PETITIONED HEALTH CONSULTATION NO. 3

Thermal Destruction Facility
Air Emissions Evaluation

DRAKE CHEMICAL
LOCK HAVEN, CLINTON COUNTY, PENNSYLVANIA
CERCLIS NO. PAD003058047

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BACKGROUND AND STATEMENT OF ISSUES

This health consultation is the third in a series the Agency for Toxic Substances and Disease Registry (ATSDR) is conducting to address public health issues relating to the Drake Chemical Superfund site in Lock Haven, Pennsylvania. The consultation evaluates three sets of air data: 1) on-site perimeter and off-site ambient air data collected before the trial burn (September 1995 - February 1996, Appendix D), 2) stack emissions, on-site perimeter, and off-site ambient air data sampled during the trial burn period (September 1996 - February 1997), and 3) on-site perimeter data (August - December 1997) and off-site ambient air data (June - September 1997) collected after the trial burn period. In Health Consultation #1 and Health Consultation #2, ATSDR has previously evaluated information contained in the trial burn risk assessment including, ambient air sampling/monitoring plans and activities, and incinerator operational plans and trial burn protocols. ATSDR refers readers to those documents for general background information and detailed discussions of those issues.

The purpose of this final health consultation is to determine whether the levels of stack emissions and fugitive emissions produced at the Drake site during the trial burn period were sufficient to cause any adverse health effects in the surrounding community. ATSDR’s evaluation will also indicate whether future adverse health effects would be likely if the incinerator operation produced similar emissions during a projected 13-16 months of full burn operation. This health consultation was released for public comment in March 1998. Public comments and ATSDR’s responses are provided in Appendix E.

DISCUSSION

Evaluation of Ambient Air Data Quality

ATSDR’s contractors (Eastern Research Group, Inc., Morrisville, NC) evaluated quality control data for the ambient air analytical data that were collected by the Environmental Protection Agency (EPA) and Army Corps of Engineers’ contractors during the trial burn period. That evaluation covered both the site perimeter and community ambient air sampling data. The following discussions are based upon ATSDR’s review and evaluation of the contractor’s findings.

All necessary analytical and quality control information was properly documented. The laboratory analytical quality control data reviewed reveals appropriate and acceptable quality control measures. Laboratory equipment performed appropriately with regard to calibration and tuning criteria.
5-naphthylamine and Fenac were not detected in air samples at the current detection limit of 0.001 μg/m³ due to poor recoveries using the EPA TO-13 method of detection. In addition, low recoveries, below acceptance criteria, were noted for several surrogate compounds (particularly surrogates for β-naphthylamine and Fenac) despite evidence that the analytical method was appropriately executed in the laboratory. ATSDR noted this issue in Health Consultation #1 and recommended that efforts be made to improve the recoveries or select a more appropriate method. The National Institute for Occupational Safety and Health (NIOSH) method 5518 was used to monitor for β-naphthylamine from November 3 to November 25, 1997. The detection limit set for β-naphthylamine using method 5518 was 2.0 μg/m³ compared to a detection limit of 0.001 μg/m³ for the TO-13 method. ATSDR does not consider the NIOSH 5518 method to be acceptable, since it is 2,000 times less sensitive in detecting β-naphthylamine than the TO-13 method which is only 20 times higher than the risk-based concentration for cancer (RBCc) of 0.000048 μg/m³. Therefore, ATSDR suggested that a different sampling and/or analytical method for β-naphthylamine should be investigated by EPA. The EPA tested a modified Occupational Safety and Health Administration (OSHA) 93 method during laboratory and field trials, collecting air samples from December 1997 to February 1998.

EPA sampling results demonstrated that while β-naphthylamine and its surrogate 4-aminobiphenyl were not detected in air samples on or off-site, control samples spiked with known quantities of either β-naphthylamine or its surrogate, were detected. ATSDR considers the OSHA 93 method to provide improved sampling and analytical methodology required to detect potential contaminants present with an adequate method detection limit of 0.001 μg/m³ and a practical detection of 0.02 μg/m³. ATSDR considers that exposure to 0.02 μg/m³ β-naphthylamine for 16 months would not represent a carcinogenic hazard to residents living within a mile of the Drake site (Appendix C). However, a detection limit of 0.001 μg/m³ for β-naphthylamine would offer a larger margin of safety. ATSDR considers a detection limit of 0.02 μg/m³ set for Fenac, a noncarcinogen, to be protective of public health.

### Ambient Air Monitoring of Emissions from the Drake Chemical Site

Ambient air monitoring continues to be conducted and evaluated for stack emissions from the incinerator at four stations (Appendix A) within the communities surrounding the Drake site. These stations are located approximately one mile from the site and designated Hospital (west), School (northwest), Airport (northeast), and Township building (southeast). In addition, four air monitoring stations are located on the Drake site perimeter (Appendix B) at approximately 90° intervals and are designated stations 1, 2, 3, and 4. These sampling locations primarily evaluate possible fugitive emissions from the Drake site. Samples from the community were collected for a 24-hour period every sixth day and analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), metals, dioxins and furans, and total
suspended particulates (TSP). Site perimeter samples were collected for a 24-hour period once every month and analyzed for semi-volatile organic compounds, TSP and metals. In addition, real-time monitoring for VOCs was conducted at the perimeter stations for 5 minutes out of every hour on a continuous basis during site operations.

