HEALTH CONSULTATION NO. 1

DRAKE CHEMICAL
(SUPERFUND SITE THERMAL DESTRUCTION FACILITY)

LOCK HAVEN, CLINTON COUNTY, PENNSYLVANIA

CERCLIS NO. PAD003058047

JULY 24, 1997

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia
Health Consultation: A Note of Explanation

An ATSDR health consultation is a verbal or written response from ATSDR to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members.

This document has previously been released for a 30 day public comment period. Subsequent to the public comment period, ATSDR addressed all public comments and revised or appended the document as appropriate. The health consultation has now been reissued. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR which, in the Agency’s opinion, indicates a need to revise or append the conclusions previously issued.
PETITIONED HEALTH CONSULTATION NO. 1

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(SUPERFUND SITE THERMAL DESTRUCTION FACILITY)

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U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
PUBLIC HEALTH SERVICE
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY
DIVISION OF HEALTH ASSESSMENT AND CONSULTATION
PETITION RESPONSE BRANCH

AR313635
Foreword

This health consultation evaluates the theoretical information in the trial burn risk assessment documents. The Agency for Toxic Substances and Disease Registry (ATSDR) has not evaluated the actual sampling or monitoring of the incinerator. This health consultation does not address operating procedures or parameters for the incinerator.

Background and Statement of Issues

U.S. Senators Arlen Spector and Rick Santorum, on behalf of residents and officials of Lock Haven, Pennsylvania, requested that ATSDR evaluate the potential public health impact of incinerator soil remediation at the Drake Chemical Superfund site. ATSDR responded by attending the public meeting held by the U.S. Environmental Protection Agency (EPA) in September 1996 to discuss the incinerator trial burn, conducting a site visit and meeting with residents and local officials in October 1996, and conducting a second site visit and holding public availability sessions in November 1996 in an effort to collect information for our evaluation. ATSDR will evaluate issues surrounding the Thermal Destruction Facility (incinerator) at Drake Chemical through a series of health consultations, which are reports designed to provide advice and recommendations on specific, health-related questions associated with actual or potential human health exposure to hazardous substances or other associated human health hazards.

Specifically, this health consultation will evaluate the Incinerator Trial Burn Risk Assessment (Volumes. 1-3) and the Risk Assessment Evaluation for Winter Months, excluding modeling to determine whether these documents contain assessments that are protective of public health. Another health consultation will addressed modeling. This consultation provides comments and recommendations that might improve future risk assessment and the ambient air monitoring system and data quality at Drake Chemical. Subsequent health consultations will address the incinerator’s operational plans and protocols, adequacy of modeling conducted for the Trial Burn Risk Assessment, and the public health implications of air sampling data collected during the trial burn process.

Lock Haven is in a valley along the West Branch of the Susquehanna River in the mountains of Pennsylvania. The Drake Chemical Superfund site, located at 180 Myrtle Street, occupies approximately 10 acres in a small industrial corridor that runs along the southeastern edge of the city of Lock Haven. Several boroughs/townships that comprise a population of more than 10,000
Drake Chemical and its predecessor, Kilsdonk Chemical Company, manufactured chemical intermediates for more than 30 years before closing in 1982. The intermediates were used in various industries. Site soils have been contaminated from leaking drums and storage tanks, leaching from waste holding ponds, and the disposal of sludge wastes. Beta-naphthylamine and 2,3,6-trichlorophenylacetic acid (Fenac) are among the primary contaminants of concern that have been produced and subsequently detected in soil at the site.

Beginning in 1982, EPA conducted a number of removal and remedial actions that included securing the site and removing drums, storage tanks, leachate, sludges, and the on-site structures. The EPA decided in 1988 to use incineration technology to remediate site soils and conducted an incineration treatability study in 1990. Construction of a mobile incineration unit began in 1993 and was completed in 1995. Clean, off-site soil was burned in November 1995 to test the incinerator. The trial burn process was initially slated for January 1996, but was delayed until September 1996 by litigation. Although it was interrupted for system modifications and repairs, it was completed in February 1997.

Discussion

Evaluation of Trial Burn Risk Assessment

ATSDR reviewed the three-volume Trial Burn Risk Assessment, dated June 21, 1996, and the Risk Assessment Evaluation for Winter Months, dated November 14, 1996. This review evaluated the risk assessments' general approach, consideration of exposure pathways, and calculations of exposure and risk to determine whether the assessment is protective of public health and whether future risk assessment at Drake Chemical may need enhancement. ATSDR also considered other specific risk assessment issues relating to community health concerns.

Note: This health consultation evaluates the theoretical information contained in the trial burn risk assessment documents. ATSDR has not conducted evaluation of actual sampling or monitoring of the incinerator.

The following comments identify areas for which ATSDR's approach to evaluating exposure and associated risk would result in a more conservative or protective assessment than that performed in the Trial Burn Risk Assessment.
Drake Chemical - Final Release

- ATSDR considers an inhalation resting rate for a period of 8 hours, not 12 hours as used in the model. However, because of other conservative assumptions in the model, no increase in exposure would be expected.

- ATSDR considers an infant to be 10 kilograms (kg) in weight with an inhalation rate of 3.8 cubic meters (m³)/day. In addition, the inhalation rate for an adult (Female/Male) is 21/23 m³/day, and for a child the rate is 15 m³/day. While this is a more conservative approach, other conservative assumptions included in the model should prevent any expected increase in adverse health effects.

- ATSDR uses the maximum concentration values (highest value observed or predicted) for constructing dose and exposure for noncarcinogenic and carcinogenic effects. While the average concentration values used in the Trial Burn Risk Assessment may represent an underestimation of exposure, other conservative assumptions built into the model should prevent any increase in expected adverse health effects, even with the use of maximum concentrations.

