DOE/RL-96-28
UC-630

Nonradioactive Air Emissions Notice of Construction Use of a Portable Exhauster on 241-A-101 Tank During Salt Well Pumping and Other Routine Activities

Date Published
March 1996

United States
Department of Energy
P.O. Box 550
Richland, Washington 99352

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Department of Energy
Richland Operations Office
P.O. Box 550
Richland, Washington 99352

96-MSD-074

NOV 2 1 1995

Mr. Joseph S. Stohr
Hanford Project Manager
State of Washington
Department of Ecology
P.O. Box 47600
Olympia, Washington 98504-7600

Dear Mr. Stohr:

NON-RADIOACTIVE AIR EMISSIONS NOTICE OF CONSTRUCTION (NOC) FOR ACTIVE VENTILATION ON 241-A-101 TANK

Enclosed is the NOC for use of a portable exhauster on the 241-A-101 Tank (Enclosure 1). The NOC is being submitted pursuant to the requirements of Washington Administrative Codes 173-400-110 and 173-460-040. The NOC is in the "reduced format" and therefore, a toxics - best available control technology analysis is not included.

The associated State Environmental Policy Act (SEPA) checklist is generally transmitted to the Washington State Department of Ecology (Ecology) with the non-radioactive NOC. However, in the recent past, Mr. Geoff Tallent of Ecology, has stated that a notification letter can be sent, in lieu of, a SEPA checklist, when SEPA requirements for a proposed project can be met by adoption of existing National Environmental Policy Act of 1969 (NEPA) documentation. The letter providing this notification is enclosed with this transmittal, and should be forwarded to Mr. Geoff Tallent (Enclosure 2).

Requirements for actively exhausting the 241-A-101 Tank are based on the Los Alamos National Laboratory's Safety Analysis Report (SAR). The SAR states that in order to get the postulated accidents, to within the risk guidelines, an exhauster is required.

Should you have any questions, please contact Ms. Carolyn Haass on (509) 372-2731 or Mr. Hector Rodriguez on (509) 376-6421.

Sincerely,

James E. Rasmussen

James E. Rasmussen, Director
Environmental Assurance, Permits,
and Policy Division

MSD:SDB

Enclosures (2)

cc w/encls:
R. King, Ecology
J. Witczak, Ecology
C. Allen, WHC
L. Borneman, WHC
E. Greager, WHC
R. Jim, YIN
D. Powaukee, Nez Perce Tribe
J. Wilkinson, CTUIR

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APPENDIX

FIGURES

TABLES

METRIC CONVERSION CHART

The following conversion chart is provided to the reader as a tool to aid in conversion.

Into metric units			Out of metric units		
If you know	Multiply by	To get	If you know	Multiply by	To get
Length			**Length**		
inches	25.40	millimeters	millimeters	0.0393	inches
inches	2.54	centimeters	centimeters	0.393	inches
feet	0.3048	meters	meters	3.2808	feet
yards	0.914	meters	meters	1.09	yards
miles	1.609	kilometers	kilometers	0.62	miles
Area			**Area**		
square inches	6.4516	square centimeters	square centimeters	0.155	square inches
square feet	0.092	square meters	square meters	10.7639	square feet
square yards	0.836	square meters	square meters	1.20	square yards
square miles	2.59	square kilometers	square kilometers	0.39	square miles
square miles	259	hectares	hectares	0.00391	square miles
acres	0.404	hectares	hectares	2.471	acres
Mass (weight)			**Mass (weight)**		
ounces	28.35	grams	grams	0.0352	ounces
pounds	0.453	kilograms	kilograms	2.2046	pounds
short ton	0.907	metric ton	metric ton	1.10	short ton
Volume			**Volume**		
fluid ounces	29.57	milliliters	milliliters	0.03	fluid ounces
quarts	0.95	liters	liters	1.057	quarts
gallons	3.79	liters	liters	0.26	gallons
cubic feet	0.03	cubic meters	cubic meters	35.3147	cubic feet
cubic feet per minute	0.02832	cubic meters per minute			
cubic yards	0.76	cubic meters	cubic meters	1.308	cubic yards
Temperature			**Temperature**		
BTU/hour	2.93 E-4	kilowatts			
Fahrenheit	subtract 32 then multiply by 5/9ths	Celsius	Celsius	multiply by 9/5ths, then add 32	Fahrenheit

NONRADIOACTIVE AIR EMISSIONS NOTICE OF CONSTRUCTION USE OF A PORTABLE EXHAUSTER ON 241-A-101 TANK DURING SALT WELL PUMPING AND OTHER ROUTINE ACTIVITIES

1.0 FACILITY IDENTIFICATION AND LOCATION

U.S. Department of Energy, Richland Operations Office
Hanford Site
200 East Area, 241-A Tank Farm, 241-A-101 Tank
Richland, Washington 99352

The responsible manager's name and address are as follows:

Mr. A. B. Sidpara, Director
Tank Operations Division
U.S. Department of Energy, Richland Operations Office
P.O. Box 550
Richland, Washington 99352
(509) 376-0933.

The 241-A-101 tank is one of six tanks included in the 241-A Single-Shell Tank (SST) Farm, which is located in the 200 East Area of the Hanford Site. Figure 1 shows the location of the 200 East Area within the Hanford Site. Figure 2 shows the location of the 241-A Tank Farm within the 200 East Area.

