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Page 2 of 2

Subject: RISK MANAGEMENT PROGRAM FOR THE 283-W WATER TREATMENT
FACILITY, DOE/RL-99-38, REV. 0, AND THE 283-W WATER TREATMENT
FACILITY RISK MANAGEMENT PLAN

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Page 1 of 2

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P.O. Box 700
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June 14, 1999

WMH-9953898

Mr. James L. Day, Manager
Water Utilities & Sanitary Services
DynCorp Tri-Cities Services, Inc., T2-11
Post Office Box 1400
Richland, Washington 99352-1400

Dear Mr. Day:

**RISK MANAGEMENT PROGRAM FOR THE 283-W WATER TREATMENT
FACILITY, DOE/RL-99-38, REV. 0, AND THE 283-W WATER TREATMENT
FACILITY RISK MANAGEMENT PLAN**

Reference: Letter, W. D. Adair, FDH, to J. E. Rasmussen, RL, "Contract No.
DE-AC06-96RL13200, Final Risk Management Plan for the 283W Water
Treatment Facility, Completion of Milestone ECP-99-419," FDH-9951536.2,
dated June 2, 1999.

Attached are your copies of the Risk Management (RM) Program, a diskette containing an electronic copy of the RM Program, and a diskette containing the 283-W Water Treatment Facility RM Plan. The RM Program and RM Plan for the 283-W Water Treatment Facility were prepared to meet the requirements of Title 40, Code of Federal Regulations (CFR) Part 68, "Accidental Release Prevention Requirements: Risk Management Programs Under the Clean Air Act, Section 112(r)(7)."

Through an earlier effort it was determined that the 283-W Water Treatment Facility had the potential to store chlorine in amounts exceeding the threshold limit. Therefore, this facility is subject to provisions of 40 CFR Part 68, including the requirement to prepare both an RM Program and an RM Plan.

During early 1999, an ad hoc committee was convened to guide preparation of the RM Program and RM Plan for affected facilities managed by the Project Hanford Management Contract. This committee included members representing two DynCorp Tri-Cities Services, Inc. (DYN) organizations, Water Utilities and Support Services, and Environmental Compliance. The committee also included representatives from Fluor Daniel Hanford, Inc. (FDH) Facility Emergency Preparedness, FDH Environmental Protection, FDH Hazardous Material Management and Emergency Response Operations, FDH Industrial Hygiene Programs, FDH Environment, Safety, Health, and Quality, Waste Management Federal Services of Hanford, Inc., Air and Water Services, and the U.S. Department of Energy, Richland Operations Office (RL) Environmental Assurance, Permits and Policy Division. Members of this committee were provided with an opportunity to review and comment on the draft RM Program. The attached RM Program resulted from their review effort.

Mr. Day
Page 2
June 14, 1999

WMH-9953898

An RM Plan, that draws heavily on information contained in the RM Program, was also prepared and submitted for review. The attached diskette containing the RM Plan reflects considerable DYN involvement. RL is required to submit this RM Plan to the U.S. Environmental Protection Agency (EPA) by June 21, 1999.

The 283-W Water Treatment Facility RM Program is being transmitted to you to maintain at the 283-W Water Treatment Facility as an auditable document that identifies risk management at the facility. Please note that DYN is responsible to conduct a compliance audit every three years pursuant to the requirements contained in 40 CFR 68.79.

The accompanying 283-W Water Treatment Facility RM Plan must also be maintained. In addition, the RM Plan must be updated and resubmitted to EPA within five years of the original submittal and under certain other conditions that are specified in the RM Program.

Should you have any questions or should you want any help in updating and resubmitting your RM Plan, please feel free to contact Mr. W. E. Green, of my staff, on 376-0583.

Very truly yours,

A handwritten signature in cursive script, reading "Eric M. Greager".

