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FINAL HEALTH THREAT EVALUATION AT BUILDING 780 CONSTRUCTION SITE NAS JACKSONVILLE FL

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ABB ENVIRONMENTAL

FINAL

BUILDING 780 CONSTRUCTION SITE HEALTH THREAT EVALUATION

NAVAL AIR STATION JACKSONVILLE, FLORIDA

OCTOBER 1992

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON, SOUTH CAROLINA
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BUILDING 780 CONSTRUCTION SITE
HEALTH THREAT EVALUATION

NAVAL AIR STATION
JACKSONVILLE, FLORIDA

Contract No. N62467-89-D-317

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EXECUTIVE SUMMARY

ABB Environmental Services, Inc. (ABB-ES), was tasked to conduct an analysis of the health threat to construction workers and other Naval Aviation Depot (NADEP) personnel at the Naval Air Station (NAS) Jacksonville, Jacksonville, Florida, resulting from the removal or redistribution of contaminated soils at the Building Number 780 construction site. ABB-ES evaluated the results of three soil sampling events and air monitoring results from three site visits. One of the site visits included a controlled, experimental excavation of the soil at the site.

ABB-ES combined the outputs of two different air models, the RTI Land Treatment Model and the U.S. Environmental Protection Agency (USEPA) SCREEN dispersion model, to estimate the worst case air concentrations of six volatile organic compounds (VOCs) that would result from the disturbance or removal of the soil from the Building 780 site. The modeled air concentrations were compared with Occupational Safety and Health Administration (OSHA) Permissible Exposure Limits (PELs). These modeled air concentrations were also used to calculate the upper bound cancer slope factors and hazard indices associated with inhalation exposure to these VOCs released during soil excavation at the construction site.

The output of the two air models predicted that a condition considered hazardous to human health by the Navy, an upper bound cancer risk greater than 1 in a million ($1x10^{-6}$) or a Hazard Index greater or equal to 1.0, could exist up to 30 meters away from the excavation site under worst case meteorologic and excavation conditions. However, the uncertainties associated with these calculations were such that ABB-ES recommended that onsite monitoring be conducted during the excavation to verify whether hazardous conditions as modeled would occur during actual excavation or displacement of the soil at the site.

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GLOSSARY

ABB-ES	ABB Environmental Services, Inc.
ACGIH	American Congress of Governmental and Industrial Hygienists
BDL	below detection limits
CFR	Code of Federal Regulations
COCs	chemicals of concern
°C	degrees Celsius
E_m	equivalent exposure
EPC	exposure point concentration
FFCA	Federal Facilities Compliance Agreement
ft^2	feet squared
g/sec	grams per second
HAZMIN	Hazardous Waste Minimization Program
HEAST	Health Effects Assessment Summary Tables
HI	Hazard Index
HTE	Health Threat Evaluation
IRAP	Immediate Removal Action Plan
IRIS	Integrated Risk Information Service
kg	kilogram
m/s	meters per second
m^3	cubic meters
mg/m^3	milligrams per cubic meter
mg/m^3	milligrams per cubic meter
mg/kg	milligrams per kilogram
MILCON	Military Construction Project
$\mu g/kg$	micrograms per kilogram
$\mu g/m^3$	micrograms per cubic meter
NADEP	Naval Aviation Depot
NAS	Naval Air Station
NEESA	Naval Energy and Environmental Support Activity
NIOSH	National Institute of Occupational Health and Safety
NPDES	National Pollution Discharge Elimination System
OSHA	Occupational Safety and Health Administration
OVA	organic vapor analyzer

GLOSSARY (Continued)

PELs	Permissible Exposure Limits
ppm	parts per million
RfC	Reference Concentration
ROICC	Resident Officer in Charge of Construction
SOW	Statement of Work
TCLP	Toxicity Characteristics Leaching Procedure
TLV	Threshold Limit Value
UCL	Upper Confidence Limit
USEPA	U.S. Environmental Protection Agency
VOCs	volatile organic compounds
yd^3	cubic yard

1.0 PROJECT HISTORY

The Navy, as part of a Federal Facilities Compliance Agreement (FFCA) dated February 1989 and National Pollution Discharge Elimination System (NPDES) permit FL0000957, consented to construct a Closed-Loop Solvent Recycling Facility at Building Number 780 as a component of the Hazardous Waste Minimization Program (HAZMIN) within Operable Unit Number 3, at Naval Aviation Depot (NADEP), Naval Air Station (NAS) Jacksonville, Florida. This was undertaken as Military Construction Project (MILCON) P616. Construction activities began in July 1991. However, when the previously existing building slab and other concrete and asphalt coverings were removed, air concentrations of volatile organic compounds (VOCs), as measured by an organic vapor analyzer, exceeded 1,000 parts per million (ppm). Due to the high VOC levels in the air, all construction work at the site was terminated.

It was determined that large areas of contaminated soil needed to be removed from the site or regraded prior to the construction of the facility as it could pose a direct health threat to workers at the site. An Immediate Removal Action Plan (IRAP) developed for the soils at the construction site required an analysis of the health threat to the construction workers at the site and to NADEP personnel during the removal of the soils.

In response to Statement of Work (SOW) Number 31 of Contract Number N62467-89-D-0317, ABB Environmental Services, Inc. (ABB-ES), representatives met with Navy personnel on February 10 and 11, 1992, at NAS Jacksonville. During this initial meeting, ABB-ES questioned the validity of the soil sampling data available for use in the Health Threat Evaluation (HTE). It was agreed that additional soil samples would be collected at the site. Additional information required by ABB-ES included the excavation schedule of the IRAP and amount of soil surface area to be exposed during the excavation. Due to the need to commence construction rapidly to meet compliance schedules, HTE recommendations were required within 2 weeks following receipt of these data.

The additional soil samples at the site were collected on February 26, 1992, and ABB-ES was provided with a preliminary copy of these results during the week of March 2, 1992. ABB-ES and the Navy met again at NAS Jacksonville on March 6, 1992, to discuss the progress of the HTE. The final excavation schedule and excavation footprint were provided to ABB-ES on March 10, 1992. The Navy stated that it needed the results of the HTE by March 19, 1992, due to a pressing construction schedule. ABB-ES performed the air modeling and developed the recommended safety zone based upon the air modeling results and provided these results to the Navy in a letter dated March 19, 1992. The HTE report contained herein is a followup to that letter.

2.0 DATA SUMMARY

The Building 780 construction site was sampled on three separate occasions. Soil and groundwater were sampled in June 1990 by Geraghty & Miller (1990). The soil was resampled by Enviropact in December 1991 and again in February 1992 (Enviropact, 1991; 1992). The results of all three sampling events indicate that large areas of the construction site were contaminated with VOCs.

2.1 FIRST SAMPLING ROUND. During the development of the construction plans for the project, Geraghty & Miller, Inc., conducted a soil and groundwater contamination investigation at the Building 780 site. In June 1990, they collected five soil samples and two groundwater samples. The samples were analyzed for total organic carbon, VOCs, and total metals.

Chromium, lead, and zinc were detected in the soil samples along with the VOCs 1,1-dichloroethene, 1,1-dichloroethane, toluene, 1,1,1-trichloroethane, and trichloroethene. The groundwater was found to be contaminated with the VOCs 2-butanone (methyl ethyl ketone), chloroethane, 1,1-dichloroethane, 1,1-dichloroethene (1,1-DCE), 1,2-dichloroethane, methylene chloride, 4-methyl-2-pentanone (methyl isobutyl ketone), toluene, 1,1,1-trichloroethane, trichloroethene, and vinyl chloride. The metals cadmium, nickel, and zinc were also detected in the groundwater samples.

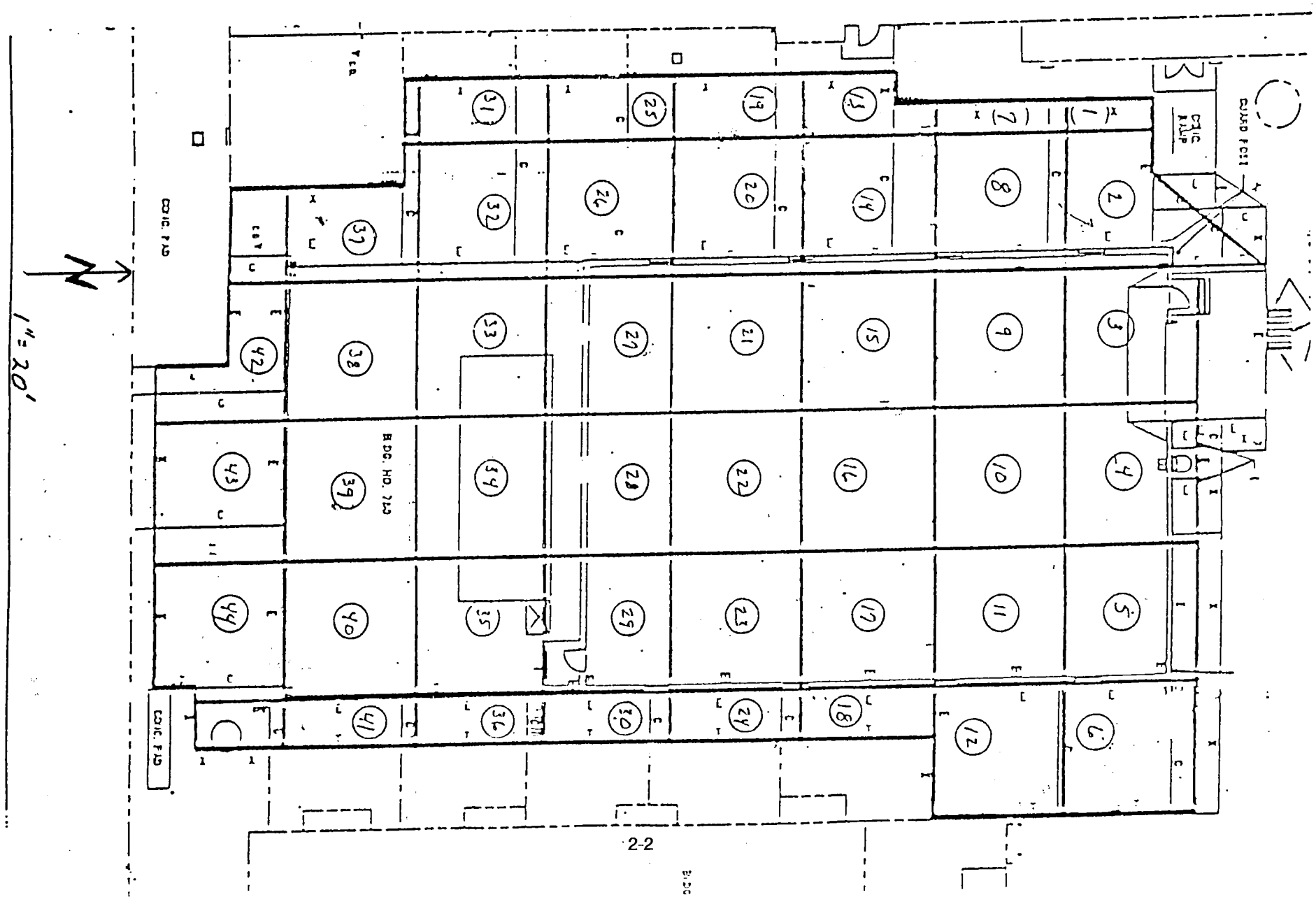
2.2 SECOND SAMPLING ROUND. During July 1991, the concrete and asphalt covering the Building 780 site was removed. Because of high VOC concentration, the work at the site was stopped. Enviropact was contracted to conduct a second sampling event. The Building 780 construction site was divided into 44 sampling zones as shown in Figure 2-1. Soil samples were collected from the center of each sampling zone at two different depths, 0 to 3 feet and 3 to 6 feet. All soil samples were analyzed for VOCs. In addition, soil samples from two sampling zones were also tested by Toxicity Characteristics Leaching Procedure (TCLP) for the metals barium, cadmium, chromium, and mercury.

The results of this sampling indicated that the northern part of the Building 780 construction site (sampling grids 1 through 22, excluding grids 14, 18, and 21) was relatively uncontaminated. VOC contamination at the site was highest in the western (sampling grids 18, 24, 30, 36, and 41), southern (grids 42, 43, and 44), and southwestern (grid 37) parts of the site. In western sampling grids the contamination was found in both the upper (0 to 3 feet) and lower (3 to 6 feet) layers. However, in the southern and southwestern sampling grids, the contamination was almost exclusively in the upper layer with little or no contamination in the lower layer.

Between the second and third soil sampling rounds, the soil from sampling grids 18, 24, 30, 36, and 41 were removed during the installation of a water line at the Building 780 construction site. Therefore, the results of these soil samples were not used in the HTE. The Resident Officer in Charge of Construction (ROICC) at NAS Jacksonville commented, however, that several construction workers did complain of eye irritation during the water line installation.

FIGURE 2-1: Location of the Soil Sampling Grids at the Building 780 Construction Site.

These grids were used for Enviropact's second and third sampling events. (This figure is reproduced as provided by the Navy.)



The highest detected soil VOC concentrations reported in the first two rounds of soil sampling are provided in Table 2-1. The complete results of the second sampling round are provided in Appendix A.

Table 2-1
Maximum Detected Soil Concentrations During the First (June 1990) and Second (December 1991) Soil Sampling Events

Health Threat Evaluation
Building 780 Construction Site
NAS Jacksonville, Florida

Chemical	Highest Detected Soil Concentration (μg/kg)
Bromodichloromethane	122
Chlorobenzene	150
Chloroform	3,120
Dibromochloromethane	101
1,2-Dichlorobenzene	886
1,3-Dichlorobenzene	1,550
1,4-Dichlorobenzene	1,020
1,1-Dichloroethane	572
1,1-Dichloroethene	9,640
Methylene Chloride	2,380
1,1,1-Trichloroethane	400,000
Tetrachloroethene	6,180
Toluene	17,100
Trichloroethene	6,740
Xylenes	4,500

Note: μg/kg = micrograms per kilogram.

The ABB-ES assessment of the December 1991 sampling program indicated that the data were inadequate for decisions regarding human health risks. The soil samples were analyzed as composite samples of soils taken from 0 to 3 feet and from 3 to 6 feet. This soil sampling technique was considered inappropriate for VOC analysis because many of the VOCs have high vapor pressures and can volatilize during the compositing procedure. Therefore, ABB-ES recommended that another round of soil sampling be conducted at the site, using appropriate soil sampling techniques, to confirm or augment the results of the Enviropact December 1991 study.

2.3 THIRD SAMPLING ROUND. The third sampling event was conducted by Enviropact in February 1992. Nine soil samples were taken from the site at sampling grids 10, 14, 21, 23, 27, 35, 37, 42, and 43. In addition to collecting soil samples, Enviropact also measured VOC concentrations in air using both chemical-specific detector tubes (Dräger tubes) and an organic vapor analyzer (OVA). They reported background organic vapor air levels of 0 to 0.2 ppm using the OVA, but it is not clear if this measurement was made in the breathing zone (approximately 6 feet above the surface of the soil) or at the soil surface. They also reported OVA

readings of 0 to 1 ppm at ground level. The air VOC levels detected during the third soil sampling event are provided in Table 2-2.

Table 2-2
Air Volatile Organic Compound (VOC) Measurements Taken During Enviropact's Third Soil Sampling Event of February 26, 1992

Health Threat Evaluation
Building 780 Construction Site
NAS Jacksonville, Florida

Grid Number[1]	Sample Description[2]	Chemical Detected	Detection Method	Air Measurement (ppm)
10	None.	Total organic vapors	OVA	10
		1,1,1-Trichloroethane	DT	2
14	Sample taken approximately 1 foot deep in hole.	Total organic vapors	OVA	10
		1,1,1-Trichloroethane	DT	20
		Trichloroethene	DT	2
21	Sample taken approximately 1 foot deep in hole.	Total organic vapors	OVA	2
23	Sample taken approximately 1 foot deep in hole.	Total organic vapors	OVA	>1,000
		1,1,1-Trichloroethane	DT	>600
		Trichloroethene	DT	10
27	Sample taken approximately 1 foot deep in hole. Hole used for both shallow and deep soil sample. (Shallow hole air measurement.)	Total organic vapors	OVA	10
	Sample taken approximately 1 foot deep in hole. Hole used for both shallow and deep soil sample. (Deep hole air measurement.)	Total organic vapors	OVA	15
35	Sample taken after first shallow sample hole dug with auger.	Total organic vapors	OVA	25
		1,1,1-Trichloroethene	DT	20
		Trichloroethene	DT	3
37	Sample taken at mouth of sampling hole.	Total organic vapors	OVA	150
	Sample taken approximately 1 foot deep in hole.	Total organic vapors	OVA	>1000
		1,1,1-Trichloroethene	DT	>600
		Trichloroethene	DT	15
		Tetrachloroethene	DT	10
		Xylene	DT	5

[1]See Figure 2-1 for location of sampling grids.
[2]Sample location description provided verbatim from Enviropact's sampling results dated February 16, 1992.

Notes: DT = chemical-specific detector tubes.
OVA = organic vapor analyzer.
ppm = parts per million.
> = greater than.

The results of this round of soil sampling confirmed that the sampling grids in the southern and southwestern areas of the site (grids 37, 42, and 43) were contaminated. No sampling grids reported to be contaminated in the second round of sampling were found to be uncontaminated in the third round. However, two sampling grids previously reported to be uncontaminated, 27 and 35, were found

to be highly contaminated. A complete comparison of the results of the second and third soil sampling rounds is provided in Appendix A.

2.4 ABB-ES SITE VISITS. ABB-ES conducted five site visits at the Building 780 construction site. The first visit was an informal visit to the site with Navy representatives. The second site visit was conducted on February 25, 1992. During this visit, background VOCs were measured in air using a portable Miran™ 10X infrared air monitor. The site was very wet and the weather mostly cloudy, with a 10 to 15 miles per hour wind and a temperature less than 24 Celsius (°C). Nonetheless, air background levels of methylene chloride of 0 to 9 ppm were detected in the air around the site. In addition, measurable air levels of two VOCs, trichloroethene and 1,1,1-trichloroethane, were detected at the site when the soil surface was disturbed by light foot traffic. Although the source of these emissions was not clearly identified due to the probable use of VOCs in the surrounding NADEP area, these air measurements suggested that measurable air VOC levels could be released from the soils during the IRAP. The background air levels measured at the site during the site visit of February 25, 1992, are provided in Table 2-3.

Table 2-3
Range of Chemicals Detected in the Air During Site Visit of February 25, 1991

Health Threat Evaluation
Building 780 Construction Site
NAS Jacksonville, Florida

Chemical	Air Concentrations (ppm)
Methylene chloride	2.0 - 9.0
Trichloroethene	0 - 2.0
1,1,1-trichloroethane	0 - 0.7

Note: ppm = parts per million

The Miran™ 10X air monitor was unable to monitor for vinyl chloride or 1,1-dichloroethene due to what was believed to be interference by the levels of methylene chloride in the area as a result of industrial operations near the site. However, computer modeling of vinyl chloride emission from groundwater, through soil, using the U.S. Environmental Protection Agency (USEPA) SESOIL program, predicted that vinyl chloride might be present in the air at the site due to volatilization from the groundwater and transport to the surface in soil gas.

Another site visit was conducted by ABB-ES personnel on March 2, 1992, to determine if vinyl chloride was present at the site. Mr. Robert Garby, Certified Industrial Hygienist for NADEP, also accompanied ABB-ES personnel. Using a Miran™ 10X infrared air monitor, ABB-ES personnel measured concentrations of vinyl chloride in excess of 1,000 ppm in the soil depressions made during the

February 1992, Enviropact soil sampling event. However, no vinyl chloride was detected in the breathing zone of the Building 780 construction site.

ABB-ES personnel revisited the site on March 3, 1992, to confirm the presence of vinyl chloride in the soil depressions using chemical-specific detector tubes (Dräger tubes). The Dräger tube studies confirmed the results of the previous site visit. Vinyl chloride was present in depressions in the soil at the site, but no detectable levels of vinyl chloride were present in the breathing zone.

On March 13, 1992, ABB-ES conducted a pilot study of the soil excavation that would occur during the IRAP at the Building 780 construction site. While the study was in progress, air VOC levels were monitored every 15 minutes with a Miran™ 10X infrared air monitor, Dräger tubes, and charcoal-containing personnel air monitoring tubes connected to calibrated personnel air samplers.

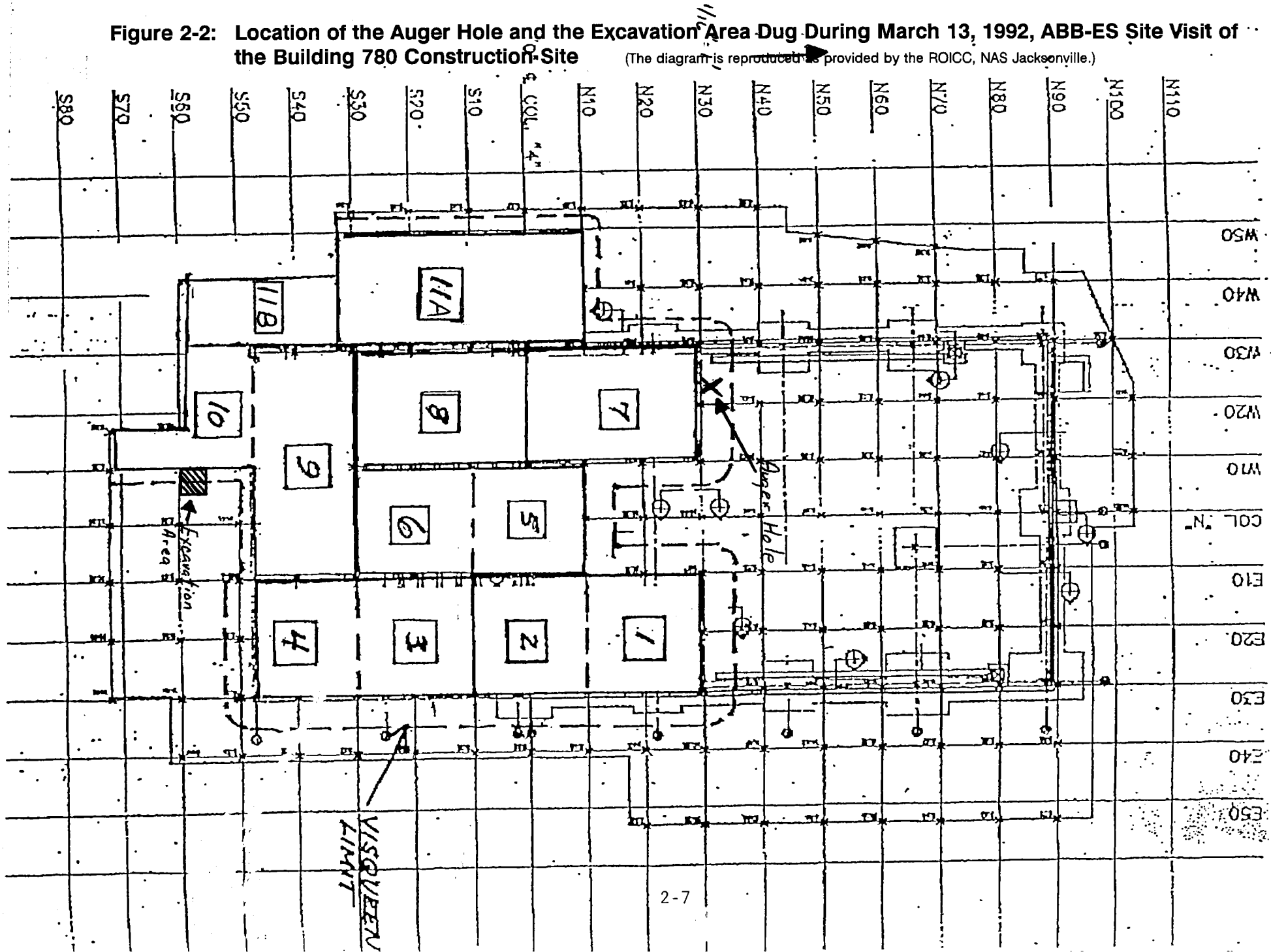
ABB-ES personnel, in Level B Personal Protective Equipment, dug two holes at the site as shown in Figure 2-2. The first was a 3 foot auger hole at the location marked with an "X" on Figure 2-2. This part of the site was believed to be uncontaminated, based upon previous sampling, and this hole was dug to confirm this belief. ABB-ES personnel, however, found air concentrations of vinyl chloride, as measured by Dräger tubes, of up to 15 ppm 2 feet down inside the auger hole. No vinyl chloride was detected either above the hole or in the breathing zone (approximately 6 feet above the surface of the soil) and no other VOCs were detected in or around the auger hole. A charcoal air sampling tube placed in the auger hole did detect 1,1-dichloroethene (3.5 ppm), trichloroethene (<1 ppm), and 1,1,1-trichloroethane (28 ppm), but it failed to detect vinyl chloride.

The second excavation was a 1-cubic-meter pit at the southern end of the construction site in an area of known soil contamination as shown in Figure 2-2. During this excavation, OVA readings exceeded 160 ppm in the hole and, near the bottom of the pit, vinyl chloride was detected at 30 ppm, tetrachloroethene and trichloroethene were detected at 20 ppm, and 1,1,1-trichloroethene was detected at 350 ppm. However, the personnel air monitoring tubes were only able to detect the presence of 1,1,1-trichloroethane at levels of 1.8 to 6.7 ppm.

The air monitoring results of this controlled excavation confirmed that VOCs were released during excavation of contaminated soil, but they also showed that the highest air concentrations would be found in the soil depressions created during the excavation rather than in the breathing zone. These results, however, may not adequately represent the conditions that could occur at the site when heavy earth moving machinery is used in the excavation process.

2.5 DATA ANALYSIS. The results of the three rounds of soil sampling and the air monitoring during four site visits all indicated that the soil at the Building 780 construction site was contaminated with VOCs. In addition, the pilot study and other observations suggested that excavation of this soil would release VOCs into the air. But, it was unknown if large-scale soil excavation during the IRAP would release sufficient levels of VOCs into the air to create a health threat to the construction workers or NADEP personnel. In addition, several critical questions concerning the usability of the soil data for the HTE remained unanswered.

Figure 2-2: Location of the Auger Hole and the Excavation Area Dug During March 13, 1992, ABB-ES Site Visit of the Building 780 Construction Site (The diagram is reproduced as provided by the ROICC, NAS Jacksonville.)



The first of these questions has to do with the extent of the contamination at the site itself. The southern and southwestern areas of soils at the site were contaminated with a number of VOCs, a fact confirmed by both soil sampling and air sampling. However, it was not known if the areas sampled were representative of the degree of contamination at the site. The most intensive soil sampling event (December 1991) collected only two samples, one shallow and one deep, in each 20 by 20 foot sampling grid. Further, the sampling plan called for sample collection in the geometric center of the grid. Thus, it was assumed that soil contamination in the center of the grid was representative of the entire grid. While this type of sampling plan is common, strict adherence to such a plan, combined with the lack of field screening, could easily result in missing the most highly contaminated areas. This might underestimate the actual contaminant levels at the site leading to a corresponding underestimation of the emissions from the site during the IRAP.

A second weakness in the December 1991 data was the reliance upon the results of composited soil samples. Because it is likely that volatilization of VOCs occurred during the soil compositing process, the analytical results from these samples would likely underestimate the actual soil contamination at the site. This sampling technique could also allow highly volatile VOCs such as vinyl chloride, 1,1-dichloroethene, or 1,2-dichloroethene to escape prior to analysis, resulting in an underestimation or complete failure to detect these VOCs. Again, this would result in an underestimation of the actual degree of soil contamination at the site.

Examples of these two uncertainty factors may be found in the differences between the analytical results of the second and third sampling events at several sampling grids. At grid 27, the results of the second sampling event were all, except for trichloroethene at 5.4 ppm in the deep sample, below the limits of detection (BDL). However, the results of the third sampling event at this same grid identified 1,1,1-trichloroethane (14.4 ppm), trichloroethene (1.0 ppm), 1,1-dichloroethane (2.2 ppm), 1,1-dichloroethene (1.0 ppm), and methylene chloride (1.1 ppm) in the shallow sample and 1,1-dichloroethane (2.2 ppm), methylene chloride (1.1 ppm), 1,1-dichloroethene (0.8 ppm), 1,1,1-trichloroethane (15.1 ppm) and several other VOCs in the deep sample. At grid 37, the 1,1,1-trichloroethane concentration was reported as 316 ppm in the second sampling event but it was more than 10 times this level, 5,400 ppm, in the third sampling event. Similar discrepancies were also noted in the analytical results of sampling grids 35, 42, and 43.

Another area of uncertainty was the lack of external data validation by an environmental chemist due to the extremely short timeframe of the HTE. An environmental chemist's input is valuable in describing the probable accuracy and the level of reliability that can be ascribed to the data. It is also important to point out that Naval Energy and Environmental Support Activity (NEESA) Level C or D data is generally required for human health risk assessments. These Data Quality Levels or documentation are functionally equivalent to USEPA data quality levels III or IV, respectively. The data documentation packages provided to ABB-ES were more consistent with USEPA level II or NEESA level E documentation, which are insufficient for decisions concerning human health.

Another example of the problems associated with this uncertainty factor can be found in a comparison of the results of the second and third sampling events at

grid 37. The second sampling event identified parts per million concentrations of 1,1-dichloroethene, toluene, xylene, trichloroethene, and tetrachloroethene at this grid. However, none of these VOCs were detected in the third round due to very high detection levels of these VOCs resulting from the presence of 1,1,1-trichloroethane at 5,600 ppm. Detection levels for methylene chloride, tetrachloroethene, trichloroethene, 1,1-dichloroethene, and many other VOCs were raised from 500 to 170,000 micrograms per kilogram (μg/kg) with even greater changes in detection levels for chloroform and 1,1-dichloroethene. Therefore, it is possible that these VOCs were present in the sample but were undetected.

Finally, the presence or absence of vinyl chloride at the site needs further discussion. It is important to know if vinyl chloride is present at the site because it is a confirmed human carcinogen by inhalation. Vinyl chloride was detected in groundwater by laboratory analysis in the 1990 groundwater study (Geraghty & Miller, 1990) and it was also detected at the site using both chemical-specific detector tubes and the Miran™ 10X infrared air monitor. However, there have been no further groundwater analyses confirming the presence of this chemical since 1990 and the screening-level results of the detector tubes and the infrared air monitor were never confirmed by laboratory analysis. Further, the presence of vinyl chloride was not detected in soil samples.

Vinyl chloride was also never detected in the breathing zone air, even when it was apparently present in the hole created during the pilot study. However, this is consistent with the known properties of the gas. It is a heavy gas, density of 2.5, that is highly mobile in groundwater and soil gas. It does not adhere to soil particles and, thus, it cannot be adequately modeled using soil-to-air models such as those employed for the other VOCs identified at the site.

All of these points suggest that vinyl chloride should not be considered as a chemical of concern at the site. It has not been positively identified at the site since 1990 and if it was present, it is likely not to be found in the breathing zone of the workers. Also, it was not observed to be present in the soil and, thus, cannot be modeled. Therefore, it will not be considered further as a possible chemical of concern at the site.

Whereas this decision is not conservative and may overlook the presence of a human carcinogen at the site, it is consistent with the level of information available concerning the presence of this chemical and the known physical properties of the gas if it is present at the site. The HTE and recommended safety zone, however, may still be protective of any possible exposures to vinyl chloride. This is due to the modeling of 1,1-dichloroethene. This chemical has the same Occupational Safety and Health Administration (OSHA) Permissible Exposure Limits (PEL) as does vinyl chloride, 1 ppm. Therefore, a safety zone that will be protective against 1,1-dichloroethene, should be protective against vinyl chloride.

3.0 AIR MODELING

The air modeling portion of the HTE was conducted in three phases. In the first phase, the VOCs at the site most likely to present an adverse inhalation health threat and the soil concentrations to be used in the air models were selected. Next, the degree of volatilization, or emission, of each selected VOC was estimated using the RTI Land Treatment model. In the third phase, the amount of dispersion, or dilution and mixing, that occurred for each VOC at the site is calculated. In this phase, another air model, the USEPA SCREEN model, was used to estimate VOC dispersion at the site.

3.1 CHEMICALS OF CONCERN. The first step was to identify those VOCs detected in the soil at the site most likely to be detrimental to human health if exposure occurred during the IRAP. Once this was done, the next step was to select the soil concentrations of these chemicals, called chemicals of concern (COCs), to be used in the air emission and dispersion models.

Due to the limited timeframe of the HTE, ABB-ES decided to model only six VOCs that were considered most likely to present a health threat to the construction workers and other NADEP employees during the IRAP. The selection of these COCs was based upon the "best professional judgment" of ABB-ES. Modeling to protect against the top six COCs was judged to also protect against the less prevalent and less toxic chemicals at the site.

A single selection criteria, such as highest detected soil concentration, was considered by ABB-ES to be insufficient for the purpose of the HTE. Whereas soil concentration was certainly an important factor in selecting a COC, it was not considered to be the only important factor. Vapor pressure and Henry's Law constant were also important determinants of volatilization of COCs from soils. Additionally, because adverse human health effects represent the endpoint of concern for the HTE, an appropriate measure of human toxicity was included as part of the selection criteria. This is especially true because some chemicals have significant toxicity at low air concentrations whereas others may have no effects even at high concentrations.

A commonly accepted measure of the human toxicity associated with inhalation exposure is the OSHA PEL. The PEL is defined as the air concentration averaged over an 8-hour work day, for a 40-hour work week, which "will protect workers against a wide variety of health effects that could cause material impairment of health or functional capacity. This includes protection against catastrophic effects such as cancer..." (29 Code of Federal Regulations [CFR] 1910.1000).

