U.S. Department of Energy

Office of River Protection

P.O. Box 450
Richland, Washington 99352

0062239

04-ED-063

JUL 22 2004

Mr. Michael A. Wilson, Program Manager
Nuclear Waste Program
State of Washington
Department of Ecology
3100 Port of Benton Blvd.
Richland, Washington 99352

RECEIVED
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EDMC

Dear Mr. Wilson:

APPROVAL OF CRITERIA AND TOXICS AIR EMISSIONS NOTICE OF CONSTRUCTION (NOC) APPLICATION FOR OPERATIONS OF WASTE RETRIEVAL SYSTEMS IN SINGLE-SHELL TANK (SST) FARMS

Attached for your review and approval is the criteria and toxics air emissions NOC application for operations of waste retrieval systems in the SST farms (Attachment 1) and Hanford Site Air Operating Permit 00-05-006 notification of off-permit change (Attachment 2). Estimated emissions of criteria and toxic air pollutants (TAP) regulated under Washington Administrative Code (WAC) 173-400 and WAC 173-460 are above exemption thresholds; therefore, the U.S. Department of Energy, Office of River Protection is required to submit an NOC for the subject activity.

The emission estimate for this application is based upon a similar method used for the recent successful permitting effort for Tanks 241-S-102 and 241-S-112 retrieval. Using this method, emissions of criteria pollutants are expected to be below the permitted thresholds cited in WAC 183-400-110(5)(d).

TAPs, as defined in WAC 173-460, are expected to be below limits with a few exceptions:

1. Emission estimates of 1,3 – Butadiene indicate that the small-quantity emission rates, as defined in WAC 173-460-080, may be exceeded;

2. Acceptable source impact levels (ASIL), as defined in WAC 173-460-150 and WAC 173-460-160, are not expected to be exceeded for any TAP (however, there are four TAPs which do not have ASILs assigned: N-Nitrosomorpholine, Propionaldehyde, Acetophenone, and Carbonyl sulfide);

3. Emissions of TAPs that have been assigned ASILs but whose emission is too low to assign a small-quantity emission rate are expected. Dioxins and Furans are two of these. An appropriate surrogate has been argued for these and a small-quantity emission rate assigned. Emission estimates indicate that the surrogate small-quantity emission rate may be exceeded. A third TAP, N-Nitrosodimethylamine, also has an assigned ASIL that is too low to assign a small-quantity emission rate; and

4. 1,2 – Dichloropropane has an ASIL based on criterion which does not allow it to be assigned a small-quantity emission rate.

Based on the issues listed above, a toxics best available control technology (T-BACT) evaluation was performed and has been submitted to the State of Washington Department of Ecology to support this application. The conclusion of the T-BACT evaluation is that no cost-effective, commercially available control devices for control of ammonia and toxic organics exist.

If you have any questions, please contact me, or your staff may contact Dennis W. Bowser, Environmental Division, (509) 373-2566.

Sincerely,

Roy J. Schepens
Manager

ED:DWB

Attachments: (2)

cc w/o attachs:
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CH2M Correspondence Control (w/attachs)
Environmental Portal, LMSI (w/attachs)

Attachment 1
04-ED-063

Criteria and Toxics Air Emissions Notice of Construction Application for Operations of Waste Retrieval Systems in Single-Shell Tank Farms

CRITERIA & TOXICS AIR EMISSIONS NOTICE OF CONSTRUCTION APPLICATION FOR OPERATIONS OF WASTE RETRIEVAL SYSTEMS IN SINGLE-SHELL TANK FARMS

Author Name: **Gary M Crummel**
Vista Engineering for CH2M HILL Hanford Group, Inc.

Date Published
June 2004

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Prepared for the U.S. Department of Energy
Office of River Protection

Contract No.: DE-AC27-99RL14047

INTRODUCTION

This Notice of Construction application is being submitted for approval in accordance with *Washington Administrative Code* (WAC) 173-400, "General Regulations for Air Pollution Sources," and *Washington Administrative Code* (WAC) 173-460, "Controls for New Sources of Toxic Air Pollutants," to retrieve waste from 141 single-shell tanks in the 200 Area of the Hanford Site. This Notice of Construction describes waste retrieval methods, equipment, and controls for retrieving waste from single-shell tanks. A separate Notice of Construction will be submitted to cover tank closure activities. Waste Retrieval Operations will utilize several different methods, such as, but not limited to a vacuum waste retrieval system consisting of a pneumatic arm vacuum system, a mobile retrieval system consisting of a pneumatic arm vacuum system and a small in-tank vehicle or crawler, dissolution retrieval, and modified sluicing.

Emissions estimated in this Notice of Construction are based on an averaging approach. To allow for the maximum flexibility in the tank retrieval sequencing, this averaging approach estimated emission from all 141 single-shell tanks and divided the emissions equally by the number of years retrieval will take. Retrieval of all 141 single-shell tanks is estimated to take 22 years. Using this method, emissions of all criteria pollutants are expected to be below the permitted thresholds cited in WAC 173-400-110(5)(d). Toxic air pollutants as defined in WAC 173-460 are expected to be below the thresholds with a few exceptions. Emission estimates of 1,3-butadiene indicate that the small-quantity emission rates as defined in WAC 173-460-080 may be exceeded. Acceptable source impact level as defined in WAC 173-460-150 and -160 are not expected to be exceeded for any toxic air pollutants. However, there are a few toxic air pollutants which do not have acceptable source impact levels assigned. These are N-nitrosomorpholine, propionaldehyde, acetophenone, and carbonyl sulfide. Lastly, emissions of a few toxic air pollutants are expected which have been assigned acceptable source impact levels which are too low to assign a small-quantity emission rate. Dioxins and furans is an example of these. An appropriate surrogate has been argued for these, of which a small-quantity emission rate can be assigned. Emission estimates indicate that even this small-quantity emission rate may be exceeded. Another toxic air pollutant which has an assigned acceptable source impact level which is too low to assign a small-quantity emission rate is N-nitrosodimethylamine. In addition, 1,2-dichloropropane has an acceptable source impact level which is based on criterion which does not allow it to be assigned a small-quantity emission rate.

Emission details are fully described in Section 8.0 below. Section 8.0, Table 7 summarizes all the various issues just described. Section 8.0, Table 8 provides a tank-by-tank breakdown of which tanks may have various permitting issues. Table 8 provides evidence that 33 tanks being permitted under this application would fall below all thresholds listed in WAC 173-400-110 and there would be no other issues like those just described (e.g., no assigned acceptable source impact levels, etc).

A best available control technology for toxics evaluation was performed for this application and is being submitted to State of Washington, Department of Ecology along with this application. The technologies considered were eliminated due to technical infeasibilities or because their costs exceeded the amounts Ecology considers to be economically justifiable, as measured by the cost to remove a ton of pollutant.

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ALARA	as low as reasonably achievable
AMS	articulated mast system
ASIL	acceptable source impact level
BACT	best available control technologies
CWD	central water distribution device
DST	double-shell tank
Ecology	State of Washington, Department of Ecology
EIS	Environmental Impact Statement
HEPA	high-efficiency particulate air
HIHTL	hose-in-hose transfer line
ITV	in-tank vehicle
LOW	liquid observation wells
MRS	mobile retrieval system
NEPA	National Environmental Policy Act of 1969
NOC	Notice of Construction
RWDD	remotely directable water distribution device
SEPA	State Environmental Policy Act of 1971
SHMS	standard hydrogen monitoring system
SQER	small-quantity emission rates
SST	single-shell tank
T-BACT	best available control technologies for toxics
TAP	toxic air pollutants
TWINS	Tank Waste Information Network System
TWRS	Tank Waste Remediation System
VOC	volatile organic compounds

1.0 FACILITY NAME AND LOCATION

The single-shell tank (SST) farms are located at the:

U.S. Department of Energy, Office of River Protection
Hanford Site,
200 East and West Area Tank Farms
Richland, Washington 99352

The SSTs are located in the 200 East and West Areas of the Hanford Site (See Figure 1). The 200 East Area SST Tank Farms are 241-A, 241-AX, 241-B, 241-BX, 241-BY and 241-C. The 200 West Area SST Tank Farms are 241-S, 241-SX, 241-T, 241-TX, 241-TY, and 241-U (See Figure 2 through 13).

241-A Tank Farm: The A tank farm consists of six buried SSTs. The tank farm is located approximately 400 meters (1,300 feet) northeast of the 202-A Building, which is directly south of the AX tank farm. A site plan of the A tank farm is provided as Figure 2. The tanks were placed in service during the mid-1950s and were retired in the early 1970s and 1980s. They are numbered 241-A-101 through 241-A-106.

241-AX Tank Farm: The AX tank farm consists of four buried SSTs. The tank farm is located approximately 530 meters (1,750 feet) northeast of the 202-A Building, east of the AY tank farm, and between the A and AZ tank farms. A site plan of the AX tank farm is provided as Figure 3. The tanks were placed in service during the mid-1960s and retired in the early 1980s. They are numbered 241-AX-101 through 241-AX-104.

241-B Tank Farm: The B tank farm consists of 16 buried SSTs. The tank farm is located approximately 792 meters (2,600 feet) north by northeast of the 221-B Building. A site plan of the B tank farm is provided as Figure 4. The tanks were placed in service between 1945 and 1952 and retired in the mid-1970s (1975-1978). They are numbered 241-B-101 through 241-B-112 and 241-B-201 through 241-B-204.

241-BX Tank Farm: The BX tank farm consists of 12 buried SSTs. The tank farm is located approximately 792.5 meters (2,600 feet) north of the 221-B Building, adjacent to the southern boundary of the BY tank farm and immediately west of the BX tank farm. A site plan of the BX tank farm is provided as Figure 5. The tanks were placed in service between 1948 to 1950, and retired in the late 1970s. They are numbered 241-BX-101 through 241-BX-112.

241-BY Tank Farm: The BY tank farm consists of 12 buried SSTs. The tank farm is located approximately 915 meters (3,000 feet) north of the 221-B Building and is adjacent to the northern boundary of the BX tank farm. A site plan of the BY tank farm is provided as Figure 6. The tanks were placed in service between 1950 and 1953, and retired in the late 1970s. They are numbered BY-101 through BY-112.

241-C Tank Farm: The C tank farm consists of 16 buried SSTs. The tank farm is located approximately 915 meters (3,000 feet) north of the 202-A Building, and 152.5 meters (500 feet) northwest of the AN tank farm. A site plan of the C tank farm is provided as Figure 7. The tanks were placed in service during the mid-1940s and were retired in the late 1970s to mid-1980s. They are numbered 241-C-101 through 241-C-112, and 241-C-201 through 241-C-204.

241-S Tank Farm: The S tank farm consists of 12 buried SSTs. The tank farm is located less than 1.6 kilometers (1 mile) northwest of the 202-S Building. A site plan of the S tank farm is provided as Figure 8. The tanks were placed in service in 1950 and 1951 and retired in 1980. They are numbered 241-S-101 through 241-S-112.

241-SX Tank Farm: The SX tank farm consists of 15 buried SSTs. The tank farm is located directly south of the S tank farm. A site plan of the SX tank farm is provided as Figure 9. The tanks were placed in service during 1953 and 1954 and retired in 1980. They are numbered 241-SX-101 through 241-SX-115.

241-T Tank Farm: The T tank farm consists of 16 buried SSTs. The tank farm is located approximately 610 meters (2,000 feet) west of the 221-T Building and directly north of the TY tank farm and 23rd Street. A site plan of the T tank farm is provided as Figure 10. The tanks were placed in service in 1945 and retired in the mid to late 1970s. They are numbered 241-T-101 through 241-T-112 and 241-T-201 through 241-T-204.

241-TX Tank Farm: The TX tank farm consists of 18 buried SSTs. The tank farm is located approximately 762 meters (2,500 feet) southwest of the 221-T Building and is directly south of the TY tank farm. A site plan of the TX tank farm is provided as Figure 11. The tanks were placed in service 1949 and retired in 1969 through 1980. They are numbered 241-TX-101 through 241-TX-118.

241-TY Tank Farm: The TY tank farm consists of six buried SSTs. The tank farm is located approximately 732 meters (2,400 feet) southwest of the 221-T Building and is directly north of the TX tank farm. A site plan of the TY tank farm is provided as Figure 12. The tanks were placed in service during 1953 and retired in 1959 through 1980. They are numbered 241-TY-101 through 241-TY-106.

241-U Tank Farm: The U tank farm consists of 16 buried SSTs. The tank farm is located immediately west of Camden Avenue and north of 16th Street in the 200 West Area. A site plan of the U tank farm is provided as Figure 13. The tanks were placed in service during 1943 and 1944 and retired 1951 through 1980. They are numbered 241-U-101 through 241-U-112 and 241-U-201 through 241-U-204.

The SST Waste Retrieval Operations will be performed in the SST farms. Table 1 is a listing of coordinates for the individual SST farms based on the location of a single reference point (tank or average of two tanks) within the tank farm

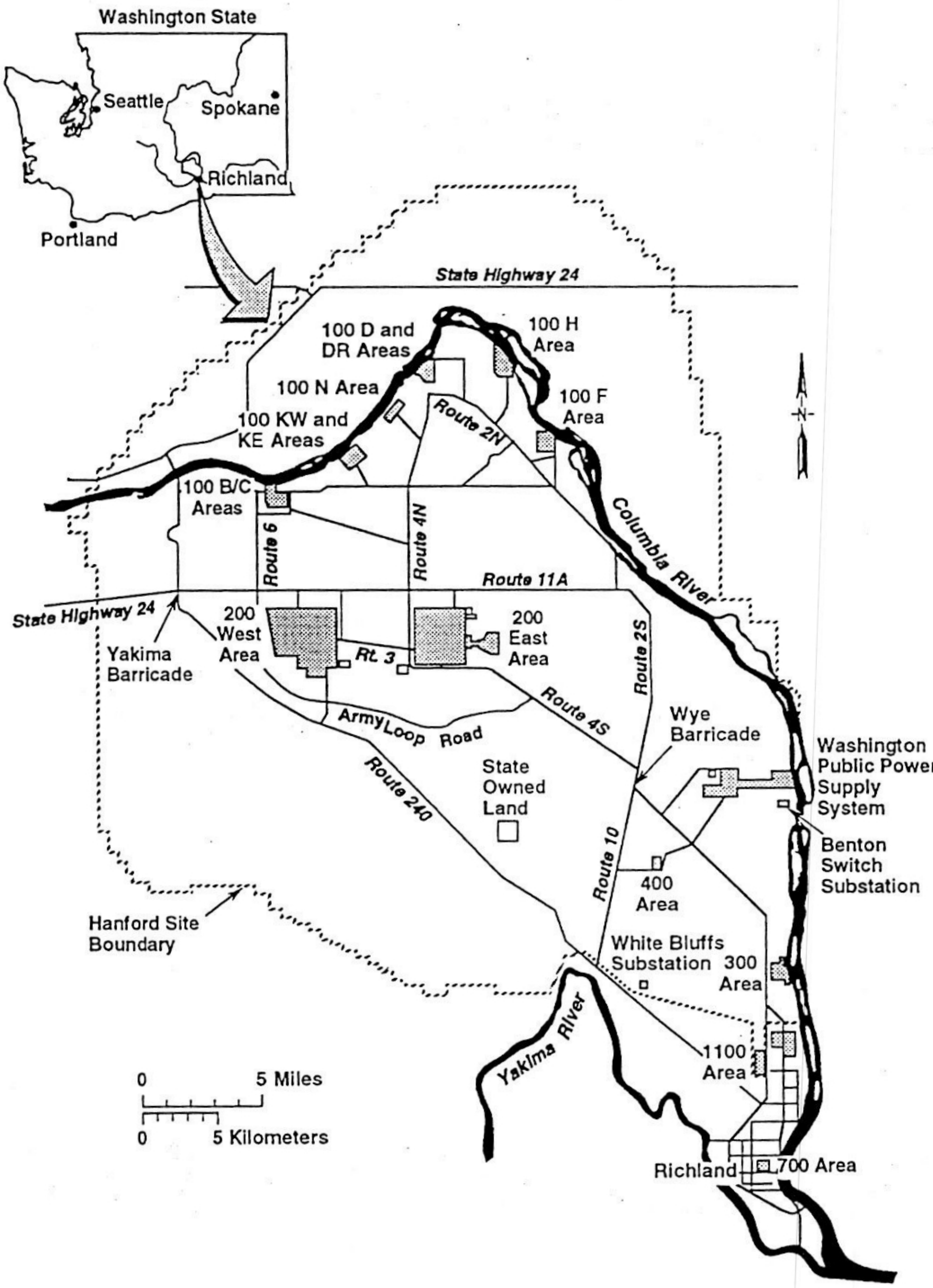
2.0 RESPONSIBLE MANAGER

Roy J. Schepens, Manager
U.S. Department of Energy, Office of River Protection
P.O. Box 450
Richland, Washington 99352-0450
(509) 376-6677

Table 1: Facility Locations.

Tank Farm	Latitude	Longitude	Reference Tank(s)
241-A	46° 33′ 11.6″ N	119° 31′ 2.3″ W	Average 241-A-103 & -104
241-AX	46° 33′ 15.7″ N	119° 31′ 29.6″ W	Average 241-AX-101 & -104
241-B	46° 33′ 52.3″ N	119° 32′ 13.9″ W	241-B-108
241-BX	46° 33′ 54.0″ N	119° 32′ 23.2″ W	Average 241-BX-101 & -112
241-BY	46° 33′ 58.5″ N	119° 32′ 36.1″ W	Average 241-BY-101 & -112
241-C	46° 33′ 28.2″ N	119° 31′ 12.0″ W	241-C-108
241-S	46° 33′ 22.9″ N	119° 37′ 88.8″ W	Average 241-S-101 & -112
241-SX	46° 32′ 13.7″ N	119° 37′ 43.0″ W	241-SX-113
241-T	46° 32′ 35.7″ N	119° 37′ 43.1″ W	241-T-108
241-TX	46° 33′ 20.0″ N	119° 37′ 44.9″ W	241-TX-110
241-TY	46° 33′ 26.4″ N	119° 37′ 45.6″ W	Average 241-TY-101 & -106
241-U	46° 32′ 41.9″ N	119° 37′ 43.7″ W	241-U-108

Figure 1: The Hanford Site.



3.0 PROPOSED ACTION

This Notice of Construction (NOC) application is being submitted for approval in accordance with *Washington Administrative Code* (WAC) 173-400, "General Regulations for Air Pollutions Sources", and WAC 173-460, "Controls for New Sources of Toxic Air Pollutants" to retrieve waste from 141 SSTs in the 200 East and West Areas of the Hanford Site. The 141 tanks include all but 8 tanks that had NOC approvals by State of Washington, Department of Ecology (Ecology), or had New Source Reviews completed and submitted to Ecology. The eight tanks that are not included in this NOC application are 241-C-106, 241-C-201, 241-C-202, 241-C-203, 241-C-204, 241-S-102, 241-S-112, and 241-U-107. Table 2 lists the tanks included in this NOC application.

Site preparation for the retrieval of the waste from SSTs will involve development of standard systems suitable for different groups of tanks. To the maximum extent possible, these systems will be modular, reusable, and portable. The factors considered in the development of the waste retrieval technology, order of retrieval, and subsequently the necessary site preparations include, but are not limited to, size of tank, type of waste (e.g., saltcake or sludge), volume of waste, tank riser configuration, and classification with respect to leaks. In general, this will include removal of pumps and thermocouple trees, removing foam from pit cover blocks and conducting pit cleanup, gauging risers, equipment installations, transfer line installations, associated excavations, and similar activities.

Waste Retrieval Operations of the 141 tanks will utilize several different methods, such as, but not limited to, a vacuum waste retrieval system consisting of a pneumatic arm vacuum system, a mobile retrieval system consisting of a pneumatic arm vacuum system and a small in-tank vehicle or crawler, dissolution retrieval, and modified sluicing. These methods will use processes that "vacuum", dissolve, or sluice waste sludge and interstitial liquids out of the tanks, move waste sludge and interstitial liquids within the tanks, and add chemical agents (e.g., mild acidic solutions) or catalysts liquid to assist in the retrieval of waste from the tank. Following waste retrieval, the waste will be transferred using existing transfer lines and/or double contained over ground hose-in-hose transfer lines (HIHTL), to double shell tanks (DSTs), treatment facilities, or other storage or disposal containers.

The waste retrieval system(s) will operate within the existing tank space, with support equipment contained in mobile skids brought into the tank farm complex. The adding of liquids, chemical agents, or catalysts, along with the pumping of the waste to storage or disposal containers will occur in existing pipelines or newly installed over ground HIHTL that are connected to either a staging SST, DST system, a packaging operation, or supplemental treatment facilities.

The duration of waste retrieval operations is expected to be approximately 22 years and the earliest start of waste retrievals using this NOC could be calendar year 2004.

This NOC covers waste retrieval operations, interim isolation tasks, and waste transfer operations. Preparatory and stabilization activities associated with closure of the tanks shall be addressed in a separate NOC to be submitted in the future. Any other emissions generated by treatment, packaging, or demonstration facilities using retrieved waste will be covered by a NOC specific to that activity.

The following proposed actions will be performed to retrieve or directly support the retrieval of wastes from the SSTs. The steps listed below may not necessarily be performed in this order:

Retrieve wastes from SSTs using a vacuum system to "vacuum" wastes from the SSTs and transfer the waste to treatment systems, or DSTs using existing transfer lines or HIHTL.

Retrieve wastes from SSTs using a vacuum system and a robotic crawler to "mobile retrieve" wastes from the SSTs and to transfer the waste to treatment systems, or DSTs using existing transfer lines or HIHTL.

Retrieve wastes from SSTs using a saltwell pump and water spray to "dissolve" wastes from the SSTs and transfer waste to treatment systems, or DSTs using existing transfer lines or HIHTL.

Retrieve wastes from SSTs using a pumping system and injection nozzle using a "modified sluicing" process from the SSTs and to transfer waste to treatment systems, or DSTs using existing transfer lines or HIHTL.

As the retrieval project progresses over the next 22 years, it is likely that modifications to the retrieval processes would occur and additional methods for removing wastes from SSTs could be developed. Prior to implementing a new waste retrieval process, this section of the NOC will be revised to add additional process description information. It is expected that the same emission calculation methods would be used for any new retrieval removal methods when determining emissions.

During most of the waste retrieval activities, the SSTs should be under active ventilation until structural safety or other considerations force shutdown of the exhauster at which time passive ventilation will be used.

Waste retrieval operations will conduct some interim isolation of equipment no longer needed to ensure structural integrity of tank and to reduce the possibility of water intrusion prior to initiation of tank closure actions.

4.0 NATIONAL ENVIRONMENTAL POLICY ACT/STATE ENVIRONMENTAL POLICY ACT

Under RCW 43.21C, "State Environmental Policy Act of 1971", and WAC 197-11, "SEPA Rules," Ecology requires all government agencies to consider the environmental impacts of a proposal before making decisions. A proposal exists when an agency is presented with an application. An environmental review of the actions identified in this NOC application was conducted with the preparation of the National Environmental Policy Act (NEPA) of 1969 (Title 10, *Code of Federal Regulations,* Part 1021, "National Environmental Policy Act" [10 CFR 1021]) documentation. Existing environmental documentation can be used to meet all or part of an agency's responsibilities under State Environmental Policy Act (SEPA) as provided in WAC-197-11-600.

Table 2: Tank NOC Retrieval List. (2 Sheets)

East Area SSTs		
Number	Year Removed From Service	Tank Capacity (gallons)
241-A-101	1980	1,000,000
241-A-102	1980	1,000,000
241-A-103	1980	1,000,000
241-A-104	1975	1,000,000
241-A-105	1963	1,000,000
241-A-106	1980	1,000,000
241-AX-101	1980	1,000,000
241-AX-102	1980	1,000,000
241-AX-103	1980	1,000,000
241-AX-104	1978	1,000,000
241-B-101	1974	500,000
241-B-102	1978	500,000
241-B-103	1977	500,000
241-B-104	1972	500,000
241-B-105	1972	500,000
241-B-106	1977	500,000
241-B-107	1969	500,000
241-B-108	1977	500,000
241-B-109	1977	500,000
241-B-110	1971	500,000
241-B-111	1976	500,000
241-B-112	1977	500,000
241-B-201	1971	55,000
241-B-202	1977	55,000
241-B-203	1977	55,000
241-B-204	1977	55,000
241-BX-101	1972	500,000
241-BX-102	1971	500,000
241-BX-103	1977	500,000
241-BX-104	1980	500,000
241-BX-105	1980	500,000
241-BX-106	1971	500,000
241-BX-107	1977	500,000
241-BX-108	1974	500,000
241-BX-109	1974	500,000
241-BX-110	1977	500,000
241-BX-111	1977	500,000
241-BX-112	1977	500,000
241-BY-101	1971	750,000
241-BY-102	1977	750,000
241-BY-103	1973	750,000
241-BY-104	1977	750,000

West Area SSTs		
Number	Year Removed From Service	Tank Capacity (gallons)
241-S-101	1980	750,000
241-S-103	1980	750,000
241-S-104	1968	750,000
241-S-105	1974	750,000
241-S-106	1979	750,000
241-S-107	1980	750,000
241-S-108	1979	750,000
241-S-109	1979	750,000
241-S-110	1979	750,000
241-S-111	1972	750,000
241-SX-101	1980	1,000,000
241-SX-102	1980	1,000,000
241-SX-103	1980	1,000,000
241-SX-104	1980	1,000,000
241-SX-105	1980	1,000,000
241-SX-106	1980	1,000,000
241-SX-107	1964	1,000,000
241-SX-108	1962	1,000,000
241-SX-109	1965	1,000,000
241-SX-110	1976	1,000,000
241-SX-111	1974	1,000,000
241-SX-112	1969	1,000,000
241-SX-113	1958	1,000,000
241-SX-114	1972	1,000,000
241-SX-115	1965	1,000,000
241-T-101	1979	500,000
241-T-102	1976	500,000
241-T-103	1974	500,000
241-T-104	1974	500,000
241-T-105	1976	500,000
241-T-106	1973	500,000
241-T-107	1976	500,000
241-T-108	1974	500,000
241-T-109	1974	500,000
241-T-110	1976	500,000
241-T-111	1974	500,000
241-T-112	1977	500,000
241-T-201	1976	55,000
241-T-202	1976	55,000
241-T-203	1976	55,000
241-T-204	1976	55,000
241-TX-101	1980	750,000

Table 2: Tank NOC Retrieval List. (2 Sheets)

East Area SSTs		
Number	Year Removed From Service	Tank Capacity (gallons)
241-BY-105	1974	750,000
241-BY-106	1977	750,000
241-BY-107	1974	750,000
241-BY-108	1972	750,000
241-BY-109	1979	750,000
241-BY-110	1979	750,000
241-BY-111	1977	750,000
241-BY-112	1978	750,000
241-C-101	1970	500,000
241-C-102	1976	500,000
241-C-103	1979	500,000
241-C-104	1980	500,000
241-C-105	1979	500,000
241-C-107	1978	500,000
241-C-108	1976	500,000
241-C-109	1976	500,000
241-C-110	1976	500,000
241-C-111	1978	500,000
241-C-112	1976	500,000

West Area SSTs		
Number	Year Removed From Service	Tank Capacity (gallons)
241-TX-102	1977	750,000
241-TX-103	1980	750,000
241-TX-104	1977	750,000
241-TX-105	1977	750,000
241-TX-106	1977	750,000
241-TX-107	1977	750,000
241-TX-108	1977	750,000
241-TX-109	1977	750,000
241-TX-110	1977	750,000
241-TX-111	1977	750,000
241-TX-112	1974	750,000
241-TX-113	1971	750,000
241-TX-114	1971	750,000
241-TX-115	1977	750,000
241-TX-116	1969	750,000
241-TX-117	1969	750,000
241-TX-118	1980	750,000
241-TY-101	1973	750,000
241-TY-102	1979	750,000
241-TY-103	1973	750,000
241-TY-104	1974	750,000
241-TY-105	1980	750,000
241-TY-106	1959	750,000
241-U-101	1960	500,000
241-U-102	1979	500,000
241-U-103	1978	500,000
241-U-104	1951	500,000
241-U-105	1978	500,000
241-U-106	1977	500,000
241-U-108	1979	500,000
241-U-109	1978	500,000
241-U-110	1975	500,000
241-U-111	1980	500,000
241-U-112	1970	500,000
241-U-201	1977	55,000
241-U-202	1977	55,000
241-U-203	1977	55,000
241-U-204	1977	55,000

Ecology and the U.S. Department of Energy (DOE) co-prepared DOE/EIS-0189, *Tank Waste Remediation System (TWRS), Hanford Site, Richland Washington, Final Environmental Impact Statement (EIS)*. The activities described in this NOC (retrieval of wastes from the SSTs) were analyzed in the EIS and the associated TWRS EIS Record of Decision (62 FR 8693, "Record f Decision: Final Environmental Impact Statement: Disposal of Hanford Defense High-Level, Transuranic and Tank Wastes, Hanford Site, Richland, WA") was issued February 26, 1997.

5.0 CHEMICAL AND PHYSICAL PROCESSES

The volume capacity of each SST varies from 55,000 to 1 million gallons. Table 2 itemizes these capacities. All but the 55,000 gallon capacity tanks are 75 feet in diameter. These tanks range in height from 29.75 to 54 feet high (at their highest points), with capacities from 500,000 to 1 million gallons. The smaller 55,000 gallon tanks are 20 feet in diameter and 25.5 feet high. Cross-sectional views of various Hanford Site SSTs are presented in Figure 14, a diagram of a typical SST is provided in Figure 15, and a diagram of a typical transfer system is provided in Figure 16.

A tank-by-tank summary of the waste volumes in the SSTs and expected retrieval duration is presented in Table 3. The retrieval method is also provided, however, it should be noted that this method is tentative at this time and is subject to change. Emission estimates are not dependent upon the retrieval method, so a change in the retrieval method is not expected to change the emission estimates determined in this NOC application.

It is also estimated at this time that there may be approximately 17 million gallons of supernatant available for use as a mobilization fluid. Supernatant is being considered as an option that could reduce the amount of water that would have to be introduced during retrieval of some SSTs, preserve DST space, and reduce the number of upcoming evaporator campaigns. Based on engineering estimates to retrieve most of the SST sludge from the tanks it would require approximately 34 million gallons per year of recycled supernatant.

During most of the waste retrieval activities the SSTs should be under active ventilation until structural safety or other considerations force shutdown at which time passive high-efficiency particulate air (HEPA) filtered ventilation will be used. The waste retrieval process(s) to be used in the SST tanks are summarized in the next sections.

Table 3: Single-Shell Tank Farm Waste Volumes and Estimated Retrieval Duration. (4 Sheets)

Tank	Total Waste (kgal)	Retrieval Technology [a]	Retrieval Duration (days)
241-A-101	395	MS	432
241-A-102	40	MS	7
241-A-103	371	MRS	66
241-A-104	28	MRS	17
241-A-105	37	MRS	29
241-A-106	79	MS	289
241-AX-101	319	MS	660
241-AX-102	30	MRS	7
241-AX-103	107	MS	411
241-AX-104	7	MRS	9
241-B-101	109	MRS	42
241-B-102	32	MS	10
241-B-103	56	MRS	19
241-B-104	374	MS	93
241-B-105	290	MRS	132
241-B-106	122	MS	23
241-B-107	161	MRS	30
241-B-108	91	MS	23
241-B-109	125	MS	106
241-B-110	245	MRS	86
241-B-111	242	MRS	85
241-B-112	35	MRS	17
241-B-201	30	V	11
241-B-202	29	V	11
241-B-203	52	V	19
241-B-204	51	V	18
241-BX-101	48	MRS	28
241-BX-102	112	MRS	183
241-BX-103	73	MS	30
241-BX-104	100	MS	166
241-BX-105	72	MS	44
241-BX-106	38	MS	29
241-BX-107	347	MS	326
241-BX-108	31	MRS	5
241-BX-109	193	MS	315
241-BX-110	205	MRS	291
241-BX-111	189	MRS	268
241-BX-112	164	MS	123
241-BY-101	370	MS	358
241-BY-102	277	MS	378
241-BY-103	417	MRS	900
241-BY-104	358	MS	337
241-BY-105	481	MRS	858

Table 3: Single-Shell Tank Farm Waste Volumes and Estimated Retrieval Duration. (4 Sheets)

Tank	Total Waste (kgal)	Retrieval Technology [a]	Retrieval Duration (days)
241-BY-106	471	MRS	208
241-BY-107	271	MRS	334
241-BY-108	222	MRS	412
241-BY-109	277	MS	373
241-BY-110	366	MS	164
241-BY-111	302	MS	319
241-BY-112	286	MS	544
241-C-101	88	MRS	13
241-C-102	316	MS	114
241-C-103	73	MS	101
241-C-104	259	MRS	127
241-C-105	132	MS	88
241-C-107	248	MS	85
241-C-108	66	MS	12
241-C-109	64	MS	14
241-C-110	178	MRS	8
241-C-111	58	MRS	8
241-C-112	104	MS	23
241-S-101	351	MS	249
241-S-103	238	MS	62
241-S-104	288	MRS	270
241-S-105	406	MS	102
241-S-106	455	MS	96
241-S-107	311	MS	59
241-S-108	550	MS	512
241-S-109	533	MS	365
241-S-110	389	MS	176
241-S-111	415	MS	64
241-SX-101	418	MS	1242
241-SX-102	409	MS	185
241-SX-103	509	MS	249
241-SX-104	446	MRS	134
241-SX-105	375	MS	294
241-SX-106	396	MS	1221
241-SX-107	95	MRS	14
241-SX-108	73	MRS	106
241-SX-109	241	MRS	178
241-SX-110	56	MRS	26
241-SX-111	115	MRS	29
241-SX-112	75	MRS	27
241-SX-113	19	MRS	13
241-SX-114	155	MRS	23
241-SX-115	4	MRS	7

Table 3: Single-Shell Tank Farm Waste Volumes and Estimated Retrieval Duration. (4 Sheets)

Tank	Total Waste (kgal)	Retrieval Technology [a]	Retrieval Duration (days)
241-T-101	100	MRS	516
241-T-102	32	MS	18
241-T-103	27	MRS	8
241-T-104	317	MRS	44
241-T-105	98	MS	135
241-T-106	22	MRS	4
241-T-107	173	MRS	139
241-T-108	16	MRS	5
241-T-109	62	MRS	44
241-T-110	370	MRS	138
241-T-111	447	MRS	124
241-T-112	67	MRS	9
241-T-201	31	V	11
241-T-202	21	V	8
241-T-203	37	V	13
241-T-204	37	V	13
241-TX-101	91	MS	25
241-TX-102	217	MS	98
241-TX-103	145	MS	64
241-TX-104	68	MS	10
241-TX-105	576	MRS	799
241-TX-106	348	MS	491
241-TX-107	29	MRS	8
241-TX-108	129	MS	229
241-TX-109	363	MS	228
241-TX-110	467	MRS	358
241-TX-111	365	MS	305
241-TX-112	634	MS	599
241-TX-113	639	MRS	1720
241-TX-114	532	MRS	384
241-TX-115	554	MRS	374
241-TX-116	599	MRS	1213
241-TX-117	481	MRS	1096
241-TX-118	256	MS	194
241-TY-101	119	MRS	22
241-TY-102	69	MS	27
241-TY-103	155	MRS	31
241-TY-104	44	MRS	40
241-TY-105	231	MRS	68
241-TY-106	16	MRS	3
241-U-101	24	MRS	5
241-U-102	327	MS	973
241-U-103	417	MS	192

Table 3: Single-Shell Tank Farm Waste Volumes and Estimated Retrieval Duration. (4 Sheets)

Tank	Total Waste (kgal)	Retrieval Technology [a]	Retrieval Duration (days)
241-U-104	122	MRS	144
241-U-105	353	MS	1045
241-U-106	172	MS	138
241-U-108	359	MS	197
241-U-109	401	MS	139
241-U-110	176	MRS	96
241-U-111	222	MS	319
241-U-112	45	MRS	231
241-U-201	4	V	7
241-U-202	4	V	7
241-U-203	3	V	7
241-U-204	3	V	7

[a] - Retrieval method is tentative only.
MS => Modified Sluicing Retrieval System
MRS => Mobile Retrieval System => In-tank Vehicle + Vacuum System
V => Vacuum Retrieval System

5.1. Tank Retrieval Site Preparation

Current design calls for modifications to many of the tanks and associated equipment to allow installation of waste retrieval system equipment, including but not limited to, the following major components:

New In-Tank Equipment

- Installation of waste distribution devices
- Installation of transfer pumps
- Installation of Enraf-Nonius Series 854 (ENRAF) stilling wells
- Temporary installation of video cameras
- Installation of instrument manifolds
- Installation of central fury devices
- Installation of drain lines back to tank
- Installation of AMS (Articulated Mast System)
- Temporary installation of sluicing nozzles
- Installation of ventilation inlet filter assemblies
- Connection of HIHTL
- Installation of new pit cover-plates as needed
- Installation of electrical power and instrument cables and other utility tie-ins and/or upgrades
- Placement of new, above ground pits
- Installation of jumpers

Removal, Decontamination and Disposal of Existing Equipment

- Removal of breather filters
- Removal of sludge weights
- Removal of liquid observation wells (LOW)
- Removal of Standard Hydrogen Monitoring System (SHMS) probe

- Removal of thermocouple probes
- Removal of sluicing nozzles and video cameras after use
- Removal of liquid level reel
- Removal of jumpers from pits
- Removal of saltwell pumps and sluice pumps
- Removal of corrosions probes
- Removal of shield plugs
- Removal of slurry distributors
- Removal of air lift circulators
- Removal of riser adapter cover-plates
- Removal of saltwell screen
- Removal of dip tubes
- Removal of protective foam coating on pits

Miscellaneous

- Performance of related miscellaneous activities in support of construction and operation activities that will not increase emissions above those estimated in Section 13.0, Release Rates, of this NOC.

Construction activities include the following:

5.1.1 Pit Work

Pits will be accessed for installation of instrument manifolds, transfer pump installation, jumper removal, replacement of existing HIHTLs with new HIHTLs, connection of HEPA filters and exhauster trunk for the portable exhausters, removal of various jumpers, and similar activities. Standard procedure for contaminated pit entry includes the application of a fixant.

5.1.2 Removal of In-Tank Equipment

Various in-tank equipment, such as those listed above, will be removed from the tanks to make room for the waste retrieval equipment, or to be replaced with equivalent equipment built to withstand the forces of waste retrieval.

5.1.3 In-Tank Equipment Installation

Motor controlled spray devices will be inserted into risers on some tanks near the outside perimeter of the tank and an automatic indexing spray device also will be installed on a centrally located riser. In-tank closed circuit television cameras will be installed into risers and connected to a master camera control system skid. The equipment will be in the risers for the duration of the project and will not contact the waste. The installation will result in negligible dose to the workers because no work is performed inside the riser.

Each spray assembly is equipped with a spray washer to provide a decontamination rinse during removal. The spray devices and cameras will be sleeved out of the risers at completion of the project for reuse with contamination and dose expected to be minimal.

An AMS will be installed through risers of some tanks for use during retrieval. The AMS may be removed and reused, but in most cases these will be abandoned in place, upon completion, to minimize worker exposure involved in the decontamination process.

Ventilation inlet filter assemblies will be installed on those tanks whose breather filters have been removed to accommodate portable exhausters and other retrieval equipment. As the filter is lowered in place, the blank is removed from the riser allowing the filter to be set in place. The riser is open for approximately five minutes.

In some cases it will be necessary to install new risers on some tasks. Nominal riser diameters range from four inches to 42 inches. Risers will be installed by first removing soil down to the concrete tank dome surface using hand digging and/or the "guzzler." A steel caisson will be inserted into the hole for wall support. A small layer of grout, added to the bottom of the hole, will provide a level surface. A hole will be partially drilled into the concrete. Minor amounts of water are used during the drilling process for cooling the core drill bit. This water will also help keep down dusting in the caisson from the concrete being drilled, but its primary purpose is bit cooling. The bit will be approximately ¼ in. wide, so for a 48-in. diameter hole, the disturbed inner surface of the tank dome would be about 38-in.^{2}, which would be released into the tank dome space by the drill bit. The majority of this material would be wetted down with the core drill water and fall to the waste surface. After a cable is attached to the core, the drilling will be completed through the dome into the tank headspace. The drill bit will fill the kerf when the tank dome is penetrated. The core disk will be removed and disposed of and/or evaluated. The new prefabricated riser will be lowered into the caisson until support brackets on the side are seated on the grout top. The riser will then be backfilled in place.

During removal of the concrete plug, the plug will be wrapped in plastic or similar containment. The hole into the tank will be sealed from the atmosphere by plastic sleeving or a similar containment method. However, it is assumed the plastic is taken off and the hole is left open to the atmosphere for an estimated five minutes per the riser as the new riser is installed.

Other similar equipment may be installed.

5.1.4 Soil Excavations

Soil will be excavated inside and outside the farms for various reasons such as tie in of instrumentation and power systems for monitoring transfer progress. Intermittent trenches will be excavated for this purpose. A HIHTL will be installed to convey waste from the single-shell tanks to the DST Transfer System. Hoses will be connected in pits using standard flex jumpers.

The volumes of soil removed during excavation activities are volumes of disturbed soil that will not leave the respective farms. Clean soil piles may be moved from one place to another within the tank farm with heavy equipment (i.e., backhoe, front loader, etc.). The soil will be used to fill the trenches after the hose and the conduits are installed. For purposes of conservatism, emission calculations were based on 75% of this soil excavated by hand digging and 25 % of the excavation performed with a guzzler.

Soil excavation outside the tank farm fence also may be performed with heavy equipment

5.2. Saltcake Dissolution Waste Retrieval System

Saltcake dissolution waste retrieval systems may be used to retrieve soluble saltcake waste. This method retrieves the soluble portion of the waste only, resulting in very few of the solids (insoluble materials and low solubility salts) being pumped from the tank. This retrieval process is relatively slow due to the amount of time that must be allowed for the brine to reach equilibrium and the amount of time that the brine takes to drain to the saltwell pump through the remainder of the waste matrix. The method of liquid removal is very similar to the method used in interim stabilization saltwell pumping. The method is relatively slow (estimated one-year retrieval duration). To reach the regulatory goals of "residual waste" from an SST containing saltcake waste several combined waste retrieval systems may be used in conjunction with dissolution. Options include using the modified sluicing, vacuum, and/or the mobile retrieval systems. These systems could be deployed at any time during the dissolution process, and the cycle repeated as necessary until a residual waste goal is met.

The saltcake dissolution waste retrieval system that may be deployed in SSTs is for water, chemical agent, or catalyst liquid to be added to the tank using a variety of spray nozzles or "sprinklers." The approach is to sprinkle the waste surface with water, chemical agent, or catalyst liquid. The added water, chemical agent, or catalyst liquid must stay in contact with the saltcake for a period of time for the brine to become saturated. Once the brine is saturated or near saturation, it is pumped from the SST to a receiver tank (e.g., waste retrieval process tank, staging SST, storage DST, or other staging/storage vessel associated with supplemental treatment, packaging, or disposal). Salt solution will be removed using the existing saltwell pump, as applicable if the tank is so equipped.

If the tank is not equipped with a saltwell pump a transfer pump (progressive cavity, vertical turbine, or some other type of transfer pump) may be installed. The saltwell pump would continue to be used until little additional saltcake is dissolved following solution addition. When this point is reached, the saltwell pump and screen will be removed and a transfer pump will be located in its place.

