BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF		
RCRA DELISTING ADJUSTED STANDARD PETITION OF PEORIA DISPOSAL COMPANY	)	**AS 08-10 (Adjusted Standard – Land) (RCRA Delisting)**

RESPONSE OF PEORIA DISPOSAL COMPANY TO ATTACHMENT A TO THE HEARING OFFICER ORDER ENTERED ON JULY 15, 2008

NOW COMES Peoria Disposal Company ("PDC"), by its attorneys, Elias, Meginnes, Riffle & Seghetti, P.C. and Brown, Hay & Stephens, LLP, and as and for its response to the questions listed in Attachment A to the Hearing Officer Order entered on July 15, 2008, relating to the RCRA Delisting Adjusted Standard Petition (the "Petition"), served pursuant to the Hearing Officer Order entered on June 17, 2008, states as follows:

On July 15, 2008, the Pollution Control Board asked PDC to address issues raised in Attachment A to the Hearing Officer Order entered on such date. Attached herewith as Exhibit A is a document responding to Attachment A to the Hearing Officer Order entered on July 15, 2008, prepared by RMT, Inc., the consultant that prepared the Technical Support Document (Exhibit 2 to the Petition). Exhibit A (with the attachments thereto) is incorporated herein as and for the Response of PDC to the questions listed in Attachment A to the Hearing Officer Order entered on July 15, 2008.

Dated: August 6, 2008

Respectfully submitted,

PEORIA DISPOSAL COMPANY,
Petitioner

By: _____
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EXHIBIT A

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF

RCRA DELISTING ADJUSTED STANDARD	)	AS 08-10
PETITION OF PEORIA DISPOSAL COMPANY	)	(Adjusted Standard – Land)
	)	(RCRA Delisting)

TECHNICAL RESPONSES TO ATTACHMENT A TO THE HEARING OFFICER ORDER ENTERED ON JULY 15, 2008

1. ***Please describe any treatment operating guidelines Peoria Disposal Company (PDC) has concerning curing times based on weather conditions.***

   PDC currently has no treatment operating guidelines concerning curing times based on weather conditions. Special condition X (E)(14)(e)(iv) of PDC's operating Permit, RCRA Part B Permit Log No. B-24R (Part B), requires that: "At a minimum, for all wastes, unless each container (roll-off box) is sampled separately, the treated batch must receive the same amount of curing time as the sample that demonstrates compliance with the LDR standard during the bench study of the waste." This condition ensures that field curing time is at least that amount proven successful as part of the laboratory treatability study.

   Part B special condition X (E)(14)(e)(ii) requires, in pertinent part, that "...a minimum of two samples must always be analyzed to demonstrate compliance." This condition requires a laboratory analysis that effectively demonstrates that no individual variable, including but not limited to reagent proportions, process controls, mixing effort, curing time, and/or weather conditions resulted in inadequate treatment. Proposed condition 3(b) of the Petition will likewise require that each treated batch be analyzed. Analyzing each treated batch is an extremely rigorous quality control measure that will verify the satisfactory control of all contributing process variables, including weather conditions.

   The referenced Part B conditions are included herewith as Attachment 1.

2. ***Please explain PDC's position on whether its shipments of electric arc furnace dust stabilization residue (EAFDSR) that meet delisting levels would be subject to the Board's "special waste" regulations, including manifesting requirements (35 Ill. Adm. Code 808,809).***

   It is PDC's position that EAFDSR meeting the delisting levels could be managed as an Illinois "non-special waste." This position regarding the regulatory definition of delisted wastes was so stated to the Illinois Environmental Protection Agency (IEPA) in a request-for-guidance letter dated January 3, 2008. In its response letter dated May 13, 2008, the

IEPA agreed with PDC's position that successfully delisted waste may be managed as an Illinois "non-special waste." Both letters are provided herewith as Attachment 2.

Non-special wastes are not subject to the manifesting requirements. That notwithstanding, PDC maintains an extensive electronic database of all non-special wastes shipped and received by its facilities, and requires bills of lading as hard-copy tracking documents for each shipment. These documents become part of the facility operating record and are available for and subject to IEPA inspection. It should also be noted that copies of non-hazardous waste manifests, including those representing special wastes, are no longer distributed to the IEPA.

3. ***Please comment on the appropriateness of including a condition in the adjusted standard language requiring that PDC, before transporting an initial load of delisted EAFDSR to a given disposal facility, provide the Illinois Environmental Protection Agency (IEPA) with a one-time written notification identifying that disposal facility. How many days before transporting those initial loads to the respective disposal facilities can PDC reasonably provide such notification?***

PDC would not object if the Board included such a condition in the adjusted standard. Presumably, such a condition would be intended only to provide the IEPA with a record of each disposal facility to which EAFDSR was shipped, and not for review and pre-approval of proposed receiving facilities. As such, PDC believes that any such condition should require notification no more than 15 days in advance of the first shipment. PDC proposes the following language for the adjusted standard:

"PDC, at least 15 calendar days before transporting an initial load of delisted EAFDSR to a given disposal facility, shall provide the Illinois Environmental Protection Agency (IEPA) with a one-time, written notification identifying that disposal facility. The notification submittal shall be addressed as specified in condition 5."

4. ***Please comment on the appropriateness of requiring PDC to provide IEPA with written notice of any "significant change" and the results of the bench-scale treatability testing prior to operating full-scale treatment using the new chemical regimen.***

   a) ***PDC's petition states that "significant change" would "mean the utilization of a chemical treatment regimen containing different active ingredients." Petition at 18. Please explain whether this definition of "significant change" should be a part of the adjusted standard conditions.***

   b) ***PDC has provided a "Reagent Constituent of Concern Evaluation" in its petition for the current recipe. Please comment on how verification under proposed condition 3(b) would ensure evaluation of potential constituents of concern (COCs) when changing the chemicals used by PDC in the treatment process.***

Although PDC believes it would be equally appropriate and effective to maintain the subject information as part of its operating record subject to IEPA inspection, PDC would not object to a condition requiring notice to the IEPA of any significant change and the results of the bench-scale treatability testing prior to operating full-scale treatment using the new chemical regimen. Presumably, such a condition would be intended only to provide the IEPA with a record of the technology modification demonstration and treatability testing, and not for review and pre-approval of the demonstration. As such, PDC believes that any such condition should require notification no more than 15 days in advance of adopting the modification in the full-scale treatment process.

PDC believes it would be appropriate to define significant change as part of the adjusted standard conditions.

Chemicals that PDC purchases as treatment reagents are of known and documented chemical composition. To the extent possible, PDC would evaluate each chemical for its potential to contribute COCs using MSDS sheets, product specification sheets, supplier process knowledge, and/or laboratory analytical data provided by the chemical supplier, all of which are typically available and provided. In the event that the absence of COCs could not be verified by those means, PDC would arrange for laboratory analysis of a representative sample for any constituents reasonably expected to be present at a concentration of concern. This would be similar to the existing regulations that allow generator knowledge to be used in evaluation of a decharacterized hazardous waste for the presence of underlying hazardous constituents (35 Ill. Adm. Code 728.102). This requirement would also be similar to the Part B condition regarding known-composition waste products. Specifically, special condition X.(G)(6)(e)(5) (provided herewith as Attachment 3) allows that: "Off-specification, unused or discarded commercial chemical products may use a MSDS to determine the hazardous constituents present and appropriate USEPA hazardous waste class, if applicable, in lieu of analytical results."

PDC proposes that the following language be added to proposed condition 3(b)of the RCRA Delisting Adjusted Standard Petition of Peoria Disposal Company (Petition):

***

"Prior to adopting any significant change in treatment chemicals as part of the full-scale treatment process, PDC shall evaluate each new chemical or chemical treatment regimen for the presence of potential constituents of concern (COCs). The evaluation shall include, but not be limited to the consideration of producer knowledge, MSDS sheets, producer specification sheets, and/or producer- or PDC-supplied analytical data, as necessary to identify any potential COCs reasonably expected to be present at concentrations of concern in the EAFDSR resulting from a new chemical treatment regimen. The universe of potential COCs that must be considered is the same as that considered for the Petition. To eliminate a constituent from further evaluation, the concentration must be no greater than the screening concentrations determined and modeled for the Petition as they appear

in Tables 3a, 3b, 3c, and 8 of the Technical Support Document for the RCRA Delisting Adjusted Standard Petition for PDC EAF Dust Stabilized Residue (TSD), which was included with the Petition as Attachment 2. If the concentration of a potential COC in the EAFSDR resulting from the proposed chemical treatment regimen is determined to be greater than that analyte's screening concentration, or for any constituents detected but not present on the previously referenced tables, PDC shall conduct a further evaluation, which may include running the then-approved version of the DRAS model (or other appropriate model or risk assessment method) with the inputs reflecting the EAFDSR concentrations as treated with the proposed chemical. PDC may proceed with the change in treatment chemical or chemical treatment regimen as part of the full-scale treatment process only if the evaluation demonstrates that the treated EAFDSR does not exceed the target human health and environment risk factors upon which the approved Petition is based (see Section 6.3.2 of the TSD).

PDC, at least 15 days before adopting any significant change in the full-scale treatment process, shall submit a report of the technology modification demonstration and bench-scale treatability testing to the IEPA, addressed as specified in condition 5. The Board recognizes that insofar as the submittal contains confidential business information (CBI) regarding a specific proprietary chemical or chemical treatment regimen, PDC may redact such CBI from its submittal to the IEPA.

For the purpose of this condition, significant change is defined as the utilization of any new chemical or chemical treatment regimen containing active ingredients different from those utilized in the full-scale, in-plant trials represented in the Petition."

5. ***Please comment on the appropriateness of including a condition in the adjusted standard language requiring PDC to submit annually to IEPA the data (and/or a summary of the data) collected pursuant to proposed condition 3(c). See 67 Fed. Reg. 1888, 1895 (Jan. 15, 2002) (Heritage Environmental Services, LLC delisting, ¶B(4)).***

Although PDC believes it would be equally appropriate and effective to maintain the subject information as part of its operating record subject to IEPA inspection, PDC would not object to the inclusion of such a condition. PDC estimates that the subject data would fill a minimum of two banker's boxes per year, but would be willing to submit the data in its entirety or any subset or summarized version to which the IEPA would agree. PDC proposes that the following language be added to proposed condition 3(c) of the Petition:

***

"PDC shall submit annually to the IEPA the data (and/or a subset or summary thereof to which the IEPA agrees) collected pursuant to this condition. The data submittal shall be addressed as specified in condition 5."

6. *Hexachlorophene, which is a 40 C.F.R. Appendix IX constituent that is not a chlorinated pesticide or herbicide, does not appear to be in PDC's analytical results. Please address sampling and analysis for hexachlorophene.*

Hexachlorophene is an unstable compound and is difficult to accurately analyze due to its extraction inefficiency. Because of this problem, it is TriMatrix Laboratory's policy to perform a gas chromatography-mass spectrometry (GC/MS) mass search and report their findings as a narrative. A statement of qualification regarding TriMatrix's approach to this compound was included in the case narrative on page 00013 of the TriMatrix data validation package, included as Appendix N of the Technical Support Document for the RCRA Delisting Adjusted Standard Petition for PDC EAF Dust Stabilized Residue (TSD), which was filed with the Board as Attachment 2 to the Petition.

A mass search is performed by looking for the primary ion in the mass spectrum for Hexachlorophene over the entire acquisition time for the sample. Ion 196 is used for this search. If any peaks for that ion are present, a spectral comparison is made for each peak and compared to the known mass spectra for Hexachlorophene. If there are no matches, as was the case for these samples, TriMatrix Laboratories adds the narrative that was included in their Statement of Data Qualifications (presented in Appendix N of the TSD). Since this analyte is prone to poor extraction efficiency and erratic chromatographic behavior, TriMatrix Laboratories has not been able to establish a firm reporting limit (RL) nor determine a Method Detection Limit (MDL). As a result, they report it as either present or not detected in the samples. If it was detected in a sample, TriMatrix Laboratories would quantitate Hexachlorophene the same as they would for a TIC (tentatively identified compound) . TriMatrix Laboratories found, after doing some research, that this analyte is not included in the 8270C Appendix IX analyte list for many laboratories due to these recovery issues.

Therefore, as indicated on page 0013 of the laboratory's Statement of Data Qualification, Hexachlorophene was not detected in any sample analyzed.

7. *PDC's Technical Support Document (TSD) (Petition Attachment 2) refers to two federal delistings involving chemically-treated EAF dust: Heritage Environmental Services, LLC (Heritage) on January 15, 2002 and Conversion Systems, Inc. (CSI) on June 13, 1995. TSD at 4-9. Although the TSD refers to its Appendix C for more information on these delistings, Appendix C does not contain the relevant material. Please provide the information referred to at 4-9 of the TSD regarding the federal delistings for Heritage and CSI.*

These two delisting documents, along with the USEPA evaluation document discussed in Section 1.4, *RCRA Hazardous Waste Delisting: The First Twenty Years* (USEPA 2002a), were inadvertently omitted from Appendix C of the TSD. All three documents are provided herewith in Attachment 4.

8. *The "EPA RCRA Delisting Program Guidance Manual for the Petitioner" dated March 23, 2000, states that "a final list of constituents can be prepared to include only the metals and organics from the 40 CFR 261.24 Toxicity Characteristics list plus all additional constituents that were detected in the first sample when analyzed for totals concentrations of constituents on the initial list." Manual, Appendix H, Attachment 2.*

   a) *PDC detected dioxins and furans in EAFDSR samples but the constituents were not included in the final list of COCs. In an email dated 1/31/08, Todd Ramaly of the United States Environmental Protection Agency (USEPA) Region 5 commented on excluding dioxins and furans from the final list of COCs: "we're not sure of this conclusion and did not yet agree that DF are no longer an issue." TSD Appendix C. Please describe any resolution PDC may have reached with USEPA concerning dioxins and furans not being on the final list of COCs.*

   PDC treated dioxins and furans as a potential COC throughout implementation of the Sampling and Analysis Plan. As a result, PDC analyzed each of the originally planned samples for dioxins and furans. The risk modeling of the dioxin/furan analytical results demonstrates that dioxin and furans will not exceed typical background levels in the environment. Based on this key information, RMT concluded that dioxins and furans were appropriately excluded from the final list of COCs.

   USEPA Region 5 (USEPA-5) was instrumental in providing tools and technical expertise in evaluating dioxins and furans for the PDC EAFDSR Delisting Petition effort, derived from federal delisting petition experience with the DRAS model and alternatives. In neither the 1/24/08 conference call agenda nor the 1/24/08 minutes did PDC or RMT request USEPA-5 concurrence that dioxins and furans should not be considered to be a COC. As noted in the agenda, one purpose of the conference call was to "present dioxin/furan data and discuss presentation in Petition." Mr. Ramaly's e-mail that transmitted the comments, stated: "Laura, Here are some comments on the minutes. Minor really ... some stuff I don't think was rigorously covered so I'm suggesting we take it out." Mr. Ramaly and Ms. Laura Curtis of RMT discussed the strike out and comment in a telephone call later on 1/31/08. Ms. Curtis stated it was PDC's intent to present this information in order to move discussions forward on the technical issues regarding the Excel file of the DRAS risk model that USEPA-5 provided in an email on January 14, 2008 and suggested she would insert the phrase, "PDC reported..." into the sentence with the questioned phrase in order to clarify this position. Mr. Ramaly indicated that he was satisfied with that addition.

   In Mr. Ramaly's comments in the USEPA e-mail dated 1/31/08, he acknowledged the 1/24/08 minutes summary statement that USEPA-5 has not formally commented on Illinois Delisting Petitions, though they are copied on the filing. Mr. Mark Crites of the IEPA commented that although USEPA-5 does not formally submit comments, they have in the past made informal communications to IEPA, and that the IEPA considers

these communications while conducting their review of the Petition and while preparing their comments to the IPCB regarding the Petition. It is our understanding that this process occurred during the IEPA's review of the subject Petition.

In their "Response to RCRA Delisting Adjusted Standard Petition" (filed June 12, 2008), the IEPA had a number of specific, detailed comments regarding the risk modeling that was conducted for dioxins and furans. Nowhere in their comments did the IEPA question the conclusion that dioxins and furans should not be considered a COC, although we suppose that IEPA concurrence would be contingent upon PDC's responses to the risk modeling questions. PDC filed its responses to the IEPA's comments with the IPCB on June 26, 2008. PDC's filing directly responded to all comments included in the IEPA's June 12, 2008 filing.

In summary, Mr. Ramaly's note on the draft meeting minutes was merely an informal comment and concurrence by all parties was neither an objective of the agenda nor an outcome of the conference call. Therefore, there are no unresolved issues or conflicts between USEPA-5 and PDC regarding dioxins and furans being excluded from the final list of COCs.

b) ***Bis(2-ethylhexyl)phthalate was detected above both the Method Detection Limit (MDL) and the Estimated Quantitation Limit (EQL), but was not included in the final list of COCs. Although semivolatile organic compounds (SVOCs) are discussed generally in the TSD at 4-6, there is no specific reference to bis(2-ethylhexyl)phthalate. Please explain why bis(2-ethylhexyl)phthalate was not included in the final list of COCs.***

Thirty-five SVOCs were detected in the composite waste samples during the Delisting Petition demonstration. Bis(2-ethylhexyl)phthalate was not included in the final list of COCs because although it was reported at 0.34 mg/kg in sample R1-03 and at an estimated value of 0.085J in sample R2-03, both values were substantially below the DRAS v.2 risk-based value of 2,720 mg/kg and the lowest Illinois Tiered Approach Corrective Action (TACO) Tier 1 Soil Remediation Objective of 3,600 mg/kg. When bis(2-ethylhexyl)phthalate was compared to these screening values, along with its calculated Toxicity Characteristic Leaching Procedure (TCLP) value to the DRAS leaching value, bis(2-ethylhexyl)phthalate was appropriately excluded from the final list of COCs. Please also note that bis(2-ethylhexyl)phthalate is considered a typical laboratory contaminant and that the estimated concentration reported for R2-03 does not have sufficient QA to dismiss the potential influence of a bis(2-ethylhexyl)phthalate laboratory contaminant affecting this method detection value.

9. ***In a communication record dated 1/24/08, PDC's consultant, RMT, summarizes the agenda for a conference call between PDC, RMT, IEPA, and USEPA. One point states: "With comparison to Illinois Tiered Approach for Corrective Action (TACO) screening values and DRAS [Delisting Risk Assessment Software] v.2 values, the results from the***

SAP [Sampling and Analysis Plan] implementation provided supports analytical results to exclude additional constituents of concern (COCs) other than the 14 metals listed in the SAP/QAPP [Quality Assurance Project Plan]." TSD Appendix C. In an email response, Todd Ramaly of USEPA Region V commented on the draft by striking the above sentence and adding, "[Laura – I don't think we discussed this last point during the call.]" TSC Appendix C (email from Ramaly to Curtis dated 1/13/08). Please describe any resolution PDC may have reached with USEPA concerning this approach to excluding detected constituents as COCs.

As stated in the response to question 8.a), above, USEPA-5 was instrumental in evaluating dioxins and furans for the PDC EAFDSR by providing the technical expertise from its federal delisting petition work using its DRAS model and alternatives. In neither the 1/24/08 conference call agenda nor its minutes, did RMT or PDC request USEPA-5 concurrence that certain constituents should be eliminated as COCs. Mr. Ramaly's strike out and comments in the USEPA email dated 1/31/08 were discussed between Mr. Ramaly and Ms. Laura Curtis of RMT in a telephone call later on 1/31/08. Ms. Curtis stated it was PDC's intent to present this information to move discussions forward on the technical issues regarding the DRAS model and that she would insert the phrase, "PDC reported..." into the questioned sentence in order to clarify this position. Mr. Ramaly indicated that he was satisfied with that addition. Concurrence by all parties was neither an objective of the agenda nor an outcome of the conference call.

Therefore, there are no unresolved issues or conflicts between USEPA-5 and PDC regarding excluding detected constituents as COCs.

10. *The values for dioxin and furan congeners and toxicity equivalency quotient (TEQ) in Table 3a and Appendix L of the TSD do not seem to agree with the raw laboratory data from Pace Analytical in Appendix N of the TSD. Please reconcile the raw data with the summarized data.*

The values for dioxin and furan congeners and TEQ values reported for total concentrations in the Pace Analytical raw laboratory data reports of Appendix N are incorrect because the results are reported on a dry-weight basis. A set of corrected laboratory reports are provided herewith in Attachment 5. These will replace the following reports from Pace:

- January 14, 2008 for Project # 1065168
- January 16, 2008 for Project # 1064827
- January 25, 2008 for Project # 1065459

During the data validation process (TSD Appendix M), the results reported by Pace were found to be on an oven-dried, or "dry weight" basis. The results reported by TriMatrix for their solid samples were on an "as is" basis (aka "wet weight"). Page 54 of the *EPA RCRA Delisting Program Guidance Manual for the Petitioner,* dated March 23, 2000, states:

"For each analysis performed on each sample, you should report the following information: .... Basis for each analysis (e.g. wet weight, dry weight). We prefer that this basis is the state in which the waste will be disposed, if allowed by the test."

In this case, the PDC EAFDSR material is disposed of "as is" and PDC does not oven-dry the waste first. So, in accordance with the Guidance Manual and for consistency with the other analytical run by TriMatrix Laboratories, RMT instructed Pace Analytical to resubmit their summary reports to report the results on a wet weight basis rather than a dry weight basis. This affected only the total concentrations (not the TCLP results) Pace Analytical reported for the dioxins and furans. This is an easily resolved issue as Pace Analytical had the moisture content for each sample, and the sample concentration can be calculated either way. On February 1, 2008, RMT instructed Pace to revise its summary reports and electronic data. RMT replaced the appropriate data in the summary tables (see Appendix J, Laboratory Reports and Appendix L, Whole Database in Tabular Form of the TSD), but inadvertently did not replace the Appendix N Pace Raw Laboratory Data. RMT apologizes for any confusion it caused the reader.

11. *The TSD indicates the TEQ value of 160 ng/kg was used in the spreadsheet calculation model for the dioxin fish ingestion pathway. Please comment on whether the higher value of 220 ng/kg (Sample R5-01) reported in the Pace Analytical raw laboratory data should be employed in the evaluation. If it should be, please provide revised input and results and address the resulting carcinogenic risk "Fishing CR," "Fish Concentration Edible Portion," and "Fishing DL" of the revised values. If PDC provides revised results, please update the comparison with the table "Background Dioxin Concentrations in Fish Tissue" presented in Appendix H of the TSD.*

The value of 220 ng/kg is on a dry-weight basis. The 160 ng/kg analytical result is the equivalent wet-weight result. As stated above in response to Board comment 10, all total concentrations should have been reported on a wet-weight basis. Attachment 5 hereto provides a set of corrected raw laboratory data reflecting the wet weight value of 160 ng/kg. As the correct input value was used in the modeling, the reported risk-based model results ("Fishing CR," "Fish Concentration Edible Portion," and "Fishing DL") are correct.

12. *Based on the TCLP results of the dioxin/furan analyses, please comment on how the highest value of 0.052 pg/L (TSD Appendix N, Sample R1-04, 1064827002, 12/07/07) compares to the groundwater adult dermal pathway that was determined as a limiting pathway by the DRAS v.2 analysis of 2.05 x 10-10 mg/L in Appendix H of the TSD. Also, please compare how the detected TCLP value of 0.052 pg/L compares to the revised "Fishing DL" in the dioxin spreadsheet calculation model.*

The maximum observed TCLP concentration for dioxin TEQs for the PDC EAFSDR data set was 0.040 pg/L for Sample R5-01 (4.0×10^{-11} mg/L), which is less than the DRAS v.2

delisting level (2.05×10^{-10} mg/L) reflective of the groundwater adult dermal pathway determined as a limiting pathway by the DRAS v.2 analysis. The TCLP dioxin TEQ concentrations for samples R1-03, R2-03, and R8-03 were reported as 0.00 pg/L.

The reported level of 0.052 pg/L (5.2×10^{-11} mg/L) questioned by the Board is for a Field Blank identified as sample R1-04. A field equipment blank is used to assess the equipment decontamination methods. This field equipment blank concentration, with a reported TEQ of 0.052 pg/L is so small that according to Pace Analytical Project Manager Scott Unze, it is most likely attributable to a laboratory contaminant from background. Mr. Unze further stated that it is common to see similarly low levels in the laboratory and that it may originate from the glassware. We note that the USEPA Primary Drinking Water Standard (DWS) for dioxin is 30 pg/L (3.0×10^{-8} mg/L), or more than 500 times that detected in the field blank.

The Fishing Delisting Level ("Fishing DL") is based on total waste concentrations, i.e., on a mg/kg basis. It is not appropriate to compare the Fishing Delisting Level to a leachable (i.e., TCLP) concentration.

13. *Please provide all of the pages from each of these DRAS runs: 2/20/08 (Arsenic) and 2/19/08 (Screening Levels to Identify COCs). See TSD Appendix H.*

All of the pages from the 2/20/08 DRAS run for Arsenic are provided herewith in Attachment 6. This DRAS model run was performed for arsenic only with a target risk of 1×10^{-4}.

All of the pages from 2/19/08 DRAS run (Screening Levels to Identify COCs) are also provided herewith in Attachment 6. Please note that the DRAS sheet entitled, "Pathways Exceeding the Delisting Limits" indicates that the following constituents required additional evaluation:

- SVOCS: Benzo(a)anthracene shows actual TCLP concentration as 1.05E-03 mg/L and the lowest limiting TCLP concentration as 1.31E-04. Benzo(a)pyrene shows actual TCLP concentration as 2.30E-05 mg/L and the lowest limiting TCLP concentration as 8.06E-06. The semivolatile organic compounds (SVOCS) subsection of Section 4.4 in the TSD explains that neither benzo(a)anthracene nor benzo(a)pyrene were detected in the TCLP analyses. An evaluation of the raw data provided no evidence of the PAHs in any of the TCLP samples. As a means of demonstrating that these two SVOCs are appropriately excluded as constituents of concern, notwithstanding the MDL being higher than the exceedingly low screening levels, a comparison of the MDLs to the Illinois Tiered Approach for Corrective Action (TACO) soil remediation objectives for industrial/commercial properties (35 IAC 742 Appendix B, Table B) was made and indicated that these detection limits are well below those TACO screening criteria. According to Table 3a, the TACO value for benzo(a)anthracene is 1,560 mg/kg versus the 0.021J mg/kg

value in Sample R1-03. Similarly, the TACO value for benzo(a)pyrene is 156 mg/kg versus the 0.017J mg/kg value in Sample R1-03.

- Mercury shows actual total concentration as 1.50 E+00 mg/kg and the limiting total pathway concentration as 9.01E-02 mg/kg. The fish ingestion pathway result in DRAS v.2 is a recognized error by USEPA-5 and, as such, the mercury total concentration was compared to the provisional concentration of 9.35 mg/kg provided by USEPA in an email dated January 24, 2008, found in Appendix C of the TSD.

- Arsenic shows actual total concentration as 3.70 E-03 mg/L and the limiting Total pathway concentration as 9.36E-04 mg/L. Arsenic TCLP was identified as a COC and additional risk-based evaluations are discussed in Section 6.3.3 of the TSD.

14. ***In a communication record dated 1/24/08, RMT summarized the agenda for a conference call between PDC, RMT, IEPA, and USEPA. One point states: "PDC requested discussing how to handle . . . altering delisting criteria acceptable by the Agency (i.e., arsenic concentration based on 1 x 10-5 risk). It was decided that a conference call on 1/28/08, after the Agency call on 1/25/08 would be scheduled for the purposes of providing the path forward and technical answers regarding the DRAS model." TSD Appendix C. Please describe any resolution PDC may have reached with USEPA or IEPA concerning altering the delisting criteria for arsenic.***

In the noted discussion with IEPA and USEPA-5 on January 29, 2008, a portion of time was set aside to discuss the appropriate target risk for arsenic. Mr. Ramaly shared that the DRAS model is a tool for risk-based modeling and a beginning point but not necessarily the only measurement available for decision making. Mr. Ramaly shared additional information throughout the delisting process regarding options for deriving alternative arsenic levels, e.g., values similar to the drinking water maximum contaminant level (MCL) value, the most stringent regulatory limit set for arsenic in the different media. Nothing has been formalized regarding the DRAS but he shared that site-specific conditions could justify, and the USEPA has allowed in past delistings, a target arsenic aggregate risk in the $1x\ 10^{-4}$ to $1x10^{-6}$ range as being protective of human health and the environment. In the delisting granted to Heritage Environmental (see Attachment 4 hereto), USEPA-5 granted a delisting specifying an arsenic concentration of .0936 mg/L, which provided an aggregate risk of 1×10^{-4}. This ended the guidance discussion provided by USEPA-5, and Mr. Ramaly stated it would be PDC and RMT's responsibility to evaluate and propose a demonstration to show an arsenic concentration at an aggregate risk other than $1x10^{-6}$ as being protective in this delisting.

As stated above in our response to Question 8.a), it is our understanding that the IEPA considered their communications with USEPA-5 when developing its "Response to RCRA Delisting Adjusted Standard Petition" (filed June 12, 2008). The IEPA's June 12 response expresses no concerns regarding risks due to arsenic.

Therefore, there are no open issues or pending resolutions either USEPA or IEPA have with PDC concerning altering the delisting criteria for arsenic.

