**Natural Resource Technology, Inc.**

N R T

July 15, 2003
(1508)

Ms. Jennifer Tobias
Bureau for Remediation & Redevelopment
Wisconsin Department of Natural Resources, Northeast Region
Oshkosh Service Center
625 East County Road Y, Suite 700
Oshkosh, WI 54901-9731



RE: Response to Remedial Design Report Review Comments
Former Manufactured Gas Plant (MGP)
337 Water Street, Appleton, WI
WDNR ERP Case # 02-45-000042
**FID #445033380**

Dear Ms. Tobias:

On behalf of We Energies, this letter is in response to your above referenced report review comments and to provide you with additional information that was not available at the time the *Remedial Design Report* was submitted. Included within this addendum is a discussion of the following:

- Thermal Treatment Performance Standards;
- May 20 and 23, 2003 Email Comments;
- Miscellaneous Comments – May 29, 2003 Conference Call;
- Free Cyanide –June 9, 2003 Email Comments;
- Update to the ISS *Treatability Study for We Energies Former MGP Site in Appleton, WI*;
- Area of Contamination Policy – June 23, 2003 Email Comments; and,
- Schedule.

## Thermal Treatment Performance Standards

The following comments followed by responses or clarifications correspond to the item numbers listed in your email dated May 20, 2003:

1. *Comment*: "On page 3-3, the second bullet states that the presence of the monolith beneath thermally treated material will "substantially reduce surface water infiltration through thermally treated material to groundwater." While this may be the case, the water has to go somewhere. A flow through to the Fox River will likely be the default route of surface water through the thermally treated

material and backfill once it hits the monolith. Will the monolith be pitched to the Fox River?"

*Response*: The primary pathway for surface water infiltration through the thermally treated material will be to the Fox River Canal. Based on the bench scale testing data obtained to date indicating low permeabilities for the material treated via in-situ stabilization/solidification (ISS) in the range of 1 x $10^{-7}$ to 1 x $10^{-9}$ cm/sec, the groundwater pathway for surface water infiltration is considered effectively mitigated. To direct surface water runoff from the ISS monolith, the monolith surface will be sloped to the Fox River Canal.

2. *Comment*: "On page 3-4, the first paragraph states that the site-specific residual contaminant levels (SSRCLs) calculated for this site (proposed in Table 8) are "also anticipated to be protective of surface water." Since it is most likely that the surface water infiltrating through the thermally treated material and backfill will end up in the Fox River, you need to be sure that the SSRCLs are protective of surface water. Has this been investigated or calculated or discussed with anyone in Water Quality Section in Madison?
Here is a contact:

James W. Schmidt - WT/2
Water Quality Standards Section
DNR Bureau of Watershed Management
phone # (608) 267-7658

I also note that in the report by Williams Environmental Services, Inc., page 2, there is no performance criteria for total PAHs for the ISS bench scale treatability test. Performance criterion for both total PAHs and benzo(a)pyrene should be obtained from Jim Schmidt."

*Response:* The proposed treatment standards were reviewed with Mr. Jim Schmidt of the WDNR's Water Quality Standards Section during a conference call with We Energies and NRT on July 14, 2003. Following review and discussion of the proposed site operations, Mr. Schmidt indicated that his greatest concern is for PAH toxicity to human health; however, he saw no reason at this time not to proceed with the current standards. As part of the overall discussion of the proposed remedial program, it was also emphasized that no thermally treated material would be placed in direct contact with the river, a portion of the material would be amended with organically rich compost and the entire site would be covered with a layer of imported fill to provide a direct contact barrier. Finally, initial post treated soil analytical data will be reviewed with Mr. Schmidt to confirm surface water considerations for beneficial reuse of the treated material as backfill.

Follow-up w/ Schmidt. What does this mean?

Verify w/ Stoll that meet WPDES limits.

With regards to total PAH and benzo(a) pyrene performance standards for the ISS bench scale testing 14- and 28-day leachability data are attached (Appendix A). To date, the 28-day leachate results of Mix Design 6 meet the WPDES General Permit Limits for Discharge from Remedial Action Operations (Appendix A, Table 15). The results of these test results are further discussed below. Pending the results of the final leachate samples, Mr. Jim Schmidt (WDNR) may be contacted to obtain performance criteria for total PAHs and benzo(a)pyrene, as necessary, before ISS construction begins.

Include as condition for approval of remedial design.

3. *Comment:* "On page 3-4, 50 ppm for total PAHs as a SSRCL are proposed and according to text in the first paragraph are to apply to the groundwater pathway and also be protective of surface water. The comment on surface water is listed in item #2 above."

B/C of monolith there is not a gw pathway.

According to the PAH Guidance, an SSRCL of 3.9 ppm for total PAHs in an industrial setting or 0.16 ppm in a non-industrial setting is appropriate for direct contact only and a SSRCL for total PAHs should not be considered for the groundwater pathway.

*Response:* Please see responses to comments numbers 1 and 2. A performance standard consisting of a direct contact barrier and institutional controls will be implemented to control any potential for direct contact exposure. Total PAHs would only be considered for the surface water pathway.

4. *Comment:* "On page 3-5, a treatment performance criterion of 400 ppb is proposed for benzene. It is also stated that this number, "has historically been demonstrated to be technically achievable." Data needs to be submitted to support this statement. Also, although this value may be technically achievable, is it protective of groundwater and surface water?"

Verify (*)

*Response:* The treatment performance criterion of 400 µg/l has previously been approved by the WDNR at three MGP sites in northeast Wisconsin (Sheboygan, Oshkosh and Green Bay). Concentration ranges previously achieved at the Green Bay site have ranged from less than 200 to greater than 300 µg/kg. Post treatment concentrations may be influenced by the relative percentage of coal fines present in the pre-treated soil that could make achieving lower level concentrations (less than 200 µg/kg) difficult. It is anticipated that average concentrations at the Appleton site will be in the range of 200 µg/kg. Given that following ISS the groundwater pathway will no longer be a significant consideration, benzene will be assessed with respect to being protective of surface water and, as previously indicated, was reviewed with Mr. Schmidt during the July 14th conference call.

Check w/ Schmidt - benzene SSRCL protective of SW?

5. *Comment*: "On page 3-5, the EPA Site Screening Levels (SSLs) for naphthalene is referenced. The EPA SSL is 4,000 ppb for naphthalene with a dilution attenuation factor of 1 (appropriate where little or no dilution takes place such as shallow water tables). This is the proposed number listed in Table Wisconsin uses different target hazard quotients and target cancer risks than EPA and are detailed in s. NR 720.19, WAC. You need to apply the specified THQ and TCR to the EPA SSLs. We also have to correct for the Preventive Action Limits in Wisconsin. Please reference Determining Residual Contaminant Levels Using the EPA Soil Screening Level Web Site, RR-682. Page 5 explains that naphthalene is handled slightly differently because the ES is not the same as the health-based limit. An example is shown on page 18. Using the soil screening web site, an RCL of 175 ppb is calculated for naphthalene.
DAF = 1
f(oc) = 0.001
L(water)/L(soil) = 0.2
dry soil bulk density = 1.5 kg/L
soil particle density = 2.65 (kg/L)
calculated soil screening level = 1.6 ppm
HBL = 7.3E-01 mg/l = 0.73 mg/l = 730 ug/l
PAL = 8 ppb
So 1.6 ppm x (8/730)= 0.175 ppm or 175 ppb when using a DAF of 1.

This is the kind of information I need to know to approve any SSRCLs (in addition to the protection of surface water calculations)."

GW pathway is not driving factor

Was it approved?

*Response:* With the exceptions of naphthalene and benzene, performance standards presented in the design report are based on WDNR regulatory guidance levels protective of the groundwater pathway. As indicated in the response to comment no. 2, the proposed napthalene performance standard of 4 mg/kg was reviewed with Mr. Jim Schmidt during the July 14th conference call.

Q #6 not listed.

**May 23, 2003 Email Comments**

The following comments were taken directly from the text of the May 23rd e-mail:

1. *Comment:* "In reading through the report, I see that an air monitoring plan will be submitted at a later date as an addendum. Please note that this addendum is needed before I can give a final approval of the remediation plan."

*Response:* An air monitoring plan was forwarded to your attention on July 2, 2003.

2. *Comment:* "Also, communicating health issues, covering the old third Ward and a 24 hour hotline were not discussed in the community relations section 5.1.3"

   *Response:* A community relations plan addressing these issues was forwarded to your attention in June 2003.

3. *Comment:* "The proposed groundwater monitoring program, referenced in Section 6.3.1, should also be submitted prior to final approval of the remedial action."

   *Response:* A revised Section 6.4 of the *Remedial Design Report* that includes an expanded groundwater monitoring plan is provided in Appendix B.

Notes on Appx B

**Miscellaneous Comments – May 29, 2003 Conference Call**

These comments were received during the May 29th conference call between you, Mr. Mark Collins of We Energies and Mr. Chris Robb of NRT:

- Landfill manifest for 2002 site investigation soil disposal is attached (Appendix C).
- Tables and figures missing from Appendix E1 of the *Remedial Design Report* are attached (Appendix D). Please note Table 5-2 – Soil pH Titration Test as listed in the Table of Contents of Geo-Cleanse International, Inc. *Bench Scale Test Report* is not included and/or mentioned in the report.

ISCO Bench-scale results

- Appendix B *Gas Holder Foundation Plan* reads "The Milwaukee Electric Railroad and Light, Showing Gas Holder Foundation for 500,000 cu. ft. Gas Holder, Location Appleton Gas Plant."
- Copies of Appendix M analytical sheets are provided in a separate transmittal for the WDNR files. Please note November 13, 2002 analytical reports on the CD, which was provided in the *Remedial Design Report,* are incorrect. The attached (Appendix E) version of November 13, 2002 analytical reports are the correct version, which were incorporated in the summary tables (Tables 4, 5 and 6) of the *Remedial Design Report*.

Need ppb if ES/PAL in ppb. ES/PAL is for free cyanide, not WAD Create column for free cyanide

- The data provided in Table 6 have been checked and are listed as milligrams per liter (mg/L) for the NR 140 ES, PAL and reported analytical results. Appx G
- Copies of the laboratory analytical reports for treatability samples COMP-1 and COMP-2 provided in Table 2 of the *Remedial Design Report* are attached (Appendix F).
- Sulfur dioxide will be sampled continuously from the thermal oxidizer stack on the thermal treatment plant. The WDNR has requested this in other thermal

desorption air emission permits to verify sulfur concentrations do not exceed conditions above the air quality limits for sulfur dioxide.

- Page 3-14 Section 3.2.4, the first bullet on the page should read "Low permeability conditions will be achieved that will effectively mitigate (stabilize/solidify) the continuing source of impacts (Treatment Zone 2) to the lower till groundwater and establish conditions conductive to natural attenuation in lower till groundwater.
- Page 3-15 Section 3.2.6 should read "Prior to full scale ISS construction at the site, a pilot scale evaluation will be performed to confirm the selected design parameters for the ISS mix design. The pilot scale will be performed in Treatment Zone 2."
- Page 6-3 reference to Section 3.1 in third paragraph should be removed. Section 3.1 does not refer to arsenic impacted material at the site.
- Groundwater progress reports including Form 4400-194 will be submitted semi-annually after ISS construction is completed. Please reference the replacement Section 6.4 for the *Remedial Design Report* for further details (Appendix B).

As contam only removed?

O&M annual OK progress reports 1/4ly.

• Schedule needs to be more detailed.

**Free Cyanide - June 9, 2003 Email Comments**

The following comments and responses correspond to your email dated June 9, 2003:

1. *Comment*: "..free cyanide can be determined by using the ligand exchange method (Method OIA-1677) [The ligand exchange method does not take into account cyanide from iron cyanide, which is generally insoluble anyway]."

E-mail sent to Phelps, Uehls-Lowe & Thibaldeaux 7/23/03

*Response:* For future groundwater monitoring events, we propose analyzing the groundwater samples for cyanide using Method OIA-1677 – "Available Cyanide by Flow Injection, Ligand Exchange and Amperometry". This method is for determining available cyanide and not "free cyanide" in that it will include the cyano-complexes that are dissociated by weak acid. We understand this is the best currently accepted method for comparison to the NR 140 ES for cyanide and addresses interferences by other methods. However, We Energies will continue to evaluate using other analytical methods as they are developed such as the Microdiffusion Method for determination of free cyanide (excludes weak metal complexes) which is currently undergoing method validation testing for EPA approval.

2. *Comment:* "Total cyanide is a measure of the iron cyanide, the cyanide salts [weak metal complexes], and hydrogen cyanide, which is very volatile. Basically, free cyanide concentration can be determined by subtracting the weak, acid dissociable (W, AC) cyanide concentration (which is comprised of cyanide salts and iron cyanide) from the total cyanide concentration."

*Response:* We concur with the general definition of total cyanide. However, the second sentence misstates the definition of the weak acid dissociable (WAD) analysis. The analysis specifically excludes iron cyanide complexes as they are dissociable only by strong acid. If you subtract the WAD cyanide from the total cyanide concentration, the resulting concentration represents the iron cyanide complexes plus the portions of the available metal cyanide complexes that have higher stability constants. Concentrations of "free" cyanide would not be included in this number. A more accurate approximation would be to compare the existing WAD cyanide data for the Appleton former MGP site to the NR 140 enforcement standard (ES) as a conservative estimate of "free" cyanide. This is because "free" cyanide (cyanide ion ($CN^-$) and hydrogen cyanide in water ($HCN_{aq}$)) is a portion of the WAD cyanide concentration. Further background and references as to the various definitions is provided below. Updated groundwater data Table 6 to reflect this comparison is included in Appendix G. The following summarizes definition of cyanide species:

Total cyanide consists of:

- strong acid dissociable species (iron-cyanide complexes);
- available cyanide species (cyanide ion ($CN^-$), hydrogen cyanide in water ($HCN_{aq}$); and,
- cyano-complexes of zinc, copper, cadmium, nickel, mercury and silver.

Weak acid dissociable (WAD) cyanide consists of:

- a portion of the available cyanide range;
- cyanide ion ($CN^-$), hydrogen cyanide in water ($HCN_{aq}$); and,
- cyano-complexes of zinc, copper, cadmium, nickel, and silver.

Free cyanide consists of:

- cyanide ion ($CN^-$); and,
- hydrogen cyanide in water ($HCN_{aq}$).

It is important to recognize that unlike the definition of "free cyanide", WAD cyanide refers to those cyanide species measured by specific analytical techniques. These definitions are discussed in detail in the documents provided in Appendix H that include:

- *Method OIA-1677 Available Cyanide by Flow Injection, Ligand Exchange, and Amperometry.* USEPA (EPA-821-R-99-013), August 1999; and,

- *Cyanide Facts: Cyanide Sampling and Analytical Methods for Gold Mining*. International Cyanide Management Institute, May 2002.

In addition, the Electrical Power Research Institute (EPRI) in their recent June 2003 MGP forum, hosted a number of presentations on the subject of dissolved cyanide classification, interpretation, and method of analysis optimization/validation. The presentations provided excellent discussion and graphics depicting the classification of dissolved cyanide compounds and how the ranges of cyanide complexes relate to total cyanide in terms of their respective stability constants. We are currently in the process of obtaining permission to provide such information to the WDNR for your future reference.

**Update to the ISS *Treatability Study for We Energies Former MGP Site in Appleton, WI***

Since submittal of the *Remedial Design Report* on April 30, 2003, the *Treatability Study for We Energies Former MGP Site in Appleton, WI* (ISS study) has been updated with additional unconfined compressive strength (UCS) and hydraulic conductivity data that further confirms the basis for the in-situ stabilization/solidification (ISS) preliminary design parameters provide in Section 3.2.4 of the *Remedial Design Report.* A copy of the updated study is enclosed for your review (Appendix A).

In addition, the first two leachate intervals from the secondary assessment portion of the ISS study are included within the updated report. The results of the 28-day leachate samples collected from Mix Designs 5 (G6733-5) and 6 (G6733-6) meet each of the performance criteria proposed in Table 1 of the ISS study with the exception of total PAHs and benzo(a)pyrene (Table 15 and the ANS 16.1 (modified) Leaching Procedure table). The 28-day leachate results of Mix Design 5 for several of the PAHs regulated by the WPDES General Permit for Discharge from Remedial Action Operation (WI-0046566-4) have been detected above the effluent limit for PAHs provided by this permit. The 28-day leachate results of Mix Design 6 for each of the PAHs regulated by the WPDES General Permit for Discharge from Remedial Action Operation (WI-0046566-4) have not been detected at the stated level of detection (LOD).

Mix Design 6 already achieves the ISS performance criteria for leaching within 28-days although the criteria was set for 90-days. Based on this data, the leaching performance of Mix Design 6 further confirms the design basis for implementation of ISS at the site. The leaching performance for Mix Design 5 is expected to improve at 90-days and the data will be forwarded to the WDNR once the ISS study is completed.

**Area of Contamination Policy – June 23, 2003 Email Comments**

The following comments were taken directly from your email dated June 23, 2003.

1. *Comment*: "I have been in communication with Brian Wayner of OMNNI in regard to the former Valmet property and he has informed me that you intend to mobilize to the Valmet site to begin construction of the thermal desorption unit on July 18th. Has the City provided written approval to allow use of the Valmet site? If so, please provide me with confirmation."

   *Response:* Written approval was received from the City in June 2003.

2. *Comment:* "I have discussed the request for designation as an "Area of Contamination" with Mark Gordon, DNR. After discussing the specifics of this site, we do not believe that designation as an AOC is appropriate or necessary in order to properly handle soils on-site. Requesting a hazardous waste variance may be more applicable. This needs to be discussed further."

   *Response:* We agree that an AOC designation is not necessary for the site and was requested to provide flexibility in the event that unanticipated conditions were encountered that would require managing characteristically hazardous waste on-site for ISS. Routine excavation of MGP impacted materials and debris are not anticipated to encounter hazardous waste. In addition, as indicated in the WDNR's draft *Guidance for Hazardous Waste Remediation,* on page 20, a May 31, 1994 WDNR memorandum is referenced that indicates "simple consolidation within a single AOC will no longer be required to obtain a hazardous waste license, variance or waiver nor will they have to occur in units that meet the standards for land disposal facilities".

3. *Comment:* "Secondly, while it is true that characterization of MGP impacted soils using TCLP is not used, soils need to be characterized using the other methods in s. NR 605.08, WAC (ignitability, corrosivity and reactivity). Generally speaking, it appears that only s. NR 605.08(4)5, WAC may apply, however, this needs to be evaluated. If soils are not characterized as a hazardous waste through these methods, a licensed solid waste hauler will need to transport the material from the site to the thermal treatment area."

   *Response:* To date, no materials transported for off-site disposal including on-site material and MGP residuals excavated from the bottom of the Fox River Canal have exhibited any of the characteristics of a hazardous waste. A copy of Waste Management's special waste profile and analyses for off-site disposal at it's Ridgeview landfill is provided in Appendix J2 of the design report. Waste profile

analytical data for the material removed from the canal are provided in Appendix E of the September 27, 2002, *Interim Remedial Action Documentation Report.*

**Schedule**

Please accept this letter as the addendum to the design report. The air monitoring plan was sent July 1, 2003 for your review. Key upcoming milestones include the following:

- Contract award for the earthwork and the ISS is scheduled for the week of July 21st.
- A community relations open house in Appleton is scheduled for July 29th;
- Site preparation activities for the thermal treatment site are planned to begin the week of July 21st;
- Construction plans and specifications will be provided to you in early August, once all contracts are awarded; and,
- Drawdown for the canal and installation of the temporary dam is scheduled for August 4th

If you have any questions or comments pertaining to this response, please call Mark Collins at 414-221-2162. Once again, thank you for your assistance and we look forward to receipt of your approval letter.

Sincerely,

Natural Resource Technology, Inc.

Christopher A. Robb
Project Engineer

Roy E. Wittenberg
Project Manager

Natural Resource Technology
N R T

Appendices:
- Appendix A: ISS *Treatability Study for We Energies Former MGP Site in Appleton, WI*
- Appendix B: Replacement Section 6.4
- Appendix C: 2002 Site Investigation Landfill Disposal Manifest
- Appendix D: *Remedial Design Report* Appendix E: Geo-Cleanse Tables and Figures
- Appendix E: Replacement *Remedial Design Report* Appendix M: November 13, 2002 Groundwater Laboratory Analytical Reports
- Appendix F: Laboratory Analytical Reports for Treatability Samples COMP-1 and COMP-2
- Appendix G: Replacement Table 6 – Groundwater Analytical Results-Inorganic
- Appendix H: Cyanide Information Documents

cc: Mr. Mark Collins, We Energies (w/appendices)
Mr. Jim Lingle, We Energies (w/appendices)
Mr. Terry Bergman, We Energies (w/appendices)
Mr. Henry Nehls-Lowe, DHFS (w/appendices)
Ms. Monica Klaeser, City of Appleton (w/appendices)
Mr. Jim Schmidt, WDNR, Madison (w/o appendices)
Mr. Bruce Urben, WDNR, Green Bay (w/o appendices)

[1508/corres 2003/1508 WDNR Response 030715 ltr]

# APPENDIX A

# ISS TREATABILITY STUDY FOR WE ENERGIES FORMER MGP SITE IN APPLETON, WI

June 4, 2003

# *Treatability Study for We Energies Former MGP Site in Appleton, WI*

**Prepared for Natural Resource Technology, Inc. by Williams Environmental Services, Inc.**

*This interim report describes the study that Williams Environmental Services is conducting for Natural Resource Technology, Inc. and discusses its findings. The study s goal is to evaluate stabilization as a technology for treating soil impacted with Manufactured Gas Plant constituents at a We Energies site in Appleton, Wisconsin. This report will be updated as the study progresses.*

## *Introduction*

Williams Environmental Services, Inc. (Williams) has been subcontracted by Natural Resource Technology, Inc. (NRT) to evaluate stabilization as a technology for treating soil impacted with Manufactured Gas Plant (MGP) constituents at a We Energies site in Appleton, Wisconsin. To evaluate the technology, Williams is conducting a bench-scale study using samples of affected soil from the site.

The study is an iterative process whereby small aliquots from these samples are mixed with different types and quantities of stabilization reagents, then tested to determine their pertinent chemical and physical properties. The study progresses through phases, each phase building upon the information developed during the preceding phases until an optimal treatment regimen is developed.

The first phase Pretreatment Analyses determines the soil s pertinent physical and chemical properties before treatment. This data is important for two primary reasons. First, it is helpful for determining the types and doses of reagents that might effectively stabilize the waste. Second, it is useful for determining the means and methods to be used for incorporating reagents into the waste.

The second phase Preliminary Assessment assesses the relative performance of a variety of treatment regimens by mixing small aliquots of the soil with as many different types and quantities of reagents as practicable. These mixtures are allowed to cure, then a few key physical properties such as strength and permeability are measured. Data

is compared to the same data for other regimens and to the project s performance criteria.

based on what ?

**TABLE 1. Performance Criteria**

| Parameter | Criterion | Methodology |
|---|---|---|
| Permeability | $< 1 \times 10^{-6}$ cm/sec<br>$< 1 \times 10^{-7}$ cm/sec along the Fox River Canal | ASTM D5084 |
| Unconfined Compressive Strength | ≥ 50 psi | ASTM D2166 |
| Durability (Freeze/Thaw) | Weight Loss < 15% | ASTM D4842 |
| Durability (Wet/Dry) | Weight Loss < 15% | ASTM D4843 |
| Slake | Minimal Deterioration, Minimal Discoloration of Water (No Phase-Separated Tar or Oil) | Qualitative Analysis |
| Volumetric Expansion | < 30% if Possible | Quantitative Analysis |
| Benzene | < 50 µg/L at 90 days[a] | ANS 16.1[b]/EPA[c] 8260B |
| TotalBETX | < 750 µg/L at 90 days[a] | ANS 16.1/EPA 8260B |
| Total PAHs | To Be Determined | To Be Determined |
| Naphthalene | < 70 µg/L at 90 days[a] | ANS 16.1/EPA 8270 |
| Total Arsenic | < 50 µg/L at 90 days[d] | ANS 16.1/EPA 6010 |
| Total Lead | < 50 µg/L at 90 days[a] | ANS 16.1/EPA 6010 |
| Total Cyanide | < 200 µg/L at 90 days[e] | ANS 16.1/EPA 6010 |
| pH | To Be Determined | Any Accepted Method for Measuring pH |

Need benzo(a)pyrene
TSS

a. Criterion is based on treatment limits for discharges of petroleum remediation wastewaters to surface water as provided in the WPDES General Permit for Discharge from Remedial Action Operations (WI-0046566-4)
b. The leaching procedure is a modified ANS 16.1 Standard. The leaching intervals will be 14, 28 and 90 days. No leachability Index will be calculated. Only the total concentration of each constituent in the deionized water will be reported.
c. All EPA Methods are SW-846, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods
d. Criterion based on the human cancer criteria for contact with or ingestion of surface waters of the state and ingestion of aquatic organisms taken from surface waters of the state as provided in NR 105.09 Table 9, Non-Public Water Supply.
e. Criterion based on the human threshold criteria for ingestion of surface waters of the state and ingestion of aquatic organisms taken from surface waters of the state as provided in NR 105.08 Table 9, Non-Public Water Supply.

The third phase Secondary Assessment refines the best treatment regimens and adds the primary chemical properties to the data being evaluated.

The fourth phase Final Assessment uses the treatment regimen refined through the previous phases of the study to treat multiple samples of a waste to confirm that the treatment regimen produces repeatable results. All the required performance tests are included during this phase of the study.

Following the bench-scale study, operations personnel evaluate the implementability of the treatment process. They review the bench-scale data and visit the site to observe site constraints that might impact the treatment process. From the data and observations they prepare a report that discusses their findings.

Finally, assuming that the treatment process is feasible to implement, operations personnel prepare a budgetary cost estimate for the work. This estimate usually defines a cost range rather than a finite cost.

## *Development of Treatment Regimen*

**PRETREATMENT ANALYSES**

Williams Stone Mountain, Georgia office received seven 5-gallon buckets of affected soil for this study. Each container was labeled with a Field ID Number and accompanied by a Chain of Custody Record. Each record included the same Field ID Number as well as a Location/Description of the container s contents.

Williams transported these samples to Accura Geotechnical Laboratory. When the samples were received at the laboratory, they were labeled with a Laboratory ID for tracking purposes.

**TABLE 2. Sample Identification**

| Field ID | Location/Description | Laboratory ID |
|---|---|---|
| TTP-1 | 8.5'–10' bgs | G6715 |
| TTP-2 | 7'–8' bgs | G6716 |
| TTP-2 | 5'–7' bgs | G6717 |
| TTP-2 | 11.5'–12.5' bgs | G6718 |
| TTP-3 | 9.5'–10' bgs | G6719 |
| GTP-3 | clay composite | G6720 |
| GTP-3 | clay composite | G6721 |

What follows is a description of the seven samples and their physical and chemical properties before treatment. All physical testing was performed by Accura Geotechnical Laboratory. All chemical testing was performed by En Chem.

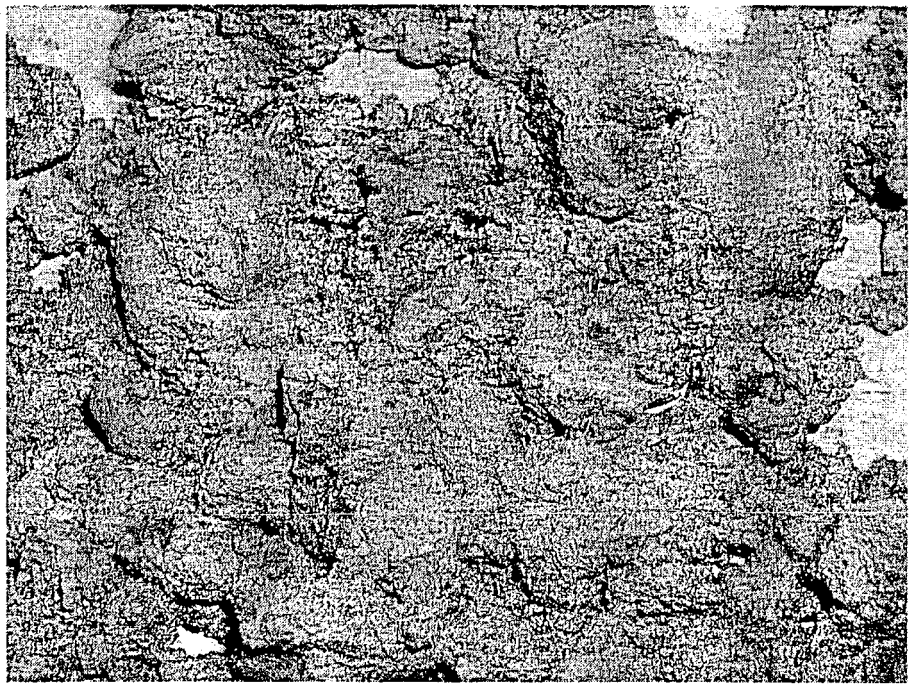
## Geotechnical Tests

**TTP-1.** This material is a black silty sand with gravel contaminated with MGP constituents.

**TABLE 3. Physical Properties of TTP-1**

| Bulk Density (pcf) | Moisture Content (%) | Atterberg Limits | | | | Particle-size Analysis | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Liquid Limit (LL) | Plastic Limit (PL) | Plasticity Index (PI) | Liquidity Index (LI) | Cobbles | Course Gravel | Fine Gravel | Course Sand | Medium Sand | Fine Sand | Fines | Total |
| 80.7 | 87.5 | 77 | 66 | 11 | 1.95 | 0.0 | 3.4 | 14.6 | 5.2 | 12.5 | 15.8 | 48.4 | 100.0 |

**FIGURE 1. TTP-1 Material**



**TTP-2.** Each of the three containers labeled TTP-2 had a layer of liquid overlaying solids. After discussing this matter with representatives from Natural Resource Technology, the opinion was that this liquid separated from the solids during transit. To remain representative of in situ conditions, this liquid was re-blended with the solids.

To ensure that the material used during the study was relatively homogeneous, the three containers labeled TTP-2 were combined to form one composite sample. But, before the composite was formed, the bulk density and moisture content of material in each container was determined.

**TABLE 4. TTP-2 Physical Properties of Individual Samples TTP-2**

| Sample ID | Laboratory ID | Bulk Density (pcf) | Moisture Content (%) |
|---|---|---|---|
| TTP-2 (7'–8' bgs) | G6716 | 96.4 | 70.4 |
| TTP-2 (5'–7' bgs) | G6717 | 95.6 | 70.0 |
| TTP-2 (11.5'–12.5' bgs)[a] | G6718 | 132.8 | 16.8 |
| TTP-2 (composite) | G6733 | 108.6 | 37.8 |
| TTP-2 (composite ≤ 0.5") | G6733 | ND[b] | 50.2 |

a. This sample contained numerous large rocks up to 3.5" x 5". These rocks contributed to the high density and low moisture content.
b. Not Determined.

Because the composite sample contained numerous large rocks, the sample was screened to remove particles greater than 0.5 inches. This was done to ensure that any mixes that were prepared in 3-inch diameter cylindrical molds will comply with the particle size requirements of the ASTM Standards for Unconfined Compressive Strength and Hydraulic Conductivity.

After removing the large rocks, the material that remains is a black silty gravel with sand. Material finer than 1.5 sieve contain some organics.

**TABLE 5. Physical Properties of Composite Sample TTP-2**

| | | Atterberg Limits | | | | Particle-size Analysis | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bulk Density (pcf) | Moisture Content (%) | Liquid Limit (LL) | Plastic Limit (PL) | Plasticity Index (PI) | Liquidity Index (LI) | Cobbles | Course Gravel | Fine Gravel | Course Sand | Medium Sand | Fine Sand | Fines | Total |
| ND[a] | 50.2 | 45 | 36 | 9 | 0.20 | 0.0 | 36.7 | 9.4 | 8.5 | 12.3 | 13.5 | 18.7 | 100.0 |

a. Not Determined.

**FIGURE 2. TTP-2 Material (composite)**

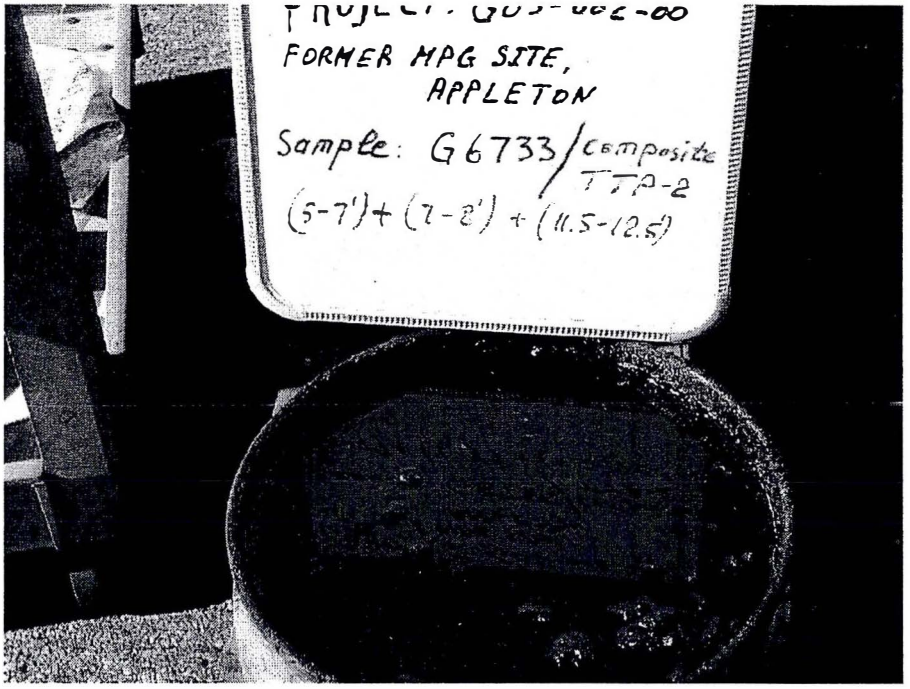



**FIGURE 3. TTP-2 Material Before Screening**

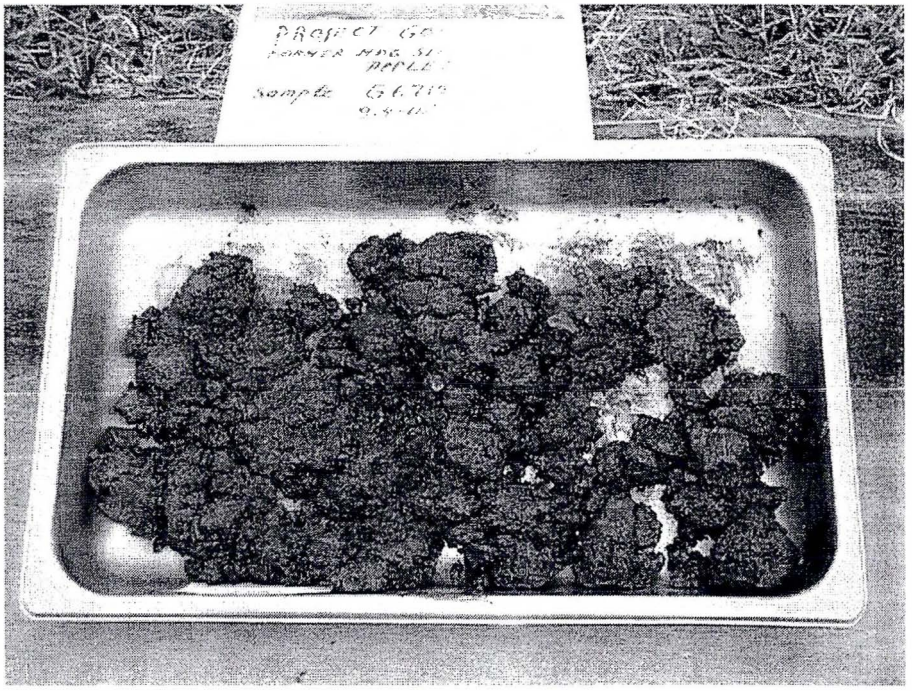
**FIGURE 4. Material Retained On 0.5 Inch Screen**


**TTP-3.** This material is a poorly graded sand with gravel and clay contaminated with MGP constituents.

**TABLE 6. Physical Properties of TTP-3**

| Bulk Density (pcf) | Moisture Content (%) | Atterberg Limits | | | | Particle-size Analysis | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Liquid Limit (LL) | Plastic Limit (PL) | Plasticity Index (PI) | Liquidity Index (LI) | Cobbles | Course Gravel | Fine Gravel | Course Sand | Medium Sand | Fine Sand | Fines | Total |
| 149.8 | 11.4 | 28 | 17 | 11 | -0.51 | 0.0 | 21.5 | 20.0 | 12.0 | 19.3 | 16.7 | 10.5 | 100.0 |

**FIGURE 5. TTP-3 Material**

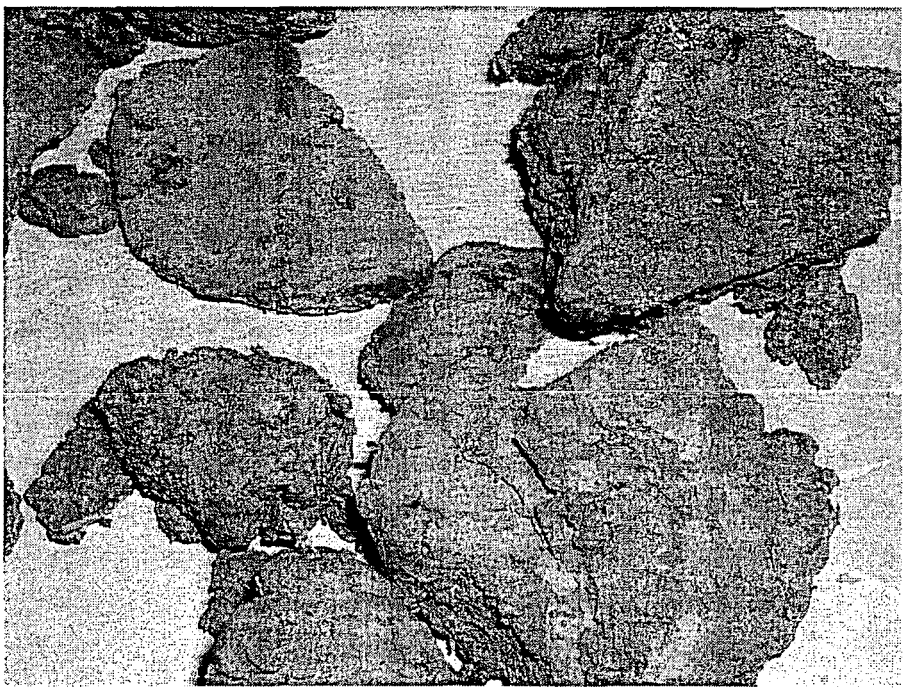


**GTP-3.** This material is a yellowish-brown lean clay.

**TABLE 7. Physical Properties of Composite Sample GTP-3**

| Bulk Density (pcf) | Moisture Content (%) | Atterberg Limits | | | | Particle-size Analysis | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Liquid Limit (LL) | Plastic Limit (PL) | Plasticity Index (PI) | Liquidity Index (LI) | Cobbles | Course Gravel | Fine Gravel | Course Sand | Medium Sand | Fine Sand | Fines | Total |
| 117.7 | 26.0 | 44 | 18 | 26 | 0.31 | 0.0 | 0.0 | 0.0 | 0.0 | 0.9 | 13.4 | 85.7 | 100.0 |

**FIGURE 6. GTP-3 (clay composite)**



## Chemical Tests

A small aliquot from each sample was submitted to En Chem, Inc. for chemical analyses. Total concentrations of constituents of concern were determined.

**Inorganic Compounds.** Arsenic concentrations range from 2 to 150 mg/kg. Lead concentrations range from 7.5 to 490 mg/kg. Cyanide concentrations range from <0.051 to 13 mg/kg.

**TABLE 8. Inorganic Concentrations**

| Compound | Methodology | units | TTP-1 | TTP-2 | TTP-3 | GTP-3 |
|---|---|---|---|---|---|---|
| arsenic | SW846 6020 | mg/kg | 14 | 26 | 150 | 2 |
| lead | SW846 6020 | mg/kg | 150 | 490 | 14 | 7.5 |
| pH | SW846 9045A | su | 7.6 | 7.8 | 8.5 | 7.9 |
| solids | SM 2540G | % | 58.4 | 75.9 | 87.8 | 82.1 |
| cyanide | SW846 9012A | mg/kg | 5.8 | 13 | 1.8 | < 0.051 |

**BTEX.** Benzene concentrations range from less than 25 g/kg to 34 mg/kg. Total BTEX concentrations range from less than 125 g/kg to 296 mg/kg.

**TABLE 9. BTEX Concentrations**

| Compound | Methodology | units | TTP-1 | TTP-2 | TTP-3 | GTP-3 |
|---|---|---|---|---|---|---|
| benzene | SW846 8021B | µg/kg | 490 | 2600 | 34000 | < 25 |
| ethylbenzene | SW846 8021B | µg/kg | 3000 | 16000 | 10000 | < 25 |
| toluene | SW846 8021B | µg/kg | 630 | 11000 | 110000 | < 25 |
| xylenes, -m, -p | SW846 8021B | µg/kg | 4900 | 19000 | 73000 | < 25 |
| xylene, -o | SW846 8021B | µg/kg | 3600 | 14000 | 69000 | < 25 |
| **Total BTEX** | | **µg/kg** | **12620** | **62600** | **296000** | **< 125** |

**PAHs.** Naphthalene concentrations range from less than 9.1 g/kg to 1,400 mg/kg. Total PAH concentrations range from 220 g/kg to 3,458 mg/kg.

**TABLE 10. PAHs**

| Compound | Methodology | units | TTP-1 | TTP-2 | TTP-3 | GTP-3 |
|---|---|---|---|---|---|---|
| acenaphthene | SW846 8270C | µg/kg | 230000 | 120000 | < 30000 | 18 |
| acenaphthylene | SW846 8270C | µg/kg | 36000 | 110000 | 88000 | < 22 |
| anthracene | SW846 8270C | µg/kg | 99000 | 120000 | 80000 | < 13 |
| benzo(a)anthracene | SW846 8270C | µg/kg | 56000 | 82000 | 47000 | < 7.3 |
| benzo(a)pyrene | SW846 8270C | µg/kg | 32000 | 53000 | 34000 | < 7.3 |
| benzo(b)fluoranthene | SW846 8270C | µg/kg | 17000 | 36000 | 19000 | < 7.9 |
| benzo(g,h,i)perylene | SW846 8270C | µg/kg | 12000 | < 13000 | < 33000 | < 15 |
| benzo(k)fluoranthene | SW846 8270C | µg/kg | 21000 | 47000 | 25000 | < 11 |
| chrysene | SW846 8270C | µg/kg | 62000 | 81000 | 45000 | < 8.4 |
| dibenzo(a,h)anthracene | SW846 8270C | µg/kg | 4500 | < 7800 | < 20000 | < 9 |
| fluoranthene | SW846 8270C | µg/kg | 90000 | 140000 | 91000 | < 9.7 |
| fluorene | SW846 8270C | µg/kg | 84000 | 110000 | 86000 | < 7.3 |
| indeno(1,2,3-cd)pyrene | SW846 8270C | µg/kg | 12000 | 13000 | < 30000 | < 13 |
| 1-methylnaphthalene | SW846 8270C | µg/kg | 280000 | 400000 | 430000 | 19 |
| 2-methylnaphthalene | SW846 8270C | µg/kg | 280000 | 310000 | 630000 | 17 |
| naphthalene | SW846 8270C | µg/kg | 110000 | 450000 | 1400000 | < 9.1 |
| phenanthrene | SW846 8270C | µg/kg | 240000 | 390000 | 270000 | < 9.7 |
| pyrene | SW846 8270C | µg/kg | 130000 | 190000 | 100000 | < 16 |
| **Total PAHs** | | **µg/kg** | **1795500** | **2672800** | **3458000** | **219.7** |

**PRELIMINARY ASSESSMENT**

A total of 20 preliminary mixes were prepared. These mixes represent four doses of five primary treatment designs or regimens. So, for example, mixes G6733-1 through

G6733-4 all used Portland cement as the reagent. The only difference between each mix is the quantity of cement.

**TABLE 11. Preliminary Mix Designs**

| Mix No. | Component | Quantity[a] | Mix No. | Component | Quantity |
|---|---|---|---|---|---|
| G6733-1 | soil | 100.0 | G6733-3 | soil | 100.0 |
| | cement | 8.0 | | cement | 16.0 |
| | water | 8.0 | | water | 16.0 |
| G6733-2 | soil | 100.0 | G6733-4 | soil | 100.0 |
| | cement | 12.0 | | cement | 20.0 |
| | water | 12.0 | | water | 20.0 |
| G6733-5 | soil | 100.0 | G6733-7 | soil | 100.0 |
| | cement | 2.0 | | cement | 4.0 |
| | GGBFS | 6.0 | | GGBFS | 12.0 |
| | water | 8.0 | | water | 16.0 |
| G6733-6 | soil | 100.0 | G6733-8 | soil | 100.0 |
| | cement | 3.0 | | cement | 5.0 |
| | GGBFS | 9.0 | | GGBFS | 15.0 |
| | water | 12.0 | | water | 20.0 |
| G6733-9 | soil | 100.0 | G6733-11 | soil | 100.0 |
| | cement | 6.0 | | cement | 12.0 |
| | flyash "C" | 2.0 | | flyash "C" | 4.0 |
| | water | 8.0 | | water | 16.0 |
| G6733-10 | soil | 100.0 | G6733-12 | soil | 100.0 |
| | cement | 9.0 | | cement | 15.0 |
| | flyash "C" | 3.0 | | flyash "C" | 5.0 |
| | water | 12.0 | | water | 20.0 |
| G6733-13 | soil | 100.0 | G6733-15 | soil | 100.0 |
| | cement | 6.0 | | cement | 12.0 |
| | flyash "F" | 2.0 | | flyash "F" | 4.0 |
| | water | 8.0 | | water | 16.0 |
| G6733-14 | soil | 100.0 | G6733-16 | soil | 100.0 |
| | cement | 9.0 | | cement | 15.0 |
| | flyash "F" | 3.0 | | flyash "F" | 5.0 |
| | water | 12.0 | | water | 20.0 |
| G6733-17 | soil | 100.0 | G6733-19 | soil | 100.0 |
| | cement | 8.0 | | cement | 16.0 |
| | silica fume | 0.80 | | silica fume | 1.60 |
| | water | 8.0 | | water | 16.0 |

**TABLE 11. Preliminary Mix Designs**

| Mix No. | Component | Quantity[a] | Mix No. | Component | Quantity |
|---|---|---|---|---|---|
| G6733-18 | soil | 100.0 | G6733-20 | soil | 100.0 |
| | cement | 12.0 | | cement | 20.0 |
| | silica fume | 1.2 | | silica fume | 2.0 |
| | water | 12.0 | | water | 20.0 |

a. Quantity is equal to the dry mass of each component, unless the component is a liquid.

Mixes were prepared by blending a known weight of soil with a prescribed weight of reagent. All ratios were calculated using the soil s dry weight. All mixes were prepared as follows:

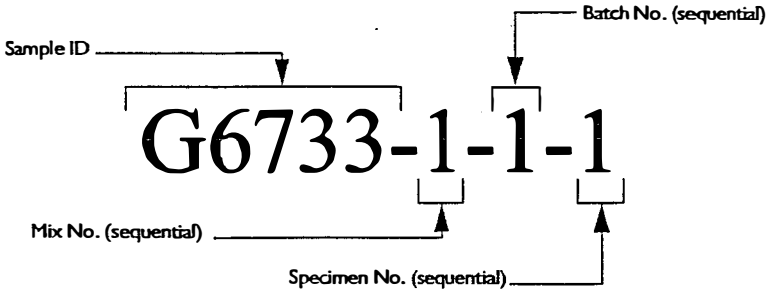
## Mix Preparation

1. Weigh quantity of soil.
2. Compute the soil s dry weight.

   Assume that the soil s wet weight is 751 grams and its moisture content is 50.2% (weight of moisture weight of solids x 100). The soil s dry weight is computed as follows: 751 grams (1 + 0.502) = 500 grams.
3. Compute prescribed quantity of reagent(s).

   Assume a mix design consists of 8% cement. The weight of reagent is computed as follows: 500 grams (soil s dry weight) x 8% = 40 grams.
4. Weigh prescribed quantity of reagent(s).
5. Place the reagents and prescribed quantity of water into an appropriate container and mix until thoroughly blended. Mix using a commercial mixer or by hand using a stainless steel spoon or other non-reactive implement.
6. Add the grout to the soil and mix until the grout is thoroughly intermixed with the soil.
7. Place the grouted soil into appropriate molds. Tamp the molds with a blunt object to remove any air and to allow the grouted soil to naturally compact.
8. Seal the ends of the specimens to prevent desiccation. Cure them in a cooler at room temperature and 100% relative humidity for the prescribed duration, then remove them from their molds and test.

**NOMENCLATURE FOR IDENTIFYING MIX SPECIMENS**



After curing for 14 days, the second mix for each regimen was removed from its mold and tested. Because of the unusual early strength of the mix prepared using cement and ground granulated blast furnace slag (GGBFS) G6733-6-1-1 the remaining three mixes for this regimen were also tested to determine whether the data was an anomaly. As can be seen from the data, all the mixes prepared using cement and GGBFS gained more early strength than expected, and more than the other regimens.

Because most of the regimens gained less strength (after 14 days) than the performance requirement, the untested specimens continued to cure for 28 days before they were finally tested. Data from these tests is tabulated on Table 11, Preliminary Mix Designs.

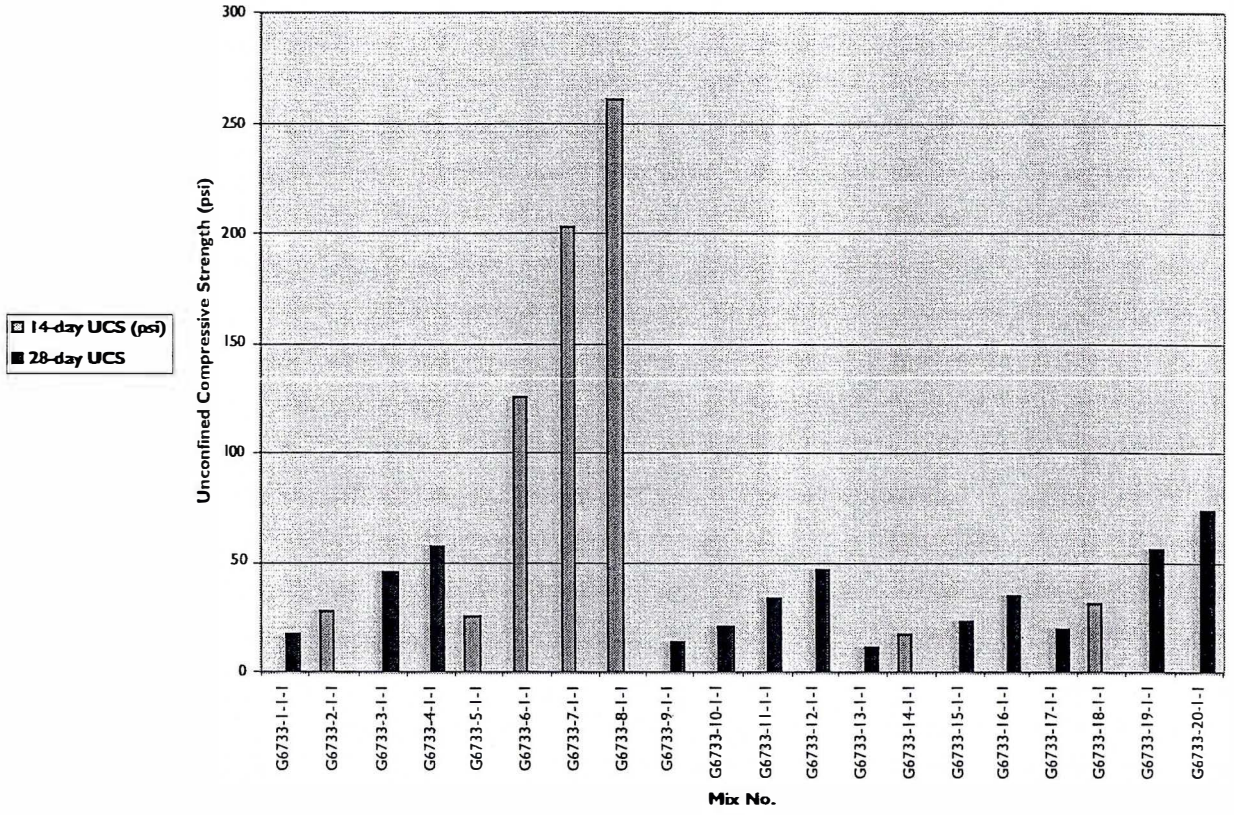
**TABLE 12. Preliminary Assessment Data[a]**

| Mix No.[b] | UCS (psi) | Moisture (%) |
|---|---|---|
| G6733-1-1-1 | 17.5 | 43.9 |
| **G6733-2-1-1** | **27.4** | **45.7** |
| G6733-3-1-1 | 46.0 | 48.0 |
| G6733-4-1-1 | 57.2 | 48.4 |
| **G6733-5-1-1** | **25.2** | **48.3** |
| **G6733-6-1-1** | **126** | **48.3** |
| **G6733-7-1-1** | **203.1** | **49.9** |
| **G6733-8-1-1** | **261.6** | **51.6** |
| G6733-9-1-1 | 14.0 | 47.3 |
| G6733-10-1-1 | 21.4 | 50.4 |
| G6733-11-1-1 | 34.4 | 50.4 |
| G6733-12-1-1 | 47.0 | 51.0 |
| G6733-13-1-1 | 11.9 | 48.2 |
| **G6733-14-1-1** | **17.9** | **49.8** |
| G6733-15-1-1 | 23.8 | 49.6 |
| G6733-16-1-1 | 35.2 | 49.8 |
| G6733-17-1-1 | 19.4 | 46.7 |
| **G6733-18-1-1** | **31.3** | **48.0** |
| G6733-19-1-1 | 56.3 | 45.4 |
| G6733-20-1-1 | 74.1 | 45.9 |

a. Mixes in **bold** were tested after curing 14 days. All other mixes were tested after curing 28 days.
b. See Figure 11, "Preliminary Mix Designs," on page 11 for a list of each mix's components and ratios.

A graph depicting strength versus dose illustrates the superior strength-gain of the mixes prepared using cement and GGBFS to any other regimen. These mixes gained more strength in 14 days than any of the other mix designs in 28 days,

**FIGURE 7. Strength Comparison of Preliminary Mix Designs**




**SECONDARY ASSESSMENT**

Six mix designs were selected for further study. These designs represent three of the five primary treatment regimens evaluated during the Preliminary Assessment phase of this study. These designs were selected because they are the ones that produced slightly less strength and slightly more strength than the performance criterion (50 psi).

**TABLE 13. Secondary Mix Designs**

| Mix No. | Component | Quantity[a] |
|---|---|---|
| G6733-3-2 | soil | 100.0 |
| | cement | 16.0 |
| | water | 16.0 |
| G6733-4-2 | soil | 100.0 |
| | cement | 20.0 |
| | water | 20.0 |

**TABLE 13. Secondary Mix Designs**

| Mix No. | Component | Quantity[a] |
|---|---|---|
| G6733-5-2 | soil | 100.0 |
| | cement | 2.0 |
| | GGBFS | 6.0 |
| | water | 8.0 |
| G6733-6-2 | soil | 100.0 |
| | cement | 3.0 |
| | GGBFS | 9.0 |
| | water | 12.0 |
| G6733-12-1 | soil | 100.0 |
| | cement | 15.0 |
| | flyash "C" | 5.0 |
| | water | 20.0 |
| G6733-19-2 | soil | 100.0 |
| | cement | 16.0 |
| | silica fume | 1.6 |
| | water | 16.0 |
| G6733-20-2 | soil | 100.0 |
| | cement | 20.0 |
| | silica fume | 2.0 |
| | water | 20.0 |

a. Quantity is equal to the dry mass of each component, unless the component is a liquid.

Specimens were prepared for testing each design s strength, permeability, and leachability. All mixes were prepared using the methodology described in Mix Preparation on page 12. Mixes were cured for 28 days in a cooler at room temperature and 100% relative humidity.

After curing for the prescribed duration, specimens were extruded from their molds and tested. Data from these tests is tabulated on Table 14, Secondary Assessment Data.

**TABLE 14. Secondary Assessment Data[a]**

| Mix No.[b] | UCS[c] (psi) | UCS (psi) | Moisture (%) | Hydraulic Conductivity (cm/sec) | Data Assessment |
|---|---|---|---|---|---|
| G6733-3-1-1 | 46.0 | - | 48.0 | - | Strength less than criterion (50 psi). Permeability acceptable. Mix will not be evaluated any further. |
| G6733-3-2-1 | - | 42.5 | 47.8 | - | |
| G6733-3-2-3 | - | - | - | $1.1 \times 10^{-6}$ | |
| G6733-4-1-1 | 57.2 | - | 48.4 | - | Both strength and permeability acceptable. Mix will be evaluated further. |
| G6733-4-2-1 | - | 61.4 | 47.4 | - | |
| G6733-4-2-3 | - | - | - | $1.0 \times 10^{-6}$ | |

**TABLE 14. Secondary Assessment Data[a]**

| Mix No.[b] | UCS[c] (psi) | UCS (psi) | Moisture (%) | Hydraulic Conductivity (cm/sec) | Data Assessment |
|---|---|---|---|---|---|
| **G6733-5-1-1** | **25.2** | **-** | **48.3** | **-** | Strength less than criterion. Permeability acceptable. Because the mix utilizes the same reagents as mix 6 (the best mix), this mix will continue to be evaluated for areas of the site where less strength is desired. |
| G6733-5-1-2 | - | 59.2 | 43.5 | - | |
| G6733-5-2-1 | - | 42.4 | 45.6 | - | |
| G6733-5-2-3 | - | - | - | $5.6 \times 10^{-7}$ | |
| **G6733-6-1-1** | **126.0** | **-** | **48.3** | **-** | Best strength and permeability of all mixes. Mix will continue to be evaluated. |
| G6733-6-2-1 | - | 190.1 | 45.6 | - | |
| G6733-6-2-3 | - | - | - | $2.0 \times 10^{-9}$ | |
| G6733-12-1-1 | - | 47.0 | 51.0 | - | Strength less than criterion. Permeability acceptable. This mix will continue to be evaluated for areas of the site where less strength is desired. |
| G6733-12-1-3 | - | - | - | $1.1 \times 10^{-6}$ | |
| G6733-19-1-1 | 56.3 | - | 45.4 | - | Acceptable strength and permeability. Mix will continue to be evaluated. |
| G6733-19-2-1 | - | 62.8 | 45.5 | - | |
| G6733-19-2-3 | - | - | - | $8.8 \times 10^{-7}$ | |
| G6733-20-1-1 | 74.1 | - | 45.9 | | Acceptable strength and permeability, but greater dose than mix 19. Mix will not be evaluated any further. |
| G6733-20-2-1 | - | 84.9 | 46.0 | - | |
| G6733-20-2-3 | - | - | - | $5.9 \times 10^{-7}$ | |

a. Mixes in **bold** were tested after curing 14 days, mixes in red were tested after curing 102 days, all other mixes were tested after curing 28 days.
b. See Figure 13, "Secondary Mix Designs," on page 14 for a list of each mix's components and ratios.
c. Preliminary Assessment data

Secondary Assessment data correlates closely with the Preliminary Assessment data proving the repeatability of results. Based on an analysis of the data, mixes 4, 5, 6, 12, and 19 will be leached according to ANS 16.1 (modified) and the leachates concentration of pertinent constituents determined.

The ANS 16.1 (modified) leaching procedure entails immersing a specimen of stabilized material in deionized water for a prescribed duration, then removing the specimen and determining the concentration of constituents of concern. The specimen is then re-immersed in a fresh sample of deionized water for a prescribed duration. This process is repeated three cycles. For this project, the durations that the specimen is immersed are 14 days, 14 days, and 62 days (90 days total).

Geotechnical data and chemical data for the mix designs are tabulated in Figure 15, Secondary Assessment Data Summary, on page 17. Leaching is still ongoing. However, based on preliminary data, mix 6 performs demonstrably better than any of the other mix designs, with the exception of leachable naphthalene where mix 12 performs slightly better.