Eric M. Greager, Manager
Air and Water Services

lad/slm

Attachments

Risk Management Program for the 283-W Water Treatment Facility

Date Published
May 1999

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

Approved for Public Release

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Table of Contents

List of Tables	ii
List of Figures	ii
List of Appendices	ii
List of Acronyms	iii
Executive Summary	ES-1
1.0 Introduction	1-1
1.1 Program Scope	1-1
1.2 Background	1-1
1.2.1 Facility Overview	1-2
1.2.2 Risk Management Program Applicability	1-2
1.2.3 Risk Management Program Eligibility	1-2
1.3 Risk Management Plan	1-3
2.0 Offsite Consequence Analysis	2-1
2.1 Worst-Case Release Scenario	2-1
2.1.1 Mandatory Input	2-1
2.1.2 Worst-Case Scenario Impacts	2-2
2.1.2.1 Population Receptors	2-2
2.1.2.2 Environmental Receptors	2-5
2.2 Document Maintenance	2-5
3.0 Five-Year Accident History	3-1
4.0 Prevention Program	4-1
5.0 Emergency Response Program	5-1
6.0 References	6-1

List of Tables

Table	Title	Page No.
2-1	Required Assumptions for the Worst-Case Scenario.....	2-2
2-2	ALOHA™ Model Input Values and Results	2-3
2-3	Federally or Washington State Listed Threatened and Endangered Species Occurring or Potentially Occurring on the Hanford Site ¹	2-6

List of Figures

Figure	Title	Page No.
2-1	Off-Site Consequence Analysis 283-W Water Treatment Plant.....	2-4

List of Appendices

Appendix	Title
A	United States Geological Quadrangle Maps
B	Offsite Consequence Analysis Modeling Results

List of Acronyms

283W Facility	283-W Water Treatment Facility
CFR	Code of Federal Regulations
EPA	U.S. Environmental Protection Agency
lb	pound(s)
OCA	off-site consequence analysis
PHMC	Project Hanford Management Contract
RM	Risk Management
WCS	worst-case scenario

Executive Summary

This Risk Management (RM) Program covers the 283-W Water Treatment Facility (283W Facility), located in the 200 West Area of the Hanford Site. A RM Program is necessary for this facility because gaseous chlorine, a listed substance, is stored in excess of the threshold quantities defined in Title 40 of the Code of Federal Regulations Part 68 (EPA, 1998).

The RM Program contains data that will be used to prepare a RM Plan, which is required by 40 Code of Federal Regulation 68. The RM Plan is a summary of the RM Program information, contained within this document, and will be submitted to the U.S. Environmental Protection Agency (EPA) ultimately for distribution to the public. The RM Plan will be prepared and submitted separately from this document.

The 283W Facility receives raw water from the Columbia River, treats (filters and disinfects) the raw water, and exports the treated water for process, fire protection, potable and irrigation purposes in accordance with current drinking water standards. One step of the treatment process is chlorination. In the chlorination system, the 283W Facility uses gaseous chlorine, stored at the facility in one ton chlorine containers, for injection into the raw, untreated facility influent and for disinfection of post filtration effluent. Chlorine is used as an algaecide and disinfectant. Evaluation of the 283W Facility and chlorine storage capacity indicated that the 283W Facility stores or has the potential to store a chlorine inventory in excess of the threshold quantity (2,500 pounds); therefore, it is subject to the RM Program regulations.

Processes subject to the RM Program requirements are divided into three eligibility levels referred to as Programs 1, 2, and 3. Program 1 is available to any process that has not had an accidental release with off-site consequences in the past 5 years and has no public receptors within the distance to the toxic endpoint associated with a worst-case scenario (WCS). Program 3 applies to processes in certain Standard Industrial Codes and/or processes subject to the Occupational Safety and Health Administration Process Safety Management regulations, unless the process is eligible for Program 1. All other covered processes must satisfy Program 2 requirements.

An eligibility analysis for the 283W Facility indicated:

- 283W Facility has not had an accidental release in the past 5 years.
- The worst-case scenario (WCS) from the off-site consequence analysis does not include public receptors within the distance to the toxic endpoint.
- Emergency response actions are coordinated with the local community response program.

Based on this information, the 283W Facility is a Program 1 process.

