BEFORE THE POLLUTION CONTROL BOARD
OF THE STATE OF ILLINOIS

ORIGINAL

In the Matter of the Petition of Saline County	)	**AS 2016-001**
	)	**(Adjusted Standard)**
Landfill, Inc., for an Adjusted Standard	)	
	)	
	)	

NOTICE

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PLEASE TAKE NOTICE that I have today filed with the office of the Clerk of the Pollution Control Board an **APPEARANCE** and **RECOMMENDATION TO PETITION FOR ADJUSTED STANDARD**, copies of which are herewith served upon you.

Respectfully submitted,

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY,

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1021 North Grand Avenue, East
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217/782-5544
217/782-9143 (TDD)
Dated: September 1, 2015

BEFORE THE POLLUTION CONTROL BOARD
OF THE STATE OF ILLINOIS

In the Matter of the Petition of Saline County	)	**AS 2016-001**
	)	**(Adjusted Standard)**
Landfill, Inc., for an Adjusted Standard	)	
	)	
	)	

APPEARANCE

The undersigned hereby enters his appearance in the above-captioned matter as counsel for the Illinois Environmental Protection Agency.

Respectfully submitted,

James M. Kropid

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1021 North Grand Avenue East
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Dated: September1, 2015

BEFORE THE POLLUTION CONTROL BOARD
OF THE STATE OF ILLINOIS

In the Matter of the Petition of Saline County Landfill, Inc., for an Adjusted Standard	)	**AS 2016-001 (Adjusted Standard)**

RECOMMENDATION TO PETITION FOR ADJUSTED STANDARD

NOW COMES the Illinois Environmental Protection Agency ("Illinois EPA"), by one of its attorneys, James Kropid, Assistant Counsel, and, pursuant to 35 Ill. Adm. Code Part 104.416, hereby submits a recommendation ("Recommendation") to the Illinois Pollution Control Board ("Board") in response to the Petition of Saline County Landfill, Inc. ("Petition") filed by Saline County Landfill, Inc. ("Petitioner") on July 17, 2015. The Petitioner is seeking adjusted standards, pertinent to the Saline County Landfill, that will: modify the detection and assessment monitoring parameter lists; modify the applicable groundwater quality standards for ammonia and chloride pursuant to 35 Ill. Adm. Code Part 811.320(a)(1)(B); and establish and implement groundwater protection standards.

The Illinois EPA recommends that, subject to Paragraph 11 of this Recommendation, the Board grant the adjusted standard requests. In support and in explanation of this recommendation, the Illinois EPA states as follows:

BACKGROUND

1. The Saline County Landfill ("Landfill" or "the facility") is located at 5000 Whitesville Road, Harrisburg, Illinois 62946. The Landfill is approximately 20.5 in area and is situated along the west side of Saline County Highway 5.

2. The Illinois EPA Identification Number for this site is 1658080001. The Landfill is currently operating under the terms and conditions of permit number 1996-147-LFM ("Permit"). (Petition Appendix G.). Of specific import to the current Petition is the groundwater monitoring provision found at Permit Condition VIII.13. (Petition Appendix G at 510.)

3. Coal strip mining operations occurred at the site location between 1959 and 1965. One byproduct of the mining operations is commonly referred to as acid mine drainage ("AMD"). (Petition at 19.) AMD related groundwater quality changes frequently cause statistically significant increases ("SSIs") in concentration for inorganic and heavy metal parameters. (Petition at 13.)

4. Additionally, there are physical limitations on the installation of upgradient wells which would be capable of providing representative groundwater water quality data. (Petition at 13.)

5. While the Petitioner has attempted to resolve background groundwater quality standard concerns associated with the Permit and with 35 Ill. Adm. Code Part 811.320, these efforts have been hindered by the fact that it has been extremely difficult to characterize background water and its impact on the Landfill and to statistically develop representative background groundwater quality standards because of the groundwater quality changes associated with AMD or with naturally occurring hydrodynamic geochemical conditions. (Petition at 13.)

6. Therefore, the Petitioner has requested adjusted standards to allow for modification of the parameters which are monitored in the detection monitoring program and in the assessment monitoring program. The request seeks to eliminate or adjust the monitoring of

constituents that are influenced by concentration changes associated with AMD or other naturally occurring conditions. (Petition at 12.)

7. The Petitioner is also requesting an adjusted standard to develop site specific groundwater protection standards which would serve as triggers for determining when groundwater changes necessitate corrective action. (Petition at 14.)

8. The Board has not yet accepted the Petition, which was filed on July 17, 2015, and received by the Illinois EPA on July 20, 2015, and has made no finding as whether the Petition satisfies the content requirements of 35 Ill. Admin. Code 104.406. Carol Webb has been assigned as Hearing Officer in this matter.

9. This recommendation is submitted pursuant to 35 Ill. Admin. Code 104.416, which requires the Illinois EPA to file a recommendation with the Board within 45 days after the filing of this Petition.

COMMENTS ON A SPECIFIC REQUESTS PRESENTED IN THE PETITION

10. On August 28, 2015, the Petitioner and the Illinois EPA discussed the inclusion of both total and dissolved ammonia in the adjusted standard request. Specifically, the Petitioner had requested that the Illinois General Use Water Standard of 15 mg/L be approved as an adjusted standard modified background concentration for total and dissolved ammonia. (Petition at 27.) While dissolved ammonia is a good indicator constituent and should be retained on the detection monitoring list, total ammonia is not on the Landfill's monitoring list and it is not monitored in the Landfill's groundwater even during assessment monitoring, as the constituent is not included in the 35 Ill. Adm. Code Part 620 or 40 CFR 258 Appendix II lists. During the discussion, the Petitioner confirmed that there is no scenario where the monitoring of total ammonia is necessary. As a result, the Petitioner told the Illinois EPA that any adjusted standard

request related to total ammonia will not be pursued. The Illinois EPA presumes that this fact will subsequently be made known to the Board. In light of this development, the Illinois EPA will make no comment or recommendation concerning total ammonia.