Therefore, the two criteria selected for choosing the COCs were the highest detected soil concentration and the known human health hazards associated with inhalation exposure. Using these two criteria, the six COCs selected for the HTE were chloroform, methylene chloride, tetrachloroethene, trichloroethene, 1,1,1-trichloroethane, and 1,1-dichloroethene. The highest detected soil concentrations of the COCs at the Building 780 construction site and their respective PELs are provided in Table 3-1.

Table 3-1
Maximum Detected Soil Levels of the Chemicals of Concern and Their Respective Occupational Safety and Health Administration (OSHA) Permissible Exposure Limits (PELs)

Health Threat Evaluation
Building 780 Construction Site
NAS Jacksonville, Florida

Chemical	Highest Detected Soil Concentration (μg/kg)	OSHA Permissible Exposure Limit (PEL) (ppm or mg/m^3)
Chloroform	3,120	(2) or [9.78]
1,1-Dichloroethene	9,640	(1) or [3.9]
Methylene chloride	2,380	(500) or [1,740] [1](50) or [1][174]
1,1,1-Trichloroethane	400,000	(350) or [1,900]
Tetrachloroethene	6,180	(25) or [170]
Trichloroethene	6,740	(50) or [270]

[1]American Congress of Governmental and Industrial Hygienists (ACGIH) Threshold Limit Value (TLV) for methylene chloride; commonly used in place of the OSHA PEL.

Notes: μg/kg = micrograms per kilogram.
ppm = parts per million.
mg/m^3 = milligrams per cubic meter.

After choosing the six COCs for the HTE, the next step was to select the soil concentration to be used in the air emission and dispersion models. The USEPA provides clear guidance for selecting soil concentrations to be modeled in conjunction with a human health risk assessment (USEPA, 1991c). This guidance states that the soil concentration used for exposure modeling, called the exposure point concentration (EPC), will be selected after comparing the maximum detected concentration for each COC to a statistic of the data called the 95 percent Upper Confidence Limit (UCL) of the estimated mean. This statistic is used when the data distribution is not normally distributed. That is, a graph of the soil contamination concentration versus the number of samples with the same soil contaminant concentration is not "bell shaped" with the majority of data points in the middle of the plot and fewer data points at each end of the graph.

USEPA guidance (1991c) goes on to state that if the UCL is higher than the maximum detected concentration, then the UCL is not descriptive of the actual conditions at the site and the maximum detected concentration is to be used as the EPC. However, if the UCL is less than the maximum detected concentration, then the UCL is considered a more conservative descriptor of the actual conditions at the site and the UCL, rather than the maximum detected concentration, is to be used as the EPC.

The soil sampling data is not normally distributed. Many areas of the site, especially in the northern end of the site, were found to have no VOC contamination although other parts of the site were contaminated with many VOCs. A plot of the VOC concentrations detected in the second soil sampling round (December 1991) versus the number of samples detected with that VOC concentration data would have 44 percent (19 of 44) of the sampling sites with no contamination (BDL), 27 percent (12 of 44) with at least one COC detected but at a concentration below 1 ppm, and 29 percent (13 of 44) with at least one COC detected at a concentration above 1 ppm. Thus, the plot would have most of the points at the high and low soil contaminant concentrations and few points in the middle. Also, the results of the third round of soil sampling would be of no help because many of the sampling grids were not sampled and those that were sampled were selected based upon the results of the second round of soil samples.

Therefore, the EPC selected for the modeling had to be either the maximum detected soil concentration or the UCL for each COC detected at the site. Table 3-2 shows that the calculated UCL values for five of the six COCs were much higher than the maximum detected concentrations and that the UCL for chloroform could not be calculated. Therefore, as required by USEPA guidance, the selected EPCs for the six COCs selected for emission and dispersion modeling were the maximum detected soil concentrations detected in either the second or third soil sampling event.

Table 3-2
Comparison of Maximum Detected Soil Concentrations for the Chemicals of Concern to the Calculated 95 Percent Upper Confidence Levels

Health Threat Evaluation
Building 780 Construction Site
NAS Jacksonville, Florida

Chemical of Concern	Highest Detected Soil Concentration (mg/kg)	Calculated 95 Percent Upper Confidence Limit (mg/kg)
Chloroform	3.12	ID
Methylene chloride	2.38	11,274
Tetrachloroethene	13.0	1,614,273
Trichloroethene	18.3	31,928
1,1,1-Trichloroethane	5,460	436,958
1,1-Dichloroethene	9.64	36,999

Notes: mg/kg = milligrams per kilogram.
ID = Insufficient number of data points to calculate a 95 percent upper confidence limits.

The use of the maximum detected soil concentration of each COC is clearly a conservative estimate of the actual soil contamination that overestimates the actual soil concentrations at most of the site. However, there are two reasons, in addition to the USEPA guidance, that support the use of these values as COCs soil concentrations.

First, the data from the two sampling visits are not conclusive. It may be possible (based upon a comparison of the sampling results of grids 35 and 37 and the air sampling during the controlled excavation which detected VOCs in a area considered to be uncontaminated) that the maximum soil concentrations reported in the two soil sampling events are not the highest at the site. Unsampled areas may have higher soil concentrations than are presently known and these areas may not be sufficiently represented by the maximum detected concentrations. Those areas, however, where the actual soil concentrations are higher than the reported maximum detected soil concentrations will be balanced out by those areas in which the soil concentrations are lower than the maximum detected soil concentrations.

The second reason has to do with the short timeframe of the HTE. Ideally, the actual soil concentrations of each COC would be used as the EPC for each excavation area modeled. This was not possible in the 2-week timeframe of the HTE and ABB-ES was forced to rely upon a single soil concentration for each COC as representative of all the soil contaminant conditions at the site.

3.2 EXCAVATION SCENARIO. The excavation scenario at the Building 780 site was provided by the NAS Jacksonville ROICC. The site was divided into 11 zones (Figure 3-1). Soil was to be displaced or excavated from each zone and then the excavated area would be covered with Visqueen™ followed by a layer of clean soil (backfill) to reduce emissions. The excavation and displacement schedule, soil cut depth, work description, and cubic yardage excavated or displaced are all provided in Table 3-3. This table is based upon the facsimile received from the NAS Jacksonville Public Works Department on March 10, 1992.

Based upon this excavation and displacement schedule, two excavation scenarios were selected for modeling: scenario 1, morning of day 1, and scenario 11, day 7. During scenario 1, only 64 cubic yards of soil was projected to be removed, but it would have the largest surface area of undisturbed soil. Scenario 11 was selected because it involves soil excavation in the most contaminated soil at the site and the excavation footprint was the largest of any of the other excavation scenarios. These were thought to represent the two most likely, worst case excavation conditions.

3.3 AIR EMISSIONS MODELING. To predict concentrations of airborne chemicals released from contaminated soil, it was necessary to estimate the emission flux of the chemicals from the undisturbed soil. This emission flux from the soil was measured in terms of grams of chemical released per second from the entire site. The USEPA RTI Land Treatment Model (1987), developed at the Research Triangle Institute, was used to estimate the flux rate of the COCs at the Building 780 construction site as it allows for time-dependent emission rates that do not predict complete volatilization over extended periods of time. This factor was considered relevant by ABB-ES because the asphalt and concrete cover had been removed from the site for more than 200 days and other emission flux models would have predicted complete volatilization of the VOCs at the site. The use of an

Figure 3-1: Diagram of the Excavations Conducted During the IRAP at the Building 780 Construction Site

See Table 3-3 for further details. (The diagram is reproduced as provided by the ROICC of NAS Jacksonville.)

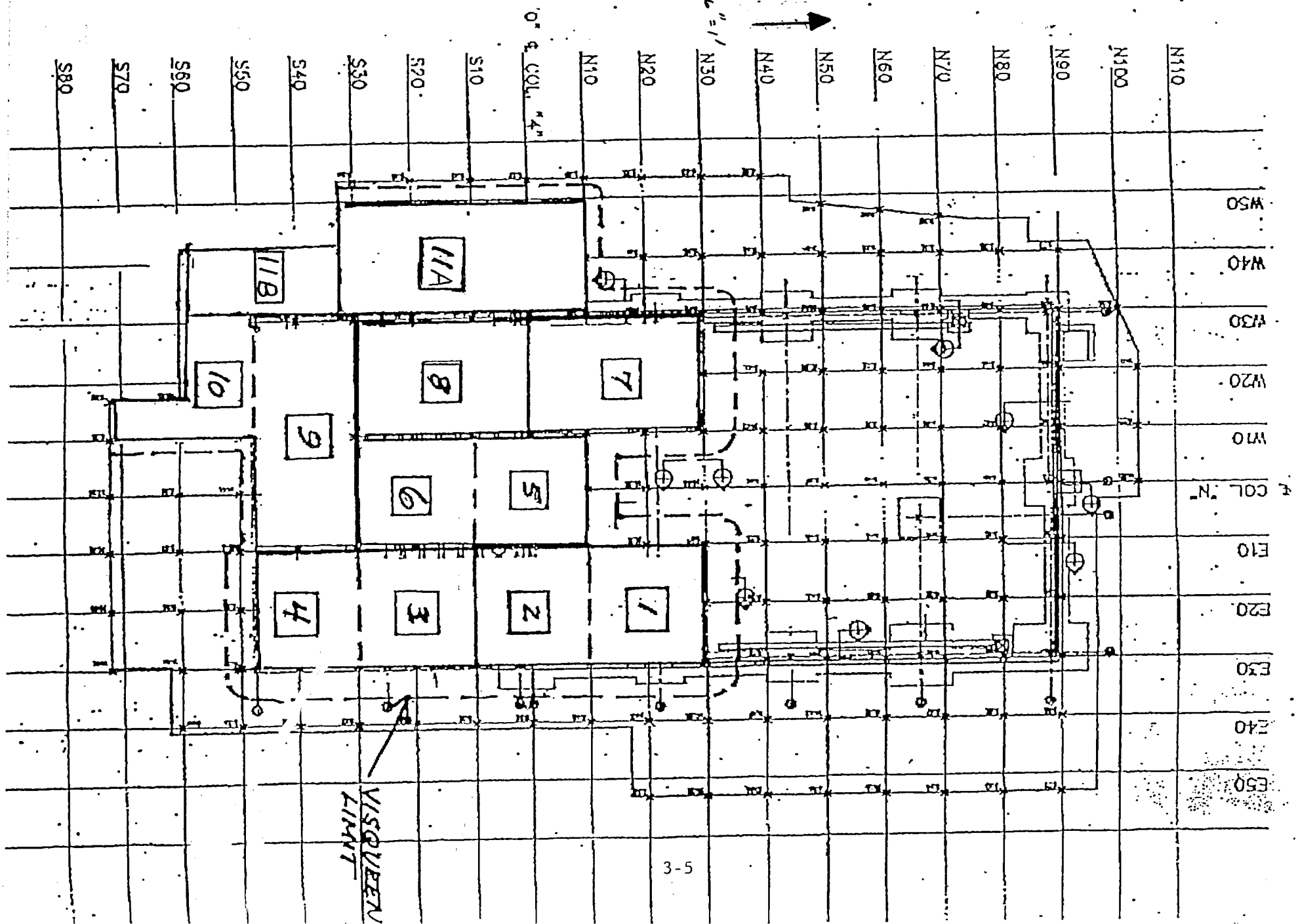


Table 3-3
Soil Excavation and Displacement Schedule

Health Threat Evaluation
Building 780 Construction Site
NAS Jacksonville, Florida

Sequence Number	Cut Depth (feet)	Work Description	Soil Excavated (yd^3)	Soil Displaced (yd^3)
1	3	Morning, first day. Remove and transport contaminated soil. Apply Visqueen™ and backfill full depth with clean soil.	64	0
2	3	Afternoon, first day. Displace clean soil to the east. Apply Visqueen™ and backfill full depth with clean soil.	0	64
3	3	Morning, second day. Displace clean soil to the east. Apply Visqueen™ and backfill full depth with clean soil.	0	64
4	2	Afternoon, second day. Remove and transport contaminated soil. Apply Visqueen™ and backfill full depth with clean soil.	39	0
5	3	Morning, third day. Remove and transport contaminated soil. Apply Visqueen™ and backfill full depth with clean soil.	64	0
6	3	Afternoon, third day. Remove and transport contaminated soil. Apply Visqueen™ and backfill full depth with clean soil.	64	0
7	3	Morning and afternoon, fourth day. Remove and transport contaminated soil. Apply Visqueen™ and backfill 1 foot with clean soil.	96	0
8	3	Morning and afternoon, fifth day. Remove and transport contaminated soil. Apply Visqueen™ and backfill 1 foot with clean soil.	96	0
9	1	Morning, sixth day. Remove and transport contaminated soil. Apply Visqueen™ and backfill 1 foot with clean soil.	30	0
10	1	Afternoon, sixth day. Remove and transport contaminated soil. Apply Visqueen™ and backfill 1 foot with clean soil.	10	0
11	1	Morning and afternoon, seventh day. Remove, transport contaminated soil. Apply Visqueen™ and backfill 1 foot with clean soil.	42	0

Note: yd^3 = cubic yard.

emissions model that predicted no VOC remaining in the soil was considered inappropriate because all of the COCs were detected at parts per million in at least one sampling grid in the soil at the site 200 days after the concrete and asphalt cover had been removed.

The RTI model, based upon Fick's second law of diffusion, as described by Crack (1970), was developed to estimate emissions from soil after the chemical of interest was applied to the surface. It assumes that emissions from the surface are limited by the diffusion of vapors through the pore spaces in the contaminated soil and that an equilibrium condition exists between the concentration of the VOCs in the soil and the corresponding organic vapor in the pore spaces. This model considers the effects of volatilization and biodegradation, but not leaching of the VOCs into the groundwater.

A Lotus™ spreadsheet was developed to automate the calculations. To initiate them, the chemical and physical constants of each COC, as well as soil and excavation characteristics, were input. The chemical and physical constants include the: molecular weight, vapor pressure, water solubility, air diffusion coefficient, water diffusion coefficient, Henry's Law constant, and organic carbon partition coefficient. The model also required soil characteristics at the site, surface area and depth of the contaminated site, and the maximum soil contaminant concentration. A soil porosity of 0.30 percent and soil moisture of 0.04 grams of water per gram of soil were used in the model. A soil density of 2.650 grams per cubic centimeter and an organic carbon fraction of 2 percent (0.02 grams of carbon per gram of soil) were also assumed. The surface area of the construction site was approximated to be 8,440 feet squared (ft^2) and the depth of contaminated soil was assumed to 6 feet. For each COC, the maximum detected concentration at the site at any depth or location, was input as the level of soil contamination throughout the site.

For the RTI model, the elapsed time from the occurrence of the last spill on the contaminated site to the time of sample collection and analysis must be provided. For this project, the elapsed time was assumed to be the period from the removal of the concrete cover to the November 1991 sampling event. This timeframe was approximately 200 days and this was used for the baseline emission flux. These baseline emission fluxes were then used for the subsequent emission calculations for each chemical during the excavation.

The RTI model was then used to calculate emission rates for each chemical for 15-minute, 1-hour, and 8-hour averaging times. The calculated average emissions for these time periods assume that the last spill had just occurred. Although this approach was conservative, it was considered reasonable by ABB-ES as it was applied to the areas of un-exposed, contaminated soils that were being agitated during excavation. Because the RTI model adjusts emissions for surface agitation, no agitation factor was applied to the predicted emission rates.

Emissions were also calculated for 200 days after removal of the asphalt and concrete slab at the site. These 200-day actual emission rates were applied to the areas of the site that were not disturbed during the excavation.

A summary of emission rates calculated by the RTI model for each averaging period are presented in Table 3-4. Fifteen-minute averaging rates ranged from 3.62×10^{-3} grams per second for chloroform to 1.31 grams per second for 1,1,1-trichloroethane. The emission rates for 1,1,1-trichloroethane were expected to be the highest because its soil concentration was more than 100 times higher than the next highest COC. Although the maximum detected soil concentration for 1,1-dichloroethene was less than that for either tetrachloroethene or trichloroethene, it had the second highest predicted emission rate due to its chemical and physical characteristics. The complete outputs from the RTI Model are provided in Appendix B.

Table 3-4
Emission Rates of the Chemicals of Concern Predicted by the RTI Land Treatment Model

Health Threat Evaluation
Building 780 Construction Site
NAS Jacksonville, Florida

Chemical of Concern	200-Day Baseline (g/sec)	15-Minute Average (g/sec)	1-Hour Average (g/sec)	8-Hour Average (g/sec)
Chloroform	1.36×10^{-5}	3.62×10^{-3}	1.82×10^{-3}	6.44×10^{-4}
Methylene chloride	1.36×10^{-5}	3.63×10^{-3}	1.82×10^{-3}	6.46×10^{-4}
Tetrachloroethene	1.09×10^{-4}	2.90×10^{-2}	1.45×10^{-2}	5.16×10^{-3}
Trichloroethene	9.38×10^{-5}	2.50×10^{-2}	1.26×10^{-2}	4.46×10^{-3}
1,1,1-Trichloroethene	4.92×10^{-3}	1.31	6.59×10^{-1}	2.34×10^{-1}
1,1-Dichloroethene	2.51×10^{-4}	6.71×10^{-2}	3.36×10^{-2}	1.19×10^{-2}

Note: g/sec = grams per second.

3.4 AIR DISPERSION MODELING. The USEPA SCREEN model, based upon the work of Brode (1988), was used to estimate ambient air concentrations resulting from the IRAP. The USEPA recommends this model for conducting air pathway analyses and atmospheric dispersion modeling (USEPA, 1989a, 1989b). SCREEN is a Gaussian dispersion model. It assumes that emissions from contaminated soils will disperse in the vertical and crosswind directions according to a Gaussian distribution in a uniform wind field. SCREEN uses a number of conservative assumptions and provides conservative estimates of air VOC concentrations.

The area source algorithm in SCREEN was used for the analysis. This algorithm uses a simple virtual point source procedure that assumes the area of the source can be approximated by a simple square. Automated receptor distances from 1 meter to 50 meters were selected for a single wind direction and discrete receptors were placed every 10 feet from the edge of the contaminated area to 100 feet and every 50 feet thereafter to a limit of 500 feet from the site. Flat terrain, urban air dispersion coefficients, and an ambient temperature of 293 degrees Kelvin were assumed in the calculations.

A wide range of meteorologic conditions were used in the modeling to ensure that worst case concentrations of the COCs would be predicted. The COC concentrations were calculated for each of the following combinations of wind speeds and air stability classes given in Table 3-5. The stability classes indicate the degree of atmospheric turbulence ranging from very unstable (Class A) to neutral (Class D) to moderately stable (Class F) conditions. The wind speeds and stability classes modeled by SCREEN are provided in Table 3-5.

Table 3-5
Wind Speeds Modeled for Each Atmospheric Stability Class in the SCREEN Model

Health Threat Evaluation
Building 780 Construction Site
NAS Jacksonville, Florida

Stability Class	10-Meter Wind Speed (m/s)
A	1,2,3
B	1,2,3,4,5
C	1,2,3,4,5,8,10
D	1,2,3,4,5,8,10,15,20
E	1,2,3,4,5
F	1,2,3,4

Note: m/s = meters per second.

Air quality impacts were analyzed for 2 days during the IRAP, days 1 (scenario 1) and 7 (scenario 11). As shown in Figure 2-2, the excavation site was divided into 11 sections. On day 1, contaminated soil was assumed to be removed from section 1, a layer of Visqueen™ put down, and clean fill soil backfilled. On day 7 contaminated soil was assumed to be removed from section 11. The largest area was assumed to be excavated on day 7; however, at that time, the remaining area of exposed, undisturbed soil was assumed to be the smallest and most of the contaminated soil at the site would have been removed and replaced with clean soil. In addition, the other areas previously excavated would have a Visqueen™ vapor barrier in place, eliminating these excavation areas as possible vapor emitting sources. A smaller area was assumed to be excavated on day 1, but the amount of exposed, contaminated soil not yet removed would be the greatest.

The surface area of contaminated soil expected to be excavated or displaced was 7,690 square feet with an additional 750 square feet of contaminated soil to the south of the excavation area that would remain exposed but not excavated. This equals the area modeled in the RTI model, 8,440 square feet.

As indicated previously, the SCREEN model assumes the area of the source of emissions can be approximated by a simple square. The length of a side of the square is required as input to the model. As a conservative estimate of the ground-level concentrations, the length of the shortest side of the section being analyzed, 33 feet, was assumed for the section of contaminated soil being agitated in scenario 1 (day 1). A length of 80 feet was used for the area source representing the remainder of the exposed surface area of contaminated soil that was not being agitated. For analysis of scenario 11 (day 7), Section 11 was divided into two areas A and B, as shown in Figure 2-2. A length of 22 feet was used for section 11A and 12 feet for section 11B; a length of 17.5 feet was assumed for the remainder of the area of contaminated soil that was not being excavated.

Emission rates to be used in the dispersion modeling for each of the six COCs were calculated from the output of the RTI model. For the sections of contaminated soil being excavated, the 15-minute, 1-hour, and 8-hour average emission rates from the RTI model were used. To obtain emission rates for the dispersion modeling, these average emission rates from the RTI model were adjusted to account for the exposed surface area after the contaminated soil was removed but before the Visqueen™ was laid down and the clean soil backfilled. Because the emissions predicted from the RTI model were very conservative estimates, no soil agitation factor was applied in the SCREEN modeling. For the undisturbed areas of contaminated soil, the 200-day actual emission rates predicted from the RTI model were used and adjusted for the surface area for the excavation footprint. The resulting emission rates were used for each of the three averaging times of concern.

The calculated emission rates used in the air quality analyses are shown in Table 3-6 and 3-7. In the SCREEN model runs, an emission rate of 1 gram per second was used for each pollutant source area and averaging time. The ambient air concentrations output from SCREEN were then multiplied by the actual emission rates for each COC and averaging time to obtain the ambient air quality concentrations to be used in the HTE. The SCREEN model output for each source area for excavation scenarios 1 and 11 are provided in Appendix C.

The SCREEN model provides estimates of ambient air concentrations for a 1-hour averaging time. For short-term exposures, these 1-hour averages must then be converted to other short-term averaging times. However, as recommended by the USEPA (Brode, 1988), the predicted 1-hour average concentrations were also used to represent 8-hour averages. No conversion factor was applied because concentrations close to an area source will not vary significantly with changes in wind direction and because meteorologic conditions likely to produce the maximum impacts can persist for several hours. Although there is no standard factor recommended for conversion of 1-hour concentrations to 15-minute averages, a factor from Turner (1969), 1.34, was applied to estimate concentrations for this averaging period.

SCREEN analyzes each emission source separately. Using a Lotus™ spreadsheet, the combined impacts of several sources were estimated by simply the summing the individual maximum air VOC concentrations at each receptor, regardless of the meteorologic conditions for which the maximum occurred. For example, at day 1, the total air VOC concentrations were estimated by summing the concentrations from both the excavated area and the undisturbed area for each receptor downwind

of the site. A summary of the maximum predicted air quality concentrations for excavation Number 1 (day 1) are provided in Table 3-6. These maximum concentrations occurred 1 meter from the edge of the excavation site under stable meteorologic conditions, i.e., stability Class E, and for a 1 meter per second wind speed.

Table 3-6
Maximum Air Concentrations for the Chemicals of Concern on Day 1 (Excavation Scenario 1) of Excavation

Health Threat Evaluation
Building 780 Construction Site
NAS Jacksonville, Florida

Chemical of Concern	Emission Period	Excavated Area Section 1 ($\mu g/m^3$)	Unagitated Area Section 1 ($\mu g/m^3$)	Total Concentration ($\mu g/m^3$)
Chloroform	15-minute	$1.03x10^3$	$1.09x10^1$	$1.04x10^3$
	1-hour	$3.85x10^2$	8.13	$3.93x10^2$
	8-hour	$1.36x10^2$	8.13	$1.44x10^2$
Methylene chloride	15-minute	$1.03x10^3$	$1.09x10^1$	$1.04x10^3$
	1-hour	$3.85x10^2$	8.13	$3.93x10^2$
	8-hour	$1.37x10^2$	8.13	$1.45x10^2$
Tetrachloroethene	15-minute	$8.24x10^3$	$8.78x10^1$	$8.33x10^3$
	1-hour	$3.06x10^3$	$6.53x10^1$	$3.12x10^3$
	8-hour	$1.09x10^3$	$6.53x10^1$	$1.16x10^3$
Trichloroethene	15-minute	$7.10x10^3$	$7.56x10^1$	$7.18x10^3$
	1-hour	$2.67x10^3$	$5.62x10^1$	$2.72x10^3$
	8-hour	$9.43x10^2$	$5.62x10^1$	$9.99x10^2$
1,1,1-Trichloroethane	15-minute	$3.72x10^5$	$3.96x10^3$	$3.76x10^5$
	1-hour	$1.39x10^5$	$2.95x10^3$	$1.42x10^5$
	8-hour	$4.94x10^4$	$2.95x10^3$	$5.24x10^4$
1,1-Dichloroethene	15-minute	$1.91x10^4$	$2.02x10^2$	$1.93x10^4$
	1-hour	$7.11x10^3$	$1.50x10^2$	$7.26x10^3$
	8-hour	$2.52x10^3$	$1.50x10^2$	$2.67x10^3$

Note: $\mu g/m^3$ = micrograms per cubic meter.

The total VOC emissions for excavation scenario 11 (day 7) were estimated by summing the air concentrations from sections 11A, 11B, and the remaining undisturbed, contaminated soil area. A summary maximum air concentrations for excavation Number 11 is provided in Table 3-7. Again, the maximum concentrations were predicted for a receptor one meter from the edge of the excavation site, under stable meteorologic conditions and a wind speed of one meter per second. The highest concentrations estimated at each receptor downwind of the site for excavation scenarios 1 and 11 (days 1 and 11, respectively) are provided in the Lotus spreadsheet output in Appendix C.

Table 3-7
Maximum Air Concentrations for the Chemicals of Concern on Day 7 (Excavation Scenario 11) of Excavation

Health Threat Evaluation
Building 780 Construction Site
NAS Jacksonville, Florida

Chemical of Concern	Emission Period	Excavated Area Section 11A ($\mu g/m^3$)	Excavated Area Section 11B ($\mu g/m^3$)	Unagitated Area ($\mu g/m^3$)	Total Concentration ($\mu g/m^3$)
Chloroform	15-minute	1.40×10^3	8.89×10^2	4.80	2.31×10^3
	1-hour	5.25×10^2	3.36×10^2	3.57	8.65×10^2
	8-hour	1.86×10^2	1.19×10^2	3.57	3.08×10^2
Methylene chloride	15-minute	1.41×10^3	9.03×10^2	4.80	2.32×10^3
	1-hour	5.25×10^2	3.36×10^2	3.57	8.65×10^2
	8-hour	1.86×10^2	1.19×10^2	3.57	3.09×10^2
Tetrachloroethene	15-minute	1.13×10^4	7.19×10^3	3.38×10^1	1.85×10^4
	1-hour	4.18×10^3	2.68×10^3	2.85×10^1	6.88×10^3
	8-hour	1.49×10^3	9.54×10^2	2.85×10^1	2.47×10^3
Trichloroethene	15-minute	9.69×10^3	6.19×10^3	3.31×10^1	1.59×10^4
	1-hour	3.63×10^3	2.33×10^3	2.46×10^1	5.98×10^3
	8-hour	1.29×10^3	8.25×10^2	2.46×10^1	2.14×10^3
1,1,1-Trichloroethene	15-minute	5.07×10^5	3.26×10^5	1.73×10^3	8.34×10^5
	1-hour	1.90×10^5	1.22×10^5	1.29×10^3	3.13×10^5
	8-hour	6.75×10^4	4.31×10^4	1.29×10^3	1.12×10^5
1,1-Dichloroethene	15-minute	2.60×10^4	1.67×10^4	8.84×10^1	4.28×10^4
	1-hour	9.69×10^3	6.22×10^3	6.58×10^1	1.60×10^4
	8-hour	3.44×10^3	2.20×10^3	6.58×10^1	5.70×10^3

Note: $\mu g/m^3$ = micrograms per cubic meter.

For each chemical, higher concentrations were predicted for excavation scenario 11 than for scenario 1. As expected, volatilization for the areas being agitated were substantially higher than those for the undisturbed areas. Additionally, the maximum impacts for each source of emissions and for all sources combined occurred at 1 meter, the closest receptor to the source of emissions.

4.0 INHALATION THREAT COMPARISON

The final step in developing the data necessary for the HTE was to combine the outputs of the RTI emission model and the SCREEN dispersion model. The resulting air concentrations of each COC were used in developing the HTE and the associated safety zone. The air concentration predicted for 15-minute, 1-hour, and 8-hour exposure periods during excavation scenarios 1 and 11 at distances from the excavation site ranging from 1 to 700 meters are provided in Appendix D.

In developing the HTE, the air concentrations predicted from the combined use of the RTI emission model and the SCREEN dispersion model were compared to human inhalation health standards for the modeled COCs at the construction site. As previously noted, one standard selected for comparison was the OSHA PEL. In addition, the air concentrations predicted to result in an inhalation life time carcinogenic risk of $1x10^{-6}$ (one in one million) and the predicted air concentrations representing an inhalation non-carcinogenic risk, or Hazard Index (HI), equal to one were calculated.

All industrial workers in the United States, including those involved in hazardous waste operations such as the IRAP, are covered by the OSHA regulations provided in 29 CFR 1910.1200. These regulations provide the PELs that workers may be exposed to while in the workplace. However, the workers at the Building 780 construction site will not be exposed to a single chemical. Rather, they will be exposed to a mixture of chemicals in the air during the IRAP. In this case, the individual PELs for the COCs at the site are inadequate to protect worker health and a procedure for calculating a PEL equivalent exposure (E_m) for combined vapors from individual chemical PELs must be used as specified in 29 CFR 1910.1000 (d)(2)(i):

> "In case of a mixture of air contaminants an employer shall compute the equivalent exposure as follows:

$$E_m = \frac{C_1}{L_1} + \frac{C_2}{L_2} + \ldots \frac{C_n}{L_n} \qquad (1)$$

where

E_m is the equivalent exposure for the mixture,
C is the concentration of a particular contaminant, and
L is the exposure limit for that substance specified in Subpart Z of 29 CFR Part 1910.

The value of E_m shall not exceed unity (1)." Therefore, the air concentrations of the COCs at the site must be considered together rather than separately. The results of these PEL calculations are provided in Appendix E.

The second human health criteria used in developing the HTE was the USEPA method-derived inhalation carcinogenic risk. For this comparison, the upper bound inhalation carcinogenic risks were calculated for an 8-hour exposure at the predicted air COC concentrations during the 7 days of the IRAP. USEPA default

factors considering a 70 kilograms (kg) adult body weight with an inhalation rate of 20 cubic meters (m^3) of air during the 8-hour workday were used in the inhalation risk estimates.

In current USEPA risk assessment methodology, lifetime cancer risks due to airborne contaminants are estimated by multiplying the air concentrations of the contaminants in units of micrograms per cubic meter ($\mu g/m^3$) by chemical-specific air unit risks expressed as $(\mu g/m^3)^{-1}$. These chemical-specific air unit risk values, from the USEPA Integrated Risk Information Service (IRIS), are provided in Table 4-1.

Table 4-1
USEPA Air Unit Risks for the Chemicals of Concern

Health Threat Evaluation
Building 780 Construction Site
NAS Jacksonville, Florida

Chemical of Concern	Air Unit Risk $(\mu g/m^3)^{-1}$
Chloroform	2.3×10^{-5}
Methylene chloride	4.7×10^{-7}
Tetrachloroethene	5.2×10^{-7}
Trichloroethene	1.7×10^{-7}
1,1,1-Trichloroethane	None
1,1-Dichloroethene	5.0×10^{-5}

Source: USEPA Integrated Risk Information System (IRIS).

Note: $(\mu g/m^3)^{-1}$ = per microgram per cubic meter.

The resulting unitless numbers are upper bound excess cancer risks. Cancer risk estimates for individual contaminants at Building 780 were calculated using the assumptions that adult workers worked seven 8-hour days exposed to the modeled air concentrations. The formula for calculating cancer risk estimates was altered to yield risks for a non-lifetime exposure:

$$RISK = \frac{C_a \times UR_a \times (ED \times ET)}{LT} \qquad (2)$$

where
C_a = air concentration of contaminant ($\mu g/m^3$),
UR_a = air unit risk $(\mu g/m^3)^{-1}$,
ED = exposure duration (7 days),
ET = exposure time (8 hours), and
LT = lifetime exposure (24 hours per day times 365 days per year times 70 years).

These cancer risks are estimates for individual contaminants at Building 780 calculated using the assumptions that adult workers worked seven 8-hour days exposed to the modeled air concentrations. Risk estimates for the individual contaminants were added together to obtain the overall cancer risks. These are provided in tables in Appendix E. These tables provide the cancer risks for each exposure period (15-minute, 1-hour, and 8-hour) modeled. The distance from the excavation site associated with a upper bound inhalation cancer risk of $1x10^{-6}$ is designated with an arrow.

The procedure for addressing non-cancer health risks is similar to the derivation of the PEL equivalent exposure. Hazard quotients for each chemical are obtained by dividing the air concentration of the contaminant by its Reference Concentration (RfC). Because the contaminants at Building 780 all belong to the same chemical class and have similar toxicological effects, it was considered appropriate to combine the individual hazard quotients to derive a Hazard Index. When a Hazard Index exceeds unity (1.0), there may be concern for potential health effects. Any single chemical with a concentration greater than its RfC will cause the Hazard Index to exceed unity; however, the Hazard Index can also exceed unity without any single chemical exceeding its RfC. The equation used to calculate the Hazard Index is:

$$HI = \frac{C_1}{RfC_1} + \frac{C_2}{RfC_2} + \ldots \frac{C_n}{RfC_n} \qquad (3)$$

where

HI = Hazard Index (unitless),
C_n = air concentration of nth contaminant (mg/m^3), and
RfC_n = reference concentration of n^{th} contaminant (mg/m^3).