Ambient air, sampled from all eight locations, was collected in the breathing zone to identify chemical concentrations to which people in those or adjacent areas may have been exposed. Sampling and monitoring at the perimeter stations focused on fugitive emissions, which resulted primarily from direct volatilization and wind blown dust from the site. It is intended to detect concentrations of contaminants that may exist on-site and may be migrating off-site.

Community sampling locations were chosen based on models developed to determine areas of maximum deposition of incineration products and public accessibility. Monitors are intended to detect the maximum concentration of contaminants that reach ground level after exiting the incinerator stack. While all of the sampling stations were targeting the incinerator and site-related activities, the impact from other air pollution sources was also detected. To determine the level of air pollution from existing sources, sampling was conducted prior to the initial operation of the incinerator and after completion of the trial burn. In this consultation, ATSDR has not only evaluated the impact of ambient air contamination during the trial burn process, but has also compared that data with air sampling results for time periods prior to the incinerator's initial operation and after the trial burn period to determine the incinerator's overall impact on local air quality.

ATSDR evaluated site perimeter ambient air data, off-site ambient air data, and stack emissions data. Chemicals of concern were selected for further toxicological evaluation. A "chemical of concern" (COC) is defined as any chemical that is detected in air at concentrations that exceed one or more of ATSDR's comparison values (CVs). These comparison values are health guidelines, which are based on toxicological information about the chemical, assumptions about the rate of exposure, and include ample safety factors to ensure protection of public health, including sensitive populations. However, the presence of a contaminant at concentrations that exceed one of these conservative health guidelines does not indicate the existence of a public health hazard. ATSDR's comparison values are used to screen contaminant concentrations at a site and to select "chemicals of concern" for further evaluation by agency health scientists.

Off-Site Ambient Air Data Evaluation

Analysis of the off-site ambient air data demonstrated that none of the 22 COCs represents a public health hazard. Only the Cancer Risk Evaluation Guides (CREGs) or Risk-Based Concentrations (RBCc) for cancer were exceeded by the average and/or the maximum concentrations of these COCs. However, CREGs and RBCc are based on lifelong exposure,
while the burn is projected to last for 16 months. In addition, cancer-based CVs assume the absence of a threshold, which makes them extremely conservative. More importantly, these same chemicals (and no others) exceeded the same comparison values before the test burn of the incinerator was conducted. Note that a similar situation existed with the dioxin/furan toxicity equivalency quotients (TEQs). Of the 22 contaminants selected for further evaluation, 17 were not actually detected but were selected because the applicable detection limits themselves exceeded cancer guidelines. There was no detectable difference between pre-burn, trial burn, or post trial burn air data. Average concentrations of benzene and arsenic and the maximum concentration of benzo(a)pyrene were actually higher before the test burn. Only the average concentration of dibenzo(a,h)pyrene at station #1 (the airport) was higher during the test burn than before it, and this was due to a single high value.

Ambient air data collected from the four off-site locations identified several dioxin-like compounds. The dioxin-like compounds detected included various chlorodibenzop-dioxins (CDDs) and chlorodibenzofuran (CDFs). The concentrations of all of the dioxin-like compounds detected at each of the 4 monitoring stations were expressed in terms of the most toxic congener, 2,3,7,8-tetrachlorodibeno-p-dioxin or TCDD, using the Toxicity Equivalency Factor (TEF). TEFs are conservative estimates of relative toxicity. The resulting composite concentrations before, during, and after the test burn, were expressed as Toxicity Equivalency Quotients (TEQs) and were then compared to EPA Region III's Risk-Based Concentration (RBCc) for potential cancer effects (5.4 X 10^-8 μg TCDD/m^3, or 0.000054 ng TCDD/m^3, or 0.054 pg TCDD/m^3). This RBCc is specific for the most toxic congener 2,3,7,8-TCDD and applying it to all dioxin-like compounds as total TEQs, introduces additional conservatism into the assessment.

There was no significant difference between the background values and the trial burn data, suggesting that the Drake incinerator had no discernable impact on background concentrations of dioxin-like compounds in the air at Lock Haven. In fact, total TEQs actually declined, relative to background levels, during the risk burn (Appendix D) at 3 of the 4 off-site ambient air monitoring stations. This suggests that the impact of the Drake site incinerator may be smaller than the seasonal variation of background CDD/CDF concentrations at Lock Haven (the background data for CDD/CDF was collected between January and August 1996, while the risk burn data was collected between September 1996 and February 1997). However, no matter what the actual seasonal variation in background dioxin levels may be, the available data indicate that the contribution of the Drake incinerator is of no toxicological significance.