15. ***PDC's proposed adjusted standard language specifies TCLP concentrations not to be exceeded for 14 metals. Unlike the federal delisting for Heritage, however, PDC's proposed language does not contain a delisting level for total mercury. See 67 Fed. Reg. 1888, 1895 (Jan. 15, 2002).***

    a) ***Please quantify the contribution from mercury to the aggregate hazard index.***

    The aggregate hazard for the surface pathway estimated from the DRAS v.2 model effort, which relies on total metal concentrations, was greater than the 1.0 threshold. Mercury, at its maximum observed concentration of 1.5 mg/kg, is the primary contributor to the estimated aggregate noncarcinogenic hazard. As noted in Section 4.3 of the TSD, USEPA-5 provided information that the DRAS v.2 model had calculation errors that result in significantly overstating the surface pathway hazards, which results in significantly understating the safe delisting levels for mercury.

    As a result of those errors, USEPA-5 recommended relying on provisional DRAS v.3 outputs (provided by USEPA-5 and included in Appendix H of the TSD) to address mercury. The DRAS v.3 model basis incorporates current regulatory and scientific position regarding mercury uptake into biological tissues, not included in DRAS v.2 used as the basis for the Heritage delisting petition. As such, the modeled hazard quotient attributable to mercury in the DRAS v.2 model should be disregarded in light of this new information. Replacing the DRAS v.2 hazard quotient (HQ) with a DRAS v. 3-derived mercury HQ in the surface pathway results in an aggregate hazard of well below 1.0, with a corresponding delisting level for total mercury of 9.35 mg/kg. The maximum observed mercury concentration contributes 0.16 to the overall aggregate hazard of 0.52. It should be noted that this aggregate hazard of 0.52 for all constituents is well below the maximum aggregate hazard of 1.0.

    b) ***Please comment on the appropriateness of including a delisting level for total mercury.***

    PDC does not find inclusion of a delisting level for total mercury appropriate for the following reasons:

    - A comparison of maximum observed total mercury concentrations (1.5 mg/kg) to the provisional DRAS v.3 delisting level (9.35 mg/kg) indicates that mercury in the EAFDSR will not result in an unacceptable aggregate hazard for the surface pathway.

    - The proposed TCLP limit for mercury of 0.025 mg/L addresses the leaching potential (TCLP) and also provides information on protection of the fish ingestion pathway for total mercury. An estimated maximum TCLP value that corresponds

to the provisional DRAS v.3 total mercury concentration of 9.35 mg/kg is 0.47 mg/L when applying the 20x rule of thumb (recognizing the twenty-fold dilution from total to TCLP values due to the TCLP test methodology). By proposing the more conservative LDR-based delisting limit of 0.025 mg/L for mercury TCLP, protection of the surface runoff pathway and an acceptable fish ingestion risk scenario is assured.

- The maximum observed total mercury concentration, 1.5 mg/kg, is over six times less than the maximum DRAS v.3 allowable total concentration for mercury of 9.35 mg/kg for the proposed annual volume of waste.

Therefore, adding a delisting level for total mercury is neither necessary nor more protective than the proposed delisting levels.

16. *PDC premises its dioxin modeling for the fish ingestion pathway on disposal in the Indian Creek Landfill. The proposed adjusted standard language, however, does not limit disposal of EAFDSR to that landfill. Please consider re-running the model using the default generic values for a less site-specific analysis. If PDC wishes to use site-specific information in its modeling, rather than the default generic values, please consider either providing site-specific modeling for all the potential Illinois landfills at which the EAFDSR might be disposed, or limiting the proposed adjusted standard language to only those disposal facilities for which site-specific modeling was performed.*

RMT has revised the risk modeling for dioxin using input data determined to be applicable for any permitted Subtitle D landfill in Illinois. The revised risk modeling is provided herewith in Attachment 7.

17. *References in the proposed adjusted standard language to the "mechanical mixer" and the "K061 stabilization process described in its Petition" (see proposed condition 2) could encompass the stabilization process that PDC has used for the past 19 years. Please comment on the appropriateness of more narrowly-tailoring the adjusted standard language to PDC's "new proprietary stabilization technology," subject to proposed condition 3(b). Petition at 2. As appropriate, please propose amendatory language*

PDC understands the potential for misunderstanding the intent of the proposed language and does not object to amending the language of proposed condition 2. Please know that it was and remains PDC's intent to utilize the new proprietary stabilization technology, unless and until it is modified in accordance with proposed condition 3(b). PDC proposes that condition 2 be modified by adding the following text as the first sentence, with the balance of the existing text remaining unchanged:

****

"This adjusted standard is provided only for K061 wastes treated using PDC's new proprietary stabilization technology described in the Petition, unless and until it is modified in accordance with condition 3(b)."

18. ***Proposed conditions 3(c)(1) and (2) each refer to "another round of verification sampling and analysis." Please clarify whether these additional rounds would include testing for all COCs or only for those that exceeded the delisting concentrations in the prior round. If PDC is proposing the latter approach, please explain how PDC will verify that over-treatment has not increased the solubility of other metals that may be amphoteric.***

PDC proposed limiting the constituents analyzed after further treatment to only those that exceeded the delisting level in the prior round because of the low probability of over-treatment given the knowledge gained from the initial analysis, i.e., once batch-specific constituent concentrations and extraction pH data are known, optimizing reagent proportions for effective re-treatment is relatively simple and yields a very high initial success rate. However, PDC would not object to analyzing all 14 metals in each round of testing. As stated in the summary section of the TSD, it is PDC's intent that: "The proposed conditional exclusion, when applied using the methods and procedures discussed herein, creates a fail-safe system that ensures that only EAFDSR meeting the proposed delisting levels will be disposed as a non-hazardous waste." In keeping with that intent, PDC proposes that proposed condition 3(c) be modified as follows, where underlined text denotes new language:

***

"...All verification analyses shall be conducted on a composite sample that effectively represents the entire batch as did the initial sample, and include analysis for all 14 constituents identified in condition 4."

19. ***PDC states that its proposed adjusted standard language requires that the delisted EAFDSR be disposed of in a lined landfill with leachate collection in Illinois that is "licensed, permitted, or otherwise authorized to accept the delisted waste in accordance with all applicable RCRA Subtitle D requirements." Petition at 19. Please explain what types of landfills other than permitted landfills PDC believes would be able to accept the delisted EAFDSR.***

The subject, potentially misleading language was borrowed from adjusted standard exclusions recently approved by the USEPA (see, for example, 72 FR 31189 [June 6, 2007] in re: delisting exclusion granted to Ford Motor Co.). The intent of using relatively recent USEPA rules as sources for proposed language was to ensure that the PDC proposal was compatible with similar, contemporary adjusted standards. While it may be possible under federal rules for a state(s) to authorize landfills to accept industrial process wastes

other than by permit, it is not possible in Illinois and PDC does not object to modifying the Petition accordingly.

While the narrative discussion of the proposed adjusted standard conditions includes the subject language, proposed condition 2 itself effectively excludes non-permitted landfills in its existing form. If desired, the Board could modify proposed condition 2 as follows to better reflect Illinois regulatory requirements, where underlined text denotes new language and struck-through text denotes replaced language:

***

"...The EAF dust stabilized residues shall be disposed of pursuant to the Board's non-hazardous landfill regulations found at 35 Ill. Adm. Code 810-815, and disposed of in a lined landfill with leachate collection and all necessary ~~authorizations~~ IEPA-issued permits to receive the non-hazardous EAF dust stabilized residues."

Dated: August 6, 2008

Laura B. Curtis

Laura B. Curtis
Project Manager
RMT, Inc.

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF

RCRA DELISTING ADJUSTED STANDARD PETITION OF PEORIA DISPOSAL COMPANY	)	AS 08-10 (Adjusted Standard – Land) (RCRA Delisting)

AFFIDAVIT OF FILING BY FEDERAL EXPRESS and SERVICE BY U.S. MAIL, FIRST CLASS

PLEASE TAKE NOTICE that on August 6, 2008, I filed with the Clerk of the Pollution Control Board of the State of Illinois the instrument(s) entitled RESPONSE OF PEORIA DISPOSAL COMPANY TO ATTACHMENT A TO THE HEARING OFFICER ORDER ENTERED ON JULY 15, 2008, and this Affidavit, by sending an original and four copies of same to the Clerk of the Pollution Control Board via Federal Express for overnight delivery. Pursuant to prior communications with the Clerk of the Pollution Control Board, PDC filed one original and four paper copies of this Response, except that only the original Response includes a paper version of Attachment 5 thereto, while the copied Responses include CD-ROM versions of Attachment 5 thereto.

I further certify that on this date I served RESPONSE OF PEORIA DISPOSAL COMPANY TO ATTACHMENT A TO THE HEARING OFFICER ORDER ENTERED ON JULY 15, 2008, and this Affidavit, by placing one copy of each document in the U.S. Mail, First Class postage prepaid, addressed as listed below. The copies of the Response include CD-ROM versions of Attachment 5 thereto.

Service list:

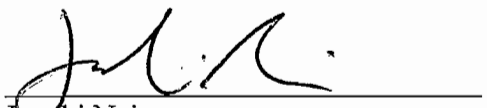
United States Environmental Protection Agency
Office of Solid Waste and Emergency Response
1200 Pennsylvania Avenue, NW
Washington, D.C. 20460

Lynn Buhl
Regional Administrator
United States Environmental Protection Agency, Region 5
77 West Jackson Boulevard
Chicago, IL 60604

William D. Ingersoll
Manager, Enforcement Programs
Illinois Environmental Protection Agency
1021 North Grand Avenue East
P.O. Box 19276
Springfield, IL 62794-9276

Dated: August 6, 2008

Respectfully submitted,



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908-0657

Attachment 1
Part B Permit Conditions Referenced in Response No. 1

b. Until such time as the analyses demonstrates compliance with LDRs, the treated waste shall be stored. Wastes subject to different land disposal restrictions may be homogeneously mixed prior to treatment or may be segregated and remain segregated until it is demonstrated that the wastes have each passed the treatment standards applicable to that waste as specified in Condition 14.e.i. below. These management procedures shall be used to segregate the waste into separate batches. A separate determination shall be made for each batch.

c. The container, tank or waste pile may contain waste generated over more than one day of operation.

d. Once the samples required for the demonstration have been obtained from a container, no new wastes may be added to any container(s) in that batch.

e. The Permittee shall demonstrate compliance with the LDRs in accordance with the steps listed below:

   i. A representative sample (i.e., a grab sample) shall be collected from the first and last container of each batch. The demonstration of compliance with the Land Disposal Restrictions for the mixture of waste codes shall be based on the most stringent treatment standard for each of the pertinent parameters.

   ii. The samples from the first and last container shall be analyzed separately to demonstrate compliance with the land disposal restrictions. A minimum of two samples must always be analyzed to demonstrate compliance.

   iii. If the treatment standard for any of the constituents is exceeded:

      1. Treated waste which fails to meet the requirements shall receive additional treatment (this may consist of additional curing time and/or reintroduction into the treatment facility for further stabilization). Waste which receives additional treatment may only be disposed in the landfill <u>after</u> it has been demonstrated that the residue meets the proper treatment standards.

      2. Wastes which fail to meet the requirements after treatment or additional curing, shall be reintroduced into the treatment facility for further stabilization. PDC shall conduct an investigation of these wastes to determine the cause of the failure. A plan shall then be developed and implemented to prevent and/or minimize future excursions.

iv. At a minimum, for all wastes, unless each container (roll-off box) is sampled separately, the treated batch must receive the same amount of curing time as the sample that demonstrates compliance with the LDR standard during the bench study of the waste.

f. Wastes which carry only the D006 or D008 waste code or a combination of these two waste codes are not subject to the testing requirements in E.14.e(i) through (iii) above but may follow the sampling frequency in condition X.G.3 below. If a demonstration fails, all waste carrying the waste code would then be subject to the verification process required by E.14.e.until the waste code(s) are requalified for the relaxed testing requirements. In order to requalify, a minimum of twenty (20) consecutive samples, collected in accordance with special condition X.E.15.e.(i) through (iii) of the approved Part B Permit, must meet the applicable treatment standards on the initial analysis. In addition, an investigation must be conducted to determine the cause of the failure. Any corrective action taken to prevent a recurrence must be documented in the operating record. This could include a new bench scale study, disqualification of a wastestream from the relaxed requirements, etc.

g. Wastes which carry the K061 waste code are not subject to the testing requirements in E.14.e(i) through (iii) above but may follow the sampling frequency in Condition X.G.3 of PDC's approved RCRA permit application Log B-24R providing the pH F (final pH value of the TCLP extraction process) parameter of each batch is within the range of 9.0 pH units through 11.2 pH units. All batches which fall outside of this range must be subject to the testing requirements of E.14.e(i) through (iii).

15. The Permittee shall demonstrate compliance for the treated waste subject to the Adjusted Standard identified in 35 IAC 721 Appendix I (originally issued by the Illinois Pollution Control Board on February 4, 1993) by following the requirements specified in the exclusion. Waste that fails to meet the delisting criteria may be subject to Section 39(h) of the Environmental Protection Act.

16. The Permittee shall treat all wastes subject to the relaxed testing requirements specified in Conditions X.E.14.f or the adjusted standard in E.15 above using the paddle wheel mixer as opposed to the backhoe/mixing box method.

17. All wastes which failed the gate control paint filter test shall be tested by the penetrometer test (after stabilization). No wastes which fails to possess a load bearing capacity of at least 2.0 tons per square foot (TSF) may be disposed.

Attachment 2
Agency Correspondence Regarding Waste Classification

Peoria Disposal Company

January 3, 2008

Mr. Stephen F. Nightingale, P.E.
Permit Section Manager
Illinois Environmental Protection Agency
Bureau of Land
1021 North Grand Avenue East
P.O. Box 19276
Springfield, Illinois 62794-9276

Re: Peoria Disposal Company #1
ILD000805812/1438120003
RCRA Part B Permit, Log No. 24

Dear Mr. Nightingale:

Further to a recent discussion with Mr. Mark Crites of your Section, PDC is hereby requesting guidance regarding the regulatory definition of certain wastes managed by PDC after treatment at the above referenced facility. Specifically, PDC currently ships for disposal to its Indian Creek Landfill in Hopedale, Illinois, both delisted and decharacterized treatment residues. In the interest of enhancing operating efficiency and simplifying recordkeeping, PDC desires to manage the delisted residues as non-special wastes. While it is clear that decharacterized residues may not be managed as non-special waste due to the exclusion at Section 3.475 (c)(1)(D) of the Illinois Environmental Protection Act ("Act"), we believe that delisted residues are outside the scope of the categories listed in Section 3.475 (c)(1) and, as such, may be certified as non-special waste pursuant to Section 22.48 of the Act. The basis of that belief is set forth below.

Section 3.475 of the Act specifies that industrial process wastes and pollution control wastes are defined as special waste unless, pursuant to that Section, any such waste is certified to not be any of the categories listed therein. Subdivision 3.475 (c)(1)(D) specifies that non-special waste may not be:

> ***
> **(D)** an industrial process or pollution control waste subject to the waste analysis and recordkeeping requirements of Section 728.107 of Title 35 of the Illinois Administrative Code under the land disposal restrictions of Part 728 of Title 35 of the Illinois Administrative Code;***

P.O. Box 9071
Peoria, IL 61612-9071
(309) 688-0760

4700 N. Sterling Ave.
Peoria, IL 61615-3647
Fax: (309) 688-0881

Therefore, decharacterized wastes, which remain subject to the waste analysis and/or recordkeeping requirements of Part 728 of Title 35 of the Illinois Administrative Code (35 IAC), may not be certified as non-special wastes. Specifically, decharacterized wastes may contain underlying hazardous constituents as defined in 35 IAC 728.102, which require treatment to meet the universal treatment standards of 35 IAC 728.148 and Table U of that Part. Even in the absence of underlying hazardous constituents, decharacterized wastes are subject to the notification and certification requirements of 35 IAC 728.107.

Delisted wastes, however, are not subject to the waste analysis and recordkeeping requirements of 35 IAC 728.107. Specifically, upon granting of an adjusted standard by the Illinois Pollution Control Board ("Board") and provided any conditions imposed by the Board order are met, a waste from a particular generating facility is excluded from the list of hazardous wastes in Subpart D of 35 IAC Part 721 and, provided it is not hazardous by operation of Subpart C of 35 IAC Part 721, is not subject to RCRA hazardous waste management requirements. One such waste is delisted F006 waste treated by PDC (Board order AS91-3 identified in 35 IAC 721, Appendix I, Table D). Because the F006 waste treated by PDC in accordance with the referenced Board order is excluded from the hazardous waste lists and does not exhibit a characteristic of a hazardous waste, it is clearly not subject to any of the 35 IAC Part 728 requirements, which apply only to hazardous wastes that are restricted from land disposal. As such, we believe the delisted waste is eligible for certification as a non-special waste, provided no other excluding conditions set forth in Section 3.475 (c)(1) of the Act exist.

We are hopeful that our stated understanding of the referenced statutes and regulations meets with Agency agreement and will look forward to your guidance. If you have any questions regarding this request or if any additional information is desired, please contact me at (309) 676-4893, ext. 1551, or by e-mail at rwelk@pdcarea.com.

Sincerely,
PEORIA DISPOSAL COMPANY

Ronald J. Welk
Facility Director

Recd. 5-14-08

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

1021 NORTH GRAND AVENUE EAST, P.O. BOX 19276, SPRINGFIELD, ILLINOIS 62794-9276 – (217) 782-3397
JAMES R. THOMPSON CENTER, 100 WEST RANDOLPH, SUITE 11-300, CHICAGO, IL 60601 – (312) 814-6026

ROD R. BLAGOJEVICH, GOVERNOR DOUGLAS P. SCOTT, DIRECTOR

217/524-3300

May 13, 2008

Peoria Disposal Company
Attn: Ronald J. Welk, Facility Director
P.O. Box 9071
Peoria, Illinois 61612-9071

Re: Letter regarding waste classification

1438120003 – Peoria County
Peoria Disposal Company #1
ILD000805812
PS08-016
RCRA Permit File

Dear Mr. Welk:

This letter is in response to your letter of January 3, 2008 in which you request the concurrence of Illinois EPA to your determination of the regulatory status of certain wastes managed by Peoria Disposal Company (PDC) after treatment in the Waste Stabilization Facility (WSF) at the above-referenced facility. Specifically, you believe that:

1. Waste treated to remove hazardous waste characteristics is not eligible for the exclusion provided at Section 3.475 (c)(1) of the Illinois Environmental Protection Act (Act) because it is still subject to the requirements of 35 Ill. Adm. Code 728, and fails the test at Section 3.475(c)(1)(D) of the Act.

2. Waste initially bearing the waste code F006 that is treated to meet the delisting granted to PDC in Illinois Pollution Control Board (IPCB) order AS91-3 is eligible for the exclusion provided in Section 3.475 (c)(1) of the Act because once this waste meets the delisting, it is no longer subject to 35 Ill. Adm. Code 728, and therefore passes the test at Section 3.475(c)(1)(D) of the Act as well as the other tests in Section 3.475(c)(1).

Illinois EPA agrees with both of these determinations. With respect to Item 2 above, we note that IPCB's ruling in AS91-3 (dated March 11, 1993), on page 4, IPCB specifically states:

> . . . Those wastes that do qualify are subject to the non-hazardous solid waste disposal regulations of 35 Ill. Adm. Code 810 through 815, rather than the Illinois RCRA regulations of 35 Ill. Adm. Code 703 and 722 through 728. [emphasis added]

Because of this statement, IPCB makes it clear that it does not intend the successfully delisted waste to be subject to the requirements of 35 Ill. Adm. Code 728.107.

If you have any questions regarding this matter, please contact Mark L. Crites at 217/524-3269.

Sincerely,

Stephen F. Nightingale, P.E.
Manager, Permit Section
Bureau of Land

SFN:MLC:mls/082371s.doc

Attachment 3
Part B Permit Conditions Referenced in Response No. 4

expected to be present in their waste. A certification statement must be submitted as part of the application to support this claim.

2. Petroleum contaminated media and debris from LUST sites are temporarily exempt from full TCLP analysis and the generator may limit analyses to flashpoint, paint filter test and TCLP lead.

3. Non-commingled hazardous wastes received at a treatment facility may be analyzed in accordance with Condition 7.

4. RCRA empty containers are exempt from testing requirements.

5. Off-specification, unused or discarded commercial chemicals products may use a MSDS to determine the hazardous constituents present and appropriate USEPA hazardous waste class, if applicable, in lieu of analytical results.

6. Identical waste streams being generated by industrial processes at multiple generator sites may use the results from the representative initial analytical sampling from one representative site for all sites. The generator must certify that the waste generation process and the raw materials used in the process were identical at each location. Specifically, the following waste streams have been approved:

   i. sand blasting residue from IDOT bridges.

   "ii. pit sludge from Iowa DOT maintenance shop

   Each load of pit sludge shall be tested for flashpoint, pH, TOX and total benzene. If the total benzene is above 10 mg/l, a TCLP analysis for benzene shall be performed. Additional parameters may be incorporated if the practices generating the wastes are changed."

   This condition may be modified to include other identical waste streams from industrial processes on a case-by-case basis. The modification request must include documentation that the processes generating the waste are identical and the QA/QC procedures are in place to insure the consistency of the waste stream.

7. In the event hazardous waste is accepted for treatment, the Permittee may accept a certification as identified in Attachment #4 indicating a waste does not contain a particular TCLP constituent in lieu of analysis for

Attachment 4
Agency Correspondence Regarding Waste Classification

- RCRA Delisting – First Twenty Years
- Heritage Environmental Delisting (Nucor)
- Conversion Systems Inc. Delisting (CSI)

RCRA Hazardous Waste Delisting: The First 20 Years

Program Evaluation

U.S. Environmental Protection Agency
Office of Solid Waste
June, 2002

RCRA Hazardous Waste Delisting:

The First Twenty Years

Office of Solid Waste
June 2002
530-R-02-014

RCRA Hazardous Waste Delisting: The First Twenty Years

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EXECUTIVE SUMMARY

PURPOSE

This report documents an evaluation of the outcomes and impacts of the hazardous waste delisting program, conducted by the United States Environmental Protection Agency under the Resources Conservation and Recovery Act (RCRA). The report describes the rationale for conducting a program evaluation, the results and outcomes of the delisting program, and other findings and issues raised in this evaluation.

This evaluation was undertaken as part of EPA's implementation of the Government Performance and Results Act (GPRA) of 1993. That statute requires federal agencies to include program evaluations in the strategic planning process.

THE HAZARDOUS WASTE DELISTING PROGRAM

The Resource Conservation and Recovery Act, which guides EPA's hazardous waste management programs, provides for a process to remove, or "*delist*", a waste generated at a facility from the list of hazardous wastes. This delisting process is initiated by the generator (person who creates the waste), who prepares a petition for delisting the waste. The petition provides information about the waste, including its chemical composition, to demonstrate the rationale for delisting the waste. The petition is reviewed by the appropriate regulatory agency (either EPA or a state hazardous waste regulatory agency which has been authorized to grant delisting petitions) to determine whether the waste should continue to be listed as hazardous.[1]

EPA's Office of Solid Waste decided that the delisting program would be a good candidate for evaluation. After consultation with staff and management in both headquarters and the regional offices, OSW decided that this evaluation would be most useful if focused on the *outcomes* and *impacts* of the federal delisting program, rather than focus on the mechanisms for conducting delistings. Therefore, this study examines how the program has functioned, and what has been gained by the operation of the delisting program. This "big picture" focus also results in findings that provide useful information for assessing the future direction and management of the delisting program. This report looks at three different categories of outcomes of the delisting program:

- Cost savings and aggregate economic impacts
- Impacts of delisting on the environment
- Impacts of delisting on the RCRA hazardous waste management program

[1] See Section 1.3 for more detail on the full process of the regulatory determination.

METHODOLOGY OF THE EVALUATION

EPA assembled a database listing all the delisting applications granted by the EPA (not including those granted by state governments) between calendar years 1980 and 1999. Some of the information had been kept by the delisting program, either in paper files or in the Delisting Petition Data Management System. This database had been discontinued in 1995. Other data was taken from the *Federal Register* notices announcing each proposed and final delisting granted.

Data elements in the current database include:

- Name and address of petitioning facility
- Date petition submitted and final decision reached
- Date delisting became effective
- Waste volume, matrix, form, quantity, and source
- Chemical test results for wastes
- RCRA waste codes
- Management of wastes before and after delisting

Using the database, we calculated total volumes of waste delisted. We also estimated the cost of administering the program, and cost savings that have been realized through delisting.

DESCRIPTIVE STATISTICS

Over the 20-year period from 1980 through 1999, delistings were granted to a total of 136 separate waste streams, generated at 115 separate facilities. By far the most common waste code for which delistings were granted is F006, an electroplating waste, found in 51 delisted waste streams. Over this period, **a cumulative total of 45 million tons of waste has been excluded from subtitle C requirements**; over 80% of that volume is wastewater.

ECONOMIC IMPACTS OF THE DELISTING PROGRAM

The reduced social costs associated with the delisting program are derived through calculating the administrative costs of operating the delisting program, and the offset of lowered costs of waste treatment and disposal.

The total administrative costs associated with this twenty year period of the delisting program ranges from $107 million to $226 million. The costs to petitioners is between 70-85% of that total. The costs of running the program, while large, are far outweighed by the cost savings achieved, however. From the inception of the delisting program through the year 2000, ***cumulative net cost savings attributable to the delisting program range between $1.2 billion and $2.4 billion***. Even if no further delistings are ever granted, the delisting program will save over $105 million each year, from wastes that have already been removed from Subtitle C regulation.

ENVIRONMENTAL IMPACTS OF THE DELISTING PROGRAM

An complete investigation into previously delisted wastes was outside the scope of this program evaluation. However, given a strict risk assessment process (which has been made progressively more accurate), the Agency has little reason to believe that these streams are causing environmental problems. The Agency has also taken steps to limit the possibilities for harmful environmental releases in the future, and to facilitate review of the consequences of disposal of delisted waste streams.

Another issue of concern is the impact of delisting on recycling. It seems logical that delisting might inhibit recycling in some cases, and promote it in others. We found anecdotal evidence of both impacts, but were unable to identify clear trends in either direction.

CONCLUSIONS

The findings of this evaluation distinctly demonstrate the significant **economic** impacts of the delisting program: reductions in deadweight loss to the economy totaling over $100 million each year. Continued efficiencies and refinements in the delisting petition review process should only improve those results. The **environmental** impacts are not as clear, although EPA does not have reason to suspect that delisted wastes are causing environmental problems.

As one of the first program evaluations undertaken by the RCRA program in response to GPRA, there is also clear value to this evaluation study itself. Not only has it helped the RCRA program understand the process of program evaluation, it has also helped us understand the nature of the value of a program. The analysis demonstrates that benefits can take many forms, not just risk reduction. A program like delisting demonstrates its value in terms of reduction in economic losses, and concomitant improvement in human welfare.

CHAPTER ONE:
EVALUATION OF THE DELISTING PROGRAM

1.1 PURPOSE

This report documents an evaluation of the outcomes and impacts of the hazardous waste delisting program, conducted by the United States Environmental Protection Agency under the Resources Conservation and Recovery Act (RCRA). The report describes the rationale for conducting a program evaluation, the results and outcomes of the delisting program, and other findings and issues raised in this evaluation.

1.2 PROGRAM EVALUATION AND GPRA

This evaluation was undertaken as part of EPA's implementation of the Government Performance and Results Act (GPRA) of 1993. Under that statute, *program evaluation* has been defined as "an objective and formal assessment of the results, impact, or effects of a program or policy." [2] Program evaluations also may examine the implementation, operations, and/or processes of programs.[3] A program evaluation will draw conclusions about the effectiveness of the design, implementation, and/or impacts of a program. The term *program* here includes the usual connotation of a set of staff activities with a defined goal or purpose; the term may also include a policy initiative, an investment project, or even a change in procedures.

Why conduct a program evaluation? Evaluation is clearly a good practice for effective management, whether public, private, or non-profit. Among the advantages of conducting evaluations are

- Assessing the impact of programs and policies
- Documenting that functions have been carried out and outcomes reached
- Documenting a lasting record of the program
- Assisting with decisions about program continuation, expansion, and future funding.

Although the GPRA statute does not require a specific schedule of program evaluations, the law clearly presumes they will be conducted. The committee report accompanying the legislation, as well as the legislation itself, speaks specifically of the role of program evaluations in the annual cycle of performance planning and reporting. Guidance from the Office of Management and

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[2] *Government Performance and Results Act of 1993: Report of the Committee on Governmental Affairs, United States Senate, to Provide for the Establishment, Testing, and Evaluation of Strategic Planning and Performance Measurement in the Federal Government, and for Other Purposes*, p. 32.

[3] See, for example, U.S. Office of Management and Budget, Circular A-11, §210.11: "Program Evaluations and Strategic Plans," 1998.

Budget[4] directs agencies to prepare a planned schedule of program evaluations. According to the GPRA, the 5-year strategic plan should contain a "description of the program evaluations used in establishing or revising general goals and objectives." The legislation also guides the agency to include a schedule for future program evaluations to be conducted. An October, 1998 memo from Sallyanne Harper, then Chief Financial Officer of the EPA, documents the Agency's expectation that programs will conduct program evaluations as part of GPRA implementation, and provides basic guidelines for conducting such evaluations.

1.3 THE HAZARDOUS WASTE DELISTING PROGRAM

EPA uses a formal assessment process to determine whether certain industrial wastes should be placed on a list of "hazardous wastes." These determinations include wastes from specific industrial processes or particular chemical formulations. Any waste that meets the listing description (regardless of its specific chemical composition) is a *listed* hazardous waste, and is regulated under RCRA Subtitle C. Those regulations include requirements for specific waste handling procedures, from generation through storage, treatment, and disposal.

