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7. Abstract

The WRAP 2A Waste Certification Strategy defines the requirements to certify waste and the functions to be accomplished in order for WRAP 2A to produce a certifiable final waste form. This functional certification strategy is compared to one existing in industry. This document also integrates the certification functions with the ongoing project activities directed at defining how each function will be accomplished. Operational implementation of the strategy is defined in terms of the activities to be performed by various entities of the Solid Waste Operations Complex at the time of WRAP 2A operation and the data elements and material movements associated with these activities.

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**WASTE RECEIVING AND PROCESSING MODULE 2A
WASTE CERTIFICATION
STRATEGY**

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10/1/77

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ACRONYMS

CFR	<i>Code of Federal Regulations</i>
DOE	Department of Energy
EPA	U.S. Environmental Protection Agency
LDR	Land Disposal Restrictions
LETF	Liquid Effluent Treatment Facility
LLBG	Low Level Burial Ground
LLW	Low Level Waste
MLLW	Mixed Low Level Waste
PA	Performance Assessment
RCRA	<i>Resource Conservation and Recovery Act of 1976</i>
TSD	Treatment, Storage, Disposal
TTF	Thermal Treatment Facility
WAC	Washington Administrative Code
WHC	Westinghouse Hanford Company
WID	Waste Immobilization Demonstration
WIPP	Waste Isolation Pilot Plant
WRAP 2A	Waste Receiving and Processing Facility Module 2A

DEFINITIONS

Certification - A statement of professional opinion based upon knowledge and belief (40 CFR 260.10).

Certified Waste - Waste that has been confirmed to comply with disposal site waste acceptance criteria under an approved certification program (DOE Order 5820.2A).

Dangerous Wastes - Dangerous wastes mean those solid wastes designated in Washington Administrative Code 173-303-070 through 173-303-100 as dangerous, or extremely hazardous or mixed waste (WAC 173-303-040).

Final Waste Form - The product of the WRAP 2A process. This form is certifiable and destined for disposal in the Low Level Burial Grounds, a Resource Conservation and Recovery Act (RCRA) interim status disposal facility.

Land Disposal - Land disposal means placement in a facility or on the land with the intent of leaving the dangerous waste at closure, and includes, but is not limited to, placement for disposal purposes in a: Landfill; surface impoundment; waste pile; injection well; land treatment facility; salt dome or salt bed formation; underground mine or cave; concrete vault or bunker (WAC 173-303-140).

Mixed Waste - Mixed waste means a dangerous, extremely hazardous, or acutely hazardous waste that contains both a nonradioactive hazardous component and, as defined by 10 CFR 20.3, source special nuclear, or by-product material subject to the Atomic Energy Act of 1954 (42 U.S.C. 2011 et seq.) (WAC 173-303-010).

Performance Assessment - A systematic analysis of the potential risks posed by waste management systems to the public and environment, and a comparison of those risks to established performance objectives.

Waste Acceptance Criteria - The criteria imposed by a Treatment, Storage, Disposal (TSD) facility on the waste being received for management (treatment, storage or disposal) in the TSD facility.

Waste Immobilization Demonstration (WID) - Test/demonstration work being conducted to define WRAP 2A formulations and control parameters for processing waste. The information generated from WID will help to define WRAP 2A design specifications and operational parameters.

1.0 INTRODUCTION

This document addresses the certification of Mixed Low Level Waste (MLLW) that will be treated in the Waste Receiving and Processing Facility Module 2A (WRAP 2A) and is destined for disposal in the MLLW trench of the Low Level Burial Grounds (LLBG). The MLLW that will be treated in WRAP 2A contains land disposal restricted and radioactive constituents. Certification of the treated waste is dependent on numerous waste management activities conducted throughout the WRAP 2A operation. These activities range from waste treatability testing conducted prior to WRAP 2A waste acceptance to overchecking final waste form quality prior to transferring waste to disposal. This document addresses the high level strategies and methodologies for certifying the final waste form.

Integration among all design and verification activities that support final waste form quality assurance is also discussed. The information generated from this effort may directly support other ongoing activities including the WRAP 2A Waste Characterization Study, WRAP 2A Waste Analysis Plan development, Sample Plan development, and the WRAP 2A Data Management System functional requirements definition.

1.1 OBJECTIVES

The WRAP 2A Waste Certification Strategy was designed to meet the following objectives:

- identify waste certification requirements;
- identify disposal site waste acceptance criteria;
- define overall strategy necessary for WRAP 2A to meet requirements and waste acceptance criteria;
- explain the integration among all ongoing design and verification activities aimed at assuring final waste form quality; and
- define the operational support necessary to achieve the certification strategy.

