARD METHODS 2540	C (DISSOLVED) 199	7						
Total Dissolved Solids	NELAP	20		484	mg/L	1	03/23/2018 15:13	R245066
STANDARD METHODS 4500	-NO3 F (TOTAL) 200	0						
Nitrogen, Nitrate (as N)	NELAP	0.050		< 0.050	mg/L	1	03/27/2018 15:05	R245123
SW-846 9036 (TOTAL)								
Sulfate	NELAP	10	S	< 10	mg/L	1	03/28/2018 17:10	R245223
Matrix spike did not recover within	control limits due to mat	rix interference	9.					
SW-846 9214 (DISSOLVED)								
Fluoride	NELAP	0.10		0.81	mg/L	1	03/23/2018 18:33	R245039
SW-846 9251 (TOTAL)								
Chloride	NELAP	10		34	mg/L	2	03/28/2018 17:18	R245264
SW-846 3005A, 6020A, META	ALS BY ICPMS (DISS	OLVED)						
Arsenic	NELAP	0.0010		0.0223	mg/L	5	03/24/2018 0:32	140252
Barium	NELAP	0.0010		0.142	rng/L	5	03/26/2018 17:33	140252
Boron	NELAP	0.0250		0.453	mg/L	5	03/27/2018 13:47	140252
Iron	NELAP	0.0250		5.01	mg/L	5	03/27/2018 13:47	
Manganese	NELAP	0.0010		0.0614	mg/L	5	03/26/2018 17:33	140252
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	03/24/2018 0:32	140252



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Client: Natural Resource Technology, Inc.

Work Order: 18030183

Client Project: Dynegy - Vermillion Power Station

Report Date: 09-Apr-18

Lab ID: 18030183-017

Client Sample ID: Field Blank

Matrix: AQUEOUS Collection Date: 03/22/2018 15:21

Analyses	Certification	RL	Qual	Result	Units	DF	<b>Date Analyzed</b>	Batch
STANDARD METIIODS 254	10 C (DISSOLVED) 199	7						
Total Dissolved Solids	NELAP	20		< 20	mg/L	1	03/23/2018 15:13	R245060
STANDARD METHODS 450	00-NO3 F (TOTAL) 200	00						
Nitrogen, Nitrate (as N)	NELAP	0.050		< 0.050	mg/L	1	03/27/2018 15:08	R245123
SW-846 9036 (TOTAL)								
Sulfate	NELAP	10		< 10	mg/L	1	03/28/2018 17:45	R245223
SW-846 9214 (DISSOLVED)	)							
Fluoride	NELAP	0.10		< 0.10	mg/L	1	03/23/2018 18:35	R245039
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		< 5	mg/L	1	03/28/2018 17:43	R245264
SW-846 3005A, 6020A, ME	TALS BY ICPMS (DISS	OLVED)						
Arsenic	NELAP	0.0010		< 0.0010	mg/L	5	03/24/2018 0:40	140252
Barium	NELAP	0.0010		< 0.0010	mg/L	5	03/26/2018 17:42	140252
Boron	NELAP	0.0250		< 0.0250	mg/L	5	03/27/2018 14:36	140252
Iron	NELAP	0.0250		< 0.0250	mg/L	5	03/27/2018 14:36	140252
Manganese	NELAP	0.0010		< 0.0010	mg/L	5	03/26/2018 17:42	140252
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	03/24/2018 0:40	140252



http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 18030183

Client Project: Dynegy - Vermillion Power Station

Report Date: 09-Apr-18

Lab ID: 18030183-018

Client Sample ID: DUP1

Matrix: GROUNDWATER Collection Date: 03/22/2018 9:25

MATTIX: GROONDY	VATER Concerton Bate. 03/22/2010 3:23							
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEAS	UREMENIS							
Depth to water from measuri	ng point *	0		4.12	ft	1	03/22/2018 9:25	R245290
STANDARD METHOD 450	00 II B 2001 FIELD							***************************************
рН	*	1.00		7.09		1	03/22/2018 9:25	R245290
STANDARD METHODS 2	130 B FIELD							
Turbidity	*	1.0		1.5	NTU	1	03/22/2018 9:25	R245290
STANDARD METHODS 18	TH ED. 2580 B FIELD							
Oxidation-Reduction Potentia	al *	-300		-121	mV	1	03/22/2018 9:25	R245290
STANDARD METHODS 25	510 B FIELD							
Conductivity	*	1		1040	µS/cm	1	03/22/2018 9:25	R245290
STANDARD METHODS 25	550 B FIELD	1100-1100-1101						
Temperature	*	0		10.95	°C	1	03/22/2018 9:25	R245290
STANDARD METHODS 45	500-O G FIELD							
Oxygen, Dissolved	*	1.00		< 1.00	mg/L	1	03/22/2018 9:25	R245290
STANDARD METHODS 25	540 C (DISSOLVED) 199	7						
Total Dissolved Solids	NELAP	20		618	mg/L	1	03/23/2018 15:14	R245066
STANDARD METHODS 45	500-NO3 F (TOTAL) 200	0						
Nitrogen, Nitrate (as N)	NELAP	0.050		< 0.050	mg/L	1	03/27/2018 15:10	R245123
SW-846 9036 (TOTAL)								
Sulfate	NELAP	100		150	mg/L	10	03/28/2018 17:53	R245223
SW-846 9214 (DISSOLVE	D)							
Fluoride	NELAP	0.10		0.19	mg/L	1	03/23/2018 18:38	R245039
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		6	mg/L	1	03/28/2018 17:45	R245264
SW-846 3005A, 6020A, MI	ETALS BY ICPMS (DISS	OLVED)						
Arsenic	NELAP	0.0010		< 0.0010	mg/L	5	03/24/2018 0:49	140252
Barium	NFL AP	0.0010		0.0944	mg/L	5	03/26/2018 17:50	140252
Boron	NELAP	0.0250		0.145	mg/L	5	03/27/2018 14:44	
Iron	NELAP	0.0250		0.0255	mg/L	5	03/27/2018 14:44	
Manganese	NELAP	0.0010		0.148	mg/L	5	03/26/2018 17:50	
Selenium	NELAP	0.0010		0.0016	mg/L	5	03/24/2018 0:49	140252



http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 18030183

Client Project: Dynegy - Vermillion Power Station

Report Date: 09-Apr-18

Lab ID: 18030183-019

Client Sample ID: DUP2

Matrix: GROUNDWATER Collection Date: 03/22/2018 10:32

Matrix. GROUNDWATER Conection Date. 03/22/2010 10.52								
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUR	REMENTS							
Depth to water from measuring	point *	0		13.99	rı	1	03/22/2018 10.32	R245290
STANDARD METHOD 4500 I	H B 2001 FIELD	***************************************						
pH	*	1.00		7.18		1	03/22/2018 10:32	R245290
STANDARD METHODS 213	0 B FIELD							
Turbidity	*	1.0		52.1	NTU	1	03/22/2018 10:32	R245290
STANDARD METHODS 18TH	H ED. 2580 B FIELD							
Oxidation-Reduction Potential	*	-300		-153	mV	1	03/22/2018 10:32	R245290
STANDARD METHODS 2510	B FIELD							
Conductivity	*	1		954	μS/cm	1	03/22/2018 10:32	R245290
STANDARD METHODS 2550	B FIELD							
Temperature	*	0		12.27	°C	1	03/22/2018 10:32	R245290
STANDARD METHODS 4500	-O G FIELD							
Oxygen, Dissolved	*	1.00		< 1.00	mg/L	1	03/22/2018 10:32	R245290
STANDARD METHODS 2540	C (DISSOLVED) 199	7						
Total Dissolved Solids	NELAP	20		462	mg/L	1	03/23/2018 15:14	R245066
STANDARD METHODS 4500	)-NO3 F (TOTAL) 200	0						
Nitrogen, Nitrate (as N)	NELAP	0.050		< 0.050	mg/L	1	03/27/2018 15:14	R245123
SW-846 9036 (TOTAL)								
Sulfate	NELAP	10		< 10	mg/L	1	03/28/2018 18:01	R245223
SW-846 9214 (DISSOLVED)								
Fluoride	NELAP	0.10		0.81	mg/L	1	03/23/2018 18:39	R245039
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		32	mg/L	1	03/28/2018 17:59	R245264
SW-846 3005A, 6020A, MET	ALS BY ICPMS (DISS	OLVED)						
Arsenic	NELAP	0.0010		0.0221	mg/L	5	03/24/2018 0:57	140252
Barium	NELAP	0.0010		0.140	mg/L	5	03/26/2018 17:58	140252
Boron	NELAP	0.0250		0.436	mg/L	5	03/27/2018 14:53	
Iron	NELAP	0.0250		4.84	mg/L	5	03/27/2018 14:53	
Manganese	NELAP	0.0010		0.0612	mg/L	5	03/26/2018 17:58	
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	03/24/2018 0:57	140252



# Sample Summary

http://www.teklabinc.com/

Lab Sample ID	Client Sample ID	Matrix	Fractions	Collection Date
18030183-001	MWI	Groundwater	4	03/22/2018 13:39
18030183-002	MW2	Groundwater	4	03/22/2018 12:47
18030183-003	MW7	Groundwater	4	03/22/2018 0:00
18030183-004	MW10	Groundwater	4	03/22/2018 15:14
18030183-005	MW17	Groundwater	4	03/22/2018 8:44
18030183 006	MW18	Groundwater	4	03/22/2018 9:01
18030183-007	MW21	Groundwater	4	03/22/2018 13:08
18030183-008	MW3R	Groundwater	4	03/22/2018 12:13
18030183-009	MW4	Groundwater	4	03/22/2018 10:55
18030183-010	MW5	Groundwater	4	03/22/2018 11:19
18030183-011	MW6R	Groundwater	4	03/22/2018 9:25
18030183-012	MW8R	Groundwater	4	03/22/2018 11:58
18030183-013	MW9	Groundwater	1	03/22/2018 9:35
18030183-014	MW19	Groundwater	1	03/22/2018 9:25
18030183-015	MW20	Groundwater	4	03/22/2018 9:58
18030183-016	MW34	Groundwater	4	03/22/2018 10:32
18030183-017	Field Blank	Aqueous	4	03/22/2018 15:21
18030183-018	DUP1	Groundwater	4	03/22/2018 9:25
18030183-019	DUP2	Groundwater	4	03/22/2018 10:32



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Client: Natural Resource Technology, Inc.
Client Project: Dynegy - Vermillion Power Station

Work Order: 18030183 Report Date: 09-Apr-18

Sample ID	Client Sample ID	Collection Date	Received Date		
	Test Name			Prep Date/Time	Analysis Date/Time
8030183-001A	MWI	03/22/2018 15:39	03/22/2018 20:20		
	Field Elevation Measurements				03/22/2018 13:39
	Standard Method 4500-II B 2001 Field				03/22/2018 13:39
	Standard Methods 2130 B Field				03/22/2018 13:39
	Standard Methods 18th Ed. 2580 B Field				03/22/2018 13:39
	Standard Methods 2510 B Field				03/22/2018 13:39
	Standard Methods 2550 B Field				03/22/2018 13:39
	Standard Methods 4500-NO2 B (Total) 2000				03/23/2018 10:10
	Standard Methods 4500-O G Field				03/22/2018 13:39
	SW-846 9036 (Total)				03/28/2018 19:20
	SW-846 9251 (Total)				03/28/2018 19.11
18030183-001B	MW1	03/22/2018 13:39	03/22/2018 20:20		
	Standard Methods 2540 C (Dissolved) 1997				03/23/2018 15:09
	SW-846 9214 (Dissolved)				03/23/2018 18:06
18030183-001C	MWI	03/22/2018 13:39	03/22/2018 20:20		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			03/23/2018 10:07	03/23/2018 22:21
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			03/23/2018 10:07	03/26/2018 15:38
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			03/23/2018 10:07	03/27/2018 12:41
18030183-001D	MWI	03/22/2018 13:39	03/22/2018 20:20	***************************************	3724-17250271327037
	Standard Methods 4500-NO3 F (Total) 2000				03/27/2018 14:02
18030183-002A	MW2	03/22/2018 12:47	03/22/2018 20:20		
	Field Elevation Measurements				03/22/2018 12:47
	Standard Method 4500-H B 2001 Field				03/22/2018 12:47
	Standard Methods 2130 B Field				03/22/2018 12:47
	Standard Methods 18th Ed. 2580 B Field				03/22/2018 12:47
	Standard Methods 2510 B Field				03/22/2018 12:47
	Standard Methods 2550 B Field				03/22/2018 12:47
	Standard Methods 4500-NO2 B (Total) 2000				03/23/2018 10:11
	Standard Methods 4500-O G Field				03/22/2018 12:47
	SW-846 9036 (Total)				03/28/2018 15:03
	SW-846 9251 (Total)				03/28/2018 14:36
18030183-002B	MW2	03/22/2018 12:47	03/22/2018 20:20		
	Standard Methods 2540 C (Dissolved) 1997				03/23/2018 15:09
	SW-846 9214 (Dissolved)				03/23/2018 18:07
18030183-002C	MW2	03/22/2018 12:47	03/22/2018 20:20		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			03/23/2018 10:07	03/23/2018 22:45
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			03/23/2018 10:07	03/26/2018 15:47



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Client: Natural Resource Technology, Inc. Work Order: 18030183

Client Project: Dynegy - Vermillion Power Station Report Date: 09-Apr-18

Sample ID	Client Sample ID  I est Name	Collection Date	Received Date	Prep Date/Time	Analysis Date/Time
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)				03/27/2018 12:49
	SW 846 3005A, 6020A, Metals by ICPMS (Dissolved)			03/23/2018 10:07	03/28/2018 13:09
18030183-002D	MW2	03/22/2018 12:47	03/22/2018 20:20	03/23/2018 10:07	03/26/2016 13:09
18030103-002D		0.3/22/2016 12.4/	03/22/2018 20:20		
	Standard Methods 4500-NO3 F (Total) 2000				03/27/2018 14:04
18030183-004A	MW10	03/22/2018 15:14	03/22/2018 20:20		
	Field Elevation Measurements				03/22/2018 15:14
	Standard Method 4500-H B 2001 Field				03/22/2018 15:14
	Standard Methods 2130 B Field				03/22/2018 15:14
	Standard Methods 18th Ed. 2580 B Field				03/22/2018 15:14
	Standard Methods 2510 B Field				03/22/2018 15:14
	Standard Methods 2550 B Field				03/22/2018 15:14
	Standard Methods 4500-NO2 B (Total) 2000				03/23/2018 10:11
	Standard Methods 4500-O G Field				03/22/2018 15:14
	SW-846 9036 (Total)				03/28/2018 15:19
	SW-846 9251 (Total)				03/28/2018 15:11
18030183-004B	MW10	03/22/2018 15:14	03/22/2018 20:20		
	Standard Methods 2540 C (Dissolved) 1997				03/23/2018 15:10
	SW-846 9214 (Dissolved)				03/23/2018 18:09
18030183-004C	MW10	03/22/2018 15:14	03/22/2018 20:20		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			03/23/2018 10:07	03/23/2018 22:53
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			03/23/2018 10:07	03/26/2018 15:55
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			03/23/2018 10:07	03/27/2018 12:58
18030183-004D	MW10	03/22/2018 15:14	03/22/2018 20:20		
	Standard Methods 4500-NO3 F (Total) 2000				03/27/2018 14:13
18030183-005A	MW17	03/22/2018 8:44	03/22/2018 20:20		
	Field Elevation Measurements				03/22/2018 8:44
	Standard Method 4500-H B 2001 Field				03/22/2018 8:44
	Standard Methods 2130 B Field				03/22/2018 8:44
	Standard Methods 18th Ed. 2580 B Field				03/22/2018 8:44
	Standard Methods 2510 B Field				03/22/2018 8:44
	Standard Methods 2550 B Field				03/22/2018 8:44
	Standard Methods 4500 NO2 B (Total) 2000				03/23/2018 10:11
	Standard Methods 4500-O G Field				03/22/2018 8:44
	SW-846 9036 (Total)				03/28/2018 15:27
	SW-846 9251 (Total)				03/28/2018 15:19
18030183-005B	MW17	03/22/2018 8:44	03/22/2018 20:20		
	Standard Methods 2540 C (Dissolved) 1997				03/23/2018 15:10



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Sample ID	Client Sample ID	Collection Date	Received Date			
	Test Name			Prep Date/Time	Analysis Date/Time	
	SW-846 9214 (Dissolved)				03/23/2018 18 10	
18030183-005C	MW1/	03/22/2018 8:44	03/22/2018 20:20			
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			03/23/2018 10:07	03/23/2018 23:02	
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			03/23/2018 10.07	03/26/2018 16:03	
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			03/23/2018 10:07	03/27/2018 15:01	
18030183-005D	MW17	03/22/2018 8:44	03/22/2018 20:20			
	Standard Methods 4500-NO3 F (Total) 2000				03/27/2018 14:15	
18030183-006A	MW18	03/22/2018 9:01	03/22/2018 20:20			
	Field Elevation Measurements				03/22/2018 9:01	
	Standard Method 4500-H B 2001 Field				03/22/2018 9:01	
	Standard Methods 2130 B Field				03/22/2018 9:01	
	Standard Methods 18th Ed. 2580 B Field				03/22/2018 9:01	
	Standard Methods 2510 B Field				03/22/2018 9:01	
	Standard Methods 2550 B Field				03/22/2018 9:01	
	Standard Methods 4500-NO2 B (Total) 2000				03/23/2018 10:12	
	Standard Methods 4500-O G Field				03/22/2018 9:01	
	SW-846 9036 (Total)				03/28/2018 15:35	
	SW-846 9251 (Total)				03/28/2018 15:27	
18030183-006B	MW18	03/22/2018 9:01	03/22/2018 20:20			
	Standard Methods 2540 C (Dissolved) 1997				03/23/2018 15:10	
	SW-846 9214 (Dissolved)				03/23/2018 18:12	
18030183-006C	MW18	03/22/2018 9:01	03/22/2018 20:20			
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			03/23/2018 10:07	03/23/2018 23:10	
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			03/23/2018 10:07	03/26/2018 16:11	
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			03/23/2018 10:07	03/27/2018 15:09	
18030183-006D	MW18	03/22/2018 9:01	03/22/2018 20:20			
	Standard Methods 4500-NO3 F (Total) 2000				03/27/2018 14:28	
18030183-007A	MW21	03/22/2018 13:08	03/22/2018 20:20			
	Field Elevation Measurements				03/22/2018 13:08	
	Standard Method 4500-H B 2001 Field				03/22/2018 13:08	
	Standard Methods 2130 B Field				03/22/2018 13:08	
	Standard Methods 18th Ed. 2580 B Field				03/22/2018 13:08	
	Standard Methods ?510 B Field				03/22/2018 13:08	
	Standard Methods 2550 B Field				03/22/2018 13:08	
	Standard Methods 4500-NO2 B (Total) 2000				03/23/2018 10:12	
	Standard Methods 4500-O G Field				03/22/2018 13:08	
	SW-846 9036 (Total)				03/28/2018 15:38	



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Client: Natural Resource Technology, Inc.

Work Order: 18030183

Client Project: Dynegy - Vermillion Power Station

ample ID	Client Sample ID	Collection Date	Received Date		
	I est Name	300-00		Prep Date/Time	Analysis Date/Time
	SW-846 9251 (Total)				03/28/2018 15:35
18030183-007B	MW21	03/22/2018 13:08	03/22/2018 20:20		
	Standard Methods 2540 C (Dissolved) 1997				03/23/2018 15:11
	SW-846 9214 (Dissolved)				03/23/2018 18:16
18030183-007C	MW21	03/22/2018 13:08	03/22/2018 20:20		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			03/23/2018 10:07	03/23/2018 23:18
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			03/23/2018 10:07	03/26/2018 16:19
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			03/23/2018 10:07	03/27/2018 13:06
18030183-007D	MW21	03/22/2018 13:08	03/22/2018 20:20		
	Standard Methods 4500-NO3 F (Total) 2000				03/27/2018 14:30
18030183-008A	MW3R	03/22/2018 12:13	03/22/2018 20:20		100000000000000000000000000000000000000
	Field Elevation Measurements				03/22/2018 12:13
	Standard Method 4500-H B 2001 Field				03/22/2018 12:13
	Standard Methods 2130 B Field				03/22/2018 12:13
	Standard Methods 18th Ed. 2580 B Field				03/22/2018 12:13
	Standard Methods 2510 B Field				03/22/2018 12:13
	Standard Methods 2550 B Field				03/22/2018 12:13
	Standard Methods 4500-NO2 B (Total) 2000				03/23/2018 10:13
	Standard Methods 4500-O G Field				03/22/2018 12:13
	SW-846 9036 (Total)				03/28/2018 16:08
	SW-846 9251 (Total)				03/28/2018 15:54
18030183-008B	MW3R	03/22/2018 12:13	03/22/2018 20:20		
	Standard Methods 2540 C (Dissolved) 1997				03/23/2018 15:11
	SW-846 9214 (Dissolved)				03/23/2018 18:17
18030183-008C	MW3R	03/22/2018 12:13	03/22/2018 20:20		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			03/23/2018 10:07	03/23/2018 23:26
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			03/23/2018 10:07	03/26/2018 16:28
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			03/23/2018 10:07	03/27/2018 13.14
18030183-008D	MW3R	03/22/2018 12:13	03/22/2018 20:20		
	Standard Methods 4500-NO3 F (Total) 2000				03/27/2018 14:32
18030183-009A	MW4	03/22/2018 10:55	03/22/2018 20:20		
	Field Elevation Measurements				03/22/2018 10:55
	Standard Method 4500-H B 2001 Field				03/22/2018 10:55
	Standard Methods 2130 B Field				03/22/2018 10:55
	Standard Methods 18th Ed. 2580 B Field				03/22/2018 10:55
	Standard Methods 2510 B Field				03/22/2018 10:55
	Standard Methods 2550 B Field				03/22/2018 10:55



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Sample ID	Client Sample ID	Collection Date	Received Date	B B.4 //El	Andreas Design	
_	Test Name			Prep Date/Time	Analysis Date/Time	
	Standard Methods 4500-NO2 B (Total) 2000				03/23/2018 10 13	
	Standard Methods 4500-O G Field				03/22/2018 10:55	
	SW-846 9036 (Total)				03/28/2018 16:10	
10000100 0000	SW-846 9251 (Total)				03/28/2018 16.08	
18030183-009B	MW4	03/22/2018 10:55	03/22/2018 20:20			
	Standard Methods 2540 C (Dissolved) 1997				03/23/2018 15:11	
	SW-846 9214 (Dissolved)				03/23/2018 18:19	
18030183-009C	MW4	03/22/2018 10:55	03/22/2018 20:20			
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			03/23/2018 10:07	03/23/2018 23:35	
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			03/23/2018 10:07	03/26/2018 16:36	
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			03/23/2018 10:07	03/27/2018 13:22	
18030183-009D	MW4	03/22/2018 10:55	03/22/2018 20:20			
	Standard Methods 4500-NO3 F (Total) 2000				03/27/2018 14:37	
18030183-010A	MW5	03/22/2018 11:19	03/22/2018 20:20			
	Field Elevation Measurements				03/22/2018 11:19	
	Standard Method 4500-H B 2001 Field				03/22/2018 11:19	
	Standard Methods 2130 B Field				03/22/2018 11:19	
	Standard Methods 18th Ed. 2580 B Field				03/22/2018 11:19	
	Standard Methods 2510 B Field				03/22/2018 11:19	
	Standard Methods 2550 B Field				03/22/2018 11:19	
	Standard Methods 4500-NO2 B (Total) 2000				03/23/2018 10:14	
	Standard Methods 4500-O G Field				03/22/2018 11:19	
	SW-846 9036 (Iotal)				03/28/2018 16:24	
	SW-846 9251 (Total)				03/28/2018 16:16	
18030183-010B	MW5	03/22/2018 11:19	03/22/2018 20:20			
	Standard Methods 2540 C (Dissolved) 1997				03/23/2018 15:11	
	SW-846 9214 (Dissolved)				03/23/2018 18:24	
18030183-010C	MW5	03/22/2018 11:19	03/22/2018 20:20			
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			03/23/2018 10:07	03/23/2018 23:43	
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			03/23/2018 10:07	03/26/2018 16:44	
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			03/23/2018 10:07	03/27/2018 15:17	
18030183-010D	MW5	03/22/2018 11:19	03/22/2018 20:20			
	Standard Methods 4500-NO3 F (Total) 2000				03/27/2018 14:39	
18030183-011A	MW6R	03/22/2018 9:25	03/22/2018 20:20			
	Field Elevation Measurements				03/22/2018 9.25	
	Standard Method 4500-H B 2001 Field				03/22/2018 9:25	
	Standard Methods 2130 B Field				03/22/2018 9:25	



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Sample ID	Client Sample ID Test Name	Collection Date	Received Date	Prep Date/Time	Analysis Date/l'ime
	Standard Methods 18th Ed. 2580 B Field				03/22/2018 9.25
	Standard Methods 2510 B Field				03/22/2018 9.25
	Standard Methods 2550 B Field				03/22/2018 9:25
	Standard Methods 4500-NO2 B (Total) 2000				03/23/2018 10:14
	Standard Methods 4500-O G Field				03/22/2018 9:25
	SW-846 9036 (Total)				03/28/2018 16:32
	SW-846 9251 (Total)				03/28/2018 16:24
8030183-011B	MW6R	03/22/2018 9:25	03/22/2018 20:20		
	Standard Methods 2540 C (Dissolved) 1997				03/23/2018 15:12
	SW-846 9214 (Dissolved)				03/23/2018 18:26
18030183-011C	MW6R	03/22/2018 9:25	03/22/2018 20:20		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			03/23/2018 10:07	03/23/2018 23:51
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			03/23/2018 10:07	03/26/2018 17:09
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			03/23/2018 10:07	03/27/2018 13:30
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			03/23/2018 10:07	03/28/2018 13:01
8030183-011D	MW6R	03/22/2018 9:25	03/22/2018 20:20		2000
	Standard Methods 4500-NO3 F (Total) 2000				03/27/2018 14:48
8030183-012A	MW8R	03/22/2018 11:58	03/22/2018 20:20	20	
	Field Elevation Measurements				03/22/2018 11:58
	Standard Method 4500-H B 2001 Field				03/22/2018 11:58
	Standard Methods 2130 B Field				03/22/2018 11:58
	Standard Methods 18th Ed. 2580 B Field				03/22/2018 11:58
	Standard Methods 2510 B Field				03/22/2018 11:58
	Standard Methods 2550 B Field				03/22/2018 11:58
	Standard Methods 4500-NO2 B (Total) 2000				03/23/2018 10:14
	Standard Methods 4500-O G Field				03/22/2018 11:58
	SW-846 9036 (Total)				03/28/2018 16:59
	SW-846 9251 (Total)				03/28/2018 16:32
8030183-012B	MW8R	03/22/2018 11:58	03/22/2018 20:20		
	Standard Methods 2540 C (Dissolved) 1997				03/23/2018 15:12
	SW-846 9214 (Dissolved)				03/23/2018 18:27
18030183-012C	MW8R	03/22/2018 11:58	03/22/2018 20:20		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			03/23/2018 10.07	03/23/2018 23:59
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			03/23/2018 10:07	03/26/2018 17:17
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			03/23/2018 10:07	03/27/2018 15:25
18030183-012D	MW8R	03/22/2018 11:58	03/22/2018 20:20		
	Standard Methods 4500-NO3 F (Total) 2000				03/27/2018 14:50



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Sample ID	Client Sample ID	Collection Date	Received Date	Ituan Dato/Itma	Analysis Date/Time
10020102 0124	Test Name	02/22/2019 0-24	02/22/2019 20.20	Prep Date/Ilme	Analysis Date/Time
18030183-013A	MW9	03/22/2018 9:35	03/22/2018 20:20		
	Field Elevation Measurements				03/22/2018 9:35
18030183-014A	MW19	03/22/2018 9.25	03/22/2018 20.20		
	Field Elevation Measurements				03/22/2018 9:25
18030183-015A	MW20	03/22/2018 9:58	03/22/2018 20:20		
	Field Elevation Measurements				03/22/2018 9:58
	Standard Method 4500-H B 2001 Field				03/22/2018 9:58
	Standard Methods 2130 B Field				03/22/2018 9:58
	Standard Methods 18th Ed. 2580 B Field				03/22/2018 9:58
	Standard Methods 2510 B Field				03/22/2018 9:58
	Standard Methods 2550 B Field				03/22/2018 9:58
	Standard Methods 4500-NO2 B (Total) 2000				03/23/2018 10:15
	Standard Methods 4500-O G Field				03/22/2018 9:58
	SW-846 9036 (Total)				03/28/2018 17:02
	SW-846 9251 (Total)				03/28/2018 16:59
18030183-015B	MW20	03/22/2018 9:58	03/22/2018 20:20		
	Standard Methods 2540 C (Dissolved) 1997				03/23/2018 15:13
	SW-846 9214 (Dissolved)				03/23/2018 18:28
18030183-015C	MW20	03/22/2018 9:58	03/22/2018 20:20		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			03/23/2018 10:07	03/24/2018 0:24
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			03/23/2018 10:07	03/26/2018 17:25
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			03/23/2018 10:07	03/27/2018 13:39
18030183-015D	MW20	03/22/2018 9:58	03/22/2018 20:20		
	Standard Methods 4500-NO3 F (Total) 2000				03/27/2018 14:52
18030183-016A	MW34	03/22/2018 10:32	03/22/2018 20:20		
	Field Elevation Measurements				03/22/2018 10:32
	Standard Method 4500-H B 2001 Field				03/22/2018 10:32
	Standard Methods 2130 B Field				03/22/2018 10:32
	Standard Methods 18th Ed. 2580 B Field				03/22/2018 10:32
	Standard Methods 2510 B Field				03/22/2018 10:32
	Standard Methods 2550 B Field				03/22/2018 10:32
	Standard Methods 4500-NO2 B (Total) 2000				03/23/2018 10:15
	Standard Methods 4500-O G Field				03/22/2018 10:32
	SW-846 9036 (Total)				03/28/2018 17:10
	SW-846 9251 (Total)				03/28/2018 17:18
18030183-016B	MW34	03/22/2018 10:32	03/22/2018 20:20	1-	
	Standard Methods 2540 C (Dissolved) 1997				03/23/2018 15:13



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Client: Natural Resource Technology, Inc.

Work Order: 18030183

Client Project: Dynegy - Vermillion Power Station

ample ID	Client Sample ID	Collection Date	Received Date		Constitution value
	Test Name		and the second	Prep Date/Time	Analysis Date/Time
	SW-846 9214 (Dissolved)				03/23/2018 18.33
18030183-016C	MW34	03/22/2018 10:32	03/22/2018 20:20		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			03/23/2018 10:07	03/24/2018 0:32
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			03/23/2018 10:07	03/26/2018 17:33
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			03/23/2018 10:07	03/27/2018 13:47
18030183-016D	MW34	03/22/2018 10:32	03/22/2018 20:20		
	Standard Methods 4500-NO3 F (Total) 2000				03/27/2018 15:05
18030183-017A	Field Blank	03/22/2018 15:21	03/22/2018 20:20		
	Standard Methods 4500-NO2 B (Total) 2000				03/23/2018 10:16
	SW-846 9036 (Total)				03/28/2018 17:45
	SW-846 9251 (Total)				03/28/2018 17:43
18030183-017B	Field Blank	03/22/2018 15:21	03/22/2018 20:20		
	Standard Methods 2540 C (Dissolved) 1997				03/23/2018 15:13
	SW-846 9214 (Dissolved)				03/23/2018 18:35
18030183-017C	Field Blank	03/22/2018 15:21	03/22/2018 20:20		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			03/23/2018 10:07	03/24/2018 0:40
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			03/23/2018 10:07	03/26/2018 17:42
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			03/23/2018 10:07	03/27/2018 14:36
18030183-017D	Field Blank	03/22/2018 15:21	03/22/2018 20:20		
	Standard Methods 4500-NO3 F (Total) 2000				03/27/2018 15:08
18030183-018A	DUP1	03/22/2018 9:25	03/22/2018 20:20		
	Field Elevation Measurements				03/22/2018 9:25
	Standard Method 4500-H B 2001 Field				03/22/2018 9:25
	Standard Methods 2130 B Field				03/22/2018 9:25
	Standard Methods 18th Ed. 2580 B Field				03/22/2018 9:25
	Standard Methods 2510 B Field				03/22/2018 9:25
	Standard Methods 2550 B Field				03/22/2018 9:25
	Standard Methods 4500 NO2 B (Total) 2000				03/23/2018 10:16
	Standard Methods 4500-O G Field				03/22/2018 9:25
	SW-846 9036 (Total)				03/28/2018 17:53
	SW-846 9251 (Total)				03/28/2018 17:45
18030183-018B	DUPI	03/22/2018 9:25	03/22/2018 20:20		
	Standard Methods 2540 C (Dissolved) 1997				03/23/2018 15:14
	SW-846 9214 (Dissolved)				03/23/2018 18:38
18030183-018C	DUPI	03/22/2018 9:25	03/22/2018 20:20		
					03/24/2018 0:49



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Client: Natural Resource Technology, Inc.
Client Project: Dynegy - Vermillion Power Station

Work Order: 18030183 Report Date: 09-Apr-18

Sample ID	Client Sample ID Test Name	Collection Date	Received Date	Prep Date/Time	Analysis Date/Time
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			03/23/2018 10.07	03/26/2018 17:50
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			03/23/2018 10:07	03/27/2018 14.44
18030183-018D	DUPI	03/22/2018 9:25	03/22/2018 20:20		
	Standard Methods 4500-NO3 F (Total) 2000				03/27/2018 15:10
18030183-019A	DUP2	03/22/2018 10:32	03/22/2018 20:20		
	Field Elevation Measurements				03/22/2018 10:32
	Standard Method 4500-H B 2001 Field				03/22/2018 10:32
	Standard Methods 2130 B Field				03/22/2018 10:32
	Standard Methods 18th Ed. 2580 B Field				03/22/2018 10:32
	Standard Methods 2510 B Field				03/22/2018 10:32
	Standard Methods 2550 B Field				03/22/2018 10:32
	Standard Methods 4500-NO2 B (Total) 2000				03/23/2018 10:17
	Standard Methods 4500-O G Field				03/22/2018 10:32
	SW-846 9036 (Total)				03/28/2018 18:01
	SW-846 9251 (Total)				03/28/2018 17:59
8030183-019B	DUP2	03/22/2018 10:32	03/22/2018 20:20		
	Standard Methods 2540 C (Dissolved) 1997				03/23/2018 15:14
	SW-846 9214 (Dissolved)				03/23/2018 18:39
18030183-019C	DUP2	03/22/2018 10:32	03/22/2018 20:20		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			03/23/2018 10:07	03/24/2018 0:57
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			03/23/2018 10:07	03/26/2018 17:58
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			03/23/2018 10:07	03/27/2018 14:53
8030183-019D	DUP2	03/22/2018 10:32	03/22/2018 20:20		
	Standard Methods 4500-NO3 F (Total) 2000				03/27/2018 15:14



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Client: Natural Resource Technology, Inc.

Work Order: 18030183

Client Project: Dynegy - Vermillion Power Station

2 / 1 - 3 /									12.00
STANDARD METHOD 4500-H	B 2001 FIELD								
Batch R245290 SampType: SampID: LCS-R245290	LCS	Units							Date
Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
pì·l	1.00		7.00	7.000	0	100.0	99.1	100.9	03/22/2018
STANDARD METHODS 2510 E	3 FIELD								
Batch R245290 SampType: SampID: LCS-R245290	LCS	Units µmhos/	cm						Date
Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Conductivity	1		1410	1412	0	99.9	90	110	03/22/201
STANDARD METHODS 2540 C	(DISSOLVED)	1997							
Batch R245066 SampType: SampID: MBLK	MBLK	Units mg/L							Date
Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Total Dissolved Solids	20		< 20						03/23/201
Total Dissolved Solids	20		< 20						03/23/201
Total Dissolved Solids	20		< 20						03/23/201
Total Dissolved Solids	20		< 20						03/23/201
Batch R245066 SampType: SampID: LCS	LCS	Units mg/L							Date
Analyses	RL	Oual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Total Dissolved Solids	20	· ·	986	1000	0	98.6	90	110	03/23/201
Batch R245066 SampType:	LCSQC	Units mg/L							No. 1
SampID: LCSQC Analyses	RL	Qual	Result	Spike	SPK Ref Val	%RFC	Low Limit	High Limit	Date Analyzed
Total Dissolved Solids	20		980	1000	0	98.0	90	110	03/23/201
Total Dissolved Solids	20		992	1000	0	99.2	90	110	03/23/201
Total Dissolved Solids	20		970	1000	0	97.0	90	110	03/23/201
Batch         R245066         SampType:           SampID:         18030183-012BMS	MS	Units mg/L			Audio.				Date
Analyses	RI	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Total Dissolved Solids	20			500.0	1704	106.4	85	115	03/23/201
Batch R245066 SampType: SampID: 18030183-012BMSD	MSD	Units mg/L					RPD	) Limit 5	Date
Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref	Val %RPD	Analyze
Total Dissolved Solids	20	×		500.0	1704	104.4	2236	0.45	03/23/201
					4.4.245	33.463	7		14.00



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STANDARD METHODS 2540 C	(DISSO	DLVED)	1997							
Batch R245066 SampType:	DUP		Units mg/L			TOTAL OF THE PARTY		RPD	Limit 5	
SampID: 18030183-006BDUP										Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref \	/al %RPD	Analyzed
Total Dissolved Solids		50		1520				1638	10.0	03/23/2018
STANDARD METHODS 4500-N	102 B (1	TOTAL)	2000							
Batch R244991 SampType: SampID: MBLK	MBLK		Units mg/L							Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Nitrogen, Nitrite (as N)		0.05		< <b>0.05</b> 0	.02500	0	0	-100	100	03/23/2018
Batch R244991 SampType: SampID: LCS	LCS		Units mg/L							Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Nitrogen, Nitrite (as N)		0.25		0.63	0.6510	0	96.8	90	110	03/23/2018
Batch R244991 SampType: SampID: 18030183-001AMS	MS		Units mg/L			- Carlo				Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Nitrogen, Nitrite (as N)		0.05		0.51	0.5000	0	102.4	85	115	03/23/2018
<b>Batch R244991 SampType:</b> SampID: 18030183-001AMSD	MSD		Units mg/L					RPD	Limit 10	Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref	/al %RPD	Analyzed
Nitrogen, Nitrite (as N)		0.05		0.51		0	102.0	0.5120	0.39	03/23/2018
<b>Batch R244991 SampType:</b> SampID: 18030183-012AMS	MS		Units mg/L							Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Nitrogen, Nitrite (as N)		0.05	7	0.57	0.5000	0.05200	103.4	85	115	03/23/2018
Batch R244991 SampType:	MSD		Units mg/L					RPE	Limit 10	
SampID: 18030183-012AMSD					ter et la					Date Analyzed
Analyses		RL	Qual	Result	STORESTON STREET, SQUARE,	SPK Ref Val			Val %RPD	
Nitrogen, Nitrite (as N)		0.05		0.56	0 5000	0.05200	102 2	0.5690	1 06	03/23/2018
STANDARD METHODS 4500-I	-	TOTAL)								
Batch R245123 SampType: SampID: ICB/MBLK	MBLK		Units mg/L							Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		< 0.050 )	.009000	0	0	-100	100	03/27/2018



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Client: Natural Resource Technology, Inc.

Work Order: 18030183

Client Project: Dynegy - Vermillion Power Station

Batch R245123 SampType:	LCS		Units mg/L							
SampID: ICV/LCS	0.10	~~			- W	ORK B. WAT	N/DEO	LOSSOFI PROVI	TERROR TRANSPORT	Date Analy∠ed
Analyses		RL	Qual			SPK Ref Val		740 300	High Limit	
Nitrogen, Nitrate-Nitrite (as N)		1.00		9.30	8.570	0	108.5	90	110	03/27/2018
<b>Batch R245123</b> SampType: SampID: 18030183-002DMS	MS		Units mg/L							Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050			0.2500	0.08500	113.2	85	115	03/27/2018
<b>Batch R245123 SampType:</b> SampID: 18030183-002DMSD	MSD		Units mg/L					RPD	Limit 10	4
Part of the Control o		-	0.1		o "	CDV Def Vel	0/ DEC	DDD Deft	/al 0/ DDD	Date Analyzed
Analyses		RL	Qual			SPK Ref Val			/al %RPD	
Nitrogen, Nitrate-Nitrite (as N)		0.050		0.369	0.2500	0.08500	113.6	0.3680	0.27	03/27/2018
<b>Batch R245123 SampType:</b> SampID: 18030183-010DMS	MS		Units mg/L						DEC. NOTE.	Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		0.299	0.2500	0.02300	110.4	85	115	03/27/2018
Batch R245123 SampType:	MSD		Units mg/L	100				RPD	Limit 10	
SampID: 18030183-010DMSD					~ "	SPK Ref Val	0/ DEC	DDD Deft	/al %RPD	Date Analyzed
Analyses		RL	Qual		Spike	The state of the s	41000			
Nitrogen, Nitrate-Nitrite (as N)		0.050		0.306	0.2500	0.02300	113.2	0.2990	2.31	03/27/2018
SW-846 9036 (TOTAL)										
Batch R245223 SampType: SampID: ICB/MBLK	MBLK		Units mg/L							Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Sulfate		10		< 10	5.000	O	U	-100	100	03/28/2018
Batch R245223 SampType: SampID: ICV/LCS	LCS		Units mg/L						,	Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Sulfate		10			20 00	0	94.2	90	110	03/28/2018
Batch R245223 SampType: SampID: 18030183-002AMS	MS		Units mg/L		1100					Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Sulfate		50			50.00	84.85	111.6	85	115	03/28/2018



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Client: Natural Resource Technology, Inc.

Work Order: 18030183

Client Project: Dynegy - Vermillion Power Station

Batch R245223 SampT	ype: MSD		Units mg/L					RPD	Limit 10	
SampID: 18030183-002AMS										Date
Analyses		RI.	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref V	/al %RPD	Analyzed
Sulfate		50		140	50.00	84.85	110.5	140.6	0.40	03/28/2018
Batch R245223 SampT SampID: 18030183-016AMS	ype: MS		Units mg/L							Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Sulfate		10	S	13	10.00	5.930	71.8	85	115	03/28/2018
Batch R245223 SampT SampID: 18030183-016AMS	ype: MSD		Units mg/L					RPD	Limit 10	Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref \	/al %RPD	Analyzed
Sulfate		10	S		10.00	5.930	66.5	13.11	4.13	03/28/2018
SW-846 9214 (DISSOLVE	D)									
Batch R245039 SampT SampID: MBLK	ype: MBLK		Units mg/L						No. of the	Dato
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Fluoride		0.10		< 0.10						03/23/2018
Batch R245039 SampT SampID: LCS	ype: LCS		Units mg/L							Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Fluoride		0.10		1.00	1.000	0	100.2	90	110	03/23/2018
Batch R245039 SampT SampID: 18030183-006BMS	ype: MS		Units mg/L							Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Fluoride		0.10	Q um		2.000	0.1380	98.4	85	115	03/23/2018
Batch R245039 Samp T SampID: 18030183-006BMS	ype: MSD		Units mg/L					RPD	Limit 10	Date
Analyses		RI.	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref \	/al %RPD	Analyzed
Fluoride		0.10	- 70.0		2.000	0.1380	99.8	2.106	1.32	03/23/2018
Batch R245039 Samp T SumpID: 18030183 015BMS	Type: MS		Units mg/L							Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Fluoride		0.10	11000		2.000	0.05500	100.4	85	115	03/23/2018



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Client: Natural Resource Technology, Inc.

Work Order: 18030183

Client Project: Dynegy - Vermillion Power Station

SW-846 9214 (DISSO	DLVED)										
Batch R245039 S	ampType:	MSD		Units mg/L					RPD	Limit 10	
SampID: 18030183-01	5BMSD										Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref \	/al %RPD	Analyzed
Fluoride			0.10		2.10	2.000	0.05500	102.0	2,063	1.59	03/23/2018
SW-846 9251 (TOTA	L)										
Batch R245264 S SampID: ICB/MBLK	ampType:	MBLK		Units mg/L							Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Chloride			5			0.3300	0	0	-100	100	03/28/2018
Batch R245264 S SampID: ICV/LCS	ampType:	LCS		Units mg/L							Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Chloride			5		20	20.00	0	100.2	90	110	03/28/2018
Batch R245264 S SampID: 18030183-00	ampType: 2AMS	MS		Units mg/L			a mala				Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Chloride			10		68	40.00	32.55	89.7	85	115	03/28/2018
Batch R245264 S SampID: 18030183-00	ampType:	MSD		Units mg/L					RPD	Limit 15	Date
Analyses			RL	Oual	Result	Spike	SPK Ref Val	%REC	RPD Ref \	/al %RPD	Analyzed
Chloride			10	******		40.00	32.55	89.0	68.41	0.40	03/28/2018
Batch R245264 S SampID: 18030183-01	sampType: 6AMS	MS		Units mg/L							Date
Analyses			RL	Oual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Chloride			10		70	40.00	34.24	88.7	85	115	03/28/2018
Batch R245264 S SamplD: 18030183-01	SampType: 6AMSD	MSD		Units mg/L					RPD	Limit 15	Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref \	/al %RPD	Analyzed
Chloride			10			40.00	34.24	87.4	69.71	0.76	03/28/2018



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Client: Natural Resource Technology, Inc. Work Order: 18030183 Client Project: Dynegy - Vermillion Power Station

Batch 140252 Sa	mpType:	MBLK		Units mg/L							
SampID: MBLK-140252											Date
Analyses			RL	Qual	Result	Spike	SPK Rof Val	%REC	Low Limit	High Limit	Analyzed
Arsenic			0.0010	9,000	< 0.0010		0	0	-100	100	03/23/2018
Barium			0.0010		< 0.0010	.000150	0	0	100	100	03/26/2018
Boron			0.0250		< 0.0250	0.009260	0	0	-100	100	03/28/2018
Iron			0.0250		< 0.0250	0.009000	0	0	-100	100	03/28/2018
Manganese			0.0020		< 0.0020	.000750	0	0	-100	100	03/26/2018
Selenium			0.0010		< 0.0010	.000280	0	0	-100	100	03/23/2018
Batch 140252 Sa	трТуре:	LCS		Units mg/L							
SampID: LCS-140252											Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Arsenic			0.0010	200000		0.5000	0	92.6	80	120	03/23/2018
Barium			0.0010		1.88	2.000	0	93.8	80	120	03/26/2018
Boron			0.0250		0.476	0.5000	0	95.3	80	120	03/27/2018
Iron			0.0250		1.79	2.000	0	89.5	80	120	03/27/2018
Manganese			0.0020		0.483	0.5000	0	96.5	80	120	03/26/2018
Selenium			0.0010		0.473	0.5000	0	94.6	80	120	03/23/2018
Batch 140252 Sa SampID: 18030183-001	mpType:	MS		Units mg/L							Date
Analyses			RL	Oual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Arsenic			0.0010			0.5000	0	94.9	75	125	03/23/2018
Barium			0.0010		1.86	2.000	0.01369	92.1	75	125	03/26/2018
Boron			0.0250	S		0.5000	1.981	148.1	75	125	03/28/2018
Iron			0.0250		2.10	2.000	0.2479	92.6	75	125	03/28/2018
Manganese			0.0020		0.496	0.5000	0.02680	93.8	75	125	03/26/2018
Selenium			0.0010		0.471	0.5000	0	94.3	75	125	03/23/2018
Batch 140252 Sa	трТуре:	MSD		Units mg/L					RPD	Limit 20	
SampID: 18030183-001	CMSD										Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref \	/al %RPD	Analyzed
Arsenic			0.0010	1		0.5000	0	93.2	0.4745	1.79	03/23/2018
Barium			0.0010		1.84	2.000	0.01369	91,4	1.856	0.75	03/26/2018
Boron			0.0250	S	2.69	0.5000	1.981	141.8	2.722	1.16	03/28/2018
Iron			0.0250		2.12	2.000	0.2479	93.7	2.099	1.06	03/28/2018
Manganese			0.0020		0.490	0.5000	0.02680	92.6	0.4959	1.22	03/26/2018
Selenium			0.0010			0.5000	0	91.5	0.4714	2.94	03/23/2018



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Client: Natural Resource Technology, Inc.

Work Order: 18030183

Client Project: Dynegy - Vermillion Power Station

Batch 140252 SampType: SampID: 18030183-019CMS	MS		Units mg/L							Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REG	I ow I imit	High Limit	Analyzed
Arsenic		0.0010		0.476	0.5000	0.02212	90.8	75	125	03/23/2018
Barlum		0.0010		1.94	2 000	0.1399	90.0	75	125	03/26/2018
Boron		0.0250		1.02	0.5000	0.4358	116.7	75	125	03/27/2018
Iron		0.0250		6.60	2.000	4.840	88.0	75	125	03/27/2018
Manganese		0.0020		0.521	0.5000	0.06124	91.9	75	125	03/26/2018
Selenium		0.0010		0.455	0.5000	0	90.9	76	125	03/23/2018
Batch 140252 SampType:	MSD		Units mg/L					RPD	Limit 20	
SampID: 18030183-019CMSD										Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref V	al %RPD	Analyzed
Arsenic		0.0010		0.483	0.5000	0.02212	92.2	0.4761	1.43	03/23/2018
Barium		0.0010		2.00	2.000	0.1399	92.9	1.940	2.90	03/26/2018
Boron		0.0250		0.917	0.5000	0.4358	96.2	1.019	10.55	03/27/2018
Iron		0.0250		6.46	2.000	4.840	81.1	6.600	2.13	03/27/2018
Manganese		0.0020		0.534	0.5000	0.06124	94.5	0.5209	2.44	03/26/2018
					0.5000		91.5		0.69	



Client: Natural Resource Technology, Inc.

### **Receiving Check List**

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Work Order: 18030183

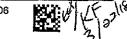
Client Project: Dynegy - Vermillion Power Station Report Date: 09-Apr-18 Carrier: Jordan Evans Received By: KF Kalyn Foecke Elmatch a Hurley Reviewed by Completed by On: On: 23 Mar 18 23 Mar 18 Kalyn Foecke Elizabeth A. Hurley Extra pages included 35 Pages to follow: Chain of custody No 🗌 Yes V Not Present Shipping container/cooler in good condition? Temp °C 5.42 Ice 🗸 Blue Ice Type of thermal preservation? None Dry Ice No 🗌 ~ Chain of custody present? Yes No 🗌 1 Chain of custody signed when relinquished and received? Yes Chain of custody agrees with sample labels? No 🗌 Yes ~ 1 No 🗌 Samples in proper container/bottle? Yes 1 No 🗌 Sample containers intact? Yes **V** No 🗌 Sufficient sample volume for indicated test? Yes 1 All samples received within holding time? Yes NA 🗌 Field V Lab Reported field parameters measured: Yes 🗸 No 🗌 Container/Temp Blank temperature in compliance? When thermal preservation is required, samples are compliant with a temperature between 0.1°C - 6.0°C, or when samples are received on ice the same day as collected. No 🗌 No VOA vials V Water - at least one vial per sample has zero headspace? Yes No 🗌 Water - TOX containers have zero headspace? Yes No TOX containers Yes 🗸 No 🗆 NA 🗌 Water - pH acceptable upon receipt? NA 🗸 Yes No 🗌 NPDES/CWA TCN interferences checked/treated in the field? Any No responses must be detailed below or on the COC.

CHAIN OF CUSTODY pg. 1 of 2 Work order # 18030183

TEKLAB, INC. 5445 Horseshoe Lake Road - Collinsville, IL 62234 - Phone: (618) 344-1004 - Fax: (618) 344-1005

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Client:	Natural Resour	ce Technolog	gy, Inc.							Sa	ìm;	ples	on:	X	CE		3LUE	ICE	E h	O ICE			42	_					
Address:	2422 East Was		et							Pr	es	erve Note	ni k	28	_AB	K	FIEL	) 1	a al	c	FO	R LA	AB U	SE C	<u>'INC</u>	<u>Y</u>			ł
City / State	/ Zip Bloomington, IL	. 61704								La	ab I	Note	s: ఫ	F 1-1	010	ď	. ( <i>ا</i> د	r 3 (	ナブ										
Contact:	Steve Wiskes		Phone	:	(41	4) 83	7-361	14					•			~,	7												
E-Mail:	steve.wiskes@obg.com		Fax:							CI	ien	ıt Co	mm	ents															
Are these samples	s known to be involved in	litigation2 !f	ves a surcharge v	يد الني	nniv		Yes	. 1)	No.	- I		ved M				020A	As E	a B F	Man .	Se.									
	s known to be hazardous				r P 13	_	,		,																				
Are there any requirements in the comm	Are there any required reporting limits to be met on the requested analysis?. If yes, please providing in the comment section. Yes No																												
Proj	Project Name/Number Sample Collector's Name												RIX					INI	DICA	TE A	NA	LYS	IS RI	EQU	EST	ED			
Dynegy - Vermillio	ynegy - Vermillion Power Station 7. Mathis J. Evans													T		Diss	_	Ţ.	Fiel	Fiel		7	Ξi	ନ୍ଧ	Z				
	Results Requested Billing Instructions # and Type of Conta									irou					Chloride	S F	ISSO	NAS C	ğ	d 오	<u>0</u>	ĕ	id T	/ De	Lrate	Sulf	SQI		
Standard	1-2 Day (100% Surcharge)	<u> </u>		1	_ ].	_	] [			ind			Ì			Fluoride	Yed	251	NS (	BS	# S	emp emp	130	p h	S S S S S	ate	. ×	Ì	
Other	3 Day (50% Surcharge)			dNb	NO	250				Groundwater					925	92	Met	Field Conductivity SM 2510-B	ield DO SM 4500-O	Field ORP SM 2580-	7 45g	erati 50	H Sign	6	450 F	Sulfate 9036	SM 2540C		ł
Lab Use Only	Sample Identification	n Date	/Time Sampled	]	ω [	4				9					-	9214	SIS	ŧ	0-0	80-	ခို	l le	Field Turbidity SM 2130πB	ater	Nitrale SM 4500-	-		.	
18030183 -	MW1	3.77	-18 1339	2	1	1			T	Х				$\top$	X	X	X	Х	Х	Х	Х	Х	Х	Х	Х	X	Х		
2023	MW2	3-7		2	1	1			7	X				$\top$	X	X	X	X	Х	Х	X	X	Х	X	X	X	Х	i	
_033	MW7 🚜			2	1	1				X					X	Х	Х	Х	Х	Х	Χ	X	X	Х	X	Х	Х		***********
004	MW10	3-2	7-18 1514	2	1	1	$\prod$			Х					X	Х	Х	Х	Х	Х	Х	Х	Х	Х	X	Х	Х		
-002	MW17		2-18 844	2	1	1	$\prod$			Х					Х	X	Х	X	Х	Х	Х	Х	Х	X	X	Х	х		
	MW18		22-18 901	2	1	1	$\prod$			Х				1	Х	Х	X	Х	Х	Х	Х	Х	Х	×	X	Х	Х		
_000	MW21	3-2	2-18 1308	2	1	1	$\prod$		$\top$	Х					×	X	X	Х	X	Х	Х	X	Х	X	X	X	X		
COS	MW3R	7-7	2-18 1213	2	1	1	П			Х				1	Х	Х	X	X.	Х	Х	χ	Х	Х	×	X	X	Х		
009	MW4			2	1	1				Х		1			X	Х	X	X	х	Х	×	Х	X	X	X	X	Х		
	009 MW5 3-27-18 1055 2 1 1 1 010 MW5 3-27-18 1119 2 1 1								$\top$	Х					Х	Х	Х	X	Х	х	X	Х	Х	×	Х	Х	х		
	Relinquished By Date/Time								<del>- '-</del>		<u></u>				ecei		Зу			****	T				ate/I	lime			
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Land grant											_								72.		T	<del></del>							
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The individual signing this agreement on behalf of the client, acknowledges that he/she has read and understands the terms and conditions of this agreement, and that he/she has the author ty to sign on behalf of the client. See www.teklabinc.com for terms and conditions.



CHAIN OF CUSTODY pg.  $\frac{\lambda}{2}$  of  $\frac{\lambda}{2}$  Work order # 18030 (83

TEKLAB, INC. 5445 Horseshoe Lake Road - Collinsville, IL 62234 - Phone: (618) 344-1004 - Fax: (618) 344-1005

<del></del>																												
Client:	Natural Resource	e Technology	, Inc.							_	les c				B B	LUE	ICE	湮 N	O ICI			42	_					
Address:	2422 East Wash	nington Street							Pr	ese	rved	in:	M L	AB	₩ F	IELD	ì			FO	R LA	AB U	SE C	<u> INC</u>	<u>Y</u>			
City / State	/Zip Bloomington, IL	61704							La	b N	otes	:																
Contact:	Steve Wiskes		Phone	. !	(414)	837-3	614																					
E-Mail:	steve.wiskes@obg.com		Fax:	-							Con						****					(*************************************	-					
Are these sample:	s known to be involved in	litigation? If y	es, a surcharge v	vill app	oly	[] Y	es 🛭	No	Dis	solve	ed Me	tals:	ICP/	MS 60	20A /	As B	a B Fe	Mn :	Se.									
Are these sample:	s known to be hazardous	? [Yes	X No																									
Are there any requirements in the comm	uired reporting limits to be nen: section.	emeton the n No	equested analysis	s?. <b>If</b> y	es, p	ease	provide	•																				
Proj	ect Name/Number		Sample							M	ATR	X					INE	ICA	TE /	įNА	LYS	IS RI	EQIJ	EST	ED			
Dynegy - Vermillio	on Power Station		T. Moth		<u> </u>	F,	1 m e								Diss	0	Ţ	Fi.e	Fie	-i:	골	Ţ.	ξ	z				
Result	s Requested	Billing (	nstructions	# an	d Ty	oe of	Contair	ners	Groundwater					Chloride	SS E	isso	Field Conductivity SM 2510-B	Q D	0 0	id p	ू त	\ <u>a</u>	) V	Litrati	န	TDS SM 2540C		
	Standard 1-2 Day (100% Surcharge)													ırîde	luori	ved	) 251	NS C	B B	118	M 20	130	βţh	8 SN	fate	NS.		
Other	Other 3 Day (50% Sørcharge)													9251	Fluoride 9214	Met	ucti	45	\ N	¥ ک 45	orat	₽₽₽	o S-	F 55	Sulfate 9036	254(		
Lab Use Only	Sample Identification	n Date/	Time Sampled	ף א	04				er					11	214	<u>a</u>	vity	Field DO SM 4500-O	Field ORP SM 2580- B	00-	uro	Field Turbidity SM 2130-B	/ater	Nitrate SM 4500 NO3 F	65	Ö		
18020123.	MW6R	3-2:	2-18 925	2 1	1				X					X	X	X	Х	X	X	X	Х	X	Х	Х	Х	Х		
	MW8R	3-2:		2 1	1				Х					×	×	X	Х	X	X	X	х	Х	X	X	Х	×		
013	MW9	3-2.	2-18 935	0					X														Х					
QIY	MW19	3-27		0			$\sqcap$		X														Х					
C/Z	MW20	3-2-2	2-18 958	2 1	1				Х					Х	Х	Х	х	X	Х	X	Х	Х	Х	Х	Х	Х		
016	MW34	3-3	2-18 1032	2 1	1				Х					X	Х	X	Х	Х	Х	X	Х	Х	Х	Х	Х	Х		
00	Field Blank	3-27	1521	2 1	1				X					Х	х	Х						-		Х	Х	Х		
018	DUP1		248 925	2 1	1				X			<u> </u>	1	X	Х	Χ	Х	X	Х	X	X	X	X	Х	Х	Х		
019	DUP2	1	Z-18 1032	2 1	1 1			1	X		_			Х	X	Х	х	X	х	X	X	Х	Х	Х	Х	х		
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	Relinquished By			Dat	e/Tir	ne	<u></u>			<u>l</u>		<del></del>	Re	ceiv	ed B	y			<u>!</u>	Ī	<u> </u>			ate/T	ime			
			3-22	-/8		Z02	20				Z,	رور	V							7	3/2	10			المتراع ا	 ഉ		
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The individual signing this agreement on behalf of the client, acknowledges that he/she has read and understands the terms and conditions of this agreement, and that he/she has the authority to sign on behalf of the client. See www.teklabinc.com for terms and conditions.







### Monitoring Well Evaluation Checklist

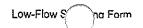
Site Vermillon	Major wel	ls repairs*	required	Yes	No	NA
Inspection Date 3-77-18	to maintai	n well Inte	grity?		X	
Well Number M W I						
Stick-up Monitoring Wells					Comments	
1. Outer protective Casing	Yes	No	NA NA			
Not corroded	X		1			
Not dented						<del>"</del>
Not craded						
Not loose	· · · · · · · · · · · · · · · · · · ·					
2. Inner casing	Yes	No	NA			
Not corroded			1			
Not dented			•	•		
Not cracked						<del></del>
Not loose	V	-	1			
	Yes	No	NA			
3. Are there weep holes in outer casing?	V					
4. Weep holes able to drain?						
5. Is there a lockable cap present?				· · · · · · · · · · · · · · · · · · ·		
6. Is there a lock present?						
7. Bumper posts in good condition?						
	<u> </u>		<u></u>			
Flushmount Monitoring Wells	Yes	No	NA I			
8. Can the lid be secured tightly?			X	·		
9. Does the lid have a gasket that seals?	<b>-</b>					·
10. No water in the flushmount?			<del></del>			
11. is the well cap lockable?			<del></del>		·	
12. Is there a lock present?			1	· · · · · · · · · · · · · · · · · · ·		···········
•	L					· · · · · · · · · · · · · · · · · ·
All Monitoring Wells	Yes ·	No	NA	•		
Pownhole Condition			X			
2. Water level measuring point clearly marked?						
3. No obstructions in well?						
4. No plant roots or vegetation in well?						····
5. No sediment in bottom of well?						
If present, how much sediment?	ft		<del></del>	· · · · · ·		
6. installed as total depth.	ft					
7. Measured total depth of well.	ft					
•	L					
eneral Condition	Yes	No	NA			
3. Concrete pad installed?						
), Concrete pad					···	
Slope away form casing?		.				
Not deteriorated?			<del></del>	<del></del>		
Not heaved or below surrounding grade?						
. No surface seal settling?						
. Well clearly visible and labeled?	<del> </del>				· · · · · · · · · · · · · · · · · · ·	
mments:		<u> </u>				
Major well repair are those that require a subcontr	actor or separa	te mobiliza	tion to com	ilete		

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### WELL DEVELOPMENT AND GROUNDWATER SAMPLING FIELD FORM

					ROJECTINI						
		mi'llon				Client	<u></u>			<del></del>	
Project Num		A		_Task #:		Start Date:				. Time:	1324
Field Person		Mathis		vans		Finish Date:	3-27			Time:	1334
	VELCINFOR	MATION			ereste en la laterancia		EVENIT	YPE	Compagnition of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the c	क्रांत्रकार क्षेत्रकार सम्बद्धाः <u>स्टिन्</u> रिकार सम्बद्धाः	and a fine property of the second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second sec
	Well ID:	MWI		Well Develop			Low-Flow / Lo	w Stress San	npling		
C	asing ID;				Approach Sam		Other (Specify):		<del></del>		
W. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.		Say Bridger	TAW	ER QUALITY	INDICATOR	RPARAMET	ERS (contin	ued)	Charles A Charles		
		Volume	Depth to				SEC or	Dissolved			
Sampling	Time	Removed	Water	Drawdown	Temp.	pН	Cond.	Oxygen	Turbidity	ORP	√isual
Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(ha,cw)	(mg/L)	(NTU)	(mV)	Clarity
·	1324	·	79.37					<del></del>			<u> </u>
	133	.26	82.74	2, 87	14,08	7.09	Z 840	- ૧૫	12.9	33	Clear
	13 33	, 39	83.68	1,44	14.03	6.95	Z740	1.27	5.2	65	clear
	1336	.52	85.27	1.59	14.05	6.91	Z796	1,69	4.6	75	Clear
	1339	.65	85.€	.53	14.09.	6.92	Z820	1,02	3.3	77	dear
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S. S. 653 W.			NOTES-/	continued		2			ABBREVI	SIONS.	
			North State Park To A	20	<u> </u>	<u> </u>	<u> 649,46,75976 (4,236)</u>	Cond Actual Cond FT BTOC - Feet Bel na - Not Applicable nm - Not Measured	uctivity	ORP - Oxidation-F	etacal Concectance ts ire
								nm - Not Measured	- <del>-</del>	Temp - Temperate	ne.

Low-Flow Sampling Ferm



### Monitoring Well Evaluation Checklist

Site	Vesmillion	Major wel	ls repairs*	Yes	No	NA	
Inspection Date	3-72.18	to maintai	n well inte	grity?		X	
Well Number	NWOZ						
)							
	-up Monitoring Wells					<u>Comments</u>	
1. Outer protective	· Casing	Yes	No	NA			
Not corroded		×	ļ				····
Not dented		1 \		<u> </u>			
Not cracked		ļ					
Not loose		Ψ	<u> </u>		<u> </u>		·
2. Inner casing		Yes	No	l NA	]		
Not corroded		X	<del></del>				
· Not dented				<del>                                     </del>			
Not cracked		<u> </u>		<del>                                     </del>			
Not loose				<del>                                     </del>			<del></del>
		Yes	No	NA			<del></del>
3. Are there ween h	oles in outer casing?	× ×					
4. Weep holes able		<del>                                   </del>		1			
5. Is there a lockable		1					
6. Is there a lock pre		<del>  </del>		-			<del></del>
7. Bumper posts in a		<del>                                     </del>		<del> </del>			
ייי בשניים ובייום וויים	soou condition:	<u></u>		<u> </u>			
Flushmo	unt Monitoring Wells	Yes	No	NA			
8. Can the lid be sec				X			
9. Does the lid have			<u> </u>	1			
10. No water in the		\ <del></del>					
11. Is the well cap lo							
12. Is there a lock pr				1		· · · · · · · · · · · · · · · · · ·	
		<u>l.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,</u>		<u> </u>			
<u>All A</u>	Monitoring Wells	Yes	No	NA			
Downhole Condition				X	***************************************		
12. Water level meas	suring point clearly marked?				······	*****	
13. No obstructions i	_ ·						·
14. No plant roots or	vegetation in well?						
15. No sediment in b	ottom of well?						
If present, how m	uch sediment?	ft			· · · · · · · · · · · · · · · · · · ·		
6. Installed as total		ft					
7. Measured total d	epth of well.	ft					į
Company Constitutes		<del></del>		1,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			
Seneral Condition	-H-45	Yes	No	NA		<del></del>	<del></del>
8. Concrete pad inst	alled?	<del>\</del>					
9 . Concrete pad		<del></del>					
	Slope away form casing?			<del></del>		<del></del>	
	Not deteriorated?				·····		
	Not heaved or below surrounding grade?						
	No surface seal settling? Well clearly visible and labeled?				<del></del>		
	and labeled?				7	<del></del>	[
omments:				···-			
***************************************					······································		
Malaruell	a those that year day a sub-			-tlen t	nloto.	<del></del>	
mojor well repair ar	e those that require a subconti	actor or separa	ite mobiliza	ation to com	piete		

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### WELL DEVELOPMENT AND GROUNDWATER SAMPLING FIELD FORM

S	ite:	Vermillion	n			Client:	NRT	<u> </u>			
Project Numi	per:			Task #:		Start Date:	3-22	-18	····	Time:	1232
Field Person		. Mathys	J, Evan			Finish Date:	3-27			Time:	1247
N. L. F.	ELL INFOR	MATION				and the second	EVENT T	YPE	e. P. P. John e. L. Will		
	Well ID:	MWZ		Well Develop	-	X	Low-Flow / Lo	ow Stress San	npling		
Ca	sing ID:		inches	Well Volume	Approach San		Other (Specify)				
公司 经基础		1. 计程序的	WAT	ER QUALT	/ INDICATO	R PARAMET	ERS (contir	rued)		*	
		Volume	Depth to				SEC or	Dissolved			
Sampling	Time	Removed	Water	Drawdown	Temp.	РH	Cond.	Oxygen	Turbidity	ORP	Visual
Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	(NTU)	(mV)	Carity
	1232		18.90								<u> </u>
	1235	,13	20,08	1,12	13,77	7.40	804	0	0.5	-39	Clear
	1238	, 26	20.44	.36	12,96	7.48	822	0	0.6	- 107	<u>Slear</u>
	1241	39	20.72	.28	14,12	7.52	839		0.4	-125	Clear
	1244	۰ 5۲	20.92	.7	14.13	7.57	8 56	0	0.3	-/37	<u> </u>
	-+247	-65	20.92	_0	14.22	7.60	867	0	2.0	- 144	clear
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*****			NOTES (	continued;	Name of the	2.5	E STEE OF THE		ABBREVIA	TIONS	•
								Cond Actual Condu FT BTOC - Feet Selo na - Not Applicable nm - Not Measured		ORP - Oxidation-P SEC - Specific Ele SU - Standard Unit Temp - Temperatu *C - Degrees Celci	crical Sendactance s re

Low-Flow Sampling Form

Low-Flow Sampling Form

### Monitoring Well Evaluation Checklist

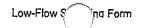
Site	Vermillion	Major we	ils repairs*	required	Yes	No	NA		
inspection Date	3.52.48	to mainta	in well inte	grity?		×			
Well Number	MW7								
}									
	up Monitoring Wells				Comments				
1. Outer protective	Cashig	Yes,	No	NA					
Not corroded		\^\							
Not dented									
Not cracked									
Not Ioose		$\Box$							
1									
2. Inner casing		Yes	No	NA					
Not corroded		_ ~							
Not dented				1					
Not cracked									
Not loose		1		1					
1		Yes	No	NA			·		
3. Are there weep ho	oles in outer casing?	X							
4. Weep holes able to		11							
5. Is there a lockable									
6. Is there a lock pres	• •	<del>  </del>		<del>   </del>					
7. Bumper posts in go		<del></del>		<del> </del>					
7. bumper posts in go	ou condition:			<u> </u>	<del></del>		· · · · · ·		
Fluchmou	unt Monitoring Wells	Yes	No	NA					
3. Can the lid be secu		165	110	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\					
	- •			<del>                                      </del>					
3. Does the lid have a	_			<del></del>			<del></del>		
LO. No water in the fl		<u> </u>		<del>                                     </del>	·····				
1. Is the well cap loc		ļ							
2. Is there a lock pre	sent?		1	<u>V</u>					
a ti na	1 Ta 1 1 A F - 1 F	- V 1		ALA .					
	onitoring Wells	Yes ·	No	NA NA					
ownhole Condition		1		χ					
	ring point clearly marked?			<del></del>					
3. No obstructions in									
4. No plant roots or v	<del></del>	ļ							
5. No sediment in bo									
If present, how mu		ft							
5. Installed as total d	•	ft							
7. Measured total de	pth of well.	ft							
		<del> </del>							
eneral Condition		Yes	No	NA					
. Concrete pad insta	lled?	1							
. Concrete pad				» » • • • • • • • • • • • • • • • •					
Slope away form ca	sing?								
Not deteriorated?				·					
	w surrounding grade?								
. No surface seal sett									
. Well clearly visible a	and labeled?								
mments:									
	٠,								
1aJor well repair are	those that require a subconti	ractor or separa	ate mobiliza	tion to com	plete				

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### WELL DEVELOPMENT AND GROUNDWATER SAMPLING FIELD FORM

		Personal Property	学的特别的	<b>可以默然的</b>	ROJECTIA	FORMATION	The section of the	China Santa Caracter The	CALLED TO SERVICE OF	Argental Company (1997)	40 0 a a
8	Site:					Client:	NRT				
Project Num			····	Task #:	···					Time:	
Field Person		jucythis	J Evan			. Finish Date:				Time:	
	VEĽL INFOF		1440				EVENT 1	YPE		and the second of	
	Well ID:	1w07		Well Develop	ment		Low-Flow / Lo	ow Stress San			
	asing ID:		inches		Approach Sa		Other (Specify)				
		3.488	èW	TER QUALT	YINDICATO	R PARAMET	ERS (contin	ued)	Constitution of the constitution of		
]		Volume	Depth to	1	<u> </u>	]	SEC or	Dissolved			
Sampling	Time	Removed	Water	Drawdown	Temp.	pH	Cond.	Oxygen	Turbidity	ORP	Visual
Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	(UTV)	(mV)	Clarity
[		<del> </del>	<u> </u>	_{	<del> </del>	<del> </del>			<u> </u>		
		<del> </del>	<del> </del>								
		<del>                                     </del>		<del></del>	<del> </del>			<u> </u>		<u> </u>	
, <u>.</u>		<del>                                     </del>			<u> </u>			<u> </u>			
ļ		<u> </u>	<del> </del>	_	<del>{</del>	}		<del> </del>	<del> </del>	<del> </del>	
ļ		<del> </del>	<u> </u>		<del> </del>			<del> </del>	<del></del>	<del> </del>	
<b></b>	<del> </del>	<del> </del>	-	_	<del> </del> -	<del></del>	}	<del>}</del>	<del> </del>	<u> </u>	<u> </u>
		1	·		<del> </del>	<del></del>		<del>                                     </del>		<u> </u>	
<del> </del>	<u> </u>	<del> </del>	<del>                                     </del>	<del>-  </del>	<del> </del>	· ·	<del>                                     </del>	<u> </u>	<del> </del>	<del> </del>	
<del>                                     </del>	<del> </del>	<del> </del>	<del> </del>					<del> </del>		<del> </del>	<del></del>
		<del></del>				· ·	· · · · · · · · · · · · · · · · · · ·			<del> </del>	
			1					<del> </del>	T		
	<u> </u>		1						1		<b>1</b>
4. 3.000		1.1.3. 陈汉	NOTE	(continued)					ABBREVIA	TIONS	e de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición del composición de la composición de la composición del composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composic
*1	11	dry				<u> </u>	<u> </u>	Cond, - Actual Condo FT 8TOC - Feet Bek na - Not Applicable nm - Not Measured	uctivity	ORP - Oxidation-Reci SEC - Specific Electis SU - Standard Units Temp- Temperature "C - Degrees Celcius	cal Conductance
	<u>-</u>										

Low-Flow Sampling Form



### Monitoring Well Evaluation Checklist

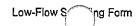
Site	Vermillion	Major we	lls repairs'	* required	Yes	No	NA
	<u>&gt;.₹₹.{}</u>	to maintạ	in well int	egrity?			
Well Number N	1610					,	
	Monitoring Wells	<u> </u>	<del>,</del>		1	Comments	
1. Outer protective Ca	sing	Yes	No	. NA			
Not corroded		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	<del> </del>		<u></u> _		
Not dented		<del></del>	<u> </u>	··································			
Not cracked Not loose		<u> </u>					
NOL 100Se		<u> </u>					<del></del>
2. Inner casing		Yes	No	NA			
Not corroded		X				<del></del>	<del></del>
Not dented		1-7		1			, <u>.</u> .
Not cracked		<del> </del>		<del></del>	<del></del>	· · · · · · · · · · · · · · · · · · ·	<del></del>
Not loose			··-	1			······································
		Yes	No	NA			···
3. Are there weep hole	s in outer casing?	Y		1			
4. Weep holes able to d							
5. Is there a lockable ca				<del>                                     </del>			
6. Is there a lock presen				1		<del></del>	
7. Bumper posts in good			./····	1			
, ,		<del></del>					<del></del>
<u>Flushmount</u>	Monitoring Wells	· Yes	No	NA			
8. Can the lid be secured				X			
9. Does the lid have a ga			· · · · · · ·				
10. No water in the flush							
11. Is the well cap lockal	ole?						<del></del>
12. Is there a lock preser	nt?			1			
<u>All Mon</u>	itoring Wells	Yes	No	NA ·			
Downhole Condition				Y			
.2. Water level measurin	ng point clearly marked?			l,			
3. No obstructions in we	ell?						
4. No plant roots or veg	etation in well?						
<ol><li>No sediment in botto</li></ol>				<b>✓</b>	·		
If present, how much		ft		•			
<ol><li>6. Installed as total dept</li></ol>		ft					
7. Measured total depth	of well.	. ft					
		<del></del>		<del></del>			·
eneral Condition		Yes	No	NA		· · · · · · · · · · · · · · · · · · ·	
3. Concrete pad installed	17	\		<del></del>			]
Concrete pad	_		.				
Slope away form cash	g?	<del></del>					
Not deteriorated?							
Not heaved or below s		<del> -</del> -			<del></del>		
. No surface seal settlin		1 1		<del></del>	· · · · · · · · · · · · · · · · · · ·		
. Well clearly visible and	a labeled?	L				· · · · · · · · · · · · · · · · · · ·	
mments:	74 m2 1/4 h 1/4 f / 4 f ) m4 m2 m2 m2 m2 m2 m2 m2 m2 m2 m2 m2 m2 m2						
Major well repair are the	ose that require a subcont	ractor or cenara	te mobiliz	ation to comp	ilete		
wentepen ale the	230 diatrequite a subcont	accor or schara	111001112	anon to comp			

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### WELL DEVELOPMENT AND GROUNDWATER SAMPLING FIELD FORM

				TO THE PARTY OF	ROJECTIN	FORMATIO	View Co	Salay in the salay		rangagan ar ar . Labar		
		rer million				Client	NRT					
Project Num	ber:			Task #:		Start Date:	3.22-18			Time:	1500	
Field Person	mel:	Matris	3. Evens			Finish Date:	3-2 <u>2-</u> 1	£		. Time:/	514	
V.	VEĽL INFOF	RMATION	海溪溪縣				EVENT 7	YPE	8,737,2 cm ~ 3,736	ering majoria Sur jajoria		
	Well ID:	MWIO		Well Develop		Low-Flow / Low Stress Sampling						
<b>4</b>	asing ID:		inches	Well Volume	<del></del>		Other (Specify)					
<b>学学验的</b>	要多生 70%	5 SHEAR	TAW	ER QUALT	INDICATO	R PARAMET	ERS (contin	(ued)				
Sampling Stage	Time (military)	Volume Removed (gallons)	Depth to Water (Feet)	Drawdown (Feet)	Temp. (*C)	pH (SU)	SEC or Cond. (µs/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP (mV)	Visual Ciarity	
	1502	<u> </u>	50.84									
	1505	. i3	57.80	1.98	14.34	7.26	1580	G	j. 3	30	CIPGY	
	1208.	.26	53.65	-83	14.16	6,89	1500	0	1, 3	65	dear	
	1514	,38	54,22	- 57	14,20	6,84	1480	0	1.5	69	(1461	
	1514	.52	54.61	.39	14,26	6.81	1456	0	7.9	74	11000	
		ļ <u>.</u>					<u> </u>	<u> </u>				
				<u> </u>						<u> </u>		
				<u> </u>	<u> </u>	<u></u>	<u> </u>	<u> </u>				
	<u> </u>	<u> </u>		<u> </u>		<u></u>				ļ		
<u> </u>		<u> </u>			<u> </u>		<u> </u>	<u> </u>	<u> </u>	<b>}</b>	<u> </u>	
<u> </u>		·			<u> </u>	ļ	ļ		<u> </u>	ļ		
	<u></u>				ļ	<u> </u>		ļ				
				<u> </u>	<u> </u>		<u> </u>					
				Į .							<u> </u>	
		是基础的	NOTES (	continued)			<b>公共文学</b> 。			TIONS		
								Cond Actual Condu FT STOC - Feet Bek na - Not Applicable nm - Not Measured		ORP - Oxidation-Re SEC - Specific Elec SU - Standard Units Temp - Temperatur *C - Degrees Celcic	erical Conductance	
	·											

Low-Flow Sampling Form



### Monitoring Well Evaluation Checklist

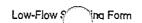
Site	Vermillion		ls repairs*	•	Yes	No	NA
Inspection Date 3	· 2Z-18	to mainta	in well inte	grity?		i X	
Well Number 🔝 🐧	AW 17						
	_						
	Monitoring Wells	r <del></del>	<del></del>		1	Comments	
1. Outer protective Cas	ing	Yes	No	. NA	ļ		
Not corroded		<u> </u>	<del>}</del>	<del>- </del>	ļ		
Not dented		<b>  </b>	<u> </u>				
Not cracked			<u> </u>	<del>- </del>			
Not loose		ΨΨ	<u> </u>	<u> </u>	<u> </u>		
2. Inner casing		Yes	No	I NA	ļ		
Not corroded		) - ''x	110	1			<del></del>
Not dented		<del> </del>		<del> </del>		·	<del></del>
Not cracked			<del></del>	<del>                                     </del>	<del></del>	· · · · · · · · · · · · · · · · · · ·	······································
Not loose			[	h		<del></del>	<del> </del>
1100 10000		Yes	No	NA	<del></del>		
3. Are there weep holes	in Outer casing?	<u> </u>	110	<del>  - ''' -  </del>			
4. Weep holes able to dr	<del>-</del>	<del> </del>		<del> </del>			
5. Is there a lockable cap		<u> </u>		1		· · · · · · · · · · · · · · · · ·	
6. Is there a lock present	•					<del></del>	
7. Bumper posts in good			****	<del>                                     </del>			
in partiper pose in good	· ·			<u> </u>		·	· .
Flushmount	Monitoring Wells	Yes	No	NA			
8. Can the lid be secured				· x			
9. Does the lid have a gas	_ •			<del> </del>	<del></del>		
10. No water in the flush					,		
11. Is the well cap lockab		<del>                                     </del>					
12. Is there a lock presen				4			
•		<u> </u>	***************************************				
<u>Ali Moni</u>	toring Wells	Yes	No	NA:			
Downhole Condition				χ			
12. Water level measuring	g point clearly marked?			) i			
13. No obstructions in we	11?						
14. No plant roots or vege	etation in well?						
L5. No sediment in bottor	n of well?	1		V			
If present, how much s	sediment?	ft					
.6. installed as total depti	h. ·	ft					
7. Measured total depth	of well.	ft					
		<del> </del>		· · · · · · · · · · · · · · · · · · ·			ļ
ieneral Condition	_	Yes	No No	NA )			
8. Concrete pad installed	?	X					
9 . Concrete pad							
Slope away form casing	<b>;</b> ?					<del></del>	
Not deteriorated?	,			<u> </u>			
Not heaved or below so		<del> -</del> - -					]
D. No surface seal settling	•	1/				······································	
L. Well clearly visible and	labeled?				<del> </del>		
omments:				· · · · · · · · · · · · · · · · · · ·			
	· · · · · · · · · · · · · · · · · · ·		<del></del>				
Major well ronair are the	se that require a subcontr	notor er cens	te mekili-	tion to com		· · · · · · · · · · · · · · · · · · ·	
major well religit dia mo	se suar require a subcontr	actor or separa	te mount	addi to com	hiere		

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### WELL DEVELOPMENT AND GROUNDWATER SAMPLING FIELD FORM

					ROJECTIN					THE STATE OF	
		million				Client:	NRT				
Project Num				Task #:		Start Date:				Time: _	811
Field Person		Murhis	3 Eva			Finish Date:				Time: _	<del>844</del>
	IELL INFOR	MATION				r services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of the services of	EVENT 1	YPE.	and the second of the second	Argania (M. 1958) Agantagan	
	Well ID:	MW 17		Well Develop	ment		Low-Flow / Lo		pling		
Ca	asing ID:			Well Volume			Other (Specify):				
and the state of	·····································	To y later than the	TAW	ER QUALITY	INDICATO	R PARAMET	ERS (contin	ued)			
		Volume	Depth to				SEC or	Dissolved		_	
Sampling	Time	Removed	Water	Drawdown	Temp.	рH	Cond.	Oxygen	Turbidity	ORP	Visual
Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SÜ)	(µs/cm)	(mg/L)	(NTU)	(mV)	Clarity
	311		39.05								
	§23.	35, <del>25,</del> 52	48.14	9.09	12.68	6.34	Z850	. 3	105	95	Chady
	826	5º 45 65	48,40	0.76	17.58	6.55	Z850	- 18	83.2	71	Cloudy
	829	.78	49.85	0.95	17,44	6.63	2860	0.0	80.0	57	Charle
	25.B	e 91	50,76	0-41	12.49	6.76	Z 880	0.0	47.6	38	clear
1	935	1,04	51.85	99	12.67	6.78	Z 880	0.0	50.8	26	Croudy
	838	1.14	52,10	. 25	12. 78	6.81	Z880	0.0	37.8	22	Chon
	841	1,30	52.3c	,20	12.67	6,83	2860	4.0	28.5	21	clear
	844	1,43	52.37	.07	17.44	6,86	2850	0	37.4	18	clear
											1
					•						
	11.1	4. 4. 4. 7.	NOTES	continued)					ABBREVI	TIONS	<u>्रिकेश विश्व</u> ास
			<u>an managan manga</u> d	<u></u>		3-2-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-		Cond Actual Condi FT BTOC - Feet Bek na - Not Applicable nm - Not Measured	ictivity	ORP - Oxication	r-Reduction-Potential Electrical Conductance Inits ature
		•	·					na - Not Applicable		SU - Standard L Temp - Temper	Jnës Alore

Low-Flow Sampling Form



### Monitoring Well Evaluation Checklist

Site	Vermillion	Major wel	ls repairs* r	equired	Yes	No	NA
Inspection Date	3-22-18	to maintai	n well integ	rity?		X	
Well Number	MW 18					.4	
]							
Stick	c-up Monitoring Wells				_	Comments	
1. Outer protectiv	e Casing	Yes	Nο	NA			
Not corroded		X					
Not dented		Ÿ					
Not cracked							
Not loose		P		Ī			
2. Inner casing		Yes	No	NA			
Not corroded		×					
Not dented		1					
Not cracked							
Not loose		1					·
		Yes	No	NA			
3. Are there weep	holes in outer casing?	X					
4. Weep holes able		Î					
5. Is there a lockab							
6. is there a lock p							
7. Bumper posts in		<del>                                      </del>					
	. 800 4 00 (10.000)	<u> </u>	\				·····
Flushm	nount Monitoring Wells	Yes	No	NA			
8. Can the lid be se		7		V			
1	e a gasket that seals?			Î	<del></del>		
10. No water in the	=						
11. Is the well cap							
12. Is there a lock		-					
zz. is there a lock ;	oresent;	<u> </u>		<u></u>			
Δ1	l Monitoring Wells	Yes	No	NA			
Downhole Condition		1	- 100	X			
	asuring point clearly marked?			7			
13. No obstruction	· · · · · · · · · · · · · · · · · ·						·
	or vegetation in well?	}					
15. No sediment in		ļ		-			·
	much sediment?	ft		L			
16. Installed as total		ft					
17. Measured total	•	ft					
17. Measurea total	depth of well.						
General Condition		Yes	No	NA			
18. Concrete pad ir	Shalletse	V 7	110				
19. Concrete pad	istanea	1-1-				<u></u>	
Slope away form	n encing?	1 1					
Not deteriorate	<del>-</del>	<del>                                     </del>					
	pelow surrounding grade?	<del>                                     </del>					
		1 1					<del></del>
20. No surface seal	<del>-</del>	-					
21. Well clearly visi	DIE AND IADEIEU?			1			
Comments:							
* Major well ====!-	and those that remains a mile and	ractor on same	rata mahili	ation to see	mploto		
iviajor well repair	are those that require a subcont	ractor or sepa	ate mobili	eation to col	npiete		<del></del>

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	Site: <u>Verm</u>		- 1 4 THE 18	TARREST FOR	ROJEGIZIN	FORMATIO Client:		0.74 2-15,744		THE STATE	
Project Num		n tis est		Task#:		Start Date:		C:		Time:	851
Field Person		Mathis "	i Evens	1 431. 11.		Finish Date:					901 901
	VELL INFO		∑ांके} क्षेत्र क्षित्र क्षेत्र क		بمناهون والمراس والمواس			·	e north de la company San San San San San San San San San San		
	Well ID:									The second	2 Y <sub>4</sub>
	*********	WM18	inches	Well Develop		. —	Other (Specify)	ow Stress San	npling		
	asing ID:	<u>เป็น หมายสุดสุด</u> เลื่อ		Well Volume					Sec. & Market Const.		
त्त्रम्, क्षेत्र <b>्ष</b>	September 1			ER QUALITY	CINDICATO	RPARAME		<del>,                                    </del>			
	<b>T</b> :	Volume	Depth to	D	**		SEC or	Dissolved	Translation.	000	
Sampling	Ti⊓e	Removed	Water	Drawdown (Feet)	Temp. (*C)	pН	Cond.	Oxygen (mg/L)	Turbidity (NTU)	ORP (mV)	Visual Clarity
Stage	(military) 851	(gallons)	(Feet) 24, 26	(reet)	( ( )	(SU)	(µs/cm)	(iiig/L)	(MID)	(mv)	Jianly
	853	,/3	24,24	С	11.99	6.84	2570	0	6.1	60	Clear
	855	.26	24.26	9	13.18	6.85	23 FO	<del>                                     </del>	7.8	47	
	857	+	74.26	0		6.86	2390	Ö	1.8	45	Clear
	859	.39	<del>!</del>	0	13.41	6.87	2330	<u> </u>	1.5	45	Clear
	<del> </del>	-52	24.26	<u> </u>		7	2310			47	Cher
	961	.65	24.26	d	13.34	. ها	2310	0	0,7	77	Clear
		<u> </u>	<del> </del>	·						<del> </del>	
		<del> </del>		<u> </u>				<u> </u>	<del>                                     </del>		
		<u> </u>		<u> </u>			<del>                                     </del>	<del> </del>		<del>-</del>	
		<del> </del>	<del> </del>					<u> </u>	<del> </del>	<u> </u>	
		1		<u> </u>							<del></del>
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········		<del> </del>		<del></del>			<u> </u>	<del> </del>		<del>                                     </del>	
1. July 1737 Johann		100000000000000000000000000000000000000		Same of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control o	na Para da da Las estadas. Transportadas de la composição de la composição de la composição de la composição de la composição de la compo	Pro 1901   2007   1964.	militaria na Madela e 194	1880 4 4 4 4	50 (420 (2014) 1901 19		
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								FTBYOC - Feet Belo na - Not Applicable			ecurcal Conductance

Flow Sampling Form 1

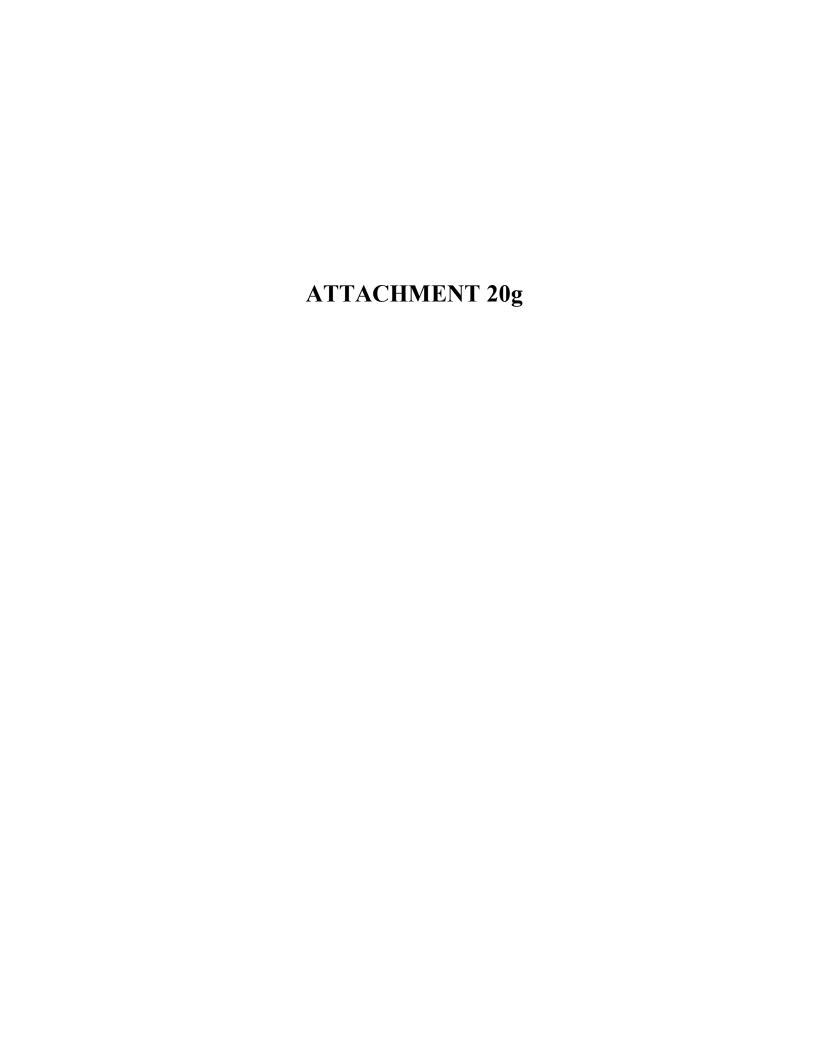
Site	Vermillion	Major wel	ls repairs*	required	Yes	No No	NA
· · · · · · · · · · · · · · · · · · ·	3-22-18	to maintal	n well inter	grity?		<b>A</b>	
Well Number	MMZI						
	Monitoring Wells	· · · · · · · · · · · · · · · · · · ·		·- <del></del>	1	Comments	
1. Outer protective Ca	ising	Yes	No	NA NA	<u> </u>		
Not corroded				<u> </u>	<u> </u>		
Not dented					ļ	<del></del>	
Not cracked					1		<del></del>
Not loose		l <u> </u>		<u> </u>	<u>[</u>		
2. Inner casing		Yes	No	I NA	]		
Not corroded		7		<del></del>			
· Not dented		<del>                                     </del>		<del> </del>		·	
Not cracked		<del> </del>		<del>  . –</del>	<del></del>		<del></del>
Not loose			<del></del>	<del></del>			·
Not loose		Yes	No	NA NA			
3. Are there weep hole	s in nuter casing?	163	NO	- 11/2			
4. Weep holes able to c		1		<u> </u>			
5. Is there a lockable ca		<del> </del>					
6. Is there a lock preser		<del>  -     </del>					
7. Bumper posts in good							
7. bumper posts in good	a condition:					<del></del>	
Flushmount	Monitoring Wells	Yes	No	NA			
8. Can the lid be secure				X	<del></del>		
9. Does the lid have a ga	• ,						
10. No water in the flusi		<del>                                     </del>		<del>-</del>	•		··· <u>-</u>
L1. Is the well cap locka							
12. Is there a lock prese				4			
•							
	itoring Wells	Yes	No	NA·	·		
Downhole Condition							
	ng point clearly marked?					<del></del>	
3. No obstructions in w		J					
4. No plant roots or veg				<del> </del> - -	*****	****	
5. No sediment In botto			1	<del></del>			
If present, how much		ft				•	
5. Installed as total dep		ft					)
7. Measured total depth	n of well.	ft					
eneral Condition		Yes	No	NA			
3. Concrete pad installe	d? ·	1 7					
. Concrete pad	~.						
Slope away form casis	. · · · · · · · · · · · · · · · · · · ·			<del></del>	······································		ľ
Not deteriorated?	·8·	<del>                                     </del>	<del></del> -	<del>  -</del>			
Not heaved or below :	surrounding grade?	<del> </del>					
. No surface seal settlin				<del></del>			
. Well clearly visible an		<del>                                     </del>					
mments:		<u> </u>			······································		
					,,	. <u>.</u>	
	-	······································					
lajor well repair are the	ose that require a subcontr	actor or separat	e mobiliza	tion to com	plete		

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		ermillion				Client:	1 4				
Project Numb				Task #:		Start Date:				Time:	1750
Field Personr	nel:	Math: 5	J. Evo			Finish Date:				Time:	1303
and way	IELL INFOR	MATION	海縣等於	TENERS.		W-199	* EVENT T	YPE		anda tariga. Markaria	
1	Well ID: µ	w 21		Well Develop			Low-Flow / Lo				
Ca	ising ID;		inches		Approach Sam		Other (Specify):				
いいっとを通	<b>新教</b> 子 3年度	3. 计多类型	WAT	ER QUALIF	PINDICATOR	RPARAMET	ERS (contin	iued)	Separate Separate		
Sampling Stage	Time (military)	Volume Removed (gallons)	Depth to Water (Feel)	Drawdown (Feet)	Temp.	pH (SU)	SEC or Cond, (µs/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP (mV)	Visual Clarity
	12.56		91.25		12/2	7 7 7	100		<del>                                     </del>	-75	
	1307	, 13	93.15	1,9	13,63	7.33	695 730	0	1.5	<del> </del>	CIPOT
	1305	. 26	95.22	2.07 2.06	13,55	7.36 7.40	7.32		0.8	-101	Close
	1308	, 34	47.28	2,46	13,99	4,40	7.3		0,5	-131	Cieca
			<del> </del>						<del> </del>	<del> ,</del>	<del></del>
<del></del>		<u> </u>		<u> </u>			<u> </u>		<del> </del>	<del> </del>	+
	*	<u> </u>		<del> </del>						<del> </del>	<del></del>
		<del>                                     </del>	1	<del> </del>	<del> </del>	<del></del> _		<del>                                     </del>	<del> </del>		<del></del>
				<del> </del>	<del>                                     </del>	<del></del>					
				1						<del> </del>	
				<u> </u>					<u> </u>	<u> </u>	<del> </del>
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				1		<del> </del>					
The American			NOTES	continued)				200 (00 - 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10 at 10	ABBREVI	TIONS	, garage and
<u> </u>							<u></u>	Cond Actual Cond FT BTOC - Feet Bek na - Not Applicable nm - Not Measured	uchity	ORP - Oxidation-R	ctrical Conductance is re

Low-Flow Sampling Form

The follow	ving are attach	nments to the	testimony o	of Andrew Rehi



Site Vermillion	Major we	lls repairs*	required	Yes	No	NA
Inspection Date 3.22-18	to mainte	ıln well inte	egrity?		X	****
Well Number MW03R					^ <del></del>	<del>,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,</del>
Stick-up Monitoring Wells					Comments	
1. Outer protective Casing	Yes	No	NA	7		
Not corroded	X				······································	7
Not dented						
Not cracked				1		
Not loose	4					
	•	Ph-section and and				
2. Inner casing	Yes	No	NA	}		
Not corroded	X					
Not dented						
Not cracked						
Not loose	V	1.	· · · · · · · · · · · · · · · · · · ·	Í		<del></del>
	Yes	No	NA			***************************************
3. Are there weep holes in outer casing?	X					
4. Weep holes able to drain?		· · · · · · · · · · · · · · · · · · ·			······································	
5. Is there a lockable cap present?						
6. Is there a lock present?						<del></del>
7. Bumper posts in good condition?						
	<u> </u>	<u> </u>			· · · · · · · · · · · · · · · · · · ·	
Flushmount Monitoring Wells	Yes	No	NA			
8. Can the lid be secured tightly?	-:		X		<del></del>	<del></del>
9. Does the lid have a gasket that seals?			······ ?	V		··
10. No water in the flushmount?			<del> \ </del>			
11. Is the well cap lockable?			<del>                                     </del>			<del></del>
12. Is there a lock present?		·	<del>                                     </del>			
122. 15 there a lock present:	L		7 4	<u> </u>		
All Monitoring Wells	Yes ·	No	NA:			
Downhole Condition	162.	- 140	X	·		
12. Water level measuring point clearly marked?	-		<del>                                     </del>		······································	
13. No obstructions in well?	<del> </del>		<del> </del>			
14. No plant roots or vegetation in well?	\ <del>-</del>	<u></u>	<del>                                     </del>	····		······································
15. No sediment in bottom of well?	J	<del></del>	<del>  _  /-  </del>			
			LY1_		······································	
If present, how much sediment?	ft					
16. Installed as total depth.	ft					
17. Measured total depth of well.	ft					
General Condition	/ Va- T	- N- 1	314			
	Yes	No	NA			
18. Concrete pad installed?	1		<del></del>			
19 . Concrete pad	<del></del>				·····	
Slope away form casing?	<del>                                     </del>	<u>-</u>				
Not deteriorated?	<del></del>			······	<del></del>	
Not heaved or below surrounding grade?						
20. No surface seal settling?	V					
21. Well clearly visible and labeled?					·····	
Comments:						
	· · · · · · · · · · · · · · · · · · ·				<del> </del>	
		·. ·			<del></del>	
<ul> <li>Major well repair are those that require a subcontra</li> </ul>	ctor or separa	te mobiliz	ation to com	plete		

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		m!!!!an			Ve	Client:		de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la			
Project Num	***************************************	<u></u>		Task #:		Start Date:	3-22-/	<u> </u>		Time;	1200
Field Person	nel: 7.	Math15	5 France			Finish Date:				Time:	7/3
	VELL INFOR	MATION						TYPE		7 - V - 9 - 9 - 1	references Quality
		1W 03R		Well Develop				ow Stress San			<del>- i . i </del>
Ca	asing ID:		inches	•	Approach San		Other (Specify)				
and suffered		h (48/3%)	TAW .	ER QUALIT	/ INDICATO	R PARAMET	ERS (contin	rued)			
		Volume	Depth to				SEC or	Dissolved			
Sampling	Time	Removed	Water	Drawdown	Temp.	рĦ	Cond.	Oxygen	Turbidity	ORP	∀isual
Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	(NTU)	(mV)	Clarity
,, <del>,,</del>	1204		7,71								<u> </u>
	1207	./3	7.71	0	/3,09	7.35	1050	d	1.4	-100	Clear
	1210	.26	7.71	0	13.38	7.35	1066	0	て・0	-121	Clear
	1213	.39	7.71	σ	13,49	7.34	/070		1.5	-128	clear
i				<u> </u>							<u> </u>
						-					
								<u> </u>			
				<u> </u>							
				<u> </u>			<u> </u>				<u> </u>
				<u> </u>							
		<u> </u>	2								
7 19 19 19 19 19 19 19 19 19 19 19 19 19			NOTES (	continued)			Service Control		ABBREVIA	TIONS	
								Cond Actual Condu FT BTOC - Feet Belo na - Not Applicable		ORP - Oxidation-Re SEC - Specific Elec SU - Standard Units	trical Concectance

Low-Flow Sampling Form MW-1

Site Vecmillian	Major well	s repairs* r	equired	Yes	No	NA
Inspection Date 3-22-18	to maintair				X	
Well Number Mwo4			,		1	·
Stick-up Monitoring Wells					Comments	•
1. Outer protective Casing	Yes	No	NA	•	***********	
Not corroded	X					
Not dented	1					
Not cracked		,				
Not loose	1 1/2	·			<del></del>	
Not loose	1 4	_	L . 1			
2. Inner casing	Yes	No	NA			
Not corroded	X	140				
Not dented						<del></del>
Not cracked	<del>                                     </del>				·	· · · · · · · · · · · · · · · · · · ·
Not loose	<del> </del>					
Not loose	<u> </u>					
	Yes	No	NA			
3. Are there weep holes in outer casing?	X					
4. Weep holes able to drain?						
5. Is there a lockable cap present?						
6. Is there a lock present?						
7. Bumper posts in good condition?						
·	<del>,</del>					
Flushmount Monitoring Wells	Yes	No	NA			
8. Can the lid be secured tightly?			X			
9. Does the lid have a gasket that seals?						
10. No water in the flushmount?						*
11. Is the well cap lockable?						
12. Is there a lock present?			V			
All Monitoring Wells	Yes	No	NA			
Downhole Condition			χ			
12. Water level measuring point clearly marked?						
13. No obstructions in well?						
14. No plant roots or vegetation in well?						
15. No sediment in bottom of well?			. /			intermed security ( ), §
If present, how much sediment?	ft					
16. Installed as total depth.	ft					
17. Measured total depth of well.	ft					
General Condition	Yes	No	NA			
18. Concrete pad Installed?	X					
19 Concrete pad	<del>  1</del>					
Slope away form casing?						
Not deteriorated?						
Not deteriorated?  Not heaved or below surrounding grade?	<del>                                     </del>					
	<del>                                     </del>					
20. No surface seal settling? 21. Well clearly visible and labeled?	<del></del>					
Comments:	L					
comments;						
* N. S			41			
*-Major-well-repair-are-those that require-a-subcontra	ccor or sepa	ate mobiliz	ation to cor	npiete		

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	Site:	Vermillion				Client:	A 0				- <del> </del>
Project Numi	ber:			Task#:		Start Date:	3-22~/	8		Time:	1043
Field Person	nel:T	i Mathis				Finish Date:				. Time:	1055
D. The same	VELC INFOR	MATION	<b>《神经》</b>			4709	EVENT 1	YPE		a to the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of	
		M W 04		Well Develop		M	Low-Flow / Lo	w Stress San	pling		
Ca	asing ID:		inches	Well Volume		npling 🔲	Other (Specify)	:			
NESTA N	解說。中學等		WAT	ER QUALITY	INDICATO	RPARAMET	ERS (contir	iued)		607	
		Volume	Depth to				SEC or	Dissolved			
Sampling	Time	Removed	Water	Drawdown	Temp.	pН	Cond,	Oxygen	Turbidity	ORP	Visual
Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	(NTU)	(mV)	Clarity
	i043	<u> </u>	(0.35				7 - 11				_
	1046	•13	6.87	0.55	10.38	7,40	634	5.25	0.8	-65	clear
<u> </u>	10 49	.76	6,96	-09	10.42	7.47	<i>64</i> 0	4.52	0.6	+//2	Clear
	<i>1</i> 6 52	.39	6.96		10.65	7,52	642	4,64	1,2	- iZZ	Clear
	10 = 5	. <u>\$</u> Z	6.96	0	10.69.	7.54	643		0.5	-126	Clear
								<u> </u>	ļ	<u> </u>	
	<u> </u>			<u> </u>							<del></del>
	<u> </u>	<u> </u>		<u> </u>		·					
			<u> </u>	<del> </del>				<u> </u>	ļ		
	<u> </u>	<u> </u>		<b></b>	<u> </u>		<u> </u>	<u> </u>	<u> </u>	<del> </del> -	
	<u> </u>		<u> </u>	<u> </u>	<u> </u>			<u> </u>	<u> </u>		
		ļ	<del> </del>	<u> </u>		· · · · · · · · · · · · · · · · · · ·	<u> </u>			<u> </u>	<del></del>
	<u> </u>	<del></del>		<u> </u>		<u> </u>	<u> </u>	<del> </del>		<u> </u>	
10.12 6053 eA-	<u> </u> 	est and a reductional	ng at the day the second of the		(Shekhanisaa) - b dan	30 300 UV	(1987) S. S. S. S. S. S. S. S. S. S. S. S. S.	di mangangan at mangan bingga	e in the home of the second or	School State of the same	
		· 等。 第二次	NOTES	continued):							
								Cond, - Actual Cond FT BTOC - Feet Bek na - Not Applicable nm - Not Measured			Reduction Potential ecuscal Condectance

Low-Flow 8 na 1

Site Ver	million	Major we	ls repairs*	required	Yes	No	NA
	2-18	to mainta	in well inte	grity?		×	) Partition
Well Number	<u>0 05</u>						
	nitoring Wells	·		···	,	Comments	
1. Outer protective Casing		Yes	No	NA			
Not corroded		<u> </u>	ļ				
Not dented			<u> </u>	-		·	
Not cracked				<u> </u>		····	
Not loose		4/	<u></u>				
2. inner casing		Yes	No	I ÑA			
Not corroded		$\frac{1-\frac{163}{X}}{X}$	1 110	1100			
Not dented		<del>                                     </del>		<del>                                     </del>	7		
Not cracked		<del></del>		<del> </del>		·	
Not loose				<del> </del>		<del> </del>	<del></del>
1101 10000.		Yes	Nο	NA			
3. Are there weep holes in	outer casing?	163	110	1-"			
4. Weep holes able to drain		<del>*</del>					··-
5. Is there a lockable cap pr				<del>                                     </del>			
6. Is there a lock present?	· ·			<del>                                     </del>		·	
7. Bumper posts in good co	ndition?	1-4-1		<del>  </del>			
Transport poots in Book co.		<u> </u>		<u> </u>		······································	
Flushmount Mo	nitoring Wells	Yes	No	NA			
8. Can the lid be secured tig				X			
9. Does the lid have a gasket			<del></del>	<del>                                     </del>			
10. No water in the flushmo					•		<del></del>
11. Is the well cap lockable?			······································				
12. Is there a lock present?				7		·	
•							
All Monitor	ing Wells	Yes	No	NA .	•		
ownhole Condition				×			
2. Water level measuring po	oint clearly marked?						
3. No obstructions in well?							
4. No plant roots or vegetat	ion in well?			_ \			
5. No sediment in bottom o	f well?			<i>i</i> ]•			
If present, how much sed	iment?	ft		•		-	
6. Installed as total depth.		ft					
7. Measured total depth of	well.	ft					
eneral Condition		Yes	No No	NA NA			
3. Concrete pad installed?		X					
. Concrete pad		<b></b>					
Slope away form casing?						·	
Not deteriorated?		<del> </del>					
Not heaved or below surro	ounding grade?	j					
. No surface seal settling?	دامات	1 4					
. Well clearly visible and lab	10100 f	L					
mments:		<del></del>	· · · · · · · · · · · · · · · · · · ·	<del> </del>		<del></del>	
lajor well repair are those t	Ilial remilre a cubcoati	ractor or senera	te mobiliza	ation to com	alete		
are are ares	mas regan e a subconti	Cator or acpera	111001114	2.01. 00 00/11			

2:\2200\2285\Deliverables\Sampling and Analysis Plans\Teklab Draft Provisional SAP\Appendix B - Field Forms\Monitoring Vell Inspection Form

		rmillion				FORMATION Client:	NR		······································		
Project Num				Task #:		Start Date:	3-22-	18		Time;	uc7
Field Person	nel: T.M	<u> Է</u> Է Է Է Է Է Է Է Է Է Է Է Է Է Է Է Է Է Է	). Evans			Finish Date:	3-22 <i>-1</i>	8		Time:	[[/c
	VELL INFO	RMATION	14 NO 14 A	11 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1	Maria de la Caractería de la Caractería de la Caractería de la Caractería de la Caractería de la Caractería de Maria de la Caractería de la Caractería de la Caractería de la Caractería de la Caractería de la Caractería de	a year of the second	EVENT	TYPE	ar beginning a	ar in the second	
		lw 05		Well Develop				ow Stress Sam			
Ç	asing ID:		inches	Well Volume		npling 🔲	Other (Specify)	:			
		5.0 (種類型)	WAT	ER QUALITY	INDICATO	R PARAMET	ERS (contin	jued)			
		Volume	Depth to				SEC or	Dissolved			T
Sampling	Time	Removed	Water	Drawdown	Temp.	pН	Cond.	Oxygen	Turbidity	ORP	Visual
Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	(UTV)	(mV)	Clarity
	1107		10,43				4-				
	1110	ا3	10.85	,42	10.57	7,35	<u>878</u>		0,6	-15	Clear
	1113	.Z6	6.96	, it	10,61	7.40	884	<u> </u>	5,0	-18	- Clear
	lille	- 35	6.96	0	10.71	7,42	887	0	0.2	-18	CROS
	1119	.52	6.96	0	<u> 10.73                                    </u>	7.43	BSE	6	0.1	-16	chear
		<u> </u>						G JE	ļ		
		<del> </del>	<u> </u>	<del></del>	:						<u> </u>
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		<u> </u>	<u></u>	<u> </u>				<u> </u>	<b></b>		
		<del> </del>	<u> </u>		<u>,</u>	ļ		<u> </u>			
		<del> </del>	<u></u>	<u> </u>		-	<u> </u>	<u> </u>	<b></b>		<u> </u>
	<del>;</del>			<del> </del>				<del> </del>	<del> </del>	ļ	
<del></del>	, <u>-</u>	ļ							<del> </del>	<del> </del>	
		<del></del>		- <del></del>					<del> </del> -		<del></del>
्र. १ द्वर <sup>्ष</sup> कुन्	1	N 2 Gilma ric	Park State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the State of the	L		27 5 5 7 7 7 14 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	an an an an an an an an an an an an an a	COST COS		remarks to the latest	
	7 7 3 May 12	A. T. T. BORNE	- NOTES (	continued)	这种作为2018	491	e Palenting	Cond Actual Condu		TIONS Oxidation R	
					·			FT BTOC - Feet Belo na - Not Applicable nm - Not Measured			drice Cwacactance is se
										S-Segreca Celo	
								Į.			