Toxic endpoints have been established in the RM Program guidance (EPA, 1998) for chlorine. The toxic endpoint for chlorine is 0.0087 milligrams per liter. Although, EPA has developed "look-up" tables in the RM Program regulation to simplify the Hazard Assessment, this analysis used the ALOHA™ program developed by EPA and National Oceanic and Atmospheric Administration to model the offsite impact for the worst-case and alternative release scenarios.

The estimated WCS distance to the toxic endpoint and area affected by the release is:

- 3 miles
- 28 square miles.

Therefore, the affected population was assumed to be the population of the 200 West Area. It is estimated that a population of 1,739 (Green, 1999) is located within the affected area. Since access is restricted to the facility, no public receptors are within the WCS release area.

Based on the 1994, 1995, and 1997 surveys conducted by the Nature Conservancy of Washington (PNNL, 1998), there are no plants or mammals on the federal list of endangered and threatened wildlife and plants within the WCS release area. However, three species of birds (Aleutian Canada Goose¹, Bald Eagle, and Peregrine Falcon¹) are on the list. Additionally, there are 18 state-level species of plants and animals listed as threatened and endangered occurring or potentially occurring on the Hanford Site.

¹ Incidental Occurrence

A review of the Hanford Occurrence reporting system printout and discussions with 283W Facility personnel revealed that there have been no known on-site or offsite deaths, injuries, significant property damage or offsite environmental damage, evacuations, or sheltering in place for the last 5 years from the 283W Facility.

Since the eligibility analysis concluded that the 283W Facility is a Program 1 process, development of an accident prevention program is not required. The eligibility analysis is located in Chapter 1.0 of this document.

An Emergency Plan for the 283W Facility (FDH, 1998c) has been developed in accordance with RM Program guidelines. This plan includes procedures for, or references to, procedures for informing the public and emergency response agencies when an accidental release occurs. Procedures also include requirements for documentation of proper first aid and emergency medical treatment necessary to treat human exposure, and procedures and measures necessary for emergency response after an accidental release (including *Environmental Notification and Reporting* [FDH, 1997]).

1.0 Introduction

This Risk Management (RM) Program covers the 283-W Water Treatment Facility (283W Facility), located in the 200 West Area of the Hanford Site. A RM Program is necessary for this facility because it stores chlorine, a listed substance, in excess of or has the potential to exceed the threshold quantities defined in Title 40 of the Code of Federal Regulations (CFR) Part 68 (EPA, 1998).

The RM Program contains data that will be used to prepare a RM Plan, which is required by 40 CFR 68. The RM Plan is a summary of the RM Program information, contained within this document, and will be submitted to the U.S. Environmental Protection Agency (EPA) ultimately for distribution to the public. The RM Plan will be prepared and submitted separately from this document.

1.1 Program Scope

The scope of this RM Program for the 283W Facility is defined in the *Risk Management Program Guidance for Waste Water Treatment Plants (40 CFR Part 68)* (EPA, 1998). The RM Program consists of descriptions of the facility's:

- Off-Site Consequence Analysis
- 5-Year Accident History
- Document Management System
- Prevention Program
- Emergency Response Program.

Descriptions of these items are presented in Chapters 2.0 through 5.0. The remainder of this chapter is devoted to presenting the background for this RM Program, an overview of the facility, the RM Program applicability, and RM Program eligibility.

1.2 Background

A RM Program for the 283W Facility has been developed according to 40 CFR 68 (EPA, 1998) as promulgated by the EPA. The RM Program was established to prevent accidental releases to the air and mitigate the consequences of such releases, if they do occur, by focusing prevention measures on chemicals that pose the greatest risk to the public and the environment. A list of 140 flammable and toxic chemicals and threshold quantities has been defined in the RM Program

regulations (EPA, 1998). If a facility stores or has the potential to store an inventory of a regulated substance that exceeds the applicable threshold, the facility is required to develop a RM Program.