1.2 BACKGROUND

Over the next 30 years, approximately 24,620 m³ (870,000 ft³) of MLLW currently in storage or forecasted as being generated will be treated and certified by WRAP 2A for permanent disposal. The primary types of solid MLLW to be treated in WRAP 2A consist of inorganic sludges and powders, debris, and lead. The proposed feed streams for WRAP 2A fall into seven major categories. These include: debris generated from various sources; secondary solids generated by Liquid Effluent Treatment Facilities (LETfs) processes; ion exchange resins; particulates and sludges from various sources; waste resulting from the solar evaporation, in the 183-H basins, of neutralized acid etch solutions

from N-reactor fuel fabrication; ash from thermal treatment; and "special" wastes which include elemental mercury, lead, and lab packs from various sources (Kruger and Sheriff 1993). Each category is described briefly below.

- **Debris Waste.** Debris waste is projected to account for approximately 40% of the total WRAP 2A feed and is expected to consist primarily of trash such as clothing, plastic, tumbleweeds, concrete, piping, and equipment that is suspected of having contacted dangerous or hazardous waste. Debris waste is defined by the Resource Conservation and Recovery Act (RCRA) (40 CFR 268.2(g)(h)).
- **Secondary Solids from LETFs.** This waste stream is comprised of secondary solids generated at the Effluent Treatment Facility (Project C-018) and the Treated Effluent Disposal Facility (Project L-045). Secondary solids for both projects C-018 and L-045 could contain spent ion exchange resins, characteristic toxic metals, and listed organics. These waste streams are projected to account for approximately 32% of the WRAP 2A feed.
- **Particulate and Sludge Waste.** This waste stream is projected to account for approximately 12% of the total WRAP 2A feed and is expected to consist of a wide range of materials including sludge, absorbed liquids, ash, soot, powder, absorbent material, soil, spent ion exchange resin, and asbestos. Most of this waste stream is expected to be dangerous waste because of the material it has contacted or absorbed, not because of the properties of the waste itself.
- **183-H Basin Waste.** This waste stream is estimated to comprise approximately 8% of the total feed to WRAP 2A. The 183-H basins were used as solar evaporation facilities for neutralized acid etching solutions from Hanford reactor fuel fabrication activities. During their active lifetime, minor quantities of discarded chemical products were also added to these basins.
- **Thermal Treatment Ash.** Ash from the Thermal Treatment Facility (TTF) is projected to account for approximately 6% of the total WRAP 2A feed. The TTF facility has not been constructed, and the configuration of the TTF feed stream has not yet been firmly established. It is uncertain what types of wastes will be treated in the TTF.
- **Special Waste.** The special waste stream is comprised of several smaller waste streams and is projected to account for approximately 2% of the total WRAP 2A feed. Expected types of wastes include elemental mercury from instrumentation, discarded cleaning products, lab packs, and lead.

Each of the projected waste feeds for WRAP 2A are restricted from land disposal, unless the wastes are treated to meet U.S. Environmental Protection Agency (EPA) treatment standards (40 CFR 268.40). Treatment standards are established to protect human health and the environment and are expressed in the form of a concentration limit or as a specified technology (McCoy 1993). The percentage breakdown of feed streams expected for processing in WRAP 2A and the associated treatment standard category are shown in Figure 1-1.

Figure 1-1. WRAP 2A Feed Streams by Treatment Standards.

WRAP 2A FEED BY TREATMENT STANDARDS

Source: Kruger, O.L., and Sheriff, M.L., 1993 *Waste Receiving and Processing, Module 2A Feed Specification*, WHC-SD-W100-RD-001, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

W2AFBTS

To prepare waste to meet EPA Land Disposal Restrictions (LDR) treatment standards for permanent disposal, WRAP 2A will process, package, and certify the waste streams described above. The waste will be processed through various process lines to screen, shred, crush, dry and treat the waste as required prior to final immobilization or encapsulation. Three separate production lines are dedicated to Special Waste Processing, Debris Processing, and Particulate/Sludge Processing. Immobilization in grout or polyethylene will be used to physically capture the waste in a stabilized matrix to prevent radioactive or hazardous materials from being released to the environment after disposal. The final waste form will then be placed in a metal product container for shipping and eventual disposal. Figure 1-2 graphically illustrates the flow of material through WRAP 2A.

1.3 SCOPE

This document describes the strategy for the certification of the final waste form that results from the treatment of MLLW in WRAP 2A. This document consists of the following sections:

- **Section 1.0** introduces the objectives, background, and scope of this effort.
- **Section 2.0** identifies the certification requirements imposed on WRAP 2A. It presents the LLW certification requirements, disposal site acceptance criteria, land disposal restricted waste certification requirements, and other applicable regulatory requirements.
- **Section 3.0** functionally describes the waste certification strategy and relates this strategy to a benchmark in industry.
- **Section 4.0** describes the design and verification activities that will be needed to support further development of certification functions.
- **Section 5.0** depicts the implementation of the WRAP 2A certification strategy within the Solid Waste Operations Complex.
- **Section 6.0** lists the references used in this document.

WRAP MODULE 2A MATERIAL FLOW DIAGRAM

Figure 1-2. WRAP 2A Material Flow Diagram.

