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# Toxic Air Pollutants Notice of Construction for Rotary Mode Core Sampling Systems Three and Four and Modification of System Two

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# RELEASE AUTHORIZATION

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# REVISION HISTORY

All changes made in this document are noted by a vertical bar in the left margin.

The Washington State Department of Ecology approved the original Notice of Construction for the Rotary Mode Core Sampling System Two in 1993 (DOE/RL-93-41). A *State Environmental Policy Act* (SEPA) Environmental checklist was completed and submitted during the 1993 approval process.

Revision 0 was submitted to Ecology in 1995 and replaced the original 1993 NOC.

Revision 1 updates Revision 0 as follows.

- The waste tank vapor characterization program is nearing completion. All existing vapor space data will be used when calculating toxic air emissions from Rotary Mode Core Sampling activities. The vapor space data from 102 waste tanks can be found in the Tank Waste Inventory System available on the World Wide Web located at URL *http://TWINS.PNL.GOV:8001/*.
- Revision 0 did not provide a method to perform emissions calculations for compounds that do not have a small quantity emission rate listed in Washington Administrative Code Chapters 173-460. A method to estimate emissions for these chemicals consistent with the technical approach in Revision 0 is included in Revision 1, Section 6.0.
- The Appendix B emissions calculation formula were modified. Revision 1 calculates emissions per tank. Revision 0 calculated annual emissions per exhauster

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# TERMS

| | |
|---|---|
| ASIL | acceptable source impact level |
| DNFSB | Defense Nuclear Facilities Safety Board |
| DST | double-shell tank |
| Ecology | Washington State Department of Ecology |
| HEPA | high-efficiency particulate air |
| HNF | Hanford Nuclear Facility (document identifier) |
| LMHC | Lockheed Martin Hanford Corporation |
| NOC | notice of construction |
| PNNL | Pacific Northwest National Laboratory |
| RMCS | rotary mode core sampling |
| SST | single-shell tank |
| SQER | small quantity emission rate |
| T-BACT | best available control technology for toxics |
| TAP | toxic air pollutant |
| TOC | total organic carbon |
| Tri-Party Agreement | *Hanford Federal Facility Agreement and Consent Order* |
| VOC | volatile organic compounds |
| WAC | *Washington Administrative Code* |

# TOXIC AIR POLLUTANTS NOTICE OF CONSTRUCTION FOR ROTARY MODE CORE SAMPLING SYSTEMS THREE AND FOUR AND MODIFICATION OF SYSTEM TWO

## 1.0 INTRODUCTION

The Washington State Department of Ecology (Ecology) approved the construction and operation of Rotary Mode Core Sampling (RMCS) System Two on November 22, 1993 (NOC-93-04). This approval supported the characterization of waste in the single-shell tanks (SSTs) and double-shell tanks (DSTs) on the Hanford Site. The waste tank characterization sampling and analysis effort is vital to the safe operations of the Hanford Site tank farms, and the timely collection of the information necessary to support retrieval, pretreatment, disposal planning, and final closure strategy.

Based on the Defense Nuclear Facilities Safety Board (DNFSB) *Recommendation 93-05 Implementation Plan* (DOE-RL-94-001), U.S. Department of Energy, Richland Operations Office (DOE-RL) proposed the expedited construction and operation of two additional RMCS systems to support characterization of waste stored in SSTs and DSTs. RMCS currently is scheduled for approximately 50 (active or passively ventilated) of the 149 SSTs in the 200 East and 200 West Areas. If necessary, the RMCS will be used to sample other tanks currently not scheduled, subject to the requirements of this document and any applicable Ecology approval order. The typical components of the RMCS systems are shown in Figure 1. It should be noted that the Flammable Gas Detector cart (Figure 1) is not being used during RMCS at this time.

RMCS is scheduled for approximately 40 tanks that are not actively ventilated. These tanks operate at atmospheric pressure with passive (breather) high-efficiency particulate air (HEPA) filters. The RMCS system uses nitrogen gas to cool and purge the drill bit assembly. Without the use of a portable ventilation system, the additional gas from RMCS might unsafely pressurize tanks that are not actively ventilated. The RMCS system also will generate aerosols and dust in the tank vapor head space. HEPA filters will be required on the portable exhauster during rotary mode core drilling to control radionuclide particulate emissions.