The USEPA determines RfCs and makes them available to the public via IRIS and the Health Effects Assessment Summary Tables (HEAST). Currently, the only COC for which a USEPA-derived RfC is available is 1,1,1-trichloroethane. However, the Massachusetts Department of Environmental Protection has independently derived RfCs using methods similar to the USEPA methods. Because it would have been inappropriate to present only the 1,1,1-trichloroethane hazard quotient to address non-cancer health risks, Massachusetts RfCs were used for the other contaminants. The RfCs used in this study are provided in Table 4-2. The chronic RfC is an estimate (with uncertainty spanning up to an order of magnitude) of a daily exposure to human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime exposure. The subchronic RfC is similar to the chronic RfC except that it is for an exposure period from 2 weeks to 7 years.

Table 4-2
References Concentrations (RfC) for the Chemicals of Concern Used for the Health Threat Evaluation (HTE)

Health Threat Evaluation
Building 780 Construction Site
NAS Jacksonville, Florida

Chemical of Concern	Chronic RfC (mg/m^3)	Subchronic RfC (mg/m^3)	Source
Chloroform	$6.6x10^{-1}$	$6.6x10^{-1}$	Mass
Methylene chloride	3.0	3.0	Mass
Tetrachloroethene	4.6	4.6	Mass
Trichloroethene	$1.8x10^{-1}$	$1.8x10^{-1}$	Mass
1,1,1-Trichloroethene	1.0	10	USEPA
1,1-Dichloroethene	$5.0x10^{-3}$	$5.0x10^{-3}$	Mass

Notes: mg/m^3 = milligrams per cubic meter of air.
Mass = Massachusetts Department of Environmental Protection.
USEPA = United States Environmental Protection Agency.

The Hazard Index for the COCs at the site were calculated for both chronic and subchronic exposures. These calculations are provided in tables for each exposure period (15-minute, 1-hour and 8-hour) in Appendix E. The distance away from the excavation site associated with a Hazard Index of less than 1.0 is designated with an arrow.

4.1 HEALTH THREAT EVALUATION AND SAFETY ZONE. As previously stated, ABB-ES was tasked to analyze the human health threat associated with inhalation exposure to the COCs volatilized during the IRAP. The HTE was to consider not only the construction workers at the site, but also, NADEP employees working in the vicinity of the Building 780 construction site. The Navy further advised ABB-ES, during the meeting on March 6, 1992, that acceptable health risks were to be set at an excess upper bound inhalation cancer risk of 1 in a million ($1x10^{-6}$) and a Hazard Index equal to 1.0, in addition to a E_m less than 1.0 as required by 29 CFR 1910.1000.

Ideally, ABB-ES would have preferred to model all of excavation activities at the site and, based upon these results, provide the Navy with a daily HTE and safety zone recommendation for each particular excavation activity. However, the extremely short timeframe required to provide the letter with the safety zone recommendations precluded this level of detail. Therefore, ABB-ES decided to select a small number of excavation conditions that would be representative of the worst excavation and meteorologic conditions that would likely occur during the IRAP. An HTE and safety zone sufficient to protect construction and NADEP personnel against exposure to the COCs during the worst case conditions modeled would also protect them against exposure to the COCs during less conservative excavation conditions.

The two exposure variables most critical to the worst case simulation were the excavation scenario and the exposure duration. Factors included in the excavation scenario were level of soil contamination in the excavation area, amount of soil to be removed or displaced, and the surface area soil exposed during the excavation or footprint. The worst excavation scenario would involve moving a large amount of heavily contaminated soil that uncovered a large footprint for VOC volatilization. Therefore, after consideration of all of these factors, the modeling results of excavation scenario number 11, which occurred on day 7 (see Table 3-3), was selected for the HTE analysis. The area was highly contaminated (see the analytical results for sampling grids 37, 38 and 42 in Appendix A) and although the amount of soil displaced was less than on other days, the size of the excavation footprint was the largest of any of the excavation scenarios.

The exposure duration was the period over which exposure to air COC levels would be averaged. A short averaging time, such as 15 minutes, would be the most protective to the workers in that the emission model predicted the highest average air concentrations, but it might not be descriptive of actual long-term conditions at the site during the IRAP. Conversely, a long averaging time might overlook high-intensity, short-duration exposures that could be more detrimental to human health than were long-term, low level exposures. Because air COC levels were expected to be quite variable during the IRAP, a long-term averaging term was believed to be more applicable as an averaging time. Therefore, for the HTE and associated safety zone, an 8-hour emission period was selected.

It was also necessary for ABB-ES to realistically evaluate the risks, both carcinogenic and non-carcinogenic, associated with COC exposure of the construction workers and the NADEP employees during the IRAP. This was done by comparing the safety zones sufficient to protect against OSHA PEL E_m values to those sufficient to protect against the carcinogenic and non-carcinogenic risks. The safety zones that were protective of both the chronic and subchronic non-carcinogenic risks were several times greater than either the OSHA PEL or carcinogenic risks and were believed to be overly conservative. The safety zone protective against OSHA PEL E_m values was believed to be insufficiently conservative because it predicted very small safety zones. Therefore, ABB-ES concluded that the most relevant toxicological endpoint to be used to established the safety zone was the cancer risk factor.

4.2 HEALTH THREAT EVALUATION (HTE) RECOMMENDATIONS AND SAFETY ZONE. The risks, both carcinogenic and non-carcinogenic, associated with an 8-hour exposure during excavation scenario 11 (day 7) are provided in Table 4-3. An analysis of this table indicated that a safety zone of 30 meters should be sufficient to protect construction workers and NADEP employees against carcinogenic effects from the COCs released into the air during the IRAP. It was recommended ,however, that anyone inside of the excavation safety zone be closely monitored to determine if that person was being exposed to air concentrations above the previously described acceptable health risk levels. This was felt to be especially true for the construction company employees working in very close proximity to the excavation process. They would be at the greatest risk and needed to be the most closely monitored individuals on the site. If onsite air monitoring indicated that they were being exposed to unacceptable levels of VOCs in the air, then appropriate respiratory protective measures would need to be employed to protect these workers.

Table 4-3
Risk Levels Based on 8-Hour Emission Rates
Section 11 Plus Unagitated Area

Health Threat Evaluation
Building 780 Construction Site
NAS Jacksonville, Florida

Distance (meters)	PEL Fraction E_m	Upper Bound Cancer Risk	1,1,1-TCA Chronic Hazard Index	1,1,1-TCA Subchronic Hazard Index	Estimated Cumulative Chronic Hazard Index	Estimated Cumulative Subchronic Hazard Index
1	1.62E+00	2.7E-05	1E+02	1E+01	1E+03	1E+03
3	4.54E-01	7.6E-06	3E+01	3E+00	4E+02	3E+02
6	1.88E-01	3.1E-06	1E+01	1E+00	1E+02	1E+02
9	1.07E-01	1.8E-06	7E+00	7E-01	8E+01	8E+01
12	7.01E-02	1.2E-06	5E+00	5E-01	5E+01	5E+01
15	4.99E-02	8.4E-07	3E+00	3E-01	4E+01	4E+01
18	3.75E-02	6.3E-07	3E+00	3E-01	3E+01	3E+01
21	2.92E-02	4.9E-07	2E+00	2E-01	2E+01	2E+01
24	2.35E-02	3.9E-07	2E+00	2E-01	2E+01	2E+01
27	1.93E-02	3.2E-07	1E+00	1E-01	2E+01	1E+01
30	1.62E-02	2.7E-07	1E+00	1E-01	1E+01	1E+01
37	1.19E-02	2.0E-07	8E-01	8E-02	9E+00	9E+00
43	9.10E-03	1.5E-07	6E-01	6E-02	7E+00	7E+00
49	7.20E-03	1.2E-07	5E-01	5E-02	6E+00	5E+00
55	5.85E-03	9.8E-08	4E-01	4E-02	5E+00	4E+00
61	4.85E-03	8.1E-08	3E-01	3E-02	4E+00	3E+00
67	4.10E-03	6.9E-08	3E-01	3E-02	3E+00	3E+00
73	3.50E-03	5.9E-08	2E-01	2E-02	3E+00	3E+00
79	3.04E-03	5.1E-08	2E-01	2E-02	2E+00	2E+00
85	2.66E-03	4.5E-08	2E-01	2E-02	2E+00	2E+00
91	2.35E-03	3.9E-08	2E-01	2E-02	2E+00	2E+00
100	2.00E-03	3.3E-08	1E-01	1E-02	2E+00	1E+00
107	1.78E-03	3.0E-08	1E-01	1E-02	1E+00	1E+00
122	1.40E-03	2.3E-08	1E-01	1E-02	1E+00	1E+00
137	1.13E-03	1.9E-08	8E-02	8E-03	9E-01	8E-01
152	9.33E-04	1.6E-08	6E-02	6E-03	7E-01	7E-01
183	6.72E-04	1.1E-08	5E-02	5E-03	5E-01	5E-01
200	5.72E-04	9.6E-09	4E-02	4E-03	4E-01	4E-01
300	2.79E-04	4.7E-09	2E-02	2E-03	2E-01	2E-01
400	1.69E-04	2.8E-09	1E-02	1E-03	1E-01	1E-01
488	1.21E-04	2.0E-09	8E-03	8E-04	9E-02	9E-02
500	1.16E-04	1.9E-09	8E-03	8E-04	9E-02	8E-02
600	8.56E-05	1.4E-09	6E-03	6E-04	7E-02	6E-02
700	6.66E-05	1.1E-09	5E-03	5E-04	5E-02	5E-02

It is important to note that this HTE and predicted safety zone recommendations do not address risks associated with exposure to vinyl chloride. It was not possible to predict emissions from the soil for this chemical because its source appears to be the groundwater. However, ABB-ES strongly recommended that vinyl chloride air levels also be monitored at the site during the IRAP, especially while the Visqueen™ was being laid down in the excavated areas at the site.

4.3 UNCERTAINTY ANALYSIS OF THE HTE. The unique nature of this project coupled with the short timeframe for completion has provided several areas of uncertainty that need further discussion. Whereas these areas of uncertainty are interrelated and difficult to categorize, they can be roughly divided into three areas: the overall conservatism of the modeling and HTE approach, the selection and use of the two air models themselves, and the human toxicology data used to analyze the results of the air modeling and recommend the safety zone. A fourth area of uncertainty, the usability of the soil sampling data, has already been addressed in the previous discussion of data usability.

The first area of uncertainty is the conservative approach used by ABB-ES. This was the result of two factors; the short timeframe allowed to complete the modeling and develop the safety zone recommendations and the need to assure adequate protection of human health during the IRAP. ABB-ES concluded that the best approach answer to these two factors was to model the worst case conditions that could occur at the site, analyze the results in the HTE, and then recommend the associated safety zone based upon this established HTE. The rationale was that a safety zone sufficient to protect construction workers and NADEP employees from the worst case conditions would also be protective during all other conditions that could occur at the site during the IRAP.

To model the worst case situation at the site, ABB-ES used the highest detected soil concentrations for each the six COCs at the site as representative of the contaminant concentrations at the entire site. ABB-ES recognized that this approach would be overly conservative during much of the IRAP, but, the additions to the health and safety plan provided by ABB-ES (ABB-ES, 1992) also allowed for changes in the level of personal protection equipment based upon the results of onsite air monitoring during the IRAP. In addition, ABB-ES suggested the use of vapor barriers, such as Visqueen™, at the site to further decrease the excavation surface area and reduce emissions at the site.

The use of the highest soil concentration in the modeling, however, was an appropriate estimate for the conditions occurring at the site during excavation scenario 11 (day 7). As Table 4-4 shows, the highest detected concentrations of half of the COCs at the site were found at soil sampling grid 37 and the level of trichloroethene at this grid was half of the highest concentration detected at the site. The soil at sampling grid 37 was part of the soil excavated during excavation scenario 11, and, because this excavation scenario was the one selected for analysis of the HTE, the recommended safety zone, at least for day 7, was realistic.

Table 4-4
Sampling Grid Locations of the Highest Detected Soil Concentrations for the Chemicals of Concern

Health Threat Evaluation
Building 780 Construction Site
NAS Jacksonville, Florida

Chemical of Concern	Highest Detected Soil Concentration (μg/kg)	Sampling Grid Where Highest Soil Concentration Was Detected
Chloroform	3.12	42
Methylene chloride	2.38	23
Tetrachloroethene	13.0	42
1,1,1-Trichloroethane	5,460	37
Trichloroethene	18.3	37
1,1-Dichloroethene	9.64	37

Note: μg/kg = micrograms per kilogram.

The conservative assumptions adopted by ABB-ES for the HTE and the safety zone were also warranted by the fact that the workers at the construction site or in the surrounding NADEP area would have virtually no olfactory warning that they were being exposed to the COCs during the IRAP. This is illustrated by the information provided in Table 4-5.

Table 4-5
Comparison of Highest Modeled Air Concentrations to the Odor Thresholds

Health Threat Evaluation
Building 780 Construction Site
NAS Jacksonville, Florida

Chemical of Concern	Highest Modeled Concentration (mg/m^3)	Odor Threshold (mg/m^3)	Percent of Odor Threshold
Chloroform	2.31	415	0.51
Methylene chloride	744.74	2.32	0.31
Tetrachloroethene	18.5	339	5.5
Trichloroethene	15.9	538	2.95
1,1,1-Trichloroethene	834	655.2	127
1,1-Dichloroethene	15.9	538	2.9

Note: mg/m^3 = milligrams per cubic meter.

The highest modeled emission concentration at the site was for a 15-minute exposure 1 meter downwind of the excavation of segment number 11 (day 7). Only 1,1,1-trichloroethane would be at levels sufficient to be detected by smell. Therefore, it would be possible to be exposed to toxic levels of the COCs at the site without any detectable odor being present and a conservative approach to the HTE and associated safety zone is appropriate. It also emphasizes the importance of onsite air monitoring for all of the chemicals at the site.

The second area of uncertainty lies with the use of the two air models to predict the emissions from the soil during the IRAP. This project may be the first combined use of these two well-accepted USEPA air models for the purpose of developing an HTE and recommending a safety zone during an IRAP. Although ABB-ES felt that these two air models were the best available for the purpose of this project, the output results could not be validated and this lack of validation represents an area of uncertainty.

The modeling assumptions of the RTI model are different from those of the SCREEN model and each one is different with regard to the interrelationships between solids (the soil), liquids (soil moisture and the liquid phase of the COCs), and gasses (the soil pore spaces, the gaseous phase of the COCs, and the atmosphere). Therefore, the accuracy of the results of the HTE are dependent not only upon the input of accurate data into the models, but also upon the complementary nature of the two models. An example of this is the fact that the RTI model considers the effects of volatilization and biodegradation on emissions but does not consider the effects of leaching into groundwater. Therefore, this factor was not considered in any part of the HTE although the site, at times, was saturated with water. Additionally, the assumptions used in the RTI model concerning soil characteristics such as soil porosity, soil moisture, organic carbon fraction, soil density, and soil bulk density were carried through to both the SCREEN model and the HTE simply due to the interrelationships of the models.

The meteorologic conditions used in the air modeling are also an area of uncertainty. SCREEN modeled the dispersion of the COCs at the site over a wide variety of atmospheric conditions and the worst case condition was used as representative of the weather conditions at the site during the IRAP. SCREEN predicted that the highest air concentrations of the COCs would occur with a wind speed of 1 meter per second under moderately stable conditions (Class E). These meteorologic conditions may be substantially different from those actually occurring at the site. Again, these differences are areas of uncertainty that can only be resolved by comparing the modeling results with empirical evidence to determine if the models are accurate.

The final area of uncertainty is the human toxicology used to analyze the results of the air modeling and recommend the safety zone. Two sets of human toxicity values were used in the project; the OSHA PELs and the USEPA toxicity factors. It was an unusual feature of this project that these two sets of toxicity values were both used to predict the health effects because they are normally used for quite different purposes.

The OSHA PELs are used in an industrial or occupational setting to limit human exposure to chemicals in the workplace. The PEL values are based on human empirical experience in the workplace and generally have no uncertainty factors associated with them. In addition, the values are usually used as an upper limit

for human exposure in the workplace and cannot be used to estimate risks or probability of developing a carcinogenic or non-carcinogenic effect due to chemical exposure. Conversely, the USEPA toxicity factors are almost exclusively based upon the results of animal testing with little human empirical evidence to support them, and uncertainty factors as high as 10,000. These values cannot be used to estimate a safe exposure to a chemical in the workplace, but they are commonly used to estimate the carcinogenic and non-carcinogenic risks associated with exposure to a chemical or mixture of chemicals.

The uncertainty associated with the use of the two different human toxicology values in this project can be illustrated in the following example. The OSHA PEL for one of the COCs in this project, methylene chloride, is 500 ppm or 1.74×10^{6} $\mu g/m^3$. Using USEPA carcinogenicity risk assessment methodology, the air concentration associated with a 1×10^{-6} risk for a person breathing methylene chloride 8 hours a day for a working lifetime, 35 years, is 5.2 $\mu g/m^3$. Therefore, a person exposed to methylene chloride at the PEL for 8 hours a day over a working lifetime of 35 years has a upper bound excess cancer risk, as calculated using USEPA methodology, of 1.2×10^{-1}. That is, if 100 people were exposed under the preceding conditions to methylene chloride at the PEL, there would be a predicted upper bound increase of 12 cancers above the number of cancers normally expected (background incident) in these people.

It is not likely that OSHA would set a PEL at a level that caused excess cancers at a rate of 12 percent of the persons exposed to this level This suggests that the USEPA human toxicity values and risk assessment methodology may be too conservative to be used in the workplace. Additionally, OSHA does not recognize methylene chloride as a carcinogen even though it is recognized by the National Institute of Occupational Safety and Health (NIOSH). NIOSH also recommends that worker exposure be reduced to the lowest feasible concentration due to its possible carcinogenicity. Because OSHA does not recognize methylene chloride as a carcinogen, the OSHA PEL for this chemical may not be conservative enough to protect a worker against possible carcinogenic effects.

Another problem with both the OSHA PEL and the USEPA toxicity values is that more of them routinely account for concomitant exposure to drugs such as ethanol, to prescribed medications, or to lifestyle activities such as smoking. Ethanol is a drug well known to interact synergistically with chlorinated hydrocarbons, including several of the COCs, causing significant liver damage. This can occur after a single, albeit large, hydrocarbon exposure and this possible interaction cannot be ignored.

A large number of drugs also stimulate chemical metabolizing systems in the body. Although this effect can result in a decreased toxicologic response to one of the COCs, it can also result in an increased toxicological response. Smoking can also influence the toxicity of a chemical or mixture of chemicals by adversely affecting the health of the individual. This effect can increase the toxicity response to a chemical exposure.

In addition, there were elevated baseline levels of solvent vapors in the NADEP area. The workers in the NADEP area are routinely exposed to solvent vapors, primarily methylene chloride, and this exposure must be taken into consideration when establishing a safety zone for these workers. It is currently unknown if constant occupational exposure to solvents increases or decreases the likelihood

of an adverse toxicologic reaction to a single large exposure to the COCs such as might occur during the IRAP.

All of these areas of uncertainty suggested that a conservative approach be used in the HTE and in recommending the associated safety zone. The effect of these areas of uncertainty are unknown. However, if this conservative approach is adopted, the safety of both the construction workers and the other NADEP employees should be adequately protected and no adverse human health effects will occur as a result of the IRAP.

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APPENDIX A

A Comparison of the Soil Sampling Results from Enviropact's December 1991 and February 1992 Sampling Visits

Appendix Table A
Soil Sampling Results

Health Threat Evaluation
Building 780 Construction Site
NAS Jacksonville, Florida

Sample Grid Number[1]	Chemical	Sample Depth	December 1991 (µg/kg)	Sample Depth	February 1992 (µg/kg)
1			BDL		NS
2			BDL		NS
3			BDL		NS
4			BDL		NS
5			BDL		NS
6			BDL		NS
7			BDL		NS
8			BDL		NS
9			BDL		NS
10	1,1-Dichloroethane	U	BDL	S	[2]3.3 - 11.4
	Toluene	U	BDL	S	6.2 - [2]10.8
	1,1,1-Trichloroethane	U	BDL	S	[2]136 - 265
	Trichloroethene	U	BDL	S	[2]6.7 - 15.0
	Xylenes	U	BDL	S	5.9 - [2]13.1
11			BDL		NS
12			BDL		NS
13			BDL		NS
14	1,1,1-Trichloroethane	S	282	S	86.8
	Trichloroethene	S	BDL	S	2.9
	1,1-Dichloroethane	S	BDL	S	2.8
	Toluene	S	BDL	S	7.7
	Xylenes	S	BDL	S	10.1
	1,4-Dichlorobenzene	S	137	S	BDL
	1,1,1-Trichloroethane	D	BDL	D	86.9
	Trichloroethene	D	BDL	D	3.3
	1,1-Dichloroethane	D	BDL	D	15.9
	Toluene	D	BDL	D	7.8
	Xylenes	D	BDL	D	9.1
15			BDL		NS
16			BDL		NS
17			BDL		NS
18	1,1,1-Trichloroethane	S	863		NS
	1,1,1-Trichloroethane	D	615		NS
19			BDL		NS
20			BDL		NS
21	1,1,1-Trichloroethane	S	1,920	S	36.1
	Trichloroethene	S	265	S	BDL
	Toluene	S	BDL	S	4.9
	Xylenes	S	BDL	S	9.6
22			BDL		NS
23	Methylene chloride	S	2,380	S	BDL
	Trichloroethene	S	BDL	S	22.1
	1,1,1-Trichloroethane	S	1,910	S	650
	1,1-Dichloroethane	S	255	S	2.5

See notes at end of table.

Appendix Table A (Continued)
Soil Sampling Results

Health Threat Evaluation
Building 780 Construction Site
NAS Jacksonville, Florida

Sample Grid Number[1]	Chemical	Sample Depth	December 1991 (µg/kg)	Sample Depth	February 1992 (µg/kg)
	Tetrachloroethene	S	BDL	S	6.7
	1,1,2-Trichloroethane	S	BDL	S	13.7
	Ethyl benzene	S	BDL	S	3.9
	Toluene	S	BDL	S	49.6
	Xylenes	S	BDL	S	33.6
	Benzo(a)anthracene	S	BDL	S	370
	Benzo(b)fluoranthene	S	BDL	S	400
	Chrysene	S	BDL	S	390
	Fluoranthene	S	BDL	S	790
	Phenanthrene	S	BDL	S	330
24	Toluene	S	1,420		NS
	Xylene	S	1,370		NS
	1,2-Dichlorobenzene	S	171		NS
	1,1-Dichloroethene	D	202		NS
	1,1,1-Trichloroethane	D	17,700		NS
	Trichloroethene	D	157		NS
	1,1-Dichloroethene	D	3,750		NS
	1,1,1-Trichloroethane	D	400,000		NS
	Trichloroethene	D	2,850		NS
25	1,1,1-Trichloroethane	U	538		NS
26	1,1,1-Trichloroethane	S	992		NS
	Trichloroethene	S	120		NS
	1,1,1-Trichloroethane	D	1,710		NS
	Trichloroethene	D	213		NS
27	1,1,1-Trichloroethane	S	160	S	35.3 - [2]14,400
	Trichloroethene	S	BDL	S	[2]1,060 - 1,070
	1,1-Dichloroethane	S	BDL	S	2,260 - [2]2,260
	1,1-Dichloroethene	S	BDL	S	840 - [2]1,080
	Methylene chloride	S	BDL	S	[2]1,050 - 1,100
	Toluene	S	BDL	S	BDL - 4.2
	Xylenes	S	BDL	S	BDL - 7.9
	2,4-Dimethylphenol	S	BDL	S	30 - [2]45
	4-Methylphenol	S	BDL	S	11 - [2]15
	2-Methylphenol	S	BDL	S	7.3 - [2]10
	Phenol	S	BDL	S	7.9 - [2]11
	1,1-Dichloroethane	D	255	D	2,260
	Methylene chloride	D	416	D	1,100
	1,1-Dichloroethene	D	255	D	840
	1,1,1-Trichloroethane	D	5,480	D	15,100
	Trichloroethene	D	220	D	1,070
	Tetrachloroethene	D	121	D	BDL
	Toluene	D	598	D	BDL
	2,4-Dimethylphenol	D	BDL	D	30
	2-Methylphenol	D	BDL	D	7.3

See notes at end of table.

Appendix Table A (Continued)
Soil Sampling Results

Health Threat Evaluation
Building 780 Construction Site
NAS Jacksonville, Florida

Sample Grid Number[1]	Chemical	Sample Depth	December 1991 (µg/kg)	Sample Depth	February 1992 (µg/kg)
	4-Methylphenol	D	BDL	D	11
	Phenol	D	BDL	D	7.9
28	Toluene	D	957		NS
	Methylene chloride	D	101		NS
	1,1,1-Trichloroethane	D	3,100		NS
	Trichloroethene	D	1,460		NS
	Tetrachloroethene	D	1,200		NS
29			BDL		NS
30	1,1,1-Trichloroethane	S	4,700		NS
	Trichloroethene	S	257		NS
	Toluene	D	283		NS
	Chlorobenzene	D	150		NS
	1,2-Dichlorobenzene	D	537		NS
	1,1,1-Trichloroethane	D	9,330		NS
	Trichloroethene	D	344		NS
31	1,1,1-Trichloroethane	U	843		NS
32	1,1,1-Trichloroethane	U	480		NS
33	Xylenes	S	219		NS
	1,1,1-Trichloroethane	S	993		NS
	Trichloroethene	D	177		NS
	Tetrachloroethene	D	291		NS
	1,1,1-Trichloroethane	D	4,940		NS
	Trichloroethene	D	2,210		NS
	Tetrachloroethene	D	291		NS
	1,2-Dichlorobenzene	D	102		NS
34	Barium (TCLP)	S	0.009 mg/L		NS
	Cadmium (TCLP)	S	0.040 mg/L		NS
	Chromium (TCLP)	S	0.130 mg/L		NS
	1,4-Dichlorobenzene	S	430		NS
	1,2-Dichlorobenzene	S	886		NS
	1,1,1-Trichloroethane	S	439		NS
	Tetrachloroethene	S	126		NS
34	Barium (TCLP)	D	0.001 mg/L		NS
	Cadmium (TCLP)	D	0.014 mg/L		NS
	Chromium (TCLP)	D	0.230 mg/L		NS
	Mercury (TCLP)	D	0.016 mg/L		NS
	Toluene	D	102		NS
	1,1,1-Trichloroethane	D	446		NS
	Trichloroethene	D	368		NS
35	2-Butanone	U	BDL	S	305
	Toluene	U	BDL	S	4.4
	1,1,1-Trichloroethane	U	BDL	S	51.5
	1,1,2-Trichloroethane	U	BDL	S	3.1

See notes at end of table.

Appendix Table A (Continued)
Soil Sampling Results

Health Threat Evaluation
Building 780 Construction Site
NAS Jacksonville, Florida

Sample Grid Number[1]	Chemical	Sample Depth	December 1991 (µg/kg)	Sample Depth	February 1992 (µg/kg)
	Xylenes	U	BDL	S	7.0
	1,1-Dichloroethane	U	BDL	S	1,880
	1,1-Dichloroethene	U	BDL	D	3,570
	1,1,1-Trichloroethane	U	BDL	D	111,000
	Trichloroethene	U	BDL	D	6,180
	Phenol	U	BDL	D	3,200
36	1,1-Dichloroethene	S	223		NS
	Chloroform	S	109		NS
	1,1,1-Trichloroethane	S	22,400		NS
	Trichloroethene	S	110		NS
	1,1,1-Trichloroethane	D	190,000		NS
	Trichloroethene	D	6,740		NS
37	1,1,1-Trichloroethane	S	316,000	S	5,460,000
	1,1-Dichloroethene	S	9,640	S	BDL
	1,1-Dichloroethane	S	572	S	BDL
	Toluene	S	17,100	S	BDL
	Xylenes	S	1,940	S	BDL
	Trichloroethene	S	18,300	S	BDL
	Tetrachloroethene	S	5,850	S	BDL
	bis(2-Ethylhexyl)phthalate	S	NR	S	950
38	1,2-Dichlorobenzene	U	251	S	NS
39	1,1,1-Trichloroethane	U	498		NS
40	1,4-Dichlorobenzene	U	126		NS
	1,2-Dichlorobenzene	U	142		NS
	1,1,1-Trichloroethane	U	1,510		NS
41	Barium (TCLP)	S	0.027 mg/L		NS
	Cadmium (TCLP)	S	0.088 mg/L		NS
	Chromium (TCLP)	S	0.029 mg/L		NS
	1,1,1-Trichloroethane	S	2,260		NS
	Methylene chloride	S	350		NS
	Trichloroethene	S	141		NS
	1,1,1-Trichloroethane	D	38,300		NS
	Trichloroethene	D	1,150		NS
42	Tetrachloroethene	S	6,180	S	13,000
	1,1,1-Trichloroethane	S	10,600	S	34,100
	Trichloroethene	S	3,270	S	5,770
	Toluene	S	2,070	S	1,860
	Xylenes	S	4,500	S	3,260
	Chloroform	S	3,120	S	BDL
	Bromodichloromethane	S	122	S	BDL
	Dibromochloromethane	S	101	S	BDL
	2-Methylnaphthalene	S	BDL	S	600
	Naphthalene	S	BDL	S	440
43	Tetrachloroethene	S	2,680	S	[2]769 - 3,440

See notes at end of table.

Appendix Table A (Continued)
Soil Sampling Results

Health Threat Evaluation
Building 780 Construction Site
NAS Jacksonville, Florida

Sample Grid Number[1]	Chemical	Sample Depth	December 1991 (µg/kg)	Sample Depth	February 1992 (µg/kg)
	1,1,1-Trichloroethane	S	9,180	S	[2]12,800 - 23,100
	Trichloroethene	S	1,620	S	[2]1,120 - 2,980
	Toluene	S	364	S	1,110
	Xylenes	S	1,470	S	[2]320 - 1,850
	1,4-Dichlorobenzene	S	723	S	BDL
	1,3-Dichlorobenzene	S	209	S	BDL
	1,2-Dichlorobenzene	S	731	S	BDL
44	Xylenes	S	2,060		NS
	1,4-Dichlorobenzene	S	1,020		NS
	1,3-Dichlorobenzene	S	1,550		NS
	1,1,1-Trichloroethane	S	11,900		NS
	Trichloroethene	S	1,550		NS
	Tetrachloroethene	S	4,930		NS

[1]See Figure 2-1 for exact location of sampling grids.
[2]Results of duplicate sample.

Notes: µg/kg = micrograms per kilogram.
mg/ℓ = milligrams per liter.
TCLP = Toxicity Characteristics Leaching Procedure.
NS = not sampled.
BDL = below detection limits.
NR = no result reported.
S = shallow sample (0 to 3 feet).
D = deep sample (3 to 6 feet)

APPENDIX B

The Complete RTI Emission Model Output for the Six Chemicals of Concern at the Building 780 Construction Site, Naval Air Station (NAS) Jacksonville, Florida

BLDG.780-HTE (3-12-92/11PM)

Compound Physical/Chemical Characteristics

Name:	CHLOROFORM	
Mw:	119.4	g/mol
Pv:	208	mmHg
Cl*:	8200	mg/l
Da:	0.104	cm^2/s
H:	0.00339	atm-m^3/mol
Koc:	31	ml/g
μ:	0	1/day

Soil Characteristics

n:	0.3	
moisture:	0.04	
Foc:	0.02	
Eg:	0.042	
El:	0.258	
RHO-s:	2.650	g/cm^3
RHO-b:	1.655	kg/m^3

Excavation Characteristics

A:	784.1	m^2	8440 ft^2
V:	1434	m^2	
L:	1.83	m	6.0 ft
l:	0.91	m	
de:	31.6	m	

Meteorological Conditions

T:	293	°K
U:	1	m/s

Concentrations

Cs:	3.12	mg/kg
Cg:	9.46E-01	g/m^3
Cl:	6.71E+00	g/m^3
Ct:	7.56E+00	g/m^3
Mt:	10.84	kg

Miscellaneous Parameters and Constants

R:	8.21E-05	atm-m^3/°K-mol
ug:	1.81E-04	g/cm-s
rho-g:	1.21E-03	g/cm^3

Computations

Keq:	2.32E-02	
Kh:	1.41E-01	
Kd:	4.65E-01	cm^3/g
Dg:	2.65E-04	m^2/d
Cg*:	1.16E+03	mg/cm^3
Sc:	1.44E+00	
kg:	2.58E-03	m/s
Rs:	2.42E+00	g/cm^3
Rl:	1.13E+00	
Rg:	7.99E+00	

Results

	Mv/Mt	Mv (g)	Eavg (g/s)	Eact (g/s)
1 hour	0.00	6.24	1.82E-03	9.60E-04
8 hour	0.00	17.60	6.44E-04	3.41E-04
24 hour	0.00	31.30	3.62E-04	1.92E-04
1 month	0.02	174.73	6.40E-05	3.41E-05
1 year	0.08	623.32	1.81E-05	9.60E-06
10 year	0.18	1973.95	5.74E-06	3.04E-06
70 year	0.46	4960.33	2.29E-06	1.21E-06
0.25 HR	0.00	3.13	3.62E-03	1.92E-03
200 DAYS	0.04	440.89	2.56E-05	1.36E-05

NOTE: Cs IS THE VALUE OF THE SOIL SAMPLE CONCENTRATION. ANALYSIS WAS DONE 180 DAYS AFTER THE SLAB WAS REMOVED.