- The values for dermal exposure to soil in the Trial Burn Risk Assessment appear low. The values ATSDR considers protective of public health are 30% area exposed and a total surface area of 3,500 centimeters squared (cm²) for ages 0 to 1 years with a body weight of 10 kg. A child (1-17 years) with a body weight between 30 and 50 kg would have a total surface area of 8,750 to 15,235 cm² and 28 to 30% area exposure. For adults (18-70 years) with a body weight of 70 kg, the total surface area is 19,400 cm² with 24% area exposed.8

- Compared with rates listed in the ATSDR Public Health Assessment Guidance Manual (Appendix E - Food Consumption Values), the ingestion and consumption rates for homegrown vegetables, beef, and dairy milk are low for both adults and children.8 For children ages 1-8 years, the milk consumption rate is 396 grams/day in the risk assessment compared with 466 grams/day in the ATSDR Public Health Assessment Guidance Manual.8 This represents an 18% difference in the milk consumption rate. The fish consumption rate appears to be adequate for both child and adult scenarios.

- Dermal absorption factors are chemical-specific. A default dermal absorption factor of 50% is low. ATSDR uses a dermal absorption factor of 100% for specific chemicals for which no absorption factor has been derived and considers that factor protective of health.

- For route-to-route extrapolation, ATSDR considers an additional uncertainty factor of 10 in the denominator of the reference dose equation to be more protective of health.

- For dermal reference doses, an uncertainty factor of 10 should be provided in the equation for the extrapolation; a gastrointestinal factor of 100% should be used when the rate of absorption for a specific chemical is not known.
ATSDR has provided the following comments that identify areas of extra conservatism in the Trial Burn Risk Assessment.

- The Trial Burn Risk Assessment and the Risk Assessment for Winter Months used scenarios that result in a very conservative (protective) evaluation. The assessments did not identify any exposures that would result in any adverse health effects. The areas identified above are areas where ATSDR might have employed more conservative assumptions in assessing potential risk. However, the Trial Burn Risk Assessment and the Risk Assessment for Winter Months did use more conservative approaches in the development of a number of exposure assumptions, including the following:

  - For the purpose of estimating inhalation exposure, it was assumed that the total mass of organic and inorganic (metals) chemicals emitted from the incinerator was in the vapor phase. In modeling deposition impact, it was assumed that the total mass emitted was in the particulate form.

  - For the sake of conservatism, the risk assessment assumes that a resident can be at two or more places at once, so that he or she can be simultaneously exposed in the areas of maximal air concentration and total surface area (organic) and mass-based (inorganic) soil deposition.

  - Air, soil, and surface water concentrations were calculated assuming that degradation and other loss mechanisms (with the exception of leaching, erosion, and runoff) did not occur.

  - All exposures associated with the trial burn process are considered subchronic (< 1 year). Chronic toxicity values, which are lower than subchronic values, were used to evaluate all oral/ingestion exposures.

  - All organic compounds, regardless of fat solubility and degradation rate, were included in the evaluation of the mother's milk consumption pathway.

  - No adjustment was made for differences in the fat content of whole body and edible portions of fish. Many contaminants preferentially accumulate in the fat and skin rather than in the traditionally edible portions of fish.

  - In estimating cancer effects, the concept of applying toxicity equivalence factors, which embodies a high degree of conservatism, was applied to all dioxin congeners and polycyclic aromatic hydrocarbons.
The comments below address specific community concerns related to the Trial Burn Risk Assessment.

- The soil cadmium concentration of 283 milligrams/kilograms (mg/kg) was reported and used in two 1995 risk assessments, but was omitted from the 1996 Trial Burn Risk Assessment. EPA provided documentation indicating that a calcium value of 283 mg/kg was transposed from the original laboratory data sheet to cadmium in a data table of the Final Phase III Remedial Investigation document, which was subsequently used in the 1995 risk assessments. Nonetheless, based on the risk assessment model assumptions, a cadmium concentration of 283 mg/kg in incinerator feed soil would not be expected to result in adverse health effects.

- Concerns have been expressed about the impact of incinerator emissions deposition on the public water supply. The Trial Burn Risk Assessment evaluated that exposure pathway, considering direct deposition and surface water runoff affecting Keller Reservoir, and does not indicate significant risk to the public. The assumptions used, such as no chemical loss/degradation during aerial transport; surface runoff; and surface water containment, treatment, and distribution, would overestimate drinking water concentrations. ATSDR considers that evaluation protective of public health.

Evaluation of Ambient Air Monitoring/Sampling Plans and Activities

Ambient air monitoring and sampling is conducted around the perimeter of the site and at locations in communities surrounding the site. Four monitoring stations are located at approximately 90° intervals around the perimeter of the site. Total non-methane organic compounds are monitored for 5 minutes out of every hour at each station. Specific action levels and response procedures have been established for that monitoring. Sampling is also conducted at each station, and samples are analyzed for semi-volatile organic compounds (SVOCs), metals, and total suspended particulates for a 24-hour period once every month. As a quality assurance check, an additional sampler (for SVOCs, metals, and total suspended particulates) is rotated between sampling locations monthly.

Four off-site sampling stations are located approximately a mile from the site toward the west, northwest, northeast, and southeast. Twenty-four hour samples are collected every sixth day and are analyzed for volatile organic compounds, SVOCs, metals, total suspended particulates, and dioxins and furans. The off-site ambient air sampling locations are shown on the map in Appendix A (designated “Hospital,” “School,” “Airport,” and “Township Bldg”).