Congress and EPA recognized, however, that listing wastes incurs the possibility of regulating wastes which do not truly pose a threat to human health or the environment. A facility may have a process or raw material that produces a waste with different attributes than others in the listed group. In other cases, waste treatment techniques may remove or destroy hazardous constituents. For example, a facility in Indiana was granted a petition to delist wastewater treatment sludges from an electroplating process, after demonstrating that concentrations of specific constituents in the the sludges were not large enough to present significant risk from disposal.

The RCRA statute[5] and regulations, therefore, also provides for a process to remove, or "*delist*", a waste generated at a facility from the list of hazardous wastes. This delisting process is initiated by the person generating the waste, who prepares a petition for delisting the waste. The petition provides information about the waste, including its chemical composition, to demonstrate the rationale for delisting the waste. The petition is reviewed by the appropriate regulatory agency (either EPA or a state hazardous waste regulatory agency which has been authorized to grant delisting petitions) to determine whether the waste should continue to be listed as hazardous.[6] This determination is subject to notice and comment before a final decision is made.

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[4] U.S. Office of Management and Budget, Circular A-11, §210.11: "Preparation and Submission of Strategic Plans," 1998.

[5] §3001(f).

[6] The process is explained in regulations at 40 CFR 260.20 and 260.22, and in *Petitions to Delist Hazardous Wastes: A Guidance Manual*, Office of Solid Waste, 1993.

To gain a better understanding of the operations of the delisting program, this study employed a tool called a *program logic model.* A program logic model is a kind of input/output model of a program's operations. Figure 1 presents a simplified logic model of the waste delisting program. The steps in the delisting process are shown down the center of the diagram. These steps represent

- *inputs*,
- *outputs* (work processes and results), and
- *outcomes* (final results of the outputs)

of the delisting processes. In addition to these steps, the model also shows:

- *objectives*: desirable attributes of the process, outputs, or outcomes.
- *contextual variables*: factors exogeneous to the Agency's performance of outputs that can affect the degree to which process objectives are successfully met.

The following is a description of the delisting program, using these terms of program logic.

INPUT: Hazardous waste generators prepare petitions and send them to the EPA.

Process objective: Ensure that generators are aware that a waste can be delisted if they can demonstrate that it should not be regulated as a hazardous waste.

OUTPUT 1 Agency staff review the applications for completeness, according to criteria in the delisting manual[7].

Process objectives: The review should be speedy; petitioners should not be left waiting too long for a decision.

Contextual Variables: The speed of the review and decision process is dependent on a number of variables, including the complexity of the applications submitted, time needed for the petitioner to submit additional materials, and the budget and FTE time available for the task. Other factors outside of EPA control, which can affect the degree of achievement of the objectives, include the nature and extent of public comments on proposed delisting decisions, and any legal challenges that might ensue.

OUTPUT 2 The next output is a decision to either reject or accept the delisting petition; that is, the decision is to either retain the hazardous status of the waste, or give it a new non-hazardous status. This initial decision is subject to notice and comment, and then a final decision is reached and published.

[7]USEPA Office of Solid Waste, "Petitions to Delist Hazardous Wastes: A Guidance Manual", March 1993.

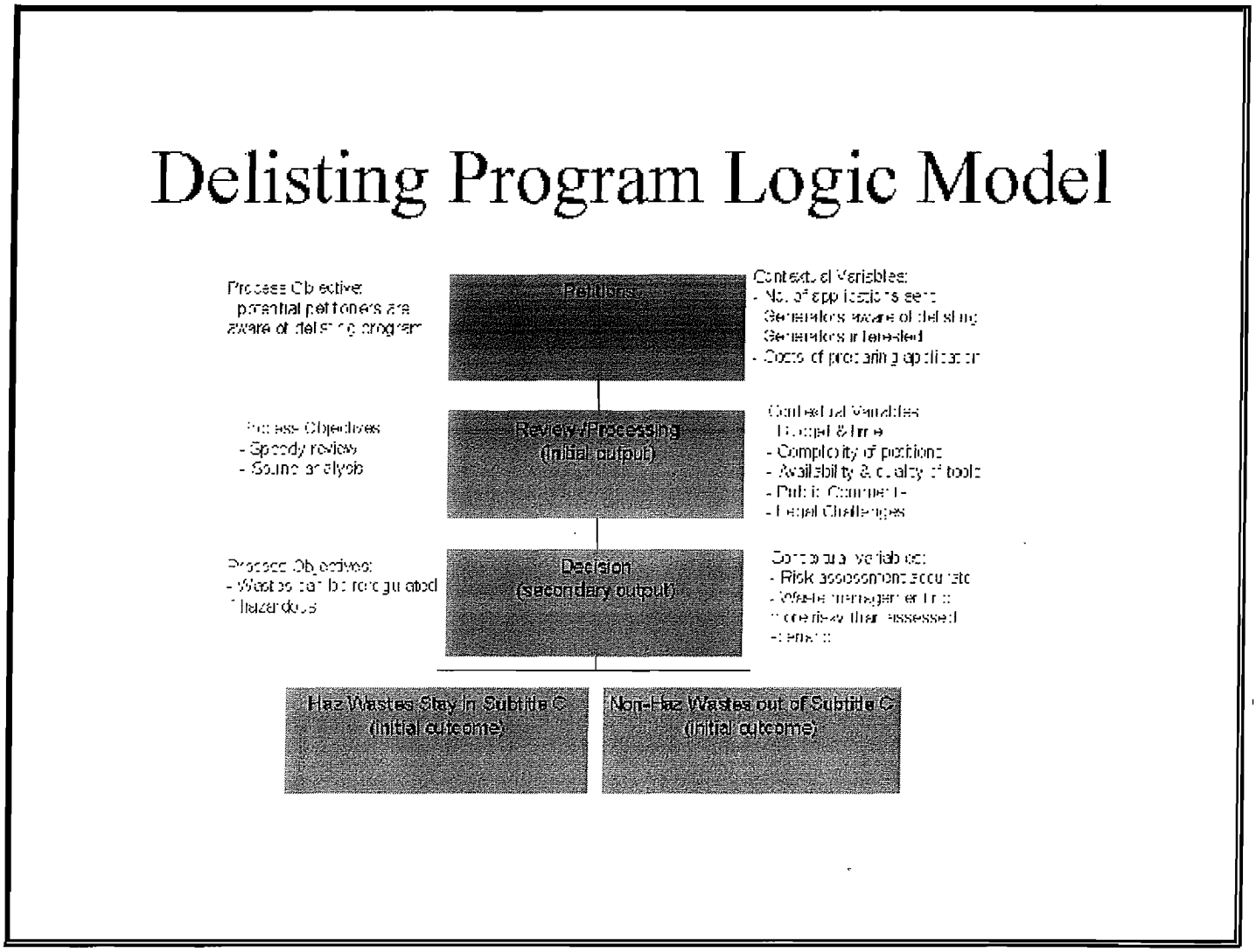

Figure 1

Process objectives: The decision should be supported by sound analysis, well-reasoned and well-documented.

OUTCOME 1 From that decision follows the first *outcome* in the process: The waste is either retained in Subtitle C regulation, or allowed to exit Subtitle C regulation.

> **Process objective**: Wastes that are allowed to exit Subtitle C regulation do not pose significant risk to human health or the environment.

Contextual Variables: The risk assessment is sufficiently conservative to cover actual post-delisting waste management. Management of delisted wastes should be no more risky than the management scenarios assessed.

OUTCOME 2 If the waste is allowed to exit Subtitle C regulation, a secondary *outcome* follows: resources previously devoted to managing that waste as hazardous can be freed up for other uses.

1.4 EVALUATION OF THE DELISTING PROGRAM

1.4.1 Why Evaluate the Delisting Program?

The delisting program has faced changes recently, which makes it a good candidate for program evaluation. Among these changes:

- Responsibility for review of petitions and issuing decisions on delistings was delegated to EPA's regional offices in October, 1995. Until that point, these functions had resided in the Office of Solid Waste (at EPA headquarters) since the beginning of the program. This change suggests that a process evaluation might be appropriate, comparing the implementation of delisting by headquarters and regional offices.

- In 2000, responsibility for national coordination of the delisting program was also delegated from OSW, this time to the Region 6 delisting staff. This change in program operations also tends to recommend a process evaluation.

- In 1999, EPA proposed revisions to the "mixture" and "derived-from" rules, which provide another way to remove low-risk wastes from Subtitle C regulation. EPA is also working on a Hazardous Waste Identification Rule (HWIR), with regulatory standards identifying wastes that are low-risk. This regulation, once fully implemented, will provide an alternative means for industry to have these wastes removed from Subtitle C regulation.[8] In light of this initiative, it seems reasonable to conclude that EPA should gain a better understanding of the delisting program, in order to better understand how it might work with HWIR. Will delisting be redundant? What roles will delisting and HWIR play, and how can EPA use the tools together to get more effective environmental regulation?

[8] See http://www.epa.gov/epaoswer/hazwaste/id/hwirwste/index.htm for more information on HWIR and the mixture and derived-from rules.

What might be the best type of evaluation for the delisting program?

There are three basic types of program evaluations:

1) *Formative* evaluations are conducted in the early stages of development (or implementation) of a program. They are intended to get an early indication of any problems with the program, and the likelihood of success.
2) *Process* evaluations focus on the operations and implementation of a program.
3) *Outcome* evaluations focus on the results, consequences, or products of a program.

The type of evaluation performed depends on the situation of the program, and the type of information that will prove useful to program managers.

The delisting program, having been carried out for 20 years, is probably not a candidate for a formative evaluation. The delegations of responsibility to Regional staff advanced the possibility of a process evaluation, looking at changes in delisting functions and operations. A process evaluation would also seem to be of limited usefulness, since EPA's Inspector General has recently completed a study of the process and operations of the delisting program[9].

After extensive consultation with managers and staff in both OSW and regional offices, OSW decided that this evaluation would be most useful it if focused on the *outcomes* and *impacts* of the federal delisting program.[10] Rather than focus on the mechanisms for conducting delistings, therefore, this study examines how the program has functioned, and what has been gained by the operation of the delisting program. This "big picture" focus also results in findings that provide useful information for assessing the future direction and management of the delisting program.

There is a great deal to be learned through this evaluation. By examining the outcomes of the program, EPA gains an understanding of what impacts the program has on industry, on waste management, and on the economy overall. The evaluation also provides RCRA managers with information to make decisions about the delisting program itself, and about interactions with other deregulatory initiatives (e.g., HWIR). This information should be useful as EPA continues working to tailor regulatory requirements to meet the risks addressed.

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[9]USEPA, Office of Inspector General, RCRA Hazardous Waste: RCRA Delisting of Hazardous Waste, Report # E1DSB7-11-002108700001, June 1998.

[10]Although some states are authorized to delist wastes, this evaluation focuses on EPA's program.

1.4.2 What are the Outcomes and Impacts of the Delisting Program?

The principal outcomes of the delisting program are the cost savings and economic impacts that result from shifting wastes from Subtitle C management to less stringent Subtitle D management standards. This report looks at three different categories of outcomes of the delisting program:

- Cost savings and aggregate economic impacts
- Impacts of delisting on the environment
- Impacts of delisting on the RCRA hazardous waste management program

The report also examines the distribution of these impacts, on different industries, geographic areas, and types of businesses.

1.4.3 Is the Delisting Program Fulfilling Its Goals?

In many cases, an important part of an outcome evaluation is an assessment of the performance of a program against some kind of standard. Is the program making good progress toward strategic goals and objectives? Are there any deficiencies in performance because of program implementation?

For the delisting program, this is not an easy question. The delisting program doesn't have *strategic* goals, in terms of what it hopes to accomplish in outcomes; EPA does not set targets, for example, of numbers of wastes to be delisted each year. Goals are operational and process-oriented (as in the process objectives noted in section 1.3), but driven by the receipt of applications, not by strategic goals. It is difficult to set goals for an essentially reactive program, which aims at processing applications as they are received.

An overall goal for federal regulatory operations, however, is to maximize regulatory efficiency. To do that, EPA attempts to make sure that the burden placed on the regulated entities is no heavier than necessary to achieve regulatory goals of protection of human health and the environment. [11] To the extent that the delisting program is promoting efficient regulation and efficient use of resources, it is meeting that overall goal of federal regulation. Section 2.2 measures how well EPA is meeting that goal.

1.5 METHODOLOGY OF THE EVALUATION

The **evaluation question** asks: *What are the economic, environmental, and programmatic impacts of delistings?* The **evaluation design** uses a simple "before-and-after" framework to assess what changes have come about as a result of the delisting program. The evaluation design rests on the assumption that without the delisting, the waste would continue to be generated and managed under RCRA Subtitle C.

[11] See "Regulatory Planning and Review", Executive Order 12866, September 30, 1993.

1.5.1 Creating the Database

EPA assembled a database listing all the delisting applications granted by the EPA (not including those granted by state governments) between calendar years 1980 and 1999. Some of the information had been kept by the delisting program, either in paper files or in the Delisting Petition Data Management System. This database had been discontinued in 1995. Other data were taken from the *Federal Register* notices announcing each proposed and final delisting granted.

Data elements in the current database include:

- Name and address of petitioning facility
- Date petition submitted and final decision reached
- Date delisting became effective
- Waste volume, matrix, form, quantity, and source
- Chemical test results for wastes
- RCRA waste codes
- Management of wastes before and after delisting

1.5.2 Assessing the Data

Using the database, we calculated total volumes of waste delisted. These volumes were calculated using the following assumptions:

- We assumed that savings from delisting begin to accrue in the year after the exclusion takes effect. This likely results in understatement of savings, since there could be some savings in the same year as the exemption is granted.

- We assumed that waste generation in the absence of the delisting would have continued indefinitely at the same quantities.[12] This may lead to overstatement of savings, since companies may have ceased generating these wastes or may have implemented pollution prevention measures to reduce the quantity of waste generated. Conversely, it could lead to understatement, since increased production might have led to increased quantities of the wastes being generated[13].

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[12]This assumption was not made for wastes which were given "one-time" standard exclusions. These delistings are granted to a quantity of waste generated in the past, and are not applicable to any subsequent wastes generated. We did not assume that these wastes were generated or delisted in any other year.

[13]This assumption is especially tricky with one of the wastes, granted to Conversion Systems, Inc. for K061. There may be much larger amounts of K061 that have been delisted since the original amount, since the delisting was predicated on a particular treatment regimen.

- We assumed that after delisting, generators manage their wastes as if they were Subtitle D industrial wastes. However, there may be state requirements for management of these wastes, even in the absence of being listed as hazardous waste. To the extent that such requirements exist, the costs savings from delisting are overestimated.

Using data on unit costs of waste management under Subtitle C and Subtitle D, we also calculated the total cost savings attributable to delistings, on an annual basis and cumulatively. Results of the analysis are presented in Chapter Two.

CHAPTER TWO:
RESULTS OF THE EVALUATION

This chapter presents the results of the data analysis, and conclusions from the data. It includes basic statistics on delistings, the economic and environmental impacts of delistings, and some data on the distribution of those impacts.

All of these statistics refer only to the federal delisting program. Incorporating the results of state delistings would lead to different results for most of these categories.

2.1 DESCRIPTIVE STATISTICS

Over the 20-year period from 1980 through 1999, delistings were granted to a total of 136 separate waste streams, generated at 115 separate facilities[14]. Table 1 below gives an overview of the individual waste streams delisted.

As-generated process wastes make up fewer than 15% of the waste streams; the majority were treatment residuals and wastewaters. Wastewater treatment sludges alone account for more than half the waste streams. Although only 4% of the waste streams were wastewaters, they are large volume wastes. 36 of the streams (26%) of the waste streams were not part of an on-going process, but only generated one time.

Table 2 shows the most frequent waste codes present in delisted wastes[15]. By far the most common code is F006, found in 51 waste streams. F019, F003, K071, and F005 were also quite common.
Delisted K061 waste streams were quite large, averaging 81,600 tons each. K071 wastes, on the other hand, averaged only 1,800 tons per year.

[14] One delisting was granted and then later revoked, so there were actually 137 wastes delisted.

[15] The numbers of waste streams appear higher than in Table 1 because many wastes carry multiple codes.

Table 1
OVERVIEW OF DELISTED WASTE STREAMS

Type of Waste	Total	Wastewaters	Process Wastes	WWT Sludges	Other Treatment Residuals	Contaminated Media
F001-F005 Solvent Wastes	21 (15%)	3	6	6	6	-
F006,F009,F019 Electroplating Wastes	69 (51%)	-	3	60	5	1
F020-F028 Dioxin Wastes	9 (7%)	2	-	-	7	-
K048,K051 Petroleum	3 (2%)	-	-	1	1	1
K060,K062 Steel	10 (7%)	-	2	2	6	-
K071,K106 Chlor-Alkali	12 (9%)	-	8	1	3	-
Miscell	12 (9%)	1	-	4	6	1
TOTAL	136 (100 %)	6	19	74	34	3
% of Waste Streams	100%	4%	14%	54%	25%	2%

Table 2
MOST FREQUENT WASTE CODES PRESENT IN DELISTED WASTES

Waste Code	No. of Streams	Average Size of Stream (tons)
F006	51	4,500
F019	34	5,400
F003	16	14,000
K071	13	1,800
F005	12	13,800*
K062	8	19,200
F020	7	1,500
F002	7	19,700*
K061	6	81,600
K002-K008	5	25,400

*Figures for F005 and F002 exclude the single outlier wastestream described below in section 2.1.1.

2.1.1 Total Quantities of Waste Delisted

The waste quantities discussed in the previous section only show generation in a single year. In the absence of the delisting program, however, these wastes would have continued to have been managed under Subtitle C management. For example, in 1985, a waste stream of sluiced bottom ash sludges was delisted; this waste is generated at an annual rate of 19,100 tons. Using the assumption of continuous generation (discussed in section 1.5.2), this analysis estimates that an aggregate total of 286,500 tons of this particular waste stream had been taken out of subtitle C management through 1999.

Cumulatively, **a total of 45 million tons of waste has been excluded from subtitle C requirements.** Over 80% of that volume is wastewater, with 32 million tons attributed to one waste stream at one facility.[16]

[16]This stream, the single largest volume waste delisted, consisted of scrubber effluent wastewaters.

2.2 ECONOMIC IMPACTS OF THE DELISTING PROGRAM

The reduced social costs associated with the delisting program are derived through calculating the administrative costs of operating the delisting program, and the offset of lowered costs of waste treatment and disposal.

2.2.1 Administrative Costs

A total of 906 delisting petitions have been submitted to EPA between 1980 and 1999. Table 3 provides a breakdown of the disposition of those petitions — those which were granted, those which were denied, and those which never completed the full review process.

Each delisting petition submitted to EPA incurs a cost to the petitioner (to gather the necessary data and prepare the petition) and to the government (for review of the petition and analysis of the data). For petitions that are incomplete, or that never complete the review process, these costs are lower.

Table 3
DELISTING ACTIVITY, 1980-1999

STATUS	NUMBER OF PETITIONS	PERCENT OF TOTAL
WITHDRAWN	503	56%
DENIED	108	12%
REFERRED TO STATE	32	4%
INCOMPLETE / IN PROCESS	122	13%
RULE-MAKING PETITION/ DISMISSED*	26	3%
GRANTED	115	13%
TOTAL	**906**	**100%**

**These petitions were all listed as "dismissed," indicating that the Agency staff decided that the petition did not warrant further review.*

EPA has previously estimated the recordkeeping burden for a petitioner as well as the burden to the government for review of a delisting petition.[17] This report estimated that the cost to the EPA for reviewing a petition is approximately $28,000. The report estimated the cost to a petitioner at approximately $82,000.[18] Because an earlier report to EPA[19] suggested that petitions sometimes cost as much as $100,000 or more, we

[17] *Supporting Statement for EPA Information Collection Request Number 1189.05, Identification, Listing, and Rulemaking Petitions,* 16 January, 1998.

[18] We assumed that a petitioner incurs all the costs of preparing a petition, even for those petitions which were withdrawn or mooted.

[19] Industrial Economics, Inc. "Final Analysis of Delisting Program Policies and Procedures", 17 February 1992.

conducted a sensitivity analysis and estimated petitioners' costs using that per-petition cost estimate, as well.

Finally, we calculated the net present value of the aggregate administrative costs by applying a discount rate. Discounting reflects the time value of money, in that the value of a dollar lost in future years is greater than a dollar, since the capacity to invest and earn extra income is also lost. The discount rate represents the displaced investments and consumption that could have been made in the absence of spending these funds on preparing and reviewing delisting petitions.

Table 4 presents the administrative costs of conducting the delisting program[20]. The total administrative costs associated with this twenty year period of the delisting program ranges from $107 million to $226 million. The costs to petitioners ranges is estimated to be 70-85% of that total.

Table 4
CUMULATIVE ADMINISTRATIVE COSTS OF DELISTING PROGRAM
(millions of dollars)

	Government Costs	Petitioner Costs	Total	7% discount rate[21]	2% discount rate[21]
Low-End	22.14	74.01	96.15	112.93	107.15
High-End	22.14	148.02	170.15	225.86	189.55

2.2.2 Costs of Treatment and Disposal

The most obvious and significant impact of the delisting program is the reduction in the costs of waste management. Waste management costs under RCRA Subtitle C (hazardous waste standards) are usually significantly more expensive than waste management under RCRA Subtitle D (non-hazardous waste standards). Where these wastes were being managed more stringently than necessary, these additional costs of waste management represent an unnecessary cost to the economy. In economic terms, this is referred to as a deadweight loss to the economy. By reducing these unnecessary costs, the delisting program is restoring value to the economy. These resources can now be devoted to producing valued goods and services.

[20] Discount rates are used to adjust the raw costs for the time value of money; the present value of cost savings is higher than the nominal value of those savings in prior years. Two different discount rates are used in the table to render the costs comparable over the twenty-year period of the study. There is not a clear consensus on the appropriate discount rate to use in a study like this; EPA guidance suggest using a lower rate of 2-3%, representing the social rate of return on investments, and a sensitivity analysis using a higher rate of around 7%, which tends to reflect returns to the private entities concerned (in this case, the firms paying waste management costs). See USEPA, *Guidelines for Preparing Economic Analyses*, 2000, Chapter 6.

Cost savings in treatment and disposal are determined by assessing the costs of treatment and disposal for each waste stream for each year after the delisting became effective, under subtitle C and under subtitle D. The analysis develops two scenarios: waste management in the baseline scenario (with a delisting granted), and in a "without-delisting" scenario. Without delisting, these wastes would have incurred the higher Subtitle C costs of treatment and disposal. The difference between the costs in these two scenarios represent the cost savings in treatment and disposal costs attributable to the delisting.

Waste Management Techniques

This requires first associating waste management techniques (treatment and disposal) under both Subtitle D and Subtitle C. In many cases, these techniques were already specified in the delisting petition or other records. In other cases (where not specified) customary practices under Subtitle D were assumed for the waste streams. Unless other information was available, we assumed the same disposal practice (e.g., surface impoundment, landfill, incineration) would be used pre- and post-delisting.

Where not otherwise specified, required treatments under Subtitle C were assumed for pre-delisting management. Land Disposal Restrictions (LDRs) typically required additional treatment of wastes prior to land disposal, or encouraged a switch to an alternative technology. The analysis takes the LDRs into account by assuming that treatment would be required prior to land disposal once the relevant LDR took effect. If wastes were delisted prior to the effective date of the relevant LDRs, we assumed (in the "without-delisting scenario") continuation of the existing treatment up until that year, and then LDR requirements after that year. We identified the year in which LDRs took effect based on the waste codes reported for each delisted waste stream The earliest effective date was selected for wastes with multiple waste codes. For example, a waste that included F005 in its list of waste codes was assigned an LDR effective date of 1986, even if other waste codes reported for that waste stream had later LDR effective dates. In the absence of a delisting, management under LDR standards was assumed to begin the year after the effective date of the relevant LDR (e.g., the savings of avoided LDR management for a waste delisted in 1986 that includes F005 as a waste code were assumed to begin in 1987.)[21]

Unit costs

Each type of waste treatment is likely to either increase the quantity of waste (e.g., waste stabilization), decrease the quantity of waste (e.g., incineration), or have no appreciable effect

[21]The analysis assumes that cost savings begin the year after a delisting takes effect. For one-time delistings, cost savings occur only in the year after the delisting takes effect. Because the delistings actually took effect earlier than the following year, this assumption tends to understate the cost savings.

(e.g., neutralization). The residual factors shown in Table 1 indicate the residual quantity that remains to be disposed of after treatment.[22]

Estimates of the unit costs of different treatment and disposal technologies are taken mostly from EPA's recent analysis of the proposed HWIR rule, and are reproduced in Table 5.[23]

Table 5:
Quantity-Based Industrial Hazardous Waste Treatment and Disposal Unit Costs

Item	Waste Treatment or Disposal Method	Residual Factor	≤ 470 tons/year	≤ 4,700 tons/year	≤ 47,000 tons/year	≤ 470,000 tons/year
1	Deactivation	0.01	$820	$820	$200	$200
2	Liquid Incineration	0.25	$301	$301	$301	$301
3	Neutralization	1.01	$270	$34	$4.48	$0.73
4	HTMR	0.0	$191	$191	$191	$191
5	Mercury Retort	1.0	$856	$856	$446	$194
6	Stabilization	1.5	$200	$150	$50	$23
7	Vitrification	1.5	$230	$230	$230	$230
8	Underground Injection		$0	$0	$0	$0
9	Acid Regeneration/ Recycling		$0	$0	$0	$0
10	Subtitle C Disposal		$130	$130	$130	$57
11	Subtitle D Disposal		$50	$50	$50	$50

(1999$ average cost per ton, depending on annual quantity treated by facility)

Source: U.S. EPA Office of Solid Waste, Economics, Methods, & Risk Assessment Division, Economic Assessment of the USEPA's 1999 Proposed Hazardous Waste Identification Rule (HWIR), 29 October 1999 Exhibit IV-14.

[22]For example, stabilization results in an increase in the waste quantity to be disposed by a factor of 1.5.

[23]U.S. EPA Office of Solid Waste, Economics, Methods, & Risk Assessment Division, *Economic Assessment of the USEPA's 1999 Proposed Hazardous Waste Identification Rule (HWIR)*, 29 October 1999.

Other unit cost figures include:

Incineration[24]:

Liquids (comparable fuels)	$70/ton
Liquids (highly contaminated)	$301/ton
Sludges (less contaminated)	$320/ton
Sludges (highly contaminated)	$630/ton
Solids (less contaminated)	$683/ton
Solids (highly contaminated)	$1281/ton

Upgrading from surface impoundments (Subtitle D) to Subtitle C storage tanks[25]: $0.40 /ton

These unit costs largely derive from 1999 estimates. Although the unit costs are adjusted for inflation for each year in which they are applied, this formula does assume that unit costs remain approximately the same over the twenty-year period of the study. Anecdotal evidence suggests that costs of hazardous waste management techniques have actually fallen at a more rapid pace than inflation. Waste management costs from the 1980's were actually higher than current prices, even in real terms. These inflation-adjusted cost savings are therefore probably an underestimate.

Assessment of Total Cost Savings

Using the aforementioned data and assumptions, each waste stream is assigned a cost of management post-delisting under Subtitle D (as actually required) and under Subtitle C (as would have been required in the absence of the delisting). Cost savings (the difference between the actual scenario and the hypothetical without-delisting scenario) were then calculated for each post-delisting year through 2000 (the first delistings took effect in 1985). [26]

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[24]Unit costs for incineration taken from from Exhibit 3-1 of *Assessment of the Potential Costs, Benefits, & Other Impacts of the Hazardous Waste Combustion MACT Standards*, USEPA, Office of Solid Waste, July 1999.

[25] Unit cost for storage tanks based on estimate of costs (capital costs plus annual operation and maintenance) for high volumes of waste, assuming 30-day storage period. Source: *Regulatory Impact Analysis: Application of Phase IV Land Disposal Restrictions to Newly Identified Mineral Processing Wastes;* USEPA, Office of Solid Waste, April 30, 1998. Exhibit F-14.

[26]It is generally the practice to convert all prices to 1999 dollars, to account for lower prices in earlier years. This practice works with the general assumption that prices of the particular commodity follow general trends of inflation. However, our data suggests that prices of hazardous waste treatment do not follow the general trend of inflation; in fact, prices are lower (even in nominal terms) than they were in earlier years. Therefore, we have assumed 1999 prices for all years of the evaluation. In practice, this probably means that we are understating the cost savings.

Table 6 presents cost savings for each year, as well as aggregate cost savings. **The cost savings that accrue in 2000 – $105.4 million — will continue to accrue every year — even if no further wastes are ever delisted**[27]. Additional delistings will increase the total cost savings. From the inception of the delisting program through the year 2000, ***cumulative gross cost savings attributable to the delisting program range between $1.36 billion and $2.49 billion.***[28]

These cost savings are probably underestimated, because of cost savings not included. Besides savings in treatment and disposal costs, there are other costs which may also be saved. Specifically, we have not accounted for

- Potential savings in transportation costs. This omission tends to underestimate the cost savings. Not only is transportation of non-hazardous wastes less expensive per mile, but it is likely that these wastes would be transported shorter distances, inasmuch as industrial waste disposal facilities are more widespread than permitted Subtitle C disposal facilities.

