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Westinghouse Hanford Company — Richland, Washington

Hanford Operations and Engineering Contractor for the U.S. Department of Energy under Contract DE-AC06-87RL10930

Manual No. WHC-CM-7-5

Date September 1988 Copy No 4/3

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Title

ENVIRONMENTAL COMPLIANCE MANUAL

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WESTINGHOUSE HANFORD COMPANY

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Manual Title: ENVIRONMENTAL COMPLIANCE MANUAL

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Environmental Compliance

Regulatory Compliance

Date Published
August 1988

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P.O. Box 1970
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Westinghouse
Hanford Company

Internal
Memo

From: Environmental Division 80000-88-248
Phone: 6-5556 H4-51
Date: September 13, 1988
Subject: DISTRIBUTION OF WHC-CM-7-5, "ENVIRONMENTAL COMPLIANCE MANUAL"

To: Distribution

cc: REL:RJL File/LB

A copy of the initial issue of WHC-CM-7-5, "Environmental Compliance Manual" is enclosed. This Level II manual replaces the following antecedent contractors' manuals:

RHO-MA-139, "Environmental Protection Manual"
HEDL-MG-99, "Environmental Protection Manual"
UNI-M-31, "Environmental Control Manual"

A training program on the "Environmental Compliance Manual" has been developed by the Regulatory Analysis Section. Managers may schedule a training class on the entire "Environmental Compliance Manual" or any part by contacting Ethel M. Mueller on 6-1349.

Questions related to the implementation or distribution of this manual may be directed to H. P. Lachmann at 6-1143, H4-50.

R E Lerch

R. E. Lerch
Manager

mmc

Enclosure

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WESTINGHOUSE HANFORD COMPANY	Manual	WHC-CM-7-5
	Part	A, REV 0
	Page	1 of 6
ENVIRONMENTAL COMPLIANCE MANUAL	Effective Date	October 1, 1988
	Organization	Environmental Division

TITLE:

GENERAL PROVISIONS

Approved by

R E Lerch

Manager, Environmental Division

A1.0 PURPOSE

The purpose of this manual is to establish requirements and guidelines to be used by Westinghouse Hanford Company (WHC) that: (1) protect the environment from radioactive materials and other dangerous substances under WHC jurisdiction; (2) protect people from radionuclides and other dangerous substances in the environment; and (3) provide a tool to be used in conjunction with applicable U. S. Department of Energy (DOE) orders and other pertinent Federal, State and local laws, rules, and regulations promulgated for Environmental Protection in accordance with the policy defined in WHC-CM-1-1, Management Policies, MP 5.1 "Environmental Assurance."

The purpose of Part A is to describe general requirements pertaining to WHC organizations and personnel relative to environmental compliance, and to provide general instructions in the use of this manual.

In the event of conflict between two inconsistent provisions the more stringent provision shall govern.

A2.0 SCOPE

The requirements apply to all WHC organizations, facilities, projects and contractors using WHC facilities that involve or support the generation, handling, treatment, processing, possession, transfer, storage, disposal, or release of gaseous, liquid, or solid radioactive, dangerous, or regulated substances.

A3.0 RESPONSIBILITIES

a. The Manager, Environmental Division in consultation with the Office of General Counsel, shall be the final authority for interpretation of this manual.

b. All WHC Managers and Facility Managers shall ensure that activities and documents under the scope of A2.0 above are executed and written in accordance with the requirements of this manual.

c. Environmental Assurance Function shall have primary authority for the enforcement of this manual.

d. Regulatory Compliance Function shall identify, review, document, and communicate environmental regulatory changes to appropriate WHC organizations.

e. Office of General Counsel shall determine the intent and applicability of any existing, new or proposed environmental statute, regulation, rule or DOE order issued for compliance as requested by the Regulation Compliance Function.

f. All WHC divisions and departments identified by the Regulatory Compliance Function as potentially affected shall be responsible for providing relevant comments as requested, concerning proposed environmental regulations.

g. All WHC employees are responsible for notifying their immediate manager of any unsafe or questionable condition or practice which may affect personnel, facilities or the environment. The manager shall give notices of this nature immediate attention and notify Environmental Assurance.

A4.0 AS LOW AS REASONABLY ACHIEVABLE

All facilities shall be operated in a manner that ensures the generation and release of radioactive materials and other regulated substances are as low as reasonably achievable (ALARA) in accordance with WHC-CM-4-11, ALARA Program.

A5.0 APPLICABILITY AND COMPLIANCE

a. Regulatory Rigor

1. Environmental Control Limits (ECL) requirements are based on permit limits and WHC policy as derived from DOE requirements. All facilities shall comply with the ECL requirements of this manual or with DOE approved exemptions in order to operate.

2. The term "shall" denotes mandatory requirements that are based on applicable environmental statutes and regulations, DOE orders and WHC policy. All facilities shall comply with the "shall" requirements of this manual.

3. "Should" statements are provided as guidelines of good practice. They do not preclude other equally acceptable or better methods for obtaining compliance with ECL and non-ECL "shall" requirements. However, these guidelines normally provide an acceptable method of complying with, or demonstrating compliance with, a mandatory requirement, or they are based on good engineering practices.

b. Violation of Requirements

1. Management shall cease operations when it is determined that a facility or operation is not in appropriate compliance with any ECL requirements of this manual and can not reestablish compliance within the appropriate recovery period and cannot recover within the boundaries stated in the ECL. Operations can only resume after appropriate corrective action has been accomplished and verified by the Environmental Assurance Function or if approval to operate has been given by DOE. Appropriate documentation shall be issued for an event which involves the violation of an ECL if required in accordance with WHC-CM-1-3, Management Requirements and Procedures, MRP 5.14, "Event, Critique, and Unusual Occurrence Reporting." See A5.0.c.4 also.

2. The Manager, Environmental Assurance has the authority to order cessation of operations when it is determined that facility operation is not in compliance with an ECL and this noncompliance may result in an unsafe condition or cause adverse environmental impact.

3. The management of the organization noting a violation of a "shall" requirement shall issue a citation (e.g., notice of findings, letter of noncompliance, nonconformance report, etc.) to the organization responsible for the noncompliant facility, project or activity with a copy sent to Environmental Assurance whenever violations of the requirements of this manual occur. In the event of such violation, one of the two actions below shall be accomplished.

   - Corrective action is accomplished within 30 days of the citation.

   - The organization responsible for the noncompliant facility or practice shall, within 30 days of the citation, obtain an approved compliance plan that describes the steps and plans to be taken to correct the violation. Compliance plans shall provide trackable dates and shall be concurred with in writing by the program office (if applicable), the organization responsible for the noncompliant facility or practice, and the Environmental Assurance Function.

c. Compliance Plans

1. The Environmental Assurance Function may approve a compliance plan for the non-ECL requirements of this manual. Operations conducted in accordance with compliance plans shall not result in an undue hazard to health or the environment and shall not be in conflict with applicable legal requirements, DOE orders, or approved exemptions. Approval authority over the conditions of compliance plans of this manual rests with the functional organization for the noncompliant facility or activity, Safety and Quality Assurance and Environmental Assurance. Compliance plans shall be in writing; shall be numbered in order of request; and shall contain specific conditions and the time frame under which the compliance plan is to be granted.

2. The Environmental Monitoring Plan (EMP) shall be amended to reflect changes due to the compliance plan.

3. Environmental Assurance shall either grant or reject requests to prepare compliance plans within 15 days of their receipt.

4. Compliance plans shall not be required for noncompliant conditions that require less than 30 days to correct.

5. Guidance for obtaining compliance plans is contained in Appendix H.

A6.0 ENVIRONMENTAL MONITORING PLAN

a. The EMP shall consist of two major sections: (1) an Operational Environmental Monitoring Program and (2) Facility Effluent Monitoring Plans (FEMP). The program implementation plan and procedures for FEMPs shall also be generated by Environmental Protection.

b. The EMP shall contain the rationale, design, and operational criteria for monitoring and sampling programs, the extent and frequency of monitoring and sampling, procedures for laboratory analysis, the quality assurance requirements, and the verification and direction for the preparation and disposition of reports (DOE Order 5400.1).

c. The requirements and recommendations given in this manual for effluent monitoring and sampling and operational environmental monitoring shall be identified and their status documented in the EMP. In those cases where monitoring practices do not meet the requirements of this manual, compliance plans shall be written which include a timetable for implementation.

d. Operational Environmental Monitoring Program (OEMP)

- An OEMP manual shall be generated by Environmental Protection.

- o The OEMP shall be updated as needed, but not less than once every 2 years.

e. Facility Effluent Monitoring Plans (FEMP)

- o Each facility shall be responsible for preparing a written FEMP which is specific to those operations and processes which use, generate, release, or manage regulated substances.

- o The FEMP should be updated as process or regulatory changes occur and shall undergo a formal review and update by June 1 of each year.

- o Waste generation management shall obtain Environmental Assurance approval for all changes as well as the annual review and update of FEMPs.

f. The requirements of this section shall be met at new or modified facilities prior to startup.

A7.0 MANUAL REVIEW AND UPDATES

This manual shall be updated by Regulatory Compliance Function, in consultation with the Office of General Counsel, in accordance with MRP 2.16, "Controlled Manual System." A comprehensive review of the ECM shall take place every 2 years.

A8.0 MANUAL MAINTENANCE AND DISTRIBUTION

All WHC organizations responsible for facilities or activities governed by the provisions of this manual, shall be responsible for maintaining controlled copies of this manual.

A9.0 REFERENCES

1. DOE Order 5400.1, "Environmental Policy Statement."

2. WHC-CM-1-1, Management Policies, MP 5.1, "Environmental Assurance."

3. WHC-CM-1-3, Management Requirements and Procedures, MRP 2.16, "Controlled Manual System."

4. WHC-CM-1-3, Management Requirements and Procedures, MRP 5.14, "Event, Critique, and Unusual Occurrence Reporting."

5. WHC-CM-4-11, ALARA Program.

Table A-1. Regulated Substances and Requirements.

Regulated substance	Activity	External requirements[a]	Applicable section of this manual
Dangerous waste	Use	WAC 173-303-120	Part I
	Generation	WAC 173-303	Part I
	Treatment	WAC 173-303	Part I
	Storage	WAC 173-303	Part I
	Disposal: pre-1980	40 CFR 302 to 306 40 CFR 264	Part I Parts L, M, O
	Post-1980	WAC 173-303	Part I
	Release	WAC 173-303	Part B
	Transport	49 CFR 171-179 WAC 173-303	(See WHC-CM-4-3) Part I
	Underground injection	WAC 173-218	Part E
Nonhazardous waste (air emissions, sewage, landfill)	Disposal	WAC 248-96 WAC 173-240, 218 WAC 173-304	Part E & G
	Release	WAC 173-400	Part C
	Underground injection	WAC 173-218	Part E
Petroleum products	Storage	40 CFR 110	Part T
	Release	40 CFR 112	Part B
Asbestos	Storage	40 CFR 61	Part G, Y
	Demolition and renovation	40 CFR 61	Part C, Y
	Disposal	40 CFR 61	Part G, Y
Polychlorinated biphenyls	Storage	40 CFR 761	Part Y
	Disposal	40 CFR 761	Part Y
	Release	40 CFR 761	Part Y
Pesticides	Use	40 CFR 162-165 40 CFR 171 WAC 16-228, 230-232 WAC 197-11 WAC 173-303	Part P
Radioactive materials	Use	DOE orders	Parts D, F, H, J, K, N, O, Q, T
	Storage	DOE orders	Parts H, J, Q, T
	Disposal	DOE orders	Parts H, J, Q, T
	Release	DOE orders WAC 402-80	Parts D, F, N, O, Q
	Transport	DOE orders	(See WHC-CM-2-14)
CERCLA hazardous substances	Tank storage	40 CFR 280	Part T
CERCLA reportable quantities	Release	40 CFR 302	Parts B, M

[a]The title of the specific regulations listed here are given in Appendix J.

PST2E-0002-A-1

TITLE:

NONROUTINE RELEASES

Approved by

RE Lerch

Manager, Environmental Division

B1.0 PURPOSE

This Part sets forth the actions to be taken in the event of a spill or other nonroutine release of radioactive or other dangerous substance to the environment. In addition, this Part establishes the procedure used to assure compliance with the reporting requirements specified by environmental regulations such as the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Washington Department of Ecology (WDOE) Dangerous Waste Regulations (WAC 173-303).

B2.0 SCOPE

This Part applies to any accidental or intentional spill or discharge of the following substances.

1. Dangerous waste as defined in Part I
2. Regulated substances (including radioactive materials) as listed in Appendices A, B, C, D, E, F, and G
3. Oil and petroleum products.

B3.0 DEFINITIONS

Release--Any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment (40 CFR 302).

Release to the environment (spill)--Includes accidental or intentional discharges that are not wholly contained in a building or similar structure (40 CFR 302). Examples of releases to the environment include:

1. Direct release to a land surface or body of water.
2. Releases to ambient air either directly or by way of facility ventilation systems.
3. Releases to liquid effluent systems.
4. Releases into a secondary containment system that is open to the atmosphere (i.e., not wholly contained within a building or similar structure).

5. Releases from storage or shipping containers when such releases result in a loss of material as described in 1, 2, 3, or 4 above.

6. Spread of contamination from a release or disposal site, including biological transport by plants or animals.

WDOE hazardous substance--Any liquid, solid, gas or sludge, including any material, substance, product, commodity, or waste, regardless of quantity, that exhibits any property that would result in the material being regulated if it were a waste (see Part I for determination of regulated wastes) (WAC 173-303).

B4.0 RESPONSIBILITIES

a. All Westinghouse Hanford Company (WHC) employees shall immediately report all spills of dangerous wastes, hazardous substances, radioactive materials, and petroleum products to their immediate manager and/or their Building Emergency Director. Employees are reminded to call 811 for fire, ambulance, Hanford Patrol, or the Hazardous Materials Response Team if needed.

b. The facility manager (or Building Emergency Director, if applicable) shall report nonroutine releases, implement response actions, and investigate the event in accordance with the provisions of Section B5.0.

c. Environmental Protection shall:

   - Provide notifications in accordance with the provisions of Section B5.0 and B6.0.
   - Coordinate the development of remedial actions required as a result of a spill.

d. The Site Hazardous Waste Engineering Unit (SHWEU) shall, if necessary:

   - Specify the proper packaging, transportation, and burial requirements for the wastes generated during remedial actions.
   - Develop and maintain procedures to be approved by Environmental Assurance for the designation of dangerous waste.
   - Perform spill designations in accordance with WHC procedures.
   - Provide Environmental Protection with an evaluation of the spill designations.

e. Industrial Safety, Industrial Hygiene, and Operational Health Physics shall specify employee protection and site monitoring requirements necessary during monitoring and remedial actions associated with the spill.

B5.0 REQUIREMENTS

a. Nonroutine releases of nonradioactive dangerous waste or hazardous substances.

1. Waste generators (or Building Emergency Directors, if applicable) shall:

a. Immediately report any situations affecting facility and/or personnel safety requiring fire, ambulance or Patrol response or assistance in accordance with WHC-CM-4-1, WHC Emergency Plan. Reports shall be made to the Patrol Operations Center (811) and to the Emergency Duty Officer (3-3800).

b. Implement the actions specified in the facility Spill Prevention, Control, and Countermeasures Plan, if appropriate (40 CFR 265, WAC 173-303, 40 CFR 112).

c. Report any releases that exceed a CERCLA Reportable Quantity (RQ), a Superfund Amendment and Reauthorization Act (SARA) RQ, or a WDOE hazardous substance limit (as noted in Appendix G), the emission limits in a Prevention of Significant Deterioration (PSD) permit, or discharge limits in a National Pollutant Discharge Elimination System (NPDES) permit immediately upon verification to Environmental Protection per MRP 5.14.

- In the case of CERCLA/SARA/WDOE limit violations, document completion of the following actions and data pertaining to the release on the CERCLA/SARA/WDOE Hazardous Substance Release Report form (figure B-1).

  - Contact the SHWEU to verify the regulatory status of the release. During off-shift hours and weekends refer to the WHC on-call list. Official written verification of regulatory status shall be provided to the plants from the SHWEU within one working day.

  - Initiate telephone contact immediately with the WHC personnel listed on the CERCLA/SARA/WDOE Hazardous Substance Release Report. The date and time of each notification shall be recorded. Document time and date that Environmental Protection contacts the U.S. Department of Energy-Richland Operations (DOE-RL) Environmental, Safety and Health (ES&H) Duty Officer.

d. Report to Media Relations any nonroutine release that may require notification of the media. Notification should occur within one hour of discovery of the release. The DOE-RL Public Information Policy and/or MRP 5.14 require media notification in the following cases:

   - o The release of nonradioactive substances when DOE and/or WHC are required to report the release to state or federal agencies.
   - o Where personnel exposures to toxic materials exceed occupational standards or appear likely to have exceeded them if that cannot be immediately determined.
   - o Any occurrence involving the safety of the public or having the potential for significant onsite or offsite environmental consequences.
   - o When facilities are evacuated due to the suspected or actual release of toxic materials.

e. Report all releases of dangerous waste and hazardous substances, including those that do not exceed a CERCLA/SARA/WDOE RQ on a monthly basis via the Chemical Discharge History (CDH) form (figure B-2). Data shall be gathered by each facility on a monthly basis and sent to the Manager of the SHWEU. Reports shall be sent by the third working day after the end of each calendar month. A completed CDH shall be sent even if no releases occurred. The SHWEU shall complete the waste designation section, compile the reports, and transmit them to Environmental Protection for review and transmittal to DOE-RL. The SHWEU shall send the completed CDH to Environmental Protection by the sixth working day after the end of each calendar month.

2. Environmental Protection shall:

a. Immediately initiate telephone contact with the DOE-RL ES&H Duty Officer to report releases that exceed CERCLA RQ, SARA RQ, WDOE hazardous substance limits, NPDES permit limits, PSD permit limits, or any other applicable local, state, or federal air pollution control standards. Although the officer on duty and the telephone number change weekly, the correct telephone number can be obtained from the Hanford Patrol Operations Center on 3-3800. The DOE-RL will notify the appropriate federal, state, and/or local authorities.

b. Provide the facility manager with the time and date of notification associated with the spill as required in B5.0.a.1.c.

c. Visit the release site, if safe to do so, to verify the accuracy of the report and make a preliminary assessment of environmental damage.

d. Inform personnel responsible for facility sampling and monitoring programs of the release.

e. In conjunction with the Emergency Duty Officer, if applicable, and facility manager, Industrial Safety, Industrial Hygiene, and Operational Health Physics specify appropriate remedial action to clean up the spill site.

f. Prepare written notification of spills that exceed CERCLA RQ, SARA RQ, and/or WDOE hazardous substance limits for transmittal to DOE-RL within 10 days of the release (WHC policy per MRP 5.14).

b. Nonroutine releases of radioactive material.

1. Except in the event of a planned airborne release of noble gases or naturally occurring radon or its daughter products that are not from technologically enhanced materials, or planned liquid releases of tritium, waste generators (or Building Emergency Directors, if applicable), shall:

a. Immediately contact Environmental Protection in the event of nonroutine release of radioactive material that meets any of the following criteria:

- Results in an offsite release of radioactive material or results in exposure to any member of the general public.
- Exceeds a CERCLA release limit (see Appendix G) (WHC policy for implementing CERCLA reporting requirements).
- Any release of radioactive material via an effluent stream in a concentration which, if averaged over a period of 24 hours, would exceed 500 times the Derived Concentrations Guides (DCG)-Public (see Appendix A) (WHC policy based upon 10 CFR 20).
- Results in significant radioactive contamination in the onsite or offsite environment (WHC policy for implementing the requirements of DOE Order 5484.1).

b. Determine cause and take steps to prevent annual release limits as established in Parts D and F from being exceeded.

c. For discharges via liquid effluent streams, shut down the offending stream immediately if the concentration of a radionuclide released to the environment instantaneously exceeds 5,000 times the DCG-Public, unless shut down of the stream would result in a greater hazard to personnel than the release itself.

d. For discharges via airborne effluent streams, shut down the offending stream immediately if the concentration of a radionuclide released to the environment averaged over a 4 hour period exceeds 5,000 times the DCG-Public, unless shut down of the stream would result in a greater hazard to personnel than the release itself.

e. Immediately report to Media Relations any nonroutine release that requires notification of the media. Notification should occur within 1 hour of discovery of the release. The DOE-RL Public Information Policy and/or MRP 5.14 require media notification in the following cases:

- o Any offsite environmental release of radioactive material in excess of DOE administrative controls.
- o Where personnel exposures to radioactive materials exceed occupational standards or appear likely to have exceeded them if that cannot be immediately determined.
- o Any occurrence involving the safety of the public or having the potential for significant onsite or offsite environmental consequences.
- o When facilities are evacuated due to the suspected or actual release of radioactive materials.
- o Any confirmed leak from high-level radioactive waste storage tanks.

f. Waste generators shall complete an Event Fact Sheet report and investigate any nonroutine release per MRP 5.14.

2. Environmental Protection shall notify DOE-RL of a release of radioactive material that meets any of the following criteria:

- o Any offsite release that could reasonably be expected to result in an annual dose commitment to any member of the general population greater than the annual standards (DOE-RL Order 5481.1, DOE Order 5484.1).

- Any release to controlled or uncontrolled areas in concentrations which, if averaged over a period of 24 hours, would exceed 5,000 times the DCG-Public limits specified in Appendix A (DOE-RL Order 5484.1, DOE Order 5484.1).

- Any release that results in significant radioactive contamination in the onsite or offsite environment (DOE-RL Order 5484.1, DOE Order 5484.1). Significant radioactive contamination is defined as contamination above the local background level.

- Any release that exceeds a CERCLA RQ limit (40 CFR 302).

B6.0 REFERENCES

1. DOE Order 5484.1, "Environmental Protection, Safety, and Health Protection Information Reporting Requirements" (February 24, 1981).

2. DOE-RL Order 5484.1, "Environmental Protection, Safety, and Health Protection Information Reporting Requirements" (September 26, 1983).

3. 10 CFR 20, "Nuclear Regulatory Commission Standards for Protection Against Radiation" (May 18, 1988).

4. 40 CFR 112, "EPA Regulations on Oil Pollution Prevention" (March 26, 1976).

5. 40 CFR 265, "EPA Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities" (July 11, 1986).

6. 40 CFR 302, "EPA Designation, Reportable Quantities, and Notification Requirements for Hazardous Substances Under CERCLA" (December 22, 1986).

7. 40 CFR 355, "EPA Regulations for Emergency Planning and Notification Under CERCLA" (February 25, 1988).

8. 42 USC 9601, et seq, (Superfund), "Comprehensive Environmental Response, Compensation, and Liability Act of 1980."

9. WAC 173-303, "Dangerous Waste Regulations" (June, 1987).

10. WHC-CM-1-3, Management Requirements and Procedures, MRP 5.14, "Event, Critique, and Unusual Occurrence Reporting."

11. WHC-CM-4-1, WHC Emergency Plan.

CERCLA/SARA/WDOE Hazardous Substance Release Report

Substance Characterization, Including Name, Composition, wt%, Sp.G., and RQ:

Facility and Location:

Quantity and Source:

Cause:

Time, Date, and Duration of Release:

Location That Spill Has Drained To:

Injuries or Property Damage:

Immediate Corrective Actions and Recommended Long-Term Actions (Attach Additional Pages if Necessary):

For Additional Information, Contact:

SHWEU Verification Obtained From:

Telephone Contacts, Time, and Date:		**DOE-RL ES&H Duty Officer**	
Haz. Waste Prog. Office		**Plant Manager**	
SHWEU		**Plant Program Manager**	
Environmental Protection		**Media Relations**	

Signatures and Date:

Shift Support Manager	**Date**	**Shift Manager**	**Date**
Plant Manager	**Date**	**Proc. Eng. Group Manager**	**Date**

NOTE: This is an auditable report. Send original to:
Manager, SHWEU, 2750-E/A-105/200E, MSIN R1-51

P1726-0002-B-1

Figure B-1. CERCLA/SARA/WDOE Hazardous Substance Release Report.
(Page 1 of 3)

1. Enter information regarding substance name, composition, weight percent of constituents, and specific gravity or weight. Add other information that may be available to characterize the nature of the release.

2. Enter name of facility and location of release.

3. Enter quantity of release and exact point (e.g., tank number) of release.

4. Enter cause (e.g., spill, overflow, pump leak).

5. Enter time, date, and duration of release.

6. Enter location that spill has drained to (e.g., CSL, 216-Z-20).

7. Enter extent of injuries, damage, and approximate value of chemicals lost.

8. Describe immediate corrective actions (e.g., lock and tag of valve, repairs). Indicate whether an Unusual Occurrence report is being initiated.

9. Describe long-term actions that could or will be needed to prevent similar events in the future (e.g., procedural changes, equipment modifications).

10. Provide name and telephone number of person delegated the responsibility to obtain and provide additional information that will be required.

11. Contact the Site Hazardous Waste Engineering unit to verify the regulatory status of the release.

12. Waste generators shall initiate telephone contact immediately with the following organizations, and record time and date of contact on the release report:

    Organization

    - o Hazardous Waste Program Office
    - o SHWEU
    - o Environmental Protection
    - o Plant Manager
    - o Plant Program Manager
    - o Media Relations

Figure B-1. Instructions for Completing the CERCLA/SARA/WDOE Hazardous Substance Release Report.
(Page 2 of 3)

13. Environmental Protection shall initiate telephone contact with the DOE-RL Environment, Safety and Health (ES&H) Duty Officer, and provide the facility manager with the time and date of contact for entry on the release report.

14. When completed, transmit original copy of report to the Manager, SHWEU, 2750-E/A105/200-E, MSIN R1-51, and transmit copies of the report to all other WHC personnel listed on the form within 2 days. Environmental Protection shall submit written notification to DOE-RL within 10 days of any release which exceeds a CERCLA RQ, SARA RQ, or WDOE hazardous substance limit.

Figure B-1. Instructions for Completing the CERCLA/SARA/WDOE Hazardous Substance Release Report.
(Page 3 of 3)

Chemical Discharge History

Plant/Laboratory _____ Month/Year _____

Origin (Tank)	Date/ Time	Batch Name	Total Volume (gal)	Composition: Chemical Names and wt%	Composition: Pounds of Each Chemical	System to Which Discharged	Approvals		SHWEU Supplied Designation
							Plant Oper.	Plant Process Engineering Section	

Reason For Discharge:

Send completed form to: SHWEU, 2750-E/A-105/200E/MSIN R1-51

Figure B-2. Chemical Discharge History.

1. Enter the identity of the plant or laboratory.

2. Identify the month and year. Data gathered shall be for a single calendar month.

3. Enter origin of release, such as from a vehicle, leaking drum, pipeline, or a numbered tank, pump, or valve.

4. Enter time and date of actual release.

5. Enter common name of mixture, batch or material.

6. Enter reason for discharge, such as a leak, overflow, drain prior to pump repair, spill, discharge of heel, or rinsing of tank.

7. Enter total volume discharged (in gallons) and weight or specific gravity.

8. Enter names of chemicals and their weight percent in the solution.

9. Enter computed (or known) weight of each chemical constituent.

10. Enter identify of system to which discharged or location of spill.

11. The initials of the appropriate Operations and Plant Process Engineering managers will indicate acknowledgement of the discharge.

12. Designations will be entered by the SHWEU.

Figure B-2. Instructions for Completing Chemical Discharge History Form.
(Page 2 of 2)

TITLE:

NONRADIOACTIVE AIRBORNE EFFLUENTS

Approved by

R E Lerch

Manager, Environmental Division

C1.0 PURPOSE

The purpose of Part C is to establish standards governing airborne emissions of nonradioactive effluents that assure compliance with applicable regulations issued by the U.S. Environmental Protection Agency (EPA), Washington State Department of Ecology (Ecology), Benton-Franklin-Walla Walla Counties Air Pollution Control Authority (APCA), and WHC policy. Additionally, compliance with the provisions of this Part will assure that WHC nonradioactive effluents have no detrimental effect on the health, safety, or welfare of any person nor cause damage to property or the environment.

C2.0 SCOPE

The provisions of this part apply to controls for nonradioactive pollutants in airborne effluent from all existing and planned WHC facilities. These provisions apply to both nonradiologically contaminated and mixed airborne effluents.

C3.0 RESPONSIBILITIES

a. All facility management or managers of activities outside of facilities (activity management) shall:

- o Ensure that airborne emissions and releases comply with the requirements of this part
- o Ensure that the periodic tests and measurements required by this Part are conducted at the required frequency
- o Ensure that the continuous emission monitoring systems required by the provisions of this part are maintained as required
- o Notify Environmental Protection concerning the occurrence of excess monitored emissions or lapses in monitoring.
- o Ensure that reasonably available control technology (RACT) (as judged by the regulatory agency) is utilized for the purpose of reducing airborne emissions (WAC 173-400-040 and APCA G.R. 80-7, Sec. 400-040), and that the terms of applicable permits are met. This shall be done at the time of final design, and each time a permit is required for modification.

- o Ensure all applicable reporting requirements for non-routine releases are met (see Part B).

b. Notify Regulatory Analysis of the proposed construction of any new source of airborne emissions of any substance listed in Appendix K, or any modification of an existing source which may increase the rate of emission of such substance from any source. Such notification should be made as soon as practicable, but at least 180 days prior to construction or modification. Both emergency and routine maintenance or repair are excluded from this requirement. Emergency replacement, but not routine replacement is excluded from the requirement. Upon determination by Regulatory Compliance of the need for a permit application for the proposed action, Operations and Engineering management shall provide Regulatory Permitting/NEPA with all requested information necessary for permit application to the applicable agency. (40 CFR 61, 40 CFR 52). See part Q also.

c. Operations Support Services shall:

- o Operate, inspect, and maintain emissions reduction systems in accordance with the applicable emission control equipment operating procedures (WAC 173-400-040 and APCA G.R. 80-7, Sec. 400-040).

- o Schedule a filer system efficiency test after modifications to the fabric filter collection system have occurred which could alter removal efficiency.

d. Environmental Protection shall evaluate the reporting requirements concerning the occurrence of excess emissions or failures of monitoring systems and notify the U.S. Department of Energy (DOE) and facility and activity management when appropriate.

C4.0 MAXIMUM PERMISSIBLE EMISSIONS

a. Point Sources

1. Environmental Control Limit--Atmospheric emissions from WHC facilities shall not exceed the maximum permissible levels established by government agencies as summarized in Table C-1 or as noted in EPA or other regulatory agency permits. Violations of this requirement shall be reported in accordance with C11.0 Notifications. In addition, incident report(s) shall be generated by waste generators in accordance with MRP 5.14 (See Part V).

   Some contaminants do not, at present, have specified maximum permissible emission standards. Until guidance concerning the maximum permissible emission standards is established, for those contaminants WHC policy is based upon:

- o Not exceeding the occupational threshold values (ACGIH) stated in WHC-CM-4-3, Industrial Safety Manual, at ground level
- o Anticipated effect on material and property (General Reg. 80-7, APCA, Section 400-040).
- o Compliance with C4.0 a.2.

2. Environmental Control Limit--Airborne releases from WHC facilities that are not addressed through EPA or Ecology airborne release permits shall not (when considered in combination with all other effluent releases from the facility) exceed the RQ values stated in Appendix G of this manual in any 24-hour period. Violations of this requirement shall be reported immediately to Environmental Protection. (CERCLA)

b. Environmental Control Limit--WHC management shall assure that the WHC contribution to combined releases of all Hanford Site sources, as reported to Environmental Protection shall not result in a violation of any applicable PSD permit (See Table C-1 bases).

c. Releases shall not result in exceeding threshold limit values (ACGIH) at any routinely occupied ground level location or at the closest point of personnel occupancy, whichever is most limiting.

C5.0 OPEN BURNING

a. Environmental Control Limit--The following materials shall not be burned in any open fire: (1) garbage, (2) dead animals, (3) asphaltic products, (4) waste petroleum products, (5) paints, (6) rubber products, (7) plastics, (8) any substance, other than natural vegetation, that normally emits dense smoke or obnoxious odors, and (9) radioactive materials (WAC 173-425-045). Exceptions are stated in the basis regulation for fire training.

b. Environmental Control Limit--Open burning shall not be done during any stage of an air pollution episode declared by the APCA or state (Ecology) authorities (i.e., forecast, alert, warning, or emergency stages) (WAC 173-425).

c. Permits for all open burning shall be obtained from APCA in advance through the Regulatory Compliance Function of WHC.

d. Open burning shall adhere to requirements in WHC-CM-4-3.

e. The use of open burning as a disposal practice shall require concurrence from Environmental Protection (Gen. Reg. 80-7, Section 425-075).

C6.0 FUGITIVE DUST

a. Facility, construction project, and activity managers shall take actions to minimize the generation of fugitive dust during operations to ensure compliance with the limits for fugitive dust in Table C-1. Examples of fugitive dust generating operations are clearing, grading, leveling, excavating, and construction. Examples of measures to be taken are application of water (refer to Part L, Groundwater), use of windbreaks, or curtailment of operations on dry, windy days.

b. Facility and construction project managers shall take measures for fugitive dust control, such as revegetation or gravel placement, upon completion of earth-moving operations.

C7.0 CONTINUOUS EMISSION MONITORING SYSTEM REQUIREMENTS

a. Continuous emission monitoring systems (CEMS) with alarm capabilities shall be used for airborne effluents that have the credible potential (based on applicable SAR analysis, Environmental Monitoring Plan documentation, and operational history) to exceed 50% of any quantifiable release standard specified in Table C-1. Upset conditions and/or changes in operating conditions shall be considered in determining the potential to exceed the limits of Table C-1. (DOE 6430.1, Section 1300-8).

b. The CEMS and alarm systems shall not be required if it can be demonstrated to Environmental Protection that there is no reasonable potential for exceeding the applicable limit. The rationale used to determine monitoring and alarm requirements shall be documented in the Facility Environmental Monitoring Plan.

c. Monitoring Sensitivity

   1. Monitoring systems shall alarm at release concentrations as low as practicable without resulting in an excessive number of alarms due to normal fluctuations in background or normal fluctuations in emission rates.

   2. Monitoring systems shall alarm at release concentrations less than or equal to 50% of any quantifiable release standard specified in Table C-1 (DOE 6430.1, Section 1300-8).

d. Alarm annunciators for monitors shall be located in continuously or frequently occupied areas. A guideline for frequently occupied is once per every half hour.

e. The design of airborne nonradioactive effluent CEMS shall be consistent with EPA methods (40 CFR 60 Appendix E). Where an agreement exists with a local, state, or Federal authority (PSD permit, etc.) stating that a specific method will be used, that method shall be required.

f. Monitor Sample Frequency

1. Continuous monitoring systems for measuring opacity shall complete a minimum of one cycle of operation (sampling, analyzing, and data recording) for each successive 10-second period (WAC 173-400-120; 40 CFR 51, Appendix P, Sec. 3.4).

2. Continuous monitoring systems for measuring oxides of nitrogen, carbon dioxide, oxygen, or sulphur dioxide shall complete a minimum of one cycle of operation (sampling, analyzing, and data recording) for each successive 15-minute period (WAC 173-400-120; 40 CFR 51, Appendix P, Sec. 3.4).

g. Monitor Downtime

1. Loss of effluent monitoring capabilities required by the provisions of this section as a result of system failures shall be corrected by completing repairs as expeditiously as practicable (WAC 173-400-120). See C11.0, "Notifications."

2. Facility and activity management shall obtain concurrence from Environmental Protection prior to commencing routine CEMS maintenance that would result in any complete loss of required monitoring capabilities (WHC-CM-7-4, Environmental Surveillance and Control).

3. Waste generators shall control operations such that pollutant levels remain below the Table C-1 limits during periods of CEMS failure.

4. Interim Monitoring

a. During periods of oxides of nitrogen, carbon dioxide, oxygen, or sulphur dioxide monitoring system malfunction, waste generators shall be responsible for insuring repairs are completed as expeditiously as practicable (WAC 173-400-120) and that proper notification is forwarded to Environmental Protection. Documentation explaining downtimes shall be maintained for information during inspections by the regulatory agencies involved. (40 CFR 60.7; WAC 173-400-120).

b. During periods of opacity CEMS malfunction and continued facility emissions, waste generators shall be responsible for insuring that the malfunction was unavoidable and repairs are completed as expeditiously as practicable. (Gen Reg. 80-7, Sec. 400-120)

h. Waste generator shall ensure tracking and monthly reporting to SHWEU of releases of any toxic chemicals as specified in Appendix F (40 CFR 372). Also see Part B.

i. Utilities Operations shall have HEHF sample all power house boiler stacks at least every two years to determine the concentrations of particles, sulphur dioxide, and oxides of nitrogen. This characterization shall be required immediately after any modification that has the potential for increasing emissions. Operations Support Services shall forward the results to Environmental Protection.

j. Waste generators shall ensure written procedures for the following CEMS and related equipment concerns are developed and are approved by Environmental Protection:

- o Calibration, drift determination and adjustments
- o Preventive maintenance
- o Corrective action in the event of a malfunction or out-of-specification condition
- o Data recording, calculations, and reporting
- o Accuracy audit (performance test) procedures.

k. Continuous Emission Monitoring Systems Audits.

1. Each CEMS shall be audited (40 CFR 60, Appendix F) by or for the operating organization at least once each calendar quarter unless a more frequent audit is required by an Operational Safety Requirement (OSR). The audit procedures shall be in accordance with applicable permits and approved by Environmental Protection. Successive quarterly audits shall occur no closer than 2 months.

2. The operating organization responsible for maintaining each CEMS shall submit a report to Environmental Protection detailing the results of the quarterly CEMS audit within one month of the completion of a CEMS audit. The report shall include the following:

- o Identification and location of the monitors in the CEMS
- o A description of the monitors, including manufacturer, model number, and serial number
- o Assessment of precision and accuracy as determined by the audit
- o Description of test gases used in the audit
- o Results of the stack flow comparison data and monitor analysis data. (See Section C9.0 below).

C8.0 ANALYTICAL METHODS

Analytical methods for continuous monitoring of effluents shall be in accordance with applicable EPA methods (40 CFR 60, Appendix B; 40 CFR 51, Appendix P) for the contaminants specified by EPA. Alternate methods can be used with the approval of Environmental Protection where approved EPA methods are not specified or are shown to be inadequate.

C9.0 STACK FLOW COMPARISON

a. Stack flow rates under conditions of routine operation shall be measured on powerhouse boiler stacks:

   - o Every 2 years in conjunction with sampling for particulates, sulfur dioxide, and oxides of nitrogen
   - o After any modification that has the potential for changing stack flow rates.

b. For other stacks, Operations Support Services (Vent and Balance) shall determine stack flow rates under conditions of routine facility operations:

   - o Annually, unless experience has shown more frequent determinations to be necessary, or
   - o After any facility modification that may have significantly altered stack flow rates.

c. Stack flow rates shall be determined in accordance with 40 CFR 60, Appendix A, Method 1 and 2 or other method approved by the EPA Administrator (40 CFR 60, Appendix A). The results shall be forwarded to the appropriate process engineering group and to Environmental Protection for analysis.

d. The stack flow readings shall be within 20 percent of the pilot tube transverse reference method. If the readings are not within 20 percent, corrective action shall be initiated (40 CFR 60, Appendix A, Method 1).

e. Stack flow rate measurement requirements shall be included in the facility Environmental Monitoring Plan.

C10.0 RECORDS

Operations management shall maintain the following records for a minimum of 3 years, or longer as specified in applicable permits. All such records, or copies thereof, shall be retained at a location approved by Environment Protection and as per applicable Quality Assurance plans.

- o Calibration, maintenance, and repair records for all continuous monitoring instruments required by the provisions of this part.
- o The date and time identifying each period that pollution abatement control equipment was out of service.
- o The magnitude, date, and time of all violations of the requirements of this part in sufficient detail to state actual conditions during the violation.
- o The date and time identifying each period during which continuous monitoring instruments required by the provisions of this Part were inoperative (except for quality control checks) and the nature of repairs or adjustments.
- o Recorder checks and applicable logs.
- o Reports on measurements of stack particulate or other emissions which were performed to demonstrate compliance with the provisions of this part.

C11.0 NOTIFICATIONS

a. Facility operations or activity management shall notify Environmental Protection or a point of contact delegated in writing by Environmental Assurance of the following:

- o Environmental Control Limit violations - immediately.
- o Shutdown of any CEMS outside the allowed downtime for maintenance, or any other change which prevents the accurate measurement of emissions to the environment - within four hours of the shutdown.
- o Violations of OSR, Operating Specifications Document (OSD), permit requirements, or technical specifications with potential to result in increased airborne effluents - within one working day.
- o Failure of a required effluent treatment system test - within one working day.
- o Operations that could result in exceeding the limits of Section C4.0, "Maximum Permissible Emissions" - two working days in advance of the operation.

C12.0 REFERENCES

1. DOE Order 6430.1, "General Design Criteria."

2. 42 USC 9601, et seq, (Superfund), "Comprehensive Environmental Response, Compensation, and Liability Act of 1980."

3. 40 CFR 51, "Requirements for Preparation, Adoption, and Submittal of Implementation Plans."

4. 40 CFR 52, "Approval and Promulgation of Implementation Plans."

5. 40 CFR 60, "Standards of Performance for New Stationary Sources."

6. 40 CFR 61, "National Emission Standards for Hazardous Air Pollutants (NESHAP)."

7. 40 CFR 372, "Toxic Chemical Release Reporting: Community Right-to-Know."

8. PSD-X80-14, "Approval of Application to Construct," EPA Region X.

9. WAC-173-400, "General Regulations for Air Pollution Sources."

10. WAC-173-403, "Implementation of Regulations for Air Contaminant Sources."

11. WAC-173-425, "Open Burning."

12. General Regulation 80-7, "Benton-Franklin-Walla Walla Counties Air Pollution Control Authority."

13. WHC-CM-4-3, Industrial Safety Manual.

14. WHC-CM-7-4, Environmental Surveillance and Control.

15. Threshold Limit Values and Biological Exposure Indices, American Conference of Governmental Industrial Hygienists (ACGIH).

Table C-1. Standards for Nonradioactive Emissions. (sheet 1 of 2)

Pollutant/activity	Standard	Basis
Air Contaminants (general) and Water Vapor	Shall not impact health, safety, or welfare of any person or damage property	WAC 173-400-040; APCA General Regulation 80-7, Sec. 400-040
Asbestos	No visible emissions. Minimize air suspension by wetting during handling	WAC 173-400-075
Asbestos (related to demolition or renovation project)	Less than 80 linear meters (260 linear feet) on pipes or 15 square meters (160 square feet) on other facility components. Advance notification to EPA required before demolition/ restoration if these limits met or exceeded.	40 CFR 61, Subpart M
Asbestos; Benzene; Beryllium; Inorganic Arsenic; Mercury; Vinyl Chloride	Application for Approval of the construction of any new source or modification of any existing source which will result in increased rate of emission. Application must be made to EPA well in advance of new or increased emission	40 CFR 61
Construction or modification of any source emitting a substance listed in Appendix E	Any new or increased emission of a substance listed in Appendix E will require permit review under the Clean Air Act well in advance of the emission. (Notify Regulatory Analysis per Section C3.0b of this Part.)	40 CFR 61; 40 CFR 52; General Regulation 80-7, APCA; WAC 173-403 (Ecology)
Odors	Shall not interfere with use of adjoining property. Shall be minimized by recognized good practice and procedure	WAC 173-400-040; also APCA General Regulation 80-7, Sec. 400-040
Opacity	Stack emissions shall not exceed 20% opacity for more than 3 min in any hour, except for boiler facilities where opacity may exceed 20% for 15 min in any 8 h as long as these 15 min periods are scheduled for the same approximate time each day and the local air authority is advised of the schedule. These limits do not apply where presence of uncombined water is the only reason for opacity exceeding 20%. Exceptions for major sources of NO_2 may be applied for with the APCA or may be inherent in NO_x PSD permits (e.g., PUREX PSD-X80-14).	WAC 173-400-040; also APCA General Regulation 80-7, Sec. 400-040
Open Burning	Permit required from APCA through the Regulatory Compliance Function of Westinghouse Hanford Company	APCA General Regulation 80-7, Part D

PST2E-0002-C-1

Table C-1. Standards for Nonradioactive Emissions. (sheet 2 of 2)

Pollutant/activity	Standard	Basis
Oxides of nitrogen (NO_X) emissions from the PUREX Plant and UO_3 Plant	Limits specified in the PUREX Plant PSD Permit.(PSD-X80-14): • Main absorber exit 2.0 vol% (dry), 1160 kg/d • Main stack 2250 kg/d, 424 MT/yr • UO_3 Plant, final condenser exit upstream of dilution 4.0 vol%, 858 kg/d, 50 MT/yr 333 Building Chemical Bay Stack; Limits from APCA: • 350 kg/d • 60 MT/yr	40 CFR 52; APCA General Regulation 80-7
Particulates	230 mg/m^3 (0.1 grains/dscf) in ambient air. No significant impact from deposition beyond plant site. Reasonable precaution to prevent airborne suspension of dust. (Concentration for combustion/ incineration sources determined after volumes are corrected to 7% oxygen)	WAC 173-400-050, -060; also APCA General Regulation 80-7, Sec. 400-050
Startup, Shutdown, Breakdown, or Upset Condition, which could result in an Emission Violation or a Violation of an Ambient Air Quality Standard	For planned condition: Notify APCA in advance For unplanned condition: Notify APCA within one working day (Above notifications made through the Regulatory Compliance Function)	WAC 173-400-120; also APCA General Regulation 80-7, Sec. 400-120
Sulfur Dioxide (SO_2)	2.6 E + 6 µg/m^3 (1,000 ppm) at stack exit	WAC 173-400-040; also APCA General Regulation 80-7, Sec. 400-040
Total Carbonyls from Combustion or Incineration Sources	100 ppm at stack exit, after volumes are corrected to 7% oxygen	WAC 173-400-050; also APCA General Regulation 80-7, Sec. 400-050
Toxic Chemicals (see Appendix F)	Any fugitive or point source emissions must be tracked and reported to EPA and Ecology annually	40 CFR 372

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D1.0 PURPOSE

The purpose of Part D is to establish requirements and guidelines governing airborne emissions of radioactive effluents that will assure compliance with Federal, State, and local regulations, DOE Orders, and with WHC policy.

D2.0 SCOPE

The provisions of this Part apply to all existing and planned WHC facilities and activities.

D3.0 RESPONSIBILITIES

a. WHC management shall ensure compliance with airborne radionuclide emission limits which apply to the Hanford Site as a single source.

b. Waste generation management shall:

- o Provide, calibrate, operate, and maintain the sampling and monitoring equipment required by this Part according to the requirements of this Part
- o Ensure that airborne emissions of radionuclides comply with the requirements of this Part and are as low as reasonably achievable (ALARA)
- o Ensure that the tests required by the provisions of this Part are conducted at the required frequency
- o Be responsible for the development of procedures and the training of facility personnel to prevent and eliminate ventilation upsets and unfiltered pathways to the environment.

c. Support Services Management shall ensure that the periodic tests and measurements of filtration systems and components are performed in accordance with the requirements of this Part.

d. Operational Health Physics shall:

- o Perform daily inspections of stack sampling and monitoring equipment and monthly source checks of monitoring equipment utilizing National Bureau of Standards (NBS) traceable sources (WAC-173-400-120, APCA-80-7-400-120).
- o Notify Environmental Protection and Plant Management of any deficiency that could result in impact on the quality of effluent sampling data.

D4.0 GENERAL REQUIREMENTS

a. The operational objective for the management of airborne effluents is to control concentrations of radionuclides released to the environment to ALARA levels with the goal of not exceeding the Derived Concentration Guide (DCG)-Public values of Appendix A of this manual at the point of release. (Note: See definition of threshold concentration in Appendix I.)

b. Work involving dispersable radioactive materials shall be performed in an enclosed facility or temporary enclosure with exhaust filtration. For work involving temporary enclosures, Operational Health Physics shall determine the degree of filtration capability necessary to ensure emissions are maintained ALARA. Exceptions to this requirement for outdoor work involving equipment or structures too large to reasonably enclose shall be regulated by WHC-CM-4-9, Radiological Design Criteria, Section 4 and by a special Radiation Work Permit (RWP).

c. Operations management shall notify Regulatory Analysis of the proposed construction of any new source of airborne radionuclide emissions or any modification of an existing source which may increase the rate of emission of airborne radionuclides from any source. Such notification should be made as soon as practicable, but at least 180 days prior to construction or modification. Both emergency and routine maintenance or repair are excluded from this requirement. Emergency replacement, but not routine replacement, is excluded from this requirement. Upon determination by Regulatory Compliance of the need for a permit application for the proposed action, Operations and Engineering management shall provide Regulatory Permitting/NEPA with all requested information necessary for permit application to the applicable agency. (40 CFR 61.07, 40 CFR 52. See Part Q also.)

D5.0 MAXIMUM PERMISSIBLE EMISSIONS

The administrative control values (ACVs) contained in this section are WHC ALARA goals. The ACVs restrict emissions of airborne radionuclides to ALARA levels utilizing currently available reliable effluent treatment technology (DOE Order 6430.1, Section 1300-8). The ACVs also ensure that

WHC airborne radionuclide emissions are well below the required levels for compliance with all applicable Federal, State, and local authority airborne radionuclide emission limits.

a. All Facilities and Operations

1. Environmental Control Limit--The emission of radionuclides in air from the combined discharge of all WHC-operated facilities shall not exceed those amounts that would cause a dose equivalent of 25 mrem/yr to the whole body or 75 mrem/yr to the critical organ of any member of the public. Doses due to radon-220, radon-222, and their respective decay products are excluded from these limits (40 CFR 61, Subpart H).

2. Individual airborne effluents shall not result in the annual average concentration at any ground-level location (DOE 6430.1, Sec. 1300-8) or other occupied area (DOE Order 5480.4, ALARA) exceeding one times the DCG-Public value as specified in Appendix A of this manual. Facilities shall enforce appropriate administrative controls that consider atmospheric conditions relative to operations for the purpose of ensuring compliance with this requirement.

b. General Facility Requirement

1. Except for noble gases, and the exceptions stated in D5.0.c.1 and D5.0.c.2, the annual average concentration of radionuclides released to the environment shall not exceed an ACV of 1 times the DCG-Public value (unity rule applies; see Appendix A) specified in Appendix A of this manual at the point of release (e.g., top of the stack). Requirements for noble gases are stated in D5.0.b.4. (See Part V.)

2. Except for noble gases the weekly average (any consecutive 7-day period) concentration of radionuclides released to the environment in airborne effluents from the stacks listed in D5.0.c, shall not exceed 10 times the annual average ACV concentration specified for that stack at the point of release. (See Part V.)

3. Except for noble gases, the maximum instantaneous concentration of radionuclides released to the environment in airborne effluents from any source shall, as averaged over any 4-hour period at the point of release, not exceed 5,000 times the DCG-Public value specified in Appendix A (see Part V). Requirements for noble gases are stated in D5.0.b.4.

4. Noble Gases

a. The annual discharge of ^{85}Kr from all 200 Area processing facilities shall not exceed a combined release of 4 E+06 Ci/yr.

b. The annual discharge of ^{41}Ar from all 100 Area sources shall not exceed a combined release of 6 E+05 Ci/yr.

c. The annual discharge of ^{133}Xe and ^{135}Xe from all 100 Area sources shall not exceed a combined release of 3 E+06 Ci/yr.

d. The annual discharge of radon (including thoron) and the resultant decay products shall be ALARA (DOE Order 5480.4, ALARA). The ALARA-based ACV limit for discharge of ^{220}Rn or ^{222}Rn from any WHC facility should not exceed $5X10^{-6}$ μCi/ml on an annual average basis.

c. Exceptions

1. Except for noble gases exceptions provided above, the annual average concentration of radionuclides released to the environment from the stacks listed below shall not exceed 10 times the DCG value (unity rule applies) specified in Appendix A of this manual at the point of release (i.e., top of the stack).

291-B-1	296-A-29	296-A-38	296-B-14	296-S-7E
296-A-27	296-U-2	296-Z-3	296-Z-5	
296-S-7W	296-A-1	296-A-2	296-A-17	

2. Except for noble gases exceptions provided above, the annual average concentration of radionuclides released to the environment from the stacks listed below shall not exceed the listed relationship to the DCG values specified in Appendix A of this manual at the point of release (i.e., top of the stack). The unity rule applies where the ACV addresses radionuclides that decay by the stated form of decay (e.g., the sum total of the ratios of alpha emitter concentrations to their respective ACV values shall not exceed one). Where a value is given for a specific isotope, the limit applies only to that isotope and does not affect the unity calculation of other limits. Reference to beta emitting radionuclides in the table below includes all non-alpha emitting radionuclides.

Stack	ACV
291-A-1 PUREX	10 x DCG for alpha emitting radionuclides 100 x DCG ^{106}Ru 10 x DCG ^{129}I 10 x DCG for beta emitting radionuclides other than ^{106}Ru and ^{129}I
291-T-1 T Plant	10 x DCG for alpha emitting radionuclides 10 x DCG for beta emitting radionuclides
296-A-24 PUREX Ammonia Stack	400 x DCG ^{106}Ru 10 x DCG for alpha emitting radionuclides 10 x DCG for beta emitting radionuclides other than ^{106}Ru
291-Z-1 Plutonium Finishing Plant	100 x DCG for alpha emitting radionuclides 10 x DCG for beta emitting radionuclides
296-U-4 UO_3 Plant	100 x DCG gross uranium 10 x DCG all other activity
100-N Combined	100 x DCG all radioiodine 1 x DCG all other activity

3. Maximum Instantaneous Concentrations. See D5.0.b.3.

4. ^{85}Kr. See D5.0.b.4.

d. Nonradioactive (non-potentially radioactively contaminated) airborne streams shall not be added to radioactive streams for the sole purpose of compliance with concentration limits in D5.0.b and c.

e. Additional Limits

1. In addition to the limits specified in D5.0.b and c. above, the Environmental Assurance Function may direct facilities to limit the concentration(s) of radioactive materials released to the environment in airborne effluents during a specified period of time if it appears likely that:

   o Any DOE or contractor requirements would be violated, particularly by the cumulative effect of multiple release points

- o Any individual, other than radiation workers would be exposed to concentrations of radionuclides in excess of the DCG values specified in Appendix A

- o Long-term buildup of radionuclides in soil will exceed the soil standards specified in Part K of this manual.

f. Environmental Control Limit

Radiologically contaminated material shall not be disposed of via open burning.

D6.0 CONTINUOUS MONITORING AND ALARM REQUIREMENTS

a. Continuous monitoring and alarm systems shall be provided for all systems that have the potential at any point in time to exceed 10 x any of the DCG-Public values (as listed in Appendix A) at the point of release. This requirement does not apply to effluents for which it can be demonstrated to Environmental Protection that there is no reasonable potential for exceeding the ACVs in D5.0.

b. Audible and visible indications shall be easily discernible to responsible personnel in continuously or frequently occupied areas. A guideline for "frequently occupied" is once per every half hour.

c. Monitoring Sensitivity

1. Monitoring systems shall alarm at release concentrations as low as possible without resulting in an excessive number of alarms due to normal fluctuations in background or normal fluctuations in releases.

2. Monitoring systems shall have the capability to alarm at the time-integrated equivalent concentration equal to a four-hour release at 5,000 times the DCG-Public value as noted in Appendix A of this manual. (See D5.0.b.3 of this Part.)

   Systems for monitoring tritium, carbon-14, or noble gases shall meet only the as-low-as-possible requirement of D6.0.c.1 using reasonable equipment. "Reasonable" shall imply some balance between state-of-the-art detection, reliability, availability, and maintainability.

d. Airborne effluent streams shall be monitored for each type of radiation or radionuclide (e.g., gross alpha, gross beta, radioiodine) that has a potential for exceeding the concentrations in D.6.0.c.2, unless unusual increases in one type of radioactivity or radionuclide are accompanied by simultaneous increases of known magnitude in another monitored type.