Real-time meteorological data are collected from a 10-meter tower located at the northeastern edge of the site. Observations are recorded every 10 minutes and averaged on an hourly basis for wind speed and direction. Additional readings, including temperature, are recorded to determine wind stability classifications.
ATSDR contracted additional air sampling expertise to assist with our evaluation of the air sampling plans and activities at the Drake Chemical Superfund site. Sampling locations, sampling/monitoring equipment, analytes, analytical methods and detection limits, field and laboratory quality assurance/quality control activities, and field sampling/monitoring protocols were evaluated. The following documents were reviewed: 1) Trial Burn Risk Assessment (Vols. 1-3), 2) Risk Assessment Evaluation for Winter Months, 3) Perimeter Air Sampling Plan, 4) Off-Site Air Sampling Plan, 5) Monthly Air Quality Report (for months 9/96, 10/96, 11/96, 12/96, 1/97), and 6) Off-Site Air Quality Report (for months 8/96, 9/96, 10/96, 11/96, 12/96, 1/97). ATSDR has developed comments and recommendations based on the documents listed, the consideration of specific community health concerns, and the contractors’ review. The comments are separated into categories, with “major issues” being those that are most likely to affect public health decision making and therefore to require the greatest attention. “Minor issues” are those that, if addressed, may improve data quality or data evaluation, but are not expected to have a significant effect on the ability to make public health decisions. Under “other issues,” ATSDR has provided comments that address specific community concerns for which no recommended action was necessary.

Major Issues:
- Laboratory control samples are producing low recoveries for β-naphthylamine and surrogates for β-naphthylamine (4-aminobiphenyl) and Fenac (dichlorophenylacetic acid). Although laboratory data suggest that contaminant concentrations 10-20 times the method detection limit are not likely to be missed in the sampling and analysis, concentrations may be biased low. Thorough evaluation of laboratory quality control data, as indicated in monthly sampling reports, is inhibited by the reporting of recoveries as averages rather than reporting a recovery value for each sample.

- From the information reviewed, ATSDR is unable to determine the basis for selecting only three indicator compounds. Based on frequency of detection (≥35%) in site soils (Trial Burn Risk Assessment, Table 2A-1), four additional compounds (Chloroform, 1,2-dichloroethane, ethylbenzene, and xylenes) and their concentrations would appear to be suitable indicators.

Minor Issues:
- Field duplicate (collocated) samples have not been included in the monthly air sampling reports and have not been provided for ATSDR evaluation. ATSDR is uncertain whether the duplicate data are being reviewed in the evaluation of field quality assurance/quality control.

- The heat traced lines used in the analysis of nonmethane organic compounds at the perimeter are very long (300-900'), increasing the potential for chemical adsorption/desorption. Ambient probe tip challenges are conducted as a quality control check to determine the accuracy of the chemical analysis against a known dry gas standard. Any bias introduced by the adsorption/desorption of a compound is better determined by the use of a humidified gas standard.
• A storage trailer is located between Perimeter Air Sampling Station Number 1 and the Feed Handling Building/excavation areas and may obstruct sampling.24

Other Issues:
• There are community concerns about dust and fugitive emissions. However, several site operations are in place to minimize dust and fugitive emissions, including wetting soil and ash to suppress dust, handling feed soil in an enclosed structure with negative pressure, and maintaining the incinerator system under negative pressure.2 The perimeter air sampling/monitoring system is in place to alert site personnel when elevated levels are being detected, identifying the need for source identification and corrective actions to ensure protection of workers and the public.13 Such actions are appropriate and appear to be adequate.

Note: This health consultation evaluates the theoretical information contained in the trial burn risk assessment documents. ATSDR has not conducted evaluation of actual sampling or monitoring of the incinerator.

Conclusions

The risk assessment conducted to evaluate the incinerator trial burn process is highly conservative (protective), and it adequately achieves its intended purpose of characterizing risk for the trial burn. Although we have identified several assumptions that are different from those that ATSDR might employ and that might underestimate certain aspects of exposure assessment, they become insignificant when compared to the overall conservatism of the approach used. Therefore, the use of ATSDR’s assumptions would not significantly change predicted values of the Trial Burn Risk Assessment.

The air sampling plans, reports, and activities evaluated generally appear to be well conducted and provide adequate data for the public health evaluation of fugitive and stack emissions. There are, however, several issues that should be addressed in order to provide information that enables ATSDR to evaluate the public health implications of remedial operations more completely.

Recommendations

1. Correct any problems associated with the field collection of β-naphthylamine and the laboratory recovery of β-naphthylamine and Fenac surrogates that may be causing low control recoveries. A more appropriate sampling method and/or other surrogates should be used if recoveries of those compounds cannot be brought within acceptable limits.

2. Provide information on the basis for selection of indicator compounds and consider expanding the list of speciated analytes where feasible.
3. Provide analytical results of field duplicates for past (through September 1996) and future ambient air sampling.

4. Challenge the perimeter ambient air monitoring probe tips with a representative humidified gas standard to determine collection efficiencies.

5. Ensure that perimeter air sampling stations meet siting requirements, particularly Air Sampling Station Number 1, which may be located too close to the storage trailer.

Preparers of Report

Adele Childress, PhD, MSPH
Environmental Health Scientist
Petitions Response Branch
Division of Health Assessment and Consultation

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Environmental Health Specialist
Petitions Response Branch
Division of Health Assessment and Consultation

Frank Schnell, PhD, DABT
Toxicologist
Petitions Response Branch
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References

APPENDIX A

MAPPING AND DEMOGRAPHICS
Drake Chemical Co.
Lock Haven, PA
PAD003058047

Clinton County, Pennsylvania

Demographic Statistics
Within One Mile of Site*

<table>
<thead>
<tr>
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*Calculated using an area-proportion spatial analysis technique.
APPENDIX B

PUBLIC COMMENTS
The Agency for Toxic Substances and Disease Registry (ATSDR) did not receive any formal public comments to this document during the public comment release period (May 16, 1997 - June 18, 1997). ATSDR did, however, receive from the Environmental Protection Agency (EPA) written responses to the recommendations issued in this health consultation.