Table 6
Cost Savings per Year
(individual years, not cumulative)

Year	Cost Savings
1985	$749,040
1986	$5,096,626
1987	$19,492,938
1988	$22,126,162
1989	$42,180,857
1990	$51,866,658
1991	$69,882,661
1992	$73,683,088
1993	$78,043,510
1994	$78,592,062
1995	$78,817,442
1996	$96,974,128
1997	$164,566,547
1998	$98,126,193
1999	$98,126,193
2000	$105,400,863
Cumulative Net Present Value at 7% discount rate	$2,490,052,373

[27]Based on the assumptions of continuous generation of equal volume of the waste.

[28]All cumulative costs in this analysis are presented in real terms, using year 2000 dollars.

- Potential savings in administrative costs, such as compliance with manifest requirements. For some facilities, delisting may have reduced or eliminated the burden of Subtitle C permitting requirements; the cost savings in those cases are significant. We did not collect data which would enable us to quantify these savings.

2.2.3 Net Cost Impacts

Section 2.2.1 discussed the costs of administering the program, while section 2.2.2 discussed the cost savings resulting from the program. The cost impacts of the delisting program are presented in Table 7. The cost savings in treatment and disposal costs overwhelm the administrative costs of conducting the program by an order of magnitude. In summary, over the twenty-year period examined, **the delisting program has resulted in a net cost savings to society in the range of *$1.17 billion to $2.38 billion.***

Table 7
CUMULATIVE COSTS, COST SAVINGS, AND NET COST SAVINGS
(millions of dollars)

Discount Rate	Admin. Costs, Low-End	Admin. Costs, High-End	Treatment & Disposal Cost Savings	Net Cost Savings, Low-End	Net Cost Savings, High-End
7%	$112.93	$225.86	$2,490.05	$2,264.19	$2,377.12
2%	$107.05	$189.56	$1,357.57	$1,168.01	$1,250.52

2.3 ENVIRONMENTAL IMPACTS OF THE DELISTING PROGRAM

A program evaluation should provide information that is useful to help manage the program; even a retrospective evaluation (such as this one) can help guide the program into the future. EPA staff who work on delisting were consistently interested in exploring the *environmental* consequences of the delisting program.

A basic premise of the delisting program (see the process objectives in the program logic model) is that delisted wastes do not pose any significant threat to human health or the environment, even when not managed under the strict guidelines of RCRA Subtitle C. This goal is accomplished through chemical analysis and fate and transport modeling of wastes, prior to granting a delisting. In order to be delisted, this analysis must demonstrate that the waste:

- Does not meet the criteria for which it was originally listed.
- Does not exhibit any of the hazardous waste characteristics.

- Does not exhibit any *other* factors (including additional constituents) which might cause the waste to be hazardous.

A delisting determination is based on reasonable worst-case scenarios, to ensure that there is no reason that the waste should remain under RCRA Subtitle C regulation.

Are there delisted wastes that nevertheless might pose environmental problems? Unfortunately, an environmental assessment of previously delisted wastes was beyond the scope of this program evaluation. We are able, however, to provide some qualitative assessment of the environmental; impacts of the delisting program.

2.3.1 Environmental Releases

In 1997, a delisting had to be revoked when EPA discovered that our risk assessment assumptions did not fully capture the risk possibilities of a waste stream. [29] The waste which had its delisting revoked posed a greater threat of release of constituents than EPA originally estimated. This re-assessment occurred because the waste was managed in a more alkaline environment than the landfill transport models anticipated, resulting in a different release profile. EPA has already reviewed previously delistings to determine if this alkaline environment could be a similar problem with other waste streams, and concluded that this was a problem unique to the chemical characteristics of this waste stream.

What is the likelihood that other delisted wastes are producing environmental releases of concern? The fate and transport models that have been used in the program use very protective assumptions in projecting exposure to constituents. It would seem that the opportunities for damage are probably limited to

- Significant changes in the waste characterization (volume, constituents, constituent concentrations) from that reported in the original petition. Waste generators are supposed to notify EPA if such changes occur; EPA efforts to check up on previously delisted wastes have been minimal, but have not discovered such changes.
- Situations, like the revoked delisting, where there is some undiscovered flaw in the waste and risk assessment methodology.

The Agency is taking steps to limit the possibilities for harmful environmental releases in the future, and to facilitate review of the consequences of disposal of delisted waste streams. In July, 1998, EPA established a *conditional delisting* policy, to ensure that delisted wastes are managed in a manner consistent with the risk evaluation that supports the delisting decision. At the same time, the Agency established a *delisting reopener* mechanism, for immediate response to new

[29] The exclusion for this waste stream, number ARD006354161, was repealed on December 1, 1997. For information on the action, see the Federal Register notice at 62FR Number 147, July 31, 1997.

information or data indicating conditions exist that may alter the Agency's position on the approval of a delisting.

Although improving environmental quality is not the primary rationale for the delisting program, it may provide some improvement in environmental quality, as well. There is anecdotal evidence that some facilities have engaged in extra treatment of their wastes (beyond what is legally required) in order to reduce the toxicity of their wastes in order to become eligible for delisting. This additional treatment would provide some additional protection against release of constituents to the environment.

Delisting may provide other environmental benefits, as well. In their review of the delisting process, EPA's Inspector General noted that some companies function with an "environmental programs budget." When the costs of waste management decline, these companies have redirected these funds into other environmental projects.

In summary, EPA does not have evidence of releases or lack of releases from delisted waste streams. However, given a strict risk assessment process (which has been made progressively more accurate), the Agency has little reason to believe that these streams are causing environmental problems. The Agency has also put additional measures in place to reduce the likelihood of releases.

2.3.2 Recycling

Delisting wastes may have an impact on recycling quantities. Although such impacts are not relevant to the delisting decision itself – which is exclusively risk-based – it is worthwhile examining how delisting has affected recycling.

To some extent, the high cost of hazardous waste treatment and disposal under Subtitle C has provided an incentive for firms to recycle wastes and to recover resources from wastes. Intuitively, therefore, it would seem that delisting – which reduces the cost of treatment and disposal – might have a negative impact on hazardous waste recycling. One particular delisting may have been very significant in inhibiting recycling. That delisting, granted in 1995, exempted 306,000 tons of chemically-stabilized electric arc furnace (EAF) dust. According to an industry study[30], over 85% of the EAF dust generated in the US had been recycled, primarily for zinc recovery. Such recovery accounted for approximately 30% of domestic zinc production, before the delisting action. This study suggested that the delisting would divert those wastes from resource recovery into chemical stabilization followed by disposal in Subtitle D landfills. As of yet, EPA has not formally assessed the impact of this delisting on zinc recovery from EAF dust wastes. Although the current database contains information on pre-delisting and (planned) post-delisting waste management, there is no clear indication of other wastes that have been diverted from recycling to waste disposal.

[30]Arthur D. Little, Inc., "Electric Arc Furnace Dust – 1993 Overview" (Cambridge, July 1993).

On the other hand, many waste generators have told EPA that the "stigma" associated with hazardous wastes impedes recycling, since treaters and recyclers are often unwilling to acquire the liabilities associated with handling hazardous waste. Delisting wastes, therefore, may *increase* quantities recycled. We have information on one case where delisting apparently promoted waste recycling. The delisting allowed the facility to convert a 12,000 ton waste stream of lagoon sludges to be used as fertilizer. Prior to the delisting, the wastes were being incinerated.

2.3.3 Opportunity Costs to EPA

Another way of looking at the cost of the delisting program is through the concept of "opportunity cost", i.e., alternative uses for the resources consumed in running the delisting program. In this sense, the cost of staff time spent on delisting is to view it as "other regulatory work" that is forgone in order to work on delistings. If EPA could have used those resources for an environmental protection program, what additional protection could they buy?

Administrative costs of the program over 20 years range between 107-226 million dollars. EPA's expenditures probably represent no more than 15-30% of that total, or 16 to 68 million dollars. If spent on other hazardous waste programs, that could have represented a certain number of facility investigations, enforcement actions, permits, or other regulatory actions. Assuming those actions would have led to some degree of improvement in environmental quality, EPA has forgone such improvements. Those improvements, of course, could only come at the expense of the billions of dollars in social costs that delisting has saved, but it is worthwhile to be aware of the budgetary tradeoffs made.

2.4 DISTRIBUTION OF IMPACTS

In addition to looking at the aggregate cost savings attributable to the delisting program, we can also examine the distribution of those impacts. What are the economic impacts on specific industries or areas of the country?

2.4.1 Geography

Geographically, the most federal delistings have been granted in in the southeast and midwest (28 delistings granted in each of EPA Regions 4 and 5). The states most affected are

- Ohio (10)
- New York (9)
- Tennessee (9)
- Indiana (8)
- Pennsylvania (8)
- Alabama (7)
- Arkansas (7)

This represents only the distribution of EPA-granted delistings; 18 states have been authorized to grant delistings on their own.[31]

2.4.2 Small Businesses

It has been suggested that smaller business are prevented from obtaining delistings because of the the high cost of preparing a petition.[32] This report has shown, however, that the savings in waste management costs readily make up for the administrative costs of preparing a petition. At least 10% (12 of the 115) of the generators who have received delistings are Small Quantity Generators (or less). Although this is not a perfect proxy for business size, larger firms tend to be larger quantity generators.

2.4.3 Industries Affected

We also reviewed the extent to which different industries have been impacted by the delisting program. The following industries are of particular interest:

Plating and Metal Polishing/Coating: This industry has been a major beneficiary of delisting, as F006 and F019 waste codes are the most common wastes to be delisted.

Chloralkali: This is a small industry, which only numbered about 20 firms overall in the late 1980's. 12 wastestreams associated with this industry were delisted, related to 8 firms.

Blast Furnaces and Steel Mills: There were 12 delistings associated with this industry. At least 1.5 million tons of K061 have been delisted, deriving from steel production at mills using electric arc furnaces.

Pharmaceutical: Of the 45 million tons of waste delisted, 32 million tons are attributable to one waste stream at a single pharmaceutical facility in the midwest. This waste, consisting of scrubber effluents, is generated at a rate of nearly 3million tons per year.

Aluminum plating is another industry which received several delistings.

In general, the larger volume generators of hazardous wastes (e.g., chemical industry, metals) are well represented in the set of delistings. One exception to this correlation, however, is the petroleum industry; although a large generator of wastes, only 3 refineries got delistings. It is not

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[31] The list of states fully or partially authorized to delist wastes is: New Jersey, Delaware, Kentucky, North Carolina, Mississippi, Alabama, Georgia, Michigan, Illinois, Louisiana, Nebraska, North Dakota, South Dakota, Wyoming, Utah, Colorado, Oregon, and Idaho.

[32] See USEPA, Office of Inspector General, *RCRA Hazardous Waste: RCRA Delisting of Hazardous Waste*, Report # E1DSB7-11-002108700001, June 1998.

clear if there is a specific reason why this industry has not made more use of delistings. One possibility is that there is either less variation among wastes in refineries, or the listing description more precisely captures the hazardous nature of their wastes.

CHAPTER THREE:
RECOMMENDATIONS AND CONCLUSIONS

3.1 RECOMMENDATIONS

3.1.1 Regulatory Impacts Analysis

In reviewing Federal Register notices for delistings, we did not find any RIAs associated with these regulatory actions. Often, these notices indicate that since the rules don't meet the criteria of Executive Order 12866 (or predecessor applicable Executive Orders) as "significant regulatory action", then "no assessment of costs and benefits is necessary."

Although such an assessment is not *required* by the Executive Order, it is often a good idea to undertake such an assessment. It is always a good practice in making public policy to be aware of the impacts of a regulatory action, whether required by Executive Order, or statute, or not at all. This evaluation has demonstrated that such an analysis is particularly helpful for delistings, to help understand the value of the program overall. As RCRA program management continues to "fine tune" hazardous waste management requirements, assessing the impacts of delistings can be valuable in the Agency's overall effort to better match risks with regulatory requirements.

3.1.2 Evaluation of the Listing Program

Delisting exists because our listing methodology captures a large category of wastes, and some wastes are caught in the net which are not necessarily risky. The earliest EPA listings involved risk assessment methodology which tended to be far more cautious than methodologies used today. Therefore, it would seem, these early listings were more likely to have captured low-risk wastes than the later listings, which used more precise and refined risk assessment methodology. (Later risk assessments may been more conservative in some respects, especially in evaluating indirect effects and ecological risks.) The methodology and results of this evaluation could be very helpful in undertaking an evaluation of the hazardous waste listing program.

3.2 CONCLUSIONS

The findings of this evaluation distinctly demonstrate the significant economic impacts of the delisting program: reductions in deadweight loss to the economy totaling over $100 million each year. Continued efficiencies and refinements in the delisting petition review process should only improve those results.

The environmental impacts are not as clear, although EPA does not have reason to suspect that delisted wastes are causing environmental problems.

As one of the first program evaluations undertaken by the RCRA program in response to GPRA, there is also clear value to this evaluation study itself. Not only has it helped the RCRA program understand the process of program evaluation, it has also helped us understand the nature of the "value" of a program. This evaluation have demonstrated that benefits can take many forms, not just risk reduction. A program like delisting demonstrates its value in terms of reduction in economic losses, and concomitant improvement in human welfare.

The delisting program has also helped refine standards for the RCRA hazardous waste management program itself, by providing information and feedback on our listing descriptions. Information received in delisting petitions has helped the Agency refine the "listing description", that is, the characterization of the hazardous nature of a class of industrial wastes.

Heritage Environmental Services LLC Delisting

Excerpt from Nucor Steel K061 exclusion from Table 2 – Wastes Excluded From Specific Sources; 40 CFR Appendix IX to Part 261

Heritage Environmental Services, LLC, at the Nucor Steel facility
Crawfordsville, Indiana

Electric arc furnace dust (EAFD) that has been generated by Nucor Steel at its Crawfordsville, Indiana facility and treated on site by Heritage Environmental Services, LLC (Heritage) at a maximum annual rate of 30,000 cubic yards per year and disposed of in a Subtitle D landfill which has groundwater monitoring, after January 15, 2002.

(1) *Delisting Levels:*

(A) The constituent concentrations measured in either of the extracts specified in Paragraph (2) may not exceed the following levels (mg/L): Antimony-0.206; Arsenic-0.0936; Barium-55.7; Beryllium-0.416; Cadmium-0.15; Chromium (total)-1.55; Lead-5.0; Mercury-0.149; Nickel-28.30; Selenium-0.58; Silver-3.84; Thallium-0.088; Vanadium-21.1; Zinc-280.0.

(B) Total mercury may not exceed 1 mg/kg.

(2) *Verification Testing:* On a monthly basis, Heritage or Nucor must analyze two samples of the waste using the TCLP, SW-846 Method 1311, with an extraction fluid of pH 12 ±0.05 standard units and for the mercury determinative analysis of the leachate using an appropriate method. The constituent concentrations measured must be less than the delisting levels established in Paragraph (1).

(3) *Changes in Operating Conditions:* If Nucor significantly changes the manufacturing process or chemicals used in the manufacturing process or Heritage significantly changes the treatment process or the chemicals used in the treatment process, Heritage or Nucor must notify the EPA of the changes in writing. Heritage and Nucor must handle wastes generated after the process change as hazardous until Heritage or Nucor has demonstrated that the wastes continue to meet the delisting levels set forth in Paragraph (1) and that no new hazardous constituents listed in Appendix VIII of Part 261 have been introduced and Heritage and Nucor have received written approval from EPA.

(4) *Data Submittals:* Heritage must submit the data obtained through monthly verification testing or as required by other conditions of this rule to U.S. EPA Region 5, Waste Management Branch (DW-8J), 77 W. Jackson Blvd., Chicago, IL 60604 by February 1 of each calendar year for the prior calendar year. Heritage or Nucor must compile, summarize, and maintain on site for a minimum of five years records of operating conditions and analytical data. Heritage or Nucor must make these records available for inspection. All data must be accompanied by a signed copy of the certification statement in 40 CFR 260.22(i)(12).

(5) *Reopener Language:*

(A) If, anytime after disposal of the delisted waste, Heritage or Nucor possesses or is otherwise made aware of any data (including but not limited to leachate data or groundwater monitoring data) relevant to the delisted waste indicating that any constituent identified in Paragraph (1) is at a level in the leachate higher than the delisting level established in Paragraph (1), or is at a level in the groundwater higher than the maximum allowable point of exposure concentration predicted by the CMTP model, then Heritage or Nucor must report such data, in writing, to the Regional Administrator within 10 days of first possessing or being made aware of that data.

(B) Based on the information described in paragraph (5)(A) and any other information received from any source, the Regional Administrator will make a preliminary determination as to whether the reported information requires Agency action to protect human health or the environment. Further action may include suspending, or revoking the exclusion, or other appropriate response necessary to protect human health and the environment.

(C) If the Regional Administrator determines that the reported information does require Agency action, the Regional Administrator will notify Heritage and Nucor in writing of the actions the Regional Administrator believes are necessary to protect human health and the environment. The notice shall include a statement of the proposed action and a statement providing Heritage and Nucor with an opportunity to present information as to why the proposed Agency action is not necessary or to suggest an alternative action. Heritage and Nucor shall have 30 days from the date of the Regional Administrator's notice to present the information.

(D) If after 30 days Heritage or Nucor presents no further information, the Regional Administrator will issue a final written determination describing the Agency actions that are necessary to protect human health or the environment. Any required action described in the Regional Administrator's determination shall become effective immediately, unless the Regional Administrator provides otherwise.

Conversion Systems Inc. (CSI) Delisting

Excerpt from CSI K061 exclusion at Northwestern Steel in Sterling, IL from Table 2 – Wastes Excluded From Specific Sources; 40 CFR Appendix IX to Part 261

Conversion Systems, Inc.
Horsham, Pennsylvania

Chemically Stabilized Electric Arc Furnace Dust (CSEAFD) that is generated by Conversion Systems, Inc. (CSI) (using the Super Detox™ treatment process as modified by CSI to treat EAFD (EPA Hazardous Waste No. K061)) at the following sites and that is disposed of in Subtitle D landfills:

Northwestern Steel, Sterling, Illinois after June 13, 1995.

CSI must implement a testing program for each site that meets the following conditions for the exclusion to be valid:

(1) *Verification Testing Requirements:* Sample collection and analyses, including quality control procedures, must be performed using appropriate methods. As applicable to the method-defined parameters of concern, analyses requiring the use of SW-846 methods incorporated by reference in 40 CFR 260.11 must be used without substitution. As applicable, the SW-846 methods might include Methods 0010, 0011, 0020, 0023A, 0030, 0031, 0040, 0050, 0051, 0060, 0061, 1010A, 1020B, 1110A, 1310B, 1311, 1312, 1320, 1330A, 9010C, 9012B, 9040C, 9045D, 9060A, 9070A (uses EPA Method 1664, Rev. A), 9071B, and 9095B.

(A) *Initial Verification Testing:* During the first 20 operating days of full-scale operation of a newly constructed Super Detox™ treatment facility, CSI must analyze a minimum of four (4) composite samples of CSEAFD representative of the full 20-day period. Composites must be comprised of representative samples collected from every batch generated. The CSEAFD samples must be analyzed for the constituents listed in Condition (3). CSI must report the operational and analytical test data, including quality control information, obtained during this initial period no later than 60 days after the generation of the first batch of CSEAFD.

(B) *Addition of New Super Detox ™ Treatment Facilities to Exclusion:* If the Agency's review of the data obtained during initial verification testing indicates that the CSEAFD generated by a specific Super Detox™ treatment facility consistently meets the delisting levels specified in Condition (3), the Agency will publish a notice adding to this exclusion the location of the new Super Detox™ treatment facility and the name of the steel mill contracting CSI's services. If the Agency's review of the data obtained during initial verification testing indicates that the CSEAFD generated by a specific Super Detox™ treatment facility fails to consistently meet the conditions of the exclusion, the Agency will not publish the notice adding the new facility.

(C) *Subsequent Verification Testing:* For the Sterling, Illinois facility and any new facility subsequently added to CSI's conditional multiple-site exclusion, CSI must collect and analyze at least one composite sample of CSEAFD each month. The composite samples must be composed

of representative samples collected from all batches treated in each month. These monthly representative samples must be analyzed, prior to the disposal of the CSEAFD, for the constituents listed in Condition (3). CSI may, at its discretion, analyze composite samples gathered more frequently to demonstrate that smaller batches of waste are nonhazardous.

(2) *Waste Holding and Handling:* CSI must store as hazardous all CSEAFD generated until verification testing as specified in Conditions (1)(A) and (1)(C), as appropriate, is completed and valid analyses demonstrate that Condition (3) is satisfied. If the levels of constituents measured in the samples of CSEAFD do not exceed the levels set forth in Condition (3), then the CSEAFD is non-hazardous and may be disposed of in Subtitle D landfills. If constituent levels in a sample exceed any of the delisting levels set in Condition (3), the CSEAFD generated during the time period corresponding to this sample must be retreated until it meets these levels, or managed and disposed of in accordance with Subtitle C of RCRA. CSEAFD generated by a new CSI treatment facility must be managed as a hazardous waste prior to the addition of the name and location of the facility to the exclusion. After addition of the new facility to the exclusion, CSEAFD generated during the verification testing in Condition (1)(A) is also non-hazardous, if the delisting levels in Condition (3) are satisfied.

(3) *Delisting Levels:* All leachable concentrations for those metals must not exceed the following levels (ppm): Antimony-0.06; arsenic-0.50; barium-7.6; beryllium-0.010; cadmium-0.050; chromium-0.33; lead-0.15; mercury-0.009; nickel-1; selenium-0.16; silver-0.30; thallium-0.020; vanadium-2; and zinc-70. Metal concentrations must be measured in the waste leachate by the method specified in 40 CFR 261.24.

(4) *Changes in Operating Conditions:* After initiating subsequent testing as described in Condition (1)(C), if CSI significantly changes the stabilization process established under Condition (1) (e.g., use of new stabilization reagents), CSI must notify the Agency in writing. After written approval by EPA, CSI may handle CSEAFD wastes generated from the new process as non-hazardous, if the wastes meet the delisting levels set in Condition (3).

(5) *Data Submittals:* At least one month prior to operation of a new Super Detox^{TM}treatment facility, CSI must notify, in writing, the Chief of the Waste Identification Branch (see address below) when the Super Detox^{TM}treatment facility is scheduled to be on-line. The data obtained through Condition (1)(A) must be submitted to the Branch Chief of the Waste Identification Branch, OSW (Mail Code 5304), U.S. EPA, 1200 Pennsylvania Ave., NW., Washington, DC 20460 within the time period specified. Records of operating conditions and analytical data from Condition (1) must be compiled, summarized, and maintained on site for a minimum of five years. These records and data must be furnished upon request by EPA, or the State in which the CSI facility is located, and made available for inspection. Failure to submit the required data within the specified time period or maintain the required records on site for the specified time will be considered by EPA, at its discretion, sufficient basis to revoke the exclusion to the extent directed by EPA. All data must be accompanied by a signed copy of the following certification statement to attest to the truth and accuracy of the data submitted:

Under civil and criminal penalty of law for the making or submission of false or fraudulent statements or representations (pursuant to the applicable provisions of the Federal Code, which

include, but may not be limited to, 18 U.S.C. 1001 and 42 U.S.C. 6928), I certify that the information contained in or accompanying this document is true, accurate and complete.

As to the (those) identified section(s) of this document for which I cannot personally verify its (their) truth and accuracy, I certify as the company official having supervisory responsibility for the persons who, acting under my direct instructions, made the verification that this information is true, accurate and complete.

In the event that any of this information is determined by EPA in its sole discretion to be false, inaccurate or incomplete, and upon conveyance of this fact to the company, I recognize and agree that this exclusion of waste will be void as if it never had effect or to the extent directed by EPA and that the company will be liable for any actions taken in contravention of the company's RCRA and CERCLA obligations premised upon the company's reliance on the void exclusion.

Attachment 5
Pace Analytical Corrected Raw Laboratory Data Reports

NOTE: Attachment 5 to the original Response is filed separately, as it is voluminous. Copies of the Response include CD-ROMs in lieu of paper versions of Attachment 5.

Attachment 6
Requested DRAS v.2 Run Data Sheets

Site and WMU Information

Delisting Petition Number:

DL-

File Name:

Updated DRAS 2-19-08, Max values used

Petitioner's Name:

Peoria Disposal Company

Address 1:

4349 W. Southport Road

Address 2:

City, State:

Peoria,

Zip Code:

61615

Analysis Performed by:

RMT Inc.

Date of Analysis:

Feb-19-2008

Waste Description:

EAF Dust Stabilized Residue

Waste Code:

K061

WMU Type:

Landfill

Waste Volume (yd^3):

95000

Active Life (years):

20

Risk Factor:

1.00E-06

HQ Factor:

1.00E+00

Select Chemicals of Concern to be Modeled (Steps 4 5)

Chemical Name	CAS Number	TCLP Concentration (mg/L)	TCLP Detection Limit	Total Concentration (mg/kg)	Total Detection Limit	Maximum Contaminant Level (MCL) (mg/L)	Carcinogenic Slope Factor - Oral (CSFo) (kg-day/mg)	Carcinogenic Slope Factor - Inhalation (CSFi) (kg-day/mg)	Reference Dose - Oral (RFDo) (mg/kg-day)
Di-n-octyl phthalate	117-84-0	2.95E-03	0.00E+00	5.90E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.00E-02
TCDD, 2,3,7,8-	1746-01-6	4.00E-11	0.00E+00	2.10E-04	0.00E+00	3.00E-08	1.50E+05	1.50E+05	0.00E+00
Benz(a)anthracene	56-55-3	1.05E-03	0.00E+00	2.10E-02	0.00E+00	0.00E+00	7.31E-01	3.10E-01	0.00E+00
Chloro-3-methylphenol 4-	59-50-7	3.85E-04	0.00E+00	7.70E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Isophorone	78-59-1	1.35E-04	0.00E+00	2.70E-03	0.00E+00	0.00E+00	1.00E-03	9.50E-04	2.00E-0
Acenaphthene	83-32-9	1.15E-04	0.00E+00	2.30E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.00E-02
Methylnaphthalene 2	91-57-6	2.65E-04	0.00E+00	5.30E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Copper	7440-50-8	8.00E+01	0.00E+00	1.60E+03	0.00E+00	1.30E+00	0.00E+00	0.00E+00	4.00E-02
Phenol	108-95-2	2.10E-03	0.00E+00	4.20E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.00E-1
Selenium	7782-49-2	3.80E-02	0.00E+00	9.00E+01	0.00E+00	5.00E-02	0.00E+00	0.00E+00	5.00E-03
Benzo(k)fluoranthene	207-08-9	8.00E-04	0.00E+00	1.60E-02	0.00E+00	0.00E+00	7.30E-02	3.10E-02	0.00E+00
Acenapthylene	208-96-8	5.50E-04	0.00E+00	1.10E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Vanadium	7440-62-2	1.00E-02	0.00E+00	1.80E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-03
Zinc	7440-66-6	4.10E+00	0.00E+00	1.20E+05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.00E-01
Chromium	7440-47-4	9.50E-02	0.00E+00	1.80E+03	0.00E+00	1.00E-01	0.00E+00	0.00E+00	1.50E-00
Fluorene	86-73-7	4.65E-04	0.00E+00	9.30E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.00E-02
Pentachlorophenol	87-86-5	3.15E-04	0.00E+00	6.30E-03	0.00E+00	1.00E-03	1.20E-01	0.00E+00	3.00E-02
nitroaniline 2-	88-74-4	9.50E-04	0.00E+00	1.90E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.00E-03
Naphthalene	91-20-3	9.50E-04	0.00E+00	1.90E-02	0.00E+00	0.00E+00	0.00E+00	3.50E-01	2.00E-02
Pyridine	110-86-1	1.05E-03	0.00E+00	2.10E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-03
Nickel	7440-02-0	6.90E-02	0.00E+00	1.70E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E-02
Bis(2-ethylhexyl)phthalat	117-81-7	1.70E-02	0.00E+00	3.40E-01	0.00E+00	6.00E-03	1.40E-02	1.40E-02	2.00E-02

Results for Analysis: Updated DRAS 2-19-08, Max values used ☐1

Select Chemicals of Concern to be Modeled (Steps 4 5)