BLDG.780-HTE (3-12-92/11PM)

Compound Physical/Chemical Characteristics

Name:	METHYL CHLOROFORM (1,1,1-TCA)	
Mw:	133.4	g/mol
Pv:	123	mmHg
Cl*:	1500	mg/l
Da:	0.00078	cm^2/s
H:	0.03	atm-m^3/mol
Koc:	152	ml/g
μ:	0	1/day

Soil Characteristics

n:	0.3	
moisture:	0.04	
Foc:	0.02	
Eg:	0.042	
El:	0.258	
RHO-s:	2.650	g/cm^3
RHO-b:	1.855	kg/m^3

Excavation Characteristics

A:	784.1	m^2	8440 ft^2
V:	1434	m^2	
L:	1.83	m	6.0 ft
l:	0.91	m	
de:	31.6	m	

Meteorological Conditions

T:	293	°K
U:	1	m/s

Concentrations

Cs:	5460	mg/kg
Cg:	2.99E+03	g/m^3
Cl:	1.50E+03	g/m^3
Ct:	1.06E+04	g/m^3
Mt:	15259.31	kg

Miscellaneous Parameters and Constants

R:	8.21E-05	atm-m^3/°K-mol
ug:	1.81E-04	g/cm-s
rho-g:	1.21E-03	g/cm^3

Computations

Keq:	2.05E-01	
Kh:	1.25E+00	
Kd:	2.28E+00	cm^3/g
Dg:	1.98E-06	m^2/d
Cg*:	1.87E+03	mg/cm^3
Sc:	1.93E+02	
kg:	9.71E-05	m/s
Rs:	1.99E+00	g/cm^3
Rl:	4.54E+00	
Rg:	3.64E+00	

Results

	Mv/Mt	Mv (g)	Eavg (g/s)	Eact (g/s)
1 hour	0.00	2265.25	6.59E-01	3.48E-01
8 hour	0.00	6385.99	2.34E-01	1.24E-01
24 hour	0.00	11356.65	1.31E-01	6.95E-02
1 month	0.00	63392.63	2.32E-02	1.24E-02
1 year	0.01	226143.08	6.57E-03	3.48E-03
10 year	0.05	716160.66	2.08E-03	1.10E-03
70 year	0.12	1799636.99	8.29E-04	4.39E-04
0.25 HR	0.00	1134.90	1.31E+00	6.95E-01
200 DAYS	0.01	159957.48	9.28E-03	4.92E-03

NOTE: Cs IS THE VALUE OF THE SOIL SAMPLE CONCENTRATION. ANALYSIS WAS DONE 180 DAYS AFTER THE SLAB WAS REMOVED.

BLDG.780-HTE (3-12-92/11PM)

Compound Physical/Chemical Characteristics

Name:	METHYLENE CHLORIDE
Mw:	84.93 g/mol
Pv:	350 mmHg
Cl*:	13200 mg/l
Da:	0.0942 cm^2/s
H:	0.00257 atm-m^3/mol
Koc:	8.8 ml/g
μ:	0 1/day

Soil Characteristics

n:	0.3
moisture:	0.04
Foc:	0.02
Eg:	0.042
El:	0.258
RHO-s:	2.650 g/cm^3
RHO-b:	1.855 kg/m^3

Excavation Characteristics

A:	784.1 m^2	8440 ft^2
V:	1434 m^2	
L:	1.83 m	6.0 ft
I:	0.91 m	
de:	31.6 m	

Meteorological Conditions

T:	293 °K
U:	1 m/s

Concentrations

Cs:	2.38 mg/kg
Cg:	1.93E+00 g/m^3
Cl:	1.80E+01 g/m^3
Ct:	9.14E+00 g/m^3
Mt:	13.11 kg

Miscellaneous Parameters and Constants

R:	8.21E-05 atm-m^3/°K-mol
ug:	1.81E-04 g/cm-s
rho-g:	1.21E-03 g/cm^3

Computations

Keq:	1.76E-02
Kh:	1.07E-01
Kd:	1.32E-01 cm^3/g
Dg:	2.40E-04 m^2/d
Cg*:	1.41E+03 mg/cm^3
Sc:	1.59E+00
kg:	2.41E-03 m/s
Rs:	3.84E+00 g/cm^3
Rl:	5.07E-01
Rg:	4.75E+00

Results

	Mv/Mt	Mv (g)	Eavg (g/s)	Eact (g/s)
1 hour	0.00	6.26	1.82E-03	9.63E-04
8 hour	0.00	17.64	6.46E-04	3.42E-04
24 hour	0.00	31.38	3.63E-04	1.92E-04
1 month	0.01	175.17	6.41E-05	3.42E-05
1 year	0.05	624.89	1.82E-05	9.63E-06
10 year	0.15	1978.94	5.75E-06	3.04E-06
70 year	0.38	4972.87	2.29E-06	1.21E-06
0.25 HR	0.00	3.13	3.83E-03	1.92E-03
200 DAYS	0.03	442.00	2.56E-05	1.36E-05

NOTE: Cs IS THE VALUE OF THE SOIL SAMPLE CONCENTRATION. ANALYSIS WAS DONE 180 DAYS AFTER THE SLAB WAS REMOVED.

BLDG.780-HTE (3-12-92/11PM)

Compound Physical/Chemical Characteristics

Name:	PERCHLOROETHYLENE (PCE)
Mw:	166 g/mol
Pv:	18.6 mmHg
Cl*:	150 mg/l
Da:	0.072 cm^2/s
H:	0.028 $atm-m^3/mol$
Koc:	364 ml/g
μ:	0 1/day

Soil Characteristics

n:	0.3
moisture:	0.04
Foc:	0.02
Eg:	0.042
El:	0.258
RHO-s:	2.650 g/cm^3
RHO-b:	1.855 kg/m^3

Excavation Characteristics

A:	784.1 m^2	8440 ft^2
V:	1434 m^2	
L:	1.83 m	6.0 ft
l:	0.91 m	
de:	31.6 m	

Meteorological Conditions

T:	293 °K
U:	1 m/s

Concentrations

Cs:	13 mg/kg
Cg:	2.87E+00 g/m^3
Cl:	2.38E+00 g/m^3
Ct:	2.49E+01 g/m^3
Mt:	35.63 kg

Miscellaneous Parameters and Constants

R:	8.21E-05 $atm-m^3/°K-mol$
ug:	1.81E-04 g/cm-s
rho-g:	1.21E-03 g/cm^3

Computations

Keq:	1.98E-01
Kh:	1.21E+00
Kd:	5.46E+00 cm^3/g
Dg:	1.83E-04 m^2/d
Cg*:	1.81E+02 mg/cm^3
Sc:	2.09E+00
kg:	2.01E-03 m/s
Rs:	1.91E+00 g/cm^3
Rl:	1.04E+01
Rg:	8.66E+00

Results

	Mv/Mt	Mv (g)	Eavg (g/s)	Eact (g/s)
1 hour	0.00	49.98	1.45E-02	7.68E-03
8 hour	0.00	140.88	5.16E-03	2.73E-03
24 hour	0.01	250.54	2.90E-03	1.53E-03
1 month	0.04	1398.41	5.12E-04	2.73E-04
1 year	0.14	4988.56	1.45E-04	7.68E-05
10 year	0.44	15797.98	4.59E-05	2.43E-05
70 year	0.86	30551.72	1.41E-05	2.43E-06
0.25 HR	0.00	25.04	2.90E-02	1.53E-02
200 DAYS	0.10	3528.56	2.05E-04	1.09E-04

NOTE: Cs IS THE VALUE OF THE SOIL SAMPLE CONCENTRATION. ANALYSIS WAS DONE 180 DAYS AFTER THE SLAB WAS REMOVED.

BLDG.780-HTE (3-12-92/11PM)

Compound Physical/Chemical Characteristics

Name:	TRICHLOROETHYLENE (TCE)
Mw:	131 g/mol
Pv:	75 mmHg
Cl*:	1100 mg/l
Da:	0.079 cm^2/s
H:	0.0091 atm-m^3/mol
Koc:	126 ml/g
μ:	0 1/day

Soil Characteristics

n:	0.3
moisture:	0.04
Foc:	0.02
Eg:	0.042
El:	0.258
RHO-s:	2.650 g/cm^3
RHO-b:	1.855 kg/m^3

Excavation Characteristics

A:	784.1 m^2	8440 ft^2
V:	1434 m^2	
L:	1.83 m	6.0 ft
l:	0.91 m	
de:	31.6 m	

Meteorological Conditions

T:	293 °K
U:	1 m/s

Concentrations

Cs:	18.3 mg/kg
Cg:	3.66E+00 g/m^3
Cl:	9.68E+00 g/m^3
Ct:	3.66E+01 g/m^3
Mt:	52.48 kg

Miscellaneous Parameters and Constants

R:	8.21E-05 atm-m^3/°K-mol
ug:	1.81E-04 g/cm-s
rho-g:	1.21E-03 g/cm^3

Computations

Keq:	6.22E-02
Kh:	3.78E-01
Kd:	1.89E+00 cm^3/g
Dg:	2.01E-04 m^2/d
Cg*:	4.16E+02 mg/cm^3
Sc:	1.90E+00
kg:	2.14E-03 m/s
Rs:	2.00E+00 g/cm^3
Rl:	3.78E+00
Rg:	9.99E+00

Results

	Mv/Mt	Mv (g)	Eavg (g/s)	Eact (g/s)
1 hour	0.00	43.18	1.25E-02	6.64E-03
8 hour	0.00	121.73	4.46E-03	2.36E-03
24 hour	0.00	216.49	2.51E-03	1.32E-03
1 month	0.02	1208.40	4.42E-04	2.36E-04
1 year	0.08	4310.75	1.25E-04	6.64E-05
10 year	0.26	13651.49	3.97E-05	2.10E-05
70 year	0.64	33427.56	1.54E-05	7.19E-06
0.25 HR	0.00	21.64	2.50E-02	1.32E-02
200 DAYS	0.06	3049.12	1.77E-04	9.38E-05

NOTE: Cs IS THE VALUE OF THE SOIL SAMPLE CONCENTRATION. ANALYSIS WAS DONE 180 DAYS AFTER THE SLAB WAS REMOVED.

BLDG.780-HTE (3-12-92/11PM)

Compound Physical/Chemical Characteristics

Name:	VINYLIDENE CHLORIDE (1,1-DCE)
Mw:	96.95 g/mol
Pv:	500 mmHg
Cl*:	400 mg/l
Da:	0.0839 cm^2/s
H:	0.154 atm-m^3/mol
Koc:	65 ml/g
μ:	0 1/day

Soil Characteristics

n:	0.3
moisture:	0.04
Foc:	0.02
Eg:	0.042
El:	0.258
RHO-s:	2.650 g/cm^3
RHO-b:	1.855 kg/m^3

Excavation Characteristics

A:	784.1 m^2	8440 ft^2
V:	1434 m^2	
L:	1.83 m	6.0 ft
I:	0.91 m	
de:	31.6 m	

Meteorological Conditions

T:	293 °K
U:	1 m/s

Concentrations

Cs:	9.64 mg/kg
Cg:	6.33E+01 g/m^3
Cl:	9.89E+00 g/m^3
Ct:	2.31E+01 g/m^3
Mt:	33.14 kg

Miscellaneous Parameters and Constants

R:	8.21E-05 atm-m^3/°K-mol
ug:	1.81E-04 g/cm-s
rho-g:	1.21E-03 g/cm^3

Computations

Keq:	1.05E+00
Kh:	6.40E+00
Kd:	9.75E-01 cm^3/g
Dg:	2.13E-04 m^2/d
Cg*:	2.56E+03 mg/cm^3
Sc:	1.79E+00
kg:	2.23E-03 m/s
Rs:	2.40E+00 g/cm^3
Rl:	2.34E+00
Rg:	3.85E-01

Results

	Mv/Mt	Mv (g)	Eavg (g/s)	Eact (g/s)
1 hour	0.00	115.64	3.36E-02	1.78E-02
8 hour	0.01	325.94	1.19E-02	6.31E-03
24 hour	0.02	579.62	6.71E-03	3.55E-03
1 month	0.10	3235.20	1.18E-03	6.31E-04
1 year	0.35	11540.94	3.36E-04	1.78E-04
10 year	0.85	28324.42	6.23E-05	1.47E-05
70 year	0.89	29550.08	1.36E-05	1.21E-11
0.25 HR	0.00	57.95	6.71E-02	3.55E-02
200 DAYS	0.25	8163.25	4.74E-04	2.51E-04

NOTE: Cs IS THE VALUE OF THE SOIL SAMPLE CONCENTRATION. ANALYSIS WAS DONE 180 DAYS AFTER THE SLAB WAS REMOVED.

APPENDIX C

The Complete SCREEN Emission Model Output for the Six Chemicals of Concern at the Building 780 Construction Site, Naval Air Station (NAS) Jacksonville, Florida

03-18-92
15:59:35

*** SCREEN-1.1 MODEL RUN ***
*** VERSION DATED 88300 ***

DAY 1 - SECTION #1 - AGITATED AREA

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/S)	=	1.000
SOURCE HEIGHT (M)	=	.00
LENGTH OF SIDE (M)	=	10.06
RECEPTOR HEIGHT (M)	=	.00
IOPT (1=URB,2=RUR)	=	1

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF .00 M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1.	.1626E+07	5	1.0	1.0	5000.0	.0	2.4	.1	NO
100.	3273.	5	1.0	1.0	5000.0	.0	13.0	7.5	NO
200.	971.9	5	1.0	1.0	5000.0	.0	23.3	14.0	NO
300.	480.0	5	1.0	1.0	5000.0	.0	33.3	19.9	NO
400.	293.5	5	1.0	1.0	5000.0	.0	42.9	25.3	NO
500.	201.8	5	1.0	1.0	5000.0	.0	52.2	30.2	NO
600.	149.4	5	1.0	1.0	5000.0	.0	61.2	34.8	NO
700.	116.4	5	1.0	1.0	5000.0	.0	69.9	39.1	NO
800.	94.11	5	1.0	1.0	5000.0	.0	78.4	43.1	NO
900.	78.23	5	1.0	1.0	5000.0	.0	86.6	47.0	NO
1000.	66.46	5	1.0	1.0	5000.0	.0	94.7	50.6	NO
1100.	57.45	5	1.0	1.0	5000.0	.0	102.5	54.1	NO
1200.	50.39	5	1.0	1.0	5000.0	.0	110.1	57.4	NO
1300.	44.72	5	1.0	1.0	5000.0	.0	117.6	60.6	NO
1400.	40.08	5	1.0	1.0	5000.0	.0	124.8	63.6	NO
1500.	36.24	5	1.0	1.0	5000.0	.0	131.9	66.6	NO
1600.	33.01	5	1.0	1.0	5000.0	.0	138.9	69.4	NO
1700.	30.26	5	1.0	1.0	5000.0	.0	145.7	72.2	NO
1800.	27.90	5	1.0	1.0	5000.0	.0	152.4	74.9	NO
1900.	25.85	5	1.0	1.0	5000.0	.0	158.9	77.5	NO
2000.	24.07	5	1.0	1.0	5000.0	.0	165.3	80.0	NO
2100.	22.49	5	1.0	1.0	5000.0	.0	171.6	82.5	NO
2200.	21.09	5	1.0	1.0	5000.0	.0	177.8	84.9	NO
2300.	19.85	5	1.0	1.0	5000.0	.0	183.9	87.2	NO
2400.	18.73	5	1.0	1.0	5000.0	.0	189.8	89.5	NO
2500.	17.72	5	1.0	1.0	5000.0	.0	195.7	91.8	NO
2600.	16.81	5	1.0	1.0	5000.0	.0	201.5	94.0	NO
2700.	15.99	5	1.0	1.0	5000.0	.0	207.1	96.1	NO
2800.	15.23	5	1.0	1.0	5000.0	.0	212.7	98.2	NO
2900.	14.54	5	1.0	1.0	5000.0	.0	218.2	100.3	NO
3000.	13.91	5	1.0	1.0	5000.0	.0	223.6	102.3	NO
3500.	11.39	5	1.0	1.0	5000.0	.0	249.6	112.0	NO
4000.	9.609	5	1.0	1.0	5000.0	.0	273.9	120.9	NO
4500.	8.294	5	1.0	1.0	5000.0	.0	296.8	129.3	NO

5000.	7.286	5	1.0	1.0	5000.0	.0	318.4	137.2	NO
5500.	6.489	5	1.0	1.0	5000.0	.0	339.1	144.7	NO
6000.	5.845	5	1.0	1.0	5000.0	.0	358.8	151.8	NO
6500.	5.315	5	1.0	1.0	5000.0	.0	377.6	158.6	NO
7000.	4.871	5	1.0	1.0	5000.0	.0	395.8	165.1	NO
7500.	4.493	5	1.0	1.0	5000.0	.0	413.2	171.4	NO
8000.	4.169	5	1.0	1.0	5000.0	.0	430.1	177.5	NO
8500.	3.888	5	1.0	1.0	5000.0	.0	446.4	183.4	NO
9000.	3.642	5	1.0	1.0	5000.0	.0	462.3	189.1	NO
9500.	3.424	5	1.0	1.0	5000.0	.0	477.6	194.6	NO
10000.	3.231	5	1.0	1.0	5000.0	.0	492.6	200.0	NO
15000.	2.060	5	1.0	1.0	5000.0	.0	624.1	247.5	NO
20000.	1.510	5	1.0	1.0	5000.0	.0	733.8	287.4	NO
25000.	1.190	5	1.0	1.0	5000.0	.0	829.5	322.3	NO
30000.	.9824	5	1.0	1.0	5000.0	.0	915.6	353.9	NO
40000.	.8030	4	1.0	1.0	320.0	.0	1552.5	1553.2	NO
50000.	.7140	4	1.0	1.0	320.0	.0	1746.0	1750.0	NO

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 1. M:

1.	.1626E+07	5	1.0	1.0	5000.0	.0	2.4	.1	NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

****
*** SCREEN DISCRETE DISTANCES ***
****

*** TERRAIN HEIGHT OF .00 M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
3.	.4898E+06	5	1.0	1.0	5000.0	.0	2.7	.2	NO
6.	.2183E+06	5	1.0	1.0	5000.0	.0	3.0	.5	NO
9.	.1314E+06	5	1.0	1.0	5000.0	.0	3.3	.7	NO
12.	.8984E+05	5	1.0	1.0	5000.0	.0	3.7	1.0	NO
15.	.6607E+05	5	1.0	1.0	5000.0	.0	4.0	1.2	NO
18.	.5097E+05	5	1.0	1.0	5000.0	.0	4.3	1.4	NO
21.	.4068E+05	5	1.0	1.0	5000.0	.0	4.7	1.7	NO
24.	.3332E+05	5	1.0	1.0	5000.0	.0	5.0	1.9	NO
27.	.2785E+05	5	1.0	1.0	5000.0	.0	5.3	2.2	NO
30.	.2365E+05	5	1.0	1.0	5000.0	.0	5.6	2.4	NO
37.	.1773E+05	5	1.0	1.0	5000.0	.0	6.3	2.8	NO
43.	.1383E+05	5	1.0	1.0	5000.0	.0	7.0	3.3	NO
49.	.1111E+05	5	1.0	1.0	5000.0	.0	7.6	3.8	NO
55.	9135.	5	1.0	1.0	5000.0	.0	8.3	4.2	NO
61.	7654.	5	1.0	1.0	5000.0	.0	8.9	4.7	NO
67.	6513.	5	1.0	1.0	5000.0	.0	9.6	5.1	NO
73.	5615.	5	1.0	1.0	5000.0	.0	10.2	5.6	NO
79.	4895.	5	1.0	1.0	5000.0	.0	10.9	6.0	NO
85.	4308.	5	1.0	1.0	5000.0	.0	11.5	6.4	NO
91.	3823.	5	1.0	1.0	5000.0	.0	12.1	6.9	NO
107.	2924.	5	1.0	1.0	5000.0	.0	13.7	7.9	NO
122.	2316.	5	1.0	1.0	5000.0	.0	15.3	9.0	NO
137.	1884.	5	1.0	1.0	5000.0	.0	16.9	10.0	NO
152.	1566.	5	1.0	1.0	5000.0	.0	18.5	11.0	NO

183.	1137.	5	1.0	1.0	5000.0	.0	21.6	13.0	NO
488.	210.3	5	1.0	1.0	5000.0	.0	51.0	29.6	NO
1006.	65.87	5	1.0	1.0	5000.0	.0	95.1	50.8	NO
1463.	37.58	5	1.0	1.0	5000.0	.0	129.3	65.5	NO
2377.	18.97	5	1.0	1.0	5000.0	.0	188.5	89.0	NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	.1626E+07	1.	0.

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****

03-18-92
16:02:07

*** SCREEN-1.1 MODEL RUN ***
*** VERSION DATED 88300 ***

DAY 1 - AFTER SECTION #1 REMOVAL - REMAINING UNAGITATED AREA

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/S)	=	1.000
SOURCE HEIGHT (M)	=	.00
LENGTH OF SIDE (M)	=	24.38
RECEPTOR HEIGHT (M)	=	.00
IOPT (1=URB,2=RUR)	=	1

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF .00 M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1.	.6891E+06	5	1.0	1.0	5000.0	.0	5.8	.1	NO
100.	2627.	5	1.0	1.0	5000.0	.0	16.2	7.5	NO
200.	858.3	5	1.0	1.0	5000.0	.0	26.4	14.0	NO
300.	440.4	5	1.0	1.0	5000.0	.0	36.3	19.9	NO
400.	274.9	5	1.0	1.0	5000.0	.0	45.8	25.3	NO
500.	191.5	5	1.0	1.0	5000.0	.0	55.0	30.2	NO
600.	143.1	5	1.0	1.0	5000.0	.0	63.9	34.8	NO
700.	112.2	5	1.0	1.0	5000.0	.0	72.5	39.1	NO
800.	91.14	5	1.0	1.0	5000.0	.0	80.9	43.1	NO
900.	76.04	5	1.0	1.0	5000.0	.0	89.1	47.0	NO
1000.	64.80	5	1.0	1.0	5000.0	.0	97.1	50.6	NO
1100.	56.16	5	1.0	1.0	5000.0	.0	104.9	54.1	NO
1200.	49.35	5	1.0	1.0	5000.0	.0	112.4	57.4	NO
1300.	43.87	5	1.0	1.0	5000.0	.0	119.8	60.6	NO
1400.	39.39	5	1.0	1.0	5000.0	.0	127.0	63.6	NO
1500.	35.66	5	1.0	1.0	5000.0	.0	134.1	66.6	NO
1600.	32.52	5	1.0	1.0	5000.0	.0	141.0	69.4	NO
1700.	29.84	5	1.0	1.0	5000.0	.0	147.8	72.2	NO
1800.	27.54	5	1.0	1.0	5000.0	.0	154.4	74.9	NO
1900.	25.54	5	1.0	1.0	5000.0	.0	160.9	77.5	NO
2000.	23.79	5	1.0	1.0	5000.0	.0	167.3	80.0	NO
2100.	22.24	5	1.0	1.0	5000.0	.0	173.5	82.5	NO
2200.	20.87	5	1.0	1.0	5000.0	.0	179.7	84.9	NO
2300.	19.65	5	1.0	1.0	5000.0	.0	185.7	87.2	NO
2400.	18.55	5	1.0	1.0	5000.0	.0	191.6	89.5	NO
2500.	17.56	5	1.0	1.0	5000.0	.0	197.5	91.8	NO
2600.	16.67	5	1.0	1.0	5000.0	.0	203.2	94.0	NO
2700.	15.86	5	1.0	1.0	5000.0	.0	208.9	96.1	NO
2800.	15.11	5	1.0	1.0	5000.0	.0	214.4	98.2	NO
2900.	14.43	5	1.0	1.0	5000.0	.0	219.9	100.3	NO
3000.	13.81	5	1.0	1.0	5000.0	.0	225.3	102.3	NO
3500.	11.32	5	1.0	1.0	5000.0	.0	251.1	112.0	NO
4000.	9.559	5	1.0	1.0	5000.0	.0	275.3	120.9	NO
4500.	8.256	5	1.0	1.0	5000.0	.0	298.1	129.3	NO

5000.	7.256	5	1.0	1.0	5000.0	.0	319.7	137.2	NO
5500.	6.466	5	1.0	1.0	5000.0	.0	340.3	144.7	NO
6000.	5.826	5	1.0	1.0	5000.0	.0	359.9	151.8	NO
6500.	5.299	5	1.0	1.0	5000.0	.0	378.8	158.6	NO
7000.	4.857	5	1.0	1.0	5000.0	.0	396.9	165.1	NO
7500.	4.482	5	1.0	1.0	5000.0	.0	414.3	171.4	NO
8000.	4.159	5	1.0	1.0	5000.0	.0	431.1	177.5	NO
8500.	3.880	5	1.0	1.0	5000.0	.0	447.4	183.4	NO
9000.	3.634	5	1.0	1.0	5000.0	.0	463.2	189.1	NO
9500.	3.418	5	1.0	1.0	5000.0	.0	478.6	194.6	NO
10000.	3.225	5	1.0	1.0	5000.0	.0	493.5	200.0	NO
15000.	2.058	5	1.0	1.0	5000.0	.0	624.9	247.5	NO
20000.	1.508	5	1.0	1.0	5000.0	.0	734.4	287.4	NO
25000.	1.190	5	1.0	1.0	5000.0	.0	830.1	322.3	NO
30000.	.9819	5	1.0	1.0	5000.0	.0	916.1	353.9	NO
40000.	.8028	4	1.0	1.0	320.0	.0	1553.0	1553.2	NO
50000.	.7139	4	1.0	1.0	320.0	.0	1746.4	1750.0	NO

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 1. M:

1.	.6891E+06	5	1.0	1.0	5000.0	.0	5.8	.1	NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

****
*** SCREEN DISCRETE DISTANCES ***
****

*** TERRAIN HEIGHT OF .00 M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
3.	.2181E+06	5	1.0	1.0	5000.0	.0	6.0	.2	NO
6.	.1036E+06	5	1.0	1.0	5000.0	.0	6.3	.5	NO
9.	.6584E+05	5	1.0	1.0	5000.0	.0	6.7	.7	NO
12.	.4717E+05	5	1.0	1.0	5000.0	.0	7.0	1.0	NO
15.	.3613E+05	5	1.0	1.0	5000.0	.0	7.3	1.2	NO
18.	.2889E+05	5	1.0	1.0	5000.0	.0	7.6	1.4	NO
21.	.2380E+05	5	1.0	1.0	5000.0	.0	8.0	1.7	NO
24.	.2005E+05	5	1.0	1.0	5000.0	.0	8.3	1.9	NO
27.	.1719E+05	5	1.0	1.0	5000.0	.0	8.6	2.2	NO
30.	.1494E+05	5	1.0	1.0	5000.0	.0	8.9	2.4	NO
37.	.1166E+05	5	1.0	1.0	5000.0	.0	9.6	2.8	NO
43.	9401.	5	1.0	1.0	5000.0	.0	10.2	3.3	NO
49.	7771.	5	1.0	1.0	5000.0	.0	10.9	3.8	NO
55.	6549.	5	1.0	1.0	5000.0	.0	11.5	4.2	NO
61.	5606.	5	1.0	1.0	5000.0	.0	12.2	4.7	NO
67.	4862.	5	1.0	1.0	5000.0	.0	12.8	5.1	NO
73.	4262.	5	1.0	1.0	5000.0	.0	13.4	5.6	NO
79.	3771.	5	1.0	1.0	5000.0	.0	14.1	6.0	NO
85.	3364.	5	1.0	1.0	5000.0	.0	14.7	6.4	NO
91.	3022.	5	1.0	1.0	5000.0	.0	15.4	6.9	NO
107.	2372.	5	1.0	1.0	5000.0	.0	16.9	7.9	NO
122.	1918.	5	1.0	1.0	5000.0	.0	18.5	9.0	NO
137.	1587.	5	1.0	1.0	5000.0	.0	20.1	10.0	NO
152.	1338.	5	1.0	1.0	5000.0	.0	21.6	11.0	NO

183.	993.9	5	1.0	1.0	5000.0	.0	24.7	13.0	NO
488.	199.4	5	1.0	1.0	5000.0	.0	53.8	29.6	NO
1006.	64.23	5	1.0	1.0	5000.0	.0	97.5	50.8	NO
1463.	36.96	5	1.0	1.0	5000.0	.0	131.5	65.5	NO
2377.	18.79	5	1.0	1.0	5000.0	.0	190.3	89.0	NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	.6891E+06	1.	0.

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****

03-18-92
18:47:19

*** SCREEN-1.1 MODEL RUN ***
*** VERSION DATED 88300 ***

DAY 7 - SECTION #11A - AGITATED AREA

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/S)	=	1.000
SOURCE HEIGHT (M)	=	.00
LENGTH OF SIDE (M)	=	6.71
RECEPTOR HEIGHT (M)	=	.00
IOPT (1=URB,2=RUR)	=	1

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF .00 M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1.	.2386E+07	5	1.0	1.0	5000.0	.0	1.7	.1	NO
100.	3473.	5	1.0	1.0	5000.0	.0	12.3	7.5	NO
200.	1003.	5	1.0	1.0	5000.0	.0	22.6	14.0	NO
300.	490.2	5	1.0	1.0	5000.0	.0	32.6	19.9	NO
400.	298.1	5	1.0	1.0	5000.0	.0	42.2	25.3	NO
500.	204.4	5	1.0	1.0	5000.0	.0	51.5	30.2	NO
600.	151.0	5	1.0	1.0	5000.0	.0	60.5	34.8	NO
700.	117.5	5	1.0	1.0	5000.0	.0	69.3	39.1	NO
800.	94.84	5	1.0	1.0	5000.0	.0	77.8	43.1	NO
900.	78.76	5	1.0	1.0	5000.0	.0	86.1	47.0	NO
1000.	66.86	5	1.0	1.0	5000.0	.0	94.1	50.6	NO
1100.	57.77	5	1.0	1.0	5000.0	.0	101.9	54.1	NO
1200.	50.63	5	1.0	1.0	5000.0	.0	109.6	57.4	NO
1300.	44.92	5	1.0	1.0	5000.0	.0	117.0	60.6	NO
1400.	40.25	5	1.0	1.0	5000.0	.0	124.3	63.6	NO
1500.	36.38	5	1.0	1.0	5000.0	.0	131.4	66.6	NO
1600.	33.13	5	1.0	1.0	5000.0	.0	138.4	69.4	NO
1700.	30.36	5	1.0	1.0	5000.0	.0	145.2	72.2	NO
1800.	27.99	5	1.0	1.0	5000.0	.0	151.9	74.9	NO
1900.	25.93	5	1.0	1.0	5000.0	.0	158.5	77.5	NO
2000.	24.13	5	1.0	1.0	5000.0	.0	164.9	80.0	NO
2100.	22.55	5	1.0	1.0	5000.0	.0	171.2	82.5	NO
2200.	21.14	5	1.0	1.0	5000.0	.0	177.4	84.9	NO
2300.	19.89	5	1.0	1.0	5000.0	.0	183.4	87.2	NO
2400.	18.77	5	1.0	1.0	5000.0	.0	189.4	89.5	NO
2500.	17.76	5	1.0	1.0	5000.0	.0	195.3	91.8	NO
2600.	16.85	5	1.0	1.0	5000.0	.0	201.1	94.0	NO
2700.	16.02	5	1.0	1.0	5000.0	.0	206.7	96.1	NO
2800.	15.26	5	1.0	1.0	5000.0	.0	212.3	98.2	NO
2900.	14.57	5	1.0	1.0	5000.0	.0	217.8	100.3	NO
3000.	13.93	5	1.0	1.0	5000.0	.0	223.3	102.3	NO
3500.	11.40	5	1.0	1.0	5000.0	.0	249.2	112.0	NO
4000.	9.621	5	1.0	1.0	5000.0	.0	273.5	120.9	NO
4500.	8.303	5	1.0	1.0	5000.0	.0	296.5	129.3	NO

5000.	7.292	5	1.0	1.0	5000.0	.0	318.1	137.2	NO
5500.	6.495	5	1.0	1.0	5000.0	.0	338.8	144.7	NO
6000.	5.850	5	1.0	1.0	5000.0	.0	358.5	151.8	NO
6500.	5.319	5	1.0	1.0	5000.0	.0	377.4	158.6	NO
7000.	4.874	5	1.0	1.0	5000.0	.0	395.5	165.1	NO
7500.	4.496	5	1.0	1.0	5000.0	.0	413.0	171.4	NO
8000.	4.172	5	1.0	1.0	5000.0	.0	429.9	177.5	NO
8500.	3.890	5	1.0	1.0	5000.0	.0	446.2	183.4	NO
9000.	3.644	5	1.0	1.0	5000.0	.0	462.0	189.1	NO
9500.	3.426	5	1.0	1.0	5000.0	.0	477.4	194.6	NO
10000.	3.233	5	1.0	1.0	5000.0	.0	492.4	200.0	NO
15000.	2.061	5	1.0	1.0	5000.0	.0	624.0	247.5	NO
20000.	1.510	5	1.0	1.0	5000.0	.0	733.6	287.4	NO
25000.	1.191	5	1.0	1.0	5000.0	.0	829.4	322.3	NO
30000.	.9826	5	1.0	1.0	5000.0	.0	915.5	353.9	NO
40000.	.8031	4	1.0	1.0	320.0	.0	1552.4	1553.2	NO
50000.	.7141	4	1.0	1.0	320.0	.0	1745.9	1750.0	NO

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 1. M:

1.	.2386E+07	5	1.0	1.0	5000.0	.0	1.7	.1	NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

****
*** SCREEN DISCRETE DISTANCES ***
****

*** TERRAIN HEIGHT OF .00 M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
3.	.6913E+06	5	1.0	1.0	5000.0	.0	1.9	.2	NO
6.	.2946E+06	5	1.0	1.0	5000.0	.0	2.2	.5	NO
9.	.1713E+06	5	1.0	1.0	5000.0	.0	2.6	.7	NO
12.	.1140E+06	5	1.0	1.0	5000.0	.0	2.9	1.0	NO
15.	.8197E+05	5	1.0	1.0	5000.0	.0	3.2	1.2	NO
18.	.6208E+05	5	1.0	1.0	5000.0	.0	3.6	1.4	NO
21.	.4878E+05	5	1.0	1.0	5000.0	.0	3.9	1.7	NO
24.	.3943E+05	5	1.0	1.0	5000.0	.0	4.2	1.9	NO
27.	.3257E+05	5	1.0	1.0	5000.0	.0	4.5	2.2	NO
30.	.2739E+05	5	1.0	1.0	5000.0	.0	4.9	2.4	NO
37.	.2020E+05	5	1.0	1.0	5000.0	.0	5.5	2.8	NO
43.	.1554E+05	5	1.0	1.0	5000.0	.0	6.2	3.3	NO
49.	.1235E+05	5	1.0	1.0	5000.0	.0	6.8	3.8	NO
55.	.1006E+05	5	1.0	1.0	5000.0	.0	7.5	4.2	NO
61.	8369.	5	1.0	1.0	5000.0	.0	8.1	4.7	NO
67.	7075.	5	1.0	1.0	5000.0	.0	8.8	5.1	NO
73.	6065.	5	1.0	1.0	5000.0	.0	9.4	5.6	NO
79.	5261.	5	1.0	1.0	5000.0	.0	10.1	6.0	NO
85.	4610.	5	1.0	1.0	5000.0	.0	10.7	6.4	NO
91.	4076.	5	1.0	1.0	5000.0	.0	11.4	6.9	NO
107.	3093.	5	1.0	1.0	5000.0	.0	13.0	7.9	NO
122.	2434.	5	1.0	1.0	5000.0	.0	14.6	9.0	NO
137.	1970.	5	1.0	1.0	5000.0	.0	16.2	10.0	NO
152.	1631.	5	1.0	1.0	5000.0	.0	17.7	11.0	NO

183.	1177.	5	1.0	1.0	5000.0	.0	20.9	13.0	NO
488.	213.1	5	1.0	1.0	5000.0	.0	50.4	29.6	NO
1006.	66.26	5	1.0	1.0	5000.0	.0	94.6	50.8	NO
1463.	37.73	5	1.0	1.0	5000.0	.0	128.8	65.5	NO
2377.	19.01	5	1.0	1.0	5000.0	.0	188.1	89.0	NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	.2386E+07	1.	0.