1.2.1 Facility Overview

The 283W Facility receives raw water from the Columbia River, treats (filters and disinfects) the raw water, and exports the treated water for process, fire protection, potable, and irrigation purposes in accordance with current drinking water standards. One step of the treatment process is chlorination. In the chlorination system, the 283W Facility uses gaseous chlorine stored in one ton chlorine containers for injection into the raw untreated facility influent and for disinfection of post filtration effluent. Chlorine is used as an algaecide and disinfectant. Evaluation of the 283W Facility and chlorine storage capacity indicated that the 283W Facility stores or has the potential to store a chlorine inventory in excess of the threshold quantity for chlorine (2,500 pounds [lb]) and, thus, is subject to the RM Program regulations.

1.2.2 Risk Management Program Applicability

An evaluation of facility chemical use and inventory indicated that RM Program applicability was limited to chlorine. Chlorine is used for water treatment and is stored at the facility in 1 ton containers. The total inventory is 4,000 lbs (two containers) of chlorine¹ when full.

1.2.3 Risk Management Program Eligibility

Processes subject to the RM Program requirements are divided into three eligibility levels referred to as Programs 1, 2, and 3. Program 1 is available to any process that has not had an accidental release with off-site consequences in the past 5 years and has no public receptors within the distance to the toxic endpoint associated with a worst-case scenario (WCS). Program 3 applies to processes in certain Standard Industrial Codes and/or processes subject to the Occupational Safety and Health Administration Process Safety Management regulations, unless the process is eligible for Program 1. All other covered processes must satisfy Program 2 requirements.

¹ The current inventory of the 283W Facility includes surplus containers from the 283E Facility. After use, the facility's normal inventory of 2 containers will be maintained.

An eligibility analysis for the 283W Facility indicated:

- 283W Facility has not had an accidental release in the past 5 years
- The WCS from the off-site consequence analysis (OCA) does not include public receptors within the distance to the toxic endpoint
- Emergency response actions are coordinated with the local community response program.

Based on this information, the 283W Facility is a Program 1 process. Therefore, the major components for this RM Program are the:

- RM Plan
- WCS Release Analysis
- Emergency Response Program Coordination.

These components are presented in Chapters 2.0, 3.0, and 4.0.

1.3 Risk Management Plan

The RM Plan consists of the Executive Summary and documentation of required data elements. The Executive Summary is a mechanism for a facility to describe its emergency response program and safe practices to the general public. Required data elements were defined in the *RMP Submit™ Users Manual* (EPA, 1999). The required data elements for the 283W Facility have been extracted from their respective section and compiled in the electronic format developed by the EPA Chemical Emergency Preparedness and Prevention office. These elements include information regarding facility registration, off-site consequence analysis, 5-year accident history, and the emergency response program.

The RM Plan will, at a minimum, be updated within 5 years of its initial submission. In addition, the RM Plan will be updated:

- Within 3 years after a newly regulated substance is first listed
- No later than the date which a newly regulated substance is present above threshold quantity for a new or covered process.

If revisions to the offsite consequence analysis or program eligibility are necessary, the RM Plan will be updated within 6 months of the process or program change.

2.0 Offsite Consequence Analysis

An OCA was conducted to assess a WCS as defined in this RM Program. The RM Program regulation (40 CFR 68) requires that the WCS consider the effects of a release down to a toxic endpoint. Toxic endpoints have been established in the RM Program guidance (EPA, 1998) for each listed substance. The toxic endpoint for chlorine is 0.0087 milligrams per liter in air. Although, EPA has developed “look-up” tables in the RM Program regulation to simplify the OCA, this analysis used the ALOHA™ program developed by EPA and National Oceanic and Atmospheric Administration to model the off-site impact for the worst-case and alternative release scenarios. The ALOHA™ program was chosen because it can simulate a dense gas, two-phase flow, and several release scenarios.

2.1 Worst-Case Release Scenario

Based on the RM Program guidance (EPA, 1998), the input required for the WCS is the worst-case release amount (quantity in largest single container), release time, mandated meteorological conditions, and the resulting distance to the toxic endpoint (i.e., the point beyond which the concentration of chlorine is below regulated limits). Mandatory input and the resulting impacts, population receptors, and environmental receptors are presented below.