Reference Dose - Inhalation (RFC) (mg/m³)	Bio- concentration Factor (BCF) (L/kg)	Soil Saturation Level (SOILSAT) (mg/kg)	Toxicity Characteristic Level (TC) (mg/L)	Henry's Law Coefficient (H) (atm-m³/mol-K)	Diffusion Coefficient in Water (Dw) (cm²/sec)	Diffusion Coefficient in Air (Da) (cm²/sec)	Solubility (SOL) (mg/L)	Landfill Dilution Attenuation Factor (DAFLF)	Surface Impoundment Dilution Attenuation Factor (DAFSI)
4.00E-02	0.00E+00	1.00E+04	0.00E+00	7.68E-07	4.20E-06	1.32E-02	2.00E-02	2.70E+01	3.50E+05
0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.60E-05	6.81E-06	1.27E-02	1.93E-05	1.80E+01	1.90E+04
0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.62E-06	6.21E-06	2.47E-02	9.40E-03	1.80E+01	3.00E+03
0.00E+00	1.34E+02	0.00E+00	0.00E+00	2.50E-06	8.06E-06	6.96E-02	3.85E+03	1.80E+01	0.00E+00
2.00E-01	1.15E+01	4.60E+03	0.00E+00	6.20E-06	7.50E-06	5.22E-02	1.20E+04	1.80E+01	5.90E+00
6.00E-02	6.07E+02	1.80E+02	0.00E+00	7.40E-05	7.19E-06	4.21E-02	3.80E+00	1.90E+01	4.50E+01
0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.05E-04	7.84E-06	4.80E-02	2.60E+01	1.80E+01	0.00E+00
0.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	8.00E-06	8.00E-02	0.00E+00	7.01E+03	2.79E+03
0.00E+00	7.81E+00	2.30E+04	0.00E+00	5.95E-07	1.03E-05	8.27E-02	8.28E+04	1.90E+01	4.20E+00
0.00E+00	1.29E+02	0.00E+00	1.00E+00	0.00E+00	1.20E-05	1.03E-01	0.00E+00	1.16E+01	4.60E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.15E-07	5.49E-06	2.28E-02	8.00E-04	1.90E+01	0.00E+00
0.00E+00	1.00E+00	0.00E+00	0.00E+00	8.29E-05	7.53E-06	4.39E-02	3.93E+00	1.80E+01	0.00E+00
0.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	8.00E-06	8.00E-02	0.00E+00	8.03E+01	3.19E+01
0.00E+00	6.54E+02	0.00E+00	0.00E+00	0.00E+00	1.36E-05	1.17E-01	0.00E+00	2.49E+01	9.90E+00
0.00E+00	2.83E-02	0.00E+00	5.00E+00	0.00E+00	8.00E-06	8.00E-02	0.00E+00	3.85E+03	1.53E+03
4.00E-02	0.00E+00	9.00E+01	0.00E+00	7.30E-05	7.88E-06	3.63E-02	1.98E+00	1.90E+01	6.40E+01
0.00E+00	0.00E+00	7.10E+03	1.00E+02	1.41E-05	8.01E-06	1.56E-02	1.95E+03	1.80E+01	1.40E+01
3.00E-05	1.50E+01	0.00E+00	0.00E+00	8.79E-08	8.00E-06	7.30E-02	2.94E+02	1.80E+01	0.00E+00
8.60E-04	2.15E+02	3.80E+02	0.00E+00	4.82E-04	8.92E-06	5.90E-02	3.10E+01	1.90E+01	1.40E+01
0.00E+00	1.90E+00	0.00E+00	5.00E+00	6.86E-03	1.08E-05	9.10E-02	1.00E+06	1.90E+01	3.90E+00
0.00E+00	3.08E+02	0.00E+00	0.00E+00	0.00E+00	1.46E-05	1.26E-01	0.00E+00	3.76E+01	1.50E+01
2.00E-02	1.20E+02	3.10E+04	0.00E+00	1.10E-07	4.22E-06	1.32E-02	3.34E-01	1.90E+01	2.10E+05

Results for Analysis: Updated DRAS 2-19-08, Max values used □1

Select Chemicals of Concern to be Modeled (Steps 4 5)

Time to reach steady state (T*) (hrs)	Skin Permeability Coefficient (Kpw) (cm/hr)	Tau (T) (hrs)	Bunge Coefficient (B) (unitless)	Organic/ Inorganic	Bio- accumulation Factor (BAF) (L/kg)	Chronic Ecological Threshhold (Aquatic TRV) (mg/L)	Carcinogen/ Noncarcinogen	Molecular Weight (MW) (gm/mol)	Vapor Pressure (Vp) (atm)	Surface Water Partition Coefficient (Kdsw) (L/kg)
9 90E+01	4 20E+00	2.10E+01	1.10E+04	1 00E+00	3 88E+02	1.99E+00	Noncarcinogen	3.91E+02	5 90E-09	6 78E+
3.80E+01	1.40E+00	8.10E+00	6.30E+02	1.00E+00	9.16E+05	3.00E-08	Carcinogen	3.22E+02	9.74E-13	2.02E+05
1 00E+01	8.60E-01	2 20E+00	5.00E+01	1 00E+00	5 10E+03	2 70E-05	Carcinogen	2.28E+02	2 03E-10	1.94E+04
0.00E+00	4.09E-02	6.50E-01	1.26E-01	1.00E+00	1.00E+00	0.00E+00	Noncarcinogen	1.43E+02	1.08E-05	2.78E+02
1 50E+00	4 40E-03	6 10E-01	5.00E-03	1 00E+00	1 00E+00	1 17E+00	Carcinogen	1 38E+02	5 38E-04	2 24E+00
6.00E+00	1.30E-01	7.60E-01	8.30E-01	1.00E+00	1.00E+00	1.70E-02	Noncarcinogen	1.54E+02	4.93E-06	3.67E+02
4.87E+00	1 42E-01	6 44E-01	7.24E-01	1 00E+00	1 00E+00	0.00E+00	Noncarcinogen	1 42E+02	0.00E+00	0 00E+00
0.00E+00	1.00E-03	0.00E+00	0.00E+00	0.00E+00	1.00E+00	9.00E-03	Noncarcinogen	6.36E+01	0.00E+00	2.20E+01
7 90E-01	5.70E-03	3.30E-01	3.00E-03	1 00E+00	1 00E+00	2.56E-01	Noncarcinogen	9.41E+01	5 74E-04	1 65E+00
0.00E+00	1.00E-03	0.00E+00	0.00E+00	0.00E+00	1.00E+00	5.00E-03	Noncarcinogen	7.90E+01	0.00E+00	4.30E+00
1.43E+01	1 00E+00	3.03E+00	1.00E+02	1.00E+00	1 00E+03	2.70E-02	Carcinogen	2.52E+02	1.32E-12	6 12E+04
6.23E+00	1.55E-01	7.42E-01	1.00E+00	1.00E+00	1.00E+00	0.00E+00	Noncarcinogen	1.52E+02	0.00E+00	0.00E+00
0.00E+00	1.00E-03	0 00E+00	0.00E+00	0 00E+00	1 00E+00	1 90E-02	Noncarcinogen	5.09E+01	0.00E+00	5 00E+01
0.00E+00	1.00E-03	0.00E+00	0.00E+00	0.00E+00	1.00E+00	1.20E-01	Noncarcinogen	6.54E+01	0.00E+00	6.20E+00
0 00E+00	1 00E-03	0 00E+00	0 00E+00	0 00E+00	1 00E+00	7 40E-02	Noncarcinogen	5 20E+01	0 00E+00	1 80E+06
5.40E+00	1.80E-01	9.00E-01	1.60E+00	1.00E+00	8.90E+01	4.00E-03	Noncarcinogen	1.66E+02	8.17E-07	5.78E+02
1 80E+01	1 90E-01	3 70E+00	1 20E+01	1 00E+00	3 97E+02	1 50E-02	Carcinogen	2.66E+02	7 11E-07	3 78E+01
1.46E+00	5.03E-03	6.09E-01	6.03E-03	1.00E+00	1.00E+00	0.00E+00	Noncarcinogen	1.38E+02	1.07E-05	2.95E+00
2.40E+00	7.70E-02	5 30E-01	2.30E-01	1.00E+00	1 00E+00	6.20E-02	Noncarcinogen	1 28E+02	1 17E-04	8 92E+01
6.40E-01	1.90E-03	2.70E-01	4.70E-04	1.00E+00	1.00E+00	0.00E+00	Noncarcinogen	7.91E+01	2.60E-02	3.54E-01
0.00E+00	1.00E-03	0 00E+00	0.00E+00	0.00E+00	1.00E+00	5.20E-02	Noncarcinogen	5.87E+01	0 00E+00	6 50E+01
1.00E+02	3.30E-02	2.10E+01	1.30E+01	1.00E+00	1.00E+00	3.20E-02	Carcinogen	3.91E+02	8.49E-09	8.32E+03

Results for Analysis: Updated DRAS 2-19-08, Max values used □1

Select Chemicals of Concern to be Modeled (Steps 4 5)

Chemical Name	CAS Number	TCLP Concentration (mg/L)	TCLP Detection Limit	Total Concentration (mg/kg)	Total Detection Limit	Maximum Contaminant Level (MCL) (mg/L)	Carcinogenic Slope Factor - Oral (CSFo) (kg-day/mg)	Carcinogenic Slope Factor - Inhalation (CSFi) (kg-day/mg)	Reference Dose - Oral (RFDo) (mg/kg-day)
Di-n-butyl phthalate	84-74-2	6.00E-03	0.00E+00	1.20E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-01
Phenanthrene	85-01-8	2.75E-03	0.00E+00	5.50E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cobalt	7440-48-4	5.50E-01	0.00E+00	1.10E+01	0.00E+00	0.00E+00	0.00E+00	9.80E+00	2.00E-02
Chrysene	218-01-9	1.65E-03	0.00E+00	3.30E-02	0.00E+00	0.00E+00	7.30E-03	3.10E-03	0.00E+00
Benzo(a)pyrene	50-32-8	2.30E-05	0.00E+00	1.70E-02	0.00E+00	2.00E-04	7.30E+00	3.10E+00	0.00E+00
Trichlorophenol, 2,4,5-	95-95-4	3.85E-04	0.00E+00	7.70E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-01
Lead	7439-92-1	3.60E-01	0.00E+00	9.60E+03	0.00E+00	1.50E-02	0.00E+00	0.00E+00	0.00E+00
Diethyl phthalate	84-66-2	2.85E-04	0.00E+00	5.70E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.00E-01
Silver	7440-22-4	7.50E-04	0.00E+00	2.50E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E-03
Dimethyl phthalate	131-11-3	1.15E-04	0.00E+00	2.30E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E+01
Dibenz(a,h)anthracene	53-70-3	2.60E-06	0.00E+00	1.30E-02	0.00E+00	0.00E+00	7.30E+00	3.10E+00	0.00E+00
Dibenzofuran	132-64-9	4.00E-04	0.00E+00	8.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E-03
Fluoranthene	206-44-0	2.95E-03	0.00E+00	5.90E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.00E-02
Butylbenzylphthalate	85-68-7	1.35E-03	0.00E+00	2.70E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E-01
Benzo(b)fluoranthene	205-99-2	4.00E-05	0.00E+00	3.20E-02	0.00E+00	0.00E+00	7.30E-01	3.10E-01	0.00E+00
Mercury	7439-97-6	2.40E-02	0.00E+00	1.50E+00	0.00E+00	2.00E-03	0.00E+00	0.00E+00	1.00E-04
Benzo (ghi) perylene	191-24-2	1.35E-03	0.00E+00	2.70E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
N-Nitrosodiphenylamine	86-30-6	1.65E-04	0.00E+00	3.30E-03	0.00E+00	0.00E+00	4.90E-03	4.90E-03	2.00E-02
Indeno(1,2,3-cd) pyrene	193-39-5	1.40E-05	0.00E+00	1.70E-02	0.00E+00	0.00E+00	7.30E-01	3.10E-01	0.00E+00
Benzyl alcohol	100-51-6	5.00E-04	0.00E+00	1.00E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.00E-01
Bromophenyl-phenyl ether,4-	101-55-3	8.50E-05	0.00E+00	1.70E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.80E-02
Toluene	108-88-3	3.75E-04	0.00E+00	7.50E-03	0.00E+00	1.00E+00	0.00E+00	0.00E+00	8.00E-02

Results for Analysis: Updated DRAS 2-19-08, Max values used □2

Select Chemicals of Concern to be Modeled (Steps 4 5)

Reference Dose - Inhalation (RFC) (mg/m³)	Bio- concentration Factor (BCF) (L/kg)	Soil Saturation Level (SOILSAT) (mg/kg)	Toxicity Characteristic Level (TC) (mg/L)	Henry's Law Coefficient (H) (atm-m³/mol-K)	Diffusion Coefficient in Water (Dw) (cm²/sec)	Diffusion Coefficient in Air (Da) (cm²/sec)	Solubility (SOL) (mg/L)	Landfill Dilution Attenuation Factor (DAFLF)	Surface Impoundment Dilution Attenuation Factor (DAFSI)
0 00E+00	0.00E+00	2 30E+03	0.00E+00	1 43E-06	7.86E-06	4 38E-02	1.12E+01	2.00E+01	1.80E+02
0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.23E-05	7.47E-06	3.33E-02	1.28E+00	1.80E+01	0.00E+00
6 00E-06	1 00E+00	0 00E+00	0 00E+00	0 00E+00	8 00E-06	8 00E-02	0.00E+00	1 00E+01	0.00E+00
0.00E+00	0.00E+00	3.80E+00	0.00E+00	1.21E-06	6.21E-06	2.48E-02	1.60E-03	1.90E+01	1.60E+03
0 00E+00	0 00E+00	0 00E+00	0.00E+00	8 30E-07	5 85E-06	2 16E-02	1.62E-03	1 80E+01	9 40E+03
0.00E+00	5.14E+02	1.90E+03	4.00E+02	5.64E-06	7.03E-06	2.91E-02	1.20E+03	1.90E+01	1.10E+01
0.00E+00	0 00E+00	0.00E+00	5.00E+00	0.00E+00	6.28E-06	5 43E-02	0.00E+00	5 00E+03	2.00E+03
0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.48E-07	6.35E-06	2.56E-02	1.08E+03	2.30E+01	6.20E+00
0.00E+00	2.04E+02	0 00E+00	5.00E+00	0 00E+00	9.71E-06	8.38E-02	0.00E+00	2 05E+01	8 20E+00
0.00E+00	1.03E+01	2.00E+03	0.00E+00	1.01E-07	7.13E-06	2.96E-02	4.00E+03	1.80E+01	0.00E+00
0.00E+00	0 00E+00	0.00E+00	0.00E+00	1 12E-05	6.01E-06	1 80E-02	2.49E-03	1.80E+01	5.00E+04
2.00E-03	1.00E+00	1.40E+02	0.00E+00	1.05E-04	8.00E-06	8.00E-02	0.00E+00	1.80E+01	0.00E+00
4 00E-02	0.00E+00	0.00E+00	0.00E+00	9.33E-06	7 18E-06	2 75E-02	2.06E-01	1 90E+01	2.90E+02
2.00E-01	0.00E+00	9.30E+02	0.00E+00	1.91E-06	5.17E-06	1.65E-02	2.69E+00	2.00E+01	1.30E+02
0.00E+00	0 00E+00	0.00E+00	0.00E+00	6 18E-06	5.49E-06	2 28E-02	1.50E-03	1 90E+01	4 70E+03
8.60E-05	0.00E+00	0.00E+00	2.00E-01	7.10E-03	3.01E-05	1.09E-02	5.62E-02	7.45E+01	2.96E+01
0.00E+00	0.00E+00	0 00E+00	0.00E+00	7 40E-07	5.26E-06	2.01E-02	2.60E-04	1 80E+01	0.00E+00
2.00E-02	1.18E+02	0.00E+00	0.00E+00	9.84E-07	6.35E-06	3.12E-02	3.51E+01	1.80E+01	1.00E+01
0.00E+00	0.00E+00	0.00E+00	0.00E+00	4 86E-09	5.66E-06	1.90E-02	2.20E-05	1 90E+01	1.30E+04
3.00E-01	4.04E+00	0.00E+00	0.00E+00	3.78E-07	9.38E-06	6.89E-02	4.00E+04	1.90E+01	3.90E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	1 02E-04	6.83E-06	1.98E-02	0.00E+00	1.80E+01	0.00E+00
1.43E+00	6.27E+01	5.20E+02	0.00E+00	6.13E-03	8.23E-06	9.72E-02	5.26E+02	1.90E+01	5.90E+00

Results for Analysis: Updated DRAS 2-19-08, Max values used □2

Select Chemicals of Concern to be Modeled (Steps 4 5)

Time to reach steady state (T*) (hrs)	Skin Permeability Coefficient (Kpw) (cm/hr)	Tau (T) (hrs)	Bunge Coefficient (B) (unitless)	Organic/ Inorganic	Bio- accumulation Factor (BAF) (L/kg)	Chronic Ecological Threshhold (Aquatic TRV) (mg/L)	Carcinogen/ Noncarcinogen	Molecular Weight (MW) (gm/mol)	Vapor Pressure (Vp) (atm)	Surface Water Partition Coefficient (Kdsw) (L/kg)
2.20E+01	7.20E-02	4.40E+00	4.10E+00	1.00E+00	5.58E+03	3.00E-02	Noncarcinogen	2.78E+02	5.55E-08	18E+02
5.60E+00	2.30E-01	1.10E+00	2.90E+00	1.00E+00	3.30E+03	0.00E+00	Noncarcinogen	1.78E+02	1.47E-07	1.57E+03
0.00E+00	1.00E-03	0.00E+00	0.00E+00	0.00E+00	1.00E+00	0.00E+00	Noncarcinogen	5.89E+01	0.00E+00	0.00E+00
1.00E+01	8.60E-01	2.20E+00	5.00E+01	1.00E+00	6.03E+03	0.00E+00	Carcinogen	5.27E+02	1.21E-06	2.23E+04
1.40E+01	1.20E+00	3.00E+00	1.30E+02	1.00E+00	1.00E+03	1.40E-05	Carcinogen	2.52E+02	6.43E-12	27E+04
1.10E+01	7.00E-02	1.40E+00	7.90E-01	1.00E+00	1.00E+00	0.00E+00	Noncarcinogen	1.97E+02	2.15E-05	8.45E+01
0.00E+00	1.00E-03	0.00E+00	0.00E+00	0.00E+00	1.00E+00	2.50E-03	Noncarcinogen	2.07E+02	0.00E+00	9.00E+02
4.80E+00	5.00E-03	2.00E+00	3.20E-02	1.00E+00	2.45E+03	2.20E-01	Noncarcinogen	2.22E+02	2.17E-06	6.15E+00
0.00E+00	1.00E-03	0.00E+00	0.00E+00	0.00E+00	1.00E+00	1.20E-01	Noncarcinogen	1.08E+02	0.00E+00	9.30E+00
3.20E+00	1.60E-03	1.30E+00	3.70E-03	1.00E+00	1.00E+00	3.30E-01	Noncarcinogen	1.94E+02	2.17E-06	2.32E+00
2.10E+01	2.10E+00	4.40E+00	4.90E+02	1.00E+00	1.00E+03	0.00E+00	Carcinogen	2.78E+02	2.70E-14	1.34E+05
0.00E+00	2.06E-01	6.90E-01	2.04E+00	1.00E+00	1.00E+00	2.00E-02	Noncarcinogen	1.68E+02	0.00E+00	0.00E+00
7.20E+00	4.80E-01	1.50E+00	1.30E+01	1.00E+00	9.60E+01	4.00E-02	Noncarcinogen	2.02E+02	1.07E-06	5.68E+03
3.40E+01	6.50E-02	7.00E+00	6.90E+00	1.00E+00	2.35E+03	1.90E-02	Noncarcinogen	3.12E+02	1.58E-08	1.03E+03
1.40E+01	1.40E+00	3.00E+00	1.60E+02	1.00E+00	1.00E+03	2.70E-02	Carcinogen	2.52E+02	1.06E-10	6.27E+04
0.00E+00	1.00E-03	0.00E+00	0.00E+00	0.00E+00	1.02E+06	7.70E-04	Noncarcinogen	2.01E+02	2.63E-06	1.00E+05
2.00E+01	1.62E+00	4.24E+00	3.16E+02	1.00E+00	3.00E+01	0.00E+00	Noncarcinogen	2.76E+02	0.00E+00	0.00E+00
4.80E+00	2.10E-02	1.40E+00	1.40E-01	1.00E+00	1.00E+00	2.10E-01	Carcinogen	1.98E+02	1.32E-04	2.45E+01
2.00E+01	2.10E+00	4.20E+00	4.50E+02	1.00E+00	1.21E+03	2.70E-02	Carcinogen	2.76E+02	1.88E-13	1.08E+05
9.60E-01	2.60E-03	4.00E-01	1.30E-03	1.00E+00	1.00E+00	3.75E-01	Noncarcinogen	1.08E+02	1.40E-04	7.65E-01
1.63E+01	6.30E-02	2.89E+00	1.91E+00	1.00E+00	1.46E+04	1.50E-03	Noncarcinogen	2.49E+02	1.97E-06	9.09E+03
7.70E-01	4.70E-02	3.20E-01	5.60E-02	1.00E+00	1.00E+00	1.30E-01	Noncarcinogen	9.21E+01	3.71E-02	1.05E+01

Results for Analysis: Updated DRAS 2-19-08, Max values used □2

Select Chemicals of Concern to be Modeled (Steps 4 5)

Chemical Name	CAS Number	TCLP Concentration (mg/L)	TCLP Detection Limit	Total Concentration (mg/kg)	Total Detection Limit	Maximum Contaminant Level (MCL) (mg/L)	Carcinogenic Slope Factor - Oral (CSFo) (kg-day/mg)	Carcinogenic Slope Factor - Inhalation (CSFi) (kg-day/mg)	Reference Dose - Oral (RFDo) (mg/kg-day)
Thallium	7440-28-0	9.30E-03	0.00E+00	1.40E+00	0.00E+00	2.00E-03	0.00E+00	0.00E+00	6.30E-05
Anthracene	120-12-7	5.00E-04	0.00E+00	1.00E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.00E-01
Pyrene	129-00-0	3.30E-03	0.00E+00	6.60E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.00E-02
Antimony	7440-36-0	2.10E-02	0.00E+00	3.90E+01	0.00E+00	6.00E-03	0.00E+00	0.00E+00	4.00E-04
Arsenic	7440-38-2	3.70E-03	0.00E+00	2.20E+01	0.00E+00	1.00E-02	1.50E+00	1.51E+01	3.00E-04
Barium	7440-39-3	6.30E-01	0.00E+00	2.00E+02	0.00E+00	2.00E+00	0.00E+00	0.00E+00	2.00E-01
Tin	7440-31-5	7.50E+00	0.00E+00	1.50E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.00E-01
Beryllium	7440-41-8	3.40E-04	0.00E+00	2.30E-01	0.00E+00	4.00E-03	0.00E+00	8.40E+00	2.00E-03
Cadmium	7440-43-9	9.20E-02	0.00E+00	2.10E+02	0.00E+00	5.00E-03	0.00E+00	6.30E+00	5.00E-04
Acetone	67-64-1	1.25E-02	0.00E+00	2.50E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.00E-01
Benzene	71-43-2	1.90E-05	0.00E+00	3.80E-04	0.00E+00	5.00E-03	5.50E-02	2.70E-02	4.00E-03

Results for Analysis: Updated DRAS 2-19-08, Max values used □3

Select Chemicals of Concern to be Modeled (Steps 4 5)

Reference Dose - Inhalation (RFC) (mg/m³)	Bio- concentration Factor (BCF) (L/kg)	Soil Saturation Level (SOILSAT) (mg/kg)	Toxicity Characteristic Level (TC) (mg/L)	Henry's Law Coefficient (H) (atm-m³/mol-K)	Diffusion Coefficient in Water (Dw) (cm²/sec)	Diffusion Coefficient in Air (Da) (cm²/sec)	Solubility (SOL) (mg/L)	Landfill Dilution Attenuation Factor (DAFLF)	Surface Impoundment Dilution Attenuation Factor (DAFSI)
0.00E+00	1.40E+03	0.00E+00	0.00E+00	0.00E+00	6.34E-06	5.48E-02	0.00E+00	4.40E+01	1.67E+01
3.00E-01	0.00E+00	6.10E+00	0.00E+00	1.46E-05	7.74E-06	3.24E-02	4.34E-02	1.80E+01	0.00E+00
3.00E-02	0.00E+00	5.50E+01	0.00E+00	1.14E-08	7.14E-06	2.72E-02	1.35E-01	1.90E+01	6.00E+02
0.00E+00	4.00E+01	0.00E+00	0.00E+00	0.00E+00	8.96E-06	7.73E-02	0.00E+00	3.43E+01	1.36E+01
0.00E+00	2.00E-01	0.00E+00	5.00E+00	0.00E+00	1.24E-05	1.07E-01	0.00E+00	1.92E+01	7.70E+00
1.43E-03	1.00E+00	0.00E+00	1.00E+02	0.00E+00	8.26E-06	7.14E-02	0.00E+00	2.78E+01	1.11E+01
0.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	8.00E-06	8.00E-02	0.00E+00	1.00E+01	0.00E+00
6.00E-06	4.20E+01	0.00E+00	0.00E+00	0.00E+00	5.08E-05	4.39E-01	0.00E+00	1.04E+02	4.14E+01
0.00E+00	2.50E+02	0.00E+00	1.00E+00	0.00E+00	9.45E-06	8.16E-02	0.00E+00	3.00E+01	1.20E+01
0.00E+00	4.00E-01	1.00E+05	0.00E+00	2.88E-05	1.15E-05	1.20E-01	1.00E+06	1.90E+01	3.90E+00
8.60E-03	2.48E+01	9.00E+02	5.00E-01	5.49E-03	1.02E-05	1.17E-01	1.75E+03	1.80E+01	5.90E+00

Results for Analysis: Updated DRAS 2-19-08, Max values used □3

Select Chemicals of Concern to be Modeled (Steps 4 5)

Time to reach steady state (T*) (hrs)	Skin Permeability Coefficient (Kpw) (cm/hr)	Tau (T) (hrs)	Bunge Coefficient (B) (unitless)	Organic/ Inorganic	Bio- accumulation Factor (BAF) (L/kg)	Chronic Ecological Threshhold (Aquatic TRV) (mg/L)	Carcinogen/ Noncarcinogen	Molecular Weight (MW) (gm/mol)	Vapor Pressure (Vp) (atm)	Surface Water Partition Coefficient (Kdsw) (L/kg)
0.00E+00	1.00E-03	0.00E+00	0.00E+00	0.00E+00	1.00E+00	4.00E-03	Noncarcinogen	2.04E+02	0.00E+00	7.10E+01
5.50E+00	2.61E-01	1.07E+00	3.47E+00	1.00E+00	2.60E+03	7.30E-04	Noncarcinogen	1.78E+02	3.35E-08	1.76E+03
7.20E+00	4.70E-01	1.50E+00	1.30E+01	1.00E+00	1.19E+04	0.00E+00	Noncarcinogen	2.02E+02	5.69E-09	9.10E+03
0.00E+00	1.00E-03	0.00E+00	0.00E+00	0.00E+00	1.00E+00	1.60E-01	Noncarcinogen	1.22E+02	0.00E+00	4.50E+01
0.00E+00	1.00E-03	0.00E+00	0.00E+00	0.00E+00	1.00E+00	1.50E-01	Carcinogen	7.49E+01	0.00E+00	2.90E+01
0.00E+00	1.00E-03	0.00E+00	0.00E+00	0.00E+00	1.00E+00	3.90E-03	Noncarcinogen	1.37E+02	0.00E+00	4.10E+01
0.00E+00	1.00E-03	0.00E+00	0.00E+00	0.00E+00	1.00E+00	0.00E+00	Noncarcinogen	1.19E+02	0.00E+00	9.00E+00
0.00E+00	1.00E-03	0.00E+00	0.00E+00	0.00E+00	1.00E+00	5.10E-03	Noncarcinogen	9.01E+00	0.00E+00	7.90E+02
0.00E+00	1.00E-03	0.00E+00	0.00E+00	0.00E+00	1.00E+00	2.20E-03	Noncarcinogen	1.12E+02	0.00E+00	4.50E+00
4.70E-01	5.70E-04	2.00E-01	5.80E-05	1.00E+00	1.00E+00	1.50E+00	Noncarcinogen	5.01E+01	2.99E-01	7.13E-02
6.30E-01	2.10E-02	2.60E-01	1.30E-02	1.00E+00	1.00E+00	4.60E-02	Carcinogen	7.81E+01	1.25E-01	4.65E+00

Results for Analysis: Updated DRAS 2-19-08, Max values used □3

List of COCs with Altered Chemical Properties

Chemical Name	CAS Number	Parameter Modified	Parameter Symbol	Parameter Units	Original Value	Modified Value
Di-n-octyl phthalate	117-84-0	Oral Reference Dose	RFDo	mg/kg-day	0.02	0.04
Di-n-octyl phthalate	117-84-0	Inhalation Reference Dose	RFC	mg/m³	0	0.04
TCDD, 2,3,7,8-	1746-01-6	Maximum Concentration Level	MCL	mg/L	0	0.00000003
Isophorone	78-59-1	Oral Carcinogenic Slope Factor	CSFo	1/(mg/kg-day)	0.00095	0.001
Isophorone	78-59-1	Inhalation Carcinogenic Slope Factor	CSFi	1/(mg/kg-day)	0	0.00095
Isophorone	78-59-1	Inhalation Reference Dose	RFC	mg/m³	0	0.2
Dimethyl phthalate	131-11-3	Landfill Dilution Attenuation Factor	DAFLF	L/mg	1	13
Dibenzofuran	132-64-9	Oral Reference Dose	RFDo	mg/kg-day	0.004	0.002
Dibenzofuran	132-64-9	Inhalation Reference Dose	RFC	mg/m³	0	0.002
Fluoranthene	206-44-0	Inhalation Reference Dose	RFC	mg/m³	0	0.04
Butylbenzylphthalate	85-68-7	Inhalation Reference Dose	RFC	mg/m³	0	0.2
N-Nitrosodiphenylamine	86-30-6	Inhalation Carcinogenic Slope Factor	CSFi	1/(mg/kg-day)	0	0.0049
N-Nitrosodiphenylamine	86-30-6	Oral Reference Dose	RFDo	mg/kg-day	0	0.02
N-Nitrosodiphenylamine	86-30-6	Inhalation Reference Dose	RFC	mg/m³	0	0.02
Benzyl alcohol	100-51-6	Inhalation Reference Dose	RFC	mg/m³	0	0.3
Toluene	108-88-3	Oral Reference Dose	RFDo	mg/kg-day	0.2	0.08
Toluene	108-88-3	Inhalation Reference Dose	RFC	mg/m³	0	1.43
Thallium	7440-28-0	Oral Reference Dose	RFDo	mg/kg-day	0.00008	0.000066
Anthracene	120-12-7	Inhalation Reference Dose	RFC	mg/m³	0	0.3
Pyrene	129-00-0	Inhalation Reference Dose	RFC	mg/m³	0	0.03
Arsenic	7440-38-2	Maximum Concentration Level	MCL	mg/L	0.05	0.01
Barium	7440-39-3	Oral Reference Dose	RFDo	mg/kg-day	0.07	0.2

