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Data Quality Objectives for Regulatory Requirements for Dangerous Waste Sampling and Analysis

C. H. Mulkey

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**DATA QUALITY OBJECTIVES
FOR REGULATORY
REQUIREMENTS FOR
DANGEROUS WASTE
SAMPLING AND ANALYSIS**

Charles H. Mulkey
Westinghouse Hanford Company

Date Published
July 1996

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LIST OF TERMS

CAMU	Corrective action management unit
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFC	Chloroflouorocarbon
CFR	Code of Federal Regulations
DCRT	Double contained receiver tank
DOE	U.S. Department of Energy
DQO	Data Quality Objective
DST	Double-Shell Tank
Ecology	Washington State Department of Ecology
EPA	Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act of 1986
GEA	Gamma Energy Analysis
HCFC	Hydrochlorofluorocarbon
LDR	Land Disposal Restriction
PCB	Polychlorinated biphenyl
QA/QC	quality assurance/quality control
RCRA	Resource Conservation and Recovery Act
RO/DI	Reverse osmosis/Delonized
SST	Single-Shell Tank
TCLP	Toxic Characteristic Leaching Procedure (see appendix II of 40 CFR Part 261)
TEDF	Treatment Effluent Disposal Facility
TPA	Tri-Party Agreement
TWRS	Tank Waste Remediation System
VOC	Volatile organic compound
WAC	Washington Administrative Code
WAP	Waste analysis plan
WDOE	Washington Department Of Ecology
WHC	Westinghouse Hanford Company

GLOSSARY

Dangerous Waste:	Those solid wastes designated in WAC 173-303-070 through 173-303-100 as dangerous, or extremely hazardous or mixed waste. (WAC 173-303-040) May also be defined as hazardous in accordance with 40 CFR 261.3.
Designate:	The act of determining and assigning the Dangerous Waste codes to a waste.
Driver	A rule or regulation which contains a requirement for which analytical data may be required.
Interim Treatment	Treatment of a waste for reasons other than for satisfying a land disposal requirement. An example is the treatment in DSTs to meet corrosion control parameters.
Monitor:	An ongoing program used to sample and report the concentration of contaminants contained in an effluent stream and designed to account for variations in the processes or operations that generate the effluents.
Purgewater	Water generated from purging ground water monitoring wells
Release:	Any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment (including the abandonment or discarding of barrels, containers, and other closed receptacles) of any toxic chemical. (40 CFR 372.3)
Secondary Waste	Waste which is produced as the result of handling or treating waste
Waste Analysis Plan	The document which sets forth analytical requirements and which is submitted as part of the Dangerous Waste Permit.

1.0 INTRODUCTION AND PURPOSE

This document describes sampling and analytical requirements which are needed to meet state and federal regulations for dangerous waste which are under the jurisdiction of TWRS. The requirements were developed using the Tank Waste Remediation Systems (TWRS) Data Quality Objective Procedure (DQO), WHC-IP-1216 (Banning 1996) which is based on the U.S. Environmental Protection Agency (EPA) DQO guidelines (EPA 1994).

A listing of required analyses is contained in Tables 6-1 and 6-2. Brief description of the regulatory drivers which may drive analyses are incorporated into Section 3.0. Regulatory requirements are expected to change as permits are issued and regulations are modified. Therefore this document should not be used to determine overall compliance with Dangerous Waste Regulations as they are in constant change. This document does reflect the latest regulatory requirements at the date of publication.

Federal and state laws and regulations pertaining to waste, contain requirements which are dependent upon the composition of the waste stream. These regulatory drivers require that pertinent information be obtained. Process knowledge of a wastes composition can be used instead of analytical data to characterize or designate a waste. When just process knowledge is used to characterize a waste, it is best management practice to validate the information with analytical measurements.

The purpose of this DQO is to identify data needs for complying with regulatory drivers for the sampling and analysis of dangerous waste managed in or generated from TWRS facilities. These drivers include both specific regulatory requirements and best management practices. (Note: analyses may have more than one regulatory driver associated with it) Data needs include sampling requirements for both radionuclide and non-radionuclide analytes from facility dangerous waste materials. Radionuclides are not a dangerous waste constituent but are included in order to address radiologic concerns relating to waste acceptance criteria for secondary waste. Unless specified differently, it is intended that this DQO not be a driver in determining the sampling schedule. The analyses required by this document should be incorporated into any sampling and analytical plan for TWRS facilities.

Pertinent federal and state regulations were reviewed and those which might result in a data need are listed in the Table 3-1 of Section 3.0. Table 3-1 contains a short description of the regulatory driver and need to obtain additional data. Most drivers are presently not applicable to TWRS activities but are retained in the table for reference. The table also includes the rationale for the decision to either require or not require additional analysis. The applicability of these requirements is based on current TWRS activities. Changes in TWRS activities or regulatory requirements may result in a need to modify these requirements.

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2.0 PROBLEM STATEMENT

Compliance with regulatory requirements can require analysis. These analytical requirements may not be adequately addressed by existing programs and could lead to impacts on compliance with the various environmental regulations (drivers). This document identified the regulatory drivers for analyses and documents them in a Data Quality Objective (DQO). This document (WHC-SD-DQO-025) identifies sampling and analysis requirements for the TWRS facilities which are needed to address environmental regulatory needs associated with Dangerous Waste and which may not be adequately addressed by other existing programs. The specific regulatory drivers for dangerous waste materials are summarized in Section 3.0.