Site Perimeter Ambient Air Data Evaluation

Four contaminants (arsenic, β-naphthylamine, cadmium, and nickel) analyzed for in the site perimeter ambient air monitoring program were selected for further toxicological evaluation. Benzo(a)pyrene also exceeded its cancer based RBCc, but was not selected as a site-related
chemical of concern because this value was exceeded only at stations 1 and 3, and only before
the risk burn. At the levels detected, none of these four contaminants were determined to
represent a public health hazard. Only CREGs or RBCs for cancer (RBCc) were exceeded by
the average and/or the maximum concentrations. However, CREGs and RBCc's are based on
lifelong exposure, while the burn is projected to last for only 16 months. In addition, cancer-
based comparison values assume zero-threshold, which makes them extremely conservative.
Moreover, these four contaminants exceeded the same CVs before the risk burn, suggesting
that the Drake incinerator was not a significant contributor to these levels, but may reflect soil-
disturbing activities at the Drake site and would be expected to be limited in duration.
ATSDR has concluded that, due to the low magnitude and duration of projected exposures at
Lock Haven, none of these four contaminants selected as chemicals of concern represent a
potential hazard to public health.

β-naphthylamine was not detected on-site using the EPA TO-13 method. It is a COC only
because 1/2 the detection limit (the default concentration used by EPA for non-detected
chemicals) was a higher concentration than the RBCc of 0.000048 μg/m³. β-naphthylamine
was not detected on-site using the same detection limit for measuring off-site emissions. The
identical assertions concerning cancer risks apply equally well on and off-site.

The average concentrations of arsenic, cadmium, and nickel were actually lower at stations 1,
2, and 4 during the burn than before it. Concentrations of all three metals and the TSP level
increased at station 3 during the trial burn, but are not at levels of health concern. The
increase in metals and TSP is probably due to emissions from the bottom ash and emissions
may be limited by wetting or covering the bottom ash storage area.

Stack Emissions Air Data Evaluation

Contaminants exiting the stack are quickly dispersed into the environment, reducing the
concentrations by various amounts, depending on where a person is located and weather
conditions. Residents are not breathing air contaminants at concentrations exiting the stack
and their levels are not directly relevant to the potential for adverse health effects. Therefore,
ATSDR prefers to use ambient air data rather than stack data in the assessment of potential
public health hazards, since no one will be directly exposed to stack gases. ATSDR evaluated
the health implications of the stack data as a "worst-case" exposure potential, and used it to
identify contaminants exiting the stack that are not monitored for in ambient air at the site
perimeter or off-site within the community.

To assess stack emissions, two risk burns were conducted during the trial burn operation of the
incinerator at the Drake site. Data from Risk Burn No. 1 was collected from January 20-22,
1997 and data from Risk Burn No. 2 was collected from February 7-9, 1997. ATSDR has
reviewed and evaluated this stack testing data. Air samples were collected from the incinerator
Drake Chemical Company

stack to determine whether concentrations of chemicals present during the trial burn (incineration of site soil spiked with known quantities of specific chemicals) and the risk burn (incineration of site soil) would be at levels of public health concern.

Data indicated that the concentrations of all inorganics, VOCs, pesticides, polychlorinated biphenyls (PCBs), and other SVOCs detected in the stack are substantially lower than their respective Threshold Limit Values (TLVs), even before these substances left the stack and were diluted in the ambient air. Several substances detected in the stack gases did exceed their respective CREGs, and chlordane exceeded its chronic Environmental Media Evaluation Guide (EMEG). However, the projected duration of exposure is for approximately 16 months and comparison values are based on lifetime exposures for evaluating either ground level ambient air or stack emissions exposures. Therefore, the CREG is not used in this evaluation.

Benzene (average concentration 335 µg/m³) was the only detected substance that exceeded a non-chronic comparison value at the stack. Benzene exceeded its acute EMEG (50 ppb or 160 µg/m³), as well as its CREG (0.1 µg/m³), but only 10% of its TLV (1 ppm or 3.2 µg/m³, OSHA), even before leaving the stack. In off-site ambient air during the trial burn, benzene concentrations (0.2-0.95 ppb) were less than 2% of ATSDR’s acute EMEG or 50 ppb and less than 0.1% of the OSHA TLV (1 ppm or 3.2 µg/m³). No inhalation values are available for calcium, magnesium, potassium, or sodium, however, these essential nutrients would not be chemicals of toxicological concern. Therefore, ATSDR concludes that none of the detected substances would be likely to produce adverse health effects at the concentrations detected in ambient air (i.e., in the breathing zone) or under the unlikely “worst-case” scenario of breathing stack gases directly at the stack.

Other Ambient Air Issues

Action Levels

Real time fence line air monitoring is being conducted at 4 stations around the site for total VOCs. If total VOC concentrations exceed 1 ppm, air samples from each station will be analyzed using an on-site gas chromatograph for the following three “indicator compounds”; toluene, tetrachloroethene, and chlorobenzene. If any of these compounds exceed their individual action level (See table), site activities will stop until the source is found and abated.