Results for Analysis: Updated DRAS 2-19-08, Max values used □1

List of COCs with Altered Chemical Properties

Chemical Name	CAS Number	Parameter Modified	Parameter Symbol	Parameter Units	Original Value	Modified Value
Barium	7440-39-3	Inhalation Reference Dose	RFC	mg/m³	0.0005	0.00143
Tin	7440-31-5	Landfill Dilution Attenuation Factor	DAFLF	L/mg	0	10
Beryllium	7440-41-8	Inhalation Reference Dose	RFC	mg/m³	0.00002	0.000006
Acetone	67-64-1	Oral Reference Dose	RFDo	mg/kg-day	0.1	0.9
Benzene	71-43-2	Maximum Concentration Level	MCL	mg/L	0.01	0.005
Benzene	71-43-2	Oral Carcinogenic Slope Factor	CSFo	1/(mg/kg-day)	0.029	0.055
Benzene	71-43-2	Inhalation Carcinogenic Slope Factor	CSFi	1/(mg/kg-day)	0.029	0.027
Benzene	71-43-2	Oral Reference Dose	RFDo	mg/kg-day	0.001	0.004
Benzene	71-43-2	Inhalation Reference Dose	RFC	mg/m³	0.009	0.0086
Acenaphthene	83-32-9	Inhalation Reference Dose	RFC	mg/m³	0	0.06
Phenol	108-95-2	Oral Reference Dose	RFDo	mg/kg-day	0.6	0.3
Vanadium	7440-62-2	Oral Reference Dose	RFDo	mg/kg-day	0.007	0.001
Fluorene	86-73-7	Inhalation Reference Dose	RFC	mg/m³	0	0.04
nitroaniline 2-	88-74-4	Oral Reference Dose	RFDo	mg/kg-day	0	0.003
nitroaniline 2-	88-74-4	Inhalation Reference Dose	RFC	mg/m³	0.0002	0.00003
Naphthalene	91-20-3	Inhalation Carcinogenic Slope Factor	CSFi	1/(mg/kg-day)	0	0.35
Naphthalene	91-20-3	Inhalation Reference Dose	RFC	mg/m³	0.003	0.00086
Bis(2-ethylhexyl)phthalate	117-81-7	Inhalation Carcinogenic Slope Factor	CSFi	1/(mg/kg-day)	0	0.014
Bis(2-ethylhexyl)phthalate	117-81-7	Inhalation Reference Dose	RFC	mg/m³	0	0.02
Cobalt	7440-48-4	Inhalation Carcinogenic Slope Factor	CSFi	1/(mg/kg-day)	0	9.8
Cobalt	7440-48-4	Oral Reference Dose	RFDo	mg/kg-day	0.06	0.02
Cobalt	7440-48-4	Inhalation Reference Dose	RFC	mg/m³	0	0.000006

Results for Analysis: Updated DRAS 2-19-08, Max values used □2

List of COCs with Altered Chemical Properties

Chemical Name	CAS Number	Parameter Modified	Parameter Symbol	Parameter Units	Original Value	Modified Value
Cobalt	7440-48-4	Landfill Dilution Attenuation Factor	DAFLF	L/mg	0	10

Results for Analysis: Updated DRAS 2-19-08, Max values used □3

Limiting Pathways

		Detection Limit Analysis - Toxicity of Petitioned Waste cannot be confirmed if Detection Limits fall below maximum allowable concentration			
Chemical Name	**CAS Number**	**Maximum Allowable TCLP Concentration (mg/L)**	**Maximum Allowable TCLP Pathway**	**Maximum Allowable Total Concentration (mg/Kg)**	**Maximum Allowable Total Pathway**
Di-n-octyl phthalate	117-84-0	7.00E-02	Groundwater Child Dermal	2.57E+01	Fish Ingestion
TCDD, 2,3,7,8-	1746-01-6	2.05E-10	Groundwater Adult Dermal	7.58E-03	Soil Ingestion
Benz(a)anthracene	56-55-3	1.31E-04	Groundwater Adult Dermal	1.56E+03	Soil Ingestion
Chloro-3-methylphenol 4-	59-50-7	---	Not Applicable	---	Not Applicable
Isophorone	78-59-1	1.32E+00	Groundwater Ingestion	2.51E+03	Air Volatile Inhalation
Silver	7440-22-4	3.84E+00	Groundwater Ingestion	4.93E+04	Fish Ingestion
Dimethyl phthalate	131-11-3	6.76E+03	Groundwater Ingestion	1.28E+09	Soil Ingestion
Dibenz(a,h)anthracene	53-70-3	3.80E-06	Groundwater Adult Dermal	1.56E+02	Soil Ingestion
Dibenzofuran	132-64-9	1.04E-01	Groundwater Child Dermal	2.57E+05	Soil Ingestion
Fluoranthene	206-44-0	1.61E+00	Groundwater Child Dermal	8.03E+05	Fish Ingestion
Butylbenzylphthalate	85-68-7	2.90E+01	Groundwater Child Dermal	1.69E+05	Fish Ingestion
Benzo(b)fluoranthene	205-99-2	7.29E-05	Groundwater Adult Dermal	1.56E+03	Soil Ingestion
Mercury	7439-97-6	8.14E-02	Groundwater Inhalation	9.01E-02	Fish Ingestion
Benzo (ghi) perylene	191-24-2	---	Not Applicable	---	Not Applicable
N-Nitrosodiphenylamine	86-30-6	2.69E-01	Groundwater Ingestion	2.32E+03	Air Volatile Inhalation

Results for Analysis: Updated DRAS 2-19-08, Max values used □1

Limiting Pathways

		Detection Limit Analysis - Toxicity of Petitioned Waste cannot be confirmed if Detection Limits fall below maximum allowable concentration			
Chemical Name	CAS Number	Maximum Allowable TCLP Concentration (mg/L)	Maximum Allowable TCLP Pathway	Maximum Allowable Total Concentration (mg/Kg)	Maximum Allowable Total Pathway
Indeno(1,2,3-cd) pyrene	193-39-5	4.11E-05	Groundwater Adult Dermal	1.56E+03	Soil Ingestion
Benzyl alcohol	100-51-6	2.14E+02	Groundwater Ingestion	4.08E+05	Air Volatile Inhalation
Bromophenyl-phenyl ether 4-	101-55-3	1.22E+01	Groundwater Child Dermal	7.21E+03	Fish Ingestion
Toluene	108-88-3	1.90E+01	MCL	6.11E+03	Air Volatile Inhalation
Thallium	7440-28-0	8.80E-02	MCL	9.47E+01	Fish Ingestion
Anthracene	120-12-7	2.50E+01	Groundwater Child Dermal	2.27E+05	Fish Ingestion
Pyrene	129-00-0	1.23E+00	Groundwater Child Dermal	4.78E+03	Fish Ingestion
Antimony	7440-36-0	2.06E-01	MCL	2.01E+04	Fish Ingestion
Arsenic	7440-38-2	9.36E-04	Groundwater Ingestion	1.68E+02	Fish Ingestion
Barium	7440-39-3	5.57E+01	MCL	2.62E+06	Air Particulate Inhalation
Tin	7440-31-5	2.25E+02	Groundwater Ingestion	7.71E+07	Soil Ingestion
Beryllium	7440-41-8	4.16E-01	MCL	1.10E+04	Air Particulate Inhalation
Cadmium	7440-43-9	1.50E-01	MCL	4.02E+03	Fish Ingestion
Acetone	67-64-1	6.42E+02	Groundwater Ingestion	1.16E+08	Soil Ingestion
Benzene	71-43-2	2.39E-02	Groundwater Ingestion	3.00E-01	Air Volatile Inhalation

Results for Analysis: Updated DRAS 2-19-08, Max values used □2

Limiting Pathways

		Detection Limit Analysis - Toxicity of Petitioned Waste cannot be confirmed if Detection Limits fall below maximum allowable concentration			
Chemical Name	**CAS Number**	**Maximum Allowable TCLP Concentration (mg/L)**	**Maximum Allowable TCLP Pathway**	**Maximum Allowable Total Concentration (mg/Kg)**	**Maximum Allowable Total Pathway**
Acenaphthene	83-32-9	1.25E+01	Groundwater Child Dermal	1.98E+05	Fish Ingestion
Methylnapthalene 2-	91-57-6	---	Not Applicable	---	Not Applicable
Copper	7440-50-8	9.11E+03	MCL	5.14E+06	Soil Ingestion
Phenol	108-95-2	2.14E+02	Groundwater Ingestion	3.85E+07	Soil Ingestion
Selenium	7782-49-2	5.80E-01	MCL	7.79E+04	Fish Ingestion
Benzo(k)fluoranthene	207-08-9	1.01E-03	Groundwater Adult Dermal	1.56E+04	Soil Ingestion
Acenapthylene	208-96-8	---	Not Applicable	---	Not Applicable
Vanadium	7440-62-2	3.02E+00	Groundwater Ingestion	1.28E+05	Soil Ingestion
Zinc	7440-66-6	2.80E+02	Groundwater Ingestion	9.22E+05	Fish Ingestion
Chromium	7440-47-4	3.85E+02	MCL	4.77E+05	Fish Ingestion
Fluorene	86-73-7	5.55E+00	Groundwater Child Dermal	8.98E+05	Fish Ingestion
Pentachlorophenol	87-86-5	2.79E-03	Groundwater Adult Dermal	9.47E+03	Soil Ingestion
nitroaniline 2-	88-74-4	2.03E+00	Groundwater Ingestion	3.95E+02	Air Volatile Innalation
Naphthalene	91-20-3	3.72E-01	Groundwater Inhalation	1.38E+03	Air Volatile Inhalation
Pyridine	110-86-1	7.13E-01	Groundwater Ingestion	1.28E+05	Soil Ingestion

Results for Analysis: Updated DRAS 2-19-08, Max values used □3

Limiting Pathways

		Detection Limit Analysis - Toxicity of Petitioned Waste cannot be confirmed if Detection Limits fall below maximum allowable concentration			
Chemical Name	CAS Number	Maximum Allowable TCLP Concentration (mg/L)	Maximum Allowable TCLP Pathway	Maximum Allowable Total Concentration (mg/Kg)	Maximum Allowable Total Pathway
Nickel	7440-02-0	2.83E+01	Groundwater Ingestion	1.30E+05	Fish Ingestion
Bis(2-ethylhexyl)phthalate	117-81-7	6.10E-02	Groundwater Adult Dermal	2.72E+03	Fish Ingestion
Di-n-butyl phthalate	84-74-2	1.65E+01	Groundwater Child Dermal	3.60E+04	Fish Ingestion
Phenanthrene	85-01-8	---	Not Applicable	---	Not Applicable
Cobalt	7440-48-4	7.51E+00	Groundwater Ingestion	1.10E+04	Air Particulate Inhalation
Chrysene	218-01-9	1.39E-02	Groundwater Adult Dermal	1.56E+05	Soil Ingestion
Benzo(a)pyrene	50-32-8	8.06E-06	Groundwater Adult Dermal	1.56E+02	Soil Ingestion
Trichlorophenol, 2,4,5-	95-95-4	2.86E+01	Groundwater Child Dermal	3.91E+05	Fish Ingestion
Lead	7439-92-1	7.50E+01	MCL	4.39E+04	Air Particulate Inhalation
Diethyl phthalate	84-66-2	6.91E+02	Groundwater Ingestion	6.57E+05	Fish Ingestion

Results for Analysis: Updated DRAS 2-19-08, Max values used □4

Groundwater Pathway Hazard Quotient

		Petitioned Waste Non-carcinogenic Hazard Quotient - Groundwater Exposure Pathways				
Chemical Name	**Waste Stream TCLP Concentration (mg/L)**	**Groundwater Ingestion Pathway**	**Groundwater Inhalation Pathway**	**Groundwater Dermal Absorption Pathway - Adult**	**Groundwater Dermal Absorption Pathway - Child**	**Groundwater Pathway Aggregate Hazard Quotient**
Di-n-octyl phthalate	2.95E-03	7.28E-05	8.33E-07	1.94E-02	4.22E-02	4.22E-02
TCDD, 2,3,7,8-	4.00E-11	---	---	---	---	---
Benz(a)anthracene	1.05E-03	---	---	---	---	---
Chloro-3-methylphenol 4-	3.85E-04	---	---	---	---	---
Isophorone	1.35E-04	9.99E-07	9.87E-08	4.74E-08	1.03E-07	1.20E-06
Silver	7.50E-04	1.95E-04	---	---	---	1.95E-04
Dimethyl phthalate	1.15E-04	1.70E-08	---	4.29E-10	9.35E-10	1.80E-08
Dibenz(a,h)anthracene	2.60E-06	---	---	---	---	---
Dibenzofuran	4.00E-04	2.96E-04	3.74E-04	2.02E-03	3.86E-03	4.54E-03
Fluoranthene	2.95E-03	1.03E-04	1.48E-05	8.40E-04	1.83E-03	1.95E-03
Butylbenzylphthalate	1.35E-03	8.99E-06	2.60E-07	2.14E-05	4.65E-05	5.58E-05
Benzo(b)fluoranthene	4.00E-05	---	---	---	---	---
Mercury	2.40E-02	8.58E-02	4.96E-01	---	---	5.82E-01
Benzo (ghi) perylene	1.35E-03	---	---	---	---	---
N-Nitrosodiphenylamine	1.65E-04	1.22E-05	1.90E-07	4.19E-06	9.13E-06	2.15E-05
Indeno(1,2,3-cd) pyrene	1.40E-05	---	---	---	---	---
Benzyl alcohol	5.00E-04	2.34E-06	1.45E-08	5.31E-08	1.16E-07	2.47E-06
Bromophenyl-phenyl ether 4-	8.50E-05	2.17E-06	---	3.21E-06	6.99E-06	9.16E-06
Toluene	3.75E-04	6.57E-06	1.28E-06	2.41E-06	5.26E-06	1.31E-05
Thallium	9.30E-03	8.53E-02	---	---	---	8.53E-02
Anthracene	5.00E-04	2.47E-06	5.48E-07	9.19E-06	2.00E-05	2.30E-05

Results for Analysis: Updated DRAS 2-19-08, Max values used □1

Groundwater Pathway Hazard Quotient

		Petitioned Waste Non-carcinogenic Hazard Quotient - Groundwater Exposure Pathways				
Chemical Name	Waste Stream TCLP Concentration (mg/L)	Groundwater Ingestion Pathway	Groundwater Inhalation Pathway	Groundwater Dermal Absorption Pathway - Adult	Groundwater Dermal Absorption Pathway - Child	Groundwater Pathway Aggregate Hazard Quotient
Pyrene	3.30E-03	1.54E-04	2.77E-08	1.23E-03	2.67E-03	2.83E-03
Antimony	2.10E-02	4.08E-02	---	---	---	4.08E-02
Arsenic	3.70E-03	1.71E-02	---	---	---	1.71E-02
Barium	6.30E-01	3.01E-03	---	---	---	3.01E-03
Tin	7.50E+00	3.33E-02	---	---	---	3.33E-02
Beryllium	3.40E-04	4.35E-05	---	---	---	4.35E-05
Cadmium	9.20E-02	1.63E-01	---	---	---	1.63E-01
Acetone	1.25E-02	1.95E-05	---	6.86E-08	1.49E-07	1.96E-05
Benzene	1.90E-05	7.03E-06	1.23E-05	1.04E-06	2.27E-06	2.15E-05
Acenaphthene	1.15E-04	2.69E-06	2.55E-06	4.21E-06	9.17E-06	1.44E-05
Methylnapthalene 2-	2.65E-04	---	---	---	---	---
Copper	8.00E+01	7.60E-03	---	---	---	7.60E-03
Phenol	2.10E-03	9.81E-06	---	4.44E-07	9.67E-07	1.08E-05
Selenium	3.80E-02	1.75E-02	---	---	---	1.75E-02
Benzo(k)fluoranthene	8.00E-04	---	---	---	---	---
Acenapthylene	5.50E-04	---	---	---	---	---
Vanadium	1.00E-02	3.32E-03	---	---	---	3.32E-03
Zinc	4.10E+00	1.46E-02	---	---	---	1.46E-02
Chromium	9.50E-02	4.38E-07	---	---	---	4.38E-07
Fluorene	4.65E-04	1.63E-05	1.53E-05	3.85E-05	8.38E-05	1.15E-04
Pentachlorophenol	3.15E-04	1.55E-05	---	7.85E-05	1.71E-04	1.86E-04

Results for Analysis: Updated DRAS 2-19-08, Max values used □2

Groundwater Pathway Hazard Quotient

		Petitioned Waste Non-carcinogenic Hazard Quotient - Groundwater Exposure Pathways				
Chemical Name	Waste Stream TCLP Concentration (mg/L)	Groundwater Ingestion Pathway	Groundwater Inhalation Pathway	Groundwater Dermal Absorption Pathway - Adult	Groundwater Dermal Absorption Pathway - Child	Groundwater Pathway Aggregate Hazard Quotient
nitroaniline 2-	9 50E-04	4.69E-04	6 76E-05	2 54E-05	5 53E-05	5 91E-04
Naphthalene	9.50E-04	6.66E-05	4.16E-03	5.16E-05	1.12E-04	4.34E-03
Pyridine	1 05E-03	1.47E-03	---	2.01E-05	4 37E-05	1.52E-03
Nickel	6.90E-02	2.44E-03	---	---	---	2.44E-03
Bis(2-ethylhexyl)phthalate	1.70E-02	1.19E-03	1 96E-06	2.49E-03	5.42E-03	6.62E-03
Di-n-butyl phthalate	6.00E-03	7.99E-05	---	1.67E-04	3.63E-04	4.43E-04
Phenanthrene	2.75E-03	---	---	---	---	---
Cobalt	5.50E-01	7.32E-02	---	---	---	7.32E-02
Chrysene	1 65E-03	---	---	---	---	---
Benzo(a)pyrene	2.30E-05	---	---	---	---	---
Trichlorophenol, 2,4,5-	3 86E-04	5.40E-06	---	6.18E-06	1.35E-05	1.89E-05
Lead	3.60E-01	---	---	---	---	---
Diethyl phthalate	2 86E-04	4.13E-07	---	4 03E-08	8 78E-08	5 00E-07
All Waste Constituents	---	5.52E-01	5.01E-01	2.64E-02	5.69E-02	1.11E+00

Results for Analysis: Updated DRAS 2-19-08, Max values used □3

Groundwater Pathway Risk

	Petitioned Waste Carcinogenic Risk - Groundwater Exposure Pathways					
Chemical Name	**Waste Stream TCLP Concentration (mg/L)**	**Groundwater Ingestion Pathway**	**Groundwater Inhalation Pathway**	**Groundwater Dermal Absorption Pathway - Adult**	**Groundwater Dermal Absorption Pathway - Child**	**Groundwater Pathway Aggregate Risk**
Di-n-octyl phthalate	2.95E-03	---	---	---	---	---
TCDD, 2,3,7,8-	4.00E-11	4.56E-09	3.09E-10	1.96E-07	8.52E-08	2.00E-07
Benz(a)anthracene	1.05E-03	5.83E-07	4.14E-09	8.01E-06	3.49E-06	8.60E-06
Chloro-3-methylphenol 4-	3.85E-04	---	---	---	---	---
Isophorone	1.35E-04	1.03E-10	2.87E-12	3.79E-12	1.65E-12	1.09E-10
Silver	7.50E-04	---	---	---	---	---
Dimethyl phthalate	1.15E-04	---	---	---	---	---
Dibenz(a,h)anthracene	2.60E-06	1.44E-08	3.14E-13	6.84E-07	2.98E-07	6.98E-07
Dibenzofuran	4.00E-04	---	---	---	---	---
Fluoranthene	2.95E-03	---	---	---	---	---
Butylbenzylphthalate	1.35E-03	---	---	---	---	---
Benzo(b)fluoranthene	4.00E-05	2.10E-08	2.51E-10	5.49E-07	2.39E-07	5.70E-07
Mercury	2.40E-02	---	---	---	---	---
Benzo (ghi) perylene	1.35E-03	---	---	---	---	---
N-Nitrosodiphenylamine	1.65E-04	6.14E-10	2.86E-12	1.64E-10	7.16E-11	7.82E-10
Indeno(1,2,3-cd) pyrene	1.40E-05	7.36E-09	6.98E-14	3.41E-07	1.48E-07	3.48E-07
Benzyl alcohol	5.00E-04	---	---	---	---	---

Results for Analysis: Updated DRAS 2-19-08, Max values used □1

Groundwater Pathway Risk

	Petitioned Waste Carcinogenic Risk - Groundwater Exposure Pathways					
Chemical Name	Waste Stream TCLP Concentration (mg/L)	Groundwater Ingestion Pathway	Groundwater Inhalation Pathway	Groundwater Dermal Absorption Pathway - Adult	Groundwater Dermal Absorption Pathway - Child	Groundwater Pathway Aggregate Risk
Bromophenyl-phenyl ether 4-	8.50E-05	---	---	---	---	---
Toluene	3.75E-04	---	---	---	---	---
Thallium	9.30E-03	---	---	---	---	---
Anthracene	5.00E-04	---	---	---	---	---
Pyrene	3.30E-03	---	---	---	---	---
Antimony	2.10E-02	---	---	---	---	---
Arsenic	3.70E-03	3.95E-06	---	---	---	3.95E-06
Barium	6.30E-01	---	---	---	---	---
Tin	7.50E+00	---	---	---	---	---
Beryllium	3.40E-04	---	---	---	---	---
Cadmium	9.20E-02	---	---	---	---	---
Acetone	1.25E-02	---	---	---	---	---
Benzene	1.90E-05	7.94E-10	4.36E-10	9.15E-11	3.99E-11	1.32E-09
Acenaphthene	1.15E-04	---	---	---	---	---
Methylnapthalene 2-	2.65E-04	---	---	---	---	---
Copper	8.00E+01	---	---	---	---	---
Phenol	2.10E-03	---	---	---	---	---

Results for Analysis: Updated DRAS 2-19-08, Max values used □2

Groundwater Pathway Risk

	Petitioned Waste Carcinogenic Risk - Groundwater Exposure Pathways					
Chemical Name	Waste Stream TCLP Concentration (mg/L)	Groundwater Ingestion Pathway	Groundwater Inhalation Pathway	Groundwater Dermal Absorption Pathway - Adult	Groundwater Dermal Absorption Pathway - Child	Groundwater Pathway Aggregate Risk
Selenium	3.80E-02	---	---	---	---	---
Benzo(k)fluoranthene	8.00E-04	4.20E-08	3.44E-11	7.89E-07	3.44E-07	8.31E-07
Acenapthylene	5.50E-04	---	---	---	---	---
Vanadium	1.00E-02	---	---	---	---	---
Zinc	4.10E+00	---	---	---	---	---
Chromium	9.50E-02	---	---	---	---	---
Fluorene	4.65E-04	---	---	---	---	---
Pentachlorophenol	3.15E-04	2.87E-08	1.76E-09	1.13E-07	4.92E-08	1.43E-07
nitroaniline 2-	9.50E-04	---	---	---	---	---
Naphthalene	9.50E-04	---	1.92E-07	---	---	1.92E-07
Pyridine	1.05E-03	---	---	---	---	---
Nickel	6.90E-02	---	---	---	---	---
Bis(2-ethylhexyl)phthalate	1.70E-02	1.71E-07	8.41E-11	2.79E-07	1.22E-07	4.50E-07
Di-n-butyl phthalate	6.00E-03	---	---	---	---	---
Phenanthrene	2.75E-03	---	---	---	---	---
Cobalt	5.50E-01	---	---	---	---	---
Chrysene	1.65E-03	8.67E-09	2.08E-11	1.19E-07	5.19E-08	1.28E-07

Results for Analysis: Updated DRAS 2-19-08, Max values used □3

Groundwater Pathway Risk

	Petitioned Waste Carcinogenic Risk - Groundwater Exposure Pathways					
Chemical Name	**Waste Stream TCLP Concentration (mg/L)**	**Groundwater Ingestion Pathway**	**Groundwater Inhalation Pathway**	**Groundwater Dermal Absorption Pathway - Adult**	**Groundwater Dermal Absorption Pathway - Child**	**Groundwater Pathway Aggregate Risk**
Benzo(a)pyrene	2.30E-05	1.28E-07	2.10E-10	2.85E-06	1.24E-06	2.98E-06
Trichlorophenol, 2,4,5-	3.85E-04	---	---	---	---	---
Lead	3.60E-01	---	---	---	---	---
Diethyl phthalate	2.85E-04	---	---	---	---	---
All Waste Constituents	---	4.96E-06	1.99E-07	1.39E-05	6.07E-06	1.91E-05

Results for Analysis: Updated DRAS 2-19-08, Max values used □4

Maximum Allowable TCLP Concentrations - Groundwater Exposure Pathways

Chemical Name Risk Factor = 1.00E-06 HQ Factor = 1.00E+00 * = Detection Limit	Waste Stream TCLP Concentration (mg/L)	Dilution Attenuation Factor (DAF)	Waste Volume Adjusted DAF	Maximum Allowable Concentration (mg/L)	DL	Max. Allowable Concentration Based on Groundwater Ingestion Pathway	Max. Allowable Concentration Based on Groundwater Inhalation Pathway	Max. Allowable Concentration Based on Adult Groundwater Dermal Absorption Pathway	Max. Allowable Concentration Based on Child Groundwater Dermal Absorption Pathway
Benzyl alcohol	5.00E-04	1.90E+01	1.90E+01	**2.14E+02**		2.14E+02	5.04E+04	9.42E+03	4.32E-01
Bromophenyl-phenyl ether 4-	8.50E-05	1.80E+01	1.80E+01	**1.22E+01**		3.92E+01	---	2.65E+01	1.22E+01
Toluene	3.75E-04	1.90E+01	1.90E+01	**1.90E+01**		5.71E+01	4.95E+02	1.65E+02	7.13E-01
Phenol	2.10E-03	1.90E+01	1.90E+01	**2.14E+02**		2.14E+02	---	4.73E+03	2.17E+03
Pyridine	1.05E-03	1.90E+01	1.90E+01	**7.13E-01**		7.13E-01	---	5.23E+01	2.40E-01
Bis(2-ethylhexyl)phthalate	1.70E-02	1.90E+01	1.90E+01	**6.10E-02**		9.92E-02	2.99E+02	6.10E-02	1.40E-01
Di-n-octyl phthalate	2.95E-03	2.70E+01	2.70E+01	**7.00E-02**		4.05E+01	5.24E+03	1.52E-01	7.00E-02
Anthracene	5.00E-04	1.80E+01	1.80E+01	**2.50E+01**		2.03E+02	1.35E+03	5.44E+01	2.50E+01
Pyrene	3.30E-03	1.90E+01	1.90E+01	**1.23E+00**		2.14E+01	1.75E+05	2.69E+00	1.23E-01
Dimethyl phthalate	1.15E-04	1.80E+01	1.80E+01	**6.76E+03**		6.76E+03	---	2.68E+05	1.23E+05
Dibenzofuran	4.00E-04	1.80E+01	1.80E+01	**1.04E-01**		1.35E+00	1.64E+00	1.98E-01	1.04E-01
TCDD, 2,3,7,8-	4.00E-11	1.80E+01	1.80E+01	**2.05E-10**		8.77E-09	1.93E-07	2.05E-10	4.70E-10
Benzo (ghi) perylene	1.35E-03	1.80E+01	1.80E+01			---	---	---	---
Indeno(1,2,3-cd) pyrene	1.40E-05	1.90E+01	1.90E+01	**4.11E-05**		1.90E-03	2.95E+02	4.11E-05	9.43E-05
Benzo(b)fluoranthene	4.00E-05	1.90E+01	1.90E+01	**7.29E-05**		1.90E-03	2.35E-01	7.29E-05	1.67E-01
Fluoranthene	2.95E-03	1.90E+01	1.90E+01	**1.61E+00**		2.85E+01	2.94E+02	3.51E+00	1.61E+00
Benzo(k)fluoranthene	8.00E-04	1.90E+01	1.90E+01	**1.01E-03**		1.90E-02	3.41E+01	1.01E-03	2.33E-01
Acenapthylene	5.50E-04	1.80E+01	1.80E+01			---	---	---	---
Chrysene	1.65E-03	1.90E+01	1.90E+01	**1.39E-02**		1.90E-01	1.17E+02	1.39E-02	3.18E-01
Benzo(a)pyrene	2.30E-05	1.80E+01	1.80E+01	**8.06E-06**		1.80E-04	1.61E-01	8.06E-06	1.85E-05
Dibenz(a,h)anthracene	2.60E-06	1.80E+01	1.80E+01	**3.80E-06**		1.80E-04	1.22E+01	3.80E-06	8.73E-05
Benz(a)anthracene	1.05E-03	1.80E+01	1.80E+01	**1.31E-04**		1.80E-03	3.73E-01	1.31E-04	3.01E-04