2.1 STAKEHOLDERS

The major programs which might be impacted by the results of this DQO are: East and West Tank Farm Transition Projects, 242-A Evaporator Project, Environmental Cleanup and Compliance Project, Characterization Project, and 222S Laboratory.

2.2 PLANNING TEAM MEMBERS

The following list of personnel have been identified as planning team members for this DQO process. They are: Dave Banning (WHC), Todd Blaak (WHC), Mark Bowman (WHC), Paul Gagnon (WHC), Mike Hall (WHC), Steve Lijek (MACTEC), Chuck Mulkey (WHC), Casey Ruud (RL), and Pamela Powell (WHC).

2.3 APPLICABILITY AND SCOPE OF THIS DQO

The applicability of this document includes all equipment, facilities and operations under the jurisdiction of TWRS which generate or handle dangerous waste, as defined by WAC 173-303-040 (see glossary). Table 8-1 lists analytical requirements for specified equipment .

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3.0 DECISION IDENTIFICATION

Environmental regulatory drivers for sampling and analyzing dangerous waste from TWRS facilities need to be identified. This document will help ensure that characterization efforts are performed to obtain and maintain compliance with regulations. This DQO addresses three key questions: (1) Why is data required; (2) What data is required; and (3) How will the data be obtained.

Since the scope of this document is limited to regulatory drivers, all data requirements must be related to a regulatory requirement. State and federal regulations governing dangerous (hazardous) waste were reviewed to determine if they contained potentially drivers for analysis. This driver for analysis can be either direct or indirect. In the case of a direct requirement, the regulation specifically mandates that an analysis be taken. In the case of indirect drivers, the regulation does not specifically state that an analysis is required but the analysis is needed to either ensure compliance with a regulation or to support an activity required by a regulation. Table 3-1 contains a listing of the regulatory drivers that were identified as possibly driving a need for an analysis. Also indicated in Table 3-1 is a decision on whether or not this document needs to address the driver and a short rationale for this decision. This was done to minimize analytical requirements and to take advantage of analyses being required by other programs. Table 3-2 takes the drivers listed in Table 3-1 and groups the drivers into generator, storage, treatment, or disposal categories. All drivers which may require additional analyses are indicated by bold lettering. These drivers are discussed further in the following sections. As an aid to future modification to this document, the drivers which do not presently require analysis are maintained in the tables to keep the requirements documented in case changes to operations or other programs cease to adequately address the requirement.

Radionuclides is not one of the listing criteria for dangerous (hazardous) waste. As discussed in section 3.1, analyses for radionuclides was included in order to address waste acceptance criteria for secondary wastes.

Table 3-1
Regulations Which May Require Analyses

Item #	Citation of Regulatory Driver	Description of Potential Analytical Need	Additional* Analysis Needed	Rationale
1	WAC 173-303-071 (3)(k) 40 CFR 268.32 40 CFR 761.60	Identification of specific exemptions relating to PCB	Yes	Some analysis may be necessary to determine if the waste can be exempted from regulation under this section. Analysis which may be needed include those necessary for waste designation and/or PCB concentration.
2	WAC 173-303-100 (5)	Toxicity Criteria	Yes	A determination needs to be made as to whether or not the waste qualifies as a toxic waste. This can be accomplished either by book designation or by analysis. The waste in the tanks has already been designated, but secondary waste (derived from tanks) has not. Analysis of tank waste would be useful for book designation of this newly generated waste.
3	WAC 173-303-100 (6)	Persistence Criteria	Yes	A determination needs to be made as to whether or not a waste contains halogenated hydrocarbons and/or polycyclic aromatic hydrocarbons. This information is used in assigning waste codes which are specific to Washington State. This information would also be useful when designating secondary wastes.

Table 3-1
Regulations Which May Require Analyses

Item #	Citation of Regulatory Driver	Description of Potential Analytical Need	Additional* Analysis Needed	Rationale
4	WAC 173-303-170 WAC 173-303-300(2)	Waste designation and/or confirmation of designation of waste already in TWRS.	Yes	The waste in the tanks has been designated using process knowledge. Confirmation of designation is of limited value for tracking waste codes applicable in specific tanks due to transfers and commingling of waste. Confirmation of designation does have value in designating secondary waste and in obtaining a basis to review the initial conservative designation. Confirmation of designation could result in the eventual removal of waste codes from some or all of the SSTs and DSTs.
5	WAC 173-303-300(2-5)	Confirmation of designation of waste received by TWRS	No	Waste received by TWRS is limited to waste sent to the DST System. The DST Waste Analysis Plan sets forth confirmation requirements and adherence to its requirements should be sufficient to ensure safe storage of the waste. Because waste is not segregated by waste codes in the DSTs, confirmation of specific waste stream designation would add little value.
6	WAC 173-303-390(2),(3)	Facility Reporting	No	Release reports and groundwater monitoring are routinely submitted to the appropriate parties. Existing programs and DQOs should obtain the necessary information, therefore additional analyses are necessary at this time.