11. As part of the adjusted standard, the Petitioner has requested that specific conductance continue to be monitored as part of the Landfill's field parameter list but not subject to statistical analysis to define increases in concentration to trigger the need for assessment monitoring. However the Petition does not include sufficient technical justification, including the necessary graphic technical analysis data, to support a modification for specific conductance. The Illinois EPA cannot make a recommendation for exempting specific conductance from the currently required statistical analyses without first reviewing the Petitioner's complete technical justification. Therefore no recommendation concerning an adjusted standard for specific conductance will be made in this filing before the Board.

SECTION 104.406 FACTORS

In order for the Board to grant the request for an adjusted standard, the Petitioner must satisfactorily address all informational requirements set forth in the Board's procedural regulations (35 Ill. Adm. Code Part 104.406). The Petitioner has organized the Petition into two sections. The first section requests modification of the detection and assessment monitoring parameter lists. (Petition Article II.1 at 26.) The second section requests groundwater protection standards. (Petition Article II.2 at 63.) Both adjusted standard requests have been organized in accordance with requirements of Part 104.406. The Illinois EPA must respond to each issue raised by these requirements and will separately address each the informational requirement for both of the requests.

The Board should be aware that the Petitioner provided the Illinois EPA with a draft adjusted standard petition for review and comment in December of 2011. Since that time, numerous discussions and information exchanges pertaining to the issues associated with the adjusted standard requests have occurred between the Petitioner and the Illinois EPA. (See e.g. Petition Appendix I.) Through this "pre-filing" review process, the Petitioner has satisfactorily addressed the questions and comments raised by the Illinois EPA and much of the information gathered as a result of this review process has been incorporated into the current Petition.

Petition for Modification of Parameter Lists and Adoption of an Adjusted Standard Modified Chloride and Ammonia Background Concentration

The first adjusted standard requests a modification of the monitoring parameter list to eliminate constituents that are affected by acid mine drainage and/or the elimination of constituents that are unlikely to act as potential sources of contamination. The Petitioner has proposed eleven Permit List G1 constituents that would undergo statistical groundwater quality evaluation to provide potential indication of potential releases of leachate. The Petitioner has proposed that eight additional Permit List G1 constituents be retained in the parameter list for trend analysis. (Petition at 22.)

The Petitioner also requests an adjusted standard to modify the total and dissolved chloride applicable groundwater quality standard ("AGQS") to 200 mg/L. This standard is based on the Illinois Class I Groundwater Quality Standard 35 Ill. Adm. Code Part 620.410.

Lastly, The Petitioner has proposed that dissolved and total ammonia be exempted from statistical trend analysis and that instead, pursuant to 35 Ill. Adm. Code Part 811.320(a)(1)(B), the Illinois General Use Water Standard of 15 mg/L be approved as an adjusted standard modified background concentration for total and dissolved ammonia.

Section 104.406(a) – Standard from which adjusted standard is sought

The Illinois EPA does not take issue with the Petitioner's statements on this subject.

Section 104.406(b) – Regulation of general applicability

The Illinois EPA does not take issue with the Petitioner's statements on this subject.

Section 104.406(c) – Level of justification

The Illinois EPA does not take issue with the Petitioner's statements on this subject.

Section 104.406(d) – Petitioner's activities

The Illinois EPA does not take issue with the Petitioner's statements on this subject.

Section 104.406(e) – Efforts necessary to comply

The Illinois EPA does not take issue with the Petitioner's statements on this subject.

Section 104.406(f) – Proposed adjusted standard

The Illinois EPA does not take issue with the Petitioner's statement on this subject.

Section 104.406(g) – Quantitative and qualitative impact on the environment

The Illinois EPA does not take issue with the Petitioner's statement on this subject.

Section 104.406(h) – Justification of the proposed adjusted standard

The Petitioner has provided technical demonstrations in support of the proposed adjusted standards. (Petition Appendix A at 117.) The Illinois EPA's specific comments on the technical demonstrations are provided herein.

Dissolved Ammonia

Because ammonia tends to be elevated in the leachate, it provides one of the more valuable indicator constituents and therefore should not be deleted from the monitoring parameter list at the present time.

In a previous draft adjusted standard petition submitted to the Illinois EPA for review, the Petitioner had proposed a revised AGQS for dissolved ammonia of 7.52 mg/L. It appeared that the Petitioner had proposed a background value calculated from the upgradient well but did so incorrectly and as a result, that value was deemed non-representative. (Petition Appendix I at 592.) The Petitioner is now stating that any such value is non-representative due to the groundwater flow path limitations and microbial catalyzed reactions. Therefore, the Petitioner proposes use of the General Use Water Standard of 15 mg/L. The Petitioner's rational is that it appears technically reasonable to assign a Board adjusted standard that is approximately twice the statistical concentration determined from the one upgradient minespoil well since upgradient well G22S concentrations are approximately half the average concentration observed at downgradient monitoring wells.

Review of the temporal ammonia concentration graph indicates that ammonia concentrations are increasing in nearly all minespoil wells. Upper Shale monitoring wells R14D and G19D also reflect similar timing of the increases of ammonia concentrations but other upper shale wells do not exhibit an increasing trend. When plotted against chloride concentrations, ammonia concentrations in the leachate correlate closely. Since chloride is conservative in terms of degradation and attenuation, this relationship provides evidence that increases in the concentrations of ammonia in groundwater are not solely the result of the facility. It would be expected that if a release from the facility were to occur, and influence ammonia concentrations, that dissolved chloride would also increase in some relative proportion. This line of reasoning can be extended to quantitative comparison of the constituents: chloride concentrations at well G17S have increased by a factor of 3.5 while ammonia concentrations at well G17S have increased by a factor of approximately 17. This

disproportionate relationship lends support to the petitioner's justification that ammonia concentrations in well G17S are not solely the result of the Landfill and can be distinguished as such. The Illinois EPA agrees that calculation of a background value from the facility's upgradient well for the parameter dissolved ammonia is not representative of site-wide groundwater quality due to flow limitations and potential microbial activity. That said, a numerical standard of 15 mg/L based on the General Use Water Standard will not provide lasting relief as it is apparent that various wells would still be subject to an alternative source demonstration. Since it is not possible to derive a statistically representative revised background concentration for dissolved ammonia, the Petitioner has proposed an alternate compliance limit of 15 mg/L.