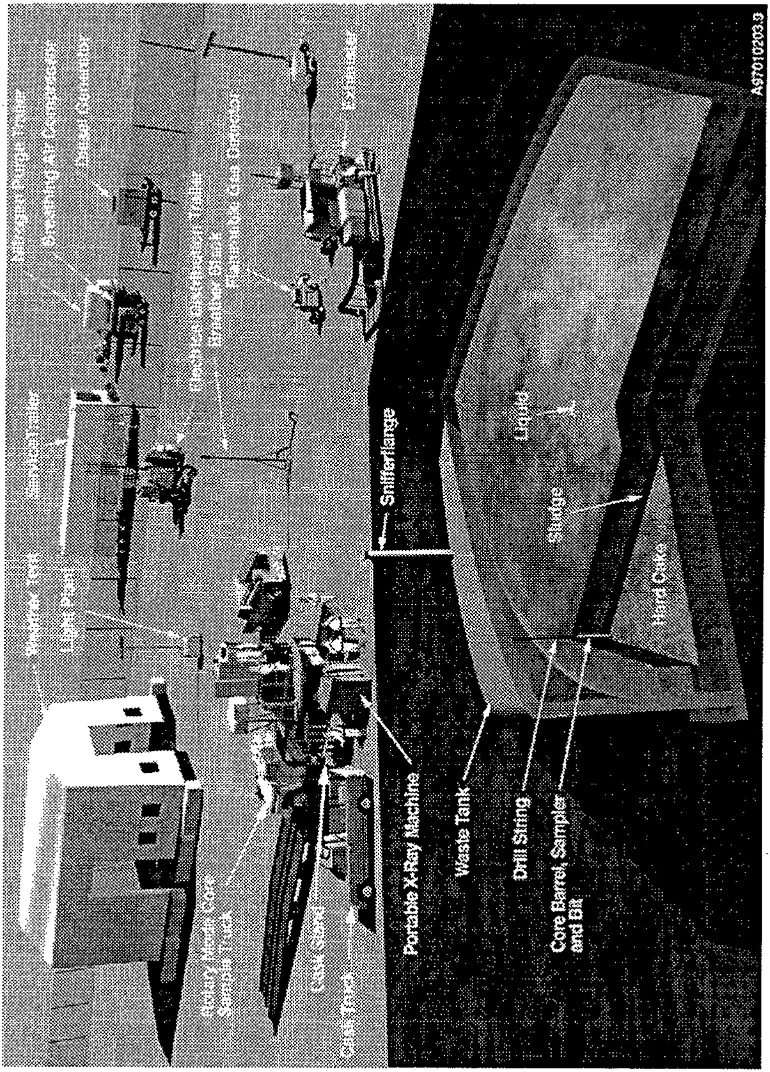

Figure 1. Typical Components of the Rotary Mode Core Sampling System.

# 2.0 PROCESS INFORMATION

The RMCS system was designed to sample tanks containing hardened wastes. A prominent feature of this sampling system is the use of nitrogen gas to cool and purge the drill bit assembly. The purge will also allow a more complete sample recovery by clearing cuttings that might otherwise obstruct the sampler drill bit, and prevents cross contamination of different waste layers in the tank. The preferred mode of sampling is push-mode, which does not involve rotation of the drill string or significant purge gas flow. When the waste is too hard to push through, the core sample truck is placed in rotary mode to allow the bit to drill through the waste. It is during the rotary mode operation that an exhauster system is necessary.

Of the approximately 50 tanks scheduled for RMCS, 40 tanks are not actively ventilated and operate at atmospheric pressure with passive HEPA filters. A portable HEPA filtered exhauster will be employed during RMCS in tanks that are not actively ventilated to prevent potentially unsafe tank pressurization and to control potentially radioactive aerosols and dust generated by RMCS. The portable exhauster must also be moved between tank farms as needed with the RMCS system. Each exhauster may emit Toxic Air Pollutants (TAPs) subject to WAC 173-460.

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# 3.0 CONTROL EQUIPMENT INFORMATION

Particulate emissions will be controlled with prefilters and HEPA filters, which are being installed primarily to control radionuclide pollutants. The HEPA filters are rated to remove 99.95 percent for particulates with a median diameter of 0.3 micrometer and larger. Efficiency testing will be performed annually in accordance with onsite procedures. A total abated particulate emission value of 9.6 grams per year (0.02 pound per year), or a maximum daily average of 0.06 gram per day (1.4 E-04 pounds per day), was provided to Washington State Department of Health (pursuant to WAC 246-247-110) and, thus, will not be regulated by Ecology.

A discussion of the best available control technology for toxics (T-BACT) is included as Appendix A of this document. The recommendation of the T-BACT assessment is that no controls for TAP compounds be installed.

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# 4.0 STACK INFORMATION

The RMCS systems will be portable systems operating in the 200 East and 200 West Areas of the Hanford Site. Each system (Figure 1) is comprised primarily of a RMCS truck, an optional exhauster platform (Figure 2), an optional less than 500-horsepower diesel powered electric generator (typically 300 horsepower), and a pressurized nitrogen gas tank platform.

The portable exhaust stack will be approximately 4.3 m (14 ft) high, with an effective height of more than 4.6 m (15 ft), and have a 10-cm (4-in.) diameter duct. The average stack temperatures will be approximately 27°C (80°F) and the exhaust rate will be approximately 5.7 ±1.4 $m^3$/min (200 ±50 $ft^3$/min).

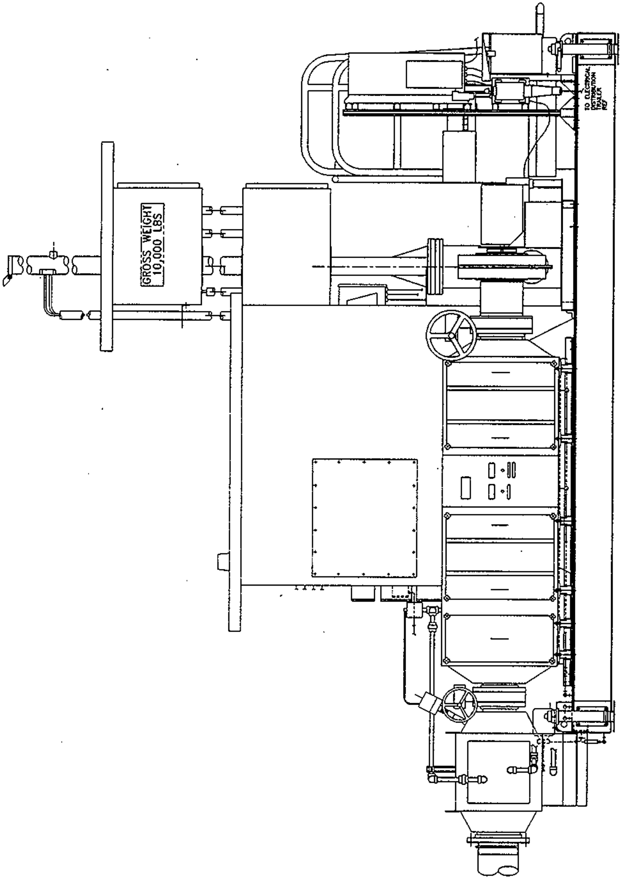

Figure 2. Design Drawing of Exhaust System.

# 5.0 PROCESS FLOW INFORMATION

## 5.1 EXHAUSTER DESIGN

The exhauster system (i.e., control equipment, fan, and stack) design is shown in Figure 2. The exhauster is attached to a tank riser by a flexible connector. A prefilter is located in the filter housing immediately upstream of two HEPA filters in series. These HEPA filters are designed to remove particulate radionuclides. After passing through the HEPA filters, the exhaust gas is released to the atmosphere through the stack. The stack will contain an access port for monitoring both total organic carbon (TOC) and ammonia.

Operation of an exhauster is required to maintain a negative tank pressure with respect to the atmosphere during RMCS and to prevent uncontrolled radionuclide particulate emissions. With the addition of nitrogen and in-leakage to the tank, flow through the exhauster is designed for control at 5.7 $m^3$/min (200 $ft^3$/min). At 5.7 $m^3$/min (200 $ft^3$/min) tank pressure is about -250 Pa or -1 in. water gauge (w.g.). Loss of the required exhauster will result in the automatic shutdown of the drilling process.

## 5.2 METHOD OF OPERATION

[*This paragraph moved to section 6.1*]

Whenever the drill bit is rotating, nitrogen gas will be injected into the drill string at approximately 0.85 $m^3$/min (30 $ft^3$/min) to a maximum of 2.8 $m^3$/min (100 $ft^3$/min). Each 48.3-cm (19-in.) segment requires 5 to 20 minutes of drilling. While the sampler is being changed out after each segment, nitrogen will be injected into the drill string at approximately 0.03 $m^3$/min (1 $ft^3$/min). This will maintain the hydrostatic head in the drill string (preventing waste from entering the space just sampled) and will allow for pressurization and depressurization of the sample receiver as necessary for sampler changeout.

Once a complete core has been obtained, the RMCS truck may either be repositioned on the same riser or moved to a different riser on the same tank to obtain a second core. When tank sampling is complete, the RMCS system will be disconnected and moved to the next tank. During system connection and disconnection, as-low-as-reasonably-achievable (ALARA) principles will be followed.

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# 6.0 TOXIC AIR POLLUTANT EMISSIONS ESTIMATION

In general, gas and vapor emissions from the exhauster can be estimated from quiescent waste tank headspace characterization data, headspace volumes, and exhauster flow rates. Current knowledge of the tank headspace gases and vapors, and the fact that tank headspace volumes are large compared to the specified exhauster flow rates, suggest TAP emission rates will be relatively low.

## 6.1 EMISSIONS CALCULATIONS

Before connecting the RMCS system to any tank, an air emissions estimate will be calculated, as described in Appendix B, using the existing tank vapor space data. If the calculated emission rate for any TAP exceeds its SQER, the actual RMCS exhauster operating time will be limited to maintain TAP emissions below the SQER. If the calculated emission rate for any TAP exceeds 50 percent of the established SQER, effluent monitoring will be performed as described in Appendix B.

The existing tank characterization vapor space data indicate some waste tanks contain chemical compounds that do not have WAC 173-460 SQER values. The TWINS database currently contains approximately 125 chemical compounds and classes of compounds identified in tank waste, of which six compounds do not have SQER values. A method to demonstrate compliance and/or monitoring requirements for each of these individual compounds is addressed in Section 6.2.

Generally, compounds with no SQERs will be modeled for atmospheric dispersion, as allowed by WAC 173-460-080, using an EPA code (EPA-454-B-95-003a) and specific Hanford Site meteorological data to calculate the site boundary concentrations. The dispersion analyses will be performed in accordance with Appendix C. The worst-case concentration at any Hanford site boundary will be compared to the acceptable source impact level (ASIL) for the contaminant as listed in WAC 173-460. A Hanford Site boundary concentration less than the ASIL renders the tank acceptable for RMCS.

## 6.2 SPECIFIC TAP CALCULATIONS

Propionaldehyde and acetophenone, both Class B TAPs as listed in WAC 173-460-160, do not have an assigned ASIL or SQER values. A conservative assumption of assigning the smallest SQER for a Class B TAP (0.02 pound per hour) will be used in Appendix B calculations to provide an acceptable level of public health protection.

The Class A compound N-nitrosodimethylamine does not have an SQER value but does have a WAC 173-460-150 ASIL value assigned. This compound will be modeled for dispersion and compared to the ASIL value.

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. This compound also will be modeled for dispersion and compared to the 24-hour average ASIL value specified in WAC 173-460.

N-nitrosomorpholine does not have an SQER or ASIL value. To evaluate the risk of exposing the public to an unacceptable dose of this Class A TAP, a study was performed by Pacific Northwest National Laboratory (PNNL 1996) to identify a compound with similar toxicological characteristics to N-nitrosomorpholine. PNNL identified 1-nitrosopyrrolidine as the chemical toxicity surrogate for N-nitrosomorpholine. The calculated ASIL for N-nitrosomorpholine using 1-nitrosopyrrolidine as a surrogate is 1.63 E-03 micrograms per cubic meter. This ASIL will be used for comparison of offsite concentrations in the event a tank containing this compound requires RMCS.

The Class A TAPs, dioxins and furans (considered together as one TAP by WAC 173-460-050), do not have an SQER value but do have an ASIL. In accordance with WAC 173-460-050, dioxin and furan emissions are combined and considered as one TAP conservatively expressed as an equivalent emission of 2,3,7,8 tetrachlorodibenzo-p-dioxin (TCDD). This TCDD compound is highly chlorinated, extremely carcinogenic, and has been assigned the smallest ASIL value of any compound listed in WAC 173-460.

With respect to the waste tanks, no dioxins have been detected and the furans detected in the tanks consist of 35 species of nonchlorinated furans (PNNL 1996). Given this information, the use of TCDD for Hanford tank nonchlorinated furans in the waste tanks is inappropriate. To evaluate the risk of exposing the public to an unacceptable dose of the nonchlorinated furans, a study was performed to identify a compound with toxicological characteristics believed to be representative of nonchlorinated furans. The study identified 1,4-Dioxane as the surrogate (PNNL 1998). The 1,4-dioxane ASIL will be used for comparison of offsite concentrations in the event a tank containing nonchlorinated furans requires RMCS.

The emissions resulting from the operation of the RMCS system are in compliance with the required standards of WAC-173-460. Compliance will be demonstrated by estimating emissions per Appendix B methodology, and limiting exhauster operation time such that actual emissions are less than the SQERs for those TAPs that have SQERs and less than the substitute SQERs or substitute ASILs for the specific TAPs described in this section. Stack emissions monitoring will be performed only for those tanks that meet Appendix B monitoring criteria.

# 7.0 SUMMARY OF COMPLIANCE WITH REQUIREMENTS

Appendix A includes a T-BACT assessment, which recommends no controls for organic or inorganic vapors. The emissions resulting from the operation of the RMCS system are in compliance with the required standards of WAC-173-460. Compliance will be demonstrated by estimating emissions per Appendix B methodology, and limiting exhauster operation time such that actual emissions are less than the SQERs for those TAPs that have SQERs and less than the substitute SQERs or substitute ASILs for the specific TAPs described in Section 6.2. Stack emissions monitoring will be performed only for those tanks that meet Appendix B monitoring criteria.

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# 8.0 REFERENCES

DOE/RL-95-62, *Nonradioactive Air Emissions Notice of Construction, Project W-320, 241-C-106 Tank Sluicing*, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE/RL 94-0001, *Recommendation 93-05 Implementation Plan,* U.S. Department of Energy, Richland, Washington.

DOE/RL-93-41, *Toxic Air Pollutants Notice of Construction, Rotary Mode Core Sampling Truck and Exhauster*, U.S. Department of Energy, Richland, Washington.

Ecology, 1995, *Notice of Construction (NOC) Permit for the Construction of Two Rotary Mode Core Sampling Systems and the Modification of the Existing System, ORDER NO. NWP 95-RMCS(3)*, letter to U.S. Department of Energy, Richland Operations Office (June 30), Washington State Department of Ecology, Olympia, Washington.

Ecology, EPA, and DOE, 1996, *Hanford Federal Facility Agreement and Consent Order*, as amended, State of Washington Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Richland, Washington.

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

HNF-SD-WM-TSR-006, *Tank Waste Remediation System Technical Safety Requirements*, Fluor Daniel Hanford Company, Richland Washington.

NOC-93-04, *Compliance With Condition 3, Approval of the Notice of Construction Application for Nonradioactive Emissions,* letter to State of Washington Department of Ecology (February 18), U.S. Department of Energy, Richland, Operations Office.

PNNL, 1996, Letter report to C. Grando (WHC) from D. Maughan (PNNL), Chemical Toxicity of N-Nitrosomorpholine (59-89-2), dated August 23, 1996.

PNNL, 1998, Letter report to D. Shuford (LMHC) from D. Maughan (PNNL), 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, dated March 12, 1998.

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# APPENDIX A

# BEST AVAILABLE CONTROL TECHNOLOGY FOR TOXICS ASSESSMENT

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# APPENDIX A

# BEST AVAILABLE CONTROL TECHNOLOGY FOR TOXICS ASSESSMENT

## A1.0 INTRODUCTION

This appendix provides the basis for the management of toxic air pollutants resulting from rotary mode core sampling (RMCS) activities. The information is intended to demonstrate that the control equipment selected for the exhauster for the RMCS system complies with the requirements concerning the Best Available Control Technology for Toxics (T-BACT) as defined in the *Washington Administrative Code* (WAC) Chapter 173-460. The conclusions reached in this document are based on an evaluation of control technologies following the procedure described by the U.S. Environmental Protection Agency (in their draft policy document)[1] and Ecology in an implementation resource manual.[2]

A description of the RMCS system, including the purpose for the system, is included in the Notice of Construction (NOC), to which this document has been appended. Please refer to the NOC for any information not directly related to the control of toxics.

## A2.0 UNABATED EMISSIONS

Before connecting the RMCS system to a tank, the vapor space will be sampled and analyzed for TAPs. As discussed in Section 6.0 of this NOC, a calculation for all TAPs listed in the TWINS data base for each tank will be performed as described in Appendix B before RMCS.

## A3.0 TOP DOWN PROCEDURE

There are five basic steps to determine T-BACT for a source. The first step is to identify all available control options. The second step is to eliminate options that are technically not feasible. The third step is to rank the remaining control technologies in order of control effectiveness. The fourth step is to evaluate the most effective controls considering energy, environmental, and economic impacts. If the top candidate is shown to be technically or economically not feasible, the next most stringent alternative

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[1] *Prevention of Significant Deterioration and Nonattainment Area Permitting (Draft)*, U.S. Environmental Protection Agency, Washington, D.C., 1990.

[2] *Regulating Toxics, Implementation Resource Manual*, State of Washington Department of Ecology, Olympia, Washington, 1991.

is evaluated. Finally, a T-BACT selection is made when the most effective control option cannot be eliminated because of energy, environmental, or economic impacts.

# A4.0 CONTROL TECHNOLOGIES AVAILABLE

Several technologies are available for the control of the contaminants included in the unabated emissions estimate. It should be noted that the exhauster will be equipped with a HEPA filter, regardless of the recommendation of this T-BACT analysis as a result of the requirements of WAC 246-247 and the U.S. Department of Energy.

Both organic and inorganic compounds are included in the unabated emissions estimate. The control technologies for each type of compound will be discussed separately.

## A4.1 CONTROLS FOR VOLATILE ORGANIC COMPOUNDS

This section describes the various technologies for the control of volatile organic compounds (VOC). The technical feasibility of each is discussed in this section, as well.

### A4.1.1 Adsorption

This technology has been used widely to capture VOC from emission sources. The stream is passed through a fixed bed of granular activated carbon, and adsorbed onto the carbon, or another adsorbent, such as a resin. This eventually depletes the available sites for adsorption, and the adsorbent must be either regenerated or discarded. This option appears to be technically feasible and will be discussed further in Section A5.0.

### A4.1.2 Thermal Incineration

In this technology, the air stream is heated to about 816 to 1,093°C (1,500 to 2,000°F) for about a 1 second residence time. This chemically oxidizes the VOCs. Due to the relatively low heat content of the air stream, and the variability from tank to tank in vapor space composition, large quantities of fuel would be required for incineration, adding another large component (the fuel tank) to the RMCS system. Because of the potential presence of hydrogen in the vapor space of some of the tanks to be rotary mode core sampled this technology would not be considered inherently safe. Additionally, any system which would remove the incineration source from the proximity of the tank to minimize safety concerns would not be feasible, because the exhaust system cannot be outside of the fence line of the tank farm being exhausted. Consequently, installation is not technically feasible on any Hanford Site waste storage tank.

### A4.1.3 Catalytic Incineration

Catalytic incineration operates in the same manner as thermal incineration, with the exception that a catalyst is used in the reaction bed to reduce the temperature required to oxidize the VOCs. The presence of chlorinated compounds in the air stream will degrade the capability of the catalyst. Additionally, the temperatures required for this control technology are not sufficiently low that the inherent safety of the system can be ascertained. Therefore, catalytic incineration is not technically feasible for this application.

### A4.1.4 Vapor Condensation

This technology is used to recover and recycle volatilized solvents from industrial processes and in some cases has been used for VOC emission control, if the VOC concentration is extremely high. The air stream to be treated is cooled to below the dewpoint temperature of the VOC to be collected, and the condensed VOCs are decanted and recovered. This technology is not applicable to air streams with widely varying composition or concentration, because of the difficulties in designing the condenser for an uncertain process stream. Also, this technology is not well suited to air streams where the VOC concentration is less than the water vapor concentration, because the air coolers will become clogged with condensed ice. The tanks to be exhausted with this system are of highly varying composition, and some of the tanks are expected to have extremely high relative humidities. Therefore, this technology is not technically feasible.

## A4.2 CONTROLS FOR INORGANIC COMPOUNDS

Only a limited quantity of methods have developed to control inorganic vapor emissions from point sources. The two most commonly used control methods are adsorption and absorption (or scrubbing).

### A4.2.1 Adsorption

Adsorption of inorganic compounds is performed in the same way the adsorption of organic compounds is performed on granular activated carbon, however the adsorbent is different. For the control of ammonia (by far the inorganic compound of highest concentration in the vapor space), impregnated carbon has been shown to be an effective control device. This option appears to be technically feasible and will be discussed further in Section A5.0.

### A4.2.2 Absorption

Absorption, or scrubbing, is used quite extensively in the control of inorganic compounds. In this technology, the air stream is contacted with a solvent, in which the inorganic compounds are highly soluble. The ideal solvent should be nonvolatile, noncorrosive, nonflammable, nontoxic, chemically stable, readily available, and inexpensive. Water is the most commonly used solvent, and is used on a once-through basis. Unfortunately, there is no wastewater disposal system in the tank farms that can handle the quantity of wastewater that will be generated by this process. Additionally, there is a restriction on the water brought into the SST farms. This restriction does not allow water to be brought into a tank farm to be used as the solvent to scrub an air stream, nor does it allow water to be removed from tank farms for treatment elsewhere on site. Therefore, this technology is not technically feasible.

### A4.2.3 Incineration

Thermal or catalytic incinerators can be used to control the emission of some inorganic compounds. However, a technically infeasible situation exists when applying these high temperature devices on tanks potentially containing concentrations of hydrogen in excess of the lower explosive level.

## A5.0 RANKING OF CONTROL TECHNOLOGIES

Adsorption is the only technically feasible control technology available for organic or inorganic compounds. Therefore adsorption is ranked first, in order of effectiveness, and "no controls" is ranked second.

## A6.0 ENVIRONMENTAL, ECONOMIC, AND ENERGY IMPACTS

The proposed RMCS System Three and Four were developed to be essentially identical to the approved System Two, with the primary goal of sampling the waste in the SSTs as efficiently, rapidly, and thoroughly as possible, while maintaining the integrity of the samples. Determining the contents of the tanks is the first step in retrieval, treatment, and eventual disposal of the wastes, which is required for clean-up of the Hanford Site.

At the flow rate selected for this exhauster, the technical feasibility of adsorption systems is questionable. EPA handbook 625/6-91/014[3] does not recommend adsorption for flows less than 8.5 $m^3$/min (300 $ft^3$/min) or temperatures greater than 54.4°C (130°F). To install these controls the flow rate would have to be increased and a chiller installed to ensure that the air stream was within the design parameters of the adsorption systems. Additionally, the pressure drop through the control technologies would cause the pressure in the tank to fall below acceptable safety criteria (<-7.62 cm w.g. [<-3 in. w.g.]). Addition of a chiller and use of a higher flow rate are technically feasible and are required for adsorption to be

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[3] EPA, 1991, *Control Technologies for Hazardous Air Pollutants*, EPA/625/6-91/014, U.S. Environmental Protection Agency, Washington, D.C.

feasible. Consequently, the following discussion of impacts includes the use of a higher flow rate and chiller system.

## A6.1 ENVIRONMENTAL IMPACTS

A system designed with the adsorption units would be extremely large, and would place the sampling of SSTs on a much slower track. Actual RMCS activities can take up to 21 days per tank. With the exhauster using VOC and ammonia adsorption, set-up and break-down could take up to another 21 days. Therefore, less than 9 tanks per unit could be sampled in a year. Delaying the schedule and increasing the time required to sample SSTs provides an environmental impact to the clean-up of the Hanford Site.

An adsorption system for the VOC was identified. This system used in-place regeneration with nitrogen and therefore did not have a significant secondary waste generation problems. However, there is an environmental impact in the generation of spent impregnated carbon from the ammonia adsorption system.

## A6.2 ECONOMIC IMPACTS

An adsorption system on the exhauster would add $185,000 to the operating cost to obtain one core sample. At a sampling rate of 30 cores per year (i.e., 15 tanks per year, 2 cores per tank), $5,550,000/year, would be spent to include adsorption on the RMCS system (this does not include the capital cost of an adsorption system). At 99 percent efficiency, this unit could remove up to 34.2 kg (75.3 lb) of TAPs per year (i.e., assuming the vapor space results from Tank 241-BY-110 are used to illustrate an annual average emissions rate). Therefore, the operating cost of the adsorption systems is $147 million/ton of TAPs (i.e, $162,000/kg [$73,700 lb] of TAPs).

Using a 300 hp diesel engine to power the adsorption system at approximately $10/h, 24 h/day, 14 d/tank, and 15 tanks/year, would cost more than $50,000/year (see Section A6.3). The total economic impact of operating an adsorption system with the RMCS exhauster is more than $5.6 million/year. Thus, the economic impact of the adsorption control technology is not efficient and does not justify its use.

## A6.3 ENERGY IMPACTS

The operation of the previously designed system (including the VOC adsorber regeneration) required approximately 175 kVa additional power. The power to the RMCS exhaust system is supplied by a diesel generator, and an additional diesel generator, of 300 hp or less, would be required to supply power to the adsorption system. The economic impact of the additional energy requirements to support the adsorption technology, to remove less than 35 kg (76 lb) of toxics from the air stream, would cost more than $50,000/year (i.e., more than $1,400/kg [$669/lb]). Thus, the energy impact does not justify the added cost to control insignificant TAP emissions.

## A7.0 CONCLUSION

Based on the previous assessment, the unabated emissions, as a result of the planned activity do not represent significant emissions to the atmosphere. Exhauster operation time will be limited such that actual emissions are less than the SQERs for those TAPs that have SQERs and less than the substitute SQERs or substitute ASILs for the specific TAPs described in the text, Section 6.2. Additionally, the impacts of the control technology are not justified in the removal of an insignificant quantity of pollutants. Therefore, the T-BACT assessment recommends that no controls for TAPs be installed.

# APPENDIX B

# TOTAL ORGANIC CARBON AND AMMONIA MONITORING REQUIREMENTS FOR THE ROTARY MODE CORE SAMPLING SYSTEM

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# APPENDIX B

## TOTAL ORGANIC CARBON AND AMMONIA MONITORING REQUIREMENTS FOR THE ROTARY MODE CORE SAMPLING SYSTEM

### B1.0 INTRODUCTION

A sample of the vapor space of each passively ventilated tank scheduled for rotary mode core sampling (RMCS) will be obtained as part of the preoperational steps. As discussed in the text, Section 6.0, a calculation for all TAPs listed in the TWINS database for each tank will be performed as described in this Appendix before RMCS. Results of this analysis will be used to determine the acceptability of performing RMCS on any given tank and the extra requirements and limitations such as limiting exhauster operation or stack monitoring that might be imposed.

Figure B1 represents the logic for determining the extra requirements such as monitoring or limiting the number of hours of exhauster operation to ensure emissions do not exceed the SQER.

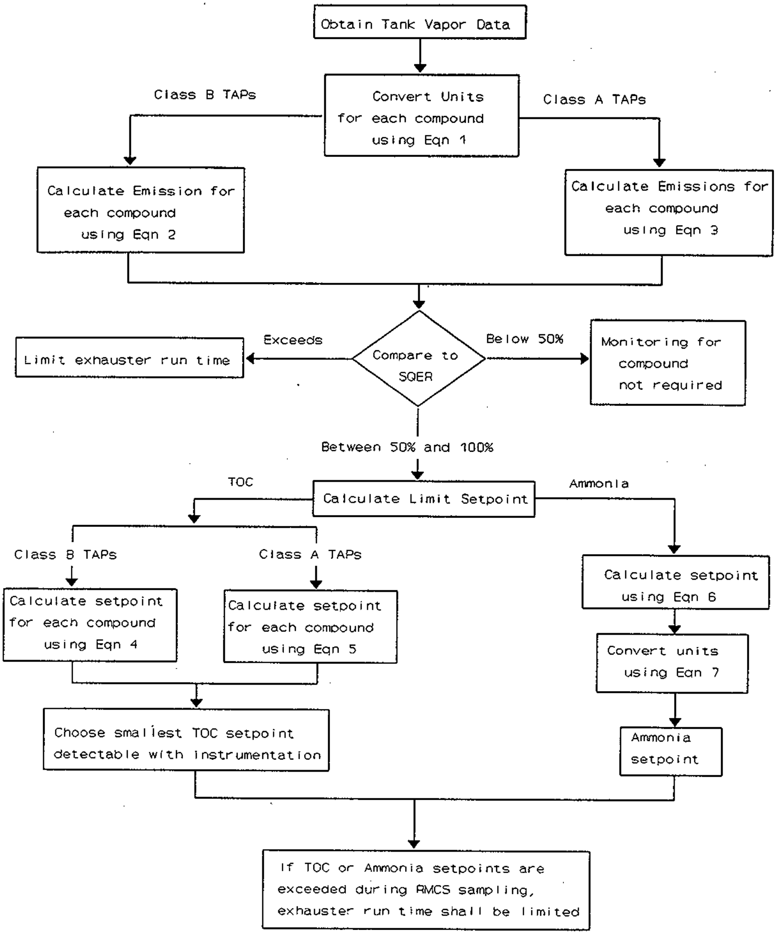

Figure B1. Total Organic Carbon and Ammonia Monitoring Requirements.

# B2.0 DETERMINATION OF ACCEPTABILITY FOR ROTARY MODE CORE SAMPLING

The following method will be used to determine whether a waste tank's vapor space is acceptable for RMCS:

- Convert ammonia and each organic species regulated as a class A or class B toxic air pollutant (TAP) from parts per million (p/M) by volume to milligrams per cubic meter using Equation 1:

$$\frac{(\text{p/M})\,(\text{gram molecular weight})}{24.45} = \frac{\text{mg}}{\text{m}^3} \qquad (1)$$

- Convert ammonia and each organic species regulated as a class B TAP from milligrams per cubic meter to pounds per hour at 5.7 $m^3$/min (200 $ft^3$/min) using Equation 2:

$$\left[X\frac{\text{mg}}{\text{m}^3}\right]\left[\frac{339.8\text{m}^3}{\text{hr}}\right]\left[\frac{\text{lb}}{453{,}593\,\text{mg}}\right] = X\frac{\text{lb}}{\text{hr}} \qquad (2)$$

- Convert each organic species regulated as a class A TAP from milligrams per cubic meter to pounds per year at 5.7 $m^3$/min (200 $ft^3$/min) using Equation 3:

$$\left[X\frac{\text{mg}}{\text{m}^3}\right]\left[\frac{339.8\text{m}^3}{\text{hr}}\right]\left[\frac{1344\text{ hr}}{\text{yr}}\right]\left[\frac{\text{lb}}{453{,}593\,\text{mg}}\right] = X\frac{\text{lb}}{\text{yr}}$$

where $\frac{672\text{ hr}}{6\text{mo.}}$ is the maximum operating time (3)

in any tank as required by

technical safety requirements (HNF-SD-WM-TSR-006).

If the calculated emission rate for any TAP exceeds its established SQER, the actual hours of RMCS exhauster operation will be reduced to maintain TAP emission estimates below permit limits.

# B3.0 DETERMINATION OF MONITORING REQUIREMENTS

If the calculated emission rate for any of the TAPs exceeds 50% of that TAP's established SQER, TOC monitoring is required during RMCS sampling. If ammonia exceeds 50 percent of its SQER, ammonia monitoring will be performed during RMCS sampling. Monitoring will be accomplished through the routine health and safety monitoring currently performed to ensure protection of personnel from TAP vapors. This approach to environmental compliance monitoring was approved by Ecology in DOE/RL-95-62.

If monitoring is the chosen option, the following criteria will be used to determine monitoring requirements:

- Establishment of a TOC limit as described in Section B4.0 and/or establishment of an ammonia limit setpoint as described in Section B5.0.

- The frequency of TOC monitoring will be as follows:

  - Once before starting the rotation of the drill string, with the exhauster operating

  - Hourly during RMCS operations.

## B4.0 DETERMINATION OF MONITORING REQUIREMENTS FOR TOTAL ORGANIC CARBON

Assuming TOC monitoring is required, the following method will be used to determine a TOC limit setpoint:

- Determine a TOC limit for each organic Class B TAP that exceeds 50 percent of its SQER and is fully detectable with the TOC monitor using equation 4:

$$\frac{(\text{sample [TOC]})(\text{SQER of chemical X})}{(\text{chemical X rate})} = \text{Limit [TOC]} \tag{4}$$

where: [TOC] = concentration of TOC in p/M
SQER of chemical X = SQER in lbs/hr
chemical X rate = result of Equation 2 in lbs/hr

- Determine a TOC limit for each organic Class A TAP that exceeds 50 percent of its SQER and is fully detectable with the TOC monitor using equation 5:

$$\frac{(\text{sample [TOC]})(\text{SQER of chemical X})}{(\text{chemical X rate})} = \text{Limit [TOC]} \tag{5}$$

where: [TOC] = concentration of TOC in p/M
SQER of chemical X = SQER in lbs/yr
chemical X rate = result of Equation 3 in lbs/yr

Monitoring instrumentation must be capable of detecting TOC concentrations as determined by equations (4) and (5). Actual RMCS operational activities may be conducted above equations (4) and (5) concentrations as long as a safe shutdown of the RMCS equipment is initiated before emissions exceed the SQER.

## B5.0 DETERMINATION OF MONITORING REQUIREMENTS FOR AMMONIA LIMIT SETPOINT

Assuming ammonia monitoring is required, the following method will be used to determine an ammonia limit setpoint:

- Convert the SQER for ammonia to milligrams per cubic meter at 5.7 $m^3$/min (200 $ft^3$/min) using equation 6:

$$\left[\mathrm{SQER}\frac{\mathrm{lb}}{\mathrm{hr}}\right]\left[\frac{\mathrm{hr}}{339.8\mathrm{m}^3}\right]\left[\frac{453{,}593\mathrm{mg}}{\mathrm{lb}}\right] = \mathrm{X}\frac{\mathrm{mg}}{\mathrm{m}^3} \qquad (6)$$

- Convert from milligrams per cubic meter to p/M using equation 7:

$$\left[\mathrm{x}\frac{\mathrm{mg}}{\mathrm{m}^3}\right]\left[\frac{24.45}{17.03}\right] = \text{Ammonia Limit (p/M)} \qquad (7)$$

Monitoring instrumentation must be capable of detecting ammonia concentrations determined by equations (6) and (7). Actual RMCS operational activities may be conducted above equation (6) and (7) concentrations as long as a safe shutdown of the RMCS equipment is initiated before emissions exceed the SQER.

# APPENDIX C

# UNIT CONCENTRATION FACTORS FROM ISC3

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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 µg/m³ 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 µg/m³. 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 µg/m³ at a location 12.6 km south of the 200 West Area.

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

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
```

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