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****

03-18-92
18:51:33

*** SCREEN-1.1 MODEL RUN ***
*** VERSION DATED 88300 ***

DAY 7 - SECTION #11B - AGITATED AREA

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/S)	=	1.000
SOURCE HEIGHT (M)	=	.00
LENGTH OF SIDE (M)	=	3.66
RECEPTOR HEIGHT (M)	=	.00
IOPT (1=URB,2=RUR)	=	1

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF .00 M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1.	.4147E+07	5	1.0	1.0	5000.0	.0	1.0	.1	NO
100.	3677.	5	1.0	1.0	5000.0	.0	11.6	7.5	NO
200.	1033.	5	1.0	1.0	5000.0	.0	22.0	14.0	NO
300.	500.0	5	1.0	1.0	5000.0	.0	31.9	19.9	NO
400.	302.5	5	1.0	1.0	5000.0	.0	41.6	25.3	NO
500.	206.7	5	1.0	1.0	5000.0	.0	50.9	30.2	NO
600.	152.4	5	1.0	1.0	5000.0	.0	60.0	34.8	NO
700.	118.4	5	1.0	1.0	5000.0	.0	68.7	39.1	NO
800.	95.50	5	1.0	1.0	5000.0	.0	77.2	43.1	NO
900.	79.24	5	1.0	1.0	5000.0	.0	85.5	47.0	NO
1000.	67.23	5	1.0	1.0	5000.0	.0	93.6	50.6	NO
1100.	58.05	5	1.0	1.0	5000.0	.0	101.4	54.1	NO
1200.	50.86	5	1.0	1.0	5000.0	.0	109.1	57.4	NO
1300.	45.10	5	1.0	1.0	5000.0	.0	116.6	60.6	NO
1400.	40.40	5	1.0	1.0	5000.0	.0	123.9	63.6	NO
1500.	36.51	5	1.0	1.0	5000.0	.0	131.0	66.6	NO
1600.	33.24	5	1.0	1.0	5000.0	.0	138.0	69.4	NO
1700.	30.46	5	1.0	1.0	5000.0	.0	144.8	72.2	NO
1800.	28.07	5	1.0	1.0	5000.0	.0	151.5	74.9	NO
1900.	26.00	5	1.0	1.0	5000.0	.0	158.0	77.5	NO
2000.	24.19	5	1.0	1.0	5000.0	.0	164.5	80.0	NO
2100.	22.60	5	1.0	1.0	5000.0	.0	170.8	82.5	NO
2200.	21.19	5	1.0	1.0	5000.0	.0	177.0	84.9	NO
2300.	19.94	5	1.0	1.0	5000.0	.0	183.1	87.2	NO
2400.	18.81	5	1.0	1.0	5000.0	.0	189.0	89.5	NO
2500.	17.80	5	1.0	1.0	5000.0	.0	194.9	91.8	NO
2600.	16.88	5	1.0	1.0	5000.0	.0	200.7	94.0	NO
2700.	16.05	5	1.0	1.0	5000.0	.0	206.4	96.1	NO
2800.	15.29	5	1.0	1.0	5000.0	.0	212.0	98.2	NO
2900.	14.59	5	1.0	1.0	5000.0	.0	217.5	100.3	NO
3000.	13.95	5	1.0	1.0	5000.0	.0	222.9	102.3	NO
3500.	11.42	5	1.0	1.0	5000.0	.0	248.9	112.0	NO
4000.	9.632	5	1.0	1.0	5000.0	.0	273.2	120.9	NO
4500.	8.311	5	1.0	1.0	5000.0	.0	296.2	129.3	NO

5000.	7.299	5	1.0	1.0	5000.0	.0	317.9	137.2	NO
5500.	6.500	5	1.0	1.0	5000.0	.0	338.5	144.7	NO
6000.	5.854	5	1.0	1.0	5000.0	.0	358.2	151.8	NO
6500.	5.322	5	1.0	1.0	5000.0	.0	377.1	158.6	NO
7000.	4.877	5	1.0	1.0	5000.0	.0	395.3	165.1	NO
7500.	4.498	5	1.0	1.0	5000.0	.0	412.8	171.4	NO
8000.	4.174	5	1.0	1.0	5000.0	.0	429.7	177.5	NO
8500.	3.892	5	1.0	1.0	5000.0	.0	446.0	183.4	NO
9000.	3.645	5	1.0	1.0	5000.0	.0	461.8	189.1	NO
9500.	3.427	5	1.0	1.0	5000.0	.0	477.2	194.6	NO
10000.	3.234	5	1.0	1.0	5000.0	.0	492.2	200.0	NO
15000.	2.061	5	1.0	1.0	5000.0	.0	623.8	247.5	NO
20000.	1.510	5	1.0	1.0	5000.0	.0	733.5	287.4	NO
25000.	1.191	5	1.0	1.0	5000.0	.0	829.3	322.3	NO
30000.	.9827	5	1.0	1.0	5000.0	.0	915.4	353.9	NO
40000.	.8031	4	1.0	1.0	320.0	.0	1552.3	1553.2	NO
50000.	.7141	4	1.0	1.0	320.0	.0	1745.8	1750.0	NO

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 1. M:

1.	.4147E+07	5	1.0	1.0	5000.0	.0	1.0	.1	NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

****
*** SCREEN DISCRETE DISTANCES ***
****

*** TERRAIN HEIGHT OF .00 M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
3.	.1104E+07	5	1.0	1.0	5000.0	.0	1.2	.2	NO
6.	.4319E+06	5	1.0	1.0	5000.0	.0	1.5	.5	NO
9.	.2366E+06	5	1.0	1.0	5000.0	.0	1.9	.7	NO
12.	.1508E+06	5	1.0	1.0	5000.0	.0	2.2	1.0	NO
15.	.1049E+06	5	1.0	1.0	5000.0	.0	2.5	1.2	NO
18.	.7741E+05	5	1.0	1.0	5000.0	.0	2.8	1.4	NO
21.	.5957E+05	5	1.0	1.0	5000.0	.0	3.2	1.7	NO
24.	.4731E+05	5	1.0	1.0	5000.0	.0	3.5	1.9	NO
27.	.3852E+05	5	1.0	1.0	5000.0	.0	3.8	2.2	NO
30.	.3199E+05	5	1.0	1.0	5000.0	.0	4.2	2.4	NO
37.	.2312E+05	5	1.0	1.0	5000.0	.0	4.8	2.8	NO
43.	.1752E+05	5	1.0	1.0	5000.0	.0	5.5	3.3	NO
49.	.1375E+05	5	1.0	1.0	5000.0	.0	6.1	3.8	NO
55.	.1109E+05	5	1.0	1.0	5000.0	.0	6.8	4.2	NO
61.	9146.	5	1.0	1.0	5000.0	.0	7.5	4.7	NO
67.	7678.	5	1.0	1.0	5000.0	.0	8.1	5.1	NO
73.	6542.	5	1.0	1.0	5000.0	.0	8.8	5.6	NO
79.	5646.	5	1.0	1.0	5000.0	.0	9.4	6.0	NO
85.	4925.	5	1.0	1.0	5000.0	.0	10.1	6.4	NO
91.	4337.	5	1.0	1.0	5000.0	.0	10.7	6.9	NO
107.	3264.	5	1.0	1.0	5000.0	.0	12.3	7.9	NO
122.	2552.	5	1.0	1.0	5000.0	.0	13.9	9.0	NO
137.	2056.	5	1.0	1.0	5000.0	.0	15.5	10.0	NO
152.	1695.	5	1.0	1.0	5000.0	.0	17.1	11.0	NO

183.	1215.	5	1.0	1.0	5000.0	.0	20.2	13.0	NO
488.	215.6	5	1.0	1.0	5000.0	.0	49.8	29.6	NO
1006.	66.62	5	1.0	1.0	5000.0	.0	94.0	50.8	NO
1463.	37.86	5	1.0	1.0	5000.0	.0	128.4	65.5	NO
2377.	19.05	5	1.0	1.0	5000.0	.0	187.7	89.0	NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	.4147E+07	1.	0.

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****

03-18-92
18:55:13

*** SCREEN-1.1 MODEL RUN ***
*** VERSION DATED 88300 ***

DAY 7 - AFTER SECTION #11 REMOVAL - REMAINING UNAGITATED AREA

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/S)	=	1.000
SOURCE HEIGHT (M)	=	.00
LENGTH OF SIDE (M)	=	5.33
RECEPTOR HEIGHT (M)	=	.00
IOPT (1=URB,2=RUR)	=	1

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF .00 M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1.	.2950E+07	5	1.0	1.0	5000.0	.0	1.3	.1	NO
100.	3562.	5	1.0	1.0	5000.0	.0	12.0	7.5	NO
200.	1016.	5	1.0	1.0	5000.0	.0	22.3	14.0	NO
300.	494.6	5	1.0	1.0	5000.0	.0	32.3	19.9	NO
400.	300.1	5	1.0	1.0	5000.0	.0	41.9	25.3	NO
500.	205.4	5	1.0	1.0	5000.0	.0	51.2	30.2	NO
600.	151.6	5	1.0	1.0	5000.0	.0	60.3	34.8	NO
700.	117.9	5	1.0	1.0	5000.0	.0	69.0	39.1	NO
800.	95.13	5	1.0	1.0	5000.0	.0	77.5	43.1	NO
900.	78.97	5	1.0	1.0	5000.0	.0	85.8	47.0	NO
1000.	67.02	5	1.0	1.0	5000.0	.0	93.9	50.6	NO
1100.	57.89	5	1.0	1.0	5000.0	.0	101.7	54.1	NO
1200.	50.73	5	1.0	1.0	5000.0	.0	109.4	57.4	NO
1300.	45.00	5	1.0	1.0	5000.0	.0	116.8	60.6	NO
1400.	40.32	5	1.0	1.0	5000.0	.0	124.1	63.6	NO
1500.	36.44	5	1.0	1.0	5000.0	.0	131.2	66.6	NO
1600.	33.18	5	1.0	1.0	5000.0	.0	138.2	69.4	NO
1700.	30.40	5	1.0	1.0	5000.0	.0	145.0	72.2	NO
1800.	28.02	5	1.0	1.0	5000.0	.0	151.7	74.9	NO
1900.	25.96	5	1.0	1.0	5000.0	.0	158.3	77.5	NO
2000.	24.16	5	1.0	1.0	5000.0	.0	164.7	80.0	NO
2100.	22.57	5	1.0	1.0	5000.0	.0	171.0	82.5	NO
2200.	21.17	5	1.0	1.0	5000.0	.0	177.2	84.9	NO
2300.	19.91	5	1.0	1.0	5000.0	.0	183.3	87.2	NO
2400.	18.79	5	1.0	1.0	5000.0	.0	189.2	89.5	NO
2500.	17.78	5	1.0	1.0	5000.0	.0	195.1	91.8	NO
2600.	16.86	5	1.0	1.0	5000.0	.0	200.9	94.0	NO
2700.	16.03	5	1.0	1.0	5000.0	.0	206.6	96.1	NO
2800.	15.27	5	1.0	1.0	5000.0	.0	212.2	98.2	NO
2900.	14.58	5	1.0	1.0	5000.0	.0	217.7	100.3	NO
3000.	13.94	5	1.0	1.0	5000.0	.0	223.1	102.3	NO
3500.	11.41	5	1.0	1.0	5000.0	.0	249.1	112.0	NO
4000.	9.626	5	1.0	1.0	5000.0	.0	273.4	120.9	NO
4500.	8.307	5	1.0	1.0	5000.0	.0	296.3	129.3	NO

5000.	7.295	5	1.0	1.0	5000.0	.0	318.0	137.2	NO
5500.	6.497	5	1.0	1.0	5000.0	.0	338.7	144.7	NO
6000.	5.852	5	1.0	1.0	5000.0	.0	358.4	151.8	NO
6500.	5.320	5	1.0	1.0	5000.0	.0	377.3	158.6	NO
7000.	4.875	5	1.0	1.0	5000.0	.0	395.4	165.1	NO
7500.	4.497	5	1.0	1.0	5000.0	.0	412.9	171.4	NO
8000.	4.173	5	1.0	1.0	5000.0	.0	429.8	177.5	NO
8500.	3.891	5	1.0	1.0	5000.0	.0	446.1	183.4	NO
9000.	3.644	5	1.0	1.0	5000.0	.0	461.9	189.1	NO
9500.	3.427	5	1.0	1.0	5000.0	.0	477.3	194.6	NO
10000.	3.233	5	1.0	1.0	5000.0	.0	492.3	200.0	NO
15000.	2.061	5	1.0	1.0	5000.0	.0	623.9	247.5	NO
20000.	1.510	5	1.0	1.0	5000.0	.0	733.6	287.4	NO
25000.	1.191	5	1.0	1.0	5000.0	.0	829.4	322.3	NO
30000.	.9826	5	1.0	1.0	5000.0	.0	915.4	353.9	NO
40000.	.8031	4	1.0	1.0	320.0	.0	1552.4	1553.2	NO
50000.	.7141	4	1.0	1.0	320.0	.0	1745.9	1750.0	NO

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 1. M:

1.	.2950E+07	5	1.0	1.0	5000.0	.0	1.3	.1	NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

****
*** SCREEN DISCRETE DISTANCES ***
****

*** TERRAIN HEIGHT OF .00 M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
3.	.8312E+06	5	1.0	1.0	5000.0	.0	1.6	.2	NO
6.	.3438E+06	5	1.0	1.0	5000.0	.0	1.9	.5	NO
9.	.1956E+06	5	1.0	1.0	5000.0	.0	2.2	.7	NO
12.	.1280E+06	5	1.0	1.0	5000.0	.0	2.6	1.0	NO
15.	.9092E+05	5	1.0	1.0	5000.0	.0	2.9	1.2	NO
18.	.6815E+05	5	1.0	1.0	5000.0	.0	3.2	1.4	NO
21.	.5311E+05	5	1.0	1.0	5000.0	.0	3.6	1.7	NO
24.	.4262E+05	5	1.0	1.0	5000.0	.0	3.9	1.9	NO
27.	.3500E+05	5	1.0	1.0	5000.0	.0	4.2	2.2	NO
30.	.2929E+05	5	1.0	1.0	5000.0	.0	4.6	2.4	NO
37.	.2142E+05	5	1.0	1.0	5000.0	.0	5.2	2.8	NO
43.	.1637E+05	5	1.0	1.0	5000.0	.0	5.9	3.3	NO
49.	.1294E+05	5	1.0	1.0	5000.0	.0	6.5	3.8	NO
55.	.1050E+05	5	1.0	1.0	5000.0	.0	7.2	4.2	NO
61.	8702.	5	1.0	1.0	5000.0	.0	7.8	4.7	NO
67.	7334.	5	1.0	1.0	5000.0	.0	8.5	5.1	NO
73.	6271.	5	1.0	1.0	5000.0	.0	9.1	5.6	NO
79.	5428.	5	1.0	1.0	5000.0	.0	9.8	6.0	NO
85.	4747.	5	1.0	1.0	5000.0	.0	10.4	6.4	NO
91.	4189.	5	1.0	1.0	5000.0	.0	11.1	6.9	NO
107.	3167.	5	1.0	1.0	5000.0	.0	12.7	7.9	NO
122.	2486.	5	1.0	1.0	5000.0	.0	14.3	9.0	NO
137.	2008.	5	1.0	1.0	5000.0	.0	15.9	10.0	NO
152.	1659.	5	1.0	1.0	5000.0	.0	17.4	11.0	NO

183.	1194.	5	1.0	1.0	5000.0	.0	20.6	13.0	NO
488.	214.2	5	1.0	1.0	5000.0	.0	50.1	29.6	NO
1006.	66.42	5	1.0	1.0	5000.0	.0	94.3	50.8	NO
1463.	37.79	5	1.0	1.0	5000.0	.0	128.6	65.5	NO
2377.	19.03	5	1.0	1.0	5000.0	.0	187.9	89.0	NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	.2950E+07	1.	0.

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****

APPENDIX D

The Complete Air Emission Concentration Tables Calculated for the Six Chemicals of Concern at the Building 780 Construction Site, Naval Air Station (NAS) Jacksonville, Florida

These tables give the RTI output across the top of the page and the SCREEN output for increasing distances from the emission site down the left hand side of the page. The resulting modeled air concentration for each COC is found at the intersection of each column and row. Each air concentration is the product of the RTI model and the SCREEN model outputs. The exception is for the 15-minute air concentrations, which include a multiplicative factor of 1.34 as described in text.

AGITATED AREA
SECTION #1

RTI 15-MIN EMISSION RATE (g/sec)

		1,1-DCE	1,1,1-TCA	CHCl3	PCE	TCE	MeCl2
		8.72E-03	1.70E-01	4.71E-04	3.77E-03	3.25E-03	4.72E-04
DISTANCE (meters)	SCREEN MODEL CONC. (ug/m^3)	1,1-DCE CONC. (ug/m^3)	1,1,1-TCA CONC. (ug/m^3)	CHCl3 CONC. (ug/m^3)	PCE CONC. (ug/m^3)	TCE CONC. (ug/m^3)	MeCl2 CONC. (ug/m^3)
1	1.63E+06	1.91E+04	3.72E+05	1.03E+03	8.24E+03	7.10E+03	1.03E+03
3	4.90E+05	5.74E+03	1.12E+05	3.10E+02	2.48E+03	2.14E+03	3.11E+02
6	2.18E+05	2.56E+03	4.99E+04	1.38E+02	1.11E+03	9.54E+02	1.39E+02
9	1.31E+05	1.54E+03	3.00E+04	8.32E+01	6.66E+02	5.74E+02	8.34E+01
12	8.98E+04	1.05E+03	2.05E+04	5.69E+01	4.55E+02	3.92E+02	5.70E+01
15	6.61E+04	7.74E+02	1.51E+04	4.18E+01	3.35E+02	2.89E+02	4.19E+01
18	5.10E+04	5.97E+02	1.16E+04	3.23E+01	2.58E+02	2.23E+02	3.23E+01
21	4.07E+04	4.77E+02	9.30E+03	2.58E+01	2.06E+02	1.78E+02	2.58E+01
24	3.33E+04	3.91E+02	7.61E+03	2.11E+01	1.69E+02	1.46E+02	2.11E+01
27	2.79E+04	3.26E+02	6.36E+03	1.76E+01	1.41E+02	1.22E+02	1.77E+01
30	2.37E+04	2.77E+02	5.40E+03	1.50E+01	1.20E+02	1.03E+02	1.50E+01
37	1.77E+04	2.08E+02	4.05E+03	1.12E+01	8.99E+01	7.75E+01	1.12E+01
43	1.38E+04	1.62E+02	3.16E+03	8.76E+00	7.01E+01	6.04E+01	8.78E+00
49	1.11E+04	1.30E+02	2.54E+03	7.03E+00	5.63E+01	4.85E+01	7.05E+00
55	9.14E+03	1.07E+02	2.09E+03	5.78E+00	4.63E+01	3.99E+01	5.80E+00
61	7.65E+03	8.97E+01	1.75E+03	4.85E+00	3.88E+01	3.34E+01	4.86E+00
67	6.51E+03	7.63E+01	1.49E+03	4.12E+00	3.30E+01	2.85E+01	4.13E+00
73	5.62E+03	6.58E+01	1.28E+03	3.56E+00	2.85E+01	2.45E+01	3.56E+00
79	4.90E+03	5.74E+01	1.12E+03	3.10E+00	2.48E+01	2.14E+01	3.11E+00
85	4.31E+03	5.05E+01	9.84E+02	2.73E+00	2.18E+01	1.88E+01	2.73E+00
91	3.82E+03	4.48E+01	8.74E+02	2.42E+00	1.94E+01	1.67E+01	2.43E+00
100	3.27E+03	3.84E+01	7.48E+02	2.07E+00	1.66E+01	1.43E+01	2.08E+00
107	2.92E+03	3.43E+01	6.68E+02	1.85E+00	1.48E+01	1.28E+01	1.86E+00
122	2.32E+03	2.71E+01	5.29E+02	1.47E+00	1.17E+01	1.01E+01	1.47E+00
137	1.88E+03	2.21E+01	4.31E+02	1.19E+00	9.55E+00	8.23E+00	1.20E+00
152	1.57E+03	1.84E+01	3.58E+02	9.92E-01	7.94E+00	6.84E+00	9.94E-01
183	1.14E+03	1.33E+01	2.60E+02	7.20E-01	5.76E+00	4.97E+00	7.21E-01
200	9.72E+02	1.14E+01	2.22E+02	6.15E-01	4.93E+00	4.25E+00	6.17E-01
300	4.80E+02	5.63E+00	1.10E+02	3.04E-01	2.43E+00	2.10E+00	3.05E-01
400	2.94E+02	3.44E+00	6.71E+01	1.86E-01	1.49E+00	1.28E+00	1.86E-01
488	2.10E+02	2.47E+00	4.81E+01	1.33E-01	1.07E+00	9.19E-01	1.33E-01
500	2.02E+02	2.37E+00	4.61E+01	1.28E-01	1.02E+00	8.82E-01	1.28E-01
600	1.49E+02	1.75E+00	3.41E+01	9.46E-02	7.57E-01	6.53E-01	9.48E-02
700	1.16E+02	1.36E+00	2.66E+01	7.37E-02	5.90E-01	5.09E-01	7.39E-02

TOTAL CONCENTRATIONS
SECTION #1 +
UNAGITATED AREA

BASED ON 15-MIN EMISSION RATES

DISTANCE (meters)	1,1-DCE CONC. (ug/m^3)	1,1,1-TCA CONC. (ug/m^3)	CHCl3 CONC. (ug/m^3)	PCE CONC. (ug/m^3)	TCE CONC. (ug/m^3)	MeCl2 CONC. (ug/m^3)
1	1.93E+04	3.76E+05	1.04E+03	8.33E+03	7.18E+03	1.04E+03
3	5.81E+03	1.13E+05	3.14E+02	2.51E+03	2.16E+03	3.14E+02
6	2.59E+03	5.05E+04	1.40E+02	1.12E+03	9.65E+02	1.40E+02
9	1.56E+03	3.04E+04	8.42E+01	6.74E+02	5.81E+02	8.44E+01
12	1.07E+03	2.08E+04	5.76E+01	4.61E+02	3.98E+02	5.78E+01
15	7.85E+02	1.53E+04	4.24E+01	3.39E+02	2.93E+02	4.25E+01
18	6.06E+02	1.18E+04	3.27E+01	2.62E+02	2.26E+02	3.28E+01
21	4.84E+02	9.43E+03	2.61E+01	2.09E+02	1.80E+02	2.62E+01
24	3.96E+02	7.73E+03	2.14E+01	1.71E+02	1.48E+02	2.15E+01
27	3.31E+02	6.46E+03	1.79E+01	1.43E+02	1.24E+02	1.79E+01
30	2.82E+02	5.49E+03	1.52E+01	1.22E+02	1.05E+02	1.52E+01
37	2.11E+02	4.12E+03	1.14E+01	9.13E+01	7.87E+01	1.14E+01
43	1.65E+02	3.21E+03	8.91E+00	7.13E+01	6.15E+01	8.92E+00
49	1.33E+02	2.58E+03	7.16E+00	5.73E+01	4.94E+01	7.17E+00
55	1.09E+02	2.13E+03	5.89E+00	4.71E+01	4.06E+01	5.90E+00
61	9.14E+01	1.78E+03	4.94E+00	3.95E+01	3.41E+01	4.95E+00
67	7.78E+01	1.52E+03	4.20E+00	3.36E+01	2.90E+01	4.21E+00
73	6.71E+01	1.31E+03	3.62E+00	2.90E+01	2.50E+01	3.63E+00
79	5.85E+01	1.14E+03	3.16E+00	2.53E+01	2.18E+01	3.17E+00
85	5.15E+01	1.00E+03	2.78E+00	2.23E+01	1.92E+01	2.79E+00
91	4.57E+01	8.91E+02	2.47E+00	1.98E+01	1.70E+01	2.47E+00
100	3.91E+01	7.63E+02	2.11E+00	1.69E+01	1.46E+01	2.12E+00
107	3.50E+01	6.82E+02	1.89E+00	1.51E+01	1.30E+01	1.89E+00
122	2.77E+01	5.40E+02	1.50E+00	1.20E+01	1.03E+01	1.50E+00
137	2.25E+01	4.40E+02	1.22E+00	9.75E+00	8.40E+00	1.22E+00
152	1.87E+01	3.66E+02	1.01E+00	8.11E+00	6.99E+00	1.01E+00
183	1.36E+01	2.66E+02	7.36E-01	5.89E+00	5.08E+00	7.37E-01
200	1.16E+01	2.27E+02	6.29E-01	5.03E+00	4.34E+00	6.30E-01
300	5.76E+00	1.12E+02	3.11E-01	2.49E+00	2.15E+00	3.12E-01
400	3.52E+00	6.87E+01	1.90E-01	1.52E+00	1.31E+00	1.91E-01
488	2.52E+00	4.92E+01	1.36E-01	1.09E+00	9.41E-01	1.37E-01
500	2.42E+00	4.72E+01	1.31E-01	1.05E+00	9.03E-01	1.31E-01
600	1.79E+00	3.50E+01	9.69E-02	7.75E-01	6.68E-01	9.71E-02
700	1.40E+00	2.72E+01	7.55E-02	6.04E-01	5.21E-01	7.56E-02

AGITATED AREA
SECTION #11A

RTI 15-MIN EMISSION RATE (g/sec)

		1,1-DCE	1,1,1-TCA	CHCl3	PCE	TCE	MeCl2
		8.12E-03	1.58E-01	4.38E-04	3.51E-03	3.02E-03	4.39E-04
DISTANCE (meters)	SCREEN MODEL CONC. (ug/m^3)	1,1-DCE CONC. (ug/m^3)	1,1,1-TCA CONC. (ug/m^3)	CHCl3 CONC. (ug/m^3)	PCE CONC. (ug/m^3)	TCE CONC. (ug/m^3)	MeCl2 CONC. (ug/m^3)
1	2.39E+06	2.60E+04	5.07E+05	1.40E+03	1.13E+04	9.69E+03	1.41E+03
3	6.91E+05	7.55E+03	1.47E+05	4.07E+02	3.26E+03	2.81E+03	4.08E+02
6	2.95E+05	3.22E+03	6.26E+04	1.73E+02	1.39E+03	1.20E+03	1.74E+02
9	1.71E+05	1.87E+03	3.64E+04	1.01E+02	8.08E+02	6.95E+02	1.01E+02
12	1.14E+05	1.24E+03	2.42E+04	6.71E+01	5.38E+02	4.63E+02	6.73E+01
15	8.20E+04	8.95E+02	1.74E+04	4.83E+01	3.87E+02	3.33E+02	4.84E+01
18	6.21E+04	6.78E+02	1.32E+04	3.66E+01	2.93E+02	2.52E+02	3.66E+01
21	4.88E+04	5.32E+02	1.04E+04	2.87E+01	2.30E+02	1.98E+02	2.88E+01
24	3.94E+04	4.30E+02	8.37E+03	2.32E+01	1.86E+02	1.60E+02	2.33E+01
27	3.26E+04	3.56E+02	6.92E+03	1.92E+01	1.54E+02	1.32E+02	1.92E+01
30	2.74E+04	2.99E+02	5.82E+03	1.61E+01	1.29E+02	1.11E+02	1.62E+01
37	2.02E+04	2.20E+02	4.29E+03	1.19E+01	9.53E+01	8.20E+01	1.19E+01
43	1.55E+04	1.70E+02	3.30E+03	9.15E+00	7.33E+01	6.31E+01	9.17E+00
49	1.24E+04	1.35E+02	2.62E+03	7.27E+00	5.83E+01	5.01E+01	7.29E+00
55	1.01E+04	1.10E+02	2.14E+03	5.92E+00	4.75E+01	4.08E+01	5.94E+00
61	8.37E+03	9.14E+01	1.78E+03	4.93E+00	3.95E+01	3.40E+01	4.94E+00
67	7.08E+03	7.73E+01	1.50E+03	4.17E+00	3.34E+01	2.87E+01	4.18E+00
73	6.07E+03	6.62E+01	1.29E+03	3.57E+00	2.86E+01	2.46E+01	3.58E+00
79	5.26E+03	5.74E+01	1.12E+03	3.10E+00	2.48E+01	2.14E+01	3.10E+00
85	4.61E+03	5.03E+01	9.79E+02	2.71E+00	2.18E+01	1.87E+01	2.72E+00
91	4.08E+03	4.45E+01	8.66E+02	2.40E+00	1.92E+01	1.65E+01	2.41E+00
100	3.47E+03	3.79E+01	7.38E+02	2.04E+00	1.64E+01	1.41E+01	2.05E+00
107	3.09E+03	3.38E+01	6.57E+02	1.82E+00	1.46E+01	1.26E+01	1.83E+00
122	2.43E+03	2.66E+01	5.17E+02	1.43E+00	1.15E+01	9.88E+00	1.44E+00
137	1.97E+03	2.15E+01	4.18E+02	1.16E+00	9.30E+00	8.00E+00	1.16E+00
152	1.63E+03	1.78E+01	3.46E+02	9.60E-01	7.70E+00	6.62E+00	9.63E-01
183	1.18E+03	1.28E+01	2.50E+02	6.93E-01	5.55E+00	4.78E+00	6.95E-01
200	1.00E+03	1.09E+01	2.13E+02	5.91E-01	4.73E+00	4.07E+00	5.92E-01
300	4.90E+02	5.35E+00	1.04E+02	2.89E-01	2.31E+00	1.99E+00	2.89E-01
400	2.98E+02	3.25E+00	6.33E+01	1.76E-01	1.41E+00	1.21E+00	1.76E-01
488	2.13E+02	2.33E+00	4.53E+01	1.25E-01	1.01E+00	8.65E-01	1.26E-01
500	2.04E+02	2.23E+00	4.33E+01	1.20E-01	9.63E-01	8.29E-01	1.20E-01
600	1.51E+02	1.65E+00	3.21E+01	8.89E-02	7.12E-01	6.13E-01	8.91E-02
700	1.18E+02	1.28E+00	2.50E+01	6.92E-02	5.54E-01	4.77E-01	6.93E-02

AGITATED AREA
SECTION #11B

RTI 15-MIN EMISSION RATE (g/sec)