Remotely directable water distribution devices (RWDD) will be located in risers spaced as far apart as practical. A combination of spraying water, chemical agent, or catalyst liquid to dissolve the saltcake would be used in conjunction with directing a flow of water, or recirculated water, at the waste to move it to the pump suction to allow the pumping of waste from the tank. The ability to recirculate waste from the pump, through a recirculation line, back into the tank may be provided as an alternative to using water to direct dissolution waste to the pump suction. In addition, supernatant may be used as a source of solution for the RWDDs. The RWDDs will be located in several risers located at specified distances and angles to ensure wide coverage within the tanks to distribute the spray over the majority of the saltcake and direct the flow of dissolution waste to the pump suction. One additional Central Water Distribution Device (CWDD) will be located near the center of the tank if possible. The RWDDs can be remotely operated.

5.3. Modified Sluicing Waste Retrieval System

The approach for some of the SST waste retrieval system(s) is to use modified sluicing. Modified sluicing is the introduction of a liquid at low-to-moderate pressures and volumes into the waste. The liquid dissolves and breaks apart solid materials and suspends them in the waste slurry. A transfer pump installed inside the tank pumps the liquid slurry to a receiver tank.

Modified sluicing differs from past-practice sluicing in the following ways: Past-practice sluicing introduces sluicing liquid from a single sluice nozzle in bulk fashion by a flooding-type action. Modified sluicing introduces sluice liquid in a controlled fashion using multiple sluicing nozzles at varying pressures and flows and pumps out the resultant waste slurry at approximately the same rate as the sluiced liquid introduced. This operating strategy maintains minimal liquid inventories within the tanks at all times. The use of multiple sluicing nozzles allows for a more thorough distribution of sluicing liquid over the tank contents. The liquids that could be used in modified sluicing range from water, recirculated water from the receiving DST, supernatant, and/or adding a chemical agent or catalyst liquid to assist in the retrieval of waste from the tank.

A transfer pump (progressive cavity, turbine, or some other appropriate type of pump) may be located near the center of the tank in a riser extension or in the central pump pit. If a saltwell pump is located in a central pump pit, that pump may be used until such time the waste retrieval operation needs to install a transfer pump. Multiple RWDDs will be located in several risers located at specified distances and angles to ensure adequate coverage within the tanks to ensure sluicing of the majority of the waste within the tank. One additional CWDD will be located near the center of the tanks. The multiple RWDDs can be remotely operated.

5.4. Vacuum Waste Retrieval System

The approach for some of the SST waste retrieval system(s) is to use a vacuum waste retrieval system similar to the one being demonstrated for use in the 200 series tanks.

The vacuum waste retrieval system is introduced to the SSTs by means of an AMS that has a horizontal reach and rotational capabilities of 360 degrees. The AMS has a retracted position, and can be extend vertically. Air is mixed at the suction port of the AMS enabling the required vertical lift of the waste to a topside receiver tank (e.g., waste retrieval process tank, staging

SST, storage DST, or other staging/storage vessel associated with supplemental treatment, packaging, or disposal).

The AMS will be deployed through and attached to standard riser flanges that are available on the SSTs. In addition, deployment of cameras in other risers for in-tank viewing and control of the AMS will occur at each of the SSTs.

Each of the C, U, B, and T farms contain four 200 series tanks aligned in a row. Because of the unique configuration of these tanks the approach to be used for these types of SSTs is to deploy a vacuum waste retrieval system at each of the four tanks in a farm. The vacuum lines for each vacuum waste retrieval system at each tank would then be routed and connected to a valve manifold box (diversion box). Based on an operation process that incorporates cost and as low as reasonably achievable (ALARA) considerations, the process would valve in one tank at a time for waste retrieval. The operation is complete when the waste retrieval process sequence has removed the waste from all four tanks to prescribed standards and requirements under regulatory agreements for residual waste.

One vacuum line runs topside from the diversion box to a receiver tank (e.g., connected to a waste retrieval process tank, staging SST, storage DST, or other staging/storage vessel associated with supplemental treatment, packaging, or disposal). The receiver tank will receive waste in batches from whichever tank is valved into the vacuum waste retrieval system. In some instances, retrieved wastes will be routed directly to the receiver tanks with the use of the valve manifold box. The vacuum pressure used to draw up the waste from the tank to the receiver tank is relieved back into the waste tank, and atmospheric pressure is reestablished for the vacuum waste retrieval system and the waste transfer processing is initiated. Operations in other SSTs may be similar to this approach or use an approach that allows waste retrieval using the vacuum system on a single SST.

5.5. Mobile Retrieval System

The approach for some of the SST waste retrieval system(s) is to use the mobile retrieval system (MRS). The MRS consists of two in-tank systems. An in-tank vehicle (ITV) or robotic crawler inserted through one riser works in conjunction with an AMS inserted through a second riser. These two systems are supported by above grade skids, HIHTL and normal services and utilities of the tank farm.

The AMS retrieves the sludge from the tank using a vacuum with assisting pneumatic conveyance. The AMS vacuum tube has a horizontal reach and can be extended to the bottom of the tank. The arm rotates 360 degrees. The vacuum will be directed through the AMS near the center of the tank to the end effector, which is in contact with the tank waste. Due to the design of the end effector, the pneumatic conveyance assisted vacuum retrieval system will draw the waste up through the vacuum pipe to the waste vessel in the vessel skid in batches. Varying amounts of air and water are introduced into this unit to enhance waste removal and to reduce plugging of the vacuum pipe.

The articulating mast system is valved out while the waste vessel is emptied and pumped out through the over ground transfer lines to a DST, a staging SST, or other treatment/disposal option. When the waste vessel is nearly empty, the transfer line will then be valved out and the AMS will be valved back in and another batch of waste will be removed from the tank. This process will typically be repeated until wastes near the center of the tank are removed. When the articulating mast unit has removed tank wastes within its reach, the robotic crawler will be lowered into the tank and remotely controlled to move and/or wash wastes toward the center of the tank where they can be removed by the AMS.

The ITV or crawler assists the AMS by moving the waste to an area within its reach. The ITV or crawler has a plow blade for pushing/pulling wastes, a screw pump to jet wastes (if the waste is not too thick) through a small nozzle towards the center of the tank. Both devices also have the ability to direct hot or cold water through the same nozzle to wash wastes off in-tank equipment, dissolve waste agglomerations in the tank, and wash wastes toward the center of the tank for removal. The ITV or crawler may be operated while the AMS is being operated. The ITV or crawler is remotely controlled via hydraulic lines contained in its umbilical cord. The umbilical cord attached to the ITV or crawler contains hydraulic lines to steer the ITV or crawler, raise and lower the plow blade, and operate a water line(s).

5.6. New Retrieval Methods

As the retrieval project progresses over the next 22 years, it is likely that modifications to the retrieval processes would occur and additional methods for removing wastes from SSTs could be developed. Prior to implementing a new waste retrieval process, this section of the NOC will be revised to add additional process description information. It is expected that the same emission calculation methods would be used for any new retrieval methods when determining emissions. Any such revision shall document descriptive information, and expected emissions from the new process to determine if emissions are already bounded.

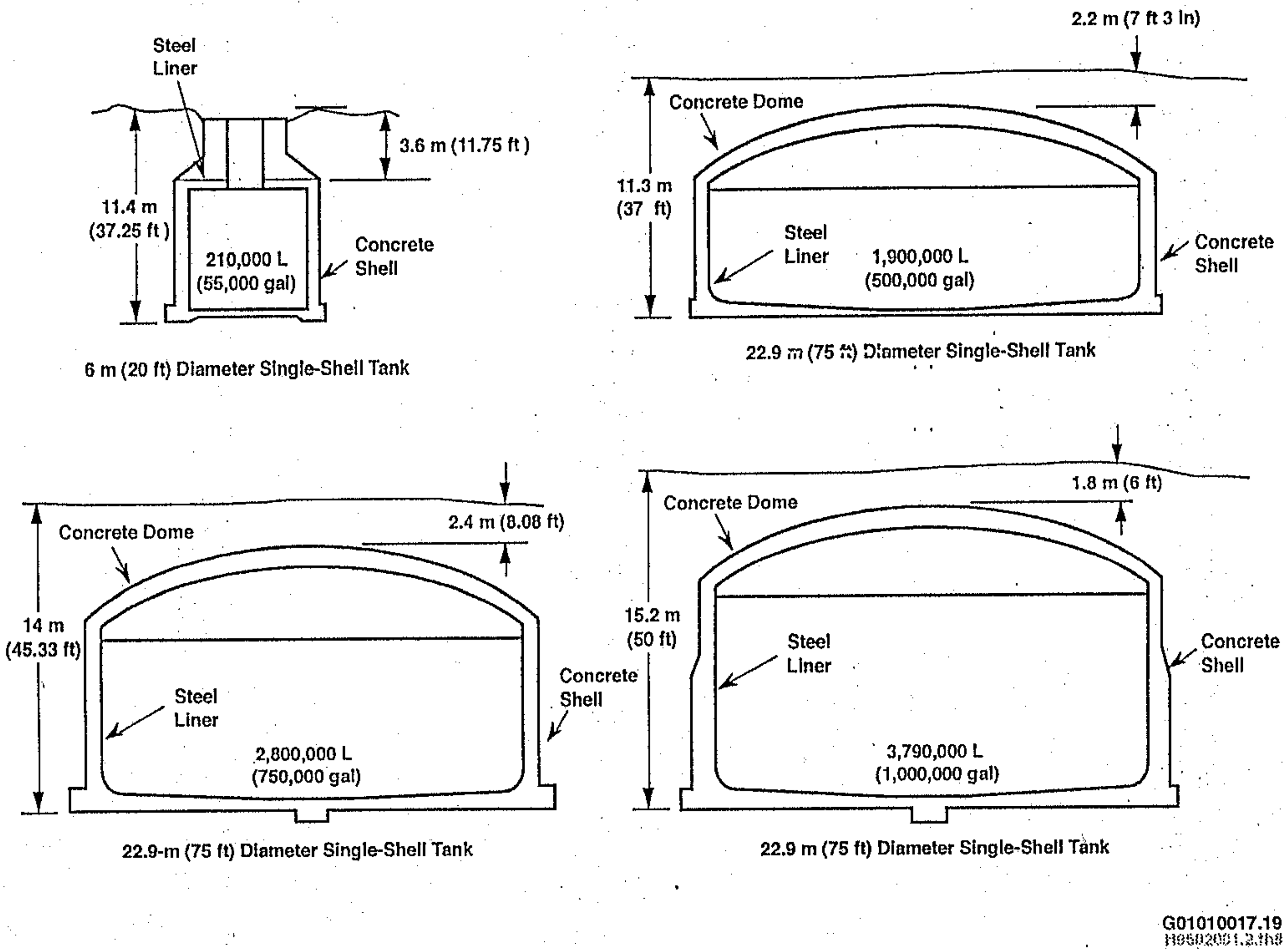


Figure 14: Cross-Sectional Views of Hanford Site Single-Shell Tanks.

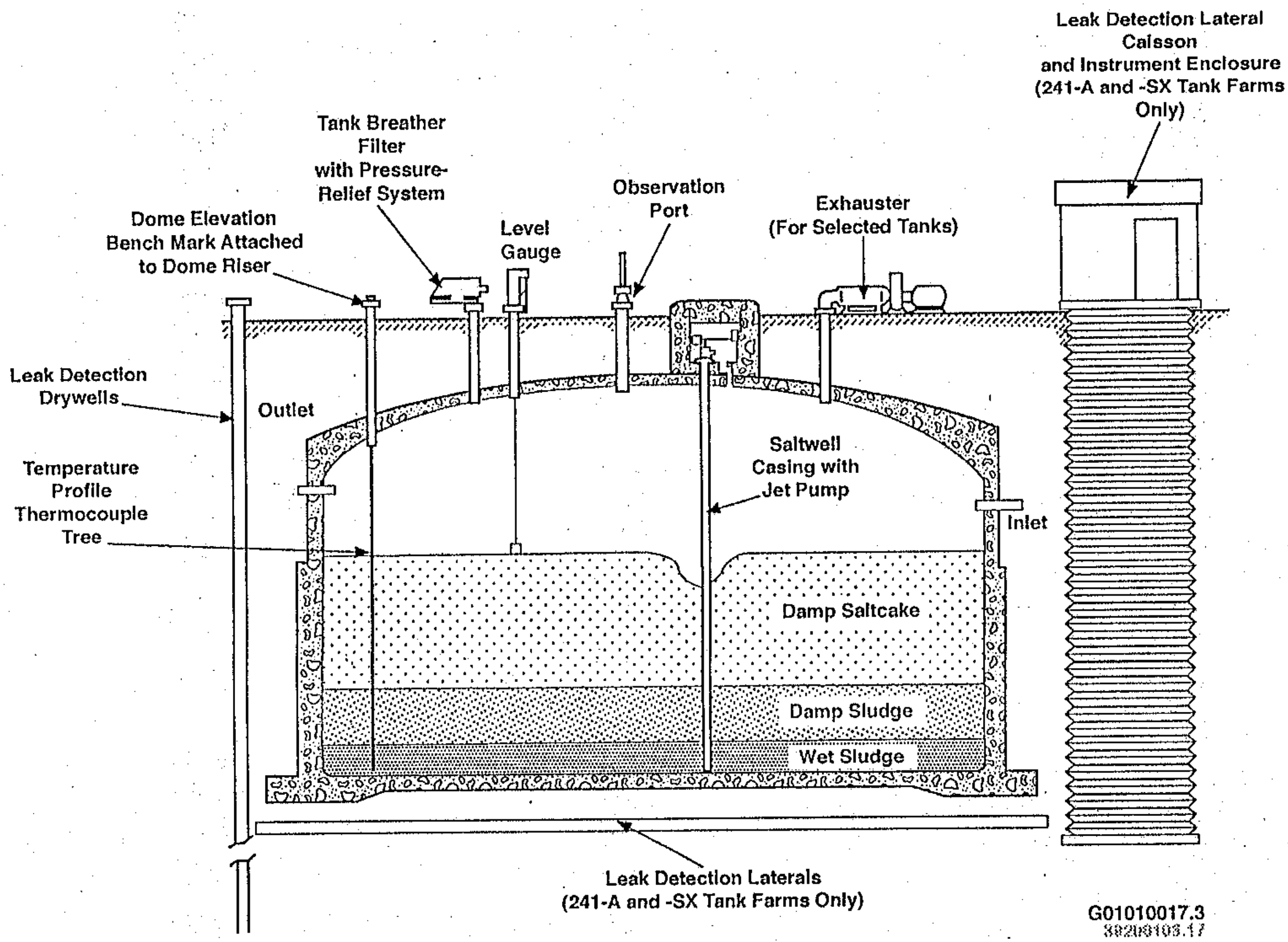


Figure 15: Typical Single-Shell Tank.

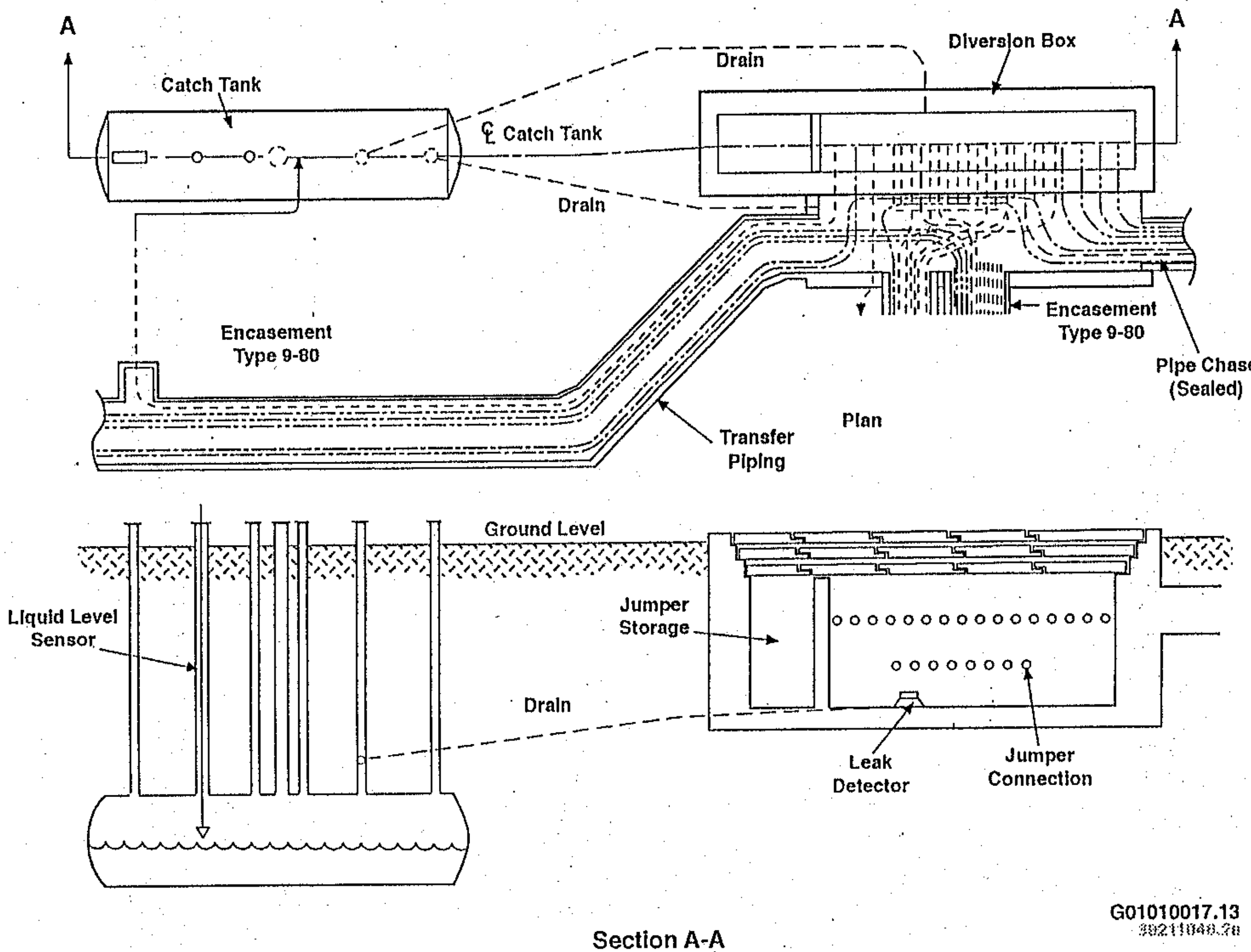


Figure 16: Typical Transfer System.

6.0 PROPOSED CRITERIA/TOXIC CONTROLS

6.1. Best Available Control Technology for Toxics

Best Available Control Technology for Toxics (T-BACT) for use during retrieval of waste from the 141 SSTs discussed in this application was examined in RPP-20773, *Evaluation of Best Available Control Technology for Toxics (T-BACT), Waste Retrieval System Operations in Single Shell Tank Farms*. This T-BACT evaluation is being submitted to Ecology along with this application.

T-BACT was determined using the "top-down" approach established for Best Available Control Technology (BACT). This approach is defined in detail in *New Source Review Workshop Manual – Prevention of Significant Deterioration and Nonattainment Area Permitting,(EPA, 1990)*. The approach consists of the following steps:

1. Identify all control technologies
2. Eliminate technically infeasible options
3. Rank remaining control technologies by control effectiveness
4. Evaluate most effective controls and document results
5. Select BACT

The T-BACT process was followed for ammonia and for the other toxic organic compounds cited in this application. For ammonia, the following emission control technologies were identified and discussed:

- Absorption (scrubbing)
- Condensation
- Adsorption
- Thermal oxidation
- Biofiltration

For the other toxic organic compounds, destruction or removal emission control technologies were identified and discussed as follows:

- Thermal oxidation
- Catalytic Oxidation
- Adsorption
- Absorption (scrubbing)

- Condensation
- Biofiltration

Some of the technology options were eliminated from further consideration because of technical infeasibility. The remaining options were evaluated for economic impact. All of these options were eliminated because their costs exceeded the amounts Ecology considers to be economically justifiable, as measured by the cost to remove a ton of pollutant. This was primarily due to the low amount of uncontrolled emissions. Even though the options evaluated would remove a high portion of the emissions, typically 98-99%, the cost of the equipment would be prohibitively high according to the available Ecology guidelines. Consequently, T-BACT is proposed to be operation of the standard exhauster configuration (moisture eliminator, preheater, HEPA filters, fan, stack with monitoring instrumentation) with periodic monitoring to confirm that the estimated emission parameters are accurate.

6.2. Passive Ventilation

The SSTs are equipped with HEPA filters which have manufacturers rated particulate removal efficiencies of 99.97%. During most of the waste retrieval activities the SSTs will be actively ventilated, however due to integrity and safety concerns some of the activities will be accomplished under passive conditions and each of these passive HEPA systems will act as the ventilation control. Each SST HEPA filter is attached at a riser and maintained by current tank farm operations and maintenance activities.

Figure 17 shows typical breather filters used on SSTs. The figure shows the components of a typical "open face" style of housing and a "G-1" style of housing breather filter. Current plans are to use the "G-1" style of housing.

The existing passive ventilation systems produce a variable flow rate through the tank, which is primarily dependent upon atmospheric pressure fluctuations and temperature differences between the tank headspace and atmosphere. A 9 cubic feet per minute (CFM) flow rate was cited as a representative maximum passive ventilation rate for SSTs in HNF-SD-WM-TI-797, *Results of Vapor Space Monitoring of Flammable Gas Watch List Tanks*.

6.3. Active Ventilation

An active ventilation system will be installed on a SST riser. The ventilation systems are skid-mounted HEPA filtered portable exhausters. The typical skid-mounted ventilation system will have configuration and functionality of the latest skid-mounted HEPA filter systems or one of recently upgraded saltwell skid-mounted ventilation systems used for the waste retrieval system demonstration activities at SSTs 241-S-102, 241-S-112, and C-106. If a new or different exhauster is used for SST waste retrievals, the exhauster design will be provided to Ecology prior to initiation of waste retrieval activities.

The portable exhauster will be designed to pass outside air through the tank, thereby reducing condensation and fog within the tank. The air will be filtered during exhauster operations before exiting to the atmosphere. See Figure 18 for a typical ventilation system. The abatement technology for a skid mounted HEPA filter system includes the following:

- Glycol (or similar) heaters and associated components,
- One pre-filter and housing,
- Demister (optional)
- Two HEPA filters and test sections,
- One exhaust fan,
- Stack.

During exhauster operations, air from the tank will pass through a demister, if needed, and be heated before passing through a pre-filter, two HEPA filters in series, a fan, and discharged through a stack. The stack will contain a section that allows airflow measurements, radiological sample extraction, and potential vapor sampling activities. The pre-filter will increase the life of the HEPA filters by trapping the larger airborne particles to allow for a more economical operating system. ALARA concepts will be applied to allow for less frequent change out of the HEPA filters, thereby reducing exposure to personnel to radiological materials.

The HEPA filters will meet the requirements of ANSIASME AG-1 *Code on Nuclear Air and Gas Treatment,* Section FC, or any new requirements following the final negotiations and final agreements between the Washington State Department of Health and the tank farm contractor. The HEPA filters will be tested annually to requirements of ANSI/ASME N510 *Testing of Nuclear Air Treatment Systems*. The HEPA filters will be nuclear grade throwaway extend-media dry-type in a rigid case having minimum particle collection efficiency of 99.97% for 0.3-micrometer median diameter particles.

The filter frame will be corrosion resistant for the air stream design conditions. The HEPA filter housing will provide a sealed barrier for the confinement of airborne radionuclides and will serve to encapsulate and hold the HEPA filter. The filter housing will provide for the attachment of pressure differential measurement components. Each filter housing will meet the applicable sections of ANSI/ASME N509 *Nuclear Power Plant Air Cleaning Units and Components* and the test requirements of ANSI/ASME N510. The filter housings will be leak tested using the pressure decay method in accordance with ANSI/ASME N510.

The test sections will provide a means for in place testing of the HEPA filters to 99.95% efficiency. Testing will confirm that any airborne radionuclide particles are captured to the level of efficiency of the installed HEPA filter. One test section will be placed downstream of the pre-filter section and upstream of the first HEPA filter section. The second test section will be placed between the first stage HEPA filter housing and the second stage HEPA filter housing.

Ductwork will be used to connect the exhauster inlet to the tank riser. Ductwork used will meet requirements of ASME AG-1, Section SA.

The exhaust fan will be constructed of non-sparking materials and will meet AMCA 99, *Standards Handbook, Air Movement Contractors Association (AMCA)* Standard 99-0401-86 and will be Type A construction. The fan will be a centrifugal type and be statically and dynamically balanced as an assembly.

The exhaust stack will house the air velocity probe and the air-sampling probe.

The exhauster will not be operated at a flow that exceeds the HEPA filter rating in each stage. The skid-mounted portable exhauster would exhaust up to 0.47 cubic meters per second (1000 cubic feet per minute).

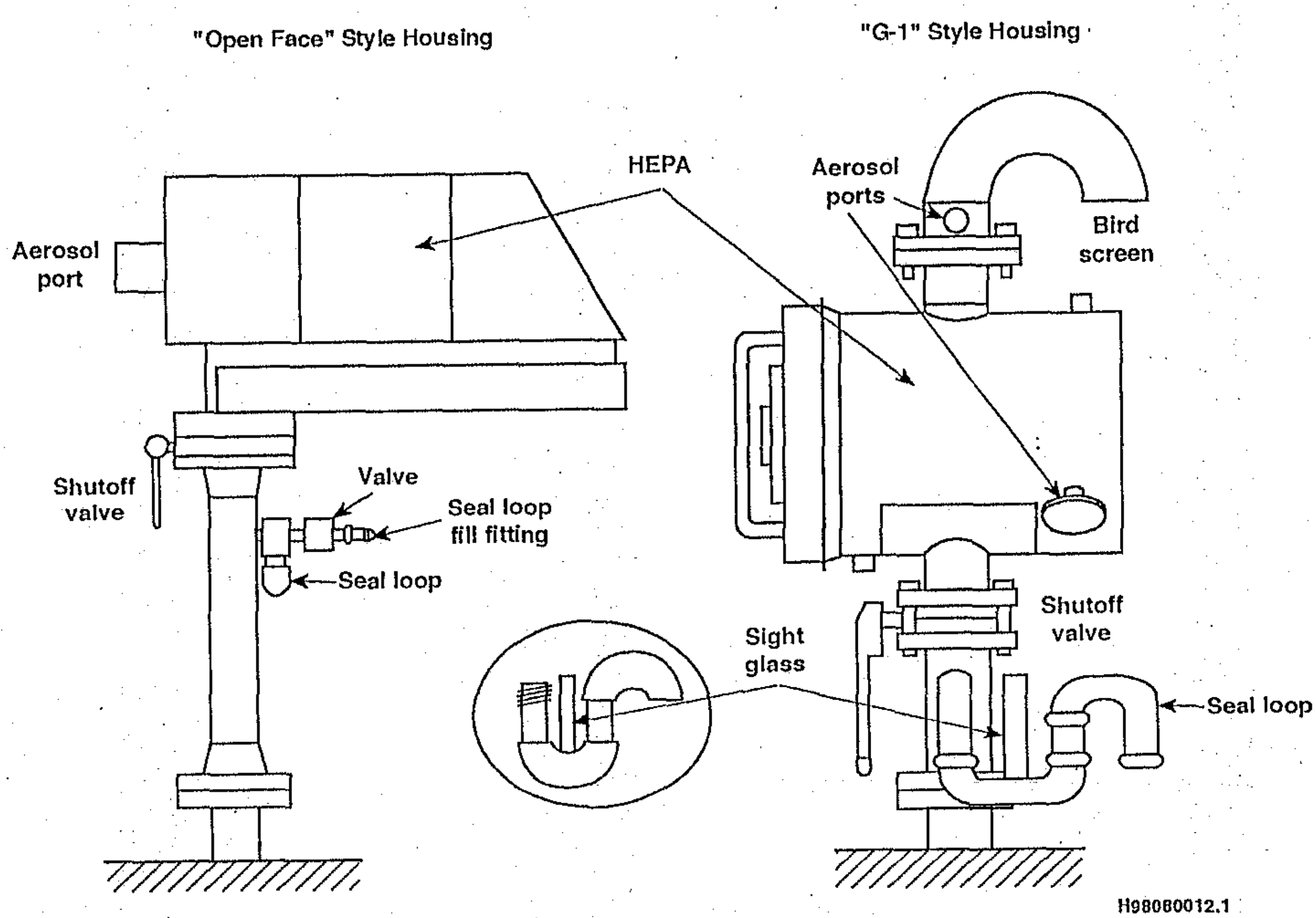
7.0 AIRBORNE EMISSIONS MONITORING SYSTEMS

Monitoring for VOC's will take place within 15 minutes of start of retrieval, using methods and instruments which are functionally equivalent to method 25A with a Flame Ionization Detector (FID), to verify low emissions. Additional monitoring using an instrument such as B&K or equivalent will be performed on specific tanks on a case by case basis as necessary to verify that emission estimates are bounding.

During active ventilation, particulate radionuclides emissions will be sampled and monitored continuously. A representative sample will be collected in the record sample collection system and analyzed by the laboratory.

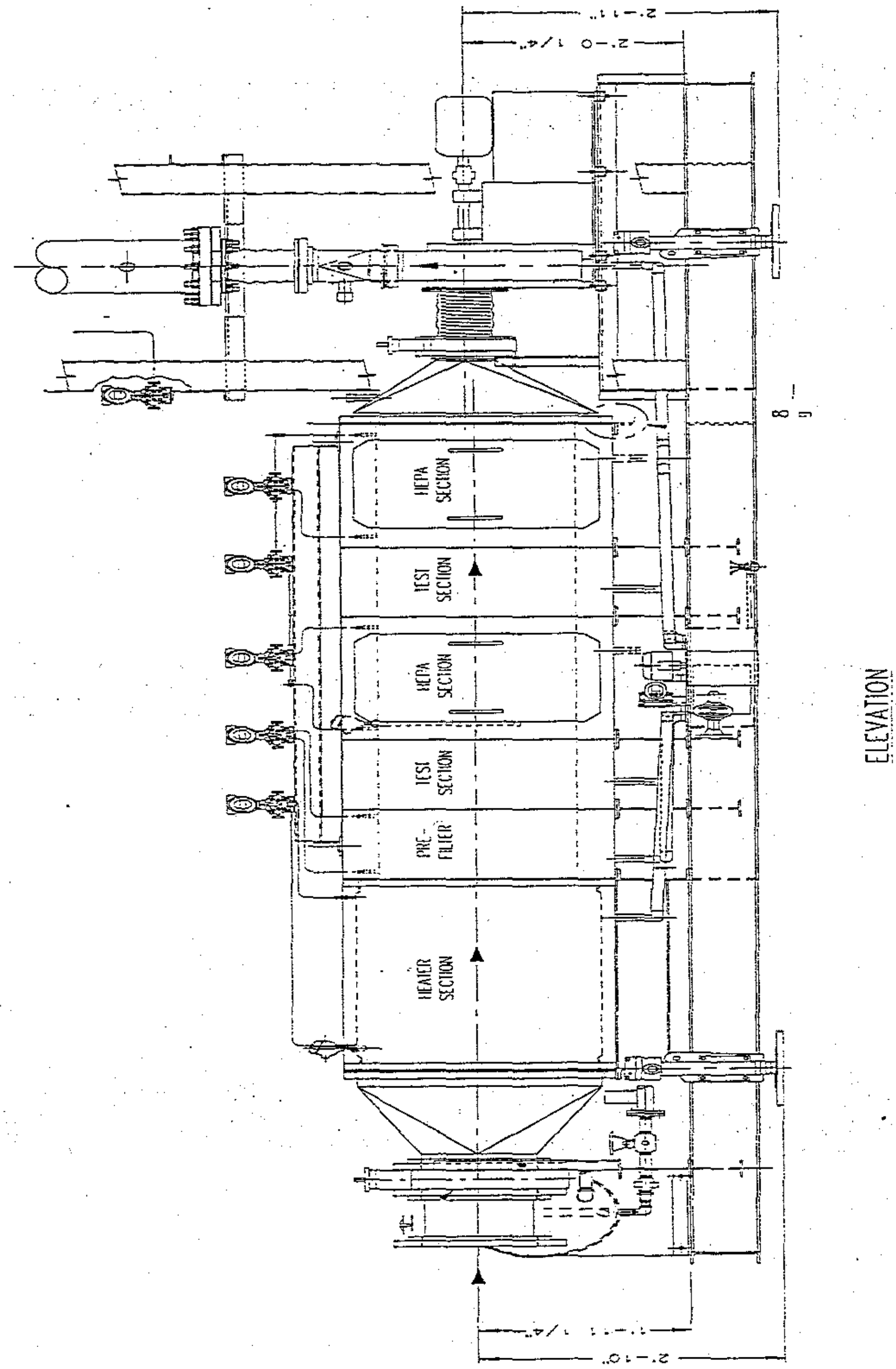
Sampling and monitoring results will be published in the annual Hanford Site Emission reports.

Figure 17: Typical Breather Filter Configuration.



HEPA = high-efficiency particulate air (filter).

Figure 18: Typical Active Ventilation System.



8.0 EMISSION ESTIMATE

Criteria emissions as defined in *Washington Administrative Code* (WAC) 173-400 "General Regulations for Air Pollution Sources" and Toxic Air Pollutants (TAPs) emissions as defined in *Washington Administrative Code* (WAC) 173-460 "Controls for New Sources of Toxic Air Pollution" were estimated in this NOC application based on an averaging approach. This averaging approach was chosen to allow for the maximum flexibility in the tank retrieval sequencing. Emissions were averaged from all 141 SSTs by dividing the total emissions equally by 22 - the number of years estimated to retrieve all the SSTs. Using this method, emissions of all criteria pollutants are expected to be below the thresholds cited in WAC 173-400-110(5)(d). Contributions on a tank-by-tank basis were then evaluated and compared to the SQERs and ASILs.

Emissions of TAPs as defined in WAC 173-460 are also expected to be below the thresholds with a few exceptions. Emission estimates for 1,3-butadiene indicate that the small-quantity emission rates (SQER) as defined in WAC 173-460-080 may be exceeded. Acceptable source impact level (ASIL) as defined in WAC 173-460-150 and -160 are not expected to be exceeded for any TAP. There a few TAPs, however, which do not have ASILs assigned. These are N-nitrosomorpholine (see section 8.2.2, F2), propionaldehyde, acetophenone, and carbonyl sulfide (see section 8.2.2, F4). Dioxins and furans, which are treated as one TAP, may exceed a surrogate ASIL (see section 8.2.2, F1). In addition, a few TAPs may be present in emissions which have been assigned ASILs which are too low to assign a SQER to or a specific SQER is not available. These TAPs are N-nitrosomorpholine, N-nitrosodimethylamine, and 1,2-dichloropropane (see section 8.2.2, F3). A list of these issues is provided in Table 7. Table 8, then, ties these issues to individual tanks.

8.1. Emissions Estimate Methodology

In the years 1993 through 1997 vapor samples were taken from the head spaces of 110 SSTs in the 200 East and West Areas of tank farms. This data is available in Tank Waste Information Network System 3 (TWINS) data base and was compiled and summarized in a single spreadsheet titled taps – 110.xls. The file was transmitted by James L. Huckaby in an e-mail dated January 28, 1999. The data in TWINs and the data in this spreadsheet are both from the same original data. The spreadsheet was utilized in this emission determination because it was readily organized into separate worksheets for polychlorinated biphenyl (PCB), dioxins and furans, cyanides, detected TAPs and non-detected TAPs. Criteria pollutants - NO_x, CO, SO_x, etc. - were not included in these spreadsheets. Estimates for these pollutants were made based on other TWINS data.

8.1.1 TAPs Emission Estimate Method

Estimated TAP emissions are listed in Table 6 below. In development of this table, East Area and West Area worksheets were added to the original Taps-110 spreadsheets (included in attachment titled "TAPs-110 Data Attachment"). The East and West Area worksheets consisted of only the East and West Area tanks respectively. The reason for the separation was to determine dispersed emissions – emissions seen by the public at the Hanford Site boundary. It is necessary to calculate what dispersed emissions would be in order to determine if the ASILs are exceeded. The East and West Area tanks were separated because the dispersion factors for East and West are different. The dispersed emissions from both East and West are combined in yet another Total Emissions Worksheet.

Seven tanks that are being retrieved under previously approved permits have not been included in the spreadsheet. The East Area tanks that were not included were 241-C-106, 241-C-201, 241-C-202, 241-C-204. The West Area tanks were 241-S-102, 241-S-112, and 241-U-107.

The worksheets list, for each tank, its own individual set of pollutants. For example, the detected TAPs worksheet lists 126 individual TAPs. In addition, each of these TAPs is listed in from 1 to 99 tanks. For example, acetone was found in 99 tanks, while N-nitrosomorpholine was found in only 1 tank. Recall that there were 110 tanks sampled. To account for the individual pollutants in each of the tanks, all 126 pollutants were summed from all 110 tanks (minus the 7 mentioned above), in the East and West Area worksheets.

Current plans call for retrieval of all 141 tanks in 22 years. Emissions from all of these tanks over this time span were averaged to accommodate the retrieval process and to allow for the maximum possible flexibility in permitting. Average emissions were estimated by summing the individual pollutants in all the tanks in the East and West Area worksheets. This sum was then divided by the 22 years retrieval period.

Since sample data was available for only 110 out of 141 SSTs the average of these tanks was extrapolated and added to the total to account for the contribution from the remaining tanks . For example, only 44 of the 61 East Area SSTs had sample data, while 59 of the 80 West Area SSTs had sample data. To account for this, the pollutant values which were previously summed and divided by 22 was, for the East Area worksheet, multiplied by the additional factor 61/44 and, for the West Area worksheet, was multiplied by the additional factor 80/59.

Individual pollutant data listed for each tank in the spreadsheets is given in terms of milligrams per cubic meter (mg/m3). So the results of the calculations explained so far are also in terms of mg/m3. This data was converted to emissions in grams per second (g/s). This conversion was done based on an SST assumed average flow rate of 5 CFM. Ventilation flow rates for passively ventilated tanks were estimated to be between 1 and 9 (5 being the average) CFM in HNF-SD-WM-TI-797. The data was converted to g/s to accommodate the dispersion factor – explained in the Section 8.1.3. Additionally, to accommodate retrieval activities, this value was multiplied by an additional factor of 100. This factor was used to estimate emissions for permitting purposes during retrieval of 241-S-102 and 241-S-112. This factor was based on the observed elevation of emissions that occurred during the original sluicing of 241-C-106 (in the November 1998). Using a Flame Ionization Detector, emissions just prior to sluicing were noted to be approximately 15 parts per million (ppm). Just shortly after sluicing began, emissions rose to nearly 500 ppm. This represents an increase factor of 33 (500/15). Because of this, the factor of 100 was used for 241-S-102 and 241-S-112 retrievals, and for its use in this NOC, was assumed to be conservative.

Emissions in terms of g/s were further converted to pounds per hour (lb/hr) and pounds per year (lb/yr) to facilitate comparison to the SQERs.

8.1.2 Criteria Emission Estimate Method

Criteria emission estimates are summarized in Table 4. Emission estimates for NO_x, CO, and SO_x are based on TWINS. Data was available for NO, N_2O, and NO_2. Since 40 CFR 60.2 exempts nitrous oxide as a nitrogen oxide, N_2O was omitted from the final results. Volatile organic compounds (VOC) data came from the Taps-110 spreadsheets, data labeled TNMOC – Total Non-Methane Organic Carbon. SO_x data was only found in 241-C-104. This data was converted to pounds per year based on the assumption that it was all $S0_2$. The data was adjusted to emissions in pounds per year via the same method employed for TAP emissions. The available data from each tank was added together, extrapolated for the tanks without recorded data and finally, the data was averaged over the 22 year retrieval period.

8.1.3 Dispersion Modeling Method

Emission concentrations at the site boundary are estimated using dispersion modeling. Unit concentration dispersion factors were developed from the ISC3 (Industrial Source Complex) program (EPA-454/B-95-003a, *User's Guide for the Industrial Source Complex (ISC3) Dispersion Models*) to represent dispersion modeling from the 200 East and 200 West Areas. Concentration factors for 24-hour and annual average releases in both the 200 East and 200 West Areas were developed. The input files and resulting factors are attached (see "Don't Say It, Write It" memo from Paul D. Rittmann to John S, subject "Unit Concentration Factors from ISC3", dated September 27, 1996). The resulting factor for East Area of 2.79 was applied to stack emissions to estimate the 24-hour average contaminant concentrations and 0.0793 was applied for the annual average contaminant concentrations at the Hanford Site Boundary. For West Area the factors were 3.46 to calculate the 24-hour average contaminant concentrations and 0.0585 to calculate the annual average contaminant concentrations at the Hanford Site boundary. These factors were multiplied by the emissions in g/s. The results give pollutant concentrations at the Site boundary in micro grams per cubic meter. The Site boundary for the East Area was assumed to be 17.1 kilometer (10.6 miles) in the east-southeast direction for both the 24-hour and the annual average. For the West Area, the site boundary was assumed to be 12.6 kilometers (7.8 miles) in the south direction for the 24-hour average and 22 kilometer (13.7 miles) in the southeast direction for the annual average. Annual averages are based on Hanford Site wind data collected from 1986 through 1995. Twenty-four-hour averages are based on hourly Hanford Site wind data for 1992 through 1995.

8.2. Estimated Emission Results

8.2.1 Criteria Emission Results

As previously noted, criteria pollutant emissions are summarized in Table 4. Emission thresholds, as defined in WAC 173-400, are expected to be exceeded. Table 5 provides VOC emission estimates on a tank-by-tank basis - for those tanks where data was available. Table 5 estimates emissions for two scenarios. The column titled *Emission During Retrieval - based on duration* estimates emission based on an anticipated retrieval duration. The column titled *Emissions During Retrieval* assumes retrieval durations for each and every tank would continue for up to a year. Actual emission will most likely be between the values listed in the two columns. As stated previously, emissions in Table 4 represent emissions of all 141 tanks divided by the 22 year retrieval period.

Table 4: Estimated Criteria Emissions.