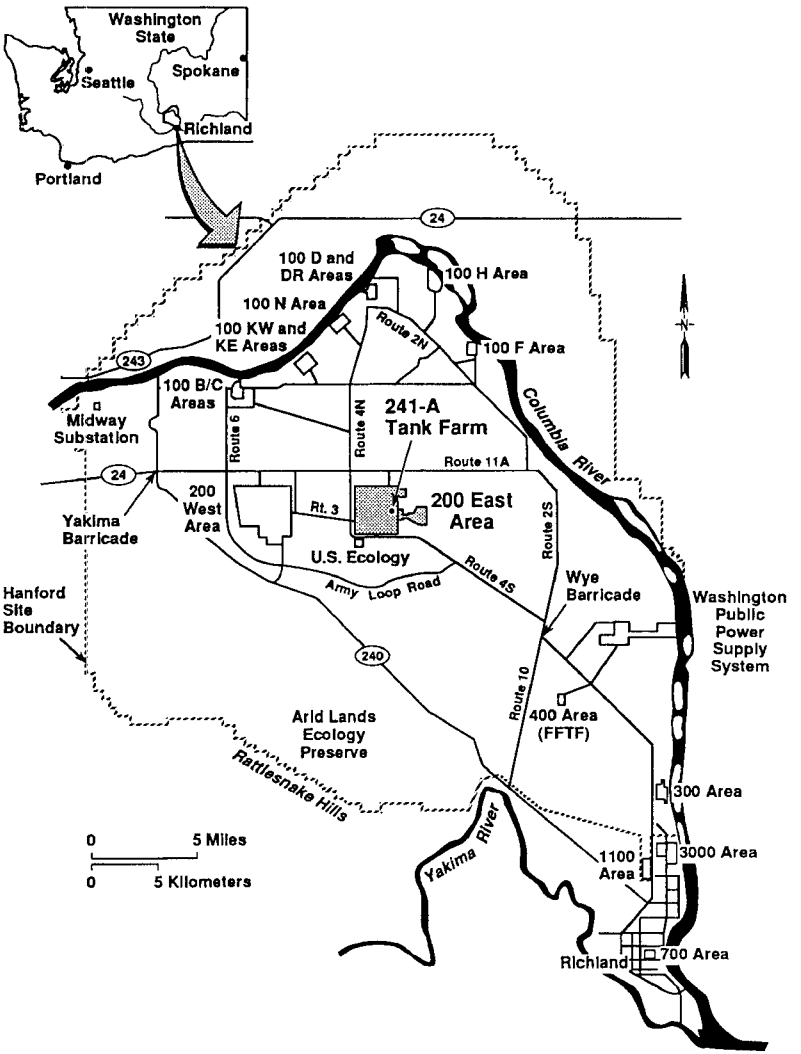

Figure 1. Hanford Site.

H96020397.2

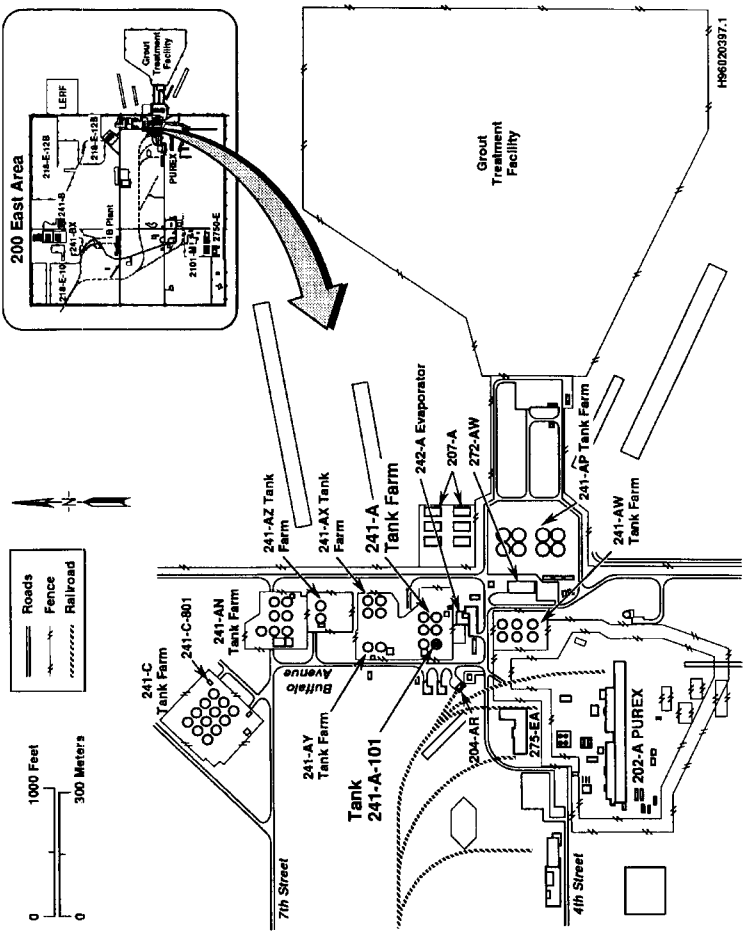

Figure 2. Location of the 241-A-101 Tank within the 200 East Area.

2.0 BACKGROUND INFORMATION

This document serves as a Notice of Construction (NOC) pursuant to the requirements of Washington Administrative Codes (WAC) 173-400-110 and 173-460-040 for the use of a portable exhauster on the 241-A-101 tank during salt well pumping of this tank. Approval for salt well pumping is not being requested as this is a routine activity performed to manage the waste within the SST System.

The primary objective of providing active ventilation to the 241-A-101 tank is to satisfy the requirements of a Los Alamos National Laboratories (LANL) Safety Analysis Report (SAR) that requires postulated accidents to remain within risk guidelines. It is anticipated that salt well pumping will release gases entrapped within the waste as the liquid level is lowered, because of less hydrostatic force keeping the gases in place. Other routine activities also have the potential to release trapped gases by interrupting gas pockets within the waste. Hanford Site waste tanks must comply with the National Fire Protection Association guidelines, which mandate that flammable gas concentration be less than 25 percent of the lower flammability limits. The LANL SAR indicates that the lower flammability limit may be exceeded during certain postulated accident scenarios. Also, the potentials for electrical (pump motor, heat tracing) and mechanical (equipment installation) spark sources exist. Therefore, because of the presence of ignition sources and the increase in released flammable gases, active ventilation will be required to reduce the 'time at risk' while performing routine operations at the tank.

Salt well pumping is the first planned activity at the tank requiring active ventilation. The exhauster may be operated continuously or intermittently as required by flammable gas levels. The pumping campaign will take approximately 3 years to complete and it is likely other routine activities will be performed in this timeframe. Also, once the pumping campaign has been completed the need for continued operation of the exhauster may arise for routine activities performed at the tank.

The 241-A-101 tank is a 3,785,400-liter capacity SST used for storage of mixed waste. This tank was put into service in 1956 and removed from service in 1980. The integrity of this tank is categorized as 'sound'. Currently the 241-A-101 tank holds approximately 3,607,486 liters of waste, of which 1,563,370 liters are pumpable interstitial liquid. The 241-A-101 tank is on the flammable gas watchlist and the organic watchlist. Salt well pumping of this tank is included in *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) Milestone M-41-10, "Start Interim Stabilization of Two Flammable Gas Watchlist Tanks in 241-A/AX Tank Farms by April 30, 1996". The milestone is currently under renegotiation for a later date.

3.0 PROJECT INFORMATION

A description of the 241-A-101 tank process, ventilation and emission control system, and monitoring is provided in the following sections.

3.1 PROCESS DESCRIPTION

The 241-A-101 tank, a 22.9 meter 3,785,400 liter capacity SST, was constructed from the fourth generation of tank designs, which were capable of holding boiling or self-concentrating waste. Construction features a reinforced concrete shell, dome, and base with a mild steel liner covering the bottom and sidewalls. The tank has a flat bottom with a usable waste depth of approximately 9.4 meters.

The tank was put into service in 1956 to store plutonium-uranium extraction (PUREX) high-level waste and organic wash waste. The waste was allowed to self-concentrate up until 1968. Tank sluicing was performed in 1969 and again in 1976 to reduce the amount of strontium and cesium, the two isotopes found to be the main heat generating sources in the tank. In 1978, the tank was reassigned for saltcake storage. The tank was taken out of service in November 1980 and partially isolated in 1982.

