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Sent:	Thursday, September 5, 2019 3:18 PM
To:	Dimond, Thomas <Thomas.Dimond@icemiller.com>
Cc:	Charlie Gregory <CGregory@BrwnCald.com>
Subject:	[EXT] Privileged and Confidential-Attorney/Client Work Product
Attach:	LR070813Har.pdf

EXTERNAL EMAIL

Tom,

We promised to re-cost the top 5 most economical alternatives.

Based on report attached, the top 4 were:

a. Alkaline stripping of secondary clarifier effluent (SCE).
b. Breakpoint chlorination of SCE.
c. Ion Exchange of SCE.
d. Ozonation of SCE.
e. Land application will likely be in top 5 on 88 acres if we do not have to tile field.

We previously said that we would not consider nitrification of effluent due to precarious nature of this process. We may want to consider costing tertiary nitrification. It appears that we have learned that MBT stays with sludge in existing plant and does not show up in final effluent.

To re-cost these options, we need to have a design effluent wasteload.
Average: flow, NH3-N, TKN, BOD (lbs/day) and flow (MGD)
97th Percentile: flow, NH3-N, TKN, BOD (lbs/day) and flow (MGD)

We also need any final effluent analyses that site has on cations (Na, K, Fe, Mg, Ca, and Mn), alkalinity, hardness, and pH.

Regards,
Houston

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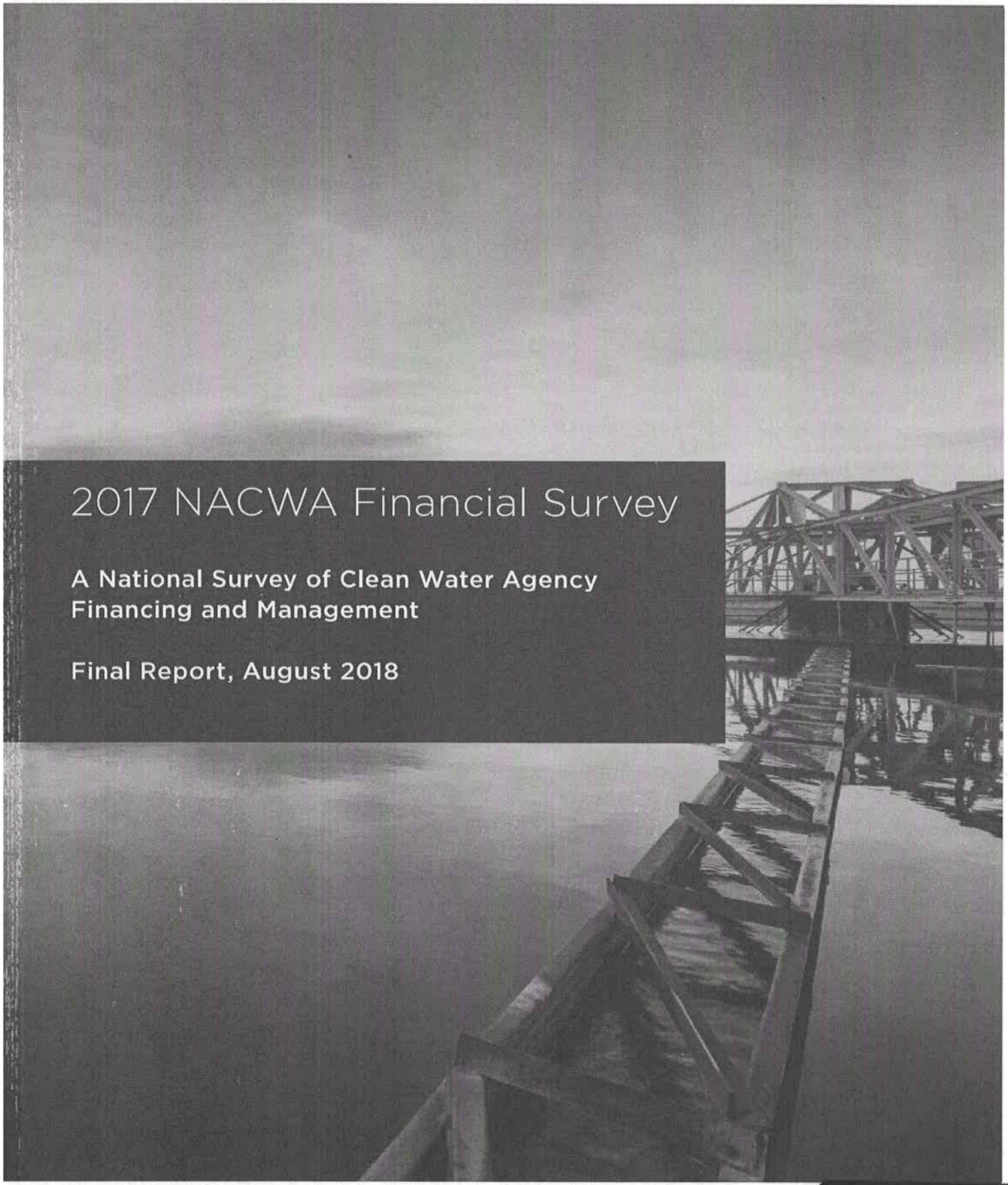
EXHIBIT
tabbies
14



2017 NACWA Financial Survey

A National Survey of Clean Water Agency Financing and Management

Final Report, August 2018

NACWA

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ACKNOWLEDGMENTS

The NACWA 2017 Financial Survey... A National Survey of Clean Water Agency Financing and Managments (Financial Survey) was produced and published by the National Association of Clean Water Agencies (NACWA) under the general direction of the NACWA Board of Directors.

The 2017 Financial Survey is the latest edition of NACWA's triennial Financial Survey. The 2017 Survey provides analysis of the most recent clean water financial data and updates and expands upon the content of past surveys, specifically the 2014 Financial Survey.

PREFACE

WHAT IS THE FINANCIAL SURVEY?

Since 1981, the National Association of Clean Water Agencies (NACWA) has performed a triennial financial survey of its membership to provide utilities, government officials, and the public, a comprehensive knowledge base on financing, rates, staffing and key utility management initiatives of U.S. clean water utilities. The 2017 NACWA Financial Survey is the twelfth triennial report to be published since the original development of the survey and covers data for 2016.

WHY IS IT IMPORTANT?

The NACWA Financial Survey is a unique source of information on clean water utilities, their financials, rates and billing, staffing, and energy use and cost. This information can be used by utilities and others to guide national, state and local policy development through comparative analysis and tracking of national trends.

HOW ARE SURVEY RESULTS PROVIDED?

NACWA publishes three different products summarizing the results of the Financial Survey. A published Executive Highlights document provides overarching summary information for utility Board members and other high ranking officials, and/or the public. An electronic version of the full report (see www.nacwa.org) provides more extensive analyses for each survey question and can be used as a reference tool by utility analysts and decision-makers. An electronic spreadsheet is also made available for those utilities and researchers that wish to perform their own custom analyses for internal performance tracking.

HOW IS THE SURVEY CONDUCTED?

The *Financial Survey* is designed as a voluntary survey of NACWA's membership. All NACWA members receive a copy of the five-part survey form and are invited to participate. The five parts to the 2017 NACWA *Financial Survey* include:

- Part A, the General Section of the survey, provides utility information on population served, size of service areas, length of pipe in ground, wholesale and retail customers, type and amount of treatment capacity, volume treated and characterization of its influent. This information provides profiles of the survey group;
- Part B, the Financial Section of the survey, looks at revenue, expenses and long-term debt as listed by all respondents. Capital improvement needs, programs, and revenues (including SRFs) are analyzed for 2017-2021. Post-employment benefits are reported and financial statement data is summarized;
- Part C, the Rate Section of the survey, compares the type and level of rates, rate structures and the frequency of billing for both residential and industrial customers across all agency respondents;
- Part D, the Staffing and Salary Section of the survey, contains information on staff size by function, and salary information for entry-level and senior positions for various occupations in the industry, and;
- Part E, the Energy Use/Costs and Materials Recovery Section of the survey, contains information on the energy use, costs, and production, as well as recent efforts to minimize energy use.

This report presents descriptive tabular summaries for numerous financing and management indicators. Data presented in the table summaries are, in a majority of cases, based on the prior year's operating results (i.e., data provided in the 2017 Survey is derived from 2016 or a respondent's most recently completed fiscal year).

These table summaries also report the number of responding agencies that responded to the particular question, which will not necessarily equal the total number of respondents to the survey since not every respondent answered every question.

There were 126 agencies representing over 81 million people served by centralized sewer service that responded to the 2017 Survey. A list of the 2017 respondents and accompanying data can be found in Appendices A through E.

TREATMENT OF CONVENTIONAL POLLUTANTS

The Survey has tracked trends in the treatment of conventional pollutants since 1987, requesting information on average influent and effluent conventional pollutant concentrations, and treatment plant flow rates. From these data, flow-weighted average influent and effluent loadings can be derived, and average removal efficiencies for treated flows calculated[4]. Table A.9 summarizes the average influent and effluent concentrations and corresponding average removal efficiencies for all 2017 Survey respondents.

During the period from 1995 to 2016, there has been a decreasing trend in average effluent concentrations for conventional pollutants. Notably, average BOD effluent concentrations for survey respondents decreased from 20 to 8 mg/l from 1995 to 2016, and average suspended solids concentrations decreased from 15 to 9 mg/l in the same time period (Figure A.21).

Improvements in operations and increasing advanced treatment and resulting higher removal efficiences have likely spurred this trend. From 1998 to 2016, average removal for BOD has risen from 89 to 97 percent, for suspended solids from 93 to 97 percent, and for phosphorus from 65 to 78 percent.

Table A.9 - Treatment removal efficiency, 2016 (all respondents)

POLLUTANT	NUMBER OF AGENCIES	FLOW-WEIGHTED AVERAGE INFLUENT CONCENTRATION (MG/L)	FLOW-WEIGHTED AVERAGE EFFLUENT CONCENTRATION (MG/L)	FLOW-WEIGHTED REMOVAL EFFICIENCY (%)
Ammonia Nitrogen	72	22.2	9.2	58.4
BOD	55	266.8	8.3	96.9
CBOD	47	166.5	7.7	95.4
Chlorine	60	NA	0.5	NA
Phosphorous	59	6.9	1.5	78.1
Suspended Solids	93	298.9	9.1	97.0
TKN	45	42.2	12.9	69.5

Nearly 97 percent of BOD and TSS loadings, and 80 percent of phosphorus loadings are removed by NACWA respondents

4. Influent concentrations, effluent concentrations, and removals were calculated only for those agencies providing influent, effluent, and flow data for a given pollutant. From these data, an average flow-weighted influent value and flow-weighted average effluent value was determined for each pollutant and used to calculate a flow-weighted removal efficiency.

TOTAL MAXIMUM DAILY LOADS

Total maximum daily loads (TMDLs) are mandated by Section 303(d) of the Clean Water Act and are developed by States to determine the maximum amount of a pollutant that a water body can receive and still meet water quality standards. The implications of TMDLs for clean water utilities include more stringent effluent requirements as a result of wasteload allocations, and the potential need for additional treatment infrastructure.

Twenty (16 percent of respondents) reported that their agency is operating under a Federal or state TMDL. Six agencies reported a total cost of compliance of $3.5 billion, with a majority devoted to meeting requiremens for nitrogen and phosphorus reduction. Other TMDLs impacting costs include bacteria and mercury. These six agencies represent three million people and the estimated compliance cost per capita is nearly $1,200.

WATERSHED AND OTHER PROGRAMS

Five mid-sized agencies (population 50,000 to 500,000) indicated that their agency is part of a regional or local watershed program, or have other regulatory requirements impacting their capital and/or annual O&M costs. These programs focus on BOD, ammonia-nitrogen, dissolved oxygen, chlorides, nutrients, selenium and sulfate. Four agencies reported a total cost of compliance of $285 million. These four agencies represent 0.33 million people and the estimated compliance cost per capita over $800. Regulatory impacts that were reported range from a start date in 2015 and an end date of 2026.

Table A.17- Regulatory cost drivers (all respondents)

REGULATORY COST DRIVER	# OF AGENCIES	TOTAL COST OF COMPLIANCE (US$ BILLION)	NUMBER OF YEARS (MEDIAN)	ANNUALIZED COST (US$ BILLION)	COMPLIANCE COST PER CAPITA
- Consent Decrees	22	29.9	21	0.7	$1,895
- Administrative Orders	14	6.6	4	0.5	$1,050
- TMDLs	20	3.5	15	1.0	$1,175
- Watershed and Other	5	0.3	4	0.7	$802
- Total	48[8]	39.2	15	2.8	$1,587

Regulatory cost drivers amount to $39 billion in capital costs from 48 agencies with a cost per capita of $1,587.

8. Several agencies reported multiple regulatory cost drivers, thus the sum of individual cost drivers is higher than the total.

EXTRA STRENGTH CHARGES

In order to recover the costs of treatment beyond that needed for domestic strength sewage, it is common for utilities to charge an additional high strength surcharge to commercial or industrial facilities that exceed a certain threshold concentration of a given parameter. These charges are generally expressed as a cost per quantity discharged ($ per pound). Reported 2016 industrial rates for conventional parameters are shown in Table C.19 and distributions of these charges are shown in Figures C.19 to C.26. Threshold or "surcharge" levels above which these charges are assessed are discussed in the following Section.