Illinois EPA recommends that an alternate compliance limit of 15 mg/L (based on the General Use Water Standard in 35 Ill. Adm. Code Part 302.212) be used in lieu of an AGQS developed by means of statistical evaluation of background data and that dissolved ammonia remain as part of the facility's detection monitoring program. It is also recommended that dissolved ammonia be exempt from the statistical analysis requirements of Permit Condition VIII.13(b, d, and e) and instead be subject to the temporal trend analysis required in Permit Condition VIII.13(a).

Dissolved Arsenic

Dissolved arsenic is proposed to be retained as part of the facility's detection monitoring list utilizing the currently permitted AGQS. Based on a review of the groundwater and leachate data, leachate concentrations are significantly elevated relative to groundwater concentrations in the shallow and deep wells. Therefore, dissolved arsenic appears to be a good

indicator of possible leachate release. It is recommended that dissolved arsenic be retained as part of the facility's detection monitoring list utilizing the currently permitted AGQS.

Dissolved Boron

Dissolved boron is proposed to be retained as part of the facility's detection monitoring list utilizing the currently permitted AGQS. Based on a review of the groundwater and leachate data, leachate concentrations are significantly elevated relative to groundwater concentrations in the shallow zone and elevated relative to groundwater concentrations in the deep zone. Therefore, dissolved boron appears to be a good indicator of possible leachate release. It is recommended that dissolved boron be retained as part of the facility's detection monitoring list utilizing the currently permitted AGQS.

Dissolved and Total Cadmium

Review of the scatterplot of cadmium versus sulfate and cadmium versus pH indicates that several of the highest cadmium concentrations are detected in samples that have high sulfate concentrations. Likewise, several of the elevated cadmium concentrations are detected in samples with low pH conditions. However, not all of the samples which have elevated sulfate concentrations have elevated cadmium concentrations and not all of the low pH samples exhibit elevated levels of cadmium. It is therefore apparent that elevated cadmium levels are not detected in all instances where acid mine drainage conditions exist. Partitioning coefficient data indicates that cadmium partitioning coefficients decrease as the pH levels decrease and therefore less cadmium is partitioned in the soil or aquifer matrix as the pH levels decrease. As such, it is anticipated that cadmium will be desorbed from the aquifer matrix and be detected in groundwater at higher concentrations as the pH levels decrease. Three mine spoil samples were collected from the perimeter of the landfill in October 2011. The samples

were stored until 2013 when they were subdivided and shipped for analysis. Leaching tests conducted on the samples indicate that on average the TCLP extraction (8 ug/L) appeared to result in concentrations twice that of the levels observed with the deionized water leaching procedure (4 ug/L) The Petitioner states that both the total cadmium concentrations in the spoil and the TCLP extract concentration from the shallow minespoil leaching are consistent with the groundwater concentrations which have been observed at the site. Based on the leachable cadmium concentrations present in the minespoil and shale, a theoretical release of leachate into the groundwater would not likely be discernible due to the elevated background concentrations. Additionally, the Petitioner states that since the elevated groundwater cadmium concentrations have been derived from water contact with the minespoil and shale matrix, it is unlikely that this condition will change.

Review of Figure 8 indicates that a relationship likely exists between depressed pH levels and the concentration of cadmium in wells G23D, G19D, and G16D such that elevated dissolved cadmium concentrations occur in association with increased acidity. (Petition Figure 8 at 651.) Elevated dissolved cadmium concentrations at well G16D were not observed until the middle of 2003 after the pH had decreased below 6.0 S.U. in early 2013. The pH levels at well G16D then increased to levels above 6.0 S.U in the middle of 2007 at which time cadmium concentrations decreased below the AGQS. Elevated dissolved cadmium concentrations in well G23D during the middle of 2007 correspond to decreased pH levels first observed in late 2006. Increased dissolved cadmium concentrations in well G19D in 2011 were preceded by pH decreases during the previous six quarters. The majority of the bedrock wells which have not experienced prolonged periods of pH below 6.0 S.U. have not exhibited persistently elevated dissolved cadmium concentrations. It appears that cadmium in the shale is

likely solubilized by pH decreases in the groundwater. Additionally, the Petitioner states that acid drainage conditions which are prevalent in the minespoil have also influenced portions of the bedrock that are hydraulically connected to the minespoil since the bedrock wells are prone to the vertical downward leakage of minespoil influenced groundwater in the upper fractured portion of the shale where the wells are screened.

The Petitioner notes that bedrock well AGQSs are inversely related to the pH levels at the shale monitoring wells. The bedrock wells which are hydraulically connected to the minespoil and exhibit similarly depressed pH levels as the minespoil wells tend to have higher intrawell values than other bedrock wells. Well G19D has exhibited pH levels ranging between 5.0 and 6.0 S.U and has an intrawell dissolved cadmium AGQS of 20 ug/L whereas the other shale wells which have average pH levels greater than 6.0 S.U. tend to have permitted intrawell AGQSs of 5.0 ug/L.

Since elevated concentrations of the constituent exist in the minespoil and shale deposits and it does not appear possible to discern any change in groundwater concentrations which might be attributed to a release from the Landfill, it is agreed that continued monitoring of this constituent will result in false positive detections due to acid mine drainage influences and leaching of the metal from the spoil and shale. Therefore, it is recommended that dissolved and cadmium be removed from the facility's detection and assessment monitoring lists. It is also recommended that total cadmium continue to not be included in the facility's detection monitoring list and be removed from the facility's assessment monitoring list for the minespoil and upper shale units.

Dissolved and Total Chloride

The Petitioner requests that chloride be exempt from the statistical requirements of Permit Condition VIII.13 and that the Class I Standard for chloride (200 mg/L) be used as the AGQS and as the groundwater protection standard.