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Source: UE&C, 1994 WRAP 2A Advanced Conceptual Design Requirements, United Engineers and Constructors, Denver, Colorado.

2.0 WASTE CERTIFICATION REQUIREMENTS AND WASTE PERFORMANCE CRITERIA

In order to develop a workable waste certification strategy, the certification requirements imposed on WRAP 2A must be thoroughly identified. Since the final waste form generated from WRAP 2A is MLLW, the certification requirements of the Department of Energy (DOE) Orders as well as the Federal and State regulations apply. According to 40 Code of Federal Regulations (CFR) 260.10, certification *"means a statement of professional opinion based upon knowledge and belief."* Certified Waste, as defined in DOE Order 5820.2A, is *"waste that has been confirmed to comply with disposal site waste acceptance criteria ... under an approved certification program."*

Section 2.1 outlines the requirements of DOE Order 5820.2A (DOE 1988) that are applicable to the radioactive constituents in the waste being processed at WRAP 2A. Section 2.2 presents the land disposal restricted waste certification requirements of 40 CFR 268 (EPA 1991) that are associated with the land disposal restricted fraction of the waste being processed in WRAP 2A. Section 2.3 details the other regulatory requirements of 40 CFR 264/265 (EPA 1992) and the Washington State Administrative Code (WAC), Section 173-303 (Ecology 1991), which impose performance standards on the WRAP 2A final waste form.

2.1 LOW LEVEL WASTE CERTIFICATION REQUIREMENTS

DOE Order 5820.2A, *Radioactive Waste Management*, and Richland Operations Office Implementing Document, RLID 5820.2A (DOE-RL 1993), provide the guidelines, policies, and minimum requirements by which the DOE manages MLLW and contaminated facilities. These orders define the performance objectives for DOE Low Level Waste (LLW) disposal sites and dictate the certification requirements associated with LLW destined for disposal.

The performance objectives are defined in terms of effective dose equivalent (mrem/yr) to any member of the public from a migration or intrusion scenario. The order requires that a Performance Assessment (PA) of the disposal site be prepared and maintained for the purpose of demonstrating compliance with the performance objectives defined by DOE Order 5820.2A. The PA is *"a systematic analysis of the potential risks posed by waste management systems to the public and environment, and a comparison of those risks to established performance objectives."*

The draft LLBG PA indicates that, for waste accepted into the burial grounds for disposal, certain radionuclides must be stabilized and the radionuclide inventory must be known. These requirements translate to LLBG waste acceptance criteria, which in turn translate to performance criteria for the WRAP 2A waste form and to the radionuclide data that must accompany this waste form to disposal. The need to define the quantity of each major radionuclide present in waste packages is further emphasized in DOE Order 5820.2A (III)(m).

As defined in DOE Order 5820.2A, generators of waste are required to implement a LLW certification program to provide assurance that the waste acceptance criteria for any LLW treatment, storage, or disposal (TSD) facility used by the generator are met. For a treatment facility like WRAP 2A, certified waste is waste that has been confirmed to comply with disposal site waste acceptance criteria under an approved certification program. This certification program is to describe methods used to determine radioactive material content of the waste (e.g., assay, material balance, etc.) and to ensure compliance with the applicable disposal criteria (Willis 1993).

2.2 LAND DISPOSAL RESTRICTED WASTE CERTIFICATION REQUIREMENTS

The requirement to certify land disposal restricted waste was promulgated in 40 CFR 268. This certification requirement is actually imbedded within § 268.7, Waste Analysis. Waste analysis is broad term that refers to a variety of waste testing methods. Waste analysis requirements imposed on treatment facilities are covered in 40 CFR 264/265 Subpart B, General Facility Standards (§ 264.13/265.13, General Waste Analysis) as well as under Part 268, Land Disposal Restrictions (§ 268.7, Waste Analysis). The following discussion of waste analysis and waste analysis plans is provided to form the ground work for understanding how the land disposal restricted waste certification requirements relate to waste analysis.

The general waste analysis requirements of 40 CFR 264.13/265.13 require that an owner or operator obtain a detailed chemical and physical analysis of a representative sample of the waste to obtain all information which must be known to treat the waste. General waste analysis requirements also dictate that the owner or operator prepare a waste analysis plan.

The waste analysis plan is to specify parameters for which each hazardous waste will be analyzed, test methods that will be used to test for these parameters, the sampling method which will be used to obtain a representative sample and the frequency with which the initial analysis of the waste will be reviewed or repeated to ensure that the analysis is accurate and up to date. In addition, where applicable, the waste analysis plan is to specify the methods that will be used to meet the additional waste analysis requirements for specific waste management methods (e.g. testing to demonstrate the absence or presence of free liquid (§264.314) and adherence to applicable concentration-based treatment standards (§268.7)).