Table C.19 - Industrial extra strength charges, 2016

PARAMETER	NUMBER OF AGENCIES	MAXIMUM RATE ($/LB)	AVERAGE RATE ($/LB)	MEDIAN RATE ($/LB)	MINIMUM RATE ($/LB)
- Biochemical Oxygen Demand (BOD)	72	2.3352	0.3797	0.2950	0.0700
- Chemical Oxygen Demand (COD)	21	0.4940	0.1951	0.1600	0.0310
- Carbonaceous BOD	5	1.0600	0.4485	0.4300	0.1566
- Suspended Solids	88	1.6800	0.3457	0.2620	0.0358
- Ammonia Nitrogen	17	5.0300	1.6014	1.5000	0.2280
- Total Kjeldahl Nitrogen	14	1.6400	0.6901	0.5979	0.1470
- Total Phosphorus	17	36.6200	6.0295	2.8700	0.0250
- Fats, Oils, & Greases	14	3.3400	0.6764	0.2695	0.0700

AMMONIA NITROGEN

Figure C.23 illustrates the distribution of industrial ammonia-nitrogen rates (above surcharge levels) for 2016, 2013, and 2010. These distributions represent 17, 15, and 15 responding agencies, respectively. The median ammonia-nitrogen rate for common respondents decreased 7.3 percent from 2013 to 2016 (Table C.23). For comparison, the inflation rate as measured by the Consumer Price Index (CPI) was 3.0 percent for the same 3-year period.

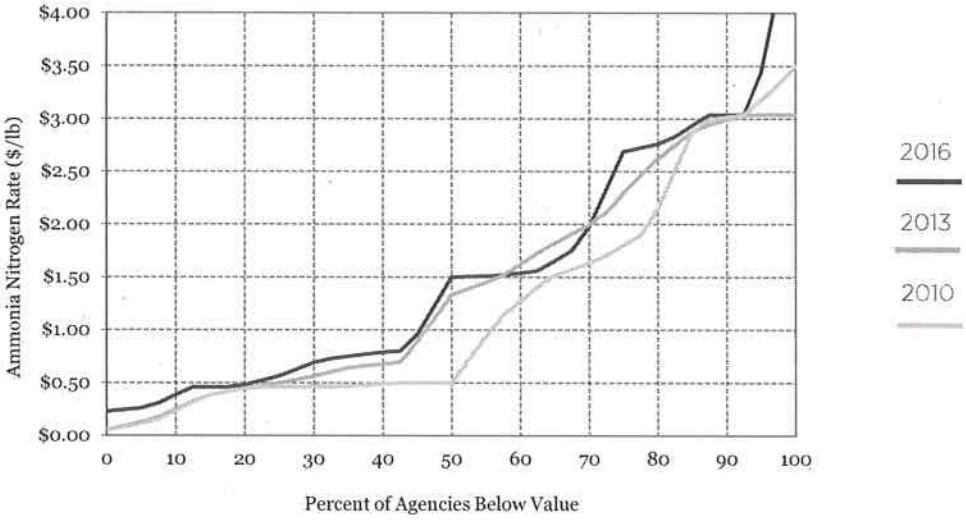


Figure C.23 - Distribution of industrial ammonia-nitrogen rates in $ per pound, 2010-2016
Note: Maximum value of $5.03 for 2016 is not shown on the chart

Table C.23 - Ammonia-nitrogen rate trends, 2004-2016

AMMONIA-NITROGEN RATE	2004 - 2007	2007-2010	2010-2013	2013-2016
- Common Agencies Responding	11	10	12	12
- 3-Year Percentage (%) Change in Median	0.0%	+1.0%	+74.7%	-7.3%
- Change in Consumer Price Index (%)	+9.7%	+5.2%	+6.8%	+3.0%

TOTAL KJELDAHL NITROGEN

Figure C.24 illustrates the distribution of industrial total Kjeldahl nitrogen (TKN) rates (above surcharge levels) for 2016, 2013, and 2010. These distributions represent 14, 12, and 15 responding agencies, respectively. The median TKN rate for common respondents decreased 6.4 percent from 2013 to 2016 (Table C.24). For comparison, the inflation rate as measured by the Consumer Price Index (CPI) was 3.0 percent for the same 3-year period.

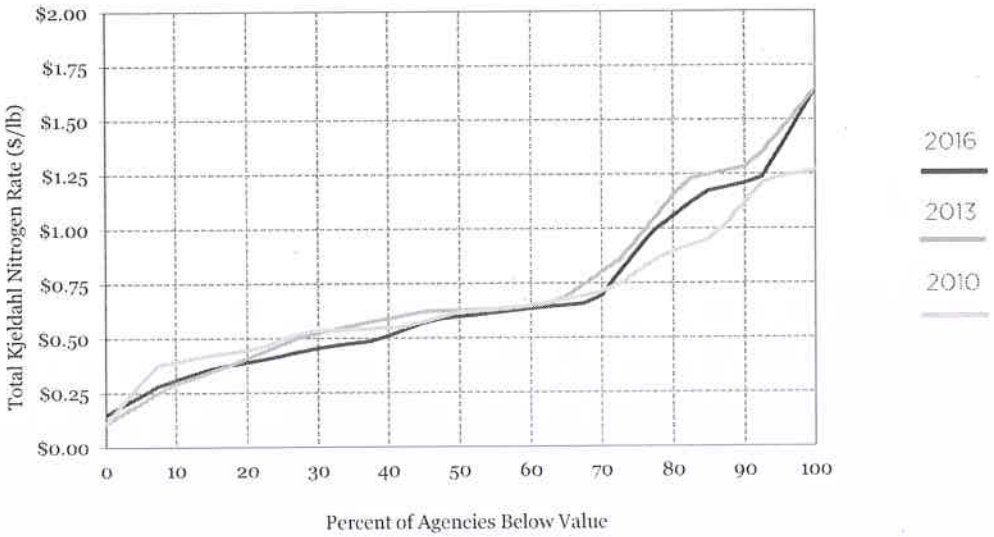


Figure C.24 - Industrial total Kjeldahl nitrogen rates in $ per pound, 2010-2016

Table C.24 - Total Kjeldahl nitrogen rate trends, 2004-2016

TKN RATE	2004 - 2007	2007-2010	2010-2013	2013-2016
- Common Agencies Responding	6	9	11	11
- 3-Year Percentage (%) Change in Median	+4.2%	+33.7%	-1.6%	-6.4%
- Change in Consumer Price Index (%)	+9.7%	+5.2%	+6.8%	+3.0%

TOTAL PHOSPHORUS

Figure C.25 illustrates the distribution of industrial phosphorus rates (above surcharge levels) for 2016, 2013, and 2010. These distributions represent 17, 13, and 17 responding agencies, respectively. The median phosphorus rate for common respondents has increased 3.0 percent from 2013 to 2016 (Table C.25). For comparison, the inflation rate as measured by the Consumer Price Index (CPI) was 3.0 percent for the same 3-year period.

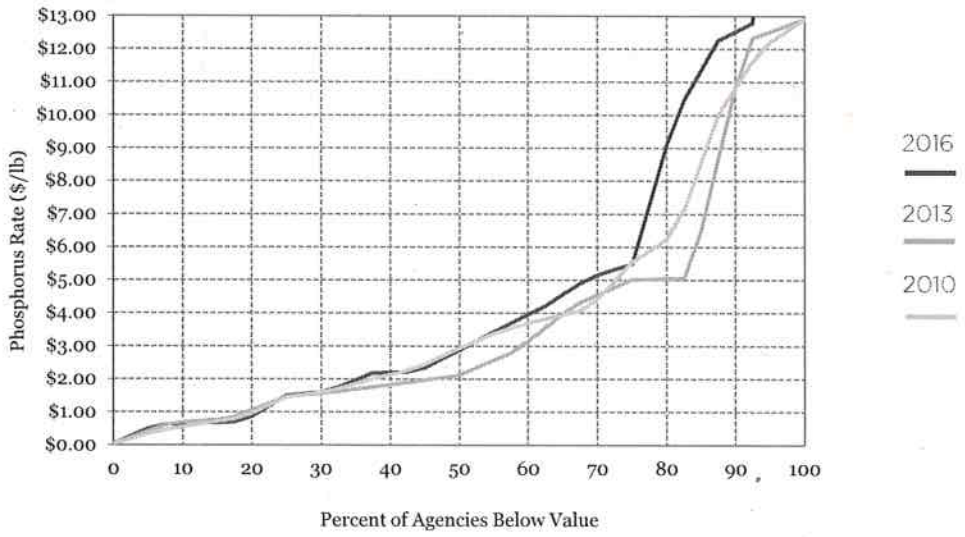


Figure C.25 - Industrial phosphorus rates in $ per pound, 2010-2016

Table C.25 - Phosphorus rate trends, 2004-2016

PHOSPHORUS RATE	2004 - 2007	2007-2010	2010-2013	2013-2016
- Common Agencies Responding	9	10	12	13
- 3-Year Percentage (%) Change in Median	+5.9%	+21.4%	-7.6%	+3.0%
- Change in Consumer Price Index (%)	+9.7%	+5.2%	+6.8%	+3.0%

The median phosphorus rate increased at the same rate as inflation from 2013 to 2016.

FATS, OILS, AND GREASES (FOGS)

Figure C.26 illustrates the distribution of industrial fats, oils, and grease (FOG) rates (above surcharge levels) for 2016, 2013, and 2010. These distributions represent 14, 10, and 14, responding agencies, respectively. The median FOG rate for common respondents has increased 40% from 2013 to 2016 (Table C.26). For comparison, the inflation rate as measured by the Consumer Price Index (CPI) was 3.0 percent for the same 3-year period.

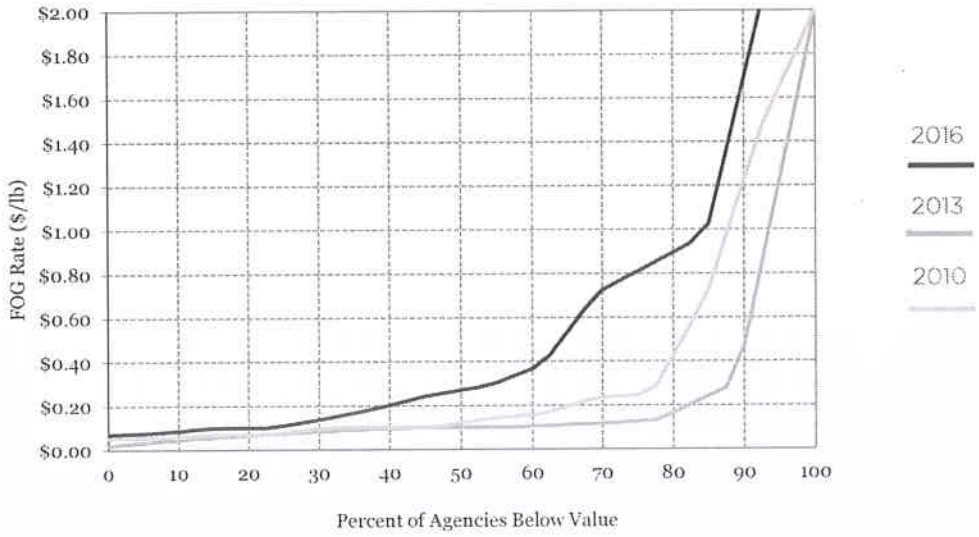


Figure C.26 - Fats, oils and grease rates in $ per pound, 2010-2016

Note: Maximum value of $3.34 for 2016 is not shown on the chart

Table C.26 - Fats, oils and grease rate trends, 2004-2016

FATS, OILS AND GREASE RATE	2004 - 2007	2007-2010	2010-2013	2013-2016
- Common Agencies Responding	10	7	7	7
- 3-Year Percentage (%) Change in Median	+21.7%	+16.7%	-12.0%	+40.0%
- Change in Consumer Price Index (%)	+9.7%	+5.2%	-6.8%	+3.0%

The median FOG rate increased 40% from 2013 to 2016.

INDUSTRIAL SURCHARGE LEVELS

A common approach towards setting high strength surcharges is to identify a "floor" or "threshold" concentration (referred to in the Survey as a "surcharge concentration") above which high strength surcharges are applied. These surcharge levels can vary for different parameters and in some cases can equal zero (i.e., charges apply to any discharge of the given parameter). Rates are usually expressed in dollars per pound ($/lb). As an example:

> Industry X is discharging 100,000 gallons of wastewater a day to the hypothetical Cleanstream Utility. The Biochemical Oxygen Demand (BOD) concentration in the industry's discharge is 750 milligrams per liter (mg/l). The Cleanstream Utility charges $0.25 per pound of BOD discharged in excess of 300 mg/l. To calculate Industry X's BOD surcharges, first determine the pounds discharged in excess of the surcharge level. Second, multiply the pounds in excess of the surcharge level by the BOD rate of $0.25 per pound.
>
> - Step 1. (100,000 gal. * (750-300) mg/l) * (8.34 * 10^{-6} conversion constant) = 375.3 pounds/day
> - Step 2. (375.3 pounds/day * $0.25 per pound) = $93.80 per day
> - Step 3. ($93.80 per day * 365 days/year) = $34,237 per year in BOD surcharges

The Survey requested information on surcharge levels for Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Carbonaceous Biochemical Oxygen Demand (CBOD), Suspended Solids (SS), Ammonia Nitrogen (NH3), Total Kjeldahl Nitrogen (TKN), Total Phosphorus (TP), and Fats, Oils, and Greases (FOG). Table C.27 presents a summary of surcharge levels for these parameters. Figure C.27 shows the distribution of surcharge levels for the four most common parameters (BOD, Suspended Solids, Phosphorus and Fats, Oils, and Greases).