Low-Flow Sampling Form MW-1

Site	Vermiller	Major well	s repairs* r	equired	Yes	No	NA
Inspection Date	3-22-18	to maintair				X	
Well Number	Mw 6R					<u> </u>	
	<u> </u>						
Stick	-up Monitoring Wells					Comments	
1. Outer protective		Yes	No	NA			
Not corroded		X	,,,,			• • • • • • • • • • • • • • • • • • • •	
Not dented				ļ			
Not cracked							<del></del>
Not loose							
2. Inner casing		Yes	No	NA			
Not corroded		X	,,,,		:		
Not dented							
Not cracked				1			
Not loose	•	1/		-			
1100 10030		Yes	No	NA NA			
2 Are there ween	holes in outer casing?	Y Y	NO	- 17.			
4. Weep holes able		1					
5. Is there a lockab		<del>                                     </del>					
6. Is there a lock pr							
		1	- :		••••		<del> </del>
7. Bumper posts in	good condition?	1				<del></del>	
Floralism				81.0			
	ount Monitoring Wells	Yes	No	X	`		
8. Can the lid be se	= *	-				<del></del>	<del></del> .
	a gasket that seals?						<u></u>
10. No water in the		J					
11. Is the well cap I		<u> </u>		1	<del>.</del>		
12. Is there a lock p	resent?	L1	·····	*			
<b>.</b> II							
	Monitoring Wells	Yes	No	NA		<u></u>	
Downhole Condition		<del></del>	<del> </del>	<u> </u>			
	asuring point clearly marked?						
13. No obstructions		<u> </u>					
•	or vegetation in well?						
15. No sediment in							
•	much sediment?	ft					
16. Installed as tota	•	ft					
17. Measured total	depth of well.	ft					
General Condition		Yes	No	NA NA			
18. Concrete pad in	stalled?	<u> </u>					
19 . Concrete pad							
Slope away form						.,	
Not deteriorated							
	elow surrounding grade?						
20. No surface seal	_	*/					
21. Well clearly visil	ole and labeled?						
Comments:				- 1×4			
* Major well repair	are those that require a subcont	ractor or separ	ate mobiliz	ation to con	nplete		

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		ermillion				Client:	NR	rigilijare og regjerj H			
Project Numi		3 34464403		Task#:		Start Date:	3-22-6		<del> </del>	Time:	9/3
	nel: 7	Math 15	J. Evant			Finish Date:				Time:	925
	VELL INFOR					en jaron san en jaron ka		TYPE	16 / 27 / 2 / 2 / 2 3 / 16 / 2 / 3 / 3		6.
	Well ID: M			Well Develop				ow Stress San			
	asing ID:	w ex	inches	Well Volume			Other (Specify)		uhimig		
		in Constanting				R PARAMET					
CHILLEN MARKET		Volume	Depth to	FIX-MOVER'S	Milipio Vil 6	IS CAUSSINE I	SEC or	Dissolved	l .	<del></del>	<u> </u>
Sampling	T me	Removed	Water	Drawdown	Temp.	На	Cond.	Oxygen	Turbidity	ORP	Visual
Stage	(military)	(galions)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	(NTU)	(mV)	Clarity
	913		4,2								
	916	,13	4,12	C	10.64	6.98	/0/0	O.	(0.7	-85	clear
	919	.26	4,12	0	10,79	7.07	1030	O	5,9	. 127	Clear
	٩٢٧	۰3۹	4.12	0	16,91	7,09	1030	0	2,7	-145	clear
	925	.52	4112	0	10.95	7,09	1640	0	1.5	-121	chear
	<u> </u>										
						·					:
- 11 Sep	417		NOTES (	continued)	<b>对新疆外</b> 主				ABBREVIA	TIONS	
								Cond Actual Condu FT BTOC - Feet Belo na - Not Applicable nm - Not Measured		ORP - Oxidation-R SEC - Specific Elec SU - Standard Unit Temp - Temperate	dricul Caroudance s

Low-Flow Sampling Form

Site Vermilion Inspection Date 3-27-18	Major wells repairs* required	Yes	No	NA
	to maintạin well integrity?	<u> </u>		
Well Number Mwoge		,		
Stick up Monitoring Malla			Commonstr	
Stick-up Monitoring Wells 1 Outer protective Casing	Yes No NA	7	Comments	
Not corroded	Yes No NA			·
Not dented	7-1	<del> </del>		
Not cracked		<del> </del>		
Not loose		·		
1101 10030	<u> </u>	. i		
2. Inner casing	Yes No NA	7		
Not corroded	No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.	<del>                                     </del>		··-
Not dented	<del>                                     </del>	<del>                                     </del>		
Not cracked				<del></del>
Not loose	<del>  1/</del>			<del></del>
10000	Yes No NA			·
3. Are there weep holes in outer casing?	165 100 100	1		
I. Weep holes able to drain?				
5. Is there a lockable cap present?				
i. Is there a lock present?				
. Bumper posts in good condition?				
, bumper posts in good condition:	<u> </u>	l		<del></del>
Flushmount Monitoring Wells	Yes No NA	I		
. Can the lid be secured tightly?	163 100 100	. ,		
Does the lid have a gasket that seals?	· · · · · · · · · · · · · · · · · · ·			
D. No water in the flushmount?				
I. is the well cap lockable?		·		
2. Is there a lock present?				
is there a took present:	<u> </u>			<del></del>
All Monitoring Wells	Yes No NA			
ownhole Condition	1es - Ro RA			
. Water level measuring point clearly marke	.d2		<del> </del>	·
. No obstructions in well?	"'			
. No plant roots or vegetation in well?				
. No sediment in bottom of well?	<del></del>			
If present, how much sediment?	ft			
Installed as total depth.	ft			
Measured total depth of well.	· ft			
weasured total depth of well.	· (L			
neral Condition	Yes No NA			
Concrete pad installed?				
. Concrete pad				
Slope away form casing?				··
Not deteriorated?				
Not deteriorated?  Not heaved or below surrounding grade?		***************************************		
No surface seal settling?				
Well clearly visible and labeled?				
nments:	L	······································		
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<sup>5:\2200\2285\</sup>Deliverables\Sampling and Analysis Plans\Teklab Draft Provisional SAP\Appendix B - Field Forms\Monitoring Veli Inspection Form

Project Number: Field Personnel:  WELL INFOR  Well ID: Casing ID:  Sampling Stage  (military)  1131  1134  1137  1146  1140	MATION S WORR	Depth to Water (Feet) 12.67 13.13	Well Develop Well Volume ER QJALIT Drawdown (Feet)	ment Approach San	npting []	Other (Specify)	Syptem Stress San  : nued) Dissolved Oxygen (mg/L)		Time: Time: ORP (mV)	Visual Clarity
Field Personnel: 7. WELL INFOR WELL INFOR Well ID: MA Casing ID:  Sampling Time Stage (military)  1131 1134 1137 1140 1143	Volume Removed (gallons)	watr Depth to Water (Feet) 12.67 13.13	Well Develop Well Volume ER QJALIT Drawdown (Feet)	ment Approach San Y INDICATO Temp. (°C)	Finish Date:    X  npling	子とと・・・ EVENT Low-Flow / Lo Other (Specify) ERS (contir SEC or Cend. (μs/cm)	Syptem Stress San  : nued) Dissolved Oxygen (mg/L)	npling Turbidity	Time:	Visual
Well ID: MACCasing ID:  Casing ID:  Sampling Time (military)  1131  1134  1137  1140  1143	Volume Removed (gallons)	Depth to Water (Feet) 12.67 13.13	Well Develop Well Volume ER Q JALTT  Drawdown (Feet)  - H  C	ment Approach San Y INDICATO Temp. (°C)	LX) npling   R PARAMET  pH  (SU)	Low-Flow / Lo Other (Specify) ERS (contin SEC or Cond. (µs/cm)	ow Stress San : nued) Dissolved Oxygen (mg/L)	npling Turbidity	ORP	
Casing ID:  Sampling Time Stage (military)  1131  11 34  1137  11 40  1143	Volume Removed (gallons)	water (Feet) 13.13 13.13	Well Develop Well Volume ER Q JALTT  Drawdown (Feet)  - H  C	ment Approach San Y INDICATO Temp. (°C)	LX) npling   R PARAMET  pH  (SU)	Other (Specify) ERS (continued of SEC or Cond. (µs/cm)	: nued) Dissolved Oxygen (mg/L)	Turbidity		
Casing ID:  Sampling Time Stage (military)  1131  11 34  1137  11 40  1143	Volume Removed (gallons)	water (Feet) 13.13 13.13	Drawdown (Feet)	Approach San Y INDICATO Temp. (°C) fi.98	npling R PARAMET pH (SU)	Other (Specify) ERS (continued of SEC or Cond. (µs/cm)	: nued) Dissolved Oxygen (mg/L)	Turbidity		
Sampling Time Stage (military)  1131  1134  1137  1140  1143	Volume Removed (gallons)	Depth to Water (Feet) 12.67 13.13 13.13	Drawdown (Feet)	Temp. (°C)	pH (SU)	SEC or Cend. (µs/cm)	Dissolved Oxygen (mg/L)	Turbidity		
Sampling Time Stage (military)  1131  1134  1137  1140  1143	Volume Removed (gallons)	Depth to Water (Feet) 12.67 13.13 13.13	Drawdown (Feet)	Temp. (°C)	pH (SU)	SEC or Cend. (µs/cm)	Dissolved Oxygen (mg/L)	Turbidity		
Stage (military)  1131  1134  1137  1140  1143	(gallons) .13 .26	Water (Feet) 12.67 13.13 13.13	(Feet)	(°C) N.98	(SU)	(µs/cm)	(mg/L)	•		
1131 1134 1137 1140 1143	,13 ,26 ,39	12.67 13.13 13.13	.46	ስ.ዓያ				(NTU)	(mV)	Clarity
11 34 11 37 11 40 1143	. z6 . 39	13.13 13.13	٥		7.05	717.	· .		1	1 -
1137 1140 1143	. z6 . 39	13.13 13.13	٥		7.05	*7 1 <sup>*7</sup> A			<u> </u>	
11 40	. 39	13,13		11 00		41+0	0	0.7	30	Clear
1143			1	11.54	ネロ	2160	G	3.5	1/	clear
	. 57		lo	11.80	7.27	2170	Ø.	2.7	0	C!par
j146		13.13	0	11.76	7.37	2176	0	7.4	-14	Claa,
	. 65	13.13	0	11.72	7,47	2/80	0	7.4	-23	Clear
1149	. 78	13.13	O	11,74	7,52	7:40	_c·	2.4	-32	Clear
1152	,91	13.13	O	11.74	7.58	7 90	0	7.4	-40	Clea
1155	1,04	13.13	0	11.76	7.63	ZZGÒ	0	1.7	-48	Clear
1158	1.17	13.13	O	11.79	7,67	2200	∙ಲ	1.6	-54	Clear
		NOTES (d	continued)					ABBREVIA	TIONS	
							Cond Acual Conduc FT BTOC. Feet Below na - Not Applicable nm - Not Measured		ORP - Oxidation-Rede SEC - Specific Electri SU - Standard Units Temp - Temperature "C - Degrees Celolus	

Low-Flow Sampling Form MW-1

Site Veconillion	Major wel	s repairs*	required	Yes	No	NA
Inspection Date 3-22-18	to maintai		•		<i>y</i>	
Well Number MU09						
Stick-up Monitoring Wells				_	<u>Comments</u>	
1. Outer protective Casing	Yes	No	NA			
Not corroded	X	<u> </u>			~	
Not dented						<u>.</u>
Not cracked			_[			
Not loose	$-\sqrt{V}$		<u> </u>	l		
2. Inner casing	Yes	No	T NA	Į		
Not corroded	X		1			<del></del>
Not dented	<del>                                     </del>		1	•		<del></del>
Not cracked	<del></del>		<u> </u>	<del></del>		
Not loose			<del>                                     </del>			·——
,	Yes	No	NA			
3. Are there weep holes in outer casing?	1 - 'es	NO	1-11			
4. Weep holes able to drain?			<del> </del>			
5. Is there a lockable cap present?	<del>                                     </del>		<del> </del>		<u></u>	
6. Is there a lockable cap present?	<del> </del>		-		<del></del>	
	<del></del>		<del> </del>			
7. Bumper posts in good condition?			ll			<del>-</del> .
Flushmount Monitoring Wells	Yes	No	NA			
3. Can the lid be secured tightly?			X			
). Does the lid have a gasket that seals?			1			
O. No water in the flushmount?		······································		*		
1. Is the well cap lockable?	<del> </del>					
2. Is there a lock present?				-,,,		
	L					
All Monitoring Wells	Yes -	No	NA			
ownhole Condition			X			
2. Water level measuring point clearly marked?						
3. No obstructions in well?						
1. No plant roots or vegetation in well?						
5. No sediment in bottom of well?			$\mathcal{L}$	· .		
If present, how much sediment?	ft		-			
6. Installed as total depth.	ft					
. Measured total depth of well.	ft					
eneral Condition	Yes	No	NA ]			
. Concrete pad installed?	5	-110	an a		·····	
. Concrete pad installed?	1-7-1					
Slope away form casing?	1-1-					
Not deteriorated?	<del></del>					<del>~-~</del>
· · · · · · · · · · · · · · · · · · ·	<b> </b>					····
Not heaved or below surrounding grade?	<del>   </del>					
No surface scal settling?					<del></del> -	
. Well clearly visible and labeled?	L					
mments:	·					
· · · · · · · · · · · · · · · · · · ·	. <del></del>					<u>-</u>
lajor well repair are those that require a subcontr	ne los est elements	ta mahili-	ation to co-	nlete		·····
refor wen repair are triose that require a subconti-	actor or separa	re modinzi	zaon to com	hiere		

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			<b>正规基础 计编</b>		ROJECTAN	FORMATIO	Age of the same of the	in the particular	A SECTION OF	risery.	
\$	Site: Ver	million				Client:	NR.T				
Project Num			·	, Task #:		Start Date:	3-22-1	8		Time: _ <i>C</i>	7.5
	nel: <i>T. U</i>					Finish Date:					
	VELC INFOR						EVENTI			A NOTE OF LIGHT OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF	
		Am od		Well Develop			Low-Flow / Lo		pling		1
	asing ID:			Well Volume			Other (Specify):		er og alvig av er er		
<b>为中国教育</b>		3、公司的法司	TAW .	ER QUALIT	INDICATO	R PARAMET	ERS (contin	ued)	460.00		` <u>`</u>
	<del></del>	Volume	Depth to Water	Drawdown	T		SEC or Cond.	Dissolved Oxygen	Turbidity	ORP	,, ,
Sampling Stage	Time (military)	Removed (gallons)	(Feel)	(Feet)	Temp. (*C)	pH (SU)	(µs/cm)	(mg/L)	(NTU)	(mV)	Visual C∤arity
Glage	935	(Sellons)	4,60	(1-001)	(0)	(00)	(pacity)	/mgrL)	(470)	(aiv)	Cherry
	722		7.0								
			<u> </u>	<u> </u>							
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<b> </b>	<del> </del>				<del> </del>	<u> </u>			<u> </u>	<del>                                     </del>	<u> </u>
	<u> </u>		<del></del>	<del> </del>	<u> </u>		<del>                                     </del>				<del> </del>
	-	<del> </del>	<del> </del>			<del> </del>	<del> </del>		<del> </del>		
<b> </b>	<del> </del>	<del>}</del>	<del>}</del>	<u> </u>	<del> </del>	<del></del>	<u> </u>	<del></del>	<del> </del>	<u> </u>	
<u> </u>	<u>!</u>	<del> </del>		<u> </u>	<del> </del>		<del> </del>		<del></del>		<del> </del>
<b>—</b>	i	<u> </u>	<del> </del>	<del>                                     </del>			<del></del>			<del> </del>	<del> </del>
<b></b>	;	<del>}</del>		<del> </del>	<del> </del>		<del> </del>	<del> </del>	<del> </del>	<del> </del>	<del> </del>
<del></del>	:	<del> </del>	<del> </del>	<del>                                     </del>	1	<b></b>		<del> </del>	<del> </del>	<u> </u>	<del> </del>
<del> </del>	:	<del> </del>	<del> </del>	<del> </del>	<del>[                                    </del>	<del> </del>	<del>                                     </del>	<del> </del>	<del> </del>	<del> </del>	<del> </del> -
			NOTES (	continued):					ABBREVIA	TIONS.	
	€ Deptr				· · · · · · · · · · · · · · · · · · ·			Cond Aciual Condu FT BYOC - Feet Belo na - Not Applicable nm - NotMeasured	alvity	ORP - Oxidation-Per SEC - Specific Elect SU - Standard Units Temp - Temperature "C - Degrees Celos	ical Conductance
·											

Low-Flow Sampling Form

Site Necrollian	Major wel	ls repairs*	required	Yes	NA	
Inspection Date 3-22-18	to maintai	n well inte	grity?		X	
Well Number がんしょな						
Stick-up Monitoring Wells				_	<b>Comments</b>	
1. Outer protective Casing	Yes	No	NA	]		
Not corroded			_]	J		
Not dented						
Not cracked						
Not loose		<u> </u>				
2. Inner casing	Yes	No	l NA	1		
Not corroded	X		<del> </del>	<b></b>	···	* · · · · · · · · · · · · · · · · · · ·
- Not dented			· ·			<del></del>
Not cracked			<del> </del>	<del></del>		
Not loose	100		1			<del></del>
	Yes	No	NA		·····	
3. Are there weep holes in outer casing?	163		1-12			
4. Weep holes able to drain?	1		<del> </del>			
5. Is there a lockable cap present?	<del> </del>					
6. Is there a lock present?	<del> </del>		<del> </del>		<u> </u>	
1			<del> </del> -		<del></del>	
7. Bumper posts in good condition?			<u> </u>		-	<u> </u>
Flushmount Monitoring Wells	Yes	No	, NA			
8. Can the lid be secured tightly?	1		· ×			
9. Does the lid have a gasket that seals?		·				
10. No water in the flushmount?		·····				
11. Is the well cap lockable?					•	
12. Is there a lock present?			~/			
All sands of our flo	<del></del>					
All Monitoring Wells	Yes	No	NA:			
Downhole Condition	<del> </del>		X		· · · · · · · · · · · · · · · · · · ·	
12. Water level measuring point clearly marked?	ļ					
13. No obstructions in well?					· · · · · · · · · · · · · · · · · · ·	
14. No plant roots or vegetation in well?			-4			
L5. No sediment in bottom of well?	<u> </u>		4			
If present, how much sediment?	ft					Į.
.6. Installed as total depth.	ft					Ì
7. Measured total depth of well.	. ft					Ì
ieneral Condition	Yes	No	NA			
8. Concrete pad installed?	V					
9 . Concrete pad	1 7 1				· · · · · · · · · · · · · · · · · · ·	
Slope away form casing?	<del>                                     </del>	·			) har-N	
Not deteriorated?	<del> </del>					
Not heaved or below surrounding grade?			———			
D. No surface seal settling?	<del>                                     </del>				<del></del>	
L. Well clearly visible and labeled?					<del></del>	
omments:	L					
Annotes.						
Major well repair are those that require a subcontr	actor or separa	te mobiliza	ation to com	plete		

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5	Site: <u>v</u> e	chillian	·····			Client:	URT	·			
Project Num				Task #:		Start Date:		-18		Time:	75
Field Person		math:s								Time:	
型声型的 <b>V</b>	VELLINFO	RMATION					EVENT T	YPE		e de d'anterior	autoria de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la company
		muig		Well Deve op			Low-Flow / Lo		npling		
	asing ID:		· · · · · · · · · · · · · · · · · · ·	Well Volume	and the later of the second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second se	The state of the state of the state of	Other (Specify):		Comment Visco		
1945年1967			WAT	ER QUALIT	INDICATO	R PARAMET	ERS (contin	ued)	(C. ) 有《花》、《木》、		
		Volume	Depth to				SEC or	Dissolved			
Sampling	Time	Removed	Water	Drawdown	Temp.	pH	Cond.	Oxygen	Turbidity	ORP	Visua:
Stage	(military)	(gallons)	(Feet) してる	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	(NTU)	(mV)	Clarity
	925		6.23			<del> </del>				ļ	
	<u> </u>					<del> </del>				<u> </u>	<del> </del>
		<del> </del>			<u> </u>	<del> </del>	<u> </u>		<del> </del>	<del> </del>	
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	<u> </u>	<u> </u>			<del> </del>	<u> </u>	ļ				<del> </del>
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		<del> </del>			<del> </del>	<del>                                     </del>	:		<del> </del>		
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Low-Flow Sampling Form

Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Date Inspection Dat	to maintai	n well inte	grity?		Comments	
Stick-up Monitoring Wells  1. Outer protective Casing  Not corroded		No	. NA		Comments	
Outer protective Casing     Not corroded		No	. NA		Comments	
Outer protective Casing     Not corroded		No	. NA	ı	Comments	
Not corroded		No	NA ,		***************************************	
	<u> </u>	ſ				
	<del></del>			·		·
Not dented	1		·  i			
Not cracked			-			
Not loose	[ \ \Psi					
2. Inner casing	Yes	No	NA			
Not corroded	- <del></del>		<del> </del> :			
· Not dented			<del>  -                                   </del>			
Not cracked			1	<del></del>		
Not loose		*	<del> </del>			·
	Yes	No	NA	, <u>-</u>	···	
. Are there weep holes in outer casing?	X	110	<del> </del>			
. Weep holes able to drain?	1	······································				
. Is there a lockable cap present?	<del>                                     </del>					
. Is there a lock present?		the particular and a second				
Bumper posts in good condition?	<del>                                     </del>				<del></del>	
, buttiper posts in good condition:	<u> </u>	,	<u> </u>		<del></del>	
Flushmount Monitoring Wells	Yes	No	NA			
Can the lid be secured tightly?			×			
Does the lid have a gasket that seals?		•	î			
). No water in the flushmount?						
. Is the well cap lockable?			1		· · · · · · · · · · · · · · · · · · ·	
. Is there a lock present?			V			
•						
All Monitoring Wells	Yes ·	No	NA NA			
wnhole Condition			X			
. Water level measuring point clearly marked?		]				
No obstructions in well?						
No plant roots or vegetation in well?						
No sediment in bottom of well?						
If present, how much sediment?	ft		•		•	
Installed as total depth.	ft					•
Measured total depth of well.	. ft					
anual Candisian	1/2	- I	NA			
neral Condition	Yes	No	NA .		<u></u>	
Concrete pad installed? Concrete pad	<del> </del>				<del></del>	
•		, ]				
Slope away form casing? Not deteriorated?	<del> </del>					
	<del> </del>				····	
Not heaved or below surrounding grade?	<del> </del>				<u></u>	
No surface seal settling? Well clearly visible and labeled?	<del></del>					
ments:	L		<u> </u>	_		
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				_ <del></del>		
ijor well repair are those that require a subcontra	ctor or consect	te mobiliza	tion to com	lete		

<sup>3:\2200\2285\</sup>Deliverables\Sampling and Analysis Plans\Teklab Draft Provisional SAP\Appendix B - Field Forms\Monitoring Vell Inspection Form

\$	Ste: Vern	KILion				Client:	NRT	İ		<u> </u>	
Project Num		· · · · · · · · · · · · · · · · · · ·		Task #:		Start Date:	7-55-5	E		Time:	940
	nel: 7, M	lathis I	Evens			Finish Date:_	3-22-1			Time:	C 53
137 v. 18 <b>V</b>	VELL INFOR	MATION	STANDAG		· 计图像		EVENT	TYPE			
		Mw zo		Well Develop				ow Stress San			
Ca	asing ID:		inches	Well Volume			Other (Specify		· · · · · · · · · · · · ·		
# ( <u>*</u> 446)	· By Man		WA1	ER QUALITY	INDICATO	R PARAMET	ERS (conti	nued)			
		Volume	Depth to				SEC or	Dissolved			
Sampling	Time	Removed	Water	Drawdowr	Temp.	pН	Cond.	Oxygen	Turbidity	ORP	Visual
Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	(NTU)	(miv)	Clarity
	940		13.09								<u> </u>
	949	.39	13.29	ح ح	10.44	7.31	568	0	ZZ, 8	-21	Clear
	952	. 52	13.29	G	10.54	7,23	581	ච	21.6	-28	clear
	955	.65	13.29	0.	10.55	7.19	583	Ó	10-5	- 3i	Clear
	958	. 78	13.29	0	10.55	7.18	585	O	8.1	-31	Cite.
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			NOTES (	continued)	M. (4) (4)				ABBREVIA	TIONS	
<u></u>	·							Cond Actual Conduc FT BTOC - Feet Belov na - Not Applicable nm - Not Measured	divity	ORP - Oxidation-Re SEC - Specific Elec SU - Standard Unit Temp - Temperation *C - Degrees Celcle	trica: Conductance ; e
									•		

Low-Flow Sampling Form
NW-1

Site Vecmillian	Major wells repai	rs* required	Yes	No	NA
Inspection Date 3-22-18	to maintạin well i	ntegrity?		Х	
Well Number Aw 34				,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	
Stick-up Monitoring We	<u>lls</u>			Comments	
1. Outer protective Casing	Yes No	NA NA	]		
Not corroded	X				
Not dented		[			
Not cracked			[		
Not loose					
				01	
2. Inner casing	Yes No	NA	ı		
Not corroded	X				
Not dented					
Not cracked					
Not loose					· · · · · · · · · · · · · · · · · · ·
1	Yes No	NA			
3. Are there weep holes in outer casing					
4. Weep holes able to drain?	·				
5. Is there a lockable cap present?	\ <del></del>				
6. Is there a lock present?	-			· · · · · · · · · · · · · · · · · · ·	<del></del>
7. Bumper posts in good condition?	<del></del>				
Fred Posts III good condition:				<del></del>	
Flushmount Monitoring We	lls Yes No	l NA			
8. Can the lid be secured tightly?	163 140	- ' <u>X</u>	<u></u>		
9. Does the lid have a gasket that seals?		<del>- -?- </del>	<del></del>		
10. No water in the flushmount?		<del>- - </del>			
				<del></del>	
11. Is the well cap lockable?		-			
12. Is there a lock present?	L				
A SERIA . TA	<del></del>				Ì
All Monitoring Wells	Yes No	NA			
Downhole Condition		1 × 1		· · · · · · · · · · · · · · · · · · ·	
12. Water level measuring point clearly	narked?				
13. No obstructions in well?				······································	
14. No plant roots or vegetation in well?					
15. No sediment in bottom of well?		<u> </u>			
If present, how much sediment?	ft				-
l6. Installed as total depth.	ft				1
7. Measured total depth of well.	ft]				
	<u></u>				ļ
Seneral Condition	Yes No	NA NA		·	
8. Concrete pad installed?	<u>X</u>	.			
9 . Concrete pad	n place control to	<u> </u>			
Slope away form casing?					
Not deteriorated?					]
Not heaved or below surrounding gra	de?				
D. No surface seal settling?	4/				
1. Well clearly visible and labeled?					
omments:					
Major well repair are those that require	a subcontractor or separate mob	ilization to com	plete		

2:\2200\2285\Deliverables\Sampling and Analysis Plans\Teklab Draft Provisional SAP\Appendix B - Field Forms\Monitoring Vell Inspection Form

5	Site: V	ecm (Ulon				Client:	NRT	<u> </u>			
Project Num				Task #:		Start Date:	3-22-	18		Time:	002
Field Person		Mathis 3	. Evons			Finish Date:	3-22-			 _ Time;	1032
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		53.43 J. S.	WAT			R PARAMET	FRS (confi	nued)	98477.277		
		Volume	Depth to				SEC or	Dissolved			1
Sampling	Time	Removed	Water	Drawdown	Temp.	pH	Cond.	Oxygen	Turbidity	ORP	Visual
Stage	(military)	(galions)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	(NTU)	(mV)	Clarity
	1002		13.99					<u> </u>		•	
	1008	,26	14.64	0.65	11,84	7,09	960	Φ	27.6	-176	Char
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	1017	.65	14.64	O	12,31_	7.16	952	b	74.1	-150	Cicady
,	1626	.78	14,64	0_	17.70	7.16	951	O	1/1	-152	(600
	lc73	19.	14.64	0	12,31	7.15	953	0	90.9	-149	Cloudy
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Low-Flow Sampling Form MW-1 Low-Flow Sampling Form

Page 2 of 2

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Sampling Stage	Time (military)	Volume Removed (gallons)	Depth to Water (Feet)	Drawdown (Feet)	Temp. (°C)	pH (SU)	SEC or Cond. (µs/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP (m:V)	Visual Clarity
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Low-Flow Sampling Form MW-1

#### Field Calibration Form Groundwater Quality Meter

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May 21, 2018

Steve Wiskes
Natural Resource Technology, Inc.
2422 East Washington Street
Suite 104
Bloomington, IL 61/04
TEL. (414) 837-3614
FAX: (414) 837-3608

RE: Dynegy Vermillion Power Station



Dear Steve Wiskes:

TEKLAB, INC received 19 samples on 5/9/2018 7:00:00 PM for the analysis presented in the following report.

Samples are analyzed on an as received basis unless otherwise requested and documented. The sample results contained in this report relate only to the requested analytes of interest as directed on the chain of custody. NELAP accredited fields of testing are indicated by the letters NELAP under the Certification column. Unless otherwise documented within this report, Teklab Inc. analyzes samples utilizing the most current methods in compliance with 40CFR. All tests are performed in the Collinsville, IL laboratory unless otherwise noted in the Case Narrative.

All quality control criteria applicable to the test methods employed for this project have been satisfactorily met and are in accordance with NELAP except where noted. The following report shall not be reproduced, except in full, without the written approval of Teklab, Inc.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Michael L. Austin Project Manager (618)344-1004 ex 16

MAustin@teklabinc.com



# **Report Contents**

#### http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 18050091

Client Project: Dynegy - Vermillion Power Station

Report Date: 21-May-18

#### This reporting package includes the following:

Cover Lotter	1
Report Contents	2
Definitions	3
Case Narrative	4
Accreditations	6
Laboratory Results	6
Sample Summary	23
Dates Report	24
Quality Control Results	32
Receiving Check List	30
Chain of Custody	Appended



#### **Definitions**

http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 18050091 Report Date: 21-May-18

Client Project: Dynegy - Vermillion Power Station

#### Abbr Definition

- \* Analytes on report marked with an asterisk are not NELAP accredited
- CCV Continuing calibration verification is a check of a standard to determine the state of calibration of an instrument between recalibration.
- CROL A Client Requested Quantitation Limit is a reporting limit that varies according to customer request. The CRQL may not be less than the MDL.
- DF Dilution factor is the dilution performed during analysis only and does not take into account any dilutions made during sample preparation. The reported result is final and includes all dilution factors.
- DNI Did not ignite
- DUP Laboratory duplicate is a replicate aliquot prepared under the same laboratory conditions and Independently analyzed to obtain a measure of precision.
- ICV Initial calibration verification is a check of a standard to determine the state of calibration of an instrument before sample analysis is initiated.
- IDPH IL Dept. of Public Health
- LCS Laboratory control sample is a sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes and analyzed exactly like a sample to establish intra-laboratory or analyst specific precision and bias or to assess the performance of all or a portion of the measurement system.
- LCSD Laboratory control sample duplicate is a replicate laboratory control sample that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
- MBLK Method blank is a sample of a matrix similar to the batch of associated sample (when available) that is free from the analytes of interest and is processed simultaneously with and under the same conditions as samples through all steps of the analytical procedures, and in which no target analytes or interferences should present at concentrations that impact the analytical results for sample analyses.
- MDL "The method detection limit is defined as the minimum measured concentration of a substance that can be reported with 99% confidence that the measured concentration is distinguishable from method blank results."
- MS Matrix spike is an aliquot of matrix fortified (spiked) with known quantities of specific analytes that is subjected to the entire analytical procedures in order to determine the effect of the matrix on an approved test method's recovery system. The acceptable recovery range is listed in the QC Package (provided upon request).
- MSD Matrix spike duplicate means a replicate matrix spike that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
- MW Molecular weight
- ND Not Detected at the Reporting Limit
- NELAP NELAP Accredited
  - PQL Practical quantitation limit means the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operation conditions.
  - RL The reporting limit the lowest level that the data is displayed in the final report. The reporting limit may vary according to customer request or sample dilution. The reporting limit may not be less than the MDL.
  - RPD Relative percent difference is a calculated difference between two recoveries (ie. MS/MSD). The acceptable recovery limit is listed in the QC Package (provided upon request).
  - SPK. The spike is a known mass of target analyte added to a blank sample or sub-sample, used to determine recovery deficiency or for other quality control purposes.
  - Surr Surrogates are compounds which are similar to the analytes of interest in chemical composition and behavior in the analytical process, but which are not normally found in environmental samples.
  - TIC Tentatively identified compound: Analytes tentatively identified in the sample by using a library search. Only results not in the calibration standard will be reported as tentatively identified compounds. Results for tentatively identified compounds that are not present in the calibration standard, but are assigned a specific chemical name based upon the library search, are calculated using total peak areas from reconstructed ion chromatograms and a response factor of one. The nearest Internal Standard is used for the calculation. The results of any TICs must be considered estimated, and are flagged with a "T". If the estimated result is above the calibration range it is flagged "ET"
- TNTC Too numerous to count ( > 200 CFU )

#### **Oualifiers**

- # Unknown hydrocarbon
- C RL shown is a Client Requested Quantitation Limit
- H Holding times exceeded
- M Manual Integration used to determine area response
- R RPD outside accepted recovery limits
- T TIC(Tentatively identified compound)

- B Analyte detected in associated Method Blank
- E Value above quantitation range
- I Associated internal standard was outside method criteria
- ND Not Detected at the Reporting Limit
- S Spike Recovery outside recovery limits
- X Value exceeds Maximum Contaminant Level



#### Case Narrative

#### http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Client Project: Dynegy - Vermillion Power Station

Work Order: 18050091 Report Date: 21-May-18

Cooler Receipt Temp: 2.82 °C

An employee of Teklab, Inc collected the sample(s).

MW7 could not be collected. Well Dry.

MW19 could not be collected. No access to well due to flooding.

#### Locations

			Locations			
	Collinsville		Springfield	Kansas City		
Address	5445 Horseshoe Lake Road	Address	3920 Pintail Dr	Address	8421 Nieman Road	
	Collinsville, IL 62234-7425		Springfield, IL 62711-9415		Lenexa, KS 66214	
Phone	(618) 344-1004	Phone	(217) 698-1004	Phone	(913) 541-1998	
Fax	(618) 344-1005	Fax	(217) 698-1005	Fax	(913) 541-1998	
Email	jhriley@teklabinc.com	Email	KKlostermann@teklabinc.com	Email	jhriley@teklabinc.com	
	Collinsville Air		Chicago			
Address	5445 Horseshoe Lake Road	Address	1319 Butterfield Rd.			
	Collinsville, IL 62234-7425		Downers Grove, IL 60515			
Phone	(618) 344-1004	Phone	(630) 324-6855			
Fax	(618) 344-1005	Fax				
Email	EHurley@teklabinc.com	Email	arenner@teklabinc.com			



### Accreditations

http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Client Project: Dynegy - Vermillion Power Station

Work Order: 18050091 Report Date: 21-May-18

State	Dept	Cert#	NELAP	Exp Date	Lab
Illinois	IEPA	100226	NELAP	1/31/2019	Collinsville
Kansas	KDHE	E 103/4	NELAP	4/30/2019	Collinsville
Louislana	LDEQ	166493	NELAP	6/30/2018	Collinsville
Louisiana	LDEQ	1665 /8	NELAP	6/30/2018	Collinsville
Texas	TCEQ	T104704515-12-1	NELAP	7/31/2018	Collinsville
Arkansas	ADEQ	88 0966 3/14/2019		3/14/2019	Collinsville
Illinois	IDPH	17584 5/31/2019		5/31/2019	Collinsville
Indiana	ISDH	C-IL-06 1/31/2019		1/31/2019	Collinsville
Kentucky	KDEP	98006		12/31/2018	Collinsville
Kentucky	UST	0073		1/31/2019	Collinsville
Louisiana	LDPH	LA170027		12/31/2018	Collinsville
Missouri	MDNR	930		1/31/2019	Collinsville
Missouri	MDNR	00930 5/31/2019		Collinsville	
Oklahoma	ODEQ	9978		8/31/2018	Collinsville
Tennessee	TDEC	04905		1/31/2019	Collinsville



http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 18050091

Client Project: Dynegy - Vermillion Power Station

Report Date: 21-May-18

Lab ID: 18050091-001

Client Sample ID: MW1

Matrix: GROUNDWATER

Collection Date: 05/09/2018 12:27

MATTA: GROONDWATER			Concetton Date: 0.3/0.3/2010 12.27							
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch		
FIELD ELEVATION MEASUR	EMENIS									
Depth to water from measuring	point *	0		78.75	ft	1	05/09/2018 12:27	R246935		
STANDARD METHOD 4500-	HB 2001 FIELD									
pH	*	1.00		6.63		1	05/09/2018 12:27	R246935		
STANDARD METHODS 2130	B FIELD									
Turbidity	*	1.0		< 1.0	NTU	1	05/09/2018 12:27	R246935		
STANDARD METHODS 18TH	ED. 2580 B FIELD									
Oxidation-Reduction Potential	*	-300		96	mV	1	05/09/2018 12:27	R246935		
STANDARD METHODS 2510	B FIELD									
Conductivity	*	1		2500	μS/cm	1	05/09/2018 12:27	R246935		
STANDARD METHODS 2550	B FIELD									
Temperature	*	0		14.27	°C	1	05/09/2018 12:27	R246935		
STANDARD METHODS 4500	-O G FIELD									
Oxygen, Dissolved	*	1.00		4.99	mg/L	1	05/09/2018 12:27	R246935		
STANDARD METHODS 2540	C (DISSOLVED) 199	7								
Total Dissolved Solids	NELAP	20		2090	mg/L	1	05/10/2018 16:17	R246936		
STANDARD METHODS 4500	-NO3 F (101AL) 200	0								
Nitrogen, Nitrate (as N)	NELAP	0.100		0.290	mg/L	2	05/10/2018 14:57	R247082		
SW-846 9036 (TOTAL)										
Sulfate	NELAP	500		1070	mg/L	50	05/14/2018 19:38	R247133		
SW-846 9214 (DISSOLVED)										
Fluoride	NELAP	0.10		0.13	mg/L	1	05/10/2018 15:56	R246957		
SW-846 9251 (TOTAL)										
Chloride	NELAP	5		14	mg/L	1	05/14/2018 19:29	R247141		
SW-846 3005A, 6020A, META	ALS BY ICPMS (DISS	OLVED)								
Arsenic	NELAP	0.0010		< 0.0010	mg/L	5	05/12/2018 4:35	141740		
Barium	NELAP	0.0010		0.0131	mg/L	5	05/12/2018 4:35	141740		
Boron	NELAP	0.0250		1.70	mg/L	5	05/12/2018 4:35	141740		
Iron	NELAP	0.0250		0.223	mg/L	5	05/12/2018 4:35	141740		
Manganese	NELAP	0.0020		0.0332	mg/L	5	05/12/2018 4:35	141740		
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	05/12/2018 4:35	141740		



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Client: Natural Resource Technology, Inc.

Work Order: 18050091

Client Project: Dynegy - Vermillion Power Station

Report Date: 21-May-18

Lab ID: 18050091-002

Client Sample ID: MW2

Matrix: GROUNDWATER

Collection Date: 05/09/2018 9:49

Mairix. GROUNDWATER			Conection Date. 05/05/2010 5.45							
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch		
FIELD ELEVATION MEAS	UREMENTS		-							
Depth to water from measuring	ng point *	0		18 47	ft	1	05/09/2018 9:49	R246935		
STANDARD METHOD 450	0 H B 2001 FIELD									
pН	*	1.00		7.40		1	05/09/2018 9:49	R246935		
STANDARD METHODS 21	130 B FIELD									
Turbidity	*	1.0		< 1.0	NTU	1	05/09/2018 9:49	R246935		
STANDARD METHODS 18	TH ED. 2580 B FIELD									
Oxidation-Reduction Potentia	l *	-300		-124	mV	1	05/09/2018 9:49	R246935		
STANDARD METHODS 25	10 B FIELD									
Conductivity	*	1		821	µS/cm	1	05/09/2018 9:49	R246935		
STANDARD METHODS 25	50 B FIELD				.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			-		
Temperature	*	0		14.45	°C	1	05/09/2018 9:49	R246935		
STANDARD METHODS 45	00-O G FIELD									
Oxygen, Dissolved	*:	1.00		< 1.00	mg/L	1	05/09/2018 9:49	R246935		
STANDARD METHODS 25	40 C (DISSOLVED) 1997	7								
Total Dissolved Solids	NELAP	20		502	mg/L	1	05/10/2018 16:17	R246936		
STANDARD METHODS 45	00-NO3 F (TOTAL) 200	0								
Nitrogen, Nitrate (as N)	NELAP	0.050		< 0.050	mg/L	1	05/10/2018 14:59	R247082		
SW-846 9036 (TOTAL)										
Sulfate	NELAP	10		46	mg/L	1	05/14/2018 19:41	R247133		
SW-846 9214 (DISSOLVED	0)									
Fluoride	NELAP	0.10		0.53	mg/L	1	05/10/2018 15:59	R246957		
SW-846 9251 (TOTAL)										
Chloride	NELAP	5		37	mg/L	1	05/14/2018 19:37	R247141		
SW-846 3005A, 6020A, ME	TALS BY ICPMS (DISS	OLVED)								
Arsenic	NELAP	0.0010		0.0088	mg/L	5	05/12/2018 5:08	141740		
Barium	NELAP	0.0010		0.171	mg/L	5	05/12/2018 5:08	141740		
Boron	NELAP	0.0250		0.249	mg/L	5	05/12/2018 5.08	141740		
Iron	NELAP	0.0250		0.358	mg/L	5	05/12/2018 5:08	141740		
Manganese	NELAP	0.0020		0.0847	mg/L	5	05/12/2018 5:08	141740		
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	05/12/2018 5:08	141740		



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Client: Natural Resource Technology, Inc.

Work Order: 18050091

Client Project: Dynegy - Vermillion Power Station

Report Date: 21-May-18

Lab ID: 18050091-004

Client Sample ID: MW10

Matrix: GROUNDWATER

Collection Date: 05/09/2018 14:05

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUR	EMENTS							
Depth to water from measuring p	olnt *	0		49.13	ft	1	05/09/2018 14:05	R246938
STANDARD METHOD 4500-H	B 2001 FIELD							
pH	*	1.00		6.42		1	05/09/2018 14:05	R246935
STANDARD METHODS 2130	B FIELD							
Turbidity	*	1.0		1.2	NTU	1	05/09/2018 14:05	R246935
STANDARD METHODS 18TH	ED. 2580 B FIELD							
Oxidation-Reduction Potential	*	-300		73	mV	1	05/09/2018 14:05	R246935
STANDARD METHODS 2510	B FIELD							
Conductivity	*	1		1510	µS/cm	1	05/09/2018 14:05	R246935
STANDARD METHODS 2550	B FIELD							
Temperature	*	0		15.30	°C	1	05/09/2018 14:05	R246935
STANDARD METHODS 4500-	O G FIELD							
Oxygen, Dissolved	*	1.00		1.34	mg/L	1	05/09/2018 14:05	R246935
STANDARD METHODS 2540	C (DISSOLVED) 199	7						
Total Dissolved Solids	NELAP	20		1010	mg/L	1	05/10/2018 16:17	R246936
STANDARD METHODS 4500-	NO3 F (TOTAL) 200	00						
Nitrogen, Nitrate (as N)	NELAP	0.100		0.405	mg/L	2	05/10/2018 15:01	R247082
SW-846 9036 (TOTAL)								
Sulfate	NELAP	100		337	mg/L	10	05/14/2018 19:54	R247133
SW-846 9214 (DISSOLVED)								
Fluoride	NELAP	0.10		0.14	mg/L	1	05/10/2018 16:00	R246957
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		8	mg/L	1	05/14/2018 19:45	R247141
SW-846 3005A, 6020A, META	LS BY ICPMS (DISS	SOLVED)						
Arsenic	NELAP	0.0010		< 0.0010	mg/L	5	05/12/2018 5:16	141740
Barium	NELAP	0.0010		0.0820	mg/L	5	05/12/2018 5:16	141740
Boron	NELAP	0.0250		0.0862	mg/L	5	05/12/2018 5:16	141740
Iron	NELAP	0.0250		< 0.0250	mg/L	5	05/14/2018 11:13	141740
Manganese	NELAP	0.0020		0.0284	mg/L	5	05/12/2018 5:16	141740
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	05/12/2018 5:16	141740



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Client: Natural Resource Technology, Inc.

Work Order: 18050091

Client Project: Dynegy - Vermillion Power Station

Report Date: 21-May-18

Lab ID: 18050091-005

Client Sample ID: MW17

Matrix: GROUNDWATER

Collection Date: 05/09/2018 9:12

MANIA. GROONDWATER			Conection Date: 03/03/2010 3.12							
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch		
FIELD ELEVATION MEASUR	EMEN18									
Depth to water from measuring p	oint *	0		38.38	ft	1	05/09/2018 9:12	R246935		
STANDARD METIIOD 4500-I	I B 2001 FIELD									
pH		1.00		6.69		1	05/09/2018 9:12	R246935		
STANDARD METHODS 2130	B FIELD									
Turbidity	*	1.0		23.2	NTU	1	05/09/2018 9:12	R246935		
STANDARD METHODS 18TH	ED. 2580 B FIELD									
Oxidation-Reduction Potential	*	-300		2	mV	1	05/09/2018 9:12	R246935		
STANDARD METHODS 2510	B FIELD									
Conductivity	*	1		2490	μS/cm	1	05/09/2018 9:12	R246935		
STANDARD METHODS 2550	B FIELD									
Temperature	*	0		15.16	°C	1	05/09/2018 9:12	R246935		
STANDARD METHODS 4500	O G FIELD									
Oxygen, Dissolved	*	1.00		2.78	mg/L	1	05/09/2018 9:12	R246935		
STANDARD METHODS 2540	C (DISSOLVED) 199	7		-4-7-32-5				Section Control Brighter		
Total Dissolved Solids	NELAP	20		1980	mg/L	1	05/10/2018 16:17	R246936		
STANDARD METHODS 4500	-NO3 F (TOTAL) 200	0								
Nitrogen, Nitrate (as N)	NELAP	0.100		0.154	mg/L	2	05/10/2018 15:04	R247082		
SW-846 9036 (TOTAL)	Sant-Ma	0.7401						375 1 22013		
Sulfate	NELAP	500		1150	mg/L	50	05/14/2018 20:02	R247133		
SW-846 9214 (DISSOLVED)										
Fluoride	NELAP	0.10		0.15	mg/L	1	05/10/2018 16:02	R246957		
SW-846 9251 (TOTAL)		-								
Chloride	NELAP	5		13	mg/L	1	05/14/2018 19:54	R247141		
SW-846 3005A, 6020A, META	LS BY ICPMS (DISS	OLVED)								
Arsenic	NELAP	0.0010		0.0021	mg/L	5	05/12/2018 5:24	141740		
Barium	NHL AP	0.0010		0.0285	mg/L	5	05/12/2018 5:24			
Boron	NELAP	0.0250		3.25	mg/L	5	05/12/2018 5:24	141740		
Iron	NELAP	0.0250		4.52	mg/L	5	05/12/2018 5:24	141740		
Manganese	NELAP	0.0020		0.128	mg/L	5	05/12/2018 5:24	141740		
Selenium	NELAP	0.0010		0.0011	mg/L	5	05/12/2018 5:24	141740		



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Client: Natural Resource Technology, Inc.

Work Order: 18050091

Client Project: Dynegy - Vermillion Power Station

Report Date: 21-May-18

Lab ID: 18050091-006

Client Sample ID: MW18

Matrix: GROUNDWATER

Collection Date: 05/09/2018 9:25

Matrix. GROONDWATER			Concetion Date: 05/05/2010 5.25							
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch		
FIELD ELEVATION MEASUR	REMENTS									
Depth to water from measuring	point *	0		22.93	ft	1	05/09/2018 9.25	R246935		
STANDARD METHOD 4500-I	HB 2001 FIELD									
pН	*	1.00		6.66		1	05/09/2018 9:25	R246935		
STANDARD METHODS 2130	D B FIELD		at. 10°					The state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the s		
Turbidity	*	1.0		1.9	NTU	1	05/09/2018 9:25	R246935		
STANDARD METHODS 18TH	ED. 2580 B FIELD									
Oxidation-Reduction Potential	*	-300		36	mV	1	05/09/2018 9:25	R246935		
STANDARD METHODS 2510	B FIELD				***					
Conductivity	*	1		1940	μS/cm	1	05/09/2018 9:25	R246935		
STANDARD METHODS 2550	BFIELD									
Temperature	*	0		14.47	°C	1	05/09/2018 9:25	R246935		
STANDARD METHODS 4500	-O G FIFLD									
Oxygen, Dissolved	*	1.00		< 1.00	mg/L	1	05/09/2018 9:25	R246935		
STANDARD METHODS 2540	C (DISSOLVED) 199	7								
Total Dissolved Solids	NELAP	20		1420	mg/L	1	05/10/2018 16:17	R246936		
STANDARD METHODS 4500	-NO3 F (TOTAL) 200	0								
Nitrogen, Nitrate (as N)	NELAP	0.050		< 0.050	mg/L	1	05/10/2018 15:08	R247082		
SW-846 9036 (TOTAL)										
Sulfate	NELAP	200		700	mg/L	20	05/14/2018 20:10	R247133		
SW-846 9214 (DISSOLVED)	D'AOGAA.			1.000			0.301 10000 3.500 3.500 3.500			
Fluoride	NELAP	0.10		0.12	mg/L	1	05/10/2018 16:06	R246957		
SW-846 9251 (TOTAL)										
Chloride	NELAP	5		17	mg/L	1	05/14/2018 20:02	R247141		
SW-846 3005A, 6020A, META	ALS BY ICPMS (DISS	OLVED)								
Arsenic	NELAP	0.0010		0.0013	mg/L	5	05/12/2018 5:32	141740		
Barium	NELAP	0.0010		0.0142	mg/L	5	05/12/2018 5:32	141740		
Boron	NELAP	0.0250		10.9	mg/L	5	05/12/2018 5:32			
Iron	NELAP	0.0250		0.108	mg/L	5	05/14/2018 11:21	141740		
Manganese	NELAP	0.0020		1.23	mg/L	5	05/12/2018 5:32	141740		
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	05/12/2018 5:32	141740		



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Client: Natural Resource Technology, Inc.

Work Order: 18050091

Client Project: Dynegy - Vermillion Power Station

Report Date: 21-May-18

Lab ID: 18050091-007

Client Sample ID: MW21

Matrix. GROUNDWATER

Collection Date: 05/09/2018 12:49

Matrial GROOMDWA	ILIX			Concessor	Date. 05/	03/2010	12.15	
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUR	EMENIS							
Depth to water from measuring	ooint *	0		90 31	ft	1	05/09/2018 12:49	R246935
STANDARD METIIOD 4500 I	I B 2001 FIELD		'					
pН	*	1.00		7.02		1	05/09/2018 12.49	R246935
STANDARD METHODS 2130	B FIELD							
Turbidity	*	1.0		1.1	NTU	1	05/09/2018 12:49	R246935
STANDARD METHODS 18TH	ED. 2580 B FIELD							
Oxidation-Reduction Potential	*	-300		-75	mV	1	05/09/2018 12:49	R246935
STANDARD METHODS 2510	B FIELD							1000
Conductivity	*	1		654	μS/cm	1	05/09/2018 12:49	R246935
STANDARD METHODS 2550	B FIELD							
Temperature	*	0		14.64	°C	1	05/09/2018 12:49	R246935
STANDARD METHODS 4500	-O G FIELD							
Oxygen, Dissolved	*	1.00		1.40	mg/L	1	05/09/2018 12:49	R246935
STANDARD METHODS 2540	C (DISSOLVED) 199	7						
Total Dissolved Solids	NELAP	20		394	mg/L	1	05/10/2018 16:18	R246936
STANDARD METHODS 4500	-NO3 F (TOTAL) 200	0						
Nitrogen, Nitrate (as N)	NELAP	0.050		< 0.050	mg/L	1	05/10/2018 15:17	R247082
SW-846 9036 (TOTAL)								
Sulfate	NELAP	10		25	mg/L	1	05/14/2018 20:29	R247133
SW-846 9214 (DISSOLVED)								
Fluoride	NELAP	0.10		1.08	mg/L	1	05/10/2018 16:10	R246957
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		< 5	mg/L	1	05/14/2018 20:26	R247141
SW-846 3005A, 6020A, META	ALS BY ICPMS (DISS	OLVED)						
Arsenic	NELAP	0.0010		0.0264	mg/L	5	05/12/2018 5:41	141740
Barium	NELAP	0.0010		0.0957	mg/L	5	05/12/2018 5:41	141740
Boron	NELAP	0.0250		0.758	mg/L	5	05/12/2018 5.41	141740
Iron	NELAP	0.0250		0.177	mg/L	5	05/12/2018 5:41	141740
Manganese	NELAP	0.0020		0.107	mg/L	5	05/12/2018 5:41	141740
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	05/12/2018 5:41	141740



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Client: Natural Resource Technology, Inc.

Work Order: 18050091

Client Project: Dynegy - Vermillion Power Station

Report Date: 21-May-18

Lab ID: 18050091-008

Client Sample ID: MW3R

Matrix: GROUNDWATER

Collection Date: 05/09/2018 10:21

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASURE		,,,,	£	***************************************				
Depth to water from measuring p		0		7.03	ft	1	05/09/2018 10:21	R24693
STANDARD METHOD 4500-H				1-00			Control Co.E.	112-1000
pH	*	1.00		7.16		1	05/09/2018 10:21	R24693
STANDARD METHODS 2130	B EIEI D	1.00				_		
Turbidity	*	1.0		< 1.0	NTU	1	05/09/2018 10:21	R24693
STANDARD METHODS 18TH	ED 2590 B EIEI D	1.0		- 1.0	1110		00/00/2010 10:21	112 1000
Oxidation-Reduction Potential	*	-300		-106	mV	1	05/09/2018 10:21	R246934
STANDARD METHODS 2510	D EIELD	-500		-100	IIIV		00/00/2010 10:21	112-10001
Conductivity	*	1		1060	μS/cm	1	05/09/2018 10:21	R246934
STANDARD METHODS 2550	D EIEL D			1000	μολοιτι	-	03/03/2010 10.21	1124033
Temperature 750	*	0		13.98	°C	1	05/09/2018 10:21	P246034
	0.0 EIELD	U		13.90			03/03/2010 10.21	11240951
STANDARD METHODS 4500-	V G FIELD	1.00		< 1.00	mg/L	1	05/09/2018 10:21	D24603
Oxygen, Dissolved	0 (DI000) VED) 400	3750		< 1.00	Hig/L		05/09/2016 10.21	R24093
STANDARD METHODS 2540 Total Dissolved Solids	NELAP	20		678	ma/l	1	05/10/2018 16:18	D24602
				676	mg/L	- 1	03/10/2016 10.16	K24093
STANDARD METHODS 4500-	Principal Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of			40.050	I	4	05/40/2049 45:40	D04700
Nitrogen, Nitrate (as N)	NELAP	0.050		< 0.050	mg/L	1	05/10/2018 15:19	R24706
SW-846 9036 (TOTAL)	NEL LE				200.00	-	05/44/0040 04:07	D0 4740
Sulfate	NELAP	50		167	mg/L	5	05/14/2018 21:07	R24/13
SW-846 9214 (DISSOLVED)						12	0=140,0040,4040	D0 1005
Fluoride	NELAP	0.10		0.48	mg/L	1	05/10/2018 16:16	R24695
SW-846 9251 (TOTAL)	MAN (1.0)			1.0	20.00			22.27
Chloride	NELAP	5		24	mg/L	1	05/14/2018 20:29	R24714
SW-846 3005A, 6020A, META								
Arsenic	NELAP	0.0010		0.0073	mg/L	5	05/11/2018 19:57	
Barium	NELAP	0.0010	1 12.	0.187	mg/L	5	05/11/2018 19:57	
Boron	NELAP	0.0250	В	4.36	mg/L	5	05/11/2018 19:57	
Iron	NELAP	0.0250		1.96	mg/L	5	05/11/2018 19:57	
Manganese	NELAP	0.0020		0.0412	mg/L	5	05/11/2018 19:57	
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	05/11/2018 19:57	141774



#### http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 18050091

Client Project: Dynegy - Vermillion Power Station

Report Date: 21-May-18

Lab ID: 18050091-009

Matrix: GROUNDWATER

Client Sample ID: MW4

Collection Date: 05/09/2018 12:03

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUR	EMENTS							
Depth to water from measuring p	point *	0		6.36	ft	1	05/09/2018 12:03	R246935
STANDARD METHOD 4500-H	B 2001 FIFLD							
pH		1.00		7.24		1	05/09/2018 12:03	R246935
STANDARD METHODS 2130	B FIELD							
Turbidity		1.0		< 1.0	NTU	1	05/09/2018 12:03	R246935
STANDARD METHODS 18TH	FD. 2580 B FIFL D							
Oxidation-Reduction Potential	*	-300		-94	mV	1	05/09/2018 12:03	R246935
STANDARD METHODS 2510	B FIELD							
Conductivity	*	1		648	μS/cm	1	05/09/2018 12:03	R246935
STANDARD METHODS 2550	B FIELD							
Temperature		0		12.16	°C	1	05/09/2018 12:03	R246935
STANDARD METHODS 4500	O G FIELD				101			
Oxygen, Dissolved	*	1.00		< 1.00	mg/L	1	05/09/2018 12:03	R246935
STANDARD METHODS 2540	C (DISSOLVED) 199	7						
Total Dissolved Solids	NELAP	20		430	mg/L	1	05/10/2018 16:19	R246936
STANDARD METHODS 4500-	NO3 F (TOTAL) 200	0						
Nitrogen, Nitrate (as N)	NELAP	0.050		< 0.050	mg/L	1	05/10/2018 15:21	R247082
SW-846 9036 (TOTAL)						400		
Sulfate	NELAP	50		99	mg/L	5	05/14/2018 21:45	R247133
SW-846 9214 (DISSOLVED)								
Fluoride	NELAP	0.10		0.28	mg/L	1	05/10/2018 16:18	R246957
SW-846 9251 (TOTAL)								
Chloride	NELAP	10		11	mg/L	2	05/14/2018 21:17	R247141
SW-846 3005A, 6020A, META	LS BY ICPMS (DISS	OLVED)						
Arsenic	NELAP	0.0010		0.0060	mg/L	5	05/11/2018 20:29	141774
Barium	NELAP	0.0010		0.320	mg/L	5	05/11/2018 20:29	141774
Boron	NELAP	0.0250	В	5.87	mg/L	5	05/11/2018 20:29	141774
Iron	NELAP	0.0250		1.31	mg/L	5	05/11/2018 20:29	141774
Manganese	NELAP	0.0020		0.750	mg/L	5	05/11/2018 20:29	141774
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	05/11/2018 20:29	141774



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Client: Natural Resource Technology, Inc.

Work Order: 18050091

Client Project: Dynegy - Vermillion Power Station

Report Date: 21-May-18

Lab ID: 18050091-010

Client Sample ID: MW5

Matrix: GROUNDWATER

Collection Date: 05/09/2018 10:39

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUR	EMENTS							
Depth to water from measuring	point *	0		6 25	ft	1	05/09/2018 10:39	R24693
STANDARD METHOD 4500-I	H B 2001 FIELD							
pH	*	1.00		7.15		1	05/09/2018 10:39	R24693
STANDARD METHODS 2130	0 B FIELD							
Turbidity	*	1.0		< 1.0	NTU	1	05/09/2018 10:39	R24693
STANDARD METHODS 18TH	ED. 2580 B FIELD							
Oxidation-Reduction Potential	*	-300		-27	mV	1	05/09/2018 10:39	R24693
STANDARD METHODS 2510	B FIELD							
Conductivity	*	1		923	µS/cm	1	05/09/2018 10:39	R24693
STANDARD METHODS 2550	B FIELD							
Temperature	*	0		11.83	°C	1	05/09/2018 10:39	R24693
STANDARD METHODS 4500	-O G FIELD							
Oxygen, Dissolved	*	1.00		< 1.00	mg/L	1	05/09/2018 10:39	R24693
STANDARD METHODS 2540	C (DISSOLVED) 199	7						
Total Dissolved Solids	NELAP	20		674	mg/L	1	05/10/2018 16:19	R24693
STANDARD METIIODS 4500	-NO3 Γ (TOTAL) 200	00						
Nitrogen, Nitrate (as N)	NELAP	0.050		< 0.050	mg/L	1	05/10/2018 15:35	R24708
SW-846 9036 (TOTAL)								
Sulfate	NELAP	100		283	mg/L	10	05/14/2018 22:01	R24713
SW-846 9214 (DISSOLVED)								
Fluoride	NELAP	0.10		0.44	mg/L	1	05/10/2018 16:19	R24695
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		9	mg/L	1	05/14/2018 21:52	R24714
SW-846 3005A, 6020A, MET	ALS BY ICPMS (DISS	OLVED)						
Arsenic	NELAP	0.0010		< 0.0010	mg/L	5	05/11/2018 20:38	141774
Barium	NELAP	0.0010		0.0283	mg/L	5	05/11/2018 20:38	141774
Boron	NELAP	0.0250	В	14.5	mg/L	5	05/11/2018 20:38	141774
Iron	NELAP	0.0250		< 0.0250	mg/L	5	05/11/2018 20:38	141774
Manganese	NELAP	0.0020		0.408	mg/L	5	05/11/2018 20:38	141774
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	05/11/2018 20:38	141774



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Client: Natural Resource Technology, Inc. Work Order: 18050091

Client Project: Dynegy - Vermillion Power Station Report Date: 21-May-18

Lab ID: 18050091 011 Client Sample ID: MW6R

Matrix: GROUNDWATER Collection Date: 05/09/2018 11:02

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUR	REMENTS							
Depth to water from measuring	point *	0		3.95	ft	1	05/09/2018 11:02	R246935
STANDARD METHOD 4500-	H B 2001 FIELD							
рН	*	1.00		6.82		1	05/09/2018 11:02	R246935
STANDARD METHODS 213	D B FIELD							
Turbidity	*	1.0		< 1.0	NIU	1	05/09/2018 11:02	R246935
STANDARD METHODS 18TH	ED. 2580 B FIELD							
Oxidation-Reduction Potential	*	-300		-66	mV	1	05/09/2018 11:02	R246935
STANDARD METHODS 2510	B FIELD							
Conductivity	*	1		868	μS/cm	1	05/09/2018 11:02	R246935
STANDARD METHODS 2550	B FIELD							
Temperature	*	0		11.63	°C	1	05/09/2018 11:02	R246935
STANDARD METHODS 4500	-O G FIELD							
Oxygen, Dissolved	*	1.00		< 1.00	mg/L	1	05/09/2018 11:02	R246935
STANDARD METHODS 2540	C (DISSOLVED) 199	7						
Total Dissolved Solids	NELAP	20		568	mg/L	1	05/10/2018 16:19	R246936
STANDARD METHODS 4500	-NO3 F (TOTAL) 200	0						
Nitrogen, Nitrate (as N)	NELAP	0.050		< 0.050	mg/L	1	05/10/2018 15:37	R247082
SW-846 9036 (TOTAL)			******					100
Sulfate	NELAP	50		166	mg/L	5	05/14/2018 22:09	R247133
SW-846 9214 (DISSOLVED)								
Fluoride	NELAP	0.10		0.10	mg/L	1	05/10/2018 16:21	R246957
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		< 5	mg/L	1	05/14/2018 22:00	R247141
SW-846 3005A, 6020A, MET	ALS BY ICPMS (DISS	OLVED)						
Arsenic	NELAP	0.0010		< 0.0010	mg/L	5	05/11/2018 20:46	141774
Barium	NELAP	0.0010		0.0679	mg/L	6	05/11/2018 20:46	141774
Boron	NELAP	0.0250	В	0.139	mg/l	5	05/14/2018 11:29	141774
Iron	NELAP	0.0250		< 0.0250	mg/L	5	05/11/2018 20:46	141774
Manganese	NELAP	0.0020		0.166	mg/L	5	05/11/2018 20:46	141774
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	05/11/2018 20:46	141774



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Client: Natural Resource Technology, Inc.

Work Order: 18050091

Client Project: Dynegy - Vermillion Power Station

Report Date: 21-May-18

Lab ID: 18050091-012

Client Sample ID: MW8R

Matrix: GROUNDWATER

Collection Date: 05/09/2018 10:07

SW-846 9214 (DISSOLVED)           Fluoride         NELAP         0.10         < 0.10	Ce		Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand   Tand	EMEN	ASUR	EMENTS							
Ph	oint	suring p	point *	0		12 44	ft	1	05/09/2018 10:07	R246936
Turbidity * 1.0 4.0 NTU  STANDARD METHODS 18TH ED. 2580 B FIELD  Oxidation-Reduction Potential * -300 47 mV  STANDARD METHODS 2510 B FIELD  Conductivity * 1 1720 μS/cm  STANDARD METHODS 2550 B FIELD  Conductivity * 1 1720 μS/cm  STANDARD METHODS 2550 B FIELD  Temperature * 0 13.30 °C  STANDARD METHODS 4500-O G FIELD  Oxygen, Dissolved * 1.00 < 1.00 mg/L  STANDARD METHODS 2540 C (DISSOLVED) 1997  Total Dissolved Solids NELAP 20 1400 mg/L  STANDARD METHODS 4500-NO3 F (TOTAL) 2000  Nitrogen, Nitrate (as N) NELAP 0.050 < 0.050 mg/L  SW-846 9036 (TOTAL)  Sulfate NELAP 500 754 mg/L  SW-846 9214 (DISSOLVED)  Fluoride NELAP 5 9 mg/L  SW-846 9251 (TOTAL)  Chloride NELAP 5 9 mg/L  SW-846 3005A, 6020A, METALS BY ICPMS (DISSOLVED)  Arsenic NELAP 0.0010 0.0017 mg/L  Barium NELAP 0.0010 0.0017 mg/L  Barium NELAP 0.0010 0.00965 mg/L  Boron NELAP 0.0250 BS 32.4 mg/L  Iron NELAP 0.0250 < 0.0250 mg/L	B 20	4500-H	H B 2001 FIELD							
Turbidity   *			*	1.00		7.16		1	05/09/2018 10:07	R246935
STANDARD METHODS 18TH ED. 2580 B FIELD	BFIE	2130	B FIELD							
Oxidation-Reduction Potential * -300			*	1.0		4.0	NTU	1	05/09/2018 10:07	R246935
STANDARD METHODS 2510 B FIELD         Lonductivity         *         1         1720         μS/cm           STANDARD METHODS 2550 B FIELD         Temperature         *         1 1,00         13,30         °C           STANDARD METHODS 4500-O G FIELD         Oxygen, Dissolved         *         1,00          1,00         1,00         mg/L           STANDARD METHODS 2540 C (DISSOLVED) 1997         Total Dissolved Solids         NELAP         20         1400         mg/L           STANDARD METHODS 4500-NO3 F (TOTAL)         2000         1400         mg/L           STANDARD METHODS 4500-NO3 F (TOTAL)         2000         1400         mg/L           SW-846 9036 (TOTAL)         SW-846 9036 (TOTAL)         SW-846 9036 (TOTAL)           SW-846 9251 (TOTAL)         NELAP         0.10          754         mg/L           SW-846 9251 (TOTAL)         NELAP         0.010         0.010         0.010         0.010         0.017	ED. 2	18TH	ED. 2580 B FIELD							
Conductivity		ential	*	-300		-47	mV	1	05/09/2018 10:07	R246935
STANDARD METHODS 2550 B FIELD   Temperature   *   0   13.30   °C	B FIE	2510	B FIELD							
Temperature   *   0   13,30 °C			*	1		1720	μS/cm	1	05/09/2018 10:07	R246935
STANDARD METHODS 4500-O G FIELD   Oxygen, Dissolved   *   1.00     < 1.00     mg/L	B FIE	2550	B FIELD							
New Strand Color			*	0		13.30	°C	1	05/09/2018 10:07	R246935
Total Dissolved Solids   NELAP   20	-0 G F	4500	-O G FIELD							
Total Dissolved Solids			*	1.00		< 1.00	mg/L	1	05/09/2018 10:07	R24693
Nitrogen, Nitrate (as N)   NELAP   0.050   wg/L	C (DI	2540	C (DISSOLVED) 19	97						
Nitrogen, Nitrate (as N)			NELAP	20		1400	mg/L	1	05/10/2018 16:19	R246936
SW-846 9036 (TOTAL) Sulfate NELAP 500 754 mg/L SW-846 9214 (DISSOLVED) Fluoride NELAP 0.10 <0.10 mg/L SW-846 9251 (TOTAL) Chloride NELAP 5 9 mg/L SW-846 3005A, 6020A, METALS BY ICPMS (DISSOLVED) Arsenic NELAP 0.0010 0.0017 mg/L Barium NELAP 0.0010 0.0965 mg/L Boron NELAP 0.0250 BS 32.4 mg/L Iron NELAP 0.0250 <0.0250 mg/L Manganese NELAP 0.0020 0.145 mg/L	NO3	4500	-NO3 F (TOTAL) 20	000						
Sulfate         NELAP         500         754         mg/L           SW-846 9214 (DISSOLVED)         Fluoride         NELAP         0.10         < 0.10			NELAP	0.050		< 0.050	mg/L	1	05/10/2018 15:39	R247082
SW-846 9214 (DISSOLVED)           Fluoride         NELAP         0.10         < 0.10         mg/L           SW-846 9251 (TOTAL)         Chloride         NELAP         5         9         mg/L           SW-846 3005A, 6020A, METALS BY ICPMS (DISSOLVED)         Arsenic         NELAP         0.0010         0.0017         mg/L           Barium         NELAP         0.0010         0.0965         mg/L           Boron         NELAP         0.0250         BS         32.4         mg/L           Iron         NELAP         0.0250         < 0.0250         mg/L           Manganese         NELAP         0.0020         0.145         mg/L										
Fluoride         NELAP         0.10         < 0.10         mg/L           SW-846 9251 (TOTAL)           Chloride         NELAP         5         9         mg/L           SW-846 3005A, 6020A, METALS BY ICPMS (DISSOLVED)         SW-846 3005A, 6020A, METALS BY ICPMS (DISSOLVED)         SW-846 3005A, 6020A, METALS BY ICPMS (DISSOLVED)           Arsenic         NELAP         0.0010         0.0017         mg/L           Barium         NELAP         0.0010         0.0965         mg/L           Boron         NELAP         0.0250         BS         32.4         mg/L           Iron         NELAP         0.0250         < 0.0250         mg/L           Manganese         NELAP         0.0020         0.145         mg/L			NELAP	500		754	mg/L	50	05/14/2018 22:17	R247133
SW-846 9251 (TOTAL)           Chloride         NELAP         5         9         mg/L           SW-846 3005A, 6020A, METALS BY ICPMS (DISSOLVED)         SW-846 3005A, 6020A, METALS BY ICPMS (DISSOLVED)         MELAP         0.0010         0.0017         mg/L           Barium         NELAP         0.0010         0.0965         mg/L           Boron         NELAP         0.0250         BS         32.4         mg/L           Iron         NELAP         0.0250         < 0.0250		VED)								
Chloride         NELAP         5         9 mg/L           SW-846 3005A, 6020A, METALS BY ICPMS (DISSOLVED)         Arsenic         NELAP         0.0010         0.0017         mg/L           Barium         NELAP         0.0010         0.0965         mg/L           Boron         NELAP         0.0250         BS         32.4         mg/L           Iron         NELAP         0.0250         < 0.0250			NELAP	0.10		< 0.10	mg/L	1	05/10/2018 16:23	R246957
SW-846 3005A, 6020A, METALS BY ICPMS (DISSOLVED)           Arsenic         NELAP         0.0010         0.0017         mg/L           Barium         NELAP         0.0010         0.0965         mg/L           Boron         NELAP         0.0250         BS         32.4         mg/L           Iron         NELAP         0.0250         < 0.0250										
Arsenic         NELAP         0.0010         0.0017         mg/L           Barium         NELAP         0.0010         0.0965         mg/L           Boron         NELAP         0.0250         BS         32.4         mg/L           Iron         NELAP         0.0250         < 0.0250			NELAP	5		9	mg/L	1	05/14/2018 22:09	R24714
Barium         NELAP         0.0010         0.0965         mg/L           Boron         NELAP         0.0250         BS         32.4         mg/L           Iron         NELAP         0.0250         < 0.0250	LS B	META	ALS BY ICPMS (DIS	SOLVED)						
Boron         NELAP         0.0250         BS         32.4         mg/L           Iron         NELAP         0.0250         < 0.0250			NELAP	0.0010		0.0017	mg/L	5	05/11/2018 20:54	141774
Iron         NELAP         0.0250         < 0.0250         mg/L           Manganese         NELAP         0.0020         0.145         mg/L			NELAP	0.0010		0.0965	mg/L	5	05/11/2018 20:54	141774
Manganese NELAP 0.0020 <b>0.145</b> mg/L			NELAP	0.0250	BS	32.4	mg/L	5	05/11/2018 20:54	
			NELAP					5	05/11/2018 20:54	
Approximation and the second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second s			NELAP			0.145		5	05/11/2018 20:54	141774
Selenium NELAP 0.0010 < 0.0010 mg/L Sample result(s) for B exceed 10 times the method blank contamination. Data is reportable per the TNI Standard.			NELAP	0.0010		< 0.0010	mg/L	5	05/11/2018 20:54	141774



#### http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 18050091

Client Project: Dynegy - Vermillion Power Station

Report Date: 21-May-18

Lab ID: 18050091-013

Client Sample ID: MW9

Matrix: GROUNDWATER Collection Date: 05/09/2018 10:48

Analyses	Certification	RI.	Qual	Result	Units	DF	Date Analyzed	Batch				
FIELD ELEVATION MEAS	UREMENTS											
Depth to water from measuring	ng point *	0		4.40	ft	1	05/09/2018 10:48	R246935				



http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 18050091

Client Project: Dynegy - Vermillion Power Station

Report Date: 21-May-18

Lab ID: 18050091-015

Client Sample ID: MW20

Matrix: GROUNDWATER

Collection Date: 05/09/2018 11:29

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASURE	MENIS							
Depth to water from measuring pe	oint *	0		13.21	ft	1	06/09/2018 11:29	R246936
STANDARD METIIOD 4500 II	B 2001 FIELD							
pH	*	1.00		6.96		1	05/09/2018 11:29	R246935
STANDARD METHODS 2130	B FIELD							
Turbidity	*	1.0		9.3	NTU	1	05/09/2018 11:29	R246935
STANDARD METHODS 18TH	ED. 2580 B FIELD						-	
Oxidation-Reduction Potential	*	-300		-21	mV	1	05/09/2018 11:29	R246935
STANDARD METHODS 2510	B FIELD							
Conductivity	*	1		550	µS/cm	1	05/09/2018 11:29	R246935
STANDARD METHODS 2550	B FIELD			200				
Temperature	*	0		11.41	°C	1	05/09/2018 11:29	R246935
STANDARD METHODS 4500-	O G FIELD							
Oxygen, Dissolved	*	1.00		< 1.00	mg/L	1	05/09/2018 11:29	R246935
STANDARD METHODS 2540	C (DISSOLVED) 199	7						N CSC NOWNERS
Total Dissolved Solids	NELAP	20		352	mg/L	1	05/10/2018 16:19	R246936
STANDARD METHODS 4500-	NO3 F (TOTAL) 200	00						
Nitrogen, Nitrate (as N)	NELAP	0.050		< 0.050	mg/L	1	05/10/2018 15:41	R247082
SW-846 9036 (TOTAL)	All plants all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the second all the se							
Sulfate	NELAP	20		53	mg/L	2	05/14/2018 22:39	R247133
SW-846 9214 (DISSOLVED)						_		
Fluoride	NELAP	0.10		< 0.10	mg/L	1	05/10/2018 16:30	R246957
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		< 5	mg/L	1	05/14/2018 22:17	R247141
SW-846 3005A, 6020A, META	LS BY ICPMS (DISS	OLVED)						
Arsenic	NELAP	0.0010		< 0.0010	mg/L	5	05/11/2018 21:02	141774
Barlum	NELAP	0.0010		0.0132	mg/L	5	05/11/2018 21:02	141774
Boron	NELAP	0.0250	В	0.362	mg/L	5	05/14/2018 11:37	141774
Iron	NELAP	0.0250		0.163	mg/L	5	05/14/2018 11:37	141774
Manganese	NELAP	0.0020		0.0180	mg/L	5	05/11/2018 21:02	141774
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	05/11/2018 21:02	141774



#### http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 18050091

Client Project: Dynegy - Vermillion Power Station

Report Date: 21-May-18

Lab ID: 18050091-016

Client Sample ID: MW34

Chefit Sample 1D. 191954

Matrix: GROUNDWA	TER			Collection Date: 05/09/2018 11:4/					
Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch	
FIELD ELEVATION MEASUR	EMENTS								
Depth to water from measuring p	point *	0		13.55	n n	1	05/09/2018 11.47	R246935	
STANDARD METHOD 4500-H	1 B 2001 FIELD								
pН	*	1.00		6.87		1	05/09/2018 11:47	R246935	
STANDARD METHODS 2130	B FIELD								
Turbidity	*	1.0		32.4	NTU	1	05/09/2018 11:47	R246935	
STANDARD METHODS 18TH	I ED. 2580 B FIELD								
Oxidation-Reduction Potential	*	-300		-101	mV	1	05/09/2018 11:47	R246935	
STANDARD METHODS 2510	B FIELD								
Conductivity	*	1		864	µS/cm	1	05/09/2018 11:47	R246935	
STANDARD METHODS 2550	B FIELD	10							
Temperature	*	0		13.08	°C	1	05/09/2018 11:47	R246935	
STANDARD METHODS 4500	-O G FIELD								
Oxygen, Dissolved	*	1.00		< 1.00	mg/L	1	05/09/2018 11:47	R246935	
STANDARD METHODS 2540	C (DISSOLVED) 199	7							
Total Dissolved Solids	NELAP	20		472	mg/L	1	05/10/2018 16:20	R246936	
STANDARD METHODS 4500	-NO3 F (TOTAL) 200	00							
Nitrogen, Nitrate (as N)	NELAP	0.050		< 0.050	mg/L	1	05/10/2018 15:46	R247082	
SW-846 9036 (TOTAL)								-	
Sulfate	NELAP	10		< 10	mg/L	1	05/14/2018 22:41	R247133	
SW-846 9214 (DISSOLVED)									
Fluoride	NELAP	0.10		0.65	mg/L	1	05/10/2018 16:34	R246957	
SW-846 9251 (TOTAL)									
Chloride	NELAP	5		32	mg/L	1	05/14/2018 22:38	R247141	
SW-846 3005A, 6020A, META	ALS BY ICPMS (DISS	OLVED)							
Arsenic	NELAP	0.0010		0.0221	mg/L	5	05/11/2018 21:10	141774	
Barium	NELAP	0.0010		0.141	mg/L	5	05/11/2018 21:10	141774	
Boron	NELAP	0.0250	В	0.493	mg/L	5	05/11/2018 21:10	141774	
Iron	NELAP	0.0250		5.02	mg/L	5	05/11/2018 21:10	141774	
Manganese	NELAP	0.0020		0.0620	mg/L	5	05/11/2018 21:10	141774	
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	05/11/2018 21:10	141774	
Sample result(s) for B exceed 10	times the method blank	contamination.	Data is re	portable per th	e TNI Standa	ird.			



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Client: Natural Resource Technology, Inc.

Work Order: 18050091

Client Project: Dynegy - Vermillion Power Station

Report Date: 21-May-18

Lab ID: 18050091-017

Client Sample ID: Field Blank

Matrix: GROUNDWATER

Collection Date: 05/09/2018 14:10

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
STANDARD METHODS 254	O C (DISSOLVED) 199	7						
Lotal Dissolved Solids	NEL AP	20		< 20	mg/L	1	05/10/2018 16:40	R246936
STANDARD METHODS 450	00-NO3 F (TOTAL) 200	0					- Indiana	
Nitrogen, Nitrate (as N)	NELAP	0.050		< 0.050	mg/L	1	05/10/2018 15:48	R247082
SW-846 9036 (TOTAL)								
Sulfate	NELAP	10		< 10	mg/L	1	05/14/2018 22:47	R247133
SW-846 9214 (DISSOLVED)								
Fluoride	NELAP	0.10		< 0.10	mg/L	1	05/10/2018 16:40	R24695
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		< 5	mg/L	1	05/14/2018 22:43	R24714
SW-846 3005A, 6020A, MET	TALS BY ICPMS (DISS	OLVED)						
Arsenic	NELAP	0.0010		< 0.0010	mg/L	5	05/11/2018 21:19	141774
Barium	NELAP	0.0010		< 0.0010	mg/L	5	05/11/2018 21:19	141774
Boron	NELAP	0.0250	В	< 0.0250	mg/L	5	05/11/2018 21:19	141774
Iron	NELAP	0.0250		< 0.0250	mg/L	5	05/11/2018 21:19	141774
Manganese	NELAP	0.0020		< 0.0020	mg/L	5	05/11/2018 21:19	141774
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	05/11/2018 21:19	141774



#### http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 18050091

Client Project: Dynegy - Vermillion Power Station

Report Date: 21-May-18

Lab ID: 18050091 018

Client Sample ID: DUP1

Chem Sample 15. DO; 1

Matrix: GROUNDWATER Collection Date: 05/09/2018 11:02

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASU	IREMENTS							
Depth to water from measuring	g point *	U		3.95	ft	1	05/09/2018 11:02	R246935
STANDARD METHOD 4500	)-H B 2001 FIELD							
pH	*	1.00		6.82		1	05/09/2018 11:02	R246935
STANDARD METHODS 21	30 B FIELD							
lurbidity	*	1.0		< 1.0	NIU	1	05/09/2018 11:02	R246935
STANDARD METHODS 187	TH ED. 2580 B FIELD							
Oxidation-Reduction Potential	*	-300		-66	mV	1	05/09/2018 11:02	R246935
STANDARD METHODS 25	IO B FIELD							
Conductivity	*	1		868	μS/cm	1	05/09/2018 11:02	R246935
STANDARD METHODS 255	50 B FIELD							
Temperature	*	0		11.63	°C	1	05/09/2018 11:02	R246935
STANDARD METHODS 450	00 O G FIELD						and the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of t	
Oxygen, Dissolved	*	1.00		< 1.00	mg/L	1	05/09/2018 11:02	R246935
STANDARD METHODS 254	10 C (DISSOLVED) 1997							
Total Dissolved Solids	NELAP	20		586	mg/L	1	05/10/2018 16:40	R246936
STANDARD METHODS 450	00-NO3 F (TOTAL) 2000							
Nitrogen, Nitrate (as N)	NELAP	0.050		< 0.050	mg/L	1	05/10/2018 15:50	R247082
SW-846 9036 (TOTAL)				41 451			THE TANKS OF THE TANKS	
Sulfate	NELAP	50		159	mg/L	5	05/14/2018 22:55	R247133
SW-846 9214 (DISSOLVED	)							
Fluoride	NELAP	0.10		< 0.10	mg/L	1	05/10/2018 16:43	R246957
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		< 5	mg/L	1	05/14/2018 22:46	R247141
SW-846 3005A, 6020A, ME	TALS BY ICPMS (DISSO	LVED)						
Arsenic	NELAP	0.0010		< 0.0010	mg/L	5	05/11/2018 21:27	141774
Barium	NELAP	0.0010		0.0686	mg/L	5	05/11/2018 21:27	141774
Boron	NELAP	0.0250	В	0.114	mg/L	5	05/11/2018 21:27	141774
Iron	NELAP	0.0250		< 0.0250	mg/L	5	05/11/2018 21:27	141774
Manganese	NELAP	0.0020		0.165	mg/L	5	05/11/2018 21:27	141774
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	05/11/2018 21:27	141774



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Client: Natural Resource Technology, Inc.

Work Order: 18050091

Client Project: Dynegy - Vermillion Power Station

Report Date: 21-May-18

Lab ID: 18050091-019

Client Sample ID: DUP2

Matrix. GROUNDWATER

Collection Date: 05/09/2018 12:2/

Matrix. GROUNDWAT	LK			Conection	Trate, US/	09/2010	12.2/	
Analyses	Certification	RL	Qual	Result	Units	DI	Date Analyzed	Batch
FIELD ELEVATION MEASURI	EMENTS							
Depth to water from measuring p	oint *	0		78.75	ft	1	05/09/2018 12:27	R24693
STANDARD METHOD 4500-H	B 2001 FIELD							
pH	*	1.00		6.63		1	05/09/2018 12:27	R24693
STANDARD METHODS 2130	B FIELD							
Turbidity	*	1.0		< 1.0	NTU	1	05/09/2018 12:27	R24693
STANDARD METHODS 18TH	ED. 2580 B FIELD							
Oxidation-Reduction Potential	*	-300		96	mV	1	05/09/2018 12:27	R24693
STANDARD METHODS 2510	B FIELD							
Conductivity	*	1		2500	μS/cm	1	05/09/2018 12:27	R24693
STANDARD METHODS 2550	B FIELD							
Temperature	*	0		14.27	°C	1	05/09/2018 12:27	R24693
STANDARD METHODS 4500-	O G FIELD							
Oxygen, Dissolved	*	1.00		4.99	mg/L	1	05/09/2018 12:27	R24693
STANDARD METHODS 2540	C (DISSOLVED) 199	7						
Total Dissolved Solids	NELAP	20		2110	mg/L	1	05/10/2018 16:40	R24693
STANDARD METHODS 4500-	NO3 F (TOTAL) 200	0						
Nitrogen, Nitrate (as N)	NELAP	0.050		0.297	mg/L	1	05/10/2018 15:54	R24708
SW-846 9036 (TOTAL)								
Sulfate	NELAP	500		1050	mg/L	50	05/14/2018 23:14	R24713
SW-846 9214 (DISSOLVED)								
Fluoride	NELAP	0.10		0.11	mg/L	1	05/10/2018 16:47	R24695
SW-846 9251 (TOTAL)								
Chloride	NELAP	5		14	mg/L	1	05/14/2018 23:00	R24714
SW-846 3005A, 6020A, META	LS BY ICPMS (DISS	OLVED)						
Arsenic	NELAP	0.0010		< 0.0010	mg/L	5	05/11/2018 21:35	141774
Barium	NELAP	0.0010		0.0131	mg/L	5	05/11/2018 21:35	141774
Boron	NELAP	0.0250	В	1.84	mg/L	5	05/11/2018 21:35	141774
Iron	NELAP	0.0250		0.283	mg/L	5	05/14/2018 11:46	141774
Manganese	NELAP	0.0020		0.0412	mg/L	5	05/11/2018 21:35	141774
Selenium	NELAP	0.0010		< 0.0010	mg/L	5	05/11/2018 21:35	141774



# Sample Summary

http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 18050091 Report Date: 21-May-18

Client Project: Dynegy - Vermillion Power Station

Lab Sample ID	Client Sample ID	Matrix	Fractions	<b>Collection Date</b>	
18050091-001	MW1	Groundwater	4	05/09/2018 12:27	
18050091-002	MW2	Groundwater	4	05/09/2018 9:49	
18050091 003	MW7	Groundwater	1		
18050091-004	MW10	Groundwater	4	05/09/2018 14:0:	
18050091-005	MW17	Groundwater	4	05/09/2018 9:12	
18050091-006	MW18	Groundwater	4	05/09/2018 9:25	
18050091-007	MW21	Groundwater	4	05/09/2018 12:49	
18050091-008	MW3R	Groundwater	4	05/09/2018 10:2	
18050091-009	MW4	Groundwater	4	05/09/2018 12:03	
18050091-010	MW5	Groundwater	4	05/09/2018 10:39	
18050091-011	MW6R	Groundwater	4	05/09/2018 11:0:	
18050091-012	MW8R	Groundwater	4	05/09/2018 10:0	
18050091-013	MW9	Groundwater	1	05/09/2018 10:48	
18050091-014	MW19	Groundwater	1		
18050091-015	MW20	Groundwater	4	05/09/2018 11:29	
18050091-016	MW34	Groundwater	4	05/09/2018 11:4	
18050091-017	Field Blank	Groundwater	4	05/09/2018 14:10	
18050091-018	DUP1	Groundwater	4	05/09/2018 11:02	
18050091-019	DUP2	Groundwater	4	05/09/2018 12:23	



http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 18050091

Client Project: Dynegy - Vermillion Power Station

Sample ID	Client Sample ID	Collection Date	Received Date		
	Test Name			Prep Date/Time	Analysis Date/Time
18050091 001A	MWI	05/09/2018 12.27	05/09/2018 19.00		
	Field Elevation Measurements				05/09/2018 12:27
	Standard Method 4500-H B 2001 Field				05/09/2018 12:27
	Standard Methods 2130 B Field				05/09/2018 12:27
	Standard Methods 18th Ed. 2580 B Field				05/09/2018 12:27
	Standard Methods 2510 B Field				05/09/2018 12.27
	Standard Methods 2550 B Field				05/09/2018 12:27
	Standard Methods 4500-NO2 B (Total) 2000				05/10/2018 20:24
	Standard Methods 4500-O G Field				05/09/2018 12:27
	SW-846 9036 (Total)				05/14/2018 19:38
	SW-846 9251 (Total)				05/14/2018 19:29
18050091-001B	MW1	05/09/2018 12:27	05/09/2018 19:00		
	Standard Methods 2540 C (Dissolved) 1997				05/10/2018 16:17
	SW-846 9214 (Dissolved)				05/10/2018 15:56
18050091-001C	MW1	05/09/2018 12:27	05/09/2018 19:00		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			05/10/2018 14:06	05/12/2018 4:35
18050091-001D	MW1	05/09/2018 12:27	05/09/2018 19:00		
	Standard Methods 4500-NO3 F (Total) 2000				05/10/2018 14:57
18050091-002A	MW2	05/09/2018 9:49	05/09/2018 19:00		
	Field Elevation Measurements				05/09/2018 9:49
	Standard Method 4500-H B 2001 Field				05/09/2018 9:49
	Standard Methods 2130 B Field				05/09/2018 9:49
	Standard Methods 18th Ed. 2580 B Field				05/09/2018 9:49
	Standard Methods 2510 B Field				05/09/2018 9:49
	Standard Methods 2550 B Field				05/09/2018 9:49
	Standard Methods 4500-NO2 B (Total) 2000				05/10/2018 20:25
	Standard Methods 4500-O G Field				05/09/2018 9:49
	SW 846 9036 (Total)				05/14/2018 19:41
	SW-846 9251 (Total)				05/14/2018 19:37
18050091-002B	MW2	05/09/2018 9:49	05/09/2018 19:00		
	Standard Methods 2540 C (Dissolved) 1997				05/10/2018 16:17
	SW-846 9214 (Dissolved)				05/10/2018 15:59
18050091-002C	MW2	05/09/2018 9:49	05/09/2018 19:00		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			05/10/2018 14:06	05/12/2018 5:08
18050091-002D	MW2	05/09/2018 9:49	05/09/2018 19:00		
	Standard Methods 4500-NO3 F (Total) 2000				05/10/2018 14:59



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Sample ID	Client Sample ID	Collection Date	Received Date		10002202
	Test Name			Prep Date/Time	Analysis Date/Time
18050091 003A	MW7		05/09/2018 19:00		
	Standard Methods 2540 C (Dissolved) 1997				05/10/2018 16.41
	SW-846 9214 (Dissolved)				05/10/2018 15.23
18050091-004A	MW10	05/09/2018 14:05	05/09/2018 19:00		
	Field Elevation Measurements				05/09/2018 14:05
	Standard Method 4500-H B 2001 Field				05/09/2018 14:05
	Standard Methods 2130 B Field				05/09/2018 14:05
	Standard Methods 18th Ed. 2580 B Field				05/09/2018 14:05
	Standard Methods 2510 B Field				05/09/2018 14:05
	Standard Methods 2550 B Field				05/09/2018 14:05
	Standard Methods 4500-NO2 B (Total) 2000				05/10/2018 20:26
	Standard Methods 4500-O G Field				05/09/2018 14:05
	SW-846 9036 (Total)				05/14/2018 19:54
	SW-846 9251 (Total)				05/14/2018 19:45
18050091-004B	MW10	05/09/2018 14:05	05/09/2018 19:00		
	Standard Methods 2540 C (Dissolved) 1997				05/10/2018 16:17
	SW-846 9214 (Dissolved)				05/10/2018 16:00
18050091-004C	MW10	05/09/2018 14:05	05/09/2018 19:00		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			05/10/2018 14:06	05/12/2018 5:16
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			05/10/2018 14:06	05/14/2018 11:13
18050091-004D	MW10	05/09/2018 14:05	05/09/2018 19:00		
	Standard Methods 4500 NO3 F (Total) 2000				05/10/2018 15:01
18050091-005A	MW17	05/09/2018 9:12	05/09/2018 19:00		
	Field Elevation Measurements				05/09/2018 9:12
	Standard Method 4500-H B 2001 Field				05/09/2018 9:12
	Standard Methods 2130 B Field				05/09/2018 9:12
	Standard Methods 18th Ed. 2580 B Field				05/09/2018 9:12
	Standard Methods 2510 B Field				05/09/2018 9:12
	Standard Methods 2550 B Field				05/09/2018 9.12
	Standard Methods 4500-NO2 B (Total) 2000				05/10/2018 20:26
	Standard Methods 4500-O G Field				05/09/2018 9:12
	SW-846 9036 (Total)				05/14/2018 20:02
	SW-846 9251 (Total)				05/14/2018 19:54
18050091-005B	MW17	05/09/2018 9:12	05/09/2018 19:00		
	Standard Methods 2540 C (Dissolved) 1997				05/10/2018 16:17
	SW-846 9214 (Dissolved)				05/10/2018 16:02
18050091-005C	MW17	05/09/2018 9:12	05/09/2018 19:00		



### http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.
Client Project: Dynegy - Vermillion Power Station

Work Order: 18050091

Sample ID	Client Sample ID Test Name	Collection Date	Received Date	Prep Date/Time	Analysis Date/Time
	\$W 846 3005A, 6020A, Metals by ICPM\$ (Dissolved)			05/10/2018 14.06	05/12/2018 5 24
18050091-0051)	MW17	05/09/2018 9:12	0.5/09/2018 19:00		
	Standard Methods 4500-NO3 F (Total) 2000				05/10/2018 15:04
18050091-006A	MW18	05/09/2018 9:25	05/09/2018 19:00		
	Field Elevation Measurements				05/09/2018 9:25
	Standard Method 4500-H B 2001 Field				05/09/2018 9:25
	Standard Methods 2130 B Field				05/09/2018 9:25
	Standard Methods 18th Ed. 2580 B Field				05/09/2018 9:25
	Standard Methods 2510 B Field				05/09/2018 9:25
	Standard Methods 2550 B Field				05/09/2018 9:25
	Standard Methods 4500-NO2 B (Total) 2000				05/10/2018 20:26
	Standard Methods 4500-O G Field				05/09/2018 9:25
	SW-846 9036 (Total)				05/14/2018 20:10
	SW-846 9251 (Total)				05/14/2018 20:02
18050091-006B	MW18	05/09/2018 9:25	05/09/2018 19:00		
	Standard Methods 2540 C (Dissolved) 1997				05/10/2018 16:17
	SW-846 9214 (Dissolved)				05/10/2018 16:06
18050091-006C	MW18	05/09/2018 9:25	05/09/2018 19:00		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			05/10/2018 14:06	05/12/2018 5:32
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			05/10/2018 14:06	05/14/2018 11:21
18050091-006D	MW18	05/09/2018 9:25	05/09/2018 19:00		
	Standard Methods 4500-NO3 F (Total) 2000				05/10/2018 15:08
18050091-007A	MW21	05/09/2018 12:49	05/09/2018 19:00		41.4.00.00.00.00.00
	Field Elevation Measurements				05/09/2018 12:49
	Standard Method 4500-H B 2001 Field				05/09/2018 12:49
	Standard Methods 2130 B Field				05/09/2018 12:49
	Standard Methods 18th Ed. 2580 B Field				05/09/2018 12:49
	Standard Methods 2510 B Field				05/09/2018 12:49
	Standard Methods 2550 B Field				05/09/2018 12:49
	Standard Methods 4500-NO2 B (Total) 2000				05/10/2018 20:27
	Standard Methods 4500-O G Field				05/09/2018 12:49
	SW-846 9036 (Total)				05/14/2018 20:29
	SW-846 9251 (Total)				05/14/2018 20:26
18050091-007B	MW21	05/09/2018 12:49	05/09/2018 19:00		
	Standard Methods 2540 C (Dissolved) 1997				05/10/2018 16:18
	SW-846 9214 (Dissolved)				05/10/2018 16:10
18050091-007C	MW21	05/09/2018 12:49	05/09/2018 19:00		



### http://www.teklabinc.com/

Sample ID	Client Sample ID Test Name	Collection Date	Received Date	Prep Date/Time	Analysis Date/Time
				Frep Date/Time	
	SW 846 3005A, 6020A, Metals by ICPMS (Dissolved)		0.5/0.0 (5.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0	05/10/2018 14.06	05/12/2018 5:41
18050091-007D	MW21	05/09/2018 12:49	05/09/2018 19:00		
	Standard Methods 4500-NO3 F (Total) 2000				05/10/2018 15.17
18050091-008A	MW3R	05/09/2018 10:21	05/09/2018 19:00		
	Field Elevation Measurements				05/09/2018 10:21
	Standard Method 4500-H B 2001 Field				05/09/2018 10:21
	Standard Methods 2130 B Field				05/09/2018 10:21
	Standard Methods 18th Ed. 2580 B Field				05/09/2018 10:21
	Standard Methods 2510 B Field				05/09/2018 10:21
	Standard Methods 2550 B Field				05/09/2018 10:21
	Standard Methods 4500-NO2 B (Total) 2000				05/10/2018 20:27
	Standard Methods 4500-O G Field				05/09/2018 10:21
	SW-846 9036 (Total)				05/14/2018 21:07
	SW-846 9251 (Total)				05/14/2018 20:29
18050091-008B	MW3R	05/09/2018 10:21	05/09/2018 19:00		
	Standard Methods 2540 C (Dissolved) 1997				05/10/2018 16:18
	SW-846 9214 (Dissolved)				05/10/2018 16:16
8050091-008C	MW3R	05/09/2018 10:21	05/09/2018 19:00		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			05/10/2018 23:41	05/11/2018 19:57
18050091-008D	MW3R	05/09/2018 10:21	05/09/2018 19:00		
	Standard Methods 4500-NO3 F (Total) 2000				05/10/2018 15:19
18050091-009A	MW4	05/09/2018 12:03	05/09/2018 19:00		
	Field Elevation Measurements				05/09/2018 12:03
	Standard Method 4500-H B 2001 Field				05/09/2018 12:03
	Standard Methods 2130 B Field				05/09/2018 12:03
	Standard Methods 18th Ed. 2580 B Field				05/09/2018 12:03
	Standard Methods 2510 B Field				05/09/2018 12:03
	Standard Methods 2550 B Field				05/09/2018 12:03
	Standard Methods 4500-NO2 B (Total) 2000				05/10/2018 20:28
	Standard Methods 4500-O G Field				05/09/2018 12:03
	SW-846 9036 (Total)				05/14/2018 21:45
	SW-846 9251 (Total)				05/14/2018 21:17
18050091-009B	MW4	05/09/2018 12:03	05/09/2018 19:00		
	Standard Methods 2540 C (Dissolved) 1997				05/10/2018 16:19
					05/10/2018 16:18
	SW-846 9214 (Dissolved)				
18050091-009C	MW4	05/09/2018 12:03	05/09/2018 19:00		



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Client: Natural Resource Technology, Inc.