For instance, if an effluent stream discharges both alpha-emitting radionuclides and beta-emitting radionuclides in concentrations that both increase during abnormal conditions, then either an alpha- or beta-detecting monitor may be used.

e. Air monitoring systems shall be calibrated in accordance with ANSI N323 1978 and ANSI N42.18 (and ANSI N317-1980 where applicable) when installed and anytime they are subject to maintenance or modification (DOE Order 5480.4). A primary calibration shall be performed at least once which shall encompass the entire system including the detector and sample collector. Calibration of the collection system includes checking sample piping for particle loss and verifying the absence of air inleakage. The primary calibration can be performed in a controlled environment rather than after installation. Monitoring systems should be recalibrated at least annually. The primary calibration shall be related to a secondary source or method which will be used for periodic recalibration in the plant. The exact conditions of calibration (calibration points, range, and traceability to the NBS shall be specified and documented in the facility environmental monitoring plan. Records or exact conditions of calibration should be maintained in accordance with ANSI N13.6.

f. The facility maintenance organization shall keep a record of maintenance, calibrations, system anomalies, etc., for each instrument for a period of at least 2 years. These records shall be maintained in accordance with the requirements stated in ANSI/ASME NQA-1.

g. Radioactive effluent continuous air monitor (CAM) designs shall meet the criteria specified in ANSI N42.18-1980 and ANSI N13.1-1969 and shall use the most reasonably available control technology available at the time of final design.

h. Air monitoring systems shall be powered from a source which has the same or equivalent emergency capability as the air mover for the effluent stream being monitored.

i. Air monitoring systems shall be inspected daily and source-checked monthly by Operational Health Physics.

j. Monitor Downtime

   1. Loss of effluent monitoring capabilities required by the provisions of this section as a result of system failures shall be corrected as soon as possible. Operations with the potential to contribute airborne radionuclide emissions shall be discontinued to the maximum extent compatible with safe operation if continuous monitoring is not restored within 72 hours.

2. Monitoring system downtime as a result of scheduled maintenance shall be limited to 4 hours per day unless prior approval is obtained from Environmental Protection.

3. During periods of monitoring system maintenance or malfunction on the stacks listed in D5.0.c facility operations management and Operational Health Physics shall be responsible for ensuring the parameter concerned is analyzed at 2-hour intervals by use of another temporary sampling method approved by Operational Health Physics. Analysis of samples by the approved temporary method shall not constitute restoration of monitoring capabilities as required in D6.0.j.1 without approval of Environmental Assurance.

k. Air monitoring systems installed after January 1, 1986, shall maintain representative sampling as defined in D7.0.b.

D7.0 SAMPLING REQUIREMENTS

a. Sampling systems shall be provided for all airborne effluents which have the potential to exceed 10% of any DCG-Public value on an annual average as noted in Appendix A of this manual.

(NOTE: Requirements for sampling and monitoring diffuse sources of airborne radioactivity are contained in Part O, "Environmental Monitoring" of this manual.)

For purposes of this part, an exhaust system is required to be sampled if any feeder stream or any part of the exhaust upstream of the filtration system is contaminated in excess of 10% of the DCG-Public value on an annual average.

It is the intent of this requirement to provide the means for accurate measurement of airborne releases of radioactive materials to the environment.

b. Sampling systems shall provide representative sampling. Standard error in proportional sampling shall not exceed 20% on a continuous basis (i.e., near isokinetic).

c. Each airborne effluent release point (as defined under normal operating conditions or remedial actions) shall have a unique identification number and each sample point shall have a unique electronic data processing (EDP) code. Environmental Protection has the responsibility for assigning these numbers.

d . Sample probes shall withdraw a near-isokinetic sample, be downstream of all effluent treatment systems, be configured to minimize sample loss in the sampling system, and be located as close as practical to the point of release. (DOE 6430.1, Section 1589-99.0.1)

e. Stack record air samples shall be collected at a sample flow rate and over a sufficient time to achieve the analytical requirements of Subsection D7.0.g. Unless otherwise informed, to achieve the analytical requirements the samples should be collected at a flow rate of 0.06 cu. meters/min (2 cfm) for a minimum of one week. Any reduction in flow rate or sample collection period will cause a proportional increase in the analytical detection level.

The flow meter, or the flow volume totalizer when it is a part of the record sampling measurement system, shall be routinely cleaned and calibrated. Prior to installation and at least annually thereafter, this equipment should be calibrated to within ± 10% of value at the normal operating flow rate at 95% confidence interval relative to a standard traceable to the NBS. The flow volume totalizer shall record total sample volume in units of cubic meters except when special arrangements are made with Environmental Protection for use of other volumetric units.

Preventive maintenance on vacuum pumps shall be provided in accordance with the manufacturer's recommendations or maintenance procedures. The frequency shall be according to the manufacturer's recommendations or as determined by a documented evaluation of the system.

f. Specific radionuclide analysis shall be performed on quarterly composites of record samples in accordance with the following criteria.

1. For stacks with average flow rates greater than 280 cu meters/minute (10,000 cfm), specific radionuclide analysis will be required when the total alpha or total beta concentration exceeds 10% of the DCG-Public value (as noted in Appendix A of this manual) for the most restrictive radionuclide not known (based upon process knowledge and/or source term characterization) to be absent from the stream.

   NOTE: Definition of the most restrictive radionuclide for each effluent release point shall be stated in the facility effluent monitoring plan. See Section A7.0.

2. For stacks with average flow rates less than 280 cu meters/minute (10,000 cfm), specific radionuclide analysis will be required when the total alpha or total beta concentration exceeds 50% of the DCG-Public value (as noted in Appendix A of this manual) for the most restrictive radionuclide not known (based upon process knowledge and/or source term characterization) to be absent from the stream.

3. When the ratio of isotopes present in the discharge is unknown or changing, the isotope present with the most restrictive DCG-Public value (as noted in Appendix A of this manual) shall be assumed for the gross beta/gamma and gross alpha activity.

g. The counting error for analytical data, excluding error due to facility stream volume measurement, shall be computed at the 95% confidence level. The limit of detection shall be equal to or less than 10% of the DCG.

h. Analytical Laboratories shall conduct a quality control program to ensure accuracy and precision of effluent sample analyses.

i. Record sampling system designs shall be reviewed and approved by Environmental Protection prior to construction or modification. Record sampling systems should be installed to operate separately from monitoring systems.

j. Waste generation managers shall be responsible for developing and maintaining record sampling schedules. Record sample schedules shall be approved by Environmental Protection. Changes to the record sampling schedule, including temporary or one time deviations, shall be pre-approved by Environmental Protection.

k. Record sample system downtime

1. Loss of effluent record sampling capabilities required by the provisions of this section shall be corrected as expeditiously as practicable. (Reference APCA General Reg. 80-7, Section 400-120.) Operations with the potential to contribute airborne radionuclide emissions shall be discontinued to the maximum extent compatible with safe operations if a record sampling method approved by Environmental Protection is not operational within 8 hours and if continuous record sampling is not restored within 72 hours. (Reference WHC ALARA Policy.)

2. The loss of record sampling capabilities as a result of scheduled maintenance shall be limited to four hours during any 24-hour period. (Reference WHC ALARA Policy.) This requirement does not preclude the use of alternative record sampling methods approved by Environmental Protection.

D8.0 EFFLUENT FILTRATION AND TREATMENT

A. Required equipment

1. Particulate filtration

a. Final airborne particulate treatment on all airborne effluents which have the potential to exceed 10% of the DCG-Public value on an annual average basis as noted in Appendix A of this manual shall use high efficiency particulate air (HEPA) or equivalent filters. An installed HEPA or HEPA equivalent filter shall have an efficiency of 99.95% in the removal of airborne particulates as stated in D8.0.b.4.a..

b. The number of exhaust filtration stages shall be sufficient to limit concentrations of airborne radioactive particulates released to the environment to less than the limits in D5.0.b.1, D5.0.c.1, or D5.0.c.2 as applicable, during normal conditions and up to design basis accident conditions. (Reference DOE Order 6430.1, Section 1300-8.) Determination of the number of exhaust filtration stages shall be performed in accordance with WHC Radiological Design Criteria. (Reference WHC-CM-4-9, Section 4, "Ventilation.")

c. Plutonium processing and handling or storage facilities designed after March 25, 1977, shall have ventilation systems that are designed to control air contaminants. Redundant equipment shall be provided in all exhaust systems servicing contaminated and potentially contaminated areas to assure that failure of any single component or control function does not compromise minimally adequate ventilation. The system shall permit easy, safe access for servicing (Reference DOE Order 6430.1, Section 1550.)

d. Plutonium processing and handling or storage facilities designed after March 25, 1977, shall have an additional HEPA filter installed as close as practical to the source of contamination to minimize the contamination of ductwork. This filter does not count as the first stage of the airborne contamination cleaning system. (Reference 6430.1.)

2. Radioiodine treatment

a. Sources of airborne radioiodine shall utilize iodine removal systems (charcoal absorbers, silver reactors, etc.) of sufficient capability to ensure compliance with the limits of D5.0.

b. Charcoal absorbers shall be located as near the source of radioiodine as practical and shall be located downstream of at least one stage of HEPA filtration or equivalent.

c. Charcoal absorbers shall not be subjected to exhaust air containing perchlorates or other strong oxidizing agents.

B. Testing and performance criteria

1. Before installation, all HEPA filter systems used by WHC, other than those built in place (e.g., sand filters) shall be efficiency tested according to the applicable Hanford Plant Standard (HPS-157-M through -160).

2. Scheduling for tests

   a. Online gaseous effluent filter systems shall have an inplace test before initial startup and after each filter change. With the exception of those systems for which an inplace DOP test frequency of every 18 months has been reviewed and approved by Environmental Protection, all systems shall be tested annually.

      Those systems which handle high levels of radioactivity (as judged by Operational Health Physics) and/or are exposed to extreme hostile environments (as judged by Vent and Balance), such as high moisture loadings, chemical fumes, or high temperatures shall be tested on a semiannual, quarterly, or monthly basis as dictated by the operational requirements of the system and as approved by Safety. These conditions shall be documented in the Environmental Monitoring Plan of A7.0.

   b. The downstream stage of a set of close-coupled, tandem air filters shall be tested each time the upstream filter stage is replaced.

   c. HEPA filter systems installed for use only under emergency conditions or during scheduled maintenance shall be leak tested immediately after installation or replacement, and every five years thereafter.

   d. The schedule system for tests shall be maintained by the Maintenance Engineering Section and approved by the facility manager. Scheduling actual tests shall be the responsibility of Vent and Balance of Operations Support Services. Operations shall document all filter systems requiring testing in the facility Environmental Monitoring Plan (A7.0).

   e. Operations shall be responsible for initiating corrective actions and notifying Vent and Balance of completion of any corrective action.

   f. Iodine removal systems shall demonstrate satisfactory efficiency annually in accordance with D8.0.b.3.c.

3. Performance of tests

   a. Each filter stage required by D8.0 shall be tested individually. Existing multi-stage HEPA filtration systems for which testing of individual stages is precluded by the design shall be tested under procedures and to standards approved in writing by Environmental Protection. A copy of the results of each test shall be sent by the Ventilation and Balance group to Environmental Protection.

b. Filter systems required by D8.0 shall be leak tested in place at the operating flow rate utilizing the dioctyl phthalate (DOP) method or equivalent described in Hanford Work Specification 10278.

c. The efficiency of a charcoal absorber or equivalent treatment installation shall be demonstrated by one of the following:

- o Annual testing using I-131.
- o Continued satisfactory service (e.g., demonstrable efficiencies of 99% or greater for absorber installations in facilities which routinely handle radioiodine).
- o Radioiodine concentrations less than limits of D5.0 indicated by the stack charcoal cartridge (or equivalent).

4. Filter inplace performance requirements

a. Filter Inplace Leak Test Requirements. All filters required under D8.0 shall remove at least 99.95% of DOP or DOS particles, or equivalent, ranging in size from 0.1 micron to 3.0 microns with a mean particle size of 0.5 micron.

b. HEPA filters which are held in the frame by turn and lock (cam-lock) devices are permitted to have penetration values of up to 0.25% provided that leak tests are performed in accordance with D8.0.b.3.b every 90 days. These filters shall be replaced if penetration values exceed 0.25% or if the exposure rate or pressure drop limits cited in D8.0.b.4.c below are exceeded.

c. HEPA filter cartridges shall be replaced when continuous exposure rates exceed 1 R/h at 6 inches (as measured or extrapolated by Radiation Protection) or when the pressure drop across the filter exceeds 4 in. water gauge (w.g.). Remotely installed HEPA filters shall be replaced when the pressure drop across the filter exceeds 4 in. w.g. or exposure rates exceed limits provided by Radiation Protection in WHC-CM-4-9.

5. Automatic dampers, scrubbers, or other equipment that is part of the environmental protection system shall be tested annually as a minimum to demonstrate satisfactory performance.

D9.0 REQUIREMENTS FOR STACK FLOW MEASUREMENTS

a. Each stack shall have its flow rate determined:

- o Prior to any hot startup

- o Annually, unless experience has shown more frequent determinations to be necessary
- o After any equipment or process modification that has the potential to significantly alter stack flow rates.
- o Upon completion of facility in-place leak tests.

b. All stack flow rate data shall be transmitted to Environmental Protection. Appropriate changes to sample flow rates shall accompany changes to stack flow rates to maintain a ±20 percent isokinetic condition.

D10.0 NOTIFICATION OF STARTUP, SHUT DOWN, OR OTHER CHANGE PERTINENT TO RELEASE DATA

Environmental Protection shall be notified directly by facility plant operations, as soon as practicable but no later than one working week, after any exhaust startup or shutdown, relocation of a portable exhauster, shutdown of any stack sampling or monitoring systems, or any other change which affects the measurement of airborne radioactive discharges to the environment that is not already outlined in the facility Environmental Monitoring Plan.

D11.0 REFERENCES

1. DOE Order 5480.1B, "Environment, Safety, and Health Program for Departmental Operations."
2. DOE Order 5480.4, "Environmental Protection, Safety, and Health Protection Standards."
3. DOE Order 5484.1, "Environmental Protection, Safety, and Health Protection Information Reporting Requirements."
4. DOE-RL Order 5484.1, "Effluent and Environmental Monitoring Program Requirements," Chapter III.
5. DOE Order 6430.1, "General Design Criteria."
6. 40 CFR 52, "Approval and Promulgation of Implementation Plans."
7. 40 CFR 61, "National Emission Standards for Hazardous Air Pollutants (HESHAP)."
8. General Regulation 80-7, "Benton-Franklin-Walla Walla Counties Air Pollution Control Authority," July 1980.
9. ANSI/ASME NQA-1, "Quality Assurance Program Requirements for Nuclear Facilities."

10. ANSI N13.1-1969, "Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities."

11. ANSI N42.18-1980, "Specification and Performance of On-Site Instrumentation for Continuously Monitoring Radioactivity in Effluents."

12. ANSI N317-1980, "Performance Criteria for Instrumentation Used for Inplant Plutonium Monitoring."

13. ANSI N323-1978, "Radiation Protection Instrumentation Testing and Calibration."

14. WHC-CM-4-9, Radiological Design Criteria.

15. HPS-157 through -160-M, "High Efficiency Particulate Air Filters."

16. HWS-10278, "Dioctyl Phtalate Testing."

17. DOE-RL, "Implementation Plan for Hanford Site Compliance to DOE Order 5820.2, "Radioactive Waste Management," August 1985.

18. DOE Memorandum, W. A. Vaughn, August 5, 1985, "Radiation Standards for Protection of the Public in the Vicinity of DOE Facilities."

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E1.0 PURPOSE

The purpose of Part E is to establish WHC requirements and guidelines for liquid effluent disposal.

E2.0 SCOPE

The requirements in this section apply to all liquid effluent streams discharged to the environment. Those discharges include:

- Discharges to the Columbia River
- Discharges to sanitary sewers
- Surface discharges
- Subsurface discharges.

Facilities operated by other contractors that discharge to WHC's liquid waste disposal sites shall comply with the provisions of this Part.

E3.0 DEFINITIONS

Surface discharges--Surface or other liquid discharges whose constituents migrate to the ground and surface waters (i.e., ponds, soil columns, etc.).

Subsurface discharges--Discharges below grade, such as cribs and underground injection wells.

Underground injection wells (UICs)--Discharges to french drains, steam traps or any subsurface facility that is deeper than its largest surface dimension (WAC 173-218).

E4.0 RESPONSIBILITIES

a. Waste Generation Management shall:

- Notify the custodian of the Waste Information Database System of:
  - The existence of liquid effluent disposal facilities (i.e., location, construction, etc.)

- Operational status of disposal facility or change in status
- Method of deactivation for out of service facilities.

o Provide, maintain, and operate the sampling and monitoring equipment required by this Part.

o Ensure proper sewer usage for operations with potential for misuse of sewers through strict adherence to operating procedures, conspicuous labeling of sinks and sewer lines, and frequent inspection.

o Control the acquisition, storage, use and disposal of chemicals to ensure compliance with the provisions of this Part.

o Promptly notify Environmental Assurance of releases that exceed the requirements of this part in accordance with Part B, failure to obtain necessary samples, or failure of sampling or monitoring equipment.

o Notify the Strategic Planning and Integration section of releases of any toxic chemicals - monthly.

o Assure that new equipment and facilities or modifications* to existing equipment and facilities are designed and constructed using the Best Available Technology (BAT) economically achievable and will be capable of complying with the requirements of this standard.

o Collect and deliver effluent samples for analysis.

o Inspect sampling and monitoring equipment for proper operation.

b. Environmental Assurance shall:

o Approve acceptable sample collection and analysis sample schedules

o Approve the purchase or modification specifications for effluent sampling or monitoring equipment

o Approve sample collection locations

o Review analytical results and investigate those in excess of applicable limits

o Publish periodic reports which summarize discharges.

*Note modification does not include replacement in kind for routine maintenance and repair.

c. The Waste Management Planning Section shall maintain a data base on waste disposal facilities.

E5.0 GENERAL REQUIREMENTS

a. Releases of liquid effluents shall not contain designated dangerous waste as defined in Part I, "Dangerous Waste Control" (WAC 173-303).

b. Quantities of regulated materials in liquid effluent releases to the environment shall be reported if in excess of the RQs listed in Appendix G in any 24-hour period. See Part B, "Nonroutine Releases" (40 CFR 302).

c. Limits for pH:

   1. The pH of all liquid effluents discharges to the environment shall not be less than or equal to 2.0 or greater than or equal to 12.5. This shall be measured for an instantaneous time period (WAC 173-303).

   2. The pH of all liquid effluents discharged directly to the Columbia River shall not be less than or equal to 6.0 or greater than or equal to 9.0 in accordance with the NPDES permit.

   3. Each facility discharging to a liquid waste disposal facility shall establish Process Control Limits (PCL) for pH to ensure that excursions beyond the limits of E4.0.c.1 and E4.0.c.2 do not occur. When establishing these limits consideration shall be given to migration of radionuclides in the vadose zone and whenever practicable, should limit pH values to between 6.0 and 9.0.

d. Limits for all liquid effluents discharged to ground water should not exceed the Maximum Contaminant Level (MCL) values noted in Appendix B at the point of release.

   Liquid effluent discharges shall meet limits as specified in permits, state registrations, BAT (as discussed in 4.0.e below), or other sections of this manual.

e. The BAT shall be used to control the release of contaminants in liquid effluent discharges to the ground water.

   1. Existing liquid effluent sources, with Functional Design Criterias (FDCs) dated prior to June 15, 1987, shall be upgraded to include use of BAT in accordance with WHC-EP-0137, "BAT Guidance Document."

   2. New liquid effluent sources with FDCs dated after June 15, 1987, see Part Q, "New and Modified Facilities."

f. Releases containing any quantity of toxic chemicals as defined in 40 CFR 372 Subpart D shall be tracked and reported annually to EPA and Ecology.

g. Inactive waste disposal facilities shall have a physical barrier (i.e., blanks) to prevent reactivation of the facility. This information shall be reported to the custodian of the Waste Information Database System.

E6.0 DISCHARGES TO THE COLUMBIA RIVER

All industrial liquid waste discharges to navigable waterways (i.e., the Columbia River) fall under the authority of the NPDES in accordance with WAC 173-220 and, as such, shall be in compliance with the Washington State Water Quality Control Standards (WAC 173-201) and applicable discharge permit limitations specifically for that effluent stream or discharge point.

a. All liquid effluent discharges to navigable waterways shall be controlled as specified below:

   - Residual chlorine shall not be discharged for more than 2 hours in any one day.* In addition, daily average and maximum residual chlorine concentrations shall not exceed 0.2 and 0.5 ppm, respectively
   - The pH shall be greater than 6.0 and less than 9.0 standard units
   - There shall be no discharge of floating solids or visible foam in other than trace amounts
   - There shall be no visible oil sheen.

b. An NPDES Permit (No. WA-00374-3) is in effect for seven discharge points. These discharges, and the respective NPDES Permit discharge number, are as follows:

   - 003 - 181-KE inlet screen backwash
   - 004 - 1908-K out fall and 183-KE holdup basin
   - 005 - 36-in RWR from 182-N tank farm overflow
   - 006 - 42-in RWR from 182-N
   - 007 - 181-N inlet screen backwash

*Less than 0.05 ppm using the idometric titration method used by the N Water Quality Laboratory for NPDES permit-related chlorine analysis.

- o 009 - 102-in RWR at 100-N
- o N Springs.

Individual release points shall be controlled by the NPDES permit limits specified in Table E-1.

c. Additional NPDES Permit discharge limits not identified in Table E-1:

Discharge	Parameter	Limit
009	BTU/day	65 x 10 E + 09
N Springs	Iron	1.0 mg/L
N Springs	Chromium	0.2 mg/L
N Springs	Ammonia	0.2 mg/L

E7.0 DISCHARGES TO SANITARY SEWERS

a. Sanitary sewer systems shall not be used for the disposal of dangerous wastes as defined in Part I or radioactive materials. Publically Owned Treatment Works (POTW) discharges see regulations in E6.0.c.

b. All sanitary wastes shall be disposed in an environmentally acceptable manner. New facilities at Hanford, including the modification of existing facilities shall be designed to meet the substantive requirements of the Benton-Franklin County Health District Department Guidelines and WAC 248-96, "Onsite Sewage Disposal," or WAC 173-240, "Submission of Plans and Reports for Construction of Waste Water Facilities" as applicable.

c. Discharges to Richland's POTW shall be in accordance with City Ordinance 35-84 as summarized below:

Prohibited from the Richland POTW are discharges:

- o With the potential to cause fire or explosion at the treatment works
- o With the potential to cause obstructions in sewer lines or treatment structures related to solid or viscous nature of the effluent
- o Which have a pH less than 5.0 or greater than 10, or has any other corrosive property capable of causing damage or hazard to structures, equipment or personnel of the treatment system

- Of toxic pollutants in sufficient quantity to injure or interfere with the wastewater treatment process or constitute a hazard to humans or animals
- That are noxious or malodorous which create a public nuisance or a condition which prevents entry into the sewers for maintenance and repair
- Of substances that will render the treatment plant's liquid and solid effluents unsuitable for typical reclamation and reuse options
- Of substances that will cause the treatment works to violate its NPDES and/or other disposal permits
- Of wastewater temperatures that will inhibit biological activity in the treatment works (in no case exceed 40 degrees Centigrade or 140 degrees Fahrenheit)
- Of substances with objectionable colors which cannot be removed in the treatment process
- Of slugloads (single extraordinary discharges) of such volume or strength to cause interference to the treatment works
- Of excessive amounts (as determined by the city) of unpolluted water
- With excessive concentrations (as established by the city) of radioactive wastes or isotopes
- Which cause a hazard to human health or creates a public nuisance
- Of the persistent pesticides listed below:
  - aldrin
  - dieldrin
  - chlordane
  - 4,4'-DDT
  - 4,4'-DDC (p,p'-DDX)
  - 4,4'-DDD (p,p'-TDE)
  - a-endosulfan-Alpha
  - b-endosulfan-Beta
  - endosulfan sulfate

- endrin
- endrin aldehyde
- heptachlor
- heptachlor epoxide
- a-BHC-Alpha
- b-BHC-Beta
- c-BHC-(lindane)-Gamma
- g-BHC-Delta
- Toxaphene

No discharger shall dilute a discharge in order to achieve compliance with the above standards.

The concentrations (and/or mass limitations) of the following substances shall be limited such that total the influent to the treatment plant to exceed specific values (for values see City Ordinance):

- o cadimum
- o chromium
- o copper
- o cyanide
- o lead
- o mercury
- o nickel
- o silver
- o zinc
- o chloroform
- o ethylbenzene
- o methylene chloride
- o tetrachloroethylene

Each discharge shall provide protection from accidental discharge of prohibited or regulate materials or substances listed above.

Dischargers shall notify the City immediately upon the occurrence of a "slugload," or accidental discharge of substance prohibited by the ordinance (see also Part B).

Dischargers shall provide wastewater pretreatment if necessary to comply with the limitations listed above.

A discharge permit issued by the City will be required shortly after the publication of this manual.

Dischargers shall provide and operate at the discharger's expense, a monitoring facility to allow inspection, sampling, and flow measurement of each sewer discharge to the City, as required by the City.

E8.0 SURFACE DISCHARGES

a. Discharges shall not be allowed to inactive disposal sites previously contaminated with radionuclides.

b. Purge water shall meet the following interim criteria:

- o Nonradioactive water with chemical contaminants below the MCLs listed in Appendix B shall be disposed as uncontaminated water
- o Nonradioactive water with chemical contaminants above the MCLs listed in Appendix B shall be disposed of in a previously established waste disposal site
- o Radioactive liquid (greater than 1/25 of DCG) see Part F of this manual
- o Liquid with hazardous or listed waste see Part I of this manual.

E9.0 SUBSURFACE DISCHARGES

a. Discharges to UICs shall be registered with Ecology by the Environmental Compliance group (WAC 173-218).

b. Radionuclides in the discharge to UICs shall be below Table II of 10 CFR 20, Appendix B and shall not be hazardous waste (WAC 173-218).

c. Any UIC receiving waste in excess of the limits in (b) above shall immediately be taken out of service and Ecology notified through Environmental Protection.

d. Discharges to UICs shall be in accordance with WAC 173-218.

E10.0 MONITORING REQUIREMENTS

a. Facility Operations shall confirm their knowledge about a dangerous waste before storing, treating, or disposing of it. Confirmation may require testing (WAC 173-303).

b. Monitoring shall be provided when a chemical has a significant potential to exceed 50% of its Equivalent Concentration percent for the stream mixture. Monitoring shall be based on BAT. If no such technology exists to monitor for the constituent, a sampling program shall be designed to closely approximate the actual stream release conditions.

c. Monitoring and alarm systems are not required for batch releases provided that the batch is retained until laboratory analysis indicate that the batch is releasable.

d. Equipment and methods for measuring, recording, and reporting the pH of all potentially (stream with a reasonable probability of exceeding the release limits) corrosive waste streams shall be provided. Continuous pH monitoring with alarm capabilities shall be employed with any continuously flowing potentially corrosive stream. For all periods of maintenance or calibration, alternative monitoring or other methods approved by Environmental Protection shall be performed to ensure that the pH of the effluent can be adequately reported.

e. The record monitoring system shall have back-up power to ensure that no unmonitored release occur due to power failure.

f. The monitoring point shall be downstream of any treatment system but prior to release to the environment.

g. Devices for measuring liquid effluents shall be calibrated by Facility Maintenance in accordance with the manufacturer's requirements and recommendations.

h. Facility Maintenance shall maintain an auditable record of maintenance, calibrations, and other pertinent information for each record monitoring system for a period of at least three years.

E11.0 SAMPLING REQUIREMENTS

a. Sampling shall be provided when a chemical has a potential to exceed 10% of its Equivalent Concentration percent for the stream mixture. A sampling program shall be designed to closely approximate the actual stream release conditions.

b. Sampling of liquid effluent streams shall be performed in a manner that provides representative measurements of the volume and concentration of pollutants released to the environment as a basis for:

- o Determining compliance with applicable discharge and effluent control guidelines
- o Evaluating the adequacy and efficiency of waste treatment and control efforts towards achieving low release levels
- o Compiling an annual inventory of the nonradioactive pollutants in liquid discharges to the environment.

c. The measurement of volume, flow rate, and concentrations, shall be made downstream of any treatment system, but prior to exiting the pipeline or mixing with streams from other facilities.

d. Grab sampling shall be acceptable in cases of a batch discharge; however, more than one grab sample may be required to demonstrate continuous compliance with the effluent standard.

e. Surface ponds shall be sampled and analyzed at least quarterly for the following parameters:

- o pH
- o Nitrate
- o Suspected deleterious chemicals as identified by the effluent monitoring plans.

f. Methods for the analysis of liquid samples for nonradioactive pollutants shall be in accordance with one of the standard analytical methods found in the following references:

- o "Standard Methods for the Examination of Water and Wastewater," latest edition (e.g., 15th Edition, APHA-AWWA-WPCF, 1980)
- o "1976 Annual Book of ASTM Standards," Part 31, Water
- o "Methods for Chemical Analysis of Water and Waste," USEPA, 1974
- o "Procedures Manual for Ground Water Monitoring at Solid Waste Disposal Facilities," USEPA, 1977
- o If the sample matrix is such that the methods listed above do not adequately analyze for the contaminant in question additional testing may be required. Written notification shall be provided to Environmental Protection.

E12.0 REFERENCES

1. DOE Order 5484.1, "Environmental Protection, Safety, and Health Protection Information Reporting Requirements."

2. 40 CFR 302, "Designation, Reportable Quantities, and Notification" (EPA under CERCLA).

3. 40 CFR 372, "EPA Toxic Chemical Release Reporting Regulation."

4. WAC 173-201, "Water Quality Standards for Waters of the State of Washington."

5. WAC 173-218, "Underground Injection Control Program."

6. WAC 173-220, "National Pollutant Discharge Control Program."

7. WAC 173-240, "Submission of Plans and Reports for Construction of Waste Water Facilities."

8. WAC 173-303, "Dangerous Waste Regulations."

9. WAC 248-96, "On-Site Sewage Disposal."

10. City of Richland Ordinance No. 35-84.

11. WHC-EP-0137, Best Available Technology Guidance Document.

Table E-1. National Pollutant Discharge Elimination System Permit Discharge Limits.

Discharge number	Flow (MGD)	Temperature (°F)	Oil and grease mg/L (lbs/d)	Total suspended solids mg/L (lbs/d)	Free Available Chlorine mg/L (lbs/d)
003					
Daily average	0.132	--	--	30 (--)	--
Daily maximum	0.132	--	--	45 (--)	--
004 - 1908-K					
Daily average	3.96	--	--	--	--
Daily maximum	5.28	75	--	--	--
004 - Backwash					
Daily average	0.6	--	--	30 (--)	--
Daily maximum	0.6	--	--	45 (--)	--
005 - without low lift pumps operating					
Daily average	4.0	77	10 (334)	10 (334)	0.1 (0.3)
Daily maximum	7.2	100	15 ((500)	30 (1000)	1.1 (2.5)
005 - lift pumps					
Daily average	50	--	--	--	--
Daily maximum	50	70	--	--	--
006					--
Daily average	0.52	--	10 (43)	10 (43)	--
Daily maximum[a]	5.28	69	15 (65)	30 (130)	
007					--
Daily average	1.06	--	--	30 (--)	--
Daily maximum	2.64	--	--	45 (--)	
009					0.2 (63)
Daily average	454	--	--	--	0.5 (210)
Daily maximum	605	77[b]	--	--	
N Springs					
Daily average	--1.85	--	15 (--)	--	--
Daily maximum		106	20 (--)	--	--

[a]An additional flow quantity of 20 million gallons per day is allowed during periods of fog spray pump operation.

[b]During periods when the Columbia River is above 65 °F, the maximum allowable discharge temperature shall be 81 °F. during N-reactor startup and shutdown periods, temperatures in excess of 77 °F are allowed for periods not to exceed 5 min.

PST2E-0002-E 1

F1.0 PURPOSE

The purpose of this Part is to define standards for the operation of WHC facilities that generate and/or discharge radioactive liquid wastes. These standards are intended to assure that WHC facilities are designed, constructed, and operated in a manner that:

- o Protects the safety of the employees and the general public
- o Minimizes spills and releases to the environment
- o Meets applicable U.S. Department of Energy (DOE), Federal, state, and local regulatory requirements.

F2.0 SCOPE

The requirements in this Part apply to facilities operated by WHC that generate and/or discharge radioactive liquid wastes. Facilities operated by other Hanford contractors that discharge to WHC disposal facilities shall comply with these effluent standards.

The requirements are derived from applicable DOE orders and EPA regulations and are designed to ensure that all operations that discharge radioactive liquid wastes do not exceed those standards. The requirements are also designed to ensure that all WHC radioactive liquid waste streams are equipped with the proper effluent controls, monitoring systems, and reporting mechanisms and that all discharges of radioactive materials are limited to ALARA levels.

Requirements pertaining to the nonradioactive regulated substances of radioactive liquid effluents are contained in Part E, "Nonradioactive Liquid Discharges."

F3.0 RESPONSIBILITIES

a. Building Administrators and Waste Generation Management shall:

- o Ensure that all radioactive liquid wastes discharged to the environment or sent to storage/disposal facilities are in compliance with the applicable requirements

- o Notify Environmental Protection within 1 regular working day of releases that exceed the requirements of this Part
- o Notify Environmental Protection within 1 regular working day of any off-normal conditions that affect radioactive liquid effluent sampling and monitoring equipment.
- o Ensure that all new equipment and facilities or modifications to existing equipment and facilities are designed and constructed using the BAT economically achievable and will be capable of complying with the requirements of this standard
- o Design and maintain sampling and monitoring equipment in compliance with this standard.

b. Environmental Protection shall:

- o Approve effluent sampling and monitoring locations
- o Approve the type and frequency of analyses to be performed
- o Approve acceptable effluent sampling and analytical methods
- o Approve the new design or modification of effluent sampling and monitoring equipment
- o Review and track analytical results and investigate those in excess of the applicable limits
- o Prepare or oversee the preparation of effluent monitoring summary reports
- o Approve Facility Effluent Monitoring Plans (FEMP).

F4.0 GENERAL REQUIREMENTS

a. Liquid effluents that satisfy the following 2 threshold requirements at the time of release are considered nonregulated concerning radioactivity:

1. The concentration of radionuclides in the liquid effluent are less than 0.04 of the Derived Concentration Guide (DCG) values listed in Appendix A at the point of release to the environment (end of pipe).
2. The "sum of the fractions" in the liquid effluents for each radionuclide shall not exceed 1 at the point of release to the environment. A sample calculation for "sum of the fractions" is discussed in Appendix A.

b. The dose to any offsite individual shall not exceed 100 mrem/yr from Hanford Site Operations resulting from all effluent release pathways including the liquid and airborne release pathways involving groundwater or surface water used for drinking, irrigation, or recreation, from all operations at the Hanford Site. (DOE 5400.XX)

c. Radionuclide concentrations shall not exceed 0.04 DCG in surface water or ground water at the nearest part of consumption by a member of the public beyond the Hanford Site boundary (DOE 5400.XX).

d. Discharges of radioactive liquid effluents from WHC facilities shall be controlled to assure that releases are ALARA.

   1. The characteristics of all effluent streams, their monitoring systems and reporting systems, shall be documented in the FEMP. This documentation shall include an assessment of the compliance status of each effluent stream as well as any needed or planned upgrades to monitoring systems. Specific requirements for the FEMP are contained in Part A7.0.

   2. All liquid effluents shall be evaluated for their potential to release radionuclides to the environment. This information shall be documented in the FEMP.

   3. The use of soil columns (cribs, ponds, ditches, etc.) to treat and remove suspended and dissolved radionuclides shall be discontinued in accordance with U.S. Department of Energy-Richland Operations Office (DOE-RL) document "Plan and Schedule to Discontinue Disposal of Contaminated Liquids into the Soil Column."

   4. The BAT economically achievable shall be used to assure that existing and future effluent sources meet the release limits specified in this section (WHC-EP-0137).

      a. Existing sources (FDC dated prior to June 15, 1987) shall be upgraded to include use of BAT in accordance with the guidance given in WHC-EP-0137, Best Available Technology Guidance Document, and the schedule specified in "Planned Schedule to Discontinue Disposal of Contaminated Liquid into the Soil Column at the Hanford Site" as updated.

      b. New liquid effluent sources (FDC dated after June 15, 1987), see Part Q, "New and Modified Facilities."

e. Systems used to store and/or transfer radioactive liquid wastes (RLW) which are subject to the provisions of Part T of this manual shall be periodically tested for integrity in accordance with Part T.

f. An effluent management system shall be provided for all RLW discharges to prevent exceeding annual average limits. The management system shall be documented in the FEMP and shall contain or reference the following minimum features.

1. A method to ensure the summation of monthly release totals for comparison to annual limits using results from required effluent samples.

2. Reference to written procedures that direct operating personnel on what to do when a limit is exceeded.

g. Liquid effluent lines leading to inactive liquid effluent disposal sites shall be physically isolated to prevent receipt and disposal of liquid discharges.

h. Information regarding deactivation status and method of deactivation for liquid effluent disposal sites shall be transmitted to the custodian of the Waste Information Database System (WIDS) for inclusion in the database (WAC 173-218 for underground injection wells).

F5.0 LIMITS FOR RELEASES TO THE COLUMBIA RIVER

a. Radioactive liquid effluents that are discharged directly into the Columbia River shall comply with the following standards.

1. The releases shall not exceed the DCG applied as an annual average. The DCG values are listed in Appendix A.

In addition, for waste streams that contain more than one type of radionuclide, the sum of the fractional DCG values (annual average) for each radionuclide at the point of release shall not exceed unity (one).

Releases of ^{90}Sr from the 100 N Area N Springs shall be exempted from this requirement. The ^{90}Sr releases from the N Springs shall not exceed the following controls.

a. The offsite dose contribution to the nearest maximally exposed individual from ^{90}Sr shall not exceed 5 mrems (whole body) or 15 mrems to the bone.

b. Total ^{90}Sr releases shall not exceed 15 Ci during any calendar year.

c. The ^{90}Sr concentrations measured at the N Springs shall not exceed 5.0×10^{-5} μCi/mL applied on an annual average basis.

2. The monthly average concentration of radionuclides (except ^{90}Sr at the N Springs) released to the Columbia River shall not exceed 2 times the DCG value.

3. Direct radioactive discharges to the Columbia River shall be continuously monitored at the point of release. Releases shall be analyzed at least monthly and evaluated for compliance with the DCG control levels.

F6.0 LIMITS FOR RELEASES TO THE SOIL

a. Radioactive liquid effluents that are discharged to a soil column (ponds, ditches, and cribs) shall comply with the following standards.

1. No new or increased discharges of radionuclides shall be released to a soil column. (DOE-RL document, "Plan and Schedule to Discontinue Disposal of Contaminated Liquid to the Soil column.")

a. Annual discharges of radionuclides to the soil column shall be considered an increased discharge if the increase is above 2% of the maximum annual radionuclide inventory disposed to the soil column disposal facility since the disposal facility startup.

b. Increased discharges of radionuclides to the soil column shall be prohibited after the effective date of DOE 5820.2A unless approved by DOE-RL.

2. Liquid discharges, including nonradioactive, shall not be released to inactive, contaminated soil columns. (This is to prevent the spread of previously deposited radionuclides.)

3. To the extent practicable, the amount of tritium that enters waste streams shall be reduced before it is discharged. Discharge of tritium to the soil column is considered BAT for the control of this radionuclide.

4. Tritium releases in the 200 Area shall not exceed 20,000 Ci during any calendar year.

5. Releases to underground injection wells shall not exceed radionuclide concentrations of 10CFR20, Appendix B, Table II.

b. To assure that releases do not exceed applicable offsite limits, administrative control value (ACV) is established for radionuclides discharged to soil columns on the Hanford Site. The ACVs are based on the following four factors:

- The ability of each specific radionuclide to be retained in the soil column

- o The ability of each specific radionuclide to be retained in the soil column
- o The half-life of the radionuclide relative to its travel time to the site boundary (i.e. 25 years)
- o The ALARA levels based on historic releases
- o Groundwater concentration of radionuclides at 0.04 DCG at the site boundary.

1. Except as provided for in Section F7.0, Table F-1 lists the ACVs for specific radionuclides discharged to the 200 Area liquid waste disposal facilities. Radioactive liquid waste discharged in the 200 Areas is regulated as a direct discharge to groundwater. The ACVs are set so that groundwater concentrations meet 4% of the DCGs (equivalent to drinking water standards) at the Hanford boundary on an annual average.

   a. The ACV for any radionuclide not listed on the Table F-1 is 4% of its DCG value. DCG values can be found in Appendix A.

   b. The sum of the fractions of the ACV limits from Table F-1 shall not exceed 1 on an annual average.

   c. Monthly averages shall not exceed 2 times the ACV.

2. The concentrations of radionuclides released to the 300 Area Process Trench shall be less than 0.20 of the DCG values listed in Appendix A on an annual average. In addition, the sum of the fractional DCG values for each radionuclide shall not exceed 0.10 on an annual average.

F7.0 INTERIM CONCENTRATION VALUES

a. Until BAT is implemented, Interim Concentration Values (ICV) shall be established for specific radionuclides contained in specific waste streams. Table F-2 lists the ICVs for specific radionuclide discharges to specified 200 Area waste disposal facilities on an annual average.

   1. Radionuclides not specifically limited by Table F-2 shall comply with the levels stated in Table F-1.

   2. Monthly averages shall not exceed 2 times the ICV value.

   3. Groundwater near each disposal site shall be monitored to evaluate impacts of operations on groundwater, during use of the ICVs, in accordance with Part N, "Groundwater."

4. If radionuclide concentrations in the groundwater exceed the standards of Part N, continued operation of the contributing facilities will be evaluated by Environmental Assurance.

5. Sum of the fractions apply. (See Appendix A.)

b. The ICVs will be in effect until treatment facilities (BAT) for each stream are brought into operation. New controls will then be established based on the treatment capabilities.

c. Table F-3 lists the ICVs for specific radionuclides discharged to the 1325-N Liquid Waste Disposal Facility. Liquid waste discharged to 1325-N is regulated as a direct discharge to the Columbia River. The ICVs are set so that discharges meet the DCGs at the river shoreline.

1. The ACV for any radionuclide not listed on the table shall be equal to its DCG value found in Appendix A.

2. The sum of the fractions of the ICV values from Table F-3 for each radionuclide shall not exceed 1.0 on an annual average.

3. Monthly averages shall not exceed 2 times the ACV.

d. Within 12 months of the effective date of this manual or within 6 months of the effective date of DOE 5400.3, effluent steam specific soil sorption characteristics for plutonium and uranium shall be determined for use in effluent limit calculations. The soil sorption characteristics shall account for the following effluent stream characteristics:

- o pH of the effluent
- o ionic strength of the effluent stream
- o oxidation state of the plutonium and uranium.

e. If stream specific soil sorption chatacteristics are not calculated within the time period specified in Part F8.c, the values stated in Table F-2, "Interim Concentration Values for Specified Discharges to the 200 Area Liquid Waste Disposal Facilities" shall become for plutonium Pu-239, 240 9.0 E-8 uCi/ml (3 x DCG), and shall become for uranium, 5.0 E-7 uCi/ml (i.e., 1 x DCG).

F8.0 MAINTENANCE OF PONDS, DITCHES, AND CRIBS

1. The upper and lower liquid-level limits for each pond shall be determined and documented in the FEMP.

2. Water levels in the ponds shall be maintained within the designated water-level limits to minimize water erosion and resuspension of contaminated sediments by wind (DOE 5820.2).

3. Staff gages in the ponds shall be calibrated at least annually to confirm their accuracy. The elevation shall be referenced to the Hanford datum.

4. Pond water chemistry and radionuclide content shall be evaluated at least annually to assure operations are within prescribed limits.

F9.0 UNDERGROUND INJECTION WELLS

a. Discharges of radioactive effluents to underground injection wells (i.e., french drains, dry wells, etc.) shall be in accordance with the Underground Injection Control Program (UIC) in WAC 173-218.

b. Information on all underground injection wells shall be transmitted to the WIDS custodian.

c. All underground injection wells shall be registered with the Washington State Department of Ecology (WAC 173-218). Registration information shall be based on the information submitted to WIDS.

d. Construction and operation of new underground injection wells is prohibited unless previously registered in an area UIC registration (WAC 173-218).

F10.0 WASTE DIVERSION SYSTEMS

a. Waste diversion/retention systems shall be provided for those liquid waste discharges which have the potential to exceed the applicable limits specified in this chapter unless it can be demonstrated that the facility, process, or waste stream can be eliminated or controlled in such a manner that the annual average limits will not be exceeded.

b. Waste diversion/retention systems shall be equipped with monitoring and alarm systems that allow detection of the radionuclides in accordance with F11.0.a.2 and F11.0.a.3. Upon detection, diversion of the waste discharge should occur with the intent of not exceeding applicable dicharge limits at the point of release to the environment.

c. Retention capacity shall be adequate to retain the total waste discharge exceeding applicable limits. Materials used in construction of retention facilities shall be selected for ease of decontamination, resistance to adverse weather conditions, suitability for spill control, and compatibility with the waste discharge to preclude undesirable chemical, physical, or biological reactions.

f. Retention systems should be designed to minimize biotransport of contamination (i.e., from birds, animal, tumbleweeds, etc.), and personnel exposure. Retention systems receiving waste from multiple streams should be designed to prevent chemical incompatibility problems.

e. A diversion/retention system is not required for systems that release batch discharges of radioactive liquid wastes provided that sampling, analysis, and reporting of the effluent are performed and reprocessing is possible prior to release to the environment. All batch releases shall be sampled and analyzed prior to release to assure that applicable release controls are not exceeded.

F11.0 EFFLUENT MONITORING REQUIREMENTS

a. Continuous radionuclide monitoring should be provided on those release points that could (1) exceed 1 DCG equivalent at the point of release averaged over 1 year, or (2) result in unanticipated releases to the environment. Sampling with frequent analysis at a frequency agreed to by Operations Management and Environmental Protection may be used in lieu of continuous monitoring. The ability to provide liquid effluent monitoring during emergency situations shall be considered when determining routine monitoring program needs. This includes shielding for personnel, accessibility, and backup power supplies (DOE 6430.1A).

1. Continuous effluent streams shall be monitored for each type of radiation, radionuclide, or indicator material (e.g., gross alpha, gross beta, radioiodine) that has the potential for exceeding the discharge limits. In cases where unusual increases in one type of radioactivity are accompanied by increases in another type and in a consistent ratio, then either an alpha - or beta-detecting monitor may be used.

2. Continuous monitoring systems shall have alarms set at release concentrations as low as possible without resulting in spurious alarms due to normal fluctuations in background or normal fluctuations in releases. The alarm limits and bases shall be documented in the FEMP.

3. Monitoring alarm/waste diversion set-points shall be set to allow sufficient margin between the discharge alarm limits and the nominal trip set-points. (This is to allow for the inaccuracy of the instrument, uncertainty in the calibration, and the instrument drift that could occur in the interval between calibrations.)

4. Monitoring systems shall be calibrated in accordance with manufacturers specifications and ANSI N42.18 when they are installed, at least annually while in operation, and after maintenance or modifications. The exact conditions of calibration (calibration points, acceptable ranges of accuracy, and traceability to NBS) shall be specified and documented in the FEMP. The primary calibration shall encompass the entire system, including the detector and sample collector, and should be performed after the system has been installed. Primary calibrations may be performed in a controlled environment rather than be performed in situ after

installation. Records of the exact conditions of calibration should be maintained in accordance with ANSI N13.6 (DOE 5480.4, ANSI N42.18).

b. The criteria for selection or modification of a monitoring system shall include characterization of the sources, pollutants, treatment systems, final release points of the effluents, and physical properties of the stream which could influence monitor system performance.

c. Audible and/or visible high-level alarm indicators shall be located in areas continuously occupied by operating personnel.

d. Monitoring and alarm systems are not required for batch releases provided that the batch is retained until laboratory analyses indicate that it is releasable.

F12.0 EFFLUENT RECORD SAMPLING REQUIREMENTS

a. Effluent record sampling systems shall be provided for all continuous liquid effluents which have the potential to exceed 4% of the DCG values listed in Appendix A on an annual average.

   1. Effluent record sampling systems shall provide representative proportional samples of the effluent stream being discharged to the environment.

   2. The type and frequency of record sample collection shall be determined by consideration of the flow and radionuclide concentration characteristics of the effluent stream and the purpose for which the data are being obtained. The frequency of record sample collection should provide representative sampling during both normal and upset conditions of operation for discharges to the environment.

   3. Flow rates of all continuous effluent streams shall be measured and/or monitored. The flow rate of releases from the N Springs shall be based on groundwater modeling information.

   4. Effluent stream flow and sampler flow measurement instruments shall be calibrated in accordance with the manufacturers specifications at the time of installation and at least annually while in operation. Accuracy shall be within 10% at the normal operating flow rate.

b. Volume, flow rate, and radionuclide concentrations shall be measured at a point which most closely represents the effluent that is being released to the environment.

c. Batch releases should be sampled, analyzed, and documented (including volume) prior to release. If components of the effluent are not completely soluble, the batch should be agitated or recirculated before the sample is taken.

d. Environmental conditions (temperature, humidity, radiation levels, and vapors) and personnel safety shall be considered when locating sampling systems. This is to avoid conditions that will influence the operation of the equipment or pose an unacceptable risk to human health and safety.

e. Record sampling systems shall be maintained in accordance with manufacturer recommendations and inspected weekly for proper operation.

f. Record sampling systems shall be functioning before a facility is placed in operation. The sampling system shall have appropriate redundancy to ensure that no unsampled releases occur. The determination of "appropriate redundancy" shall be documented in the FEMP and shall consider backup power, backup sampling capabilities, et cetera (DOE 6430.1A).

g. The overall measurement system shall be such that the reported values of the total quantities of radionuclides discharged to the environment are representative of the actual releases.

   1. The laboratory methods used to analyze record samples shall have a minimum detection limit of less than or equal to 4% of the DCG values listed in Appendix A for each radionuclide present in the waste stream.

   2. The uncertainty of analytical data shall be computed at the 95% confidence interval. For analytical measurement values below the minimum detection limit, the 95% confidence interval around the measurement value shall lie below the established release criteria.

   3. Collection periods for composite samples shall be as short as practicable to prevent the loss of radioactive material by decay and deposition on the walls of the sample container. Periodic checks shall be performed to quantify any such losses in composite samples. Appropriate sample bottles should be used to minimize loss by deposition on walls. Sample analysis results for short-lived radionuclides should be decay corrected to the mid-point of the sample collection interval.

   4. Analytical laboratories shall conduct a quality control program to ensure accuracy and precision of effluent sample analysis. The results of the quality control program shall be reviewed by Environmental Assurance.

5. Less-than-detectable data will produce numerical measurements with values below the detection limit and sometimes as impossible negative values. All of the actual values, including those that are negative, should be included in the statistical analyses. Practices such as assigning a zero, the detection limit value, or some value in-between to the below-detectable data point, or discarding those data points can severely bias the resulting parameter estimates and should be avoided.

h. Record sampling programs shall provide accurate information on the identity and quantity of specific radionuclides in the effluents. Gross radioactivity measurements shall not be used for showing compliance with effluent release limits unless the measurements are documented to be indicative of the actual quantity and/or concentration of radionuclides released or be documented to give the upper limit of the concentration of the most restrictive isotope of each type of radiation.

i. Record sample collection schedules shall be approved by Environmental Protection for compliance with the requirements of this manual. Any deviation to these schedules shall be preapproved by Environmental Protection.

F13.0 NOTIFICATION REQUIREMENTS

a. Facility operations management shall notify Environmental Protection within one working week of any of the following conditions:

   - o Upset conditions that result in liquid discharges above the ACV or ICV
   - o Spills of hazardous substances into radioactive liquid waste systems which are reportable to the EPA, Ecology, or DOE in accordance with Part B of this manual.
   - o Upsets or malfunctions of required effluent sampling or monitoring systems outside the conditions established in the FEMP which affect the volume of record samples.

b. Discharges of radionuclides that exceed federally permitted release levels (e.g., DOE Orders) during a 24 hour period by a value equal to the reportable quantity values listed in Appendix G, shall be reported in accordance with Part B, "Non-Routine Releases."

c. Discharges that are a result of a violation of any DOE Order of radionuclides in quantities equal to or greater than a CERCLA RQ as defined in Appendix G shall be reported in accordance with Part B.

F14.0 REFERENCES

1. DOE Order 5820.2, "Radioactive Waste Management."

2. 10 CFR 20, "Standards for Protection Against Radiation."

3. ANSI N42.18-1980, "Specifications and Performance of Onsite Instrumentation for Continuously Monitoring Radioactivity in Effluents."

4. WAC 173-218, "Underground Injection Control Program."

5. WHC-EP-0137, Best Available Technology (BAT) Guidance Document for the Hanford Site, July 1988.

6. DOE-RL, March 1987, "Plan and Schedule to Discontinue Disposal of Contaminated Liquids into the Soil Column."

7. DOE Memorandum, W. A. Vaughn, August 5, 1985, "Radiation Standards for Protection of the Public in the Vicinity of DOE Facilities."

Table F-1. Administrative Control Value for Discharges to the 200 Area Liquid Waste Disposal Facilities.

Radionuclide	Administrative control value (μCi/mL)	Comparison to DCG
^{60}Co	5.0 E-06	25 x (DCG/25)
^{89}Sr	4.0 E-04	500 x (DCG/25)
^{90}Sr	2.0 E-05	500 x (DCG/25)
^{90}Y	2.0 E-04	500 x (DCG/25)
$^{95}ZrNb$	4.0 E-04	250 x (DCG/25)
^{99}Tc	4.0 E-06	1 x (DCG/25)
^{103}Ru	5.0 E-04	250 x (DCG/25)
^{106}Ru	6.0 E-04	250 x (DCG/25)
^{113}Sn	5.0 E-05	25 x (DCG/25)
^{125}Sb	5.0 E-05	25 x (DCG/25)
^{129}I	2.0 E-08	1 x (DCG/25)
^{134}Cs	2.0 E-06	25 x (DCG/25)
^{137}Cs	3 E-5	250 x (DCG/25)
^{141}Ce	5 E-05	25 x (DCG/25)
$^{144}Ce/Pr$	7.0 E-06	25 x (DCG/25)
^{147}Pm	1.0 E-04	25 x (DCG/25)
^{238}Pu	4.0 E-08	25 x (DCG/25)
$^{239,240}Pu$	4 E-9	3 x (DCG/25)
^{241}Pu	8.0 E-06	100 x (DCG/25)
^{241}Am	4.8 E-07	400 x (DCG/25)
U gross (U-234)	2.0 E-08	1 x (DCG/25)
Other radionuclides	--	1 x (DCG/25)

Table F-2. Interim Concentration Values for Specified Discharges to the 200 Area Liquid Waste Disposal Facilities.
(sheet 1 of 2)

Radionuclide*	Interim concentration values(μCi/mL)	Comparison to DCG
PUREX Process Condensate (216-A-45)(PDD)		
^{90}Sr	2.0 E-3	2000 x DCG
^{103}Ru	5.0 E-3	100 x DCG
^{106}Ru	6.0 E-2	10,000 x DCG
^{113}Sn	5.0 E-3	100 x DCG
^{125}Sb	5.0 E-4	10 x DCG
^{129}I	5.0 E-07	1 x DCG
^{134}Cs	2.0 E-4	100 x DCG
^{137}Cs	3 E-3	1000 x DCG
^{147}Pm	1.0 E-2	100 x DCG
^{238}Pu	4 E-5	1000 x DCG
$^{239,240}Pu$	2 E-5	667 x DCG
^{241}Pu	2.0 E-03	1000 x DCG
^{241}Am	6.0 E-06	200 x DCG
Uranium	5.0 E-07	1 x DCG (U-234)
PUREX Steam Condensate (216-A-30/A-37-2)(SCD)		
$^{239,240}Pu$	3 E-7	10 x DCG
U	5 E-7	1 x DCG

*Other radionuclides shall be limited to the concentrations specified in Table F-1.