The waste analysis requirements of §268.7 (in Part 268 - Land Disposal Restrictions) dictate the need to test wastes treated to concentration-based standards to assure that the treatment residue or extract meets the applicable treatment standards. (Note that no testing is specified for waste with technology-based treatment standards.) It is also within § 268.7 that certification requirements are defined.

For waste with treatment standards expressed as concentrations in the waste or the waste extract, the LDR certification statement attests to the proper operation and maintenance of the treatment process as a means of assuring compliance with performance levels. The associated certification statement, defined by 40 CFR 268.7(b)(5)(i), reads as follows:

"I certify under penalty of law that I have personally examined and am familiar with the treatment technology and operation of the treatment process used to support this certification and that, based on my inquiry of those individuals immediately responsible for obtaining this information, I believe that the treatment process has been operated and maintained properly so as to comply with the performance levels specified in 40 CFR Part 268 Subpart D and all applicable prohibitions set forth in 40 CFR 268.32 or RCRA section 3004(d) without dilution of the prohibited waste. I am aware that there are significant penalties for submitting a false certification, including the possibility of fine and imprisonment."

For wastes with treatment standards expressed as technologies, this certification attests to treatment in accordance with the technology-based standards defined in 40 CFR 268.42. The associated certification statement, defined by 40 CFR 268.7(b)(5)(ii) reads as follows:

"I certify under penalty of law that the waste has been treated in accordance with the requirements of 40 CFR 268.42. I am aware that there are significant penalties for submitting a false certification, including the possibility of fine and imprisonment."

The information needed to support these certification statements is more comprehensive than the information obtained from waste analysis, as evidenced by reference to the maintenance and operational practices in the final statement. A complete certification strategy for WRAP 2A requires more than physical and chemical testing of WRAP 2A's incoming and outgoing waste. A program to certify waste is not unlike other certification programs for a variety of other products produced in other industries. A strategy for certifying waste is discussed further in Section 3.0.

Finally, it should be noted that an LDR certification statement is not required to accompany land disposal restricted waste to land disposal if the treatment and disposal occur onsite. The final rule for land disposal restricted solvents (51 *Federal Register* 40572, November 16, 1986) stated: *"Generators who are also treatment, storage, or disposal facilities must place the same information [required by the notice] in the operating record of the facility, although a formal notice and manifest are not required."* Also, in 40 CFR 264/5.73(b)(11), (12), (13) and (14), the distinction is made between offsite requirements (*"a copy of the notice and certification"*) and onsite requirements (*"the information contained in the notice"*) regarding retention of records and waste analyses.

Hanford Site practice will dictate whether or not a formal certification will accompany land disposal restricted waste to disposal. Regardless, the same information required to support the certification statement is to be placed in the facility operating record. For the purposes of this strategy document, it is assumed that WRAP 2A will certify waste being sent to disposal. It is recognized, however, that it is not important whether or not the certification statement will be required but rather that a methodology for generating the information to support such a statement is available.

2.3 OTHER WASTE PERFORMANCE CRITERIA IMPOSED BY DISPOSAL FACILITY REGULATIONS

As discussed previously in Section 2.1, the disposal site performance objectives defined by DOE Order 5820.2A translate to waste acceptance criteria and, subsequently, to waste form performance criteria for WRAP 2A final waste forms. Operating standards for final and interim status disposal facilities (defined in 40 CFR 264 Subpart N and 40 CFR 265 Subpart N, respectively) impose additional requirements on WRAP 2A final waste form performance.

Landfills are prohibited from accepting wastes that contain free liquids. As specified in 40 CFR 264.314(d)(1)/265.314(c)(1), *"Containers holding free liquids must not be placed in a landfill unless: (1) All free-standing liquid: (i) has been removed by decanting, or other methods; (ii) has been mixed with absorbent or solidified so that free-standing liquid is no longer observed; or (iii) has been otherwise eliminated;"* Landfills are also prohibited from accepting waste having significant void spaces. As specified in § 264.315/265.315, *"Unless they are very small, such as ampules, containers must be either: (a) At least 90 percent full when placed in the landfill; or (b) Crushed, shredded, or similarly reduced in volume to the maximum practical extent before burial in the landfill."*

These free liquid and void space restrictions reduce leachate generation and the potential for subsidence, resulting in improved long-term performance of the landfill. It becomes the responsibility of WRAP 2A to demonstrate that the final waste form can meet these landfill requirements in addition to being certifiable.

3.0 LAND DISPOSAL RESTRICTED WASTE CERTIFICATION STRATEGY

The certification statement required by 40 CFR 268.7(b)(5)(i) (see Section 2.2) has created much concern because there are "*significant penalties for submitting a false certification.*" The individual who signs this statement must certify that he/she personally has examined and is familiar with the treatment technology and operation of the treatment process used to support the certification. In addition, this individual must attest to the fact that the treatment process has been maintained properly.