		1,1-DCE	1,1,1-TCA	CHCl3	PCE	TCE	MeCl2
		2.99E-03	5.84E-02	1.61E-04	1.29E-03	1.11E-03	1.62E-04
DISTANCE (meters)	SCREEN MODEL CONC. (ug/m^3)	1,1-DCE CONC. (ug/m^3)	1,1,1-TCA CONC. (ug/m^3)	CHCl3 CONC. (ug/m^3)	PCE CONC. (ug/m^3)	TCE CONC. (ug/m^3)	MeCl2 CONC. (ug/m^3)
1	4.15E+06	1.67E+04	3.26E+05	8.98E+02	7.19E+03	6.19E+03	9.03E+02
3	1.10E+06	4.44E+03	8.67E+04	2.39E+02	1.91E+03	1.65E+03	2.40E+02
6	4.32E+05	1.74E+03	3.39E+04	9.35E+01	7.49E+02	6.44E+02	9.41E+01
9	2.37E+05	9.51E+02	1.86E+04	5.12E+01	4.10E+02	3.53E+02	5.15E+01
12	1.51E+05	6.06E+02	1.18E+04	3.26E+01	2.62E+02	2.25E+02	3.28E+01
15	1.05E+05	4.22E+02	8.24E+03	2.27E+01	1.82E+02	1.57E+02	2.28E+01
18	7.74E+04	3.11E+02	6.08E+03	1.68E+01	1.34E+02	1.16E+02	1.69E+01
21	5.96E+04	2.39E+02	4.68E+03	1.29E+01	1.03E+02	8.89E+01	1.30E+01
24	4.73E+04	1.90E+02	3.71E+03	1.02E+01	8.20E+01	7.06E+01	1.03E+01
27	3.85E+04	1.55E+02	3.02E+03	8.34E+00	6.68E+01	5.75E+01	8.39E+00
30	3.20E+04	1.29E+02	2.51E+03	6.92E+00	5.55E+01	4.77E+01	6.97E+00
37	2.31E+04	9.29E+01	1.82E+03	5.00E+00	4.01E+01	3.45E+01	5.03E+00
43	1.75E+04	7.04E+01	1.38E+03	3.79E+00	3.04E+01	2.61E+01	3.82E+00
49	1.38E+04	5.53E+01	1.08E+03	2.98E+00	2.38E+01	2.05E+01	2.99E+00
55	1.11E+04	4.46E+01	8.71E+02	2.40E+00	1.92E+01	1.65E+01	2.42E+00
61	9.15E+03	3.68E+01	7.18E+02	1.98E+00	1.59E+01	1.36E+01	1.99E+00
67	7.68E+03	3.09E+01	6.03E+02	1.66E+00	1.33E+01	1.15E+01	1.67E+00
73	6.54E+03	2.63E+01	5.14E+02	1.42E+00	1.13E+01	9.76E+00	1.42E+00
79	5.65E+03	2.27E+01	4.43E+02	1.22E+00	9.79E+00	8.42E+00	1.23E+00
85	4.93E+03	1.98E+01	3.87E+02	1.07E+00	8.54E+00	7.35E+00	1.07E+00
91	4.34E+03	1.74E+01	3.40E+02	9.39E-01	7.52E+00	6.47E+00	9.44E-01
100	3.68E+03	1.48E+01	2.89E+02	7.96E-01	6.38E+00	5.49E+00	8.01E-01
107	3.26E+03	1.31E+01	2.56E+02	7.06E-01	5.66E+00	4.87E+00	7.11E-01
122	2.55E+03	1.03E+01	2.00E+02	5.52E-01	4.43E+00	3.81E+00	5.56E-01
137	2.06E+03	8.26E+00	1.61E+02	4.45E-01	3.57E+00	3.07E+00	4.48E-01
152	1.70E+03	6.81E+00	1.33E+02	3.67E-01	2.94E+00	2.53E+00	3.69E-01
183	1.22E+03	4.88E+00	9.54E+01	2.63E-01	2.11E+00	1.81E+00	2.65E-01
200	1.03E+03	4.15E+00	8.11E+01	2.24E-01	1.79E+00	1.54E+00	2.25E-01
300	5.00E+02	2.01E+00	3.93E+01	1.08E-01	8.67E-01	7.46E-01	1.09E-01
400	3.03E+02	1.22E+00	2.37E+01	6.55E-02	5.25E-01	4.51E-01	6.59E-02
488	2.16E+02	8.67E-01	1.69E+01	4.67E-02	3.74E-01	3.22E-01	4.70E-02
500	2.07E+02	8.31E-01	1.62E+01	4.47E-02	3.58E-01	3.08E-01	4.50E-02
600	1.52E+02	6.13E-01	1.20E+01	3.30E-02	2.64E-01	2.27E-01	3.32E-02
700	1.18E+02	4.76E-01	9.29E+00	2.56E-02	2.05E-01	1.77E-01	2.58E-02

TOTAL CONCENTRATIONS
SECTION #11 +
UNAGITATED AREA

CONCENTRATIONS FOR 15-MIN EMISSION RATE

DISTANCE (meters)	1,1-DCE CONC. (ug/m^3)	1,1,1-TCA CONC. (ug/m^3)	CHCl3 CONC. (ug/m^3)	PCE CONC. (ug/m^3)	TCE CONC. (ug/m^3)	MeCl2 CONC. (ug/m^3)
1	4.28E+04	8.34E+05	2.31E+03	1.85E+04	1.59E+04	2.32E+03
3	1.20E+04	2.34E+05	6.47E+02	5.19E+03	4.46E+03	6.50E+02
6	4.96E+03	9.67E+04	2.67E+02	2.14E+03	1.84E+03	2.68E+02
9	2.83E+03	5.51E+04	1.52E+02	1.22E+03	1.05E+03	1.53E+02
12	1.85E+03	3.61E+04	1.00E+02	8.01E+02	6.89E+02	1.00E+02
15	1.32E+03	2.57E+04	7.11E+01	5.70E+02	4.90E+02	7.14E+01
18	9.91E+02	1.93E+04	5.34E+01	4.28E+02	3.68E+02	5.36E+01
21	7.73E+02	1.51E+04	4.17E+01	3.34E+02	2.88E+02	4.18E+01
24	6.22E+02	1.21E+04	3.35E+01	2.69E+02	2.31E+02	3.36E+01
27	5.11E+02	9.96E+03	2.76E+01	2.21E+02	1.90E+02	2.77E+01
30	4.28E+02	8.35E+03	2.31E+01	1.85E+02	1.59E+02	2.32E+01
37	3.14E+02	6.12E+03	1.69E+01	1.36E+02	1.17E+02	1.70E+01
43	2.41E+02	4.69E+03	1.30E+01	1.04E+02	8.94E+01	1.30E+01
49	1.90E+02	3.71E+03	1.03E+01	8.23E+01	7.08E+01	1.03E+01
55	1.55E+02	3.01E+03	8.34E+00	6.68E+01	5.75E+01	8.37E+00
61	1.28E+02	2.50E+03	6.92E+00	5.55E+01	4.77E+01	6.94E+00
67	1.08E+02	2.11E+03	5.84E+00	4.68E+01	4.03E+01	5.86E+00
73	9.27E+01	1.81E+03	5.00E+00	4.00E+01	3.45E+01	5.01E+00
79	8.03E+01	1.56E+03	4.33E+00	3.47E+01	2.98E+01	4.34E+00
85	7.03E+01	1.37E+03	3.79E+00	3.04E+01	2.61E+01	3.80E+00
91	6.20E+01	1.21E+03	3.35E+00	2.68E+01	2.31E+01	3.36E+00
100	5.28E+01	1.03E+03	2.85E+00	2.28E+01	1.96E+01	2.86E+00
107	4.70E+01	9.15E+02	2.53E+00	2.03E+01	1.75E+01	2.54E+00
122	3.69E+01	7.19E+02	1.99E+00	1.59E+01	1.37E+01	2.00E+00
137	2.98E+01	5.81E+02	1.61E+00	1.29E+01	1.11E+01	1.61E+00
152	2.47E+01	4.80E+02	1.33E+00	1.07E+01	9.17E+00	1.33E+00
183	1.78E+01	3.46E+02	9.58E-01	7.68E+00	6.60E+00	9.61E-01
200	1.51E+01	2.95E+02	8.16E-01	6.54E+00	5.62E+00	8.19E-01
300	7.38E+00	1.44E+02	3.98E-01	3.19E+00	2.74E+00	3.99E-01
400	4.48E+00	8.72E+01	2.41E-01	1.94E+00	1.66E+00	2.42E-01
488	3.20E+00	6.23E+01	1.72E-01	1.38E+00	1.19E+00	1.73E-01
500	3.06E+00	5.97E+01	1.65E-01	1.32E+00	1.14E+00	1.66E-01
600	2.27E+00	4.41E+01	1.22E-01	9.79E-01	8.42E-01	1.23E-01
700	1.76E+00	3.43E+01	9.50E-02	7.61E-01	6.55E-01	9.53E-02

AGITATED AREA
SECTION #1

RTI 1-HOUR EMISSION RATE (g/sec)

		1,1-DCE	1,1,1-TCA	CHCl3	PCE	TCE	MeCl2
		4.37E-03	8.57E-02	2.37E-04	1.88E-03	1.64E-03	2.37E-04
DISTANCE (meters)	SCREEN MODEL CONC. (ug/m^3)	1,1-DCE CONC. (ug/m^3)	1,1,1-TCA CONC. (ug/m^3)	CHCl3 CONC. (ug/m^3)	PCE CONC. (ug/m^3)	TCE CONC. (ug/m^3)	MeCl2 CONC. (ug/m^3)
1	1.63E+06	7.11E+03	1.39E+05	3.85E+02	3.06E+03	2.67E+03	3.85E+02
3	4.90E+05	2.14E+03	4.20E+04	1.16E+02	9.21E+02	8.03E+02	1.16E+02
6	2.18E+05	9.54E+02	1.87E+04	5.17E+01	4.10E+02	3.58E+02	5.17E+01
9	1.31E+05	5.74E+02	1.13E+04	3.11E+01	2.47E+02	2.15E+02	3.11E+01
12	8.98E+04	3.93E+02	7.70E+03	2.13E+01	1.69E+02	1.47E+02	2.13E+01
15	6.61E+04	2.89E+02	5.66E+03	1.57E+01	1.24E+02	1.08E+02	1.57E+01
18	5.10E+04	2.23E+02	4.37E+03	1.21E+01	9.58E+01	8.36E+01	1.21E+01
21	4.07E+04	1.78E+02	3.49E+03	9.64E+00	7.65E+01	6.67E+01	9.64E+00
24	3.33E+04	1.46E+02	2.86E+03	7.90E+00	6.26E+01	5.46E+01	7.90E+00
27	2.79E+04	1.22E+02	2.39E+03	6.60E+00	5.24E+01	4.57E+01	6.60E+00
30	2.37E+04	1.03E+02	2.03E+03	5.61E+00	4.45E+01	3.88E+01	5.61E+00
37	1.77E+04	7.75E+01	1.52E+03	4.20E+00	3.33E+01	2.91E+01	4.20E+00
43	1.38E+04	6.04E+01	1.19E+03	3.28E+00	2.60E+01	2.27E+01	3.28E+00
49	1.11E+04	4.86E+01	9.52E+02	2.63E+00	2.09E+01	1.82E+01	2.63E+00
55	9.14E+03	3.99E+01	7.83E+02	2.16E+00	1.72E+01	1.50E+01	2.16E+00
61	7.65E+03	3.34E+01	6.56E+02	1.81E+00	1.44E+01	1.26E+01	1.81E+00
67	6.51E+03	2.85E+01	5.58E+02	1.54E+00	1.22E+01	1.07E+01	1.54E+00
73	5.62E+03	2.45E+01	4.81E+02	1.33E+00	1.06E+01	9.21E+00	1.33E+00
79	4.90E+03	2.14E+01	4.20E+02	1.16E+00	9.20E+00	8.03E+00	1.16E+00
85	4.31E+03	1.88E+01	3.69E+02	1.02E+00	8.10E+00	7.07E+00	1.02E+00
91	3.82E+03	1.67E+01	3.28E+02	9.06E-01	7.19E+00	6.27E+00	9.06E-01
100	3.27E+03	1.43E+01	2.80E+02	7.76E-01	6.15E+00	5.37E+00	7.76E-01
107	2.92E+03	1.28E+01	2.51E+02	6.93E-01	5.50E+00	4.80E+00	6.93E-01
122	2.32E+03	1.01E+01	1.98E+02	5.49E-01	4.35E+00	3.80E+00	5.49E-01
137	1.88E+03	8.23E+00	1.61E+02	4.47E-01	3.54E+00	3.09E+00	4.47E-01
152	1.57E+03	6.84E+00	1.34E+02	3.71E-01	2.94E+00	2.57E+00	3.71E-01
183	1.14E+03	4.97E+00	9.74E+01	2.69E-01	2.14E+00	1.86E+00	2.69E-01
200	9.72E+02	4.25E+00	8.33E+01	2.30E-01	1.83E+00	1.59E+00	2.30E-01
300	4.80E+02	2.10E+00	4.11E+01	1.14E-01	9.02E-01	7.87E-01	1.14E-01
400	2.94E+02	1.28E+00	2.52E+01	6.96E-02	5.52E-01	4.81E-01	6.96E-02
488	2.10E+02	9.19E-01	1.80E+01	4.98E-02	3.95E-01	3.45E-01	4.98E-02
500	2.02E+02	8.82E-01	1.73E+01	4.78E-02	3.79E-01	3.31E-01	4.78E-02
600	1.49E+02	6.53E-01	1.28E+01	3.54E-02	2.81E-01	2.45E-01	3.54E-02
700	1.16E+02	5.09E-01	9.98E+00	2.76E-02	2.19E-01	1.91E-01	2.76E-02

TOTAL CONCENTRATIONS
SECTION #1 +
UNAGITATED AREA

BASED ON 1-HOUR EMISSION RATE

DISTANCE (meters)	1,1-DCE CONC. (ug/m^3)	1,1,1-TCA CONC. (ug/m^3)	CHCl3 CONC. (ug/m^3)	PCE CONC. (ug/m^3)	TCE CONC. (ug/m^3)	MeCl2 CONC. (ug/m^3)
1	7.26E+03	1.42E+05	3.93E+02	3.12E+03	2.72E+03	3.93E+02
3	2.19E+03	4.29E+04	1.19E+02	9.41E+02	8.21E+02	1.19E+02
6	9.77E+02	1.92E+04	5.30E+01	4.20E+02	3.66E+02	5.30E+01
9	5.89E+02	1.15E+04	3.19E+01	2.53E+02	2.21E+02	3.19E+01
12	4.03E+02	7.90E+03	2.18E+01	1.73E+02	1.51E+02	2.18E+01
15	2.97E+02	5.82E+03	1.61E+01	1.28E+02	1.11E+02	1.61E+01
18	2.29E+02	4.49E+03	1.24E+01	9.86E+01	8.59E+01	1.24E+01
21	1.83E+02	3.59E+03	9.92E+00	7.87E+01	6.87E+01	9.92E+00
24	1.50E+02	2.94E+03	8.13E+00	6.45E+01	5.63E+01	8.13E+00
27	1.25E+02	2.46E+03	6.80E+00	5.40E+01	4.71E+01	6.80E+00
30	1.07E+02	2.09E+03	5.78E+00	4.59E+01	4.00E+01	5.78E+00
37	8.00E+01	1.57E+03	4.34E+00	3.44E+01	3.00E+01	4.34E+00
43	6.25E+01	1.23E+03	3.39E+00	2.69E+01	2.34E+01	3.39E+00
49	5.02E+01	9.85E+02	2.72E+00	2.16E+01	1.89E+01	2.72E+00
55	4.13E+01	8.11E+02	2.24E+00	1.78E+01	1.55E+01	2.24E+00
61	3.47E+01	6.80E+02	1.88E+00	1.49E+01	1.30E+01	1.88E+00
67	2.95E+01	5.79E+02	1.60E+00	1.27E+01	1.11E+01	1.60E+00
73	2.55E+01	4.99E+02	1.38E+00	1.10E+01	9.56E+00	1.38E+00
79	2.22E+01	4.36E+02	1.20E+00	9.56E+00	8.34E+00	1.20E+00
85	1.96E+01	3.84E+02	1.06E+00	8.42E+00	7.34E+00	1.06E+00
91	1.74E+01	3.41E+02	9.42E-01	7.47E+00	6.52E+00	9.42E-01
100	1.49E+01	2.92E+02	8.07E-01	6.40E+00	5.58E+00	8.07E-01
107	1.33E+01	2.61E+02	7.21E-01	5.72E+00	4.99E+00	7.21E-01
122	1.05E+01	2.07E+02	5.72E-01	4.54E+00	3.95E+00	5.72E-01
137	8.58E+00	1.68E+02	4.65E-01	3.69E+00	3.22E+00	4.65E-01
152	7.14E+00	1.40E+02	3.87E-01	3.07E+00	2.68E+00	3.87E-01
183	5.19E+00	1.02E+02	2.81E-01	2.23E+00	1.95E+00	2.81E-01
200	4.43E+00	8.70E+01	2.40E-01	1.91E+00	1.66E+00	2.40E-01
300	2.19E+00	4.30E+01	1.19E-01	9.44E-01	8.23E-01	1.19E-01
400	1.34E+00	2.63E+01	7.28E-02	5.78E-01	5.04E-01	7.28E-02
488	9.62E-01	1.89E+01	5.22E-02	4.14E-01	3.61E-01	5.22E-02
500	9.24E-01	1.81E+01	5.01E-02	3.98E-01	3.47E-01	5.01E-02
600	6.84E-01	1.34E+01	3.71E-02	2.94E-01	2.57E-01	3.71E-02
700	5.33E-01	1.05E+01	2.89E-02	2.29E-01	2.00E-01	2.89E-02

AGITATED AREA
SECTION #11A

RTI 1-HOUR EMISSION RATE (g/sec)

		1,1-DCE	1,1,1-TCA	CHCl3	PCE	TCE	MeCl2
		4.06E-03	7.97E-02	2.20E-04	1.75E-03	1.52E-03	2.20E-04
DISTANCE (meters)	SCREEN MODEL CONC. (ug/m^3)	1,1-DCE CONC. (ug/m^3)	1,1,1-TCA CONC. (ug/m^3)	CHCl3 CONC. (ug/m^3)	PCE CONC. (ug/m^3)	TCE CONC. (ug/m^3)	MeCl2 CONC. (ug/m^3)
1	2.39E+06	9.69E+03	1.90E+05	5.25E+02	4.18E+03	3.63E+03	5.25E+02
3	6.91E+05	2.81E+03	5.51E+04	1.52E+02	1.21E+03	1.05E+03	1.52E+02
6	2.95E+05	1.20E+03	2.35E+04	6.48E+01	5.16E+02	4.48E+02	6.48E+01
9	1.71E+05	6.95E+02	1.37E+04	3.77E+01	3.00E+02	2.60E+02	3.77E+01
12	1.14E+05	4.63E+02	9.09E+03	2.51E+01	2.00E+02	1.73E+02	2.51E+01
15	8.20E+04	3.33E+02	6.53E+03	1.80E+01	1.43E+02	1.25E+02	1.80E+01
18	6.21E+04	2.52E+02	4.95E+03	1.37E+01	1.09E+02	9.44E+01	1.37E+01
21	4.88E+04	1.98E+02	3.89E+03	1.07E+01	8.54E+01	7.41E+01	1.07E+01
24	3.94E+04	1.60E+02	3.14E+03	8.67E+00	6.90E+01	5.99E+01	8.67E+00
27	3.26E+04	1.32E+02	2.60E+03	7.17E+00	5.70E+01	4.95E+01	7.17E+00
30	2.74E+04	1.11E+02	2.18E+03	6.03E+00	4.79E+01	4.16E+01	6.03E+00
37	2.02E+04	8.20E+01	1.61E+03	4.44E+00	3.54E+01	3.07E+01	4.44E+00
43	1.55E+04	6.31E+01	1.24E+03	3.42E+00	2.72E+01	2.36E+01	3.42E+00
49	1.24E+04	5.01E+01	9.84E+02	2.72E+00	2.16E+01	1.88E+01	2.72E+00
55	1.01E+04	4.08E+01	8.02E+02	2.21E+00	1.76E+01	1.53E+01	2.21E+00
61	8.37E+03	3.40E+01	6.67E+02	1.84E+00	1.46E+01	1.27E+01	1.84E+00
67	7.08E+03	2.87E+01	5.64E+02	1.56E+00	1.24E+01	1.08E+01	1.56E+00
73	6.07E+03	2.46E+01	4.83E+02	1.33E+00	1.06E+01	9.22E+00	1.33E+00
79	5.26E+03	2.14E+01	4.19E+02	1.16E+00	9.21E+00	8.00E+00	1.16E+00
85	4.61E+03	1.87E+01	3.67E+02	1.01E+00	8.07E+00	7.01E+00	1.01E+00
91	4.08E+03	1.65E+01	3.25E+02	8.97E-01	7.13E+00	6.20E+00	8.97E-01
100	3.47E+03	1.41E+01	2.77E+02	7.64E-01	6.08E+00	5.28E+00	7.64E-01
107	3.09E+03	1.26E+01	2.47E+02	6.80E-01	5.41E+00	4.70E+00	6.80E-01
122	2.43E+03	9.88E+00	1.94E+02	5.35E-01	4.26E+00	3.70E+00	5.35E-01
137	1.97E+03	8.00E+00	1.57E+02	4.33E-01	3.45E+00	2.99E+00	4.33E-01
152	1.63E+03	6.62E+00	1.30E+02	3.59E-01	2.85E+00	2.48E+00	3.59E-01
183	1.18E+03	4.78E+00	9.38E+01	2.59E-01	2.06E+00	1.79E+00	2.59E-01
200	1.00E+03	4.07E+00	7.99E+01	2.21E-01	1.76E+00	1.52E+00	2.21E-01
300	4.90E+02	1.99E+00	3.91E+01	1.08E-01	8.58E-01	7.45E-01	1.08E-01
400	2.98E+02	1.21E+00	2.38E+01	6.56E-02	5.22E-01	4.53E-01	6.56E-02
488	2.13E+02	8.65E-01	1.70E+01	4.69E-02	3.73E-01	3.24E-01	4.69E-02
500	2.04E+02	8.29E-01	1.63E+01	4.49E-02	3.57E-01	3.10E-01	4.49E-02
600	1.51E+02	6.13E-01	1.20E+01	3.32E-02	2.64E-01	2.30E-01	3.32E-02
700	1.18E+02	4.77E-01	9.36E+00	2.59E-02	2.06E-01	1.79E-01	2.59E-02

AGITATED AREA
SECTION #11B

RTI 1-HOUR EMISSION RATE (g/sec)

		1,1-DCE	1,1,1-TCA	CHCl3	PCE	TCE	MeCl2
		1.50E-03	2.94E-02	8.11E-05	6.46E-04	5.61E-04	8.11E-05
DISTANCE (meters)	SCREEN MODEL CONC. (ug/m^3)	1,1-DCE CONC. (ug/m^3)	1,1,1-TCA CONC. (ug/m^3)	CHCl3 CONC. (ug/m^3)	PCE CONC. (ug/m^3)	TCE CONC. (ug/m^3)	MeCl2 CONC. (ug/m^3)
1	4.15E+06	6.22E+03	1.22E+05	3.36E+02	2.68E+03	2.33E+03	3.36E+02
3	1.10E+06	1.66E+03	3.25E+04	8.95E+01	7.13E+02	6.19E+02	8.95E+01
6	4.32E+05	6.48E+02	1.27E+04	3.50E+01	2.79E+02	2.42E+02	3.50E+01
9	2.37E+05	3.55E+02	6.96E+03	1.92E+01	1.53E+02	1.33E+02	1.92E+01
12	1.51E+05	2.26E+02	4.43E+03	1.22E+01	9.74E+01	8.46E+01	1.22E+01
15	1.05E+05	1.57E+02	3.08E+03	8.51E+00	6.78E+01	5.88E+01	8.51E+00
18	7.74E+04	1.16E+02	2.28E+03	6.28E+00	5.00E+01	4.34E+01	6.28E+00
21	5.96E+04	8.94E+01	1.75E+03	4.83E+00	3.85E+01	3.34E+01	4.83E+00
24	4.73E+04	7.10E+01	1.39E+03	3.84E+00	3.06E+01	2.65E+01	3.84E+00
27	3.85E+04	5.78E+01	1.13E+03	3.12E+00	2.49E+01	2.16E+01	3.12E+00
30	3.20E+04	4.80E+01	9.41E+02	2.59E+00	2.07E+01	1.79E+01	2.59E+00
37	2.31E+04	3.47E+01	6.80E+02	1.88E+00	1.49E+01	1.30E+01	1.88E+00
43	1.75E+04	2.63E+01	5.15E+02	1.42E+00	1.13E+01	9.83E+00	1.42E+00
49	1.38E+04	2.06E+01	4.04E+02	1.12E+00	8.88E+00	7.71E+00	1.12E+00
55	1.11E+04	1.66E+01	3.26E+02	8.99E-01	7.16E+00	6.22E+00	8.99E-01
61	9.15E+03	1.37E+01	2.69E+02	7.42E-01	5.91E+00	5.13E+00	7.42E-01
67	7.68E+03	1.15E+01	2.26E+02	6.23E-01	4.96E+00	4.31E+00	6.23E-01
73	6.54E+03	9.81E+00	1.92E+02	5.31E-01	4.23E+00	3.67E+00	5.31E-01
79	5.65E+03	8.47E+00	1.66E+02	4.58E-01	3.65E+00	3.17E+00	4.58E-01
85	4.93E+03	7.39E+00	1.45E+02	3.99E-01	3.18E+00	2.76E+00	3.99E-01
91	4.34E+03	6.51E+00	1.28E+02	3.52E-01	2.80E+00	2.43E+00	3.52E-01
100	3.68E+03	5.52E+00	1.08E+02	2.98E-01	2.38E+00	2.06E+00	2.98E-01
107	3.26E+03	4.90E+00	9.60E+01	2.65E-01	2.11E+00	1.83E+00	2.65E-01
122	2.55E+03	3.83E+00	7.50E+01	2.07E-01	1.65E+00	1.43E+00	2.07E-01
137	2.06E+03	3.08E+00	6.04E+01	1.67E-01	1.33E+00	1.15E+00	1.67E-01
152	1.70E+03	2.54E+00	4.98E+01	1.37E-01	1.09E+00	9.51E-01	1.37E-01
183	1.22E+03	1.82E+00	3.57E+01	9.85E-02	7.85E-01	6.82E-01	9.85E-02
200	1.03E+03	1.55E+00	3.04E+01	8.38E-02	6.67E-01	5.80E-01	8.38E-02
300	5.00E+02	7.50E-01	1.47E+01	4.06E-02	3.23E-01	2.81E-01	4.06E-02
400	3.03E+02	4.54E-01	8.89E+00	2.45E-02	1.95E-01	1.70E-01	2.45E-02
488	2.16E+02	3.23E-01	6.34E+00	1.75E-02	1.39E-01	1.21E-01	1.75E-02
500	2.07E+02	3.10E-01	6.08E+00	1.68E-02	1.34E-01	1.16E-01	1.68E-02
600	1.52E+02	2.29E-01	4.48E+00	1.24E-02	9.85E-02	8.55E-02	1.24E-02
700	1.18E+02	1.78E-01	3.48E+00	9.60E-03	7.65E-02	6.64E-02	9.60E-03

TOTAL CONCENTRATIONS
SECTION #11 +
UNAGITATED AREA

CONCENTRATIONS FOR 1-HOUR EMISSION RATE

DISTANCE (meters)	1,1-DCE CONC. (ug/m^3)	1,1,1-TCA CONC. (ug/m^3)	CHCl3 CONC. (ug/m^3)	PCE CONC. (ug/m^3)	TCE CONC. (ug/m^3)	MeCl2 CONC. (ug/m^3)
1	1.60E+04	3.13E+05	8.65E+02	6.88E+03	5.98E+03	8.65E+02
3	4.48E+03	8.79E+04	2.43E+02	1.93E+03	1.68E+03	2.43E+02
6	1.85E+03	3.63E+04	1.00E+02	7.98E+02	6.93E+02	1.00E+02
9	1.05E+03	2.07E+04	5.71E+01	4.55E+02	3.95E+02	5.71E+01
12	6.92E+02	1.36E+04	3.75E+01	2.98E+02	2.59E+02	3.75E+01
15	4.92E+02	9.66E+03	2.67E+01	2.12E+02	1.84E+02	2.67E+01
18	3.70E+02	7.25E+03	2.00E+01	1.59E+02	1.38E+02	2.00E+01
21	2.89E+02	5.66E+03	1.56E+01	1.24E+02	1.08E+02	1.56E+01
24	2.32E+02	4.55E+03	1.26E+01	1.00E+02	8.68E+01	1.26E+01
27	1.91E+02	3.74E+03	1.03E+01	8.22E+01	7.14E+01	1.03E+01
30	1.60E+02	3.14E+03	8.66E+00	6.89E+01	5.98E+01	8.66E+00
37	1.17E+02	2.30E+03	6.34E+00	5.05E+01	4.39E+01	6.34E+00
43	8.97E+01	1.76E+03	4.86E+00	3.87E+01	3.36E+01	4.86E+00
49	7.11E+01	1.39E+03	3.85E+00	3.06E+01	2.66E+01	3.85E+00
55	5.77E+01	1.13E+03	3.13E+00	2.49E+01	2.16E+01	3.13E+00
61	4.79E+01	9.40E+02	2.59E+00	2.06E+01	1.79E+01	2.59E+00
67	4.04E+01	7.93E+02	2.19E+00	1.74E+01	1.51E+01	2.19E+00
73	3.46E+01	6.78E+02	1.87E+00	1.49E+01	1.29E+01	1.87E+00
79	2.99E+01	5.88E+02	1.62E+00	1.29E+01	1.12E+01	1.62E+00
85	2.62E+01	5.14E+02	1.42E+00	1.13E+01	9.81E+00	1.42E+00
91	2.31E+01	4.54E+02	1.25E+00	9.98E+00	8.66E+00	1.25E+00
100	1.97E+01	3.86E+02	1.07E+00	8.49E+00	7.37E+00	1.07E+00
107	1.75E+01	3.44E+02	9.49E-01	7.55E+00	6.56E+00	9.49E-01
122	1.38E+01	2.70E+02	7.45E-01	5.93E+00	5.15E+00	7.45E-01
137	1.11E+01	2.18E+02	6.03E-01	4.80E+00	4.16E+00	6.03E-01
152	9.20E+00	1.81E+02	4.98E-01	3.97E+00	3.44E+00	4.98E-01
183	6.63E+00	1.30E+02	3.59E-01	2.86E+00	2.48E+00	3.59E-01
200	5.64E+00	1.11E+02	3.06E-01	2.43E+00	2.11E+00	3.06E-01
300	2.75E+00	5.40E+01	1.49E-01	1.19E+00	1.03E+00	1.49E-01
400	1.67E+00	3.28E+01	9.05E-02	7.20E-01	6.25E-01	9.05E-02
488	1.19E+00	2.34E+01	6.46E-02	5.14E-01	4.47E-01	6.46E-02
500	1.14E+00	2.24E+01	6.19E-02	4.93E-01	4.28E-01	6.19E-02
600	8.45E-01	1.66E+01	4.58E-02	3.64E-01	3.16E-01	4.58E-02
700	6.57E-01	1.29E+01	3.56E-02	2.83E-01	2.46E-01	3.56E-02

AGITATED AREA
SECTION #1

RTI 8-HOUR EMISSION RATE (g/sec)

		1,1-DCE	1,1,1-TCA	CHCl3	PCE	TCE	MeCl2
		1.55E-03	3.04E-02	8.37E-05	6.71E-04	5.80E-04	8.40E-05
DISTANCE (meters)	SCREEN MODEL CONC. (ug/m^3)	1,1-DCE CONC. (ug/m^3)	1,1,1-TCA CONC. (ug/m^3)	CHCl3 CONC. (ug/m^3)	PCE CONC. (ug/m^3)	TCE CONC. (ug/m^3)	MeCl2 CONC. (ug/m^3)
1	1.63E+06	2.52E+03	4.94E+04	1.36E+02	1.09E+03	9.43E+02	1.37E+02
3	4.90E+05	7.59E+02	1.49E+04	4.10E+01	3.29E+02	2.84E+02	4.11E+01
6	2.18E+05	3.38E+02	6.64E+03	1.83E+01	1.46E+02	1.27E+02	1.83E+01
9	1.31E+05	2.04E+02	3.99E+03	1.10E+01	8.82E+01	7.62E+01	1.10E+01
12	8.98E+04	1.39E+02	2.73E+03	7.52E+00	6.03E+01	5.21E+01	7.55E+00
15	6.61E+04	1.02E+02	2.01E+03	5.53E+00	4.43E+01	3.83E+01	5.55E+00
18	5.10E+04	7.90E+01	1.55E+03	4.27E+00	3.42E+01	2.96E+01	4.28E+00
21	4.07E+04	6.31E+01	1.24E+03	3.40E+00	2.73E+01	2.36E+01	3.42E+00
24	3.33E+04	5.16E+01	1.01E+03	2.79E+00	2.24E+01	1.93E+01	2.80E+00
27	2.79E+04	4.32E+01	8.47E+02	2.33E+00	1.87E+01	1.62E+01	2.34E+00
30	2.37E+04	3.67E+01	7.19E+02	1.98E+00	1.59E+01	1.37E+01	1.99E+00
37	1.77E+04	2.75E+01	5.39E+02	1.48E+00	1.19E+01	1.03E+01	1.49E+00
43	1.38E+04	2.14E+01	4.20E+02	1.16E+00	9.28E+00	8.02E+00	1.16E+00
49	1.11E+04	1.72E+01	3.38E+02	9.30E-01	7.45E+00	6.44E+00	9.33E-01
55	9.14E+03	1.42E+01	2.78E+02	7.65E-01	6.13E+00	5.30E+00	7.67E-01
61	7.65E+03	1.19E+01	2.33E+02	6.41E-01	5.14E+00	4.44E+00	6.43E-01
67	6.51E+03	1.01E+01	1.98E+02	5.45E-01	4.37E+00	3.78E+00	5.47E-01
73	5.62E+03	8.70E+00	1.71E+02	4.70E-01	3.77E+00	3.26E+00	4.72E-01
79	4.90E+03	7.59E+00	1.49E+02	4.10E-01	3.28E+00	2.84E+00	4.11E-01
85	4.31E+03	6.68E+00	1.31E+02	3.61E-01	2.89E+00	2.50E+00	3.62E-01
91	3.82E+03	5.93E+00	1.16E+02	3.20E-01	2.57E+00	2.22E+00	3.21E-01
100	3.27E+03	5.07E+00	9.95E+01	2.74E-01	2.20E+00	1.90E+00	2.75E-01
107	2.92E+03	4.53E+00	8.89E+01	2.45E-01	1.96E+00	1.70E+00	2.46E-01
122	2.32E+03	3.59E+00	7.04E+01	1.94E-01	1.55E+00	1.34E+00	1.95E-01
137	1.88E+03	2.92E+00	5.73E+01	1.58E-01	1.26E+00	1.09E+00	1.58E-01
152	1.57E+03	2.43E+00	4.76E+01	1.31E-01	1.05E+00	9.08E-01	1.32E-01
183	1.14E+03	1.76E+00	3.46E+01	9.52E-02	7.63E-01	6.59E-01	9.55E-02
200	9.72E+02	1.51E+00	2.95E+01	8.13E-02	6.52E-01	5.64E-01	8.16E-02
300	4.80E+02	7.44E-01	1.46E+01	4.02E-02	3.22E-01	2.78E-01	4.03E-02
400	2.94E+02	4.55E-01	8.92E+00	2.46E-02	1.97E-01	1.70E-01	2.47E-02
488	2.10E+02	3.26E-01	6.39E+00	1.76E-02	1.41E-01	1.22E-01	1.77E-02
500	2.02E+02	3.13E-01	6.13E+00	1.69E-02	1.35E-01	1.17E-01	1.70E-02
600	1.49E+02	2.32E-01	4.54E+00	1.25E-02	1.00E-01	8.67E-02	1.25E-02
700	1.16E+02	1.80E-01	3.54E+00	9.74E-03	7.81E-02	6.75E-02	9.78E-03