Work Order: 18050091

Client Project: Dynegy - Vermillion Power Station

Sample ID	Client Sample ID Test Name	Collection Date	Received Date	Prep Date/Time	Analysis Date/Time
LEATERSE LARKE		A # 10 A 10 A 10 A 10 A	0.000.000.000.000.000	trep bate/ time	Analysis Date/Time
18050091 009D	MW4	05/09/2018 12:03	05/09/2018 19:00		
	Standard Methods 4500-NO3 F (Total) 2000				05/10/2018 15:21
18050091 010A	MW5	05/09/2018 10.39	05/09/2018 19.00		
	Field Elevation Measurements				05/09/2018 10:39
	Standard Method 4500-H B 2001 Field				05/09/2018 10:39
	Standard Methods 2130 B Field				05/09/2018 10:39
	Standard Methods 18th Ed. 2580 B Field				05/09/2018 10:39
	Standard Methods 2510 B Field				05/09/2018 10:39
	Standard Methods 2550 B Field				05/09/2018 10:39
	Standard Methods 4500-NO2 B (Total) 2000				05/10/2018 20:29
	Standard Methods 4500-O G Field				05/09/2018 10:39
	SW-846 9036 (Total)				05/14/2018 22:01
	SW-846 9251 (Total)				05/14/2018 21:52
18050091-010B	MW5	05/09/2018 10:39	05/09/2018 19:00		
	Standard Methods 2540 C (Dissolved) 1997				05/10/2018 16:19
	SW-846 9214 (Dissolved)				05/10/2018 16:19
18050091-010C	MW5	05/09/2018 10:39	05/09/2018 19:00		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			05/10/2018 23:41	05/11/2018 20:38
18050091-010D	MW5	05/09/2018 10:39	05/09/2018 19:00		
	Standard Methods 4500-NO3 F (Total) 2000				05/10/2018 15:35
18050091-011A	MW6R	05/09/2018 11:02	05/09/2018 19:00		
	Field Elevation Measurements				05/09/2018 11:02
	Standard Method 4500-H B 2001 Field				05/09/2018 11:02
	Standard Methods 2130 B Field				05/09/2018 11:02
	Standard Methods 18th Ed. 2580 B Field				05/09/2018 11:02
	Standard Methods 2510 B Field				05/09/2018 11:02
	Standard Methods 2550 B Field				05/09/2018 11:02
	Standard Methods 4500-NO2 B (Total) 2000				05/10/2018 20:29
	Standard Methods 4500 O G Field				05/09/2018 11:02
	SW-846 9036 (Total)				05/14/2018 22:09
	SW-846 9251 (Total)				05/14/2018 22:00
18050091-011B	MW6R	05/09/2018 11:02	05/09/2018 19:00		
	Standard Methods 2540 C (Dissolved) 1997				05/10/2018 16:19
	SW-846 9214 (Dissolved)				05/10/2018 16:21
18050091-011C	MW6R	05/09/2018 11:02	05/09/2018 19:00		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			05/10/2018 23:41	05/11/2018 20:46
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			05/10/2018 23:41	05/14/2018 11:29



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Sample ID	Client Sample ID Test Name	Collection Date	Received Date	Prep Date/Time	Analysis Date/Time
18050091 011D	MW6R	05/09/2018 11:02	05/09/2018 19:00		•
	Standard Methods 4500-NO3 F (Total) 2000				05/10/2018 15:37
18050091-012A	MW8R	05/09/2018 10.07	05/09/2018 19.00		05/10/2010 15.57
10050071 01271		03/07/2010 10:07	05/07/2010 17100		05/00/2019 10:07
	Field Elevation Measurements Standard Method 4500-H B 2001 Field				05/09/2018 10:07 05/09/2018 10:07
	Standard Methods 2130 B Field				05/09/2018 10:07
	Standard Methods 18th Ed. 2580 B Field				05/09/2018 10:07
	Standard Methods 18th Ed. 2380 B Field Standard Methods 2510 B Field				05/09/2018 10:07
	Standard Methods 2550 B Field				05/09/2018 10:07
	Standard Methods 2550 B Fred Standard Methods 4500-NO2 B (Total) 2000				05/10/2018 20:30
	Standard Methods 4500-O G Field				05/09/2018 10:07
	SW-846 9036 (Total)				05/14/2018 22:17
	SW-846 9251 (Total)				05/14/2018 22:09
18050091-012B	MW8R	05/09/2018 10:07	05/09/2018 19:00		00,1 112010 22103
2203 4 20 20 4 20 20	Standard Methods 2540 C (Dissolved) 1997	23,137,2129,0286			05/10/2018 16:19
	SW-846 9214 (Dissolved)				05/10/2018 16:23
18050091-012C	MW8R	05/09/2018 10:07	05/09/2018 19:00		03/10/2016 10.23
18030091-0120		03/03/2018 10.07	03/03/2018 17:00		05/11/2019 20 54
10050001 0105	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)	05/00/2010 10 07	05/00/2010 10 00	05/10/2018 23:41	05/11/2018 20:54
18050091-012D	MW8R	05/09/2018 10:07	05/09/2018 19:00		
	Standard Methods 4500-NO3 F (Total) 2000				05/10/2018 15:39
18050091-013A	MW9	05/09/2018 10:48	05/09/2018 19:00		
	Field Elevation Measurements				05/09/2018 10:48
18050091-015A	MW20	05/09/2018 11:29	05/09/2018 19:00		
	Field Elevation Measurements				05/09/2018 11:29
	Standard Method 4500-H B 2001 Field				05/09/2018 11:29
	Standard Methods 2130 B Field				05/09/2018 11:29
	Standard Methods 18th Ed. 2580 B Field				05/09/2018 11:29
	Standard Methods 2510 B Field				05/09/2018 11:29
	Standard Methods 2550 B Field				05/09/2018 11.29
	Standard Methods 4500-NO2 B (Total) 2000				05/10/2018 20:30
	Standard Methods 4500-O G Field				05/09/2018 11.29
	SW-846 9036 (Total)				05/14/2018 22:39
	SW-846 9251 (Total)				05/14/2018 22:17
18050091-015B	MW20	05/09/2018 11:29	05/09/2018 19:00		
	Standard Methods 2540 C (Dissolved) 1997				05/10/2018 16:19
	SW-846 9214 (Dissolved)				05/10/2018 16:30



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Sample ID	Client Sample ID	Collection Date	Received Date	P	
	Test Name			Prep Date/Time	Analysis Date/Time
18050091-015C	MW20	05/09/2018 11:29	05/09/2018 19 00		
	SW-846 4005A, 6020A, Metals by ICPMS (Dissolved)			05/10/2018 23 41	05/11/2018 21:02
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			05/10/2018 23:41	05/14/2018 11:37
18050091-015D	MW20	05/09/2018 11:29	05/09/2018 19:00		
	Standard Methods 4500-NO3 F (Total) 2000				05/10/2018 15:41
18050091-016A	MW34	05/09/2018 11:47	05/09/2018 19:00		
	Field Elevation Measurements				05/09/2018 11:47
	Standard Method 4500-H B 2001 Field				05/09/2018 11:47
	Standard Methods 2130 B Field				05/09/2018 11:47
	Standard Methods 18th Ed. 2580 B Field				05/09/2018 11:47
	Standard Methods 2510 B Field				05/09/2018 11:47
	Standard Methods 2550 B Field				05/09/2018 11:47
	Standard Methods 4500-NO2 B (Total) 2000				05/10/2018 20:30
	Standard Methods 4500 O G Field				05/09/2018 11:47
	SW-846 9036 (Total)				05/14/2018 22:41
	SW-846 9251 (Total)				05/14/2018 22:38
18050091-016B	MW34	05/09/2018 11:47	05/09/2018 19:00		
	Standard Methods 2540 C (Dissolved) 1997				05/10/2018 16:20
	SW-846 9214 (Dissolved)				05/10/2018 16:34
18050091-016C	MW34	05/09/2018 11:47	05/09/2018 19:00		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			05/10/2018 23:41	05/11/2018 21:10
18050091-016D	MW34	05/09/2018 11:47	05/09/2018 19:00		
	Standard Methods 4500-NO3 F (Total) 2000				05/10/2018 15:46
18050091-017A	Field Blank	05/09/2018 14:10	05/09/2018 19:00		
	Standard Methods 4500-NO2 B (Total) 2000				05/10/2018 20:31
	SW-846 9036 (Total)				05/14/2018 22:47
	SW-846 9251 (Total)				05/14/2018 22:43
18050091 017B	Field Blank	05/09/2018 14:10	05/09/2018 19:00		
	Standard Methods 2540 C (Dissolved) 1997				05/10/2018 16:40
	SW-846 9214 (Dissolved)				05/10/2018 16:40
18050091-017C	Field Blank	05/09/2018 14:10	05/09/2018 19:00		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)		2000 May 238 27 152	05/10/2018 23:41	05/11/2018 21:19
18050091-017D	Field Blank	05/09/2018 14:10	05/09/2018 19:00	03/10/2018 23:41	03/11/2010 21.19
10030031-017D		05/05/2010 14.10	03/03/2010 19:00		and a second
10050001 0101	Standard Methods 4500-NO3 F (Total) 2000	05/00/2013 11 05	05/00/2010 10 00		05/10/2018 15:48
18050091-018A	DUP1	05/09/2018 11:02	05/09/2018 19:00		
	Field Elevation Measurements				05/09/2018 11:02



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Sample ID	Client Sample ID	Collection Date	Received Date		Access distribution
	Test Name			Prep Date/Time	Analysis Date/Time
	Standard Method 4500 II B 2001 Field				05/09/2018 11.02
	Standard Methods 2130 B Field				05/09/2018 11:02
	Standard Methods 18th Ed 2580 B Field				05/09/2018 11:02
	Standard Methods 2510 B Field				05/09/2018 11:02
	Standard Methods 2550 B Field				05/09/2018 11:02
	Standard Methods 4500-NO2 B (Total) 2000				05/10/2018 20:31
	Standard Methods 4500-O G Field				05/09/2018 11:02
	SW-846 9036 (Total)				05/14/2018 22:55
	SW-846 9251 (Total)				05/14/2018 22:46
18050091-018B	DUPI	05/09/2018 11:02	05/09/2018 19:00		
	Standard Methods 2540 C (Dissolved) 1997				05/10/2018 16:40
	SW-846 9214 (Dissolved)				05/10/2018 16:43
18050091-018C	DUP1	05/09/2018 11:02	05/09/2018 19:00		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			05/10/2018 23:41	05/11/2018 21:27
18050091-018D	DUP1	05/09/2018 11:02	05/09/2018 19:00		
	Standard Methods 4500-NO3 F (Total) 2000				05/10/2018 15:50
18050091-019A	DUP2	05/09/2018 12:27	05/09/2018 19:00		
	Field Elevation Measurements				05/09/2018 12:27
	Standard Method 4500-H B 2001 Field				05/09/2018 12:27
	Standard Methods 2130 B Field				05/09/2018 12:27
	Standard Methods 18th Ed. 2580 B Field				05/09/2018 12:27
	Standard Methods 2510 B Field				05/09/2018 12:27
	Standard Methods 2550 B Field				05/09/2018 12:27
	Standard Methods 4500-NO2 B (Total) 2000				05/10/2018 20:32
	Standard Methods 4500-O G Field				05/09/2018 12:27
	SW-846 9036 (Total)				05/14/2018 23:14
	SW-846 9251 (Total)				05/14/2018 23:00
18050091-019B	DUP2	05/09/2018 12:27	05/09/2018 19:00		
	Standard Methods 2540 C (Dissolved) 1997				05/10/2018 16:40
	SW-846 9214 (Dissolved)				05/10/2018 16:47
18050091-019C	DUP2	05/09/2018 12:27	05/09/2018 19:00		
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			05/10/2018 23:41	05/11/2018 21:35
	SW-846 3005A, 6020A, Metals by ICPMS (Dissolved)			05/10/2018 23:41	05/14/2018 11:46
18050091-019D	DUP2	05/09/2018 12:27	05/09/2018 19:00	0503505456	711.774.005.1111.
	Standard Methods 4500-NO3 F (Total) 2000				05/10/2018 15:54



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Client: Natural Resource Technology, Inc.

Work Order: 18050091

Client Project: Dynegy - Vermillion Power Station

, 2,							2003.000.00		. 12.70
STANDARD METHOD 4500-H	B 2001 FIELD								
Batch R246935 SampType: SampID: LCS-R246935	LCS	Units							Date
Analyses	RL	Qual	Result	Spike	SPI( Ref Val	%REC	Low Limit	High Limit	Analyzed
рН	1 00		7 00	7 000	0	100 0	99 1	100 9	05/09/2018
STANDARD METHODS 2510 I	B FIELD								
Batch R246935 SampType: SampID: LCS-R246935	LCS	Units µS/cm							Date
Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Conductivity	1		1410	1412	0	99.9	90	110	05/09/2018
STANDARD METHODS 2540	C (DISSOLVED)	1997							
<b>Batch R246936</b> SampType: SampID: MBLK	MBLK	Units mg/L							Date
Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Total Dissolved Solids	20		< 20						05/10/201
Total Dissolved Solids	20		< 20						05/10/201
Total Dissolved Solids	20		< 20						05/09/201
Total Dissolved Solids	20		< 20						05/09/2018
Batch R246936 SampType: SampID: LCS	LCS	Units mg/L							Date
Analyses	RL	Qual	Recult	Snike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Total Dissolved Solids	20	Quai	982	1000	0	98.2	90	110	05/09/2018
Batch R246936 SampType: SampID: LCSQC	LCSQC	Units mg/L							Date
Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Total Dissolved Solids	20		944	1000	0	94.4	90	110	05/10/201
Total Dissolved Solids	20		988	1000	0	98.8	90	110	05/09/201
Total Dissolved Solids	20		980	1000	0	98.0	90	110	05/10/201
Batch R246936 SampType: SampID: 18050091-006BMS	MS	Units mg/L							Date
Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzoo
Lotal Dissolved Solids	50		1930	600.0	1422	102.0	85	115	05/10/201
<b>Batch R246936 SampType:</b> SampID: 18050091-006BMSD	MSD	Units mg/L					RPD	Limit 5	Date
Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref	Val %RPD	Analyzed
Total Dissolved Solids	20			500.0	1422	103.6	1932	0.41	05/10/201



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Client: Natural Resource Technology, Inc.

Work Order: 18050091

Client Project: Dynegy - Vermillion Power Station

Batch R246936 SampTypo: SampID: 18050091-012BDUP Analyses Total Dissolved Solids  STANDARD METHODS 4500-N Batch R246930 SampType:	RL 20 102 B (TOTAL)	Unite <b>mg/L</b> Qual	Result Spike	enk b-tv-		RPD	Limit 5	11-4-
Analyses Total Dissolved Solids  STANDARD METHODS 4500-N Batch R246930 SampType:	20 IO2 B (TOTAL)	Qual		env n-tv-i				T 1 - 4 -
Total Dissolved Solids  STANDARD METHODS 4500-N Batch R246930 SampType:	20 IO2 B (TOTAL)	Qual			0/ 121.70	DDD Dati	/al %RPD	Date Analyzed
STANDARD METHODS 4500-N Batch R246930 SampType:	IO2 B (TOTAL)		1/120	SPK Rei Vai	%REC			Section Contracts
Batch R246930 SampType:			1420			1404	0.99	05/10/2018
	and the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of t	2000						
SampID: MBLK	MBLK	Units mg/L						Date
Analyses	KL	Qual	Result Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzod
Nitrogen, Nitrite (as N)	0.05	300	< 0.05 0.02500	0	0	-100	100	05/10/2018
Nitrogen, Nitrite (as N)	0.05		< 0.05 0.02500	0	0	-100	100	05/10/2018
Batch R246930 SampType: SampID: LCS	LCS	Units mg/L	100					Date
Analyses	RL	Qual	Result Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Nitrogen, Nitrite (as N)	0.25		1.64 1.630	0	100.3	90	110	05/10/2018
Nitrogen, Nitrite (as N)	0.25		<b>1.62</b> 1.630	0	99.4	90	110	05/10/2018
Batch         R246930         SampType:           SampID:         18050091-001AMS	MS	Units mg/L						Date
Analyses	RL	Qual	Result Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Nitrogen, Nitrite (as N)	0.05	7	<b>0.51</b> 0.5000	0	102.4	85	115	05/10/2018
Batch R246930 SampType: SampID: 18050091-001AMSD	MSD	Units mg/L				RPD	Limit 10	Date
Analyses	RL	Qual	Result Spike	SPK Ref Val	%REC	RPD Ref \	/al %RPD	Analyzed
Nitrogen, Nitrite (as N)	0.05		<b>0.51</b> 0.5000	0	102.6	0.5120	0.20	05/10/2018
Batch R246930 SampType: SampID: 18050091-019AMS	MS	Units mg/L			Marie Value			Date
Analyses	RL	Qual	Result Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Nitrogen, Nitrite (as N)	0.05		<b>0.52</b> 0.5000	0	103.0	85	115	05/10/2018
Batch R246930 SampType: SampID: 18050091-019AMSD	MSD	Units mg/L				RPD	Limit 10	Date
Analyses	RL	Qual	Result Spike	SPK Ref Val	%REC	RPD Ref V	/al %RPD	Analyzed
Nitrogen, Nitrite (as N)	0.05		0.52 0.5000	0	103.0	0.5150	0.00	05/10/2018
STANDARD METHODS 4500-N	IO3 F (TOTAL)	2000						in all on the control of
Batch R24/062 SampType: SampID: ICB/MBLK		Units mg/L				100	La constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constitución de la constituci	Date
	DT	O1	D1/ C11	SDK Pof Vol	%PEC	Low Limit	High Limit	Date Analyzed
Analyses Nitrogen, Nitrate-Nitrite (as N)	RL 0.050	Qual	Result Spike < 0.050 ).009000		0 0	-100	100	05/10/2018



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STANDARD METHODS 4500-		ed and though all and the character and	CHARLEST AND ADDRESS OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PAR							
Batch R247082 SampType. SampID. ICV/LCS	LCS		Units mg/L							Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Nitrogen, Nitrate-Nitrite (as N)		1 00		7 09	7 020	0	100.9	90	110	05/10/2018
Batch R247082 SampType: SampID: 18050091-006DMS	MS		Units mg/L							Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050		0.260	0.2500	0	104.0	85	115	05/10/2018
Batch R247082 SampType: SampID: 18050091-006DMSD	MSD		Units mg/L					RPD	Limit 10	Date
Analyses		RL	Qual	Result	Snike	SPK Ref Val	%REC	RPD Ref \	/al %RPD	Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050	Quar		0.2500	0	106.0	0.2600	1.90	05/10/2018
Batch R247082 SampType: SampID: 18050091-019DMS	MS		Units mg/L							Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050			0.2500	0.2970	109.2	85	115	05/10/2018
Batch R247082 SampType:	MSD		Units mg/L					RPD		
SampID: 18050091-019DMSD Analyses		RL	Qual	Pacult	Snika	SPK Ref Val	%REC	RPD Ref \	/al %RPD	Date Analyzed
Nitrogen, Nitrate-Nitrite (as N)		0.050	Quai		0.2500	0.2970	110.8	0.5700	0.70	05/10/2018
SW-846 9036 (TOTAL)										
Batch R247133 SampType: SampID: ICB/MBLK	MBLK		Units mg/L							Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Sulfate		10		< 10	5.000	0	0	-100	100	05/14/2018
Batch R247133 SampType: SampID: MBLK-141698	MBLK		Units mg/L							Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Sulfate		10			5.000	0	0	-100	100	05/15/2018
Batch R247133 SampType: SampID: ICV/LCS	LCS		Units mg/L							Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Sulfate		10			20.00	0	93.0	90	110	05/14/2018



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SW-846 9036 (TOTAL)	9										
Batch R247133 Sar SampID: 18050091-009A	npType: AMS	MS		Units mg/L							Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%RFC	I ow I imit	High Limit	Analyzed
Sulfate			50		147	50.00	98.82	95.6	85	115	05/14/2018
Batch R247133 Sar SampID: 18050091-009A	mpType:	MSD		Units mg/L					RPD	Limit 10	Dut
Analyses	WOD		RL	Qual	Regult	Snike	SPK Ref Val	%RFC	RPD Ref \	/al %RPD	Date Analyzed
Sulfate			50	Quai		50.00	98.82	105.6	146.6	3.36	05/14/2018
SW-846 9214 (DISSOL	VED)										
Batch R246957 Sar SampID: MBLK	прТуре:	MBLK		Units mg/L							Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Fluoride			0.10		< 0.10	.007000	0	0	-100	100	05/10/2018
Batch R246957 SampID: LCS	прТуре:	LCS		Units mg/L			-2.17.7.7.7				Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Fluoride			0.10		0.95	1.000	0	94.8	90	110	05/10/2018
Batch R246957 Sar SampID: 18050091-0068	mpType: BMS	MS		Units mg/L							Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Fluoride			0.10		2.15	2.000	0.1160	101.7	85	115	05/10/2018
Batch R246957 Sar SampID: 18050091-0068	mpType:	MSD		Units mg/L				101111	RPD	Limit 10	Date
Analyses	5035		RL	Qual	Result	Snike	SPK Ref Val	%REC	RPD Ref \	/al %RPD	Analyzed
Fluoride			0.10	Quui		2.000	0.1160	102.3	2.149	0.60	05/10/2018
<b>Batch R246957 San</b> SampID: 18050091-0128	mpType: BMS	MS		Units mg/L							Date
Analyses			RL	Qual			SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Fluoride			0.10		2.11	2.000	0.07000	101.8	85	115	05/10/2018
Batch R246957 San SampID: 18050091-0128	mpType: BMSD	MSD		Units mg/L					RPD	) Limit 10	Date
Analyses			RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref	Val %RPD	Analyzed
Fluoride			0.10			2.000	0.07000	105.3	2.108	3.27	05/10/2018



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Client: Natural Resource Technology, Inc.

Work Order: 18050091

Client Project: Dynegy - Vermillion Power Station

SW-846 9251 (TOTAL)										
Batch R247141 SampType: SampID: ICB/MBLK	MBLK		Units mg/L							Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Chloride		5		Car Charles and the A. S.	0.5000	0	0	-100	100	05/14/2018
Batch R247141 SampType: SampID: MBLK-141698	MBLK		Units mg/L							Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Chloride		5		< 5	0.5000	0	0	-100	100	05/15/2018
Batch R247141 SampType: SampID: ICV/LCS	LCS		Units mg/L							Date
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Chloride		5		20	20.00	0	100.0	90	110	05/14/2018
Batch R247141 SampType: SampID: 18050091-009AMS	MS	7.7	Units mg/L	D 1	o ::	CDV Def Vel	W DEC	Low Limit	Lilah Limit	Date Analyzed
Analyses		RL	Qual			SPK Ref Val	The second second		High Limit	
Chloride		10		47	40.00	11.16	88.8	85	115	05/14/2018
Batch R247141 SampType:	MSD		Units mg/L					RPD	Limit 15	
SampID: 18050091-009AMSD					~ "	ODK D-41/-1	N/DEC	PPD P-6)	/-! 0/ DDD	Date Analyzed
Analyses		RL	Qual		Spike		The second second		/al %RPD	05/14/2018
Chloride		10		46	40.00	11.16	88.2	46.69	0.58	05/14/2018
SW-846 3005A, 6020A, META	LS BY I	CPMS (I	DISSOLVED)							
Batch 141740 SampType: SampID: MBLK-141740	MBLK		Units mg/L							Date
Analyses		RL	Qual			SPK Ref Val			High Limit	Analyzed
Arsenic		0.0010		< 0.0010	100.70		0	-100	100	05/12/2018
Barium		0.0010		< 0.0010			0	-100	100	05/12/2018
Boron		0.0250		< 0.0250			0	-100	100	05/12/2018
Iron		0.0250		< 0.0250			0	-100	100	05/14/2018
Manganese		0.0020		< 0.0020			0	-100	100	05/12/2018
Selenium		0.0010		< 0.0010	.000280	0	0	100	100	05/12/2018
Batch 141740 SampType: SampID: LCS-141740	LCS		Units mg/L							Date
Analyses		RL	Qual			SPK Ref Val			High Limit	Analyzed
Arsenic		0.0010			0.5000	0	95.1	80	120	05/12/2018
Barium		0.0010			2.000	0	96.0	80	120	05/12/2018
Boron		0.0250			0.5000	0	93.3	80	120	05/12/2018
Iron		0.0250			2.000	0	91.6	80	120	05/12/2018
Manganese		0.0020		0.470	0.5000	0	94.0	80	120	05/12/2018
		0.0010			0.5000		94.1	80	120	05/12/2018



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Client: Natural Resource Technology, Inc.

Work Order: 18050091

Client Project: Dynegy - Vermillion Power Station

SW-846 3005A, 6020A,	METAL	S BY ICPMS (	DISSOLVED)						
	npType:	MS	Unite mg/L						
SampID. 18050091-0010	SW3								Date
Analyses		RI.	Qual	Result Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Arsenic		0.0010		0.489 0.5000	0	97.8	75	125	05/12/2018
Barium		0.0010		1.91 2.000	0.01313	95.0	15	125	05/12/2018
Boron		0.0250		2.14 0.5000	1.698	87.4	75	125	05/12/2018
Iron		0.0250		2.05 2.000	0.2227	91.6	75	125	05/12/2018
Manganese		0.0020		0.495 0.5000	0.03315	92.4	75	125	05/12/2018
Selenium		0.0010		<b>0.467</b> 0.5000	0	93.4	75	125	05/12/2018
Batch 141740 San	npType:	MSD	Units mg/L				RPD	Limit 20	
SampID: 18050091-0010	MSD								Date
Analyses		RL	Qual	Result Spike	SPK Ref Val	%REC	RPD Ref \	/al %RPD	Analyzed
Arsenic		0.0010		0.482 0.5000	0	96.3	0.4889	1.48	05/12/2018
Barium		0.0010		1.87 2.000	0.01313	92.7	1.914	2.53	05/12/2018
Boron		0.0250		2.17 0.5000	1.698	95.2	2.135	1.80	05/12/2018
Iron		0.0250		2.05 2.000	0.2227	91.4	2.055	0.24	05/12/2018
Manganese		0.0020		0.489 0.5000	0.03315	91.3	0.4952	1.15	05/12/2018
Selenium		0.0010		<b>0.457</b> 0.5000	0	91.5	0.4669	2.04	05/12/2018
2000	прТуре:	MBLK	Units mg/L						
SampID: MBLK-141774									Date
Analyses		RL	Qual	Result Spike	SPK Ref Val		Low Limit	High Limit	Analyzed
Arsenic		0.0010		< 0.0010 .000380	0	0	-100	100	05/11/2018
Barium		0.0010		< 0.0010 .000150	0	0	-100	100	05/11/2018
Boron		0.0250	S	< 0.0250 ).009260		125.0	-100	100	05/11/2018
Iron		0.0250		< 0.0250 ).009000		0	-100	100	05/11/2018
Manganese		0.0020		< 0.0020 .000750	0	0	-100	100	05/11/2018
Selenium		0.0010		< 0.0010 .000280	0	0	-100	100	05/11/2018
Batch 141774 San SampID: LCS-141774	прТуре:	LCS	Units mg/L						Date
Analyses		RL	Qual	Result Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Arsenic		0.0010	-	0.466 0.5000	0	93.2	80	120	05/11/2018
Barium		0.0010		1.84 2.000	0	91.8	80	120	05/11/2018
Boron		0.0250	В	0.478 0.5000	0	95.6	80	120	05/11/2018
Iron		0.0250		1.80 2.000	0	90.1	80	120	05/11/201
IIOH							1000		
Manganese		0.0020		0.456 0.5000	0	91.2	80	120	05/11/2018



#### http://www.teklabinc.com/

Client: Natural Resource Technology, Inc.

Work Order: 18050091

Client Project:	Dynegy - Vermillion Power Station	

Batch 141774 SamplD: 18050091-	SampType.	MS	Units mg/L							Date
Analyses		RL	Qual	Resul	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Arsenic		0.001	0	0.472	0.5000	0.001702	94.1	75	125	05/11/2018
Barium		0.001	0	1.90	2.000	0.09649	90.2	75	125	05/11/2018
Boron		0.025	0 BS	35.2	0.5000	32.44	546.9	75	125	05/11/2018
Iron		0.025	0	1.79	2 000	0 01608	88.7	75	125	05/11/2018
Manganese		0.002	0	0.594	0.5000	0.1447	89.8	75	125	05/11/2018
Selenium		0.001	0	0.449	0.5000	0	89.8	75	125	05/11/2018

Batch 141774	SampType:	MSD		Units mg/L					RPD Li	mit 20	
SampID: 1805009 Analyses	1-012CMSD		RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Arsenic			0.0010		0.478	0.5000	0.001702	95.2	0.4723	1.11	05/11/2018
Barium			0.0010		1.90	2.000	0.09649	90.1	1.901	0.08	05/11/2018
Boron			0.0250	BS	34.7	0.5000	32.44	457.4	35.17	1.28	05/11/2018
Iron			0.0250		1.78	2.000	0.01608	88.1	1.789	0.61	05/11/2018
Manganese			0.0020		0.591	0.5000	0.1447	89.3	0.5938	0.45	05/11/2018
Selenium			0.0010		0.452	0.5000	0	90.4	0.4490	0.62	05/11/2018



Client: Natural Resource Technology, Inc.

### **Receiving Check List**

http://www.teklabinc.com/

Work Order: 18050091

Client Project: Dynegy - Vermillion Power Station Report Date: 21-May-18 Carrier: Jordan Evans Received By: EAH Completed by: ton Orgall Reviewed by: On: On: 10-May-18 10-May-18 Amber M. Dilallo Michael L. Austin Chain of custody Pages to follow: Extra pages included Shipping container/cooler in good condition? Yes No 🗌 Not Present Temp °C 2.82 Ice 🗹 Type of thermal preservation? None Blue Ice Dry Ice ~ No 🗌 Chain of custody present? Yes No 🗌 Yes 1 Chain of custody signed when relinquished and received? No 🗌 1 Chain of custody agrees with sample labels? Yes No 🗌 ~ Samples in proper container/bottle? Yes ~ Sample containers intact? Yes Yes 🗸 No 🗌 Sufficient sample volume for indicated test? Yes 🗸 All samples received within holding time? No 🗌 Lab Reported field parameters measured: Field V NA 🗌 Container/Temp Blank temperature in compliance? Yes 🗸 No 🗌 When thermal preservation is required, samples are compliant with a temperature between 0.1°C - 6.0°C, or when samples are received on ice the same day as collected. Water - at least one vial per sample has zero headspace? Yes 🗌 No 🗌 No VOA vials 🗸 Water - TOX containers have zero headspace? Yes No 🗌 No TOX containers Yes 🗸 No 🗌 NA 🗌 Water - pH acceptable upon receipt? NPDES/CWA TCN interferences checked/treated in the field? Yes No 🗌 NA V Any No responses must be detailed below or on the COC.

# **CHAIN OF CUSTODY**

pg. 1 of 1 Work order #\80500

TEKLAB, INC. 5445 Horseshoe Lake Road - Collinsville, IL 62234 - Phone: (618) 344-1004 - Fax: (618) 344-1005

Client:	Natural Rescurce	e Technolog	y, Inc.							Ts		nples	on	· 🔀	ICE	. [	≌ B	LUE	ICE	⊇ N	O ICE	=	7	.&Z	°C	<del></del>	<del></del>	<del></del>		
Address:	2422 East Wash	ingtor Stree	<u> </u>	<del></del>																					_	ONL	Y			1
City / State	/ Zin Bloomington, IL	61704								1;	ah	serv Not	25"	 ★ U	se	(i	<u>_</u>	50	2/k	$h_{\epsilon}$	,						_			
Contact:	Steve Wiskes		Phone	•	(41	14) 8:	37-36	614		<b>-</b> [ -								,												
E-Mail:	steve.wiskes@obg.com		Fax:	-						<u> </u>	مناذ	nt C	````	aanf	ŀc		·					-								—
<u> </u>	s known to be involved in	litination? If		uill o	nnhe	r	7 🗸		X No	l		olved I				S 60:	20A A	∖s Ba	a B Fe	Mn s	Se.									ŀ
	s known to be involved in s known to be hazardous?			vili a	ppiy	L	J 16	55	<u> </u>	1																				
	uired reporting limits to be nent section.   Yes		requested analysis	s?. If	f yes	, plea	ase p	orovi	ide																					
Proj	ject Name/Number		Sample	Col	lec	tor's	s Na	ame	<del>)</del>	T	_	MAT	RIX		I			,	IND	ICA	TE /	\NA	YS.	IS R	EQL	JEST	'ED	<del></del>		ᅥ
Dynegy - Vermillio	on Power Station	**************************************	T. Mathis		7.	Εν	av	S			,						밎	` o	규	Fiel	Field	듄		Ţ	ଦୁ	Z				
	s Requested	Billing	Instructions	# 8	and	Type	of C	Cont	ainers	Groundwater						Chloride 925	Diss Fluoride 9214	Dissolved	Field Conductivity	Field DO SM 4500-O	d OF	Fleid pH SM 4500- H+B	S I	Field Turbidity SM 2130-B	De	Nitrate SM 4500- NO3 F	Sulfate	TDS		
X Standard	1-2 Day (100% Surcharge)				_	┰┃				ndv	-			ŀ	ı	ride	lorid	ved	251C	MS	∦PS∤ B	i SN H÷B	empe	urbid	i t	D3 MS	ate 9	SM 2		
Other	3 Day (50% Surcharge)			S S	HN03	250			11	Vate					Ì	9251	le 92	Metals	ctivi B	450	vi 25	450	natu Maria	B EV S	o Water	4500	9036	2540C		
Lab Use Only	Sample Identification	Date	Time Sampled	L				$oldsymbol{\perp}$		_							4	<u></u>		_6	<u>ဗို</u>				<u>ē</u>	L	Ŀ			
1802003].	5009) MW1 5-9-18 1227 2 1 1									X						X	×	X	X	х	X	Х	Х	X	X	X	X	Х		
යාන	MW2	S-9.	-18 949	2	1	1				X	(					Х	×	Х	Х	Х	Х	Х	Х	X	Х	X	X	Х		
<i>დ</i> 3	MW7 🛠			2	1	1				X						X	×	Х	Х	Х	Х	Х	Х	Х	Х	X	Х	Х		
901	MW10	5-9	-18 1405	2	1	1				X	[					X	×	Х	Х	х	Х	Х	Х	Х	Х	X	Х	Х		
COS	MW17	5-9	18 912	2	1	1		T		X						X	×	X	Х	Х	Х	Х	χ	Х	Х	X	Х	Х		
006	MW18	5-9.	-18 G 75	2	1	1		F		X				Т	Ī	X	×	X	Х	Х	X	х	Х	Х	Х	X	Х	Х	***************************************	
(C)	MW21	5-9	-18 1249	2	1	1				X						X	×	X	X	X	x	Х	Х	Х	Х	X	Х	Х		
008	MW3R	5-9	18 1021	2	1	1				X	T				┨	X	X	Х	Х	Х	X	х	Х	Х	X	X	Х	Х		
<i>Q</i> 29	MW4	5-9		2	1	1	$\top$			X						Х	х	Χ	Х	Χ	X	Х	Х	Х	x	X	Х	Х		
910	MW5	5-9-		2	1	1	$\top$	T		X					_	X	X	Χ	Х	Х	Х	X	Х	Х	Х	X	Х	х	<del></del>	
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The individual signing this agreement on behalf of the client, acknowledges that he/she has read and understands the terms and conditions of this agreement, and that ne/she has the authority to sign on behalf of the client. See www.teklabinc.com for terms and conditions.

BottleOrder:

43690



## **CHAIN OF CUSTODY**

pg. 2 of 2 Work order # 18050091

TEKLAB, INC. 5445 Horseshoe Lake Road - Collinsville, IL 62234 - Phone: (618) 344-1004 - Fax: (618) 344-1005

Client:	Natural Resource	Technology, I	Inc.		· · · · · · · · · · · · · · · · · · ·			Т	Sa	mple	s on	: 🗹	ICE	<b>3</b>	BLUE	ICE	™ N	O ICE	<b>.</b>	Z 8	ځ	°C	<u></u>			<del>'</del>
Address:	2422 East Washi	ngron Street						7		eserv										R <u>L</u> /	/B U	SE C	NL	<u> </u>		
City / State	/ Zip Bloomington, IL t	31704	·					7	La	b No	es:	1 ¥	<b>W</b> LU	19	alma	hia	<u>.</u>	<i></i>	~~~	5 (	أاص					
Contact:	Steve Wiskes		Phone	(4	114) 8	37-36	314				1			• •	~ · · · ·	910.	10	νζ	Cesa	, ,	J		٠			
E-Mail:	steve.wiskes@obg.com		Fax:	_					Cli	ent C	omr	nent	S			· · · <u>.</u>	<u> </u>									<del></del>
Are these samples	s known to be involved in list known to be lazardous? uired reporting fimits to be lient section.	Yes 🔯 meat on the req	∛ No		•		es 🛚	No	Diss	solved	Metal	s: ICF	/MS (	6020A	As B	a B Fe	Mn S	Se.								
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1	1-2 Day (100% Surcharge)  3 Day (50% Surcharge)			UNP HNO3	H2				Groundwater				ide 92	( 등	ed M	Field Conductivity SM 2510-B	DO SM 4500-	PSM	HAS I	Field Temperature	Field Turbidity SM 2130-B	ith to	Nitrate SM 4500-	Sulfate 9036	SM 2540C	ŀ
Lab Use Only	Sample Identification	Date/Tir			ater				1926	9214	etals	P Wity	500-	2580	500	ature	MS V	Wate	500	36	8					
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The individual signing this agreement on behalf of the client, acknowledges that he/she has read and understands the terms and conditions of this agreement, and that he/she has the authority to sign on behalf of the client. See www.teklabinc.com for terms and conditions.

BotheOrder:

43690



### Monitoring Well Evaluation Checklist

Inspection Date	Site Vermillion	Major we	ells repairs	* required	Yes	No	NA
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12. Water level measuring point clearly marked?  13. No obstructions in well?  14. No plant roots or vegetation in well?  15. No sediment in bottom of well?  If present, how much sediment?  16. Installed as total depth.  17. Measured total depth of well.  General Condition  18. Concrete pad installed?  19. Concrete pad  Slope away form casing?  Not deteriorated?  Not heaved or below surrounding grade?  20. No surface seal settling?		100					· · · · · · · · · · · · · · · · · · ·
13. No obstructions in well?  14. No plant roots or vegetation in well?  15. No sediment in bottom of well?  If present, how much sediment?  16. Installed as total depth.  17. Measured total depth of well.  General Condition  18. Concrete pad installed?  19. Concrete pad  Slope away form casing?  Not deteriorated?  Not heaved or below surrounding grade?  20. No surface seal settling?	1			1			<del></del>
14. No plant roots or vegetation in well?  15. No sediment in bottom of well?  If present, how much sediment?  16. Installed as total depth.  17. Measured total depth of well.  General Condition  18. Concrete pad installed?  19. Concrete pad  Slope away form casing?  Not deteriorated?  Not heaved or below surrounding grade?  20. No surface seal settling?							
15. No sediment in bottom of well?  If present, how much sediment?  16. Installed as total depth.  17. Measured total depth of well.  General Condition  18. Concrete pad installed?  19. Concrete pad  Slope away form casing?  Not deteriorated?  Not heaved or below surrounding grade?  20. No surface seal settling?							
If present, how much sediment?  16. Installed as total depth.  17. Measured total depth of well.  General Condition  18. Concrete pad installed?  19. Concrete pad  Slope away form casing?  Not deteriorated?  Not heaved or below surrounding grade?  20. No surface seal settling?				- V			
16. Installed as total depth.  17. Measured total depth of well.  General Condition  18. Concrete pad installed?  19 . Concrete pad  Slope away form casing?  Not deteriorated?  Not heaved or below surrounding grade?  20. No surface seal settling?		ft		<del></del>			
17. Measured total depth of well.  General Condition  18. Concrete pad installed?  19 . Concrete pad Slope away form casing? Not deteriorated? Not heaved or below surrounding grade?  20. No surface seal settling?							
General Condition  18. Concrete pad installed?  19. Concrete pad  Slope away form casing?  Not deteriorated?  Not heaved or below surrounding grade?  20. No surface seal settling?		······································					
18. Concrete pad installed?  19. Concrete pad  Slope away form casing?  Not deteriorated?  Not heaved or below surrounding grade?  20. No surface seal settling?	,						
18. Concrete pad installed?  19. Concrete pad  Slope away form casing?  Not deteriorated?  Not heaved or below surrounding grade?  20. No surface seal settling?	General Condition	Yes	No	NA			
19 . Concrete pad Slope away form casing? Not deteriorated? Not heaved or below surrounding grade? 20. No surface seal settling?		4					
Not deteriorated?  Not heaved or below surrounding grade?  20. No surface seal settling?	19 . Concrete pad					eq. i -	
Not deteriorated?  Not heaved or below surrounding grade?  20. No surface seal settling?	Slope away form casing?			· .			
20. No surface seal settling?							
20. No surface seal settling?	Not heaved or below surrounding grade?						
on electrit remote dura tancierat	1. Well clearly visible and labeled?		<del></del>				
Comments:							
Major well repair are those that require a subcontractor or separate mobilization to complete	Major well repair are those that require a subcontr	ractor or separa	te mobiliza	ation to com	plete		

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### WELL DEVELOPMENT AND GROUNDWATER SAMPLING FIELD FORM

門門學院所	Market Contract	Bar Malay	中的情况中的	机动物等的	ROJECTIN	FORMATION	E-CENTER TO		and the second of the	Company State of	ESTATES.
	Site: <u>Vermi</u>					Client					
Project Num			····	Task#:		Start Date:				Time:	1217
Field Person		Math's	J. Evens	<u> </u>		Finish Date:	5-9-18			 Time:	1227
	VELL INFOR	MATION				Jerne et ann 19 mar Jerne Di	EVENT T	YPE		y ny national a Taona an an	
		Mwi		Well Develop		K	Low-Flow / Lo	w Stress Sam	pling		
C	asing ID:			Well Volume		npling 🔲	Other (Specify):				
<b>公司等的</b> 。	機器に当場		WAT	ER QUÂLI	INDICATO	R PARAMET	ERS (contin	ued)			
		Volume	Depth to				SEC or	Dissolved			
Sampling	Time	Removed	Water	Drawdown	Temp.	рĦ	Cond.	Oxygen	Turbidity	ORP	Visual
Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(us/cm)	(mg/L)	(NTU)	(mV)	Clarity
	1217		78.75					·····			
٠.	1219	0.13	80,26	1.51	14.87	6,96	2600	8.51	0.4	37	Cleur
	1221	0.26	81,46	1, 20	14.70	6.74	7650	4.75	0.8	69.	Clear
	1773	0,39	82.45	0.99	14.13	6.69	Z600	5.0	0.6	80	Clear
	1225	0,52	83.59	1.14	14,12	6,63	2540	5.45	0,3	52	Clear
	1777	0,65	84.09	0.5	14.27	6.63	Z <i>50</i> 0	4.99	0.5	96	Clear
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					<u> </u>						
			NOTES (	continued			4000		ABBREVIA	ATIONS	
	<u> </u>				<u>na kitani</u>		<u>,                                    </u>	Cond Actual Cond. FT BT/OC - Feet Bek na - Not App%cable nm - Not Measured	ıctivity	ORP - Oxidation 7	imcaj Souductance s se
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Low-Flow Sampling Form MW-1

Low-Flow Sampling Form

Page 2 of 2

### Monitoring Well Evaluation Checklist

Site	Vermillion	Major w	ells repairs	* required	Yes	No	1
Inspection Date	5-4-18	to maint	ạin well int	egrity?		X	
Well Number	Mwoz						
	,						
Stick	-up Monitoring Wells					Comments	
1. Outer protective	e Casing	Yes	No	NA	l		
Not corroded		X	!				
Not dented	V.						
Not cracked							
Not loose							
2. Inner casing		Yes	No	NA	7		
Not corroded	į	X				•	
Not dented				·	·		
Not cracked							
Not loose				-i			
		Yes	No	NA			
3. Are there weep h	oles in outer casing?	X	<del> </del>	<u> </u>	<b>-</b> j		
4. Weep holes able t		<del> </del>			<del> </del>	<del></del>	
5. Is there a lockable		<del>  </del>		<del>- </del>	<del> </del>		
5. Is there a lock pre		<del> </del>		<del> </del>	<del>}</del>	<del></del>	
7. Bumper posts in g				<del>-[</del>	<del> </del>		
· nouther hoses in 8	ood conditions		<u> </u>	<u> </u>	<u> </u>		<del></del> -
	unt Monitoring Wells	· Yes	No *	NA	]		
. Can the lid be secu	red tightly?			· X	f		
. Does the lid have a	gasket that seals?			1 7			
<ol><li>No water in the fl</li></ol>	ushmount?						
1. Is the well cap loc	kable?						
2. Is there a lock pre	sent?			V			
A II K	Ionitoring Wells	Yes	No	NA:			
ownhole Condition	Contornig Wens	163	NO	<del>\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\</del>			
				l '	·		
	aring point clearly marked?			<del>   </del>	<del></del>		
No obstructions in		ļ <u></u>					
. No plant roots or v				1			
. No sediment in bo		<u> </u>		<u> </u>			
If present, how mu		ft				•	
. Installed as total d	-	ft					
Measured total de	pth of well.	ft			•		
neral Condition		Yes	No	NA			
Concrete pad instal	lled?	X					·
Concrete pad		(					
Slope away form ca	sing?	1	* *	· •			-
Not deteriorated?	<b>U</b> -						
	w surrounding grade?	<del>                                     </del>					
	ilian)	<del></del>	<del></del>	·			
No surface seal sett			i				
No surface seal sett		1-4-1	1	}			
No surface seal sett Well clearly visible a aments:		4					

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### WELL DEVELOPMENT AND GROUNDWATER SAMPLING FIELD FORM

S				30.00		LOWRITION			\$1.60 m		
0.	ite: <u>Verw</u>	HION				Client:	NRT				
Project Numb				Task #:		Start Date:		-18		Time:	923
Field Personn	iel: <u>7. ju</u>	athic 3	. Evans			Finish Date:_	<u> </u>	18		Time:	५५९
APPROPRIENT	ELL INFOR	MATION					EVENT 1	PYRE ** **	The state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the s	e en la company	ga (Sulles de Ario) gas (Sulles de Ario)
	Well ID:	MWOZ		Well Develop				ow Stress San			·
Ca	sing ID:				Approach Sam		Other (Specify)				
地。阿斯斯	製造の会員	7.18M()	WAT	ER QUALITY	INDICATOR	RPARAMET	ERS (contin	jued)	A THE REAL PROPERTY.		
		Volume	Depth to			-	SEC or	Dissolved			
Sampling	Time	Removed	Water	Drawdown	Temp.	pH [	Cond.	Oxygen	Turbidity	ORP	Visual
Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	(UTM)	(mV)	Clarity
	933		18.47.	. !							
i - ,	935	0.13	20,57	Z: 1	14.83	7.08	716	1.71	9.0	-62	Clear
	937	0,76	71.5Z	0.95	14.45	7.23	747	1.62	3.0	- 78.	Clase
	939	0.39	z1.95	0.43	14.54	7.27	787	1.04	₹,0	- 94	clear
	94(	0.52	27.16	15.0	14.87	7.33	799	0.90	0.8	-101	Clary
	943	0.65	ZZ. 47	0.3!	14.47	7.37	218	0.63	0.7	-113	Clear
	945	0.78	27.92	0,45	14.50	7.44	SIZ	0.65	1.0	+118	clear
	947	0.91	23.14	0,72	14.36	7.41	873	0.40	5.1	-121	clear
	949	1,04	23.30	0.16	14.45	7.40	158	0,40	0,8	-124	Clear
									<u> </u>		
,											
			NOTES (	continued)-	KENTA J				ABBREVIA	SKOTE	
								Cond, - Actual Condu FT BTOC - Feet Beld na - Not Applicable nm - Not Measured	ıctivity	ORP - Oxidation-Ri SEC - Specific Elec SU - Standard Unit Temp - Temperatu "C - Degrees Celci	zinical Conductance s re
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Low-Flow Sampling Form

Low-Flow Sampling Form

Page 2 of 2

### Monitoring Well Evaluation Checklist

Site Vermillion	Major we	Yes	No	NA		
Inspection Date 5-9-18	to maintain well integrity?				¥ .	
Well Number 46102						
Stick-up Monitoring Wells	,			<del></del>	<u>Comments</u>	
1. Outer protective Casing	Yes	No	NA NA		<del> </del>	···
Not corroded	X	ļ			····	
Not dented \			- [		·····	
Not cracked						
Not loose	<u> </u>	l				·····
2 /	<u> </u>		<del></del>			
2. Inner casing	Yes	No_	NA NA	-		
Not corroded	X			ļ	•	
Not dented	ļ		<b>- </b>	<del></del>		
Not cracked			<u> </u>	·		<u> </u>
Not loose	- V	, ,				·
2 A 46	Yes	No	NA			
3. Are there weep holes in outer casing?	X		<b></b>	<b> </b> -	··	<del></del>
4. Weep holes able to drain?			<u> </u>	ļ		
5. Is there a lockable cap present?	<del></del>		<u> </u>		<u> </u>	
6. Is there a lock present?				ļ		
7. Bumper posts in good condition?	V		<u>J</u>	<u> </u>		
Floring 400 to 400 to			<del>1</del>	1		•
Flushmount Monitoring Wells	Yes	No 1	NA NA			
8. Can the lid be secured tightly?		:	· *	· · · · · · · · · · · · · · · · · · ·		
9. Does the lid have a gasket that seals?			<del>  </del>		···	
10. No water in the flushmount?					<del></del>	
11. Is the well cap lockable?	<b> </b>		<del>                                     </del>	<u> </u>		
12. is there a lock present?	<u> </u>				·	
AU			1			
All Monitoring Wells	Yes ·	No	NA		··	
Downhole Condition				`		
12. Water level measuring point clearly marked?						
13. No obstructions in well?					····	
14. No plant roots or vegetation in well?						
15. No sediment in bottom of well?	<u> </u>		<u> </u>	· · · · · · · · · · · · · · · · · · ·	····	
If present, how much sediment?	ft				•	ł
16. Installed as total depth.	ft					İ
17. Measured total depth of well.	ft			•		[
General Condition	- Va = 1	No.	110			
18. Concrete pad installed?	Yes	No	NA			
19 . Concrete pad	<del>                                     </del>	<u>-</u>  -		<del></del>		
Slope away form casing?	1 1.	Į.				
Not deteriorated?	<del> </del>		<del></del>		·····	
Not heaved or below surrounding grade?	<del> </del>					
20. No surface seal settling?	<b>   </b>	<u> </u>	·		<del></del>	
21. Well clearly visible and labeled?	<del>                                      </del>					
	<u> </u>		<del></del>		<del>/</del>	
comments: Well casing was know	rked over	- an	a layi	agan	groud	
·		· · · · · · · · · · · · · · · · · · ·				
Major well repair are those that require a subcontra	ctor or senarat	e mobiliza	tion to com	ınlete		
	ctor or acpurat	- 1,10011126		F-010		

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	Site: <u>Vern</u>	silion				•	Client:	NR7				
Project Num				Task≢	¥:		Start Date:	5-9-18	<u> </u>		Time:	930
	inel:		T. Evans	·  -			Finish Date:				Time:	
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	asing ID:		inches			pproach San		Other (Specify)				
	學家可以的		WAT	ER QU	ALITY	INDICATO	RPARAMET	ERS (contin	iued)			
		Volume	Depth to	,	١.			SEC or	Dissolved			
Sampling	Time	Removed	Water	Drawo		Temp.	pН	Cond.	Oxygen	Turbidity	ORF	Visual
Stage	(military)	(gallons)	(Feet)	(Fe	et)	(°C)	(SU)	(ha/cw)	(mg/L)	(NTU)	(mV)	Clarity
		<u> </u>									<u> </u>	<del></del>
		<del> </del>		<del>                                     </del>							<u>                                      </u>	
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	<del></del>	<del> </del>										
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Low-Flow Sampling Form MW-1

Low-Flow Sampling Form

Site Verbillion	Major wells repairs* requir		Yes	NA	
Inspection Date	to maintain well integrity?			+	
Well Number 10				<b>,</b>	
Stick up Monitoring Wells				Comments	
1. Outer protective Casing	Yes No	NA			
Not corroded	1 1				
Not dented					
Not cracked				<u> </u>	<del></del>
Not loose .	[ 1/4/ ]				
				,	
2. Inner casing	Yes No N	IA			
Not corroded	X			-	
- Not dented					· <del>·····</del>
Not cracked		<u> </u>			
Not loose					
The state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the s	Yes No N	A			
3. Are there weep holes in outer casing?	X				
4. Weep holes able to drain?					
5. Is there a lockable cap present?					
6. Is there a lock present?					
7. Bumper posts in good condition?					
	**************************************			· · · · · · · · · · · · · · · · · · ·	-
Flushmount Monitoring Wells	Yes No N/				
8. Can the lid be secured tightly?	1 1	7			
9. Does the lid have a gasket that seals?					<del></del>
10. No water in the flushmount?			•	······································	·
11. is the well cap lockable?			<del></del>		
12. Is there a lock present?		/			
•					
All Monitoring Wells	Yes No NA				
Downhole Condition		,		· · · · · · · · · · · · · · · · · · ·	
12. Water level measuring point clearly marked?			, ,, ,	***************************************	
13. No obstructions in well?					
14. No plant roots or vegetation in well?		)		· //•	
15. No sediment in bottom of well?		<b>└</b>	-		
If present, how much sediment?	ft				
l6. Installed as total depth.	ft				i
7. Measured total depth of well,	ft				]
•	<u> </u>				1
Seneral Condition	Yes No NA	$\neg$			
8. Concrete pad installed?	<b>X</b>			·····	
9 . Concrete pad					
Slope away form casing?		$\dashv \vdash$			
Not deteriorated?					
Not heaved or below surrounding grade?				· · · · · · · · · · · · · · · · · · ·	
). No surface seal settling?		<del>                                     </del>		······	
Well clearly visible and labeled?		_			
emments:					
najor well repair are those that require a subcon	tractor or separate mobilization to	compl	ete		
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	nel: 77 A		Jr Evans		- <u></u>	Finish Date:				. Time:	165
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	Well ID:	10		Well Devel			Low-Flow / Lo				
Ca	sing ID:				ne Approach Sar	<del></del>	Other (Specify):				
<b>"你的"她</b> "	<b>被</b> 探问:1985			ER QUAL	TY INDICATO	R PARAMET	ERS (contin	ued)			
		Volume	Depth to				SEC or	Dissolved .			
Sampling	Time	Removed	Water	Drawdow	n Temp,	pH	Cond.	Oxygen	Turbidity	ORP	Visua:
Stage	(military:	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	(NTU)	(mV;	Clarity
:	1353		49:13	·		<u> </u>					
	1355	03	50.30	1,17	15.64	7,42	1620	4.9	1.6	77	Clear
ì	1357	0,26	51.92	1.32	15.01	6.74	1570	3.02	0.7	37.	Clear
	135 C	0.39	52.72	0.8	15.12	6.52	1540	7.09	0.6	50	Clear
	1401	0.52	53.76	0.5	4 15.08	6.45	15.70	1.61	1.3	60	Clear
	1403	0.65	53.67	0.4	1 15.20	6.43	1510	1,51	1.3	67	Clear
:	1405	0.78	53,97	0.2	5 15.30	6.42	1510	1.34	1,7	73	Clear
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						<u> </u>					
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		<b>"</b> "。第二章	NOTES	continue	n) -				ABBREV!	TIENS	्रकृत्यन प्रत्ते ।
					<u> </u>		- Cond Actual Cond FT STOC - Feet Bei na - Not Applicable nm - Not Measured	ucivity	ORP - Oxidation	Reduction Potential securce; Conductance hits (use	
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Low-Flow Sampling Form MW-1

Low-Flow Sampling Form

Page 2/

Site Vernaillian	Major we	lls repairs	* required	Yes				
Inspection Date 5-G-18	to mainta	in well int	egrity?		X			
Well Number MW17								
Stick-up Monitoring Wells	_				Comments			
1. Outer protective Casing	Yes	No	NA					
Not corroded	X							
Not dented \	1							
Not cracked	<u> </u>	]						
Not loose	<b>V</b>			14. at 1. g 1. % - M 4/ T 4/ 4/4				
2. Inner casing	Yes	No	T NA	7				
Not corroded	Ϋ́		-		-			
Not dented	1 7	<del> </del>	<del>                                     </del>					
Not cracked		<del> </del>	<del></del>	<del></del>				
Not loose		!	<del></del>	<del>-  </del>		<del></del>		
1000	Yes	No	NA					
3. Are there weep holes in outer casing?	<u> </u>		1	1				
4. Weep holes able to drain?	X	ļ	<del></del>		······································			
5. Is there a lockable cap present?	I X			<del></del>				
6. Is there a lock present?	<del>\</del> <del>\</del> \		<del>- </del>	<del></del>	<u></u>	<del></del>		
7. Bumper posts in good condition?	X		<del> </del>	<del></del>	<del></del>			
7. bampa posts in good condition:	<u> </u>		J	. I	· · · · · · · · · · · · · · · · · · ·			
Flushmount Monitoring Wells	· Yes	No	l NA	7				
8. Can the lid be secured tightly?	163		X					
9. Does the lid have a gasket that seals?	<u> </u>		1	<del> </del>				
10. No water in the flushmount?	1		<del> </del>	<del></del>	<del></del>			
11. Is the well cap lockable?	<u> </u>		<del>                                     </del>	<del> </del>				
12. Is there a lock present?	[····		1	<u> </u>				
122. 15 chara a lock present:	L		1 F	<u>. tr </u>				
All Monitoring Wells	Yes	No	NA:	7				
Downhole Condition			X					
12. Water level measuring point clearly marked?			1					
13. No obstructions in well?				<del> </del>				
14. No plant roots or vegetation in well?								
15. No sediment in bottom of well?			<b>-</b>	· -				
If present, how much sediment?	ft		· ·	I		<u> </u>		
16. Installed as total depth.	ft							
17. Measured total depth of well.	ft							
General Condition	Yes	No	NA I	!				
18. Concrete pad installed?	Yes X	_110	NA.			·		
19 . Concrete pad	1-7-				p . gq1			
Slope away form casing?	1 1	•	•					
Not deteriorated?			. [		<del></del>			
Not heaved or below surrounding grade?	<del> </del>		<del></del>			———		
20. No surface seal settling?	<del> </del>		·		<del></del>			
21. Well clearly visible and labeled?	<del>                                     </del>					{		
Comments:	4 1							
anti-11 ant 141	100 - 12 N. B. B. B. B.							
					·			
Major well repair are those that require a subcontra	actor or senarat	te mobiliza	ation to cor	nnlete				
	or achara							

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		rerm! 11:	<u> </u>			Client:					
Project Num				_Task <i>#</i> ;		Start Date:		9-18		Time:	835
Field Person		T Math		vens		Finish Date:		C1-18		Time:	012
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		MW 17		Well Develop			Low-Flow / Lo	w Stress Sam	npling	<u> </u>	
Ca	asirg ID:		inches	Well Volume	Approach San		Other (Specify):		• 7.		
各的機能		5. <b>. (63. 1</b> 16)	WAT	ER QUALITY	INDICATO	R PARAMET	ERS (contin	ued)			
		Volume	Depth to				SEC or	Dissolved			T
Sampling	Time	Removed	Water	Drawdown	Temp.	рH	Cond.	Oxygen	Turbidity	ORP	Visual
Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	(NTU)	(mV;	Clarty
	833		38.36		,					<u> </u>	<u> </u>
	900	1.17	50.67	17. 29	18.76	6.77	2470	3,15	37.0	15	(loar
	903	1,30	51.84	1.17	16.19	6.65	2 430	2.8≤	37.g	10	Clear
	906	1.43	52.20	0.36	15.57	10,67	7470	7.83	76.4	5.	CLEON
	909	1,56	53.45	1.25	15.47	6.68	7490	₹.81	2.7.5	3	choar
	912	1,69	53.90	9.45	15.16	6.69	7490	7.78	23.2	2	(1 post
				<u> </u>				·	<u> </u>	<u> </u>	
			<u> </u>	<u> </u>	<u> </u>	<u> </u>			<u> </u>	· .	
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			<u> </u>			<u> </u>			<u> </u>		
					<u> </u>	<u> </u>					
		<u> </u>			<u>'</u>	<u> </u>	<u>]</u>			<u> </u>	
		1. 漢字:2	NOTES (	continued):		BB AND TO AN OFFICE AND AN OFFICE AND AN OFFICE AND AN OFFICE AND AN OFFICE AND AN OFFICE AND AN OFFICE AND AN			ABBREVIA	TIONS	,
								Cond Actual Cond FT 870C - Peet Bek na - Not Applicable nm - Not Measured			lete
									•	-	
					<u></u>			<u> </u>			

Low-Flow Sampling Form MV4-1

Low-Flow Sampling Form

Page 2

Site Vermillien	Major wells repairs* required	Yes	No 1	N,
Inspection Date 5-9-18	to maintain well integrity?			
Well Number Mw 18				
Stick-up Monitoring Wells			Comments	
1. Outer protective Casing	Yes No NA	1		
Not corroded	x			
Not dented				
Not cracked	` .			
Not loose	41			
2. Inner casing	Yes No NA			
Not corroded	V NO NA			
Not dented		<del> </del>	·	
	<del></del>			
Not cracked				·
Not loose	<u> </u>			
er na lesta a navaguar og 140 haste at eller skriva og 180 i eller eller skriva og 180 i eller eller skriva og	Yes No NA			
3. Are there weep holes in outer casing?				
4. Weep holes able to drain?				
5. is there a lockable cap present?				
5. Is there a lock present?			······································	
7. Bumper posts in good condition?				
. Sampar posts at Book conditions	<u> </u>			
Flushmount Monitoring Wells	Yes No NA			
	TES NO NA		······································	
. Can the lid be secured tightly?	<u> </u>			
. Does the lid have a gasket that seals?				
O. No water in the flushmount?		·		
1. Is the well cap lockable?				<u></u>
2. Is there a lock present?				
All Monitoring Wells	Yes No NA			
ownhole Condition		<del></del>		
. Water level measuring point clearly mark	ear ————————————————————————————————————			
. No obstructions in well?				
. No plant roots or vegetation in well?				
. No sediment in bottom of well?	4		<u> </u>	
If present, how much sediment?	ft		•	
Installed as total depth.	ft			
Measured total depth of well.	ft			
neral Condition	Yes No NA			
Concrete pad installed?				
Concrete pad	<del>                                     </del>			
Slope away form casing?	·			
Not deteriorated?			<del></del>	<del>-</del>
Not heaved or below surrounding grade?	·			·
No surface seal settling?				
Well clearly visible and labeled? Iments:				

THE SECOND	ANGELIS GEORGE	<b>新聞歌記編輯</b>	40000000000000000000000000000000000000	WE STATE	ROJECTANI	ORMATION	<b>医学家医学</b>	A. A. S. S. S. S. S. S. S. S. S. S. S. S. S.	A STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STA	وران مساورة ووادوا	
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	VELLINFO	RMATION	<b>等条数</b>				EVENT	YPE		र के प्रस्ति हैं। जिस्सी के स्वर्ध	
		MM 18		Well Develop				w Stress Sam	npling		
	asing ID:				Approach Sam		Other (Specify):				
は魔をある。	學家在小學	A CHEST	WAT	ER QUALIT	INDICATOR	PARAMET	ERS (contin	rued)			
Sampling Stage	Time (military)	Volume Removed (gallons	Depth to Water (Feet)	Drawdown (Feet)	Temp.	pH (SU)	SEC or Cond. (µs/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORF (mV;	Visual Clarity
	919		77.43								
	927	0.13	ZZ. 93	O	15,58	6.65	2000	1.52	3.3	37	Clear
,	973	0.26	77.93	Ö	14.89	6.67	1970	0.40	1,8	<i>3</i> 2	Class
	928	0.39	77.93	o	14.47	6.66	1940	0.11	1,9	36	Clex
					•						
<u> </u>	<u> </u>			<u> </u>		<u>.                                  </u>	<u>,_</u>		ļ	<u> </u>	
	<u> </u>	<u> </u>		<u> </u>		<del></del>				ļ <u>.</u>	
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<u></u>	<u> </u>			-	<del> </del> _			<del>                                     </del>	<del> </del>		<del> </del>
<u> </u>	<del> </del>			<del>                                     </del>	<del> </del>		<del> </del>	<u> </u>	<del> </del>	<del></del>	<del> </del>
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1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			NOTEST	continued)				Cond Actual Cond. FT BTOC - Feet Belona - Not Applicable nm - Not Measured		ORP - Oxication - Re SEC - Specific Elec SU - Standard - nits Temp - Temperable 'C - Degrees Celch	aricat Conductance : e
									,		

Low-Flow Sampling Form

Low-Flow Sampling Form

Page 2 of 2

Site Vecmillion	Major wells repairs* required Yes No						
Inspection Date	to maintại				7		
Well Number Mw21			- ,	<u> </u>	<del>,</del>		
Stick-up Monitoring Wells					Comments		
1. Outer protective Casing	Yes	Nο	NA.				
Not corroded	X_						
Not dented							
Not cracked							
Not loose	<u> </u>		_L	L			
2. Inner casing	Yes	No	NA NA				
Not corroded	X				-		
· Not dented			· ·	-			
Not cracked	]	mr	1	,			
Not loose	V	-	· · · · · ·			·	
	Yes	No	NA				
3. Are there weep holes in outer casing?	8		1	┪			
4. Weep holes able to drain?			<del> </del>	1	-turn		
5. Is there a lockable cap present?			<del>                                     </del>	1	· · · · · · · · · · · · · · · · · · ·		
6. Is there a lock present?	<del>             </del>		<u> </u>	1	<del></del>	<del></del>	
7. Bumper posts in good condition?			<del></del>	<del>- </del>			
to a mile as bears in Book containing	4_1.		.J	<u></u>	· · · · · · · · · · · · · · · · · · ·	<del></del>	
Flushmount Monitoring Wells	Yes	No 1	NA.	٦			
8. Can the lid be secured tightly?	<del></del>		\ \ \ \ \	<del>                                     </del>			
9. Does the lid have a gasket that seals?	<del>                                     </del>	· ·	1	1			
10. No water in the flushmount?		····		<del> </del>			
11. Is the well cap lockable?	1	· · · · · · · · · · · · · · · · · · ·					
12. Is there a lock present?			1 1/2	-			
	L		<u> </u>	<u></u>			
All Monitoring Wells	Yes ·	No	NA:	7			
Pownhole Condition	163	110	<del>- "\$−</del>				
Water level measuring point clearly marked?	- <del> </del>	·····					
3. No obstructions in well?			}				
4. No plant roots or vegetation in well?							
5. No sediment in bottom of well?			1		·		
If present, how much sediment?	-		· 4	L			
5. Installed as total depth.	ft		•		•		
•	ft						
7. Measured total depth of well.	ft				•		
eneral Condition	Yes	No	NA I				
. Concrete pad installed?	'= '-	-110	- 170				
. Concrete pad	<del>                                     </del>					<del></del>	
Slope away form casing?	<del> </del>			····	410 0000 1		
Not deteriorated?	garatadagurung g p ggan un un u			****	<del></del>		
Not heaved or below surrounding grade?							
No surface seal settling?	<del></del>		·	<del></del>			
Well clearly visible and labeled?							
nments:							

2200\2285\Deliverables\Sampling and Analysis Plans\Teklab Draft Provisional SAP\Appendix B - Field Forms\Monitoring Ill Inspection Form

<b>在中国的</b>		はのでは、		學物學學可	ROJECTAN	FORMATION		erica des estantistas	(AL MELINANCE VILLE	April April 1	
,	Site: Ve	million	·			Client:					
Project Num		····		Task#:	<del></del>	Start Date:	5-9-	18		Time:	12.41
Field Persor		Math:s	J. Evens			Finish Date:	5-9	-18		Time:	1244
	VELL INFOF	MATION:									
1.	Well ID:	MW ZI		Well Develop				ow Stress San	npling		
	asing ID:		inches		Approach San		Other (Specify)				
	學家心 "特别		TAW	ER QUALIT	Y INDICATO	R PARAMET	ERS (conti	nued)	CONTROL OF		
		Volume	Depth to				SEC or	Dissolved			
Sampling	Time	Removed	Water	Drawdown	Temp.	Нq	Cond.	Oxygen	Turbidity	ORP	Visual
Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	(NTU)	(mV)	Clarity
	1241		90,31	<u> </u>	·			<u> </u>			
: ' •	1243	0:13	97,04	1,73	14.58	7.10	649	4.64	1.5	36	Clear
	1245	0,26	97.34	6.3	14,56	6.99	644	7.66	1,7	-44	Clear
:	1247	0.39	97.58	0.74	14.69	6,99	655	1.66	1.7	-71	Clear
	1749	0.52	93,00	<u> </u>	14,64	7.02	654	1.4	1.1	-75	Claur
:			<u> </u>	<u> -                                    </u>							
			1						-		
				f i				<u> </u>			
1.		Ţ									
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		《基本》	NOTES	continued)			\$ (2.20 Mg)		ABBREVI	TIONS	
			. <u>(2356/2<del>1</del></u>		THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE S	<u> Companya (C. C. C. C. C. C. C. C. C. C. C. C. C. C</u>	<u> </u>	- Cond Actual Cond FT 87.00 - Feet Bek na - Not AppScable nm - Not Measured	ictivity	ORP - Oxidatios-R	ctaca) Conductance s re
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Low-Flow Sampling Form

Low-Flow Sampling Form

Page 2 of 2

Site Vermillion	Major wells repairs* required Yes No							
Inspection Date 5-9-18	to maintain we		1					
Well Number MW 3R					·			
Stick-up Monitoring Wells				Comments				
1. Outer protective Casing	Yes	No NA						
Not corroded	X							
Not dented \(\)								
Not cracked								
Not loose	L V							
2. Inner casing	Yes	lo NA	7					
Not corroded	X							
Not dented	<del></del>	····	<del> </del>					
Not cracked	·		<del></del>					
Not loose			<del></del>		<del></del>			
Not loose	4		<u> </u>		<del></del>			
	YesN	o NA		* *** · **** *** *** ***				
3. Are there weep holes in outer casing?	, <u> </u>	<u> </u>	<u> </u>					
4. Weep holes able to drain?	<u> </u>		Ĺ <u></u>					
5. Is there a lockable cap present?			<u> </u>	· ·				
6. Is there a lock present?					,			
7. Bumper posts in good condition?								
·		-	_					
Flushmount Monitoring Wells	Yes No	NA NA						
8. Can the lid be secured tightly?		<u> </u>						
9. Does the lid have a gasket that seals?								
10. No water in the flushmount?								
11. Is the well cap lockable?			1					
12. Is there a lock present?								
•								
All Monitoring Wells	Yes No							
Pownhole Condition		大						
2. Water level measuring point clearly marked?								
3. No obstructions in well?								
4. No plant roots or vegetation in well?								
5. No sediment in bottom of well?		-V						
If present, how much sediment?	ft			-				
5. Installed as total depth.	ft							
. Measured total depth of well.	ft							
eneral Condition	Voc. No.	NA I						
Concrete pad installed?	Yes No	- INA		<del></del>				
. Concrete pad installed?	<del>                                     </del>			Plany 6				
		- { - {-						
Slope away form casing?	<del>  </del>	<del></del>						
Not deteriorated?				<u>,</u>				
Not heaved or below surrounding grade?	<del></del>							
No surface seal settling?	<del></del>			<del></del>				
Well clearly visible and labeled?								
mments:								
<u> </u>	<u> </u>							
lajor well repair are those that require a subcontra	actor or separate mol	ollization to com	plete					
elet men reban are mose mar redaile a anocourt	actor or acharate mor	SINZACION LO COM	hiere					

2200\2285\Deliverables\Sampling and Analysis Plans\Teklab Draft Provisional SAP\Appendix B - Field Forms\Monitoring III Inspection Form

			W. 100 April 174	g controllers rid	PROJECTAN	FORMATION	rein Car			drogest browning	
	Site: <u>Vecm</u>	!t1:0n			·	Client:	NRT				
Project Numl				Task#;		Start Date:				Time:	1015
Field Person	nel: $\mathcal{T}_{\epsilon}$	math/s	J. Evan			Finish Date:				Time:	125!
Frank V	VELL INFOR	MATION		个可能			EVENT	YPE *		angrapatrija Nasilisti	्रम् १८७% (५४) इंटे
	Well ID:	MW 3R		Well Deve		X	Low-Flow / Lo	w Stress San	pling		· · · · · · · · · · · · · · · · · · ·
Ca	sing ID:		inches	Well Volun	ne Approach San	npling	Other (Specify):				
5. 2. 全部。	開發生製物		WAT	ER QUĂL	ITY INDICATO	RPARAMET	ERS (contin	ued)			
		Volume	Depth to			•	SEC or	Dissolved	ig.		
Sampling	Time	Removed	Water	Drawdow	n Temp.	pH	Cond.	Oxygen	Turbidity	ORP	Visual
Stage	(military)	(gallons;	(Feet)	(Feet)	(*C)	(SU)	(µs/cm)	(mg/L)	(UTV)	(mV)	Clarity
	1015		7.03.								
· · .	1017	0.13	7.55	0,52	14,44	7,16	1090	7.31	1-6	-71	Cleon
	1019	6.26	7.55	0	14.02	7.16	/050	0.38	0.5	-100	Clear
	1521	0.3°	7.55	6	13.98	7.16	1060	0.10	0,4	-106	Clear
			<u> </u>				ļ		<u></u>		
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4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		<b>公文等</b> 位	NOTES (	continue	gradients.		3.72.24°.3		ABBREVI#	CTIONS	
<u> </u>						<del></del>	1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	Cond Actual Cond. FT BTOC - Feet Bak na - Not Applicable nm - Not Measured			72·
•			·	mandel and process to be a second					·		

Low-Flow Sampling Form

Low-Flow Sampling Form

Page 2 of 2

Site Vecnillien	Major wel	ls repairs*	Yes	No	NA	
Inspection Date 5-4-18	to maintai	n well inte	grity?		_	
Well Number No 4						
Stick-up Monitoring Wells			_		Comments	
1. Outer protective Casing	Yes	No	NA			
Not corroded	X					
Not dented \						
Not cracked						
Not loose	<b>V</b>					
				_		
2. Inner casing	Yes	No	NA	] 		_
Not corroded	X				•	
· Not dented				!		
Not cracked			T ·		. ,	
Not loose			1			
	Yes	No	NA			
3. Are there weep holes in outer casing?	X					
4. Weep holes able to drain?						
5. Is there a lockable cap present?					:	
6. Is there a lock present?						•
7. Bumper posts in good condition?			1		· · · · · · · · · · · · · · · · · · ·	
Flushmount Monitoring Wells	Yes	No	NA			1
8. Can the lid be secured tightly?	1		X			
9. Does the lid have a gasket that seals?		•			/	
10. No water in the flushmount?	<del></del>		<del></del>	•		
11. Is the well cap lockable?						
12. Is there a lock present?	[ <del></del>					
22. 13 there a lock present:	L		<del>y</del> 1.			<del></del>
All Monitoring Wells	Yes	No	NA:			-
Downhole Condition						{
12. Water level measuring point clearly marked?	-		<del></del>		<del></del>	
13. No obstructions in well?	<del></del>		<del></del>			
14. No plant roots or vegetation in well?	<del></del>					
15. No sediment in bottom of well?			<del></del>			
If present, how much sediment?	ft		· 4 1			
	ft					Ì
16. Installed as total depth.						
.7. Measured total depth of well.	ft			_		]
Seneral Condition	Yes	No	NA			
8. Concrete pad installed?	1es	NO	- NA			
9 . Concrete pad installed?	1					
Slope away form casing!	1 1	ļ.	i		49.4	
<del></del>			<del></del>		· · · · · · · · · · · · · · · · · · ·	
Not deteriorated?	<del> </del>					
Not heaved or below surrounding grade?		<u> </u>				
D. No surface seal settling?	<del></del>				· · · · · · · · · · · · · · · · · · ·	
L. Well clearly visible and labeled?	<u> </u>					
omments:				weeks a dedication of the service		
			<del></del>		····	
Maley well repair and the seather with a set of the seather with a set of the seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a seather with a sea	hatau au aanan-t	o mokili	tion to core	ioto		
Major well repair are those that require a subcontr	actor or separat	e modiliza	aon to comp	nete		

	united to the Anna			<b>运用的</b>	PROJECTIN	FORMATION	Version of	Catharana basanasan	Salara Samuel Control	din (M) Zinit, Zi	
,	Site: Vorm	illian			· ·	Client:					
Project Num	iber:			Task#:		Start Date:				Time:	,2S
	nnel: 7		J. Eva			Finish Date:		8		Time:	1203
		RMATION ∵	"强"。在	ない 一番				YPE.		e y de mangen d Ly	
		uw4		Well Devel	•		Low-Flow / Lo		npling		
	asing ID;				ne Approach San		Other (Specify):		·		
は本語を	<b>明</b> 不可以		WAT	ER QUÂL	ITY INDICATO	RPARAMET	ERS (contin	iued)			
		Volume	Depth to				SEC or	Dissolved			
Sampling	Time	Removed	Water	Drawdow		pН	Cond.	Oxygen	Turbidity	OR?	Visual
Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	(NTU)	(mV)	Clarity
<b> </b>	1155	ļ	6.36	<del>                                     </del>						<u> </u>	
<u> </u>	1157	0,13	6,85	0.49		7,35	641	0.01	0	+ 93	Clear
<u> </u>	1139	0.26	6.85	0_	17.44	7.27	648	0	G	-93	Clear
<u> </u>	izol	0.39	6.85	C	17.33	7.26	649	0	0	-94	CIEGO
	17.03	0.57	6.85	<u> </u>	12,16	7.24	648	0	0	-94	Clear
<u> </u>	<u> </u>			<u> </u>							
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	<u> </u>		432					Cond Actual Condu FT BTOC - Feet Bek na - Not Applicable nm - Not Measured	ıctivity	ORP - Oxidation-Re- SEC - Specific Elec SU - Standard Units Temp - Temperatus 'C - Degrees Celon	irical Conductance : e
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Low-Flow Sampling Form

Low-Flow Sampling Form

Page 2 of 2

Site	1		vells repa			Yes	No	NA
inspection Date 5-9-18		to main	tạin well	integr	ity?		X	
Well Number								
Stick-up Monitoring	<u> Wells</u>						Comments	
1. Outer protective Casing		Yes	N	0	NA			
Not corroded		Х						
Not dented ,								
Not cracked								v=
Not loose								
1.		<u> </u>					<del></del> -	
2. Inner casing		Yes	No.		NA		· · · · · · · · · · · · · · · · · · ·	
Not corroded		Ι						
Not dented		1			•	•		
Not cracked								
Not loose	•	V			-			-
		Yes	Nc		NA			
3. Are there weep holes in outer ca	sing?	Х			7			
4. Weep holes able to drain?			T					
5. Is there a lockable cap present?								
6. Is there a lock present?								· · · · · · · · · · · · · · · · · · ·
7. Bumper posts in good condition?	•	1	1					
Flushmount Monitoring	Wells	· Yes	No	· 1	NA	7		
8. Can the lid be secured tightly?			1	_ _	λ	1		
9. Does the lid have a gasket that se	als?		<del> </del>	_		<del></del>		
10. No water in the flushmount?			<del> </del>			<del></del>		<del></del>
11. Is the well cap lockable?		}	<del> </del>	_		<del> </del>		
12. Is there a lock present?			<del> </del>			<del> </del>		
1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2		L	<u> </u>					· ·
All Monitoring Well	ls	Yes	No	$\neg$	NA:	1		
Downhole Condition	<del>~</del>				×			
12. Water level measuring point clea	rly marked?			$\dashv$	<del>-                                    </del>		· · · · · · · · · · · · · · · · · · ·	
13. No obstructions in well?	ny markeu.	<del></del>						<del></del>
14. No plant roots or vegetation in w	roll2							
15. No sediment in bottom of well?	CIII				<del>\</del>			
If present, how much sediment?					<u> </u>			<del></del>
16. Installed as total depth.		ft					•	
17. Measured total depth of well.	_	ft						
Tr. Measured total depth of Well.		ft						
General Condition	1	Yes	No	- <del>'-</del> T	NA			ł
18. Concrete pad installed?	<u>.</u>	X	NU	-	170			
19 . Concrete pad	ŀ	<del></del>						
Slope away form casing?	Į	\ \	•	+	-			
Not deteriorated?	ł	<del>  </del> - -						
				-			·	
Not heaved or below surrounding.	Riager .	<del></del>		<del> </del>				
20. No surface seal settling?	-	<u> </u>				<del></del>	·	
21. Well clearly visible and labeled?	Ļ							
Comments:								
						· · · · · · · · · · · · · · · · · · ·		
Major well renair and the and the	dan a sub sub-	<u> </u>		lt		1-+-		
Major well repair are those that requ	ire a supcontract	or or separ	ate mooi	uzatio	n to con	ibiere		

	Site: <u>Verm</u>			P		Client:	NRT				
Project Num				Task#:		Start Date:	5-9-18			Time:	1029
Field Person		Math: 5	J, Evins			Finish Date:	5-9-18			Time:	039
THE WAY	VELL INFOF	MATION			<b>数</b> 套的 水本。	er er er er er er	EVENT T	YPE * *			The Company of the
	Well ID:	NW5		Well Develop		X	Low-Flow / Lo	w Stress Sam	pling	<del></del>	
Ca	asing ID:		inches	Weil Volume	Approach San	npling 🔲	Other (Specify):		· •,		
外的技術	物学に子供	8 ( <b>KA</b> )	TAW	ER QUALITY	INDICATO	R PARAMET	ERS (contin	rued)			
		Volume	Depth to				SEC or	Dissolved			
Sampling	Time	Removed	Water	Drawdown	Temp.	pН	Cond.	Oxygen	Turbidity	ORP	Visual
Stage	(military)	(gallons:	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	(NTU)	(mV)	Clarity
	lozq		6.25.								
<u> </u>	1031	0,13	6.83		12.32	7,33	919	2,84	0.3	248	Clear
	1033	0.26	6.83	Ø	12.17	7.25	923	1.03	0	-41	Clear
	1035	0.39	6.83	ġ .	11.89	7.19	921	0.35	0	-35	- Tear
· · · · ·	10 37	0.52	6.83	0	11,77	7.16	779_	0.16		-30	<u> </u>
	10.34	0,65	6.83	<u>                                     </u>	11.83	7.15	923	0.06	0_	-27	C/00-
		<del></del>	<del>                                     </del>	<del>                                     </del>	<del> </del>				<del> </del>	<del>                                     </del>	
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	<del> </del>	}	<u> </u>		}	<u> </u>	<u> </u>			<del>-</del>	
	<del> </del>			!							
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			- Estimates (	commuea			A. A. Marketine Company	- Cond Actual Condu FT STOC - Feet Belo na - Not Applicable nm - Not Measured	clivity	ORP - Oxidation SEC - Specific E SU - Standard LI Temp - Tempera	tune
			•							*C + Degrees Ce	kies
				ļ.							
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Low-Flow Sampling Form

Site Vermillion	Major w	ells repairs'	* required	Yes	No	N
Inspection Date 2-9-18	to maint	ain weli int	egrity?		X	
Well Number MW 6 R		•	- •	<u> </u>	·	
Stick-up Monitoring Wells					<u>Comments</u>	
1. Outer protective Casing	Yes	No	NA NA	1		
Not corroded	\ \X			[		, 1+1
Not dented \					······	,
Not cracked	]					
Not loose	4				••	1
2. Inner casing	Yes	No	NA.	7		
Not corroded	X					
Not dented				· · · · · · · · · · · · · · · · · · ·		
Not cracked		<del> </del>	<del></del>	<del> </del>		
Not loose			<del> </del>		····	<del></del>
	Yes	No	NA			
3. Are there weep holes in outer casing?	K	1	1			
4. Weep holes able to drain?		<del> </del>	<del> </del>	<del> </del>	·	
5. Is there a lockable cap present?		<del> </del>	<del> </del>			
6. Is there a lock present?	<del></del>	-	<del> </del>	1 .	<del>.</del>	
7. Bumper posts in good condition?	<del></del>		<del> </del>	<del>                                     </del>		
. Samper posts in good conditions	<u> </u>	<u></u>	.1			•
Flushmount Monitoring Wells	Yes	No	NA	]		
. Can the lid be secured tightly?			X			
. Does the lid have a gasket that seals?						
0. No water in the flushmount?						
1. Is the well cap lockable?						
2. Is there a lock present?			1			
•						
All Monitoring Wells	Yes ·	No	NA.			
ownhole Condition			X			
2. Water level measuring point clearly marked?						
. No obstructions in well?						
. No plant roots or vegetation in well?					-	
. No sediment in bottom of well?			J			
If present, how much sediment?	ft		•			
. Installed as total depth.	ft					
. Measured total depth of well.	ft			,		
neral Condition	Yes	No	NA .			
Concrete pad installed?	X					
. Concrete pad	<b> </b>		———	· · · · · · · · · · · · · · · · · · ·	<u></u>	
. concrete pad Slope away form casing?	1 7 1	10 10 10 10 10 10 1/2			<del></del>	
Not deteriorated?	<del>       </del>					
Not deteriorated?  Not heaved or below surrounding grade?	<del>}</del>					
Not neaved of below suffounding grader  No surface seal settling?	<del>                                     </del>					
Well clearly visible and labeled?	<del>                                     </del>					
weu crearry visible and labeled? iments:	<u> </u>					
ments:	-					

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	Site: <u>Vecm</u>					Client:	WR.	Ĩ .			
Project Numi				Task #:		Start Date:	5-9	7-18		Time:	10<0
Field Person	nel: <u> </u>	Mathis	y, Evan			Finish Date:				Time:	1102
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		MW6R		Well Develop				ow Stress Sam			<del></del>
Ca	asing ID:		inches	Well Volume		npling 🔲 (	Otner (Specify)	:			
(A) (A) (A)	學是在一种學		. WAT	ER QUÂLITY	INDICATO	RPARAMET	ERS (contir	rued)	Andrews Const.		
		Volume	Depth to				SEC or	Dissolved	***	<u> </u>	
Sampling	Time	Removed	Water	Drawdown	Temp.	Hq	Cond.	Oxygen	Turbidity	ORP	Visual
Stage	(military)	(gallons	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	(NTU)	(mV)	Clarity
	10.50		3.95	•				]			
	1052	0.43	4.10	0.15	11.99	7,32	874	0.79	5,0	-61	Clear
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	1056	0.39	4.10	Ġ	11.72	6.93	872	0	0.5	-64	C100-
	1058	0.52	4.10	Ö	11.75	6.88	868	0	0	-64	Clear
	1100	0.65	4.10	· 6	11.66	6.85	871	0	0	-66	Clear
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		( § § ( )	NOTES (	continued)				10多。这是	ABBREVIA	TIONS	
· · · · · · · · · · · · · · · · · · ·			<del>,</del>	-				Cond Actual Cond. FT BTOC - Feet Belo na - Not Applicable nm - Not Measured	ctivity	ORP - Oxidation-R	cirical Canductance is fiz
		έ,						ļ			

Low-Flow Sampling Form MW-1

Low-Flow Sampling Form

Page 2 of

Site	Vermillian	Major well	s repairs*	required	Yes	No	N/
Inspection Date	5-9-18	to maintair			<u>-</u>		
Well Number	MW 8R			~ ,			
Stick-	-up Monitoring Wells					Comments	
1. Outer protective		Yes	No	I NA	7		
Not corroded		7		<u> </u>	i		
Not dented			-eq. ac.				·
Not cracked		<del> </del>		<del> </del>	<del> </del>		
Not loose					<del></del>		
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	•	1 - 1		_l			
2. Inner casing	•	Yes	No	NA.	7		
Not corroded	<b>j</b>	Tes X	110	14/4	-		
Not dented		<del></del>		<del> </del>		· · · · · · · · · · · · · · · · · · ·	
Not cracked		<b> </b>		<del> </del>	<del>                                     </del>		
Not loose				<u> </u>			<del></del>
NOT 10026			<del></del>		<del></del>	-	
2. 4 11		Yes	No	NA		**** -** ******* ***	
3. Are there weep ho	oles in outer casing?	×			<u> </u>	<del></del>	<del></del>
4. Weep holes able t				<u> </u>	ļ		
5. Is there a lockable	cap present?					<u> </u>	
6. Is there a lock pres					<u> </u>		<del>.</del>
7. Bumper posts in go	ood condition?					,	
<u>Flushmou</u>	int Monitoring Wells	Yes	No	NA			
8. Can the lid be secu	red tightly?			· X			
9. Does the lid have a		11-77-41 1-4					
10. No water in the flo							
L1. Is the well cap loci							
2. Is there a lock pre				-			
		L	<u>.</u>			····	
MILA	onitoring Wells	Yes	No	NA.			
ownhole Condition				X		· · · · · · · · · · · · · · · · · · ·	<del></del>
	ring point clearly marked?	<del> </del>					
3. No obstructions in	molio						
4. No plant roots or v				<del></del>		<del></del>	
5. No sediment in bot							
	<del>-</del>	<u> </u>		·			<u> </u>
If present, how much		ft					
. Installed as total de	•	ft		,			
'. Measured total dep	oth of well.	ft			•		
eneral Condition		Yes	No	NA			
. Concrete pad install	lea?	*					
. Concrete pad			ļ,				
Slope away form cas	ingt	\ <u></u>					
Not deteriorated?							
	v surrounding grade?						
No surface seal settl							
Well clearly visible a	nd labeled?	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\					
nments:	·						

2200\2285\Deliverables\Sampling and Analysis Plans\Teklab Draft Provisional SAP\Appendix B - Field Forms\Monitoring Il Inspection Form

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ber:	<del></del>				Start Date:	5-9-	18		Time:	45Q
nel:	<u>Mathis</u>					<u> 5.</u> 9.	18		Time:	1007
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Well ID:	iw &R									
asing ID:		inches	Well Volume	Approach San						
	1,1829-20	. WAT	ER QUALITY	INDICATO	R PARAMET	ERS (contin	ued)			
	Volume	Depth to				SEC or	Dissolved			
Time	Removes	Water	Drawdown	Temp.	pН	Cond,	Oxygen	Turbidity	ORP	Visual
(military)	(gallons)		(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	(NTU)	(mV)	Clarity
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160l	<u> 0.13</u>	<del> </del>							<del> </del>	Clear
1003	0.76	·							-55.	Clear
1005	0.34	12.87							· (	Clear
1007	0.52	12.87	Ġ	13.30	7.16	1770	0,52	4.0	- 47	Clear
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		<u> </u>	<u> </u>							
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		<u> </u>						<u> </u>		
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11 20 20 A 1 1 1 1	in the company	ng gradiense-spille	A DESCRIPTION OF THE SECOND	1 2000/2004/2004/2004		C.O.O. Supplement	AND POSTAL VALUE		87495080374. 12	
77 3 3 3 4 4 A		NOTES (	continued)			A DESCRIPTION OF THE				5.4 H 5.4 L 3.
			**************************************			·			SEC - Specific E SU - Standard U Temp - Tempera	lectrica: Conductance nits iture
			<u> </u>				l	•		
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	itie: Verber: ber: per: mel: T.  VELL INFOR Well ID: J asing ID:  Time (mitary) 9 59 1001 1003 1005 1007	ite: Vermillion per: mel: T. Mathis  VELL'INFORMATION  Well ID: Aw & R  asing ID:  Time Remove: (milary) (gallons)  959  1001 0.13  1003 0.76  1007 0.52	ite: Vecm! (I ion ber: mel: I. Math!s J. Evens   IELL INFORMATION   Wall ID: Aw &	Task #:   Task #:   Task #:	ite: Vermillion  per: Task#:  mel: T. Mathis J. Evens  VELL'INFORMATION  Well ID: Aw &R	Client: Deer: Task#: Start Date: Finish Date: VELLINFORMATION  Well ID: AW SR sing ID:  VOlume Remove:: Water (mitary) (gallons) (Feet) (Feet) (Client: Start Date: Finish Date: Well Volume Approach Sampling  WAJER QUALITY INDICATOR PARAMET  Water (mitary) (gallons) (Feet) (Feet) (C) (SU)  959 1001 0.13 12.87 0.43 14.10 7.23 1003 0.76 17.87 0 13.59 7.09 1007 0.52 12.87 0 13.30 7.16	Client:   NRT	Client: NR.T	Task #   Start Date:   5-9-19	Task #:   Start Date:   5-9-1/8   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Time:   Ti

Low-Flow Sampling Form

Page 2 of

Site Vermillion	Major w	ells repairs	* required	Yes	No	NA
Inspection Date 5-9-16		ain well int		1 7	1	
Well Number Nw 9			• ,	<u> </u>		
Stick-up Monitoring Wells					Comments	<u>i</u>
1. Outor protective Casing	Yes	No	. NA			
Not corroded		χ				
Not dented \		X				
Not crucked	X					
Not loose		. [ ×		<u> </u>		
2. Inner casing	Yes	No	NA NA	7		
Not corroded	<i>k</i>					
· Not dented				<del></del>		·····
Not cracked			1 .	, ,		
Not loose	*	<del>                                     </del>		-		•
	- Yes	No-	NA			
3. Are there weep holes in outer casing?	Y Y	1		┪		
4. Weep holes able to drain?	<del>\ \ \ \ \ \</del>		- <del> </del>	<del> </del>		
5. Is there a lockable cap present?	X	<del> </del>		<del>                                     </del>		<u>,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,</u>
6. Is there a lock present?	<del></del>		<del></del>	<del>-</del>	· · · · · · · · · · · · · · · · · · ·	<del></del>
7. Bumper posts in good condition?	<u> </u>	<del> </del>	\ <u> </u>			
Jumper posts in good conditions	L	l	<u> </u>	-L	<del></del>	
Flushmount Monitoring Wells	Yes	No *	NA.	7		_
8. Can the lid be secured tightly?	163	NO	1 105	<del> </del>	<del></del>	
9. Does the lid have a gasket that seals?		•	1.	<b> </b>		
10. No water in the flushmount?			-	<del> </del>		
11. Is the well cap lockable?			1			
12. Is there a lock present?	<del> </del>					
12. 13 there a lock present?	L1	····	4	<u> </u>		
All Monitoring Wells	Vac	No.	T NA.	Ŧ		
Downhole Condition	Yes ·	No	NA ·			
	.		ļ		<del> </del>	
12. Water level measuring point clearly marked? 13. No obstructions in well?		<del> </del>	ļ			
The state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the s						
14. No plant roots or vegetation in well?						
15. No sediment in bottom of well?			<u></u>	· · · · · · · · · · · · · · · · · · ·	······································	
If present, how much sediment?	ft				•	- 1
16. Installed as total depth.	ft		•			
17. Measured total depth of well.	ft			•		1
General Condition	<u> </u>		· 1			1
18. Concrete pad installed?	Yes	No	NA	·····		
•	<del> </del>					
19 . Concrete pad	] [					1
Slope away form casing? Not deteriorated?	<b> </b>					
• • • • • • • • • • • •	<del> </del>					
Not heaved or below surrounding grade?	<b> </b>		·			
20. No surface seal settling?					·····	
21. Well clearly visible and labeled?	L					
Comments:				· · · · · · · · · · · · · · · · · · ·		
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Malarmali	·				·····	
Major well repair are those that require a subcontra	ctor or separa	te mobiliza	tion to com	piete	·	

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5	Site: <u>Vern</u>	illion			•		NRT				
Project Num	ber:			Task#:		Start Date:	5-91	8		Time: _20	48
Field Person	nel: T. M	ictn!s	J. Franz	·		_ Finish Date:_				Time:	
GYALA.	VELL INFOR	MATION									3.78
		NW 9		i i	elopment	<u> </u>	Low-Flow / Lo	w Stress Sam	pling		
	asing ID:				me Approach Sa		Other (Specify)				
がないが改善しま	<b>秦水山</b> 。		WAT	ER QUÁ	LITYINDICATO	R PARAMET	ERS (contir	iued)			
		Volume	Depth to				SEC or	Dissolved			
Sampling	Time	Removed	. Water	Drawdo	1 .	pH	Cond.	Oxygen	Turbicity	ORP	Visua:
Stage	(military)	(gallons)	(Feet)	(Feet)	(,c)	(SU)	(µs/cm)	(mg/L)	(NTU;	(mV)	Clarity
			4,40			<u> </u>	<del></del>	<del></del>			
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* D	epth on	ly						Cond Actual Condu FT 5TOC - Feet Belo na - Not Applicable nm - Not Measured		ORP - Oxidation Rec SEC - Specific Eed! SU - Standard Units Temp - Temperaure *C - Degrees Cercin	icaj Conductance
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Low-Flow Sampling Form MW-1

Low-Flow Sampling Form

Page 2 of 2

200	<b>网络哈拉斯</b>	多年 计测定性	"于2008年9月	學等學	#PROJECT I	NEORMATIO	(Francisco)		al Milania (1)	entition (1)	
	Site: <u>Ve.cw</u>	illion				Client	MRT				
Project Num	ber:			Task#:		_ Start Date:				Time:	
	inel: <u>T.</u> /		I Evans	1.		Finish Date:				Time:	
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:	Well ID:	MWIG		Well Dev	elopment	1×	Low-Flow / Lo	w Stress San	npling		
	asing ID:				ıme Approach Sa		Other (Specify):		· · · · · · · · · · · · · · · · · · ·		
では、意味を	動品に対象	P. 186	WAT	ER QUA	LITY INDICATE	R PARAMET	ERS (contin	ued)			
Sampling	Time	Volume Removed	Depth to Water	Drawdo	wn Temp.	pН	SEC or Cond,	Dissolved Oxygen	Turbidity	ORP	Visual
Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	(NTU)	(mV)	Clarity
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			NOTES (	continu	ed)				ABBREVI/		1
* U	nable	to acce	<i>255</i> wel					Cond Actual Cond. FT BTOC - Faet Bek na - Not Applicable nnt - Not Measured		ORP - Oxidation-Red SEC - Specific Elect SU - Standard Units Temp - Temperature 'C - Degrees Celcius	rical Conductance
								<u> </u>			

Site Vermillica	Major wel	ls repairs	* required	Yes	No	N/
Inspection Date 5-9-18	to maintai	n well int	egrity?		X	
Well Number NWZO					······································	
	•					
Stick-up Monitoring Wells					Comments	
1. Outer protective Casing	Yes	No	NA			
Not corroded	κ'					
Not dented \						
Not cracked						
Not loose	[					
2. Inner casing	Yes	No	NA	7		
Not corroded	X					
Not dented				· · · · · · · · · · · · · · · · · · ·	······································	
Not cracked	<u>   </u>		1111, 1111			
Not loose		<del></del>		<del></del>	<u>-</u>	· · · · · · · · · · · · · · · · · · ·
	Yes	No	NA			
3. Are there weep holes in outer casing?	100			7		
4. Weep holes able to drain?	1 1		<u> </u>	1		
5. Is there a lockable cap present?			·}	<del> </del>		
				<b>_</b>	<del></del>	
6. Is there a lock present?	<del></del>		ļ	<u> </u>		
7. Bumper posts in good condition?			J	<u> </u>		
Flushmount Monitoring Wells	Yes	No	l NA	7		
8. Can the lid be secured tightly?	163	110	1 1/1	<del> </del>		
9. Does the lid have a gasket that seals?			<del> </del>	·		
10. No water in the flushmount?			·			
	<del> </del>		<del> </del>			·
11. is the well cap lockable?						
12. Is there a lock present?	ĹL	·		·		
All Monitoring Wells	Yes ·	No	NA .	1		
Downhole Condition			7			
12. Water level measuring point clearly marked?		<u></u>	1			
13. No obstructions in well?						<del></del>
	ļ					
14. No plant roots or vegetation in well?						
				•		<del></del>
If present, how much sediment?	ft				•	
6. Installed as total depth.	ft					
7. Measured total depth of well.	ft			•		
eneral Condition	Yes	No	NA			
8. Concrete pad installed?	X		·····			
9 . Concrete pad						
Slope away form casing?				**		ĭ.
Not deteriorated?						· · · · · · · · · · · · · · · · · · ·
Not heaved or below surrounding grade?	<del>                                     </del>					
). No surface seal settling?			<del></del>	· · · · · · · · · · · · · · · · · · ·	<del></del>	·
. Well clearly visible and labeled?	<del>  4 </del>				<del></del>	
mments:	<u> </u>					
inneits.						
Major well repair are those that require a subcontr	actor or consent-	mobilize	ation to con	nlete		
	accor or scharati	- 1110011120		1P1080		

を記るない	William Co.	BANCH BERT	中海等等	· · · · · · · · · · · · · · · · · · ·	ROJECTIN	ORMATION	Care To	OCT ASSESSMENT	Action of the second second	sides many processing	
	Site: <u>Verm</u>		<u> </u>	i		Client:	NRT				
Project Num		·	·	Task#:		Start Date:	<u>5-</u>	Q-18		Time:	/1:3
Field Person		Mathis	J. Frm			Finish Date: _		Q.18			129
	VELL INFOR	MATION	なる		<b>数</b> 等的形态。						
		MW ZO		Well Develop				w Stress Sam	pling		
	asing ID:				Approach Sam		Other (Specify)		<u> </u>		
の開発を引	學學可以學問	5 4 4 4 4	. WAT	ER QUALIT	INDICATOR	R PARAMET	ERS (contir	iued)	Brighman, Nati	<u> </u>	
		Volume	Depth to				SEC or	Dissolved			
Sampling	Time	Removed	Water	Drawdown	Temp.	pН	Cond.	Oxygen	Turbidity	ORP	Visual
Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	(NTU)	(mV)	Clarity
	1113	ļ	13,21								<u> </u>
	1119	0,39	13.41	٥.٥	13.59	7.37	515	0.21	48.4	-50	Slear
	1171	0.57	13,41	0	11.57	7.21	547	0	64.1	-36	Clady
	1123	0.65	13.41	0	11.70	7,01	536	0	22.3	-24	Clear
	i175	0.78	13.41	6	11.54	7,03	542	0	74,4	-20	Clear
	H 77	0.91	13.41	. 6	11.61	7.60	544	0	13,4	~24	Clear
	129	1.04	1341	0.	13.41	6.96	550	0	9,3	15~	Clear
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			NOTES!	continued					ABBREVIA	TIONS	
1.5.1.5.1.	1	San Programme	: Allegaron	· ·	a destination of a larger	<u> </u>	<u>An an an an an an an an an an an an an an</u>	Cond Actual Condu	ictivity	ORP - Oxidation R	
							,	FT 8T,OC - Feet Belo na - Not Applicable nm - Not Measured	w Top of Casing	SEC - Specific Eer SU - Standard Unit Temp - Temperat: "C - Degrees Georgian	re .
			•	į	•						<del></del>
1:									•		
				•				1			
										······································	

Site Vermillier	Major wells repa	irs* required	Yes	No	1
Inspection Date 59-18	to maintain well		_ x	_	
Well Number MW 34					
Stick-up Monitoring Wells				Comments	
1. Outer protective Casing	Yes N	o NA	}		_
Not corroded	X				
Not dented \					
Not cracked	1. 1. 1				
Not loose			<u> </u>	and Assessed a Same	
2. Inner casing	Yes No	) NA			
Not corroded	$\Gamma$ X				
Not dented					
Not cracked		· .			
Not loose					-
The state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the s	YesNo	NA			
3. Are there weep holes in outer casing?	7				
. Weep holes able to drain?					
. Is there a lockable cap present?					
. Is there a lock present?					
. Bumper posts in good condition?					
and the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of th	<u>L</u>				-
Flushmount Monitoring Wells	· Yes No	' NA			
Can the lid be secured tightly?		X			
Does the lid have a gasket that seals?		1			
). No water in the flushmount?					
. Is the well cap lockable?	-	<del></del>			
. Is there a lock present?		1 1	<del> </del>		
· · · · · · · · · · · · · · · · · · ·	<del></del>				
All Monitoring Wells	Yes No	NA:			
wnhole Condition		1 × 1			
Water level measuring point clearly marked?	·}	<del></del>			
No obstructions in well?	<del> </del>	<del>- - -</del>			
No plant roots or vegetation in well?		<del></del>			
No sediment in bottom of well?		<del></del>	····		
if present, how much sediment?	ft				<del></del>
Installed as total depth.	ft				
Measured total depth of well.	ft				
incusured total depth of Well.					
eral Condition	Yes No	NA			
Concrete pad installed?	X	1 17			
Concrete pad installed?					
lope away form easing?	<del></del>	- j j-			
lot deteriorated?	<del>                                     </del>	<del>- </del>	,,,		<del></del>
· · · · · · · · · · · · · · · · · · ·	<del>}</del>	<del> </del>			
lot heaved or below surrounding grade?	<del>                                      </del>	<del> </del> -			
lo surface seal settling?	<del>V</del>   -		<del></del>	<del></del>	
Vell clearly visible and labeled?	Y		······································		
ments:				· · · · · · · · · · · · · · · · · · ·	

	Registration of the		門中國國際	为"等的特殊"的1	ROJECTAN	ORMATION	Comment	<b>电子型外子设备</b>	<b>建加州中央</b> (10)		
	Site: <u>Vecm</u> :	arico			·	Client:	NRT				
Project Num				Task#:		Start Date:	5-0	-18		Time:	1135
Field Person	net: <u>1</u> ,	MRTHS	J. Ev	on5.		Finish Date:		-18		Time:	1147
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	等家人个政队	M. Astan	. WAT	ER QUALIT	/ INDICATOR	PARAMET	ERS (contin	ued)			
		Volume	Depth to	· ·			SEC or	Dissolved		•	
Sampling	Time	Removed	Water	Drawdown	Temp.	pΗ	Cond.	Oxygen	Turbidity	ORP	Visual
Stage	(military)	(gallons)	(Feet)	(Feet)	(°C)	(SU)	(µs/cm)	(mg/L)	(NTU)	(mV)	Clarity
	1135	<u> </u>	13,55.	<u> </u>							
: <b>'</b> •	1141	0.34	13.89	0.34	13,54	6.72	860	0.83	28,2	-65	Clear
	1143	0.52	13.89	10	13.18	6.82	863	0.23	30.8	-88	Clear
	1145	0.65	13.89	1_0_	13.05	6.86	867	0.07	35.1	- 95	Cleon
	1147	0.78	13.89	0	13.08	6.87	864	0	32,4	-101	Clear
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\$	Site: <u>Verm</u>	11tion				Client:					
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Lite The Page 1	學家性自我的		WAT	ER QUALI	TYINDICATE	R PARAMET	ERS (conti	nued)			
Sampling Stage	Time (military)	Volume Removed (gallons	Depth to Water (Feet)	Drawdowr (Feet)	Temp.	pH (su)	SEC or Cond. (µs/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP _(mV;	Visual Clarity
	1050		3.45	<del> </del>	11 1 -3						
	1102	0.78	4.10	;O	11.63	(0.82	868	0,14	0	-66	Clear
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			20年前6年	NAME OF STREET	ROJECT IN	FORMATION		North Contract	NAME OF THE PARTY OF		
;	Site: <u>Vec</u> r	nillion			····	Client:	HRT				
Project Num				Task#:		Start Date:	5-9-1	8		Time:	12.17
Field Persor	nnel: $\underline{X}$	hathis J	, Evans			Finish Date:	5-9-	18		Time:	1227
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の動物を	學的學	<b>、特别</b>	WAT	ER QUALIT	INDICATO	R PARAMET	ERS (conti	nued)	<b>张</b> 华""		
Sampling Stage	Time (military)	Volume Removed (gallons)	Depth to Water (Feet) 78:75	Drawdown (Feet)	Temp. (°C)	pH (SU)	SEC or Cond. (µs/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP (mV)	Visual Clarity
	1277	0:65	84.09	0.5	14.27	6.63	Z 500	499	0.5	96	Clear
			NOTES:	continued)					ABBREVI	TIGNS:	
			4,0420.5	:	<u> </u>	<u> 1944 - 1944 - 1944 - 1944 - 1944 - 1944 - 1944 - 1944 - 1944 - 1944 - 1944 - 1944 - 1944 - 1944 - 1944 - 194</u>	<u> </u>	Conc Actual Condu FT BTOC - Feet Balo na - Not Applicable nm - Not Measured	ctivity	ORP - Oxidation-8	re

Low-Flow Sampling Form MW-\*

#### Field Calibration Form Groundwater Quality Meter

Date of Calibration Check	Calibration Standard Concentration	Calibration Reading	Within +/_ 10% (yes or no)	Comments
5-9-18 815	11,00	4 01	Yes_	
	(0,00	/6:00		
	7,00	7.00		
	0.0	G, 6		
	1417	1410		
	100%	10090		
5-9-18 1430	7.00	7.01		
	0.0	0.8		
	10090	119,4%		
1	1412	1440		
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#### INSTRUMENT CALIBRATION REPORT



#### Pine Environmental Services LLC

10883 Metro Blvd Maryland Heights, MO 63043 Toll-free (800) 242-3910

### Pine Environmental Services, Inc.

Instrument ID 21152

Description Horiba U-52

Calibrated 5/8/2018 1:02:17PM

Manufacturer Horiba

Model Number U-52

Serial Number/Lot Y9E5AG8R

Number

Location St. Louis

Department

State Certified

Status Pass

Temp °C 22

Humidity % 32

Departme	:Nt						
		<u>Calib</u>	ration Specific	ations			
Group I	oup # 1 Name PH Accy Pct of Re	eading		Range Acc % Reading Acc % Plus/Minus	3.0000		
Nom In Val / In Val 7.01 / 7.01 4.01 / 4.01	<u>In Type</u> PH PH	Out Val 7.01 4.01	<u>Out Type</u> PH PH	<u>Fnd As</u> 6.00 3.50	Lft As 7.00 4.00	<u>Dev%</u> -0.14% -0.25%	<u>Pass/Fail</u> Pass Pass
Group I Group I Stated	Range Acc % Reading Acc % Plus/Minus	3.0000					
Nom In Val / In Val 0.00 / 0.00 800.00 / 800.00	<u>In Type</u> NTU NTU	Out Val 0.00 800.00	<u>Out Type</u> NTU NTU	<u>Fnd As</u> 0.00 800.00	Lft As 0.00 800.00	<u>Dev%</u> 0.00% 0.00%	Pass/Fail Pass Pass
Group I	oup # 3 Name Conduct Accy Pct of Re	<del>-</del>		Range Acc % Reading Acc % Plus/Minus	3.0000		
Nom In Val / In Val 0.718 / 0.718 5.000 / 5.000 80.000 / 80.000	In Type ms/cm ms/cm ms/cm	Out Val 0.718 5.000 80.000	Out Type ms/cm ms/cm ms/cm	Fnd As 0.800 4.600 94.800	Lft As 0.718 5.000 80.000	<u>Dev%</u> 0.00% 0.00% 0.00%	Pass/Fail Pass Pass Pass Pass
Group I	oup # 4 Name Redox (6 Accy Pct of Re	•		Range Acc % Reading Acc % Plus/Minus	3.0000		
Nom In Val / In Val 240.00 / 240.00	<u>In Type</u> mv	Out Val 240.00	Out Type mv	<u>Fnd As</u> 254.00	Lft As 240.00	<u>Dev%</u> 0.00%	Pass/Fail Pass
Group I	oup # 5 Name Tempera Accy Pct of Re	iture DO Span % eading		Range Acc % Reading Acc % Plus/Minus	3,0000		

#### INSTRUMENT CALIBRATION REPORT



#### Pine Environmental Services LLC

10883 Metro Blvd Maryland Heights, MO 63043 Toll-free: (800) 242-3910

### Pine Environmental Services, Inc.

Instrument ID 21152
Description Horiba U-52
Calibrated 5/8/2018 1:02:17PM

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment Please call 800-301-9663 for Technical Assistance

#### INSTRUMENT CALIBRATION REPORT



#### Pine Environmental Services LLC

10883 Metro Blvd Maryland Heights, MO 63043 Toll-free: (800) 242-3910

### Pine Environmental Services, Inc.

Instrument ID 23260

Description Horiba U-52

Calibrated 5/8/2018 1:02:56PM

Manufacturer Horiba

Model Number U-52 Serial Number/ Lot F94BU6X6

Number

Location St. Louis

Department

State Certified

Status Pass

Temp °C 22

Humidity % 32

#### **Calibration Specifications**

Group # 1

Group Name DISPLAY

Test Performed: N/A

As Found Result:

As Left Result:

Test Instruments Used During the Calibration

(As Of Cal Entry Date)

Test Standard ID Description

Manufacturer

Model Number

Serial Number / Lot Number Next Cal Date /
Last Cal Date/ Expiration Date

Opened Date

#### Notes about this calibration

Calibration Result Calibration Successful Who Calibrated Kendall Wilkes

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment Please call 800-301-9663 for Technical Assistance

### **INSTRUMENT QC/ PACKING LIST**

Description	Horiba U-52/ U-53
Sonde ID#	21152
Display ID#	93960
Date Calibrated	5-8-18

Prepared by: QC checked by:



Standard Items	Prepared	QC check	Received by customer	Returned to Pine
Horiba U-52/53 w/ <u>Vm'</u> cable and display w/ case				
Manual	1	W.		
Quick reference card	1			<del></del>
(4) C Alkaline batteries			****	
Probe Guard			***	
Calibration cup (clear)				
Sample cup (Black)		<u>~</u>		
Flow cell	<u> </u>			
Cell body				
Center window				
Base and black bottom		<del></del>		
O-ring cover		+		<del></del>
Threaded ring	<del>_</del>			W-2-10-1-1-1
• (2) black O-rings				
• (1) red O-ring				
<ul> <li>2 of each black barb sizes (1/4, 3/8, and 1/2)</li> </ul>				<del></del>
D.O. probe reconditioning kit	<u></u>	-66		<del></del>
330 internal pH reference solution (1)	1	<u> </u>	<u></u>	
250 ml Autocal solution		<u> </u>	<del></del>	<u></u>
ProCal calibration sheet				
Optional items				
U-50 Data Collection Software	p- <del></del>	- and aff		<del></del>
USB Cable				

This packing list is to ensure that every item needed to operate the unit was sent and received. Upon receiving a shipment, please fill out the "Received by customer" column. Call Pine within 24 hours of receiving the equipment if any pieces are missing, damaged, or malfunctioning. Thank you for choosing Pine Environmental Services LLC

Appendix C
November 2017 DMG
Letter to IEPA



DYNEGY MIDWEST GENERATION, LLC 1500 East Port Plaza Drive Collinsville, IL 62234

#### Via UPS

November 30, 2017

Mr. Richard Cobb, P.G.
Deputy Division Manager
Bureau of Water; Division of Public Water Supplies
Illinois Environmental Protection Agency
1021 North Grand Avenue East
Springfield, Illinois 62794-9276

Dear Mr. Cobb:

Re: Vermilion Site

**Ash Pond Closures Options Report** 

Enclosed please find the Vermilion site ash pond closure options report requested in your May 30, 2017 letter. Options are identified for the north, old east, and new east ash ponds at our former Vermilion power station site. The report was prepared by Stantec Consulting Services, Inc. (St. Louis, MO). It includes cost estimates for the various identified ash pond closure options and costs for associated river bank stabilization options. This report should be read in conjunction with the river bank stabilization options report submitted to you on November 6, 2017 and the groundwater flow and transport modeling report that will be submitted to you in October 2018.

