Subject: Demonstration Report of Outside Contamination of Toluene Detected in WIPP Detection Monitoring Well WQSP-5, Permit Number NM4890139088-TSDF

Reference: DOE Memorandum CBFO:OESH:GTB:ANC :13-0750 :UFC 5400.00 from Mr. Jose R. Franco and Mr. M. F. Sharif to Mr. J. E. Kieling, dated July 2, 2013, subject: Notification of Toluene Detected in WIPP Detection Monitoring Well WQSP-5, Permit Number NM4890139088-TSDF

Dear Mr. Kieling:

Enclosed to this letter is a demonstration prepared by the Permittees that shows that the toluene detected above background, reported in the referenced letter, in Detection Monitoring Well (DMW) WQSP-5 is not from the regulated unit. Because the Permittees believed the source of toluene was not associated with the regulated unit Permit Condition 5, Section 5.10.4.2 was implemented which requires submittal to the NMED of a demonstration of outside contamination report within 90 calendar days of determining statistically significant evidence of contamination. The subject report is enclosed.

We certify under penalty of law that this document and all attachments were prepared under our direction or supervision according to a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on our inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of our knowledge and belief, true, accurate and complete. We are aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

Please feel free to contact Mr. George T. Basabilvazo at (575) 234-7488, if you have any questions regarding this notification.

Sincerely,

Jose R. Franco, Manager
Carlsbad Field Office

M. F. Sharif, Project Manager
Nuclear Waste Partnership LLC

Enclosure

cc:
T. Blaine, NMED * ED
T. Kliphuis, NMED ED
R. Maestas, NMED ED
CBFO M&RC
*ED denotes electronic distribution
DETECTION MONITORING WELL WQSP-5
DEMONSTRATION OF OUTSIDE CONTAMINATION REPORT

SEPTEMBER 2013
1.0 INTRODUCTION

The purpose of this report is to demonstrate that contamination discovered in WIPP Detection Monitoring Well (DMW) WQSP-5 is caused by a source other than the regulated unit and therefore can be classified as "outside contamination" per 40 CFR §264.98(g)(6)(ii). This demonstration is being submitted as required by the Waste Isolation Pilot Plant (WIPP) Hazardous Waste Facility Permit ( Permit), Part 5, Section 5.10.4.2.

This DMW was sampled on May 21, 2013, as part of the annual Detection Monitoring Program (DMP) sampling Round 35. Results of DMP sampling were reviewed and statistical analysis completed on June 26, 2013. The concentration of toluene detected in the primary groundwater sample was 141 micrograms per liter (μg/L) and 82.1 μg/L in the duplicate sample. The laboratory reports for Round 35 will be included in the Annual Culebra Groundwater Report to be submitted by November 30, 2013. The Permit requires the Permittees to submit this demonstration if it is suspected that a source other than the regulated unit caused the contamination or that the detection is an artifact caused by an error in sampling, analysis, or statistical evaluation or natural variation of the groundwater.

Activities described herein are intended to demonstrate that the source of contamination is not from a regulated unit and can be classified as outside contamination in accordance with the Permit. This demonstration also presents, Appendix E, the Permittees conclusion that the contamination did not result from any error in sampling, analysis, or evaluation. The demonstration indicates the source of toluene in the WQSP-5 sample was introduced into the well during pump replacement prior to sampling. Tape was used to secure the power cable supplying the pump motor and the sample line to the pump discharge tubing. Literature documents that some tapes contain volatile organic compounds (VOCs) within their adhesives (NHDES, 2011; US Army, 2003). It is plausible that adhesives from the tape could leach into the groundwater formation under these conditions.

2.0 DEMONSTRATION

2.1 WQSP-5 PUMP DECONTAMINATION, WELL RESAMPLING AND RESULTS

During Round 35 sampling of WQSP-5 on April 29, 2013, the pump failed. On May 6, 2013, the pump assembly (tubing, power cable and discharge hose) was removed and disassembled. Failure of the pump housing seal was discovered which allowed water to enter the motor creating an electrical short. The pump was replaced and the assembly re-installed in the well. During installation, the power cable and sampling line were attached at every discharge tubing joint using tape instead of nylon zip ties.

Table 1 shows the historical toluene concentrations for WQSP-5. Prior to Round 35, toluene concentrations were consistently below the method reporting limit of 1.0 μg/L. Following installation of a new pump, toluene was detected in both the primary and duplicate samples.
TABLE 1. HISTORICAL COMPARISON OF TOLUENE CONCENTRATIONS IN WQSP-5 GROUNDWATER BEFORE AND AFTER TAPE APPLICATION

<table>
<thead>
<tr>
<th>Sample Description</th>
<th>Sample Date</th>
<th>Toluene, µg/L^a,b</th>
<th>Sample</th>
<th>Duplicate</th>
</tr>
</thead>
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<tr>
<td>Groundwater Round 1 – Round 31</td>
<td>1995 to 2010</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td>Groundwater Round 32</td>
<td>5/9/2011</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
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<td>Groundwater Round 33</td>
<td>9/19/2011</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
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<td>Groundwater Round 34</td>
<td>5/1/2012</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td>Groundwater Round 35, original sample^c</td>
<td>5/20/2013</td>
<td>141</td>
<td>82.1</td>
<td></td>
</tr>
</tbody>
</table>

^aToluene quantified by EPA Method 8260B; µg/L = ppb.
^bND = non detected; concentration below reporting detection limit (1.0 µg/L).
^cCollected after pump assembly reinstallation.

While the Permittees were testing the leachability of the tape, an action plan was put into place to decontaminate the pump by removing the pump and tubing from the well; removing the tape; washing the hoses, power cable, tubing and pump; and reinstalling the pump with nylon zip ties instead of tape.

2.1.1 PUMP REMOVAL, CLEANING, AND REINSTALLATION

On July 9, 2013 the entire assembly was removed from the well, disassembled, and every component (tubing, discharge hose, power cable, and pump) was cleaned using a strong Liqui-Nox™ and distilled water solution to remove residual adhesive and toluene. The components were rinsed with distilled water prior to installation. During installation the power cable and discharge hose were connected to the discharge tubing at each connection using nylon zip ties.

2.1.2 WELL PURGING #1

The pump was started again on July 11, 2013 and allowed to run continuously through July 13, 2013. This step was performed to evacuate as much of the contaminated water in the well as possible and to draw in fresh formation water. Based on meter readings and field calculations 932 gallons were removed, or an equivalent of over 3.8 well borehole volumes (WBV).