Previous soil, sediment, and on-site air data were reviewed by ATSDR to determine if appropriate compounds were selected for site perimeter “indicator compounds” to monitor for fugitive VOC emissions from on-site activities. The data reviewed was not sufficient to adequately determine if other indicator compounds would be more appropriate. To ensure that VOCs other than the indicator compounds are not exceeding levels of health concern, ATSDR recommends the following:
1) If total VOC concentrations exceed 1 ppm for 10 - 15 minutes, a grab air sample should be collected and sent for laboratory analysis of VOCs (i.e., EPA method TO-14 or equivalent). Review of this data should ensure that the current indicator compounds and their respective action levels are appropriate and protective.

2) If total VOC concentrations exceed 5 ppm for 10 - 15 minutes, in addition to collecting a grab sample, the source of VOCs should be determined and stopped. This may include covering exposed soils, stopping work, etc.

3) If any of the indicator compounds reach 50% of their action levels, the source of VOCs should be determined and stopped. This may include covering exposed soils, stopping work, etc.

4) If any of the indicator compounds reach or exceed their action levels, on-site activities should cease until the source is found and abated. Ambient air samples should be analyzed for VOCs, SVOCs, metals, and particulates, to identify and determine the maximum concentration of the contaminants present at the perimeter of the site.

<table>
<thead>
<tr>
<th>Perimeter Air Action Levels and Corresponding Actions</th>
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<tbody>
<tr>
<td>Chemical</td>
</tr>
<tr>
<td>Total VOCs</td>
</tr>
<tr>
<td>Toluene</td>
</tr>
<tr>
<td>Tetrachloroethene</td>
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<tr>
<td>Chlorobenzene</td>
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</tbody>
</table>

* Collect grab air sample for VOC laboratory analysis

** Collect air samples for VOCs, SVOCs, metals, and particulates for laboratory analysis

Fugitive Emissions (Air Blown Dust)

Residents of Lock Haven have expressed concern over the potential exposure from contaminated soil blown off-site during periods of soil excavation on the Drake site and occasional high winds that may blow soil off-site from uncovered soil stock piles. ATSDR reviewed the on-site and off-site ambient air data for total suspended particulates (TSP).
The maximum on-site TSP for monitoring stations 1, 2, and 4 was approximately two-three times higher before the trial burn than during the trial burn period, but did not exceed EPA's National Ambient Air Standard for PM$_{10}$ of 150 μg/m$^3$, based on a 24 hour average not to exceed more than 3 times in a year. A maximum TSP of 436.4 μg/m$^3$ was detected on-site only at station 4 and before the trial burn period. Only at station 3 and for one sampling date during the trial burn period was the maximum TSP (199.2 μg/m$^3$) above the comparison value. The TSP exceeded 150 μg/m$^3$ only during one air sampling period (May 5, 1997) at station 4, after the trial burn period ended. No difference in the maximum TSP was observed either before or during the trial burn period at off-site air monitors located at the hospital, school, or in Castanea. Only the maximum TSP monitored at the airport, increased during the trial burn period. It is unlikely that any health effects would be expected, from the total suspended particulate levels detected at the perimeter or off-site within the community.

CHILD HEALTH

Children may be at greater risk than adults from certain kinds of exposures to hazardous substances emitted from waste sites. ATSDR has evaluated the likelihood that children living near the Drake Chemical site would be exposed to contaminants at levels that may affect their health. Ambient air data reviewed to date did not demonstrate an exposure of health concern during the trial burn period at the Drake site and health effects are not likely to occur during the full burn operation.

CONCLUSIONS

1. With the exception of the β-naphthylamine and Fenac, the analytical data for ambient air samples is of generally high quality and acceptable for the evaluation of potential public health impacts. Due to poor surrogate recoveries, β-naphthylamine and Fenac were not detected on or off-site. Results suggest that concentrations of 0.02 μg/m$^3$ for both compounds would be detected during laboratory analysis of air samples. A detection limit set at 0.02 μg/m$^3$ for Fenac and β-naphthylamine would be protective of public health during the full burn period of operation.

2. Off-site ambient air data collected at all four air monitoring stations within the community demonstrated that contaminants were not present at levels of health concern.

3. There was no detectable difference in the concentration of 17 out of the 22 chemicals detected off-site from air collected either before, during, or after the trial burn period.
4. Average off-site concentrations of benzene and arsenic, and the maximum concentrations of benzo(a)pyrene were higher before the test burn than during the test burn. None of the detected concentrations are at levels of health concern.

5. No significant difference between total dioxin/furan toxicity equivalency quotients (TEQs) was found at 3 of the 4 off-site air monitoring stations.

6. Total chlorodibenzofurans (CDF) toxicity equivalency quotients and total toxicity equivalency quotients were significantly elevated at station 3 (the hospital monitoring station) before, during, and after the trial burn, compared to the other 3 stations. These concentrations were below levels of health concern.

7. All maximum concentrations of individual dioxin congeners and the total chlorodibenzo-p-dioxins (CDDs) at every station off-site were below comparison values and were of no public health concern.

8. Levels of arsenic, cadmium, and nickel detected by site perimeter air monitors exceeded cancer-based comparison values only, and were determined not to be of any public health concern under site-specific conditions of exposure.