TOTAL CONCENTRATIONS
SECTION #1 +
UNAGITATED AREA

BASED ON 8-HOUR EMISSION RATE

DISTANCE (meters)	1,1-DCE CONC. (ug/m^3)	1,1,1-TCA CONC. (ug/m^3)	CHCl3 CONC. (ug/m^3)	PCE CONC. (ug/m^3)	TCE CONC. (ug/m^3)	MeCl2 CONC. (ug/m^3)
1	2.67E+03	5.24E+04	1.44E+02	1.16E+03	9.99E+02	1.45E+02
3	8.07E+02	1.58E+04	4.36E+01	3.49E+02	3.02E+02	4.37E+01
6	3.61E+02	7.08E+03	1.95E+01	1.56E+02	1.35E+02	1.96E+01
9	2.18E+02	4.28E+03	1.18E+01	9.44E+01	8.16E+01	1.18E+01
12	1.50E+02	2.93E+03	8.08E+00	6.48E+01	5.60E+01	8.10E+00
15	1.10E+02	2.16E+03	5.96E+00	4.78E+01	4.13E+01	5.98E+00
18	8.53E+01	1.67E+03	4.61E+00	3.69E+01	3.19E+01	4.62E+00
21	6.82E+01	1.34E+03	3.69E+00	2.96E+01	2.55E+01	3.70E+00
24	5.60E+01	1.10E+03	3.03E+00	2.43E+01	2.10E+01	3.04E+00
27	4.69E+01	9.20E+02	2.53E+00	2.03E+01	1.76E+01	2.54E+00
30	3.99E+01	7.83E+02	2.16E+00	1.73E+01	1.49E+01	2.16E+00
37	3.00E+01	5.89E+02	1.62E+00	1.30E+01	1.12E+01	1.63E+00
43	2.35E+01	4.61E+02	1.27E+00	1.02E+01	8.79E+00	1.27E+00
49	1.89E+01	3.71E+02	1.02E+00	8.19E+00	7.08E+00	1.02E+00
55	1.56E+01	3.06E+02	8.42E-01	6.75E+00	5.83E+00	8.45E-01
61	1.31E+01	2.57E+02	7.07E-01	5.67E+00	4.90E+00	7.09E-01
67	1.12E+01	2.19E+02	6.03E-01	4.83E+00	4.17E+00	6.04E-01
73	9.63E+00	1.89E+02	5.20E-01	4.17E+00	3.60E+00	5.22E-01
79	8.41E+00	1.65E+02	4.54E-01	3.64E+00	3.15E+00	4.56E-01
85	7.41E+00	1.45E+02	4.00E-01	3.21E+00	2.77E+00	4.02E-01
91	6.58E+00	1.29E+02	3.56E-01	2.85E+00	2.46E+00	3.57E-01
100	5.65E+00	1.11E+02	3.05E-01	2.45E+00	2.11E+00	3.06E-01
107	5.05E+00	9.90E+01	2.73E-01	2.19E+00	1.89E+00	2.74E-01
122	4.01E+00	7.86E+01	2.16E-01	1.74E+00	1.50E+00	2.17E-01
137	3.27E+00	6.41E+01	1.76E-01	1.41E+00	1.22E+00	1.77E-01
152	2.72E+00	5.33E+01	1.47E-01	1.18E+00	1.02E+00	1.47E-01
183	1.98E+00	3.88E+01	1.07E-01	8.57E-01	7.41E-01	1.07E-01
200	1.69E+00	3.32E+01	9.15E-02	7.34E-01	6.34E-01	9.18E-02
300	8.40E-01	1.65E+01	4.54E-02	3.64E-01	3.14E-01	4.55E-02
400	5.15E-01	1.01E+01	2.78E-02	2.23E-01	1.93E-01	2.79E-02
488	3.69E-01	7.25E+00	2.00E-02	1.60E-01	1.38E-01	2.00E-02
500	3.55E-01	6.95E+00	1.92E-02	1.54E-01	1.33E-01	1.92E-02
600	2.63E-01	5.15E+00	1.42E-02	1.14E-01	9.83E-02	1.42E-02
700	2.05E-01	4.02E+00	1.11E-02	8.87E-02	7.67E-02	1.11E-02

AGITATED AREA
SECTION #11B

RTI 8-HOUR EMISSION RATE (g/sec)

		1,1-DCE	1,1,1-TCA	CHCl3	PCE	TCE	MeCl2
		5.30E-04	1.04E-02	2.87E-05	2.30E-04	1.99E-04	2.88E-05
DISTANCE (meters)	SCREEN MODEL CONC. (ug/m^3)	1,1-DCE CONC. (ug/m^3)	1,1,1-TCA CONC. (ug/m^3)	CHCl3 CONC. (ug/m^3)	PCE CONC. (ug/m^3)	TCE CONC. (ug/m^3)	MeCl2 CONC. (ug/m^3)
1	4.15E+06	2.20E+03	4.31E+04	1.19E+02	9.54E+02	8.25E+02	1.19E+02
3	1.10E+06	5.85E+02	1.15E+04	3.17E+01	2.54E+02	2.20E+02	3.18E+01
6	4.32E+05	2.29E+02	4.49E+03	1.24E+01	9.93E+01	8.59E+01	1.24E+01
9	2.37E+05	1.25E+02	2.46E+03	6.79E+00	5.44E+01	4.71E+01	6.81E+00
12	1.51E+05	7.99E+01	1.57E+03	4.33E+00	3.47E+01	3.00E+01	4.34E+00
15	1.05E+05	5.56E+01	1.09E+03	3.01E+00	2.41E+01	2.09E+01	3.02E+00
18	7.74E+04	4.10E+01	8.05E+02	2.22E+00	1.78E+01	1.54E+01	2.23E+00
21	5.96E+04	3.16E+01	6.20E+02	1.71E+00	1.37E+01	1.19E+01	1.72E+00
24	4.73E+04	2.51E+01	4.92E+02	1.36E+00	1.09E+01	9.41E+00	1.36E+00
27	3.85E+04	2.04E+01	4.01E+02	1.11E+00	8.86E+00	7.67E+00	1.11E+00
30	3.20E+04	1.70E+01	3.33E+02	9.18E-01	7.36E+00	6.37E+00	9.21E-01
37	2.31E+04	1.23E+01	2.40E+02	6.64E-01	5.32E+00	4.60E+00	6.66E-01
43	1.75E+04	9.29E+00	1.82E+02	5.03E-01	4.03E+00	3.49E+00	5.05E-01
49	1.38E+04	7.29E+00	1.43E+02	3.95E-01	3.16E+00	2.74E+00	3.96E-01
55	1.11E+04	5.88E+00	1.15E+02	3.18E-01	2.55E+00	2.21E+00	3.19E-01
61	9.15E+03	4.85E+00	9.51E+01	2.62E-01	2.10E+00	1.82E+00	2.63E-01
67	7.68E+03	4.07E+00	7.99E+01	2.20E-01	1.77E+00	1.53E+00	2.21E-01
73	6.54E+03	3.47E+00	6.80E+01	1.88E-01	1.50E+00	1.30E+00	1.88E-01
79	5.65E+03	2.99E+00	5.87E+01	1.62E-01	1.30E+00	1.12E+00	1.63E-01
85	4.93E+03	2.61E+00	5.12E+01	1.41E-01	1.13E+00	9.80E-01	1.42E-01
91	4.34E+03	2.30E+00	4.51E+01	1.24E-01	9.98E-01	8.63E-01	1.25E-01
100	3.68E+03	1.95E+00	3.82E+01	1.06E-01	8.46E-01	7.32E-01	1.06E-01
107	3.26E+03	1.73E+00	3.39E+01	9.37E-02	7.51E-01	6.50E-01	9.40E-02
122	2.55E+03	1.35E+00	2.65E+01	7.32E-02	5.87E-01	5.08E-01	7.35E-02
137	2.06E+03	1.09E+00	2.14E+01	5.90E-02	4.73E-01	4.09E-01	5.92E-02
152	1.70E+03	8.98E-01	1.76E+01	4.86E-02	3.90E-01	3.37E-01	4.88E-02
183	1.22E+03	6.44E-01	1.26E+01	3.49E-02	2.79E-01	2.42E-01	3.50E-02
200	1.03E+03	5.47E-01	1.07E+01	2.96E-02	2.38E-01	2.06E-01	2.98E-02
300	5.00E+02	2.65E-01	5.20E+00	1.44E-02	1.15E-01	9.95E-02	1.44E-02
400	3.03E+02	1.60E-01	3.15E+00	8.68E-03	6.96E-02	6.02E-02	8.71E-03
488	2.16E+02	1.14E-01	2.24E+00	6.19E-03	4.96E-02	4.29E-02	6.21E-03
500	2.07E+02	1.10E-01	2.15E+00	5.93E-03	4.75E-02	4.11E-02	5.95E-03
600	1.52E+02	8.08E-02	1.58E+00	4.37E-03	3.51E-02	3.03E-02	4.39E-03
700	1.18E+02	6.28E-02	1.23E+00	3.40E-03	2.72E-02	2.36E-02	3.41E-03

AGITATED AREA
SECTION #11A

RTI 8-HOUR EMISSION RATE (g/sec)

		1,1-DCE	1,1,1-TCA	CHCl3	PCE	TCE	MeCl2
		1.44E-03	2.83E-02	7.79E-05	6.24E-04	5.40E-04	7.81E-05
DISTANCE (meters)	SCREEN MODEL CONC. (ug/m^3)	1,1-DCE CONC. (ug/m^3)	1,1,1-TCA CONC. (ug/m^3)	CHCl3 CONC. (ug/m^3)	PCE CONC. (ug/m^3)	TCE CONC. (ug/m^3)	MeCl2 CONC. (ug/m^3)
1	2.39E+06	3.44E+03	6.75E+04	1.86E+02	1.49E+03	1.29E+03	1.86E+02
3	6.91E+05	9.95E+02	1.96E+04	5.39E+01	4.31E+02	3.73E+02	5.40E+01
6	2.95E+05	4.24E+02	8.34E+03	2.29E+01	1.84E+02	1.59E+02	2.30E+01
9	1.71E+05	2.47E+02	4.85E+03	1.33E+01	1.07E+02	9.25E+01	1.34E+01
12	1.14E+05	1.64E+02	3.23E+03	8.88E+00	7.11E+01	6.16E+01	8.90E+00
15	8.20E+04	1.18E+02	2.32E+03	6.39E+00	5.11E+01	4.43E+01	6.40E+00
18	6.21E+04	8.94E+01	1.76E+03	4.84E+00	3.87E+01	3.35E+01	4.85E+00
21	4.88E+04	7.02E+01	1.38E+03	3.80E+00	3.04E+01	2.63E+01	3.81E+00
24	3.94E+04	5.68E+01	1.12E+03	3.07E+00	2.46E+01	2.13E+01	3.08E+00
27	3.26E+04	4.69E+01	9.22E+02	2.54E+00	2.03E+01	1.76E+01	2.54E+00
30	2.74E+04	3.94E+01	7.75E+02	2.13E+00	1.71E+01	1.48E+01	2.14E+00
37	2.02E+04	2.91E+01	5.72E+02	1.57E+00	1.26E+01	1.09E+01	1.58E+00
43	1.55E+04	2.24E+01	4.40E+02	1.21E+00	9.70E+00	8.39E+00	1.21E+00
49	1.24E+04	1.78E+01	3.50E+02	9.62E-01	7.71E+00	6.67E+00	9.65E-01
55	1.01E+04	1.45E+01	2.85E+02	7.84E-01	6.28E+00	5.43E+00	7.86E-01
61	8.37E+03	1.21E+01	2.37E+02	6.52E-01	5.22E+00	4.52E+00	6.54E-01
67	7.08E+03	1.02E+01	2.00E+02	5.52E-01	4.42E+00	3.82E+00	5.53E-01
73	6.07E+03	8.73E+00	1.72E+02	4.72E-01	3.78E+00	3.28E+00	4.74E-01
79	5.26E+03	7.58E+00	1.49E+02	4.10E-01	3.28E+00	2.84E+00	4.11E-01
85	4.61E+03	6.64E+00	1.30E+02	3.59E-01	2.88E+00	2.49E+00	3.60E-01
91	4.08E+03	5.87E+00	1.15E+02	3.18E-01	2.54E+00	2.20E+00	3.18E-01
100	3.47E+03	5.00E+00	9.83E+01	2.71E-01	2.17E+00	1.88E+00	2.71E-01
107	3.09E+03	4.45E+00	8.75E+01	2.41E-01	1.93E+00	1.67E+00	2.42E-01
122	2.43E+03	3.50E+00	6.89E+01	1.90E-01	1.52E+00	1.31E+00	1.90E-01
137	1.97E+03	2.84E+00	5.58E+01	1.53E-01	1.23E+00	1.06E+00	1.54E-01
152	1.63E+03	2.35E+00	4.62E+01	1.27E-01	1.02E+00	8.81E-01	1.27E-01
183	1.18E+03	1.69E+00	3.33E+01	9.17E-02	7.34E-01	6.36E-01	9.19E-02
200	1.00E+03	1.44E+00	2.84E+01	7.81E-02	6.26E-01	5.42E-01	7.83E-02
300	4.90E+02	7.06E-01	1.39E+01	3.82E-02	3.06E-01	2.65E-01	3.83E-02
400	2.98E+02	4.29E-01	8.44E+00	2.32E-02	1.86E-01	1.61E-01	2.33E-02
488	2.13E+02	3.07E-01	6.03E+00	1.66E-02	1.33E-01	1.15E-01	1.66E-02
500	2.04E+02	2.94E-01	5.78E+00	1.59E-02	1.27E-01	1.10E-01	1.59E-02
600	1.51E+02	2.17E-01	4.27E+00	1.18E-02	9.42E-02	8.15E-02	1.18E-02
700	1.18E+02	1.69E-01	3.33E+00	9.15E-03	7.33E-02	6.35E-02	9.18E-03

TOTAL CONCENTRATIONS
SECTION #11 +
UNAGITATED AREA

8-HOUR EMISSION RATE (g/sec)

DISTANCE (meters)	1,1-DCE CONC. (ug/m^3)	1,1,1-TCA CONC. (ug/m^3)	CHCl3 CONC. (ug/m^3)	PCE CONC. (ug/m^3)	TCE CONC. (ug/m^3)	MeCl2 CONC. (ug/m^3)
1	5.70E+03	1.12E+05	3.08E+02	2.47E+03	2.14E+03	3.09E+02
3	1.60E+03	3.14E+04	8.65E+01	6.93E+02	6.00E+02	8.68E+01
6	6.61E+02	1.30E+04	3.58E+01	2.86E+02	2.48E+02	3.59E+01
9	3.76E+02	7.39E+03	2.04E+01	1.63E+02	1.41E+02	2.04E+01
12	2.47E+02	4.85E+03	1.34E+01	1.07E+02	9.26E+01	1.34E+01
15	1.76E+02	3.45E+03	9.51E+00	7.62E+01	6.59E+01	9.53E+00
18	1.32E+02	2.59E+03	7.14E+00	5.72E+01	4.95E+01	7.16E+00
21	1.03E+02	2.02E+03	5.57E+00	4.47E+01	3.86E+01	5.59E+00
24	8.28E+01	1.63E+03	4.48E+00	3.59E+01	3.11E+01	4.49E+00
27	6.81E+01	1.34E+03	3.69E+00	2.95E+01	2.55E+01	3.70E+00
30	5.70E+01	1.12E+03	3.09E+00	2.47E+01	2.14E+01	3.10E+00
37	4.18E+01	8.21E+02	2.26E+00	1.81E+01	1.57E+01	2.27E+00
43	3.20E+01	6.29E+02	1.73E+00	1.39E+01	1.20E+01	1.74E+00
49	2.54E+01	4.98E+02	1.37E+00	1.10E+01	9.51E+00	1.38E+00
55	2.06E+01	4.05E+02	1.11E+00	8.93E+00	7.73E+00	1.12E+00
61	1.71E+01	3.36E+02	9.25E-01	7.41E+00	6.41E+00	9.28E-01
67	1.44E+01	2.83E+02	7.81E-01	6.25E+00	5.41E+00	7.83E-01
73	1.23E+01	2.42E+02	6.68E-01	5.35E+00	4.63E+00	6.70E-01
79	1.07E+01	2.10E+02	5.78E-01	4.63E+00	4.01E+00	5.80E-01
85	9.35E+00	1.84E+02	5.06E-01	4.06E+00	3.51E+00	5.08E-01
91	8.26E+00	1.62E+02	4.47E-01	3.58E+00	3.10E+00	4.48E-01
100	7.03E+00	1.38E+02	3.80E-01	3.05E+00	2.64E+00	3.81E-01
107	6.25E+00	1.23E+02	3.38E-01	2.71E+00	2.35E+00	3.39E-01
122	4.91E+00	9.65E+01	2.66E-01	2.13E+00	1.84E+00	2.67E-01
137	3.97E+00	7.80E+01	2.15E-01	1.72E+00	1.49E+00	2.15E-01
152	3.28E+00	6.45E+01	1.78E-01	1.42E+00	1.23E+00	1.78E-01
183	2.37E+00	4.65E+01	1.28E-01	1.03E+00	8.87E-01	1.28E-01
200	2.01E+00	3.96E+01	1.09E-01	8.73E-01	7.56E-01	1.09E-01
300	9.82E-01	1.93E+01	5.31E-02	4.26E-01	3.68E-01	5.33E-02
400	5.96E-01	1.17E+01	3.23E-02	2.58E-01	2.24E-01	3.24E-02
488	4.26E-01	8.37E+00	2.30E-02	1.85E-01	1.60E-01	2.31E-02
500	4.08E-01	8.02E+00	2.21E-02	1.77E-01	1.53E-01	2.21E-02
600	3.02E-01	5.92E+00	1.63E-02	1.31E-01	1.13E-01	1.64E-02
700	2.35E-01	4.61E+00	1.27E-02	1.02E-01	8.80E-02	1.27E-02

UNAGITATED AREA
AFTER SECTION 1 REMOVAL

RTI EMISSION RATE FOR ALL TIMES(g/sec)

		1,1-DCE	1,1,1-TCA	CHCl3	PCE	TCE	MeCl2
		2.18E-04	4.28E-03	1.18E-05	9.48E-05	8.16E-05	1.18E-05
DISTANCE (meters)	SCREEN MODEL CONC. (ug/m^3)	1,1-DCE CONC. (ug/m^3)	1,1,1-TCA CONC. (ug/m^3)	CHCl3 CONC. (ug/m^3)	PCE CONC. (ug/m^3)	TCE CONC. (ug/m^3)	MeCl2 CONC. (ug/m^3)
1	6.89E+05	1.50E+02	2.95E+03	8.13E+00	6.53E+01	5.62E+01	8.13E+00
3	2.18E+05	4.75E+01	9.33E+02	2.57E+00	2.07E+01	1.78E+01	2.57E+00
6	1.04E+05	2.26E+01	4.43E+02	1.22E+00	9.82E+00	8.45E+00	1.22E+00
9	6.58E+04	1.44E+01	2.82E+02	7.77E-01	6.24E+00	5.37E+00	7.77E-01
12	4.72E+04	1.03E+01	2.02E+02	5.57E-01	4.47E+00	3.85E+00	5.57E-01
15	3.61E+04	7.88E+00	1.55E+02	4.26E-01	3.43E+00	2.95E+00	4.26E-01
18	2.89E+04	6.30E+00	1.24E+02	3.41E-01	2.74E+00	2.36E+00	3.41E-01
21	2.38E+04	5.19E+00	1.02E+02	2.81E-01	2.26E+00	1.94E+00	2.81E-01
24	2.01E+04	4.37E+00	8.58E+01	2.37E-01	1.90E+00	1.64E+00	2.37E-01
27	1.72E+04	3.75E+00	7.36E+01	2.03E-01	1.63E+00	1.40E+00	2.03E-01
30	1.49E+04	3.26E+00	6.39E+01	1.76E-01	1.42E+00	1.22E+00	1.76E-01
37	1.17E+04	2.54E+00	4.99E+01	1.38E-01	1.11E+00	9.51E-01	1.38E-01
43	9.40E+03	2.05E+00	4.02E+01	1.11E-01	8.91E-01	7.67E-01	1.11E-01
49	7.77E+03	1.69E+00	3.33E+01	9.17E-02	7.37E-01	6.34E-01	9.17E-02
55	6.55E+03	1.43E+00	2.80E+01	7.73E-02	6.21E-01	5.34E-01	7.73E-02
61	5.61E+03	1.22E+00	2.40E+01	6.62E-02	5.31E-01	4.57E-01	6.62E-02
67	4.86E+03	1.06E+00	2.08E+01	5.74E-02	4.61E-01	3.97E-01	5.74E-02
73	4.26E+03	9.29E-01	1.82E+01	5.03E-02	4.04E-01	3.48E-01	5.03E-02
79	3.77E+03	8.22E-01	1.61E+01	4.45E-02	3.57E-01	3.08E-01	4.45E-02
85	3.36E+03	7.33E-01	1.44E+01	3.97E-02	3.19E-01	2.75E-01	3.97E-02
91	3.02E+03	6.59E-01	1.29E+01	3.57E-02	2.86E-01	2.47E-01	3.57E-02
100	2.63E+03	5.73E-01	1.12E+01	3.10E-02	2.49E-01	2.14E-01	3.10E-02
107	2.37E+03	5.17E-01	1.02E+01	2.80E-02	2.25E-01	1.94E-01	2.80E-02
122	1.92E+03	4.18E-01	8.21E+00	2.26E-02	1.82E-01	1.57E-01	2.26E-02
137	1.59E+03	3.46E-01	6.79E+00	1.87E-02	1.50E-01	1.29E-01	1.87E-02
152	1.34E+03	2.92E-01	5.73E+00	1.58E-02	1.27E-01	1.09E-01	1.58E-02
183	9.94E+02	2.17E-01	4.25E+00	1.17E-02	9.42E-02	8.11E-02	1.17E-02
200	8.58E+02	1.87E-01	3.67E+00	1.01E-02	8.14E-02	7.00E-02	1.01E-02
300	4.40E+02	9.60E-02	1.88E+00	5.20E-03	4.17E-02	3.59E-02	5.20E-03
400	2.75E+02	5.99E-02	1.18E+00	3.24E-03	2.61E-02	2.24E-02	3.24E-03
488	1.99E+02	4.35E-02	8.53E-01	2.35E-03	1.89E-02	1.63E-02	2.35E-03
500	1.92E+02	4.17E-02	8.20E-01	2.26E-03	1.82E-02	1.56E-02	2.26E-03
600	1.43E+02	3.12E-02	6.12E-01	1.69E-03	1.36E-02	1.17E-02	1.69E-03
700	1.12E+02	2.45E-02	4.80E-01	1.32E-03	1.06E-02	9.16E-03	1.32E-03

UNAGITATED AREA
AFTER SECTION #1 REMOVAL

RTI EMISSION RATE FOR ALL TIMES (g/sec)

		1,1-DCE	1,1,1-TCA	CHCl3	PCE	TCE	MeCl2
		2.18E-04	4.28E-03	1.18E-05	9.48E-05	8.16E-05	1.18E-05
DISTANCE (meters)	SCREEN MODEL CONC. (ug/m^3)	1,1-DCE CONC. (ug/m^3)	1,1,1-TCA CONC. (ug/m^3)	CHCl3 CONC. (ug/m^3)	PCE CONC. (ug/m^3)	TCE CONC. (ug/m^3)	MeCl2 CONC. (ug/m^3)
1	6.89E+05	1.50E+02	2.95E+03	8.13E+00	6.53E+01	5.62E+01	8.13E+00
3	2.18E+05	4.75E+01	9.33E+02	2.57E+00	2.07E+01	1.78E+01	2.57E+00
6	1.04E+05	2.26E+01	4.43E+02	1.22E+00	9.82E+00	8.45E+00	1.22E+00
9	6.58E+04	1.44E+01	2.82E+02	7.77E-01	6.24E+00	5.37E+00	7.77E-01
12	4.72E+04	1.03E+01	2.02E+02	5.57E-01	4.47E+00	3.85E+00	5.57E-01
15	3.61E+04	7.88E+00	1.55E+02	4.26E-01	3.43E+00	2.95E+00	4.26E-01
18	2.89E+04	6.30E+00	1.24E+02	3.41E-01	2.74E+00	2.36E+00	3.41E-01
21	2.38E+04	5.19E+00	1.02E+02	2.81E-01	2.26E+00	1.94E+00	2.81E-01
24	2.01E+04	4.37E+00	8.58E+01	2.37E-01	1.90E+00	1.64E+00	2.37E-01
27	1.72E+04	3.75E+00	7.36E+01	2.03E-01	1.63E+00	1.40E+00	2.03E-01
30	1.49E+04	3.26E+00	6.39E+01	1.76E-01	1.42E+00	1.22E+00	1.76E-01
37	1.17E+04	2.54E+00	4.99E+01	1.38E-01	1.11E+00	9.51E-01	1.38E-01
43	9.40E+03	2.05E+00	4.02E+01	1.11E-01	8.91E-01	7.67E-01	1.11E-01
49	7.77E+03	1.69E+00	3.33E+01	9.17E-02	7.37E-01	6.34E-01	9.17E-02
55	6.55E+03	1.43E+00	2.80E+01	7.73E-02	6.21E-01	5.34E-01	7.73E-02
61	5.61E+03	1.22E+00	2.40E+01	6.62E-02	5.31E-01	4.57E-01	6.62E-02
67	4.86E+03	1.06E+00	2.08E+01	5.74E-02	4.61E-01	3.97E-01	5.74E-02
73	4.26E+03	9.29E-01	1.82E+01	5.03E-02	4.04E-01	3.48E-01	5.03E-02
79	3.77E+03	8.22E-01	1.61E+01	4.45E-02	3.57E-01	3.08E-01	4.45E-02
85	3.36E+03	7.33E-01	1.44E+01	3.97E-02	3.19E-01	2.75E-01	3.97E-02
91	3.02E+03	6.59E-01	1.29E+01	3.57E-02	2.86E-01	2.47E-01	3.57E-02
100	2.63E+03	5.73E-01	1.12E+01	3.10E-02	2.49E-01	2.14E-01	3.10E-02
107	2.37E+03	5.17E-01	1.02E+01	2.80E-02	2.25E-01	1.94E-01	2.80E-02
122	1.92E+03	4.18E-01	8.21E+00	2.26E-02	1.82E-01	1.57E-01	2.26E-02
137	1.59E+03	3.46E-01	6.79E+00	1.87E-02	1.50E-01	1.29E-01	1.87E-02
152	1.34E+03	2.92E-01	5.73E+00	1.58E-02	1.27E-01	1.09E-01	1.58E-02
183	9.94E+02	2.17E-01	4.25E+00	1.17E-02	9.42E-02	8.11E-02	1.17E-02
200	8.58E+02	1.87E-01	3.67E+00	1.01E-02	8.14E-02	7.00E-02	1.01E-02
300	4.40E+02	9.60E-02	1.88E+00	5.20E-03	4.17E-02	3.59E-02	5.20E-03
400	2.75E+02	5.99E-02	1.18E+00	3.24E-03	2.61E-02	2.24E-02	3.24E-03
488	1.99E+02	4.35E-02	8.53E-01	2.35E-03	1.89E-02	1.63E-02	2.35E-03
500	1.92E+02	4.17E-02	8.20E-01	2.26E-03	1.82E-02	1.56E-02	2.26E-03
600	1.43E+02	3.12E-02	6.12E-01	1.69E-03	1.36E-02	1.17E-02	1.69E-03
700	1.12E+02	2.45E-02	4.80E-01	1.32E-03	1.06E-02	9.16E-03	1.32E-03

UNAGITATED AREA
AFTER SECTION #1 REMOVAL

RTI EMISSION RATE FOR ALL TIMES (g/sec)

		1,1-DCE	1,1,1-TCA	CHCl3	PCE	TCE	MeCl2
		2.18E-04	4.28E-03	1.18E-05	9.48E-05	8.16E-05	1.18E-05
DISTANCE (meters)	SCREEN MODEL CONC. (ug/m^3)	1,1-DCE CONC. (ug/m^3)	1,1,1-TCA CONC. (ug/m^3)	CHCl3 CONC. (ug/m^3)	PCE CONC. (ug/m^3)	TCE CONC. (ug/m^3)	MeCl2 CONC. (ug/m^3)
1	6.89E+05	2.02E+02	3.96E+03	1.09E+01	8.78E+01	7.56E+01	1.09E+01
3	2.18E+05	6.39E+01	1.25E+03	3.46E+00	2.78E+01	2.39E+01	3.46E+00
6	1.04E+05	3.04E+01	5.96E+02	1.64E+00	1.32E+01	1.14E+01	1.64E+00
9	6.58E+04	1.93E+01	3.79E+02	1.04E+00	8.39E+00	7.22E+00	1.04E+00
12	4.72E+04	1.38E+01	2.71E+02	7.48E-01	6.01E+00	5.17E+00	7.48E-01
15	3.61E+04	1.06E+01	2.08E+02	5.73E-01	4.60E+00	3.96E+00	5.73E-01
18	2.89E+04	8.47E+00	1.66E+02	4.58E-01	3.68E+00	3.17E+00	4.58E-01
21	2.38E+04	6.97E+00	1.37E+02	3.78E-01	3.03E+00	2.61E+00	3.78E-01
24	2.01E+04	5.88E+00	1.15E+02	3.18E-01	2.56E+00	2.20E+00	3.18E-01
27	1.72E+04	5.04E+00	9.89E+01	2.73E-01	2.19E+00	1.89E+00	2.73E-01
30	1.49E+04	4.38E+00	8.60E+01	2.37E-01	1.90E+00	1.64E+00	2.37E-01
37	1.17E+04	3.42E+00	6.71E+01	1.85E-01	1.49E+00	1.28E+00	1.85E-01
43	9.40E+03	2.75E+00	5.41E+01	1.49E-01	1.20E+00	1.03E+00	1.49E-01
49	7.77E+03	2.28E+00	4.47E+01	1.23E-01	9.90E-01	8.52E-01	1.23E-01
55	6.55E+03	1.92E+00	3.77E+01	1.04E-01	8.35E-01	7.18E-01	1.04E-01
61	5.61E+03	1.64E+00	3.23E+01	8.89E-02	7.14E-01	6.15E-01	8.89E-02
67	4.86E+03	1.42E+00	2.80E+01	7.71E-02	6.20E-01	5.33E-01	7.71E-02
73	4.26E+03	1.25E+00	2.45E+01	6.76E-02	5.43E-01	4.68E-01	6.76E-02
79	3.77E+03	1.11E+00	2.17E+01	5.98E-02	4.81E-01	4.14E-01	5.98E-02
85	3.36E+03	9.86E-01	1.94E+01	5.34E-02	4.29E-01	3.69E-01	5.34E-02
91	3.02E+03	8.86E-01	1.74E+01	4.79E-02	3.85E-01	3.31E-01	4.79E-02
100	2.63E+03	7.70E-01	1.51E+01	4.17E-02	3.35E-01	2.88E-01	4.17E-02
107	2.37E+03	6.95E-01	1.36E+01	3.76E-02	3.02E-01	2.60E-01	3.76E-02
122	1.92E+03	5.62E-01	1.10E+01	3.04E-02	2.44E-01	2.10E-01	3.04E-02
137	1.59E+03	4.65E-01	9.13E+00	2.52E-02	2.02E-01	1.74E-01	2.52E-02
152	1.34E+03	3.92E-01	7.70E+00	2.12E-02	1.71E-01	1.47E-01	2.12E-02
183	9.94E+02	2.91E-01	5.72E+00	1.58E-02	1.27E-01	1.09E-01	1.58E-02
200	8.58E+02	2.52E-01	4.94E+00	1.36E-02	1.09E-01	9.41E-02	1.36E-02
300	4.40E+02	1.29E-01	2.53E+00	6.99E-03	5.61E-02	4.83E-02	6.99E-03
400	2.75E+02	8.06E-02	1.58E+00	4.36E-03	3.50E-02	3.02E-02	4.36E-03
488	1.99E+02	5.84E-02	1.15E+00	3.16E-03	2.54E-02	2.19E-02	3.16E-03
500	1.92E+02	5.61E-02	1.10E+00	3.04E-03	2.44E-02	2.10E-02	3.04E-03
600	1.43E+02	4.19E-02	8.23E-01	2.27E-03	1.82E-02	1.57E-02	2.27E-03
700	1.12E+02	3.29E-02	6.46E-01	1.78E-03	1.43E-02	1.23E-02	1.78E-03

UNAGITATED AREA
AFTER SECTION #11 REMOVAL

RTI EMISSION RATE FOR ALL TIMES (g/sec)

