

ENGINEERING CHANGE NOTICE

Page 1 of 3

1. ECN 186861

Proj.
ECN

2. ECN Category (mark one)		Supplemental <input type="checkbox"/>	Change ECN <input type="checkbox"/>	Supersedure <input type="checkbox"/>
Cancel/Void <input type="checkbox"/>	Direct Revision <input checked="" type="checkbox"/>	Temporary <input type="checkbox"/>	Discovery <input type="checkbox"/>	
3. Originator's Name, Organization, MSIN, and Telephone No. J. A. Seamans, FFTF Regulatory Compliance, N2-04, 6-0540			4. Date September 11, 1992	
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12. Description of Change See attachment.				
13a. Justification (mark one)		Criteria Change <input checked="" type="checkbox"/>	Environmental <input type="checkbox"/>	Facilitate Const. <input type="checkbox"/>
Design Error/Omission <input type="checkbox"/>	Design Improvement <input type="checkbox"/>	As-Found <input type="checkbox"/>	Const. Error/Omission <input type="checkbox"/>	
13b. Justification Details Incorporate Washington Department of Ecology, DOE-RL, and WHC comments.				
14. Distribution (include name, MSIN, and no. of copies) See distribution sheet.			RELEASE STAMP	
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15. Design Verification Required [] Yes [X] No	16. Cost Impact		CONSTRUCTION		17. Schedule Impact (days)	
	ENGINEERING				Improvement	[n/a]
	Additional	[n/a] \$	Additional	[n/a] \$		
	Savings	[n/a] \$	Savings	[n/a] \$	Delay	[n/a]

18. Change Impact Review: Indicate the related documents (other than the engineering documents identified on Side 1) that will be affected by the change described in Block 12. Enter the affected document number in Block 19.

SDD/DD	[]	Seismic/Stress Analysis	[]	Tank Calibration Manual	[]
Functional Design Criteria	[]	Stress/Design Report	[]	Health Physics Procedure	[]
Operating Specification	[]	Interface Control Drawing	[]	Spares Multiple Unit Listing	[]
Criticality Specification	[]	Calibration Procedure	[]	Test Procedures/Specification	[]
Conceptual Design Report	[]	Installation Procedure	[]	Component Index	[]
Equipment Spec.	[]	Maintenance Procedure	[]	ASME Coded Item	[]
Const. Spec.	[]	Engineering Procedure	[]	Human Factor Consideration	[]
Procurement Spec.	[]	Operating Instruction	[]	Computer Software	[]
Vendor Information	[]	Operating Procedure	[]	Electric Circuit Schedule	[]
OM Manual	[]	Operational Safety Requirement	[]	ICRS Procedure	[]
FSAR/SAR	[]	IEFD Drawing	[]	Process Control Manual/Plan	[]
Safety Equipment List	[]	Cell Arrangement Drawing	[]	Process Flow Chart	[]
Radiation Work Permit	[]	Essential Material Specification	[]	Purchase Requisition	[]
Environmental Impact Statement	[]	Fac. Proc. Samp. Schedule	[]		[]
Environmental Report	[]	Inspection Plan	[]		[]
Environmental Permit	[]	Inventory Adjustment Request	[]		[]

19. Other Affected Documents: (NOTE: Documents listed below will not be revised by this ECN.) Signatures below indicate that the signing organization has been notified of other affected documents listed below.

Document Number/Revision	Document Number/Revision	Document Number Revision

20. Approvals

Signature	Date	Signature	Date
OPERATIONS AND ENGINEERING		ARCHITECT-ENGINEER	
Cog./Project Engineer J. A. Seamans	<i>J.A. Seamans</i> 9/10/92	PE	_____
Cog./Project Engr. Mgr. P. C. Miller	<i>P.C. Miller</i> 9-10-92	QA	_____
QA J. E. Parker	<i>J.E. Parker</i> 9/10/92	Safety	_____
Safety R. W. Passage	<i>R.W. Passage</i> 10 Sept 92	Design	_____
Security	_____	Other	_____
Proj. Prog./Dept. Mgr.	_____		_____
Def. React. Div.	_____		_____
Chem. Proc. Div.	_____		_____
Def. Wst. Mgmt. Div.	_____		_____
Adv. React. Dev. Div.	_____		_____
Proj. Dept.	_____		_____
Environ. Div. E. M. Greager	<i>E.M. Greager</i> 9/11/92	DEPARTMENT OF ENERGY	
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Other	_____	ADDITIONAL	
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	_____	D. R. Speer	
	_____	J. E. Hyatt	

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L.A. Mays 9/14/92
R. W. Oldham 9/16/92
D. R. Speer 9-11-92
J. E. Hyatt 9/16/92

12. Description of Change

- o The format and text have been revised to read consistently with other, approved Sampling and Analysis Plans for other Hanford facilities. The text revisions reflect an expanded introduction, a greater discussion of the data quality objectives (DQO) for this activity, and inclusion of facility-specific sampling information.
- o The waste characterization (also known as protocol) sampling analyte list has been revised to reflect current guidance from DOE-RL and Westinghouse Hanford Effluent Treatment Programs group.
- o The Material Safety Data Sheets (MSDS's) for the Dearborn chemicals described in this document have been added as an appendix.
- o All references to SW-846 state "latest edition".
- o The facility-specific sampling procedure has been more fully discussed.
- o The 400 Area map now includes a symbol to display waste characterization sampling points.
- o The description/table concerning the 481-A building process sewer entry points has been revised to include 5 drains, instead of 4.
- o Minor grammatical and editorial changes have been made.

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SUPPORTING DOCUMENT

1. Total Pages 29

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400 Area Secondary Cooling Water Sampling and Analysis Plan

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WHC-SD-FF-PLN-002

4. Rev No.
2

5. Key Words
400 Area, Process Sewer, sampling

6. Author
Name: J. A. Seamans

Signature 

Organization/Charge Code 18120/B1257

7. Abstract

This document presents the 400 Area Process Sewer (also know as Secondary Cooling Water) sampling and analysis plan. The plan describes the sampling methods, location, frequency, analytes, and stream sources. A description of the contributing facilities is also included.

8. ~~PURPOSE AND USE OF DOCUMENT - This document was prepared for use within the U.S. Department of Energy and its contractors. It is to be used only to perform, direct, or integrate work under U.S. Department of Energy contracts. This document is not approved for public release until reviewed.~~

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10. RELEASE STAMP

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9. Impact Level 1EQ

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S.W. BERGLIN by M. Boston
IRA 10/6/92

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PUBLIC RELEASE

RECORD OF REVISION

(1) Document Number

WHC-SO-FE-PLN-002

Page

1

(2) Title

400 Area Secondary Cooling Water Sampling and Analysis Plan

CHANGE CONTROL RECORD

(3) Revision	(4) Description of Change - Replace, Add, and Delete Pages	Authorized for Release		
		(5) Cog/Proj. Engr.	(6) Cog/Proj. Mgr.	Date
RS 1	<p>(7) EOT-157410, REV. 0</p> <p>Incorporate ECN 167140, editorial changes and expanded cap practical sampling analytes and sample point locations</p>	<p>J.A. Seamans</p> <p><i>[Signature]</i></p>	<p><i>[Signature]</i> P.C. Miller</p>	<p>4/12/82</p>
Rev. 2	<p>Incorporate ECN 186861; comments from EPA and Wa. Dept. of Ecology.</p>	<p><i>[Signature]</i> J. A. Seamans</p>	<p><i>[Signature]</i> P. C. Miller</p>	<p>4/10/82</p>

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WHC-SD-FF-PLN-002
REV 2

400 AREA SECONDARY COOLING WATER
SAMPLING AND ANALYSIS PLAN

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MATERIAL SAFETY DATA SHEETS FOR DEARBORN PRODUCTS.30

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A. INTRODUCTION AND DESCRIPTION OF SAMPLING OBJECTIVES

A.1 Introduction

The *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) was signed by the Washington State Department of Ecology (Ecology), the U.S. Environmental Protection Agency (EPA), and the U.S. Department of Energy (DOE) on May 15, 1989. Restrictions on the disposal of liquid effluents to the soil column at the Hanford site are found in Tri-Party Agreement Milestone M-17-00 and corresponding interim milestones. Sampling and Analysis Plans (SAP) are required for the 33 Phase I and Phase II streams that are discharged to the soil column. These SAPs are subject to the approval of EPA and Ecology.

A SAP was prepared for the 400 Area Secondary Cooling Water. The *400 Area Secondary Cooling Water Sampling and Analysis Plan*, WHC-SD-FF-PLN-002, establishes the requirements and guidelines used by Westinghouse Hanford Company (Westinghouse Hanford) in implementing an upgraded liquid effluent sampling program for the 400 Area Secondary Cooling Water is more commonly known as the 400 Area Process Sewer, and this terminology will be used in this document. Both titles describe the same system and are interchangeable. Revision 1 of the 400 Area SAP was submitted on April 29, 1992 to fulfill Tri-Party Agreement Milestone M-17-44. This document, Revision 2 of the 400 Area SAP, incorporates comments from Ecology and the EPA on Revision 1. Guidance from EPA and DOE-Headquarters on the establishment of Data Quality Objectives has also been incorporated into this document.

This SAP was prepared in accordance with requirements specified in the *Liquid Effluent Sampling Quality Assurance Program Plan* (QAPP), WHC-SD-WM-QAPP-011. The QAPP provides the Hanford Site guidelines and requirements for special high-quality liquid effluent sampling activities, which include the following: control of samples, laboratory analysis, processing of data, control of data, quality assurance requirements, and corrective actions used in obtaining high-quality data for the Liquid Effluent Sampling Program. The high-quality data is obtained from controlled grab samples, called "liquid effluent characterization samples," that are used to characterize the distribution of analytes in the effluent and to determine which analytes will require further monitoring in the future by the existing facility routine monitoring program.

The QAPP was written to allow each facility some flexibility in accommodating the Hanford Site requirements. One prime reason for flexibility is the differences in procedures for surveying radiation sources at each facility. The QAPP requirements for chain of custody, laboratory analysis, validation of data, control of records, and corrective actions have not been modified by this SAP.

The SAP is a facility-specific document for describing the way the requirements of the QAPP shall be implemented for activities occurring at the facility. The SAP provides a general description of the procedures that will be used to execute the work needed to implement the QAPP requirements. The SAP identifies facility-specific exceptions to the QAPP, which include changes to the required list of analytes. In addition, the SAP describes the way in which the liquid effluent characterization samples and data will be integrated with the existing liquid effluent monitoring program (routine monitoring program).

A.2 Objectives

This SAP provides information on how sampling and analysis of the 400 Area Process Sewer effluent will be performed to accomplish the following objectives:

- Collect data to evaluate the feasibility of use of historic sampling data for the characterization of wastewater, and provide data to support a conclusive waste designation for the effluent stream.
- Confirm the wastewater analytical data, as identified in the *400 Area Secondary Cooling Water Stream-Specific Report* (WHC-EP-0342, Addendum 28) were correct.
- Routinely monitor the stream for flow-rate and constituents as identified in this document, to insure that internal limits are met.
- Collect data to support preparation of the Washington Administrative Code (WAC) 173-216 permit application and the implementation 173-240 engineering report for the 400 Area Secondary Cooling Water.
- Provide data on chemical and radiological constituents to calculate loading and rate of migration to support the assessment of impact of continued discharge.

Quality Assurance objectives for the sampling activities are described in the QAPP.

A.3 Approach

This SAP has been prepared to describe a program for obtaining high-quality sampling data that will identify the types and quantities of contaminants found in the 400 Area Process Sewer. The data will come from liquid effluent characterization samples that have quality controlled and verifiable methods for collecting the wastewater sample, transportation of the sample to the analytical laboratory, analysis of the sample, statistical evaluation of the analytical results, and the storage of sample records. Samples will be taken from a variety of

operational locations to ensure that representative samples are obtained.

Chemical analytes that are not detected will be eliminated from the list of analytes in future liquid effluent characterization samples. Chemical analytes found in both the wastewater and sanitary (potable) water at equivalent concentration levels will also be eliminated from the list of analytes. The amended analyte list shall be a Class 3 change to the SAP in accordance with the Tri-Party Agreement, as stated in the QAPP. A Class 3 change does not impact interim milestones, and requires approval of the assigned DOE and lead regulatory agency unit managers. A more complete definition of a Class 3 change may be found in Section 12.2 of the Tri-Party Agreement. Chemical analytes found to be consistently present in the 400 Area Process Sewer in significant measurable quantities shall be evaluated for addition to the list of analytes for the existing routine monitoring program. The document used for determining significance in amending the routine monitoring program list of analytes is WAC 173-200, "Water Quality Standards for Ground Waters of the State of Washington."

An important pool of historical data is available from the routine monitoring program. These data provide information on soil column and process equipment solids loading for future remedial studies, treatment system design, and permitting documentation. The data from the routine monitoring program will also be used to evaluate the causes of seasonal, climatic, and operational variations in the quality of the wastewater. The SAP describes the existing routine monitoring program, which allows the accumulation of historical information and to provide a baseline data pool for comparing the reliability and validity of past data.