2.1.1 Mandatory Input

Requirements in the RM Program guidance (EPA, 1998) define the input used for the WCS, including the release amount, release time, mandated meteorological conditions, and the toxic endpoint. Table 2-1 presents the required WCS input established by the RM Program regulation (40 CFR 68).

The chlorine one ton containers are stored within an enclosed structure. In the event of a sudden loss of the contents from the chlorine container, this building configuration would not offer any passive mitigation. Therefore, no credit was taken for passive mitigation.

Table 2-1
Required Assumptions for the Worst-Case Scenario

Requirement	Value
Release amount (quantity of the single largest container)	2,000 pounds
Release (pressurized, liquefied gas, contents completely released within 10 minutes)	Vapor Cloud
Wind Speed	3.4 miles per hour
Atmospheric Stability Class	F

2.1.2 Worst-Case Scenario Impacts

ALOHA™ Model results predict the estimated WCS distance to the toxic endpoint and the area affected by the release. These are:

- 3 miles
- 28 square miles.

Table 2-2 summarizes the WCS inputs and results. Figure 2-1 illustrates the area potentially affected by the WCS releases. The impacted area is also presented on the applicable United States Geologic Survey quadrangle maps (see Appendix A). Both the Gable Butte and Hanford maps are required to show the impacted area, the Gable Butte quadrangle containing the majority of the WCS impacted area. The ALOHA™ Model output for the WCS is located in Appendix B.

2.1.2.1 Population Receptors

The program Landview III™ was used to determine the impacted population from the WCS. Landview III is an information system that contains EPA regulated sites and demographic and economic data from the Bureau of Census presented in a geographic context. No census data are available for the area centered at the 283W Facility and within the WCS radius. Therefore, the affected population was assumed to be the population of the 200 West Area². It is estimated that a population of 1,739 (Green, 1999) is located within the affected area. Since access is restricted to the facility, no public receptors are within the WCS release area.

² Including the Waste Characterization and Sampling Facility, the Environmental Restoration Disposal Facility including their resident subcontractor work force, the 200 West Fire Station, and the Hanford Meteorological Station.

Table 2-2
ALOHA™ Model Input Values and Results

Input Categories	Worst-Case Scenario
Chemical Information	
Material	Chlorine
Molecular Weight	70.91 kg/kmol ⁴
TLV-TWA ¹	0.5 parts per million
IDLH ²	10 parts per million
Level of Concern	0.0087 milligrams per liter in air
Boiling Point	-29.25°F ⁵
Atmospheric Information	
Wind Speed	3.4 miles per hour
Stability	F
Ground Roughness	Open Country
Atmospheric Temperature	56°F ⁶
Relative Humidity	50 percent
Cloud Cover	3 tenths
Source Strength Information	
Release Rate	200 pounds per minute
Source Height	0
Release Duration	10 minutes
Total Amount Released	2,000 pounds
Footprint Information	
Level of Concern	0.0087 milligrams per liter in air
Max Threat Zone for LOC³	3 miles (15,840 feet)

¹ Threshold Limit Value-Time Weighted Average² Immediately Dangerous to Life and Health³ Level of Concern⁴ kilograms per mole⁵ degrees Fahrenheit⁶ Hanford Meteorological Station

Figure 2-1
Off Site Consequence Analysis
283-W Water Treatment Plant

NOTE:

Analysis Indicates Potential Area
Of Impact Is Entirely On Site.

WCS = Worst Case Scenario

2.1.2.2 Environmental Receptors

Based on the 1994, 1995, and 1997 surveys conducted by The Nature Conservancy of Washington (PNNL, 1998), there are no plants or mammals on the federal list of endangered and threatened wildlife and plants. However, three species of birds (Aleutian Canada Goose³, Bald Eagle, and Peregrine Falcon²) are on the list. Additionally, there are 18 state-level species of plants and animals listed as threatened and endangered occurring or potentially occurring on the Hanford Site. These are presented in Table 2-3. United States Geologic Survey quadrangle map (Appendix A) was used to identify the impacted environmental receptors for the WCS.

2.2 Document Maintenance

Documents are maintained at the 283W Facility in accordance with the Project Hanford Management Contract (PHMC) Document Management Policy (FDH, 1998a).