Criteria Emissions	Average Emissions During Retrieval (lbs/hr)	Average Emissions During Retrieval (lbs/day)	Average Emission During Retrieval (lbs/yr)	Tons/yr	WAC 173-400-110 Threshold Tons/yr
NOx	2.3E-03	5.5E-02	20	0.03	2
VOCs	2.3E-01	5.6E+00	2,031	1.02	2
CO	2.1E-02	5.0E-01	184	0.09	5
SOx	1.1E-02	2.6E-01	95	0.05	2

Table 5: Tank-by-Tank Estimated VOC Emissions. (3 Sheets)

Tank Name	Result Average Adjusted to 25 degrees C (mg/m3)	Emission During Retrieval (lbs/yr)	Retrieval Duration - days	Emission During Retrieval - based on duration (lbs/yr)
241-A-101	2.40E+01	3.93E+02	432	3.93E+02
241-A-102	4.60E+00	7.54E+01	7	1.45E+00
241-A-103	7.20E+00	1.18E+02	66	2.13E+01
241-A-106	1.00E+00	1.64E+01	289	1.30E+01
241-AX-101	1.00E+00	1.64E+01	660	1.64E+01
241-AX-102	1.10E+01	1.80E+02	7	3.46E+00
241-AX-103	4.80E-01	7.87E+00	411	7.87E+00
241-AX-104	1.00E+00	1.64E+01	9	4.04E-01
241-B-102	3.90E+00	6.39E+01	10	1.75E+00
241-B-103	1.40E+01	2.29E+02	19	1.19E+01
241-B-105	1.40E+00	2.29E+01	132	8.30E+00
241-B-107	7.70E-01	1.26E+01	30	1.04E+00
241-B-202	7.90E-01	1.29E+01	31	1.10E+00
241-BX-102	7.90E-01	1.29E+01	183	6.49E+00
241-BX-103	4.70E+01	7.70E+02	30	6.33E+01
241-BX-104	1.19E+02	1.95E+03	166	8.87E+02
241-BX-105	4.10E+00	6.72E+01	167	3.07E+01
241-BX-106	1.80E+00	2.95E+01	168	1.36E+01
241-BX-107	1.90E+00	3.11E+01	326	2.78E+01
241-BX-110	1.80E+00	2.95E+01	291	2.35E+01
241-BX-111	3.00E+00	4.92E+01	268	3.61E+01
241-BY-101	5.20E+01	8.52E+02	358	8.36E+02
241-BY-102	1.80E+01	2.95E+02	378	2.95E+02
241-BY-103	7.10E+00	1.16E+02	900	1.16E+02
241-BY-104	1.90E+02	3.11E+03	337	2.88E+03
241-BY-105	1.00E+01	1.64E+02	858	1.64E+02
241-BY-106	1.20E+01	1.97E+02	208	1.12E+02
241-BY-107	7.70E+01	1.26E+03	334	1.15E+03
241-BY-108	2.85E+02	4.67E+03	412	4.67E+03
241-BY-109	1.50E+01	2.46E+02	373	2.46E+02
241-BY-110	4.60E+01	7.54E+02	164	3.39E+02
241-BY-111	7.70E+00	1.26E+02	319	1.10E+02
241-BY-112	1.30E+01	2.13E+02	544	2.13E+02
241-C-101	8.00E+01	1.31E+03	13	4.67E+01
241-C-102	1.23E+02	2.02E+03	114	6.30E+02
241-C-103	4.76E+02	7.80E+03	101	2.16E+03
241-C-104	2.50E+01	4.10E+02	127	1.43E+02
241-C-105	9.20E-01	1.51E+01	88	3.64E+00
241-C-107	3.80E+00	6.23E+01	85	1.45E+01
241-C-108	3.40E-01	5.57E+00	12	1.83E-01
241-C-109	5.30E-01	8.69E+00	14	3.33E-01
241-C-110	5.10E+00	8.36E+01	8	1.83E+00
241-C-111	5.40E-01	8.85E+00	8	1.94E-01
241-C-112	2.70E+00	4.43E+01	23	2.79E+00
241-S-101	7.60E+00	1.25E+02	249	8.50E+01
241-S-103	2.50E+00	4.10E+01	62	6.96E+00

Table 5: Tank-by-Tank Estimated VOC Emissions. (3 Sheets)

Tank Name	Result Average Adjusted to 25 degrees C (mg/m3)	Emission During Retrieval (lbs/yr)	Retrieval Duration - days	Emission During Retrieval - based on duration (lbs/yr)
241-S-105	2.30E+00	3.77E+01	102	1.05E+01
241-S-106	3.50E+00	5.74E+01	96	1.51E+01
241-S-107	6.50E+00	1.07E+02	97	2.83E+01
241-S-108	2.40E+00	3.93E+01	512	3.93E+01
241-S-109	3.40E+00	5.57E+01	513	5.57E+01
241-S-110	3.50E+00	5.74E+01	176	2.77E+01
241-S-111	1.80E+00	2.95E+01	64	5.17E+00
241-SX-101	9.00E-01	1.48E+01	1242	1.48E+01
241-SX-102	1.10E+00	1.80E+01	185	9.14E+00
241-SX-103	7.10E-01	1.16E+01	249	7.94E+00
241-SX-104	1.10E+00	1.80E+01	134	6.62E+00
241-SX-105	1.80E+00	2.95E+01	294	2.38E+01
241-SX-106	2.10E+00	3.44E+01	1221	3.44E+01
241-SX-107	1.70E-01	2.79E+00	14	1.07E-01
241-SX-108	1.90E-01	3.11E+00	106	9.04E-01
241-SX-109	7.50E-01	1.23E+01	178	5.99E+00
241-SX-110	1.90E-01	3.11E+00	26	2.22E-01
241-SX-111	8.50E-02	1.39E+00	29	1.11E-01
241-SX-112	1.10E+00	1.80E+01	27	1.33E+00
241-SX-114	9.00E-02	1.48E+00	23	9.29E-02
241-T-101	7.40E-02	1.21E+00	516	1.21E+00
241-T-104	1.80E+00	2.95E+01	517	2.95E+01
241-T-107	3.60E+00	5.90E+01	139	2.25E+01
241-T-110	1.00E+00	1.64E+01	138	6.20E+00
241-T-111	2.00E+01	3.28E+02	124	1.11E+02
241-TX-101	1.20E-01	1.97E+00	25	1.35E-01
241-TX-102	2.00E+00	3.28E+01	98	8.80E+00
241-TX-103	6.20E-01	1.02E+01	64	1.78E+00
241-TX-104	1.90E-01	3.11E+00	10	8.53E-02
241-TX-105	4.80E+00	7.87E+01	799	7.87E+01
241-TX-106	1.50E+00	2.46E+01	491	2.46E+01
241-TX-108	3.60E-01	5.90E+00	229	3.70E+00
241-TX-110	5.00E+00	8.19E+01	358	8.04E+01
241-TX-111	1.50E+01	2.46E+02	305	2.05E+02
241-TX-112	1.40E+00	2.29E+01	599	2.29E+01
241-TX-113	7.40E-01	1.21E+01	1720	1.21E+01
241-TX-114	2.30E+00	3.77E+01	384	3.77E+01
241-TX-115	6.10E-01	1.00E+01	374	1.00E+01
241-TX-116	4.80E+00	7.87E+01	1213	7.87E+01
241-TX-117	1.10E+00	1.80E+01	1096	1.80E+01
241-TX-118	1.10E+01	1.80E+02	194	9.58E+01
241-TY-101	2.00E+01	3.28E+02	22	1.98E+01
241-TY-102	3.20E-01	5.24E+00	27	3.88E-01
241-TY-103	4.60E+01	7.54E+02	31	6.40E+01
241-TY-104	1.80E+01	2.95E+02	40	3.23E+01
241-TY-105	5.60E+00	9.18E+01	68	1.71E+01

Table 5: Tank-by-Tank Estimated VOC Emissions. (3 Sheets)

Tank Name	Result Average Adjusted to 25 degrees C (mg/m3)	Emission During Retrieval (lbs/yr)	Retrieval Duration - days	Emission During Retrieval - based on duration (lbs/yr)
241-U-102	5.20E+00	8.52E+01	973	8.52E+01
241-U-103	1.00E+01	1.64E+02	192	8.62E+01
241-U-105	2.80E+00	4.59E+01	1045	4.59E+01
241-U-106	1.20E+01	1.97E+02	138	7.44E+01
241-U-108	1.10E+01	1.80E+02	197	9.73E+01
241-U-109	8.50E+00	1.39E+02	139	5.31E+01
241-U-111	3.80E+00	6.23E+01	319	5.44E+01
241-U-112	3.70E+00	6.06E+01	231	3.84E+01
241-U-203	1.80E+00	2.95E+01	7	5.66E-01
241-U-204	7.90E-01	1.29E+01	7	2.48E-01

8.2.2 Toxic Emissions Results

Estimated emissions of TAPs are listed in Table 6. The following notes were used in development of the table:

F1: In accordance with WAC 173-460-050, dioxin and furan emissions are considered together as one TAP and expressed as an equivalent emission of 2,3,7,8 tetrachlorodibenzodioxin (TCDD). A number of the chlorinated dioxins and dibenzofurans are known animal carcinogens and teratogens, from which the 2,3,7,8 TCDD is derived. However, no dioxins have been detected in Hanford tanks and the furans detected in the Hanford waste tanks consist of 35 species of nonchlorinated furans. Little information is available about the nonchlorinated species. In order to evaluate the risk of exposing the public to an unacceptable dose of nonchlorinated furans, a study was performed to identify a compound with toxicological characteristics believed to be representative of nonchlorinated furans. The study was performed by Pacific Northwest National Laboratory (PNNL) and is attached to this NOC. The study is referenced as a letter from David Maughan, PNNL, to David Suford, Lockheed-Martin Hanford Corporation, *A Status Report on the Cancer Potential of Furan Chemicals in the Hanford Tank Headspace Gases and a Recommended Surrogate and ASIL for Using in Assessing Chronic Public Exposure*, dated March 16, 1998. The study identified 1,4-dioxane as the surrogate. The ASIL calculated for dioxins and furans using 1,4-dioxane as a surrogate is 3.2E-02 ug/m3.

F2: N-Nitrosomorpholine does not have an SQER or ASIL value. In order to evaluate the risk of exposing the public to an unacceptable dose of this Class A TAP, a study was performed by PNNL to identify a compound with similar toxicological characteristics to N-Nitrosomorpholine. This study is attached to this NOC. It is referenced as letter from David Maughan, PNNL, to Carl Grando, WHC *Chemical Toxicity Surrogate for N-Nitrosomorpholine,* dated September 6, 1996. The study identified 1-Nitrosopyrrolidine as the surrogate. The calculated ASIL for N-Nitrosomorpholine using 1-Nitrosopyrrolidine as the surrogate is 1.63E-03 ug/m3.

F3: The Class A compound 1,2 Dichloropropane does not have an SQER but does have an ASIL with a special averaging time of 24 hours. For conservatism, the 24-hour averaging ASIL value was assumed as an annual ASIL to arrive at an SQER of 500 pounds per year.

F4: The Class B TAPs propionaldehyde, acetophenone, and carbonyl sulfide do not have ASILs assigned to them by regulation. However, the SQER tables in WAC 173-460-080 assign a SQER of 0.02 pounds per hour for ASILS less than 1. As such, this smallest and most conservative SQER was used for these TAPs.

Table 6: Estimated TAP Emissions During Retrieval. (6 Sheets)

Toxic Air Pollutant	CAS #[a]	TAP CLASS[b]	SQER[c] (A lbs/yr, B lbs/hr)	SQER Ratio[e] (Emissions /SQER)	ASIL[d] (ug/m3)	ASIL Ratio[f] Dispersed/ ASIL)	Emission During Retrieval (lbs/hr)	Emission During Retrieval (lbs/yr)	Dispersed - 24hr (ug/m3)	Dispersed - Annual (ug/m3)
Dioxins and furans		AI	10	7.1E+00	[F1]	4.9E-02	8.1E-03	7.1E+01	2.9E-03	8.0E-05
N-Nitrosomorpholine	59-89-2	AI	0.5	9.3E-02	[F2]	2.4E-05	5.3E-06	4.6E-02	2.3E-06	3.9E-08
1,3-Butadiene	106-99-0	AI, AII	0.5	3.2E+00	0.0036	5.1E-04	1.8E-04	1.6E+00	6.4E-05	1.8E-06
Ethylene dibromide (dibromethane)	106-93-4	AI, AII	0.5	7.4E-01	0.0045	8.4E-05	4.2E-05	3.7E-01	1.6E-05	3.8E-07
Polychlorinated Biphenyls (PCBs)	1336-36-3	AI, AII	0.5	2.8E-01	0.0045	3.0E-05	1.6E-05	1.4E-01	6.6E-06	1.4E-07
Ethylene oxide	75-21-8	AI, AII	10	4.8E-03	0.010	4.1E-06	5.5E-06	4.8E-02	2.4E-06	4.1E-08
Vinyl chloride	75-01-4	AI, AII	10	1.2E-02	0.012	1.0E-05	1.4E-05	1.2E-01	5.3E-06	1.2E-07
Acrylonitrile	107-13-1	AI, AII	10	5.7E-04	0.015	3.2E-07	6.5E-07	5.7E-03	2.8E-07	4.8E-09
1,4-Dioxane	123-91-1	AI, AII	10	1.7E-02	0.032	5.0E-06	2.0E-05	1.7E-01	8.0E-06	1.6E-07
1,2-Dichloroethane (ethylene chloride)	107-06-2	AI, AII	10	1.8E-02	0.038	4.4E-06	2.0E-05	1.8E-01	8.4E-06	1.7E-07
Chloroform	67-66-3	AI, AII	10	5.4E-02	0.043	1.2E-05	6.1E-05	5.4E-01	2.5E-05	5.0E-07
Carbon tetrachloride	56-23-5	AI, AII	20	4.1E-01	0.067	1.0E-04	9.3E-04	8.2E+00	4.0E-04	6.9E-06
Benzene	71-43-2	AI, AII	20	6.1E-01	0.12	1.1E-04	1.4E-03	1.2E+01	4.9E-04	1.4E-05
Acetaldehyde	75-07-0	AI, AII	50	9.7E-02	0.45	1.1E-05	5.6E-04	4.9E+00	2.1E-04	5.1E-06
Dichloromethane (methylene chloride)	75-09-2	AI, AII	50	4.2E-01	0.56	4.2E-05	2.4E-03	2.1E+01	8.7E-04	2.4E-05
Trichloroethylene	79-01-6	AI, AII	50	1.5E-02	0.59	1.4E-06	8.8E-05	7.7E-01	3.3E-05	8.2E-07
Perchloroethylene (tetrachloroethylene)	127-18-4	AI, AII	500	5.4E-03	1.1	2.5E-06	3.1E-04	2.7E+00	1.2E-04	2.8E-06
1,4-Dichlorobenzene	106-46-7	AI, AII	500	5.3E-04	1.5	1.8E-07	3.0E-05	2.6E-01	1.2E-05	2.7E-07
Bis(2-ethylhexyl)phthalate (DEHP)	117-81-7	AI, AII	500	9.5E-06	2.5	2.2E-09	5.4E-07	4.8E-03	1.9E-07	5.4E-09
N-Nitrosodimethylamine	62-75-9	AI, AII			7.1E-05	1.8E-02	1.8E-04	1.6E+00	7.8E-05	1.3E-06
1,2-Dichloropropane	78-87-5	AI, AIII	[F3]	2.9E-04	4.0	3.6E-08	1.6E-05	1.4E-01	6.4E-06	1.5E-07
Acrolein	107-02-8	B	0.02	8.3E-05	0.02	8.3E-07	1.7E-06	1.4E-02	5.8E-07	1.7E-08

Table 6: Estimated TAP Emissions During Retrieval. (6 Sheets)

Toxic Air Pollutant	CAS #[a]	TAP CLASS[b]	SQER[c] (A lbs/yr, B lbs/hr)	SQER Ratio[e] (Emissions /SQER)	ASIL[d] (ug/m3)	ASIL Ratio[f] Dispersed/ ASIL)	Emission During Retrieval (lbs/hr)	Emission During Retrieval (lbs/yr)	Dispersed - 24hr (ug/m3)	Dispersed - Annual (ug/m3)
Methyl isocyanate	624-83-9	B	0.02	2.4E-04	0.16	2.2E-07	4.8E-06	4.2E-02	2.1E-06	3.6E-08
Acrylic acid	79-10-7	B	0.02	2.4E-02	0.3	1.6E-05	4.7E-04	4.1E+00	1.7E-04	4.7E-06
Hexachlorobutadiene	87-68-3	B	0.02	2.1E-03	0.70	5.4E-07	4.1E-05	3.6E-01	1.6E-05	3.8E-07
Allyl chloride	107-05-1	B	0.02	1.8E-04	1.0	2.6E-08	3.6E-06	3.1E-02	1.6E-06	2.6E-08
Methyl hydrazine	60-34-4	B	0.02	1.4E-05	1.2	1.8E-09	2.9E-07	2.5E-03	1.3E-07	2.1E-09
Nitrobenzene	98-95-3	B	0.02	1.0E-04	1.7	8.7E-09	2.0E-06	1.8E-02	8.8E-07	1.5E-08
p-Nitrochlorobenzene	100-00-5	B	0.02	2.9E-05	2.0	2.9E-09	5.8E-07	5.1E-03	2.0E-07	5.8E-09
Diphenylamine	122-39-4	B	0.02	1.9E-03	3.3	1.1E-07	3.8E-05	3.3E-01	1.3E-05	3.7E-07
1,1-Dimethylhydrazine	57-14-7	B	0.02	6.0E-05	4.0	2.2E-09	1.2E-06	1.1E-02	5.2E-07	8.8E-09
Biphenyl	92-52-4	B	0.02	1.0E-01	4.3	1.7E-04	2.0E-03	1.8E+01	7.2E-04	2.0E-05
Methyl bromide	74-83-9	B	0.02	1.2E-03	5.0	1.9E-06	2.4E-05	2.1E-01	9.5E-06	2.1E-07
Tributyl phosphate	126-73-8	B	0.02	9.6E-02	7.3	1.0E-04	1.9E-03	1.7E+01	7.6E-04	1.7E-05
Methylacrylonitrile	126-98-7	B	0.02	5.9E-04	9.0	4.6E-07	1.2E-05	1.0E-01	4.1E-06	1.2E-07
Propylene imine	75-55-8	B	0.20	3.4E-05	16	1.5E-07	6.7E-06	5.9E-02	2.4E-06	6.7E-08
Allyl alcohol	107-18-6	B	0.20	5.5E-06	17	2.8E-08	1.1E-06	9.6E-03	4.8E-07	8.1E-09
Cyanides, as CN (mg/m3 of CN)	51-12-5	B	0.20	3.1E-02	17	1.3E-04	6.2E-03	5.4E+01	2.2E-03	6.1E-05
Diethyl phthalate	84-66-2	B	0.20	7.9E-04	17	4.0E-06	1.6E-04	1.4E+00	6.7E-05	1.2E-06
Dibutyl phthalate	84-74-2	B	0.20	6.5E-06	17	2.7E-08	1.3E-06	1.1E-02	4.6E-07	1.3E-08
1,2-Epoxybutane	106-88-7	B	0.2	1.5E-04	20	5.2E-07	2.9E-05	2.6E-01	1.0E-05	2.9E-07
1-Nitropropane	108-03-2	B	0.20	8.6E-05	20	3.7E-07	1.7E-05	1.5E-01	7.3E-06	1.3E-07
Crotonaldehyde	4170-30-3	B	0.20	1.2E-04	20	4.3E-07	2.4E-05	2.1E-01	8.6E-06	2.4E-07
Phenyl ether	101-84-8	B	0.20	9.9E-05	23	3.8E-07	2.0E-05	1.7E-01	8.7E-06	1.5E-07
1,1,2,2-Tetrachloroethane	79-34-5	B	0.20	2.7E-04	23	9.0E-07	5.4E-05	4.7E-01	2.1E-05	4.9E-07
2,6-Ditert, butyl-p-cresol	128-37-0	B	0.60	9.1E-04	33	5.8E-06	5.5E-04	4.8E+00	1.9E-04	5.5E-06
Pyridine	110-86-1	B	0.60	4.8E-04	53	2.1E-06	2.9E-04	2.5E+00	1.1E-04	2.5E-06

Table 6: Estimated TAP Emissions During Retrieval. (6 Sheets)

Toxic Air Pollutant	CAS #[a]	TAP CLASS[b]	SQER[c] (A lbs/yr, B lbs/hr)	SQER Ratio[e] (Emissions /SQER)	ASIL[d] (ug/m3)	ASIL Ratio[f] Dispersed/, ASIL)	Emission During Retrieval (lbs/hr)	Emission During Retrieval (lbs/yr)	Dispersed - 24hr (ug/m3)	Dispersed - Annual (ug/m3)
Formamide	75-12-7	B	1.20	7.6E-07	60	5.3E-09	9.1E-07	8.0E-03	3.2E-07	9.1E-09
Phenol	108-95-2	B	1.20	2.5E-05	63	1.7E-07	3.0E-05	2.6E-01	1.1E-05	2.9E-07
2-Hexanone (MBK)	591-78-6	B	1.20	7.1E-04	67	4.6E-06	8.5E-04	7.5E+00	3.1E-04	8.4E-06
Vinylidene chloride	75-35-4	B	1.20	4.9E-05	67	3.4E-07	5.8E-05	5.1E-01	2.3E-05	5.2E-07
Trimethylamine	75-50-3	B	1.20	1.5E-04	80	7.8E-07	1.8E-04	1.5E+00	6.2E-05	1.8E-06
Acetic acid	64-19-7	B	1.20	2.0E-04	83	1.0E-06	2.4E-04	2.1E+00	8.5E-05	2.3E-06
Nitric oxide	10102-43-9	B	2.00	1.0E-03	100	7.9E-06	2.1E-03	1.8E+01	7.9E-04	1.9E-05
Carbon disulfide	75-15-0	B	2.00	1.6E-04	100	1.1E-06	3.2E-04	2.8E+00	1.1E-04	3.1E-06
Ammonia	7664-41-7	B	2.00	7.3E-01	100	5.9E-03	1.5E+00	1.3E+04	5.9E-01	1.2E-02
Propionic acid	79-09-4	B	2.00	1.9E-06	100	1.5E-08	3.8E-06	3.3E-02	1.5E-06	3.3E-08
1,2,4-Trichlorobenzene	120-82-1	B	2.00	1.8E-05	120	1.1E-07	3.6E-05	3.2E-01	1.3E-05	3.5E-07
Dimethyl acetamide	127-19-5	B	2.00	2.7E-06	120	1.6E-08	5.4E-06	4.8E-02	1.9E-06	5.4E-08
Dichlorofluoromethane	75-43-4	B	2.60	2.0E-05	130	1.6E-07	5.2E-05	4.6E-01	2.0E-05	4.6E-07
Chlorobenzene	108-90-7	B	2.60	1.1E-05	150	7.2E-08	2.8E-05	2.5E-01	1.1E-05	2.5E-07
Naphthalene	91-20-3	B	2.60	3.5E-06	170	2.3E-08	9.1E-06	8.0E-02	3.9E-06	6.8E-08
1,1,2-Trichloroethane	79-00-5	B	2.60	3.2E-05	180	1.7E-07	8.4E-05	7.3E-01	3.1E-05	8.0E-07
Vinyl acetate	108-05-4	B	2.60	1.2E-07	200	6.8E-10	3.1E-07	2.7E-03	1.4E-07	2.3E-09
Mesityl oxide	141-79-7	B	2.60	5.8E-06	200	2.6E-08	1.5E-05	1.3E-01	5.3E-06	1.5E-07
Acetonitrile	75-05-8	B	2.60	2.3E-03	220	9.7E-06	6.0E-03	5.2E+01	2.1E-03	5.9E-05
Cyclohexanone	108-94-1	B	5	4.4E-05	330	2.4E-07	2.2E-04	1.9E+00	7.9E-05	2.1E-06
Methyl chloride	74-87-3	B	5	1.8E-05	340	1.1E-07	9.2E-05	8.1E-01	3.8E-05	7.5E-07
n-Propyl nitrate	627-13-4	B	5	5.9E-05	360	3.3E-07	3.0E-04	2.6E+00	1.2E-04	2.5E-06
Toluene	108-88-3	B	5	6.2E-04	400	2.9E-06	3.1E-03	2.7E+01	1.2E-03	2.9E-05
2-Butoxyethanol	111-76-2	B	5	2.3E-05	400	1.0E-07	1.1E-04	9.9E-01	4.0E-05	1.1E-06
n-Butyl alcohol	71-36-3	B	5	1.2E-02	500	4.2E-05	5.8E-02	5.1E+02	2.1E-02	5.7E-04

Table 6: Estimated TAP Emissions During Retrieval. (6 Sheets)

Toxic Air Pollutant	CAS #[a]	TAP CLASS[b]	SQER[c] (A lbs/yr, B lbs/hr)	SQER Ratio[e] (Emissions /SQER)	ASIL[d] (ug/m3)	ASIL Ratio[f] Dispersed/ ASIL)	Emission During Retrieval (lbs/hr)	Emission During Retrieval (lbs/yr)	Dispersed - 24hr (ug/m3)	Dispersed - Annual (ug/m3)
Isobutyl alcohol	78-83-1	B	5	2.4E-06	510	1.0E-08	1.2E-05	1.0E-01	5.2E-06	8.8E-08
n-Valeraldehyde	110-62-3	B	5	7.3E-05	590	2.2E-07	3.7E-04	3.2E+00	1.3E-04	3.6E-06
Methyl isobutyl ketone (MIBK)	108-10-1	B	5	1.9E-04	680	4.9E-07	9.3E-04	8.2E+00	3.3E-04	9.1E-06
Cyclohexanol	108-93-0	B	5	4.6E-08	690	1.5E-10	2.3E-07	2.0E-03	1.0E-07	1.7E-09
Ethyl butyl ketone	106-35-4	B	5	2.8E-04	780	6.5E-07	1.4E-03	1.2E+01	5.1E-04	1.3E-05
Methyl isoamyl ketone	110-12-3	B	5	1.2E-05	780	2.7E-08	5.8E-05	5.1E-01	2.1E-05	5.5E-07
Methyl n-amyl ketone	110-43-0	B	5	1.8E-04	780	4.2E-07	9.0E-04	7.9E+00	3.2E-04	8.8E-06
Diprophyl ketone	123-19-3	B	5	6.3E-05	780	1.4E-07	3.2E-04	2.8E+00	1.1E-04	3.1E-06
a-Methyl styrene	98-83-9	B	5	4.2E-07	810	9.0E-10	2.1E-06	1.8E-02	7.3E-07	2.1E-08
Methyl formate	107-31-3	B	5	4.2E-08	820	1.1E-10	2.1E-07	1.8E-03	9.1E-08	1.5E-09
Cumene	98-82-8	B	5	1.1E-05	820	2.3E-08	5.4E-05	4.8E-01	1.9E-05	5.4E-07
Nitromethane	75-52-5	B	5	3.1E-06	830	8.2E-09	1.6E-05	1.4E-01	6.8E-06	1.2E-07
Methyl alcohol	67-56-1	B	5	1.7E-03	870	3.9E-06	8.5E-03	7.4E+01	3.4E-03	7.2E-05
Ethyl benzene	100-41-4	B	5	6.1E-05	1,000	1.1E-07	3.1E-04	2.7E+00	1.1E-04	3.0E-06
Styrene	100-42-5	B	5	5.8E-05	1,000	1.0E-07	2.9E-04	2.5E+00	1.0E-04	2.8E-06
tert-Butyl alcohol	75-65-0	B	5	4.8E-05	1,000	9.8E-08	2.4E-04	2.1E+00	9.8E-05	2.0E-06
sec-Butyl alcohol	78-92-2	B	5	3.0E-05	1,000	5.5E-08	1.5E-04	1.3E+00	5.5E-05	1.4E-06
Methyl ethyl ketone (MEK)	78-93-3	B	5	1.5E-03	1,000	2.7E-06	7.4E-03	6.5E+01	2.7E-03	7.3E-05
o-Dichlorobenzene (1,2-Dichlorobenzene)	95-50-1	B	5	4.5E-06	1,000	8.9E-09	2.3E-05	2.0E-01	8.9E-06	2.0E-07
Isoamyl alcohol	123-51-3	B	5	2.5E-06	1,200	3.7E-09	1.3E-05	1.1E-01	4.4E-06	1.3E-07
Xylenes (m-,o-,p-isomers)	1330-20-7	B	5	3.3E-05	1,500	3.9E-08	1.7E-04	1.5E+00	5.9E-05	1.7E-06
n-Propyl alcohol	71-23-8	B	5	5.3E-04	1,600	6.4E-07	2.6E-03	2.3E+01	1.0E-03	2.3E-05
Tetrahydrofuran	109-99-9	B	5	8.9E-04	2,000	8.0E-07	4.4E-03	3.9E+01	1.6E-03	4.3E-05
Methyl acetate	79-20-9	B	5	3.6E-06	2,000	3.9E-09	1.8E-05	1.6E-01	7.8E-06	1.3E-07

Table 6: Estimated TAP Emissions During Retrieval. (6 Sheets)

Toxic Air Pollutant	CAS #[a]	TAP CLASS[b]	SQER[c] (A lbs/yr, B lbs/hr)	SQER Ratio[e] (Emissions /SQER)	ASIL[d] (ug/m3)	ASIL Ratio[f] Dispersed/ ASIL)	Emission During Retrieval (lbs/hr)	Emission During Retrieval (lbs/yr)	Dispersed - 24hr (ug/m3)	Dispersed - Annual (ug/m3)
Methyl propyl ketone	107-87-9	B	5	3.4E-04	2,300	2.6E-07	1.7E-03	1.5E+01	6.1E-04	1.6E-05
Methyl isopropyl ketone	563-80-4	B	5	1.8E-04	2,300	1.4E-07	8.8E-04	7.7E+00	3.1E-04	8.7E-06
Diethyl ketone	96-22-0	B	5	1.6E-06	2,300	1.3E-09	8.1E-06	7.1E-02	3.1E-06	7.5E-08
n-Butyl acetate	123-86-4	B	5	3.9E-04	2,400	2.8E-07	1.9E-03	1.7E+01	6.8E-04	1.9E-05
1,1-Dichloroethane	75-34-3	B	5	4.6E-06	2,700	3.4E-09	2.3E-05	2.0E-01	9.1E-06	2.0E-07
Isopropyl alcohol	67-63-0	B	5	4.0E-04	3,300	2.3E-07	2.0E-03	1.7E+01	7.5E-04	1.8E-05
Cyclohexane	110-82-7	B	5	1.5E-04	3,400	8.1E-08	7.7E-04	6.8E+00	2.8E-04	7.6E-06
Cyclohexene	110-83-8	B	5	2.2E-07	3,400	1.1E-10	1.1E-06	9.5E-03	3.8E-07	1.1E-08
Isopropyl ether	108-20-3	B	5	9.4E-06	3,500	4.7E-09	4.7E-05	4.1E-01	1.7E-05	4.7E-07
Nonane	111-84-2	B	5	1.5E-04	3,500	7.7E-08	7.6E-04	6.7E+00	2.7E-04	7.5E-06
Octane	111-65-9	B	5	1.9E-04	4,700	7.3E-08	9.6E-04	8.4E+00	3.4E-04	9.6E-06
Ethyl acetate	141-78-6	B	5	1.0E-03	4,800	3.8E-07	5.2E-03	4.5E+01	1.8E-03	5.2E-05
Methylcyclohexane	108-87-2	B	5	2.2E-04	5,400	8.5E-08	1.1E-03	9.8E+00	4.6E-04	9.2E-06
Heptane (n-Heptane)	142-82-5	B	5	4.7E-04	5,500	1.6E-07	2.4E-03	2.1E+01	8.7E-04	2.2E-05
Methyl acetylene	74-99-7	B	5	3.0E-05	5,500	9.6E-09	1.5E-04	1.3E+00	5.3E-05	1.5E-06
Cyclopentane	287-92-3	B	5	2.3E-05	5,700	7.2E-09	1.2E-04	1.0E+00	4.1E-05	1.2E-06
Acetone	67-64-1	B	5	5.3E-03	5,900	1.7E-06	2.6E-02	2.3E+02	9.8E-03	2.5E-04
Pentane	109-66-0	B	5	5.7E-04	6,000	1.7E-07	2.9E-03	2.5E+01	1.0E-03	2.8E-05
Butane	106-97-8	B	5	1.1E-03	6,300	3.2E-07	5.6E-03	4.9E+01	2.0E-03	5.5E-05
Ethyl alcohol	64-17-5	B	5	1.2E-03	6,300	3.9E-07	5.9E-03	5.2E+01	2.4E-03	4.8E-05
Methyl chloroform (1,1,1-Trichloroethane)	71-55-6	B	5	1.1E-05	6,400	3.3E-09	5.7E-05	5.0E-01	2.1E-05	5.2E-07
Ethyl chloride	75-00-3	B	5	8.0E-06	10,000	1.5E-09	4.0E-05	3.5E-01	1.5E-05	3.8E-07
Chlorodifluoromethane	75-45-6	B	5	1.7E-04	12,000	2.6E-08	8.4E-04	7.4E+00	3.1E-04	8.0E-06
Dichlorodifluoromethane	75-71-8	B	5	2.7E-05	16,000	3.4E-09	1.4E-04	1.2E+00	5.4E-05	1.2E-06

Table 6: Estimated TAP Emissions During Retrieval. (6 Sheets)

Toxic Air Pollutant	CAS #[a]	TAP CLASS[b]	SQER[c] (A lbs/yr, B lbs/hr)	SQER Ratio[e] (Emissions /SQER)	ASIL[d] (ug/m3)	ASIL Ratio[f] Dispersed/ ASIL)	Emission During Retrieval (lbs/hr)	Emission During Retrieval (lbs/yr)	Dispersed - 24hr (ug/m3)	Dispersed - Annual (ug/m3)
Trichlorofluoromethane	75-69-4	B	5	6.2E-03	19,000	6.0E-07	3.1E-02	2.7E+02	1.1E-02	2.9E-04
Dichlorotetrafluoroethane	76-14-2	B	5	1.1E-05	23,000	8.7E-10	5.3E-05	4.6E-01	2.0E-05	4.9E-07
1,1,2-Trichloro-1,2,2-trifluorethane	76-13-1	B	5	6.6E-05	27,000	5.0E-09	3.3E-04	2.9E+00	1.4E-04	2.7E-06
Propionaldehyde	123-38-6	B*	[F4]	5.5E-03			1.1E-04	9.7E-01	4.0E-05	1.1E-06
Acetophenone	98-86-2	B*	[F4]	1.4E-02			2.8E-04	2.5E+00	1.0E-04	2.8E-06
Carbonyl sulfide	463-58-1	B*	[F4]	5.2E-04			1.0E-05	9.2E-02	4.6E-06	7.7E-08

[a]Chemical Abstracts Service number (CAS).
[b]Toxic Air Pollutant (TAP) Class as defined in WAC 173-460-150 and -160.
[c]The Small Quantity Emission Rate (SQER) as defined in WAC 173-460-080
[d]The acceptable source impact level (ASIL) as defined in WAC 173-460-150 and -160.
[e]A value greater than 1 would indicate that the SQER was exceeded.
[f]A value greater than 1 would indicate that the ASIL was exceeded.

8.2.3 Summary of Toxic Air Pollutant Issues

Table 7 has been provided to summarize the various TAP issues which have been described in the emission estimate for this NOC. Table 8 ties these issues to individual tanks and includes SQERs which would be exceeded if retrieval of individual tanks were permitted separately. If permitted separately, for example, there would be 6 additional TAPs which would show up as exceeding SQERs. These are ethylene dibromide, PCBs, carbon tetrachloride, benzene, dichloromethane, and biphenyl.

Table 7: Summary of TAP Emission Issues.

Toxic Air Pollutant	CAS #	TAP CLASS	Issue
Dioxins and furans		AI	See F1 explained in section 8.2.2 above. No Dioxins have been seen in Hanford tanks and the Furans that have been found are not chlorinated. 1,4-Dioxane is argued as an appropriate surrogate. However, emission estimates indicate that this surrogate SQER may be exceeded.
N-Nitrosomorpholine	59-89-2	AI	There is no ASIL for this TAP See F2 explained in section 8.2.2 above. 1-Nitrosopyrrolidine is argued as an appropriate surrogate with an ASIL of 1.63E-03 ug/m3. Emission estimates indicate this alternate ASIL, or an appropriately assigned SQER is not exceeded. In addition, this SQER may be exceeded if individual tanks were permitted separately.
1,3-Butadiene	106-99-0	AI, AII	The assigned SQER may be exceeded.
Ethylene dibromide (dibromethane)	106-93-4	AI, AII	The SQER may be exceeded if individual tanks were permitted separately.
Polychlorinated Biphenyls (PCBs)	1336-36-3	AI, AII	The SQER may be exceeded if individual tanks were permitted separately.
Carbon tetrachloride	56-23-5	AI, AII	The SQER may be exceeded if individual tanks were permitted separately.
Benzene	71-43-2	AI, AII	The SQER may be exceeded if individual tanks were permitted separately.
N-Nitrosodimethylamine	62-75-9	AI, AII	The ASIL is too low to assign a SQER
Dichloromethane (methylene chloride)	75-09-2	AI, AII	The SQER may be exceeded if individual tanks were permitted separately.
1,2-Dichloropropane	78-87-5	AI, AIII	No specific SQER can be assigned. See F3 explained in section 8.2.2 above. This Class A, Table III TAP has an ASIL based on a 24-hr average, and a SQER can not be assigned - a SQER of 500 pounds per year has been conservatively assigned. With this, the SQER is not exceeded.
Biphenyl	92-52-4	B	The SQER may be exceeded if individual tanks were permitted separately.
Propionaldehyde	123-38-6	B*	No ASILs are assigned. See F4 explained in section 8.2.2 above. The smallest possible SQER is assigned. Emission estimates do not exceed this SQER.
Acetophenone	98-86-2	B*	
Carbonyl sulfide	463-58-1	B*	

Table 8: Tank-by-Tank Emission Issues. (7 Sheets)

	Tanks Sampled	Tanks with no issue	No ASIL				ASIL too low to assign SQER or SQER is not assignable				SQER is exceeded – including tanks if permitted separately								VOC 2 Ton per year threshold exceeded if permitted separately	Tanks with No Data
			N-Nitrosomorpholine	Propionaldehyde	Acetophenone	Carbonyl sulfide	N-Nitrosomorpholine	Dioxins & Furans	N-Nitrosodimethylamine	1,2-Dichloropropane	Dioxins & Furans - surrogate	1,3-Butadiene	Ethylene dibromide (dibromethane)	Polychlorinated Biphenyls (PCBs)	Carbon tetrachloride	Benzene	Dichloromethane (methylene chloride)	Biphenyl		
141	103	33	1	4	17	2	1	64	14	5	12	8	4	2	2	2	3	1	1	38
241-A-101	x							x			x	x								
241-A-102	x				x															
241-A-103	x							x												
241-A-104																				x
241-A-105																				x
241-A-106	x	x																		
241-AX-101	x							x												
241-AX-102	x							x												
241-AX-103	x							x												
241-AX-104	x																			
241-B-101																				x
241-B-102	x	x																		
241-B-103	x			x				x			x			x						
241-B-104																				x
241-B-105	x							x		x										
241-B-106																				x
241-B-107	x							x					x							
241-B-108																				x
241-B-109																				x
241-B-110																				x

Table 8: Tank-by-Tank Emission Issues. (7 Sheets)

			No ASIL				ASIL too low to assign SQER or SQER is not assignable				SQER is exceeded – including tanks if permitted separately									
	Tanks Sampled	Tanks with no issue	N-Nitrosomorpholine	Propionaldehyde	Acetophenone	Carbonyl sulfide	N-Nitrosomorpholine	Dioxins & Furans	N-Nitrosodimethylamine	1,2-Dichloropropane	Dioxins & Furans - surrogate	1,3-Butadiene	Ethylene dibromide (dibromethane)	Polychlorinated Biphenyls (PCBs)	Carbon tetrachloride	Benzene	Dichloromethane (methylene chloride)	Biphenyl	VOC 2 Ton per year threshold exceeded if permitted separately	Tanks with No Data
241-B-111																				x
241-B-112																				x
241-B-201																				x
241-B-202	x	x																		
241-B-203																				x
241-B-204																				x
241-BX-101																				x
241-BX-102	x							x												
241-BX-103	x			x				x												
241-BX-104	x							x			x									
241-BX-105	x	x																		
241-BX-106	x	x																		
241-BX-107	x	x																		
241-BX-108																				x
241-BX-109																				x
241-BX-110	x							x												
241-BX-111	x							x					x							
241-BX-112																				x
241-BY-101	x							x				x								
241-BY-102	x							x												
241-BY-103	x							x												

Table 8: Tank-by-Tank Emission Issues. (7 Sheets)

	Tanks Sampled	Tanks with no issue	No ASIL				ASIL too low to assign SQER or SQER is not assignable				SQER is exceeded – including tanks if permitted separately								VOC 2 Ton per year threshold exceeded if permitted separately	Tanks with No Data
			N-Nitrosomorpholine	Propionaldehyde	Acetophenone	Carbonyl sulfide	N-Nitrosomorpholine	Dioxins & Furans	N-Nitrosodimethylamine	1,2-Dichloropropane	Dioxins & Furans - surrogate	1,3-Butadiene	Ethylene dibromide (dibromethane)	Polychlorinated Biphenyls (PCBs)	Carbon tetrachloride	Benzene	Dichloromethane (methylene chloride)	Biphenyl		
241-BY-104	x				x			x			x	x				x				
241-BY-105	x				x			x				x								
241-BY-106	x				x			x			x	x								
241-BY-107	x							x			x	x								
241-BY-108	x							x		x	x	x	x				x		x	
241-BY-109	x							x			x									
241-BY-110	x							x												
241-BY-111	x							x												
241-BY-112	x				x			x												
241-C-101	x							x			x									
241-C-102	x							x			x					x				
241-C-103	x				x			x			x	x					x	x		
241-C-104	x							x			x									
241-C-105	x				x			x												
241-C-107	x				x			x									x			
241-C-108	x				x															
241-C-109	x				x															
241-C-110	x							x												
241-C-111	x				x			x												
241-C-112	x				x															
241-S-101	x							x	x											

Table 8: Tank-by-Tank Emission Issues. (7 Sheets)

			No ASIL				ASIL too low to assign SQER or SQER is not assignable				SQER is exceeded – including tanks if permitted separately									
	Tanks Sampled	Tanks with no issue	N-Nitrosomorpholine	Propionaldehyde	Acetophenone	Carbonyl sulfide	N-Nitrosomorpholine	Dioxins & Furans	N-Nitrosodimethylamine	1,2-Dichloropropane	Dioxins & Furans - surrogate	1,3-Butadiene	Ethylene dibromide (dibromethane)	Polychlorinated Biphenyls (PCBs)	Carbon tetrachloride	Benzene	Dichloromethane (methylene chloride)	Biphenyl	VOC 2 Ton per year threshold exceeded if permitted separately	Tanks with No Data
241-S-103	x							x	x	x										
241-S-104																				x
241-S-105	x	x																		
241-S-106	x							x												
241-S-107	x	x																		
241-S-108	x							x												
241-S-109	x																			
241-S-110	x							x	x											
241-S-111	x							x	x											
241-SX-101	x	x																		
241-SX-102	x	x																		
241-SX-103	x							x	x											
241-SX-104	x	x																		
241-SX-105	x	x																		
241-SX-106	x							x	x											
241-SX-107	x	x																		
241-SX-108	x	x																		
241-SX-109	x	x																		
241-SX-110	x	x																		
241-SX-111	x	x																		
241-SX-112	x	x																		

Table 8: Tank-by-Tank Emission Issues. (7 Sheets)

	Tanks Sampled	Tanks with no issue	No ASIL				ASIL too low to assign SQER or SQER is not assignable				SQER is exceeded – including tanks if permitted separately								VOC 2 Ton per year threshold exceeded if permitted separately	Tanks with No Data
			N-Nitrosomorpholine	Propionaldehyde	Acetophenone	Carbonyl sulfide	N-Nitrosomorpholine	Dioxins & Furans	N-Nitrosodimethylamine	1,2-Dichloropropane	Dioxins & Furans - surrogate	1,3-Butadiene	Ethylene dibromide (dibromethane)	Polychlorinated Biphenyls (PCBs)	Carbon tetrachloride	Benzene	Dichloromethane (methylene chloride)	Biphenyl		
241-SX-113																				x
241-SX-114	x	x																		
241-SX-115																				x
241-T-101	x	x																		
241-T-102																				x
241-T-103																				x
241-T-104	x	x																		
241-T-105																				x
241-T-106																				x
241-T-107	x				x			x												
241-T-108																				x
241-T-109																				x
241-T-110	x	x																		
241-T-111	x	x																		
241-T-112																				x
241-T-201																				x
241-T-202																				x
241-T-203																				x
241-T-204																				x
241-TX-101	x	x																		
241-TX-102	x							x												

Table 8: Tank-by-Tank Emission Issues. (7 Sheets)

	Tanks Sampled	Tanks with no issue	No ASIL				ASIL too low to assign SQER or SQER is not assignable				SQER is exceeded – including tanks if permitted separately								VOC 2 Ton per year threshold exceeded if permitted separately	Tanks with No Data
			N-Nitrosomorpholine	Propionaldehyde	Acetophenone	Carbonyl sulfide	N-Nitrosomorpholine	Dioxins & Furans	N-Nitrosodimethylamine	1,2-Dichloropropane	Dioxins & Furans - surrogate	1,3-Butadiene	Ethylene dibromide (dibromethane)	Polychlorinated Biphenyls (PCBs)	Carbon tetrachloride	Benzene	Dichloromethane (methylene chloride)	Biphenyl		
241-TX-103	x	x																		
241-TX-104	x	x																		
241-TX-105	x				x			x							x					
241-TX-106	x							x												
241-TX-107																				x
241-TX-108	x	x																		
241-TX-109																				x
241-TX-110	x							x	x		x									
241-TX-111	x							x												
241-TX-112	x							x												
241-TX-113	x							x							x					
241-TX-114	x							x			x									
241-TX-115	x							x												
241-TX-116	x	x																		
241-TX-117	x	x																		
241-TX-118	x				x			x		x										
241-TY-101	x					x		x												
241-TY-102	x	x																		
241-TY-103	x			x				x						x						
241-TY-104	x				x	x		x												
241-TY-105	x							x												

Table 8: Tank-by-Tank Emission Issues. (7 Sheets)

			No ASIL				ASIL too low to assign SQER or SQER is not assignable				SQER is exceeded – including tanks if permitted separately									
	Tanks Sampled	Tanks with no issue	N-Nitrosomorpholine	Propionaldehyde	Acetophenone	Carbonyl sulfide	N-Nitrosomorpholine	Dioxins & Furans	N-Nitrosodimethylamine	1,2-Dichloropropane	Dioxins & Furans - surrogate	1,3-Butadiene	Ethylene dibromide (dibromethane)	Polychlorinated Biphenyls (PCBs)	Carbon tetrachloride	Benzene	Dichloromethane (methylene chloride)	Biphenyl	VOC 2 Ton per year threshold exceeded if permitted separately	Tanks with No Data
241-TY-106																				x
241-U-101																				x
241-U-102	x							x	x											
241-U-103	x				x			x	x											
241-U-104	x	x																		
241-U-105	x							x	x											
241-U-106	x							x	x											
241-U-108	x		x				x	x	x											
241-U-109	x							x	x											
241-U-110																				x
241-U-111	x							x	x											
241-U-112	x			x				x		x			x							
241-U-201																				x
241-U-202																				x
241-U-203	x	x																		
241-U-204	x	x																		

9.0 REFERENCES

10 CFR 1021, "Compliance with the National Environmental Policy Act," *Code of Federal Regulations*, as amended.

40 CFR 60.2, "Standards Of Performance For New Stationary Sources, Definitions", *Code of Federal Regulations*, as amended.