Table F-2. Interim Concentration Values for Specified Discharges to the 200 Area Liquid Waste Disposal Facilities. (sheet 2 of 2)

Radionuclide*	Interim concentration values(μCi/mL)	Comparison to DCG
PUREX Cooling Water (216-B-3 Pond)(CWL)		
$^{239,240}Pu$	3 E-6	100 x DCG
B Plant Process Condensate 216-B-62		
^{90}Sr	1.0 E-04	100 x DCG
^{137}Cs	3.0 E-05	10 x DCG
B Plant Steam Condensate 216-B-55		
^{90}Sr	1.0 E-04	100 x DCG
^{137}Cs	3.0 E-05	10 x DCG
242-A Process Condensate 216-A-37		
^{90}Sr	1.0 E-04	100 x DCG
^{129}I	1.0 E-07	0.2 x DCG
^{241}Am	3.0 E-07	10 x DCG
PFP Waste Water 216-Z20		
^{238}Pu	4 E-7	10 x DCG
$^{239,240}Pu$	2.0 E-6	67 x DCG
^{241}Pu	2 E-4	100 x DCG
^{241}Am	3.0 E-07	10 x DCG
UO_3 Process Condensate 216-U-17		
Uranium	7 E-6	14 x DCG (U-234)

*Other radionuclides shall be limited to the concentrations specified in Table F-1.

Table F-3. Interim Control Value for Discharges to the 1325-N Liquid Waste Disposal Facility.

Radionuclide	Administrative concentration value (μCi/mL)	Comparison to DCG
^{54}Mn	5.0 E-04	10 x DCG
^{59}Fe	5.0 E-04	25 x DCG
^{60}Co	2.5 E-04	50 x DCG
^{89}Sr	2.0 E-04	10 x DCG
^{90}Sr	2.5 E-04	250 x DCG
$^{95}ZrNb$	4.0 E-04	10 x DCG
^{99}Mo	3.0 E-03	100 x DCG
^{103}Ru	1.0 E-04	2 x DCG
^{106}Ru	1.8 E-05	3 x DCG
^{131}I	3.0 E-03	1,000 x DCG
^{134}Cs	2.0 E-05	10 x DCG
^{137}Cs	3.0 E-04	100 x DCG
^{140}Ba	2.0 E-04	10 x DCG
^{141}Ce	2.5 E-04	5 x DCG
^{144}Ce	1.0 E-04	15 x DCG
^{238}Pu	8.0 E-08	2.5 x DCG
$^{239,240}Pu$	5.4 E-08	1.8 x DCG
^{239}Np	5.0 E-03	100 x DCG

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TITLE:

STANDARD FOR NONRADIOACTIVE NONHAZARDOUS SOLID WASTE DISPOSAL

Approved by

R E Lerch

Manager, Environmental Division

G1.0 PURPOSE

The purpose of Part G is to establish requirements and guidelines for the handling and disposal of solid wastes that are considered nonradioactive and nonhazardous.

G2.0 SCOPE

The provisions of this Part apply to WHC waste generators and to Central Landfill, 100 Area demolition and inert waste landfill, and steam plant ash pile facilities.

G3.0 DEFINITIONS

Demolition waste--Solid waste, largely inert waste, resulting from the demolition or razing of buildings, roads and other man-made structures. Demolition waste consists of, but is not limited to, concrete, brick, bituminous concrete, wood and masonry, composition roofing and roofing paper, steel, and minor amounts of other metals like copper. Plaster (i.e., sheet rock or plaster board) or any other material, other than wood, that is likely to produce gases or a leachate during the decomposition process and asbestos wastes are not considered to be demolition waste for the purposes of this regulation.

Inert wastes--Noncombustible, nondangerous solid wastes that are likely to retain their physical and chemical structure under expected conditions of disposal, including resistance to biological attack and chemical attack from acidic rainwater.

G4.0 RESPONSIBILITIES

a. Waste generators should make efforts to minimize the volume of wastes disposed of at the disposal facilities.

b. Waste generators have the responsibility to assure that radioactive and hazardous wastes as defined in Appendix I are not disposed of at the disposal facilities.

c. The waste disposal facility management shall be responsible for:

- Developing, maintaining, and implementing plans of operation, closure, and postclosure
- Maintaining a daily operating log
- Performing and keeping records of inspections of the facility
- Obtaining permits to operate in accordance with WAC-173-304-600
- Submitting an annual report by March 1 of each year to the Environmental Protection Section and Ecology (through DOE-RL).

d. Environmental Protection shall perform and document monthly disposal facility inspections.

e. Environmental Engineering and Technology shall be responsible for groundwater monitoring.

G5.0 GENERAL NONHAZARDOUS, NONRADIOACTIVE WASTE DISPOSAL FACILITY REQUIREMENTS

a. Hazardous substances and wastes as defined in Appendix I shall not be disposed of at these disposal facilities (WAC 173-304).

b. Wastes generated by Hanford contractors or their subcontractors other than WHC shall not be disposed of at the disposal facilities without approval of WHC Fleet Operations, Transportation and Maintenance Management.

c. Radioactive waste as defined in Appendix I shall be excluded from the disposal facilities. Waste generators have the responsibility to assure that radioactive wastes are not disposed of at the disposal facility. Operators at the site shall be alert to suspicious material and shall contact Environmental Protection as needed.

d. The disposal facility management shall be responsible for developing, maintaining, and implementing a plan of operation. The plan of operation shall be available for inspection at the request of the jurisdictional health officer. The plan of operations shall include the following in accordance with WAC 173-304:

- How solid wastes are to be handled onsite during the active life of the disposal facility

- o How the disposal facility will be closed and how postclosure will be carried out, including plans of restoring the facility compatibly with the environment and plans for continued monitoring until stabilization is complete
- o Frequency and procedures for inspecting and monitoring the disposal facility
- o Actions to take if there is a fire or explosion
- o Actions to take if leaks are detected
- o Corrective actions to take if groundwater is contaminated
- o A safety plan or procedure.

e. The disposal facility management shall be responsible for a daily operating log. Included in the log shall be weights (or volumes) of each waste disposed, number of vehicles entering, types of waste received, deviations from operating plan, dust control efforts, vector and litter control efforts, and radiation survey data, if any (WAC 173-304).

f. The disposal facility operations management shall submit an annual report by March 1 of each year to Environmental Protection and Ecology (through DOE-RL). The annual report shall cover disposal facility activities during the previous year and shall include the following information (WAC 173-304):

- o Location of the disposal facility
- o Calendar year covered by the report
- o Annual quantity, in tons, or volume, in cubic yards, and estimated in-place density in pounds per cubic yard of solid waste handled, by type of solid waste if available
- o Results of groundwater monitoring required in G7.0.d.

g. The disposal facility operations management shall be responsible for performing inspections (weekly at a minimum) of the disposal facility. An inspection log shall be maintained that includes the date and time of inspection, the printed name and handwritten signature of the inspector, and notations of observations made and the date and nature of repairs or corrective action. Environmental Protection shall perform and document monthly inspections (WAC 173-304).

h. Groundwater monitoring shall be performed (WAC 173-304).

- o The groundwater monitoring wells shall be sampled for the parameters listed below, at least quarterly using methods described in EPA Publication Number SW-846, "Test Methods for Evaluating Solid

Waste - Physical/Chemical Methods," except for total coliform which shall use the latest edition of "Standard Methods for the Examination of Water and Wastewater." If the sample matrix is such that the methods listed above do not adequately analyze for the contaminant in question, additional testing may be required. Written notification shall be provided to Environmental Protection.

- o The groundwater surface elevation and groundwater flowrate and direction shall be determined each time sampling is performed. These results shall be included in the annual report.

- o The samples shall be tested for the following parameters: temperature, conductivity, pH, chloride, nitrate, nitrite, and ammonia as nitrogen, sulfate, dissolved iron, dissolved zinc and manganese, chemical oxygen demand, total organic carbon, and total coliform.

- o A statistical procedure shall be used to determine whether a significant change over background has occurred. Should a significant increase occur, Environmental Surveillance shall be notified.

- o Also see Section N6.0 concerning groundwater monitoring requirements.

i. Disposal facilities shall be closed according to the plan of operation. Disposal facilities shall be restored as compatible as possible with surrounding environment. Closure includes grading, seeding, landscaping, contouring, and screening. Post closure activities include groundwater monitoring, gas monitoring and maintenance of site until the site is stabilized (WAC 173-304).

j. Maps and a statement concerning the location of the site shall be recorded as a part of the deed with the county auditor not later than three months after closure (WAC 173-304).

G6.0 CENTRAL LANDFILL SPECIFIC REQUIREMENTS

The Central Landfill is a sanitary landfill for which the requirements below are applicable in addition to the general disposal facility requirements listed above (WAC 173-304).

a. Landfill operations shall not contaminate the groundwater beyond the point of compliance with any substance determined to present a substantial risk to human health or environment.

b. Liquids or sludges containing free liquids shall not be disposed of at the landfill.

c. All incoming waste shall be weighed or volume calculated.

d. Scavenging shall be prohibited.

e. Open burning shall not be conducted at the landfill.

f. Litter fencing shall be maintained to ensure the containment of blowing litter in the area. The landfill shall be fenced and locked during nonoperating hours to prevent unauthorized disposals.

g. Fence litter shall be collected on an as-needed basis and disposed of to avoid fire hazard and an unsightly accumulation or blowing debris from the landfill.

h. Conditions shall be maintained which are unfavorable for the harboring, feeding, and breeding of insects, rodents or other vectors.

i. Road dust shall be controlled.

j. The waste placed in the landfill shall be thoroughly compacted before succeeding layers are added. The compacted waste shall be covered with at least 6 inches of compacted cover material after each day of operation, or when deemed necessary, to minimize detrimental environmental effects.

k. Central landfill operations personnel shall not knowingly dispose, treat, store or otherwise handle dangerous waste.

l. Asbestos shall be disposed of at the landfill only under the following conditions (40 CFR 61, Subpart M):

- o A proper disposal request shall accompany the asbestos waste
- o Asbestos shall be wetted and sealed in a leak tight container
- o The container shall bear a label reading

CAUTION
Contains Asbestos -
Avoid Opening or
Breaking Container.
Breathing Asbestos is
Hazardous to Your Health.

- o Asbestos waste shall be segregated from the rest of the solid waste going to the landfill
- o See Part Y for additional asbestos requirements.

m. Pesticide or herbicide containers shall be disposed of at the landfill only under the following conditions (40 CFR 165):

- o The container shall not have contained any organic, mercury, lead, cadmium, or arsenic compounds
- o Combustible containers shall be segregated from non-combustible waste
- o The containers shall be triple-rinsed

  NOTE: The rinse liquid shall be added to the normal spray mixture or it shall be disposed of consistent with hazardous waste, pesticide, or herbicide regulations as applicable.
- o After triple-rinsing, the container shall be punctured to facilitate drainage
- o A non-hazardous designation shall have been received from the Site Hazardous Waste Engineering Support Unit.

G7.0 CENTRAL LANDFILL DESIGN REQUIREMENTS (WAC 173-304)

a. The landfill shall be designed to prevent contamination of the groundwater beneath the landfill.

- o Design shall meet arid climate liner and leachate collection requirement which is to provide for vadose zone moisture monitoring.
- o Groundwater monitoring devices shall consist of at least one up-gradient well and three down-gradient wells.

b. The landfill shall be designed so as not to violate any ambient air quality or emission standards listed in Part C of this manual. Vents shall be provided for any gas generated.

c. The landfill design shall prevent violation of any water quality standards described in Part E of this manual of any surface water.

- o Liquids shall be minimized in the landfill by design to prevent run-on and run-off of liquids from either a storm or surface water in active and closed portions of the landfill.

d. Other requirements.

- o Employee facilities shall be provided (i.e., shelter, toilets, hand washing facilities, and potable drinking water).

- o A fence surrounding the landfill property with a lockable gate shall be installed and maintained.
- o The site shall be identified by a sign which shall include the hours of operation, a WHC contact phone number, and those principal wastes which are unacceptable.
- o Communication for employees to handle emergencies shall be provided.
- o Boundary posts to clearly mark the active area boundaries authorized in the permit shall be provided.
- o Fire protection shall be provided for landfill operations.

e. See Part Q also for new and modified facilities.

f. Closure.

- o Closure shall be designed to minimize further maintenance.
- o Land shall be returned to the appearance and use of the surrounding land.
- o Closure design shall allow for continued monitoring until the landfill is stabilized.
- o Deactivated trenches shall be covered with at least 2 feet of 1×10^{-5} cm/s or lower permeability soil or artificial liners with a minimum thickness of 50 mils. The grade of surface slopes shall not be less than 2%, nor the grade of side slopes more than 33%.
- o At least 6 inches of topsoil shall be placed over the soil cover and vegetation replanted as soon as practical. Vegetation shall be replanted annually if needed.

G8.0 DEMOLITION AND INERT WASTE LANDFILL SPECIFIC REQUIREMENTS

Only waste meeting the definitions of demolition and inert waste is allowed to be disposed of in the 100 Area landfills. In addition to the in-situ building demolition, the following sites are authorized to receive demolition and inert waste:

100-B Area
184-B Coal Pit
183-B Clearwells

100-F Area
183-F Clearwells

100-H Area
183-H Clearwells

100-D Area	100-K Area
190-DR Clearwell Tank Pit	Gravel Pit (East of Burial Ground)
	183-KE and 183-KW Clearwells

NOTE: Due to their proximity to the water table and flood plain, the 183-F and 183-H Clearwells are not authorized to receive asbestos-containing waste materials.

a. Demolition and inert landfills shall comply with the general requirements of G4.0.

b. As long as only inert and demolition wastes are disposed of in these facilities, groundwater monitoring is not required during operation of the facility.

c. Disposal facilities shall not be located on a hill with an unstable slope.

d. Friable asbestos shall not be disposed of in the 100 Area demolition and inert landfills.

e. Records of weights or volumes and types of waste disposed at each site shall be maintained.

f. Dust from disposal operations shall be controlled as necessary by water spray.

g. Timbers and wood waste shall be covered during summer months to reduce fire hazard.

h. Facility managers shall not allow disposal of any form of waste except inert waste and demolition waste.

i. For the sites listed above, a minimum distance of 50 feet shall be maintained between the disposal site and any permanent roads or structures. The disposal site area will be roped off, at a minimum, to control access, with appropriate signs and the entrance(s) posted. The signs shall provide instructions to prevent the disposal of unsuitable waste at the site.

j. Open burning or incineration shall not be performed at the inert waste and demolition waste sites.

k. Salvage operations shall not be performed at the disposal site.

l. As small an area as possible shall be used for waste disposal by employing appropriate compaction techniques. Layering of the waste shall be performed as appropriate. Face slopes shall be maintained between 20 and 30°.

m. These landfills shall be closed by leveling and filling all the voids. A minimum of 1 foot soil shall be used as cover.

G9.0 ASH PILE SPECIFIC REQUIREMENTS (WAC 173-304)

a. Ash piles shall comply with the general facility requirements listed in G4.0.

b. All solid wastes shall be removed from the pile at closure to another permitted disposal facility.

c. Disposal facility management shall obtain a certificate of non-designation as part of the permitting process. This certificate signifies that the ash waste is nonhazardous and is not likely to produce leachate which would cause the concentration of the substance in the groundwater to exceed the maximum contaminant limits.

If a certificate is not granted then, the following requirements shall be met in accordance with WAC 173-304-420.

- A liner shall be installed.
- Liquid run-off control systems shall be installed such as
  - i) groundwater monitoring or
  - ii) leachate detection, collection, and treatment system.
- Liquid run-on prevention shall be installed.

G10.0 REFERENCES

1. 40 CFR 61, Subpart M, "National Emission Standard for Asbestos."

2. 40 CFR 165, "Regulations for the Acceptance of Certain Pesticides and Recommended Procedures for the Disposal and Storage of Pesticides and Pesticide Containers."

3. SW-846, "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods," EPA.

4. WAC 173-304, "Minimum Functional Standards - For Solid Waste Handling."

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RADIOACTIVE SOLID WASTE STORAGE AND DISPOSAL

Approved by

R E Lerch

Manager, Environmental Division

H1.0 PURPOSE

The purpose of this Part is to establish WHC standards for the management and disposal of solid radioactive waste.

H2.0 SCOPE

The provisions of this Part apply to all existing and planned WHC waste management activities governing the storage and disposal of the radioactive constituents of solid waste. The additional requirements for disposal of mixed waste are contained in Part J of this manual.

H3.0 DEFINITIONS

Refer to Appendix I, Glossary.

H4.0 RESPONSIBILITIES

The solid waste generator shall be responsible for:

- o Segregation, packaging, minimization of volume and content, and disposal of solid radioactive waste in accordance with this section and the provisions of WHC-EP-0063, Hanford Radioactive Solid Waste Packaging, Storage and Disposal Requirements.
- o Providing individual waste package labeling that indicates the radioactive characteristics of the waste.

H4.0 GENERAL REQUIREMENTS

a. Technical and administrative efforts shall be directed toward minimizing the generation of solid waste.

b. Radioactive waste packages shall remain below the limits for smearable contamination as stated in WHC-CM-4-10, Radiation Protection, during transport and placement into burial sites.

c. Solid wastes generated in radiologically controlled areas where unsealed radioactive materials are used or are present shall be considered to be radioactive unless surveyed and unconditionally released by Occupational Health Physics.

d. Solid waste generated in radiologically controlled areas where dispersible radioactive material is handled or stored shall be collected in containers as noted in WHC-EP-0063. Waste containers specifically marked for radioactive application (e.g., standard waste cartons) shall not be used to package nonradioactive waste or material.

e. Nonradioactive wastes generated in radiologically controlled areas which are designated as contamination-free by Occupational Health Physics, or nonradioactive waste generated in controlled zones may be collected in nonradioactive-waste containers.

f. Waste containing reactive chemicals or materials that could result in fire, hazardous fumes, corrosion, pressurization or other occurrences that could spread contamination shall be converted into stable forms or shall be surrounded by sufficient absorbent to limit radionuclide migration in the event of breach of containment (see WHC-EP-0063 for details). Alkali metals shall be removed and/or reacted to a thermodynamically stable state before the waste is transported to the disposal site.

g. During accumulation and storage, solid radioactive wastes shall be protected from fire or other events that might lead to inadvertent release to the environment or exposure to personnel.

h. Unabsorbed liquid waste shall not be placed in dry waste containers. Packaged moist items or small quantities of inorganic liquids that are contained on an absorbent medium may be placed in dry waste containers.

i. Improperly packaged waste shall be repacked by the generating organization at the direction of Waste Systems Operations.

j. Environmental Assurance shall have concurrence approval for disposal of unusual forms of wastes which are in a chemical or physical matrix such that they do not conform to existing burial ground requirements.

k. A waste minimization program (WHC-CM-1-3, MRP 5.44) shall be implemented that identifies radioactive waste, segregates radioactive waste from other waste, and minimizes the generation of radioactive waste by identifying and encouraging efficient work practices, volume reduction, and other methods so that the volume of waste generated and disposed of is minimized.

l. Radioactive waste that does not exceed the threshold levels for radioactive material as specified in Part K, even though generated in a radiologically controlled area can be released for disposal on the Hanford site as non-radioactive waste.

H5.0 HIGH-LEVEL RADIOACTIVE WASTE

a. Stored high-level radioactive waste (HLW) should be contained so as to be retrievable for removal and transfer elsewhere. (DOE Order 5820.2)

b. The volume, radioactive content, and chemical and physical characteristics of HLW in storage shall be documented and updated at least annually. (DOE Order 5820.2)

c. For emergencies, spare capacity with adequate heat dissipation capability for each tanks farm shall be maintained to receive the largest volume of liquid contained in any one tank. Adequate spare transfer pipelines shall also be maintained. (DOE Order 5820.2)

d. All new HLW handling, transfer, and storage facilities (e.g., tanks, bins, pipelines, and capsules) shall be doubly contained. Existing singly contained systems for handling, transfer, and storage of HLW shall be replaced with doubly contained systems as practical. (DOE Order 5820.2)

e. All new HLW handling, transfer, and storage facilities shall be designed in accordance with DOE Order 6430.1A.

f. HLW disposal shall ensure adequate protection for the public and the environment from the potential hazards of the radioactive and nonradioactive constituents in accordance with the requirements of DOE 5480.2 and the performance objectives of 40 CFR 191, and may impose additional requirements deemed necessary to achieve such protection. (DOE Order 5820.2)

g. HLW shall be disposed of in an NRC licensed facility and in compliance with 40 CFR 191.

h. New and readily retrievable existing HLW shall be processed for disposal in a geologic repository according to the requirements of the Nuclear Waste Policy Amendments Act of 1987 (Public Law 100-203) as implemented by 40 CFR 191. (DOE Order 5820.2)

H6.0 TRANSURANIC WASTE

a. Transuranic (TRU) waste meeting the requirements of the Waste Isolation Pilot Plant (WIPP) - Waste Acceptance Criteria, WIPP-DOE-069, revision 2, shall be sent to WIPP for disposal. (53 FR 72, 4/14/88)

b. The Data Package prepared for WIPP shall include information on the kinds and quantities of hazardous wastes contained in a waste package in accordance with the requirements of WHC-EP-0063 and data required by WIPP-DOE-157, revision 1.

c. Radioactive waste with radioactivity concentrations above threshold quantities but below the limit for TRU waste shall be considered low-level radioactive waste (LLW) and disposed of according to the requirements of Part H7.0. (DOE Order 5820.2)

d. The TRU waste shall be packaged, labeled, and stored such that intact, contamination free retrieval, identification, and onsite transportation can be readily implemented for at least 20 years after emplacement in storage.

e. TRU waste storage at Hanford shall comply with the provisions of DOE 5820.2A.

f. TRU disposal at the Hanford Site shall comply with the provisions of DOE 5820.2 and 40 CFR 191.

H7.0 LOW LEVEL RADIOACTIVE WASTE

a. Waste acceptance criteria shall be established to ensure compliance to the following performance objectives: (DOE Memorandum, J. E. Lytle)

   - o 25 mrem/year to the offsite public from all exposure pathways (i.e., crop ingestion, inhalation, direct radiation, etc.)
   - o 4 mrem/year to the offsite public from consuming 2 liters per day of groundwater
   - o 100 mrem/year for a continuous exposure resulting from inadvertent intrusion into the waste 100 years after loss of institutional control
   - o 500 mrem/year for a single acute exposure resulting from inadvertent exposure resulting from inadvertent intrusion into the waste 100 after loss of institutional control.
   - o Engineered features and waste form stabilization may be considered for compliance with these performance objectives.

b. New LLW disposal sites shall be sited in accordance with the guidance of DOE 5820.2, Chapter III.

c. New LLW burial grounds shall be sited on the 200 Area plateau.

d. In situ disposal of radioactively contaminated waste resulting from decommissioning and deactivation activities shall be allowed provided:

   - o For uncontrolled onsite release, radionuclides are present below the concentration limits in Part K

- o Waste acceptance limits, when calculated using the Allowable Residual Contamination Level (ARCL) method as specified in "A Manual for Applying the Allowable Residual Contamination Level Method for Decommissioning Facilities on the Hanford Site", do not violate the performance objectives in H7.a.

- o Siting is in accordance with DOE 5820.2.

e. The resuspension of radioactive wastes by the wind shall be minimized at the burial ground facilities. To prevent the spread of contamination, backfilling of subsurface facilities (i.e., trenches) and stabilization of earth cover shall proceed as soon as practical.

f. LLW disposal sites shall be designed to comply with the requirements of DOE 5820.2, Chapter III, and shall ensure compliance with the performance objectives of Part H7.a.

g. LLW disposal sites shall be operated to protect the environment and the health and safety of the public and site personnel, assure the security of the site, encourage good housekeeping practices, minimize the need for long-term control, and meet the requirements of the closure/post-closure plan. (DOE Order 5820.2)

h. Residual radioactivity levels for surface soils shall comply with site threshold quantity requirements as specified in Part K for onsite release.

i. Disposition of waste designated as greater-than-class C as defined in 10 CFR 61.55 shall be handled as special cases. Disposal systems for such waste shall be justified by a specific performance assessment and shall receive concurrence of DOE-RL. (DOE Order 5820.2)

H8.0 NATURALLY OCCURRING RADIONUCLIDES

a. Waste containing naturally occurring radionuclides whose specific activity is equal to or greater than 2n Ci/g shall be disposed of as LLW except for:

- o Smoke detectors

- o Watches and clocks using radioluminescent paint

- o Instruments using radioluminescent paint

- o Gas lanterns

b. Waste containing naturally occurring radionuclides whose specific activity is below 2nCi/g can be considered to be non-radioactive waste.

H9.0 THRESHOLD CONCENTRATIONS

a. Waste containing radionuclides below the concentrations stated in Table K-1 do not require the controls of the LLW Burial ground and may be released for disposal on the Hanford site as non-radioactive waste.

b. Waste containing radionuclides below regulatory concern (i.e., delivers less than 4 mrem/year) as defined by Federal regulations, may be disposed without regard to radioactivity content for onsite release. (DOE Order 5820.2A). Waste shall be evaluated on a case by case basis for uncontrolled offsite disposal by Regulatory Compliance.

H10.0 NOTIFICATION REQUIREMENTS

Environmental Protection shall be notified immediately of detection of any surface contamination resulting from accidental releases due to unabsorbed liquids, failed containers, etc. Reporting of these events shall in all other respects be in accordance with MRP 5.14, "Event, Critique, and Unusual Occurrence Reporting."

H11.0 REFERENCES

1. DOE Order 5820.2, "Radioactive Waste Management."

2. DOE Order 6430.1A (draft) "General Design Criteria."

3. 10 CFR 61.55, "Licensing Requirements for Land Disposal of Radioactive Waste."

4. 40 CFR 191, "Environmental Radiation Protection Standards for Management and Disposal of spent Nuclear Fuel, High-level, and Transuranic Radioactive Wastes."

5. Nuclear Waste Policy Amendments Act of 1987; Public Law 100-203.

6. WHC-CM-1-3, Management Requirements and Procedures, MRP 5.14, "Event, Critique, and Unusual Occurrence Reporting."

7. WHC-CM-1-3, Management Requirements and Procedures, MRP 5.44, "Waste Minimization."

8. WHC-CM-4-10, Radiation Protection.

9. WHC-EP-0063, Hanford Radioactive Solid Waste Packaging, Storage, and Disposal Requirements.

10. 53 FR 72, "Disposal of Hanford Defense High-Level, Transuranic, and Tank Wastes, Hanford Site, Richland, Washington; Record of Decision (ROD)," April 14, 1988.

11. WIPP-DOE-069,"TRU Waste Acceptance Criteria for the Waste Isolation Plant," Rev. 2, as updated.

12. WIPP-DOE-157, Rev. 1, "Data Package Format for Certified Transuranic Waste for the Waste Isolation Pilot Plant."

13. DOE Memorandum, J. E. Lytle to Heads of Field Offices, "Additional Implementation Guidance for DOE 5820.2, "Radioactive Waste Management."

14. PNL 6348, Napier, B. A., Peipel, G. F., and Kennedy, W. E., "A Manual for Applying the Allowable Residual Contamination Level Method for Decommissioning Facilities on the Hanford Site," 1988.

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DANGEROUS WASTE CONTROL

Approved by

R E Lerch

Manager, Environmental Division

I1.0 PURPOSE

This Part defines the WHC Dangerous Waste Control Program. This program ensures WHC compliance with the State of Washington Dangerous Waste Regulations contained in WAC 173-303 and other requirements imposed by the DOE.

I2.0 SCOPE

The requirements of this Part apply to all WHC nonradioactive dangerous waste generators and treatment, storage, and disposal unit operators on the Hanford Site. The requirements are intended to ensure proper management of dangerous waste from the point of generation of a waste to its final disposition on the Hanford Site. Management of polychlorinated biphenyl (PCB) and asbestos waste are contained in Part Y. With the exception of PCB wastes described in WAC 173-303-9904, PCB and asbestos wastes are excluded from the requirements of WAC 173-303 and this Part when these wastes are managed in compliance with 40 CFR 761 and 40 CFR 61, Subpart M, respectively. Terms contained in this section, such as generator, tank, container, are equivalent to those contained in WAC 173-393-040.

Part I is directed toward protection of the environment from dangerous waste. Guidance for protection of workers is provided in WHC-CM-4-3, Industrial Safety.

The requirements of this Part do not include detailed information on generator waste identification, packaging, labeling, marking, and transport. Such requirements are required by this Part. This information is contained in WHC-CM-5-16, Nonradioactive Dangerous Waste Packaging and Disposal Requirements.

I3.0 DEFINITIONS

Definitions applicable to this Part are the same as those found in WAC 173-303-040.

I4.0 RESPONSIBILITIES

a. Waste Generation Managers shall:

- Assure that all dangerous waste generation, treatment, storage, and disposal is managed in compliance with the applicable requirements of this Part.
- Be responsible for obtaining proper designation of and packaging for all dangerous waste generated at their facility in accordance with WHC-CM-5-16.
- Be responsible for obtaining appropriate samples and analyses of generated waste in order to obtain proper designations.
- Conduct inspections, maintain required records and reports, and develop inspection schedules, waste analysis plans, contingency plans, emergency procedures, personnel training, and closure plans, as required by this Part.
- Identify a hazardous waste coordinator to facilitate dangerous waste management.
- Provide annual waste inventories to Site Hazardous Waste Support Unit for inclusion in the Annual Hanford Site Generator and Treatment, Storage, and Disposal Dangerous Waste Report.
- Minimize the generation of dangerous waste to the maximum extent economically practical.
- Assure that appropriate dangerous waste permitting is developed for their facility, when applicable.
- Promptly notify Environmental Protection of any spills or releases of dangerous waste that exceed the limits of Part B5.0 of this manual.
- Comply with all generator responsibilities defined in WHC-CM-5-16.
- Assure that new equipment used for the purposes of storing, treating, or disposing of dangerous waste is designed in compliance with the requirements of this Part.
- Maintain existing equipment used for the purposes of storing, treating, or disposing of dangerous waste in accordance with the requirements of this Part.

b. Site Hazardous Waste Engineering Support shall:

- o Approve all dangerous waste designations provided by site generators and perform generator waste designations when requested
- o Provide packaging and labeling instructions to site generators
- o Be responsible for development of the Annual Hanford Site Generator and Treatment, Storage, and Disposal Dangerous Waste Report.
- o Comply with coordinator responsibilities defined in WHC-CM-5-16.

c. Westinghouse Hanford Company Traffic Department shall:

- o Inspect dangerous waste packages to be transported and assure proper manifesting of the shipment.
- o Comply with inspector responsibilities defined in WHC-CM-5-16.

d. Westinghouse Hanford Company Transportation Department shall:

- o Assure safe, manifested transport of all shipments of dangerous waste to the receiving facility.
- o Assure that the entire quantity of dangerous waste is delivered to the receiving facility.
- o Promptly notify Environmental Protection of any spills or releases during transport of dangerous waste that exceed the provisions of Part B of this manual.
- o Comply with transporter responsibilities defined in WHC-CM-5-16.

e. Environmental Protection shall:

- o Determine nonradioactive dangerous waste release reporting and notification requirements as defined in Part B of this manual and, when required, report releases to the DOE-RL.
- o Assist in the identification of remedial actions required in response to dangerous waste releases.

f. Regulatory Compliance shall:

- o Provide regulatory guidance to dangerous waste generators, transporters, and treatment, storage, and disposal operators.
- o Conduct periodic inspections of facilities and operations to ensure compliance with the requirements of this Part.

- o Coordinate the development and submittal of dangerous waste treatment, storage, and disposal permits.

I5.0 REQUIREMENTS

I5.1 WASTE CATEGORIES

a. Waste identification and designation required by this Part is described in detail within WHC-CM-5-16. Waste categories regulated by WAC 173-303 are briefly described below. These definitions should not be considered all inclusive nor used as a substitute for applicable statutory/regulatory requirements.

Ignitable--flash point below 140 degrees Fahrenheit or defined as an oxidizer.

Corrosive--pH equal to or above 12.5 or equal to or below 2.0.

Reactive--water reactive, explosive, toxic gas generator, or cyanide or sulfide-bearing.

EP Toxic--contains concentrations of heavy metals or pesticides as specified in Table I-1 of this section.

Listed Discarded Chemical Products--contained in Appendix C of this manual.

Listed Spent Solvents--contained in Appendix C of this manual.

Toxic--contains regulated concentrations of biologically toxic substances.

Persistent--contains regulated concentrations of halogenated hydrocarbons or polycyclic aromatic hydrocarbons.

Carcinogenic--contains regulated concentrations of human or animal positive or suspected carcinogens.

b. The State of Washington Dangerous Waste Regulations define a broad spectrum of materials as "dangerous waste." It is important for all Hanford Site waste generators to be familiar with the types of materials that are regulated and to question all wastes generated at their facility as being potentially regulated under WAC 173-303.

c. Because the Hanford Site is considered one generator, individual generators cannot get credit for being small quantity generators or for having wastes that are defined as "undesignated" due to quantity. Any quantity of dangerous waste generated on the Hanford Site shall be

managed in compliance with applicable EPA and Washington State Dangerous Waste Regulations according to WAC 173-303-070(7).

d. The point at which a waste must be designated as regulated dangerous waste is at the initial point of generation and prior to mixing with other regulated or nonregulated wastes (WAC 173-303-016).

e. Waste generators shall not take any action to avoid the requirements of this Part and WAC 173-303 by dividing or diluting their waste in order to change its designation except for the purposes of treating, neutralizing, or detoxifying such waste (WAC 173-303-150) in accordance with interim status requirements or a final status permit as defined in Section I5.3 of this Part.

f. Land Disposal Restrictions

Certain hazardous wastes are restricted from land disposal by 40 CFR 268. Along with prohibitions on land disposal, restricted wastes are required to undergo treatment to achieve specified concentrations and are prohibited from storage unless such storage is solely for the purpose of the accumulation of such quantities of hazardous waste as necessary to facilitate proper recovery, treatment, or disposal (40 CFR 268.50). The current types of wastes that are restricted from land disposal are:

- Spent solvents (F001 - F005).
- Dioxin-containing wastes (F020 - F028).
- Liquid waste with pH less than or equal to 2.
- Liquid hazardous waste with PCB concentrations less than 500 mg/L and greater than 50 mg/L.
- Hazardous waste containing halogenated organic compounds greater than 1,000 mg/kg.
- Liquid hazardous waste containing arsenic (greater than 500 ppm), cadmium (greater than 100 ppm), chromium (greater than 500 ppm), lead (greater than 500 ppm), mercury (greater than 20 ppm), nickel (greater than 134 ppm), selenium (greater than 100 ppm), or thallium (greater than 130 ppm).
- Liquid hazardous waste containing greater than 1,000 ppm free cyanide.

Ecology has also restricted land disposal of certain types of waste as specified in WAC 173-303-140 and is requiring minimum treatment processes that must be performed on certain restricted waste. A summary of the waste types restricted are as follows:

- o Extremely hazardous waste
- o Dangerous waste with organic/carbonaceous content (containing carbon-hydrogen, carbon-halogen or carbon-carbon chemical bonds) of greater than ten percent (must be incinerated as a minimum)
- o Liquid waste
- o Ignitable and reactive waste
- o Solid acid waste
- o Leachable inorganic waste (must be stabilized as a minimum).

I5.2 GENERATOR REQUIREMENTS

a. Generator requirements relative to waste identification, packaging, labeling, marking, and manifesting are described in WHC-CM-5-16. Generator waste identification and designation shall be performed in accordance with WAC 173-303-070.

b. Recycling

Certain dangerous waste recycling, reclaiming, and recovery operations are not regulated under State dangerous waste regulations (WAC 173-303-120). For clarification of these activities, contact the WHC Regulatory Analysis Section.

c. Generator Recordkeeping (WAC 173-303-210)

- o Generators shall keep copies of any test results, waste analyses, or other determinations made for designating the waste as dangerous for at least three years from the date of transport from his facility.
- o Inspection logs and operating inventories must be maintained by the generator and kept for at least three years.

d. Generator Dangerous Waste Management Plans

- o Personnel Training (WAC 173-303-330)

Generating facilities are responsible for providing a personnel training program to its personnel in compliance with WAC 173-303-330. WHC Safety Training is responsible for the development of various training programs associated with dangerous waste management at WHC facilities and should be contacted for further information. Generators should also contact Safety Training to assure that facility training programs are complete and consistent across the site. A summary of this requirement follows:

- The program shall teach personnel to perform their duties in compliance with the Dangerous Waste Regulations, including instruction in the implementation of the contingency plan and emergency procedures.

- It must be taught by a person knowledgeable in dangerous waste management.

- New employees must receive training within six months and must be supervised until completion of training.

- Employees must participate in an annual review of training.

- The program must contain, at a minimum, the elements contained in WAC 173-303-330(1)(d) and (2).

- The generating facility must develop and maintain a written training plan and documented records which are auditable by Ecology and which must be kept for at least three years for former employees and until closure for current employees.

o Contingency Plan and Emergency Procedures (WAC 173-303-350)

Generating facilities are responsible for developing and maintaining a contingency plan and emergency procedures in compliance with WAC 173-303-350. Elements of these requirements are summarized:

- The purpose of a contingency plan and emergency procedures are to lessen the potential impact to public health and the environment in the event of an emergency from a release, fire, or explosion from dangerous waste management.

- Specific contents of a contingency plan are contained in WAC 173-303-350(3).

- The use of WHC-CM-4-1, WHC Emergency Plan, shall not be considered to suffice for the purposes of this requirement. Contingency plans and emergency procedures are required to be specific to a facility and to the particular hazards associated with the dangerous waste it generates. WHC-CM-4-1 may be referenced for certain requirements of the contingency plan in accordance with WAC 173-303-350.

- Individuals within a generating facility shall be assigned the responsibility of emergency coordinator/WHC Building Emergency Director with one individual named the primary emergency coordinator/WHC Building Emergency Director. The emergency coordinator/WHC Building Emergency Director has the responsibilities defined in WAC 173-303-360.

- Inspection Plans (WAC 173-303-320)

  Generating facilities shall provide routine, documented inspections of their container or tank storage areas and, in the case of generator tank storage, develop an inspection plan that includes schedules for inspecting and procedures for assessing the condition of the containers and tanks.

  - For containers, inspections shall occur at least weekly to look for leakage or deterioration of containers or containment structures.

  - For covered and uncovered tanks, inspections shall occur at least once each operating day to ensure that overfill control and monitoring equipment where present is working properly and for uncovered tanks, that sufficient freeboard exists to prevent overtopping by wave or wind action. At least weekly, inspection of the above ground portion, if any, of the tank must occur to assure that corrosion or leaking of the tank or fixtures or leakage surrounding the tank has not occurred.

  - For uncovered tanks, inspections shall occur once each operating day or before each filling to ensure maintenance of sufficient freeboard to prevent overtopping by wave or wind action or precipitation.

e. Generator Preparedness and Prevention (WAC 173-303-340)

- Facilities shall be designed, constructed, maintained, and operated to minimize the potential for fire, explosion, or release of dangerous waste.

- If required based on the type of dangerous waste managed, the following equipment shall be available at the facility and readily accessible to personnel:

  - Internal communications or alarm systems

  - Telephones or other devices capable of summoning external emergency assistance

  - Portable fire control equipment

  - Spill control and decontamination equipment

  - Water at adequate volume and pressure to supply fire suppression systems

- Adequate aisle space shall be maintained in container storage areas to allow unobstructed movement of personnel and emergency equipment.

f. Generator Container Management (WAC 173-303-630(7))

- o Other generator requirements specific to container management not already specified in this Part include:
  - Containers shall be kept in good condition. If leaks could occur or have occurred, the generator must transfer the waste to a container in good condition.
  - Only containers and container liners shall be used that are compatible with the waste placed in them
  - Containers shall always be closed except when in use and must not be handled in a manner that could cause rupture or leakage
  - Containers holding ignitable or reactive waste shall be stored in a manner equivalent with the Uniform Fire Code or existing state or local fire codes (WAC 173-303-630(8)(a). Specific requirements can be obtained from the Hanford Fire Department. Such container storage areas must be inspected at least yearly by a professional person familiar with the Uniform Fire Code, or in the presence of the Hanford Fire Department. Inspections must include the information contained in WAC 173-303-395(1)(d).
  - Incompatible wastes may not be placed in the same container
  - Containers holding incompatible waste must be separated from one another by diking, berming, or some other device
- o New container storage areas (constructed after September 30, 1986) must be provided with secondary containment as specified in WAC 173-303-630(7).

g. Generator Tank Management (WAC 173-303-640(3), (4), (5), (6), and (7))

- o Tank requirements not already specified in this Part include:
  - Overfill prevention controls must be provided by the operator
  - Closure of tanks must be provided to the extent that the tanks, associated equipment, bases, and contaminated soils are removed or decontaminated of dangerous waste residues
  - Ignitable or reactive liquids shall be stored in tanks in compliance with the National Fire Protection Association's buffer zone requirements, or state and local fire codes specified in WAC 173-303-640(8). Such tanks must be inspected at least yearly by a professional person familiar with the Uniform Fire Code, or in the presence of personnel from the

Hanford Fire Department. Inspections must include the information contained in WAC 173-303-395(1)(d).

- Incompatible wastes may not be placed in the same tank including wastes placed in unwashed tanks that previously held an incompatible material

- Wastes incompatible with tank materials may not be placed in a tank

h. Generator versus Permitted Activities

A generator cannot treat, store over 90 days (the 90-day clock starts on the day that waste is first added to the container or tank), or dispose of dangerous waste onsite without interim status or a permit as described in Section I5.3 of this Part as required in WAC 173-303-200. Exceptions to this are as follows. All generator requirements still apply to these activities.

o Storage

- Satellite storage areas - A generator may store up to 55 gallons of dangerous waste or 1 quart of acutely hazardous waste in containers at satellite storage areas at the facility per WAC 173-303-700(c), as defined in WHC-CM-5-16, before the 90 day clock begins, if storage is at or near the point of generation of the waste where the waste initially accumulates and is under the direct control of the operator of the process generating the waste. As a matter of WHC policy, wastes being stored in satellite storage areas must be removed within a 6 month period from the time of initial waste generation.

- 30-day extensions - WAC 173-303-200(1)(a) allows Ecology to formally approve storage extensions of up to 30 days to generators storing waste onsite if unforeseen, temporary, and uncontrollable circumstances occur. Such approval must occur before exceeding the 90-day storage limit.

o Waste minimization

A generator is required to minimize the generation of dangerous waste, whenever feasible. Certifications of waste minimization are required on generator manifests and annual reports (40 CFR 262). The WHC Waste Minimization Policy, WHC-CM-1-1, Management Policies, MP 5.17, "Waste Minimization," and MRP 5.44, "Waste Minimization Program" contain the Hanford Site requirements for compliance with waste minimization.

o Treatment

- Totally enclosed treatment (TET) - A generator may treat dangerous waste in a TET system that is directly connected to a production process and which prevents the release of dangerous waste or dangerous waste constituents to the environment during treatment without the need to obtain interim status or a permit in accordance with WAC 173-303-400(2)(c)(iv) and upon approval from Regulatory Compliance. Operators of TET units shall comply with the requirements of WAC 173-303-802(5).

- Elementary neutralization unit (ENU) - A generator can treat waste in a system that is defined as a tank, container, transport vehicle, or vessel whose purpose is to neutralize a waste that is designated only due to corrosivity without the need to obtain interim status or a permit in accordance with WAC 173-303-400(2)(c)(iv) and upon approval from Regulatory Compliance. Operators of ENUs shall comply with the requirements of WAC 173-303-802(5).

- Treatment-by-generator status - A generator may treat waste in a system if it meets the definition of treatment-by-generator and has formal approval from Ecology without the need to obtain interim status or a permit. Such allowance has been provided by Ecology and described in a Technical Information Memorandum Number 86-3, "Treatment by Generators." Treatment-by-generator qualifications are:

  - Treatment occurs in a container or tank at or near the point of generation

  - Storage and treatment occurs within 90 days

  - Container and tanks comply with the storage requirements contained in WAC 173-303-030 and -640.

  - Waste is low toxicity and system has low release potential.

- Absorption addition - A generator can add absorbent material to waste in a container to prevent the occurrence of free liquids without the need to obtain interim status or a permit provided that it is done at the time the waste is first placed in the container according to WAC 173-303-400(2)(c)(vi).

- o Disposal

  - Disposal of dangerous waste at Hanford is allowed without the need to obtain interim status or a permit only if wastes are discharged to and in compliance with a publicly-owned treatment works (for specific City of Richland disposal prohibitions, see Part E) or are a point-source discharge subject to regulation under Section 402 of the Clean Water Act.

I5.3 TREATMENT, STORAGE, AND DISPOSAL REQUIREMENTS

a. A facility that treats, stores over 90 days, or disposes of dangerous waste, excluding the exceptions specified in Section I5.2.h, may only do so if it has received interim status or a final status permit from Ecology and the EPA, Region 10. These terms are defined as follows:

   - o Interim status

     A facility has obtained interim status if it has filed a Part A Permit Application with Ecology and is in compliance with the Dangerous Waste Regulations.

   - o Final status permit

     A facility has a final status permit if it has submitted a Part B Permit Application to Ecology and it is subsequently approved. Until such approval is gained, a facility is operating under interim status.

b. Treatment is defined in WAC 173-303-040(97) as: the physical, chemical, or biological processing of dangerous waste to make such wastes nondangerous or less dangerous, safer for transport, amenable for energy or material resource recovery, amenable for storage, or reduced in volume.

   Examples of treatment include: solidification; evaporation; decanting; ion exchange; distillation; and incineration.

c. Storage is defined in WAC 173-303-040(85) as: the holding of dangerous waste for a temporary period. Interim or final status permitted storage exceeds a period of 90 days.

d. Disposal is defined in WAC 173-303-040(25) as: the discharging, discarding, or abandoning of dangerous wastes or the treatment, decontamination, or recycling of such wastes once they have been discarded or abandoned. This includes the discharge of any dangerous wastes into or on any land, air, or water.

e. New dangerous waste facilities may require an approved final status permit prior to construction and operation. New nonradioactive dangerous waste facilities are facilities for which construction and operation occurs after the effective date of regulation which is November 19, 1980, for wastes that are federally regulated and August 9, 1982, for wastes regulated solely by the State of Washington (WAC 173-303-400(2)(a)). Some facilities may qualify as expansions to existing facilities, and therefore, may be constructed and operated as a part of interim status. WHC Regulatory Compliance should be consulted regarding the permit status of any proposed nonradioactive dangerous waste facilities.

f. Any treatment, storage, or disposal (TSD) facility operator shall comply with the generator requirements specified in Section I5.2(d) - (g). In addition, the following general requirements must be complied with:

- o Waste analysis plans

  All TSD facility operators shall develop and maintain a waste analysis plan which confirms knowledge of his waste through the use of process knowledge or sampling and analysis in order to properly treat, store, or dispose of this waste. Specific requirements of this plan are contained in WAC 173-303-300.

- o Security

  All TSD facility operators shall provide protection of public health and the environment from waste through the posting of warning signs, and either a 24-hour surveillance system or a barrier which controls entry as required in WAC 173-303-310.

- o Inspection plans

  All TSD facility operators shall maintain an inspection plan as specified in WAC 173-303-320.

- o TSD operating records

  Detailed, auditable operating records shall be kept by all TSD facility operators as specified in WAC 173-303-380.

- o TSD labeling for containers and tanks

  Containers and tanks shall be labeled in a manner that identifies the major nonradiological chemical risk(s) associated with the contents unless due to security considerations, such labelling is not allowed. For tanks, such labels must be legible at a distance of at least 50 feet.

g. Interim status standards for specific units

The standards for compliance with interim status standards other than the general standards previously mentioned are referenced by WAC 173-303-400 as being contained in 40 CFR 265 Subparts F through R. Certain exceptions to this reference are contained in WAC 173-303-400(3).

Due to the volume and detail of information contained in 40 CFR Part 265 (effective on or before July 11, 1986), interim status standards for specific units will be required by this manual by reference to individual subparts within 40 CFR 265:

- Groundwater Monitoring Requirements - Subpart F
- Closure and Post-Closure Requirements - Subpart G
- Containers - Subpart I
- Tanks - Subpart J
- Surface Impoundments - Subpart K
- Waste Piles - Subpart L
- Landfills - Subpart N
- Thermal Treatment --Subpart P
- Chemical, Physical, and Biological Treatment - Subpart Q
- Underground Injection - Subpart R

"Interim Facilities Requirements", Internal Memo, R. E. Lerch to All Level 2 Managers, 80000-88-049, April 29, 1988, contains summaries of the specific interim status standards contained in 40 CFR 265 for each TSD facility on the Hanford Site.

h. Final status standards for specific units

Upon approval of the Part B Permit Application, TSD units must comply with the final facility standards contained in WAC 173-303-600 through -670 as well as the general standards previously described in Section I5.3(f). All final status standards as required by this Part will be contained within the approved Part B Permit.

I6.0 REFERENCES

1. 40 CFR 61, "National Air Emission Standards for Hazardous Air Pollutants."

2. 40 CFR 260 - 270, "Hazardous Waste Management System."

3. 40 CFR 761, "Polychlorinated Biphenyls Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions."

4. WAC 173-303, "Dangerous Waste Regulations."

5. WHC-CM-1-1, Management Policies, MP 5.17, "Waste Minimization."

6. WHC-CM-1-3, Management Requirements and Procedures, MRP 5.44, "Waste Minimization Program."

7. WHC-CM-4-1, WHC Emergency Plan.

8. WHC Internal Memo, 80000-88-049, April 29, 1988, R. E. Lerch to Level 2 Managers, "Interim Facilities Requirements."

Table I-1. Extraction Procedure Toxicity List.

Dangerous waste number	Contaminant	Extremely hazardous waste maximum concentration in extract (mg/L)	Dangerous waste maximum concentration in extract (mg/L)
D004	Arsenic	>500	5 - 500
D005	Barium	>10,000	100 - 10,000
D006	Cadmium	>100	1 - 100
D007	Chromium	>500	5 - 500
D008	Lead	>500	5 - 500
D009	Mercury	>20	0.2 - 20
D010	Selenium	>100	1 - 100
D011	Silver	>500	5 - 500
D012	Endrin	>2	0.02 - 2
D013	Lindane	>40	0.4 - 40
D014	Methoxychlor	>1,000	10 - 1,000
D015	Toxaphene	>50	0.5 - 50
D016	2,4-D	>1,000	10 - 1,000
D017	2,4,5-TP Silvex	>100	1 - 100

PST2E-0002-I-1

TITLE:

MIXED WASTE

Approved by

R E Lerch

Manager, Environmental Division

J1.0 PURPOSE

The purpose of this Part is to establish the additional WHC requirements for the generation, packaging, storage, and disposal of mixed waste.

J2.0 SCOPE

The provisions of this Part specify additional requirements for mixed waste management and apply to all facilities that have the potential to generate mixed waste, and to facilities that actively generate or store mixed waste. Mixed waste is subject to the provisions of Part H, Part I, and Part Y, as applicable.

J3.0 DEFINITIONS

Mixed waste--Waste that is classified as dangerous waste and contains radioactivity so as to also be classified as radioactive waste in accordance with Part H.

Dangerous wastes--For the purposes of this part the definition of dangerous waste has been expanded to include waste that is either contaminated with Toxic Substance Control Act (TSCA) waste [as listed in Appendix F, i.e., asbestos, polychlorinated biphenyls (PCBs)] except asbestos, or is classified as dangerous waste as per Part I of this manual.

J4.0 RESPONSIBILITIES

a. Waste generators shall be responsible for minimizing the amount of mixed waste generated at their facilities and developing the facility waste minimization plan.

b. Solid Waste Programs is responsible for the interim storage and final disposal of WHC mixed waste.

J5.0 GENERAL

a. Mixed waste shall be managed in accordance with the requirements for radioactive waste for the radionuclides present in the waste and shall be managed in accordance with dangerous waste requirements for the hazardous waste present in the waste (10 CFR 962.3).

b. Hazardous waste present in the mixed waste matrix shall be managed in accordance with the provisions of Part I, "Dangerous Waste Control."

c. Radionuclides present in the mixed waste matrix shall be managed in accordance with the provisions of Part H, "Radioactive Solid Waste Disposal."

d. The PCBs present in the radioactively contaminated PCB waste shall be managed in accordance with the provisions of Part Y, "Polychlorinated Biphenyls and Asbestos."

e. Radioactively contaminated asbestos shall be managed in accordance with the provisions of Part Y, and disposed in accordance with the provisions of Part H.

f. Liquid mixed waste shall not be disposed of directly to the soil column (i.e., french drains, cribs, trenches, etc.) (WAC 173-303).

g. Liquid mixed waste shall be solidified prior to disposal in landfill (WAC 173-303).

h. Mixed waste shall be packaged and disposed of in accordance with the provisions of Part I of this manual and WAC 173-303 as implemented in WHC-CM-5-16, Nonradioactive Dangerous Waste Packaging and Disposal Requirements.

J6.0 WASTE MINIMIZATION

a. Waste generation shall be minimized in accordance with WHC-CM-1-1, Management Policies, MP 5.17, "Waste Minimization" as implemented in WHC-CM-1-3, Management Requirements and Procedures, MRP 5.44, "Waste Minimization Program."

b. Dangerous waste containing radionuclides at levels below that requiring control as radioactive material, as specified in Part K4.0, may be disposed of as non-radioactive waste onsite even though generated in a radiologically controlled area.

J7.0 MIXED TRANSURANIC SOLID WASTE

a. Mixed transuranic waste meeting the requirements of the Waste Isolation Pilot Plant (WIPP) - Waste Acceptance Criteria, WIPP-DOE-069, revision 2 shall be sent to WIPP for disposal (DOE Order 5820.2).

b. The Data Package prepared for WIPP shall include information on the kinds and quantities of hazardous wastes contained in a waste package in accordance with the requirements of WHC-EP-0063, Hanford Radioactive Solid Waste Packaging Storage and Disposal Requirements, and data required by WIPP-DOE-157, revision 1 (DOE Order 5820.2).

c. Determination whether the TRU waste exhibits any dangerous characteristics or contains listed dangerous components may be based on the knowledge of the waste generating process when the performance of a chemical analysis would increase the radiological hazard to personnel (DOE Order 5820.2).

d. Mixed TRU waste shall be treated, where feasible and practical, to destroy the dangerous waste component.

J8.0 LEAD

a. Lead that is used as shielding in radioactive waste packages is not solid waste as defined in WAC 173-303 and is therefore not subject to the disposal prohibitions for lead specified in WAC 173-303. This lead shielding may be used for its intended function (i.e., shielding) even though its use constitutes disposal (WAC 173-303).

b. Lead used as shielding in radioactive disposal packages shall not be placed in the Burial Grounds except as follows:

   - Lead used as shielding for remote handled waste (waste packages with an exposure rate of greater than 200mR/hr at the surface) in accordance with the Hanford Radioactive Mixed Waste Storage Strategy (DOE-RL and WHC Policy).

   - Lead used as shielding for other waste as may be accepted on a case by case basis by Burial Ground Management and Regulatory Compliance.

c. Radioactively contaminated lead waste should be decontaminated to levels below that requiring control as radioactive material if economically achievable. Decontaminated lead shall be stored for onsite recycling, or disposed of as dangerous waste.

d. Radioactively contaminated lead waste shall be disposed of as mixed waste in accordance with the requirements of WHC-CM-5-16.

J9.0 STORAGE OF MIXED WASTE

a. All containerized mixed waste (except for remote handled waste) generated by WHC facilities shall be consolidated for storage at the WHC Central Waste Complex located in the 200 West Area or other permitted storage facilities.

b. Remote handled mixed waste (waste package with an exposure rate of greater than 200mR/hr at surface) shall be stored in the low-level radioactive waste burial ground or the retrievable storage units (DOE-RL and WHC Policy).

J10.0 DISPOSAL OF MIXED WASTE

a. Mixed waste shall be disposed of in a landfill that complies with the requirements of WAC 173-303 for the disposal of hazardous waste (WAC 173-303).

J11.0 REFERENCES

1. DOE Order 5820.2, "Radioactive Waste Management."

2. 10 CFR 962.3, "Byproduct Material."