9. β-naphthylamine was not detected in ambient air, due to poor recoveries using previous analytical methods of detection. Therefore, ATSDR suggested a different sampling/analytical method be investigated by EPA. ATSDR considers that the modified OSHA 93 method proposed by EPA would be adequate in detecting β-naphthylamine in ambient air at Lock Haven and the detection limits established for this method would be at levels protective of public health.

10. The site sampling data reviewed was not sufficient to adequately determine if the current "indicator compounds" are the most appropriate to ensure that other VOCs are not exceeding levels of health concern.

11. ATSDR reviewed the on-site and off-site ambient air data for total suspended particulates. It is unlikely that any health effects would be expected, from the total suspended particulate levels detected at the perimeter or off-site within the community.
RECOMMENDATIONS

1. Continue to use the modified OSHA 93 analytical method with appropriate field and laboratory controls for detecting β-naphthylamine, so that low ambient air levels of this contaminant can be reliably identified.

2. To ensure that VOCs other than the indicator compounds are not exceeding levels of health concern, ATSDR recommends that the following actions be added to EPA's site perimeter sampling plan for protection of public health.

   a) If total VOC concentrations exceed 1 ppm for 10 - 15 minutes, a grab air sample should be collected and sent for laboratory analysis of VOCs (i.e., EPA method TO-14 or equivalent). Review of these data should ensure that the current indicator compounds and their respective action levels are appropriate and protective.

   b) If total VOC concentrations exceed 5 ppm for 10 - 15 minutes, in addition to collecting a grab sample, the source of VOCs should be determined and stopped. This may include covering exposed soils, stopping work, etc.

   c) If any of the indicator compounds reach 50% of their action levels, the source of VOCs should be determined and stopped. This may include covering exposed soils, stopping work, etc.

   d) If any of the indicator compounds reach or exceed their action levels, on-site activities should cease until the source is found and abated. Ambient air samples should be taken for VOCs, SVOCs, metals, and particulates should be taken to identify and determine the maximum concentration of the contaminants present at the perimeter of the site.

3. Continue sampling for volatile, semi-volatile organic compounds, metals, dioxin/furans, and total suspended particulates off-site during the full burn operation.

4. Cover all stock piles of soil and ash to reduce dispersion of particulates off-site.
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APPENDIX A

Location of Off-Site Ambient Air Monitors
APPENDIX B

Location of On-Site Perimeter Ambient Air Monitors
APPENDIX C
Toxicological Information
Toxicological Information

Fenac

Fenac (2,3,6-trichlorophenylacetic acid) is a persistent herbicide that is not known to bioaccumulate due to effective excretion in the urine. Due in part to this effective elimination mechanism, Fenac is only slightly to moderately toxic to mammalian species. Inhalation exposure standards for Fenac are not available. Although oral and inhalation doses are not strictly comparable in terms of effect, such a comparison can at least provide some perspective as to the magnitude of estimated doses at Lock Haven. For example, the lowest recorded oral LD$_{50}$ in mammals is 576-1780 mg/kg in rats. This is more than four billion times higher than the daily inhalation dose ($0.00000143$ mg/kg/day) that would result from breathing 20 m$^3$ air/day containing $0.0005$ µg/m$^3$ in the community surrounding the Drake site.

A useful comparison can be made between the levels of Fenac in air at Lock Haven and OSHA’s previous occupational exposure limit (TLV-TWA) for a more toxic herbicide, 2,4,5-T, which is also no longer in use. The previous TLV-TWA for 2,4,5-T was 10 mg/m$^3$. This concentration was twenty million times higher than the average concentration of Fenac measured at the Lock Haven ambient air monitoring stations ($0.0005$ µg/m$^3$) during the trial burn. The margin of safety for the less toxic pesticide, Fenac, could be even greater.

Thus, in spite of an absence of detailed toxicological data, ATSDR concludes that the levels of Fenac in air resulting from incineration of contaminated soil at the Drake site will pose no threat to human health at Lock Haven.

β-naphthylamine

Beta naphthylamine or 2-naphthylamine was formerly used as an intermediate in the manufacture of dyes and rubber, but is no longer manufactured in the U.S. for commercial use because it was found to cause bladder cancer in laboratory animals and in occupationally exposed humans. Beta naphthylamine was not actually detected on- or off-site. However, the detection limit ($0.001$ µg/m$^3$) of the method used was too high to enable ATSDR to determine whether or not the “true” concentration of β-naphthylamine in air exceeded the comparison value of $0.000048$ µg/m$^3$ (EPA Region III’s RBCc). If one were to make several highly conservative assumptions, including: 1) the “true” average concentration of β-naphthylamine in air was the maximum possible, i.e., just barely below the detection limit or, essentially, $0.001$ µg/m$^3$, 2) the human bladder carcinogen, 2-naphthylamine, has no threshold of effect other than zero, and 3) the estimated lifetime “risk” of one “excess” cancer in a million at an exposure level of $0.00005$ µg/m$^3$ is a reasonable prediction of the resulting adverse health effects, then the corresponding theoretical lifetime cancer risk would be 20 per million or 0.2 person in an exposed population of 10,000. The potentially exposed population living in the