Table 3-1
Regulations Which May Require Analyses

Item #	Citation of Regulatory Driver	Description of Potential Analytical Need	Additional* Analysis Needed	Rationale
7	WAC 173-303-395(1)	Precautions for ignitable, reactive, or incompatible waste.	No	The waste in the tanks does not exhibit the characteristics of ignitability or reactivity. Requirements in the compatibility DQO take into consideration the potential for propagating chemical reactions and the mixing of incompatible waste. Therefore no additional analyses are necessary at this time.
8	WAC 173-303-395(2)	Other environmental laws and regulations	No	As long as the requirements specified in the wastewater and air regulatory DQOs are followed, no additional analyses are needed to address other environmental laws and regulations.
9	WAC 173-303-395(30)	Asbestos	No	Adherence to WHC procedures for asbestos are sufficient and no additional analyses are needed.

Table 3-1
Regulations Which May Require Analyses

Item #	Citation of Regulatory Driver	Description of Potential Analytical Need	Additional* Analysis Needed	Rationale
10	WAC 173-303-395(5)	Storage time limits for surface impoundments and piles.	No	The only surface impoundment under TWRS jurisdiction is the Liquid Effluent Retention Facility which is required to be emptied and cleaned on an annual basis to comply with LDR requirements. Issues for this facility are being addressed by Effluent Treatment Facility Personnel, so no analysis are needed by TWRS to address this issue. Contaminated equipment stored by TWRS could be considered waste piles. TWRS contaminated equipment is being managed in accordance with site wide policy which has been reviewed and agreed to by Ecology. Therefore, no additional analysis of this equipment is being required at this time.
11	WAC 173-303-395(6)	Container and tank labeling requirements	No	Existing process knowledge is sufficient to address labeling requirements.
12	WAC 173-303-400(2)(b)(ix)	Elementary neutralization pits	No	TWRS does not have equipment which meets the definition of elementary neutralization pits.
13	WAC 173-303-400(3)(a)	Requirements in 40 CFR Subparts F to R, Subpart W, Subparts AA, BB, and DD	See separate responses for each of these sections later on in this table	The state requirements incorporate the federal requirements by reference.

Table 3-1
Regulations Which May Require Analyses

Item #	Citation of Regulatory Driver	Description of Potential Analytical Need	Additional* Analysis Needed	Rationale
14	WAC 173-303-505	Recyclable material used in a manner constituting disposal	No	TWRS does not handle any of its dangerous waste in this manner, therefore no analysis is necessary.
15	WAC 173-303-506(2)(a)(ii) & (iii)	Reclamation of CFC's & HCFC's	No	Existing programs handle the inspection and repair of equipment containing CFC's and HCFC's so no analysis is needed by TWRS to address these issues.
16	WAC 173-303-510, 515	Use of used oil or dangerous waste for fuel	No	TWRS does not reuse any of its used oil or waste for fuel so no analyses are necessary.
17	WAC 173-303-610	Closure and postclosure	No	Closure of TWRS will be specifically addressed in closure plans. Therefore this document will not further address these issues.
18	WAC 173-303-630 (3), (4)	Labeling and compatibility of waste with storage containers	No	Existing process knowledge is generally sufficient to satisfy labeling requirements.
19	WAC 173-303-630(9)	Special requirements for incompatible wastes	No	TWRS waste which is typically placed in drums consists of contaminated equipment, clothing and other miscellaneous items. Due to the nature of this type of waste it is unlikely that any of the waste will be incompatible with the container. There can be an exception to this, but the exceptions should be dealt with on an individual basis and not specifically in this document.

Table 3-1
Regulations Which May Require Analyses

Item #	Citation of Regulatory Driver	Description of Potential Analytical Need	Additional* Analysis Needed	Rationale
20	WAC 173-303-640(3)	Design and installation of new tank systems	No	This section requires that a registered corrosion engineer address specific soil conditions relating to corrosion during the design and installation of a new tank system. Depending on the availability of existing information, the corrosion engineer may need analysis of the soil. This determination must be made on an individual basis so is not included in this document.
21	WAC 173-303-640 (5)(d),(e)	General requirements pertaining to design and labeling of tank systems	No	Existing knowledge is adequate to address design and labeling issues.
22	WAC 173-303-640 (7)	Response to leaking tanks	Yes	In the event of a leaking tank it may be necessary to conduct analyses to determine the extent of the release and to document cleanup of the spill. Analyses may also be required for the designation of any secondary waste which is produced from the response actions. See WAC 173-303-646 (2)(a)
23	WAC 173-303-645 (4),(5)	Groundwater monitoring for releases from tanks	No	These sections require Ecology to specify in the facility permit the dangerous waste constituents which must be monitored. At this time, TWRS is under Interim Status and the facility permit has not yet been issued. Once the permit is issued it should specify any required analyses.

Table 3-1
Regulations Which May Require Analyses

Item #	Citation of Regulatory Driver	Description of Potential Analytical Need	Additional* Analysis Needed	Rationale
24	WAC 173-303-646 (2)(a)	Corrective action for releases of dangerous waste and dangerous constituents.	Possibly	Analytical requirements associated with releases would be very incident specific, therefore no specific set of analytes can be specified in this document. In general for new spills, removal of the contaminated area as determined by visual observation and radiation measurement is sufficient. Old spills are being cleaned up according to CERCLA or RCRA past practice requirements. Activities may need some analysis in order to document that there has been sufficient cleanup.
25	WAC 173-303-646 (5)	Monitoring of CAMU	No	Ecology must specify monitoring requirements for CAMUs. At this time TWRS does not have any CAMUs, therefore this requirement is not applicable.
26	WAC 173-303-650 (11)(c)	Response action to surface impoundment leaks	Possibly	If liquid is found in a leak detection system some analysis may be required to verify the source of the liquid and to determine the extent of any leak.
27	WAC 173-303-660 (7)	Special requirements for ignitable and reactive waste placed in piles	No	TWRS waste piles consist of contaminated equipment which does not exhibit the characteristics of ignitability and reactivity. (See #7)
28	WAC 173-303-660 (8)	Special requirements for incompatible waste placed in piles	No	TWRS waste piles consist of contaminated equipment and there should not be any compatibility problems associated with the equipment.