Adherence to a waste analysis plan will be necessary to dispose of waste from WRAP 2A. However, the data elements necessary to support a certification statement may be broader than those obtained solely through waste analysis. The certification strategy developed in this effort goes beyond waste testing and relies on process development, treatability work and other elements of an overall treatment system. Certification can be viewed as an integrated system consisting of both data collection and data verification rather than as a single signed statement.

3.1 WASTE CERTIFICATION FUNCTIONS

In order to institute a certification process at WRAP 2A, integration among various Westinghouse Hanford Company (WHC) entities will be required. Since this document is being written from a WRAP 2A operational perspective and waste certification for disposal is viewed as the primary responsibility of the treatment facility, WRAP 2A is considered to be the director of the process. Other WHC entities are viewed as support organizations.

The high order objectives that drive final waste form quality assurance are "*protect human health*" and "*protect the environment*". The various functions that must be accomplished to assure successful treatment, thus producing an acceptable final waste form, will be undertaken as part of WRAP 2A operations or will be accomplished with the support of other organizations (e.g., Laboratory, Quality Assurance, Waste Acceptance, etc.).

Figure 3-1 provides a logic diagram depicting the WRAP 2A functions that must be accomplished in order to demonstrate final waste form acceptability for disposal. The higher order (more inclusive) functions are at the left of the diagram. The supporting functions are to the right of the higher order functions. The functions narrow in scope as one proceeds to the right side of the diagram. All functions that fall to the right of the scope line represent actions needed to demonstrate the acceptability of the final waste form for disposal.

The following is a description of the functions that appear in Figure 3-1.

- **Determine Radionuclide Composition.** The radionuclide composition of the incoming waste as well as the radionuclide composition of the final waste form must be known. This function may be accomplished through administrative tracking.

WASTE CERTIFICATION PROCESS - FUNCTION ANALYSIS DIAGRAM

Figure 3-1. WRAP 2A Certification Functions.

- **Confirm Incoming Waste Identity.** This function confirms the generator's physical and chemical characterization through limited analysis of the waste feed. This confirmation is the means by which operations assures that the waste received is the waste expected. The verification of bulk physical/chemical characterization also serves to assure that process control parameters are maintained.
- **Support Formulation Selection.** In order to assure the waste can be treated effectively, key chemical and physical characteristics/ concentrations of new waste streams are assessed to support treatability studies. This information is used to select an appropriate formulation for demonstration.
- **Verify Raw Material Quality.** The quality of the raw material to be used in the immobilization process is verified. This function is conducted to assure that acceptable operational parameters are maintained. This function may be accomplished by requiring material certification from the raw material supplier and most likely will focus on those final waste form impacting parameters defined by the WRAP 2A Waste Immobilization Demonstration (WID) effort.
- **Operate Process Within Design Control Limits.** In order to demonstrate WRAP 2A operations are maintained within defined control limits, the following actions must occur:
 - 1) Control limits must be determined.
 - 2) Key operational parameters must be monitored.
 - 3) Off normal situations must be detected and corrected.
 - 4) Equipment must be maintained.
- **Demonstrate Formulation.** Prior to sending new waste streams to WRAP 2A for treatment, treatability studies are used to demonstrate acceptable immobilization formulations. These treatability studies are expected to continue into the operational phases of WRAP 2A.
- **Conduct Treatability Studies.** Treatability studies demonstrate that the immobilization formulation selected for a given waste stream results in an acceptable final waste form. Treatability studies are conducted on waste samples and are performed prior to accepting waste for full-scale treatment.
- **Overcheck Final Waste Form Quality.** Final waste form quality is ascertained by analysis and testing in order to demonstrate adherence to the disposal site waste acceptance criteria and the concentration-based treatment standards.
- **Maintain Data.** This function must be performed throughout the process. Data collected throughout the process will culminate in certification package(s) for WRAP 2A final waste forms. One industry concept for developing a certification package is presented in Section 3.2.

3.2 WASTE CERTIFICATION MODEL FROM THE WASHINGTON STATE PUBLIC SECTOR

The Burlington Environmental (Burlington) approach to creating the certification package can serve as a benchmark for how WRAP 2A might generate the data required to support the certification statement. The Burlington system has been approved by Washington State Department of Ecology and is being used to support waste certification at five different Resource Conservation and Recovery Act (RCRA) TSD facilities: four in the Seattle area and one in Kansas City, Missouri. The Burlington approach involves several well-defined operating stages during which data is collected and/or verified. A detailed discussion of each of these stages and the data management system is provided below.