This SAP has been structured to obtain high-quality sampling data that will identify the types of contaminants found in the liquid effluent stream from the 400 Area. The data will come from grab samples, liquid effluent characterization samples that have quality-controlled and verifiable methods for collecting the sample media, transporting the sample media, analyzing the media, statistically evaluating of the analytical results, and storing of sample records. All liquid effluent characterization sampling work shall be performed according to approved written procedures. The procedures shall comply with the requirements of *Test Methods for Evaluating Solid Waste*, EPA SW-846, latest revision.

All personnel associated with collection of liquid effluent characterization samples, processing of the samples, processing of the data, and control of records shall comply with the procedures related to their responsibilities. The personnel shall sign a document verifying that they have read and understand the procedures. The signed documents shall become part of the training records.

The liquid effluent characterization samples are grab samples because some constituents (volatile organics, ammonia) are unstable with

time. Grab samples are used to minimize the hold time from sample collection to laboratory analyses to prevent a significant loss of these unstable analytes.

B. SITE BACKGROUND

B.1 400 Area Facilities Description

The 400 Area contains four facilities which contribute to the 400 Area Process Sewer (see Figure 1). These four facilities are not cross-connected by underground piping. The effluent does not flow from one facility to another. The process water flows out from all four facilities through individual pipelines to a sewer main pipe (see Figure 1). This sewer main leaves the 400 Area and discharges the effluent to one of two Percolation Ponds, which will be described at the end of this section.

The four contributing facilities contain 75 potential contributors (i.e., points of entry) to the 400 Area Process Sewer. Table 1 identifies all the entry points, locations, and flow rates. Of the 75 points of entry, nine routine contributors, summarized in Table 2, represent greater than 99% of the total water volume currently discharged into the process sewer. The 75 points of entry and, more specifically, the nine routine points of entry will be discussed further in Section B.3, "Stream Description". The facility descriptions, and their associated points of entry, are summarized below.

1. **Fuels and Materials Examination Facility (FMEF)** - the FMEF is designed and constructed to be a high security, multi-storied structure with the capability to handle low and high exposure radioactive materials. The original intent was to use FMEF to fabricate and re-process FFTF fuel and experiments. Due to program and funding changes, most of the specialized equipment has never been installed and radioactive material has never been introduced to the facility. The facility is used only for personnel offices. The facility may, in the future, be used for nuclear reactor fuel assembly production and radioisotope power unit production.

FMEF points of entry - The FMEF contains 63 points of entry to the process sewer. Four are routine and 59 are inactive or have very infrequent use. The points of entry to the 400 Area Process Sewer are innocuous. They would not come into contact with any radioactive materials even if any radioactive material were in the facility. The facility is equipped with a Retention Liquid Waste System (RLWS), which provides effluent hold-up and sampling from areas of the facility where the potential for contamination would be the greatest. With this system, all aqueous waste generated in areas served by the RLWS is collected in one of two 6,000 gallon tanks. The effluent can be sampled for possible radioactivity and verified to meet acceptable discharge limits before being discharged into the process sewer. Currently, the only activity in

these areas is routine fire system testing, H&V systems, and electric water coolers (EWC). Due to this low volume, the tank contents are discharged to the process sewer only one or two times a year.

2. Maintenance and Storage Facility (MASF), the MASF consists of a main building and a two-story service wing, located within the 400 Area Protected Area. The purpose of this facility is to provide maintenance, repair, and storage facilities for radioactive or specialized maintenance equipment used in support of the Fast Flux Test Facility (FFTF). The MASF currently functions for its intended purposes.

MASF points of entry - the MASF contains 4 points of entry to the process sewer. One is routine and 3 are infrequent. The points of entry to the process sewer are not located in areas with the potential for radioactive contamination. All contaminated liquid waste is collected in radioactive liquid waste tanks and is not in contact with the process sewer effluent at any point. The radioactive liquid discharge collection system and the process water discharge are separate systems and are not connected. The routine contributor is the cooling water from the building service and instrument air compressor.

3. 481-A Water Pumphouse - the Water Pumphouse is a concrete block building, on a concrete pad, which was constructed to provide space for a diesel fire pump and two sanitary water pumps. This building is also located within the 400 Area Protected Area. As shown in Figure 1, this facility is detached from the FFTF reactor containment and service building. No radioactive material is in this building.

481-A Water Pumphouse points of entry - the pumphouse contains 5 points of entry: one is routine and 4 are infrequent contributors. These points of entry are all related to the pumps housed in the facility. The 4 infrequent contributors (floor drains) are protected from contaminants by detailed maintenance procedures and administrative controls. The fourth floor drain, a frequent contributor because of weekly fire pump testing (a National Fire Protection Association (NFPA) requirement) is protected from potential contamination since its inlet is installed above floor level. A 300 gallon fuel tank for the diesel fire pump is installed above floor level on a seismically qualified support (also an NFPA requirement). There is a very minor risk of the introduction of diesel fuel or equipment oil into the process sewer due to maintenance or an emergency in this building.

4. The Fast Flux Test Facility (FFTF) - the FFTF is a sodium cooled test reactor. The reactor's high neutron flux levels and energies have allowed accelerated testing of fuels and materials.

The reactor has operated from 1980 until April 1, 1992, when it was ordered into standby (able to restart) status by the Department of Energy. The reactor will possibly be restarted in 1996 for Pu-238 production. The radioactive materials used in the facility would not significantly change for this new mission.

Eight cooling towers reject heat generated in equipment supporting the FFTF auxiliary systems, such as the heating, ventilation, and air conditioning (HVAC) systems. Adjacent to the cooling towers pad, a support building contains the water treatment equipment, water quality monitoring instrumentation, and the process controls for blowdown valves associated with the towers. This system is adjacent to the facility's reactor containment and service buildings within the 400 Area Protected Area. There is no contact between the process sewer and the cooling tower system and any radioactive wastes or nuclear materials in the facility.

The amount of waste process water discharged is expected to remain at current levels during standby and during possible restart. Since the cooling tower treatment procedures have not changed with the change in plant status, the effluent constituents would also remain unchanged.

FFTF points of entry - the cooling towers have 3 possible points of entry. All 3 are considered routine contributors to the process sewer effluent. They are 1) the equipment drain in the water treatment building which receives the effluent wastewater discharged by the Cooling Tower blowdown system, 2) the drain trench on the north side of the Cooling Tower pad which handles overflow or draining of the towers and precipitation runoff, and 3) the sink in the water treatment building which the operators use to wash their gloves, glassware, small equipment, hands, and similar items. In the water treatment building, the only chemicals that could be discharged into the sink are those already used to treat the cooling towers (no other chemicals are in the building).

B.2 4608 Percolation Ponds B and C Description

The 4608 Percolation Ponds B and C are engineered structures, located north-northeast of the 400 Area. The unlined ponds are 50x100 ft at the base, and are approximately 4 ft deep. The 400 Area Process Sewer empties into a diversion box built into the earthen wall dividing the two ponds. Manually operated slide gates located on either side of the diversion box determine the flow to the B or C pond. The ability to isolate either pond is provided to allow for maintenance, if required.

B.3 Stream Description

Table 1 identifies all the potential contributors (i.e., points of entry) to the 400 Area Process Sewer. Nine routine contributors

represent greater than 99% of the total water volume currently discharged into the process sewer. The nine routine contributors are discussed below. They have been given item numbers in Table 2 for ease of reference.

Five of the routine contributors, which are items 1 through 5 on Table 2, are associated with the FMEF and FFTF Cooling Tower systems. The other four routine contributors, which are items 6 through 9 on Table 2, are associated with auxiliary facility equipment and cooling systems. The effluent stream has the basic characteristics of the 400 Area sanitary (potable) water supply. All of the 400 Area water is pumped from deep wells and chlorinated. The well water is also monitored by the Hanford Environmental Health Foundation (HEHF). The effluent wastestream divides into approximately 15% use from equipment and auxiliary systems cooling, and 85% from the two cooling tower systems.

The cooling tower systems at FMEF and FFTF have the same basic design and use the same treatment chemicals. Cooling towers at FFTF and FMEF represent the source of the majority of the water which is eventually discharged to the 400 Area Process Sewer, which may have been the reason for describing this discharge as "400 Area Secondary Cooling Water". The cooling tower operations at FMEF and FFTF differ in demand, but the basic design of the towers and the chemicals used at both facilities are the same. The cooling towers at both facilities are galvanized steel, closed loop evaporative cooling towers. The cooling systems for the facilities circulate a 40% ethylene glycol solution from the buildings through cooling coils in the cooling towers. Water is sprayed over coils as air is blown up through the cooling towers by fans. The evaporation of the spray water provides the cooling effect which is transferred through the cooling coils to the recirculated ethylene glycol solution. The three towers at FMEF and the eight towers at FFTF each have a sump capacity of approximately 2,000 gallons and periodically require draining for maintenance.

The chemical control systems have two objectives: to control biological growth within the tower and to protect the tower from the effects of scale formation.

The biological control is accomplished by use of two different chemicals, a biocide (Dearborn 702) and a microbicide (sodium hypochlorite). Biological growth within the cooling tower is controlled because detrimental biological species would thrive in a warm moist environment causing offensive odors or health risks to personnel and fouling of the cooling tower tubes with algae would inhibit heat transfer from the recirculated loop to the spray water.

The control is accomplished by adding the biocide (702) to the sump water on a regular basis to maintain a 25 ppm concentration in the towers. At FFTF the biocide (702) is continuously added by a metering pump into the makeup water provided to the towers. At FMEF, however,

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the biocide is added daily via metering pump into a recirculated stream of water from each cooling tower sump. The microbicide sodium hypochlorite addition to the towers at FMEF is done weekly to each operating tower by metering pump via the sump recirculation loop described above. At the FFTF, it is done manually to "shock" the tower only when maintenance requires personnel to physically enter the towers for cleaning (normally done during the spring and summer months). The microbicide sodium hypochlorite will have a concentration of 5 ppm for the shock treatment and 0.6-0.8 ppm if the normal 702 metering pump system is inoperative.

Scale formation protection is required due to increasing concentration of naturally occurring salts (typically calcium carbonate) resulting from the evaporation of the tower water. Primary protection is accomplished in both FMEF and FFTF by monitoring the electrical conductivity of the water in the sump. When the water conductivity approaches 1200 micromhos, automatic valving opens to discharge water. This conductivity is 3.5-4 times the average concentration of the incoming water, which corresponds to 2.5-3 cycles (uses) of the water through the cooling towers. Therefore, the concentration of nonvolatile constituents is expected to be at least 2.5 times that of the well water. Due to the discharge of water, the tower sump water level control system will initiate the addition of makeup water. The discharge of water continues until the conductivity of the sump water has fallen to approximately 900 micromhos due to the addition of fresh water.

A scale inhibitor, Dearborn 878, is added to the towers to maintain concentrations of 50-75 ppm in order to prevent the formation of scale. Scale inhibitor concentration control at FFTF is accomplished by metering the chemical into the makeup water to a concentration of approximately 40 ppm. This concentration increases to the required range in the tower because of the evaporation of the water. At FMEF, the control is accomplished by metering the chemical directly into the tower when the conductivity control system opens the valve which blows down the sump water. As an independent operational check, a chemical analysis is performed in the field by the operator to ensure that the proper balance between addition to and discharges from the cooling towers is being maintained.

The chemical testing for scale inhibitor concentration involves the use of the following Dearborn Products:

Dearborn Code 595	Hydrochloric Acid Solution
Dearborn Code 904	Thorium Nitrate Solution
Dearborn Code 550	Sodium Thiosulfate/Borate Solution
Dearborn Code 562	Xylenol Orange Indicator
Dearborn Code 899	Beryllium Sulfate Solution

The resultant solution from the test (approximately 50 ml per test) is not designated a dangerous waste (WC02) since the beryllium concentration is .00095%, which is <.01% of the reportable concentration level. In conjunction with the washing of gloves, glass ware, equipment, hands, trace quantities of these products, along with the other cooling tower chemicals described above, are subject to disposal via the sinks located in both cooling tower buildings.