Table C.27 - Surcharge levels, 2016

SURCHARGE LIMITS	BOD	COD	CBOD	SS	NH3-N	TKN	TP	FOG
- Agencies Responding	57	16	3	65	12	10	12	14
- Maximum	1,800.0	1,800.0	250.0	1,800.0	30.0	47.0	20.0	300.0
- Average	282.5	603.5	235.0	305.9	24.3	37.2	10.8	93.6
- Median	250.0	516.0	250.0	260.0	25.0	40.0	10.0	100.0
- Minimum	0.0	0.0	205.0	0.0	19.0	20.0	5.5	0.0

In comparing surcharge levels with previous Surveys, there appears to be no significant changes to the average or median surcharge levels, or to the prevalence of one or more surcharge parameters.

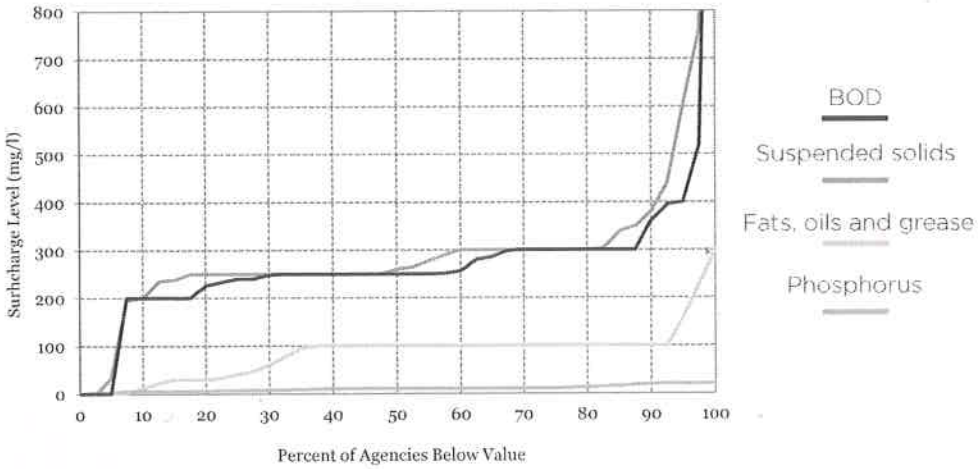
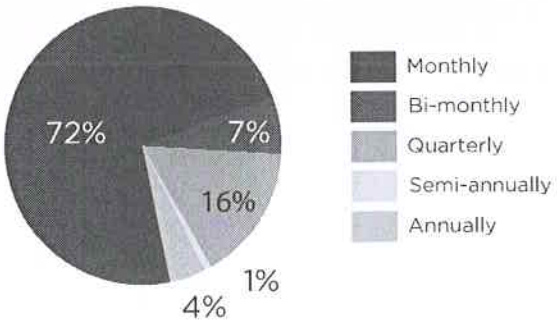


Figure C.27 - Surcharge levels, 2016
Note: Maximum value of 1,800 mg/l for BOD and suspended solids is not shown on the chart

INDUSTRIAL BILLING FREQUENCY

Figure C.28 shows the distribution of various billing frequencies for commercial and industrial users. Monthly billing continues to be the most common billing time period for commercial and industrial users. The percentage of respondents indicating the use of monthly industrial billing has ranged from 59 to 75 percent during the 1990-2017 Surveys.



Nearly 75% of commercial and industrial users are billed monthly.

Figure C.28 - Industrial billing frequency, 2016 (102 agencies)

aace International

AACE International Recommended Practice No. 18R-97

COST ESTIMATE CLASSIFICATION SYSTEM – AS APPLIED IN ENGINEERING, PROCUREMENT, AND CONSTRUCTION FOR THE PROCESS INDUSTRIES

TCM Framework: 7.3 – Cost Estimating and Budgeting

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COST ESTIMATE CLASSIFICATION SYSTEM – AS APPLIED IN ENGINEERING, PROCUREMENT, AND CONSTRUCTION FOR THE PROCESS INDUSTRIES

TCM Framework: 7.3 – Cost Estimating and Budgeting

February 2, 2005

PURPOSE

As a recommended practice of AACE International, the Cost Estimate Classification System provides guidelines for applying the general principles of estimate classification to project cost estimates (i.e., cost estimates that are used to evaluate, approve, and/or fund projects). The Cost Estimate Classification System maps the phases and stages of project cost estimating together with a generic maturity and quality matrix, which can be applied across a wide variety of industries.

This addendum to the generic recommended practice provides guidelines for applying the principles of estimate classification specifically to project estimates for engineering, procurement, and construction (EPC) work for the process industries. This addendum supplements the generic recommended practice (17R-97) by providing:

- a section that further defines classification concepts as they apply to the process industries;
- charts that compare existing estimate classification practices in the process industry; and
- a chart that maps the extent and maturity of estimate input information (project definition deliverables) against the class of estimate.

As with the generic standard, an intent of this addendum is to improve communications among all of the stakeholders involved with preparing, evaluating, and using project cost estimates specifically for the process industries.

It is understood that each enterprise may have its own project and estimating processes and terminology, and may classify estimates in particular ways. This guideline provides a generic and generally acceptable classification system for process industries that can be used as a basis to compare against. It is hoped that this addendum will allow each user to better assess, define, and communicate their own processes and standards in the light of generally-accepted cost engineering practice.

INTRODUCTION

For the purposes of this addendum, the term process industries is assumed to include firms involved with the manufacturing and production of chemicals, petrochemicals, and hydrocarbon processing. The common thread among these industries (for the purpose of estimate classification) is their reliance on process flow diagrams (PFDs) and piping and instrument diagrams (P&IDs) as primary scope defining documents. These documents are key deliverables in determining the level of project definition, and thus the extent and maturity of estimate input information.

Estimates for process facilities center on mechanical and chemical process equipment, and they have significant amounts of piping, instrumentation, and process controls involved. As such, this addendum may apply to portions of other industries, such as pharmaceutical, utility, metallurgical, converting, and similar industries. Specific addendums addressing these industries may be developed over time.

This addendum specifically does not address cost estimate classification in nonprocess industries such as commercial building construction, environmental remediation, transportation infrastructure, "dry" processes such as assembly and manufacturing, "soft asset" production such as software development, and similar industries. It also does not specifically address estimates for the exploration, production, or transportation of mining or hydrocarbon materials, although it may apply to some of the intermediate processing steps in these systems.

The cost estimates covered by this addendum are for engineering, procurement, and construction (EPC) work only. It does not cover estimates for the products manufactured by the process facilities, or for research and development work in support of the process industries. This guideline does not cover the

significant building construction that may be a part of process plants. Building construction will be covered in a separate addendum.

This guideline reflects generally-accepted cost engineering practices. This addendum was based upon the practices of a wide range of companies in the process industries from around the world, as well as published references and standards. Company and public standards were solicited and reviewed by the AACE International Cost Estimating Committee. The practices were found to have significant commonalities that are conveyed in this addendum.

COST ESTIMATE CLASSIFICATION MATRIX FOR THE PROCESS INDUSTRIES

The five estimate classes are presented in figure 1 in relationship to the identified characteristics. Only the level of project definition determines the estimate class. The other four characteristics are secondary characteristics that are generally correlated with the level of project definition, as discussed in the generic standard. The characteristics are typical for the process industries but may vary from application to application.

This matrix and guideline provide an estimate classification system that is specific to the process industries. Refer to the generic standard for a general matrix that is non-industry specific, or to other addendums for guidelines that will provide more detailed information for application in other specific industries. These will typically provide additional information, such as input deliverable checklists to allow meaningful categorization in those particular industries.

	Primary Characteristic	***Secondary Characteristic***			
ESTIMATE CLASS	**LEVEL OF PROJECT DEFINITION** Expressed as % of complete definition	**END USAGE** Typical purpose of estimate	**METHODOLOGY** Typical estimating method	**EXPECTED ACCURACY RANGE** Typical variation in low and high ranges [a]	**PREPARATION EFFORT** Typical degree of effort relative to least cost index of 1 [b]
Class 5	0% to 2%	Concept Screening	Capacity Factored, Parametric Models, Judgment, or Analogy	L: -20% to -50% H: +30% to +100%	1
Class 4	1% to 15%	Study or Feasibility	Equipment Factored or Parametric Models	L: -15% to -30% H: +20% to +50%	2 to 4
Class 3	10% to 40%	Budget, Authorization, or Control	Semi-Detailed Unit Costs with Assembly Level Line Items	L: -10% to -20% H: +10% to +30%	3 to 10
Class 2	30% to 70%	Control or Bid/ Tender	Detailed Unit Cost with Forced Detailed Take-Off	L: -5% to -15% H: +5% to +20%	4 to 20
Class 1	50% to 100%	Check Estimate or Bid/Tender	Detailed Unit Cost with Detailed Take-Off	L: -3% to -10% H: +3% to +15%	5 to 100

Notes: [a] The state of process technology and availability of applicable reference cost data affect the range markedly. The +/- value represents typical percentage variation of actual costs from the cost estimate after application of contingency (typically at a 50% level of confidence) for given scope.

[b] If the range index value of "1" represents 0.005% of project costs, then an index value of 100 represents 0.5%. Estimate preparation effort is highly dependent upon the size of the project and the quality of estimating data and tools.

Figure 1. – Cost Estimate Classification Matrix for Process Industries

CHARACTERISTICS OF THE ESTIMATE CLASSES

The following charts (figures 2a through 2e) provide detailed descriptions of the five estimate classifications as applied in the process industries. They are presented in the order of least-defined estimates to the most-defined estimates. These descriptions include brief discussions of each of the estimate characteristics that define an estimate class.

For each chart, the following information is provided:

- **Description:** a short description of the class of estimate, including a brief listing of the expected estimate inputs based on the level of project definition.
- **Level of Project Definition Required:** expressed as a percent of full definition. For the process industries, this correlates with the percent of engineering and design complete.
- **End Usage:** a short discussion of the possible end usage of this class of estimate.
- **Estimating Methods Used:** a listing of the possible estimating methods that may be employed to develop an estimate of this class.
- **Expected Accuracy Range:** typical variation in low and high ranges after the application of contingency (determined at a 50% level of confidence). Typically, this results in a 90% confidence that the actual cost will fall within the bounds of the low and high ranges.
- **Effort to Prepare:** this section provides a typical level of effort (in hours) to produce a complete estimate for a US$20,000,000 plant. Estimate preparation effort is highly dependent on project size, project complexity, estimator skills and knowledge, and on the availability of appropriate estimating cost data and tools.
- **ANSI Standard Reference (1989) Name:** this is a reference to the equivalent estimate class in the existing ANSI standards.
- **Alternate Estimate Names, Terms, Expressions, Synonyms:** this section provides other commonly used names that an estimate of this class might be known by. These alternate names are not endorsed by this Recommended Practice. The user is cautioned that an alternative name may not always be correlated with the class of estimate as identified in the chart.

CLASS 5 ESTIMATE	
Description: Class 5 estimates are generally prepared based on very limited information, and subsequently have wide accuracy ranges. As such, some companies and organizations have elected to determine that due to the inherent inaccuracies, such estimates cannot be classified in a conventional and systemic manner. Class 5 estimates, due to the requirements of end use, may be prepared within a very limited amount of time and with little effort expended—sometimes requiring less than an hour to prepare. Often, little more than proposed plant type, location, and capacity are known at the time of estimate preparation. **Level of Project Definition Required:** 0% to 2% of full project definition. **End Usage:** Class 5 estimates are prepared for any number of strategic business planning purposes, such as but not limited to market studies, assessment of initial viability, evaluation of alternate schemes, project screening, project location studies, evaluation of resource needs and budgeting, long-range capital planning, etc.	**Estimating Methods Used:** Class 5 estimates virtually always use stochastic estimating methods such as cost/capacity curves and factors, scale of operations factors, Lang factors, Hand factors, Chilton factors, Peters-Timmerhaus factors, Guthrie factors, and other parametric and modeling techniques. **Expected Accuracy Range:** Typical accuracy ranges for Class 5 estimates are - 20% to -50% on the low side, and +30% to +100% on the high side, depending on the technological complexity of the project, appropriate reference information, and the inclusion of an appropriate contingency determination. Ranges could exceed those shown in unusual circumstances. **Effort to Prepare (for US$20MM project):** As little as 1 hour or less to perhaps more than 200 hours, depending on the project and the estimating methodology used. **ANSI Standard Reference Z94.2-1989 Name:** Order of magnitude estimate (typically -30% to +50%). **Alternate Estimate Names, Terms, Expressions, Synonyms:** Ratio, ballpark, blue sky, seat-of-pants, ROM, idea study, prospect estimate, concession license estimate, guesstimate, rule-of-thumb.