The RM Program will be kept onsite and will be made available upon request. The RM Program will be reviewed and updated at least once every 5 years. The RM Program will be revised within 6 months of a significant change and a revised RM Plan will be submitted. Significant changes are any change that might cause the WCS distance to the endpoint to change by a factor of two or more. Examples of these types of changes include changes to the process, the amount of chlorine stored or handled, or any other aspect of the 283W Facility operation that may affect the WCS distance to the endpoint.

³ Incidental Occurrence

Table 2-3
Federally or Washington State Listed Threatened (T) and Endangered (E) Species
Occurring or Potentially Occurring on the Hanford Site¹

Common Name	Scientific Name	Federal	State
Plants			
Columbia milkvetch	<i>Astragalus columbianus</i>		T
Columbia yellowcress	<i>Rorippa columbiae</i>		E
Dwarf evening primrose	<i>Camissonia (= Oenothera) pygmaea</i>		T
Hoover's desert parsley	<i>Lomatium tuberosum</i>		T
Loeflingia	<i>Loeflingia squarrosa</i> var. <i>squarrosa</i>		T
Northern wormwood ²	<i>Artemisia campestris borealis</i> var. <i>wormskioldii</i>		E
Umtanum desert buckwheat	<i>Eriogonum codium</i>		E
White Bluffs bladderpod	<i>Lesquerella tuplashensis</i>		E
White eatonella	<i>Eatonella nivea</i>		T
Fish			
Steelhead ³	<i>Oncorhynchus mykiss</i>		E
Birds			
Aleutian Canada goose ⁴	<i>Branta canadensis leucopareia</i>	T	E
American white pelican	<i>Pelecanus erythrorhychos</i>		E
Bald eagle	<i>Haliaeetus leucocephalus</i>	T	T
Ferruginous hawk	<i>Buteo regalis</i>		T
Peregrine falcon ⁴	<i>Falco peregrinus</i>	E	E
Sandhill crane ⁴	<i>Grus canadensis</i>		E
Western sage grouse ⁴	<i>Centrocercus urophasianus phaios</i>		T
Mammals			
Pygmy rabbit ²	<i>Brachylagus idahoensis</i>		E

¹ Table F.1, Pacific Northwest National Laboratory (PNNL), 1998, *Hanford Site Environmental Report for Calendar Year 1997*, PNNL-11795, UC-602, Richland, Washington.

² Likely not currently occurring on the site.

³ Upper Columbia River steelhead that migrate through the Hanford Reach.

⁴ Incidental occurrence.

3.0 Five-Year Accident History

A review of the Hanford Occurrence Reporting System printout and discussions with 283W Facility personnel revealed that there have been no known on-site or offsite deaths, injuries, significant property damage or offsite environmental damage, evacuations, or sheltering in place for the last 5 years from the 283W Facility.

4.0 Prevention Program

Since the eligibility analysis concluded that the 283W Facility is a Program 1 process, development of an accident prevention program is not required. The eligibility analysis is located in Chapter 1.0 of this document.

5.0 Emergency Response Program

The PHMC maintains and administers the Emergency Preparedness Program at the Hanford Site on behalf of U.S. Department of Energy. Much of the 283W Facility operations' emergency planning and response actions fall under the site-wide procedures. The 283W Facility participates in the PHMC site program in many ways, including:

- Building Emergency Director training
- Participation in PHMC sponsored drills
- Coordination of alarm responses and staging areas.

Project Hanford Management Contract written Building Emergency Plans and Emergency Action Levels (FDH, 1998b and DOE, 1998) provide current and updated procedures for response to many emergency scenarios. These procedures include catastrophic events of all types and the proper responses for each. Additionally, the 283W Facility reports its inventory of hazardous materials through the Federal Government's Emergency Planning and Community Right-to-Know Act (40 CFR 370).