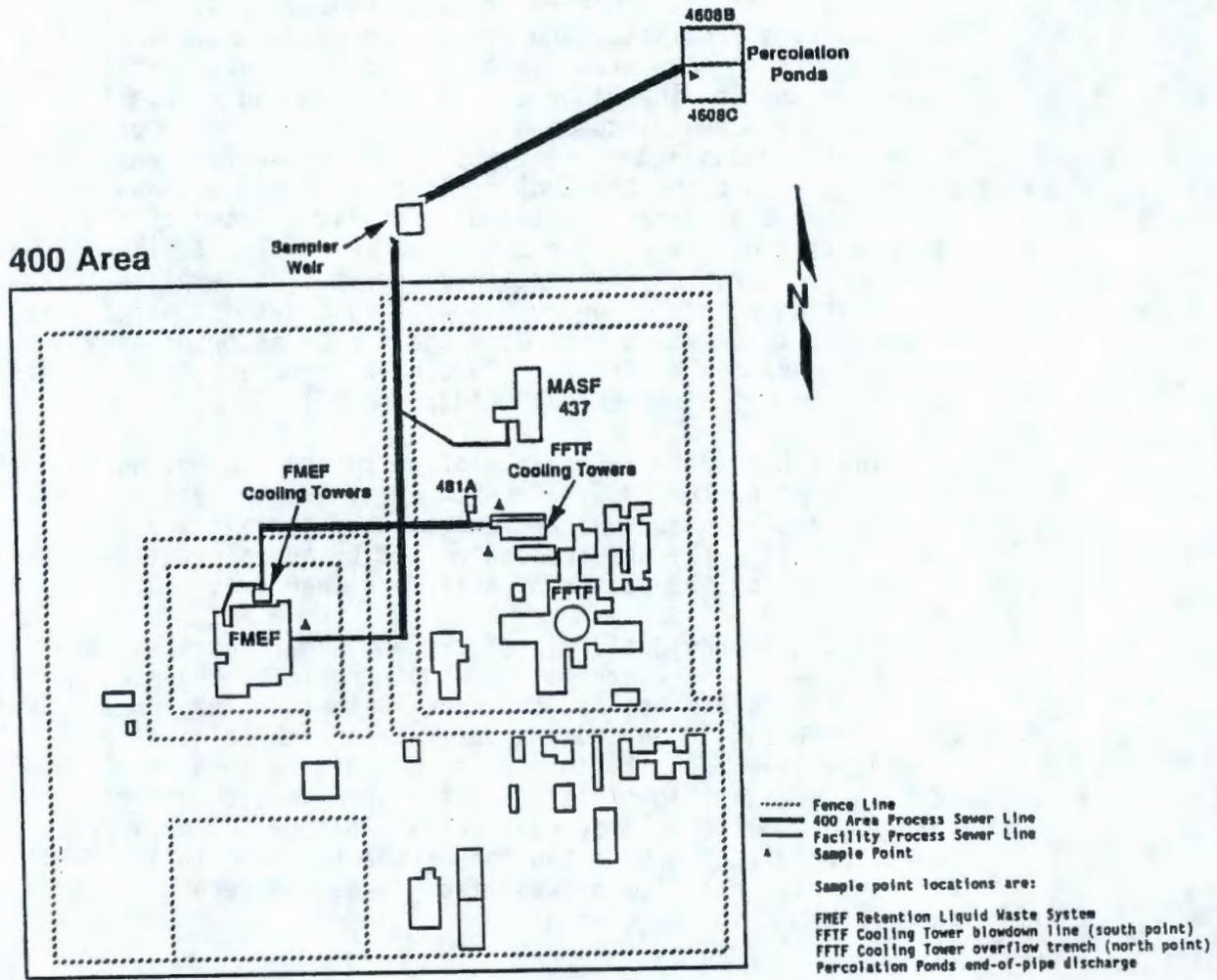
The procedures identified in this plan provide impartial verification of the 400 Area Process Sewer wastestream constituents. Past sampling, analysis, and process knowledge have indicated that the constituents in this wastestream are at innocuous levels. The Cooling Tower systems are the major contributors to the effluent stream and, as shown in the above discussion of chemical treatment, present the major potential for dangerous constituents in the wastestream. The average discharge amount for the Cooling Tower systems is shown in Table 2. The end-of-pipe discharge is not substantially diluted by the other contributing effluent. The potential for effluent dilution will be closely monitored by effluent characterization sampling at the major contributing points of entry, as well as final discharge point. Historical information regarding the stream description and past sampling data can be found in "400 Area Secondary Cooling Water Stream-Specific Report" (WHC-EP-0342, Addendum 28).

The other potential points of entry are controlled by means of systems such as the FMEF Retention Liquid Waste System (RLWS). In all cases potential hazardous and dangerous materials are stored away from the points of entry and are controlled by administrative procedures. The majority of the points of entry are inactive.

Figure 1 provides a map of the 400 Area Process Sewer contributors, and the sewer main route to the 4608 Percolation Ponds. As discussed in the facility descriptions, the contributors to the process sewer are not cross-connected. The process water from each point of entry flows from its respective facility through an outgoing 6 inch pipe, which enters a 12 inch diameter pipe located in the approximate center of the 400 Area. This single outgoing pipe runs outside of the 400 Area Protected Area fence, and discharges to the one of the two Percolation Ponds. The effluent does not flow between facilities and becomes a single wastestream prior to discharge.

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Figure 1. The 400 Area Process Sewer Map of Contributing Facilities and Effluent Discharge Route



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**Table 1. The 400 Area Process Sewer
Total List of Contributors
(Sheet 1 of 4)**

Item	Contributor			Type		Retention Liquid Waste System ^a	Source	Flow Range (gal/min)	Est. avg. (gal/ min)
	Entry Type	Location	Room	Routine	Infrequent				
1	EWC	PB-FMEF	600		X	X	Personnel	--	--
2	EWC	PB-FMEF	608		X	X	Personnel	--	--
3	EWC	PB-FMEF	515		X	X	Personnel	--	--
4	EWC	PB-FMEF	409		X	X	Personnel	--	--
5	EWC	PB-FMEF	430		X	X	Personnel	--	--
6	EWC	PB-FMEF	117		X	X	Personnel	--	--
7	EWC	PB-FMEF	223		X	X	Personnel	--	--
8	EWC	FAA-FMEF	E105		X	X	Personnel	--	--
9	JS	PB-FMEF	504		X	X	Personnel	--	--
10	JS	PB-FMEF	408		X	X	Personnel	--	--
11	JS	PB-FMEF	309		X	X	Personnel	--	--
12	JS	PB-FMEF	149		X	X	Personnel	--	--
13	JS	FAA-FMEF	E278		X	X	Personnel	--	--
14	JS	CT-FMEF	N.yard	X			Personnel	<1	<1
15	FD	PB-FMEF	404		X	X	Process water/condensate	--	--
16	FD	PB-FMEF	238		X	X	Process water/condensate	--	--
17	FD	PB-FMEF	302		X	X	Process water/condensate	--	--
18	FD	PB-FMEF	307		X	X	Process water/condensate	--	--
19	FD	PB-FMEF	308		X	X	Process water/condensate	--	--
20	FD	PB-FMEF	313		X	X	Process water/condensate	--	--
21	FD	PB-FMEF	224		X	X	Process water/condensate	--	--
22	FD	PB-FMEF	213		X	X	Process water/condensate	--	--
23	FD	PB-FMEF	213		X	X	Process water/condensate	--	--
24	FD	PB-FMEF	204		X	X	Process water/condensate	--	--
25	FD	PB-FMEF	206		X	X	Process water/condensate	--	--
26	FD	PB-FMEF	321		X	X	Process water/condensate	--	--
27	FD	PB-FMEF	209		X	X	Process water/condensate	--	--

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Table 1 (continued)

Item	Contributor			Type		Retention Liquid Waste System ^a	Source	Flow Range (gal/min)	Est. avg. (gal/ min)
	Entry Type	Location	Room	Routine	Infrequent				
28	FD	PB-FMEF	300		X		Equipment/Vehicles	--	--
29	FD	MEW-FMEF	352		X		Process water/condensate	--	--
30	FD	MEW-FMEF	352		X		Process water/condensate	--	--
31	FD	MEW-FMEF	352		X		Process water/condensate	--	--
32	FD	MEW-FMEF	352		X		Process water/condensate	--	--
33	FD	MEW-FMEF	352		X		Process water/condensate	--	--
34	FD	MEW-FMEF	352		X		Process water/condensate	--	--
35	FD	MEW-FMEF	352		X		Process water/condensate	--	--
36	FD	MEW-FMEF	352		X		Process water/condensate	--	--
37	FD	MEW-FMEF	352		X		Process water/condensate	--	--
38	FD	MEW-FMEF	352		X		Process water/condensate	--	--
39	FD	MEW-FMEF	352		X		Process water/condensate	--	--
40	FD	MEW-FMEF	352		X		Process water/condensate	--	--
41	FD	MEW-FMEF	352		X		Process water/condensate	--	--
42	FD	MEW-FMEF	352		X		Process water/condensate	--	--
43	FD	MEW-FMEF	352		X		Process water/condensate	--	--
44	FD	MEW-FMEF	352		X		Process water/condensate	--	--
45	FD	MEW-FMEF	352		X		Process water/condensate	--	--
46	FD	MEW-FMEF	352		X		Process water/condensate	--	--
47	FD	MEW-FMEF	352		X		Process water/condensate	--	--
48	FD	MEW-FMEF	352	X			Process water/pressure regulator	<1	<1
49	FD	EEW-FMEF	355		X		--	--	--
50	FD	EEW-FMEF	355		X		--	--	--
51	FD	FAA-FMEF	E104		X	X	--	--	--
52	FD	FAA-FMEF	E104		X	X	--	--	--

Table 1 (continued)

Item	Contributor		Room	Type		Retention Liquid Waste System ^a	Source	Flow Range (gal/min)	Est. avg. (gal/ min)
	Entry Type	Location		Routine	Infrequent				
53	FD	FAA-FMEF	E104		X	X	--	--	--
54	FD	FAA-FMEF	E104		X	X	--	--	--
55	FD	FAA-FMEF	E300		X	X	--	--	--
56	FD	CT-FMEF	N.yard		X		Empty CT chemical drum wash	--	--
57	ED	PB-FMEF	204		X	X	--	--	--
58	ED	PB-FMEF	238		X		--	--	--
59	ED	EW-FMEF	E215	X			Computer room AC cooling	0-3	<1
60	ED	CT-FMEF	N.yard		X		--	--	--
61	ED	CT-FMEF	N.yard	X			CT drains	0-10 ^b	4 ^b
62	FD	HB-MASF	High Bay		X		Steam cleaner drain	--	--
63	FD	HB-MASF	High Bay		X		--	--	--
64	ED	ER-MASF	Equip. Rm	X			Air compressor cooling water	0-12	2 ^c
65	FD	ER-MASF	Equip. Rm		X		--	--	--
66	FD	PH-481-A	--		X		--	--	--
67	ED	PH-481-A	--	X			Sanitary water pump	<1	<1
68	ED	PH-481-A	--		X		--	--	--
69	ED	H-481-A	--		X		--	--	--
70	ED	PH-481-A	--		X		--	--	--
71	JS	CT-FFTF	611	X			Personnel	<1	<1
72	ED	CT-FFTF	611	X			CT blowdown	4-25 ^b	10
73	ED	CT-FFTF	PAD	X			Overflow and drains	1-5	1
74	FD	PB-FMEF			X	X	Overflow from T- 21 & 22	--	--
75	FD	PB-FMEF			X	X	Overflow from T- 23 & 24	--	--

^aEffluent wastewater collected and stored in FMEF retention liquid waste tanks. All sampling (future) before discharge to process sewer.

^bVariance results from ambient conditions (FMEF Cooling Tower O flow for November through March).

^cFacility support system intermittent operation.

AC = air conditioning

CT = cooling towers

CT-FFTF = FFTF cooling tower area on 483 pad

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Table 1 (continued)

CT-FMEF	=	FMEF cooling towers area
ED	=	equipment drain
EEW-FMEF	=	427 Emergency Equipment Wing
ER-MASF	=	equipment room of 437 Building
EW-FMEF	=	4862 Entry Wing
EWC	=	electric water cooler (drinking fountain)
FAA-FMEF	=	4862 Fuel Assembly Area
FD	=	floor drain
HB-MASF	=	high-bay area of 437 Building
JS	=	Janitorial sink
MEW-FMEF	=	427 Mechanical Equipment Wing
PB-FMEF	=	427 Process Building
PH-481-A	=	481-A Pump House
RM	=	room

Table 2. The 400 Area Process Sewer
List of Routine Contributors

Item #	Entry Point	Location	Source	Flow (gal/min)	
		Facility-Building/area		Range	Average
1	Sink	FMEF/CT	Personnel	<1	<1
2	Equipment drain	FMEF/CT	Blowdown system, cooling spray water	0-10 ^{ab}	<1 ^a
3	Sink	FFTF/CT	Personnel	<1	<1
4	Equipment drain	FFTF/CT	Blowdown system cooling water	4-25 ^b	10
5	Equipment drain	FFTF/CT	Drain trench cooling water	1-5	1
6	Floor drain	FMEF/MEW	Process water pressure regulator, relief drain	<1	<1
7	Equipment drain	FMEF/EW	Computer room air conditioning unit, cooling water	0-3	<1
8	Equipment drain	MASF/ER	Air compressor cooling water	0-12 ^c	2
9	Equipment drain	481-A Pump House	Sanitary water pump packing leakage	<1	<1
		Total flow	All sources	6-56	18

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^aTower cooling water drained October through March.

^bVariance because of ambient conditions.

^cFacility support system intermittent operation.