3. WAC 173-303, "Dangerous Waste Regulations."

4. WHC-CM-1-1, Management Policies, MP 5.17, "Waste Minimization."

5. WHC-CM-1-3, Management Requirements and Procedures, MRP 5.44, "Waste Minimization Program."

6. WHC-CM-5-16, Nonradioactive Dangerous Waste Packaging and Disposal Requirements.

7. WHC-EP-0063, Hanford Radioactive Solid Waste Packaging, Storage, and Disposal Requirements.

8. WIPP-DOE-069, Rev. 2, "Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant."

9. WIPP-DOE-157, Rev.1, "Data Package Format for Certified Transuranic Waste for the Waste Isolation Pilot Plant.

TITLE:

STANDARDS FOR RADIOACTIVE SOIL CONTAMINATION

Approved by

R E Lerch

Manager, Environmental Division

K1.0 PURPOSE

The purpose of this Part is to establish radioactive soil contamination limits for the Hanford Site. Since all materials are radioactive to some degree, it is necessary to define threshold concentrations of radioactive materials in soils below which the soils can be disposed of without the controls of the LLW Burial Grounds. The intent of establishing threshold concentrations in soils is to ensure that individual effective dose equivalents would not exceed 25 mrem/yr (.25 mSv/yr) total, under any reasonable scenario, such as inadvertent ingestion, inhalation from resuspension, ingestion of food crops, and direct radiation, or 4 mrem/yr (.04 mSv/yr) from drinking water (DOE 5820.2 and 40 CFR 141). Although the determination of the threshold concentrations depends on the assumptions used within various scenarios and other factors, conservative assumptions have been made to ensure that the degree of protection required is met.

K2.0 SCOPE

The concentration limits specified in this part apply to the Hanford Site with respect to disposal operations, stabilization and cleanup, posting and control, and decontamination and decommissioning operations.

K3.0 RESPONSIBILITIES

It is the responsibility of project and waste generation managers to ensure that the requirements of this part are met relative to their respective projects and operations.

K4.0 THRESHOLD CONCENTRATIONS

Except as provided in Section K9.0, threshold concentrations for radioactivity shall be defined as levels below the concentration values of Table K-1 (EG-2400). Threshold concentrations are established for the purpose of defining levels below which soil (and other materials) does not require control as radioactive material. Soils below the threshold may be disposed of on site as non-radioactive waste. However, if contamination in soils can be detected by survey with portable instruments, in accordance with WHC-CM-4-10, Radiation Protection Manual, it cannot be considered below threshold concentrations regardless of the actual concentration of radioactivity present unless a dose assessment using the methods specified in PNL-6348, 1988, determines the annual dose contribution from the site to be less than 25 mrem/yr.

K5.0 POSTING CONTAMINATED SOILS

Posting of radiologically contaminated soils shall be in accordance with WHC-CM-4-10. An area shall be posted and have controlled access when:

a. Any surface or subsurface soil within the boundaries of Hanford containing concentrations of radioactive materials that can be detected with portable survey instruments (see WHC-CM-4-10) normally used for performing radiation surveys at Hanford; or

b. Any surface or subsurface soils within the boundaries of Hanford that contain concentrations of radioactive materials in excess of those concentrations listed in Table K-2 (RHO-SA-153).

Methodology specified in PNL-6348 may also be used to demonstrate that unrestricted release requirements are met (i.e., <25 mrem/yr) for the in situ disposal of soil.

K6.0 CRITERIA FOR DISPOSAL OF CONTAMINATED SOILS

Any Hanford soil containing concentrations of radionuclides in excess of threshold concentrations listed in Table K-1 shall be managed as radioactive. Every effort should be made to remove, clean up, and dispose of Hanford radioactive soils in properly designated and designed radioactive burial grounds or sites, in accordance with WHC-CM-4-10. Any Hanford soil containing concentrations of radioactive materials in excess of those limits specified in Section K5.0 of this manual shall be posted in accordance with K5.0 until removal, clean up, or permanent disposition has been accomplished.

K7.0 NATURALLY OCCURRING RADIOACTIVE MATERIALS

a. Waste from naturally occurring radioactive materials whose specific activity is below 2nCi/g shall be exempt from the requirements of this Part.

b. Waste from naturally occurring radioactive materials whose specific activity is above 2nCi/g shall be disposed of as LLW in accordance with Part H of this manual except for:

- o smoke detectors
- o watches and clocks using radioluminescent paint
- o instruments using radioluminescent paint
- o gas lantern mantles

K8.0 DETERMINING AVERAGE CONCENTRATIONS

It is recognized that the determinations of average concentration of radioactive materials in soil is greatly influenced by sampling techniques and the volume over which averaging is allowed. For purposes of using Tables K-1 or K-2, the largest area over which concentrations may be averaged is 15 cm^2 and the largest mass over which concentrations may be averaged is 1 kg. This means that for a cookie cutter-type sample or for a soil core, the following relationship must be met:

Sample Area (cm^2) x Sample Depth (cm) x 1.6 g/cm^3 <1,000 g (RHO-SA-153).

K9.0 RELEASE CRITERIA FOR DECOMMISSIONING

As indicated in section K1.0, threshold concentrations in soil (i.e., those concentrations that would result in effective dose equivalents of less than 25 mrem/yr) depend on which scenarios are used and other factors, including site specific parameters. For decommissioning purposes at Hanford the ARCL as specified in PNL-6384 shall be used to establish release criteria (i.e., threshold concentrations) (DOE-RL Directive, 1984).

K10.0 REFERENCES

1. DOE Order 5820.2, "Radioactive Waste Management," February 1984.

2. DOE-RL Directive, M. J. Lawrence, Manager of DOE-RL Operations to Hanford Contractors, "Radiological Release Criteria for Surplus Contaminated Facilities on the Hanford Site," July 1984.

3. DOE/EP-0100, "Guide for Radiological Characterization and Measurement for Decommissioning of U.S. Department of Energy Surplus Facilities," August 1983.

4. 40 CFR 141, "Water Pollution Control; National Primary Drinking Water Regulations; Radionuclides; Advance Notice of Proposed Rulemaking," September 30, 1986.

5. WHC-CM-5-10, Radiation Protection.

6. RHO-SA-153, Surface Soil Contamination Standards for Rockwell Hanford Operations, Boothe, G. F., December 1979.

7. PNL-6384; A Manual for Applying the Allowable Residual Contamination Level Method for Decommissioning Facilities on the Hanford Site, Napier, B. A., Piepel, G. F., and Kennedy, W. E., 1988.

8. EG-2400, "Development of Criteria for Release of Idaho National Engineering Laboratory Sites Following Decontamination and Decommissioning," EG&G Idaho, Inc., August 1986.

9. Gesell, T. F., and N. M. Brichard, "The Technologically Enhanced Natural Radiation Environment," Health Physics, V.28, November 4, 1975.

Table K-1. Threshold Concentrations in Soils.

Radionuclide	Concentration (pCi/g)	Radionuclide	Concentration (pCi/g)
^{277}Ac	2	^{239}Pu	75
^{241}Am	20	^{240}Pu	75
^{125}Sb	5	^{241}Pu	2,500
^{207}Bi	230	^{147}Pm	1,700
^{14}C	870	^{226}Ra	5
^{144}Ce	75	^{106}Ru	15
^{134}Cs	2	^{90}Sr	13
^{137}Cs	3	^{99}Tc	1,750
^{58}Co	10	^{232}Th	9
^{60}Co	1	^{232}U	1
^{152}Eu	3	^{233}U	100
^{154}Eu	3	^{234}U	100
^{155}Eu	100	^{235}U	15
^{3}H	35,000	^{238}U	50
^{129}I	50		
^{55}Fe	1		
^{63}Ni	3,900		
^{238}Pu	75		

Reference: EG-2400.

PST2E-0082-K-1

Table K-2. Contamination Concentrations in Soils Requiring Posting and Radiological Control at Hanford.

Radionuclide	Concentration (pCi/g)	Radionuclide	Concentration (pCi/g)
^{227}Ac	2	^{238}Pu	75
^{241}Am	20	^{239}Pu	75
^{125}Sb	60,000	^{240}Pu	75
^{207}Bi	50,000	^{241}Pu	2,500
^{14}C	3×10^7	^{147}Pm	20,000
^{144}Ce	1,900	^{226}Ra	60
^{134}Cs	10,000	^{106}Ru	15
^{137}Cs	20,000	^{90}Sr	600
^{58}Co	10,000	^{99}Tc	100,000
^{60}Co	5,000	^{232}Th	9
^{152}Eu	3,000	^{232}U	1
^{154}Eu	3,000	^{233}U	100
^{155}Eu	20,000	^{234}U	100
^{3}H	1×10^7	^{235}U	15
^{129}I	4,000	^{238}U	50
^{55}Fe	300,000		
^{63}Ni	100,000		
		Other	$\frac{DCG\ (\mu Ci/ml) \times 10^{14}}{1.6\ (g\text{-}\mu Ci/pCi\text{-}ml)}$ or Threshold concentrations listed in Table K-1, whichever is larger

Reference: RHO-SA-153.

PST2E-0002-K-2

TITLE:

INACTIVE RADIOACTIVE WASTE SITES

Approved by

R E Lerch

Manager, Environmental Division

L1.0 PURPOSE

The purpose of Part L is to establish the requirements for the monitoring and maintenance of inactive radioactive waste sites.

L2.0 SCOPE

The requirements of this part apply to inactive, radioactive waste sites such as burial grounds, cribs, ditches and ponds, and other contaminated areas that were used for the planned or unplanned disposal of radioactive waste. The criteria and standards of this Part are based on operational practices in the 200 Areas. The requirements of this Part do not apply to the operations of active burial grounds. Criteria and standards for new or current burial operations are specified in Part H.

L3.0 RESPONSIBILITIES

a. Facility operations management shall:

- o Provide a barrier over the disposal site contamination source which prevents radionuclide transport to the surface
- o Accurately and permanently mark the disposal site boundaries with concrete posts
- o Document verification of process line isolation to preclude an accidental release to an inactive site.

b. Decontamination and Decommissioning Program shall develop, maintain, and execute a plan for consolidating all unplanned radioactive non-dangerous waste sites existing outside the Future Control Zone (FCZ) into as few as possible waste sites within the FCZ.

c. Operational Health Physics shall perform routine radiological surveys of waste sites to detect transport of contamination to the surface.

d. Environmental Protection shall:

- o Establish radiological survey schedules of waste sites
- o Review radiological survey data

- o Conduct environmental inspections
- o Issue reports to appropriate managers for corrective actions when violations of this manual occur.

e. Environmental Engineeering and Technology shall:

- o Review groundwater monitoring results.
- o Establish, conduct, maintian and interpret data for a vadose zone (unsaturated zone) monitoring program.

L4.0 GENERAL REQUIREMENTS

a. Facility operations management shall provide a barrier over the contamination source which inhibits radionuclide transport to the surface. The barrier design shall be based on proven techniques which are appropriate for the type of disposal, and the adequacy of the barrier shall be verified by demonstrating through periodic monitoring that surface contamination levels do not exceed the limits established in Part K4.0.

b. The safety of the inactive radioactive waste site with respect to subsidence slope stability, liquifaction during earthquakes and erosion shall be demonstrated by techniques approved by Environmental Engineering and Environmental Protection.

c. Surface radiation levels shall be less than 1 mrem/h (10 Sv/h). The surface shall be uncontaminated, i.e., less than limits in Part K (Part K4.0).

d. Inactive radioactive waste sites shall comply with the performance objectives of Part H7.0a of this manual (DOE 5820.2). Engineered barriers shall also be used to limit biotransport of contamination and personnel exposure.

e. Facility operations management shall accurately and permanently mark the disposal site boundaries with concrete posts as specified in Hanford Plant Standard AC-5-40. Posting shall be in accordance with WHC-CM-4-10, Radiation Protection. Records shall be kept per Part L5.0 of this manual.

f. Maintenance of the inactive sites shall include the use of herbicide application, or equivalent techniques, to reduce the amount of deep rooted vegetation which could provide transport of contamination to the surface through plant uptake (DOE Order 3820.2). Application of pesticide shall conform to the requirements of Part P.

g. Facility operations management shall document verification of process line isolation to preclude an accidental release to an inactive site. For sites in which isolation has not yet been accomplished, an administrative control plan to reduce the possibility of effluent discharge to the site; or a compliance plan to achieve isolation, shall be prepared and submitted to Environmental Protection and Environmental Engineering for review and approval (WAC 173-218, WAC 173-303).

L5.0 SURVEYING AND RECORDS

a. Deactivated solid and liquid waste disposal sites shall be periodically (at least annually) surveyed by Operational Health Physics and inspected by Environmental Protection to ensure that the above radiological conditions are being maintained. Deficiencies to Section L4.0 noted upon inspection shall be corrected by the appropriate operating group. Environmental Protection shall be responsible for notifying the operating group of any deficiencies.

b. Environmental Protection shall maintain permanent records of the status and characteristics of the radiological conditions of the surfaces of each site. Other traceable records of historical, radiological, surveillance, and environmental characterization data for each site shall be maintained using the WIDS.

L6.0 BACKFILL SOIL

Backfill soil is the soil used as a plant growth medium between the depths of 30-120 cm as measured at the restabilization site. Backfill soil shall fall within the range of the following limiting characteristics:

- Less than 25% gravels
- 0-4 millimhos/cm electrical conductivity of soluble salts.
- pH less than 9
- 0-15 sodium adsorption ratio.

L7.0 TOPSOIL

Topsoil is the soil used as a plant growth medium at the surface to a depth of 30 cm as measured at the restabilization site. Topsoil shall fall within the range of the following limiting characteristics:

- Less than 15% gravels
- 0-4 millimhos/cm electrical conductivity of soluble salts

- o pH between 6 and 8.2
- o 0-5 sodium adsorption ratio.

L8.0 RESTART OF INACTIVE SITES

a. There shall be no liquid discharges, even though nonradioactive, to inactive radioactive waste sites. This action is taken to prevent the movement of previously contaminated material in the soil column.

L9.0 CONSOLIDATION OF UNPLANNED RADIOACTIVE WASTE SITES

a. Environmental Protection shall identify all unplanned radioactive release sites and document their location through the WIDS.

b. Decontamination and Decommissioning Program shall develop, maintain, and execute a plan for consolidating all unplanned radioactive non-dangerous waste sites existing outside the FCZ into as few as possible waste sites within the FCZ (DOE/EIS-0113). Environmental Assurance shall review and approve the consolidation plan annually at a minimum. The goal of this plan shall be to:

- o Minimize the costs associated with engineered barrier construction
- o Prevent the spread of contamination through resuspension and/or biotic transport
- o Lessen the task of monitoring, sampling, and documenting the unplanned release sites.

L10.0 REFERENCES

1. DOE Order 5820.2, "Radioactive Waste Management."
2. DOE/EIS-0113, "Disposal of Hanford Defense High-Level, Transuranic and Tank Wastes."
3. WAC 173-218, "Underground Injection Control Program."
4. WAC 173-303, "Dangerous Waste Regulations."
5. WHC-CM-4-10, Radiation Protection.
6. AC-5-40 and AC-3-25, "Architectural-Civil Standards," Hanford Plant Standards.

TITLE:

INACTIVE WASTE MANAGEMENT SITES

Approved by

R E Lerch

Manager, Environmental Division

M1.0 PURPOSE

This Part establishes requirements for sites which have received hazardous substances (including dangerous wastes) or non-hazardous solid wastes. These sites may include burial grounds, cribs, ditches, ponds, tanks, storage facilities, and other units used for the intentional or unintentional disposal or management of wastes. This Part implements WHC policy to ensure compliance with the requirements of RCRA, Section 3004(u); 40 CFR 264; 40 CFR 270; CERCLA, Section 103(c); and "The Action Plan for Implementation in Accordance with Federal Facility Agreement Between U. S. Environmental Protection Agency, U. S. Department of Energy, and Washington Department of Ecology" (dated June 1988) and "Consent Decree Between Washington Department of Ecology and U. S. Department of Energy" (dated June 1988) (henceforth referred to as the "Action Plan for Implementation").

M2.0 SCOPE

The requirements of this Part are applicable to all inactive waste management units, including units created via unintentional discharges or hazardous substances at any time. Units used for the management of substances which are both radioactive and dangerous wastes (mixed wastes) shall comply with the standards of this Part, Part L, Inactive Radioactive Waste Sites and Part J, Mixed Wastes.

M3.0 DEFINITIONS

The following definitions apply to terms used within this Part:

Dangerous wastes--Liquid, solid, or contained gaseous wastes that are regulated as dangerous by WAC 173-303 (see Appendix I, Glossary and Part I, Dangerous Waste Control for further guidance).

Disposal--The act of discharging, discarding, or abandoning hazardous substances to the environment.

Hazardous substance--Any substance identified as such in the CERCLA or SARA RQ tables (Appendix G) or any substance regulated as a dangerous waste.

Storage--The holding of hazardous substances for a period that exceeded 90 days.

Solid waste--Any discarded material except as specifically excluded in 40 CFR 261.4.

Treatment--The physical, chemical, or biological processing of a hazardous substance to make the material non-dangerous for transport, amenable for energy or material resource recovery (recycling), amenable for storage, or reduced in volume prior to disposal.

Waste management units--Any facility or location where waste was disposed, including engineered waste disposal units, unplanned release sites, contaminated structures, and in-plant treatment and storage units.

M4.0 RESPONSIBILITIES

a. Facility managers shall:

- o Ensure compliance with the requirements of this Part for all inactive waste management units within their facility or area
- o Identify to Environmental Protection any inactive hazardous substance waste management unit within 24 hours of discovery
- o Identify to Environmental Protection any inactive non-hazardous waste management unit within 1 week of discovery
- o Report within 1 week to Environmental Protection the results of inactive hazardous substance unit inspections required by the provisions of Section M5.0.d
- o Obtain the concurrence of Environmental Assurance prior to any use of an inactive waste management unit for any waste disposal purpose or activity that may adversely impact such a site.

b. Environmental Assurance shall:

- o Review any proposed activity, other than routine inspections, that may impact or may be impacted by any inactive waste management unit
- o Notify Defense Waste Management Planning of any newly identified waste management unit.

c. Environmental Engineering and Technology Function shall:

- o Characterize and determine the extent of hazardous substance contamination which may be present at inactive hazardous substance waste management sites
- o Notify the WIDS custodian and provide adequate documentation regarding the method of deactivation taken at each inactive waste management unit.

d. Defense Waste Engineering shall:

- o Update and maintain the Hanford WIDS
- o Update, on an annual basis, the Hanford Site Waste Management Units Report (HSWMUR).

e. Strategic Planning and Integration shall:

- o Coordinate the transmittal of the annual HSWMUR update through DOE-RL to the EPA and WDOE
- o Coordinate the transmittal of WIDS database updates through DOE-RL to the EPA and WDOE upon request.

M5.0 REQUIREMENTS

a. The facility manager shall evaluate the inactive waste management units in their facility or area to determine whether any of those units fall under the scope of this part. (WHC policy for implementing the requirements of RCRA, Section 3004(u); 40 CFR 264; 40 CFR 270; CERCLA, Section 103(c); and the "Action Plan for Implementation.")

b. All inactive waste management units that may have contained a hazardous substance shall be identified within 24 hours of discovery to Environmental Protection by the responsible operations management. (WHC policy for implementing the requirements of CERCLA, Section 103(c). All inactive waste management units that contain only non-hazardous substances shall be identified within 1 week of discovery to Environmental Protection by the responsible operations management. (WHC policy for implementing the requirements of RCRA, Section 3004(u); 40 CFR 264; 40 CFR 270; and the "Action Plan for Implementation.") Units which have been previously identified in any of the following documents will be considered to have met this requirement:

- o Hanford Site Part A Permit Application (RCRA)
- o Hanford Site Waste Management Units Report [3004(u) Report] (RCRA)
- o CERCLA Phase I Assessment Report of Waste Disposal Sites at Hanford.

c. The facility manager shall conduct periodic inspections of all inactive waste management units that contained hazardous substances. These inspections should be conducted on at least a quarterly basis, and inspections should be recorded on an inspection log. Recordkeeping requirements shall be in accordance with Part V.

d. Inactive waste management units may not be used for any other purpose without the prior written approval of Environmental Assurance.

e. Inactive waste management units that contain hazardous substances shall be posted, if necessary, to protect personnel and prevent spread of contamination.

f. The information pertaining to each waste management unit in the WIDS shall be maintained current. Newly identified units shall be added to the WIDS within 30 days from the date of discovery.

g. The HSWMUR shall be updated at least annually. The updated HSWMUR shall be submitted to DOE-RL for transmittal to EPA and WDOE.

M6.0 REFERENCES

1. 42 USC 6901, "Resource Conservation and Recovery Act," October 17, 1986.

2. 42 USC 9601, et seq, (Superfund), "Comprehensive Environmental Response, Compensation, and Liability Act," December 22, 1987.

3. 40 CFR 261, "Regulations for Identifying Hazardous Waste," June 2, 1988.

4. 40 CFR 264, "Regulations for Owners and Operators of Permitted Hazardous Waste Facilities," December 10, 1987.

5. 40 CFR 270, "Regulations for Federally Administered Hazardous Waste Permit Programs," December 10, 1987.

6. WAC 173-303, "Dangerous Waste Regulations," June 1987.

7. "Action Plan for Implementation," in Accordance with Federal Facility Agreement Between U. S. Environmental Protection Agency, U. S. Department of Energy, and Washington Department of Ecology, dated June 1988, and "Consent Decree Between Washington Department of Ecology and U. S. Department of Energy," dated June 1988.

TITLE:

GROUNDWATER PROTECTION

Approved by

R E Lerch

Manager, Environmental Division

N1.0 PURPOSE

The purpose of Part N is to establish requirements for the prevention of groundwater degradation from current and future activities at the Hanford Site.

N2.0 SCOPE

These standards apply to the routine monitoring of groundwater wells, groundwater use, and waste disposal site impact on groundwater.

N3.0 RESPONSIBILITIES

a. The manager of a liquid waste disposal site shall be responsible for maintaining a groundwater and environmental radioactivity monitoring program to assure:

   - o containment and control of releases to the environment from site operations is functioning as planned
   - o that levels of radionuclides and other pollutants released from their facilities comply with applicable environmental standards
   - o that each liquid disposal site is functioning in accordance with design specifications related to liquid level and percolation rate.
   - o that each disposal site is in compliance with this document.

b. Managers of solid waste disposal sites shall be responsible for maintaining a groundwater monitoring program to assure compliance with the provisions of the permits applicable to their disposal sites.

c. Environmental Protection shall be responsible for preparing an operational environmental monitoring report which will include a compliance summary on groundwater monitoring.

d. Groundwater well drillers and/or operators shall ensure that the requirements of the effluent monitoring plan applicable to the well site are followed.

N4.0 CONTROL STANDARDS AND REQUIREMENTS FOR LIQUID WASTE DISPOSAL SITES

a. Except as provided in N4.0.b and .c, the impacts of using the liquid waste disposal site shall be evaluated if concentrations of radionuclides or nonradioactive pollutants in the groundwater exceed the limits in either (1) or (2) below.* This requirement does not apply to pre-existing contamination resulting from past operations, or if the operation of the disposal site will not result in further degradation of the groundwater.

1. (0.04) x (DCG)**

2. Maximum Contaminant Levels (MCL) values stated in Appendix B.**

b. The impacts of using 200 Area liquid waste disposal sites shall be evaluated if concentrations of radionuclides (except for tritium) in the groundwater exceed the limits in either (1) or (2) below.* This requirement does not apply to contamination that is totally independent of the disposal site operation, or if operation of the disposal site will not result in further degradation of the groundwater.

1. For 200 West Area liquid waste disposal sites***

$$\text{Ground Water Concentration } (\mu \text{ curies/ml})^{**} = \left(\frac{100}{2^{t/2}}\right)\left(\frac{DCG}{25}\right)$$

For 200 East Area liquid waste disposal sites***

$$\text{Ground Water Concentration } (\mu \text{ curies/ml})^{**} = \left(\frac{25}{2^{t/2}}\right)\left(\frac{DCG}{25}\right)$$

where t/2 = half life (years)

*If contaminant concentrations in a groundwater monitoring well exceed the indicated standards in this paragraph, impacts of continued operation of the contributing facility will be evaluated by Environmental Assurance. The evaluation will be based on the following factors: sampling and measurement statistics, effluent and contaminant chemical characteristics, proximity of well(s) to release point or zone, effluent discharge rate and trends in adjacent monitoring wells.

**For a mixture of radionuclides the summation of the ratios of the concentration of each radionuclide to the concentration limit shall be less than 1.0.

***Measurement shall be at the natural level of the aquifer.

2. 1 x DCG public

It is the intent of this requirement that at the end of the period of institutional control (assumed to be the year 2150 A.D.) and prior to migration to the site boundary, the groundwater beneath the site will meet the 0.04 DCG for radioactivity from current or future operations. It is recognized that past accidents and practices may preclude meeting this standard with respect to some isotopes. However, these standards apply only to current and future operations in order to prevent additional degradation of the groundwater.

c. Discharges to the 1325-N liquid waste disposal site enter the Columbia River through underground springs. Releases to the 1325-N liquid waste disposal site are controlled as a direct discharge to the river (WAC 173-220). The limits for the allowable radionuclide concentrations in the 1325-N plume are discussed in Parts E and F of this manual.

d. Routine evaluations of liquid waste disposal sites shall include an assessment of the site impact on the buildup of groundwater mounds and their resultant impact on contaminant migration in the unconfined aquifer.

e. Process Engineering shall notify Environmental Protection in writing of any flowsheet modifications or throughput rate changes related to changes in feedstock, operational procedures, or flow rates that could cause changes in the volume or in the radiological or chemical characteristics of the effluent stream.

f. Underground injection wells shall not be used as a method of liquid waste disposal for new sources.

g. Refer to Part E, "Nonradioactive Liquid Effluent," and Part F, "Radioactive Liquid," for requirements relating to standards governing discharges to the soil.

h. Refer to Part Q, "New and Modified Facilities," for requirements relative to new liquid waste disposal sites.

N5.0 GROUNDWATER USE

a. Groundwater beneath the Hanford Site shall not be considered potable until the groundwater has been determined to meet the water quality requirements (i.e., maximum contaminant limits) of WAC 248-54, and approval has been given by Environmental Protection.

b. The use of groundwater with contaminants above the values listed in Appendixes B, C, D, F, and G shall require approval by Environmental Assurance.

c. The groundwater utilized by facilities shall be routinely sampled and analyzed for radioactive and nonradioactive hazardous contaminants. The extent of the sampling, analysis, and monitoring required for each well shall be determined by Pacific Northwest Laboratory (PNL) Geosciences with concurrence from Environmental Protection based on the proposed use, history, and proximity of contaminant source terms. The Occupational Safety organization shall have concurrence responsibilities regarding any sampling, monitoring, or analyses of the groundwater intended for drinking.

d. Facilities designed after January 1984 shall not use the groundwater for any purpose until (1) an evaluation of the impact of the proposed use would have on workers and the environment (e.g., increased exposures or surface contamination) is completed by PNL Geosciences with concurrence from Environmental Protection and (2) a groundwater management investigation conducted by Environmental Engineering shows that there will be minimal adverse impact on the groundwater system (i.e., altering the groundwater contaminant plume).

e. Facility modifications that would require or increase groundwater usage shall be subject to the evaluations described in N5.0.c and d.

N6.0 CONTROL STANDARDS FOR SOLID WASTE DISPOSAL SITES

a. The impacts of using a solid waste disposal site shall be evaluated if concentrations of radionuclides or nonradioactive pollutants in the groundwater* exceed either (1) or (2) below. This requirement does not apply to pre-existing contamination resulting from past operations.

   1. (0.04) x (DCG-Public as noted in Appendix A)

   2. MCL values stated in Appendix B, "Maximum Contaminant Levels".

b. Monitoring well selection, groundwater sampling, analysis, instructions, and corrective actions for nonradioactive constituents shall be performed as specified in the applicable RCRA Part B Permit Application, issued Part B Permit, RCRA Groundwater Monitoring Plan, or WAC 173-304 Groundwater Compliance Plan.

N7.0 GROUNDWATER WELL INSTALLATION AND USE

a. Groundwater monitoring wells shall be constructed in accordance with the relevant requirements on WAC 173-160 and WAC 173-162.

*For a mixture of radionuclides the summation of the ratios of the concentration of each radionuclide to the concentration limit shall be less than 1.0.

b. Groundwater monitoring wells shall be operated in accordance with WAC 173-162 and the relevant requirements of WAC 173-160 for resource protection wells.

N8.0 REFERENCES

1. DOE Order 5480.1B, "Environmental Protection, Safety and Health Protection Program for DOE Operations."

2. 40 CFR 141, "National Interim Primary Drinking Water Regulations."

3. 40 CFR 260-265, "Resource Conservation and Recovery Act Hazardous Waste Regulations."

4. WAC 173-160, "Minimum Standards for Construction and Maintenance of Water Wells."

5. WAC 173-162, "Regulation and Licensing of Well Contractors and Operators."

6. WAC 173-220, "National Pollutant Discharge Elimination System Permit Program."

7. WAC 173-303, "Dangerous Waste Regulations."

8. WAC 248-54, "Public Water Supplies."

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TITLE:

ENVIRONMENTAL MONITORING

Approved by

R E Lerch

Manager, Environmental Division

01.0 PURPOSE

The purpose of Part 0 is to establish Westinghouse Hanford Company (WHC) standards for the routine monitoring of the environment for demonstrating compliance with environmental regulations and process control.

02.0 SCOPE

The provisions of this part apply to the monitoring of WHC facilities and diffuse sources at the Hanford Site for radioactive and chemical emissions.

03.0 DEFINITIONS

Diffuse Source--A source or sources of radioactive contaminants (emissions) released into the atmosphere that do not have a defined point (origin) of release (i.e., a nonpoint source). Such sources are also known as area sources.

04.0 RESPONSIBILITIES

a. Environmental Protection shall:

- o Manage, operate, and maintain an environmental radioactivity and chemicals emission monitoring program at active WHC facilities and associated active and inactive waste sites as required to demonstrate compliance to environmental regulations.
- o Manage, operate, and maintain an environmental radioactivity monitoring program for diffuse sources of airborne radioactivity.
- o Be responsible for maintaining Washington State and Federal permits for the collection of Hanford Site flora and fauna as required for the support of environmental monitoring activities. See Part X also.
- o Evaluate and approve the vadose zone monitoring plan (VZMP) for compliance with the requirements of this manual and applicable laws and regulations.

b. Environmental Engineering shall develop, maintain, and implement a VZMP for active and inactive waste sites that is capable of detecting lateral and downward migration of radionuclides and dangerous waste.

c. WHC shall be responsible for all environmental monitoring programs necessary to demonstrate compliance with environmental regulations.

05.0 GENERAL REQUIREMENTS

a. Operational or non-operational waste treatment, storage, and disposal facilities shall be monitored by an environmental monitoring program that complies with the requirements of DOE Order 5484.1.

b. The environmental monitoring program shall be designed to measure:

   - o migration of radionuclides,
   - o disposal unit subsidence,
   - o changes in disposal facility and disposal site parameters which may affect long-term site performance. (DOE Order 5484.1)

c. The environmental monitoring program may include, but not necessarily be limited to, monitoring surface soil, air, surface water, and, in the subsurface, soil and water, both in the saturated and the unsaturated zones. (DOE Order 5820.2 and DOE Order 5484.1)

d. Environmental monitoring for nonradioactive pollutants shall be performed if it is not possible to determine compliance with Federal, state,or local environmental regulations on the basis of effluent monitoring data. (DOE Order 5484.1)

e. The monitoring program shall be capable of detecting changing trends in the performance sufficiently in advance to allow application of any necessary corrective action prior to exceeding performance objectives.

f. Preoperational environmental surveys shall be performed to obtain background and baseline data at least one year and preferably two years in advance of start up of any new facility or process at an existing site. (DOE ORder 5484.1)

g. Preoperational environmental surveys shall establish background levels of radioactive and chemical pollutants; characterize pertinent environmental and ecological parameters; and identify potential pathways for human exposure or environmental impact as a basis for determining the nature and extent of the subsequent routine operational effluent and environmental monitoring program. (DOE Order 5484.1)

06.0 AIRBORNE EFFLUENT MONITORING

a. Diffuse sources shall be monitored in accordance with the provisions of 40 CFR 61 (including radioactive materials).

b. Individual diffuse sources shall be monitored when they have the potential to contribute more than 10% of the total dose from Site operations to members of the public.

07.0 GROUNDWATER MONITORING

a. Groundwater shall be monitored in accordance with 40 CFR 264, Subpart F; 40 CFR 265, Subpart F; WAC 173-303; DOE 5484.1; and DOE 5820.2.

b. For sites with multiple groundwater pollutant sources, more extensive information than required by the requirements of Part O, 8.0a may be required, therefore site-specific characteristics should determine monitoring needs.

08.0 FLORA AND FAUNA COLLECTION

WHC personnel shall not collect animals found dead on the Hanford Site except as allowed through current Washington State permits and only in the support of environmental monitoring, scientific collection, and research efforts described in such permits (WAC 232-12-279). See Part X also.

09.0 REPORTING

a. An environmental monitoring report shall be prepared annually by Environmental Assurance to summarize and interpret the monitoring results which assess the effectiveness of environmental controls imposed on operations and waste management practices (DOE 5484.1, CHAPTER III).

010.0 QUALITY ASSURANCE

a. Environmental monitoring activities shall comply with the applicable Quality Assurance provisions of DOE Order 5700.6B.

b. The environmental monitoring program shall include an established routine quality control program to assure that the program is accurate and reliable.

c. The level of assurance shall be commensurate with the complexity of the monitoring program.

d. Contract laboratories performing environmental sample analyses shall be appropriately certified by the EPA regional office or Ecology.

e. DOE or contractor-operator laboratories that conduct sample analyses should be appropriately certified by the EPA regional office or Ecology.

011.0 REFERENCES

1. DOE Order 5484.1, "Environmental Protection, Safety and Health Information Reporting."

2. DOE Order 5700.6B, "Quality Assurance."

3. DOE Order 5820.2, "Radioactive Waste Management."

4. 40 CFR 61, "National Emission Standards for Hazardous Air Pollutants."

5. 40 CFR 264, Subpart F, "Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities: Releases from Solid Waste Management Units."

6. 40 CFR 265, Subpart F, "Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities: Ground-Water Monitoring."

7. WAC 173-303, "Dangerous Waste Regulations."

8. WAC 232-12-279, "Conditions for Issuance of Permits for Scientific Collection, Research, or Display."

WESTINGHOUSE HANFORD COMPANY	Manual	WHC-CM-7-5
	Part	P, REV 0
	Page	1 of 5
ENVIRONMENTAL COMPLIANCE MANUAL	Effective Date	October 1, 1988
	Organization	Environmental Division

TITLE:

PESTICIDE USE AND CONTROL

Approved by

R E Lerch

Manager, Environmental Division

P1.0 PURPOSE

The purpose of Part P is to establish WHC requirements for the safe use, storage, and disposal of pesticides.

P2.0 SCOPE

The provisions of this part apply to all pest control programs on the Hanford Site that are under the jurisdiction of WHC.

P3.0 DEFINITIONS

Pesticide--as used in this part is intended to be inclusive as defined in 40 CFR 162 and covers all pest control chemicals such as herbicides, rodenticides, and insecticides.

P3.0 RESPONSIBILITIES

WHC Environmental Engineering and Technology function shall:

- Maintain at least one licensed Commercial Pesticide Applicator (CPA) who shall be knowledgeable in all facets of pesticide application and who shall be responsible for all pesticide review and coordination activities (40 CFR 171, WAC 16-228.010, RCW 17.21).
- The commercial pesticide operators (CPO) are also licensed and at WHC operate under direction of the CPA (WAC 16-228.010, RCW 17.21).
- The CPA ensures training of the CPO's and nonlicensed sprayer operators in the safe handling and use of pesticides (RCW 17.21).
- Maintain a list of pesticides approved for use on the Hanford Site and a list of personnel authorized to approve procurement of pesticides.
- Purchase orders for pesticides must be approved by a CPA.

P4.0 GENERAL REQUIREMENTS

a. Each noncertified sprayer operator (i.e., not licensed by Washington State Department of Agriculture) shall act only under the direct on-the-job supervision of a CPO/CPA (RCW 17.21).

b. Only pesticides registered for use by the EPA and the State of Washington shall be used (40 CFR 162). A list of restricted pesticides are contained in WAC 16-230; restricted herbicides are listed in WAC 16-231 and WAC 16-232.

c. The CPO shall decontaminate all pesticide-contaminated equipment according to label directions prior to other pesticide use (40 CFR 165).

d. Pesticides shall be contained only in approved, nonleaking, clearly labeled containers (40 CFR 165).

e. All pesticides and pesticide-contaminated containers must be used, disposed of, and/or stored in compliance with the label (40 CFR 165).

f. Pesticide residues and pesticide containers which are classified as dangerous waste shall be held in a designated pesticide storage area (i.e., at 2707W or the 1171 Building; see Part I, Dangerous Waste) for shipment to offsite disposal areas. (Exception: External containers protected by inner liners and containers that are triple rinsed with a diluent volume as directed by label requirements. See G5.0 for criteria requirements.

g. All pesticides other than those labeled for "home and garden use" shall be stored in a designated storage facility. The facility shall have the following characteristics (40 CFR 165.10):

   1. Secured by either a climb-proof fence and locked gate or a locked building

   2. Warning signs to identify the hazardous nature of the stored substance and to prohibit unauthorized entry

   3. Dry, well-ventilated, segregated, covered area where fire protection is provided

   4. Inert absorbents kept near the facility.

h. Residue, decontamination liquid waste, and rinse liquids should be added to spray mixtures in the field or solidified and disposed per P4.0.e (40 CFR 165).

i. Pesticide containers shall be checked monthly for leakage and appropriate action shall be taken at the direction of the CPA. Leakage to the environment shall be reported immediately to WHC Environmental Protection (40 CFR 165.10).

j. Pesticides shall not be stored adjacent to feed, food, or an eating area (40 CFR 165.10).

k. The use of pesticides shall follow the guidance of the label instructions (40 CFR 165).

l. Personnel handling pesticides shall be provided access to protective clothing and decontamination facilities and equipment per label directions (40 CFR 165.10).

m. The cognizant CPA shall review and modify the pesticide spray program plan and herbicide use guidelines and application instructions annually.

n. Pesticides spray drift to offsite areas shall be precluded by adherence to all label requirements and state regulations (WAC 16-228).

o. All items of movable equipment used for handling pesticides at the storage site which might be used for other purposes shall be labeled "For Pesticide Use Only, Contaminated With Pesticides" and shall not be removed from the site or used for purposes other than pesticides handling unless thoroughly decontaminated (40 CFR 165.10).

p. Provisions shall be provided at pesticide storage locations for the decontamination of equipment such as delivery trucks, tarpaulin covers, etc. (40 CFR 165.10).

P5.0 RECORDS

a. The cognizant CPA shall maintain a permanent record of (ANSI/ASME NQA-1) all pesticide spray operations from the date of application.

b. The cognizant CPA shall maintain records of pesticide applications. These records shall be prepared the same day the pesticide is applied, and shall contain the following information (WAC 16-228):

1. Location of area sprayed
2. Time of day and date of spray application
3. Direction and estimated velocity of the wind during the spray application
4. Pesticide used and dilution ratio
5. Rates of application
6. Name of licensed CPA/CPO in attendance
7. Spray vehicle identification number

8. Total amount sprayed

9. Total area sprayed (RCW 17.21).

c. Storage facilities containing highly toxic or moderately toxic (DANGER, POISON, WARNING, or the skull and crossbones symbol on the label) pesticides shall have a current record of the types of pesticides stored within posted in plain sight outside the storage facility. List must be amended at the time of inventory change. The responsible CPA/CPO shall keep and update the record to reflect changes in types stored [40 CFR 165.1(g)(2)(ii)].

d. The manager of storage facilities containing pesticides registered for use in the home and garden or pesticides classed as slightly toxic (word CAUTION on the label) shall be responsible for maintaining a current pesticide inventory. The inventory does not need to be posted (40 CFR 165.10).

e. Facility management shall provide the Hanford Fire Department with an inventory for all pesticide storage facilities annually, when the inventory changes ± 20% from that of the previous inventory, or changes in pesticide type occur (40 CFR 165.10).

f. The CPA shall provide procurement with a current list of pesticides approved for use on the Hanford Site and a list of personnel authorized to approve procurement of pesticides. Procurement shall not process pesticide procurement applications which are initiated by unauthorized personnel or which request procurement of unauthorized pesticides unless a concurrence signature is obtained by a CPA or his/her designated alternate.

P6.0 EMERGENCY PROCEDURES

The cognizant CPA shall develop procedures to be taken in the event of an accidental pesticide release which occurs during handling, storage or application. The cognizant CPA shall provide these procedures to Emergency Preparedness for inclusion into the WHC Emergency Plan, WHC-CM-4-1, and the cognizant CPA shall appropriately reference the emergency procedures in the pesticide application procedures.

P7.0 REFERENCES

1. 40 CFR 162, "Regulations for the Enforcement of the Federal Insecticide, Fungicide, and Rodenticide Act."

2. 40 CFR 165, "Regulations for the Acceptance of Certain Pesticides and Recommended Procedures for Disposal and Storage of Pesticides and Pesticide Containers."

3. 40 CFR I71, "Certification of Pesticide Applicators."
4. ANSI/ASME NQA-1, "Quality Assurance Requirements for Nuclear Facilities."
5. RCW 17.21, "Washington Pesticide Application Act."
6. WAC 16-228, "General Pesticide Regulations."
7. WAC 16-230, "Use of Chemicals and Chemically Treated Materials in Certain Counties."
8. WAC 16-231, "Restricted Use Herbicides."
9. WAC 16-232, "Restricted Use of Herbicides in Certain Counties."
10. WHC-CM-4-1, WHC Emergency Plan.

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TITLE:

NEW AND MODIFIED FACILITIES

Approved by

Q E Lerch

R. E. Lerch, Manager
Environmental Division

1.0 PURPOSE

The purpose of this Part is to assure compliance with the environmental requirements applicable to the construction of new facilities or the modification of existing facilities.

2.0 SCOPE

The provisions of Part Q apply to all new facilities and facilities that are being modified on the Hanford Site that are under the jurisdiction of WHC.

3.0 RESPONSIBILITIES

1. Project Management shall:

   a. Design new and modified facilities in compliance with this manual. Decommissioning features shall be identified during the facility planning and design stage.

   b. Request Environmental Engineering and Technology to provide an environmental evaluation, environmental assessment, or environmental impact statement and/or, if State approvals or permits are required, a State Environmental Policy Act Checklist for new facilities or for modification of existing facilities.

      A baseline study in accordance with the requirements of Part O, paragraph 5.0.f on pre-operational environmental surveys may also be needed. This action should take place during the process leading up to the Conceptual Design Report (CDR). See also WHC-CM-6-12, "Projects Department Procedures," P-13, "Environmental Evaluation."

c. Coordinate with and obtain the assistance of Environmental Programs concerning National Pollutant Discharge Elimination (NPDES) permits, Prevention of Significant Deterioration (PSD) permits, Part A and Part B permits, and any other environmental permits that may be required. This should take place during the CDR stage to ensure enough time for accomplishing the necessary permit applications. Project engineers should be aware that obtaining necessary permits is not a trivial exercise. The process involves generating and submitting a permit application to a regulatory agency, review by the agency, possible revisions requested by the agency, and permit writing by the agency listing the operating parameters of the facility. Cost and schedule may be impacted if adequate consideration is not given to this process by the project engineer.

d. Obtain a Cultural Resource Clearance for any excavation or disturbance of land as defined in Part W, "Historical Site Preservation."

e. Transport and dispose of all nonradioactive solid wastes resulting from construction activities at the Hanford Landfill.

f. Obtain the review of Environmental Assurance for new facility designs, design modifications, and startup plans to ensure that environmental concerns have been adequately addressed and resolved. This review shall be limited to Impact Level 1, 2, and 3 documents

2. Environmental Engineering and Technology shall:

a. Assist project management in the preparation of permit request and National Environmental Policy Act (NEPA) documentation

b. Approve local, state, and federal permit applications

c. Provide notification of start-up to the EPA and the Benton, Franklin, Walla Walla Counties Air Pollution Control Authorization (the Authority) of a new facility that is a source of air pollution. This notification is a two-step process which includes:

- The anticipated date of initial start-up of the source at least 100 days prior to such date
- A notification of the actual date of initial start-up of the source within 15 days after such date.

3. Environmental Assurance shall review new facility designs, design modifications, and startup plans.

4.0 ENVIRONMENTAL DESIGN AND CONSTRUCTION REQUIREMENTS

1. Determination of Need for an Environmental Evaluation, Environmental Assessment, or Impact Statement

   The initial step in the environmental process for new facility construction or modification of an existing facility is to determine what form of NEPA document is required. The WHC point-of-contact is the Environmental Engineering and Technology.

   The DOE-RL authority to make NEPA determinations of appropriate level of documentation only applies to those DOE-Headquarters (DOE-HQ) Program sponsors (Assistant Secretaries) that have delegated that authority to Managers of Field Offices. Specifically, Defense Projects, Management and Administration and Fossil Energy have delegated the authority. All others, including Nuclear Energy and Energy Research, have kept authority.

   For those programs that have not delegated to the Field Offices, all NEPA determinations must be done by the sponsor organizations (e.g., Nuclear Energy) with concurrence of Environmental and Health and General Council. The DOE-RL (and WHC) action would be to provide the sponsor organization with an Action Description Memorandum recommending the appropriate level of NEPA documentation.

   For those programs that have delegated to the Field Office (e.g., Defense Projects), DOE-RL may do lower tier determinations (i.e., categorical exclusions, Memorandum-to-File). However, higher tier determinations (i.e., Environmental Assessment or Environmental Impact Statement) still must be resolved by the program sponsor with Environmental and Health and General Council. An Action Description Memorandum would be sent to the appropriate DOE-HQ sponsor recommending either an Environmental Assessment or an Environmental Impact Statement.

   In DOE-RL, the Manager has delegated authority to the Assistant Manager for Safety, Environment and Security (AMS) who delegated to the Director of Safety and Environment.

   Basis: The requirements for and the process of complying with the National Environmental Policy Act (NEPA) are found at DOE-RL Order 5440.1A, "Implementation of the National Environmental Policy Act at the Richland Operations Office."

2. Liquid Effluents

   Requirements for new facilities or modifications to existing facilities relating to water discharges are summarized below:

a. New and modified facilities shall utilize Best Available Technology (BAT) as defined in WHC-EP-0137.

Basis: WHC Environmental Division policy reflecting the substantive requirements of WAC 173-216.

b. Nonradioactive liquid waste discharges from facilities shall be minimized and not exceed the limits in Part E of this manual.

Basis: See the basis for Part E, paragraphs 5.0 through 11.0.

c. Radioactive liquid waste discharges from facilities shall be minimized and not exceed the limits in Part F of this manual.

Basis: See the basis for Part F, paragraphs 4.0 through 10.0.

d. Discharges of nonradioactive regulated substances to the Columbia River require that a NPDES permit be obtained prior to start up.

Basis: This requirement is from 40 CFR 122.1(b).

e. When economically feasible preference shall be given to discharges to the Columbia river instead of discharges to the soil when designing new facilities.

Basis: WHC Environmental Division policy developed to protect the ground water. In general, the waste assimilative capacity of a river, such as the Columbia, is much greater than the less mobile ground water.

f. Discharges of liquid effluents to the soil column shall be permittable under WAC 173-216. Modified sources shall be upgraded to include BAT in accordance with the "Plan and Schedule to Discontinue disposal of Contaminated Liquids into the Soil Column at the Hanford Site," DOE-RL, March 1987, for the purpose of meeting the substantive requirement of WAC 173-216. The goal of BAT installation is to eliminate the discharge of contaminated liquid waste to the soil column.

Basis: Westinghouse Environmental Divison Position for responding to the intent of WAC 173-216.

3. Gaseous Effluents

Airborne emissions from new or modified facilities shall meet the following requirements:

a. If nonradioactive airborne emissions exceed significant levels set in 40 CFR 52.21, "Best Available Control Technology (BACT)" shall be used and a PSD application shall be submitted. These levels are:

(1) Carbon monoxide: 100 Tpy*
(2) Nitrogen oxides: 40 Tpy
(3) Sulfur dioxide: 40 Tpy
(4) Particulate matter: 25 Tpy
(5) Ozone: 40 Tpy of volatile organic compounds
(6) Lead: 0.6 Tpy
(7) Asbestos: 0.007 Tpy
(8) Beryllium: 0.0004 Tpy
(9) Mercury: 0.1 Tpy
(10) Vinyl chloride: 1 Tpy
(11) Fluorides: 3 Tpy
(12) Sulfuric acid mist: 7 Tpy
(13) Hydrogen sulfide: 10 Tpy
(14) Total reduced sulfur (including H_2S): 10 Tpy
(15) Reduced sulfur compounds (including H_2S): 10 Tpy
(16) Arsenic: any amount
(17) Benzene: any amount
(18) Radionuclides: any amount

Basis: This requirement is from 40 CFR 52.21.

b. Dust generation caused by construction or operational activities shall be minimized to meet the requirements contained in Part C of this manual, Table C-1.

Basis: This requirement is from 40 CFR 52.21.

New and modified sources shall be designed to meet the requirements of Part D, paragraph 5.0.b.1, during normal operations. In the event that new source radionuclide emission projections do not meet the requirements of Part D, paragraph 5.0.b.1, Project Management shall submit the ALARA evaluation used to determine the effluent treatment system for the new source and the projected facility emissions to Regulatory Compliance for review. Environmental Assurance may grant a specific annual administrative control value for this facility based on ALARA and external regulatory concerns.

Basis: See Part D, paragraph 5.0.b.1.

*Note: tons per year (Tpy).

4. Solid Waste Requirements

Solid wastes generated during the construction of new or modified facilities shall meet the following requirements:

a. Nonradioactive nondangerous solid wastes shall be disposed of at the Central Landfill in accordance with the requirements contained in Part G.

b. Radioactive solid wastes are covered by Part H.

c. Dangerous wastes are governed by Part I.

d. Radioactive mixed solid wastes have special requirements covered in Part J.

Basis: See the referenced Parts for the technical basis.

5. Final Facility Permits (Part B Permits).

All new and modified TSD facilities must obtain a final facility (Part B) permit from the State of Washington. Physical construction cannot start until a finally effective RCRA permit has been received. The contents of a Part B permit application are outlined in WAC 173-303-806. The information and data requirements of a Part B permit application are extensive and include a detailed description of the facility, geological data, training programs, and closure plan. For new facilities a notice of intent to submit an application must be filed.

Basis: Reflects the requirements found at WAC 173-303-806 and 173-303-281.

5.0 REFERENCES

1. DOE-RL Order 5440.1A, "Implementation of the National Environmental Policy Act at the Richland Operations Office."

2. 40 CFR 52, "Approval and Promulgation of Implementation Plans."

3. 40 CFR 122, "EPA Administered Permit Programs: The National Pollutant Discharge Elimination System."

4. WAC 173-216, "State Waste Discharge Permit Program."

5. WAC 173-303, "Dangerous Waste Regulations."

6. WHC-EP-0137, Best Available Technology (BAT) Guidance Document.

WESTINGHOUSE HANFORD COMPANY	Manual	WHC-CM-7-5
	Part	R, REV 0
	Page	1 of 3
ENVIRONMENTAL COMPLIANCE MANUAL	Effective Date	October 1, 1988
	Organization	Environmental Division

TITLE:

PROCUREMENT

Approved by

R E Lerch

Manager, Environmental Division

R1.0 PURPOSE

The purpose of this Part is to establish controls on the purchase of certain chemicals, oils, and oil-filled electrical equipment. These controls are necessary to minimize the threat to the environs due to accidental release and to minimize problems associated with disposal of the materials or equipment. In addition, this Part establishes controls for the purchase of effluent sampling and monitoring equipment.

R2.0 SCOPE

This procedure applies to the purchase of:

- o Chemicals including carcinogens and pesticides
- o Oil-filled electrical equipment
- o Oils and fluids
- o Effluent sampling and monitoring equipment.

R3.0 RESPONSIBILITIES

a. Regulatory Compliance shall provide guidance on the environmental risks and waste disposal problems associated with the acquisition of chemicals.

b. Environmental Protection shall:

- o Concur with the purchase of all effluent sampling and monitoring equipment
- o Ensure the purchaser had developed suitable use, storage, and disposal procedures
- o Verify that the Building Emergency Plan covers the chemicals to be purchased.

c. Purchasing shall provide the following information to Environmental Protection:

- o Name of chemicals ordered

- o Quantity
- o Name of the individual placing the order.

d. Chemical purchasers shall:

- o Establish control on the acquisition of dangerous materials as identified in both Parts B and I of this manual
- o Ensure that the Building Emergency Plan contains provisions for emergencies involving the materials to be purchased.

R4.0 REQUIREMENTS

a. Purchase of Chemicals Including Carcinogens and Pesticides

The storage, use, and disposal of a large number of chemicals are regulated by either the state or Federal government. It is, therefore, prudent to substitute nonregulated chemicals whenever possible and minimize the costs associated with controlling and disposing of the regulated substances (MRP 5.44, "Waste Minimization Program). In some instances, although the chemical is not regulated, impurities or additives may be present in concentrations so high as to cause the chemical to be regulated. Part I and Appendixes C, D, E and F of this manual provide lists of materials that are regulated by either the state or Federal government. Operating managers shall establish controls on the acquisition of dangerous materials to ensure that:

- o The least dangerous material is being used considering suitability, costs, personnel safety, and environmental protection
- o The on-hand quantity of dangerous material is kept to a practical minimum

1. A material safety data sheet (MSDS) shall be obtained for each new dangerous material purchased (40 CFR 370).

2. Requisitions for the purchase of known and suspected carcinogens shall be approved by the Manager, Industrial Safety and Fire Protection (see Part I).

3. Purchase of materials that contain Endrin; Lindane; Methoxychlor; Toxaphene; 2,4-D; or 2,4,5-TP Silvex shall be approved by a CPA.

b. Purchase of oil-filled electrical equipment

New oil-filled electrical equipment shall be certified to be PCB free (less than 1 ppm). Whenever possible, the engineer responsible for procurement of the oil-filled electrical equipment shall obtain an oil sample from the new equipment for PCB analysis prior to accepting the

equipment. A copy of any PCB certification or laboratory analysis shall be transmitted to Environmental Protection.

c. Purchase of PCB free oils and fluids

All new oils and fluids must be certified to be PCB free less than 1 ppm). This certification may consist of (1) a statement from the vendor that their process does not produce or use PCB; (2) submittal of analytical results of their oil or fluid for PCB content; or (3) submittal of a sample of the oil or fluid for analysis by WHC.

d. Purchase of effluent monitoring and sampling equipment

Environmental Assurance shall approve the purchase specification prior to the purchase of the following types of equipment:

- Radioactive liquid effluent monitoring and/or sampling equipment
- Nonradioactive liquid effluent monitoring and sampling equipment (including pH monitoring equipment)
- Radioactive airborne effluent sampling and monitoring equipment
- Nonradioactive airborne effluent sampling and monitoring equipment (including opacity and NO_x monitors).

R5.0 REFERENCES

1. 40 CFR 370, "Emergency and Hazardous Chemical Inventory Forms and Community Right-To-Know Reporting Requirements."

2. WHC-CM-1-3, Management Requirements and Procedures, MRP 5.44, "Waste Minimization Program."

3. WHC-CM-4-1, WHC Emergency Plan.

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WESTINGHOUSE HANFORD COMPANY	Manual	WHC-CM-7-5
	Part	S, REV 0
	Page	1 of 3
ENVIRONMENTAL COMPLIANCE MANUAL	Effective Date	October 1, 1988
	Organization	Environmental Division

TITLE:

ENVIRONMENTAL TRAINING

Approved by

R E Lerch

Manager, Environmental Division

S1.0 PURPOSE

The purpose of this Part is to establish the minimum training requirements necessary to implement the WHC environmental protection program.

S2.0 SCOPE

Four major types of training are discussed in this part:

- Training of operating personnel performing procedures that could cause adverse environmental impact
- Hazardous waste training of generators; transporters; and treatment, storage, and disposal (TSD) facility personnel
- Training of personnel performing effluent sampling or effluent sampler maintenance
- Training of personnel who use registered pesticides
- Training of personnel who handle and dispose of asbestos materials and polychlorinated biphenyls.

S3.0 RESPONSIBILITIES

a. Operations management shall:

- Assure that no personnel perform a task for which they are not properly trained
- Define training requirements for personnel
- Identify personnel who require training or retraining
- Ensure such training is acquired
- Maintain auditable records of training and retraining

b. Environmental Assurance shall audit the effectiveness of this training.