An Emergency Plan for the 283W Facility (FDH, 1998c) has been developed in accordance with RM Program guidelines. This plan includes procedures for, or references to, procedures for informing the public and emergency response agencies should an accidental release occur. Procedures also include requirements for documentation of proper first aid and emergency medical treatment necessary to treat human exposure and procedures and measures necessary for emergency response after an accidental release (including *Environmental Notification and Reporting* [FDH, 1997]).

6.0 References

Fluor Daniel Hanford, Inc. (FDH), 1998a, *Processing Project Hanford Procedures*, HNF-PRO-589, Richland, Washington.

Fluor Daniel Hanford, Inc. (FDH), 1998b, *Emergency Preparedness Program*, HNF-PRO-424, Richland, Washington.

Fluor Daniel Hanford, Inc. (FDH), 1998c, *Building Emergency Plan for the 283-E and 283-W Buildings*, Revision 3, HNF-IP-0263-283E/W, July 13, 1998, Richland, Washington.

Fluor Daniel Hanford, Inc. (FDH), 1997, *Environmental Notification and Reporting*, HNF-PRO-453, Rev. 0, August 1997, Richland, Washington.

Green, William, 1999, *Personnel Estimates for Impacted Area*, E-mail from William E. Green, Jr. to C. Ray Windmueller, Dated March 17, 1999.

Pacific Northwest National Laboratory (PNNL), 1998, *Hanford Site Environmental Report for Calendar Year 1997*, PNNL-11795, UC-602, Richland, Washington.

U.S. Department of Energy (DOE), 1998, *DOE Hanford Emergency Response Plan*, DOE/RL/94-02, Richland, Washington.

U.S. Environmental Protection Agency (EPA), 1999, *RMP Submit™ Users Manual*, EPA-550-B99-001, U.S. Environmental Protection Agency, Chemical Emergency Preparedness and Prevention Office (EPA CEPP0), Washington, D.C.

U.S. Environmental Protection Agency (EPA), 1998, *Risk Management Program Guidance for Wastewater Treatment Plants (40 CFR Part 68)*, EPA-550-B-98-010, Washington, D.C.

Washington Administrative Code (WAC), 173-303-355, *Superfund Amendments and Reauthorization Act Title III Coordination*.

Appendix A
United States Geological Quadrangle Maps

List of Quadrangle Maps_____

Quadrangle Title

Gable Butte, Wash Provisional Edition 1986

Hanford, Wash Provisional Edition 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

RIVERLAND QUADRANGLE.
WASHINGTON-BENTON CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

PRODUCED BY THE UNITED STATES GEOLOGICAL SURVEY
CONTROL BY USGS, NOS/NOAA
COMPILED FROM AERIAL PHOTOGRAPHS TAKEN 1982
FIELD CHECKED 1983, MAP EDITED 1986
PROJECTION LAMBERT CONFORMAL CONIC
GRID: 1000-METER UNIVERSAL TRANSVERSE MERCATOR ZONE 11
100,000-FOOT STATE GRID TICS WASHINGTON, SOUTH ZONE
UTM GRID DECLINATION 1983 NORTH AMERICAN DATUM
20' EAST
MAGNETIC NORTH DECLINATION 1983 NORTH AMERICAN DATUM
To place on the predicted North American Datum of 1983,
move the projection lines as shown by dashed corner ticks
(19 meters north / 87 meters east)
There may be private inholdings within the boundaries of any
Federal and State Reservations shown on this map
No distinction made between houses, barns, and other buildings

PROVISIONAL MAP
Produced from original
manuscript drawings. Infor-
mation shown as of date of
photography.

SCALE 1:24 000

CONTOUR INTERVAL 10 FEET

CONTROL ELEVATIONS SHOWN TO THE NEAREST 0.1 FOOT
OTHER ELEVATIONS SHOWN TO THE NEAREST FOOT
To convert meters to feet multiply by 3.2808
To convert feet to meters multiply by 0.3048

THIS MAP COMPLES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092

1	2	3	1	Priest Rapids NE
4	5	6	2	Vernita Bridge
7	8	9	3	Coyote Rapids
			4	Emerson Nipple
			5	Gable Butte
			6	Malden Spring
			7	Snively Basin
			8	Iowa Plate

ROAD LEGEND

Improved Road
Unimproved Road
Trail
Interstate Route
U.S. Route
State Route

RIVERLAND, WASH.
PROVISIONAL EDITION 1986

4619-E6-TF-0

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

GABLE BUTTE QUADRANGLE
WASHINGTON-BENTON CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

PRODUCED BY THE UNITED STATES GEOLOGICAL SURVEY
CONTROL BY USGS, NOS/NOAA
COMPILED FROM AERIAL PHOTOGRAPHS TAKEN 1982
FIELD CHECKED 1983. MAP EDITED 1986
PROJECTION LAMBERT CONFORMAL CONIC
GRID: 1000-METER UNIVERSAL TRANSVERSE MERCATOR ZONE 11
10,000-FOOT STATE GRID TICS WASHINGTON SOUTH ZONE
UTM GRID DECLINATION 1927 NORTH AMERICAN DATUM
1980 MAGNETIC NORTH DECLINATION 20° EAST
VERTICAL DATUM NATIONAL GEODETIC VERTICAL DATUM OF 1929
HORIZONTAL DATUM 1927 NORTH AMERICAN DATUM
To place on the predicted North American Datum of 1983,
move the projection lines as shown by dashed corner ticks
(19 meters north, 86 meters east)
There may be private inholdings within the boundaries of any
Federal and State Reservations shown on this map
No distinction made between houses, barns, and other buildings

PROVISIONAL MAP
Produced from original
manuscript drawings. Infor-
mation shown as of date of
photography.

CONTOUR INTERVAL 10 FEET

CONTROL ELEVATIONS SHOWN TO THE NEAREST 0.1 FOOT
OTHER ELEVATIONS SHOWN TO THE NEAREST FOOT
To convert meters to feet multiply by 3.2808
To convert feet to meters multiply by 0.3048

1	2	3	1 Vermita Bridge
4	5	2 Copote Rapids	2 Locke Island
6	7	3 Riverland	4 Handford
		5 Shively Basin	7 Iowa Flats
		8 Horn Rapids Dam	

ROAD LEGEND
Improved Road
Unimproved Road
Trail
Interstate Route U.S. Route State Route

GABLE BUTTE, WASH.
PROVISIONAL EDITION 1986

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092

46119-E5-TF-024

Appendix B
Offsite Consequence Analysis
Modeling Results

***283W Facility Worst-Case Scenario
Modeling Result***

SITE DATA INFORMATION:

Location: HANFORD, WASHINGTON

Building Air Exchanges Per Hour: 0.32 (Unsheltered single storied)

Time: March 5, 1999 1613 hours PST (User specified)

CHEMICAL INFORMATION:

Chemical Name: CHLORINE Molecular Weight: 70.91 kg/kmol

TLV-TWA: 0.5 ppm IDLH: 10 ppm

Footprint Level of Concern: 0.0087 mg/liter

Boiling Point: -29.25° F

Vapor Pressure at Ambient Temperature: greater than 1 atm

Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC INFORMATION: (MANUAL INPUT OF DATA)

Wind: 1.5 meters/sec from NW at 10 meters

No Inversion Height

Stability Class: F (user override)

Air Temperature: 56° F

Relative Humidity: 50% Ground Roughness: Open country

Cloud Cover: 3 tenths

SOURCE STRENGTH INFORMATION:

Direct Source: 200 pounds/min

Source Height: 0

Release Duration: 10 minutes

Release Rate: 200 pounds/min

Total Amount Released: 2,000 pounds

Note: This chemical may flash boil and/or result in two phase flow.

FOOTPRINT INFORMATION:

Model Run: Heavy Gas

User-specified LOC: 0.0087 mg/liter

Max Threat Zone for LOC: 3.0 miles

Time: March 5, 1999 1613 hours PST (User specified)

Chemical Name: CHLORINE

Wind: 1.5 meters/sec from NW at 10 meters

FOOTPRINT INFORMATION:

Model Run: Heavy Gas

User-specified LOC: 0.0087 mg/liter

Max Threat Zone for LOC: 3.0 miles

miles