- ED = equipment drain
- CT = cooling towers
- FFTF = Fast Flux Test Facility
- FMEF = Fuels and Materials
Examination Facility
- MASF = Maintenance and Storage
Facility
- MEW = Mechanical Equipment
Wing

C. RESPONSIBILITIES

The responsibility descriptions below are related to wastewater sampling activities occurring at the 400 Area as described in this SAP. Overall responsibilities for other components of the sampling program are described in the QAPP.

Effluent Treatment Programs (ETP) will do the following:

- Coordinate the overall program.
- Act as the liaison between facilities and RL.
- Prepare the Quality Assurance Program Plan.
- Provide the Program Manager.
- Manage input of validated data into the Liquid Effluent Monitoring Information System (LEMIS).
- Issue Liquid Effluent Characterization Annual Report to EPA and Ecology.

FFTF Regulatory Compliance will do the following:

- Prepare the *400 Area Secondary Cooling Water Sampling and Analysis Plan*.
- Ensure that procedures are prepared to support the sampling activities.
- Provide the Sampling Task Leader (Effluents and Regulatory Compliance Cognizant Engineer).
- Initiate scheduling of personnel required for sampling.
- Provide technical support for sampling activities.
- Review data logs and sampling activities.
- Oversee chain-of-custody activities at the facility.
- Reviews liquid effluent characterization sampling data for completeness and consistency, initiating corrective action if necessary.
- Provide flow data to Effluent Treatment Programs.
- File routine monitoring program sample data for 400 Area wastewater at the Environmental Data Management Center.

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- Transmits validated data, from the liquid effluent characterization sampling, to Environmental Assurance for inclusion in the annual report of environmental releases, if requested
- Review the Liquid Effluent Characterization Annual Report.

The Office of Sample Management does the following:

- Validate the data for a Level B validation per "Data Validation for RCRA Analysis", WHC-CM-5-3, Section 2.0.
- Select a laboratory for liquid effluent characterization samples.
- Transmit validated data packages to the EDMC.
- File sample chain-of-custody documentation.

400 Area Operations Support Services does the following:

- Provides sampling and transportation of routine monitoring program samples.
- Completes sample log sheets for routine monitoring program samples.

The Sampling And Mobile Laboratory organization does the following:

- Provides trained samplers for liquid effluent characterization sampling activities.
- Provides at least one sampler shall have a WHC Certificate of Qualification from the Environmental Engineering Technology, and Permitting Group.
- Prepares the 400 Area wastewater liquid effluent characterization sampling and packaging procedure.
- Ensures that the certified sampler directs liquid effluent characterization sampling and packaging.
- Documents sampling activities in a log book.
- Transports liquid effluent characterization samples to laboratory or shipping center.
- Initiates "chain-of-custody" documentation for liquid effluent characterization samples.

- Packages liquid effluent characterization samples for shipping.
- Ensures that copies of field logs and other sampling data sheets are filed with FFTF Regulatory Compliance cognizant engineer.

The Quality Assurance (QA) organization does the following:

- Provides surveillance of the liquid effluent characterization sampling program
- Audits records and procedures
- Issues a stop work order if procedures are not being followed

D. SAMPLING LOCATION AND FREQUENCY

D.1 Sampling Location

Routine sampling activities include composite effluent sampling and continuous pH, flowrate, and conductivity measurements at the North Environmental Monitoring Station (see Sampler Weir on Figure 1). A composite sample is drawn and analyzed monthly. Continuous (circle chart) pH, flowrate, and conductivity measurements are collected weekly. The sampling location provides a representation of the total contribution to the 400 Area Process Sewer. The analytes of interest for the monthly composite sample are specified in Section G.1 of this document.

Effluent characterization samples will be taken at 3 major contributing discharge points: 1) the FMEF Liquid Retention Waste System (LRWS), 2) the FFTF Cooling Towers blowdown line at the discharge point from the towers, and 3) the FFTF Cooling Towers overflow discharge to the overflow trench. These 3 points represent almost the total process sewer effluent (refer to section B, Tables 1 and 2 of this document for specific discharge point descriptions and percentage of effluent contribution). Effluent characterization samples will also be taken at the end-of-pipe location where the effluent is discharged into the Percolation Ponds. This location is the most downstream position where a sample may be taken. As discussed in the stream description (Section B.3), this will accurately represent all wastewater constituents in the waste stream. Effluent characterization sampling at the 4 above-described discharge points, 3 major contributors and the 1 final point, will monitor for the slight possibility of effluent dilution prior to final Percolation Pond discharge. The proposed effluent characterization sample analytes are shown in Section G.2.

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D.2 Frequency

Monthly composite samples will be taken from the process sewer sampler. This monthly composite sample will comply with the written facility operating procedures. These procedures specify the appropriate procedure for operating the equipment, using a clean, polyurethane sample bottle from the 400 Area Operations Services, collecting representative effluent, and appropriate transportation to the laboratory.

Effluent characterization samples will be taken at 1) the RLWS system in FMEF, 2) the FFTF Cooling Towers blowdown line at the discharge point from the towers, 3) the FFTF Cooling Towers overflow discharge to the overflow trench, and 4) at the end-of-pipe. All 4 points will be taken twice initially to establish a baseline. After a characterization baseline is established, effluent characterization samples will be taken annually. In addition, further sampling events may be conducted in accordance with future permitting requirements, or for additional verification of constituent analysis. These will be conducted by the same responsible personnel as in effluent characterization sampling activities. As described below, quality control samples such as field duplicate blanks will be taken during each effluent characterization sampling event. The number of these samples will be a full set, or a lesser number if the qualified sampling team members evaluate this to be appropriate and of equal quality to the full set. Effluent characterization sampling will be initiated within three months after approval of this plan.

Field duplicate samples, field blanks, and trip blanks will be taken during each non-routine sampling event. Field duplicate samples as defined in the QAPP are samples taken at approximately the same time, and under identical conditions and preparation, to verify the repeatability of the laboratory data. A sample of 400 Area sanitary water supply will also be taken during each sampling event and analyzed for the same set of analytes as shown in Section G.2.

Monitoring for the flowrate, pH, and conductivity of the effluent is done on a continuous basis. It will be monitored by the effluent characterization sampling team, in addition to temperature, when those sampling activities are conducted. The sampling team is also trained to make the appropriate environmental observations in log books, and used the prescribed control samples to assure a quality data record of the sampling environment.

E. SAMPLE DESIGNATION

For monthly composite samples, the sample is transferred by the operator from the sampler receiving bottle into a clean, labeled one (1) liter bottle. The label information, as specified in the composite sampler operating procedure, includes the date, time, location, sample

matrix (i.e., soil, air, water, etc.) and name of operator who took the sample. The operator then delivers it to the Supervisor, FFTF Transportation Services for delivery to the Environmental Protection Laboratory, 325 Building, 300 Area. The analytes of interest in routine sampling are to be in compliance with WAC 248-54-175, "Maximum Contaminant Levels," 40 CFR 141, "National Primary Drinking Water Regulations," and 40 CFR 143, "National Secondary Drinking Water Standards". These analytes are discussed in Section G.1.

Liquid effluent characterization samples will be assigned a unique sample number by the Westinghouse Hanford Sampling And Mobile Laboratory personnel. The general numbering method will be as follows:

Z - 000000 - 00000 A
(Date) (Seq. #) (Bottle Letter)

The date portion of this number is comprised of the numeric date form of the month, day, and year. (The date is optional in abbreviation of reports and labels.)

The sequence number is the laboratory log book number control number.

The bottle letter indicates the sequential lettering of numbers used more than once during a single sampling event. (For single bottle samples, the bottle letter is optional.)

Sample labels for liquid effluent characterization samples will be provided by the sampling team from the Sampling And Mobile Laboratory. In addition, each bottle shall be identified with a bar code sticker attached to the bottle by the bottle manufacturer. The bar code shall identify the bottle lot number and individual bottle number.

The date and time of sample collection, the stream identification, the sampling location, identification of the person in charge of collecting the sample, preservative added, and the analysis to be performed on the sample will be included on the label with the unique identification number.

F. SAMPLING EQUIPMENT AND PROCEDURES

F.1 Routine Monitoring

The routine monitoring of discharges to the 4608 B and C Percolation Ponds is performed in the North Environmental Monitoring Station located north of the 400 Area. As discussed in the stream description above, this location is the representative point to obtain a typical sample of the total facility effluent stream. The characteristics for which the effluent is continuously monitored include pH, flowrate, and conductivity. Where applicable, preventative

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maintenance and calibration procedures are used to maintain the sampling and monitoring equipment.

The analysis performed on the monthly composite wastewater samples will be for the analytes shown in Section G.1. A Hanford based laboratory, such as Pacific Northwest Laboratories (PNL), will perform the analysis using current approved procedures and Quality Assurance requirements. The data sheets and analytical results from the onsite laboratory will be transmitted to and maintained by 400 Area OSS and FFTF Regulatory Compliance.

Data and record information that has been validated will be transmitted to the Environmental Data Management Center (EDMC), or to the HEIS data file when it becomes available.

F.2 Effluent characterization Samples

"Procedure for Collecting RCRA/CERCLA Samples From the 400 Area Secondary Cooling Water (Process Sewer) System" (WHC, LO-080-433A.0) is the facility-specific procedure for effluent characterization sample collection and analysis. The sampling procedure identifies 400 Area-specific sampling requirements, which include the following:

- Sampling location
- A description of sampling equipment, containers, and reagents
- Safety precautions, including personnel protective equipment
- Specific steps for collecting the sample
- Instructions for completing field notebook entries, sample labels, and sample chain of custody forms.

General Hanford Site sample handling and data management requirements will be specified in procedures as identified in the Section 5.1 of the QAPP.

Field logs will be completed per the "Environmental Investigations and Site Characterizations Manual", WHC-CM-7-7, procedure EII 1.5 "Field Logbooks", during the sampling event. The logbook shall contain information pertinent to the sampling, including any intermittent sources at the time of sampling. A fuller discussion of pertinent information may be found in 6.1 of WHC-SD-WM-QAPP-011.

The sampling procedure will be reviewed prior to each subsequent sampling event and updated as necessary.

G. SAMPLE HANDLING AND ANALYSIS

G.1 Routine Monitoring

For monthly composite samples, the sample is labeled with information. The operator delivers it to the Supervisor, FFTF Transportation Services for delivery to the Environmental Protection Laboratory, 325 Building, 300 Area.

The 400 Area Process Sewer routine effluent samples will be analyzed for the following:

Barium

Cadmium

Chromium

Fluoride

Lead

Nitrate (as N)

Chloride

Copper

Sulfate

pH

Gross alpha particle activity

Gross beta particle activity

G.2 Effluent characterization Sampling

Liquid effluent characterization samples will be analyzed for the following:

- Volatile organics (VOA), EPA method 8240
- Semi-volatile organics (semi-VOA), EPA method 8270.
- Polychlorinated biphenyls (PCB)/organochlorine pesticides, EPA method 8080
- Anions (IC) sulfate, flouride, phosphate, chloride, EPA method 300.0

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- Conductivity, EPA method 120.1
- pH, EPA method 9040
- Nitrate and Nitrite, EPA method 353.3
- Alkalinity, EPA method 310.2
- Total dissolved solids (TDS), EPA method 160.1
- Total suspended solids (TSS), EPA method 160.2
- Ammonia, EPA method 350.1
- Chemical oxygen demand (COD), EPA method 410.4
- Inductive coupled plasma (ICP) metals, including:
 - Tin, EPA method 6010
 - Selenium, EPA method 7740
 - Arsenic, EPA method 7060
 - Lead, EPA method 7421
 - Mercury, EPA method 7470
- Total recoverable oil and grease, EPA method 9070
- Total phenols, EPA method 9066
- Phosphorus, EPA method 365.1
- Total cyanide, EPA method 9012
- Sulfides, EPA method 9030
- Herbicides, EPA method 8150
- Organophosphorous Pesticides, EPA method 8140
- Total inorganic carbon, EPA method 415.1
- Total organic carbon (TOC), EPA method 415.2
- Total organic halides (TOX), EPA method 9020
- Gross alpha/beta/gamma spectroscopy (includes cesium-137, cobalt-60, ruthenium-108); total uranium (includes uranium-238); total radium; strontium-90; iodine-129; tritium; no standard method

The actual analyses of the analytes of concern, such as precision and accuracy, are discussed in Appendix A of the QAPP.

G.2.1 Liquid Effluent Characterization Sample Handling

Liquid effluent characterization samples will be collected in commercially available, individually certified, precleaned glass or plastic bottles. The certification of the precleaned condition shall accompany the bottle. The sample volumes and number of containers are prescribed by the analytical laboratory and are subject to change. Tentative container types, and preservatives are discussed in the facility-specific sampling procedure, "Procedure for Collecting RCRA/CERCLA Samples From the 400 Area Secondary Cooling Water (Process Sewer) System".

Preservatives required above will be vendor-supplied and added to the containers in the field. The caps will be sealed to the containers with tamper-evident tape. The containers will be labeled, then individually bagged and re-bagged. The outer bag will be taped with tamper-evident tape. The samples will be refrigerated at 4 degrees Celsius until ready to ship, and will then be placed in a cooler containing ice.