## TABLE 15. Secondary Assessment Data Summary[a]

| Mix No.[b] | UCS (psi) | Hydraulic Conductivity (cm/sec) | ANS 16.1 Leachability Index[c] | | | | | | | | | | pH (su) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Benzene[d] (µg/L) | Ethylbenzene (µg/L) | Toluene (µg/L) | Xylenes (µg/L) | BETX[c] (µg/L) | PAHs (µg/L) | Naphthalene[c] (µg/L) | Arsenic[e] (µg/L) | Lead[c] (µg/L) | Cyanide[f] (µg/L) | |
| Design Criteria | > 50 | $< 1 \times 10^{-6}$ cm/sec<br>$< 1 \times 10^{-7}$ cm/sec along the Fox River Canal | < 50 | ND | ND | ND | < 750 | TBD | < 70 | < 50 | < 50 | < 200 | TBD |
| G6733-4 | 57.2 | $1.0 \times 10^{-6}$ | 22 | 13 | 35 | 24 | 94 | 237.7 | 200 | 6.9 | 17 | 53 | 11 |
| | 61.4 | | 15 | 6.3 | 22 | 12.4 | 55.7 | 66 | 58 | < 5.8 | 21 | 36 | 10 |
| G6733-5 | **25.2** | $5.6 \times 10^{-7}$ | 39 | 16 | 46 | 30 | 131 | 243.7 | 200 | 8.8 | 6.1 | 280 | 10 |
| | 42.4 | | 18 | 6.8 | 20 | 13.1 | 57.9 | 107.8 | 66 | < 5.8 | 26 | 100 | 9.6 |
| | 59.2 | | | | | | | | | | | | |
| G6733-6 | **126.0** | $2.0 \times 10^{-9}$ | 9.4 | 5.4 | 13 | 11 | 38.8 | 196 | 160 | <5.8 | < 1.2 | 85 | 10 |
| | 190.1 | | 8.5 | 3.1 | 8.7 | 6 | 26.3 | 45.4 | 36 | < 5.8 | 5.1 | 48 | 10 |
| G6733-12 | 47.0 | $1.1 \times 10^{-6}$ | 19 | 14 | 33 | 27 | 93 | 155.5 | 130 | 9.6 | 2.5 | 150 | 11 |
| | | | 9 | 7.4 | 19 | 14 | 49.4 | 92.8 | 67 | < 5.8 | 22 | 82 | 10 |
| G6733-19 | 56.3 | $8.8 \times 10^{-7}$ | 21 | 14 | 36 | 28 | 99 | 194.4 | 160 | 7.2 | 5.7 | 110 | 11 |
| | 62.8 | | 15 | 7.5 | 22 | 14 | 58.5 | 78.2 | 67 | < 5.8 | 17 | 88 | 10 |

a. Data in **bold** was determined after mixes cured for 14 days, data in red was determined after mixes cured for 102 days, all other data was determined after mixes cured for 28 days. Shaded data exceeds the preliminary design criteria.

b. See Figure 13, "Secondary Mix Designs," on page 14 for a list of each mix's components and ratios.

c. After 90 days of leaching.

d. Design criteria based on treatment limits for discharges of petroleum remediation wastewaters to surface water as provided in the WPDES General Permit for Discharge from Remedial Action Operations (WI-0046566-4).

e. Design criteria based on the human cancer criterion for contact with or ingestion of surface water of the state and ingestion of aquatic organisms taken from surface waters of the state as provided in NR 105.09 Table 9, Non-public Water Supply.

f. Design criteria based on the human threshold criterion for ingestion of surface water of the state and ingestion of aquatic organisms taken from surface waters of the state as provided in NR 105.08 Table 9, Non-public Water Supply.

**FINAL ASSESSMENT**

Mix 6 is the mix to be used for the final assessment. There are areas of the site, however, where less strength is desirable. Therefore, the final assessment will also include mix 5 which uses a lesser dose of the same components as mix 6.

## *Assessment of Full-Scale Implementation*

## *Cost Estimate for Implementation*

# ANS 16.1 (modified) Leaching Procedure

| | | "4-2-2" | | | "5-2-2" | | | "6-2-2" | | | "12-2-2" | | | "19-2-2" | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **units** | **14-day** | **28-day** | **90-day** | **14-day** | **28-day** | **90-day** | **14-day** | **28-day** | **90-day** | **14-day** | **28-day** | **90-day** | **14-day** | **28-day** | **90-day** |
| **Inorganics** | | | | | | | | | | | | | | | | |
| arsenic | µg/L | 6.9 | < 5.8 | | 8.8 | < 5.8 | | < 5.8 | < 5.8 | | 9.6 | < 5.8 | | 7.2 | < 5.8 | |
| lead | µg/L | 17 | 21 | | 6.1 | 26 | | < 1.2 | 5.1 | | 2.5 | 22 | | 5.7 | 17 | |
| cyanide | µg/L | 53 | 36 | | 280 | 100 | | 85 | 48 | | 150 | 82 | | 110 | 88 | |
| pH | su | 11 | 10 | | 10 | 9.6 | | 10 | 10 | | 11 | 10 | | 11 | 10 | |
| **BTEX** | | | | | | | | | | | | | | | | |
| benzene | µg/L | 22 | 15 | | 39 | 18 | | 9.4 | 8.5 | | 19 | 9 | | 21 | 15 | |
| ethylbenzene | µg/L | 13 | 6.3 | | 16 | 6.8 | | 5.4 | 3.1 | | 14 | 7.4 | | 14 | 7.5 | |
| toluene | µg/L | 35 | 22 | | 46 | 20 | | 13 | 8.7 | | 33 | 19 | | 36 | 22 | |
| xylene, -o | µg/L | 13 | 7 | | 16 | 7.2 | | 5.9 | 3.5 | | 15 | 7.7 | | 15 | 7.9 | |
| xylenes, -m, -p | µg/L | 11 | 5.4 | | 14 | 5.9 | | 5.1 | 2.5 | | 12 | 6.3 | | 13 | 6.1 | |
| **total BTEX** | **µg/L** | **94** | **55.7** | | **131** | **57.9** | | **38.8** | **26.3** | | **93** | **49.4** | | **99** | **58.5** | |
| **PAHs** | | | | | | | | | | | | | | | | |
| 1-methylnaphthalene | µg/L | 19 | 8 | | 22 | 7.6 | | 18 | 4.7 | | 12 | 6.8 | | 17 | 7.3 | |
| 2-methylnaphthalene | µg/L | 8.4 | < 3.4 | | 10 | 3.7 | | 8.2 | 2.1 | | 5.2 | 3.3 | | 7.7 | < 3.4 | |
| acenaththene | µg/L | 3 | < 3.6 | | 3.5 | 1.3 | | 2.9 | < 1.8 | | < 3.6 | 1.2 | | 2.8 | < 3.6 | |
| acenaphthylene | µg/L | 7.3 | < 3.8 | | 8.2 | 8 | | 6.9 | 2.6 | | 5.5 | 4.6 | | 6.9 | 3.9 | |
| anthracene | µg/L | < 2 | < 4 | | < 2 | 2.5 | | < 2 | < 2 | | < 4 | 1.3 | | < 2 | < 4 | |
| benzo(a)anthracene | µg/L | < 1.2 | < 2.4 | | < 1.2 | 4 | | < 1.2 | < 1.2 | | 0.26 | 1 | | < 1.2 | < 2.4 | |
| benzo(a)pyrene | µg/L | < 1.4 | < 2.8 | | < 1.4 | 4 | | < 1.4 | < 1.4 | | 0.35 | 1.4 | | < 1.4 | < 2.8 | |
| benzo(b)fluoranthene | µg/L | < 1.3 | < 2.6 | | < 1.3 | 2.5 | | < 1.3 | < 1.3 | | 0.22 | 0.81 | | < 1.3 | < 2.6 | |
| benzo(g,h,i)perylene | µg/L | < 1.6 | < 3.2 | | < 1.6 | 1.9 | | < 1.6 | < 1.6 | | 0.17 | 0.75 | | < 1.6 | < 3.2 | |
| benzo(k)fluoranthene | µg/L | < 1.9 | < 3.8 | | < 1.9 | 2.4 | | < 1.9 | < 1.9 | | 0.2 | 0.81 | | < 1.9 | < 3.8 | |
| chrysene | µg/L | < 1.4 | < 2.8 | | < 1.4 | 3.5 | | < 1.4 | < 1.4 | | 0.19 | 0.86 | | < 1.4 | < 2.8 | |
| dibenzo(a,h)anthracene | µg/L | < 1.6 | < 3.2 | | < 1.6 | 0.83 | | < 1.6 | < 1.6 | | 0.084 | < 0.32 | | < 1.6 | < 3.2 | |
| fluoranthene | µg/L | < 1.3 | < 2.6 | | < 1.3 | 2.5 | | < 1.3 | < 1.3 | | 0.26 | 0.44 | | < 1.3 | < 2.6 | |
| fluorene | µg/L | < 1.7 | < 3.4 | | < 1.7 | 0.75 | | < 1.7 | < 1.7 | | 0.26 | 0.43 | | < 1.7 | < 3.4 | |
| indeno(1,2,3-cd)pyrene | µg/L | < 2.1 | < 4.2 | | < 2.1 | 1.8 | | < 2.1 | < 2.1 | | 0.17 | 0.7 | | < 2.1 | < 4.2 | |
| naphthalene | µg/L | 200 | 58 | | 200 | 66 | | 160 | 36 | | 130 | 67 | | 160 | 67 | |
| phenanthrene | µg/L | < 1.6 | < 3.2 | | < 1.6 | 2.8 | | < 1.6 | < 1.6 | | 0.46 | 0.87 | | < 1.6 | < 3.2 | |
| pyrene | µg/L | < 1.7 | < 3.4 | | < 1.7 | 3 | | < 1.7 | < 1.7 | | 0.17 | 0.49 | | < 1.7 | < 3.4 | |
| **total PAHs** | **µg/L** | **238** | **66** | | **244** | **108** | | **196** | **45.4** | | **###** | **92.8** | | **194** | **78.2** | |

EN CHEM INC.

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www.enchem.com

# - Analytical Report -

## Batch Number : 833815

Project Name : FORMER MGP SITE, APPLETON

Project Number :

Client: WILLIAMS ENVIRONMENTAL SERVI

WI DNR LAB ID : 405132750

| Sample No. | Field ID | Collection Date | Sample No. | Field ID | Collection Date |
|---|---|---|---|---|---|
| 833815-001 | G6733 / 5-2-2 / 28 (2) | 04/29/03 | | | |
| 833815-002 | G6733 / 4-2-2 / 28 (2) | 04/29/03 | | | |
| 833815-003 | G6733 / 19-2-2 / 28 (2) | 04/29/03 | | | |
| 833815-004 | G6733 / 6-2-2 / 28 (2) | 04/29/03 | | | |

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The "Q" flag is present when a parameter has been detected below the LOQ. This indicates the results are qualified due to the uncertainty of the parameter concentration between the LOD and the LOQ.

Soil VOC detects are corrected for the total solids, unless otherwise noted.

I certify that the data contained in this Final Report has been generated and reviewed in accordance with approved methods and Laboratory Standard Operating Procedure. Exceptions, if any, are discussed in the accompanying sample comments. Release of this final report is authorized by Laboratory management, as is verified by the following signature. Reported results shall not be reproduced, except in full, without the written approval of the lab. The sample results relate only to the analytes of interest tested.

Approval Signature

5/9/03
Date

# En Chem, Inc. Cooler Receipt Log

Batch No. 833815

Project Name or ID G03-0002 No. of Coolers: 1 Temps: Room Temp

**A. Receipt Phase: Date cooler was opened:** 4-30-03 **By:** GP

| | | | |
|---|---|---|---|
| 1: Were samples received on ice? (Must be ≤ 6 C ) | YES | (NO[2]) | |
| 2. Was there a Temperature Blank? | YES | (NO) | |
| 3: Were custody seals present and intact? (Record on COC) | YES | (NO) | |
| 4: Are COC documents present? | (YES) | NO[2] | |
| 5: Does this Project require quick turn around analysis? | (YES) | NO | |
| 6: Is there any sub-work? | YES | (NO) | |
| 7: Are there any short hold time tests? | (YES) | NO | |
| 8: Are any samples nearing expiration of hold-time? (Within 2 days) | YES[1] | (NO) | Contacted by/Who |
| 9: Do any samples need to be Filtered or Preserved in the lab? | (YES[1]) | NO | Contacted by/Who Sample Rec |

**B. Check-in Phase: Date samples were Checked-In:** 4/30/03 **By:** GP

| | | | |
|---|---|---|---|
| 1: Were all sample containers listed on the COC received and intact? | (YES) | NO[2] | NA |
| 2: Sign the COC as received by En Chem. Completed | (YES) | NO | |
| 3: Do sample labels match the COC? | (YES) | NO[2] | |
| 4: Completed pH check on preserved samples.. *(This statement does not apply to water: VOC, O&G, TOC, DRO, Total Rec. Phenolics)* | YES | NO | (NA) |
| 5: Do samples have correct chemical preservation? *(This statement does not apply to water: VOC, O&G, TOC, DRO, Total Rec. Phenolics)* | YES | (NO[2]) | NA |
| 6: Are dissolved parameters field filtered? | YES | NO[2] | (NA) |
| 7: Are sample volumes adequate for tests requested? | YES | NO[2] | |
| 8: Are VOC samples free of bubbles >6mm | YES | NO[2] | NA |
| 9: Enter samples into logbook. Completed | (YES) | NO | |
| 10: Place laboratory sample number on all containers and COC. Completed | (YES) | NO | |
| 11: Complete Laboratory Tracking Sheet (LTS). Completed | YES | NO | (NA) |
| 12: Start Nonconformance form. | (YES) | NO | NA |
| 13: Initiate Subcontracting procedure. Completed | YES | NO | (NA) |
| 14: Check laboratory sample number on all containers and COC. JR | (YES) | NO | NA |

**Short Hold-time tests:**

| | |
|---|---|
| 48 Hours or less | 7 days |
| Coliform (6 hrs) | Flashpoint |
| Hexavalent Chromium (24 Hrs) | TSS |
| BOD | Total Solids |
| Nitrite or Nitrate | TDS |
| Low Level Mercury | Sulfide |
| Ortho Phosphorus | Free Liquids |
| Turbidity | Total Volatile Solids |
| Surfactants | (Aqueous Extractable Organics- ALL) |
| Sulfite | Unpreserved VOC's |
| En Core Preservation | Ash |
| Color | |

Footnotes
1 Notify proper lab group immediately.
2 Complete nonconformance memo.

Rev. 4/11/03, Attachment to 1-RE -5.
Subject to QA Audit.

Reviewed by/date 5/1/03

p:/everyone/forms/samplereceiving/crl.doc

# En Chem Inc.

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| Lab#: | TestGroupID: | Comment: |
|---|---|---|
| 833815 | All Samples | Sample was received in two poly bottles. Per client request, the sample was split into proper containers and preserved. The PAH was analyzed from a plastic container. The volume for BTEX analysis was transferred to HCL preserved 40 ml vials. Samples were received at room temperature. Analyzed per client request. |
| 833815- | M-PB-W | X The samples were reported as totals but, per client request, were not digested. |
| | M-AS-W | X The samples were reported as totals but, per client request, were not digested. |

# En Chem Inc.

## Analysis Summary by Laboratory

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| Test Group Name | 833815-001 | 833815-002 | 833815-003 | 833815-004 |
|---|---|---|---|---|
| ARSENIC | G | G | G | G |
| BTEX | G | G | G | G |
| CYANIDE, TOTAL | K | K | K | K |
| LEAD | G | G | G | G |
| PAH/ PNA | G | G | G | G |
| PH, LABORATORY | G | G | G | G |

| WISCONSIN Certification | |
|---|---|
| G = En Chem Green Bay | 405132750 |
| K = En Chem Kimberly | 445134030 |
| S = Subcontracted Analysis | |

*En Chem, Inc.*

## Inorganic Data Qualifiers

| | |
|---|---|
| A | Analyte is detected in the method blank. Method blank criteria is evaluated to the laboratory method detection limit. Additionally, method blank acceptance may be based on project specific criteria or determined from analyte concentrations in the sample and are evaluated on a sample by sample basis. |
| B | The analyte has been detected between the method detection limit and the reporting limit. |
| C | Elevated detection limit due to matrix effects. |
| E | Estimated concentration due to matrix interferences. During the metals analysis using the inductively coupled plasma (ICP), the serial dilution failed to meet the established control limits of 0-10% and the sample concentration is greater than 50 times the IDL (100 times the IDL for analysis done on the ICP-MS). The result was flagged with the E qualifier to indicate that a physical interference was observed. |
| F | Due to potential interferences for this analysis by Inductively Coupled Plasma techniques (SW-846 Method 6010), this analyte has been confirmed by and reported from an alternate method. |
| H | Preservation or analysis performed past holding time. |
| K | Sample received unpreserved. Sample was either preserved at the time of receipt or at the time of sample preparation. |
| L | Elevated detection limit due to low sample volume. |
| N | Spiked sample recovery not within control limits. |
| Q | The analyte has been detected between the limit of detection (LOD) and limit of quantitation (LOQ). The results are qualified due to the uncertainty of analyte concentrations within this range. |
| U | The analyte was not detected above the reporting limit. |
| X | See sample narrative. |
| & | Laboratory Control Spike recovery not within control limits. |
| * | Duplicate analyses not within control limits. |
| 1 | Dissolved analyte or filtered analyte greater than total analyte; analyses passed QC based on precision criteria. |
| 2 | Dissolved analyte or filtered analyte greater than total analyte; analyses failed QC based on precision criteria. |
| 3 | BOD result is estimated due to the BOD blank exceeding the allowable oxygen depletion. |
| 4 | BOD duplicate precision not within control limits. Due to the 48 hour holding time for this test, it is not practical to reanalyze and try to correct the deficiency. |
| 5 | BOD result is estimated due to insufficient oxygen depletion. Due to the 48 hour holding time for this test, it is not practical to reanalyze and try to correct the deficiency. |
| 6 | BOD laboratory control sample not within control limits. Due to the 48 hour holding time for this test, it is not practical to reanalyze and try to correct the deficiency. |
| 7 | BOD result is estimated due to complete oxygen depletion. Due to the 48 hour holding time for this test, it is not practical to reanalyze and try to correct the deficiency. |

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## Analytical Report Number: 833815

**Client :** WILLIAMS ENVIRONMENTAL SERVICES
**Project Name** : FORMER MGP SITE, APPLETON
**Project Number**
**Field ID :** G6733 / 5-2-2 / 28 (2)

**Matrix Type** : WATER
**Collection Date :** 04/29/03
**Report Date :** 05/07/03
**Lab Sample Number** 833815-001

**INORGANICS**

| Test | Result | LOD | LOQ | EQL | Units | Code | Analysis Date | Prep Method | Analysis Method | Analyst |
|---|---|---|---|---|---|---|---|---|---|---|
| Arsenic | 8.8 | 5.8 | 18 | | ug/L | QX | 05/01/03 | SW846 6010B | SW846 6010B | DLB |
| Lead | 6.1 | 1.2 | 3.8 | | ug/L | X | 05/01/03 | SW846 6010B | SW846 6010B | DLB |
| Cyanide, Total | 0.28 | 0.001 | 0.0048 | | mg/L | | 05/05/03 | EPA 335.4 | EPA 335.4 | DAW |
| pH, Laboratory | 10.0 | | | | su | H | 04/30/03 | EPA 150.1 | EPA 150.1 | crw |

**BTEX** **Prep Method** SW846 5030B **Prep Date:** 05/02/03 **Analyst:** JSF

| Analyte | Result | LOD | LOQ | EQL | Units | Code | Analysis Date | Analysis Method |
|---|---|---|---|---|---|---|---|---|
| Benzene | 39 | 0.41 | 1.3 | | ug/L | | 05/02/03 | SW846 8260B |
| Ethylbenzene | 16 | 0.54 | 1.7 | | ug/L | | 05/02/03 | SW846 8260B |
| Toluene | 46 | 0.67 | 2.1 | | ug/L | | 05/02/03 | SW846 8260B |
| Xylene, o | 16 | 0.83 | 2.6 | | ug/L | | 05/02/03 | SW846 8260B |
| Xylenes, m + p | 14 | 1.8 | 5.7 | | ug/L | | 05/02/03 | SW846 8260B |
| 4-Bromofluorobenzene | 91 | | | | %Recov | | 05/02/03 | SW846 8260B |
| Toluene-d8 | 104 | | | | %Recov | | 05/02/03 | SW846 8260B |
| Dibromofluoromethane | 106 | | | | %Recov | | 05/02/03 | SW846 8260B |

**PAH/ PNA** **Prep Method** SW846 3510 **Prep Date:** 05/02/03 **Analyst:** RJN

| Analyte | Result | LOD | LOQ | EQL | Units | Code | Analysis Date | Analysis Method |
|---|---|---|---|---|---|---|---|---|
| 1-Methylnaphthalene | 22 | 1.8 | 5.7 | | ug/L | | 05/02/03 | SW846 8270C |
| 2-Methylnaphthalene | 10 | 1.7 | 5.4 | | ug/L | | 05/02/03 | SW846 8270C |
| Acenaphthene | 3.5 | 1.8 | 5.7 | | ug/L | Q | 05/02/03 | SW846 8270C |
| Acenaphthylene | 8.2 | 1.9 | 6.1 | | ug/L | | 05/02/03 | SW846 8270C |
| Anthracene | < 2.0 | 2.0 | 6.4 | | ug/L | | 05/02/03 | SW846 8270C |
| Benzo(a)anthracene | < 1.2 | 1.2 | 3.8 | | ug/L | | 05/02/03 | SW846 8270C |
| Benzo(a)pyrene | < 1.4 | 1.4 | 4.5 | | ug/L | | 05/02/03 | SW846 8270C |
| Benzo(b)fluoranthene | < 1.3 | 1.3 | 4.1 | | ug/L | | 05/02/03 | SW846 8270C |
| Benzo(ghi)perylene | < 1.6 | 1.6 | 5.1 | | ug/L | | 05/02/03 | SW846 8270C |
| Benzo(k)fluoranthene | < 1.9 | 1.9 | 6.1 | | ug/L | | 05/02/03 | SW846 8270C |
| Chrysene | < 1.4 | 1.4 | 4.5 | | ug/L | | 05/02/03 | SW846 8270C |
| Dibenzo(a,h)anthracene | < 1.6 | 1.6 | 5.1 | | ug/L | | 05/02/03 | SW846 8270C |
| Fluoranthene | < 1.3 | 1.3 | 4.1 | | ug/L | | 05/02/03 | SW846 8270C |
| Fluorene | < 1.7 | 1.7 | 5.4 | | ug/L | | 05/02/03 | SW846 8270C |
| Indeno(1,2,3-cd)pyrene | < 2.1 | 2.1 | 6.7 | | ug/L | | 05/02/03 | SW846 8270C |
| Naphthalene | 200 | 24 | 76 | | ug/L | D | 05/05/03 | SW846 8270C |
| Phenanthrene | < 1.6 | 1.6 | 5.1 | | ug/L | | 05/02/03 | SW846 8270C |
| Pyrene | < 1.7 | 1.7 | 5.4 | | ug/L | | 05/02/03 | SW846 8270C |
| Nitrobenzene-d5 | 87 | | | | %Recov | | 05/02/03 | SW846 8270C |
| 2-Fluorobiphenyl | 124 | | | | %Recov | | 05/02/03 | SW846 8270C |

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## Analytical Report Number: 833815

**Client :** WILLIAMS ENVIRONMENTAL SERVICES
**Matrix Type** : WATER
**Project Name** : FORMER MGP SITE, APPLETON
**Collection Date :** 04/29/03
**Project Number**
**Report Date :** 05/07/03
**Field ID :** G6733 / 5-2-2 / 28 (2)
**Lab Sample Number** 833815-001

**PAH/ PNA** **Prep Method** SW846 3510 **Prep Date:** 05/02/03 **Analyst:** RJN

| Analyte | Result | LOD | LOQ | EQL | Units | Code | Analysis Date | Analysis Method |
|---|---|---|---|---|---|---|---|---|
| Terphenyl-d14 | 81 | | | | %Recov | | 05/02/03 | SW846 8270C |

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## Analytical Report Number: 833815

**Client :** WILLIAMS ENVIRONMENTAL SERVICES
**Project Name** : FORMER MGP SITE, APPLETON
**Project Number**
**Field ID :** G6733 / 4-2-2 / 28 (2)

**Matrix Type** : WATER
**Collection Date :** 04/29/03
**Report Date :** 05/09/03
**Lab Sample Number** 833815-002

**INORGANICS**

| Test | Result | LOD | LOQ | EQL | Units | Code | Analysis Date | Prep Method | Analysis Method | Analyst |
|---|---|---|---|---|---|---|---|---|---|---|
| Arsenic | 6.9 | 5.8 | 18 | | ug/L | QX | 05/01/03 | SW846 6010B | SW846 6010B | DLB |
| Lead | 17 | 1.2 | 3.8 | | ug/L | X | 05/01/03 | SW846 6010B | SW846 6010B | DLB |
| Cyanide, Total | 0.053 | 0.001 | 0.0048 | | mg/L | | 05/05/03 | EPA 335.4 | EPA 335.4 | DAW |
| pH, Laboratory | 11 | | | | su | H | 04/30/03 | EPA 150.1 | EPA 150.1 | crw |

**BTEX** **Prep Method** SW846 5030B **Prep Date**: 05/02/03 **Analyst:** JSF

| Analyte | Result | LOD | LOQ | EQL | Units | Code | Analysis Date | Analysis Method |
|---|---|---|---|---|---|---|---|---|
| Benzene | 22 | 0.41 | 1.3 | | ug/L | | 05/02/03 | SW846 8260B |
| Ethylbenzene | 13 | 0.54 | 1.7 | | ug/L | | 05/02/03 | SW846 8260B |
| Toluene | 35 | 0.67 | 2.1 | | ug/L | | 05/02/03 | SW846 8260B |
| Xylene, o | 13 | 0.83 | 2.6 | | ug/L | | 05/02/03 | SW846 8260B |
| Xylenes, m + p | 11 | 1.8 | 5.7 | | ug/L | | 05/02/03 | SW846 8260B |
| 4-Bromofluorobenzene | 92 | | | | %Recov | | 05/02/03 | SW846 8260B |
| Toluene-d8 | 99 | | | | %Recov | | 05/02/03 | SW846 8260B |
| Dibromofluoromethane | 108 | | | | %Recov | | 05/02/03 | SW846 8260B |

**PAH/ PNA** **Prep Method** SW846 3510 **Prep Date**: 05/02/03 **Analyst:** RJN

| Analyte | Result | LOD | LOQ | EQL | Units | Code | Analysis Date | Analysis Method |
|---|---|---|---|---|---|---|---|---|
| 1-Methylnaphthalene | 19 | 1.8 | 5.7 | | ug/L | | 05/02/03 | SW846 8270C |
| 2-Methylnaphthalene | 8.4 | 1.7 | 5.4 | | ug/L | | 05/02/03 | SW846 8270C |
| Acenaphthene | 3.0 | 1.8 | 5.7 | | ug/L | Q | 05/02/03 | SW846 8270C |
| Acenaphthylene | 7.3 | 1.9 | 6.1 | | ug/L | | 05/02/03 | SW846 8270C |
| Anthracene | < 2.0 | 2.0 | 6.4 | | ug/L | | 05/02/03 | SW846 8270C |
| Benzo(a)anthracene | < 1.2 | 1.2 | 3.8 | | ug/L | | 05/02/03 | SW846 8270C |
| Benzo(a)pyrene | < 1.4 | 1.4 | 4.5 | | ug/L | | 05/02/03 | SW846 8270C |
| Benzo(b)fluoranthene | < 1.3 | 1.3 | 4.1 | | ug/L | | 05/02/03 | SW846 8270C |
| Benzo(ghi)perylene | < 1.6 | 1.6 | 5.1 | | ug/L | | 05/02/03 | SW846 8270C |
| Benzo(k)fluoranthene | < 1.9 | 1.9 | 6.1 | | ug/L | | 05/02/03 | SW846 8270C |
| Chrysene | < 1.4 | 1.4 | 4.5 | | ug/L | | 05/02/03 | SW846 8270C |
| Dibenzo(a,h)anthracene | < 1.6 | 1.6 | 5.1 | | ug/L | | 05/02/03 | SW846 8270C |
| Fluoranthene | < 1.3 | 1.3 | 4.1 | | ug/L | | 05/02/03 | SW846 8270C |
| Fluorene | < 1.7 | 1.7 | 5.4 | | ug/L | | 05/02/03 | SW846 8270C |
| Indeno(1,2,3-cd)pyrene | < 2.1 | 2.1 | 6.7 | | ug/L | | 05/02/03 | SW846 8270C |
| Naphthalene | 200 | 24 | 76 | | ug/L | D | 05/05/03 | SW846 8270C |
| Phenanthrene | < 1.6 | 1.6 | 5.1 | | ug/L | | 05/02/03 | SW846 8270C |
| Pyrene | < 1.7 | 1.7 | 5.4 | | ug/L | | 05/02/03 | SW846 8270C |
| Nitrobenzene-d5 | 109 | | | | %Recov | | 05/02/03 | SW846 8270C |
| 2-Fluorobiphenyl | 124 | | | | %Recov | | 05/02/03 | SW846 8270C |

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## Analytical Report Number: 833815

**Client :** WILLIAMS ENVIRONMENTAL SERVICES
**Project Name** : FORMER MGP SITE, APPLETON
**Project Number**
**Field ID :** G6733 / 4-2-2 / 28 (2)

**Matrix Type** : WATER
**Collection Date :** 04/29/03
**Report Date :** 05/09/03
**Lab Sample Number** 833815-002

**PAH/ PNA** **Prep Method** SW846 3510 **Prep Date:** 05/02/03 **Analyst:** RJN

| Analyte | Result | LOD | LOQ | EQL | Units | Code | Analysis Date | Analysis Method |
|---|---|---|---|---|---|---|---|---|
| Terphenyl-d14 | 87 | | | | %Recov | | 05/02/03 | SW846 8270C |

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## Analytical Report Number: 833815

**Client :** WILLIAMS ENVIRONMENTAL SERVICES
**Project Name :** FORMER MGP SITE, APPLETON
**Project Number**
**Field ID :** G6733 / 19-2-2 / 28 (2)

**Matrix Type :** WATER
**Collection Date :** 04/29/03
**Report Date :** 05/07/03
**Lab Sample Number** 833815-003

### INORGANICS

| Test | Result | LOD | LOQ | EQL | Units | Code | Analysis Date | Prep Method | Analysis Method | Analyst |
|---|---|---|---|---|---|---|---|---|---|---|
| Arsenic | 7.2 | 5.8 | 18 | | ug/L | QX | 05/01/03 | SW846 6010B | SW846 6010B | DLB |
| Lead | 5.7 | 1.2 | 3.8 | | ug/L | X | 05/01/03 | SW846 6010B | SW846 6010B | DLB |
| Cyanide, Total | 0.11 | 0.001 | 0.0048 | | mg/L | | 05/05/03 | EPA 335.4 | EPA 335.4 | DAW |
| pH, Laboratory | 11 | | | | su | H | 04/30/03 | EPA 150.1 | EPA 150.1 | crw |

### BTEX

**Prep Method** SW846 5030B **Prep Date:** 05/02/03 **Analyst:** JSF

| Analyte | Result | LOD | LOQ | EQL | Units | Code | Analysis Date | Analysis Method |
|---|---|---|---|---|---|---|---|---|
| Benzene | 21 | 0.41 | 1.3 | | ug/L | | 05/02/03 | SW846 8260B |
| Ethylbenzene | 14 | 0.54 | 1.7 | | ug/L | | 05/02/03 | SW846 8260B |
| Toluene | 36 | 0.67 | 2.1 | | ug/L | | 05/02/03 | SW846 8260B |
| Xylene, o | 15 | 0.83 | 2.6 | | ug/L | | 05/02/03 | SW846 8260B |
| Xylenes, m + p | 13 | 1.8 | 5.7 | | ug/L | | 05/02/03 | SW846 8260B |
| 4-Bromofluorobenzene | 97 | | | | %Recov | | 05/02/03 | SW846 8260B |
| Toluene-d8 | 101 | | | | %Recov | | 05/02/03 | SW846 8260B |
| Dibromofluoromethane | 105 | | | | %Recov | | 05/02/03 | SW846 8260B |

### PAH/ PNA

**Prep Method** SW846 3510 **Prep Date:** 05/02/03 **Analyst:** RJN

| Analyte | Result | LOD | LOQ | EQL | Units | Code | Analysis Date | Analysis Method |
|---|---|---|---|---|---|---|---|---|
| 1-Methylnaphthalene | 17 | 1.8 | 5.7 | | ug/L | | 05/02/03 | SW846 8270C |
| 2-Methylnaphthalene | 7.7 | 1.7 | 5.4 | | ug/L | | 05/02/03 | SW846 8270C |
| Acenaphthene | 2.8 | 1.8 | 5.7 | | ug/L | Q | 05/02/03 | SW846 8270C |
| Acenaphthylene | 6.9 | 1.9 | 6.1 | | ug/L | | 05/02/03 | SW846 8270C |
| Anthracene | < 2.0 | 2.0 | 6.4 | | ug/L | | 05/02/03 | SW846 8270C |
| Benzo(a)anthracene | < 1.2 | 1.2 | 3.8 | | ug/L | | 05/02/03 | SW846 8270C |
| Benzo(a)pyrene | < 1.4 | 1.4 | 4.5 | | ug/L | | 05/02/03 | SW846 8270C |
| Benzo(b)fluoranthene | < 1.3 | 1.3 | 4.1 | | ug/L | | 05/02/03 | SW846 8270C |
| Benzo(ghi)perylene | < 1.6 | 1.6 | 5.1 | | ug/L | | 05/02/03 | SW846 8270C |
| Benzo(k)fluoranthene | < 1.9 | 1.9 | 6.1 | | ug/L | | 05/02/03 | SW846 8270C |
| Chrysene | < 1.4 | 1.4 | 4.5 | | ug/L | | 05/02/03 | SW846 8270C |
| Dibenzo(a,h)anthracene | < 1.6 | 1.6 | 5.1 | | ug/L | | 05/02/03 | SW846 8270C |
| Fluoranthene | < 1.3 | 1.3 | 4.1 | | ug/L | | 05/02/03 | SW846 8270C |
| Fluorene | < 1.7 | 1.7 | 5.4 | | ug/L | | 05/02/03 | SW846 8270C |
| Indeno(1,2,3-cd)pyrene | < 2.1 | 2.1 | 6.7 | | ug/L | | 05/02/03 | SW846 8270C |
| Naphthalene | 160 | 24 | 76 | | ug/L | D | 05/05/03 | SW846 8270C |
| Phenanthrene | < 1.6 | 1.6 | 5.1 | | ug/L | | 05/02/03 | SW846 8270C |
| Pyrene | < 1.7 | 1.7 | 5.4 | | ug/L | | 05/02/03 | SW846 8270C |
| Nitrobenzene-d5 | 80 | | | | %Recov | | 05/02/03 | SW846 8270C |
| 2-Fluorobiphenyl | 106 | | | | %Recov | | 05/02/03 | SW846 8270C |

# En Chem Inc.

1241 Bellevue Street
Green Bay, WI 54302
920-469-2436
800-7-ENCHEM
Fax: 920-469-8827


## Analytical Report Number: 833815

**Client :** WILLIAMS ENVIRONMENTAL SERVICES
**Project Name** : FORMER MGP SITE, APPLETON
**Project Number**
**Field ID :** G6733 / 19-2-2 / 28 (2)

**Matrix Type** : WATER
**Collection Date :** 04/29/03
**Report Date :** 05/07/03
**Lab Sample Number** 833815-003

**PAH/ PNA** **Prep Method** SW846 3510 **Prep Date**: 05/02/03 **Analyst:** RJN

| Analyte | Result | LOD | LOQ | EQL | Units | Code | Analysis Date | Analysis Method |
|---|---|---|---|---|---|---|---|---|
| Terphenyl-d14 | 76 | | | | %Recov | | 05/02/03 | SW846 8270C |

# En Chem Inc.

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## Analytical Report Number: 833815

**Client :** WILLIAMS ENVIRONMENTAL SERVICES
**Project Name** : FORMER MGP SITE, APPLETON
**Project Number**
**Field ID :** G6733 / 6-2-2 / 28 (2)

**Matrix Type** : WATER
**Collection Date :** 04/29/03
**Report Date :** 05/07/03
**Lab Sample Number** 833815-004

### INORGANICS

| Test | | Result | LOD | LOQ | EQL | Units | Code | Analysis Date | Prep Method | Analysis Method | Analyst |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Arsenic | < | 5.8 | 5.8 | 18 | | ug/L | X | 05/01/03 | SW846 6010B | SW846 6010B | DLB |
| Lead | < | 1.2 | 1.2 | 3.8 | | ug/L | X | 05/01/03 | SW846 6010B | SW846 6010B | DLB |
| Cyanide, Total | | 0.085 | 0.001 | 0.0048 | | mg/L | | 05/05/03 | EPA 335.4 | EPA 335.4 | DAW |
| pH, Laboratory | | 10 | | | | su | H | 04/30/03 | EPA 150.1 | EPA 150.1 | crw |

### BTEX

**Prep Method** SW846 5030B **Prep Date:** 05/02/03 **Analyst:** JSF

| Analyte | Result | LOD | LOQ | EQL | Units | Code | Analysis Date | Analysis Method |
|---|---|---|---|---|---|---|---|---|
| Benzene | 9.4 | 0.41 | 1.3 | | ug/L | | 05/02/03 | SW846 8260B |
| Ethylbenzene | 5.4 | 0.54 | 1.7 | | ug/L | | 05/02/03 | SW846 8260B |
| Toluene | 13 | 0.67 | 2.1 | | ug/L | | 05/02/03 | SW846 8260B |
| Xylene, o | 5.9 | 0.83 | 2.6 | | ug/L | | 05/02/03 | SW846 8260B |
| Xylenes, m + p | 5.1 | 1.8 | 5.7 | | ug/L | Q | 05/02/03 | SW846 8260B |
| 4-Bromofluorobenzene | 93 | | | | %Recov | | 05/02/03 | SW846 8260B |
| Toluene-d8 | 103 | | | | %Recov | | 05/02/03 | SW846 8260B |
| Dibromofluoromethane | 102 | | | | %Recov | | 05/02/03 | SW846 8260B |

### PAH/ PNA

**Prep Method** SW846 3510 **Prep Date:** 05/02/03 **Analyst:** RJN

| Analyte | Result | LOD | LOQ | EQL | Units | Code | Analysis Date | Analysis Method |
|---|---|---|---|---|---|---|---|---|
| 1-Methylnaphthalene | 18 | 1.8 | 5.7 | | ug/L | | 05/02/03 | SW846 8270C |
| 2-Methylnaphthalene | 8.2 | 1.7 | 5.4 | | ug/L | | 05/02/03 | SW846 8270C |
| Acenaphthene | 2.9 | 1.8 | 5.7 | | ug/L | Q | 05/02/03 | SW846 8270C |
| Acenaphthylene | 6.9 | 1.9 | 6.1 | | ug/L | | 05/02/03 | SW846 8270C |
| Anthracene | < 2.0 | 2.0 | 6.4 | | ug/L | | 05/02/03 | SW846 8270C |
| Benzo(a)anthracene | < 1.2 | 1.2 | 3.8 | | ug/L | | 05/02/03 | SW846 8270C |
| Benzo(a)pyrene | < 1.4 | 1.4 | 4.5 | | ug/L | | 05/02/03 | SW846 8270C |
| Benzo(b)fluoranthene | < 1.3 | 1.3 | 4.1 | | ug/L | | 05/02/03 | SW846 8270C |
| Benzo(ghi)perylene | < 1.6 | 1.6 | 5.1 | | ug/L | | 05/02/03 | SW846 8270C |
| Benzo(k)fluoranthene | < 1.9 | 1.9 | 6.1 | | ug/L | | 05/02/03 | SW846 8270C |
| Chrysene | < 1.4 | 1.4 | 4.5 | | ug/L | | 05/02/03 | SW846 8270C |
| Dibenzo(a,h)anthracene | < 1.6 | 1.6 | 5.1 | | ug/L | | 05/02/03 | SW846 8270C |
| Fluoranthene | < 1.3 | 1.3 | 4.1 | | ug/L | | 05/02/03 | SW846 8270C |
| Fluorene | < 1.7 | 1.7 | 5.4 | | ug/L | | 05/02/03 | SW846 8270C |
| Indeno(1,2,3-cd)pyrene | < 2.1 | 2.1 | 6.7 | | ug/L | | 05/02/03 | SW846 8270C |
| Naphthalene | 160 | 24 | 76 | | ug/L | D | 05/05/03 | SW846 8270C |
| Phenanthrene | < 1.6 | 1.6 | 5.1 | | ug/L | | 05/02/03 | SW846 8270C |
| Pyrene | < 1.7 | 1.7 | 5.4 | | ug/L | | 05/02/03 | SW846 8270C |
| Nitrobenzene-d5 | 69 | | | | %Recov | | 05/02/03 | SW846 8270C |
| 2-Fluorobiphenyl | 112 | | | | %Recov | | 05/02/03 | SW846 8270C |

# En Chem Inc.

1241 Bellevue Street
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800-7-ENCHEM
Fax: 920-469-8827


## Analytical Report Number: 833815

**Client :** WILLIAMS ENVIRONMENTAL SERVICES
**Matrix Type** : WATER
**Project Name** : FORMER MGP SITE, APPLETON
**Collection Date :** 04/29/03
**Project Number**
**Report Date :** 05/07/03
**Field ID :** G6733 / 6-2-2 / 28 (2)
**Lab Sample Number** 833815-004

**PAH/ PNA** **Prep Method** SW846 3510 **Prep Date**: 05/02/03 **Analyst:** RJN

| Analyte | Result | LOD | LOQ | EQL | Units | Code | Analysis Date | Analysis Method |
|---|---|---|---|---|---|---|---|---|
| Terphenyl-d14 | 81 | | | | %Recov | | 05/02/03 | SW846 8270C |

# ACCURA ANALYTICAL LABORATORIES, INC.

## ACCURA GEOTECHNICAL LABORATORY

AASHTO R18

Due 5/1/7


3342 INTERNATIONAL PARK DRIVE
ATLANTA, GA 30316
PHONE: (404) ~~248-5400~~ 2514774 (404) 248-5405
FAX: (404) ~~248-5424~~ x-205 241-4577

MAIN OFFICE: 6017 FINANCIAL DRIVE
NORCROSS, GA 30071
PHONE: (770) 449-8800
FAX: (770) 449-5477


Subcontractor

# CHAIN OF CUSTODY

Company Name: Williams Environmental Services
Address: 2810 Dunevin Circle Suite 103 Amarillo, TX 79109
Billing address:

Report Sent to (Client Contact): Thomas de Groot
Contact Phone #: 806-457-0800
Fax #: 801-340-8326

Project Name: Former MGP Site, Appleton
Project Number: 833815-EnChem
Client P.O. #:

Samplers(signature)
Samplers(printed)
Client E-mail:

*If AASHTO or other METHOD required please INDICATE

AGL PROJECT # G03-0002-

TESTS and ANALYSIS (ASTM TEST METHOD*)

| Client Sample ID # | Sample Location | Sample Type | Accura Sample ID # | Std. Proctor(D698) | Mod. Proctor (D1557) | Moisture Content(D2216) | Atterberg Limits (D4318) | Specific Gravity(D854) | Sieve Analysis(D422,C136) | Sieve An. with Hydro(D422) | # 200 Sieve(D1140,C117) | Rigid Wall Perm(D2434) | Flex. Wall Perm(D5084) | CU Triaxial(D4767) | UU Triaxial(D2850) | UCS(D2166) | Direct Shear(D3080) | Consolidation(D2435) | USCS(D2487) | BTEX 8260 (5035) | PAH | As, Pb (6010) | CN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| G6733/5-2-2/28 (2) | 14 day Leach | 4/29/03 | G 001 | | | | | | | | | | | | | | | | | | | | |
| G6733/4-2-2/28 (2) | 14 day Leach | | G 002 | | | | | | | | | | | | | | | | | | | | |
| G6733/19-2-2/28 (2) | 14 day Leach | | G 003 | | | | | | | | | | | | | | | | | | | | |
| G6733/6-2-2/28 (2) | 14 day Leach | | G 004 | | | | | | | | | | | | | | | | | | | | |
| | | | G | | | | | | | | | | | | | | | | | | | | |
| | | | G | | | | | | | | | | | | | | | | | | | | |
| | | | G | | | | | | | | | | | | | | | | | | | | |
| | | | G | | | | | | | | | | | | | | | | | | | | |
| | | | G | | | | | | | | | | | | | | | | | | | | |
| | | | G | | | | | | | | | | | | | | | | | | | | |

Remarks, Conditions and Parameters of Testing
1-2" 2-20" 3-40" 1-Poly
Do not digest metals

| Relinquished By | Date/Time | Received By | Date/Time |
|---|---|---|---|
| [signature] | 4/29/03 1200 | | |
| Fedex | 4/30/03 0925 | Gloria Dufatar | |

Special Requirements
Please contact Thomas de Groot (806-457-0800) For testing

Room Temp

EN CHEM INC.

**Corporate Office & Laboratory**
1241 Bellevue Street, Suite 9 • Green Bay, WI 54302
920-469-2436 • FAX: 920-469-8827 • 800-7-ENCHEM
www.enchem.com

# Analytical Report Number: 833911

**Client :** WILLIAMS ENVIRONMENTAL SERVICES

**Project Name :** FORMER MGP SITE

**Project Number :** 03-0002-01

| Lab Sample Number | Field ID | Matrix | Collection Date |
|---|---|---|---|
| 833911-001 | G6733 / 12-1-2 (2) | WATER | 05/01/03 |

The "Q" flag is present when a parameter has been detected below the LOQ. This indicates the results are qualified due to the uncertainty of the parameter concentration between the LOD and the LOQ.

I certify that the data contained in this Final Report has been generated and reviewed in accordance with approved methods and Laboratory Standard Operating Procedure. Exceptions, if any, are discussed in the accompanying sample comments. Release of this final report is authorized by Laboratory management, as is verified by the following signature. Reported results shall not be reproduced, except in full, without the written approval of the lab. The sample results relate only to the analytes of interest tested.

Approval Signature

5/9/03
Date

# En Chem, Inc. Cooler Receipt Log

Batch No. 837911

Project Name or ID Former MGP Site Appleton No. of Coolers: 1 Temps: Room Temp

**A. Receipt Phase: Date cooler was opened:** 5/2/03 **By:** CK

| | | |
|---|---|---|
| 1: Were samples received on ice? (Must be ≤ 6 C ) | YES | NO[3] |
| 2. Was there a Temperature Blank? | YES | NO |
| 3: Were custody seals present and intact? (Record on COC) | YES | NO |
| 4: Are COC documents present? | YES | NO[2] |
| 5: Does this Project require quick turn around analysis? | YES | NO |
| 6: Is there any sub-work? | YES | NO |
| 7: Are there any short hold time tests? | YES | NO |
| 8: Are any samples nearing expiration of hold-time? (Within 2 days) | YES[1] | NO Contacted by/Who |
| 9: Do any samples need to be Filtered or Preserved in the lab? | YES[1] | NO 5/2/03 CK Contacted by/Who CD |

**B. Check-in Phase: Date samples were Checked-in:** 5/2/03 **By:** CK

| | | | |
|---|---|---|---|
| 1: Were all sample containers listed on the COC received and intact? | YES | NO[2] | NA |
| 2 Sign the COC as received by En Chem. Completed | YES | NO | |
| 3: Do sample labels match the COC? | YES | NO[2] | |
| 4: Completed pH check on preserved samples.. *(This statement does not apply to water: VOC, O&G, TOC, DRO, Total Rec. Phenolics)* | YES | NO | NA |
| 5: Do samples have correct chemical preservation? *(This statement does not apply to water: VOC, O&G, TOC, DRO, Total Rec. Phenolics)* | YES | NO[2] | NA |
| 6: Are dissolved parameters field filtered? | YES | NO[2] | NA |
| 7: Are sample volumes adequate for tests requested? | YES | NO[2] | |
| 8: Are VOC samples free of bubbles >6mm | YES | NO[2] | NA |
| 9: Enter samples into logbook. Completed | YES | NO | |
| 10: Place laboratory sample number on all containers and COC. Completed | YES | NO | |
| 11: Complete Laboratory Tracking Sheet (LTS). Completed | YES | NO | NA |
| 12: Start Nonconformance form. | YES | NO | NA |
| 13: Initiate Subcontracting procedure. Completed | YES | NO | NA |
| 14: Check laboratory sample number on all containers and COC. JR | YES | NO | NA |

**Short Hold-time tests:**

| | | |
|---|---|---|
| 48 Hours or less | 7 days | Footnotes |
| Coliform (6 hrs) | Flashpoint | 1 Notify proper lab group immediately. |
| Hexavalent Chromium (24 Hrs) | TSS | |
| BOD | Total Solids | 2 Complete nonconformance memo. |
| Nitrite or Nitrate | TDS | |
| Low Level Mercury | Sulfide | |
| Ortho Phosphorus | Free Liquids | |
| Turbidity | Total Volatile Solids | |
| Surfactants | Aqueous Extractable Organics- ALL | |
| Sulfite | Unpreserved VOC's | |
| En Core Preservation | Ash | |
| Color | | |

Rev. 4/11/03, Attachment to 1-REC-5.
Subject to QA Audit.

Reviewed by/date LW 5/5/03

p:/everyone/forms/samplereceiving/crl.doc

# En Chem Inc.

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Green Bay, WI 54302
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Fax: 920-469-8827

| Lab#: | TestGroupID: | Comment: |
|---|---|---|
| 833911 | All Samples | Sample was received in two poly bottles. Per client request, the sample was split into proper containers and preserved. The PAH was analyzed from a plastic container. The volume for BTEX analysis was transferred to HCL preserved 40 ml vials. Samples were received at room temperature. Analyzed per client request. |
| 833911-001 | M-AS-W | X -Per client request, the sample was not digested before analysis. |
| G6733 / 12-1-2 (2) | | |
| | M-PB-W | X - Per client request, the sample was not digested before analysis. |

# En Chem Inc.

## Analysis Summary by Laboratory

1241 Bellevue Street
Green Bay, WI 54302
920-469-2436
800-7-ENCHEM
Fax: 920-469-8827

| Test Group Name | 833911-001 |
|---|---|
| ARSENIC | G |
| BTEX | G |
| CYANIDE, TOTAL | K |
| LEAD | G |
| PAH/ PNA | G |
| PH, LABORATORY | G |

| WISCONSIN Certification | |
|---|---|
| G = En Chem Green Bay | 405132750 |
| K = En Chem Kimberly | 445134030 |
| S = Subcontracted Analysis | |

*En Chem, Inc.*

## Inorganic Data Qualifiers

| | |
|---|---|
| A | Analyte is detected in the method blank. Method blank criteria is evaluated to the laboratory method detection limit. Additionally, method blank acceptance may be based on project specific criteria or determined from analyte concentrations in the sample and are evaluated on a sample by sample basis. |
| B | The analyte has been detected between the method detection limit and the reporting limit. |
| C | Elevated detection limit due to matrix effects. |
| E | Estimated concentration due to matrix interferences. During the metals analysis using the inductively coupled plasma (ICP), the serial dilution failed to meet the established control limits of 0-10% and the sample concentration is greater than 50 times the IDL (100 times the IDL for analysis done on the ICP-MS). The result was flagged with the E qualifier to indicate that a physical interference was observed. |
| F | Due to potential interferences for this analysis by Inductively Coupled Plasma techniques (SW-846 Method 6010), this analyte has been confirmed by and reported from an alternate method. |
| H | Preservation or analysis performed past holding time. |
| K | Sample received unpreserved. Sample was either preserved at the time of receipt or at the time of sample preparation. |
| L | Elevated detection limit due to low sample volume. |
| N | Spiked sample recovery not within control limits. |
| Q | The analyte has been detected between the limit of detection (LOD) and limit of quantitation (LOQ). The results are qualified due to the uncertainty of analyte concentrations within this range. |
| U | The analyte was not detected above the reporting limit. |
| X | See sample narrative. |
| & | Laboratory Control Spike recovery not within control limits. |
| * | Duplicate analyses not within control limits. |
| 1 | Dissolved analyte or filtered analyte greater than total analyte; analyses passed QC based on precision criteria. |
| 2 | Dissolved analyte or filtered analyte greater than total analyte; analyses failed QC based on precision criteria. |
| 3 | BOD result is estimated due to the BOD blank exceeding the allowable oxygen depletion. |
| 4 | BOD duplicate precision not within control limits. Due to the 48 hour holding time for this test, it is not practical to reanalyze and try to correct the deficiency. |
| 5 | BOD result is estimated due to insufficient oxygen depletion. Due to the 48 hour holding time for this test, it is not practical to reanalyze and try to correct the deficiency. |
| 6 | BOD laboratory control sample not within control limits. Due to the 48 hour holding time for this test, it is not practical to reanalyze and try to correct the deficiency. |
| 7 | BOD result is estimated due to complete oxygen depletion. Due to the 48 hour holding time for this test, it is not practical to reanalyze and try to correct the deficiency. |

# En Chem Inc.

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Fax: 920-469-8827


## Analytical Report Number: 833911

**Client :** WILLIAMS ENVIRONMENTAL SERVICES
**Matrix Type :** WATER
**Project Name :** FORMER MGP SITE
**Collection Date :** 05/01/03
**Project Number** 03-0002-01
**Report Date :** 05/09/03
**Field ID :** G6733 / 12-1-2 (2)
**Lab Sample Number** 833911-001

### INORGANICS

| Test | Result | LOD | LOQ | EQL | Units | Code | Analysis Date | Prep Method | Analysis Method | Analyst |
|---|---|---|---|---|---|---|---|---|---|---|
| Arsenic | 9.6 | 5.8 | 18 | | ug/L | QX | 05/06/03 | SW846 6010B | SW846 6010B | DLB |
| Lead | 2.5 | 1.2 | 3.8 | | ug/L | QX | 05/05/03 | SW846 6010B | SW846 6010B | DLB |
| Cyanide, Total | 0.15 | 0.007 | 0.024 | | mg/L | | 05/05/03 | EPA 335.4 | EPA 335.4 | DAW |
| pH, Laboratory | 11 | | | | s u | H | 05/05/03 | EPA 150.1 | EPA 150.1 | crw |

### BTEX

**Prep Method** SW846 5030B **Prep Date:** 05/05/03 **Analyst:** JSF

| Analyte | Result | LOD | LOQ | EQL | Units | Code | Analysis Date | Analysis Method |
|---|---|---|---|---|---|---|---|---|
| Benzene | 19 | 2.0 | 6.4 | | ug/L | | 05/05/03 | SW846 8260B |
| Ethylbenzene | 14 | 2.7 | 8.6 | | ug/L | | 05/05/03 | SW846 8260B |
| Toluene | 33 | 3.4 | 11 | | ug/L | | 05/05/03 | SW846 8260B |
| Xylene, o | 15 | 4.2 | 13 | | ug/L | | 05/05/03 | SW846 8260B |
| Xylenes, m + p | 12 | 9.0 | 29 | | ug/L | Q | 05/05/03 | SW846 8260B |
| 4-Bromofluorobenzene | 98 | | | | %Recov | | 05/05/03 | SW846 8260B |
| Toluene-d8 | 101 | | | | %Recov | | 05/05/03 | SW846 8260B |
| Dibromofluoromethane | 106 | | | | %Recov | | 05/05/03 | SW846 8260B |

### PAH/ PNA

**Prep Method** SW846 3510 **Prep Date:** 05/05/03 **Analyst:** RJN

| Analyte | Result | LOD | LOQ | EQL | Units | Code | Analysis Date | Analysis Method |
|---|---|---|---|---|---|---|---|---|
| 1-Methylnaphthalene | 12 | 3.6 | 11 | | ug/L | D | 05/06/03 | SW846 8270C |
| 2-Methylnaphthalene | 5.2 | 3.4 | 11 | | ug/L | QD | 05/06/03 | SW846 8270C |
| Acenaphthene | < 3.6 | 3.6 | 11 | | ug/L | D | 05/06/03 | SW846 8270C |
| Acenaphthylene | 5.5 | 3.8 | 12 | | ug/L | QD | 05/06/03 | SW846 8270C |
| Anthracene | < 4.0 | 4.0 | 13 | | ug/L | D | 05/06/03 | SW846 8270C |
| Benzo(a)anthracene | 0.26 | 0.012 | 0.038 | | ug/L | | 05/05/03 | SW846 8270C |
| Benzo(a)pyrene | 0.35 | 0.014 | 0.045 | | ug/L | | 05/05/03 | SW846 8270C |
| Benzo(b)fluoranthene | 0.22 | 0.013 | 0.041 | | ug/L | | 05/05/03 | SW846 8270C |
| Benzo(ghi)perylene | 0.17 | 0.016 | 0.051 | | ug/L | | 05/05/03 | SW846 8270C |
| Benzo(k)fluoranthene | 0.20 | 0.019 | 0.061 | | ug/L | | 05/05/03 | SW846 8270C |
| Chrysene | 0.19 | 0.014 | 0.045 | | ug/L | | 05/05/03 | SW846 8270C |
| Dibenzo(a,h)anthracene | 0.084 | 0.016 | 0.051 | | ug/L | | 05/05/03 | SW846 8270C |
| Fluoranthene | 0.26 | 0.013 | 0.041 | | ug/L | | 05/05/03 | SW846 8270C |
| Fluorene | 0.26 | 0.017 | 0.054 | | ug/L | | 05/05/03 | SW846 8270C |
| Indeno(1,2,3-cd)pyrene | 0.17 | 0.021 | 0.067 | | ug/L | | 05/05/03 | SW846 8270C |
| Naphthalene | 130 | 9.6 | 31 | | ug/L | D | 05/06/03 | SW846 8270C |
| Phenanthrene | 0.46 | 0.016 | 0.051 | | ug/L | | 05/05/03 | SW846 8270C |
| Pyrene | 0.17 | 0.017 | 0.054 | | ug/L | | 05/05/03 | SW846 8270C |
| Nitrobenzene-d5 | 104 | | | | %Recov | | 05/05/03 | SW846 8270C |
| 2-Fluorobiphenyl | 39 | | | | %Recov | | 05/05/03 | SW846 8270C |

# En Chem Inc.

1241 Bellevue Street
Green Bay, WI 54302
920-469-2436
800-7-ENCHEM
Fax: 920-469-8827


## Analytical Report Number: 833911

**Client :** WILLIAMS ENVIRONMENTAL SERVICES
**Project Name :** FORMER MGP SITE
**Project Number** 03-0002-01
**Field ID :** G6733 / 12-1-2 (2)

**Matrix Type :** WATER
**Collection Date :** 05/01/03
**Report Date :** 05/09/03
**Lab Sample Number** 833911-001

**PAH/ PNA** **Prep Method** SW846 3510 **Prep Date:** 05/05/03 **Analyst:** RJN

| Analyte | Result | LOD | LOQ | EQL | Units | Code | Analysis Date | Analysis Method |
|---|---|---|---|---|---|---|---|---|
| Terphenyl-d14 | 70 | | | | %Recov | | 05/05/03 | SW846 8270C |

# ACCURA ANALYTICAL LABORATORIES, INC.

## ACCURA GEOTECHNICAL LABORATORY

AASHTO R18


3342 INTERNATIONAL PARK DRIVE
ATLANTA, GA 30316
PHONE: (404) ~~248-5408~~ 241-4774 → 205 (404) 248-5405
FAX: (404) ~~248-5424~~ 241 4577

MAIN OFFICE: 6017 FINANCIAL DRIVE
NORCROSS, GA 30071
PHONE: (770) 449-8800
FAX: (770) 449-5477


Due 5/9

Subcontractor

# CHAIN OF CUSTODY

Company Name: Williams Environmental Services
Billing address:
Address: 2810 Dorcheven Circle
Suite 102 Amarillo TX 79109
Report Sent to (Client Contact): Thomas De Grood
Contact Phone #: 806-457-0800
Fax #: 281-340-8326
Project Name: Former MGP Site, Appleton
Project Number:
Client P.O. #:
Client E-mail:

Samplers(signature):
Samplers(printed)

TESTS and ANALYSIS (ASTM TEST METHOD*)

*If AASHTO or other METHOD required please INDICATE

AGL PROJECT # G 03.0022.01

| Client Sample ID # | Quantity | Sample Location | Sample Type | Accura Sample ID # | Std. Proctor(D698) | Mod. Proctor (D1557) | Moisture Content(D2216) | Atterberg Limits (D4318) | Specific Gravity(D854) | Sieve Analysis(D422,C136) | Sieve An. with Hydro(D422) | # 200 Sieve(D1140,C117) | Rigid Wall Perm(D2434) | Flex. Wall Perm(D5084) | CU Triaxial(D4767) | UU Triaxial(D2850) | UCS(D2166) | Direct Shear(D3080) | Consolidation(D2435) | USCS(D2487) | BTEX-8260 | PAH | As, Pb - 6010 | CN | Remarks,Conditions and Parameters of Testing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| G6733/12-17(2) | 1 | 14 day leachate | 5/1/03 LW | G | | | | | | | | | | | | | | | | | | | | | 2 - 1L poly A |
| | | | | G | | | | | | | | | | | | | | | | | | | | | Do not digest metals LW 5/2/03 |
| | | | | G | | | | | | | | | | | | | | | | | | | | | |
| | | | | G | | | | | | | | | | | | | | | | | | | | | |
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| | | | | G | | | | | | | | | | | | | | | | | | | | | |

| Relinquished By | Date/Time | Received By | Date/Time |
|---|---|---|---|
| Thwesby | 5-1-02 12:45 | CLCX | 5/2/03 0930 |
| Relinquished By | Date/Time | Received By | Date/Time |
| FED EX | 5/2/03 0930 | | |

Special Requirements
Please contact Thomas de Grood For testing (806-457-0800)

# EN CHEM INC.

## Green Bay to Kimberly Sample Transfer Record

Client: Accuracy Analytical Lab

QT? ☒ yes ☐ no Due: 5-9-03

Rec Temp: RT

| Lab No. | Collection Date | Collection Time | Matrix | ANALYSES REQUESTED: CN | | | | | | | | | | | | | TOTAL # OF BOTTLES SENT | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 833911-001 | | | W | X | | | | | | | | | | | | | 1 | 250ml Grab |
| | | | | | | | | | | | | | | | | | | |
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Relinquished By: [signature] Date/Time: 5/2/03

Received By: [signature] Date/Time: 5/5/03 6:50

Relinquished By: [signature] Date/Time: 5/5/03

Received By: Lori Stevens Date/Time: 5/5/03 9:45

Relinquished By: Date/Time:

Received By: Date/Time:

COMMENTS:

Cooler Custody Seal (if applicable) Intact / Not Intact

Version 1.0 07/02

## Organic Data Qualifiers

| | |
|---|---|
| B | Analyte is present in the method blank. Method blank criteria is evaluated to the laboratory method detection limit. Additionally, method blank acceptance may be based on project specific criteria or determined from analyte concentrations in the sample and are evaluated on a sample by sample basis. |
| C | Elevated detection limit. |
| D | Analyte value from diluted analysis, or surrogate result not applicable due to sample dilution. |
| E | Analyte concentration exceeds calibration range. |
| F | Surrogate results outside control criteria. |
| H | Extraction or analysis performed past holding time. |
| J | Qualitative evidence of analyte present: concentration detected is greater than the method detection limit but less than the reporting limit. |
| K | Detection limit may be elevated due to the presence of an unrequested analyte. |
| N | Spiked sample recovery not within control limits. |
| P | The relative percent difference between the two columns for detected concentrations was greater than 40%. |
| Q | The analyte has been detected between the limit of detection (LOD) and limit of quantitation (LOQ). The results are qualified due to the uncertainty of analyte concentrations within this range. |
| S | The relative percent difference between quantitation and confirmation columns exceeds internal quality control criteria. Because the result is unconfirmed, it has been reported as a non-detect with an elevated detection limit. |
| U | The analyte was not detected above the reporting limit. |
| V | Sample received with headspace. |
| W | A second aliquot of sample was analyzed from a container with headspace. |
| X | See Sample Narrative. |
| & | Laboratory Control Spike recovery not within control limits. |
| * | Duplicate analyses not within control limits. |

EN CHEM INC.