Salt well pumping is a method used to interim stabilize SSTs. Interim stabilization is commenced once all the liquid above the solids has been removed (primary stabilization). Interim stabilization removes the gravity drainable liquid and the interstitial liquid between the solids from the SST and transfers the liquid to a double-shell tank (DST) or to a staging double-contained receiver tank (DCRT), which is subsequently transferred to a DST. Pumping is accomplished at very low flow rates, 15.1 liters per minute or less. Slow collection of liquid in the well often requires pumping at less than 3.8 liters per minute.

Normally, salt well pumping is performed without the need of an exhauster. However, recent safety evaluations concluded that a minimum exhaust flow rate of 7.1 cubic meters per minute would be required to enhance the safety of the tank. Therefore, active ventilation will be part of this process for the 241-A-101 tank.

The exhauster may be operated continuously or intermittently as required by flammable gas levels, for the duration of the pumping campaign, including installation of the pump. Pumping operations will be in a continuous mode for approximately 3 years. It is likely that other routine activities will be performed in that timeframe. After transfer of the waste, continued operation of the exhauster may be needed for routine activities at the tank.

3.2 VENTILATION AND EMISSIONS CONTROL SYSTEM DESCRIPTION

During exhauster operation, the offgas will flow through a prefilter and two high-efficiency particulate air (HEPA) filters in series before entering the fan and exiting through the stack. The HEPA filters are rated for 28.3 cubic meters per minute and are equipped with fluid seals. Each stage is fully testable to the requirements of ASME N509/510. The fan is rated for 14.2 cubic meters per minute of air and will be of nonsparking design. A system heater will not be used at this time; however, space will be designed into the filter train to insert an intrinsically safe electric or glycol heater later. The heater system will be located upstream of the prefilter. Figure 3 shows plan and elevation views of the ventilation control system.

3.2.1 Stack Description

The stack is circular, 15.2 centimeters in diameter, and 3.7 to 4.6 meters high from ground level. The stack exhaust temperature will be between 57.2 and 60.0 °C. The nominal exhaust rate will be 14.2 cubic meters per minute.

3.2.2 Control Equipment Efficiencies

Particulate emissions will be controlled with a prefilter and two HEPA filters. The controls are used primarily to control radionuclide pollutants. The HEPA filters are each 99.95 percent efficient for the removal of particulates that are 0.3 micron and larger.

To determine the overall particulate decontamination factor (DF) for the control system, the individual component DFs were multiplied together. A DF of 2,000 was used for each HEPA filter. The overall DF is 4.0 E+06.

No controls are proposed for nonparticulate emissions.

3.3 MONITORING DESCRIPTION

The monitoring system being put in place is in accordance with radioactive air emission regulations and will consist of periodic confirmatory measurements. No sampling is proposed for nonradioactive air emissions because all contaminant emissions are below their respective small quantity emission rate or below their acceptable source impact level.

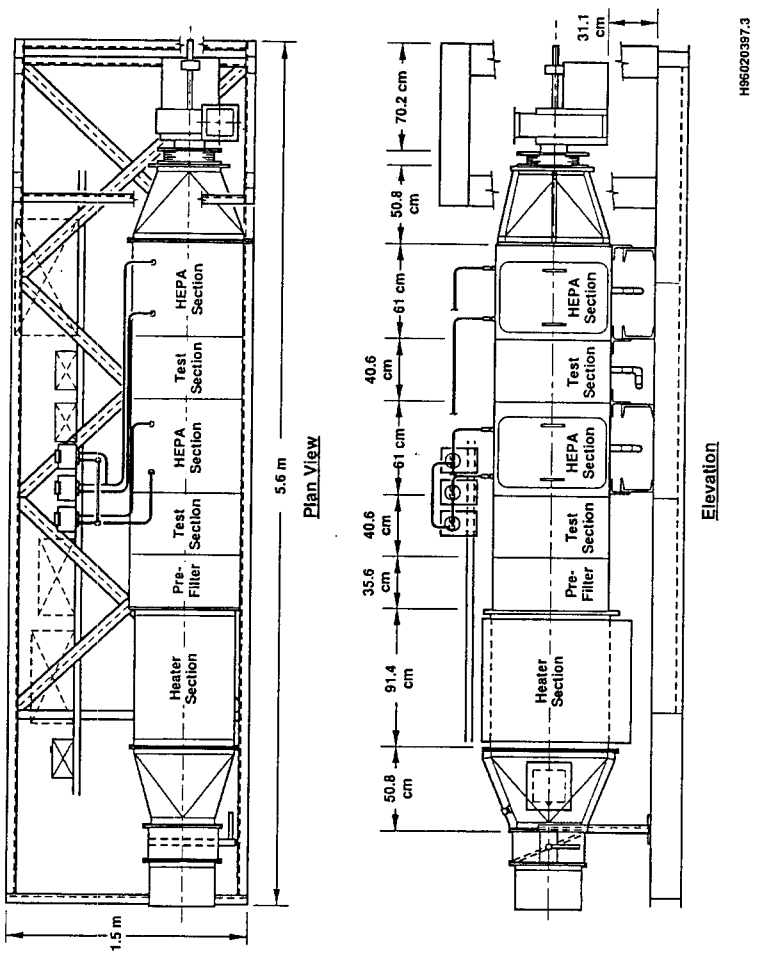

Figure 3. Ventilation and Emissions Control System Diagram.

4.0 EMISSIONS ESTIMATION

Currently, the 241-A-101 tank holds approximately 3,607,486 liters of waste; 1,525,516 liters of salt slurry, 2,070,613 liters of saltcake, and 11,370 liters of sludge (WHC 1994), of which 1,563,370 liters is pumpable interstitial liquid (WHC 1995). The current nominal bulk temperature of the waste is 68.3 °C. Assembled tank photographs show a white to grayish-yellow saltcake surface with no visible liquid.

Emissions resulting from the use of an exhauster on the 241-A-101 tank during salt well pumping and other routine activities are expected to be low. These activities minimally disturb the tank waste and vapor space. The following estimate is based on vapor space sampling (WHC 1995a). The concentration of contaminants in the estimate is assumed to be the same concentration as in the vapor space under passive ventilation.

4.1 CRITERIA POLLUTANTS PER WAC 173-400-030

Only one criteria pollutant, volatile organic compounds (VOCs), is expected to be emitted during use of an exhauster on the 241-A-101 tank.

Table 1 shows the individual VOCs, the respective concentrations in the head space, and the resulting emission rates, assuming 100 percent of the concentration is released. The total organic emissions are well below the Prevention of Significant Deterioration trigger level of 40 tons per year specified in WAC 173-400-030.