In an effort to address recommendation number 1, regarding the low control recoveries of β-naphthylamine and the surrogates for β-naphthylamine and Fenac, EPA is investigating the use of the Occupational Safety and Health Administration (OSHA) Method 93 for β-naphthylamine sampling at the perimeter and off-site stations as a potential replacement for the current sampling and analysis methods. ATSDR will evaluate the adequacy and appropriateness of any data resulting for this new method or from other corrections/modifications made to improve the quality of ambient air data.

In response to recommendations number 2 and 4, regarding the selection of indicator compounds and perimeter ambient air probe tip challenges, respectively, EPA has provided additional information and data supporting sampling/monitoring plans and procedures. ATSDR will evaluate this information and data further to determine whether other actions are necessary.

EPA has provided to ATSDR the analytical results of the ambient air sampling field duplicates requested in recommendation number 3. EPA has indicated that the Agency will either relocate Air Sampling Station Number 1 or move the nearby storage trailer to ensure compliance with siting requirements as noted in recommendation number 5.

EPA’s written responses, with associated support data (Table 1, Table 2, and 2-Naphthylamine/4-Aminobiphenyl Ambient Air Recovery Study), are attached in Appendix C.
APPENDIX C

U.S. ENVIRONMENTAL PROTECTION AGENCY'S RESPONSE TO RECOMMENDATIONS
Mr. Jeffrey A. Church, MPH, REHS
ATSDR
Petition Response Branch
Division of Health Assessment and Consultation
1600 Clifton Road (E28)
Atlanta, GA 30333

Dear Mr. Church:

Thank you for the opportunity to comment on the May 2, 1997 Health Consultation of the Drake Chemical Superfund Site, Thermal Destruction Facility in Lock Haven, PA. We have focused our comments on the recommendations presented in the Consultation. These comments were comprised and reviewed by the Drake site Team including EPA Region 3, the US Army Corps of Engineers, OHM Remediation Services and the Pennsylvania Department of Environmental Protection Williamsport Regional Office. Please feel free to contact me if you have any questions on these comments.

ATSDR Recommendation 1. Correct any problems associated with the field collection of β-Naphthylamine and the laboratory recovery of β-Naphthylamine and Fenac surrogates that may be causing low control recoveries. A more appropriate sampling method and/or other surrogates should be used if recoveries of those compounds cannot be brought within acceptable limits.

Response: A demonstration study has been performed which documents that if B-Naphthylamine were present or near the Pennsylvania Air Toxic Guidance level of 19μg/m³ the compound would be detected by the TO-13 sampling and analysis method. A copy of the study results is attached. β-Naphthylamine has not been detected in any of the samples collected during the sampling program.

During November 1996, sampling for β-Naphthylamine by NIOSH Method 5518 was added to the air monitoring program. This method has a detection limit of approximately 2μg/m³. β-Naphthylamine has not been detected in any of the samples collected during the sampling program.

We are currently investigating the use of OSHA Method 93 for β-Naphthylamine sampling at the perimeter and off-site stations as a potential replacement for the current TO-13 and NIOSH 5518 sampling. It is anticipated that OSHA Method

Celebrating 25 Years of Environmental Progress
93 will have an estimated detection limit of 0.02µg/m³. A method detection limit study will need to be performed to confirm the achievable MDL.

ATSDR Rec 2. Provide information on the basis for selection of indicator compounds and consider expanding the list of speciated analytes where feasible.

Response: The criteria used for the selection of volatile organic compounds for real time air monitoring at the Drake site were that:

a) they are representative of the classes of compounds found on site (see Table 2),

b) they were detected at a significant frequency in most if not all of the on-site matrices analyzed for the ROD (see Table 1),

c) they have established regulatory levels that can be used as alert/action levels (see Table 2),

d) they are volatile and stable enough to be readily separated from interferences via gas chromatography (see Table 2),

e) they are able to be monitored at the required sensitivity, on a real time basis with a commercially available gas chromatography system that can produce total (non-methane) and speciated volatile organic compounds values, and

f) they are capable of being monitored and reported on a real time basis in the cycle times needed.

Based on this selection criteria and the information in Tables 1 and 2, toluene, tetrachloroethene and chlorobenzene were chosen as the key indicator compounds.

Regarding the four compounds suggested by ATSDR:

Chloroform and 1,2-Dichloroethane are in the same compound class as tetrachloroethene but were not detected in the bore hole air or ambient air samples whereas tetrachloroethene was found in the ambient air samples. Ethylbenzene and Xylene are in the same chemical class as toluene but are less volatile than Toluene.

Based on this analysis we believe the compounds currently in use are appropriate, however, we would be glad to discuss this issue further with ATSDR should you believe it is necessary.

ATSDR Rec 3. Provide analytical results of field duplicates for past (through September 1996) and future ambient air sampling.

Response: Results of USACE field duplicate (QA) samples will be provided under separate cover.
ATSDR Rec 4. Challenge the perimeter ambient air monitoring probe tips with a representative humidified gas standard to determine collection efficiencies.

Response: We understand the concern that ATSDR raises regarding the potential for organic adsorption and desorption from the sample collection lines, however, there are several items that result in us believing this is not a significant issue with the system at the Drake site:

We are analyzing for compounds in the ppm range (action levels are: Toluene - 9.15 ppm, tetrachloroethene - 2.51 ppm & chlorobenzene - 7.78 ppm). Adsorption/desorption concerns are typically considered significant when monitoring in the ppb or ppt levels.