The Petitioner has addressed the Illinois EPA concerns with respect to calculation of a background value for chloride that is representative of background groundwater quality. (See Petition Appendix I at 604.) The Petitioner does not attribute all of the chloride variations to upwelling of brines from the deeper formation, but instead makes a case that upwelling is viewed as a factor which, in addition to other site-specific factors, further complicates the determination of representative background values. The primary factor inhibiting the development of representative background levels is that the groundwater from the one upgradient minespoil well has limited contact time with the minespoil and is incapable of geochemically characterizing groundwater due to the length of the flow path and duration of contact with the minespoil material. It is believed that the limited contact with minespoil material is the reason that the Petitioner has not previously sought a Class IV groundwater designation since, for chloride, the standard would be the existing concentrations at the upgradient well. These concentrations are considerably lower than concentrations observed in downgradient monitoring wells.

Given the limitations calculating a value representative of background groundwater quality, it is recommended that chloride be exempt from the statistical requirements of Permit Condition VIII.13(b, d, and e) and instead be subject only to the temporal trend analysis required in Permit Condition VIII.13(a). Additionally, given the limitations on development of representative background levels for both the minespoil and shale units, it appears to be

appropriate that a non-statistical standard (Class I Standard) be used as the groundwater protection standard which will gauge the effectiveness of source control measures in meeting the requirements of 35 IAC 811.325(e) and (f). It is also recommended dissolved and total chloride remain as part of the facility's detection monitoring list and total chloride shall remain as part of the facility's assessment monitoring list.

Dissolved Chromium

Dissolved chromium is proposed to be retained as part of the facility's detection monitoring list. The Petitioner has previously proposed to develop intrawell AGQSs via significant permit modification for the lacustrine unit wells and the shale wells beneath the lacustrine unit and utilize the existing permit interwell AGQS/Maximum Allowable Predicted Concentration ("MAPC") for the minespoil and shale wells not underlying the lacustrine unit. Based on a review of the groundwater and leachate data, leachate concentrations are elevated relative to concentrations in the shallow zone and deep zone. Therefore, dissolved chromium appears to be a good indicator of possible leachate release and the proposal to retain dissolved chromium in the facility's detection monitoring list is appropriate and recommended.

The Petitioner states that since leachate concentrations are elevated compared to groundwater, it is recommended that total chromium be retained as an assessment monitoring parameter. This is appropriate and recommended.

Total Cyanide

Total cyanide is proposed to be retained as part of the facility's detection monitoring list utilizing the currently permitted background concentrations. Based on a review of the groundwater and leachate data, all groundwater and leachate concentrations have been less than the reporting limits with the exception of several samples collected from wells L36R and

L302. It appears that while leachate concentrations are low and inconsistent, potential exists for elevated groundwater concentrations due to the heterogeneous waste conditions. Therefore, the proposal to retain the parameter total cyanide in the facility's detection monitoring list is appropriate and recommended.

Dissolved and Total Lead

Dissolved lead should be retained in the facility's detection and assessment monitoring list for the minespoil and upper shale units since neither the minespoil nor shale wells are prone to persistent dissolved lead exceedances which can be attributed to acid mine drainage conditions. Total lead should be retained in the facility's assessment monitoring list for the minespoil and upper shale units. It is recommended that in instances where the permit required reporting limits cannot be achieved due to matrix interferences, the analytical results not be deemed to represent an AGQS/MAPC exceedance. Instead, it is recommended that the wells for which the required reporting limits cannot be achieved due to matrix interferences should undergo one round of verification monitoring in attempt to meet the reporting limits. If the permit required reporting limit cannot be achieved, the results should be reported as less than the lowest quantitation limit the lab is able to achieve given the matrix interferences and the result not be deemed to represent a reportable AGQS/MAPC exceedance since no quantifiable concentrations will have been reported by the laboratory.

Dissolved Magnesium

Dissolved magnesium is proposed to be removed from the facility's detection monitoring list. Based on a review of the groundwater and leachate data, concentrations of total magnesium (not dissolved as presented) in both the minespoil and the shale monitoring wells tend to be greater than leachate concentrations. Although box plots and analytical data

for dissolved magnesium from leachate wells are provided, dissolved magnesium is not a parameter that is analyzed in the leachate, but has been presented as though it is analyzed. Although no increasing concentration trends exist for this parameter and groundwater concentrations are elevated relative to leachate concentrations, there have been detections of total magnesium in the leachate. Therefore, it is recommended that dissolved magnesium be retained in the list of detection monitoring parameters. It is also recommended that dissolved magnesium be exempt from the statistical analyses required by Permit Condition VIII.13 (b, d and e) and instead subject only to the temporal trend analysis required in Permit Condition VIII.13(a).

Dissolved Mercury

Dissolved mercury is proposed to be retained as a part of the facility's detection and assessment monitoring lists utilizing the currently permitted background concentrations. Based on a review of the groundwater and leachate data, leachate and groundwater concentrations are less than the reporting limits. However, as stated by the petitioner, the detection limits for mercury in the leachate are more than twice as high as the groundwater due to matrix interference issues. Therefore, potential exists that the leachate could contain mercury concentrations sufficient to result in an SSI in groundwater. As such, the proposal that dissolved mercury be retained as part of the facility's detection and assessment monitoring lists is appropriate and recommended.

Dissolved Nitrate

Dissolved nitrate is proposed to be retained as part of the facility's detection monitoring list utilizing the current permitted AGQS. Based on a review of leachate and groundwater data, leachate concentrations are similar to concentrations observed in the lacustrine unit wells and

slightly higher than the concentrations observed in either the minespoil or the shale unit wells. Since the potential exists that ammonia in the leachate could be transformed to nitrate if it enters the groundwater, the proposal to retain dissolved nitrate as part of the facility's detection monitoring list is appropriate and recommended.