4.2 TOXIC AIR POLLUTANTS PER WAC 173-460-080

Toxic air pollutant (TAP) emissions are anticipated to be in gaseous form. Table 2 lists the TAP emissions from the 241-A-101 tank, evaluated per WAC 173-460, and compares the emissions against the regulated quantities of the contaminants. Table 2 contains the constituent's TAP class, vapor space concentration, emission rate (assuming 100 percent release), acceptable source impact level (ASIL), and the corresponding small quantity emissions (SQE) rate.

As indicated in Table 2, emissions are well below the SQE rates with the exception of 1,3-Butadiene. This constituent was modeled using the EPA model ISC3 (EPA 1996). The model produced a 24 hour average concentration of 2.7 E-04 micrograms per cubic meter for the worst case nearest public access point, and 2.3 E-04 micrograms per cubic meter for the worst case at the Hanford Site boundary. The concentration is well below the 24-hour-average ASIL value of 3.6 E-03 micrograms per cubic meter for the constituent. The modeling output report is shown in Appendix A.

The emissions are in compliance with the ASILs. This is demonstrated by meeting the SQE rates and by the modeling done for 1,3-Butadiene.

Table 1. Volatile Organic Compounds Regulated Per WAC 170-400-030.

Constituent	Vapor space concentration milligrams per cubic meter	Emission rate pounds per year
1,3-Butadiene	0.259	4.25
2-Hexanone (MBK)	0.08632	1.42
Acetic acid	0.071	1.16
Acetone	1.85876	30.49
Acetonitrile	0.28546	4.68
Benzene	0.05228	0.86
Butane	0.24733	4.06
Dichlorodifluoromethane	0.05929	0.97
Dichloromethane	0.03789	0.62
Diprophyl ketone	0.08592	1.41
Ethyl alcohol	0.64233	10.54
Ethyl butyl ketone	0.639	10.48
Heptane (n-Heptane)	0.10019	1.64
Isopropyl alcohol	0.24767	4.06
Methyl alcohol	1.79833	29.50
Methyl ethyl ketone (MEK)	0.26926	4.42
Methyl n-amyl ketone	0.15216	2.50
Methyl propyl ketone	0.097	1.59
n-Butyl alcohol	13.6113	223.31
n-Propyl alcohol	0.38788	6.36
n-Valderaldehyde	0.052	0.85
Nonane	0.02101	0.34
Octane	0.01244	0.20
Pentane	0.10567	1.73
Perchloroethylene	0.09769	1.60
Pyridine	0.03764	0.62
Sec-Butyl alcohol	0.066	1.08
Tetrahydrofuran	0.50713	8.32
Toluene	0.0644	1.06
Tributyl phosphate	2.37638	38.99
Trichlorofluoromethane	0.35005	5.74
Vinylidene chloride	0.03084	0.51
Total		405.39

Table 2. Toxic Air Pollutants Regulated per WAC 173-460-080.

Constituent	Toxic air pollutant class	Vapor space concentration (milligrams per cubic meter)	Vapor space concentration (micrograms per cubic meter)	Emission rate (pounds per hour)	Emission rate (pounds per year)	Acceptable source impact level (24 hour) (micrograms per cubic meter)	Small quantity emissions rate (pounds per year)
1,3-Butadiene	AI, AII	0.259	259	0.000485	4.25	0.0036	0.50
Benzene	AI, AII	0.05228	52.28	0.000098	0.86	0.12	2
Dichloromethane	AI, AII	0.3789	37.89	0.000071	0.62	0.56	50
Perchloroethylene	AI, AII	0.09769	97.69	0.000183	1.60	1.1	500
2-Hexanone (MBK)	B	0.08632	86.32	0.000162	1.42	67	10,500
Acetic acid	B	0.071	71	0.000133	1.16	83	10,500
Acetone	B	1.85876	1,858.76	0.003481	30.49	5,900	43,748
Acetonitrile	B	0.28546	285.46	0.000535	4.68	220	22,750
Ammonia	B	572.777	572,777	1.072718	9,397.01	100	17,500
Butane	B	0.24733	247.33	0.000463	4.06	6,300	43,748
Dichlorodifluoromethane	B	0.05929	59.29	0.000111	0.97	16,000	43,748
Diprophyl ketone	B	0.08592	85.92	0.000161	1.41	780	43,748
Ethyl alcohol	B	0.64233	642.33	0.001203	10.54	6,300	43,748
Ethyl butyl ketone	B	0.639	639	0.001197	10.48	780	43,748
Heptane (n-Heptane)	B	0.10019	100.19	0.000188	1.64	5,500	43,748
Isopropyl alcohol	B	0.24767	247.67	0.000464	4.06	3,300	43,748
Methyl alcohol	B	1.79833	1,798.33	0.003368	29.50	870	43,748
Methyl ethyl ketone (MEK)	B	0.26926	269.26	0.000504	4.42	1,000	43,748
Methyl n-amyl ketone	B	0.15216	152.16	0.000285	2.50	780	43,748
Methyl propyl ketone	B	0.097	97	0.000182	1.59	2,300	43,748
n-Butyl alcohol	B	13.6113	13611.3	0.025492	223.31	500	43,748
n-Propyl alcohol	B	0.38788	387.88	0.000726	6.36	1,600	43,748
n-Valderaldehyde	B	0.052	52	0.000097	0.85	590	43,748
Nonane	B	0.02101	21.01	0.000039	0.34	3,500	43,748
Octane	B	0.01244	12.44	0.000023	0.20	4,700	43,748
Pentane	B	0.10567	105.67	0.000198	1.73	6,000	43,748
Pyridine	B	0.03764	37.64	0.000070	0.62	53	5,250
Sec-Butyl alcohol	B	0.066	66	0.000124	1.08	1,000	43,748
Tetrahydrofuran	B	0.50713	507.13	0.000950	8.32	2,000	43,748
Toluene	B	0.0644	64.4	0.000121	1.06	400	43,748
Tributyl phosphate	B	2.37638	2,376.38	0.004451	38.99	7.3	175
Trichlorofluoromethane	B	0.35005	350.05	0.000656	5.74	19,000	43,748
Vinylidene chloride	B	0.03084	30.84	0.000058	0.51	67	10,500
Total				1.12	9,795.07		

5.0 SCHEDULE

The salt well pumping is scheduled to begin in the second quarter of 1996. The exhauster may be operated continuously or intermittently, as required by flammable gas levels, for the duration of the pumping campaign, including installation of the pump. Pumping operations will be in a continuous mode for approximately 3 years and it is likely other routine activities also will be performed in that timeframe. The campaign will be operated 3 shifts per day, operating 24 hours a day, 7 days a week. After transfer of the waste, continued operation of the exhauster may be needed for routine activities at the tank.