2.1.3 GROUNDWATER RESAMPLING #1

Re-sampling for toluene began on July 15, 2013 when pumping restarted and field parameters were measured per procedure WP 02-EM1010. Once field parameters stabilized, the well was purged overnight and final samples obtained on July 16, 2013 after purging 719 gallons (3.0 WBV) of groundwater. Samples were prepared, packaged, and shipped to Hall Environmental Analytical Laboratory (HEAL), Albuquerque, NM on July 16, 2013 per procedure. Samples were received at HEAL on July 17, 2013.

2.1.4 RESULTS OF GROUNDWATER RESAMPLING #1
Table 2 shows the comparison in toluene concentrations between the original sample and resample #1 for WQSP-5. A dramatic reduction in toluene was observed following pipe cleaning and well remediation via purging (Appendix A).

The concentrations of toluene were 7.57 µg/L in the primary resample and 8.13 µg/L in the duplicate resample. A decrease in the concentration of toluene due to purging demonstrates that the source of the contamination has been eliminated and therefore it can be concluded that the source is not the regulated units. In addition, purging appears to be an effective method to restore the groundwater to its background value. At this point, it was determined to continue well purging to further reduce the residual concentration in the well with the goal of re-establishing the concentration of toluene to < 1.0 µg/L which is the background value in Permit Part 5, Table 5.6.

### TABLE 2. COMPARISON OF TOLUENE CONCENTRATIONS IN WQSP-5 GROUNDWATER BEFORE AND AFTER PIPE CLEANING

<table>
<thead>
<tr>
<th>Sample Description</th>
<th>Sample Date</th>
<th>Toluene, µg/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groundwater Round 35, original sample&lt;sup&gt;b&lt;/sup&gt;</td>
<td>5/20/2013</td>
<td>141</td>
</tr>
<tr>
<td>Groundwater Round 35, resample #1&lt;sup&gt;c&lt;/sup&gt;</td>
<td>7/16/2013</td>
<td>7.57</td>
</tr>
</tbody>
</table>

<sup>a</sup>Toluene quantified by EPA Method 8260B; µg/L = ppb.
<sup>b</sup>Collected after pump assembly reinstallation following initial failure.
<sup>c</sup>Collected after pump assembly cleaning and well remediation (purging).

2.2 CONTINUATION OF WELL PURGING

Since the initial detection of toluene in the groundwater, WQSP-5 had been purged for 54.7 hours and approximately 1,800 gallons of groundwater were evacuated from the well. Based on this information and the results of the first resampling, the Permittees conducted additional purging of contaminated groundwater to remediate the well.

2.2.1 WELL PUMPING #2

The pump in WQSP-5 was restarted on July 29, 2013 and ran continuously through August 1, 2013. The pump was shut down over the weekend and pumping resumed on Monday, August 5, 2013. The pump was allowed to run continuously until 15:10 on August 7, 2012 when pumping was shut off due to severe weather.

Based on meter readings and field calculations, the well was purged for an additional 122.3 hours with approximately 3,500 gallons of groundwater removed, or an equivalent of over 14.4 well borehole volumes (WBV) during this second remediation.

2.2.2 GROUNDWATER RESAMPLING #2

The second resampling for toluene began on August 13, 2013 when pumping restarted and field parameters were measured per procedure WP 02-EM1010. Once field parameters stabilized, the well was purged overnight and final samples were taken on August 14, 2013 after purging 138 gallons (0.6 WBV) of groundwater. Samples were prepared, packaged, and shipped to HEAL on August 14, 2013 per procedure. Samples were received at HEAL on August 15, 2013.
2.2.3 RESULTS OF GROUNDWATER RESAMPLING #2

Table 3 shows the comparison in toluene concentrations in WQSP-5 between the original sample and through the second resampling event. Concentrations of toluene detected during resample #2 were 2.88 μg/L in the primary groundwater sample and 2.87 μg/L in the duplicate groundwater sample (Appendix B). To date, 5,418 gallons of groundwater has been purged from WQSP-5 since remediation began (after tape removal), which equates to the removal of approximately 22.3 WBVs.

TABLE 3. COMPARISON OF TOLUENE CONCENTRATIONS IN WQSP-5 GROUNDWATER BEFORE AND AFTER WELL REMEDINATION

<table>
<thead>
<tr>
<th>Sample Description</th>
<th>Sample Date</th>
<th>Toluene, μg/L</th>
<th>Sample</th>
<th>Duplicate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groundwater Round 35, original sample</td>
<td>5/20/2013</td>
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<td>82.1</td>
<td></td>
</tr>
<tr>
<td>Groundwater Round 35, resample #1</td>
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<td>7.57</td>
<td>8.13</td>
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<td>Groundwater Round 35, resample #2</td>
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<td>2.88</td>
<td>2.87</td>
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</tbody>
</table>

*Toluene quantified by EPA Method 8260B; μg/L = ppb.
*Collected after pump assembly cleaning and well remediation (purging).

3.0 BENCH SCALE TESTING AND RESULTS

Bench scale testing was performed to determine if WQSP-5 groundwater could leach toluene from UPC/Winmore-brand, 10-mil black tape used during pump reinstallation. The tape used is specified as a corrosion protective wrap for above and below ground metal piping systems after proper priming (3M Company, 2013). The tape was used to secure the electrical power cable and water sample line to the pump discharge tubing.

A test protocol was developed for this experiment (Appendix C). The experiment involved leaching of tape using synthetic groundwater, with similar chemistry to the contaminated DMW. Following the tape leaching period, aliquots of the aqueous-extracts (40-mL VOA vials) were submitted to HEAL for toluene analysis.

3.1 TEST PLAN

Retained samples from WQSP-5 taken during the previous DMP sampling (Round 34) were composited and used to represent toluene-free groundwater for the leaching experiment; laboratory-grade deionized water was also used as a leachate. Since the retained sample was acid-preserved, the pH was adjusted (6M NaOH) to match its original field pH. Tape used for this experiment was from the same lot used during pump reinstallation.

On July 2, 2013 groundwater sample- and deionized water-extracts were prepared using clean, 1-liter wide-mouth jars. Two jars were partially filled (500 mL) with groundwater from the pH-adjusted WQSP-5 retained sample and 2 additional jars were partially filled (500 mL) with laboratory-grade deionized water. Analysts placed approximately 10 feet of tape into each jar and added a stir bar to aid the leaching. Ten feet of tape was used in the 1-liter wide-mouth jars to ensure a sufficient amount of tape to facilitate leaching. Jars were filled with their respective
liquid to achieve zero headspace in the jars. Round 34 results for WQSP-5 served as the control for this experiment because there was no toluene detected in the sample (see Table 1). Retained water from Round 34 was used as the base solution for the leaching experiment. Jars were agitated for one minute at least once daily and stored in a secure location with limited access at room temperature.