Dissolved Sulfate

Dissolved sulfate is proposed to be removed from the facility's detection monitoring list. Based on a review of the leachate and groundwater data, concentrations in the minespoil and shale units are much higher than the leachate. It should be noted that dissolved sulfate concentrations from leachate have been provided in box plot format as well as tabular format. However, total sulfate rather than dissolved sulfate is the parameter that is analyzed in the leachate. Given that a correlation exists between decreasing pH and increasing ammonia concentrations and increasing sulfate concentrations, it is likely that the oxidation of pyrite in the minespoil and shale and the AMD contribute to the source of sulfate. However, there have been detections of total sulfate in the leachate. Furthermore, consistently increasing concentrations (e.g. well G17S) are not an expected geochemical response to AMD effects. Therefore, it is recommended that dissolved sulfate be retained in the list of detection monitoring parameters. It is also recommended that dissolved sulfate be exempt from the statistical analyses required by Permit Condition VIII.13 (b, d and e) and instead subject only to the temporal trend analysis required in Permit Condition VIII.13(a).

Total Dissolved Solids (TDS)

Based on a review of the leachate and groundwater data, concentrations in the shale and lacustrine units are similar to leachate while concentrations in the minespoil are much higher than leachate. Although AMD appears to influence sulfate concentrations and hence TDS

levels, TDS should be retained in the list of detection monitoring parameters since there have been detections of the constituent in leachate. It is recommended that TDS continue to be sampled as permitted. It is also recommended that TDS be exempt from the statistical analyses required by Permit Condition VIII.13 (b, d and e) and instead subject only to the temporal trend analysis required in Permit Condition VIII.13(a).

Dissolved Zinc

Review of the groundwater and leachate data indicate that leachate concentrations are significantly lower than concentrations observed in the minespoil and shale monitoring wells, but not the lacustrine unit monitoring wells. Although concentrations appear to vary as a function of AMD and leachate concentrations are not significantly elevated with respect to groundwater concentrations, total zinc has been detected in leachate. Therefore, it is recommended that dissolved zinc be retained in the facility's list of detection monitoring parameters and that total zinc be retained in the facility's list of assessment monitoring parameters. It is also recommended that dissolved and total zinc be exempt from the statistical analyses required by Permit Condition VIII.13 (b, d and e) and instead subject only to the temporal trend analysis required in Permit Condition VIII.13(a).

Total Organic Carbon (TOC)

TOC is proposed to not be included in the facility's adjusted standard modified detection monitoring list. TOC is currently not included in the facility's detection monitoring list. Based on a review of the groundwater and leachate data, leachate concentrations are significantly higher than groundwater concentrations. However, TOC was excluded from the 35 Ill. Adm. Code Part 811.319(a)(E)(2)(ii) detection monitoring list in 2007. The proposal to not include TOC as a part of the facility's detection monitoring list is appropriate.

Chemical Oxygen Demand (COD)

COD is proposed to not be included in the facility's detection or assessment monitoring lists. COD is currently not included in either of the facility's lists. Based on a review of the groundwater and leachate data, leachate concentrations are significantly higher than groundwater concentrations. However, the petitioner has stated that episodes of pronounced AMD are generally accompanied by increased COD concentrations making it difficult to distinguish between elevated COD concentrations attributed to AMD or the influence of a leachate release. Since COD is currently not included in the facility's detection or assessment monitoring lists, it is appropriate that COD not be included in the facility's detection monitoring list for the minespoil and upper shale units.

Biological Oxygen Demand (BOD)

BOD is proposed to not be included in the facility's detection or assessment monitoring lists. BOD is currently not included in either of the facility's monitoring lists. Based on a review of the groundwater and leachate data, a considerable contrast exists between the leachate and groundwater concentrations. However, due to the limited hold time, number of detection wells, and the remote geographic location of the facility with respect to laboratories, the petitioner requests that BOD not be included as part of the facility's detection or assessment monitoring lists. Given the limitations calculating a value representative of background groundwater quality and the potential for significant variation in BOD concentrations due to AMD conditions, it is recommended that BOD continue to not be included in the facility's detection monitoring list and removed from the facility's assessment monitoring list for the minespoil and upper shale units.

Bicarbonate Alkalinity

Bicarbonate alkalinity is proposed to be included in the facility's detection monitoring list. Based on a review of the groundwater and leachate data, leachate concentrations are significantly higher than groundwater concentrations. Therefore, the proposal to include bicarbonate alkalinity as part of the facility's adjusted standard detection monitoring list for the minespoil and upper shale units is appropriate and recommended.

pH

pH is proposed to be retained as part of the field parameter list but not be subject to the statistical analyses used to define statistically significant increases in concentrations which trigger the need for assessment monitoring. Review of the groundwater and leachate data indicates that leachate pH levels are generally more alkaline than minespoil pH levels and are similar to lacustrine unit and shale levels. Given the more alkaline nature of the leachate with respect to the minespoil, pH levels would likely be buffered by the acidic minespoil if a release from the facility were to occur. Since pH does not appear to be a useful indicator parameter for leachate releases, given the AMD conditions that exist at the site, it is appropriate that pH be exempt from the statistical analyses used to define SSIs which trigger the need for assessment monitoring. Therefore it is recommended that pH be exempt from the statistical analyses required by Permit Condition VIII.13 (b, d and e) and instead subject only to the temporal trend analysis required in Permit Condition VIII.13(a). It is also recommended that pH be retained as part of the field parameter list for the minespoil and upper shale units.

Total Antimony

Review of the leachate and groundwater data indicate that leachate concentrations are similar to groundwater concentrations in the deep wells and shallow wells. A scatter plot of

total antimony plotted against sulfate indicates that total antimony concentrations vary as a function of AMD rather than landfill related changes in groundwater quality. Furthermore, concentrations in the deep wells are more likely to be influenced by flow from the minespoil or acidic conditions resulting from oxidation of pyrite. Therefore, the request that total antimony not be included as a detection monitoring constituent or retained as an assessment monitoring constituent is appropriate and recommended.

Total Selenium

Total selenium is proposed to be removed from the facility's assessment monitoring list. Review of the leachate and groundwater data indicate that leachate concentrations have not been detected and are lower than groundwater concentrations. A scatter plot of total selenium plotted against sulfate indicates that total selenium concentrations in groundwater vary as a function of AMD rather than landfill related changes in groundwater quality. As such, it is appropriate that total selenium be removed from the facility's assessment monitoring list and continue to not be included in the facility's detection monitoring list for the minespoil and upper shale units.