6.0 REFERENCES

EPA, 1996, *ISC3, Industrial Source Complex Dispersion Model*, screening procedures for estimating the air quality impact of stationary sources, EPA-454/B-95-003a, updated periodically, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina.

WHC, 1994, *Historical Tank Content Estimate for the Northeast Quadrant of the Hanford 200 East Areas*, WHC-SD-WM-ER-349, Westinghouse Hanford Company, Richland Washington.

WHC, 1995, *Waste Tank Summary for Month Ending May, 1995*, WHC-EP-0182-82, Westinghouse Hanford Company, Richland, Washington.

WHC, 1995a, *Tank 241-A-101 Headspace Gas and Vapor Characterization Results for Samples Collected in June 1995*, WHC-SD-WM-ER-505, Rev. 0, Westinghouse Hanford Company, Richland Washington.

WHC, 1996, *Engineering Technical Justification for Portable Exhausters to Support Salt Well Pumping of Single Shell Tanks*, WHC-SD-WM-TI-734, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

APPENDIX A

DISPERSION MODELING ISC3 RUN

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DISPERSION MODELING SUMMARY
1,3-BUTADIENE

The following is a tabulation of results from ISC3 calculations using hourly meteorological data collected in the 200 West Area over a three year period, 1992, 1993 and 1994. The receptor locations were chosen in a circular array around the 241-A-101 tank out to the Site boundary, out to the nearest public access point and to on Site 200 East Area work locations. The worst case results are noted with an asterisk.

	Site Boundary			Nearest Public Access	
Dir	Distance meters	Air Conc $\mu g/m^3$	Dir	Distance meters	Air Conc $\mu g/m^3$
S	19920	0.00014	S	9740	0.00027
SSW	17230	0.00008	SSW	9000	0.00016
SW	17590	0.00004	SW	9000	0.00007
WSW	21310	0.00007	WSW	9760	0.00014
W	20860	0.00012	W	12780	0.00018
WNW	21390	0.00007	WNW	16370	0.00008
NW	20950	0.00003	NW	12720	0.00006
NNW	21150	0.00016	NNW	12810	0.00026
N	24860	0.00009	N	15380	0.00013
NNE	23140	0.00013	NNE	13120	0.00022
NE	17770	0.00009	NE	10710	0.00015
ENE	15050	0.00016	ENE	10600	0.00022
E *	**15000**	**0.00023**	**E ***	**12430**	**0.00027**
ESE *	**19860**	**0.00023**	ESE	18900	0.00024
SE	24070	0.00006	SE	12370	0.00013
SSE	20030	0.00016	SSE	13350	0.00023

200 East Receptor Locations			$\mu g/m^3$
A farm	150m	0° N	0.00952
A farm	120m	80° E	0.01524
272-AW	200m	140° SE	0.01434
PUREX	380m	190° S	0.00461
275-E	210m	220° SW	0.00834
275-E	290m	230° SW	0.00845
204-AR	100m	240° WSW	0.01384
244-AR *	**100m**	**300° WNW**	**0.02622**

```
CO STARTING
   TITLEONE  Emission from 101-A in the 200 East Area
   MODELOPT  MSGPRO  CONC  RURAL
   AVERTIME  24
   POLLUTID  VARIOUS
   RUNORNOT  RUN
CO FINISHED

SO STARTING
   LOCATION   Exhaust1  POINT   0.0  0.0  0.0
**                       g/sec    ht,m   temp°K   m/sec   diam,m
   SRCPARAM   Exhaust1 6.13E-5    3.7    330.4   13.00    0.152
   SRCGROUP ALL
SO FINISHED

RE STARTING
   DISCPOLR Exhaust1  19920   180.0
   DISCPOLR Exhaust1   9740   180.0
   DISCPOLR Exhaust1  17230   202.5
   DISCPOLR Exhaust1   9000   202.5
   DISCPOLR Exhaust1  17590   225.0
   DISCPOLR Exhaust1   9000   225.0
   DISCPOLR Exhaust1  21310   247.5
   DISCPOLR Exhaust1   9760   247.5
   DISCPOLR Exhaust1  20860   270.0
   DISCPOLR Exhaust1  12780   270.0
   DISCPOLR Exhaust1  21390   292.5
   DISCPOLR Exhaust1  16370   292.5
   DISCPOLR Exhaust1  20950   315.0
   DISCPOLR Exhaust1  12720   315.0
   DISCPOLR Exhaust1  21150   337.5
   DISCPOLR Exhaust1  12810   337.5
   DISCPOLR Exhaust1  24860     0.0
   DISCPOLR Exhaust1  15380     0.0
   DISCPOLR Exhaust1  23140    22.5
   DISCPOLR Exhaust1  13120    22.5
   DISCPOLR Exhaust1  17770    45.0
   DISCPOLR Exhaust1  10710    45.0
   DISCPOLR Exhaust1  15050    67.5
   DISCPOLR Exhaust1  10600    67.5
   DISCPOLR Exhaust1  15000    90.0
   DISCPOLR Exhaust1  12430    90.0
   DISCPOLR Exhaust1  19860   112.5
   DISCPOLR Exhaust1  18900   112.5
   DISCPOLR Exhaust1  24070   135.0
   DISCPOLR Exhaust1  12370   135.0
   DISCPOLR Exhaust1  20030   157.5
   DISCPOLR Exhaust1  13350   157.5
   DISCPOLR Exhaust1    150     0.0
   DISCPOLR Exhaust1    120    80.0
   DISCPOLR Exhaust1    200   140.0
   DISCPOLR Exhaust1    380   190.0
   DISCPOLR Exhaust1    210   220.0
   DISCPOLR Exhaust1    290   230.0
   DISCPOLR Exhaust1    100   240.0
   DISCPOLR Exhaust1    100   300.0
RE FINISHED

ME STARTING
   INPUTFIL  EPA92-94.2W
   ANEMHGHT  10.0
   SURFDATA  67656  1992   Hanford-200W
   UAIRDATA  67656  1992   Hanford-200W
ME FINISHED

OU STARTING
   RECTABLE  ALLAVE FIRST
   MAXTABLE  ALLAVE 20
OU FINISHED

**********************************
*** SETUP Finishes Successfully ***
**********************************
```

```
 *** ISCST3 - VERSION 95250 ***     ***  Emission from 101-A in the 200 East Area                    ***      04/22/96
                                    ***                                                              ***      12:03:44
**MODELOPTs: CONC                          RURAL  FLAT                                                       PAGE    1
                                                                                          MSGPRO
                                      ***     MODEL SETUP OPTIONS SUMMARY       ***
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

**Intermediate Terrain Processing is Selected

**Model Is Setup For Calculation of Average CONCentration Values.

  --  SCAVENGING/DEPOSITION LOGIC --
**Model Uses NO DRY DEPLETION.  DDPLETE = F
**Model Uses NO WET DEPLETION.  WDPLETE = F
**NO WET SCAVENGING Data Provided.
**Model Does NOT Use GRIDDED TERRAIN Data for Depletion Calculations

**Model Uses RURAL Dispersion.

**Model Uses User-Specified Options:
          1. Final Plume Rise.
          2. Stack-tip Downwash.
          3. Buoyancy-induced Dispersion.
          4. Calms Processing Routine.
          5. Missing Data Processing Routine.
          6. Default Wind Profile Exponents.
          7. Default Vertical Potential Temperature Gradients.

**Model Assumes Receptors on FLAT Terrain.

**Model Assumes No FLAGPOLE Receptor Heights.

**Model Calculates  1 Short Term Average(s) of:  24-HR

**This Run Includes:    1 Source(s);      1 Source Group(s); and     40 Receptor(s)

**The Model Assumes A Pollutant Type of:  VARIOUS

**Model Set To Continue RUNning After the Setup Testing.

**Output Options Selected:
        Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE Keyword)
        Model Outputs Tables of Overall Maximum Short Term Values (MAXTABLE Keyword)

**NOTE:  The Following Flags May Appear Following CONC Values:  c for Calm Hours
                                                                m for Missing Hours
                                                                b for Both Calm and Missing Hours

**Misc. Inputs:  Anem. Hgt. (m) =    10.00 ;    Decay Coef. =    .0000     ;    Rot. Angle =      .0
                 Emission Units = GRAMS/SEC                                 ;  Emission Rate Unit Factor =    .10000E+07
                 Output Units   = MICROGRAMS/M**3

**Input Runstream File: 101a.IN                                  ;  **Output Print File: 101a.ST
```