Table 3-1
Regulations Which May Require Analyses

Item #	Citation of Regulatory Driver	Description of Potential Analytical Need	Additional* Analysis Needed	Rationale
29	WAC 173-303-680	Miscellaneous Units	No	The only TWRS Facility that is a miscellaneous unit is the purge water facility. Analytical requirements are specified in the Purge water Waste Analysis Plan (McDowell 1996)
30	WAC 173-303-690	Air emissions from process vents	No	The only TWRS facility that falls within the purview of this regulation is the 242-A Evaporator. Analytical requirements are contained in the Evaporator DQO (Von Bergen 1995)
31	WAC 173-303-691	Air emission standards for equipment leaks	Yes	This part and Subpart BB of 40 CFR 264, 265 Subpart BB are applicable to those wastes with an organic content of 10% or more by weight. Determination of the organic content of the waste is necessary in order to determine and document the applicability of the requirements.
32	40 CFR 264, 265 Subpart F	Groundwater Monitoring	No	Groundwater monitoring is being addressed by a separate group. There are no known deficiencies which need to be addressed by this document.
33	40 CFR 264, 265 Subpart G	Closure and Post Closure	No	Analytical requirements for closure and post closure will be documented in plans approved by the regulators.
34	40 CFR 264, 265 Subpart H	Financial Requirements	No	Any analytical needs will be addressed in the closure plans under item #33.
35	40 CFR 264, 265 Subpart I	Container management	No	These issues are addressed in items #18 and 19.

Table 3-1
Regulations Which May Require Analyses

Item #	Citation of Regulatory Driver	Description of Potential Analytical Need	Additional* Analysis Needed	Rationale
36	40 CFR 264, 265 Subparts J	Tank Systems	No	These issues are addressed in items #7,11, 19, 20, 21, 22 and 23.
37	40 CFR 264, 265 Subpart K	Surface Impoundments	No	These issues are addressed in items #10 and 26.
38	40 CFR 264, 265 Subpart L	Waste Piles	No	These issues are addressed in items #27 and 28.
39	40 CFR 264, 265 Subpart M	Land Treatment	No	TWRS does not operate any land treatment facilities.
40	40 CFR 264, 265 Subpart N	Landfills	No	TWRS does not operate any landfills.
41	40 CFR 264, 265 Subpart O	Incinerator	No	TWRS does not operate any incinerators.
42	40 CFR 264, 265 Subpart P	Thermal Treatment	No	Vitrification may fall under this definition but if it does any analytical requirements will have to be met by the group who wins the bid for the project. This should not require any analysis by TWRS.
43	40 CFR 264, 265 Subpart Q	Chemical, physical, and biological treatment	No	These issues can be very case specific and are not being addressed at this time.
44	40 CFR 264, 265 Subpart R	Underground Injection	No	TWRS does not operate any disposal unit where Dangerous Waste is sent to underground injection wells.
45	40 CFR 264, 265 Subpart W	Drip Pads	No	No analyses are needed to address these requirements.

Table 3-1
Regulations Which May Require Analyses

Item #	Citation of Regulatory Driver	Description of Potential Analytical Need	Additional* Analysis Needed	Rationale
46	40 CFR 265.1030 Subpart AA	Vessel Vents	No	The only TWRS facility which is subject to these requirements is the 242-A Evaporator. Adherence to requirements in the Evaporator DQO (Von Bargaen, 1995) is sufficient to address these issues.
47	40 CFR 265.1050 Subpart BB	Equipment leaks	Yes	Analysis is needed for total organic content in order to document the applicability of the subpart.
48	40 CFR 265.1080 Subpart CC	Air Emission Standards for tanks, surface impoundments, and containers	Yes	Currently there is an exemption for mixed waste but this exemption is under evaluation and is expected to be eliminated in the future. In order to determine the impact that removal of this exemption would have, it is a best management practice to determine the VOC content of waste streams entering the DST system.
49	40 CFR 265.1100 Subpart DD	Containment Buildings	No	No additional analyses are needed to address these issues.
50		Complete RCRA Analysis	No	This requirement was brought up by WDOE during meetings on the DST WAP. No specific citations were given and no specific requirements were stated for this requirement. Since all known regulatory requirements under the purview of WDOE are being addressed in this document or one of the other regulatory DQOs, no additional analytical requirements are needed at this time.