**Corporate Office & Laboratory**
1241 Bellevue Street, Suite 9 • Green Bay, WI 54302
920-469-2436 • FAX: 920-469-8827 • 800-7-ENCHEM
www.enchem.com

# Analytical Report Number: 834526

Client : WILLIAMS ENVIRONMENTAL SERVICES

Project Name : FORMER MGP SITE, APPLETON

Project Number :

| Lab Sample Number | Field ID | Matrix | Collection Date |
|---|---|---|---|
| 834526-001 | G6733/5-2-2/28 | WATER | 05/15/03 |
| 834526-002 | G6733/4-2-2/28 | WATER | 05/15/03 |
| 834526-003 | G6733/19-2-2/28 | WATER | 05/15/03 |
| 834526-004 | G6733/6-2-2/28 | WATER | 05/15/03 |
| 834526-005 | G6733/12-1-2/28 | WATER | 05/15/03 |

The "Q" flag is present when a parameter has been detected below the LOQ. This indicates the results are qualified due to the uncertainty of the parameter concentration between the LOD and the LOQ.

I certify that the data contained in this Final Report has been generated and reviewed In accordance with approved methods and Laboratory Standard Operating Procedure. Exceptions, if any, are discussed in the accompanying sample comments. Release of this final report is authorized by Laboratory management, as is verified by the following signature. Reported results shall not be reproduced, except in full, without the written approval of the lab. The sample results relate only to the analytes of interest tested.

Approval Signature

5/30/03
Date

# En Chem, Inc. Cooler Receipt Log

Batch No. 834526

Project Name or ID Former MGP Site  No. of Coolers: 1  Temps: Room Temp

**A. Receipt Phase: Date cooler was opened:** 5/20/03  **By:** KP

| | | | |
|---|---|---|---|
| 1: Were samples received on ice? (Must be ≤ 6 C ) | YES | (NO[2]) | |
| 2. Was there a Temperature Blank? | YES | (NO) | |
| 3: Were custody seals present and intact? (Record on COC) | YES | (NO) | |
| 4: Are COC documents present? | (YES) | NO[2] | |
| 5: Does this Project require quick turn around analysis? | YES | (NO) | |
| 6: Is there any sub-work? | YES | (NO) | |
| 7: Are there any short hold time tests? | (YES) | NO | |
| 8: Are any samples nearing expiration of hold-time? (Within 2 days) | YES[1] | (NO) | Contacted by/Who |
| 9: Do any samples need to be Filtered or Preserved in the lab? | YES[1] | (NO) | Contacted by/Who |

**B. Check-In Phase: Date samples were Checked-in:** 5/20/03  **By:** KP

| | | | |
|---|---|---|---|
| 1: Were all sample containers listed on the COC received and intact? | (YES) | NO[2] | NA |
| 2: Sign the COC as received by En Chem. Completed | (YES) | NO | |
| 3: Do sample labels match the COC? | (YES) | NO[2] | |
| 4: Completed pH check on preserved samples.. *(This statement does not apply to water: VOC, O&G, TOC, DRO, Total Rec. Phenolics)* | YES | NO | (NA) |
| 5: Do samples have correct chemical preservation? *(This statement does not apply to water: VOC, O&G, TOC, DRO, Total Rec. Phenolics)* | YES | NO[2] | (NA) |
| 6: Are dissolved parameters field filtered? | YES | NO[2] | (NA) |
| 7: Are sample volumes adequate for tests requested? | (YES) | NO[2] | |
| 8: Are VOC samples free of bubbles >6mm | (YES) | NO[2] | NA |
| 9: Enter samples into logbook. Completed | (YES) | NO | |
| 10: Place laboratory sample number on all containers and COC. Completed | (YES) | NO | |
| 11: Complete Laboratory Tracking Sheet (LTS). Completed | YES | NO | (NA) |
| 12: Start Nonconformance form. | (YES) | NO | NA |
| 13: Initiate Subcontracting procedure. Completed | YES | NO | (NA) |
| 14: Check laboratory sample number on all containers and COC. JR | (YES) | NO | NA |

**Short Hold-time tests:**

| | | |
|---|---|---|
| 48 Hours or less | 7 days | Footnotes |
| Coliform (6 hrs) | Flashpoint | 1 Notify proper lab group immediately. |
| Hexavalent Chromium (24 Hrs) | TSS | |
| BOD | Total Solids | 2 Complete nonconformance memo. |
| Nitrite or Nitrate | TDS | |
| Low Level Mercury | Sulfide | |
| Ortho Phosphorus | Free Liquids | |
| Turbidity | Total Volatile Solids | |
| Surfactants | Aqueous Extractable Organics- ALL | |
| Sulfite | Unpreserved VOC's | |
| En Core Preservation | Ash | |
| Color | | |

Rev. 4/11/03, Attachment to 1-REC-5.
Subject to QA Audit.

Reviewed by/date 5/21/03

p:/everyone/forms/samplereceiving/crl.doc

# En Chem Inc.

## Analysis Summary by Laboratory

1241 Bellevue Street
Green Bay, WI 54302
920-469-2436
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Fax: 920-469-8827

| Test Group Name | 834526-001 | 834526-002 | 834526-003 | 834526-004 | 834526-005 |
|---|---|---|---|---|---|
| ARSENIC | G | G | G | G | G |
| BTEX | G | G | G | G | G |
| CYANIDE, TOTAL | K | K | K | K | K |
| LEAD | G | G | G | G | G |
| PAH/ PNA | G | G | G | G | G |
| PH, LABORATORY | G | G | G | G | G |

| WISCONSIN Certification | |
|---|---|
| G = En Chem Green Bay | 405132750 / DATCP: 105 000444 |
| K = En Chem Kimberly | 445134030 |
| S = Subcontracted Analysis | |

# En Chem Inc.

1241 Bellevue Street
Green Bay, WI 54302
920-469-2436
800-7-ENCHEM
Fax: 920-469-8827

| Lab#: | TestGroupID: | Comment: |
|---|---|---|
| 834526 | All Samples | Sample was received in two poly bottles. Per client request, the sample was split into proper containers and preserved. The PAH was analyzed from a plastic container. The volume for BTEX analysis was transferred to HCL preserved 40 ml vials. Samples were received at room temperature. Analyzed per client request. |
| 834526- | M-PB-W | X - Reported result is an estimated result due to samples not being digested per client request. |
| | M-AS-W | X - Reported result is an estimated result due to samples not being digested per client request. |

## Organic Data Qualifiers

| | |
|---|---|
| B | Analyte is present in the method blank. Method blank criteria is evaluated to the laboratory method detection limit. Additionally, method blank acceptance may be based on project specific criteria or determined from analyte concentrations in the sample and are evaluated on a sample by sample basis. |
| C | Elevated detection limit. |
| D | Analyte value from diluted analysis, or surrogate result not applicable due to sample dilution. |
| E | Analyte concentration exceeds calibration range. |
| F | Surrogate results outside control criteria. |
| H | Extraction or analysis performed past holding time. |
| J | Qualitative evidence of analyte present: concentration detected is greater than the method detection limit but less than the reporting limit. |
| K | Detection limit may be elevated due to the presence of an unrequested analyte. |
| N | Spiked sample recovery not within control limits. |
| P | The relative percent difference between the two columns for detected concentrations was greater than 40%. |
| Q | The analyte has been detected between the limit of detection (LOD) and limit of quantitation (LOQ). The results are qualified due to the uncertainty of analyte concentrations within this range. |
| S | The relative percent difference between quantitation and confirmation columns exceeds internal quality control criteria. Because the result is unconfirmed, it has been reported as a non-detect with an elevated detection limit. |
| U | The analyte was not detected above the reporting limit. |
| V | Sample received with headspace. |
| W | A second aliquot of sample was analyzed from a container with headspace. |
| X | See Sample Narrative. |
| & | Laboratory Control Spike recovery not within control limits. |
| * | Duplicate analyses not within control limits. |

# En Chem Inc.

1241 Bellevue Street
Green Bay, WI 54302
920-469-2436
800-7-ENCHEM
Fax: 920-469-8827


## Analytical Report Number: 834526

**Client :** WILLIAMS ENVIRONMENTAL SERVICES
**Project Name :** FORMER MGP SITE, APPLETON
**Project Number**
**Field ID :** G6733/5-2-2/28

**Matrix Type :** WATER
**Collection Date :** 05/15/03
**Report Date :** 06/03/03
**Lab Sample Number** 834526-001

### INORGANICS

| Test | | Result | LOD | LOQ | EQL | Units | Code | Analysis Date | Prep Method | Analysis Method | Analyst |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Arsenic | < | 5.8 | 5.8 | 18 | | ug/L | X | 05/22/03 | SW846 6010B | SW846 6010B | DLB |
| Lead | | 26 | 1.2 | 3.8 | | ug/L | X | 05/22/03 | SW846 6010B | SW846 6010B | DLB |
| Cyanide, Total | | 0.10 | 0.001 | 0.0048 | | mg/L | | 05/28/03 | EPA 335.4 | EPA 335.4 | DAW |
| pH, Laboratory | | 9.6 | | | | su | H | 05/21/03 | EPA 150.1 | EPA 150.1 | crw |

### BTEX

**Prep Method** SW846 5030B **Prep Date:** 05/22/03 **Analyst:** HW

| Analyte | Result | LOD | LOQ | EQL | Units | Code | Analysis Date | Analysis Method |
|---|---|---|---|---|---|---|---|---|
| Benzene | 18 | 0.41 | 1.3 | | ug/L | | 05/22/03 | SW846 8260B |
| Ethylbenzene | 6.8 | 0.54 | 1.7 | | ug/L | | 05/22/03 | SW846 8260B |
| Toluene | 20 | 0.67 | 2.1 | | ug/L | | 05/22/03 | SW846 8260B |
| Xylene, o | 7.2 | 0.83 | 2.6 | | ug/L | | 05/22/03 | SW846 8260B |
| Xylenes, m + p | 5.9 | 1.8 | 5.7 | | ug/L | | 05/22/03 | SW846 8260B |
| 4-Bromofluorobenzene | 126 | | | | %Recov | | 05/22/03 | SW846 8260B |
| Toluene-d8 | 125 | | | | %Recov | | 05/22/03 | SW846 8260B |
| Dibromofluoromethane | 126 | | | | %Recov | | 05/22/03 | SW846 8260B |

### PAH/ PNA

**Prep Method** SW846 3510 **Prep Date:** 05/22/03 **Analyst:** RJN

| Analyte | Result | LOD | LOQ | EQL | Units | Code | Analysis Date | Analysis Method |
|---|---|---|---|---|---|---|---|---|
| 1-Methylnaphthalene | 7.6 | 0.36 | 1.1 | | ug/L | | 05/23/03 | SW846 8270C |
| 2-Methylnaphthalene | 3.7 | 0.34 | 1.1 | | ug/L | | 05/23/03 | SW846 8270C |
| Acenaphthene | 1.3 | 0.36 | 1.1 | | ug/L | | 05/23/03 | SW846 8270C |
| Acenaphthylene | 8.0 | 0.38 | 1.2 | | ug/L | | 05/23/03 | SW846 8270C |
| Anthracene | 2.5 | 0.40 | 1.3 | | ug/L | | 05/23/03 | SW846 8270C |
| Benzo(a)anthracene | 4.0 | 0.24 | 0.76 | | ug/L | | 05/23/03 | SW846 8270C |
| Benzo(a)pyrene | 4.0 | 0.28 | 0.89 | | ug/L | | 05/23/03 | SW846 8270C |
| Benzo(b)fluoranthene | 2.5 | 0.26 | 0.83 | | ug/L | | 05/23/03 | SW846 8270C |
| Benzo(ghi)perylene | 1.9 | 0.32 | 1.0 | | ug/L | | 05/23/03 | SW846 8270C |
| Benzo(k)fluoranthene | 2.4 | 0.38 | 1.2 | | ug/L | | 05/23/03 | SW846 8270C |
| Chrysene | 3.5 | 0.28 | 0.89 | | ug/L | | 05/23/03 | SW846 8270C |
| Dibenzo(a,h)anthracene | 0.83 | 0.32 | 1.0 | | ug/L | Q | 05/23/03 | SW846 8270C |
| Fluoranthene | 2.5 | 0.26 | 0.83 | | ug/L | | 05/23/03 | SW846 8270C |
| Fluorene | 0.75 | 0.34 | 1.1 | | ug/L | Q | 05/23/03 | SW846 8270C |
| Indeno(1,2,3-cd)pyrene | 1.8 | 0.42 | 1.3 | | ug/L | | 05/23/03 | SW846 8270C |
| Naphthalene | 66 | 4.8 | 15 | | ug/L | D | 05/24/03 | SW846 8270C |
| Phenanthrene | 2.8 | 0.32 | 1.0 | | ug/L | | 05/23/03 | SW846 8270C |
| Pyrene | 3.0 | 0.34 | 1.1 | | ug/L | | 05/23/03 | SW846 8270C |
| Nitrobenzene-d5 | 107 | | | | %Recov | | 05/23/03 | SW846 8270C |
| 2-Fluorobiphenyl | 76 | | | | %Recov | | 05/23/03 | SW846 8270C |

# En Chem Inc.

1241 Bellevue Street
Green Bay, WI 54302
920-469-2436
800-7-ENCHEM
Fax: 920-469-8827


## Analytical Report Number: 834526

**Client :** WILLIAMS ENVIRONMENTAL SERVICES
**Project Name** : FORMER MGP SITE, APPLETON
**Project Number**
**Field ID :** G6733/5-2-2/28

**Matrix Type** : WATER
**Collection Date :** 05/15/03
**Report Date :** 06/03/03
**Lab Sample Number** 834526-001

**PAH/ PNA** **Prep Method** SW846 3510 **Prep Date:** 05/22/03 **Analyst:** RJN

| Analyte | Result | LOD | LOQ | EQL | Units | Code | Analysis Date | Analysis Method |
|---|---|---|---|---|---|---|---|---|
| Terphenyl-d14 | 78 | | | | %Recov | | 05/23/03 | SW846 8270C |

# En Chem Inc.

1241 Bellevue Street
Green Bay, WI 54302
920-469-2436
800-7-ENCHEM
Fax: 920-469-8827


## Analytical Report Number: 834526

**Client :** WILLIAMS ENVIRONMENTAL SERVICES
**Matrix Type** : WATER
**Project Name** : FORMER MGP SITE, APPLETON
**Collection Date :** 05/15/03
**Project Number**
**Report Date :** 06/03/03
**Field ID :** G6733/4-2-2/28
**Lab Sample Number** 834526-002

### INORGANICS

| Test | | Result | LOD | LOQ | EQL | Units | Code | Analysis Date | Prep Method | Analysis Method | Analyst |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Arsenic | < | 5.8 | 5.8 | 18 | | ug/L | X | 05/22/03 | SW846 6010B | SW846 6010B | DLB |
| Lead | | 21 | 1.2 | 3.8 | | ug/L | X | 05/22/03 | SW846 6010B | SW846 6010B | DLB |
| Cyanide, Total | | 0.036 | 0.001 | 0.0048 | | mg/L | | 05/28/03 | EPA 335.4 | EPA 335.4 | DAW |
| pH, Laboratory | | 10 | | | | su | H | 05/21/03 | EPA 150.1 | EPA 150.1 | crw |

### BTEX

**Prep Method** SW846 5030B **Prep Date**: 05/22/03 **Analyst:** HW

| Analyte | Result | LOD | LOQ | EQL | Units | Code | Analysis Date | Analysis Method |
|---|---|---|---|---|---|---|---|---|
| Benzene | 15 | 0.41 | 1.3 | | ug/L | | 05/22/03 | SW846 8260B |
| Ethylbenzene | 6.3 | 0.54 | 1.7 | | ug/L | | 05/22/03 | SW846 8260B |
| Toluene | 22 | 0.67 | 2.1 | | ug/L | | 05/22/03 | SW846 8260B |
| Xylene, o | 7.0 | 0.83 | 2.6 | | ug/L | | 05/22/03 | SW846 8260B |
| Xylenes, m + p | 5.4 | 1.8 | 5.7 | | ug/L | Q | 05/22/03 | SW846 8260B |
| 4-Bromofluorobenzene | 126 | | | | %Recov | | 05/22/03 | SW846 8260B |
| Toluene-d8 | 123 | | | | %Recov | | 05/22/03 | SW846 8260B |
| Dibromofluoromethane | 129 | | | | %Recov | | 05/22/03 | SW846 8260B |

### PAH/ PNA

**Prep Method** SW846 3510 **Prep Date**: 05/22/03 **Analyst:** RJN

| Analyte | | Result | LOD | LOQ | EQL | Units | Code | Analysis Date | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|
| 1-Methylnaphthalene | | 8.0 | 3.6 | 11 | | ug/L | Q | 05/27/03 | SW846 8270C |
| 2-Methylnaphthalene | < | 3.4 | 3.4 | 11 | | ug/L | | 05/27/03 | SW846 8270C |
| Acenaphthene | < | 3.6 | 3.6 | 11 | | ug/L | | 05/27/03 | SW846 8270C |
| Acenaphthylene | < | 3.8 | 3.8 | 12 | | ug/L | | 05/27/03 | SW846 8270C |
| Anthracene | < | 4.0 | 4.0 | 13 | | ug/L | | 05/27/03 | SW846 8270C |
| Benzo(a)anthracene | < | 2.4 | 2.4 | 7.6 | | ug/L | | 05/27/03 | SW846 8270C |
| Benzo(a)pyrene | < | 2.8 | 2.8 | 8.9 | | ug/L | | 05/27/03 | SW846 8270C |
| Benzo(b)fluoranthene | < | 2.6 | 2.6 | 8.3 | | ug/L | | 05/27/03 | SW846 8270C |
| Benzo(ghi)perylene | < | 3.2 | 3.2 | 10 | | ug/L | | 05/27/03 | SW846 8270C |
| Benzo(k)fluoranthene | < | 3.8 | 3.8 | 12 | | ug/L | | 05/27/03 | SW846 8270C |
| Chrysene | < | 2.8 | 2.8 | 8.9 | | ug/L | | 05/27/03 | SW846 8270C |
| Dibenzo(a,h)anthracene | < | 3.2 | 3.2 | 10 | | ug/L | | 05/27/03 | SW846 8270C |
| Fluoranthene | < | 2.6 | 2.6 | 8.3 | | ug/L | | 05/27/03 | SW846 8270C |
| Fluorene | < | 3.4 | 3.4 | 11 | | ug/L | | 05/27/03 | SW846 8270C |
| Indeno(1,2,3-cd)pyrene | < | 4.2 | 4.2 | 13 | | ug/L | | 05/27/03 | SW846 8270C |
| Naphthalene | | 58 | 4.8 | 15 | | ug/L | | 05/27/03 | SW846 8270C |
| Phenanthrene | < | 3.2 | 3.2 | 10 | | ug/L | | 05/27/03 | SW846 8270C |
| Pyrene | < | 3.4 | 3.4 | 11 | | ug/L | | 05/27/03 | SW846 8270C |
| Nitrobenzene-d5 | < | NA | | | | %Recov | D | 05/27/03 | SW846 8270C |
| 2-Fluorobiphenyl | < | NA | | | | %Recov | D | 05/27/03 | SW846 8270C |

# En Chem Inc.

1241 Bellevue Street
Green Bay, WI 54302
920-469-2436
800-7-ENCHEM
Fax: 920-469-8827


## Analytical Report Number: 834526

**Client :** WILLIAMS ENVIRONMENTAL SERVICES
**Project Name** : FORMER MGP SITE, APPLETON
**Project Number**
**Field ID :** G6733/4-2-2/28

**Matrix Type** : WATER
**Collection Date :** 05/15/03
**Report Date :** 06/03/03
**Lab Sample Number** 834526-002

**PAH/ PNA** **Prep Method** SW846 3510 **Prep Date**: 05/22/03 **Analyst:** RJN

| Analyte | | Result | LOD | LOQ | EQL | Units | Code | Analysis Date | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|
| Terphenyl-d14 | < | NA | | | | %Recov | D | 05/27/03 | SW846 8270C |

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Fax: 920-469-8827


## Analytical Report Number: 834526

**Client :** WILLIAMS ENVIRONMENTAL SERVICES
**Project Name** : FORMER MGP SITE, APPLETON
**Project Number**
**Field ID :** G6733/19-2-2/28

**Matrix Type** : WATER
**Collection Date :** 05/15/03
**Report Date :** 06/03/03
**Lab Sample Number** 834526-003

### INORGANICS

| Test | | Result | LOD | LOQ | EQL | Units | Code | Analysis Date | Prep Method | Analysis Method | Analyst |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Arsenic | < | 5.8 | 5.8 | 18 | | ug/L | X | 05/22/03 | SW846 6010B | SW846 6010B | DLB |
| Lead | | 17 | 1.2 | 3.8 | | ug/L | X | 05/22/03 | SW846 6010B | SW846 6010B | DLB |
| Cyanide, Total | | 0.088 | 0.001 | 0.0048 | | mg/L | | 05/28/03 | EPA 335.4 | EPA 335.4 | DAW |
| pH, Laboratory | | 10 | | | | su | H | 05/21/03 | EPA 150.1 | EPA 150.1 | crw |

### BTEX

**Prep Method** SW846 5030B **Prep Date:** 05/22/03 **Analyst:** HW

| Analyte | Result | LOD | LOQ | EQL | Units | Code | Analysis Date | Analysis Method |
|---|---|---|---|---|---|---|---|---|
| Benzene | 15 | 0.41 | 1.3 | | ug/L | | 05/22/03 | SW846 8260B |
| Ethylbenzene | 7.5 | 0.54 | 1.7 | | ug/L | | 05/22/03 | SW846 8260B |
| Toluene | 22 | 0.67 | 2.1 | | ug/L | | 05/22/03 | SW846 8260B |
| Xylene, o | 7.9 | 0.83 | 2.6 | | ug/L | | 05/22/03 | SW846 8260B |
| Xylenes, m + p | 6.1 | 1.8 | 5.7 | | ug/L | | 05/22/03 | SW846 8260B |
| 4-Bromofluorobenzene | 125 | | | | %Recov | | 05/22/03 | SW846 8260B |
| Toluene-d8 | 127 | | | | %Recov | | 05/22/03 | SW846 8260B |
| Dibromofluoromethane | 122 | | | | %Recov | | 05/22/03 | SW846 8260B |

### PAH/ PNA

**Prep Method** SW846 3510 **Prep Date:** 05/22/03 **Analyst:** RJN

| Analyte | | Result | LOD | LOQ | EQL | Units | Code | Analysis Date | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|
| 1-Methylnaphthalene | | 7.3 | 3.6 | 11 | | ug/L | Q | 05/27/03 | SW846 8270C |
| 2-Methylnaphthalene | < | 3.4 | 3.4 | 11 | | ug/L | | 05/27/03 | SW846 8270C |
| Acenaphthene | < | 3.6 | 3.6 | 11 | | ug/L | | 05/27/03 | SW846 8270C |
| Acenaphthylene | | 3.9 | 3.8 | 12 | | ug/L | Q | 05/27/03 | SW846 8270C |
| Anthracene | < | 4.0 | 4.0 | 13 | | ug/L | | 05/27/03 | SW846 8270C |
| Benzo(a)anthracene | < | 2.4 | 2.4 | 7.6 | | ug/L | | 05/27/03 | SW846 8270C |
| Benzo(a)pyrene | < | 2.8 | 2.8 | 8.9 | | ug/L | | 05/27/03 | SW846 8270C |
| Benzo(b)fluoranthene | < | 2.6 | 2.6 | 8.3 | | ug/L | | 05/27/03 | SW846 8270C |
| Benzo(ghi)perylene | < | 3.2 | 3.2 | 10 | | ug/L | | 05/27/03 | SW846 8270C |
| Benzo(k)fluoranthene | < | 3.8 | 3.8 | 12 | | ug/L | | 05/27/03 | SW846 8270C |
| Chrysene | < | 2.8 | 2.8 | 8.9 | | ug/L | | 05/27/03 | SW846 8270C |
| Dibenzo(a,h)anthracene | < | 3.2 | 3.2 | 10 | | ug/L | | 05/27/03 | SW846 8270C |
| Fluoranthene | < | 2.6 | 2.6 | 8.3 | | ug/L | | 05/27/03 | SW846 8270C |
| Fluorene | < | 3.4 | 3.4 | 11 | | ug/L | | 05/27/03 | SW846 8270C |
| Indeno(1,2,3-cd)pyrene | < | 4.2 | 4.2 | 13 | | ug/L | | 05/27/03 | SW846 8270C |
| Naphthalene | | 67 | 4.8 | 15 | | ug/L | | 05/27/03 | SW846 8270C |
| Phenanthrene | < | 3.2 | 3.2 | 10 | | ug/L | | 05/27/03 | SW846 8270C |
| Pyrene | < | 3.4 | 3.4 | 11 | | ug/L | | 05/27/03 | SW846 8270C |
| Nitrobenzene-d5 | < | NA | | | | %Recov | D | 05/27/03 | SW846 8270C |
| 2-Fluorobiphenyl | < | NA | | | | %Recov | D | 05/27/03 | SW846 8270C |

# En Chem Inc.

1241 Bellevue Street
Green Bay, WI 54302
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800-7-ENCHEM
Fax: 920-469-8827


## Analytical Report Number: 834526

**Client :** WILLIAMS ENVIRONMENTAL SERVICES
**Project Name :** FORMER MGP SITE, APPLETON
**Project Number**
**Field ID :** G6733/19-2-2/28

**Matrix Type :** WATER
**Collection Date :** 05/15/03
**Report Date :** 06/03/03
**Lab Sample Number** 834526-003

**PAH/ PNA** **Prep Method** SW846 3510 **Prep Date:** 05/22/03 **Analyst:** RJN

| Analyte | | Result | LOD | LOQ | EQL | Units | Code | Analysis Date | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|
| Terphenyl-d14 | < | NA | | | | %Recov | D | 05/27/03 | SW846 8270C |

# En Chem Inc.

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Fax: 920-469-8827


## Analytical Report Number: 834526

**Client :** WILLIAMS ENVIRONMENTAL SERVICES
**Project Name :** FORMER MGP SITE, APPLETON
**Project Number**
**Field ID :** G6733/6-2-2/28

**Matrix Type :** WATER
**Collection Date :** 05/15/03
**Report Date :** 06/03/03
**Lab Sample Number** 834526-004

### INORGANICS

| Test | | Result | LOD | LOQ | EQL | Units | Code | Analysis Date | Prep Method | Analysis Method | Analyst |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Arsenic | < | 5.8 | 5.8 | 18 | | ug/L | X | 05/22/03 | SW846 6010B | SW846 6010B | DLB |
| Lead | | 5.1 | 1.2 | 3.8 | | ug/L | X | 05/22/03 | SW846 6010B | SW846 6010B | DLB |
| Cyanide, Total | | 0.046 | 0.001 | 0.0048 | | mg/L | | 05/28/03 | EPA 335.4 | EPA 335.4 | DAW |
| pH, Laboratory | | 10 | | | | su | H | 05/21/03 | EPA 150.1 | EPA 150.1 | crw |

### BTEX

**Prep Method** SW846 5030B **Prep Date:** 05/22/03 **Analyst:** HW

| Analyte | Result | LOD | LOQ | EQL | Units | Code | Analysis Date | Analysis Method |
|---|---|---|---|---|---|---|---|---|
| Benzene | 8.5 | 0.41 | 1.3 | | ug/L | | 05/22/03 | SW846 8260B |
| Ethylbenzene | 3.1 | 0.54 | 1.7 | | ug/L | | 05/22/03 | SW846 8260B |
| Toluene | 8.7 | 0.67 | 2.1 | | ug/L | | 05/22/03 | SW846 8260B |
| Xylene, o | 3.5 | 0.83 | 2.6 | | ug/L | | 05/22/03 | SW846 8260B |
| Xylenes, m + p | 2.5 | 1.8 | 5.7 | | ug/L | Q | 05/22/03 | SW846 8260B |
| 4-Bromofluorobenzene | 125 | | | | %Recov | | 05/22/03 | SW846 8260B |
| Toluene-d8 | 126 | | | | %Recov | | 05/22/03 | SW846 8260B |
| Dibromofluoromethane | 121 | | | | %Recov | | 05/22/03 | SW846 8260B |

### PAH/ PNA

**Prep Method** SW846 3510 **Prep Date:** 05/22/03 **Analyst:** RJN

| Analyte | | Result | LOD | LOQ | EQL | Units | Code | Analysis Date | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|
| 1-Methylnaphthalene | | 4.7 | 1.8 | 5.7 | | ug/L | Q | 05/27/03 | SW846 8270C |
| 2-Methylnaphthalene | | 2.1 | 1.7 | 5.4 | | ug/L | Q | 05/27/03 | SW846 8270C |
| Acenaphthene | < | 1.8 | 1.8 | 5.7 | | ug/L | | 05/27/03 | SW846 8270C |
| Acenaphthylene | | 2.6 | 1.9 | 6.1 | | ug/L | Q | 05/27/03 | SW846 8270C |
| Anthracene | < | 2.0 | 2.0 | 6.4 | | ug/L | | 05/27/03 | SW846 8270C |
| Benzo(a)anthracene | < | 1.2 | 1.2 | 3.8 | | ug/L | | 05/27/03 | SW846 8270C |
| Benzo(a)pyrene | < | 1.4 | 1.4 | 4.5 | | ug/L | | 05/27/03 | SW846 8270C |
| Benzo(b)fluoranthene | < | 1.3 | 1.3 | 4.1 | | ug/L | | 05/27/03 | SW846 8270C |
| Benzo(ghi)perylene | < | 1.6 | 1.6 | 5.1 | | ug/L | | 05/27/03 | SW846 8270C |
| Benzo(k)fluoranthene | < | 1.9 | 1.9 | 6.1 | | ug/L | | 05/27/03 | SW846 8270C |
| Chrysene | < | 1.4 | 1.4 | 4.5 | | ug/L | | 05/27/03 | SW846 8270C |
| Dibenzo(a,h)anthracene | < | 1.6 | 1.6 | 5.1 | | ug/L | | 05/27/03 | SW846 8270C |
| Fluoranthene | < | 1.3 | 1.3 | 4.1 | | ug/L | | 05/27/03 | SW846 8270C |
| Fluorene | < | 1.7 | 1.7 | 5.4 | | ug/L | | 05/27/03 | SW846 8270C |
| Indeno(1,2,3-cd)pyrene | < | 2.1 | 2.1 | 6.7 | | ug/L | | 05/27/03 | SW846 8270C |
| Naphthalene | | 36 | 2.4 | 7.6 | | ug/L | | 05/27/03 | SW846 8270C |
| Phenanthrene | < | 1.6 | 1.6 | 5.1 | | ug/L | | 05/27/03 | SW846 8270C |
| Pyrene | < | 1.7 | 1.7 | 5.4 | | ug/L | | 05/27/03 | SW846 8270C |
| Nitrobenzene-d5 | < | NA | | | | %Recov | D | 05/27/03 | SW846 8270C |
| 2-Fluorobiphenyl | < | NA | | | | %Recov | D | 05/27/03 | SW846 8270C |

# En Chem Inc.

1241 Bellevue Street
Green Bay, WI 54302
920-469-2436
800-7-ENCHEM
Fax: 920-469-8827


## Analytical Report Number: 834526

**Client :** WILLIAMS ENVIRONMENTAL SERVICES
**Project Name :** FORMER MGP SITE, APPLETON
**Project Number**
**Field ID :** G6733/6-2-2/28

**Matrix Type :** WATER
**Collection Date :** 05/15/03
**Report Date :** 06/03/03
**Lab Sample Number** 834526-004

**PAH/ PNA** **Prep Method** SW846 3510 **Prep Date:** 05/22/03 **Analyst:** RJN

| Analyte | | Result | LOD | LOQ | EQL | Units | Code | Analysis Date | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|
| Terphenyl-d14 | < | NA | | | | %Recov | D | 05/27/03 | SW846 8270C |

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Fax: 920-469-8827


## Analytical Report Number: 834526

**Client :** WILLIAMS ENVIRONMENTAL SERVICES
**Matrix Type :** WATER
**Project Name :** FORMER MGP SITE, APPLETON
**Collection Date :** 05/15/03
**Project Number**
**Report Date :** 06/03/03
**Field ID :** G6733/12-1-2/28
**Lab Sample Number** 834526-005

### INORGANICS

| Test | | Result | LOD | LOQ | EQL | Units | Code | Analysis Date | Prep Method | Analysis Method | Analyst |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Arsenic | < | 5.8 | 5.8 | 18 | | ug/L | X | 05/22/03 | SW846 6010B | SW846 6010B | DLB |
| Lead | | 22 | 1.2 | 3.8 | | ug/L | X | 05/22/03 | SW846 6010B | SW846 6010B | DLB |
| Cyanide, Total | | 0.082 | 0.001 | 0.0048 | | mg/L | | 05/28/03 | EPA 335.4 | EPA 335.4 | DAW |
| pH, Laboratory | | 10 | | | | su | H | 05/21/03 | EPA 150.1 | EPA 150.1 | crw |

### BTEX

**Prep Method** SW846 5030B **Prep Date:** 05/22/03 **Analyst:** HW

| Analyte | Result | LOD | LOQ | EQL | Units | Code | Analysis Date | Analysis Method |
|---|---|---|---|---|---|---|---|---|
| Benzene | 9.0 | 0.41 | 1.3 | | ug/L | | 05/22/03 | SW846 8260B |
| Ethylbenzene | 7.4 | 0.54 | 1.7 | | ug/L | | 05/22/03 | SW846 8260B |
| Toluene | 19 | 0.67 | 2.1 | | ug/L | | 05/22/03 | SW846 8260B |
| Xylene, o | 7.7 | 0.83 | 2.6 | | ug/L | | 05/22/03 | SW846 8260B |
| Xylenes, m + p | 6.3 | 1.8 | 5.7 | | ug/L | | 05/22/03 | SW846 8260B |
| 4-Bromofluorobenzene | 124 | | | | %Recov | | 05/22/03 | SW846 8260B |
| Toluene-d8 | 124 | | | | %Recov | | 05/22/03 | SW846 8260B |
| Dibromofluoromethane | 126 | | | | %Recov | | 05/22/03 | SW846 8260B |

### PAH/ PNA

**Prep Method** SW846 3510 **Prep Date:** 05/22/03 **Analyst:** RJN

| Analyte | Result | LOD | LOQ | EQL | Units | Code | Analysis Date | Analysis Method |
|---|---|---|---|---|---|---|---|---|
| 1-Methylnaphthalene | 6.8 | 0.36 | 1.1 | | ug/L | | 05/23/03 | SW846 8270C |
| 2-Methylnaphthalene | 3.3 | 0.34 | 1.1 | | ug/L | | 05/23/03 | SW846 8270C |
| Acenaphthene | 1.2 | 0.36 | 1.1 | | ug/L | | 05/23/03 | SW846 8270C |
| Acenaphthylene | 4.6 | 0.38 | 1.2 | | ug/L | | 05/23/03 | SW846 8270C |
| Anthracene | 1.3 | 0.40 | 1.3 | | ug/L | | 05/23/03 | SW846 8270C |
| Benzo(a)anthracene | 1.00 | 0.24 | 0.76 | | ug/L | | 05/23/03 | SW846 8270C |
| Benzo(a)pyrene | 1.4 | 0.28 | 0.89 | | ug/L | | 05/23/03 | SW846 8270C |
| Benzo(b)fluoranthene | 0.81 | 0.26 | 0.83 | | ug/L | Q | 05/23/03 | SW846 8270C |
| Benzo(ghi)perylene | 0.75 | 0.32 | 1.0 | | ug/L | Q | 05/23/03 | SW846 8270C |
| Benzo(k)fluoranthene | 0.81 | 0.38 | 1.2 | | ug/L | Q | 05/23/03 | SW846 8270C |
| Chrysene | 0.86 | 0.28 | 0.89 | | ug/L | Q | 05/23/03 | SW846 8270C |
| Dibenzo(a,h)anthracene | < 0.32 | 0.32 | 1.0 | | ug/L | | 05/23/03 | SW846 8270C |
| Fluoranthene | 0.44 | 0.26 | 0.83 | | ug/L | Q | 05/23/03 | SW846 8270C |
| Fluorene | 0.43 | 0.34 | 1.1 | | ug/L | Q | 05/23/03 | SW846 8270C |
| Indeno(1,2,3-cd)pyrene | 0.70 | 0.42 | 1.3 | | ug/L | Q | 05/23/03 | SW846 8270C |
| Naphthalene | 67 | 4.8 | 15 | | ug/L | D | 05/24/03 | SW846 8270C |
| Phenanthrene | 0.87 | 0.32 | 1.0 | | ug/L | Q | 05/23/03 | SW846 8270C |
| Pyrene | 0.49 | 0.34 | 1.1 | | ug/L | Q | 05/23/03 | SW846 8270C |
| Nitrobenzene-d5 | 92 | | | | %Recov | | 05/23/03 | SW846 8270C |
| 2-Fluorobiphenyl | 77 | | | | %Recov | | 05/23/03 | SW846 8270C |

# En Chem Inc.

1241 Bellevue Street
Green Bay, WI 54302
920-469-2436
800-7-ENCHEM
Fax: 920-469-8827


## Analytical Report Number: 834526

**Client :** WILLIAMS ENVIRONMENTAL SERVICES
**Matrix Type** : WATER
**Project Name** : FORMER MGP SITE, APPLETON
**Collection Date :** 05/15/03
**Project Number**
**Report Date :** 06/03/03
**Field ID :** G6733/12-1-2/28
**Lab Sample Number** 834526-005

**PAH/ PNA** **Prep Method** SW846 3510 **Prep Date**: 05/22/03 **Analyst:** RJN

| Analyte | Result | LOD | LOQ | EQL | Units | Code | Analysis Date | Analysis Method |
|---|---|---|---|---|---|---|---|---|
| Terphenyl-d14 | 74 | | | | %Recov | | 05/23/03 | SW846 8270C |

VJH

# ACCURA ANALYTICAL LABORATORIES, INC.

## ACCURA GEOTECHNICAL LABORATORY

AASHTO R18

834526


3342 INTERNATIONAL PARK DRIVE
ATLANTA, GA 30316
PHONE: (404) 241-4774 ext. 205 (404) 248-5405
FAX: ~~(404) 248-5424~~ (404) 241-4577

MAIN OFFICE: 6017 FINANCIAL DRIVE
NORCROSS, GA 30071
PHONE: (770) 449-8800
FAX: (770) 449-5477


Subcontractor

# CHAIN OF CUSTODY

Company Name: Williams Environmental Service Billing address:

Address: 2810 Donegan Circle
Suite 102 Amarillo, TX 79109

Report Sent to (Client Contact): Thomas de Grood Contact Phone #: 806-457-0800 Fax #: 801-340-3326

Project Name: Former MGP Site, Appleton Project Number: Client P.O. #:

Samplers(signature) Samplers(printed)

Client E-mail:

*If AASHTO or other METHOD required please INDICATE

AGL PROJECT # G03-0002.01

TESTS and ANALYSIS (ASTM TEST METHOD*)

| Client Sample ID # | Sample Location | Sample Type | Accura Sample ID # | Std. Proctor(D698) | Mod. Proctor (D1557) | Moisture Content(D2216) | Atterberg Limits (D4318) | Specific Gravity(D854) | Sieve Analysis(D422,C136) | Sieve An. with Hydro(D422) | # 200 Sieve(D1140,C117) | Rigid Wall Perm(D2434) | Flex. Wall Perm(D5084) | CU Triaxial(D4767) | UU Triaxial(D2850) | UCS(D2166) | Direct Shear(D3080) | Consolidation(D2435) | USCS(D2487) | BTEX 8260 plus TMB | PAH | As, Pb (6010) | Cyanide, pH | Remarks, Conditions and Parameters of Testing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| G6733/5-2-2/28(2) | 28 | 28 day leach | G 001 | | | | | | | | | | | | | | | | | ✓ | ✓ | ✓ | ✓ | 2-1L Poly A |
| G6733/4-2-2/28(2) | 28 | 28 day leach | G 002 | | | | | | | | | | | | | | | | | | | | | |
| G6733/9-2-2/28(2) | 28 | 28 day leach | G 003 | | | | | | | | | | | | | | | | | | | | | |
| G6733/6-2-2/28(2) | 28 | 28 day leach | G 004 | | | | | | | | | | | | | | | | | | | | | |
| G6733/12-1-2/28(2) | 28 | 28 day leach | G 005 | | | | | | | | | | | | | | | | | | | | | |
| | | | G | | | | | | | | | | | | | | | | | | | | | Do not digest Metals |
| | | | G | | | | | | | | | | | | | | | | | | | | | Normal TAT per TdG 5/21/13 |
| | | | G | | | | | | | | | | | | | | | | | | | | | |
| | | | G | | | | | | | | | | | | | | | | | | | | | |
| | | | G | | | | | | | | | | | | | | | | | | | | | |

| Relinquished By | Date/Time | Received By | Date/Time |
|---|---|---|---|
| Thomas de Grood | 5/15/03 11:30 | | |
| Relinquished By | Date/Time | Received By | Date/Time |
| Ted G | 5/19/03 10:00 | L. Hamm | 5/19/03 10:00 |

Special Requirements

Please contact Thomas de Grood (806-457-0800) for testing

# EN CHEM INC.

## Green Bay to Kimberly Sample Transfer Record

Client: Accura Analytical

QT? ☐ yes ☒ no Due:

Rec Temp: Ro I

| Lab No. | Collection Date | Collection Time | Matrix | ANALYSES REQUESTED: Cyanide | TOTAL # OF BOTTLES SENT | COMMENTS |
|---|---|---|---|---|---|---|
| 834326-001 | | | W | Y | 1 | 1-250mL plastic |
| -002 | | | ↓ | Y | 1 | ↓ |
| -003 | | | | Y | 1 | |
| -004 | | | | Y | 1 | |
| -005 | | | | X | 1 | |

| Relinquished By: | Date/Time: | Received By: | Date/Time: |
|---|---|---|---|
| Kelly Kantanski | 5/20/03 | Brad Schwarzen | 5-21-03 |
| Relinquished By: | Date/Time: | Received By: | Date/Time: |
| Brad Schwarzen | 5-21-03 | Lori Stevens | 5/21/03 8:45 |
| Relinquished By: | Date/Time: | Received By: | Date/Time: |

COMMENTS:

Cooler Custody Seal (if applicable)
Intact / Not Intact

Version 1.0, 10/00

*En Chem, Inc.*

**Inorganic Data Qualifiers**

| | |
|---|---|
| A | Analyte is detected in the method blank. Method blank criteria is evaluated to the laboratory method detection limit. Additionally, method blank acceptance may be based on project specific criteria or determined from analyte concentrations in the sample and are evaluated on a sample by sample basis. |
| B | The analyte has been detected between the method detection limit and the reporting limit. |
| C | Elevated detection limit due to matrix effects. |
| E | Estimated concentration due to matrix interferences. During the metals analysis using the inductively coupled plasma (ICP), the serial dilution failed to meet the established control limits of 0-10% and the sample concentration is greater than 50 times the IDL (100 times the IDL for analysis done on the ICP-MS). The result was flagged with the E qualifier to Indicate that a physical interference was observed. |
| F | Due to potential interferences for this analysis by Inductively Coupled Plasma techniques (SW-846 Method 6010), this analyte has been confirmed by and reported from an alternate method. |
| H | Preservation or analysis performed past holding time. |
| K | Sample received unpreserved. Sample was either preserved at the time of receipt or at the time of sample preparation. |
| L | Elevated detection limit due to low sample volume. |
| N | Spiked sample recovery not within control limits. |
| Q | The analyte has been detected between the limit of detection (LOD) and limit of quantitation (LOQ). The results are qualified due to the uncertainty of analyte concentrations within this range. |
| U | The analyte was not detected above the reporting limit. |
| X | See sample narrative. |
| & | Laboratory Control Spike recovery not within control limits. |
| * | Duplicate analyses not within control limits. |
| 1 | Dissolved analyte or filtered analyte greater than total analyte; analyses passed QC based on precision criteria. |
| 2 | Dissolved analyte or filtered analyte greater than total analyte; analyses failed QC based on precision criteria. |
| 3 | BOD result is estimated due to the BOD blank exceeding the allowable oxygen depletion. |
| 4 | BOD duplicate precision not within control limits. Due to the 48 hour holding time for this test, it is not practical to reanalyze and try to correct the deficiency. |
| 5 | BOD result is estimated due to insufficient oxygen depletion. Due to the 48 hour holding time for this test, it is not practical to reanalyze and try to correct the deficiency. |
| 6 | BOD laboratory control sample not within control limits. Due to the 48 hour holding time for this test, it is not practical to reanalyze and try to correct the deficiency. |
| 7 | BOD result is estimated due to complete oxygen depletion. Due to the 48 hour holding time for this test, it is not practical to reanalyze and try to correct the deficiency. |

# APPENDIX B

# REPLACEMENT SECTION 6.4

Upon completion of the ISCO treatment of the lower till, all of the injection wells will be abandoned in-place in accordance with the requirements of NR 141.25.

## 6.4 Phase IV: Post Remedial Performance Monitoring

### 6.4.1 Proposed Monitoring Well Installation

Three bedrock piezometers will be installed to further address bedrock groundwater quality. Three bedrock piezometers (PZ-04-07B, PZ-04-12B, and PZ-04-15B) are proposed to be nested with the monitoring wells of the same number (Sheet 12). Installation of these piezometers will facilitate remedial groundwater monitoring in the bedrock.

An upgradient groundwater monitoring nest MW-04-19S/D is proposed north of the existing inactive gas holder structure in an area upgradient of monitoring well MW-01-11. This well nest will provide post-remedial groundwater monitoring data for shallow and deep groundwater to assess remedy effectiveness.

Three lower till monitoring wells MW-7RD, MW-01-12D, and MW-01-15D that are to be abandoned will be replaced with wells located within the same vicinity as the previous wells. A licensed drilling company will install the wells per NR 141. These wells will be named MW-04-7RD, MW-04-12D, and MW-04-15D. Shallow monitoring wells and piezometers (PZ-01-01 and PZ-01-02) will not be replaced, as they would be screened in the ISS monolith.

### 6.4.2 ISCO Groundwater Monitoring Evaluation

Recommend twice/mo (bi-monthly on pg 6-22)

After site restoration activities are completed at the site, post remedial groundwater monitoring will be conducted once a month for the first three months then quarterly thereafter to evaluate and confirm ISCO requirements. The proposed monitoring plan is to sample and measure water levels for wells MW-04-7RD, MW-04-12D, MW-04-15D, and MW-04-19D.

S/D? rest

What about the bedrock piezometers? PZ-04 (7B, 12B+15B)

Monthly monitoring of these wells will consist of the following parameters:

- Contaminant Parameters: VOCs (USEPA 8260), PAHs (USEPA 8310), and available cyanide (OIA-1677);
- Field Measured Parameters: Alkalinity, pH, dissolved oxygen, temperature, specific conductance, oxidation / reduction potential; and,
- Geochemical Parameters: Nitrate, manganese, ferrous and total iron, sulfate, methane and alkalinity.

The duration and appropriateness of this program may be altered if conditions indicate one or more of the following:

- ISCO requirements are more limited than currently estimated or may not be necessary based on the effectiveness of ISS in Treatment Zone 2;
- The actual quantity of contaminant mass treated during ISS can no longer contribute dissolved phase COCs to lower till groundwater; and,
- Observation of a stable and/or receding plume.

### 6.4.3 Post Remedial Groundwater Monitoring Plan

Quarterly monitoring will be performed for the first two years after ISCO bi-monthly groundwater monitoring is completed to establish seasonal trends and to interpret if dissolved phase groundwater contaminants are receding or stabilizing. The proposed monitoring plan is to sample and measure water levels for the wells listed in Section 6.4.1 including the proposed bedrock wells.

+ sVOCs B(a)P + BEHP (sVOC) phenol naph

Proposed groundwater monitoring will consist of the following parameters:

- Contaminant Parameters: VOCs (USEPA 8260), PAHs (USEPA 8310), and available cyanide (OIA-1677);
- Field Measured Parameters: Alkalinity, pH, dissolved oxygen, temperature, specific conductance, oxidation / reduction potential; and,
- Geochemical Parameters: Nitrate, manganese, ferrous and total iron, sulfate,

methane and alkalinity.

The contaminant parameters and field measured parameters will be collected quarterly. Geochemical parameters will be analyzed semiannually. In addition, RCRA metals will be sampled semiannually. These parameters and frequency are proposed in conjunction with the *Guidance of Natural Attenuation for Petroleum Releases* PUB-RR-614 March 2003. The data will be used to evaluate the following:

- Decrease in MGP residual concentrations (e.g., total BTEX, naphthalene);
- Increasing geochemical; trends (i.e., ferrous iron) or decreasing geochemical trends (i.e., sulfate, nitrate) that may change with increasing biological activity; and,
- Changes in dissolved oxygen trends.

As requested by the WDNR in the October 4, 2001 letter, MW-08, MW-09 and MW-10 were sampled in 2002 for sulfate, chloride and cyanide. MW-9 exhibits of high levels of sulfate and chloride (Table 6). Quarterly sampling at MW-9 will continue for sulfate and chloride analyses; cyanide will not be sampled from the well. Also, MW-8 quarterly sampling of sulfate and cyanide will continue to evaluate off-site groundwater quality. Groundwater monitoring of MW-10 will be eliminated from the monitoring plan. The new well nest (MW-04-19S/D) will be used for upgradient groundwater monitoring.

OIA-1677?

The groundwater monitoring objective is to assess natural attenuation as a final remedy for the lower till groundwater. Natural attenuation monitoring will be used to evaluate the contaminant plume for decreasing contaminant concentrations in groundwater and for evidence of biodegradation processes. Progress reports including Form 4400-194 will be submitted to the WDNR semi-annually. Future groundwater monitoring frequencies beyond the initial two year period will be reassessed on the basis of remedy performance and in accordance with WDNR approval. In addition, recommendations may be developed to reduce the number of monitoring wells that are included for future monitoring events.

Progress reports quarterly O&M semi-(active) O&M annual (passive)

# APPENDIX C

# 2002 SITE INVESTIGATION LANDFILL DISPOSAL MANIFEST

**(DRIVER:** PLEASE SIGN BELOW)

006538

REFERENCE NO.
444678
12/26/2002

**DRIVER SIGN HERE**

| Loc ID | LOCATION County | ST Pct |
|---|---|---|
| OUTAGAMI | OUTAGAMIE | WI 100% |

GROSS: 33,390
TARE: 18,290
NET: 15,100

| | Oper | Time | Date |
|---|---|---|---|
| In: | LMD | 10:51 AM | 12/26/2002 |
| Out: | LMD | 11:06 AM | 12/26/2002 |

RIDGEVIEW RDF
WASTE MANAGEMENT
PO BOX 227
WHITELAW WI 54247
920/732-4473 FAX: 920/732-3758

COMMENTS:
WE ENERGIES/COAL TAR CONT SOIL

| CUSTOMER NO. | TRUCK NO. |
|---|---|
| 7002054 | 496105 |

PROFILE NO
4844976
MANIFEST NO.
PERMIT NO

CUSTOMER:
WASTE MANAGEMENT/NORTHEAST
P O BOX 227
WHITELAW WI 54247

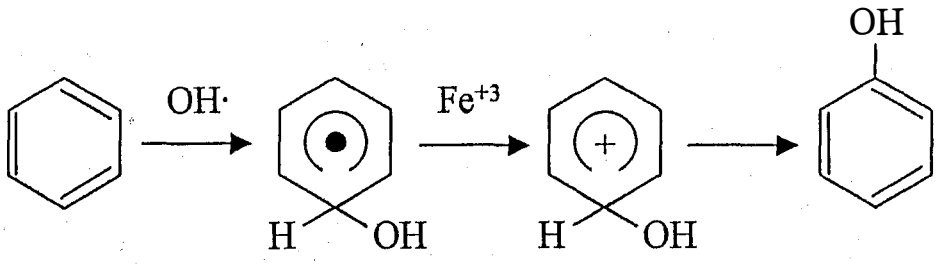
| LOAD CODE | LOAD DESCRIPTION | LOAD QUANTITY | AMOUNT |
|---|---|---|---|
| 658 | CONTAMINATED SOIL | 0.00 | |
| 111 | WI GENERATOR TAX/FEE | 0.00 | |

COPY 1

# APPENDIX D

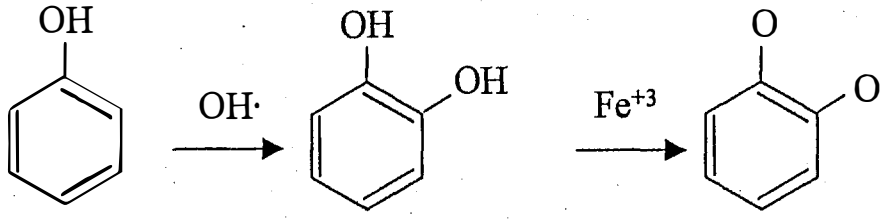
## *REMEDIAL DESIGN REPORT*
## APPENDIX E: GEO-CLEANSE TABLES AND FIGURES

**Step 1. Benzene Hydroxylation to Phenol**



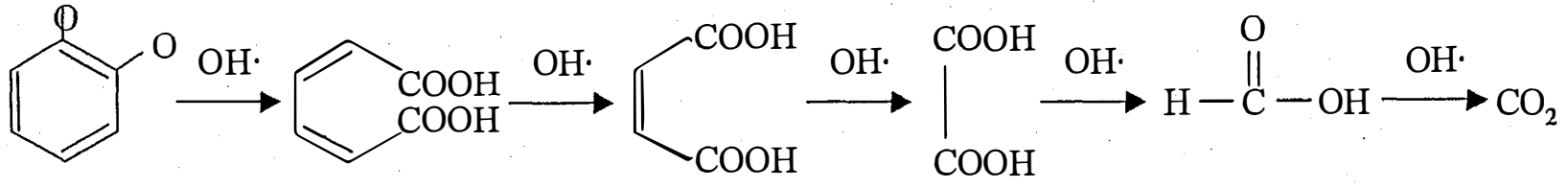

Benzene — Hydroxycyclohexadienyl Intermediates — Phenol

**Step 2. Phenol Oxidation to Benzoquinone**




Phenol — Dihydroxybenzene — Orthobenzoquinone

**Step 3. Carboxylic Acid Formation and Oxidation to Carbon Dioxide**




Orthobenzoquinone — Muconic Acid — Maleic Acid — Oxalic Acid — Formic Acid — Carbon Dioxide

*References: Edwards and Curci 1992; Scheck and Frimmel, 1995*

**Figure 2-1. Benzene Oxidation Pathway**

Geo-Cleanse® International, Inc.

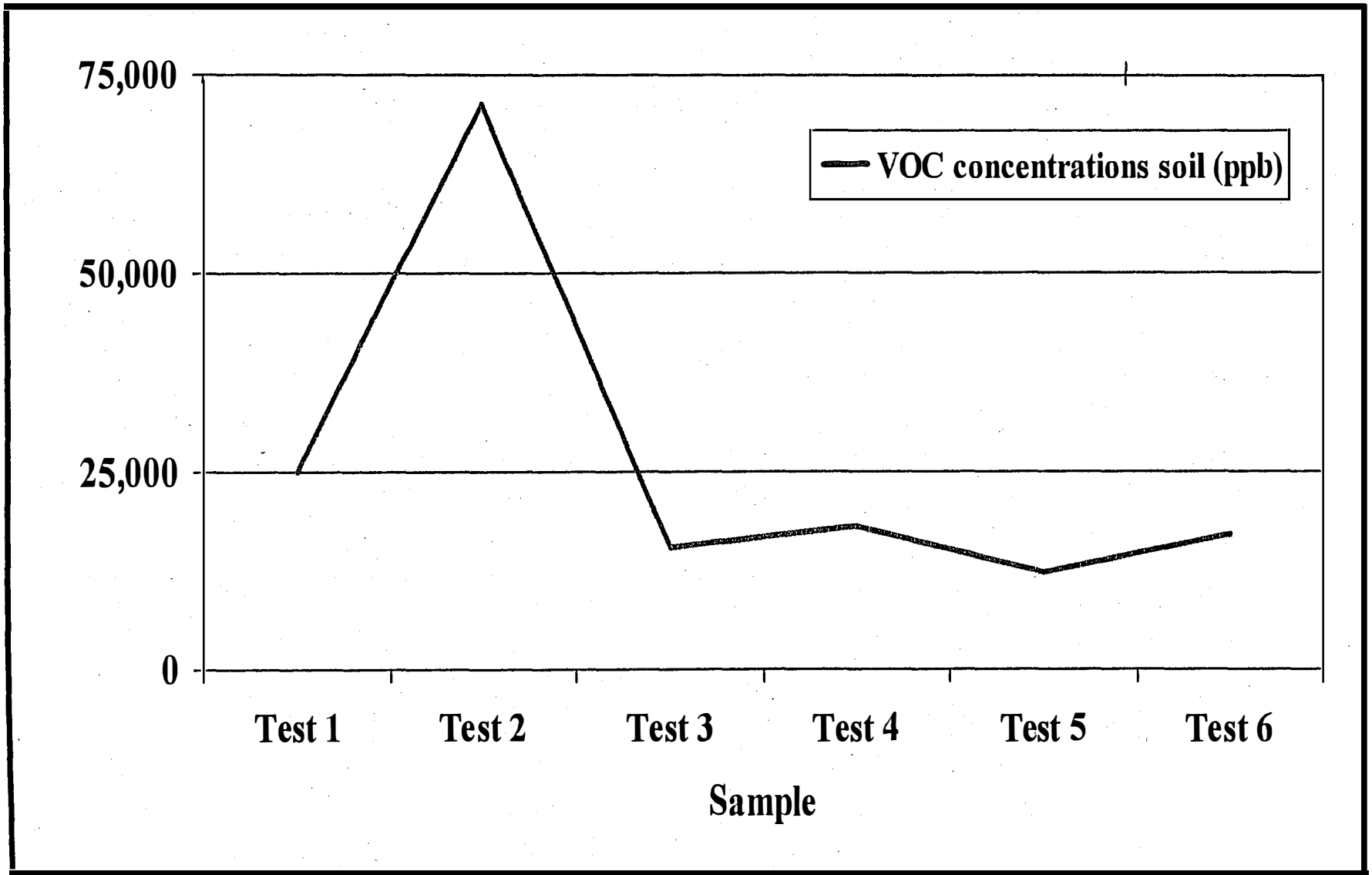



Figure 5-2. We Energies Treated Soil VOC Results

Geo-Cleanse® International, Inc.