Total Barium

Total barium is proposed to be included in the facility's detection monitoring list and be retained in the facility's assessment monitoring list. Review of the leachate and groundwater data indicates that leachate concentrations are elevated relative to groundwater concentrations. Also AMD conditions do not appear to result in significant fluctuation of concentrations. It is recommended that total barium should be included in the facility's detection monitoring list and should be retained in the facility's assessment monitoring list for the minespoil and upper shale units utilizing the currently permitted AGQSs.

Total Nickel

Data provided by the Petitioner shows that no linear relationship exists between sulfate and nickel and the highest nickel concentrations occur at wells which exhibit sulfate concentrations between 2,000 mg/L and 10,000 mg/L. (Petition Figure 18 at 661.) Additionally, the highest nickel concentrations are observed at wells with pH of approximately 6 S.U. However, the leach test results for EW-2 and EW-5 indicate that the minespoil contains sufficient leachable nickel such that the cause of relatively high concentrations observed at facility wells could not likely be identified based on comparison to a background value. As such, it is recommended that total nickel be removed from the facility's assessment monitoring list and continue to not be included in the facility's detection monitoring list for the minespoil and upper shale units.

Total Thallium

Total thallium is proposed to be removed from the facility's assessment monitoring list. Review of the leachate and groundwater data indicate that leachate concentrations have been below the reporting limit and fluctuations observed in the shallow and deep monitored units are a result of varied reporting limits between sampling events. Given that matrix interferences associated with the TDS and AMD have resulted in variations of the reporting limits and that concentrations in the leachate have not been detected, it does not appear that facility leachate is a significant potential source of this constituent and it is therefore appropriate that total thallium be removed from the assessment monitoring list for the minespoil and upper shale units.

Total Vanadium

Review of the groundwater and leachate data indicate that leachate concentrations are slightly elevated with respect to groundwater concentrations with the exception of G17S which has exceeded leachate concentrations. Since concentrations of total vanadium have been detected in facility leachate and the petitioner's statement that total vanadium concentrations suggest that AMD affects concentrations has not been adequately demonstrated, total vanadium should be retained as a constituent in the facility's assessment monitoring list for the minespoil and upper shale units utilizing the currently permitted AGQSs.

Dissolved and Total Iron

Review of the leachate and groundwater data indicate that dissolved iron concentrations in the minespoil and shale are greater than concentrations observed in the leachate and in the lacustrine unit. Since concentrations are greater at monitoring wells completed within the minespoil and the shale which are overlain by minespoil, concentrations appear to be dependent on AMD conditions. Since concentrations of total and dissolved iron, in conjunction with manganese, sulfate, and pH, are likely to provide strong indications of AMD conditions and thus may help facilitate the completion of alternate source demonstrations, it is recommended that dissolved and total iron be retained in the facility's assessment monitoring list for the minespoil and upper shale units as proposed by the petitioner. It is also recommended that dissolved and total iron be exempt from the statistical analyses required by Permit Condition VIII.13 (b, d and e) and instead subject only to the temporal trend analysis required in Permit Condition VIII.13(a). Dissolved and total iron should continue to not be included in the facility's detection monitoring list for the minespoil and upper shale units.

Dissolved and Total Manganese

As with concentrations of iron, groundwater concentrations of dissolved and total manganese are significantly higher than leachate concentrations. Since concentrations of total and dissolved manganese, in conjunction with iron, sulfate, and pH, are likely to provide strong indications of AMD conditions and thus may help facilitate the completion of alternate source demonstrations, dissolved and total manganese should be retained in the facility's assessment monitoring list for the minespoil and upper shale units. It is recommended that dissolved and total manganese be exempt from the statistical analyses required by Permit Condition VIII.13(b, d, and e) and instead subject only to the temporal trend analysis required in Permit Condition VIII.13(a). Dissolved and total manganese should continue to not be included in the facility's detection monitoring list for the minespoil and upper shale units.

Total Potassium

Review of the leachate and groundwater data indicate that leachate concentrations are significantly higher than groundwater concentrations. Since leachate concentrations are elevated with respect to groundwater concentrations and appear insensitive to AMD, total potassium should be included in the facility's detection monitoring list and should be retained in the facility's assessment monitoring list for the minespoil and upper shale units utilizing the currently permitted AGQSs.

Total Sodium

Review of the leachate and groundwater data indicate that leachate concentrations are higher than groundwater concentrations. Since leachate concentrations are elevated with respect to groundwater concentrations and appear insensitive to AMD, it is appropriate and recommended that total sodium be included in the facility's list of detection monitoring

parameters as proposed. As proposed by the petitioner, total sodium should be included in the facility's detection monitoring list and should be retained in the facility's assessment monitoring list for the minespoil and upper shale units utilizing the currently permitted AGQSs.

The Petitioner has also proposed the following constituents for retention or deletion from the monitoring lists. (See Petition Table 6 at 97.)

Total Cobalt

Review of the box plots (total cobalt comparison for shallow wells and deep wells) indicates that the minespoil wells and documented AMD-impacted bedrock wells exhibit total cobalt concentrations that are greater than typical leachate concentrations. Additionally, the provided scatter plots indicate that leachate cobalt concentrations in the minespoil and shale wells are not related to leachate concentrations.

The TCLP leach test on the minespoil samples indicate that elevated cobalt concentrations were released from each of the three minespoil samples. From the extraction test results, it appears that elevated cobalt concentrations are likely to occur due to percolation of groundwater through minespoil. Since total cobalt is easily solubilized from the minespoil at concentrations which are greater than the typical leachate concentrations, it is unlikely that monitoring for total cobalt will provide any useful indication of landfill impact. As such, it is recommended that total cobalt be removed from the facility's assessment monitoring list as requested.

Total Copper

Total copper concentrations observed in the minespoil and shale wells are similar to or slightly less than concentrations observed in the leachate wells. Additionally, the total copper

leach analysis of the minespoil samples indicate that total copper in the groundwater is, at least in part, attributable to leaching from the minespoil. Since total copper is contained in the minespoil and groundwater concentrations are very similar to leachate concentrations, it is believed that total copper is not an effective leachate indicator constituent or assessment monitoring parameter. As such, it is recommended that total copper be removed from the facility's assessment monitoring list.