Adsorption/desorption typically does not have a significant impact in dynamic (high flow) systems but is considered a potential issue in "semi-static" systems such as closed vessels, bags and/or sorbents where prolonged contact can occur. The Drake system is a high flow sampling system.

Over the past two years the system has been tested many times by introducing calibration gas both at the instrument and at the probe tips and no indications of significant adsorption/desorption has been identified (eg. the system has repeatedly performed within the established quality control ranges.)

The use of heat traced lines was implemented as a precautionary, good sampling practice, to maintain volatile materials in the vapor state and prevent water vapor from condensing in the sampling lines which could impact system performance. Additionally, from time to time, probe tip and instrument challenges have been performed with the heat traced lines at ambient temperature and the system performance has complied with the established quality control limits.

Since calibration gases with humidity contents equal to those normally found in ambient air are not commercially available, a dry calibration gas would need to be humidified at the entry point to the system. This process would introduce an uncertainty due to the humidification and mixing process.

We would be glad to discuss this issue further if ATSDR does not agree that the current approach is acceptable.
ATSDR Rec 5. Ensure that perimeter air sampling stations meet citing requirements, particularly Air Sampling Station Number 1, which may be located too close to the storage trailer.

Response: We will relocate either the storage trailer or the sampling location to meet the requirements in our plan.

Again, thank you for the opportunity to comment on the consultation and we appreciate your involvement in the Drake Project.

Sincerely,

[Signature]

Gregg Crystal*, USEPA
Drake Project Manager
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<th>COMPOUND</th>
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<td>21,000</td>
<td>4,269</td>
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</tbody>
</table>

NL No level
--- Not Included in analysis
*** None detected
<table>
<thead>
<tr>
<th>CAS No.</th>
<th>COMPOUND</th>
<th>BOILING POINT (°C)</th>
<th>OSHA PEL/TWA (ug/M³)</th>
<th>TEST PIT (ug/Kg)</th>
<th>ON-SITE SEDIMENT (ug/Kg)</th>
<th>BOREHOLE AIR (ug/M³)</th>
<th>AMBIENT AIR (ug/M³)</th>
<th>VOLATILE COMPOUND</th>
<th>CLASS</th>
</tr>
</thead>
<tbody>
<tr>
<td>67-64-1</td>
<td>Acetone</td>
<td>56</td>
<td>1,780</td>
<td>YES</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
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<td>Aliphatic Ketones</td>
</tr>
<tr>
<td>78-93-3</td>
<td>2-Butanone</td>
<td>80</td>
<td>590</td>
<td>YES</td>
<td>YES</td>
<td>NA</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>591-78-6</td>
<td>2-Hexanone</td>
<td>127</td>
<td>20</td>
<td>YES</td>
<td>YES</td>
<td>NA</td>
<td>NA</td>
<td></td>
<td></td>
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<tr>
<td>108-10-1</td>
<td>4-Methyl-2-pentanone</td>
<td>128</td>
<td>205</td>
<td>YES</td>
<td>YES</td>
<td>NA</td>
<td>NA</td>
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</tr>
<tr>
<td>71-43-2</td>
<td>Benzene</td>
<td>80</td>
<td>3.25</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
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<td>Aromatic Hydrocarbons</td>
</tr>
<tr>
<td>108-88-3</td>
<td>Toluene</td>
<td>111</td>
<td>375</td>
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<td>YES</td>
<td>YES</td>
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<tr>
<td>100-41-4</td>
<td>Ethylbenzene</td>
<td>138</td>
<td>434</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(*)</td>
<td>Total Xylenes</td>
<td>(*)</td>
<td>434</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td></td>
<td></td>
</tr>
<tr>
<td>79-09-2</td>
<td>Methyl Chloride</td>
<td>40</td>
<td>1,765</td>
<td>YES</td>
<td>---</td>
<td>***</td>
<td>YES</td>
<td></td>
<td>Chlor Alkanes &amp; Chloro Alkenes</td>
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<tr>
<td>107-06-2</td>
<td>1,2-Dichloroethane</td>
<td>84</td>
<td>400</td>
<td>YES</td>
<td>---</td>
<td>***</td>
<td>***</td>
<td></td>
<td></td>
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<tr>
<td>75-55-5</td>
<td>1,1,1-Trichloroethane</td>
<td>74</td>
<td>910</td>
<td>YES</td>
<td>YES</td>
<td>***</td>
<td>***</td>
<td></td>
<td></td>
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<tr>
<td>79-01-6</td>
<td>Trichloroethene</td>
<td>87</td>
<td>259</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td></td>
<td></td>
</tr>
<tr>
<td>127-18-4</td>
<td>Tetrachloroethene</td>
<td>121</td>
<td>170</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td></td>
<td>Chlorinated Aromatic Hydrocarbons</td>
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<tr>
<td>67-66-3</td>
<td>Chloroform</td>
<td>61</td>
<td>9.78</td>
<td>YES</td>
<td>---</td>
<td>***</td>
<td>***</td>
<td></td>
<td></td>
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<tr>
<td>55-23-5</td>
<td>Carbon Tetrachloride</td>
<td>77</td>
<td>12.6</td>
<td>YES</td>
<td>***</td>
<td>***</td>
<td>***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>108-90-7</td>
<td>Chlorobenzene</td>
<td>132</td>
<td>350</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td></td>
<td></td>
</tr>
<tr>
<td>95-50-1</td>
<td>1,2-Dichlorobenzene</td>
<td>176</td>
<td>NL</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td></td>
<td></td>
</tr>
<tr>
<td>541-73-1</td>
<td>1,3-Dichlorobenzene</td>
<td>172</td>
<td>NL</td>
<td>YES</td>
<td>---</td>
<td>***</td>
<td>***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>108-46-7</td>
<td>1,4-Dichlorobenzene</td>
<td>174</td>
<td>460</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td></td>
<td></td>
</tr>
<tr>
<td>120-62-1</td>
<td>1,2,4-Trichlorobenzene</td>
<td>214</td>
<td>40</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NL: No level  
---: Not included in analysis  
***: None detected  
(*) 0- 95-47-6  
(*) p- 106-42-3 (138°C)  
(*) m- 108-38-3 (139°C)
2-NAPHTHYLAMINE/4-AMINOBIPHENYL
AMBIENT AIR RECOVERY STUDY
(10% DIETHYL ETHER/HEXANE)