Table 3-1
Regulations Which May Require Analyses

Item #	Citation of Regulatory Driver	Description of Potential Analytical Need	Additional* Analysis Needed	Rationale
51		Waste Acceptance	Yes	In order to send a waste to another facility for further treatment or for disposal, the waste acceptance criteria for the receiving facility must be met. This is not a regulatory requirement but is a best management practice which assures that waste is only sent to facilities which can properly handle the waste. TWRS secondary waste which is sent to Solid Waste must meet the acceptance criteria specified by Hanford Site Solid Waste Acceptance Criteria (WHC-EP-0063-4). Therefore it becomes incumbent to meet these requirements.
52	10 CFR 61.55	Waste Classification (radionuclide)	Yes	Mixed waste sent for land disposal must be categorized as high level, or Class A, B, or C. Note: This is being included to address waste acceptance criteria for secondary waste. See #51
53	40 CFR 268.7(a) 40 CFR 268.30(d) 40 CFR 268.31(d) 40 CFR 268.32(a) 40 CFR 268.33(e) 40 CFR 268.32(f) 40 CFR 268.32(l) 40 CFR 268.40	Land Disposal Restrictions	Yes	Analyses to confirm that a waste meets land disposal restriction requirements are required unless an exemption has been granted. TWRS, as a waste generator and treater, has an obligation to ensure that its waste meets these standards prior to ultimate disposal.

* Yes and possibly answers are further discussed in the text in section 3.1, 3.2, and 3.3

Table 3-2 Category Breakdown	
Category	Item # From Table 6-1
Generator	(1), (2), (3), (4), 8, 14, 19, (51), (52)
Storage and Interim Treatment	(4), 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 17, 18, 19, 20, 21, (22), 23, (24), 25, (26), 27, 28, 29, 30, (31), 32, 33, 34, 35, 36, 37, 38, 46, (47), (48), 49, 50, (51)
Final Treatment and Disposal	8, 16, 39, 40, 41, 42, 43, 44, 45, 48, (52), (53)
Other Issues	15

Numbers in parenthesis are those for which further analysis may be required

3.1 GENERATOR REQUIREMENTS (WAC 173-303, 10 CFR 61, and 40 CFR 261, 262, 268, & 761)

The regulations require that waste generators properly designate their waste. Waste designation is accomplished by determining if the waste displays a hazardous characteristic and by determining if the waste originated from a specific source. Characteristic determination can be based on either knowledge of the process or by actual analysis. This waste designation is then used to establish disposal requirements for the waste and to specify any treatment which is required prior to that disposal.

Historically waste received by TWRS was designated by process knowledge since very little analytical information was available. This has led to the same waste designation for each tank and to the liberal placement of characteristic waste codes on the waste in the tanks. Since subsequent disposal requirements are based on waste designation, this has resulted in onerous treatment requirements being placed on the waste which must be met prior to ultimate waste disposal. At this time, waste in the tanks is expected to be treated to meet Land Disposal Restrictions (LDR) through the vitrification process. As long as vitrification meets all treatment requirements, there is not a big need to confirm this conservative designation.

TWRS activities also generate secondary wastes. This waste primarily consists of contaminated equipment and clothing which has been in contact with tank waste. This waste is usually transported to the solid waste facility burial and/or storage. The packaging requirements and other costs associated with this waste are very dependant upon actual composition of the waste, unlike the waste remaining in the tanks.

Analysis of the tank dangerous (hazardous) constituents would be used for verifying the waste designation of each tank and used in designating secondary waste produced from that tank. This information could also be used to identify the underlying hazardous constituent standards which must be met and to determine if any land disposal requirements can be dropped from both tank waste and the secondary waste. Analysis of the secondary waste has been difficult due to timing considerations with meeting the 90-day clock and the inability to obtain samples from some of the equipment due to access limitations.

Analysis of the tank contents could also resolve issues concerning PCB's. Disposal requirements vary with the concentration of PCB. Documentation of PCB content in the tanks and in incoming waste has also been very limited.

Analyses for specific radionuclides is not specifically required by environmental regulations. However, specific requirements have been codified in Nuclear Regulatory Commission Regulations and in Department of Energy Orders. For secondary waste, these requirements are contained in the Hanford Site Solid Waste Acceptance Criteria (WHC 1993) manual.

3.2 STORAGE AND INTERIM TREATMENT (WAC 173-303 and 40 CFR 264, 265, 266, & 267)

Most analytical requirements which apply to the interim storage and treatment of waste are already specified in the DST Waste Analysis Plan (Mulkey & Jones 1995), SST Waste Analysis Plan, 242-A Evaporator Waste Analysis Plan (Basra 1995), and the Purge water Waste Analysis Plan (McDowell 1996). These documents contain requirements pertaining to safe handling of waste and for waste acceptance. These documents do not specifically address analytical needs related to release reporting, response to leaks, and determining applicability of air emission controls.

Various regulations require reporting in the event of a release to the environment. This release can be continuous, intermittent, or a single event. Most of the regulations do not require that analyses be taken but do require reporting if certain quantities are emitted. In determining quantities, analytical information is often quite valuable and can help ensure proper reporting. Section 3 of the Air Regulatory DQO (Mulkey 1995) contains more information on this issue.

In the event of a suspected leak it may be necessary to determine if the fluid found in the detection system is from the tank or surface impoundment. The best method of confirming whether or not the material in the detection system is from a leak is to compare analytical results of the fluid in the detection system with that of the fluid in the suspected source. If there is a close correlation between the two analyses, the leak could be considered confirmed. If the analysis does not match, the leak would remain unconfirmed and further investigation would be necessary. This same type of approach could be used for analysis of groundwater to determine if a particular source has resulted in groundwater contamination.