**MODELOPTs: CONC RURAL FLAT MSGPRO

*** POINT SOURCE DATA ***

SOURCE ID	NUMBER PART. CATS.	EMISSION RATE (GRAMS/SEC)	X (METERS)	Y (METERS)	BASE ELEV. (METERS)	STACK HEIGHT (METERS)	STACK TEMP. (DEG.K)	STACK EXIT VEL. (M/SEC)	STACK DIAMETER (METERS)	BUILDING EXISTS	EMISSION RATE SCALAR VARY BY
EXHAUST1	0	.61300E-04	.0	.0	.0	3.70	330.40	13.00	.15	NO	

**MODELOPTs: CONC RURAL FLAT MSGPRO

*** SOURCE IDs DEFINING SOURCE GROUPS ***

GROUP ID	SOURCE IDs
ALL	EXHAUST1,

**MODELOPTs: CONC RURAL FLAT MSGPRO

*** DISCRETE POLAR RECEPTORS ***
ORIGIN: (DIST, DIR, ZELEV, ZFLAG)
SRCID: (METERS,DEG,METERS,METERS)

EXHAUST1: (	19920.0,	180.0,	.0,	.0);	EXHAUST1: (	9740.0,	180.0,	.0,	.0);
EXHAUST1: (	17230.0,	202.5,	.0,	.0);	EXHAUST1: (	9000.0,	202.5,	.0,	.0);
EXHAUST1: (	17590.0,	225.0,	.0,	.0);	EXHAUST1: (	9000.0,	225.0,	.0,	.0);
EXHAUST1: (	21310.0,	247.5,	.0,	.0);	EXHAUST1: (	9760.0,	247.5,	.0,	.0);
EXHAUST1: (	20860.0,	270.0,	.0,	.0);	EXHAUST1: (	12780.0,	270.0,	.0,	.0);
EXHAUST1: (	21390.0,	292.5,	.0,	.0);	EXHAUST1: (	16370.0,	292.5,	.0,	.0);
EXHAUST1: (	20950.0,	315.0,	.0,	.0);	EXHAUST1: (	12720.0,	315.0,	.0,	.0);
EXHAUST1: (	21150.0,	337.5,	.0,	.0);	EXHAUST1: (	12810.0,	337.5,	.0,	.0);
EXHAUST1: (	24860.0,	360.0,	.0,	.0);	EXHAUST1: (	15380.0,	360.0,	.0,	.0);
EXHAUST1: (	23140.0,	22.5,	.0,	.0);	EXHAUST1: (	13120.0,	22.5,	.0,	.0);
EXHAUST1: (	17770.0,	45.0,	.0,	.0);	EXHAUST1: (	10710.0,	45.0,	.0,	.0);
EXHAUST1: (	15050.0,	67.5,	.0,	.0);	EXHAUST1: (	10600.0,	67.5,	.0,	.0);
EXHAUST1: (	15000.0,	90.0,	.0,	.0);	EXHAUST1: (	12430.0,	90.0,	.0,	.0);
EXHAUST1: (	19860.0,	112.5,	.0,	.0);	EXHAUST1: (	18900.0,	112.5,	.0,	.0);
EXHAUST1: (	24070.0,	135.0,	.0,	.0);	EXHAUST1: (	12370.0,	135.0,	.0,	.0);
EXHAUST1: (	20030.0,	157.5,	.0,	.0);	EXHAUST1: (	13350.0,	157.5,	.0,	.0);
EXHAUST1: (	150.0,	360.0,	.0,	.0);	EXHAUST1: (	120.0,	80.0,	.0,	.0);
EXHAUST1: (	200.0,	140.0,	.0,	.0);	EXHAUST1: (	380.0,	190.0,	.0,	.0);
EXHAUST1: (	210.0,	220.0,	.0,	.0);	EXHAUST1: (	290.0,	230.0,	.0,	.0);
EXHAUST1: (	100.0,	240.0,	.0,	.0);	EXHAUST1: (	100.0,	300.0,	.0,	.0);

*** ISCST3 - VERSION 95250 ***   *** Emission from 101-A in the 200 East Area   ***   04/22/96
***   ***   12:03:44
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**MODELOPTs: CONC   .. RURAL FLAT   MSGPRO

*** METEOROLOGICAL DAYS SELECTED FOR PROCESSING ***
(1=YES; 0=NO)

```
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1
```

NOTE: METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FILE.

*** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
(METERS/SEC)

1.54, 3.09, 5.14, 8.23, 10.80,

*** WIND PROFILE EXPONENTS ***

STABILITY CATEGORY	WIND SPEED CATEGORY 1	2	3	4	5	6
A	.70000E-01	.70000E-01	.70000E-01	.70000E-01	.70000E-01	.70000E-01
B	.70000E-01	.70000E-01	.70000E-01	.70000E-01	.70000E-01	.70000E-01
C	.10000E+00	.10000E+00	.10000E+00	.10000E+00	.10000E+00	.10000E+00
D	.15000E+00	.15000E+00	.15000E+00	.15000E+00	.15000E+00	.15000E+00
E	.35000E+00	.35000E+00	.35000E+00	.35000E+00	.35000E+00	.35000E+00
F	.55000E+00	.55000E+00	.55000E+00	.55000E+00	.55000E+00	.55000E+00

*** VERTICAL POTENTIAL TEMPERATURE GRADIENTS ***
(DEGREES KELVIN PER METER)

STABILITY CATEGORY	WIND SPEED CATEGORY 1	2	3	4	5	6
A	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
B	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
C	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
D	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
E	.20000E-01	.20000E-01	.20000E-01	.20000E-01	.20000E-01	.20000E-01
F	.35000E-01	.35000E-01	.35000E-01	.35000E-01	.35000E-01	.35000E-01

*** ISCST3 - VERSION 95250 *** *** Emission from 101-A in the 200 East Area *** 04/22/96
*** *** 12:03:44
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**MODELOPTs: CONC RURAL FLAT MSGPRO

*** THE FIRST 24 HOURS OF METEOROLOGICAL DATA ***

FILE: EPA92-94.2W FORMAT: (4I2,2F9.4,F6.1,I2,2F7.1,f9.4,f10.1,f8.4,i4,f7.2)
SURFACE STATION NO.: 67656 UPPER AIR STATION NO.: 67656
NAME: HANFORD-200W NAME: HANFORD-200W
YEAR: 1992 YEAR: 1992

YEAR	MONTH	DAY	HOUR	FLOW VECTOR	SPEED (M/S)	TEMP (K)	STAB CLASS	MIXING HEIGHT (M) RURAL	MIXING HEIGHT (M) URBAN	USTAR (M/S)	M-O LENGTH (M)	Z-O (M)	IPCODE	PRATE (mm/HR)
92	1	1	1	290.0	1.79	275.9	4	90.0	.0	.0000	.0	.0000	0	.00
92	1	1	2	290.0	2.23	275.8	4	150.0	.0	.0000	.0	.0000	0	.00
92	1	1	3	290.0	1.79	275.7	4	130.0	.0	.0000	.0	.0000	0	.00
92	1	1	4	290.0	1.79	275.7	4	170.0	.0	.0000	.0	.0000	0	.00
92	1	1	5	280.0	1.79	275.6	4	170.0	.0	.0000	.0	.0000	0	.00
92	1	1	6	270.0	1.79	275.5	4	120.0	.0	.0000	.0	.0000	0	.00
92	1	1	7	280.0	1.79	275.5	4	100.0	.0	.0000	.0	.0000	0	.00
92	1	1	8	270.0	1.79	275.3	4	140.0	.0	.0000	.0	.0000	0	.00
92	1	1	9	280.0	1.79	275.3	4	90.0	.0	.0000	.0	.0000	0	.00
92	1	1	10	290.0	2.23	275.5	4	110.0	.0	.0000	.0	.0000	0	.00
92	1	1	11	300.0	1.79	276.0	4	140.0	.0	.0000	.0	.0000	0	.00
92	1	1	12	310.0	2.23	276.6	4	210.0	.0	.0000	.0	.0000	0	.00
92	1	1	13	310.0	2.23	276.8	4	210.0	.0	.0000	.0	.0000	0	.00
92	1	1	14	300.0	2.23	277.0	4	210.0	.0	.0000	.0	.0000	0	.00
92	1	1	15	300.0	2.68	277.0	4	210.0	.0	.0000	.0	.0000	0	.00
92	1	1	16	310.0	2.68	276.6	4	140.0	.0	.0000	.0	.0000	0	.00
92	1	1	17	300.0	2.23	276.2	4	140.0	.0	.0000	.0	.0000	0	.00
92	1	1	18	290.0	1.34	275.8	4	160.0	.0	.0000	.0	.0000	0	.00
92	1	1	19	280.0	1.34	275.6	4	140.0	.0	.0000	.0	.0000	0	.00
92	1	1	20	270.0	.89	275.4	4	140.0	.0	.0000	.0	.0000	0	.00
92	1	1	21	250.0	.89	275.3	4	140.0	.0	.0000	.0	.0000	0	.00
92	1	1	22	310.0	1.79	275.2	4	120.0	.0	.0000	.0	.0000	0	.00
92	1	1	23	300.0	2.68	274.9	4	90.0	.0	.0000	.0	.0000	0	.00
92	1	1	24	300.0	2.23	274.6	4	120.0	.0	.0000	.0	.0000	0	.00

*** NOTES: STABILITY CLASS 1=A, 2=B, 3=C, 4=D, 5=E AND 6=F.
FLOW VECTOR IS DIRECTION TOWARD WHICH WIND IS BLOWING.

*** ISCST3 - VERSION 95250 *** *** Emission from 101-A in the 200 East Area *** 04/22/96
*** *** 12:03:44
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**MODELOPTs: CONC RURAL FLAT MSGPRO

*** THE 1ST HIGHEST 24-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): EXHAUST1,

*** DISCRETE POLAR RECEPTOR POINTS ***

** CONC OF VARIOUS IN MICROGRAMS/M**3 **

ORIGIN SRCID	DIST (M)	DIR (DEG)	CONC	(YYMMDDHH)	ORIGIN SRCID	DIST (M)	DIR (DEG)	CONC	(YYMMDDHH)
EXHAUST1:	19920.00	180.00	.00014	(92121924)	EXHAUST1:	9740.00	180.00	.00027	(92121924)
EXHAUST1:	17230.00	202.50	.00008c	(93050324)	EXHAUST1:	9000.00	202.50	.00016c	(93050324)
EXHAUST1:	17590.00	225.00	.00004	(93032224)	EXHAUST1:	9000.00	225.00	.00007	(93032224)
EXHAUST1:	21310.00	247.50	.00007	(94040824)	EXHAUST1:	9760.00	247.50	.00014	(94040824)
EXHAUST1:	20860.00	270.00	.00012c	(93123024)	EXHAUST1:	12780.00	270.00	.00018c	(93123024)
EXHAUST1:	21390.00	292.50	.00007	(92112124)	EXHAUST1:	16370.00	292.50	.00008	(92112124)
EXHAUST1:	20950.00	315.00	.00003c	(93112924)	EXHAUST1:	12720.00	315.00	.00006c	(93112924)
EXHAUST1:	21150.00	337.50	.00016b	(93010224)	EXHAUST1:	12810.00	337.50	.00026b	(93010224)
EXHAUST1:	24860.00	360.00	.00009c	(93040324)	EXHAUST1:	15380.00	360.00	.00013c	(93040324)
EXHAUST1:	23140.00	22.50	.00013c	(94121024)	EXHAUST1:	13120.00	22.50	.00022c	(94121024)
EXHAUST1:	17770.00	45.00	.00009c	(93011924)	EXHAUST1:	10710.00	45.00	.00015c	(93011924)
EXHAUST1:	15050.00	67.50	.00016c	(93011924)	EXHAUST1:	10600.00	67.50	.00022c	(93011924)
EXHAUST1:	15000.00	90.00	.00023	(92091524)	EXHAUST1:	12430.00	90.00	.00027	(92091524)
EXHAUST1:	19860.00	112.50	.00023c	(94121124)	EXHAUST1:	18900.00	112.50	.00024c	(94121124)
EXHAUST1:	24070.00	135.00	.00006m	(93011424)	EXHAUST1:	12370.00	135.00	.00013c	(92112724)
EXHAUST1:	20030.00	157.50	.00016	(93021924)	EXHAUST1:	13350.00	157.50	.00023	(93021924)
EXHAUST1:	150.00	360.00	.00952	(94061624)	EXHAUST1:	120.00	80.00	.01524	(92072324)
EXHAUST1:	200.00	140.00	.01434c	(92112724)	EXHAUST1:	380.00	190.00	.00461	(93102324)
EXHAUST1:	210.00	220.00	.00834c	(94022724)	EXHAUST1:	290.00	230.00	.00845	(94050424)
EXHAUST1:	100.00	240.00	.01384	(94072224)	EXHAUST1:	100.00	300.00	.02622	(92010124)