Sample bottles will also be prepared for field quality control samples. The facility-specific field sampling procedure identifies this preparation and analytes to be evaluated for each field quality control sample.

Field notes will be kept by sampling personnel who will identify date, time, weather conditions, Plant operational status, and any other relevant information from each sampling event. The field log for each sampling event will identify which intermittent wastewater contributors are operating.

A chain of custody form will be filled out at the time of bottle preparation (preservative addition and pre-labeling) and will accompany each sample. A sample may consist of several containers. The chain-of-custody will account for each container and may be filled out for a maximum of 20 containers or one cooler. Once the sample has been drawn, it must be in the physical control or view of the custodian, locked in an area where it can not be tampered with, or prepared for shipping with tamper-evident tape applied. The definition of physical control includes being in the sight of the custodian, being in a room which will signal an alarm when entered, or being locked in a cabinet.

When more than one person is involved in sampling, one person alone shall be designated to sign as sampler. The sampler is the custodian until the samples are transferred to another location or group; he or she shall sign when releasing the samples to the designated receiver. Any private carrier used to transport the samples and chain-of-custody documentation shall be bonded.

The liquid effluent characterization samples will be routed to an approved Westinghouse Hanford Company participant contractor or

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subcontractor laboratory for analysis consistent with SW-846 requirements.

The data will be considered representative so long as at least 90 percent of the data points meet the established requirements in the laboratory contract for precision and accuracy. Data which does not meet this objective will be reviewed to determine whether the data can be used or whether corrective action should be taken. Corrective action measures are described in Section 14.0 of the QAPP. If necessary, corrective action will consist of repeating the sampling and/or analysis activity. Validated data will be sent by OSM to the Environmental Data Management Center. The data will be part of the administrative record for Tri-Party Agreement Milestone M-17-16. An electronic database (LEMIS) for management of this data is being developed and will be accessible by EPA and Ecology.

All sampling and analytical data will be maintained by the sampling task leader as quality records. The field logs will be maintained by Sampling and Mobile Laboratories. Copies of the Sample Analysis Request Form, Chain-of-Custody, and activity screening results will be sent to the Office of Sample Management (OSM). The original shipping papers will accompany the sample. Copies of the Sample Analysis Request form and chain-of-custody form will be returned to OSM from the laboratory after the samples are received. The original shipping papers will be kept by the laboratory, and the copies maintained by OSM.

H. REFERENCES

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APPENDIX

MATERIAL SAFETY DATA SHEETS FOR DEARBORN PRODUCTS

9 3 1 2 7 5 8 1 2 6 5

MSDS # 10767

Material Safety Data Sheet

Emergency Phone
708-438-1800

Section 1 Product Identification

TRADE NAME	DEARCIDE 702	PRODUCT TYPE	biocide	CODE IDENT.	14-120
DOT SHIPPING NAME	Corrosive Liquid, N.O.S. UN 1760				

Section 2 Hazardous Ingredients

	CAS NUMBER	%	EXPOSURE CRITERIA
5-Chloro-2-methyl-4-isothiazolin-3-one	26172-55-4	1.15	Total isothiazolines
2, Methyl-4-Isothiazolin-3-one	2682-20-4	0.35	TWA: 0.1 mg/m ³ STEL: 0.1 mg/m ³
Magnesium Chloride	7786-30-3	< 2.0	Not established
Magnesium Nitrate	10377-60-3	< 3.0	Not established
Water	7732-18-5	< 96.0	Not established

HMIS	7-0-0	EPA REGISTRATION NO.	4443-40
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Section 3 Physical Data

BOILING POINT, 760 mm Hg	212 F	MELTING POINT	NA
FREEZING POINT	32 F	VAPOR PRESSURE	20 mm Hg est.
SPECIFIC GRAVITY (H ₂ O = 1)	1.01	SOLUBILITY IN H ₂ O	complete
VAPOR DENSITY (AIR = 1)	0.4 est.	EVAPORATION RATE, (Bu Ac = 1)	< 1
% VOLATILES BY VOLUME	ND	pH	3.5-4.5

APPEARANCE & ODOR

Pale amber to green liquid, mild aromatic odor.

Section 4 Fire & Explosion Hazard Data

FLASH POINT (& METHOD USED)	FLAMMABLE LIMITS IN AIR % BY VOLUME	AUTO IGNITION TEMPERATURE
NA, water-based product	LOWER: NA UPPER: NA	NA

EXTINGUISHING MEDIA: FOAM, CO₂, DRY CHEMICAL

SPECIAL FIRE FIGHTING PROCEDURES:

Wear respirator (pressure-demand, self-contained breathing apparatus, MSHA/NIOSH approved or equivalent) and full protective gear. Use water spray to cool fire and exposed containers.

UNUSUAL FIRE AND EXPLOSION HAZARD:

Avoid exposure to fumes and vapors from a fire—can possibly include sulfur dioxide and hydrogen chloride and oxides of nitrogen.

Section 5 Reactivity Data

STABILITY (NORMAL CONDITIONS)	CONDITIONS TO AVOID
Stable	Evaporation to dryness; Nitrates can explode
INCOMPATIBILITY (MATERIALS TO AVOID)	

none known

HAZARDOUS DECOMPOSITION PRODUCTS

HCl, oxides of sulfur and oxides of nitrogen.

HAZARDOUS POLYMERIZATION	CONDITIONS TO AVOID
Will not occur	Not applicable

GRACE Dearborn

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93127581266

Material Safety Data Sheet (continued)

DEARBORN 702, CONTINUED

Section 6 Health Hazard Information

TOXICITY INFORMATION:

Oral LD50 rat: 457 mg/kg; Dermal LD50 rabbit: 660 mg/kg. Eye irritation rabbit: Corrosive. Corneal injury. Skin irritation rabbit: Corrosive under test conditions for DOT skin corrosivity. Severely irritating under conditions of OECD.

EFFECTS OF OVEREXPOSURE:

MSDS # 10767

INHALATION: Harmful if inhaled.
INGESTION: Harmful if swallowed.
SKIN CONTACT: Corrosive to skin; causes burns. Harmful if absorbed through skin
EYE CONTACT: Corrosive to eyes; causes permanent, irreversible eye injury.

DELAYED EFFECTS: Substance can cause allergic skin reaction.

EMERGENCY AND FIRST AID PROCEDURES

INHALATION: Remove affected person to fresh air and treat symptoms.
INGESTION: If swallowed dilute by giving 2 glasses of water to drink. See a physician. Never give anything by mouth to unconscious person.
SKIN CONTACT: Wash thoroughly with soap and water. Remove and wash clothing before reuse.
EYE CONTACT: Flush eyes with a large amount of water for at least 15 minutes. Get prompt medical attention.
NOTE: Mucosal damage may contraindicate the use of gastric lavage. Measures against circulatory shock, respiratory depression & convulsions may be required

Section 7 Special Protection Information

VENTILATION REQUIREMENTS

~~Use adequate mechanical ventilation~~

RESPIRATORY PROTECTION (SPECIFY TYPE)

~~Wear MSHA/NIOSH-approved respirator suitable for concentrations encountered**~~

EYE PROTECTION

~~Splashproof goggles & face shield~~

GLOVES

~~Impervious~~

OTHER PROTECTIVE CLOTHING AND EQUIPMENT

~~Impervious apron, eyewash facility, emergency shower, impervious overshoes.~~

~~**where exposure limits are exceeded~~

Section 8 Spill or Leak Procedures

STEPS TO TAKE IF MATERIAL IS RELEASED OR SPILLED

Wear protective clothing, splashproof goggles & impervious overshoes. Remove contaminated clothing promptly; launder thoroughly before reuse. Wash affected skin areas with soap and water. CAUTION: Keep spills out of municipal sewers and open bodies of water. Dike and absorb spill with inert material (dry earth, sand). Shovel all contaminated solids—diking material, absorbent and soil—into corrosion-proof drums for storage until disposal.

WASTE DISPOSAL METHOD

When discarded, this material is a hazardous waste. RCRA HD-002 (corrosive). Incinerate liquid and contaminated diking material, at a permitted facility, in accordance with local and state regulations.

Section 9 Special Precautions

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE

Do not contaminate water, food or feed by storage or disposal. Keep containers closed when not in use. Wash thoroughly after handling.

OTHER PRECAUTIONS

FOR INDUSTRIAL USE ONLY. KEEP OUT OF REACH OF CHILDREN.

PREPARED BY:

S. Norris

DATE:

10/26/89

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GRACE Dearborn

Dearborn Division W. R. Grace & Co. - Conn., 300 Genesee Street, Lake Zurich, IL 60047 (708) 438-1800

9312781267

Material Safety Data Sheet

Emergency Phone
312-438-8241

Section 1 Product Identification

TRADE NAME	DEARBORN 878	PRODUCT TYPE	Cooling water treatment	CODE/IDENT.	11-878
DOT SHIPPING NAME	Compound industrial process water treating, liquid				

Section 2 Hazardous Ingredients

	CAS NUMBER	%	EXPOSURE CRITERIA
Potassium hydroxide (45%)	1310-58-3	C 20	Ceiling limit: 2 mg/m ³

HMS 2-0-0

Section 3 Physical Data

BOILING POINT, 760 mm Hg	> 212 F	MELTING POINT	NA
FREEZING POINT	25 F	VAPOR PRESSURE	21 mm Hg
SPECIFIC GRAVITY (H ₂ O = 1)	1.12	SOLUBILITY IN H ₂ O	complete
VAPOR DENSITY (AIR = 1)	ND	EVAPORATION RATE, (Bu Ac = 1)	C 1
% VOLATILES BY VOLUME	ND	pH	11.4

APPEARANCE & ODOR

Faint yellow liquid

Section 4 Fire & Explosion Hazard Data

FLASH POINT (& METHOD USED)	FLAMMABLE LIMITS IN AIR % BY VOLUME		AUTO IGNITION TEMPERATURE
	LOWER	UPPER	
NA, water-based product	NA	NA	NA

EXTINGUISHING MEDIA: FOAM CO₂ DRY CHEMICAL

SPECIAL FIRE FIGHTING PROCEDURES:

Firefighters should wear full protective gear

UNUSUAL FIRE AND EXPLOSION HAZARD:

none known

Section 5 Reactivity Data

STABILITY (NORMAL CONDITIONS)	CONDITIONS TO AVOID
Stable	Extreme heat

INCOMPATIBILITY (MATERIALS TO AVOID)

Acids, oxidizers

HAZARDOUS DECOMPOSITION PRODUCTS

CO, CO₂

HAZARDOUS POLYMERIZATION	CONDITIONS TO AVOID
Will not occur	Not applicable

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93127581268

Section 6 Health Hazard Information

TOXICITY INFORMATION:

See Section 2

MSDS # 22946

EFFECTS OF OVEREXPOSURE:

- INHALATION: Prolonged inhalation of vapors or mist may irritate nasal passages.
- INGESTION: Harmful if digested.
- SKIN OR EYE CONTACT: Alkaline material will cause irritation on contact with skin or eyes.

EMERGENCY AND FIRST AID PROCEDURES

- INHALATION: Remove affected persons to fresh air and treat symptoms.
- INGESTION: If ingested, dilute with fruit juices or water.
- SKIN CONTACT: Wash with soap and water. Remove contaminated clothing and wash before reuse.
- EYE CONTACT: Flood eyes with water and seek medical attention.

Treat as alkaline liquid

Section 7 Special Protection Information

VENTILATION REQUIREMENTS

Mechanical ventilation should be adequate

RESPIRATORY PROTECTION (SPECIFY TYPE)

None special

EYE PROTECTION

Goggles

GLOVES

Rubber or plastic

OTHER PROTECTIVE CLOTHING AND EQUIPMENT

Alkali resistant clothing.

Section 8 Spill or Leak Procedures

STEPS TO TAKE IF MATERIAL IS RELEASED OR SPILLED

Collect using absorbent, place in container for proper disposal. Flush area of spill with water.

WASTE DISPOSAL METHOD

Dispose using chemical scavenger service in authorized landfill. For additional disposal instructions, contact your state water pollution control agency.

Section 9 Special Precautions

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE

Store containers closed when not in use. Avoid freezing.

OTHER PRECAUTIONS

For industrial use only.