To simulate conditions of the monitoring well following pump reinstallation, tape was leached for 13 days. On July 15, 2013, three 40-mL vials were filled with the contents from each jar as described in WP 02-EM1010 for toluene analysis. Samples were shipped to HEAL, per procedure, on July 16, 2013.

3.2 RESULTS AND DISCUSSION OF LEACHING EXPERIMENT

The chemical analysis results of the bench-scale experiment are present in Table 4. The results confirm the expectation that groundwater from the WQSP-5 retained sample was capable of leaching toluene from the tape adhesive, with an average concentration of 14,700 µg/L (Appendix D). Deionized water was also capable of leaching toluene from the tape material used during pump installation as shown in Table 4.

TABLE 4. BENCH-SCALE INVESTIGATION RESULT OF TOLUENE SOURCE CONTAMINATION IN WQSP-5 GROUNDWATER, SAMPLING ROUND 35

<table>
<thead>
<tr>
<th>Extraction Matrix</th>
<th>Sample Date</th>
<th>Toluene, µg/L²</th>
<th>Sample Duplicate</th>
</tr>
</thead>
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<tr>
<td>Groundwater, WQSP-5, Round 34 retained sampleᵇ</td>
<td>7/15/2013</td>
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<td>18,800</td>
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<tr>
<td>Deionized waterᶜ</td>
<td>7/15/2013</td>
<td>25,700</td>
<td>28,800</td>
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</tbody>
</table>

*Toluene quantified by EPA Method 8260B; µg/L = ppb
ᵇWQSP-5 Round 34 retained sample (2012) selected since chemistry most similar to current groundwater obtained from this well and was known to be toluene-free. ᶜDeionized water was obtained from the WIPP Laboratory and was selected since caustic used to readjust the WQSP-5 retained sample back to its original pH was prepared from this source water.

Based on the results from the bench-scale investigations, the Permittees concluded that the adhesive backing of the tape was the source of the toluene detected in the Round 35 WQSP-5 groundwater sample.

4.0 CONCLUSIONS AND RECOMMENDATIONS

The demonstration proves the toluene detected in WQSP-5 was due to introduction of tape in the well during pump replacement on May 6, 2013. Through pumping the well the concentrations were significantly reduced. At this time it is recommended that continued monitoring and reporting per the Permit should be sufficient follow-up activities with respect to toluene detection in this well. Pumping for sampling, removal of the toluene source, and natural attenuation will likely decrease the concentration of toluene to background. Therefore, the Permittees have determined that instead of revising the Permit at this time per Permit Part 5, Section 5.10.4.3 to modify the background level for toluene it is more appropriate to continue purging and monitoring the well. This approach does not pose a threat to human health or the environment because the current concentration (2.88 µg/L) is less than the New Mexico Environment Department Ground and Surface Water Protection Standard of 750 µg/L (20.6.2
NMAC). If it appears to the Permittees that a new background level needs to be established it will be proposed in the future.

5.0 REFERENCES


6.0 APPENDICES

Appendix A WQSP-5 Round 35 Resample #1 - Analytical Report
Appendix B WQSP-5 Round 35 Resample #2 - Analytical Report
Appendix C Test Plan for Evaluating if Tape is a Source of Toluene in Groundwater
Appendix D Tape Leaching Experiment - Analytical Report
Appendix E Determination That Toluene Did Not Result from Error in Sampling, Analysis, or Evaluation
August 01, 2013
Greg Jungclaus
WIPP
P.O. Box 2078
Carlsbad, NM 88221-2078
TEL: (575) 234-8615
FAX

RE: WIPP DMP

Dear Greg Jungclaus:

Hall Environmental Analysis Laboratory received 4 sample(s) on 7/17/2013 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites. In order to properly interpret your results it is imperative that you review this report in its entirety. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. When necessary, data qualifiers are provided on both the sample analysis report and the QC summary report, both sections should be reviewed. All samples are reported, as received, unless otherwise indicated. Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH and residual chlorine are qualified as being analyzed outside of the recommended holding time.

Please don't hesitate to contact HEAL for any additional information or clarifications.

ADHS Cert #AZ0682 -- NMED-DWB Cert #NM9425 -- NMED-Micro Cert #NM0190

Sincerely,

[Signature]

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109
<table>
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<th>Lab SampleID</th>
<th>Client Sample ID</th>
<th>Tag No</th>
<th>Date Collected</th>
<th>Date Received</th>
<th>Matrix</th>
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All analytes reported are associated with passing CCVs.

METHOD: 8260B

HOLDING TIMES: All holding times for Preparation and Analysis were met.

METHOD: Preparations: 5030
Analysis: 8260B

PREPARATION: Sample preparation proceeded normally.

ANALYSIS:
1. Calibration: All acceptance criteria were met.
2. Blanks: All acceptance criteria were met.
3. Internal Standards: All acceptance criteria were met.
4. Surrogates: All acceptance criteria were met.
5. Spikes: All acceptance criteria were met.
6. Samples: All acceptance criteria were met.
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Project: WIPP DMP  
Lab ID: 1307855-001  
Matrix: AQUEOUS  
Received Date: 7/17/2013 9:00:00 AM

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Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

**Qualifiers:**

- **B**: Analyte detected in the associated Method Blank
- **E**: Value above quantitation range
- **H**: Holding times for preparation or analysis exceeded
- **J**: Analyte detected below quantitation limits
- **ND**: Not Detected at the Reporting Limit
- **O**: RSD is greater than RSD limit
- **P**: Sample pH greater than 2 for VOA and TOC only.
- **RL**: Reporting Detection Limit
## EpA Method: 8260B

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Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

**Qualifiers:**
- * Value exceeds Maximum Contaminant Level.
- E Value above quantitation range
- J Analyte detected below quantitation limits
- O RSD is greater than KSDlimit
- R RPD outside accepted recovery limits
- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- P Sample pH greater than 2 for VOA and TOC only.
- RL Reporting Detection Limit
CLIENT: WIPP
Project: WIPP DMP
Lab ID: 1307855-003
Matrix: AQUEOUS

**Analyses**

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<td></td>
<td>1</td>
<td>7/22/2013 2:43:31 PM</td>
<td>R12104</td>
</tr>
<tr>
<td>Surr: Dibromofluoromethane</td>
<td>81.3</td>
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<td>7/22/2013 2:43:31 PM</td>
<td>R12104</td>
</tr>
</tbody>
</table>