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WAC 173-400, "General Regulations for Air Pollution Sources," *Washington Administrative Code*, as amended.

WAC 173-460, "Controls for New Sources of Toxic Air Pollutants," *Washington Administrative Code*, as amended.

WAC 197-11, "SEPA Rules," *Washington Administration Code*, as amended.

	B	C	D	E	F	G	H	I
1	**Toxic Air Pollutant**	**CAS # [F1]**	**TAP CLASS [F2]**	**SQE (A lbs/yr, B lbs/hr) [F3]**	**ASIL (ug/m3) [F5]**	**Grand Average (mg/m3)**	**Maximum Reported (mg/m3)**	**Number of Tanks**
2	**Sampling Dates**							
3	Dioxins and furans [F8]		AI*		3.0E-08	1.0E+00	3.6E+01	68
4	N-Nitrosomorpholine	59-89-2	AI*			4.6E-02	4.6E-02	1
5	1,3-Butadiene	106-99-0	AI, AII	0.5	0.0036	1.4E-01	5.4E-01	15
6	Ethylene dibromide (dibromethane)	106-93-4	AI, AII	0.5	0.0045	2.8E-02	8.7E-02	13
7	Polychlorinated Biphenyls (PCBs)	1336-36-3	AI, AII	0.5	0.0045	1.4E-02	3.5E-02	10
8	Ethylene oxide	75-21-8	AI, AII	10	0.010	4.8E-02	4.8E-02	1
9	Vinyl chloride	75-01-4	AI, AII	10	0.012	1.6E-02	3.1E-02	8
10	Acrylonitrile	107-13-1	AI, AII	10	0.015	5.6E-03	5.6E-03	1
11	1,4-Dioxane	123-91-1	AI, AII	10	0.032	3.2E-02	5.5E-02	7
12	1,2-Dichloroethane (ethylene chloride)	107-06-2	AI, AII	10	0.038	2.9E-02	5.3E-02	6
13	Chloroform	67-66-3	AI, AII	10	0.043	2.1E-02	8.2E-02	26
14	Carbon tetrachloride	56-23-5	AI, AII	20	0.067	2.1E-01	2.2E+00	38
15	Benzene	71-43-2	AI, AII	20	0.12	1.7E-01	6.8E+00	69
16	Acetaldehyde	75-07-0	AI, AII	50	0.45	1.5E-01	6.4E-01	32
17	Dichloromethane (methylene chloride)	75-09-2	AI, AII	50	0.56	3.6E-01	6.9E+00	60
18	Trichloroethylene	79-01-6	AI, AII	50	0.59	4.3E-02	4.1E-01	18
19	Perchloroethylene (tetrachloroethylene)	127-18-4	AI, AII	500	1.1	5.5E-02	7.1E-01	50
20	1,4-Dichlorobenzene	106-46-7	AI, AII	500	1.5	1.6E-02	5.1E-02	17
21	Bis(2-ethylhexyl)phthalate (DEHP)	117-81-7	AI, AII	500	2.5	4.6E-03	4.6E-03	1
22	N-Nitrosodimethylamine	62-75-9	AI, AII*		7.1E-05	1.0E-01	2.5E-01	17
23	1,2-Dichloropropane	78-87-5	AI, AIII	[F12]	4.0	2.8E-02	6.5E-02	5
24	Acrolein	107-02-8	B	0.02	0.02	1.4E-02	1.4E-02	1
25	Methyl isocyanate	624-83-9	B	0.02	0.16	4.2E-02	4.2E-02	1
26	Acrylic acid	79-10-7	B	0.02	0.3	4.0E+00	4.0E+00	1
27	Hexachlorobutadiene	87-68-3	B	0.02	0.70	3.0E-02	1.2E-01	12
28	Allyl chloride	107-05-1	B	0.02	1.0	1.5E-02	2.0E-02	2
29	Methyl hydrazine	60-34-4	B	0.02	1.2	2.5E-03	2.5E-03	1
30	Nitrobenzene	98-95-3	B	0.02	1.7	8.7E-03	1.4E-02	2
31	p-Nitrochlorobenzene	100-00-5	B	0.02	2.0	4.9E-03	4.9E-03	1
32	Diphenylamine	122-39-4	B	0.02	3.3	3.5E-02	2.1E-01	9
33	1,1-Dimethylhydrazine	57-14-7	B	0.02	4.0	5.2E-03	7.5E-03	2
34	Biphenyl	92-52-4	B	0.02	4.3	2.9E+00	1.4E+01	6
35	Methyl bromide	74-83-9	B	0.02	5.0	2.1E-02	5.9E-02	10
36	Tributyl phosphate	126-73-8	B	0.02	7.3	6.7E-01	5.9E+00	25
37	Methylacrylonitrile	126-98-7	B	0.02	9.0	1.0E-01	1.0E-01	1
38	Propylene imine	75-55-8	B	0.20	16	6.2E-02	1.3E-01	3
39	Allyl alcohol	107-18-6	B	0.20	17	4.8E-03	8.7E-03	2
40	Cyanides, as CN (mg/m3 of CN)	51-12-5	B	0.20	17	6.3E-01	2.8E+01	85
41	Diethyl phthalate	84-66-2	B	0.20	17	1.2E-01	1.2E+00	11
42	Dibutyl phthalate	84-74-2	B	0.20	17	5.5E-03	5.5E-03	2
43	1,2-Epoxybutane	106-88-7	B	0.2	20	2.5E-01	2.5E-01	1
44	1-Nitropropane	108-03-2	B	0.20	20	7.4E-02	1.3E-01	2
45	Crotonaldehyde	4170-30-3	B	0.20	20	3.2E-02	6.6E-02	7
46	Phenyl ether	101-84-8	B	0.20	23	8.6E-02	1.7E-01	2
47	1,1,2,2-Tetrachloroethane	79-34-5	B	0.20	23	3.9E-02	1.9E-01	12
48	2,6-Ditert. butyl-p-cresol	128-37-0	B	0.60	33	1.5E+00	4.6E+00	3
49	Pyridine	110-86-1	B	0.60	53	8.2E-02	4.3E-01	34
50	Formamide	75-12-7	B	1.20	60	7.7E-03	7.7E-03	1
51	Phenol	108-95-2	B	1.20	63	3.2E-02	8.0E-02	8
52	2-Hexanone (MBK)	591-78-6	B	1.20	67	1.2E-01	2.7E+00	59
53	Vinylidene chloride	75-35-4	B	1.20	67	1.6E-02	9.1E-02	33
54	Trimethylamine	75-50-3	B	1.20	80	1.5E+00	1.5E+00	1
55	Acetic acid	64-19-7	B	1.20	83	1.2E-01	6.4E-01	17
56	Nitric oxide	10102-43-9	B	2.00	100	5.3E-01	2.2E+00	37
57	Carbon disulfide	75-15-0	B	2.00	100	6.8E-01	2.5E+00	4
58	Ammonia	7664-41-7	B	2.00	100	1.4E+02	7.9E+02	96
59	Propionic acid	79-09-4	B	2.00	100	8.1E-03	1.6E-02	4
60	1,2,4-Trichlorobenzene	120-82-1	B	2.00	120	3.7E-02	1.3E-01	10
61	Dimethyl acetamide	127-19-5	B	2.00	120	4.6E-02	4.6E-02	1
62	Dichlorofluoromethane	75-43-4	B	2.60	130	3.8E-02	2.3E-01	13
63	Chlorobenzene	108-90-7	B	2.60	150	1.9E-02	7.7E-02	13
64	Napthalene	91-20-3	B	2.60	170	2.0E-02	4.5E-02	4
65	1,1,2-Trichloroethane	79-00-5	B	2.60	180	6.0E-02	4.9E-01	12
66	Vinyl acetate	108-05-4	B	2.60	200	2.7E-03	2.7E-03	1
67	Mesityl oxide	141-79-7	B	2.60	200	4.2E-02	7.9E-02	3

	B	C	D	E	F	G	H	I
1	Toxic Air Pollutant	CAS # [F1]	TAP CLASS [F2]	SQE (A lbs/yr, B lbs/hr) [F3]	ASIL (ug/m3) [F5]	Grand Average (mg/m3)	Maximum Reported (mg/m3)	Number of Tanks
68	Acetonitrile	75-05-8	B	2.60	220	6.1E-01	2.4E+01	84
69	Cyclohexanone	108-94-1	B	5	330	9.3E-02	3.7E-01	21
70	Methyl chloride	74-87-3	B	5	340	2.3E-02	2.1E-01	37
71	n-Propyl nitrate	627-13-4	B	5	360	1.7E-01	1.1E+00	19
72	Toluene	108-88-3	B	5	400	3.4E-01	4.8E+00	84
73	2-Butoxyethanol	111-76-2	B	5	400	1.4E-01	2.9E-01	7
74	n-Butyl alcohol	71-36-3	B	5	500	5.7E+00	1.8E+02	88
75	Isobutyl alcohol	78-83-1	B	5	510	2.1E-02	5.5E-02	5
76	n-Valeraldehyde	110-62-3	B	5	590	2.6E-01	8.4E-01	12
77	Methyl isobutyl ketone (MIBK)	108-10-1	B	5	680	2.2E-01	3.8E+00	36
78	Cyclohexanol	108-93-0	B	5	690	2.0E-03	2.0E-03	1
79	Ethyl butyl ketone	106-35-4	B	5	780	2.7E-01	3.3E+00	44
80	Methyl isoamyl ketone	110-12-3	B	5	780	7.0E-02	1.8E-01	7
81	Methyl n-amyl ketone	110-43-0	B	5	780	1.3E-01	2.6E+00	58
82	Diprophyl ketone	123-19-3	B	5	780	1.8E-01	2.0E+00	15
83	a-Methyl styrene	98-83-9	B	5	810	8.8E-03	1.3E-02	2
84	Methyl formate	107-31-3	B	5	820	1.8E-03	1.8E-03	1
85	Cumene	98-82-8	B	5	820	2.3E-01	4.3E-01	2
86	Nitromethane	75-52-5	B	5	830	4.5E-02	1.3E-01	3
87	Methyl alcohol	67-56-1	B	5	870	1.8E+00	2.9E+01	58
88	Ethyl benzene	100-41-4	B	5	1,000	6.8E-02	6.6E-01	39
89	Styrene	100-42-5	B	5	1,000	1.1E-01	1.2E+00	23
90	tert-Butyl alcohol	75-65-0	B	5	1,000	9.5E-02	3.3E-01	22
91	sec-Butyl alcohol	78-92-2	B	5	1,000	1.1E-01	6.2E-01	13
92	Methyl ethyl ketone (MEK)	78-93-3	B	5	1,000	8.9E-01	3.8E+01	72
93	o-Dichlorobenzene (1,2-Dichlorobenzene)	95-50-1	B	5	1,000	2.0E-02	5.5E-02	10
94	Isoamyl alcohol	123-51-3	B	5	1,200	5.3E-02	9.8E-02	2
95	Xylenes (m-,o-,p-isomers)	1330-20-7	B	5	1,500	7.1E-01	1.4E+00	2
96	n-Propyl alcohol	71-23-8	B	5	1,600	3.7E-01	4.7E+00	65
97	Tetrahydrofuran	109-99-9	B	5	2,000	6.2E-01	1.5E+01	62
98	Methyl acetate	79-20-9	B	5	2,000	7.8E-02	1.3E-01	2
99	Methyl propyl ketone	107-87-9	B	5	2,300	2.4E-01	4.1E+00	59
100	Methyl isopropyl ketone	563-80-4	B	5	2,300	4.4E-01	6.5E+00	17
101	Diethyl ketone	96-22-0	B	5	2,300	1.7E-02	3.9E-02	4
102	n-Butyl acetate	123-86-4	B	5	2,400	1.8E+00	1.6E+01	9
103	1,1-Dichloroethane	75-34-3	B	5	2,700	2.5E-02	4.9E-02	8
104	Isopropyl alcohol	67-63-0	B	5	3,300	3.0E-01	4.8E+00	58
105	Cyclohexane	110-82-7	B	5	3,400	2.6E-01	3.9E+00	27
106	Cyclohexene	110-83-8	B	5	3,400	9.2E-03	9.2E-03	1
107	Isopropyl ether	108-20-3	B	5	3,500	4.0E-01	4.0E-01	1
108	Nonane	111-84-2	B	5	3,500	1.1E-01	1.6E+00	62
109	Octane	111-65-9	B	5	4,700	1.4E-01	1.6E+00	60
110	Ethyl acetate	141-78-6	B	5	4,800	1.5E+01	4.3E+01	3
111	Methylcyclohexane	108-87-2	B	5	5,400	3.6E-01	1.5E+00	27
112	Heptane (n-Heptane)	142-82-5	B	5	5,500	2.9E-01	4.0E+00	70
113	Methyl acetylene	74-99-7	B	5	5,500	3.2E-01	5.6E-01	4
114	Cyclopentane	287-92-3	B	5	5,700	2.0E-01	6.0E-01	5
115	Acetone	67-64-1	B	5	5,900	2.3E+00	5.0E+01	99
116	Pentane	109-66-0	B	5	6,000	5.7E-01	1.0E+01	43
117	Butane	106-97-8	B	5	6,300	9.6E-01	1.8E+01	50
118	Ethyl alcohol	64-17-5	B	5	6,300	1.4E+00	4.3E+01	72
119	Methyl chloroform (1,1,1-Trichloroethane)	71-55-6	B	5	6,400	1.8E-02	6.3E-02	28
120	Ethyl chloride	75-00-3	B	5	10,000	2.4E-02	1.1E-01	15
121	Chlorodifluoromethane	75-45-6	B	5	12,000	8.9E-01	5.9E+00	8
122	Dichlorodifluoromethane	75-71-8	B	5	16,000	2.9E-02	1.1E-01	41
123	Trichlorofluoromethane	75-69-4	B	5	19,000	2.9E+00	1.7E+02	91
124	Dichlorotetrafluoroethane	76-14-2	B	5	23,000	4.5E-02	1.7E-01	10
125	1,1,2-Trichloro-1,2,2-trifluorethane	76-13-1	B	5	27,000	8.3E-02	4.6E-01	37
126	Propionaldehyde	123-38-6	B*	0.02		2.7E-01	5.1E-01	5
127	Acetophenone	98-86-2	B*	0.02		1.4E-01	2.2E+00	17
128	Carbonyl sulfide	463-58-1	B*	0.02		4.6E-02	6.4E-02	2
129	Total non-methane organic compounds (TNMOC) by EPA TO-12 Method							71
130	Total non-methane organic compounds (TNMOC) by summation of GC/MS results							38

	B	C	J	K	L	M	N	O	P	Q	R
1	**Toxic Air Pollutant**	CAS # [F1]	**A101 mg/m3 Max Average**	**A102 mg/m3 Max Average**	**A103 mg/m3 Max Average**	**A106 mg/m3 Max Average**	**AX101 mg/m3 Max Average**	**AX102 mg/m3 Max Average**	**AX103 mg/m3 Max Average**	**AX104 mg/m3 Max Average**	**B102 mg/m3 Max Average**
2	**Sampling Dates**		6/8/1995	11/10/1995	11/9/1995	01/16/97	6/15/1995	6/27/1995	6/21/1995	01/23/97	4/18/1996
3	Dioxins and furans [F8]		6.08E-01		5.60E-02		4.06E-02	1.35E-01	2.00E-03		
4	N-Nitrosomorpholine	59-89-2									
5	1,3-Butadiene	106-99-0	2.40E-01								
6	Ethylene dibromide (dibromethane)	106-93-4									
7	Polychlorinated Biphenyls (PCBs)	1336-36-3						6.30E-03			
8	Ethylene oxide	75-21-8									
9	Vinyl chloride	75-01-4									
10	Acrylonitrile	107-13-1									
11	1,4-Dioxane	123-91-1									
12	1,2-Dichloroethane (ethylene chloride)	107-06-2									
13	Chloroform	67-66-3									
14	Carbon tetrachloride	56-23-5									
15	Benzene	71-43-2	5.20E-02	6.30E-03	1.50E-02		4.70E-03	6.20E-03	1.00E-03		
16	Acetaldehyde	75-07-0							2.10E-02		
17	Dichloromethane (methylene chloride)	75-09-2	3.80E-02	1.40E-02	3.60E-02			2.40E-02			
18	Trichloroethylene	79-01-6									
19	Perchloroethylene (tetrachloroethylene)	127-18-4	9.90E-02	1.20E-01	4.50E-02		6.60E-03	1.90E-01	2.40E-02		
20	1,4-Dichlorobenzene	106-46-7									
21	Bis(2-ethylhexyl)phthalate (DEHP)	117-81-7									
22	N-Nitrosodimethylamine	62-75-9									
23	1,2-Dichloropropane	78-87-5									
24	Acrolein	107-02-8									
25	Methyl isocyanate	624-83-9									
26	Acrylic acid	79-10-7									
27	Hexachlorobutadiene	87-68-3									
28	Allyl chloride	107-05-1									
29	Methyl hydrazine	60-34-4									
30	Nitrobenzene	98-95-3									
31	p-Nitrochlorobenzene	100-00-5									
32	Diphenylamine	122-39-4									
33	1,1-Dimethylhydrazine	57-14-7									
34	Biphenyl	92-52-4									
35	Methyl bromide	74-83-9									
36	Tributyl phosphate	126-73-8					1.80E-01				
37	Methylacrylonitrile	126-98-7									
38	Propylene imine	75-55-8		3.00E-02							
39	Allyl alcohol	107-18-6									
40	Cyanides, as CN (mg/m3 of CN)	51-12-5	2.51E-01	9.51E-02	9.27E-02	9.29E-02	2.79E-02	5.14E-01	1.54E-02		
41	Diethyl phthalate	84-66-2		9.40E-03			4.70E-03		1.00E-03		
42	Dibutyl phthalate	84-74-2									
43	1,2-Epoxybutane	106-88-7									
44	1-Nitropropane	108-03-2						1.90E-02			
45	Crotonaldehyde	4170-30-3			2.80E-02						
46	Phenyl ether	101-84-8									
47	1,1,2,2-Tetrachloroethane	79-34-5									
48	2,6-Ditert, butyl-p-cresol	128-37-0									
49	Pyridine	110-86-1	3.80E-02	4.80E-03		3.70E-02					
50	Formamide	75-12-7									
51	Phenol	108-95-2									
52	2-Hexanone (MBK)	591-78-6	7.80E-02	1.80E-02	2.70E-02		5.90E-03	4.70E-02	8.00E-04		
53	Vinylidene chloride	75-35-4	3.00E-02				4.60E-03	1.30E-02	6.30E-03		
54	Trimethylamine	75-50-3									
55	Acetic acid	64-19-7	6.40E-02	6.80E-03					5.30E-03		
56	Nitric oxide	10102-43-9		2.90E-01	1.30E-01		1.40E-01	2.30E-01	4.60E-01		2.00E-01
57	Carbon disulfide	75-15-0									
58	Ammonia	7664-41-7	5.73E+02	1.95E+02	2.01E+02	2.11E+02	3.20E+01	2.60E+01	3.20E+01		3.60E+00
59	Propionic acid	79-09-4							1.60E-03		
60	1,2,4-Trichlorobenzene	120-82-1									
61	Dimethyl acetamide	127-19-5									
62	Dichlorofluoromethane	75-43-4						2.30E-01	1.70E-03		
63	Chlorobenzene	108-90-7									
64	Naptnalene	91-20-3									
65	1,1,2-Trichloroethane	79-00-5									
66	Vinyl acetate	108-05-4									
67	Mesityl oxide	141-79-7		1.30E-02				7.90E-02			

	B	C	J	K	L	M	N	O	P	Q	R
1	Toxic Air Pollutant	CAS # [F1]	A101 mg/m3 Max Average	A102 mg/m3 Max Average	A103 mg/m3 Max Average	A106 mg/m3 Max Average	AX101 mg/m3 Max Average	AX102 mg/m3 Max Average	AX103 mg/m3 Max Average	AX104 mg/m3 Max Average	B102 mg/m3 Max Average
68	Acetonitrile	75-05-8	2.60E-01	9.00E-02	9.80E-02	7.50E-02	3.10E-02	4.80E-01	2.30E-02		
69	Cyclohexanone	108-94-1		5.60E-03							
70	Methyl chloride	74-87-3							1.70E-03		
71	n-Propyl nitrate	627-13-4		1.60E-02							
72	Toluene	108-88-3	6.40E-02	5.30E-03	3.10E-02	1.50E+00	6.60E-03	2.20E-02	1.40E-03		
73	2-Butoxyethanol	111-76-2									
74	n-Butyl alcohol	71-36-3	1.20E+01	2.90E-01	1.60E+00	8.40E-01	4.00E-01	5.10E-01	1.20E-02		
75	Isobutyl alcohol	78-83-1									
76	n-Valeraldehyde	110-62-3	4.60E-02				4.30E-02				
77	Methyl isobutyl ketone (MIBK)	108-10-1									
78	Cyclohexanol	108-93-0									
79	Ethyl butyl ketone	106-35-4	5.90E-01	2.20E-01	1.60E-01		6.40E-02	1.20E+00	6.00E-04		
80	Methyl isoamyl ketone	110-12-3									
81	Methyl n-amyl ketone	110-43-0	1.40E-01	2.40E-02	1.90E-02		8.50E-03	6.30E-02	3.00E-04		
82	Diprophyl ketone	123-19-3	7.90E-02	3.50E-02	4.30E-02		9.10E-03	7.80E-02			
83	a-Methyl styrene	98-83-9									
84	Methyl formate	107-31-3									
85	Cumene	98-82-8									
86	Nitromethane	75-52-5							4.80E-03		
87	Methyl alcohol	67-56-1	1.60E+00	3.00E-01		2.10E-01	1.80E-01	3.70E+00	6.10E-02		
88	Ethyl benzene	100-41-4									
89	Styrene	100-42-5									
90	tert-Butyl alcohol	75-65-0									
91	sec-Butyl alcohol	78-92-2	6.00E-02								
92	Methyl ethyl ketone (MEK)	78-93-3	2.70E-01	5.60E-02		1.30E-01	1.60E-02	1.70E-01			
93	o-Dichlorobenzene (1,2-Dichlorobenzene)	95-50-1									
94	Isoamyl alcohol	123-51-3									
95	Xylenes (m-,o-,p-isomers)	1330-20-7									
96	n-Propyl alcohol	71-23-8	3.90E-01	1.90E-02	5.00E-02	6.40E-02	3.00E-02	1.40E-01			
97	Tetrahydrofuran	109-99-9	5.10E-01		3.30E-02		1.80E-02				
98	Methyl acetate	79-20-9									
99	Methyl propyl ketone	107-87-9	9.20E-02	2.10E-02	1.50E-02	2.50E-02	4.70E-03	2.60E-02	5.00E-04		
100	Methyl isopropyl ketone	563-80-4									
101	Diethyl ketone	96-22-0									
102	n-Butyl acetate	123-86-4									
103	1,1-Dichloroethane	75-34-3									
104	Isopropyl alcohol	67-63-0	2.30E-01	1.50E-02	2.60E-02	1.80E-02	7.50E-03				
105	Cyclohexane	110-82-7									
106	Cyclohexene	110-83-8									
107	Isopropyl ether	108-20-3									
108	Nonane	111-84-2	1.90E-02	3.50E-03	6.70E-03		2.40E-03	9.00E-03	4.00E-04		
109	Octane	111-65-9	1.10E-02	7.10E-03	1.40E-02		1.70E-03	1.10E-02	3.00E-04		
110	Ethyl acetate	141-78-6									
111	Methylcyclohexane	108-87-2									
112	Heptane (n-Heptane)	142-82-5	1.00E-01	3.10E-02	1.20E-01		2.00E-02	6.80E-02	3.00E-04		
113	Methyl acetylene	74-99-7									
114	Cyclopentane	287-92-3									
115	Acetone	67-64-1	1.90E+00	1.30E-01	1.60E-01	7.30E-01	2.10E-01	5.80E-01	6.70E-02	3.60E-02	
116	Pentane	109-66-0	9.80E-02		3.80E-02					3.90E-02	
117	Butane	106-97-8	2.30E-01		4.30E-01			2.60E-01			
118	Ethyl alcohol	64-17-5	5.90E-01	4.80E-02	7.30E-02		5.20E-02	4.30E-01	2.00E-03		
119	Methyl chloroform (1,1,1-Trichloroethane)	71-55-6					5.80E-02		1.50E-03		
120	Ethyl chloride	75-00-3									
121	Chlorodifluoromethane	75-45-6									
122	Dichlorodifluoromethane	75-71-8	5.90E-02								
123	Trichlorofluoromethane	75-69-4	3.50E-01	3.10E-02	4.80E-02	9.80E-02	9.80E-02	2.50E+00	3.70E-01		
124	Dichlorotetrafluoroethane	76-14-2									
125	1,1,2-Trichloro-1,2,2-trifluorethane	76-13-1				1.10E-01					
126	Propionaldehyde	123-38-6									
127	Acetophenone	98-86-2		1.30E-02							
128	Carbonyl sulfide	463-58-1									
129	Total non-methane organic compounds (TNMOC) by EPA TO-12 Method			4.60E+00	7.20E+00	1.00E+00					3.90E+00
130	Total non-methane organic compounds (TNMOC) by summation of GC/MS results		2.40E+01				1.00E+00	1.10E+01	4.80E-01	1.00E+00	

	B	C	S	T	U	V	W	X	Y	Z	AA
1	**Toxic Air Pollutant**	**CAS # [F1]**	**B103 mg/m3 Max Average**	**B105 mg/m3 Max Average**	**B107 mg/m3 Max Average**	**B202 mg/m3 Max Average**	**BX102 mg/m3 Max Average**	**BX103 mg/m3 Max Average**	**BX104 mg/m3 Max Average**	**BX105 mg/m3 Max Average**	**BX106 mg/m3 Max Average**
2	**Sampling Dates**		2/8/1995, 10/16/1996	7/30/1996	7/23/1996	7/18/1996	07/31/96	08/01/96	12/30/94, 8/22/96, 12/12/96, 02/06/97, 04/07/97, 06/10/97	4/24/1996	08/15/96
3	Dioxins and furans [F8]		7.33E-01	4.70E-02	1.90E-02		7.60E-02	1.20E-01	1.47E+00		
4	N-Nitrosomorpholine	59-89-2									
5	1,3-Butadiene	106-99-0									
6	Ethylene dibromide (dibromethane)	106-93-4		1.90E-02	3.30E-02		7.20E-03		8.50E-03		
7	Polychlorinated Biphenyls (PCBs)	1336-36-3	3.30E-02								
8	Ethylene oxide	75-21-8									
9	Vinyl chloride	75-01-4		6.70E-03	1.60E-02						
10	Acrylonitrile	107-13-1									
11	1,4-Dioxane	123-91-1									
12	1,2-Dichloroethane (ethylene chloride)	107-06-2		1.10E-02							
13	Chloroform	67-66-3	5.00E-04	1.60E-02	2.60E-02		5.90E-03	9.10E-03	5.90E-03		
14	Carbon tetrachloride	56-23-5	2.00E-04	1.90E-02	3.00E-02		6.80E-03		7.50E-03		
15	Benzene	71-43-2	1.40E-02	9.90E-03	1.50E-02		7.20E-03	1.30E-02	3.60E-02		
16	Acetaldehyde	75-07-0	2.00E-01						6.40E-01		
17	Dichloromethane (methylene chloride)	75-09-2	7.20E-02	3.90E-02	1.10E-01		1.30E-01	8.00E-02	1.70E-01		
18	Trichloroethylene	79-01-6	4.00E-03	1.20E-02	2.40E-02		6.40E-03	1.80E-02	6.60E-03		
19	Perchloroethylene (tetrachloroethylene)	127-18-4	4.70E-02	4.40E-02	3.80E-02		9.90E-03	3.60E-02	1.90E-02		
20	1,4-Dichlorobenzene	106-46-7	9.60E-03	9.80E-03	2.20E-02		8.20E-03	1.80E-02	6.90E-03		
21	Bis(2-ethylhexyl)phthalate (DEHP)	117-81-7									
22	N-Nitrosodimethylamine	62-75-9									
23	1,2-Dichloropropane	78-87-5		1.50E-02							
24	Acrolein	107-02-8	1.40E-02								
25	Methyl isocyanate	624-83-9									
26	Acrylic acid	79-10-7									
27	Hexachlorobutadiene	87-68-3	1.00E-02	2.40E-02	2.70E-02				8.80E-03		
28	Allyl chloride	107-05-1									
29	Methyl hydrazine	60-34-4									
30	Nitrobenzene	98-95-3									
31	p-Nitrochlorobenzene	100-00-5									
32	Diphenylamine	122-39-4									
33	1,1-Dimethylhydrazine	57-14-7									
34	Biphenyl	92-52-4									
35	Methyl bromide	74-83-9		9.60E-03							
36	Tributyl phosphate	126-73-8	6.50E-02					1.50E-02	2.10E-01		
37	Methylacrylonitrile	126-98-7									
38	Propylene imine	75-55-8									
39	Allyl alcohol	107-18-6									
40	Cyanides, as CN (mg/m3 of CN)	51-12-5	2.38E-01	8.93E-02	7.28E-02		6.12E-02	3.09E+00	7.15E-01		
41	Diethyl phthalate	84-66-2									
42	Dibutyl phthalate	84-74-2									
43	1,2-Epoxybutane	106-88-7	2.50E-01								
44	1-Nitropropane	108-03-2									
45	Crotonaldehyde	4170-30-3	2.00E-02								
46	Phenyl ether	101-84-8									
47	1,1,2,2-Tetrachloroethane	79-34-5	1.80E-03	2.50E-02	3.30E-02				4.50E-03		
48	2,6-Ditert, butyl-p-cresol	128-37-0									
49	Pyridine	110-86-1	7.50E-03	8.50E-03	2.40E-02			2.80E-02	3.10E-01		
50	Formamide	75-12-7									
51	Phenol	108-95-2									
52	2-Hexanone (MBK)	591-78-6	3.10E-02					4.30E-01	2.60E-01		
53	Vinylidene chloride	75-35-4		1.00E-02	2.10E-02				5.40E-03		
54	Trimethylamine	75-50-3									
55	Acetic acid	64-19-7									
56	Nitric oxide	10102-43-9	6.20E-01						5.80E-01		
57	Carbon disulfide	75-15-0						4.90E-02			
58	Ammonia	7664-41-7	6.70E+00	4.20E+00	1.60E+01	2.10E+00	2.00E+00	6.90E+01	2.00E+02	1.12E+02	3.60E+01
59	Propionic acid	79-09-4									
60	1,2,4-Trichlorobenzene	120-82-1	1.90E-02	1.00E-02							
61	Dimethyl acetamide	127-19-5									
62	Dichlorofluoromethane	75-43-4									
63	Chlorobenzene	108-90-7	1.00E-03	1.40E-02	2.10E-02				6.90E-03		
64	Naptnalene	91-20-3									
65	1,1,2-Trichloroethane	79-00-5		1.30E-02	2.50E-02				1.10E-02		
66	Vinyl acetate	108-05-4									
67	Mesityl oxide	141-79-7									

	B	C	S	T	U	V	W	X	Y	Z	AA
1	**Toxic Air Pollutant**	**CAS # [F1]**	**B103 mg/m3 Max Average**	**B105 mg/m3 Max Average**	**B107 mg/m3 Max Average**	**B202 mg/m3 Max Average**	**BX102 mg/m3 Max Average**	**BX103 mg/m3 Max Average**	**BX104 mg/m3 Max Average**	**BX105 mg/m3 Max Average**	**BX106 mg/m3 Max Average**
68	Acetonitrile	75-05-8	1.90E-01	8.40E-02	6.00E-02		6.80E-02	1.50E+00	5.80E-01		
69	Cyclohexanone	108-94-1	7.00E-02	3.30E-02	9.20E-02		8.80E-02	1.50E-01	1.30E-01		
70	Methyl chloride	74-87-3	1.30E-03	6.80E-03	1.50E-02		9.90E-03		5.60E-03		
71	n-Propyl nitrate	627-13-4	6.30E-01								
72	Toluene	108-88-3	1.10E-01	7.50E-02	2.60E-02		2.10E-01	4.80E+00	5.20E-01		
73	2-Butoxyethanol	111-76-2									
74	n-Butyl alcohol	71-36-3	3.30E+00	1.70E-01	5.80E-02		1.70E-01	3.00E+00	2.90E+01		
75	Isobutyl alcohol	78-83-1									
76	n-Valeraldehyde	110-62-3	8.20E-02					4.80E-01	4.10E-01		
77	Methyl isobutyl ketone (MIBK)	108-10-1	1.20E-02	2.10E-02	3.30E-02		2.40E-02	7.20E-01	2.70E-01		
78	Cyclohexanol	108-93-0									
79	Ethyl butyl ketone	106-35-4	2.30E-01						4.90E-01		
80	Methyl isoamyl ketone	110-12-3							4.60E-02		
81	Methyl n-amyl ketone	110-43-0	1.80E-02					2.70E-01	4.30E-01		
82	Diprophyl ketone	123-19-3									
83	a-Methyl styrene	98-83-9	1.30E-02								
84	Methyl formate	107-31-3									
85	Cumene	98-82-8									
86	Nitromethane	75-52-5									
87	Methyl alcohol	67-56-1	8.60E-01	1.20E-01	2.30E-01		6.80E-02	8.90E-01	2.10E+00		
88	Ethyl benzene	100-41-4	5.50E-02	8.20E-03	4.10E-02		4.10E-02	6.60E-01	9.20E-02		
89	Styrene	100-42-5	4.10E-02	1.10E-02	3.40E-02		3.50E-02	1.40E-01	3.10E-02		
90	tert-Butyl alcohol	75-65-0	1.00E-01					1.20E-01	6.30E-02		
91	sec-Butyl alcohol	78-92-2	1.30E-02					1.40E-01	1.50E-01		
92	Methyl ethyl ketone (MEK)	78-93-3	4.50E-01	6.60E-02			7.40E-02	1.40E+00	1.60E+00		
93	o-Dichlorobenzene (1,2-Dichlorobenzene)	95-50-1	2.90E-03	1.10E-02	2.20E-02						
94	Isoamyl alcohol	123-51-3							9.80E-02		
95	Xylenes (m-,o-,p-isomers)	1330-20-7									
96	n-Propyl alcohol	71-23-8	2.80E-01	2.40E-02	5.50E-02		3.60E-02	6.10E-01	2.00E+00		
97	Tetrahydrofuran	109-99-9	7.00E-01	4.70E-02	1.90E-02		7.60E-02	1.20E-01	1.20E+00		
98	Methyl acetate	79-20-9									
99	Methyl propyl ketone	107-87-9	2.90E-02					5.60E-01	5.40E-01		
100	Methyl isopropyl ketone	563-80-4							4.20E-02		
101	Diethyl ketone	96-22-0									
102	n-Butyl acetate	123-86-4									
103	1,1-Dichloroethane	75-34-3		1.10E-02	2.10E-02				4.80E-03		
104	Isopropyl alcohol	67-63-0						1.10E-01	2.60E-01		
105	Cyclohexane	110-82-7	5.80E-03	1.50E-02				3.80E-01	3.30E-02		
106	Cyclohexene	110-83-8									
107	Isopropyl ether	108-20-3									
108	Nonane	111-84-2	1.60E-02	7.40E-03	1.70E-02		1.40E-02	1.90E-01	2.00E-01		
109	Octane	111-65-9	3.10E-02	6.60E-03	1.40E-02			2.20E-01	2.00E-01		
110	Ethyl acetate	141-78-6									
111	Methylcyclohexane	108-87-2	2.60E-02					8.30E-02			
112	Heptane (n-Heptane)	142-82-5	2.00E-01	1.40E-02	1.90E-02		2.20E-02	3.10E-01	3.20E-01		
113	Methyl acetylene	74-99-7									
114	Cyclopentane	287-92-3									
115	Acetone	67-64-1	8.40E-01	2.20E-01	2.20E-01		1.60E-01	1.90E+00	6.60E+00		
116	Pentane	109-66-0.	3.20E-01	1.10E-02	2.10E-02			1.20E+00	7.10E-01		
117	Butane	106-97-8	7.60E-01	2.30E-02	2.90E-02		3.90E-02	1.90E+00	2.20E+00		
118	Ethyl alcohol	64-17-5	4.20E-01		4.70E-02		1.30E-02	8.80E-01	1.70E+00		
119	Methyl chloroform (1,1,1-Trichloroethane)	71-55-6	8.90E-03	1.90E-02	3.00E-02		1.40E-02	4.00E-02	5.50E-02		
120	Ethyl chloride	75-00-3	1.40E-02	5.60E-03	1.70E-02				2.70E-02		
121	Chlorodifluoromethane	75-45-6	5.50E-02								
122	Dichlorodifluoromethane	75-71-8	5.90E-03	1.60E-02	3.00E-02		1.20E-02	3.50E-03	2.00E-02		
123	Trichlorofluoromethane	75-69-4	1.20E+00	1.10E+00	1.80E+00		5.60E-01	5.40E-01	2.00E+00		
124	Dichlorotetrafluoroethane	76-14-2		1.90E-02	4.20E-02		1.10E-02				
125	1,1,2-Trichloro-1,2,2-trifluorethane	76-13-1	2.60E-02	5.00E-02	6.70E-02		3.30E-02	2.50E-02	1.00E-01		
126	Propionaldehyde	123-38-6	2.90E-01					5.10E-01			
127	Acetophenone	98-86-2									
128	Carbonyl sulfide	463-58-1									
129	Total non-methane organic compounds (TNMOC) by EPA TO-12 Method		1.40E+01	1.40E+00	7.70E-01	7.90E-01	7.90E-01	4.70E+01	1.19E+02	4.10E+00	1.80E+00
130	Total non-methane organic compounds (TNMOC) by summation of GC/MS results										

	B	C	AB	AC	AD	AE	AF	AG	AH	AI	AJ
1	**Toxic Air Pollutant**	**CAS # [F1]**	**BX107 mg/m3 Max Average**	**BX110 mg/m3 Max Average**	**BX111 mg/m3 Max Average**	**BY101 mg/m3 Max Average**	**BY102 mg/m3 Max Average**	**BY103 mg/m3 Max Average**	**BY104 mg/m3 Max Average**	**BY105 mg/m3 Max Average**	**BY106 mg/m3 Max Average**
2	**Sampling Dates**		11/17/1995	4/30/1996	08/27/96	08/29/96	11/21/1995	5/5/1994, 11/1/1994	4/1994, 6/24/1994	5/9/1994, 7/7/1994	5/1994, 7/8/1994
3	Dioxins and furans [F8]			5.30E-03	2.10E-02	2.70E-01	1.56E-01	2.10E-01	8.86E-01	3.01E-01	7.53E-01
4	N-Nitrosomorpholine	59-89-2									
5	1,3-Butadiene	106-99-0				1.50E-01		3.60E-03	3.20E-01	1.10E-01	4.00E-02
6	Ethylene dibromide (dibromethane)	106-93-4			3.40E-02	8.30E-03					
7	Polychlorinated Biphenyls (PCBs)	1336-36-3						7.80E-03			
8	Ethylene oxide	75-21-8									
9	Vinyl chloride	75-01-4			1.80E-02						
10	Acrylonitrile	107-13-1									
11	1,4-Dioxane	123-91-1									5.50E-02
12	1,2-Dichloroethane (ethylene chloride)	107-06-2									
13	Chloroform	67-66-3			2.70E-02	6.00E-03					
14	Carbon tetrachloride	56-23-5			3.00E-02	7.50E-03					
15	Benzene	71-43-2		1.90E-03	1.70E-02	1.00E-02	1.40E-02	8.00E-03	6.80E+00	2.20E-02	2.30E-02
16	Acetaldehyde	75-07-0		3.80E-02	1.20E-01	2.30E-01					
17	Dichloromethane (methylene chloride)	75-09-2		3.20E-02	6.70E-02	1.90E-01	3.20E-02	1.10E-02	2.50E-02	1.80E-02	3.80E-03
18	Trichloroethylene	79-01-6			2.50E-02	6.30E-03					
19	Perchloroethylene (tetrachloroethylene)	127-18-4		4.40E-03	3.30E-02	1.40E-02		7.40E-03	2.30E-02	7.40E-03	2.40E-02
20	1,4-Dichlorobenzene	106-46-7			1.10E-02	1.50E-02					
21	Bis(2-ethylhexyl)phthalate (DEHP)	117-81-7									
22	N-Nitrosodimethylamine	62-75-9									
23	1,2-Dichloropropane	78-87-5									
24	Acrolein	107-02-8									
25	Methyl isocyanate	624-83-9									
26	Acrylic acid	79-10-7									
27	Hexachlorobutadiene	87-68-3			2.70E-02						
28	Allyl chloride	107-05-1									
29	Methyl hydrazine	60-34-4									
30	Nitrobenzene	98-95-3									
31	p-Nitrochlorobenzene	100-00-5									
32	Diphenylamine	122-39-4						6.90E-03			
33	1,1-Dimethylhydrazine	57-14-7									
34	Biphenyl	92-52-4									
35	Methyl bromide	74-83-9			2.80E-02						
36	Tributyl phosphate	126-73-8							9.70E-03	2.10E-03	5.00E-04
37	Methylacrylonitrile	126-98-7									
38	Propylene imine	75-55-8					2.70E-02				
39	Allyl alcohol	107-18-6									
40	Cyanides, as CN (mg/m3 of CN)	51-12-5	8.74E-02	1.87E-02	6.86E-02	4.72E-02	8.38E-02	1.37E-01	4.14E-01	1.00E-01	1.74E-01
41	Diethyl phthalate	84-66-2								3.70E-02	3.50E-02
42	Dibutyl phthalate	84-74-2									
43	1,2-Epoxybutane	106-88-7									
44	1-Nitropropane	108-03-2									
45	Crotonaldehyde	4170-30-3								3.70E-02	5.40E-02
46	Phenyl ether	101-84-8									
47	1,1,2,2-Tetrachloroethane	79-34-5			3.50E-02						
48	2,6-Ditert, butyl-p-cresol	128-37-0									
49	Pyridine	110-86-1		3.40E-02	3.30E-02	9.50E-03					
50	Formamide	75-12-7									
51	Phenol	108-95-2							7.30E-02	1.40E-02	4.60E-02
52	2-Hexanone (MBK)	591-78-6	1.90E-03				1.30E-01	2.00E-02	2.30E-01	2.20E-02	1.70E-02
53	Vinylidene chloride	75-35-4			2.20E-02	5.80E-03			1.30E-02	5.80E-03	4.30E-03
54	Trimethylamine	75-50-3									
55	Acetic acid	64-19-7		3.40E-02				5.30E-02			
56	Nitric oxide	10102-43-9					3.60E-01		4.60E-01	1.30E-01	1.80E-01
57	Carbon disulfide	75-15-0									
58	Ammonia	7664-41-7	6.30E+01	4.80E+01	4.80E+01	4.60E+01	1.33E+02	2.60E+01	2.16E+02	4.30E+01	6.80E+01
59	Propionic acid	79-09-4									
60	1,2,4-Trichlorobenzene	120-82-1									
61	Dimethyl acetamide	127-19-5									
62	Dichlorofluoromethane	75-43-4									
63	Chlorobenzene	108-90-7			2.20E-02	6.00E-03					
64	Naphthalene	91-20-3									
65	1,1,2-Trichloroethane	79-00-5			2.50E-02	6.50E-03					
66	Vinyl acetate	108-05-4									
67	Mesityl oxide	141-79-7					3.50E-02				