Figure 2a. – Class 5 Estimate

CLASS 4 ESTIMATE	
Description: Class 4 estimates are generally prepared based on limited information and subsequently have fairly wide accuracy ranges. They are typically used for project screening, determination of feasibility, concept evaluation, and preliminary budget approval. Typically, engineering is from 1% to 15% complete, and would comprise at a minimum the following: plant capacity, block schematics, indicated layout, process flow diagrams (PFDs) for main process systems, and preliminary engineered process and utility equipment lists. **Level of Project Definition Required:** 1% to 15% of full project definition. **End Usage:** Class 4 estimates are prepared for a number of purposes, such as but not limited to, detailed strategic planning, business development, project screening at more developed stages, alternative scheme analysis, confirmation of economic and/or technical feasibility, and preliminary budget approval or approval to proceed to next stage.	**Estimating Methods Used:** Class 4 estimates virtually always use stochastic estimating methods such as equipment factors, Lang factors, Hand factors, Chilton factors, Peters-Timmerhaus factors, Guthrie factors, the Miller method, gross unit costs/ratios, and other parametric and modeling techniques. **Expected Accuracy Range:** Typical accuracy ranges for Class 4 estimates are -15% to -30% on the low side, and +20% to +50% on the high side, depending on the technological complexity of the project, appropriate reference information, and the inclusion of an appropriate contingency determination. Ranges could exceed those shown in unusual circumstances. **Effort to Prepare (for US$20MM project):** Typically, as little as 20 hours or less to perhaps more than 300 hours, depending on the project and the estimating methodology used. **ANSI Standard Reference Z94.2-1989 Name:** Budget estimate (typically -15% to + 30%). **Alternate Estimate Names, Terms, Expressions, Synonyms:** Screening, top-down, feasibility, authorization, factored, pre-design, pre-study.

Figure 2b. – Class 4 Estimate

CLASS 3 ESTIMATE	
Description: Class 3 estimates are generally prepared to form the basis for budget authorization, appropriation, and/or funding. As such, they typically form the initial control estimate against which all actual costs and resources will be monitored. Typically, engineering is from 10% to 40% complete, and would comprise at a minimum the following: process flow diagrams, utility flow diagrams, preliminary piping and instrument diagrams, plot plan, developed layout drawings, and essentially complete engineered process and utility equipment lists. **Level of Project Definition Required:** 10% to 40% of full project definition. **End Usage:** Class 3 estimates are typically prepared to support full project funding requests, and become the first of the project phase "control estimates" against which all actual costs and resources will be monitored for variations to the budget. They are used as the project budget until replaced by more detailed estimates. In many owner organizations, a Class 3 estimate may be the last estimate required and could well form the only basis for cost/schedule control.	**Estimating Methods Used:** Class 3 estimates usually involve more deterministic estimating methods than stochastic methods. They usually involve a high degree of unit cost line items, although these may be at an assembly level of detail rather than individual components. Factoring and other stochastic methods may be used to estimate less-significant areas of the project. **Expected Accuracy Range:** Typical accuracy ranges for Class 3 estimates are -10% to -20% on the low side, and +10% to +30% on the high side, depending on the technological complexity of the project, appropriate reference information, and the inclusion of an appropriate contingency determination. Ranges could exceed those shown in unusual circumstances. **Effort to Prepare (for US$20MM project):** Typically, as little as 150 hours or less to perhaps more than 1,500 hours, depending on the project and the estimating methodology used. **ANSI Standard Reference Z94.2-1989 Name:** Budget estimate (typically -15% to + 30%). **Alternate Estimate Names, Terms, Expressions, Synonyms:** Budget, scope, sanction, semi-detailed, authorization, preliminary control, concept study, development, basic engineering phase estimate, target estimate.

Figure 2c. – Class 3 Estimate

CLASS 2 ESTIMATE	
Description: Class 2 estimates are generally prepared to form a detailed control baseline against which all project work is monitored in terms of cost and progress control. For contractors, this class of estimate is often used as the "bid" estimate to establish contract value. Typically, engineering is from 30% to 70% complete, and would comprise at a minimum the following: process flow diagrams, utility flow diagrams, piping and instrument diagrams, heat and material balances, final plot plan, final layout drawings, complete engineered process and utility equipment lists, single line diagrams for electrical, electrical equipment and motor schedules, vendor quotations, detailed project execution plans, resourcing and work force plans, etc. **Level of Project Definition Required:** 30% to 70% of full project definition. **End Usage:** Class 2 estimates are typically prepared as the detailed control baseline against which all actual costs and resources will now be monitored for variations to the budget, and form a part of the change/variation control program.	**Estimating Methods Used:** Class 2 estimates always involve a high degree of deterministic estimating methods. Class 2 estimates are prepared in great detail, and often involve tens of thousands of unit cost line items. For those areas of the project still undefined, an assumed level of detail takeoff (forced detail) may be developed to use as line items in the estimate instead of relying on factoring methods. **Expected Accuracy Range:** Typical accuracy ranges for Class 2 estimates are -5% to -15% on the low side, and +5% to +20% on the high side, depending on the technological complexity of the project, appropriate reference information, and the inclusion of an appropriate contingency determination. Ranges could exceed those shown in unusual circumstances. **Effort to Prepare (for US$20MM project):** Typically, as little as 300 hours or less to perhaps more than 3,000 hours, depending on the project and the estimating methodology used. Bid estimates typically require more effort than estimates used for funding or control purposes. **ANSI Standard Reference Z94.2-1989 Name:** Definitive estimate (typically -5% to + 15%). **Alternate Estimate Names, Terms, Expressions, Synonyms:** Detailed control, forced detail, execution phase, master control, engineering, bid, tender, change order estimate.

Figure 2d. – Class 2 Estimate

CLASS 1 ESTIMATE	
Description: Class 1 estimates are generally prepared for discrete parts or sections of the total project rather than generating this level of detail for the entire project. The parts of the project estimated at this level of detail will typically be used by subcontractors for bids, or by owners for check estimates. The updated estimate is often referred to as the current control estimate and becomes the new baseline for cost/schedule control of the project. Class 1 estimates may be prepared for parts of the project to comprise a fair price estimate or bid check estimate to compare against a contractor's bid estimate, or to evaluate/dispute claims. Typically, engineering is from 50% to 100% complete, and would comprise virtually all engineering and design documentation of the project, and complete project execution and commissioning plans. **Level of Project Definition Required:** 50% to 100% of full project definition. **End Usage:** Class 1 estimates are typically prepared to form a current control estimate to be used as the final control baseline against which all actual costs and resources will now be monitored for variations to the budget, and form a part of the change/variation control program. They may be used to evaluate bid checking, to support vendor/contractor negotiations, or for claim evaluations and dispute resolution.	**Estimating Methods Used:** Class 1 estimates involve the highest degree of deterministic estimating methods, and require a great amount of effort. Class 1 estimates are prepared in great detail, and thus are usually performed on only the most important or critical areas of the project. All items in the estimate are usually unit cost line items based on actual design quantities. **Expected Accuracy Range:** Typical accuracy ranges for Class 1 estimates are -3% to -10% on the low side, and +3% to +15% on the high side, depending on the technological complexity of the project, appropriate reference information, and the inclusion of an appropriate contingency determination. Ranges could exceed those shown in unusual circumstances. **Effort to Prepare (for US$20MM project):** Class 1 estimates require the most effort to create, and as such are generally developed for only selected areas of the project, or for bidding purposes. A complete Class 1 estimate may involve as little as 600 hours or less, to perhaps more than 6,000 hours, depending on the project and the estimating methodology used. Bid estimates typically require more effort than estimates used for funding or control purposes. **ANSI Standard Reference Z94.2 Name:** Definitive estimate (typically -5% to + 15%). **Alternate Estimate Names, Terms, Expressions, Synonyms:** Full detail, release, fall-out, tender, firm price, bottoms-up, final, detailed control, forced detail, execution phase, master control, fair price, definitive, change order estimate.

Figure 2e. – Class 1 Estimate

COMPARISON OF CLASSIFICATION PRACTICES

Figures 3a through 3c provide a comparison of the estimate classification practices of various firms, organizations, and published sources against one another and against the guideline classifications. These tables permits users to benchmark their own classification practices.

INCREASING PROJECT DEFINITION

AACE Classification Standard	ANSI Standard Z94.0	AACE Pre-1972	Association of Cost Engineers (UK) ACostE	Norwegian Project Management Association (NFP)	American Society of Professional Estimators (ASPE)
Class 5	Order of Magnitude Estimate -30/+50	Order of Magnitude Estimate	Order of Magnitude Estimate Class IV -30/+30	Concession Estimate	Level 1
				Exploration Estimate	
				Feasibility Estimate	
Class 4	Budget Estimate -15/+30	Study Estimate	Study Estimate Class III -20/+20	Authorization Estimate	Level 2
Class 3		Preliminary Estimate	Budget Estimate Class II -10/+10	Master Control Estimate	Level 3
Class 2	Definitive Estimate -5/+15	Definitive Estimate	Definitive Estimate Class I -5/+5	Current Control Estimate	Level 4
Class 1		Detailed Estimate			Level 5
					Level 6

Figure 3a. – Comparison of Classification Practices

AACE Classification Standard	Major Consumer Products Company (Confidential)	Major Oil Company (Confidential)	Major Oil Company (Confidential)	Major Oil Company (Confidential)
Class 5	Class S Strategic Estimate	Class V Order of Magnitude Estimate	Class A Prospect Estimate	Class V
			Class B Evaluation Estimate	
Class 4	Class 1 Conceptual Estimate	Class IV Screening Estimate	Class C Feasibility Estimate	Class IV
			Class D Development Estimate	
Class 3	Class 2 Semi-Detailed Estimate	Class III Primary Control Estimate		Class III
			Class E Preliminary Estimate	
Class 2	Class 3 Detailed Estimate	Class II Master Control Estimate	Class F Master Control Estimate	Class II
Class 1		Class I Current Control Estimate	Current Control Estimate	Class I

INCREASING PROJECT DEFINITION

Figure 3b. – Comparison of Classification Practices

AACE Classification Standard	J.R. Heizelman, 1988 AACE Transactions [1]	K.T. Yeo, The Cost Engineer, 1989 [2]	Stevens & Davis, 1988 AACE Transactions [3]	P. Behrenbruck, Journal of Petroleum Technology, 1993 [4]
Class 5	Class V	Class V Order of Magnitude	Class III*	Order of Magnitude
Class 4	Class IV	Class IV Factor Estimate	Class II	Study Estimate
Class 3	Class III	Class III Office Estimate		Budget Estimate
Class 2	Class II	Class II Definitive Estimate		
Class 1	Class I	Class I Final Estimate	Class I	Control Estimate

INCREASING PROJECT DEFINITION

[1] John R. Heizelman, ARCO Oil & Gas Co., 1988 AACE Transactions, Paper V3.7
[2] K.T. Yeo, The Cost Engineer, Vol. 27, No. 6, 1989
[3] Stevens & Davis, BP International Ltd., 1988 AACE Transactions, Paper B4.1 (* Class III is inferred)
[4] Peter Behrenbruck, BHP Petroleum Pty., Ltd., article in Petroleum Technology, August 1993

Figure 3c. – Comparison of Classification Practices

ESTIMATE INPUT CHECKLIST AND MATURITY MATRIX

Figure 4 maps the extent and maturity of estimate input information (deliverables) against the five estimate classification levels. This is a checklist of basic deliverables found in common practice in the process industries. The maturity level is an approximation of the degree of completion of the deliverable. The degree of completion is indicated by the following letters.

- None (blank): development of the deliverable has not begun.
- Started (S): work on the deliverable has begun. Development is typically limited to sketches, rough outlines, or similar levels of early completion.
- Preliminary (P): work on the deliverable is advanced. Interim, cross-functional reviews have usually been conducted. Development may be near completion except for final reviews and approvals.
- Complete (C): the deliverable has been reviewed and approved as appropriate.