S4.0 REQUIREMENTS

a. WHC personnel are required to be trained prior to the performance of any procedure that has the potential to adversely impact the environment (MP 4.3, "Employee Training and Development"). Such training should be of sufficient scope and depth for an understanding of the following:

- o The system and instrumentation
- o The environmental hazards
- o The details of the procedure
- o Appropriate actions in case of an emergency, including immediate corrective action and notification required (see Part B of this manual).

b. Dangerous waste training shall be directed by a person knowledgeable in dangerous waste management, shall ensure compliance with WAC 173-303-330 requirements and shall be concurred with by Environmental Protection. These stipulate the following points:

- o The TSD facility personnel, shippers, and generators shall be trained in dangerous waste management procedures relevant to the positions they are assigned
- o The TSD facility personnel, shippers, and generators shall be familiarized with emergency equipment, systems, and procedures
- o An annual training review shall be accomplished
- o The dangerous waste training shall be successfully completed within six months of assignment of personnel
- o Personnel shall not perform tasks associated with dangerous waste unsupervised until after the required training is completed and properly documented.

c. Effluent sampling training for facility personnel shall include the following:

- o Sample chain of custody requirements
- o Sample handling techniques
- o Knowledge of sample locations
- o Correct labeling and recording of each sample
- o Radiological and other hazards of the sampling locations

- o The purpose of the samples and the role the sample plays in the environmental protection program
- o Quality control requirements
- o Operating knowledge of sampling equipment
- o Trouble-shooting sampling equipment
- o Sampling schedules and the importance of collecting samples on time
- o Procedure to follow and required notification when sampling equipment fails
- o Response to alarms on continuous monitors
- o Importance of collecting correct amount of sample needed to complete all required specific analyses.

d. Pesticide sprayer operators shall receive training in the safe handling and use of pesticides. Each operator should be certified (i.e., licensed) or must be acting under the direct on-the-job supervision of a CPA, in conformance with WAC 16-228, see Part P.

S5.0 REFERENCES

1. WAC 16-228, "Pesticide Regulations."
2. WAC 173-303, "Dangerous Waste Disposal Regulations."
3. WHC-CM-1-1, Management Policies, MP 4.3, "Employee Training and Development."

T1.0 PURPOSE

The purpose of this Part is to establish requirements for storage tanks and associated transfer equipment operated by WHC. These requirements are intended to ensure that WHC product and waste storage equipment and facilities are designed, constructed, operated, and maintained in a manner that:

- o Protects the safety of employees and the general public.
- o Minimizes, to the extent practicable, spills and releases to the environment.
- o Meets applicable DOE, Federal, state, and local regulatory requirements.

T2.0 SCOPE

The requirements in this Part apply to all storage tanks, sumps, and associated piping and pumping systems which are used to store the following materials:

- o Oil products
- o Hazardous substances
- o Low-level radioactive wastes
- o Dangerous wastes
- o Mixed (radioactive and dangerous) wastes
- o High level and transuranic (TRU) materials

The requirements are intended to ensure that all storage tanks, sumps, and piping and pumping systems are designed and operated in a safe and acceptable manner. The requirements also ensure that there is adequate spill containment and detection capability in place in the event of operating errors or equipment failure.

The requirements of this Part do not apply to:

- Non-tank storage containers such as drums, carboys, etc.
- Process tanks (i.e., tanks used in a processing operation as opposed to being used for storage purposes) other than dangerous or mixed waste treatment tanks subject to the requirements of section T5.0
- Septic tanks
- Stormwater collection systems
- Surface impoundments, ponds, or lagoons
- Above bround tanks used as a part of a waste sample collection system provided that the waste collected has not been determined to be a dangerous or mixed waste.

T3.0 DEFINITIONS

Above ground storage tank--Any tank other than an underground storage tank.

Hazardous substance--Any substance regulated as such by CERCLA other than any substance regulated as a hazardous waste. CERCLA regulated substances are listed in 40 CFR 302.4 (see Appendix G).

Oil--Oil of any kind or in any form, including petroleum, fuel oil, sludge, oil refuse, and oil mixed with wastes (40 CFR 112.2).

Petroleum--Crude oil, crude oil fractions, and refined petroleum fractions including gasoline, kerosene, heating oils, and diesel fuels (40 CFR 280.1).

Recycling--As applied to dangerous and mixed wastes, to use, reuse, or reclaim a material (WAC 173-303-040).

Septic tank--A water-tight covered receptacle designed to receive or process, through liquid separation or biological digestion, the sewage discharged from a building sewer. The effluent from such a receptacle is distributed for disposal through the soil and settled solids and scum from the tank are pumped out periodically and hauled to a treatment facility (40 CFR 280, proposed). Oil products, hazardous substances, low-level radioactive wastes, dangerous wastes, mixed wastes, high level wastes, and tru wastes are prohibited from discharge into systems categorized as septic tanks.

Stormwater collection system--Piping, pumps, conduits, and any other equipment necessary to collect and transport the flow of surface water run-off resulting from precipitation to and from retention areas (40 CFR 280, proposed). Oil products, hazardous substances, low-level radioactive wastes, dangerous wastes, mixed wastes, high level wastes, and tru wastes are prohibited from discharge into systems categorized as stormwater collection systems.

Treatment--As applied to dangerous or mixed wastes, the physical, chemical, or biological processing of waste to make such waste non-dangerous or less dangerous, safer for transport, amenable for energy or material resource recovery, amenable for storage, or reduced in volume (WAC 173-303-040).

Underground storage tank--Any storage tank or sump the volume of which (including the volume of any associated underground piping) is 10% or more beneath the surface of the ground (40 CFR 280). A tank situated in an underground area such as a basement, cellar, etc., is not considered to be underground if the tank is situated upon or above the surface of the floor (40 CFR 280). Surface impoundments, pits, ponds, or lagoons are not considered tanks and hence are not subject to the underground storage tank requirements (40 CFR 280).

T4.0 RESPONSIBILITIES

a. Building Administrators and Operating Managers shall:

- Assure that all storage tanks, sumps, and associated piping and pumping systems within their jurisdiction are in compliance with the requirements in the applicable sections of this Part.
- Maintain appropriate product inventories and equipment inspection and maintenance records in order to verify the condition of storage tanks, sumps, and associated transfer systems within their jurisdiction.
- Promptly notify Environmental Protection of any spills or releases from a storage tank system.
- Prepare and maintain a quality assurance (QA) program plan to assure compliance with the requirements of this Part (WHC-CM-4-2).

b. Operations Support Services shall:

- Assure that all new tanks, sumps, and associated transfer systems constructed for the purpose of storing or transferring materials within the scope of this Part are in compliance with the applicable requirements.

- o Maintain existing tanks, sumps, and associated transfer equipment in accordance with the requirements of this Part.

c. Environmental Assurance shall:

- o Prepare (or oversee the preparation of) and revise Spill Prevention, Control, and Countermeasures (SPCC) Plans for each of the Hanford operating areas.
- o Investigate spills or releases from storage tank systems.
- o Overview cleanup of spills or releases from storage tank systems.
- o Concur with the purchase or modification of facilities and equipment within the scope of this Part.

d. The Manager of Safety, Quality Assurance, and Security shall determine which (if any) above ground oil, hazardous substance, or low level waste storage tanks should not be labelled based upon security considerations.

T5.0 DANGEROUS AND MIXED WASTE STORAGE TANKS AND ANCILLARY EQUIPMENT

In accordance with RCRA or Washington State Dangerous Waste Regulations, most facilities used to treat, store, and dispose of dangerous or mixed (radioactive and dangerous) wastes require a Treatment, Storage, and Disposal (TSD) permit or are required to comply with interim status facility requirements. Specific design and operating requirements are included in the permit or interim status facility regulations.

The requirements in this section apply to dangerous or mixed waste storage facilities and equipment that are exempt from the TSD permit or interim status facility requirements. Exempt systems include those systems that store regulated dangerous wastes for less than 90 days or those that have been granted treatment by generator status.

Any recycling process that has been exempted from regulation by the Washington State Dangerous Waste Regulations is exempted from the requirements of section T5.0.

The Compliance Plan mechanism described in Part A shall be used to negotiate a waiver in any instance where compliance with a requirement of this section is impractical or unattainable.

a. All dangerous or mixed waste storage equipment that is exempt from the requirements of a TSD permit or interim status facility regulations shall comply with the following requirements.

1. A facility-specific contingency plan shall be provided for and maintained at each facility (40 CFR 265 Subpart D, WAC 173-303-350). This plan shall include evacuation routes and procedures, emergency response procedures, and spill cleanup procedures (40 CFR 265 Subpart D, WAC 173-303-350). Environmental Assurance shall review and concur with each contingency plan (WHC policy).

2. The facility shall comply with all reporting, security, training, and emergency response equipment requirements specified in the contingency plan (40 CFR 265 Subpart D, WAC 173-303-350).

3. All tanks and associated transfer equipment shall be constructed of materials that are compatible with the wastes they contain (40 CFR 265.199, WAC 173-303-640).

4. High-level alarms and/or other overfilling controls shall be provided on all storage tanks. (40 CFR 265.194, WAC 173-303-640). Each alarm/control shall be inspected daily to ensure that it is in good operating order (40 CFR 265.195, WAC 173-303-640).

5. All above-ground storage tanks and associated equipment shall be visually inspected on a weekly basis for signs of leakage or equipment deterioration (WAC 173-303-640).

6. Storage tanks shall be labeled to identify the contents of each tank and the major risk associated with the waste being stored (WAC 173-303-640). The labels shall be visible form a distance of at least 50 feet (WAC 173-303-640).

7. All storage tanks shall be equipped with level monitoring and leak detection systems (40 CFR 265.195, WAC 173-303-640). Data from these systems shall be inspected and recorded each operating day (40 CFR 265.195, WAC 173-303-640).

8. Operating managers shall provide auditable records for the daily and periodic requirements listed in this part (WAC 173-303-320). These records shall be retained for a minimum of three years (WAC 173-303-320).

b. Dangerous or mixed waste storage equipment that is exempt from the requirements of a TSD permit or interim status requirements shall:

1. Not be used to store dangerous or mixed wastes for more than 90 days (40 CFR 262.34, WAC 173-303-200). Wastes stored greater than 90 days must be reported to Environmental Assurance within 24 hours of discovery (WHC policy).

2. Not be used to treat a dangerous or mixed waste, unless treatment by generator status has been granted by the Washington Department of Ecology (WAC 173-303-200, DOE Technical Information Memorandum #86-3).

3. Not be used to store extremely hazardous wastes (EHW) that are toxic by inhalation and/or are volatile unless the facility is designed to prevent the escape of any vapors, fumes, or other emissions into the air (WAC 173-303-640).

4. Not be used to store untreated ignitable or reactive wastes unless stored in such a manner to prevent ignition or reaction (40 CFR 265.198, WAC 173-303-640).

5. Not be used to store incompatible wastes (40 CFR 265.199, WAC 173-303-640).

c. New dangerous waste or mixed storage equipment that is exempt from the requirements of a TSD permit or interim status requirements shall comply with the following requirements:

1. Be constructed above ground (WAC 173-303-640).

2. Provide secondary containment and/or diversion structures sufficient to contain 110% of the volume of the largest individual tank (WAC 173-303-640).

a. The secondary containment system shall be constructed of materials compatible with the wastes contained (WAC 173-303-640).

b. A leak detection system capable of detecting leakage into the secondary containment structure shall be provided (WHC policy in anticipation of incorporation of 40 CFR 265.193 requirements into WAC 173-303).

c. Containment areas that are not covered shall provide sufficient additional capacity to hold an additional 3 inches of accumulated precipitation (WAC 173-303-640).

d. Tanks and equipment shall be evaluated for integrity and certified by a registered professional engineer (WAC 173-303-640).

d. Existing dangerous or mixed waste storage equipment that is exempt from the requirements of a TSD permit or interim status requirements should comply with the items listed in T.5.0(c), above.

e. It is anticipated that several requirements currently present in 40 CFR 265 Subpart J will become mandatory via incorporation into WAC 173-303. This incorporation is expected to occur before the end of 1988. Requirements resulting from this incorporation will be as follows:

1. Upon incorporation of 40 CFR 265 Subpart J into WAC 173-303, the inspections established in item a.5., above, shall be performed on a daily basis (40 CFR 265.195).

2. Following incorporation of 40 CFR 265 Subpart J requirements into WAC 173-303, tanks shall be equipped and monitored so as to be able to detect any leak or discharge within 24 hours, or at the earliest practicable time if the existing detection technology or site conditions will not allow detection within 24 hours (40 CFR 265.193, 40 CFR 265.196). Provision of this equipment and monitoring systems shall be completed within the time frame established in WAC 173-303-640.

3. Following incorporation of 40 CFR 265 Subpart J requirements into WAC 173-303, all storage and transfer systems shall be assessed for integrity (40 CFR 265.191, 40 CFR 265.192). This shall consist of a written assessment reviewed and certified by an independent, qualified, registered professional engineer (40 CFR 265.191). For tank systems with secondary containment complying with the requirements of 40 CFR 265.193, this assessment may be a one time review (40 CFR 265.191). For tank systems without an adequate secondary containment system, this assessment must be conducted annually (40 CFR 265.194(i)). For non-enterable underground tanks, this assessment must include a leak test (40 CFR 265.191).

4. Following incorporation of 40 CFR 265 Subpart J requirements into WAC 173-303, all storage and transfer systems shall be provided secondary containment sufficient to contain 100% of the volume of the largest tank within its boundary plus, for systems without precipitation run-on/infiltration control, additional capacity capable of containing precipitation from a 25-year, 24-hour rainfall event (40 CFR 265.193). Provision of secondary containment shall be completed within the time frame established in WAC 173-303.

T6.0 ABOVE GROUND OIL, HAZARDOUS SUBSTANCE, AND LOW-LEVEL RADIOACTIVE WASTE STORAGE TANKS

The requirements in this section apply to all above ground storage tanks, sumps (other than sumps used solely for secondary containment in the event of a spill or leak), and associated transfer equipment containing oil, hazardous substances, or low-level radioactive wastes. The time frame for attaining compliance with the requirements of this section is specified in item h., below.

The Compliance Plan mechanism described in Part A shall be used to negotiate a waiver in any instance where compliance with a requirement of this section is impractical or unattainable.

a. All storage tanks, sumps, and associated transfer equipment shall be included in the SPCC plan for the operating area where the equipment is located [40 CFR 112.3 (oil storage tanks), WHC policy for other tanks].

   1. The operating facility shall comply with all reporting, security, training, and emergency response requirements specified by the SPCC plan [40 CFR 112 (oil storage tanks), WHC policy for other tanks].

   2. The SPCC plan shall include specific information concerning all oil storage facilities, spill control and detection systems, and spill response procedures (40 CFR 112.7).

b. Tanks shall be clearly labeled to identify the contents of each tank unless such labelling is unacceptable based upon security considerations or, in the case of tanks holding low-level radioactive wastes, if the act of labelling would expose personnel to unacceptable levels of radiation (WHC policy). The Manager of WHC Safety, Quality Assurance, and Security shall determine which tanks would present a potential security problem if labelled (WHC policy).

c. All storage tanks shall be equipped with level monitoring and/or calculated product inventory capability [40 CFR 112.7 (oil storage tanks), WHC policy for other tanks]. Monitoring and/or product inventory calculations shall be done, at a minimum, on a daily basis (WHC policy).

   1. Oil product storage tanks with a capacity of greater than 200 gallons should be monitored in such a manner as to be capable of detecting a loss of 100 gallons or less of product during a 24-hour period (WHC policy). Oil product storage tanks with a capacity between 5 and 200 gallons should be monitored in such a manner as to be capable of detecting a loss of 50% or less of the storage volume (WHC policy). In cases where these guidelines cannot be met, Environmental Protection will assist in determining the appropriate detection capabilities (WHC policy).

   2. Tanks containing regulated wastes or materials listed in Appendices C through G should be monitored in such a manner as to be capable, at a minimum, of detecting leakage of 50% of the RQ for that material during a 24-hour period (WHC policy). In cases where this guideline cannot be met, Environmental Protection will assist in determining the appropriate detection capabilities (WHC policy).

d. Storage and transfer equipment shall be visually inspected once a week for signs of leakage or equipment deterioration [40 CFR 112.7 (oil storage tanks), WHC policy for other tanks].

e. All oil or hazardous substance storage and transfer systems shall be integrity tested (e.g., hydrostatic testing, visual inspections, shell thickness testing) [40 CFR 112.7 (oil storage tanks), WHC policy for other tanks]. Storage and transfer equipment shall be tested at least once every 2 years if in operation (WHC policy). Systems used less frequently than once every 2 years shall be leak tested before each use (WHC policy). (Note: Some tanks subject to the integrity testing requirement may be part of a critical system or emergency backup system. Appropriate notifications must be made and approvals obtained prior to testing these tanks if the operability of the critical system could be adversely affected during the testing period.)

f. All low-level radioactive waste storage tanks and transfer systems shall be integrity tested if such testing is practicable (WHC policy). The testing frequency shall be at least once every 2 years for systems in operation (WHC policy). Systems used less frequently than once every 2 years shall be leak tested before each use (WHC policy). Environmental Protection will assist in determining alternative integrity evaluation methods in cases where testing of a low-level radioactive waste storage system is not practicable.

g. Operating managers shall provide auditable records for the daily (see item c), weekly (see item d), and periodic inspections (see items e and f) listed in this section [40 CFR 112.7 for oil storage tanks, WHC policy for other tanks]. These records shall be maintained for a minimum of 3 years (WHC policy).

h. New storage and transfer systems shall be designed and constructed to comply with the following requirements. In addition, existing storage and transfer systems should be upgraded to comply with these guidelines.

    1. New systems shall be provided with secondary containment and/or diversion structures [40 CFR 112.7 (oil storage tanks), WHC policy for other tanks].

        a. The containment structure shall be sufficient to contain the volume of the largest individual tank plus, for uncovered systems, a rain allowance of 3" [40 CFR 112.7 (oil storage tanks), WHC policy for other tanks].

        b. Diked areas shall be impervious to the spill products [40 CFR 112.7 (oil storage tanks), WHC policy for other tanks].

2. New storage and transfer systems shall be provided with high-level liquid alarms and direct communications between tank level control systems and pumping station personnel during product transfer operations [40 CFR 112.7 (oil storage tanks), WHC policy for other tanks].

3. Secondary spill containment shall be provided for facility tank car and tank truck loading/unloading areas [40 CFR 112.7 (oil storage tanks), WHC policy for other tanks]. Containment shall be sufficient to contain at least the maximum capacity of any single compartment of a tank car or tank truck loaded or unloaded at the Hanford Site [40 CFR 112.7 (oil storage tanks), WHC policy for other tanks].

h. The time frame for attaining compliance with the requirements of this section is as follows:

1. Compliance shall be maintained for any existing tank system currently equipped or operated in accordance with any requirement of this section.

2. For existing tank systems not currently equipped or operated in accordance with any requirement(s) of this section, compliance shall be attained:

- Within 5 years from the date of approval of this manual for any requirement identified as "WHC policy".

- Immediately for any item identified as a current regulatory provision, unless a longer time frame has been established via the Compliance Plan mechanism described in Part A.

T7.0 UNDERGROUND OIL, HAZARDOUS SUBSTANCE, AND LOW-LEVEL RADIOACTIVE WASTE STORAGE TANKS

This section applies to new and existing oil, hazardous substance, or low-level radioactive waste underground storage tanks except as specifically exempted in T7.a.1.i, below. The time frame for attaining compliance with the requirements of this section is specified in T7.a.1.j, below.

The Compliance Plan mechanism described in Part A shall be used to negotiate a waiver in any instance where compliance with a requirement of this section is impractical or unattainable.

a. All storage tanks, sumps, and associated transfer equipment shall be included in the SPCC plan for the operating area where the equipment is located [40 CFR 112.3 (oil storage tanks), WHC policy for other tanks].

1. The operating facility shall comply with all reporting, security, training, and emergency response requirements specified by the SPCC plan [40 CFR 112 (oil storage tanks), WHC policy for other tanks].

2. The SPCC plans shall include specific information concerning all oil storage facilities, spill control and detection systems, and spill response procedures (40 CFR 112.7).

b. All oil and hazardous substance storage tanks shall be equipped with level monitoring and/or calculated product inventory capability [40 CFR 112.7 (oil storage tanks), 40 CFR 280.30 (proposed regulations for petroleum and hazardous substance and storage)]. Monitoring and/or product inventory calculations shall be done, at a minimum, on a daily basis (WHC policy). Monitoring and inventory calculations for tanks containing petroleum products or hazardous substances shall be done in such a manner as to be capable of detecting leakage of 5% of weekly volumetric flow through the system and 0.5% of the monthly volumetric flow through the system [40 CFR 280.41 (proposed)]. Other tanks subject to the requirements of this section, including tanks with no weekly or monthly flow-through, should be monitored in such a manner as to be capable of detecting leakage of 100 gallons or less of product during a 24-hour period (WHC policy). In cases where these monitoring capabilities cannot be met, Environmental Protection will assist in determining the appropriate alternative detection capabilities (WHC policy).

c. All low-level radioactive waste storage tanks shall be equipped with level monitoring and/or calculated product inventory capability if provision of such equipment is practicable (WHC policy). Monitoring and/or product inventory calculation shall be done, at a minimum, on a daily basis (WHC policy).

d. All oil and hazardous substance storage and transfer systems shall be integrity tested [40 CFR 112.7 (oil storage tanks), 40 CFR 280.41 (proposed regulations for petroleum and hazardous substance tanks), WHC policy for other tanks]. Petroleum and hazardous substance storage tank systems shall be tightness tested every six months using a method capable of detecting a 0.1 gallon per hour leak rate with a probability of detection of 0.99 and a probability of false alarm of 0.01 from any portion of the UST system [40 CFR 280.41 (proposed regulations)]. Information of acceptable tightness tests can be found in the EPA document entitled "Underground Tank Leak Detection Methodology: A State-of-the Art Review." In cases where the tightness testing requirement cannot be met, Environmental Protection will assist in determining appropriate alternative testing methods (WHC policy). (Note: Some tanks subject to the tightness testing requirement may be part of a critical system or emergency backup system. Appropriate notifications must be made and approvals obtained prior to testing

these tanks if the operability of the critical system could be adversely affected during the testing period.)

e. Where practicable, low-level radioactive waste storage tanks shall be integrity tested (e.g., hydrostatic testing, shell thickness testing) at least once every 2 years if in operation (WHC policy). Systems used less frequently than once every 2 years shall be leak tested, if practicable, before each use (WHC policy). In cases where this requirement cannot be met, Environmental Protection will assist in determining appropriate alternative testing methods (WHC policy).

f. Operating managers shall provide auditable records for the daily (see items b and c) and periodic inspections (see items d and e) listed in this section [40 CFR 112.7 (oil storage tanks,), 40 CFR 280.41 (proposed regulations for petroleum and hazardous substance tanks), WHC policy for other tanks]. These records shall be maintained for a minimum of 3 years (WHC policy).

g. Tanks containing petroleum or hazardous substances shall be registered with the State of Washington under the requirements of the state underground storage tank program. (40 CFR 280.22). Registration of tanks shall be coordinated by Regulatory Compliance (WHC policy).

h. New storage tanks should be constructed above ground with any associated piping located either above grade or within a pipe trench that will provide secondary containment.

   If for safety or security purposes a new underground storage tank must be installed, construction and installation shall comply with the following requirements:

   1. Tanks shall be constructed of materials compatible with the materials stored within [40 CFR 280.32 (proposed regulations for petroleum and hazardous substance tanks), WHC policy for other tanks].

   2. Tanks and associated transfer lines shall be constructed of non-corrodible material or be cathodically protected against corrosion [40 CFR 280.20 (proposed regulations for petroleum and hazardous substance tanks), WHC policy for other tanks].

   3. Tanks and associated transfer lines shall be double-lined or provided with some other form of secondary containment [40 CFR 280.41 (proposed regulations for petroleum and hazardous substance tanks), WHC policy for other tanks].

4. Tanks shall be equipped with spill and overflow prevention devices [40 CFR 280.30 (proposed regulations for petroleum and hazardous substance tanks), WHC policy and other tanks].

5. Tanks shall be provided with secondary containment and interstitial monitoring [40 CFR 280.41 (proposed regulations for hazardous substance tanks), 40 CFR 112.7 (oil storage), WHC policy for other tanks]. Associated transfer lines shall be provided with a leak detection system that will detect leaks into the secondary containment structure [40 CFR 280.41 (proposed regulations for hazardous substance tanks), 40 CFR 112.7 (oil tanks), WHC policy for other tanks].

6. Tanks shall be installed using approved methods and procedures and shall be certified by a registered professional engineer [40 CFR 280.20 (proposed regulations for hazardous substance and petroleum tanks), WHC policy for other tanks].

i. Tanks storing regulated dangerous wastes are exempted from the requirements of this section T7.0.

Flow-through process tanks are exempted from the requirements of items b, c, and f of this section (40 CFR 280.1).

Sumps used solely for secondary containment in the event of a leak or spill are exempt from the requirements of this section T7.0.

j. The time frame for attaining compliance with the requirements of this section is as follows:

1. Compliance shall be maintained for any existing tank system currently equipped or operated in accordance with any requirement of this section.

2. For existing tank systems not currently equipped or operated in accordance with any requirement(s) of this section, compliance shall be attained:

- Within 5 years from the date of approval of this manual or within the time frame specified in a final regulation, whichever occurs first, for any requirement identified as coming from a "proposed regulation."

- Within 5 years from the date of approval of this manual for any requirement identified as "WHC policy".

- Immediately for any item identified as a current regulatory or DOE Order requirement, unless a longer item time frame has been established via the Compliance Plan mechanism described in Part A.

3. New tank systems shall be designed to meet all applicable requirements of this section. Applicable operational requirements shall be implemented upon initiation of new tank system operation.

T8.0 HIGH LEVEL AND TRANSURANIC MATERIAL STORAGE TANKS

High level and transuranic material storage tanks that are not also mixed waste shall be managed in accordance with the requirements of DOE Order 5820.2A and DOE Order 6430.1A. High level mixed waste and transuranic mixed waste systems that do not have a TSD permit or that are not required to comply with interim status facility requirements shall be managed in accordance with the requirements of section T5.0 of this Part in addition to DOE Order 5820.2A and DOE Order 6430.1A.

T9.0 REFERENCES

1. DOE Order 5480.1, "Hazardous and Radioactive Mixed Waste Management," December 12, 1982.

2. DOE Order 5820.2, "Radioactive Waste Management," February 6, 1984.

3. DOE Order 6430.1A, "Draft General Design Criteria," December 8, 1987.

4. 40 CFR 112, "Environmental Protection Agency Regulations On Oil Pollution Prevention," March 26, 1976.

5. 40 CFR 262, "Environmental Protection Agency Regulations for Hazardous Waste Generators," September 23, 1987.

6. 40 CFR 265, "Interim Status Standards for Owners and Operators of Hazardous Waste Facilities," July 11, 1986 (July 14, 1986 for any reference identified as Subpart J).

7. 40 CFR 280, "EPA Underground Storage Tank Regulations," April 21, 1986 (April 17, 1987 for any reference identified as proposed regulation).

8. 40 CFR 302, "EPA Designation, Reportable Quantities, and Notification Requirements for Hazardous Substance Under CERCLA," December 22, 1986.

9. WAC 173-303, "Dangerous Waste Regulations," June 26, 1987.

10. EPA Report, "Underground Tank Leak Detection Methodology: A State-of-the Art Review," 1986.

11. WHC-CM-4-2, Quality Assurance, QR 2.0, "Quality Assurance Program."

WESTINGHOUSE HANFORD COMPANY	Manual	WHC-CM-7-5
	Part	U, REV 0
	Page	1 of 5
ENVIRONMENTAL COMPLIANCE MANUAL	Effective Date	October 1, 1988
	Organization	Environmental Division

TITLE:

ENVIRONMENTAL COMPLIANCE VERIFICATION

Approved by

R E Lerch

Manager, Environmental Division

U1.0 PURPOSE

The purpose of this Part is to establish WHC requirements necessary to verify compliance with environmental protection program requirements imposed by this manual, applicable environmental laws, regulations, and DOE.

U2.0 SCOPE

The provisions of this Part apply to all WHC environmental compliance verification programs including environmental surveillance, monitoring, assessment, appraisal, audit activities, and inspection. The provisions of this part shall not be interpreted to exempt environmental activities/ processes from the requirements contained in WHC-CM-4-2, Quality Assurance Manual.

U3.0 RESPONSIBILITIES

a. Environmental Assurance shall:

1. Perform environmental compliance verification activities (audits, appraisals, inspections, assessments, evaluations, reviews, and environmental surveys-effluent monitoring activities) to verify compliance with requirements specified in WHC and DOE documents identified in Paragraph U5.0 of this Part.

2. Report the results of environmental compliance verification activities to appropriate levels of management.

3. Evaluate the adequacy of responses to findings identified during the course of environmental compliance verification activities and perform follow-up of corrective action.

4. Provide for continued improvement in environmental compliance, through evaluation of environmental protection program strengths and weaknesses and by initiating implementation of improvement opportunities identified by these evaluations.

5. Maintain records of all environmental compliance verification activities.

b. Operating level organizations shall:

1. Perform internal appraisals in accordance with WHC and DOE requirements.

2. Report the results of internal appraisals to appropriate levels of management.

3. Evaluate the adequacy of compliance plans developed to remedy problems identified during internal appraisals.

4. Maintain records supporting all internal appraisals.

5. Submit timely responses to findings identified during the course of environmental compliance verification activities and implement appropriate corrective action measures for identified problem areas of environmental risk.

U4.0 GENERAL REQUIREMENTS

a. Environmental compliance verification activities shall include the following:

1. Management Control Systems Assessments

An in-depth investigation performed to identify existing or required environmental management control systems documents, to establish their place within the WHC document hierarchy, and to determine their capability for achieving compliance with applicable environmental laws, regulations, DOE and WHC requirements.

2. Functional Appraisal

A documented review of a specialty discipline performed in accordance with written guidance and criteria to verify, by examination and evaluation of objective evidence (including visits to sites of activity) that applicable elements of the WHC environmental protection program have been developed and effectively implemented in accordance with specific DOE and WHC requirements and needs.

3. Field Inspection

An examination of specific operations, usually including a visit to a specific site or location verify whether an item or activity conforms to specified requirements. A field inspection can usually be completed in a short period of time; it allows timely review of specific operations of concern.

4. Management Appraisal

A determination of managerial effectiveness in establishing and implementing environmental management control systems that conform to DOE and WHC requirements. It is based on an analysis of functional appraisals, audits, and other information and on the application of appropriate criteria. It is a review and evaluation of management responsibility and performance in assuring proper balance, integration, and implementation of WHC environmental protection programs.

5. Document Review

A documented review performed to support the development of environmental management control systems to provide assurance that all applicable environmental protection program requirements are addressed. Document reviews include, as appropriate, reviews of key documentation prepared as a consequence of environmental protection program compliance activities.

6. Environmental Audit

A documented assessment of a facility, project, program, or operation designed to monitor the progress of necessary corrective actions, to verify compliance with environmental laws and regulations, and to evaluate field organization practices and procedures.

7. Independent Review Group Evaluation

A documented review and evaluation of a topic of concern by a team of recognized experts not affiliated with WHC. Such evaluations are designed to assess the overall completeness and reasonableness of portions of environmental protection program activities, highlight areas of program strengths and weaknesses, and identify principal program needs.

8. Environmental Survey (Effluent and Environmental Monitoring)

A documented multi-disciplined assessment (with facility specific sampling and analyses as appropriate) to determine environmental conditions and practices, to verify compliance with environmental protection program requirements, and to identify problem areas of environmental risk requiring corrective action.

9. Internal Appraisal

An examination and evaluation performed by or at the direction of the operating level organization to verify that those elements of the environmental management control systems retained under the organization's direct control have been developed and effectively

implemented in accordance with specified environmental protection requirements. Internal appraisal activities include:

- o Identification of all waste streams, units, and/or activities (SUA) at Hanford Site facilities
- o Identification of environmental laws and regulations applicable to each SUA
- o Determination of compliance status of each regulated SUA
- o Determination of appropriate remedial actions to correct the noncompliant SUAs
- o Entry of environmental compliance data on each SUA's real-time compliance status with current laws and regulations into an environmental compliance tracking system to facilitate compliance maintenance through three parallel processes: regulatory change control, operation change control, and environmental compliance auditing.

b. Environmental compliance verification activities shall be conducted as follows:

1. For Part U4.0, 1 through 7, in accordance with WHC-CM-7-6, Environmental Compliance Verification Manual.
2. For Part U4.0, 8, in accordance with WHC-CM-7-3, Effluent Monitoring Program - 100 Areas, and WHC-CM-7-4, Environmental Surveillance and Control.
3. For Part U4.0, 9, in accordance with procedures prepared by Regulatory Compliance.

U5.0 REFERENCES

1. DOE Order 5400.1, "Environmental Policy Statement."
2. DOE Order 5480.1B, "Environmental, Safety, and Health Program for DOE Operations."
3. DOE Order 5480.12, "General Environmental Protection Program Requirements."
4. DOE Order 5482.1B, "Environment, Safety, and Health Appraisal Program."
5. DOE-RL Order 5482.1B, "Environmental, Safety, Health, and Quality Assurance Appraisal and Surveillance Program."
6. DOE-RL Order 5700.1A, "Quality Assurance."

7. DOE Order 5700.6B, "Quality Assurance."

8. WHC-CM-4-2, Quality Assurance Manual.

9. WHC-CM-7-3, Effluent Monitoring Program - 100 Areas.

10. WHC-CM-7-4, Environmental Surveillance and Control.

11. WHC-CM-7-6, Environmental Compliance Verification Manual.

12. WHC-EP-0180, "Hanford Environmental Management Program Implementation Plan (HIP)."

13. Hanford Environmental Management Program Plan (HEMPP).

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WESTINGHOUSE HANFORD COMPANY	Manual	WHC-CM-7-5
	Part	V, REV 0
	Page	1 of 7
ENVIRONMENTAL COMPLIANCE MANUAL	Effective Date	October 1, 1988
	Organization	Environmental Division

TITLE:

RECORDS AND REPORTING REQUIREMENTS

Approved by

R E Lerch

Manager, Environmental Division

V1.0 PURPOSE

The purpose of Part V is to establish the minimum level of reporting required for routine and nonroutine release and disposal of materials to the environment. See Part B for immediate notification requirements associated with nonroutine releases (spills) to the environment.

V2.0 SCOPE

The provisions of this part apply to all existing, planned, and deactivated facilities. The requirements of this part shall be used in conjunction with, and not instead of, MRP 5.14, "Event, Critique, and Unusual Occurrence Reporting."

V3.0 RESPONSIBILITIES

a. Waste generation management shall:

- o Install, maintain, and operate the necessary equipment to generate the data required by the provisions of this Part
- o Generate required reports or submit data for reports as appropriate
- o Notify Environmental Protection when any effluent release limit contained in this manual is exceeded
- o Submit data and reports as required by the provisions of this Part
- o Notify Environmental Protection of any unplanned releases (spills, leaks, etc.) on or offsite
- o Provide a safe repository for storage of the records required by the provisions of this Part.

b. Environmental Assurance shall:

- o File the appropriate reports according to DOE Order 5484.1.
- o Provide Safeguards with the annual emissions report in accordance with WHC-CM-4-34, Nuclear Materials Control and Accountability.

c. Regulatory Compliance shall:

- o Identify current and new record keeping and data submittal requirements by reviewing the Federal and Washington State registers and DOE Orders and incorporating them into the text of this manual. Concurrence shall be obtained from the Office of General Council.
- o Interpret external regulations and the requirements of this manual as needed.

d. The responsible submitter in Table V-1 a,b,d and 2a and b shall determine data submittal and record keeping requirements, due dates for reports, and applicable formats.

V4.0 ROUTINE REPORTING REQUIREMENTS

a. Table V-1 and V-2 list the minimum data submittal and recordkeeping requirements for existing, planned, and deactivated facilities (the requirements for new facilities are contained in Part Q of this manual). More detailed information on the requirements contained in this Part can be obtained from Regulatory Compliance.

b. All records used in the collection of samples and data, analysis of samples, generation of reports, and final reports shall be retained in accordance with DOE Order 1324.2. As a general rule, records used to generate initial data (e.g., strip charts, log books, etc.) shall be maintained at the facility for a period of 3 years. After a period of 3 years the records will be sent to permanent storage.

V5.0 REFERENCES

1. DOE 1324.2, "Records Management."

2. DOE 5484.1, "Environmental Protection, Safety and Health Protection Information Reporting Requirements."

3. WHC-CM-1-3, Management Requirements and Procedures, MRP 5.14, "Event, Critique, and Unusual Occurrence Reporting."

4. WHC-CM-4-34, Nuclear Materials Control and Accountability.

Table V-1a. Existing Facility Environmental Data Submittal and Record Keeping Requirements.

Requirement (Permits)	Source	Compliance criteria	Data submitter	Due date	Record keeper
1. Part A	RCRA WAC-173-303	Existing hazardous waste TSD facility as of 11/19/80 or RMW or TSD facility as of 11/23/87	Permitting*	For new facilities, 180 days prior to start of construction	Permitting
2. Part B	RCRA WAC-173-303	Specifically requested by WDOE after receipt of Part A	Permitting*	Negotiated with WDOE	Permitting
3. Part A/Part B amendments	RCRA WAC-173-303	Significant changes in facility	Permitting*	Prior to change	Facilities
4. PSD and PSD amendments	CAA WAC-173-403	Construction of new or modified facility	Permitting*	60 days prior to start of construction	Facilities
5. NPDES and NPDES amendments	CWA	Construction of new or modified facility	Permitting*	60 days prior to discharge	Facilities
6. Commercial pesticide applicator	WAC-16-228 FIFRA	Pesticide use	Environmental technology	Prior to insecticide use	Environmental technology
7. Cultural resources review request	Historical preservation	Any disturbance of land greater than 5 ft^2	Projects	60 days before excavation	Projects
8. Open burning	WAC-173-425	Burning material other than in an approved incinerator or boiler	Functional organization	On the day of the burning	Functional organization
9. Solid waste handling permit	WAC-173-304	Owners/operators of nonhazardous, solid waste disposal sites	Permitting*	Annually on date of operating permit	Permitting

*Requires coordination with Office of General Counsel prior to submittal.

PST2E-0002-V-1A

Table V-1b. Existing Facility Environmental Data Submittal and Record Keeping Requirements. (Sheet 1 of 2)

Requirement (reports/ notification)	Source	Compliance criteria	Data submitter	Due date	Record keeper
1. Spills and releases to the environment of certain substances in excess of standards specified in regulations are to be reported to the appropriate agency. Examples of applicable standards are contained in the appendixes 1a Planned, continuous, and stable releases in excess of standards	DOE 5484.1 RCRA CERCLA CAA CWA WAC-170-303 TCA PCA 80-7	Limits identified in the regulations	Environmental Protection	Immediately to the National Response Center then to other agencies January 1	Facility
2. Data on waste activities, such as description, quantity, and method	WAC-170-303	Hazardous waste generators	SHWES	(Annual) to DOE/RL by 2/25	SHWES
3. Unmanifested waste received from offsite must be reported to WDOE	WAC-170-303	Receipt of unmanifested waste	Waste Managemnt Program	15 days after receipt of waste	Facility
4. Hazardous constituent level change in groundwater	WAC-170-303	Statistically significant increase in hazardous constituents	Environmental Protection	7 days after determination	Environmental Protection
5. Material Safety Data Sheets (MSDS) must be submitted to the Benton County Department of Emergency Management, Washington State, and the Hanford Fire Department as part of the "community right to know" program	CERCLA/SARA (community right to know)	Presence of any materials under OSHA that requires a MSDS	Strategic Planning and Integration	10/17/87 and as required thereafter to DOE/RL	Facility
6. Hazardous material inventory forms must be submitted to the same organizations that receive MSDSs	CERCLA/SARA (community right to know)	Presence of any materials under OSHA that requires a MSDS	Strategic Planning and Integration	3/1/88 and annually thereafter	Facility
7. Toxic chemical release forms are to be submitted as part of the community right to know	CERCLA/SARA (community right to know)	Release of toxic chemicals	Environmental Division	7/1/88 and annually thereafter to DOE/RL by 6/20.	Facility

PST2E-0082-V-1b

Table V-1b. Existing Facility Environmental Data Submittal and Record Keeping Requirements. (Sheet 2 of 2)

Requirement (reports/ notification)	Source	Compliance criteria	Data submitter	Due date	Record keeper
8. Permit reporting/ notification requirements	Part A Part B PSD NPDES	Identified in permit	Environmental Protection	Specified in permit	Environ-mental Protection
9. Underground injection well data on waste constituents and volumes	SDWA WAC-173-218	Use of well for nonhazardous nonradioactive waste disposal	TBD	TBD	TBD
10. Radioactive effluent and onsite discharge data, EG&G, Idaho	DOE 5484.1	All DOE Sites	Environmental Protection	April 1	Environ-mental Protection
11. Data on annual quantity of solid waste handled, by type if available, and results of groundwater monitoring shall be submitted to WDOE	WAC-173-304	Owner/operator of nonhazardous, solid waste disposal sites	Road, Delivery, and Equipment Operations	March 1	Road, Delivery, and Equipment Operations
12. Data on PCBs and PCB containing items of equipment, such as removal dates, quantities, and types of equipment, shall be submitted to DOE-RL	40 CFR761	Presence of PCBs	Environmental Divison	June 1	Electrical Utilities, Solid Waste Engineering
13. Information on the waste minimization efforts to reduce the volume and toxicity of generated waste	RCRA	Existence of waste generator facilities	SHWES	3/1/88 and every two years there-after	Facility

PST 2E-0002-V-1B TBL V-1b

Table V-1c. Existing Facility Environmental Data Submittal and Record Keeping Requirements.

Requirement (records)	Source	Compliance criteria	Data submitter	Due date	Record keeper
1. Groundwater monitoring	RCRA SDWA	TSD facility	NA	NA	Facility
2. Waste stream monitoring	RCRA CAA CWA	Hazardous waste generator	NA	NA	Facility
3. Instrumentation maintenance and calibration	RCRA CAA CWA	Hazardous waste generator, TSD facility	NA	NA	Facility
4. Waste shipment manifests	RCRA	Hazardous waste generator, TSD facility	NA	NA	Facility
5. Injection well monitoring	RCRA SDWA	Existence and use	NA	NA	Facility
6. Microbiological, inorganic, and organic chemical sampling	SDWA	Operator of water system	NA	NA	Facility
7. Radioactivity/ effluent monitoring	DOE 5484.1	Presence of radioactive material	NA	NA	Facility
8. HLW monitoring	DOE 5820.2	HLW in interim storage tanks	NA	NA	Facility
9. Pesticide spray usage	WAC-16-228 FIFRA	Pesticide use	NA	NA	Environmental engineering
10. Test results, waste analyses, operating records, annual reports	WAC-173-303 RCRA	Hazardous waste generator, TSD facility	NA	NA	Facility
11 Personnel hazardous waste training records	WAC-173-303 RCRA	Hazardous waste generator, TSD facility	NA	NA	Facility
12. Statement as to existence of a waste minimization program	RCRA	Hazardous waste generator	NA	NA	Facility
13. Plan of operation for nonhazardous, solid waste disposal site	WAC-173-304	Owner/operator of nonhazardous, solid waste disposal site	NA	NA	Facility
14 Operating records for nonhazardous, solid waste disposal site	WAC-173-304	Owner/operator of nonhazardous, solid waste disposal site	NA	NA	Facility
15 PCB data	TSCA	Presence of PCBs	NA	NA	Facility

PST2E-0002-V-1C

Table V-1d. Existing Facility Environmental Data Submittal and Record Keeping Requirements.

Requirement (surveys)	Source	Compliance criteria	Data submitter	Due date	Record keeper
National survey of hazardous waste generators	HSWA	Hazardous waste generators	Regulatory compliance	8/5/88	Facilities

PST2E-0002-V-1d

Table V-2a. Surplus/Inactive Environmental Data Submittal and Record Keeping Requirements.

Requirement (permits)	Source	Compliance criteria	Data submitter	Due date	Record keeper
Closure	RCRA WAC-173-303	Hazardous waste generators and TSD facilities that closed operation before 11/19/80	Permitting*	8/5/88	Permitting

*Requires coordination with Office of General Counsel prior to submittal.

PST2E-0002-V-2a

Table V-2b. Surplus/Inactive Environmental Data Submittal and Record Keeping Requirements.

Requirement (records)	Source	Compliance criteria	Data submitter	Due date	Record keeper
1. Groundwater monitoring	DOE 5820.2	Radioactive wastes disposed of prior to 1984	NA	NA	Facility
2. Quarterly inspection log	ECM	Inactive dangerous waste sites	NA	NA	Facility
3. Survey data	ECM	Inactive dangerous waste sites	NA	NA	Environmental Protection

PST2E-0002-V-2b

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TITLE:

HISTORICAL SITE PRESERVATION

Approved by

R E Lerch

R. E. Lerch, Manager
Environmental Division

1.0 PURPOSE

The purpose of Part W is to establish the requirements for the preservation of historical sites and cultural resources in connection with WHC activities.

2.0 SCOPE

The provisions of this part apply to any excavation or disturbance of land greater than 5.0 ft^2 in area. This 5.0 ft^2 exclusion does not apply to areas within 400 meters of the Columbia River, or land generally comprising Gable Mountain, Gable Butte, Rattlesnake Mountain or Rattlesnake Springs. Any disturbance of the land in these areas requires a Cultural Resource Clearance (CRC), as described in paragraph 4.0, below. No area of the Hanford Site is excluded from this review.

3.0 RESPONSIBILITIES

Each user of land (includes facility managers, project engineers, or cognizant engineers) shall:

1. Determine the exact location and dimensions of the excavation

2. Submit the form, Figure W-1, Request for Cultural Resources Review, accompanied by a map identifying the area to be disturbed. This information shall be submitted to the Manager, Cultural Resources Project, 375-6873, MSIN K5-09.

4.0 REQUIREMENTS

The following requirements shall be met:

1. Disturbance includes, but is not limited to, leveling, road or utility line construction, excavation of pits, foundations and trenches, quarrying and borrow of rocks and soils, seismic testing, and stockpiling of earth. In general, any activity requiring an excavation permit shall be reviewed.

2. Submission of formal requests may be preceded by a phone call; however, 60 days lead time shall be required. Excavation shall not proceed without this approval.

3. Variances or waivers to this process may be granted. All such requests shall be directed to Manager, Cultural Resources Project, Office of Hanford Environment, Pacific Northwest Laboratory.

4. No areas are exempted from the provisions of this Part. Highly industrialized areas may only be waivered on a case-by-case basis.

5. Emergency repair work, for emergencies as defined in WHC-CM-4-1, WHC Emergency Plan, may proceed without first having a CRC. A CRC shall be obtained after the fact.

Basis: 1. Letter, July 10, 1987, A. J. Rizzo (DOE-RL) to W. M. Jacobi, et.al., "Cultural Resource Review Process."

2. Internal Letter November 3, 1987, M. T. Black to J. M. Atwood, et.al., "Cultural Resource Review."

5.0 REFERENCES

1. WHC-CM-4-1, WHC Emergency Plan.

Figure W-1. Request for Cultural Resources Reviews.

REQUEST FOR CULTURAL RESOURCES REVIEW	HCRC #
Project Name	
Requesting Organization and Division	
Submitter (Name, Address, and Telephone)	
Date of Request	Date Findings Requested By
Primary Contact Person Phone Secondary (If primary not available) Phone	
Project Development Stage: ☐ Site Selection ☐ CDR ☐ Construction ☐ Not Applicable	
Project Description (narrative may be attached)	
Project Dimensions	
Depth of Excavation ☐ Not Applicable	
Location of Project: ☐ 100 Area ☐ 200 Area ☐ 300 Area ☐ 400 Area ☐ 600 Area ☐ 700 Area ☐ 1100 Area ☐ 3000 Area ☐ Other _____	
Maps Enclosed: ☐ USGS topo showing project location (or other suitable map to assist in finding the project site) ☐ Scale drawing showing construction, parking, topsoil storage areas, equipment stockpiles, (including water, sewer and power lines, etc), access roads and utility corridors. ☐ Other	
Minimum Clearance Required: ☐ 0 ☐ 5 ☐ 3	

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TITLE:
CONSIDERATION OF PROTECTED WILDLIFE, ENDANGERED SPECIES, AND INTRODUCTION OF EXOTIC SPECIES

Approved by
R. E. Lerch, Manager
Environmental Division

1.0 PURPOSE

The purpose of Part X is to establish standards for the treatment, handling, and disposition of protected wildlife and endangered and exotic species on the Hanford Site by WHC employees.

2.0 SCOPE

The provisions of this part apply to:

1. The taking* of any animal, or part thereof, living or dead, on the Hanford Site, whether or not such taking is done within the normal performance of work.

2. Modifications of habitat which adversely affect endangered or protected species.

3. Introduction of exotic species of plants or animals to the Hanford Site.

3.0 RESPONSIBILITIES

1. Operations/project managers shall:

   a. Assess the potential of their project/operations for damage to species protected under this part. For new projects, such consideration should be taken as part of the environmental document appended to the Conceptual Design Report (CDR).

   b. Take all reasonable measures to conserve and preserve existing habitat not withstanding that there are no Federal-listed plant species and none of the state-listed plant species are legally afforded protection.

   c. Investigate, evaluate, and control the impact of exotic plant or animal species on Site environs. This includes organisms introduced for the purposes of soil stabilization/revegetation, or pest control. Additional documentation may be required under the NEPA. See Part Q of this manual.

*Take means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such activity.

2. Employees of WHC, during the conduct of their duties, shall notify the Manager, Environmental Protection or Patrol, of any protected or threatened, and endangered animal or plant listed in Table X-1 found dead on the Hanford Site.

3. Environmental Protection shall be responsible for proper notification regarding taking of wildlife protected under this Part to designated state or Federal agencies.

4.0 REQUIREMENTS

1. No employee of WHC shall:

   a. Take or otherwise reduce to possession any plant or animal species, or part thereof.

      Basis: WAC 232-12-274, "Wildlife Code of the State of Washington."

   b. Take or otherwise reduce to possession any wildlife species without appropriate Federal and/or state permits or approvals authorizing such activity and have the actual need to perform such activity as part of the employee's job assignment.

      Basis: WAC 232-12-274, "Wildlife Code of the State of Washington."

   c. Cut any tree or modify any habitat used by wildlife prior to filing a workplan with and obtaining approval from Environmental Protection. Environmental Protection will determine if the planned work is compatible with 16 USC 1531 before giving approval. See Parts O and Q of this manual.

      Basis: The reference for this requirement is 16 USC 1531, "Endangered Species Act of 1973.

   d. Release on the Hanford Site any exotic species of plant or animal, including domestic species, for any purpose without specific approval from Environmental Protection.

      Basis: This requirement is from EO 11987, "Exotic Organisms," May 24, 1971.

5.0 REFERENCES

1. Executive Order 11987, "Exotic Organisms."

2. 16 USC 1531, "Endangered Species Act of 1973."

3. WAC 232-12-274, "Wildlife Code of the State of Washington."

Table X-1. Endangered, Threatened, and Sensitive Animals on the Hanford Site. (Sheet 1 of 7)

Taxa	Status[a]	Relationship to the Hanford Site
Washington State Status of Special Bird Species		
Birds associated with the Hanford Reach of the Columbia River but not known to nest on the Hanford Site		
Bald Eagle Haliaeetus leucocephalus	ST FT	A regular winter visitor to the Columbia River on the Hanford Site. Occasional forager of sagebrush/grass habitat.
American White Pelican Pelecanus erythrohynchus	SE	A regular fall and winter visitor to the Columbia River on the Hanford Site.
Black-Crowned Night Heron Nycticorax nycticorax	PM	A migrant and occasional forager along the Columbia River and at waste ponds on the Hanford Site.
Horned Grebe Podiceps auritus	PM	A common migrant along the Hanford reach of the Columbia River; occasional visitor to waste ponds.
Red-necked Grebe Podiceps grisegena	PM	Uncommon migrant along the Hanford reach of the Columbia River.
Western Grebe Aechmophorus occidentalis	PM	Common migrant along the Hanford reach of the Columbia River.
Clark's Grebe Aechmophorus clarkii	PM	Common migrant along the Hanford reach of the Columbia River.
Trumpeter Swan Cygnus buccinator	PM	Uncommon migrant along the Hanford reach of the Columbia River.
Aleutian Canada Goose Branta canadensis leucopareia	SE FE	Rare migrant and winter resident along the Columbia River; likely occurs along the Hanford Reach.
Osprey Pandion haliaetus	PM	Common visitor to the Hanford Reach of the Columbia River; no nesting records for the Hanford Site.

Table X-1. Endangered, Threatened, and Sensitive Animals on the Hanford Site. (Sheet 2 of 7)

Taxa	Status[a]	Relationship to the Hanford Site
Peregrine Falcon Falco peregrinus	SE FE	Migrant and winter resident along the Columbia River; several sightings along the Hanford Reach.
Black-necked stilt Himantopus mexicanus	PM	Uncommon migrant along the Hanford reach of the Columbia River and waste ponds.
Caspian tern Sterna caspia	PM	Common migrant and summer resident along the Hanford Reach of the Columbia River.
Arctic tern Sterna paradisaea	PM	Rare migrant along the Hanford Reach of the Columbia River.
Black tern Chlidonias niger	PM	Uncommon migrant along the Hanford Reach of the Columbia River.
Birds associated with the Hanford Reach of the Columbia River that also nest on the Hanford Site		
Great Blue Heron Ardea herodias	PM	Nests in trees along the Columbia River; Forages along the river and occasionally at waste ponds; a year-round resident.
Common Loon Gavia immer	PT	Infrequent nester along the Columbia River on the Hanford site; common migrant and winter resident.
Great Egret Casmerodius albus	PM	Infrequently nests with Great blue Herons on the Hanford Site.
Forster's Tern Sterna forsteri	PM	Common nesting species along the Columbia River of the Hanford Site.
Birds Associated with Sagebrush/Grass Habitats		
Ferrunginous Hawk Buteo reglis	ST FC	Occasional forager and nester on the Hanford Site.

Table X-1. Endangered, Threatened, and Sensitive Animals on the Hanford Site. (Sheet 3 of 7)

Taxa	Status[a]	Relationship to the Hanford Site
Swainson's Hawk Buteo swainsoni	PS FC	Common forager and nester on the Hanford Site.
Prairie Falcon Falco mexicanus	PM	Common forager and nester on the Hanford Site.
Turkey vulture Cathartes aura	PM	Uncommon migrant and summer resident on the Hanford Site.
Northern goshawk Accipiter gentilis	PS	Common fall and winter visitor to riparian habitats on the Hanford Site.
Golden eagle Aquila chrysaetos	PS	Common migrant and resident on the Hanford Site. No records of nesting.
Merlin Falco columbarius	PM	Uncommon migrant on the Hanford Site.
Gyfalcon Falco rusticolus	PM	Uncommon migrant and winter visitor to the Hanford Site; most observations from the ALE Reserve.
Sage Grouse Centrocercus urophasianus	PS	Uncommon resident on the Hanford Site. Adults and broods have been observed on the Arid Lands Ecology Reserve; a lek was present on the USF&W Saddle Mt. refuge prior to 1985.
Sandhill Crane Grus canadensis	SE	A common migrant across the Hanford Site. Rarely observed stopping over on the Hanford Site.
Long-billed Curlew Numenius americanus	PM FC	A common forager and nester in Sagebrush/grass habitats.
Flammulated Owl Otus flammeolus	PS	A rare migrant on the Hanford Site; one observation on the ALE reserve.
Snowy Owl Nyctea scandiaca	PM	A rare migrant on the Hanford Site; several observations.
Burrowing Owl Athene cunicularia	PS	A common forager and nester in Sagebrush/grass habitats.