The probable cost estimates are based on information available at this time and should not viewed as exact cost determinations. The estimates are based upon numerous assumptions such as the viability of beneficial reuse, ability to obtain U.S. Army Corp of Engineers permits, availability and costs of materials, etc.

At this time, Dynegy Midwest Generation, LLC (DMG) is unable to make a recommendation as to the closure option that it would like to implement for each ash pond. DMG believes it must wait until the hydrogeologic studies are completed in October 2018 to make a recommendation.

In the meantime, DMG will proceed with Section 404 permitting with Army Corp of Engineers (Louisville, KY District) for implementing river bank stabilization along the north and old east ash ponds.

We would be happy to meet with you to discuss the enclosed report. You should also feel free to call me at 618/343-7761 if you have questions about the report.

Sincerely,

Dynegy Midwest Generation, LLC by its agent Dynegy Operating Company

**Rick Diericx** 

Managing Director – Environmental Compliance

**Enclosures** 

bcc A.D. Diericx Correspondence File - Collinsville

T. L. Davis – Collinsville

M. Ballance / Vic Modeer – Collinsville

D. Tickner – Collinsville

#### Stantec Consulting Services Inc. 1859 Bowles Avenue Suite 250, Fenton MO 63026-1944

November 27, 2017

File: let vermillon closure IEPA 20171127

Attention: Mr. Victor Modeer, PE

Dynegy Midwest Generation, LLC

1500 Eastport Plaza Drive Collinsville, Illinois 62234

Reference: Closure Options

Ash Ponds Closure Vermilion Site

Dear Mr. Modeer,

Stantec Consulting Services Inc. (Stantec) has completed an evaluation of closure options for the North Ash Pond (NAP), Old East Ash Pond (OEAP), and New East Ash Pond (NEAP) at the Vermilion Site. For your use in responding to the letter from the Illinois Environmental Protection Agency (IEPA) to Dynegy Midwest Generation, LLC (DMG) dated May 30, 2017, please find attached a table that includes an opinion of probable cost, anticipated project duration, and a summary of each closure option evaluated. The attached figures are provided to illustrate each closure option. Details regarding the riverbank stabilization options along the North and Old East Ash Ponds are included in Vermilion Site Riverbank Assessment prepared by Stantec on November 2, 2017 and submitted to the IEPA by DMG on November 6, 2017. The riverbank improvements can be implemented prior to or in conjunction with closure construction.

Stantec appreciates the opportunity to support this project. If you have any questions or need additional information, please call.

STANTEC CONSULTING SERVICES INC.

Matthew Hoy, PE

Project Manager/Senior Associate

Matthew.Hoy@Stantec.com

Matt Vaughan, PE Senior Associate

Matt.Vaughan@Stantec.com

Marchw C. Vogh

cel/

Attachments: Table 1 – Closure Options Summary

Figure 1 - Close in Place (Option 1)

Figure 2 – Closure by Removal (Option 2)

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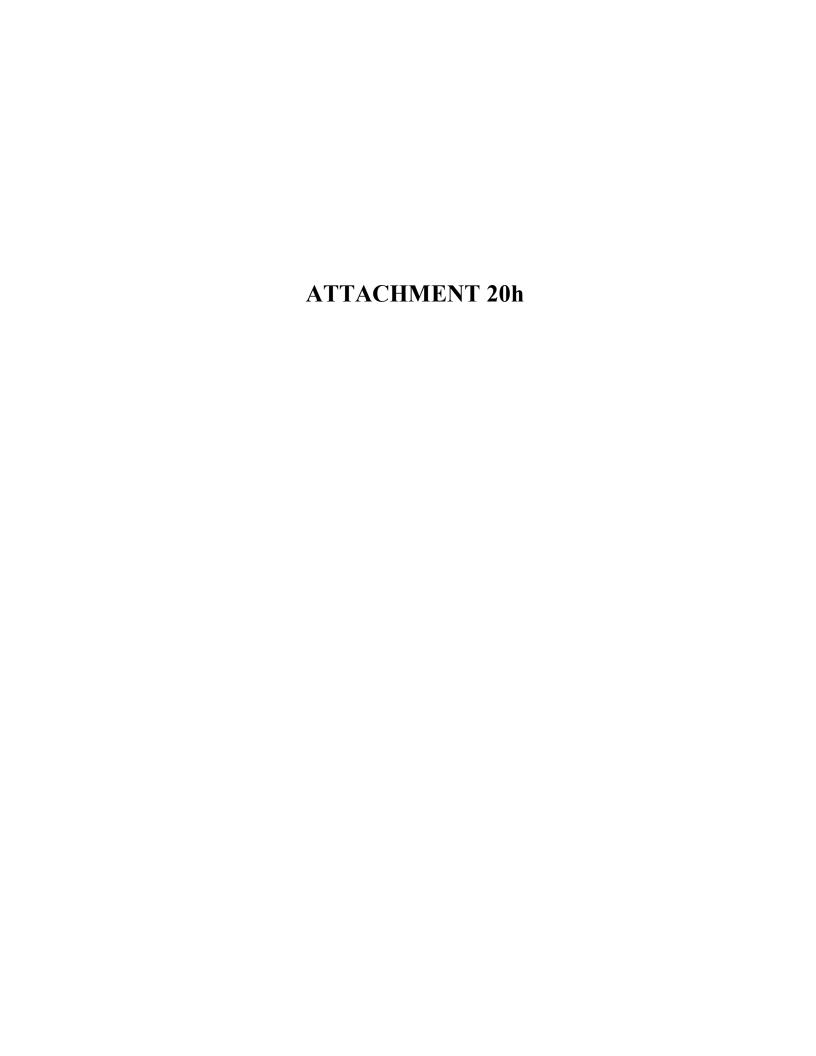
Figure 3 – Beneficial Re-use (Option 3)

Figure 4 – Consolidate OEAP to NAP/NEAP (Option 4)

Figure 5 – Consolidate NEAP and OEAP Layback to NAP (Option 5)

Cc. Matt Ballance

The follow	ving are attach	nments to the	testimony o	of Andrew Rehi





Client	Dynegy Midwest Generation, LLC		
Project Name	Vermilion Ash Ponds Closure		
Location	Danville, IL		
Facility	Vermilion Site		
Date	11/2//2017		

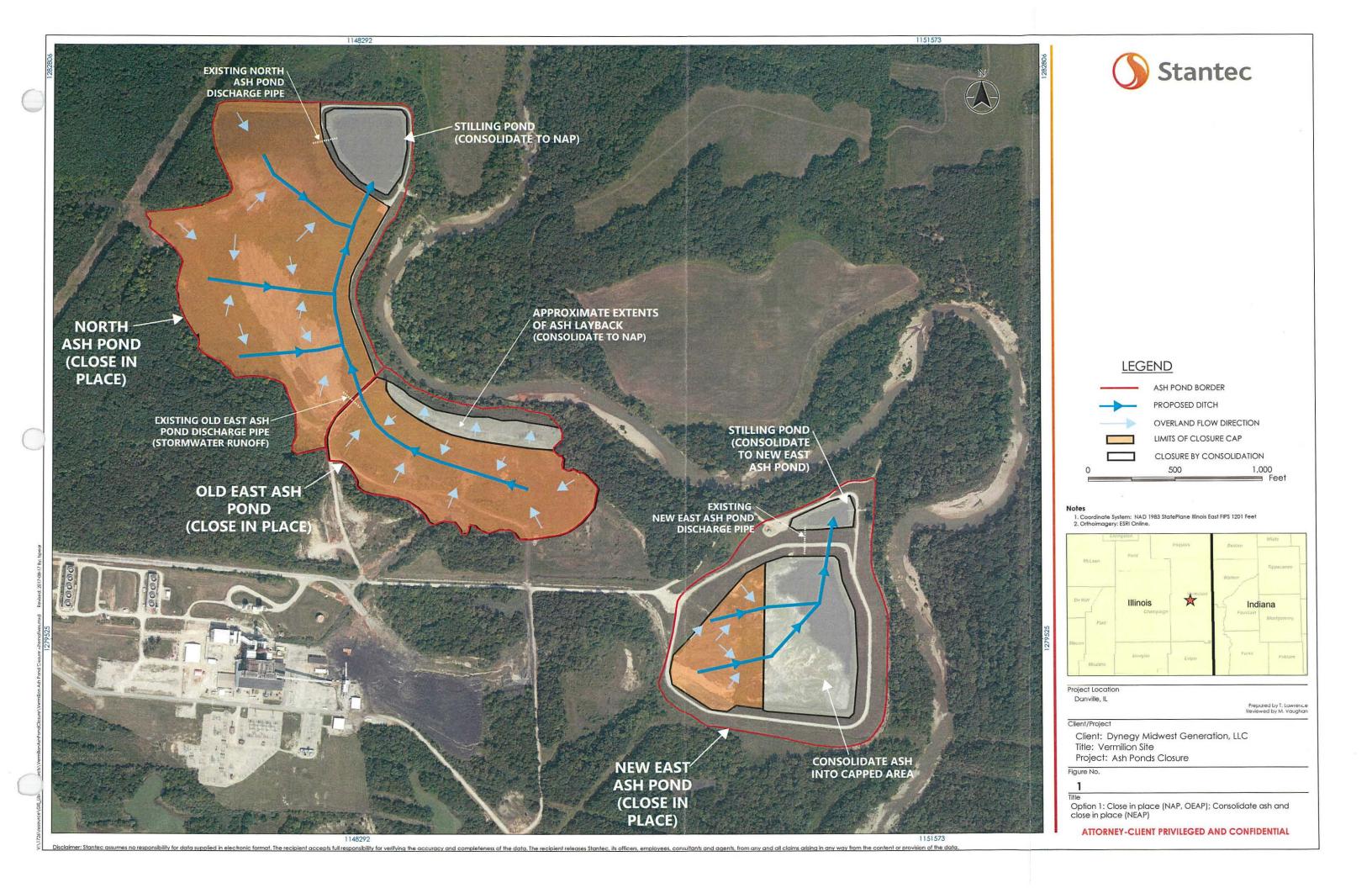
# Table 1 - Closure Options Summary

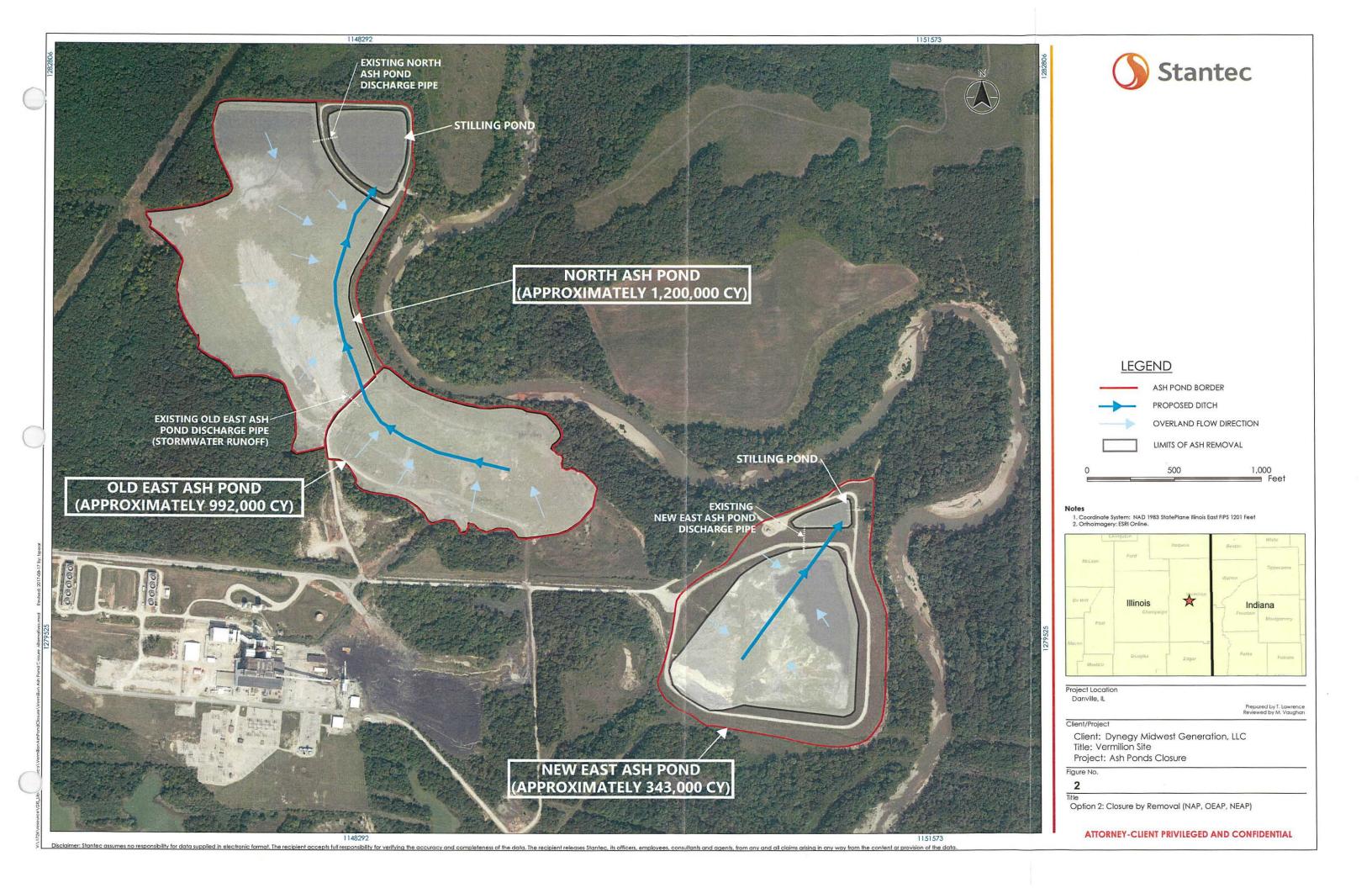
	Table 1 - Closure Options summary						
	Option 1: Close in place (NAP, OEAP); Consolidate ash and close in place (NEAP) <sup>1</sup>	Option 2: Closure by removal (NAP, OEAP, NEAP)	Option 3: Beneficial Re-use (NAP, OEAP, NEAP)	Option 4: Consolidate OEAP to NAP/NEAP, close NAP and NEAP in place	Option 5: Consolidate NEAP and OEAP layback to NAP, close OEAP and NAP in place		
Considerations							
Opinion of Probable Cost (Closure)	\$29M	\$192M	\$33M - \$145M <sup>3</sup>	\$43M	\$32M		
Anticipated Project Duration (Closure) <sup>2</sup>	2 years	5 to 10 years	10 to 20 years	3 to 5 years	2 to 3 years		
Opinion of Probable Cost (Riverbank)	\$3M to \$3.5M	\$3M to \$3.5M	\$3M to \$3.5M	\$3M to \$3.5M	\$3M to \$3.5M		
Anticipated Project Duration (Riverbank) <sup>2</sup>	6-12 Months	6-12 Months	6-12 Months	6-12 Months	6-12 Months		
Summary	Since the NAP and OEAP will remain in place, stabilize the riverbank along the OEAP and NAP, as necessary, with rock toe with live branch layering and/or a buried riprap trench.  Contour the ash to promote positive drainage.  Consolidate ash in NEAP to a smaller footprint on the west side prior to capping.  The OEAP slope along the riverbank will be laid back to provide access for inspections, maintenance and installation of riverbank stabilization.  Construct an engineered cap system over the three ash ponds.  Drainage of post-closure surface runoff will generally be consistent with existing drainage pattorns	Since closure by removal will require 5-10 years, stabilize the riverbank along the OEAP and NAP, as necessary, with rock toe with live branch layering and/or a buried riprap trench.  Moisture condition the ash ,as needed, prior to loading into trucks and hauling offsite.  Excavate the ash from the three ash ponds and dispose of it at an offsite landfill.  Once all the ash has been removed, soil material from the existing dikes will be used to fill the bottom of the three ponds to promote positive drainage. The site will be left in a condition that will not impound water.	require 10-20 years, stabilize the riverbank along the OEAP and NAP, as necessary, with rock toe with live branch layering and/or a buried riprap trench.  Excavate the ash from the three ash ponds, if necessary, condition it onsite, and then haul it	The NAP/NEAP will be closed in place with an engineered cap system.  Soil fill will be placed in the bottom of the OEAP to promote positive drainage. The OEAP will be	NAP.  Lay back the OEAP slope along the riverbank to provide access for inspections, maintenance and installation of riverbank stabilization.  Construct an engineered cap system over the NAP and OEAP.		
Figure	4	2	3	4	5		

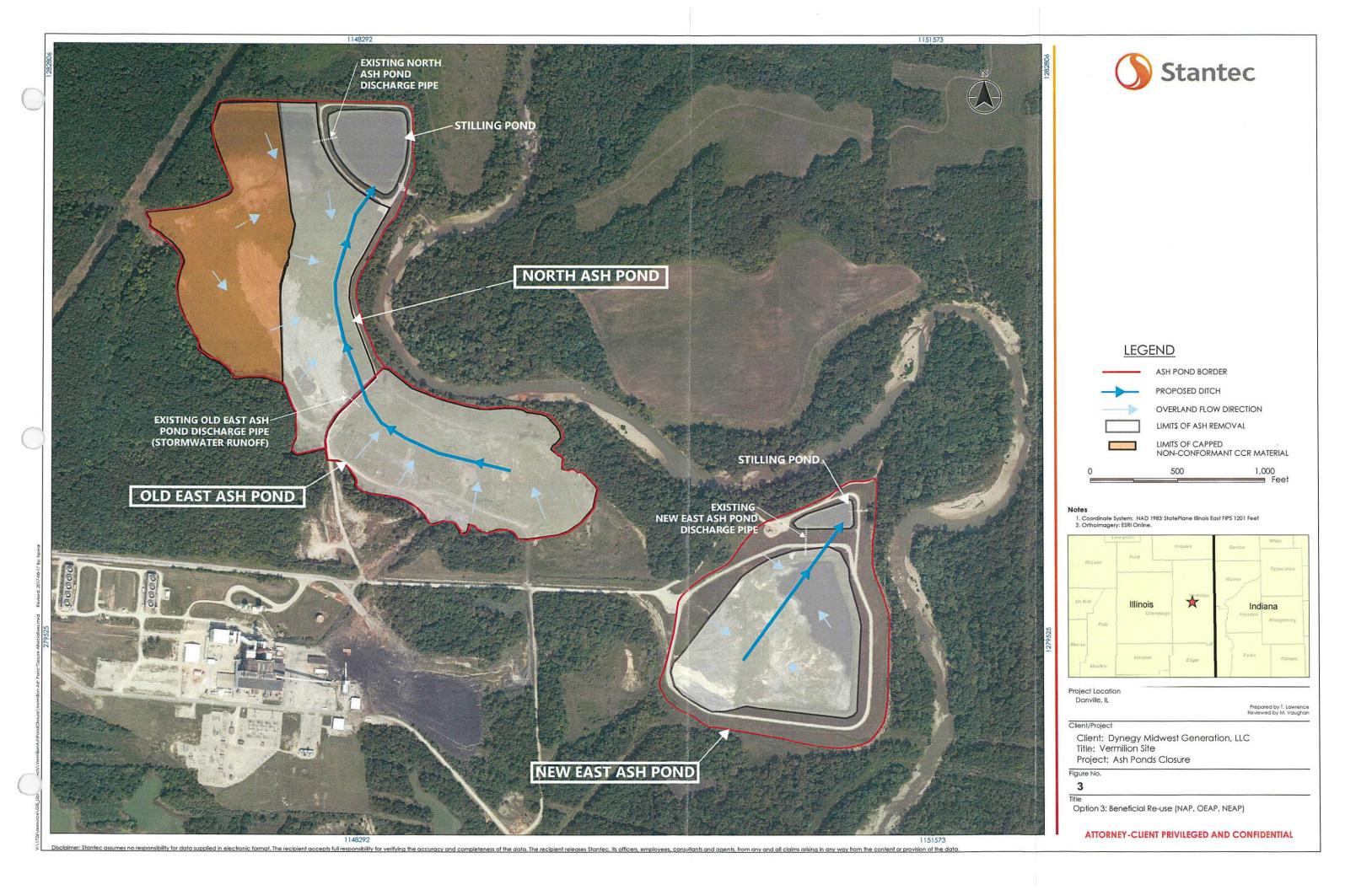
Acronyms/Abbreviations used in the table: M (million), NAP (North Ash Pond), NEAP (New East Ash Pond), OEAP (Old East Ash Pond).

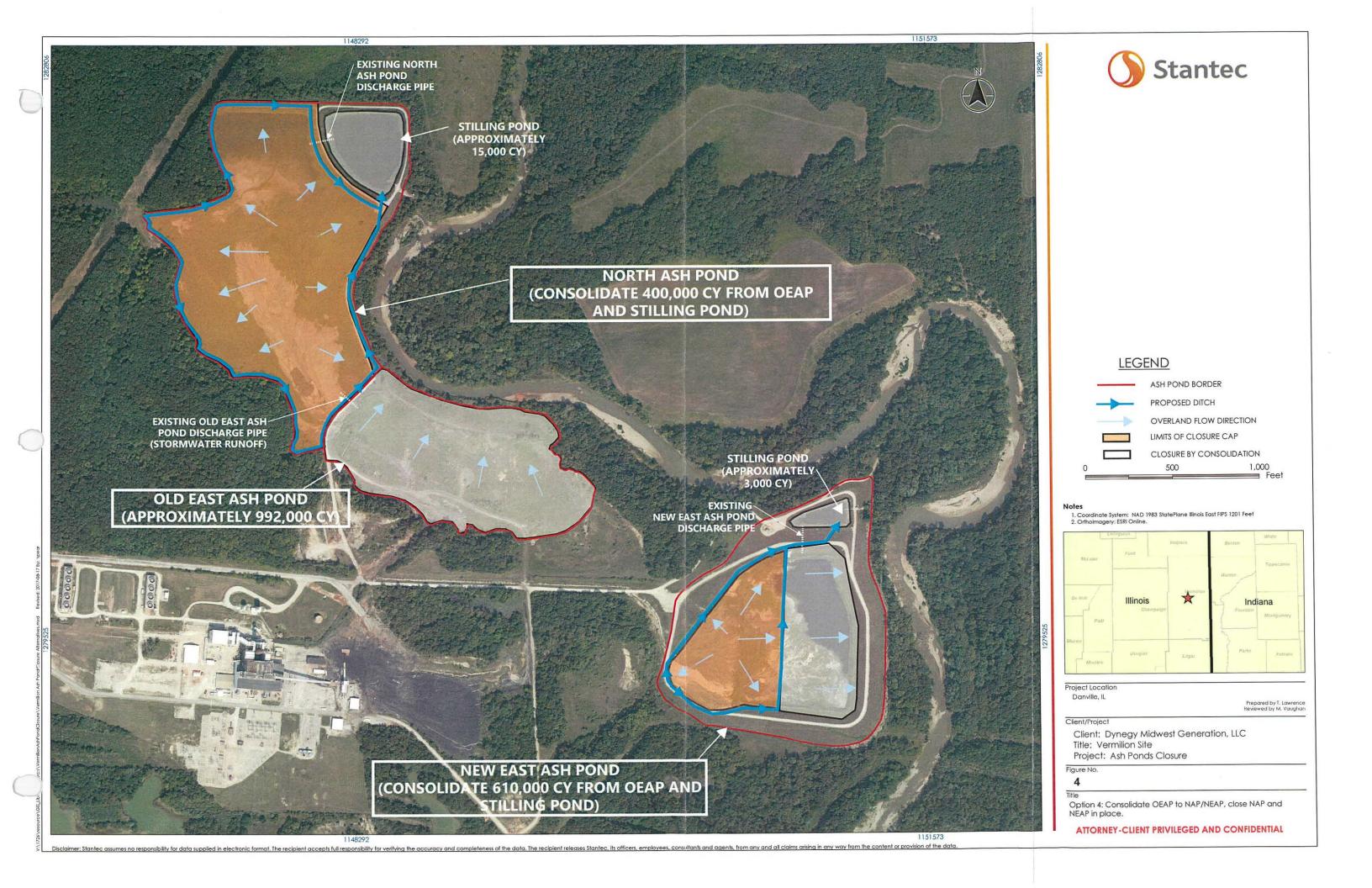
<sup>&</sup>lt;sup>2</sup>Anticipated project duration only includes construction and does not account for design and permitting.

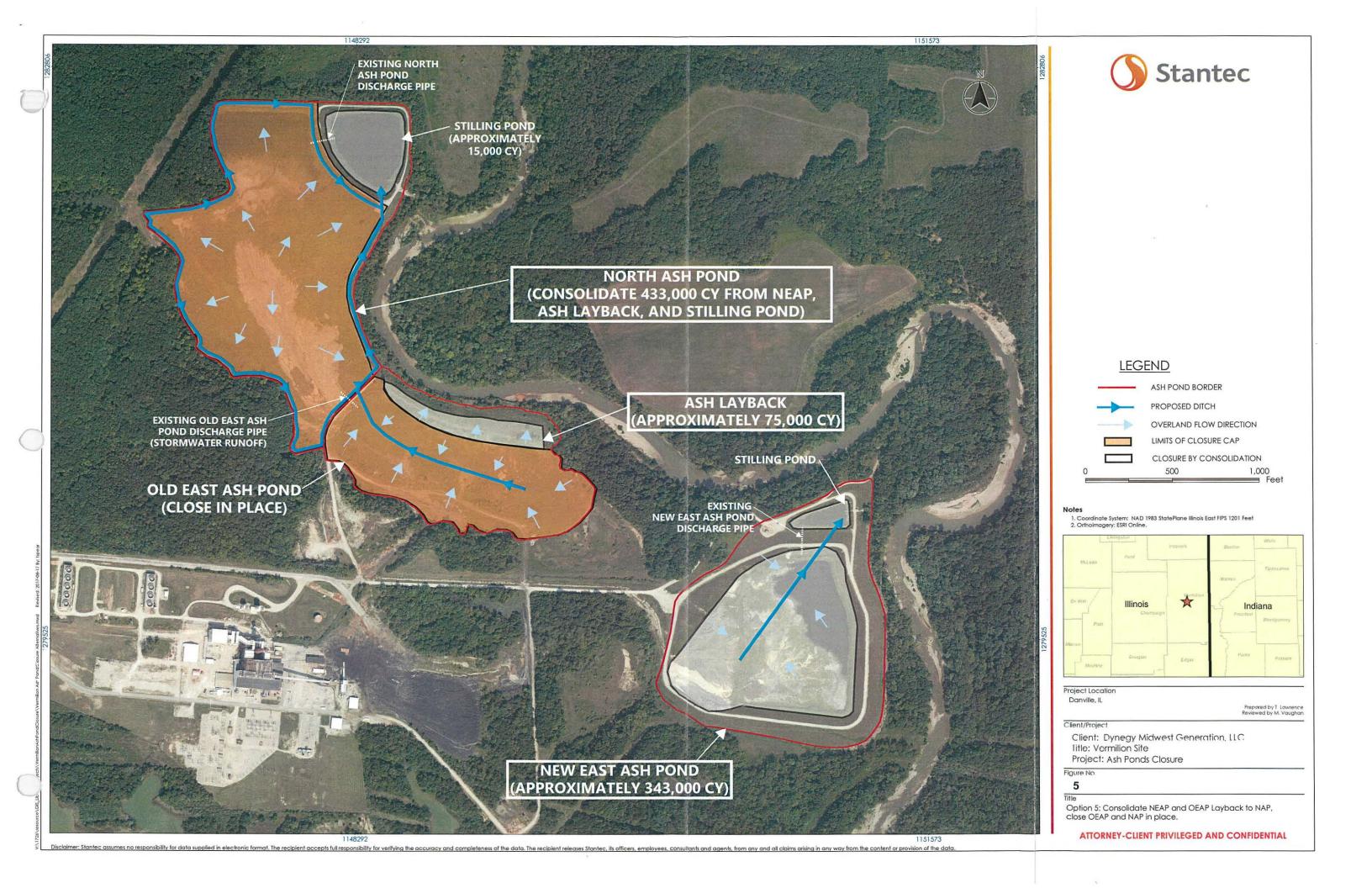
<sup>3</sup> The cost range depicts the volatility of the beneficial reuse market and the differential in cost associated with capping non-conformance materials on-site vs off-site disposal at a landfill.



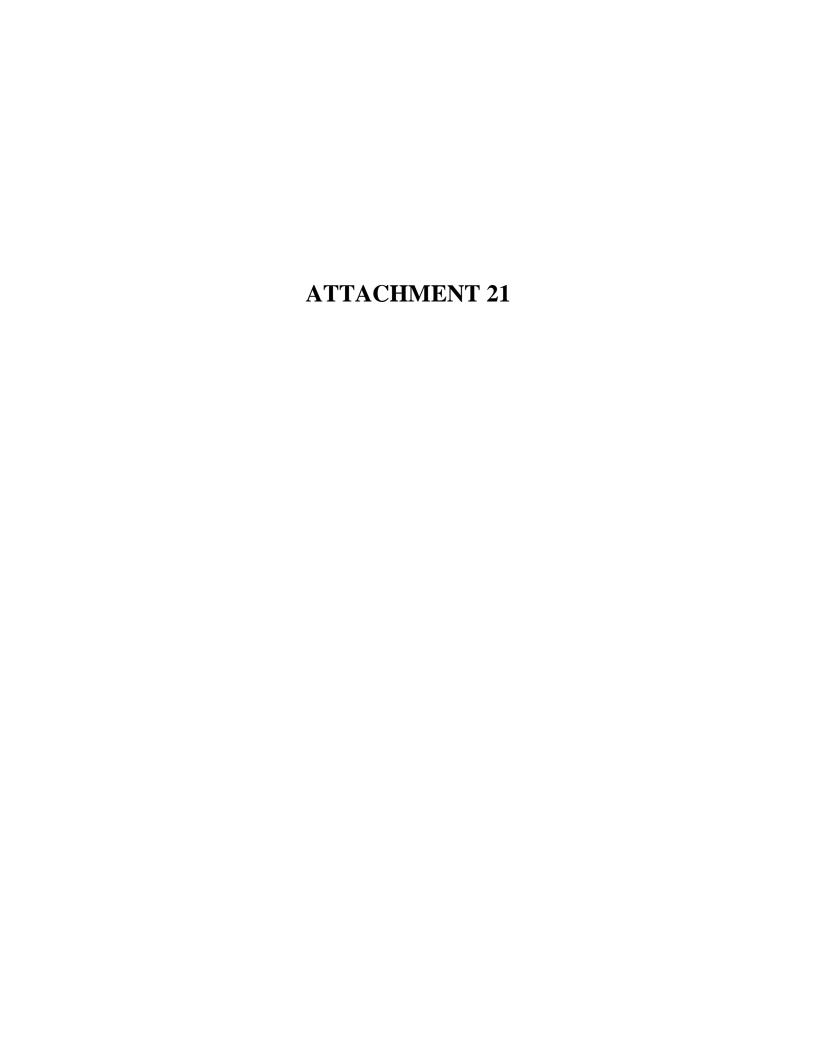








The following a	re attachments	to the testimony	y of Andrew Rehn.



# ILLINOIS EPA'S ASH IMPOUNDMENT STRATEGY PROGRESS REPORT 2019

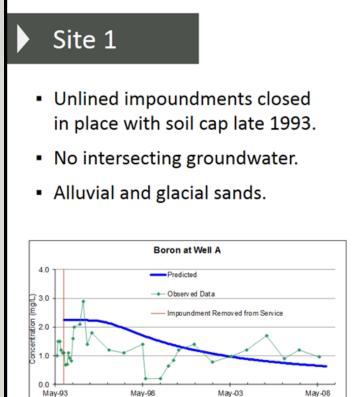
RICK COBB, P.G., ACTING DIVISION MANAGER, DIVISION OF DRINKING WATER AND GROUNDWATER

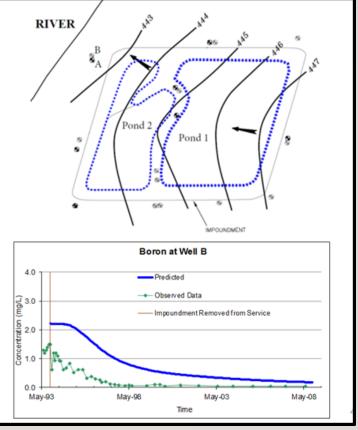


# HAVANA GMZ CASE STUDY I

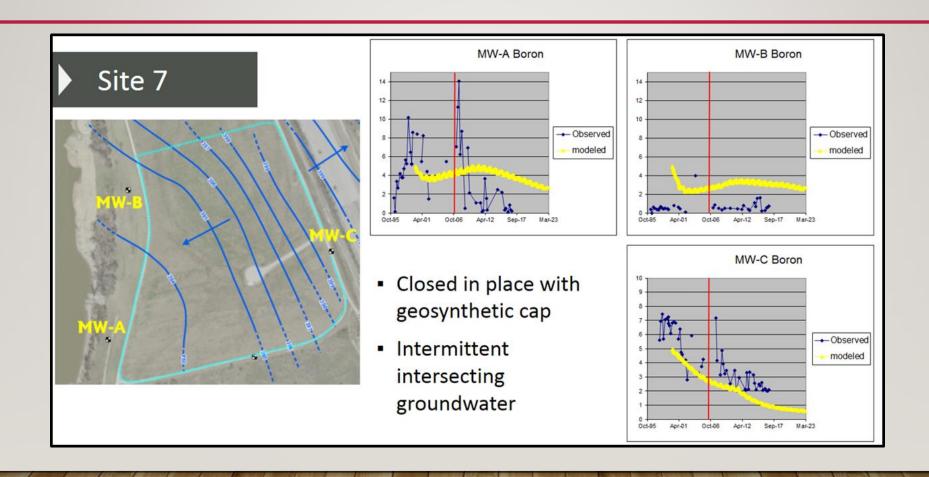
Modeled = blue line

Observed = green line



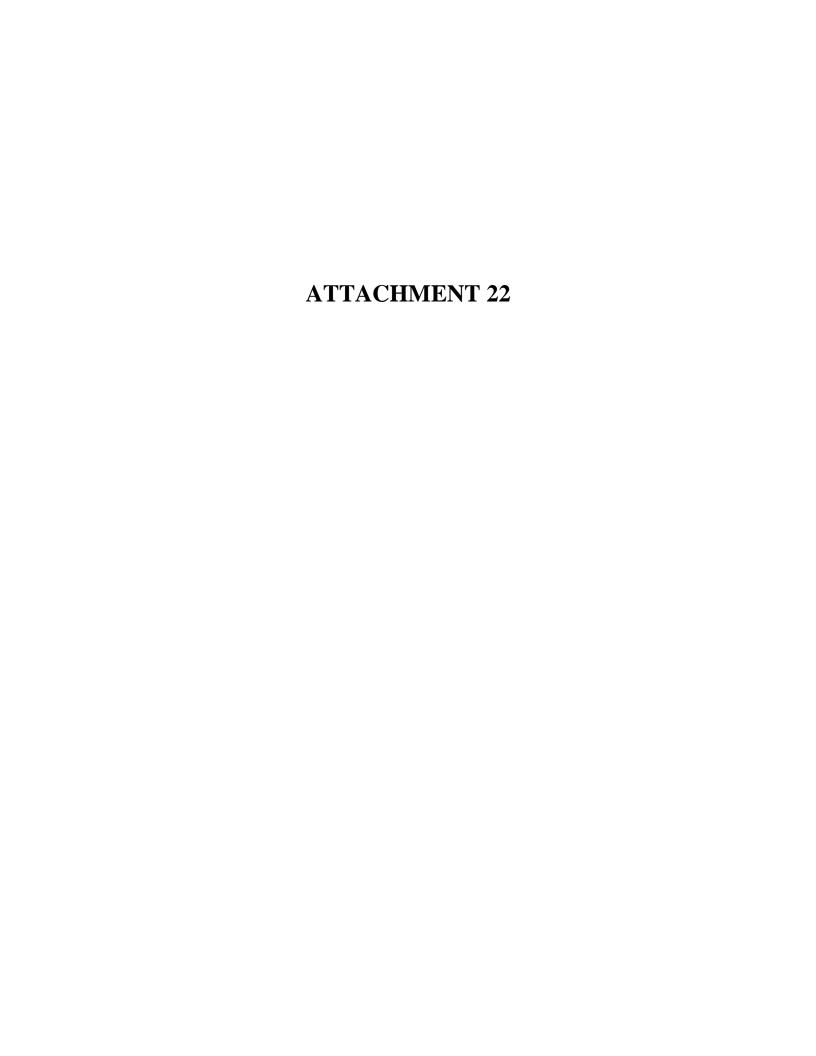


# CASE STUDY 5 - VENICE GMZ



Modeled = yellow

Observed = blue





# TECHNICAL MEMORANDUM

**No.** 6

#### www.naturalrt.com

Date: March 12, 2010

Subject: Groundwater Modeling of Venice Former Ash Ponds

From: Brian Hennings and Bruce Hensel

## **Objective and Summary of Results**

The objective of the modeling described in this technical memorandum was to develop a fate and transport model to simulate changes in groundwater quality resulting from capping Venice power plant ash ponds 2 and 3. A final cap, consisting of a geosynthetic material, drainage layer, and protective cover material similar to the recommendation in NRT Technical Memorandum 4 was assumed beginning in 2011.

Groundwater downgradient of the ash ponds has concentrations of boron and manganese that are higher than Illinois Class I groundwater quality standards, and these concentrations are attributable to coal ash leachate. Concentrations of several other constituents also exceed standards, but these concentrations are not attributable to coal ash leachate. The geosynthetic cap will limit the amount of infiltration into the coal ash, which will subsequently limit the generation and release of leachate to groundwater.

Boron was modeled because it is a primary indicator of coal ash leachate and it is more mobile and less reactive in groundwater than manganese. Model results indicated that groundwater quality will improve over time after the geosynthetic cover is applied and leachate percolation from the impoundments is reduced. Model predictions indicate that boron concentrations at off-site monitoring points will be lower than the Class I groundwater quality standard of 2 mg/L within 13 to 20 years, depending on location.

## **Background**

The Venice power plant and ash ponds are located adjacent to the Mississippi River, straddling the county line between St. Clair and Madison Counties west of the city of Venice, Illinois. The site is located within the floodplain of the Mississippi River, in an area referred to as the American Bottoms. The site

lies east of the river, and the western boundary of the former ash ponds abuts a portion of the Mississippi River levee (Figure 1).

The ash ponds, hydrogeologic setting, and local groundwater quality are described in detail by Hanson Engineers (2000), and supplemented by NRT Technical Memorandum No. 2 "Supplemental Hydrogeological Assessment, Venice Ash Ponds" prepared in December 1999 and finalized on March 3, 2010. The ponds cover an area of 58 acres. They received fly ash from the 1940s until 1977, and storm water discharge until 2005. The ash is currently uncapped, however vegetation ranging from grass to shrubs to trees covers most of the surface and ash is not readily visible in most places (Figure 1).



Figure 1. Outline of Venice ash ponds showing abundant vegetation growing on the surface.

Boreholes drilled through the coal ash found the base of ash as low as 400 feet MSL, which is 5 to 10 feet higher than the water table at normal river stage. In the spring, when river stage is greater than 400 feet, the water table may be above the base of ash; however, seepage into the ash is restricted beneath much of the footprint by the low-permeability fine-grained alluvial sediments that occur in the upper 20 to 30 feet of the stratigraphic column throughout this area. These fine-grained sediments also restrict the downward

migration of leachate from the ponds during periods of low water. The fine-grained alluvium is underlain by coarse-grained sands and gravels that form a highly productive aquifer, as described below.

The description of hydrostratigraphy that follows was developed from site boring logs, the Hanson (2000) hydrogeologic report, and Illinois State Water Survey (ISWS) Circular 180 (ISWS, 1995). Alluvial sediments fill the Mississippi River valley to a depth of approximately 80 feet in this area. The alluvial deposits consist of sand and gravel with variable amounts of silt and clay (see Attachment 1). These deposits coarsen downward with the coarsest encountered in a 30 to 40 foot thick interval near the base of the formation. Mississippian aged limestone bedrock lies beneath the valley fill material. Low permeability and poor water quality make the bedrock less desirable for potable use than the overlying sand and gravel aquifer.

For purposes of this technical memorandum, the alluvium is categorized into three hydrostratigraphic units:

- Interbedded unit: This unit is encountered in the upper 20 to 30 feet of the valley fill, and consists of interbedded layers of sand, silt, and clay. This unit is typically dry at the top while lower portions may be saturated when river stage is above normal. The perched zone monitoring wells are screened across sand layers within this unit, and these sand layers are underlain by silt or clay layers.
- Upper Sand unit: This unit extends from the base of the Interbedded unit to the lower sand and gravel unit. It is primarily composed of sand, although lenses of silt and clay are possible. The existing monitoring wells are all screened in this hydrostratigraphic unit.
- Lower Sand and Gravel unit: This unit is based on regional descriptions of hydrostratigraphy in the American Bottoms, rather than site-specific information. Regionally, the lower 30 to 40 feet of the alluvial valley fill deposits have coarser grain size than overlying deposits.

Perched groundwater was observed within the interbedded unit during operation of the ponds. After dewatering of the ponds, those wells were frequently observed to be dry. This indicates that the perched zone is not a significant pathway for groundwater flow or transport after the ponds were dewatered, therefore the perched zone and associated wells were not included in the model.

Groundwater in the upper and lower sand units occurs under leaky artesian and water-table conditions. Regional groundwater flow in the American Bottoms is from east to west, toward the river. However, there are large groundwater pumping centers and associated cones of depression located in the Venice and National City areas that influence groundwater flow direction (ISWS, 1995). Groundwater withdrawals from those pumping centers are mainly for highway dewatering. Locally, groundwater flow at the site is

strongly influenced by seasonal fluctuations in Mississippi River stage. Flow is typically west or southwest toward the Mississippi River; however, temporary flow reversals toward the east occur during periods of high river stage (see Plates 1 and 2 in NRT Technical Memorandum 2).

Groundwater quality monitoring at the site shows concentrations of boron, the primary indicator of coal ash leachate for this site, higher than Class I groundwater quality standards both on site and extending for a distance of approximately 500 feet south of the ash ponds (Figure 2). Concentrations of arsenic, manganese, iron, and total dissolved solids also exceed Class I groundwater quality standards, although arsenic, iron, and total dissolved solids concentrations are not attributable to release of leachate from the ash ponds.

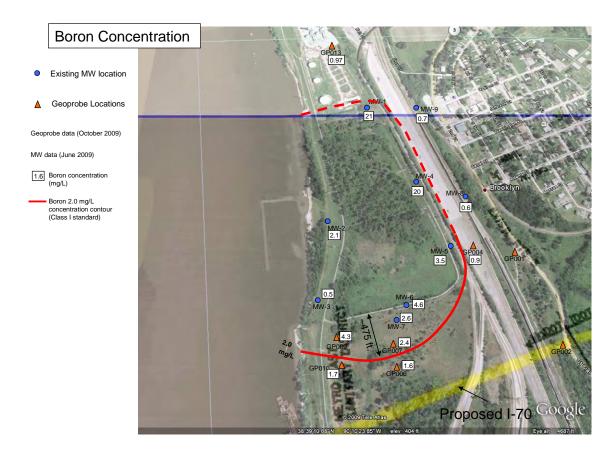


Figure 2. Extent of Class I exceedances attributable to seepage from Ponds 2 and 3, as defined by boron

#### **Conceptual Model**

Groundwater in the vicinity of the Venice ash ponds originates as recharge from precipitation, flow from the east, and recharge from the Mississippi River when at high stage. The ultimate discharge point for groundwater is the Mississippi River since there are no known active water supply wells near the ash

ponds (see NRT Technical Memorandum 1). Groundwater elevation fluctuates in response to changes in river stage. Flow direction reversals are also common, resulting in a highly variable up and down, back and forth flow pathway.

The only sources considered for this modeling are the Venice ash ponds. While other sources of contamination are present in the area, the ash ponds are the only source of boron, the primary ash indicator constituent. Boron mass enters groundwater via two mechanisms: year-round leaching as precipitation and snow melt water percolates vertically through the ash, and occasional leaching when groundwater elevation rises to a level higher than the base of ash and flows horizontally through the material. The groundwater that seeps into the ash when water table is high likely drains vertically for an unspecified period of time after the water table returns to normal elevation.

## **Model Approach**

A three-dimensional transient groundwater flow and transport model was calibrated to represent the conceptual flow system described above. Modeling begins in the year 2000, and mass that entered the aquifer prior to 2000 was simulated by specifying initial concentrations in groundwater. The model was calibrated to match groundwater elevation and concentration trends observed between 2000 and 2009 (Run 19). Prediction simulations were then performed to evaluate the effect of the synthetic cap, which was assumed to be present beginning in 2011. The following scenarios were simulated:

- No Action (Run 19pna): The calibrated model was extended 27 years into the future without placement of the cap;
- Base Case (Run 19pbc): The calibrated model was extended to July 2011 (estimate of when the geomembrane portion of the cap will be constructed). Starting in August 2011 the cap was simulated 25 years into the future. The cap covers the former ponds and berms.
- Case 1 (Run 19pc1): Similar to the base case, the calibrated model was extended to July 2011, then the cap was simulated another 25 years in the future. This scenario differs from the base case in that the cap covers the former ponds but leaves the eastern and southern berms uncapped.

Transport of boron was modeled because it is an indicator parameter for coal ash leachate, it is mobile in groundwater, and its concentration in downgradient monitoring wells is higher than its Class I groundwater quality standard.

This model was complicated by the need to simulate the fluctuations in elevation and flow direction caused by changes in Mississippi River stage. To accommodate these fluctuations, four stress periods

were used for each calendar year in the model from the first year of calibration (2000) to the final year of prediction (2035), for a total of 144 stress periods.

- The first stress period of each year, from August through February simulated base flow conditions.
- The second stress period covered, March and April, represented a period of higher than normal stage.
- The third stress period, May, represented flood stage.
- The fourth stress period, June and July, again represented a period of higher than normal stage.

As described in more detail in the subsection titled "River Parameters", these four stress periods simulate the average long-term transient fluctuations of the Mississippi River and its effects on groundwater flow near the site.

Three model codes were used to simulate groundwater flow and contaminant transport:

- Leachate percolation from the ponds and aquifer recharge south of the ponds was modeled using the Hydrologic Evaluation of Landfill Performance (HELP) model;
- Groundwater flow was modeled in three dimensions using MODFLOW; and
- Contaminant transport was modeled in three dimensions using MT3DMS.

# Percolation and Recharge Modeling Using HELP

The Hydrologic Evaluation of Landfill Performance (HELP) code was developed by the U.S. Environmental Protection Agency and is used extensively in waste facility assessments. HELP predicts one-dimensional vertical percolation from a landfill or soil column based on precipitation, evapotranspiration, runoff, and the geometry and hydrogeologic properties of a layered soil and waste profile.

HELP (Version 3.07; Schroeder et. al, 1994) was used to estimate percolation through the former ash ponds after construction of the synthetic cap. HELP was also used to estimate aquifer recharge in the field south of the former ash ponds. This field lies in a closed depression ringed by soil berms that form the levee, railroad tracks, and the south berm of the former ash ponds. The hydrologic data required by and entered into HELP are listed in Table 1 and described in the following paragraphs.

#### **Help Model Approach**

Modeling of existing conditions was described in NRT Technical Memorandum No. 5 (2010) (described as "Current" in this technical memorandum). For this modeling effort, three configurations of synthetic cap placement were simulated, based on the texture of the protective soil layer (Silty, Sandy, and Clayey). All scenarios were modeled for a period of 20 years. Since the ponds are already dewatered, dewatering was not considered. Infiltration and recharge in the field south of the former ash ponds was also simulated with HELP for a period of 20 years (Field).

#### **Input Data**

Most climatic input variables were synthetically generated by the model using default values for East St. Louis, IL, and a latitude of 38.65° N for the Venice ash ponds. The only exception was precipitation, which was based on model defaults for St. Louis, MO because HELP does not have synthetic precipitation defaults for East St. Louis. Modeling was performed assuming poor vegetation on the currently uncapped ash ponds and fair vegetation for the cap scenarios and field scenario.

Physical input data were based on a combination of measured and assumed soil properties. Hydrogeologic properties for the ash and cap soils were selected from the HELP database. Initial moisture content and initial water were calculated by the model. Cap slope and design were not finalized at the time of the modeling; therefore, conservative estimates were used (slope of 0.01 and mid-drains placed every 300 feet).

The HELP modeling assumed no ponded water within the impoundment, the cap materials and ash had uniform texture and hydraulic properties, there was no lateral groundwater flow into or out of the impoundment, and all leakage to groundwater was vertical. Other assumptions inherent in the model are listed in Schroeder et al. (1994).

#### **Help Model Results**

Help model results are discussed below in the MODFLOW recharge subsection. A disk containing model files is attached to the back of the report.

## Flow and Transport Modeling

#### **Model Descriptions**

MODFLOW uses a finite difference approximation to solve a three-dimensional head distribution in a transient, multi-layer, heterogeneous, anisotropic, variable-gradient, variable-thickness, confined or unconfined flow system—given user-supplied inputs of hydraulic conductivity, aquifer/layer thickness, recharge, wells, and boundary conditions. The program also calculates water balance at wells, rivers, and drains.

MODFLOW was developed by the United States Geological Survey (McDonald and Harbaugh, 1988) and has been updated several times since. Major assumptions of the code are: 1) groundwater flow is governed by Darcy's law; 2) the formation behaves as a continuous porous medium; 3) flow is not affected by chemical, temperature, or density gradients; and 4) hydraulic properties are constant within a grid cell. Other assumptions concerning the finite difference equation can be found in McDonald and Harbaugh (1988).

MT3DMS (Zheng and Wang, 1998) is an update of MT3D. It calculates concentration distribution for a single dissolved solute as a function of time and space. Concentration is distributed over a three-dimensional, non-uniform, transient flow field. Solute mass may be input at discrete points (wells, drains, river nodes, constant head cells), or areally distributed evenly or unevenly over the land surface (recharge).

MT3DMS accounts for advection, dispersion, diffusion, first-order decay, and sorption. Sorption can be calculated using linear, Freundlich, or Langmuir isotherms. First-order decay terms may be differentiated for the adsorbed and dissolved phases.

The program uses a finite difference solution, third-order total-variation-diminishing (TVD) solution, or one of three Method of Characteristics (MOC) solutions. The finite difference solution can be prone to numerical dispersion for low-dispersivity transport scenarios, and the MOC solutions sometimes fail to conserve mass. The TVD solution is not subject to numerical dispersion and conserves mass well, but is computationally intensive.

For this modeling, the finite difference solution was used. Zheng and Wang (1998) indicated that the effects of numerical dispersion are minimal when grid Peclet<sup>1</sup> numbers are smaller than 4.0. Since a Peclet number of 2.0 was maintained for this analysis,<sup>2</sup> the finite difference solution is acceptable.

Major assumptions are: 1) changes in the concentration field do not affect the flow field; 2) changes in the concentration of one solute do not affect the concentration of another solute; 3) chemical and hydraulic properties are constant within a grid cell; and 4) sorption is instantaneous and fully reversible, and decay is not reversible.

#### **Model Sequence**

MODFLOW was calibrated to groundwater elevation data collected between March 2000 and February 2009 (nine years). This timeframe was chosen because it represents current conditions and there was adequate data for calibration of this transient groundwater flow system. Next, MT3DMS was run, and model-predicted concentrations were calibrated to observed boron concentration values at the monitoring wells. Multiple iterations of MODFLOW and MT3DMS calibration were performed to achieve an acceptable match to observed data.

Once calibrated, additional simulations were performed to simulate the prediction scenarios. With the exception of the No Action scenario (which has no cap) the percolation rate and concentration value assigned to the cap was the same for all prediction scenarios (25 mg/L), only the distribution of the cap was varied between the Base Case and Case 1.

#### **Model Setup**

#### **Grid and Boundaries**

A five layer, 127 by 78 node grid was established with variable grid spacing ranging from 225 feet to 50 feet in length parallel and perpendicular to the primary flow direction (Figure 3).<sup>3</sup> The largest node spacings were near the upgradient and lateral model boundaries, and the finest node spacings were along the river and near the former ash ponds.

<sup>&</sup>lt;sup>1</sup> Peclet number (Pe) = Grid spacing divided by longitudinal dispersivity.

 $<sup>^{2}</sup>$  Pe =  $50 \div 25 = 2.0$ 

<sup>&</sup>lt;sup>3</sup> Figures 3 through 15 are at the end of this memorandum.

Flow and transport boundaries were the same for all calibration and prediction scenarios (Figure 3). The upgradient (east) edge of the model was a MODFLOW general head boundary. A general head boundary was selected for the upgradient edge of the model to allow flow reversals to occur throughout the model grid. The bottom (bedrock surface) and lateral (north and south) boundaries were no-flow boundaries. The downgradient (west) boundaries were either MODFLOW river boundaries (layer 1) or no flow (layers 2-5). The top boundary (land surface) was a time-dependent specified flux boundary, with specified flux rates equal to the recharge rate outside the ponds or the rate of percolation within the former ash ponds.

Two types of transport boundaries were used. Specified mass flux boundaries were used to simulate downward percolation of solute mass in areas where ash is above the water table, and constant concentration boundaries were used in areas where ash is seasonally below the water table. The former boundary condition assigns a specified concentration to recharge water entering the cell, and in this application the resulting concentration in the cell is a function of the relative rate and concentration of water percolating from the ash compared to the rate and concentration of groundwater flow. The latter boundary type assigns the specified concentration to all water passing through the cell, although as described later, this boundary was not turned on during all stress periods.

#### **MODFLOW Input Values**

MODFLOW input values are listed in Table 2 and described below.

#### Layer Top/Bottom

The top of layer 1 was set at an elevation of 414 feet, a value above the highest modeled Mississippi River stage (410 feet) and within the range of land surface elevations in the area outside of the ash ponds. The top of layers 2-5 was the base of the overlying layer, which were all flat with the exception of layer 1. The bottom elevation of layer 1 was set at 371 feet in most areas of the model so that all of the water table monitoring wells were in the same layer.

Model layer 1 also included a zone with hydraulic conductivity representing coal ash. This zone was used as a source area representing seasonally saturated ash during transport modeling. The base elevation of this zone was determined from boring logs and cross sections (Attachment 1). The base elevation of

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<sup>&</sup>lt;sup>4</sup> Use of no-flow boundaries beneath the river boundary representing the Mississippi River inherently assumes that

coal ash below the ponds occurs just above 400 feet; however, the base of ash was modeled at a lower elevation (394 feet) so the cells would be saturated during the elevated river stages (March through July). Conceptually, the ash above 400 feet is only saturated (and only contributes mass to the model) during flood-stage (when the river was modeled at elevation greater than 400 feet). Therefore, the constant concentration boundary used to represent the source area was setup as a transient boundary active during the flood stage stress period (May) and the subsequent stress period (June and July). The constant concentration boundary was extended into June and July, which allows for addition of mass to the model as these cells dewater. Because this representation results in a greater thickness of saturated ash (down to 394 feet) than the observed condition (ash down to 400 feet), it inputs more mass to groundwater than might otherwise be expected and is therefore conservative.

Layer 2 was created to model the alluvial deposits beneath the ash in layer 1. As such, layer 2 was set at a thickness of 24 feet within the ponds and 1 foot outside of the ponds. The bottom of layer 2 was set at a flat elevation of 370 feet. Layers 3, 4, and 5 were split evenly into 12-foot layers to make the total aquifer thickness equal to 80 feet (estimated depth to bedrock). The base of layer 3 was at elevation 358 feet, the base of layer 4 was at 346 feet, and the base of layer 5 was at 334 feet.

#### Hydraulic Conductivity

Hydraulic conductivity values (Figures 4 and 5) were derived from field measured values reported in Hanson (2000) for the upper sand units. Hydraulic conductivity for the lower sand and gravel unit was determined during calibration and is consistent with published values for sand and gravel (Anderson and Woessner, 1992). No horizontal or vertical anisotropy was assumed.

#### Storage

No field data defining these terms were available, so representative values for similar materials were obtained from Fetter (1988).

there is no groundwater flow across the river.

<sup>&</sup>lt;sup>5</sup> The transport model proved unstable when the base of ash was simulated at 400 feet; setting it at 394 feet maintained model stability.

#### Recharge

Recharge rates were modeled using results from HELP or established during calibration (Figure 6). The recharge value for the dewatered ponds was provided by HELP modeling described in NRT Technical Memorandum No. 5. The recharge value for the field south of the former ash ponds and the area between the eastern edge of the ponds and the paved area of the railroad yard was determined using HELP modeling performed for this model.

The other four recharge zones were determined during calibration:

- Recharge zone 5 was created for areas of the model known to have pavement and/or storm water management.
- Recharge zone 4 was created over the floodplain on the river side of the levee, to simulate additional recharge as a result of frequent flooding.
- Recharge zone 6 was created to simulate recharge through the berms surrounding the former ash ponds, this zone had the same flux as the ambient zone but includes a mass component for transport modeling.
- Recharge zone 1 was created as ambient recharge for the rest of the model area.

Cap placement scenarios were simulated using recharge zone 7. The highest of the three percolation rates (0.0024 in/yr) from the HELP synthetic cap simulations (Table 1) was applied to this recharge zone. A concentration mass component was also applied to this zone for transport modeling.

#### **River Parameters**

The Mississippi River was represented by head-dependant flux nodes that required inputs for river stage, width, bed thickness, and bed hydraulic conductivity. The latter three parameters were used to calculate a conductance term for the boundary node. This conductance term was determined by adjusting hydraulic conductivity during model calibration, while bed thickness was set at 10 feet. River stage was sloped downward toward the south based on observed data from US Army Corps of Engineers (USACE) tailwater readings at Lock and Dam 27 (located 2.6 river miles upstream) and data collected at the site.

River stage data obtained from the USACE (Table 3) from 1999 through 2008 were reviewed and it was determined that 390 feet was an appropriate break point between high-stage and base-stage river flow. Months with a mean monthly river stage in excess of 390 feet were included as high-stage; months with a mean monthly river stage below 390 feet were included as base stage. It was also determined that an additional period of flood-stage was required to simulate periods when ash could become saturated. The

month of May had the most monthly mean averages in excess of 410 feet (high enough elevation to saturate ash at 400 feet beneath the ponds).

Table of Annual Stress Periods				
Name	Months	Stage near site (feet)		
High-Stage1	March – April	396.71		
Flood-Stage	May	410.01		
High-Stage2	June – July	396.71		
Base-Stage	August – February	385.41		

#### MT3DMS Input Values

MT3DMS input values are listed in Table 4 and described below.

#### **Initial Concentration**

An initial concentration array was used for the calibration run to simulate mass released from the ash ponds prior to the model period (before 2000). Initial concentration for prediction simulations was the ending concentration of the calibration run. Initial concentrations for the calibration run (Figures 7 and 8) were estimated from data collected at site monitoring wells and refined during calibration. The highest concentration zones were placed just below the ash ponds and lower concentration zones were placed in a ring around the ponds. Layer 1 had an initial concentration of 25 mg/L below the ponds (ash, source) and a concentration of 5 mg/L in the ring around the ponds. Layers 2 and 3 had a concentration of 15 mg/L below the ponds and a concentration of 3 mg/L in the ring around the ponds.

#### Source Concentration

Three types of sources were simulated for calibration: percolation through the ponds, percolation through the berms, and seasonally saturated ash. All three were assigned a concentration of 25 mg/L. Percolation

through the ponds and access roads was constant through time. The seasonally saturated ash was simulated using constant concentration cells that were active during flood-stage and high-stage2. Site boring logs suggested that the deepest accumulations of ash (area most likely to become saturated) lie along the eastern edge of the ponds. Constant concentration cells (Figure 9) were placed along the eastern edge of the ponds to simulate these areas of saturated ash. An alternative model was also developed where the entire footprint of the ash ponds could be seasonally saturated. This alternative presented a more-conservative approach to simulating seasonal saturation than the base case alternative.

#### Effective Porosity

Effective porosity values were based on ranges provided by Mercer and Waddel (1993).

#### **Dispersivity**

Longitudinal dispersivity (25 ft.) was determined using the approach of Xu and Eckstein (1995). Transverse dispersivity was set at 1/5 longitudinal (5 ft.). Vertical dispersivity was set at 1/10 transverse (0.5 ft.). These values are higher than standard estimates for these constituents (1/10 and 1/100, respectively) because they account for additional macroscopic dispersion caused by gradient reversals and large vertical fluctuations in groundwater elevation, both of which result from Mississippi River flood events.

#### Retardation

It was assumed that boron would not have any reactions with the soils resulting in retardation of mass transport ( $K_d$  was set to 0).

#### Input Data Assumptions

Simplifying assumptions were made while developing this model, including:

- The cap has an instantaneous effect on percolation rate;
- Leachate is assumed to instantaneously reach groundwater (e.g., migrate through the unsaturated zone);
- The Mississippi River is assumed to behave in a consistent annual pattern;
- The general head boundary and natural recharge are assumed constant over time; and

Leachate concentrations are assumed to remain constant over time.

## **Modeling Results**

Results of the MODFLOW/MT3DMS modeling are presented below. A disk containing model files is attached to the back of the report. Model file folder names are listed in Table 5.

#### Calibration

The model was calibrated to observed conditions from 2000 through 2009. The model was first calibrated to observed groundwater elevation (head) data, and then to observed concentration data. MW-1 and MW-4 were not used for concentration calibration because those wells were installed through ash and groundwater quality results appear anomalous.

Head calibration results show that the model successfully reproduces observed seasonal fluctuations (Figure 10). MW-2 and MW-7 represented downgradient calibration; MW-1 and MW-5 represented onsite calibration; and MW-8 and MW-9 represented upgradient calibration. In all three areas, modeled and observed heads were in good agreement considering that the stress periods used in the model represent river stage in concept, rather than a historical depiction.

Concentration calibration accurately simulated observed trends at most monitoring wells (Figure 11). MW-2, MW-3, MW-7, and GP-6 represented downgradient concentrations. GP-6 is a monitoring point placed in the model to compare to a groundwater grab sample collected in the fall of 2009. MW-5 and MW-6 represented on-site conditions; and MW-8 and MW-9 represented upgradient conditions. The largest discrepancy between modeled and observed concentrations was at MW-3, where observed concentrations appear to be anomalously low given its proximity to the site in the downgradient flow path. The model also predicted slightly higher than observed concentrations at MW-6; however the modeled concentration trend matches the observed trend. Since one purpose of the model is to predict the amount of time needed for groundwater to attain Class I standards, the higher than observed modeled concentrations at MW-3 and MW-6 are conservative because it increases this prediction time.

#### **Prediction**

The No Action scenario (Figure 12) suggests that concentrations in wells MW-2 and MW-3 (downgradient, between the levee and the ponds) will stabilize around 4 to 5 mg/L boron, approximately twice the Class I standard. Concentrations in GP-6 (downgradient, about 500 feet south of ponds) will

stabilize just below the Class I standard of 2 mg/L. Concentrations in well MW-7 (downgradient, about 100 feet south of the ponds) will stabilize around 3 mg/L, above the Class I standard. On-site concentrations at MW-6 will stabilize around 6 mg/L, while on-site concentrations at MW-5 will stabilize just below the Class I standard. This scenario was modeled for comparison with the two scenarios described next, and does not represent a closure alternative being considered by Ameren.

The Base Case scenario (Figure 13) suggests that concentrations in all monitoring wells will stabilize below the Class I standard within 13 to 20 years, with the exception of on-site well MW-6. Concentrations modeled at MW-6 were slowly decreasing at the end of the model period and a linear interpolation of the trend suggests that concentrations will be lower than the Class I standard 28 years after the cap is constructed.

The sensitivity of the Base Case scenario to saturated ash extent was tested by increasing the area of saturated ash to include the entire footprint of the former ash ponds (Figure 14). The results are similar with the following exception: Concentrations in MW-2 and MW-3 (downgradient, between the levee and ponds) stabilize around 4 to 5 mg/L. This suggests that if ash extent is greater than that assumed for the base case, Class I exceedances may persist west of the ash ponds, but not to the south.

The Case 1 scenario (Figure 15) suggests that concentration distribution will be similar to the Base Case scenario if the berms are not capped. The most notable exception is that concentrations at MW-5 stabilize around 1 mg/L rather than 0.4 mg/L in the Base Case. Predicted time to attain Class I standards under this scenario is 14 to 20 years, with the exception of on-site monitoring well MW-6.

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# **Tables**

Table 1. HELP Input Parameters Venice Ash Ponds 2 and 3 Ameren Services

	Current	Silty	Sandy	Clayey	Field	
land Barrata			Foliation Footon	14	((l(l)	Nata
Input Parameter			Existing Footpr	int	(south of ponds)	Notes
Climate-General	noo noto	soo noto	soo noto	coo noto	soo noto	Fact St. Lauis II
City Latitude	see note 38.65	see note 38.65	see note 38.65	see note 38.65	see note 38.65	East St. Louis, IL Plant
Evap Zone	14	21	21	21	21	poor (14), fair (21)
Leaf Index	14	2	2	2	2	poor (14), fair (21)
All Others	see note	see note	see note	see note	see note	Defaults for East St. Louis
Climate-precip/temp/ET	See note	See note	see note	see note	see note	Delaults for East St. Louis
All Soils-General	see note	see note	see note	see note	see note	Synthetically generated using St. Louis (precipitation) or East St. Louis (ET and solar radiation) defaults
	58	58	58	58	5	
Area (acres)	0	100	100	100	0	
% where runoff possible					-	Madal adameted
Specify Initial MC Surface Water/Snow	No Calc	No Calc	No Calc	No Calc	No Colo	Model calculated
	Caic	Caic	Caic	Caic	Calc	Model calculated
Soils-Layers	ash	native (cilty)	native (sandy)	native (clayey)	native	
2	ash	native (silty) drainage	drainage	drainage	Halive	
3		•	•	synthetic		
4	ash	synthetic	synthetic	,		
		ash	ash	ash		
5		ash	ash	ash		
Cail Daramatora nativo		ash	ash	ash		
Soil Parametersnative	- 1-	4	4	1 4	4	diadaaaaaladaa la
Type	n/a	1	1	1	1	vertical percolation layer
Thickness (in)	n/a	36	36	36	36	
Texture	n/a	9	6	11	4	
Description	n/a	silt loam	sand loam	clay	silty sand	
Soil Parametersdrainage	-/-	2	2	1 0	-/-	duaise and layer
Type	n/a	2	2	2	n/a	drainage layer
Thickness (in) Texture	n/a	0.2 20	0.2 20	0.2	n/a	duning and unit (nin and 200th)
Soil Parameterssynthetic	n/a	20	20	20	n/a	drainage net (pipes@300ft)
-	2/2	3	3	3	2/2	goomombrono
Type Thickness (in)	n/a	0.03	0.03	0.03	n/a n/a	geomembrane
Texture	n/a n/a	37	37	37	n/a	PVC, defaults used
Pinhole density	n/a	1	1	1	n/a	r vo, delaults used
Installation Defects	n/a	4	4	4	n/a	
Placement Quality	n/a	3	3	3	n/a	good placement quality
Soil Parametersash layers	11/a	3	3	3	11/4	good placement quality
Type	1	1	1	1	n/a	vertical percolation layer
Thickness (in)	60	60	60	60	n/a	vertical percolation layer
Texture	30	30	30	30	n/a	coal fly ash, defaults used
SoilsRunoff	30	30	30	1 30	11/a	oodi ny don, deladito doed
Equation	n/a	HELP CN	HELP CN	HELP CN	n/a	HELP-calculated
Slope	n/a	1.0%	1.0%	1.0%	n/a	i iLLi -calculateu
Length (ft)	n/a	1000	1000	1000	n/a	
Texture	n/a	9	6	11	n/a	
Vegetation	n/a	fair	fair	fair	n/a	
Execution Parameters	11/4	1011	ian	1011	11/4	
Years	20	20	20	20	20	
Report Daily	n	n	n	n	n	
Report Monthly	n	n	n	n	n	
Report Annual	у	у	У	у	у	
Report Armai	у у	y	у	у	у	
Percolation Rate (in/yr)	5.3	0.00122	0.0024	0.00171	7.58	
Percolation Volume (ft <sup>3</sup> /yr)						
recolation volume (it /yr)	1,121,171	257	505	360	n/a	ļ.



### Table 2 MODFLOW Input Parameters Venice Ash Ponds 2 and 3 Ameren Services

Havizantal Hudraulia Candustivitus	Zono	£114	om/s
Horizontal Hydraulic Conductivity	Zone	<u>ft/d</u>	<u>cm/s</u>
Layer 1 Upper Send	4 2	0.10 20	3.5E-05
Layer 1 Upper Sand			7.1E-03
Layers 1-3 Upper Sand	1	10	3.5E-03
Layers 4-5 Lower Sand and Gravel	3	150	5.3E-02
Vertical Hydraulic Conductivity		ft/d	Kh/Kv
Layer 1 coal ash	4	0.10	1.0
Layer 1 Upper Sand	2	20	1.0
Layers 1-3 Upper Sand	1	10	1.0
Layers 4-5 Lower Sand and Gravel	3	150	1.0
Recharge		ft/d	in/yr
General	1	0.00046	2.0
Former coal ash ponds uncapped	2	0.0012	5.3
Field south of ponds	3	0.0012	7.6
Upper Sand west of levee	4	3.20E-03	14.0
Surface water management (paved) areas	5	0.00023	1.0
Berms	6	0.00025	2.0
Synthetic Cap <sup>1</sup>	7	6.00E-07	0.003
Storage			<u>S</u> <sub>Y</sub>
Layer 1 coal ash	1		0.05
Layers 1-3 Upper Sand	1		0.05
Layers 4-5 Lower Sand and Gravel	2		0.10
River Parameters			Miss Riv
Bed Thickness (ft)			10
Hydraulic Conductivity (ft/d)			1
Conductance (ft²/d, normalized per ft² area)			0.1
River Width (ft)			2,000
River Cell Length (ft)			variable
River stage (March-April), head in feet <sup>2</sup>			396.71
River stage (May), head in feet <sup>2</sup>			410.01
River stage (June-July), head in feet <sup>2</sup>			396.71
River stage (August-February), head in feet <sup>2</sup>			385.41
River Slope <sup>3</sup>			0.0001
Canaral Hand Barmdon, Barrara - Canaral Hand			Foot Decorder
General Head Boundary Parameters Head (ft) <sup>4</sup>			East Boundary 394.12
Slope <sup>5</sup>			
•		layer 1 <sup>6</sup>	0.0017
Saturated thickness (ft)		•	30
Width (ft)		cell width	50-200
Distance to GHB (ft)		1 4 0	2,000
Hydraulic Conductivity (ft/d)		Layers 1-3	10
Hydraulic Conductivity (ft/d)		Layers 4-5	150
Conductance (ft <sup>2</sup> /d, normalized per ft <sup>2</sup> area) Conductance (ft <sup>2</sup> /d, normalized per ft <sup>2</sup> area)		Layers 1-3 Layers 4-5	0.00075 0.0045

<sup>1.</sup> Synthetic ash pond recharge value used to simulate cap placement in prediction runs only



<sup>2.</sup> River stage reported for cell row 67, column 23 located near the center of the former ash ponds

<sup>3.</sup> River slope was estimated using data collected from the site and from Lock and Dam 27 Tailwater

<sup>4.</sup> GHB stage reported for cell row 67, column 78 located in the same row as the reported river stage elevations

<sup>5.</sup> GHB slope was determined through calibration

<sup>6.</sup> Layers 2-5 are below the water table therefore saturated thickness is equal to layer thickness

Table 3
Mean Monthly Mississippi River Stage from 1999 through 2008
Venice Ash Ponds 2 and 3
Ameren Services

Mean Monthly Mississippi River Stage Data for March, April, May, June, and July 1999-2008 (High and Flood Stages). 1999 2000 2002 2005 2007 Average<sup>6</sup> 2001 2003 2004 2006 2008 March Mean Stage 395.23 389.20 401.73 390.36 384.00 396.43 388.52 386.03 399.02 403.82 393.43 April Mean Stage 403.12 387.64 404.17 395.68 387.98 394.39 395.58 395.79 404.65 409.83 397.88 402.44 May Mean Stage 411.47 389.97 409.47 411.79 401.08 396.07 393.08 395.66 405.51 410.25 June Mean Stage 407.62 399.37 410.22 402.72 393.36 407.11 396.47 388.02 397.75 415.92 401.86

393.08

391.90

396.88

398.18

387.57

392.24

382.66

389.63

391.65

399.72

409.98

409.96

394.74

398.07

Average Mean Monthly Stage: 398.1

396.11

404.34

Site Corrected Mean Monthly Stage (High-Stage1 and High-Stage2): 396.7

398.01

392.84

400.77

403.64

Mean Monthly Mississippi River Stage Data for August, September, October, November, December, January, and February 1999-2008 (Base Stage).

390.71

398.25

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Average <sup>6</sup>
August Mean Stage	393.46	387.40	386.91	388.27	382.46	389.29	383.08	381.89	390.75	392.98	387.65
September Mean Stage	386.97	384.63	385.86	386.36	382.51	388.31	383.20	383.45	391.28	399.24	387.18
October Mean Stage	386.35	383.78	387.22	388.04	380.00	385.46	386.53	381.90	393.05	390.56	386.29
November Mean Stage	385.18	386.01	385.93	384.79	384.91	391.71	381.00	380.44	387.91	387.68	385.56
December Mean Stage	384.86	381.48	387.87	381.50	386.35	392.36	380.89	386.48	385.99	386.44	385.42
January Mean Stage	389.62	383.31	382.64	383.20	379.32	384.73	398.31	383.04	388.73	390.10	386.30
February Mean Stage	399.33	384.11	395.51	389.45	379.87	382.84	397.03	382.54	385.49	394.22	389.04
	389.40	384.39	387.42	385.94	382.20	387.81	387.15	382.82	389.03	391.60	386.78

Average Mean Monthly Stage: 386.8
Site Corrected Mean Monthly Stage (Base Stage): 385.4

#### Notes:

- 1. All river stage data are in feet above mean sea level
- 2. All river stage elevations were recorded by the United States Army Corps of Engineers from the Granite City Lock and Dam tailwater gauging station (Lock and Dam 27)
- 3. All river stage data were copied from the United States Army Corps of Engineers historical data published on the web at http://mvs-wc.mvs.usace.army.mil/archive/mi.html
- 4. 2009 river stage data was not available when this table was created in February of 2010.
- 5. Corrected mean monthly stage was calculated by subtracting the median difference in elevation (1.4 ft.) between Lock and Dam 27 and site observations
- 6. Months with an average river stage in excess of 390 feet were determined to be high stage; months with an average river stage below 390 were considered base stage



July Mean Stage

# Table 4 MT3DMS Input Parameters Venice Ash Ponds 2 and 3 Ameren Services

Initial Concentration (mg/L)	<u>Value</u>
Ambient (calibration)	0.0
Layer 1 high conc. zone (calibration)	25
Layer 1 low conc. zone (calibration)	5
Layer 2 and 3 high conc zone (calibration)	15
Layer 2 and 3 low conc zone (calibration)	3
Source Concentration - Recharge (mg/L)	<u>Value</u>
Former Ash Ponds	25
Berms	25
Synthetic Cap	25
Source Concentration - Constant (mg/L)	<u>Value</u>
Seasonally Saturated Coal Ash Nodes	25
Effective Porosity	<u>Value</u>
Layer 1 ash	0.20
Layer 1 Upper Sand	0.20
Layers 1-3 Upper Sand	0.20
Layers 4-5 Lower Sand and Gravel	0.30
Dispersivity (ft)	<u>Value</u>
Longitudinal	25
Transverse	5
Vertical	0.50
<u>Retardation</u>	<u>Value</u>
Entire domain	0.0



# Table 5 Model Files Venice Ash Ponds 2 and 3 Ameren Services

The disk attached to this report contains the ASCII input files and output files used and generated by HELP, MODFLOW, and MT3DMS for each scenario. The files are named as follows:

Folder / Subfolder		Initial Head Files		Comments / Description				
MODFLOW_MT3DMS /								
Run 19		n/a		Calibration model				
	Run 19pna*	(Run	19IH)	No Action (2009 - 2017)				
Run 19pna/	Run 19pna_2018*	(Run 19	pna IH)	No Action (2018 - 2026)				
	Run 19pna_2027*		a_2018IH)	No Action (2027 - 2036)				
	Run 19pbc*	(Run	19IH)	Base Case (2009 - 2017)				
Run 19pbc/	Run 19pbc_2018*	(Run 19	9pbclH)	Base Case (2018 - 2026)				
	Run 19pbc_2027*	(Run 19pbc_2018IH)		Base Case (2027 - 2036)				
	Run 18*	n	/a	Entire footprint of seasonally saturated ash				
D 40 40 - k - /	Run 18pbc*	(Run 18IH)		Entire footprint (2009 - 2017)				
Run 18_18pbc/	Run 18pbc_2018*	(Run 18pbclH)		Entire footprint (2018 - 2026)				
	Run 18pbc_2027*	(Run 18pbc_2018IH)		Entire footprint (2027 - 2036)				
	Run 19pc1*	(Run 19IH)		Case 1 (2009 - 2017)				
Run 19pc1/	Run 19pc1_2018*	(Run 19pc1IH)		Case 1 (2018 - 2026)				
	Run 19pc1_2027*	(Run 19pc1_2018IH)		Case 1 (2027 - 2036)				
Help Files /		Precip	Temp	Solar Rad	ET	Soil	Output	
	Current	V0	V0	V0	V0	Vbase	Vbase	
	Silty	V1	V1	V1	V1	VS1	VS1	
	Sandy	V1	V1	V1	V1	VS1snd	VS1snd	
	Clayey	V1	V1	V1	V1	VS1cly	VS1cly	
Field		1949P1	1949T1	1949S1	1949E1	1949NR1	1949NR	

Prediction runs were done by running each model file in sequence to get the desired timeframe.



<sup>\*</sup>MT3DMS file names have the suffix \_m (e.g., Run 19pbc\_m.out)

### **Figures**

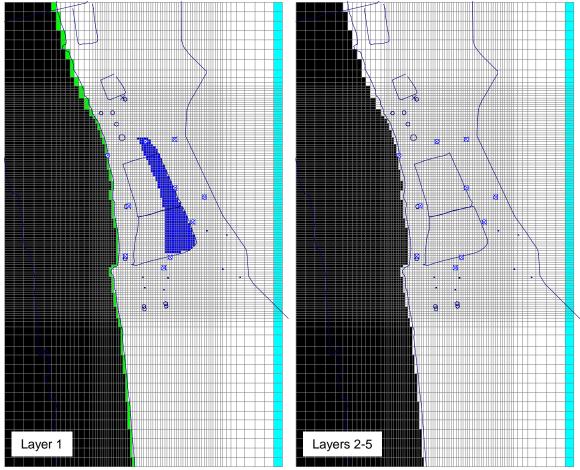


Figure 3. Grid layout. The river boundary cells (green cells on the west edge of the model) and constant concentration boundary cells (dark blue cells) were placed in layer 1 only. The general head boundary cells (light blue cells on the east edge of the model) were placed in all 5 layers of the model.

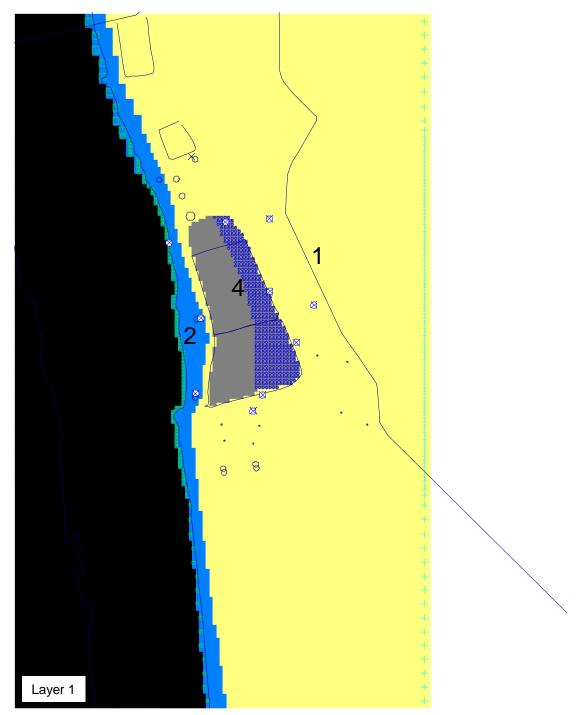


Figure 4. Hydraulic conductivity zones for layer 1. The general area was modeled as Zone 1 (Upper Sand unit), Zone 2 simulates sandy deposits west of the levee, and zone 4 simulates the coal ash material in the ponds. The squares on the left illustrate the location of the river boundary. The + signs on the right illustrate the location of the GHB.

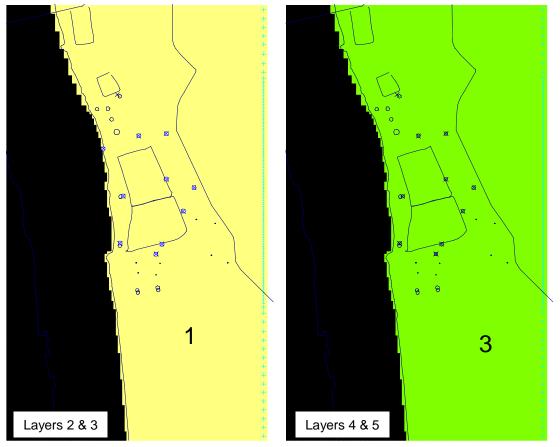


Figure 5. Hydraulic conductivity zones for layers 2 though 5. Layers 2 and 3 were both modeled as Zone 1 (Upper Sand unit). Layers 4 and 5 were both modeled as zone 3 (Lower Sand and Gravel unit). The green + signs illustrate the location of the GHB in these layers. The GHB is also present in layers 4 and 5, but the symbols are not visible.

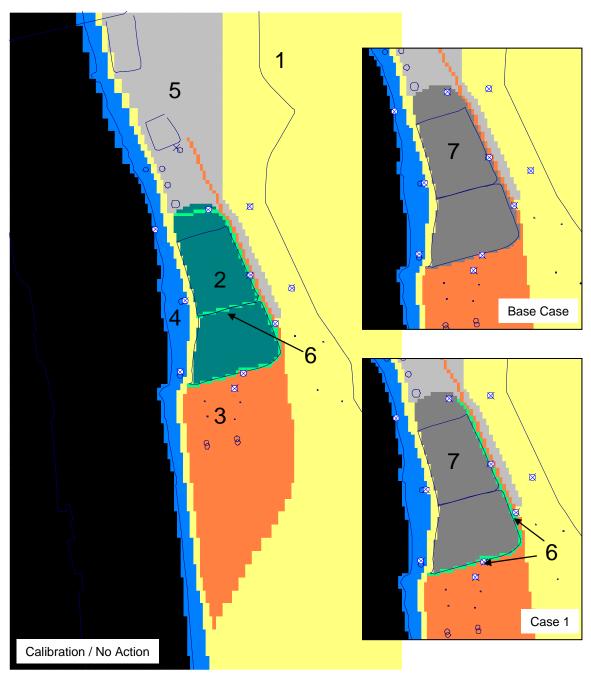


Figure 6. Recharge zones. Recharge zones 1 through 6 were applied to model runs without the cap. Zone 1 = general, Zone 2 = former ash ponds (uncapped), Zone 3 = field south of ponds, Zone 4 = upper sand west of levee, Zone 5 = surface water management (paved) areas, and zone 6 = berms. Zone 7 = synthetic cap. The Base Case inset illustrates cap placement over the berms. The Case 1 inset illustrates cap placement without covering the berms.

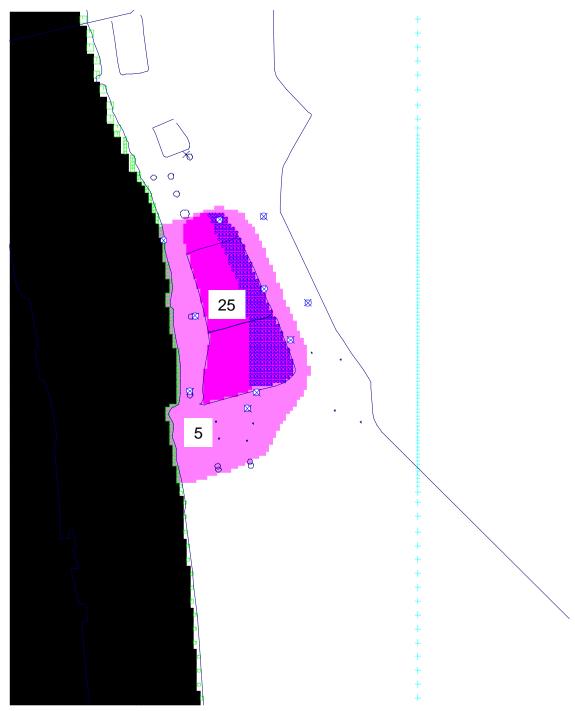


Figure 7. Initial concentrations for Layer 1. Dark pink is the higher concentration of 25 mg/L. Light pink is the lower concentration of 5 mg/L that surrounds the higher concentration zone. The blue markings within the dark pink zone are the symbols for the constant concentration cells. The boxes on the left are river cells, and the + signs on the right are the general head boundary cells.

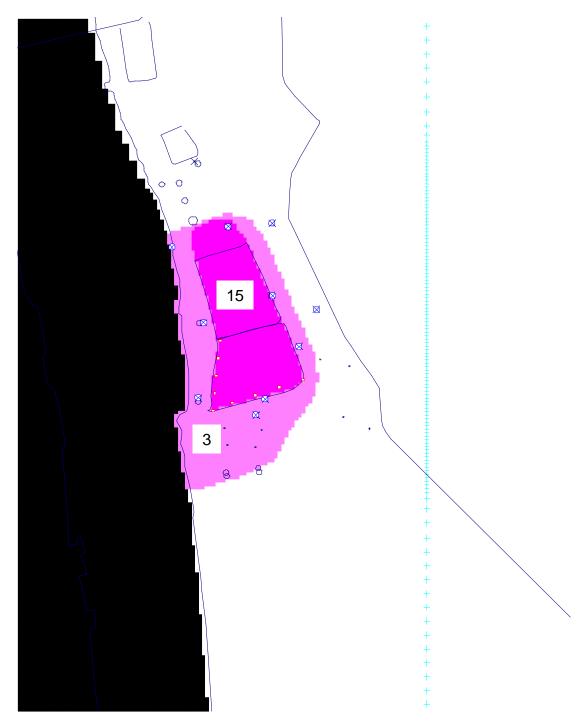


Figure 8. Initial concentrations for Layers 2 and 3. Dark pink is the higher concentration of 15 mg/L. Light pink is the lower concentration of 3 mg/L that surrounds the higher concentration zone. + signs on the right are the general head boundary cells.

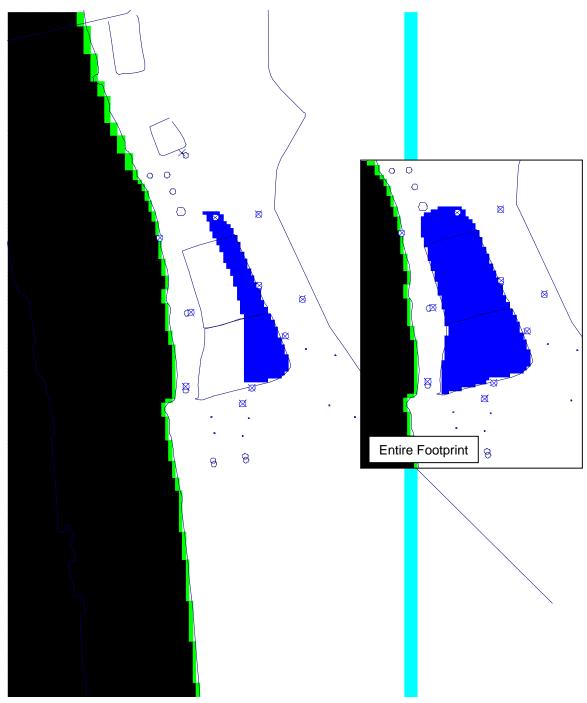


Figure 9. Constant concentration boundary. Portions of the model containing constant concentration cells (seasonally saturated ash) are dark blue. The estimated "partial footprint" area used for modeling is on the left. The more conservative "entire footprint" is in the inset. Light blue = general head boundary, Green = river boundary.

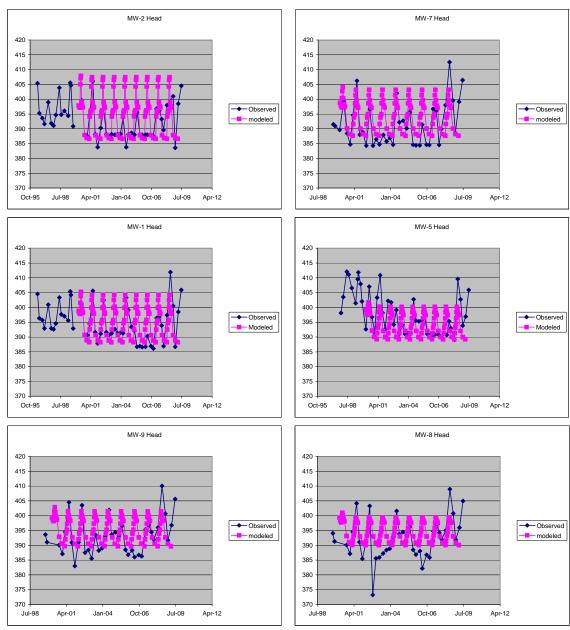


Figure 10. Head calibration graphs [Run 19]. MW-2 and MW-7 represented downgradient calibration; MW-1 and MW-5 represented on-site calibration; and MW-8 and MW-9 represented upgradient calibration.

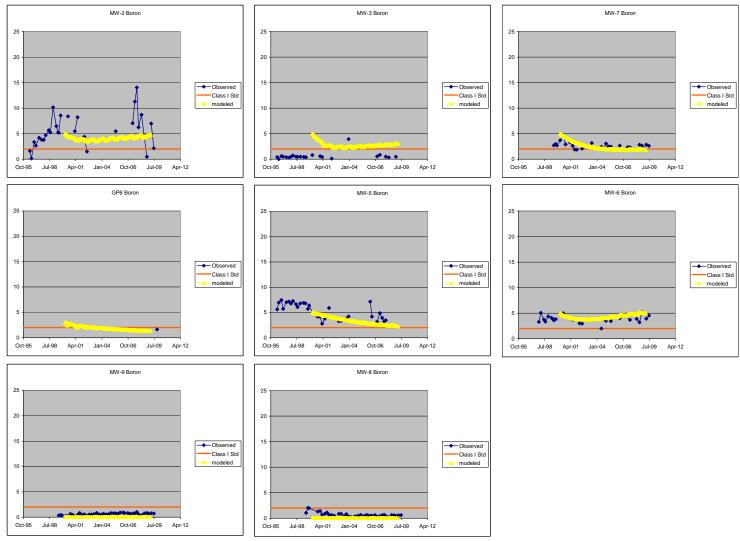


Figure 11. Concentration calibration graphs [Run 19]. MW-2, MW-3, MW-7, and GP-6 represented downgradient concentrations. GP-6 is a monitoring point placed in the model to compare to a groundwater grab sample collected in the fall of 2009. MW-5 and MW-6 represented on-site conditions; and MW-8 and MW-9 represented upgradient conditions.

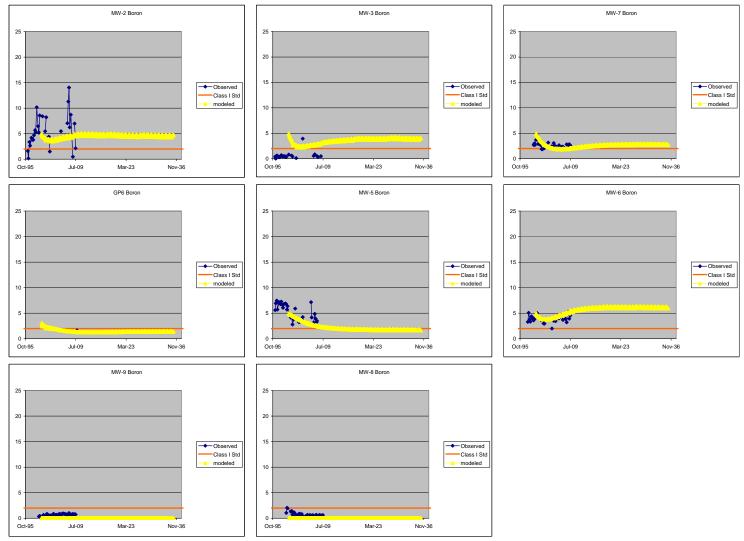


Figure 12. No Action Prediction Scenario [Run 19pna]. MW-2, MW-3, MW-7, and GP-6 represented downgradient concentrations. GP-6 is a monitoring point placed in the model to compare to a groundwater grab sample collected in the fall of 2009. MW-5 and MW-6 represented on-site conditions; and MW-8 and MW-9 represented upgradient conditions.

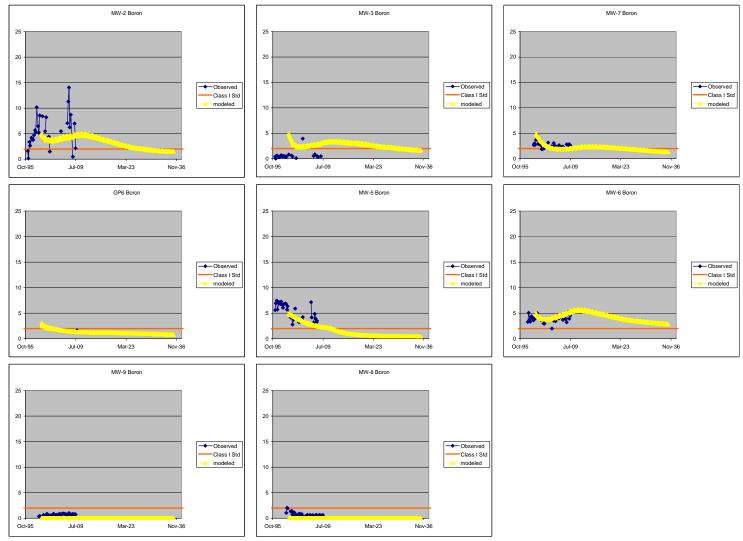


Figure 13. Base Case Prediction Scenario [Run 19pbc]. MW-2, MW-3, MW-7, and GP-6 represented downgradient concentrations. GP-6 is a monitoring point placed in the model to compare to a groundwater grab sample collected in the fall of 2009. MW-5 and MW-6 represented on-site conditions; and MW-8 and MW-9 represented upgradient conditions.

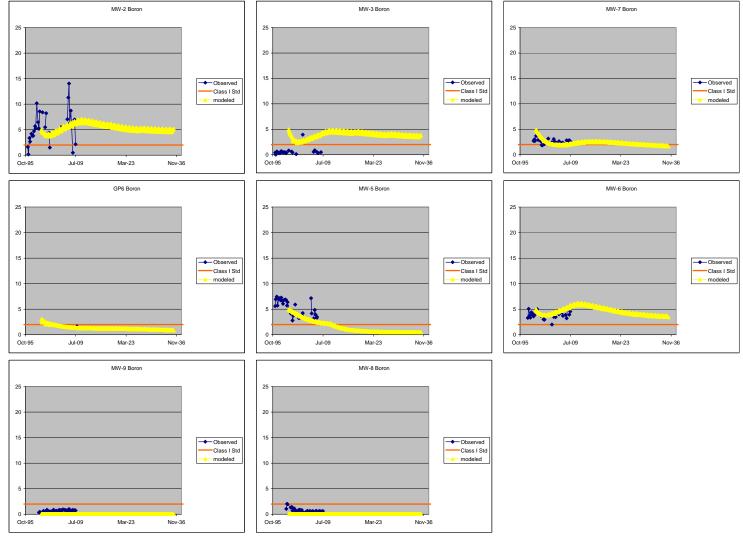


Figure 14. Base Case Prediction with entire footprint of saturated ash [Run 18pbc]. Compared to Figure 16, note that the results are similar with the following exception: Concentrations in MW-2 and MW-3 (downgradient, between the levee and ponds) stabilize around 4 to 5 mg/L, twice the Class I standard.