In recent years the regulations have been amended to require air emission controls on waste processing equipment if the organic content is above specified quantities. Information to document the applicability of these requirements is not required by existing documentation and this information is not generally verifiable via process knowledge.

3.3 FINAL TREATMENT AND DISPOSAL (WAC 173-303 and 40 CFR 264, 265, & 268)

Requirements pertaining to final treatment and disposal ensure that the waste has been treated to specified standards. These standards are commonly referred to as LDR or Land Disposal Requirements. In addition to these LDR requirements is regulation identifies dangerous waste that are restricted from land disposal and defines those limited circumstances under which an otherwise restricted waste may continue to be land disposed. The primary requirement for waste testing under this regulation is found in 40 CFR 268.7(a), which essentially requires that the generators analyze for listed and characteristic waste constituents to determine if they meet LDR treatment standards. Analysis is not required if this information is available via process knowledge.

4.0 DECISION INPUTS

This section addresses the selection of analyses which are needed to meet the needs discussed in section three. These needs can be separated into needs associated with 1) waste designation, 2) safe handling, treatment and storage of the waste, 3) determining applicability of requirements and 4) waste treatment standards which must be met prior to ultimate disposal. Waste designation issues can be addressed by the compounds and characteristics identified in WAC 173-303-090 (for non-radionuclides) and in section 3.4.2 of WHC 1993 (for radionuclides). Analyses required to address safety related issues are addressed in the Compatibility DQO (Fowler 1995) and are not incorporated into this document in order to reduce duplication of requirements. Issues related to determining applicability of the regulations are the same as those with waste designation but with the addition of analysis for total organics which is required to address the air emission regulations. Waste treatment standards and disposal requirements are addressed by Subpart D of 40 CFR 268 and by subpart P of 40 CFR 264 and 265.

Analytical methods specified in Table 6-2 were determined by the regulatory driver which is listed in Table 4-1. The analyses which were not specified by a regulation such as those for radionuclides were chosen based upon normally used analytical methods. Minimum detection limits were chosen based on 50% of the regulatory decision point for non-radionuclides. Detection limits for radionuclides were based on the limits taken from an internal memo from P. A. Gagnon to J. G. Burton dated November 8, 1995.

Table 4-1		
Source of Analytes		
Item #	Analytical Driver	Itemization of analyte or citation reference
1	Waste Designation	WAC 173-303-090 (for non-radionuclides) WHC 1993 and 10 CFR 61.55 (for radionuclides)
2	Waste Treatment Standards	40 CFR 268.48
3	Applicability of Regulations	WAC 173-303-090 40 CFR 264, subpart AA, BB, CC 40 CFR 265 Subpart AA, BB, CC

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5.0 STUDY BOUNDARIES

The scope of this document covers all TWRS units that generate or handle dangerous waste. Specifically this covers the 242-A Evaporator; 204 AR Unloading Station, 222-S Laboratories; DST, SST and DCRT systems; and any identified or new incoming waste streams to the DST system. The scope also includes all dangerous waste which is produced by the TWRS facilities.

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6.0 DECISION RULES

Decision rules for needed analyses were formulated by applying the regulatory drivers for generators, treatment and disposal discussed in Section 3.0 to the units subject to these requirements. As mentioned in the section 1.0 and 3.0, this document does not include requirements which are addressed by other documents such as waste analysis plans, groundwater monitoring plans, and closure plans. This document also does not address analyses which will be required for final waste treatment, analyses associated with monitoring for personnel exposure, treatment by generator issues, and analyses associated with transportation issues. As these documents and regulations change, the effects of the changes will need to be evaluated for their effect on analytical requirements. If these programs fail to adequately address the regulatory driver, then this document should be revised to incorporate the appropriate requirement. Tables 6-1 and 6-2 contain a listing of the analytes for which analysis was deemed to be warranted.

Table 6-1**Non-Radionuclide Analytes**

Analyte	Minimum Quantification Level For Waste Designation Test Method is TCLP (mg/L) unless specified	Minimum Quantification Level For LDR Treatment Standard Test Method is any in SW-846 unless specified (mg/kg)	Minimum Quantification Level For Other Issues Method as specified	Regulatory Driver From Table 4-1
Arsenic	2.5	2.5 mg/l TCLP		1,2
Barium	50	2.5 mg/l TCLP		1,2
Benzene	0.25	5		1,2
Cadmium	0.50	0.10 mg/l TCLP		1,2
Carbon Tetrachloride	0.25	3.0		1,2
Chloroform	3.0	3.0		1,2
Chromium (total)	2.5	0.43 mg/l TCLP		1,2
Cresol (total)	100			1
1,2-Dichloroethane	0.25	3.0		1,2
1,1-Dichloroethylene	0.35	3.0		1,2
2,4-Dinitrotoluene	0.07	70		1,2
Hexachlorobutadiene	0.25	2.8		1,2
Hexachloroethane	1.5	15		1,2
Lead	2.5	0.18		1,2
Mercury	0.1	0.13		1,2
Methyl ethyl ketone	100mg/l TCLP for toxicity 1 mg/kg for F005 listing of secondary wastes	18		1,2