3.2.1 The Profile Approval

The majority of the data collected for a given waste is gathered during the profile approval phase. The profile approval is conducted prior to Burlington's acceptance of a new generator's waste stream for treatment. The intent of this step is to evaluate the generator's waste stream and to determine whether Burlington can provide the treatment services required. The generator must submit a completed "*Generator's Waste Material Profile Sheet*" (henceforth referred to as the profile sheet) and a sample of their waste to Burlington. This profile sheet contains all information needed to assure proper transport, storage, treatment and disposal of the waste. After receipt of the sample and the profile sheet, the profile approval system is initiated. The profile approval system is an interactive process that involves representatives from Burlington's laboratory, sales, quality control, regulatory affairs and operations organizations. This system is depicted in Figure 3-2. When executed, this system assures the accuracy of the generator's waste stream information on the profile sheet and ensures that Burlington has the capability to properly treat the generator's waste stream. At the end of this effort, the generator (referred to as customer on Figure 3-2) is notified that their waste will be accepted for treatment at a selected Burlington facility.

3.2.2 Waste Receipt, Treatment and Disposal

When the selected Burlington treatment facility receives the generator's waste, samples are taken from one or more containers in the shipment, and a fingerprint analysis is performed to confirm the waste's identity. Fingerprint analysis is a subset of the full analysis that was performed on the waste sample during the profile approval process. Specific analyses, selected for the fingerprint during the profile approval step, serve as a means of verifying that the waste received is the same waste for which the profile sheet was generated.

Once the fingerprint analysis has been completed, the waste is treated. The treatment facility uses the information generated during the profile approval stage to determine the treatment parameters for this specific generator's waste. (During the profile approval process, Burlington's research and development personnel conducted treatability studies on the waste sample to confirm that the formulation they selected will result in an acceptable final waste form.)

Figure 3-2. Profile Approval System.

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As most of Burlington's waste is being treated to concentration-based standards, the final waste form is sampled so that analysis can be conducted as required by regulation. Waste shipment to the disposal facility is initiated prior to obtaining the analysis results, and as soon as the results are available, they are electronically transmitted to the disposal facility to coincide with arrival of the waste shipment.

3.2.3 Data Management

The data collection and verification performed throughout the waste handling stages utilizes an interactive database system. Data is logged at each of the steps of the process, and quality control checks are performed at specified points. Even reviews and review comment incorporation are handled in the electronic environment of the data management system.

The data management system architecture provides for different levels of access to assure data quality. Data access levels are dependent on a combination of job function and process phase. For example, a sales representative would not have "data entry" access to the sample analysis results field, but may have "read only" access to that field and "data entry" access to the associated comment field. A laboratory representative would have "data entry" access to the sample analysis results field at the time the data is initially entered, but would have "read only" access after the data had been quality control checked.

By the time the waste is sent to the disposal facility, an entire qualified data package has been generated for it. This data package, in combination with process equipment maintenance records, serves as the basis by which an individual can sign the LDR certification statements defined in 40 CFR 268.7(b)(5).

3.3 APPLICATION OF BENCHMARK CERTIFICATION TO WRAP 2A

A certification system similar to Burlington's could be applied to WRAP 2A operations. The storage/disposal acceptance process that already exists within WHC could be expanded to include all of the elements of the Burlington profile approval process. Many of the entities involved in the Burlington process also exist within WHC; for example, both have laboratory, quality control, and operation functions. In addition, the WRAP 2A WID function parallels Burlington's Research and Development function, specifically in the confirmation of waste stream treatability.

The design and verification activities that will further define the functions of the certification strategy are discussed in greater detail in Section 4.0. Operational implementation of this strategy, which is based on the Burlington approach described above, is defined in Section 5.0.

4.0 ACTIVITIES TO DEFINE CERTIFICATION FUNCTIONS

At this stage of the WRAP 2A design, how each function of Figure 3-1 will be accomplished has not been fully defined. There are several concurrent efforts directed at achieving an operational WRAP 2A facility that produces a certifiable final waste form. Many of these ongoing activities have already been mentioned (e.g., WID); however, it is important to understand more fully each activity and the role each plays in the integrated effort. This section provides a brief description of each ongoing design/verification activity and defines how each relates to one or several functions of the certification strategy.

4.1 ONGOING DESIGN AND VERIFICATION ACTIVITIES DEFINING WASTE CERTIFICATION FUNCTIONS

The primary objective of the WRAP 2A facility is to treat waste so that it is acceptable for land disposal. In addition to this strategy document, there are several other key ongoing activities directed at assuring that this primary objective can be achieved at the time WRAP 2A becomes operational. The following is a brief description of each of these activities:

- **WRAP 2A DESIGN.** The WRAP 2A design effort will produce the design media from which the WRAP 2A facility will be constructed. The Advanced Conceptual Design Report has been issued (UE & C, 1994), and Title I Design is now proceeding.
- **WASTE IMMOBILIZATION DEMONSTRATION.** Initially, the WID effort confirmed the technical basis for the process selection in WRAP 2A. The WID is now an ongoing formulation demonstration effort that will define the stabilization formulations to be used for processing various WRAP 2A feed streams. In addition, the WID encompasses some of the initial treatability study work. Similar treatability study work potentially could continue throughout the operational life of WRAP 2A. For additional information on WID, refer to the following documents: 1) *WRAP Module 2A Waste Form Qualification Plan*, WHC-SD-W100-TP-002, Rev. 0 (Burbank 1993), 2) *WRAP Module 2A Waste Form Qualification Status Report*, WHC-SD-W100-TI-003, Rev. 0 (Benar 1993a), and 3) *WRAP 2A Process Confirmation Plan*, WHC-SD-W100-SD-001, Rev. 0 (Benar 1993b).
- **EQUIPMENT VERIFICATION.** Demonstration/verification of key equipment is being conducted in parallel with the WRAP 2A design effort. The *Solid Waste Operations Complex Engineering Verification Program Plan*, WHC-SD-W306-PAP-001, Rev. 0 (Bergeson 1994), identifies those verification activities required to support the WRAP 2A project technical basis and the design effort.