Prepared for:
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Cary, North Carolina 27513

March 20, 1997
1.0 INTRODUCTION

On February 18, 1997, OHM Remediation Service Corp. directed MRI to implement a defined Scope of Services, based upon the conclusions of the previous study entitled: *Ambient Air Method: 2-Naphthylamine and 4-Aminobiphenyl Ambient Air Recovery and Demonstration Extension Study*. This new directive requires MRI to evaluate the performance of the PUF/XAD-2 cartridge for quantifying concentrations of 2-naphthylamine and 4-aminobiphenyl approximately equal to the ATG value, one-half the ATG value and one tenth of the ATG value in aerated and non-aerated cartridges, using 10 percent diethyl ether/hexane as the extraction solvent.

2.0 SAMPLE PREPARATION

In accordance with the approved Scope of Services, MRI laboratory personnel prepared a total of 10 filter/PUF/XAD-2 cartridges for the 10 percent diethyl ether/hexane study. The following cartridges were prepared (see also Table 1):

- A total of ten filter/PUF/XAD-2 sorbent cartridges were pre-cleaned and prepared with methylene chloride.

- In order to prepare solutions containing the high concentrations of 2-naphthylamine and 4-aminobiphenyl, neat analytes were purchased from Chem Service and weighed to prepare stock solutions. The target concentrations of the stock solutions were 5,000 μg/mL. The actual concentrations prepared were 4,910 μg/mL for 2-naphthylamine and 4,990 μg/mL for 4-aminobiphenyl in methylene chloride.

- Four of the cartridges were spiked with 2-naphthylamine and 4-aminobiphenyl at ~6,000 μg (high-level, ~ equal to the ATG value), two were spiked at ~3,000 μg (mid-level, ~ equal to one-half of the ATG value), two were spiked at ~600 μg (low-level, ~ equal to one-tenth of the ATG value), and two were not spiked.
### Table 1. Summary of Ambient Air 10% Diethyl Ether/Hexane Study Spiking and Aeration Scheme

<table>
<thead>
<tr>
<th>Sorbent Cartridge Number</th>
<th>Sample Description</th>
<th>Actual Spiking Levels, µg</th>
<th>Aeration Volume, scm</th>
<th>Sampling Location</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>2-naphthylamine</td>
<td>4-amino-biphenyl</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>LCS</td>
<td>5,990</td>
<td>5,988</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>FAS</td>
<td>5,990</td>
<td>5,988</td>
<td>351.4</td>
</tr>
<tr>
<td>3</td>
<td>FAS</td>
<td>5,990</td>
<td>5,988</td>
<td>312.9</td>
</tr>
<tr>
<td>4</td>
<td>LCS</td>
<td>2,995</td>
<td>2,994</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>FAS</td>
<td>2,995</td>
<td>2,994</td>
<td>336.1</td>
</tr>
<tr>
<td>6</td>
<td>LCS</td>
<td>589</td>
<td>599</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>FAS</td>
<td>589</td>
<td>599</td>
<td>354.9</td>
</tr>
<tr>
<td>8</td>
<td>FAS/NS</td>
<td>0</td>
<td>0</td>
<td>347.9</td>
</tr>
<tr>
<td>9</td>
<td>FS</td>
<td>5,990</td>
<td>5,988</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>MB</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

1 LCS = laboratory control sample; FAS = field aerated sample; NS = no spike; FS = field spike (no aeration); MB = method blank.

2 NA = non-applicable (samples were not aerated with ambient air and remained at MRI's laboratory); OFF/C = sampling performed at off-site location (Castanga Township); ON/4 = sampling performed at perimeter location at Drake site (Station #4); ON/3 = sampling performed at perimeter location at Drake site (Station #3); OFF/S = sampling performed at off-site location (school).
Two high-level, one mid-level, one low-level, and one cartridge with no spikes were
wrapped in hexane rinsed foil, placed in aluminum shipping tubes, shipped to the
Drake site, aerated with ambient air for 24 hours following Compendium Method
TO-13 procedures, recovered, and shipped back to the laboratory under dry ice for
analysis.

- The remaining spiked cartridges were not shipped to the field and were stored in a
  laboratory refrigerator at 4°C until analysis. These cartridges served as laboratory
  control samples (LCS).

3.0 SAMPLING

All five designated field aerated sample (FAS) filter/PUF/XAD-2 cartridges shipped
from MRI's laboratory were received at the Drake site intact. As indicated in Table 1,
ambient air was pulled through the cartridges at either perimeter or off-site locations in
accordance with procedures specified in the Corps approved Perimeter Air Sampling Plan
(PASP) and Off-site Ambient Air Monitoring Plan (OASP).