Total Silver

Given that concentrations of total silver have not been detected in leachate since 2006, elevated total silver concentrations occur at the wells which have exhibited the characteristics of AMD, and the leach tests indicate that silver concentrations may be the result of leaching, it is recommended that total silver be removed from the facility's assessment monitoring list as it is believed that total silver is not an effective leachate indicator constituent.

Total Tin

Since total tin has not been detected in any of the samples collected from the minespoil or shale, it is apparent that relief is not necessary for this constituent. As such, total tin may be retained for assessment monitoring purposes since the potential for AMD related concentration fluctuations appears minimal.

Section 104.406(i) – Consistency with federal law

The Illinois EPA does not take issue with the Petitioner's statements on this subject.

Section 104.406(j) – Hearing

The Illinois EPA does not take issue with the Petitioner's statements on this subject.

Section 104.406(k) – Supporting documents

The Illinois EPA does not take issue with the Petitioner's statements on this subject.

Section 104.406(l) – Additional Information

The Illinois EPA does not take issue with the Petitioner's statements on this subject.

Adjusted Standard to Allow Development of Groundwater Protection Standards

The second adjusted standard seeks to establish Groundwater Protection Standard ("GPS") values which will act as trigger concentrations to determine the need to initiate corrective measures or additional source control measures. (Petition at 83.) Specifically, the Petitioner is asking the Board to approve the standards described in Tables 4, 5 and 6 of the Petition. (Petition at 79.) By proposing Class I potable groundwater standards as GPS, the Petitioner has utilized published groundwater standards which are recognized by the State of Illinois as being deemed protective of the environment.

Section 104.406(a) – Standard from which adjusted standard is sought

The Illinois EPA does not take issue with the Petitioner's statements on this subject.

Section 104.406(b) – Regulation of general applicability

The Illinois EPA does not take issue with the Petitioner's statements on this subject.

Section 104.406(c) – Level of justification

The Illinois EPA does not take issue with the Petitioner's statements on this subject.

Section 104.406(d) – Petitioner's activities

The Illinois EPA does not take issue with the Petitioner's statements on this subject.

Section 104.406(e) – Efforts necessary to comply

The Illinois EPA does not take issue with the Petitioner's statements on this subject.

Section 104.406(f) – Proposed adjusted standard

The Illinois EPA does not take issue with the Petitioner's statements on this subject.

Section 104.406(g) – Quantitative and qualitative impact on the environment

The Illinois EPA does not take issue with the Petitioner's statements on this subject.

Section 104.406(h) – Justification of the proposed adjusted standard

The Petitioner has provided a technical demonstration in justification of the proposed adjusted standard. (Petition Appendix A at 117.) The Illinois EPA's comments on the technical demonstration are provided herein.

Although 35 Ill. Adm. Code Parts 811.325 (e) and (f) recognize that pre-existing conditions unrelated to the landfill might exist which cause groundwater to be degraded to the extent that corrective action to achieve background concentrations is not practical, the regulations do not provide a means to determine what constitutes a "significant reduction in risk to actual or potential receptors." As such, due to the non-degradation requirements of 35 Ill. Adm. Code Part 811.319(a)(4)(A), the Illinois EPA has consistently and appropriately applied the most conservative non-degradation interpretation (i.e., restoration of background groundwater quality) as the relevant groundwater standard. Current regulatory guidance requires that the Illinois EPA utilize background groundwater quality determined pursuant to 35 Ill. Adm. Code Part 811.320 as the trigger concentration to assess the need for corrective action, whereas 35 Ill. Adm. Code Part 811.325(e) requires that the risk to actual or potential receptors be considered to establish the need for corrective action. In Tables 4, 5, and 6 of the Petition, GPSs are proposed as a numerical value that, if exceeded within the zone of attenuation ("ZOA"), would necessitate corrective action or additional source control measures. Thus, the GPSs will act as numerical standards which will be recognized as the effective concentrations for corrective action. If these GPS concentrations are exceeded due to

releases from the landfill, corrective action would be required to achieve the requirements of 35 Ill. Adm. Code Part 811.325(f).

The proposal to establish GPSs is in attempt to define numerical standards which will be used to assess potential risks to actual or potential receptors (35 Ill. Adm. Code Part 811.325(e)) and define remedial concentrations that are technically practical and reduce threats to human health and the environment (35 Ill. Adm. Code Part 811.325(f)). Pursuant to 40 CFR 258.55(4), the facility is required to develop GPSs if exceedances are identified which are associated with releases from the landfill. The Petitioner requests that the GPS requirements of 40 CFR 258.55(4) be made applicable to the Landfill to resolve the conflict between the non-degradation standards of 35 Ill. Adm. Code Part 811.319(a)(1)(A) and 35 Ill. Adm. Code Part 811.319(a)(4)(A)(iv) which define threat as an exceedance of the background standard at or beyond the ZOA, and 35 Ill. Adm. Code Parts 811.325(e) and (f) which indicate that risk-based considerations dictate the need for corrective action. The GPS values would be applicable within the ZOA and would apply to parameters which are not deleted or exempted from the Permit Condition VIII.13 statistical requirements. As stated, the background concentrations of constituents not deleted or exempted from the statistical requirements of Permit Condition VIII.A.13 would remain as the compliance standard for wells located at or beyond the ZOA and thus the proposed adjusted standard appears consistent with the non-degradation intent of the regulations.