	B	C	AB	AC	AD	AE	AF	AG	AH	AI	AJ
1	Toxic Air Pollutant	CAS # [F1]	BX107 mg/m3 Max Average	BX110 mg/m3 Max Average	BX111 mg/m3 Max Average	BY101 mg/m3 Max Average	BY102 mg/m3 Max Average	BY103 mg/m3 Max Average	BY104 mg/m3 Max Average	BY105 mg/m3 Max Average	BY106 mg/m3 Max Average
68	Acetonitrile	75-05-8	5.00E-02	2.10E-02	5.30E-02	5.10E-02	9.10E-02	4.30E-02	4.70E-01	1.40E-01	2.10E-01
69	Cyclohexanone	108-94-1			9.60E-02	1.10E-01					
70	Methyl chloride	74-87-3			1.70E-02			2.30E-03	1.80E-02	6.80E-03	6.40E-03
71	n-Propyl nitrate	627-13-4									
72	Toluene	108-88-3	7.50E-03	1.10E-02	6.90E-01	7.00E-01	6.00E-02	2.40E-01	7.00E-01	2.50E+00	3.40E-01
73	2-Butoxyethanol	111-76-2						1.30E-01	2.90E-01	1.00E-01	1.00E-01
74	n-Butyl alcohol	71-36-3	1.60E-01	1.00E-01	8.00E-02	3.50E+01	5.90E+00	6.00E+00	2.60E+00	2.10E+00	1.00E+00
75	Isobutyl alcohol	78-83-1									
76	n-Valeraldehyde	110-62-3							7.30E-02		
77	Methyl isobutyl ketone (MIBK)	108-10-1		3.70E-03	1.70E-01	3.00E-01	3.80E-02			1.10E-02	1.80E-02
78	Cyclohexanol	108-93-0									
79	Ethyl butyl ketone	106-35-4				1.20E-01	6.40E-01	6.40E-02	1.90E-01	4.40E-02	2.60E-02
80	Methyl isoamyl ketone	110-12-3					2.90E-02		3.90E-02		
81	Methyl n-amyl ketone	110-43-0	1.30E-03				1.70E-01	2.90E-02	1.90E-01	2.00E-02	1.50E-02
82	Diprophyl ketone	123-19-3					9.40E-02			2.10E-02	
83	a-Methyl styrene	98-83-9									
84	Methyl formate	107-31-3									
85	Cumene	98-82-8									
86	Nitromethane	75-52-5									
87	Methyl alcohol	67-56-1	6.30E-02	1.40E+00	1.10E+00	7.10E-01					
88	Ethyl benzene	100-41-4			1.50E-01	2.20E-01			1.30E-02	8.10E-03	6.30E-03
89	Styrene	100-42-5			3.90E-02	5.50E-02			2.30E-02	7.80E-03	5.00E-03
90	tert-Butyl alcohol	75-65-0									
91	sec-Butyl alcohol	78-92-2								9.20E-03	
92	Methyl ethyl ketone (MEK)	78-93-3		2.40E-02	1.10E-01	9.60E-01		2.70E-01	1.30E+00	1.50E-01	1.90E-01
93	o-Dichlorobenzene (1,2-Dichlorobenzene)	95-50-1									
94	Isoamyl alcohol	123-51-3									
95	Xylenes (m-,o-,p-isomers)	1330-20-7									
96	n-Propyl alcohol	71-23-8		4.70E-02	7.10E-02	5.30E-01	1.80E-01		5.50E-02		
97	Tetrahydrofuran	109-99-9		5.30E-03	2.10E-02	2.70E-01	1.20E-01	2.10E-01	7.30E-01	2.20E-01	2.80E-01
98	Methyl acetate	79-20-9									
99	Methyl propyl ketone	107-87-9	2.80E-03			1.50E-01	1.40E-01	6.60E-02	4.90E-01	4.20E-02	1.20E-01
100	Methyl isopropyl ketone	563-80-4							6.40E-02	9.20E-03	
101	Diethyl ketone	96-22-0									
102	n-Butyl acetate	123-86-4							2.30E-02	9.20E-03	6.60E-03
103	1,1-Dichloroethane	75-34-3			2.30E-02						
104	Isopropyl alcohol	67-63-0	5.60E-02		2.40E-01	2.60E-01	1.10E-01	2.40E-01	6.10E-01	2.70E-01	2.50E-01
105	Cyclohexane	110-82-7		7.50E-02		4.10E-02			6.40E-02		
106	Cyclohexene	110-83-8								9.20E-03	
107	Isopropyl ether	108-20-3									
108	Nonane	111-84-2			1.90E-02	2.90E-02	1.80E-01	3.90E-03	2.10E-01	7.30E-02	2.40E-02
109	Octane	111-65-9			1.50E-02	2.10E-02	2.30E-01	3.50E-03	3.50E-01	1.20E-01	1.00E-01
110	Ethyl acetate	141-78-6									
111	Methylcyclohexane	108-87-2						2.80E-01	1.70E-01	6.40E-02	3.80E-02
112	Heptane (n-Heptane)	142-82-5	2.00E-03	2.20E-03	2.30E-02	8.20E-02	2.70E-01	1.30E-01	9.10E-01	3.10E-01	3.10E-01
113	Methyl acetylene	74-99-7									5.80E-02
114	Cyclopentane	287-92-3							2.00E-01	4.80E-02	1.10E-01
115	Acetone	67-64-1	8.70E-02	4.90E-01	1.10E+00	3.10E+00	1.20E+00	1.30E+00	2.60E+00	5.90E-01	8.70E-01
116	Pentane	109-66-0		8.70E-03	3.00E-02	9.40E-02		4.60E-02	1.40E+00	4.40E-01	6.90E-01
117	Butane	106-97-8		8.90E-03	4.00E-02	3.00E-01		5.50E-02	1.30E+00	4.30E-01	7.80E-01
118	Ethyl alcohol	64-17-5		1.50E+00	4.60E-01	5.00E-01	1.30E-01	1.20E-01			1.00E-01
119	Methyl chloroform (1,1,1-Trichloroethane)	71-55-6			3.10E-02	1.10E-02			6.00E-03		
120	Ethyl chloride	75-00-3			1.70E-02						
121	Chlorodifluoromethane	75-45-6			5.90E+00						
122	Dichlorodifluoromethane	75-71-8		6.70E-03	3.60E-02	1.20E-02		5.40E-03	8.30E-02	3.60E-02	6.00E-02
123	Trichlorofluoromethane	75-69-4		3.50E-02	3.20E-01	2.50E+00	5.60E-02	8.80E-01	1.66E+02	9.80E-01	1.20E+00
124	Dichlorotetrafluoroethane	76-14-2			4.80E-02	1.10E-02					
125	1,1,2-Trichloro-1,2,2-trifluorethane	76-13-1			3.80E-02	2.10E-02			8.40E-03	8.40E-03	
126	Propionaldehyde	123-38-6									
127	Acetophenone	98-86-2							5.50E-02	9.20E-03	8.70E-03
128	Carbonyl sulfide	463-58-1									
129	Total non-methane organic compounds (TNMOC) by EPA TO-12 Method		1.90E+00	1.80E+00	3.00E+00	5.20E+01	1.80E+01				
130	Total non-methane organic compounds (TNMOC) by summation of GC/MS results							7.10E+00	1.90E+02	1.00E+01	1.20E+01

	B	C	AK	AL	AM	AN	AO	AP	AQ	AR	AS
1	Toxic Air Pollutant	CAS # [F1]	BY107 mg/m3 Max Average	BY108 mg/m3 Max Average	BY109 mg/m3 Max Average	BY110 mg/m3 Max Average	BY111 mg/m3 Max Average	BY112 mg/m3 Max Average	C101 mg/m3 Max Average	C102 mg/m3 Max Average	C103 mg/m3 Max Average
2	Sampling Dates		3/25/1994, 10/26/1994	3/28/1994, 10/27/94, 1/23/96, 3/28/96, 09/10/96, 11/14/96, 01/30/97	9/22/1994	11/11/1994	5/11/1994, 11/16/1994	11/18/1994	9/1/1994	8/23/1994	11/1993, 12/1993, 1/1994, 4/1994, 5/1994
3	Dioxins and furans [F8]		4.56E+00	1.03E+01	3.09E+00	4.80E-01	9.26E-02	5.50E-03	1.00E+00	3.12E+00	3.57E+01
4	N-Nitrosomorpholine	59-89-2									
5	1,3-Butadiene	106-99-0	8.90E-02	4.20E-01			1.10E-02				1.40E-01
6	Ethylene dibromide (dibromethane)	106-93-4		8.70E-02							
7	Polychlorinated Biphenyls (PCBs)	1336-36-3						5.70E-03			
8	Ethylene oxide	75-21-8									
9	Vinyl chloride	75-01-4		2.40E-02							
10	Acrylonitrile	107-13-1									
11	1,4-Dioxane	123-91-1									
12	1,2-Dichloroethane (ethylene chloride)	107-06-2		3.90E-02							
13	Chloroform	67-66-3		5.90E-02							
14	Carbon tetrachloride	56-23-5		6.60E-02							
15	Benzene	71-43-2	1.20E-01	5.70E-01	4.40E-02	1.10E-01	3.50E-02	6.50E-03	9.10E-01	2.00E+00	2.60E-01
16	Acetaldehyde	75-07-0			6.00E-02			1.40E-01	6.40E-02	6.20E-01	
17	Dichloromethane (methylene chloride)	75-09-2	4.30E-02	6.90E+00			4.80E-03	5.40E-03	7.20E-01	3.00E-01	6.00E+00
18	Trichloroethylene	79-01-6		4.10E-01							
19	Perchloroethylene (tetrachloroethylene)	127-18-4	7.10E-01	8.50E-02	3.70E-02		4.90E-03		2.90E-02		
20	1,4-Dichlorobenzene	106-46-7		5.10E-02							
21	Bis(2-ethylhexyl)phthalate (DEHP)	117-81-7									
22	N-Nitrosodimethylamine	62-75-9									
23	1,2-Dichloropropane	78-87-5		6.50E-02							
24	Acrolein	107-02-8									
25	Methyl isocyanate	624-83-9									
26	Acrylic acid	79-10-7									4.00E+00
27	Hexachlorobutadiene	87-68-3	2.60E-02	1.20E-01							
28	Allyl chloride	107-05-1									
29	Methyl hydrazine	60-34-4									
30	Nitrobenzene	98-95-3									
31	p-Nitrochlorobenzene	100-00-5									
32	Diphenylamine	122-39-4	4.00E-02	2.10E-01	2.80E-02						
33	1,1-Dimethylhydrazine	57-14-7									
34	Biphenyl	92-52-4							8.20E-01	2.50E+00	1.40E+01
35	Methyl bromide	74-83-9		3.30E-02							
36	Tributyl phosphate	126-73-8							9.50E-02	5.90E-01	5.90E+00
37	Methylacrylonitrile	126-98-7							1.00E-01		
38	Propylene imine	75-55-8									
39	Allyl alcohol	107-18-6									
40	Cyanides, as CN (mg/m3 of CN)	51-12-5	2.71E+00	1.61E+00	1.65E-01	1.03E+00	6.37E-02	1.27E-01	1.06E+00	1.27E+00	2.78E+01
41	Diethyl phthalate	84-66-2						2.70E-02			
42	Dibutyl phthalate	84-74-2						5.50E-03			
43	1,2-Epoxybutane	106-88-7									
44	1-Nitropropane	108-03-2									
45	Crotonaldehyde	4170-30-3									
46	Phenyl ether	101-84-8									
47	1,1,2,2-Tetrachloroethane	79-34-5	9.50E-03	1.90E-01			8.00E-04				
48	2,6-Ditert, butyl-p-cresol	128-37-0									4.60E+00
49	Pyridine	110-86-1		4.30E-01		1.50E-01				6.70E-02	
50	Formamide	75-12-7						7.70E-03			
51	Phenol	108-95-2	8.00E-02								
52	2-Hexanone (MBK)	591-78-6	6.10E-01	6.40E-01	5.80E-02	2.70E-01	7.30E-02	2.20E-02	2.50E-01	6.70E-01	2.70E+00
53	Vinylidene chloride	75-35-4	3.50E-02	7.10E-02			3.20E-03				
54	Trimethylamine	75-50-3									1.50E+00
55	Acetic acid	64-19-7						2.00E-01			
56	Nitric oxide	10102-43-9	1.70E-01					2.40E-01	2.00E+00	3.30E-01	2.20E+00
57	Carbon disulfide	75-15-0									2.50E+00
58	Ammonia	7664-41-7	7.39E+02	7.93E+02	3.40E+01	3.05E+02	4.50E+01	4.80E+01	7.50E+01	1.43E+02	2.51E+02
59	Propionic acid	79-09-4									
60	1,2,4-Trichlorobenzene	120-82-1		8.70E-02		1.30E-01					
61	Dimethyl acetamide	127-19-5									
62	Dichlorofluoromethane	75-43-4									
63	Chlorobenzene	108-90-7		7.70E-02							
64	Napthalene	91-20-3									
65	1,1,2-Trichloroethane	79-00-5		4.90E-01							
66	Vinyl acetate	108-05-4									
67	Mesityl oxide	141-79-7									

	B	C	AK	AL	AM	AN	AO	AP	AQ	AR	AS
1	**Toxic Air Pollutant**	**CAS # [F1]**	**BY107 mg/m3 Max Average**	**BY108 mg/m3 Max Average**	**BY109 mg/m3 Max Average**	**BY110 mg/m3 Max Average**	**BY111 mg/m3 Max Average**	**BY112 mg/m3 Max Average**	**C101 mg/m3 Max Average**	**C102 mg/m3 Max Average**	**C103 mg/m3 Max Average**
68	Acetonitrile	75-05-8	3.60E+00	1.80E+00	1.70E-01	1.40E+00	8.30E-02	1.70E-01	1.20E+00	1.10E+00	2.40E+01
69	Cyclohexanone	108-94-1	2.60E-02	3.70E-01		2.50E-01			1.60E-01	6.60E-02	
70	Methyl chloride	74-87-3	5.20E-02	3.40E-02			3.20E-03				
71	n-Propyl nitrate	627-13-4						1.30E-02	2.20E-01		
72	Toluene	108-88-3	8.30E-01	6.50E-01	2.10E+00	1.10E-01	1.80E-01	1.70E-01	2.70E-01	6.30E-01	1.20E-01
73	2-Butoxyethanol	111-76-2	2.00E-01	1.40E-01							
74	n-Butyl alcohol	71-36-3	2.40E+01	1.77E+02	3.00E+00	9.00E-01	1.60E-01	1.80E-01	1.40E+00	4.60E+01	9.20E+01
75	Isobutyl alcohol	78-83-1									
76	n-Valeraldehyde	110-62-3							8.40E-01	8.30E-01	
77	Methyl isobutyl ketone (MIBK)	108-10-1	4.90E-01	5.10E-01		6.80E-02			6.30E-01	2.10E-01	3.80E+00
78	Cyclohexanol	108-93-0									
79	Ethyl butyl ketone	106-35-4	5.30E-01	6.20E-01	9.80E-02	3.90E-01	1.70E-01	2.10E-02	1.20E-01		3.30E+00
80	Methyl isoamyl ketone	110-12-3			9.50E-02					1.80E-01	
81	Methyl n-amyl ketone	110-43-0	5.70E-01	6.70E-01	2.90E-02	2.60E-01	6.40E-02	1.90E-02	2.70E-01	7.90E-01	2.80E+00
82	Diprophyl ketone	123-19-3	1.20E-01								2.00E+00
83	a-Methyl styrene	98-83-9									
84	Methyl formate	107-31-3									
85	Cumene	98-82-8								4.30E-01	
86	Nitromethane	75-52-5									
87	Methyl alcohol	67-56-1		1.10E+01		7.90E-01		5.00E-01			
88	Ethyl benzene	100-41-4	2.70E-02	8.70E-02			1.20E-02	9.10E-03	2.70E-01	4.90E-01	
89	Styrene	100-42-5		4.60E-02						5.90E-01	1.20E+00
90	tert-Butyl alcohol	75-65-0				8.90E-02	1.40E-01	2.20E-01			
91	sec-Butyl alcohol	78-92-2	6.20E-01								
92	Methyl ethyl ketone (MEK)	78-93-3	3.60E+00	2.40E+00	1.10E-01	1.50E+00	3.40E-01	3.80E-01	4.60E-01	3.00E+00	3.80E+01
93	o-Dichlorobenzene (1,2-Dichlorobenzene)	95-50-1		5.50E-02							
94	Isoamyl alcohol	123-51-3						8.20E-03			
95	Xylenes (m-,o-,p-isomers)	1330-20-7								1.40E+00	
96	n-Propyl alcohol	71-23-8	4.70E+00	2.10E+00		1.70E-01	6.50E-03	5.80E-02		5.60E-01	
97	Tetrahydrofuran	109-99-9	1.80E+00	7.80E+00	3.90E-01	4.80E-01	8.80E-02		1.00E+00	2.40E+00	1.50E+01
98	Methyl acetate	79-20-9									
99	Methyl propyl ketone	107-87-9	1.70E+00	1.60E+00	5.10E-02	7.40E-01	1.50E-01	7.10E-02	5.90E-01	1.50E+00	4.10E+00
100	Methyl isopropyl ketone	563-80-4	2.20E-01					4.60E-02	2.30E-01	1.20E-01	6.50E+00
101	Diethyl ketone	96-22-0				3.90E-02		1.10E-02			
102	n-Butyl acetate	123-86-4	2.60E-01								1.60E+01
103	1,1-Dichloroethane	75-34-3		4.60E-02							
104	Isopropyl alcohol	67-63-0	2.90E+00	4.80E+00	1.10E+00	1.80E-01	1.20E-02	1.20E-01			
105	Cyclohexane	110-82-7	2.90E-01	8.80E-01		7.80E-02				1.10E-01	3.90E+00
106	Cyclohexene	110-83-8									
107	Isopropyl etner	108-20-3	4.00E-01								
108	Nonane	111-84-2	4.20E-01	1.30E+00	1.90E-01	1.90E-01	9.00E-04	1.00E-02	5.40E-01	8.00E-01	1.60E+00
109	Octane	111-65-9	5.60E-01	1.50E+00	1.60E-01	2.80E-01	5.80E-02	1.30E-02	1.10E+00	1.10E+00	1.60E+00
110	Ethyl acetate	141-78-6									4.30E+01
111	Methylcyclohexane	108-87-2	4.70E-01	1.00E+00	5.70E-01	7.30E-02			1.20E-01		
112	Heptane (n-Heptane)	142-82-5	1.40E+00	4.00E+00	3.10E-01	6.10E-01	1.80E-01	2.50E-02	1.80E+00	8.80E-01	2.90E+00
113	Methyl acetylene	74-99-7		1.50E-01					5.10E-01	5.60E-01	
114	Cyclopentane	287-92-3	6.00E-01								
115	Acetone	67-64-1	1.70E+01	2.00E+01	1.10E+00	2.60E+01	4.00E+00	1.10E+01	2.40E+00	1.10E+01	5.00E+01
116	Pentane	109-66-0	4.60E+00	1.00E+01	5.00E-02	1.40E+00	2.60E-01	6.70E-02	3.30E-01	5.70E-01	
117	Butane	106-97-8	4.60E+00	8.80E+00	8.00E-02	1.60E+00	1.70E-01	1.10E-01	6.10E-01	1.00E+00	1.80E+01
118	Ethyl alcohol	64-17-5	1.30E-01	4.80E+00	1.20E-01	4.80E-01	6.70E-02	8.90E-02		1.50E-01	
119	Methyl chloroform (1,1,1-Trichloroethane)	71-55-6		6.30E-02			2.00E-03				
120	Ethyl chloride	75-00-3	8.50E-03	3.30E-02							
121	Chlorodifluoromethane	75-45-6									
122	Dichlorodifluoromethane	75-71-8	1.30E-02	5.10E-02			4.50E-03				
123	Trichlorofluoromethane	75-69-4	1.60E+00	1.60E+01	2.20E-01	2.10E+00	1.70E+00	1.30E+00	2.20E+00	2.80E+00	4.50E-01
124	Dichlorotetrafluoroethane	76-14-2		1.70E-01							
125	1,1,2-Trichloro-1,2,2-trifluorethane	76-13-1	2.90E-02	8.40E-02		6.30E-02	3.30E-03				1.30E-01
126	Propionaldehyde	123-38-6									
127	Acetophenone	98-86-2						8.00E-03			2.20E+00
128	Carbonyl sulfide	463-58-1									
129	Total non-methane organic compounds (TNMOC) by EPA TO-12 Method			2.85E+02							4.76E+02
130	Total non-methane organic compounds (TNMOC) by summation of GC/MS results		7.70E+01		1.50E+01	4.60E+01	7.70E+00	1.30E+01	8.00E+01	1.23E+02	

	B	C	AT	AU	AV	AW	AX	AY	AZ	BA	BB
1	**Toxic Air Pollutant**	**CAS # [F1]**	**C104 mg/m3 Max Average**	**C105 mg/m3 Max Average**	**C106 mg/m3 Max Average**	**C107 mg/m3 Max Average**	**C108 mg/m3 Max Average**	**C109 mg/m3 Max Average**	**C110 mg/m3 Max Average**	**C111 mg/m3 Max Average**	**C112 mg/m3 Max Average**
2	**Sampling Dates**		3/3/1994	2/16/1994	2/15/1994	6/17/1994, 9/29/94, 1/17/96, 3/26/96, 9/5/96, 12/17/96, 02/07/97	7/23/1993, 8/5/1994	6/23/1994, 8/10/1994	8/18/1994	8/12/1993, 6/20/1994, 9/13/1994	8/11/1994
3	Dioxins and furans [F8]		6.79E-01	2.54E-01		2.21E-02			1.85E-01	1.80E-03	
4	N-Nitrosomorpholine	59-89-2									
5	1,3-Butadiene	106-99-0	1.90E-02	5.20E-03	1.00E-03						
6	Ethylene dibromide (dibromethane)	106-93-4				4.90E-03	1.80E-02				
7	Polychlorinated Biphenyls (PCBs)	1336-36-3									
8	Ethylene oxide	75-21-8									
9	Vinyl chloride	75-01-4									
10	Acrylonitrile	107-13-1									
11	1,4-Dioxane	123-91-1									
12	1,2-Dichloroethane (ethylene chloride)	107-06-2									
13	Chloroform	67-66-3	2.40E-03	9.00E-04	5.00E-04	4.10E-03					
14	Carbon tetrachloride	56-23-5		7.00E-04	7.00E-04	3.70E-03	4.00E-04			2.00E-04	
15	Benzene	71-43-2	3.20E-02	1.90E-03	1.60E-03	5.20E-02	1.20E-03	5.00E-04	4.00E-02	1.20E-02	4.00E-04
16	Acetaldehyde	75-07-0	2.40E-01			7.90E-02	8.90E-02	4.70E-02	4.60E-01	8.50E-02	1.50E-01
17	Dichloromethane (methylene chloride)	75-09-2	9.10E-03	2.10E-01	3.20E-01	2.70E+00	1.00E-03		4.80E-02	6.20E-01	6.00E-04
18	Trichloroethylene	79-01-6				5.20E-02					
19	Perchloroethylene (tetrachloroethylene)	127-18-4		7.00E-04		3.70E-03					
20	1,4-Dichlorobenzene	106-46-7				2.00E-03					
21	Bis(2-ethylhexyl)phthalate (DEHP)	117-81-7					4.60E-03				
22	N-Nitrosodimethylamine	62-75-9									
23	1,2-Dichloropropane	78-87-5									
24	Acrolein	107-02-8									
25	Metnyl isocyanate	624-83-9									
26	Acrylic acid	79-10-7									
27	Hexachlorobutadiene	87-68-3				2.30E-03					
28	Allyl chloride	107-05-1									
29	Methyl hydrazine	60-34-4									
30	Nitrobenzene	98-95-3									
31	p-Nitrochlorobenzene	100-00-5				4.90E-03					
32	Diphenylamine	122-39-4					8.80E-03	7.30E-03		7.30E-03	4.10E-03
33	1,1-Dimethylhydrazine	57-14-7									
34	Biphenyl	92-52-4									
35	Methyl bromide	74-83-9				2.10E-02				8.00E-03	
36	Tributyl phosphate	126-73-8	2.60E-01	2.20E-01	1.30E-01		1.50E-03		2.40E-02		
37	Methylacrylonitrile	126-98-7									
38	Propylene imine	75-55-8									
39	Allyl alcohol	107-18-6									
40	Cyanides, as CN (mg/m3 of CN)	51-12-5	3.67E-01	6.37E-02	3.25E-03	2.05E+00	6.27E-03	3.04E-01	3.96E-01	1.08E-02	3.52E+00
41	Diethyl phthalate	84-66-2								8.60E-03	
42	Dibutyl phthalate	84-74-2	5.50E-03								
43	1,2-Epoxybutane	106-88-7									
44	1-Nitropropane	108-03-2									
45	Crotonaldehyde	4170-30-3		6.60E-02							
46	Phenyl ether	101-84-8									
47	1,1,2,2-Tetrachloroethane	79-34-5				4.50E-03					
48	2,6-Ditert, butyl-p-cresol	128-37-0	1.40E-02	1.50E-02							
49	Pyridine	110-86-1				8.40E-02					
50	Formamide	75-12-7									
51	Phenol	108-95-2		1.00E-02						6.40E-03	
52	2-Hexanone (MBK)	591-78-6	6.10E-02	4.60E-03	2.00E-04	5.20E-03	1.20E-03	6.00E-04	2.40E-02	1.30E-03	1.30E-03
53	Vinylidene chloride	75-35-4	4.60E-03	9.00E-04	4.00E-04	1.80E-02	1.50E-02			5.00E-04	
54	Trimethylamine	75-50-3									
55	Acetic acid	64-19-7	6.40E-01	4.20E-01	1.70E-02	2.40E-01	1.40E-01	3.30E-02		3.50E-02	5.00E-03
56	Nitric oxide	10102-43-9	3.50E-01		3.50E-01	8.40E-01	3.30E-01	6.90E-01	1.00E-01	8.30E-01	8.30E-01
57	Carbon disulfide	75-15-0									
58	Ammonia	7664-41-7	3.30E+01	1.90E+00	1.90E+00	6.40E+01	2.00E+00	7.70E+00	9.40E+01	4.30E+00	1.70E+01
59	Propionic acid	79-09-4					1.60E-02				
60	1,2,4-Trichlorobenzene	120-82-1				3.50E-03					
61	Dimethyl acetamide	127-19-5		4.60E-02							
62	Dichlorofluoromethane	75-43-4									
63	Chlorobenzene	108-90-7				3.30E-03					
64	Naptnalene	91-20-3				2.70E-03					
65	1,1,2-Trichloroethane	79-00-5				1.60E-02					
66	Vinyl acetate	108-05-4									
67	Mesityl oxide	141-79-7									

	B	C	AT	AU	AV	AW	AX	AY	AZ	BA	BB
1	Toxic Air Pollutant	CAS # [F1]	C104 mg/m3 Max Average	C105 mg/m3 Max Average	C106 mg/m3 Max Average	C107 mg/m3 Max Average	C108 mg/m3 Max Average	C109 mg/m3 Max Average	C110 mg/m3 Max Average	C111 mg/m3 Max Average	C112 mg/m3 Max Average
68	Acetonitrile	75-05-8	2.30E-01	4.30E-02	3.90E-03	2.80E+00	8.70E-03	4.30E-01	4.40E-01	1.60E-02	5.00E+00
69	Cyclohexanone	108-94-1									
70	Methyl chloride	74-87-3	6.40E-03	6.00E-04	2.00E-04	2.40E-02	2.70E-03	5.70E-03		4.60E-03	
71	n-Propyl nitrate	627-13-4		6.10E-02		3.40E-02		6.90E-03			3.20E-03
72	Toluene	108-88-3	3.10E-02	2.00E-03	1.40E-02	4.50E-01	1.50E-03	3.40E-02	3.30E-02	7.10E-03	1.40E-02
73	2-Butoxyethanol	111-76-2					2.70E-03				
74	n-Butyl alcohol	71-36-3	6.60E+00	5.20E-01	5.50E-02	2.80E-01	1.90E-03	1.30E-02	2.30E+00	4.90E-03	1.30E-02
75	Isobutyl alcohol	78-83-1									
76	n-Valeraldehyde	110-62-3	1.30E-01							3.60E-02	
77	Methyl isobutyl ketone (MIBK)	108-10-1				1.80E-02					
78	Cyclohexanol	108-93-0									
79	Ethyl butyl ketone	106-35-4	3.80E-01	3.60E-02		6.40E-03			2.50E-02		
80	Methyl isoamyl ketone	110-12-3									
81	Methyl n-amyl ketone	110-43-0	6.70E-02	4.30E-03	3.00E-04	5.10E-03	1.20E-03	5.00E-04	4.70E-02	1.50E-03	1.00E-03
82	Diprophyl ketone	123-19-3									
83	a-Methyl styrene	98-83-9					4.60E-03				
84	Methyl formate	107-31-3									
85	Cumene	98-82-8							3.20E-02		
86	Nitromethane	75-52-5									
87	Methyl alcohol	67-56-1				3.30E+00					
88	Ethyl benzene	100-41-4	1.60E-03	5.00E-04	5.00E-04	3.50E-02			5.60E-02		
89	Styrene	100-42-5				1.20E-02			6.00E-02		
90	tert-Butyl alcohol	75-65-0									
91	sec-Butyl alcohol	78-92-2									
92	Methyl ethyl ketone (MEK)	78-93-3	3.90E-01	3.60E-01		2.00E-01			2.30E-01	1.80E-02	
93	o-Dichlorobenzene (1,2-Dichlorobenzene)	95-50-1				2.40E-03					
94	Isoamyl alcohol	123-51-3									
95	Xylenes (m-,o-,p-isomers)	1330-20-7									
96	n-Propyl alcohol	71-23-8				1.10E-01			5.40E-02		
97	Tetrahydrofuran	109-99-9	5.80E-01	1.00E-01		2.80E-03			1.40E-01		
98	Methyl acetate	79-20-9									
99	Methyl propyl ketone	107-87-9	4.20E-02	8.40E-03	2.00E-04	7.70E-03		2.30E-03	7.30E-02		4.30E-03
100	Methyl isopropyl ketone	563-80-4									
101	Diethyl ketone	96-22-0									
102	n-Butyl acetate	123-86-4	9.70E-02	2.90E-02					1.70E-02		
103	1,1-Dichloroethane	75-34-3									
104	Isopropyl alcohol	67-63-0									
105	Cyclohexane	110-82-7				1.00E-01			4.10E-02		
106	Cyclohexene	110-83-8									
107	Isopropyl ether	108-20-3									
108	Nonane	111-84-2	9.20E-02	4.80E-03	2.00E-04	1.30E-02	1.10E-03	6.00E-04	1.20E-02	9.00E-04	6.00E-04
109	Octane	111-65-9	1.90E-01	7.20E-03	2.00E-04	8.70E-03	1.60E-03	4.00E-04	7.40E-03	9.00E-04	7.00E-04
110	Ethyl acetate	141-78-6	4.30E-01	2.60E-01							
111	Methylcyclohexane	108-87-2									
112	Heptane (n-Heptane)	142-82-5	2.80E-01	3.70E-03		8.00E-02	2.70E-03		1.10E-02		2.90E-03
113	Methyl acetylene	74-99-7									
114	Cyclopentane	287-92-3							2.90E-02		
115	Acetone	67-64-1	3.60E-01	3.30E-02	5.50E-02	2.80E+00	7.90E-02	7.60E-02	5.80E-01	7.00E-02	5.10E-01
116	Pentane	109-66-0	1.00E+00			3.70E-02					
117	Butane	106-97-8	1.00E+00	1.80E-01		4.10E-02					
118	Ethyl alcohol	64-17-5				7.10E-01					
119	Methyl chloroform (1,1,1-Trichloroethane)	71-55-6		8.00E-04	1.20E-03	4.10E-03	5.00E-04			3.00E-04	
120	Ethyl chloride	75-00-3				1.10E-01	2.40E-02	2.40E-02		8.00E-04	
121	Chlorodifluoromethane	75-45-6									
122	Dichlorodifluoromethane	75-71-8	8.50E-03	1.80E-03	1.10E-03	1.10E-01	1.10E-03	8.00E-03		7.90E-03	
123	Trichlorofluoromethane	75-69-4	2.20E-01	2.20E-02	3.90E-03	2.20E-01	5.80E-02	4.30E-02	2.00E-01	9.70E-02	4.60E-03
124	Dichlorotetrafluoroethane	76-14-2				5.30E-03					
125	1,1,2-Trichloro-1,2,2-trifluorethane	76-13-1	2.50E-03	8.00E-04	8.00E-04	3.00E-03	7.20E-02			9.00E-04	
126	Propionaldehyde	123-38-6									
127	Acetophenone	98-86-2		6.40E-03		6.90E-03	2.30E-03	1.50E-02		3.70E-03	4.60E-03
128	Carbonyl sulfide	463-58-1									
129	Total non-methane organic compounds (TNMOC) by EPA TO-12 Method					3.80E+00					
130	Total non-methane organic compounds (TNMOC) by summation of GC/MS results		2.50E+01	9.20E-01	2.40E-01		3.40E-01	5.30E-01	5.10E+00	5.40E-01	2.70E+00

	B	C	BC	BD	BE	BF	BG	BH	BI	BJ	BK
1	**Toxic Air Pollutant**	**CAS # [F1]**	**C201 mg/m3 Max Average**	**C202 mg/m3 Max Average**	**C204 mg/m3 Max Average**	**S101 mg/m3 Max Average**	**S102 mg/m3 Max Average**	**S103 mg/m3 Max Average**	**S105 mg/m3 Max Average**	**S106 mg/m3 Max Average**	**S107 mg/m3 Max Average**
2	**Sampling Dates**		6/19/1996	6/25/1996	7/2/1996	6/6/1996	3/14/95, 1/26/96, 4/4/96, 09/19/96, 12/19/96, 02/11/97	6/12/1996	12/7/1995	6/13/1996	6/18/1996
3	Dioxins and furans [F8]				8.90E-02	1.50E-01	2.60E-01	3.20E-02		4.70E-02	
4	N-Nitrosomorpholine	59-89-2									
5	1,3-Butadiene	106-99-0			5.40E-01						
6	Ethylene dibromide (dibromethane)	106-93-4					5.40E-03	2.60E-02		2.90E-02	
7	Polychlorinated Biphenyls (PCBs)	1336-36-3									
8	Ethylene oxide	75-21-8									
9	Vinyl chloride	75-01-4				5.60E-03	7.70E-03	1.60E-02			
10	Acrylonitrile	107-13-1									
11	1,4-Dioxane	123-91-1					5.50E-02				
12	1,2-Dichloroethane (ethylene chloride)	107-06-2				4.40E-03		2.00E-02			
13	Chloroform	67-66-3			2.90E-03		3.30E-03	2.70E-02		2.10E-02	
14	Carbon tetrachloride	56-23-5			1.10E-03		4.00E-03	3.00E-02		2.30E-02	
15	Benzene	71-43-2			9.80E-03	3.10E-02	1.00E-01	2.30E-02	3.00E-03	1.30E-02	
16	Acetaldehyde	75-07-0			1.60E-01	5.00E-02		2.90E-02			
17	Dichloromethane (methylene chloride)	75-09-2			5.20E-02	3.80E-01	6.40E-01	7.10E-02		3.00E-02	
18	Trichloroethylene	79-01-6				2.50E-02	2.70E-02	2.80E-02		2.20E-02	
19	Perchloroethylene (tetrachloroethylene)	127-18-4				3.40E-03	8.40E-02	4.50E-02	1.70E-02	2.90E-02	
20	1,4-Dichlorobenzene	106-46-7				7.20E-03	5.70E-03	1.50E-02		2.20E-02	
21	Bis(2-ethylhexyl)phthalate (DEHP)	117-81-7									
22	N-Nitrosodimethylamine	62-75-9				9.20E-02	9.30E-02	7.30E-03			
23	1,2-Dichloropropane	78-87-5						2.90E-02			
24	Acrolein	107-02-8									
25	Methyl isocyanate	624-83-9									
26	Acrylic acid	79-10-7									
27	Hexachlorobutadiene	87-68-3					2.30E-03	2.10E-02		3.30E-02	
28	Allyl chloride	107-05-1						1.10E-02			
29	Methyl hydrazine	60-34-4									
30	Nitrobenzene	98-95-3									
31	p-Nitrochlorobenzene	100-00-5									
32	Diphenylamine	122-39-4									
33	1,1-Dimethylhydrazine	57-14-7									
34	Biphenyl	92-52-4							5.90E-03		
35	Methyl bromide	74-83-9				7.20E-03		2.00E-02		1.80E-02	
36	Tributyl phosphate	126-73-8			3.50E-02						
37	Methylacrylonitrile	126-98-7									
38	Propylene imine	75-55-8					1.30E-01				
39	Allyl alcohol	107-18-6									
40	Cyanides, as CN (mg/m3 of CN)	51-12-5			2.20E-01	8.72E-02	1.92E-01	1.30E-01	4.41E-03	4.79E-02	
41	Diethyl phthalate	84-66-2									
42	Dibutyl phthalate	84-74-2									
43	1,2-Epoxybutane	106-88-7									
44	1-Nitropropane	108-03-2									
45	Crotonaldehyde	4170-30-3			1.50E-02						
46	Phenyl ether	101-84-8									
47	1,1,2,2-Tetrachloroethane	79-34-5						2.60E-02		3.60E-02	
48	2,6-Ditert, butyl-p-cresol	128-37-0									
49	Pyridine	110-86-1			5.50E-03	5.40E-02	8.40E-02	5.80E-02		5.30E-02	
50	Formamide	75-12-7									
51	Phenol	108-95-2									
52	2-Hexanone (MBK)	591-78-6					1.40E-02	3.40E-03	6.50E-03	6.40E-03	
53	Vinylidene chloride	75-35-4				9.10E-02	1.40E-02	1.50E-02		1.50E-02	
54	Trimethylamine	75-50-3									
55	Acetic acid	64-19-7									
56	Nitric oxide	10102-43-9			1.10E+00						
57	Carbon disulfide	75-15-0									
58	Ammonia	7664-41-7			5.90E-01	5.87E+02	6.06E+02	1.14E+02	2.80E+01	2.80E+01	1.39E+02
59	Propionic acid	79-09-4									
60	1,2,4-Trichlorobenzene	120-82-1					2.00E-03	9.70E-03			
61	Dimethyl acetamide	127-19-5									
62	Dichlorofluoromethane	75-43-4									
63	Chlorobenzene	108-90-7					5.90E-03	1.60E-02		1.80E-02	
64	Napthalene	91-20-3									
65	1,1,2-Trichloroethane	79-00-5					1.10E-02	3.30E-02		2.50E-02	
66	Vinyl acetate	108-05-4									
67	Mesityl oxide	141-79-7									