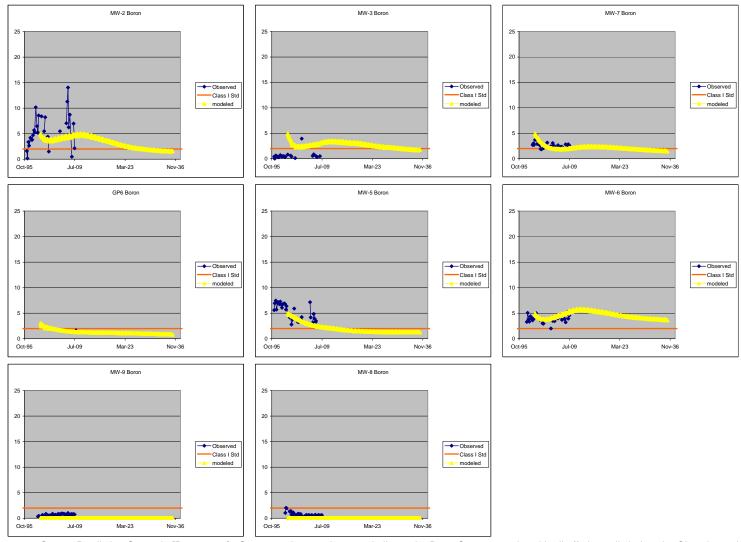
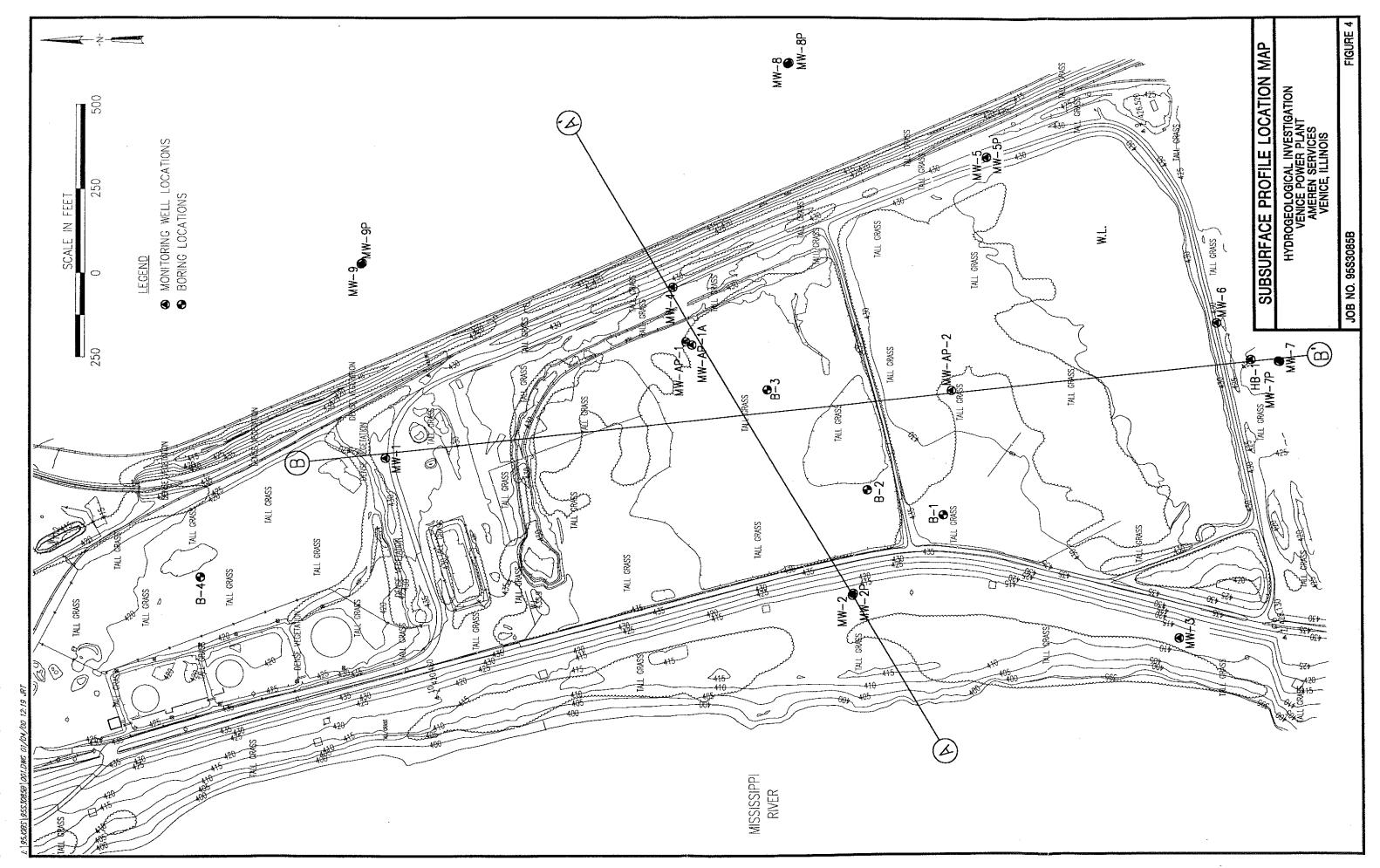
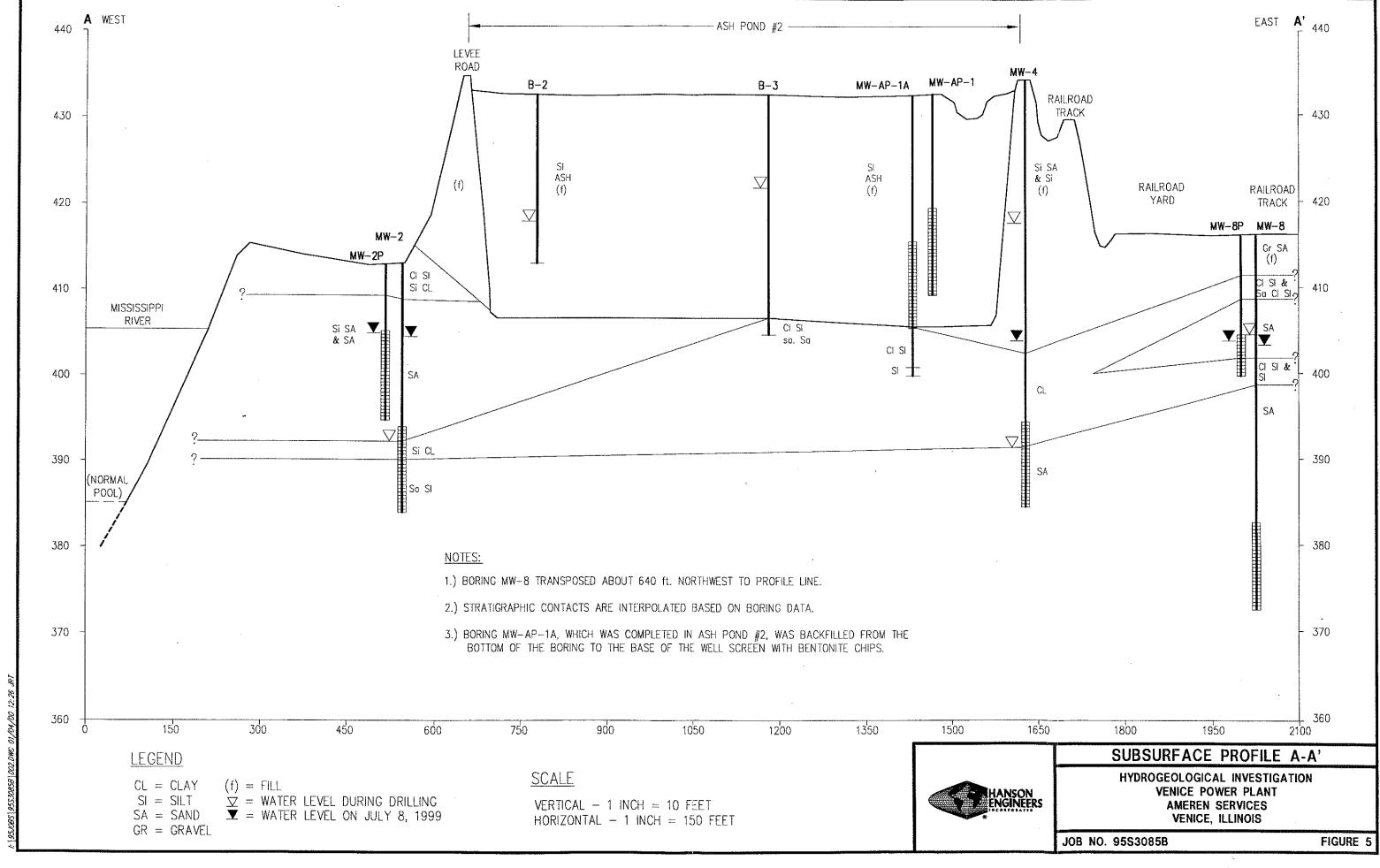
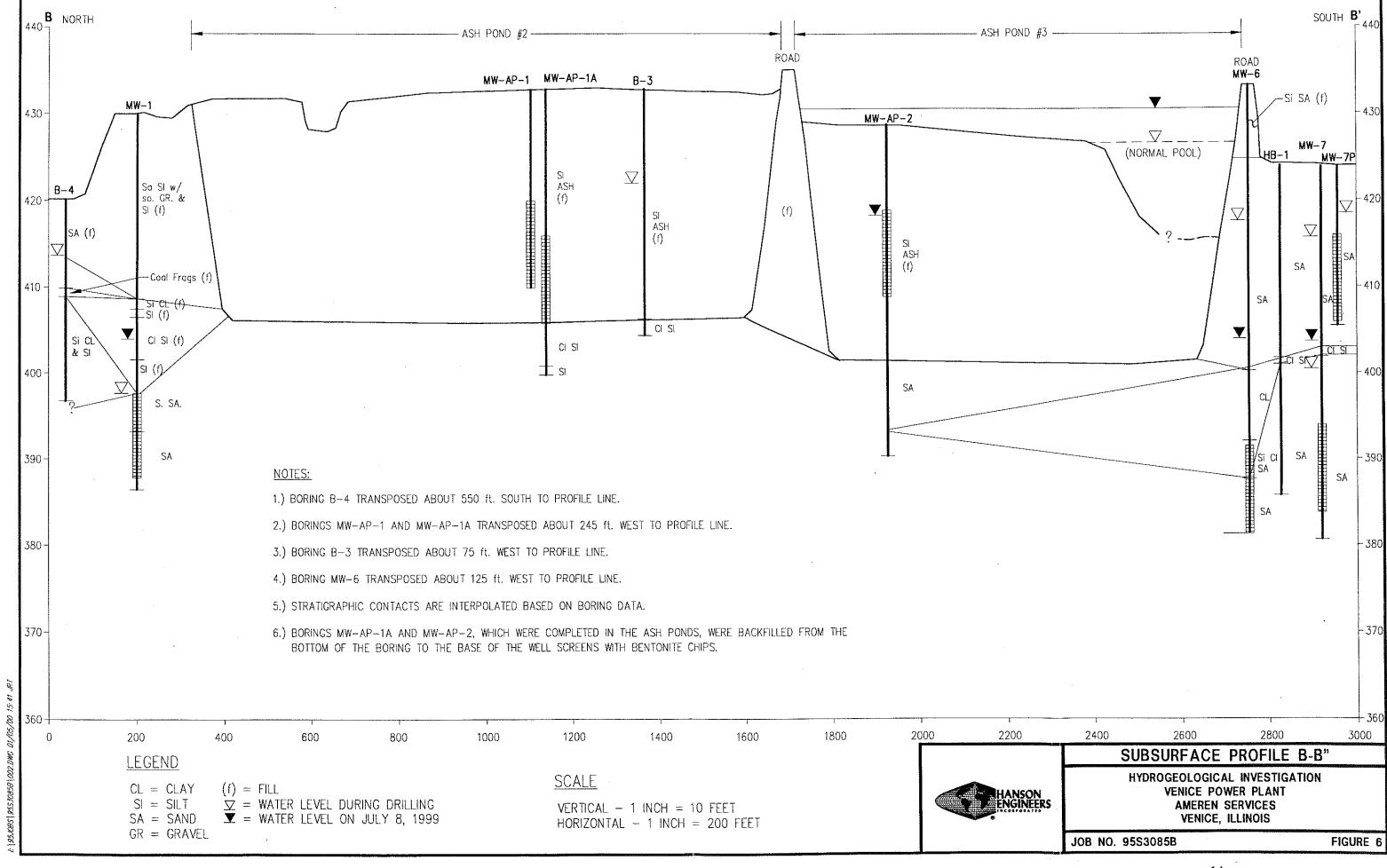


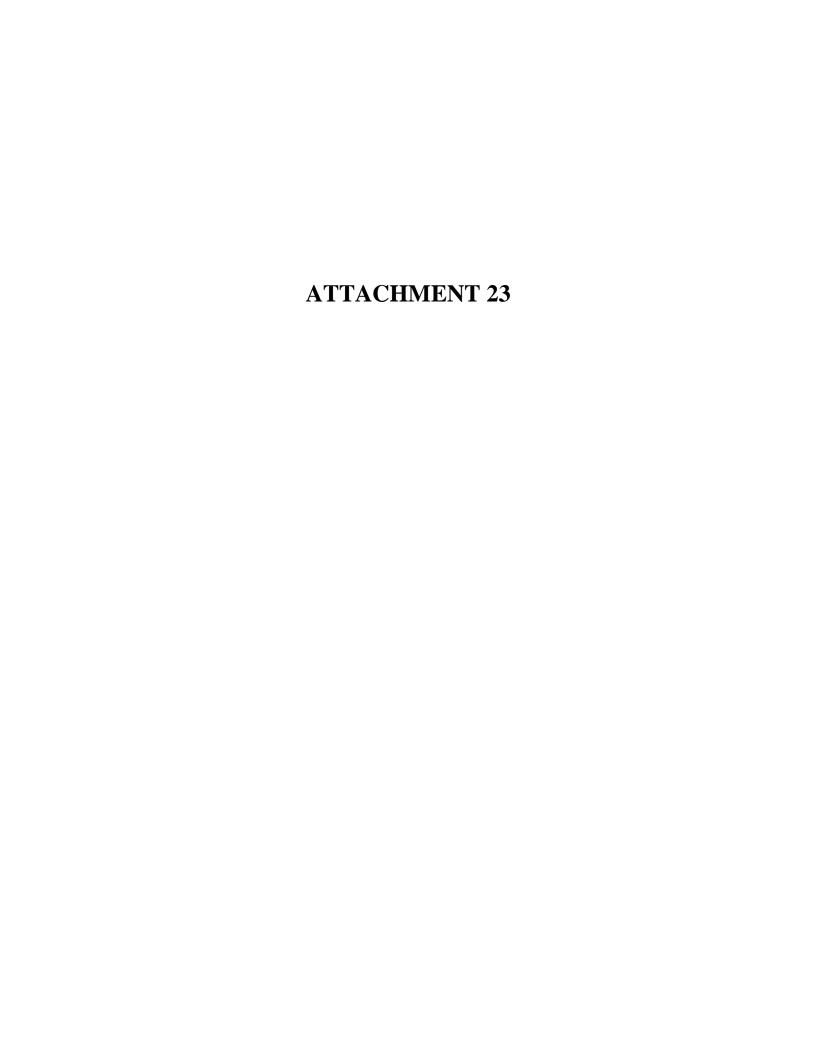
Figure 15. Case 1 Prediction Scenario [Run 19pc1]. Concentration trends were similar to the Base Case scenario, with all off-site wells below the Class I standard. The most notable exception is that MW-5 concentrations appear to stabilize closer to the Class I standard than in the Base Case.

# Attachment 1 Geologic Cross-Sections From Hanson (2000)









### **CLOSURE PLAN:**

### ASH PONDS A, B, C & BOTTOM ASH POND **HUTSONVILLE POWER STATION Project J04PT**



MPA-DIVISION OF RECORDS MANAGEMENT RELEASABLE

FEB 26 2016 REVIÉWER: JKS

AmerenEnergy Medina Valley Cogen, L.L.C.

Crawford County, Illinois

September 15, 2014 (Rev 0)

Revised February 23, 2015 (Rev 1)

FEB 26 2015

Prepared by:

Div. of Public Water Supplies Illinois EPA

Hanson Professional Services



Dam Safety, Hydro & Civil Engineering 314.957.3202 3700 S. Lindbergh Blvd. St. Louis, MO 63127



#### 1.6 Timeline of Ash Pond Actions

An approximate schedule is summarized below that outlines the time for implementation of the Closure Plan elements, as well as the timelines of previous ash pond constructions, removals, and other related operations:

- 1968 2000: Ash Pond A and Ash Ash Pond D were the only existing ash ponds operated on Site.
- 2000:
  - a. Ash Pond D was removed from service.
  - b. The ash laydown area was excavated.
  - c. Construction of the interim pond (Ash Pond B) and the drainage collection pond (Ash Pond
     C) were finished.
- January 2013: Capping of Ash Pond D was completed.
- January 2015 (Expected): The groundwater collection trench will begin operation.
- January 2016 (Expected):
  - a. Removal of Ash Pond B, Ash Pond C, and the Bottom Ash Sluice Pond will be completed.
  - b. Capping of Ash Pond A will be completed.

#### 2. Groundwater MODEL Approach

#### 2.1 Overview

This section presents the conceptual model and the overall modeling methodology. The model was established to predict the effect of the proposed closure actions for Ash Pond A, Ash Pond B, Ash Pond C, and the Bottom Ash Sluice Pond on groundwater quality at the site. These ponds have limited impact on groundwater flow and quality, so Ash Pond D was included in the modeling for calibration purposes.

#### 2.2 Conceptual Model

The conceptual model for the Site is schematically illustrated in Figure 3, below. Three sources of water are present: natural recharge within the model domain, percolation water from the ash ponds, and groundwater flow from the west. Groundwater in the shallow groundwater zone flows horizontally east, discharging into the Wabash River, a regional groundwater sink. Where coal ash is encountered within the shallow groundwater zone, groundwater flows horizontally through the ash. Only Ash Pond D was deep enough to have horizontal groundwater migration through the coal ash.

Rev. 0



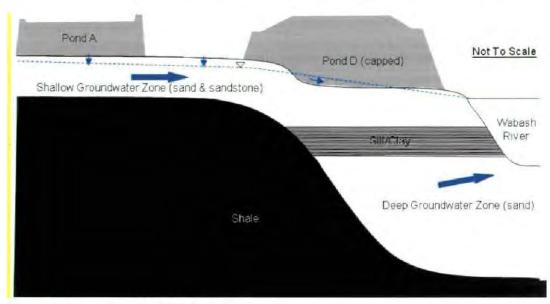


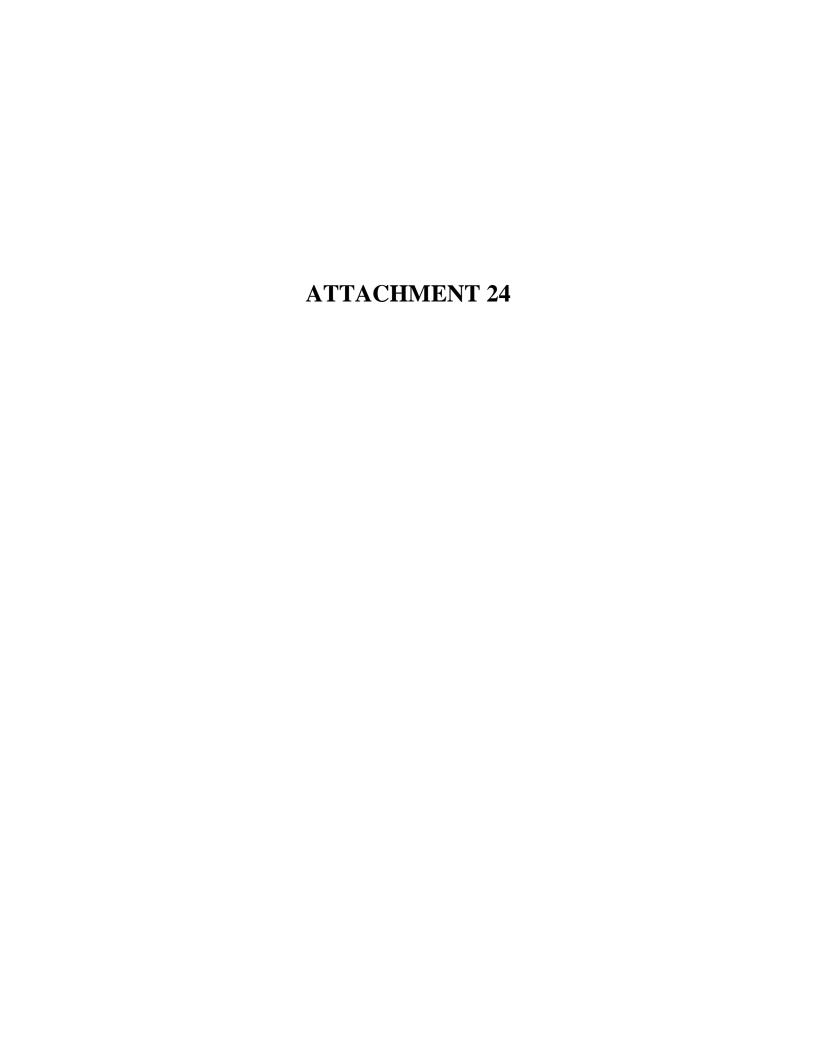
Figure 3. Conceptual Model Schematic

Boron was modeled to simulate migration of CCW leachate because it 1) has concentrations exceeding the Class I standard in a number of on-site monitoring wells, 2) is mobile in groundwater, and 3) is not chemically reactive. The conceptual model for transport assumes two boron sources: boron that leaches to recharge water during percolation through ash above the water table; and boron that leaches to groundwater as it flows through ash below the water table, which is limited to Ash Pond D. Therefore, mass is added to groundwater via vertical recharge through coal ash, and horizontal groundwater flow through coal ash where it lies below the water table. Mass is discharged at the model representation of the Wabash River. It is assumed that boron undergoes reversible adsorption and desorption within the soil matrix along its transport pathways, however no removal of mass occurs with this process. The conceptual transport model also assumes that boron concentration in leachate does not vary as a function of time, although the volume of leachate released decreases over time as a function of pond dewatering and capping.

#### 2.3 Model Approach

Three model codes were used to simulate groundwater flow and boron transport:

- Leachate percolation after Ash Pond D closure was modeled using the Hydrologic Evaluation of Landfill Performance (HELP) model and the leachate percolation rates were applied in MODFLOW to simulate recharge beneath the pond cap.
- Groundwater flow was modeled in three dimensions using MODFLOW.
- Boron transport was modeled in three dimensions using MT3DMS (MODFLOW calculated the flow field that MT3DMS used in the transport calculations).



## PLACEMENT ABOVE THE UPPERMOST AQUIFER LOCATION RESTRICTIONS LINCOLN STONE QUARRY JOLIET #9 STATION OCTOBER 2018

Pursuant to Code of Federal Regulations Title 40, Part 257, Subpart D (40 CFR), Section 257.60, KPRG and Associates, Inc (KPRG) prepared this report to document compliance with location restrictions related to placement above the uppermost aquifer for the existing Lincoln Stone Quarry (the Quarry) at the Joliet #9 Station (Site) in Joliet, Illinois.

The work presented in this report was performed under the direction of Joshua Davenport in accordance with §257.60. Richard Gnat reviewed this report in accordance with KPRG's quality assurance/quality control procedures.

#### 1. Placement Location Restriction Determination

The base of the Quarry is elevation 501 ft amsl and the upper limit groundwater elevation is 555.35 ft amsl. The Quarry is not separated from the upper limit of the uppermost aquifer by a minimum of five (5) feet.

#### 2. Limitations and Certification

This report was prepared in accordance with current practices and the standard of care exercised by scientists and engineers performing similar tasks in the field of civil engineering. The contents of this report are based solely on the observations of the conditions observed by KPRG personnel and information provided to KPRG by Midwest Generation. Consistent with applicable professional standards of care, our opinions and recommendations were based in part on data furnished by others, which was consistent with other information that we developed in the course of our performance of the scope of services. The information contained in this report is intended for use solely by Midwest Generation and their subconsultants.

Joshua D. Davenport, P.E.

Illinois Professional Engineer No. 062.061945

License Expires: 11/30/2019

#### WETLANDS LOCATION RESTRICTIONS LINCOLN STONE QUARRY JOLIET #9 STATION OCTOBER 2018

Pursuant to Code of Federal Regulations Title 40, Part 257, Subpart D (40 CFR), Section 257.61, KPRG and Associates, Inc (KPRG) prepared this report to document compliance with location restrictions related to wetlands for the existing Lincoln Stone Quarry (the Quarry) at the Joliet #9 Station (Site) in Joliet, Illinois.

The work presented in this report was performed under the direction of Joshua Davenport in accordance with §257.61. Richard Gnat reviewed this report in accordance with KPRG's quality assurance/quality control procedures.

#### 1. Wetlands Location Restriction Determination

In order to determine if the Quarry was located in wetlands, it was necessary to determine if wetlands are present in the area of the Quarry. Site visits to the Quarry did not identify any wetlands around the perimeter of the Quarry that would indicate if wetlands were present prior to the mining of the Quarry. The national wetlands inventory (NWI) and the Will County Geographical Information System (GIS) Data Viewer were viewed to identify the presence of wetlands around the Quarry. Neither the NWI nor the Will County GIS Data Viewer identified wetlands around the Quarry, but the NWI did identify wetlands located inside the Quarry. The wetlands identified inside the Quarry were classified as a lake habitat with a classification code of L1UBHx. The definition of each component of this classification code is as follows:

- L = System: Lacustrine. The Lacustrine System includes wetlands and deepwater habitats with all of the following characteristics: (1) situated in a topographic depression or a dammed river channel; (2) lacking trees, shrubs, persistent emergents, and emergent mosses or lichens with 30 percent or greater areal coverage; and (3) total area of at least 20 acres. Similar wetlands and deepwater habitats totaling less than 8 ha are also included in the Lacustrine System if an active wave-formed or bedrock shoreline feature makes up all or part of the boundary, or if the water depth in the deepest part of the basin equals or exceeds 8.2 ft at low water.
- 1 = Subsystem: Limnetic. This Subsystem includes all deepwater habitats (i.e., areas > 8.2 ft deep below low water) in the Lacustrine System. Many small Lacustrine Systems have no Limnetic Subsystem.
- UB = Class: Unconsolidated Bottom. Includes all wetlands and deepwater habitats with at least 25% cover of particles smaller than stones (less than 6-7 cm), and a vegetative cover less than 30%.
- H = Water Regime: Permanently Flooded. Water covers the substrate throughout the year

in all years.

• x = Water Chemistry: Excavated. This Modifier is used to identify wetland basins or channels that were excavated by humans.

The active mining of the limestone and the use of this open Quarry to store CCR from the burning of coal at Joliet generating stations 9 and 29 created the necessary conditions for the wetland that has been classified inside the Quarry. The removal of the limestone created the manmade topographical depression that fulfills the first requirement for a Lacustrine System and the excavated water chemistry (x) designation as noted above. The exposure of the limestone during the mining activities removed vegetation within the area, which fulfills the second requirement for a Lacustrine System. The sluicing of CCR from the generating stations into the Quarry for storage created the standing water and the manmade depression was large enough to allow the surface of the water to be at least 20 acres in size, which meets the third requirement for a Lacustrine System. In addition, the standing water will minimize the potential for vegetation to establish itself on the CCR. The limestone was removed to a depth that allowed the stored water to achieve a depth greater than 8.2 feet deep, which is why the Limnetic Subsystem (1) designation is applicable. The manmade depression is permanently flooded because it was created in a way that does not allow for the natural drainage of the water, which is why the water regime permanently flooded (H) designation is applicable.

The wetland classification given to the standing water and the area within the Quarry is a result of the mining operation and the CCR material storage activities that took place in this area. Therefore, based on this evaluation, the Quarry is not located in a wetland, but an area classified as a wetland that was artificially created within the Quarry.

#### 2. Limitations and Certification

This report was prepared in accordance with current practices and the standard of care exercised by scientists and engineers performing similar tasks in the field of engineering. The contents of this report are based solely on the observations of the conditions observed by KPRG personnel and information provided to KPRG by Midwest Generation. Consistent with applicable professional standards of care, our opinions and recommendations were based in part on data furnished by others, which was consistent with other information that we developed in the course of our performance of the scope of services. The information contained in this report is intended for use solely by Midwest Generation and their subconsultants.

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Illinois Professional Engineer No. 062.061945

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#### 3. References

U.S. Fish and Wildlife Service, 2018. "National Wetlands Inventory," <a href="https://www.fws.gov/wetlands/">https://www.fws.gov/wetlands/</a>, accessed 7 September 2018.

Will County, 2018. "GIS Data Viewer," <a href="http://www.willcogis.org/website2014/gis/applications.html">http://www.willcogis.org/website2014/gis/applications.html</a>, accessed 7 September 2018.

### FAULT AREAS LOCATION RESTRICTIONS LINCOLN STONE QUARRY JOLIET #9 STATION OCTOBER 2018

Pursuant to Code of Federal Regulations Title 40, Part 257, Subpart D (40 CFR), Section 257.62, KPRG and Associates, Inc (KPRG) prepared this report to document compliance with location restrictions related to fault areas for the existing Lincoln Stone Quarry (the Quarry) at the Joliet #9 Station (Site) in Joliet, Illinois.

The work presented in this report was performed under the direction of Joshua Davenport in accordance with §257.62. Richard Gnat reviewed this report in accordance with KPRG's quality assurance/quality control procedures.

#### 1. Fault Areas Location Restriction Determination

The Quarry is not located within 200 feet (60 meters) of a mapped Holocene-aged fault, as mapped by the United States Geological Survey (USGS) Quaternary Fault Database [USGS, 2018]. Therefore, the location of the Quarry complies with the requirements outlined in §257.62(a).

#### 2. Limitations and Certification

This report was prepared in accordance with current practices and the standard of care exercised by scientists and engineers performing similar tasks in the field of civil engineering. The contents of this report are based solely on the observations of the conditions observed by KPRG personnel and information provided to KPRG by Midwest Generation. Consistent with applicable professional standards of care, our opinions and recommendations were based in part on data furnished by others, which was consistent with other information that we developed in the course of our performance of the scope of services. The information contained in this report is intended for use solely by Midwest Generation and their subconsultants.

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#### 3. References

USGS, 2018. "Quaternary Fault and Fold Database," <a href="https://earthquake.usgs.gov/hazards/qfaults/">https://earthquake.usgs.gov/hazards/qfaults/</a>, accessed 17 September 2018.

## SEISMIC IMPACT ZONES LOCATION RESTRICTIONS LINCOLN STONE QUARRY JOLIET #9 STATION OCTOBER 2018

Pursuant to Code of Federal Regulations Title 40, Part 257, Subpart D (40 CFR), Section 257.63, KPRG and Associates, Inc (KPRG) prepared this report to document compliance with location restrictions related to seismic impact zones for the existing Lincoln Stone Quarry (the Quarry) at the Joliet #9 Station (Site) in Joliet, Illinois.

The work presented in this report was performed under the direction of Joshua Davenport in accordance with §257.63. Richard Gnat reviewed this report in accordance with KPRG's quality assurance/quality control procedures.

#### 1. Seismic Impact Zones Location Restriction Determination

The U.S. Geological Survey (USGS) National Seismic Hazard Tool website was used to provide the peak ground acceleration based on a 2% probability in 50 years, with a land designation of 'a site on rock' with a ground acceleration of 760 m/s in the upper 30 meters. The peak ground acceleration was determined to be 0.070 g in 50 years, which is less than 0.10 g in 50 years. The Quarry complies with the location requirement in 257.63(a) and is not located in a seismic impact zone. The peak ground acceleration where the Quarry is located is 0.070 g in 50 years, which is less than 0.10 g in 50 years, which is the minimum threshold specified in the regulations.

#### 2. Limitations and Certification

This report was prepared in accordance with current practices and the standard of care exercised by scientists and engineers performing similar tasks in the field of engineering. The contents of this report are based solely on the observations of the conditions observed by KPRG personnel and information provided to KPRG by Midwest Generation. Consistent with applicable professional standards of care, our opinions and recommendations were based in part on data furnished by others, which was consistent with other information that we developed in the course of our performance of the scope of services. The information contained in this report is intended for use solely by Midwest Generation and their subconsultants.

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Illinois Professional Engineer No. 062.061945

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#### 3. References

USGS, 2018.

"National

Seismic

Hazard

Tool,"

https://www.earthquake.usgs.gov/hazards/interactive/, accessed 17 September 2018.

### UNSTABLE AREAS LOCATION RESTRICTIONS LINCOLN STONE QUARRY JOLIET #9 STATION OCTOBER 2018

Pursuant to Code of Federal Regulations Title 40, Part 257, Subpart D (40 CFR), Section 257.64, KPRG and Associates, Inc (KPRG) prepared this report to document compliance with location restrictions related to unstable areas for the existing Lincoln Stone Quarry (the Quarry) at the Joliet #9 Station (Site) in Joliet, Illinois.

The work presented in this report was performed under the direction of Joshua Davenport in accordance with §257.64. Richard Gnat reviewed this report in accordance with KPRG's quality assurance/quality control procedures.

#### 1. Unstable Areas Location Restriction Determination

The Quarry is not located in unstable areas. Therefore, the location of the Quarry complies with the requirements outlined in 257.64(a).

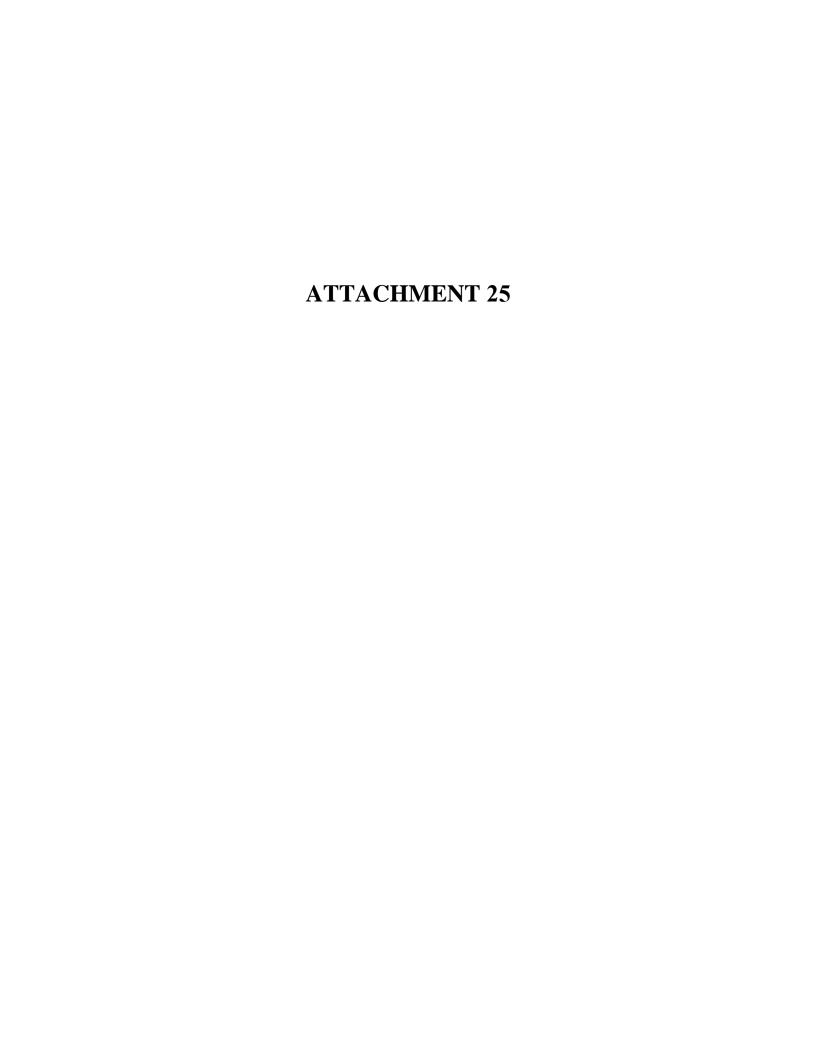
#### 2. Limitations and Certification

This report was prepared in accordance with current practices and the standard of care exercised by scientists and engineers performing similar tasks in the field of engineering. The contents of this report are based solely on the observations of the conditions observed by KPRG personnel and information provided to KPRG by Midwest Generation. Consistent with applicable professional standards of care, our opinions and recommendations were based in part on data furnished by others, which was consistent with other information that we developed in the course of our performance of the scope of services. The information contained in this report is intended for use solely by Midwest Generation and their subconsultants.

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Illinois Professional Engineer No. 062.061945

License Expires: 11/30/2019





# **MEMORANDUM**

16 October 2018 File No. 129788

SUBJECT:

Location Restriction Demonstration - Placement Above Uppermost Aquifer

Ash Pond No. 1

Coffeen Power Station

Coffeen, Illinois

Illinois Power Resources Generating, LLC operates the coal-fired Coffeen Power Station (Plant) located near Coffeen, Illinois. The Ash Pond No. 1 (Unit) is an existing coal combustion residuals (CCR) surface impoundment. This demonstration addresses the requirements of 40 CFR §257.60 (Placement above the uppermost aquifer) of the U.S. Environmental Protection Agency's (EPA) rule entitled Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities. 80 Fed. Reg. 21,302 (Apr. 17, 2015) (promulgating 40 CFR §257.60); 83 Fed. Reg. 36,435 (July 30, 2018) (amending 40 CFR §257.60).

§257.60(a): New CCR landfills, existing and new CCR surface impoundments, and all lateral expansions of CCR units must be constructed with a base that is located no less than 1.52 meters (five feet) above the upper limit of the uppermost aquifer, or must demonstrate that there will not be an intermittent, recurring, or sustained hydraulic connection between any portion of the base of the CCR unit and the uppermost aquifer due to normal fluctuations in groundwater elevations (including the seasonal high water table). The owner or operator must demonstrate by the dates specified in paragraph (c) of this section that the CCR unit meets the minimum requirements for placement above the uppermost aquifer.

Haley & Aldrich reviewed available information provided by Vistra including historic record drawings, and based on review and evaluation of the information provided, the results do not demonstrate compliance with the requirements of 40 CFR §257.60(a).

Coffeen Power Station - Ash Pond No. 1 Location Restriction - Placement Above Uppermost Aquifer 16 October 2018 Page 2

§257.60(b): The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer or approval from the Participating State Director or approval from EPA where EPA is the permitting authority stating that the demonstration meets the requirements of paragraph (a) of this section.

I, Steven F. Putrich, being a Registered Professional Engineer in good standing in the State of Illinois, do hereby certify, to the best of my knowledge, information, and belief, that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify that the above-referenced CCR Unit does not meet the requirements of 40 CFR §257.60(a).

Signed:

Consulting Engineer

Print Name:

Steven F. Putrich

Illinois License No.:

62048779

Title:

Vice President

Company:

Haley & Aldrich, Inc.







# **MEMORANDUM**

16 October 2018 File No. 129788

SUBJECT:

Location Restriction Demonstration - Wetland Areas

Coffeen Power Station

Ash Pond No. 1 Coffeen, Illinois

Illinois Power Generating Company operates the coal-fired Coffeen Power Station (Plant) located south of Coffeen, Illinois. Ash Pond No. 1 (Unit) is an existing coal combustion residuals (CCR) surface impoundment. This demonstration addresses the requirements of 40 CFR §257.61 (Wetlands) of the U.S. Environmental Protection Agency's (EPA) rule entitled Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities. 80 Fed. Reg. 21,302 (Apr. 17, 2015) (promulgating 40 CFR §257.61); 83 Fed. Reg. 36,435 (July 30, 2018) (amending 40 CFR §257.61.

§257.61(a): New CCR landfills, existing and new CCR surface impoundments, and all lateral expansions of CCR units must not be located in wetlands, as defined in §232.2 of this chapter, unless the owner or operator demonstrates by the dates specified in paragraph (c) of this section that the CCR unit meets the requirements of paragraphs (a)(1) through (5) of this section.

Based on a review of the U.S. Fish and Wildlife Service's National Wetland Inventory mapping, 0.5-meter resolution aerial imagery (2015) and the results of on-site field assessments, the Unit is not located in wetlands as defined by 40 CFR §232.2.

Coffeen Power Station – Ash Pond No. 1 Location Restriction – Wetland Areas 16 October 2018 Page 2

§257.61(b): The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer or approval from the Participating State Director or approval from EPA where EPA is the permitting authority stating that the demonstration meets the requirements of paragraph (a) of this section.

I, Steven F. Putrich, being a Registered Professional Engineer in good standing in the State of Illinois, do hereby certify, to the best of my knowledge, information, and belief, that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify, for the above-referenced CCR Unit, that the CCR Unit is not located in wetlands as included in the CCR Rule Location Restrictions Evaluation memorandum dated 12 October 2018 and, therefore, meets the requirements of 40 CFR §257.61(a).

Signed:

Consulting Engineer

Print Name:

Steven F. Putrich

Illinois License No.:

62048779

Title:

Vice President

Company:

Haley & Aldrich, Inc.







#### **MEMORANDUM**

16 October 2018 File No. 129788

SUBJECT:

Location Restriction Demonstration - Fault Areas

Coffeen Power Station

Ash Pond No. 1 Coffeen, Illinois

Illinois Power Generating Company operates the coal-fired Coffeen Power Station (Plant) located south of Coffeen, Illinois. The Ash Pond No. 1 (Unit) is an existing coal combustion residuals (CCR) surface impoundment. This demonstration addresses the requirements of 40 CFR §257.62 (Fault Areas) of the U.S. Environmental Protection Agency's (EPA) rule entitled Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities. 80 Fed. Reg. 21,302 (Apr. 17, 2015) (promulgating 40 CFR §257.62); 83 Fed. Reg. 36,435 (July 30, 2018) (amending 40 CFR §257.62).

§257.62(a): New CCR landfills, existing and new CCR surface impoundments, and all lateral expansions of CCR units must not be located within 60 meters (200 feet) of the outermost damage zone of a fault that has had displacement in Holocene time unless the owner or operator demonstrates by the dates specified in paragraph (c) of this section that an alternative setback distance of less than 60 meters (200 feet) will prevent damage to the structural integrity of the CCR unit.

A review of available data from the U.S. Geologic Survey, the Illinois State Geological Survey, and other available information was completed for this demonstration. The nearest known mapped faults are the Crown Fault, which is located approximately 31 miles northwest, and the Centralia Fault zone, located approximately 35 miles southeast of the Unit. The timeframe of the most recent activity on these faults is not known. Based on the available published geologic data and information reviewed, there are no active faults or fault damage zones that have had displacement in Holocene time reported or indicated within 200 feet of the Unit.

Coffeen Power Station – Ash Pond No. 1 Location Restriction – Fault Areas 16 October 2018 Page 2

§257.62(b): The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer or approval from the Participating State Director or approval from EPA where EPA is the permitting authority stating that the demonstration meets the requirements of paragraph (a) of this section.

I, Steven F. Putrich, being a Registered Professional Engineer in good standing in the State of Illinois, do hereby certify, to the best of my knowledge, information, and belief, that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify, for the above-referenced CCR Unit, that the demonstration that the CCR Unit is not located within 60 meters (200 feet) of the outermost damage zone of a fault that has had a displacement in Holocene time as included in the CCR Rule Location Restrictions Evaluation memorandum dated 12 October 2018 meets the requirements of 40 CFR §257.62(a).

Signed:

Consulting Engineer

Print Name:

Steven F. Putrich

Illinois License No.:

62048779

Title:

Vice President

Company:

Haley & Aldrich, Inc.







### **MEMORANDUM**

16 October 2018 File No. 129788

SUBJECT:

Location Restriction Demonstration - Seismic Impact Zone

Coffeen Power Station

Ash Pond No. 1 Coffeen, Illinois

Illinois Power Generating Company operates the coal-fired Coffeen Power Station (Plant) located south of Coffeen, Illinois. The Ash Pond No. 1 (Unit) is an existing coal combustion residuals (CCR) surface impoundment. This demonstration addresses the requirements of 40 CFR §257.63 (Seismic Impact Zones) of the U.S. Environmental Protection Agency's (EPA) rule entitled Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities. 80 Fed. Reg. 21,302 (Apr. 17, 2015) (promulgating 40 CFR §257.63); 83 Fed. Reg. 36,435 (July 30, 2018) (amending 40 CFR §257.63).

§257.63(a): New CCR landfills, existing and new CCR surface impoundments, and all lateral expansions of CCR units must not be located in seismic impact zones unless the owner or operator demonstrates by the dates specified in paragraph (c) of this section that all structural components including liners, leachate collection and removal systems, and surface water control systems, are designed to resist the maximum horizontal acceleration in lithified earth material for the site.

A Seismic Impact Zone is defined in the CCR Rule (40 CFR §257.63) as "an area having a 2% or greater probability that the maximum expected horizontal acceleration, expressed as a percentage of the earth's gravitational pull (g), will exceed 0.10 g in 50 years". The 2014 US Geological Survey Hazard Map raw data for the Coffeen Power Station Ash Pond No. 1 indicates that the maximum expected horizontal acceleration for 2 percent probability of exceedance in 50 years is 0.21g.

The results of our evaluation indicate that the Unit is in compliance with 40 CFR §257.63(a). Although the Unit is located in a seismic impact zone, it satisfies the demonstration requirements of 40 CFR §257.63(a). The AECOM report entitled "CCR Certification Report: Initial Structural Stability Assessment, Initial Safety Factor Assessment, and Initial Inflow Design Flood Control System Plan for the Ash Pond No. 1 at Coffeen Power Station" dated October 2016 (AECOM Report), includes engineering analysis, calculations, and findings that support the requirements of 40 CFR §257.63(a), and provides documentation that those requirements have been evaluated by AECOM for the subject CCR unit.

Coffeen Power Station – Ash Pond No. 1 Location Restriction – Seismic Impact Zone 16 October 2018 Page 2

§257.63(b): The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer or approval from the Participating State Director or approval from EPA where EPA is the permitting authority stating that the demonstration meets the requirements of paragraph (a) of this section.

I, Steven F. Putrich, being a Registered Professional Engineer in good standing in the State of Illinois, do hereby certify, to the best of my knowledge, information, and belief, that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify, that the CCR Unit is located in a seismic impact zone as included in the CCR Rule Location Restrictions memorandum dated 12 October 2018 and satisfies all requirements of 40 CFR §257.63(a).

By providing this certification demonstration statement, we are not stating or inferring that we have verified or certified the details, assumptions, calculations and/or site condition models developed by AECOM in the subject report; those elements of the report are considered the professional opinions and determinations of AECOM.

Signed:

Consulting Engineer

Print Name:

Steven F. Putrich

Illinois License No.:

62048779

Title:

Vice President

Haley & Aldrich, Inc.

Professional Engineer's Seal:

Company:







# **MEMORANDUM**

16 October 2018 File No. 129788

SUBJECT:

Location Restriction Demonstration - Unstable Areas

Coffeen Power Station

Ash Pond No. 1 Coffeen, Illinois

Illinois Power Generating Company operates the coal-fired Coffeen Power Station (Plant) located south of Coffeen, Illinois. The Ash Pond No. 1 (Unit) is an existing coal combustion residuals (CCR) surface impoundment. This demonstration addresses the requirements of 40 CFR §257.64 (Unstable Areas) of the U.S. Environmental Protection Agency's (EPA) rule entitled Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities. 80 Fed. Reg. 21,302 (Apr. 17, 2015) (promulgating 40 CFR §257.64); 83 Fed. Reg. 36,435 (July 30, 2018) (amending 40 CFR §257.64).

§257.64(a): An existing or new CCR landfill, existing or new CCR surface impoundment, or any lateral expansion of a CCR unit must not be located in an unstable area unless the owner or operator demonstrates by the dates specified in paragraph (d) of this section that recognized and generally accepted good engineering practices have been incorporated into the design of the CCR unit to ensure that the integrity of the structural components of the CCR unit will not be disrupted.

§257.64(b): The owner or operator must consider all of the following factors, at a minimum, when determining whether an area is unstable:

- (1) On-site or local soil conditions that may result in significant differential settling;
- (2) On-site or local geologic or geomorphologic features; and
- (3) On-site or local human-made features or events (both surface and subsurface).

Determination of compliance with §257.64(b)(1) - Conditions associated with the potential for significant differential settlement due to liquefaction were not identified in the area where the Plant is located. A separate report completed by AECOM entitled "CCR Certification Report: Initial Structural Stability Assessment, Initial Safety Factor Assessment, and Initial Inflow Design Flood Control System Plan for the Ash Pond No. 1 at Coffeen Power Station" dated October 2016 concluded that the coarse-grained soils beneath the Unit are not susceptible to liquefaction and soft clays beneath the Unit were susceptible to cyclic softening (strength loss). The post-earthquake stability analysis performed by AECOM to model the stability of the impoundment slopes following an earthquake and soil strength loss produced acceptable factors of safety.

Determination of compliance with §257.64(b)(2) - Based on available United States Geological Survey (USGS) and Illinois State Geological Survey (ISGS) information, karst topography or physiographic features such as sinkholes, vertical shafts, sinking streams, caves, large springs, or blind valleys do not

Coffeen Power Station – Ash Pond No. 1 Location Restriction – Unstable Areas 16 October 2018 Page 2

exist at the Plant. To evaluate the susceptibility of landslides, we reviewed readily available USGS and ISGS data. The USGS data indicates that the Plant is in an area of low landslide incidence and the closest document landslide is more than 10 miles from the site. Accordingly, it is our opinion that the Unit is not located in an area that has high susceptibility to landslides.

Determination of compliance with §257.64(b)(3) - An abandoned underground coal mine is located below the Unit, however an evaluation by AECOM (2016) concluded that the presence of this underground mine does not negatively affect the stability of the Unit.

 $\S257.64(c)$ : The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer or approval from the Participating State Director or approval from EPA where EPA is the permitting authority stating that the demonstration meets the requirements of paragraph (a) of this section.

I, Steven F. Putrich, being a Registered Professional Engineer in good standing in the State of Illinois, do hereby certify, to the best of my knowledge, information, and belief, that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify, for the above-referenced CCR Unit, that the demonstration indicating the CCR Unit is not located in an unstable area as included in the CCR Rule Location Restrictions Evaluation memorandum dated 12 October 2018 meets the requirements of 40 CFR §257.64(a).

Signed:

Consulting Engineer

Print Name:

Steven F. Putrich

Illinois License No.:

62048779

Title:

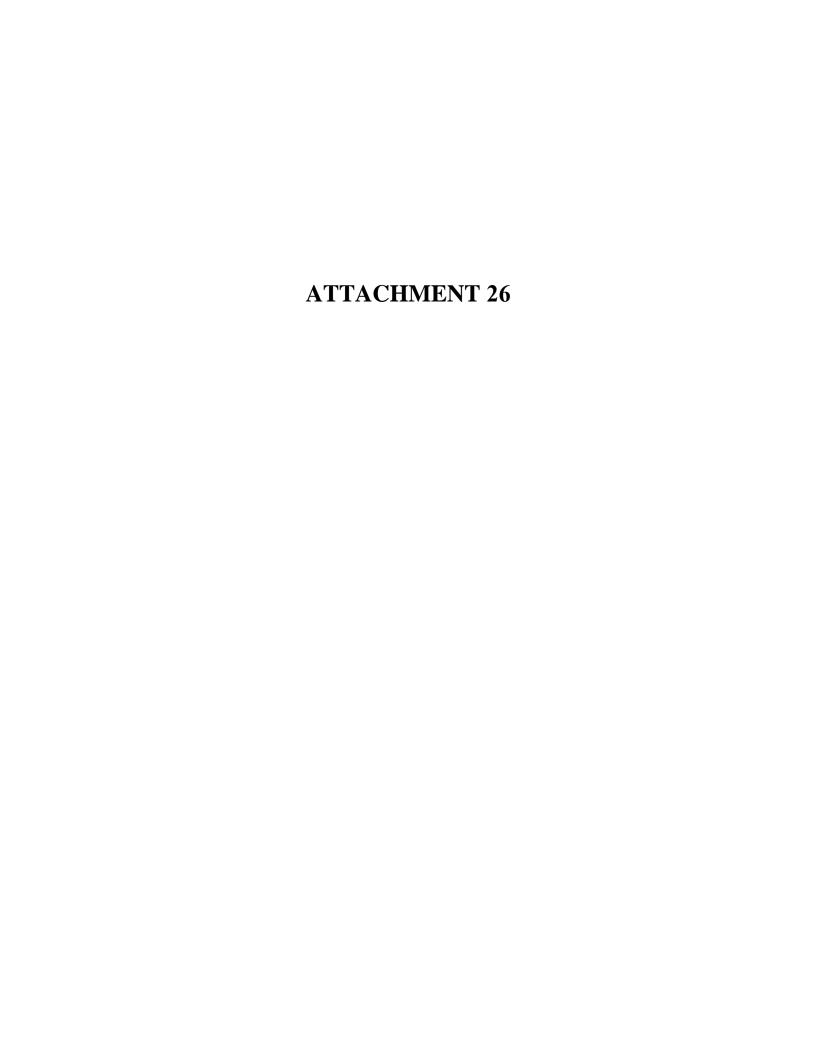
Vice President

Company:

Haley & Aldrich, Inc.









#### MEMORANDUM

16 October 2018 File No. 129788

SUBJECT:

Location Restriction Demonstration - Placement Above Uppermost Aquifer

Coffeen Power Station GMF Gypsum Stack Pond

Coffeen, Illinois

Illinois Power Generating Company operates the coal-fired Coffeen Power Station (Plant) located near Coffeen, Illinois. The GMF Gypsum Stack Pond (Unit) is an existing coal combustion residuals (CCR) surface impoundment. This demonstration addresses the requirements of 40 CFR §257.60 (Placement above the uppermost aquifer) of the U.S. Environmental Protection Agency's (EPA) rule entitled Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities. 80 Fed. Reg. 21,302 (Apr. 17, 2015) (promulgating 40 CFR §257.60); 83 Fed. Reg. 36,435 (July 30, 2018) (amending 40 CFR §257.60).

§257.60(a): New CCR landfills, existing and new CCR surface impoundments, and all lateral expansions of CCR units must be constructed with a base that is located no less than 1.52 meters (five feet) above the upper limit of the uppermost aquifer, or must demonstrate that there will not be an intermittent, recurring, or sustained hydraulic connection between any portion of the base of the CCR unit and the uppermost aquifer due to normal fluctuations in groundwater elevations (including the seasonal high water table). The owner or operator must demonstrate by the dates specified in paragraph (c) of this section that the CCR unit meets the minimum requirements for placement above the uppermost aquifer.

Haley & Aldrich reviewed available information provided by Vistra including historic record drawings, design drawings, and boring logs, and based on review and evaluation of the information provided, the results do not demonstrate compliance with the requirements of 40 CFR §257.60(a).

Coffeen Power Station – GMF Gypsum Stack Pond Location Restriction – Placement Above Uppermost Aquifer 16 October 2018 Page 2

§257.60(b): The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer or approval from the Participating State Director or approval from EPA where EPA is the permitting authority stating that the demonstration meets the requirements of paragraph (a) of this section.

I, Steven F. Putrich, being a Registered Professional Engineer in good standing in the State of Illinois, do hereby certify, to the best of my knowledge, information, and belief, that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify that the above-referenced CCR Unit does not meet the requirements of 40 CFR §257.60(a).

Signed:

Consulting Engineer

Print Name:

Steven F. Putrich

Illinois License No.:

62048779

Title:

Vice President

Company:

Haley & Aldrich, Inc.







#### MEMORANDUM

16 October 2018 File No. 129788

SUBJECT:

Location Restriction Demonstration - Wetland Areas

Coffeen Power Station GMF Gypsum Stack Pond

Coffeen, Illinois

Illinois Power Generating Company operates the coal-fired Coffeen Power Station (Plant) located near Coffeen, Illinois. The GMF Gypsum Stack Pond (Unit) is an existing coal combustion residuals (CCR) surface impoundment. This demonstration addresses the requirements of 40 CFR §257.61 (Wetlands) of the U.S. Environmental Protection Agency's (EPA) rule entitled Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities. 80 Fed. Reg. 21,302 (Apr. 17, 2015) (promulgating 40 CFR §257.61); 83 Fed. Reg. 36,435 (July 30, 2018) (amending 40 CFR §257.61.

§257.61(a): New CCR landfills, existing and new CCR surface impoundments, and all lateral expansions of CCR units must not be located in wetlands, as defined in §232.2 of this chapter, unless the owner or operator demonstrates by the dates specified in paragraph (c) of this section that the CCR unit meets the requirements of paragraphs (a)(1) through (5) of this section.

Based on a review of the U.S. Fish and Wildlife Service's National Wetland Inventory mapping, 0.5-meter resolution aerial imagery (2015) and the results of on-site field assessments, the Unit is not located in wetlands as defined by 40 CFR §232.2.

Coffeen Power Station – GMF Gypsum Stack Pond Location Restriction – Wetland Areas 16 October 2018 Page 2

§257.61(b): The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer or approval from the Participating State Director or approval from EPA where EPA is the permitting authority stating that the demonstration meets the requirements of paragraph (a) of this section.

I, Steven F. Putrich, being a Registered Professional Engineer in good standing in the State of Illinois, do hereby certify, to the best of my knowledge, information, and belief, that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify, for the above-referenced CCR Unit, that the CCR Unit is not located in wetlands as included in the CCR Rule Location Restrictions Evaluation memorandum dated 12 October 2018 and, therefore, meets the requirements of 40 CFR §257.61(a).

Signed:

Consulting Engineer

Print Name:

Steven F. Putrich

Illinois License No.:

62048779

Title:

Vice President

Company:

Haley & Aldrich, Inc.







#### MEMORANDUM

16 October 2018 File No. 129788

SUBJECT:

Location Restriction Demonstration - Fault Areas

Coffeen Power Station
GMF Gypsum Stack Pond

Coffeen, Illinois

Illinois Power Generating Company operates the coal-fired Coffeen Power Station (Plant) located near Coffeen, Illinois. The GMF Gypsum Stack Pond (Unit) is an existing coal combustion residuals (CCR) surface impoundment. This demonstration addresses the requirements of 40 CFR §257.62 (Fault Areas) of the U.S. Environmental Protection Agency's (EPA) rule entitled Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities. 80 Fed. Reg. 21,302 (Apr. 17, 2015) (promulgating 40 CFR §257.62); 83 Fed. Reg. 36,435 (July 30, 2018) (amending 40 CFR §257.62).

§257.62(a): New CCR landfills, existing and new CCR surface impoundments, and all lateral expansions of CCR units must not be located within 60 meters (200 feet) of the outermost damage zone of a fault that has had displacement in Holocene time unless the owner or operator demonstrates by the dates specified in paragraph (c) of this section that an alternative setback distance of less than 60 meters (200 feet) will prevent damage to the structural integrity of the CCR unit.

A review of available data from the U.S. Geologic Survey, the Illinois State Geological Survey, and other available information was completed for this demonstration. The nearest known mapped faults are the Crown Fault, which is located approximately 31 miles northwest, and the Centralia Fault zone, located approximately 35 miles southeast of the Unit. The timeframe of the most recent activity on these faults is not known. Based on the available published geologic data and information reviewed, there are no active faults or fault damage zones that have had displacement in Holocene time reported or indicated within 200 feet of the Unit.

Coffeen Power Station – GMF Gypsum Stack Pond Location Restriction – Fault Areas 16 October 2018 Page 2

§257.62(b): The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer or approval from the Participating State Director or approval from EPA where EPA is the permitting authority stating that the demonstration meets the requirements of paragraph (a) of this section.

I, Steven F. Putrich, being a Registered Professional Engineer in good standing in the State of Illinois, do hereby certify, to the best of my knowledge, information, and belief, that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify, for the above-referenced CCR Unit, that the demonstration that the CCR Unit is not located within 60 meters (200 feet) of the outermost damage zone of a fault that has had a displacement in Holocene time as included in the CCR Rule Location Restrictions Evaluation memorandum dated 12 October 2018 meets the requirements of 40 CFR §257.62(a).

Signed:

Consulting Engineer

Print Name:

Steven F. Putrich

Illinois License No.:

62048779

Title:

Vice President

Company:

Haley & Aldrich, Inc.







#### MEMORANDUM

16 October 2018 File No. 129788

SUBJECT:

Location Restriction Demonstration - Seismic Impact Zone

Coffeen Power Station
GMF Gypsum Stack Pond

Coffeen, Illinois

Illinois Power Generating Company operates the coal-fired Coffeen Power Station (Plant) located near Coffeen, Illinois. The GMF Gypsum Stack Pond (Unit) is an existing coal combustion residuals (CCR) surface impoundment. This demonstration addresses the requirements of 40 CFR §257.63 (Seismic Impact Zones) of the U.S. Environmental Protection Agency's (EPA) rule entitled Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities. 80 Fed. Reg. 21,302 (Apr. 17, 2015) (promulgating 40 CFR §257.63); 83 Fed. Reg. 36,435 (July 30, 2018) (amending 40 CFR §257.63).

§257.63(a): New CCR landfills, existing and new CCR surface impoundments, and all lateral expansions of CCR units must not be located in seismic impact zones unless the owner or operator demonstrates by the dates specified in paragraph (c) of this section that all structural components including liners, leachate collection and removal systems, and surface water control systems, are designed to resist the maximum horizontal acceleration in lithified earth material for the site.

A Seismic Impact Zone is defined in the CCR Rule (40 CFR §257.63) as "an area having a 2% or greater probability that the maximum expected horizontal acceleration, expressed as a percentage of the earth's gravitational pull (g), will exceed 0.10 g in 50 years". The 2014 US Geological Survey Hazard Map raw data for the Coffeen Power Station GMF Gypsum Stack Pond indicates that the maximum expected horizontal acceleration for 2 percent probability of exceedance in 50 years is 0.21g.

The results of our evaluation indicate that the Unit is in compliance with 40 CFR §257.63(a). Although the Unit is located in a seismic impact zone, it satisfies the demonstration requirements of 40 CFR §257.63(a). The AECOM report entitled "CCR Certification Report: Initial Structural Stability Assessment, Initial Safety Factor Assessment, and Initial Inflow Design Flood Control System Plan for the GMF Pond at Coffeen Power Station" dated October 2016 (AECOM Report), includes engineering analysis, calculations, and findings that support the requirements of 40 CFR §257.63(a), and provides documentation that those requirements have been evaluated by AECOM for the subject CCR unit.

Coffeen Power Station – GMF Gypsum Stack Pond Location Restriction – Seismic Impact Zone 16 October 2018 Page 2

§257.63(b): The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer or approval from the Participating State Director or approval from EPA where EPA is the permitting authority stating that the demonstration meets the requirements of paragraph (a) of this section.

I, Steven F. Putrich, being a Registered Professional Engineer in good standing in the State of Illinois, do hereby certify, to the best of my knowledge, information, and belief, that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify, that the CCR Unit is located in a seismic impact zone as included in the CCR Rule Location Restrictions Evaluation memorandum dated 12 October 2018 and satisfies all requirements of 40 CFR §257.63(a).

By providing this certification demonstration statement, we are not stating or inferring that we have verified or certified the details, assumptions, calculations and/or site condition models developed by AECOM in the subject report; those elements of the report are considered the professional opinions and determinations of AECOM.

Signed:

Consulting Engineer

Print Name:

Steven F. Putrich

Illinois License No.:

62048779

Title:

Vice President

Company:

Haley & Aldrich, Inc.







#### **MEMORANDUM**

16 October 2018 File No. 129788

SUBJECT:

Location Restriction Demonstration - Unstable Areas

Coffeen Power Station GMF Gypsum Stack Pond

Coffeen, Illinois

Illinois Power Generating Company operates the coal-fired Coffeen Power Station (Plant) located near Coffeen, Illinois. The GMF Gypsum Stack Pond (Unit) is an existing coal combustion residuals (CCR) surface impoundment. This demonstration addresses the requirements of 40 CFR §257.64 (Unstable Areas) of the U.S. Environmental Protection Agency's (EPA) rule entitled Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities. 80 Fed. Reg. 21,302 (Apr. 17, 2015) (promulgating 40 CFR §257.64); 83 Fed. Reg. 36,435 (July 30, 2018) (amending 40 CFR §257.64).

§257.64(a): An existing or new CCR landfill, existing or new CCR surface impoundment, or any lateral expansion of a CCR unit must not be located in an unstable area unless the owner or operator demonstrates by the dates specified in paragraph (d) of this section that recognized and generally accepted good engineering practices have been incorporated into the design of the CCR unit to ensure that the integrity of the structural components of the CCR unit will not be disrupted.

§257.64(b): The owner or operator must consider all of the following factors, at a minimum, when determining whether an area is unstable:

- (1) On-site or local soil conditions that may result in significant differential settling;
- (2) On-site or local geologic or geomorphologic features; and
- (3) On-site or local human-made features or events (both surface and subsurface).

Determination of compliance with §257.64(b)(1) - Conditions associated with the potential for significant differential settlement due to liquefaction were not identified in the area where the Plant is located. A separate report completed by AECOM entitled "CCR Certification Report: Initial Structural Stability Assessment, Initial Safety Factor Assessment, and Initial Inflow Design Flood Control System Plan for the GMF Pond at Coffeen Power Station" dated October 2016 concluded that a 1-ft thick layer of liqueifiable material existed below the impoundment and post-liquefaction stability analyses performed by AECOM concluded that the impoundment slopes would remain stable if that layer liquefied during the design seismic event.

Determination of compliance with  $\S 257.64(b)(2)$  - Based on available United States Geological Survey (USGS) and Illinois State Geological Survey (ISGS) information, karst topography or physiographic features such as sinkholes, vertical shafts, sinking streams, caves, large springs, or blind valleys do not

Coffeen Power Station – GMF Gypsum Stack Pond Location Restriction – Unstable Areas 16 October 2018 Page 2

exist at the Plant. To evaluate the susceptibility of landslides, we reviewed readily available USGS and ISGS data. The USGS data indicates that the Plant is in an area of low landslide incidence and the closest document landslide is more than 10 miles from the site. Accordingly, it is our opinion that the Unit is not located in an area that has high susceptibility to landslides.

Determination of compliance with §257.64(b)(3) - An inactive underground mine is located below the Unit, however an evaluation by AECOM (2016) concluded that the presence of this underground mine does not negatively affect the stability of the Unit.

§257.64(c): The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer or approval from the Participating State Director or approval from EPA where EPA is the permitting authority stating that the demonstration meets the requirements of paragraph (a) of this section.

I, Steven F. Putrich, being a Registered Professional Engineer in good standing in the State of Illinois, do hereby certify, to the best of my knowledge, information, and belief, that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify, for the above-referenced CCR Unit, that the demonstration indicating the CCR Unit is not located in an unstable area as included in the CCR Rule Location Restrictions Evaluation memorandum dated 12 October 2018 meets the requirements of 40 CFR §257.64(a).

Signed:

Consulting Engineer

Print Name:

Steven F. Putrich

Illinois License No.:

62048779

Title:

Vice President

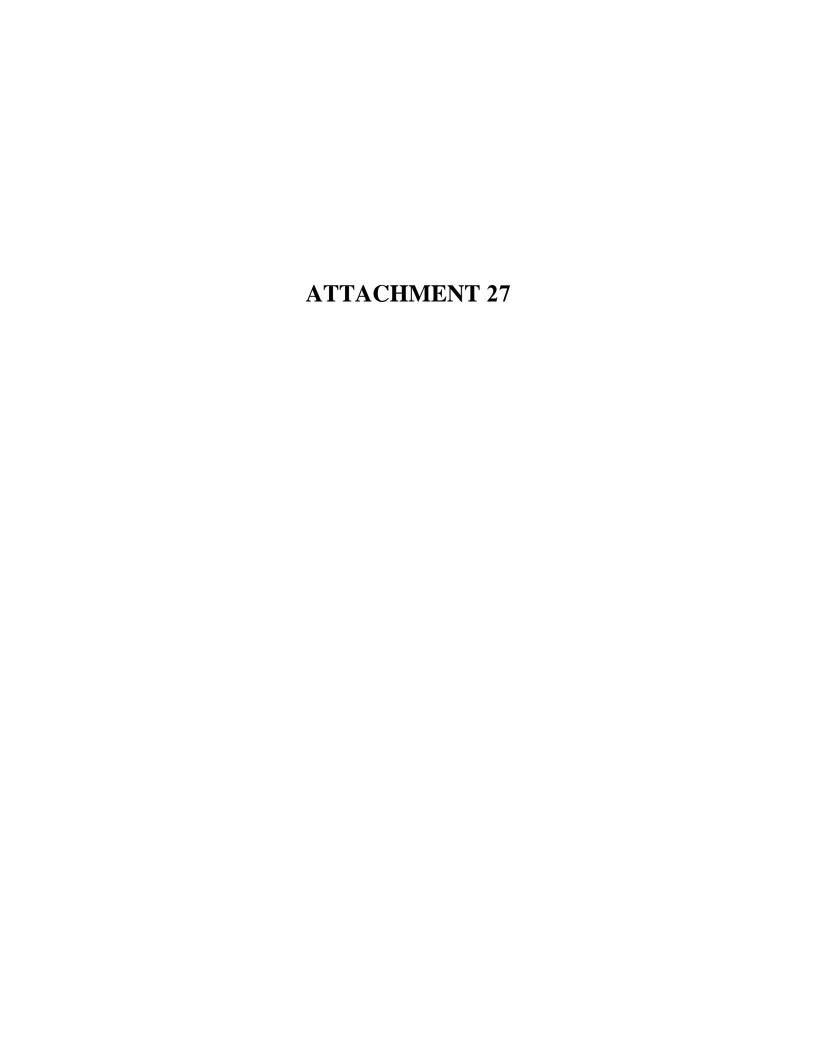
Company:

Haley & Aldrich, Inc.





The followin	g are attachment	s to the testimo	ony of Andrew	Rehn.	





# **MEMORANDUM**

16 October 2018 File No. 129788

SUBJECT:

Location Restriction Demonstration - Placement Above Uppermost Aquifer

GMF Recycle Pond Coffeen Power Station

Coffeen, Illinois

Illinois Power Resources Generating, LLC operates the coal-fired Coffeen Power Station (Plant) located near Coffeen, Illinois. The GMF Recycle Pond (Unit) is an existing coal combustion residuals (CCR) surface impoundment. This demonstration addresses the requirements of 40 CFR §257.60 (Placement above the uppermost aquifer) of the U.S. Environmental Protection Agency's (EPA) rule entitled Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities. 80 Fed. Reg. 21,302 (Apr. 17, 2015) (promulgating 40 CFR §257.60); 83 Fed. Reg. 36,435 (July 30, 2018) (amending 40 CFR §257.60).

§257.60(a): New CCR landfills, existing and new CCR surface impoundments, and all lateral expansions of CCR units must be constructed with a base that is located no less than 1.52 meters (five feet) above the upper limit of the uppermost aquifer, or must demonstrate that there will not be an intermittent, recurring, or sustained hydraulic connection between any portion of the base of the CCR unit and the uppermost aquifer due to normal fluctuations in groundwater elevations (including the seasonal high water table). The owner or operator must demonstrate by the dates specified in paragraph (c) of this section that the CCR unit meets the minimum requirements for placement above the uppermost aquifer.

Haley & Aldrich reviewed available information provided by Vistra including historic record drawings, and based on review and evaluation of the information provided, the results do not demonstrate compliance with the requirements of 40 CFR §257.60(a).

Coffeen Power Station - GMF Recycle Pond Location Restriction - Placement Above Uppermost Aquifer 16 October 2018 Page 2

§257.60(b): The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer or approval from the Participating State Director or approval from EPA where EPA is the permitting authority stating that the demonstration meets the requirements of paragraph (a) of this section.

I, Steven F. Putrich, being a Registered Professional Engineer in good standing in the State of Illinois, do hereby certify, to the best of my knowledge, information, and belief, that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify that the above-referenced CCR Unit does not meet the requirements of 40 CFR §257.60(a).

Signed:

Consulting Engineer

Print Name:

Steven F. Putrich

Illinois License No.:

62048779

Title:

Vice President

Company:

Haley & Aldrich, Inc.







# **MEMORANDUM**

16 October 2018 File No. 129788

SUBJECT:

Location Restriction Demonstration - Wetland Areas

Coffeen Power Station GMF Recycle Pond Coffeen, Illinois

Illinois Power Generating Company operates the coal-fired Coffeen Power Station (Plant) located near Coffeen, Illinois. The GMF Recycle Pond (Unit) is an existing coal combustion residuals (CCR) surface impoundment. This demonstration addresses the requirements of 40 CFR §257.61 (Wetlands) of the U.S. Environmental Protection Agency's (EPA) rule entitled Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities. 80 Fed. Reg. 21,302 (Apr. 17, 2015) (promulgating 40 CFR §257.61); 83 Fed. Reg. 36,435 (July 30, 2018) (amending 40 CFR §257.61.

§257.61(a): New CCR landfills, existing and new CCR surface impoundments, and all lateral expansions of CCR units must not be located in wetlands, as defined in §232.2 of this chapter, unless the owner or operator demonstrates by the dates specified in paragraph (c) of this section that the CCR unit meets the requirements of paragraphs (a)(1) through (5) of this section.

Based on a review of the U.S. Fish and Wildlife Service's National Wetland Inventory mapping, 0.5-meter resolution aerial imagery (2015) and the results of on-site field assessments, the Unit is not located in wetlands as defined by 40 CFR §232.2.

Coffeen Power Station – GMF Recycle Pond Location Restriction – Wetland Areas 16 October 2018 Page 2

§257.61(b): The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer or approval from the Participating State Director or approval from EPA where EPA is the permitting authority stating that the demonstration meets the requirements of paragraph (a) of this section.

I, Steven F. Putrich, being a Registered Professional Engineer in good standing in the State of Illinois, do hereby certify, to the best of my knowledge, information, and belief, that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify, for the above-referenced CCR Unit, that the CCR Unit is not located in wetlands as included in the CCR Rule Location Restrictions Evaluation memorandum dated 12 October 2018 and, therefore, meets the requirements of 40 CFR §257.61(a).

Signed:

Consulting Engineer

Print Name:

Steven F. Putrich

Illinois License No.:

62048779

Title:

Vice President

Company:

Haley & Aldrich, Inc.





### **MEMORANDUM**

16 October 2018 File No. 129788

SUBJECT:

Location Restriction Demonstration - Fault Areas

Coffeen Power Station GMF Recycle Pond Coffeen, Illinois

Illinois Power Generating Company operates the coal-fired Coffeen Power Station (Plant) located near Coffeen, Illinois. The GMF Recycle Pond (Unit) is an existing coal combustion residuals (CCR) surface impoundment. This demonstration addresses the requirements of 40 CFR §257.62 (Fault Areas) of the U.S. Environmental Protection Agency's (EPA) rule entitled Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities. 80 Fed. Reg. 21,302 (Apr. 17, 2015) (promulgating 40 CFR §257.62); 83 Fed. Reg. 36,435 (July 30, 2018) (amending 40 CFR §257.62).

§257.62(a): New CCR landfills, existing and new CCR surface impoundments, and all lateral expansions of CCR units must not be located within 60 meters (200 feet) of the outermost damage zone of a fault that has had displacement in Holocene time unless the owner or operator demonstrates by the dates specified in paragraph (c) of this section that an alternative setback distance of less than 60 meters (200 feet) will prevent damage to the structural integrity of the CCR unit.

A review of available data from the U.S. Geologic Survey, the Illinois State Geological Survey, and other available information was completed for this demonstration. The nearest known mapped faults are the Crown Fault, which is located approximately 31 miles northwest, and the Centralia Fault zone, located approximately 35 miles southeast of the Unit. The timeframe of the most recent activity on these faults is not known. Based on the available published geologic data and information reviewed, there are no active faults or fault damage zones that have had displacement in Holocene time reported or indicated within 200 feet of the Unit.

Coffeen Power Station – GMF Recycle Pond Location Restriction – Fault Areas 16 October 2018 Page 2

§257.62(b): The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer or approval from the Participating State Director or approval from EPA where EPA is the permitting authority stating that the demonstration meets the requirements of paragraph (a) of this section.

I, Steven F. Putrich, being a Registered Professional Engineer in good standing in the State of Illinois, do hereby certify, to the best of my knowledge, information, and belief, that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify, for the above-referenced CCR Unit, that the demonstration that the CCR Unit is not located within 60 meters (200 feet) of the outermost damage zone of a fault that has had a displacement in Holocene time as included in the CCR Rule Location Restrictions Evaluation memorandum dated 12 October 2018 meets the requirements of 40 CFR §257.62(a).

Signed:

Consulting Engineer

Print Name:

Steven F. Putrich

Illinois License No.:

62048779

Title:

Vice President

Company:

Haley & Aldrich, Inc.







#### **MEMORANDUM**

16 October 2018 File No. 129788

SUBJECT:

Location Restriction Demonstration - Seismic Impact Zone

Coffeen Power Station GMF Recycle Pond Coffeen, Illinois

Illinois Power Generating Company operates the coal-fired Coffeen Power Station (Plant) located near Coffeen, Illinois. The GMF Recycle Pond (Unit) is an existing coal combustion residuals (CCR) surface impoundment. This demonstration addresses the requirements of 40 CFR §257.63 (Seismic Impact Zones) of the U.S. Environmental Protection Agency's (EPA) rule entitled Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities. 80 Fed. Reg. 21,302 (Apr. 17, 2015) (promulgating 40 CFR §257.63); 83 Fed. Reg. 36,435 (July 30, 2018) (amending 40 CFR §257.63).

§257.63(a): New CCR landfills, existing and new CCR surface impoundments, and all lateral expansions of CCR units must not be located in seismic impact zones unless the owner or operator demonstrates by the dates specified in paragraph (c) of this section that all structural components including liners, leachate collection and removal systems, and surface water control systems, are designed to resist the maximum horizontal acceleration in lithified earth material for the site.

A Seismic Impact Zone is defined in the CCR Rule (40 CFR §257.63) as "an area having a 2% or greater probability that the maximum expected horizontal acceleration, expressed as a percentage of the earth's gravitational pull (g), will exceed 0.10 g in 50 years". The 2014 US Geological Survey Hazard Map raw data for the Coffeen Power Station GMF Recycle Pond indicates that the maximum expected horizontal acceleration for 2 percent probability of exceedance in 50 years is 0.21g.

The results of our evaluation indicate that the Unit is in compliance with 40 CFR §257.63(a). Although the Unit is located in a seismic impact zone, it satisfies the demonstration requirements of 40 CFR §257.63(a). The Hanson report entitled "CCR Documentation Report: Initial Structural Stability Assessment, Initial Safety Factor Assessment, and Initial Inflow Design Flood Control System Plan, GMF Recycle Pond, Coffeen Power Station" dated October 2016 (Hanson Report), includes engineering analysis, calculations, and findings that support the requirements of 40 CFR §257.63(a), and provides documentation that those requirements have been evaluated by Hanson for the subject CCR unit.

Coffeen Power Station – GMF Recycle Pond Location Restriction – Seismic Impact Zone 16 October 2018 Page 2

§257.63(b): The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer or approval from the Participating State Director or approval from EPA where EPA is the permitting authority stating that the demonstration meets the requirements of paragraph (a) of this section.

I, Steven F. Putrich, being a Registered Professional Engineer in good standing in the State of Illinois, do hereby certify, to the best of my knowledge, information, and belief, that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify, that the CCR Unit is located in a seismic impact zone as included in the CCR Rule Location Restrictions Evaluation memorandum dated 12 October 2018 and satisfies all requirements of 40 CFR §257.63(a).

By providing this certification demonstration statement, we are not stating or inferring that we have verified or certified the details, assumptions, calculations and/or site condition models developed by Hanson in the subject report; those elements of the report are considered the professional opinions and determinations of Hanson.

Signed:

Consulting Engineer

Print Name:

mic ivaliic.

Illinois License No.:

Title:

Company:

Steven F. Putrich

62048779

Vice President

Haley & Aldrich, Inc.







#### MEMORANDUM

16 October 2018 File No. 129788

SUBJECT:

Location Restriction Demonstration - Unstable Areas

Coffeen Power Station GMF Recycle Pond Coffeen, Illinois

Illinois Power Generating Company operates the coal-fired Coffeen Power Station (Plant) located near Coffeen, Illinois. The GMF Recycle Pond (Unit) is an existing coal combustion residuals (CCR) surface impoundment. This demonstration addresses the requirements of 40 CFR §257.64 (Unstable Areas) of the U.S. Environmental Protection Agency's (EPA) rule entitled Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities. 80 Fed. Reg. 21,302 (Apr. 17, 2015) (promulgating 40 CFR §257.64); 83 Fed. Reg. 36,435 (July 30, 2018) (amending 40 CFR §257.64).

§257.64(a): An existing or new CCR landfill, existing or new CCR surface impoundment, or any lateral expansion of a CCR unit must not be located in an unstable area unless the owner or operator demonstrates by the dates specified in paragraph (d) of this section that recognized and generally accepted good engineering practices have been incorporated into the design of the CCR unit to ensure that the integrity of the structural components of the CCR unit will not be disrupted.

§257.64(b): The owner or operator must consider all of the following factors, at a minimum, when determining whether an area is unstable:

- (1) On-site or local soil conditions that may result in significant differential settling;
- (2) On-site or local geologic or geomorphologic features; and
- (3) On-site or local human-made features or events (both surface and subsurface).

Determination of compliance with §257.64(b)(1) - Conditions associated with the potential for significant differential settlement due to liquefaction were not identified in the area where the Plant is located. A separate report completed by Hanson Professional Services, Inc. (Hanson) entitled "CCR Documentation Report: Initial Structural Stability Assessment, Initial Safety Factor Assessment, and Initial Inflow Design Flood Control System Plan, GMF Recycle Pond, Coffeen Power Station" dated October 2016 concluded that the soils beneath the Unit are not susceptible to liquefaction.

Determination of compliance with §257.64(b)(2) - Based on available United States Geological Survey (USGS) and Illinois State Geological Survey (ISGS) information karst topography or physiographic features such as sinkholes, vertical shafts, sinking streams, caves, large springs, or blind valleys do not exist at the Plant. To evaluate the susceptibility of landslides, we reviewed readily available USGS and ISGS data. The USGS data indicates that the Plant is in an area of low landslide incidence and the closest

Coffeen Power Station – GMF Recycle Pond Location Restriction – Unstable Areas 16 October 2018 Page 2

document landslide is more than 10 miles from the site. Accordingly, it is our opinion that the Unit is not located in an area that has high susceptibility to landslides.

Determination of compliance with §257.64(b)(3) - There are no documented surface or subsurface anthropogenic activities that would be indicative of creating unstable foundation conditions.

 $\S257.64(c)$ : The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer or approval from the Participating State Director or approval from EPA where EPA is the permitting authority stating that the demonstration meets the requirements of paragraph (a) of this section.

I, Steven F. Putrich, being a Registered Professional Engineer in good standing in the State of Illinois, do hereby certify, to the best of my knowledge, information, and belief, that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify, for the above-referenced CCR Unit, that the demonstration indicating the CCR Unit is not located in an unstable area as included in the CCR Rule Location Restrictions Evaluation memorandum dated 12 October 2018 meets the requirements of 40 CFR §257.64(a).

Signed:

Consulting Engineer

Print Name:

Steven F. Putrich

Illinois License No.:

62048779

Title:

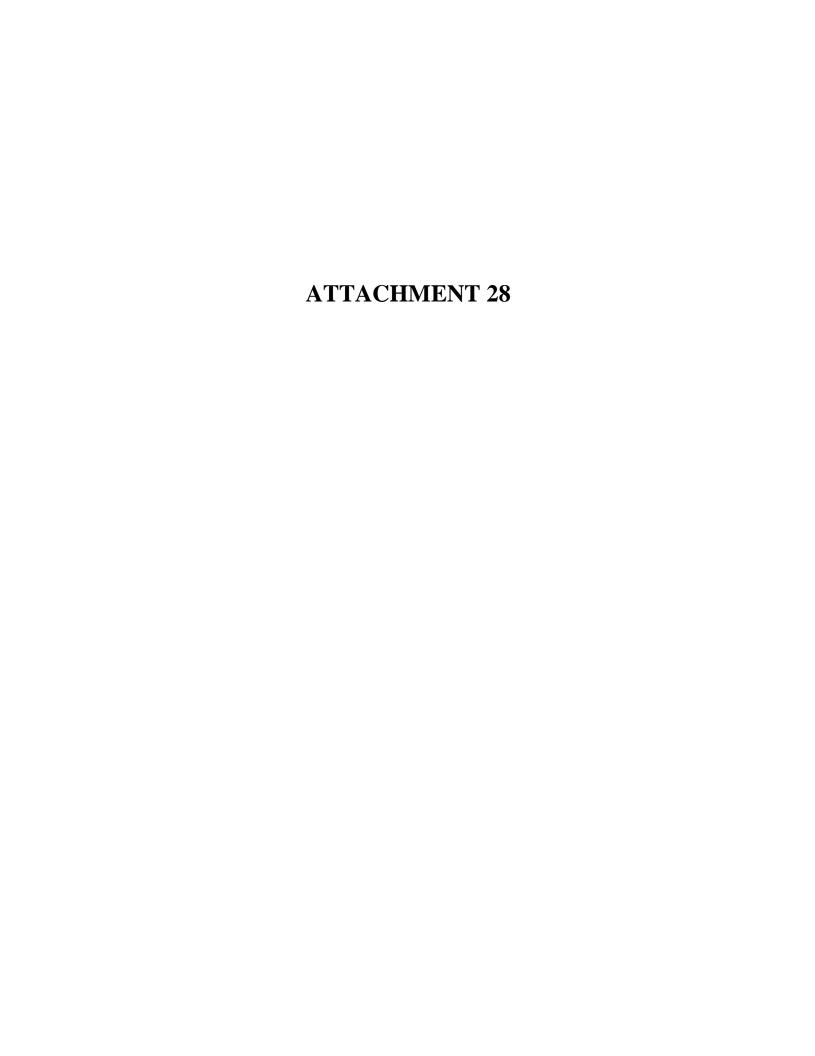
Vice President

Company:

Haley & Aldrich, Inc.







# CITY WATER, LIGHT AND POWER CCR SURFACE IMPOUNDMENT LOCATION RESTRICTIONS

The following information provides an evaluation of the CCR locations standards with respect to closure or retrofitting the CCR surface impoundments.

The locations restrictions consist of:

- 1. Placement Above the Uppermost Aquifer (§257.60)
- 2. Wetlands (§257.61)
- 3. Fault Areas (§257.62)
- 4. Seismic Impact Zones (§257.63)
- 5. Unstable Areas (§257.64)

Documentation showing compliance with the location standards must be placed in the operational record by October 17, 2018. If compliance cannot be certified, closure requirements of §257.101(b)(1) will apply. Each restriction is discussed separately below. The Lakeside and Dallman ash ponds are both considered CCR impoundments.

# Placement Above the Uppermost Aquifer

The impoundments must be constructed with a base that is located no less than 5 feet above the upper limit of the uppermost aquifer, or must demonstrate that there will not be an intermittent, recurring, or sustained hydraulic connection between any portion of the base of the CCR unit and the uppermost aquifer due to fluctuations in the groundwater elevations. If the demonstration cannot be made by the aforementioned date, the facility must cease accepting the CCR and begin closure activities pursuant to §257.101(b)(1).

Definitions of relevant terms in the paragraph above include (from §257.53):

"Aquifer means a geologic formation, group of formations, or portion of a formation capable of yielding usable quantities of groundwater to wells or springs."

"Uppermost Aquifer means the geologic formation nearest the natural ground surface that is an aquifer, as well as lower aquifers that are hydraulically interconnected with this aquifer within the facility's property boundary. Upper limit is measured at a point nearest to the natural ground surface to which the aquifer rises during the wet season."

It is debatable whether the deposits beneath the ash ponds are capable of yielding "usable" quantities of groundwater as the term is vague. Therefore, since the term "aquifer" is part of "uppermost aquifer," it can also be debatable if the unconsolidated deposits overlying the bedrock but beneath the ash ponds constitute an uppermost aquifer.

There are fine-grained sediments (silty clay/clayey silt) present beneath the ponds that do have confining hydraulic properties. However, there are also sand/sandy deposits that are water-bearing with potentiometric surfaces within 5 feet of the bottom of the ponds.

Documents from Hanson Engineers (1987) indicate the base of the Lakeside ash pond is approximately 535 feet above mean sea level (msl). Design drawings from Burns & McDonnell (1976) show the base of the Dallman ash pond to be approximately 533 feet above msl, with some variability. The potentiometric surfaces along the perimeter of the impoundments are largely above those elevations with the exception of the wells adjacent to (north and west) the Dallman ash pond. However, because the water level in the pond is approximately 548 feet above msl, an outward hydraulic gradient is present which fully saturates the soils beneath the impoundment. There is a direct hydraulic connection with the water table.

The term "uppermost aquifer" is contained in the RCRA Subtitle D regulations that were used when creating the CCR regulations. Additionally, the "uppermost aquifer" was incorporated into the 35 Illinois Administrative Code (IAC) Part 814, Subpart C regulations, which apply to the FGDS onsite landfill. The uppermost aquifer at the landfill site does include the water-bearing deposits beneath the landfill, which also extend beneath and adjacent to the ash ponds.

Based on the potentiometric surfaces and the bottom elevations of the Dallman and Lakeside ash ponds, it is likely the ponds would be found not to meet the location standard of §257.60. Therefore, either retrofit or closure must be implemented pursuant to §257.101(b)(1).

# <u>Wetlands</u>

The applicable units must not be located in wetlands. The existing and potential applicable units are listed on the wetland inventory map as a wetland. Clarification with the U.S. Fish and Wildlife Service and the U.S. Army Corps of Engineers (USACE) should adequately address any issues. It is Andrews' experience that no USACE permit will be necessary for any of the operational ponds (CCR or process) and that the wetlands can be disturbed or removed.

# Fault Areas

The applicable surface impoundments must not be located within 200 feet of the outermost damage zone of a fault that has had displacement in Holocene time unless the owner or operator demonstrates that an alternative setback distance of less than 200 feet will prevent damage to the structural integrity of the CCR unit.

The fault areas for the FGDS landfill were identified as part of the initial Significant Modification Application (Log No. 1995-243-LFM). The study area incorporates that of the surface impoundments. There are no fault areas in the vicinity of the surface impoundments.

# Seismic Impact Zones

The applicable units must not be located in seismic impact zones unless the owner or operator demonstrates that all structural components including liners, leachate collection and removal systems, and surface water control systems, are designed to resist the maximum horizontal acceleration in lithified earth material for the site.

The seismic impact zones were evaluated as part of the initial Significant Modification Application (Log No. 1995-243-LFM) to Unit 2 of the FGDS landfill, including evaluation of the slope and mass stability. The study area includes the location of the impoundments. The ponds are not located within a seismic impact zone that would pose a threat to the structural integrity of the impoundments.

## **Unstable Areas**

The applicable units must not be located in an unstable area unless it can be demonstrated that recognized and generally accepted good engineering practices have been incorporated into the design of the CCR units to ensure that the integrity of the structural components of the CCR unit will not be disrupted.

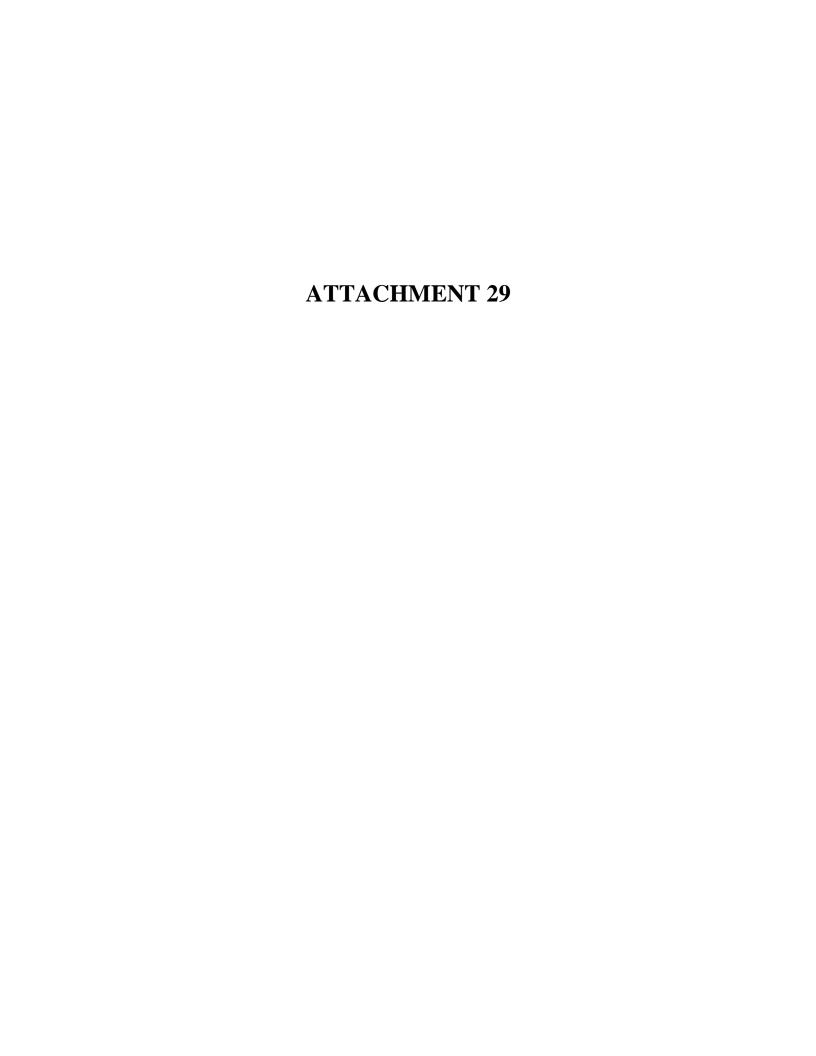
Unstable area means a location that is susceptible to natural or human-induced events or forces capable of impairing the integrity of some or all of the structural components responsible for preventing releases from the CCR unit. The preamble implies these issues will specifically relate to foundation conditions resulting in mass movement of soils, or karst terrains where bedrock is involved.

The hazard potential classification assessment with oversight from the Illinois Department of Natural Resources, and structural integrity assessments, did not indicate any unstable areas in the immediate surface impoundment area. Geotechnical analyses were conducted for both the Lakeside and Dallman ponds, and for the FGDS landfill as part of the permitting process. As provided in the differing reports, the soil characteristics were adequate to support the structures designed for the Lakeside and Dallman ash ponds.

# **COMPLIANCE**

Of the five location requirements, four appear to comply with the specific rules. However, unlined ponds are placed directly above and within 5 feet of the high water table for the uppermost aquifer. Either it must be demonstrated that there will not be intermittent, reoccurring or sustained hydraulic connection between any portion of the base of the CCR unit and the uppermost aquifer, or cessation of disposal and closure must begin.

Hydraulic separation can be shown by retrofitting the ponds. A composite liner consisting of a two-foot (minimum) low hydraulic conductivity (< 1.0x10<sup>-7</sup> cm/sec) clayey material overlain by a minimum 30 mil geomembrane (or equivalent) will be adequate to demonstrate hydraulic separation. Part or all of the impoundments can be retrofitted to meet the location requirement.





#### **MEMORANDUM**

16 October 2018 File No. 129788

SUBJECT:

Location Restriction Demonstration - Placement Above Uppermost Aquifer

Ash Pond

Edwards Power Station Bartonville, Illinois

Illinois Power Resources Generating, LLC operates the coal-fired Edwards Power Station (Plant) located near Bartonville, Illinois. The Ash Pond (Unit) is an existing coal combustion residuals (CCR) surface impoundment. This demonstration addresses the requirements of 40 CFR §257.60 (*Placement above the uppermost aquifer*) of the U.S. Environmental Protection Agency's (EPA) rule entitled *Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities.* 80 Fed. Reg. 21,302 (Apr. 17, 2015) (promulgating 40 CFR §257.60); 83 Fed. Reg. 36,435 (July 30, 2018) (amending 40 CFR §257.60).

§257.60(a): New CCR landfills, existing and new CCR surface impoundments, and all lateral expansions of CCR units must be constructed with a base that is located no less than 1.52 meters (five feet) above the upper limit of the uppermost aquifer, or must demonstrate that there will not be an intermittent, recurring, or sustained hydraulic connection between any portion of the base of the CCR unit and the uppermost aquifer due to normal fluctuations in groundwater elevations (including the seasonal high water table). The owner or operator must demonstrate by the dates specified in paragraph (c) of this section that the CCR unit meets the minimum requirements for placement above the uppermost aquifer.

Haley & Aldrich reviewed available information provided by Vistra including historic record drawings, design drawings, and boring logs, and based on review and evaluation of the information provided, the results do not demonstrate compliance with the requirements of 40 CFR §257.60(a).

Edwards Power Station - Ash Pond Location Restriction - Placement Above Uppermost Aquifer 16 October 2018 Page 2

§257.60(b): The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer or approval from the Participating State Director or approval from EPA where EPA is the permitting authority stating that the demonstration meets the requirements of paragraph (a) of this section.

I, Steven F. Putrich, being a Registered Professional Engineer in good standing in the State of Illinois, do hereby certify, to the best of my knowledge, information, and belief, that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify that the above-referenced CCR Unit does not meet the requirements of 40 CFR §257.60(a).

Signed:

Consulting Engineer

Print Name:

Steven F. Putrich

Illinois License No.:

62048779

Title:

Vice President

Company:

Haley & Aldrich, Inc.







### **MEMORANDUM**

16 October 2018 File No. 129788

SUBJECT:

Location Restriction Demonstration - Wetland Areas

**Edwards Power Station** 

Ash Pond

Bartonville, Illinois

Illinois Power Resources Generating, LLC operates the coal-fired Edwards Power Station (Plant) located near Bartonville, Illinois. The Ash Pond (Unit) is an existing coal combustion residuals (CCR) surface impoundment. This demonstration addresses the requirements of 40 CFR §257.61 (Wetlands) of the U.S. Environmental Protection Agency's (EPA) rule entitled Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities. 80 Fed. Reg. 21,302 (Apr. 17, 2015) (promulgating 40 CFR §257.61); 83 Fed. Reg. 36,435 (July 30, 2018) (amending 40 CFR §257.61.

§257.61(a): New CCR landfills, existing and new CCR surface impoundments, and all lateral expansions of CCR units must not be located in wetlands, as defined in §232.2 of this chapter, unless the owner or operator demonstrates by the dates specified in paragraph (c) of this section that the CCR unit meets the requirements of paragraphs (a)(1) through (5) of this section.

Based on a review of the U.S. Fish and Wildlife Service's National Wetland Inventory mapping, 0.5-meter resolution aerial imagery (2016) and the results of on-site field assessments, the Unit is not located in wetlands as defined by 40 CFR §232.2.

Edwards Power Station – Ash Pond Location Restriction – Wetland Areas 16 October 2018 Page 2

§257.61(b): The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer or approval from the Participating State Director or approval from EPA where EPA is the permitting authority stating that the demonstration meets the requirements of paragraph (a) of this section.

I, Steven F. Putrich, being a Registered Professional Engineer in good standing in the State of Illinois, do hereby certify, to the best of my knowledge, information, and belief, that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify, for the above-referenced CCR Unit, that the CCR Unit is not located in wetlands as included in the CCR Rule Location Restrictions Evaluation memorandum dated 12 October 2018 and, therefore, meets the requirements of 40 CFR §257.61(a).

Signed:

Consulting Engineer

Print Name:

Steven F. Putrich

Illinois License No.:

62048779

Title:

Vice President

Company:

Haley & Aldrich, Inc







### **MEMORANDUM**

16 October 2018 File No. 129788

SUBJECT:

Location Restriction Demonstration - Fault Areas

**Edwards Power Station** 

Ash Pond

Bartonville, Illinois

Illinois Power Resources Generating, LLC operates the coal-fired Edwards Power Station (Plant) located near Bartonville, Illinois. The Ash Pond (Unit) is an existing coal combustion residuals (CCR) surface impoundment. This demonstration addresses the requirements of 40 CFR §257.62 (Fault Areas) of the U.S. Environmental Protection Agency's (EPA) rule entitled Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities. 80 Fed. Reg. 21,302 (Apr. 17, 2015) (promulgating 40 CFR §257.62); 83 Fed. Reg. 36,435 (July 30, 2018) (amending 40 CFR §257.62).

§257.62(a): New CCR landfills, existing and new CCR surface impoundments, and all lateral expansions of CCR units must not be located within 60 meters (200 feet) of the outermost damage zone of a fault that has had displacement in Holocene time unless the owner or operator demonstrates by the dates specified in paragraph (c) of this section that an alternative setback distance of less than 60 meters (200 feet) will prevent damage to the structural integrity of the CCR unit.

A review of available data from the U.S. Geologic Survey, the Illinois State Geological Survey, and other available information was completed for this demonstration. The nearest known mapped faults are four unnamed faults associated with the Troy Grove Dome, which are located approximately 63 miles northeast and the timeframe of the most recent activity on this fault is not known. Based on the available published geologic data and information reviewed, there are no active faults or fault damage zones that have had displacement in Holocene time reported or indicated within 200 feet of the Unit.

Edwards Power Station – Ash Pond Location Restriction – Fault Areas 16 October 2018 Page 2

§257.62(b): The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer or approval from the Participating State Director or approval from EPA where EPA is the permitting authority stating that the demonstration meets the requirements of paragraph (a) of this section.

I, Steven F. Putrich, being a Registered Professional Engineer in good standing in the State of Illinois, do hereby certify, to the best of my knowledge, information, and belief, that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify, for the above-referenced CCR Unit, that the demonstration that the CCR Unit is not located within 60 meters (200 feet) of the outermost damage zone of a fault that has had a displacement in Holocene time as included in the CCR Rule Location Restrictions Evaluation memorandum dated 12 October 2018 meets the requirements of 40 CFR §257.62(a).

Signed:

Consulting Engineer

Print Name:

Steven F. Putrich

Illinois License No.:

62048779

Title:

Vice President

Company:

Haley & Aldrich, Inc.





#### **MEMORANDUM**

16 October 2018 File No. 129788

SUBJECT:

Location Restriction Demonstration - Seismic Impact Zone

**Edwards Power Station** 

Ash Pond

Bartonville, Illinois

Illinois Power Resources Generating, LLC operates the coal-fired Edwards Power Station (Plant) located near Bartonville, Illinois. The Ash Pond (Unit) is an existing coal combustion residuals (CCR) surface impoundment. This demonstration addresses the requirements of 40 CFR §257.63 (Seismic Impact Zones) of the U.S. Environmental Protection Agency's (EPA) rule entitled Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities. 80 Fed. Reg. 21,302 (Apr. 17, 2015) (promulgating 40 CFR §257.63); 83 Fed. Reg. 36,435 (July 30, 2018) (amending 40 CFR §257.63).

§257.63(a): New CCR landfills, existing and new CCR surface impoundments, and all lateral expansions of a CCR units must not be located in seismic impact zones unless the owner or operator demonstrates by the dates specified in paragraph (c) of this section that all structural components including liners, leachate collection and removal systems, and surface water control systems, are designed to resist the maximum horizontal acceleration in lithified earth material for the site.

A Seismic Impact Zone is defined in the CCR Rule (40 CFR §257.63) as "an area having a 2% or greater probability that the maximum expected horizontal acceleration, expressed as a percentage of the earth's gravitational pull (g), will exceed 0.10 g in 50 years". The 2014 US Geological Survey Hazard Map raw data for the E.D. Edwards Power Station Ash Pond indicates that the maximum expected horizontal acceleration for 2 percent probability of exceedance in 50 years is 0.06g. Accordingly, the Unit is not located in a seismic impact zone and a demonstration that the structural components have been designed to resist the maximum horizontal acceleration in lithified earth material for the site is not required.

Edwards Power Station – Ash Pond Location Restriction – Seismic Impact Zone 16 October 2018 Page 2

§257.63(b): The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer or approval from the Participating State Director or approval from EPA where EPA is the permitting authority stating that the demonstration meets the requirements of paragraph (a) of this section.

I, Steven F. Putrich, being a Registered Professional Engineer in good standing in the State of Illinois, do hereby certify, to the best of my knowledge, information, and belief, that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify, that the CCR Unit is not located in a seismic impact zone as included in the CCR Rule Location Restrictions Evaluation memorandum dated 12 October 2018 and, therefore, satisfies all requirements of 40 CFR §257.63(a).

Signed:

Consulting Engineer

Print Name:

Steven F. Putrich

Illinois License No.:

62048779

Title:

Vice President

Company:

Haley & Aldrich, Inc







### **MEMORANDUM**

16 October 2018 File No. 129788

SUBJECT:

Location Restriction Demonstration - Unstable Areas

**Edwards Power Station** 

Ash Pond

Bartonville, Illinois

Illinois Power Resources Generating, LLC operates the coal-fired Edwards Power Station (Plant) located near Bartonville, Illinois. The Ash Pond (Unit) is an existing coal combustion residuals (CCR) surface impoundment. This demonstration addresses the requirements of 40 CFR §257.64 (Unstable Areas) of the U.S. Environmental Protection Agency's (EPA) rule entitled Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities. 80 Fed. Reg. 21,302 (Apr. 17, 2015) (promulgating 40 CFR §257.64); 83 Fed. Reg. 36,435 (July 30, 2018) (amending 40 CFR §257.64).

§257.64(a): An existing or new CCR landfill, existing or new CCR surface impoundment, or any lateral expansion of a CCR unit must not be located in an unstable area unless the owner or operator demonstrates by the dates specified in paragraph (d) of this section that recognized and generally accepted good engineering practices have been incorporated into the design of the CCR unit to ensure that the integrity of the structural components of the CCR unit will not be disrupted.

§257.64(b): The owner or operator must consider all of the following factors, at a minimum, when determining whether an area is unstable:

- (1) On-site or local soil conditions that may result in significant differential settling;
- (2) On-site or local geologic or geomorphologic features; and
- (3) On-site or local human-made features or events (both surface and subsurface).

Determination of compliance with §257.64(b)(1) - Conditions associated with the potential for significant differential settlement due to liquefaction were not identified in the area where the Plant is located. A separate report completed by AECOM entitled "CCR Certification Report: Initial Structural Stability Assessment, Initial Safety Factor Assessment, and Initial Inflow Design Flood Control System Plan for the Ash Pond at E.D. Edwards Power Station" dated October 2016 concluded that the soils beneath the Unit are not susceptible to liquefaction.

Determination of compliance with §257.64(b)(2) - Based on available United States Geological Survey (USGS) and Illinois State Geological Survey (ISGS) information, karst topography or physiographic features such as sinkholes, vertical shafts, sinking streams, caves, large springs, or blind valleys do not exist at the Plant. To evaluate the susceptibility of landslides, we reviewed readily available USGS and ISGS data. The USGS data indicates that the Plant is in an area of high landslide incidence, however more detailed ISGS data indicates that there has not been a documented landslide occurrence at the

Edwards Power Station – Ash Pond Location Restriction – Unstable Areas 16 October 2018 Page 2

Unit. The ISGS documented landslide occurrences near the site are along U.S. Highway 24 and appear to be associated with roadside landslides. Accordingly, it is our opinion that the Unit is not located in an area that has high susceptibility to landslides.

Determination of compliance with §257.64(b)(3) - There are no documented surface or subsurface anthropogenic activities that would be indicative of creating unstable foundation conditions.

 $\underline{§257.64(c)}$ : The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer or approval from the Participating State Director or approval from EPA where EPA is the permitting authority stating that the demonstration meets the requirements of paragraph (a) of this section.

I, Steven F. Putrich, being a Registered Professional Engineer in good standing in the State of Illinois, do hereby certify, to the best of my knowledge, information, and belief, that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify, for the above-referenced CCR Unit, that the demonstration indicating the CCR Unit is not located in an unstable area as included in the CCR Rule Location Restrictions Evaluation memorandum dated 12 October 2018 meets the requirements of 40 CFR §257.64(a).

Signed:

Consulting Engineer

Print Name:

Steven F. Putrich

Illinois License No.:

62048779

Title:

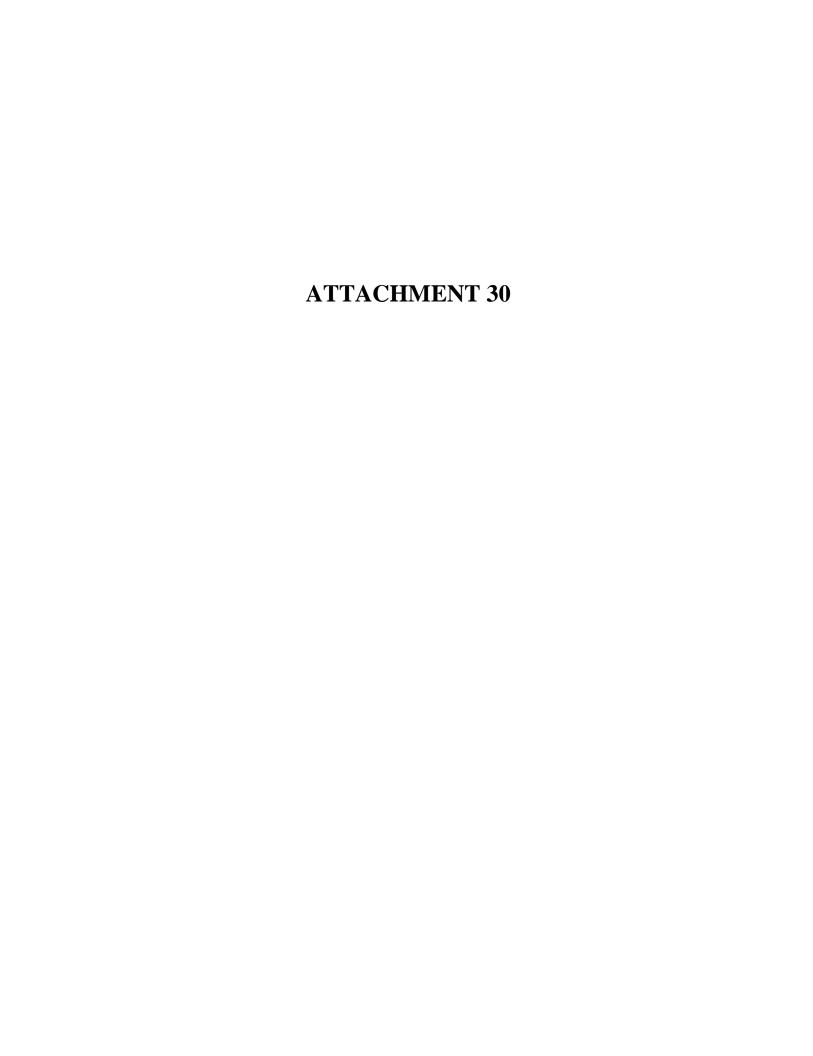
Vice President

Company:

Haley & Aldrich, Inc.









#### **MEMORANDUM**

16 October 2018 File No. 129788

SUBJECT:

Location Restriction Demonstration - Placement Above Uppermost Aquifer

East Ash Pond

Havana Power Station

Havana, Illinois

Dynegy Midwest Generating, LLC operates the coal-fired Havana Power Station (Plant) located near Havana, Illinois. The East Ash Pond (Unit), consisting of four sub-units (Cell 1 through Cell 4) is an existing coal combustion residuals (CCR) surface impoundment. This demonstration addresses the requirements of 40 CFR §257.60 (Placement above the uppermost aquifer) of the U.S. Environmental Protection Agency's (EPA) rule entitled Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities. 80 Fed. Reg. 21,302 (Apr. 17, 2015) (promulgating 40 CFR §257.60); 83 Fed. Reg. 36,435 (July 30, 2018) (amending 40 CFR §257.60).