	ESTIMATE CLASSIFICATION				
General Project Data:	**CLASS 5**	**CLASS 4**	**CLASS 3**	**CLASS 2**	**CLASS 1**
Project Scope Description	General	Preliminary	Defined	Defined	Defined
Plant Production/Facility Capacity	Assumed	Preliminary	Defined	Defined	Defined
Plant Location	General	Approximate	Specific	Specific	Specific
Soils & Hydrology	None	Preliminary	Defined	Defined	Defined
Integrated Project Plan	None	Preliminary	Defined	Defined	Defined
Project Master Schedule	None	Preliminary	Defined	Defined	Defined
Escalation Strategy	None	Preliminary	Defined	Defined	Defined
Work Breakdown Structure	None	Preliminary	Defined	Defined	Defined
Project Code of Accounts	None	Preliminary	Defined	Defined	Defined
Contracting Strategy	Assumed	Assumed	Preliminary	Defined	Defined
Engineering Deliverables:					
Block Flow Diagrams	S/P	P/C	C	C	C
Plot Plans		S	P/C	C	C
Process Flow Diagrams (PFDs)		S/P	P/C	C	C
Utility Flow Diagrams (UFDs)		S/P	P/C	C	C
Piping & Instrument Diagrams (P&IDs)		S	P/C	C	C
Heat & Material Balances		S	P/C	C	C
Process Equipment List		S/P	P/C	C	C
Utility Equipment List		S/P	P/C	C	C
Electrical One-Line Drawings		S/P	P/C	C	C
Specifications & Datasheets		S	P/C	C	C
General Equipment Arrangement Drawings		S	P/C	C	C
Spare Parts Listings			S/P	P	C
Mechanical Discipline Drawings			S	P	P/C
Electrical Discipline Drawings			S	P	P/C
Instrumentation/Control System Discipline Drawings			S	P	P/C
Civil/Structural/Site Discipline Drawings			S	P	P/C

Figure 4. – Estimate Input Checklist and Maturity Matrix

REFERENCES

ANSI Standard Z94.2-1989. **Industrial Engineering Terminology: Cost Engineering.**
AACE International Recommended Practice No.17R-97, **Cost Estimate Classification System.**

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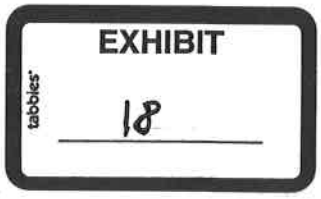
BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF: Petition of Emerald Polymer Additives, LC for an Adjusted Standard from 35 Ill. Adm. Code 304.122(b),) AS 19-002

The deposition of MARK E. WINTERS, called for examination pursuant to the provisions of the Illinois Code of Civil Procedure and the Rules of the Supreme Court as they apply to the taking of said depositions, taken before Paula A. Morsch, C.S.R. License No. 84-002965, a Certified Shorthand Reporter in the State of Illinois, on the 18th day of December, 2019, at the hour of 9:00 a.m., at 412 SW Washington Street, Ste. D, in the City of Peoria, County of Peoria, State of Illinois.



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I N D E X

E X H I B I T S

(Attached.)

MARK E. WINTERS, Engineer
called by the IEPA,
being first duly sworn,
was examined and testified
as follows:

DIRECT EXAMINATION

BY MR. GRADELESS:

Q This is the deposition of Mark Winters in the matter of the Petition of Emerald Polymer Additives for an Adjusted Standard before the Pollution Control Board, Case Number AS 19-002.

Can you please state your full name and spell it for the record?

A Mark Edward Winters, M-A-R-K, E-D-W-A-R-D, W-I-N-T-E-R-S.

Q Okay. Have you ever had a deposition before, taken a deposition before, Mark?

A No.

Q Okay. Well, let me go over the ground rules real quick so that there's no surprises and you let me know if you have any questions. The first one is we have to make sure our responses are

audible. We have a court reporter here. We should try to talk slowly and clearly to help her out, and also our responses need to be in the form of a yes or a no or if something requires further than a yes or no, you need to elaborate, but we can't say things like uh-huh and huh-uh because when we go to look and read that later, I can't really read your voice inflection. Do you understand that?

A Yes.

Q You passed the first test. Second, from time to time we attorneys like to yell at each other and argue and object. I don't anticipate that here, but sometimes we may object, and mainly the purpose of that is to get that on the record, so I just ask that during an objection we stop your answer and we get it on the record and then you'll be asked most likely to continue the response, but it shouldn't sway you or affect what you say unless you're specifically told not to respond, but I don't envision that being the case today.

Any questions from me? Again if you need to stop at any time -- you're nodding your head. Is there a question?

A No, no. I don't have any questions.

Q If you need to stop at any time, just interrupt and say it. I just ask that if you do, wait until you've completed an answer and so not in the middle of a question if you need to stop for a break, bathroom break, something like that.

All right. So, Mr. Winters, where do you live?

A East Peoria.

Q What's your address?

A 103 Flossmoor Court, Apartment 5.

Q Okay. And by whom are you employed?

A Emerald Polymer Additives.

Q And how long have you been employed by Emerald Polymer Additives?

A Just about a year.

Q When did you start?

A I started during the first week of January in this year.

Q What is your job title at Emerald Performance -- or Emerald Polymer Additives?

A Utilities foreman.

Q Now I want to kind of walk back through your job history before that. So what, if any, jobs did you hold before utilities foreman at any

employer?

A Prior to that I was the shift foreman for Veolia North America in Henry, Illinois.

Q From what dates were you the shift foreman there?

A That would have been from December '17 to December '18.

Q December 2017 to December 2018, right?

A That's correct.

Q And what about before that job?

A Before that job I was the shift foreman for a contractor for Caterpillar.

Q Okay. Here in Peoria?

A Yes.

Q All right. And how long did you hold that position?

A I was at that position for a year as well.

Q Okay. I've got a pattern going here. So from December '18 -- I'm sorry; from December --

A December '16 to December '17.

Q Okay, thank you. And before that?

A Before that I was a contract employee for an engineering testing lab in Michigan; Holland, Michigan.

Q And how long did you hold that position?

A Four months.

Q Okay. What about before that position?

A Before that position I was at a different engineering testing lab for a company called Stryker Medical.

Q Okay. What did you do there?

A They make surgical instruments. I did the quality testing on those.

Q Before we -- let me back up a little bit. What is your educational background that led you to this current position?

A I have a Bachelor's of Science in chemical engineering from Western Michigan University.

Q Any graduate education?

A No.

Q Or schooling?

A No.

Q Any other certificates or certifications? Do you hold any of those?

A Since working for Emerald I have my drinking water license from the Illinois Department of Public Health non-transient, non-- I forgot how the rest of that works, but it's the non-transient,

noncommunity. That's what it is.

Q Right, noncom. And do you hold any drinking water operator licenses from the Illinois EPA?

A No.

Q Any other professional licenses or designations that you have?

A No.

Q Okay. And you said you're the utilities foreman currently at Emerald Polymer Additives. Is that the facility in Henry?

A Yes.

Q Okay. What is a utilities foreman?

A Chiefly it's the wastewater treatment system. That's the biggest utility I'm in charge of, and it's also a couple other utilities around the plant like our compressed nitrogen gas, cooling tower, and process water.

Q And your what? I'm sorry.

A Process water.

Q Process water, okay. Now, when you delineate cooling tower and process water and the compressed nitrogen, what does that mean? I mean are these different buildings?

A They are different buildings.

Q Okay. And you say you oversee those functions, is that right?

A Correct.

Q What does that entail?

A Cooling tower, it entails are the pumps on or off, do we have good flow through the processes or cooling. For the process water, all I do there is we just make sure the pumps are on and we have good water pressure.

Q What about the compressed nitrogen?

A The compressed nitrogen is if we -- if there's a leak somewhere, we kind of -- I'm the guy that knows what valves to close to stop the leaks and then track down where the leaks are happening.

Q Any other job responsibilities in that Henry plant that you have?

A I also handle the two guys that work in our warehouse.

Q Tell me about the warehouse. What's the warehouse?

A It's just our standard shipping and receiving warehouse, so orders out, materials in.

Q Okay. Do you say you supervise two

employees in the warehouse?

A That's correct.

Q And how many employees do you supervise?

A There's those two and then there's four waste treatment operators that I supervise.

Q So six total?

A Yes.

Q And who do you report to?

A I report to Jim Hastings.

Q And what is his position?

A I do believe he's just head of production is his title.

Q What's head of production, if you know?

A All the shift foremen answer to him. All the maintenance foremen answer to him. I answer to him.

Q Okay.

A He's the number two behind the plant manager, behind Galen Hathcock.

Q Understood. What, if anything, did you do to prepare for today's deposition?

A I read back through the history a little bit, some of the things we've tried to do.

Q Anything else?

A No, I just read through the histories.

Q Okay. Did you talk to anybody about the deposition outside of Mr. Dimond or an attorney?

A I talked to Galen Hathcock for a couple minutes just because I've never done one of these before. I was kind of nervous about how this was supposed to work out.

Q And what was discussed with Galen?

A Mostly just what I should, you know, what I should expect, how I should expect it.

Q Did he approach you or did you approach him?

A I approached him.

Q And what, if anything, did you ask Galen?

A Well, first what I asked him was if there was a website where I can go to like I'mabouttobedeposed.com where you can practice.

Q I wish there was one on how to be an attorney and depose someone. Yes, I wish the same. Trust me, nobody is in trouble. So more of a how to?

A Yeah, how to.

Q Did he tell you how to?

A He gave me some pointers, keep your calm,

answer truthfully, don't guess on anything.

Q Perfect, okay. You guys didn't talk about the plans or this case or anything like that?

A Not in -- no, not in those ways.

Q Okay. In any other -- what kind of ways did you talk about it?

A We have activities ongoing in waste treatment and that naturally came up in the course of conversation as well.

Q Understood, okay. You also mentioned you read over some of the history of this case?

A Yes.

Q Do you recall, what did you read?

A Previous efforts at containing the TBA, MBT, keeping it out of the wastewater.

Q Do you remember what that document looked like?

A I do believe they were previous written testimonies.

Q Was it like a transcript form, if you recall?

A I don't think it was a transcript. I think it was previous EHS and plant manager's written depositions.

Q Do you remember whose depositions you read over?

A I think the fellow's name was Dave Giffin.

Q And do you remember who Dave Giffin was?

A No, I never met him.

Q Anybody else's previous depositions that you read over?

A Actually I think that was it.

Q Aside of the previous efforts, were there any other documents that you looked at to prepare for the deposition?

A I looked at our previous DMR's just in case we were asked questions about it.

Q And any other documents or items that you read to prepare for your deposition?

A One of Houston Flippin's reports on his suggestions.

Q Do you recall the date of that report?

A I don't recall the actual date. I do recall it was from 2019.

Q Any other documents or text that you reviewed to prepare for the deposition?

A No. That would be a complete list.

Q Okay. I want to make sure that you said

this. Galen was the only one that you talked to about the deposition, is that correct?

A That's correct, outside of Mr. Dimond here.

Q Right. How did you -- did somebody give you those documents?

A I believe I was given all those documents by Galen.

Q Do you remember when he gave you those?

A Friday. It was last Friday.

Q December 13th?

A Yeah. If that was what this past Friday was, yes.

Q It was this past Friday. We'll go with that.

A Yes, it was this past Friday.

Q Okay, understood. Did Galen say anything to you when he gave you those documents?

A Nothing besides this is the history, you might want to review this in prep.

Q You said earlier that Mr. Hastings is number two under Galen, so would Galen be Mr. Hastings' boss?

A I'm not entirely certain on the power

structure there. I do know that Jim gets a lot of his marching orders from what Galen thinks we ought to be doing in the plant.

Q You had mentioned or you talked a little bit about your job duties at the Henry plant. Have you ever been a part of a continuous process improvement team?

A Yes.

Q And when did the continuous process improvement team start?

A Are you talking about previous experience or currently?

Q Currently.

A I started being a part of that this spring.

Q You couldn't be a part of it before you started I guess.

A Right.

Q What is the continuous process improvement team?

A A lot of what we're looking at are ways to run the waste treatment facility better.

Q And what are you looking at to make the waste treatment system run better?

A A lot of our focus lately has been on better reaction efficiency upstream to keep less or keep fewer components out of the wastewater when I get it.

Q Any other processes you're looking at?

A We're looking at some testing equipment for the lab to increase our ability to test things on as well as a new piece of software that would handle all of our data.

Q Anything else that comes to mind that you guys are looking at with respect to the process improvements?

A There's a lot of other process improvements that are internal processes that I'm not a part of that are also being worked on. I couldn't really tell you what they are though.

Q Your focus mostly or your knowledge is limited specifically with respect to the waste stream; is that fair?

A Yes.

Q Okay. I'm trying to understand how all this works. So when you said you were looking at software improvements for data, what is that?

A Right now all of our data is stored in a

Microsoft access database. We're just looking at -- contractors have different, or companies have different data service and lab packages that they want to sell you. We were just comparing those to see if something was better.

Q Are you still comparing those?

A We are. We are still looking.

Q Is this like a data management software package, so to speak?

A Yeah. I'm sorry, yes.

Q Yeah works I think. All right. You also mentioned testing equipment. What kind of testing equipment are you guys looking at?

A Hach makes a device that can do -- it can do all of our hardness testing. It can do ammonia testing. It can do a lot of stuff that we currently outsource, we would have the ability to kind of test in-house.

Q What was the company you said?

A The company is called Hach, H-A-C-H.

Q Okay. Are you comparing that to any other companies?

A Right now we're comparing that unit with our current outside lab to see, you know, compare

results, make sure that it's a reasonable comparison between one and the other.

Q And that would allow you to conduct the testing in-house?

A That's correct.

Q Have you received any of those results?

A I have the results from our in-house testing but I haven't received results from -- PDC is the lab that we use to compare against.

Q You also mentioned looking at upstream efficiencies. What does that entail?

A Largely that entails looking at the formulas for the different reactions and seeing if we can improve those so that we -- it's hard to have MBT in the water if you reacted it all, so driving reactions to completion.

Q Oh, boy. Can you explain that?

A I will try to. MBT is a one of the base ingredients that we use and we're looking at different ways to manipulate the chemistry of the rest of the reaction to see if we can drive the reaction of the MBT to completion so that there's no MBT going out because we reacted all of it and we made product with all of it so there's none left.