- **PROCESS CONTROL PLAN.** The process control plan will describe the WRAP 2A immobilization systems, their controls and the final waste form quality requirements to be achieved by the system. This document will evolve into operating procedures to support WRAP 2A process operation. (The process control plan is presently being written, but no references are available at this time.)
- **WASTE CHARACTERIZATION STUDY.** The waste characterization study will address those certification strategy functions related to characterization. This study will fully define criteria associated with each function, identify administrative and design mechanisms for accomplishing each of these functions and evaluate equipment alternatives where applicable. (Work on the waste characterization study has begun; however, no references are available at this time.)

4.2 INTEGRATION AMONG ONGOING DESIGN AND VERIFICATION ACTIVITIES

There are a number of interdependencies among the various ongoing design and verification activities defined in Section 4.1. As few as one or as many as four activities may be defining how a single function will be performed at the time of WRAP 2A operation. The following matrix correlates the WRAP 2A design and verification activities to the WRAP 2A certification functions for which they will be defining criteria or method of performance.

FUNCTIONS	ONGOING DESIGN AND VERIFICATION ACTIVITIES				
	WRAP 2A DESIGN	WID	EQUIPMENT VERIFICATION	PROCESS CONTROL PLAN	WASTE CHARACTERIZATION STUDY
DETERMINE (RADIONUCLIDE) COMPOSITION	X				X
CONFIRM (INCOMING WASTE) IDENTITY	X			X	X
<ul style="list-style-type: none"> Verify (Bulk Physical/ Chemical) Characterization 	✓			✓	✓
VERIFY (KEY CHEMICAL) CONCENTRATIONS (IN WASTE/RECYCLE)	X				X
VERIFY (RAW MATERIAL) QUALITY	X			X	
OPERATE PROCESS (WITHIN CONTROL LIMITS)	X	X	X	X	
<ul style="list-style-type: none"> Monitor (Key Operation) Parameters Correct (Off-Normal) Situations Maintain Equipment Determine (Control) Limits 	✓	✓	✓	✓	
DEMONSTRATE FORMULATION		X	X		
<ul style="list-style-type: none"> Conduct (Treatability) Studies 		✓			
OVERCHECK (FINAL WASTE FORM) QUALITY	X		X		X
MAINTAIN DATA	X				

5.0 OPERATIONAL IMPLEMENTATION OF THE WRAP 2A CERTIFICATION STRATEGY

This document fully investigates the requirements to certify waste, defines functional steps for achieving waste certification and compares this approach to one in the waste management industry. The certification strategy presented in this document depends on several functions conducted throughout the generation, storage, treatment, and disposal of a waste. These various critical functions will be performed by a number of entities, many of which will be under the purview of WRAP 2A and some which will not be. Full understanding of what must be done to certify waste for disposal leads to an understanding of how the WRAP 2A facility and other Solid Waste Operations Complex facilities must operate in support of a certification program. The following operational scenario is based on current WRAP 2A design, the functional certification strategy (Section 3.1), and the Burlington model (Section 3.2).

5.1 PROPOSED OPERATIONAL SCENARIO

Prior to the acceptance of a waste by Solid Waste Operations, the generator must designate the waste (Willis 1993). Designation is the mechanism used to ensure that future waste handling activities, such as transportation and storage, will be performed in a safe manner. Prior to treatment at WRAP 2A, the waste may be further characterized in order to define key parameters that may impact the process but were not included in the original designation information. Based on the characteristics of a given waste, a grout or polyethylene formulation will be selected. This formulation then may be demonstrated using an actual waste sample. These characterization and formulation demonstration activities are most applicable to those wastes with concentration-based treatment standards.

All characterization and treatment information associated with a given waste serves to define the profile for that waste. Prior to treatment of a batch of the given waste, a subset of the waste containers may be randomly tested for fingerprint parameters to confirm that it meets the profile established for the waste. Once confirmed, the waste is batched and transferred to the treatment process within WRAP 2A. Just prior to entering the WRAP 2A process, a final visual check of the containers (e.g., bar code check) assures that the waste intended to be treated with a selected process and formulation is the waste that has been received at the treatment facility. Once it enters the process, the waste is treated using the demonstrated formulation in a specially designed and controlled process. For those wastes treated to concentration-based treatment standards, a sample of the final waste form is subject to testing to confirm that the final waste form is acceptable for disposal. After treatment in WRAP 2A, waste is returned to storage until it can be accepted at the disposal facility. The certification data package is a compilation of validated data generated during all of the preceding activities and is maintained in the WRAP 2A operating record.