	B	C	BC	BD	BE	BF	BG	BH	BI	BJ	BK
1	Toxic Air Pollutant	CAS # [F1]	C201 mg/m3 Max Average	C202 mg/m3 Max Average	C204 mg/m3 Max Average	S101 mg/m3 Max Average	S102 mg/m3 Max Average	S103 mg/m3 Max Average	S105 mg/m3 Max Average	S106 mg/m3 Max Average	S107 mg/m3 Max Average
68	Acetonitrile	75-05-8			2.00E-01	1.10E-01	2.50E-01	4.60E-02		2.30E-02	
69	Cyclohexanone	108-94-1			6.20E-02		4.10E-02	2.20E-02		2.70E-02	
70	Methyl chloride	74-87-3			6.00E-03	2.10E-02	1.90E-02	1.50E-02		1.40E-02	
71	n-Propyl nitrate	627-13-4			6.40E-01				9.00E-03		
72	Toluene	108-88-3			1.40E-01	6.20E-01	1.30E+00	1.20E+00	5.20E-02	2.80E-02	
73	2-Butoxyethanol	111-76-2									
74	n-Butyl alcohol	71-36-3			3.50E+00	2.00E+00	3.60E+00	2.80E-01	3.80E-02	2.50E-01	
75	Isobutyl alcohol	78-83-1									
76	n-Valeraldehyde	110-62-3									
77	Methyl isobutyl ketone (MIBK)	108-10-1			1.80E-02	3.30E-02	5.70E-02	4.90E-02		4.20E-02	
78	Cyclohexanol	108-93-0									
79	Ethyl butyl ketone	106-35-4							4.90E-03		
80	Methyl isoamyl ketone	110-12-3									
81	Methyl n-amyl ketone	110-43-0					1.10E-02		3.10E-03		
82	Dipropyl ketone	123-19-3									
83	a-Methyl styrene	98-83-9									
84	Methyl formate	107-31-3									
85	Cumene	98-82-8									
86	Nitromethane	75-52-5									
87	Methyl alcohol	67-56-1			2.80E-01	7.80E+00	2.90E+01	3.00E+00		3.80E+00	
88	Ethyl benzene	100-41-4			9.20E-03	9.20E-03	2.60E-02	4.20E-02	9.40E-03	1.70E-02	
89	Styrene	100-42-5			9.60E-03		1.80E-02	3.40E-02		1.50E-02	
90	tert-Butyl alcohol	75-65-0			2.20E-02	1.30E-01		3.30E-02			
91	sec-Butyl alcohol	78-92-2					1.30E-01	2.10E-02			
92	Methyl ethyl ketone (MEK)	78-93-3			4.00E-01	1.60E-01	3.00E-01	7.30E-02	4.00E-02		
93	o-Dichlorobenzene (1,2-Dichlorobenzene)	95-50-1				8.50E-03	2.60E-03	1.50E-02		2.40E-02	
94	Isoamyl alcohol	123-51-3									
95	Xylenes (m-,o-,p-isomers)	1330-20-7							2.00E-02		
96	n-Propyl alcohol	71-23-8			7.70E-01	1.20E-01	5.30E-01	7.80E-02	7.50E-03	6.10E-02	
97	Tetrahydrofuran	109-99-9			8.90E-02	1.50E-01	2.60E-01	3.20E-02		4.70E-02	
98	Methyl acetate	79-20-9									
99	Methyl propyl ketone	107-87-9					2.30E-02		1.10E-02		
100	Methyl isopropyl ketone	563-80-4									
101	Diethyl ketone	96-22-0									
102	n-Butyl acetate	123-86-4									
103	1,1-Dichloroethane	75-34-3						2.50E-02		1.90E-02	
104	Isopropyl alcohol	67-63-0				1.30E-01	2.20E-01	2.80E-02	1.30E-02		
105	Cyclohexane	110-82-7			4.50E-02	2.90E-02	9.00E-02	1.20E-01			
106	Cyclohexene	110-83-8									
107	Isopropyl ether	108-20-3									
108	Nonane	111-84-2			5.10E-02	1.20E-02	2.50E-02	1.40E-02	2.50E-03	1.80E-02	
109	Octane	111-65-9			4.00E-02	8.50E-03	4.40E-02	1.60E-02	2.30E-03	1.50E-02	
110	Ethyl acetate	141-78-6									
111	Methylcyclohexane	108-87-2			9.20E-02			1.10E+00			
112	Heptane (n-Heptane)	142-82-5			6.70E-02	2.70E-02	9.40E-02	6.80E-01	2.30E-03	2.00E-02	
113	Methyl acetylene	74-99-7									
114	Cyclopentane	287-92-3									
115	Acetone	67-64-1			9.70E-01	1.00E+00	1.60E+00	3.00E-01	7.60E-01	5.70E-01	
116	Pentane	109-66-0			3.00E-02	4.10E-02	7.40E-02	2.70E-02		3.00E-02	
117	Butane	106-97-8			3.30E-01	1.70E-01	5.00E-01	4.50E-02			
118	Ethyl alcohol	64-17-5			3.10E-01	1.20E+00	4.30E+01	1.20E+00	1.20E-02	2.80E+00	
119	Methyl chloroform (1,1,1-Trichloroethane)	71-55-6			2.90E-03	1.40E-02	4.80E-03	3.40E-02		2.40E-02	
120	Ethyl chloride	75-00-3					1.30E-02	2.00E-02			
121	Chlorodifluoromethane	75-45-6									
122	Dichlorodifluoromethane	75-71-8			1.10E-02	2.60E-02	2.00E-02	3.10E-02		3.20E-02	
123	Trichlorofluoromethane	75-69-4			2.90E-02	3.90E-01	4.80E-01	9.00E-02	1.40E-01	4.60E-02	
124	Dichlorotetrafluoroethane	76-14-2						2.90E-02		2.60E-02	
125	1,1,2-Trichloro-1,2,2-trifluorethane	76-13-1			1.70E-01	2.00E-01	3.50E-02	4.80E-02		4.20E-02	
126	Propionaldehyde	123-38-6			4.30E-01						
127	Acetophenone	98-86-2									
128	Carbonyl sulfide	463-58-1									
129	Total non-methane organic compounds (TNMOC) by EPA TO-12 Method		5.80E+00	2.30E+00	1.47E+02	7.60E+00	2.50E+01	2.50E+00	2.30E+00	3.50E+00	6.50E+00
130	Total non-methane organic compounds (TNMOC) by summation of GC/MS results										

	B	C	BL	BM	BN	BO	BP	BQ	BR	BS	BT
1	**Toxic Air Pollutant**	**CAS # [F1]**	**S108 mg/m3 Max Average**	**S109 mg/m3 Max Average**	**S110 mg/m3 Max Average**	**S111 mg/m3 Max Average**	**S112 mg/m3 Max Average**	**SX101 mg/m3 Max Average**	**SX102 mg/m3 Max Average**	**SX103 mg/m3 Max Average**	**SX104 mg/m3 Max Average**
2	**Sampling Dates**		12/6/1995	6/4/1996	12/5/1995	3/21/1995	7/11/1995	7/21/1995	7/19/1995	3/23/1995	7/25/1995
3	Dioxins and furans [F8]		1.68E-02		3.71E-02	6.57E-02	2.00E-01			1.44E-02	
4	N-Nitrosomorpholine	59-89-2									
5	1,3-Butadiene	106-99-0									
6	Ethylene dibromide (dibromethane)	106-93-4									
7	Polychlorinated Biphenyls (PCBs)	1336-36-3				1.60E-03					
8	Ethylene oxide	75-21-8									
9	Vinyl chloride	75-01-4									
10	Acrylonitrile	107-13-1									
11	1,4-Dioxane	123-91-1									
12	1,2-Dichloroetnane (ethylene chloride)	107-06-2									
13	Chloroform	67-66-3									
14	Carbon tetrachloride	56-23-5									
15	Benzene	71-43-2	2.00E-03		5.80E-03	1.00E-02				2.20E-03	
16	Acetaldehyde	75-07-0								3.30E-02	
17	Dichloromethane (methylene chloride)	75-09-2				4.00E-04	1.10E-01			6.10E-03	
18	Trichloroethylene	79-01-6									
19	Perchloroethylene (tetrachloroethylene)	127-18-4				3.80E-03					
20	1,4-Dichlorobenzene	106-46-7									
21	Bis(2-ethylhexyl)phthalate (DEHP)	117-81-7									
22	N-Nitrosodimethylamine	62-75-9			6.00E-02	3.10E-02	5.80E-02			4.60E-03	
23	1,2-Dichloropropane	78-87-5									
24	Acrolein	107-02-8									
25	Methyl isocyanate	624-83-9									
26	Acrylic acid	79-10-7									
27	Hexachlorobutadiene	87-68-3									
28	Allyl chloride	107-05-1									
29	Methyl hydrazine	60-34-4									
30	Nitrobenzene	98-95-3									
31	p-Nitrochlorobenzene	100-00-5									
32	Diphenylamine	122-39-4									
33	1,1-Dimethylhydrazine	57-14-7									
34	Biphenyl	92-52-4									
35	Methyl bromide	74-83-9									
36	Tributyl phosphate	126-73-8							4.40E+00		1.10E+00
37	Methylacrylonitrile	126-98-7									
38	Propylene imine	75-55-8									
39	Allyl alcohol	107-18-6									
40	Cyanides, as CN (mg/m3 of CN)	51-12-5	1.50E-02		4.59E-02	3.23E-02	4.12E-02	5.80E-03	8.13E-03	1.27E-02	
41	Diethyl phthalate	84-66-2									
42	Dibutyl phthalate	84-74-2									
43	1,2-Epoxybutane	106-88-7									
44	1-Nitropropane	108-03-2									
45	Crotonaldehyde	4170-30-3									
46	Phenyl ether	101-84-8									
47	1,1,2,2-Tetrachloroethane	79-34-5									
48	2,6-Ditert, butyl-p-cresol	128-37-0									
49	Pyridine	110-86-1					8.80E-02			6.70E-02	
50	Formamide	75-12-7									
51	Phenol	108-95-2									
52	2-Hexanone (MBK)	591-78-6	7.50E-03		1.20E-02	3.30E-03				1.10E-03	
53	Vinylidene chloride	75-35-4				1.20E-03					
54	Trimethylamine	75-50-3									
55	Acetic acid	64-19-7									
56	Nitric oxide	10102-43-9	6.70E-01		4.00E-01		1.80E-01	1.70E-01			
57	Carbon disulfide	75-15-0									
58	Ammonia	7664-41-7	2.00E+01	3.40E+01	1.12E+02	9.20E+01	6.70E+01	2.90E+00	1.20E+01	5.80E+01	1.90E+01
59	Propionic acid	79-09-4									
60	1,2,4-Trichlorobenzene	120-82-1					6.10E-02				
61	Dimethyl acetamide	127-19-5									
62	Dichlorofluoromethane	75-43-4									
63	Chlorobenzene	108-90-7									
64	Naptnalene	91-20-3									
65	1,1,2-Trichloroethane	79-00-5									
66	Vinyl acetate	108-05-4									
67	Mesityl oxide	141-79-7									

	B	C	BL	BM	BN	BO	BP	BQ	BR	BS	BT
1	Toxic Air Pollutant	CAS # [F1]	S108 mg/m3 Max Average	S109 mg/m3 Max Average	S110 mg/m3 Max Average	S111 mg/m3 Max Average	S112 mg/m3 Max Average	SX101 mg/m3 Max Average	SX102 mg/m3 Max Average	SX103 mg/m3 Max Average	SX104 mg/m3 Max Average
68	Acetonitrile	75-05-8	1.50E-02		5.70E-02	3.70E-02	1.40E-02	9.20E-03	1.30E-02	1.30E-02	
69	Cyclohexanone	108-94-1									
70	Methyl chloride	74-87-3									
71	n-Propyl nitrate	627-13-4									
72	Toluene	108-88-3	5.30E-03		5.70E-02	9.00E-02	7.10E-02			4.70E-03	
73	2-Butoxyethanol	111-76-2									
74	n-Butyl alcohol	71-36-3	2.50E-01		2.10E-01	1.80E-01	9.40E-01	5.80E-02	9.50E-02	4.30E-01	1.40E-01
75	Isobutyl alcohol	78-83-1									
76	n-Valeraldehyde	110-62-3									
77	Methyl isobutyl ketone (MIBK)	108-10-1									
78	Cyclohexanol	108-93-0				2.00E-03					
79	Ethyl butyl ketone	106-35-4	4.30E-02		3.30E-02	7.00E-03	2.30E-01			2.20E-03	
80	Methyl isoamyl ketone	110-12-3									
81	Methyl n-amyl ketone	110-43-0	1.10E-02		7.70E-03	3.70E-03	4.90E-02			1.10E-03	
82	Diprophyl ketone	123-19-3	6.60E-03								
83	a-Methyl styrene	98-83-9									
84	Methyl formate	107-31-3									
85	Cumene	98-82-8									
86	Nitromethane	75-52-5									
87	Methyl alcohol	67-56-1			6.20E-01	4.40E-01	1.30E-01	7.90E-02	3.60E-01	1.60E-01	2.60E-01
88	Ethyl benzene	100-41-4				3.30E-03					
89	Styrene	100-42-5									
90	tert-Butyl alcohol	75-65-0									
91	sec-Butyl alcohol	78-92-2									
92	Methyl ethyl ketone (MEK)	78-93-3	1.10E-02			3.20E-02	3.20E-01				
93	o-Dichlorobenzene (1,2-Dichlorobenzene)	95-50-1									
94	Isoamyl alcohol	123-51-3									
95	Xylenes (m-,o-,p-isomers)	1330-20-7									
96	n-Propyl alcohol	71-23-8	1.20E-02		1.80E-02	2.10E-02	3.60E-01		3.20E-02	6.00E-03	
97	Tetrahydrofuran	109-99-9	8.90E-03		2.90E-02	5.60E-02	2.00E-01			6.20E-03	
98	Methyl acetate	79-20-9									
99	Methyl propyl ketone	107-87-9	9.90E-03		4.90E-03	7.60E-03				1.70E-03	
100	Methyl isopropyl ketone	563-80-4				3.70E-03					
101	Diethyl ketone	96-22-0									
102	n-Butyl acetate	123-86-4									
103	1,1-Dichloroethane	75-34-3									
104	Isopropyl alcohol	67-63-0	8.10E-03		2.20E-02	3.40E-02	1.10E-01			7.90E-03	
105	Cyclohexane	110-82-7									
106	Cyclohexene	110-83-8									
107	Isopropyl ether	108-20-3									
108	Nonane	111-84-2	2.30E-03		4.00E-03	2.20E-03				1.50E-03	
109	Octane	111-65-9	2.50E-03		4.30E-03	3.30E-03				1.80E-03	
110	Ethyl acetate	141-78-6									
111	Methylcyclohexane	108-87-2									
112	Heptane (n-Heptane)	142-82-5	3.10E-03		6.10E-03	8.00E-03				1.90E-03	
113	Methyl acetylene	74-99-7									
114	Cyclopentane	287-92-3									
115	Acetone	67-64-1	1.50E-01		2.10E-01	3.90E-01	2.60E+00	8.70E-02	6.10E-02	2.40E-02	8.50E-02
116	Pentane	109-66-0									
117	Butane	106-97-8				5.50E-02					
118	Ethyl alcohol	64-17-5	7.90E-02		6.70E-01	4.00E-01	7.70E-01	2.70E-02	1.10E-01	2.20E-02	3.70E-01
119	Methyl chloroform (1,1,1-Trichloroethane)	71-55-6									
120	Ethyl chloride	75-00-3									
121	Chlorodifluoromethane	75-45-6									
122	Dichlorodifluoromethane	75-71-8						1.10E-01			
123	Trichlorofluoromethane	75-69-4			8.50E-03	1.30E-01	4.70E-02	1.50E-01	8.80E-02	6.90E-02	9.60E-02
124	Dichlorotetrafluoroethane	76-14-2									
125	1,1,2-Trichloro-1,2,2-trifluorethane	76-13-1									
126	Propionaldehyde	123-38-6									
127	Acetophenone	98-86-2									
128	Carbonyl sulfide	463-58-1									
129	Total non-methane organic compounds (TNMOC) by EPA TO-12 Method		2.40E+00	3.40E+00	3.50E+00		7.50E+00	9.00E-01	1.10E+00		1.10E+00
130	Total non-methane organic compounds (TNMOC) by summation of GC/MS results					1.80E+00				7.10E-01	

	B	C	BU	BV	BW	BX	BY	BZ	CA	CB	CC
1	**Toxic Air Pollutant**	**CAS # [F1]**	**SX105 mg/m3 Max Average**	**SX106 mg/m3 Max Average**	**SX107 mg/m3 Max Average**	**SX108 mg/m3 Max Average**	**SX109 mg/m3 Max Average**	**SX110 mg/m3 Max Average**	**SX111 mg/m3 Max Average**	**SX112 mg/m3 Max Average**	**SX114 mg/m3 Max Average**
2	**Sampling Dates**		7/26/1995	3/24/1995	05/19/97	07/16/97	8/1/1995	07/30/97	05/22/97	06/18/97	06/25/97
3	Dioxins and furans [F8]			3.57E-02							
4	N-Nitrosomorpholine	59-89-2									
5	1,3-Butadiene	106-99-0									
6	Ethylene dibromide (dibromethane)	106-93-4									
7	Polychlorinated Biphenyls (PCBs)	1336-36-3									
8	Ethylene oxide	75-21-8									
9	Vinyl chloride	75-01-4									
10	Acrylonitrile	107-13-1									
11	1,4-Dioxane	123-91-1		8.70E-03							
12	1,2-Dichloroethane (ethylene chloride)	107-06-2									
13	Chloroform	67-66-3									
14	Carbon tetrachloride	56-23-5									
15	Benzene	71-43-2	2.80E-02	1.70E-03						2.60E-02	
16	Acetaldehyde	75-07-0									
17	Dichloromethane (methylene chloride)	75-09-2	2.30E-02								
18	Trichloroethylene	79-01-6									
19	Perchloroethylene (tetrachloroethylene)	127-18-4									
20	1,4-Dichlorobenzene	106-46-7									
21	Bis(2-ethylhexyl)phthalate (DEHP)	117-81-7									
22	N-Nitrosodimethylamine	62-75-9		2.30E-02							
23	1,2-Dichloropropane	78-87-5									
24	Acrolein	107-02-8									
25	Methyl isocyanate	624-83-9									
26	Acrylic acid	79-10-7									
27	Hexachlorobutadiene	87-68-3									
28	Allyl chloride	107-05-1									
29	Methyl hydrazine	60-34-4									
30	Nitrobenzene	98-95-3									
31	p-Nitrochlorobenzene	100-00-5									
32	Diphenylamine	122-39-4									
33	1,1-Dimethylhydrazine	57-14-7									
34	Biphenyl	92-52-4									
35	Methyl bromide	74-83-9									
36	Tributyl phosphate	126-73-8	1.30E+00				7.10E-01				
37	Methylacrylonitrile	126-98-7									
38	Propylene imine	75-55-8									
39	Allyl alcohol	107-18-6		8.70E-03							
40	Cyanides, as CN (mg/m3 of CN)	51-12-5		2.58E-02							
41	Diethyl phthalate	84-66-2									
42	Dibutyl phthalate	84-74-2									
43	1,2-Epoxybutane	106-88-7									
44	1-Nitropropane	108-03-2									
45	Crotonaldehyde	4170-30-3									
46	Phenyl ether	101-84-8									
47	1,1,2,2-Tetrachloroethane	79-34-5									
48	2,6-Ditert, butyl-p-cresol	128-37-0									
49	Pyridine	110-86-1		5.40E-02							
50	Formamide	75-12-7									
51	Phenol	108-95-2									
52	2-Hexanone (MBK)	591-78-6		1.10E-03							
53	Vinylidene chloride	75-35-4		2.00E-02							
54	Trimethylamine	75-50-3									
55	Acetic acid	64-19-7									
56	Nitric oxide	10102-43-9									
57	Carbon disulfide	75-15-0									
58	Ammonia	7664-41-7	2.10E+01	1.36E+02			1.30E+01				
59	Propionic acid	79-09-4									
60	1,2,4-Trichlorobenzene	120-82-1									
61	Dimethyl acetamide	127-19-5									
62	Dichlorofluoromethane	75-43-4									
63	Chlorobenzene	108-90-7									
64	Naptnalene	91-20-3			2.60E-02					4.50E-02	
65	1,1,2-Trichloroethane	79-00-5									
66	Vinyl acetate	108-05-4									
67	Mesityl oxide	141-79-7									

	B	C	BU	BV	BW	BX	BY	BZ	CA	CB	CC
1	Toxic Air Pollutant	CAS # [F1]	SX105 mg/m3 Max Average	SX106 mg/m3 Max Average	SX107 mg/m3 Max Average	SX108 mg/m3 Max Average	SX109 mg/m3 Max Average	SX110 mg/m3 Max Average	SX111 mg/m3 Max Average	SX112 mg/m3 Max Average	SX114 mg/m3 Max Average
68	Acetonitrile	75-05-8		3.00E-02							
69	Cyclohexanone	108-94-1									
70	Methyl chloride	74-87-3									
71	n-Propyl nitrate	627-13-4									
72	Toluene	108-88-3		2.10E-03		7.50E-02		1.60E-01	2.40E-02	4.30E-01	3.50E-02
73	2-Butoxyethanol	111-76-2									
74	n-Butyl alcohol	71-36-3	2.70E-01	4.00E-01	1.50E-01		7.30E-02				
75	Isobutyl alcohol	78-83-1									
76	n-Valeraldehyde	110-62-3									
77	Methyl isobutyl ketone (MIBK)	108-10-1									
78	Cyclohexanol	108-93-0									
79	Ethyl butyl ketone	106-35-4		2.90E-03							
80	Methyl isoamyl ketone	110-12-3									
81	Methyl n-amyl ketone	110-43-0		1.50E-03	1.50E-01						
82	Diprophyl ketone	123-19-3									
83	a-Methyl styrene	98-83-9									
84	Methyl formate	107-31-3									
85	Cumene	98-82-8									
86	Nitromethane	75-52-5									
87	Methyl alcohol	67-56-1	1.50E-01	1.20E+00			7.30E-02				
88	Ethyl benzene	100-41-4			2.20E-02						
89	Styrene	100-42-5									
90	tert-Butyl alcohol	75-65-0									
91	sec-Butyl alcohol	78-92-2									
92	Methyl ethyl ketone (MEK)	78-93-3			1.70E-02		3.40E-02				
93	o-Dichlorobenzene (1,2-Dichlorobenzene)	95-50-1									
94	Isoamyl alcohol	123-51-3									
95	Xylenes (m-,o-,p-isomers)	1330-20-7									
96	n-Propyl alcohol	71-23-8		1.10E-01							
97	Tetrahydrofuran	109-99-9		2.40E-02							
98	Methyl acetate	79-20-9									
99	Methyl propyl ketone	107-87-9		1.40E-03							
100	Methyl isopropyl ketone	563-80-4									
101	Diethyl ketone	96-22-0									
102	n-Butyl acetate	123-86-4									
103	1,1-Dichloroethane	75-34-3									
104	Isopropyl alcohol	67-63-0		1.30E-02							
105	Cyclohexane	110-82-7							1.70E-02		
106	Cyclohexene	110-83-8									
107	Isopropyl ether	108-20-3									
108	Nonane	111-84-2		1.10E-03							
109	Octane	111-65-9									
110	Ethyl acetate	141-78-6									
111	Methylcyclohexane	108-87-2				7.80E-02		3.40E-01	2.60E-01	1.30E-01	1.80E-01
112	Heptane (n-Heptane)	142-82-5		1.00E-03					2.50E-02	2.30E-02	3.60E-02
113	Methyl acetylene	74-99-7									
114	Cyclopentane	287-92-3									
115	Acetone	67-64-1	1.00E-01	5.40E-02	5.20E-02	2.30E-02	1.80E-01	2.30E-02	1.20E-02		2.10E-02
116	Pentane	109-66-0								2.20E-02	
117	Butane	106-97-8	1.30E-02								
118	Ethyl alcohol	64-17-5	1.00E-01	3.50E-01			3.60E-02				
119	Methyl chloroform (1,1,1-Trichloroethane)	71-55-6									
120	Ethyl chloride	75-00-3									
121	Chlorodifluoromethane	75-45-6									
122	Dichlorodifluoromethane	75-71-8									
123	Trichlorofluoromethane	75-69-4	2.00E-01	8.10E-03			7.20E-02				
124	Dichlorotetrafluoroethane	76-14-2									
125	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1			8.20E-02	4.20E-01			1.80E-01		3.70E-01
126	Propionaldehyde	123-38-6									
127	Acetophenone	98-86-2									
128	Carbonyl sulfide	463-58-1									
129	Total non-methane organic compounds (TNMOC) by EPA TO-12 Method		1.80E+00		1.70E-01	1.90E-01	7.50E-01	1.90E-01	8.50E-02	1.10E+00	9.00E-02
130	Total non-methane organic compounds (TNMOC) by summation of GC/MS results			2.10E+00							

	B	C	CD	CE	CF	CG	CH	CI	CJ	CK	CL
1	**Toxic Air Pollutant**	**CAS # [F1]**	**T101 mg/m3 Max Average**	**T104 mg/m3 Max Average**	**T107 mg/m3 Max Average**	**T110 mg/m3 Max Average**	**T111 mg/m3 Max Average**	**TX101 mg/m3 Max Average**	**TX102 mg/m3 Max Average**	**TX103 mg/m3 Max Average**	**TX104 mg/m3 Max Average**
2	**Sampling Dates**		12/1/1997	2/7/1996	1/18/1995	8/31/1995	1/20/1995	10/28/1997	10/13/97	10/24/1997	05/05/97
3	Dioxins and furans [F8]				6.30E-03				4.40E-02		
4	N-Nitrosomorpholine	59-89-2									
5	1,3-Butadiene	106-99-0									
6	Ethylene dibromide (dibromethane)	106-93-4									
7	Polychlorinated Biphenyls (PCBs)	1336-36-3									
8	Ethylene oxide	75-21-8									
9	Vinyl chloride	75-01-4									
10	Acrylonitrile	107-13-1									
11	1,4-Dioxane	123-91-1									
12	1,2-Dichloroethane (ethylene chloride)	107-06-2									
13	Chloroform	67-66-3					5.50E-02				
14	Carbon tetrachloride	56-23-5						1.30E-01	2.10E-01	2.60E-01	3.00E-01
15	Benzene	71-43-2			2.40E-03		1.50E-02				
16	Acetaldehyde	75-07-0									
17	Dichloromethane (methylene chloride)	75-09-2			2.10E-03	5.10E-02	3.20E-02				
18	Trichloroethylene	79-01-6									
19	Perchloroethylene (tetrachloroethylene)	127-18-4			9.20E-03		1.10E-01			8.80E-02	4.30E-02
20	1,4-Dichlorobenzene	106-46-7									
21	Bis(2-ethylhexyl)phthalate (DEHP)	117-81-7									
22	N-Nitrosodimethylamine	62-75-9									
23	1,2-Dichloropropane	78-87-5									
24	Acrolein	107-02-8									
25	Methyl isocyanate	624-83-9									
26	Acrylic acid	79-10-7									
27	Hexachlorobutadiene	87-68-3									
28	Allyl chloride	107-05-1									
29	Methyl hydrazine	60-34-4									
30	Nitrobenzene	98-95-3									
31	p-Nitrochlorobenzene	100-00-5									
32	Diphenylamine	122-39-4									
33	1,1-Dimethylhydrazine	57-14-7									
34	Biphenyl	92-52-4									
35	Methyl bromide	74-83-9									
36	Tributyl phosphate	126-73-8									
37	Methylacrylonitrile	126-98-7									
38	Propylene imine	75-55-8									
39	Allyl alcohol	107-18-6									
40	Cyanides, as CN (mg/m3 of CN)	51-12-5	7.89E-03		7.35E-02	6.96E-03	9.74E-02	1.15E-02	2.04E-02	5.11E-02	1.28E-02
41	Diethyl phthalate	84-66-2									
42	Dibutyl phthalate	84-74-2									
43	1,2-Epoxybutane	106-88-7									
44	1-Nitropropane	108-03-2									
45	Crotonaldehyde	4170-30-3									
46	Phenyl ether	101-84-8			2.10E-03		1.70E-01				
47	1,1,2,2-Tetrachloroethane	79-34-5									
48	2,6-Ditert, butyl-p-cresol	128-37-0									
49	Pyridine	110-86-1					4.40E-02				
50	Formamide	75-12-7									
51	Phenol	108-95-2									
52	2-Hexanone (MBK)	591-78-6			3.00E-03		2.80E-02		2.20E-02		
53	Vinylidene chloride	75-35-4									
54	Trimethylamine	75-50-3									
55	Acetic acid	64-19-7			3.30E-02						
56	Nitric oxide	10102-43-9		4.00E-01							
57	Carbon disulfide	75-15-0									
58	Ammonia	7664-41-7	1.50E+01	8.00E+01	9.50E+01	8.20E+01	1.71E+02		1.18E+02	7.50E+01	2.00E+01
59	Propionic acid	79-09-4			1.80E-03						
60	1,2,4-Trichlorobenzene	120-82-1									
61	Dimethyl acetamide	127-19-5									
62	Dichlorofluoromethane	75-43-4			1.80E-03						
63	Chlorobenzene	108-90-7									
64	Naptnalene	91-20-3									
65	1,1,2-Trichloroethane	79-00-5									
66	Vinyl acetate	108-05-4									
67	Mesityl oxide	141-79-7									

	B	C	CD	CE	CF	CG	CH	CI	CJ	CK	CL
1	Toxic Air Pollutant	CAS # [F1]	T101 mg/m3 Max Average	T104 mg/m3 Max Average	T107 mg/m3 Max Average	T110 mg/m3 Max Average	T111 mg/m3 Max Average	TX101 mg/m3 Max Average	TX102 mg/m3 Max Average	TX103 mg/m3 Max Average	TX104 mg/m3 Max Average
68	Acetonitrile	75-05-8	1.10E-02		8.20E-02	1.10E-02	9.60E-02	1.70E-02	1.10E-02	4.40E-02	1.80E-02
69	Cyclohexanone	108-94-1									
70	Methyl chloride	74-87-3									
71	n-Propyl nitrate	627-13-4			6.40E-03				9.60E-02		
72	Toluene	108-88-3			4.40E-03		5.70E-02		1.60E-01		
73	2-Butoxyethanol	111-76-2									
74	n-Butyl alcohol	71-36-3			8.20E-02		1.70E-02		4.20E-01	5.50E-02	
75	Isobutyl alcohol	78-83-1			1.80E-03						
76	n-Valeraldehyde	110-62-3									
77	Methyl isobutyl ketone (MIBK)	108-10-1					1.40E-02				
78	Cyclohexanol	108-93-0									
79	Ethyl butyl ketone	106-35-4			4.00E-03				1.00E-01		
80	Methyl isoamyl ketone	110-12-3							2.70E-02		
81	Methyl n-amyl ketone	110-43-0			3.40E-03		4.20E-02		2.40E-02		
82	Diprophyl ketone	123-19-3									
83	a-Methyl styrene	98-83-9									
84	Methyl formate	107-31-3			1.80E-03						
85	Cumene	98-82-8									
86	Nitromethane	75-52-5									
87	Methyl alcohol	67-56-1			1.00E+00		3.30E-01		5.80E-01		
88	Ethyl benzene	100-41-4									
89	Styrene	100-42-5									
90	tert-Butyl alcohol	75-65-0					5.50E-02		1.20E-01		
91	sec-Butyl alcohol	78-92-2			3.70E-03						
92	Methyl ethyl ketone (MEK)	78-93-3			3.70E-03	2.60E-02	4.70E-02		2.90E-01	3.80E-02	
93	o-Dichlorobenzene (1,2-Dichlorobenzene)	95-50-1									
94	Isoamyl alcohol	123-51-3									
95	Xylenes (m-,o-,p-isomers)	1330-20-7									
96	n-Propyl alcohol	71-23-8			9.20E-03		1.90E-02		4.70E-01	2.20E-02	
97	Tetrahydrofuran	109-99-9			1.80E-03				4.40E-02		
98	Methyl acetate	79-20-9			2.60E-02						
99	Methyl propyl ketone	107-87-9			1.00E-02		6.10E-02		6.00E-02		
100	Methyl isopropyl ketone	563-80-4			1.80E-03				4.20E-02		
101	Diethyl ketone	96-22-0			3.40E-03						
102	n-Butyl acetate	123-86-4									
103	1,1-Dichloroethane	75-34-3									
104	Isopropyl alcohol	67-63-0			1.80E-02		1.20E-02		3.90E-02		
105	Cyclohexane	110-82-7									
106	Cyclohexene	110-83-8									
107	Isopropyl ether	108-20-3									
108	Nonane	111-84-2			1.50E-03		7.80E-02				
109	Octane	111-65-9			2.00E-03		4.40E-03				
110	Ethyl acetate	141-78-6									
111	Methylcyclohexane	108-87-2									
112	Heptane (n-Heptane)	142-82-5			2.00E-03		5.50E-03				
113	Methyl acetylene	74-99-7									
114	Cyclopentane	287-92-3									
115	Acetone	67-64-1	2.80E-02		2.40E+00	1.80E-02	4.20E-01	1.20E-01	5.00E+00	8.30E-01	9.00E-02
116	Pentane	109-66-0									
117	Butane	106-97-8									
118	Ethyl alcohol	64-17-5	3.40E-02		1.10E-01				9.20E-01	3.00E-01	1.00E-02
119	Methyl chloroform (1,1,1-Trichloroethane)	71-55-6									
120	Ethyl chloride	75-00-3									
121	Chlorodifluoromethane	75-45-6								3.70E-01	3.70E-01
122	Dichlorodifluoromethane	75-71-8							2.60E-02		
123	Trichlorofluoromethane	75-69-4	1.50E-01		3.50E-02	4.90E-02	5.50E-02	7.90E-01	9.50E-01	2.40E+00	4.40E-01
124	Dichlorotetrafluoroethane	76-14-2									
125	1,1,2-Trichloro-1,2,2-trifluorethane	76-13-1									2.20E-02
126	Propionaldehyde	123-38-6									
127	Acetophenone	98-86-2			3.70E-03						
128	Carbonyl sulfide	463-58-1									
129	Total non-methane organic compounds (TNMOC) by EPA TO-12 Method		7.40E-02	1.80E+00		1.00E+00		1.20E-01	2.00E+00	6.20E-01	1.90E-01
130	Total non-methane organic compounds (TNMOC) by summation of GC/MS results				3.60E+00		2.00E+01				

	B	C	CM	CN	CO	CP	CQ	CR	CS	CT	CU
1	**Toxic Air Pollutant**	**CAS # [F1]**	**TX105 mg/m3 Max Average**	**TX106 mg/m3 Max Average**	**TX108 mg/m3 Max Average**	**TX110 mg/m3 Max Average**	**TX111 mg/m3 Max Average**	**TX112 mg/m3 Max Average**	**TX113 mg/m3 Max Average**	**TX114 mg/m3 Max Average**	**TX115 mg/m3 Max Average**
2	**Sampling Dates**		12/20/1994	03/05/97	12/5/1997	09/23/97	10/12/1995	12/9/1997	08/06/97	03/25/97	11/20/1997
3	Dioxins and furans [F8]		7.30E-03	6.20E-02		3.20E-01	2.93E-01	1.30E-01	4.10E-02	4.60E-01	2.90E-02
4	N-Nitrosomorpholine	59-89-2									
5	1,3-Butadiene	106-99-0									
6	Ethylene dibromide (dibromethane)	106-93-4									
7	Polychlorinated Biphenyls (PCBs)	1336-36-3	2.30E-03								
8	Ethylene oxide	75-21-8									
9	Vinyl chloride	75-01-4								-	
10	Acrylonitrile	107-13-1									
11	1,4-Dioxane	123-91-1									
12	1,2-Dichloroethane (ethylene chloride)	107-06-2		4.90E-02							
13	Chloroform	67-66-3	8.20E-02	3.10E-02					3.60E-02		
14	Carbon tetrachloride	56-23-5	2.20E+00	8.20E-01	6.20E-01	2.50E-01	4.10E-02		1.90E+00		2.40E-01
15	Benzene	71-43-2	5.00E-04				2.70E-02				
16	Acetaldehyde	75-07-0	5.50E-02				7.90E-02				
17	Dichloromethane (methylene chloride)	75-09-2	1.70E-03				3.40E-02	2.60E-02			
18	Trichloroethylene	79-01-6									
19	Perchloroethylene (tetrachloroethylene)	127-18-4	2.40E-03		6.20E-02		7.20E-02	1.30E-01			
20	1,4-Dichlorobenzene	106-46-7									
21	Bis(2-ethylhexyl)phthalate (DEHP)	117-81-7									
22	N-Nitrosodimethylamine	62-75-9				1.50E-01					
23	1,2-Dichloropropane	78-87-5									
24	Acrolein	107-02-8									
25	Methyl isocyanate	624-83-9									
26	Acrylic acid	79-10-7									
27	Hexachlorobutadiene	87-68-3									
28	Allyl chloride	107-05-1									
29	Methyl hydrazine	60-34-4									
30	Nitrobenzene	98-95-3									
31	p-Nitrochlorobenzene	100-00-5									
32	Diphenylamine	122-39-4									
33	1,1-Dimethylhydrazine	57-14-7	7.50E-03								
34	Biphenyl	92-52-4									
35	Methyl bromide	74-83-9									
36	Tributyl phosphate	126-73-8									
37	Methylacrylonitrile	126-98-7									
38	Propylene imine	75-55-8									
39	Allyl alcohol	107-18-6									
40	Cyanides, as CN (mg/m3 of CN)	51-12-5	9.98E-03	3.96E-02	1.28E-02	1.28E-01	1.66E-01	1.16E-02			
41	Diethyl phthalate	84-66-2	1.70E-02								
42	Dibutyl phthalate	84-74-2									
43	1,2-Epoxybutane	106-88-7									
44	1-Nitropropane	108-03-2									
45	Crotonaldehyde	4170-30-3									
46	Phenyl ether	101-84-8									
47	1,1,2,2-Tetrachloroethane	79-34-5									
48	2,6-Ditert, butyl-p-cresol	128-37-0									
49	Pyridine	110-86-1		1.40E-01			1.90E-02			1.30E-01	
50	Formamide	75-12-7									
51	Phenol	108-95-2									
52	2-Hexanone (MBK)	591-78-6	4.40E-03			1.20E-01	5.50E-02	3.80E-02			
53	Vinylidene chloride	75-35-4	4.00E-04								
54	Trimethylamine	75-50-3									
55	Acetic acid	64-19-7									
56	Nitric oxide	10102-43-9	1.40E+00				7.10E-01				
57	Carbon disulfide	75-15-0									
58	Ammonia	7664-41-7	1.50E+01	1.78E+02	1.70E+01	6.86E+02	4.65E+02	7.80E+01	1.50E+01	1.13E+02	
59	Propionic acid	79-09-4									
60	1,2,4-Trichlorobenzene	120-82-1									
61	Dimethyl acetamide	127-19-5									
62	Dichlorofluoromethane	75-43-4			1.90E-02				2.40E-02		
63	Chlorobenzene	108-90-7									
64	Naphthalene	91-20-3									
65	1,1,2-Trichloroethane	79-00-5									
66	Vinyl acetate	108-05-4									
67	Mesityl oxide	141-79-7									

	B	C	CM	CN	CO	CP	CQ	CR	CS	CT	CU
1	**Toxic Air Pollutant**	**CAS # [F1]**	**TX105 mg/m3 Max Average**	**TX106 mg/m3 Max Average**	**TX108 mg/m3 Max Average**	**TX110 mg/m3 Max Average**	**TX111 mg/m3 Max Average**	**TX112 mg/m3 Max Average**	**TX113 mg/m3 Max Average**	**TX114 mg/m3 Max Average**	**TX115 mg/m3 Max Average**
68	Acetonitrile	75-05-8	9.30E-03	4.90E-02	1.80E-02	1.80E-01	1.20E-01	1.70E-02			
69	Cyclohexanone	108-94-1									
70	Methyl chloride	74-87-3	1.60E-02	2.10E-02		2.10E-01	3.30E-02				
71	n-Propyl nitrate	627-13-4	8.60E-03			1.40E-01	3.60E-02				
72	Toluene	108-88-3	3.10E-03	4.90E-02		8.30E-02	2.10E-01	3.60E-01	6.40E-02		
73	2-Butoxyethanol	111-76-2									
74	n-Butyl alcohol	71-36-3	3.00E-02	8.00E-01	3.90E-01	3.30E+00	2.40E+00	1.70E+00	6.70E-01	3.70E+00	3.60E-01
75	Isobutyl alcohol	78-83-1									
76	n-Valeraldehyde	110-62-3									
77	Methyl isobutyl ketone (MIBK)	108-10-1					3.70E-02				
78	Cyclohexanol	108-93-0									
79	Ethyl butyl ketone	106-35-4	1.70E-02	3.20E-02		9.30E-01	2.60E-01	1.00E-01			
80	Methyl isoamyl ketone	110-12-3				7.70E-02					
81	Methyl n-amyl ketone	110-43-0	3.90E-03			1.20E-01	4.00E-02				
82	Diprophyl ketone	123-19-3				9.50E-02	3.90E-02			4.70E-02	
83	a-Methyl styrene	98-83-9									
84	Methyl formate	107-31-3									
85	Cumene	98-82-8									
86	Nitromethane	75-52-5									
87	Methyl alcohol	67-56-1	7.40E-02	1.40E+00		9.80E-01	1.30E+00		9.80E-02	3.50E-01	
88	Ethyl benzene	100-41-4									
89	Styrene	100-42-5									
90	tert-Butyl alcohol	75-65-0	2.80E-02			3.30E-01	5.40E-02	7.80E-02			
91	sec-Butyl alcohol	78-92-2									
92	Methyl ethyl ketone (MEK)	78-93-3	1.50E-01	7.10E-02	3.50E-02	4.70E-01	8.20E-01	1.90E-01	6.50E-02	2.70E-01	5.30E-02
93	o-Dichlorobenzene (1,2-Dichlorobenzene)	95-50-1									
94	Isoamyl alcohol	123-51-3									
95	Xylenes (m-,o-,p-isomers)	1330-20-7									
96	n-Propyl alcohol	71-23-8	2.60E-02	4.20E-01	6.10E-02	3.20E+00	6.00E-01	5.20E-01	7.60E-02	3.10E-01	3.70E-02
97	Tetrahydrofuran	109-99-9		6.20E-02		3.20E-01	2.60E-01	1.30E-01	4.10E-02	4.60E-01	2.90E-02
98	Methyl acetate	79-20-9									
99	Methyl propyl ketone	107-87-9	1.20E-02	2.50E-02		2.00E-01	1.50E-01	8.80E-02	3.30E-02	1.50E-01	
100	Methyl isopropyl ketone	563-80-4	3.50E-03			7.20E-02	5.20E-02			3.70E-02	
101	Diethyl ketone	96-22-0									
102	n-Butyl acetate	123-86-4									
103	1,1-Dichloroethane	75-34-3									
104	Isopropyl alcohol	67-63-0	4.20E-03	4.20E-02	5.20E-02	7.10E-01	3.20E-01	3.90E-01	2.20E-01	2.70E-01	4.90E-01
105	Cyclohexane	110-82-7									
106	Cyclohexene	110-83-8									
107	Isopropyl ether	108-20-3									
108	Nonane	111-84-2	1.60E-03				1.30E-02				
109	Octane	111-65-9	1.80E-03				2.50E-02				
110	Ethyl acetate	141-78-6									
111	Methylcyclohexane	108-87-2									1.20E-01
112	Heptane (n-Heptane)	142-82-5	1.40E-03				3.90E-02				
113	Methyl acetylene	74-99-7									
114	Cyclopentane	287-92-3									
115	Acetone	67-64-1	2.30E+00	1.00E+00	2.80E-01	7.60E+00	5.80E+00	1.60E+00	6.40E-01	3.00E+00	1.10E+00
116	Pentane	109-66-0		1.10E-01			6.90E-02	1.90E-02			
117	Butane	106-97-8		2.90E-02		8.30E-02	1.30E-01			7.10E-02	1.30E-02
118	Ethyl alcohol	64-17-5	2.80E-02	2.30E-01	1.30E-01	5.80E+00	4.70E-01	6.40E-01	8.50E-02	1.70E-01	1.30E-01
119	Methyl chloroform (1,1,1-Trichloroethane)	71-55-6									
120	Ethyl chloride	75-00-3									
121	Chlorodifluoromethane	75-45-6			2.70E-01						
122	Dichlorodifluoromethane	75-71-8		4.40E-02	2.60E-02		1.00E-01				5.90E-02
123	Trichlorofluoromethane	75-69-4	3.80E-01	7.90E-01	1.70E+00	2.70E+00	1.70E+00	8.40E-01	3.80E+00	1.20E+00	7.90E-01
124	Dichlorotetrafluoroethane	76-14-2									
125	1,1,2-Trichloro-1,2,2-trifluorethane	76-13-1									
126	Propionaldehyde	123-38-6									
127	Acetophenone	98-86-2	2.00E-03								
128	Carbonyl sulfide	463-58-1									
129	Total non-methane organic compounds (TNMOC) by EPA TO-12 Method			1.50E+00	3.60E-01	5.00E+00	1.50E+01	1.40E+00	7.40E-01	2.30E+00	6.10E-01
130	Total non-methane organic compounds (TNMOC) by summation of GC/MS results		4.80E+00								