		1,1-DCE	1,1,1-TCA	CHCl3	PCE	TCE	MeCl2
		2.23E-05	4.37E-04	1.21E-06	9.67E-06	8.34E-06	1.21E-06
DISTANCE (meters)	SCREEN MODEL CONC. (ug/m^3)	1,1-DCE CONC. (ug/m^3)	1,1,1-TCA CONC. (ug/m^3)	CHCl3 CONC. (ug/m^3)	PCE CONC. (ug/m^3)	TCE CONC. (ug/m^3)	MeCl2 CONC. (ug/m^3)
1	2.95E+06	6.58E+01	1.29E+03	3.57E+00	2.85E+01	2.46E+01	3.57E+00
3	8.31E+05	1.85E+01	3.63E+02	1.01E+00	8.04E+00	6.93E+00	1.01E+00
6	3.44E+05	7.67E+00	1.50E+02	4.16E-01	3.32E+00	2.87E+00	4.16E-01
9	1.96E+05	4.36E+00	8.55E+01	2.37E-01	1.89E+00	1.63E+00	2.37E-01
12	1.28E+05	2.85E+00	5.59E+01	1.55E-01	1.24E+00	1.07E+00	1.55E-01
15	9.09E+04	2.03E+00	3.97E+01	1.10E-01	8.79E-01	7.58E-01	1.10E-01
18	6.82E+04	1.52E+00	2.98E+01	8.25E-02	6.59E-01	5.68E-01	8.25E-02
21	5.31E+04	1.18E+00	2.32E+01	6.43E-02	5.14E-01	4.43E-01	6.43E-02
24	4.26E+04	9.50E-01	1.86E+01	5.16E-02	4.12E-01	3.55E-01	5.16E-02
27	3.50E+04	7.81E-01	1.53E+01	4.24E-02	3.38E-01	2.92E-01	4.24E-02
30	2.93E+04	6.53E-01	1.28E+01	3.54E-02	2.83E-01	2.44E-01	3.54E-02
37	2.14E+04	4.78E-01	9.36E+00	2.59E-02	2.07E-01	1.79E-01	2.59E-02
43	1.64E+04	3.65E-01	7.15E+00	1.98E-02	1.58E-01	1.37E-01	1.98E-02
49	1.29E+04	2.88E-01	5.64E+00	1.56E-02	1.25E-01	1.08E-01	1.56E-02
55	1.05E+04	2.34E-01	4.59E+00	1.27E-02	1.02E-01	8.76E-02	1.27E-02
61	8.70E+03	1.94E-01	3.80E+00	1.05E-02	8.41E-02	7.26E-02	1.05E-02
67	7.33E+03	1.64E-01	3.20E+00	8.87E-03	7.09E-02	6.12E-02	8.87E-03
73	6.27E+03	1.40E-01	2.74E+00	7.59E-03	6.06E-02	5.23E-02	7.59E-03
79	5.43E+03	1.21E-01	2.37E+00	6.57E-03	5.25E-02	4.53E-02	6.57E-03
85	4.75E+03	1.06E-01	2.07E+00	5.74E-03	4.59E-02	3.96E-02	5.74E-03
91	4.19E+03	9.34E-02	1.83E+00	5.07E-03	4.05E-02	3.49E-02	5.07E-03
100	3.56E+03	7.94E-02	1.56E+00	4.31E-03	3.44E-02	2.97E-02	4.31E-03
107	3.17E+03	7.06E-02	1.38E+00	3.83E-03	3.06E-02	2.64E-02	3.83E-03
122	2.49E+03	5.54E-02	1.09E+00	3.01E-03	2.40E-02	2.07E-02	3.01E-03
137	2.01E+03	4.48E-02	8.77E-01	2.43E-03	1.94E-02	1.67E-02	2.43E-03
152	1.66E+03	3.70E-02	7.25E-01	2.01E-03	1.60E-02	1.38E-02	2.01E-03
183	1.19E+03	2.66E-02	5.22E-01	1.44E-03	1.15E-02	9.96E-03	1.44E-03
200	1.02E+03	2.27E-02	4.44E-01	1.23E-03	9.82E-03	8.47E-03	1.23E-03
300	4.95E+02	1.10E-02	2.16E-01	5.98E-04	4.78E-03	4.12E-03	5.98E-04
400	3.00E+02	6.69E-03	1.31E-01	3.63E-04	2.90E-03	2.50E-03	3.63E-04
488	2.14E+02	4.78E-03	9.36E-02	2.59E-04	2.07E-03	1.79E-03	2.59E-04
500	2.05E+02	4.58E-03	8.98E-02	2.49E-04	1.99E-03	1.71E-03	2.49E-04
600	1.52E+02	3.38E-03	6.62E-02	1.83E-04	1.47E-03	1.26E-03	1.83E-04
700	1.18E+02	2.63E-03	5.15E-02	1.43E-04	1.14E-03	9.83E-04	1.43E-04

UNAGITATED AREA
AFTER SECTION #11 REMOVAL

RTI EMISSION RATE FOR ALL TIMES (g/sec)

		1,1-DCE	1,1,1-TCA	CHCl3	PCE	TCE	MeCl2
		2.23E-05	4.37E-04	1.21E-06	9.67E-06	8.34E-06	1.21E-06
DISTANCE (meters)	SCREEN MODEL CONC. (ug/m^3)	1,1-DCE CONC. (ug/m^3)	1,1,1-TCA CONC. (ug/m^3)	CHCl3 CONC. (ug/m^3)	PCE CONC. (ug/m^3)	TCE CONC. (ug/m^3)	MeCl2 CONC. (ug/m^3)
1	2.95E+06	6.58E+01	1.29E+03	3.57E+00	2.85E+01	2.46E+01	3.57E+00
3	8.31E+05	1.85E+01	3.63E+02	1.01E+00	8.04E+00	6.93E+00	1.01E+00
6	3.44E+05	7.67E+00	1.50E+02	4.16E-01	3.32E+00	2.87E+00	4.16E-01
9	1.96E+05	4.36E+00	8.55E+01	2.37E-01	1.89E+00	1.63E+00	2.37E-01
12	1.28E+05	2.85E+00	5.59E+01	1.55E-01	1.24E+00	1.07E+00	1.55E-01
15	9.09E+04	2.03E+00	3.97E+01	1.10E-01	8.79E-01	7.58E-01	1.10E-01
18	6.82E+04	1.52E+00	2.98E+01	8.25E-02	6.59E-01	5.68E-01	8.25E-02
21	5.31E+04	1.18E+00	2.32E+01	6.43E-02	5.14E-01	4.43E-01	6.43E-02
24	4.26E+04	9.50E-01	1.86E+01	5.16E-02	4.12E-01	3.55E-01	5.16E-02
27	3.50E+04	7.81E-01	1.53E+01	4.24E-02	3.38E-01	2.92E-01	4.24E-02
30	2.93E+04	6.53E-01	1.28E+01	3.54E-02	2.83E-01	2.44E-01	3.54E-02
37	2.14E+04	4.78E-01	9.36E+00	2.59E-02	2.07E-01	1.79E-01	2.59E-02
43	1.64E+04	3.65E-01	7.15E+00	1.98E-02	1.58E-01	1.37E-01	1.98E-02
49	1.29E+04	2.88E-01	5.64E+00	1.56E-02	1.25E-01	1.08E-01	1.56E-02
55	1.05E+04	2.34E-01	4.59E+00	1.27E-02	1.02E-01	8.76E-02	1.27E-02
61	8.70E+03	1.94E-01	3.80E+00	1.05E-02	8.41E-02	7.26E-02	1.05E-02
67	7.33E+03	1.64E-01	3.20E+00	8.87E-03	7.09E-02	6.12E-02	8.87E-03
73	6.27E+03	1.40E-01	2.74E+00	7.59E-03	6.06E-02	5.23E-02	7.59E-03
79	5.43E+03	1.21E-01	2.37E+00	6.57E-03	5.25E-02	4.53E-02	6.57E-03
85	4.75E+03	1.06E-01	2.07E+00	5.74E-03	4.59E-02	3.96E-02	5.74E-03
91	4.19E+03	9.34E-02	1.83E+00	5.07E-03	4.05E-02	3.49E-02	5.07E-03
100	3.56E+03	7.94E-02	1.56E+00	4.31E-03	3.44E-02	2.97E-02	4.31E-03
107	3.17E+03	7.06E-02	1.38E+00	3.83E-03	3.06E-02	2.64E-02	3.83E-03
122	2.49E+03	5.54E-02	1.09E+00	3.01E-03	2.40E-02	2.07E-02	3.01E-03
137	2.01E+03	4.48E-02	8.77E-01	2.43E-03	1.94E-02	1.67E-02	2.43E-03
152	1.66E+03	3.70E-02	7.25E-01	2.01E-03	1.60E-02	1.38E-02	2.01E-03
183	1.19E+03	2.66E-02	5.22E-01	1.44E-03	1.15E-02	9.96E-03	1.44E-03
200	1.02E+03	2.27E-02	4.44E-01	1.23E-03	9.82E-03	8.47E-03	1.23E-03
300	4.95E+02	1.10E-02	2.16E-01	5.98E-04	4.78E-03	4.12E-03	5.98E-04
400	3.00E+02	6.69E-03	1.31E-01	3.63E-04	2.90E-03	2.50E-03	3.63E-04
488	2.14E+02	4.78E-03	9.36E-02	2.59E-04	2.07E-03	1.79E-03	2.59E-04
500	2.05E+02	4.58E-03	8.98E-02	2.49E-04	1.99E-03	1.71E-03	2.49E-04
600	1.52E+02	3.38E-03	6.62E-02	1.83E-04	1.47E-03	1.26E-03	1.83E-04
700	1.18E+02	2.63E-03	5.15E-02	1.43E-04	1.14E-03	9.83E-04	1.43E-04

UNAGITATED AREA
AFTER SECTION #11 REMOVAL

RTI EMISSION RATES FOR ALL TIMES (g/sec)

		1,1-DCE	1,1,1-TCA	CHCl3	PCE	TCE	MeCl2
		2.23E-05	4.37E-04	1.21E-06	9.67E-06	8.34E-06	1.21E-06
DISTANCE (meters)	SCREEN MODEL CONC. (ug/m^3)	1,1-DCE CONC. (ug/m^3)	1,1,1-TCA CONC. (ug/m^3)	CHCl3 CONC. (ug/m^3)	PCE CONC. (ug/m^3)	TCE CONC. (ug/m^3)	MeCl2 CONC. (ug/m^3)
1	2.95E+06	8.84E+01	1.73E+03	4.80E+00	3.83E+01	3.31E+01	4.80E+00
3	8.31E+05	2.49E+01	4.88E+02	1.35E+00	1.08E+01	9.32E+00	1.35E+00
6	3.44E+05	1.03E+01	2.02E+02	5.59E-01	4.47E+00	3.85E+00	5.59E-01
9	1.96E+05	5.86E+00	1.15E+02	3.18E-01	2.54E+00	2.19E+00	3.18E-01
12	1.28E+05	3.84E+00	7.52E+01	2.08E-01	1.66E+00	1.44E+00	2.08E-01
15	9.09E+04	2.73E+00	5.34E+01	1.48E-01	1.18E+00	1.02E+00	1.48E-01
18	6.82E+04	2.04E+00	4.00E+01	1.11E-01	8.86E-01	7.64E-01	1.11E-01
21	5.31E+04	1.59E+00	3.12E+01	8.64E-02	6.90E-01	5.95E-01	8.64E-02
24	4.26E+04	1.28E+00	2.50E+01	6.93E-02	5.54E-01	4.78E-01	6.93E-02
27	3.50E+04	1.05E+00	2.06E+01	5.69E-02	4.55E-01	3.92E-01	5.69E-02
30	2.93E+04	8.78E-01	1.72E+01	4.76E-02	3.81E-01	3.28E-01	4.76E-02
37	2.14E+04	6.42E-01	1.26E+01	3.48E-02	2.78E-01	2.40E-01	3.48E-02
43	1.64E+04	4.91E-01	9.62E+00	2.66E-02	2.13E-01	1.84E-01	2.66E-02
49	1.29E+04	3.87E-01	7.58E+00	2.10E-02	1.68E-01	1.45E-01	2.10E-02
55	1.05E+04	3.15E-01	6.17E+00	1.71E-02	1.36E-01	1.18E-01	1.71E-02
61	8.70E+03	2.61E-01	5.11E+00	1.42E-02	1.13E-01	9.76E-02	1.42E-02
67	7.33E+03	2.20E-01	4.31E+00	1.19E-02	9.53E-02	8.22E-02	1.19E-02
73	6.27E+03	1.88E-01	3.68E+00	1.02E-02	8.15E-02	7.03E-02	1.02E-02
79	5.43E+03	1.63E-01	3.19E+00	8.83E-03	7.06E-02	6.09E-02	8.83E-03
85	4.75E+03	1.42E-01	2.79E+00	7.72E-03	6.17E-02	5.32E-02	7.72E-03
91	4.19E+03	1.26E-01	2.46E+00	6.81E-03	5.45E-02	4.70E-02	6.81E-03
100	3.56E+03	1.07E-01	2.09E+00	5.79E-03	4.63E-02	3.99E-02	5.79E-03
107	3.17E+03	9.49E-02	1.86E+00	5.15E-03	4.12E-02	3.55E-02	5.15E-03
122	2.49E+03	7.45E-02	1.46E+00	4.04E-03	3.23E-02	2.79E-02	4.04E-03
137	2.01E+03	6.02E-02	1.18E+00	3.27E-03	2.61E-02	2.25E-02	3.27E-03
152	1.66E+03	4.97E-02	9.75E-01	2.70E-03	2.16E-02	1.86E-02	2.70E-03
183	1.19E+03	3.58E-02	7.01E-01	1.94E-03	1.55E-02	1.34E-02	1.94E-03
200	1.02E+03	3.05E-02	5.97E-01	1.65E-03	1.32E-02	1.14E-02	1.65E-03
300	4.95E+02	1.48E-02	2.91E-01	8.04E-04	6.43E-03	5.55E-03	8.04E-04
400	3.00E+02	9.00E-03	1.76E-01	4.88E-04	3.90E-03	3.36E-03	4.88E-04
488	2.14E+02	6.42E-03	1.26E-01	3.48E-04	2.78E-03	2.40E-03	3.48E-04
500	2.05E+02	6.16E-03	1.21E-01	3.34E-04	2.67E-03	2.30E-03	3.34E-04
600	1.52E+02	4.54E-03	8.91E-02	2.47E-04	1.97E-03	1.70E-03	2.47E-04
700	1.18E+02	3.53E-03	6.93E-02	1.92E-04	1.53E-03	1.32E-03	1.92E-04

APPENDIX E

The Complete Inhalation Risk Estimates Calculated for the Six Chemicals of Concern at the Building 780 Construction Site, Naval Air Station (NAS) Jacksonville, Florida

ASEA BROWN BOVERI

21 February 1992

Commanding Officer
Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive
P.O. Box 10068
Charleston, South Carolina 29411-0068

Attention: Joel Murphy
Code 18213

Subject: Preliminary Recommended Site Safety Management Strategy,
Contract No. N62467-89-D-0317, Statement of Work No. 31,
Health Threat Evaluation (HTE),
Naval Aviation Depot (NADEP), Building 780,
Naval Air Station, Jacksonville, Florida

Dear Mr. Murphy:

Purpose and Background

ABB Environmental Services, Inc. (ABB-ES) has been tasked to develop recommendations for a Site Safety Management Strategy as Task 3 of the Health Threat Evaluation (HTE) for the planned Immediate Removal Action (IRA) and construction of a Closed Loop Solvent Treatment Facility at Building 780, Naval Aviation Depot (NADEP), Naval Air Station Jacksonville, Florida. During the implementation of MILCON P-616, air monitoring results indicated a threat to construction workers. The scope of these recommendations to develop a site safety management requirements to protect workers during the removal of contaminated soils prior to the construction of a closed loop solvent treatment facility, and further to protect construction workers from exposure to hazardous substances during the construction of the facility.

The recommendations include:

- Personnel protection requirements for workers at the construction site
- Action levels and strategies for upgrade and downgrade of levels of protection for these workers
- Personnel and site monitoring strategies
- The applicable regulations supporting these recommendations
- Recommended distances to be maintained between the bottom of excavations at the site and the groundwater to prevent the volatilization of the VOCs
- Construction Actions/Recommendations to mitigate exposures

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Geraghty and Miller, Inc. conducted soil and water sampling at the Building 780 site in June, 1990. Forty-four composite samples were collected at two depth intervals, a shallow sample (0 to 3 feet) and a deep sample (3-6 feet), by Harry Pepper and Associates, Inc. in December, 1991. The results of these sampling episodes indicated that the soil of the building site and the groundwater was contaminated with a number of volatile organic chemicals (VOCs). The VOCs identified at this site are listed in Table 1.

Review of the data indicated significant limitations. The Geraghty and Miller, Inc. June 1990 data was valid, however, the samples were taken one and one half years ago. Samples were collected by cutting through the concrete and asphalt which was covering the building site at that time. Because of the time that has elapsed and the removal of the concrete and asphalt surface, the earlier data may no longer represent soil and groundwater VOC concentrations of constituents. The Harry Pepper and Associates 1991 data have severe limitations. Compositing the depth intervals may have resulted in significant loss of VOCs. Because of this factor the concentrations of chemicals reported probably underestimates the true concentrations at the site. In addition, VOCs occurring at low concentrations or highly volatile chemicals, such as vinyl chloride, may have not been detected.

A resampling program is ongoing. Valid, current data are projected to become available by the end of February, 1992. Because of the data limitations described above, the recommendations presented in this memorandum are to be considered preliminary and subject to change based upon the results of the new data.

The existing data has utility for developing a recommended health and safety management strategy because the strategy is based upon the potential for specific chemicals to be present and develops a monitoring program to detect and screen observations against permissible exposure limits and protection strategy. In that sense the true present concentrations of chemicals in the soil and groundwater are not essential to development of preliminary recommendations.

The purpose of these recommendations is to support modification of construction contracts to allow the IRA and construction to proceed.

Table 1
Chemicals Identified in the Soil of the Building 780 Site
During the Sampling Conducted by Geraghty and Miller
(June, 1990 and December, 1991)

Chemical Name	Highest Detected Concentration (ppb)	PEL (ppm) [$\mu g/m^3$]	Highest Detected Concentration to PEL Ratio	Odor Threshold (ppm)
Bromodichloromethane	122	None	None	No Data
Chlorobenzene	150	75 [350]	0.002	0.21
Chloroethane (Ethyl Chloride)	4000 $\mu g/L$	1000 [2600]	0.004	4.2
Chloroform	3120	2 [9.78]	1.56	85
Dibromochloromethane	101	None	None	No Data
1,2 Dichlorobenzene	886	50 [300]	0.017	50

Chemical Name	Highest Detected Concentration (ppb)	PEL (ppm) [$\mu g/m^3$]	Highest Detected Concentration to PEL Ratio	Odor Threshold (ppm)
1,3 Dichlorobenzene	1550	None	None	No Data
1,4 Dichlorobenzene	1020	75 [450]	0.0136	15-30
1,1 Dichloroethane	572	100 [400]	0.00572	200
1,1 Dichloroethene (dichloroethylene)	9640	1	9.64	500-1000
1,2 Dichloroethene[f]	(7000 $\mu g/L$)	200 [790]	0.008	0.085
Dichloromethane[*]	2380 (94,000 $\mu g/L$)	500	0.0476 (1.88)	214
Methyl Chloroform (1,1,1 Trichloroethane)	400,000	350 [1900]	1.14	120
Methyl Ethyl Ketone[f]	(6000 $\mu g/L$)	200	0.03	5.4 - 10
4 Methyl-2-Pentanone[f]	(14,000 $\mu g/L$)	None	None	
Perchloroethylene	6180	25 [170]	0.24	50
Toluene	17,100	100 [275]	0.171	2.9
Trichloroethene (Trichloroethylene)	6740	50 [270]	0.1348	100
Vinyl Chloride[f]	(2000 $\mu g/L$)	1 [260]	2	4000
Xylenes	4500	100 [435]	0.045	1.1

[f] This Chemicals was detected only in groundwater.
[*] The ACGIH TLV for Dichloromethane (50 ppm) was used in these calculations.

Chemicals of Concern

The first step in developing recommendations for a Site Safety Management Strategy is to identify those chemicals which will be the basis for establishing the level of personnel protection at the site. These contaminants were identified using two independent methodologies. The first methodology identifies the monitoring chemicals based on their permissible exposure limits (PEL), or for the case of dichloromethane, the American Congress of Governmental and Industrial Hygienists (ACGIH) Threshold Limit Values (TLV), and their abundance in the soils and groundwater at the site. Specifically, the ratio of the contaminant concentration to their respective PEL, or TLV, was used to identify the chemicals of concern.

The second methodology estimates the airborne concentration using the Henry's Law Constant and vapor pressure for each chemical. The estimated airborne concentrations are levels which would be seen at the surface of the groundwater or soil and are based on factors such as natural dispersion and distance from

the source. It should be noted that these represent worst case conditions and are therefore very conservative.

Both methodologies identified the same chemicals of concern: methylene chloride, vinyl chloride, 1,1 dichloroethene (vinylidene chloride), and chloroform. There are several other VOCs present that have low PELs, such as trichloroethene and tetrachloroethylene, or that are present in high concentrations such as 1,1,1,-Trichloroethene. The protection from unacceptable exposure to toxic or irritating efforts of VOCs are also considered in the personnel protection and monitoring strategy.

Personal Protection Requirements

There will be three distinct phases of construction work at the Building 780 site. The first is the Immediate Removal Action (IRA) phase during which the most heavily contaminated soils will be removed from the site prior to the initiation of the construction of the closed loop solvent recovery treatment facility. This IRA is clearly a remedial response at a hazardous waste site, performed in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), as required by the Comprehensive Environmental Response Compensation and Liabilities Act (CERCLA) of 1980 amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986. Due to the invasive nature of the remedial action, all on-site personnel in this phase will need training and medical monitoring in compliance with 29 CFR 1910.120 (e) and (f), respectively, entitled "Hazardous Waste Operations and Emergency Response."

All of the above compounds require the use of supplied air systems if the PEL is exceeded. This is because the chemicals have high odor thresholds compared to the PEL and because the chemicals have poor absorption capacities on respirator cartridges. Due to the nature of the remedial work required, an airline system is most efficient. This system should be a pressure-demand type with a full facepiece. The rest of the protective ensemble should include inner surgical gloves, outer nitrile gloves, steel-toed neoprene boots and a coverall of Tyvek or similar material, preferably polycoated Tyvek, weather dependent.

The IRA work may begin at modified Personnel Protection Equipment (PPE) Level D with monitoring as described in the monitoring strategy in following paragraphs. Monitoring should begin prior to beginning intrusive work. Modified PPE Level D is used at sites where there is a potential for workers to come in contact with hazardous chemicals but where the quantities at the site do not warrant the wearing of respiratory equipment. While workers are wearing modified PPE Level D protective equipment, the ambient air must be continuously monitored to determine if the level of protection is adequate. Modified PPE Level D consists of chemical-resistant clothing (coated Tyvek), gloves (inner, chemical-resistant), gloves (outer, chemical resistant), boots (chemical-resistant, steel-toed), a hard hat, and boot covers (chemical-resistant) (optional).

Workers during the IRA should work at either modified PPE Level D or Level B based on monitoring results.

The second phase, begins at the conclusion of the IRA and ends at the point when the entire surface of soil which contains contaminants has been covered by a liner, a significant layer of clean (uncontaminated) fill, and/or the concrete or asphalt pads. Prior to the development of these barriers, potential for exposure exists and the construction site, in the opinion of ABB-ES, remains a remedial response action site, covered by 29 CFR 1920.120.

In this phase, there will be areas or periods when there is no potential for chemical exposure especially if certain construction actions identified below can be implemented. This phase is considered to be general construction where PPE Level "D" protection is appropriate. Workers not in a 29 CFR 1910.120 program may be utilized if their work does not involve any disturbance to or contact with the contaminated soil. Such activities would include normal foot traffic (e.g. site visits). Construction workers in this phase will have to

be safety trained and participate in a medical monitoring program if their work involves disturbance of contaminated materials in the soil (29 CFR 1910.120). Such activities include the movement of heavy equipment over contaminated soil.

The third phase will begin after the completion of the liner, slab, and short walls and all contaminated soils are covered by impenetrable barriers, the site no longer would be considered a remedial response site. At this time, subject to continued monitoring showing no VOC emissions from the site, no further requirement exists for use of 29 CFR 1910.120 trained workers.

Action Levels and Strategy for Upgrading Levels of Protection

Two options are appropriate for determining the level of personal protection to be worn by workers at the Building 780 site. Because the use of field gas chromatographs does not provide instantaneous readings of specific contaminants, the monitoring approach for personnel protection recommended involves the use of direct reading equipment that provide instantaneous response. In a GC mode, an Organic Vapor Analyzer (OVA) requires from 3 to 25 minutes to run and tentatively identify specific VOCs, depending on column conditions, and other chemical/physical attributes of the chemicals and the system.

Other operations occurring in adjacent buildings also emit VOCs. Because of this possible interference with on-site monitoring operations, background monitoring is extremely important.

Option 1

If the instrument utilized at the site to monitor organic vapor reads above background, upgrade the level of personal protection to PPE B. This option is based upon the very low PELs of vinyl chloride, 1,1 dichloroethene, and chloroform. If the instrument reads above background, it is assumed that the vapors are either vinyl chloride of 1,1 dichloroethene and as a result, the level of protection is upgraded to level B. This option is the most conservative.

Option 2

Upgrade the level of personal protection to PPE Level B if the organic vapor analyzer, specifically a Flame Ionization Detector (FID), reads greater than or equal to 10 ppm **or** a direct reading detector (Draeger tube) detects either vinyl chloride at levels $\geq$ 0.5 ppm or 1,1 dichloroethene at levels $\geq$ 0.5 ppm or chloroform at levels $\geq$ 1 ppm. This type of graded approach is commonly employed if a small number of chemicals with the greatest hazard can be easily identified and monitored at the work site.

Personnel Monitoring and Site Monitoring Strategy, Procedures, and Requirements

The FID should be use to constantly monitor the breathing zone of all workers potentially exposed. Frequent measurements of background air levels should be made due to the potential emissions from the nearby painting operations. Observations should also be made to determine when the industrial operations are at their peak so that their emissions can be taken into consideration. Background measurements should also be made with the direct reading detector (Draeger tubes) occasionally to determine if any of the chemical in use from the industrial operations cause interference problems. The results for all site monitoring should be kept in a bound log along with the time, date, any special meteorological observations, e.g. no wind, fog, inversions, etc., and signature. The same should also be required for any changes in level of protection, either upgrade or downgrade.

Personal air monitoring is required for workers involved with remedial efforts. The U.S. Occupational Safety and Health Agency (OSHA) standard, 29 CFR 1910.120(h), requires personal sir monitoring for the workers in the highest risk category. Sampling should be performed for methylene chloride, vinyl chloride, 1,1 dichloroethene, and chloroform. All four chemicals can be monitored simultaneously if a manifold system is employed. It is also recommended that one additional type sample be taken periodically. This fifth sample is recommended for two reasons. First, it provides for a more sensitive type of chemical analysis, e.g. gas chromatography-mass spectrometry, which will confirm the findings of the relatively crude screening instruments and the detector tubes. The fifth sample can also be used for documentation of the actual chemical concentrations in the air at the site in the unlikely event of a worker exposure. In this regard, the fifth sample should be treated in a manner similar to other field samples with a complete chain of record and proper documentation.

Personal monitoring must continue until it can be established that no workers are exposed to levels of contaminants that exceed the PEL, or other published standards in the event that a PEL has not been established for a particular chemical. With one exception, dichloromethane which will use the ACGIH TLV, the OSHA PEL shall supersede any other standard. Organic vapor screening with the FID and the detector tubes should continue during the non-remedial construction phase of the project to insure that no exposure is occurring.

Air sampling should also be accomplished in the industrial operations prior to any soil disturbance. This data when compared with the data from air monitoring in the industrial operations during remediation activities, will indicate if any contaminants are being transported to other locations off site. Samples should be taken in both buildings and in open areas adjacent to buildings.

Regulatory Basis

The regulatory basis for the above recommendations are cited in the test where appropriate. The major regulatory impact on the project is therefore 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response. This regulation requires health and safety plans in section (b), training in section (e), medical monitoring in section (f), personal protective equipment in section (g) and air monitoring in section (h). Additional respiratory protection requirements are found in 29 CFR 1910.134, Respiratory Protection. Based on the intent of this regulation ABB-ES has interpreted it to be in effect whenever workers are or potentially can come in contact with contaminated soils or groundwater during or after the IRA.

Recommendations Concerning Soil Clearances to Groundwater

Vinyl chloride is a highly toxic chemical that is extremely volatile. The groundwater sampling conducted by Geraghty and Miller, Inc. in 1990 detected vinyl chloride at 2,000 μg/L with an average depth to groundwater at the site of 6.1 ft (range 5.88 to 6.86 ft).

Vinyl chloride is of particular concern since workers must be protected against any skin contact and PPE Level D would not be considered sufficient protection. Therefore, ABB-ES has also been tasked to recommend soil clearances which will provide adequate protection against direct contact with vinyl chloride or exposure to concentrations of vinyl chloride in excess of the PEL in air, due to the liberation of vinyl chloride from the groundwater into the air at the work site.

As discussed above, the personal protection required for detectable vinyl chloride in air is PPE Level B. This level of protection also provides for adequate protection of the skin from contact with wet soil and/or groundwater contaminated with vinyl chloride. However, if a requirement to work in PPE Level B can be avoided, it should be order to minimize the safety hazards associated with reduced worker visibility and

efficiency. ABB-ES has evaluated the likelihood of air emissions from vinyl chloride and estimated air concentrations emitted from exposed groundwater assuming that the 1990 groundwater concentration is an accurate representation of present conditions.

Based upon Mackay's equilibrium partitioning model (Mackay, D. and Patterson, S. 1982. Environ. Sci. Technol. 16:654A-660A) vinyl chloride partitions as follows:

Soil Environment	Soil	Soil-Water	Soil-Air
Unsaturated topsoil	1.8	1.1	97.1
Saturated Deep Soil	3.3	96.7	-

Vinyl chloride partitions much more completely from soil to air than from water to soil. Since the migration of vinyl chloride from water to soil is the rate limiting step for emissions from exposure to groundwater-saturated soil, the concentration of vinyl chloride in soil will always be less than or equal to 3.3 percent of the groundwater concentration.

Based upon the partitioning equilibrium, of 60 μg/kg represents the maximum expected vinyl chloride concentration in soil over groundwater contaminated at 2000 μg/L. Using the GEOTOX model (T.E. McKone et al. Lawrence Livermore National Laboratory, Livermore, California, 1987) to estimate air concentrations above such soil, concentrations of vinyl chloride in the air ranging from 0.53 to 16 ppm are predicted at elevations up to 2 meters above the ground surface. These air levels may be found in the vicinity of a building footing or an excavated pit depending upon the wind speed. The wind speeds used in this scenario ranged from 3.8 meters per second, which is the average wind speed for Jacksonville, to 0.1 meters per second. The results of this model indicates that de-watering may be required to prevent air concentrations of vinyl chloride in excess of the PEL if saturated soil and/or groundwater are exposed.

Based on there predicted results, soil cover should be kept in place to reduce vinyl chloride emissions from exposed groundwater or saturated soils by a factor of 10. This reduction should generally prevent vinyl chloride in groundwater from causing concentrations in excess of the PEL on the construction site. A kinetic model will be necessary to predict the specific soil cover depth required to affect this reduction. This data will be available 25 February 1992.

Recommended Construction Actions/Strategy to Mitigate Expenses

The above preliminary recommended protection and monitoring strategies have been developed to be protective of worker health during the IRA and construction operation. In spite of the limitation of the existing data, these strategies are probably appropriate and conservative. Requirements to upgrade to PPE Level B should be minimized, however, to mitigate impact on schedule and to minimize safety hazards based upon operating equipment in high levels of PPE. The air emission modeling and risk analysis to be developed using the new valid data should support prediction of the probability that the site operations will need to be performed at PPE Level B. A major output of that effort is to estimate soil action levels for the IRA that will appropriately minimize worker elevated PPE requirements and prevent off-construction site exposure to NADEP workers.

This section identifies a preliminary set of additional operations and actions that may be necessary or desirable to minimize exposures, reduce ambient air concentrations, and minimize the requirements for using

29 CFR 1910.120 trained personnel and/or minimize needs for PPE Level B protection. Because of the current data limitations these are necessarily preliminary and incomplete. A final set will be prepared after completion of the modeling and HTE.

1. The IRA should remove, to the extent practical, soils contaminated to a degree that Level B PPE is no longer required on-site. During the IRA, removed soil should be placed in covered roll off containers or drums and removed as rapidly as possible from the construction site. This removal must comply with all applicable Federal, State and local regulations for testing and disposal. All transportation and disposal should be performed by properly licensed and permitted entities who are in compliance with applicable regulations.

2. As described in the preceding section, soil cover should be maintained above groundwater which contains significant concentrations of vinyl chloride. The VOC 1,1-dichloroethene also may require soil cover based on its PEL and volatility. This will be evaluated in the modeling.

3. If emissions on-site are predictable to be slightly above the PPE thresholds, under stagnant air conditions, but are not predicted to cause down wind risks, properly monitored fans may be used as an engineering control to prevent the need to elevate to Level B PPE. This action must be monitored properly both on-site and down wind. This scenario will be tested during the modeling program.

4. After the IRA, work should progress as rapidly as possible to install the liner, slab and short wall to minimize the use of specially trained personnel.

5. Pave the areas surrounding the site as soon as possible to prevent VOC migration around the slab.

6. Consider preventing worker exposure and/or minimizing volatilization of soil VOC by providing temporary cover of exposed contaminated soil using Visqueen. Place no contaminated soil on Visqueen, however, clean fill from other sources may be used to cover the Visqueen.

7. If necessary, schedule disturbance of highly contaminated soils for periods when NADEP is not active (i.e., off-shift periods) and/or coincide with minimum industrial emissions.

8. To the extent feasible, use completely uncontaminated soil as fill where non health and safety trained workers will work. Non-intrusive construction works can be conducted where a significant (i.e., one foot) cover of clean fill (with no detectable VOCs) prevents contact with contaminated material, no invasive actions are occurring at contaminated portions of the site and air emissions remain below the PELs. During each operation, any contaminated soils should be temporarily fenced, air monitoring continued and monitoring of workers to inadvertent areas to these areas performed.

These actions or combinations of these actions may be appropriate to mitigate or prevent health, safety, or schedule impacts. A final set of recommendations will be prepared at the conclusion of the HTE.