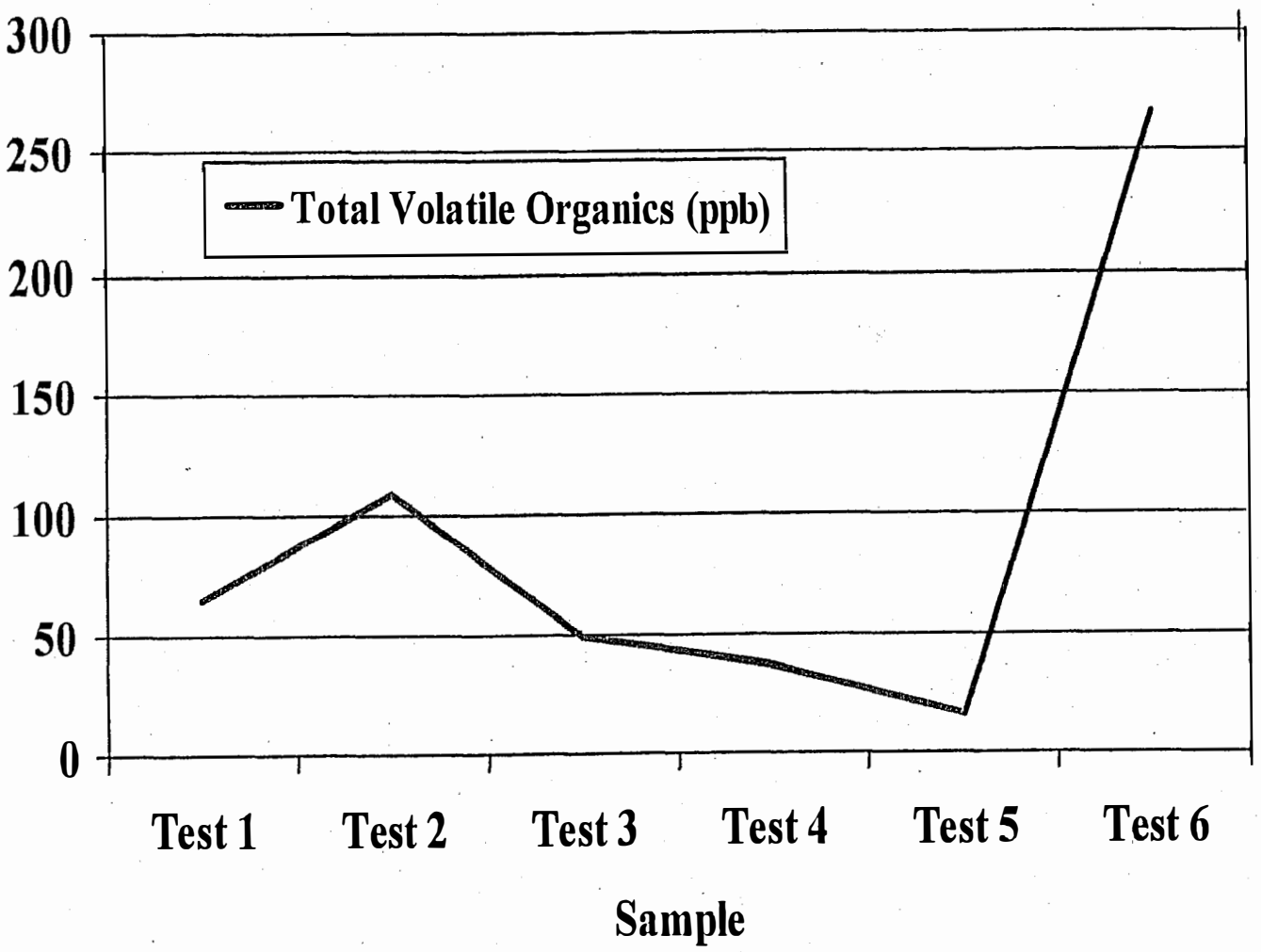



**Figure 5-1. We Energies Treated Liquid Phase VOC Results**

Geo-Cleanse®
International, Inc.

Table 4-1. Test Setup and Experimental Conditions

| Test Identification | Target Mass Ratio $H_2O_2$ : Contaminant | Soil Mass (g) | % Solids (from Baseline) | Soil Mass (g) | Adsorbed Water (mL) | Volume Water Added (mL) | Volume Catalyst Added (mL) | Volume 35% $H_2O_2$ Added (ml) | $H_2O_2$ Mass Added (g) | Total Liquid Volume (mL) (Adsorbed + Groundwater + Catalyst + $H_2O_2$) |
|---|---|---|---|---|---|---|---|---|---|---|
| Test 1 | Control | 2,500 | 89% | 2,225 | 275 | 2,500 | 0 | 0 | 0 | 2,775 |
| Test 2 | 10:1 | 2,500 | 89% | 2,225 | 275 | 378.9 | 1,500 | 21.1 | 21.1 | 2,175 |
| Test 3 | 20:1 | 2,500 | 89% | 2,225 | 275 | 357.8 | 1,500 | 42.2 | 42.2 | 2,175 |
| Test 4 | 30:1 | 2,500 | 89% | 2,225 | 275 | 336.7 | 1,500 | 63.3 | 63.3 | 2,175 |
| Test 5 | 40:1 | 2,500 | 89% | 2,225 | 275 | 315.6 | 1,500 | 84.4 | 84.4 | 2,175 |
| Test 6 | 50:1 | 2,500 | 89% | 2,225 | 275 | 294.5 | 1,500 | 105.5 | 105.5 | 2,175 |

**Table 5-1. Analytical Results Fenton's Reagent Oxidation Test**

| Sample | | | Baseline | | Test 1 (Control) | | Test 2 (10:1) | | Test 3 (20:1) | | Test 4 (30:1) | | Test 5 (40:1) | | Test 6 (50:1) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Actual $H_2O_2$ : Contaminant Mass Ratio | | | Not Applicable | | Zero | | | | | | | | | | | |
| | Compound / Result | Enforcement Standard | Water µg/L | Soil µg/kg | Water µg/L | Soil µg/kg | Water µg/L | Soil µg/kg | Water µg/L | Soil µg/kg | Water µg/L | Soil µg/kg | Water µg/L | Soil µg/kg | Water µg/L | Soil µg/kg |
| Semi-Volatiles | Acenaphthene | | <92 | 2,500 | 10 | 930 | <4.6 | 1,100 | <4.6 | 620 | <4.6 | 710 | <4.6 | 440 | <9.2 | 360 |
| | Acenaphthylene | | <94 | <600 | <4.7 | 350 | <4.7 | 760 | <4.7 | 200 | <4.7 | 280 | <4.7 | 170 | <9.4 | 280 |
| | Anthracene | 3000 | <56 | 2,400 | <2.8 | 1,400 | <2.8 | 4,500 | <2.8 | 930 | <2.8 | 1,000 | <2.8 | 680 | 9.6 | 1,000 |
| | Benzo(a)anthracene | | <34 | 2,000 | 3.6 | 1,800 | 2.2 | 4,600 | 3.5 | 1,200 | 4 | 1,300 | 2.3 | 990 | 27 | 1,300 |
| | Benzo(a)pyrene | 0.2 | <30 | 1,300 | 3.1 | 1,400 | 1.6 | 3,000 | 2.7 | 780 | 3.6 | 960 | <1.5 | 700 | 23 | 890 |
| | Benzo(b)fluoranthene | 0.2 | <44 | 800 | <2.2 | 1,000 | <2.2 | 2,600 | <2.2 | 650 | 2.4 | 790 | <2.2 | 490 | 18 | 730 |
| | Benzo(g,h,i)perylene | | <42 | 680 | <2.1 | 580 | <2.1 | 1,500 | <2.1 | 340 | 2.4 | 470 | <2.1 | 290 | 14 | 430 |
| | Benzo(k)fluoranthene | | <48 | 1,200 | 2.6 | 1,400 | <2.2 | 3,500 | 2.7 | 800 | 3.3 | 930 | <2.4 | 650 | 22 | 930 |
| | Carbazole | | <28 | <600 | <1.4 | <160 | <1.4 | <630 | <1.4 | <160 | <1.4 | <160 | <1.4 | <160 | <2.8 | <150 |
| | Chrysene | 0.2 | <36 | 2,200 | 3.9 | 1,700 | 2.8 | 4,500 | 4.3 | 1,100 | 5.1 | 1,300 | 2.9 | 910 | 31 | 1,100 |
| | Dibenzo(a,h)anthracene | | <48 | <270 | <2.4 | 190 | <2.4 | 470 | <2.4 | <69 | <2.4 | 130 | <2.4 | <69 | <4.8 | 130 |
| | Dibenzofuran | | <94 | <650 | <4.7 | 300 | <4.7 | <670 | <4.7 | 200 | <4.7 | 230 | <4.7 | <170 | <9.4 | 250 |
| | 2,4-Dimethylphenol | | 140 | <560 | <2.9 | <150 | <4.7 | <580 | <4.7 | <140 | <2.9 | <150 | <2.9 | <140 | <5.8 | <140 |
| | Diethylphthalate | 6 | <54 | <620 | 22 | <160 | 83 | <650 | 10 | <160 | <2.7 | <170 | <2.7 | <160 | <5.4 | <160 |
| | Fluoranthene | 400 | <32 | 3,500 | 7.2 | 3,000 | 4.2 | 9,800 | 5.9 | 1,800 | 4.7 | 2,100 | 3.2 | 1,600 | 42 | 2,300 |
| | Fluorene | 400 | <94 | 1,900 | <4.7 | 1,100 | <4.7 | 2,400 | <4.7 | 650 | <4.7 | 630 | <4.7 | 380 | 9.8 | 620 |
| | Indeno(1,2,3-cd)pyrene | | <32 | <910 | <1.6 | 640 | <1.6 | 1,900 | <1.6 | 380 | 2.4 | 500 | <1.6 | 380 | 16 | 520 |
| | 2-Methylnaphthalene | | 220 | 1,900 | <3.9 | 800 | <3.9 | 910 | <3.9 | 400 | <3.9 | 660 | <3.5 | 400 | <7.8 | 460 |
| | 2-Methylphenol | | <46 | <670 | <2.3 | <170 | <2.3 | <690 | <2.3 | <170 | <2.3 | <180 | <2.3 | <170 | <4.6 | <170 |
| | 4-Methylphenol | | 76 | <580 | <2.0 | <150 | <2.0 | <600 | <2.0 | <150 | <2.0 | <160 | <2.0 | <150 | <4.0 | <150 |
| | Naphthalene | 40 | 2,200 | 2,100 | <3.8 | 1,000 | 4.2 | 8,700 | 4.1 | 410 | <3.8 | 680 | <3.8 | 470 | 8 | 450 |
| | Phenanthrene | | <42 | 6,400 | 2.3 | 3,500 | 6.8 | 11,000 | 8.9 | 2,600 | 3.5 | 2,500 | 3.7 | 1,700 | 46 | 2,800 |
| | Phenol | 6000 | <20 | <490 | <1.0 | <130 | <1.0 | <510 | <1.0 | <130 | <1.0 | <130 | <1.0 | <130 | <2.0 | <130 |
| | Pyrene | 250 | <36 | 4,600 | 7.8 | 3,900 | 4.9 | 10,000 | 7 | 2,400 | 5.5 | 3,000 | 3.8 | 1,900 | 42 | 2,700 |
| | PAH | | 2,636 | 33,480 | 63 | 24,990 | 110 | 71,240 | 49 | 15,460 | 37 | 18,170 | 16 | 12,150 | 308 | 17,250 |
| Volatiles | Benzene | 5 | 4,900 | 30 | 2 | 97 | <0.25 | 98 | <0.25 | <18 | <0.25 | 19 | 0.28 | <25 | <0.25 | 58 |
| | Ethylbenzene | 700 | 1,100 | 250 | <0.53 | 770 | <0.53 | 170 | <0.53 | 30 | <0.53 | 28 | <0.53 | 52 | <0.53 | 91 |
| | Xylene, total | 10 | 1,200 | 560 | <1.9 | 1200 | <1.9 | 310 | <1.9 | 57 | <1.9 | 60 | <1.9 | 110 | <1.9 | 200 |
| | Toluene | 1000 | 1,700 | 120 | <0.84 | 78 | <0.84 | 46 | <0.84 | <17 | <0.84 | <17 | <0.84 | <25 | <0.84 | 51 |
| | MAH | | 8,900 | 960 | 2 | 2,145 | 0 | 624 | 0 | 87 | 0 | 107 | 0 | 162 | 0 | 400 |
| Sum | Total Volatile Organics | | 11,636 | 34,440 | 64.5 | 27,135 | 109.7 | 71,864 | 49.1 | 15,547 | 36.9 | 18,277 | 16.2 | 12,150 | 266.4 | 17,250 |
| | Diesel Range Organics | | 13,000 | 260,000 | 1,000 | 99,000 | 690 | 120,000 | 600 | 100,000 | 1,200 | 88,000 | 480 | 79,000 | 4,500 | 250,000 |
| | Gasoline Range Organics | - | 19,000 | 28,000 | <50 | 49,000 | <50 | 14,000 | <50 | 9,400 | <50 | 9,700 | <50 | 6,800 | <50 | 6,400 |
| | TPH | | 32,000 | 288,000 | 1,000 | 148,000 | 690 | 134,000 | 600 | 109,400 | 1,200 | 97,700 | 480 | 85,800 | 4,500 | 256,400 |
| Misc. | Arsenic | 50 | 290 | 4,800 | 9 | 3,100 | 9.4 | 2,200 | 7.5 | 3,800 | 7.9 | 3,000 | 8 | 3,500 | 5.4 | 2,100 |
| | Cyanide, total (En Chem) | | 170 | 4,100 | 170 | 3,000 | 87 | 4,000 | 61 | 1,800 | 60 | 1,900 | 330 | 4,200 | 1,300 | 3,700 |
| | Cyanide, total (Frontier) | | 540 | NA | 172 | 235 | 62.8 | 404 | 51.8 | 225 | 44.9 | 528 | 87.2 | 430 | 847 | 433 |
| | Cyanide, weak and dissociable | | 52 | NA | 4.3 | NA | 45 | NA | 34 | NA | 33 | NA | 290 | NA | 110 | NA |
| | Iron Cyanide (Frontier) | | 53.5 | NA | 83.8 | NA | 13.8 | NA | 11.9 | NA | 15.6 | NA | 19.8 | NA | 894 | NA |
| | % Solids | | NA | 89.9% | NA | 86.1% | NA | 86.4% | NA | 86.9% | NA | 83.8% | NA | 86.4% | NA | 86.8% |

Note: NA = Not analyzed

# APPENDIX E

# REPLACEMENT *REMEDIAL DESIGN REPORT* APPENDIX M: NOVEMBER 13, 2002 GROUNDWATER LABORATORY ANALYTICAL REPORTS

# En Chem Inc.

1241 Bellevue Street
Green Bay, WI 54302
920-469-2436
800-7-ENCHEM
Fax: 920-469-8827


## Analytical Report Number: 828497

**Client :** WE ENERGIES
**Project Name :** APPLETON MGP
**Project Number :** 1302440
**Field ID :** TRIP BLANK

**Matrix Type :** WATER
**Collection Date :** 11/12/02
**Report Date :** 07/01/03
**Lab Sample Number :** 828497-024

**VOC 3.4 List (Total 12DCE & XYL)** — **Prep Date:** 11/19/02

| Analyte | | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 4-Bromofluorobenzene | | 107 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |
| Toluene-d8 | | 113 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |
| Dibromofluoromethane | | 96 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |
| Acetone | < | 3.3 | 3.3 | 11 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Benzene | < | 0.25 | 0.25 | 0.80 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromodichloromethane | < | 0.23 | 0.23 | 0.73 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromoform | < | 0.45 | 0.45 | 1.4 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromomethane | < | 0.87 | 0.87 | 2.8 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 2-Butanone | < | 4.0 | 4.0 | 13 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Carbon disulfide | < | 0.50 | 0.50 | 1.6 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Carbon tetrachloride | < | 0.47 | 0.47 | 1.5 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chlorobenzene | < | 0.58 | 0.58 | 1.8 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chlorodibromomethane | < | 0.84 | 0.84 | 2.7 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloroethane | < | 0.84 | 0.84 | 2.7 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloroform | < | 0.45 | 0.45 | 1.4 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloromethane | < | 0.27 | 0.27 | 0.86 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1-Dichloroethane | < | 0.87 | 0.87 | 2.8 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloroethane | < | 0.55 | 0.55 | 1.8 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1-Dichloroethene | < | 0.56 | 0.56 | 1.8 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloroethene, total | < | 1.2 | 1.2 | 3.8 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloropropane | < | 0.39 | 0.39 | 1.2 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| cis-1,3-Dichloropropene | < | 0.57 | 0.57 | 1.8 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| trans-1,3-Dichloropropene | < | 0.64 | 0.64 | 2.0 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Ethylbenzene | < | 0.53 | 0.53 | 1.7 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 2-Hexanone | < | 1.2 | 1.2 | 3.8 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Methylene chloride | | 1.0 | 0.47 | 1.5 | | 1 | ug/L | Q | 11/19/02 | SW846 5030B | SW846 8260B |
| 4-Methyl-2-pentanone | < | 0.91 | 0.91 | 2.9 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Styrene | < | 0.62 | 0.62 | 2.0 | | 1 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,2,2-Tetrachloroethane | < | 0.77 | 0.77 | 2.5 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Tetrachloroethene | < | 0.63 | 0.63 | 2.0 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Toluene | < | 0.84 | 0.84 | 2.7 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,1-Trichloroethane | < | 0.65 | 0.65 | 2.1 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,2-Trichloroethane | < | 0.50 | 0.50 | 1.6 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Trichloroethene | < | 0.39 | 0.39 | 1.2 | | 1 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| Vinyl chloride | < | 0.11 | 0.11 | 0.35 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Xylene, total | < | 1.9 | 1.9 | 6.1 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |

# En Chem Inc.

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## Analytical Report Number: 828497

**Client :** WE ENERGIES
**Project Name :** APPLETON MGP
**Project Number :** 1302440
**Field ID :** MW2

**Matrix Type :** WATER
**Collection Date :** 11/13/02
**Report Date :** 07/01/03
**Lab Sample Number :** 828497-023

**VOC 3.4 List (Total 12DCE & XYL)**

**Prep Date:** 11/19/02

| Analyte | | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Dibromofluoromethane | | 96 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |
| 4-Bromofluorobenzene | | 109 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |
| Acetone | < | 3.3 | 3.3 | 11 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Benzene | | 22 | 0.25 | 0.80 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromodichloromethane | < | 0.23 | 0.23 | 0.73 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromoform | < | 0.45 | 0.45 | 1.4 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromomethane | < | 0.87 | 0.87 | 2.8 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 2-Butanone | < | 4.0 | 4.0 | 13 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Carbon disulfide | < | 0.50 | 0.50 | 1.6 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Carbon tetrachloride | < | 0.47 | 0.47 | 1.5 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chlorobenzene | < | 0.58 | 0.58 | 1.8 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chlorodibromomethane | < | 0.84 | 0.84 | 2.7 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloroethane | < | 0.84 | 0.84 | 2.7 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloroform | < | 0.45 | 0.45 | 1.4 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloromethane | < | 0.27 | 0.27 | 0.86 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1-Dichloroethane | < | 0.87 | 0.87 | 2.8 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloroethane | < | 0.55 | 0.55 | 1.8 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1-Dichloroethene | < | 0.56 | 0.56 | 1.8 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloroethene, total | < | 1.2 | 1.2 | 3.8 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloropropane | < | 0.39 | 0.39 | 1.2 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| cis-1,3-Dichloropropene | < | 0.57 | 0.57 | 1.8 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| trans-1,3-Dichloropropene | < | 0.64 | 0.64 | 2.0 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Ethylbenzene | < | 0.53 | 0.53 | 1.7 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 2-Hexanone | < | 1.2 | 1.2 | 3.8 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Methylene chloride | < | 0.47 | 0.47 | 1.5 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 4-Methyl-2-pentanone | < | 0.91 | 0.91 | 2.9 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Styrene | < | 0.62 | 0.62 | 2.0 | | 1 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,2,2-Tetrachloroethane | < | 0.77 | 0.77 | 2.5 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Tetrachloroethene | < | 0.63 | 0.63 | 2.0 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Toluene | < | 0.84 | 0.84 | 2.7 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,1-Trichloroethane | < | 0.65 | 0.65 | 2.1 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,2-Trichloroethane | < | 0.50 | 0.50 | 1.6 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Trichloroethene | < | 0.39 | 0.39 | 1.2 | | 1 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| Vinyl chloride | < | 0.11 | 0.11 | 0.35 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Xylene, total | < | 1.9 | 1.9 | 6.1 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |

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## Analytical Report Number: 828497

**Client :** WE ENERGIES
**Project Name :** APPLETON MGP
**Project Number :** 1302440
**Field ID :** MW2

**Matrix Type :** WATER
**Collection Date :** 11/13/02
**Report Date :** 07/01/03
**Lab Sample Number :** 828497-023

### SPECIAL SEMI-VOLATILE LIST

Prep Date: 11/20/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| bis(2-Ethylhexyl)phthalate | < 1.4 | 1.4 | 4.5 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Fluoranthene | < 1.6 | 1.6 | 5.1 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Fluorene | < 4.7 | 4.7 | 15 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Hexachlorobenzene | < 1.4 | 1.4 | 4.5 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Hexachlorobutadiene | < 2.9 | 2.9 | 9.2 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Hexachlorocyclopentadiene | < 1.4 | 1.4 | 4.5 | | 1 | ug/L | & | 11/20/02 | SW846 3510 | SW846 8270 |
| Hexachloroethane | < 2.3 | 2.3 | 7.3 | | 1 | ug/L | & | 11/20/02 | SW846 3510 | SW846 8270 |
| Indeno(1,2,3-cd)pyrene | < 1.6 | 1.6 | 5.1 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Isophorone | < 4.5 | 4.5 | 14 | | 1 | ug/L | & | 11/20/02 | SW846 3510 | SW846 8270 |
| 1-Methylnaphthalene | < 4.2 | 4.2 | 13 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 2-Methylnaphthalene | < 3.9 | 3.9 | 12 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| N-Nitroso-di-n-propylamine | < 4.3 | 4.3 | 14 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| N-Nitrosodiphenylamine | < 2.2 | 2.2 | 7.0 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 2-Nitroaniline | < 4.2 | 4.2 | 13 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 2-Nitrophenol | < 3.7 | 3.7 | 12 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 3-Nitroaniline | < 2.8 | 2.8 | 8.9 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 4-Nitroaniline | < 1.8 | 1.8 | 5.7 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 4-Nitrophenol | < 1.8 | 1.8 | 5.7 | | 1 | ug/L | & | 11/20/02 | SW846 3510 | SW846 8270 |
| Naphthalene | < 3.8 | 3.8 | 12 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Nitrobenzene | < 3.5 | 3.5 | 11 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 2,2'-oxybis(1-Chloropropane) | < 3.6 | 3.6 | 11 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Di-n-octylphthalate | < 1.3 | 1.3 | 4.1 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Pentachlorophenol | < 0.78 | 0.78 | 2.5 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Phenanthrene | < 2.1 | 2.1 | 6.7 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Phenol | < 1.0 | 1.0 | 3.2 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Pyrene | < 1.8 | 1.8 | 5.7 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 1,2,4-Trichlorobenzene | < 3.0 | 3.0 | 9.6 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 2,4,5-Trichlorophenol | < 4.6 | 4.6 | 15 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 2,4,6-Trichlorophenol | < 4.0 | 4.0 | 13 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 2-Fluorophenol | 15 | | | | 1 | %Recov | | 11/20/02 | SW846 3510 | SW846 8270 |
| Phenol-d5 | 8.2 | | | | 1 | %Recov | | 11/20/02 | SW846 3510 | SW846 8270 |
| 2-Chlorophenol-d4 | 39 | | | | 1 | %Recov | | 11/20/02 | SW846 3510 | SW846 8270 |
| 1,2-Dichlorobenzene-d4 | 44 | | | | 1 | %Recov | | 11/20/02 | SW846 3510 | SW846 8270 |
| Nitrobenzene-d5 | 52 | | | | 1 | %Recov | | 11/20/02 | SW846 3510 | SW846 8270 |
| 2,4,6-Tribromophenol | 88 | | | | 1 | %Recov | | 11/20/02 | SW846 3510 | SW846 8270 |
| Terphenyl-d14 | 80 | | | | 1 | %Recov | | 11/20/02 | SW846 3510 | SW846 8270 |
| 2-Fluorobiphenyl | 57 | | | | 1 | %Recov | | 11/20/02 | SW846 3510 | SW846 8270 |

### VOC 3.4 List (Total 12DCE & XYL)

Prep Date: 11/19/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Toluene-d8 | 114 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |

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## Analytical Report Number: 828497

Client : WE ENERGIES
Project Name : APPLETON MGP
Project Number : 1302440
Field ID : MW2

Matrix Type : WATER
Collection Date : 11/13/02
Report Date : 07/01/03
Lab Sample Number : 828497-023

### INORGANICS

| Test | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Cyanide, total | 1.4 | 0.027 | 0.086 | | 1 | mg/L | SUB1 | 11/25/02 | EPA 335.4 | EPA 335.4 |
| Cyanide, weak and dissociable | 0.24 | 0.0054 | 0.017 | | 1 | mg/L | SUB1 | 11/27/02 | SM 4500 | SM 4500 |

### SPECIAL SEMI-VOLATILE LIST

Prep Date: 11/20/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| 4-Methylphenol | < 2.0 | 2.0 | 6.4 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 4-Bromophenyl phenyl ether | < 3.6 | 3.6 | 11 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 2-Methylphenol | < 2.3 | 2.3 | 7.3 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Acenaphthene | < 4.6 | 4.6 | 15 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Acenaphthylene | < 4.7 | 4.7 | 15 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Anthracene | < 2.8 | 2.8 | 8.9 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Di-n-butylphthalate | < 1.4 | 1.4 | 4.5 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Benzo(a)anthracene | < 1.7 | 1.7 | 5.4 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Benzo(a)pyrene | < 1.5 | 1.5 | 4.8 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Benzo(b)fluoranthene | < 2.2 | 2.2 | 7.0 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Benzo(g,h,i)perylene | < 2.1 | 2.1 | 6.7 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Benzo(k)fluoranthene | < 2.4 | 2.4 | 7.6 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Butylbenzylphthalate | < 1.8 | 1.8 | 5.7 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 2-Chloronaphthalene | < 4.2 | 4.2 | 13 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 2-Chlorophenol | < 1.1 | 1.1 | 3.5 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 4-Chloro-3-methylphenol | < 4.1 | 4.1 | 13 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 4-Chloroaniline | < 4.2 | 4.2 | 13 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 4-Chlorophenyl phenyl ether | < 4.7 | 4.7 | 15 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Carbazole | < 1.4 | 1.4 | 4.5 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| bis(2-Chloroethoxy)methane | < 4.5 | 4.5 | 14 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| bis(2-Chloroethyl)ether | < 0.87 | 0.87 | 2.8 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Chrysene | < 1.8 | 1.8 | 5.7 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 1,2-Dichlorobenzene | < 2.5 | 2.5 | 8.0 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 1,3-Dichlorobenzene | < 2.3 | 2.3 | 7.3 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 1,4-Dichlorobenzene | < 2.3 | 2.3 | 7.3 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 2,4-Dichlorophenol | < 3.7 | 3.7 | 12 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 2,4-Dimethylphenol | < 2.9 | 2.9 | 9.2 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 2,4-Dinitrophenol | < 3.0 | 3.0 | 9.6 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 2,4-Dinitrotoluene | < 1.7 | 1.7 | 5.4 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 2,6-Dinitrotoluene | < 3.7 | 3.7 | 12 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 3,3-Dichlorobenzidine | < 2.8 | 2.8 | 8.9 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 4,6-Dinitro-2-methylphenol | < 1.7 | 1.7 | 5.4 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Dibenzo(a,h)anthracene | < 2.4 | 2.4 | 7.6 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Dibenzofuran | < 4.7 | 4.7 | 15 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Diethylphthalate | < 2.7 | 2.7 | 8.6 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Dimethylphthalate | < 3.5 | 3.5 | 11 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |

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## Analytical Report Number: 828497

**Client :** WE ENERGIES
**Project Name :** APPLETON MGP
**Project Number :** 1302440
**Field ID :** MW10

**Matrix Type :** WATER
**Collection Date :** 11/14/02
**Report Date :** 07/01/03
**Lab Sample Number :** 828497-022

### INORGANICS

| Test | | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Cyanide, total | | 0.0030 | 0.0027 | 0.0086 | | 1 | mg/L | QSUB | 11/22/02 | EPA 335.4 | EPA 335.4 |
| Cyanide, weak and dissociable | < | 0.0027 | 0.0027 | 0.0086 | | 1 | mg/L | SUB1 | 11/22/02 | SM 4500 | SM 4500 |

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## Analytical Report Number: 828497

**Client :** WE ENERGIES
**Project Name :** APPLETON MGP
**Project Number :** 1302440
**Field ID :** MW8

**Matrix Type :** WATER
**Collection Date :** 11/14/02
**Report Date :** 07/01/03
**Lab Sample Number :** 828497-021

### INORGANICS

| Test | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Cyanide, total | 0.066 | 0.0027 | 0.0086 | | 1 | mg/L | SUB1 | 11/22/02 | EPA 335.4 | EPA 335.4 |
| Cyanide, weak and dissociable | 0.0060 | 0.0027 | 0.0086 | | 1 | mg/L | QSUB | 11/22/02 | SM 4500 | SM 4500 |

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## Analytical Report Number: 828497

**Client :** WE ENERGIES
**Project Name :** APPLETON MGP
**Project Number :** 1302440
**Field ID :** MW9

**Matrix Type :** WATER
**Collection Date :** 11/14/02
**Report Date :** 07/01/03
**Lab Sample Number :** 828497-020

### INORGANICS

| Test | | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Cyanide, total | | 0.0090 | 0.0027 | 0.0086 | | 1 | mg/L | SUB1 | 11/22/02 | EPA 335.4 | EPA 335.4 |
| Cyanide, weak and dissociable | < | 0.0027 | 0.0027 | 0.0086 | | 1 | mg/L | SUB1 | 11/22/02 | SM 4500 | SM 4500 |

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## Analytical Report Number: 828497

Client : WE ENERGIES
Project Name : APPLETON MGP
Project Number : 1302440
Field ID : QCFB

Matrix Type : WATER
Collection Date : 11/14/02
Report Date : 07/01/03
Lab Sample Number : 828497-019

**VOC 3.4 List (Total 12DCE & XYL)**

Prep Date: 11/19/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Dibromofluoromethane | 97 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |
| 4-Bromofluorobenzene | 92 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |
| Acetone | < 3.3 | 3.3 | 11 | | 1 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| Benzene | < 0.25 | 0.25 | 0.80 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromodichloromethane | < 0.23 | 0.23 | 0.73 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromoform | < 0.45 | 0.45 | 1.4 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromomethane | < 0.87 | 0.87 | 2.8 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 2-Butanone | < 4.0 | 4.0 | 13 | | 1 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| Carbon disulfide | < 0.50 | 0.50 | 1.6 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Carbon tetrachloride | < 0.47 | 0.47 | 1.5 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chlorobenzene | < 0.58 | 0.58 | 1.8 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chlorodibromomethane | < 0.84 | 0.84 | 2.7 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloroethane | < 0.84 | 0.84 | 2.7 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloroform | < 0.45 | 0.45 | 1.4 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloromethane | < 0.27 | 0.27 | 0.86 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1-Dichloroethane | < 0.87 | 0.87 | 2.8 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloroethane | < 0.55 | 0.55 | 1.8 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1-Dichloroethene | < 0.56 | 0.56 | 1.8 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloroethene, total | < 1.2 | 1.2 | 3.8 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloropropane | < 0.39 | 0.39 | 1.2 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| cis-1,3-Dichloropropene | < 0.57 | 0.57 | 1.8 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| trans-1,3-Dichloropropene | < 0.64 | 0.64 | 2.0 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Ethylbenzene | < 0.53 | 0.53 | 1.7 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 2-Hexanone | < 1.2 | 1.2 | 3.8 | | 1 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| Methylene chloride | < 0.47 | 0.47 | 1.5 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 4-Methyl-2-pentanone | < 0.91 | 0.91 | 2.9 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Styrene | < 0.62 | 0.62 | 2.0 | | 1 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,2,2-Tetrachloroethane | < 0.77 | 0.77 | 2.5 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Tetrachloroethene | < 0.63 | 0.63 | 2.0 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Toluene | < 0.84 | 0.84 | 2.7 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,1-Trichloroethane | < 0.65 | 0.65 | 2.1 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,2-Trichloroethane | < 0.50 | 0.50 | 1.6 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Trichloroethene | < 0.39 | 0.39 | 1.2 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Vinyl chloride | < 0.11 | 0.11 | 0.35 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Xylene, total | < 1.9 | 1.9 | 6.1 | | 1 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |

# En Chem Inc.

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## Analytical Report Number: 828497

Client : WE ENERGIES
Project Name : APPLETON MGP
Project Number : 1302440
Field ID : QCFB

Matrix Type : WATER
Collection Date : 11/14/02
Report Date : 07/01/03
Lab Sample Number : 828497-019

### SPECIAL SEMI-VOLATILE LIST

Prep Date: 11/20/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| bis(2-Ethylhexyl)phthalate | < 1.4 | 1.4 | 4.5 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Fluoranthene | < 1.6 | 1.6 | 5.1 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Fluorene | < 4.7 | 4.7 | 15 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Hexachlorobenzene | < 1.4 | 1.4 | 4.5 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Hexachlorobutadiene | < 2.9 | 2.9 | 9.2 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Hexachlorocyclopentadiene | < 1.4 | 1.4 | 4.5 | | 1 | ug/L | & | 11/20/02 | SW846 3510 | SW846 8270 |
| Hexachloroethane | < 2.3 | 2.3 | 7.3 | | 1 | ug/L | & | 11/20/02 | SW846 3510 | SW846 8270 |
| Indeno(1,2,3-cd)pyrene | < 1.6 | 1.6 | 5.1 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Isophorone | < 4.5 | 4.5 | 14 | | 1 | ug/L | & | 11/20/02 | SW846 3510 | SW846 8270 |
| 1-Methylnaphthalene | < 4.2 | 4.2 | 13 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 2-Methylnaphthalene | < 3.9 | 3.9 | 12 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| N-Nitroso-di-n-propylamine | < 4.3 | 4.3 | 14 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| N-Nitrosodiphenylamine | < 2.2 | 2.2 | 7.0 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 2-Nitroaniline | < 4.2 | 4.2 | 13 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 2-Nitrophenol | < 3.7 | 3.7 | 12 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 3-Nitroaniline | < 2.8 | 2.8 | 8.9 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 4-Nitroaniline | < 1.8 | 1.8 | 5.7 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 4-Nitrophenol | < 1.8 | 1.8 | 5.7 | | 1 | ug/L | & | 11/20/02 | SW846 3510 | SW846 8270 |
| Naphthalene | < 3.8 | 3.8 | 12 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Nitrobenzene | < 3.5 | 3.5 | 11 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 2,2'-oxybis(1-Chloropropane) | < 3.6 | 3.6 | 11 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Di-n-octylphthalate | < 1.3 | 1.3 | 4.1 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Pentachlorophenol | < 0.78 | 0.78 | 2.5 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Phenanthrene | < 2.1 | 2.1 | 6.7 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Phenol | < 1.0 | 1.0 | 3.2 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Pyrene | < 1.8 | 1.8 | 5.7 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 1,2,4-Trichlorobenzene | < 3.0 | 3.0 | 9.6 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 2,4,5-Trichlorophenol | < 4.6 | 4.6 | 15 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 2,4,6-Trichlorophenol | < 4.0 | 4.0 | 13 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 2-Fluorophenol | 15 | | | | 1 | %Recov | | 11/20/02 | SW846 3510 | SW846 8270 |
| Phenol-d5 | 8.5 | | | | 1 | %Recov | | 11/20/02 | SW846 3510 | SW846 8270 |
| 2-Chlorophenol-d4 | 37 | | | | 1 | %Recov | | 11/20/02 | SW846 3510 | SW846 8270 |
| 1,2-Dichlorobenzene-d4 | 43 | | | | 1 | %Recov | | 11/20/02 | SW846 3510 | SW846 8270 |
| Nitrobenzene-d5 | 51 | | | | 1 | %Recov | | 11/20/02 | SW846 3510 | SW846 8270 |
| 2,4,6-Tribromophenol | 62 | | | | 1 | %Recov | | 11/20/02 | SW846 3510 | SW846 8270 |
| Terphenyl-d14 | 113 | | | | 1 | %Recov | | 11/20/02 | SW846 3510 | SW846 8270 |
| 2-Fluorobiphenyl | 50 | | | | 1 | %Recov | | 11/20/02 | SW846 3510 | SW846 8270 |

### VOC 3.4 List (Total 12DCE & XYL)

Prep Date: 11/19/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Toluene-d8 | 107 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |

# En Chem Inc.

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## Analytical Report Number: 828497

**Client:** WE ENERGIES
**Project Name:** APPLETON MGP
**Project Number:** 1302440
**Field ID:** QCFB

**Matrix Type:** WATER
**Collection Date:** 11/14/02
**Report Date:** 07/01/03
**Lab Sample Number:** 828497-019

### INORGANICS

| Test | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Cyanide, total | < 0.0027 | 0.0027 | 0.0086 | | 1 | mg/L | SUB1 | 11/22/02 | EPA 335.4 | EPA 335.4 |
| Cyanide, weak and dissociable | < 0.0027 | 0.0027 | 0.0086 | | 1 | mg/L | SUB1 | 11/22/02 | SM 4500 | SM 4500 |

### SPECIAL SEMI-VOLATILE LIST

Prep Date: 11/20/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| 4-Methylphenol | < 2.0 | 2.0 | 6.4 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 4-Bromophenyl phenyl ether | < 3.6 | 3.6 | 11 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 2-Methylphenol | < 2.3 | 2.3 | 7.3 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Acenaphthene | < 4.6 | 4.6 | 15 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Acenaphthylene | < 4.7 | 4.7 | 15 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Anthracene | < 2.8 | 2.8 | 8.9 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Di-n-butylphthalate | < 1.4 | 1.4 | 4.5 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Benzo(a)anthracene | < 1.7 | 1.7 | 5.4 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Benzo(a)pyrene | < 1.5 | 1.5 | 4.8 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Benzo(b)fluoranthene | < 2.2 | 2.2 | 7.0 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Benzo(g,h,i)perylene | < 2.1 | 2.1 | 6.7 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Benzo(k)fluoranthene | < 2.4 | 2.4 | 7.6 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Butylbenzylphthalate | < 1.8 | 1.8 | 5.7 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 2-Chloronaphthalene | < 4.2 | 4.2 | 13 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 2-Chlorophenol | < 1.1 | 1.1 | 3.5 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 4-Chloro-3-methylphenol | < 4.1 | 4.1 | 13 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 4-Chloroaniline | < 4.2 | 4.2 | 13 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 4-Chlorophenyl phenyl ether | < 4.7 | 4.7 | 15 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Carbazole | < 1.4 | 1.4 | 4.5 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| bis(2-Chloroethoxy)methane | < 4.5 | 4.5 | 14 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| bis(2-Chloroethyl)ether | < 0.87 | 0.87 | 2.8 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Chrysene | < 1.8 | 1.8 | 5.7 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 1,2-Dichlorobenzene | < 2.5 | 2.5 | 8.0 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 1,3-Dichlorobenzene | < 2.3 | 2.3 | 7.3 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 1,4-Dichlorobenzene | < 2.3 | 2.3 | 7.3 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 2,4-Dichlorophenol | < 3.7 | 3.7 | 12 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 2,4-Dimethylphenol | < 2.9 | 2.9 | 9.2 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 2,4-Dinitrophenol | < 3.0 | 3.0 | 9.6 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 2,4-Dinitrotoluene | < 1.7 | 1.7 | 5.4 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 2,6-Dinitrotoluene | < 3.7 | 3.7 | 12 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 3,3-Dichlorobenzidine | < 2.8 | 2.8 | 8.9 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| 4,6-Dinitro-2-methylphenol | < 1.7 | 1.7 | 5.4 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Dibenzo(a,h)anthracene | < 2.4 | 2.4 | 7.6 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Dibenzofuran | < 4.7 | 4.7 | 15 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Diethylphthalate | < 2.7 | 2.7 | 8.6 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |
| Dimethylphthalate | < 3.5 | 3.5 | 11 | | 1 | ug/L | | 11/20/02 | SW846 3510 | SW846 8270 |

# En Chem Inc.

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## Analytical Report Number: 828497

Client : WE ENERGIES
Project Name : APPLETON MGP
Project Number : 1302440
Field ID : QC2

Matrix Type : WATER
Collection Date : 11/13/02
Report Date : 07/01/03
Lab Sample Number : 828497-018

**VOC 3.4 List (Total 12DCE & XYL)**

Prep Date: 11/19/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Dibromofluoromethane | 100 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |
| 4-Bromofluorobenzene | 93 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |
| Acetone | < 8.2 | 8.2 | 26 | | 2.5 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| Benzene | 60 | 0.62 | 2.0 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromodichloromethane | < 0.58 | 0.58 | 1.8 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromoform | < 1.1 | 1.1 | 3.5 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromomethane | < 2.2 | 2.2 | 7.0 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 2-Butanone | < 10 | 10 | 32 | | 2.5 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| Carbon disulfide | < 1.2 | 1.2 | 3.8 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Carbon tetrachloride | < 1.2 | 1.2 | 3.8 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chlorobenzene | < 1.4 | 1.4 | 4.5 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chlorodibromomethane | < 2.1 | 2.1 | 6.7 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloroethane | < 2.1 | 2.1 | 6.7 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloroform | < 1.1 | 1.1 | 3.5 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloromethane | < 0.68 | 0.68 | 2.2 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1-Dichloroethane | < 2.2 | 2.2 | 7.0 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloroethane | < 1.4 | 1.4 | 4.5 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1-Dichloroethene | < 1.4 | 1.4 | 4.5 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloroethene, total | < 3.0 | 3.0 | 9.6 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloropropane | < 0.97 | 0.97 | 3.1 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| cis-1,3-Dichloropropene | < 1.4 | 1.4 | 4.5 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| trans-1,3-Dichloropropene | < 1.6 | 1.6 | 5.1 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Ethylbenzene | 44 | 1.3 | 4.1 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 2-Hexanone | < 3.0 | 3.0 | 9.6 | | 2.5 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| Methylene chloride | < 1.2 | 1.2 | 3.8 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 4-Methyl-2-pentanone | < 2.3 | 2.3 | 7.3 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Styrene | < 1.6 | 1.6 | 5.1 | | 2.5 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,2,2-Tetrachloroethane | < 1.9 | 1.9 | 6.1 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Tetrachloroethene | < 1.6 | 1.6 | 5.1 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Toluene | 4.9 | 2.1 | 6.7 | | 2.5 | ug/L | Q | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,1-Trichloroethane | < 1.6 | 1.6 | 5.1 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,2-Trichloroethane | < 1.2 | 1.2 | 3.8 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Trichloroethene | < 0.97 | 0.97 | 3.1 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Vinyl chloride | < 0.28 | 0.28 | 0.89 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Xylene, total | 69 | 4.8 | 15 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |

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## Analytical Report Number: 828497

**Client :** WE ENERGIES
**Project Name :** APPLETON MGP
**Project Number :** 1302440
**Field ID :** QC2

**Matrix Type :** WATER
**Collection Date :** 11/13/02
**Report Date :** 07/01/03
**Lab Sample Number :** 828497-018

### SPECIAL SEMI-VOLATILE LIST

**Prep Date:** 11/16/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| bis(2-Ethylhexyl)phthalate | < 7.0 | 7.0 | 22 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Fluoranthene | < 8.0 | 8.0 | 25 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Fluorene | < 24 | 24 | 76 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorobenzene | < 7.0 | 7.0 | 22 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorobutadiene | < 14 | 14 | 45 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorocyclopentadiene | < 7.0 | 7.0 | 22 | | 5 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachloroethane | < 11 | 11 | 35 | | 5 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| Indeno(1,2,3-cd)pyrene | < 8.0 | 8.0 | 25 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Isophorone | < 22 | 22 | 70 | | 5 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| 1-Methylnaphthalene | 53 | 21 | 67 | | 5 | ug/L | Q | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Methylnaphthalene | < 20 | 20 | 64 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| N-Nitroso-di-n-propylamine | < 22 | 22 | 70 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| N-Nitrosodiphenylamine | < 11 | 11 | 35 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Nitroaniline | < 21 | 21 | 67 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Nitrophenol | < 18 | 18 | 57 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 3-Nitroaniline | < 14 | 14 | 45 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Nitroaniline | < 9.0 | 9.0 | 29 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Nitrophenol | < 9.0 | 9.0 | 29 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Naphthalene | 290 | 19 | 61 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Nitrobenzene | < 18 | 18 | 57 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,2'-oxybis(1-Chloropropane) | < 18 | 18 | 57 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Di-n-octylphthalate | < 6.5 | 6.5 | 21 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Pentachlorophenol | < 3.9 | 3.9 | 12 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenanthrene | < 10 | 10 | 32 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenol | < 5.0 | 5.0 | 16 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Pyrene | < 9.0 | 9.0 | 29 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2,4-Trichlorobenzene | < 15 | 15 | 48 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,5-Trichlorophenol | < 23 | 23 | 73 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,6-Trichlorophenol | < 20 | 20 | 64 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Fluorophenol | 28 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenol-d5 | 16 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chlorophenol-d4 | 63 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2-Dichlorobenzene-d4 | 73 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Nitrobenzene-d5 | 83 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,6-Tribromophenol | 98 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Terphenyl-d14 | 101 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Fluorobiphenyl | 88 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |

### VOC 3.4 List (Total 12DCE & XYL)

**Prep Date:** 11/19/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Toluene-d8 | 107 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |

# En Chem Inc.

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## Analytical Report Number: 828497

**Client :** WE ENERGIES
**Project Name :** APPLETON MGP
**Project Number :** 1302440
**Field ID :** QC2

**Matrix Type :** WATER
**Collection Date :** 11/13/02
**Report Date :** 07/01/03
**Lab Sample Number :** 828497-018

### INORGANICS

| Test | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Cyanide, total | 0.18 | 0.011 | 0.035 | | 1 | mg/L | SUB1 | 11/22/02 | EPA 335.4 | EPA 335.4 |
| Cyanide, weak and dissociable | 0.041 | 0.0027 | 0.0086 | | 1 | mg/L | SUB1 | 11/22/02 | SM 4500 | SM 4500 |

### SPECIAL SEMI-VOLATILE LIST

**Prep Date:** 11/16/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| 4-Methylphenol | < 10 | 10 | 32 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Bromophenyl phenyl ether | < 18 | 18 | 57 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Methylphenol | < 11 | 11 | 35 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Acenaphthene | < 23 | 23 | 73 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Acenaphthylene | < 24 | 24 | 76 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Anthracene | < 14 | 14 | 45 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Di-n-butylphthalate | < 7.0 | 7.0 | 22 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(a)anthracene | < 8.5 | 8.5 | 27 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(a)pyrene | < 7.5 | 7.5 | 24 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(b)fluoranthene | < 11 | 11 | 35 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(g,h,i)perylene | < 10 | 10 | 32 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(k)fluoranthene | < 12 | 12 | 38 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Butylbenzylphthalate | < 9.0 | 9.0 | 29 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chloronaphthalene | < 21 | 21 | 67 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chlorophenol | < 5.5 | 5.5 | 18 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chloro-3-methylphenol | < 20 | 20 | 64 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chloroaniline | < 21 | 21 | 67 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chlorophenyl phenyl ether | < 24 | 24 | 76 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Carbazole | < 7.0 | 7.0 | 22 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| bis(2-Chloroethoxy)methane | < 22 | 22 | 70 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| bis(2-Chloroethyl)ether | < 4.3 | 4.3 | 14 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Chrysene | < 9.0 | 9.0 | 29 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2-Dichlorobenzene | < 12 | 12 | 38 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,3-Dichlorobenzene | < 11 | 11 | 35 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,4-Dichlorobenzene | < 11 | 11 | 35 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dichlorophenol | < 18 | 18 | 57 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dimethylphenol | < 14 | 14 | 45 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dinitrophenol | < 15 | 15 | 48 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dinitrotoluene | < 8.5 | 8.5 | 27 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,6-Dinitrotoluene | < 18 | 18 | 57 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 3,3-Dichlorobenzidine | < 14 | 14 | 45 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4,6-Dinitro-2-methylphenol | < 8.5 | 8.5 | 27 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dibenzo(a,h)anthracene | < 12 | 12 | 38 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dibenzofuran | < 24 | 24 | 76 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Diethylphthalate | < 14 | 14 | 45 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dimethylphthalate | < 18 | 18 | 57 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |

# En Chem Inc.

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Fax: 920-469-8827


## Analytical Report Number: 828497

**Client :** WE ENERGIES
**Project Name :** APPLETON MGP
**Project Number :** 1302440
**Field ID :** MW11S

**Matrix Type :** WATER
**Collection Date :** 11/13/02
**Report Date :** 07/01/03
**Lab Sample Number :** 828497-017

**VOC 3.4 List (Total 12DCE & XYL)** — **Prep Date:** 11/19/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Dibromofluoromethane | 101 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |
| 4-Bromofluorobenzene | 92 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |
| Acetone | < 8.2 | 8.2 | 26 | | 2.5 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| Benzene | 290 | 0.62 | 2.0 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromodichloromethane | < 0.58 | 0.58 | 1.8 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromoform | < 1.1 | 1.1 | 3.5 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromomethane | < 2.2 | 2.2 | 7.0 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 2-Butanone | < 10 | 10 | 32 | | 2.5 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| Carbon disulfide | < 1.2 | 1.2 | 3.8 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Carbon tetrachloride | < 1.2 | 1.2 | 3.8 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chlorobenzene | < 1.4 | 1.4 | 4.5 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chlorodibromomethane | < 2.1 | 2.1 | 6.7 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloroethane | < 2.1 | 2.1 | 6.7 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloroform | < 1.1 | 1.1 | 3.5 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloromethane | < 0.68 | 0.68 | 2.2 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1-Dichloroethane | < 2.2 | 2.2 | 7.0 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloroethane | < 1.4 | 1.4 | 4.5 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1-Dichloroethene | < 1.4 | 1.4 | 4.5 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloroethene, total | < 3.0 | 3.0 | 9.6 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloropropane | < 0.97 | 0.97 | 3.1 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| cis-1,3-Dichloropropene | < 1.4 | 1.4 | 4.5 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| trans-1,3-Dichloropropene | < 1.6 | 1.6 | 5.1 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Ethylbenzene | 130 | 1.3 | 4.1 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 2-Hexanone | < 3.0 | 3.0 | 9.6 | | 2.5 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| Methylene chloride | < 1.2 | 1.2 | 3.8 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 4-Methyl-2-pentanone | < 2.3 | 2.3 | 7.3 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Styrene | < 1.6 | 1.6 | 5.1 | | 2.5 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,2,2-Tetrachloroethane | < 1.9 | 1.9 | 6.1 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Tetrachloroethene | < 1.6 | 1.6 | 5.1 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Toluene | 13 | 2.1 | 6.7 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,1-Trichloroethane | < 1.6 | 1.6 | 5.1 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,2-Trichloroethane | < 1.2 | 1.2 | 3.8 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Trichloroethene | < 0.97 | 0.97 | 3.1 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Vinyl chloride | < 0.28 | 0.28 | 0.89 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Xylene, total | 53 | 4.8 | 15 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |

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Fax: 920-469-8827


## Analytical Report Number: 828497

**Client :** WE ENERGIES
**Project Name :** APPLETON MGP
**Project Number :** 1302440
**Field ID :** MW11S

**Matrix Type :** WATER
**Collection Date :** 11/13/02
**Report Date :** 07/01/03
**Lab Sample Number :** 828497-017

### SPECIAL SEMI-VOLATILE LIST

**Prep Date:** 11/16/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| bis(2-Ethylhexyl)phthalate | < 7.0 | 7.0 | 22 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Fluoranthene | < 8.0 | 8.0 | 25 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Fluorene | 46 | 24 | 76 | | 5 | ug/L | Q | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorobenzene | < 7.0 | 7.0 | 22 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorobutadiene | < 14 | 14 | 45 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorocyclopentadiene | < 7.0 | 7.0 | 22 | | 5 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachloroethane | < 11 | 11 | 35 | | 5 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| Indeno(1,2,3-cd)pyrene | < 8.0 | 8.0 | 25 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Isophorone | < 22 | 22 | 70 | | 5 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| 1-Methylnaphthalene | 280 | 21 | 67 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Methylnaphthalene | < 20 | 20 | 64 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| N-Nitroso-di-n-propylamine | < 22 | 22 | 70 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| N-Nitrosodiphenylamine | < 11 | 11 | 35 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Nitroaniline | < 21 | 21 | 67 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Nitrophenol | < 18 | 18 | 57 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 3-Nitroaniline | < 14 | 14 | 45 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Nitroaniline | < 9.0 | 9.0 | 29 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Nitrophenol | < 9.0 | 9.0 | 29 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Naphthalene | 210 | 19 | 61 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Nitrobenzene | < 18 | 18 | 57 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,2'-oxybis(1-Chloropropane) | < 18 | 18 | 57 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Di-n-octylphthalate | < 6.5 | 6.5 | 21 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Pentachlorophenol | < 3.9 | 3.9 | 12 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenanthrene | 53 | 10 | 32 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenol | < 5.0 | 5.0 | 16 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Pyrene | < 9.0 | 9.0 | 29 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2,4-Trichlorobenzene | < 15 | 15 | 48 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,5-Trichlorophenol | < 23 | 23 | 73 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,6-Trichlorophenol | < 20 | 20 | 64 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Fluorophenol | 30 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenol-d5 | 16 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chlorophenol-d4 | 64 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2-Dichlorobenzene-d4 | 78 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Nitrobenzene-d5 | 81 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,6-Tribromophenol | 97 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Terphenyl-d14 | 100 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Fluorobiphenyl | 88 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |

### VOC 3.4 List (Total 12DCE & XYL)

**Prep Date:** 11/19/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Toluene-d8 | 106 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |

# En Chem Inc.

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## Analytical Report Number: 828497

**Client :** WE ENERGIES
**Project Name :** APPLETON MGP
**Project Number :** 1302440
**Field ID :** MW11S

**Matrix Type :** WATER
**Collection Date :** 11/13/02
**Report Date :** 07/01/03
**Lab Sample Number :** 828497-017

### INORGANICS

| Test | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Cyanide, total | 0.88 | 0.027 | 0.086 | | 1 | mg/L | SUB1 | 11/25/02 | EPA 335.4 | EPA 335.4 |
| Cyanide, weak and dissociable | 0.093 | 0.0027 | 0.0086 | | 1 | mg/L | SUB1 | 11/22/02 | SM 4500 | SM 4500 |

### SPECIAL SEMI-VOLATILE LIST

Prep Date: 11/16/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| 4-Methylphenol | < 10 | 10 | 32 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Bromophenyl phenyl ether | < 18 | 18 | 57 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Methylphenol | < 11 | 11 | 35 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Acenaphthene | 44 | 23 | 73 | | 5 | ug/L | Q | 11/19/02 | SW846 3510 | SW846 8270 |
| Acenaphthylene | 54 | 24 | 76 | | 5 | ug/L | Q | 11/19/02 | SW846 3510 | SW846 8270 |
| Anthracene | < 14 | 14 | 45 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Di-n-butylphthalate | < 7.0 | 7.0 | 22 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(a)anthracene | < 8.5 | 8.5 | 27 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(a)pyrene | < 7.5 | 7.5 | 24 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(b)fluoranthene | < 11 | 11 | 35 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(g,h,i)perylene | < 10 | 10 | 32 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(k)fluoranthene | < 12 | 12 | 38 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Butylbenzylphthalate | < 9.0 | 9.0 | 29 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chloronaphthalene | < 21 | 21 | 67 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chlorophenol | < 5.5 | 5.5 | 18 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chloro-3-methylphenol | < 20 | 20 | 64 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chloroaniline | < 21 | 21 | 67 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chlorophenyl phenyl ether | < 24 | 24 | 76 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Carbazole | 16 | 7.0 | 22 | | 5 | ug/L | Q | 11/19/02 | SW846 3510 | SW846 8270 |
| bis(2-Chloroethoxy)methane | < 22 | 22 | 70 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| bis(2-Chloroethyl)ether | < 4.3 | 4.3 | 14 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Chrysene | < 9.0 | 9.0 | 29 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2-Dichlorobenzene | < 12 | 12 | 38 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,3-Dichlorobenzene | < 11 | 11 | 35 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,4-Dichlorobenzene | < 11 | 11 | 35 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dichlorophenol | < 18 | 18 | 57 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dimethylphenol | < 14 | 14 | 45 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dinitrophenol | < 15 | 15 | 48 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dinitrotoluene | < 8.5 | 8.5 | 27 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,6-Dinitrotoluene | < 18 | 18 | 57 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 3,3-Dichlorobenzidine | < 14 | 14 | 45 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4,6-Dinitro-2-methylphenol | < 8.5 | 8.5 | 27 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dibenzo(a,h)anthracene | < 12 | 12 | 38 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dibenzofuran | < 24 | 24 | 76 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Diethylphthalate | < 14 | 14 | 45 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dimethylphthalate | < 18 | 18 | 57 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |

# En Chem Inc.

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## Analytical Report Number: 828497

**Client :** WE ENERGIES
**Project Name :** APPLETON MGP
**Project Number :** 1302440
**Field ID :** MW11D

**Matrix Type :** WATER
**Collection Date :** 11/13/02
**Report Date :** 07/01/03
**Lab Sample Number :** 828497-016

**VOC 3.4 List (Total 12DCE & XYL)**

**Prep Date:** 11/19/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Dibromofluoromethane | 100 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |
| 4-Bromofluorobenzene | 93 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |
| Acetone | < 16 | 16 | 51 | | 5 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| Benzene | 94 | 1.2 | 3.8 | | 5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromodichloromethane | < 1.2 | 1.2 | 3.8 | | 5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromoform | < 2.2 | 2.2 | 7.0 | | 5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromomethane | < 4.3 | 4.3 | 14 | | 5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 2-Butanone | < 20 | 20 | 64 | | 5 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| Carbon disulfide | < 2.5 | 2.5 | 8.0 | | 5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Carbon tetrachloride | < 2.3 | 2.3 | 7.3 | | 5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chlorobenzene | < 2.9 | 2.9 | 9.2 | | 5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chlorodibromomethane | < 4.2 | 4.2 | 13 | | 5 | ug/L | | 11/19/02 | SW846 5030B | SW8468260B |
| Chloroethane | < 4.2 | 4.2 | 13 | | 5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloroform | < 2.2 | 2.2 | 7.0 | | 5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloromethane | < 1.4 | 1.4 | 4.5 | | 5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1-Dichloroethane | < 4.3 | 4.3 | 14 | | 5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloroethane | < 2.8 | 2.8 | 8.9 | | 5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1-Dichloroethene | < 2.8 | 2.8 | 8.9 | | 5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloroethene, total | < 6.0 | 6.0 | 19 | | 5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloropropane | < 1.9 | 1.9 | 6.1 | | 5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| cis-1,3-Dichloropropene | < 2.8 | 2.8 | 8.9 | | 5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| trans-1,3-Dichloropropene | < 3.2 | 3.2 | 10 | | 5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Ethylbenzene | 160 | 2.6 | 8.3 | | 5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 2-Hexanone | < 6.0 | 6.0 | 19 | | 5 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| Methylene chloride | < 2.3 | 2.3 | 7.3 | | 5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 4-Methyl-2-pentanone | < 4.5 | 4.5 | 14 | | 5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Styrene | < 3.1 | 3.1 | 9.9 | | 5 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,2,2-Tetrachloroethane | < 3.9 | 3.9 | 12 | | 5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Tetrachloroethene | < 3.1 | 3.1 | 9.9 | | 5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Toluene | 7.2 | 4.2 | 13 | | 5 | ug/L | Q | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,1-Trichloroethane | < 3.2 | 3.2 | 10 | | 5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,2-Trichloroethane | < 2.5 | 2.5 | 8.0 | | 5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Trichloroethene | < 1.9 | 1.9 | 6.1 | | 5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Vinyl chloride | < 0.55 | 0.55 | 1.8 | | 5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Xylene, total | 65 | 9.5 | 30 | | 5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |

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## Analytical Report Number: 828497

**Client :** WE ENERGIES
**Project Name :** APPLETON MGP
**Project Number :** 1302440
**Field ID :** MW11D

**Matrix Type :** WATER
**Collection Date :** 11/13/02
**Report Date :** 07/01/03
**Lab Sample Number :** 828497-016

### SPECIAL SEMI-VOLATILE LIST

**Prep Date:** 11/16/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| bis(2-Ethylhexyl)phthalate | < 7.0 | 7.0 | 22 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Fluoranthene | < 8.0 | 8.0 | 25 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Fluorene | 33 | 24 | 76 | | 5 | ug/L | Q | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorobenzene | < 7.0 | 7.0 | 22 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorobutadiene | < 14 | 14 | 45 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorocyclopentadiene | < 7.0 | 7.0 | 22 | | 5 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachloroethane | < 11 | 11 | 35 | | 5 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| Indeno(1,2,3-cd)pyrene | < 8.0 | 8.0 | 25 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Isophorone | < 22 | 22 | 70 | | 5 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| 1-Methylnaphthalene | 320 | 21 | 67 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Methylnaphthalene | < 20 | 20 | 64 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| N-Nitroso-di-n-propylamine | < 22 | 22 | 70 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| N-Nitrosodiphenylamine | < 11 | 11 | 35 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Nitroaniline | < 21 | 21 | 67 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Nitrophenol | < 18 | 18 | 57 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 3-Nitroaniline | < 14 | 14 | 45 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Nitroaniline | < 9.0 | 9.0 | 29 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Nitrophenol | < 9.0 | 9.0 | 29 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Naphthalene | 210 | 19 | 61 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Nitrobenzene | < 18 | 18 | 57 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,2'-oxybis(1-Chloropropane) | < 18 | 18 | 57 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Di-n-octylphthalate | < 6.5 | 6.5 | 21 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Pentachlorophenol | < 3.9 | 3.9 | 12 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenanthrene | 42 | 10 | 32 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenol | < 5.0 | 5.0 | 16 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Pyrene | < 9.0 | 9.0 | 29 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2,4-Trichlorobenzene | < 15 | 15 | 48 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,5-Trichlorophenol | < 23 | 23 | 73 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,6-Trichlorophenol | < 20 | 20 | 64 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Fluorophenol | 21 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenol-d5 | 12 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chlorophenol-d4 | 48 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2-Dichlorobenzene-d4 | 58 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Nitrobenzene-d5 | 59 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,6-Tribromophenol | 97 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Terphenyl-d14 | 107 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Fluorobiphenyl | 62 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |

### VOC 3.4 List (Total 12DCE & XYL)

**Prep Date:** 11/19/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Toluene-d8 | 106 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |

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## Analytical Report Number: 828497

**Client :** WE ENERGIES
**Project Name :** APPLETON MGP
**Project Number :** 1302440
**Field ID :** MW11D

**Matrix Type :** WATER
**Collection Date :** 11/13/02
**Report Date :** 07/01/03
**Lab Sample Number :** 828497-016

### INORGANICS

| Test | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Cyanide, total | 0.50 | 0.011 | 0.035 | | 1 | mg/L | SUB1 | 11/22/02 | EPA 335.4 | EPA 335.4 |
| Cyanide, weak and dissociable | 0.064 | 0.0027 | 0.0086 | | 1 | mg/L | SUB1 | 11/22/02 | SM 4500 | SM 4500 |

### SPECIAL SEMI-VOLATILE LIST

Prep Date: 11/16/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| 4-Methylphenol | < 10 | 10 | 32 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Bromophenyl phenyl ether | < 18 | 18 | 57 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Methylphenol | < 11 | 11 | 35 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Acenaphthene | 70 | 23 | 73 | | 5 | ug/L | Q | 11/19/02 | SW846 3510 | SW846 8270 |
| Acenaphthylene | 30 | 24 | 76 | | 5 | ug/L | Q | 11/19/02 | SW846 3510 | SW846 8270 |
| Anthracene | < 14 | 14 | 45 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Di-n-butylphthalate | < 7.0 | 7.0 | 22 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(a)anthracene | < 8.5 | 8.5 | 27 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(a)pyrene | < 7.5 | 7.5 | 24 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(b)fluoranthene | < 11 | 11 | 35 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(g,h,i)perylene | < 10 | 10 | 32 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(k)fluoranthene | < 12 | 12 | 38 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Butylbenzylphthalate | < 9.0 | 9.0 | 29 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chloronaphthalene | < 21 | 21 | 67 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chlorophenol | < 5.5 | 5.5 | 18 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chloro-3-methylphenol | < 20 | 20 | 64 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chloroaniline | < 21 | 21 | 67 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chlorophenyl phenyl ether | < 24 | 24 | 76 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Carbazole | < 7.0 | 7.0 | 22 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| bis(2-Chloroethoxy)methane | < 22 | 22 | 70 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| bis(2-Chloroethyl)ether | < 4.3 | 4.3 | 14 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Chrysene | < 9.0 | 9.0 | 29 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2-Dichlorobenzene | < 12 | 12 | 38 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,3-Dichlorobenzene | < 11 | 11 | 35 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,4-Dichlorobenzene | < 11 | 11 | 35 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dichlorophenol | < 18 | 18 | 57 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dimethylphenol | < 14 | 14 | 45 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dinitrophenol | < 15 | 15 | 48 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dinitrotoluene | < 8.5 | 8.5 | 27 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,6-Dinitrotoluene | < 18 | 18 | 57 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 3,3-Dichlorobenzidine | < 14 | 14 | 45 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4,6-Dinitro-2-methylphenol | < 8.5 | 8.5 | 27 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dibenzo(a,h)anthracene | < 12 | 12 | 38 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dibenzofuran | < 24 | 24 | 76 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Diethylphthalate | < 14 | 14 | 45 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dimethylphthalate | < 18 | 18 | 57 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |

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## Analytical Report Number: 828497

**Client :** WE ENERGIES
**Project Name :** APPLETON MGP
**Project Number :** 1302440
**Field ID :** MW18D

**Matrix Type :** WATER
**Collection Date :** 11/13/02
**Report Date :** 07/01/03
**Lab Sample Number :** 828497-015

**VOC 3.4 List (Total 12DCE & XYL)**

**Prep Date:** 11/19/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Dibromofluoromethane | 102 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |
| 4-Bromofluorobenzene | 93 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |
| Acetone | < 8.2 | 8.2 | 26 | | 2.5 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| Benzene | 58 | 0.62 | 2.0 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromodichloromethane | < 0.58 | 0.58 | 1.8 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromoform | < 1.1 | 1.1 | 3.5 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromomethane | < 2.2 | 2.2 | 7.0 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 2-Butanone | < 10 | 10 | 32 | | 2.5 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| Carbon disulfide | < 1.2 | 1.2 | 3.8 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Carbon tetrachloride | < 1.2 | 1.2 | 3.8 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chlorobenzene | < 1.4 | 1.4 | 4.5 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chlorodibromomethane | < 2.1 | 2.1 | 6.7 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloroethane | < 2.1 | 2.1 | 6.7 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloroform | < 1.1 | 1.1 | 3.5 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloromethane | < 0.68 | 0.68 | 2.2 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1-Dichloroethane | < 2.2 | 2.2 | 7.0 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloroethane | < 1.4 | 1.4 | 4.5 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1-Dichloroethene | < 1.4 | 1.4 | 4.5 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloroethene, total | < 3.0 | 3.0 | 9.6 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloropropane | < 0.97 | 0.97 | 3.1 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| cis-1,3-Dichloropropene | < 1.4 | 1.4 | 4.5 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| trans-1,3-Dichloropropene | < 1.6 | 1.6 | 5.1 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Ethylbenzene | 44 | 1.3 | 4.1 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 2-Hexanone | < 3.0 | 3.0 | 9.6 | | 2.5 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| Methylene chloride | < 1.2 | 1.2 | 3.8 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 4-Methyl-2-pentanone | < 2.3 | 2.3 | 7.3 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Styrene | < 1.6 | 1.6 | 5.1 | | 2.5 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,2,2-Tetrachloroethane | < 1.9 | 1.9 | 6.1 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Tetrachloroethene | < 1.6 | 1.6 | 5.1 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Toluene | 4.8 | 2.1 | 6.7 | | 2.5 | ug/L | Q | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,1-Trichloroethane | < 1.6 | 1.6 | 5.1 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,2-Trichloroethane | < 1.2 | 1.2 | 3.8 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Trichloroethene | < 0.97 | 0.97 | 3.1 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Vinyl chloride | < 0.28 | 0.28 | 0.89 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Xylene, total | 67 | 4.8 | 15 | | 2.5 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |

# En Chem Inc.

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## Analytical Report Number: 828497

Client : WE ENERGIES
Project Name : APPLETON MGP
Project Number : 1302440
Field ID : MW18D

Matrix Type : WATER
Collection Date : 11/13/02
Report Date : 07/01/03
Lab Sample Number : 828497-015

### SPECIAL SEMI-VOLATILE LIST

Prep Date: 11/16/02

| Analyte | | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|---|
| bis(2-Ethylhexyl)phthalate | < | 7.0 | 7.0 | 22 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Fluoranthene | < | 8.0 | 8.0 | 25 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Fluorene | < | 24 | 24 | 76 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorobenzene | < | 7.0 | 7.0 | 22 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorobutadiene | < | 14 | 14 | 45 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorocyclopentadiene | < | 7.0 | 7.0 | 22 | | 5 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachloroethane | < | 11 | 11 | 35 | | 5 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| Indeno(1,2,3-cd)pyrene | < | 8.0 | 8.0 | 25 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Isophorone | < | 22 | 22 | 70 | | 5 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| 1-Methylnaphthalene | | 48 | 21 | 67 | | 5 | ug/L | Q | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Methylnaphthalene | < | 20 | 20 | 64 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| N-Nitroso-di-n-propylamine | < | 22 | 22 | 70 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| N-Nitrosodiphenylamine | < | 11 | 11 | 35 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Nitroaniline | < | 21 | 21 | 67 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Nitrophenol | < | 18 | 18 | 57 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 3-Nitroaniline | < | 14 | 14 | 45 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Nitroaniline | < | 9.0 | 9.0 | 29 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Nitrophenol | < | 9.0 | 9.0 | 29 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Naphthalene | | 270 | 19 | 61 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Nitrobenzene | < | 18 | 18 | 57 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,2'-oxybis(1-Chloropropane) | < | 18 | 18 | 57 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Di-n-octylphthalate | < | 6.5 | 6.5 | 21 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Pentachlorophenol | < | 3.9 | 3.9 | 12 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenanthrene | < | 10 | 10 | 32 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenol | < | 5.0 | 5.0 | 16 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Pyrene | < | 9.0 | 9.0 | 29 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2,4-Trichlorobenzene | < | 15 | 15 | 48 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,5-Trichlorophenol | < | 23 | 23 | 73 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,6-Trichlorophenol | < | 20 | 20 | 64 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Fluorophenol | | 26 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenol-d5 | | 16 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chlorophenol-d4 | | 58 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2-Dichlorobenzene-d4 | | 70 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Nitrobenzene-d5 | | 75 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,6-Tribromophenol | | 84 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Terphenyl-d14 | | 99 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Fluorobiphenyl | | 81 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |

### VOC 3.4 List (Total 12DCE & XYL)

Prep Date: 11/19/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Toluene-d8 | 106 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |

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## Analytical Report Number: 828497

**Client :** WE ENERGIES
**Project Name :** APPLETON MGP
**Project Number :** 1302440
**Field ID :** MW18D

**Matrix Type :** WATER
**Collection Date :** 11/13/02
**Report Date :** 07/01/03
**Lab Sample Number :** 828497-015

### INORGANICS

| Test | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Cyanide, total | 0.12 | 0.0027 | 0.0086 | | 1 | mg/L | SUB1 | 11/22/02 | EPA 335.4 | EPA 335.4 |
| Cyanide, weak and dissociable | 0.025 | 0.0027 | 0.0086 | | 1 | mg/L | SUB1 | 11/22/02 | SM 4500 | SM 4500 |

### SPECIAL SEMI-VOLATILE LIST

Prep Date: 11/16/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| 4-Methylphenol | < 10 | 10 | 32 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Bromophenyl phenyl ether | < 18 | 18 | 57 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Methylphenol | < 11 | 11 | 35 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Acenaphthene | < 23 | 23 | 73 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Acenaphthylene | < 24 | 24 | 76 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Anthracene | < 14 | 14 | 45 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Di-n-butylphthalate | < 7.0 | 7.0 | 22 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(a)anthracene | < 8.5 | 8.5 | 27 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(a)pyrene | < 7.5 | 7.5 | 24 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(b)fluoranthene | < 11 | 11 | 35 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(g,h,i)perylene | < 10 | 10 | 32 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(k)fluoranthene | < 12 | 12 | 38 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Butylbenzylphthalate | < 9.0 | 9.0 | 29 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chloronaphthalene | < 21 | 21 | 67 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chlorophenol | < 5.5 | 5.5 | 18 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chloro-3-methylphenol | < 20 | 20 | 64 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chloroaniline | < 21 | 21 | 67 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chlorophenyl phenyl ether | < 24 | 24 | 76 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Carbazole | < 7.0 | 7.0 | 22 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| bis(2-Chloroethoxy)methane | < 22 | 22 | 70 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| bis(2-Chloroethyl)ether | < 4.3 | 4.3 | 14 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Chrysene | < 9.0 | 9.0 | 29 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2-Dichlorobenzene | < 12 | 12 | 38 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,3-Dichlorobenzene | < 11 | 11 | 35 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,4-Dichlorobenzene | < 11 | 11 | 35 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dichlorophenol | < 18 | 18 | 57 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dimethylphenol | < 14 | 14 | 45 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dinitrophenol | < 15 | 15 | 48 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dinitrotoluene | < 8.5 | 8.5 | 27 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,6-Dinitrotoluene | < 18 | 18 | 57 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 3,3-Dichlorobenzidine | < 14 | 14 | 45 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4,6-Dinitro-2-methylphenol | < 8.5 | 8.5 | 27 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dibenzo(a,h)anthracene | < 12 | 12 | 38 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dibenzofuran | < 24 | 24 | 76 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Diethylphthalate | < 14 | 14 | 45 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dimethylphthalate | < 18 | 18 | 57 | | 5 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |

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## Analytical Report Number: 828497

**Client :** WE ENERGIES
**Project Name :** APPLETON MGP
**Project Number :** 1302440
**Field ID :** MW3

**Matrix Type :** WATER
**Collection Date :** 11/13/02
**Report Date :** 07/01/03
**Lab Sample Number :** 828497-014

### VOC 3.4 List (Total 12DCE & XYL)

**Prep Date:** 11/19/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Dibromofluoromethane | 104 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |
| 4-Bromofluorobenzene | 94 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |
| Acetone | < 33 | 33 | 110 | | 10 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| Benzene | 77 | 2.5 | 8.0 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromodichloromethane | < 2.3 | 2.3 | 7.3 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromoform | < 4.5 | 4.5 | 14 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromomethane | < 8.7 | 8.7 | 28 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 2-Butanone | < 40 | 40 | 130 | | 10 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| Carbon disulfide | < 5.0 | 5.0 | 16 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Carbon tetrachloride | < 4.7 | 4.7 | 15 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chlorobenzene | < 5.8 | 5.8 | 18 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chlorodibromomethane | < 8.4 | 8.4 | 27 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloroethane | < 8.4 | 8.4 | 27 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloroform | < 4.5 | 4.5 | 14 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloromethane | < 2.7 | 2.7 | 8.6 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1-Dichloroethane | < 8.7 | 8.7 | 28 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloroethane | < 5.5 | 5.5 | 18 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1-Dichloroethene | < 5.6 | 5.6 | 18 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloroethene, total | < 12 | 12 | 38 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloropropane | < 3.9 | 3.9 | 12 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| cis-1,3-Dichloropropene | < 5.7 | 5.7 | 18 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| trans-1,3-Dichloropropene | < 6.4 | 6.4 | 20 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Ethylbenzene | 25 | 5.3 | 17 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 2-Hexanone | < 12 | 12 | 38 | | 10 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| Methylene chloride | < 4.7 | 4.7 | 15 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 4-Methyl-2-pentanone | < 9.1 | 9.1 | 29 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Styrene | < 6.2 | 6.2 | 20 | | 10 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,2,2-Tetrachloroethane | < 7.7 | 7.7 | 25 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Tetrachloroethene | < 6.3 | 6.3 | 20 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Toluene | < 8.4 | 8.4 | 27 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,1-Trichloroethane | < 6.5 | 6.5 | 21 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,2-Trichloroethane | < 5.0 | 5.0 | 16 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Trichloroethene | < 3.9 | 3.9 | 12 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Vinyl chloride | < 1.1 | 1.1 | 3.5 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Xylene, total | 57 | 19 | 61 | | 10 | ug/L | Q | 11/19/02 | SW846 5030B | SW846 8260B |

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## Analytical Report Number: 828497

**Client :** WE ENERGIES
**Project Name :** APPLETON MGP
**Project Number :** 1302440
**Field ID :** MW3

**Matrix Type :** WATER
**Collection Date :** 11/13/02
**Report Date :** 07/01/03
**Lab Sample Number :** 828497-014

### SPECIAL SEMI-VOLATILE LIST

**Prep Date:** 11/16/02

| Analyte | | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|---|
| bis(2-Ethylhexyl)phthalate | < | 14 | 14 | 45 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Fluoranthene | < | 16 | 16 | 51 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Fluorene | < | 47 | 47 | 150 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorobenzene | < | 14 | 14 | 45 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorobutadiene | < | 29 | 29 | 92 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorocyclopentadiene | < | 14 | 14 | 45 | | 10 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachloroethane | < | 23 | 23 | 73 | | 10 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| Indeno(1,2,3-cd)pyrene | < | 16 | 16 | 51 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Isophorone | < | 45 | 45 | 140 | | 10 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| 1-Methylnaphthalene | | 120 | 42 | 130 | | 10 | ug/L | Q | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Methylnaphthalene | < | 39 | 39 | 120 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| N-Nitroso-di-n-propylamine | < | 43 | 43 | 140 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| N-Nitrosodiphenylamine | < | 22 | 22 | 70 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Nitroaniline | < | 42 | 42 | 130 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Nitrophenol | < | 37 | 37 | 120 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 3-Nitroaniline | < | 28 | 28 | 89 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Nitroaniline | < | 18 | 18 | 57 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Nitrophenol | < | 18 | 18 | 57 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Naphthalene | | 690 | 38 | 120 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Nitrobenzene | < | 35 | 35 | 110 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,2'-oxybis(1-Chloropropane) | < | 36 | 36 | 110 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Di-n-octylphthalate | < | 13 | 13 | 41 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Pentachlorophenol | < | 7.8 | 7.8 | 25 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenanthrene | < | 21 | 21 | 67 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenol | < | 10 | 10 | 32 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Pyrene | < | 18 | 18 | 57 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2,4-Trichlorobenzene | < | 30 | 30 | 96 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,5-Trichlorophenol | < | 46 | 46 | 150 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,6-Trichlorophenol | < | 40 | 40 | 130 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Fluorophenol | | 25 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenol-d5 | | 14 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chlorophenol-d4 | | 57 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2-Dichlorobenzene-d4 | | 65 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Nitrobenzene-d5 | | 73 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,6-Tribromophenol | | 81 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Terphenyl-d14 | | 86 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Fluorobiphenyl | | 79 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |

### VOC 3.4 List (Total 12DCE & XYL)

**Prep Date:** 11/19/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Toluene-d8 | 107 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |

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## Analytical Report Number: 828497

**Client :** WE ENERGIES
**Project Name :** APPLETON MGP
**Project Number :** 1302440
**Field ID :** MW3

**Matrix Type :** WATER
**Collection Date :** 11/13/02
**Report Date :** 07/01/03
**Lab Sample Number :** 828497-014

### INORGANICS

| Test | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Cyanide, total | 0.10 | 0.0054 | 0.017 | | 1 | mg/L | SUB1 | 11/25/02 | EPA 335.4 | EPA 335.4 |
| Cyanide, weak and dissociable | 0.027 | 0.0027 | 0.0086 | | 1 | mg/L | SUB1 | 11/22/02 | SM 4500 | SM 4500 |

### SPECIAL SEMI-VOLATILE LIST

Prep Date: 11/16/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| 4-Methylphenol | < 20 | 20 | 64 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Bromophenyl phenyl ether | < 36 | 36 | 110 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Methylphenol | < 23 | 23 | 73 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Acenaphthene | < 46 | 46 | 150 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Acenaphthylene | < 47 | 47 | 150 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Anthracene | < 28 | 28 | 89 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Di-n-butylphthalate | < 14 | 14 | 45 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(a)anthracene | < 17 | 17 | 54 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(a)pyrene | < 15 | 15 | 48 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(b)fluoranthene | < 22 | 22 | 70 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(g,h,i)perylene | < 21 | 21 | 67 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(k)fluoranthene | < 24 | 24 | 76 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Butylbenzylphthalate | < 18 | 18 | 57 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chloronaphthalene | < 42 | 42 | 130 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chlorophenol | < 11 | 11 | 35 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chloro-3-methylphenol | < 41 | 41 | 130 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chloroaniline | < 42 | 42 | 130 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chlorophenyl phenyl ether | < 47 | 47 | 150 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Carbazole | < 14 | 14 | 45 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| bis(2-Chloroethoxy)methane | < 45 | 45 | 140 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| bis(2-Chloroethyl)ether | < 8.7 | 8.7 | 28 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Chrysene | < 18 | 18 | 57 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2-Dichlorobenzene | < 25 | 25 | 80 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,3-Dichlorobenzene | < 23 | 23 | 73 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,4-Dichlorobenzene | < 23 | 23 | 73 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dichlorophenol | < 37 | 37 | 120 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dimethylphenol | < 29 | 29 | 92 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dinitrophenol | < 30 | 30 | 96 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dinitrotoluene | < 17 | 17 | 54 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,6-Dinitrotoluene | < 37 | 37 | 120 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 3,3-Dichlorobenzidine | < 28 | 28 | 89 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4,6-Dinitro-2-methylphenol | < 17 | 17 | 54 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dibenzo(a,h)anthracene | < 24 | 24 | 76 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dibenzofuran | < 47 | 47 | 150 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Diethylphthalate | < 27 | 27 | 86 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dimethylphthalate | < 35 | 35 | 110 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |

# En Chem Inc.

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## Analytical Report Number: 828497

**Client :** WE ENERGIES
**Project Name :** APPLETON MGP
**Project Number :** 1302440
**Field ID :** MW7RD

**Matrix Type :** WATER
**Collection Date :** 11/13/02
**Report Date :** 07/01/03
**Lab Sample Number :** 828497-013

**VOC 3.4 List (Total 12DCE & XYL)** — **Prep Date:** 11/19/02

| Analyte | | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Dibromofluoromethane | | 100 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |
| 4-Bromofluorobenzene | | 94 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |
| Acetone | < | 170 | 170 | 540 | | 50 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| Benzene | | 3900 | 12 | 38 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromodichloromethane | < | 12 | 12 | 38 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromoform | < | 22 | 22 | 70 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromomethane | < | 44 | 44 | 140 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 2-Butanone | < | 200 | 200 | 640 | | 50 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| Carbon disulfide | | 26 | 25 | 80 | | 50 | ug/L | Q | 11/19/02 | SW846 5030B | SW846 8260B |
| Carbon tetrachloride | < | 23 | 23 | 73 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chlorobenzene | < | 29 | 29 | 92 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chlorodibromomethane | < | 42 | 42 | 130 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloroethane | < | 42 | 42 | 130 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloroform | < | 22 | 22 | 70 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloromethane | < | 14 | 14 | 45 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1-Dichloroethane | < | 44 | 44 | 140 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloroethane | < | 28 | 28 | 89 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1-Dichloroethene | < | 28 | 28 | 89 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloroethene, total | < | 60 | 60 | 190 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloropropane | < | 20 | 20 | 64 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| cis-1,3-Dichloropropene | < | 28 | 28 | 89 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| trans-1,3-Dichloropropene | < | 32 | 32 | 100 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Ethylbenzene | | 1300 | 26 | 83 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 2-Hexanone | < | 60 | 60 | 190 | | 50 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| Methylene chloride | < | 23 | 23 | 73 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 4-Methyl-2-pentanone | < | 46 | 46 | 150 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Styrene | < | 31 | 31 | 99 | | 50 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,2,2-Tetrachloroethane | < | 38 | 38 | 120 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Tetrachloroethene | < | 32 | 32 | 100 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Toluene | | 190 | 42 | 130 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,1-Trichloroethane | < | 32 | 32 | 100 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,2-Trichloroethane | < | 25 | 25 | 80 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Trichloroethene | < | 20 | 20 | 64 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Vinyl chloride | < | 5.5 | 5.5 | 18 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Xylene, total | | 1400 | 95 | 300 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |

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## Analytical Report Number: 828497

Client : WE ENERGIES
Project Name : APPLETON MGP
Project Number : 1302440
Field ID : MW7RD

Matrix Type : WATER
Collection Date : 11/13/02
Report Date : 07/01/03
Lab Sample Number : 828497-013

### SPECIAL SEMI-VOLATILE LIST

Prep Date: 11/16/02

| Analyte | | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|---|
| bis(2-Ethylhexyl)phthalate | < | 140 | 140 | 450 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Fluoranthene | < | 160 | 160 | 510 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Fluorene | < | 470 | 470 | 1500 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorobenzene | < | 140 | 140 | 450 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorobutadiene | < | 290 | 290 | 920 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorocyclopentadiene | < | 140 | 140 | 450 | | 100 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachloroethane | < | 230 | 230 | 730 | | 100 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| Indeno(1,2,3-cd)pyrene | < | 160 | 160 | 510 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Isophorone | < | 450 | 450 | 1400 | | 100 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| 1-Methylnaphthalene | | 530 | 420 | 1300 | | 100 | ug/L | Q | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Methylnaphthalene | | 770 | 390 | 1200 | | 100 | ug/L | Q | 11/19/02 | SW846 3510 | SW846 8270 |
| N-Nitroso-di-n-propylamine | < | 430 | 430 | 1400 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| N-Nitrosodiphenylamine | < | 220 | 220 | 700 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Nitroaniline | < | 420 | 420 | 1300 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Nitrophenol | < | 370 | 370 | 1200 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 3-Nitroaniline | < | 280 | 280 | 890 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Nitroaniline | < | 180 | 180 | 570 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Nitrophenol | < | 180 | 180 | 570 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Naphthalene | | 7200 | 380 | 1200 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Nitrobenzene | < | 350 | 350 | 1100 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,2'-oxybis(1-Chloropropane) | < | 360 | 360 | 1100 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Di-n-octylphthalate | < | 130 | 130 | 410 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Pentachlorophenol | < | 78 | 78 | 250 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenanthrene | < | 210 | 210 | 670 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenol | < | 100 | 100 | 320 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Pyrene | < | 180 | 180 | 570 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2,4-Trichlorobenzene | < | 300 | 300 | 960 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,5-Trichlorophenol | < | 460 | 460 | 1500 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,6-Trichlorophenol | < | 400 | 400 | 1300 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Fluorophenol | | 28 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenol-d5 | | 18 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chlorophenol-d4 | | 64 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2-Dichlorobenzene-d4 | | 69 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Nitrobenzene-d5 | | 69 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,6-Tribromophenol | | 76 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Terphenyl-d14 | | 90 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Fluorobiphenyl | | 91 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |

### VOC 3.4 List (Total 12DCE & XYL)

Prep Date: 11/19/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Toluene-d8 | 106 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |

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## Analytical Report Number: 828497

**Client :** WE ENERGIES
**Project Name :** APPLETON MGP
**Project Number :** 1302440
**Field ID :** MW7RD

**Matrix Type :** WATER
**Collection Date :** 11/13/02
**Report Date :** 07/01/03
**Lab Sample Number :** 828497-013

### INORGANICS

| Test | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Cyanide, total | 0.53 | 0.027 | 0.086 | | 1 | mg/L | SUB1 | 11/25/02 | EPA 335.4 | EPA 335.4 |
| Cyanide, weak and dissociable | 2.0 | 0.0027 | 0.0086 | | 1 | mg/L | SUB1 | 11/22/02 | SM 4500 | SM 4500 |

### SPECIAL SEMI-VOLATILE LIST

Prep Date: 11/16/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| 4-Methylphenol | < 200 | 200 | 640 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Bromophenyl phenyl ether | < 360 | 360 | 1100 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Methylphenol | < 230 | 230 | 730 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Acenaphthene | < 460 | 460 | 1500 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Acenaphthylene | < 470 | 470 | 1500 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Anthracene | < 280 | 280 | 890 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Di-n-butylphthalate | < 140 | 140 | 450 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(a)anthracene | < 170 | 170 | 540 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(a)pyrene | < 150 | 150 | 480 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(b)fluoranthene | < 220 | 220 | 700 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(g,h,i)perylene | < 210 | 210 | 670 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(k)fluoranthene | < 240 | 240 | 760 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Butylbenzylphthalate | < 180 | 180 | 570 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chloronaphthalene | < 420 | 420 | 1300 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chlorophenol | < 110 | 110 | 350 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chloro-3-methylphenol | < 410 | 410 | 1300 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chloroaniline | < 420 | 420 | 1300 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chlorophenyl phenyl ether | < 470 | 470 | 1500 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Carbazole | < 140 | 140 | 450 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| bis(2-Chloroethoxy)methane | < 450 | 450 | 1400 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| bis(2-Chloroethyl)ether | < 87 | 87 | 280 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Chrysene | < 180 | 180 | 570 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2-Dichlorobenzene | < 250 | 250 | 800 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,3-Dichlorobenzene | < 230 | 230 | 730 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,4-Dichlorobenzene | < 230 | 230 | 730 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dichlorophenol | < 370 | 370 | 1200 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dimethylphenol | < 290 | 290 | 920 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dinitrophenol | < 300 | 300 | 960 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dinitrotoluene | < 170 | 170 | 540 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,6-Dinitrotoluene | < 370 | 370 | 1200 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 3,3-Dichlorobenzidine | < 280 | 280 | 890 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4,6-Dinitro-2-methylphenol | < 170 | 170 | 540 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dibenzo(a,h)anthracene | < 240 | 240 | 760 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dibenzofuran | < 470 | 470 | 1500 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Diethylphthalate | < 270 | 270 | 860 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dimethylphthalate | < 350 | 350 | 1100 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |

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## Analytical Report Number: 828497

Client : WE ENERGIES
Project Name : APPLETON MGP
Project Number : 1302440
Field ID : MW7RS

Matrix Type : WATER
Collection Date : 11/13/02
Report Date : 07/01/03
Lab Sample Number : 828497-012

**VOC 3.4 List (Total 12DCE & XYL)**

Prep Date: 11/19/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Dibromofluoromethane | 102 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |
| 4-Bromofluorobenzene | 93 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |
| Acetone | < 82 | 82 | 260 | | 25 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| Benzene | 4600 | 6.2 | 20 | | 25 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromodichloromethane | < 5.8 | 5.8 | 18 | | 25 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromoform | < 11 | 11 | 35 | | 25 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromomethane | < 22 | 22 | 70 | | 25 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 2-Butanone | < 100 | 100 | 320 | | 25 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| Carbon disulfide | < 12 | 12 | 38 | | 25 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Carbon tetrachloride | < 12 | 12 | 38 | | 25 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chlorobenzene | < 14 | 14 | 45 | | 25 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chlorodibromomethane | < 21 | 21 | 67 | | 25 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloroethane | < 21 | 21 | 67 | | 25 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloroform | < 11 | 11 | 35 | | 25 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloromethane | < 6.8 | 6.8 | 22 | | 25 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1-Dichloroethane | < 22 | 22 | 70 | | 25 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloroethane | < 14 | 14 | 45 | | 25 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1-Dichloroethene | < 14 | 14 | 45 | | 25 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloroethene, total | < 30 | 30 | 96 | | 25 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloropropane | < 9.8 | 9.8 | 31 | | 25 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| cis-1,3-Dichloropropene | < 14 | 14 | 45 | | 25 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| trans-1,3-Dichloropropene | < 16 | 16 | 51 | | 25 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Ethylbenzene | 260 | 13 | 41 | | 25 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 2-Hexanone | < 30 | 30 | 96 | | 25 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| Methylene chloride | < 12 | 12 | 38 | | 25 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 4-Methyl-2-pentanone | < 23 | 23 | 73 | | 25 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Styrene | < 16 | 16 | 51 | | 25 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,2,2-Tetrachloroethane | < 19 | 19 | 61 | | 25 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Tetrachloroethene | < 16 | 16 | 51 | | 25 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Toluene | 210 | 21 | 67 | | 25 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,1-Trichloroethane | < 16 | 16 | 51 | | 25 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,2-Trichloroethane | < 12 | 12 | 38 | | 25 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Trichloroethene | < 9.8 | 9.8 | 31 | | 25 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Vinyl chloride | < 2.8 | 2.8 | 8.9 | | 25 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Xylene, total | 760 | 48 | 150 | | 25 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |

# En Chem Inc.

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## Analytical Report Number: 828497

**Client :** WE ENERGIES
**Project Name :** APPLETON MGP
**Project Number :** 1302440
**Field ID :** MW7RS

**Matrix Type :** WATER
**Collection Date :** 11/13/02
**Report Date :** 07/01/03
**Lab Sample Number :** 828497-012

### SPECIAL SEMI-VOLATILE LIST

**Prep Date:** 11/16/02

| Analyte | | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|---|
| bis(2-Ethylhexyl)phthalate | < | 70 | 70 | 220 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Fluoranthene | < | 80 | 80 | 250 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Fluorene | < | 240 | 240 | 760 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorobenzene | < | 70 | 70 | 220 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorobutadiene | < | 150 | 150 | 480 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorocyclopentadiene | < | 70 | 70 | 220 | | 50 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachloroethane | < | 110 | 110 | 350 | | 50 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| Indeno(1,2,3-cd)pyrene | < | 80 | 80 | 250 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Isophorone | < | 230 | 230 | 730 | | 50 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| 1-Methylnaphthalene | < | 210 | 210 | 670 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Methylnaphthalene | | 230 | 200 | 640 | | 50 | ug/L | Q | 11/19/02 | SW846 3510 | SW846 8270 |
| N-Nitroso-di-n-propylamine | < | 220 | 220 | 700 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| N-Nitrosodiphenylamine | < | 110 | 110 | 350 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Nitroaniline | < | 210 | 210 | 670 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Nitrophenol | < | 190 | 190 | 610 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 3-Nitroaniline | < | 140 | 140 | 450 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Nitroaniline | < | 90 | 90 | 290 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Nitrophenol | < | 90 | 90 | 290 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Naphthalene | | 2600 | 190 | 610 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Nitrobenzene | < | 180 | 180 | 570 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,2'-oxybis(1-Chloropropane) | < | 180 | 180 | 570 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Di-n-octylphthalate | < | 65 | 65 | 210 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Pentachlorophenol | < | 39 | 39 | 120 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenanthrene | < | 110 | 110 | 350 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenol | < | 50 | 50 | 160 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Pyrene | < | 90 | 90 | 290 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2,4-Trichlorobenzene | < | 150 | 150 | 480 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,5-Trichlorophenol | < | 230 | 230 | 730 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,6-Trichlorophenol | < | 200 | 200 | 640 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Fluorophenol | | 29 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenol-d5 | | 16 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chlorophenol-d4 | | 58 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2-Dichlorobenzene-d4 | | 90 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Nitrobenzene-d5 | | 82 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,6-Tribromophenol | | 74 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Terphenyl-d14 | | 87 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Fluorobiphenyl | | 86 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |

### VOC 3.4 List (Total 12DCE & XYL)

**Prep Date:** 11/19/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Toluene-d8 | 106 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |

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## Analytical Report Number: 828497

Client : WE ENERGIES
Project Name : APPLETON MGP
Project Number : 1302440
Field ID : MW7RS

Matrix Type : WATER
Collection Date : 11/13/02
Report Date : 07/01/03
Lab Sample Number : 828497-012

### INORGANICS

| Test | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Cyanide, total | 1.6 | 0.027 | 0.086 | | 1 | mg/L | SUB1 | 11/25/02 | EPA 335.4 | EPA 335.4 |
| Cyanide, weak and dissociable | 0.23 | 0.0054 | 0.017 | | 1 | mg/L | SUB1 | 11/22/02 | SM 4500 | SM 4500 |

### SPECIAL SEMI-VOLATILE LIST

Prep Date: 11/16/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| 4-Methylphenol | < 100 | 100 | 320 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Bromophenyl phenyl ether | < 180 | 180 | 570 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Methylphenol | 130 | 110 | 350 | | 50 | ug/L | Q | 11/19/02 | SW846 3510 | SW846 8270 |
| Acenaphthene | < 230 | 230 | 730 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Acenaphthylene | < 240 | 240 | 760 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Anthracene | < 140 | 140 | 450 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Di-n-butylphthalate | < 70 | 70 | 220 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(a)anthracene | < 85 | 85 | 270 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(a)pyrene | < 75 | 75 | 240 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(b)fluoranthene | < 110 | 110 | 350 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(g,h,i)perylene | < 110 | 110 | 350 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(k)fluoranthene | < 120 | 120 | 380 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Butylbenzylphthalate | < 90 | 90 | 290 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chloronaphthalene | < 210 | 210 | 670 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chlorophenol | < 55 | 55 | 180 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chloro-3-methylphenol | < 200 | 200 | 640 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chloroaniline | < 210 | 210 | 670 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chlorophenyl phenyl ether | < 240 | 240 | 760 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Carbazole | < 70 | 70 | 220 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| bis(2-Chloroethoxy)methane | < 230 | 230 | 730 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| bis(2-Chloroethyl)ether | < 44 | 44 | 140 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Chrysene | < 90 | 90 | 290 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2-Dichlorobenzene | < 130 | 130 | 410 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,3-Dichlorobenzene | < 110 | 110 | 350 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,4-Dichlorobenzene | < 110 | 110 | 350 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dichlorophenol | < 190 | 190 | 610 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dimethylphenol | 540 | 150 | 480 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dinitrophenol | < 150 | 150 | 480 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dinitrotoluene | < 85 | 85 | 270 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,6-Dinitrotoluene | < 190 | 190 | 610 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 3,3-Dichlorobenzidine | < 140 | 140 | 450 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4,6-Dinitro-2-methylphenol | < 85 | 85 | 270 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dibenzo(a,h)anthracene | < 120 | 120 | 380 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dibenzofuran | < 240 | 240 | 760 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Diethylphthalate | < 140 | 140 | 450 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dimethylphthalate | < 180 | 180 | 570 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |

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## Analytical Report Number: 828497

Client : WE ENERGIES
Project Name : APPLETON MGP
Project Number : 1302440
Field ID : MW13S

Matrix Type : WATER
Collection Date : 11/13/02
Report Date : 07/01/03
Lab Sample Number : 828497-011

**VOC 3.4 List (Total 12DCE & XYL)**

Prep Date: 11/19/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Dibromofluoromethane | 104 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |
| 4-Bromofluorobenzene | 94 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |
| Acetone | < 170 | 170 | 540 | | 50 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| Benzene | 1500 | 12 | 38 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromodichloromethane | < 12 | 12 | 38 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromoform | < 22 | 22 | 70 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromomethane | < 44 | 44 | 140 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 2-Butanone | < 200 | 200 | 640 | | 50 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| Carbon disulfide | 230 | 25 | 80 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Carbon tetrachloride | < 23 | 23 | 73 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chlorobenzene | < 29 | 29 | 92 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chlorodibromomethane | < 42 | 42 | 130 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloroethane | < 42 | 42 | 130 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloroform | < 22 | 22 | 70 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloromethane | < 14 | 14 | 45 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1-Dichloroethane | < 44 | 44 | 140 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloroethane | < 28 | 28 | 89 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1-Dichloroethene | < 28 | 28 | 89 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloroethene, total | < 60 | 60 | 190 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloropropane | < 20 | 20 | 64 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| cis-1,3-Dichloropropene | < 28 | 28 | 89 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| trans-1,3-Dichloropropene | < 32 | 32 | 100 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Ethylbenzene | 390 | 26 | 83 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 2-Hexanone | < 60 | 60 | 190 | | 50 | ug/L | & | 11/19/02 | SW846 50308 | SW846 8260B |
| Methylene chloride | < 23 | 23 | 73 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 4-Methyl-2-pentanone | < 46 | 46 | 150 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Styrene | < 31 | 31 | 99 | | 50 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,2,2-Tetrachloroethane | < 38 | 38 | 120 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Tetrachloroethene | < 32 | 32 | 100 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Toluene | 340 | 42 | 130 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,1-Trichloroethane | < 32 | 32 | 100 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,2-Trichloroethane | < 25 | 25 | 80 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Trichloroethene | < 20 | 20 | 64 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Vinyl chloride | < 5.5 | 5.5 | 18 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Xylene, total | 1700 | 95 | 300 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |

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## Analytical Report Number: 828497

**Client :** WE ENERGIES
**Project Name :** APPLETON MGP
**Project Number :** 1302440
**Field ID :** MW13S

**Matrix Type :** WATER
**Collection Date :** 11/13/02
**Report Date :** 07/01/03
**Lab Sample Number :** 828497-011

### SPECIAL SEMI-VOLATILE LIST

**Prep Date:** 11/16/02

| Analyte | | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|---|
| bis(2-Ethylhexyl)phthalate | < | 140 | 140 | 450 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Fluoranthene | < | 160 | 160 | 510 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Fluorene | < | 470 | 470 | 1500 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorobenzene | < | 140 | 140 | 450 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorobutadiene | < | 290 | 290 | 920 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorocyclopentadiene | < | 140 | 140 | 450 | | 100 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachloroethane | < | 230 | 230 | 730 | | 100 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| Indeno(1,2,3-cd)pyrene | < | 160 | 160 | 510 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Isophorone | < | 450 | 450 | 1400 | | 100 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| 1-Methylnaphthalene | < | 420 | 420 | 1300 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Methylnaphthalene | | 390 | 390 | 1200 | | 100 | ug/L | Q | 11/19/02 | SW846 3510 | SW846 8270 |
| N-Nitroso-di-n-propylamine | < | 430 | 430 | 1400 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| N-Nitrosodiphenylamine | < | 220 | 220 | 700 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Nitroaniline | < | 420 | 420 | 1300 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Nitrophenol | < | 370 | 370 | 1200 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 3-Nitroaniline | < | 280 | 280 | 890 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Nitroaniline | < | 180 | 180 | 570 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Nitrophenol | < | 180 | 180 | 570 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Naphthalene | | 5900 | 380 | 1200 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Nitrobenzene | < | 350 | 350 | 1100 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,2'-oxybis(1-Chloropropane) | < | 360 | 360 | 1100 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Di-n-octylphthalate | < | 130 | 130 | 410 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Pentachlorophenol | < | 78 | 78 | 250 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenanthrene | < | 210 | 210 | 670 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenol | < | 100 | 100 | 320 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Pyrene | < | 180 | 180 | 570 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2,4-Trichlorobenzene | < | 300 | 300 | 960 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,5-Trichlorophenol | < | 460 | 460 | 1500 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,6-Trichlorophenol | < | 400 | 400 | 1300 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Fluorophenol | | 31 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenol-d5 | | 13 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chlorophenol-d4 | | 56 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2-Dichlorobenzene-d4 | | 72 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Nitrobenzene-d5 | | 74 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,6-Tribromophenol | | 73 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Terphenyl-d14 | | 88 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Fluorobiphenyl | | 77 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |

### VOC 3.4 List (Total 12DCE & XYL)

**Prep Date:** 11/19/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Toluene-d8 | 108 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |

# En Chem Inc.

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## Analytical Report Number: 828497

**Client :** WE ENERGIES
**Project Name :** APPLETON MGP
**Project Number :** 1302440
**Field ID :** MW13S

**Matrix Type :** WATER
**Collection Date :** 11/13/02
**Report Date :** 07/01/03
**Lab Sample Number :** 828497-011

### INORGANICS

| Test | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Cyanide, total | 0.62 | 0.027 | 0.086 | | 1 | mg/L | SUB1 | 11/25/02 | EPA 335.4 | EPA 335.4 |
| Cyanide, weak and dissociable | 0.022 | 0.0027 | 0.0086 | | 1 | mg/L | SUB1 | 11/22/02 | SM 4500 | SM 4500 |

### SPECIAL SEMI-VOLATILE LIST

Prep Date: 11/16/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| 4-Methylphenol | < 200 | 200 | 640 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Bromophenyl phenyl ether | < 360 | 360 | 1100 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Methylphenol | < 230 | 230 | 730 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Acenaphthene | < 460 | 460 | 1500 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Acenaphthylene | < 470 | 470 | 1500 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Anthracene | < 280 | 280 | 890 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Di-n-butylphthalate | < 140 | 140 | 450 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(a)anthracene | < 170 | 170 | 540 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(a)pyrene | < 150 | 150 | 480 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(b)fluoranthene | < 220 | 220 | 700 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(g,h,i)perylene | < 210 | 210 | 670 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(k)fluoranthene | < 240 | 240 | 760 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Butylbenzylphthalate | < 180 | 180 | 570 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chloronaphthalene | < 420 | 420 | 1300 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chlorophenol | < 110 | 110 | 350 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chloro-3-methylphenol | < 410 | 410 | 1300 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chloroaniline | < 420 | 420 | 1300 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chlorophenyl phenyl ether | < 470 | 470 | 1500 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Carbazole | < 140 | 140 | 450 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| bis(2-Chloroethoxy)methane | < 450 | 450 | 1400 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| bis(2-Chloroethyl)ether | < 87 | 87 | 280 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Chrysene | < 180 | 180 | 570 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2-Dichlorobenzene | < 250 | 250 | 800 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,3-Dichlorobenzene | < 230 | 230 | 730 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,4-Dichlorobenzene | < 230 | 230 | 730 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dichlorophenol | < 370 | 370 | 1200 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dimethylphenol | < 290 | 290 | 920 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dinitrophenol | < 300 | 300 | 960 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dinitrotoluene | < 170 | 170 | 540 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,6-Dinitrotoluene | < 370 | 370 | 1200 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 3,3-Dichlorobenzidine | < 280 | 280 | 890 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4,6-Dinitro-2-methylphenol | < 170 | 170 | 540 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dibenzo(a,h)anthracene | < 240 | 240 | 760 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dibenzofuran | < 470 | 470 | 1500 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Diethylphthalate | < 270 | 270 | 860 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dimethylphthalate | < 350 | 350 | 1100 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |

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## Analytical Report Number: 828497

Client : WE ENERGIES
Project Name : APPLETON MGP
Project Number : 1302440
Field ID : MW13D

Matrix Type : WATER
Collection Date : 11/13/02
Report Date : 07/01/03
Lab Sample Number : 828497-010

**VOC 3.4 List (Total 12DCE & XYL)**

Prep Date: 11/19/02

| Analyte | | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Dibromofluoromethane | | 99 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |
| 4-Bromofluorobenzene | | 93 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |
| Acetone | < | 33 | 33 | 110 | | 10 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| Benzene | | 1100 | 2.5 | 8.0 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromodichloromethane | < | 2.3 | 2.3 | 7.3 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromoform | < | 4.5 | 4.5 | 14 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromomethane | < | 8.7 | 8.7 | 28 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 2-Butanone | < | 40 | 40 | 130 | | 10 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| Carbon disulfide | | 10 | 5.0 | 16 | | 10 | ug/L | Q | 11/19/02 | SW846 5030B | SW846 8260B |
| Carbon tetrachloride | < | 4.7 | 4.7 | 15 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chlorobenzene | < | 5.8 | 5.8 | 18 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chlorodibromomethane | < | 8.4 | 8.4 | 27 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloroethane | < | 8.4 | 8.4 | 27 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloroform | < | 4.5 | 4.5 | 14 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloromethane | < | 2.7 | 2.7 | 8.6 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1-Dichloroethane | < | 8.7 | 8.7 | 28 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloroethane | < | 5.5 | 5.5 | 18 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1-Dichloroethene | < | 5.6 | 5.6 | 18 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloroethene, total | < | 12 | 12 | 38 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloropropane | < | 3.9 | 3.9 | 12 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| cis-1,3-Dichloropropene | < | 5.7 | 5.7 | 18 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| trans-1,3-Dichloropropene | < | 6.4 | 6.4 | 20 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Ethylbenzene | | 140 | 5.3 | 17 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 2-Hexanone | < | 12 | 12 | 38 | | 10 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| Methylene chloride | < | 4.7 | 4.7 | 15 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 4-Methyl-2-pentanone | < | 9.1 | 9.1 | 29 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Styrene | < | 6.2 | 6.2 | 20 | | 10 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,2,2-Tetrachloroethane | < | 7.7 | 7.7 | 25 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Tetrachloroethene | < | 6.3 | 6.3 | 20 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Toluene | | 20 | 8.4 | 27 | | 10 | ug/L | Q | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,1-Trichloroethane | < | 6.5 | 6.5 | 21 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,2-Trichloroethane | < | 5.0 | 5.0 | 16 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Trichloroethene | < | 3.9 | 3.9 | 12 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Vinyl chloride | < | 1.1 | 1.1 | 3.5 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Xylene, total | | 200 | 19 | 61 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |

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## Analytical Report Number: 828497

**Client :** WE ENERGIES
**Project Name :** APPLETON MGP
**Project Number :** 1302440
**Field ID :** MW13D

**Matrix Type :** WATER
**Collection Date :** 11/13/02
**Report Date :** 07/01/03
**Lab Sample Number :** 828497-010

### SPECIAL SEMI-VOLATILE LIST

**Prep Date:** 11/16/02

| Analyte | | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|---|
| bis(2-Ethylhexyl)phthalate | < | 70 | 70 | 220 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Fluoranthene | < | 80 | 80 | 250 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Fluorene | < | 240 | 240 | 760 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorobenzene | < | 70 | 70 | 220 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorobutadiene | < | 150 | 150 | 480 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorocyclopentadiene | < | 70 | 70 | 220 | | 50 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachloroethane | < | 110 | 110 | 350 | | 50 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| Indeno(1,2,3-cd)pyrene | < | 80 | 80 | 250 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Isophorone | < | 230 | 230 | 730 | | 50 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| 1-Methylnaphthalene | < | 210 | 210 | 670 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Methylnaphthalene | < | 200 | 200 | 640 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| N-Nitroso-di-n-propylamine | < | 220 | 220 | 700 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| N-Nitrosodiphenylamine | < | 110 | 110 | 350 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Nitroaniline | < | 210 | 210 | 670 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Nitrophenol | < | 190 | 190 | 610 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 3-Nitroaniline | < | 140 | 140 | 450 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Nitroaniline | < | 90 | 90 | 290 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Nitrophenol | < | 90 | 90 | 290 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Naphthalene | | 4200 | 190 | 610 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Nitrobenzene | < | 180 | 180 | 570 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,2'-oxybis(1-Chloropropane) | < | 180 | 180 | 570 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Di-n-octylphthalate | < | 65 | 65 | 210 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Pentachlorophenol | < | 39 | 39 | 120 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenanthrene | < | 110 | 110 | 350 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenol | < | 50 | 50 | 160 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Pyrene | < | 90 | 90 | 290 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2,4-Trichlorobenzene | < | 150 | 150 | 480 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,5-Trichlorophenol | < | 230 | 230 | 730 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,6-Trichlorophenol | < | 200 | 200 | 640 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Fluorophenol | | 33 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenol-d5 | | 14 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chlorophenol-d4 | | 55 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2-Dichlorobenzene-d4 | | 69 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Nitrobenzene-d5 | | 68 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,6-Tribromophenol | | 93 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Terphenyl-d14 | | 113 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Fluorobiphenyl | | 77 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |

### VOC 3.4 List (Total 12DCE & XYL)

**Prep Date:** 11/19/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Toluene-d8 | 106 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |

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## Analytical Report Number: 828497

Client : WE ENERGIES
Project Name : APPLETON MGP
Project Number : 1302440
Field ID : MW13D

Matrix Type : WATER
Collection Date : 11/13/02
Report Date : 07/01/03
Lab Sample Number : 828497-010

### INORGANICS

| Test | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Cyanide, total | 0.74 | 0.027 | 0.086 | | 1 | mg/L | SUB1 | 11/25/02 | EPA 335.4 | EPA 335.4 |
| Cyanide, weak and dissociable | 0.040 | 0.0027 | 0.0086 | | 1 | mg/L | SUB1 | 11/22/02 | SM 4500 | SM 4500 |

### SPECIAL SEMI-VOLATILE LIST

Prep Date: 11/16/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| 4-Methylphenol | < 100 | 100 | 320 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Bromophenyl phenyl ether | < 180 | 180 | 570 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Methylphenol | < 110 | 110 | 350 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Acenaphthene | < 230 | 230 | 730 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Acenaphthylene | < 240 | 240 | 760 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Anthracene | < 140 | 140 | 450 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Di-n-butylphthalate | < 70 | 70 | 220 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(a)anthracene | < 85 | 85 | 270 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(a)pyrene | < 75 | 75 | 240 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(b)fluoranthene | < 110 | 110 | 350 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(g,h,i)perylene | < 110 | 110 | 350 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(k)fluoranthene | < 120 | 120 | 380 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Butylbenzylphthalate | < 90 | 90 | 290 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chloronaphthalene | < 210 | 210 | 670 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chlorophenol | < 55 | 55 | 180 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chloro-3-methylphenol | < 200 | 200 | 640 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chloroaniline | < 210 | 210 | 670 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chlorophenyl phenyl ether | < 240 | 240 | 760 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Carbazole | < 70 | 70 | 220 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| bis(2-Chloroethoxy)methane | < 230 | 230 | 730 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| bis(2-Chloroethyl)ether | < 44 | 44 | 140 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Chrysene | < 90 | 90 | 290 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2-Dichlorobenzene | < 130 | 130 | 410 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,3-Dichlorobenzene | < 110 | 110 | 350 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,4-Dichlorobenzene | < 110 | 110 | 350 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dichlorophenol | < 190 | 190 | 610 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dimethylphenol | 680 | 150 | 480 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dinitrophenol | < 150 | 150 | 480 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dinitrotoluene | < 85 | 85 | 270 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,6-Dinitrotoluene | < 190 | 190 | 610 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 3,3-Dichlorobenzidine | < 140 | 140 | 450 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4,6-Dinitro-2-methylphenol | < 85 | 85 | 270 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dibenzo(a,h)anthracene | < 120 | 120 | 380 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dibenzofuran | < 240 | 240 | 760 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Diethylphthalate | < 140 | 140 | 450 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dimethylphthalate | < 180 | 180 | 570 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |

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## Analytical Report Number: 828497

**Client :** WE ENERGIES
**Project Name :** APPLETON MGP
**Project Number :** 1302440
**Field ID :** QC1

**Matrix Type :** WATER
**Collection Date :** 11/12/02
**Report Date :** 07/01/03
**Lab Sample Number :** 828497-009

**VOC 3.4 List (Total 12DCE & XYL)**

**Prep Date:** 11/19/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Dibromofluoromethane | 104 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |
| 4-Bromofluorobenzene | 92 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |
| Acetone | < 330 | 330 | 1100 | | 100 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| Benzene | 12000 | 25 | 80 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromodichloromethane | < 23 | 23 | 73 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromoform | < 45 | 45 | 140 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromomethane | < 87 | 87 | 280 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 2-Butanone | < 400 | 400 | 1300 | | 100 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| Carbon disulfide | < 50 | 50 | 160 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Carbon tetrachloride | < 47 | 47 | 150 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chlorobenzene | < 58 | 58 | 180 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chlorodibromomethane | < 84 | 84 | 270 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloroethane | < 84 | 84 | 270 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloroform | < 45 | 45 | 140 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloromethane | < 27 | 27 | 86 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1-Dichloroethane | < 87 | 87 | 280 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloroethane | < 55 | 55 | 180 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1-Dichloroethene | < 56 | 56 | 180 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloroethene, total | < 120 | 120 | 380 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloropropane | < 39 | 39 | 120 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| cis-1,3-Dichloropropene | < 57 | 57 | 180 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| trans-1,3-Dichloropropene | < 64 | 64 | 200 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Ethylbenzene | 410 | 53 | 170 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 2-Hexanone | < 120 | 120 | 380 | | 100 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| Methylene chloride | < 47 | 47 | 150 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 4-Methyl-2-pentanone | < 91 | 91 | 290 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Styrene | 190 | 62 | 200 | | 100 | ug/L | Q& | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,2,2-Tetrachloroethane | < 77 | 77 | 250 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Tetrachloroethene | < 63 | 63 | 200 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Toluene | 3300 | 84 | 270 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,1-Trichloroethane | < 65 | 65 | 210 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,2-Trichloroethane | < 50 | 50 | 160 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Trichloroethene | < 39 | 39 | 120 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Vinyl chloride | < 11 | 11 | 35 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Xylene, total | 1400 | 190 | 610 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |

# En Chem Inc.

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## Analytical Report Number: 828497

**Client :** WE ENERGIES
**Project Name :** APPLETON MGP
**Project Number :** 1302440
**Field ID :** QC1

**Matrix Type :** WATER
**Collection Date :** 11/12/02
**Report Date :** 07/01/03
**Lab Sample Number :** 828497-009

### SPECIAL SEMI-VOLATILE LIST

**Prep Date:** 11/16/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| bis(2-Ethylhexyl)phthalate | < 70 | 70 | 220 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Fluoranthene | < 80 | 80 | 250 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Fluorene | < 240 | 240 | 760 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorobenzene | < 70 | 70 | 220 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorobutadiene | < 150 | 150 | 480 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorocyclopentadiene | < 70 | 70 | 220 | | 50 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachloroethane | < 110 | 110 | 350 | | 50 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| Indeno(1,2,3-cd)pyrene | < 80 | 80 | 250 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Isophorone | < 230 | 230 | 730 | | 50 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| 1-Methylnaphthalene | 250 | 210 | 670 | | 50 | ug/L | Q | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Methylnaphthalene | 320 | 200 | 640 | | 50 | ug/L | Q | 11/19/02 | SW846 3510 | SW846 8270 |
| N-Nitroso-di-n-propylamine | < 220 | 220 | 700 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| N-Nitrosodiphenylamine | < 110 | 110 | 350 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Nitroaniline | < 210 | 210 | 670 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Nitrophenol | < 190 | 190 | 610 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 3-Nitroaniline | < 140 | 140 | 450 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Nitroaniline | < 90 | 90 | 290 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Nitrophenol | < 90 | 90 | 290 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Naphthalene | 5300 | 190 | 610 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Nitrobenzene | < 180 | 180 | 570 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,2'-oxybis(1-Chloropropane) | < 180 | 180 | 570 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Di-n-octylphthalate | < 65 | 65 | 210 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Pentachlorophenol | < 39 | 39 | 120 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenanthrene | < 110 | 110 | 350 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenol | 820 | 50 | 160 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Pyrene | < 90 | 90 | 290 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2,4-Trichlorobenzene | < 150 | 150 | 480 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,5-Trichlorophenol | < 230 | 230 | 730 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,6-Trichlorophenol | < 200 | 200 | 640 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Fluorophenol | 40 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenol-d5 | 18 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chlorophenol-d4 | 65 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2-Dichlorobenzene-d4 | 79 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Nitrobenzene-d5 | 90 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,6-Tribromophenol | 87 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Terphenyl-d14 | 110 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Fluorobiphenyl | 94 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |

### VOC 3.4 List (Total 12DCE & XYL)

**Prep Date:** 11/19/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Toluene-d8 | 106 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |

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## Analytical Report Number: 828497

Client : WE ENERGIES
Project Name : APPLETON MGP
Project Number : 1302440
Field ID : QC1

Matrix Type : WATER
Collection Date : 11/12/02
Report Date : 07/01/03
Lab Sample Number : 828497-009

### INORGANICS

| Test | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Cyanide, total | 0.17 | 0.011 | 0.035 | | 1 | mg/L | SUB1 | 11/21/02 | EPA 335.4 | EPA 335.4 |
| Cyanide, weak and dissociable | 0.044 | 0.0027 | 0.0086 | | 1 | mg/L | SUB1 | 11/22/02 | SM 4500 | SM 4500 |

### SPECIAL SEMI-VOLATILE LIST

Prep Date: 11/16/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| 4-Methylphenol | 2600 | 100 | 320 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Bromophenyl phenyl ether | < 180 | 180 | 570 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Methylphenol | 2100 | 110 | 350 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Acenaphthene | < 230 | 230 | 730 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Acenaphthylene | < 240 | 240 | 760 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Anthracene | < 140 | 140 | 450 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Di-n-butylphthalate | < 70 | 70 | 220 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(a)anthracene | < 85 | 85 | 270 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(a)pyrene | < 75 | 75 | 240 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(b)fluoranthene | < 110 | 110 | 350 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(g,h,i)perylene | < 110 | 110 | 350 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(k)fluoranthene | < 120 | 120 | 380 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Butylbenzylphthalate | < 90 | 90 | 290 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chloronaphthalene | < 210 | 210 | 670 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chlorophenol | < 55 | 55 | 180 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chloro-3-methylphenol | < 200 | 200 | 640 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chloroaniline | < 210 | 210 | 670 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chlorophenyl phenyl ether | < 240 | 240 | 760 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Carbazole | < 70 | 70 | 220 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| bis(2-Chloroethoxy)methane | < 230 | 230 | 730 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| bis(2-Chloroethyl)ether | < 44 | 44 | 140 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Chrysene | < 90 | 90 | 290 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2-Dichlorobenzene | < 130 | 130 | 410 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,3-Dichlorobenzene | < 110 | 110 | 350 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,4-Dichlorobenzene | < 110 | 110 | 350 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dichlorophenol | < 190 | 190 | 610 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dimethylphenol | 4800 | 150 | 480 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dinitrophenol | < 150 | 150 | 480 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dinitrotoluene | < 85 | 85 | 270 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,6-Dinitrotoluene | < 190 | 190 | 610 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 3,3-Dichlorobenzidine | < 140 | 140 | 450 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4,6-Dinitro-2-methylphenol | < 85 | 85 | 270 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dibenzo(a,h)anthracene | < 120 | 120 | 380 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dibenzofuran | < 240 | 240 | 760 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Diethylphthalate | < 140 | 140 | 450 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dimethylphthalate | < 180 | 180 | 570 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |

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## Analytical Report Number: 828497

Client : WE ENERGIES
Project Name : APPLETON MGP
Project Number : 1302440
Field ID : MW4

Matrix Type : WATER
Collection Date : 11/12/02
Report Date : 07/01/03
Lab Sample Number : 828497-008

**VOC 3.4 List (Total 12DCE & XYL)**

Prep Date: 11/19/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Dibromofluoromethane | 100 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |
| 4-Bromofluorobenzene | 94 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |
| Acetone | < 170 | 170 | 540 | | 50 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| Benzene | 3300 | 12 | 38 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromodichloromethane | < 12 | 12 | 38 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromoform | < 22 | 22 | 70 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromomethane | < 44 | 44 | 140 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 2-Butanone | < 200 | 200 | 640 | | 50 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| Carbon disulfide | 76 | 25 | 80 | | 50 | ug/L | Q | 11/19/02 | SW846 5030B | SW846 8260B |
| Carbon tetrachloride | < 23 | 23 | 73 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chlorobenzene | < 29 | 29 | 92 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chlorodibromomethane | < 42 | 42 | 130 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloroethane | < 42 | 42 | 130 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloroform | < 22 | 22 | 70 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloromethane | < 14 | 14 | 45 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1-Dichloroethane | < 44 | 44 | 140 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloroethane | < 28 | 28 | 89 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1-Dichloroethene | < 28 | 28 | 89 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloroethene, total | < 60 | 60 | 190 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloropropane | < 20 | 20 | 64 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| cis-1,3-Dichloropropene | < 28 | 28 | 89 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| trans-1,3-Dichloropropene | < 32 | 32 | 100 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Ethylbenzene | 560 | 26 | 83 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 2-Hexanone | < 60 | 60 | 190 | | 50 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| Methylene chloride | < 23 | 23 | 73 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 4-Methyl-2-pentanone | < 46 | 46 | 150 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Styrene | < 31 | 31 | 99 | | 50 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,2,2-Tetrachloroethane | < 38 | 38 | 120 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Tetrachloroethene | < 32 | 32 | 100 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Toluene | 1900 | 42 | 130 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,1-Trichloroethane | < 32 | 32 | 100 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,2-Trichloroethane | < 25 | 25 | 80 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Trichloroethene | < 20 | 20 | 64 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Vinyl chloride | < 5.5 | 5.5 | 18 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Xylene, total | 2200 | 95 | 300 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |

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## Analytical Report Number: 828497

Client : WE ENERGIES
Project Name : APPLETON MGP
Project Number : 1302440
Field ID : MW4

Matrix Type : WATER
Collection Date : 11/12/02
Report Date : 07/01/03
Lab Sample Number : 828497-008

### SPECIAL SEMI-VOLATILE LIST

Prep Date: 11/16/02

| Analyte | | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|---|
| bis(2-Ethylhexyl)phthalate | < | 140 | 140 | 450 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Fluoranthene | < | 160 | 160 | 510 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Fluorene | < | 470 | 470 | 1500 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorobenzene | < | 140 | 140 | 450 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorobutadiene | < | 290 | 290 | 920 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorocyclopentadiene | < | 140 | 140 | 450 | | 100 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachloroethane | < | 230 | 230 | 730 | | 100 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| Indeno(1,2,3-cd)pyrene | < | 160 | 160 | 510 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Isophorone | < | 450 | 450 | 1400 | | 100 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| 1-Methylnaphthalene | < | 420 | 420 | 1300 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Methylnaphthalene | | 420 | 390 | 1200 | | 100 | ug/L | Q | 11/19/02 | SW846 3510 | SW846 8270 |
| N-Nitroso-di-n-propylamine | < | 430 | 430 | 1400 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| N-Nitrosodiphenylamine | < | 220 | 220 | 700 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Nitroaniline | < | 420 | 420 | 1300 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Nitrophenol | < | 370 | 370 | 1200 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 3-Nitroaniline | < | 280 | 280 | 890 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Nitroaniline | < | 180 | 180 | 570 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Nitrophenol | < | 180 | 180 | 570 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Naphthalene | | 6200 | 380 | 1200 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Nitrobenzene | < | 350 | 350 | 1100 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,2'-oxybis(1-Chloropropane) | < | 360 | 360 | 1100 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Di-n-octylphthalate | < | 130 | 130 | 410 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Pentachlorophenol | < | 78 | 78 | 250 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenanthrene | < | 210 | 210 | 670 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenol | < | 100 | 100 | 320 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Pyrene | < | 180 | 180 | 570 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2,4-Trichlorobenzene | < | 300 | 300 | 960 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,5-Trichlorophenol | < | 460 | 460 | 1500 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,6-Trichlorophenol | < | 400 | 400 | 1300 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Fluorophenol | | 26 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenol-d5 | | 13 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chlorophenol-d4 | | 47 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2-Dichlorobenzene-d4 | | 54 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Nitrobenzene-d5 | | 57 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,6-Tribromophenol | | 86 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Terphenyl-d14 | | 87 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Fluorobiphenyl | | 75 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |

### VOC 3.4 List (Total 12DCE & XYL)

Prep Date: 11/19/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Toluene-d8 | 108 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |

# En Chem Inc.

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## Analytical Report Number: 828497

Client : WE ENERGIES
Project Name : APPLETON MGP
Project Number : 1302440
Field ID : MW4

Matrix Type : WATER
Collection Date : 11/12/02
Report Date : 07/01/03
Lab Sample Number : 828497-008

### INORGANICS

| Test | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Cyanide, total | 1.4 | 0.027 | 0.086 | | 1 | mg/L | SUB1 | 11/25/02 | EPA 335.4 | EPA 335.4 |
| Cyanide, weak and dissociable | 0.015 | 0.0027 | 0.0086 | | 1 | mg/L | SUB1 | 11/22/02 | SM 4500 | SM 4500 |

### SPECIAL SEMI-VOLATILE LIST

Prep Date: 11/16/02

| Analyte | | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 4-Methylphenol | < | 200 | 200 | 640 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Bromophenyl phenyl ether | < | 360 | 360 | 1100 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Methylphenol | < | 230 | 230 | 730 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Acenaphthene | < | 460 | 460 | 1500 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Acenaphthylene | < | 470 | 470 | 1500 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Anthracene | < | 280 | 280 | 890 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Di-n-butylphthalate | < | 140 | 140 | 450 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(a)anthracene | < | 170 | 170 | 540 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(a)pyrene | < | 150 | 150 | 480 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(b)fluoranthene | < | 220 | 220 | 700 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(g,h,i)perylene | < | 210 | 210 | 670 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(k)fluoranthene | < | 240 | 240 | 760 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Butylbenzylphthalate | < | 180 | 180 | 570 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chloronaphthalene | < | 420 | 420 | 1300 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chlorophenol | < | 110 | 110 | 350 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chloro-3-methylphenol | < | 410 | 410 | 1300 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chloroaniline | < | 420 | 420 | 1300 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chlorophenyl phenyl ether | < | 470 | 470 | 1500 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Carbazole | < | 140 | 140 | 450 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| bis(2-Chloroethoxy)methane | < | 450 | 450 | 1400 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| bis(2-Chloroethyl)ether | < | 87 | 87 | 280 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Chrysene | < | 180 | 180 | 570 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2-Dichlorobenzene | < | 250 | 250 | 800 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,3-Dichlorobenzene | < | 230 | 230 | 730 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,4-Dichlorobenzene | < | 230 | 230 | 730 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dichlorophenol | < | 370 | 370 | 1200 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dimethylphenol | < | 290 | 290 | 920 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dinitrophenol | < | 300 | 300 | 960 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dinitrotoluene | < | 170 | 170 | 540 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,6-Dinitrotoluene | < | 370 | 370 | 1200 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 3,3-Dichlorobenzidine | < | 280 | 280 | 890 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4,6-Dinitro-2-methylphenol | < | 170 | 170 | 540 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dibenzo(a,h)anthracene | < | 240 | 240 | 760 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dibenzofuran | < | 470 | 470 | 1500 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Diethylphthalate | < | 270 | 270 | 860 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dimethylphthalate | < | 350 | 350 | 1100 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |

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## Analytical Report Number: 828497

**Client :** WE ENERGIES
**Project Name :** APPLETON MGP
**Project Number :** 1302440
**Field ID :** MW14S

**Matrix Type :** WATER
**Collection Date :** 11/12/02
**Report Date :** 07/01/03
**Lab Sample Number :** 828497-007

### VOC 3.4 List (Total 12DCE & XYL)

**Prep Date:** 11/19/02

| Analyte | | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Dibromofluoromethane | | 100 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |
| 4-Bromofluorobenzene | | 94 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |
| Acetone | < | 820 | 820 | 2600 | | 250 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| Benzene | | 34000 | 62 | 200 | | 250 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromodichloromethane | < | 58 | 58 | 180 | | 250 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromoform | < | 110 | 110 | 350 | | 250 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromomethane | < | 220 | 220 | 700 | | 250 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 2-Butanone | < | 1000 | 1000 | 3200 | | 250 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| Carbon disulfide | < | 130 | 130 | 410 | | 250 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Carbon tetrachloride | < | 120 | 120 | 380 | | 250 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chlorobenzene | < | 150 | 150 | 480 | | 250 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chlorodibromomethane | < | 210 | 210 | 670 | | 250 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloroethane | < | 210 | 210 | 670 | | 250 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloroform | < | 110 | 110 | 350 | | 250 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloromethane | < | 68 | 68 | 220 | | 250 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1-Dichloroethane | < | 220 | 220 | 700 | | 250 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloroethane | < | 140 | 140 | 450 | | 250 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1-Dichloroethene | < | 140 | 140 | 450 | | 250 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloroethene, total | < | 300 | 300 | 960 | | 250 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloropropane | < | 98 | 98 | 310 | | 250 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| cis-1,3-Dichloropropene | < | 140 | 140 | 450 | | 250 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| trans-1,3-Dichloropropene | < | 160 | 160 | 510 | | 250 | ug/L | | 11/19/02 | SW8465030B | SW846 8260B |
| Ethylbenzene | | 760 | 130 | 410 | | 250 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 2-Hexanone | < | 300 | 300 | 960 | | 250 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| Methylene chloride | < | 120 | 120 | 380 | | 250 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 4-Methyl-2-pentanone | < | 230 | 230 | 730 | | 250 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Styrene | | 7500 | 160 | 510 | | 250 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,2,2-Tetrachloroethane | < | 190 | 190 | 610 | | 250 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Tetrachloroethene | < | 160 | 160 | 510 | | 250 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Toluene | | 25000 | 210 | 670 | | 250 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,1-Trichloroethane | < | 160 | 160 | 510 | | 250 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,2-Trichloroethane | < | 130 | 130 | 410 | | 250 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Trichloroethene | < | 98 | 98 | 310 | | 250 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Vinyl chloride | < | 28 | 28 | 89 | | 250 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Xylene, total | | 4600 | 470 | 1500 | | 250 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |

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## Analytical Report Number: 828497

**Client :** WE ENERGIES
**Project Name :** APPLETON MGP
**Project Number :** 1302440
**Field ID :** MW14S

**Matrix Type :** WATER
**Collection Date :** 11/12/02
**Report Date :** 07/01/03
**Lab Sample Number :** 828497-007

### SPECIAL SEMI-VOLATILE LIST

**Prep Date:** 11/16/02

| Analyte | | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|---|
| bis(2-Ethylhexyl)phthalate | < | 280 | 280 | 890 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Fluoranthene | < | 320 | 320 | 1000 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Fluorene | < | 940 | 940 | 3000 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorobenzene | < | 280 | 280 | 890 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorobutadiene | < | 580 | 580 | 1800 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorocyclopentadiene | < | 280 | 280 | 890 | | 200 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachloroethane | < | 460 | 460 | 1500 | | 200 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| Indeno(1,2,3-cd)pyrene | < | 320 | 320 | 1000 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Isophorone | < | 900 | 900 | 2900 | | 200 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| 1-Methylnaphthalene | < | 840 | 840 | 2700 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Methylnaphthalene | < | 780 | 780 | 2500 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| N-Nitroso-di-n-propylamine | < | 860 | 860 | 2700 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| N-Nitrosodiphenylamine | < | 440 | 440 | 1400 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Nitroaniline | < | 840 | 840 | 2700 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Nitrophenol | < | 740 | 740 | 2400 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 3-Nitroaniline | < | 560 | 560 | 1800 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Nitroaniline | < | 360 | 360 | 1100 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Nitrophenol | < | 360 | 360 | 1100 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Naphthalene | | 14000 | 760 | 2400 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Nitrobenzene | < | 700 | 700 | 2200 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,2'-oxybis(1-Chloropropane) | < | 720 | 720 | 2300 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Di-n-octylphthalate | < | 260 | 260 | 830 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Pentachlorophenol | < | 160 | 160 | 510 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenanthrene | < | 420 | 420 | 1300 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenol | | 1000 | 200 | 640 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Pyrene | < | 360 | 360 | 1100 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2,4-Trichlorobenzene | < | 600 | 600 | 1900 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,5-Trichlorophenol | < | 920 | 920 | 2900 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,6-Trichlorophenol | < | 800 | 800 | 2500 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Fluorophenol | | 56 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenol-d5 | | 14 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chlorophenol-d4 | | 63 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2-Dichlorobenzene-d4 | | 65 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Nitrobenzene-d5 | | 82 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,6-Tribromophenol | | 103 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Terphenyl-d14 | | 91 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Fluorobiphenyl | | 86 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |

### VOC 3.4 List (Total 12DCE & XYL)

**Prep Date:** 11/19/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Toluene-d8 | 106 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |

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## Analytical Report Number: 828497

**Client :** WE ENERGIES
**Project Name :** APPLETON MGP
**Project Number :** 1302440
**Field ID :** MW14S

**Matrix Type :** WATER
**Collection Date :** 11/12/02
**Report Date :** 07/01/03
**Lab Sample Number :** 828497-007

### INORGANICS

| Test | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Cyanide, total | 0.66 | 0.027 | 0.086 | | 1 | mg/L | SUB1 | 11/25/02 | EPA 335.4 | EPA 335.4 |
| Cyanide, weak and dissociable | 0.075 | 0.0027 | 0.0086 | | 1 | mg/L | SUB1 | 11/22/02 | SM 4500 | SM 4500 |

### SPECIAL SEMI-VOLATILE LIST

Prep Date: 11/16/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| 4-Methylphenol | 1600 | 400 | 1300 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Bromophenyl phenyl ether | < 720 | 720 | 2300 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Methylphenol | 790 | 460 | 1500 | | 200 | ug/L | Q | 11/19/02 | SW846 3510 | SW846 8270 |
| Acenaphthene | < 920 | 920 | 2900 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Acenaphthylene | < 940 | 940 | 3000 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Anthracene | < 560 | 560 | 1800 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Di-n-butylphthalate | < 280 | 280 | 890 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(a)anthracene | < 340 | 340 | 1100 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(a)pyrene | < 300 | 300 | 960 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(b)fluoranthene | < 440 | 440 | 1400 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(g,h,i)perylene | < 420 | 420 | 1300 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(k)fluoranthene | < 480 | 480 | 1500 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Butylbenzylphthalate | < 360 | 360 | 1100 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chloronaphthalene | < 840 | 840 | 2700 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chlorophenol | < 220 | 220 | 700 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chloro-3-methylphenol | < 820 | 820 | 2600 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chloroaniline | < 840 | 840 | 2700 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chlorophenyl phenyl ether | < 940 | 940 | 3000 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Carbazole | < 280 | 280 | 890 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| bis(2-Chloroethoxy)methane | < 900 | 900 | 2900 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| bis(2-Chloroethyl)ether | < 170 | 170 | 540 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Chrysene | < 360 | 360 | 1100 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2-Dichlorobenzene | < 500 | 500 | 1600 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,3-Dichlorobenzene | < 460 | 460 | 1500 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,4-Dichlorobenzene | < 460 | 460 | 1500 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dichlorophenol | < 740 | 740 | 2400 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dimethylphenol | 1000 | 580 | 1800 | | 200 | ug/L | Q | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dinitrophenol | < 600 | 600 | 1900 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dinitrotoluene | < 340 | 340 | 1100 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,6-Dinitrotoluene | < 740 | 740 | 2400 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 3,3-Dichlorobenzidine | < 560 | 560 | 1800 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4,6-Dinitro-2-methylphenol | < 340 | 340 | 1100 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dibenzo(a,h)anthracene | < 480 | 480 | 1500 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dibenzofuran | < 940 | 940 | 3000 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Diethylphthalate | < 540 | 540 | 1700 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dimethylphthalate | < 700 | 700 | 2200 | | 200 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |

# En Chem Inc.

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## Analytical Report Number: 828497

Client : WE ENERGIES
Project Name : APPLETON MGP
Project Number : 1302440
Field ID : MW14D

Matrix Type : WATER
Collection Date : 11/12/02
Report Date : 07/01/03
Lab Sample Number : 828497-006

**VOC 3.4 List (Total 12DCE & XYL)**

Prep Date: 11/19/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Dibromofluoromethane | 100 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |
| 4-Bromofluorobenzene | 93 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |
| Acetone | < 170 | 170 | 540 | | 50 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| Benzene | 4900 | 12 | 38 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromodichloromethane | < 12 | 12 | 38 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromoform | < 22 | 22 | 70 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromomethane | < 44 | 44 | 140 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 2-Butanone | < 200 | 200 | 640 | | 50 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| Carbon disulfide | < 25 | 25 | 80 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Carbon tetrachloride | < 23 | 23 | 73 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chlorobenzene | < 29 | 29 | 92 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chlorodibromomethane | < 42 | 42 | 130 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloroethane | < 42 | 42 | 130 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloroform | < 22 | 22 | 70 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloromethane | < 14 | 14 | 45 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1-Dichloroethane | < 44 | 44 | 140 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloroethane | < 28 | 28 | 89 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1-Dichloroethene | < 28 | 28 | 89 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloroethene, total | < 60 | 60 | 190 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloropropane | < 20 | 20 | 64 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| cis-1,3-Dichloropropene | < 28 | 28 | 89 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| trans-1,3-Dichloropropene | < 32 | 32 | 100 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Ethylbenzene | 1200 | 26 | 83 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 2-Hexanone | < 60 | 60 | 190 | | 50 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| Methylene chloride | < 23 | 23 | 73 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 4-Methyl-2-pentanone | < 46 | 46 | 150 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Styrene | 390 | 31 | 99 | | 50 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,2,2-Tetrachloroethane | < 38 | 38 | 120 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Tetrachloroethene | < 32 | 32 | 100 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Toluene | 2000 | 42 | 130 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,1-Trichloroethane | < 32 | 32 | 100 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,2-Trichloroethane | < 25 | 25 | 80 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Trichloroethene | < 20 | 20 | 64 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Vinyl chloride | < 5.5 | 5.5 | 18 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Xylene, total | 1500 | 95 | 300 | | 50 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |

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## Analytical Report Number: 828497

**Client :** WE ENERGIES
**Project Name :** APPLETON MGP
**Project Number :** 1302440
**Field ID :** MW14D

**Matrix Type :** WATER
**Collection Date :** 11/12/02
**Report Date :** 07/01/03
**Lab Sample Number :** 828497-006

### SPECIAL SEMI-VOLATILE LIST

**Prep Date:** 11/16/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| bis(2-Ethylhexyl)phthalate | < 140 | 140 | 450 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Fluoranthene | < 160 | 160 | 510 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Fluorene | < 470 | 470 | 1500 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorobenzene | < 140 | 140 | 450 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorobutadiene | < 290 | 290 | 920 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorocyclopentadiene | < 140 | 140 | 450 | | 100 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachloroethane | < 230 | 230 | 730 | | 100 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| Indeno(1,2,3-cd)pyrene | < 160 | 160 | 510 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Isophorone | < 450 | 450 | 1400 | | 100 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| 1-Methylnaphthalene | 550 | 420 | 1300 | | 100 | ug/L | Q | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Methylnaphthalene | 720 | 390 | 1200 | | 100 | ug/L | Q | 11/19/02 | SW846 3510 | SW846 8270 |
| N-Nitroso-di-n-propylamine | < 430 | 430 | 1400 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| N-Nitrosodiphenylamine | < 220 | 220 | 700 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Nitroaniline | < 420 | 420 | 1300 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Nitrophenol | < 370 | 370 | 1200 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 3-Nitroaniline | < 280 | 280 | 890 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Nitroaniline | < 180 | 180 | 570 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Nitrophenol | < 180 | 180 | 570 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Naphthalene | 6700 | 380 | 1200 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Nitrobenzene | < 350 | 350 | 1100 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,2'-oxybis(1-Chloropropane) | < 360 | 360 | 1100 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Di-n-octylphthalate | < 130 | 130 | 410 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Pentachlorophenol | < 78 | 78 | 250 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenanthrene | < 210 | 210 | 670 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenol | < 100 | 100 | 320 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Pyrene | < 180 | 180 | 570 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2,4-Trichlorobenzene | < 300 | 300 | 960 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,5-Trichlorophenol | < 460 | 460 | 1500 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,6-Trichlorophenol | < 400 | 400 | 1300 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Fluorophenol | 41 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenol-d5 | 16 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chlorophenol-d4 | 64 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2-Dichlorobenzene-d4 | 84 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Nitrobenzene-d5 | 83 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,6-Tribromophenol | 58 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Terphenyl-d14 | 84 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Fluorobiphenyl | 107 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |

### VOC 3.4 List (Total 12DCE & XYL)

**Prep Date:** 11/19/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Toluene-d8 | 107 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |

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## Analytical Report Number: 828497

Client : WE ENERGIES
Project Name : APPLETON MGP
Project Number : 1302440
Field ID : MW14D

Matrix Type : WATER
Collection Date : 11/12/02
Report Date : 07/01/03
Lab Sample Number : 828497-006

### INORGANICS

| Test | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Cyanide, total | 0.31 | 0.011 | 0.035 | | 1 | mg/L | SUB1 | 11/21/02 | EPA 335.4 | EPA 335.4 |
| Cyanide, weak and dissociable | 0.038 | 0.0027 | 0.0086 | | 1 | mg/L | SUB1 | 11/22/02 | SM 4500 | SM 4500 |

### SPECIAL SEMI-VOLATILE LIST

Prep Date: 11/16/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| 4-Methylphenol | < 200 | 200 | 640 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Bromophenyl phenyl ether | < 360 | 360 | 1100 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Methylphenol | < 230 | 230 | 730 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Acenaphthene | < 460 | 460 | 1500 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Acenaphthylene | < 470 | 470 | 1500 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Anthracene | < 280 | 280 | 890 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Di-n-butylphthalate | < 140 | 140 | 450 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(a)anthracene | < 170 | 170 | 540 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(a)pyrene | < 150 | 150 | 480 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(b)fluoranthene | < 220 | 220 | 700 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(g,h,i)perylene | < 210 | 210 | 670 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(k)fluoranthene | < 240 | 240 | 760 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Butylbenzylphthalate | < 180 | 180 | 570 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chloronaphthalene | < 420 | 420 | 1300 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chlorophenol | < 110 | 110 | 350 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chloro-3-methylphenol | < 410 | 410 | 1300 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chloroaniline | < 420 | 420 | 1300 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chlorophenyl phenyl ether | < 470 | 470 | 1500 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Carbazole | < 140 | 140 | 450 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| bis(2-Chloroethoxy)methane | < 450 | 450 | 1400 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| bis(2-Chloroethyl)ether | < 87 | 87 | 280 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Chrysene | < 180 | 180 | 570 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2-Dichlorobenzene | < 250 | 250 | 800 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,3-Dichlorobenzene | < 230 | 230 | 730 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,4-Dichlorobenzene | < 230 | 230 | 730 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dichlorophenol | < 370 | 370 | 1200 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dimethylphenol | < 290 | 290 | 920 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dinitrophenol | < 300 | 300 | 960 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dinitrotoluene | < 170 | 170 | 540 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,6-Dinitrotoluene | < 370 | 370 | 1200 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 3,3-Dichlorobenzidine | < 280 | 280 | 890 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4,6-Dinitro-2-methylphenol | < 170 | 170 | 540 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dibenzo(a,h)anthracene | < 240 | 240 | 760 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dibenzofuran | < 470 | 470 | 1500 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Diethylphthalate | < 270 | 270 | 860 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dimethylphthalate | < 350 | 350 | 1100 | | 100 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |

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## Analytical Report Number: 828497

**Client :** WE ENERGIES
**Project Name :** APPLETON MGP
**Project Number :** 1302440
**Field ID :** MW5

**Matrix Type :** WATER
**Collection Date :** 11/12/02
**Report Date :** 07/01/03
**Lab Sample Number :** 828497-005

**VOC 3.4 List (Total 12DCE & XYL)** — **Prep Date:** 11/19/02

| Analyte | | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Dibromofluoromethane | | 99 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |
| 4-Bromofluorobenzene | | 93 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |
| Acetone | < | 330 | 330 | 1100 | | 100 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| Benzene | | 12000 | 25 | 80 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromodichloromethane | < | 23 | 23 | 73 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromoform | < | 45 | 45 | 140 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromomethane | < | 87 | 87 | 280 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 2-Butanone | < | 400 | 400 | 1300 | | 100 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| Carbon disulfide | < | 50 | 50 | 160 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Carbon tetrachloride | < | 47 | 47 | 150 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chlorobenzene | < | 58 | 58 | 180 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chlorodibromomethane | < | 84 | 84 | 270 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloroethane | < | 84 | 84 | 270 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloroform | < | 45 | 45 | 140 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloromethane | < | 27 | 27 | 86 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1-Dichloroethane | < | 87 | 87 | 280 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloroethane | < | 55 | 55 | 180 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1-Dichloroethene | < | 56 | 56 | 180 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloroethene, total | < | 120 | 120 | 380 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloropropane | < | 39 | 39 | 120 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| cis-1,3-Dichloropropene | < | 57 | 57 | 180 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| trans-1,3-Dichloropropene | < | 64 | 64 | 200 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Ethylbenzene | | 420 | 53 | 170 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 2-Hexanone | < | 120 | 120 | 380 | | 100 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| Methylene chloride | < | 47 | 47 | 150 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 4-Methyl-2-pentanone | < | 91 | 91 | 290 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Styrene | | 180 | 62 | 200 | | 100 | ug/L | Q& | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,2,2-Tetrachloroethane | < | 77 | 77 | 250 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Tetrachloroethene | < | 63 | 63 | 200 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Toluene | | 3400 | 84 | 270 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,1-Trichloroethane | < | 65 | 65 | 210 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,2-Trichloroethane | < | 50 | 50 | 160 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Trichloroethene | < | 39 | 39 | 120 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Vinyl chloride | < | 11 | 11 | 35 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Xylene, total | | 1400 | 190 | 610 | | 100 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |

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## Analytical Report Number: 828497

**Client :** WE ENERGIES
**Project Name :** APPLETON MGP
**Project Number :** 1302440
**Field ID :** MW5

**Matrix Type :** WATER
**Collection Date :** 11/12/02
**Report Date :** 07/01/03
**Lab Sample Number :** 828497-005

### SPECIAL SEMI-VOLATILE LIST

**Prep Date:** 11/16/02

| Analyte | | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|---|
| bis(2-Ethylhexyl)phthalate | < | 70 | 70 | 220 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Fluoranthene | < | 80 | 80 | 250 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Fluorene | < | 240 | 240 | 760 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorobenzene | < | 70 | 70 | 220 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorobutadiene | < | 150 | 150 | 480 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorocyclopentadiene | < | 70 | 70 | 220 | | 50 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachloroethane | < | 110 | 110 | 350 | | 50 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| Indeno(1,2,3-cd)pyrene | < | 80 | 80 | 250 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Isophorone | < | 230 | 230 | 730 | | 50 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| 1-Methylnaphthalene | | 250 | 210 | 670 | | 50 | ug/L | Q | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Methylnaphthalene | | 310 | 200 | 640 | | 50 | ug/L | Q | 11/19/02 | SW846 3510 | SW846 8270 |
| N-Nitroso-di-n-propylamine | < | 220 | 220 | 700 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| N-Nitrosodiphenylamine | < | 110 | 110 | 350 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Nitroaniline | < | 210 | 210 | 670 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Nitrophenol | < | 190 | 190 | 610 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 3-Nitroaniline | < | 140 | 140 | 450 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Nitroaniline | < | 90 | 90 | 290 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Nitrophenol | < | 90 | 90 | 290 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Naphthalene | | 4700 | 190 | 610 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Nitrobenzene | < | 180 | 180 | 570 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,2'-oxybis(1-Chloropropane) | < | 180 | 180 | 570 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Di-n-octylphthalate | < | 65 | 65 | 210 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Pentachlorophenol | < | 39 | 39 | 120 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenanthrene | | 120 | 110 | 350 | | 50 | ug/L | Q | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenol | | 720 | 50 | 160 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Pyrene | < | 90 | 90 | 290 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2,4-Trichlorobenzene | < | 150 | 150 | 480 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,5-Trichlorophenol | < | 230 | 230 | 730 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,6-Trichlorophenol | < | 200 | 200 | 640 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Fluorophenol | | 44 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenol-d5 | | 18 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chlorophenol-d4 | | 63 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2-Dichlorobenzene-d4 | | 74 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Nitrobenzene-d5 | | 82 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,6-Tribromophenol | | 91 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Terphenyl-d14 | | 96 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Fluorobiphenyl | | 91 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |

### VOC 3.4 List (Total 12DCE & XYL)

**Prep Date:** 11/19/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Toluene-d8 | 107 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |

# En Chem Inc.

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## Analytical Report Number: 828497

Client : WE ENERGIES
Project Name : APPLETON MGP
Project Number : 1302440
Field ID : MW5

Matrix Type : WATER
Collection Date : 11/12/02
Report Date : 07/01/03
Lab Sample Number : 828497-005

### INORGANICS

| Test | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Cyanide, total | 0.36 | 0.011 | 0.035 | | 1 | mg/L | SUB1 | 11/21/02 | EPA 335.4 | EPA 335.4 |
| Cyanide, weak and dissociable | 0.019 | 0.0027 | 0.0086 | | 1 | mg/L | SUB1 | 11/22/02 | SM 4500 | SM 4500 |

### SPECIAL SEMI-VOLATILE LIST

Prep Date: 11/16/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| 4-Methylphenol | 2400 | 100 | 320 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Bromophenyl phenyl ether | < 180 | 180 | 570 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Methylphenol | 2100 | 110 | 350 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Acenaphthene | < 230 | 230 | 730 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Acenaphthylene | < 240 | 240 | 760 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Anthracene | < 140 | 140 | 450 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Di-n-butylphthalate | < 70 | 70 | 220 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(a)anthracene | < 85 | 85 | 270 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(a)pyrene | < 75 | 75 | 240 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(b)fluoranthene | < 110 | 110 | 350 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(g,h,i)perylene | < 110 | 110 | 350 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(k)fluoranthene | < 120 | 120 | 380 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Butylbenzylphthalate | < 90 | 90 | 290 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chloronaphthalene | < 210 | 210 | 670 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chlorophenol | < 55 | 55 | 180 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chloro-3-methylphenol | < 200 | 200 | 640 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chloroaniline | < 210 | 210 | 670 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chlorophenyl phenyl ether | < 240 | 240 | 760 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Carbazole | < 70 | 70 | 220 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| bis(2-Chloroethoxy)methane | < 230 | 230 | 730 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| bis(2-Chloroethyl)ether | < 44 | 44 | 140 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Chrysene | < 90 | 90 | 290 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2-Dichlorobenzene | < 130 | 130 | 410 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,3-Dichlorobenzene | < 110 | 110 | 350 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,4-Dichlorobenzene | < 110 | 110 | 350 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dichlorophenol | < 190 | 190 | 610 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dimethylphenol | 4000 | 150 | 480 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dinitrophenol | < 150 | 150 | 480 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dinitrotoluene | < 85 | 85 | 270 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,6-Dinitrotoluene | < 190 | 190 | 610 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 3,3-Dichlorobenzidine | < 140 | 140 | 450 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4,6-Dinitro-2-methylphenol | < 85 | 85 | 270 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dibenzo(a,h)anthracene | < 120 | 120 | 380 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dibenzofuran | < 240 | 240 | 760 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Diethylphthalate | < 140 | 140 | 450 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dimethylphthalate | < 180 | 180 | 570 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |

# En Chem Inc.

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## Analytical Report Number: 828497

**Client :** WE ENERGIES
**Project Name :** APPLETON MGP
**Project Number :** 1302440
**Field ID :** MW17D

**Matrix Type :** WATER
**Collection Date :** 11/12/02
**Report Date :** 07/01/03
**Lab Sample Number :** 828497-004

### VOC 3.4 List (Total 12DCE & XYL)

**Prep Date:** 11/19/02

| Analyte | | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Dibromofluoromethane | | 99 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |
| 4-Bromofluorobenzene | | 93 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |
| Acetone | < | 33 | 33 | 110 | | 10 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| Benzene | | 1600 | 2.5 | 8.0 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromodichloromethane | < | 2.3 | 2.3 | 7.3 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromoform | < | 4.5 | 4.5 | 14 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Bromomethane | < | 8.7 | 8.7 | 28 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 2-Butanone | < | 40 | 40 | 130 | | 10 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| Carbon disulfide | < | 5.0 | 5.0 | 16 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Carbon tetrachloride | < | 4.7 | 4.7 | 15 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chlorobenzene | < | 5.8 | 5.8 | 18 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chlorodibromomethane | < | 8.4 | 8.4 | 27 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloroethane | < | 8.4 | 8.4 | 27 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloroform | < | 4.5 | 4.5 | 14 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Chloromethane | < | 2.7 | 2.7 | 8.6 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1-Dichloroethane | < | 8.7 | 8.7 | 28 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloroethane | < | 5.5 | 5.5 | 18 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1-Dichloroethene | < | 5.6 | 5.6 | 18 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloroethene, total | < | 12 | 12 | 38 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloropropane | < | 3.9 | 3.9 | 12 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| cis-1,3-Dichloropropene | < | 5.7 | 5.7 | 18 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| trans-1,3-Dichloropropene | < | 6.4 | 6.4 | 20 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Ethylbenzene | | 53 | 5.3 | 17 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 2-Hexanone | < | 12 | 12 | 38 | | 10 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| Methylene chloride | < | 4.7 | 4.7 | 15 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 4-Methyl-2-pentanone | < | 9.1 | 9.1 | 29 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Styrene | < | 6.2 | 6.2 | 20 | | 10 | ug/L | & | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,2,2-Tetrachloroethane | < | 7.7 | 7.7 | 25 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Tetrachloroethene | < | 6.3 | 6.3 | 20 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Toluene | | 72 | 8.4 | 27 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,1-Trichloroethane | < | 6.5 | 6.5 | 21 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| 1,1,2-Trichloroethane | < | 5.0 | 5.0 | 16 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Trichloroethene | < | 3.9 | 3.9 | 12 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Vinyl chloride | < | 1.1 | 1.1 | 3.5 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |
| Xylene, total | | 350 | 19 | 61 | | 10 | ug/L | | 11/19/02 | SW846 5030B | SW846 8260B |

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## Analytical Report Number: 828497

Client : WE ENERGIES
Project Name : APPLETON MGP
Project Number : 1302440
Field ID : MW17D

Matrix Type : WATER
Collection Date : 11/12/02
Report Date : 07/01/03
Lab Sample Number : 828497-004

### SPECIAL SEMI-VOLATILE LIST

Prep Date: 11/16/02

| Analyte | | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|---|
| bis(2-Ethylhexyl)phthalate | < | 28 | 28 | 89 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Fluoranthene | < | 32 | 32 | 100 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Fluorene | < | 94 | 94 | 300 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorobenzene | < | 28 | 28 | 89 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorobutadiene | < | 58 | 58 | 180 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorocyclopentadiene | < | 28 | 28 | 89 | | 20 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachloroethane | < | 46 | 46 | 150 | | 20 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| Indeno(1,2,3-cd)pyrene | < | 32 | 32 | 100 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Isophorone | < | 90 | 90 | 290 | | 20 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| 1-Methylnaphthalene | | 110 | 84 | 270 | | 20 | ug/L | Q | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Methylnaphthalene | | 130 | 78 | 250 | | 20 | ug/L | Q | 11/19/02 | SW846 3510 | SW846 8270 |
| N-Nitroso-di-n-propylamine | < | 86 | 86 | 270 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| N-Nitrosodiphenylamine | < | 44 | 44 | 140 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Nitroaniline | < | 84 | 84 | 270 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Nitrophenol | < | 74 | 74 | 240 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 3-Nitroaniline | < | 56 | 56 | 180 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Nitroaniline | < | 36 | 36 | 110 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Nitrophenol | < | 36 | 36 | 110 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Naphthalene | | 1100 | 76 | 240 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Nitrobenzene | < | 70 | 70 | 220 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,2'-oxybis(1-Chloropropane) | < | 72 | 72 | 230 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Di-n-octylphthalate | < | 26 | 26 | 83 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Pentachlorophenol | < | 16 | 16 | 51 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenanthrene | < | 42 | 42 | 130 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenol | < | 20 | 20 | 64 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Pyrene | < | 36 | 36 | 110 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2,4-Trichlorobenzene | < | 60 | 60 | 190 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,5-Trichlorophenol | < | 92 | 92 | 290 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,6-Trichlorophenol | < | 80 | 80 | 250 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Fluorophenol | | 28 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenol-d5 | | 14 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chlorophenol-d4 | | 59 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2-Dichlorobenzene-d4 | | 64 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Nitrobenzene-d5 | | 76 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,6-Tribromophenol | | 85 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Terphenyl-d14 | | 92 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Fluorobiphenyl | | 75 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |

### VOC 3.4 List (Total 12DCE & XYL)

Prep Date: 11/19/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Toluene-d8 | 104 | | | | 1 | %Recov | | 11/19/02 | SW846 5030B | SW846 8260B |

# En Chem Inc.

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## Analytical Report Number: 828497

Client : WE ENERGIES
Project Name : APPLETON MGP
Project Number : 1302440
Field ID : MW17D

Matrix Type : WATER
Collection Date : 11/12/02
Report Date : 07/01/03
Lab Sample Number : 828497-004

### INORGANICS

| Test | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Cyanide, total | 0.15 | 0.0027 | 0.0086 | | 1 | mg/L | SUB1 | 11/21/02 | EPA 335.4 | EPA 335.4 |
| Cyanide, weak and dissociable | 0.017 | 0.0027 | 0.0086 | | 1 | mg/L | SUB1 | 11/22/02 | SM 4500 | SM 4500 |

### SPECIAL SEMI-VOLATILE LIST

Prep Date: 11/16/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| 4-Methylphenol | < 40 | 40 | 130 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Bromophenyl phenyl ether | < 72 | 72 | 230 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Methylphenol | < 46 | 46 | 150 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Acenaphthene | < 92 | 92 | 290 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Acenaphthylene | < 94 | 94 | 300 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Anthracene | < 56 | 56 | 180 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Di-n-butylphthalate | < 28 | 28 | 89 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(a)anthracene | < 34 | 34 | 110 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(a)pyrene | < 30 | 30 | 96 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(b)fluoranthene | < 44 | 44 | 140 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(g,h,i)perylene | < 42 | 42 | 130 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(k)fluoranthene | < 48 | 48 | 150 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Butylbenzylphthalate | < 36 | 36 | 110 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chloronaphthalene | < 84 | 84 | 270 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chlorophenol | < 22 | 22 | 70 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chloro-3-methylphenol | < 82 | 82 | 260 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chloroaniline | < 84 | 84 | 270 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chlorophenyl phenyl ether | < 94 | 94 | 300 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Carbazole | < 28 | 28 | 89 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| bis(2-Chloroethoxy)methane | < 90 | 90 | 290 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| bis(2-Chloroethyl)ether | < 17 | 17 | 54 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Chrysene | < 36 | 36 | 110 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2-Dichlorobenzene | < 50 | 50 | 160 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,3-Dichlorobenzene | < 46 | 46 | 150 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,4-Dichlorobenzene | < 46 | 46 | 150 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dichlorophenol | < 74 | 74 | 240 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dimethylphenol | < 58 | 58 | 180 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dinitrophenol | < 60 | 60 | 190 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dinitrotoluene | < 34 | 34 | 110 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,6-Dinitrotoluene | < 74 | 74 | 240 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 3,3-Dichlorobenzidine | < 56 | 56 | 180 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4,6-Dinitro-2-methylphenol | < 34 | 34 | 110 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dibenzo(a,h)anthracene | < 48 | 48 | 150 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dibenzofuran | < 94 | 94 | 300 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Diethylphthalate | < 54 | 54 | 170 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dimethylphthalate | < 70 | 70 | 220 | | 20 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |

# En Chem Inc.

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## Analytical Report Number: 828497

**Client :** WE ENERGIES
**Project Name :** APPLETON MGP
**Project Number :** 1302440
**Field ID :** MW15D

**Matrix Type :** WATER
**Collection Date :** 11/12/02
**Report Date :** 07/01/03
**Lab Sample Number :** 828497-003

**VOC 3.4 List (Total 12DCE & XYL)**

**Prep Date:** 11/20/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Dibromofluoromethane | 102 | | | | 1 | %Recov | | 11/20/02 | SW846 5030B | SW846 8260B |
| 4-Bromofluorobenzene | 91 | | | | 1 | %Recov | | 11/20/02 | SW846 5030B | SW846 8260B |
| Acetone | 340 | 170 | 540 | | 50 | ug/L | Q | 11/20/02 | SW846 5030B | SW846 8260B |
| Benzene | 1300 | 12 | 38 | | 50 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Bromodichloromethane | < 12 | 12 | 38 | | 50 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Bromoform | < 22 | 22 | 70 | | 50 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Bromomethane | < 44 | 44 | 140 | | 50 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| 2-Butanone | < 200 | 200 | 640 | | 50 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Carbon disulfide | < 25 | 25 | 80 | | 50 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Carbon tetrachloride | < 23 | 23 | 73 | | 50 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Chlorobenzene | < 29 | 29 | 92 | | 50 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Chlorodibromomethane | < 42 | 42 | 130 | | 50 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Chloroethane | < 42 | 42 | 130 | | 50 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Chloroform | < 22 | 22 | 70 | | 50 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Chloromethane | < 14 | 14 | 45 | | 50 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| 1,1-Dichloroethane | < 44 | 44 | 140 | | 50 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloroethane | < 28 | 28 | 89 | | 50 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| 1,1-Dichloroethene | < 28 | 28 | 89 | | 50 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloroethene, total | < 60 | 60 | 190 | | 50 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloropropane | < 20 | 20 | 64 | | 50 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| cis-1,3-Dichloropropene | < 28 | 28 | 89 | | 50 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| trans-1,3-Dichloropropene | < 32 | 32 | 100 | | 50 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Ethylbenzene | 400 | 26 | 83 | | 50 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| 2-Hexanone | < 60 | 60 | 190 | | 50 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Methylene chloride | < 23 | 23 | 73 | | 50 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| 4-Methyl-2-pentanone | < 46 | 46 | 150 | | 50 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Styrene | < 31 | 31 | 99 | | 50 | ug/L | & | 11/20/02 | SW846 5030B | SW846 8260B |
| 1,1,2,2-Tetrachloroethane | < 38 | 38 | 120 | | 50 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Tetrachloroethene | < 32 | 32 | 100 | | 50 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Toluene | < 42 | 42 | 130 | | 50 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| 1,1,1-Trichloroethane | < 32 | 32 | 100 | | 50 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| 1,1,2-Trichloroethane | < 25 | 25 | 80 | | 50 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Trichloroethene | < 20 | 20 | 64 | | 50 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Vinyl chloride | < 5.5 | 5.5 | 18 | | 50 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Xylene, total | 240 | 95 | 300 | | 50 | ug/L | Q | 11/20/02 | SW846 5030B | SW846 8260B |

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## Analytical Report Number: 828497

Client : WE ENERGIES
Project Name : APPLETON MGP
Project Number : 1302440
Field ID : MW15D

Matrix Type : WATER
Collection Date : 11/12/02
Report Date : 07/01/03
Lab Sample Number : 828497-003

### SPECIAL SEMI-VOLATILE LIST

Prep Date: 11/16/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| bis(2-Ethylhexyl)phthalate | < 70 | 70 | 220 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Fluoranthene | < 80 | 80 | 250 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Fluorene | < 240 | 240 | 760 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorobenzene | < 70 | 70 | 220 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorobutadiene | < 150 | 150 | 480 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorocyclopentadiene | < 70 | 70 | 220 | | 50 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachloroethane | < 110 | 110 | 350 | | 50 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| Indeno(1,2,3-cd)pyrene | < 80 | 80 | 250 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Isophorone | < 230 | 230 | 730 | | 50 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| 1-Methylnaphthalene | 330 | 210 | 670 | | 50 | ug/L | Q | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Methylnaphthalene | 270 | 200 | 640 | | 50 | ug/L | Q | 11/19/02 | SW846 3510 | SW846 8270 |
| N-Nitroso-di-n-propylamine | < 220 | 220 | 700 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| N-Nitrosodiphenylamine | < 110 | 110 | 350 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Nitroaniline | < 210 | 210 | 670 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Nitrophenol | < 190 | 190 | 610 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 3-Nitroaniline | < 140 | 140 | 450 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Nitroaniline | < 90 | 90 | 290 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Nitrophenol | < 90 | 90 | 290 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Naphthalene | 4400 | 190 | 610 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Nitrobenzene | < 180 | 180 | 570 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,2'-oxybis(1-Chloropropane) | < 180 | 180 | 570 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Di-n-octylphthalate | < 65 | 65 | 210 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Pentachlorophenol | < 39 | 39 | 120 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenanthrene | < 110 | 110 | 350 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenol | < 50 | 50 | 160 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Pyrene | < 90 | 90 | 290 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2,4-Trichlorobenzene | < 150 | 150 | 480 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,5-Trichlorophenol | < 230 | 230 | 730 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,6-Trichlorophenol | < 200 | 200 | 640 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Fluorophenol | 30 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenol-d5 | 15 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chlorophenol-d4 | 66 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2-Dichlorobenzene-d4 | 103 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Nitrobenzene-d5 | 83 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,6-Tribromophenol | 70 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Terphenyl-d14 | 95 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Fluorobiphenyl | 90 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |

### VOC 3.4 List (Total 12DCE & XYL)

Prep Date: 11/20/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Toluene-d8 | 106 | | | | 1 | %Recov | | 11/20/02 | SW846 5030B | SW846 8260B |

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## Analytical Report Number: 828497

**Client :** WE ENERGIES
**Project Name :** APPLETON MGP
**Project Number :** 1302440
**Field ID :** MW15D

**Matrix Type :** WATER
**Collection Date :** 11/12/02
**Report Date :** 07/01/03
**Lab Sample Number :** 828497-003

### INORGANICS

| Test | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Cyanide, total | 0.059 | 0.0027 | 0.0086 | | 1 | mg/L | SUB1 | 11/21/02 | EPA 335.4 | EPA 335.4 |
| Cyanide, weak and dissociable | 0.0070 | 0.0027 | 0.0086 | | 1 | mg/L | QSUB | 11/22/02 | SM 4500 | SM 4500 |

### SPECIAL SEMI-VOLATILE LIST

Prep Date: 11/16/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| 4-Methylphenol | < 100 | 100 | 320 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Bromophenyl phenyl ether | < 180 | 180 | 570 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Methylphenol | < 110 | 110 | 350 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Acenaphthene | < 230 | 230 | 730 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Acenaphthylene | < 240 | 240 | 760 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Anthracene | < 140 | 140 | 450 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Di-n-butylphthalate | < 70 | 70 | 220 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(a)anthracene | < 85 | 85 | 270 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(a)pyrene | < 75 | 75 | 240 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(b)fluoranthene | < 110 | 110 | 350 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(g,h,i)perylene | < 110 | 110 | 350 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(k)fluoranthene | < 120 | 120 | 380 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Butylbenzylphthalate | < 90 | 90 | 290 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chloronaphthalene | < 210 | 210 | 670 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chlorophenol | < 55 | 55 | 180 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chloro-3-methylphenol | < 200 | 200 | 640 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chloroaniline | < 210 | 210 | 670 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chlorophenyl phenyl ether | < 240 | 240 | 760 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Carbazole | < 70 | 70 | 220 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| bis(2-Chloroethoxy)methane | < 230 | 230 | 730 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| bis(2-Chloroethyl)ether | < 44 | 44 | 140 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Chrysene | < 90 | 90 | 290 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2-Dichlorobenzene | < 130 | 130 | 410 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,3-Dichlorobenzene | < 110 | 110 | 350 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,4-Dichlorobenzene | < 110 | 110 | 350 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dichlorophenol | < 190 | 190 | 610 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dimethylphenol | < 150 | 150 | 480 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dinitrophenol | < 150 | 150 | 480 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dinitrotoluene | < 85 | 85 | 270 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,6-Dinitrotoluene | < 190 | 190 | 610 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 3,3-Dichlorobenzidine | < 140 | 140 | 450 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4,6-Dinitro-2-methylphenol | < 85 | 85 | 270 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dibenzo(a,h)anthracene | < 120 | 120 | 380 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dibenzofuran | < 240 | 240 | 760 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Diethylphthalate | < 140 | 140 | 450 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dimethylphthalate | < 180 | 180 | 570 | | 50 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |

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## Analytical Report Number: 828497

**Client :** WE ENERGIES
**Project Name :** APPLETON MGP
**Project Number :** 1302440
**Field ID :** MW12D

**Matrix Type :** WATER
**Collection Date :** 11/12/02
**Report Date :** 07/01/03
**Lab Sample Number :** 828497-002

**VOC 3.4 List (Total 12DCE & XYL)** — **Prep Date:** 11/20/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Dibromofluoromethane | 99 | | | | 1 | %Recov | | 11/20/02 | SW846 5030B | SW846 8260B |
| 4-Bromofluorobenzene | 94 | | | | 1 | %Recov | | 11/20/02 | SW846 5030B | SW846 8260B |
| Acetone | < 16 | 16 | 51 | | 5 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Benzene | 88 | 1.2 | 3.8 | | 5 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Bromodichloromethane | < 1.2 | 1.2 | 3.8 | | 5 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Bromoform | < 2.2 | 2.2 | 7.0 | | 5 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Bromomethane | < 4.3 | 4.3 | 14 | | 5 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| 2-Butanone | < 20 | 20 | 64 | | 5 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Carbon disulfide | < 2.5 | 2.5 | 8.0 | | 5 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Carbon tetrachloride | < 2.3 | 2.3 | 7.3 | | 5 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Chlorobenzene | < 2.9 | 2.9 | 9.2 | | 5 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Chlorodibromomethane | < 4.2 | 4.2 | 13 | | 5 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Chloroethane | < 4.2 | 4.2 | 13 | | 5 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Chloroform | < 2.2 | 2.2 | 7.0 | | 5 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Chloromethane | < 1.4 | 1.4 | 4.5 | | 5 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| 1,1-Dichloroethane | < 4.3 | 4.3 | 14 | | 5 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloroethane | < 2.8 | 2.8 | 8.9 | | 5 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| 1,1-Dichloroethene | < 2.8 | 2.8 | 8.9 | | 5 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloroethene, total | < 6.0 | 6.0 | 19 | | 5 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloropropane | < 1.9 | 1.9 | 6.1 | | 5 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| cis-1,3-Dichloropropene | < 2.8 | 2.8 | 8.9 | | 5 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| trans-1,3-Dichloropropene | < 3.2 | 3.2 | 10 | | 5 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Ethylbenzene | 77 | 2.6 | 8.3 | | 5 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| 2-Hexanone | < 6.0 | 6.0 | 19 | | 5 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Methylene chloride | < 2.3 | 2.3 | 7.3 | | 5 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| 4-Methyl-2-pentanone | < 4.5 | 4.5 | 14 | | 5 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Styrene | < 3.1 | 3.1 | 9.9 | | 5 | ug/L | & | 11/20/02 | SW846 5030B | SW846 8260B |
| 1,1,2,2-Tetrachloroethane | < 3.9 | 3.9 | 12 | | 5 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Tetrachloroethene | < 3.1 | 3.1 | 9.9 | | 5 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Toluene | 12 | 4.2 | 13 | | 5 | ug/L | Q | 11/20/02 | SW846 5030B | SW846 8260B |
| 1,1,1-Trichloroethane | < 3.2 | 3.2 | 10 | | 5 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| 1,1,2-Trichloroethane | < 2.5 | 2.5 | 8.0 | | 5 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Trichloroethene | < 1.9 | 1.9 | 6.1 | | 5 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Vinyl chloride | < 0.55 | 0.55 | 1.8 | | 5 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Xylene, total | 64 | 9.5 | 30 | | 5 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |

# En Chem Inc.

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## Analytical Report Number: 828497

**Client :** WE ENERGIES
**Project Name :** APPLETON MGP
**Project Number :** 1302440
**Field ID :** MW12D

**Matrix Type :** WATER
**Collection Date :** 11/12/02
**Report Date :** 07/01/03
**Lab Sample Number :** 828497-002

### SPECIAL SEMI-VOLATILE LIST

**Prep Date:** 11/16/02

| Analyte | | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|---|
| bis(2-Ethylhexyl)phthalate | < | 14 | 14 | 45 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Fluoranthene | < | 16 | 16 | 51 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Fluorene | | 55 | 47 | 150 | | 10 | ug/L | Q | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorobenzene | < | 14 | 14 | 45 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorobutadiene | < | 29 | 29 | 92 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorocyclopentadiene | < | 14 | 14 | 45 | | 10 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachloroethane | < | 23 | 23 | 73 | | 10 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| Indeno(1,2,3-cd)pyrene | < | 16 | 16 | 51 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Isophorone | < | 45 | 45 | 140 | | 10 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| 1-Methylnaphthalene | | 640 | 42 | 130 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Methylnaphthalene | | 42 | 39 | 120 | | 10 | ug/L | Q | 11/19/02 | SW846 3510 | SW846 8270 |
| N-Nitroso-di-n-propylamine | < | 43 | 43 | 140 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| N-Nitrosodiphenylamine | < | 22 | 22 | 70 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Nitroaniline | < | 42 | 42 | 130 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Nitrophenol | < | 37 | 37 | 120 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 3-Nitroaniline | < | 28 | 28 | 89 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Nitroaniline | < | 18 | 18 | 57 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Nitrophenol | < | 18 | 18 | 57 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Naphthalene | | 620 | 38 | 120 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Nitrobenzene | < | 35 | 35 | 110 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,2'-oxybis(1-Chloropropane) | < | 36 | 36 | 110 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Di-n-octylphthalate | < | 13 | 13 | 41 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Pentachlorophenol | < | 7.8 | 7.8 | 25 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenanthrene | | 64 | 21 | 67 | | 10 | ug/L | Q | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenol | < | 10 | 10 | 32 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Pyrene | < | 18 | 18 | 57 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2,4-Trichlorobenzene | < | 30 | 30 | 96 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,5-Trichlorophenol | < | 46 | 46 | 150 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,6-Trichlorophenol | < | 40 | 40 | 130 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Fluorophenol | | 34 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenol-d5 | | 19 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chlorophenol-d4 | | 74 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2-Dichlorobenzene-d4 | | 89 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Nitrobenzene-d5 | | 95 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,6-Tribromophenol | | 91 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Terphenyl-d14 | | 104 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Fluorobiphenyl | | 95 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |

### VOC 3.4 List (Total 12DCE & XYL)

**Prep Date:** 11/20/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Toluene-d8 | 107 | | | | 1 | %Recov | | 11/20/02 | SW846 5030B | SW846 8260B |

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## Analytical Report Number: 828497

Client : WE ENERGIES
Project Name : APPLETON MGP
Project Number : 1302440
Field ID : MW12D

Matrix Type : WATER
Collection Date : 11/12/02
Report Date : 07/01/03
Lab Sample Number : 828497-002

### INORGANICS

| Test | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Cyanide, total | 0.46 | 0.011 | 0.035 | | 1 | mg/L | SUB1 | 11/21/02 | EPA 335.4 | EPA 335.4 |
| Cyanide, weak and dissociable | 0.051 | 0.0027 | 0.0086 | | 1 | mg/L | SUB1 | 11/22/02 | SM 4500 | SM 4500 |

### SPECIAL SEMI-VOLATILE LIST

Prep Date: 11/16/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| 4-Methylphenol | < 20 | 20 | 64 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Bromophenyl phenyl ether | < 36 | 36 | 110 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Methylphenol | < 23 | 23 | 73 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Acenaphthene | 100 | 46 | 150 | | 10 | ug/L | Q | 11/19/02 | SW846 3510 | SW846 8270 |
| Acenaphthylene | 92 | 47 | 150 | | 10 | ug/L | Q | 11/19/02 | SW846 3510 | SW846 8270 |
| Anthracene | < 28 | 28 | 89 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Di-n-butylphthalate | < 14 | 14 | 45 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(a)anthracene | < 17 | 17 | 54 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(a)pyrene | < 15 | 15 | 48 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(b)fluoranthene | < 22 | 22 | 70 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(g,h,i)perylene | < 21 | 21 | 67 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(k)fluoranthene | < 24 | 24 | 76 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Butylbenzylphthalate | < 18 | 18 | 57 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chloronaphthalene | < 42 | 42 | 130 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chlorophenol | < 11 | 11 | 35 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chloro-3-methylphenol | < 41 | 41 | 130 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chloroaniline | < 42 | 42 | 130 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chlorophenyl phenyl ether | < 47 | 47 | 150 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Carbazole | < 14 | 14 | 45 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| bis(2-Chloroethoxy)methane | < 45 | 45 | 140 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| bis(2-Chloroethyl)ether | < 8.7 | 8.7 | 28 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Chrysene | < 18 | 18 | 57 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2-Dichlorobenzene | < 25 | 25 | 80 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,3-Dichlorobenzene | < 23 | 23 | 73 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,4-Dichlorobenzene | < 23 | 23 | 73 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dichlorophenol | < 37 | 37 | 120 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dimethylphenol | < 29 | 29 | 92 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dinitrophenol | < 30 | 30 | 96 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dinitrotoluene | < 17 | 17 | 54 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,6-Dinitrotoluene | < 37 | 37 | 120 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 3,3-Dichlorobenzidine | < 28 | 28 | 89 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4,6-Dinitro-2-methylphenol | < 17 | 17 | 54 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dibenzo(a,h)anthracene | < 24 | 24 | 76 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dibenzofuran | < 47 | 47 | 150 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Diethylphthalate | < 27 | 27 | 86 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dimethylphthalate | < 35 | 35 | 110 | | 10 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |

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## Analytical Report Number: 828497

**Client :** WE ENERGIES
**Project Name :** APPLETON MGP
**Project Number :** 1302440
**Field ID :** MW1RS

**Matrix Type :** WATER
**Collection Date :** 11/12/02
**Report Date :** 07/01/03
**Lab Sample Number :** 828497-001

**VOC 3.4 List (Total 12DCE & XYL)**

**Prep Date:** 11/20/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Dibromofluoromethane | 99 | | | | 1 | %Recov | | 11/20/02 | SW846 5030B | SW846 8260B |
| 4-Bromofluorobenzene | 92 | | | | 1 | %Recov | | 11/20/02 | SW846 5030B | SW846 8260B |
| Acetone | < 3.3 | 3.3 | 11 | | 1 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Benzene | 12 | 0.25 | 0.80 | | 1 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Bromodichloromethane | < 0.23 | 0.23 | 0.73 | | 1 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Bromoform | < 0.45 | 0.45 | 1.4 | | 1 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Bromomethane | < 0.87 | 0.87 | 2.8 | | 1 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| 2-Butanone | < 4.0 | 4.0 | 13 | | 1 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Carbon disulfide | < 0.50 | 0.50 | 1.6 | | 1 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Carbon tetrachloride | < 0.47 | 0.47 | 1.5 | | 1 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Chlorobenzene | < 0.58 | 0.58 | 1.8 | | 1 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Chlorodibromomethane | < 0.84 | 0.84 | 2.7 | | 1 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Chloroethane | < 0.84 | 0.84 | 2.7 | | 1 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Chloroform | < 0.45 | 0.45 | 1.4 | | 1 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Chloromethane | < 0.27 | 0.27 | 0.86 | | 1 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| 1,1-Dichloroethane | < 0.87 | 0.87 | 2.8 | | 1 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloroethane | < 0.55 | 0.55 | 1.8 | | 1 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| 1,1-Dichloroethene | < 0.56 | 0.56 | 1.8 | | 1 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloroethene, total | < 1.2 | 1.2 | 3.8 | | 1 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| 1,2-Dichloropropane | < 0.39 | 0.39 | 1.2 | | 1 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| cis-1,3-Dichloropropene | < 0.57 | 0.57 | 1.8 | | 1 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| trans-1,3-Dichloropropene | < 0.64 | 0.64 | 2.0 | | 1 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Ethylbenzene | 1.1 | 0.53 | 1.7 | | 1 | ug/L | Q | 11/20/02 | SW846 5030B | SW846 8260B |
| 2-Hexanone | < 1.2 | 1.2 | 3.8 | | 1 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Methylene chloride | < 0.47 | 0.47 | 1.5 | | 1 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| 4-Methyl-2-pentanone | < 0.91 | 0.91 | 2.9 | | 1 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Styrene | < 0.62 | 0.62 | 2.0 | | 1 | ug/L | & | 11/20/02 | SW846 5030B | SW846 8260B |
| 1,1,2,2-Tetrachloroethane | < 0.77 | 0.77 | 2.5 | | 1 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Tetrachloroethene | < 0.63 | 0.63 | 2.0 | | 1 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Toluene | < 0.84 | 0.84 | 2.7 | | 1 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| 1,1,1-Trichloroethane | < 0.65 | 0.65 | 2.1 | | 1 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| 1,1,2-Trichloroethane | < 0.50 | 0.50 | 1.6 | | 1 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Trichloroethene | < 0.39 | 0.39 | 1.2 | | 1 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Vinyl chloride | < 0.11 | 0.11 | 0.35 | | 1 | ug/L | | 11/20/02 | SW846 5030B | SW846 8260B |
| Xylene, total | 1.9 | 1.9 | 6.1 | | 1 | ug/L | Q | 11/20/02 | SW846 5030B | SW846 8260B |

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## Analytical Report Number: 828497

Client : WE ENERGIES
Project Name : APPLETON MGP
Project Number : 1302440
Field ID : MW1RS

Matrix Type : WATER
Collection Date : 11/12/02
Report Date : 07/01/03
Lab Sample Number : 828497-001

### SPECIAL SEMI-VOLATILE LIST

Prep Date: 11/16/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| bis(2-Ethylhexyl)phthalate | < 1.4 | 1.4 | 4.5 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Fluoranthene | 2.5 | 1.6 | 5.1 | | 1 | ug/L | Q | 11/19/02 | SW846 3510 | SW846 8270 |
| Fluorene | 9.9 | 4.7 | 15 | | 1 | ug/L | Q | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorobenzene | < 1.4 | 1.4 | 4.5 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorobutadiene | < 2.9 | 2.9 | 9.2 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachlorocyclopentadiene | < 1.4 | 1.4 | 4.5 | | 1 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| Hexachloroethane | < 2.3 | 2.3 | 7.3 | | 1 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| Indeno(1,2,3-cd)pyrene | < 1.6 | 1.6 | 5.1 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Isophorone | < 4.5 | 4.5 | 14 | | 1 | ug/L | & | 11/19/02 | SW846 3510 | SW846 8270 |
| 1-Methylnaphthalene | 16 | 4.2 | 13 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Methylnaphthalene | < 3.9 | 3.9 | 12 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| N-Nitroso-di-n-propylamine | < 4.3 | 4.3 | 14 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| N-Nitrosodiphenylamine | < 2.2 | 2.2 | 7.0 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Nitroaniline | < 4.2 | 4.2 | 13 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Nitrophenol | < 3.7 | 3.7 | 12 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 3-Nitroaniline | < 2.8 | 2.8 | 8.9 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Nitroaniline | < 1.8 | 1.8 | 5.7 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Nitrophenol | < 1.8 | 1.8 | 5.7 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Naphthalene | 14 | 3.8 | 12 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Nitrobenzene | < 3.5 | 3.5 | 11 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,2'-oxybis(1-Chloropropane) | < 3.6 | 3.6 | 11 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Di-n-octylphthalate | < 1.3 | 1.3 | 4.1 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Pentachlorophenol | < 0.78 | 0.78 | 2.5 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenanthrene | 14 | 2.1 | 6.7 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenol | < 1.0 | 1.0 | 3.2 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Pyrene | < 1.8 | 1.8 | 5.7 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2,4-Trichlorobenzene | < 3.0 | 3.0 | 9.6 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,5-Trichlorophenol | < 4.6 | 4.6 | 15 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,6-Trichlorophenol | < 4.0 | 4.0 | 13 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Fluorophenol | 32 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Phenol-d5 | 19 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chlorophenol-d4 | 69 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2-Dichlorobenzene-d4 | 76 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Nitrobenzene-d5 | 85 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4,6-Tribromophenol | 100 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| Terphenyl-d14 | 94 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Fluorobiphenyl | 84 | | | | 1 | %Recov | | 11/19/02 | SW846 3510 | SW846 8270 |

### VOC 3.4 List (Total 12DCE & XYL)

Prep Date: 11/20/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Toluene-d8 | 106 | | | | 1 | %Recov | | 11/20/02 | SW846 5030B | SW846 8260B |

# En Chem Inc.

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## Analytical Report Number: 828497

Client : WE ENERGIES
Project Name : APPLETON MGP
Project Number : 1302440
Field ID : MW1RS

Matrix Type : WATER
Collection Date : 11/12/02
Report Date : 07/01/03
Lab Sample Number : 828497-001

### INORGANICS

| Test | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Cyanide, total | 0.37 | 0.011 | 0.035 | | 1 | mg/L | SUB1 | 11/21/02 | EPA 335.4 | EPA 335.4 |
| Cyanide, weak and dissociable | 0.044 | 0.0027 | 0.0086 | | 1 | mg/L | SUB1 | 11/22/02 | SM 4500 | SM 4500 |

### SPECIAL SEMI-VOLATILE LIST

Prep Date: 11/16/02

| Analyte | Result | LOD | LOQ | EQL | Dil. | Units | Code | Analysis Date | Prep Method | Analysis Method |
|---|---|---|---|---|---|---|---|---|---|---|
| 4-Methylphenol | < 2.0 | 2.0 | 6.4 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Bromophenyl phenyl ether | < 3.6 | 3.6 | 11 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Methylphenol | < 2.3 | 2.3 | 7.3 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Acenaphthene | 12 | 4.6 | 15 | | 1 | ug/L | Q | 11/19/02 | SW846 3510 | SW846 8270 |
| Acenaphthylene | < 4.7 | 4.7 | 15 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Anthracene | < 2.8 | 2.8 | 8.9 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Di-n-butylphthalate | < 1.4 | 1.4 | 4.5 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(a)anthracene | < 1.7 | 1.7 | 5.4 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(a)pyrene | < 1.5 | 1.5 | 4.8 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(b)fluoranthene | < 2.2 | 2.2 | 7.0 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(g,h,i)perylene | < 2.1 | 2.1 | 6.7 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Benzo(k)fluoranthene | < 2.4 | 2.4 | 7.6 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Butylbenzylphthalate | < 1.8 | 1.8 | 5.7 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chloronaphthalene | < 4.2 | 4.2 | 13 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2-Chlorophenol | < 1.1 | 1.1 | 3.5 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chloro-3-methylphenol | < 4.1 | 4.1 | 13 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chloroaniline | < 4.2 | 4.2 | 13 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4-Chlorophenyl phenyl ether | < 4.7 | 4.7 | 15 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Carbazole | 12 | 1.4 | 4.5 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| bis(2-Chloroethoxy)methane | < 4.5 | 4.5 | 14 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| bis(2-Chloroethyl)ether | < 0.87 | 0.87 | 2.8 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Chrysene | < 1.8 | 1.8 | 5.7 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,2-Dichlorobenzene | < 2.5 | 2.5 | 8.0 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,3-Dichlorobenzene | < 2.3 | 2.3 | 7.3 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 1,4-Dichlorobenzene | < 2.3 | 2.3 | 7.3 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dichlorophenol | < 3.7 | 3.7 | 12 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dimethylphenol | < 2.9 | 2.9 | 9.2 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dinitrophenol | < 3.0 | 3.0 | 9.6 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,4-Dinitrotoluene | < 1.7 | 1.7 | 5.4 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 2,6-Dinitrotoluene | < 3.7 | 3.7 | 12 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 3,3-Dichlorobenzidine | < 2.8 | 2.8 | 8.9 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| 4,6-Dinitro-2-methylphenol | < 1.7 | 1.7 | 5.4 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dibenzo(a,h)anthracene | < 2.4 | 2.4 | 7.6 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dibenzofuran | 9.7 | 4.7 | 15 | | 1 | ug/L | Q | 11/19/02 | SW846 3510 | SW846 8270 |
| Diethylphthalate | < 2.7 | 2.7 | 8.6 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |
| Dimethylphthalate | < 3.5 | 3.5 | 11 | | 1 | ug/L | | 11/19/02 | SW846 3510 | SW846 8270 |

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www.enchem.com

# Analytical Report Number: 828497

**Client:** WE ENERGIES
**Project Name:** APPLETON MGP
**Project Number:** 1302440

| Lab Sample Number | Field ID | Matrix | Collection Date |
|---|---|---|---|
| 828497-001 | MW1RS | WATER | 11/12/02 |
| 828497-002 | MW12D | WATER | 11/12/02 |
| 828497-003 | MW15D | WATER | 11/12/02 |
| 828497-004 | MW17D | WATER | 11/12/02 |
| 828497-005 | MW5 | WATER | 11/12/02 |
| 828497-006 | MW14D | WATER | 11/12/02 |
| 828497-007 | MW14S | WATER | 11/12/02 |
| 828497-008 | MW4 | WATER | 11/12/02 |
| 828497-009 | QC1 | WATER | 11/12/02 |
| 828497-010 | MW13D | WATER | 11/13/02 |
| 828497-011 | MW13S | WATER | 11/13/02 |
| 828497-012 | MW7RS | WATER | 11/13/02 |
| 828497-013 | MW7RD | WATER | 11/13/02 |
| 828497-014 | MW3 | WATER | 11/13/02 |
| 828497-015 | MW18D | WATER | 11/13/02 |
| 828497-016 | MW11D | WATER | 11/13/02 |
| 828497-017 | MW11S | WATER | 11/13/02 |
| 828497-018 | QC2 | WATER | 11/13/02 |
| 828497-019 | QCFB | WATER | 11/14/02 |
| 828497-020 | MW9 | WATER | 11/14/02 |
| 828497-021 | MW8 | WATER | 11/14/02 |
| 828497-022 | MW10 | WATER | 11/14/02 |
| 828497-023 | MW2 | WATER | 11/13/02 |
| 828497-024 | TRIP BLANK | WATER | 11/12/02 |

**The "Q" flag is present when a parameter has been detected below the LOQ. This indicates the results are qualified due to the uncertainty of the parameter concentration between the LOD and the LOQ.**

**I certify that the data contained in this Final Report has been generated and reviewed in accordance with approved methods and Laboratory Standard Operating Procedure. Exceptions, if any, are discussed in the accompanying sample comments. Release of this final report is authorized by Laboratory management, as is verified by the following signature. Reported results shall not be reproduced, except in full, without the written approval of the lab. The sample results relate only to the analytes of interest tested.**

Tom Trainor — Approval Signature

7/1/03 — Date

VLS

(Please Print Legibly)
Company Name: WE ENERGIES
Branch or Location: LAB SERVICES
Project Contact: DAVE KOLLAKOWSKY
Telephone: 414-221-2835
Project Number: 130440
Project Name: APPLETON MBP
Project State: WI
Sampled By (Print): BILL BRAUNSCHWEIG


EN CHEM INC.
1241 Bellevue St., Suite 9
Green Bay, WI 54302
920-469-2436
FAX 920-469-8827

525 Science Drive
Madison, WI 53711
608-232-3300
FAX: 608-233-0502


# CHAIN OF CUSTODY

85560

Page 1 of 2

P.O. # _____ Quote # _____

Mail Report To: DAVE KOLLAKOWSKY
Company: WE ENERGIES
Address: 333 W. EVERETT ST
MILWAUKEE, WI. 53203

Invoice To: SAME
Company:
Address:

Mail Invoice To:

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=EnCore F=Methanol G=NaOH
H = Sodium Bisulfate Solution I = Sodium Thiosulfate J = Other

Data Package Options - (please circle if requested)
Sample Results Only (no QC)
EPA Level II (Subject to Surcharge)
EPA Level III (Subject to Surcharge)
EPA Level IV (Subject to Surcharge)

Regulatory Program: UST, RCRA, SDWA, NPDES, CERCLA

Matrix Codes: W=Water, S=Soil, A=Air, C=Charcoal, B=Biota, Sl=Sludge

| LABORATORY ID (Lab Use Only) | FIELD ID | COLLECTION DATE | COLLECTION TIME | MATRIX | FILTERED? (YES/NO) | PRESERVATION (CODE)* | ANALYSES REQUESTED: $260 VOLATILES | $270 SEMI-VOLATILES | TOTAL CHLORIDE WATER AND DISSOLVED CHLORIDE | TOTAL # OF BOTTLES SENT | CLIENT COMMENTS | LAB COMMENTS (Lab Use Only) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | N | B | 3 | 2 | 1 | | | |
| 001 | WELL: MW1AS | 11/12 | 0930 | W | 3 | 2 | 1 | | | 6 | 2-1L Amber, 1-500ml poly, G, 3-40ml B | |
| 002 | WELL: MW12D | | 0940 | | 3 | 2 | 1 | | | 6 | | |
| 003 | WELL: MW15D | | 1015 | | 3 | 2 | 1 | | | 6 | | |
| 004 | WELL: MW11D | | 1630 | | 3 | 2 | 1 | | | 6 | | |
| 005 | WELL: MW5 | | 1145 | | 3 | 2 | 1 | | | 6 | | |
| 006 | WELL: MW14D | | 1245 | | 3 | 2 | 1 | | | 6 | | |
| 007 | WELL: MW14S | | 1300 | | 3 | 2 | 1 | | | 6 | | |
| 008 | WELL: MW4 | | 1345 | | 3 | 2 | 1 | | | 6 | | |
| 009 | WELL: QC1 | | ? | | 3 | 2 | 1 | | | 6 | BLIND DUPLICATE | |
| 010 | WELL: MW13D | 11/13 | 0930 | | 3 | 2 | 1 | | | 6 | | |
| 011 | WELL: MW13S | | 0945 | | 3 | 2 | 1 | | | 6 | | |
| 012 | WELL: MW7AS | | 1630 | | 3 | 2 | 1 | | | 6 | | |

Rush Turnaround Time Requested (TAT) - Prelim
(Rush TAT subject to approval/surcharge)
Date Needed: _____
Transmit Prelim Rush Results by (circle):
Phone Fax E-Mail
Phone #: _____
Fax #: _____
E-Mail Address: _____

Samples on HOLD are subject to special pricing and release of liability

| Relinquished By: | Date/Time: | Received By: | Date/Time: |
|---|---|---|---|
| Bill Braunschweig | 11-14-02 1210 | Amanda VanLyke | 11/14/02 12:10 |
| | | Allen A. Cole | 11/14/02 14:00 |
| Allen A. Cole | 11/14/02 14:30 | Jason Richards | 1430 11/14/02 |

En Chem Project No: 828497
Sample Receipt Temp: ROI
Sample Receipt pH (Wet/Metals): VOK
Cooler Custody Seal: Present / Not Present
Intact / Not Intact

Ver [redacted] /02

# APPENDIX F

# LABORATORY ANALYTICAL REPORTS FOR TREATABILITY SAMPLES COMP-1 AND COMP-2

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EN CHEM INC.

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*www.enchem.com*

# - Analytical Report -

Project Name : APPLETON FORMER MGP SITE

Project Number : 1508/4.5

Client: WE ENERGIES

WI DNR LAB ID : 405132750

| Sample No. | Field ID | Collection Date | Sample No. | Field ID | Collection Date |
|---|---|---|---|---|---|
| 830035-002 | COMP-1 | 12/20/02 | | | |
| 830035-003 | COMP-2 | 12/20/02 | | | |

Please visit our Internet homepage at: www.enchem.com

The "Q" flag is present when a parameter has been detected below the LOQ. This indicates the results are qualified due to the uncertainty of the parameter concentration between the LOD and the LOQ.

Soil VOC detects are corrected for the total solids, unless otherwise noted.

I certify that the data contained in this Final Report has been generated and reviewed in accordance with approved methods and Laboratory Standard Operating Procedure. Exceptions, if any, are discussed in the accompanying sample comments. Release of this final report is authorized by Laboratory management, as is verified by the following signature. Reported results shall not be reproduced, except in full, without the written approval of the lab. The sample results relate only to the analytes of interest tested.

Kari Warnock — Approval Signature

2-17-03 — Date

[redacted] [redacted] [redacted] [redacted] [redacted]

→ L3

(Please Print Legibly)
Company Name: We Energies
Branch or Location: Laboratory Services
Project Contact: David Kollakowsky
Telephone: (414) 221-2835
Project Number: Mark Cowles / (1508/415)
Project Name: Appleton Former MGP Site
Project State: Appleton, WI
Sampled By (Print): Brian Hennings

EN CHEM INC.

1241 Bellevue St., Suite 9
Green Bay, WI 54302
920-469-2136
FAX 920-469-8827

# CHAIN OF CUSTODY

97133

Page 1 of 1

PO # 4700000051 Quote #

Mail Report To: David Kollakowsky
Company: We Energies
Address: 333 W. Everett St.
Milwaukee, WI 53203
Invoice To: Ken Schroeder
Company: We Energies
Address: Same
Mail Invoice To: same

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=EnCore F=Methanol G=NaOH
H = Sodium Bisulfate Solution I = Sodium Thiosulfate J = Other

Data Package Options - (please circle if requested)
Sample Results Only (no QC)
EPA Level II (Subject to Surcharge)
EPA Level III (Subject to Surcharge)
EPA Level IV (Subject to Surcharge)

Regulatory Program: UST, RCRA, SDWA, NPDES, CERCLA

Matrix Codes: W=Water S=Soil A=Air C=Charcoal B=Biota Sl=Sludge

| LABORATORY ID (Lab Use Only) | FIELD ID | COLLECTION DATE | COLLECTION TIME | MATRIX | ANALYSES REQUESTED Protocol B (see attached list) | VOC | BTU | Total Sulfur | GRO | DRO | TOTAL # OF BOTTLES SENT | CLIENT COMMENTS | LAB COMMENTS (Lab Use Only) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | FILTERED? (YES/NO) | | | | | | | | |
| | | | | | PRESERVATION (CODE)* | F/A | F | A | A | F | A | | |
| 001 | Composite ① | 12/20 | 11:00 | S | X | X | | | | | 9 | 2-8oz jars A 5-2oz jars F, AAA 2-40z cups A | put these on hold |
| 002 | Comp-1 | 12/20 | ↓ | S | | | X | X | X | X | 4 | Unsaturated Zone | 2-2oz jars A, F 1-8oz jar A 12-23-02 |
| 003 | Comp-2 | 12/20 | ↓ | S | | | X | X | X | X | 4 | Saturated Zone | 1-4oz cup A per client ↓ |

① on hold per Chris Rawe 12/23/03

Rush Turnaround Time Requested (TAT) - Prelim
(Rush TAT subject to approval/surcharge)
Date Needed:
Transmit Prelim Rush Results by (circle):
Phone Fax E-Mail
Phone #:
Fax #:
E-Mail Address:

Samples on HOLD are subject to special pricing and release of liability

| Relinquished By: | Date/Time: | Received By: | Date/Time: |
|---|---|---|---|
| [signature] | 12/20/5pm | [signature] | 12/21/02 1000 |
| [signature] | 12/20 | Clay Pagnotta | 12/23/02 11:45 |
| Clay Pagnotta | 12/23/02 13:45 | Tom Stevens | 12/23/02 1345 |
| | | | |
| | | | |

En Chem Project No. 830035
Sample Receipt Temp. ROT
Sample Receipt pH (Wet/Metals) N/A
Cooler Custody Seal: Present / Not Present
Intact / Not Intact

# En Chem Inc.

1241 Bellevue Street
Green Bay, WI 54302
920-469-2436
800-7-ENCHEM
Fax: 920-469-8827


## - Analytical Report -

**Project Name :** APPLETON FORMER MGP SITE
**Project Number :** 1508/4.5
**Field ID :** COMP-1
**Lab Sample Number :** 830035-002
**WI DNR LAB ID :** 405132750
**Client :** WE ENERGIES
**Report Date :** 2/17/03
**Collection Date :** 12/20/02
**Matrix Type :** SOIL

## Inorganic Results

| Test | Result | LOD | LOQ | EQL | Units | Code | Analysis Date | Prep Method | Analysis Method | Analyst |
|---|---|---|---|---|---|---|---|---|---|---|
| British Thermal Units | 320 | 100 | 320 | | BTU/lb | | 12/27/02 | D240 | D240 | *SF |
| Sulfur | 0.28 | 0.040 | 0.13 | | % wt | | 12/27/02 | SW846 9038 | SW846 9038 | *SF |

## Organic Results

**Preservation Date :** 12/24/02

**DIESEL RANGE ORGANICS - SOIL** **Prep Method:** Wi MOD DRO **Prep Date:** 12/26/02 **Analyst:** KEG

| Analyte | Result | LOD | LOQ | EQL | Units | Code | Analysis Date | Analysis Method |
|---|---|---|---|---|---|---|---|---|
| DIESEL RANGE ORGANICS | 2800 | | | 85 | mg/kg | | 12/27/02 | Wi MOD DRO |
| Blank spike | 92 | | | 50 | %Recov | | 12/27/02 | Wi MOD DRO |
| Blank spike duplicate | 82 | | | 50 | %Recov | | 12/27/02 | Wi MOD DRO |
| Blank | < 5.0 | | | 5.0 | mg/kg | | 12/27/02 | Wi MOD DRO |

## Organic Results

**GASOLINE RANGE ORGANICS - SOIL/METHANOL** **Prep Method:** Wi MOD GRO **Prep Date:** 12/26/02 **Analyst:** PMS

| Analyte | Result | LOD | LOQ | EQL | Units | Code | Analysis Date | Analysis Method |
|---|---|---|---|---|---|---|---|---|
| Gasoline Range Organics | 370 | | | 61 | mg/kg | | 12/26/02 | Wi MOD GRO |
| Blank Spike | 98 | | | 1.0 | %Recov | | 12/26/02 | Wi MOD GRO |
| Blank Spike Duplicate | 101 | | | 1.00 | %Recov | | 12/26/02 | Wi MOD GRO |
| Blank | < 2.5 | | | 2.5 | mg/kg | | 12/26/02 | Wi MOD GRO |

All soil results are reported on a dry weight basis unless otherwise noted.

# En Chem Inc.

1241 Bellevue Street
Green Bay, WI 54302
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800-7-ENCHEM
Fax: 920-469-8827


## - Analytical Report -

**Project Name :** APPLETON FORMER MGP SITE
**Project Number :** 1508/4.5
**Field ID :** COMP-2
**Lab Sample Number :** 830035-003
**WI DNR LAB ID :** 405132750
**Client :** WE ENERGIES
**Report Date :** 2/17/03
**Collection Date :** 12/20/02
**Matrix Type :** SOIL

## Inorganic Results

| Test | Result | LOD | LOQ | EQL | Units | Code | Analysis Date | Prep Method | Analysis Method | Analyst |
|---|---|---|---|---|---|---|---|---|---|---|
| British Thermal Units | 280 | 100 | 320 | | BTU/lb | Q | 12/27/02 | D240 | D240 | *SF |
| Sulfur | 0.28 | 0.040 | 0.13 | | % wt | | 12/27/02 | SW846 9038 | SW846 9038 | *SF |

## Organic Results

**Preservation Date :** 12/24/02

DIESEL RANGE ORGANICS - SOIL **Prep Method:** Wi MOD DRO **Prep Date:** 12/26/02 **Analyst:** KEG

| Analyte | Result | LOD | LOQ | EQL | Units | Code | Analysis Date | Analysis Method |
|---|---|---|---|---|---|---|---|---|
| DIESEL RANGE ORGANICS | 8100 | | | 300 | mg/kg | | 12/30/02 | Wi MOD DRO |
| Blank spike | 92 | | | 50 | %Recov | | 12/30/02 | Wi MOD DRO |
| Blank spike duplicate | 82 | | | 50 | %Recov | | 12/30/02 | Wi MOD DRO |
| Blank | < 5.0 | | | 5.0 | mg/kg | | 12/30/02 | Wi MOD DRO |

## Organic Results

GASOLINE RANGE ORGANICS - SOIL/METHANOL **Prep Method:** Wi MOD GRO **Prep Date:** 12/26/02 **Analyst:** PMS

| Analyte | Result | LOD | LOQ | EQL | Units | Code | Analysis Date | Analysis Method |
|---|---|---|---|---|---|---|---|---|
| Gasoline Range Organics | 1400 | | | 600 | mg/kg | | 12/26/02 | Wi MOD GRO |
| Blank Spike | 98 | | | 1.0 | %Recov | | 12/26/02 | Wi MOD GRO |
| Blank Spike Duplicate | 101 | | | 1.00 | %Recov | | 12/26/02 | Wi MOD GRO |
| Blank | < 2.5 | | | 2.5 | mg/kg | | 12/26/02 | Wi MOD GRO |

**All soil results are reported on a dry weight basis unless otherwise noted.**

*En Chem, Inc.*

## Inorganic Data Qualifiers

| | |
|---|---|
| A | Analyte is detected in the method blank. Method blank criteria are evaluated to the laboratory method detection limit. Additionally, method blank acceptance may be based on project specific criteria or determined from analyte concentrations in the sample and are evaluated on a sample-by-sample basis. |
| B | The analyte has been detected between the method detection limit and the reporting limit. |
| C | Elevated detection limit due to matrix effects. |
| E | Estimated concentration due to matrix interferences. During the metals analysis using the inductively coupled plasma (ICP), the serial dilution failed to meet the established control limits of 0-10% and the sample concentration is greater than 50 times the IDL (100 times the IDL for analysis done on the ICP-MS). The result was flagged with the E qualifier to indicate that a physical interference was observed. |
| F | Due to potential interferences for this analysis by Inductively Coupled Plasma techniques (SW-846 Method 6010), this analyte has been confirmed by and reported from an alternate method. |
| H(n) | Analysis performed "n" days past holding time (See Sample Narrative). |
| K | Sample received unpreserved. Sample was either preserved at the time of receipt or at the time of sample preparation. |
| L | Elevated detection limit due to low sample volume. |
| N | Spiked sample recovery not within control limits. |
| Q | The analyte has been detected between the limit of detection (LOD) and limit of quantitation (LOQ). The results are qualified due to the uncertainty of analyte concentrations within this range. |
| U | The analyte was not detected above the reporting limit. |
| X | See sample narrative. |
| & | Laboratory Control Spike recovery not within control limits. |
| * | Duplicate analyses not within control limits. |
| SUB1 | Assay was subcontracted to an approved lab. |
| SUB2 | Assay was subcontracted to En Chem Green Bay WI Cert. #405132750. |
| 1 | Dissolved analyte or filtered analyte greater than total analyte; analyses passed QC based on precision criteria. |
| 2 | Dissolved analyte or filtered analyte greater than total analyte; analyses failed QC based on precision criteria. (See Sample Narrative). |
| 3 | BOD result is estimated due to the BOD blank exceeding the allowable oxygen depletion. |
| 4 | BOD duplicate precision not within control limits. Due to the 48 hour holding time for this test, it is not practical to reanalyze and try to correct the deficiency. |
| 5 | BOD result is estimated due to insufficient oxygen depletion. Due to the 48 hour holding time for this test, it is not practical to reanalyze and try to correct the deficiency. |
| 6 | BOD laboratory control sample not within control limits. Due to the 48 hour holding time for this test, it is not practical to reanalyze and try to correct the deficiency. |
| 7 | BOD result is estimated due to complete oxygen depletion. Due to the 48 hour holding time for this test, it is not practical to reanalyze and try to correct the deficiency. |

S-F ANALYTICAL LABORATORIES, INC.
A Subsidiary of Sommer-Frey Laboratories, Inc.

En Chem, Inc.
Attn: Karri Warnock
1241 Bellevue Street
Green Bay, WI 54302

Received Date: 12/24/02
Report Date: 12/30/02

## - Analytical Results -

**Lab #:** 02A7173-001 **Sample ID:** 830035-002

| Test | Result | Units | LOD | LOQ | Analysis Date | By | Method | Flag |
|---|---|---|---|---|---|---|---|---|
| BTU Per Pound | 320 | BTU/Lb | 100 | 320 | 12/27/02 | HTM | D240 | 1 |
| Sulfur | .276 | % wt | 0.04 | 0.128 | 12/27/02 | HTM | 9038 | 1 |
| Total Solids | 83.83 | % | 0.01 | 0.032 | 12/27/02 | HTM | 160.3 | 1 |

**Lab #:** 02A7173-002 **Sample ID:** 830035-003

| Test | Result | Units | LOD | LOQ | Analysis Date | By | Method | Flag |
|---|---|---|---|---|---|---|---|---|
| BTU Per Pound | 282 | BTU/Lb | 100 | 320 | 12/27/02 | HTM | D240 | 1 |
| Sulfur | .278 | % wt | 0.04 | 0.128 | 12/27/02 | HTM | 9038 | 1 |
| Total Solids | 82.22 | % | 0.01 | 0.032 | 12/27/02 | HTM | 160.3 | 1 |

Note: All results, except Total Solids, are reported on the dry weight basis.

| FLAG | Comment |
|---|---|
| 1 | All laboratory QC requirements were met for this sample. |

Gary G. Geipel
Senior Analyst

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S-F

(Please Print Legibly)
Company Name: En Chem
Branch or Location: Green Bay
Project Contact: Karri Warnick
Telephone: 608-232-3300 ext 310
Project Number: 830035
Project Name:
Project State: WI
Sampled By (Print):

EN CHEM INC.

1241 Bellevue St., Suite 9
Green Bay, WI 54302
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# CHAIN OF CUSTODY

94870

Page 1 of 1
P.O. # Quote #
Mail Report To: Karri W.
Company: See Above
Address:
Invoice To:
Company:
Address:
Mail Invoice To:

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=EnCore F=Methanol G=NaOH
H = Sodium Bisulfate Solution I = Sodium Thiosulfate J = Other

Data Package Options - (please circle if requested)
Sample Results Only (no QC)
EPA Level II (Subject to Surcharge)
EPA Level III (Subject to Surcharge)
EPA Level IV (Subject to Surcharge)

Regulatory Program: UST, RCRA, SDWA, NPDES, CERCLA

Matrix Codes: W=Water, S=Soil, A=Air, C=Charcoal, B=Biota, SI=Sludge

| LABORATORY ID (Lab Use Only) | FIELD ID | COLLECTION DATE | COLLECTION TIME | MATRIX | FILTERED? (YES/NO) | PRESERVATION (CODE)* | BTU | Total Sulfer | | | | | TOTAL # OF BOTTLES SENT | CLIENT COMMENTS | LAB COMMENTS (Lab Use Only) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 830035-002 | 12/20 | 1100 | S | | X | X | | | | | | 1 | 1-8oz Amber | |
| | -003 | 12/20 | " | " | | X | X | 1 | | | | | 1 | " | |
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Rush Turnaround Time Requested (TAT) - Prelim
(Rush TAT subject to approval/surcharge)
Date Needed:
Transmit Prelim Rush Results by (circle):
Phone Fax E-Mail
Phone #:
Fax #:
E-Mail Address:

Samples on HOLD are subject to special pricing and release of liability

| Relinquished By: | Date/Time: | Received By: | Date/Time: |
|---|---|---|---|
| Karl Lambrecht | 12/24/02 | | |
| Relinquished By: | Date/Time: | Received By: | Date/Time: |
| Relinquished By: | Date/Time: | Received By: | Date/Time: |
| Relinquished By: | Date/Time: | Received By: | Date/Time: |
| Relinquished By: | Date/Time: | Received By: | Date/Time: |

En Chem Project No:
Sample Receipt Temp:
Sample Receipt pH (Wet/Metals):
Cooler Custody Seal: Present / Not Present
Intact / Not Intact

# APPENDIX G

# REPLACEMENT TABLE 6 – GROUNDWATER ANALYTICAL RESULTS-INORGANIC

**Table 6-Groundwater Analytical Results-Inorganics**
**We Energies**
**Appleton Former Manufactured Gas Plant Site**

| Sample Location | Sample Date | Inorganic Compounds (mg/L) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Arsenic, total | Barium, total | Cadmium, total | Chloride, total | Chromium, total | Cyanide, total | Cyanide, weak acid dissociable | Iron, total | Lead, total | Manganese, total | Nitrite + Nitrate, total | Selenium, total | Silver, total | Sulfate |
| **Wisconsin Groundwater Quality Standards (Wisconsin Administrative Code NR 140, April 2001)** | | | | | | | | | | | | | | | |
| **Preventive Action Limit** | | **0.005** | **0.4** | **0.0005** | **125** | **0.01** | ns | **0.04** | **0.15** | **0.0015** | **0.025** | **2** | **0.01** | **0.01** | **125** |
| **Enforcement Standard** | | **0.05** | **2** | **0.005** | **250** | **0.1** | ns | **0.2** | **0.3** | **0.015** | **0.05** | **10** | **0.05** | **0.05** | **250** |
| **Groundwater Monitoring Wells** | | | | | | | | | | | | | | | |
| MW-01RS | 2/19/2002 | **0.0062** | **0.095** | <0.00012 | -- | <0.0018 | **0.67** | **0.02** | **2.5** | <0.0009 | **0.26** | **0.51** | <0.0011 | <0.0001 | -- |
| | 5/13/2002 | **0.0085** | **0.1** | <0.00012 | -- | <0.0011 | **0.45** | **0.034** | **3.1** | **0.001** | **0.29** | **0.98** | **0.012** | <0.0001 | -- |
| | 8/19/2002 | **0.003** | **0.12** | <0.00012 | -- | **0.00038** | **0.64** | **0.13** | **2.5** | **0.00081** | **0.28** | **0.7** | <0.0011 | <0.0001 | -- |
| | 11/12/2002 | **0.0075** | **0.12** | <0.00012 | -- | **0.00076** | **0.37** | **0.044** | **4.9** | <0.0007 | **0.39** | **0.09** | **0.0024** | <0.0001 | -- |
| | 2/17/2003 | **0.0026** | **0.07** | <0.00004 | -- | **0.00091** | **0.33** | **0.04** | **1.9** | <0.00083 | **0.17** | **0.52** | <0.0015 | <0.00004 | -- |
| MW-02 | 2/19/2002 | **0.005** | **0.19** | <0.00012 | -- | <0.0018 | **2.4** | **0.054** | **17** | <0.0009 | **0.41** | **0.17** | <0.0011 | <0.0001 | -- |
| | 5/13/2002 | **0.0045** | **0.27** | <0.00012 | -- | <0.0011 | **1.8** | **0.053** | **21** | <0.0007 | **0.58** | **0.78** | <0.0055 | <0.0001 | -- |
| | 8/20/2002 | **0.041** | **0.22** | <0.00012 | -- | **0.00089** | **4** | **0.11** | **18** | <0.0007 | **0.51** | <0.15 | **0.003** | <0.0001 | -- |
| | 11/13/2002 | **0.0015** | **0.17** | <0.00012 | -- | **0.0013** | **1.4** | **0.24** | **17** | <0.0007 | **0.55** | <0.09 | <0.0015 | <0.0001 | -- |
| | 2/19/2003 | **0.004** | **0.15** | <0.00004 | -- | **0.0016** | **2.2** | **1.1** | **21** | <0.00083 | **0.51** | <0.135 | <0.0015 | <0.00004 | -- |
| MW-03 | 2/19/2002 | **0.066** | **0.091** | <0.00012 | -- | <0.0018 | **0.46** | **0.009** | **3.3** | <0.0009 | **0.39** | **0.13** | <0.0011 | <0.0001 | -- |
| | 5/13/2002 | **0.24** | **0.079** | <0.00012 | -- | <0.0011 | **0.22** | **0.015** | **6.4** | <0.0007 | **0.37** | **0.86** | <0.0055 | <0.0001 | -- |
| | 8/20/2002 | **0.073** | **0.099** | <0.00012 | -- | **0.0053** | **0.6** | <0.0084 | **6.2** | <0.0007 | **0.62** | <0.15 | **0.0027** | <0.0001 | -- |
| | 11/13/2002 | **0.098** | **0.068** | <0.00012 | -- | **0.0021** | **0.1** | **0.027** | **4.6** | <0.0007 | **0.41** | <0.09 | <0.0015 | <0.0001 | -- |
| | 2/20/2003 | **0.043** | **0.086** | <0.00004 | -- | **0.0013** | **0.28** | **0.1** | **5** | <0.00083 | **0.52** | <0.135 | **0.0016** | <0.00004 | -- |
| MW-04 | 2/20/2002 | **0.59** | **0.061** | <0.00012 | -- | **0.012** | **1.3** | **0.039** | **1.2** | <0.0009 | **0.58** | **0.17** | <0.0011 | <0.0001 | -- |
| | 5/13/2002 | **0.22** | **0.076** | <0.00012 | -- | <0.0011 | **2.1** | **0.003** | **2** | <0.0007 | **0.74** | **0.79** | <0.0055 | <0.0001 | -- |
| | 8/20/2002 | **1.2** | **0.086** | <0.00012 | -- | **0.0024** | **1** | **0.033** | **1.3** | <0.0007 | **0.54** | **0.23** | <0.0011 | <0.0001 | -- |
| | 11/12/2002 | **1.3** | **0.075** | <0.00012 | -- | **0.0028** | **1.4** | **0.015** | **1.9** | <0.0007 | **0.85** | <0.09 | **0.0044** | <0.0001 | -- |
| | 2/20/2003 | **1** | **0.067** | <0.00004 | -- | **0.003** | **1.1** | **0.018** | **3** | <0.00083 | **0.57** | <0.135 | <0.0015 | <0.00004 | -- |
| MW-05 | 2/18/2002 | **0.17** | **0.091** | <0.00012 | -- | **0.0024** | **0.29** | <0.0022 | **1.4** | **0.0018** | **0.48** | **0.16** | <0.0011 | <0.0001 | -- |
| | 5/13/2002 | **0.11** | **0.099** | <0.00012 | -- | <0.0011 | **0.16** | <0.0022 | **3** | <0.0007 | **0.58** | **0.71** | **0.0082** | <0.0001 | -- |
| | 8/19/2002 | **0.49** | **0.11** | <0.00012 | -- | **0.0072** | **0.52** | <0.0084 | **8.3** | **0.0012** | **0.67** | **0.46** | **0.0012** | <0.0001 | -- |
| | 11/12/2002 | **0.43** | **0.08** | <0.00012 | -- | **0.005** | **0.36** | **0.019** | **1.2** | <0.0007 | **0.34** | <0.09 | **0.0017** | <0.0001 | -- |
| | 2/18/2003 | **0.36** | **0.077** | <0.00004 | -- | **0.0034** | **0.33** | **0.22** | **0.68** | <0.00083 | **0.37** | <0.135 | <0.0015 | <0.00004 | -- |

**Table 6-Groundwater Analytical Results-Inorganics**
**We Energies**
**Appleton Former Manufactured Gas Plant Site**

| Sample Location | Sample Date | Inorganic Compounds (mg/L) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Arsenic, total | Barium, total | Cadmium, total | Chloride, total | Chromium, total | Cyanide, total | Cyanide, weak acid dissociable | Iron, total | Lead, total | Manganese, total | Nitrite + Nitrate, total | Selenium, total | Silver, total | Sulfate |
| **Wisconsin Groundwater Quality Standards (Wisconsin Administrative Code NR 140, April 2001)** | | | | | | | | | | | | | | | |
| **Preventive Action Limit** | | **0.005** | **0.4** | **0.0005** | **125** | **0.01** | ns | **0.04** | **0.15** | **0.0015** | **0.025** | **2** | **0.01** | **0.01** | **125** |
| **Enforcement Standard** | | **0.05** | **2** | **0.005** | **250** | **0.1** | ns | **0.2** | **0.3** | **0.015** | **0.05** | **10** | **0.05** | **0.05** | **250** |
| MW-06 | 2/18/2002 | **0.024** | **0.087** | <0.00012 | -- | <0.0018 | **0.45** | **0.026** | **4.7** | **0.0016** | **0.2** | **0.33** | <0.0011 | <0.0001 | -- |
| | 5/13/2002 | **0.027** | **0.088** | <0.00012 | -- | <0.0011 | **0.62** | **0.045** | **1.6** | <0.0007 | **0.19** | **0.71** | <0.0055 | <0.0001 | -- |
| MW-07RD | 2/18/2002 | **0.026** | **0.41** | <0.00012 | -- | <0.0018 | **0.66** | **0.0045** | **0.4** | **0.001** | **0.077** | **0.16** | <0.0011 | <0.0001 | -- |
| | 5/13/2002 | **0.051** | **0.4** | <0.00012 | -- | <0.0011 | **0.53** | **0.022** | **0.34** | <0.0007 | **0.13** | **0.72** | **0.0056** | <0.0001 | -- |
| | 8/19/2002 | **0.04** | **0.46** | <0.00012 | -- | **0.00063** | **0.76** | **0.071** | **0.3** | <0.0007 | **0.058** | <0.15 | <0.0011 | <0.0001 | -- |
| | 11/13/2002 | **0.034** | **0.5** | <0.00012 | -- | **0.001** | **0.53** | **2** | **0.37** | <0.0007 | **0.074** | <0.09 | <0.0015 | <0.0001 | -- |
| | 2/18/2003 | **0.041** | **0.49** | <0.00004 | -- | **0.0012** | **0.45** | **0.067** | **0.34** | <0.00083 | **0.055** | <0.135 | <0.0015 | <0.00004 | -- |
| MW-07RS | 2/18/2002 | **0.0027** | **0.6** | <0.00012 | -- | <0.0018 | **0.92** | **0.092** | **0.84** | **0.0017** | **3.2** | <0.034 | <0.0011 | <0.0001 | -- |
| | 5/13/2002 | **0.0037** | **0.42** | <0.00012 | -- | <0.0011 | **1.8** | **0.3** | **1.3** | <0.0007 | **3** | **0.68** | <0.0055 | <0.0001 | -- |
| | 8/19/2002 | **0.0027** | **0.45** | **0.00015** | -- | **0.0014** | **1.9** | **0.36** | **1.4** | **0.001** | **3** | <0.15 | **0.0015** | <0.0001 | -- |
| | 11/13/2002 | **0.0019** | **0.27** | **0.00025** | -- | **0.0056** | **1.6** | **0.23** | **1.5** | **0.0007** | **2.7** | <0.09 | <0.0015 | <0.0001 | -- |
| | 2/18/2003 | **0.0045** | **0.26** | **0.00017** | -- | **0.004** | **1.5** | **0.39** | **1.3** | **0.0015** | **2.2** | <0.135 | **0.0025** | **0.00004** | -- |
| MW-08 | 2/20/2002 | -- | -- | -- | **21** | -- | **0.11** | <0.0022 | -- | -- | -- | -- | -- | -- | **109** |
| | 5/13/2002 | -- | -- | -- | **22** | -- | **0.14** | <0.0022 | -- | -- | -- | -- | -- | -- | **171** |
| | 8/20/2002 | -- | -- | -- | **21** | -- | **0.82** | <0.0084 | -- | -- | -- | -- | -- | -- | **99** |
| | 11/14/2002 | -- | -- | -- | **18** | -- | **0.066** | **0.006** | -- | -- | -- | -- | -- | -- | **45** |
| | 2/19/2003 | -- | -- | -- | **19** | -- | **0.072** | **0.012** | -- | -- | -- | -- | -- | -- | **26** |
| MW-09 | 2/20/2002 | -- | -- | -- | **486** | -- | **0.0064** | <0.0022 | -- | -- | -- | -- | -- | -- | **190** |
| | 5/13/2002 | -- | -- | -- | **348** | -- | **0.0047** | <0.0022 | -- | -- | -- | -- | -- | -- | **168** |
| | 8/20/2002 | -- | -- | -- | **331** | -- | **0.01** | <0.0084 | -- | -- | -- | -- | -- | -- | **215** |
| | 11/14/2002 | -- | -- | -- | **295** | -- | **0.009** | <0.0027 | -- | -- | -- | -- | -- | -- | **225** |
| | 2/19/2003 | -- | -- | -- | **273** | -- | **0.0083** | **0.0075** | -- | -- | -- | -- | -- | -- | **241** |

**Table 6-Groundwater Analytical Results-Inorganics**
**We Energies**
**Appleton Former Manufactured Gas Plant Site**

| Sample Location | Sample Date | Inorganic Compounds (mg/L) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Arsenic, total | Barium, total | Cadmium, total | Chloride, total | Chromium, total | Cyanide, total | Cyanide, weak acid dissociable | Iron, total | Lead, total | Manganese, total | Nitrite + Nitrate, total | Selenium, total | Silver, total | Sulfate |
| **Wisconsin Groundwater Quality Standards (Wisconsin Administrative Code NR 140, April 2001)** | | | | | | | | | | | | | | | |
| **Preventive Action Limit** | | **0.005** | **0.4** | **0.0005** | **125** | **0.01** | ns | **0.04** | **0.15** | **0.0015** | **0.025** | **2** | **0.01** | **0.01** | **125** |
| **Enforcement Standard** | | **0.05** | **2** | **0.005** | **250** | **0.1** | ns | **0.2** | **0.3** | **0.015** | **0.05** | **10** | **0.05** | **0.05** | **250** |
| MW-10 | 2/20/2002 | -- | -- | -- | **20** | -- | **0.0086** | **0.0023** | -- | -- | -- | -- | -- | -- | **50** |
| | 5/13/2002 | -- | -- | -- | **22** | -- | **0.0078** | <0.0022 | -- | -- | -- | -- | -- | -- | **32** |
| | 8/20/2002 | -- | -- | -- | **20** | -- | <0.0023 | <0.0084 | -- | -- | -- | -- | -- | -- | **29** |
| | 11/14/2002 | -- | -- | -- | **18** | -- | **0.003** | <0.0027 | -- | -- | -- | -- | -- | -- | **27** |
| | 2/19/2003 | -- | -- | -- | **21** | -- | **0.01** | **0.0046** | -- | -- | -- | -- | -- | -- | **32** |
| MW1-11D | 2/19/2002 | <0.0008 | **0.12** | <0.00012 | -- | <0.0018 | **0.45** | **0.0044** | **0.24** | **0.0011** | **0.15** | **0.13** | <0.0011 | <0.0001 | -- |
| | 5/16/2002 | **0.0012** | **0.088** | <0.00012 | -- | <0.0011 | **0.65** | **0.0079** | **0.22** | <0.0007 | **0.14** | **0.72** | <0.0055 | <0.0001 | -- |
| | 8/20/2002 | <0.0008 | **0.17** | <0.00012 | -- | **0.0007** | **0.53** | **0.075** | **0.22** | <0.0007 | **0.13** | **0.38** | **0.0014** | <0.0001 | -- |
| | 11/13/2002 | <0.0008 | **0.17** | <0.00012 | -- | **0.0027** | **0.5** | **0.064** | **0.24** | <0.0007 | **0.12** | <0.09 | <0.0015 | <0.0001 | -- |
| | 2/19/2003 | <0.0012 | **0.17** | <0.00004 | -- | **0.0027** | **0.44** | **0.069** | **0.23** | <0.00083 | **0.11** | <0.135 | <0.0015 | <0.00004 | -- |
| MW1-11S | 2/19/2002 | **0.002** | **0.041** | <0.00012 | -- | **0.0027** | **0.63** | **0.016** | **1.5** | **0.001** | **0.12** | **1** | <0.0011 | <0.0001 | -- |
| | 5/13/2002 | **0.0038** | **0.057** | <0.00012 | -- | **0.0013** | **0.69** | **0.028** | **2.4** | **0.001** | **0.17** | **1.1** | <0.0055 | <0.0001 | -- |
| | 8/20/2002 | **0.0072** | **0.064** | <0.00012 | -- | **0.002** | **0.97** | **0.086** | **3.6** | **0.0014** | **0.18** | **0.52** | <0.0011 | <0.0001 | -- |
| | 11/13/2002 | **0.0036** | **0.091** | <0.00012 | -- | **0.0027** | **0.88** | **0.093** | **2.6** | **0.0013** | **0.2** | <0.09 | **0.0037** | <0.0001 | -- |
| | 2/19/2003 | **0.0034** | **0.048** | <0.00004 | -- | **0.0017** | **0.4** | **0.13** | **1.2** | <0.00083 | **0.1** | <0.135 | <0.0015 | <0.00004 | -- |
| MW1-12D | 2/19/2002 | <0.0008 | **0.12** | <0.00012 | -- | <0.0018 | **0.34** | <0.0022 | **0.87** | **0.0015** | **0.28** | **0.13** | <0.0011 | <0.0001 | -- |
| | 5/13/2002 | **0.0016** | **0.11** | <0.00012 | -- | <0.0011 | **0.38** | <0.0022 | **1** | <0.0007 | **0.24** | **0.9** | <0.0055 | <0.0001 | -- |
| | 8/19/2002 | <0.0008 | **0.12** | <0.00012 | -- | **0.00081** | **0.47** | **0.13** | **1** | <0.0007 | **0.24** | **0.24** | <0.0011 | <0.0001 | -- |
| | 11/12/2002 | <0.0008 | **0.11** | <0.00012 | -- | **0.0011** | **0.46** | **0.051** | **0.99** | <0.0007 | **0.25** | **0.29** | <0.0015 | <0.0001 | -- |
| | 2/17/2003 | <0.0012 | **0.1** | <0.00004 | -- | **0.0017** | **0.38** | **0.05** | **1.1** | <0.00083 | **0.25** | <0.135 | <0.0015 | <0.00004 | -- |
| MW1-13D | 2/19/2002 | **0.034** | **0.82** | <0.00012 | -- | <0.0018 | **0.77** | **0.032** | **1.5** | **0.0011** | **0.31** | **0.15** | <0.0011 | <0.0001 | -- |
| | 5/13/2002 | **0.02** | **0.4** | <0.00012 | -- | <0.0011 | **0.9** | <0.0022 | **1.1** | <0.0007 | **0.12** | **0.66** | <0.0055 | <0.0001 | -- |
| | 8/19/2002 | **0.015** | **0.48** | <0.00012 | -- | **0.0026** | **0.12** | **0.064** | **0.95** | **0.001** | **0.14** | **0.37** | <0.0011 | <0.0001 | -- |
| | 11/13/2002 | **0.032** | **0.43** | <0.00012 | -- | **0.0055** | **0.74** | **0.04** | **1.2** | <0.0007 | **0.11** | <0.09 | **0.003** | <0.0001 | -- |
| | 2/19/2003 | **0.0098** | **0.39** | <0.00004 | -- | **0.0042** | **0.81** | **0.09** | **0.77** | <0.00083 | **0.11** | <0.135 | <0.0015 | <0.00004 | -- |

**Table 6-Groundwater Analytical Results-Inorganics**
**We Energies**
**Appleton Former Manufactured Gas Plant Site**

| Sample Location | Sample Date | Inorganic Compounds (mg/L) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Arsenic, total | Barium, total | Cadmium, total | Chloride, total | Chromium, total | Cyanide, total | Cyanide, weak acid dissociable | Iron, total | Lead, total | Manganese, total | Nitrite + Nitrate, total | Selenium, total | Silver, total | Sulfate |
| **Wisconsin Groundwater Quality Standards (Wisconsin Administrative Code NR 140, April 2001)** | | | | | | | | | | | | | | | |
| **Preventive Action Limit** | | **0.005** | **0.4** | **0.0005** | **125** | **0.01** | ns | **0.04** | **0.15** | **0.0015** | **0.025** | **2** | **0.01** | **0.01** | **125** |
| **Enforcement Standard** | | **0.05** | **2** | **0.005** | **250** | **0.1** | ns | **0.2** | **0.3** | **0.015** | **0.05** | **10** | **0.05** | **0.05** | **250** |
| MW1-13S | 2/19/2002 | **0.17** | **0.077** | <0.00012 | -- | <0.0018 | **1.2** | <0.0022 | **0.46** | **0.0021** | **0.56** | **0.09** | <0.0011 | <0.0001 | -- |
| | 5/13/2002 | **0.16** | **0.12** | <0.00012 | -- | <0.0011 | **0.97** | **0.023** | **0.78** | <0.0007 | **0.66** | **0.59** | <0.0055 | <0.0001 | -- |
| | 8/19/2002 | **0.52** | **0.099** | <0.00012 | -- | **0.0017** | **0.72** | **0.013** | **4.3** | **0.0015** | **0.52** | **0.42** | **0.0019** | <0.0001 | -- |
| | 11/13/2002 | **0.4** | **0.088** | <0.00012 | -- | **0.0021** | **0.62** | **0.022** | **1.2** | <0.0007 | **0.42** | <0.09 | **0.0059** | <0.0001 | -- |
| | 2/17/2003 | **0.12** | **0.066** | <0.00004 | -- | **0.0016** | **0.25** | **0.019** | **0.44** | <0.00083 | **0.44** | <0.135 | **0.0016** | <0.00004 | -- |
| MW1-14D | 2/18/2002 | **0.2** | **0.18** | <0.00012 | -- | <0.0018 | **0.19** | **0.011** | **0.17** | **0.0018** | **0.12** | **0.17** | <0.0011 | <0.0001 | -- |
| | 5/16/2002 | **0.17** | **0.19** | <0.00012 | -- | <0.0011 | **0.29** | **0.0027** | **0.19** | **0.0007** | **0.13** | **0.65** | <0.0055 | <0.0001 | -- |
| | 8/19/2002 | **0.36** | **0.22** | <0.00012 | -- | **0.00068** | **0.37** | **0.027** | **0.22** | <0.0007 | **0.16** | <0.15 | <0.0011 | <0.0001 | -- |
| | 11/12/2002 | **0.35** | **0.24** | <0.00012 | -- | **0.0014** | **0.31** | **0.038** | **0.22** | <0.0007 | **0.16** | <0.09 | **0.0027** | <0.0001 | -- |
| | 2/18/2003 | **0.2** | **0.2** | <0.00004 | -- | **0.0011** | **0.15** | **0.019** | **0.12** | <0.00083 | **0.12** | <0.135 | <0.0015 | <0.00004 | -- |
| MW1-14S | 2/18/2002 | **0.85** | **0.079** | <0.00012 | -- | <0.0018 | **0.62** | **0.04** | **0.44** | <0.0009 | **0.19** | **0.21** | <0.0011 | <0.0001 | -- |
| | 5/13/2002 | **1.6** | **0.044** | <0.00012 | -- | <0.0011 | **0.6** | **0.07** | **0.38** | <0.0007 | **0.084** | **0.74** | <0.0055 | <0.0001 | -- |
| | 8/19/2002 | **1.9** | **0.053** | <0.00012 | -- | **0.0022** | **1.8** | **0.098** | **0.66** | **0.0017** | **0.11** | <0.15 | **0.0019** | <0.0001 | -- |
| | 11/12/2002 | **2.9** | **0.068** | <0.00012 | -- | **0.0022** | **0.66** | **0.075** | **0.51** | <0.0007 | **0.14** | <0.09 | **0.0027** | <0.0001 | -- |
| | 2/18/2003 | **0.69** | **0.043** | <0.00004 | -- | **0.0022** | **0.47** | **0.075** | **0.34** | <0.00083 | **0.095** | <0.135 | **0.0017** | <0.00004 | -- |
| MW1-15D | 2/18/2002 | **0.005** | **0.38** | <0.00012 | -- | <0.0018 | **0.068** | **0.0028** | **1.7** | **0.001** | **0.028** | **0.1** | <0.0011 | <0.0001 | -- |
| | 5/13/2002 | **0.011** | **0.41** | <0.00012 | -- | <0.0011 | **0.13** | **0.0066** | **1.8** | **0.001** | **0.026** | **0.55** | <0.0055 | <0.0001 | -- |
| | 8/19/2002 | **0.0096** | **0.4** | <0.00012 | -- | <0.00021 | **0.011** | <0.0084 | **1.8** | **0.0008** | **0.025** | **0.36** | **0.002** | <0.0001 | -- |
| | 11/12/2002 | **0.007** | **0.42** | <0.00012 | -- | **0.00042** | **0.059** | **0.007** | **1.8** | <0.0007 | **0.028** | <0.09 | **0.0016** | <0.0001 | -- |
| | 2/18/2003 | **0.0057** | **0.39** | <0.00004 | -- | **0.00092** | **0.064** | **0.051** | **1.7** | <0.00083 | **0.026** | <0.135 | **0.0018** | <0.00004 | -- |
| MW1-17D | 2/20/2002 | **0.0053** | **0.53** | **0.0007** | -- | **0.078** | **0.13** | **0.0079** | **16** | **0.022** | **3.3** | | <0.0011 | <0.0001 | -- |
| | 5/13/2002 | **0.0028** | **0.39** | **0.00041** | -- | <0.0011 | **0.25** | **0.02** | **2.6** | <0.0007 | **1.6** | **0.58** | <0.0055 | <0.0001 | -- |
| | 8/19/2002 | **0.0023** | **0.39** | <0.00012 | -- | **0.028** | **0.66** | **0.034** | **6.5** | <0.0007 | **2.2** | **0.37** | <0.0011 | <0.0001 | -- |
| | 11/12/2002 | **0.0014** | **0.36** | <0.00012 | -- | **0.016** | **0.15** | **0.017** | **2.4** | <0.0007 | **1.9** | <0.09 | **0.0038** | <0.0001 | -- |
| | 2/18/2003 | **0.0023** | **0.33** | <0.00004 | -- | **0.0056** | **0.18** | **0.22** | **3.6** | <0.00083 | **2.1** | <0.135 | <0.0015 | <0.00004 | -- |

**Table 6-Groundwater Analytical Results-Inorganics**
**We Energies**
**Appleton Former Manufactured Gas Plant Site**

| Sample Location | Sample Date | Inorganic Compounds (mg/L) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Arsenic, total | Barium, total | Cadmium, total | Chloride, total | Chromium, total | Cyanide, total | Cyanide, weak acid dissociable | Iron, total | Lead, total | Manganese, total | Nitrite + Nitrate, total | Selenium, total | Silver, total | Sulfate |
| **Wisconsin Groundwater Quality Standards (Wisconsin Administrative Code NR 140, April 2001)** | | | | | | | | | | | | | | | |
| **Preventive Action Limit** | | **0.005** | **0.4** | **0.0005** | **125** | **0.01** | ns | **0.04** | **0.15** | **0.0015** | **0.025** | **2** | **0.01** | **0.01** | **125** |
| **Enforcement Standard** | | **0.05** | **2** | **0.005** | **250** | **0.1** | ns | **0.2** | **0.3** | **0.015** | **0.05** | **10** | **0.05** | **0.05** | **250** |
| MW1-18D | 2/19/2002 | **0.0046** | **0.075** | <0.00012 | -- | <0.0018 | **0.2** | **0.011** | **2.1** | **0.0012** | **0.2** | **0.16** | <0.0011 | <0.0001 | -- |
| | 5/13/2002 | **0.0049** | **0.058** | <0.00012 | -- | <0.0011 | **0.27** | **0.0081** | **2.1** | <0.0007 | **0.15** | **0.58** | <0.0055 | <0.0001 | -- |
| | 8/20/2002 | **0.0027** | **0.058** | <0.00012 | -- | <0.00021 | **0.21** | **0.04** | **2.5** | **0.0013** | **0.17** | <0.15 | **0.0016** | <0.0001 | -- |
| | 11/13/2002 | **0.0018** | **0.053** | <0.00012 | -- | **0.00077** | **0.12** | **0.025** | **2.6** | <0.0007 | **0.18** | <0.09 | <0.0015 | <0.0001 | -- |
| | 2/20/2003 | **0.0014** | **0.055** | <0.00004 | -- | **0.00069** | **0.2** | **0.029** | **2.7** | <0.00083 | **0.21** | <0.135 | <0.0015 | <0.00004 | -- |
| QC1 | 2/19/2002 | **0.0042** | **0.094** | <0.00012 | -- | <0.0018 | **0.63** | **0.023** | **2.6** | **0.001** | **0.25** | **0.32** | <0.0011 | <0.0001 | -- |
| | 5/13/2002 | **1.3** | **0.047** | <0.00012 | -- | <0.0011 | **1** | **0.003** | **0.38** | <0.0007 | **0.088** | **0.75** | <0.0055 | <0.0001 | -- |
| | 8/19/2002 | **0.33** | **0.22** | <0.00012 | -- | **0.00066** | **0.47** | **0.029** | **0.24** | **0.0011** | **0.16** | <0.15 | <0.0011 | <0.0001 | -- |
| | 11/12/2002 | **0.54** | **0.076** | <0.00012 | -- | **0.0052** | **0.17** | **0.044** | **0.71** | **0.0063** | **0.33** | **0.28** | <0.0015 | <0.0001 | -- |
| | 2/18/2003 | **0.7** | **0.044** | <0.00004 | -- | **0.0018** | **0.44** | **0.44** | **0.35** | <0.00083 | **0.096** | <0.135 | <0.0015 | <0.00004 | -- |
| QC2 | 2/19/2002 | **0.0034** | **0.078** | <0.00012 | -- | <0.0018 | **0.22** | **0.015** | **2.3** | **0.0022** | **0.22** | **0.12** | <0.0011 | <0.0001 | -- |
| | 5/13/2002 | <0.0008 | **0.091** | <0.00012 | -- | <0.0011 | **0.48** | **0.0052** | **0.55** | <0.0007 | **0.15** | **0.67** | <0.0055 | <0.0001 | -- |
| | 8/20/2002 | **0.0099** | **0.23** | <0.00012 | -- | **0.00066** | **3.9** | **0.2** | **19** | <0.0007 | **0.48** | <0.15 | <0.0011 | <0.0001 | -- |
| | 11/13/2002 | **0.0021** | **0.054** | <0.00012 | -- | **0.00054** | **0.18** | **0.041** | **2.6** | <0.0007 | **0.18** | **0.85** | **0.0015** | <0.0001 | -- |
| | 2/19/2003 | <0.0012 | **0.17** | <0.00004 | -- | **0.0028** | **0.44** | **0.38** | **0.22** | <0.00083 | **0.11** | <0.135 | <0.0015 | <0.00004 | -- |
| QCFB | 2/20/2002 | **0.0009** | <0.0014 | <0.00012 | -- | <0.0018 | <0.0021 | <0.0022 | **0.0028** | **0.0014** | <0.00042 | **0.44** | <0.0011 | <0.0001 | -- |
| | 5/13/2002 | **0.0008** | <0.0012 | <0.00012 | -- | <0.0011 | **0.0025** | <0.0022 | <0.0012 | <0.0007 | <0.00035 | **0.1** | <0.0055 | <0.0001 | -- |
| | 8/20/2002 | <0.0008 | <0.0012 | <0.00012 | -- | <0.00021 | **0.0076** | <0.0084 | **0.002** | <0.0007 | <0.00035 | **0.31** | <0.0011 | <0.0001 | -- |
| | 11/14/2002 | <0.0008 | <0.0012 | <0.00012 | -- | **0.00027** | <0.0027 | <0.0027 | **0.0029** | <0.0007 | <0.00035 | **0.27** | <0.0015 | <0.0001 | -- |
| | 2/20/2003 | <0.0012 | <0.0013 | <0.00004 | -- | **0.00074** | <0.0014 | **0.0029** | **0.012** | <0.00083 | <0.00045 | <0.135 | <0.0015 | <0.00004 | -- |

[O-PAH 4/1/03. C-MJR 4/10/03. HMS/PAR 7/10/03]

**Notes:**

mg/L: Milligram per Liter

-- No standard

na: Parameter not analyzed

1) Samples exceeding the ES are boxed/bold, samples exceeding the PAL are underlined/bold.

# APPENDIX H

# CYANIDE INFORMATION DOCUMENTS

United States Environmental Protection Agency

Office of Water (4303)

EPA-821-R-99-013
August 1999

EPA

# Method OIA-1677 Available Cyanide by Flow Injection, Ligand Exchange, and Amperometry

## Acknowledgments

This method was developed by Michael Straka of OI Analytical in cooperation with Emil Milosavljevic and Ljiljana Solujic of the University of Nevada Reno Mackay School of Mines and guidance from William A. Telliard of the Engineering and Analysis Division (EAD) within the U.S. Environmental Protection Agency's (EPA's) Office of Science and Technology (OST). Additional assistance in preparing the method was provided by DynCorp Information and Enterprise Technology and Interface, Inc..

## Disclaimer

This Method has been reviewed and approved for publication by the Analytical Methods Staff within EPA's Engineering and Analysis Division. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

Questions concerning this Method or its application should be addressed to:

W.A. Telliard
Engineering and Analysis Division (4303)
U.S. Environmental Protection Agency
401 M Street SW
Washington, DC 20460
Phone: 202/260–7120
Fax: 202/260–7185

# Table of Contents

## Introduction

Method OIA-1677 was developed by ALPKEM, a division of OI Analytical, in cooperation with the University of Nevada Reno Mackay School of Mines, as a way to measure available cyanide without the interference problems of the currently approved available cyanide methods. EPA proposed the use of Method OIA-1677 on July 7, 1998 (63 FR 36809). EPA is approving the use of Method OIA-1677 for compliance monitoring under Section 304(h) of the Clean Water Act. Method OIA-1677 is an additional test procedure for measuring the same cyanide species as are measured by currently approved methods for cyanide amenable to chlorination (CATC). In some matrices, CATC methods are subject to significant test interferences. Method OIA-1677 has been added to the list of approved methods because it is more specific for available cyanide, is more rapid, measures cyanide at lower concentrations, offers improved safety, reduces laboratory waste, and is more precise and accurate than currently approved CATC methods.

Requests for additional copies of this Method should be directed to:

Attn: Catherine Anderson
ALPKEM
A Division of OI Analytical
PO Box 9010
College Station, TX 77842-9010
Phone: 409/690-1711
Fax: 409/690-0440

National Technical Information Service (NTIS)
5285 Port Royal Road
Springfield, VA 22161
Phone: 800/553-6847 or 703/605-6000
PB99-132011

Note: This Method is performance based. The laboratory is permitted to omit any step or modify any procedure provided that all performance requirements in this Method are met. The laboratory may not omit any quality control tests. The terms "shall" and "must" define procedures required for producing reliable data at water quality criteria levels. The terms "should" and "may" indicate optional steps that may be modified or omitted if the laboratory can demonstrate that the modified method produces results equivalent or superior to results produced by this Method.

# Method OIA-1677

# Available Cyanide by Flow Injection, Ligand Exchange, and Amperometry

## 1.0 Scope and Application

**1.1** This method is for determination of available cyanide in water and wastewater by flow injection, ligand exchange, and amperometric detection. The method is for use in EPA's data gathering and monitoring programs associated with the Clean Water Act, Resource Conservation and Recovery Act, Comprehensive Environmental Response, Compensation and Liability Act, and Safe Drinking Water Act.

**1.2** Cyanide ion ($CN^-$), hydrogen cyanide in water ($HCN_{aq}$), and the cyano-complexes of zinc, copper, cadmium, mercury, nickel, and silver may be determined by this method (see Section 17.2.1).

**1.3** The presence of polysulfides may prove intractable for application of this method.

**1.4** The method detection limit (MDL) is 0.5 µg/L and the minimum level (ML) is 2.0 µg/L. The dynamic range is approximately 2.0 µg/L (ppb) to 5.0 mg/L (ppm) cyanide ion using a 200 µL sample loop volume. Higher concentrations can be determined by dilution of the original sample or by reducing volume of the sample loop.

**1.5** This method is for use by analysts experienced with flow injection equipment or under close supervision of such qualified persons.

**1.6** The laboratory is permitted to modify the method to overcome interferences or to lower the cost of measurements, provided that all performance criteria in this method are met. Requirements for establishing method equivalency are given in Section 9.1.2.

## 2.0 Summary of Method

**2.1** The analytical procedure employed for determination of available cyanide is divided into two parts: sample pretreatment and cyanide detection. In the pretreatment step, ligand-exchange reagents are added at room temperature to 100 mL of a cyanide-containing sample. The ligand-exchange reagents form thermodynamically stable complexes with the transition metal ions listed in Section 1.2, resulting in the release of cyanide ion from the metal-cyano complexes.

Cyanide detection is accomplished using a flow-injection analysis (FIA) system (Reference 15.6). A 200-µL aliquot of the pre-treated sample is injected into the flow injection manifold of the system. The addition of hydrochloric acid converts cyanide ion to hydrogen cyanide (HCN) that passes under a gas diffusion membrane. The HCN diffuses through the membrane into an alkaline receiving solution where it is converted back to cyanide ion. The cyanide ion is monitored amperometrically with a silver working electrode, silver/silver chloride reference electrode, and platinum/stainless steel counter

electrode, at an applied potential of zero volt. The current generated is proportional to the cyanide concentration present in the original sample. Total analysis time is approximately two minutes.

2.2 The quality of the analysis is assured through reproducible calibration and testing of the FIA system.

2.3 A flow diagram of the FIA system is shown in Figure 1.

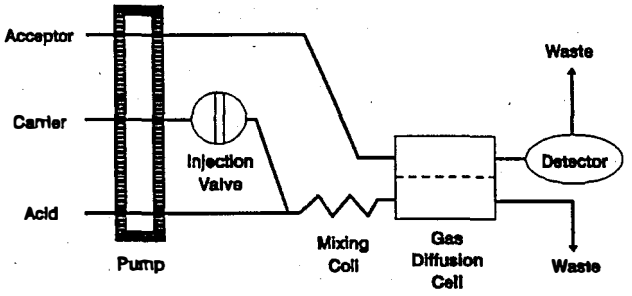


**Figure 1. Flow injection Manifold used in the quantification of cyanide in the pretreated sample. Carrier (0.1 M HCl); Acid (0.1 M HCl); Acceptor (0.1 M NaOH).**

## 3.0 Definitions

Definitions for terms used in this method are given in the glossary at the end of the method.

## 4.0 Interferences

4.1 Solvents, reagents, glassware, and other sample-processing hardware may yield artifacts that affect results. Specific selection of reagents or purification of these reagents may be required.

4.2 All materials used in the analysis shall be demonstrated to be free from interferences under the conditions of analysis by running laboratory blanks as described in Section 9.4.

4.3 Glassware is cleaned by washing in hot water containing detergent, rinsing with tap and reagent water, and drying in an area free from interferences.

4.4 Interferences extracted from samples will vary considerably from source to source, depending upon the diversity of the site being sampled.

4.5 Sulfide is a positive interferent in this method (References 15.3 and 15.4), because an acidified sample containing sulfide liberates hydrogen sulfide that is passed through the

membrane and produces a signal at the silver electrode. In addition, sulfide ion reacts with cyanide ion in solution to reduce its concentration over time. To overcome this interference, the sulfide ion must be precipitated with lead ion immediately upon sample collection. Sulfide ion and lead sulfide react with cyanide ion to form thiocyanate which is not detected in the analytical system. Tests have shown (Reference 15.7) that if lead carbonate is used for sulfide precipitation, the supernate containing cyanide must be filtered immediately to avoid loss of cyanide through reaction with precipitated lead sulfide (Section 8.2.1).

4.6 Though not interferences, substances that react with cyanide should also be removed from samples at time of collection. These substances include water soluble aldehydes that form cyanohydrins and oxidants such as hypochlorite and sulfite. Water soluble aldehydes react with cyanide to form cyanohydrins that are not detected by the analytical system; hypochlorite and sulfite oxidize cyanide to non-volatile forms. Procedures for the removal of these substances are provided in Sections 8.2.2 and 8.2.3.

## 5.0 Safety

5.1 The toxicity or carcinogenicity of each compound or reagent used in this method has not been precisely determined; however, each chemical compound should be treated as a potential health hazard. Exposure to these compounds should be reduced to the lowest possible level.

5.2 Cyanides and cyanide solutions

WARNING: The cyanide ion, hydrocyanic acid, all cyanide salts, and most metal-cyanide complexes are extremely dangerous. As a contact poison, cyanide need not be ingested to produce toxicity. Also, cyanide solutions produce fatally toxic hydrogen cyanide gas when acidified. For these reasons, it is mandatory that work with cyanide be carried out in a well-ventilated hood by properly trained personnel wearing adequate protective equipment.

5.3 Sodium hydroxide solutions

CAUTION: Considerable heat is generated upon dissolution of sodium hydroxide in water. It may be advisable to cool the container in an ice bath when preparing sodium hydroxide solutions.

5.4 Unknown samples may contain high concentrations of volatile toxic compounds. Sample containers should be opened in a hood and handled with gloves to prevent exposure.

5.5 This method does not address all safety issues associated with its use. The laboratory is responsible for maintaining a safe work environment and a current awareness file of OSHA regulations regarding the safe handling of the chemicals specified in this method. A reference file of material safety data sheets (MSDSs) should be available to all personnel involved in these analyses. Additional information on laboratory safety can be found in References 15.8 and 15.9.

## 6.0 Equipment and Supplies

NOTE: Brand names, suppliers, and part numbers are for illustrative purposes only. No endorsement is implied. Equivalent performance may be achieved using apparatus and materials other than those specified here, but demonstration of equivalent performance that meets the requirements of this method is the responsibility of the laboratory.

**6.1** Flow injection analysis (FIA) system—ALPKEM Model 3000 (Reference 15.5), or equivalent, consisting of the following:

6.1.1 Injection valve capable of injecting 40 to 300 µL samples

6.1.2 Gas diffusion manifold with a microporous Teflon® or polypropylene membrane

6.1.3 Amperometric detection system with:

6.1.3.1 Silver working electrode

6.1.3.2 Ag/AgCl reference electrode

6.1.3.3 Pt/stainless steel counter electrode

6.1.3.4 Applied potential of 0.0 volt

**6.2** Sampling equipment—Sample bottle, amber glass, 0.1-L, with polytetrafluoroethylene (PTFE)-lined cap. Clean by washing with detergent and water, rinsing with two aliquots of reagent water, and drying by baking at 110 - 150 °C for one hour minimum.

**6.3** Standard laboratory equipment including volumetric flasks, pipettes, syringes, etc. all cleaned, rinsed and dried per bottle cleaning procedure in Section 6.2.

## 7.0 Reagents and Standards

**7.1** Reagent water—Water in which cyanide and potentially interfering substances are not detected at the MDL of this method. It may be generated by any one of the methods listed below. Reagent water generated by these methods shall be tested for purity utilizing the procedure in Section 11.

7.1.1 Activated carbon—Pass distilled or deionized water through an activated carbon bed (Calgon Filtrasorb-300 or equivalent).

7.1.2 Water purifier—Pass distilled or deionized water through a purifier (Millipore Super Q, or equivalent).

**7.2** Sodium hydroxide—ACS reagent grade.

**7.3** Potassium cyanide—ACS reagent grade.

**7.4** Mercury (II) cyanide, □99% purity—Aldrich Chemical Company Catalog No. 208140, or equivalent.

**7.5** Potassium nickel (II) cyanide—Aldrich Chemical Company Catalog No. 415154, or equivalent.

**7.6** Silver nitrate—ACS reagent grade. Aldrich Chemical Company Catalog No. 209139, or equivalent.

**7.7** Hydrochloric acid—approximately 37%, ACS reagent grade.

**7.8** Preparation of stock solutions. Observe the warning in Section 5.2.

7.8.1 Silver nitrate solution, 0.0192 N—Weigh 3.27 g of $AgNO_3$ into a 1-L volumetric flask and bring to the mark with reagent water.

7.8.2 Rhodanine solution, 0.2 mg/mL in acetone—Weigh 20 mg of p-dimethylaminobenzalrhodanine (Aldrich Chemical Co. Catalog No. 114588, or equivalent) in a 100-mL volumetric flask and dilute to the mark with acetone.

7.8.3 Potassium cyanide stock solution, 1000 mg/L

7.8.3.1 Dissolve approximately 2 g (approximately 20 pellets) of sodium hydroxide in approximately 500 mL of reagent water contained in a one liter volumetric flask. Observe the caution in Section 5.3. Add 2.51 g of potassium cyanide (Aldrich Chemical Co. Catalog No. 207810, or equivalent), dilute to one liter with reagent water, and mix well. Store KCN solution in an amber glass container at 0-4□C.

7.8.3.2 Standardize the KCN solution (Section 7.8.3.1) by adding 0.5 mL of rhodanine solution (Section 7.8.2) to 25 mL of KCN solution and titrating with $AgNO_3$ solution (Section 7.8.1) until the color changes from canary yellow to a salmon hue. Based on the determined KCN concentration, dilute the KCN solution to an appropriate volume so the final concentration is 1.00 g/L, using the following equation:

**EQUATION 1**

$$x \times v \square 1\ g/L \times 1\ L$$

*where:*
*x=concentration of KCN solution determined from titrations*
*v=volume of KCN solution needed to prepare 1 L of 1 g/L KCN solution*

If the concentration is not 1.00 g/L, correct the intermediate and working calibration concentrations accordingly.

7.8.4 1M sodium hydroxide—Dissolve 40 g of sodium hydroxide pellets in approximately 500 mL of reagent water in a 1-liter volumetric flask, observing the caution in Section 5.3. Dilute to one liter with reagent water. Store in an amber bottle at room temperature.

**7.9** Secondary standards.

7.9.1 Cyanide, 100 mg/L—Dilute 100.0 mL of cyanide stock solution (Section 7.8.3.2) and 10 mL of 1M sodium hydroxide (Section 7.8.4) to one liter with reagent water (Section 7.1). Store in an amber glass bottle at 0-4□C.

7.9.2 Cyanide, 10 mg/L—Dilute 10.0 mL of cyanide stock solution and 10 mL of 1M sodium hydroxide to one liter with reagent water. Store in an amber glass bottle at 0-4□C.

7.9.3 Cyanide, 1 mg/L—Dilute 1.0 mL of cyanide stock solution and 1 mL of 1M sodium hydroxide to one liter with reagent water. Store in an amber glass bottle at 0-4□C.

7.9.4 Cyanide working calibration standard solutions (2 - 5000 µg/L as cyanide)—Working calibration standards may be prepared to cover the desired calibration range by adding the appropriate volumes of secondary standards (Sections 7.9.1, 7.9.2, 7.9.3) to 100 mL volumetric flasks that contain 40 mL of reagent water (Section 7.1) and 1 mL of 1M sodium hydroxide (Section 7.8.4). Dilute the solutions to 100 mL with reagent water. Prepare working calibration standards daily. The following table provides the quantity of secondary standard necessary to prepare working standards of the specified concentration.

| Working Calibration Standard Concentration (□g/L) | Secondary Standard Solution Volume | | |
|---|---|---|---|
| | Secondary Standard Concentration (Section 7.8.3) 1 mg/L | Secondary Standard Concentration (Section 7.8.2) 10 mg/L | Secondary Standard Concentration (Section 7.8.1) 100 mg/L |
| 0.000 | | | |
| 2.0 | 0.200 | | |
| 5.0 | 0.500 | 0.050 | |
| 10.0 | 1.00 | 0.100 | |
| 50.0 | 5.00 | 0.500 | 0.050 |
| 100 | 10.0 | 1.00 | 0.100 |
| 200 | 20.0 | 2.00 | 0.200 |
| 500 | 50.0 | 5.00 | 0.500 |
| 1000 | | 10.0 | 1.00 |
| 3000 | | 30.0 | 3.00 |
| 5000 | | 50.0 | 5.00 |

If desired, the laboratory may extend the analytical working range by using standards that cover more than one calibration range, so long as the requirements of Section 10.3 are met.

**7.10** Sample Preservation Reagents

7.10.1 The presence of sulfide may result in the conversion of cyanide to thiocyanate. While lead acetate test paper has been recommended for determining the presence of sulfide in samples, the test is generally unreliable and is typically not usable for sulfide concentrations below approximately 1 ppm. The use of lead carbonate (Aldrich Chemical Co. Catalog No. 336378, or equivalent), followed by immediate filtration of the sample is required whenever sulfide ion is present. If the presence of sulfide is suspected but not verifiable from the use of lead acetate test paper, two samples may be collected, one without lead carbonate addition and another with lead carbonate addition followed by immediate filtration. Analyze both samples. If sulfide is present, the preserved sample should contain higher levels of cyanide than the unpreserved sample. Lead acetate test paper may be used, but should be tested for minimum level of sulfide detection by spiking reagent water aliquots with decreasing levels of sulfide and determining the lowest level of sulfide detection attainable. The spiked samples are tested with lead acetate test paper moistened with acetate buffer solution. The buffer solution is prepared by

dissolving 146 g anhydrous sodium acetate, or 243 g sodium acetate trihydrate in 400 mL of reagent water, followed by addition of 480 g concentrated acetic acid. Dilute the solution to 1 L with reagent water. Each new batch of test paper and/or acetate buffer should be tested to determine the lowest level of sulfide ion detection prior to use.

7.10.2 Ethylenediamine solution—In a 100 mL volumetric flask, dilute 3.5 mL pharmaceutical-grade anhydrous ethylenediamine (Aldrich Chemical Co. Catalog No. 240729, or equivalent) with reagent water.

7.10.3 Ascorbic acid—Crystals—Aldrich Chemical Co. Catalog No. 268550, or equivalent.

**7.11** FIA Reagents.

7.11.1 Carrier and acid reagent (0.1M hydrochloric acid)—Dilute 8 mL of concentrated hydrochloric acid to one liter with reagent water.

7.11.2 Acceptor reagent (0.1M sodium hydroxide)—Dilute 100 mL of sodium hydroxide solution (Section 7.8.4) to 1000 mL with reagent water.

7.11.3 Ligand-exchange reagent A-ALPKEM part number A001416, or equivalent.

7.11.4 Ligand-exchange reagent B-ALPKEM part number A001417, or equivalent.

**7.12** Quality control solutions

7.12.1 Mercury (II) cyanide stock solution (1000 mg/L as cyanide)—Weigh 0.486 g of mercury (II) cyanide (Section 7.4) in a 100-mL volumetric flask. Add 10 - 20 mL of reagent water and 1 mL of 1M sodium hydroxide solution (Section 7.8.4). Swirl to mix. Dilute to the mark with reagent water.

7.12.2 Laboratory control sample (LCS)—Place 0.20 mL of the mercury (II) cyanide stock solution (Section 7.12.1) in a 100-mL volumetric flask and dilute to the mark with reagent water to provide a final cyanide concentration of 2.00 mg/L.

## 8.0 Sample Collection, Preservation, and Storage

**8.1** Sample collection and preservation—Samples are collected using manual (grab) techniques and are preserved immediately upon collection.

8.1.1 Grab sampling—Collect samples in amber glass bottles with PTFE-lined caps cleaned according to the procedure in Section 6.2. Immediately after collection, preserve the sample using any or all of the preservation techniques (Section 8.2), followed by adjustment of the sample pH to □12 by addition of 1M sodium hydroxide and refrigeration at 0-4□C.

8.1.2 Compositing—Compositing is performed by combining aliquots of grab samples only. Automated compositing equipment may not be used because cyanide may react or degrade during the sampling period. Preserve and refrigerate each grab sample immediately after collection (Sections 8.1.1 and 8.2) until compositing.

8.1.3 Shipment—If the sample will be shipped by common carrier or mail, limit the pH to a range of 12.0 - 12.3. (See the footnote to 40 CFR 136.3(e), Table II, for the column headed "Preservation.")

**8.2** Preservation techniques

8.2.1 Samples containing sulfide ion

8.2.1.1 Test the sample with lead acetate test paper (Section 7.10.1) to determine the presence or absence of sulfide ion. If sulfide ion is present, the sample must be treated immediately (within 15 minutes of collection) with sufficient solid lead carbonate (Section 7.10.1) to remove sulfide (as evidenced by the lead acetate test paper), and immediately filtered into another sample bottle to remove precipitated lead sulfide.

8.2.1.2 If sulfide ion is suspected to be present, but its presence is not detected by the lead acetate paper test, two samples should be collected. One is treated for the presence of sulfide and immediately filtered, while the second is not treated for sulfide. Both samples must be analyzed. (Tests conducted prior to the interlaboratory validation of this method showed significant and rapid losses of cyanides when lead sulfide was allowed to remain in contact with the sample during holding times of three days or less. As a result, the immediate filtration of samples preserved with lead carbonate is essential (Reference 15.6)).

8.2.1.3 If the sample contains particulate matter that would be removed upon filtration, the sample must be filtered prior to treatment with lead carbonate to assure that cyanides associated with the particulate matter are included in the measurement. The collected particulate matter must be saved and the filtrate treated using the sulfide removal procedure above (Section 8.2.1.1). The collected particulate and treated filtrate must be recombined and homogenized, and then sent to the laboratory for analysis.

8.2.2 Samples containing water soluble aldehydes—Treat samples containing or suspected to contain formaldehyde, acetaldehyde, or other water soluble aldehydes with 20 mL of 3.5% ethylenediamine solution (Section 7.10.2) per liter of sample.

8.2.3 Samples known or suspected to contain chlorine, hypochlorite, and/or sulfite—Treat with 0.6 g of ascorbic acid (Section 7.10.3) per liter of sample. EPA Method 330.4 or 330.5 may be used for the measurement of residual chlorine (Reference 15.1).

8.3 Sample holding time—Maximum holding time for samples preserved as above is 14 days. Unpreserved samples must be analyzed within 24 hours, or sooner if a change in cyanide concentration will occur. (See the footnotes to Table II at 40 CFR 136.3(e).)

## 9.0 Quality Control

9.1 Each laboratory that uses this method is required to operate a formal quality assurance program (Reference 15.9). The minimum requirements of this program consist of an initial demonstration of laboratory capability, and the periodic analysis of LCSs and MS/MSDs as a continuing check on performance. Laboratory performance is compared to established performance criteria to determine if the results of the analyses meet the performance characteristics of the method.

9.1.1 The laboratory shall make an initial demonstration of the ability to generate acceptable precision and accuracy with this method. This ability is established as described in Section 9.2.

9.1.2 In recognition of advances that are occurring in analytical technology, and to allow the laboratory to overcome sample matrix interferences, the laboratory is permitted certain options to improve performance or lower the costs of measurements. Alternate determinative techniques, such as the substitution of spectroscopic or immuno-assay techniques, and changes that degrade method performance, are not allowed. If an analytical technique other than the techniques specified in this method is used, then that technique must have a specificity equal to or better than the specificity of the techniques in this method for the analytes of interest.

9.1.2.1 Each time a modification is made to this method, the laboratory is required to repeat the procedure in Section 9.2. If the detection limit of the method will be affected by the change, the laboratory must demonstrate that the MDL is equal to or less than the MDL in Section 1.4 or one-third the regulatory compliance level, whichever is greater. If calibration will be affected by the change, the laboratory must recalibrate the instrument per Section 10.3.

9.1.2.2 The laboratory is required to maintain records of modifications made to this method. These records include the information in this subsection, at a minimum.

9.1.2.2.1 The names, titles, addresses, and telephone numbers of the analyst(s) who performed the analyses and modification, and of the quality control officer who witnessed and will verify the analyses and modification.

9.1.2.2.2 A narrative stating the reason(s) for the modification.

9.1.2.2.3 Results from all quality control (QC) tests comparing the modified method to this method including:

(a) calibration (Section 10.3)
(b) calibration verification (Section 9.5)
(c) initial precision and recovery (Section 9.2)
(d) analysis of blanks (Section 9.4)
(e) laboratory control sample (Section 9.6)
(f) matrix spike and matrix spike duplicate (Section 9.3)
(g) MDL (Section 1.4)

9.1.2.2.4. Data that will allow an independent reviewer to validate each determination by tracing the instrument output (peak height, area, or other signal) to the final result. These data are to include:

(a) sample numbers and other identifiers
(b) analysis dates and times
(c) analysis sequence/run chronology
(d) sample weight or volume
(e) sample volume prior to each cleanup step, if applicable
(f) sample volume after each cleanup step, if applicable
(g) final sample volume prior to injection (Sections 10 and 11)
(h) injection volume (Sections 10 and 11)
(i) dilution data, differentiating between dilution of a sample or modified sample (Sections 10 and 11)
(j) instrument and operating conditions
(k) other operating conditions (temperature, flow rates, etc.)
(l) detector (operating condition, etc.)
(m) printer tapes, disks, and other recording of raw data
(n) quantitation reports, data system outputs, and other data necessary to link raw data to the results reported

9.1.3 Analyses of matrix spike and matrix spike duplicate samples are required to demonstrate method accuracy and precision and to monitor matrix interferences (interferences caused by the sample matrix). The procedure and QC criteria for spiking are described in Section 9.3.

9.1.4 Analyses of blanks are required to demonstrate freedom from contamination and that the compounds of interest and interfering compounds have not been carried over from a previous analysis. The procedures and criteria for analysis of a blank are described in Section 9.4.

9.1.5 The laboratory shall, on an ongoing basis, demonstrate through the analysis of the LCS (Section 7.12.2) that the analysis system is in control. This procedure is described in Section 9.6.

9.1.6 The laboratory should maintain records to define the quality of data that is generated. Development of accuracy statements is described in Sections 9.3.8 and 9.6.3.

9.1.7 Accompanying QC for the determination of cyanide is required per analytical batch. An analytical batch is a set of samples analyzed at the same time, to a maximum of 10 samples. Each analytical batch of 10 or fewer samples must be accompanied by a laboratory blank (Section 9.4), an LCS (Section 9.6), and a matrix spike and matrix spike duplicate (MS/MSD, Section 9.3), resulting in a minimum of five analyses (1 sample, 1 blank, 1 LCS, 1 MS, and 1 MSD) and a maximum of 14 analyses (10 samples, 1 blank, 1 LCS, 1 MS, and 1 MSD) in the batch. If greater than 10 samples are analyzed at one time, the samples must be separated into analytical batches of 10 or fewer samples.

**9.2** Initial demonstration of laboratory capability

9.2.1 Method Detection Limit (MDL)—To establish the ability to detect cyanide at low levels, the laboratory shall determine the MDL per the procedure in 40 CFR Part 136, Appendix B (Reference 15.4) using the apparatus, reagents, and standards that will be used in the practice of this method. An MDL less than or equal to the MDL listed in Section 1.4 must be achieved prior to practice of this method.

9.2.2 Initial Precision and Recovery (IPR)—To establish the ability to generate acceptable precision and accuracy, the laboratory shall perform the following operations:

9.2.2.1 Analyze four samples of the LCS (Section 7.12.2) according to the procedure beginning in Section 10.

9.2.2.2 Using the results of the set of four analyses, compute the average percent recovery (x) and the standard deviation of the percent recovery (s) for cyanide. Use Equation 2 for calculation of the standard deviation of the percent recovery.

**EQUATION 2**

$$s = \sqrt{\frac{\sum x^2 - \frac{(\sum x)^2}{n}}{n - 1}}$$

*where:*
*n = Number of samples*
*x = Percent recovery in each sample*

9.2.3 Compare s and x with the acceptance criteria specified in Table 1. If s exceeds the precision limit or x falls outside the range for recovery, system performance is unacceptable and the problem must be found and corrected before analyses can begin.

**9.3** Matrix spike/matrix spike duplicate (MS/MSD)—The laboratory shall spike, in duplicate, a minimum of 10 percent of all samples (one sample in duplicate in each batch of ten samples) from a given discharge.

9.3.1 The concentration of the spike in the sample shall be determined as follows:

9.3.1.1 If, as in compliance monitoring, the concentration of cyanide in the sample is being checked against a regulatory concentration limit, the spiking level shall be at that limit or at 1 to 5 times higher than the background concentration of the sample (determined in Section 9.3.2), whichever concentration is higher.

9.3.1.2 If the concentration of cyanide in a sample is not being checked against a limit, the spike shall be at the concentration of the LCS or at 1 to 5 times higher than the background concentration, whichever concentration is higher.

9.3.2 Analyze one sample aliquot out of each set of ten samples from each discharge according to the procedure beginning in Section 11 to determine the background concentration (B) of cyanide.

9.3.2.1 Spike this sample with the amount of mercury (II) cyanide stock solution (Section 7.12.1) necessary to produce a cyanide concentration in the sample of 2 mg/L. If necessary, prepare another stock solution appropriate to produce a level in the sample at the regulatory compliance limit or at 1 to 5 times the background concentration (per Section 9.3.1).

9.3.2.2 Spike two additional sample aliquots with the spiking solution and analyze these aliquots to determine the concentration after spiking (A).

9.3.3 Calculate the percent recovery of cyanide in each aliquot using Equation 3.

**EQUATION 3**

$$P = \frac{100\ (A - B)}{T}$$

*where:*
*P = Percent recovery*
*A = Measured concentration of cyanide after spiking*
*B = Measured background concentration of cyanide*
*T = True concentration of the spike*

9.3.4 Compare the recovery to the QC acceptance criteria in Table 1. If recovery is outside of the acceptance criteria, and the recovery of the LCS in the ongoing precision and recovery test (Section 9.6) for the analytical batch is within the acceptance criteria, an interference is present. In this case, the result may not be reported for regulatory compliance purposes.

9.3.5 If the results of both the MS/MSD and the LCS test fail the acceptance criteria, the analytical system is judged to be out of control. In this case, the problem shall be identified and corrected, and the analytical batch reanalyzed.

9.3.6 Calculate the relative percent difference (RPD) between the two spiked sample results (Section 9.3, not between the two percent recoveries) using Equation 4.

**EQUATION 4**

$$RPD = \frac{|D_1 - D_2|}{(D_1 + D_2)/2} \times 100$$

*where:*
*RPD = Relative percent difference*
*$D_1$ = Concentration of cyanide in the spiked sample*
*$D_2$ = Concentration of cyanide in the spiked duplicate sample*

9.3.7 Compare the precision to the RPD criteria in Table 1. If the RPD is greater than the acceptance criteria, the analytical system is judged to be out of control, and the problem must be immediately identified and corrected, and the analytical batch reanalyzed.

9.3.8 As part of the QC program for the laboratory, method precision and accuracy for samples should be assessed and records should be maintained. After the analysis of five spiked samples in which the recovery passes the test in Section 9.3.4, compute the average percent recovery ($P_s$) and the standard deviation of the percent recovery ($s_p$). Express the accuracy assessment as a percent recovery

interval from $P_a - 2s_p$ to $P_a + 2s_p$. For example, if $P_a = 90\%$ and $s_p = 10\%$ for five analyses, the accuracy interval is expressed as 70 – 110%. Update the accuracy assessment on a regular basis (e.g., after each five to ten new accuracy measurements).

**9.4** Laboratory blanks—Laboratory reagent water blanks are analyzed to demonstrate freedom from contamination.

9.4.1 Analyze a reagent water blank initially (i.e., with the tests in Section 9.2) and with each analytical batch. The blank must be subjected to the same procedural steps as a sample.

9.4.2 If cyanide is detected in the blank at a concentration greater than the ML, analysis of samples is halted until the source of contamination is eliminated and a blank shows no evidence of contamination.

**9.5** Calibration verification—Verify calibration of the analytical equipment before and after each analytical batch of 14 or fewer measurements. (The 14 measurements will normally be 10 samples, 1 reagent blank, 1 LCS, 1 MS, and 1 MSD). Verification is accomplished by analyzing the mid-range calibration standard and verifying that it is within the QC acceptance criteria for recovery in Table 1. (The concentration of the calibration verification depends on the calibration range being used.) Failure to verify calibration within the acceptance criteria requires recalibration of the analysis system.

**9.6** Laboratory control sample (LCS)—To demonstrate that the analytical system is in control, and acceptable precision and accuracy is being maintained with each analytical batch, the laboratory shall perform the following operations.

9.6.1 Analyze a LCS (Section 7.12.2) with each analytical batch according to the procedure in Section 10.

9.6.2 If the results for the LCS are within the acceptance criteria specified in Table 1, analysis of the batch may continue. If, however, the concentration is not within this range, the analytical process is not in control. In this event, correct the problem, repeat the LCS test, and reanalyze the batch.

9.6.3 The laboratory should add results that pass the specification in Section 9.6.2 to IPR and previous LCS data and update QC charts to form a graphic representation of continued laboratory performance. The laboratory should also develop a statement of laboratory data quality for cyanide by calculating the average percent recovery (R) and the standard deviation of the percent recovery ($s_r$). Express the accuracy as a recovery interval from $R - 2s_r$ to $R + 2s_r$. For example, if $R = 95\%$ and $s_r = 5\%$, the accuracy is 85% to 105%.

**9.7** Reference Sample—To demonstrate that the analytical system is in control, the laboratory should periodically test an external reference sample, such as a Standard Reference Material (SRM) if an SRM is available from the National Institutes of Standards and

Technology (NIST). The reference sample should be analyzed quarterly, at a minimum. Corrective action should be taken if the measured concentration significantly differs from the stated concentration.

## 10.0 Calibration and Standardization

This section describes the procedure to calibrate and standardize the FIA system prior to cyanide determination.

**10.1** Instrument setup

10.1.1 Set up the FIA system and establish initial operating conditions necessary for determination of cyanide. If the FIA system is computerized, establish a method for multi-point calibration and for determining the cyanide concentration in each sample.

10.1.2 Verify that the reagents are flowing smoothly through the FIA system and that the flow cell is purged of air bubbles.

**10.2** Instrument Stabilization

10.2.1 Load a 10 mg/L KCN standard (Section 7.8.3) into the sampling valve and inject into the FIA system.

10.2.2 Continue to inject 10 mg/L KCN standards until 3 successive peak height or area results are within 2% RSD, indicating that the electrode system is stabilized.

10.2.3 Following stabilization, inject the highest concentration calibration standard until 3 successive peak height or area results are within 2% RSD indicating stabilization at the top of the calibration range.

**10.3** External standard calibration

10.3.1 Inject each of a minimum of3 calibration standards. One of the standards should be at the minimum level (ML) unless measurements are to be made at higher levels. The other concentrations should correspond to the expected range of concentrations found in samples or should define the working range of the FIA system.

10.3.2 Using injections of a constant volume, analyze each calibration standard according to Section 11 and record peak height or area responses against the concentration. The results can be used to prepare a calibration curve. Alternatively, if the ratio of response to amount injected (calibration factor) is constant over the working range (<10% RSD), linearity through the origin can be assumed and the averaged calibration factor (area/concentration) can be used in place of a calibration curve.

## 11.0 Procedure

This section describes the procedure for determination of available cyanide using the FIA system.

**11.1** Analysis of standards, samples, and blanks

11.1.1 Ligand-exchange reagent treatment of standards, samples, and blanks.

11.1.2 To 100-mL of cyanide-containing sample (or standard or blank) at pH of approximately 12, add 100 µL of ligand-exchange reagent Part B (Section 7.11.5), 50µL of ligand-exchange reagent Part A (Section 7.11.4), and mix thoroughly. Load the sample, standard, or blank into the sample loop.

NOTE: The ligand-exchange reagents, when added to 100 mL of sample at the specified volume, will liberate cyanide from metal complexes of intermediate stability up to 5 mg/L cyanide ion. If higher concentrations are anticipated, add additional ligand-exchange reagent, as appropriate, or dilute the sample. The ligand-exchange reagents have an approximate lifetime of 6 months after opening. The reagents should be stored in a refrigerator at 4□C. Samples should be analyzed within 2 hours of adding the ligand-exchange reagents. The reagents should always be used in solutions similar to cyanide samples (pH 12 adjusted). It is recommended that the ligands be checked monthly. This can be done by preparing pH 12 adjusted 2 mg/l solutions of mercury(II) cyanide (Section 7.4) and of potassium nickel(II) cyanide (Section 7.5). Add ligand-exchange reagent B to the mercury(II) standard and ligand-exchange reagent A to the potassium nickel(II) cyanide standard and confirm cyanide recovery.

11.1.3 Inject the sample and begin data collection. When data collection is complete, analyze the next sample, standard or blank in the batch until analyses of all samples in the batch are completed.

## 12.0 Data Analysis and Calculations

**12.1** Calculate the concentration of material in the sample, standard or blank from the peak height or area using the calibration curve or calibration factor determined in Section 10.3.

**12.2** Reporting

12.2.1 Samples—Report results to three significant figures for cyanide concentrations found above the ML (Section 1.4) in all samples. Report results below the ML as <2 □g/L, or as required by the permitting authority or permit.

12.2.2 Blanks—Report results to three significant figures for cyanide concentrations found above the MDL (Section 1.4). Do not report results below the MDL unless required by the permitting authority or in the permit.

## 13.0 Method Performance

13.1 Method detection limit (MDL)—MDLs from nine laboratories were pooled to develop the MDL of 0.5 □g/L given in Section 1.4 (Reference 15.12).

13.2 Data obtained from single laboratory testing of the method are summarized in Table 2 and show recoveries and reproducibility for "free" forms of cyanide, including the recovery and reproducibility of silver, nickel, and mercury cyanide species. Determination of these species tends to be problematic with other methods for the determination of available cyanide. As it is the case with other methods used for available cyanide, iron cyanide species were not recovered and recoveries for gold and cobalt species were zero or very low. The complete results from the single laboratory study are available in the Report of the Draft OIA Method 1677 Single Laboratory Validation Study (Reference 15.11).

13.3 Listed in Table 1 are the QC acceptance criteria developed from an interlaboratory validation study of this method. This study was conducted following procedures specified in the Guide to Method Flexibility and Approval of EPA Water Methods (Reference 15.10). In this study, a total of nine laboratories performed analyses for various water matrices. Table 3 shows a summary of the interlaboratory results which include the accuracy and precision data as % recoveries and relative standard deviations. In addition to spikes of easily dissociable cyanides, some samples contained known amounts of cyanides that are not recoverable (e.g., Pt and Fe complexes) and thiocyanate was spiked to one sample to investigate the potential for interference. The complete study results are available in the Report of the Draft OIA Method 1677 Interlaboratory Validation Study (Reference 15.12).

## 14.0 Pollution Prevention and Waste Management

14.1 The laboratory is responsible for complying with all Federal, State, and local regulations governing waste management, particularly hazardous waste identification rules and land disposal restrictions, and for protecting the air, water, and land by minimizing and controlling all releases from fume hoods and bench operations. Compliance with all sewage discharge permits and regulations is also required. An overview of requirements can be found in *Environmental Management Guide for Small Laboratories* (EPA 233-B-98-001).

14.2 Samples containing cyanide, certain metals, and acids at a pH of less than 2 are hazardous and must be treated before being poured down a drain or must be handled as hazardous waste.

14.3 For further information on waste management, consult *Less is Better: Laboratory Chemical Management for Waste Reduction*, Reference 15.8.

## 15.0 References


**15.1** Environmental Monitoring Systems Laboratory. EPA Method 335.1. In: *Methods for the Chemical Analysis of Water and Wastes* (EPA/600/4-79-020). Environmental Protection Agency, Cincinnati, Ohio. Revised March 1983.

**15.2** American Public Health Association, American Waterworks Association, Water Pollution Control Board. Methods Section 4500-CN in *Standard Methods for the Examination of Water and Wastewater*, 19th Edition. American Public Health Association, Washington, DC, 1995.

**15.3** Ingersol, D.; Harris, W.R.; Bomberger, D.C.; Coulson, D.M. *Development and Evaluation Procedures for the Analysis of Simple Cyanides, Total Cyanides, and Thiocyanate in Water and Waste Water* (EPA-600/4-83-054), 1983.

**15.4** *Code of Federal Regulations*, Title 40, Part 136, Appendix B. U.S. Government Printing Office, Washington, D.C., 1994.

**15.5** ALPKEM CNSolution Model 3000 Manual. Available from ALPKEM / OI Analytical, Box 9010, College Station, TX 77842-9010.

**15.6** Milosavljevic, E.B.; Solujic, L.; Hendrix, J.L. *Environmental Science and Technology*, Vol. 29, No. 2, 1995, pp 426-430. Rapid Distillationless "Free Cyanide" Determination by a Flow Injection Ligand Exchange Method.

**15.7** Wilmont, J.C.; Solujic, L.; Milosavljevic, E. B.; Hendrix, J.L.; Reader, W.S. *Analyst*, June 1996, Vol. 121, pp 799-801. Formation of Thiocyanate During Removal of Sulfide as Lead Sulfide Prior to Cyanide Determination.

**15.8** *Less is Better: Laboratory Chemical Management for Waste Reduction.* Available from the American Chemical Society, Department of Government Regulations and Science Policy, 1155 16th Street, NW, Washington, DC 20036.

**15.9** *Handbook for Analytical Quality Control in Water and Wastewater Laboratories* (EPA-600/4-79-019), USEPA, NERL, Cincinnati, Ohio 45268 (March 1979).

**15.10** *Guide to Method Flexibility and Approval of EPA Water Methods*, December, 1996, (EPA-821-D-96-004). Available from the National Technical Information Service (PB97-117766).

**15.11** *Report of the Draft OIA Method 1677 Single Laboratory Validation Study*, November 1996. Available from ALPKEM / OI Analytical, Box 9010, College Station, TX 77842-9010.

**15.12** *Report of the Draft OIA Method 1677 Interlaboratory Validation Study,* March 1997. Available from ALPKEM / OI Analytical, Box 9010, College Station, TX 77842-9010.

## 16.0 Tables

**Table 1. Quality Control Acceptance Criteria**

| Criterion | Required Recovery Range (%) | Precision |
|---|---|---|
| Initial Precision and Recovery | 92 - 122 | <5.1% RSD |
| Ongoing Precision and Recovery (Laboratory Control Sample) | 82 - 132 | N/A |
| Calibration Verification | 86 - 118 | N/A |
| Matrix Spike/Matrix Spike Duplicate | 82 - 130 | <11% RPD |

**Table 2. Species-Dependent Cyanide Recoveries Using Draft Method 1677[1]**

| Species | 0.20 µg/mL $CN^-$ | 2.00 µg/mL $CN^-$ |
|---|---|---|
| $[Zn(CN)_4]^{2-}$ | 97.4 (0.7) | 98.5 (0.7) |
| $[Cd(CN)_4]^{2-}$ | 100.0 (0.8) | 100.0 (0.2) |
| $[Cu(CN)_4]^{2-}$ | 100.9 (1.3) | 99.0 (0.6) |
| $[Ag(CN)_4]^{3-}$ | 101.8 (0.9) | 100.0 (0.5) |
| $[Ni(CN)_4]^{2-}$ | 104.3 (0.2) | 103.0 (0.5) |
| $[Hg(CN)_4]^{2-}$ | 100.0 (0.6) | 99.0 (0.3) |
| $Hg(CN)_2$ | 103.4 (0.4) | 98.0 (0.3) |
| $[Fe(CN)_4]^{4-}$ | 0.0 | 0.0 |
| $[Fe(CN)_6]^{3-}$ | 0.0 | 0.0 |
| $[Au(CN)_2]^-$ | 1.3[2] (0.0) | 0.0 |
| $[Co(CN)_6]^{3-}$ | 2.9[2] (0.0) | 2.0[2] (0.0) |

[1] Values are % recoveries; numbers in parentheses are percent relative standard deviations.
[2] Commercial product contains some free cyanide.

**Table 3. Cyanide Recoveries From Various Aqueous Matrices**

| Sample | Sample CN Concentration | Added CN[1] Concentration | Average % Recovery | % RSD |
|---|---|---|---|---|
| Reagent water w/0.01M NaOH | 0 µg/L | 100 µg/L as KCN | 108 | 4.0 |
| POTW secondary effluent | 3.0 µg/L | 100 µg/L as KCN; 2 mg/L as $[Pt(CN)_6]^{4-}$ | 102 | 7.0 |
| Petroleum Refinery Secondary Effluent | 9.9 µg/L | 2 mg/L as KCN; 5 mg/L as $[Fe(CN)_6]^{4-}$ | 87 | 21 |
| Coke Plant Secondary Effluent | 14.0 µg/L | 50 µg/L as KCN | 95 | 4.0 |
| Rolling Mill Direct Filter Effluent | 4.0 µg/L | none | 80 | 41 |
| Metals Finishing Indirect Primary Effluent | 1.0 µg/L | 200 µg/L as KCN; 2 mg/L as KSCN | 92 | 16 |
| Reagent water w/0.01M NaOH | 0 µg/L | 200 µg/L as KCN | 101 | 8.0 |
| Reagent water w/0.01M NaOH | 0 µg/L | 10 mg/L as KCN; 10 mg/L as $[Pt(CN)_6]^{4-}$ | 103 | 2.0 |
| Mining Tailing Pond Effluent | 842 µg/L | 4 mg/L as KCN | 98 | 3.0 |

[1] Cyano-complexes of Pt and Fe were added to the POTW and petroleum refinery effluents, respectively; and thiocyanate was added to the metals finishing effluent to demonstrate that the FI/LE system does not determine these forms of cyanide.

## 17.0 Glossary of Definitions and Purposes

The definitions and purposes are specific to this method but have been conformed to common usage as much as possible.

**17.1** Units of weights and measures and their abbreviations

17.1.1 Symbols

| | |
|---|---|
| °C | degrees Celsius |
| % | percent |
| ± | plus or minus |
| ≥ | greater than or equal to |

17.1.2 Alphabetical characters

| | |
|---|---|
| g | gram |
| L | liter |
| mg | milligram |
| mg/L | milligram per liter |
| µg | microgram |

| | |
|---|---|
| □g/L | microgram per liter |
| mL | milliliter |
| ppm | parts per million |
| ppb | parts per billion |
| M | molar solution |

**17.2** Definitions

17.2.1 Available cyanide consists of cyanide ion ($CN^-$), hydrogen cyanide in water ($HCN_{aq}$) and the cyano-complexes of zinc, copper, cadmium, mercury, nickel, and silver.

17.2.2 Calibration blank—A 100 mL volume of reagent water treated with the ligand-exchange reagents and analyzed using the FIA procedure.

17.2.3 Calibration standard (CAL)—A solution prepared from the dilution of stock standard solutions. A 100 mL aliquot of each of the CALs are subjected to the analysis procedure. The resulting observations are used to calibrate the instrument response with respect to the analyte concentration.

17.2.4 Discharge—Specific discharge (also known as "matrix type") means a sample medium with common characteristics across a given industrial category or industrial subcategory. Examples include: C-stage effluents from chlorine bleach mills in the Pulp, Paper, and Paperboard industrial category; effluent from the continuous casting subcategory of the Iron and Steel industrial category; publicly owned treatment work (POTW) sludge; and in-process streams in the Atlantic and Gulf Coast Hand-shucked Oyster Processing subcategory.

Specific discharge also means a discharge with characteristics different from other discharges. Therefore, if there are multiple discharges from a facility all with the same characteristics, these are the same discharge for the purpose of demonstrating equivalency of a method modification. In this context, "characteristics" means that results of the matrix spike and matrix spike duplicate (MS/MSD) tests with the unmodified method meet the QC acceptance criteria for recovery and relative percent difference (RPD).

17.2.5 Initial precision and recovery (IPR)—Four aliquots of the LRB spiked with the analytes of interest and used to establish the ability to generate acceptable precision and accuracy. An IPR is performed the first time this method is used and any time the method or instrumentation is modified.

17.2.6 Laboratory control sample (LCS)—An aliquot of LRB to which a quantity of mercury (II) cyanide stock solution is added in the laboratory. The LCS is analyzed like a sample. Its purpose is to determine whether the methodology is in control and whether the laboratory is capable of making accurate and precise measurements.

17.2.7 Laboratory reagent blank (LRB)—An aliquot of reagent water that is treated like a sample including exposure to all glassware, equipment, and reagents that are used with other samples. The LRB is used to determine if the method analyte or other interferences are present in the laboratory environment, reagents, or apparatus.

17.2.8 Matrix spike/matrix spike duplicate (MS/MSD)—An aliquot of an environmental sample to which a quantity of the method analyte is added in the laboratory. MS/MSDs are analyzed like a sample. Their purpose is to determine whether the sample matrix contributes bias to the analytical results. The background concentration of the analyte in the sample matrix must be determined in a separate aliquot and the measured values in the MS/MSD corrected for the background concentration.

17.2.9 Minimum level (ML)—The level at which the entire analytical system shall give a recognizable signal and acceptable calibration point, taking into account method specific sample and injection volumes.

17.2.10 Ongoing precision and recovery (OPR)—See Laboratory control sample

# INTERNATIONAL CYANIDE MANAGEMENT INSTITUTE

***www.cyanidecode.org***

# *Cyanide Facts: Cyanide Sampling and Analytical Methods for Gold Mining*

***May 2002***

# SAMPLING AND ANALYTICAL METHODS

**This document provides general background information on the sampling and analysis of the various forms of cyanide in aqueous samples at gold mining operations. It is not intended to be an all-inclusive reference for cyanide sampling or analysis.**

## *General Information*

This document places emphasis on proven and reliable methods used globally for the monitoring of process solutions and environmental compliance at gold mining operations. Other analytical procedures do exist for the measurement of cyanide that are capable of generating acceptable results; these alternative procedures can be substituted for the traditional methods included in this document.

The mining industry, regulators and most service laboratories generally use the following guidelines for cyanide species.

*Free Cyanide ($CN_F$)*
Only hydrogen cyanide and the cyanide ion in solution can be classed as "free" cyanide. The proportions of HCN and $CN^-$ in solution are according to their equilibrium equation; this is influenced by the solution pH.

- Methods used to detect free cyanide should not alter the stability of weaker cyanide complexes, as they may otherwise be included in the free cyanide result.
- Methods used to detect free cyanide should be clear of interferences due to the presence of high concentrations of more stable cyanide complexes or other cyanide forms. If not, the interference must be quantified and allowed for in the result.

*Weak Acid Dissociable Cyanide ($CN_{WAD}$)*
Unlike the definition of "free cyanide" which identifies the specific cyanide species being measured, WAD cyanide refers to those cyanide species measured by specific analytical techniques. WAD cyanide includes those cyanide species liberated at moderate pH of 4.5 such as HCN(aq) and $CN^-$, the majority of Cu, Cd, Ni, Zn, Ag complexes and others with similar low dissociation constants.

- Methods used to measure WAD should be free from interferences due to the presence of high concentrations of more stable cyanide complexes or other cyanide forms. If not, the interference must be quantified and allowed for in the result.

*Total Cyanide ($CN_T$)*
This measurement of cyanide includes all free cyanide, all dissociable cyanide complexes and all strong metal cyanide including ferro-cyanide $Fe(CN)_6^{-4}$, ferri-cyanide $Fe(CN)_6^{-3}$ and portions of hexacyano cobaltate $Co(CN)_6^{-3}$ and those of gold and platinum. Only the related or derived

compounds cyanate ($CNO^-$) and thiocyanate ($SCN^-$) are excluded from the definition of total cyanide.

- Methods used to determine total cyanide must be shown to be capable of quantitatively determining all stable complexes of cyanide, including the cobalt cyanide complex. If methods determine other analytes as well (e.g. include $SCN^-$), those analytes need to be determined separately and allowed for in the total result.

## Sampling

The importance of sampling and sample handling, prior to delivery to the laboratory, is summarized by the following statement.

***The results of analysis can be no better than the sample on which it was performed.***

While the taking of either aqueous or solid samples may appear easy, the collection of correct samples, both in terms of location and with respect to the analytes to be monitored, is fraught with difficulties. Any sampling must have as its aim the collection of a representative portion of the substance to be analysed. When this portion is presented for analysis, the parameters to be determined must be present in the same concentration and chemical or biological form as found in the original environment from which the portion was removed.

Samples representative of a site, or of a portion of a site, provide information that is often extrapolated to include the whole area under investigation. This is true whether the entity being sampled is a contaminated section of land, surface water, an industrial outfall, or a drum containing waste material. Therefore, samples must be representative of the specific entity being sampled, but not necessarily representative of the entire area of which it is part.

The overall objectives of a sampling program must be considered in the development of the sampling plan. Sampling may be performed for one of several purposes:

- Maximum, minimum and average values for a near steady state stream with the aim of monitoring compliance versus set specifications (process control, environmental criteria). Such data can illustrate the likelihood and magnitude of occurring non-compliance provided enough data points have been analyzed from samples. Process, residue, and effluent stream analysis could have this type of objective. Even aquifer sampling (bore-holes) would fit this description. Often the relative mass-flows have to be known for proper data integration.

- Maximum, minimum and average values derived from the analysis of "batch streams" such as treated backfill portions or detoxified waste batches usually require a minimum of one data point per batch to insure a representative sample. The major objective remains one of compliance and/or verification of effective management procedures for the batch streams involved.

1. Non-steady state events following a cyclic pattern are often influenced by several parameters, and these parameters in themselves may also be susceptible to cyclic changes. In other words, these confounding factors create a complex situation that requires careful analysis and planning to obtain a representative sample.

2. The cycle periods have to be known along with many other factors of influence in the "system". A typical example would be the sampling of tailings surface liquid (or solids), decant liquids or return dam bulk liquid. All of these "sample populations" undergo massive cyclic fluctuations through influence of chemical and physical changes from process management tailings surface events and seasonal climatic conditions.

3. It will be apparent that the cycle periods are not in any way synchronized and hence seemingly random data might be obtained. An objective for such sampling campaigns could be the establishment of a predictions database based on the understanding of the fundamental principles. This means that a complete, non-biased sampling effort across the longest cycle needs to be performed at least once. Alternatively, once such principles are known, selected samples taken at certain times could be analyzed for monitoring purposes.

While many sampling strategies may be developed, the main, basic approaches to sampling are depicted in the following table.

TABLE OF BASIC SAMPLING APPROACHES

| Approach | Number of Samples | Potential Relative Bias | Basis of site selection |
|---|---|---|---|
| Judgmental | Small | Very Large | Prior history, visual assessment, and/or technical judgment |
| Systematic | Large | Small | Consistent grid or pattern |
| Random | Very Large | Very Small | Simple random selection |

*Sample Preservation*

Once samples are removed from their natural environment, chemical or biological reactions can occur to change the composition of the sample, so it is best to analyze the sample as quickly as possible. Preservation of the sample will keep the parameter of interest in the same form as it was prior to the removal from its surroundings. No single preservation technique will preserve all parameters, so each parameter of interest must be considered and preserved specifically. While most soil samples require exclusion of light, air and warmth to preserve the integrity of the sample, aqueous samples require a more concerted effort.

Samples of aqueous cyanide species are potentially very reactive and toxic, so safety precautions such as gloves and protective clothing must be rigorously observed. Due to their reactivity,

sample solutions must be tested on site prior to cyanide analysis to preserve them against the main interfering substances, oxidizing matter and sulfides.

The presence of *oxidizing matter* is detected by potassium iodide/starch test papers. Place a drop of the sample on a moist test paper strip. A blue coloration of the test paper indicates the presence of sufficient oxidizing matter to potentially react with the cyanide present during transport. Oxidizing agents must be reduced prior to sending the sample to the laboratory.

*Procedure for Removal of Oxidizing Matter*

1. Remove and retain any solids by decantation or pressure filtration.
2. Add sodium arsenite and mix. About 0.1g/L is usually sufficient.
3. Retest, and if test strip is discolored, retreat as per Step 2.
4. Return solids to sample solution and raise pH to 12 by adding 1-2 pellets of solid sodium hydroxide.

The presence of *sulfides* is indicated by lead acetate paper turning black. Place a drop of the sample on the test paper previously moistened with a drop of acetic acid and if the paper darkens, sulfides are indicated. Sulfides are removed by reaction with lead carbonate.

*Procedure for Removal of Sulfides*

1. Remove any solids by decantation or pressure filtration and hold.
2. Add lead carbonate (about 0.1 g/L) and mix.
3. Remove formed lead sulfide by pressure filtration and discard PbS precipitate.
4. Retest sample solution. If test strip is discolored, retreat as in Steps 2 and 3.
5. Return solids to sample and raise pH to 12 with solid sodium hydroxide.

Samples should be stored in a dark place at about 4?C, such as in an esky (cool box) during transport and then refrigerated at the laboratory. Soil samples for cyanide analysis (in cores or jars) must be wrapped in dark plastic and kept cool at 4?C without further treatment.

*Transport and Storage*

Once correctly preserved and packaged, samples should be sealed and each container (bottle or jar) individually placed in a sealed plastic bag. All samples should then be packed in an esky (cool box with some ice bricks) to keep them cool during transport. Shipment to the analytical laboratory should occur as soon as practical by overnight truck or airfreight courier. It is essential that the sampling protocol be recorded and a chain of custody included with the shipment to allow tracking prior to and during storage and analysis.

## Analytical Procedures

A quality laboratory with necessary technician experience can achieve good results with many different methods. The modified automated SFAA method using the McLeod microstill may be the method of choice for the most advanced laboratories, however global uniformity, availability and cost factors indicate that the analytical methods listed as "Primary" in the following table as are suggested.

TABLE OF PRIMARY AND ALTERNATE ANALYTICAL METHODS

| Analyte | Method | Comments |
|---|---|---|
| Free Cyanide | $AgNO_3$ titration | ? Preferred method<br>? For process solutions primarily above 1 mg/l<br>? LQL[1]: 1 mg/l<br>? HCN(aq), $CN^-$, $Zn(CN)_x$, parts of $Cu(CN)_4$ |
| | $AgNO_3$ titration with potentiometric endpoint determination | ? Alternate method<br>? Precise method of endpoint determination<br>? Measures same species as primary method |
| | Micro diffusion of HCN from static sample into NaOH [ASTM D4282] | ? Alternate Method<br>? Close to "free cyanide" |
| | Ion Selective Electrode | ? Alternate Method<br>? Close to "free cyanide" |
| | Direct colorimetry | ? Alternate Method<br>? HCN(aq), $CN^-$, $Zn(CN)_x$, parts of $Cu(CN)_4$ + ? |
| | Amperometric determination | ? Alternate Method<br>? Measures same species as primary method |
| WAD Cyanide | Manual distillation pH 4.5 + potentiometric or colorimetric finish [ISO/DIS 6703/2, DIN 38405 Part 13.2: 1981-02] | ? Preferred method<br>? LQL[1]: 0.05 mg/l<br>? HCN(aq), $CN^-$, Zn/Cd/Cu/Ni/$Ag(CN)_x$<br>? Better results than ASTM method in presence of high copper concentration |
| | Amenable to chlorination (CN Total - non-chlorinatable part) [ASTM D2036-B, US-EPA 9010] | ? Alternate Method<br>? Measures same species as primary method |
| | SFIA in-line micro-distillation pH 4.5 + colorimetric finish [ASTM D4374] | ? Alternate Method<br>? Measures same species as primary method |
| | FIA In-line ligand exchange + amperometric finish [US-EPA OIA-1677] | ? Alternate Method<br>? Measures same species as primary method |
| | Picric Acid, Colorimetric determination | ? Alternate Method<br>? Measures same species as primary method |
| Total Cyanide | Manual batch distillation + titration/potentiometric or colorimetric finish [ISO/DIS 6703/1, DIN 38405 Part 13.1: 1981-02] | ? Preferred method<br>? LQL[2]: 0.10 mg/l<br>? HCN(aq), $CN^-$, Zn/Cd/Cu/Ni/Ag/$Fe(CN)_x$, parts of Au/Co/Pt/$Pd(CN)_x$ |
| | SFIA, in-line UV irradiation, micro-distillation + colorimetric finish [ASTM D4374] | ? Alternate Method<br>? Measures same species as primary method |

[1] LQL, Lower Quantitation Level, is defined as about 3 times Detection Level or 10 times the Standard Deviation at near blank level.

For these primary methods, the table also provides a Lower Quantification Level representing the concentration that all laboratories should be able to reliably determine. Laboratories with a proven record of working with alternative methods, such as those based on automated standard methods, should be encouraged to continue with those methods but should establish cross-references for each site by applying the suggested methods.

To insure that the mine receives quality analytical service, the chosen laboratory must:

- Have experienced staff perform the analyses.
- Be certified by the respective national accreditation body for all analytical methods.
- Have sound quality control procedures in place.
- Be able to prove the quality of their data by participation in proficiency tests.

Trained analysts and supervisory staff with an expertise in cyanide chemistry methods are critical to consistent and reliable results, as they are aware of the potential interferences inherent in each method.

The preferred methods for analytical determination of the different types of cyanide are briefly summarized below:

*Free Cyanide*

The preferred method for the analytical determination of free cyanide is silver nitrate titration. Silver ions are added to the solution to complex the free cyanide ions. When all free cyanide is consumed as silver cyanide complex, the excess silver ions indicate the endpoint of the titration. The analytical equipment used for the titration is rather simple. To accurately determine the cyanide concentration, a normalized silver nitrate solution is dosed with a manual or automatic burette, which should be capable of measuring volumes to an accuracy of better than 0.005 ml.

Several techniques can be used for the endpoint determination. The easiest possibility is to use an indicator such as potassium iodide or rhodanine that changes color upon appearance of free silver ions. It is important that the first color change is used as endpoint indication because the silver ions tend to liberate cyanide ions from other complexes, which leads to a disappearance of the color. The potentiometric endpoint detection is a more accurate way to determine the endpoint as a more easily identified peak signal is produced.

*Weak Acid Dissociable Cyanide*

The preferred analytical method to determine weak acid dissociable cyanide is the distillation method according to ASTM or ISO/DIS. These methods create chemical conditions which allow the $CN_{WAD}$ to be liberated as dissolved hydrogen cyanide gas which is then carried in an air stream to a caustic soda absorption where the $CN_{WAD}$ appears as $CN_F$. As the hydrogen cyanide is adsorbed in a much smaller volume than the original sample solution, the $CN_F$ concentration to be analyzed is typically at least 10 times higher than the original $CN_{WAD}$ concentration in the sample solution. The $CN_F$ concentration in the distillation product sample is then determined using silver nitrate titration as described above.

The methods according to ASTM and ISO/DIS are similar. However, the results from ISO/DIS method are more accurate than those from the ASTM method for samples containing a high concentration of copper cyanide.

*Total Cyanide*
The preferred analytical method to determine total cyanide is the distillation method according to ASTM or ISO/DIS. The applied method is in principle very similar to the distillation method described for weak acid dissociable cyanide. However, strongly acidic conditions and elevated temperatures are required to liberate the cyanide ion from the stable cyanide complexes such as ferri- and ferrocyanides.

## References

Complete descriptions of these analytical procedures can be found in the following references:

DIN 38405-13: 1981-02, German Standard Methods for the Analysis of Water, Waste Water and Sludge - Anions (Group D) - Determination of Cyanides (D13), German Standards (DIN Normen, Beuth Verlag GmbH, Burggrafenstr. 6, 10787 Berlin/Germany).

South African Water Quality Guidelines, Volumes 1-7, Department of Water Affairs and Forestry, 1996.

Standard Methods For The Examination Of Waters and Wastewater, APHA-AWWA-WEF, 20th Edition, Washington DC, 1998.

Water Quality - Determination of Cyanide - Part 1: Determination of Total Cyanide ISO/DIS 6703/1, International Organization of Standardization.

Water Quality - Determination of Cyanide - Part 2: Determination of Easy Liberated Cyanide ISO/DIS 6703/2, International Organization of Standardization.

USEPA "Methods and Guidance for Analysis of Water", United States Environmental Protection Agency (USEPA), June 1999.