Between February 26 and 27, 1997, the special spiked (high, mid- and low level)
filter/PUF/XAD-2 samples were operated without incident for approximately 24 hours. The
amount of air sampled through each of the sorbent cartridges exceeded 310 scm. At the end
of the sampling period, all sample cartridges and filters were returned to their shipping
containers and shipped (under dry ice), along with chain-of-custody, to MRI's laboratory for
analysis.

4.0 ANALYSIS

4.1 Sample Extraction

All samples were extracted in a Soxhlet extractor for 18 hours. The extraction solvent
was 10 percent diethyl ether/hexane. The extracts were only partially concentrated using
Kuderna-Danish glassware and diluted to known volumes in volumetric flasks for the initial
analysis based upon estimated recoveries for the target analytes. The extracts of the
cartridges spiked with ~6,000 µg of 2-naphthylamine and 4-aminobiphenyl were adjusted to
a final volume of 100 mL, spiked with internal standards, of which a 1.0-mL aliquot was
placed in a GC sample vial for GC/MS analysis. The extracts of the samples spiked with
~3,000 µg of 2-naphthylamine and 4-aminobiphenyl were adjusted to a final extract volume of 50 mL, spiked with internal standards, of which a 1.0-mL aliquot was placed in a GC sample vial for GC/MS analysis. The extracts of the samples spiked with ~600 µg of 2-naphthylamine and 4-aminobiphenyl were concentrated to a final volume of 10 mL, internal standards added, of which a 1.0-mL aliquot was placed in a GC vial for GC/MS analysis. The final extract volume for Sample FAS/NS (Cartridge #8) and MB (Cartridge #10) was 1-mL, internal standards added, and placed in a GC sample vial for GC/MS analysis. From each of the GC sample vials, ~1 µL aliquot was taken for analysis.

The samples that had been spiked with ~6,000 µg of 2-naphthylamine and 4-aminobiphenyl and then aerated at the Drake site yielded a dark brown color extract product while those that were not aerated were slightly yellow extract product. The ~3,000 µg spiked sample and ~600 µg samples that were aerated at the Drake site were also quite dark in color. In contrast, sample FAS/NS (Cartridge #8) and MB (Cartridge #10) yielded clear extract products.

Sample FAS/NS (Cartridge #8) and MB (Cartridge #10) were spiked with 5.0 µg of 4-aminobiphenyl just prior to extraction as required by the Corps approved PASP and OASP.

4.2 Sample Analysis

The samples were analyzed by GC/MS using the Corps approved PASP/OASP (Compendium Method TO-13 analysis with 10 percent diethyl ether as the extraction solvent) and EPA Method 8270 criteria for internal standards and calibration acceptance criteria. Each extract except sample FAS/NS (Cartridge #8) and MB (Cartridge #10) were spiked with 20 µg/mL of the Method 8270 internal standards. Sample FAS/NS (Cartridge #8) and MB (Cartridge #10) were spiked with 2.0 µg/mL of internal standards and analyzed according to the Corps approved PASP/OASP. The extracts were analyzed on a 30-m x 0.32-mm ID DB-5 fused silica capillary column with a 1.0-µm film thickness. The temperature was programmed from 70°C to 300° at 10°C/min. The calibration range for the target analytes was from 2.0 to 80 µg/mL and 0.1 to 5.0 µg/mL for FAS/NS (Cartridge #8) and MB (Cartridge #10).
5.0 QUALITY CONTROL (QC)

All aspects of the sampling and analysis followed the procedures outlined in the Corps approved OASP/PASP and delineated in EPA Compendium Method TO-13, using 10 percent diethyl ether in hexane as the extraction solvent. All QC normally required was incorporated into this study.

6.0 RESULTS

The results of the study are presented in Table 2. Table 2 illustrates that 2-naphthylamine was detected in all the spiked samples. The recoveries were consistently higher in samples that were not aerated compared to the same spike level in aerated samples. The recoveries of 2-naphthylamine and 4-aminobiphenyl in the aerated samples decreased as the spiking levels decreased, but still yielded 20 percent recovery or greater at a spike level of 10 percent of Pennsylvania ATG value (1.9 μg/scm corresponding to a total spike level of 600 μg). The data demonstrate that if 2-naphthylamine is present in the ambient air at levels approaching the Pennsylvania ATG, the compound would be detected in the air monitoring samples using the procedures described in the Corps approved PASP/OASP with 10 percent diethyl ether as the extraction solvent.

The sample data for FAS (Cartridge #3) was not consistent with the other data. This sample was spiked, aerated, and analyzed in the same manner as FAS (Cartridge #2), but yielded less than one-half the recovery of FAS (Cartridge #2). The reason for the significantly lower recovery is not known.

The recoveries using 10 percent diethyl ether/hexane were only slightly lower than the recoveries achieved in the previous study using methylene chloride as the extraction solvent. For example, with FAS (Cartridge #5) the recovery of 2-naphthylamine in the aerated sample was 55.1 percent, whereas it was 56 percent with methylene chloride as the extraction solvent in the previous study.

Since these samples were extracted with 10 percent diethyl ether/hexane rather than methylene chloride, the data do have a direct bearing on the air monitoring data obtained up until this time at the Drake Chemical Superfund site. Based on the results of this study, 2-naphthylamine would have been detected at one-tenth the PA ATG value if present in the ambient air at the site.
TABLE 2. CHEMICAL ANALYSIS RESULTS FOR 2-NAPHTHYLAMINE/4-AMINOBIPHENYL AMBIENT AIR RECOVERY STUDY (10% DIETHYL ETHER/HEXANE)

<table>
<thead>
<tr>
<th>Sorbent Cartridge Number</th>
<th>Sample Description</th>
<th>Actual Spiking Levels, µg</th>
<th>Recovery, %&lt;sup&gt;4&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>2-naph-</td>
<td>4-amino-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>thylamine</td>
<td>bipheny</td>
</tr>
<tr>
<td>1</td>
<td>LCS</td>
<td>5,990</td>
<td>5,988</td>
</tr>
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<td>FAS</td>
<td>5,990</td>
<td>5,988</td>
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<td>FS</td>
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<td>5,988</td>
</tr>
<tr>
<td>10</td>
<td>MB</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

<sup>1</sup> LCS = laboratory control sample; FAS = field aerated sample; NS = no spike; FS = field spike (no aeration); MB = method blank.