Table X-1. Endangered, Threatened, and Sensitive Animals on the Hanford Site. (Sheet 4 of 7)

Taxa	Status[a]	Relationship to the Hanford Site
Lewis' woodpecker Melanerpes lewis	PS	A rare migrant on the Hanford Site.
Mammals associated with the Hanford Site		
Merriam's shrew Sorex merriami	PS	Uncommon inhabitant of upper elevations of Rattlesnake mountain of the ALE Reserve.
Pallid Bat Antrozous palliuds	PM	Inhabits deserted buildings and cliffs on the Hanford Site.
Pygmy Rabbit sylvilagus idahoensis	PE	Prior to the 1984 fire, this small rabbit occurred on Rattlesnake Mountain on the ALE Reserve. No records of occurrence since 1984.
Northern Grasshopper Mouse Onychomys leucogaster	PM	Common in Sagebrush/grass habitats on the Hanford Site; particularly abundant on the ALE Reserve.
Sagebrush Vole Lagurus curtatus	PM	Common at higher elevation on Rattlesnake Mountain on the ALE Reserve. Found mostly in bunchgrass dominated habitats.
Reptiles and Amphibians of the Hanford Site		
Woodhouse's toad Bufo woodhousei	PM	Uncommon along the Hanford Reach of the Columbia River and riparian areas of the ALE Reserve.
Night Snake Hypsiglena torquata	PM	Common around basalt outcroppings on the Hanford Site.
Striped whipsnake Masticophis taeniatus	PS	Uncommon in Sagebrush/grass habitats where lizards (their chief food) are not abundant.

Table X-1. Endangered, Threatened, and Sensitive Animals on the Hanford Site. (Sheet 5 of 7)

Taxa	Status[a]	Relationship to the Hanford Site
Invertebrates of the Hanford Site		
Columbia River Limpet *Lanx nuttalli*	PM	Common inhabitant of the Hanford Reach of the Columbia River.
Columbia River Spire Snail *Lithoglyphus columbiana*	PM	Common inhabitant of the Hanford Reach of the Columbia River.
Short-tailed black swallowtail *Papilio indra*	PM	Inhabits most of the Hanford Site.
Fish of the Hanford Reach of the Columbia River		
Mountain Sucker *Catostomus platyrhynchus*	PM	Uncommon inhabitant of the Hanford Reach of the Columbia River.
Sand Roller *Percopsis transmontana*	PM	Common inhabitant of Pool areas of Hanford Reach.
Piute Sculpin *Cottus beldingi*	PM	Abundant inhabitant of riffle and cobble areas of the Hanford Reach.
Reticulate Sculpin *Cottus perplexus*	PM	Uncommon habitat of the Hanford Reach of the Columbia River.
Endangered, Threatened, and Sensitive Plants on the Hanford Site[b]		
Columbia Milk-Vetch *Astragalus columbianus* Barneby	Threatened C	A local endemic with its major populations located on the Yakima Firing Center; small populations also exist on the Hanford boundary adjacent to the Firing Center.
Persistentsepal Yellowcress *Rorippa columbiae* Suskd. ex Howell	Endangered C	Known to occur on the wetted shoreline of the Columbia River on the Hanford site; not likely to occur elsewhere.

Table X-1. Endangered, Threatened, and Sensitive Animals on the Hanford Site. (Sheet 6 of 7)

Taxa	Status[a]	Relationship to the Hanford Site
Thompson's Sandwort Arenaria franklinii Doug. var. Thompsonii Peck	Threatened	Exists as A. franklinii on stabilized sand dunes on the Hanford Site; taxonomic status is currently under consideration.
Hoover's Desert Parsley Lomatium tuberosum Hoover	Threatened C	A local endemic in Yakima, Benton, Grant, and Kittitas Counties; not known from the Hanford Site.
Gray Cryptantha Cryptantha leucophea Dougl. Pays	Sensitive	Occurs on stabilized sand dunes of the Hanford Site near the WYE barricade; occurrence in other areas has not been established.
Piper's Daisy Erigeron piperianus Cronq.	Sensitive	A local endemic, occurs on the Arid Lands Ecology Reserve; occurrence in other areas has not been established.
Tooth-Sepal Dodder Cuscuta denticulata Englem.	Monitor	Recently found in Benton County; parasitic on sagebrush; may occur in the vicinity of the Hanford Site.

Reference[a] Definitions of special classifications of animal species:

FE--Federally designated endangered species.
FT--Federally designated threatened species.
FC--Federally designated candidate species.

PE--Proposed Endangered. A species proposed for consideration for State Endangered classification.

PM--Proposed Monitor. A species proposed for State Monitor classification.

PS--Proposed Sensitive. A species proposed for consideration for State Sensitive classification.

PT--Proposed Threatened. A species proposed for consideration for State Threatened classification.

Table X-1. Endangered, Threatened, and Sensitive Animals on the Hanford Site. (Sheet 7 of 7)

SE--State Endangered. A species which is seriously threatened with extirpation within the State of Washington. These are classified by the State Game Commission as endangered wildlife (WAC 232-12-014). Protected from taking due to damage (RCW 77.12.265); trafficking (RCW 77.16.040); and possession, control, or destruction of nests or eggs (RCW 77.16.120).

SM--State Monitor. A species of special interest because of public appeal, need for special habitats during a portion of their life cycle, status as indicators of environmental quality, population status that is mostly unknown, taxonomic status in need of further study, or justifiably removed from Endangered, Threatened, or Sensitive classification.

SS--State Sensitive. A species that could become threatened if current water, land, and environmental practices continue. Classification by the State Game Commission as Protected Wildlife and protected from possession, control, or destruction of nests or eggs.

ST--State Threatened. A species that could become endangered without management or removal of threats. These species are classified by the State Game Commission as Protected Wildlife (WAC 232-12-011). Protected from possession, control, or destruction of nests or eggs (RCW 77.16.120).

Reference[b] Definitions of special classifications of plant species:

Endangered. A vascular plant taxon in danger of becoming extinct or extirpated in Washington within the near future if factors contributing to its decline continue. These are taxa whose populations are at critically low levels or whose habitats have been degraded or depleted to a significant degree.

Local Endemic. A taxon restricted to a limited geographical area, usually with a single county or several adjacent counties.

Monitor. A vascular plant taxon of potential concern because of uncertain taxonomic status or paucity of information concerning distribution; or a taxon that is actually more abundant or less threatened than previously thought.

Sensitive. A vascular plant taxon, with small populations or localized distribution within the state, that is not presently endangered or threatened, but whose populations and habitats will be jeopardized if current land use practices continue.

Threatened. A vascular plant taxon likely to become endangered within the near future in Washington if factors contributing to its population decline or habitat degradation or loss continue.

TITLE:

ASBESTOS AND POLYCHLORINATED BIPHENYLS

Approved by

R. E. Lerch, Manager
Environmental Division

1.0 PURPOSE

The purpose of this Part is to establish WHC standards for asbestos and polychlorinated biphenyls (PCBs) on the Hanford Site. These standards are intended to ensure that WHC personnel control, handle, and dispose of these materials in a manner that:

1. Protects the safety of employees and the general public.
2. Minimizes spills and releases to the environment.
3. Meets applicable DOE, Federal, state, and local regulatory requirements.

2.0 SCOPE

1. Asbestos

   This part applies to the removal of asbestos from facilities and facility components and the subsequent disposal of the asbestos. This part complements WHC-CM-4-3, "Industrial Safety Standards," Standard C-3, "Asbestos Control," which covers the safety aspects of asbestos removal.

2. PCBs

   The responsibilities and requirements of this part apply to the following radioactive and nonradioactive equipment and materials containing two (2) parts per million (ppm) PCBs* or more.

   a. Hydraulic and heat transfer systems
   b. Materials (rags, debris, soil, etc.)
   c. Transformers, capacitors, and other electrical equipment
   d. Waste oils.

*Two (2) ppm using ASTM method D-4059-86 or one (1) ppm using EPA method 60/4-81-045.

The requirements of this part are intended to supplement WHC-CM-4-3, Industrial Safety Standards, Standard C-1, "Polychlorinated Biphenyls (PCB)" which is concerned with the control of employee exposure to PCBs.

3.0 RESPONSIBILITIES

1. Building Managers and Operations Managers shall:

   a. Ensure that all waste asbestos materials are removed, handled, packaged, labeled, stored and disposed of in compliance with the requirements of this standard.

   b. Maintain the necessary inventory, storage, clean up, and disposal records for waste asbestos materials and items and materials containing PCB.

   c. Ensure that personnel handling asbestos materials and PCB items and materials containing PCB have received proper training.

   d. Ensure that all items and materials containing PCB within their facility or cognizance are handled and controlled in accordance with the requirements of this part.

   e. Ensure that all new oils and electrical items used are certified free of PCB.

   f. Promptly take the following actions in the event of any spill or release of PCBs:

      (1) Environmental Protection shall be immediately notified.

      (2) Any leak to electrical equipment that requires equipment inspection and/or repair shall be immediately reported to Electrical Utilities.

2. Industrial Safety and Fire Protection shall:

   a. Establish safety policies for handling asbestos materials and PCB items and materials.

   b. Overview removal, handling, packaging, labeling, storing, and disposal of radioactive and non-radioactive asbestos materials.

3. Solid Waste Engineering shall:

   a. Maintain asbestos disposal records for the Hanford Site.

b. Issue a quarterly report that summarizes disposal of non-radioactive asbestos on the Hanford Site and forecasts disposal quantities for the next calendar year.

c. Prepare and submit to DOE-RL the annual radioactive PCB status report for the Hanford Site by June 1.

d. Provide spill designations for PCB releases.

e. Provide "Chemical Waste Disposal Analysis" designating PCB wastes and coordinating disposal.

f. Provide assistance and direction for containment and remediation of PCB spills.

4. Electrical Utilities shall:

a. Ensure that all items and materials containing PCB under their cognizance are handled, controlled, and disposed of in accordance with the requirements of this part.

b. Provide approved storage for items and materials containing PCB.

c. Maintain a data base for Site-wide inventory, inspection, storage, and disposal records for PCB items and materials containing PCB.

d. Maintain an updated registration of all PCB transformers with the Hanford Fire Department and responsible building managers.

e. Prepare and submit to DOE-RL by June 1 the annual non-radioactive PCB status report for the Hanford Site.

f. Provide timely maintenance and repair of leaks in PCB and PCB-contaminated transformers in accordance with applicable state and federal regulations.

g. Provide spill control and cleanup services in response to PCB spills that require corrective actions beyond the abilities and responsibilities of the operating facilities.

h. Notify Environmental Protection of any spill or release of materials that contain PCB.

i. Provide support to Hanford Site PCB Task Force.

5. Site Support shall provide environmental training for personnel handling asbestos and PCBs.

6. Regulatory Compliance shall:

   a. Establish standards necessary to ensure that WHC facilities and equipment are in compliance with applicable DOE and Federal regulations.

   b. Provide support to the Hanford Site PCB Task Force.

7. Environmental Assurance shall:

   a. Assist building managers, operating managers, and support personnel in implementing and meeting the requirements of this part. Notify the Area or Building Emergency Director if the spill represents an exposure risk or release to the environment.

   b. Investigate spills or releases of PCB and file the necessary reports.

   c. Overview cleanup of spills or releases of PCB.

   d. Overview storage and disposal of PCB items and materials.

   e. Provide support to the Hanford Site PCB Task Force.

4.0 REQUIREMENTS

4.1 GENERAL REQUIREMENTS FOR WASTE ASBESTOS MATERIALS

Environmental requirements concerning handling and disposal of asbestos materials are based on the ability of the material to become airborne. Asbestos materials are divided into two general categories: friable asbestos and non-friable asbestos. Friable asbestos is defined as material containing more than 1% asbestos by weight that hand pressure can crumble, pulverize, or reduce to powder when dry. If not handled properly fibers of friable asbestos can become airborne, resulting in a potential hazard to personnel and a potential release to the environment.

Basis: See the definition for "asbestos-containing waste materials" and "friable asbestos" at 40 CFR 61.141.

Asbestos materials must also be controlled according to whether the material is radioactive or non-radioactive. The following requirements apply to handling, packaging, storing, and disposing of radioactive and non-radioactive asbestos materials on the Hanford Site.

1. All work involving removing, handling, packaging, labeling and storing asbestos materials shall be conducted in accordance with the requirements of WHC-CM-4-3, Industrial Safety Manual, Standard C-3, "Asbestos Control."

2. All work involving removal, handling, packaging, labeling, storing, and disposing of friable asbestos shall be controlled to prevent any visible release of asbestos fibers to the environment. This may be accomplished by the use of water sprays, ventilation filtration equipment, proper packaging techniques, and other means of controlling airborne particulate materials.

3. All non-radioactive waste asbestos materials (including friable and non-friable forms) shall be disposed of in accordance with the requirements contained in Part G of this manual and Fleet Operations, Transportation and Maintenance Management Standard Operating Procedure 25.2, "Disposal of Asbestos at Central Landfill."

4. All radioactive waste asbestos materials (including friable and non-friable forms) shall be disposed of in accordance with the requirements contained in Part H of this manual and WHC-EP-0063, Hanford Radioactive Solid Waste Packaging, Storage, and Disposal Requirements.

   Basis: The requirements in 1 through 4, above, reflect the requirements at 40 CFR 61.145, 146, 147, 152, 154, 155, and 156, and DOE-RL Order 5480.10A.

4.2 GENERAL REQUIREMENTS FOR ITEMS AND MATERIALS CONTAINING PCB

Items and materials containing Polychlorinated Biphenyls (PCB) are regulated under 40 CFR 761. The following definitions will be used to describe the regulatory limits for PCB items and materials on the Hanford Site.

PCB Materials. PCB materials include oils, liquids, rags, absorbent materials, etc. that contain PCB in concentrations of 2 ppm (or 1 ppm depending on test method) or greater.

PCB-Contaminated Items. PCB-contaminated items include transformers, circuit breakers, switch-gear, reclosers, voltage regulators, etc. that contain PCB in concentrations of 50 ppm or greater but less than 500 ppm. Mineral oil transformers that have never been sampled for PCB are classified as "PCB-contaminated" until further testing is completed.

PCB Container. Any package, can, bottle, bag, barrel, drum, tank, or other device that contains PCBs or PCB articles and whose surface(s) has been in direct contact with PCBs.

PCB Items. PCB items include electrical equipment (transformers, rectifiers, switch-gear, capacitors, light ballasts, etc.) that contain PCB in concentrations of 500 ppm or greater.

The following requirements apply to using, handling, packaging, storing, and disposing of materials and items containing regulated concentrations of PCB.

1. The following equipment, materials, and locations shall be clearly labeled with the large (6" x 6") PCB ML label. Where the PCB item is too small to accommodate the large ML label, a smaller PCB ML label may be used.

   a. All drums containing PCBs.

   b. All hydraulic and heat transfer systems containing 50 ppm or greater PCB.

   c. All PCB transformers.

   d. All PCB large (containing three pounds or more of dielectric fluid) capacitors at the time of removal from service.

   e. All vehicles used to transport more than 45 Kg (99.4 lbs) of PCB materials or one or more PCB transformers (labeled on all four sides).

   f. All PCB storage areas including temporary storage.

   g. All doors, fences, hallways, or means of entrance (excluding grates and manhole covers) to a PCB transformer.

   Basis: These requirements reflect the requirements found at 40 CFR 761.40.

2. The following conditions and PCB items are prohibited on the Hanford Site.

   a. PCB transformers and large capacitors in a location that poses an exposure risk to food and feed.

   b. Hydraulic and heat transfer systems with fluids that contain 50 ppm PCB or greater.

c. Large capacitors (both high and low voltage), unless they are located in a restricted-access electrical substation or a restricted-access indoor installation that provides spill containment.

d. Combustible materials located within 5 meters of a PCB transformer or PCB transformer enclosure.

e. The installation of a PCB transformer in or within 30 meters of a commercial building or onsite office building.

Basis: These requirements reflect the requirements found at 40 CFR 761.30(a).

3. All hydraulic and heat transfer systems containing greater than 2 quarts fluid that have not been replaced or flushed since January 1983 shall be tested for PCB.

Basis: This requirement reflects the requirement found at 40 CFR 761.30(d) and (e). The "2 quarts" threshold is based on small hydraulic systems, as found on vehicles, which would be changed every year as part of the vehicle preventive maintenance and would not have to be tested because after January 1, 1983 no more PCB fluids would be purchased.

4. All PCB transformers shall be registered with the Hanford Fire Department and the cognizant Area or Building Administrator. The following information shall be included in the registration.

a. The address and physical location of the transformer(s).

b. The principal constituent of the dielectric fluid in the transformer(s).

c. The type of transformer installation(s).

d. The name and telephone number of the person to contact in the event of a fire involving the equipment.

Basis: These requirements reflect the requirements found at 40 CFR 761.30(a)(1)(vi).

5. Copies of the inspection forms for the following are to be forwarded to Electrical Utilities and Environmental Protection for transformers at 165-KE and KW and 105-KE and KW, and rectifiers at 189-D.

a. PCB transformers with risk reduction measures (containing less than 60,000 ppm PCB and/or provided with spill containment) shall be visually inspected at least annually.

b. All PCB transformers without risk reduction measures shall be visually inspected at least once every three months. There shall be a minimum of 30 days between each inspection.

Basis: These requirements reflect the requirements found at 40 CFR 761.30(a)(1)(xiii).

6. The following permanent corrective actions shall be completed in response to a spill or leak of PCB.

   a. All visible traces of the spilled material shall be removed.

   b. Depending on the location of the leak and the concentration of the spilled material, different cleanup procedures and a verification sample may be required. These requirements can be obtained from Electrical Utilities and/or Environmental Protection.

   c. A cleanup certification sample shall be collected and analyzed to verify that residual PCB concentrations are below the levels determined in paragraph 6(b) above.

   d. All discarded PCB items, PCB materials, and spent absorbent materials shall be packaged, labeled, and disposed in accordance with paragraph 4.3.

   e. Follow-up inspections shall be conducted and documented by the equipment manager to ensure that the leaking equipment has been adequately repaired.

Basis: These requirements reflect the requirements found at 40 CFR 761.125.

7. The following records and reports are required.

   a. Complete inventory of all PCB-contaminated and PCB items located on the Hanford Site.

   b. Records of inspection and maintenance history for all PCB transformers. The records shall be maintained for at least three years after the equipment has been disposed and shall contain the following information.

      (1) The location of the transformer.

      (2) The date of each visible inspection and the name of the inspector.

(3) Information concerning any leaks or spills associated with the transformer. This information should include the date and location of the leak, an estimate of the spilled volume, and the date and description of any cleanup, containment, repair, or replacement.

c. An annual PCB report shall be prepared that includes the following information.

(1) The dates when PCB materials and PCB items were removed from service, placed into storage for disposal, and transported for disposal.

(2) The total quantities of PCB materials and PCB items removed from service, placed into storage for disposal, and transported for disposal.

(3) The location of the initial disposal or storage facility for PCB materials and PCB items removed from service.

(4) The total number of PCB transformers removed from service and remaining in service and the total weight of PCBs contained in them.

(5) PCB container contents identified.

(6) Total number of PCB capacitors removed from service and remaining in service.

Basis: The requirements in paragraphs 7.a and 7.c above reflect the requirements in 40 CFR 761.180. The requirements in paragraph 7.b above reflect the requirements in 40 CFR 761.30.

4.3 TEMPORARY STORAGE OF PCB MATERIALS AND PCB ITEMS

The following PCB items may be stored for up to 30 days in a temporary storage area, provided that a notation is attached to the PCB item or container indicating the date the item was removed from service:

1. Non-leaking PCB articles and PCB equipment.

2. Leaking PCB articles and PCB equipment if the PCB items are placed in a non-leaking PCB container that contains sufficient absorbent material to absorb any liquid PCBs remaining in the PCB items.

3. PCB containers containing non-liquid PCBs such as contaminated soil, rags, and debris.

4. PCB containers containing liquid PCBs at a concentration between 50 and 500 ppm, provided a Spill Prevention, Control and Countermeasure Plan (SPCC) has been prepared for the temporary storage area in accordance with 40 CFR 112. In addition, each container must bear a notation that indicates that the liquids in the drum do not exceed 500 ppm PCB.

   Basis: These requirements reflect the requirements found in 40 CFR 761.65(c)(1).

4.4 STORAGE FOR DISPOSAL FACILITIES

WHC operates a Storage For Disposal (SFD) Facility at 212-P Building located in the 200-N Area. The facility is managed and operated by Electrical Utilities. The SFD facility shall be operated in a manner that complies with the following requirements.

1. PCB materials, PCB-contaminated items, and PCB items may be stored at the SFD facility. No stored item or material shall remain in storage for more than 9 months from the date when it was first placed into storage, including temporary storage.

2. The facility shall have the following minimum design features.

   a. An adequate roof and walls to prevent rain water from reaching items and materials in storage.

   b. A continuous, smooth, impervious floor area that contains no drain valves, floor drains, expansion joints, sewer lines, or other openings that would allow release of liquids.

   c. Continuous, smooth, impervious curbing that is at least 6 inches in height and capable of containing two times the volume of the largest article in storage or 25% of the total volume in storage, whichever is greater.

   d. The SFD facility shall not be located on the 100-year flood plain.

   e. An up-to-date spill contingency plan or SPCC Plan.

   Basis: These requirements reflect the requirements found at 40 CFR 761.65(b).

5.0 REFERENCES

1. DOE-RL Order 5480.10A, "Industrial Hygiene Program."

2. 40 CFR 61, Subpart M, "National Emission Standards for Asbestos."

3. 40 CFR 761, "Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution In Commerce, and Use Prohibitions."

4. WHC-CM-4-3, Industrial Safety Manual.
   Standard C-1, "Polychlorinated Biphenyls."
   Standard C-3, "Asbestos Control."

5. WHC-EP-0063, Hanford Radioactive Solid Waste Packaging, Storage, and Disposal Requirements.

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SURPLUS FACILITIES DECONTAMINATION AND DECOMMISSIONING

Approved by

R. E. Lerch 7-17-89

R. E. Lerch, Manager
Environmental Division

1.0 PURPOSE

The purpose of Part Z is to establish standards and guidelines for the management, decontamination, and decommissioning of new and surplus facilities under the control of WHC which are contaminated with radioactive and or dangerous wastes.

2.0 SCOPE

Facilities shall be subject to the provisions of this Part when they are declared surplus and have been accepted into a decommissioning program.

3.0 RESPONSIBILITIES

1. Facility Management shall:

   a. Maintain all surplus facilities under their jurisdiction in full compliance with the applicable parts of this manual.

   b. Provide routine surveillance and maintenance of surplus facilities to assure ongoing compliance.

2. The Environmental Restoration shall:

   a. Prioritize surplus facilities under their control for remedial action.

   b. Assure that plans and programs for decontamination and decommissioning (D&D) comply with all applicable standards in this manual.

   c. Coordinate the environmental review process for each facility undergoing D&D so that the status of that facility with regard to RCRA, CERCLA/SARA, NEPA, and State Regulations is understood.

   d. Conduct the decommissioning project in accordance with a project plan approved by DOE-RL. Deviations to the plan will require the same level of approval as the original.

e. Obtain approval to demolish a facility from DOE-RL in accordance with DOE Order 4300.1B, "Real Property and Site Development Plans."

f. Prepare report documenting radiological and hazardous materials status of the facility, including allowable residual contaminant level analyses, if applicable.

g. Prepare a post decommissioning final report.

h. Provide for long term surveillance and maintenance, when necessary.

i. Comply with the release criteria of Part K of this manual.

3. Quality Assurance shall:

a. Assure D&D activities are conducted consistent with WHC-CM-6-7, Environmental Restoration Quality Assurance Program Plan Manual.

b. Provide to the process described in paragraph 4.0 quality assurance elements for each activity, investigation, or project.

4. Project Management shall ensure that planning for facility decommissioning is considered during the Conceptual Design Report stage of a new or modified facility.

5. Safety shall:

a. Review and approve safety analysis documentation for decontamination and decommissioning activities as required.

b. Provide independent safety review to ensure that all necessary standards for industrial safety, industrial hygiene, fire protection, and radiological safety are observed.

4.0 GENERAL REQUIREMENTS

The requirements for decontaminating and decommissioning radioactively contaminated facilities are described in the DOE manual, "Defense Decontamination and Decommissioning Program Management Plan." This document identifies the activities required for the management, surveillance and maintenance, and decontamination and decommissioning of surplus facilities managed under the DOE Defense Program.

5.0 REFERENCES

1. DOE Order 4300.1B, "Real Property and Site Development Plans."

2. DOE Manual (unnumbered), "Defense Decontamination and Decommissioning Program Management Plan."

3. WHC-CM-6-7, Environmental Restoration Quality Assurance Program Plan Manual.

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DERIVED CONCENTRATION GUIDES FOR CONTROLLING EXPOSURE TO MEMBERS OF THE PUBLIC

Approved by
R E Lerch
Manager, Environmental Division

APPENDIX A1.0 PURPOSE

The purpose of this Appendix is to list the Derived Concentration Guides (DCG) values referred to in the text of this manual.

APPENDIX A2.0 SCOPE

The DCG values listed in this appendix were derived for the purpose of relating concentrations of radionuclides in the environment to a human dose. When a standard man is exposed continuously for 1 yr to air concentrations at one times the DCG values contained in this appendix he will receive an effective committed dose equivalent of 100 mrem to the whole body or other limiting dose to an organ. Likewise, if a standard man consumes the standard amount of water (as noted in ICRP 30) each day for 1 yr he will receive an effective committed dose equivalent of 100 mrem to the whole body or other limiting dose to an organ from that source also. When more than one radionuclide is involved in the exposure the fractional relationship of the concentration of each radionuclide to its respective DCG value must be summed to determine the total dose from the radionuclide mix. The DCG values relate to a 100 mrem dose only when applied at the point of exposure to humans. When a multiple of the DCG value is utilized as an administrative control limit at the point of release it is done so in the interest of maintaining radioactive contaminants in effluent as low as reasonably achievable (ALARA). The dose to either an onsite worker or offsite individual from a source operating at a release concentration of 1 DCG will be significantly lower than 100 mrem due to dilution of the effluent prior to exposure.

APPENDIX A3.0 INFORMATION SOURCE

Draft DOE Order 5400.XX, "Radiation Protection of the Public and the Environment" is the source of the data for the tables in this Appendix.

APPENDIX A4.0 INDEX

PST2E-8802-A4

Name	Symbol	Page	Name	Symbol	Page
Plutonium	Pu	29	Sulfur	S	4
Polonium	Po	27	Tantalum	Ta	22
Potassium	K	5	Technetium	Tc	10
Praseodymium	Pr	17	Tellurium	Te	14
Promethium	Pm	18	Terbium	Tb	19
Protactinium	Pa	28	Thallium	Tl	25
Radium	Ra	27	Thorium	Th	27
Radon	Rn	27	Thulium	Tm	20
Rhenium	Re	23	Tin	Sn	13
Rhodium	Rh	11	Titanium	Ti	5
Rubidium	Rb	9	Tungsten	W	22
Ruthenium	Ru	11	Uranium	U	28
Samarium	Sm	18	Vanadium	V	5
Scandium	Sc	5	Xenon	Xe	15
Selenium	Se	8	Ytterbium	Yb	21
Silicon	Si	4	Yttrium	Y	9
Silver	Ag	12	Zinc	Zn	7
Sodium	Na	4	Zirconium	Zr	10
Strontium	Sr	9			

PST2E-0062-A4

APPENDIX A5.0 DERIVED CONCENTRATION GUIDES VALUES

Radionuclide	Water		Air		
	DCG-Public		DCG-Public		Solubility class[a]
	µCi/mL	Bq/mL	µCi/mL	Bq/mL	
^{3}H (water)	2.0 E-03	8.0 E+01	1.0 E-07	4.0 E-03	W
^{7}Be	1.0 E-03	5.0 E+01	4.0 E-08	2.0 E-03	Y
^{10}Be	3.0 E-05	1.0 E+00	3.0 E-11	1.0 E-06	Y
^{11}C (org. CO)	1.0 E-02	4.0 E+02	1.0 E-06	4.0 E-02	W
^{11}C (CO)	--	--	3.0 E-06	1.0 E-01	D
^{11}C (CO_2)	--	--	1.0 E-06	4.0 E-02	D
^{14}C (org. CO)	7.0 E-05	2.0 E+00	6.0 E-09	2.0 E-04	W
^{14}C (CO)	--	--	4.0 E-06	2.0 E-01	D
^{14}C (CO_2)	--	--	5.0 E-07	2.0 E-02	D
^{13}N	--	--	2.0 E-08[b]	8.0 E-04[b]	
^{16}N	--	--	3.0 E-09[b]	1.0 E-04[b]	
^{15}O	--	--	2.0 E-08[b]	8.0 E-04[b]	
^{18}F	1.0 E-03	5.0 E+01	2.0 E-07[b]	6.0 E-03[b]	D W Y
^{22}Na	1.0 E-05	4.0 E-01	1.0 E-09	6.0 E-05	D
^{24}Na	1.0 E-04	4.0 E+00	1.0 E-08[b]	5.0 E-04[b]	D
^{28}Mg	2.0 E-05	7.0 E-01	3.0 E-09	1.0 E-04	W
^{26}Al	1.0 E-05	4.0 E-01	1.0 E-10	6.0 E-06	D
^{31}Si	3.0 E-04	1.0 E-01	6.0 E-08	2.0 E-03	D Y
^{32}Si	8.0 E-05	3.0 E+00	1.0 E-11	4.0 E-07	Y
^{32}P	2.0 E-05	7.0 E-01	9.0 E-10	3.0 E-05	W
^{33}P	2.0 E-04	6.0 E+00	6.0 E-09	2.0 E-04	W
^{35}S	2.0 E-04	8.0 E+00	5.0 E-09	2.0 E-04	W
^{35}S (gases)	--	--	3.0 E-08	1.0 E-03	D
^{36}Cl	5.0 E-05	2.0 E+00	6.0 E-10[b]	2.0 E-05[b]	W
^{38}Cl	7.0 E-04	3.0 E+01	1.0 E-07	4.0 E-03	D W
^{39}Cl	1.0 E-03	4.0 E+01	1.0 E-07	5.0 E-03	D W
^{37}Ar	--	--	1.0 E-02[b]	4.0 E+02[b]	
^{39}Ar	--	--	4.0 E-06[b]	2.0 E-01[b]	
^{41}Ar	--	--	1.0 E-08[b]	4.0 E-04[b]	

Radionuclide	Water		Air		
	DCG-Public		DCG-Public		Solubility class[a]
	µCi/mL	Bq/mL	µCi/mL	Bq/mL	
^{40}K	7.0 E-06	3.0 E-01	9.0 E-10	4.0 E-05	D
^{42}K	1.0 E-04	5.0 E+00	1.0 E-08	4.0 E-04	D
^{43}K	2.0 E-04	7.0 E+00	2.0 E-08[b]	8.0 E-04[b]	D
^{44}K	9.0 E-04	4.0 E+01	2.0 E-07	6.0 E-03	D
^{45}K	1.0 E-03	6.0 E+01	3.0 E-07	1.0 E-02	D
^{41}Ca	1.0 E-04	4.0 E+00	9.0 E-09	3.0 E-04	W
^{45}Ca	5.0 E-05	2.0 E+00	2.0 E-09	7.0 E-05	W
^{47}Ca	2.0 E-05	9.0 E-01	2.0 E-09	8.0 E-05	W
^{43}Sc	2.0 E-04	7.0 E+00	5.0 E-08	2.0 E-03	Y
^{44m}Sc	1.0 E-05	5.0 E-01	2.0 E-09	6.0 E-05	Y
^{44}Sc	1.0 E-04	4.0 E+00	3.0 E-08[b]	1.0 E-03[b]	Y
^{46}Sc	2.0 E-05	9.0 E-01	6.0 E-10	2.0 E-05	Y
^{47}Sc	7.0 E-05	3.0 E+00	7.0 E-09	3.0 E-04	Y
^{48}Sc	2.0 E-05	8.0 E-01	3.0 E-09	1.0 E-04	Y
^{49}Sc	6.0 E-04	2.0 E+01	1.0 E-07	5.0 E-03	Y
^{44}Ti	7.0 E-06	3.0 E-01	1.0 E-11	5.0 E-07	Y
^{45}Ti	2.0 E-04	9.0 E+00	6.0 E-08[b]	2.0 E-03[b]	D
^{47}V	9.0 E-04	3.0 E+01	2.0 E-07	7.0 E-03	D
^{48}V	2.0 E-05	7.0 E-01	2.0 E-09	8.0 E-05	W
^{49}V	3.0 E-03	1.0 E+02	4.0 E-08	2.0 E-03	W
^{48}Cr	2.0 E-04	6.0 E+00	2.0 E-08	6.0 E-04	Y
^{49}Cr	8.0 E-04	3.0 E+01	2.0 E-07[b]	7.0 E-03[b]	D W Y
^{51}Cr	1.0 E-03	4.0 E+01	5.0 E-08	2.0 E-03	Y
^{51}Mn	6.0 E-04	2.0 E+01	1.0 E-07	4.0 E-03	D
^{52m}Mn	9.0 E-04	3.0 E+01	2.0 E-07[b]	8.0 E-03[b]	D W
^{52}Mn	2.0 E-05	8.0 E-01	2.0 E-09	8.0 E-05	W
^{53}Mn	1.0 E-03	5.0 E+01	3.0 E-08	1.0 E-03	W
^{54}Mn	5.0 E-05	2.0 E+00	2.0 E-09	7.0 E-05	W
^{56}Mn	1.0 E-04	5.0 E+00	4.0 E-08[b]	1.0 E-03[b]	D

Radionuclide	Water		Air		
	DCG-Public		DCG-Public		Solubility class[a]
	µCi/mL	Bq/mL	µCi/mL	Bq/mL	
^{52}Fe	3.0 E-05	1.0 E+00	6.0 E-09	2.0 E-04	W
^{55}Fe	2.0 E-04	9.0 E+00	5.0 E-09	2.0 E-04	D
^{59}Fe	2.0 E-05	8.0 E-01	8.0 E-10	3.0 E-05	D
^{60}Fe	9.0 E-07	3.0 E-02	2.0 E-11	6.0 E-07	D
^{55}Co	3.0 E-05	1.0 E+00	6.0 E-09	2.0 E-04	Y
^{56}Co	1.0 E-05	4.0 E-01	5.0 E-10	2.0 E-05	Y
^{57}Co	1.0 E-04	5.0 E+00	2.0 E-09	6.0 E-05	Y
^{58m}Co	2.0 E-03	6.0 E+01	2.0 E-07	6.0 E-03	Y
^{58}Co	4.0 E-05	1.0 E+00	2.0 E-09	6.0 E-05	Y
^{60m}Co	4.0 E-02	1.0 E+03	6.0 E-06[b]	2.0 E-01[b]	Y
^{60}Co	5.0 E-06	2.0 E-01	8.0 E-11	3.0 E-06	Y
^{61}Co	5.0 E-04	2.0 E+01	1.0 E-07	5.0 E-03	Y
^{62m}Co	1.0 E-03	5.0 E+01	4.0 E-07	1.0 E-02	W Y
^{56}Ni (inorg)	4.0 E-05	1.0 E+00	3.0 E-09	1.0 E-04	W
^{56}Ni (vapor)	--	--	3.0 E-09	1.0 E-04	
^{57}Ni (inorg)	4.0 E-05	2.0 E+00	7.0 E-09[b]	3.0 E-04[b]	W
^{57}Ni (vapor)	--	--	1.0 E-08	6.0 E-04	
^{59}Ni (inorg)	7.0 E-04	3.0 E+01	9.0 E-09	3.0 E-04	D
^{59}Ni (vapor)	--	--	4.0 E-09	2.0 E-04	
^{63}Ni (inorg)	3.0 E-04	1.0 E+01	4.0 E-09	1.0 E-04	D
^{63}Ni (vapor)	--	--	2.0 E-09	7.0 E-05	
^{65}Ni (inorg)	2.0 E-04	8.0 E+00	6.0 E-08[b]	2.0 E-03[b]	D
^{65}Ni (vapor)	--	--	4.0 E-08	1.0 E-03	
^{66}Ni (inorg)	1.0 E-05	5.0 E-01	1.0 E-09	6.0 E-05	W
^{66}Ni (vapor)	--	--	7.0 E-09	3.0 E-04	
^{60}Cu	8.0 E-04	3.0 E+01	2.0 E-07	8.0 E-03	D
^{61}Cu	3.0 E-04	1.0 E+01	7.0 E-08[b]	3.0 E-03[b]	D
^{64}Cu	3.0 E-04	1.0 E+01	5.0 E-08	2.0 E-03	W Y
^{67}Cu	1.0 E-04	5.0 E+00	1.0 E-08	4.0 E-04	Y

Radionuclide	Water		Air		
	DCG-Public		DCG-Public		Solubility class[a]
	µCi/mL	Bq/mL	µCi/mL	Bq/mL	
^{62}Zn	4.0 E-05	2.0 E+00	7.0 E-09	3.0 E-04	Y
^{63}Zn	7.0 E-04	3.0 E+01	2.0 E-07	6.0 E-03	Y
^{65}Zn	9.0 E-06	4.0 E-01	6.0 E-10	2.0 E-05	Y
^{69m}Zn	1.0 E-04	4.0 E+00	2.0 E-08	6.0 E-04	Y
^{69}Zn	2.0 E-03	6.0 E+01	3.0 E-07	1.0 E-02	Y
^{71m}Zn	2.0 E-04	6.0 E+00	4.0 E-08	2.0 E-03	Y
^{72}Zn	3.0 E-05	1.0 E+00	3.0 E-09	1.0 E-04	Y
^{65}Ga	2.0 E-03	7.0 E+01	4.0 E-07	2.0 E-02	D W
^{66}Ga	3.0 E-05	1.0 E+00	7.0 E-09[b]	3.0 E-04[b]	Y
^{67}Ga	2.0 E-04	7.0 E+00	2.0 E-08	9.0 E-04	W
^{68}Ga	4.0 E-04	2.0 E+01	1.0 E-07[b]	--	D W
^{70}Ga	2.0 E-03	7.0 E+01	4.0 E-07	2.0 E-02	D W
^{72}Ga	3.0 E-05	1.0 E+00	7.0 E-09[b]	3.0 E-04[b]	W
^{73}Ga	1.0 E-04	5.0 E+00	4.0 E-08	1.0 E-03	D W
^{66}Ge	7.0 E-04	2.0 E+01	5.0 E-08	2.0 E-03	W
^{67}Ge	1.0 E-03	5.0 E+01	2.0 E-07	8.0 E-03	D
^{68}Ge	1.0 E-04	5.0 E+00	2.0 E-10	9.0 E-06	W
^{69}Ge	4.0 E-04	1.0 E+01	2.0 E-08	7.0 E-04	W
^{71}Ge	1.0 E-02	5.0 E+02	1.0 E-07	4.0 E-03	W
^{75}Ge	2.0 E-03	7.0 E+01	2.0 E-07	7.0 E-03	D W
^{77}Ge	2.0 E-04	9.0 E+00	1.0 E-08	5.0 E-04	W
^{78}Ge	7.0 E-04	2.0 E+01	5.0 E-08	2.0 E-03	D W
^{69}As	1.0 E-03	5.0 E+01	3.0 E-07	1.0 E-02	W
^{70}As	4.0 E-04	2.0 E+01	1.0 E-07	5.0 E-03	W
^{71}As	1.0 E-04	4.0 E+00	1.0 E-08	4.0 E-04	W
^{72}As	2.0 E-05	9.0 E-01	3.0 E-09	1.0 E-04	W
^{73}As	2.0 E-04	9.0 E+00	4.0 E-09	1.0 E-04	W
^{74}As	4.0 E-05	2.0 E+00	2.0 E-09	7.0 E-05	W
^{76}As	3.0 E-05	1.0 E+00	4.0 E-09	1.0 E-04	W
^{77}As	1.0 E-04	5.0 E+00	1.0 E-08	4.0 E-04	W

Radionuclide	Water		Air		
	DCG-Public		DCG-Public		Solubility class[a]
	µCi/mL	Bq/mL	µCi/mL	Bq/mL	
^{78}As	2.0 E-04	8.0 E+00	5.0 E-08	2.0 E-03	W
^{70}Se	3.0 E-04	1.0 E+01	9.0 E-08	3.0 E-03	D
^{73m}Se	9.0 E-04	4.0 E+01	3.0 E-07	1.0 E-02	W
^{73}Se	9.0 E-05	3.0 E+00	3.0 E-08[b]	1.0 E-03[b]	D
^{75}Se	2.0 E-05	6.0 E-01	1.0 E-09	5.0 E-05	W
^{79}Se	2.0 E-05	6.0 E-01	1.0 E-09	5.0 E-05	W
^{81m}Se	7.0 E-04	2.0 E+01	2.0 E-07	6.0 E-03	D W
^{81}Se	2.0 E-03	9.0 E+01	5.0 E-07	2.0 E-02	D W
^{83}Se	9.0 E-04	3.0 E+01	3.0 E-07	1.0 E-02	D W
^{74m}Br	6.0 E-04	2.0 E+01	9.0 E-08	3.0 E-03	D
^{74}Br	1.0 E-03	4.0 E+01	2.0 E-07	6.0 E-03	D
^{75}Br	1.0 E-03	4.0 E+01	1.0 E-07	4.0 E-03	D W
^{76}Br	1.0 E-04	4.0 E+00	1.0 E-08	4.0 E-04	D W
^{77}Br	4.0 E-04	2.0 E+01	5.0 E-08[b]	2.0 E-03[b]	W
^{80m}Br	6.0 E-04	2.0 E+01	3.0 E-08	1.0 E-03	W
^{80}Br	2.0 E-03	9.0 E+01	4.0 E-07[b]	2.0 E-02[b]	D
^{82}Br	8.0 E-05	3.0 E+00	9.0 E-09[b]	3.0 E-04[b]	W
^{83}Br	2.0 E-03	7.0 E+01	1.0 E-07	4.0 E-03	D
^{84}Br	9.0 E-04	3.0 E+01	1.0 E-07[b]	5.0 E-03[b]	D
^{79}Kr	--	--	7.0 E-08[b]	3.0 E-03[b]	
^{81}Kr	--	--	2.0 E-06b	8.0 E-02[b]	
^{83m}Kr	--	--	2.0 E-04[b]	8.0 E+00[b]	
^{85}Kr	--	--	3.0 E-06[b]	1.0 E-01[b]	
^{85m}Kr	--	--	1.0 E-07[b]	4.0 E-03[b]	
^{87}Kr	--	--	2.0 E-08[b]	8.0 E-04[b]	
^{88}Kr	--	--	3.0 E-08[b]	1.0 E-03[b]	
^{89}Kr	--	--	1.0 E-08[b]	4.0 E-04[b]	
^{90}Kr	--	--	1.0 E-08[b]	4.0 E-04[b]	

Radionuclide	Water		Air		
	DCG-Public		DCG-Public		Solubility class[a]
	µCi/mL	Bq/mL	µCi/mL	Bq/mL	
^{79}Rb	2.0 E-03	6.0 E+01	3.0 E-07	1.0 E-02	D
^{81m}Rb	7.0 E-03	3.0 E+02	8.0 E-07	3.0 E-02	D
^{81}Rb	1.0 E-03	4.0 E+01	1.0 E-07[b]	4.0 E-03[b]	D
^{82m}Rb	3.0 E-04	1.0 E+01	4.0 E-08	2.0 E-03	D
^{83}Rb	2.0 E-05	7.0 E-01	2.0 E-09	9.0 E-05	D
^{84}Rb	1.0 E-05	5.0 E-01	2.0 E-09	7.0 E-05	D
^{86}Rb	1.0 E-05	6.0 E-01	2.0 E-09	7.0 E-05	D
^{87}Rb	3.0 E-05	1.0 E+00	4.0 E-09	1.0 E-04	D
^{88}Rb	8.0 E-04	3.0 E+01	1.0 E-07[b]	4.0 E-03[b]	D
^{89}Rb	2.0 E-03	6.0 E+01	3.0 E-07[b]	1.0 E-02[b]	
^{90}Rb	--	--	9.0 E-09[b]	3.0 E-04[b]	
^{90m}Rb	--	--	5.0 E-08[b]	2.0 E-03[b]	
^{80}Sr	3.0 E-02	1.0 E+03	5.0 E-06	2.0 E-01	D Y
^{81}Sr	6.0 E-04	2.0 E+01	2.0 E-07	7.0 E-03	D Y
^{83}Sr	6.0 E-05	2.0 E+00	8.0 E-09	3.0 E-04	Y
^{85m}Sr	6.0 E-03	2.0 E+02	1.0 E-06[b]	5.0 E-02[b]	D
^{85}Sr	7.0 E-05	3.0 E+00	4.0 E-09	1.0 E-04	Y
^{87m}Sr	1.0 E-03	4.0 E+01	3.0 E-07[b]	1.0 E-02[b]	D
^{89}Sr	2.0 E-05	6.0 E-01	3.0 E-10	1.0 E-05	Y
^{90}Sr	1.0 E-06	4.0 E-02	9.0 E-12	3.0 E-07	Y
^{91}Sr	6.0 E-05	2.0 E+00	8.0 E-09	3.0 E-04	Y
^{92}Sr	9.0 E-05	3.0 E+00	2.0 E-08[b]	6.0 E-04[b]	D
^{86m}Y	6.0 E-04	2.0 E+01	1.0 E-07	5.0 E-03	W Y
^{86}Y	3.0 E-05	1.0 E+00	7.0 E-09[b]	3.0 E-04[b]	Y
^{87}Y	6.0 E-05	2.0 E+00	7.0 E-09	3.0 E-04	Y
^{88}Y	3.0 E-05	1.0 E+00	6.0 E-10	2.0 E-05	W Y
^{90m}Y	2.0 E-04	8.0 E+00	3.0 E-08[b]	1.0 E-03[b]	W Y
^{90}Y	1.0 E-05	5.0 E-01	1.0 E-09	5.0 E-05	Y
^{91m}Y	4.0 E-03	1.0 E+02	4.0 E-07[b]	1.0 E-02[b]	Y

Radionuclide	Water		Air		
	DCG-Public		DCG-Public		Solubility class[a]
	µCi/mL	Bq/mL	µCi/mL	Bq/mL	
^{91}Y	2.0 E-05	6.0 E-01	3.0 E-10	1.0 E-05	Y
^{92}Y	7.0 E-05	3.0 E+00	2.0 E-08	7.0 E-04	W Y
^{93}Y	3.0 E-05	1.0 E+00	6.0 E-09	2.0 E-04	Y
^{94}Y	8.0 E-04	3.0 E+01	2.0 E-07	7.0 E-03	W Y
^{95}Y	1.0 E-03	5.0 E+01	3.0 E-07	1.0 E-02	Y
^{86}Zr	4.0 E-05	1.0 E+00	6.0 E-09	2.0 E-04	W Y
^{88}Zr	1.0 E-04	4.0 E+00	5.0 E-10	2.0 E-05	D
^{89}Zr	4.0 E-05	2.0 E+00	6.0 E-09	2.0 E-04	W Y
^{93}Zr	9.0 E-05	3.0 E+00	4.0 E-11	1.0 E-06	D
^{95}Zr	4.0 E-05	2.0 E+00	6.0 E-10	2.0 E-05	D Y
^{97}Zr	2.0 E-05	6.0 E-01	3.0 E-09	1.0 E-04	W Y
^{88}Nb	2.0 E-03	7.0 E+01	5.0 E-07	2.0 E-02	W Y
^{89}Nb (66 min)	3.0 E-04	1.0 E+01	9.0 E-08	3.0 E-03	Y
^{89}Nb (122 min)	1.0 E-04	5.0 E+00	4.0 E-08	1.0 E-03	Y
^{90}Nb	3.0 E-05	1.0 E+00	6.0 E-09	2.0 E-04	W Y
^{93m}Nb	3.0 E-04	1.0 E+01	4.0 E-10	2.0 E-05	Y
^{94}Nb	3.0 E-05	1.0 E+00	4.0 E-11	1.0 E-06	Y
^{95m}Nb	7.0 E-05	3.0 E+00	5.0 E-09	2.0 E-04	Y
^{95}Nb	6.0 E-05	2.0 E+00	3.0 E-09	1.0 E-04	W Y
^{96}Nb	3.0 E-05	1.0 E+00	6.0 E-09	2.0 E-04	W Y
^{97}Nb	6.0 E-04	2.0 E+01	2.0 E-07[b]	6.0 E-03[b]	W Y
^{98}Nb	4.0 E-04	2.0 E+01	1.0 E-07	4.0 E-03	Y
^{90}Mo	6.0 E-05	2.0 E+00	1.0 E-08	4.0 E-04	Y
^{93m}Mo	1.0 E-04	5.0 E+00	3.0 E-08	1.0 E-03	Y
^{93}Mo	1.0 E-04	4.0 E+00	4.0 E-10	2.0 E-05	Y
^{99}Mo	3.0 E-05	1.0 E+00	3.0 E-09	1.0 E-04	Y
^{101}Mo	2.0 E-03	6.0 E+01	3.0 E-07[b]	1.0 E-02[b]	D
^{93m}Tc	2.0 E-03	7.0 E+01	4.0 E-07	1.0 E-02	D
^{93}Tc	8.0 E-04	3.0 E+01	2.0 E-07	6.0 E-03	D
^{94m}Tc	5.0 E-04	2.0 E+01	1.0 E-07	4.0 E-03	D

Radionuclide	Water		Air		
	DCG-Public		DCG-Public		Solubility class[a]
	µCi/mL	Bq/mL	µCi/mL	Bq/mL	
^{94}Tc	2.0 E-04	9.0 E+00	4.0 E-08	2.0 E-03	D W
^{96m}Tc	4.0 E-03	2.0 E+02	6.0 E-07[b]	2.0 E-02[b]	W
^{96}Tc	5.0 E-05	2.0 E+00	5.0 E-09	2.0 E-04	W
^{97m}Tc	1.0 E-04	5.0 E+00	3.0 E-09	1.0 E-04	W
^{97}Tc	9.0 E-04	4.0 E+01	1.0 E-08	5.0 E-04	W
^{98}Tc	3.0 E-05	1.0 E+00	7.0 E-10	3.0 E-05	W
^{99m}Tc	2.0 E-03	9.0 E+01	4.0 E-07[b]	1.0 E-02[b]	D
^{99}Tc	1.0 E-04	4.0 E+00	2.0 E-09	6.0 E-05	W
^{101}Tc	4.0 E-03	1.0 E+02	8.0 E-07[b]	3.0 E-02[b]	D
^{104}Tc	8.0 E-04	3.0 E+01	2.0 E-07	6.0 E-03	D
^{94}Ru	4.0 E-04	2.0 E+01	1.0 E-07	4.0 E-03	D
^{97}Ru	2.0 E-04	8.0 E+00	3.0 E-08	1.0 E-03	W Y
^{103}Ru	5.0 E-05	2.0 E+00	2.0 E-09	6.0 E-05	Y
^{105}Ru	1.0 E-04	5.0 E+00	3.0 E-08[b]	1.0 E-03[b]	D W Y
^{106}Ru	6.0 E-06	2.0 E-01	3.0 E-11	1.0 E-06	Y
^{99m}Rh	5.0 E-04	2.0 E+01	1.0 E-07	5.0 E-03	D
^{99}Rh	7.0 E-05	3.0 E+00	5.0 E-09	2.0 E-04	W Y
^{100}Rh	4.0 E-05	2.0 E+00	9.0 E-09	3.0 E-04	Y
^{101m}Rh	2.0 E-04	6.0 E+00	2.0 E-08	7.0 E-04	W Y
^{101}Rh	6.0 E-05	2.0 E+00	4.0 E-10	1.0 E-05	Y
^{102m}Rh	4.0 E-05	1.0 E+00	3.0 E-10	1.0 E-05	Y
^{102}Rh	2.0 E-05	6.0 E-01	1.0 E-10	5.0 E-06	Y
^{103m}Rh	1.0 E-02	5.0 E+02	3.0 E-06	1.0 E-01	D W Y
^{105}Rh	1.0 E-04	4.0 E+00	1.0 E-08	5.0 E-04	W Y
^{106m}Rh	2.0 E-04	9.0 E+00	6.0 E-08	2.0 E-03	D
^{107}Rh	3.0 E-03	1.0 E+02	6.0 E-07	2.0 E-02	D W Y
^{100}Pd	4.0 E-05	1.0 E+00	3.0 E-09	1.0 E-04	D W Y
^{101}Pd	4.0 E-04	1.0 E+01	7.0 E-08	3.0 E-03	D W Y

Radionuclide	Water		Air		
	DCG-Public		DCG-Public		Solubility class[a]
	µCi/mL	Bq/mL	µCi/mL	Bq/mL	
^{103}Pd	2.0 E-04	7.0 E+00	8.0 E-09	3.0 E-04	Y
^{107}Pd	1.0 E-03	4.0 E+01	9.0 E-10	3.0 E-05	Y
^{109}Pd	6.0 E-05	2.0 E+00	1.0 E-08	4.0 E-04	Y
^{102}Ag	2.0 E-03	7.0 E+01	4.0 E-07	2.0 E-02	D W Y
^{103}Ag	1.0 E-03	4.0 E+01	2.0 E-07	9.0 E-03	D
^{104m}Ag	9.0 E-04	3.0 E+01	2.0 E-07	8.0 E-03	D
^{104}Ag	6.0 E-04	2.0 E+01	2.0 E-07	6.0 E-03	D
^{105}Ag	7.0 E-05	3.0 E+00	3.0 E-09	9.0 E-05	D
^{106m}Ag	2.0 E-05	8.0 E-01	2.0 E-09	6.0 E-05	D
^{106}Ag	2.0 E-03	7.0 E+01	4.0 E-07	2.0 E-02	D W Y
^{108m}Ag	2.0 E-05	7.0 E-01	6.0 E-11	2.0 E-06	Y
^{110m}Ag	1.0 E-05	5.0 E-01	2.0 E-10	8.0 E-06	Y
^{111}Ag	3.0 E-05	1.0 E+00	2.0 E-09	8.0 E-05	W Y
^{112}Ag	9.0 E-05	3.0 E+00	2.0 E-08	7.0 E-04	D
^{115}Ag	9.0 E-04	3.0 E+01	2.0 E-07	7.0 E-03	W Y
^{104}Cd	6.0 E-04	2.0 E+01	2.0 E-07	6.0 E-03	D
^{107}Cd	6.0 E-04	2.0 E+01	1.0 E-07	4.0 E-03	Y
^{109}Cd	1.0 E-05	4.0 E-01	1.0 E-10	4.0 E-06	D
^{113m}Cd	9.0 E-07	4.0 E-02	8.0 E-12	30 E-07	D
^{113}Cd	8.0 E-07	3.0 E-02	8.0 E-12	3.0 E-07	D
^{115m}Cd	9.0 E-06	3.0 E-01	2.0 E-10	7.0 E-06	D
^{115}Cd	3.0 E-05	1.0 E+00	3.0 E-09	1.0 E-04	D W Y
^{117m}Cd	1.0 E-04	5.0 E+00	3.0 E-08[b]	1.0 E-03[b]	D Y
^{117}Cd	1.0 E-04	5.0 E+00	3.0 E-08[b]	1.0 E-03[b]	D Y
^{109}In	5.0 E-04	2.0 E+01	1.0 E-07	4.0 E-03	D
^{110}In (69.1 m)	4.0 E-04	2.0 E+01	1.0 E-07	4.0 E-03	D
^{110}In (4.9 h)	1.0 E-04	5.0 E+00	4.0 E-08	1.0 E-03	D
^{111}In	1.0 E-04	4.0 E+00	2.0 E-08	6.0 E-04	D W
^{112}In	6.0 E-03	2.0 E+02	1.0 E-06	6.0 E-02	D W