Analyte	Minimum Quantification Level For Waste Designation Test Method is TCLP (mg/L) unless specified	Minimum Quantification Level For LDR Treatment Standard Test Method is any in SW-846 unless specified (mg/kg)	Minimum Quantification Level For Other Issues Method as specified	Regulatory Driver From Table 4-1
Nitrobenzene	1.0	7.0		1,2
Polychlorinated Biphenyl (total)		25		2
Pyridine	50	8.0		1,2
Selenium	2.5	0.08		1,2
Silver	0.50	0.15		1,2
Tetrachloroethyne	0.35	3.0		1,2
Trichloroethylene	0.25	3.0		1,2
2,4,5-Trichlorophenol	200	3.7		1,2
Vinyl Chloride	0.1	3.0		1,2
Corrosivity	0.5 pH unit, SW846 method 9040 or 9041			1
Ignitability	5°F up to 160°F, ASTM D-93-79, D-93-80, or D-3278-78			1
Reactivity (total sulfides and total cyanides)	100 by any method in SW-846	0.43 TCLP cyanide 7 total for sulfides		1,2
Total organic			5 mg/l by EPA method 9060 or 8240 Needed for applicability of subparts AA and BB	3

Analyte	Minimum Quantification Level For Waste Designation Test Method is TCLP (mg/L) unless specified	Minimum Quantification Level For LDR Treatment Standard Test Method is any in SW-846 unless specified (mg/kg)	Minimum Quantification Level For Other Issues Method as specified	Regulatory Driver From Table 4-1
Acetone			1 mg/kg Needed to address F003 listing for secondary wastes	1
Methyl isobutyl ketone			1 mg/kg Needed to address F003 listing for secondary wastes	1
Methylene chloride			0.1 mg/kg Needed to address F002 listing for secondary wastes	1
1,1,1 Trichloroethane			1 mg/kg Needed to address F001 listing for secondary wastes	1
o-Cresol	5 mg/kg	2.8		1,2
p-Cresol	5 mg/kg	2.8		1,2
m-Cresol		2.8		1,2

Table 6-2
Radionuclide Analysis

Analyte	Minimum Quantification Level Ci/m ³	Test Method
³ H	9.9 E+2	radiochemical separation followed by liquid scintillation
⁶⁰ Co	7.5 E-1	GEA
⁹⁰ Sr	1.6 E-4	radiochemical separation followed by liquid scintillation or low background thin window counting
⁹⁹ Tc	2.3 E-4	radiochemical separation followed by liquid scintillation or low background thin window counting
¹²⁵ Sb	*	GEA
¹²⁹ I	8.5 E-5	radiochemical separation and x-ray counting
¹³⁷ Cs	5.5 E-5	GEA
¹⁴⁴ Ce	*	GEA
¹⁵⁴ Eu	*	GEA
²²⁸ Th	*	GEA
²³⁴ U	8.9 E-5	radiochemical separation for alpha spectrometry
²³⁵ U	2.8 E-5	radiochemical separation for alpha spectrometry
²³⁶ U	9.5 E-5	radiochemical separation for alpha spectrometry
²³⁸ U	5.7 E-5	radiochemical separation for alpha spectrometry
²³⁸ Pu	5.7 E-5	radiochemical separation for alpha spectrometry
²³⁹ Pu	1.9 E-5	radiochemical separation for mass spectrometry
²⁴⁰ Pu	1.9 E-5	radiochemical separation for mass spectrometry
²⁴¹ Pu	6.1 E-4	radiochemical separation for thin window beta counting

²³⁷ Np	6.8E-6	radiochemical separation for alpha spectrometry
²⁴¹ Am	2.1E-5	radiochemical separation for alpha spectrometry
¹⁵² Eu	*	GEA
²¹⁴ Bi	*	GEA
Total beta	5.5 E-5	Sample preparation for thin window beta counting
Total alpha	6.8 E-6	Sample preparation for thin window alpha counting

* Specific detection limits are not specified. The GEA analysis should be conducted for the other radionuclides and the presence of these compounds must be reported either as a positive result or a less than quantity.

Note: analysis for the following radionuclides was not included at this time as there is an ongoing effort to establish the quantities of the compounds using a global approach. If that effort fails or stops analysis for these compounds is required.

Ag-108m, Ni-63, Cl-36, Mo-93, Re-187, Cs-135, Pu-242, Fe-55, Pd-107, Ru-106, Pu-236, Am-242m, Ni-59, Cd-113m, Sm-151, Am-243, Se-79, Sn-121m, Th-228, Cm-242, Zr-93, Sn-126, Th-229, Cm-243/244, Nb-93m, Ce-144, Th-230, U-232, Nb-94, Pm-147, Th-232, C-14, U-233, Th-229, Th-230, Th-232, and U-233.

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7.0 DECISION ERROR LIMITS

Per the TWRS DQO Procedures (Banning 1996), decision error limits which define acceptable levels of error for measurement data are to be discussed in this section. However, the regulations do not mandate any specified decision errors, therefore no decision error limits for any TWRS permitted discharges of dangerous waste are addressed in this document. In order to help ensure that the proper decision is made, the minimum detection limits were set at 50% of the regulatory decision. This should ensure sufficient accuracy to meet regulatory requirements.

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8.0 OPTIMIZATION OF SAMPLING AND ANALYSIS DESIGNS

The analytical requirements specified by this document can be met by obtaining grab samples from each of the double and single-shell tanks. Table 8-1 contains a list of what analyses are required. It is not intended that the requirements of this document drive a sampling schedule provided that samples are obtained at the next scheduled sampling event or TWRS Environmental Cleanup & Compliance project decides that an analysis is not required.