*** ISCST3 - VERSION 95250 *** *** Emission from 101-A in the 200 East Area *** 04/22/96
*** *** 12:03:44
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**MODELOPTs: CONC RURAL FLAT MSGPRO

*** THE MAXIMUM 20 24-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): EXHAUST1,

** CONC OF VARIOUS IN MICROGRAMS/M**3 **

RANK	CONC	(YYMMDDHH) AT	RECEPTOR (XR,YR) OF TYPE			RANK	CONC	(YYMMDDHH) AT	RECEPTOR (XR,YR) OF TYPE		
1.	.02622	(92010124) AT (	-86.60,	50.00)	DP	11.	.01182c	(94071024) AT (	-86.60,	50.00)	DP
2.	.02001	(92012024) AT (	-86.60,	50.00)	DP	12.	.01182	(93011824) AT (	128.56,	-153.21)	DP
3.	.01557c	(92082324) AT (	-86.60,	50.00)	DP	13.	.01113	(92040524) AT (	118.18,	20.84)	DP
4.	.01524	(92072324) AT (	118.18,	20.84)	DP	14.	.01110b	(92122824) AT (	128.56,	-153.21)	DP
5.	.01434c	(92112724) AT (	128.56,	-153.21)	DP	15.	.01103	(92120524) AT (	-86.60,	-50.00)	DP
6.	.01416c	(94100924) AT (	-86.60,	50.00)	DP	16.	.01101	(92123124) AT (	128.56,	-153.21)	DP
7.	.01386	(92050924) AT (	118.18,	20.84)	DP	17.	.01099c	(94121124) AT (	128.56,	-153.21)	DP
8.	.01384	(94072224) AT (	-86.60,	-50.00)	DP	18.	.01098c	(92112924) AT (	-86.60,	-50.00)	DP
9.	.01218c	(92102424) AT (	-86.60,	50.00)	DP	19.	.01097	(94090324) AT (	118.18,	20.84)	DP
10.	.01195	(94112124) AT (	-86.60,	50.00)	DP	20.	.01078	(93031424) AT (	-86.60,	-50.00)	DP

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR
BD = BOUNDARY

*** ISCST3 - VERSION 95250 *** *** Emission from 101-A in the 200 East Area *** 04/22/96
*** *** 12:03:44
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**MODELOPTs: CONC RURAL FLAT MSGPRO

*** THE SUMMARY OF HIGHEST 24-HR RESULTS ***

** CONC OF VARIOUS IN MICROGRAMS/M**3 **

GROUP ID	AVERAGE CONC	DATE (YYMMDDHH)	RECEPTOR (XR, YR, ZELEV, ZFLAG)	OF TYPE	NETWORK GRID-ID
ALL HIGH 1ST HIGH VALUE IS	.02622	ON 92010124: AT (	-86.60, 50.00, .00, .00)	DP	NA

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR
BD = BOUNDARY

**MODELOPTs: CONC RURAL FLAT MSGPRO

*** Message Summary : ISCST3 Model Execution ***

--------- Summary of Total Messages --------

A Total of 0 Fatal Error Message(s).
A Total of 1193 Warning Message(s)
A Total of 954 Informational Message(s)

A Total of 461 Calm Hours Identified

A Total of 491 Missing Hours Identified

******** FATAL ERROR MESSAGES ********
*** NONE ***

******** WARNING MESSAGES ********

MX	W410	397	METQA :Flow Vector Out-of-Range. KURDAT=		92011713
MX	W420	397	METQA :Wind Speed Out-of-Range. KURDAT=		92011713
MX	W430	397	METQA :Ambient Temperature Data Out-of-Range.	KURDAT=	92011713
MX	W410	398	METQA :Flow Vector Out-of-Range. KURDAT=		92011714
MX	W420	398	METQA :Wind Speed Out-of-Range. KURDAT=		92011714
MX	W430	398	METQA :Ambient Temperature Data Out-of-Range.	KURDAT=	92011714
MX	W410	399	METQA :Flow Vector Out-of-Range. KURDAT=		92011715
MX	W420	399	METQA :Wind Speed Out-of-Range. KURDAT=		92011715
MX	W430	399	METQA :Ambient Temperature Data Out-of-Range.	KURDAT=	92011715
MX	W410	400	METQA :Flow Vector Out-of-Range. KURDAT=		92011716
MX	W420	400	METQA :Wind Speed Out-of-Range. KURDAT=		92011716
MX	W430	400	METQA :Ambient Temperature Data Out-of-Range.	KURDAT=	92011716
MX	W410	635	METQA :Flow Vector Out-of-Range. KURDAT=		92012711
MX	W420	635	METQA :Wind Speed Out-of-Range. KURDAT=		92012711
MX	W430	635	METQA :Ambient Temperature Data Out-of-Range.	KURDAT=	92012711

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MX	W410	25403	METQA :Flow Vector Out-of-Range. KURDAT=		94112411
MX	W420	25403	METQA :Wind Speed Out-of-Range. KURDAT=		94112411
MX	W430	25403	METQA :Ambient Temperature Data Out-of-Range.	KURDAT=	94112411
MX	W410	25404	METQA :Flow Vector Out-of-Range. KURDAT=		94112412
MX	W420	25404	METQA :Wind Speed Out-of-Range. KURDAT=		94112412
MX	W430	25404	METQA :Ambient Temperature Data Out-of-Range.	KURDAT=	94112412

****
*** ISCST3 Finishes Successfully ***
****

EPA-454/B-95-003a

USER'S GUIDE FOR THE INDUSTRIAL SOURCE COMPLEX (ISC3) DISPERSION MODELS

VOLUME I - USER INSTRUCTIONS

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Air Quality Planning and Standards
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September 1995

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