§257.60(a): New CCR landfills, existing and new CCR surface impoundments, and all lateral expansions of CCR units must be constructed with a base that is located no less than 1.52 meters (five feet) above the upper limit of the uppermost aquifer, or must demonstrate that there will not be an intermittent, recurring, or sustained hydraulic connection between any portion of the base of the CCR unit and the uppermost aquifer due to normal fluctuations in groundwater elevations (including the seasonal high water table). The owner or operator must demonstrate by the dates specified in paragraph (c) of this section that the CCR unit meets the minimum requirements for placement above the uppermost aquifer.

Haley & Aldrich reviewed available information provided by Vistra including historic design drawings and based on review and evaluation of the information provided, the results do not demonstrate compliance with the requirements of 40 CFR §257.60(a).

Havana Power Station - East Ash Pond Location Restriction - Placement Above Uppermost Aquifer 16 October 2018 Page 2

 $\S257.60(b)$ : The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer or approval from the Participating State Director or approval from EPA where EPA is the permitting authority stating that the demonstration meets the requirements of paragraph (a) of this section.

I, Steven F. Putrich, being a Registered Professional Engineer in good standing in the State of Illinois, do hereby certify, to the best of my knowledge, information, and belief, that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify that the above-referenced CCR Unit does not meet the requirements of 40 CFR §257.60(a).

Signed:

Consulting Engineer

Print Name:

Steven F. Putrich

Illinois License No.:

62048779

Title:

Vice President

Company:

Haley & Aldrich, Inc.







### **MEMORANDUM**

16 October 2018 File No. 129788

SUBJECT:

Location Restriction Demonstration - Wetland Areas

Havana Power Station

East Ash Pond Havana, Illinois

Dynegy Midwest Generating, LLC operates the coal-fired Havana Power Station (Plant) located near Havana, Illinois. The East Ash Pond (Unit) is an existing coal combustion residuals (CCR) surface impoundment. This demonstration addresses the requirements of 40 CFR §257.61 (Wetlands) of the U.S. Environmental Protection Agency's (EPA) rule entitled Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities. 80 Fed. Reg. 21,302 (Apr. 17, 2015) (promulgating 40 CFR §257.61); 83 Fed. Reg. 36,435 (July 30, 2018) (amending 40 CFR §257.61.

§257.61(a): New CCR landfills, existing and new CCR surface impoundments, and all lateral expansions of CCR units must not be located in wetlands, as defined in §232.2 of this chapter, unless the owner or operator demonstrates by the dates specified in paragraph (c) of this section that the CCR unit meets the requirements of paragraphs (a)(1) through (5) of this section.

Based on a review of the U.S. Fish and Wildlife Service's National Wetland Inventory mapping, 0.5-meter resolution aerial imagery (2016) and the results of on-site field assessments, the Unit is not located in wetlands as defined by 40 CFR §232.2.

Havana Power Station – East Ash Pond Location Restriction – Wetland Areas 16 October 2018 Page 2

§257.61(b): The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer or approval from the Participating State Director or approval from EPA where EPA is the permitting authority stating that the demonstration meets the requirements of paragraph (a) of this section.

I, Steven F. Putrich, being a Registered Professional Engineer in good standing in the State of Illinois, do hereby certify, to the best of my knowledge, information, and belief, that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify, for the above-referenced CCR Unit, that the CCR Unit is not located in wetlands as included in the CCR Rule Location Restrictions Evaluation memorandum dated 12 October 2018 and, therefore, meets the requirements of 40 CFR §257.61(a).

Signed:

Consulting Engineer

Print Name:

Steven F. Putrich

Illinois License No.:

62048779

Title:

Vice President

Company:

Haley & Aldrich, Inc.





#### MEMORANDUM

16 October 2018 File No. 129788

SUBJECT:

Location Restriction Demonstration - Fault Areas

Havana Power Station

East Ash Pond Havana, Illinois

Dynegy Midwest Generating, LLC operates the coal-fired Havana Power Station (Plant) located near Havana, Illinois. The East Ash Pond (Unit) is an existing coal combustion residuals (CCR) surface impoundment. This demonstration addresses the requirements of 40 CFR §257.62 (Fault Areas) of the U.S. Environmental Protection Agency's (EPA) rule entitled Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities. 80 Fed. Reg. 21,302 (Apr. 17, 2015) (promulgating 40 CFR §257.62); 83 Fed. Reg. 36,435 (July 30, 2018) (amending 40 CFR §257.62).

§257.62(a): New CCR landfills, existing and new CCR surface impoundments, and all lateral expansions of CCR units must not be located within 60 meters (200 feet) of the outermost damage zone of a fault that has had displacement in Holocene time unless the owner or operator demonstrates by the dates specified in paragraph (c) of this section that an alternative setback distance of less than 60 meters (200 feet) will prevent damage to the structural integrity of the CCR unit.

A review of available data from the U.S. Geologic Survey, the Illinois State Geological Survey, and other available information was completed for this demonstration. The nearest known mapped fault is the Sicily Fault, which is located approximately 55 miles southeast and the timeframe of the most recent activity on these faults is not known. Based on the available published geologic data and information reviewed, there are no active faults or fault damage zones that have had displacement in Holocene time reported or indicated within 200 feet of the Unit.

Havana Power Station – East Ash Pond Location Restriction – Fault Areas 16 October 2018 Page 2

 $\S257.62(b)$ : The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer or approval from the Participating State Director or approval from EPA where EPA is the permitting authority stating that the demonstration meets the requirements of paragraph (a) of this section.

I, Steven F. Putrich, being a Registered Professional Engineer in good standing in the State of Illinois, do hereby certify, to the best of my knowledge, information, and belief, that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify, for the above-referenced CCR Unit, that the demonstration that the CCR Unit is not located within 60 meters (200 feet) of the outermost damage zone of a fault that has had a displacement in Holocene time as included in the CCR Rule Location Restrictions Evaluation memorandum dated 12 October 2018 meets the requirements of 40 CFR §257.62(a).

Signed:

Consulting Engineer

Print Name:

Steven F. Putrich

Illinois License No.:

62048779

Title:

Vice President

Company:

Haley & Aldrich, Inc.





### **MEMORANDUM**

16 October 2018 File No. 129788

SUBJECT:

Location Restriction Demonstration - Seismic Impact Zone

Havana Power Station

East Ash Pond Havana, Illinois

Dynegy Midwest Generating, LLC. operates the coal-fired Havana Power Station (Plant) located near Havana, Illinois. The East Ash Pond (Unit) is an existing coal combustion residuals (CCR) surface impoundment. This demonstration addresses the requirements of 40 CFR §257.63 (Seismic Impact Zones) of the U.S. Environmental Protection Agency's (EPA) rule entitled Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities. 80 Fed. Reg. 21,302 (Apr. 17, 2015) (promulgating 40 CFR §257.63); 83 Fed. Reg. 36,435 (July 30, 2018) (amending 40 CFR §257.63).

§257.63(a): New CCR landfills, existing and new CCR surface impoundments, and all lateral expansions of CCR units must not be located in seismic impact zones unless the owner or operator demonstrates by the dates specified in paragraph (c) of this section that all structural components including liners, leachate collection and removal systems, and surface water control systems, are designed to resist the maximum horizontal acceleration in lithified earth material for the site.

A Seismic Impact Zone is defined in the CCR Rule (40 CFR §257.63) as "an area having a 2% or greater probability that the maximum expected horizontal acceleration, expressed as a percentage of the earth's gravitational pull (g), will exceed 0.10 g in 50 years." The 2014 US Geological Survey Hazard Map raw data for the Havana Power Station East Ash Pond indicates that the maximum expected horizontal acceleration for 2 percent probability of exceedance in 50 years is 0.07g. Accordingly, the Unit is not located in a seismic impact zone and a demonstration that the structural components have been designed to resist the maximum horizontal acceleration in lithified earth material for the site is not required.

Havana Power Station – East Ash Pond Location Restriction – Seismic Impact Zone 16 October 2018 Page 2

§257.63(b): The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer or approval from the Participating State Director or approval from EPA where EPA is the permitting authority stating that the demonstration meets the requirements of paragraph (a) of this section.

I, Steven F. Putrich, being a Registered Professional Engineer in good standing in the State of Illinois, do hereby certify, to the best of my knowledge, information, and belief, that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify, that the CCR Unit is not located in a seismic impact zone as included in the CCR Rule Location Restrictions Evaluation memorandum dated 12 October 2018 and, therefore, satisfies all requirements of 40 CFR §257.63(a).

Signed:

Consulting Engineer

Print Name:

Steven F. Putrich

Illinois License No.:

62048779

Title:

Vice President

Company:

Haley & Aldrich, Inc







### **MEMORANDUM**

16 October 2018 File No. 129788

SUBJECT:

Location Restriction Demonstration - Unstable Areas

Havana Power Station

East Ash Pond Havana, Illinois

Dynegy Midwest Generating, LLC operates the coal-fired Havana Power Station (Plant) located near Havana, Illinois. The East Ash Pond (Unit) is an existing coal combustion residuals (CCR) surface impoundment. This demonstration addresses the requirements of 40 CFR §257.64 (*Unstable Areas*) of the U.S. Environmental Protection Agency's (EPA) rule entitled *Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities*. 80 Fed. Reg. 21,302 (Apr. 17, 2015) (promulgating 40 CFR §257.64); 83 Fed. Reg. 36,435 (July 30, 2018) (amending 40 CFR §257.64).

§257.64(a): An existing or new CCR landfill, existing or new CCR surface impoundment, or any lateral expansion of a CCR unit must not be located in an unstable area unless the owner or operator demonstrates by the dates specified in paragraph (d) of this section that recognized and generally accepted good engineering practices have been incorporated into the design of the CCR unit to ensure that the integrity of the structural components of the CCR unit will not be disrupted.

§257.64(b): The owner or operator must consider all of the following factors, at a minimum, when determining whether an area is unstable:

- (1) On-site or local soil conditions that may result in significant differential settling;
- (2) On-site or local geologic or geomorphologic features; and
- (3) On-site or local human-made features or events (both surface and subsurface).

Determination of compliance with §257.64(b)(1) - Conditions associated with the potential for significant differential settlement due to liquefaction were not identified in the area where the Plant is located. A separate report completed by AECOM entitled "CCR Certification Report: Initial Structural Stability Assessment, Initial Safety Factor Assessment, and Initial Inflow Design Flood Control System Plan for the East Ash Pond at Havana Power Station" dated October 2016 concluded that factor of safety against liquefaction for the silty soils are generally above 1.2 for the design seismic event.

Determination of compliance with §257.64(b)(2) - Based on available United States Geological Survey (USGS), Illinois State Geological Survey (ISGS) information, and communication with Vistra representatives familiar with the Plant's history, karst topography or physiographic features such as sinkholes, vertical shafts, sinking streams, caves, large springs, or blind valleys do not exist at the Plant. To evaluate the susceptibility of landslides, we reviewed readily available USGS and ISGS data. The USGS data indicates that the Plant is in an area of high landslide susceptibility and low incidence, however more detailed ISGS data indicates that there has not been a documented landslide occurrence at or near

Havana Power Station – East Ash Pond Location Restriction – Unstable Areas 16 October 2018 Page 2

the Unit. The closest documented landslide is approximately 5 miles away. Accordingly, it is our opinion that the Unit is not located in an area that has high susceptibility to landslides.

Determination of compliance with §257.64(b)(3) - There are no documented surface or subsurface anthropogenic activities that would be indicative of creating unstable foundation conditions.

 $\S 257.64(c)$ : The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer or approval from the Participating State Director or approval from EPA where EPA is the permitting authority stating that the demonstration meets the requirements of paragraph (a) of this section.

I, Steven F. Putrich, being a Registered Professional Engineer in good standing in the State of Illinois, do hereby certify, to the best of my knowledge, information, and belief, that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify, for the above-referenced CCR Unit, that the demonstration indicating the CCR Unit is not located in an unstable area as included in the CCR Rule Location Restrictions Evaluation memorandum dated 12 October 2018 meets the requirements of 40 CFR §257.64(a).

Signed:

Consulting Engineer

Print Name:

Steven F. Putrich

Illinois License No.:

62048779

Title:

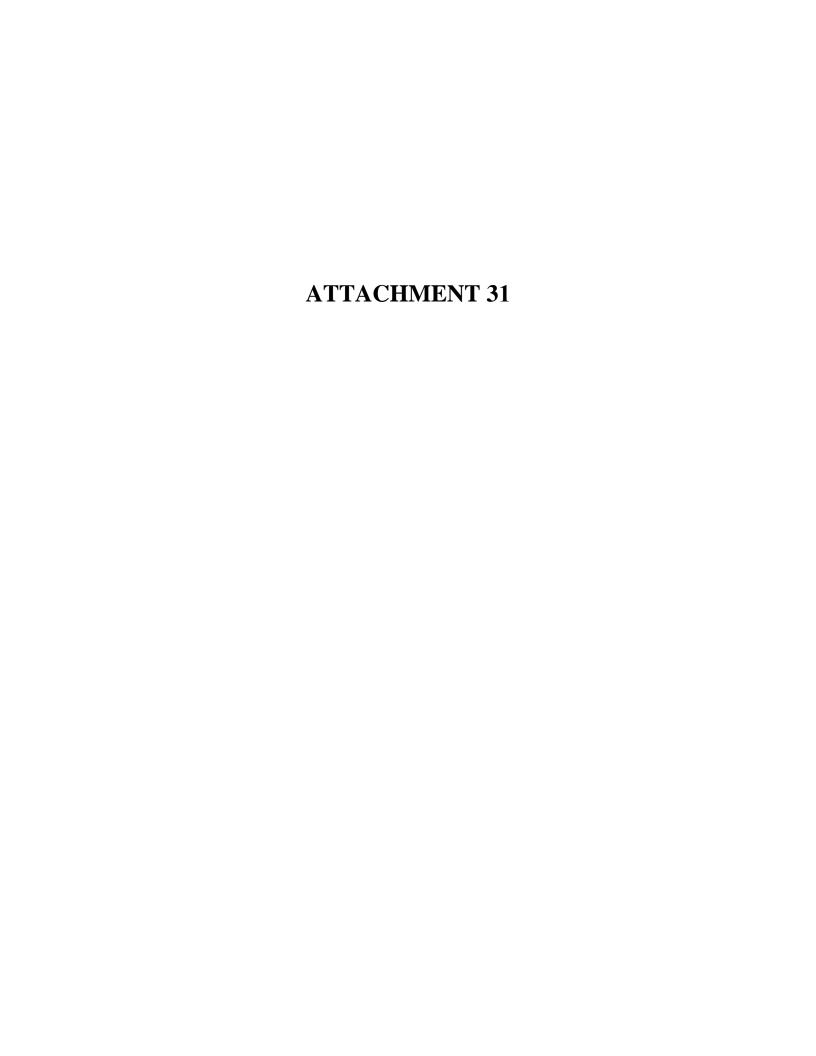
Vice President

Company:

Haley & Aldrich, Inc.









### **MEMORANDUM**

16 October 2018 File No. 129788

SUBJECT:

Location Restriction Demonstration - Placement Above Uppermost Aquifer

East Ash Pond

Hennepin Power Station Hennepin, Illinois

Dynegy Midwest Generating, LLC operates the coal-fired Hennepin Power Station (Plant) located near Hennepin, Illinois. The East Ash Pond (Unit) is an existing coal combustion residuals (CCR) surface impoundment. This demonstration addresses the requirements of 40 CFR §257.60 (*Placement above the uppermost aquifer*) of the U.S. Environmental Protection Agency's (EPA) rule entitled *Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities*. 80 Fed. Reg. 21,302 (Apr. 17, 2015) (promulgating 40 CFR §257.60); 83 Fed. Reg. 36,435 (July 30, 2018) (amending 40 CFR §257.60).

§257.60(a): New CCR landfills, existing and new CCR surface impoundments, and all lateral expansions of CCR units must be constructed with a base that is located no less than 1.52 meters (five feet) above the upper limit of the uppermost aquifer, or must demonstrate that there will not be an intermittent, recurring, or sustained hydraulic connection between any portion of the base of the CCR unit and the uppermost aquifer due to normal fluctuations in groundwater elevations (including the seasonal high water table). The owner or operator must demonstrate by the dates specified in paragraph (c) of this section that the CCR unit meets the minimum requirements for placement above the uppermost aquifer.

Haley & Aldrich reviewed available information provided by Vistra including historic record drawings and design drawings and based on review and evaluation of the information provided, the results do not demonstrate compliance with the requirements of 40 CFR §257.60(a).

Hennepin Power Station - East Ash Pond Location Restriction - Placement Above Uppermost Aquifer 16 October 2018 Page 2

 $\underline{§257.60(b)}$ : The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer or approval from the Participating State Director or approval from EPA where EPA is the permitting authority stating that the demonstration meets the requirements of paragraph (a) of this section.

I, Steven F. Putrich, being a Registered Professional Engineer in good standing in the State of Illinois, do hereby certify, to the best of my knowledge, information, and belief, that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify that the above-referenced CCR Unit does not meet the requirements of 40 CFR §257.60(a).

Signed:

Consulting Engineer

Print Name:

Steven F. Putrich

Illinois License No.:

62048779

Title:

Vice President

Company:

Haley & Aldrich, Inc.







#### **MEMORANDUM**

16 October 2018 File No. 129788

SUBJECT:

Location Restriction Demonstration - Wetland Areas

Hennepin Power Station

East Ash Pond Hennepin, Illinois

Dynegy Midwest Generation, LLC operates the coal-fired Hennepin Power Station (Plant) located near Hennepin, Illinois. The East Ash Pond (Unit) is an existing coal combustion residuals (CCR) surface impoundment. This demonstration addresses the requirements of 40 CFR §257.61 (Wetlands) of the U.S. Environmental Protection Agency's (EPA) rule entitled Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities. 80 Fed. Reg. 21,302 (Apr. 17, 2015) (promulgating 40 CFR §257.61); 83 Fed. Reg. 36,435 (July 30, 2018) (amending 40 CFR §257.61.

§257.61(a): New CCR landfills, existing and new CCR surface impoundments, and all lateral expansions of CCR units must not be located in wetlands, as defined in §232.2 of this chapter, unless the owner or operator demonstrates by the dates specified in paragraph (c) of this section that the CCR unit meets the requirements of paragraphs (a)(1) through (5) of this section.

Based on a review of the U.S. Fish and Wildlife Service's National Wetland Inventory mapping, 0.5-meter resolution aerial imagery (2016) and the results of on-site field assessments, the Unit is not located in wetlands as defined by 40 CFR §232.2.

Hennepin Power Station – East Ash Pond Location Restriction – Wetland Areas 16 October 2018 Page 2

§257.61(b): The owner or operator of the CCR unit must obtain a certification from a qualified professional engineers or approval from the Participating State Director or approval from EPA where EPA is the permitting authority stating that the demonstration meets the requirements of paragraph (a) of this section.

I, Steven F. Putrich, being a Registered Professional Engineer in good standing in the State of Illinois, do hereby certify, to the best of my knowledge, information, and belief, that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify, for the above-referenced CCR Unit, that the CCR Unit is not located in wetlands as included in the CCR Rule Location Restrictions Evaluation memorandum dated 12 October 2018 and, therefore, meets the requirements of 40 CFR §257.61(a).

Signed:

Consulting Engineer

Print Name:

Steven F. Putrich

Illinois License No.:

62048779

Title:

Vice President

Company:

Haley & Aldrich, Inc.







### **MEMORANDUM**

16 October 2018 File No. 129788

SUBJECT:

Location Restriction Demonstration - Fault Areas

Hennepin Power Station

East Ash Pond Hennepin, Illinois

Dynegy Midwest Generation, LLC operates the coal-fired Hennepin Power Station (Plant) located near Hennepin, Illinois. The East Ash Pond (Unit) is an existing coal combustion residuals (CCR) surface impoundment. This demonstration addresses the requirements of 40 CFR §257.62 (Fault Areas) of the U.S. Environmental Protection Agency's (EPA) rule entitled Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities. 80 Fed. Reg. 21,302 (Apr. 17, 2015) (promulgating 40 CFR §257.62); 83 Fed. Reg. 36,435 (July 30, 2018) (amending 40 CFR §257.62).

§257.62(a): New CCR landfills, existing and new CCR surface impoundments, and all lateral expansions of CCR units must not be located within 60 meters (200 feet) of the outermost damage zone of a fault that has had displacement in Holocene time unless the owner or operator demonstrates by the dates specified in paragraph (c) of this section that an alternative setback distance of less than 60 meters (200 feet) will prevent damage to the structural integrity of the CCR unit.

A review of available data from the U.S. Geologic Survey, the Illinois State Geological Survey, and other available information was completed for this demonstration. The nearest known mapped faults area a series of four unnamed faults associated with the Troy Grove Dome, which is located approximately 11 miles northeast and the timeframe of the most recent activity on these faults is not known. Based on the available published geologic data and information reviewed, there are no active faults or fault damage zones that have had displacement in Holocene time reported or indicated within 200 feet of the Unit.

Hennepin Power Station – East Ash Pond Location Restriction – Fault Areas 16 October 2018 Page 2

§257.62(b): The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer or approval from the Participating State Director or approval from EPA where EPA is the permitting authority stating that the demonstration meets the requirements of paragraph (a) of this section.

I, Steven F. Putrich, being a Registered Professional Engineer in good standing in the State of Illinois, do hereby certify, to the best of my knowledge, information, and belief, that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify, for the above-referenced CCR Unit, that the demonstration that the CCR Unit is not located within 60 meters (200 feet) of the outermost damage zone of a fault that has had a displacement in Holocene time as included in the CCR Rule Location Restrictions Evaluation memorandum dated 12 October 2018 meets the requirements of 40 CFR §257.62(a).

Signed:

Consulting Engineer

Print Name:

Steven F. Putrich

Illinois License No.:

62048779

Title:

Vice President

Company:

Haley & Aldrich, Inc.





### **MEMORANDUM**

16 October 2018 File No. 129788

SUBJECT:

Location Restriction Demonstration - Seismic Impact Zone

Hennepin Power Station

East Ash Pond Hennepin, Illinois

Dynegy Midwest Generation, LLC operates the coal-fired Hennepin Power Station (Plant) located near Hennepin, Illinois. The East Ash Pond (Unit) is an existing coal combustion residuals (CCR) surface impoundment This demonstration addresses the requirements of 40 CFR §257.63 (Seismic Impact zones) of the U.S. Environmental Protection Agency's (EPA) rule entitled Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities. 80 Fed. Reg. 21,302 (Apr. 17, 2015) (promulgating 40 CFR §257.63); 83 Fed. Reg. 36,435 (July 30, 2018) (amending 40 CFR §257.63).

§257.63(a): New CCR landfills, existing and new CCR surface impoundments, and all lateral expansions of CCR units must not be located in seismic impact zones unless the owner or operator demonstrates by the dates specified in paragraph (c) of this section that all structural components including liners, leachate collection and removal systems, and surface water control systems, are designed to resist the maximum horizontal acceleration in lithified earth material for the site.

A Seismic Impact Zone is defined in the CCR Rule (40 CFR §257.63) as "an area having a 2% or greater probability that the maximum expected horizontal acceleration, expressed as a percentage of the earth's gravitational pull (g), will exceed 0.10 g in 50 years." The 2014 US Geological Survey Hazard Map raw data for the Hennepin Power Station East Ash Pond indicates that the maximum expected horizontal acceleration for 2 percent probability of exceedance in 50 years is 0.07g. Accordingly, the Unit is not located in a seismic impact zone and a demonstration that the structural components have been designed to resist the maximum horizontal acceleration in lithified earth material for the site is not required.

Hennepin Power Station – East Ash Pond Location Restriction – Seismic Impact Zone 16 October 2018 Page 2

§257.63(b): The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer or approval from the Participating State Director or approval from EPA where EPA is the permitting authority stating that the demonstration meets the requirements of paragraph (a) of this section.

I, Steven F. Putrich, being a Registered Professional Engineer in good standing in the State of Illinois, do hereby certify, to the best of my knowledge, information, and belief, that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify, that the CCR Unit is not located in a seismic impact zone as included in the CCR Rule Location Restrictions Evaluation memorandum dated 12 October 2018 and, therefore, satisfies all requirements of 40 CFR §257.63(a).

Signed:

**Consulting Engineer** 

Print Name:

Steven F. Putrich

Illinois License No.:

62048779

Title:

Vice President

Company:

Haley & Aldrich, Inc.







### MEMORANDUM

16 October 2018 File No. 129788

SUBJECT:

Location Restriction Demonstration - Unstable Areas

Hennepin Power Station

East Ash Pond Hennepin, Illinois

Dynegy Midwest Generation, LLC operates the coal-fired Hennepin Power Station (Plant) located near Hennepin, Illinois. The East Ash Pond (Unit) is an existing coal combustion residuals (CCR) surface impoundment. This demonstration addresses the requirements of 40 CFR §257.64 (Unstable Areas) of the U.S. Environmental Protection Agency's (EPA) rule entitled Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities. 80 Fed. Reg. 21,302 (Apr. 17, 2015) (promulgating 40 CFR §257.64); 83 Fed. Reg. 36,435 (July 30, 2018) (amending 40 CFR §257.64).

§257.64(a): An existing or new CCR landfill, existing or new CCR surface impoundment, or any lateral expansion of a CCR unit must not be located in an unstable area unless the owner or operator demonstrates by the dates specified in paragraph (d) of this section that recognized and generally accepted good engineering practices have been incorporated into the design of the CCR unit to ensure that the integrity of the structural components of the CCR unit will not be disrupted.

§257.64(b): The owner or operator must consider all of the following factors, at a minimum, when determining whether an area is unstable:

- (1) On-site or local soil conditions that may result in significant differential settling;
- (2) On-site or local geologic or geomorphologic features; and
- (3) On-site or local human-made features or events (both surface and subsurface).

Determination of compliance with §257.64(b)(1) - Conditions associated with the potential for significant differential settlement due to liquefaction were not identified in the area where the Plant is located. A separate report completed by AECOM entitled "CCR Certification Report: Initial Structural Stability Assessment, Initial Safety Factor Assessment, and Initial Inflow Design Flood Control System Plan for the East Ash Pond at Hennepin Power Station" dated October 2016 concluded that the soils beneath the Unit are not susceptible to liquefaction.

Determination of compliance with §257.64(b)(2) - Based on available United States Geological Survey (USGS), Illinois State Geological Survey (ISGS) information, and communication with Vistra representatives familiar with the Plant's history, karst topography or physiographic features such as sinkholes, vertical shafts, sinking streams, caves, large springs, or blind valleys do not exist at the Plant. To evaluate the susceptibility of landslides, we reviewed readily available USGS and ISGS data. The USGS data indicates that the Plant is in an area of high landslide susceptibility and low landslide incidence,

Hennepin Power Station – East Ash Pond Location Restriction – Unstable Areas 16 October 2018 Page 2

however more detailed ISGS data indicates that there has not been a documented landslide occurrence at the Unit. The closest ISGS documented landslide occurrences are approximately 3.5 to 5 miles away from the site and appear to be roadway landslides associated with Illinois Route 26 and Illinois Route 89. Accordingly, it is our opinion that the Unit is not located in an area that has high susceptibility to landslides.

Determination of compliance with §257.64(b)(3) - There are no documented surface or subsurface anthropogenic activities that would be indicative of creating unstable foundation conditions.

 $\S257.64(c)$ : The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer or approval from the Participating State Director or approval from EPA where EPA is the permitting authority stating that the demonstration meets the requirements of paragraph (a) of this section.

I, Steven F. Putrich, being a Registered Professional Engineer in good standing in the State of Illinois, do hereby certify, to the best of my knowledge, information, and belief, that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify, for the above-referenced CCR Unit, that the demonstration indicating the CCR Unit is not located in an unstable area as included in the CCR Rule Location Restrictions Evaluation memorandum dated 12 October 2018 meets the requirements of 40 CFR §257.64(a).

Signed:

Consulting Engineer

Print Name:

Steven F. Putrich

Illinois License No.:

62048779

Title:

Vice President

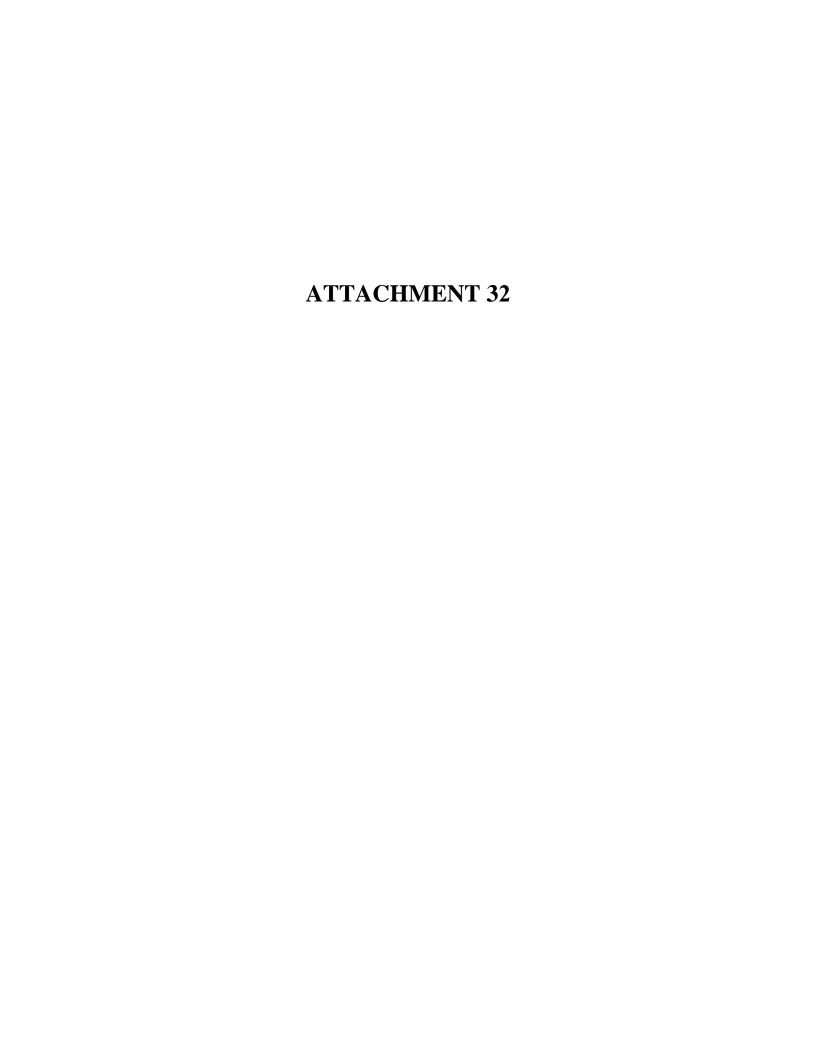
Company:

Haley & Aldrich, Inc.





The followin	g are attachment	s to the testimo	ony of Andrew	Rehn.	





HALEY & ALDRICH, INC. 6500 Rockside Road Suite 200 Cleveland, OH 44131 216.739.0555

### **MEMORANDUM**

16 October 2018 File No. 129788

SUBJECT:

Location Restriction Demonstration - Placement Above Uppermost Aquifer

Ash Pond

Kincaid Power Station

Kincaid, Illinois

Kincaid Generation, LLC operates the coal-fired Kincaid Power Station (Plant) located near Kincaid, Illinois. The Ash Pond (Unit) is an existing coal combustion residuals (CCR) surface impoundment. This demonstration addresses the requirements of 40 CFR §257.60 (Placement above the uppermost aquifer) of the US Environmental Protection Agency's (EPA) rule entitled Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities. 80 Fed. Reg. 21,302 (Apr. 17, 2015) (promulgating 40 CFR §257.60); 83 Fed. Reg. 36,435 (July 30, 2018) (amending 40 CFR §257.60).

§257.60(a): New CCR landfills, existing and new CCR surface impoundments, and all lateral expansions of CCR units must be constructed with a base that is located no less than 1.52 meters (five feet) above the upper limit of the uppermost aquifer, or must demonstrate that there will not be an intermittent, recurring, or sustained hydraulic connection between any portion of the base of the CCR unit and the uppermost aquifer due to normal fluctuations in groundwater elevations (including the seasonal high water table). The owner or operator must demonstrate by the dates specified in paragraph (c) of this section that the CCR unit meets the minimum requirements for placement above the uppermost aquifer.

Haley & Aldrich reviewed available information provided by Vistra including historic design reference documents, field investigations, and laboratory reports, and based on review and evaluation of the information provided, the results do not demonstrate compliance with the requirements of 40 CFR §257.60(a).

Kincaid Power Station - Ash Pond Location Restriction - Placement Above Uppermost Aquifer 16 October 2018 Page 2

 $\S257.60(b)$ : The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer or approval from the Participating State Director or approval from EPA where EPA is the permitting authority stating that the demonstration meets the requirements of paragraph (a) of this section.

I, Steven F. Putrich, being a Registered Professional Engineer in good standing in the State of Illinois, do hereby certify, to the best of my knowledge, information, and belief, that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify that the above-referenced CCR Unit does not meet the requirements of 40 CFR §257.60(a).

Signed:

Consulting Engineer

Print Name:

Steven F. Putrich

Illinois License No.:

62048779

Title:

Vice President

Company:

Haley & Aldrich, Inc.

Professional Engineer's Seal:







HALEY & ALDRICH, INC. 6500 Rockside Road Suite 200 Cleveland, OH 44131 216.739.0555

### **MEMORANDUM**

16 October 2018 File No. 129788

SUBJECT:

Location Restriction Demonstration - Wetland Areas

Kincaid Power Station

Ash Pond

Kincaid, Illinois

Kincaid Generating, LLC operates the coal-fired Kincaid Power Station (Plant) located near Kincaid, Illinois. The Ash Pond (Unit) is an existing coal combustion residuals (CCR) surface impoundment. This demonstration addresses the requirements of 40 CFR §257.61 (Wetlands) of the US Environmental Protection Agency's (EPA) rule entitled Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities. 80 Fed. Reg. 21,302 (Apr. 17, 2015) (promulgating 40 CFR §257.63); Fed. Reg. 36,435 (July 30, 2018) (amending 40 CFR §257.63).

§257.61(a): New CCR landfills, existing and new CCR surface impoundments, and all lateral expansions of CCR units must not be located in wetlands, as defined in §232.2 of this chapter, unless the owner or operator demonstrates by the dates specified in paragraph (c) of this section that the CCR unit meets the requirements of paragraphs (a)(1) through (5) of this section.

Based on a review of the U.S. Fish and Wildlife Service's National Wetland Inventory mapping, 0.5-meter resolution aerial imagery (2015) and the results of on-site field assessments, the Unit is not located in wetlands as defined by 40 CFR §232.2.

Kincaid Power Station – Ash Pond Location Restriction – Wetland Areas 16 October 2018 Page 2

§257.61(b): The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer or approval from the Participating State Director or approval from EPA where EPA is the permitting authority stating that the demonstration meets the requirements of paragraph (a) of this section.

I, Steven F. Putrich, being a Registered Professional Engineer in good standing in the State of Illinois, do hereby certify, to the best of my knowledge, information, and belief, that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify, for the above-referenced CCR Unit, that the CCR Unit is not located in wetlands as included in the CCR Rule Location Restrictions Evaluation memorandum dated 12 October 2018 and, therefore, meets the requirements of 40 CFR §257.61(a).

Signed:

Consulting Engineer

Print Name:

Steven F. Putrich

Illinois License No.:

62048779

Title:

Vice President

Company:

Haley & Aldrich, Inc.

Professional Engineer's Seal:







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#### **MEMORANDUM**

16 October 2018 File No. 129788

SUBJECT:

Location Restriction Demonstration - Fault Areas

Kincaid Power Station

Ash Pond Kincaid, Illinois

Dynegy operates the coal-fired Kincaid Power Station (Plant) located approximately 3 miles west of the City of Kincaid, Christian County, Illinois. The Ash Pond (Unit) is an existing coal combustion residuals (CCR) surface impoundment at the Plant. This demonstration addresses the requirements of 40 CFR §257.62 (Fault Areas) of the US Environmental Protection Agency's (EPA) rule entitled Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities. 80 Fed. Reg. 21,302 (Apr. 17, 2015) (promulgating 40 CFR §257.62); 83 Fed. Reg. 36,435 (July 30, 2018) (amending 40 CFR §257.62)

§257.62(a): New CCR landfills, existing and new CCR surface impoundments, and all lateral expansions of CCR units must not be located within 60 meters (200 feet) of the outermost damage zone of a fault that has had displacement in Holocene time unless the owner or operator demonstrates by the dates specified in paragraph (c) of this section that an alternative setback distance of less than 60 meters (200 feet) will prevent damage to the structural integrity of the CCR unit.

A review of available data from the U.S. Geologic Survey, the Illinois State Geological Survey, and other available information was completed for this demonstration. The nearest known mapped fault is the Sicily Fault which is located approximately 2 miles east and the known timeframe of the most recent activity on this fault is not known. Based on the available published geologic data and information reviewed, there are no active faults or fault damage zones that have had displacement in Holocene time reported or indicated within 200 feet of the Unit.

Kincaid Power Station —Ash Pond Location Restriction — Fault Areas 16 October 2018 Page 2

 $\S 257.62(b)$ : The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer or approval from the Participating State Director or approval from EPA where EPA is the permitting authority stating that the demonstration meets the requirements of paragraph (a) of this section.

I, Steven F. Putrich, being a Registered Professional Engineer in good standing in the State of Illinois, do hereby certify, to the best of my knowledge, information, and belief, that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify, for the above-referenced CCR Unit, that the demonstration that the CCR Unit is not located within 60 meters (200 feet) of the outermost damage zone of a fault that has had a displacement in Holocene time as included in the CCR Rule Location Restrictions Evaluation memorandum dated 12 October 2018 meets the requirements of 40 CFR §257.62(a).

Signed:

Consulting Engineer

Print Name:

Steven F. Putrich

Illinois License No.:

62048779

Title:

Vice President

Company:

Haley & Aldrich, Inc.

Professional Engineer's Seal:







HALEY & ALDRICH, INC. 6500 Rockside Road Suite 200 Cleveland, OH 44131 216.739.0555

### **MEMORANDUM**

16 October 2018 File No. 129788

SUBJECT:

Location Restriction Demonstration - Seismic Impact Zone

Kincaid Power Station

Ash Pond Kincaid, Illinois

Kincaid Generation, LLC operates the coal-fired Newton Power Station (Plant) located near Kincaid, Illinois. The Primary Ash Pond (Unit) is an existing coal combustion residuals (CCR) surface impoundment. This demonstration addresses the requirements of 40 CFR §257.63 (Seismic Impact Zones) of the U.S. Environmental Protection Agency's (EPA) rule entitled Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities. 80 Fed. Reg. 21,302 (Apr. 17, 2015) (promulgating 40 CFR §257.63); Fed. Reg. 36,435 (July 30, 2018) (amending 40 CFR §257.63).

§257.63(a): New CCR landfills, existing and new CCR surface impoundments, and all lateral expansions of CCR units must not be located in seismic impact zones unless the owner or operator demonstrates by the dates specified in paragraph (c) of this section that all structural components including liners, leachate collection and removal systems, and surface water control systems, are designed to resist the maximum horizontal acceleration in lithified earth material for the site.

The results of our evaluation indicate that the Unit is in compliance with 40 CFR §257.63(a). Although the Unit is located in a seismic impact zone, it satisfies the demonstration requirements of 40 CFR §257.63(a). The AECOM report entitled "CCR Certification Report: Initial Structural Stability Assessment, Initial Safety Factor Assessment, and Initial Inflow Design Flood Control System Plan for the Kincaid Ash Pond at Kincaid Power Station" dated October 2016 (AECOM Report), includes engineering analysis, calculations, and findings that support the requirements of 40 CFR §257.63(a), and provides documentation that those requirements have been evaluated by AECOM for the subject CCR unit.

Kincaid Power Station – Ash Pond Location Restriction – Seismic Impact Zone 16 October 2018 Page 2

§257.63(b): The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer or approval from the Participating State Director or approval from EPA where EPA is the permitting authority stating that the demonstration meets the requirements of paragraph (a) of this section.

I, Steven F. Putrich, being a Registered Professional Engineer in good standing in the State of Illinois, do hereby certify, to the best of my knowledge, information, and belief, that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify that the CCR Unit is located in a seismic impact zone as included in the CCR Rule Location Restriction Evaluation memorandum dated 12 October 2018 and satisfies all requirements of 40 CFR §257.63(a).

By providing this certification demonstration statement, we are not stating or inferring that we have verified or certified the details, assumptions, calculations and/or site condition models developed by AECOM in the subject report; those elements of the report are considered the professional opinions and determinations of AECOM.

Signed:

Consulting Engineer

Print Name:

Steven F. Putrich

Illinois License No.:

62048779

Title:

Vice President

Company:

Haley & Aldrich, Inc.

Professional Engineer's Seal:







HALEY & ALDRICH, INC. 6500 Rockside Road Suite 200 Cleveland, OH 44131 216.739.0555

#### **MEMORANDUM**

16 October 2018 File No. 129788

SUBJECT:

Location Restriction Demonstration - Unstable Areas

Kincaid Power Station

Ash Pond Kincaid, Illinois

Vistra Energy/Dynegy operates the coal-fired Kincaid Power Station (Plant) located near Kincaid, Illinois. The Ash Pond (Unit) is an existing coal combustion residuals (CCR) surface impoundment at the Plant. This demonstration addresses the requirements of 40 CFR §257.64 (Unstable Areas) of the US Environmental Protection Agency's (EPA) rule entitled Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities. 80 Fed. Reg. 21,302 (Apr. 17, 2015) (promulgating 40 CFR §257.63); Fed. Reg. 36,435 (July 30, 2018) (amending 40 CFR §257.63).

§257.64(a): An existing or new CCR landfill, existing or new CCR surface impoundment, or any lateral expansion of a CCR unit must not be located in an unstable area unless the owner or operator demonstrates by the dates specified in paragraph (d) of this section that recognized and generally accepted good engineering practices have been incorporated into the design of the CCR unit to ensure that the integrity of the structural components of the CCR unit will not be disrupted.

§257.64(b): The owner or operator must consider all of the following factors, at a minimum, when determining whether an area is unstable:

- (1) On-site or local soil conditions that may result in significant differential settling;
- (2) On-site or local geologic or geomorphologic features; and
- (3) On-site or local human-made features or events (both surface and subsurface).

Determination of compliance with §257.64(b)(1) - Conditions associated with the potential for significant differential settlement were not identified in the area where the Plant is located. A separate report completed by AECOM entitled "CCR Certification Report: Initial Structural Stability Assessment, Initial Safety Factor Assessment, and Initial Inflow Design Flood Control System Plan for the Kincaid Ash Pond at Kincaid Power Station" dated October 2016 concluded that the soils under the Unit are not susceptible to liquefaction.

Determination of compliance with §257.64(b)(2) - Based on available United States Geological Survey (USGS) and Illinois State Geological Survey (ISGS) information, karst topography or physiographic features such as sinkholes, vertical shafts, sinking streams, caves, large springs, or blind valleys do not exist at the Plant. In addition, communication with ISGS indicated that karst features are not common in Christian County, where the Unit is located. To evaluate the susceptibility of landslides, we reviewed readily available USGS and Illinois Department of Energy and Natural Resources (IDENR) data. The USGS

Kincaid Power Station – Ash Pond Location Restriction – Unstable Areas 16 October 2018 Page 2

data indicates that the Plant is in an area of low landslide incidence. A review of IDENR data indicated that there has not been a landslide occurrence at or near the Unit. Accordingly, it is our opinion that the Unit is not located in an area that has high susceptibility to landslides.

Determination of compliance with §257.64(b)(3) - An inactive underground mine is located below the Unit, however an evaluation by AECOM (2016) concluded that the presence of this underground mine does not negatively affect the stability of the Unit.

 $\S257.64(c)$ : The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer or approval from the Participating State Director or approval from EPA where EPA is the permitting authority stating that the demonstration meets the requirements of paragraph (a) of this section.

I, Steven F. Putrich, being a Registered Professional Engineer in good standing in the State of Illinois, do hereby certify, to the best of my knowledge, information, and belief, that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify, for the above-referenced CCR Unit, that the demonstration indicating the CCR Unit is not located in an unstable area as included in the CCR Rule Location Restrictions Evaluation memorandum dated 12 October 2018 meets the requirements of 40 CFR §257.64(a).

Signed:

Consulting Engineer

Print Name:

Steven F. Putrich

Illinois License No.:

62048779

Title:

Vice President

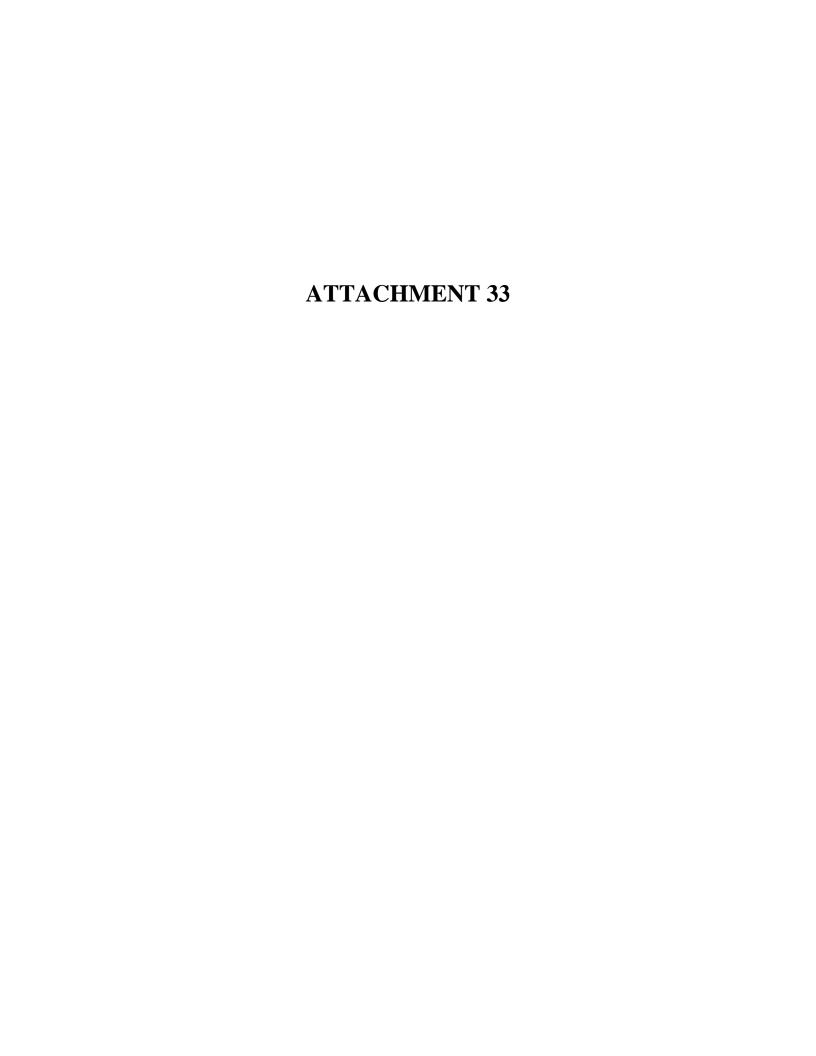
Company:

Haley & Aldrich, Inc.

Professional Engineer's Seal:









1420 Kensington Road, Suite 103 Oak Brook, Illinois 60523 Phone: 630.203.3340 Fax: 630.203.3341 www.geosyntec.com

# PLACEMENT ABOVE THE UPPERMOST AQUIFER LOCATION RESTRICTIONS SOUTH ASH PONDS 2S AND 3S WILL COUNTY STATION OCTOBER 2018

Pursuant to Code of Federal Regulations Title 40, Part 257, Subpart D (40 CFR), Section 257.62, Geosyntec Consultants (Geosyntec) prepared this report to document compliance with location restrictions related to placement above the uppermost aquifer for the existing South Ash Pond 2S and South Ash Pond 3S (the Ponds) at the Will County Station (Site) in Romeoville, Illinois.

The work presented in this report was performed under the direction of Mr. Jesse Varsho, P.G., P.E., of Geosyntec. Ms. Jane Soule, P.E., reviewed this report in accordance with Geosyntec's senior review policy.

### 1. Placement

South Ash Pond 2S and South Ash Pond 3S are not separated from the upper limit of the uppermost aquifer by a minimum of five (5) feet.

# 2. Limitations and Certification

This report was prepared in accordance with current practices and the standard of care exercised by scientists and engineers performing similar tasks in the field of civil engineering. The contents of this report are based solely on the observations of the conditions observed by Geosyntec personnel and information provided to Geosyntec by Midwest Generation. Consistent with applicable professional standards of care, our opinions and recommendations were based in part on data furnished by others, which was consistent with other information that we developed in the course of our performance of the scope of services. The information contained in this report is intended for use solely by Midwest Generation and their subconsultants.

JESSE PAUL VARSHO 062-059069

Jesse Varsho, P.E.

Illinois Professional Engineer No. 062.067766

License Expires: 11/30/19

of the





# WETLANDS LOCATION RESTRICTIONS SOUTH ASH PONDS 2S AND 3S WILL COUNTY STATION OCTOBER 2018

Pursuant to Code of Federal Regulations Title 40, Part 257, Subpart D (40 CFR), Section 257.61, Geosyntec Consultants (Geosyntec) prepared this report to document compliance with location restrictions related to wetlands for the existing South Ash Pond 2S and South Ash Pond 3S (the Ponds) at the Will County Station (Site) in Romeoville, Illinois.

The work presented in this report was performed under the direction of Mr. Jesse Varsho, P.G., P.E., of Geosyntec in accordance with §257.61. Ms. Jane Soule, P.E., reviewed this report in accordance with Geosyntec's senior review policy.

### 1. Wetlands Location Restriction Determination

South Ash Pond 2S and South Ash Pond 3S are not located in mapped wetlands included in the National Wetlands Inventory – Version 2 presented by the U.S. Fish and Wildlife Service (USFW) [USFW, 2018]. Therefore, the locations of the Ponds are in compliance with the requirements outlined in §257.61(a).

## 2. Limitations and Certification

This report was prepared in accordance with current practices and the standard of care exercised by scientists and engineers performing similar tasks in the field of civil engineering. The contents of this report are based solely on the observations of the conditions observed by Geosyntec personnel and information provided to Geosyntec by Midwest Generation. Consistent with applicable professional standards of care, our opinions and recommendations were based in part on data furnished by others, which was consistent with other information that we developed in the course of our performance of the scope of services. The information contained in this report is intended for use solely by Midwest Generation and their subconsultants.

Jesse Varsho, P.E.

Illinois Professional Engineer No. 062.067766

License Expires: 11/30/19

Wetlands Location Restrictions South Ash Pond 2S and South Ash Pond 3S, Will County Station October 2018

# 3. References

USFS, 2018. "National Wetlands Inventory, Version 2," <a href="https://www.fws.gov/wetlands/data/Mapper.html">https://www.fws.gov/wetlands/data/Mapper.html</a>, updated 1 May 2018, accessed 28 August 2018.





# FAULT AREAS LOCATION RESTRICTIONS SOUTH ASH PONDS 2S AND 3S WILL COUNTY STATION OCTOBER 2018

Pursuant to Code of Federal Regulations Title 40, Part 257, Subpart D (40 CFR), Section 257.62, Geosyntec Consultants (Geosyntec) prepared this report to document compliance with location restrictions related to fault areas for the existing South Ash Pond 2S and South Ash Pond 3S (the Ponds) at the Will County Station (Site) in Romeoville, Illinois.

The work presented in this report was performed under the direction of Mr. Jesse Varsho, P.G., P.E., of Geosyntec in accordance with §257.62. Ms. Jane Soule, P.E., reviewed this report in accordance with Geosyntec's senior review policy.

### 1. Fault Areas Location Restriction Determination

South Ash Pond 2S and South Ash Pond 3S are not located within 200 feet (60 meters) of a mapped Holocene-aged fault, as mapped by the United States Geological Survey (USGS) Quaternary Fault Database [USGS, 2018]. Therefore, the locations of the Ponds are in compliance with the requirements outlined in §257.62(a).

# 2. Limitations and Certification

This report was prepared in accordance with current practices and the standard of care exercised by scientists and engineers performing similar tasks in the field of civil engineering. The contents of this report are based solely on the observations of the conditions observed by Geosyntec personnel and information provided to Geosyntec by Midwest Generation. Consistent with applicable professional standards of care, our opinions and recommendations were based in part on data furnished by others, which was consistent with other information that we developed in the course of our performance of the scope of services. The information contained in this report is intended for use solely by Midwest Generation and their subconsultants.

Jesse Varsho, P.E.

Illinois Professional Engineer No. 062.067766

License Expires: 11/30/19

Fault Areas Location Restrictions South Ash Pond 2S and South Ash Pond 3S, Will County Station October 2018

# 3. References

USGS, 2018. "Quaternary Fault and Fold Database," <a href="https://earthquake.usgs.gov/hazards/qfaults/">https://earthquake.usgs.gov/hazards/qfaults/</a>, accessed 28 August 2018.





# SEISMIC IMPACT ZONES LOCATION RESTRICTIONS SOUTH ASH PONDS 2S AND 3S WILL COUNTY STATION OCTOBER 2018

Pursuant to Code of Federal Regulations Title 40, Part 257, Subpart D (40 CFR), Section 257.63, Geosyntec Consultants (Geosyntec) prepared this report to document compliance with location restrictions related to seismic impact areas for the existing South Ash Pond 2S and South Ash Pond 3S (the Ponds) at the Will County Station (Site) in Romeoville, Illinois.

The work presented in this report was performed under the direction of Mr. Jesse Varsho, P.G., P.E., of Geosyntec in accordance with §257.63. Ms. Jane Soule, P.E., reviewed this report in accordance with Geosyntec's senior review policy.

# 1. Seismic Impact Zones Restriction Determination

South Ash Pond 2S and South Ash Pond 3S are not located within a seismic impact zone as defined in §257.53 and as mapped by the United States Geological Survey (USGS) [USGS, 2014]. Therefore, the locations of the Ponds are in compliance with the requirements outlined in §257.63(a).

# 2. Limitations and Certification

This report was prepared in accordance with current practices and the standard of care exercised by scientists and engineers performing similar tasks in the field of civil engineering. The contents of this report are based solely on the observations of the conditions observed by Geosyntec personnel and information provided to Geosyntec by Midwest Generation. Consistent with applicable professional standards of care, our opinions and recommendations were based in part on data furnished by others, which was consistent with other information that we developed in the course of our performance of the scope of services. The information contained in this report is intended for use solely by Midwest Generation and their subconsultants.

Jesse Varsho, P.E.

Illinois Professional Engineer No. 062.067766

License Expires: 11/30/19

L The

Seismic Impact Zones Location Restrictions South Ash Pond 2S and South Ash Pond 3S, Will County Station October 2018

# 3. References

USGS, 2014. "2014 U.S. Geological Survey National Seismic Hazard Maps, PGA 2% in 50 Years," <a href="https://earthquake.usgs.gov/hazards/hazmaps/conterminous/index.php#2014">https://earthquake.usgs.gov/hazards/hazmaps/conterminous/index.php#2014</a>, accessed 28 August 2018.



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# UNSTABLE AREAS LOCATION RESTRICTIONS SOUTH ASH PONDS 2S AND 3S WILL COUNTY STATION OCTOBER 2018

Pursuant to Code of Federal Regulations Title 40, Part 257, Subpart D (40 CFR), Section 257.64, Geosyntec Consultants (Geosyntec) prepared this report to document compliance with location restrictions related to unstable areas for the existing South Ash Pond 2S and South Ash Pond 3S (the Ponds) at the Will County Station (Site) in Romeoville, Illinois.

The work presented in this report was performed under the direction of Mr. Jesse Varsho, P.G., P.E., of Geosyntec in accordance with §257.64. Ms. Jane Soule, P.E., reviewed this report in accordance with Geosyntec's senior review policy.

### 1. Unstable Areas Restriction Determination

South Ash Pond 2S and South Ash Pond 3S are not located in unstable areas based on a review of subsurface investigations at the site [Patrick, 2011], published liquefaction maps [ISGS, 2008] and a site visit by Geosyntec. Therefore, the locations of the Ponds are in compliance with the requirements outlined in §257.64(a).

## 2. Limitations and Certification

This report was prepared in accordance with current practices and the standard of care exercised contents of this report are based solely on the observations of the conditions observed by Geosyntec personnel and information provided to Geosyntec by Midwest Generation. Consistent with applicable professional standards of care, our opinions and recommendations were based in part on data furnished by others, which was consistent with other information that we developed in the course of our performance of the scope of services. The information contained in this report is intended for use solely by Midwest Generation and their subconsultants.

Jesse Varsho, P.E.

Illinois Professional Engineer No. 062.067766

License Expires: 11/30/19

Unstable Areas Location Restrictions South Ash Pond 2S and South Ash Pond 3S, Will County Station October 2018

# 3. References

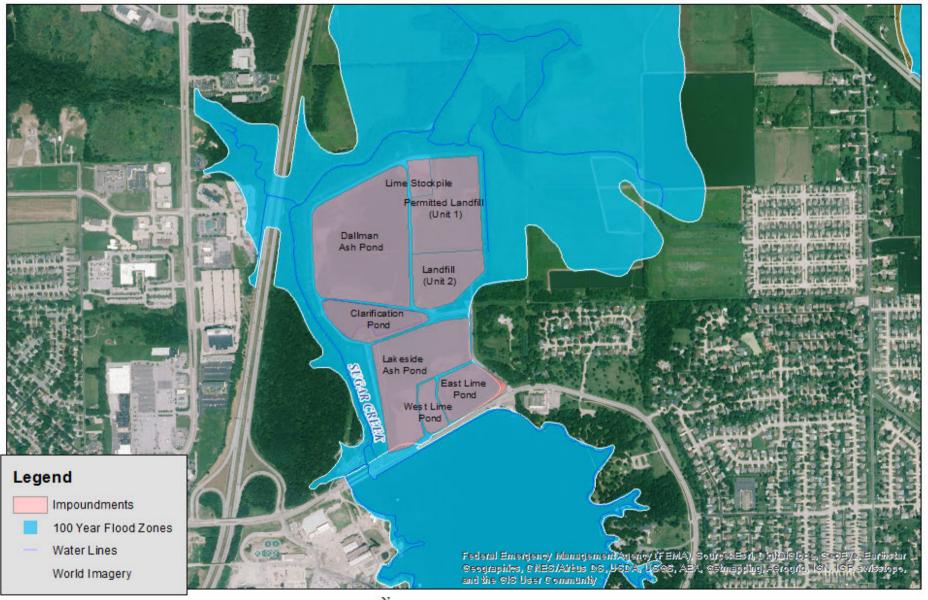
Illinois State Geological Survey (ISGS), 2008. "Illinois USGS I-2789 Map," accessed as GIS shape file, downloaded from <a href="http://isgs.illinois.edu/earthquake-consortium/digital-maps">http://isgs.illinois.edu/earthquake-consortium/digital-maps</a>, 26 September 2018.

Patrick Engineering, 2011. "Hydrogeologic Assessment Report, Will County Generating Station, Romeoville, Illinois," Patrick Project Number 21053.070, February.



# **Dallman Power Station**

Flood Risk

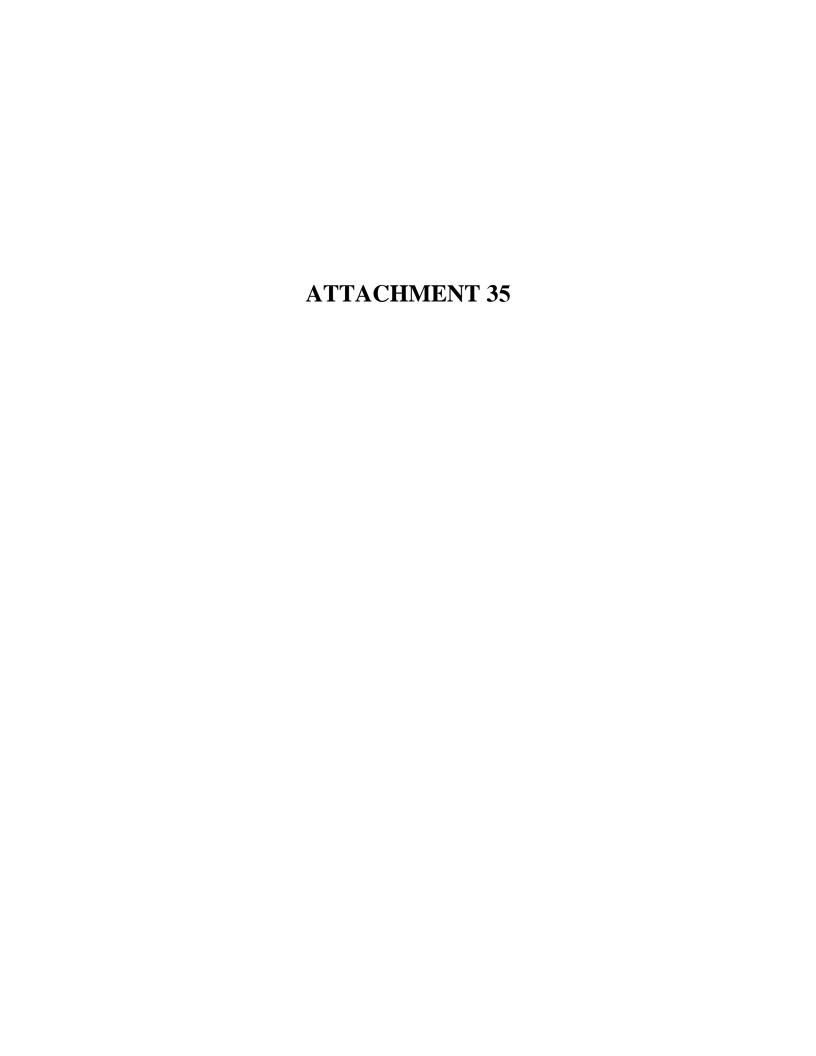




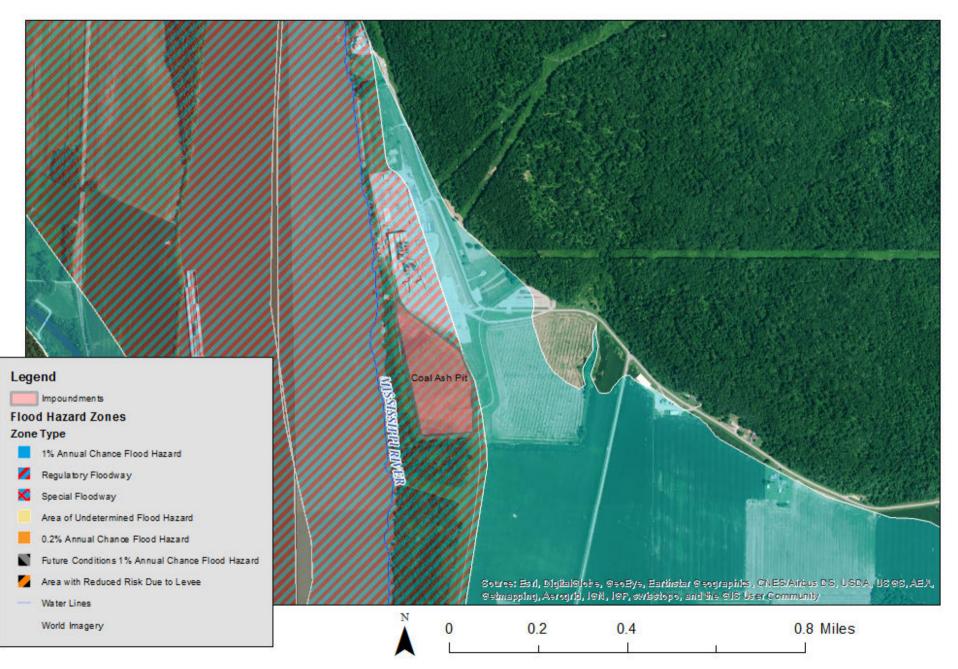
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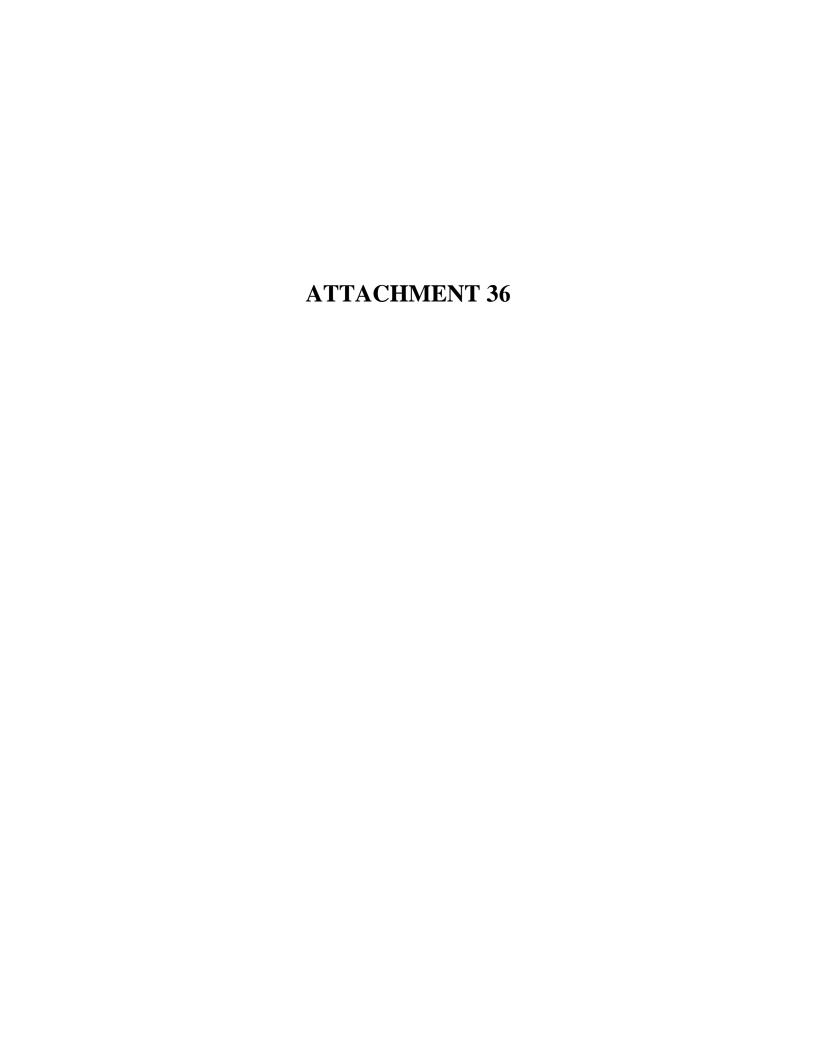
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1 Miles

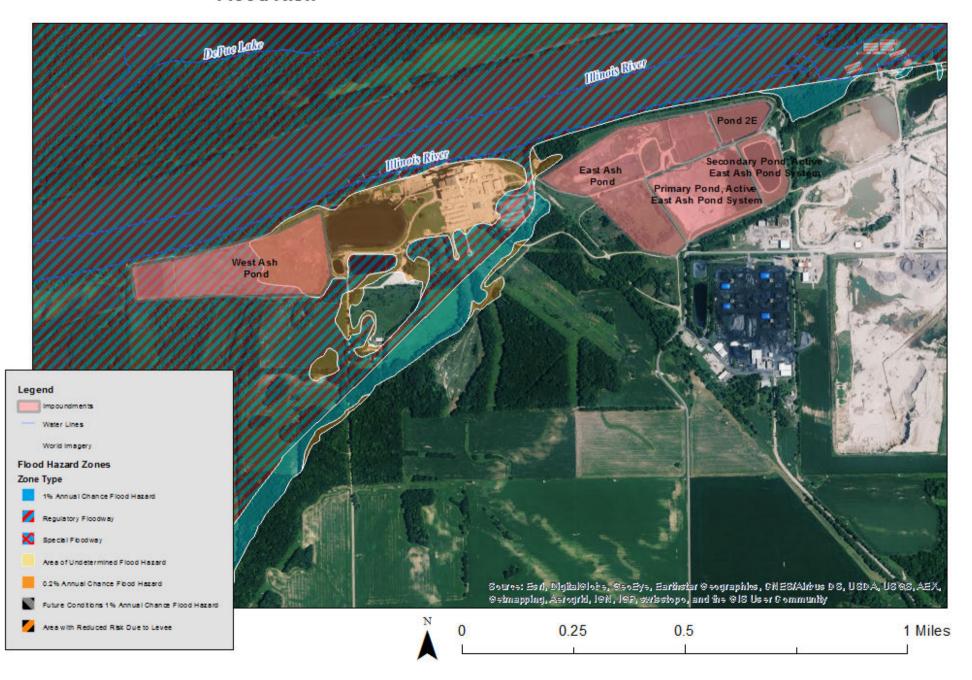


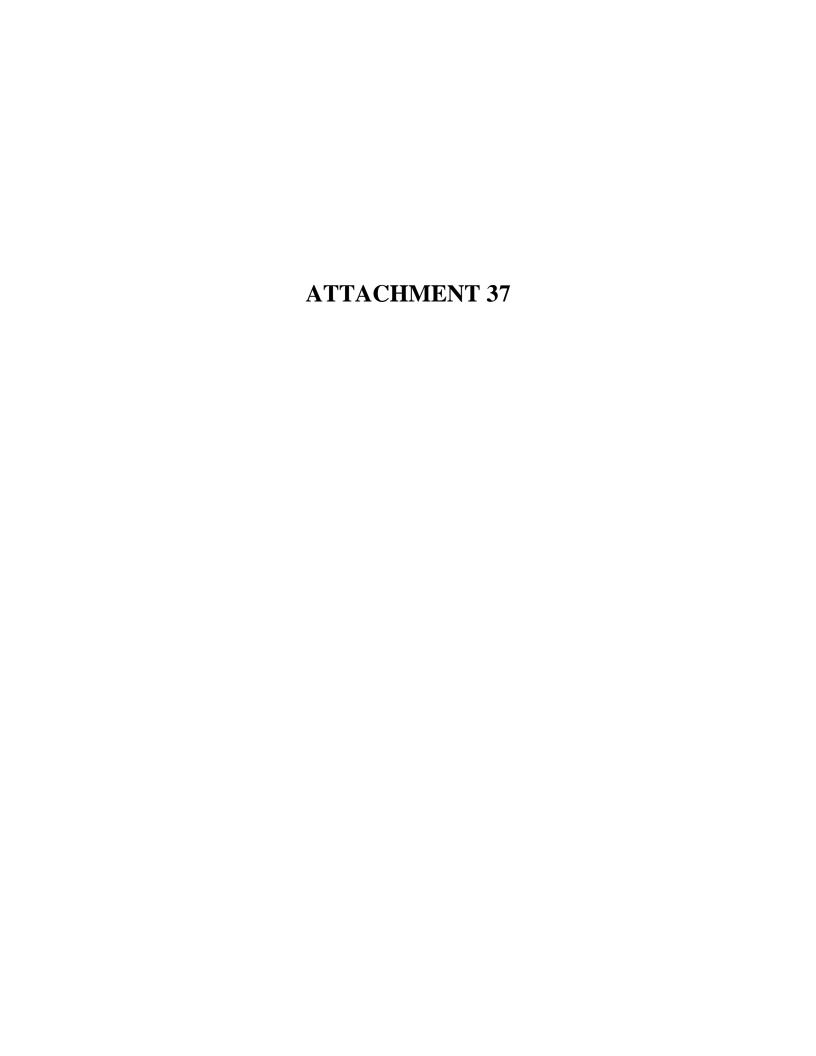
Andrew Rehn, Prairie Rivers Network Source: FEMA 100-Year Floodplain



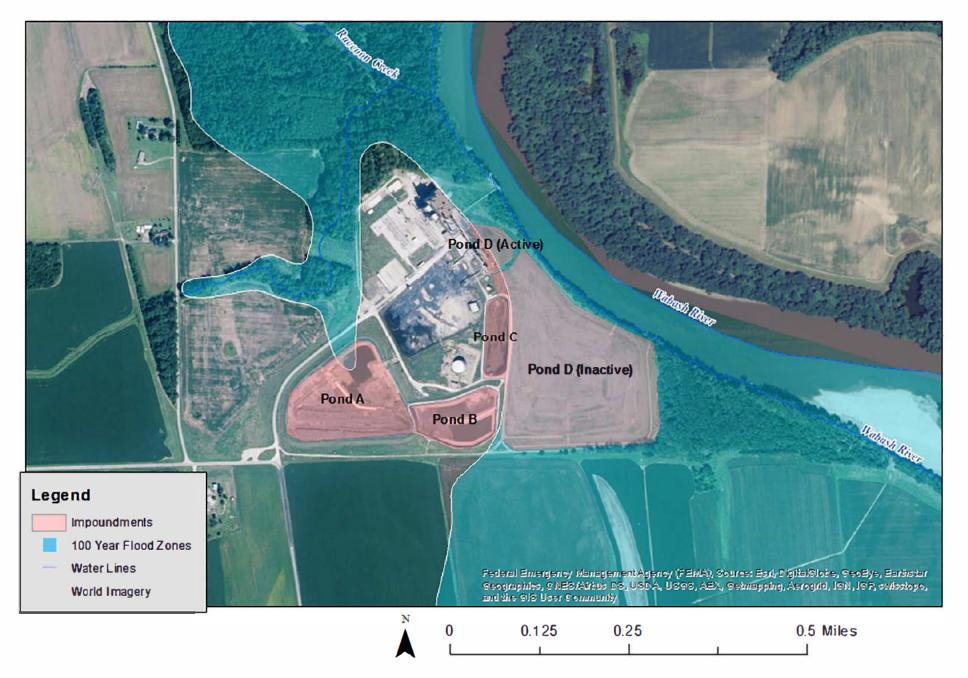


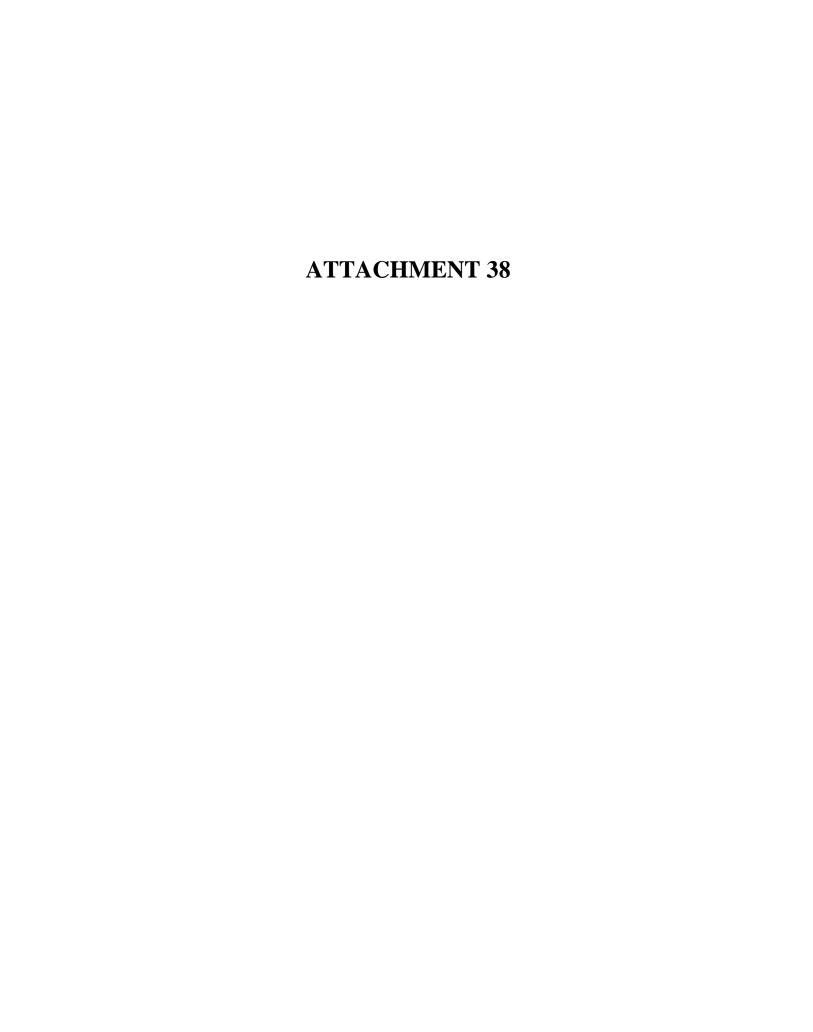
# **Hennepin Power Station**



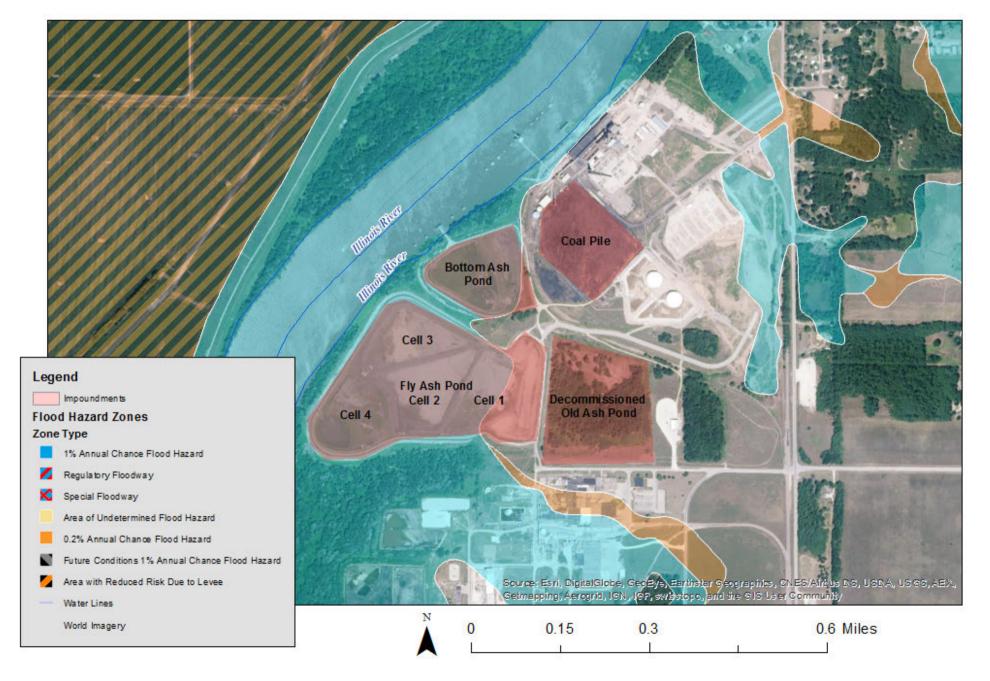


Andrew Rehn, Prairie Rivers Network Source: FEMA 100-Year Floodplain





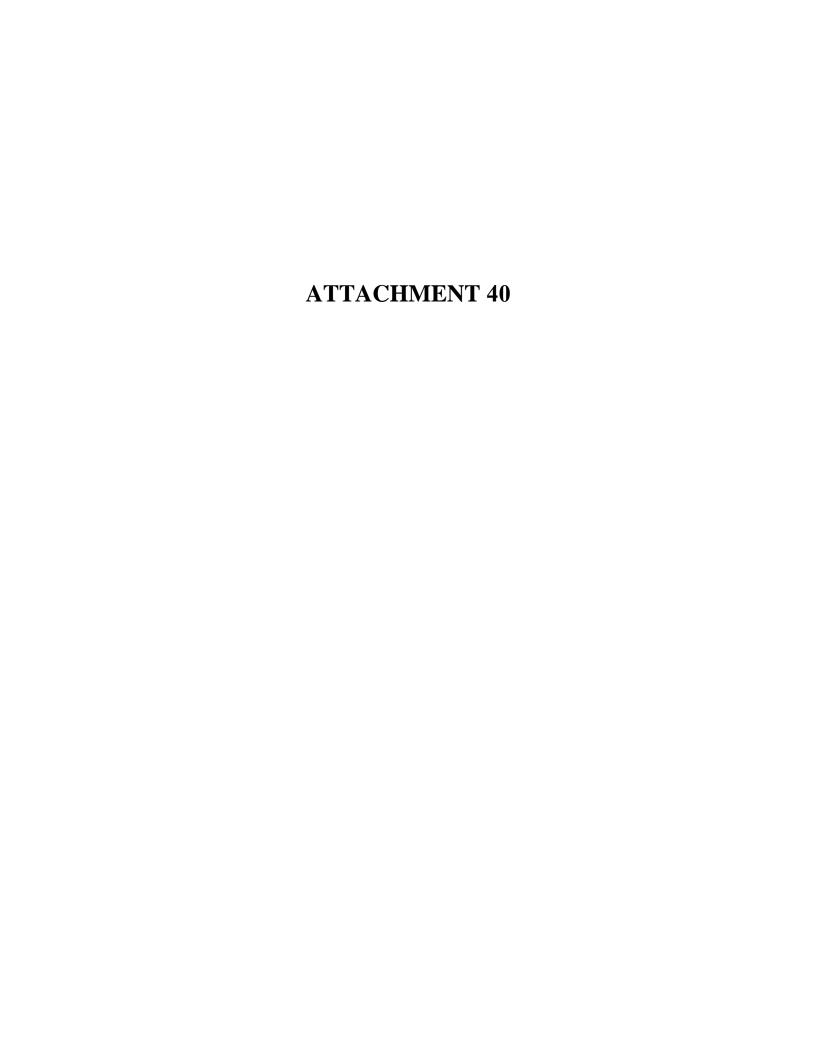
Andrew Rehn, Prairie Rivers Network Source: FEMA 100-Year Floodplain



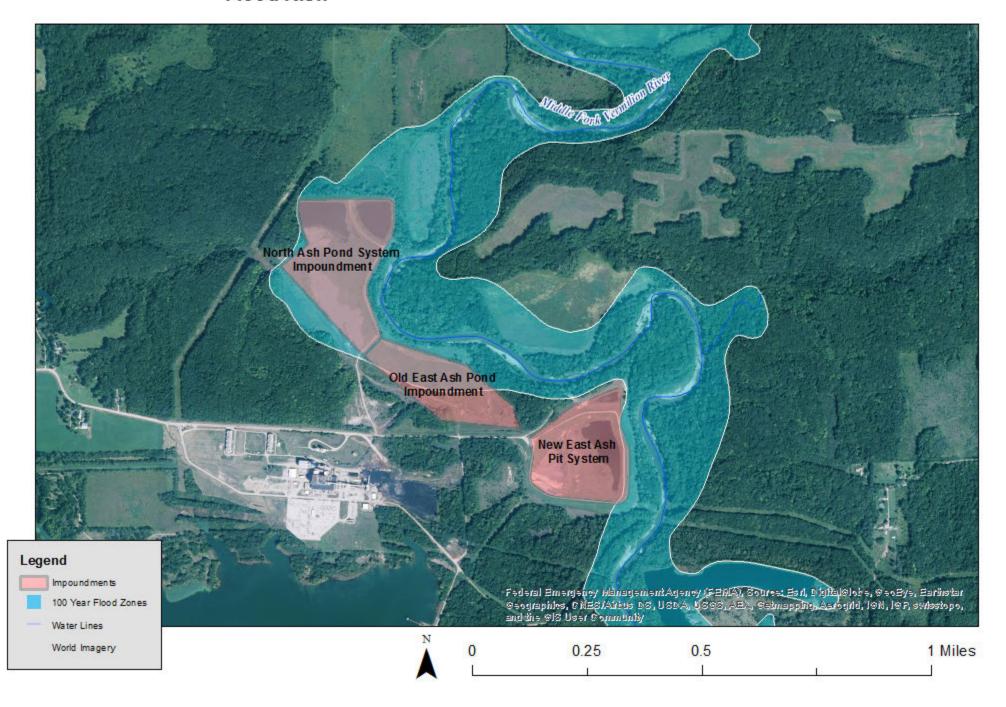


# Pearl Station





# **Vermilion Power Station**



The followin	g are attachment	s to the testimo	ony of Andrew	Rehn.	



# Frequency Distributions of Heavy Precipitation in Illinois: Updated Bulletin 70

James Angel and Momcilo Markus

March 2019



# Frequency Distributions of Heavy Precipitation in Illinois: Updated Bulletin 70

James Angel and Momcilo Markus

Illinois State Water Survey
Prairie Research Institute
University of Illinois

Prepared for the

Illinois Department of Commerce and Economic Opportunity

March 2019

#### Acknowledgments

This material is based on work supported by the Illinois Department of Commerce and Economic Opportunity under Grant No. 08-355061 and funded by the U.S. Department of Housing and Urban Development's Community Development Block Grants Award No. B-08-DI-17-0001. Any opinions, findings, and conclusions or recommendations expressed in this publication are those of the authors and do not necessarily reflect the views of the Illinois Department of Commerce and Economic Opportunity, the U.S. Department of Housing and Urban Development, the Illinois State Water Survey, or the University of Illinois.

We would like to acknowledge the contributions of Sally McConkey as a project advisor and reviewer, David Kristovich, who also reviewed the final version of the report, as well as the contributions of Brian Kerschner and Mary Richardson, all from ISWS. Wes Cattoor (IDNR) also provided several important review comments. Tom Over from USGS, Annie Peiyong Qu from the Department of Statistics, and Francina Dominguez and Ryan Sriver from the Department of Atmospheric Sciences, University of Illinois, provided additional insights and suggestions in the early stages of the project. Kexuan Ariel Wang, Lu Jin, Shaoxuan Guo, and Shailendra Singh performed most of the calculations for this project and Lisa Sheppard from ISWS edited and formatted the final version of the text.

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#### Introduction

This study was designed to update the Illinois State Water Survey (ISWS) Bulletin 70, evaluating rainfall frequency relations in Illinois using current precipitation datasets. The study primarily used the National Oceanic and Atmospheric Administration (NOAA) daily precipitation data from 1948 to 2017 to perform regional frequency analysis (RFA) using the L-moments approach. Additional information on precipitation relationships for less than 24 hours were obtained from NOAA hourly precipitation data from 1948 to 2014 and Cook County Precipitation Network (CCPN) data from 1989 to 2016. Precipitation frequency relations were developed for storm durations from 1 to 240 hours and for recurrence intervals from 2 to 500 years. The results are presented for the same 10 geographic sections as in Bulletin 70 (Figure 1) to maintain the continuity of hydrologic studies and compatibility with regulations.

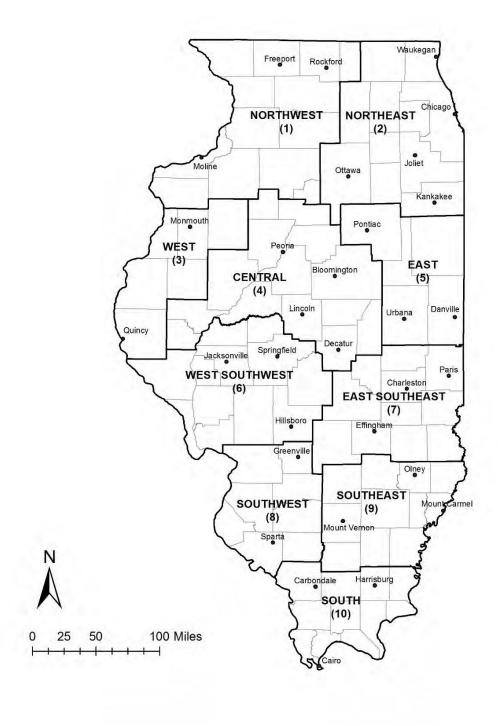


Figure 1 Climatic sections used in developing Illinois frequency estimates

#### **Previous Studies**

Several previous studies have examined precipitation frequencies related to Illinois, including Yarnell (1935), ISWS Bulletin 46 (Huff and Neil, 1959), and the U.S. Weather Bureau Technical Paper 40 (Hershfield, 1961).

The two studies currently applicable to Illinois are the ISWS Bulletin 70 (Huff and Angel, 1989) and NOAA Atlas 14 (Bonnin et al., 2006). ISWS Bulletin 70 is the current state standard for expected extreme rainfall events. The Illinois Department of Natural Resources (IDNR), Office of Water Resources (OWR) requires the use of Bulletin 70 for flood studies requiring state permits. Many Illinois county and community stormwater ordinances require that designs are based on Bulletin 70 as well. Bulletin 70 was based on analyses of precipitation data from 1901 to 1983, and the distributions were adjusted for the observed increases in the number of heavy precipitation events in Illinois.

In 2006, the NOAA National Weather Service (NWS) published NOAA Atlas 14 (Bonnin et al., 2006) for several states, including Illinois. The period of record for the data included in these analyses extends to 2000, providing 17 years of additional data over that available for Bulletin 70. However, the resulting frequency analysis yielded unexpected results of lowered precipitation estimates, especially at longer return periods.

Figure 2 shows a comparison of precipitation totals for an event of 24 hours in duration and a 1 percent annual chance probability (100-year storm). Positive (blue) numbers signify that the Atlas 14 study's total precipitation values are higher than the Bulletin 70 values, and negative (brown) numbers indicate that the Atlas 14 study's total precipitation values are lower than the Bulletin 70 values. Despite the additional 20 years of data that should have reflected the continued trend toward heavier events, the Atlas 14 study produced smaller values at many locations. Similar differences were found at other storm durations and probabilities. These results have hampered its acceptance in Illinois for design purposes.

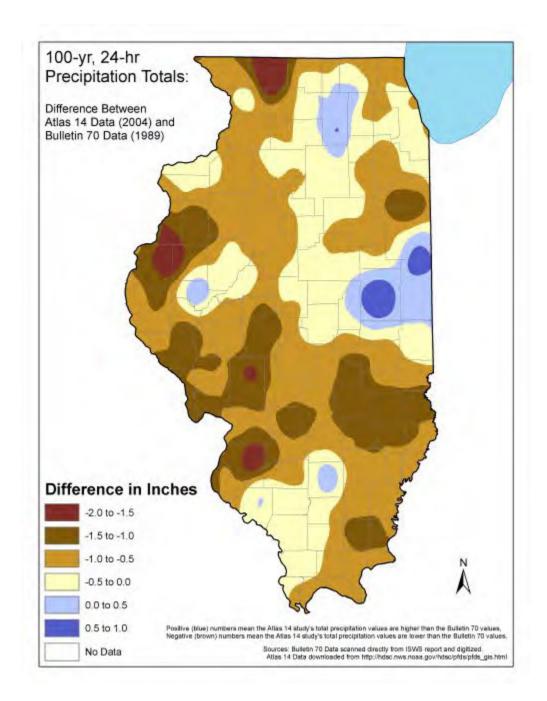


Figure 2 Differences in precipitation totals between Bulletin 70 and NOAA Atlas 14 for the 100-year, 24-hour storm

#### Climate Change and Its Impact on Heavy Precipitation in Illinois

Observed state increases in precipitation in general and heavy precipitation in particular have been a concern for several decades. As noted previously, a climate change adjustment was made in Bulletin 70 to address the trends already observed in the 1980s. In 2015, the IDNR, in cooperation with the Illinois State Water Survey, produced a report for the Urban Flooding Awareness Act outlining the impacts of increased precipitation in Illinois (Winters et al., 2015). Over a 10-year period, the IDNR documented \$2.3 billion dollars in costs in urban areas. Some \$1.6 billion in damages resulted from five severe storms. More than 90 percent of these damages occurred outside the mapped 1 percent annual chance floodplain.

Historical records for the statewide average annual precipitation for Illinois from 1895 to 2017 are shown in Figure 3. Based on a linear trend, Illinois precipitation has increased from 36 to 40 inches, or 11 percent over the past century. Illinois has become more likely to experience exceptionally wet years in recent decades. The year 1993 was the wettest on record with 51.18 inches of precipitation. The next two wettest years were 2009 with 50.96 inches and 2008 with 50.18 inches. All of these years were noted for widespread flooding across Illinois.

Temperatures in Illinois have warmed by about 1.2 degrees Fahrenheit over the past century. Warmer air can increase evaporation into the atmosphere by almost 4 percent with each degree increase in air temperature, meaning that on average, storms have more water available for precipitation. A longer warm season would increase the opportunity for thunderstorms. Additional work suggests that the increasingly intensive agricultural practices of the Midwest (more acreage and more plants per acre) have elevated summer humidity levels as well (Alter et al., 2017).

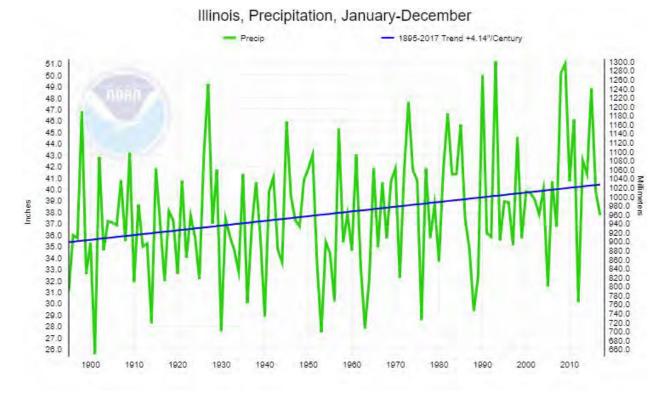


Figure 3 Statewide average annual precipitation for Illinois from 1895 to 2017. The green line shows the year-to-year variability. The blue line is a linear trend showing an increase of 4.14 inches over the past century. Source: NOAA NCEI, 2018.

Not only have the amounts of annual and seasonal precipitation increased, but so too have the numbers of extreme precipitation events (Frankson et al., 2017). Figure 4 shows the observed annual number of days with precipitation greater than 2 inches per station for 1900–2014 on average over 5-year periods. These values are averaged over 43 available long-term stations in Illinois. The average number of annual events has been above the long-term average for most 5-year periods since the 1960s. During the most recent 5-year period (2010–2014), Illinois experienced a record number of events in which stations averaged more than two 2-inch events annually. The dark horizontal line in Figure 4 is the 1900–2014 average of approximately 1.6 days per year. This pattern of heavier precipitation events has continued since the 2014 cutoff in the figure.

Conventional analyses of the frequency of extreme precipitation assumed a stationary time series (e.g., NOAA Atlas 14). This assumption meant that the longest period of record was always desired for the analysis. However, considerable evidence shows that the assumption of stationarity cannot be met (DeGaetano, 2009; Groisman et al., 2012). A concern of the current study was that an upward trend in precipitation could result in an underestimation of the current frequency of heavy precipitation by sampling earlier, drier years in the record.

For this study, the problem was minimized by using only the more recent records. As a result, the period of record selected for this report extended from 1948 to 2017. A recent study (DeGaetano and Castellano, 2018) supported this notion, showing that using 70 years of data or less can minimize the impacts from trends in precipitation. The selection of this period had the added benefit of yielding significantly more stations available for the study. In general, the number of stations increased significantly in Illinois after World War II, greatly improving the spatial coverage across the state.

The following sections of the report provide more details on the data sources and quality control, describe the methodology, and provide the results for the 10 geographic sections in tables, graphs, and maps. Additional research results on precipitation relationships will be shared in a second report to be published in 2019. That report will revisit the distribution of precipitation within the storm, also known as the Huff curves, along with the relationship between point and areal precipitation patterns out to 400 square miles.

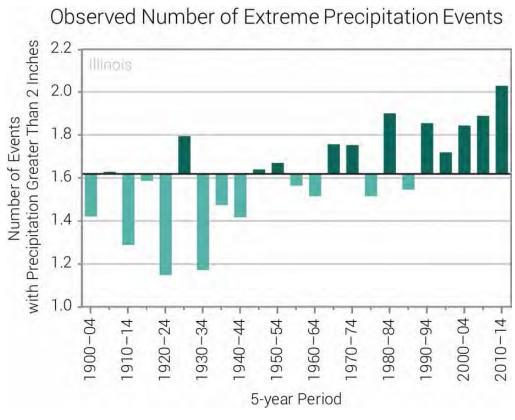


Figure 4 The observed annual number of days with precipitation greater than 2 inches for 1900–2014 on average over 5-year periods (Source: Frankson et al., 2017)

#### Precipitation Data Used in the Study

Three precipitation data sources were used in this study. As in Bulletin 70, the primary data source was the Global Historical Climatology Network Daily (GHCN-Daily), available through the NOAA National Center for Environmental Information (NCEI). This network of daily quality-controlled cooperative observers with the National Weather Service (NWS) is the longest serving network with the widest coverage across the state. The NWS provides equipment, training, and forms for observers, as well as the first level of quality assurance as the observations are reported. A more detailed description of this data source can be found at <a href="https://www.ncdc.noaa.gov/ghcn-daily-description">https://www.ncdc.noaa.gov/ghcn-daily-description</a>. Data were downloaded using the CRAN R package 'rnoaa'. A total of 761 stations was downloaded from Illinois and from adjacent counties of neighboring states (Missouri, Iowa, Wisconsin, Indiana, and Kentucky) for consideration in this study. From this pool of stations, several criteria were applied to achieve the final list of stations.

As noted in the Introduction, the period since 1948 was notably wetter than earlier time periods and had more heavy precipitation events. To minimize the potential for underestimating the frequency of heavy precipitation events from sampling the earlier, drier period, only the data from the 1948–2017 period were considered in this study. From this pool of stations, only the stations with 30 years of data during the 1948–2017 period were selected. A minimum of 30 years was needed to develop reliable statistics for a station. In addition, data from each of those years had to be 90 percent complete. This was a common requirement in many climatological studies to strike a balance between the negative effects of missing data versus rejecting years with nearly complete records. A total of 176 stations met the criteria of the study. The map of daily stations used in this report is shown in Figure 5.

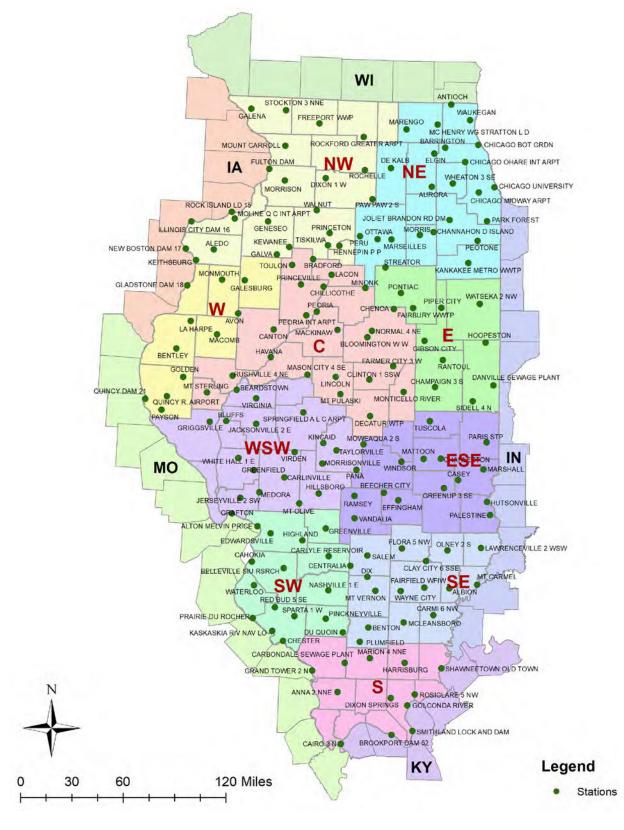


Figure 5 Daily precipitation stations used in this study

The second data source was the hourly precipitation dataset from NOAA. These data have been collected from automated gages since 1948. Unfortunately, the gages required a higher level of maintenance, which resulted in a much higher rate of missing data than that from the daily data network. As a result, the data were of limited use in this study. Their primary use for this report was to confirm earlier relationships developed between 24-hour and less than 24-hour amounts used in Bulletin 70 and NOAA Atlas 14. These relationships are documented later in this report. A total of 73 stations were examined in this study. A map of those stations with hourly data is shown in Figure 6.

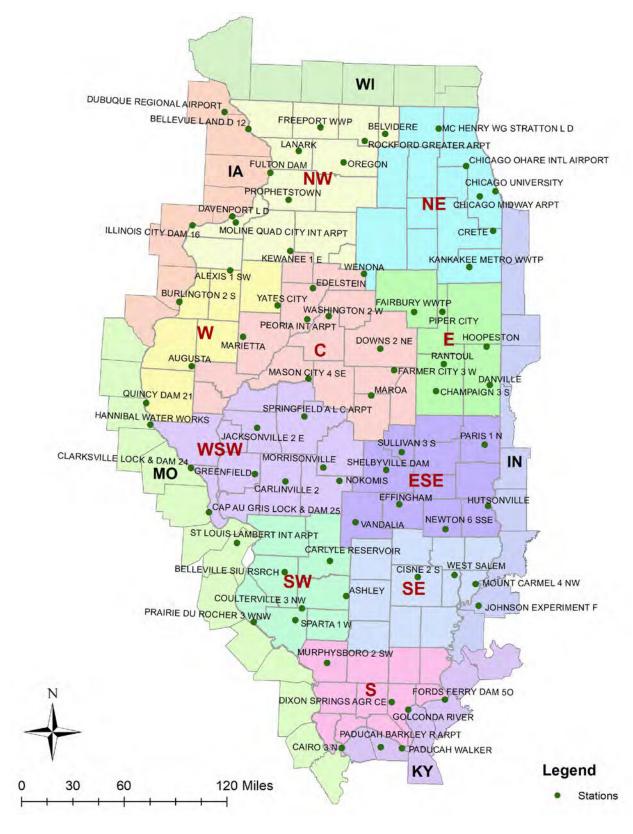


Figure 6 Hourly precipitation stations used in this study

The final data source for this study was the Cook County Precipitation Network (CCPN). This network is a collaborative study between ISWS and the US Army Corps of Engineers to produce consistent and accurate data for the Chicagoland region. The 25 recording gages have an average grid spacing of 5 to 7 miles (Bauer, 2018). A map of the stations is shown in Figure 7. As with the NOAA hourly data, the CCPN hourly data were used for this report to confirm earlier relationships developed between 24-hour and less than 24-hour amounts.

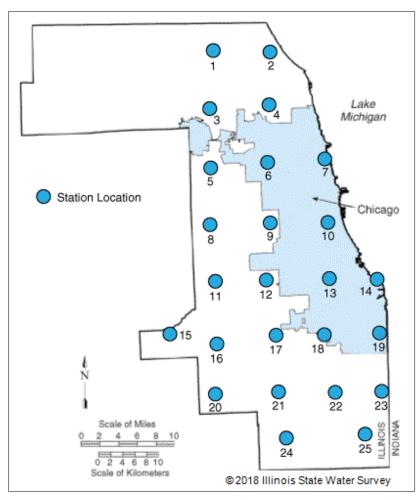


Figure 7 Precipitation stations in the Cook County Precipitation Network (CCPN)

#### Methodology Description

For each region (section), the annual maximum series (AMS) data observed at each station were used as inputs to produce regional (sectional) statistical frequency estimates for storm durations from 1 hour to 240 hours and for recurrence intervals from 2 to 500 years. For each duration of 24 hours or more, the frequency analysis was based on the L-moments method and Langbein's formula for debiasing. Due to significant uncertainty in hourly data, the frequency analysis for durations shorter than 24 hours was replaced by the application of newly calculated x-hour:24-hour ratios. This approach was similar to that of the original Bulletin 70. To maintain consistency with the format of the original Bulletin 70, the site estimates were averaged for each section, adjusted for temporal trends, and presented in the final tables appearing later in this text.

#### Annual Maximum and Partial Duration Series

Frequency estimates at a station can be calculated based on either an annual maximum series (AMS) or a partial duration series (PDS). The AMS-based method involves selecting the largest precipitation amount from each year on record for each duration of interest. In the PDSbased method, a given number of rainfall totals are selected that are larger than a predefined threshold for all durations independently of the year of occurrence. With this method, multiple events can occur in the same calendar year. Selected events need to be screened for independence, i.e., to determine if two precipitation peaks can be considered coming from the same event before inclusion in the final dataset. The PDS method uses the available precipitation information more completely than the AMS-based method does. As a result, the AMS method estimates are biased, particularly for smaller recurrence intervals. On the other hand, no method has been widely accepted for threshold selection and accounting for dependence between the events in the PDS-based approach, making the method somewhat subjective. To reconcile the strengths and weaknesses of the two methods, many precipitation frequency studies (Perica et al., 2011) used the AMS approach and then corrected for the bias using the Langbein's equation (Langbein, 1949). Similarly, in this study, the Langbein's equation (Eq. 1) was used to convert frequencies associated with AMS data to the ones with PDS data, thus providing unbiased frequency estimates.

$$T_{AMS} = \frac{1}{(1 - \exp(-\frac{1}{T_{PDS}})} \tag{1}$$

where T<sub>AMS</sub> and T<sub>PDS</sub> are the recurrence intervals (return periods) associated with AMS and PDS data, respectively. After conversion, the AMS-based frequencies of 2.54, 5.52, 10.51, 25, 50, and 100 years correspond to the PDS-based 2, 5, 10, 25, 50, and 100-year frequencies, respectively. For example, the unbiased estimate of a 2-year recurrence interval rainfall can be calculated using the AMS approach for a recurrence interval of 2.54 years.

#### Constrained vs. Unconstrained Daily Precipitation

Daily rainfall data include all precipitation that was recorded on a given calendar day between the fixed monitoring times, such as between 7 a.m. on a certain day and 7 a.m. on the following day. This amount may be smaller than the maximum rainfall in a given 24-hour period. Instances will occur in which the maximum 24-hour rainfall will span more than a single calendar day. Adjustment factors to account for this difference have been determined through a comparative analysis of Hershfield (1961), Huff and Neil (1959), Huff and Angel (1989), Markus et al. (2007), and Perica et al. (2011). The conversion factors are shown in Table 1. To avoid confusion between the constrained and unconstrained precipitation, all results in this report are presented in hours (e.g., 24-hour or 240-hour precipitation).

Table 1 Conversion from Constrained to Unconstrained Precipitation Adopted in this Study

From	1 day	2 days	3 days	5 days	10 days
То	24 hours	48 hours	72 hours	120 hours	240 hours
Conversion factor	1.13	1.04	1.02	1.01	1.00

#### Sub-Daily Precipitation Frequency Conversions

As for Bulletin 70, sub-daily precipitation frequencies were obtained for this study based on x-hour to 24-hour type conversions. The direct regional frequency analysis of sub-daily data produced significantly variable and uncertain results because of numerous factors, such as the number/spatial coverage of hourly stations, their shorter record lengths, missing/incomplete data, and questionable quality of the data at some of these stations.

To determine the conversion factors, an extensive study of the average ratios of x-hour to 24-hour rainfall was performed using the hourly data. The ratios obtained in this study by running a regional frequency analysis (RFA) for 1948 to 2017 were compared with ISWS Bulletin 70 and NOAA Atlas 14, and the differences among the ratios were not found to be significant (Table 2). The adopted conversion factors were identical to those in Bulletin 70.