Radionuclide	Water		Air		
	DCG-Public		DCG-Public		Solubility class[a]
	µCi/mL	Bq/mL	µCi/mL	Bq/mL	
^{113m}In	1.0 E-03	5.0 E+01	3.0 E-07[b]	1.0 E-02[b]	D
^{114m}In	9.0 E-06	4.0 E-01	2.0 E-10	6.0 E-06	D
^{115m}In	4.0 E-04	2.0 E+01	1.0 E-07	4.0 E-03	D W
^{115}In	1.0 E-06	4.0 E-02	3.0 E-12	1.0 E-07	D
^{116m}In	7.0 E-04	2.0 E+01	2.0 E-07[b]	7.0 E-03[b]	D
^{117m}In	3.0 E-04	1.0 E+01	8.0 E-08	3.0 E-03	D
^{117}In	2.0 E-03	6.0 E+01	4.0 E-07[b]	1.0 E-02[b]	D
^{119m}In	1.0 E-03	5.0 E+01	3.0 E-07	1.0 E-02	D W
^{110}Sn	9.0 E-05	4.0 E+00	3.0 E-08	1.0 E-03	D W
^{111}Sn	2.0 E-03	8.0 E+01	5.0 E-07	2.0 E-02	D W
^{113}Sn	5.0 E-05	2.0 E+00	1.0 E-09	5.0 E-05	W
^{117m}Sn	5.0 E-05	2.0 E+00	3.0 E-09	1.0 E-04	W
^{119m}Sn	1.0 E-04	4.0 E+00	2.0 E-09	8.0 E-05	W
^{121m}Sn	1.0 E-04	4.0 E+00	1.0 E-09	5.0 E-05	W
^{121}Sn	2.0 E-04	6.0 E+00	3.0 E-08	1.0 E-03	W
^{123m}Sn	1.0 E-03	5.0 E+01	3.0 E-07	1.0 E-02	D W
^{123}Sn	2.0 E-05	7.0 E-01	4.0 E-10	1.0 E-05	W
^{125}Sn	1.0 E-05	5.0 E-01	8.0 E-10	3.0 E-05	W
^{126}Sn	8.0 E-06	3.0 E-01	1.0 E-10	5.0 E-06	D
^{127}Sn	2.0 E-04	7.0 E+00	4.0 E-08	2.0 E-03	W
^{128}Sn	3.0 E-04	1.0 E+01	6.0 E-08	2.0 E-03	D
^{115}Sb	2.0 E-03	8.0 E+01	6.0 E-07	2.0 E-02	D
^{116m}Sb	6.0 E-04	2.0 E+01	2.0 E-07	6.0 E-03	D
^{116}Sb	2.0 E-03	9.0 E+01	7.0 E-07	2.0 E-02	D
^{117}Sb	2.0 E-03	7.0 E+01	5.0 E-07[b]	2.0 E-02[b]	D
^{118m}Sb	2.0 E-04	6.0 E+00	5.0 E-08	2.0 E-03	D W
^{119}Sb	4.0 E-04	2.0 E+01	6.0 E-08	2.0 E-03	W
^{120}Sb (15.89)	5.0 E-03	2.0 E+02	1.0 E-06	4.0 E-02	D W
^{120}Sb (5.76)	3.0 E-05	1.0 E+00	3.0 E-09	1.0 E-04	W

Radionuclide	Water		Air		
	DCG-Public		DCG-Public		Solubility class[a]
	µCi/mL	Bq/mL	µCi/mL	Bq/mL	
^{122}Sb	2.0 E-05	8.0 E-01	3.0 E-09	9.0 E-05	W
^{124m}Sb	7.0 E-03	3.0 E+02	1.0 E-06	5.0 E-02	W
^{124}Sb	2.0 E-05	6.0 E-01	6.0 E-10	2.0 E-05	W
^{125}Sb	6.0 E-05	2.0 E+00	1.0 E-09	5.0 E-05	W
^{126m}Sb	2.0 E-03	7.0 E+01	4.0 E-07[b]	2.0 E-02[b]	D
^{126}Sb	1.0 E-05	5.0 E-01	1.0 E-09	4.0 E-05	W
^{127}Sb	2.0 E-05	8.0 E-01	2.0 E-09	8.0 E-05	W
^{128}Sb (9.01 h)	3.0 E-05	1.0 E-00	8.0 E-09	3.0 E-04	W
^{128}Sb (10.4)	3.0 E-03	1.0 E+02	9.0 E-07	3.0 E-02	D
^{129}Sb	8.0 E-05	3.0 E+00	2.0 E-08[b]	8.0 E-04[b]	D
^{130}Sb	5.0 E-04	2.0 E+01	1.0 E-07	6.0 E-03	D
^{131}Sb	5.0 E-04	2.0 E+01	9.0 E-08	4.0 E-03	D W
^{116}Te	2.0 E-04	8.0 E+00	5.0 E-08	2.0 E-03	D
^{121m}Te	2.0 E-05	8.0 E-01	9.0 E-10	3.0 E-05	D
^{121}Te	9.0 E-05	3.0 E+00	7.0 E-09	3.0 E-04	W
^{123m}Te	3.0 E-05	1.0 E+00	1.0 E-09	5.0 E-05	D W
^{123}Te	3.0 E-05	1.0 E+00	1.0 E-09	4.0 E-05	D
^{125m}Te	4.0 E-05	2.0 E+00	2.0 E-09	7.0 E-05	W
^{127m}Te	2.0 E-05	7.0 E-01	6.0 E-10	2.0 E-06	W
^{127}Te	2.0 E-04	7.0 E+00	4.0 E-08	2.0 E-03	W
^{129m}Te	1.0 E-05	5.0 E-01	6.0 E-10	2.0 E-05	W
^{129}Te	7.0 E-04	3.0 E+01	2.0 E-07	6.0 E-03	D
^{131m}Te	9.0 E-06	3.0 E-01	2.0 E-09	8.0 E-05	W
^{131}Te	7.0 E-04	3.0 E+01	1.0 E-07	4.0 E-03	D W
^{132}Te	2.0 E-05	7.0 E-01	2.0 E-09	6.0 E-05	W
^{133m}Te	2.0 E-04	7.0 E+00	3.0 E-08[b]	1.0 E-03[b]	D W
^{133}Te	9.0 E-04	3.0 E+01	1.0 E-07[b]	5.0 E-03[b]	D W
^{134}Te	7.0 E-04	2.0 E+01	1.0 E-07[b]	4.0 E-03[b]	D W
^{120m}I	4.0 E-04	1.0 E+01	5.0 E-08	2.0 E-03	D

Radionuclide	Water		Air		
	DCG-Public		DCG-Public		Solubility class[a]
	µCi/mL	Bq/mL	µCi/mL	Bq/mL	
^{120}I	2.0 E-04	8.0 E+00	3.0 E-08	1.0 E-03	D
^{121}I	8.0 E-04	3.0 E+01	1.0 E-07	4.0 E-03	D
^{122}I	-	-	2.0 E-08[b]	8.0 E-04[b]	
^{123}I	3.0 E-04	1.0 E+01	4.0 E-08	2.0 E-03	D
^{124}I	4.0 E-06	2.0 E-01	6.0 E-10	2.0 E-05	D
^{125}I	4.0 E-06	1.0 E-01	5.0 E-10	2.0 E-05	D
^{126}I	2.0 E-06	7.0 E-02	3.0 E-10	1.0 E-05	D
^{128}I	2.0 E-03	6.0 E+01	3.0 E-07[b]	1.0 E-02[b]	D
^{129}I	5.0 E-07	2.0 E-02	7.0 E-11	2.0 E-06	D
^{130}I	3.0 E-05	1.0 E+00	5.0 E-09	2.0 E-04	D
^{131}I	3.0 E-06	1.0 E-01	4.0 E-10	1.0 E-05	D
^{132m}I	3.0 E-04	1.0 E+01	5.0 E-08	2.0 E-03	D
^{132}I	2.0 E-04	9.0 E-00	4.0 E-08[b]	1.0 E-03[b]	D
^{133}I	1.0 E-05	5.0 E-01	2.0 E-09	8.0 E-05	D
^{134}I	7.0 E-04	3.0 E+01	1.0 E-07[b]	4.0 E-03[b]	D
^{135}I	7.0 E-05	3.0 E+00	1.0 E-08[b]	4.0 E-04[b]	D
^{122}Xe	--	--	3.0 E-07[b]	1.0 E-02[b]	
^{123}Xe	--	--	3.0 E-07[b]	1.0 E-02[b]	
^{125}Xe	--	--	8.0 E-08[b]	3.0 E-03[b]	
^{127}Xe	--	--	8.0 E-08[b]	3.0 E-03[b]	
^{129m}Xe	--	--	8.0 E-07[b]	3.0 E-02[b]	
^{131m}Xe	--	--	2.0 E-06[b]	8.0 E-02[b]	
^{133}Xe	--	--	6.0 E-07[b]	2.0 E-02[b]	
^{133m}Xe	--	--	6.0 E-07[b]	2.0 E-02[b]	
^{135}Xe	--	--	8.0 E-08[b]	3.0 E-03[b]	
^{135m}Xe	--	--	5.0 E-08[b]	2.0 E-03[b]	
^{137}Xe	--	--	9.0 E-08[b]	3.0 E-03[b]	
^{138}Xe	--	--	2.0 E-08[b]	8.0 E-04[b]	
^{125}Cs	2.0 E-03	9.0 E+01	3.0 E-07	1.0 E-02	D
^{127}Cs	2.0 E-03	6.0 E+01	2.0 E-07	8.0 E-03	D

Radionuclide	Water		Air		
	DCG-Public		DCG-Public		Solubility class[a]
	µCi/mL	Bq/mL	µCi/mL	Bq/mL	
^{129}Cs	6.0 E-04	2.0 E+01	8.0 E-08[b]	3.0 E-03[b]	D
^{130}Cs	3.0 E-03	1.0 E+02	4.0 E-07	2.0 E-02	D
^{131}Cs	6.0 E-04	2.0 E+01	7.0 E-08	3.0 E-03	D
^{132}Cs	7.0 E-05	3.0 E+00	1.0 E-08	4.0 E-04	D
^{134m}Cs	3.0 E-03	1.0 E+02	3.0 E-07	1.0 E-02	D
^{134}Cs	2.0 E-06	7.0 E-02	2.0 E-10	9.0 E-06	D
^{135m}Cs	3.0 E-03	1.0 E+02	5.0 E-07	2.0 E-02	D
^{135}Cs	2.0 E-05	7.0 E-01	3.0 E-09	1.0 E-04	D
^{136}Cs	1.0 E-05	5.0 E-01	2.0 E-09	6.0 E-05	D
^{137}Cs	3.0 E-06	1.0 E-01	4.0 E-10	1.0 E-05	D
^{138}Cs	9.0 E-04	3.0 E+01	1.0 E-07[b]	4.0 E-03[b]	D
^{126}Ba	2.0 E-04	6.0 E+00	4.0 E-08	1.0 E-03	D
^{128}Ba	1.0 E-05	5.0 E-01	4.0 E-09	2.0 E-04	D
^{131m}Ba	1.0 E-02	5.0 E+02	3.0 E-06	1.0 E-01	D
^{131}Ba	8.0 E-05	3.0 E+00	2.0 E-08	7.0 E-04	D
^{133m}Ba	7.0 E-05	3.0 E+00	2.0 E-08	8.0 E-04	D
^{133}Ba	4.0 E-05	2.0 E+00	2.0 E-09	6.0 E-05	D
^{135m}Ba	9.0 E-05	3.0 E+00	3.0 E-08	1.0 E-03	D
^{137m}Ba	--	--	3.0 E-08[b]	1.0 E-03[b]	
^{139}Ba	3.0 E-04	1.0 E+01	7.0 E-08	3.0 E-03	D
^{140}Ba	2.0 E-05	6.0 E-01	3.0 E-09	1.0 E-04	D
^{141}Ba	7.0 E-04	3.0 E+01	2.0 E-07[b]	6.0 E-03[b]	D
^{142}Ba	1.0 E-03	5.0 E+01	3.0 E-07[b]	1.0 E-02[b]	D
^{131}La	1.0 E-03	5.0 E+01	3.0 E-07	1.0 E-02	D W
^{132}La	9.0 E-05	3.0 E+00	2.0 E-08	9.0 E-04	D
^{135}La	1.0 E-03	4.0 E+01	2.0 E-07	7.0 E-03	W
^{137}La	3.0 E-04	1.0 E+01	2.0 E-10	6.0 E-06	D
^{138}La	2.0 E-05	9.0 E-01	8.0 E-12	3.0 E-07	D
^{140}La	2.0 E-05	7.0 E-01	3.0 E-09	1.0 E-04	D W

Radionuclide	Water		Air		
	DCG-Public		DCG-Public		Solubility class[a]
	µCi/mL	Bq/mL	µCi/mL	Bq/mL	
^{141}La	1.0 E-04	4.0 E+00	2.0 E-08	8.0 E-04	D
^{142}La	2.0 E-04	8.0 E+00	5.0 E-08	2.0 E-03	D
^{143}La	1.0 E-03	4.0 E+01	2.0 E-07	8.0 E-03	W
^{134}Ce	2.0 E-05	6.0 E-01	2.0 E-09	6.0 E-05	Y
^{135}Ce	4.0 E-05	2.0 E+00	8.0 E-09	3.0 E-04	Y
^{137m}Ce	7.0 E-05	3.0 E+00	9.0 E-09	3.0 E-04	Y
^{137}Ce	1.0 E-03	5.0 E+01	3.0 E-07	1.0 E-02	W Y
^{139}Ce	1.0 E-04	5.0 E+00	2.0 E-09	6.0 E-05	Y
^{141}Ce	5.0 E-05	2.0 E+00	1.0 E-09	5.0 E-05	Y
^{143}Ce	3.0 E-05	1.0 E+00	4.0 E-09	1.0 E-04	Y
^{144}Ce	7.0 E-06	3.0 E-01	3.0 E-11	1.0 E-06	Y
^{136}Pr	2.0 E-03	8.0 E+01	5.0 E-07	2.0 E-02	Y
^{137}Pr	1.0 E-03	4.0 E+01	3.0 E-07	1.0 E-02	Y
^{138m}Pr	3.0 E-04	1.0 E+01	1.0 E-07	4.0 E-03	Y
^{139}Pr	1.0 E-03	4.0 E+01	3.0 E-07	1.0 E-02	W Y
^{142m}Pr	2.0 E-03	8.0 E+01	3.0 E-07	1.0 E-02	Y
^{142}Pr	3.0 E-05	1.0 E+00	4.0 E-09	2.0 E-04	Y
^{143}Pr	3.0 E-05	1.0 E+00	2.0 E-09	6.0 E-05	Y
^{144}Pr	1.0 E-03	5.0 E+01	3.0 E-07	1.0 E-02	W Y
^{145}Pr	9.0 E-05	3.0 E+00	2.0 E-08	7.0 E-04	Y
^{147}Pr	2.0 E-03	9.0 E+01	4.0 E-07	2.0 E-02	Y
^{136}Nd	4.0 E-04	2.0 E+01	1.0 E-07	5.0 E-03	W Y
^{138}Nd	5.0 E-05	2.0 E+00	1.0 E-08	5.0 E-04	Y
^{139m}Nd	1.0 E-04	5.0 E+00	3.0 E-08	1.0 E-03	Y
^{139}Nd	2.0 E-03	9.0 E+01	7.0 E-07	3.0 E-02	Y
^{141}Nd	4.0 E-03	2.0 E+02	1.0 E-06	5.0 E-02	Y
^{147}Nd	4.0 E-05	1.0 E+00	2.0 E-09	7.0 E-05	Y
^{149}Nd	3.0 E-04	1.0 E+01	6.0 E-08[b]	2.0 E-03[b]	W Y
^{151}Nd	2.0 E-03	7.0 E+01	4.0 E-07	2.0 E-02	Y

Radionuclide	Water		Air		
	DCG-Public		DCG-Public		Solubility class[a]
	µCi/mL	Bq/mL	µCi/mL	Bq/mL	
^{141}Pm	2.0 E-03	6.0 E+01	4.0 E-07	2.0 E-02	W Y
^{143}Pm	1.0 E-04	5.0 E+00	1.0 E-09	5.0 E-05	W
^{144}Pm	3.0 E-05	1.0 E+00	3.0 E-10	1.0 E-05	W Y
^{145}Pm	3.0 E-04	1.0 E+01	4.0 E-10	1.0 E-05	Y
^{146}Pm	4.0 E-05	2.0 E+00	1.0 E-10	4.0 E-06	W Y
^{147}Pm	1.0 E-04	5.0 E+00	3.0 E-10	1.0 E-05	Y
^{148m}Pm	2.0 E-05	7.0 E-01	7.0 E-10	3.0 E-05	W Y
^{148}Pm	1.0 E-05	5.0 E-01	1.0 E-09	4.0 E-05	Y
^{149}Pm	4.0 E-05	1.0 E+00	4.0 E-09	1.0 E-04	Y
^{150}Pm	1.0 E-04	5.0 E+00	4.0 E-08	2.0 E-03	W Y
^{151}Pm	5.0 E-05	2.0 E+00	7.0 E-09	3.0 E-04	Y
^{141m}Sm	8.0 E-04	3.0 E+01	2.0 E-07	9.0 E-03	W
^{141}Sm	2.0 E-03	6.0 E+01	4.0 E-07	2.0 E-02	W
^{142}Sm	2.0 E-04	9.0 E+00	6.0 E-08	2.0 E-03	W
^{145}Sm	2.0 E-04	6.0 E+00	1.0 E-09	5.0 E-05	W
^{146}Sm	7.0 E-07	3.0 E-02	2.0 E-13	6.0 E-09	W
^{147}Sm	8.0 E-07	3.0 E-02	2.0 E-13	6.0 E-09	W
^{151}Sm	4.0 E-04	2.0 E+01	4.0 E-10	2.0 E-05	W
^{153}Sm	5.0 E-05	2.0 E+00	7.0 E-09	3.0 E-04	W
^{155}Sm	2.0 E-03	8.0 E+01	5.0 E-07	2.0 E-02	W
^{156}Sm	1.0 E-04	5.0 E+00	2.0 E-08	8.0 E-04	W
^{145}Eu	4.0 E-05	2.0 E+00	5.0 E-09	2.0 E-04	W
^{146}Eu	3.0 E-05	1.0 E+00	3.0 E-09	1.0 E-04	W
^{147}Eu	8.0 E-05	3.0 E+00	4.0 E-09	1.0 E-04	W
^{148}Eu	3.0 E-05	1.0 E+00	8.0 E-10	3.0 E-05	W
^{149}Eu	3.0 E-04	1.0 E+01	7.0 E-09	3.0 E-04	W
^{150}Eu (12.62)	9.0 E-05	3.0 E+00	2.0 E-08	7.0 E-04	W
^{150}Eu (34.2Y)	2.0 E-05	8.0 E+01	4.0 E-11	2.0 E-06	W
^{152m}Eu	7.0 E-05	3.0 E+00	2.0 E-08	6.0 E-04	W

Radionuclide	Water		Air		
	DCG-Public		DCG-Public		Solubility class[a]
	µCi/mL	Bq/mL	µCi/mL	Bq/mL	
^{152}Eu	2.0 E-05	9.0 E-01	5.0 E-11	2.0 E-06	W
^{154}Eu	2.0 E-05	6.0 E-01	5.0 E-11	2.0 E-06	W
^{155}Eu	1.0 E-04	4.0 E+00	3.0 E-10	1.0 E-05	W
^{156}Eu	2.0 E-05	6.0 E-01	1.0 E-09	4.0 E-05	W
^{157}Eu	6.0 E-05	2.0 E+00	1.0 E-08	4.0 E-04	W
^{158}Eu	5.0 E-04	2.0 E+01	1.0 E-07	5.0 E-03	W
^{145}Gd	1.0 E-03	5.0 E+01	4.0 E-07	1.0 E-02	D W
^{146}Gd	4.0 E-05	1.0 E+00	3.0 E-10	1.0 E-05	D
^{147}Gd	5.0 E-05	2.0 E+00	8.0 E-09	3.0 E-04	W
^{148}Gd	7.0 E-07	3.0 E-02	4.0 E-14	1.0 E-09	D
^{149}Gd	8.0 E-05	3.0 E+00	5.0 E-09	2.0 E-04	D W
^{151}Gd	2.0 E-04	7.0 E+00	1.0 E-09	6.0 E-05	D
^{152}Gd	9.0 E-07	3.0 E-02	5.0 E-14	2.0 E-09	D
^{153}Gd	1.0 E-04	5.0 E+00	6.0 E-10	2.0 E-05	D
^{159}Gd	7.0 E-05	3.0 E+00	1.0 E-08	5.0 E-04	W
^{147}Tb	2.0 E-04	9.0 E+00	7.0 E-08	3.0 E-03	W
^{149}Tb	1.0 E-04	5.0 E+00	2.0 E-09	7.0 E-05	W
^{150}Tb	1.0 E-04	5.0 E+00	5.0 E-08	2.0 E-03	W
^{151}Tb	1.0 E-04	4.0 E+00	2.0 E-08	8.0 E-04	W
^{153}Tb	1.0 E-04	5.0 E+00	2.0 E-08	6.0 E-04	W
^{154}Tb	5.0 E-05	2.0 E+00	1.0 E-08	4.0 E-04	W
^{155}Tb	2.0 E-04	6.0 E+00	2.0 E-08	7.0 E-04	W
^{156m}Tb (24.4)	2.0 E-04	7.0 E+00	2.0 E-08	7.0 E-04	W
^{156m}Tb (5.0 h)	4.0 E-04	2.0 E+01	6.0 E-08	2.0 E-03	W
^{156}Tb	3.0 E-05	1.0 E+00	3.0 E-09	1.0 E-04	W
^{157}Tb	1.0 E-03	5.0 E+01	1.0 E-09	5.0 E-05	W
^{158}Tb	3.0 E-05	1.0 E+00	5.0 E-11	2.0 E-06	W
^{160}Tb	2.0 E-05	8.0 E-01	5.0 E-10	2.0 E-05	W
^{161}Tb	5.0 E-05	2.0 E+00	4.0 E-09	1.0 E-04	W

Radionuclide	Water		Air		
	DCG-Public		DCG-Public		Solubility class[a]
	µCi/mL	Bq/mL	µCi/mL	Bq/mL	
^{155}Dy	2.0 E-04	9.0 E+01	6.0 E-08	2.0 E-03	W
^{157}Dy	5.0 E-04	2.0 E+01	2.0 E-07[b]	6.0 E-03[b]	W
^{159}Dy	3.0 E-04	1.0 E+01	6.0 E-09	2.0 E-04	W
^{165}Dy	4.0 E-04	1.0 E+01	1.0 E-07	4.0 E-03	W
^{166}Dy	2.0 E-05	8.0 E-01	2.0 E-09	6.0 E-05	W
^{155}Ho	1.0 E-03	4.0 E+01	4.0 E-07	1.0 E-02	W
^{157}Ho	7.0 E-03	3.0 E+02	3.0 E-06	1.0 E-01	W
^{159}Ho	6.0 E-03	2.0 E+02	2.0 E-06	9.0 E-02	W
^{161}Ho	3.0 E-03	1.0 E+02	1.0 E-06	4.0 E-02	W
^{162m}Ho	2.0 E-03	6.0 E+01	6.0 E-07	2.0 E-02	W
^{162}Ho	2.0 E-02	8.0 E+02	6.0 E-06	2.0 E-01	W
^{164m}Ho	3.0 E-03	1.0 E+02	7.0 E-07	3.0 E-02	W
^{164}Ho	6.0 E-03	2.0 E+02	1.0 E-06	6.0 E-02	W
^{166m}Ho	2.0 E-05	7.0 E-1	2.0 E-11	6.0 E-07	W
^{166}Ho	2.0 E-05	9.0 E-01	4.0 E-09	2.0 E-04	W
^{167}Ho	4.0 E-04	2.0 E+01	16.0 E-07	5.0 E-03	W
^{161}Er	4.0 E-04	2.0 E+01	2.0 E-07	6.0 E-03	W
^{165}Er	2.0 E-03	7.0 E+01	4.0 E-07	2.0 E-02	W
^{169}Er	1.0 E-04	4.0 E+00	6.0 E-09	2.0 E-04	W
^{171}Er	1.0 E-04	4.0 E+00	2.0 E-08	9.0 E-04	W
^{172}Er	4.0 E-05	1.0 E+00	3.0 E-09	1.0 E-04	W
^{162}Tm	2.0 E-03	7.0 E+01	7.0 E-07	2.0 E-02	W
^{166}Tm	1.0 E-04	4.0 E+00	3.0 E-08	1.0 E-03	W
^{167}Tm	7.0 E-05	2.0 E+00	5.0 E-09	2.0 E-04	W
^{170}Tm	3.0 E-05	1.0 E+00	5.0 E-10	2.0 E-05	W
^{171}Tm	4.0 E-04	1.0 E+01	1.0 E-09	5.0 E-05	W
^{172}Tm	2.0 E-05	9.0 E-01	3.0 E-09	1.0 E-04	W
^{173}Tm	1.0 E-04	4.0 E+00	3.0 E-08	1.0 E-03	W
^{175}Tm	3.0 E-03	1.0 E+02	6.0 E-07	2.0 E-02	W

Radionuclide	Water		Air		
	DCG-Public		DCG-Public		Solubility class[a]
	µCi/mL	Bq/mL	µCi/mL	Bq/mL	
^{162}Yb	2.0 E-03	7.0 E+01	7.0 E-07	2.0 E-02	Y
^{166}Yb	4.0 E-05	1.0 E+00	4.0 E-09	1.0 E-04	Y
^{167}Yb	8.0 E-03	3.0 E+02	2.0 E-06	6.0 E-02	Y
^{169}Yb	5.0 E-05	2.0 E+00	2.0 E-09	6.0 E-05	Y
^{175}Yb	9.0 E-05	3.0 E+00	8.0 E-09	3.0 E-04	W Y
^{177}Yb	4.0 E-04	2.0 E+01	1.0 E-07	4.0 E-03	W Y
^{178}Yb	4.0 E-04	1.0 E+01	9.0 E-08	3.0 E-03	Y
^{169}Lu	7.0 E-05	3.0 E+00	1.0 E-08	4.0 E-04	W Y
^{170}Lu	3.0 E-05	1.0 E+00	5.0 E-09	2.0 E-04	W Y
^{171}Lu	5.0 E-05	2.0 E+00	4.0 E-09	2.0 E-04	W Y
^{172}Lu	3.0 E-05	1.0 E+00	3.0 E-09	1.0 E-04	W Y
^{173}Lu	1.0 E-04	5.0 E+00	6.0 E-10	2.0 E-05	Y
^{174m}Lu	8.0 E-05	3.0 E+00	5.0 E-10	2.0 E-05	Y
^{174}Lu	1.0 E-04	5.0 E+00	4.0 E-10	1.0 E-05	Y
^{176m}Lu	2.0 E-04	8.0 E+00	5.0 E-08	2.0 E-03	Y
^{176}Lu	2.0 E-05	8.0 E-01	2.0 E-11	7.0 E-07	Y
^{177m}Lu	2.0 E-05	8.0 E-01	2.0 E-10	7.0 E-06	Y
^{177}Lu	7.0 E-05	3.0 E+00	5.0 E-09	2.0 E-04	W Y
^{178m}Lu	2.0 E-03	6.0 E+01	4.0 E-07	2.0 E-02	W Y
^{178}Lu	1.0 E-03	4.0 E+01	3.0 E-07	1.0 E-02	W Y
^{179}Lu	2.0 E-04	6.0 E+00	4.0 E-08	1.0 E-03	Y
^{170}Hf	7.0 E-05	3.0 E+00	1.0 E-08	4.0 E-04	W
^{172}Hf	3.0 E-05	1.0 E+00	4.0 E-11	2.0 E-06	D
^{173}Hf	1.0 E-04	5.0 E+00	3.0 E-08	1.0 E-03	D W
^{175}Hf	8.0 E-05	3.0 E+00	2.0 E-09	9.0 E-05	D
^{177m}Hf	5.0 E-04	2.0 E+01	1.0 E-07	5.0 E-03	D
^{178m}Hf	7.0 E-06	3.0 E-01	6.0 E-12	2.0 E-07	D
^{179m}Hf	3.0 E-05	1.0 E+00	1.0 E-09	5.0 E-05	D W
^{180m}Hf	2.0 E-04	8.0 E+00	5.0 E-08	2.0 E-03	D W

Radionuclide	Water		Air		
	DCG-Public		DCG-Public		Solubility class[a]
	µCi/mL	Bq/mL	µCi/mL	Bq/mL	
^{181}Hf	3.0 E-05	1.0 E+00	9.0 E-10	4.0 E-05	D
^{182m}Hf	1.0 E-03	4.0 E+01	2.0 E-07	8.0 E-03	D
^{182}Hf	1.0 E-05	4.0 E-01	4.0 E-12	2.0 E-07	D
^{183}Hf	6.0 E-04	2.0 E+01	1.0 E-07	4.0 E-03	D
^{184}Hf	7.0 E-05	2.0 E+00	2.0 E-08	6.0 E-04	W
^{172}Ta	1.0 E-03	4.0 E+01	2.0 E-07	9.0 E-03	Y
^{173}Ta	2.0 E-04	7.0 E+00	4.0 E-08	1.0 E-03	Y
^{174}Ta	7.0 E-04	3.0 E+01	2.0 E-07	8.0 E-03	W Y
^{175}Ta	2.0 E-04	6.0 E+00	3.0 E-08	1.0 E-03	Y
^{176}Ta	1.0 E-04	4.0 E+00	3.0 E-08	1.0 E-03	W Y
^{177}Ta	3.0 E-04	1.0 E+01	4.0 E-08	1.0 E-03	Y
^{178}Ta	5.0 E-04	2.0 E+01	2.0 E-07	6.0 E-03	Y
^{179}Ta	6.0 E-04	2.0 E+01	2.0 E-09	8.0 E-05	Y
^{180m}Ta	6.0 E-04	2.0 E+01	1.0 E-07	5.0 E-03	Y
^{180}Ta	4.0 E-05	2.0 E+00	6.0 E-01	2.0 E-06	Y
^{182m}Ta	6.0-E-03	2.0 E+02	1.0 E-06	4.0 E-02	Y
^{182}Ta	2.0 E-05	9.0 E-01	3.0 E-10	1.0 E-05	Y
^{183}Ta	3.0 E-05	1.0 E+00	2.0 E-09	9.0 E-05	Y
^{184}Ta	5.0 E-05	2.0 E+00	1.0 E-08	4.0 E-04	Y
^{185}Ta	7.0 E-04	3.0 E+01	2.0 E-07	6.0 E-03	Y
^{186}Ta	2.0 E-03	8.0 E+01	5.0 E-07	2.0 E-02	W Y
^{176}W	3.0 E-04	1.0 E+01	1.0 E-07	5.0 E-03	D
^{177}W	6.0 E-04	2.0 E+01	2.0 E-07	3.0 E-03	D
^{178}W	1.0 E-04	6.0 E+00	5.0 E-08	2.0 E-03	D
^{179}W	2.0 E-02	6.0 E+02	4.0 E-06	1.0 E-01	D
^{181}W	4.0 E-04	2.0 E+01	8.0 E-08	3.0 E-03	D
^{185}W	7.0 E-05	3.0 E+00	2.0 E-08	6.0 E-04	D
^{187}W	5.0 E-05	2.0 E+00	2.0 E-08	8.0 E-04	D
^{188}W	2.0 E-05	6.0 E-01	3.0 E-09	1.0 E-04	D

Radionuclide	Water		Air		
	DCG-Public		DCG-Public		Solubility class[a]
	µCi/mL	Bq/mL	µCi/mL	Bq/mL	
^{177}Re	3.0 E-03	1.0 E+02	6.0 E-07	2.0 E-02	D
^{178}Re	3.0 E-03	1.0 E+02	6.0 E-07	2.0 E-02	D W
^{181}Re	1.0 E-04	5.0 E+00	2.0 E-08	8.0 E-04	D W
^{182}Re (64.0 h)	4.0 E-05	2.0 E+00	5.0 E-09	2.0 E-04	D W
^{182}Re (12.7 h)	2.0 E-04	7.0 E+00	3.0 E-08[b]	1.0 E-03[b]	D
^{184m}Re	6.0 E-05	2.0 E+00	1.0 E-09	4.0 E-05	W
^{184}Re	6.0 E-05	2.0 E+00	3.0 E-09	1.0 E-04	W
^{186m}Re	4.0 E-05	2.0 E+00	4.0 E-10	1.0 E-05	W
^{186}Re	5.0 E-05	2.0 E+00	4.0 E-09	2.0 E-04	W
^{187}Re	2.0 E-02	6.0 E+02	2.0 E-07	9.0 E-03	W
^{188m}Re	2.0 E-03	8.0 E+01	3.0 E-07	1.0 E-02	D W
^{188}Re	5.0 E-05	2.0 E+00	6.0 E-09	2.0 E-04	W
^{189}Re	9.0 E-05	3.0 E+00	1.0 E-08	4.0 E-04	W
^{180}Os	3.0 E-03	1.0 E+02	9.0 E-07	3.0 E-02	D
^{181}Os	4.0 E-04	1.0 E+01	1.0 E-07	4.0 E-03	D W Y
^{182}Os	6.0 E-05	2.0 E+00	9.0 E-09	3.0 E-04	Y
^{185}Os	7.0 E-05	3.0 E+00	1.0 E-09	4.0 E-05	D
^{189m}Os	2.0 E-03	8.0 E+01	4.0 E-07	1.0 E-02	Y
^{191m}Os	4.0 E-04	1.0 E+01	4.0 E-08	1.0 E-03	Y
^{191}Os	7.0 E-05	3.0 E+00	3.0 E-09	1.0 E-04	Y
^{193}Os	4.0 E-05	2.0 E+00	6.0 E-09	2.0 E-04	Y
^{194}Os	2.0 E-05	6.0 E-01	2.0 E-11	7.0 E-07	Y
^{182}Ir	1.0 E-03	4.0 E+01	3.0 E-07	1.0 E-02	D W Y
^{184}Ir	2.0 E-04	8.0 E+00	6.0 E-08	2.0 E-03	D Y
^{185}Ir	1.0 E-04	5.0 E+00	2.0 E-08	9.0 E-04	Y
^{186}Ir	6.0 E-05	2.0 E+00	1.0 E-08	5.0 E-04	Y
^{187}Ir	3.0 E-04	1.0 E+01	6.0 E-08	2.0 E-03	Y
^{188}Ir	5.0 E-05	2.0 E+00	8.0 E-09	3.0 E-04	W Y
^{189}Ir	1.0 E-04	6.0 E+00	9.0 E-09	3.0 E-04	W Y
^{190m}Ir	5.0 E-03	2.0 E+02	5.0 E-07[b]	2.0 E-02[b]	D W Y

Radionuclide	Water		Air		
	DCG-Public		DCG-Public		Solubility class[a]
	µCi/mL	Bq/mL	µCi/mL	Bq/mL	
^{190}Ir	3.0 E-05	1.0 E+00	2.0 E-09	8.0 E-05	D Y
^{192m}Ir	9.0 E-05	3.0 E+00	4.0 E-11	1.0 E-06	Y
^{192}Ir	3.0 E-05	1.0 E+00	5.0 E-10	2.0 E-05	Y
^{194m}Ir	2.0 E-05	6.0 E-01	2.0 E-10	8.0 E-06	D
^{194}Ir	3.0 E-05	1.0 E+00	4.0 E-09	2.0 E-04	Y
^{195m}Ir	2.0 E-04	8.0 E+00	5.0 E-08	2.0 E-03	Y
^{195}Ir	4.0 E-04	2.0 E+01	1.0 E-07	4.0 E-03	D Y
^{186}Pt	4.0 E-04	1.0 E+01	9.0 E-08	3.0 E-03	D
^{188}Pt	4.0 E-05	2.0 E+00	4.0 E-09	1.0 E-04	D
^{189}Pt	3.0 E-04	1.0 E+01	7.0 E-08	3.0 E-03	D
^{191}Pt	1.0 E-04	4.0 E+00	2.0 E-08	7.0 E-04	D
^{193m}Pt	8.0 E-05	3.0 E+00	1.0 E-08	5.0 E-04	D
^{193}Pt	1.0 E-03	5.0 E+01	6.0 E-08	2.0 E-03	D
^{195m}Pt	6.0 E-05	2.0 E+00	1.0 E-08	4.0 E-04	D
^{197m}Pt	4.0 E-04	2.0 E+01	1.0 E-07	4.0 E-03	D
^{197}Pt	9.0 E-05	3.0 E+00	2.0 E-08	9.0 E-04	D
^{199}Pt	1.0 E-03	5.0 E+01	3.0 E-07	1.0 E-02	D
^{200}Pt	3.0 E-05	1.0 E+00	8.0 E-09	3.0 E-04	D
^{193}Au	2.0 E-04	9.0 E+00	3.0 E-08	1.0 E-03	D
^{194}Au	7.0 E-05	3.0 E+00	9.0 E-09	3.0 E-04	D
^{195}Au	1.0 E-04	5.0 E+00	1.0 E-09	4.0 E-05	Y
^{198m}Au	2.0 E-05	9.0 E-01	2.0 E-09	9.0 E-05	W Y
^{198}Au	6.0 E-05	2.0 E+00	4.0 E-09	1.0 E-04	D W Y
^{199}Au	8.0 E-05	3.0 E+00	8.0 E-09	3.0 E-04	D W Y
^{200m}Au	3.0 E-05	1.0 E+00	4.0 E-09	2.0 E-04	D W Y
^{200}Au	7.0 E-04	3.0 E+01	9.0 E-08	3.0 E-03	D
^{201}Au	2.0 E-03	9.0 E-01	3.0 E-07	1.0 E-02	D
^{193m}Hg (org)	1.0 E-04	4.0 E+00	3.0 E-08	1.0 E-03	D
^{193m}Hg (inorg)	9.0 E-05	3.0 E+00	2.0 E-08	7.0 E-04	W
^{193m}Hg (vapor)	--	--	2.0 E-08	8.0 E-04	

Radionuclide	Water		Air		
	DCG-Public		DCG-Public		Solubility class[a]
	µCi/mL	Bq/mL	µCi/mL	Bq/mL	
^{193}Hg (org)	5.0 E-04	2.0 E+01	2.0 E-07	6.0 E-03	D
^{193}Hg (inorg)	4.0 E-04	2.0 E+01	1.0 E-07	4.0 E-03	D W
^{193}Hg (vapor)	--	--	7.0 E-08	3.0 E-03	
^{194}Hg (org)	5.0 E-07	2.0 E-02	7.0 E-11	2.0 E-06	D
^{194}Hg (inorg)	2.0 E-05	9.0 E-01	1.0 E-10	4.0 E-06	D
^{194}Hg (vapor)	--	--	7.0 E-11	3.0 E-06	
^{195m}Hg (org)	8.0 E-05	3.0 E+00	1.0 E-08	5.0 E-04	D
^{195m}Hg (inorg)	6.0 E-05	2.0 E+00	9.0 E-09	3.0 E-04	W
^{195m}Hg (vapor)	--	--	9.0 E-09	3.0 E-04	
^{195}Hg (org)	5.0 E-04	2.0 E+01	1.0 E-07	4.0 E-03	D
^{195}Hg (inorg)	4.0 E-04	1.0 E+01	8.0 E-08	3.0 E-03	D W
^{195}Hg (vapor)	--	--	7.0 E-08	3.0 E-03	
^{197m}Hg (org)	1.0 E-04	4.0 E+00	2.0 E-08	8.0 E-04	D
^{197m}Hg (inorg)	8.0 E-05	3.0 E-00	1.0 E-08	4.0 E-04	W
^{197m}Hg (vapor)	--	--	1.0 E-08	5.0 E-04	
^{197}Hg (org)	2.0 E-04	7.0 E-00	3.0 E-08	1.0 E-03	D
^{197}Hg (inorg)	1.0 E-04	6.0 E-00	2.0 E-08	8.0 E-04	W
^{197}Hg (vapor)	--	--	2.0 E-07	7.0 E-03	D
^{199m}Hg (org)	2.0 E-03	6.0 E+01	4.0 E-07	1.0 E-02	D
^{199m}Hg (inorg)	2.0 E-03	6.0 E+01	4.0 E-07	1.0 E-02	D
^{199m}Hg (vapor)	--	--	2.0 E-07	7.0 E-03	
^{203}Hg (org)	1.0 E-05	5.0 E-01	2.0 E-09	7.0 E-05	D
^{203}Hg (inorg)	7.0 E-05	2.0 E+00	3.0 E-09	1.0 E-04	D W
^{203}Hg (vapor)	--	--	2.0 E-09	7.0 E-05	
^{194m}Tl	2.0 E-03	7.0 E+01	4.0 E-07	1.0 E-02	D
^{194}Tl	7.0 E-03	3.0 E+02	1.0 E-06	5.0 E-02	D
^{195}Tl	2.0 E-03	7.0 E+01	3.0 E-07	1.0 E-02	D
^{197}Tl	2.0 E-03	8.0 E-01	3.0 E-07	1.0 E-02	D
^{198m}Tl	8.0 E-04	3.0 E+01	1.0 E-07	5.0 E-03	D

Radionuclide	Water		Air		
	DCG-Public		DCG-Public		Solubility class[a]
	µCi/mL	Bq/mL	µCi/mL	Bq/mL	
^{198}Tl	5.0 E-04	2.0 E+01	7.0 E-08	3.0 E-03	D
^{199}Tl	2.0 E-03	6.0 E+01	2.0 E-07	7.0 E-03	D
^{200}Tl	2.0 E-04	8.0 E+00	3.0 E-08[b]	1.0 E-03[b]	D
^{201}Tl	5.0 E-04	2.0 E+01	5.0 E-08	2.0 E-03	D
^{202}Tl	9.0 E-05	4.0 E+00	1.0 E-08	5.0 E-04	D
^{204}Tl	4.0 E-05	2.0 E+00	5.0 E-09	2.0 E-04	D
^{208}Tl	--	--	5.0 E-09[b]	2.0 E-04[b]	
^{195m}Pb	2.0 E-03	6.0 E+01	5.0 E-07	2.0 E-02	D
^{198}Pb	9.0 E-04	3.0 E+01	2.0 E-07	6.0 E-03	D
^{199}Pb	6.0 E-04	2.0 E+01	2.0 E-07	6.0 E-03	D
^{200}Pb	9.0 E-05	3.0 E+00	1.0 E-08	6.0 E-04	D
^{201}Pb	2.0 E-04	8.0 E+00	5.0 E-08	2.0 E-03	D
^{202m}Pb	2.0 E-04	9.0 E+00	7.0 E-08	3.0 E-03	D
^{202}Pb	4.0 E-06	1.0 E-01	1.0 E-10	4.0 E-06	D
^{203}Pb	1.0 E-04	5.0 E+00	2.0 E-08	8.0 E-04	D
^{205}Pb	9.0 E-05	4.0 E+00	3.0 E-09	1.0 E-04	D
^{209}Pb	7.0 E-04	3.0 E+01	1.0 E-07	5.0 E-03	D
^{210}Pb	3.0 E-08	1.0 E+03	9.0 E-13	4.0 E-08	D
^{211}Pb	3.0 E-04	1.0 E+01	1.0 E-09	6.0 E-05	D
^{212}Pb	3.0 E-06	1.0 E-01	8.0 E-11	3.0 E-06	D
^{214}Pb	2.0 E-04	9.0 E+00	2.0 E-09	7.0 E-05	D
^{200}Bi	8.0 E-04	3.0 E+01	2.0 E-07	7.0 E-03	D
^{201}Bi	3.0 E-04	1.0 E+01	7.0 E-08	3.0 E-03	D W
^{202}Bi	4.0 E-04	1.0 E+01	1.0 E-07	4.0 E-03	D
^{203}Bi	7.0 E-05	3.0 E+00	1.0 E-08	5.0 E-04	W
^{205}Bi	4.0 E-05	1.0 E+00	3.0 E-09	1.0 E-04	W
^{206}Bi	2.0 E-05	6.0 E-01	2.0 E-09	8.0 E-05	W
^{207}Bi	3.0 E-05	1.0 E+00	8.0 E-10	3.0 E-05	W
^{210m}Bi	2.0 E-06	6.0 E-02	2.0 E-12	6.0 E-08	D

Radionuclide	Water		Air		
	DCG-Public		DCG-Public		Solubility class[a]
	µCi/mL	Bq/mL	µCi/mL	Bq/mL	
^{210}Bi	2.0 E-05	9.0 E-01	6.0 E-11	2.0 E-06	W
^{212}Bi	1.0 E-04	5.0 E+00	6.0 E-10	2.0 E-05	D
^{213}Bi	2.0 E-04	8.0 E+00	7.0 E-10	3.0 E-05	D W
^{214}Bi	6.0 E-04	2.0 E+01	2.0 E-09	7.0 E-05	D
^{203}Po	7.0 E-04	3.0 E+01	2.0 E-07	6.0 E-03	D
^{205}Po	6.0 E-04	2.0 E+01	9.0 E-08	3.0 E-03	D
^{207}Po	2.0 E-04	8.0 E+00	6.0 E-08	2.0 E-03	D
^{210}Po	8.0 E-08	3.0 E-03	1.0 E-12	5.0 E-08	W
^{214}Po	--	--	2.0 E-04[b]	8.0 E+00[b]	
^{216}Po	--	--	1.0 E-03[b]	4.0 E+01[b]	
^{207}At	2.0 E-04	6.0 E+00	5.0 E-09	2.0 E-04	W
^{211}At	3.0 E-06	1.0 E-01	1.0 E-10	5.0 E-06	W
^{220}Rn	--	--	1.0 E-10	4.0 E-06	
^{222}Rn	--	--	5.0 E-05[b]	2.0 E+00[b]	
^{222}Fr	6.0 E-05	2.0 E+00	1.0 E-09	4.0 E-05	D
^{223}Fr	2.0 E-05	6.0 E-01	2.0 E-09	7.0 E-05	D
^{223}Ra	3.0 E-07	9.0 E-03	2.0 E-12	6.0 E-08	W
^{224}Ra	4.0 E-07	2.0 E-02	4.0 E-12	2.0 E-07	W
^{225}Ra	4.0 E-07	2.0 E-02	2.0 E-12	6.0 E-08	W
^{226}Ra	1.0 E-07	5.0 E-03	1.0 E-12	6.0 E-08	W
^{227}Ra	6.0 E-04	2.0 E+01	4.0 E-08	2.0 E-03	W
^{228}Ra	1.0 E-07	4.0 E-03	3.0 E-12	1.0 E-07	W
^{224}Ac	5.0 E-05	2.0 E+00	9.0 E-11	3.0 E-06	D
^{225}Ac	1.0 E-06	5.0 E-02	1.0 E-12	4.0 E-08	D
^{226}Ac	3.0 E-06	1.0 E-01	9.0 E-12	3.0 E-07	D
^{227}Ac	1.0 E-08	4.0 E-04	2.0 E-15	7.0 E-11	D
^{228}Ac	6.0 E-05	2.0 E+00	4.0 E-11	2.0 E-06	D
^{226}Th	1.0 E-04	6.0 E+00	3.0 E-10	1.0 E-05	Y
^{227}Th	4.0 E-06	1.0 E-01	7.0 E-13	3.0 E-08	Y
^{228}Th	4.0 E-07	1.0 E-02	4.0 E-14	1.0 E-09	Y

Radionuclide	Water		Air		
	DCG-Public		DCG-Public		Solubility class[a]
	µCi/mL	Bq/mL	µCi/mL	Bq/mL	
^{229}Th	4.0 E-08	1.0 E-03	6.0 E-15	2.0 E-10	W
^{230}Th	3.0 E-07	1.0 E-02	4.0 E-14	1.0 E-09	W
^{231}Th	1.0 E-04	4.0 E+00	1.0 E-08	5.0 E-04	W
^{232}Th	5.0 E-08	2.0 E-03	7.0 E-15	3.0 E-10	W
^{234}Th	1.0 E-05	4.0 E-01	4.0 E-10	1.0 E-05	Y
^{227}Pa	1.0 E-04	4.0 E+00	2.0 E-10	9.0 E-06	Y
^{228}Pa	3.0 E-05	1.0 E+00	3.0 E-11	1.0 E-06	Y
^{230}Pa	2.0 E-05	9.0 E-01	8.0 E-12	3.0 E-07	Y
^{231}Pa	1.0 E-08	5.0 E-04	9.0 E-15	3.0 E-10	W
^{232}Pa	4.0 E-05	2.0 E+00	1.0 E-10	5.0 E-06	W
^{233}Pa	4.0 E-05	2.0 E+00	1.0 E-09	5.0 E-05	Y
^{234}Pa	7.0 E-05	3.0 E+00	2.0 E-08[b]	6.0 E-04[b]	W Y
^{230}U	2.0 E-07	6.0 E-03	6.0 E-13	2.0 E-08	Y
^{231}U	1.0 E-04	5.0 E+00	1.0 E-08	4.0 E-04	Y
^{232}U	1.0 E-07	4.0 E-03	2.0 E-14	7.0 E-10	Y
^{233}U	5.0 E-07	2.0 E-02	9.0 E-14	3.0 E-09	Y
^{234}U	5.0 E-07	2.0 E-02	9.0 E-14	3.0 E-09	Y
^{235}U	6.0 E-07	2.0 E-02	1.0 E-13	4.0 E-09	Y
^{236}U	5.0 E-07	2.0 E-02	1.0 E-13	4.0 E-09	Y
^{237}U	5.0 E-05	2.0 E+00	4.0 E-09	1.0 E-04	Y
^{238}U	6.0 E-07	2.0 E-02	1.0 E-13	4.0 E-09	Y
^{239}U	2.0 E-03	7.0 E+01	4.0 E-07[b]	1.0 E-02[b]	D W
^{240}U	3.0 E-05	1.0 E+00	6.0 E-09	2.0 E-04	Y
^{232}Np	6.0 E-03	2.0 E+02	1.0 E-08	4.0 E-04	W
^{233}Np	2.0 E-02	7.0 E+02	8.0 E-06	3.0 E-01	W
^{234}Np	8.0 E-05	3.0 E+00	6.0 E-09	2.0 E-04	W
^{235}Np	6.0 E-04	2.0 E+01	3.0 E-09	1.0 E-04	W
^{236}Np (1 E+05 yr)	2.0 E-09	3.0 E-05	1.0 E-13	4.0 E-09	W
^{236}Np (22.5 h)	1.0 E-04	4.0 E+00	2.0 E-10	6.0 E-06	W

Radionuclide	Water		Air		
	DCG-Public		DCG-Public		Solubility class[a]
	µCi/mL	Bq/mL	µCi/mL	Bq/mL	
^{237}Np	3.0 E-08	1.0 E-03	2.0 E-14	9.0 E-10	W
^{238}Np	4.0 E-05	1.0 E+00	4.0 E-10	1.0 E-05	W
^{239}Np	5.0 E-05	2.0 E-00	5.0 E-09	2.0 E-04	W
^{240}Np	7.0 E-04	3.0 E+01	2.0 E-07[b]	7.0 E-03[b]	W
^{234}Pu	1.0 E-04	4.0 E+00	4.0 E-10	2.0 E-05	Y
^{235}Pu	1.0 E-02	4.0 E+02	6.0 E-06	2.0 E-01	Y
^{236}Pu	1.0 E-07	4.0 E-03	8.0 E-14	3.0 E-09	W Y
^{237}Pu	1.0 E-04	4.0 E+00	7.0 E-09	3.0 E-04	Y
^{238}Pu	4.0 E-08	1.0 E-01	3.0 E-14	1.0 E-09	W Y
^{239}Pu	3.0 E-08	1.0 E-03	2.0 E-14	9.0 E-10	W
^{240}Pu	3.0 E-08	1.0 E-01	2.0 E-14	9.0 E-10	W
^{241}Pu	2.0 E-06	6.0 E+00	1.0 E-12	4.0 E-08	W
^{242}Pu	3.0 E-08	1.0 E-03	2.0 E-14	9.0 E-10	W
^{243}Pu	4.0 E-04	1.0 E+01	8.0 E-08	3.0 E-03	W Y
^{244}Pu	3.0 E-08	1.0 E-03	2.0 E-14	9.0 E-10	W
^{245}Pu	6.0 E-05	2.0 E+00	1.0 E-08	4.0 E-04	W Y
^{237}Am	2.0 E-03	7.0 E+01	7.0 E-07	2.0 E-02	W
^{238}Am	8.0 E-04	3.0 E+01	1.0 E-08	5.0 E-04	W
^{239}Am	1.0 E-04	4.0 E+00	3.0 E-08	1.0 E-03	W
^{240}Am	5.0 E-05	2.0 E+00	6.0 E-09	2.0 E-04	W
^{241}Am	3.0 E-08	1.0 E-03	2.0 E-14	9.0 E-10	W
^{242m}Am	3.0 E-08	1.0 E-03	2.0 E-14	9.0 E-10	W
^{242}Am	1.0 E-04	4.0 E+00	2.0 E-10	7.0 E-06	W
^{243}Am	3.0 E-08	1.0 E-03	2.0 E-14	9.0 E-10	W
^{244m}Am	2.0 E-03	7.0 E+01	1.0 E-08	6.0 E-04	W
^{244}Am	7.0 E-05	3.0 E+00	7.0 E-10	3.0 E-05	W
^{245}Am	8.0 E-04	3.0 E+01	2.0 E-07	7.0 E-03	W
^{246m}Am	2.0 E-03	7.0 E+01	4.0 E-07[b]	2.0 E-02[b]	W
^{246}Am	9.0 E-04	3.0 E+01	2.0 E-07	9.0 E-03	W
^{238}Cm	4.0 E-04	1.0 E+01	3.0 E-09	9.0 E-05	W

Radionuclide	Water		Air		
	DCG-Public		DCG-Public		Solubility class[a]
	µCi/mL	Bq/mL	µCi/mL	Bq/mL	
^{240}Cm	2.0 E-06	7.0 E-02	1.0 E-12	5.0 E-08	W
^{241}Cm	3.0 E-05	1.0 E+00	7.0 E-11	3.0 E-06	W
^{242}Cm	1.0 E-06	4.0 E-02	7.0 E-13	3.0 E-08	W
^{243}Cm	5.0 E-08	2.0 E-03	3.0 E-14	1.0 E-09	W
^{244}Cm	6.0 E-08	2.0 E-03	4.0 E-14	2.0 E-09	W
^{245}Cm	3.0 E-08	1.0 E-03	2.0 E-14	8.0 E-10	W
^{246}Cm	3.0 E-08	1.0 E-03	2.0 E-14	8.0 E-10	W
^{247}Cm	3.0 E-08	1.0 E-03	2.0 E-14	9.0 E-10	W
^{248}Cm	8.0 E-09	3.0 E-04	6.0 E-15	2.0 E-10	W
^{249}Cm	1.0 E-03	4.0 E+01	5.0 E-08	2.0 E-03	W
^{245}Bk	6.0 E-05	2.0 E+00	3.0 E-09	1.0 E-04	W
^{246}Bk	7.0 E-05	3.0 E+00	7.0 E-09	3.0 E-04	W
^{247}Bk	6.0 E-08	2.0 E-03	2.0 E-14	8.0 E-10	W
^{249}Bk	2.0 E-05	9.0 E-01	9.0 E-12	3.0 E-07	W
^{250}Bk	3.0 E-04	1.0 E+01	2.0 E-09	6.0 E-05	W
^{244}Cf	9.0 E-04	3.0 E+01	1.0 E-09	5.0 E-05	W Y
^{246}Cf	1.0 E-05	4.0 E-01	2.0 E-11	8.0 E-07	Y
^{248}Cf	5.0 E-07	2.0 E-02	3.0 E-13	1.0 E-8	W Y
^{249}Cf	3.0 E-08	1.0 E-03	2.0 E-14	8.0 E-10	W
^{250}Cf	7.0 E-08	3.0 E-03	5.0 E-14	2.0 E-09	W Y
^{251}Cf	3.0 E-08	1.0 E-03	2.0 E-14	8.0 E-10	W
^{252}Cf	1.0 E-07	4.0 E-03	9.0 E-14	3.0 E-09	Y
^{253}Cf	1.0 E-05	4.0 E-01	4.0 E-12	1.0 E-07	Y
^{254}Cf	5.0 E-08	2.0 E-03	4.0 E-14	2.0 E-09	Y
^{250}Es	1.0 E-03	5.0 E+01	3.0 E-09	1.0 E-04	W
^{251}Es	2.0 E-04	8.0 E+00	3.0 E-09	1.0 E-04	W
^{253}Es	6.0 E-06	2.0 E-01	4.0 E-12	1.0 E-07	W
^{254m}Es	9.0 E-06	3.0 E-01	3.0 E-11	9.0 E-07	W
^{254}Es	9.0 E-07	4.0 E-02	3.0 E-13	1.0 E-08	W

Radionuclide	Water		Air		
	DCG-Public		DCG-Public		Solubility class[a]
	µCi/mL	Bq/mL	µCi/mL	Bq/mL	
^{252}Fm	1.0 E-05	5.0 E-01	3.0 E-11	1.0 E-06	W
^{253}Fm	4.0 E-05	1.0 E+00	2.0 E-11	9.0 E-07	W
^{254}Fm	8.0 E-05	3.0 E+00	2.0 E-10	9.0 E-06	W
^{255}Fm	1.0 E-05	5.0 E-01	5.0 E-11	2.0 E-06	W
^{257}Fm	2.0 E-06	7.0 E-02	6.0 E-13	2.0 E-08	W
^{257}Md	3.0 E-04	1.0 E+01	2.0 E-10	9.0 E-06	W
gross alpha[c]	3.0 E-08	1.0 E-03	2.0 E-14	8.0 E-10	W
gross beta[d]	1.0 E-06	4.0 E-02	9.0 E-12	3.0 E-07	Y

[a]To describe the clearance of inhaled radioactive materials from the lung, materials are classified D, W, or Y referring to their retention in the pulmonary region. This classification applies to a range of half-times for D of less than 10 days, for W from 10 days to 100 days, and for Y of greater than 100 days.