Results for Analysis: Updated DRAS 2-19-08, Max values used □1

Maximum Allowable TCLP Concentrations - Groundwater Exposure Pathways

Max. Allowable Concentration Based on MCL

1.90E+01

1.14E-01

5.40E-07

3.60E-03

Results for Analysis: Updated DRAS 2-19-08, Max values used □1

Maximum Allowable TCLP Concentrations - Groundwater Exposure Pathways

Chemical Name Risk Factor = 1.00E-06 HQ Factor = 1.00E+00 * = Detection Limit	Waste Stream TCLP Concentration (mg/L)	Dilution Attenuation Factor (DAF)	Waste Volume Adjusted DAF	Maximum Allowable Concentration (mg/L)	DL	Max. Allowable Concentration Based on Groundwater Ingestion Pathway	Max. Allowable Concentration Based on Groundwater Inhalation Pathway	Max. Allowable Concentration Based on Adult Groundwater Dermal Absorption Pathway	Max. Allowable Concentration Based on Child Groundwater Dermal Absorption Pathway
Chloro-3-methylphenol 4-	3.85E-04	1.80E+01	1.80E+01			---	---	---	---
Acetone	1.25E-02	1.90E+01	1.90E+01	6.42E+02		6.42E+02	---	1.82E+05	8.37E+04
Benzene	1.90E-05	1.80E+01	1.80E+01	2.39E-02		2.39E-02	7.33E-02	2.08E-01	4.76E-01
Lead	3.60E-01	5.00E+03	5.00E+03	7.50E+01		---	---	---	---
Mercury	2.40E-02	7.45E+01	7.45E+01	8.14E-02		2.80E-01	8.14E-02	---	---
Nickel	6.90E-02	3.76E+01	3.76E+01	2.83E+01		2.83E+01	---	---	---
Silver	7.50E-04	2.05E+01	2.05E+01	3.84E+00		3.84E+00	---	---	---
Thallium	9.30E-03	4.40E+01	4.40E+01	8.80E-02		1.09E-01	---	---	---
Tin	7.50E+00	1.00E+01	1.00E+01	2.25E+02		2.25E+02	---	---	---
Antimony	2.10E-02	3.43E+01	3.43E+01	2.06E-01		5.15E-01	---	---	---
Arsenic	3.70E-03	1.92E+01	1.92E+01	9.36E-04		9.36E-04	---	---	---
Barium	6.30E-01	2.78E+01	2.78E+01	5.57E+01		2.09E+02	---	---	---
Beryllium	3.40E-04	1.04E+02	1.04E+02	4.16E-01		7.81E+00	---	---	---
Cadmium	9.20E-02	3.00E+01	3.00E+01	1.50E-01		5.63E-01	---	---	---
Chromium	9.50E-02	3.85E+03	3.85E+03	3.85E+02		2.17E+05	---	---	---
Cobalt	5.50E-01	1.00E+01	1.00E+01	7.51E+00		7.51E+00	---	---	---
Copper	8.00E+01	7.01E+03	7.01E+03	9.11E+03		1.05E+04	---	---	---
Vanadium	1.00E-02	8.03E+01	8.03E+01	3.02E+00		3.02E+00	---	---	---
Zinc	4.10E+00	2.49E+01	2.49E+01	2.80E+02		2.80E+02	---	---	---
Selenium	3.80E-02	1.16E+01	1.16E+01	5.80E-01		2.18E+00	---	---	---
Isophorone	1.35E-04	1.80E+01	1.80E+01	1.32E+00		1.32E+00	6.88E+01	3.56E+01	8.17E+01
Acenaphthene	1.15E-04	1.90E+01	1.90E+01	1.25E+01		4.28E+01	6.86E+01	2.73E+01	1.25E+01

Results for Analysis: Updated DRAS 2-19-08, Max values used □2

Maximum Allowable TCLP Concentrations - Groundwater Exposure Pathways

Max. Allowable Concentration Based on MCL

9.00E-02
7.50E+01
1.49E-01

8.80E-02

2.06E-01
1.92E-01
5.57E+01
4.16E-01
1.50E-01
3.85E+02

9.11E+03

5.80E-01

Results for Analysis: Updated DRAS 2-19-08, Max values used □2

Maximum Allowable TCLP Concentrations - Groundwater Exposure Pathways

Chemical Name Risk Factor = 1.00E-06 HQ Factor = 1.00E+00 * = Detection Limit	Waste Stream TCLP Concentration (mg/L)	Dilution Attenuation Factor (DAF)	Waste Volume Adjusted DAF	Maximum Allowable Concentration (mg/L)	DL	Max. Allowable Concentration Based on Groundwater Ingestion Pathway	Max. Allowable Concentration Based on Groundwater Inhalation Pathway	Max. Allowable Concentration Based on Adult Groundwater Dermal Absorption Pathway	Max. Allowable Concentration Based on Child Groundwater Dermal Absorption Pathway
Diethyl phthalate	2.85E-04	2.30E+01	2.30E+01	6.91E+02		5.91E+02	---	7.07E+03	3.25E+03
Di-n-butyl phthalate	6.00E-03	2.00E+01	2.00E+01	1.65E+01		7.51E+01	---	3.60E+01	1.65E+01
Phenanthrene	2.75E-03	1.80E+01	1.80E+01			---	---	---	---
Butylbenzylphthalate	1.35E-03	2.00E+01	2.00E+01	2.90E+01		1.50E+02	7.67E+03	6.32E+01	2.90E+01
N-Nitrosodiphenylamine	1.65E-04	1.80E+01	1.80E+01	2.69E-01		1.69E-01	8.47E-01	1.10E+00	2.30E-01
Fluorene	4.65E-04	1.90E+01	1.90E+01	5.55E+00		2.85E+01	4.61E+01	1.21E+01	5.55E+00
Pentachlorophenol	3.15E-04	1.80E+01	1.80E+01	2.79E-03		1.10E-01	2.66E-01	2.79E-03	3.40E-01
nitroaniline 2-	9.50E-04	1.80E+01	1.80E+01	2.03E+00		2.03E+00	2.05E+01	3.74E+01	1.72E+01
Naphthalene	9.50E-04	1.90E+01	1.90E+01	8.06E-03		---	8.06E-03	---	---
Methylnapthalene 2-	2.65E-04	1.80E+01	1.80E+01			---	---	---	---
Trichlorophenol, 2,4,5	3.95E-04	1.90E+01	1.90E+01	2.86E+01		1.03E+01	---	6.27E+01	2.86E+01

Results for Analysis: Updated DRAS 2-19-08, Max values used □3

Maximum Allowable TCLP Concentrations - Groundwater Exposure Pathways

Max. Allowable Concentration Based on MCL

1.80E-02

Results for Analysis: Updated DRAS 2-19-08, Max values used □3

Surface Pathway Hazard Quotient

		Petitioned Waste Non-carcinogenic Hazard Quotient - Surface Water Exposure Pathways					
Chemical Name	Waste Stream Total Concentration (mg/Kg)	Surface Water Ingestion Pathway	Air Particulate Inhalation Pathway	Fish Ingestion Pathway	Soil Ingestion Pathway	Air Volatile Inhalation Pathway	Surface Pathway Aggregate Hazard Quotient
Di-n-octyl phthalate	5.90E-02	7.12E-10	8.05E-10	3.53E-09	1.15E-08	3.16E-15	1.65E-08
TCDD, 2,3,7,8-	2.10E-04	---	---	---	---	---	---
Benz(a)anthracene	2.10E-02	---	---	---	---	---	---
Chloro-3-methylphenol 4-	7.70E-03	---	---	---	---	---	---
Isophorone	2.70E-03	6.52E-12	7.37E-12	6.71E-12	1.05E-10	3.69E-12	1.29E-10
Silver	2.50E+01	2.41E-06	---	2.49E-06	3.89E-05	---	4.38E-05
Dimethyl phthalate	2.30E-03	1.11E-13	---	1.14E-13	1.79E-12	---	2.02E-12
Dibenz(a,h)anthracene	1.30E-02	---	---	---	---	---	---
Dibenzofuran	8.00E-03	1.93E-09	2.18E-09	1.99E-09	3.11E-08	---	3.72E-08
Fluoranthene	5.90E-02	7.12E-10	8.05E-10	6.75E-08	1.15E-08	6.18E-15	8.05E-08
Butylbenzylphthalate	2.70E-02	6.52E-11	7.37E-11	1.56E-07	1.05E-09	7.74E-16	1.57E-07
Benzo(b)fluoranthene	3.20E-02	---	---	---	---	---	---
Mercury	1.50E+00	7.24E-06	8.52E-06	3.48E-00	1.17E-04	7.06E-09	3.48E-00
Benzo (ghi) perylene	2.70E-02	---	---	---	---	---	---
N-Nitrosodiphenylamine	3.30E-03	7.96E-11	9.01E-11	8.20E-11	1.28E-09	9.49E-12	1.55E-09
Indeno(1,2,3-cd) pyrene	1.70E-02	---	---	---	---	---	---
Benzyl alcohol	1.00E-02	1.61E-11	1.82E-11	1.66E-11	2.59E-10	2.45E-12	3.13E-10
Bromophenyl-phenyl ether 4-	1.70E-03	1.41E-11	---	1.92E-07	2.28E-10	---	1.92E-07
Toluene	7.50E-03	4.53E-11	2.86E-12	4.66E-11	7.30E-10	1.23E-10	9.47E-10

Results for Analysis: Updated DRAS 2-19-08, Max values used □1

Surface Pathway Hazard Quotient

		Petitioned Waste Non-carcinogenic Hazard Quotient - Surface Water Exposure Pathways					
Chemical Name	**Waste Stream Total Concentration (mg/Kg)**	**Surface Water Ingestion Pathway**	**Air Particulate Inhalation Pathway**	**Fish Ingestion Pathway**	**Soil Ingestion Pathway**	**Air Volatile Inhalation Pathway**	**Surface Pathway Aggregate Hazard Quotient**
Thallium	1.40E+00	1.02E-05	---	1.05E-05	1.65E-04	---	1.86E-04
Anthracene	1.00E-02	1.61E-11	1.82E-11	4.22E-08	2.59E-10	4.54E-16	4.25E-08
Pyrene	6.60E-02	1.06E-09	1.20E-09	1.23E-05	1.71E-08	4.76E-15	1.23E-05
Antimony	3.90E+01	4.71E-05	---	4.85E-05	7.59E-04	---	8.54E-04
Arsenic	2.20E+01	3.54E-05	---	3.65E-05	5.71E-04	---	6.43E-04
Barium	2.00E+02	4.83E-07	7.64E-05	4.97E-07	7.78E-06	---	8.51E-05
Tin	1.50E+02	1.21E-07	---	1.24E-07	1.95E-06	---	2.19E-06
Beryllium	2.30E-01	5.55E-08	2.09E-05	5.67E-08	8.95E-07	---	2.19E-05
Cadmium	2.10E+02	2.03E-04	---	2.09E-04	3.27E-03	---	3.68E-03
Acetone	2.50E-01	1.34E-10	---	1.38E-10	2.16E-09	---	2.43E-09
Benzene	3.80E-04	4.59E-11	2.41E-11	4.72E-11	7.39E-10	3.55E-09	4.41E-09
Acenaphthene	2.30E-03	1.85E-11	2.09E-11	1.90E-11	2.98E-10	8.64E-14	3.57E-10
Methylnapthalene 2-	5.30E-03	---	---	---	---	---	---
Copper	1.60E+03	1.93E-05	---	1.99E-05	3.11E-04	---	3.51E-04
Phenol	4.20E-02	6.76E-11	---	6.96E-11	1.09E-09	---	1.23E-09
Selenium	9.00E+01	8.69E-06	---	8.95E-06	1.40E-04	---	1.58E-04
Benzo(k)fluoranthene	1.60E-02	---	---	---	---	---	---
Acenapthylene	1.10E-02	---	---	---	---	---	---
Vanadium	1.80E+02	8.69E-05	---	8.95E-05	1.40E-03	---	1.58E-03

Results for Analysis: Updated DRAS 2-19-08, Max values used □2

Surface Pathway Hazard Quotient

		Petitioned Waste Non-carcinogenic Hazard Quotient - Surface Water Exposure Pathways					
Chemical Name	**Waste Stream Total Concentration (mg/Kg)**	**Surface Water Ingestion Pathway**	**Air Particulate Inhalation Pathway**	**Fish Ingestion Pathway**	**Soil Ingestion Pathway**	**Air Volatile Inhalation Pathway**	**Surface Pathway Aggregate Hazard Quotient**
Zinc	1.20E+05	1.93E-04	---	1.99E-04	3.11E-03	---	3.51E-03
Chromium	1.80E+03	5.79E-07	---	2.67E-08	9.34E-06	---	9.95E-06
Fluorene	9.30E-03	1.12E-10	1.27E-10	1.02E-08	1.81E-09	8.07E-14	1.23E-08
Pentachlorophenol	6.30E-03	1.01E-10	---	4.14E-08	1.63E-09	---	4.32E-08
nitroaniline 2-	1.90E-02	3.06E-09	3.46E-07	3.15E-09	4.93E-08	4.81E-09	4.06E-07
Naphthalene	1.90E-02	4.59E-10	1.21E-08	4.72E-10	7.39E-09	1.38E-09	2.18E-08
Pyridine	2.10E-02	1.01E-08	---	1.04E-08	1.63E-07	---	1.84E-07
Nickel	1.70E+02	4.10E-06	---	4.22E-06	6.62E-05	---	7.45E-05
Bis(2-ethylhexyl)phthalate	3.40E-01	8.21E-09	9.28E-09	7.69E-09	1.32E-07	5.24E-14	1.58E-07
Di-n-butyl phthalate	1.20E-01	5.79E-10	---	3.33E-06	9.34E-09	---	3.34E-06
Phenanthrene	5.50E-02	---	---	---	---	---	---
Cobalt	1.10E+01	2.65E-07	1.00E-03	2.74E-07	4.28E-06	---	1.01E-03
Chrysene	3.30E-02	---	---	---	---	---	---
Benzo(a)pyrene	1.70E-02	---	---	---	---	---	---
Trichlorophenol 2,4,5-	7.70E-03	3.72E-11	---	3.83E-11	5.99E-10	---	6.75E-10
Lead	9.60E+03	---	---	---	---	---	---
Diethyl phthalate	5.70E-03	3.44E-12	---	8.68E-09	5.55E-11	---	8.74E-09
All Waste Constituents	---	6.19E-04	1.11E-03	3.48E+00	9.98E-03	1.69E-08	3.49E+00

Results for Analysis: Updated DRAS 2-19-08, Max values used □3

Surface Pathway Risk

		Petitioned Waste Carcinogenic Risk - Surface Water Exposure Pathways					
Chemical Name	Waste Stream Total Concentration (mg/Kg)	Surface Water Ingestion Pathway	Air Particulate Inhalation Pathway	Fish Ingestion Pathway	Soil Ingestion Pathway	Air Volatile Inhalation Pathway	Surface Pathway Aggregate Cancer Risk
Di-n-octyl phthalate	5.90E-02	---	---	---	---	---	---
TCDD, 2,3,7,8-	2.10E-04	7.81E-09	2.64E-09	1.69E-03	2.77E-08	1.35E-18	1.69E-03
Benz(a)anthracene	2.10E-02	3.81E-12	5.45E-13	1.27E-08	1.35E-11	8.05E-20	1.27E-08
Chloro-3-methylphenol 4-	7.70E-03	---	---	---	---	---	---
Isophorone	2.70E-03	6.69E-16	2.15E-16	5.37E-16	2.37E-15	1.08E-16	3.90E-15
Silver	2.50E+01	---	---	---	---	---	---
Dimethyl phthalate	2.30E-03	---	---	---	---	---	---
Dibenz(a,h)anthracene	1.30E-02	2.35E-11	3.37E-12	7.29E-09	8.35E-11	5.89E-23	7.40E-09
Dibenzofuran	8.00E-03	---	---	---	---	---	---
Diethyl phthalate	5.70E-03	---	---	---	---	---	---
Fluoranthene	5.90E-02	---	---	---	---	---	---
Butylbenzylphthalate	2.70E-02	---	---	---	---	---	---
Benzo(b)fluoranthene	3.20E-02	5.79E-12	8.31E-13	2.66E-09	2.05E-11	6.53E-20	2.69E-09
Mercury	1.50E+00	---	---	---	---	---	---
Benzo (ghi) perylene	2.70E-02	---	---	---	---	---	---
N-Nitrosodiphenylamine	3.30E-03	4.01E-15	1.35E-15	3.22E-15	1.42E-14	1.43E-16	2.29E-14
Indeno(1,2,3-cd) pyrene	1.70E-02	3.08E-12	4.41E-13	6.95E-09	1.09E-11	5.62E-23	6.96E-09
Benzyl alcohol	1.00E-02	---	---	---	---	---	---
Bromophenyl-phenyl ether 4-	1.70E-03	---	---	---	---	---	---

Results for Analysis: Updated DRAS 2-19-08, Max values used □1

Surface Pathway Risk

		Petitioned Waste Carcinogenic Risk - Surface Water Exposure Pathways					
Chemical Name	Waste Stream Total Concentration (mg/Kg)	Surface Water Ingestion Pathway	Air Particulate Inhalation Pathway	Fish Ingestion Pathway	Soil Ingestion Pathway	Air Volatile Inhalation Pathway	Surface Pathway Aggregate Cancer Risk
Toluene	7.50E-03	---	---	---	---	---	---
Thallium	1.40E+00	---	---	---	---	---	---
Anthracene	1.00E-02	---	---	---	---	---	---
Pyrene	6.60E-02	---	---	---	---	---	---
Antimony	3.90E+01	---	---	---	---	---	---
Arsenic	2.20E+01	8.18E-09	2.78E-06	6.56E-09	2.90E-08	---	7.16E-08
Barium	2.00E+02	---	---	---	---	---	---
Tin	1.50E+02	---	---	---	---	---	---
Beryllium	2.30E-01	---	1.62E-10	---	---	---	1.62E-10
Cadmium	2.10E+02	---	1.11E-07	---	---	---	1.11E-07
Acetone	2.50E-01	---	---	---	---	---	---
Benzene	3.80E-04	5.18E-15	8.59E-16	4.16E-15	1.84E-14	1.27E-13	1.55E-13
Acenaphthene	2.30E-03	---	---	---	---	---	---
Methylnapthalene 2-	5.30E-03	---	---	---	---	---	---
Copper	1.60E+03	---	---	---	---	---	---
Phenol	4.20E-02	---	---	---	---	---	---
Selenium	9.00E+01	---	---	---	---	---	---
Benzo(k)fluoranthene	1.60E-02	2.90E-13	4.15E-14	1.35E-10	1.03E-12	4.07E-23	1.36E-10
Acenapthylene	1.10E-02	---	---	---	---	---	---

Results for Analysis: Updated DRAS 2-19-08, Max values used □2

Surface Pathway Risk

		Petitioned Waste Carcinogenic Risk - Surface Water Exposure Pathways					
Chemical Name	Waste Stream Total Concentration (mg/Kg)	Surface Water Ingestion Pathway	Air Particulate Inhalation Pathway	Fish Ingestion Pathway	Soil Ingestion Pathway	Air Volatile Inhalation Pathway	Surface Pathway Aggregate Cancer Risk
Vanadium	1.80E+02	---	---	---	---	---	---
Zinc	1.20E+05	---	---	---	---	---	---
Chromium	1.80E+03	---	---	---	---	---	---
Fluorene	9.30E-03	---	---	---	---	---	---
Pentachlorophenol	6.30E-03	1.87E-13	6.33E-14	5.97E-11	6.65E-13	2.41E-17	6.06E-11
nitroaniline 2-	1.90E-02	---	---	---	---	---	---
Naphthalene	1.90E-02	---	5.57E-13	---	---	6.35E-14	6.20E-13
Pyridine	2.10E-02	---	---	---	---	---	---
Nickel	1.70E+02	---	---	---	---	---	---
Bis(2-ethylhexyl)phthalate	3.40E-01	1.18E-12	3.99E-13	8.62E-13	4.19E-12	2.25E-18	6.63E-12
Di-n-butyl phthalate	1.20E-01	---	---	---	---	---	---
Phenanthrene	5.50E-02	---	---	---	---	---	---
Cobalt	1.10E+01	---	9.03E-09	---	---	---	9.03E-09
Chrysene	3.30E-02	5.97E-14	8.57E-15	2.29E-10	2.12E-13	1.75E-17	2.29E-10
Benzo(a)pyrene	1.70E-02	3.08E-11	4.41E-12	1.33E-08	1.09E-10	2.01E-20	1.34E-08
Trichlorophenol, 2,4,5-	7.70E-03	---	---	---	---	---	---
Lead	9.60E+03	---	---	---	---	---	---
All Waste Constituents	---	1.61E-08	1.50E-07	1.69E-03	5.70E-08	1.90E-13	1.69E-03

Results for Analysis: Updated DRAS 2-19-08, Max values used □3

Maximum Allowable Total Concentrations - Surface Exposure Pathways

		Maximum Allowable Total Concentration (mg/Kg)						
Chemical Name **Risk Factor = 1.00E-06** **HQ Factor = 1.00E+00** *** = Detection Limit**	**Waste Stream Total Concentration (mg/Kg)**	**Maximum Allowable Total Concentration (mg/kg)**	**DL**	**Surface Water Ingestion Pathway**	**Air Particulate Inhalation Pathway**	**Fish Ingestion Pathway**	**Soil Ingestion Pathway**	**Air Volatile Inhalation Pathway**
Di-n-octyl phthalate	5.90E-02	**2.57E+01**		8.29E+07	7.33E+07	2.57E+01	5.14E+06	1.87E+09
TCDD, 2,3,7,8-	2.10E-04	**7.58E-03**		2.69E-02	7.96E-02	6.10E+03	7.58E-03	1.55E+04
Benz(a)anthracene	2.10E-02	**1.56E+03**		5.52E+03	3.85E+04	1.68E+04	1.56E+03	2.61E+07
Chloro-3-methylphenol 4-	7.70E-03			---	---	---	---	---
Isophorone	2.70E-03	**2.51E+03**		4.03E+06	1.26E+07	4.37E+05	1.14E+06	2.51E+03
Silver	2.50E+01	**4.93E+04**		1.04E+07	---	4.93E+04	6.42E+05	---
Dimethyl phthalate	2.30E-03	**1.28E+09**		2.07E+10	---	1.95E+09	1.28E+09	---
Dibenz(a,h)anthracene	1.30E-02	**1.56E+02**		5.53E+02	3.85E+03	7.54E+08	1.56E+02	2.21E+10
Dibenzofuran	8.00E-03	**2.57E+05**		4.14E+06	3.66E+06	4.02E+06	2.57E+05	---
Diethyl phthalate	5.70E-03	**6.57E+05**		1.66E+09	---	6.57E+05	1.03E+08	---
Fluoranthene	5.90E-02	**8.03E+05**		8.29E+07	7.33E+07	8.03E+05	5.14E+06	9.54E+08
Butylbenzylphthalate	2.70E-02	**1.69E+05**		4.14E+08	3.66E+08	1.69E+05	2.57E+07	3.49E+09
Benzo(b)fluoranthene	3.20E-02	**1.56E+03**		5.53E+03	3.85E+04	9.81E+04	1.56E+03	4.90E+07
Mercury	1.50E+00	**9.01E-02**		2.07E+05	1.57E+05	9.01E-02	1.28E+04	2.12E+04
Benzo (ghi) perylene	2.70E-02			---	---	---	---	---
N-Nitrosodiphenylamine	3.30E-03	**2.32E+03**		8.23E+05	2.44E+06	8.69E+03	2.32E+05	2.32E+03
Indeno(1,2,3-cd) pyrene	1.70E-02	**1.56E+03**		5.53E+03	3.85E+04	1.87E+03	1.56E+03	3.03E+10
Benzyl alcohol	1.00E-02	**4.08E+05**		6.21E+08	5.49E+08	1.49E+08	3.85E+07	4.08E+05
Bromophenyl-phenyl ether 4-	1.70E-03	**7.21E+03**		1.20E+08	---	7.21E+03	7.45E+06	---
Toluene	7.50E-03	**6.11E+03**		1.66E+08	2.62E+09	2.57E+06	1.03E+07	6.11E+03

Results for Analysis: Updated DRAS 2-19-08, Max values used □1

Maximum Allowable Total Concentrations - Surface Exposure Pathways

		Maximum Allowable Total Concentration (mg/Kg)						
Chemical Name **Risk Factor = 1.00E-06** **HQ Factor = 1.00E+00** *** = Detection Limit**	**Waste Stream Total Concentration (mg/Kg)**	**Maximum Allowable Total Concentration (mg/kg)**	**DL**	**Surface Water Ingestion Pathway**	**Air Particulate Inhalation Pathway**	**Fish Ingestion Pathway**	**Soil Ingestion Pathway**	**Air Volatile Inhalation Pathway**
Thallium	1.40E+00	**9.47E+01**		1.37E+06	---	9.47E+01	8.48E+03	---
Anthracene	1.00E-02	**2.27E+05**		6.21E+08	5.49E+08	2.27E+05	3.85E+07	2.20E+09
Pyrene	6.60E-02	**4.78E+03**		6.21E+07	5.49E+07	4.78E+03	3.85E+06	1.39E+09
Antimony	3.90E+01	**2.01E+04**		8.29E+05	---	2.01E+04	5.14E+04	---
Arsenic	2.20E+01	**1.68E+02**		2.69E+03	7.91E+02	1.68E+02	7.58E+02	---
Barium	2.00E+02	**2.62E+06**		4.14E+08	2.62E+06	4.02E+08	2.57E+07	---
Tin	1.50E+02	**7.71E+07**		1.24E+09	---	1.21E+09	7.71E+07	---
Beryllium	2.30E-01	**1.42E+03**		---	1.42E+03	---	---	---
Cadmium	2.10E+02	**1.90E+03**		---	1.90E+03	---	---	---
Acetone	2.50E-01	**1.16E+08**		1.86E+09	---	4.52E+09	1.16E+08	---
Benzene	3.80E-04	**3.00E-01**		7.33E+04	4.42E+05	3.69E+03	2.07E+04	3.00E-01
Acenaphthene	2.30E-03	**1.98E+05**		1.24E+08	1.10E+08	1.98E+05	7.71E+06	2.66E+06
Methylnapthalene 2-	5.30E-03			---	---	---	---	---
Copper	1.60E+03	**5.14E+06**		8.29E+07	---	8.04E+07	5.14E+06	---
Phenol	4.20E-02	**3.85E+07**		6.21E+08	---	7.72E+07	3.85E+07	---
Selenium	9.00E+01	**7.79E+04**		1.04E+07	---	7.79E+04	6.42E+05	---
Benzo(k)fluoranthene	1.60E-02	**1.56E+04**		5.53E+04	3.85E+05	4.51E+04	1.56E+04	3.93E+10
Acenapthylene	1.10E-02			---	---	---	---	---
Vanadium	1.80E+02	**1.28E+05**		2.07E+06	---	2.01E+06	1.28E+05	---
Zinc	1.20E+05	**9.22E+05**		6.21E+08	---	9.22E+05	3.85E+07	---

Results for Analysis: Updated DRAS 2-19-08, Max values used □2

Maximum Allowable Total Concentrations - Surface Exposure Pathways

		Maximum Allowable Total Concentration (mg/Kg)						
Chemical Name **Risk Factor = 1.00E-06** **HQ Factor = 1.00E+00** *** = Detection Limit**	**Waste Stream Total Concentration (mg/Kg)**	**Maximum Allowable Total Concentration (mg/kg)**	**DL**	**Surface Water Ingestion Pathway**	**Air Particulate Inhalation Pathway**	**Fish Ingestion Pathway**	**Soil Ingestion Pathway**	**Air Volatile Inhalation Pathway**
Chromium	1.80E+03	**4.77E+05**		3.11E+09	---	4.77E+05	1.93E+08	---
Fluorene	9.30E-03	**8.98E+05**		8.29E+07	7.33E+07	8.98E+05	5.14E+06	1.15E+07
Pentachlorophenol	6.30E-03	**9.47E+03**		3.36E+04	9.95E+04	1.52E+05	9.47E+03	2.61E+04
nitroaniline 2-	1.90E-02	**3.95E+02**		6.21E+06	5.49E+04	4.02E+05	3.85E+05	3.95E+02
Naphthalene	1.90E-02	**2.99E+01**		---	3.41E+04	---	---	2.99E+01
Pyridine	2.10E-02	**1.28E+05**		2.07E+06	---	1.06E+06	1.28E+05	---
Nickel	1.70E+02	**1.30E+05**		4.14E+07	---	1.30E+05	2.57E+06	---
Bis(2-ethylhexyl)phthalate	3.40E-01	**2.72E+03**		2.88E+05	8.53E+05	2.72E+03	8.12E+04	1.51E+07
Di-n-butyl phthalate	1.20E-01	**3.60E+04**		2.07E+08	---	3.60E+04	1.28E+07	---
Phenanthrene	5.50E-02			---	---	---	---	---
Cobalt	1.10E+01	**1.22E+03**		---	1.22E+03	---	---	---
Chrysene	3.30E-02	**1.56E+05**		5.53E+05	3.85E+06	3.18E+07	1.56E+05	1.89E+05
Benzo(a)pyrene	1.70E-02	**1.56E+02**		5.53E+02	3.85E+03	2.16E+07	1.56E+02	8.45E+07
Trichlorophenol, 2,4,5-	7.70E-03	**3.91E+05**		2.07E+08	---	3.91E+05	1.28E+07	---
Lead	9.60E+03	**4.39E+04**		---	4.39E+04	---	1.64E+05	---