Table 2 X-hr:24-hr Ratios

Storm Duration (hours)	RFA 1948-2017	Bulletin 70	Atlas 14	Adopted
1	0.42	0.47	0.47	0.47
2	0.56	0.58	0.57	0.58
3	0.64	0.64	0.63	0.64
6	0.76	0.75	0.75	0.75
12	0.87	0.87	0.86	0.87
18	0.94	0.94	N/A	0.94

#### Stationary Regional Frequency Analysis

Although the observed precipitation datasets were nonstationary, the authors first performed the stationary frequency analysis based on the L-moments (Hosking, 2000; Hosking and Wallis, 1997), and then adjusted the results to account for trends. The method accounting for trends was adopted from the original Bulletin 70 and described in the Nonstationary Temporal Trend Analysis section. The L-moments methodology first computed the point rainfall depths for each duration and recurrence interval at each raingage. For consistency with Bulletin 70, these depths were then averaged for each section and expressed as sectional frequencies (see the Results section). Past research results (Vogel and Fennessey, 1993) indicate that regional frequency analysis based on the L-moments is more robust and better identifies the parent distribution compared to other more traditional estimation techniques, particularly for regional studies. This methodology was also adopted by NOAA (Bonnin et al., 2006; Perica et al., 2011) and applied in previous studies in Illinois (Markus et al., 2007; Hejazi and Markus, 2009). The L-moments method uses the discordancy measure (Hosking and Wallis, 1997) to identify statistically unusual (discordant) sites in a region and the heterogeneity measure to assess if the region is homogeneous. Next, for each region, the method finds the best-fit statistical distribution among the following distributions (Hosking, 2000): Exponential, Gamma, Gumbel, Normal, Generalized Pareto, Generalized Extreme Value, Generalized Logistic, Generalized Normal, Pearson 3, and Wakeby. To construct 90 percent confidence limits, 500 synthetic datasets that have the same statistical features as the adopted distribution were generated using a Monte Carlo simulation technique (Hosking and Wallis, 1997). In this method, each synthetic dataset produces a quantile. The upper confidence limit separates the upper 5 percent and the lower 95 percent, and similarly, the lower confidence limit separates the lower 5 from the top 95 percent of all generated quantiles.

#### Nonstationary Temporal Trend Analysis

Traditional hydroclimatologic studies typically relied on long-term precipitation records, which have been used to estimate the probability of heavy precipitation events that will occur in the future. The underlying assumption was that the precipitation data were stationary, or in other words, that future variability will be similar to the past variability. However, numerous studies have indicated that the frequency and intensity of precipitation in Illinois have been increasing in the past several decades and will continue to increase in the future (Winters et al., 2015). Therefore, because of climate change, precipitation stationarity cannot be assumed. To account for nonstationarity, the approach used in the original Bulletin 70 was adopted. The Bulletin 70 approach divides the whole period, in this case 1948–2017, into two equal periods, 1948–1982 and 1983–2017, and then estimates frequency quantiles (e.g. 24-hour 100-year storm) for the first half (RFA1), the second half (RFA2), and the whole period (RFA0). The nonstationary adjustment factor NAF is defined as

$$NAF = \frac{RFA_2}{RFA_1} \tag{2}$$

The frequency quantile RFA, which accounts for the trend in peaks, is given by

$$RFA = NAF \cdot RFA_0 = RFA_0 \frac{RFA_2}{RFA_1} \tag{3}$$

The trend adjustment factors used in this study are shown in Table 3. A companion report, to be published in 2019, will provide more in-depth information through nonstationarity analysis and comparisons with other approaches that have been designed to determine frequency as a function of time (e.g., Salas et al., 2018; Serago and Vogel, 2018; Cheng et al., 2014).

Table 3 Temporal Trend Adjustment Factors for 10 Sections

	Climatic section	24 hrs	48 hrs	72 hrs	120 hrs	240 hrs	Average
1	Northwest	1.07	1.07	1.03	1.05	1.12	1.07
2	Northeast	1.06	1.12	1.13	1.18	1.21	1.14
3	West	1.00	0.96	0.91	0.92	1.02	0.96
4	Central	1.02	0.94	0.94	0.97	1.08	0.99
5	East	0.99	0.94	0.92	0.96	1.02	0.97
6	West Southwest	0.99	0.97	0.98	1.02	1.10	1.01
7	East Southeast	1.05	0.97	1.02	1.01	1.12	1.03
8	Southwest	1.11	1.09	1.10	1.13	1.26	1.14
9	Southeast	1.07	1.09	1.04	1.03	1.09	1.06
10	South	0.96	1.02	1.06	1.03	0.99	1.01

#### Results

#### Frequency Estimates

To determine the precipitation frequency, the previously described regional frequency analysis was applied to the AMS data. The results were then converted to the PDS domain based on the relationship defined in Eq. 1 and adjusted for the trend (Eq. 3). These results, however, still had occasional minor inconsistencies caused by several factors, such as variable data length for different durations, which resulted in irregular frequency curves. To produce the final curves, these irregularities had to be smoothed out, which was done based on the authors' professional judgment and knowledge of specific regions and gages.

The results for all sections are shown in the following tables. Table 4 displays the key for the codes used in Table 5, where the results are presented numerically. The results are shown graphically in Figures 8–12.

Table 4 Storm and Sectional Codes for Table 5

	Storm Code		Sectional Code
1	240 hours	1	Northwest
2	120 hours	2	Northeast
3	72 hours	3	West
4	48 hours	4	Central
5	24 hours	5	East
6	18 hours	6	West Southwest
7	12 hours	7	East Southeast
8	6 hours	8	Southwest
9	3 hours	9	Southeast
10	2 hours	10	South
11	1 hour		

Table 5 Rainfall Frequencies

		Rainfall (inches) for given recurrence interval						
Storm	Section	2-year	5-year	10-year	25-year	50-year	100-	<i>500</i> -
code	code						year	year
1	1	5.48	6.86	7.98	9.55	10.84	12.14	15.65
1	2	5.60	7.09	8.25	9.90	11.26	12.65	16.00
1	3	5.62	7.00	8.10	9.60	10.65	11.64	13.99
1	4	5.46	6.87	8.04	9.53	10.55	11.50	13.65
1	5	5.50	6.84	7.90	9.35	10.45	11.55	13.96
1	6	6.00	7.38	8.47	9.95	10.99	11.95	14.08
1	7	6.57	7.86	8.90	10.20	11.20	12.06	13.95
1	8	6.75	8.18	9.30	10.80	11.95	13.10	15.95
1	9	7.06	8.30	9.22	10.37	11.21	11.96	13.75
1	10	6.36	7.65	8.76	10.40	11.66	12.96	16.20
2	1	4.35	5.51	6.46	7.88	8.96	10.20	13.33
2	2	4.42	5.63	6.68	8.16	9.39	10.66	13.81
2	3	4.51	5.66	6.62	7.94	8.93	9.83	11.99
2	4	4.27	5.42	6.42	7.75	8.72	9.60	11.54
2	5	4.34	5.43	6.41	7.73	8.79	9.80	11.93
2	6	4.49	5.60	6.49	7.77	8.69	9.57	11.53
2	7	5.00	6.11	7.01	8.23	9.11	9.95	11.71
2	8	5.31	6.51	7.47	8.79	9.81	10.84	13.45
2	9	5.73	6.78	7.60	8.64	9.47	10.20	11.97
2	10	5.18	6.30	7.29	8.69	9.78	10.91	13.84
3	1	3.90	4.95	5.87	7.21	8.30	9.45	12.30
3	2	3.97	5.08	6.05	7.49	8.64	9.85	12.81
3	3	4.11	5.18	6.08	7.34	8.31	9.18	11.27
3	4	3.88	4.96	5.90	7.17	8.09	8.98	10.81
3	5	3.88	4.90	5.78	7.04	8.01	8.93	11.00
3	6	4.00	5.00	5.83	7.01	7.91	8.73	10.61
3	7	4.35	5.37	6.19	7.34	8.19	8.97	10.57
3	8	4.74	5.82	6.71	7.96	8.89	9.86	12.32
3	9	5.13	6.09	6.86	7.87	8.63	9.34	10.93
3	10	4.54	5.61	6.50	7.78	8.79	9.86	12.55

6

10

3.41

4.25

		D : ( !! /:				,		
C+	Castian	Rainfall (in					100	500
Storm code	Section code	2-year	5-year	10-year	25-year	50-year	100-	500-
		2.61	4.50	Г 42	C 73	7 72	year	year
4	1	3.61	4.59	5.43	6.72	7.73	8.83	11.53
4	2	3.66	4.71	5.62	6.99	8.13	9.28	12.10
4	3	3.76	4.76	5.62	6.81	7.72	8.60	10.58
4	4	3.59	4.61	5.47	6.65	7.55	8.40	10.21
4	5	3.54	4.49	5.32	6.48	7.38	8.27	10.26
4	6	3.66	4.61	5.38	6.48	7.33	8.11	9.93
4	7	3.92	4.85	5.61	6.67	7.46	8.21	9.76
4	8	4.28	5.29	6.10	7.25	8.15	9.08	11.40
4	9	4.64	5.54	6.27	7.24	7.94	8.58	10.06
4	10	4.06	5.02	5.86	7.04	8.01	9.02	11.56
-	4	2.24	4.22	F 03	C 20	7.20	0.25	10.04
5	1	3.34	4.22	5.03	6.20	7.20	8.25	10.84
5	2	3.34	4.30	5.15	6.45	7.50	8.57	11.24
5	3	3.48	4.45	5.24	6.38	7.25	8.06	9.91
5	4	3.32	4.30	5.10	6.20	7.05	7.85	9.53
5	5	3.12	3.97	4.71	5.78	6.62	7.43	9.32
5	6	3.23	4.07	4.76	5.79	6.56	7.31	9.04
5	7	3.49	4.33	5.00	5.98	6.71	7.40	8.84
5	8	3.69	4.56	5.27	6.30	7.14	7.96	10.06
5	9	4.07	4.89	5.55	6.42	7.06	7.68	8.99
5	10	3.63	4.52	5.28	6.38	7.29	8.23	10.57
6	1	3.14	3.97	4.73	5.83	6.77	7.75	10.19
6	2	3.14	4.04	4.84	6.06	7.05	8.06	10.57
6	3	3.27	4.18	4.93	6.00	6.82	7.58	9.32
6	4	3.12	4.04	4.79	5.83	6.63	7.38	8.96
6	5	2.93	3.73	4.43	5.43	6.22	6.98	8.76
6	6	3.04	3.83	4.47	5.44	6.17	6.87	8.50
6	7	3.28	4.07	4.70	5.62	6.31	6.96	8.31
6	8	3.47	4.29	4.95	5.92	6.71	7.48	9.45
6	9	3.83	4.60	5.22	6.03	6.64	7.22	8.45

4.96

6.00

6.85

7.73

9.93

Table 5 (continued)

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2.32

2.89

Rainfall (inches) for given recurrence interval									
Storm	Section	2-year	5-year	10-year	25-year	50-year	100-	500-	
code	code						year	year	
7	1	2.91	3.67	4.38	5.40	6.26	7.18	9.43	
7	2	2.91	3.74	4.48	5.61	6.53	7.46	9.78	
7	3	3.03	3.87	4.56	5.55	6.31	7.01	8.62	
7	4	2.89	3.74	4.44	5.39	6.13	6.83	8.29	
7	5	2.71	3.45	4.10	5.03	5.76	6.46	8.11	
7	6	2.81	3.54	4.14	5.04	5.71	6.36	7.86	
7	7	3.04	3.77	4.35	5.20	5.84	6.44	7.69	
7	8	3.21	3.97	4.58	5.48	6.21	6.93	8.75	
7	9	3.54	4.25	4.83	5.59	6.14	6.69	7.82	
7	10	3.16	3.93	4.59	5.55	6.34	7.16	9.19	
8	1	2.51	3.17	3.77	4.65	5.40	6.19	8.13	
8	2	2.51	3.23	3.86	4.84	5.63	6.43	8.43	
8	3	2.61	3.34	3.93	4.79	5.44	6.05	7.43	
8	4	2.49	3.23	3.83	4.65	5.29	5.89	7.15	
8	5	2.34	2.98	3.53	4.34	4.97	5.57	6.99	
8	6	2.42	3.05	3.57	4.34	4.92	5.48	6.78	
8	7	2.62	3.25	3.75	4.49	5.03	5.55	6.63	
8	8	2.77	3.42	3.95	4.73	5.36	5.97	7.54	
8	9	3.05	3.67	4.16	4.82	5.30	5.76	6.74	
8	10	2.72	3.39	3.96	4.79	5.47	6.17	7.92	
9	1	2.14	2.70	3.22	3.97	4.61	5.28	6.94	
9	2	2.14	2.75	3.30	4.13	4.80	5.49	7.20	
9	3	2.23	2.85	3.35	4.08	4.64	5.16	6.34	
9	4	2.12	2.75	3.26	3.97	4.51	5.02	6.10	
9	5	2.00	2.54	3.01	3.70	4.24	4.76	5.97	
9	6	2.07	2.60	3.05	3.71	4.20	4.68	5.79	
9	7	2.23	2.77	3.20	3.83	4.29	4.74	5.66	
9	8	2.36	2.92	3.37	4.03	4.57	5.09	6.44	
9	9	2.60	3.13	3.55	4.11	4.52	4.92	5.75	

3.38

4.09

4.66

5.26

6.76

Table 5 (continued)

### Rainfall (inches) for given recurrence interval

		, ,	,, ,					
Storm	Section	2-year	5-year	10-year	25-year	50-year	100-	500-
code	code						year	year
10	1	1.94	2.45	2.92	3.60	4.17	4.78	6.29
10	2	1.94	2.49	2.99	3.74	4.35	4.97	6.52
10	3	2.02	2.58	3.04	3.70	4.21	4.67	5.75
10	4	1.93	2.49	2.96	3.60	4.09	4.55	5.53
10	5	1.81	2.30	2.73	3.35	3.84	4.31	5.41
10	6	1.87	2.36	2.76	3.36	3.80	4.24	5.24
10	7	2.02	2.51	2.90	3.47	3.89	4.29	5.13
10	8	2.14	2.64	3.06	3.65	4.14	4.62	5.83
10	9	2.36	2.84	3.22	3.72	4.09	4.46	5.21
10	10	2.10	2.62	3.06	3.70	4.23	4.77	6.13
11	1	1.57	1.98	2.36	2.92	3.38	3.88	5.09
11	2	1.57	2.02	2.42	3.03	3.53	4.03	5.28
11	3	1.64	2.09	2.46	3.00	3.41	3.79	4.66
11	4	1.56	2.02	2.40	2.91	3.31	3.69	4.48
11	5	1.47	1.87	2.21	2.72	3.11	3.49	4.38
11	6	1.52	1.91	2.24	2.72	3.08	3.44	4.25
11	7	1.64	2.04	2.35	2.81	3.15	3.48	4.15
11	8	1.73	2.14	2.48	2.96	3.36	3.74	4.73
11	9	1.91	2.30	2.61	3.02	3.32	3.61	4.23
11	10	1.71	2.12	2.48	3.00	3.43	3.87	4.97

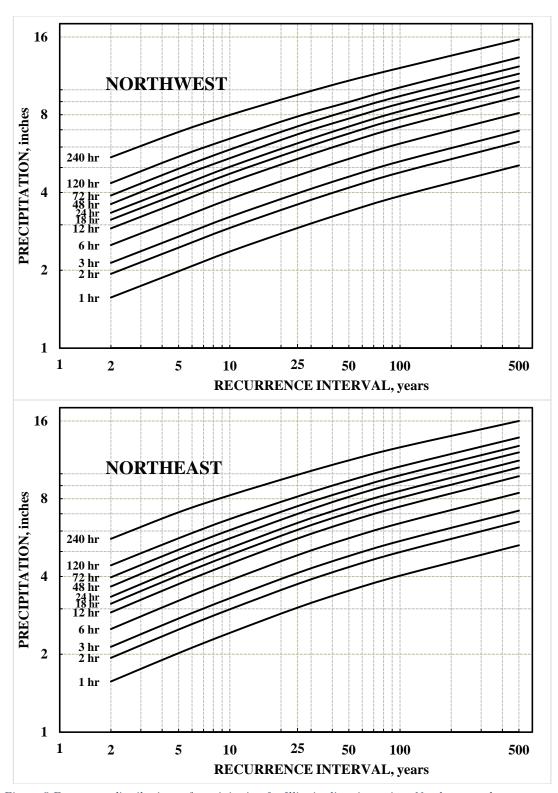


Figure 8 Frequency distributions of precipitation for Illinois climatic sections Northwest and Northeast for storm periods of 1 hour to 240 hours days and recurrence intervals of 2 to 100 years.

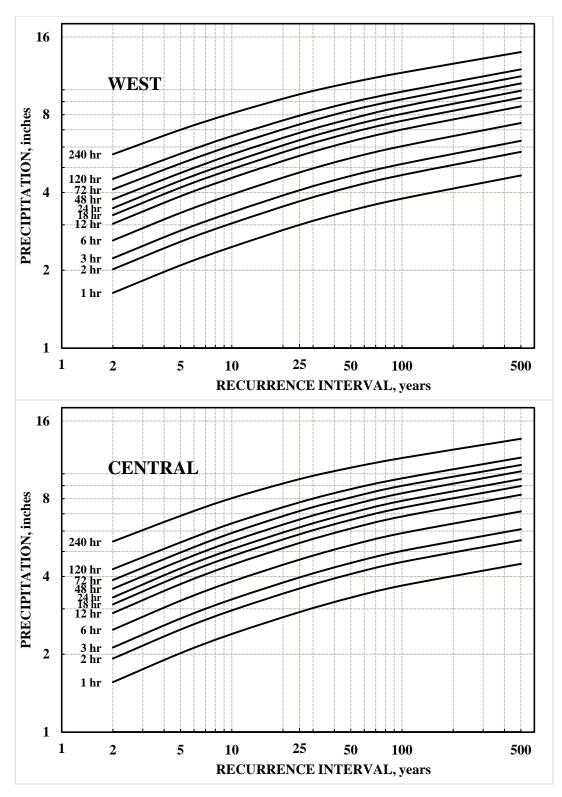


Figure 9 Frequency distributions of precipitation for Illinois climatic sections west and central for storm periods of 1 hour to 240 hours and recurrence intervals of 2 to 100 years

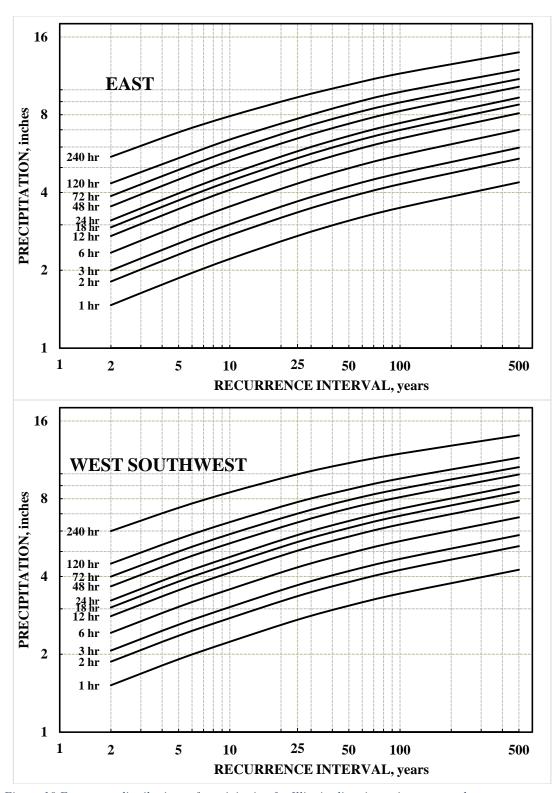


Figure 10 Frequency distributions of precipitation for Illinois climatic sections east and west southwest for storm periods of 1 hour to 240 hours and recurrence intervals of 2 to 100 years

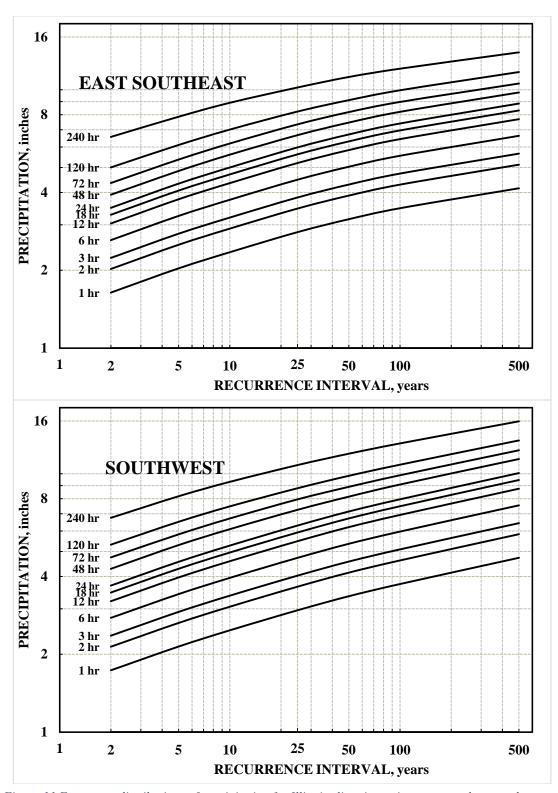


Figure 11 Frequency distributions of precipitation for Illinois climatic sections east southeast and southwest for storm periods of 1 hour to 240 hours and recurrence intervals of 2 to 100 years

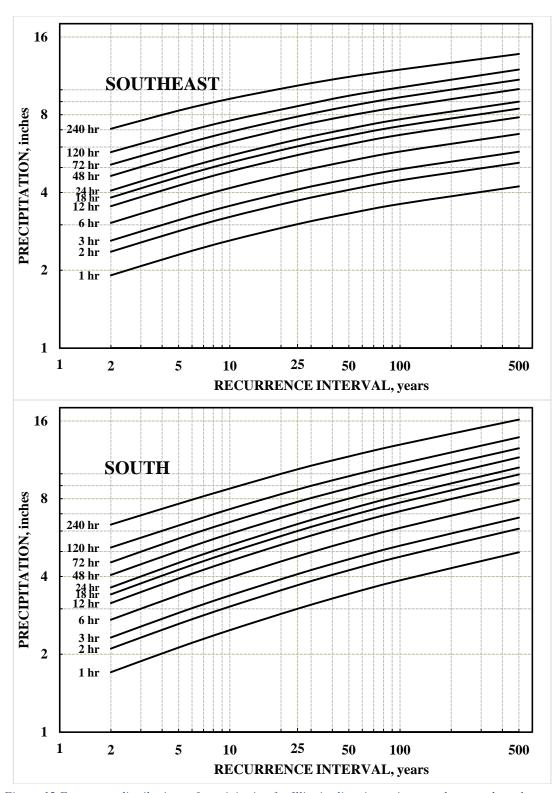


Figure 12 Frequency distributions of precipitation for Illinois climatic sections southeast and south for storm periods of 1 hour to 240 hours and recurrence intervals of 2 to 100 years

#### Confidence Limits

Confidence limits were calculated based on the methodology described in the previous Frequency Estimates section. Confidence limits are provided for section codes 1–10 and for storm codes 1–11 (Table 4), and are shown in Table 6.

Table 6 Precipitation Frequency Estimates (in inches) with 90% Confidence Intervals

Storm Code	Section Code	Recurrence interval							
		2-year	5-year	10-year	25-year	50-year	100-year	500-year	
1	1	5.48	6.86	7.98	9.55	10.84	12.14	15.65	
		( 5.04 -	( 6.30 -	( 7.30 -	( 8.67 -	( 9.76 -	( 10.82 -	( 13.53 -	
		5.95)	7.48)	8.73)	10.53)	12.06)	13.63)	18.10)	
1	2	5.60	7.09	8.25	9.90	11.26	12.65	16.00	
		( 5.14 -	( 6.48 -	( 7.49 -	( 8.89 -	( 10.01 -	( 11.08 -	( 13.40 -	
		6.09)	7.75)	9.08)	11.04)	12.72)	14.51)	19.13)	
1	3	5.62	7.00	8.10	9.6	10.65	11.64	13.99	
		( 5.21 -	( 6.47 -	( 7.44 -	( 8.73 -	( 9.59 -	( 10.34 -	( 11.96 -	
		6.11)	7.62)	8.86)	10.58)	11.84)	13.05)	16.14)	
1	4	5.46	6.87	8.04	9.53	10.55	11.5	13.65	
		( 5.07 -	( 6.36 -	( 7.43 -	( 8.75 -	( 9.62 -	( 10.40 -	( 12.02 -	
		5.90)	7.43)	8.71)	10.38)	11.56)	12.70)	15.40)	
1	5	5.50	6.84	7.9	9.35	10.45	11.55	13.96	
		( 5.14 -	( 6.38 -	( 7.34 -	( 8.64 -	( 9.60 -	( 10.52 -	( 12.39 -	
		5.89)	7.34)	8.50)	10.12)	11.40)	12.71)	15.72)	
1	6	6.00	7.38	8.47	9.95	10.99	11.95	14.08	
		( 5.55 -	( 6.82 -	( 7.81 -	( 9.11 -	( 9.97 -	( 10.74 -	( 12.31 -	
		6.51)	8.02)	9.21)	10.88)	12.09)	13.26)	15.96)	
1	7	6.57	7.86	8.90	10.20	11.20	12.06	13.95	
		( 6.03 -	( 7.22 -	( 8.16 -	( 9.29 -	( 10.09 -	( 10.71 -	( 11.94 -	
		7.14)	8.55)	9.72)	11.27)	12.49)	13.62)	16.28)	
1	8	6.75	8.18	9.30	10.80	11.95	13.10	15.95	
		( 6.10 -	( 7.35 -	( 8.26 -	( 9.38 -	( 10.16 -	( 10.84 -	( 12.28 -	
		7.44)	9.06)	10.40)	12.30)	13.87)	15.56)	20.09)	
1	9	7.06	8.30	9.22	10.37	11.21	11.96	13.75	
		( 6.45 -	( 7.54 -	( 8.32 -	( 9.21 -	( 9.75 -	( 10.18 -	( 11.06 -	
		7.73)	9.12)	10.19)	11.62)	12.71)	13.74)	16.40)	
1	10	6.36	7.65	8.76	10.40	11.66	12.96	16.20	
		( 5.81 -	( 6.94 -	( 7.87 -	( 9.19 -	( 10.07 -	( 10.92 -	( 12.63 -	
		6.92)	8.38)	9.67)	11.69)	13.35)	15.16)	20.04)	

Table 6 Precipitation Frequency Estimates (in inches) with 90% Confidence Intervals (continued)

Storm Code	Section Code	Recurrence interval							
		2-year	5-year	10-year	25-year	50-year	100-year	500-year	
2	1	4.35	5.51	6.46	7.88	8.96	10.20	13.33	
		( 3.96 -	( 5.00 -	( 5.84 -	( 7.07 -	( 7.99 -	( 9.01 -	( 11.44 -	
		4.77)	6.07)	7.16)	8.80)	10.12)	11.67)	15.78)	
2	2	4.42	5.63	6.68	8.16	9.39	10.66	13.81	
		( 4.02 -	( 5.09 -	( 6.01 -	( 7.26 -	( 8.25 -	( 9.22 -	( 11.44 -	
		4.83)	6.18)	7.38)	9.12)	10.63)	12.22)	16.42)	
2	3	4.51	5.66	6.62	7.94	8.93	9.83	11.99	
		( 4.14 -	( 5.18 -	( 6.03 -	( 7.16 -	( 7.97 -	( 8.66 -	( 10.11 -	
		4.92)	6.19)	7.29)	8.86)	10.12)	11.33)	14.43)	
2	4	4.27	5.42	6.42	7.75	8.72	9.6	11.54	
		( 3.92 -	( 4.97 -	( 5.87 -	( 7.03 -	( 7.84 -	( 8.54 -	( 10.02 -	
		4.66)	5.92)	7.02)	8.53)	9.67)	10.73)	13.21)	
2	5	4.34	5.43	6.41	7.73	8.79	9.8	11.93	
		( 4.00 -	( 5.00 -	( 5.89 -	( 7.06 -	( 7.98 -	( 8.81 -	( 10.42 -	
		4.71)	5.90)	6.99)	8.49)	9.75)	11.01)	13.87)	
2	6	4.49	5.60	6.49	7.77	8.69	9.57	11.53	
		( 4.13 -	( 5.14 -	( 5.95 -	( 7.06 -	( 7.84 -	( 8.54 -	( 9.93 -	
		4.90)	6.12)	7.13)	8.59)	9.69)	10.78)	13.35)	
2	7	5.00	6.11	7.01	8.23	9.11	9.95	11.71	
		( 4.60 -	( 5.60 -	( 6.41 -	( 7.45 -	( 8.16 -	( 8.80 -	( 9.95 -	
		5.45)	6.68)	7.70)	9.11)	10.19)	11.27)	13.69)	
2	8	5.31	6.51	7.47	8.79	9.81	10.84	13.45	
		( 4.83 -	( 5.90 -	( 6.74 -	( 7.82 -	( 8.62 -	( 9.36 -	( 11.00 -	
		5.86)	7.23)	8.37)	9.97)	11.29)	12.68)	16.39)	
2	9	5.73	6.78	7.60	8.64	9.47	10.20	11.97	
		( 5.19 -	( 6.12 -	( 6.81 -	( 7.63 -	( 8.23 -	( 8.67 -	( 9.50 -	
		6.31)	7.50)	8.49)	9.84)	10.99)	12.09)	14.95)	
2	10	5.18	6.30	7.29	8.69	9.78	10.91	13.84	
		( 4.71 -	( 5.71 -	( 6.56 -	( 7.68 -	( 8.47 -	( 9.22 -	( 10.96 -	
		5.71)	6.99)	8.18)	9.94)	11.41)	13.02)	17.59)	

Table 6 Precipitation Frequency Estimates (in inches) with 90% Confidence Intervals (continued)

Storm Code	Section Code	Recurrence interval							
		2-year	5-year	10-year	25-year	50-year	100-year	500-year	
3	1	3.9	4.95	5.87	7.21	8.30	9.45	12.30	
		( 3.52 -	( 4.47 -	( 5.28 -	( 6.46 -	( 7.39 -	( 8.33 -	( 10.56 -	
		4.28)	5.46)	6.52)	8.12)	9.46)	10.91)	14.76)	
3	2	3.97	5.08	6.05	7.49	8.64	9.85	12.81	
		( 3.60 -	( 4.59 -	( 5.44 -	( 6.69 -	( 7.66 -	( 8.63 -	( 10.82 -	
		4.36)	5.60)	6.71)	8.39)	9.78)	11.29)	15.18)	
3	3	4.11	5.18	6.08	7.34	8.31	9.18	11.27	
		( 3.77 -	( 4.74 -	( 5.53 -	( 6.61 -	( 7.39 -	( 8.05 -	( 9.42 -	
		4.50)	5.71)	6.76)	8.27)	9.50)	10.70)	13.83)	
3	4	3.88	4.96	5.90	7.17	8.09	8.98	10.81	
		( 3.55 -	( 4.53 -	( 5.37 -	( 6.48 -	( 7.25 -	( 7.97 -	( 9.30 -	
		4.25)	5.45)	6.51)	7.98)	9.09)	10.21)	12.69)	
3	5	3.88	4.9	5.78	7.04	8.01	8.93	11	
		( 3.57 -	( 4.50 -	( 5.30 -	( 6.42 -	( 7.24 -	( 7.98 -	( 9.56 -	
		4.19)	5.32)	6.32)	7.77)	8.94)	10.10)	12.94)	
3	6	4.00	5.00	5.83	7.01	7.91	8.73	10.61	
		( 3.65 -	( 4.55 -	( 5.28 -	( 6.28 -	( 7.01 -	( 7.64 -	( 8.93 -	
		4.38)	5.49)	6.44)	7.81)	8.91)	9.96)	12.54)	
3	7	4.35	5.37	6.19	7.34	8.19	8.97	10.57	
		( 3.99 -	( 4.91 -	( 5.65 -	( 6.65 -	( 7.34 -	( 7.94 -	( 9.02 -	
		4.74)	5.87)	6.80)	8.14)	9.16)	10.13)	12.32)	
3	8	4.74	5.82	6.71	7.96	8.89	9.86	12.32	
		( 4.31 -	( 5.27 -	( 6.04 -	( 7.07 -	( 7.78 -	( 8.47 -	( 10.09 -	
		5.23)	6.45)	7.48)	8.94)	10.10)	11.35)	14.72)	
3	9	5.13	6.09	6.86	7.87	8.63	9.34	10.93	
		( 4.66 -	( 5.51 -	( 6.17 -	( 6.95 -	( 7.49 -	( 7.95 -	( 8.80 -	
		5.65)	6.74)	7.65)	8.89)	9.87)	10.87)	13.29)	
3	10	4.54	5.61	6.50	7.78	8.79	9.86	12.55	
		( 4.09 -	( 5.04 -	( 5.80 -	( 6.86 -	( 7.62 -	( 8.38 -	( 10.05 -	
		5.01)	6.23)	7.27)	8.83)	10.16)	11.63)	15.65)	

Table 6 Precipitation Frequency Estimates (in inches) with 90% Confidence Intervals (continued)

Storm Code	Section Code	Recurrence interval								
		2-year	5-year	10-year	25-year	50-year	100-year	500-year		
4	1	3.61	4.59	5.43	6.72	7.73	8.83	11.53		
		( 3.26 -	( 4.14 -	( 4.89 -	( 6.01 -	( 6.87 -	( 7.78 -	( 9.84 -		
	3.97)	5.09)	6.06)	7.59)	8.84)	10.25)	13.98)			
4	2	3.66	4.71	5.62	6.99	8.13	9.28	12.10		
		( 3.31 -	( 4.26 -	( 5.06 -	( 6.25 -	( 7.21 -	( 8.15 -	( 10.33 -		
		4.02)	5.20)	6.24)	7.87)	9.26)	10.73)	14.56)		
4	3	3.76	4.76	5.62	6.81	7.72	8.6	10.58		
	( 3.46 -	( 4.36 -	(5.13 -	( 6.17 -	( 6.92 -	( 7.63 -	( 9.06 -			
	4.10)	5.19)	6.15)	7.52)	8.62)	9.73)	12.40)			
4	4	3.59	4.61	5.47	6.65	7.55	8.40	10.21		
		( 3.26 -	( 4.18 -	( 4.96 -	( 5.99 -	( 6.77 -	( 7.47 -	( 8.86 -		
	3.94)	5.07)	6.04)	7.41)	8.48)	9.53)	11.92)			
4	5	3.54	4.49	5.32	6.48	7.38	8.27	10.26		
		( 3.25 -	( 4.12 -	( 4.87 -	( 5.90 -	( 6.67 -	( 7.41 -	( 8.94 -		
		3.83)	4.89)	5.82)	7.14)	8.22)	9.32)	12.01)		
4	6	3.66	4.61	5.38	6.48	7.33	8.11	9.93		
		( 3.35 -	( 4.19 -	( 4.88 -	( 5.84 -	( 6.55 -	( 7.18 -	( 8.53 -		
		4.01)	5.06)	5.94)	7.22)	8.24)	9.21)	11.62)		
4	7	3.92	4.85	5.61	6.67	7.46	8.21	9.76		
		( 3.57 -	( 4.41 -	( 5.09 -	( 6.02 -	( 6.68 -	( 7.28 -	( 8.39 -		
		4.27)	5.30)	6.16)	7.39)	8.35)	9.28)	11.36)		
4	8	4.28	5.29	6.1	7.25	8.15	9.08	11.4		
		( 3.88 -	( 4.77 -	( 5.46 -	( 6.43 -	( 7.14 -	( 7.85 -	( 9.42 -		
		4.73)	5.86)	6.81)	8.20)	9.34)	10.56)	13.79)		
4	9	4.64	5.54	6.27	7.24	7.94	8.58	10.06		
		( 4.22 -	( 5.02 -	( 5.63 -	( 6.42 -	( 6.92 -	( 7.34 -	( 8.13 -		
		5.12)	6.15)	7.01)	8.22)	9.16)	10.07)	12.37)		
4	10	4.06	5.02	5.86	7.04	8.01	9.02	11.56		
		( 3.66 -	( 4.51 -	( 5.22 -	( 6.22 -	( 6.98 -	( 7.72 -	( 9.38 -		
		4.45)	5.53)	6.50)	7.95)	9.20)	10.56)	14.33)		

Table 6 Precipitation Frequency Estimates (in inches) with 90% Confidence Intervals (continued)

Storm Code	Section Code	Recurrence interval								
		2-year	5-year	10-year	25-year	50-year	100-year	500-year		
5	1	3.34	4.22	5.03	6.20	7.20	8.25	10.84		
		( 3.00 -	( 3.79 -	( 4.50 -	( 5.51 -	( 6.34 -	( 7.20 -	( 9.16 -		
		3.69)	4.68)	5.61)	6.99)	8.21)	9.54)	13.00)		
5	2	3.34	4.30	5.15	6.45	7.50	8.57	11.24		
		( 3.00 -	( 3.85 -	( 4.60 -	( 5.71 -	( 6.59 -	( 7.46 -	( 9.48 -		
		3.69)	4.77)	5.73)	7.26)	8.55)	9.93)	13.63)		
5	3	3.48	4.45	5.24	6.38	7.25	8.06	9.91		
		( 3.19 -	( 4.07 -	( 4.79 -	( 5.81 -	( 6.56 -	( 7.23 -	( 8.61 -		
		3.79)	4.86)	5.74)	7.05)	8.09)	9.07)	11.47)		
5	4	3.32	4.30	5.10	6.20	7.05	7.85	9.53		
		( 3.01 -	( 3.89 -	( 4.61 -	( 5.58 -	( 6.31 -	( 6.99 -	( 8.31 -		
		3.65)	4.74)	5.64)	6.91)	7.93)	8.92)	11.16)		
5	5	3.12	3.97	4.71	5.78	6.62	7.43	9.32		
		( 2.86 -	( 3.64 -	( 4.30 -	( 5.25 -	( 5.97 -	( 6.63 -	( 8.08 -		
		3.38)	4.31)	5.15)	6.38)	7.39)	8.41)	10.96)		
5	6	3.23	4.07	4.76	5.79	6.56	7.31	9.04		
		( 2.95 -	( 3.71 -	( 4.32 -	( 5.21 -	( 5.85 -	( 6.45 -	( 7.73 -		
		3.54)	4.47)	5.26)	6.45)	7.37)	8.30)	10.59)		
5	7	3.49	4.33	5.00	5.98	6.71	7.40	8.84		
		( 3.18 -	( 3.93 -	( 4.53 -	( 5.39 -	( 6.00 -	( 6.54 -	( 7.58 -		
		3.80)	4.74)	5.50)	6.64)	7.54)	8.42)	10.44)		
5	8	3.69	4.56	5.27	6.3	7.14	7.96	10.06		
		( 3.36 -	( 4.15 -	( 4.78 -	( 5.67 -	( 6.37 -	( 7.03 -	( 8.60 -		
		4.04)	5.01)	5.82)	7.03)	8.03)	9.05)	11.78)		
5	9	4.07	4.89	5.55	6.42	7.06	7.68	8.99		
		( 3.71 -	( 4.45 -	( 5.03 -	( 5.79 -	( 6.32 -	( 6.80 -	( 7.73 -		
		4.44)	5.35)	6.10)	7.12)	7.91)	8.70)	10.51)		
5	10	3.63	4.52	5.28	6.38	7.29	8.23	10.57		
		( 3.29 -	( 4.08 -	( 4.73 -	( 5.66 -	( 6.36 -	( 7.07 -	( 8.67 -		
		4.00)	5.01)	5.88)	7.21)	8.36)	9.59)	13.03)		

Table 6 Precipitation Frequency Estimates (in inches) with 90% Confidence Intervals (continued)

	Section Code	Recurrence interval								
		2-year	5-year	10-year	25-year	50-year	100-year	500-year		
6	1	3.14	3.97	4.73	5.83	6.77	7.75	10.19		
		( 2.82 -	( 3.56 -	( 4.23 -	( 5.18 -	( 5.96 -	( 6.77 -	( 8.61 -		
		3.47)	4.40)	5.28)	6.57)	7.71)	8.96)	12.22)		
6	2	3.14	4.04	4.84	6.06	7.05	8.06	10.57		
	( 2.82 -	( 3.62 -	( 4.32 -	( 5.37 -	( 6.19 -	( 7.01 -	( 8.91 -			
		3.47)	4.48)	5.39)	6.82)	8.03)	9.33)	12.81)		
6	3	3.27	4.18	4.93	6.00	6.82	7.58	9.32		
	( 3.00 -	( 3.83 -	( 4.50 -	( 5.46 -	( 6.16 -	( 6.80 -	( 8.09 -			
	3.57)	4.57)	5.40)	6.62)	7.60)	8.53)	10.78)			
6	4	3.12	4.04	4.79	5.83	6.63	7.38	8.96		
		( 2.83 -	( 3.66 -	( 4.34 -	( 5.24 -	( 5.93 -	( 6.57 -	( 7.81 -		
	3.43)	4.46)	5.31)	6.50)	7.46)	8.39)	10.49)			
6	5	2.93	3.73	4.43	5.43	6.22	6.98	8.76		
		( 2.69 -	( 3.42 -	( 4.04 -	( 4.94 -	( 5.61 -	( 6.23 -	( 7.59 -		
		3.18)	4.06)	4.84)	6.00)	6.94)	7.90)	10.30)		
6	6	3.04	3.83	4.47	5.44	6.17	6.87	8.50		
		( 2.77 -	( 3.48 -	( 4.06 -	( 4.90 -	( 5.50 -	( 6.06 -	( 7.26 -		
		3.32)	4.20)	4.94)	6.06)	6.93)	7.81)	9.95)		
6	7	3.28	4.07	4.70	5.62	6.31	6.96	8.31		
		( 2.99 -	( 3.70 -	( 4.26 -	( 5.07 -	( 5.64 -	( 6.15 -	( 7.13 -		
		3.57)	4.45)	5.17)	6.25)	7.09)	7.91)	9.81)		
6	8	3.47	4.29	4.95	5.92	6.71	7.48	9.45		
		( 3.16 -	( 3.90 -	( 4.49 -	( 5.33 -	( 5.99 -	( 6.61 -	( 8.08 -		
		3.80)	4.71)	5.47)	6.60)	7.55)	8.51)	11.07)		
6	9	3.83	4.6	5.22	6.03	6.64	7.22	8.45		
		( 3.49 -	( 4.19 -	( 4.73 -	( 5.44 -	( 5.94 -	( 6.39 -	( 7.26 -		
		4.17)	5.03)	5.74)	6.70)	7.43)	8.18)	9.88)		
6	10	3.41	4.25	4.96	6	6.85	7.73	9.93		
		( 3.10 -	( 3.83 -	( 4.45 -	( 5.32 -	( 5.98 -	( 6.64 -	( 8.15 -		
		3.76)	4.71)	5.53)	6.78)	7.86)	9.02)	12.25)		

Table 6 Precipitation Frequency Estimates (in inches) with 90% Confidence Intervals (continued)

Storm Code	Section Code	Recurren	ce interval					
		2-year	5-year	10-year	25-year	50-year	100-year	500-year
7	1	2.91	3.67	4.38	5.40	6.26	7.18	9.43
		( 2.61 -	( 3.29 -	( 3.92 -	( 4.80 -	( 5.52 -	( 6.26 -	( 7.97 -
		3.21)	4.07)	4.88)	6.08)	7.14)	8.30)	11.31)
7	2	2.91	3.74	4.48	5.61	6.53	7.46	9.78
		( 2.61 -	( 3.35 -	( 4.00 -	( 4.97 -	( 5.73 -	( 6.49 -	( 8.25 -
		3.21)	4.15)	4.99)	6.32)	7.44)	8.64)	11.86)
7	3	3.03	3.87	4.56	5.55	6.31	7.01	8.62
		( 2.78 -	( 3.54 -	( 4.17 -	( 5.05 -	( 5.70 -	( 6.29 -	( 7.49 -
		3.30)	4.23)	5.00)	6.13)	7.03)	7.89)	9.98)
7	4	2.89	3.74	4.44	5.39	6.13	6.83	8.29
		( 2.62 -	( 3.39 -	( 4.01 -	( 4.85 -	( 5.49 -	( 6.08 -	( 7.23 -
		3.18)	4.13)	4.91)	6.01)	6.90)	7.76)	9.71)
7	5	2.71	3.45	4.10	5.03	5.76	6.46	8.11
		( 2.49 -	( 3.16 -	( 3.74 -	( 4.57 -	( 5.19 -	( 5.77 -	( 7.03 -
		2.94)	3.75)	4.48)	5.55)	6.43)	7.32)	9.53)
7	6	2.81	3.54	4.14	5.04	5.71	6.36	7.86
		( 2.56 -	( 3.23 -	( 3.76 -	( 4.53 -	( 5.09 -	( 5.61 -	( 6.72 -
		3.08)	3.89)	4.57)	5.61)	6.41)	7.23)	9.21)
7	7	3.04	3.77	4.35	5.2	5.84	6.44	7.69
		( 2.76 -	( 3.42 -	( 3.94 -	( 4.69 -	( 5.22 -	( 5.69 -	( 6.60 -
		3.31)	4.12)	4.79)	5.78)	6.56)	7.32)	9.08)
7	8	3.21	3.97	4.58	5.48	6.21	6.93	8.75
		( 2.93 -	( 3.61 -	( 4.16 -	( 4.93 -	( 5.54 -	( 6.11 -	( 7.48 -
		3.51)	4.36)	5.06)	6.11)	6.99)	7.88)	10.25)
7	9	3.54	4.25	4.83	5.59	6.14	6.69	7.82
		( 3.23 -	( 3.87 -	( 4.38 -	( 5.03 -	( 5.50 -	( 5.91 -	( 6.72 -
		3.86)	4.66)	5.31)	6.20)	6.88)	7.57)	9.14)
7	10	3.16	3.93	4.59	5.55	6.34	7.16	9.19
		( 2.86 -	( 3.55 -	( 4.12 -	( 4.92 -	( 5.54 -	( 6.15 -	( 7.55 -
		3.48)	4.36)	5.12)	6.27)	7.27)	8.35)	11.34)

Table 6 Precipitation Frequency Estimates (in inches) with 90% Confidence Intervals (continued)

Storm Code	Section Code	Recurrence interval								
		2-year	5-year	10-year	25-year	50-year	100-year	500-year		
8	1	2.51	3.17	3.77	4.65	5.4	6.19	8.13		
		( 2.25 -	( 2.84 -	( 3.38 -	( 4.14 -	( 4.76 -	( 5.40 -	( 6.87 -		
		2.77)	3.51)	4.21)	5.24)	6.15)	7.15)	9.75)		
8	2	2.51	3.23	3.86	4.84	5.63	6.43	8.43		
		( 2.25 -	( 2.89 -	( 3.45 -	( 4.28 -	( 4.94 -	( 5.60 -	( 7.11 -		
		2.77)	3.57)	4.30)	5.45)	6.41)	7.44)	10.22)		
8	3	2.61	3.34	3.93	4.79	5.44	6.05	7.43		
		( 2.39 -	( 3.06 -	( 3.59 -	( 4.36 -	( 4.92 -	( 5.42 -	( 6.46 -		
		2.85)	3.65)	4.31)	5.29)	6.06)	6.81)	8.60)		
8	4	2.49	3.23	3.83	4.65	5.29	5.89	7.15		
		( 2.26 -	( 2.92 -	( 3.46 -	( 4.18 -	( 4.74 -	( 5.24 -	( 6.23 -		
		2.74)	3.56)	4.23)	5.18)	5.95)	6.69)	8.37)		
8	5	2.34	2.98	3.53	4.34	4.97	5.57	6.99		
		( 2.15 -	( 2.73 -	( 3.23 -	( 3.94 -	( 4.47 -	( 4.97 -	( 6.06 -		
		2.54)	3.24)	3.86)	4.78)	5.54)	6.31)	8.22)		
8	6	2.42	3.05	3.57	4.34	4.92	5.48	6.78		
		( 2.21 -	( 2.78 -	( 3.24 -	( 3.91 -	( 4.39 -	( 4.84 -	( 5.80 -		
		2.65)	3.35)	3.94)	4.83)	5.53)	6.23)	7.94)		
8	7	2.62	3.25	3.75	4.49	5.03	5.55	6.63		
		( 2.38 -	( 2.95 -	( 3.40 -	( 4.04 -	( 4.50 -	( 4.91 -	( 5.69 -		
		2.85)	3.55)	4.13)	4.98)	5.66)	6.31)	7.83)		
8	8	2.77	3.42	3.95	4.73	5.36	5.97	7.54		
		( 2.52 -	( 3.11 -	( 3.59 -	( 4.25 -	( 4.78 -	( 5.27 -	( 6.45 -		
		3.03)	3.76)	4.37)	5.27)	6.02)	6.79)	8.83)		
8	9	3.05	3.67	4.16	4.82	5.3	5.76	6.74		
		( 2.78 -	( 3.34 -	( 3.78 -	( 4.34 -	( 4.74 -	( 5.10 -	( 5.79 -		
		3.33)	4.02)	4.58)	5.34)	5.93)	6.53)	7.88)		
8	10	2.72	3.39	3.96	4.79	5.47	6.17	7.92		
		( 2.47 -	( 3.06 -	( 3.55 -	( 4.24 -	( 4.77 -	( 5.30 -	( 6.51 -		
		3.00)	3.76)	4.41)	5.41)	6.27)	7.20)	9.77)		

Table 6 Precipitation Frequency Estimates (in inches) with 90% Confidence Intervals (continued)

Storm Code	Section Code	Recurren	ce interval					
		2-year	5-year	10-year	25-year	50-year	100-year	500-year
9	1	2.14	2.7	3.22	3.97	4.61	5.28	6.94
		( 1.92 -	( 2.42 -	( 2.88 -	( 3.53 -	( 4.06 -	( 4.61 -	( 5.86 -
		2.36)	3.00)	3.59)	4.48)	5.25)	6.10)	8.32)
9	2	2.14	2.75	3.30	4.13	4.80	5.49	7.20
		( 1.92 -	( 2.46 -	( 2.94 -	( 3.66 -	( 4.22 -	( 4.78 -	( 6.07 -
		2.36)	3.05)	3.67)	4.65)	5.47)	6.35)	8.72)
9	3	2.23	2.85	3.35	4.08	4.64	5.16	6.34
		( 2.04 -	( 2.61 -	( 3.07 -	( 3.72 -	( 4.20 -	( 4.63 -	( 5.51 -
		2.43)	3.11)	3.68)	4.51)	5.17)	5.81)	7.34)
9	4	2.12	2.75	3.26	3.97	4.51	5.02	6.1
		( 1.93 -	( 2.49 -	( 2.95 -	( 3.57 -	( 4.04 -	( 4.47 -	( 5.32 -
		2.34)	3.04)	3.61)	4.42)	5.08)	5.71)	7.14)
9	5	2.00	2.54	3.01	3.70	4.24	4.76	5.97
		( 1.83 -	( 2.33 -	( 2.75 -	( 3.36 -	( 3.82 -	( 4.24 -	( 5.17 -
		2.16)	2.76)	3.29)	4.08)	4.73)	5.38)	7.01)
9	6	2.07	2.60	3.05	3.71	4.20	4.68	5.79
		( 1.89 -	( 2.37 -	( 2.76 -	( 3.33 -	( 3.74 -	( 4.13 -	( 4.95 -
		2.26)	2.86)	3.36)	4.12)	4.72)	5.32)	6.78)
9	7	2.23	2.77	3.20	3.83	4.29	4.74	5.66
		( 2.03 -	( 2.52 -	( 2.90 -	( 3.45 -	( 3.84 -	( 4.19 -	( 4.85 -
		2.43)	3.03)	3.52)	4.25)	4.83)	5.39)	6.68)
9	8	2.36	2.92	3.37	4.03	4.57	5.09	6.44
		( 2.15 -	( 2.65 -	( 3.06 -	( 3.63 -	( 4.08 -	( 4.50 -	( 5.50 -
		2.58)	3.21)	3.73)	4.50)	5.14)	5.79)	7.54)
9	9	2.60	3.13	3.55	4.11	4.52	4.92	5.75
		( 2.38 -	( 2.85 -	( 3.22 -	( 3.70 -	( 4.04 -	( 4.35 -	( 4.95 -
		2.84)	3.43)	3.91)	4.56)	5.06)	5.57)	6.73)
9	10	2.32	2.89	3.38	4.09	4.66	5.26	6.76
		( 2.11 -	( 2.61 -	( 3.03 -	( 3.62 -	( 4.07 -	( 4.52 -	( 5.55 -
		2.56)	3.21)	3.77)	4.62)	5.35)	6.14)	8.34)

Table 6 Precipitation Frequency Estimates (in inches) with 90% Confidence Intervals (continued)

Storm Code	Section Code	Recurrence interval								
		2-year	5-year	10-year	25-year	50-year	100-year	500-year		
10	1	1.94	2.45	2.92	3.60	4.17	4.78	6.29		
		( 1.74 -	( 2.20 -	( 2.61 -	( 3.20 -	( 3.68 -	( 4.17 -	( 5.31 -		
		2.14)	2.72)	3.26)	4.06)	4.76)	5.53)	7.54)		
10	2	1.94	2.49	2.99	3.74	4.35	4.97	6.52		
		( 1.74 -	( 2.23 -	( 2.67 -	( 3.31 -	( 3.82 -	( 4.33 -	( 5.50 -		
		2.14)	2.76)	3.32)	4.21)	4.96)	5.76)	7.90)		
10	3	2.02	2.58	3.04	3.70	4.21	4.67	5.75		
		( 1.85 -	( 2.36 -	( 2.78 -	( 3.37 -	( 3.80 -	( 4.19 -	( 4.99 -		
		2.20)	2.82)	3.33)	4.09)	4.69)	5.26)	6.65)		
10	4	1.93	2.49	2.96	3.60	4.09	4.55	5.53		
		( 1.74 -	( 2.26 -	( 2.68 -	( 3.24 -	( 3.66 -	( 4.05 -	( 4.82 -		
		2.12)	2.75)	3.27)	4.01)	4.60)	5.17)	6.47)		
10	5	1.81	2.30	2.73	3.35	3.84	4.31	5.41		
		( 1.66 -	( 2.11 -	( 2.50 -	( 3.05 -	( 3.46 -	( 3.85 -	( 4.69 -		
		1.96)	2.50)	2.99)	3.70)	4.29)	4.88)	6.35)		
10	6	1.87	2.36	2.76	3.36	3.80	4.24	5.24		
		( 1.71 -	( 2.15 -	( 2.50 -	( 3.02 -	( 3.39 -	( 3.74 -	( 4.48 -		
		2.05)	2.59)	3.05)	3.74)	4.28)	4.82)	6.14)		
10	7	2.02	2.51	2.90	3.47	3.89	4.29	5.13		
		( 1.84 -	( 2.28 -	( 2.63 -	( 3.13 -	( 3.48 -	( 3.79 -	( 4.40 -		
		2.21)	2.75)	3.19)	3.85)	4.37)	4.88)	6.05)		
10	8	2.14	2.64	3.06	3.65	4.14	4.62	5.83		
		( 1.95 -	( 2.41 -	( 2.77 -	( 3.29 -	( 3.69 -	( 4.08 -	( 4.99 -		
		2.34)	2.91)	3.38)	4.08)	4.66)	5.25)	6.83)		
10	9	2.36	2.84	3.22	3.72	4.09	4.46	5.21		
		( 2.15 -	( 2.58 -	( 2.92 -	( 3.36 -	( 3.66 -	( 3.94 -	( 4.48 -		
		2.58)	3.11)	3.54)	4.13)	4.59)	5.05)	6.10)		
10	10	2.1	2.62	3.06	3.7	4.23	4.77	6.13		
		( 1.91 -	( 2.37 -	( 2.74 -	( 3.28 -	( 3.69 -	( 4.10 -	( 5.03 -		
		2.32)	2.91)	3.41)	4.18)	4.85)	5.56)	7.56)		

Table 6 Precipitation Frequency Estimates (in inches) with 90% Confidence Intervals (continued)

Storm Code	Section Code	Recurrence interval								
		2-year	5-year	10-year	25-year	50-year	100-year	500-year		
11	1	1.57	1.98	2.36	2.92	3.38	3.88	5.09		
		( 1.41 -	( 1.78 -	( 2.12 -	( 2.59 -	( 2.98 -	( 3.38 -	( 4.30 -		
		1.74)	2.20)	2.64)	3.29)	3.86)	4.48)	6.11)		
11	2	1.57	2.02	2.42	3.03	3.53	4.03	5.28		
		( 1.41 -	( 1.81 -	( 2.16 -	( 2.69 -	( 3.10 -	( 3.51 -	( 4.46 -		
		1.73)	2.24)	2.69)	3.41)	4.02)	4.67)	6.40)		
11	3	1.64	2.09	2.46	3.00	3.41	3.79	4.66		
		( 1.50 -	( 1.91 -	( 2.25 -	( 2.73 -	( 3.08 -	( 3.40 -	( 4.05 -		
		1.78)	2.29)	2.70)	3.31)	3.80)	4.26)	5.39)		
11	4	1.56	2.02	2.4	2.91	3.31	3.69	4.48		
		( 1.41 -	( 1.83 -	( 2.17 -	( 2.62 -	( 2.97 -	( 3.28 -	( 3.91 -		
		1.72)	2.23)	2.65)	3.25)	3.73)	4.19)	5.24)		
11	5	1.47	1.87	2.21	2.72	3.11	3.49	4.38		
		( 1.35 -	( 1.71 -	( 2.02 -	( 2.47 -	( 2.80 -	( 3.12 -	( 3.80 -		
		1.59)	2.03)	2.42)	3.00)	3.47)	3.95)	5.15)		
11	6	1.52	1.91	2.24	2.72	3.08	3.44	4.25		
		( 1.38 -	( 1.74 -	( 2.03 -	( 2.45 -	( 2.75 -	( 3.03 -	( 3.63 -		
		1.66)	2.10)	2.47)	3.03)	3.46)	3.90)	4.98)		
11	7	1.64	2.04	2.35	2.81	3.15	3.48	4.15		
		( 1.49 -	( 1.85 -	( 2.13 -	( 2.53 -	( 2.82 -	( 3.07 -	( 3.56 -		
		1.79)	2.23)	2.59)	3.12)	3.54)	3.96)	4.91)		
11	8	1.73	2.14	2.48	2.96	3.36	3.74	4.73		
		( 1.58 -	( 1.95 -	( 2.25 -	( 2.66 -	( 2.99 -	( 3.30 -	( 4.04 -		
		1.90)	2.36)	2.74)	3.30)	3.77)	4.26)	5.54)		
11	9	1.91	2.3	2.61	3.02	3.32	3.61	4.23		
		( 1.75 -	( 2.09 -	( 2.37 -	( 2.72 -	( 2.97 -	( 3.19 -	( 3.63 -		
		2.09)	2.52)	2.87)	3.35)	3.72)	4.09)	4.94)		
11	10	1.71	2.12	2.48	3.00	3.43	3.87	4.97		
		( 1.55 -	( 1.92 -	( 2.22 -	( 2.66 -	( 2.99 -	( 3.32 -	( 4.08 -		
		1.88)	2.35)	2.77)	3.39)	3.93)	4.51)	6.13)		

## Comparisons with Existing Sources

The frequency analysis in this study was compared with Bulletin 70 (Huff and Angel, 1989) and NOAA Atlas 14 (Bonnin et al., 2006). Study results were formatted similar to those of Bulletin 70, and the comparisons were made for each section, as shown in Figures 13–23. Similar comparisons with Atlas 14 were not possible, however, because Atlas 14 did not provide values for the sections defined in Bulletin 70. Instead, the frequency estimates for each county (represented by its centroid) in a section were averaged and compared with the results for the same section in this study, meaning that some additional uncertainty was introduced. Nonetheless, this comparison still provides usable information on general trends. The comparisons between the new frequency analyses (updated Bulletin 70) and Atlas 14 are presented in Figures 24–33.

Bulletin 70, NOAA Atlas 14, and this study have numerous differences, such as the selection of gages, periods of record, data processing, methods used for frequency analysis, and methods for trend adjustment. Despite these differences, comparisons made with the existing studies (spanning 30 years) still provide a general idea about the changes in precipitation frequency with time.

## Final Remarks

This study used updated data through 2017 and techniques (L-Moments) to provide an update to the original Bulletin 70, published in 1989. Compared with the original Bulletin 70 (Huff and Angel, 1989), the results of this study generally show increasing precipitation amounts at selected frequencies for most of the sections with some relatively smaller decreases in the southern and western sections of Illinois. The present study shows consistent increases compared with NOAA Atlas 14 (Bonnin et al., 2006) and better reflects the current risk of heavier precipitation events.

The changing climate of heavy precipitation observed in Illinois and the Midwest presents a significant challenge for storm water management. The observed increases noted in this report, along with the expectation of continued increases over the 21st Century (Easterling et al. 2017), will necessitate more frequent assessments of precipitation frequency, as suggested by Winters et al. (2015). To help plan for future climate change, this analysis, representing the present time, should be accompanied with frequency analysis of climate model-generated data for future time horizons (Markus et al., 2017, 2018).

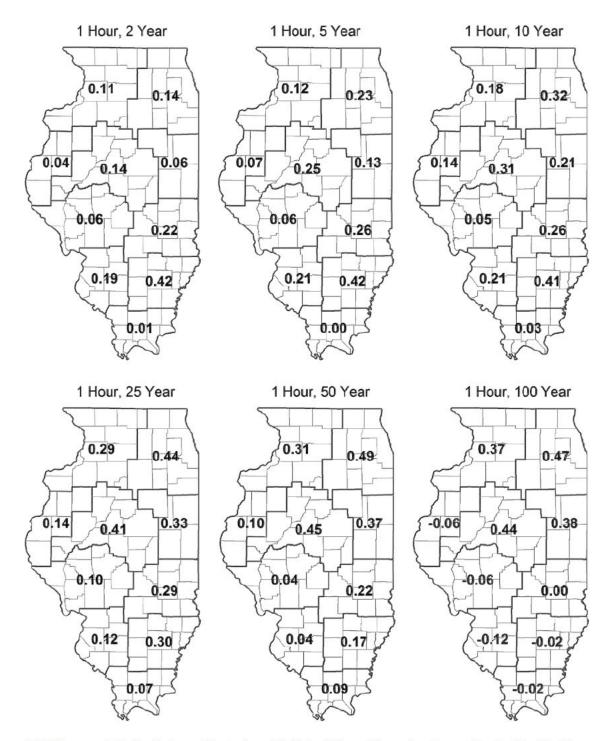


Figure 13 Differences in inches between this study and Bulletin 70 for a 1-hour duration and 2-, 5-, 10-, 25-, 50-, and 100-year frequencies for 10 sections in Illinois. Positive numbers denote an increase and negative numbers show a decrease compared with Bulletin 70.

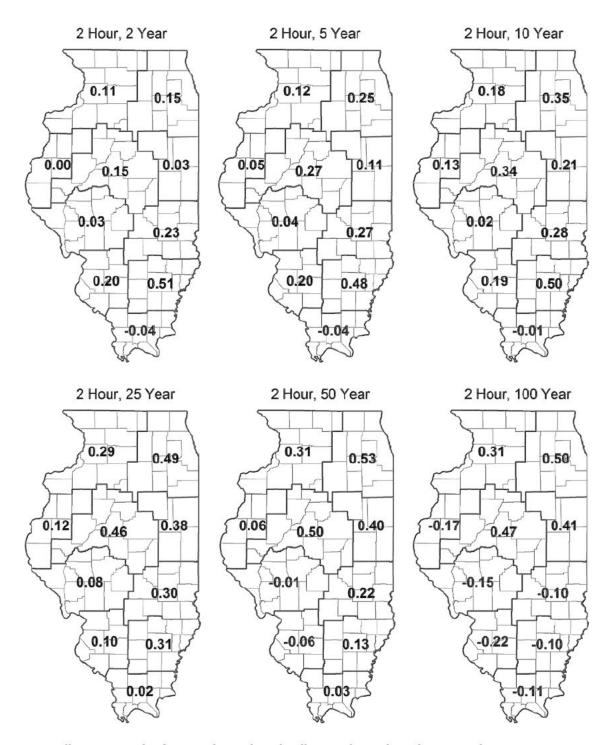


Figure 14 Differences in inches between this study and Bulletin 70 for a 2-hour duration and 2-, 5-, 10-, 25-, 50-, and 100-year frequencies for 10 sections in Illinois. Positive numbers denote an increase and negative numbers show a decrease compared with Bulletin 70.

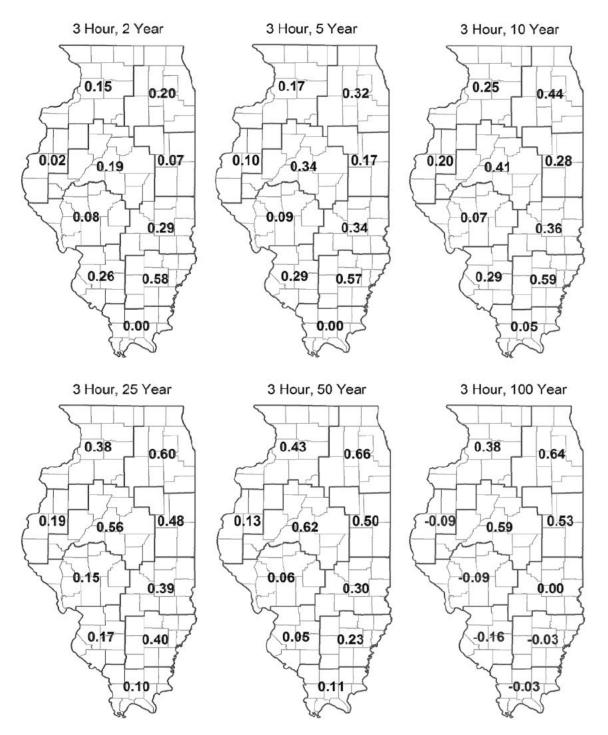


Figure 15 Differences in inches between this study and Bulletin 70 for a 3-hour duration and 2-, 5-, 10-, 25-, 50-, and 100-year frequencies for 10 sections in Illinois. Positive numbers denote an increase and negative numbers show a decrease compared with Bulletin 70.

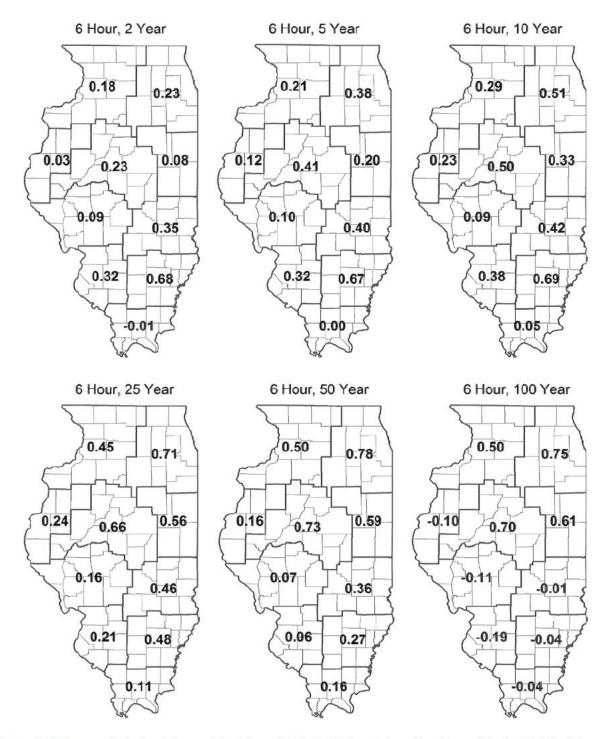


Figure 16 Differences in inches between this study and Bulletin 70 for a 6-hour duration and 2-, 5-, 10-, 25-, 50-, and 100-year frequencies for 10 sections in Illinois. Positive numbers denote an increase and negative numbers show a decrease compared with Bulletin 70.

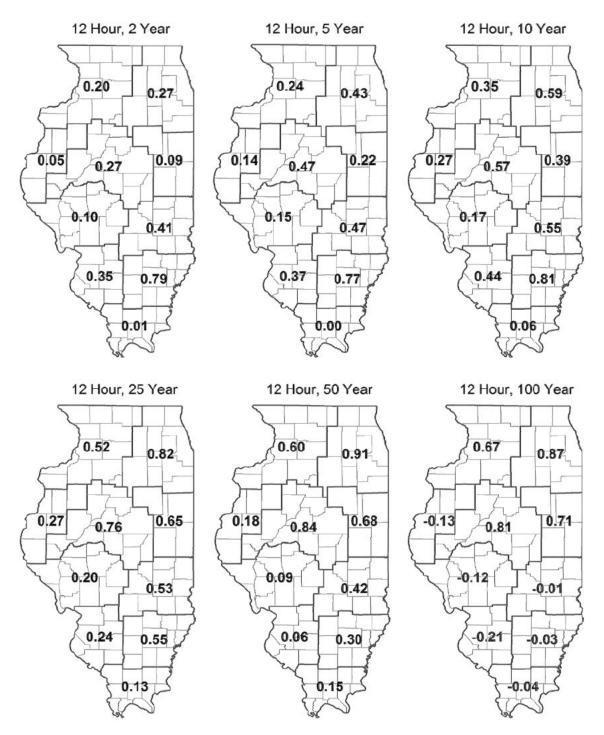


Figure 17 Differences in inches between this study and Bulletin 70 for a 12-hour duration and 2-, 5-, 10-, 25-, 50-, and 100-year frequencies for 10 sections in Illinois. Positive numbers denote an increase and negative numbers show a decrease compared with Bulletin 70.

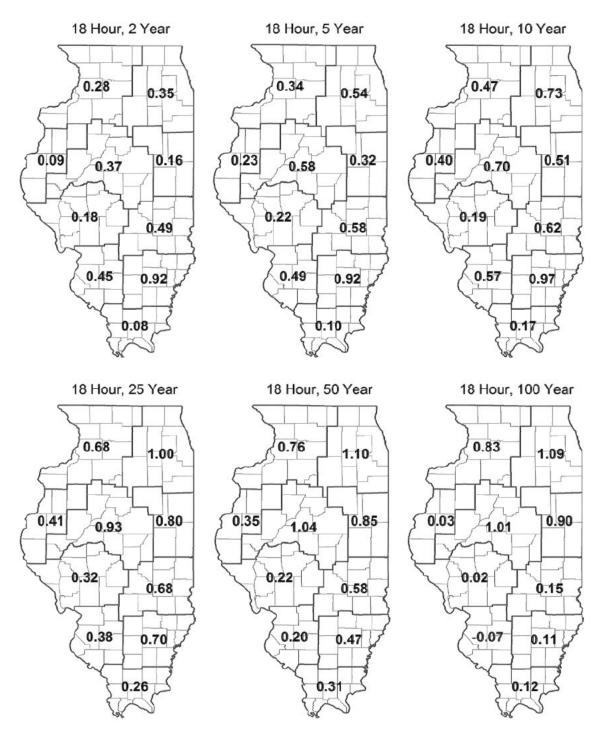


Figure 18 Differences in inches between this study and Bulletin 70 for an 18-hour duration and 2-, 5-, 10-, 25-, 50-, and 100-year frequencies for 10 sections in Illinois. Positive numbers denote an increase and negative numbers show a decrease compared with Bulletin 70.

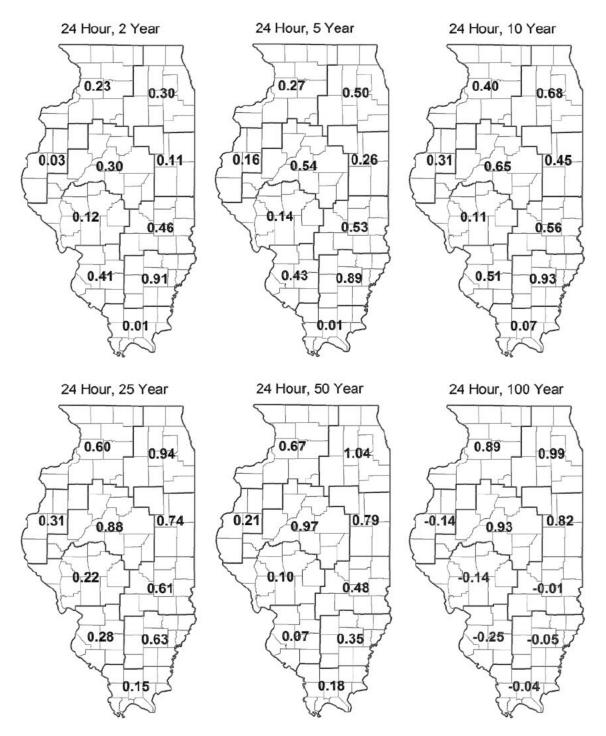


Figure 19 Differences in inches between this study and Bulletin 70 for a 24-hour duration and 2-, 5-, 10-, 25-, 50-, and 100-year frequencies for 10 sections in Illinois. Positive numbers denote an increase and negative numbers show a decrease compared with Bulletin 70.

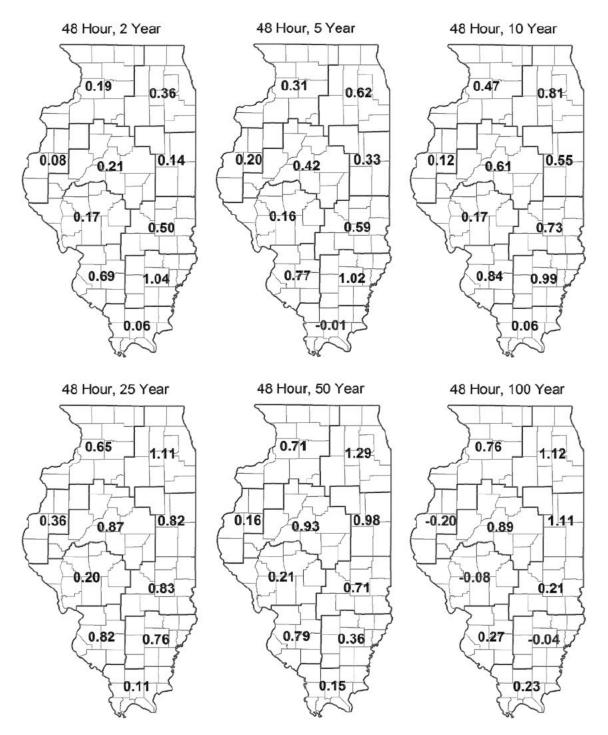


Figure 20 Differences in inches between this study and Bulletin 70 for a 48-hour duration and 2-, 5-, 10-, 25-, 50-, and 100-year frequencies for 10 sections in Illinois. Positive numbers denote an increase and negative numbers show a decrease compared with Bulletin 70.

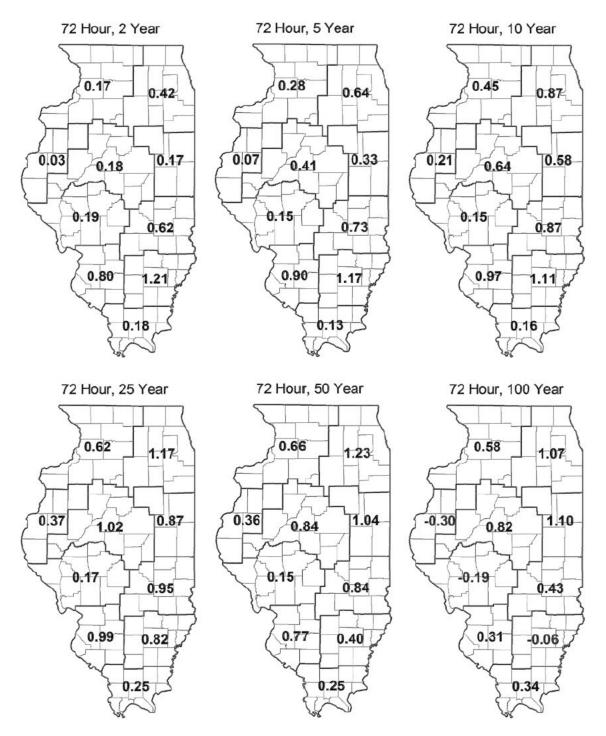


Figure 21 Differences in inches between this study and Bulletin 70 for a 72-hour duration and 2-, 5-, 10-, 25-, 50-, and 100-year frequencies for 10 sections in Illinois. Positive numbers denote an increase and negative numbers show a decrease compared with Bulletin 70.

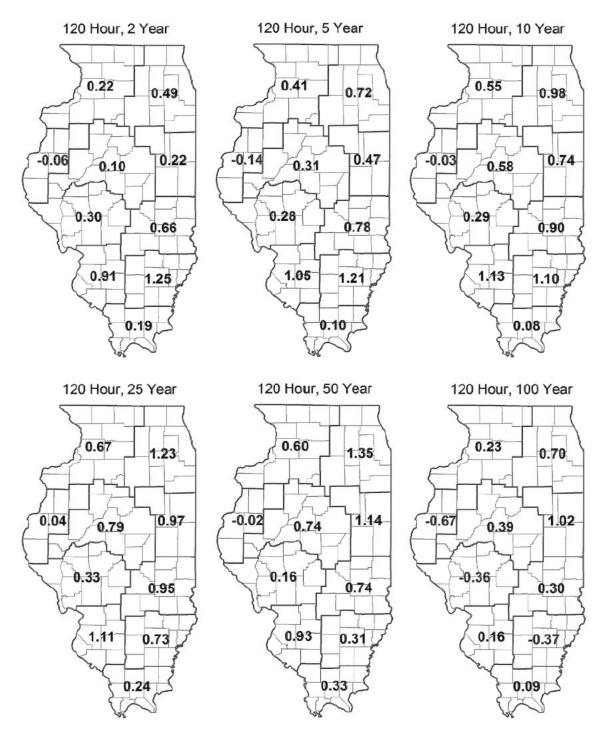


Figure 22 Differences in inches between this study and Bulletin 70 for a 120-hour duration and 2-, 5-, 10-, 25-, 50-, and 100-year frequencies for 10 sections in Illinois. Positive numbers denote an increase and negative numbers show a decrease compared with Bulletin 70.

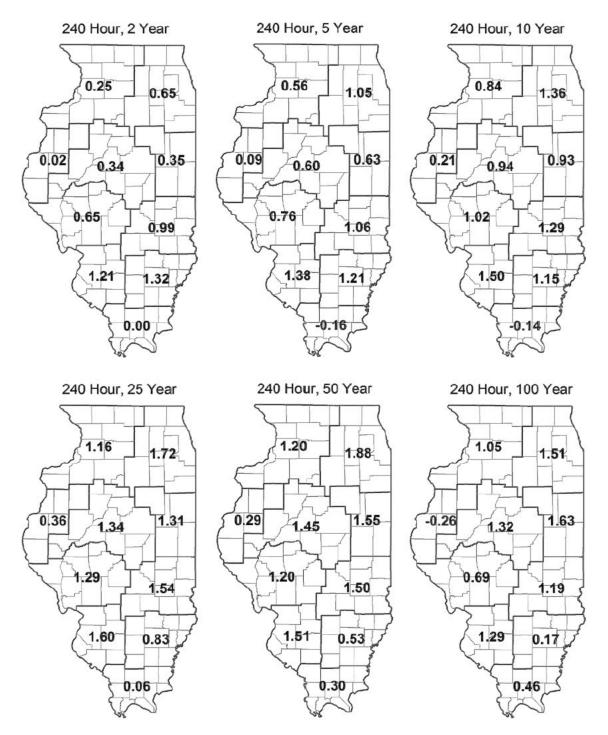


Figure 23 Differences in inches between this study and Bulletin 70 for a 240-hour duration and 2-, 5-, 10-, 25-, 50-, and 100-year frequencies for 10 sections in Illinois. Positive numbers denote an increase and negative numbers show a decrease compared with Bulletin 70.

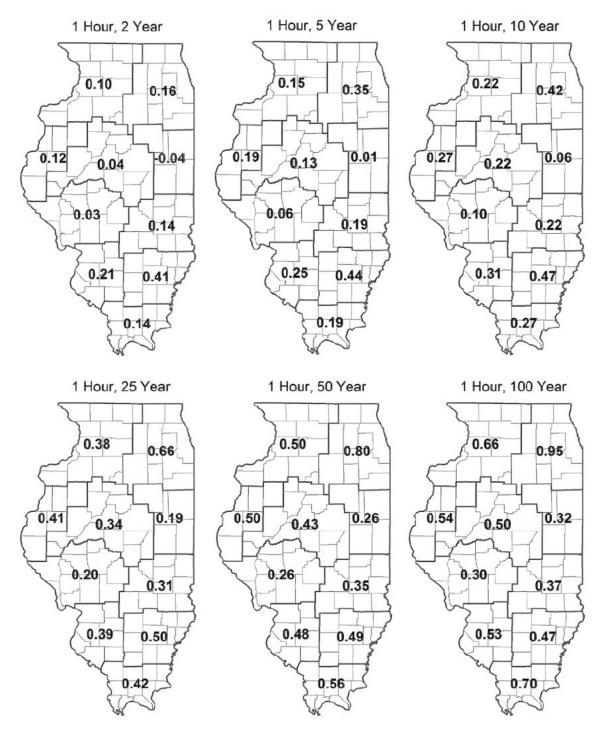


Figure 24 Differences in inches between this study and NOAA Atlas 14 for a 1-hour duration and 2-, 5-, 10-, 25-, 50-, and 100-year frequencies for 10 sections in Illinois. Positive numbers denote an increase and negative numbers show a decrease compared with Atlas 14.

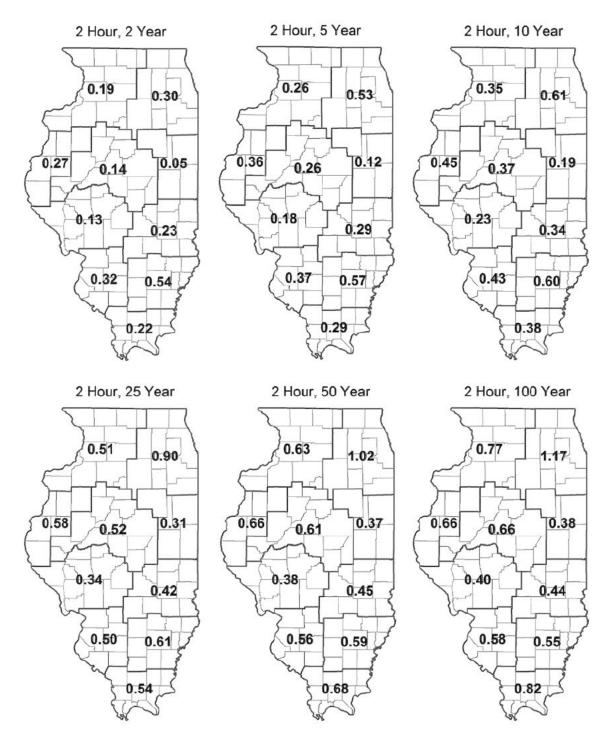


Figure 25 Differences in inches between this study and NOAA Atlas 14 for a 2-hour duration and 2-, 5-, 10-, 25-, 50-, and 100-year frequencies for 10 sections in Illinois. Positive numbers denote an increase and negative numbers show a decrease compared with Atlas 14.

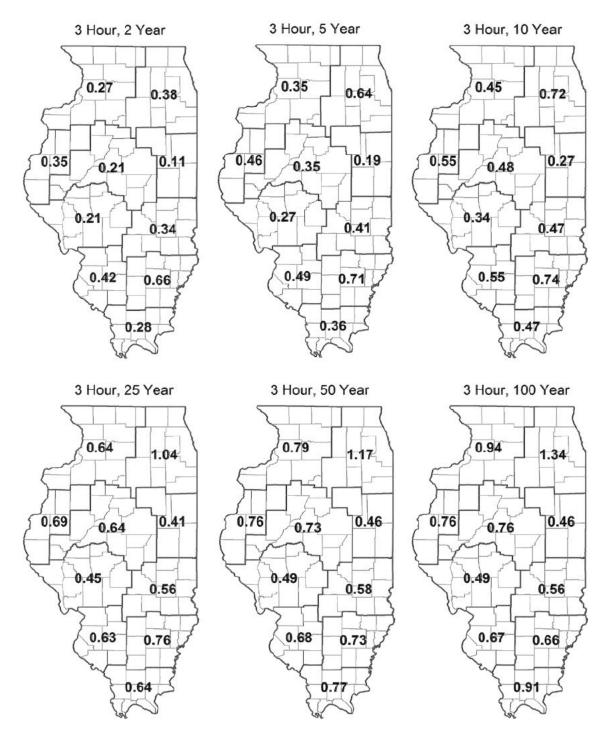


Figure 26 Differences in inches between this study and NOAA Atlas 14 for a 3-hour duration and 2-, 5-, 10-, 25-, 50-, and 100-year frequencies for 10 sections in Illinois. Positive numbers denote an increase and negative numbers show a decrease compared with Atlas 14.

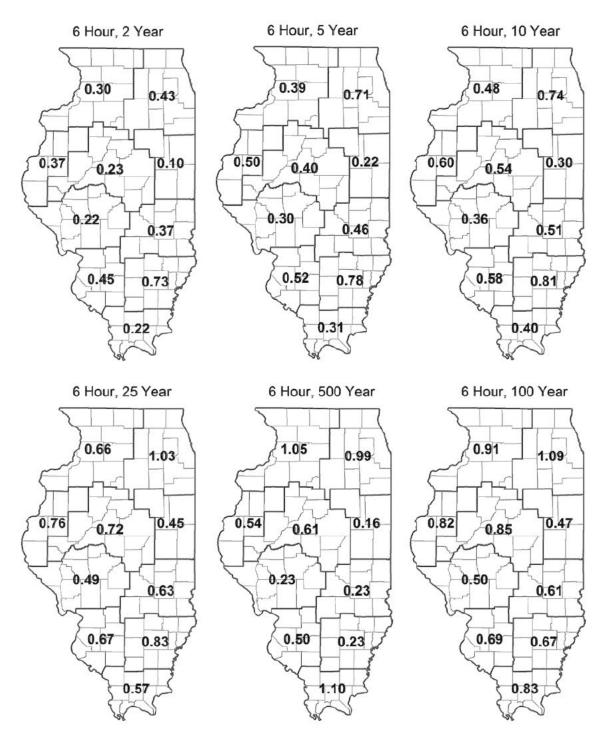


Figure 27 Differences in inches between this study and NOAA Atlas 14 for a 6-hour duration and 2-, 5-, 10-, 25-, 50-, and 100-year frequencies for 10 sections in Illinois. Positive numbers denote an increase and negative numbers show a decrease compared with Atlas 14.

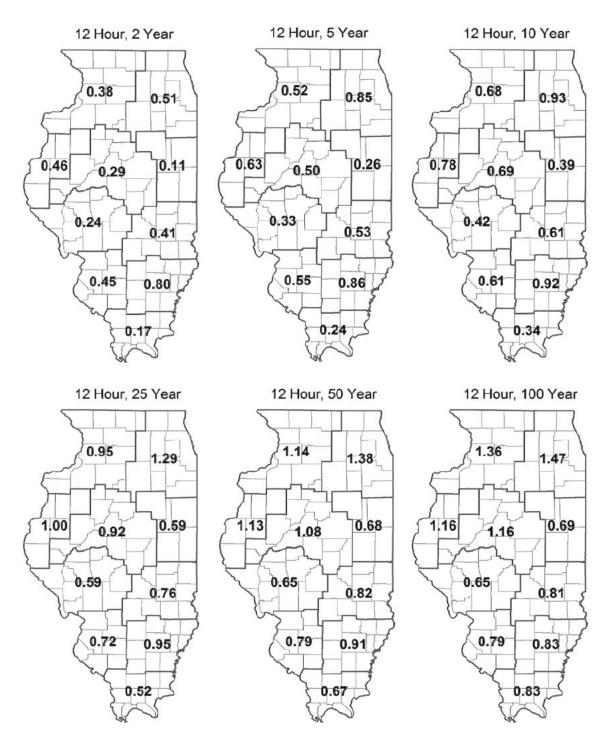


Figure 28 Differences in inches between this study and NOAA Atlas 14 for a 12-hour duration and 2-, 5-, 10-, 25-, 50-, and 100-year frequencies for 10 sections in Illinois. Positive numbers denote an increase and negative numbers show a decrease compared with Atlas 14.

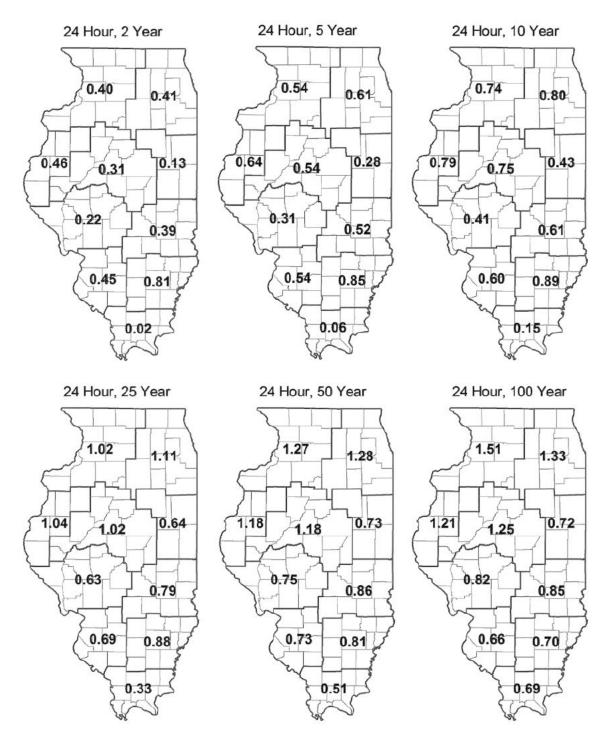


Figure 29 Differences in inches between this study and NOAA Atlas 14 for a 24-hour duration and 2-, 5-, 10-, 25-, 50-, and 100-year frequencies for 10 sections in Illinois. Positive numbers denote an increase and negative numbers show a decrease compared with Atlas 14.

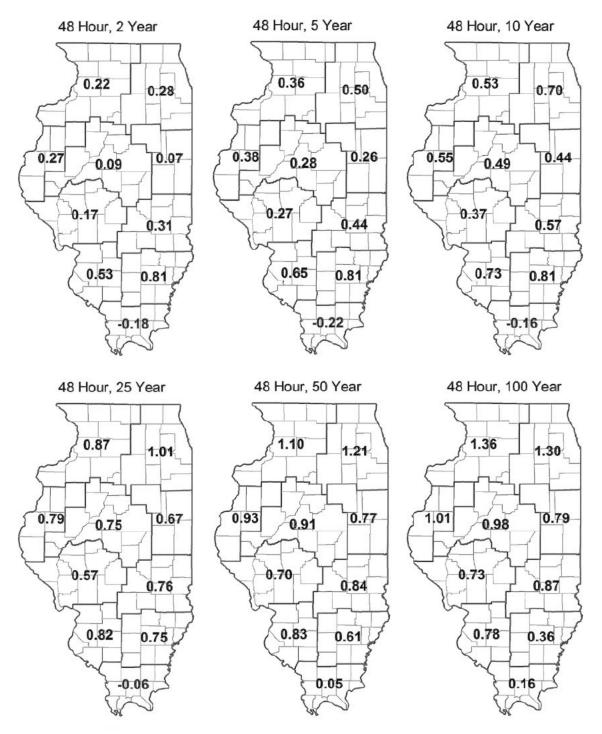


Figure 30 Differences in inches between this study and NOAA Atlas 14 for a 48-hour duration and 2-, 5-, 10-, 25-, 50-, and 100-year frequencies for 10 sections in Illinois. Positive numbers denote an increase and negative numbers show a decrease compared with Atlas 14.

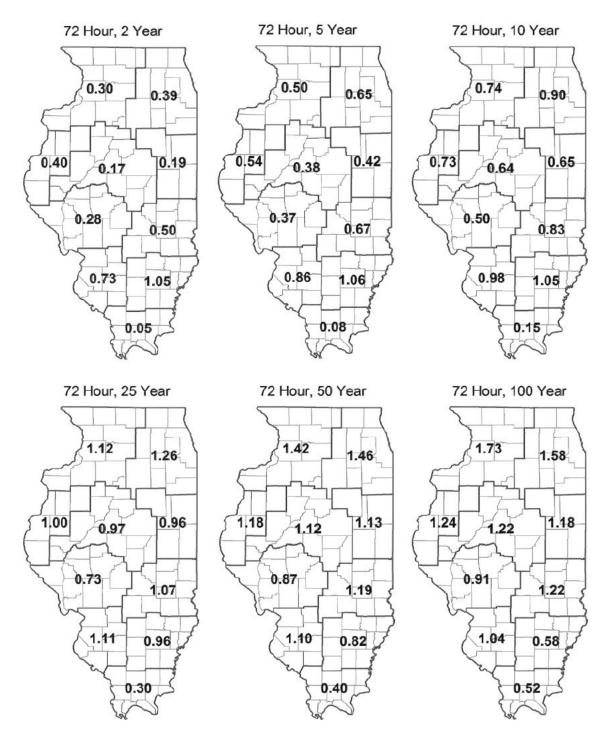


Figure 31 Differences in inches between this study and NOAA Atlas 14 for a 72-hour duration and 2-, 5-, 10-, 25-, 50-, and 100-year frequencies for 10 sections in Illinois. Positive numbers denote an increase and negative numbers show a decrease compared with Atlas 14.

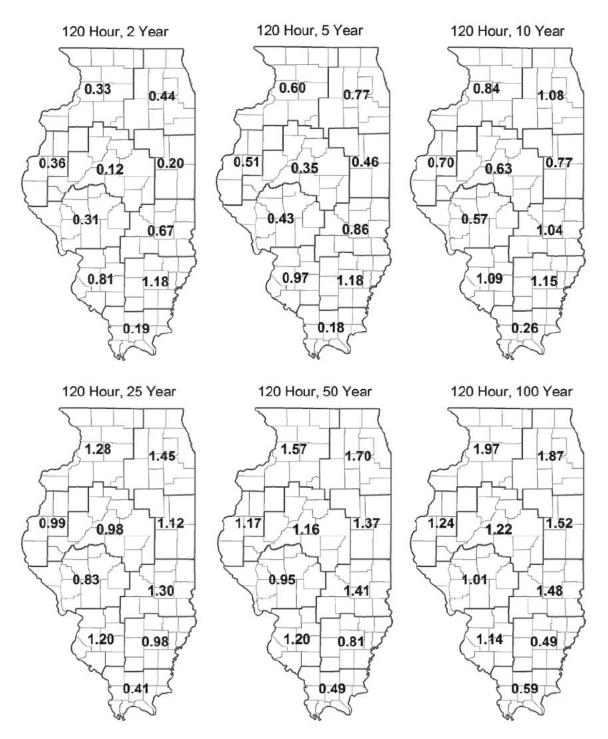


Figure 32 Differences in inches between this study and NOAA Atlas 14 for a 120-hour duration and 2-, 5-, 10-, 25-, 50-, and 100-year frequencies for 10 sections in Illinois. Positive numbers denote an increase and negative numbers show a decrease compared with Atlas 14.

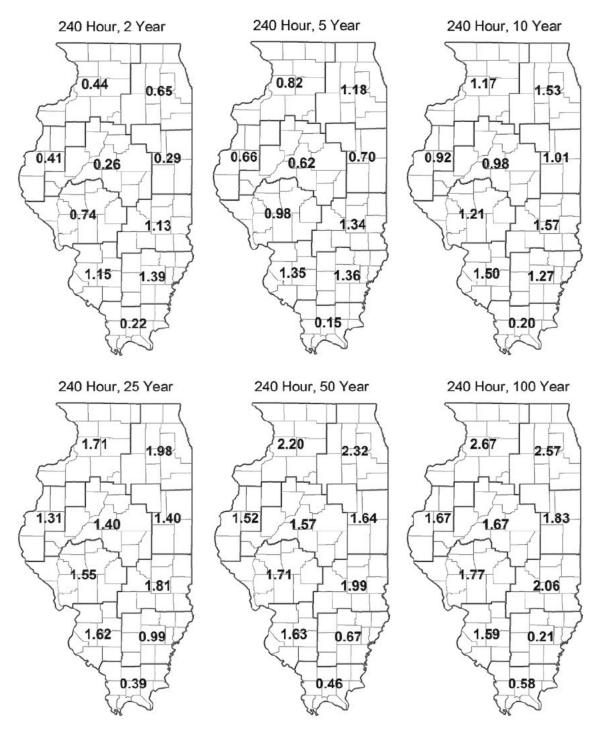


Figure 33 Differences in inches between this study and NOAA Atlas 14 for a 240-hour duration and 2-, 5-, 10-, 25-, 50-, and 100-year frequencies for 10 sections in Illinois. Positive numbers denote an increase and negative numbers show a decrease compared with Atlas 14.

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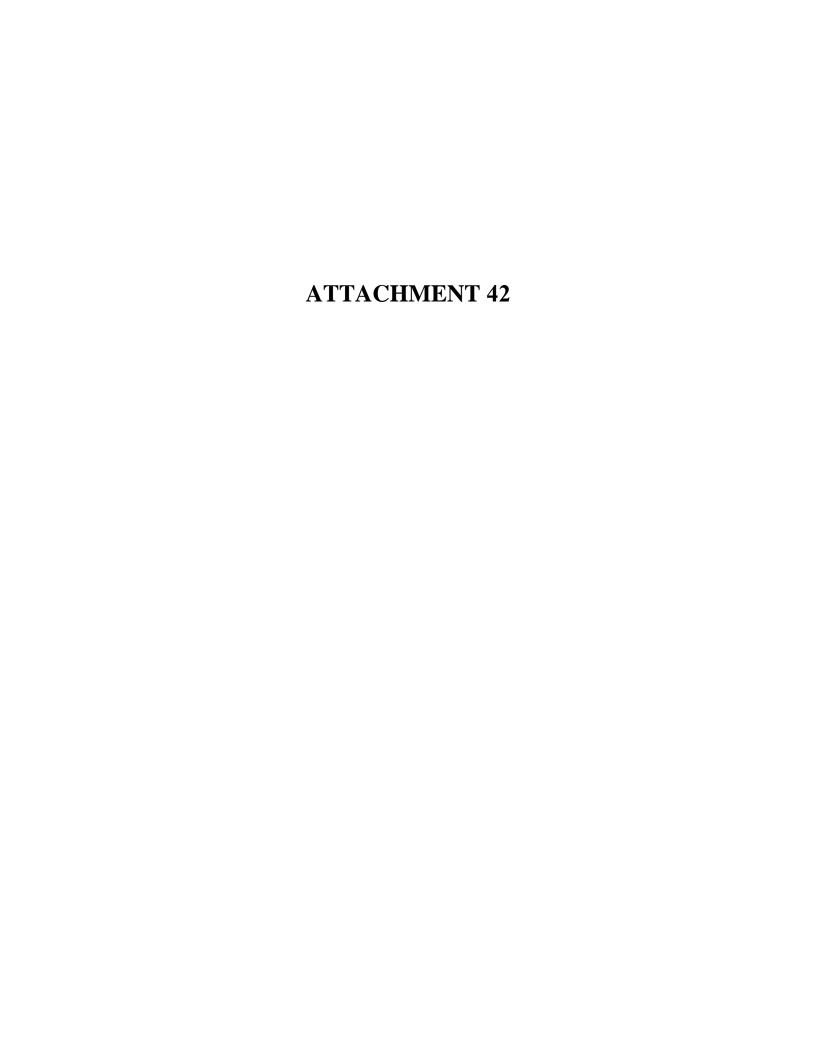
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On the Web: https://nca2018.globalchange.gov/chapter/midwest

Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II

## Midwest



Key Message 1 Carson, Wisconsin

## Agriculture

The Midwest is a major producer of a wide range of food and animal feed for national consumption and international trade. Increases in warm-season absolute humidity and precipitation have eroded soils, created favorable conditions for pests and pathogens, and degraded the quality of stored grain. Projected changes in precipitation, coupled with rising extreme temperatures before mid-century, will reduce Midwest agricultural productivity to levels of the 1980s without major technological advances.

## Key Message 2

## **Forestry**

Midwest forests provide numerous economic and ecological benefits, yet threats from a changing climate are interacting with existing stressors such as invasive species and pests to increase tree mortality and reduce forest productivity. Without adaptive actions, these interactions will result in the loss of economically and culturally important tree species such as paper birch and black ash and are expected to lead to the conversion of some forests to other forest types or even to non-forested ecosystems by the end of the century. Land managers are beginning to manage risk in forests by increasing diversity and selecting for tree species adapted to a range of projected conditions.

## **Key Message 3**

## **Biodiversity and Ecosystems**

The ecosystems of the Midwest support a diverse array of native species and provide people with essential services such as water purification, flood control, resource provision, crop pollination, and recreational opportunities. Species and ecosystems, including the important freshwater resources of the Great Lakes, are typically most at risk when climate stressors, like temperature increases, interact with land-use change, habitat loss, pollution, nutrient inputs, and nonnative invasive species. Restoration of natural systems, increases in the use of green infrastructure, and targeted conservation efforts, especially of wetland systems, can help protect people and nature from climate change impacts.

## **Key Message 4**

## **Human Health**

Climate change is expected to worsen existing health conditions and introduce new health threats by increasing the frequency and intensity of poor air quality days, extreme high temperature events, and heavy rainfalls; extending pollen seasons; and modifying the distribution of disease-carrying pests and insects. By mid-century, the region is projected to experience substantial, yet avoidable, loss of life, worsened health conditions, and economic impacts estimated in the billions of dollars as a result of these changes. Improved basic health services and increased public health measures—including surveillance and monitoring—can prevent or reduce these impacts.

## Key Message 5

## Transportation and Infrastructure

Storm water management systems, transportation networks, and other critical infrastructure are already experiencing impacts from changing precipitation patterns and elevated flood risks. Green infrastructure is reducing some of the negative impacts by using plants and open space to absorb storm water. The annual cost of adapting urban storm water systems to more frequent and severe storms is projected to exceed \$500 million for the Midwest by the end of the century.

## **Key Message 6**

## **Community Vulnerability and Adaptation**

At-risk communities in the Midwest are becoming more vulnerable to climate change impacts such as flooding, drought, and increases in urban heat islands. Tribal nations are especially vulnerable because of their reliance on threatened natural resources for their cultural, subsistence, and economic needs. Integrating climate adaptation into planning processes offers an opportunity to better manage climate risks now. Developing knowledge for decision-making in cooperation with vulnerable communities and tribal nations will help to build adaptive capacity and increase resilience.

## **Executive Summary**



The Midwest is home to over 60 million people, and its active economy represents 18% of the U.S. gross domestic product.<sup>1</sup> The region is probably best known for agricultural production.

Increases in growing-season temperature in the Midwest are projected to be the largest contributing factor to declines in the productivity of U.S. agriculture.<sup>2</sup> Increases in humidity in spring through mid-century<sup>3,4</sup> are expected to increase rainfall, which will increase the potential for soil erosion<sup>5,6</sup> and further reduce planting-season workdays due to waterlogged soil.<sup>7</sup>

Forests are a defining characteristic of many landscapes within the Midwest, covering more than 91 million acres. However, a changing climate, including an increased frequency of late-growing-season drought conditions, is worsening the effects of invasive species, insect pests, and plant disease as trees experience periodic moisture stress. Impacts from human activities, such as logging, fire suppression, and agricultural expansion, have lowered the diversity of the Midwest's forests from the pre-Euro-American settlement period.

Natural resource managers are taking steps to address these issues by increasing the diversity of trees and introducing species suitable for a changing climate.<sup>8</sup>

The Great Lakes play a central role in the Midwest and provide an abundant freshwater resource for water supplies, industry, shipping, fishing, and recreation, as well as a rich and diverse ecosystem. These important ecosystems are under stress from pollution, nutrient and sediment inputs from agricultural systems, and invasive species. 9,10 Lake surface temperatures are increasing, 11,12 lake ice cover is declining, 12,13,14 the seasonal stratification of temperatures in the lakes is occurring earlier in the year, 15 and summer evaporation rates are increasing. 13,16 Increasing storm impacts and declines in coastal water quality can put coastal communities at risk. While several coastal communities have expressed willingness to integrate climate action into planning efforts, access to useful climate information and limited human and financial resources constrain municipal action.

Land conversion, and a wide range of other stressors, has already greatly reduced biodiversity in many of the region's prairies, wetlands, forests, and freshwater systems. Species are already responding to changes that have occurred over the last several decades, 17,18,19 and rapid climate change over the next century is expected to cause or further amplify stress in many species and ecological systems in the Midwest. 20,21,22 The loss of species and the degradation of ecosystems have the potential to reduce or eliminate essential ecological services such as flood control, water purification, and crop pollination, thus reducing the potential for society to successfully adapt to ongoing changes. However, understanding these relationships also highlights important climate adaptation strategies. For example, restoring systems like wetlands and forested floodplains and implementing agricultural best management strategies that increase vegetative cover (cover crops and riparian buffers) can help reduce flooding risks and protect water quality. 23,24,25

Midwestern populations are already experiencing adverse health impacts from climate change, and these impacts are expected to worsen in the future.<sup>26,27</sup> In the absence of

mitigation, ground-level ozone concentrations are projected to increase across most of the Midwest, resulting in an additional 200–550 premature deaths in the region per year by 2050.<sup>28</sup> Exposure to high temperatures impacts workers' health, safety, and productivity.<sup>29</sup> Currently, days over 100°F in Chicago are rare. However, they could become increasingly more common by late century in both the lower and higher scenarios (RCP4.5 and RCP8.5).

The Midwest also has vibrant manufacturing, retail, recreation/tourism, and service sectors. The region's highways, railroads, airports, and navigable rivers are major modes for commerce activity. Increasing precipitation, especially heavy rain events, has increased the overall flood risk, causing disruption to transportation and damage to property and infrastructure. Increasing use of green infrastructure (including nature-based approaches, such as wetland restoration, and innovations like permeable pavements) and better engineering practices are beginning to address these issues.



#### **Conservation Practices Reduce Impact of Heavy Rains**

Integrating strips of native prairie vegetation into row crops has been shown to reduce sediment and nutrient loss from fields, as well as improve biodiversity and the delivery of ecosystem services.<sup>33</sup> Iowa State University's STRIPS program is actively conducting research into this agricultural conservation practice.<sup>34</sup> The inset shows a close-up example of a prairie vegetation strip. *From Figure 21.2 (Photo credits: [main photo] Lynn Betts, [inset] Farnaz Kordbacheh).* 

Citizens and stakeholders value their health and the well-being of their communities—all of which are at risk from increased flooding, increased heat, and lower air and water quality under a changing climate.<sup>30,31</sup> To better prevent and respond to these impacts, scholars and

practitioners highlight the need to engage in risk-driven approaches that not only focus on assessing vulnerabilities but also include effective planning and implementation of adaptation options.<sup>32</sup>



The photo shows Menominee Tribal Enterprises staff creating opportunity from adversity by replanting a forest opening caused by oak wilt disease with a diverse array of tree and understory plant species that are expected to fare better under future climate conditions. From Figure 21.4 (Photo credit: Kristen Schmitt).