Q Okay.

A That's the goal.

Q At what point in the process are you looking to ensure that there's no MBT left? Is it in the pipe or is it somewhere else in the process?

A We are taking samples, as part of this study, we're taking samples at the end of the pipe at each process; so not the end of the wastewater treatment facility but at the end of each individual process.

Q Before I ask that, any other upstream efficiency type projects that you guys are looking at?

A No, we're just looking at limiting MBT.

Q Can MBT be disposed of in any way?

A I honestly don't have a good answer for that.

Q Okay. Why do you say you don't have a good answer for that?

A I could speculate but it would just be speculation as to how to dispose of it.

Q You haven't -- you're not aware of anybody disposing MBT?

A No.

Q Have you guys researched ways to possibly dispose of it?

MR. DIMOND: Object that it's vague. I'm not sure what you mean by disposing of it.

Q You can answer.

A We -- I've done some research that shows that they use it in the fertilizer industry to help retain nitrogen in the soil, but as far as any kind of actual just dumping it in a landfill or something, no, I don't know anything about it.

Q What did you read about the MBT being used to fertilize?

A It was part of a research paper. I googled it and found a research paper that suggested they put MBT in with high nitrogen fertilizers and it helps retain nitrogen in the soil.

Q Did you provide that study to anybody?

A At the time I brought it to Lance Richards' attention.

Q And who is Lance Richards?

A He was our environmental health and safety coordinator.

Q I believe he's in Oklahoma now.

A I have no knowledge of that.

Q That's okay. And this was obviously sometime after January 2019 --

A Correct.

Q -- when you gave the MBT's fertilizing study to Lance Richards, is that right?

A Correct.

Q Do you remember how you -- did mail it? What was the way you gave it to Lance?

A I think it was more of a showed it to him. I don't even recall E-mailing it to him. I think I saw it, dragged him into my office, showed him. We talked about it for a couple minutes.

Q Do you remember when this was?

A That part I do not. I couldn't recall a date for you.

Q Do you recall whether it was before or after you met with the Illinois EPA in June of 2019?

A It may have been before that.

Q What, if anything, did Lance say about it?

A That I don't recall either.

Q And then has that study been discussed since?

A No. No, it has not.

Q Why did you give it to Lance?

A I read it and thought it was interesting. We were discussing the issue. I thought he might think it was interesting as well.

Q And then, I'm sorry, you didn't give that study to anyone else at the facility; is that correct?

A That's correct.

Q Do you remember the author of that study?

A No, I do not.

Q Do you still have a copy?

A No, I don't recall ever saving a copy. I read it. No one seemed terribly interested in discussing it further so I read it, I got some information off of it, and I just exited out.

Q Oh, did you send Lance the link; you didn't download it?

A No, I did not download it.

Q But how did you send it to Lance? Oh, you just showed him?

A Yeah, I just showed him. We went into my office. I pulled it up on my screen. We talked about it.

Q Gotcha, okay. Do you remember anything that was said in that conversation?

A No, not really.

Q You also mentioned upstream efficiency projects and looking at those at the end of the pipe of each process, is that right?

A Yes.

Q How many processes have MBT showing up at the end of the pipe?

A There should be three that I can think of, but I might be missing something.

Q It is my understanding that -- can you tell us what MBT is for the record?

A Mercaptobenzothiazole.

Q Okay.

A It's the basic building block of our entire plant basically.

Q And is it a byproduct of your processes?

A It is the basic building block of our processes. Everything we make is based on that molecule.

Q All your products you use MBT?

A There's a few products we don't. There's a few products we don't use MBT, but most of our products, yes, use MBT.

Q Okay. Would it be possible for you to

tell me what products that you use MBT, if you can recall? It's not a test. I'm just trying to see if the list is like 50, tell me. If it's four and you know it, that would be great.

A I believe the list is about seven. I may not be able to get all of them for you.

Q Okay.

A There's BBTS, OBTS, MBDS. We make a 50 percent MBT that we put in drums. I think that's all I can think of right now.

Q So aside of the reaction formulas and the MBT upstream efficiencies and looking at those at the end of the pipe, are there any other upstream efficiencies that come to mind?

A Not off the top of my head.

Q Have you ever considered water reductions?

A If that's being considered, I'm not a part of that.

Q Fair. You have no knowledge of that being considered?

A No.

Q Do you know when the continuous process improvement team began?

A I do not know when the team began meeting.

Q Who do they meet with?

A It's an in-house team. We meet semi regularly on site.

Q What's semi regularly?

A Every other week.

Q How long are the meetings?

A They can vary from couple hours to 20 minutes.

Q Do folks from Mexichem attend those meetings?

A Not regularly.

Q When do they?

A If we think we need to discuss something with them.

Q How often have the Mexichem employees attended the meetings that you know of?

A On the ones that I know of a couple times. I couldn't give you a firm answer. A lot of times things come up in those meetings that we then discuss with Mexichem at our monthly meeting with them.

Q So there's a separate monthly?

A Yeah, there's a separate monthly. I believe that monthly is part of a CCA that we

entered into where we agreed to hold meetings with Mexichem once a month to discuss how waste treatment was going.

Q Okay. Do you know if that's the latest CCA by any chance?

A I actually don't believe it is the latest one.

Q Do you recall how you became involved in the continuous process improvement team?

A Largely that happened over the summer. Our ammonia levels dropped down considerably and we suddenly realized that maybe this was attainable, and they started bringing me into all the other continuous process meetings to discuss, you know, what are we seeing and how can we do things.

Q Right, and that was the summer of 2019?

A That's correct.

Q Was that before or after -- I'm sorry. When you saw the ammonia reductions in the summer of 2019, was that before you met with the Illinois EPA or after you met with the Illinois EPA?

A That was after.

Q Okay. So let me talk first about do you recall meeting with the Illinois EPA on or about

June 18th, 2019?

A I do recall.

Q And who invited you? I mean we did, but who at your plant?

A I was included into that by Galen Hathcock.

Q And do you remember discussions about that meeting before that meeting, having discussions before that meeting; I'm sorry, having discussions before that meeting with Galen?

A At that time, no, I didn't have a lot of discussions with Galen. I was still learning the processes more than anything.

Q And did you have discussions I guess after the meeting with the Illinois EPA about the meeting?

A With the Illinois EPA?

Q Yeah.

A I personally did not. If discussions took place, I was not a part of them.

Q Tell me what happened the summer of 2019.

A We went on shutdown in the middle of August. I do believe it was the second week of August we went on shutdown and when we came back up, things were running exceptionally slow and we

happened to get results back as part of our DMR that indicated our ammonia levels in our plant effluent were below the detectable limit of the test.

Q And those effluents did not show any MBT in it, did they?

A No, they did not.

Q Were you able to determine what happened?

A That's part of what the testing we're doing now is to determine which processes are the ones that cause the problems and which processes don't seem to be causing the problems and then focus in on which processes seem to be causing the problems.

Q Okay. In the summer of 2019 were you accepting waste treatment from Mexichem at the time?

A Yes.

Q So that I guess investigation or research, what has been discussed?

A We discussed a new sampling plan for MBT in the facility to more clearly understand which processes are dumping the most MBT and we've been watching Mexichem's ammonia coming into us a little more closely than we had been.

Q What's a sampling plan?

A You're asking what our sampling plan is right now?

Q Just generally what is a sampling plan? I guess you said an MBT sampling plan.

A Yes.

Q What is that?

A We have a weekly set of samples that we pull and when we pull them for all our different processes.

Q Is it like a schedule?

A Yeah, it's a scheduled sampling for different areas of the plant.

Q And you say you've changed that now?

A That's correct.

Q When did that change happen?

A That change happened in October.

Q Of 2019?

A That's correct, October of 2019.

Q And this was as a result of what happened in the summer of, the reductions you saw in the summer of 2019?

A Yes.

Q Tell me how the sampling plan changed.

A We used to sample three times a week at

one spot. It was the -- well, let me back up.

Q That's all right.

A We sampled three times a week at the secondary clarifier and at the PC tank and at the primary clarifier. We also sampled at the secondary clarifier every day of the week and when we changed in October, we started sampling at the processes as well because we wanted to see at each process, and that was every day that they were running.

Q Why would sampling at each process, what's the benefit in doing that?

A The benefit in doing that is then to know which process is the biggest offender and which process you can look at how to change to get the MBT out of the water supply.

Q Did you stop producing a product in the summer of 2019?

A We didn't stop but sales lagged significantly and we effectively stopped.

Q It was shut down, right?

A Yeah.

Q Am I missing something? I mean if you shut down and stopped, is that why you -- I guess why are you surprised that the ammonia levels

dropped in the summer of 2019?

A It wasn't an expected result. We were just shocked. We didn't realize that the ammonia would drop like that because everybody had told us that that's not possible.

Q When you say everybody had told you it's not possible, who are those?

A That would just be the legacy of previous reports, everybody saying that there's no way to get all the MBT out, there's no way to nitrify. Nitrification does not happen in our process.

Q Do you remember who made those reports?

A That would be Dave Giffin reports. I believe there's a Houston Flippin report that says nitrification is difficult to achieve.

Q You said that it wasn't expected that the ammonia levels would drop, is that right?

A That's correct.

Q And I guess why would it not be expected if production shut down?

A Well, while production was shut down, the ammonia levels were kind of, you know, we would have expected that.

Q Okay.

A But in the weeks after when we started back up, the ammonia levels stayed down, and that was a surprise to us.

Q And where are we, where are you, I'm sorry, your group in evaluating the cause of that lowered ammonia level?

A During the course of this month, we've been actually doing some recipe changes and tests with one of our processes that we didn't expect to be a big MBT contributor because of how little it runs, but despite its smaller flow rate compared to others in the waste stream and how little it runs, it turned out to be a much bigger offender than we had thought. So we identified it and we're working on recipe changes right now to see what we can make better.

Q Okay. That is encouraging. You mentioned that you reviewed the DMR's prior to today?

A Yes.

Q Do you recall what those DMR's provided, what information you read from the DMR's?

A I was particularly interested in if we had ever had an exceedance on our ammonia in terms of concentration or pounds per day.

Q What was the range of the DMR's that you looked at?

A It was, I believe it was just this past year's DMR's. It may have been a few more than that.

Q Did you have any exceedances?

A I was not aware of any, no.

Q Do you recall the highest levels that you had of ammonia?

A The highest level I saw in the DMR was probably in the 90's, 90 milligrams per liter.

Q Okay. It's my understanding that you've made some process improvements in 2015. Are you aware of any of those?

A I've heard of them. I couldn't tell you with any degree of certainty what they were or how they worked.

Q Have you been a part of any specific process improvements since you started?

A Yes, but not relating to wastewater treatment.

Q Thank you for that clarification. Appreciate it.

I'm going to hand Mr. Winters -- we'll go

Winters Exhibit 1.

(At this point in the proceedings Deposition Exhibit No. 1 was marked for identification.)

BY MR. GRADELESS:

Q Please just take a second to review this document. Do you recognize this document?

A This is the actual petition to have our ammonia standard renewed. I don't believe I have ever seen this particular document.

Q Okay. Did you see a draft or any portions of this document?

A No, I don't believe so.

Q How about this? Did you assist in preparing or gathering information for the petition?

A Again, no, I don't believe so.

Q Is it a part of your job duties to typically look at the DMR data?

A Yes, it is.

Q So you would have seen the DMR's from your facility since you've -- you've seen the DMR's from your facility, is that correct?

A That's correct.

Q Do you recall providing that information at any time to anyone?

A No. No, that information is readily available on our in-company servers.

Q Okay. So anybody could have access to that?

A That's correct. Oh, let me clarify that. Obviously the union employees don't have access to that. So not everybody.

Q Okay, appreciate that. So you didn't help prepare this document in any way?

A No, not that I'm aware of.

Q Do you recall helping prepare any documents with respect to the adjusted standard?

A No.

Q Just a second. Were you ever involved in reviewing treatment alternatives?

A Prior to our meeting with the EPA back in -- that was June, correct? I believe I discussed with Lance some of the ideas that had been talked about during that meeting.

Q Okay. And what were those alternatives that you talked about?

A We talked about land application. None of

us had heard of the algae wheel so we did a little bit of looking into what that was.

Q Okay.

A And we discussed somewhat the river water dilution idea.

Q Do you recall any other alternatives that you discussed or provided input?

A No.

Q What about after Mr. Flippin's report?

A After Mr. Flippin's report, I think we did go back and discuss the activated carbon idea.

Q Okay. Any others?

A Not to my knowledge. There may be and I've forgotten.

Q And what was your opinion on the land application alternative?

MR. DIMOND: Objection, calls for speculation.

A My opinion on it was having studied pulp and paper industry wastewater treatment in college for a fair amount, I was fairly familiar with how to do that. I was curious about it but when I discussed it with Lance, Lance knew a lot about hydrology and was able to show me drawings of how

our hydrology would work and it would just go straight back into the river, and we discussed in those terms how the land application was going to work.

Q So did you have any knowledge of land application aside of that?

A No, I did not.

Q It's just you and Lance discussing land application?

A Yes.

Q And Lance informed you that -- what did Lance say about the land application?

A Our soil is highly permeable and it won't retain the water.