PREPARED BY:

S. MORSS

DATE: 1/18/88

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GRACE Dearborn

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93127581269

MATERIAL SAFETY DATA SHEET

W.R. Grace & Co. - Conn.
Dearborn Division

Hanford's MSDS No.: 12928
CODE 899

MANUFACTURER INFORMATION

Product Trade Name: CODE 899.
MSDS Date: 07/30/90

W.R. Grace & Co. - Conn.
Dearborn Division
300 Genesee Street
Lake Zurich, IL 60047
(708) 438-1800

EMERGENCY Phone: (708) 438-1800

Prepared by: S. Morss

Date Prepared: 07/30/90

SECTION I - MATERIAL IDENTIFICATION

Mfg's Product ID: 33-899

National Paint & Coatings Association HMIS Codes

Hazard Ratings: 0-Minimal; 1-Slight; 2-Moderate; 3-Serious; 4-Severe; *-Chronic

Health: 2 Fire: 0 Reactivity: 0

OTHER DESIGNATIONS (Synonyms) -----
CODE 899

Additional Information: Customer No. 93337A 01

Ticket No. 084261

SECTION II - INGREDIENTS AND EXPOSURE LIMITS

Ingredient Name	CAS Number	Percent	Exposure Limits
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BERYLLIUM SULFATE	13510-49-1	< 5	
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Other Exposure: TWA - 0.002 mg/m³

Cancer: Animal Suspect Carcinogen

WATER	7732-18-5	< 96	
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CODE 899

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MATERIAL SAFETY DATA SHEET

W.R. Grace & Co. - Conn.
Dearborn Division

Hanford's MSDS No.: 12928
CODE 899

--- SECTION II - INGREDIENTS AND EXPOSURE LIMITS continued from page 1 ---

Other Exposure: Not Established.

PRODUCT Exposure Limits: No TLV established for product. See individual ingredients for component information.

SECTION III - PHYSICAL DATA

Appearance and Odor: Clear, colorless, odorless liquid.
Product Uses: PRODUCT TYPE: Interference Suppressor

Boiling Point: 212°F (760. mm Hg)
Vapor Pressure: ND
Vapor Density: ND
Water Solubility: Appreciable
pH: 5 - 7
Specific Gravity: 0.95 (H₂O = 1).
Melting Point: NA
Evaporation Rate: <1 (BuAc = 1)
Percent Volatile: ND
Freezing Point: ND

SECTION IV - FIRE AND EXPLOSION DATA

Flammable Limits:

LEL(%): NA
UEL(%): NA

Autoignition: NA

Flash Point (Method): Not Applicable.

Extinguishing Media: Water fog, foam, CO₂, dry chemical.

Special Fire Fighting Procedures: Firefighters should wear full protective gear.

Unusual Fire and Explosion Hazards: None known.

MATERIAL SAFETY DATA SHEET

W.R. Grace & Co. - Conn.
Dearborn Division

Hanford's MSDS No.: 12928
CODE 899

SECTION V - REACTIVITY DATA

Stability: Stable.
Conditions to Avoid: Heat.

Hazardous Polymerization: Will not occur.
Conditions to Avoid: Not determined.

Incompatibilities/Materials to Avoid: Caustic.

Hazardous Decomposition Products: Sulfur oxides.

SECTION VI - HEALTH HAZARDS

Effects of Exposure/Overexposure:
INHALATION: Inhalation of mist may irritate respiratory passages.
INGESTION: May be harmful if swallowed.
SKIN CONTACT: Prolonged or frequent skin contact may cause irritation.

SECTION VII - FIRST AID PROCEDURES

Eyes: Flush with water immediately for 15 minutes. Seek medical attention.

Skin: Wash with soap and water. Remove contaminated clothing and wash before reuse.

Inhalation: Remove affected persons to fresh air and treat symptoms. Give artificial respiration if necessary.

Ingestion: If conscious, give water to dilute and contact physician.

93127581272

MATERIAL SAFETY DATA SHEET

W.R. Grace & Co. - Conn.
Dearborn Division

Hanford's MSDS No.: 12928
CODE 899

SECTION VIII - WORKPLACE PRECAUTIONS / CONTROL MEASURES

Handling/Storage Precautions: Wash thoroughly after handling. Store container closed when not in use.

Other Precautions: FOR INDUSTRIAL USE ONLY. KEEP OUT OF REACH OF CHILDREN

Personal Protection -----

Respirator: Hood

Eye Protection: Chemical goggles.

Gloves: Impervious.

Other Protective Clothing & Equipment: Lab coat or long sleeve work shirt.

WORKPLACE CONTROLS -----

Ventilation: Use adequate mechanical ventilation.

SECTION IX - SPILL & LEAK / ENVIRONMENT / SHIPPING

SPILL & LEAK / ENVIRONMENTAL -----

Procedures for Spill / Leak: Collect on absorbent paper and dispose of with laboratory waste. Wash area of spill with water.

Waste Management/Disposal: Dispose of in accordance with federal, state and local regulations.

DOT Shipping Name: Chemical
N.O.I. Water Testing Reagent.

MATERIAL SAFETY DATA SHEET

W.R. Grace & Co. - Conn.
Dearborn Division

Hanford's MSDS No.: 12928
CODE 899

SECTION X - LABELS / SUPPLEMENTAL / OTHER REGS

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MATERIAL SAFETY DATA SHEET

W.R. Grace & Co. - Conn.
Dearborn Division

Hanford's MSDS No.: 16069
CODE 562

MANUFACTURER INFORMATION

Product Trade Name: CODE 562
MSDS Date: 10/03/89

W.R. Grace & Co. - Conn.
Dearborn Division
300 Genesee Street
Lake Zurich, IL 60047
(708) 438-1800

EMERGENCY Phone: (708) 438-1800

Prepared by: S. Morss

SECTION I - MATERIAL IDENTIFICATION

Mfg's Product ID: 33-562

National Paint & Coatings Association HMIS Codes

Hazard Ratings: 0-Minimal; 1-Slight; 2-Moderate; 3-Serious; 4-Severe; *-Chronic

Health: 0 Fire: 0 Reactivity: 0

OTHER DESIGNATIONS (Synonyms) -----
CODE 562

Additional Information: Product Type: Xylenol Orange Indicator

SECTION II - INGREDIENTS AND EXPOSURE LIMITS

Ingredient Name	CAS Number	Percent	Exposure Limits
POTASSIUM CHLORIDE	7447-40-7	> 99	
Other Exposure: Not established			
XYLENOL ORANGE	3618-43-7	< 0.1	
Other Exposure: Not established			

PRODUCT Exposure Limits: No TLV established for product. See above for
CODE 562

93127581275

MATERIAL SAFETY DATA SHEET

W.R. Grace & Co. - Conn.
Dearborn Division

Hanford's MSDS No.: 16069
CODE 562

--- SECTION II - INGREDIENTS AND EXPOSURE LIMITS continued from page 1 ---
component information.

SECTION III - PHYSICAL DATA

Appearance and Odor: Purple, odorless powder.
Boiling Point: NA (760 mm Hg)
Vapor Pressure: ND
Vapor Density: 3.0 (Air = 1)
Water Solubility: Complete
pH: 7.0 of 5% solution
Specific Gravity: 2.0 (H₂O = 1)
Melting Point: ND
Evaporation Rate: Very Low (BuAc = 1)
Percent Volatile: 0 (by Volume)
Freezing Point: ND

SECTION IV - FIRE AND EXPLOSION DATA

Flammable Limits:

LEL(%): NA
UEL(%): NA

Autoignition: NA

Flash Point (Method): Not applicable

Extinguishing Media: Water fog.

Special Fire Fighting Procedures: Firefighters should wear full protective gear.

Unusual Fire and Explosion Hazards: None known.

93127581276

MATERIAL SAFETY DATA SHEET

W.R. Grace & Co. - Conn.
Dearborn Division

Hanford's MSDS No.: 16069
CODE 562

SECTION V - REACTIVITY DATA

Stability: Stable.
Conditions to Avoid: Moisture.

Hazardous Polymerization: Will not occur.
Conditions to Avoid: Not applicable.

Incompatibilities/Materials to Avoid: Silver solutions.

Hazardous Decomposition Products: Not determined.

SECTION VI - HEALTH HAZARDS

Effects of Exposure/Overexposure:
INHALATION: Inhalation of powder may irritate respiratory tract.
SKIN CONTACT: Prolonged or frequent skin contact may cause irritation.
INGESTION: May be harmful if swallowed.

SECTION VII - FIRST AID PROCEDURES

Eyes: Immediately flush with water for 15 minutes. Call physician.
Skin: Flush skin with water for 15 minutes. Wash with soap and water. Remove contaminated clothing and wash before reuse.
Inhalation: Remove affected persons to fresh air and treat symptoms.
Ingestion: Give large quantities of water or milk. Call physician.

93127581277

MATERIAL SAFETY DATA SHEET

W.R. Grace & Co. - Conn.
Dearborn Division

Hanford's MSDS No.: 16069
CODE 562

SECTION VIII - WORKPLACE PRECAUTIONS / CONTROL MEASURES

Handling/Storage Precautions: Store containers closed away from extreme temperatures.

Other Precautions: FOR INDUSTRIAL USE ONLY. KEEP OUT OF REACH OF CHILDREN.

Personal Protection -----

Respirator: Usually not needed.

Eye Protection: Safety glasses.

Gloves: Impervious.

Other Protective Clothing & Equipment: Lab coat or long sleeve shirt.

WORKPLACE CONTROLS -----

Ventilation: Use adequate mechanical ventilation.

SECTION IX - SPILL & LEAK / ENVIRONMENT / SHIPPING

SPILL & LEAK / ENVIRONMENTAL -----

Procedures for Spill / Leak: Flush to drain with excess water.

Waste Management/Disposal: Dispose of in accordance with federal, state and local regulations.

DOT Shipping Name: Chemicals,
N.O.I., Water Testing Reagents

SECTION X - LABELS / SUPPLEMENTAL / OTHER REGS

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MATERIAL SAFETY DATA SHEET

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Hanford's MSDS No.: 16069
CODE 562

--- SECTION X - LABELS / SUPPLEMENTAL / OTHER REGS continued from page 4 ---

data to remain currently informed on chemical hazard information, to design and update its own safety program and to comply with all national, federal, state, and local laws and regulations applicable to safety, occupational health, right to know and environmental protection.

MATERIAL SAFETY DATA SHEET

W.R. Grace & Co. - Conn.
Dearborn Division

Hanford's MSDS No.: 12925
CODE 550

MANUFACTURER INFORMATION

Product Trade Name: CODE 550
MSDS Date: 10/03/89

W.R. Grace & Co. - Conn.
Dearborn Division
300 Genesee Street
Lake Zurich, IL 60047
(708) 438-1800

EMERGENCY Phone: (708) 438-1800

Prepared by: S. Morss

Date Prepared: 10/03/89

SECTION I - MATERIAL IDENTIFICATION

Mfg's Product ID: 33-550

National Paint & Coatings Association HMIS Codes
Hazard Ratings: 0-Minimal; 1-Slight; 2-Moderate; 3-Serious; 4-Severe; *-Chronic

Health: 0 Fire: 0 Reactivity: 0

OTHER DESIGNATIONS (Synonyms) -----
CODE 550

Additional Information: Product Type: Sodium Thiosulfate 0.1N

SECTION II - INGREDIENTS AND EXPOSURE LIMITS

Ingredient Name	CAS Number	Percent	Exposure Limits
SODIUM THIOSULFATE	10102-17-2	<	0.5
Other Exposure: Not Established.			
SODIUM BORATE	1330-43-4	<	0.05
Other Exposure: Not Established.			
WATER	7732-18-5	<	100
CODE 550			

93127581280

MATERIAL SAFETY DATA SHEET

W.R. Grace & Co. - Conn.
Dearborn Division

Hanford's MSDS No.: 12925
CODE 550

--- SECTION II - INGREDIENTS AND EXPOSURE LIMITS continued from page 1 ---

Other Exposure: Not applicable.

PRODUCT Exposure Limits: No TLV established for product. See above for component information.

SECTION III - PHYSICAL DATA

Appearance and Odor: Clear, colorless liquid.
Boiling Point: 212°F (760 mm Hg)
Vapor Pressure: ND
Vapor Density: ND
Water Solubility: Miscible.
pH: 8 - 10
Specific Gravity: 1.0 (H₂O = 1)
Melting Point: NA
Evaporation Rate: <1 (Bu Ac = 1)
Percent Volatile: ND by volume
Freezing Point: ND

SECTION IV - FIRE AND EXPLOSION DATA

Flammable Limits:

LEL(%): NA
UEL(%): NA

Autoignition: NA

Flash Point (Method): Not Applicable.

Extinguishing Media: Water fog.

Special Fire Fighting Procedures: Firefighters should wear full protective gear.

Unusual Fire and Explosion Hazards: None known.

MATERIAL SAFETY DATA SHEET

W.R. Grace & Co. - Conn.
Dearborn Division

Hanford's MSDS No.: 12925
CODE 550

SECTION V - REACTIVITY DATA

Stability: Stable.
Conditions to Avoid: Not determined.

Hazardous Polymerization: Will not occur.
Conditions to Avoid: Not applicable.

Incompatibilities/Materials to Avoid: Acids, alkaloidal, metallic salts and silver halides.

Hazardous Decomposition Products: None known.

SECTION VI - HEALTH HAZARDS

Effects of Exposure/Overexposure:
INHALATION: Avoid breathing vapors or mist which may irritate respiratory passages.

INGESTION: May be harmful if swallowed.

SKIN CONTACT: Prolonged or frequent skin contact may cause irritation.

SECTION VII - FIRST AID PROCEDURES

Eyes: Immediately flush eyes with water for 15 minutes. Call physician.