Qualifiers:
- * Value exceeds Maximum Contaminant Level.
- E Value above quantitation range
- J Analyte detected below quantitation limits
- O RSD is greater than RSD limit
- R RPD outside accepted recovery limits

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

**EPA METHOD: 8260B**

**Analyst:** RAA

**Date Reported:** 8/12/2013
<table>
<thead>
<tr>
<th>Analyses</th>
<th>Result</th>
<th>MDL</th>
<th>RL</th>
<th>Qual</th>
<th>Units</th>
<th>DF</th>
<th>Date Analyzed</th>
<th>Batch ID</th>
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<tbody>
<tr>
<td>EPA METHOD: 8260B</td>
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<tr>
<td>Toluene</td>
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<tr>
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<td>%REC</td>
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<td>R12104</td>
</tr>
<tr>
<td>Surr: 4-Bromofluorobenzene</td>
<td>88.1</td>
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<td>70-130</td>
<td>%REC</td>
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<td>R12104</td>
</tr>
<tr>
<td>Surr: Dibromofluoromethane</td>
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</table>

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

- * Value exceeds Maximum Contaminant Level.
- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- H Holding times for preparation or analysis exceeded
- J Analyte detected below quantitation limits
- N Not Detected at the Reporting Limit
- O RSD is greater than RSDlimit
- P Sample pH greater than 2 for VOA and TOC only.
- R RPD outside accepted recovery limits
- RL Reporting Detection Limit

Page 6 of 8
<table>
<thead>
<tr>
<th>Sample ID</th>
<th>Client Sample ID</th>
<th>Collection Date</th>
<th>Matrix</th>
<th>Test Name</th>
<th>Leachate Date</th>
<th>Prep Date</th>
<th>Analysis Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1307855-001A</td>
<td>GW-WQ5-C-R35-RN1</td>
<td>7/16/2013 9:00:00 AM</td>
<td>Aqueous</td>
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<td>7/22/2013 1:38:41 PM</td>
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<td>GW-WQ5-C-R35-RN1D</td>
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<td></td>
<td>7/22/2013 3:15:56 PM</td>
<td></td>
</tr>
</tbody>
</table>

**Dates Report**

WO#: 1307855

01-Aug-13
## QC SUMMARY REPORT

**Hall Environmental Analysis Laboratory, Inc.**

**Client:** WIPP  
**Project:** WIPP DMP

### Sample ID: 5ml-rb

- **Client ID:** PBW  
- **Sample Type:** MBLK  
- **Test Code:** EPA Method: 8260B
- **Run No:** 12104  
- **Units:** µg/L

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Result</th>
<th>PQL</th>
<th>SPK</th>
<th>SPK Ref Val</th>
<th>%REC</th>
<th>LowLimit</th>
<th>HighLimit</th>
<th>%RPD</th>
<th>RPD Limit</th>
<th>Qual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toluene</td>
<td>ND</td>
<td>1.00</td>
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<td>88.7</td>
<td>70</td>
<td>130</td>
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<tr>
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<td>8.87</td>
<td>10.00</td>
<td>88.6</td>
<td>70</td>
<td>130</td>
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<tr>
<td>Surr: 4-Bromofluorobenzene</td>
<td>9.26</td>
<td>10.00</td>
<td>92.6</td>
<td>70</td>
<td>130</td>
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<tr>
<td>Surr: Dibromofluoromethane</td>
<td>8.58</td>
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<td>85.8</td>
<td>70</td>
<td>130</td>
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</tbody>
</table>

### Sample ID: 100ng lcs

- **Client ID:** BatchQC  
- **Sample Type:** LCS4  
- **Test Code:** EPA Method: 8260B
- **Run No:** 12104  
- **Units:** µg/L

<table>
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<tr>
<th>Analyte</th>
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<th>PQL</th>
<th>SPK</th>
<th>SPK Ref Val</th>
<th>%REC</th>
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<tbody>
<tr>
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<tr>
<td>Surr: 1,2-Dichloroethane-d4</td>
<td>7.65</td>
<td>10.00</td>
<td>76.5</td>
<td>70</td>
<td>130</td>
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<tr>
<td>Surr: 4-Bromofluorobenzene</td>
<td>8.29</td>
<td>10.00</td>
<td>82.9</td>
<td>70</td>
<td>130</td>
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<tr>
<td>Surr: Toluene-d8</td>
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### Sample ID: 1307855-002a ms

- **Client ID:** GW-WQ5-C-R35-RN  
- **Sample Type:** MS4  
- **Test Code:** EPA Method: 8260B
- **Run No:** 12104  
- **Units:** µg/L

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<tbody>
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<td>Surr: 1,2-Dichloroethane-d4</td>
<td>8.73</td>
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<td>130</td>
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<td>Surr: 4-Bromofluorobenzene</td>
<td>8.55</td>
<td>10.00</td>
<td>85.5</td>
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<td>130</td>
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<td>Surr: Dibromofluoromethane</td>
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### Sample ID: 1307855-002a msd

- **Client ID:** GW-WQ5-C-R35-RN  
- **Sample Type:** MSD4  
- **Test Code:** EPA Method: 8260B
- **Run No:** 12104  
- **Units:** µg/L

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<tbody>
<tr>
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<tr>
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<td>80.8</td>
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<td>Surr: Toluene-d8</td>
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<td>87.3</td>
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<td>130</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Qualifiers:

- A: Value exceeds Maximum Contaminant Level.  
- B: Analyte detected in the associated Method Blank  
- E: Value above quantitation range  
- H: Holding times for preparation or analysis exceeded  
- J: Analyte detected below quantitation limits  
- ND: Not Detected at the Reporting Limit  
- P: Sample pH greater than 2 for VOA and TOC only.  
- RL: Reporting Detection Limit
Sample Log-In Check List

Client Name: WIPP
Work Order Number: 1307855
RcptNo: 1

Received by/date: 07/17/2013
Logged By: Anne Thorne
Completed By: Anne Thorne
Reviewed By: Anne Thorne

Chain of Custody
1. Custody seals intact on sample bottles? Yes ☑ No ☐ Not Present ☐
2. Is Chain of Custody complete? Yes ☑ No ☐ Not Present ☐
3. How was the sample delivered? FedEx