C2

AR321478
In reality, the "true" risk would be considerably lower. The assumption that chemical carcinogens exhibit no threshold of effect other than zero is a useful one from the regulatory point of view. EPA's 1986 cancer guidelines clearly warn that a cancer risk estimate based on such assumptions (which are built into the Linear Multistage Model that the Agency uses for cancer risk assessment) "does not necessarily give a realistic prediction of risk". Indeed, EPA has stated that "the true risk is unknown and may be as low as zero". Furthermore, judging, by analogy, from the carcinogenic response of mice to 2-acetylaminofluorene, another aryamine bladder carcinogen, it seems reasonable to expect that \( \beta \)-naphthylamine would exhibit a practical threshold for cancer well in excess of the inhalation dose (0.006 and 0.0003 mg/kg/day, respectively) associated with concentrations of \( \beta \)-naphthylamine equivalent to either the practical detection limit of 0.02 \( \mu g/m^3 \) or method detection limit of 0.001 \( \mu g/m^3 \).

All of the above considerations apply equally well both on and off-site, since \( \beta \)-naphthylamine was undetected at the same detection limit in both places.
APPENDIX D
Abbreviations and Terms
Listed and described below are the various comparison values that ATSDR uses to select chemicals for further evaluation, along with the abbreviations for the most common units of measure.

- **ATSDR** = Agency for Toxic Substances and Disease Registry
- **CDD** = chlorodibenzo-p-dioxin
- **CDF** = chlorodibenzofuran
- **COC** = Contaminants of Concern
- **CREG** = Cancer Risk Evaluation Guides
- **DWEL** = Drinking Water Equivalent Level
- **EMEG** = Environmental Media Evaluation Guide
- **EPA III** = EPA Region III
- **NIOSH** = National Institute for Occupational Safety and Health
- **OSHA** = Occupational Safety and Health Administration
- **PEL** = Permissible Exposure Limit (OSHA)
- **REL** = Recommended Exposure Limits (NIOSH)
- **SVOC** = Semi-Volatile Organic Compounds
- **TCDD** = 2,3,7,8-tetrachlorodibenzo-p-dioxin
- **TEF** = Toxicity Equivalency Factor
- **TEQ** = Toxicity Equivalency Quotient
- **TLV** = Threshold Limit Value (ACGIH)
- **TSP** = Total Suspended Particulate
- **VOC** = Volatile Organic Compounds
- **ppm** = parts per million, e.g., mg/L or mg/kg
- **ppb** = parts per billion, e.g., μg/L or μg/kg
- **kg** = kilogram (1,000 grams)
- **mg** = milligram (0.001 grams)
- **μg** = microgram (0.000001 grams)
- **L** = liter
- **m³** = cubic meter (used in reference to a volume of air equal to 1,000 liters)

Cancer Risk Evaluation Guides (CREGS) are estimated contaminant concentrations in water, soil, or air that would be expected to cause no more than one excess cancer in a million persons exposed over a lifetime. CREGS are calculated from EPA's cancer slope factors.

ATSDR's Comparison Values (CVs) are media-specific concentrations that are considered to be "safe" under default conditions of exposure. They are used as screening values in the preliminary identification of "contaminants of concern" at a site. Generally, a chemical is selected as a contaminant of concern because its maximum concentration in air, water, or soil at the site exceeds one of ATSDR's comparison values. However, it cannot be emphasized strongly enough that comparison values are not thresholds of toxicity. While concentrations at or below the relevant comparison value may reasonably be considered safe, it does not
automatically follow that any environmental concentration that exceeds a comparison value would be expected to produce adverse health effects.

Environmental Protection Agency Region III (EPA III) values are similar to ATSDR's EMEGs in that they are risk-based concentrations derived for carcinogens and non-carcinogens from RfDs and Cancer Slope Factors, respectively, assuming default values for body weight, exposure duration and frequency, etc. Unlike EMEGs, however, they are available for fish, as well as for water, soil, and air.

Risk-Based Concentrations (RBC) are derived by the Region III Office of the Environmental Protection Agency. They represent levels of contaminants (non-carcinogens) in air, water, soil, and fish that are considered safe, assuming default values for body weight, exposure duration, and ingestion/inhalation rates.

Risk-Based Concentrations for Cancer (RBCc) are derived by the Region III Office of the Environmental Protection Agency. They represent levels of contaminants (carcinogens) in air, water, soil, and fish that are considered safe, assuming default values for body weight, exposure duration, and ingestion/inhalation rates.

Risk Burn - incineration of contaminated soil on the Drake Chemical site. ATSDR used this data to predict potential exposures to the community that might occur during remediation of the site.