	B	C	CV	CW	CX	CY	CZ	DA	DB	DC	DD
1	**Toxic Air Pollutant**	**CAS # [F1]**	**TX116 mg/m3 Max Average**	**TX117 mg/m3 Max Average**	**TX118 mg/m3 Max Average**	**TY101 mg/m3 Max Average**	**TY102 mg/m3 Max Average**	**TY103 mg/m3 Max Average**	**TY104 mg/m3 Max Average**	**TY105 mg/m3 Max Average**	**U102 mg/m3 Max Average**
2	**Sampling Dates**		09/18/97	12/11/1997	7/28/1993, 9/7/1994, 12/16/1994	8/5/1994, 4/6/1995	4/12/1996	8/5/1994, 4/11/95, 11/22/96	8/5/1994, 4/27/1995	10/20/1997	12/18/1997
3	Dioxins and furans [F8]				5.81E-02	4.50E-03		7.00E-02	2.03E-02	2.20E-01	2.50E-01
4	N-Nitrosomorpholine	59-89-2									
5	1,3-Butadiene	106-99-0			3.90E-03						
6	Ethylene dibromide (dibromethane)	106-93-4									
7	Polychlorinated Biphenyls (PCBs)	1336-36-3			1.33E-02	4.50E-03		3.50E-02	3.02E-02		
8	Ethylene oxide	75-21-8							4.80E-02		
9	Vinyl chloride	75-01-4									
10	Acrylonitrile	107-13-1			5.60E-03						
11	1,4-Dioxane	123-91-1									3.30E-02
12	1,2-Dichloroethane (ethylene chloride)	107-06-2									
13	Chloroform	67-66-3			1.00E-02	1.70E-03		4.30E-02	4.10E-03		
14	Carbon tetrachloride	56-23-5		4.40E-02	2.50E-01	4.10E-02	1.20E-02	2.00E-01	5.90E-02	1.20E-01	
15	Benzene	71-43-2			1.40E-02	7.00E-04	2.00E-03	1.50E-02	6.10E-03		3.00E-02
16	Acetaldehyde	75-07-0			8.20E-02	1.00E-01	2.50E-02	3.20E-01	5.50E-02	4.50E-01	
17	Dichloromethane (methylene chloride)	75-09-2			2.30E-02		4.00E-02	2.10E-02	4.90E-03		
18	Trichloroethylene	79-01-6			1.60E-03			1.40E-02			
19	Perchloroethylene (tetrachloroethylene)	127-18-4			1.40E-02	7.40E-03	2.00E-02	8.20E-02	7.10E-02		4.90E-02
20	1,4-Dichlorobenzene	106-46-7			7.00E-04			8.90E-03			
21	Bis(2-ethylhexyl)phthalate (DEHP)	117-81-7									
22	N-Nitrosodimethylamine	62-75-9									9.00E-02
23	1,2-Dichloropropane	78-87-5			3.70E-03						
24	Acrolein	107-02-8									
25	Methyl isocyanate	624-83-9									
26	Acrylic acid	79-10-7									
27	Hexachlorobutadiene	87-68-3									
28	Allyl chloride	107-05-1									
29	Methyl hydrazine	60-34-4				2.50E-03					
30	Nitrobenzene	98-95-3			1.40E-02				3.40E-03		
31	p-Nitrochlorobenzene	100-00-5									
32	Diphenylamine	122-39-4							6.40E-03		
33	1,1-Dimethylhydrazine	57-14-7							2.90E-03		
34	Biphenyl	92-52-4			4.00E-03				4.60E-03		
35	Methyl bromide	74-83-9			2.10E-03						
36	Tributyl phosphate	126-73-8									
37	Methylacrylonitrile	126-98-7									
38	Propylene imine	75-55-8									
39	Allyl alcohol	107-18-6							8.00E-04		
40	Cyanides, as CN (mg/m3 of CN)	51-12-5	1.16E-02	3.71E-02	1.60E-01	1.01E-01	1.53E-02	1.57E-01	1.35E-01	1.06E+00	3.48E-02
41	Diethyl phthalate	84-66-2			1.90E-02				8.00E-04		
42	Dibutyl phthalate	84-74-2									
43	1,2-Epoxybutane	106-88-7									
44	1-Nitropropane	108-03-2								1.30E-01	
45	Crotonaldehyde	4170-30-3							2.00E-03		
46	Phenyl ether	101-84-8									
47	1,1,2,2-Tetrachloroethane	79-34-5									
48	2,6-Ditert. butyl-p-cresol	128-37-0									
49	Pyridine	110-86-1						4.40E-02	1.60E-01		
50	Formamide	75-12-7									
51	Phenol	108-95-2			5.70E-03				1.70E-02		
52	2-Hexanone (MBK)	591-78-6			2.50E-02	1.30E-03		1.50E-02	6.30E-03	1.40E-01	
53	Vinylidene chloride	75-35-4			1.30E-03	9.30E-03		1.20E-02	7.00E-04		
54	Trimethylamine	75-50-3									
55	Acetic acid	64-19-7							1.60E-03		
56	Nitric oxide	10102-43-9			9.20E-01	1.50E-01		1.40E-01	2.40E-01		
57	Carbon disulfide	75-15-0									
58	Ammonia	7664-41-7	9.90E+00		3.20E+01	1.30E+01	3.10E+00	3.70E+01	4.60E+01		4.58E+02
59	Propionic acid	79-09-4			1.30E-02						
60	1,2,4-Trichlorobenzene	120-82-1						1.10E-02			
61	Dimethyl acetamide	127-19-5									
62	Dichlorofluoromethane	75-43-4		1.60E-02	5.50E-03	1.40E-03			1.60E-03		
63	Chlorobenzene	108-90-7			5.00E-04						
64	Napthalene	91-20-3							5.00E-03		
65	1,1,2-Trichloroethane	79-00-5						8.80E-03			
66	Vinyl acetate	108-05-4									
67	Mesityl oxide	141-79-7									

	B	C	CV	CW	CX	CY	CZ	DA	DB	DC	DD
1	Toxic Air Pollutant	CAS # [F1]	TX116 mg/m3 Max Average	TX117 mg/m3 Max Average	TX118 mg/m3 Max Average	TY101 mg/m3 Max Average	TY102 mg/m3 Max Average	TY103 mg/m3 Max Average	TY104 mg/m3 Max Average	TY105 mg/m3 Max Average	U102 mg/m3 Max Average
68	Acetonitrile	75-05-8	1.70E-02	5.40E-02	1.30E-01	1.40E-01	2.30E-02	1.40E-01	1.50E-01	8.70E-01	5.00E-02
69	Cyclohexanone	108-94-1						5.40E-02		4.80E-02	
70	Methyl chloride	74-87-3	4.50E-02	3.70E-02	2.30E-02			2.30E-03			
71	n-Propyl nitrate	627-13-4			1.30E-01	1.20E-03			2.50E-02	1.10E+00	
72	Toluene	108-88-3	4.70E-01	3.70E-02	4.50E-02	7.90E-01	2.30E-03	8.20E-01	2.80E-01	7.20E-01	3.00E-01
73	2-Butoxyethanol	111-76-2									
74	n-Butyl alcohol	71-36-3		8.50E-02	1.00E+00	8.20E-03	9.40E-03	1.10E+00	3.30E-01	8.50E+00	9.10E-01
75	Isobutyl alcohol	78-83-1							5.50E-02		
76	n-Valeraldehyde	110-62-3						1.40E-01	1.00E-02		
77	Methyl isobutyl ketone (MIBK)	108-10-1			8.10E-03		1.10E-02	1.80E-02			5.70E-02
78	Cyclohexanol	108-93-0									
79	Ethyl butyl ketone	106-35-4			4.60E-01				1.30E-02		
80	Methyl isoamyl ketone	110-12-3									
81	Methyl n-amyl ketone	110-43-0			2.10E-02	1.00E-03		1.60E-02	5.60E-03	2.00E-01	
82	Diprophyl ketone	123-19-3			1.00E-02				6.00E-04		
83	a-Methyl styrene	98-83-9									
84	Methyl formate	107-31-3									
85	Cumene	98-82-8									
86	Nitromethane	75-52-5			1.60E-03						
87	Methyl alcohol	67-56-1			1.40E+00	7.20E-01	1.20E-01	6.60E-01	1.30E-01		6.60E-01
88	Ethyl benzene	100-41-4			8.00E-04			3.10E-02			2.30E-02
89	Styrene	100-42-5			4.00E-03			2.20E-02			
90	tert-Butyl alcohol	75-65-0			1.50E-02			1.20E-01			1.30E-01
91	sec-Butyl alcohol	78-92-2									8.30E-02
92	Methyl ethyl ketone (MEK)	78-93-3	2.70E-02	3.50E-02	2.30E-01	1.10E-01	1.40E-02	1.80E-01	6.70E-02	8.30E-01	8.00E-02
93	o-Dichlorobenzene (1,2-Dichlorobenzene)	95-50-1									
94	Isoamyl alcohol	123-51-3									
95	Xylenes (m-,o-,p-isomers)	1330-20-7									
96	n-Propyl alcohol	71-23-8	1.70E-01		1.70E-01			9.70E-02	2.30E-02	9.60E-01	1.90E-01
97	Tetrahydrofuran	109-99-9			5.50E-02			7.00E-02	2.70E-03	2.20E-01	2.50E-01
98	Methyl acetate	79-20-9									
99	Methyl propyl ketone	107-87-9			4.60E-02	2.20E-03		1.60E-02	1.40E-02	4.20E-01	
100	Methyl isopropyl ketone	563-80-4			6.60E-03				2.10E-03		
101	Diethyl ketone	96-22-0			1.60E-02						
102	n-Butyl acetate	123-86-4			9.00E-03						
103	1,1-Dichloroethane	75-34-3									
104	Isopropyl alcohol	67-63-0	1.60E-01	1.70E-01	2.70E-01	8.20E-03		5.50E-02	5.00E-02	7.10E-01	1.20E-01
105	Cyclohexane	110-82-7			7.50E-02			5.60E-03	1.30E-02		8.20E-02
106	Cyclohexene	110-83-8									
107	Isopropyl ether	108-20-3									
108	Nonane	111-84-2			2.30E-02	6.00E-04		2.20E-02	4.90E-03		
109	Octane	111-65-9			3.00E-02	3.00E-04		2.80E-02	2.60E-02		
110	Ethyl acetate	141-78-6									
111	Methylcyclohexane	108-87-2	7.60E-01	2.50E-02		1.50E+00		7.40E-01	1.10E+00		3.70E-01
112	Heptane (n-Heptane)	142-82-5	2.30E-01	2.00E-02	7.70E-02	1.40E+00		5.70E-01	6.40E-01	6.60E-02	2.60E-01
113	Methyl acetylene	74-99-7									
114	Cyclopentane	287-92-3									
115	Acetone	67-64-1	6.20E-01	8.10E-01	3.90E+00	3.70E-01	1.40E-01	5.30E-01	2.20E+00	4.30E+00	3.30E-01
116	Pentane	109-66-0						4.80E-02		5.60E-02	5.90E-02
117	Butane	106-97-8			1.20E-01			1.30E-01		2.30E-01	2.90E-01
118	Ethyl alcohol	64-17-5	5.10E-01	3.20E-01	3.80E-01	2.40E-03		1.50E-01	2.40E-02	1.80E+00	2.60E+00
119	Methyl chloroform (1,1,1-Trichloroethane)	71-55-6			1.90E-03	1.60E-03		1.00E-02	9.00E-04		
120	Ethyl chloride	75-00-3			7.30E-03						
121	Chlorodifluoromethane	75-45-6		5.60E-02			7.80E-02	4.40E-02			
122	Dichlorodifluoromethane	75-71-8			3.60E-03		4.90E-03	1.80E-02			
123	Trichlorofluoromethane	75-69-4	1.70E+00	2.20E+00	2.40E+00	2.50E-01	4.20E-01	9.40E-01	4.20E-01	3.70E-01	1.30E+00
124	Dichlorotetrafluoroethane	76-14-2									
125	1,1,2-Trichloro-1,2,2-trifluorethane	76-13-1			1.70E-03	1.60E-03		7.20E-02	4.60E-01		
126	Propionaldehyde	123-38-6						1.20E-01			
127	Acetophenone	98-86-2			2.40E-02				4.60E-02		
128	Carbonyl sulfide	463-58-1				6.40E-02			2.70E-02		
129	Total non-methane organic compounds (TNMOC) by EPA TO-12 Method		4.80E+00	1.10E+00			3.20E-01	4.60E+01		5.60E+00	5.20E+00
130	Total non-methane organic compounds (TNMOC) by summation of GC/MS results				1.10E+01	2.00E+01			1.80E+01		

	B	C	DE	DF	DG	DH	DI	DJ	DK	DL	DM
1	Toxic Air Pollutant	CAS # [F1]	U103 mg/m3 Max Average	U104 mg/m3 Max Average	U105 mg/m3 Max Average	U106 mg/m3 Max Average	U107 mg/m3 Max Average	U108 mg/m3 Max Average	U109 mg/m3 Max Average	U111 mg/m3 Max Average	U112 mg/m3 Max Average
2	Sampling Dates		2/15/1995	7/16/1996	2/24/1995	8/25/1994, 3/7/1995	2/17/1995	8/29/1995	8/10/1995	2/28/1995	7/9/96, 12/06/96
3	Dioxins and furans [F8]		1.10E-01		4.00E-02	2.52E-01	9.50E-02	2.60E-01	2.80E-01	6.40E-02	6.46E-02
4	N-Nitrosomorpholine	59-89-2						4.60E-02			
5	1,3-Butadiene	106-99-0									
6	Ethylene dibromide (dibromethane)	106-93-4									8.40E-02
7	Polychlorinated Biphenyls (PCBs)	1336-36-3									
8	Ethylene oxide	75-21-8									
9	Vinyl chloride	75-01-4									3.10E-02
10	Acrylonitrile	107-13-1									
11	1,4-Dioxane	123-91-1	1.70E-02							4.40E-02	1.10E-02
12	1,2-Dichloroethane (ethylene chloride)	107-06-2									5.30E-02
13	Chloroform	67-66-3									5.30E-02
14	Carbon tetrachloride	56-23-5	4.80E-02								3.90E-02
15	Benzene	71-43-2	3.40E-02		5.30E-03	3.10E-02	1.10E-01	6.90E-02	4.90E-02	1.80E-02	2.90E-02
16	Acetaldehyde	75-07-0				1.40E-01	2.20E-02				4.70E-02
17	Dichloromethane (methylene chloride)	75-09-2	5.80E-02			6.10E-01	1.60E-02	8.30E-02	2.60E-01		4.60E-02
18	Trichloroethylene	79-01-6							3.50E-02		5.60E-02
19	Perchloroethylene (tetrachloroethylene)	127-18-4	2.00E-02				3.50E-02		4.20E-02		4.00E-02
20	1,4-Dichlorobenzene	106-46-7									5.10E-02
21	Bis(2-ethylhexyl)phthalate (DEHP)	117-81-7									
22	N-Nitrosodimethylamine	62-75-9	1.90E-01		8.40E-02	2.20E-01	4.10E-02	2.50E-01	2.10E-01	1.30E-01	
23	1,2-Dichloropropane	78-87-5									2.80E-02
24	Acrolein	107-02-8									
25	Methyl isocyanate	624-83-9				4.20E-02					
26	Acrylic acid	79-10-7									
27	Hexachlorobutadiene	87-68-3									5.30E-02
28	Allyl chloride	107-05-1									2.00E-02
29	Methyl hydrazine	60-34-4									
30	Nitrobenzene	98-95-3									
31	p-Nitrochlorobenzene	100-00-5									
32	Diphenylamine	122-39-4									
33	1,1-Dimethylhydrazine	57-14-7									
34	Biphenyl	92-52-4									
35	Methyl bromide	74-83-9									5.90E-02
36	Tributyl phosphate	126-73-8						1.10E-01	1.10E-01	4.30E-03	
37	Methylacrylonitrile	126-98-7									
38	Propylene imine	75-55-8									
39	Allyl alcohol	107-18-6									
40	Cyanides, as CN (mg/m3 of CN)	51-12-5	2.20E-01		5.07E-02	1.96E-01	2.19E-01	5.77E-02	4.76E-02	2.54E-01	1.31E-01
41	Diethyl phthalate	84-66-2				1.20E+00					
42	Dibutyl phthalate	84-74-2									
43	1,2-Epoxybutane	106-88-7									
44	1-Nitropropane	108-03-2									
45	Crotonaldehyde	4170-30-3									
46	Phenyl ether	101-84-8									
47	1,1,2,2-Tetrachloroethane	79-34-5									9.70E-02
48	2,6-Ditert, butyl-p-cresol	128-37-0									
49	Pyridine	110-86-1				2.70E-01	1.40E-01	1.80E-02		2.40E-02	6.60E-02
50	Formamide	75-12-7									
51	Phenol	108-95-2									
52	2-Hexanone (MBK)	591-78-6	1.10E-02		2.60E-03	2.80E-02	2.50E-03			5.50E-03	
53	Vinylidene chloride	75-35-4									4.30E-02
54	Trimethylamine	75-50-3									
55	Acetic acid	64-19-7				1.10E-01					
56	Nitric oxide	10102-43-9									
57	Carbon disulfide	75-15-0									9.00E-03
58	Ammonia	7664-41-7	5.55E+02		2.47E+02	7.51E+02	3.44E+02	5.25E+02	4.39E+02	5.14E+02	2.34E+02
59	Propionic acid	79-09-4									
60	1,2,4-Trichlorobenzene	120-82-1									4.00E-02
61	Dimethyl acetamide	127-19-5									
62	Dichlorofluoromethane	75-43-4	2.20E-02			2.80E-02	4.60E-02				
63	Chlorobenzene	108-90-7									5.50E-02
64	Napthalene	91-20-3									
65	1,1,2-Trichloroethane	79-00-5									5.80E-02
66	Vinyl acetate	108-05-4									2.70E-03
67	Mesityl oxide	141-79-7									

	B	C	DE	DF	DG	DH	DI	DJ	DK	DL	DM
1	**Toxic Air Pollutant**	**CAS # [F1]**	**U103 mg/m3 Max Average**	**U104 mg/m3 Max Average**	**U105 mg/m3 Max Average**	**U106 mg/m3 Max Average**	**U107 mg/m3 Max Average**	**U108 mg/m3 Max Average**	**U109 mg/m3 Max Average**	**U111 mg/m3 Max Average**	**U112 mg/m3 Max Average**
68	Acetonitrile	75-05-8	2.70E-01		6.30E-02	2.30E-01	2.10E-01	8.10E-02	7.50E-02	3.30E-01	4.30E-02
69	Cyclohexanone	108-94-1									5.70E-02
70	Methyl chloride	74-87-3				1.10E-01	2.50E-02				2.50E-02
71	n-Propyl nitrate	627-13-4									
72	Toluene	108-88-3	1.20E-01		2.50E-02	2.80E-01	1.90E-01	1.50E-01	1.70E-01	1.20E-01	2.10E-01
73	2-Butoxyethanol	111-76-2									
74	n-Butyl alcohol	71-36-3	8.70E-01		2.90E-01	2.00E+00	2.10E-01	1.20E+00	1.00E+00	7.80E-01	5.60E-01
75	Isobutyl alcohol	78-83-1	1.50E-02			2.60E-02					5.50E-03
76	n-Valeraldehyde	110-62-3									
77	Methyl isobutyl ketone (MIBK)	108-10-1	2.50E-02			3.50E-02		3.00E-02	4.00E-02		1.20E-01
78	Cyclohexanol	108-93-0									
79	Ethyl butyl ketone	106-35-4	1.70E-02			4.20E-02					
80	Methyl isoamyl ketone	110-12-3									
81	Methyl n-amyl ketone	110-43-0	5.80E-03		2.40E-03	1.10E-02	3.30E-03			6.20E-03	
82	Diprophyl ketone	123-19-3									
83	a-Methyl styrene	98-83-9									
84	Methyl formate	107-31-3									
85	Cumene	98-82-8									
86	Nitromethane	75-52-5									1.30E-01
87	Methyl alcohol	67-56-1	2.90E+00		2.00E+00	4.30E+00	2.90E+00	1.20E+00	9.60E-01	2.70E+00	2.00E+00
88	Ethyl benzene	100-41-4	1.90E-02			3.80E-02	2.10E-02		3.20E-02	2.90E-02	5.20E-02
89	Styrene	100-42-5									3.90E-02
90	tert-Butyl alcohol	75-65-0				2.70E-02		1.00E-01	8.00E-02		3.70E-02
91	sec-Butyl alcohol	78-92-2						7.20E-02		6.40E-02	3.80E-02
92	Methyl ethyl ketone (MEK)	78-93-3	1.90E-02		2.30E-02	3.10E-02	7.60E-02	1.00E-01	8.40E-02	6.20E-02	2.90E-02
93	o-Dichlorobenzene (1,2-Dichlorobenzene)	95-50-1									5.30E-02
94	Isoamyl alcohol	123-51-3									
95	Xylenes (m-,o-,p-isomers)	1330-20-7									
96	n-Propyl alcohol	71-23-8	9.00E-02		2.60E-02	9.10E-01	1.30E-01	5.00E-01	6.50E-01	6.60E-02	1.10E-01
97	Tetrahydrofuran	109-99-9	1.10E-01		4.00E-02	1.70E-01	9.50E-02	2.60E-01	2.80E-01	6.40E-02	6.00E-02
98	Methyl acetate	79-20-9	1.30E-01								
99	Methyl propyl ketone	107-87-9	6.70E-03		3.00E-03	1.20E-02				7.70E-03	
100	Methyl isopropyl ketone	563-80-4									
101	Diethyl ketone	96-22-0									
102	n-Butyl acetate	123-86-4									
103	1,1-Dichloroethane	75-34-3									4.90E-02
104	Isopropyl alcohol	67-63-0	1.70E-01			2.50E-01	2.20E-01	8.70E-02	5.40E-02	1.70E-01	1.40E-01
105	Cyclohexane	110-82-7	8.80E-02				3.20E-01			7.40E-02	4.50E-02
106	Cyclohexene	110-83-8									
107	Isopropyl ether	108-20-3									
108	Nonane	111-84-2	8.30E-03		2.70E-03	8.20E-03	1.10E-02			5.30E-03	1.90E-02
109	Octane	111-65-9	1.30E-02		1.80E-03	1.60E-02	1.10E-02			8.20E-03	1.90E-02
110	Ethyl acetate	141-78-6									
111	Methylcyclohexane	108-87-2				5.50E-02					1.60E-02
112	Heptane (n-Heptane)	142-82-5	3.30E-02		7.20E-03	6.00E-02	1.20E-02	3.10E-02	4.50E-02	1.70E-02	4.60E-02
113	Methyl acetylene	74-99-7									
114	Cyclopentane	287-92-3									
115	Acetone	67-64-1	4.40E-01		9.70E-02	1.20E+00	7.20E-01	6.70E-01	6.40E-01	2.60E-01	1.80E-01
116	Pentane	109-66-0	1.20E-01			7.30E-02	7.90E-02	8.20E-02	1.00E-01		4.20E-02
117	Butane	106-97-8	4.60E-01			1.90E-01	2.20E-01	2.30E-01	3.10E-01	6.40E-02	1.20E-01
118	Ethyl alcohol	64-17-5	2.10E+00		2.50E+00	3.40E+00	5.80E+00	2.00E+00	8.10E-01	3.20E+00	1.00E+00
119	Methyl chloroform (1,1,1-Trichloroethane)	71-55-6									5.10E-02
120	Ethyl chloride	75-00-3									3.20E-02
121	Chlorodifluoromethane	75-45-6									
122	Dichlorodifluoromethane	75-71-8									3.00E-02
123	Trichlorofluoromethane	75-69-4	6.70E-01		2.00E-01	1.70E+00	2.40E+00	1.00E+00	2.10E+00	8.80E-02	5.60E-01
124	Dichlorotetrafluoroethane	76-14-2									9.20E-02
125	1,1,2-Trichloro-1,2,2-trifluorethane	76-13-1									8.60E-02
126	Propionaldehyde	123-38-6									1.80E-02
127	Acetophenone	98-86-2	7.90E-03								
128	Carbonyl sulfide	463-58-1									
129	Total non-methane organic compounds (TNMOC) by EPA TO-12 Method							1.10E+01	8.50E+00		3.70E+00
130	Total non-methane organic compounds (TNMOC) by summation of GC/MS results		1.00E+01		2.80E+00	1.20E+01	1.50E+01			3.80E+00	

	B	C	DN	DO
1	**Toxic Air Pollutant**	**CAS # [F1]**	**U203 mg/m3 Max Average**	**U204 mg/m3 Max Average**
2	**Sampling Dates**		8/9/1995	8/8/1995
3	Dioxins and furans [F8]			
4	N-Nitrosomorpholine	59-89-2		
5	1,3-Butadiene	106-99-0		
6	Ethylene dibromide (dibromethane)	106-93-4		
7	Polychlorinated Biphenyls (PCBs)	1336-36-3		
8	Ethylene oxide	75-21-8		
9	Vinyl chloride	75-01-4		
10	Acrylonitrile	107-13-1		
11	1,4-Dioxane	123-91-1		
12	1,2-Dichloroethane (ethylene chloride)	107-06-2		
13	Chloroform	67-66-3		
14	Carbon tetrachloride	56-23-5		6.40E-02
15	Benzene	71-43-2		
16	Acetaldehyde	75-07-0		
17	Dichloromethane (methylene chloride)	75-09-2	2.90E-02	2.30E-02
18	Trichloroethylene	79-01-6		
19	Perchloroethylene (tetrachloroethylene)	127-18-4		
20	1,4-Dichlorobenzene	106-46-7		
21	Bis(2-ethylhexyl)phthalate (DEHP)	117-81-7		
22	N-Nitrosodimethylamine	62-75-9		
23	1,2-Dichloropropane	78-87-5		
24	Acrolein	107-02-8		
25	Methyl isocyanate	624-83-9		
26	Acrylic acid	79-10-7		
27	Hexachlorobutadiene	87-68-3		
28	Allyl chloride	107-05-1		
29	Methyl hydrazine	60-34-4		
30	Nitrobenzene	98-95-3		
31	p-Nitrochlorobenzene	100-00-5		
32	Diphenylamine	122-39-4		
33	1,1-Dimethylhydrazine	57-14-7		
34	Biphenyl	92-52-4		
35	Methyl bromide	74-83-9		
36	Tributyl phosphate	126-73-8	5.30E-01	6.70E-01
37	Methylacrylonitrile	126-98-7		
38	Propylene imine	75-55-8		
39	Allyl alcohol	107-18-6		
40	Cyanides, as CN (mg/m3 of CN)	51-12-5		
41	Diethyl phthalate	84-66-2		
42	Dibutyl phthalate	84-74-2		
43	1,2-Epoxybutane	106-88-7		
44	1-Nitropropane	108-03-2		
45	Crotonaldehyde	4170-30-3		
46	Phenyl ether	101-84-8		
47	1,1,2,2-Tetrachloroethane	79-34-5		
48	2,6-Ditert. butyl-p-cresol	128-37-0		
49	Pyridine	110-86-1		
50	Formamide	75-12-7		
51	Phenol	108-95-2		
52	2-Hexanone (MBK)	591-78-6		
53	Vinylidene chloride	75-35-4		
54	Trimethylamine	75-50-3		
55	Acetic acid	64-19-7		
56	Nitric oxide	10102-43-9		
57	Carbon disulfide	75-15-0		1.60E-01
58	Ammonia	7664-41-7	6.60E-01	1.00E-01
59	Propionic acid	79-09-4		
60	1,2,4-Trichlorobenzene	120-82-1		
61	Dimethyl acetamide	127-19-5		
62	Dichlorofluoromethane	75-43-4		9.50E-02
63	Chlorobenzene	108-90-7		
64	Napthalene	91-20-3		
65	1,1,2-Trichloroethane	79-00-5		
66	Vinyl acetate	108-05-4		
67	Mesityl oxide	141-79-7		

	B	C	DN	DO
1	**Toxic Air Pollutant**	**CAS # [F1]**	**U203 mg/m3 Max Average**	**U204 mg/m3 Max Average**
68	Acetonitrile	75-05-8		
69	Cyclohexanone	108-94-1		
70	Methyl chloride	74-87-3		
71	n-Propyl nitrate	627-13-4		
72	Toluene	108-88-3	8.60E-02	
73	2-Butoxyethanol	111-76-2		
74	n-Butyl alcohol	71-36-3		3.60E-02
75	Isobutyl alcohol	78-83-1		
76	n-Valeraldehyde	110-62-3		
77	Methyl isobutyl ketone (MIBK)	108-10-1	5.40E-02	
78	Cyclohexanol	108-93-0		
79	Ethyl butyl ketone	106-35-4		
80	Methyl isoamyl ketone	110-12-3		
81	Methyl n-amyl ketone	110-43-0		
82	Diprophyl ketone	123-19-3		
83	a-Methyl styrene	98-83-9		
84	Methyl formate	107-31-3		
85	Cumene	98-82-8		
86	Nitromethane	75-52-5		
87	Methyl alcohol	67-56-1		
88	Ethyl benzene	100-41-4		
89	Styrene	100-42-5		
90	tert-Butyl alcohol	75-65-0		
91	sec-Butyl alcohol	78-92-2		
92	Methyl ethyl ketone (MEK)	78-93-3		
93	o-Dichlorobenzene (1,2-Dichlorobenzene)	95-50-1		
94	Isoamyl alcohol	123-51-3		
95	Xylenes (m-,o-,p-isomers)	1330-20-7		
96	n-Propyl alcohol	71-23-8		
97	Tetrahydrofuran	109-99-9		
98	Methyl acetate	79-20-9		
99	Methyl propyl ketone	107-87-9		
100	Methyl isopropyl ketone	563-80-4		
101	Diethyl ketone	96-22-0		
102	n-Butyl acetate	123-86-4		
103	1,1-Dichloroethane	75-34-3		
104	Isopropyl alcohol	67-63-0		
105	Cyclohexane	110-82-7		
106	Cyclohexene	110-83-8		
107	Isopropyl ether	108-20-3		
108	Nonane	111-84-2		
109	Octane	111-65-9		
110	Ethyl acetate	141-78-6		
111	Methylcyclohexane	108-87-2		
112	Heptane (n-Heptane)	142-82-5		
113	Methyl acetylene	74-99-7		
114	Cyclopentane	287-92-3		
115	Acetone	67-64-1	5.30E-01	2.90E-02
116	Pentane	109-66-0		
117	Butane	106-97-8		
118	Ethyl alcohol	64-17-5		
119	Methyl chloroform (1,1,1-Trichloroethane)	71-55-6		
120	Ethyl chloride	75-00-3		
121	Chlorodifluoromethane	75-45-6		
122	Dichlorodifluoromethane	75-71-8	4.70E-02	2.70E-02
123	Trichlorofluoromethane	75-69-4	9.90E+00	6.50E+00
124	Dichlorotetrafluoroethane	76-14-2		
125	1,1,2-Trichloro-1,2,2-trifluorethane	76-13-1		
126	Propionaldehyde	123-38-6		
127	Acetophenone	98-86-2		
128	Carbonyl sulfide	463-58-1		
129	Total non-methane organic compounds (TNMOC) by EPA TO-12 Method		1.80E+00	7.90E-01
130	Total non-methane organic compounds (TNMOC) by summation of GC/MS results			

Footnotes

F1 = Chemical Abstracts Service number.

F2 = TAP class as defined in the WAC 173-460-150

F3 = Small Quantity Emission rate; lbs/yr for Class A TAPs, lbs/hr for Class B TAPs. No SQEs exist for Class AI substances, for Class A substances with ASILs below 0.001 ug/m3 annual average or for Class AIII substances with ASILs based on 24-hr avg

F4 = Maximum headspace concentration of TAP allowed by current RMCS exhauster NOC.

F5 = Acceptable Source Impact Level; 1 yr average for Class A TAPs, 24 hr average for Class B TAPs. except as noted.

F6 = For Class A, maximum reported concentration (Column Q) * exhaust rate (9.5*10-5 g/s) * maximum annual X/Q (from model= 0.74) = Max reported * (7.03*10-5); and
for Class B, maximum reported concentration (Column Q) * exhaust rate (9.5*10-5 g/s) * max 24 hr X/Q (from model = 12.23) = Max reported * (1.16*10-3).

F7 = Tank headspace concentration of TAP that would result in a site-boundary concentrations equal to the ASIL if the headspace were exhausted at 200 cfm (the exhaust rate of the RMCS exhauster).

F8 = WAC 460 specifies equivalency in 2,3,7,8-TCDD; see Maughan 1996 "Disease potential for tank vapor nonchlorinated furans at the Hanford Site", letter report to C. K. Mulkey, April 18.

F9 = tank vapor chemical assessment; indicates those substances which have been detected in the headspace of study tanks, and evaluates probability of substances being present based on process knowledge and chemical judgment.
- *p = possible
  - *p1 = analogs found
  - *p2 = NO2, NH2, or CN derivative of detected or analogous compound
- *u = unlikely
  - *u1 = low vapor pressure
  - *u2 = no analogs, but hard to rule out
  - *u4 = F compounds not common in tank vapor except for freon
  - *u5 = Cl, I compounds not common in tank vapor
  - *u6 = not likely to be stable
  - *u7 = not likely to be synthesized
  - *u8 = not likely in base
- *i = highly unlikely
  - *i1 = not likely to be synthesized
  - *i2 = particulate
  - *i3 = nonvolatile
  - *i4 = elements very uncommon in tanks
  - *i5 = not stable in water or moisture sensitive
  - *i6 = unlikely in base
  - *i7 = no source term, though individual compounds may be present
  - *i8 = unstable

F10 = mass spectrometry capability; an assessment of whether mass spectral library contains a spectrum for the substance and would consequently allow tentative identification
- y = present in MS library
- x = not in MS library
- b = in MS library, but MW at or below m/e scan range

F11 = Gas chromatography capability; an assessment of whether the compound should GC under the conditions used
- y = should GC under conditions used by PNNL
- d = should GC but under different conditions than those used by PNNL
- x = not able to GC

F12 = This Class A, Table III TAP has an ASIL based on a 24-hr average, and a SQE can not be assigned - a surrogate of 500 pounds per year has been conservativly assigned.

* = No SQE given in WAC; Class A & B TAPs assigned lowest value of SQER used for each class, i.e., 0.5 lb/yr for Class A and 0.02 lb/hr for Class B

DON'T SAY IT -- Write It!

September 27, 1996

To: John S. Hill
H6-25 372-1617

From: Paul D. Rittmann
H0-31 376-8715

Subject: Unit Concentration Factors from ISC3

The ISC3 program (EPA-454/B-95-003a, "User's Guide for the Industrial Source Complex (ISC3) Dispersion Models", September 1995) was used to compute unit concentration factors for the Hanford Site boundary for 24 hour and annual releases from the 100-N (or 100-K), the 200 West, the 200 East, and 300 Areas. Hanford site wind data is used for these calculations. The data for each area was collected in that area. For the 24 hour releases, hourly data from 1992, 1993, 1994, and 1995 was used. For the annual releases the joint frequency summary for each area for the years 1986 to 1995 was used. Results are summarized in the first table below. These are the worst-case values for ground level releases from each area.

Table 1. Summary of Unit Concentration Factors for Ground Level Releases from Hanford Facilities

Release Locations	24 Hour Average		Annual Average	
	Concen. Factor	Site Boundary Location	Concen. Factor	Site Boundary Location
100-N & KW	4.17	8.5 km WNW	0.125	8.5 km WNW
200 West Area	3.46	12.6 km S	0.0585	22.0 km SE
200 East Area	2.79	17.1 km ESE	0.0793	17.1 km ESE
300 Area	38.1	1.1 km E	1.56	1.3 km NE

Note: Units for the Concentration Factors are $\mu g/m^3$ per g/s.
Peak values are given.
Note: Annual averages are based on Hanford Site wind data collected over the years 1986 to 1995.
24 hour averages are based on hourly Hanford Site wind data for the years 1992, 1993, 1994, and 1995.

To use these factors, the rate at which a chemical is released into the air must be computed. To do this, the total amount (in grams) of the chemical released is divided by either 86,400 seconds (24 hours) or 31,557,600 seconds (1 year). This release rate is then multiplied by one of the factors on Table 1 to compute the average concentration at the Hanford site boundary in $\mu g/m^3$. The formula below summarizes the calculation.

$$\text{Air Conc } (\mu g/m^3) = \frac{(\text{Total Release, grams})*(\text{Concen. Factor})}{\text{Release Period, seconds}}$$

As an example, suppose that 10 grams of ammonia is released over a 24 hour period from the 200 West Area. Then the largest observed air concentration at the Hanford site boundary over the past four years is 0.0004 $\mu g/m^3$ at a location 12.6 km south of the 200 West Area.

$$\frac{(10 \text{ grams})*(3.46\ \mu g/m^3 \text{ per g/s})}{86{,}400 \text{ seconds}} = 4.0\times10^{-4}\ \mu g/m^3 \text{ (12.6 km S)}$$

Method of Calculating the Concentration Factors

The first step was to estimate distances to the Hanford Site boundary from each of the areas of interest in all 16 wind transport directions. Table 2 shows the facilities selected and the distances obtained from the Hanford Map Distance (HMD) software by P.D. Rittmann.

Table 2. Distances (meters) to the Hanford Site Boundary

Dir	100-N and -K		200 West		200 East		300 Area	
	100 N	100 KW	CWC	REDOX	PUREX	WESF	324	333
N	9600	11000	17300	20300	24600	19400	7000	8700
NNW	8700	8900	15500	18100	21200	16700	46000	45500
NW	8300	8700	14600	17200	21300	18100	48600	48100
WNW	8500	10100	11800	13200	21200	19300	28500	28200
W	11500	12100	11500	13000	20700	18900	6000	6700
WSW	17300	15700	11800	13300	21100	19400	3500	4200
SW	20500	17400	13800	15500	17100	19900	2400	2900
SSW	28600	25600	15100	12800	16800	19600	2000	2700
S	28600	25200	14700	12600	19600	22800	1900	2400
SSE	34100	31000	19200	18200	19800	25500	1900	2400
SE	27300	32100	24700	22000	24300	19900	1500	1700
ESE	19100	21700	29900	28700	20200	17100	1200	1400
E	17300	20600	24300	25000	16000	16900	1100	1300
ENE	17300	20400	24600	23200	15300	21900	1100	1300
NE	16300	19900	27400	26400	18100	26400	1300	1500
NNE	13800	15200	25000	28800	23600	21100	1800	2200

The second step was to obtain Hanford Site wind data from Kenneth W. Burk at PNNL. The wind data for each area is then used in the ISC3 calculations.

The third step is to create input files for the ISC3 software. Two of the input files are attached for reference. The first is an annual average calculation using ISCLT, while the second is a 24 hour calculation using ISCST. Both use a release height of 2 meters, with an exhaust flow rate of 2000 cfm at a temperature of 20°C. These conditions model ground level releases.

The final step was to arrange the ISC3 results into Tables 3 and 4. The worst case concentration factor was taken for each area. These worst-case results are listed in Table 1.

Table 3. Annual Average Concentration Factors ($\mu g/m^3$ per g/s) from Ground Level Releases

Dir	100-N and -K		200 West		200 East		300 Area	
	100 N	100 KW	CWC	REDOX	PUREX	WESF	324	333
N	0.0500	0.0410	0.0249	0.0200	0.0136	0.0187	0.145	0.106
NNW	0.0656	0.0635	0.0311	0.0251	0.0216	0.0300	0.011	0.012
NW	0.1064	0.0993	0.0381	0.0303	0.0220	0.0276	0.014	0.014
WNW	0.1252	0.0973	0.0351	0.0299	0.0173	0.0197	0.017	0.017
W	0.0863	0.0803	0.0290	0.0243	0.0150	0.0171	0.059	0.050
WSW	0.0373	0.0427	0.0233	0.0196	0.0112	0.0126	0.079	0.060
SW	0.0234	0.0293	0.0212	0.0179	0.0154	0.0124	0.157	0.117
SSW	0.0126	0.0146	0.0246	0.0312	0.0153	0.0123	0.403	0.255
S	0.0136	0.0161	0.0366	0.0457	0.0147	0.0119	0.992	0.696
SSE	0.0131	0.0148	0.0368	0.0396	0.0189	0.0133	1.171	0.823
SE	0.0230	0.0186	0.0500	0.0585	0.0289	0.0380	1.248	1.036
ESE	0.0504	0.0423	0.0532	0.0562	0.0629	0.0793	1.142	0.917
E	0.0661	0.0520	0.0505	0.0486	0.0585	0.0542	1.184	0.933
ENE	0.0555	0.0442	0.0306	0.0331	0.0366	0.0224	1.382	1.082
NE	0.0389	0.0295	0.0182	0.0191	0.0207	0.0124	1.558	1.256
NNE	0.0318	0.0277	0.0153	0.0127	0.0117	0.0136	0.975	0.719

Table 4. 24 Hour Average Concentration Factors ($\mu g/m^3$ per g/s) from Ground Level Releases

Dir	100-N and -K		200 West		200 East		300 Area	
	100 N	100 KW	CWC	REDOX	PUREX	WESF	324	333
N	3.75	3.30	1.96	1.70	1.29	1.71	5.91	4.47
NNW	3.20	3.13	3.30	2.84	1.95	2.45	0.52	0.53
NW	2.29	2.17	0.78	0.64	0.53	0.62	0.29	0.30
WNW	4.17	3.51	2.16	1.94	1.16	1.28	1.12	1.13
W	2.51	2.35	3.24	2.91	1.74	1.89	4.25	3.66
WSW	1.42	1.57	1.90	1.69	0.29	0.32	6.05	5.08
SW	0.81	0.96	0.79	0.71	1.31	1.13	4.79	3.97
SSW	0.92	1.02	1.92	2.30	1.39	1.20	1.91	8.91
S	0.90	1.01	3.02	3.46	1.69	1.48	7.25	9.85
SSE	0.81	0.90	2.64	2.78	1.31	1.02	0.01	5.84
SE	0.51	0.41	0.99	1.12	1.00	1.29	6.44	3.08
ESE	1.62	1.44	2.51	2.61	2.36	2.79	8.42	4.65
E	3.23	2.76	2.44	2.38	1.73	1.64	8.11	0.78
ENE	2.71	2.30	1.69	1.78	1.10	0.73	7.63	2.98
NE	0.61	0.48	0.91	0.95	0.41	0.26	1.38	8.12
NNE	2.36	2.15	1.96	1.70	0.97	1.08	6.36	3.08

ISCLT Input File for 100-N Area

```
CO STARTING
   TITLEONE  Ground Level Emissions from 100-N Area
   MODELOPT  DFAULT  CONC  RURAL
   AVERTIME  annual
   POLLUTID  Unknown
   RUNORNOT  RUN
CO FINISHED

SO STARTING
   LOCATION   Exhaust1  POINT   0.0  0.0  0.0
**            2000 cfm   g/sec    ht,m    temp°K   m/sec    diam,m
   SRCPARAM   Exhaust1   1.0      2.0     293.0    2.0      0.775
   SRCGROUP ALL
SO FINISHED

RE STARTING
** These are the CAP88 order -- counter-clockwise from N
** Distances from 100-N are 1,3,5,...;  Distances from 100-KW are 2,4,6,...
   DISCPOLR Exhaust1   9600    0.0
   DISCPOLR Exhaust1  11000    0.0
   DISCPOLR Exhaust1   8700  337.5
   DISCPOLR Exhaust1   8900  337.5
   DISCPOLR Exhaust1   8300  315.0
   DISCPOLR Exhaust1   8700  315.0
   DISCPOLR Exhaust1   8500  292.5
   DISCPOLR Exhaust1  10100  292.5
   DISCPOLR Exhaust1  11500  270.0
   DISCPOLR Exhaust1  12100  270.0
   DISCPOLR Exhaust1  17300  247.5
   DISCPOLR Exhaust1  15700  247.5
   DISCPOLR Exhaust1  20500  225.0
   DISCPOLR Exhaust1  17400  225.0
   DISCPOLR Exhaust1  28600  202.5
   DISCPOLR Exhaust1  25600  202.5
   DISCPOLR Exhaust1  28600  180.0
   DISCPOLR Exhaust1  25200  180.0
   DISCPOLR Exhaust1  34100  157.5
   DISCPOLR Exhaust1  31000  157.5
   DISCPOLR Exhaust1  27300  135.0
   DISCPOLR Exhaust1  32100  135.0
   DISCPOLR Exhaust1  19100  112.5
   DISCPOLR Exhaust1  21700  112.5
   DISCPOLR Exhaust1  17300   90.0
   DISCPOLR Exhaust1  20600   90.0
   DISCPOLR Exhaust1  17300   67.5
   DISCPOLR Exhaust1  20400   67.5
   DISCPOLR Exhaust1  16300   45.0
   DISCPOLR Exhaust1  19900   45.0
   DISCPOLR Exhaust1  13800   22.5
   DISCPOLR Exhaust1  15200   22.5
RE FINISHED

ME STARTING
   INPUTFIL  JF100N10.STA  FREE
   ANEMHGHT  10.0
   SURFDATA  67656  1995  HANFORD100
   UAIRDATA  67656  1995  HANFORD100
   STARDATA  ANNUAL
** WINDCATS  1.341  3.576  5.364  8.494  10.729
   AVESPEED  1.00   2.682  4.694  7.153  9.835  14.304
   AVETEMPS  ANNUAL    6*285.3
   AVEMIXHT  ANNUAL  A  6*1000.0
   AVEMIXHT  ANNUAL  B  6*1000.0
   AVEMIXHT  ANNUAL  C  6*1000.0
   AVEMIXHT  ANNUAL  D  6*1000.0
   AVEMIXHT  ANNUAL  E  6*1000.0
   AVEMIXHT  ANNUAL  F  6*1000.0
ME FINISHED

OU STARTING
   RECTABLE  SRCGRP
   MAXTABLE  10  INDSRC  SOCONT
OU FINISHED
```

ISCST Input File for 200 West Area

```
CO STARTING
   TITLEONE  Ground Level Emissions from 200 West Area
   MODELOPT  MSGPRO  CONC  RURAL
   AVERTIME  24
   POLLUTID  Unknown
   RUNORNOT  RUN
CO FINISHED

SO STARTING
   LOCATION   Exhaust1  POINT   0.0  0.0  0.0
**            2000 cfm   g/sec   ht,m    temp°K   m/sec   diam,m
   SRCPARAM   Exhaust1   1.0     2.0     293.0    2.0     0.775
   SRCGROUP ALL
SO FINISHED

RE STARTING
**   Distances from CWC are 1,3,5,...;  Distances from REDOX are 2,4,6,...
   DISCPOLR Exhaust1  17300    0.0
   DISCPOLR Exhaust1  20300    0.0
   DISCPOLR Exhaust1  15500  337.5
   DISCPOLR Exhaust1  18100  337.5
   DISCPOLR Exhaust1  14600  315.0
   DISCPOLR Exhaust1  17200  315.0
   DISCPOLR Exhaust1  11800  292.5
   DISCPOLR Exhaust1  13200  292.5
   DISCPOLR Exhaust1  11500  270.0
   DISCPOLR Exhaust1  13000  270.0
   DISCPOLR Exhaust1  11800  247.5
   DISCPOLR Exhaust1  13300  247.5
   DISCPOLR Exhaust1  13800  225.0
   DISCPOLR Exhaust1  15500  225.0
   DISCPOLR Exhaust1  15100  202.5
   DISCPOLR Exhaust1  12800  202.5
   DISCPOLR Exhaust1  14700  180.0
   DISCPOLR Exhaust1  12600  180.0
   DISCPOLR Exhaust1  19200  157.5
   DISCPOLR Exhaust1  18200  157.5
   DISCPOLR Exhaust1  24700  135.0
   DISCPOLR Exhaust1  22000  135.0
   DISCPOLR Exhaust1  29900  112.5
   DISCPOLR Exhaust1  28700  112.5
   DISCPOLR Exhaust1  24300   90.0
   DISCPOLR Exhaust1  25000   90.0
   DISCPOLR Exhaust1  24600   67.5
   DISCPOLR Exhaust1  23200   67.5
   DISCPOLR Exhaust1  27400   45.0
   DISCPOLR Exhaust1  26400   45.0
   DISCPOLR Exhaust1  25000   22.5
   DISCPOLR Exhaust1  28800   22.5
RE FINISHED

ME STARTING
   INPUTFIL  EPA92-95.2W
   ANEMHGHT  10.0
   SURFDATA  67656  1992   Hanford-200
   UAIRDATA  67656  1992   Hanford-200
ME FINISHED

OU STARTING
   RECTABLE  ALLAVE FIRST
   MAXTABLE  ALLAVE 20
OU FINISHED
```

Pacific Northwest National Laboratory
Operated by Battelle for the U.S. Department of Energy

March 12, 1998

RECEIVED
MAR 16 1998
D.H. SHUFORD

Mr. David H. Suford, S7-01
Manager: Characterization Technical Operations
2704 HV / C110 / 200 East
Lockheed-Martin Hanford Corporation
Richland, WA 99352

Dear Mr. Suford,

Please find enclosed two final copies of the report on furans, "A Status Report on the Cancer Potential of Furan Chemicals in the Hanford Tank Headspace Gases and a Recommended Surrogate and ASIL for use in Assessing Chronic Public Exposure."