Skin: Flush skin with water, then wash with soap and water. Wash contaminated clothing before reuse.

Inhalation: Remove affected persons to fresh air.

Ingestion: Call physician.

93127581282

MATERIAL SAFETY DATA SHEET

W.R. Grace & Co. - Conn.
Dearborn Division

Hanford's MSDS No.: 12925
CODE 550

SECTION VIII - WORKPLACE PRECAUTIONS / CONTROL MEASURES

Handling/Storage Precautions: Wash thoroughly after handling. Avoid contact with eyes, skin and clothing. Protect containers from physical damage.

Other Precautions: FOR INDUSTRIAL USE ONLY. KEEP OUT OF REACH OF CHILDREN.

Personal Protection -----

Respirator: None special.

Eye Protection: Safety glasses.

Gloves: Impervious.

Other Protective Clothing & Equipment: Lab coat or long sleeve work shirt.

WORKPLACE CONTROLS -----

Ventilation: Use adequate mechanical ventilation.

SECTION IX - SPILL & LEAK / ENVIRONMENT / SHIPPING

SPILL & LEAK / ENVIRONMENTAL -----

Procedures for Spill / Leak: Dilute with large amount of water. Wash down drain with excess water.

Waste Management/Disposal: Dispose of in accordance with federal, state and local regulations.

DOT Shipping Name: Chemicals,
N.O.I., Water Testing Reagent

93127581283

MATERIAL SAFETY DATA SHEET

W.R. Grace & Co. - Conn.
Dearborn Division

Hanford's MSDS No.: 12925
CODE 550

SECTION X - LABELS / SUPPLEMENTAL / OTHER REGS

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MANUFACTURER'S SUPPLEMENTAL INFORMATION

CODE 380 ORG SEQUESTERING TEST

93127581284

MATERIAL SAFETY DATA SHEET

W.R. Grace & Co. - Conn.
Dearborn Division

Hanford's MSDS No.: 16348
CODE 904

MANUFACTURER INFORMATION

Product Trade Name: CODE 904
MSDS Date: 06/14/91

W.R. Grace & Co. - Conn.
Dearborn Division
300 Genesee Street
Lake Zurich, IL 60047
(708) 438-1800

EMERGENCY Phone: (708) 438-1800

Prepared by: P. Gabris

SECTION I - MATERIAL IDENTIFICATION

Mfg's Product ID: 33-904

National Paint & Coatings Association HMIS Codes

Hazard Ratings: 0-Minimal; 1-Slight; 2-Moderate; 3-Serious; 4-Severe; *-Chronic

Health: 1 Fire: 0 Reactivity: 0

OTHER DESIGNATIONS (Synonyms) -----
CODE 904

Additional Information: Product Type: Thorium Nitrate (0.001M)

SECTION II - INGREDIENTS AND EXPOSURE LIMITS

Ingredient Name	CAS Number	Percent	Exposure Limits
THORIUM NITRATE	13822-29-5	< 0.05	
Other Exposure: Not established			
WATER	7732-18-5	< 100	
Other Exposure: Not established			

PRODUCT Exposure Limits: No TLV established for product. See above for
CODE 904

93127581285

MATERIAL SAFETY DATA SHEET

W.R. Grace & Co. - Conn.
Dearborn Division

Hanford's MSDS No.: 16348
CODE 904

--- SECTION II - INGREDIENTS AND EXPOSURE LIMITS continued from page 1 ---

component information.

Additional Information: The level of alpha radiation of Code 904 thorium nitrate is equivalent to 0.000025 microcuries per gram, which is the lowest level considered to be radioactive under Dept. of Transportation Regulation 49 CFR 173.389 (e). Alpha radiation does not penetrate the skin.

SECTION III - PHYSICAL DATA

Appearance and Odor: Clear, colorless, odorless solution.
Boiling Point: 212°F (760 mm Hg)
Vapor Pressure: ND
Vapor Density: ND (Air = 1)
Water Solubility: Miscible
pH: 4 - 6
Specific Gravity: 1.0 (H₂O = 1)
Melting Point: ND
Evaporation Rate: < 1 (BuAc = 1)
Percent Volatile: > 99 (by Volume)
Freezing Point: ND

SECTION IV - FIRE AND EXPLOSION DATA

Flammable Limits:

LEL(%): NA
UEL(%): NA

Autoignition: NA

Flash Point (Method): Not applicable

Extinguishing Media: Water fog.

Special Fire Fighting Procedures: Firefighters should wear full protective gear.

Unusual Fire and Explosion Hazards: None special.

93127581286

MATERIAL SAFETY DATA SHEET

W.R. Grace & Co. - Conn.
Dearborn Division

Hanford's MSDS No.: 16348
CODE 904

SECTION V - REACTIVITY DATA

Stability: Stable.
Conditions to Avoid: Not determined.

Hazardous Polymerization: Will not occur.
Conditions to Avoid: Not determined.

Incompatibilities/Materials to Avoid: Soluble fluorides.

Hazardous Decomposition Products: Not determined.

SECTION VI - HEALTH HAZARDS

Effects of Exposure/Overexposure:

INHALATION: Inhalation of mist may irritate respiratory passages.

INGESTION: May be harmful if swallowed.

SKIN CONTACT: Prolonged or frequent skin contact may cause irritation.

SECTION VII - FIRST AID PROCEDURES

Eyes: Immediately flush eyes with water for 15 minutes. Call physician.

Skin: Flush skin with water then wash with soap and water. Wash contaminated clothing before reuse.

Inhalation: Remove affected persons to fresh air and treat symptoms.

Ingestion: If conscious, give water to dilute and contact physician.

MATERIAL SAFETY DATA SHEET

W.R. Grace & Co. - Conn.
Dearborn Division

Hanford's MSDS No.: 16348
CODE 904

SECTION VIII - WORKPLACE PRECAUTIONS / CONTROL MEASURES

Handling/Storage Precautions: Store containers closed away from extreme temperatures.

Other Precautions: FOR INDUSTRIAL USE ONLY. KEEP OUT OF REACH OF CHILDREN.

Personal Protection -----

Respirator: None special.

Eye Protection: Safety glasses.

Gloves: Impervious.

Other Protective Clothing & Equipment: Lab coat or long sleeve work shirt.

WORKPLACE CONTROLS -----

Ventilation: Use adequate mechanical ventilation.

SECTION IX - SPILL & LEAK / ENVIRONMENT / SHIPPING

SPILL & LEAK / ENVIRONMENTAL -----

Procedures for Spill / Leak: Dilute with large amount of water. Wash down drain with excess water.

Waste Management/Disposal: Dispose of in accordance with federal, state and local regulations.

DOT Shipping Name: Chemicals,
NOI, water testing reagents.

Additional Information: The level of alpha radiation of Code 904 thorium nitrate is equivalent to 0.000025 microcuries per gram, which is the lowest level considered to be radioactive under Dept. of Transportation Regulation 49 CFR 173.389 (e). Alpha radiation does not penetrate the skin.

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MATERIAL SAFETY DATA SHEET

W.R. Grace & Co. - Conn.
Dearborn Division

Hanford's MSDS No.: 16348
CODE 904

SECTION X - LABELS / SUPPLEMENTAL / OTHER REGS

Manufacturer's Disclaimer: The data included herein are presented according to W.R. Grace & Co.'s practices current at the time of preparation hereof, are made available solely for the consideration, investigation and verification of the original recipients hereof and do not constitute a representation or warranty for which Grace assumes legal responsibility. It is the responsibility of a recipient of this data to remain currently informed on chemical hazard information, to design and update its own safety program and to comply with all national, federal, state, and local laws and regulations applicable to safety, occupational health, right to know and environmental protection.

MATERIAL SAFETY DATA SHEET

W.R. Grace & Co. - Conn.
Dearborn Division

Hanford's MSDS No.: 1250
CODE 595

MANUFACTURER INFORMATION

Product Trade Name: CODE 595
MSDS Date: 10/24/89

W.R. Grace & Co. - Conn.
Dearborn Division
300 Genesee Street
Lake Zurich, IL 60047
(708) 438-1800

EMERGENCY Phone: (708) 438-1800

Prepared by: S. Morss

SECTION I - MATERIAL IDENTIFICATION

Mfg's Product ID: 33-595

National Paint & Coatings Association HMIS Codes
Hazard Ratings: 0-Minimal; 1-Slight; 2-Moderate; 3-Serious; 4-Severe; *-Chronic

Health: 3 Fire: 0 Reactivity: 0

OTHER DESIGNATIONS (Synonyms) -----
CODE 595

Additional Information: Product Type: Hydrochloric Acid (1M)

SECTION II - INGREDIENTS AND EXPOSURE LIMITS

Ingredient Name	CAS Number	Percent	Exposure Limits
HYDROCHLORIC ACID	7647-01-0	< 5	
Other Exposure: Ceiling Limit: 7 mg/m ³			
WATER	7732-18-5	< 100	
Other Exposure: Not established			

PRODUCT Exposure Limits: No TLV established for product. See above for
CODE 595

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MATERIAL SAFETY DATA SHEET

W.R. Grace & Co. - Conn.
Dearborn Division

Hanford's MSDS No.: 1250
CODE 595

--- SECTION II - INGREDIENTS AND EXPOSURE LIMITS continued from page 1 ---
component information.

SECTION III - PHYSICAL DATA

Appearance and Odor: Colorless to pale yellow liquid with pungent odor.
Boiling Point: 212°F (760 mm Hg)
Vapor Pressure: ND
Vapor Density: ND (Air = 1)
Water Solubility: Complete
pH: < 1
Specific Gravity: 1.08 (H₂O = 1)
Melting Point: NA
Evaporation Rate: NA (BuAc = 1)
Percent Volatile: ND (by Volume)
Freezing Point: ND

SECTION IV - FIRE AND EXPLOSION DATA

Flammable Limits:

LEL(%): NA
UEL(%): NA

Autoignition: NA

Flash Point (Method): Not applicable

Extinguishing Media: Water fog.

Special Fire Fighting Procedures: Firefighters should wear full protective gear.

Unusual Fire and Explosion Hazards: None known.

MATERIAL SAFETY DATA SHEET

W.R. Grace & Co. - Conn.
Dearborn Division

Hanford's MSDS No.: 1250
CODE 595

SECTION V - REACTIVITY DATA

Stability: Stable.

Conditions to Avoid: Keep containers closed.

Hazardous Polymerization: Will not occur.

Conditions to Avoid: Not applicable.

Incompatibilities/Materials to Avoid: Silver, lead, mercury salts, metals, strong alkali.

Hazardous Decomposition Products: Chlorine gas, hydrogen gas if allowed to react with metal.

SECTION VI - HEALTH HAZARDS

Effects of Exposure/Overexposure:

INHALATION: Inhalation of vapors or mist may cause irritation to respiratory tract.

SKIN CONTACT: Prolonged or frequent skin contact may cause irritation.

INGESTION: May be harmful if swallowed.

SECTION VII - FIRST AID PROCEDURES

Eyes: Flush eyes with water for 15 minutes. Call physician.

Skin: Flush skin with water then wash with soap and water. Launder contaminated clothing before reuse.

Inhalation: Remove affected persons to fresh air and treat symptoms.

Ingestion: DO NOT induce vomiting. Give large quantities of water. Give at least one ounce of milk of magnesia in an equal amount of water, or three egg whites. Call physician.

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MATERIAL SAFETY DATA SHEET

W.R. Grace & Co. - Conn.
Dearborn Division

Hanford's MSDS No.: 1250
CODE 595

SECTION VIII - WORKPLACE PRECAUTIONS / CONTROL MEASURES

Handling/Storage Precautions: Store containers closed away from extreme temperatures.

Other Precautions: FOR INDUSTRIAL USE ONLY. KEEP OUT OF REACH OF CHILDREN.

Personal Protection -----

Respirator: Hood recommended.

Eye Protection: Face shield or chemical goggles.

Gloves: Impervious.

Other Protective Clothing & Equipment: Lab coat or long sleeve work shirt.

WORKPLACE CONTROLS -----

Ventilation: Use adequate mechanical ventilation.

SECTION IX - SPILL & LEAK / ENVIRONMENT / SHIPPING

SPILL & LEAK / ENVIRONMENTAL -----

Procedures for Spill / Leak: Neutralize spill with sodium bicarbonate or a soda ash-slaked lime mixture (50-50). Mix to form a slurry. Scoop and wash down the drain with excess water. Wash site of spill with soda and ash solution.

Waste Management/Disposal: Dispose of in accordance with federal, state and local regulations.

UN No: UN1789

DOT Shipping Name:
Hydrochloric acid, solution,
corrosive liquid UN 1789

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MATERIAL SAFETY DATA SHEET

W.R. Grace & Co. - Conn.
Dearborn Division

Hanford's MSDS No.: 1250
CODE 595

SECTION X - LABELS / SUPPLEMENTAL / OTHER REGS

Manufacturer's Disclaimer: The data included herein are presented according to W. R. Grace & Co.'s practices current at the time of preparation hereof, are made available solely for the consideration, investigation and verification of the original recipients hereof and do not constitute a representation or warranty for which Grace assumes legal responsibility. It is the responsibility of a recipient of this data to remain currently informed on chemical hazard information, to design and update its own safety program and to comply with all national, federal, state and local laws and regulations applicable to safety, occupational health, right to know and environmental protection.

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MATERIAL SAFETY DATA SHEET

Van Waters & Rogers, Inc.

Hanford's MSDS No.: 23398
SODIUM HYPOCHLORITE

MANUFACTURER INFORMATION

Product Trade Name: SODIUM HYPOCHLORITE
MSDS Date: 12/12/89

Van Waters & Rogers, Inc.
1600 Norton Bldg.
Seattle, WA 98104-1564
Contact your local Van Waters & Rogers branch
office for product and sales information.

Revision: Version: 012
Supercedes: 08/89
Revision of: 12/12/89

EMERGENCY Phone: For Emergency Assistance Involving Chemicals Call
CHEMTREC - (800) 424-9300

Subsidiary of Univar

SECTION I - MATERIAL IDENTIFICATION

Mfg's Product ID: 503030

Mfg's MSDS ID: VM&R Code: P1147

CAS Number: Mixture

Formula: Na O Cl

Common Name: Liquid Bleach, Liquichlor, Hypochlorous Acid, Sodium Salt,
Soda Bleach

OTHER DESIGNATIONS (Synonyms) -----

SODIUM HYPOCHLORITE
LIQUID BLEACH
LIQUICHLOR
HYPOCHLOROUS ACID
SODIUM SALT
SODA BLEACH

Additional Information: Report Number: 703
Order Number: 145602

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MATERIAL SAFETY DATA SHEET

Van Waters & Rogers, Inc.

Hanford's MSDS No.: 23398
SODIUM HYPOCHLORITE

SECTION II - INGREDIENTS AND EXPOSURE LIMITS

Ingredient Name	CAS Number	Percent	Exposure Limits
SODIUM HYPOCHLORITE	7681-52-9	7 - 16	PEL: None TLV: None

Other Exposure: None

Comments: Hazard: Corrosive; oxidizer.

SODIUM CHLORIDE	7647-14-5	5 - 13	PEL: None TLV: None
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Other Exposure: None

Comments: Hazard: None.

SODIUM HYDROXIDE	1310-73-2	0.05 - 0.9	PEL: 2 mg/m ³ TLV: 2 mg/m ³
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Other Exposure: None

Comments: Hazard: Corrosive; toxic.

WATER	7732-18-5	Balance	PEL: None TLV: None
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Other Exposure: None

Comments: Hazard: None.

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MATERIAL SAFETY DATA SHEET

Van Waters & Rogers, Inc.

Hanford's MSDS No.: 23398
SODIUM HYPOCHLORITE

SECTION III - PHYSICAL DATA

Appearance and Odor: Light yellow to green clear liquid, chlorine odor.

Boiling Point: Decomposes at 125°F

Vapor Pressure: 100 mm Hg @ 125°F

Vapor Density: 0.9 (Air = 1)

Water Solubility: 100%

Specific Gravity: 1.1 - 1.3 (Water = 1)

Melting Point: 9.4 - 10.4°F

Evaporation Rate: As water (Butyl Acetate = 1)

SECTION IV - FIRE AND EXPLOSION DATA

National Fire Protection Association Hazard Codes

Hazard Ratings: 0-None --> 4-Extreme

Health: 2 Fire: 0 Reactivity: 2 Special: Oxy

Flammable Limits:

LEL(%): N/A

UEL(%): N/A

Flash Point (Method): Not Flammable (N/A)

Extinguishing Media: This material is not combustible. Use extinguishing media appropriate for surrounding fire.

Special Fire Fighting Procedures: Fire fighters should wear self-contained breathing apparatus and full protective clothing. Use water spray to cool nearby containers and structures exposed to fire.

Unusual Fire and Explosion Hazards: Containers of this material can explode under fire conditions. Oxygen may be liberated upon contact with certain metals. Toxic fumes are liberated by contact with acids or heat. Highly exothermic reactions with organic materials and oxidizable materials may cause fires.

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MATERIAL SAFETY DATA SHEET

Van Waters & Rogers, Inc.

Hanford's MSDS No.: 23398
SODIUM HYPOCHLORITE

SECTION V - REACTIVITY DATA

Stability: Stable. Stability decreases with concentration, heat, light exposure, decrease in pH and contamination with heavy metals such as nickel, cobalt, copper and iron.

Hazardous Polymerization: Will not occur.

CONDITIONS TO AVOID: Excessive heat, exposure to light, excess alkalinity, and contamination of any kind.

Incompatibilities/Materials to Avoid: Ether, ammonia acids, reducing agents, oxidizable materials, combustible materials such as wood, cloth or organic materials, heavy metals such as iron and copper and their alloys, and dirt. Also magnesium, aluminum, tin, or manganese.

Hazardous Decomposition Products: HOCL, Chlorine, HCL, NaCL, Sodium Chlorate, and Oxygen which depend on pH, temperature and time.

SECTION VI - HEALTH HAZARDS

Signs / Symptoms: Inhalation: Inhalation of fumes or mists causes respiratory tract irritation and irritation of mucous membranes. If sodium hypochlorite is mixed with ammonia or other chemicals, evolution of chlorine or hypochlorous acid results. These gases can produce pulmonary edema.

Eye Contact: Liquid and mists may severely irritate or damage the eyes.

Skin Contact: The liquid will irritate the skin, causing redness and possibly inflammation.

Ingestion: Mists and liquid are extremely corrosive to the mouth and throat, mucous membranes and stomach. Swallowing the liquid burns the tissues, causes severe abdominal pain, nausea, vomiting, circulatory collapse, confusion, delerium, coma, and collapse. Swallowing large quantities can cause death.

Effects of Exposure/Overexposure:

Chronic: Eyes: Irritation effects increase with strength of solution and time of exposure. Prolonged or repeated exposure can

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MATERIAL SAFETY DATA SHEET

Van Waters & Rogers, Inc.

Hanford's MSDS No.: 23398
SODIUM HYPOCHLORITE

--- SECTION VI - HEALTH HAZARDS continued from page 4 ---

lead to constant irritation of eyes.

Inhalation: Irritation effects increase with strength of solution and time of exposure. Prolonged or repeated exposure can lead to constant irritation of throat.

Medical Conditions Aggravated: None reported.

Routes of Entry: Skin or eye contact; inhalation.

Sensitization: Prolonged or repeated contact may cause dermatitis and sensitization.

Cancer Statement: This material is not considered to be a carcinogen by the National Toxicology Program, the International Agency for Research on Cancer, or the Occupational Safety and Health Administration.

Toxicity Data: Oral: For 5% solution rat $LD_{50} = 13$ g/kg
For 12.5% solution rat $LD_{50} = 5$ g/kg

Dermal: Rat $LD_{50} > 3.0$ g/kg

Inhalation: No data available.

Other Data: None.

SECTION VII - FIRST AID PROCEDURES

Eyes: Immediately flush eyes with lots of running water for 15 minutes, lifting the upper and lower eyelids occasionally. Get immediate medical attention.

Skin: Immediately flush skin with lots of running water for 15 minutes. Remove contaminated clothing and shoes; wash before reuse. Get immediate medical attention.

Inhalation: Remove to fresh air. Give artificial respiration if not breathing. Get immediate medical attention.

Ingestion: Do not induce vomiting. If conscious, give lots of water or milk, milk of magnesia. Get immediate medical attention. Do not give baking soda or acid antidotes. Do not give anything by mouth to an unconscious or convulsing person.

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MATERIAL SAFETY DATA SHEET

Van Waters & Rogers, Inc.

Hanford's MSDS No.: 23398
SODIUM HYPOCHLORITE

SECTION VIII - WORKPLACE PRECAUTIONS / CONTROL MEASURES

Handling/Storage Precautions: Store in a cool, dry, well-ventilated place away from incompatible materials. Keep container tightly closed when not in use. Do not use pressure to empty container. Wash thoroughly after handling. Do not get in eyes, on skin, or on clothing. Store in original containers only at temperatures below 85° F. Do not store near acids, oxidizable materials, or organics. Do not store on wooden floors, pallets, or near wood of any kind.

Other Precautions: Containers, even those that have been emptied, will retain product residue and vapors. Always obey hazard warnings and handle empty containers as if they were full. Do not mix this product with other cleaning agents that may liberate chlorine gas vapors (i.e. acidic agents). This product degrades with age; use it within one month of receipt. It is a violation of federal law to use this product in a manner inconsistent with its labeling.

Personal Protection -----

Respirator: Wear a NIOSH-approved respirator appropriate for the vapor or mist concentration at the point of use. Appropriate respirators may be a full facepiece or a half mask air-purifying cartridge respirator equipped for acid gases/mists, a self-contained breathing apparatus in the pressure demand mode, or a supplied-air respirator.

Eye Protection: Chemical goggles and full faceshield unless a full facepiece respirator is also worn. It is generally recognized that contact lenses should not be worn when working with chemicals because contact lenses may contribute to the severity of an eye injury.

Gloves: Rubber gloves.

Other Protective Clothing & Equipment: Long-sleeved shirt, trousers, rubber boots, and rubber apron.

WORKPLACE CONTROLS -----

Ventilation: Local mechanical exhaust ventilation capable of minimizing emissions at the point of use.

Other Workplace Controls: An eyewash and safety shower should be nearby and ready for use.

Additional Information: Repair and Maintenance Precautions: None.

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MATERIAL SAFETY DATA SHEET

Van Waters & Rogers, Inc.

Hanford's MSDS No.: 23398
SODIUM HYPOCHLORITE

SECTION IX - SPILL & LEAK / ENVIRONMENT / SHIPPING

SPILL & LEAK / ENVIRONMENTAL -----

Procedures for Spill / Leak: Wear alkali-resistant slicker suit and complete protective equipment including rubber gloves, rubber boots, and a self-contained breathing apparatus in the pressure demand mode or a supplied-air respirator. If the spill or leak is small, a full facepiece air-purifying cartridge respirator equipped with acid gases/mists filters may be satisfactory. In any event, always wear eye protection. For small spills or drips, mop or wipe up and dispose of in DOT-approved waste containers. For large spills, contain by diking with oil or other non-combustible absorbent material and carefully neutralize with dilute hydrochloric acid. Keep non-neutralized material out of sewers, storm drains, surface waters, and soil. This product is very toxic to aquatic life. Comply with all applicable governmental regulations on spill reporting, and handling and disposal of waste.

Waste Management/Disposal: Dispose of contaminated product and materials used in cleaning up spills or leaks in a manner approved for this material. Consult appropriate federal, state and local regulatory agencies to ascertain proper disposal procedures.

NOTE: Empty containers can have residues, gases and mists and are subject to proper waste disposal, as above.

SECTION X - LABELS / SUPPLEMENTAL / OTHER REGS

Additional MSDS Information: For Product and Sales Information: Contact your local Van Waters & Rogers branch office at VW&R Kent Office, (206) 872-5000, Kent, WA.

Revision: 12/89: Revised Synonym.

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MATERIAL SAFETY DATA SHEET

Van Waters & Rogers, Inc.

Hanford's MSDS No.: 23398
SODIUM HYPOCHLORITE

--- SECTION X - LABELS / SUPPLEMENTAL / OTHER REGS continued from page 7 ---

control and therefore users are responsible to verify this data under their own operating conditions to determine whether the product is suitable for their particular purposes and they assume all risks of their use, handling, and disposal of the product, or from the publication or use of, or reliance upon, information contained herein. This information relates only to the product designated herein, and does not relate to its use in combination with any other material or in any other process.

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ID Number (include revision, volume, etc.): WHC-SD-AF-PLN-002 Rev. 2

List attachments:

Date Release Required:

Title: 400 Area Secondary Cooling Water Sampling and Analysis Plan

Unclassified Category: UC- Impact Level: 1E0

New or novel (patentable) subject matter? No Yes
 If "Yes", has disclosure been submitted by WHC or other company? No Yes Disclosure No(s):

Information received from others in confidence, such as proprietary data, trade secrets, and/or inventions? No Yes (Identify)

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Title of Journal: _____

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Information conforms to all applicable requirements. The above information is certified to be correct.

<p>References Available to Intended Audience: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Transmit to DOE-HQ/Office of Scientific and Technical Information: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p> <p>Author/Requestor (Printed/Signature): J. A. Searians, WHC Cognizant Engineer Date: 9/10/92</p> <p>Intended Audience: <input type="checkbox"/> Internal <input type="checkbox"/> Sponsor <input checked="" type="checkbox"/> External</p> <p>Responsible Manager (Printed/Signature): P. C. Miller, Manager/FFTF Regulatory Compliance Date: 9/10/92</p>	<p>INFORMATION RELEASE ADMINISTRATION APPROVAL STAMP</p> <p>Stamp is required before release. Release is contingent upon resolution of mandatory comments.</p>   <p>Date Cancelled: _____ Date Disapproved: _____</p>
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