[b]For the radionuclide shown, the DCG for external exposure from immersion in a contaminated plume (listed in Figure III-2 of DOE 5400.XX) is more restrictive.

[c]The values shown for gross alpha may be used when it is known that ^{239}Pu is the most limiting alpha emitter present as per section 3 of this appendix. The most limiting isotope shall be specified in the facility effluent monitoring plan for each stream.

[d]The values shown for gross beta activity may be used when it is known that ^{90}Sr is the most limiting beta emitter present as per section 3 of this appendix. The most limiting isotope shall be specified in the facility effluent monitoring plan for each stream.

NOTE: In any case where there is a mixture in air or water or more than one radionuclide, the guide values, for purpose of this appendix, should be determined as follows:

1. Application to Mixtures of Radionuclides. The DCG values are given for individual radionuclides. For known mixtures of radionuclides, the sum of the ratios of the observed concentration of each radionuclide to its corresponding DCG must not exceed 1.0 if the discharge limit is 1 DCG.

EXAMPLE: If radionuclides A, B, and C are present in concentrations C_A, C_B, and C_C, and if the applicable DCGs are DCG_A, DCG_B, and DCG_C, respectively, then concentrations should be limited so that the following relationship exists:

$$\frac{C_A}{DCG_A} + \frac{C_B}{DCG_B} + \frac{C_C}{DCG_C} \leq 1$$

2. To determine compliance with effluent limits based on multiples of the DCG, the sum of the fractions is determined as follows:

$$\frac{C_A}{limit_{CA}} + \frac{C_B}{limit_{CB}} + \frac{C_C}{limit_{CC}} \leq 1$$

where:

C_A, C_B, C_C are the observed concentrations of radionuclides A, B, and C, respectively. The limits are a multiple of the DCG..

If the limits for radionuclide A is 0.04 DCG, the limit for radionuclide B is 1 DCG, and the limit for radionuclide C is 20 DCG, sum of the fractions is determined as follows:

$$\frac{C_A}{(0.04)(DCG_A)} + \frac{C_B}{(1)(DCG_B)} + \frac{C_C}{(20)(DCG_C)} \leq 1$$

3. Conversion from $\mu Ci/cm^3$ to pCi/m^3 for air and pCi/L for water as follows:

   a. Air - $\mu Ci/cm^3 \times E + 12 = pCi/m^3$

   b. Water - $\mu Ci/cm^3 \times E + 09 = pCi/L$

TITLE:

MAXIMUM CONTAMINANT LEVELS

Approved by

R. E. Lerch, Manager
Environmental Division

APPENDIX B

1.0 PURPOSE

The purpose of this Appendix is to provide a listing of the maximum contaminant levels (MCLs) that are utilized as limits and thresholds by the requirements of this manual.

2.0 SCOPE

Maximum contaminant levels were derived for the purpose of establishing acceptable levels of pollutants in public drinking water systems. These levels were initially applied at the well head, and ensured that the community potable water would be safe for consumption by people of all age groups. After their original printing, the MCL values were utilized by several state and Federal laws and agencies as threshold levels in groundwater when determining unacceptable impact to the environment from industrial waste discharges to the soil. Other considerations are also necessary when determining acceptable impact to the environment from liquid effluent sources, and are taken into consideration in the text of this manual.

For the purposes of compliance with the requirements of this manual, the MCL values can be considered the point below which a liquid is no longer considered regulated and above which a liquid must be controlled as a regulated material.

3.0 PRIMARY MAXIMUM CONTAMINANT LEVELS

Arsenic	0.05	mg/l
Barium	1.0	mg/l
Cadmium	0.01	mg/l
Chromium	0.05	mg/l
Fluoride	2.0	mg/l
Lead	0.05	mg/l
Mercury	0.002	mg/l
Nitrate (as N)	10.0	mg/l
Selenium	0.01	mg/l
Silver	0.05	mg/l

Coliform Bacteria	1/100 ml	
Turbidity	1.0	Turbidity Unit

2,4-D	0.10	mg/l
Endrin	0.0002	mg/l
Lindane	0.004	mg/l
Methoxychlor	0.10	mg/l
Total Trihalomethanes	0.10	mg/l
Toxaphene	0.005	mg/l
2,4,5-TP	0.01	mg/l
Benezene	0.005	mg/l
Carbon Tetrachloride	0.005	mg/l
Para-dichlorobenzene	0.075	mg/l
1,2-dichloroethane	0.005	mg/l
1,1-dichloroethylene	0.007	mg/l
1,1,1-trichloroethane	0.2	mg/l
Trichloroethylene	0.005	mg/l
Vinyl Chloride	0.002	mg/l

Gross alpha particle activity (including radium-226, but excluding uranium)	15.0 pCi/l
Radium 226 and 228	5.0 pCi/l
Gross beta particle activity	4.0 mrem/year

4.0 SECONDARY MAXIMUM CONTAMINANT LEVELS

Chloride	250.0	mg/l
Color	15.0	units
Copper	1.0	mg/l
Iron	0.3	mg/l
Manganese	0.05	mg/l
Sulfate	250	mg/l
Total dissolved solids	500.0	mg/l
Zinc	5.0	mg/l

Specific conductivity	700.0	µmhos/cm
Foaming Agents	0.5	mg/l
Odor	3	Threshold odor number
Corrosivity	Non-Corrosive	
pH	6.5 - 8.5	

5.0 REFERENCES

1. WAC 248-54-175, "Maximum Contaminant Levels."

2. 40 CFR 141, "National Primary Drinking Water Regulations."

3. 40 CFR 143, "National Secondary Drinking Water Regulations."

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APPENDIX B1.0 PURPOSE

The purpose of this Appendix is to provide a listing of the Maximum Contaminant Levels (MCLs) that are utilized as limits and thresholds by the requirements of this manual.

APPENDIX B2.0 SCOPE

Maximum Contaminant Levels were derived for the purpose of establishing acceptable levels of pollutants in public drinking water systems. These levels applied at the well head and ensured that the community potable water would be safe for consumption by people of all age groups. After their original printing, the MCL values were utilized by several state and Federal laws and agencies as threshold levels in groundwater when determining unacceptable impact to the environment from industrial waste discharges to the soil. Other considerations are also necessary when determining acceptable impact to the environment from liquid effluent sources and are taken into consideration in the text of this manual.

For the purposes of compliance with the requirements of this manual, the MCL values can be considered the point below which a liquid is no longer considered regulated and above which a liquid must be controlled as a regulated material.

APPENDIX B3.0 MAXIMUM CONTAMINANT LEVELS FOR ORGANIC CHEMICALS

The maximum contaminant levels for organic chemicals are as follows (WAC 248-54-175):

a. Chlorinated hydrocarbons

Endrin	0.0002 mg/L
Lindane	0.004 mg/L
Methoxychlor	0.1 mg/L
Toxaphene	0.005 mg/L

b. Chlorophenoxys

2,4-D	0.1 mg/L
2,4,5-TP Silvex	0.01 mg/L

c. Trihalomethanes 0.10 mg/L

APPENDIX B4.0 MAXIMUM CONTAINMENT LEVELS FOR NONRADIOACTIVE CHEMICAL AND PHYSICAL CONTAMINANTS

Primary chemical and physical contaminants	Level
Arsenic	0.05 mg/L
Barium	1.0 mg/L
Cadmium	0.01 mg/L
Chromium	0.05 mg/L
Fluoride	2.0 mg/L
Lead	0.05 mg/L
Mercury	0.002 mg/L
Nitrate (as N)	10.0 mg/L
Selenium	0.01 mg/L
Silver	0.05 mg/L
Turbidity	1.0 TU*

*Turbitity units.

Secondary chemical and physical contaminants	Level
Chloride	250.0 mg/L
Color	15.0 units
Copper	1.0 mg/L
Iron	0.3 mg/L
Manganese	0.05 mg/L
Specific conductivity	700.0 umhos/cm
Sulfate	250.0 mg/L
Total dissolved solids	500.0 mg/L
Zinc	5.0 mg/L

APPENDIX B5.0 REFERENCE

WAC 248-54-175, "Maximum Contaminant Levels."

TITLE:

LISTED DANGEROUS WASTES

Approved by

R E Lerch

Manager, Environmental Division

APPENDIX C1.0 PURPOSE

The purpose of this Appendix is to identify the "listed dangerous wastes" referred to in the text of this manual.

APPENDIX C2.0 SCOPE

The substances identified in this Appendix are implemented through the text of this manual.

APPENDIX C3.0 LISTED DANGEROUS WASTES

The substances are taken from the Washington Administrative Code, Chapter 173-303, "Dangerous Waste Regulations."

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APPENDIX D1.0 PURPOSE

The purpose of this Appendix is to identify the elements and compounds that are designated as hazardous substances by the Clean Water Act (CWA).

APPENDIX D2.0 SCOPE

The designation of these elements and compounds as hazardous includes isomers and hydrates as well as any solutions and mixtures containing these substances.

APPENDIX D3.0 LISTED CLEAN WATER ACT HAZARDOUS SUBSTANCES

The elements and compounds are taken from 40 CFR 116.

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TITLE:

CLEAN AIR ACT REGULATED POLLUTANTS

Approved by

R E Lerch

Manager, Environmental Division

APPENDIX E1.0 PURPOSE

The purpose of this Appendix is to list the pollutants that are being regulated through the Clean Air Act and Federal Register citations.

APPENDIX E2.0 SCOPE

The listing provided in this Appendix are applicable to Parts C, D, and Q of this manual.

APPENDIX E3.0 CLEAN AIR ACT REGULATED POLLUTANTS

Criteria Pollutants 40 CFR 50-52
Particulate matter
Sulfur oxides
Nitrogen oxide
Ozone*
Carbon monoxide
Lead

Significant Pollutants 40 CFR 52
Carbon monoxide
Nitrogen oxides
Sulfur dioxide
Particulate matter
Ozone
Lead
Asbestos
Beryllium
Mercury
Vinyl chloride
Flourides
Sulfuric acid mist
Hydrogen sulfide
Total reduced sulfur compounds

Hazardous Pollutants 40 CFR 61
Mercury
Beryllium
Asbestos
Vinyl Chloride
Benzene
Radionuclides
Inorganic arsenic
Coke oven emissions

Toxic Air Pollutants
Individually established and regulated by State and/or Local Government

*Photochemically produced from volatile organic compounds and oxides of nitrogen.

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TITLE:

TOXIC SUBSTANCE CONTROL ACT SUBSTANCES

Approved by

R E Lerch

Manager, Environmental Division

APPENDIX F1.0 PURPOSE

The purpose of this Appendix is to list the substances controlled under Toxic Substance Control Act (TSCA).

APPENDIX F2.0 SCOPE

The listing provided in this Appendix is implemented in Part Y.

APPENDIX F3.0 LISTED SUBSTANCES

Polychlorinated biphenyls (PCBs) (40 CFR 761)
Fully halogenated chlorofluoroalkanes (40 CFR 762)
Asbestos (40 CFR 61)
Dibenzo-para-dioxins/dibenzofurans (40 CFR 766)

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TITLE:

CERCLA/SARA AND WDOE REPORTABLE QUANTITIES

Approved by

R E Lerch

Manager, Environmental Division

APPENDIX G1.0 PURPOSE

The purpose of this Appendix is to identify the Comprehensive Environmental Resource Conservation Liability Act (CERCLA)/Superfund Amendment and Reauthorization Act (SARA), and Washington Department of Ecology (WDOE) hazardous substance reportable quantity (RQ) values applicable to the Hanford Site.

APPENDIX G2.0 SCOPE

The RQ values referenced in this appendix are applicable to unpermitted releases and to releases above federally permitted levels. Therefore, the proper manner for applying these RQ values will vary with type of release (e.g., radioactive airborne, nonradioactive liquid, etc.). See the appropriate part of this manual for the type of release involved to determine the manner in which to apply these RQ values.

APPENDIX G3.0 CERCLA/SARA, AND WDOE REPORTABLE QUANTITIES

The CERCLA RQs are in 40 CFR 302, Table 304.2. The SARA RQs are in 40 CFR 355.

WDOE requires immediate notification of any release of a WDOE hazardous substance that exceeds 22 lbs if the substance would be designated extremely hazardous waste (EHW) and 220 lbs if the substance would be designated DW. The reporting requirement applies whether or not the substance was a waste prior to being released. WDOE also requires that WDOE hazardous substance releases not exceeding the immediate notification reportable quantities be summarized on a monthly basis. The latter requirement is coordinated by Environmental Protection via the "Monthly Release Report."

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TITLE:

COMPLIANCE PLANS

Approved by

R E Lerch

Manager, Environmental Division

APPENDIX H 1.0 INTRODUCTION

A compliance plan is a document allowing continued operation of a noncompliant, yet safe, condition while efforts are made to bring the activity or facility into compliance. As described in Part A, Environmental Assurance may issue compliance plans for situations that are noncompliant with the requirements of this manual, if such compliance plans will not result in an unacceptable impact to the environment. This appendix provides guidance on how to generate such a compliance plan.

APPENDIX H 2.0 APPLICABILITY

Compliance plans may be issued within Westinghouse Hanford Company (WHC) when it has been determined that interim practices can be defined and enacted that are safe and within the applicable local, state, and Federal requirements. The following are suggested as examples in which the development of a compliance plan is the appropriate action for correcting situations that are not in compliance with the requirements of this manual:

- Actions necessary to correct the noncompliant situation have been identified and/or are in progress. In some situations this may involve the scoping, engineering, and cost estimating of remedial actions as required to develop a plan for their funding

- Actions appropriate to a compliance plan are clearly identified but not yet funded. Funding commitments are to be included as part of the compliance plan

- A study is necessary to identify the appropriate actions to correct the noncompliant situation, and interim controls need to be implemented while the study is performed.

APPENDIX H 3.0 APPLICATION FOR COMPLIANCE PLANS

a. Requests--Requests for compliance plans shall be the responsibility of the manager of the noncompliant facility or activity. The organization responsible for the noncompliance shall interface with Environmental Protection while preparing the document.

b. Content--The content of compliance plans shall be kept to the minimum necessary level of detail with additional background for each compliance plan being maintained as an auditable record by Environmental Protection. The following is a discussion of the information required for a compliance plan.

1. Section in WHC-CM-7-5. The specific requirement the compliance plan is to address.

2. Reason for Noncompliance. The request shall identify the reasoning by which immediate compliance to the specific requirement is considered infeasible and any cost/benefit analysis.

3. Proposed Conditions.

   a. Interim limits. The request shall contain recommended interim limits under which the facility can operate. These limits shall be based on past operating experience, applicable regulations, and present operating capabilities. These interim limits shall be negotiated by the requesting organization with Environmental Protection.

   b. Actions and commitment dates--Actions necessary to ensure compliance with interim limits or to further characterize the noncompliant situation shall be identified. Commitment dates shall be included for each action item.

4. Requested duration--Compliance plans shall be issued for the period expected to be required to bring the facility or activity into compliance.

5. Effect of noncompliance--The request shall identify the magnitude of environmental impact that can be attributed to continued or interim noncompliance. An analysis of hazards involved, including the nature, magnitude, and consequences as well as the estimated probability of foreseeable accidents shall be provided. This also applies in situations where the primary effect of noncompliance is risk of (rather than ongoing) environmental impact.

6. Justification for noncompliance--The request shall identify the technical basis for the determination that interim or continued noncompliance is a safe, acceptable practice. The justification shall show that the intent of the addressed requirement is met by the interim conditions.

c. Response--Unless otherwise specified, the manager of Environmental Assurance shall respond to the requesting organization within 15 working days.

APPENDIX H 4.0 ACCOUNTABILITY

a. Tracking.--At the time of issue, compliance plans shall have their expiration, action, and commitment dates reflected in the Automated Action Tracking System (AATS). Organizations responsible for completing compliance plan actions or commitments shall provide written notice to Environmental Protection of item completion prior to their due dates. Environmental Protection shall update the manager of Environmental Assurance of the status of all compliance plans quarterly.

b. An internal letter stating that the noncompliant situation has been corrected shall be prerequisite to closing out a compliance plan. The required letter shall be addressed to the manager of Environmental Assurance from the management of the facility or activity concerned and be approved by the manager of Environmental Compliance Verification.

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APPENDIX I 1.0 PURPOSE

The purpose of this Appendix is to define unique terms and phrases used in this manual.

APPENDIX I 2.0 DEFINITIONS

Administrative Control Value (ACV) is the Operating Contractor's internally imposed release limit for an airborne or liquid effluent. The ACV is usually expressed as a fraction or multiple of the derived concentration guide (DCG)-Public but may also be expressed as a total release value (e.g. curies per year for Kr-85 and tritium). In applying the ACV, the "Unity Rule" applies such that the sum of the fractions of the ACV in an effluent shall not exceed one.

Activity means the use, generation, treatment, storage, disposal, release, or transport of regulated substances.

Acutely hazardous waste means dangerous waste sources and discarded chemicals (as listed in WAC-173-303) that are identified with a dangerous waste number beginning with a "P" or that show an "X" or "A" in the Reason For Designation column.

Airborne radioactive effluents means radioactive particles, mists, vapors, fumes, and/or gases contained or entrained in airborne effluents.

Alarm system means instrumentation which provides an audible and/or visible indication whenever a predetermined value of a parameter (such as concentration of a contaminant or pollutant or stream flow) of an airborne or liquid waste stream is exceeded. A radiation alarm system is a system in which radiation or radioactivity is the measured or detected parameter.

ALARA means as low as reasonably achievable. The implementation of ALARA is described in WHC-CM-4-11, ALARA Program. This concept applies to releases at or below prescribed regulatory limits.

Anisokinetic means a condition which prevails when the velocity of the medium entering a sample probe is different from the velocity of the medium being sampled.

Asbestos trench means that Central Landfill trench that is dedicated to the disposal of asbestos and other insulating material.

Areal contamination means contamination generally confined to less than the first centimeter of soil. Numerically, the areal contamination is the radioactivity content averaged over a suitable area.

Audit means an announced examination of a facility or operation to determine compliance with the specific requirements of this manual.

Average meteorological conditions are the meteorological conditions as recorded by the Hanford Site meteorological station average for the previous 10 years.

Average soil contamination means contamination generally dispersed through the soil. Numerically, the average soil contamination is the radioactivity content averaged over a suitable mass of soil.

Backfill soil means the soil used as a plant growth medium between the depths of 30-120 cm as measured at the restabilization site. Backfill soil shall fall within the range of limiting characteristics of Section L6.0.

BATEA means best available technology economically achievable. Further guidance is available on this subject in WHC-EP-0137, "Best Available Technology (BAT) Guidance Document."

Becquerel (Bq) is the Standard International unit of radioactivity. One Bq is one disintegration per second or:

$$Bq = 2.7 \times 10E\text{-}11Ci$$

Byproduct means any radioactive material (except special nuclear material) yielded in or made radioactive by exposure to the radiation incident to the process of producing or utilizing special nuclear material (Atomic Energy Act of 1954, as amended). Any nonradioactive hazardous component of the waste material will be subject to regulation under RCRA.

Calibration means determining the deviations of an instrument from a standard traceable to the National Bureau of Standards (NBS) or other recognized agency and reporting and/or eliminating the deviations by adjustment.

Central Landfill means the Contractor-operated, DOE-owned disposal site used for trash, and other nonhazardous nonradioactive wastes.

CERCLA Materials are materials defined in 40 CFR 302.4 that exceed reportable quantities as designated in 40 CFR 302.5.

Chelate is an organo-metallic complex in which a ring or multiring structure is formed by the joining of a multivalent cation to 2 or more bonds of an organic molecule (chelating agent).

Chemical trench means the Central Landfill trench that was dedicated for disposal of chemicals, hazardous wastes, and hazardous substances.

Chem-Security Systems site means the site south of Arlington, Oregon, that is approved by the U.S. Environmental Protection Agency (EPA) for disposal of hazardous and extremely hazardous wastes.

Complexant is a chemical species that is able to bond onto another chemical species and thus reduce the availability of that species for further chemical reaction. A chelate is a special case of complexed chemical species, or a chelating agent is one kind of complexant.

Compliance Plan - see Appendix H.

Contamination limit means that concentration limit or activity limit for radioactive materials below which posting restrictions and environmental controls are not necessary to protect personnel or the environment.

Continuous monitoring system - see monitoring system.

Continuous sampling system - see sampling system.

Crib means an underground structure into which liquid wastes are discharged so that most radionuclides are sorbed on the soil before the liquid reaches the groundwater.

Dangerous waste means those solid wastes designated in WAC 173-303-070 through 173-303-103 as dangerous or extremely hazardous wastes. As used in this manual, dangerous wastes will refer to the full universe of wastes regulated by WAC 173-303 (including dangerous and extremely hazardous waste), while the abbreviation "DW" will refer to that part of the regulated universe which is dangerous only.

Demolition waste means solid waste, largely inert waste, resulting from the demolition or razing of buildings, roads and other man-made structures. Demolition waste consists of, but is not limited to, concrete, brick, bituminous concrete, wood and masonry, composition roofing and roofing paper, steel, and minor amounts of other metals like copper. Plaster (i.e., sheet rock or plaster board) or any other material, other than wood, that is likely to produce gases or a leachate during the decomposition process and asbestos wastes are not considered to be demolition waste for the purposes of this regulation.

Derived concentration guide for public exposure (DCG-Public) refers to a concentration of radioactive materials in air or water specified in appendix A of this manual. The DCG-Public are those concentrations of radionuclides in air or water that would result in a maximum effective committed dose equivalent of 100 mrem per year using ICRP 30 dose methodology under conditions of continuous exposure or use (i.e., continuously breathing or being immersed in contaminated air or exclusively drinking contaminated water).

Derived concentration guide for occupational exposure (DCG-Occupational) refers to those concentrations in air or water that an individual would inhale/ingest in a year to result in 5000 mrem/50 yr dose commitment to occupationally exposed individuals.

Detection limit means the smallest concentration of radioactive material in a sample that will yield a net count (above system background) that will be detected with 95% confidence.

$$DL = \frac{\left(4.66sb + \frac{2.72}{T}\right)_{\ell} \lambda \Delta t}{EV(2.22E+06)Y}$$

where

DL = The detection limit as defined above (uCi per unit mass or volume)

sb = The standard deviation of the background counting rate or of the counting rate of a

T = The sample count time in minutes

E = The counting efficiency (counts per disintegration)

V = The sample size (in units of mass or volume)

2.22E+06 = Number of disintegrations per minute per microcurie

Y = The fractional radiochemical yield (when applicable)

= The radioactive decay constant for the particular radionuclide

t = The elapsed time between sample collection (or end of the sample collection period) and time of counting.

Directive means a statement that must be carried out to either provide compliance with applicable requirements or to protect the environment from an undue hazard.

Dispersible means capable of being spread widely.

Disposal means the discharging, discarding, or abandoning of dangerous wastes or the treatment, decontamination, or recycling of such wastes once they have been discarded or abandoned. This includes the discharge of any dangerous wastes into or on any land, air, or water (WAC 173-303-040). This definition also includes the disposal of radioactive materials.

Disposal facility means any facility or part of a facility where hazardous and/or radioactive waste is intentionally placed into or on any land or water at which waste will remain after closure.

Ecology means the Washington State Department of Ecology.

Effluent means an airborne or liquid discharge from a facility after all engineered waste treatment and effluent controls have been effected. The term includes onsite discharges to the atmosphere, lagoons, ponds, cribs, injection wells, french drains, or ditches. The term does not include solid wastes stored or removed for disposal or wastes which are contained in retention basins or tanks prior to treatment and/or disposal.

Environmental Control Limit (ECL) means the environmentally based permit limits and WHC policy as derived from DOE requirements.

Environmental Monitoring Plan (EMP) means the Operational Environmental Monitoring Program and the Facility Effluent Monitoring Plans.

EPA means the U.S. Environmental Protection Agency.

Exhaust system means a stack, gaseous effluent system, building ventilation system, or any system which vents air or gaseous material to the atmosphere.

Exotic Species for purposes of Part X, means all species of plants and animals not naturally occurring, (endemic to), either presently or historically, in the shrub-steppe ecosystem common to the Hanford Site.

Extended remedial soil zone means soil from two to thirty six inches deep.

Extremely Hazardous Waste (EHW) means those dangerous wastes designated in WAC 173-303-070 through 173-303-103 as extremely hazardous.

Facility means a processing plant, tank farm, shop, laboratory, powerhouse or laundry. In addition, this term will be defined as, all contiguous land, and structures, other appurtenances, and improvements on land used for recycling, reusing, reclaiming, transferring, storing, treating, or disposing of dangerous waste, (including treatment, storage and disposal sites as well as groundwater wells). (40 CFR 261 and WAC 173-303-040)

Flow totalization means the cumulative measurement over time of the total quantity of a material in terms of mass or volume.

French drain means a covered or rock-filled encasement with the bottom end open to allow liquids to seep into the ground.

Fugitive particulate material means material that is generated incidental to an operation, process, or activity and is released or dispersed into the open air.

Future Control Zone (FCZ) means a 4 by 8 mile area including the 200 Areas, enclosed by the "Outer Marked Boundary" shown in Figure 4.1 of DOE/EIS-0113 (Vol. 1), Draft EIS for Disposal of Hanford Defense, High- Level, Transuranic, and Tank Waste," March, 1986.

Generator means any person responsible for an act or process which produces dangerous waste, or causes a dangerous waste to become subject to regulation (WAC 173-303-040).

Grab sample means a single sample removed from a stream over a short time interval.

Gray (Gy) is the SI (translated: standard international) unit for absorbed dose.

Gy = 100 rad

Hazardous substance means any liquid, solid, gas, or sludge, including any material, substance, product, commodity, or waste, regardless of quantity, that exhibits any of the physical, chemical or biological properties described in WAC 173-303-090, 173-303-101, 173-303-102 or 173-303-103.

Hazardous waste is waste that is identified or listed in 40 CFR 261. Source, special nuclear material, and byproduct material as defined by the Atomic Energy Act of 1954, as amended, are specifically excluded from the term hazardous waste (DOE Order 5480.2).

HEPA means high efficiency particulate air filter. To qualify as a HEPA, a filter must achieve an efficiency of 99.97% under laboratory conditions and 99.95% after installation in the removal of airborne particulates of greater than 3E-05 cm (0.3 micron) in size.

High level nuclear waste means spent nuclear fuel or radioactive waste resulting directly from the dissolution and reprocessing of spent nuclear fuel. Secondary waste streams resulting from the dissolution and reprocessing of spent nuclear fuel are not considered high level waste.

Immobile radionuclides means all those radionuclides that are sorbed onto Hanford soils and usually would not migrate through the vadose zone or the groundwater below the FCZ.

Inactive crib means a crib that has been designated as permanently out of service.

Inactive Radioactive Waste Site means any waste site that is no longer needed for current operational programs and is not currently an active waste disposal site.

Inert wastes means noncombustible, nondangerous solid wastes that are likely to retain their physical and chemical structure under expected conditions of disposal, including resistance to biological attack and chemical attack from acidic rainwater.

Isokinetic means a condition that prevails when the velocity of a medium entering a sample probe is identical to the velocity of the medium being sampled.

Low-level waste means any gaseous, liquid, or solid waste not classified as high-level waste, Tru waste, or spent nuclear fuel as defined by DOE Order 5820.2, "Radioactive Waste Management." See also Threshold Concentrations.

Maximum contaminant level (MCL) means the drinking water standards specified in 40 CFR 141 - see Appendix B.

Minimum detection limit--see detection limit.

Mixed waste is dangerous waste which also contains radioactivity so as to be classified as radioactive waste in accordance with Part H.

Moderate risk waste refers to certain solid substances (nonliquid, nonaqueous, nongaseous) that are designated DW only and are not regulated as hazardous under 40 CFR 261. This waste is designated as dangerous by the Washington State requirements for Dangerous waste characteristics, Toxic Dangerous Wastes, Persistent Dangerous Wastes and Carcinginic Wastes.

Modified Facility means a facility that undergoes upgrades or changes that total 50% of the fixed capital replacement costs of the facility itself.

Monitored sample means a sample collected in a monitoring system and used to alert operations to nonroutine releases and provide process control.

Monitoring system means instrumentation which provides the near real-time measurement of an airborne or liquid waste stream parameter. The system includes a detector and associated readout components. A continuous monitoring system measures the stream parameter on a near-real time basis or as specified in applicable EPA regulations (e.g., 40 CFR 52, Appendix E; 40 CFR 51, Appendix P) or as defined in applicable ANSI Standards. A

radiation monitoring system is a system in which radiation or radioactivity is the measured parameter. An integrating monitoring system integrates the instantaneously measured parameter over some time period. A sampling system is distinct from a monitoring system in that a sampling system does not measure and read out an instantaneous stream parameter.

Monthly reportable waste is, by virtue of quantity or property, a waste that is a Dangerous Waste or a RCRA Waste but does not require immediate notification to the proper authorities when spilled or released to the environment.

Naturally occurring radioactive materials (see Threshold Concentrations)

Near isokinetic means a condition in which the velocity of the medium entering a sampling probe is within ±20% of the isokinetic condition.

Noncompliance with WHC-CM-7-5 means that the facility, system, equipment, or procedure does not conform to the "ECL" or "shall" requirements of this manual.

Nondangerous waste means any material (solid, liquid, or gas) which meets the following criteria.

- o The waste is not a hazard to public health or the environment.

NOTE: For the purpose of this definition hazardous means any waste or combination of wastes which pose a substantial present or potential hazard to human health or living organisms because such wastes are nondegradable or persistent in nature or because they can be biologically magnified, or because they can be lethal, or because they may otherwise cause or tend to cause detrimental cumulative effects.

- o The waste is not listed on the EPA lists of hazardous wastes as recorded in 40 CFR 261.

- o The waste is not defined in the State of Washington hazardous waste regulations (WAC 173-303) as a dangerous waste.

Normally contaminated airborne or liquid effluent means an airborne or liquid effluent from a facility or area that contains dispersible or unsealed radioactive materials in quantities sufficient to cause releases of radioactive materials in excess of 10% of the ACL averaged over one year (i.e., the total activity present times an appropriate suspendable or immersible fraction divided by the total annual flow exceeds 10% of the ACL.

Open burning means the combustion of material, in the open or in a container, with no provisions for the control of the emission of combustion products.

Operations means the contractor organization responsible for operating plants and facilities.

Organic Compounds means compounds that have carbon and usually hydrogen and oxygen as the main elemental components in their structural framework. However, some species, such as carbonic acid, carbon dioxide, bicarbonate ion, and carbonate ion are not classified as organics. The term "organic" as it is used in this manual is limited to those organics that are classified as toxic, dangerous, or extremely hazardous waste and/or organics that are known to enhance the movement of radionuclides in soil.

Pesticide as used in this manual is intended to be inclusive as defined in the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and covers all pest control chemicals such as herbicides, rodenticides, and insecticides.

Plutonium Processing and Handling Facility Any facility constructed primarily to process plutonium (including Pu 238) and that handles substantial quantities of in-process plutonium where there is a possibility of a release of plutonium to the environs under normal operations or design basis accident conditions in excess of limits set forth in the directive in the 5400 series of DOE orders on Radiation Protection of the Public and the Environment.

Plutonium Storage Facility Any facility constructed to store strategic (category I) quantities of plutonium.

Point of release means the point at which a material is released to the environment (i.e., top of stack, end of pipe).

Polychlorinated biphenyls (PCBs) are substituted derivatives of the compound biphenyl in which from one to ten of the hydrogen atoms have been replaced by chlorine.

Pond means an engineered surface impoundment of water enclosed by a dike or natural land contour used for liquid waste disposal.

Potentially contaminated airborne or liquid effluent means an airborne or liquid effluent from a facility or area that contains radioactive materials in quantities sufficient to cause releases of radioactive materials in excess of 10% of the ACV averaged over one year (i.e., the total activity present times a reasonable suspendable or immersible fraction divided by the annual flow exceeds 10% of the ACV.

Potentially corrosive liquid waste stream is defined as any liquid waste stream that has been identified as having the potential, during upset conditions, to discharge liquid with a pH value of less than or equal to 2 or greater than or equal to 12.5.

Proportional sampling or monitoring means:

- For continuous airborne effluents, that the ratio of the sample flow rate (e.g., the flow through the filter) to the discharge flow rate is constant within acceptable limits in Part D7.0.b.

- For continuous liquid effluents, that the ratio of the sample volume to the discharge volume is constant;

- For batch releases, that the ratio of sample volume to batch volume is constant from batch to batch. (This applies only to the final volumetric composition of the record sample as analyzed by the laboratory.)

Quality Assurance means all those planned and systematic actions necessary to provide adequate confidence that a structure, system, or component will perform satisfactorily in service.

Radiation alarm system (see Monitoring System).

Radioactive liquid effluent means a liquid effluent that has a reasonable potential for containing radioactive materials in quantities such that the annual average concentration is equal to or greater than the MCL. (See Threshold Concentrations.)

Radioactive Mixed Waste means radioactive waste which also contains hazardous waste constituents (as defined by WAC 173-303). Source, special nuclear material, and byproduct material as defined by the Atomic Energy Act of 1954, as amended, are specifically excluded (subject to change).

Radioactive solid waste (See Threshold Concentrations).

RCRA waste is a waste that has been designated by EPA (Published in Federal Register of 1976) that has not yet been included in WAC 173-303 as a Dangerous Waste.

Reasonably Available Control Technology (RACT) means the lowest emission limit a source can meet by applying control technology and economic feasibility. RACT is determined on a case by case basis.

Record sample means a representative sample collected in a sampling system for laboratory analysis and is used as the basis for reporting the amount and concentration of contaminant(s) released to the environment to the Department of Energy, facility operations and Safety.

Regulated Substance means radioactive or nonradioactive materials that are regulated in any way under any regulatory domain. [See Section A10.0.a.] Regulated substance include:

- Dangerous waste (DW and EHW of WAC 173-303)

- Hazardous waste (RCRA)

- Nonhazardous waste (OSDA., particulates)

- Petroleum products

- o Asbestos (TSCA)
- o Polychlorinated biphenyls (PCB)(TSCA)
- o Pesticides (FIFRA)
- o Radioactive materials (defined in parts D, F, K)
- o Substances reportable under CERCLA.
- o Effluent being disposed of in underground injection wells

Release to the environment (spill) includes accidental or intentional discharges via:

1. Direct release to the land surface
2. Releases to ambient air either directly or by way of facility ventilation systems
3. Releases to liquid effluent systems
4. Releases from storage or shipping containers when such releases result in a loss of material as described in 1, 2, or 3 above.
5. Spread of contamination from a previous release or disposal site.

Representative sample means that the average stream parameter being measured occurs in the sample in the same average proportion that it occurs in the environmental discharge.

Sampling system means instrumentation and equipment which remove a part of a liquid or airborne waste stream for subsequent quantitative determination of a stream parameter. The system generally employs such devices as filters, other sample collection media, or effluent traps of some kind. A continuous sampling system removes a part of the stream continuously except during sample change, maintenance, repair, or other necessary outages. A grab sampling system removes an instantaneous part of the stream or removes a part of the stream over a time period.

Sealed means a container having a bonded cover, the container or cover being strong enough to prevent contact with and dispersion of the contents under conditions of use and wear for which it was designed.

Sediment Column means the sediment beneath a crib. Depending on usage, it can mean either the sediment beneath the bottom of the crib and extending to the water table, or all sediment beneath a crib contaminated by radioactive materials.

Separation Areas refers to the fenced 200 Areas and those areas (such as B-Pond and Gable Mountain Pond) which have received or continue to receive liquid waste discharged from previous or current chemical processing and waste management operations. The FCZ includes the Separation area.

Shall refers to requirements that are mandatory requirements based on applicable environmental statutes and regulations, DOE orders, and WHC policy.

Should refers to a guideline or goal only and not a requirement. A facility that does not meet "should" guidelines contained in this manual may nevertheless be in compliance with the requirements of this manual.

Sievert (Sv) means a unit of radiation dose equivalent equal to one joule per kiligram or 100 rem.

Soil at depth means soil below thirty six inches.

Solid waste means any solid, semi-solid, liquid or contained gaseous material, garbage, refuse, sludge, or discarded commodity resulting from a variety of industrial/commercial operations or activities.

Sorption means the retention of a chemical species on sediment particles by either physical or chemical means.

Specification means a detailed description of the parts of a whole; a statement or enumeration of particulars as to actual or required size, quality, or performance.

Spot contamination means: (1) a spot or quantity of contamination less than 1 cu cm in volume, or (2) areal contamination less than 15 sq cm in area.

Standard means a specified set of rules or conditions concerned with the classification of components; delineation of procedures; definition of terms; designation of materials, performance, design, or operations; or measurements of quality in describing materials, products, systems, services, or practices. A standard is more general than a procedure or specification and more specific than a criterion.

Suitable surface area means that area over which spot contamination may be averaged in determining areal contamination. A suitable area shall be no more than 15 sq cm.

Suitable mass means a mass of soil which is representative of radioactive contamination and over which contamination can be averaged to determine concentration. A suitable mass shall be at least 1 kg. The suitable mass sample shall not intentially dilute radionuclide content from exceeding surface or spot contamination limits.

Surface soil means soil from zero to two inches deep.

Survey means a method to detect the release, disposal, or presence of radioactive materials or hazardous substances under a specific set of conditions to determine actual or potential hazards. Such an evaluation may include, but is not limited to, tests, physical examinations, and measurements of radiation or concentrations of materials.

Suspendable fraction means the fraction of material that may become airborne.

Test means the performance of a procedure to determine the status or condition of equipment, components, radioactive sources, or of hazardous material.

Technologically Enhanced Naturally Occurring Radioactivity means refined or processed ores or other materials containing naturally occurring radioactive materials, such that radiation exposure or potential radiation exposure is increased.

Threshold limit value (TLV) The threshold limit value-time weighted average (TLV-TWA)--the time-weight average concentration for a normal 8-h workday and a 40-h workweek, to which nearly all workers may be repeatedly exposed, day after day, without adverse effect.

Threshold Concentrations - Those concentrations of radionuclides in various wastes or substances that do not require the controls of radioactive waste disposal.

Soil/Solid: Soils or other solids containing radionuclides below those listed in Table K-1 may be released for on-site disposal as non-radioactive waste. No offsite release criteria exist. (See Part H)

Liquid: Liquids containing radionuclides in a concentration of less than 0.04 x DCG may be disposed of as non-radioactive liquid waste. This threshold level is equivalent to the EPA Drinking Water Standard (40 CFR 141). (See Part F)

Air: No threshold value exists.

Transporter means a person engaged in the offsite transportation of dangerous waste.

Top soil means the soil used as a plant growth medium at the surface to a depth of 30 cm as measured at the restabilization site. Top soil is added soil to support the stabilization of a retired disposal facility with the objective of controlling erosion, establishing the growth of perennial grasses, and preventing the growth of deep-rooted vegetation. Top soil shall fall within the requirements stated in Section J.50.

Transuranic radionuclide means any radionuclide having an atomic number greater than 92 (DOE Order 5820.2).

Transuranic waste means, without regard to source or form, radioactive waste that at the end of institutional control periods is contaminated with alpha-emitting transuranium radionuclides with half-lives greater than 20 yr and concentrations greater than 100 nCi/g (3700 Bq/g). The Waste Isolation Pilot Plant, high-level waste and spent nuclear fuel as defined by DOE Order 5820.2, are specifically excluded from this definition.,

Triple rinse means the flushing of containers three times, each time using a volume of the normal diluent equal to approximately ten percent of the container's capacity.

NOTE: The rinse liquid shall be properly designated and disposed.

Uncontaminated soil means a soil or a land area which, (1) requires no controls or restrictions in any way for radiation protection purposes, and/or (2) meets the contamination limit specifications of I.30(a).

Unity Rule means that if more than one radionuclide is present, the sum of the fractions represented by each radionuclide concentration divided by its respective limiting concentration (e.g., ACV) shall not exceed unity. This rule could also apply to parameters other than radionuclide concentration (see appendix A, p. A-35).

Unsampled liquid disposal site means a liquid waste disposal site that is currently receiving an effluent stream that does not require sampling in accordance with Part F.

Vadose zone means the zone of aeration in the earths crust above the groundwater level.

Vector means a vertebrate or invertebrate that can transmit toxic, radioactive, or infectious material from a disposal or storage site to uncontrolled areas. Examples: files, birds, mice.

Waste sites means any facility used for the planned disposal of hazardous, radioactive, toxic, or nonradioactive/non-toxic waste.

Acronyms

ASW	means ammonia scrubber waste.
ANSI	means American National Standards Institute.
ASME	means American Society of Mechanical Engineers.
ALARA	means as low as reasonably achievable.
ACV	means administrative control value.
AEA	means atomic energy act.
APCA	means air pollution control area.
BAT	means best available technology
CASS	means Computerized Automated Surveillance System
CERCLA	means comprehensive environmental response, compensation and liability act of 1980.
CPA	means certified pesticide applicator.
CPO	means certified pesticide operator.
CAA	means clean air act.
CWA	means clean water act.
CRR	means Cultural Resource Review.
CDR	means conceptual design report.
CEMS	means continuous emission monitoring system.
DOE	means the U. S. Department of Energy.
DOE-RL	means the U. S. Department of Energy-Richland Operations Office.
DOE-HQ	means the U. S. Department of Energy-Headquarters Office in Washington D.C.
D&D	means decontamination and decommissioning.
DCG	means derived concentration guides.
DW	means dangerous waste.
ECL	means Environmental Control Limits.
EIS	means environmental impact statement.
EHW	means extremely hazardous waste.
ECM	means the Environmental Compliance Manual, WHC-CM-7-5.
EMP	means environmental monitoring plan.
EPA	means the Environmental Protection Agency.
FEMP	means Facility Effluent Monitoring Plan.
FIFRA	means Federal Insecticide Fungicide and Rodenticide Act.
FDC	means facility design criteria.
FCZ	means future control zone.
HEPA	means high efficiency particulate air filter.
HMTA	means hazardous material transportation act
ICV	means interim concentration value.
MCL	means maximum contamination level of 40 CFR 141.
MSDS	means material safety data sheet.
NBS	means National Bureau of Standards
NPDES	means national pollution discharge elimination system.
OSHA	means occupations safety and health act.
OSDA	means on-site sewage disposal act.
OSR	means operational safety requirements.
OSD	means onsite sewage disposal or operational safety document.
PSD	means prevention of significant deterioration.
PCB	means polychlorinated byphenyls.
PCB-ML	means PCB-mark, large (large label)

PCB-ML	means PCB-mark, large (large label)
PCB-MS	means PCB-mark, small (small label)
PCL	means process control limit.
RA	means Regulatory Analysis section.
RACT	means Reasonably Achievable Control Technology
RQ	means reportable quantity.
RCRA	means Resource Conservation and Recovery Act.
RCW	means Revised Code of Washington.
RLW	means radioactive liquid waste.
RMW	means radioactive mixed waste.
SPCC	means spill prevention control and countermeasures.
SUA	means stream, unit, or activity
SHWES	means solid and hazardous waste engineering section
SHWPE	means solid and hazardous waste process engineering
SFMP	means surplus facilities management program.
SDWA	means Safe Drinking Water Act.
SARA	means superfund amendment reauthorization act.
SHWEU	means solid and hazardous waste engineering unit.
SAR	means safety analysis report.
TPY	means tons per year.
TSD	means treatment, storage, or disposal.
TSCA	means Toxic Substance Control Act.
TFPO	means tank farm production operations.
TRU	means transuranic waste.
TLD	means thermoluminesent dosimeter
UST	means underground storage tank.
UO	means unusual occurrence.
UICA	means Underground Injection Control Act.
USFWS	means U.S. Fish and Wildlife Service
VZMP	means vadose zone monitoring plan.
WAC	means Washington Administrative code
WIPP	means waste isolation pilot plant.
WIPP-WAC	means waste isolation pilot plant waste acceptance criteria.
WIDS	means waste information database system
WDOE	means Washington State Department of Ecology.

APPENDIX J1.0 PURPOSE

The purpose of this Appendix is to furnish a consolidated list of the references which serve as a basis for this manual.

APPENDIX J2.0 SCOPE

Unless otherwise noted the statute, regulation, or DOE Order citations listed refer to the latest version of the document that was in effect at the time of manual issuance.

APPENDIX J3.0 SUMMARY

1. Executive Order 11870, Environmental Safeguards or Activities for Animal Damage Control on Federal Lands.
2. Executive Order 11987, Exotic Organisms.
3. DOE Order 1324.2, Records Management.
4. DOE Order 5400.1, Environmental Policy Statement.
5. DOE Order 5480.1B, Environment, Safety, and Health Program for DOE Operations.
6. DOE Order 5480.4, Environmental Protection, Safety, and Health Protection Standards.
7. DOE Order 5480.12, (Draft) General Environmental Protection Program Requirements.
8. DOE Order 5482.1B, Environment, Safety, and Health Appraisal Program.
9. DOE Order 5484.1, Environmental Protection, Safety, and Health Protection Information Reporting Requirements.
10. DOE Order 5700.6B, Quality Assurance.
11. DOE Order 5820.2, Radioactive Waste Management (Guidance Document).
12. DOE Order 6430.1A, Draft General Design Criteria.

13. DOE-RL Order 4300.1A, Real Estate Management.

14. DOE-RL Order 5440.1A, Implementation of the National Environmental Policy Act at the Richland Operations Office.

15. DOE-RL Order 5482.1B, Environmental, Safety, Health, and Quality Assurance Appraisal and Surveillance Program.

16. DOE-RL Order 5484.1, Environmental Protection, Safety, and Health Protection Information Reporting Requirements.

17. DOE-RL Order 5700.1A, Quality Assurance.

18. DOE-RL Directive, M. J. Lawrence, Manager of DOE-RL Operations to Hanford Contractors, "Radiological Release Criteria for Surplus Contaminated Facilities on the Hanford Site."

19. DOE/EIS-0113, Final Environmental Impact Statement - Disposal of Hanford Defense, High-Level, Transuranic, and Tank Wastes, Hanford Site, Volume 1.

20. DOE/EP-0100, Guide for Radiological Characterization and Measurement for Decommissioning of U.S. Department of Energy Surplus Facilities.

21. WIPP-DOE-069, Rev. 2, Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant.

22. WIPP-DOE-157, Rev. 1, Data Package Format for Certified Transuranic Waste for the Waste Isolation Pilot Plant.

23. DOE-RL, Implementation Plan for Hanford Site Compliance to DOE Order 5820.2, Radioactive Waste Management, August 1985.

24. DOE-RL, A. J. Rizzo to Contractors, Richland, Washington, Cultural Resource Review Process, July 10, 1987.

25. DOE-RL, March 1987, "Plan and Schedule to Discontinue Disposal of Contaminated Liquids into the Soil Column."

26. DOE Memorandum, W. A. Vaughn, August 5, 1985, "Radiation Standards for Protection of the Public in the Vicinity of DOE Facilities."

27. DOE Memorandum, J. E. Lytle to Heads of Field Offices, "Additional Implementation Guidance for DOE 5820.2, "Radioactive Waste Management."

28. Nuclear Waste Policy Amendments Act of 1987, Public Law 100-203.

29. 10 CFR 20, Standards for Protection Against Radiation.

30. 10 CFR 61.55, Licensing Requirements for Land Disposal of Radioactive Waste.

31. 10 CFR 962.3, Byproduct Material.

32. 40 CFR 51, Requirements for Preparation, Adoption, and Submittal of Implementation Plans.

33. 40 CFR 52, Approval and Promulgation of Implementation Plans.

34. 40 CFR 60, Standards of Performance for New Stationary Sources.

35. 40 CFR 61, National Air Emission Standards for Hazardous Air Pollutants.

36. 40 CFR 61, Subpart M, National Emission Standards for Asbestos.

37. 40 CFR 112, EPA Regulations on Oil Pollution Prevention.

38. 40 CFR 122, EPA Administered Permit Programs: The National Pollutant Discharge Elimination System.

39. 40 CFR 141, National Primary Drinking Water Regulations.

40. 40 CFR 162, Regulations for the Enforcement of the Federal Insecticide, Fungicide, and Rodenticide Act.

41. 40 CFR 165, Regulations for the Acceptance of Certain Pesticides and Recommended Procedures for the Disposal and Storage of Pesticides and Pesticide Containers.

42. 40 CFR 191, Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-level, and Transuranic Radioactive Wastes.

43. 40 CFR 260-265, Resource Conservation and Recovery Act Hazardous Waste Regulations.

44. 40 CFR 260-270, Hazardous Waste Management System.

45. 40 CFR 261, Regulations for Identifying Hazardous Waste.

46. 40 CFR 262, Environmental Protection Agency Regulations for Hazardous Waste Generators.

47. 40 CFR 264, Regulations for Owners and Operators of Permitted Hazardous Waste Facilities.

48. 40 CFR 264, Subpart F, Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities: Releases from Solid Waste Management Units.

49. 40 CFR 265, EPA Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities.

50. 40 CFR 265, Subpart F, Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities: Ground-Water Monitoring.

51. 40 CFR 270, Regulations for Federally Administered Hazardous Waste Permit Programs.

52. 40 CFR 280, EPA Underground Storage Tank Regulations.

53. 40 CFR 302, EPA Designation, Reportable Quantities, and Notification Requirements for Hazardous Substance Under CERCLA.

54. 40 CFR 355, EPA Regulations for Emergency Planning and Notification Under CERCLA.

55. 40 CFR 370, Emergency and Hazardous Chemical Inventory Forms and Community Right-To-Know Reporting Requirements.

56. 40 CFR 372, EPA Toxic Chemical Release Reporting Regulation.

57. 40 CFR 761, Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution In Commerce, and Use Prohibitions.

58. 40 CFR I71, Certification of Pesticide Applicators.

59. 40 CFR 1501, NEPA and Agency Planning.

60. 53 FR 72, Disposal of Hanford Defense High-Level, Transuranic, and Tank Wastes, Hanford Site, Richland, Washington; Record of Decision (ROD).

61. 16 USC 1531, Endangered Species Act of 1973.

62. 42 USC 6901, Resource Conservation and Recovery Act.

63. 42 USC 9601, et seq, (Superfund), Comprehensive Environmental Response, Compensation, and Liability Act of 1980.

64. ANSI/ASME NQA-1, Quality Assurance Program Requirements for Nuclear Facilities.

65. ANSI N13.1-1969, Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities.

66. ANSI N42.18-1980, Specification and Performance of On-Site Instrumentation for Continuously Monitoring Radioactivity in Effluents.

67. ANSI N317-1980, Performance Criteria for Instrumentation Used for Inplant Plutonium Monitoring.

68. ANSI N323-1978, Radiation Protection Instrumentation Testing and Calibration.

69. PSD-X80-14, Approval of Application to Construct.

70. SW-846, Test Methods for Evaluating Solid Waste - Physical/Chemical Methods.

71. EPA Report, Underground Tank Leak Detection Methodology: A State-of-the Art Review.

72. WAC 16-228, General Pesticide Regulations.

73. WAC 16-230, Use of Chemicals and Chemically Treated Materials in Certain Counties.

74. WAC 16-231, Restricted Use Herbicides.

75. WAC 16-232, Restricted Use of Herbicides in Certain Counties.

76. WAC 173-160, Minimum Standards for Construction and Maintenance of Water Wells.

77. WAC 173-162, Regulation and Licensing of Well Contractors and Operators.

78. WAC 173-201, Water Quality Standards for Waters of the State of Washington.

79. WAC 173-216, State Waste Discharge Permit Program.

80. WAC 173-218, Underground Injection Control Program.

81. WAC 173-220, National Pollutant Discharge Elimination System Permit Program.

82. WAC 173-240, Submission of Plans and Reports for Construction of Waste Water Facilities.

83. WAC 173-303, Dangerous Waste Regulations.

84. WAC 173-304, Minimum Functional Standards - For Solid Waste Handling.

85. WAC 173-400, General Regulations for Air Pollution Sources.

86. WAC 173-403, Implementation of Regulations for Air Contaminant Sources.

87. WAC 173-425, Open Burning.

88. WAC 232-12-011, Wildlife Classified as Protected Wildlife.

89. WAC 232-12-014, Wildlife Classified as Endangered Species.

90. WAC 232-12-279, Conditions for Issuance of Permits for Scientific Collection, Research, or Display.

91. WAC 248-54, Public Water Supplies.

92. WAC 248-54-175, Maximum Contaminant Levels.

93. WAC 248-96, On-Site Sewage Disposal.

94. RCW 17.21, Washington Pesticide Application Act.

95. General Regulation 80-7, Benton-Franklin-Walla Walla Counties Air Pollution Control Authority.

96. City of Richland Ordinance No. 35-84.

97. WHC-CM-1-1, Management Policies, MP 4.3, "Employee Training and Development."

98. WHC-CM-1-1, Management Policies, MP 5.1, "Environmental Assurance."

99. WHC-CM-1-1, Management Policies, MP 5.17, "Waste Minimization."

100. WHC-CM-1-3, Management Requirements and Procedures, MRP 2.16, "Controlled Manual System."

101. WHC-CM-1-3, Management Requirements and Procedures, MRP 5.14, "Event, Critique, and Unusual Occurrence Reporting."

102. WHC-CM-1-3, Management Requirements and Procedures, MRP 5.44, "Waste Minimization Program."

103. WHC-CM-4-1, WHC Emergency Plan.

104. WHC-CM-4-2, Quality Assurance Manual.

105. WHC-CM-4-3, Industrial Safety Manual, Standard C-1, "Polychlorinated Biphenyls."

106. WHC-CM-4-3, Industrial Safety Manual, Standard C-3, "Asbestos Control."

107. WHC-CM-4-9, Radiological Design Criteria.

108. WHC-CM-4-10, Radiation Protection.

109. WHC-CM-4-11, ALARA Program.

110. WHC-CM-4-34, Nuclear Materials Control and Accountability.

111. WHC-CM-5-16, Nonradioactive Dangerous Waste Packaging and Disposal Requirements.

112. WHC-CM-7-3, Effluent Monitoring Program - 100 Areas.

113. WHC-CM-7-4, Environmental Surveillance and Control.

114. WHC-CM-7-6, Environmental Compliance Verification Manual.

115. WHC-EP-0063, Hanford Radioactive Solid Waste Packaging, Storage, and Disposal Requirements.

116. WHC-EP-0137, Best Available Technology (BAT) Guidance Document.

117. WHC-EP-0180, Hanford Environmental Management Program Implementation Plan.

118. AC-5-40 and AC-3-25, Architectural-Civil Standards.

119. HPS-157 through -160-M, High Efficiency Particulate Air Filters.

120. HWS-10278, Dioctyl Phtalate Testing.

121. RHO-SA-153, Surface Soil Contamination Standards for Rockwell Hanford Operations.

122. WHC Internal Memo, 80000-88-049, April 29, 1988, R. E. Lerch to Level 2 Managers, Interim Facilities Requirements.

123. EG-2400, "Development of Criteria for Release of Idaho National Engineering Laboratory Sites Following Decontamination and Decommissioning," EG&G Idaho, Inc., August 1986.

124. PNL-6348, A Manual for Applying the Allowable Residual Contamination Level Method for Decommissioning Facilities on the Hanford Site.

125. "Action Plan for Implementation," in Accordance with Federal Facility Agreement Between U. S. Environmental Protection Agency, U. S. Department of Energy, and Washington Department of Ecology, dated June 1988, and "Consent Decree Between Washington Department of Ecology and U. S. Department of Energy," dated June 1988.

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