Log in
4. Was an attempt made to cool the samples? Yes ☑ No ☐ NA ☐
5. Were all samples received at a temperature of >0°C to 6.0°C Yes ☑ No ☐ NA ☐
6. Sample(s) in proper container(s)? Yes ☑ No ☐
7. Sufficient sample volume for indicated test(s)? Yes ☑ No ☐
8. Are samples (except VOA and ONG) properly preserved? Yes ☑ No ☐
9. Was preservative added to bottles? Yes ☑ No ☐ NA ☐
10. VOA vials have zero headspace? Yes ☑ No ☐ NA ☐
11. Were any sample containers received broken? Yes ☑ No ☐
12. Does paperwork match bottle labels? (Note discrepancies on chain of custody) Yes ☑ No ☐
13. Are matrices correctly identified on Chain of Custody? Yes ☑ No ☐
14. Is it clear what analyses were requested? Yes ☑ No ☐
15. Were all holding times able to be met? Yes ☑ No ☐

Special Handling (If applicable)
16. Was client notified of all discrepancies with this order? Yes ☑ No ☐ NA ☑

<table>
<thead>
<tr>
<th>Person Notified:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>By Whom:</td>
<td></td>
</tr>
<tr>
<td>Via:</td>
<td></td>
</tr>
<tr>
<td>☐ eMail ☐ Phone ☐ Fax ☐ In Person</td>
<td></td>
</tr>
<tr>
<td>Regarding:</td>
<td></td>
</tr>
<tr>
<td>Client Instructions:</td>
<td></td>
</tr>
</tbody>
</table>

# of preserved bottles checked for pH:
(If <2 or >12 unless noted)

Adjusted? ☐
Checked by: ☐

17. Additional remarks:

18. Cooler Information

<table>
<thead>
<tr>
<th>Cooler No</th>
<th>Temp °C</th>
<th>Condition</th>
<th>Seal Intact</th>
<th>Seal No.</th>
<th>Seal Date</th>
<th>Signed By</th>
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<tbody>
<tr>
<td>1</td>
<td>4.5</td>
<td>Good</td>
<td>Yes</td>
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Page 1 of 1
# Chain of Custody Record

<table>
<thead>
<tr>
<th>Project Number</th>
<th>Project Name</th>
<th>Requested Analyses</th>
<th>Analytical Laboratory</th>
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<tbody>
<tr>
<td>TA9304-1</td>
<td>WIPP/DMP</td>
<td>HEAL</td>
<td>Albuquerque, NM</td>
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<table>
<thead>
<tr>
<th>Sample Date</th>
<th>Sample Time</th>
<th>Matrix</th>
<th>Sample Number</th>
<th>Total Number of Containers</th>
<th>Failure</th>
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<tbody>
<tr>
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<td>09:00</td>
<td>EW</td>
<td>WQ5-C135-RN1</td>
<td>3</td>
<td>X</td>
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<td>l</td>
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<td>3</td>
<td>X</td>
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<tr>
<td></td>
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<td>3</td>
<td>X</td>
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<tr>
<td>NRA</td>
<td>N/A</td>
<td>l</td>
<td>-RN3</td>
<td>3</td>
<td>X</td>
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</table>

<table>
<thead>
<tr>
<th>Received By: (Signature, Date/Time)</th>
<th>Relinquished By: (Signature, Date/Time)</th>
<th>Received By: (Signature, Date/Time)</th>
<th>Received By: (Signature, Date/Time)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allen                 7/6/13 12:05</td>
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<table>
<thead>
<tr>
<th>Sample Disposal:</th>
<th>Reported turnaround time:</th>
<th>Sample Receipt Remarks:</th>
<th>Results To:</th>
<th>Special Instructions:</th>
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</thead>
<tbody>
<tr>
<td>N/A</td>
<td>8/3/11/13</td>
<td>4.5°</td>
<td>Greg Jangelaus</td>
<td>07/11/13 0900</td>
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<table>
<thead>
<tr>
<th>Carrier/Account No.:</th>
<th>FedEx 8779 5711 7400</th>
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</table>

<table>
<thead>
<tr>
<th>WHITE – Analytical Laboratory</th>
<th>YELLO– Field Copy</th>
<th>GREEN – Groundwater</th>
<th>RED – Sediment</th>
<th>GRAY – Soil</th>
<th>BLUE – Surface Water</th>
<th>PINK – Record Copy</th>
<th>PURPLE – Vegetation</th>
</tr>
</thead>
</table>

Form CoC/RFA, Rev. 0 – NICHOLS PRINTING, INC
August 19, 2013

Greg Jungclaus
WIPP
P.O. Box 2078
Carlsbad, NM 88221-2078
TEL: (575) 234-8615
FAX

RE: WIPP DMP

OrderNo.: 1308638

Dear Greg Jungclaus:

Hall Environmental Analysis Laboratory received 4 sample(s) on 8/15/2013 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites. In order to properly interpret your results it is imperative that you review this report in its entirety. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. When necessary, data qualifiers are provided on both the sample analysis report and the QC summary report, both sections should be reviewed. All samples are reported, as received, unless otherwise indicated. Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH and residual chlorine are qualified as being analyzed outside of the recommended holding time.

Please don't hesitate to contact HEAL for any additional information or clarifications.

ADHS Cert #AZ0682 -- NMED-DWB Cert #NM9425 -- NMED-Micro Cert #NM0190

Sincerely,

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109
**Client:** WIPP  
**Project:** WIPP DMP

<table>
<thead>
<tr>
<th>Lab SampleID</th>
<th>Client Sample ID</th>
<th>Tag No</th>
<th>Date Collected</th>
<th>Date Received</th>
<th>Matrix</th>
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</tr>
</tbody>
</table>
All analytes reported are associated with passing CCVs.

METHOD: 8260B

HOLDING TIMES: All holding times for Preparation and Analysis were met.

METHOD: Preparations: 5030
          Analysis: 8260B

PREPARATION: Sample preparation proceeded normally.

ANALYSIS:
1. Calibration: All acceptance criteria were met.
2. Blanks: All acceptance criteria were met.
3. Internal Standards: All acceptance criteria were met.
4. Surrogates: All acceptance criteria were met.
5. Spikes: All acceptance criteria were met.
6. Samples: All acceptance criteria were met.
## Analytical Report

Lab Order 1308638  
Date Reported: 8/19/2013

### Hall Environmental Analysis Laboratory, Inc.

- **CLIENT:** WIPP  
- **Project:** WIPP DMP  
- **Lab ID:** 1308638-001  
- **Matrix:** AQUEOUS  
- **Collection Date:** 8/13/2013 1:52:00 PM  
- **Received Date:** 8/15/2013 8:45:00 AM

### Analyses

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<th>Qual</th>
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Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

### Qualifiers:

- **A** Value exceeds Maximum Contaminant Level  
- **B** Analyte detected in the associated Method Blank  
- **C** Value above quantitation range  
- **D** Analyte detected below quantitation limits  
- **E** RSD is greater than RSD limit  
- **F** RPD outside accepted recovery limits  
- **G** Spike Recovery outside accepted recovery limits  
- **H** Holding times for preparation or analysis exceeded  
- **I** Not Detected at the Reporting Limit  
- **J** Sample pH greater than 2 for VOA and TOC only.

---

Page 3 of 8
<table>
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Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.
Hall Environmental Analysis Laboratory, Inc.

CLIENT: WIPP
Project: WIPP DMP
Lab ID: 1308638-003

Matrix: AQUEOUS

Client Sample ID: GW-WQ5-C-R35-R2N2
Collection Date: 8/13/2013 1:45:00 PM
Received Date: 8/15/2013 8:45:00 AM

EPA METHOD: 8260B

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Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:
- * Value exceeds Maximum Contaminant Level.
- E Value above quantitation range
- J Analyte detected below quantitation limits
- O RSD is greater than RSD limit
- R RPD outside accepted recovery limits
- S Spike Recovery outside accepted recovery limits
- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- P Sample pH greater than 2 for VOA and TOC only.
- RL Reporting Detection Limit
# Hall Environmental Analysis Laboratory, Inc.

**CLIENT:** WIPP  
**Project:** WIPP DMP  
**Lab ID:** 1308638-004  
**Matrix:** AQUEOUS  
**Received Date:** 8/15/2013 8:45:00 AM  

## Analyses

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**EPA METHOD:** 8260B  
**Analyst:** JMP

---

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

### Qualifiers:
- **A:** Value exceeds Maximum Contaminant Level.
- **B:** Analyte detected in the associated Method Blank
- **E:** Value above quantitation range
- **H:** Holding times for preparation or analysis exceeded
- **J:** Analyte detected below quantitation limits
- **N:** Not Detected at the Reporting Limit
- **O:** RSD is greater than RSD limit
- **P:** Sample pH greater than 2 for VOA and TOC only.
- **R:** RPD outside accepted recovery limits
- **S:** Spike Recovery outside accepted recovery limits
- **RL:** Reporting Detection Limit
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## QC SUMMARY REPORT

### Hall Environmental Analysis Laboratory, Inc.

**Client:** WIPP  
**Project:** WIPP DMP

### Sample ID b2
**SampType:** MBLK  
**TestCode:** EPA Method: 8260B  
**Client ID:** PBW  
**Batch ID:** R12689  
**Run No:** 12689

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### Sample ID 100ng lcs
**SampType:** LCS4  
**TestCode:** EPA Method: 8260B  
**Client ID:** BatchQC  
**Batch ID:** R12689  
**Run No:** 12689

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**TestCode:** EPA Method: 8260B  
**Client ID:** BatchQC  
**Batch ID:** R12689  
**Run No:** 12689

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**Client ID:** GW-WQ5-C-R35-R2  
**Batch ID:** R12689  
**Run No:** 12689

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**TestCode:** EPA Method: 8260B  
**Client ID:** GW-WQ5-C-R35-R2  
**Batch ID:** R12689  
**Run No:** 12689

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### Qualifiers:

- * Value exceeds Maximum Contaminant Level.
- E Value above quantitation range
- J Analyte detected below quantitation limits
- O RSD is greater than RSD Limit
- R RPD outside accepted recovery limits
- S Spike Recovery outside accepted recovery limits
- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- P Sample pH greater than 2 for VOA and TOC only.
- RL Reporting Detection Limit

---

Page 29
Sample Log-In Check List

**Client Name:** WIPP  
**Work Order Number:** 1308638  
**RcptNo:** 1

**Received by:date:** 8/15/13

Logged By: Anne Thorne  
Completed By: Anne Thorne  
Reviewed By:  

**Chain of Custody**

1. Custody seals intact on sample bottles?  
   Yes ✓  
2. Is Chain of Custody complete?  
   Yes ✓  
3. How was the sample delivered?  
   FedEx

**Log In**

4. Was an attempt made to cool the samples?  
   Yes ✓
5. Were all samples received at a temperature of >0°C to 6.0°C?  
   Yes ✓
6. Sample(s) in proper container(s)?  
   Yes ✓
7. Sufficient sample volume for indicated test(s)?  
   Yes ✓
8. Are samples (except VOA and ONG) properly preserved?  
   Yes ✓
9. Was preservative added to bottles?  
   Yes ✓
10. VOA vials have zero headspace?  
    Yes ✓
11. Were any sample containers received broken?  
    Yes ✓
12. Does paperwork match bottle labels?  
    (Note discrepancies on chain of custody)  
    Yes ✓
13. Are matrices correctly identified on Chain of Custody?  
    Yes ✓
14. Is it clear what analyses were requested?  
    Yes ✓
15. Were all holding times able to be met?  
    (If no, notify customer for authorization.)  
    Yes ✓

**Special Handling (if applicable)**

16. Was client notified of all discrepancies with this order?  
    Yes ✓

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<th>Date</th>
<th>By Whom:</th>
<th>Vis:</th>
<th>Client Instructions:</th>
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17. Additional remarks:

18. Cooler Information

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<th>Seal Intact</th>
<th>Seal No</th>
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# Chain of Custody Record

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**Requested Analyses:**

- HEAL #1808638
- Albuquerque, NM
- Comments:
  - Use as MS/MSD -001
  - -002
  - -003
  - N/A, HEAL Provided -004

**Analysis:**

- 3.8°C
- Analyze LCS in duplicate.

**Sample Receipt Remarks:**

- Greg Jurgelschau

**Sample Disposal:**

- □ Routine
- □ Rush
- TAT 5 days

**Center / Airbill No.:**

FedEx 8739-5714-7422
APPENDIX C
TEST PLAN FOR EVALUATING IF TAPE IS A SOURCE OF TOLUENE IN GROUNDWATER
TEST PLAN FOR EVALUATING IF TAPE IS A SOURCE OF TOLUENE IN GROUNDWATER

PURPOSE:

The purpose of this test is to determine if groundwater can leach toluene from Winmore 10mil UPC black tape installed in WQSP-5. This tape was used to secure electrical and sampling lines when the pump was replaced.

OVERVIEW:

The process of accomplishing the purpose of this test plan will involve the generation of aqueous samples for analysis of toluene. The aqueous samples will be generated by the Permittees and provided to the lab in the form of 40-mL VOA vials so that the samples can be analyzed according to the lab's routine operating procedures.

MATERIALS:

- Same brand and composition of tape used to secure the electrical cable and sampling line in WQSP-5.
- Groundwater of approximately the same composition as that of WQSP-5. (Note that groundwater from WQSP-5 cannot be used because it likely already contains toluene.)
- De-ionized water
- One-liter clean glass wide-mouth screw cap jars. (Similar bottles/containers may be used if the wide-mouth jars are not available.)
- Marking pens, labels, notebook
- VOA vials, 40.0-mL
- Hydrochloric acid (HCl), 1:1 = 6N (normal) for adjusting the pH of the samples to ≤2
- Scissors
- Tape measure
- Teflon-coated stirring bars or other relatively dense, cleanable objects that can be used to agitate water in a full, closed container
- Sample cooler for shipping samples
- CoC/RFA form

EXPERIMENTAL:

Each of the tests will be performed in duplicate. The procedure will simply be to expose the tape to WQSP-5 groundwater and distilled water for an extended period of time with occasional agitation to mimic the exposure of the tape used in the WQSP-5 well.

1. Fill two 1-L jars about half full with the groundwater samples and two other 1-L jars about half full with distilled water.
2. Unroll 10 to 12 feet of the tape and transfer it to the first of the four 1-L jars. Portions of the tape may be stuck together - this is acceptable. However, the surface area of the tape should be as large as reasonable.
3. Repeat the process of unrolling the tape and adding it to the other three jars.
4. Add the stir bars or equivalent to each container and fill to the top with the same fluid as originally added.
5. Record the date and time that the leaching experiment started.
6. Equally agitate the four jars for one-minute each at specified times during work days, e.g., 7:30, 10:30, and 2:30. Since the containers do not have any head space, if any toluene is leached from the tape, it should remain dissolved in the water to the point of saturation.

7. At the end of the specified period, e.g., 2.0 weeks, add 6 drops of the 6N HCl to the 8 VOA vials. (Note that this amount of HCl is known to be sufficient to reduce the pH to ≤2.) Fill two labeled VOA vials from each of the four experimental containers by gently pouring the contents of the jars into the VOA vials until overflowing. Immediately cap the VOA vials. Perform this step over a tub or other vessel to catch any liquid that spills. Any spilled liquid should be combined and retained for later disposal, if necessary, pending the results of the chemical analysis of the samples. Note that one VOA vial from each of the four containers is a backup and is not analyzed.

8. Complete CoC/RFA form for submittal to the laboratory for the analysis of four samples with a backup sample for each. No laboratory control spikes or matrix spikes are required for these analyses.

9. Immediately cap the VOA vials, ensure correct labeling, and prepare for shipping them along with the completed CoC/RFA form in a cooler with ice to the laboratory for analysis. The form only needs to request analysis of VOCs.

INTERPRETATION:

The laboratory analysis results will be checked for the presence and relative concentration of toluene in the samples. Based on information in the literature it is expected that toluene will be present in the samples. If toluene is detected in the samples it is very likely that the tape was the source of the toluene detected in the WQSP-5 groundwater samples. If it is not detected, hypotheses on the possible source of toluene in the groundwater samples will need to be revised.

The four samples (two each of distilled water and groundwater) will also provide information on the consistency of the leaching process.
Dear Greg Jungclaus:

Hall Environmental Analysis Laboratory received 6 sample(s) on 7/17/2013 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites. In order to properly interpret your results it is imperative that you review this report in its entirety. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. When necessary, data qualifiers are provided on both the sample analysis report and the QC summary report, both sections should be reviewed. All samples are reported, as received, unless otherwise indicated. Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH and residual chlorine are qualified as being analyzed outside of the recommended holding time.

Please don't hesitate to contact HEAL for any additional information or clarifications.

ADHS Cert #AZ0682 -- NMED-DWB Cert #NM9425 -- NMED-Micro Cert #NM0190

Sincerely,

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109
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All analytes reported are associated with passing CCVs.

METHOD: 8260B

HOLDING TIMES: All holding times for Preparation and Analysis were met.

METHOD: Preparations: 5030
Analysis: 8260B

PREPARATION: Sample preparation proceeded normally.

ANALYSIS:
1. Calibration: All acceptance criteria were met.
2. Blanks: All acceptance criteria were met.
3. Internal Standards: All acceptance criteria were met.
4. Surrogates: All acceptance criteria were met.
5. Spikes: All acceptance criteria were met.
6. Samples: All acceptance criteria were met.
CLIENT: WIPP  
Project: WIPP DMP  
Lab ID: 1307856-001  
Matrix: AQUEOUS  
Received Date: 7/17/2013 9:00:00 AM

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Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:  
* Value exceeds Maximum Contaminant Level  
E Value above quantitation range  
J Analyte detected below quantitation limits  
O RSD is greater than RSDlimit  
R RPD outside accepted recovery limits  
B Analyte detected in the associated Method Blank  
H Holding times for preparation or analysis exceeded  
ND Not Detected at the Reporting Limit  
P Sample pH greater than 2 for VOA and TOC only  
RL Reporting Detection Limit
### Analyses

**EPA METHOD: 8260B**

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**Qualifiers:**

- * Value exceeds Maximum Contaminant Level
- E Value above quantitation range
- J Analyte detected below quantitation limits
- O RSD is greater than RSDlimit
- R RPD outside accepted recovery limits
- A Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- P Sample pH greater than 2 for VOA and TOC only.
- XL Reporting Detection Limit

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.
Hall Environmental Analysis Laboratory, Inc.

CLIENT: WIPP  
Project: WIPP DMP  
Lab ID: 1307856-003  
Matrix: AQUEOUS

CLIENT Sample ID: GW-WQ5-C-R35-EN2  
Collection Date: 7/15/2013 10:30:00 AM  
Received Date: 7/17/2013 9:00:00 AM

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Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:  
* Value exceeds Maximum Contaminant Level  
E Value above quantitation range  
I Analyte detected below quantitation limits  
O RSD is greater than RSD limit  
R RPD outside accepted recovery limits  
B Analyte detected in the associated Method Blank  
H Holding times for preparation or analysis exceeded  
ND Not Detected at the Reporting Limit  
P Sample pH greater than 2 for VOA and TOC only  
RL Reporting Detection Limit
 CLIENT: WIPP  
Project: WIPP DMP  
Lab ID: 1307856-004  
Matrix: AQUEOUS  

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Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

**Qualifiers:**

- **A** Value exceeds Maximum Contaminant Level.
- **B** Analyte detected in the associated Method Blank
- **C** Not Detected at the Reporting Limit
- **D** Value above quantitation range
- **F** Holding times for preparation or analysis exceeded
- **J** Analyte detected below quantitation limits
- **K** Sample pH greater than 2 for VOA and TOC only.
- **L** Reporting Detection Limit
- **O** RSD is greater than RSD limit
- **P** RPD outside accepted recovery limits
- **RL** Reporting Detection Limit

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### Hall Environmental Analysis Laboratory, Inc.

**CLIENT:** WIPP  
**Project:** WIPPDMP  
**Lab ID:** 1307856-005  
**Matrix:** AQUEOUS  
**Received Date:** 7/17/2013 9:00:00 AM  

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Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

**Qualifiers:**
- ' Value exceeds Maximum Contaminant Level.
- E Value above quantitation range
- J Analyte detected below quantitation limits
- O RSD is greater than RSD limit
- R RPD outside accepted recovery limits
- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- P Sample pH greater than 2 for VOA and TOC only.
- RL Reporting Detection Limit

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Hall Environmental Analysis Laboratory, Inc.

CLIENT: WIPP
Project: WIPP DMP
Lab ID: 1307856-006
Matrix: AQUEOUS
Received Date: 7/17/2013 9:00:00 AM

EPA METHOD: 8260B

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Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:
- * Value exceeds Maximum Contaminant Level
- E Value above quantitation range
- J Analyte detected below quantitation limits
- O RSD is greater than RSDlimit
- R RPD outside accepted recovery limits
- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- P Sample pH greater than 2 for VOA and TOC only.
- KL Reporting Detection Limit
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Qualifiers:

* Value exceeds Maximum Contaminant Level
E Value above quantitation range
J Analyte detected below quantitation limits
O RSD is greater than RSDlimit
R RPD outside accepted recovery limits
B Analyte detected in the associated Method Blank
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
P Sample pH greater than 2 for VOA and TOC only.
RL Reporting Detection Limit

Page 10 of 11
## QC SUMMARY REPORT

**Client:** WIPP  
**Project:** WIPP DMP

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### Analyte Results

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### Qualifiers

- **B**: Analyte detected in the associated Method Blank
- **H**: Holding times for preparation or analysis exceeded
- **ND**: Not Detected at the Reporting Limit
- **P**: Sample pH greater than 2 for VOA and TOC only.
- **RL**: Reporting Detection Limit

---

**Page 47 of 11**
Sample Log-In Check List

Client Name: WIPP  Work Order Number: 1307856  RcptNo: 1

Received by/date: 07/17/2013
Logged By: Anne Thorne  7/17/2013 9:00:00 AM
Completed By: Anne Thorne  7/18/2013
Reviewed By: 07/18/2013

Chain of Custody
1. Custody seals intact on sample bottles? Yes ☐ No ☐ Not Present ☐
2. Is Chain of Custody complete? Yes ☑ No ☐ Not Present ☐
3. How was the sample delivered? FedEx

Log In
4. Was an attempt made to cool the samples? Yes ☑ No ☐ NA ☐
5. Were all samples received at a temperature of >0°C to 8.0°C? Yes ☑ No ☐ NA ☐
6. Sample(s) in proper container(s)? Yes ☑ No ☐
7. Sufficient sample volume for indicated test(s)? Yes ☑ No ☐
8. Are samples (except VOA and ONG) properly preserved? Yes ☑ No ☐ NA ☐
9. Was preservative added to bottles? Yes ☑ No ☐
10. VOA vials have zero headspace? Yes ☑ No ☐
11. Were any sample containers received broken? Yes ☑ No ☐
12. Does paperwork match bottle labels? Yes ☑ No ☐
   (Note discrepancies on chain of custody)
13. Are matrices correctly identified on Chain of Custody? Yes ☑ No ☐
14. Is it clear what analyses were requested? Yes ☑ No ☐
15. Were all holding times able to be met? Yes ☑ No ☐
   (If no, notify customer for authorization.)

Special Handling (if applicable)
16. Was client notified of all discrepancies with this order? Yes ☑ No ☐ NA ☑
   Person Notified: __________________________  Date: ________________
   By Whom: __________________________  Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person
   Regarding: __________________________
   Client instructions: __________________________

17. Additional remarks: __________________________

18. Cooler Information
   Cooler No  Temp °C  Condition  Seal Intact  Seal No  Seal Date  Signed By
   1       5.4     Good     Yes

Page 1 of 1
CHAIN OF CUSTODY RECORD

No. 1066
Page 1 of 1

Project Number: T409304-1
Project Name: WIPP Dmp

Sampler(s): R. King, RASpoon

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Requested Time received: Report by 8/21/13

Sample Disposal:
- Return to Client
- Disposal by Lab

Requested by: (Signature, Date/Time)
Received by: (Signature, Date/Time)
Relinquished by: (Signature, Date/Time)
Requested Time received: Report by 8/21/13

Sample Receipt Remarks:
- S,4°C
- N/A

Sample Disposal:
- Return to Client
- Disposal by Lab

Carrier/Airbill No.: FedEx
8739 5711 7411

WHITE - Analytical Laboratory
DI - Dissolved Water
GW - Groundwater

YELLOW - Field Copy
AF - Air Filter(s)
AN - Animal(s)

RED - Receipt Copy
SE - Sediment
SO - Soil

www - Surface Water
VG - Vegetation
APPENDIX E
DETERMINATION THAT TOLUENE DID NOT RESULT FROM ERROR IN SAMPLING, ANALYSIS, OR EVALUATION
Determination That Toluene Did Not result from Error in Sampling, Analysis, or Evaluation

The laboratory analyzed the primary and duplicate groundwater sample from WQSP-5 and determined that the detected concentration in the primary sample was above the calibration range of the GC/MS analysis instrument. To confirm the higher than expected concentration, the lab retrieved a backup sample vial of the primary sample, diluted it by a factor of 10, and measured a toluene concentration of 141 ug/L. (The estimated concentration measured in the original sample was 130 ug/L, but this concentration was above the calibration range of the instrument.) In addition the laboratory retrieved the backup vial of the duplicate sample, diluted it by a factor of 10, analyzed it and obtained a concentration of 79.6 ug/L compared to the original concentration of 82.1 ug/L, which was within in the calibration range and reported as the sample concentration.

In addition a third VOA vial of the primary sample was used for the matrix spike and matrix spike duplicate samples in which toluene as well as the other target volatile organic compounds, were spiked and the samples analyzed to determine percent recovery. (This was done before the toluene concentration was known.) The measured concentrations of toluene in the matrix spike and matrix spike duplicate were much higher than the spiked concentrations and above the calibration range of the instrument. This is an indication of the high concentration of toluene in the WQSP-5 groundwater samples.

The laboratory data were verified and validated according to Permittees standard operating procedure. The data review confirmed the validity of the data, and applicable quality assurance objectives were met. In addition the analysis results from the re-sampling of WQSP-5 were verified and validated and shown to meet applicable quality assurance objectives.