Federal regulations in 40 CFR 258.55(h) require that the GPS values be set based on the promulgated maximum contaminant level ("MCL"), or for constituents where no MCL has been promulgated, the background concentration. If the background concentration is higher than the MCL, the background level shall be utilized in lieu of the MCL. The Class I Standards

of 35 Ill. Adm. Code Part 620.410 are equal to or lower than the federal MCLs, thus; the Class I Standards have been adopted in lieu of the MCLs. The proposed GPSs for the inorganic constituents are based on either background standards (where defined) or, in instances where the background levels cannot be readily defined due to site-specific limitations, on the Class I Standards. Similarly, the proposed GPSs for the organic List G2 constituents are also based on Class I Standards. If no Class I Standard has been promulgated by 35 Ill. Adm. Code Part 620.410, the proposed GPS values have been based on the practical quantitation level ("PQL"). The proposed GPSs for the majority of the List G2 constituents GPSs are based on the Unit AGQSs. The GPSs for the organic constituents at wells located within the ZOA shall be the Class I Standard if one exists, or if no Class I Standard exists, the existing Unit AGQS values shall constitute the effective compliance standard. Since the majority of the List G2 and 40 CFR 258 Appendix II assessment monitoring organic constituents have no promulgated Class I Standard, the groundwater non-degradation requirements of 35 Ill. Adm. Code Parts 811.319(a)(4)(A)(iv) and 35 IAC 811.320(a)(2) are maintained for the majority of the potential organic monitoring constituents. In these instances, the background concentrations will be based on the laboratory reporting limits or the PQL. The background levels and GPSs for the organic constituents will be based on the Unit AGQS values which more closely reflect the PQLs, which can consistently be achieved given the analytical methods and the matrix interferences that exist.

The proposed adjusted standard to create GPSs is deemed justified based on the lack of potential for beneficial use and due to the physical limitations in developing statistical background values using the methods provided in 35 Ill. Adm. Code Part 811.320(d). Pursuant to 35 Ill. Adm. Code Part 811.320(b)(4), the background levels need not meet the requirements

of 35 Ill. Adm. Code Parts 620.410 or 620.420 since the facility is located within an area where previous site activity has degraded the groundwater such that it is not possible to utilize the groundwater for beneficial purposes. However, the Petitioner has selected the more rigorous standards of 35 Ill. Adm. Code Part 620.410 in order to provide GPS values which are demonstrably protective of public health, welfare, and the environment. As stated, it appears the adjusted standard to implement GPS values is necessary to establish corrective action objectives that remain protective of human health and the environment while recognizing limitations associated with the background groundwater quality associated with the previous strip mine operations at the site.

A review of the Petition Tables indicates that the proposed GPS for dissolved arsenic is 50 ug/L and is based on the permitted AGQS. The proposed GPS for dissolved boron (2,000 ug/L for all units) is based on the Class I Standard. Review of Attachment 2 of the Permit indicates that the proposed GPS is less than the intrawell MAPC for wells G11S and G13S. (Petition Appendix G at 538.) The proposed GPS for dissolved chloride (200 mg/L for all units) and dissolved chromium (100 ug/L for all units) are based on the Class I Standards. The GPSs for total cyanide (0.005 mg/L for upper shale and minespoil and 0.010 mg/L for lacustrine) are lower than the Class I Standard and are based on the Unit AGQSs for the minespoil (0.005 mg/L). These are appropriate values. The GPS for dissolved ammonia (15 mg/L for all units) is based on the General Use Water Standard, 35 Ill. Adm. Code Part 302.212. Regardless, a GPS of 15 mg/L is appropriate for dissolved ammonia as the value will be used as an alternate compliance limit as requested. The proposed GPSs for TOC (8.3 mg/L for minespoil, 9.7 mg/L for lacustrine, and 5.7 mg/L for shale) are based on the currently permitted interwell value for the minespoil and shale and the highest permitted AGQS for the

lacustrine unit. These are appropriate. The GPS for dissolved mercury (2 ug/L for all units) is based on the Class I Standard. The proposed GPS is lower than the MAPC for the lacustrine unit (2.6 ug/L). The GPSs for total sodium (549 mg/L for minespoil, 186 mg/L for lacustrine, and 521 mg/L for shale) are based on the highest permitted intrawell AGQS for each unit. These are appropriate. The GPSs for total potassium (438 mg/L for minespoil, 18.8 mg/L for lacustrine, and 55.7 mg/L for shale) are based on the AGQS for the minespoil and shale and the highest intrawell AGQS for the lacustrine unit. These values are appropriate. The GPS for dissolved nitrate (10 mg/L for all units) is based on the Class I Standard. This is appropriate.

With the exception of dissolved ammonia, total cyanide, total and dissolved nitrate, TOC, and total and dissolved arsenic, proposed assessment monitoring constituent GPSs provided in Table 6 are based on the Class I Standards or PQLs for the majority of constituents. The proposed GPSs for the assessment monitoring list are appropriate.

As proposed by the Petitioner, the organic PQLs will remain as currently permitted. Revision to the PQLs will be addressed in an application for a significant modification and not recommended in this Petition. (Petition at 85.)

Section 104.406(i) – Consistency with federal law

The Illinois EPA does not take issue with the Petitioner's statements on this subject.

Section 104.406(j) – Hearing

The Illinois EPA does not take issue with the Petitioner's statements on this subject.

Section 104.406(k) – Supporting documents

The Illinois EPA does not take issue with the Petitioner's statements on this subject.

Section 104.406(l) – Additional Information

The Illinois EPA does not take issue with the Petitioner's statements on this subject.

CONCLUSION

For the reasons more fully set forth herein and in the Petition, the Illinois EPA recommends:

That, subject to Paragraph 11 of this Recommendation and its comment regarding specific conductance, the Petitioner's request for adjusted standards to modify the Landfill's detection and assessment monitoring parameter lists and to modify the applicable groundwater quality standards for ammonia and chloride be granted; and

That the Petitioner's request to establish Groundwater Protection Standards for the List G1 constituents provided in Table 4 and the List G2 constituents provided in Tables 5 and 6 be granted.

Respectfully submitted,

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY,

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Dated: September 1, 2015

CERTIFICATE OF SERVICE

I, the undersigned, hereby state that on September 1, 2015, I served the **APPEARANCE** and **RECOMMENDATION TO PETITION FOR ADJUSTED STANDARD**, by placing true and correct copies thereof in properly sealed and addressed envelopes and by depositing said sealed envelopes in a U.S. mail drop box located within Springfield, Illinois, with first class postage affixed, upon the following named persons:

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Illinois Pollution Control Board
James R. Thompson Center
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