## **Background**

The Midwest is home to more than 60 million people, and its active economy represents 18% of the U.S. gross domestic product.<sup>1</sup> In this report, the Midwest covers Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin. The region is probably best known for agricultural production. Trends toward warmer, wetter, and more humid conditions provide challenges for field work, increase disease and pest pressure, and reduce yields to an extent that these challenges can be only partially overcome by technology.<sup>35</sup> The Midwest contains large tracts of federal, state, and private forests and preserves that provide significant economic and ecological benefits to the region. However, as a changing climate results in shifting precipitation patterns, altered disturbance regimes, and increased frequency of late-growing-season moisture stress, the effects of existing stressors such as invasive species, insect pests, and plant disease are amplified.<sup>36</sup> Natural resource managers are taking steps to address these issues by increasing the diversity of trees and introducing species suitable for a changing climate.8

The Midwest also has vibrant manufacturing, retail, recreation/tourism, and service sectors. The region's highways, railroads, airports, and navigable rivers are major modes for commercial activity. Increasing precipitation, especially heavy rain events, has increased the overall flood risk, causing disruption to transportation and damage to property and infrastructure (e.g., Winters et al. 2015<sup>37</sup>). Increasing use of green infrastructure (including nature-based approaches, such as wetland restoration, and innovations like permeable pavements) and better engineering practices are beginning to address these issues (e.g., City of Chicago 2015<sup>38</sup>).

Tourism and outdoor recreation are major economic activities that may be affected by climate change, particularly in coastal towns that are at risk from algal bloom impacts and in areas that host winter sports that are especially vulnerable to warming winters. For example, ice fishing was limited due to mild temperatures in the winters of 2015–2016 and 2016-2017, and the American Birkebeiner cross-country ski race in Wisconsin was cancelled due to a lack of snow in February 2017. Portions of Michigan, Wisconsin, and Minnesota contain ceded territory of many tribes, and these are used for hunting, fishing, and gathering native plants, all of which play vital roles in maintaining cultural heritage. Projected changes in climate and ecosystems will have strong impacts on these activities.<sup>39</sup>

The Great Lakes play a central role in the Midwest and provide an abundant freshwater resource for water supplies, industry, shipping, fishing, and recreation, as well as a rich and diverse ecosystem. The same can be said for the upper Mississippi, lower Missouri, Illinois, and Ohio River systems. Episodes of widespread heavy rains in recent years have led to flooding, soil erosion, and water quality issues from nutrient runoff into those systems. Land managers are beginning to change some of their practices (such as increasing the use of cover crops) to better manage excess surface water. Land managers are water.

Citizens and stakeholders in the Midwest value their health and the well-being of their communities—all of which are at risk from increased flooding, increased heat, and lower air and water quality under a changing climate.<sup>30,31</sup>

#### **Energy in the Midwest**

The Midwest is a major consumer of coal. In 2015, coal provided 56% of the electricity consumed in the region, and the eight states in the region accounted for 32% of the Nation's coal consumption (in BTUs). Coal's share of electricity production is declining in the Midwest, following the national trend (Ch. 4: Energy, Figure 4.3). In 2008, coal accounted for more than 70% of electricity consumption in the Midwest. Wind power is a small but growing source of electricity for the region. Iowa leads the Nation in per capita consumption of wind power, with wind providing over 30% of the state's electrical needs in 2015.41

Renewable energy is expanding in the Midwest. As part of a campus-wide initiative to transition to renewable energy sources, in 2017, Michigan State University established five solar carports that have an estimated annual production of 15,000 megawatt hours, representing about 5% of electricity use on campus (Figure 21.1). In addition to reducing carbon emissions, this investment is expected to save the university \$10 million over 25 years.<sup>42</sup>



#### **Solar Charging Stations**

**Figure 21.1:** Solar carports were recently installed on the Michigan State University campus. Photo credit: David Rothstein.

#### What Is New in NCA4

Two new Key Messages are introduced (Key Messages 3 and 6). Key Message 3 recognizes the important role that ecosystems of the Midwest play in supporting a diverse array of species and providing important benefits such as flood control, crop pollination, and outdoor recreation. Key Message 6 addresses how at-risk communities in the Midwest are becoming more vulnerable to climate change impacts and how they are working to build adaptive capacity. Tribal nations are especially vulnerable because of their reliance on threatened natural resources for their cultural, subsistence, and economic needs. The four remaining Key Messages address improvements in the understanding of risks and responses to climate change since NCA3. Key Message 1 on agriculture provides more specificity about the risk to agriculture by stating that agricultural productivity (the ratio of outputs to inputs) is projected to decline by 2050 to levels of the 1980s (that is, yields may increase but at the cost of substantial increases in inputs). Key Message 2 on forestry illustrates the progress foresters and land managers have made in climate adaptation through their efforts to incorporate climate change risks into management decision-making. Key Message 5 on transportation and infrastructure highlights a growing interest in green infrastructure—the use of plants and open space in storm water management—as an option for adapting to more frequent episodes of extreme precipitation. Finally, Key Message 4 on human health identifies specific health impacts by naming expected changes in magnitude and occurrence of extreme events, exposures, and economic impacts. The message explicitly states public health actions that can be implemented to avoid or reduce the health impacts.

## **Key Message 1**

## **Agriculture**

The Midwest is a major producer of a wide range of food and animal feed for national consumption and international trade. Increases in warm-season absolute humidity and precipitation have eroded soils, created favorable conditions for pests and pathogens, and degraded the quality of stored grain. Projected changes in precipitation, coupled with rising extreme temperatures before mid-century, will reduce Midwest agricultural productivity to levels of the 1980s without major technological advances.

#### **Recent Agriculturally Important Trends**

The two main commodity crops in the Midwest are corn and soybeans, which are grown on 75% of the arable land. Wheat and oats are important crops grown on fewer acres. An increasing number of niche but higher-value crops (such as apples, grapes, cherries, cranberries, blueberries, and pumpkins) also are grown in the region.<sup>43</sup>

Over the past 30 years, increased rainfall from April to June has been the most impactful climate trend for agriculture in the Midwest,3 providing a favorable supply of soil moisture while also reducing flexibility for timing of spring planting and increasing soil erosion.44 In addition, wet conditions at the end of the growing season can create elevated levels of mold, fungus, and toxins.<sup>45</sup> The last spring frost has occurred earlier, causing the frostfree season to increase by an average of nine days since 1901.46 However, daily maximum temperatures in summer in the Midwest have not followed the upward global trend, in part due to higher early summer rainfall on deep, water-holding soils,<sup>47</sup> thereby avoiding plant stress detrimental to crops. The avoidance of

heat stress and longer growing seasons have favored production in some parts of and some years in the Midwest.

Daily minimum temperatures have increased in all seasons due to increasing humidity. 48,49 Elevated growing-season minimum daily temperatures are considered a factor in reducing grain weight in corn due to increased nighttime plant respiration. 50 Warming winters have increased the survival and reproduction of existing insect pests and already are enabling a northward range expansion of new insect pests and crop pathogens into the Midwest. 52

A contributing factor underpinning Midwest growing-season trends in both temperature and precipitation is the increase in water vapor (absolute humidity):<sup>49,53</sup> higher humidity decreases the day-night temperature range and increases warm-season precipitation. Rising humidity also leads to longer dew periods and high moisture conditions that favor many agricultural pests and pathogens for both growing plants and stored grain.

### **Projected Trends and Agricultural Impacts**

Warm-season temperatures are projected to increase more in the Midwest than any other region of the United States.<sup>54</sup> The frost-free season is projected to increase 10 days by early this century (2016–2045), 20 days by midcentury (2036–2065), and possibly a month by late century (2070–2099) compared to the period 1976–2005 according to the higher scenario (RCP8.5).<sup>46</sup>

By the middle of this century (2036–2065), 1 year out of 10 is projected to have a 5-day period that is an average of 13°F warmer than a comparable period at the end of last century (1976–2005).<sup>54</sup> Current average annual 5-day maximum temperature values range from about 88°F in Northern Minnesota to 97°F in Southern Missouri. Tables 21.1 and 21.2 show that by mid-century under the higher scenario (RCP8.5), 5-day maximum temperatures are projected to have moved further above optimum conditions for many crops and closer to the reproductive failure temperature, especially for corn in the southern half of the Midwest. Higher growing-season temperatures also shorten phenological stages in crops (for example, the grain fill period for corn). Under these temperatures, overall yield trends will be reduced because of periodic pollination failures and reduced grain fill during other years.

Increases in humidity in spring through mid-century<sup>3,4</sup> are expected to increase rainfall, which will increase the potential for soil erosion<sup>5,6</sup> and further reduce planting-season workdays due to waterlogged soil.<sup>7</sup> As an example, for the Cedar River Basin in Iowa, the 100-year flood (1% chance of occurring in a given year) of the 20th century is projected to be a 25-year flood (4% chance per year) in the 21st century,<sup>55</sup> with associated increased frequency of flooding of agricultural land.

Increased spring precipitation and higher temperatures and humidity are expected to increase the number and intensity of fungus and disease outbreaks<sup>56,57</sup> and the prevalence of bacterial plant diseases,<sup>58</sup> such as bacterial spot in pumpkin and squash.<sup>59</sup> Increased precipitation and soil moisture in a warmer climate also lead to increased loss of soil carbon<sup>60</sup> and degraded surface water quality due to loss of soil particles and nutrients.<sup>61,62</sup> Transitions from extremes of drought to floods, in particular, increase nitrogen levels in rivers<sup>63</sup> and lead to harmful algal blooms.

Current understanding of drought in the Midwest is that human activity has not been a major component in historical droughts, and it remains uncertain how droughts will behave in the future. However, future projections show that Midwest surface soil moisture likely will transition from excessive levels in spring due to increased precipitation to insufficient levels in summer driven by higher temperatures, causing more moisture to be lost through evaporation.<sup>64</sup>

#### Average Annual 5-Day Maximum Temperature

Geographic Area	Modeled Historical (1976–2005)	Mid-21st Century (2036–2065) for Lower Scenario (RCP4.5)	Mid-21st Century (2036–2065) for Higher Scenario (RCP8.5)
Northern Minnesota	88°F	93°F	95°F
Southern Missouri	97°F	102°F	103°F

**Table 21.1:** These modeled historical and projected average annual 5-day maximum temperatures illustrate the temperature increases projected for the middle of this century across the Midwest. Sources: NOAA NCEI and CICS-NC.

#### **Optimum and Failure Temperatures for Vegetative Growth and Reproduction**

Crop	Optimum Growth	Failure for Growth	Optimum Reproduction	Failure for Reproduction
Corn	80°F	105°F	67°F	95°F
Soybean	86°F	101°F	72°F	102°F

**Table 21.2:** This table shows the temperatures at which corn and soybeans reach optimum growth and reproduction as well as the temperatures at which growth and reproduction fail.<sup>50</sup>

Projections of mid-century yields of commodity crops<sup>65,66</sup> show declines of 5% to over 25% below extrapolated trends broadly across the region for corn (also known as maize) and more than 25% for soybeans in the southern half of the region, with possible increases in yield in the northern half of the region. Increases in growing-season temperature in the Midwest are projected to be the largest contributing factor to declines in the productivity of U.S. agriculture.<sup>2</sup> In particular, heat stress in maize during the reproductive period is projected by crop models to reduce yields in the second half of the 21st century.<sup>67</sup> These losses may be mitigated by enhanced photosynthesis and reduced crop water use, although the magnitude is uncertain. 68,69 Elevated atmospheric CO<sub>2</sub> is expected to partially, but not completely, offset yield declines caused by climate extremes, with effects on soybeans less than on maize.<sup>70</sup>

Non-commodity crops produced in the Midwest include tree fruits, sweet corn, and vegetables for farmers markets and canning. While the general impacts of climate change on specialty crops are similar to commodity crops, the more intense heat waves, excessive rain interspersed with drought, and higher humidity of a future climate likely will degrade market quality as well as yield by mid-century.<sup>71</sup> Although data on climate-related losses are sparse, excess moisture is emerging as a major cause of crop loss.<sup>72</sup> Wild rice is an annual plant harvested by tribes and others in shallow wetlands of northern Minnesota, Wisconsin, and Michigan. Stable production depends on a stable climate that maintains ecosystem diversity. Declines in production are expected, related to increases in climate extremes and climate-related disease and pest outbreaks as well as northward shifts of favorable growing regions.73

Longer growing seasons and the introduction of hoop buildings (low, translucent, fabric-covered structures that protect plants from extreme weather) have allowed local growers of annual vegetable crops to extend the fresh produce season. However, unsheltered perennial crops such as tree fruits may be subjected increasingly to untimely budbreak followed by cold pulses due to earlier and longer occurrences of warm conditions in late winter.

Most animal agriculture in the region is in confinement, rather than range-based without shelter, and therefore offers an opportunity for mitigating some of the effects of climate change. Without adaptive actions, breeding success and production of milk and eggs will be reduced due to projected temperature extremes by mid-century.<sup>74,75,76</sup>

#### Adaptation

Soil-erosion suppression methods in row-crop agriculture subjected to more intense rains include use of cover crops, grassed waterways, water management systems, contour farming, and prairie strips.<sup>6,40</sup> More diversity in planting dates, pollination periods, chemical use, and crop and cultivar selection reduces vulnerability of overall production to specific climate extremes or the changes in pests and pathogens that they cause.

An example of a highly successful program is the Iowa State Science-based Trials of Rowcrops Integrated with Prairie Strips (STRIPS) program that demonstrates that replacing 10 percent of cropland with prairie grasses reduced sediment loss 20-fold while total nitrogen concentrations were 3.3 times lower (Figure 21.2).<sup>33</sup> An example of a private-public response is the National Corn Growers Association's Soil Health Partnership (SHP),<sup>77</sup> a network of working farms across the Midwest



#### **Conservation Practices Reduce Impact of Heavy Rains**

**Figure 21.2:** Integrating strips of native prairie vegetation into row crops has been shown to reduce sediment and nutrient loss from fields, as well as improve biodiversity and the delivery of ecosystem services.<sup>33</sup> Iowa State University's STRIPS program is actively conducting research into this agricultural conservation practice.<sup>34</sup> The inset shows a close-up example of a prairie vegetation strip. Photo credits: (main photo) Lynn Betts, (inset) Farnaz Kordbacheh.

engaged in refining techniques for growing cover crops, implementing conservation tillage, and using science-based nutrient management to reduce erosion and nutrient loss while increasing organic matter.

Acreage under irrigation has expanded modestly since 2002,<sup>78</sup> mostly in the northern part of the Midwest where coarse soils of lower water-holding capacity are more vulnerable to drying under increased temperature. No strategies currently are available for maintaining historical trends in commodity agriculture production to cope with increases in spring rainfall and summer heat waves projected for mid-century.<sup>2,65</sup>

## **Key Message 2**

## **Forestry**

Midwest forests provide numerous economic and ecological benefits, yet threats from a changing climate are interacting with existing stressors such as invasive species and pests to increase tree mortality and reduce forest productivity. Without adaptive actions, these interactions will result in the loss of economically and culturally important tree species such as paper birch and black ash and are expected to lead to the conversion of some forests to other forest types or even to non-forested ecosystems by the end of the century. Land managers are beginning to manage risk in forests by increasing diversity and selecting for tree species adapted to a range of projected conditions.

Forests are a defining characteristic of many landscapes within the Midwest, covering more than 91 million acres. From the oak-hickory forests of the Missouri Ozarks to the northern hardwood forests of the Upper Midwest, forest ecosystems sustain the people and communities within the region by providing numerous ecological, economic, and cultural benefits. The economic output of the Midwest forestry sector totals around \$122 billion per  $year.^{79,80,81,82,83,84,85,86} \ Forest-related \ recreation$ such as hunting, fishing, hiking, skiing, camping, wildlife watching, off-highway vehicles, and many other pursuits add to the region's economy. For example, forest-based recreationists spend approximately \$2.5 billion (in 1996 dollars) within Wisconsin communities.87 Forests are fundamental to cultural and spiritual practices within tribal communities, supporting plants and animals of central cultural importance and providing food and resources for making items such as baskets, canoes, and shelters.88

Climate change is anticipated to have a pervasive influence on forests within this region over the coming decades. 36,89,90,91,92,93,94 Tree growth rates and forest productivity have benefited from longer growing seasons and higher atmospheric carbon dioxide concentrations, but continued benefits are expected only if adequate moisture and nutrients are available to support enhanced growth rates.95 As growing-season temperatures rise, reduced tree growth<sup>96,97</sup> or widespread tree mortality<sup>98</sup> is expected as the frequency of drought stress increases from drier air (as a result of increases in vapor pressure deficit [VPD]; Figure 21.3) and changing patterns of precipitation. Greater tree mortality from increased VPD likely will be particularly evident where competition for water is high in dense stands of trees 99,100 or where forests naturally transition to grasslands due to limited soil moisture. 101 Late-growingseason heat- and drought-related vegetation

stress is projected to shift the composition and structure of forests in the region<sup>102</sup> by increasing mortality of younger trees, which are sensitive to drought.<sup>19</sup> Warming winters will reduce snowpack that acts to insulate soil from freezing temperatures, increasing frost damage to shallow tree roots<sup>103</sup> and reducing tree regeneration.<sup>104</sup> Additionally, increases in existing biological stressors of forests are expected as temperatures rise. Effects of insect pests and tree pathogens are anticipated to intensify as winters warm, increasing winter survival of pests and allowing expansion into new regions. 105,106 Changing climate conditions and atmospheric carbon dioxide concentrations will likely favor invasive plant species over native species, potentially decreasing tree regeneration. 107,108 Overall, the increasing stress on trees from rising temperatures, drought, and frost damage raises the susceptibility of individual trees to the negative impacts from invasive plants, insect pests, and disease agents (Ch. 6: Forests, Figure 6.1). 109,110,111

Impacts from human activities such as logging, fire suppression, and agricultural expansion have lowered the diversity of the Midwest's forests from the pre-Euro-American settlement period. The forest types that occur within the region have been altered significantly relative to presettlement forests, with greater homogeneity in tree species composition across existing forest types. 112 Changes in modern forest types also include reduced structural complexity and less diverse mixes of tree species and tree ages.<sup>113</sup> Forests with reduced diversity are at an increased risk of negative effects from climate change, because the potential for tree species or age classes that are resistant to impacts from biological stressors and climate change is reduced.93 Forests composed of trees of similar size and age or with lower tree diversity are at increased risk of widespread mortality114,115 or declines in productivity.<sup>116</sup> In many midwestern forests, fire suppression has decreased the prevalence of

## **Drying Effect of Warmer Air on Plants and Soils** Cooler air can hold less water Warmer air can hold more water Less moisture demand on plants More moisture demand on plants 50% relative humidity Air water vapor Deficit in air water vapor Leaf tissue water vapor Projected Increases in Vapor Pressure Deficit (b) Lower Scenario (RCP4.5) (c) Higher Scenario (RCP8.5) Percent Change Higher values = drier plants and soils 10 20 30 40 50 60

Figure 21.3: As air temperature increases in a warming climate, vapor pressure deficit (VPD) is projected to increase. VPD is the difference between how much moisture is in the air and the amount of moisture in the air at saturation (at 100% relative humidity). Increased VPD has a drying effect on plants and soils, as moisture transpires (from plants) and evaporates (from soil) into the air. (a) Cooler air can maintain less water as vapor, putting less demand for moisture on plants, while warmer air can maintain more water as vapor, putting more demand for moisture on plants. (b, c) The maps show the percent change in the moisture deficit of the air based on the projected maximum 5-day VPD by the late 21st century (2070–2099) compared to 1976–2005 for (b) lower and (c) higher scenarios (RCP4.5 and RCP8.5). Sources: U.S. Forest Service, NOAA NCEI, and CICS-NC.

the drought-tolerant tree species, such as oak, hickory, and pine, while increasing the abundance of species with higher moisture requirements, such as maples.<sup>89,117</sup> This results in greater risk of declines in forest health and productivity as the frequency of drought conditions increases.<sup>118,119</sup>

Changes in climate and other stressors are projected to result in changes in major forest types and changes in forest composition as tree species at the northern limits of their ranges decline and southern species experience increasingly suitable habitat. However, the fragmentation of midwestern forests and

the flatness of the terrain raise the possibility that the ranges of particular tree species will not be able to shift to future suitable habitats within the Midwest.<sup>121</sup> For example, to reach areas 1.8°F (1°C) cooler, species in flat terrain must move up to 90 miles (150 km) north to reach cooler habitat, whereas species in mountainous terrain can shift higher in altitude over less latitudinal (north-south) distance. 122 These changes raise the possibility of future losses of economic and cultural benefits of forests due to conversion to different forest types or the change to non-forest ecosystems. 119,123,124 Projected shifts in forest composition in the central hardwood region (southern Missouri, Illinois, Indiana, and Ohio) by the end of the century under a higher scenario (RCP8.5) would result in substantial declines in wildlife habitat and reduce economic value of timber in the region by up to \$788 billion (in 2015 dollars).125

Changing climate conditions increasingly cause both cultural and economic impacts within the Midwest, and it is very likely these impacts will worsen in the future. For example, many tree species on which tribes depend for their culture and livelihoods—such as paper birch, northern white cedar, and quaking aspen—are highly vulnerable due to temperature increases. 90,91,92,126 Populations of the emerald ash borer, a destructive invasive insect pest that attacks native ash trees, will increase due to warming winters in the region. Mortality of black ash trees, which are important for traditional basket-making for many tribes, is highly likely as winter temperatures continue to rise. 127

Warming winters already have economic impacts on the forest industry, as well. Forest operations (for example, site access, tree harvesting, and product transport) in many northern regions are conducted on snowpack or frozen ground to protect the site from negative impacts such as soil disturbance

and compaction,<sup>128</sup> but the timing of suitable conditions has become shorter and more variable. In the Upper Midwest, the duration of frozen ground conditions suitable for winter harvest has been shortened by 2 to 3 weeks in the past 70 years.<sup>129</sup> The contraction of winter snow cover and frozen ground conditions has increased seasonal restrictions on forest operations in these areas,<sup>130</sup> with resulting economic impacts to both forestry industry and woodland landowners through reduced timber values.<sup>131</sup>

Forestry professionals in the Midwest increasingly are considering the risks to forests from climate change<sup>132</sup> and are responding by incorporating climate adaptation into land management.8 There are a growing number of examples of climate adaptation in forest management developed by more than 150 organizations that have participated in the Climate Change Response Framework, an approach to climate change adaptation led by the U.S. Forest Service. 133,134,135 Management actions intended to maintain healthy and productive forests in a changing climate include a diverse suite of actions<sup>135</sup> but largely focus on activities that enhance species and structural diversity of existing forest communities and on management approaches that aim to increase the prevalence of species that are better suited to future climatic conditions.8 Forest management on tribal lands and ceded territory within the region increasingly integrates Scientific Ecological Knowledge of natural resource management with Traditional Ecological Knowledge, a highly localized, place-based system of knowledge learned and observed over many generations. 136 This integration can inform the co-creation of approaches to climate adaptation important for maintaining healthy, functioning forests that continue to provide cultural and spiritual benefits (see Case Study "Adaptation in Forestry").

## Case Study: Adaptation in Forestry

The Menominee Forest is well known as an exemplary forest; for generations, the Menominee Tribe has pioneered practices that have preserved nearly 220,000 acres with numerous species and varied habitats while maximizing the sustainable production of forest products. However, climate change—along with invasive species and insect pests and diseases—is creating new challenges for maintaining these diverse habitats and the sustainable supply of timber.

In response to tree mortality caused by oak wilt disease, an introduced exotic disease first identified in 1944 in Wisconsin, foresters at Menominee Tribal Enterprises (MTE) have integrated climate change adaptation into reforestation activities on severely disturbed areas created by the disease. 134 Using science guided by Traditional Ecological Knowledge of forest communities, forest openings created by oak wilt disease were replanted with a diverse array of tree and understory plant species that are expected to fare better under future climate conditions. Many of these species tolerate late-growing-season heat- and drought-related stress, while also providing important cultural benefits to the tribe such as food and medicine. The selection of locally collected plants and seeds used for restoring the oak wilt-affected openings combined scientific information on the future habitat of tree species with Indigenous knowledge of the forest communities necessary for guiding the development of diverse and healthy forests.



**Figure 21.4:** The photo shows Menominee Tribal Enterprises staff creating opportunity from adversity by replanting a forest opening caused by oak wilt disease with a diverse array of tree and understory plant species that are expected to fare better under future climate conditions. Photo credit: Kristen Schmitt.

The grass, plant, and shrub species are put together to strengthen the immune system of the deeprooted trees. We tried to emphasize the underground biotic community within these openings. A healthy underground community ensures a healthy aboveground community. The shrubs hold the key to a healthy change of species within the local plant communities.

-MTE forester and tribal member

## **Key Message 3**

## **Biodiversity and Ecosystems**

The ecosystems of the Midwest support a diverse array of native species and provide people with essential services such as water purification, flood control, resource provision, crop pollination, and recreational opportunities. Species and ecosystems, including the important freshwater resources of the Great Lakes, are typically most at risk when climate stressors, like temperature increases, interact with land-use change, habitat loss, pollution, nutrient inputs, and nonnative invasive species. Restoration of natural systems, increases in the use of green infrastructure, and targeted conservation efforts, especially of wetland systems, can help protect people and nature from climate change impacts.

Species already are responding to environmental changes that have occurred over the last several decades,<sup>17,18,19</sup> and rapid climate change over the next century is expected to cause or further amplify stress in many species and ecological systems in the Midwest.<sup>20,21,22</sup> Land conversion and a wide range of other stressors have already greatly reduced biodiversity in many of the region's prairies, wetlands, forests, and freshwater systems. High rates of change in climate factors like air and water temperature and increasing drought risk likely will accelerate the rate of species declines and extinctions. 18,137 The Midwest region supports the world's largest freshwater ecosystem, the Great Lakes, which are at risk from rising temperatures, changes in seasonal stratification of lake temperatures, and increased summer evaporation rates, combined with stresses from pollution, nutrient inputs that promote harmful algal blooms, and invasive species (Box 21.1).

The loss of species and degradation of ecosystems have the potential to reduce or eliminate essential ecological services such as flood control, water purification, and crop pollination, thus reducing the potential for society to successfully adapt to ongoing changes.

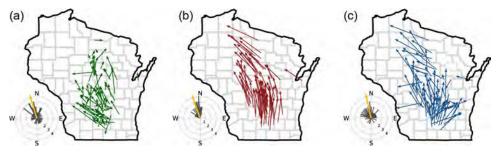
Observations, ecological theory, experimental studies, and predictive models provide insights into how shifts in several climate factors (temperature, precipitation patterns, humidity, and moisture stress) may interact over the next several decades. 120,138,139 Vulnerability assessments for species and ecosystems quickly become complex, as species in the same ecosystem may have different climate sensitivities, and interactions with landuse change and other factors can strongly influence the level of impact (Ch. 5: Land Changes, KM 2; Ch. 17: Complex Systems, KM 1). Local expertise, input from multiple stakeholders, and tools like scenario planning can help improve assessment of vulnerability so that risks can be connected to management actions. 132,140 Changes observed in the Midwest include species range shifts (avoiding exposure to new climatic conditions by shifting location), changes in population size (indicating a change in viability in a given place), shifts in body size and growth rates, and changes in the timing of seasonal events (phenology). Since the Third National Climate Assessment,<sup>27</sup> the number of studies documenting these types of changes has continued to grow. For example, climate change appears to have contributed to the apparent local extinction of populations of the Federally Endangered Karner blue butterfly at sites in the southern end of its range in northern Indiana, despite active management and extensive habitat restoration efforts. While climate change cannot be singled out as the only cause, the populations disappeared following multiple years of warming conditions and a very early onset of spring in 2012.139 New evidence of shifting ranges comes from

Wisconsin forests, where a set of 78 understory plant species sampled in the 1950s and again in the 2000s have demonstrated shifts in their abundance centroids (a measure of the distribution and local abundance of populations) of about 30 miles (49 km ± 29 km) over this 50-year period (Figure 21.5).141 The dominant direction of this shift was to the northwest, which matches the direction of change in important climatic conditions associated with the distributions of these species. While this shift suggests the potential for successful adaptation to changing conditions, the rate of change for most species was much less than the amount of change in the climate metrics over the same time period, raising the concern that the climate is changing too fast for these species to keep up.141 Similarly, a study of shifts in the timing of spring green-up, an indicator of when plant-feeding insects emerge, and the timing of migratory bird arrivals found that while both are shifting earlier in the Midwest, the arrival of birds is not advancing as quickly as the plants.<sup>142</sup> Risks to birds from this mismatch in phenology include the potential for birds to arrive after food availability has peaked or for later arrivals to be less able to compete for territories or mates. Land protection and management strategies that help maintain or increase phenological variation of plants within key migratory and breeding habitats like

the Great Lakes coastlines may help increase the odds that birds can find the resources they need.<sup>143</sup>

The drivers of changes in species ranges or abundance can be complex and difficult to detect until key thresholds are crossed. For example, in the Midwest region, cool- and coldwater fishes in inland lakes are particularly susceptible to changes in climate because habitat with appropriate temperatures and oxygen concentrations is often limited during summer months. In lakes at the southern (warmer) end of their ranges, these fish experience a squeezing of available habitat during summer months as the water near the lake surface becomes too warm and the dissolved oxygen levels in deeper waters drop (Figure 21.6). 144,145,146 This "invisible" loss of habitat is driven by increases in water temperatures, longer duration of the stratified period (which delays the mixing of oxygen-rich water into the deeper waters), and declines in ice cover. 147,148,149,150 Recent research has identified fish kill events tied to temperature and oxygen stress from increased air temperatures, and modeling results forecast increased numbers of these events, likely leading to local extinction of cool- and coldwater fish species in some lakes and reduced geographic distribution across the Midwest. 151,152,153,154

## Climate Change Outpaces Plants' Ability to Shift Habitat Range



**Figure 21.5:** While midwestern species, such as understory plants in Wisconsin, are showing changes in range, they may not be shifting quickly enough to keep up with changes in climate. The panels here represent 78 plant species, showing (a) observed changes in the center of plant species abundances (centroids) from the 1950s to 2000s, (b) the direction and magnitude of changes in climate factors associated with those species, and (c) the lag, or difference, between where the species centroid is now located and where the change in climate factors suggests it should be located in order to keep pace with a changing climate. Source: adapted from Ash et al. 2017. <sup>141</sup> ©John Wiley & Sons, Ltd.

### **Coldwater Fish at Risk**

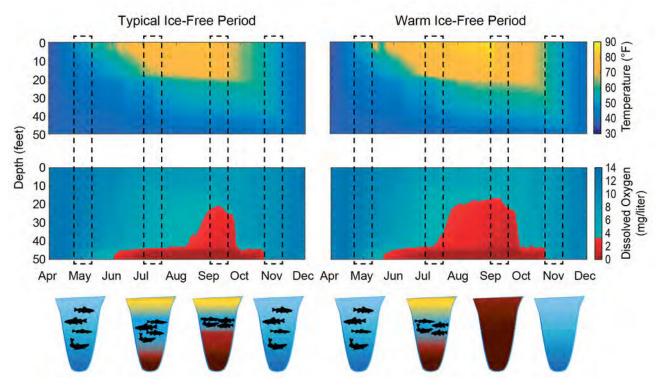


Figure 21.6: The graphic shows the oxythermal (oxygen and temperature) habitat of coldwater fish in midwestern inland lakes, illustrated by water depth under (left) a typical ice-free period and (right) a warm ice-free period (right). The top plots show water temperatures during the ice-free period, and the bottom plots show the dissolved oxygen concentrations. The schematics at the bottom illustrate the area of the lake that is ideal habitat for coldwater fish (in blue) and areas that represent water outside of the temperature or dissolved oxygen limit (in yellow and red, respectively). The left plots show how available habitat "squeezes" during a typical year, while the right plots illustrate a complete loss of suitable habitat during very warm years. Source: Madeline Magee, University of Wisconsin.

Taken individually, responses like range shifts, changes in local abundance, or changes in phenology may indicate that a species is successfully adapting to new conditions, or conversely may indicate a species is under stress. The extent to which responses indicate risk and the challenge of attributing changes to climate drivers when systems are exposed to many additional stressors are important sources of uncertainty that likely slow progress on climate change adaptation within the resource management sector. 155,156 Further, while evidence of species- and ecosystem-level responses to direct climate change impacts is increasing, many of the most immediate risks are even more challenging to track, because they relate to climate-driven enhancement of existing stressors, such as habitat loss and degradation, pollution, the spread of invasive

species, and drainage and irrigation practices in agricultural landscapes. 138,157 As species are lost from midwestern ecosystems, there likely will be a net loss of biodiversity, as numerous additional stressors, especially widespread land conversion across the southern Midwest, limit opportunities for these gaps to be filled by species moving in from other regions (Ch. 7: Ecosystems, KM 1 and 2). 158,159

While movement of species from the south-central United States could help sustain species-diverse ecosystems as some of the Midwest's current species move north, these range expansions can further stress current species. Many species and ecosystems in the Midwest, especially the Upper Midwest, are best suited to survive and compete for resources when winter conditions are harsh

and growing seasons are short. As winter warms and the growing season extends, species from the south-central United States, as well as species from outside the country that are more traditionally viewed as invasive species, are expected to be able to grow faster and take advantage of these changes, increasing the rate of loss of the region's native species. 160,161 For invasive insect pests, these impacts may be compounded as extended growing seasons allow time for additional generations to be produced in a single season;162 the same mechanism can promote higher impacts from native insect pests, as well. Given that some native species will decline in the region, to maintain or increase species diversity, some managers are beginning to plan for and even promote some native plant species that are present in a region, but more common to the south, as conditions change. While these can be important strategies for maintaining diversity and ecosystem functions, especially in isolated habitats where inward migration is not likely, careful consideration of the source of plant stocks is important when seeking to avoid introducing new or more competitive genotypes. 163 Further, as some native species decline, managers will benefit from increased vigilance in keeping potential invasive species from outside of North America from gaining a foothold.

Declines in native pollinator species are another important concern in the Midwest, as both native and managed pollinator species (typically nonnative bee species) play vital roles in supporting food production and farmer livelihoods and are critical for supporting wild plant reproduction and the diversity of ecosystems. Key threats to this diverse group of insects, mammals, and birds include habitat loss and degradation, pathogens, pesticide use, and invasive species. Most native and agricultural crops that require a pollinator are pollinated by insects, and where information is available, declines in populations of pollinator

insects in the Midwest have primarily been linked to the expansion of intensive agriculture. 167,168,169,170 In addition to habitat loss, climate change is likely to act as an added stressor for many species, through many different mechanisms.<sup>164</sup> Many insects may be limited by their ability to shift to new habitats as conditions change; for example, many bumble bee species are showing population declines at southern range edges but not expanding as quickly at northern range edges.<sup>171</sup> It is likely that pollinators that specialize on one or a few species for some aspect of their life history will be particularly vulnerable.<sup>172</sup> Within the Midwest, observed high rates of decline in the monarch butterfly, 167 which relies on milkweed species as a host plant, are the focus of a network of outreach and ambitious multi-partner conservation efforts that are helping raise awareness of pollinator declines and links between pollinators and habitat availability.<sup>173</sup> These efforts, boosted by research demonstrating that habitat restoration can help sustain pollinator populations, 174,175 provide examples of how to help support the adaptation of this critical group of species.

Perhaps more than in any other region of the United States, human land use has influenced the structure and function of natural systems of the Midwest. Widespread conversion of natural systems to agriculture has changed much of the region's water and energy balance (Ch. 5: Land Changes, KM 1). When vegetation has been removed or undergoes a major change, runoff and flooding both tend to increase.<sup>24,176,177</sup> As land has been cleared for agriculture and cities, it simultaneously has lost the capacity to store water due to the resulting conversion to pavement, compaction of soils, and widespread loss of wetlands. More than half of the region's wetlands have been drained (Ch. 22: N. Great Plains, Case Study "Wetlands and the Birds of the Prairie Pothole Region"); in states at the southern end of the region, fewer than

10%–15% of presettlement wetlands remained in the 1980s.<sup>178</sup> The growth of agriculture and loss of wetlands in the Midwest mean that changes to the timing, type (snow or rain), and amount of precipitation are acting on a system that is already highly altered in ways that tend to promote flooding.<sup>24</sup> Climate change modeling suggests that the southern half of the Midwest likely will see increases in saturated soils, which also indicates risks to agriculture and property from inundation and flooding;<sup>179</sup> recent work incorporating land-use

change and population changes also suggests the number of people at risk from flooding will increase across much of the Midwest. 180 However, understanding these relationships also highlights important climate adaptation strategies. For example, restoring systems like wetlands and forested floodplains and implementing agricultural best management strategies that increase vegetative cover (such as cover crops and riparian buffers) can help reduce flooding risks and protect water quality (Figure 21.7). 23,24,25





#### **Wetland Restoration Projects Can Help Reduce Impacts**

**Figure 21.7:** The Blausey Tract restoration project on the U.S. Fish and Wildlife Service's Ottawa National Wildlife Refuge (Ohio) restored 100 acres of former Lake Erie coastal wetlands that were previously in row crop production. In addition to providing habitat for wildlife and fish, these wetlands help reduce climate change impacts by storing water from high-water events and by filtering nutrients and sediments out of water pumped from an adjacent farm ditch. This work was carried out by two conservation groups, The Nature Conservancy and Ducks Unlimited, in partnership with the U.S. Fish and Wildlife Service, and was funded by The Great Lakes Restoration Initiative.<sup>186,187</sup> (top) Shown here is the Blausey Tract restoration site in early spring of 2011, prior to the restoration activities. (bottom) In the spring of 2013, just two years after the start of restoration, the site already was providing important habitat for wildlife and fish. Photo credits: (top) ©The Nature Conservancy, (bottom) Bill Stanley, ©The Nature Conservancy.

As the flooding risk example above illustrates, understanding both the history of change and how future climate patterns can drive additional changes is useful for identifying meaningful strategies for reducing risks to both people and biodiversity through strategically protecting and restoring ecosystems. Since the Third National Climate Assessment,<sup>27</sup> the recognition, promotion, and implementation of green or ecosystem-based climate change adaptation solutions have expanded. While the idea of using natural systems to reduce risks and provide benefits to society is not new, efforts to document and quantify benefits, costs, and costs savings (relative to hard, or "gray," infrastructure) of these types of approaches are increasing.<sup>181</sup> These approaches often help replace systems that

have been lost, such as Great Lakes coastal wetlands, prairies, and vegetated floodplains along rivers and streams that slow water flows and act as sponges that keep floodwaters from people, property, and infrastructure (Figure 21.7), 182,183 or tree cover that increases shade and improves urban air quality.181,184 The important role of nature-based solutions like reforestation for mitigating climate change is also increasingly being recognized and quantified.<sup>185</sup> From the perspective of protecting the biodiversity of the Midwest, adaptation and mitigation strategies that incorporate protection or restoration of natural systems can be a great win-win approach, because they often add habitat and restore ecological and hydrological functions that were reduced as a result of land conversion.

#### Box 21.1: Focus on the Great Lakes

The Great Lakes contain 20% of the world's surface freshwater, provide drinking water and livelihood to more than 35 million people, <sup>188</sup> and allow for important economic and cultural services such as shipping and recreation. The Great Lakes influence regional weather and climate conditions and impact climate variability and change across the region. The lakes influence daily weather by 1) moderating maximum and minimum temperatures of the region in all seasons, 2) increasing cloud cover and precipitation over and just downwind of the lakes during winter, and 3) decreasing summertime convective clouds and rainfall over the lakes. <sup>189,190</sup> In recent decades, the Great Lakes have exhibited notable changes that are impacting and will continue to impact people and the environment within the region. <sup>191</sup> In particular, lake surface temperatures are increasing, <sup>11,12</sup> lake ice cover is declining, <sup>12,13,14</sup> the seasonal stratification of temperatures in the lakes is occurring earlier in the year, <sup>15</sup> and summer evaporation rates are increasing. <sup>13,16</sup>

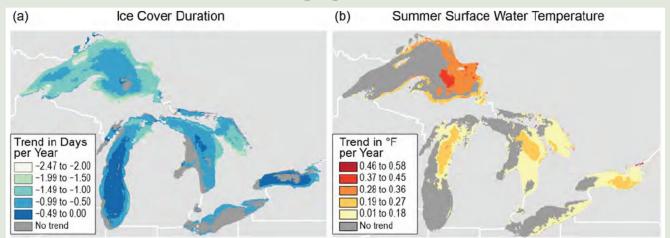
Along the Great Lakes, lake-effect snowfall has increased overall since the early 20th century. However, studies have shown that the increase has not been steady, and it generally peaked in the 1970s and early 1980s before decreasing. As the warming in the Midwest continues, reductions in lake ice may increase the frequency of lake-effect snows until winters become so warm that snowfall events shift to rain. 194,195

Lake-surface temperatures increased during the period 1985–2009 in most lakes worldwide, including the Great Lakes. <sup>196</sup> The most rapid increases in lake-surface temperature occur during the summer and can greatly exceed temperature trends of air at locations surrounding the lakes. <sup>197</sup> From 1973 to 2010, ice cover on the Great Lakes declined an average of 71%; <sup>14</sup> although ice cover was again high in the winters of 2014 and 2015, <sup>192</sup> a continued decrease in ice cover is expected in the future. <sup>198,199</sup>

Water levels in the Great Lakes fluctuate naturally, though levels more likely than not will decline with the changing climate.<sup>200</sup> A period of low water levels persisted from 1998 to early 2013. A single warm winter in



## **The Changing Great Lakes**



**Figure 21.8:** The duration of seasonal ice cover decreased in most areas of the Great Lakes between 1973 and 2013, while summer surface water temperature (SWT) increased in most areas between 1994 and 2013. (a) The map shows the rate of change in ice cover duration. The greatest rate of decrease in seasonal ice cover duration is seen near shorelines, with smaller rates occurring in the deeper central parts of Lakes Michigan and Ontario, which rarely have ice cover. (b) The map shows the rate of change in summer SWT. The greatest rates of increase in summer SWT occurred in deeper water, with smaller increases occurring near shorelines. Source: adapted from Mason et al. 2016. 192 Used with permission from Springer.

1997–1998 (corresponding to a major El Niño event) and ongoing increases in sunlight reaching the lake surface (due to reduced cloud cover) were likely strong contributors to these low water levels. <sup>11</sup> Following this period, water levels rose rapidly. Between January 2013 and December 2014, Lake Superior's water rose by about 2 feet (0.6 meters) and Lakes Michigan and Huron's by about 3.3 feet (1.0 meter). <sup>201</sup> Recent projections with updated methods of lake levels for the next several decades under 64 global model-based climate change simulations (from the Coupled Model Intercomparison Project Phase 5, or CMIP5 database, using the RCP4.5, RCP6.0, and RCP8.5 scenarios) on average show small drops in water levels over the 21st century (approximately 6 inches for Lakes Michigan and Huron and less for the other lakes), with a wide range of uncertainty. <sup>200</sup>

An important seasonal event for biological activity in the Great Lakes is the turnover of water, or destratification, which historically has occurred twice per year. Destratification occurs during the fall as the water temperature drops below a threshold of 39°F, the point at which freshwater attains its maximum density, and again during the spring when the water temperature rises above that threshold. The resultant mixing carries oxygen down from the lake surface and nutrients up from the lake bottom and into the water column. In a pattern that is similar to changes in duration of the growing season on land, the climate projections suggest that the overturn in spring that triggers the start of the aquatic "growing season" will happen earlier, and the fall overturn will happen later. 198,202 This trend toward a longer stratified season has been documented at locations in Lake Superior. 197,203 As the duration of the stratified period increases, the risk of impacts from low oxygen levels at depth and a lack of nutrient inputs at the surface increases, potentially leading to population declines of species in both zones. As warming trends continue, it is possible that a full overturning may not occur each year. 204 For example, lake surface temperatures failed to drop below the 39°F threshold during the winters of 2012 and 2017 in parts of southern Lake Michigan and Lake Ontario (see https://coastwatch.glerl.noaa. gov/glsea/glsea.html). When this lack of water mixing contributes to persistently low oxygen levels, the result may be reductions in the growth of phytoplankton (algae) and zooplankton (microscopic animals) that form the basis of aquatic food webs, potentially leading to cascading effects on the health and abundance of species across all levels of Great Lakes food webs. 202,205,206

#### Box 21.1: Focus on the Great Lakes, continued

Ecological impacts of climate change in the Great Lakes occur in the context of multiple stressors, as these important ecosystems are under stress from pollution, nutrient and sediment inputs from agricultural systems, and invasive species (Ch. 17: Complex Systems, KM 1). 9,10 Human influence on habitats is another stressor. Examples include coastal wetland damage 207 and disturbance by human structures that change habitat conditions and water flow patterns. 208 Fish harvest and other management activities also have influences on populations. 209 Especially in Lake Erie, runoff from agricultural watersheds can carry large volumes of nutrients and sediments that can reduce water quality, potentially leading to hypoxia (inadequate oxygen supply), 210,211 an occurrence that is predicted to be more likely as the climate continues to change. 10 Increased water temperatures and nutrient inputs also contribute to algal blooms, including harmful cyanobacterial algae that are toxic to people, pets, and many native species. 212,213

As with the inland lake fish described above (see Figure 21.6), climate change is expected to impact the species and fisheries of the Great Lakes.<sup>214</sup> However, the vast size and low temperatures in these lakes suggest that mortality events from temperature are a much lower risk. One key aspect of the influence of warming lakes on fish growth is the availability of suitable thermal habitat, as ectotherms, or cold-blooded species, can grow faster in warmer water due to temperature impacts on metabolic rates. Fish can behaviorally thermoregulate, meaning they can migrate to the portion of the water column that contains water of the particular species' preferred temperature.<sup>215</sup> Bottom-water temperatures in the deep parts of the lakes are expected to remain close to 39°F, while temperatures above the seasonal thermocline (the distinct temperature transition zone separating warmer surface waters from colder waters below) are expected to warm considerably.<sup>202</sup> This means that fish will be able to find habitats that favor higher growth rates for a longer period of time during the year. This same growth rate increase may occur for some species in smaller lakes, but the potential for exceeding critical thresholds is likely higher (Figure 21.6). If sufficient food is available, this will enhance the growth rates for economically important species like yellow perch and lake whitefish even though they are classed as cool-water and coldwater fishes, respectively.<sup>216</sup> It remains unclear, however, if a sufficient food supply will be available to sustain this increase in growth rates.

While some native fish may show enhanced growth, these same changes can influence the survival and growth of invasive species. Nonnative species such as alewife<sup>217</sup> and zebra and quagga mussels<sup>218</sup> have had dramatic impacts on the Great Lakes. Warmer conditions may lead to increases in invasion success and may increase the impact of invasive species that are already present. For example, sea lamprey are parasitic fish that are native to the Atlantic Ocean, and in the Great Lakes, they are the focus of several forms of control efforts.<sup>219</sup> Climate change has potential to reduce the effectiveness of these efforts. In the Lake Superior watershed, in years with longer growing seasons (defined as the number of days with water temperatures above 50°F), lamprey reach larger weights before spawning.<sup>161</sup> Larger body sizes suggest a greater impact on other fish species, because larger lamprey produce more eggs and require more food to survive.<sup>161</sup>

Coastal communities and several economic sectors, including shipping, transportation, and tourism, are vulnerable to the aforementioned climate impacts (Ch. 8: Coastal, KM 1). While the most recent research<sup>200</sup> underscores the great uncertainty in future lake levels, earlier research showed that scenarios of decreasing lake levels will increase shipping costs even if the shipping season is longer,<sup>220</sup> or that lower ice cover could increase the damage to coastal infrastructure caused by winter storms.<sup>221,222</sup> While several coastal communities have expressed willingness to integrate climate action into planning efforts, access to useful climate information and limited human and financial resources constrain municipal action. Producers and users of climate

#### Box 21.1: Focus on the Great Lakes, continued

information are working together to create customized climate information and resources, which increases trust and legitimacy, addressing this challenge (see Case Study "Great Lakes Climate Adaptation Network"). This has been demonstrated in projects, for instance, with marinas and harbors in Michigan, with ravine management in Illinois and Wisconsin, and with the Chicago Climate Action Plan in Illinois. <sup>223,224,225,226</sup> Although many communities in the region are taking steps to incorporate climate change and related impacts into policy and planning decisions, many more may benefit from using their existing stakeholder networks to engage with producers of climate information and build upon lessons learned from leaders in the region. <sup>227</sup>

## Key Message 4

#### **Human Health**

Climate change is expected to worsen existing health conditions and introduce new health threats by increasing the frequency and intensity of poor air quality days, extreme high temperature events, and heavy rainfalls; extending pollen seasons; and modifying the distribution of disease-carrying pests and insects. By mid-century, the region is projected to experience substantial, yet avoidable, loss of life, worsened health conditions, and economic impacts estimated in the billions of dollars as a result of these changes. Improved basic health services and increased public health measures including surveillance and monitoringcan prevent or reduce these impacts.

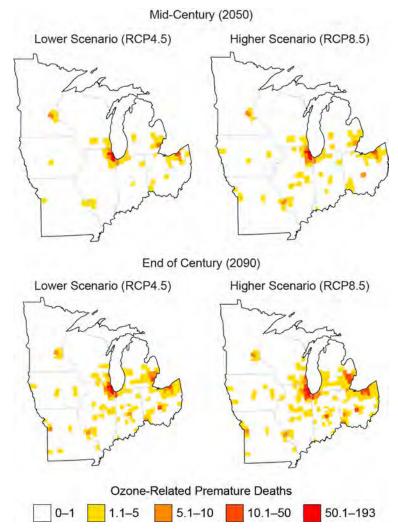
Climate change directly and indirectly impacts human health (Ch. 14: Human Health, KM 1). Midwestern populations are already experiencing adverse health impacts from climate change, and these impacts are expected to worsen in the future.<sup>26,27</sup> The risks are especially high for people who are less able to cope because characteristics like age, income, or social connectivity make them more vulnerable.<sup>228</sup>

### **Air Quality**

Degraded air quality impacts people living in the Midwest. Increases in ground-level ozone and particulate matter are associated with the prevalence of various lung and cardiovascular diseases, which can lead to missed school days, hospitalization, and premature death (Ch. 13: Air Quality, KM 1).<sup>26,28</sup> Despite successful efforts to reduce particulate matter and ozone pollution, climate change could increase the frequency of meteorological conditions that lead to poor air quality.<sup>26,229</sup> In the absence of mitigation, ground-level ozone concentrations are projected to increase across most of the Midwest, resulting in an additional 200 to 550 premature deaths in the region per year by 2050.28 These account for almost half of the total projected deaths due to the climate-related increase in ground-level ozone nationwide and may cost an estimated \$4.7 billion (in 2015 dollars).28

Pollen production has been on the rise in the Midwest in recent years, with pollen seasons starting earlier and lasting longer (Ch. 13: Air Quality, KM 3).<sup>28,230</sup> People, particularly children, with asthma and other respiratory diseases are especially vulnerable to aeroallergens.<sup>231</sup> Aeroallergens can cause allergic rhinitis and exacerbate asthma and sinusitis.<sup>231</sup> Oak pollen may be responsible for an increase of 88 to 350 asthma-related emergency room visits by 2050 under the higher scenario (RCP8.5), with an estimated average annual cost ranging between \$43,000 and \$170,000 (in 2015 dollars).<sup>28</sup>

## **Projected Changes in Ozone-Related Premature Deaths**



**Figure 21.9:** Maps show county-level estimates for the change in average annual ozone-related premature deaths over the summer months in 2050 (2045–2055) and 2090 (2085–2095) compared to 2000 (1995–2005) under the lower and higher scenarios (RCP4.5 and RCP8.5) in the Midwest. The results represent the average of five global climate models. Source: adapted from EPA 2017.<sup>28</sup>

#### **Temperature**

Increased daytime and nighttime temperatures are associated with heat-related diseases (for example, dehydration and heatstroke) and death in the Midwest. <sup>26,232</sup> Extreme heat in urban centers like Chicago, St. Louis, Cincinnati, Minneapolis/St. Paul, Milwaukee, and Detroit can cause dangerous living conditions. <sup>26,232,233,234,235,236</sup> High rates of heat-related illness also have been observed in rural populations, <sup>235</sup> where occupational exposure to heat and access to care is a concern. Exposure to high temperatures impacts workers' health, safety, and productivity. <sup>29</sup>

Future risk of heat-related disease could be significantly higher. As an example, Figure 21.10 shows the projected number of days over 100°F in Chicago over the 21st century using 32 models and two scenarios. Currently, days over 100°F in Chicago are rare. However, they could become increasingly more common in both the lower and higher scenarios (RCP4.5 and RCP8.5). The higher scenario (RCP8.5) yields a wider range and a higher number of days over 100°F than the lower scenario (RCP4.5), especially by 2070–2090. Near the upper end of the model results (95th percentile) at late-century, with the potential for almost 60 days per year

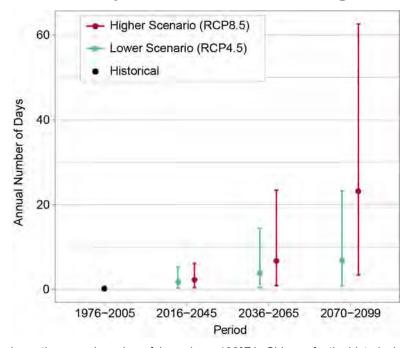
over 100°F, conditions could be more typical of present-day Las Vegas than Chicago. While the degree of uncertainty becomes larger further into the future, all model results show an increase in heat in the last two periods of the 21st century—changes that would pose a significant challenge to Chicago and other midwestern cities.

Compared to other regions where worsening heat is also expected to occur, the Midwest is projected to have the largest increase in extreme temperature-related premature deaths under the higher scenario (RCP8.5): by 2090, 2,000 additional premature deaths per year, compared to the base period of 1989–2000, are projected due to heat alone without adaptation efforts.<sup>28</sup> Northern midwestern communities and vulnerable populations (see Key Message 6) that historically have

not experienced high temperatures may be at risk for heat-related disease and death. Risk of death from extremely cold temperatures will decrease under most climate projection scenarios.<sup>28</sup>

Unabated climate change will translate into costs among the workforce and in utility bills, potentially exacerbating existing health disparities among those most at risk. By 2050, increased temperatures under the higher scenario (RCP8.5) are estimated to cost around \$10 billion (in 2015 dollars) due to premature deaths and lost work hours. Increased electricity demand is estimated to amount to \$1.2 billion by 2090 (in 2015 dollars). For those who are chronically ill or reliant on electronic medical devices, the increased cost of electricity, which contributes to energy insecurity, and may introduce financial and health burdens.

## Days Above 100°F for Chicago



**Figure 21.10:** This graph shows the annual number of days above 100°F in Chicago for the historical period of 1976–2005 (black dot) and projected throughout the 21st century under lower (RCP4.5, teal) and higher (RCP8.5, red) scenarios. Increases at the higher end of these ranges would pose major heat-related health problems for people in Chicago. As shown by the black dot, the average number of days per year above 100°F for 1976–2005 was essentially zero. By the end of the century (2070–2099), the projected number of these very hot days ranges from 1 to 23 per year under the lower scenario and 3 to 63 per year under the higher scenario. For the three future periods, the teal and red dots represent the model-weighted average for each scenario, while the vertical lines represent the range of values (5th to 95th percentile). Both scenarios show an increasing number of days over 100°F with time but increasing at a faster rate under the higher scenario. Sources: NOAA NCEI and CICS-NC.

#### **Precipitation**

An increase in localized extreme precipitation and storm events can lead to an increase in flooding.<sup>27</sup> River flooding in large rivers like the Mississippi, Ohio, and Missouri Rivers and their tributaries can flood surface streets and low-lying areas, resulting in drinking water contamination, evacuations, damage to buildings, injury, and death.<sup>26</sup> Flooded buildings can experience mold growth that can trigger asthma attacks and allergies during cleanup efforts.<sup>237</sup> Mental stress following flooding events can cause substantial health impacts, including sleeplessness, anxiety, depression, and post-traumatic stress disorder.<sup>238</sup> Similarly, drought has been identified as a slow-moving stressor that contributes to acute and chronic mental health impacts such as anxiety and depression.<sup>239</sup>

Precipitation events can transport pathogens that cause gastrointestinal illnesses, putting populations who rely on untreated groundwater (such as wells) at an increased risk of disease, <sup>240</sup> particularly following large rainfall events. <sup>241</sup> Many midwestern communities use wells as their drinking water sources. Adaptive measures, such as water treatment installations, may substantially reduce the risk of gastrointestinal illness, in spite of climate change. <sup>240</sup>

#### **Habitat Conditions**

Climate-related changes in habitats (see Key Message 3) for disease-carrying insects like the mosquito found in the Midwest (*Culex pipiens* and *Culex tarsalis*) that transmits West Nile virus (WNV) and the blacklegged, or deer, tick (*Ixodes scapularis*) that transmits Lyme disease have been associated with higher rates of infection.<sup>242,243</sup> Northern expansion of the *Culex* species in the Midwest is expected to result in upwards of 450 additional WNV cases above the 1995 baseline by 2090 absent greenhouse gas mitigation.<sup>28</sup>

Harmful algal blooms (Box 21.1), such as one that occurred in August 2014 in Lake Erie, can introduce cyanobacteria into drinking and recreational water sources, resulting in restrictions on access and use.<sup>28</sup> Contact with and consumption of water contaminated with cyanobacteria have been associated with skin and eye irritation, respiratory illness, gastrointestinal illness, and liver and kidney damage.<sup>26</sup> The occurrence of conditions that encourage cyanobacteria growth, such as higher water temperatures, increased runoff, and nutrient-rich habitats, are projected to increase in the Midwest.<sup>28</sup>

#### **Challenges and Opportunities**

Climate-sensitive health impacts are complex and dynamic. Coordination across public health, emergency preparedness, planning, and communication agencies can maximize outreach to the most at-risk populations while directing activities to reduce health disparities and impacts.<sup>244</sup> Public health agencies in the Midwest have developed interdisciplinary communities of practice around climate and health adaptation efforts, effectively enhancing the resilience of the region's public health systems.<sup>244,245,246,247,248</sup> Activities around increased surveillance of climate-sensitive exposures and disease are gaining momentum and interest among practitioners and researchers.<sup>249,250</sup>

Actions tied to reducing contributions to global climate change can result in direct co-benefits related to health and other outcomes (such as economic development).<sup>251</sup> Reducing emissions related to energy production and transportation may involve changes to fuel sources, vehicle technology, land use, and infrastructure.<sup>251</sup> Active transportation, such as biking and walking, has been found to significantly decrease disease burden.<sup>252,253,254</sup> A study of the 11 largest midwestern metropolitan areas estimated a health benefit of nearly 700 fewer deaths per year by swapping half of short trips

from car to bike.<sup>255</sup> As Midwest Rust Belt metropolitan areas revitalize and reinvest, there are opportunities to prioritize active living to maximally reduce climate change drivers and improve health.

## **Key Message 5**

## **Transportation and Infrastructure**

Storm water management systems, transportation networks, and other critical infrastructure are already experiencing impacts from changing precipitation patterns and elevated flood risks. Green infrastructure is reducing some of the negative impacts by using plants and open space to absorb storm water. The annual cost of adapting urban storm water systems to more frequent and severe storms is projected to exceed \$500 million for the Midwest by the end of the century.

Climate change poses several challenges to transportation and storm water systems in the Midwest. Annual precipitation in the Midwest has increased by 5% to 15% from the first half of the last century (1901–1960) compared to present day (1986–2015). Winter and spring precipitation are important to flood risk in the Midwest and are projected to increase by up to 30% by the end of this century. Heavy precipitation events in the Midwest have increased in frequency and intensity since 1901 and are projected to increase through this century. 193

There has been an increase in extreme precipitation events that overwhelm storm water sewage systems, disrupt transportation networks, and cause damage to infrastructure and property. Runoff from extreme precipitation events can exceed the capacity of storm water systems, resulting in property damage, including basement backups (Ch. 11: Urban,

KM 2).<sup>37,256</sup> In addition, in metropolitan areas with older sewer systems that combine sanitary sewage with storm water, extreme rain can result in the release of raw sewage into rivers and streams, posing both health and ecological risks.<sup>257</sup> These releases, known as combined sewer overflows (CSO), pose challenges to major sources of drinking water including the Mississippi River<sup>258</sup> and the Great Lakes. 259,260 On the Great Lakes, increases in CSO frequency and volume are projected under mid-high and higher scenarios (RCP6.0 and RCP8.5).<sup>261</sup> The U.S. Environmental Protection Agency (EPA) estimates that the cost of adapting urban storm water systems to handle more intense and frequent storms in the Midwest could exceed \$480 million per year (in 2015 dollars) by the end of the century under either the lower or higher scenario (RCP4.5 or RCP8.5).<sup>28</sup> Extreme precipitation events also affect transportation systems (Ch. 12: Transportation, KM 1). Heavy rainstorms can result in the temporary closure of roadways. In addition, faster streamflow caused by extreme precipitation can erode the bases of bridges, a condition known as scour. A study of six Iowa bridges deemed to be critical infrastructure found that under all emissions scenarios (in the Coupled Model Intercomparison Project Phase 3), each location was projected to have increased vulnerability from more frequent episodes of overtopping and potential scour.55 The EPA estimates that the annual cost of maintaining current levels of service on midwestern bridges in the face of increased scour damage from climate change could reach approximately \$400 million in the year 2050 under either the lower or higher scenario (RCP4.5 or RCP8.5).28

In addition to its impacts on infrastructure, heavy precipitation also affects the operation of roadways by reducing safety and capacity while increasing travel times (Ch. 12: Transportation, KM 1). Projected increases in the number of extreme precipitation events have

been linked to an increased risk of traffic crashes. <sup>262</sup> Intelligent Transportation Systems (ITS) use sensors and cameras to monitor road conditions. This allows for rapid deployment of emergency response vehicles and use of electronic signage to reroute traffic. Such systems allow transportation agencies to minimize the adverse impacts associated with extreme weather. <sup>263</sup>

Flooding on major rivers also poses a challenge to Midwest communities. Major river floods differ from flash floods on smaller streams in that they affect a larger area and require longer periods of heavy precipitation to create flood conditions. The Nation's two largest rivers, the Mississippi and the Missouri, flow through the Midwest. River floods can cause loss of life, as well as significant property damage. River floods have caused the closure of interstate highways in the Midwest and temporary inundation of secondary roads. During floods in May 2017, more than 400 state roads in Missouri were closed due to flooding, including several stretches of Interstate 44 (Figure 21.11).<sup>264</sup> High water also disrupts barge traffic on the Mississippi River. 265,266,267,268,269,270 Billion-dollar floods in the Midwest have occurred three times in the last quartercentury.<sup>271</sup> Climate projections suggest an increased risk of inland flooding under either the lower or higher scenario (RCP4.5 or RCP8.5). Average annual damages from heightened flooding risk in the Midwest are projected to be in excess of \$500 million (in 2015 dollars) by 2050.28

Changes in temperature also can pose challenges to infrastructure. Extreme heat creates material stress on road pavements, bridge expansion joints, and railroad tracks. Milder winter temperatures, however, may be expected to partially offset these damages by reducing the amount of rutting caused by the freeze—thaw cycle. Even taking into account



#### **River Flooding in the Midwest**

**Figure 21.11:** This composite image shows portions of Interstate 44 near St. Louis that were closed by Meramec River flooding in both 2015 and 2017. The flooding shown here occurred in May 2017. Image credit: Surdex Corporation.

the benefits of milder winters for paved surfaces, the EPA estimates that higher temperatures associated with unmitigated climate change would result in approximately \$6 billion annually in added road maintenance costs and over \$1 billion in impacts to rail transportation by 2090 (in 2015 dollars).<sup>28</sup>

Green infrastructure—the use of plants and open space to manage storm water—is helping communities in the Midwest become more resilient to challenges associated with heavy precipitation. At the site or neighborhood level, rain gardens and other planted landscape elements collect and filter rainwater in the soil, slowing runoff into sewer systems. Permeable pavements on parking lots allow water to be stored in the soil. Trees planted next to streets also provide important storm water management benefits. Larger-scale projects include preservation of wetlands. In addition to their storm water management benefits, some types of green infrastructure, such as urban trees and green roofs, contribute to climate change mitigation by acting as carbon sinks. 272,273,274

There are many examples of green infrastructure projects in the Midwest, though not all explicitly identify climate change as a rationale. The examples below enhance resilience to the heavy rains that are projected to become more frequent.

- The Cermak/Blue Island Sustainable Streetscape Project in the Pilsen neighborhood of Chicago uses bioswales, rain gardens, and permeable pavements to reduce up to 80% of storm water runoff. It also uses street trees and other vegetation to reduce the urban heat island effect while also providing an attractive public space.<sup>275</sup>
- The Metropolitan Sewer District in St. Louis has embarked upon a \$100 million rainscaping project designed to divert storm water runoff in the northern portion of the City of St. Louis and adjacent north St. Louis County.<sup>276</sup>
- The City of Minneapolis uses street trees to reduce storm water runoff through enhanced evaporation and infiltration of water into the soil.<sup>277</sup> The City of Cleveland also prioritizes tree planting as an adaptation strategy, with an emphasis on increasing the tree canopy in low-income neighborhoods. In addition to its storm water management benefits, urban forestry also reduces the urban heat island effect and acts as a carbon sink.<sup>278</sup>

At the scale of a metropolitan region, preservation and restoration of streams, floodplains, and watersheds are enhancing biodiversity while also reducing storm water runoff.

Open Space Preservation: Many communities in the Midwest are recognizing that preservation of open space, particularly in floodplains, is a cost-effective method for

managing storm water. Ducks Unlimited, a non-profit organization, has purchased conservation easements that restrict future development on nearly 10,000 acres of floodplain around the confluence of the Mississippi and Missouri Rivers. In the Milwaukee area, the Ozaukee Washington Land Trust has preserved more than 6,000 acres of forests, wetlands, and open space through acquisitions and the purchase of conservation easements, preserving lands important for absorbing rainwater and filtering toxins from sediment.<sup>279,280</sup>

- communities are turning to dechannelization (the removal of concrete linings placed in waterways) and daylighting (bringing back to the surface streams that had been previously buried in pipes) as methods of storm water management. The Milwaukee Metropolitan Sewerage District is currently undertaking a dechannelization of the Kinnickinnic River. According to the District, the concrete lining of the waterway actually makes the waterway more dangerous during heavy rain. Flooding motivated the City of Kalamazoo to daylight a 1,500-foot section of Arcadia Creek in the downtown district. <sup>281,282</sup>
- Ravine Restoration: Lake Michigan's western shore in Wisconsin and northern Illinois holds more than 50 small watersheds, known locally as ravines. Storm water runoff subjects these ravines to serious erosion, which threatens property and infrastructure. The Great Lakes Alliance has produced guides to reduce erosion through best management practices, including stream buffers, use of native plants for stabilization, and reducing the steepness or gradient of the stream bank.<sup>223</sup>

## **Key Message 6**

# Community Vulnerability and Adaptation

At-risk communities in the Midwest are becoming more vulnerable to climate change impacts such as flooding, drought, and increases in urban heat islands. Tribal nations are especially vulnerable because of their reliance on threatened natural resources for their cultural, subsistence, and economic needs. Integrating climate adaptation into planning processes offers an opportunity to better manage climate risks now. Developing knowledge for decision-making in cooperation with vulnerable communities and tribal nations will help to build adaptive capacity and increase resilience.

## **Vulnerability and Adaptation**

In the Midwest, negative impacts related to climate change are projected to affect human systems, including cities, rural and coastal communities, and tribes. 28,283,284 Higher temperatures, increasing variation in precipitation patterns, and changes in lake levels are likely to increase the vulnerability of these systems to extreme events (including flooding, drought, heat waves, and more intense urban heat island effects), compounding already existing stressors such as economic downturns, shrinking cities, and deteriorating infrastructure.285 Extreme heat such as that experienced in July 2011 (with temperatures reaching over 100°F in the majority of the Midwest) is expected to intensify,<sup>286</sup> and urban heat islands may cause hardships to those most vulnerable, such as the old and infirm and those without resources to control their microclimate (for example, through the use of air conditioning).<sup>287</sup> Under the higher scenario (RCP8.5), extreme heat is

projected to result in losses in labor and associated losses in economic revenue up to \$9.8 billion per year in 2050 and rising to \$33 billion per year in 2090 (in 2015 dollars). Expanding the use of green infrastructure and locating it properly may mitigate the negative impact of heat islands in urban settings (see Key Messages 4 and 5) (see also Ch. 11: Urban, KM 4).

To mitigate or better respond to these impacts, scholars and practitioners highlight the need to engage in risk-based approaches that not only focus on assessing vulnerabilities but also include effective planning and implementation of adaptation options (Ch. 28: Adaptation, KM 3).32 These place-based approaches actively rely on participatory methodologies to evaluate and manage risk and to monitor and evaluate adaptation actions.32 However, documented implementation of climate change planning and action in Midwest cities and rural communities remains low. For example, in 2015, only four counties and cities in the region-Marquette and Grand Rapids in Michigan and Dane County and Milwaukee in Wisconsin-had created formal climate adaptation plans, none of which have been implemented.<sup>288</sup> Moreover, a recent study of 371 cities in the Great Lakes region found that only 36 of them could identify a climate entrepreneur, that is, a public official clearly associated with pushing for climate action.<sup>285</sup> Attempts to assess vulnerabilities, especially for poor urban communities, face persisting environmental and social justice barriers, such as lack of participation and historical disenfranchisement, 289 despite evidence that these communities are going to be disproportionately affected by climate impacts.<sup>290</sup> Additionally, in-depth interviews with local decision-makers on water management across scales have suggested that a lack of political and financial support at the state and federal levels is a barrier to adaptation action in cities and counties.<sup>291</sup> While initiatives are underway in the Midwest to mainstream

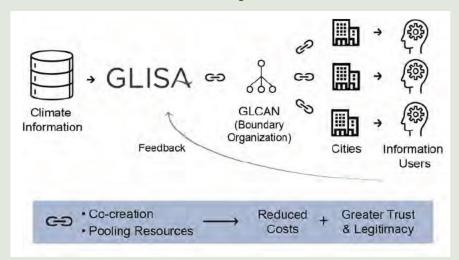
adaptation action—that is, embed and integrate climate adaptation action in what cities already do (see Case Study "Great Lakes Climate Adaptation Network") (see also Ch. 28: Adaptation,

KM 5)—there are few examples in the published literature that document failure or success (but see Kalafatis et al. 2015, Vogel et al. 2016<sup>292,293</sup>).

## Case Study: Great Lakes Climate Adaptation Network

The Great Lakes Climate Adaptation Network (GLCAN) is a regional, member-driven peer network of local government staff who work together to identify and act on the unique climate adaptation challenges of the Great Lakes region. GLCAN formed in 2015 as a regional network of the Urban Sustainability Directors' Network (USDN) to unite Great Lakes cities with universities in the region. It has been cooperating actively with a regional climate organization, the Great Lakes Integrated Sciences and Assessments (GLISA), a NOAA-supported program housed at the University of Michigan and Michigan State University, to create climate information in support of decision-making in member cities. In this example of sustained engagement, GLCAN and GLISA work as a boundary chain that moves climate information from producers at the Universities to users in the cities, as well as across cities. This minimizes transaction costs, in terms of human and financial resources, while building trust and legitimacy. 292,294 In one example of this partnership, with funding from USDN, GLCAN and GLISA worked with the Huron River Watershed Council and five Great Lakes cities (Ann Arbor, Dearborn, Evanston, Indianapolis, and Cleveland) to develop a universal vulnerability assessment template that mainstreams the adaptation planning process and results in the integration of climate-smart and equity-focused information into all types of city planning.<sup>295</sup> The template is publicly available;<sup>296</sup> its purpose is to reduce municipal workloads and save limited resources by mainstreaming existing, disparate planning domains (such as natural hazards, infrastructure, and climate action), regardless of city size or location. Based on this work, USDN funded a follow-up project for GLISA to work with additional Great Lakes and Mid-Atlantic cities and a nonprofit research group (Headwaters Economics) to develop a socioeconomic mapping tool for climate risk planning.

## **Linked Boundary Chain Model**



**Figure 21.12:** Shown here is a configuration of the boundary chain employed in the Great Lakes Climate Adaptation Network (GLCAN) Case Study. The information is tailored and moves through different boundary organizations (links in the chain) to connect science to users. By co-creating information and pooling resources throughout the chain, trust and legitimacy are built and cost is decreased. Source: adapted from Lemos et al. 2014.<sup>294</sup> ©American Meteorological Society.

In addition, work on estimating the cost of adaptation nationally and in the Midwest remains limited, though the EPA has estimated that the Midwest is among the regions with the largest expected damages to infrastructure, including the highest estimated damages to roads, rising from \$3.3 billion per year in 2050 to \$6 billion per year in 2090 (in 2015 dollars) under a higher scenario (RCP8.5), and highest number of vulnerable bridges (Key Message 5).<sup>28</sup> Additionally, economic models that value climate amenities—for example, offering residents the benefits of warmer winters or cooler summers-indicate that while the Midwest is among the regions with the largest predicted amenity loss, certain cities (such as Minneapolis and Minnesota) and subregions (such as upper Michigan) will be among the few places where the value of warmer winters outweighs the cost of hotter summers.<sup>297,298</sup> Limited evidence indicates that household consideration of climate amenities may contribute to reversing long-standing trends in out-migration from the Midwest<sup>298</sup> and that changes in national migration patterns will contribute to population growth in the region.<sup>28</sup> More research is needed to understand how cities in the Midwest might be affected by long-term migration to the region.<sup>31</sup>

## Collaboratively Developing Knowledge and Building Adaptive Capacity

Interactions among producers of climate information (for example, universities and research institutes), end users (such as city planners, watershed managers, and natural resource managers), and intermediaries (for example, information brokers and organizations) play a critical role in increasing the integration and use of climate knowledge for adaptation.<sup>299</sup> In the Midwest, organizations such as the Great Lakes Integrated Sciences and Assessments (GLISA; glisa.umich.edu) and the Wisconsin Initiative on Climate Impacts (wicci.wisc.edu), and research projects such as Useful to Usable (U2U), have created mechanisms and tools, such as climate scenarios, decision support tools, and climate

data, that promote the joint development of usable climate information across different types of stakeholders, including city officials, water managers, farmers, and tribal officials. 224,294,300 For example, working closely with corn farmers and climate information intermediaries, including extension agents and crop consultants, in Iowa, Nebraska, Michigan, and Indiana, an interdisciplinary team of climate scientists, agronomists, computer scientists, and social scientists have not only created a suite of decision support tools (see Key Message 1) but also significantly advanced understanding of corn farmers' perceptions of climate change,301 willingness to adapt,302 and opportunities for and limitations of the use of climate information in the agricultural sector.<sup>294,303</sup> Strategies being implemented as a result of these collaborations, including the use of green infrastructure and water conservation efforts, are proving effective at reducing sensitivity to the impacts of climate change in the Midwest.304,305,306 In addition, binational partnerships between the United States and Canada, in support of the Great Lakes Water Quality Agreement, synthesized annual climate trends and impacts for a general audience in a pilot product for 2017 to provide a timely and succinct summary in an easy-tounderstand format (Ch. 16: International, KM 4).307 However, these organizations face challenges including the high costs in interacting with users, contextualizing and customizing climate information, and building trust.<sup>308</sup> The development of new forms of sustained engagement likely would increase the use of climate information in the region.

### **Tribal Adaptation**

Tribes and Indigenous communities in the Midwest have been among the first to feel the effects of climate change as it impacts their culture, sovereignty, health, economies, and ways of life.<sup>39</sup> The Midwest contains ceded territory—large swaths of land in Minnesota, Wisconsin, and Michigan in which Ojibwe tribes reserved hunting, fishing, and gathering

rights in treaties with the United States government.88 Climate change presents challenges to the Ojibwe tribes in co-managing these resources with other land managers; as the climate changes, various species utilized by tribes are declining and may shift entirely outside of treaty boundaries and reserved lands. 127,309,310 In certain tribal cultures, all beings (species) are important; climate adaptation efforts that favor certain beings at the detriment of others can be problematic. Adaptation to climate change might also mean giving up on something deeply embedded in tribal culture for which no substitute exists.<sup>31</sup> A family sugarbush (a forest stand used for maple syrup), for example, cannot be replaced culturally, spiritually, or economically if the sugar maple range were to shift outside of treaty or reservation boundaries. As the effects of climate change become more pronounced, further research can shed light on how tribal nations are being affected.

Projected changes in climate, particularly increases in extreme precipitation events, will have pronounced impacts on tribal culture and tribal people in the Midwest.<sup>283</sup> Reservations often are located in isolated rural communities, meaning emergency response to flooding presents challenges in getting help to tribal citizens. Additionally, in areas of the Midwest, infestations of the invasive emerald ash borer already are devastating ash tree populations and corresponding Indigenous cultural and economic traditions.<sup>127</sup>

Across the United States, a number of tribal nations are developing adaptation plans, including in the Midwest (Ch. 15: Tribes, KM 3).<sup>283</sup> These plans bring together climate data and projections with Traditional Ecological Knowledge <sup>311,312</sup> of tribal members. Within Indigenous oral history lies a complex and rich documentation of local ecosystems—not found in books—that can be used to understand and document the changes that are occurring.<sup>313</sup> Climate change effects are not typically immediate or dramatic because they

occur over a relatively long period of time, but tribal elders and harvesters have been noticing changes, such as declining numbers of waabooz (snowshoe hare), many of which Scientific Ecological Knowledge has been slower to document. The Traditional Ecological Knowledge of elders and harvesters who have lived and subsisted in a particular ecosystem can provide a valuable and nuanced understanding of ecological conditions on a smaller, more localized scale. Integrating this Traditional Ecological Knowledge with Scientific Ecological Knowledge in climate change initiatives provides a more complete understanding of climate change impacts. 136 Community input to tribal adaptation plans ensures that Traditional Ecological Knowledge can be used to produce adaptation strategies trusted by community members.314

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#### **Opening Image Credit**

Carson, Wisconsin: © William Garrett/Flickr (<u>CC BY 2.0</u>). Adaptation: cropped top and bottom to conform to the size needed for publication.

### **Traceable Accounts**

#### **Process Description**

The chapter lead authors were identified in October 2016, and the author team was recruited in October and November 2016. Authors were selected for their interest and expertise in areas critical to the Midwest with an eye on diversity in expertise, level of experience, and gender. The writing team engaged in conference calls starting in December 2016, and calls continued on a regular basis to discuss technical and logistical issues related to the chapter. The Midwest chapter hosted an engagement workshop on March 1, 2017, with the hub in Chicago and satellite meetings in Iowa, Indiana, Michigan, and Wisconsin. The authors also considered other outreach with stakeholders, inputs provided in the public call for technical material, and incorporated the available recent scientific literature to write the chapter. Additional technical authors were added as needed to fill in the gaps in knowledge.

Discussion amongst the team members, along with reference to the Third National Climate Assessment and conversations with stakeholders, led to the development of six Key Messages based on key economic activities, ecology, human health, and the vulnerability of communities. In addition, care was taken to consider the concerns of tribal nations in the northern states of the Midwest. The Great Lakes were singled out as a special case study based on the feedback of the engagement workshop and the interests of other regional and sector chapters.

### Note on regional modeling uncertainties

Interaction between the lakes and the atmosphere in the Great Lakes region (e.g., through ice cover, evaporation rates, moisture transport, and modified pressure gradients) is crucial to simulating the region's future climate (i.e., changes in lake levels or regional precipitation patterns). 315,316 Globally recognized modeling efforts (i.e., the Coupled Model Intercomparison Project, or CMIP) do not include a realistic representation of the Great Lakes, simulating the influence of the lakes poorly or not at all. 92,198,317,318,319 Ongoing work to provide evaluation, analysis, and guidance for the Great Lakes region includes comparing this regional model data to commonly used global climate model data (CMIP) that are the basis of many products practitioners currently use (i.e., NCA, IPCC, NOAA State Climate Summaries). To address these challenges, a community of regional modeling experts are working to configure and utilize more sophisticated climate models that more accurately represent the Great Lakes' lake–land–atmosphere system to enhance the understanding of uncertainty to inform better regional decision–making capacity (see <a href="http://glisa.umich.edu/projects/great-lakes-ensemble">http://glisa.umich.edu/projects/great-lakes-ensemble for more information)</a>.

## Key Message 1

## **Agriculture**

The Midwest is a major producer of a wide range of food and animal feed for national consumption and international trade. Increases in warm-season absolute humidity and precipitation have eroded soils, created favorable conditions for pests and pathogens, and degraded the quality of stored grain (*very likely, very high confidence*). Projected changes in precipitation, coupled with rising extreme temperatures before mid-century, will reduce Midwest agricultural productivity to levels of the 1980s without major technological advances (*likely, medium confidence*).

#### **Description of evidence base**

Humidity is increasing. Feng et al. (2016)³ show plots of trends in surface and 850 hPa specific humidity of 0.4 and 0.2 g/kg/decade, respectively, from 1979–2014 for the April–May–June period across the Midwest. These represent increases of approximately 5% and 3% per decade, respectively. Automated Surface Observing Stations in Iowa³20 having dew point records of this length and season show dew point temperature increases of about 1°F per decade. Brown and DeGaetano (2013)⁴9 show increasing dew points in all seasons throughout the Midwest. Observed changes in annual average maximum temperature for the Midwest over the 20th century (Vose et al. 2017,⁵⁴ Table 6.1) have been less than 1°F. However, future projected changes in annual average temperature (Vose et al. 2017,⁵⁴ Table 6.4), as well as in both warmest day of the year and warmest 5-day 1-in-10 year events (Vose et al. 2017,⁵⁴ Table 6.5), are higher for the Midwest than in any other region of the United States.

Garbrecht et al. (2007)<sup>321</sup> state that precipitation changes are sufficient to require U.S. policy changes for agricultural lands. The Soil Erosion Site (<a href="http://soilerosion.net/water\_erosion.">httml</a>) describes the soil erosion process and provides links to soil erosion models.<sup>322</sup> Nearing et al. (2004)<sup>44</sup> report that global climate models project increases in erosivity (the ability or power of rain to cause soil loss) across the northern states of the United States over the 21st century.

Spoilage in stored grain is caused by mold growth and insect activity, which are related to the moisture content and temperature of the stored grain. The ability of fungi to produce mycotoxins, including aflatoxin and fumonisins, is largely influenced by temperature, relative humidity, insect attack, and stress conditions of the plants. Humidity has a determining influence on the growth rate of these degradation agents.

Germination of wheat declined in storage facilities where moisture level increased with time. <sup>326</sup> Freshly harvested, high-moisture content grain must be dried to minimize (or prevent) excessive respiration and mold growth on grains. <sup>327</sup> The storage life of grain is shortened significantly when stored at warm temperatures. One day of holding warm, wet corn before drying can decrease storage life by 50%. <sup>45</sup>

Feng et al. (2016)<sup>3</sup> show humidity is rising in the Midwest in the warm season. Cook et al. (2008)<sup>4</sup> show that the factors leading to these humidity increases (warming Gulf of Mexico and strengthening of the Great Plains Low-Level Jet) will increase in a warming climate.

The ability of fungi to produce mycotoxins is largely influenced by temperature, relative humidity, insect attack, and stress conditions of the plants.<sup>324</sup> More extreme rainfall events would favor formation of Deoxynivalenol, also known as vomitoxin.<sup>57</sup>

Hatfield et al. (2011,<sup>50</sup> Table 1) give the relationships between temperature and vegetative function as well as reproductive capacity. This work was expanded and updated in Walthall et al. (2012).<sup>328</sup>

Mader et al. (2010)<sup>74</sup> report a comprehensive climate index for describing the effect of ambient temperature, relative humidity, radiation, and wind speed on environmental stress in animals. St-Pierre et al. (2003)<sup>329</sup> provide tables estimating economic losses in dairy due to reduced reproduction. The data show a strong gradient across the Midwest (with losses in Iowa, Illinois, and Indiana being three times the losses in Minnesota, Wisconsin, and Michigan under the current

climate). Temperature and humidity increases projected for the Midwest will increase economic losses across the entire region. Lewis and Bunter (2010)<sup>330</sup> document heat stress effects of temperature on pig production and reproduction.

St-Pierre et al. (2003)<sup>329</sup> provide tables estimating economic losses in dairy, beef, swine, and poultry, resulting in declines from both meat/milk/egg production. The data show a strong gradient across the Midwest (with losses in Iowa, Illinois, and Indiana being twice the losses in Minnesota, Wisconsin, and Michigan under the current climate). Temperature and humidity increases projected for the Midwest will increase losses across the entire region. Babinszky et al. (2011)<sup>75</sup> identified temperature thresholds for meat/egg/milk production, beyond which performance declines. The adverse effects of heat stress include high mortality, decreased feed consumption, poor body weight gain and meat quality in broiler chickens, and poor laying rate, egg weight, and shell quality in laying hens.<sup>76</sup>

Takle et al. (2013)<sup>65</sup> found that by mid-century, yields of corn and soybean are projected to fall well below projections based on extrapolation of trends since 1970 even under an optimistic economic scenario, with larger interannual variability in yield and total production. Liang et al. (2017)<sup>2</sup> report that the ratio of measured agricultural output to measured inputs would drop by an average 3% to 4% per year under medium to high emissions scenarios and could fall to pre-1980 levels by 2050 even when accounting for present rates of innovation. Schauberger et al. (2017)<sup>66</sup> found that the impact of exposure to temperatures from 30°C to 36°C projected for the end of the century under RCP8.5 creates yield losses of 49% for maize and 40% for soybean.

According to Easterling et al. (2017),<sup>193</sup> evidence suggests that droughts have become less frequent in the Midwest as the region has become wetter. However, they note that "future higher temperatures will likely lead to greater frequencies and magnitudes of agricultural droughts throughout the continental United States as the resulting increases in evapotranspiration outpace projected precipitation increases."

## **Major uncertainties**

Global and regional climate models do not simulate well the dynamical structure of mesoscale convective systems in the Midwest, which are the critical "end processes" that create intense precipitation from increasing amounts of moisture evaporated over the Gulf of Mexico and transported by low-level jets (LLJs) into the Midwest. Secondly, the strengthening of future LLJs depends on strengthening of both the Bermuda surface high pressure and the lee surface low over the eastern Rocky Mountains. Confirming simulations of this in future climates are needed. Global and regional climate models do simulate future scenarios having increasing temperatures for the region with high confidence (a necessary ingredient for increased humidity). There is uncertainty of the temperature thresholds for crops because, as pointed out by Schauberger et al. (2017), <sup>66</sup> some negative impacts of higher temperatures can be overcome through increased water availability. Agricultural yield models, productivity models, and integrated assessment models each provide different ways of looking at agricultural futures, and each of these three types of models has high levels of uncertainty. However, all point to agriculture futures that fail to maintain upward historical trends.

#### Description of confidence and likelihood

There is *very high confidence* that increases in warm-season absolute humidity and precipitation *very likely* have eroded soils, created favorable conditions for pests and pathogens, and degraded quality of stored grain. There is *medium confidence* that projected increases in moisture, coupled with rising mid-summer temperatures, *likely* will be detrimental to crop and livestock production and put future gains in commodity grain production at risk by mid-century. Projected changes in precipitation, coupled with rising extreme temperatures, provide *medium confidence* that by mid-century Midwest agricultural productivity *likely* will decline to levels of the 1980s without major technological advances.

# **Key Message 2**

# **Forestry**

Midwest forests provide numerous economic and ecological benefits, yet threats from a changing climate are interacting with existing stressors such as invasive species and pests to increase tree mortality and reduce forest productivity (*likely, high confidence*). Without adaptive actions, these interactions will result in the loss of economically and culturally important tree species such as paper birch and black ash (*very likely, very high confidence*) and are expected to lead to the conversion of some forests to other forest types (*likely, high confidence*) or even to non-forested ecosystems by the end of the century (*as likely as not, medium confidence*). Land managers are beginning to manage risk in forests by increasing diversity and selecting for tree species adapted to a range of projected conditions.

## **Description of evidence base**

Multiple ecosystem vulnerability assessments that have been conducted for major forested ecoregions within the Midwest<sup>89,90,91,92,93</sup> suggest that climate change is expected to have significant direct impacts to forests through effects of warming and changes in the timing and amounts of precipitation.<sup>96,98,103,104</sup>

Significant indirect impacts to forests are expected as warming increases the negative effects of invasive plants, insect pests, and tree pathogens of forests. <sup>105,106</sup> Increasing stress on individual trees from climate changes (warming temperatures, drought, and frost damage) increases the susceptibility of trees to the impacts from invasive plants, insect pests, and disease agents. <sup>109,111</sup>

Direct and indirect impacts of climate change may lead to the decline of culturally<sup>88,127</sup> and economically important tree species,<sup>125</sup> as well as leading to shifts in major forest types and altered forest composition as tree species at the northern limits of their ranges decline and southern species experience increasing suitable habitat.<sup>120</sup> These shifts raise the possibility of future losses of economic and cultural benefits of forests due to conversion to different forest types or the change to non-forest ecosystems.<sup>119,123,124</sup>

Many examples of land managers implementing climate adaptation in forest management exist, suggesting significant willingness to address the impacts of a changing climate across diverse land ownerships in managed forests<sup>134</sup> and urban forests.<sup>133</sup> Forest management strategies to adapt to a changing climate highlight the importance of increasing forest diversity and managing for

tree species adapted to a range of climate conditions.<sup>8</sup> The importance of Traditional Ecological Knowledge for informing approaches for climate adaptation on tribal lands and within ceded territory is recognized.<sup>331</sup>

## **Major uncertainties**

There is significant uncertainty surrounding the ability of tree species migration rates to keep pace with changes in climate (based on temperature and precipitation) due to existing forest fragmentation and loss of habitat. Uncertainty in forest management responses, including active and widespread adaptation efforts that alter forest composition, add to the uncertainty of tree species movements. This leads to considerable uncertainty in the extent to which shifts in tree species ranges may lead to altered forest composition or loss of forest ecosystems in the future.

Due to the complex interactions among species, there is uncertainty in the extent that longer growing seasons, warming temperatures, and increased CO<sub>2</sub> concentrations will benefit tree species, due to both limitations in available water and nutrients, as well as limited benefits for trees relative to the positive influences of these changes on stressors (invasives, insect pests, pathogens).

## Description of confidence and likelihood

There is *high confidence* that the interactions of warming temperatures, precipitation changes, and drought with insect pests, invasive plants, and tree pathogens will *likely* lead to increased tree mortality of some species, reducing productivity of some forests. There is *very high confidence* that these interactions will *very likely* result in the decline of some economically or culturally important tree species. Additionally, there is *high confidence* that suitable habitat conditions for tree species will change as temperatures increase and precipitation patterns change, making it *likely* that forest composition will be altered and forest ecosystems may shift to new forest types. Due to uncertainties on species migration rates and forest management responses to climate changes, there is *medium confidence* that by the end of the century, some forest ecosystems are *as likely as not* to convert to non-forest ecosystems.

# **Key Message 3**

# **Biodiversity and Ecosystems**

The ecosystems of the Midwest support a diverse array of native species and provide people with essential services such as water purification, flood control, resource provision, crop pollination, and recreational opportunities. Species and ecosystems, including the important freshwater resources of the Great Lakes, are typically most at risk when climate stressors, like temperature increases, interact with land-use change, habitat loss, pollution, nutrient inputs, and nonnative invasive species (*very likely, very high confidence*). Restoration of natural systems, increases in the use of green infrastructure, and targeted conservation efforts, especially of wetland systems, can help protect people and nature from climate change impacts (*likely, high confidence*).

#### **Description of evidence base**

Changes in climate will very likely stress many species and ecological systems in the Midwest. As a result of increases in climate stressors, which typically interact with multiple other stressors, especially in the southern half of the Midwest region, both the ecological systems and the ecological services (water purification, pollination of crops and wild species, recreational opportunities, etc.) they provide to people are at risk. We draw from a wide range of national and global scale assessments of risks to biodiversity (e.g., Maclean and Wilson 2011, Pearson et al. 2014, and the review by Staudinger et al. 2013 that covered literature included in the Third National Climate Assessment<sup>20, 18,22</sup>), which all agree that on the whole, we are highly likely to see increases in species declines and extinctions as a result of climate change. It is very challenging to say specifically what combination of factors will drive these responses, but the weight of evidence suggests very high confidence in the overall trends. The link to interactions with other stressors is also very strong and is described in Brook et al. (2008)<sup>157</sup> and Cahill et al. (2013),<sup>17</sup> among others. Terrestrial ecosystem connectivity, thought to be important for the adaptive capacity of many species, is very low in the southern half of the Midwest region. <sup>158,159</sup> This may limit the movement of species to more suitable habitats or for species from the southern United States to migrate into the Midwest. These connectivity/movement potential studies also support the idea that land-use change will constrain the potential for retaining function and overall diversity levels. The last section refers to the benefits of restoration as a mechanism for protecting people and nature from climate change impacts. While it is not possible to fully demonstrate that protection of people and nature is indeed occurring now from climate change impacts (we would need attribution of current floods, etc.), there is strong evidence that actions like restoring wetlands can reduce flooding impacts<sup>182</sup> and that protecting forests protects water quality and supply.

## **Major uncertainties**

There is significant uncertainty surrounding the ability of species and ecosystems to persist and thrive under climate change, and we expect to see many different types of responses (population increases, declines, local and regional extinctions).<sup>17</sup> In some cases, climate change does have the potential to benefit species; for example, fish in the coldest regions of the Great Lakes (i.e., Lake Superior) are likely to show increases in productivity, at least in the short run.<sup>332</sup> However, as a whole, given the environmental context upon which climate change is operating, and the presence of many cold-adapted species that are close to the southern edge of their distributional range, we expect more declines than increases.

The last section of the Key Message focuses on land protection and restoration—conservation strategies intended to reduce the impacts of land-use change. Many modeling studies have called out loss of habitat in the Midwest as a key barrier to both local survival and species movement in response to climate change (Schloss et al. 2012 and Carroll et al. 2015 are two of the most recent<sup>158,159</sup>). Restoring habitat can restore connectivity and protect key ecological functions like pollination services and water purification. Restoring wetlands also can help protect ecosystems and people from flooding, which is the rationale for the last line in the Key Message.

# Description of confidence and likelihood

In the Midwest, we already have seen very high levels of habitat loss and conversion, especially in grasslands, wetlands, and freshwater systems. This habitat degradation, in addition to the

pervasive impacts of invasive species, pollution, water extraction, and lack of connectivity, all suggest that the adaptive capacity of species and systems is compromised relative to systems that are more intact and under less stress. Over time, this pervasive habitat loss and degradation has contributed to population declines, especially for wetland, prairie, and stream species. A reliance on cold surface-water systems, which often have compromised connectivity (due to dams, roadstream crossings with structures that impede stream flow, and other barriers) suggests that freshwater species, especially less mobile species like mussels, which are already rare, are at particular risk of declines and extinction. Due to the variety of life histories and climate sensitivities of species within the region, it is very challenging to specify what mechanisms will be most important in terms of driving change. However, knowing that drivers like invasive species, habitat loss, pollution, and hydrologic modifications promote species declines, it is very likely that the effects of climate change will interact, and we have very high confidence that these interactions will tend to increase, rather than decrease, stresses on species that are associated with these threats. While there is strong evidence that investments in restoring habitat can benefit species, we currently do not have strong observational evidence of the use of these new habitats, or benefits of restored wetlands, in response to isolated climate drivers. Thus, the confidence level for this statement is lower than for the first half of the message.

# **Key Message 4**

## **Human Health**

Climate change is expected to worsen existing conditions and introduce new health threats by increasing the frequency and intensity of poor air quality days, extreme high temperature events, and heavy rainfalls; extending pollen seasons; and modifying the distribution of disease-carrying pests and insects (*very likely, very high confidence*). By mid-century, the region is projected to experience substantial, yet avoidable, loss of life, worsened health conditions, and economic impacts estimated in the billions of dollars as a result of these changes (*likely, high confidence*). Improved basic health services and increased public health measures—including surveillance and monitoring—can prevent or reduce these impacts (*likely, high confidence*).

#### **Description of evidence base**

There is strong evidence that increasing temperatures and precipitation in the Midwest will occur by the middle and end of the 21st century.<sup>27</sup> The impacts of these changes on human health are broadly captured in the 2016 U.S. Global Change Research Program's Climate and Health Assessment.<sup>26</sup> Air quality, including particulate matter and ground-level ozone, is positively associated with increased temperatures and has been well-documented to show deleterious impacts on morbidity and mortality.<sup>231</sup> Likewise, increased temperatures have been shown in communities in the Midwest, as well as across the United States, to have substantial impacts on health and well-being.<sup>232,233,235,236,333,334</sup> The frequency of extreme rainfall events in the Midwest has increased in recent decades, and this trend is projected to continue.<sup>193</sup> Studies have shown that extreme rainfall events lead to disease, injury, and death.<sup>237</sup> Increases in seasonal temperatures and shifting precipitation patterns have been well documented to be correlated with increased pollen production, allergenicity, and pollen season length.<sup>230,231</sup> Similarly, there is agreement that shifting temperature and precipitation patterns are making habitats more suitable for disease-carrying vectors to move

northward toward the Midwest region.<sup>242,243,250,335,336,337</sup> The disease burden and economic projections primarily are based on EPA estimates.<sup>28</sup>

Access to basic preventive care measures quantifiably reduces disease burden for climatesensitive exposures. <sup>238,240</sup> Gray literature indicates that public health practitioners are dedicated to increasing capacity for adapting to climate change through classic public health activities such as conducting vulnerability assessments, employing communication and outreach campaigns, and investing in surveillance efforts. <sup>26,244,245,246,247,248</sup>

#### **Major uncertainties**

While the modeling performed by the EPA was completed using the best available information, there is uncertainty around the extent to which biophysical adaptations will protect midwestern populations from heat-, air pollution-, aeroallergen-, and vector-related illness and death. Likewise, while there is a general consensus regarding habitat suitability for disease-carrying vectors in the eastern and western United States, the degree to which the disease burden may increase or decrease is largely uncertain.

## Description of confidence and likelihood

Based on the evidence, there is *very high confidence* that climate change is *very likely* to impact midwesterners' health.

# **Key Message 5**

# **Transportation and Infrastructure**

Storm water management systems, transportation networks, and other critical infrastructure are already experiencing impacts from changing precipitation patterns and elevated flood risks (medium confidence). Green infrastructure is reducing some of the negative impacts by using plants and open space to absorb storm water (medium confidence). The annual cost of adapting urban storm water systems to more frequent and severe storms is projected to exceed \$500 million for the Midwest by the end of the century (medium confidence).

## **Description of evidence base**

The patterns of increased annual precipitation, and the size and frequency of heavy precipitation events in the Midwest, are shown in numerous studies and highlighted in Melillo et al. (2014)<sup>27</sup> and Easterling et al. (2017).<sup>193</sup> Increases in annual precipitation of 5% to 15% are reported across the Midwest region.<sup>193</sup> In addition, both the frequency and the intensity of heavy precipitation events in the Midwest have increased since 1901.<sup>193</sup>

For the early 21st century (2016–2045), both lower and higher scenarios (RCP4.5 and RCP8.5) indicate that average annual precipitation could increase by 1% to 5% across the Midwest, suggesting that the observed increases are likely to continue. By mid-century (2036–2065), both scenarios (RCP4.5 and RCP8.5) indicate precipitation increases of 1% to 5% in Missouri and Iowa and 5% to 10% increases in states to the north and east. By late century (2070–2089), precipitation is expected to increase by 5% to 15% over present day, with slightly larger increases in the higher scenario (RCP8.5). Model simulations suggest that most of these increases will occur in winter and spring

over the 21st century. Similar to annual precipitation, the amounts from the annual maximum one-day precipitation events (a measure of heavy precipitation events) are projected to increase over time in the Midwest. The size of the events could increase by 5% to 15% by late century. 193

Gray literature documents that heavy rains in the Midwest are overwhelming storm water management systems, leading to property damage. Kenward et al.  $(2016)^{256}$  provide examples of rain-related sewage overflows in the Midwest. These include an overflow of 681 million gallons during heavy rains in April 2015 in Milwaukee and an overflow of over 100 million gallons from December 26–28, 2015, in St. Louis. Winters et al.  $(2015)^{37}$  document that failure of storm water management systems in heavy rain leads to property damage, including basement backups.

The disruption of transportation networks by heavy precipitation in the Midwest has been documented by collecting contemporary news reports and by compiling state government reports. Posey (2016)<sup>338</sup> relates that four storms between April 2013 and April 2014 forced evacuations or damaged cars in St. Louis, Missouri. In the same period, there were 18 flood-related closures on Missouri roads, a figure that excludes closures on small local roads. Flooding in May 2017 led to the closure of more than 400 roads across Missouri, a figure that again excludes local roads. Closed roadways included multiple stretches of Interstate 44, as well as sections of I-55, affecting interstate traffic between St. Louis and Memphis.<sup>339</sup> News reports document that the same stretch of I-44 was shut down during the floods of December 2015–January 2016.<sup>340</sup>

Flood-related disruptions to Midwest barge and rail traffic in 2013 were documented by several articles in Journal of Commerce, a shipping trade magazine. WorkBoat, a trade journal of the inland shipping industry, documents that Mississippi River navigation has been halted by flooding in 2013, 2015, 2016, and 2017. It also documents low river conditions affecting navigation in 2012 and 2015. 267,268,269,270,341 Disruptions to rail service caused by the floods of 2017 were documented in news media accounts. 342 Changon (2009)343 documents that flooding in 2008 resulted in extensive damage to railroads in Illinois and adjacent states, with costs exceeding \$150 million due to direct damage and lost revenue.

Although there is ample documentation of transportation systems in the Midwest being disrupted by floods in recent years, there is a lack of long-term time series data on disruptions with which to determine whether these incidents are becoming more frequent. Development of long-term data on transportation disruptions in the Midwest is a research need. It is clear that flood frequency and severity on major rivers in the Midwest have increased in recent decades, although additional research is needed on the relative contributions of climate change and land-use change to increases in flood risk. 344,345,346

The EPA estimated economic costs related to infrastructure and transportation in the Midwest, including costs associated with bridge scour and pavement degradation.<sup>28</sup> The use of green infrastructure to reduce impacts associated with heavy precipitation is also documented in gray literature, including municipal planning documents. Using planted areas to absorb rainfall and reduce runoff has become a common approach to storm water management.<sup>223,275,276,347,348,349,350</sup> Dechannelization and restoration of streams as a technique for improving storm water management is described in Trice (2013)<sup>282</sup> and Milwaukee Metropolitan Sewer District (2017).<sup>281</sup> Preservation of open space is described in Ducks Unlimited (2017)<sup>279</sup> and the Ozaukee Washington

Land Trust (2016).<sup>280</sup> The use of urban forestry as an adaptation method is documented in the Minneapolis Marq2 Project (2017)<sup>277</sup> and the Cleveland Tree Plan (2015).<sup>278</sup> Projected costs to storm water systems are based on EPA projections.<sup>28</sup>

## **Major uncertainties**

Although there is *very high confidence* that flood risk is increasing in the Midwest, there remains uncertainty about the relative contributions of climate change and land-use change. There is, however, sufficient evidence that changing precipitation patterns are leading to changes in hydrology in the Midwest, 351,352,353,354,355 and that heavier precipitation patterns are consistent with projections from climate models, to justify a rating of *medium confidence* to the assertion that climate change is contributing to changes in flooding risk. There is *high confidence* that local governments and nongovernmental organizations are turning to green infrastructure solutions as a response to increased flooding risk. Additional research is needed to quantify the aggregate benefits of these approaches.

While it is clear that flood frequency and severity on major rivers in the Midwest have increased in recent decades, it must be emphasized that the change in precipitation levels is not the only factor contributing to the increase in flood risk. Land-use change, particularly the destruction of floodplains by levee systems, has also been documented as a key contributor to increasing flood risk in the Midwest. 344,345,346 On smaller streams, tile drainage systems have been shown to exacerbate flood risk. Determining the relative contribution of land-use change and climate change to increases in riverine flood risk is an important research need.

## Description of confidence and likelihood

There is *medium confidence* that climate change is contributing to increased flood risk in the Midwest; there is *medium confidence* that green infrastructure is reducing flood risk. There is much uncertainty associated with specific numerical projections. This leads to *medium confidence* that costs will exceed \$500 million. However, the EPA projections are sufficient to provide *high confidence* that increasing the capacity of existing storm water systems in order to maintain current levels of service would require significant expenditures on the part of urban sewer districts.

# Key Message 6

# **Community Vulnerability and Adaptation**

At-risk communities in the Midwest are becoming more vulnerable to climate change impacts such as flooding, drought, and increases in urban heat islands (as likely as not, high confidence). Tribal nations are especially vulnerable because of their reliance on threatened natural resources for their cultural, subsistence, and economic needs (likely, medium confidence). Integrating climate adaptation into planning processes offers an opportunity to better manage climate risks now (medium confidence). Developing knowledge for decision-making in cooperation with vulnerable communities and tribal nations will help to build adaptive capacity and increase resilience (high confidence).

#### **Description of evidence base**

Limited evidence in the scientific literature indicates that at-risk communities in the Midwest will be increasingly vulnerable to the impacts of climate change, including increased flooding resulting from increased variation in precipitation patterns and changing lake levels, <sup>285</sup> urban heat islands, <sup>287</sup> and an intensification of heat and drought (see also the impacts and associated references in the previous sections). <sup>286</sup>

Several recent survey reports<sup>28,283,284</sup> project negative climate impacts for tribal nations and Indigenous communities, especially as a result of an increased frequency of extreme precipitation events.<sup>283</sup> Tribal nations are especially vulnerable to climate impacts because of their reliance on natural resources,<sup>127</sup> the isolation of rural communities, and potential shifts of species out of sovereign land.<sup>309,310</sup> Climate change thus poses a threat to tribal culture, sovereignty, health, and way of life.<sup>39</sup>

Gray literature,<sup>293</sup> survey reports,<sup>32</sup> and scientific literature<sup>292</sup> point to a few initiatives to integrate adaptation into municipal planning processes and utilize participatory methodologies to evaluate and manage climate risk.

A growing body of research indicates that interaction between producers of climate information, intermediaries, and end users plays a critical role in increasing climate knowledge integration and use for adaptation in the Midwest.<sup>224,294,300,308</sup> Limited evidence links the implementation of adaptation actions identified as a result of these collaborations to reduced sensitivity.<sup>304,305,306</sup>

## **Major uncertainties**

Limited research specific to the Midwest region contributes to uncertainty around the specific vulnerabilities of at-risk communities, including urban and rural communities and tribal nations. Though climate change planning and action in both Midwest cities and rural areas are underway, documentation remains low, few examples exist in the public literature of the failure or success of efforts to mainstream climate action into municipal governance, and attempts to assess vulnerabilities, especially in poor urban communities, frequently encounter climate justice barriers. Likewise, the number, scope, and nature of tribal adaptation plans remain undocumented, as does the degree of implementation of these plans and the manner in which Traditional Ecological Knowledge is incorporated.

## Description of confidence and likelihood

There is *high* confidence that communities in the Midwest will as likely as not be increasingly vulnerable to climate change impacts such as flooding, urban heat islands, and drought. Similarly, there is *medium* confidence that tribal nations in the Midwest are likely to be especially vulnerable because of their reliance on threatened natural resources for their cultural, subsistence, and economic needs. Due to limited documentation in the literature, there is *medium* confidence that integrating adaptation into planning processes will offer an opportunity to manage climate risk better. Finally, there is *high* confidence that developing knowledge for decision-making in cooperation with vulnerable communities and tribal nations will help to decrease sensitivity and build adaptive capacity.

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