Threshold Limit Values (TLV) are established by the American Conference of Government Industrial Hygienists (ACGIH). The TLV is the time-weighted average concentrations for a normal 8-hour workday and a 40-hour workweek, to which nearly all workers may be repeatedly exposed, day after day, without adverse effect. Many of ACGIH's TLVs were adopted by OSHA for use as PELs. TLVs and PELs, which are designed to protect healthy workers, are usually much higher than the health-based values of ATSDR and EPA, which were designed to protect the health of the general population, including the very young and the elderly. (Note: OSHA is required by statute to make rules that are economically feasible.) Although the ATSDR does not base any of its community health decisions on TLVs or PELs, it sometimes cites such values in Public Health Assessments merely as a means of putting concentrations of site-specific contaminants into a meaningful perspective for the reader.

Trial Burn Test - incineration of site soil spiked with known quantities of specific chemicals. ATSDR used this data to evaluate the performance of the incinerator.
APPENDIX E
Comments
ATSDR released the third public health consultation for public review and comment during the period April 3 to May 3, 1998. ATSDR received written comments from the Environmental Protection Agency, Region III, and verbal comments from the community at the public availability meeting held by ATSDR staff in Lock Haven on April 20, 1998, and in a telephone call from a local resident. This section lists the comments received and ATSDR’s response to each comment.

**Comment 1:** Community members expressed concerns regarding potential fugitive emissions coming from steam emitted from the fly ash building during the incinerator start-up in March.

**ATSDR Response:** ATSDR has reviewed off-site and perimeter ambient air data collected from December 1997 through April 1998 for VOC, SVOC, metals, and total suspended particulate (TSP) emissions. The perimeter ambient air data collected from monitor station P3, located near the venturi scrubber was specifically reviewed, since it would be likely to capture any exceedence in the comparison values for TSP, metals, VOCs, and SVOCs. No contaminants at levels above ATSDR health based comparison values have been observed in data collected from the four off-site (community) air monitoring stations or the four perimeter monitoring stations, during the monthly sampling program.

In March and April 1998, data were obtained from special TSP/metal samples taken at the four perimeter stations. TSP levels above 150 ug/m³ were observed at two of the perimeter monitoring stations, P1 (3/12/98 at 373 ug/m³, and 4/7/98 at 169.4 ug/m³) and P3 (3/17/98 at 532 ug/m³, 3/25/98 at 207 ug/m³, and 4/7/98 at 594.2 ug/m³). The 150 ug/m³ comparison value is an 8 hour average value. These TSP levels were not detected during the monthly monitoring period and only intermittently during the special sampling period. Therefore, no adverse health effects are expected to occur. Arsenic and chromium were also detected at three of the four monitoring stations (P1 and P2 in March, and P3 in April), however, health effects are unlikely since these levels were not consistently detected and the comparison values that were exceeded are based on chronic occupational exposures. The intermittent levels detected for TSP, arsenic, and chromium at some of the perimeter monitoring stations during the special sampling events, but not during the monthly monitoring program from December to March, may be related to soil movement activities occurring on-site. ATSDR will continue to review air data as it becomes available during the full burn operation.

**Comment 2:** A community member expressed concern that the new ash scrubber might not be adequate for removing organics left in the steam, if the ash did not pass the backfill standards for treated soil on-site. They asked if ash scrubber emissions might cause health problems in the community when the ash does not meet these standards.

**ATSDR Response:** Health consultation number three discusses ATSDR’s review of all the available off-site and perimeter ambient air data for the entire period that the incinerator has
been operational. September 1996 through March 1998. No contaminants have been detected at levels of public health concern at any of the eight monitoring stations during this period. During the equipment shake down and trial burn period on several occasions the treated soil did not pass the backfill criteria and had to be reprocessed. Perimeter monitor P3 is close to the ash handling building, so it should have detected any fugitive organic emissions that may have occurred when the soil did not pass this criteria. Enclosing the ash handling building and adding the venturi wet scrubber (also known as the "ash scrubber") to the ash handling system to capture all the steam produced in the ash cooling process will provide an additional level of protection for the community. ATSDR does not anticipate any public health impacts in the community due to emissions from the ash scrubber or ash handling system even if the ash does not pass the treated soil backfill criteria.

EPA Comments

Comment 3: Regarding ATSDR Recommendation No. 1: We concur. OSHA 93 will continue to be used for detection of 2-naphthylamine.

ATSDR Response: None

Comment 4: Regarding ATSDR Recommendation No. 2: We believe that ATSDR has the following objectives with regard to the recommendations made in 2a through 2d of Health Consultation No. 3 received April 07, 1998.

First, We understand that ATSDR would like to confirm that the speciated, "key indicator", compounds (KICs) analyzed for when the total volatile organics (NMOCs) exceed the plan initial alert level of 1 ppm are appropriate. While the justification for the selection of the compounds is sound (see attached EPA Region III letter to ATSDR dated 23 Jul 1997) and necessary for rapid "real time" monitoring, the Drake Site Cleanup Team agrees that this is an appropriate analytical addition. The following program will be implemented to provide additional information regarding other NMOCs that may be present from the groups represented by the KICs.