<sup>2</sup> NA = not applicable.

<sup>3</sup> Cartridges #8 (FAS/NS) and #10 (MB) were spiked with 5.0 µg of 4-aminobiphenyl (extraction surrogate) just prior to extraction according to Corps approved PASP/OASP.

<sup>4</sup> Percent recovery based on the actual spike level (stock standard concentration time µL spiked).
FACT SHEET

ATSDR's Health Consultations on Drake Chemical Thermal Destruction Facility

The Agency for Toxic Substances and Disease Registry (ATSDR) developed this fact sheet to provide communities near the Drake Chemical Superfund Site information about the two health consultations on the site because the consultations are very technical. If you need more information about the site or about the agency and its activities, ATSDR staff will be available to talk to you at the Clinton County Court House August 19 from 5 p.m. to 8 p.m. and August 20 from 9 a.m. to noon. You can also call the agency number at the end of this fact sheet.

Why is ATSDR involved at Drake?
ATSDR conducted this technical review of the site-related documents because community members around the site raised concerns about the risk assessment, the ambient air monitoring system, operation of the incinerator, and the modeling and weather data the Environmental Protection Agency (EPA) used for the trial burn period. ATSDR has not evaluated actual sampling or monitoring of the incinerator.

What does Health Consultation #1 cover?
- It evaluated the incinerator trial burn risk assessment to determine whether its approach and assessments are considered to be protective of public health.
- It also reviewed the ambient air monitoring/sampling plans and activities to determine whether they would provide appropriate and adequate data for the evaluation of public health hazards.

What did ATSDR conclude in Health Consultation #1?
- The incinerator trial burn risk assessment adequately characterizes the risks associated with the trial burn, and its assessments are considered sufficient to protect public health.
- The ambient air sampling plans, reports, and activities evaluated appear to be well conducted and to provide adequate data for the public health evaluation of site/incinerator-related emissions.

What did ATSDR recommend to EPA in Health Consultation #1?
- Improve or change sampling and/or analytical methods for two site-related chemicals (β-naphthylamine and Fenac) so that very low levels can be accurately detected.
- Provide information regarding the basis for the selection of chemicals being instantaneously monitored at the site perimeter. ATSDR has also requested air sampling results that were taken by two separate samplers at the same time and locations but were analyzed by different laboratories.
- Examine a different procedure to test the accuracy of the instantaneous perimeter monitors.
- Ensure that the perimeter air sampling stations are not obstructed.

What does Health Consultation #2 cover?
- It evaluated the incinerator design and operating conditions and the modeling that was done to predict ground-level concentrations of stack emissions during the trial burn period.
What did ATSDR conclude in Health Consultation #2?

- There is a need for new modeling before restarting the incinerator for full operation; modelers should consider all seasons of the year and a longer history of meteorological data.

- The incinerator design includes a number of safety features that will help assure the proper operation of the incinerator. Good operation does not depend solely on the operator on duty “doing the right thing”; the incinerator will automatically shut off the waste feed when the key operating conditions exceed specific numbers or when certain conditions occur. All these conditions are continuously monitored and recorded by a computer or other instruments. Our staff have concluded that all the key operating conditions that are likely to affect emissions and thus cause public exposure are included in the automatic waste feed shut-off system and are continuously monitored and recorded.

- Four events could result in an emergency situation that would release extremely hot incinerator gases at ground level (and potentially cause a fire or explosion) if the safety valve (thermal relief valve or TRV) is not opened. If one of these events occurs, it is much more protective of the public and workers to release those hot gases (2,600°F) through the TRV stack than to allow a catastrophic equipment failure and the subsequent release of the gases at ground level. ATSDR concurs with EPA and Pennsylvania staff in approving the use of the TRV if one of the designated events occurs.

- To evaluate the potential public health impacts, ATSDR needs actual stack emission data to predict emissions that may occur if the incinerator does not operate properly and the TRV opens.

What did ATSDR recommend to EPA in Health Consultation #2?

- Conduct new modeling of the stack emissions measured during the trial burn and risk burn. We also recommended that 5 years of meteorological data be used in the modeling.

- Reevaluate the assumptions used in projecting the emissions that will be released when operating conditions cause the TRV to open.

What can be expected to follow?

- EPA has already responded to the recommendations requested in the public comment version of Health Consultation #1, and those responses are included in an appendix of the final version. ATSDR will further evaluate and discuss with EPA issues regarding the sampling/analytical methods, selection of chemicals for monitoring, and testing of instantaneous monitors.

- After the public comment period on Health Consultation #2 closes, ATSDR will address all comments received and issue the final Health Consultation #2.

- When the incinerator test data, ambient air monitoring data, and new modeling are available, ATSDR staff will review these data and provide a consultation evaluating whether air concentrations during the trial burn period might have impacted public health. ATSDR will also address community concerns regarding specific operating incidents (such as TRV releases) that occurred during the trial burn. Until we have data showing what chemicals (and concentrations of those chemicals) the public was exposed to, it is not possible to say what the public health impact may be or to address adequately the communities’ concerns regarding specific events that occurred during the trial burn period.

CALL-- ATSDR at 1-800-447-4784 then dial 329-1175 to leave a message.