Q All right. Did he raise any other concerns that you remember about land application?

A I believe we discussed the salts in our wastewater building up in the soil too.

Q What about the algae wheel?

A Outside of a high level discussion of what it was, I don't believe we discussed it too much.

Q What was said about the algae wheel?

A That it was mostly just a tertiary biotreater kind of setup.

Q And what about the river water dilution?

A We talked to some degree about the energy requirements to do that and how much water we would actually have to pump out of the river to be able to do that.

Q Did you have any opinions on the river water dilution?

A I personally felt like it was not a great idea.

Q Okay, that's fair. Why did you think it was not a great idea?

A The amount of effort, the amount of energy it would take to heat the water up to not sterilize our biotreater that we currently use would have been cost prohibitive. It would have dumped all kinds of greenhouse gasses into the air. I thought it was a bad idea.

Q Okay. Did you know about the greenhouse gasses as being a potential side effect of river water dilution?

A Once I knew that the water had to be heated, yes.

Q And what about activated carbon? What was said about that alternative?

A That was mostly a discussion about how it works and the fact that it had several problems as far as waste itself and what we would have to do about those and I believe somebody discussed how expensive it was.

Q Do you remember discussing ozonation?

A No, I don't recall discussing that with anybody.

Q What about alkaline stripping?

A No, I don't recall discussing that one with anybody either.

Q Ion exchange?

A Maybe me and Lance discussed that one but to discuss what we discussed, I couldn't tell you what we talked about.

Q I don't want you to guess if you can't remember.

A Yeah, I couldn't remember that one.

Q That's fine. Do you remember anybody talking about break point chlorination?

A I do recall me and Lance discussing break point chlorination. I don't recall if that was in relationship to this particular issue or a different issue that we also had.

Q Are you familiar with the dechlorination methods of treatment facilities?

A I personally am not, no.

Q You don't do dechlorination at the Henry facility, do you?

A No. No, we do not.

Q And what about tertiary nitrification? What does that mean?

A You're discussing the process of adding a an additional biotreater of some kind that would then treat the nitrification after the biotreaters?

Q That's an example is what you're saying, right?

A Yes.

Q Yeah, the general concept?

A Yeah.

Q Did you discuss tertiary nitrification?

A No, we did not, outside of the algae wheel. We did discuss the algae wheel which is a form of that. So we discussed that.

Q Okay. Do any other alternatives come to mind that you reviewed or discussed with respect to the Henry plant?

A As far as end of pipe treatment, no, I do

believe those are what we discussed.

Q Any in process treatments, anything additional that you discussed?

A I discussed with a couple of people some alternatives, alternative ways to pull MBT out of the water supply, including hydrogen peroxide. That's what it is. Hydrogen peroxide can actually oxygenate the MBT and pull it out.

Q Oh, really? So if you mix hydrogen peroxide with the MBT, what happens?

A I am not familiar with the chemistry. I just know that it oxidizes the MBT and destroys it inside the wastewater. I don't know how it works though.

Q Are you able to isolate the MBT in the treatment process?

A Currently, no. That's one of the things we're talking about.

Q Okay. Does the MBT remain in the first biotreater at the Henry facility?

A I couldn't give you a for sure answer. I can just tell you what our test results show, that there's no MBT in the secondary clarifier, which is the next step after the biotreater.

Q Okay.

A So in there it's gone. I'm assuming it gets pulled out in the biotreater somehow.

Q Is it in there before the biotreater?

A Yes. We know it's in the primary clarifier, goes to the biotreater, and then it's gone by the time it makes it to the secondary clarifier.

Q So somewhere in there?

A Yeah, somewhere inside that area is where it's going away.

Q Okay. Could -- and I don't know the chemistry. You're the chemistry. Could hydrogen peroxide be added into the biotreater?

MR. DIMOND: Objection, calls for speculation.

A I actually wouldn't recommend that. I think it would damage the bugs, cause BOD problems and whatnot in that location.

Q Solve one problem, create another, right?

A A worse problem too.

Q Have you proposed any alternatives for meeting the ammonia limits?

A Can you repeat that question?

Q Sure. I'm just wondering if you've proposed any alternatives for solving this problem, reducing the ammonia.

MR. DIMOND: Objection, it's vague and calls for speculation.

A I think the alternatives that we've been looking at are all based on in process removing MBT, removing any kind of total Kjeldahl nitrogen that we can from the systems before it makes it to the waste treatment. Those are our ideal treatment points up front where it's smaller streams that are concentrated with less water.

Q Have you considered break point chlorination at different points in your process?

A We have not. One of the things that is coming out is one of the reactions uses chlorination as part of the reaction and there was a suggestion that there wasn't enough chlorine being added in the reaction.

Q What does that mean?

A I'm not too familiar with how that reaction works, but I can tell you that chlorine is part of what stops the reaction from proceeding any further forward and they were suggesting that by not

having enough, there was residuals left that were making it down to the waste streams.

Q I still don't know what that means but I'll take your word for it. That's okay. So you're saying that break point chlorination could not be considered at different points in the process given that issue that you just mentioned?

A I don't see why you couldn't still consider break point chlorination but I think part of what they're looking at right now, and this is ongoing even today --

Q Right.

A -- part of that is the application of break point chlorination to stop the reaction and, you know, clear up the product. Like I said, I'm not too certain on the technicalities of the in process reaction, but I think that's kind of how that works.

Q Is there somebody that's tasked at the plant with trying to, besides the process improvement team, is there somebody that's tasked with trying to solve the ammonia problem?

A Not that I'm aware of. There's just the process improvement team.

Q And how many people are on that team?

A We typically have three or four and then we bring in other process engineers from the plant as needed when it's their process we want to look at.

Q It sounds like it's Galen, you?

A Yeah.

Q And --

A Chris Wrobel.

Q Chris, all right. He's on the phone?

A Yep.

Q And then anyone else?

A From time to time we bring in Jim Hastings. He's kind of the plant historian, being the guy that's worked there the longest.

Q Okay. And it's fair to say all of these four have other job responsibilities?

A That's correct.

Q What are your thoughts about the alternatives?

MR. DIMOND: Objection, it's vague and compound and I think it's also asked and answered. You've asked about all the other alternatives already.

A My own personal view on all these different alternatives is most of them I don't think are feasible as far as the end of pipe ones are concerned. There's some good evidence of some of -- like the hydrogen peroxide, there's some good evidence that that might help. I think there isn't really a good silver bullet option that fixes the problem though.

Q When you said these -- can that answer be read back?

(Record read as requested.)

Q When you say there's not a silver bullet option, I want to make sure we know what that means. What do you mean by that?

A There isn't one thing that will bring us down to within the limits that we need to be.

Q Do you know whether a combination of alternatives and improvement processes, whether that could achieve the result?

MR. DIMOND: Objection, calls for speculation.

A It's possible. It's possible. It would

take a long time to install, study, do a study and figure out what's going on, and with an activated biological system, there could be ramifications beyond -- if I put too much hydrogen peroxide in, I can't sterilize my bugs. So there are risks involved that need to be weighed against.

Q Henry plant has four biotreaters, is that correct?

A That is correct.

Q And only one is operational?

A That is correct.

Q What is the capacity of that biotreater, the one that's operational?

A 100 percent full is 1.4 million gallons.

Q And what about the other three that are not operational? If you can just go down and tell me their capacity if you know it.

A I do believe it's 270,000, 270,000, and 360,000 are the three that are not operational.

Q What was the last one? I'm sorry.

A 360,000.

Q Thank you. And how much are you utilizing the first biotreater? You said when full it's 1.4 million gallons.

A That's correct.

Q What's your average use per month or whatever unit you want to give me?

A We maintain a 90 percent level in that tank.

Q 90 percent level at all times?

A At all times.

Q Even when you shut down?

A Yeah, actually even when we shut down.

Q I'll get my calculator out later. It was my understanding that one of the -- or that those other three biotreaters were going to be repaired. Do you know anything about that?

A I know there is an ongoing project to do refurbishment repair on those. I'm not part of that project. I couldn't tell you where we're at in it.

Q And do you know whether it was to refurbish and repair all three?

A I think they had a five-year plan for doing all three, yes.

Q And I think you said you're not involved in that process?

A That's correct. That's a project engineer. I'm not involved in that.

Q When you reviewed Mr. Flippin's 2019 report to prepare for the deposition, do you recall what, if anything, you read about that?

MR. DIMOND: Objection, it's vague.

A The majority of what I took out of that report was the difficulties he described in achieving nitrification inside the system. I feel current evidence suggests that that is possible.

Q That what's possible?

A That nitrification is possible based on current evidence that I have, again referencing the decreased ammonia levels over the summer.

Q You said you would have evidence of nitrification would be possible?

A Yes.

Q Inside the facility?

A Yes.

Q And the basis for that was?

A The basis for that was the reduced ammonia levels that began in late summer.

Q Any other evidence that you can think of that serves as the basis for your opinion on that?

A There are reports from PDC that show that evidence of nitrification is the presence of nitrate

and nitrite in the wastewater, and at times the low ammonia, that number is a lot higher. So that supports the idea that we are nitrifying in our biotreater now when we didn't used to be able to.

Q What about running a pipe from your first bio, at your active biotreater through another biotreater, would that achieve nitrification?

A It possibly could. We would probably have to consider other nutrients that would need to be added because that first bio is going to remove all other nutrients. It may be difficult to sustain a bug population in another tank.

Q And how would you add other nutrients in that other tank?

MR. DIMOND: Objection, calls for speculation.

A We would probably have to pump ethanol or something, some kind of chemical that bugs would eat off of and to grow a colony in there.

Q When you say grow a colony, for the record can you describe what that means?

A Oh, to keep a sustainable population of microbiological life inside the biotreater.

Q And what does that do?

A The microbiological life is required to eat up the chemical oxygen demand, the biological oxygen demand. They are the bugs that do the nitrification. It's all a live biological system.

Q To your knowledge have you looked at that alternative?

A To my knowledge we discussed the algae wheel which is a very similar technology to that and we have discussed bringing in the others online, the other biotreaters online as additional biotreater capacity, but I don't believe we've looked at cycling a pipe from one to those to do just a nitrification step.

Q And would that sort of be called tertiary nitrification?

A That would be fair to call it tertiary nitrification.

Q Do you know of any, this may sound funny, any reason why the plant would not want to reduce the ammonia levels?

A No, I can't think of a good reason why we would want to --

Q I didn't know if there was a benefit is what I was getting at.

A Oh, no.

Q You can't sell the stuff. There's nothing I guess holding you back from developing these process improvements?

A Right. Outside of reasonableness of cost for any of those processes, I don't think a -- we don't have a reason why we wouldn't want to.

Q Do you know how long Galen has been employed?

A It's my understanding he was hired in 2017, but as far as actual date and time, no, I do not.

Q Do you know how long Jim Hastings has been employed there?

A Vaguely I know it's about 43 years, 45 years, somewhere in that vicinity.

Q Okay. And Lance Richards was only there six months?

A Yes. Yes, something in that range.

Q Right. Do you know how long Chris Wrobel has been employed?

A I do not.

Q Have you met him?

A I have met him a couple times.

Q Have you discussed this case with Chris?

A We have discussed the ammonia with Chris a couple times.

Q And tell me about those discussions.

A Ultimately he likes the direction that we've been going in trying to attack MBT at the processes.

Q Okay.

A And he is also interested in the fact that we have evidence from our outside lab that nitrification can occur in our waste treatment system.

Q If you can achieve nitrification within your waste stream system, what does that mean?

A That potentially gives us the ability to remove ammonia in our waste treatment system as is.

Q So you wouldn't have, if you know, capital improvement costs?

MR. DIMOND: Objection, calls for speculation.

A Capital improvement cost wise, I wouldn't have the foggiest idea as to how much it might cost us to make changes to make that a controllable process.

Q Right. Let me -- is it the general idea that that will be a cheaper alternative if you can nitrify in-house? That's kind of the general hypothesis that's floating around. Is that fair to say?

A Yes, that's fair to say.

Q Okay. I just wanted to understand. So you said the algae wheel is sort of a new concept. Was that considered by you guys as a potential way of achieving nitrification or is it kind of put on the back burner?

MR. DIMOND: Objection, calls for speculation and lack of foundation.

A I think it was mostly put on the back burner but we did discuss it for several hours, what are the potentials, what would be the hangups of a system like that.

Q Okay. Have you been asked by anybody to testify in the hearing?

A No.

Q Do you know anything about the hearing?

A I do not.

Q Okay. Do you have any expectations of testifying at the hearing?

A I do not.

MR. GRADELESS: I think I need five minutes to go over some notes and again a bathroom break. I think we'll be in good shape.

MR. DIMOND: Okay.

(Whereupon a five-minute break was taken.)

BY MR. GRADELESS:

Q Do you know who held your position as utilities foreman before you?

A I do not. I've heard a lot of names but I do not.

Q Okay. Do you know who held Lance Richards' position before him?

A I do believe that was David Sikes.

Q And how long, if you know, how long had David Sikes been employed there?

A I do not know.

Q Do you have an idea of whether it was more than ten years?

A Actually I think it was less than ten years.

Q More than five?

A Could have been. I really couldn't tell you.

Q And what about the -- who held the position before Galen, do you know?

A The only other name I know is Bill Stone. I think he was the guy before Galen.

Q Do you know how long he had been there?

A From what I've been led to believe, it was awhile.

Q More than ten years?

A Could have been more than ten years. If it was, I don't think it was much more than ten though.

Q More than five?

A Probably.

Q Okay. And you said Jim Hastings has been there about 40 years maybe?

A Yes.

Q Have you discussed this case with Jim Hastings?

A I have discussed the petition with Jim Hastings a couple times.

Q Has he expressed any positions with respect to this case?

A Just his knowledge of the history of things of how we've done in the past.

Q Does he share in the belief that nitrification cannot be achieved at the Henry plant internally?

A He is of the opinion or at least I believe he is of the opinion that nitrification has never been achieved sustainably at the Henry plant.

Q And you disagree with Mr. Hastings?

MR. DIMOND: Objection, that misstates his testimony.

Q I'm asking, do you disagree?

A I don't necessarily disagree with him on that. I think that something has changed that maybe is making it possible now.

Q Right, okay. And is Jim involved in the process improvement team?

A Yes, occasionally.

Q And how so?

A When we come up with ideas, we'll go to Jim. We'll talk to Jim about has this been tried before, do you know of this ever being done, and get his input as far as what he knows.

Q And what kind of input does Jim provide?

A Historical relevance, yes, we've tried something similar to this, it doesn't do this, or you've got to think about how break point chlorination, for instance, may impact the bugs, if it gets here, it gets there; what if we can't dechlorinate effectively and we over chlorinate to the river. Jim has seen it all, so he can give us a pretty good guidance on what he thinks.

Q Does he ever suggest ideas?

A Not really. We're usually past the point of ideation before we get to him.

Q I like that word. So you run the ideas through Jim?

A Yes.

Q Has he ever suggested or approved of any of your ideas?

A Occasionally he gives me the go ahead to try on a small scale like inside of a jar test or something how to do that.

Q I'm sorry, say that again.

A Occasionally he'll give me, you know, the permission to try in a jar test to see how it will impact things.

Q And what's a jar test? I see you

signaling what appears to be a jar here.

A Correct, correct. It's a 1,000-milliliter jar. You fill it 1,000 milliliters full of your wastewater sample and you take the chemical, whichever chemical it is you're trying to see how it impacts your wastewater, there's an agitator bar on a motor that spins. It helps if you're testing out different flocculations, coagulations, whatever, and then you can see how this chemical treatment you're suggesting is going to impact your ability to settle out solids or whatever.

Q How did you learn to do the jar test?

A That was something I partially learned in college but also from one of our contractors when they brought me on board, that was one of the first things they trained me on was how to do that.

Q You had mentioned earlier that you don't believe there's necessarily one silver bullet type solution with respect to ammonia at the Henry facility. Are those the kind of ideas that you bring to Jim when you're suggesting possible alternatives?

MR. DIMOND: Objection, it's vague.

A A lot of what I bring to Jim Hastings is I

see what seems to be a relationship between like the chlorination that we put into our sanitary water and the residual chlorine coming down to the river and then the nitrification. So I'll go to Jim and I'll say I think I see a relationship here, and he'll either say yeah, no kidding, or no, I don't think you're on to something, I don't think you've got something there.

Q Would you describe him as open-minded?

A I would.

Q And what's the basis for that?

A He's always willing to listen to the ideas that I've got.

Q Any other basis?

A I mean when I have an idea, he lets me talk it out with him. If he believes that I won't completely destroy everything, he'll let me try it.

Q Okay. I guess are there any, anyone that you have brought any ideas to that they sort of naysay everything?

A No, not really. Everybody is pretty open to helping me solve this problem.

Q Do you view it as your task to be solving this problem?

A Yes, actually I do feel like this is kind of my opportunity to shine and show everybody that I actually know my shit. Sorry, I don't know if we're supposed to swear in here.

Q That's okay.

MR. DIMOND: As long as you've told the truth, there's nothing wrong with that.

Q We're all good. I'm rooting for you, trust me. We're all rooting for you, that you know your things. So is it tied to a job performance eval in any way?

A It is actually. Part of my evaluation is working with, working on the ammonia problem. It's specifically listed in my evaluation as how I'm doing in those regards.

Q And what does it say, do you remember?

A I don't remember it word for word. I do remember that it's one of the criterion that I'm getting judged on is how well are we proceeding in finding solutions to the ammonia problem.

Q Do you have certain tasks that you need to achieve with respect to your performance evaluation and the ammonia problem?

A I wouldn't call them tasks so much as

goals, so much as developing understanding.

Q Okay. What are your goals, do you remember?

A I think the goal is intentionally written fairly vague. I don't exactly -- like I said, I don't remember what it says word for word. I just know that it's related to how to get the ammonia out of the water.

Q How often are you up for a job performance evaluation?

A Annually.

Q So January 2020?

A Yes, that would be correct.

Q And do you expect to receive a favorable job performance evaluation?

MR. DIMOND: Objection, it's not relevant or seeking the discovery of relevant information. Also I don't know how he would have knowledge of what somebody else is going to write in his evaluation, so I'm going to object on foundation as well.

A I assume I'm doing a good job because they're not mad at me all the time.

Q Good.

A I assume I'm at least not going to get in trouble.

Q Perfect. That's what I'm asking, thank you. Are you in -- we mentioned a hearing earlier and you said you hadn't had any expectations of testifying. Are you in the state in January?

A Yeah. I live here. I'm not planning on --

Q Just making sure you're not leaving the country. It's January 14th and 15th that we may need you, and we may not but we can talk about that later. Tom, I think I'm finished with Mr. Winters.

MR. DIMOND: Okay. Let's take a short break.

(Whereupon a five-minute break was taken.)

CROSS EXAMINATION

BY MR. DIMOND:

Q Mr. Winters, my name is Tom Dimond. I represent Emerald Polymer Additives, your employer, and I have just a few follow-up questions for you.

In response to some of Mr. Gradeless' questions, you said that after the plant started

back up in August, that the plant saw very low levels of ammonia in the wastewater treatment plant effluent. Do you recall that?

A Yes.

Q Since that time in late August, what has happened to the levels of ammonia that you're seeing in the plant effluent?

A Occasionally the ammonia in the plant effluent is at the detection limit, the detection limit capabilities of Peoria Disposal Company's laboratories, but that level fluctuates and we have no understanding as to what causes the fluctuations.

Q So since late August, how high have you seen it?

A Since late August we've seen it as high as the 40's, 40 milligrams per liter. There may be some data points in the 50's.

Q Based on what you currently know about the operations of the plant and the operation of the wastewater treatment system, do you believe that -- strike that.

Based on what you know about the operations of the plant and the wastewater treatment system, can the plant foresee that it will be able

to consistently achieve the levels of ammonia that you have seen since mid August?

A At our current run rates, that may be possible, but if production were to pick up, if our volumes were to pick up, we currently don't have a good knowledge of what's causing the ammonia levels to be low so we wouldn't be able to control it if production levels went back up high again. We would simply be at the mercy of the system.

Q Now, you talk about the production levels. In broad terms what are the production levels of the plant in 2019 versus 2018?

A In broad terms some processes in 2018 set production records running the fastest that they've ever ran. In 2019 they've been idle for more than half the year.

Q And have you continued to run at lower production rates since you restarted in mid August?

A That's correct. If anything, production rates are lower now than they were prior to the August shutdown.

Q And could those lower production levels be contributing to the lower concentrations of ammonia that you've been seeing coming out of the wastewater

treatment system?

A Absolutely.

Q Do you recall Mr. Gradeless also asked you some questions about the second, third, and fourth biotreaters?

A Yes.

Q If you took the final effluent from the wastewater treatment system and biotreaters two, three, and four were repaired and you simply ran the water into the biotreaters and you did nothing else, would that materially impact the amount of ammonia in the final effluent after the three biotreaters?

A It may to a small degree, but it's not extremely likely without additional steps.

Q And what would the additional steps be?

A I would need to add nitrifying bugs. Without adding any nitrifying bugs to it, it wouldn't work. And then I would need to add additional nutrients to those biotreaters for those nitrifying bugs to eat beyond just the ammonia.

Q Because the bugs need the nutrients to stay alive?

A That's correct.

Q What else would you need to do?

A Once I had nitrified, I would be reintroducing solids to the water and I would need to pull those solids back out before I could send that water down to discharge.

Q And why would you need to pull those solids out?

A We have a total suspended solids limit on what goes to the river. We would have to make sure we were in compliance with that as well as our ammonia standard before we could put that water in the river.

Q Okay. All those steps you've described, is that in essence the tertiary nitrification alternative that Mr. Flippin considered in his report in 2019?

A It is very similar to. In Flippin's report, I don't recall him mentioning the need to reclean the solids from the water before putting it in the river. I think he oversighted that fact.

Q My math is that 90 -- you also testified about the capacity of the various biotreaters. Do you remember that?

A Yes.

Q And you said that you maintain the level

of water in the 1.4 million-gallon biotreater at 90 percent, correct?

A That's correct.

Q By my calculation 90 percent of 1.4 million is 1.26 million. Does that sound right to you?

A Without a calculator, yes, that sounds right.

Q And you also told us that the capacity of biotreaters two, three, and four is respectively, 270,000, 270,000, and 360,000, right?

A That's correct.

Q So if I add that up, that's 900,000 total. Does that seem about right?

A That seems about right.

Q So these three biotreaters, these other three biotreaters, they don't have enough capacity to handle 1.26 million gallons of water, do they?

A No, they do not.

MR. DIMOND: That's all I've got.

REDIRECT EXAMINATION

BY MR. GRADELESS:

Q Mr. Winters, you mentioned lower

production levels could also potentially have something to do with the lower ammonia nitrogen levels?

A Yes.

Q Is it also possible that the lower production levels have nothing to do with the lower ammonia levels?

A That's extremely unlikely. The lower numbers, the lower production values are directly related to the amount of total Kjeldahl nitrogen and ammonia that wind up hitting the waste treatment facility.

Q I guess I'm just confused. Then why were you surprised in the summer of 2019 that the ammonia was low?

A We were surprised because we had been told nitrification wasn't possible. So we expect it to at least match up with what Mexichem was sending us for ammonia and we didn't see that. We saw evidence of nitrification.

Q And you just mentioned the Mexichem was sending you something. What were they sending you?

A They were sending us their regular wastewater streams.

Q Gotcha. Do you currently remove suspended solids at the Henry facility?

A We do.

MR. GRADELESS: I have nothing further.

MR. DIMOND: We reserve signature.

WITNESS FURTHER SAYETH NOT;

BY AGREEMENT, SIGNATURE NOT WAIVED.

STATE OF ILLINOIS)
)
COUNTY OF PEORIA)

I, PAULA A. MORSCH, Certified Shorthand Reporter and Officer of the Court authorized to report depositions, do hereby certify that heretofore, to-wit, on the 18th day of December, 2019, at the hour of 9:00 a.m., MARK E. WINTERS, Engineer, personally appeared before me at 412 SW Washington Street, Ste. D, in the City of Peoria, County of Peoria, State of Illinois.

I further certify that the said witness was by me first duly sworn to testify to the truth, the whole truth and nothing but the truth in the cause aforesaid, that the testimony then given by said witness was reported stenographically by me in the presence of said witness and afterwards reduced to typewriting, and the foregoing is a true and correct transcript of the testimony so given by said witness as aforesaid.

I further certify that the signature of the witness to the deposition was not waived by agreement of counsel.

I further certify that I am not counsel for nor in any way related to any of the parties to

this suit, nor am I in any way interested in the outcome thereof.

_____ C.S.R.

ALARIS LITIGATION SERVICES

January 6, 2020

ICE MILLER
Thomas W. Dimond, Esq.
200 W. Madison Street, Ste. 3500
Chicago, IL 60606

IN RE: Petition of Emerald Polymer Additives, LC for an Adjusted Standard from 35 Ill. Adm. Code 304.122(b)

Dear Mr. Dimond,

Please find enclosed your copies of the deposition of MARK E. WINTERS taken on December 18, 2019 in the above-referenced case. Also enclosed is the original signature page and errata sheets.

Please have the witness read your copy of the transcript, indicate any changes and/or corrections desired on the errata sheets, and sign the signature page before a notary public.

Please return the errata sheets and notarized signature page to our office at 711 N 11th Street, St. Louis, MO 63101 for filing prior to trial date.

Sincerely,

Paula A. Morsch

ERRATA SHEET

Witness Name: MARK E. WINTERS

Case Name: Petition of Emerald Polymer Additives, LC for an Adjusted Standard from 35 Ill. Adm. Code 304.122(b)

Date Taken: DECEMBER 18, 2019

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Witness Signature: _____

STATE OF _____)

COUNTY OF _____)

I, MARK E. WINTERS, do hereby certify:

That I have read the foregoing deposition;

That I have made such changes in form and/or substance to the within deposition as might be necessary to render the same true and correct;

That having made such changes thereon, I hereby subscribe my name to the deposition.

I declare under penalty of perjury that the foregoing is true and correct.

Executed this _____ day of _____, 20___, at _____.

_____

MARK E. WINTERS

_____

NOTARY PUBLIC

My Commission Expires:

84958