Should the NMOC (total volatile organic level) at a downwind perimeter air monitoring station exceed 1 ppm EPA will deploy Summa canisters to collect 15 minute grab samples at both the upwind and the downwind site stations. These samples will be sent to an offsite laboratory for volatile analysis by TO-14. This procedure will be followed for the first four (4) non-consecutive occurrences of a downwind station exceeding 1 ppm NMOC. The results of this sampling will be used to supplement and further define the specific volatile compounds present and to further assess the appropriateness of the "real time" key indicator compounds selected. The results of the above will also be provided to ATSDR for their review.
ATSDR Response: ATSDR agrees to this approach, pending review of evacuated canister data.

Secondly, ATSDR is recommending that the action levels associated with the real time perimeter air monitoring system be modified. After considerable review the Drake Site Cleanup Team has determined that the current real time perimeter air monitoring system action levels are appropriate. We provide the following clarification of why the action levels are appropriate.

The data quality objective (DQO) established for the real time perimeter air monitoring is based on the need to verify that NMOC contaminants of concern are not persistently migrating off the Drake site as a result of site activities in a manner that presents an unacceptable health and safety risk to local citizens/receptors. The key words are persistently and citizen/receptor risk.

The DQO statements require that if a perimeter location sampling site results in an analysis indicating greater than 1 ppm NMOC, then a sample must be acquired from that location and be speciated for the three KICs: toluene, chlorobenzene and tetrachloroethylene. If the speciation analysis confirms that neither toluene, chlorobenzene nor tetrachloroethylene are above the alert levels, the routine four-location sampling for total NMOCs is resumed. There is no immediate need to implement a corrective action since the target compounds levels have not exceeded the alert levels. The target compound alert levels are set at 1/10 the PELs for the three compounds: toluene (9.15 ppm), chlorobenzene (7.78 ppm) or tetrachloroethylene (2.51 ppm). PELs are based on 8 hour exposures and not on instantaneous exposure. Exceeding the individual speciated alert levels on a momentary basis would still pose no threat to receptors even if the dilution factor involved in the dispersion process were disregarded. If such a momentary action level was exceeded at the Drake site it therefore would be hard to technically defend any additional corrective action beyond documenting the event.

The second alert level of the Perimeter Air Sampling Plan (PASP) indicates that the Health and Safety Monitor (HSM) will document the activity. The second alarm also states that if the speciated net concentrations are below the perimeter action levels the investigation will cease. Note, however that this requires the sampling and speciation of the upwind sample to calculate a net concentration.

The third alert/action level addresses the situation when the downwind speciated net concentration of a target compound exceeds the alert level of 1/10 the PEL after the speciated background concentration of that compound has been subtracted from the downwind concentration. The corrective action required is the HSM initiates an on-site investigation, using a hand held PID, to determine the source/activity resulting in the generation of the compound of issue. Not until this action level has been exceeded for two hours is further action required. Then USACE is notified, employee exposure evaluated, and abatement procedures implemented to control the source. If the source is determined to be from off-site,
operations will resume and the local emergency management official are informed. Only if the net concentration exceeds five times the action level is an immediate corrective action beyond the HSM required. (Note that five times the action level is still only one-half the 8 hour PEL concentration).

ATSDR Response: ATSDR cannot concur with this approach at this time. After review of the anticipated evacuated canister samples, ATSDR will re-evaluate this issue.

Comment 5: Regarding ATSDR Recommendation No. 3: We concur.

ATSDR Response: None

Comment 6: Regarding ATSDR Recommendation No. 4: Feed soil is controlled and prepared in a building in which air movements are induced and controlled to remove suspended particles from the discharge air, and site soils are watered or covered with "Concover" or equivalent to reduce emissions. Any area of the stockpile that is not in use for an extended period of time will be covered with "Concover" or equivalent material to reduce dispersion of particulates off-site. It is not practical to cover the entire stockpile while it is in use. Excavation activities are currently being reviewed to ensure that the most effective measures are being taken to excavate and transport contaminated material within the physical constraints of the site while minimizing the potential for fugitive emissions. Additionally, ash is wetted in the final drag conveyor and stored in a covered building to prevent fugitive emissions and a venturi scrubber is being added to the system to control the steam emissions from the hot ash.

ATSDR Response: None
Mr. Gregg Crystall  
U.S. Environmental Protection Agency  
Region III  
Hazardous Waste Management (3HW00)  
841 Chestnut Building, 9th Floor  
Philadelphia, PA 19107

Dear Mr. Crystall:

Enclosed please find a copy of the petitioned health consultation no. 3 for Drake Chemical, Lock Haven, Clinton County, Pennsylvania, dated July 31, 1998. This petitioned health consultation addresses the public health significance of the data generated by the NGK in-house analytical method and the NGK contractor analytical method.

Please address correspondence to the Chief, Program Evaluation, Records, and Information Services Branch, Division of Health Assessment and Consultation, Agency for Toxic Substances and Disease Registry, ATTN: Drake Chemical No 3, 1600 Clifton Road, NE (E56), Atlanta, Georgia 30333.

If there are any questions, please direct them to Adele Childress, the health assessor, at (404) 639-0666.

Sincerely yours,

Max M. Howie, Jr.  
Chief, Program Evaluation, Records, and Information Services Branch  
Division of Health Assessment and Consultation

Enclosure