Each of these steps, conducted throughout the life of a waste, contributes to the confidence in the quality of the final waste form. The degree of confidence in the information provided by each process step dictates if succeeding steps of the process are performed and the degree to which they are performed. For example, in the case of a waste stream that is routinely treated at WRAP 2A, there generally will be a very high

degree of confidence that newly generated waste can be successfully treated in the same manner as previous waste from the same source. In fact, there may be such a high degree of confidence in producing an acceptable final waste form that the formulation demonstration is omitted and only minimal fingerprint testing is conducted prior to waste batch treatment.

Based on the above operational scenario, Figure 5-1 summarizes waste flow for those wastes destined for treatment in WRAP 2A. The upper portion of Figure 5-1 depicts the life cycle of waste which has already been generated or will be generated in the near term (referred to as "existing waste"). The flow of "existing wastes" through the system is based on current Hanford practices (Willis 1993). The lower portion of Figure 5-1 defines the life cycle for future generated waste that will be generated just prior to or during the time of WRAP 2A operation. This "future generated waste" flow diagram is a simplification of the "existing waste" flow diagram since it minimizes the number of waste container movements in support of sampling.

5.2 KEY ELEMENTS OF THE PROPOSED SCENARIO

Several key elements of the certification strategy and the resulting "future generated waste" flow diagram should be emphasized. These include the following:

- The generator should be encouraged to provide the waste analysis needed to support formulation selection and demonstration. This will reduce WRAP 2A sampling activities and associated drum movements in support of formulation selections/demonstration.
- Between waste generation and waste treatment, there are several different mechanisms available that contribute to the confidence in the final waste form quality. Flexibility exists to use each mechanism to the extent required to obtain the needed level of confidence in the incoming waste and the formulation to be used in treatment. This high degree of confidence assures process efficiency. The need for this level of confidence is further emphasized by the WRAP 2A design, which does not routinely accommodate removal of waste once it has entered the process.
- The critical path (dashed arrow) includes waste sampling, analysis and formulation demonstration activities. By performing these activities prior to receipt of the waste by WRAP 2A, they have been effectively uncoupled from the main processes of WRAP 2A.
- In order to remain uncoupled from the main process, critical path activities must be scheduled sufficiently in advance of waste processing. This must be done to maintain sufficient "ready to feed" waste feed inventories to support desired process throughput.
- Sufficient storage must be provided to maintain the necessary waste feed inventories and to store final waste form inventories destined for disposal until analysis and testing work has been completed.

Figure 5-1. Flow Diagram for Waste Destined for WRAP 2A Treatment.

FLOW DIAGRAM FOR WASTE DESTINED FOR WRAP 2A TREATMENT

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- Box Breakdown Area operations may be on the critical path if generator production of new waste feeds in 55-gal drums is not sufficient to maintain sufficient WRAP 2A waste feed inventories.

5.3 INTEGRATION WITHIN THE SOLID WASTE MANAGEMENT SYSTEM

In order to assure a fully effective WRAP 2A operation, the ongoing WRAP 2A design and verification activities (section 4.2) must also be integrated with the larger solid waste management system. The WRAP 2A design will dictate how the WRAP 2A facility must operate, however, existing solid waste operating procedures (e.g., *Hanford Site Solid Waste Acceptance Criteria* [Willis 1993]) define current solid waste operating philosophies which, in turn, limit the WRAP 2A operating basis and drive the facility design. Existing solid waste operations also will define the system into which WRAP 2A must integrate. Prior to WRAP 2A operations, the existing solid waste operating system must evolve to the point that the needs of future treatment facilities are addressed when accepting waste for storage. This evolution directly influences the implementation of the WRAP 2A certification strategy and will define whether the flow shown for "existing" waste or "future generated" waste in Figure 5-1 is implemented. Figure 5-2 depicts the integration of various design/verification/strategy activities and the iterative aspects of the overall WRAP 2A certification strategy implementation.

It should be recognized that as the WRAP 2A design progresses more and more detailed activities must be accomplished in order to further define WRAP 2A operations. A Quality Assurance Program Plan may further define the WRAP 2A operational strategy. In addition, the process of determining data quality objectives will help to define the contents of the Waste Analysis Plan in the WRAP 2A RCRA permit, and, in turn, the permit will dictate an operational basis for the facility. These activities and their impacts have not been fully defined at this time, but this certification strategy may be refined as the iterative process proceeds throughout design and construction of WRAP 2A.

Figure 5-2. WRAP 2A Certification Strategy Implementation.

WRAP 2A CERTIFICATION STRATEGY IMPLEMENTATION

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