Results for Analysis: Updated DRAS 2-19-08, Max values used □3

Aggregate Risk and Hazard Quotient Results

		Petitioned Waste Aggregate Non-carcinogenic Hazard			Petitioned Waste Aggregate Carcinogenic Risk		
Chemical Name	CAS Number	Aggregate HI-Groundwater Pathways	Aggregate HI-Surface Pathways	Total Aggregate Hazard Index	Aggregate Risk-Groundwater Pathways	Aggregate Risk-Surface Pathways	Total Aggregate Risk
Acenaphthene	83-32-9	1.44E-05	3.57E-10	1.44E-05	---	---	---
Methylnapthalene 2-	91-57-6	---	---	---	---	---	---
Copper	7440-50-8	7.60E-03	3.51E-04	7.96E-03	---	---	---
Phenol	108-95-2	1.08E-05	1.23E-09	1.08E-05	---	---	---
Selenium	7782-49-2	1.75E-02	1.58E-04	1.76E-02	---	---	---
Benzo(k)fluoranthene	207-08-9	---	---	---	8.31E-07	1.36E-10	8.31E-07
Acenapthylene	208-96-8	---	---	---	---	---	---
Vanadium	7440-62-2	3.32E-03	1.58E-03	4.89E-03	---	---	---
Zinc	7440-66-6	1.46E-02	3.51E-03	1.81E-02	---	---	---
Chromium	7440-47-4	4.38E-07	9.95E-06	1.04E-05	---	---	---
Fluorene	86-73-7	1.15E-04	1.23E-08	1.15E-04	---	---	---
Pentachlorophenol	87-86-5	1.86E-04	4.32E-08	1.87E-04	1.43E-07	6.06E-11	1.44E-07
nitroaniline 2-	88-74-4	5.91E-04	4.06E-07	5.92E-04	---	---	---
Naphthalene	91-20-3	4.34E-03	2.18E-08	4.34E-03	1.92E-07	6.20E-13	1.92E-07
Pyridine	110-86-1	1.52E-03	1.84E-07	1.52E-03	---	---	---

Results for Analysis: Updated DRAS 2-19-08, Max values used □3

Aggregate Risk and Hazard Quotient Results

		Petitioned Waste Aggregate Non-carcinogenic Hazard			Petitioned Waste Aggregate Carcinogenic Risk		
Chemical Name	CAS Number	Aggregate HI-Groundwater Pathways	Aggregate HI-Surface Pathways	Total Aggregate Hazard Index	Aggregate Risk-Groundwater Pathways	Aggregate Risk-Surface Pathways	Total Aggregate Risk
Nickel	7440-02-0	2.44E-03	7.45E-05	2.52E-03	---	---	---
Bis(2-ethylhexyl)phthalate	117-81-7	6.62E-03	1.58E-07	6.62E-03	4.50E-07	6.63E-12	4.50E-07
Di-n-butyl phthalate	84-74-2	4.43E-04	3.34E-06	4.47E-04	---	---	---
Phenanthrene	85-01-8	---	---	---	---	---	---
Cobalt	7440-48-4	7.32E-02	1.01E-03	7.43E-02	---	9.03E-09	9.03E-09
Chrysene	218-01-9	---	---	---	1.28E-07	2.29E-10	1.28E-07
Benzo(a)pyrene	50-32-8	---	---	---	2.98E-06	1.34E-08	3.00E-06
Trichlorophenol, 2,4,5-	95-95-4	1.89E-05	6.75E-10	1.89E-05	---	---	---
Lead	7439-92-1	---	---	---	---	---	---
Diethyl phthalate	84-66-2	5.00E-07	8.74E-09	5.09E-07	---	---	---
All Waste Constituents Excluding Non-detect Risk	---	**1.11E+00**	**3.49E+00**	**4.60E+00**	**1.91E-05**	**1.69E-03**	**1.71E-03**
All Waste Constituents Including Non-detect Risk	---	**1.11E+00**	**3.49E+00**	**4.60E+00**	**1.91E-05**	**1.69E-03**	**1.71E-03**

Toxicity Characteristic, Soil Saturation, and Ecological Values

		Toxicity Characteristic Rule		Soil Saturation		Ecological Screen	
Chemical Name	CAS Number	Allowable TC Concentration (mg/L)	Waste Constituent TCLP Concentration (mg/L)	Allowable Soil Saturation Concentration (mg/Kg)	Actual Soil Concentration (mg/Kg)	Allowable Aquatic Concentration (mg/L)	Predicted Ambient Concentration (mg/L)
Pyridine	110-86-1	---	---	---	---	---	3.92E-08
Trichlorophenol, 2,4,5-	95-95-4	---	---	---	---	---	1.44E-08
Lead	7439-92-1	---	---	---	---	2.50E-03	1.77E-02
Pyrene	129-00-0	---	---	---	---	---	1.16E-07
Chrysene	218-01-9	---	---	---	---	---	4.87E-08
Zinc	7440-66-6	---	---	---	---	1.20E-01	2.24E-01

Results for Analysis: Updated DRAS 2-19-08, Max values used □1

Pathways Exceeding the Delisting Limits

		Exceeding Pathways Analysis - Chemicals that exceed the delisting level listed by exceeding pathway					
Chemical Name	CAS Number	Actual TCLP Concentration (mg/L)	Limiting TCLP Concentration (mg/L)	Limiting TCLP Pathway	Actual Total Concentration (mg/kg)	Limiting Total Concentration (mg/Kg)	Limiting Total Pathway
Benz(a)anthracene	56-55-3	1.05E-03	1.31E-04	GW Dermal-Adult	---	---	---
Benz(a)anthracene	56-55-3	1.05E-03	3.01E-04	GW Dermal-Child	---	---	---
Mercury	7439-97-6	---	---	---	1.50E+00	9.01E-02	Fish Ingestion
Arsenic	7440-38-2	3.70E-03	9.36E-04	GW Ingestion	---	---	---
Benzo(a)pyrene	50-32-8	2.30E-05	8.06E-06	GW Dermal-Adult	---	---	---
Benzo(a)pyrene	50-32-8	2.30E-05	1.85E-05	GW Dermal-Child	---	---	---

Results for Analysis: Updated DRAS 2-19-08, Max values used □1

Site and WMU Information

Delisting Petition Number:

DL-

File Name:

2-20-08, Arsenic, Max values used

Petitioner's Name:

Peoria Disposal Company

Address 1:

4349 W. Southport Road

Address 2:

City, State:

Peoria,

Zip Code:

61615

Analysis Performed by:

RMT Inc.

Date of Analysis:

Feb-20-2008

Waste Description:

EAF Dust Stabilized Residue

Waste Code:

K061

WMU Type:

Landfill

Waste Volume (yd^3):

95000

Active Life (years):

20

Risk Factor:

1.00E-04

HQ Factor:

1.00E+00

Select Chemicals of Concern to be Modeled (Steps 4 5)

Chemical Name	CAS Number	TCLP Concentration (mg/L)	TCLP Detection Limit	Total Concentration (mg/kg)	Total Detection Limit	Maximum Contaminant Level (MCL) (mg/L)	Carcinogenic Slope Factor - Oral (CSFo) (kg-day/mg)	Carcinogenic Slope Factor - Inhalation (CSFi) (kg-day/mg)	Reference Dose - Oral (RFDo) (mg/kg-day)
Arsenic	7440 38-2	3.70E-03	0.00E+00	2.20E+01	0 00E+00	1 00E-02	1.50E+00	1 5[illegible]E+0[illegible]	3)1E-04

Results for Analysis: 2-20-08, Arsenic, Max values used □1

Select Chemicals of Concern to be Modeled (Steps 4 5)

Reference Dose - Inhalation (RFC) (mg/m³)	Bio- concentration Factor (BCF) (L/kg)	Soil Saturation Level (SOILSAT) (mg/kg)	Toxicity Characteristic Level (TC) (mg/L)	Henry's Law Coefficient (H) (atm-m³/mol-K)	Diffusion Coefficient in Water (Dw) (cm²/sec)	Diffusion Coefficient in Air (Da) (cm²/sec)	Solubility (SOL) (mg/L)	Landfill Dilution Attenuation Factor (DAFLF)	Surface Impoundment Dilution Attenuation Factor (DAFSI)
0.00E+00	2.00E+01	0.00E+00	5.00E+00	0.00E+00	1.24E-05	1.07E-01	0.00E+00	1.92E+01	7.70E+00

Results for Analysis: 2-20-08, Arsenic, Max values used □1

Select Chemicals of Concern to be Modeled (Steps 4 5)

Time to reach steady state (T*) (hrs)	Skin Permeability Coefficient (Kpw) (cm/hr)	Tau (T) (hrs)	Bunge Coefficient (B) (unitless)	Organic/ Inorganic	Bio-accumulation Factor (BAF) (L/kg)	Chronic Ecological Threshhold (Aquatic TRV) (mg/L)	Carcinogen/ Noncarcinogen	Molecular Weight (MW) (gm/mol)	Vapor Pressure (Vp) (atm)	Surface Water Partition Coefficient (Kdsw) (L/kg)
0.00E+00	1.00E-03	0.00E+00	0.00E+00	0.00E+00	1.00E+00	1.50E-01	Carcinogen	7.49E-01	0.00E+00	2.30E-01

Results for Analysis: 2-20-08, Arsenic, Max values used □1

List of COCs with Altered Chemical Properties

Chemical Name	CAS Number	Parameter Modified	Parameter Symbol	Parameter Units	Original Value	Modified Value
Arsenic	7440-38-2	Maximum Concentration Level	MCL	mg/L	0.05	0.01

Results for Analysis: 2-20-08, Arsenic, Max values used □1

Limiting Pathways

		Detection Limit Analysis - Toxicity of Petitioned Waste cannot be confirmed if Detection Limits fall below maximum allowable concentration			
Chemical Name	CAS Number	Maximum Allowable TCLP Concentration (mg/L)	Maximum Allowable TCLP Pathway	Maximum Allowable Total Concentration (mg/Kg)	Maximum Allowable Total Pathway
Arsenic	7440-38-2	9.36E-02	Groundwater Ingestion	1.68E+04	Fish ingestion

Results for Analysis: 2-20-08, Arsenic, Max values used □1

Groundwater Pathway Hazard Quotient

		Petitioned Waste Non-carcinogenic Hazard Quotient - Groundwater Exposure Pathways				
Chemical Name	Waste Stream TCLP Concentration (mg/L)	Groundwater Ingestion Pathway	Groundwater Inhalation Pathway	Groundwater Dermal Absorption Pathway - Adult	Groundwater Dermal Absorption Pathway - Child	Groundwater Pathway Aggregate Hazard Quotient
Arsenic	3.70E-03	1.71E-02	---	---	---	1.71E-02
All Waste Constituents	---	1.71E-02	---	---	---	1.71E-02

Results for Analysis: 2-20-08, Arsenic, Max values used □1

Groundwater Pathway Risk

	Petitioned Waste Carcinogenic Risk - Groundwater Exposure Pathways					
Chemical Name	Waste Stream TCLP Concentration (mg/L)	Groundwater Ingestion Pathway	Groundwater Inhalation Pathway	Groundwater Dermal Absorption Pathway - Adult	Groundwater Dermal Absorption Pathway - Child	Groundwater Pathway Aggregate Risk
Arsenic	3.70E-03	3.95E-06	---	---	---	3.95E-06
All Waste Constituents	---	3.95E-06	---	---	---	3.95E-06

Results for Analysis: 2-20-08, Arsenic, Max values used □1

Maximum Allowable TCLP Concentrations - Groundwater Exposure Pathways

Chemical Name Risk Factor = 1.00E-04 HQ Factor = 1.00E+00 * = Detection Limit	Waste Stream TCLP Concentration (mg/L)	Dilution Attenuation Factor (DAF)	Waste Volume Adjusted DAF	Maximum Allowable Concentration (mg/L)	DL	Max. Allowable Concentration Based on Groundwater Ingestion Pathway	Max. Allowable Concentration Based on Groundwater Inhalation Pathway	Max. Allowable Concentration Based on Adult Groundwater Dermal Absorption Pathway	Max. Allowable Concentration Based on Child Groundwater Dermal Absorption Pathway
Arsenic	3.70E-03	1.92E+01	1.92E+01	**9.36E-02**		9.36E-02	---	---	---

Results for Analysis: 2-20-08, Arsenic, Max values used ☐1

Maximum Allowable TCLP Concentrations - Groundwater Exposure Pathways

Max. Allowable Concentration Based on MCL
1.92E-01

Results for Analysis: 2-20-08, Arsenic, Max values used □1

Surface Pathway Hazard Quotient

		Petitioned Waste Non-carcinogenic Hazard Quotient - Surface Water Exposure Pathways					
Chemical Name	Waste Stream Total Concentration (mg/Kg)	Surface Water Ingestion Pathway	Air Particulate Inhalation Pathway	Fish Ingestion Pathway	Soil Ingestion Pathway	Air Volatile Inhalation Pathway	Surface Pathway Aggregate Hazard Quotient
Arsenic	2.20E+01	3.54E-05	---	3.65E-05	5.71E-04	---	6.43E-04
All Waste Constituents	---	3.54E-05	---	3.65E-05	5.71E-04	---	6.43E-04

Results for Analysis: 2-20-08, Arsenic, Max values used ☐1

Surface Pathway Risk

		Petitioned Waste Carcinogenic Risk - Surface Water Exposure Pathways					
Chemical Name	Waste Stream Total Concentration (mg/Kg)	Surface Water Ingestion Pathway	Air Particulate Inhalation Pathway	Fish Ingestion Pathway	Soil Ingestion Pathway	Air Volatile Inhalation Pathway	Surface Pathway Aggregate Cancer Risk
Arsenic	2.20E+01	8.18E-09	2.78E-08	6.56E-09	2.90E-08	---	7.16E-08
All Waste Constituents	---	8.18E-09	2.78E-08	6.56E-09	2.90E-08	---	7.16E-08

Results for Analysis: 2-20-08, Arsenic, Max values used □1

Maximum Allowable Total Concentrations - Surface Exposure Pathways

Chemical Name Risk Factor = 1.00E-04 HQ Factor = 1.00E+00 * = Detection Limit	Waste Stream Total Concentration (mg/Kg)	Maximum Allowable Total Concentration (mg/kg)	DL	Maximum Allowable Total Concentration (mg/Kg)				
				Surface Water Ingestion Pathway	Air Particulate Inhalation Pathway	Fish Ingestion Pathway	Soil Ingestion Pathway	Air Volatile Inhalation Pathway
Arsenic	2.20E+01	1.68E+04		2.59E+05	7.91E+04	1.68E+04	7.58E+04	---

Results for Analysis: 2-20-08, Arsenic, Max values used □1

Aggregate Risk and Hazard Quotient Results

		Petitioned Waste Aggregate Non-carcinogenic Hazard			Petitioned Waste Aggregate Carcinogenic Risk		
Chemical Name	**CAS Number**	**Aggregate HI-Groundwater Pathways**	**Aggregate HI-Surface Pathways**	**Total Aggregate Hazard Index**	**Aggregate Risk-Groundwater Pathways**	**Aggregate Risk-Surface Pathways**	**Total Aggregate Risk**
Arsenic	7440-38-2	1.71E-02	6.43E-04	1.77E-02	3.95E-06	7.16E-08	4.02E-06
All Waste Constituents Excluding Non-detect Risk	---	**1.71E-02**	**6.43E-04**	**1.77E-02**	**3.95E-06**	**7.16E-08**	**4.02E-06**
All Waste Constituents Including Non-detect Risk	---	**1.71E-02**	**6.43E-04**	**1.77E-02**	**3.95E-06**	**7.16E-08**	**4.02E-06**

Results for Analysis: 2-20-08, Arsenic, Max values used □1

Attachment 7
Revised Appendix H.4 Dioxin and Furan Worksheet and Summary

Dioxin Model Spreadsheet

[redacted] Returned to defaults [redacted]

INPUT VARIABLES		Rationale modification of assumptions
Waste Volume (cy/year)	95000	Increased from 80000 in original provided
Landfill Lifetime (year)	20	
Period of Waste Exposure (day)	10	Covered daily Modified from 30 days in original
Rainfall Erosion Potential, R (1/year)	[redacted] 300	Figure B-1 for Peoria area modified from 300 in original
Soil Erodibility, K (ton/acre)	0.3	Value is supportable for Silty Clay Loam - Not modified
Percent slope	5.00%	
Cover & Management Factor, C	1	
Support Practice Factor, P	[redacted] 1	Original assumption assumes no mangement practice
Distance to Stream (meter)	[redacted] 100	Default assumption
Percentage of Waste Exposed	0.0014	
2nd order Stream Volume (L/year)	3.30E+09	
5th order Stream Volume (L/year)	3.40E+11	
Concentration Reduction Factor Due to Addition of Reagents	1	

OUTPUT VARIABLES	
Slope Length	708.7
Topographic Factor, LS	1.42
Soil eroded (kg/acre/year)	1.16E+05
Sedimentary Delivery Ratio, Sd	0.28
Soil Delivered to Stream, As (kg/acre/year)	3.25E+04
Percentage of Eroded Waste in Soil	0.0014
Annual Waste Eroded, Aw (kg/acre/year)	4.45E+01
Waste Conc. - 2nd Order Stream, (kg/L)	6.22E-07
Waste Conc. - 5th Order Stream, (kg/L)	6.04E-09
Dilution factor - 2nd Order Stream, (L/Kg)	1.61E+06
Dilution factor - 5th Order Stream, (L/Kg)	1.66E+08

CALCULATIONS	
Area (acre)	46.12
Slope Length (ft)	708.7
Slope Length-Exponent, m	0.5
Topographic Factor, LS	1.42
Soil Eroded (ton/acre/year)	128.18
Soil Eroded (kg/acre/year)	116282
Sed. Delivery Ratio, Sd	0.28
Soil Delivered to S.W. (kg/acre/year)	3.25E+04

fraction organic carbon in suspended solids =	0.075	assumption
minimum TSS level (erosion input only) to 2nd order stream =	454.3	mg/L
	454.3	mg/L

Assumptions

fraction organic carbon in suspended solids = 0.075

background TSS concentration in stream = 10 mg/L

Constituent	Total Constituent Concentration (mg/Kg)	Concentration (Fifth order Stream) (mg/L)	Concentration (Second order Stream) (mg/L)	log Koc (log Kow for organics)	Kdsw sometimes Koc (or Kow for organics)	BAF (BCF for metals etc) freely dissolved	2nd order stream Surface Water Concentration (freely dissolved)	TEF TEQdfp-WHO98	Edible Portion Fish Tissue Concentration from freely dissolved
2,3,7,8-TCDD	1.60E-04	9.67E-13	9.96E-11	5.31	2.02E+05	9.16E+05	1.05E-12	1	9.62E-07

Estimating Lake Trout Fish Lipid Content

From Table 1, Appendix I, EPA-820-B-95-005	% lipid	samples	sample weighted percent
Lake Superior	11.42%	44	0.66%
	10.46%	71	0.97%
	9.21%	28	0.34%
Lake Erie	13.00%	5	0.08%
Lake Ontario	3.38%	98	0.43%
Lake Michigan	11.88%	28	0.43%
	17.25%	156	3.51%
	16.58%	13	0.28%
	8.81%	3	0.03%
	12.01%	9	0.14%
	12.71%	311	5.16%
		766	12.04% sample weighted mean of mean lipid content trophic level 4

From Table 2, Appendix I, EPA-820-B-95-005

Lake Superior	10.61%
Lake Huron	14.12%
Lakes St. Claire and Erie	13.00%
Lake Michigan	13.70%
Lake Ontario	14.53%

13.19% average lipid content of Lake Trout weighing each lake equally trophic level 4

From Table 10, EPA-820-B-95-005

Mean TCDD BAF (in fish lipids and referenced to chemical concentration freely dissolved) 9.00E+06 salmonids

To convert to a BAF for lipids in the edible portion only, multiply by the lipid concentrations above

1.08E+06 from sample weighted mean of mean lipid content
1.19E+06 from average lipid content of Lake Trout weighing each lake equally

Summary

9.16E+05 current value in DRAS
10.18% lipid content assumed in DRAS

To conservatively evaluate the bioaccumulation of chemicals in fish for the purpose of conservative human health comparison, EPA assumed subpopulations could be exposed to trophic level 4 Lake trout (a fatty species).

The BAF in DRAS is consistent and actually a little less than that implied by the fish lipid concentrations given in the report.

Dietary Exposure/Risk Modeling

target hazard quotient (HQ) =	1	unitless
target cancer risk (CR) =	1.00E-06	unitless
chemical concentration in fish lipid tissue (Clipids) =	calculated per constituent	mg/kg
fraction of fish intake from this source (F) =	0.5	unitless
fish consumption rate (CR) =	0.006	kg/day
exposure duration (ED) =	30	years
exposure frequency (EF) =	350	days/year
cancer slope factor (CSF) =	chemical specific	kg-day/mg
body weight (BW) =	72	kg
noncarcinogenic averaging time (AT) =	30	years
carcinogenic averaging time (AT) =	75	years
drinking water ingestion rate (adult) =	2	L/day
age-adjusted drinking water ingestion factor (IFWadj) =	1.07	L yr/kg day

Rationale modification of assumptions

Assumes 50% of all freshwater fish consumption is from surface water nearest the disposal site

Fish consumption value reflects recommended freshwater fish consumption/day - modified from 0.02 kg/day which is a recommended total (marine/freshwater) fish consumption rate.

COPC	Waste Conc	Rfd	CSFo	5th order stream concentration	SWing HQ	SWing CR	SWing DL	Fish Concentration Edible Portion	Fishing HQ	Fishing CR	Fishing DL for Waste
	mg/kg	mg/kg day	kg day/mg	mg/L				mg/kg			mg/kg
2,3,7,8-TCDD	1.60E-04		1.50E+05	9.67E-13			0.00E+00	9.62E-07		2.31E-06	6.94E-05

0.96 ng/kg

See table on observed dioxin concentrations in background fish. Modeled concentration consistent with background.

Revised Dioxin/Furan Summary
Modeling of Fish Tissue Ingestion Pathway for Dioxin TEQs

Background

The DRAS v.2 model has a confirmed error in the surface migration/fish ingestion pathway that is particularly problematic for those compounds which have a tendency to bioaccumulate, most notably dioxins and furans. As a result of this known error in the available DRAS v.2 model, Mr. Todd Ramaly, USEPA Region 5, provided a spreadsheet calculation model (USEPA email dated January 14, 2008, located in Appendix C of the Technical Support Document to the RCRA Delisting Adjusted Standard Petition for PDC EAF Dust Stabilized Residue (TSD), filed as Attachment 2 to the Petition) that could be used as a substitute evaluation tool. The spreadsheet calculation model corrects the error in the DRAS v.2 model and incorporates updates to the modeling approach anticipated for the updated DRAS v.3 model. An original dioxin and furan summary was provided in Appendix H.4 of the Technical Support Document to the RCRA Delisting Adjusted Standard Petition for PDC EAF Dust Stabilized Residue (TSD), filed as Attachment 2 to the Petition. This original analysis used site-specific information for the PDC-owned Indian Creek Landfill in Tazewell County, Illinois, the most likely receiving landfill of the delisted waste. This revised dioxin and furan summary provides a general assessment applicable to all Subtitle D disposal facilities in Illinois, in response to comment 16 of Attachment A to the July 15, 2008 Hearing Officer Order by the Illinois Pollution Control Board.

Surface Migration/Fish Tissue Ingestion Pathway

Exposure through the surface pathway, and ultimately the fish ingestion pathway, is assumed to result from erosion of hazardous materials from the surface of a solid waste landfill and transport of these constituents to nearby surface water bodies. The initial component of the calculations rely on the universal soil loss equation (USLE; Wischmeier and Smith 1978) to compute long-term soil and waste erosion from a landfill in which delisted waste is being disposed. The amount of soil delivered to surface water is estimated using a sediment delivery ratio, which is translated into estimates of dissolved surface water concentrations and projected fish tissue concentrations through application of conservative partitioning and bioaccumulation values. In the final component of the calculations, modeled fish tissue concentrations are incorporated into an ingestion pathway model to assess potential risk and arrive at a delisting level.

With few exceptions, the surface migration/fish tissue ingestion pathway modeling was performed using conservative generic parameter input values. Non-generic input values, which are determined to be representative of any RCRA Subtitle D disposal facility in Illinois, are summarized in the following table.

Site Specific Model Assumptions

MODEL VARIABLE	GENERIC INPUT	SITE-SPECIFIC INPUT	RATIONALE
USLE Assumptions			
Waste Volume (cy/year)	80,000	95,000	Increased to 95,000 to match maximum allowed by the PDC Petition.
Period of Waste Exposure (day)	30	10	The disposal area is covered on a daily basis as required by 35 Ill. Adm. Code Part 811.106. Additional intermediate cover requirements are provided at 35 Ill. Adm. Code Part 811.313. The site-specific value assumes deviation from standard practice of 10 days.
Dietary Exposure/Risk Model Assumptions			
Fish consumption rate (CR)	0.02 kg/day	0.006 kg/day	Fish consumption value reflects recommended freshwater fish consumption/day (EFH, 1997) Modified from 0.02 kg/day which is a recommended total (marine plus freshwater) fish consumption rate.
Fraction of fish intake from this source (F)	1.0	0.5	Assumes 50% of all freshwater fish consumption for an individual is taken from surface water immediately adjacent to an Illinois disposal site.

The migration and exposure model for dioxins and furans is based on the assumption that waste materials are eroded from the landfill surface and carried as sediment to the nearest stream which supports a fishery. For licensed and permitted Subtitle D landfills in Illinois, it is important to note that, in reality; the waste will always be covered with daily, intermediate or final cover and, therefore, will not be subject to erosion. Furthermore, even if waste materials would be eroded from the landfill surface, these sediments would be captured by the landfill's sediment control system, as required by Illinois landfill regulations at 35 Ill. Adm. Code 811.103a)1). Only clear water is discharged from the sediment basins to surface water. Therefore, the route of migration for dioxins and furans (and other constituents) to fish is virtually incomplete.

The fish consumption value relied upon in support of the PDC delisting petition was 0.006 kg/day (or 6 g/day). This value represents the freshwater portion of the recommended mean fish consumption value. As presented in the Section 10.10.1 of the Exposure Factors Handbook (1997), the generic fish consumption value of 0.02 kg/day reflects consumption of all fish including finfish (freshwater and marine) and shellfish (marine). The recommended values for mean intake by habitat/fish type are 6.0 g/day for freshwater/ estuarine fish, 14.1 g/day for marine fish, and 20.1 g/day for all fish types. Although the relied upon value is not more conservative than the generic model value, given that no Illinois disposal sites have a marine water habitat, the freshwater fish value is more appropriate. Since the Delisting Adjusted Standard Petition for the PDC Electric Arc Furnace Dust Stabilized Residue (EAFDSR) limits disposal to only Subtitle D facilities in Illinois, per 35 Ill. Adm. Code 720.122(r), these fish consumption and intake modeling assumptions would apply in any Illinois Subtitle D disposal scenario.

The "fraction ingested" variable is intended to account in the model for the portion of an individual's freshwater fish diet, over a 30-year period, anticipated to be harvested from surface water stream adjacent to an Illinois disposal site. The 50 percent value was based on professional judgment reflecting the conservative, yet highly unlikely, assumption that one-half of an individual's freshwater fish diet over a 30-year period would be sourced from a single body of water immediately adjacent to an Illinois disposal site.

The attached spreadsheet presents the results of an Illinois-specific USLE and dietary exposure/risk modeling of the maximum dioxin TEQ concentration (160 ng/kg wet weight) observed in treated waste samples. The modeled fish tissue dioxin TEQ concentration for fish in surface water immediately adjacent to an Illinois disposal site is 0.96 ng/kg. Estimated carcinogenic risk posed through a conservative fish ingestion scenario is 2.3×10^{-6}.

Discussion of Results

As shown in the following table, the modeled fish tissue concentration, which is likely an overestimate given the compounding of conservative assumptions, is consistent with national background TEQ concentrations in fish tissues.

Background Dioxin Concentrations in Fish Tissue

CATEGORY/DESCRIPTION	MAXIMUM OBSERVED CONCENTRATION	AVERAGE CONCENTRATION
DIOXIN TEQ (in ng/kg wet weight)		
NASQAN (background) [1]	7.18	1.12
Background[1]	3.02	0.59
Agricultural[1]	4.44	1.02
North American Background[2]	- -	1.16
DRAS Modeled fish tissue concentrations in surface water immediately adjacent to a disposal site [3]	**0.96**	

(1) Excerpted from the National Survey of Chemical Residues in Fish (USEPA, September 1992)
(2) Reported in USEPA's Dioxin Reassessment (USEPA, 1994)
(3) Modified DRAS v.3 spreadsheet model (original provided by Todd Ramaly, USEPA Region 5) of PDC waste materials

Dioxin/furans have been found throughout the world in practically all media including air, soil, water, sediment, fish and shellfish, and other food products such as meat and dairy products. The highest levels of these compounds are found in soils, sediments, and biota; very low levels are found in water and air. The widespread occurrence is not unexpected considering the numerous natural and anthropogenic sources that emit these compounds into the atmosphere, and the overall resistance of these compounds to biotic and abiotic transformation. Modeled dioxin TEQ concentrations in fish tissue are consistent with background and therefore are not expected to pose an unacceptable risk over and above background.