Due to lack of existing analytical results optimization of sampling requirements cannot be further refined at this time. For radionuclide analysis there is the potential to reduce the costly speciation of radionuclides by establishing a ratio of isotope concentrations to quantity of element present. If it is decided that this optimization is warranted then analysis for elemental totals of each of the isotopes listed in Table 6-2 must be conducted when the radionuclide samples are taken. After samples from ten different tanks have been subjected to this testing the data can be reviewed to establish any relationships between elemental totals and isotopes. If a relationship is established then there can be a reduction in analysis for future tank samples. TWRS Environmental Cleanup & Compliance Project must approve any such reduction.

8.1 NUMBER OF SAMPLES

In order to obtain an indication of analyte deviation, at least two samples should be obtained from each tank. If analytical results are either close to a regulatory decision point or are two orders of magnitude different from each other, additional samples should be obtained. The number of additional samples required will have to be determined on a case by case basis. Location of samples is not specified but must be taken at a representative location.

8.2 SAMPLING AND ANALYSIS METHODS

All analyses should be conducted as specified in Tables 6-1 and 6-2. The samples should be treated as "EPA Protocol Samples". Any deviations must be approved by the TWRS Environmental Cleanup & Compliance Project.

8.2.1 Sample Handling and Analysis

All samples must be handled and transported to the laboratory in a manner to ensure that the integrity of the samples will be protected. All sample handling documentation must be confirmed by the sampling laboratory. Packaging and shipping requirements consistent with EPA Protocol samples is required

8.3 QA/QC SAMPLES

All Quality Assurance/Quality Control (QA/QC) samples must be collected at the same time that actual samples are collected. The sampling of the tanks must include duplicate samples as specified in section 8.3.2. A set of QA/QC samples must accompany an actual chemical sample to the respective laboratory.

8.3.1 Trip Blanks

A trip blank should accompany all samples. This blank shall be retained and analyzed at the laboratory as if it were an actual sample if any of the tank samples are suspect. The sample collection bottle shall be filled in a manner consistent with sampling protocol. The filled bottle shall travel with the bottle designated for sample collection. The trip blank bottle(s) shall be labeled in the same manner as the actual samples, but shall have a unique sample number. Once tank sample results are shown to be consistent, the blank can be discarded.

8.3.2 Duplicate Samples

At least one duplicate sample shall be collected for every 10 tank samples.

A duplicate sample will be collected at the same time and from the same homogenized mixture that an actual sample is collected. The duplicate shall be analyzed for the same constituents as the actual sample that it represents. The duplicate sample bottles shall be labeled identically to the actual sample, but will be assigned a unique sample number.

8.3.3 Equipment Blanks

Equipment blanks shall be collected at the same time duplicate samples are collected. The equipment blank is to be collected to represent the conditions present during collection of the sample. Reverse Osmosis/De-Ionized (RO/DI) water shall be used to mimic collection of the sample. The equipment blank shall be analyzed for the same constituents as the actual sample that it represents.

The equipment blank sample bottles shall be labeled identically to the actual sample, but will be assigned a unique sample number. This information shall not be indicated on the label, the chain of custody or any other documents that accompany the sample to the laboratory.

**Table 8-1
Analytical Requirements**

Equipment	Issue	Analytes	Frequency	Time Constraints
Single-Shell and Double Shell Tanks	Waste designation of secondary waste and confirmation of any existing designation	Analytes listed in Table 6-1 with a 1 for regulatory driver	One time only for each tank	Should be conducted at next scheduled sampling event.
Single Shell and Double Shell Tanks	Radiologic concerns relating to waste acceptance of secondary waste	Analytes listed in Table 6-2	One time only for each tank	Should be conducted at next scheduled sampling event.
Single Shell Tanks	Land disposal issues including underlying hazardous constituents	Analytes listed in Table 6-1 with a 2 for regulatory driver	One time only for each tank	prior to sluicing and sending the waste to the double-shell tanks or other facility
Double Shell Tanks	Land disposal issues including underlying hazardous constituents	Analytes listed in Table 6-1 with a 2 for regulatory driver	One time only for each tank	After final shipment to the tank and prior to retrieval
Single-Shell and Double-Shell Tanks	Applicability of Regulations	Analytes listed in Table 6-1 with a 3 for regulatory driver	Initially one time for each tank and repeated if process knowledge indicates that the organic content may have changed to alter the applicability of the regulations	Should be conducted at next scheduled sampling event.

Note: Analyses for waste designation are optional if sufficient process knowledge is available. The Environmental Compliance and Support Services must concur with any decision to not sample to confirm waste designation.

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9.0 REFERENCES

- 40 CFR 264, 1980, "EPA Regulations For Owners And Operators Of Hazardous Waste Facilities, "Code of Federal Regulations, as amended.
- 40 CFR 265, 1980, "EPA Interim Status Standards For Owners And Operators Of Hazardous Waste Facilities", Code of Federal Regulations, as amended.
- 40 CFR 268, 1986, "EPA Regulations on Land Disposal ", Code of Federal Regulations, as amended.
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- WAC 173-303, "Dangerous Waste Regulations," *Washington Administrative Code*, as amended.
- WHC, 1993, Hanford Site Solid Waste Acceptance Criteria, WHC-EP-0063-4, Westinghouse Hanford Company, Richland, Washington