I appreciate the opportunity to prepare this report for you. If you have any questions about the document or if I can clarify this or any other related information, please contact me.

Sincerely,

A. David Maughan, MA
Senior Research Scientist (Toxicologist)
Multimedia Exposure Assessment

ADM:pp

Enclosures (2)

cc: James G. Droppo, Jr.
File/LB

Phone (509)376-1785 ■ E-mail:david.maughan@pnl.gov ■ Fax (509)373-0335
902 Battelle Boulevard ■ P.O. Box 999 ■ Richland, WA 99352

A Status Report on the Cancer Potential of Furan Chemicals in the Hanford Tank Headspace Gases and a Recommended Surrogate and ASIL for use in Assessing Chronic Public Exposure.

By A. David Maughan

Pacific Northwest National Laboratory
Richland, WA

March 12, 1998

Prepared for David H. Shuford
Manager: Characterization Technical Operations

Lockheed-Martin Hanford Corporation
Richland, Washington

INTRODUCTION

This report has been written to provide a basis for evaluating potential cancer health risks from possible public exposure to furan chemicals that escape as gases from the underground waste storage tanks at Hanford. The document, addressed to regulators, scientists, and contractors, reviews the current literature and fills a void in toxicity data, without which it would not be possible to estimate realistic exposures, with margins of safety, to the furan class of chemicals. The U.S. Environmental Protection Agency (EPA) has designated an interim surrogate for use in assessing cancer health risks from exposure to chlorinated dioxins and furans. However, when risks are estimated for nonchlorinated chemicals using this interim method, they are considered to be inflated. And if they trigger remedial action, they will unnecessarily drive upward the cleanup costs associated with the tanks at this Superfund site without enhancing health issues. As a result of the analyses undertaken here, the chemical 1,4-dioxane is recommended as a reliable surrogate for assessing cancer risk to the furan chemicals detected in the storage tanks.

The presence of measurable concentrations in headspace gases has indicated a need to address the issue of furans. When a hypothetical population at a downwind Hanford fenceline was modeled for exposure to these chemicals, a potential for cancer risk was noted (Maughan 1998a). This modeling exercise, which followed State of Washington regulatory guidance, provides a conservative estimate of health risks from exposure to headspace furans. For chemicals without toxicity information, the state regulation assumes that all dioxins and furans, whether chlorinated or not, will be treated as if they are 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD). This surrogate chemical is a strong initiator of cancer in rodents according to EPA cancer potency information. However, application of the state's assumption needs to be questioned because neither chlorinated dioxins nor chlorinated furans have been measured in the tank vapors.

The EPA has delegated to State agencies the responsibility for Superfund remedial actions at the Hanford tanks. The State of Washington Clean Air Act requirements to quantify emissions for control of new sources of toxic air pollutants, Section 173-460-050 (4)(b) states that

> "Dioxin and furan emissions shall be considered together as one toxic air pollutant (TAP) and expressed as an equivalent emission of 2,3,7,8 TCDD based on the relative potency of the isomers in accordance with United States Environmental Protection Agency (EPA) guidelines."
>
> The Washington Administrative Code further references EPA, "*Interim procedures for estimating risks associated with exposures to mixtures of chlorinated dibenzo-p-dioxins and dibenzofurans (CDDs and CDFs), 1989 Update*" (EPA /625/3-89/016, March 1989).

The State regulation requires that any emitted furans, whether chlorinated or not, be equated to a highly toxic chlorinated dioxin (2,3,7,8 TCDD). However, the interim 1989 EPA document cited by the State as guidance "assigns a value of zero (toxicity) to non-2378-substituted congeners." (A congener is a compound within the same chemical class, e.g., furans or dioxins). The EPA document further states "... that the toxicities of mono- through tri-(chlorinated)-substituted compounds are considered to be negligible." It is apparent that a unique high level of toxicity exists for the symmetrical tetra-chlorinated dioxin and its isomers, including those with additional chlorine atoms. The principal author of the March 1989 EPA document, has said that there is virtually no similarity between the 2,3,7,8 TCDD and nonchlorinated furans, and that the procedures provided in the document to assign toxicities to chlorinated congeners do not apply to the nonchlorinated furans (Maughan 1998b).

This document therefore reviews the current health-impact knowledge for nonchlorinated furans, and proposes the use of a furan-like chemical which has available EPA toxicity information to estimate potential human health risks downwind from the tanks. A current appraisal of the toxicity issues for nonchlorinated furans should lend clarity to the dilemma noted above in the State/EPA guidance. A surrogate chemical that is structurally similar to and which would be expected to affect target organs similar to those affected by the furans found in the Hanford tanks should provide a better estimator of chronic population cancer risks than is possible by using a chlorinated dioxin. An acceptable source impact level (ASIL) is also recommended to meet the risk assessment needs of the State of Washington State.

CHEMICAL DATABASE

The tentatively identified gaseous furans inventoried within the tanks were reviewed to identify the types of structures that should be considered as surrogates. And estimated concentrations were tabulated for the various furans to understand which species are most abundant and which might cause greatest impacts on inhalation contact.

The 1994-1995 data abstracted from the Tank Waste Information Network System 2 (TWINS2), found on the WEB (http://twins.pnl.gov:8001/) and last modified January 8th, 1997, was used in this assessment. Data collected after 1989 and found in the electronic tables are recognized by the Washington State Department of Ecology as the official Hanford tank database. Table 1 and Figure 1 report the maximum concentrations for 15 furans found in at least 9 tanks. Overall, there are some 850 entries for nonchlorinated furan chemicals in the database, 90 percent of which are tetrahydrofuran, about 3 percent are furan, and the remaining compounds are at 1 percent or lower in frequency. The search was made for the major furan chemicals starting with the root-word "furan."

Based on the concentrations shown in Figure 1 and on the frequency of occurrence, tetrahydrofuran, furan, 2,5-dihydrofuran, and 2-methylfuran are the prime candidates for matching with a surrogate. Figure 2 shows the chemical structures for the fifteen furans with greatest concentrations. The numbers adjacent to the structures shown in Figure 2 refer to the numbers given in the first column of Table 1.

TOXICITY DATABASE

The U.S. EPA's Integrated Risk Information System (IRIS) was designed to assemble the best available information on the toxicity of chemicals with emphasis on human exposures. The EPA has evaluated human exposures to 2,3,7,8 TCDD, but has not published cancer potencies for furan, tetrahydrofuran, or others in this class. In 1987 the EPA stated that "no data" are available for furan (IRIS 1998) and the agency instead endorsed the interim guidance approach, noted above, for chlorinated dioxins and furans (EPA 1989).

The National Toxicology Program (NTP) sponsored by the National Institute of Environmental Health Sciences has exposed mice and rats to some of the chemicals measured in the Hanford tanks. The data in Tables 2 and 3 summarize dose, exposure durations, major organs effected, and outcomes for the Hanford related chemicals for respective oral and inhalation exposures. However, the cancer potency factors (CPFs) needed for health risk assessment have not yet been calculated for the chemicals researched in the newer NTP tests. This calculation of CPFs is beyond the scope allowed for this document. Subjective comparisons in dose for benzene and 2,3,7,8 TCDD, which have CPFs, and for the remaining furans seen in Table 2, allowed for calculation of order-of-magnitude levels in toxicity. The tables provide only a general summary of results and do not clearly show how the effects on target organs are dose, species, time, and/or sex dependent. The NTP studies provide peer reviewed results that are consistent and comparable among research laboratories for the selected two-year animal dosing studies. The reader may wish to consult the cited references for additional detail.

DISCUSSION

Data from the above studies are pertinent to health risk questions asked at Hanford. Focusing on the chemicals which indicate "positive or clear evidence" for cancer induction, several calculations can be made to provide perspective for the issues. The NTP findings in Table 2 support the EPA's interim guidance that the 2,3,7,8 TCDD is perhaps the most potent cancer-causing agent in rodents, i.e., less than 0.5 μg of the chemical per kg body weight per week causes tumor induction. In comparison, 10 to 15 mg/kg/wk of furan is required for the same effect. Similar target organs are affected and the same exposure routes and approximate test conditions prevailed for the two chemicals. When the high-dose (0.5 μg/kg) dioxin animals are compared with the high-dose rats and low-dose mice (8 mg/kg) for furan, it is apparent that a furan dose approximately 16,000 times (three fold) larger is needed for tumor induction than for the 2,3,7,8 TCDD treatments. In other words, the 2,3,7,8-compound is much more toxic than furan because only a very small amount of the dioxin causes cancer in comparison to furan.

It is interesting from the NTP studies that the absence of chlorine atoms attached to a compound do not necessarily render it a non-cancer agent. Under the same comparative conditions, benzene, a known human cancer agent, requires about 10 times larger dose than does furan for tumor expression. It is acknowledged that different target organs and modes of actions are likely involved.

In Table 3 the inhalation route for 1,3-butadiene, a probable human carcinogen, provides "clear evidence" for tumor production as for female mice when inhaling tetrahydrofuran. Based on the dose amounts, it is probable that tetrahydrofuran is a weaker carcinogen (by about 1-fold) than is 1,3-butadiene.

In summary, identifying the chemicals that are carcinogens (at least in animals), and the presence of oxygen, double bonding, aromatic resonance (of electrons), symmetry, or other unexplained factors provides a partial basis for selecting a surrogate chemical.

The IRIS toxicity database was reviewed to select the chemicals with CFPs that are structurally similar to the furan chemicals listed in Figure 2. The chemicals in Table 4 were considered to be the best available candidates for selecting a surrogate for evaluating carcinogenicity of the tank furan vapors. Subjectively based on similarly affected target organs, whether a cancer slope factor exists or not, and on similarity of chemical structure, 1,4-dioxane is recommended as a surrogate for the Hanford tank nonchlorinated furan gaseous chemicals. Its ring structure is symmetrical and it has oxidation potential, but it lacks the double bonding associated chemical resonance observed in most furans. The dioxane is probably less reactive than the furans.

CONCLUSIONS

The furan-class chemicals in the tank and their relative concentrations indicate that the best representative chemicals for health risk assessment for this class of compounds would be furan or tetrahydrofuran or one of the dihydro-isomers. However because these lack the toxicity factors needed to assess cancer potential, a review of the recent literature on furan chemicals and their toxicity to animals and humans was conducted. It was found that sufficient information now exists in the National Toxicology Program data to make possible the evaluate human health risks from exposure to some of the tank head-space furans and to compute cancer slope factors using available dose and response data. Furthermore, and contrary to EPA's interim guidance issued in 1989, the newer toxicity data indicates that a probability of cancer risk is neither negligible nor at a zero level for the several nonchlorinated furans studied under the program.

The approach called for in this evaluation emphasized a comparative search of available data to determine which chemical will best act as a surrogate for the furans found at Hanford. The search focused on selecting a chemical surrogate with structural similarities and on modes of toxicity within test animals that are also approximately similar.

It is recommended that the chemical 1,4-dioxane be used as an inhalant surrogate to represent the furan chemicals which escape from the tanks. It is likely that this chemical will underestimate the potential for cancer formation (by a 2-fold factor), but it will serve as a better estimator of risk than does 2,3,7,8-tetrachlorodibenzo-p-dioxin, which probably would overestimate health risks by some 3 fold.

Details:

Recommended Surrogate: 1,4-dioxane,

CAS No. 123-91-1, ASIL = 0.032 $\mu g/m^3$

(reference: 173-460-150 (2) Table II. Class A Toxic Air Pollutants with Established Acceptable Source Impact Levels for a 10^{-6} Risk Level)

REFERENCES

IRIS 1998. Http://www.epa.gov/iris accessed February 1998.

Maughan 1998a. Personal communication in February with Carl Grando about exposure modeling performed by the Lockheed-Martin Hanford Company of Hanford.

Maughan 1989b. Personal communication in February with Stephen H. Safe, Texas A&M University, College Station, TX.

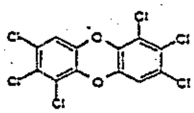
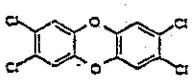
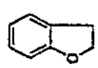
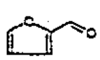
Other references are provided in the text and as footnotes in the tables.

Table 1. Listing of Furan Chemicals Measured in Hanford Underground Storage Tank Head space Gases

	Chemical Name	Chemical CAS ID No.	Maximum Reported Value (mg/m3)	Tank Name	Date of Sample
1	Furan	110-00-9	9.69	241-C-103	1994
2	Furan, 2,3-dihydro-	1191-99-7	0.055	241-BY-106	1994
3	Furan, 2,5-diethyltetrahydro-	41239-48-9	0.1248	241-A-101	1995
4	Furan, tetrahydro-	109-99-9	22.69	241-C-103	1994
5	Furan, 2,5-dihydro-	1708-29-8	5.68	241-C-103	1994
6	Furan, 2,5-dimethyl-	625-86-5	0.04	241-BY-104	1994
7	Furan, 2-ethyl-5-methyl-	1703-52-2	0.05	241-BY-104	1994
8	Furan, tetrahydro-2,4-dimethyl-, trans-	39168-02-0	0.0159	241-B-103	1995
9	Furan, 2-methyl-	534-22-5	3.66	241-C-103	1994
10	Furan, 2,3-dihydro-4-(1-methylpropyl)-, (S)-	34379-54-9	0.0055	241-AX-102	1995
11	Furan, 2-pentyl-	3777-69-3	0.0169	241-AX-101	1995
12	Furan, 2-propyl-	4229-91-8	0.349	241-BY-106	1994
13	Furan, 3-(1,1-dimethylethyl)-2,3-dihydro-	34314-82-4	0.003	241-BY-105	1994
14	Furan, 2-heptyl-	3777-71-7	0.454	241-BY-108	1994
15	Furan, 2-octyl-	4179-38-8	0.007	241-BY-106	1994

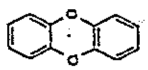
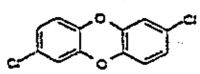
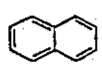
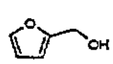
All chemical analysis performed at the Oak Ridge National Laboratory
The "JNX" data qualifier code applies to these data
Data obtained from TWINS2 electronic database

Table 2. National Toxicology Program Two-year Animal Studies of Cancer Potential in Chemicals that Relate to Furans found in Hanford tank Head space Gases--Oral Exposure Routes

Chemical	Ref./ Date	Intake Route/ Target Organ	Dose	Evidence of Carcinogenicity
1,2,3,6,7,8-Hexachloro-dibenzo-p-dioxin 	TR-198 1980	Oral/ Liver	1-5 μg/kg/wk rats & male mice 2.5-10 μg/kg/wk female mice	female rats: positive male rats: equivocal female mice: positive male mice: positive
2,3,7,8-Tetrachloro-dibenzo-p-dioxin 	TR-209 1982	Oral/ Thyroid, Liver	0.04-2 μg/kg/wk female mice 0.01-0.5 μg/kg/wk all others	female rats: positive male rats: positive female mice: positive male mice: positive
Benzene 	TR-289 1986	Oral/ Zymbal, Squamous, Lung	0-200 mg/kg male rats 0-100 mg/kg for others all dosed 5 days/wk	female rats: clear evidence male rats: clear evidence female mice: clear evidence male mice: clear evidence
Benzofuran 	TR-370 1989	Oral/ Liver, Lung, Stomach	30-60 mg/kg male rats 60-120 female rats, male mice 120-240 female mice all dosed 5 days/wk	female rats: some evidence male rats: no evidence female mice: clear evidence male mice: clear evidence
Furfural 	TR-382 1990	Oral/ Liver, Stomach	0-60 mg/kg rats 0-175 mice all dosed 5 days/wk	female rats: no evidence male rats: some evidence female mice: some evidence male mice: clear evidence
Furan 	TR-402 1993	Oral/ Liver, Blood, Adrenal	2-8 mg/kg rats 8-15 mice all dosed 5 days/wk	female rats: clear evidence male rats: clear evidence female mice: clear evidence male mice: clear evidence

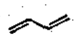
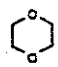
Data obtained in February 1998 from the WEB site (http://ntp-server.niehs.nih.gov)

Table 3. National Toxicology Program Two-year Animal Studies of Cancer Potential for Chemicals that Related to Furans found in Hanford tank Head space Gases--Inhalation Exposure Routes

Chemical	Ref./ Date	Route/ Target Organ	Dose	Evidence of Carcinogenicity
Dibenzo-p-dioxin 	TR-122 1979	Inhalation/ Not applicable	5K-10K ppm/wk	male/female rats: negative male/female mice: negative
2,7-Dichloro-p-dioxin 	TR-123 1979	Inhalation/ Not applicable	5K-10K ppm/wk	male/female rats: negative female mice: negative male mice: equivocal
Naphthalene 	TR-410 1992	Inhalation/ Lung	0-30 ppm mice 6 hr/day 5day/wk	female mice: some evidence male mice: no evidence
1,3-Butadiene 	TR-434 1993	Inhalation/ Many organs	0-200 ppm mice 6 hr/day 5day/wk	female mice: clear evidence male mice: clear evidence
Tetrahydrofuran 	TR-475 1996	Inhalation/ Liver	0-1800 ppm rats & mice 6 hr/day 5 day/wk	female rats: no evidence male rats: some evidence female mice: clear evidence male mice: no evidence
Furfuryl Alcohol 	TR-482 1997	Inhalation/ Nose, kidney, cornea	0-32 ppm rats & mice 6 hr/day 5 day/wk	female rats: equivocal evidence male rats: some evidence female mice: no evidence male mice: some evidence

Data obtained in February 1998 from the WEB site (http://ntp-server.niehs.nih.gov)

Table 4. Candidate Surrogate Chemicals with Published Slope Factors for Assessing the Cancer Potential of Furans Observed in Hanford Tank Head space Gases

Name	Chemical Structure	Target Organ	Inhalation EPA Slope Factor	Reference
1-3,Butadiene		Lymphatic/blood system, lung tissue	9.8E-01	IRIS
1,4-Dioxane		Liver, nasal carcinomas	1.1E-02	R-IRIS
Ethylene oxide		Stomach, blood, brain tissues	3.5E-01	HEAST
Propylene oxide		Fore-stomach, thyroid	1.3E-02	IRIS

(IRIS) EPA Integrated Risk Information System (1998)
(R-IRIS) Route to route extrapolation, oral to inhalation (1998)
(HEAST) EPA Health Effects Assessment Summary Tables (1996)
IRIS WEB database (www.epa.gov./iris) accessed February 1998.
Seventh Annual Report on Anticipated Carcinogens–database (http://ntp-db.niehs.nih.gov/htdocs/ARC accessed February 1998.

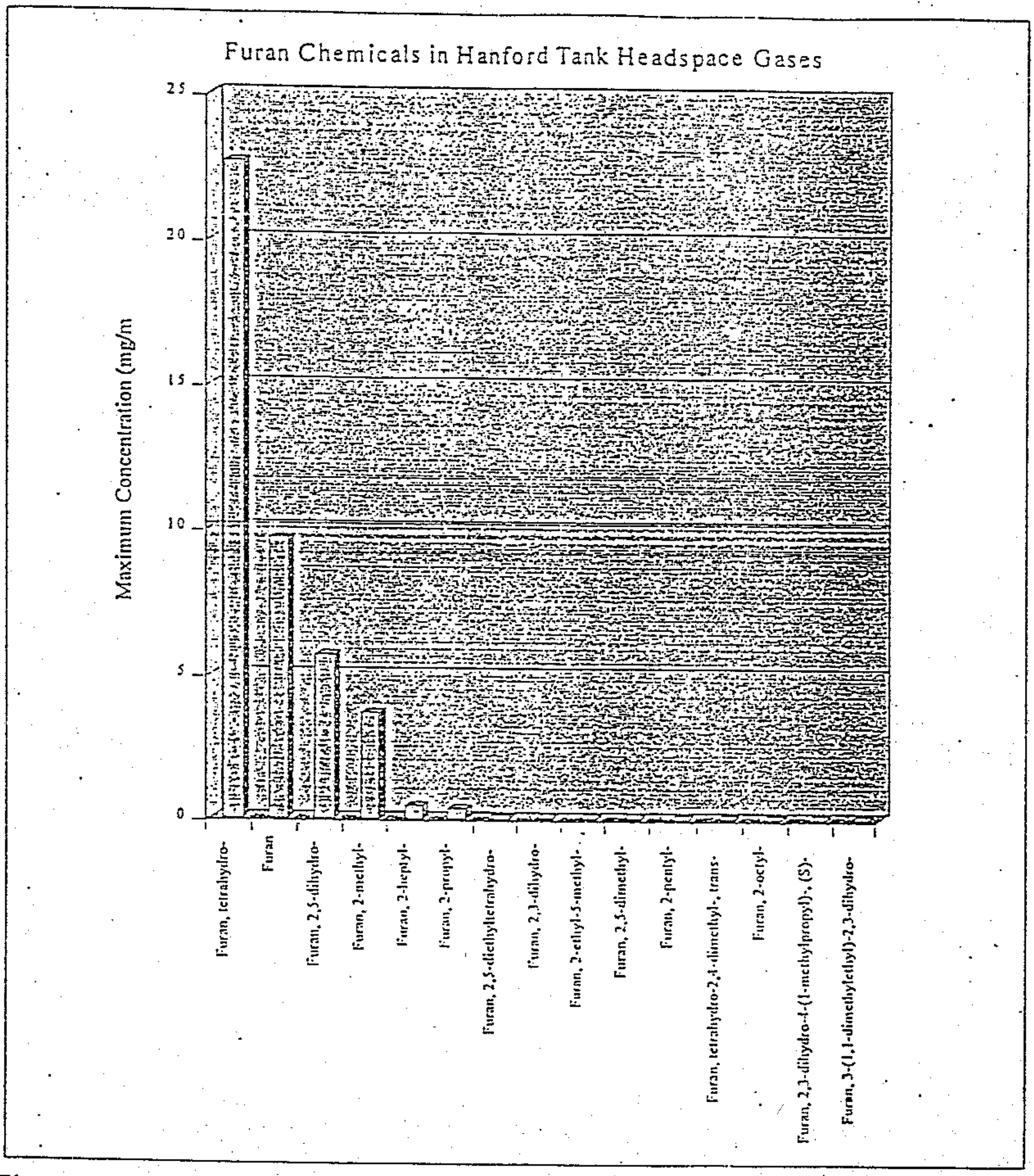


Figure 1. Concentration Distribution of the Furan Chemicals Measured in the Hanford Storage Tanks.

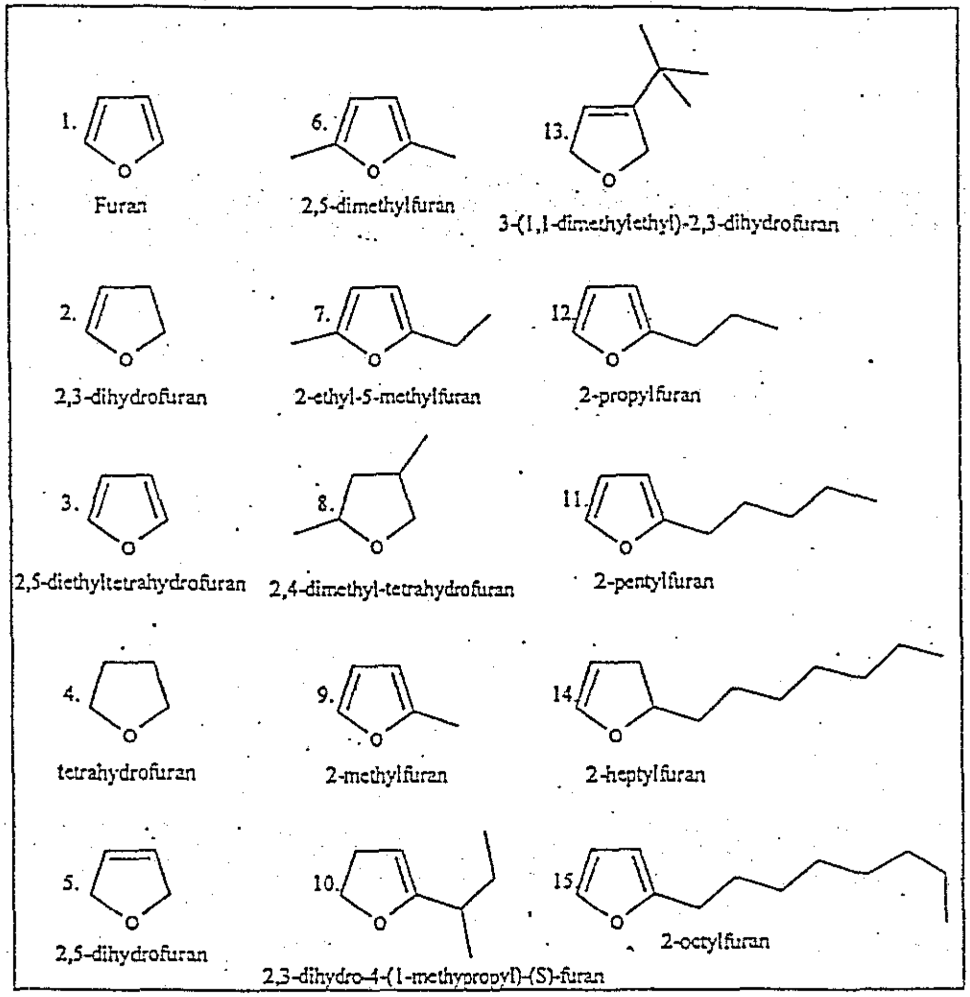


Figure 2. Example furan chemicals observed in Hanford tank headspace gases, as abstracted from the TWINS2 database. Carbon and hydrogen atoms are implied between bonds in the rings, at the ends of, and at the junctions of the chains attached to the ring structures.

To: Carl Grando, WHC September 6, 1996
From: David Maughan, PNNL

Subject: Chemical Toxicity Surrogate for N-Nitrosomorpholine

N-Nitrosomorpholine (59-89-2) is measured in Hanford tank vapors. This brief memo report addresses the questions, 1) should N-nitrosomorpholine be treated using a surrogate chemical which has referenced toxicity data, or 2) could it be disregarded by Hanford risk managers based on low toxicity potential?

N-nitrosomorpholine has been included by the Washington Department of Ecology (Ecology) in its Table 1, Class A - Toxic Air Pollutant (WAC 173-460-150) list of "known and probable carcinogens." Although so listed, the U.S. EPA has not provided the cancer potency slope factor needed to evaluate possible health risks from contact with N-Nitrosomorpholine. Ecology relies on the EPA factors to set acceptable source impact levels (ASILs). An ASIL, as defined by Ecology, is the ratio of risk per upperbound unit risk factor. Here risk is defined at the 1 in 1,000,000 rate and the unit risk factor is the EPA Integrated Risk Information System (IRIS) cancer slope factor or other appropriate value.

The International Agency for Research on Cancer (IARC) has found that there is sufficient evidence for cancer in animals, but that data are not adequate to indicate carcinogenicity in humans. The selected abstracts that follow, lists topics usually considered when evaluating carcinogens.

- Dose-response Relationships.

  In animals, typically used to test for cancer, strong dose-response evidence exists to link exposure or contact with N-nitrosomorpholine to cancer tumors. One of several recent literature studies indicates the existence of a linear relationship between daily exposure to low levels of N-nitrosamines including N-nitrosomorpholine and time to death for liver tumors in rats (Berger et al. 1992). Another study found a predictable but nonlinear relationship associated with dosed Sprague-Dawley rats with N-nitrosomorpholine. Doses ranged from low to moderate concentrations (6 to 60 mg/l) for 6 to 12 week durations. This particular dose-response study found that carcinogenesis occurs even at low dose (Enzmann et al. 1995).

- Tumors Induced for Multiple Routes /Animal Models / Target Organs.

  N-nitrosomorpholine induces tumor formation in different small mammals for several routes of exposure for different affected target organs in a number of studies cited in the literature. For example, subcutaneous injections of the chemical in male and female Syrian golden hamsters (single doses from 50, 100, 200, 400 mg/kg body weight) resulted in respiratory system tumors (IARC 1978). N-nitrosomorpholine administered with drinking water to SD rats at daily doses of 2.4 mg/kg for seven weeks, induced persisting changes in hepatocytes (Wanson et al. 1980). Groups of 40 female A/J mice were given 0.2 μmol/ml of the carcinogen N-nitrosomorpholine in drinking water for 10 weeks. The chemical is a potent tumorigen, inducing 20.3 lung tumors/mouse (100 % incidence, $p<0.01$) (Hecht et al. 1989). When administered intragastrically N-nitrosomorpholine induced hepatocellular carcinomas and neoplastic nodules in female rats. When administered by intraperitoneal injection, the chemical induced hepatocarcinomas in male rats (DHHS/NTP 1989).

- Potential Links at Hanford for Exposure.

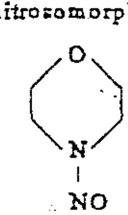
  In vitro tests using human gastric juice with small doses of precursors (sodium nitrile and morpholine, an algicide in cooling water and corrosion inhibitor) shows that nitrosation reactions, occur under hypo- and anacidic conditions, resulting in formation of N-nitrosomorpholine (Korchenko et al. 1990). The fact that N-nitrosomorpholine is detected in the tanks implies that the above reaction is possible; sodium nitrile is certainly present.

In summary, although no data are available for evidence of cancer in humans, the IARC evaluates N-nitrosomorpholine as Group 2B, possibly carcinogenic to humans.

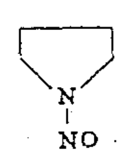
While there is a large database on the carcinogenicity of nitrosoamines, most of the information has been estimated based on structure-activity rather than on dose-response relationships, which are preferred as the basis for toxicological assessments.

A structural survey of nitrosomines with cancer potency information was done to see if one is similar to N-nitrosomorpholine. 1-Nitrosopyrrolidine was most similar; it is cyclic and possesses the -nitroso group (-NO), which is foundation for the carcinogenicity. They differ in the one oxygen atom, as shown below. The EPA has probably researched and provided oral and inhalation cancer (dose-response) slope factors for 1-Nitrosopyrrolidine because it is associated with tobacco products, which are highly studied. Both chemicals are symmetrical, which characteristic is important for carcinogens, and both are grouped B2, probable human cancer agents by the International Agency for Research on Cancer. Similar low doses (IRIS2 1996 and Hecht et al. 1989) of the two chemicals have caused 100 percent mortality in test animals by different routes. RTECS® (1996) indicates that the dose to induce liver tumors in rats is approximately one-third higher for 1-Nitrosopyrrolidine than for N-nitrosomorpholine, which is evidence that the structurally similar chemical, N-nitrosomorpholine, may be more toxic than 1-Nitrosopyrrolidine.

N-nitrosomorpholine



1-Nitrosopyrrolidine



It is therefore recommended that 1-Nitrosopyrrolidine be considered a surrogate for N-nitrosomorpholine using the following factors:

- Oral cancer potency factor (1-Nitrosopyrrolidine) = 2.10×10^0 1/(mg/kg·day).
- Inhalation cancer potency factor (1-Nitrosopyrrolidine) = 2.13×10^0 1/(mg/kg·day).

The second option noted above, that the chemical might be disregarded because of low toxicity potential, is considered not appropriate. N-nitrosomorpholine is rather toxic, at least to test animals.

The **Ecology ASIL** (in $\mu g/m^3$) = Risk (at 1E-06)/Unit Slope Factor

= 1E-06/[(2.13)(2.86E-04)] or 1E-06/6.1E-04*

≈ **1.6E-03 $\mu g/m^3$ for N-nitrosomorpholine** (using 1-Nitrosopyrrolidine as surrogate)

[The factor 2.86E-04 $m^3 \cdot mg/(kg \cdot day \cdot \mu g)$ = (1/70 kg)(20 m^3/day)(10^{-3} $mg/\mu g$) is used to convert the inhalation cancer slope factor to a unit risk factor.]

* see Attachment A from IRIS2 below.

Note: at a concentration greater than approximately 0.0016 $\mu g/m^3$ (or 0.00034 ppb SAC) the mortality rate of one in a million is exceeded. Chronic exposure may be unlikely if the TOMES-Plus® Hazardous Substances Database vapor-phase, half-life estimate of approximately 11 hours is correct, unless generation of the chemical is continuous.

References:

Berger, MR, D Schmahl, L Edler. 1992. Relationship between dose and risk reduction: statistical evaluation of a combination experiment with three hepatocarcinogenic N-nitrosamines in rats. IARC-Science Publication, ISS 105, P 311.

DHHS/NTP 1989. Fifth Annual Report on Carcinogens. NTP 85-002. Page 220.

Enzmann, H. et al. Carcinogenesis 16: ISS 7, 1513-8.

Hecht, SS et al. 1989. Carcinogenesis 10 (8): 1475-7.

IARC 1978. IARC Monographs on the evaluation of the carcinogenic risk of chemicals to man. Geneva: World Health Organization, International Agency for Research on Cancer. Vol. 17, p. 267.

IRIS2 1996. Integrated Risk Information System 2. Environmental Protection Agency, Office of Research and Development. Cincinnati, OH. September 1996.

Korchenko, VA. et al. 1990. EKSP Onkol 12 (2): 24-26.

RTECS® 1996. TOMES Plus® National Institute of Medicine Database. July.

TOMES Plus® 1996. Hazardous Substances Database. July.

Wanson, JC et al. 1980. Cancer Research 40 (2): 459.

Attachment A. Abstracted EPA IRIS2 Summary Information (September 1996)

═══════════ CARCINOGENICITY SUMMARY TABLE ═══════════

Substance Name: N-Nitrosopyrrolidine [CASRN: 930-55-2]
Classification: B2; probable human carcinogen

—— QUANTITATIVE ESTIMATE OF CARCINOGENIC RISK FROM ORAL EXPOSURE ——

Slope Factor: 2.1E+0 per mg/(kg/day)
Unit Risk: 6.1E-5 per ug/liter
Extrapolation Method: Linearized multistage procedure, extra risk

——— DOSE-RESPONSE DATA (CARCINOGENICITY, ORAL EXPOSURE) ———

Tumor Type: hepatocellular carcinoma and adenoma
Test Animals: Rat/Sprague-Dawley, male and female
Route: diet

——— ADDITIONAL COMMENTS (CARCINOGENICITY, ORAL EXPOSURE) ———

There was increased mortality because of pneumonia in the highest dose group. Preussmann et al. (1977) indicated that increased susceptibility to respiratory infection may have been due to cumulative nitrosopyrrolidine toxicity.

——— DISCUSSION OF CONFIDENCE (CARCINOGENICITY, ORAL EXPOSURE) ———

Tumor incidence was shown to be dependent on the nitrosopyrrolidine dose in the study above. Adequate numbers of animals were treated and observed for their normal lifetime at several lower doses. As incidences of benign and malignant growths were added, it is not possible to ascertain whether any animals were counted more than once.

— QUANTITATIVE ESTIMATE OF CARCINOGENIC RISK FROM INHALATION EXPOSURE —

* Unit Risk: 6.1E-4 per (ug/cu.m)
Extrapolation Method: Linearized multistage procedure, extra risk

Air Concentrations at Specified Risk Levels:

Risk Level	Concentration
E-4 (1 in 10,000)	2E-1 per (ug/cu.m)
E-5 (1 in 100,000)	2E-2 per (ug/cu.m)
E-6 (1 in 1,000,000)	2E-3 per (ug/cu.m)

——— ADDITIONAL COMMENTS (CARCINOGENICITY, INHALATION EXPOSURE) ———

The unit risk should not be used if air concentrations exceed 20 ug/cu.m, since above this concentration the unit risk may not be appropriate.

—— DISCUSSION OF CONFIDENCE (CARCINOGENICITY, INHALATION EXPOSURE) ——

See oral quantitative estimate.

—————— EPA DOCUMENTATION AND REVIEW ——————

Source Document: U.S. EPA. 1980. Ambient Water Quality Criteria Document for Nitrosamines. Environmental Criteria and Assessment Office, Cincinnati, OH. EPA 440/5-80-064. NTIS PB 81-117756.

U.S. EPA. 1986. Health and Environmental Effects Profile for Nitrosamines. Prepared by the Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Cincinnati, OH for the Office of Solid Waste and Emergency Response, Washington, DC.

The values in the Ambient Water Quality Criteria Document for Nitrosamines (U.S. EPA, 1980) received extensive peer and public review.

Agency Work Group Review: 07/23/86, 10/14/86, 10/29/86
Verification Date: 10/14/86

Attachment 2
04-ED-063

Hanford Site Air Operating Permit 00-05-006
Notification of Off-Permit Change

NOTIFICATION OF OFF-PERMIT CHANGE

Permit Number: 00-05-006

This notification is provided to Washington State Department of Ecology, Washington State Department of Health, and the U.S. Environmental Protection Agency as a notice of an off-permit change described as follows.

This change is allowed pursuant to WAC 173-401-724(1) as: 1. Change is not specifically addressed or prohibited by the permit terms and conditions 2. Change does not weaken the enforceability of the existing permit conditions 3. Change is not a Title I modification or a change subject to the acid rain requirements under Title IV of the FCAA 4. Change meets all applicable requirements and does not violate an existing permit term or condition 5. Change has complied with applicable preconstruction review requirements established pursuant to RCW 70.94.152.

Provide the following information pursuant to WAC-173-401-724(3):

Description of the change:	
Submittal of Criteria & Toxics Air Emissions Notice of Construction Application for Operations of Waste Retrieval Systems in Single Shell Tank Farms. This Notice of Construction requests approval for retrieval of wastes from 141 Single Shell Tanks in the 200 Areas of the Hanford Site.	
Date of Change: (To be provided in the agency approval order.)	
The date the approval order is issued by State of Washington, Department of Ecology (Ecology).	
Describe the emissions resulting from the change:	
Emissions of all criteria pollutants are expected to be below the permitted thresholds cited in WAC 183-400-110(5)(d). Toxic air pollutants (TAPs), as defined in WAC 173-460, are expected to be below the thresholds with a few exceptions. Emission estimates of 1,3-Butadiene indicate that the small-quantity emission rate (SQER), as defined in WAC 173-460-080, may be exceeded. Acceptable source impact levels (ASILs), as defined in WAC 173-460-150 and -160, are not expected to be exceeded for any TAP. However, there are a few TAPs which do not have ASILs assigned. These are N-Nitrosomorpholine, Propionaldehyde, Acetophenone, and Carbonyl Sulfide. Emissions of a few TAPs are expected which have been assigned ASILs that do not have an SQER, e.g. dioxins and furans. An appropriate surrogate has been developed for these so an SQER can be assigned. Emission estimates indicate that even this SQER may be exceeded. Another TAP which has an ASIL that does not have an SQER is N-Nitrosodimethylamine. In addition, 1,2-Dichloropropane has an ASIL which is based on criteria which do not allow it to be assigned an SQER.	
Describe the new applicable requirements that will apply as a result of the change: (To be provided in the agency approval order.)	
Conditions and limitations will be those identified in the approval order when issued by Ecology.	
For Hanford Use Only:	
AOP Change Control Number:	Date Submitted: