WHC-EP-0342
Addendum 18

2101-M Laboratory Wastewater Stream-Specific Report

Prepared for the U.S. Department of Energy
Office of Environmental Restoration
and Waste Management

Westinghouse
Hanford Company Richland, Washington

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

Approved for Public Release

This report has been reproduced from the best available copy.
Available in paper copy and microfiche.
The U.S. Department of Energy and its contractors can obtain copies of this report from:
Office of Scientific and Technical Information
P.O. Box 62
Oak Ridge, TN 37831
(615) 576-8401
This report is publicly available from:
National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
(703) 487-4650

Printed in the United States of America

DISCLM-1.CHP (7-90)

START

0010821

WHC-EP-0342
Addendum 18

2101-M Laboratory Wastewater Stream-Specific Report

Prepared for the U.S. Department of Energy
Office of Environmental Restoration
and Waste Management

Westinghouse
Hanford Company Richland, Washington

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

Approved for Public Release

THIS PAGE INTENTIONALLY
LEFT BLANK

WHC-EP-0342
Addendum 18

UC-630

2101-M Laboratory Wastewater Stream-Specific Report

Operations Support Services Department

Date Published
August 1990

Prepared for the U.S. Department of Energy
Office of Environmental Restoration
and Waste Management

Westinghouse
Hanford Company
P.O. Box 1970
Richland, Washington 99352

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

THIS PAGE INTENTIONALLY
LEFT BLANK

2101-M LABORATORY WASTEWATER STREAM-SPECIFIC REPORT

OPERATIONS SUPPORT SERVICES DEPARTMENT

ABSTRACT

The proposed wastestream designation for the 2101-M Laboratory Wastewater wastestream is that this stream is not a dangerous waste, pursuant to the Washington (State) Administrative Code 173-303, Dangerous Waste Regulations.* *A combination of process knowledge and sampling data was used to make this determination.*

---

*Ecology, 1989, *Dangerous Waste Regulations*, Washington (State) Administrative Code (WAC) 173-303, Washington State Department of Ecology, Olympia, Washington.

THIS PAGE INTENTIONALLY
LEFT BLANK

This page intentionally left blank.

EXECUTIVE SUMMARY

The proposed wastestream designation for the 2101-M Laboratory Wastewater is that it is not a dangerous waste, pursuant to the Washington (State) Administrative Code (WAC) 173-303, *Dangerous Waste Regulations**. This proposed designation is based on applying both process knowledge and sample data to the WAC 173-303 requirements for the three types of dangerous waste: (1) listed, (2) criteria, and (3) characteristic dangerous waste. Current operations in the 2101-M Facility use very little, if any, materials that might lead to the disposal of regulated wastes in the 2101-M Laboratory Wastewater. The activities that are now being conducted in the facility are limited to soil testing, soil sample archiving, stores warehousing and staff work in administrative offices. Chemical constituents present in the old data set that may be of potential regulatory concern are likely due to discontinued previous activities (such as the Basalt Waste isolation Program).

Process knowledge used in this report was based on such things as present operating knowledge of the facility and Material Safety Data Sheets for all chemical products stored or used in the laboratory. Sample data consists of samples taken between September 9, 1985 and January 26, 1987. It has not been possible to qualify the old data as "validated data." New samples have not yet been taken because at the point of discharge to the 2101-M Pond the wastewater is now below the pond surface.

---

*Ecology, 1989, *Dangerous Waste Regulations*, WAC 173-303, Washington State Department of Ecology, Olympia Washington.

This page intentionally left blank.

LIST OF TERMS

BWIP	Basalt Waste Isolation Project
DOE	U.S. Department of Energy
EC%	percent equivalent concentration
Ecology	Washington State Department of Ecology
EP	extraction procedure
EPA	U.S. Environmental Protection Agency
HH	halogenated hydrocarbons
HVAC	heating, ventilation, and air conditioning
PAH	polycyclic aromatic hydrocarbons
PUREX	Plutonium/Uranium Extraction (Plant)
SARA	*Superfund Amendments and Reauthorization Act*
Tri-Party Agreement	*Hanford Federal Facility Agreement and Consent Order*
WAC	Washington (State) Administrative Code
Westinghouse Hanford	Westinghouse Hanford Company

This page intentionally left blank.

CONTENTS

CONTENTS (continued)

LIST OF FIGURES

LIST OF TABLES

This page intentionally left blank.

PRELIMINARY 2101-M LABORATORY WASTEWATER STREAM-SPECIFIC CHARACTERIZATION REPORT

1.0 INTRODUCTION

1.1 BACKGROUND

In response to the *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) (Ecology et al. 1989), comments from the public were received regarding reduction of the discharge of liquid effluents into the soil column. As a result, the U.S. Department of Energy (DOE), with the concurrence of the Washington State Department of Ecology (Ecology), and the U.S. Environmental Protection Agency (EPA), committed to assess the contaminant migration potential of liquid discharges at the Hanford Site (Lawrence 1989).

This assessment is described in the *Liquid Effluent Study Project Plan* (WHC 1990). A portion of this study consists of characterizing 33 liquid effluent streams. The characterization consists of the following elements: process description, sampling data, and dangerous waste regulations concerning designation contained in the Washington (State) Administrative Code (WAC) 173-303 (Ecology 1989).

The results of the characterization study are documented in 33 separate reports (i.e., one report for each wastestream). The complete list of stream-specific characterization reports is given in Table 1-1. This document is one of the 33 reports and is Addendum 18, "2101-M Laboratory Wastewater."

1.2 APPROACH

This report characterizes the 2101-M Laboratory wastewater stream in sufficient detail so that a wastestream designation, in accordance with WAC 173-303 *Dangerous Waste Regulations*, can be proposed.

This characterization strategy (shown in Figure 1-1) is implemented by means of the following steps.

1. Describe both process and sampling data (Sections 2.0 and 3.0, respectively).

2. Integrate the data (Section 4.0).

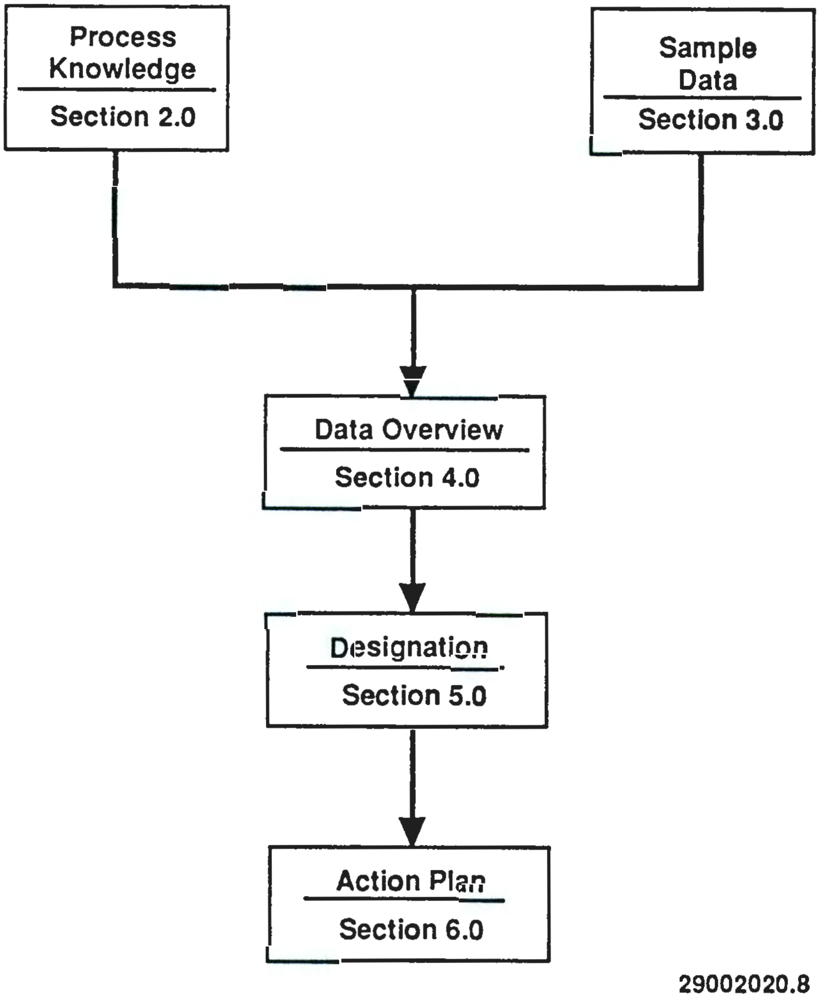
3. Propose a designation (Section 5.0).

4. Design an action plan, if needed, to obtain additional characterization data (Section 6.0).

Table 1-1. Stream-Specific Characterization Reports.

WHC-EP-0342	Addendum 1	300 Area Process Wastewater
WHC-EP-0342	Addendum 2	PUREX Plant Chemical Sewer
WHC-EP-0342	Addendum 3	N Reactor Effluent
WHC-EP-0342	Addendum 4	163N Demineralization Plant Wastewater
WHC-EP-0342	Addendum 5	PUREX Plant Steam Condensate
WHC-EP-0342	Addendum 6	B Plant Chemical Sewer
WHC-EP-0342	Addendum 7	UO_3/U Plant Wastewater
WHC-EP-0342	Addendum 8	Plutonium Finishing Plant Wastewater
WHC-EP-0342	Addendum 9	S Plant Wastewater
WHC-EP-0342	Addendum 10	T Plant Wastewater
WHC-EP-0342	Addendum 11	2724-W Laundry Wastewater
WHC-EP-0342	Addendum 12	PUREX Plant Process Condensate
WHC-EP-0342	Addendum 13	222-S Laboratory Wastewater
WHC-EP-0342	Addendum 14	PUREX Plant Ammonia Scrubber Condensate
WHC-EP-0342	Addendum 15	242-A Evaporator Process Condensate
WHC-EP-0342	Addendum 16	B Plant Steam Condensate
WHC-EP-0342	Addendum 17	B Plant Process Condensate
WHC-EP-0342	Addendum 18	2101-M Laboratory Wastewater
WHC-EP-0342	Addendum 19	UO_3 Plant Process Condensate
WHC-EP-0342	Addendum 20	PUREX Plant Cooling Water
WHC-EP-0342	Addendum 21	242-A Evaporator Cooling Water
WHC-EP-0342	Addendum 22	B Plant Cooling Water
WHC-EP-0342	Addendum 23	241-A Tank Farm Cooling Water
WHC-EP-0342	Addendum 24	284-E Powerplant Wastewater
WHC-EP-0342	Addendum 25	244-AR Vault Cooling Water
WHC-EP-0342	Addendum 26	242-A Evaporator Steam Condensate
WHC-EP-0342	Addendum 27	284-W Powerplant Wastewater
WHC-EP-0342	Addendum 28	400 Area Secondary Cooling Water
WHC-EP-0342	Addendum 29	242-S Evaporator Steam Condensate
WHC-EP-0342	Addendum 30	241-AY/AZ Tank Farms Steam Condensate
WHC-EP-0342	Addendum 31	209-E Laboratory Reflector Water
WHC-EP-0342	Addendum 32	T Plant Laboratory Wastewater
WHC-EP-0342	Addendum 33	183-D Filter Backwash Wastewater

Figure 1-1. Characterization Strategy.



1.3 SCOPE

The scope of this report is the characterization of the current 2101-M Laboratory Wastewater effluent with a corresponding analysis to propose a waste designation for the effluent. There is no new validated data (after October 1, 1989) available for this wastewater. This is a consequence of the sampling point used in the past now being below the pond surface.

The scope involves identification and characterization of all of the contributing sources of the effluent. These have been identified by reviewing available drawings and completing a field inspection. They have been identified as follows:

1. 2101-M Building room sinks and laboratory sinks wastewater
2. 2101-M Building janitorial floor drains
3. 2101-M Building compressor cooling water and the "Buffalo" model cooler reservoir overflow
4. 2101-M Building heating steam condensate.

The scope of this report is restricted to these wastestreams and does not include other wastestreams from the 2101-M Building such as solid waste, gaseous waste, and sanitary waste which do not contribute to the wastewater.

2.0 PROCESS KNOWLEDGE

This section presents a qualitative and quantitative process-knowledge-based characterization of the chemical and radiological constituents of the 2101-M Laboratory wastewater. These process data are discussed in terms of the following factors:

1. Location and physical layout of the process facility
2. A general description of the present, past, and future activities of the process
3. The identity of the wastestream contributors
4. The concentration of the constituents of each contributor.

2.1 PHYSICAL LAYOUT

The 2101-M Laboratory Wastewater effluent has various sources, all of them in the 2101-M Building. This building is a single-story Butler-type constructed with steel panels and beams on a concrete foundation. It has a concrete floor and a built-up asphalt and gravel roof.

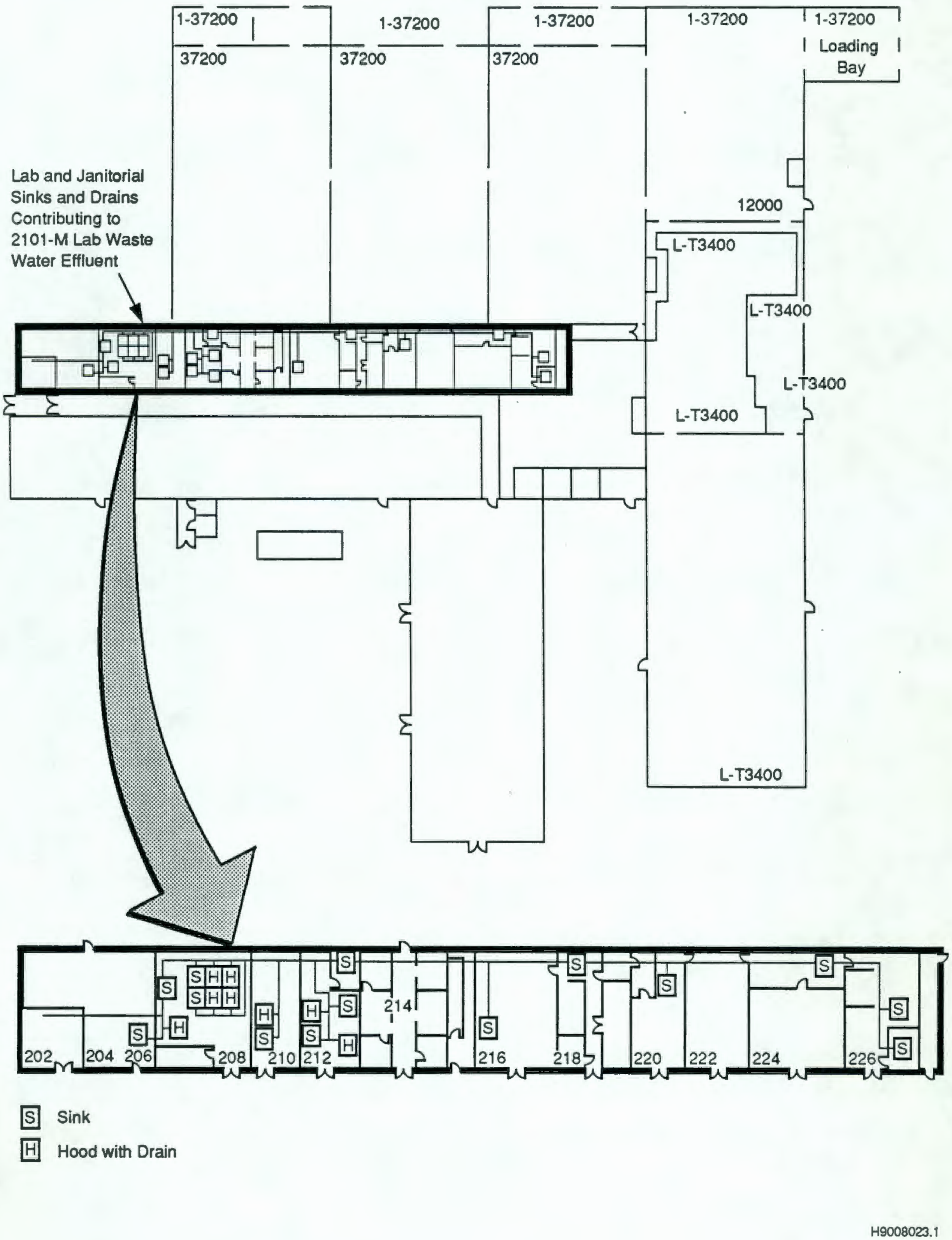
The building houses several different activities. Different areas in the building are used for soil testing laboratories, as a spare parts warehouse, as craft shops, and as offices. Most of the spaces in the building are environmentally controlled by evaporative cooling and steam heating.

The building is serviced by an 8-in.-diameter sanitary water line with building water pressure at 40 lb/in^2 (gauge). Other services include steam, (at 30 to 40 lb/in^2 [gauge]), a compressed air system, a ventilation system and telephone and communications systems.

The title of this report refers to the wastewater from the laboratories in the building. However, at this time the contribution from the laboratories to the overall effluent is a minor one. The drains in the laboratories have been either physically sealed or have administrative controls in place to stop chemical discharges from them to the soil column. Most of the volume of the effluent is attributable to activities associated with general use of the building. Therefore, the effluent is primarily from the heating, ventilation, and air conditioning (HVAC) system of the building. A floor plan drawing of the building is given in Figure 2-1.

All effluent from the 2101-M Building not discharged to the sanitary sewer is discharged to the 2101-M Pond. This pond has been active from 1953 to the present. The primary use of the pond has been to receive drainage from the 2101-M Building. It now also receives surface drainage from nearby

Figure 2-1. Building 2101-M Floor Plan.



vehicle parking lots. It was used to receive a small quantity of chemical wastes from the Basalt Waste Isolation Project (BWIP) laboratories located in the 2101-M Building that operated between 1983 and 1986. There are no effluent monitors on this wastestream.

A diagram of the 2101-M Pond showing its adjacency to the 2101-M Building is given in Figure 2-2. The point used for sampling the 2101-M Building is where the effluent drain enters the 2101-M Pond.

2.2 CONTRIBUTORS

At present, the routine, normal contributors to the 2101-M Laboratory Wastewater are some components of the HVAC system, janitorial drains, and laboratory sinks, all of which are within the 2101-M Building. The BWIP laboratory work that was discharging to the soil column between 1983 and 1986 is no longer in operation. Current activities in the testing laboratories have physical and administrative controls in place to stop discharges to the soil column. There are no known occasional contributors to the 2101-M Laboratory Wastewater effluent.

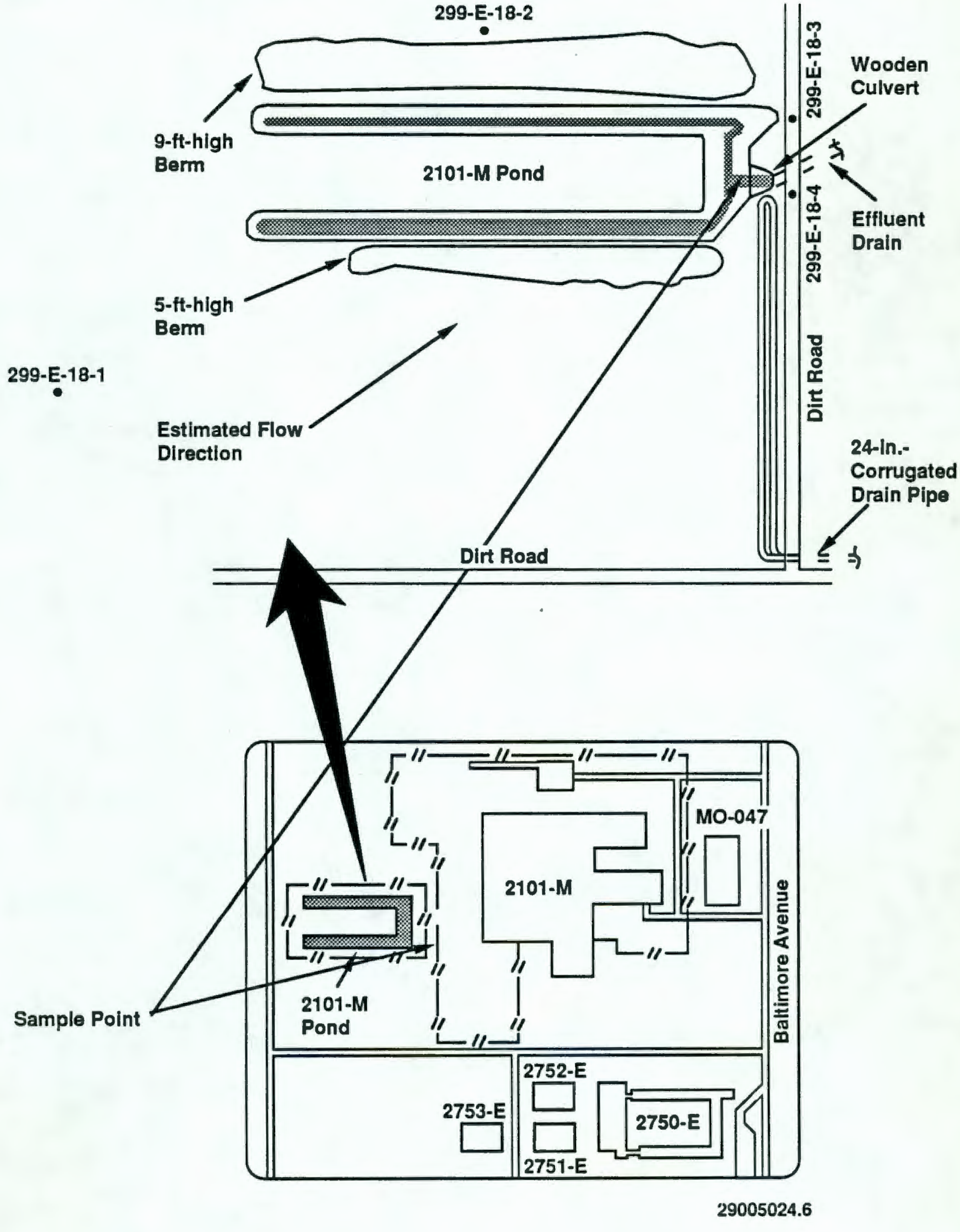
In terms of volume the largest contributor to the wastewater is the condensate from the heating system. There are about 35 steam traps that release steam condensate to the soil column. They do this by discharging to the 2101-M Pond via the waste line from the 2101-M Building. The flow volume is related to the season. In a winter it can be as large as 500,000 gal/mo and in summer it can be essentially 0 gal/mo.

The second largest contributor is the reservoir overflow from the air conditioning system. There are nine Buffalo units, each one having a reservoir. As in the case of the heating system, the cooling system effluent also varies during the year, being seasonal. The yearly flow from this system is about 50,000 gal of overflow, all of which occurs during the hot summer months of the year.

The laboratory and janitorial sinks and drains as well as a small flow from the compressed air dryer system are in the final category of contributors to the 2101-M Laboratory Wastewater. The combined volume from these is only nominal, of the order of less than 100 gal/mo. This waste consists of spent floor and tile cleaning solutions used by janitorial staff and spent laboratory equipment cleaning detergents used by research staff. The cleaners are readily available household products. The wastes have concentrations comparable to those used in household applications.

The 2101-M Laboratory Wastewater as a descriptive name for this wastewater is a misnomer because very little of the wastewater flow is attributable to the soil testing laboratories. These laboratories do not require chemical reagents for the physical testing of soils that is performed in them. The chemicals used are primarily household detergents and soaps for cleaning equipment and laboratory staff's hands.

Figure 2-2. Locations of the 2101-M Building and the 2101-M Pond.



The total flowrate of the 2101-M Laboratory Wastewater effluent is not measured directly as there is no flowmeter located on the waste line exiting from the building. As there are no flowmeters elsewhere in the building, flowrates of individual contributors are not measured except for the steam condensate. Steam condensate flow can be obtained indirectly because the pounds of steam exported to the 2101-M Building from the 200 Area Powerplants is monitored. All of the steam delivered to the building is condensed and released to the soil column as condensate. There is no steam return line from the 2101-M Building back to the powerplants. In the past, steam delivery has been measured because of the need to know the heating demand of the 2101-M Building rather than the need to know and characterize the effluent.

A fairly accurate estimate of the total flowrate can be made. This is done based on process knowledge of the steam condensate and cooling reservoir flowrates, while considering the contribution from the other sources as nominal. This leads to an estimation of the flowrate of about 1.75 Mgal/yr. Values for the monthly flowrates vary between 10,000 gal/mo for the hottest midsummer month to 600,000 gal/mo for the coldest midwinter month. For purposes of calculating deposition rates a value of 150,000 gal/mo (568,000 L/mo) has been used for the average monthly flowrate.

Chemical reactions between constituents is of little regulatory significance. This is because the contributors have few constituents in them and those that are present are in very dilute concentrations. It is also because the constituents are chemically compatible. They are not likely to react with each other and change the chemical nature of the effluent in a way that it becomes more dangerous to the environment.

From a process knowledge viewpoint the effluent from the building is more like the kind of effluent expected in a sanitary sewer line than one from a laboratory conducting chemical experiments.

2.3 PROCESS DESCRIPTIONS

There is no single process associated with the 2101-M Laboratory Wastewater effluent. It is more a case of the combining of separate effluent streams within the building to make up the effluent. In this sense, the discussion that follows describes the past, present, and future activities that have been practiced that contributed to the 2101-M Laboratory Wastewater effluent.

2.3.1 Present Activities

Present activities in the building are limited to environmental control using HVAC systems and maintenance of the building, testing laboratories, warehousing activities, and office functions. At this time, only steam condensate from the building heating system, reservoir overflow from the building cooling system, and household cleaning solutions from the laboratories and janitorial activities make up the effluent.

2.3.2 Past Activities

Past activities have been essentially the same as they are today with the notable exception of the BWIP laboratory activities. These were conducted in 1983 and 1986 when small amounts of chemicals were released to the soil column via the 2101-M Pond. A discussion of this past laboratory activity is not within the scope of this addendum. Records for what materials were released are limited. Hence, this past activity could best be characterized by the analysis of actual soil samples taken at the 2101-M Pond. Appendix B lists the chemical inventory for BWIP. This listing is indicative of the variety of chemicals that could have been discharged into the 2101-M Pond and may account for some of the trace chemicals identified in the wastewater.

For the purposes of this report, it is very important to recognize that there is a great deal of difference between the laboratory activities that are conducted today compared to those conducted in the past. In the past, although only small quantities of chemicals were released they covered a wide spectrum of reactivity and toxicity to the environment. Today, none of these chemicals are released because of the changes in testing activities as well as the implementation of administrative controls and the physical barriers that are now in place.

2.3.3 Future Activities

There are no future plans for 2101-M Laboratory Wastewater effluent that would result in the effluent becoming more dangerous to the environment. Therefore, the designation for it proposed elsewhere in this report should not be impacted by some future change. The 2101-M Pond is scheduled for closure as a former treatment, storage, and disposal facility under the guidelines of the *Resource Conservation and Recovery Act* regulation. Consequently, administration of the 2101-M Laboratory Wastewater effluent is carried out with the object of not changing the composition or volume of it in any significant way. This is to ensure that no changes will be necessary in the prescribed closure activities relating to the 2101-M Pond because of changes in the 2101-M Laboratory Wastewater.

2.3.4 Administrative Controls

Administrative controls have been enacted to implement the overall policy of conducting operations to meet the requirements, intent, and spirit of all applicable federal, state, and local environmental laws, regulations, and standards. A program of regulatory compliance based on the requirements of applicable environmental laws and input from appropriate regulatory agencies has been developed.

2.3.4.1 General 2101-M Laboratory Wastewater Monitoring Description. Since current technology does not exist for on-line (real-time) monitoring for all regulated materials, the 2101-M Building Management relies upon administrative controls to regulate use of the 2101-M Laboratory Wastewater.

2.3.4.2 General Requirements. The administrative controls have general requirements that apply to all activities associated with regulated materials.

Training is a very important function of these administrative controls. General training courses are given to all employees, and specific training is given to employees working with regulated materials or in areas where they may come into contact with them. This training program includes annual refresher training.

A general requirement that acts as an important control is the system of frequent surveillances and inspections with the associated action findings and follow-up inspections. These are conducted on a regular basis and are supplemented with random surveillances.

2.3.4.2.1 Specific Requirements. Administrative Controls for materials regulated by Ecology, EPA, and DOE have the clear goal of assuring that no regulated dangerous (hazardous) material is released into Hanford sewer systems.

Specific activity control is maintained by the use of detailed, written procedures. These outline proper handling of materials as an aid to assure regulatory compliance. They are updated as needed when new regulatory requirements mandate it.

In terms of the management of sinks and drains, there are several stipulations. The most important one is that no dangerous (hazardous) waste shall be disposed of in drains. In the cases of new installations of floor drains or janitorial sinks, extra consideration is given to the location of them so that any accidental spills will not result in a prohibited discharge to the 2101-M Laboratory Wastewater.

There are also several requirements for the acquisition, storage, use and disposal of materials. They are to be physically controlled so that the risks of them being disposed on the Hanford Site soil column are minimized. Wherever possible, they are placed at distances removed from entry points to the sewer system. Also, physical barriers such as closed doors and dams are utilized wherever possible.

2.3.4.4 "Diligent Search". A very important new administrative control is a documented "diligent search." In this activity, a written record is maintained when an inspection is made of a facility for materials or activities that have a direct bearing on the environmental compliance of that facility. In the case of preparation of this report the facility search encompassed review of appropriate documentation and inspection of selected operating activities for product and waste handling. This was to assure that an accurate proposed designation of the 2101-M Laboratory Wastewater could be presented in this report.

Documentation reviewed included Material Safety Data Sheets, Superfund Amendments and Reauthorization Act (SARA) 312 inventory reports, dangerous waste shipping reports, and facility operating procedures. A facility inspection was made that covered inspection of activities associated with wastewater management as well as solid waste shipping. The inspection included discussions with facility staff on procedures relating to the 2101-M Laboratory Wastewater contributor disposal practices that were not being conducted at the time of the visits.

Results of the "diligent search" and the potential for prohibited disposal of materials in the 2101-M Laboratory Wastewater are incorporated in the discussion of Section 5.0.

2.4 PROCESS DATA

The overall chemical nature of the constituents in 2101-M Laboratory Wastewater effluent is innocuous. The materials that are introduced with the contributors are primarily cleaning agents and corrosion inhibitors.

"Alum" and "Super Filameen 14" (a nonhazardous product, octadecylamine) are added to supply water before steam production in the 200 Area Powerplants.

The Buffalo unit cooling reservoir overflow is made up of water that has added to it "Alum" and Dearcide 730, the latter is an agent for algae control in the reservoir units. The MSDSs for these products are available.

The laboratory and janitorial cleaners that could be used in the building are Step Off Stripper**, Freedom Speed Stripper**, Complete for Floors**, R Rugbee Concentrate Foam Shampoo**, and Horizon 420 No Rinse Neutral Cleaner**. These products are used for floor cleaning and laboratory cleaning on an "as needed" basis. Large quantities of these products are not used in the 2101-M Building because of the reduced work activities that are conducted in the building. Most of the floor area of the building is used for warehousing and offices, and only a few of the laboratories are used for soil testing.

From process knowledge all of the constituents of the contributors are estimated to be found in dilute concentrations below regulatory limits where limits are applicable. The prime reason for this is that there is no single process associated with the 2101-M Laboratory Wastewater effluent such that a major constituent would be present in high concentration. Also, most of the volume contribution to this effluent is from the HVAC system used for maintaining climate control in the building. This contributor is almost pure water. The incidental use of cleaning products is such that high concentrations of their constituents is unlikely, particularly with the dilution of them by other flow contributors.

---

*Dearcide is a registered trademark of U3S International Limited. This product is trichloro-s-triazenetrione, a common swimming pool chlorination tablet.

**Trademark information is listed in Appendix B, p. B-10.

3.0 SAMPLE DATA

This section provides an evaluation of the sampling data pertaining to the 2101-M Laboratory wastewater stream. These data are divided into two categories--wastestream data and background data--each of which is further subdivided into chemical data and radiological data.

3.1 DATA SOURCE

Two sources of sampling data were used in this analysis: wastestream data for routine operation and background data for the raw water.

3.1.1 Sample Data

The sampling data are made up of two distinct sources: the chemical data set and the radiological data set. All data used in this section are contained in Volume 2, Section A.28, of the *Waste Stream Characterization Report* (WHC 1989).

3.1.1.1 Chemical. The chemical data were obtained from five samples that were taken over a 16-mo period of time from September 1985 to January 1987. All of the samples were obtained from the same sampling location. The samples were chemically analyzed at a contract laboratory (a non-Hanford Site facility) in Richland, Washington. A description of the sampling techniques and analytical procedures is beyond the scope of this report. However, details of the sampling and analytical procedures used are described in Volume 4 of the *Waste Stream Characterization Report* (WHC 1989).

Table 3-1 is a listing of sample numbers and the chemical analytic procedures used on each one. A statistical summary of the data for the five samples is shown if Table 3-2.

3.1.1.2 Radiological Data. The 2101-M Building is not in a radiation zone and no radioactive processes or activities are conducted there. However, routine radiological checks are made and radiological analyses are performed on the Hanford Site at the 222-S Laboratory. Some radioactive materials have been or are being stored in 2101-M.

The data analysis convention used in the 222-S Laboratory is as follows. The value reported represents a composite of two tests: the level of radionuclide found in both the sediment and the filtrate portion of the sample. The following rule is applied to the data: if the contribution of either the sediment data or the filtrate data represents a fraction greater than 10% of the total and this is a lower limit of detection, then a less than (<) symbol precedes the result.

Table 3-1. Procedures for 2101-M Laboratory Wastewater Samples. (sheet 1 of 2)

LEAD# / CofC#	50019 / 50019	50051 / 50051	50089 / 50089	50167 / 50167
Alpha counting	X	X	X	X
Ammonia	X	X	X	X
Atomic emission spectroscopy	X	X	X	X
Beta counting	X	X	X	X
Conductivity-field	X	X	X	X
Cyanide	X	X	X	X
Direct aqueous injection (GC/MS)	X	X	X	X
Hydrazine	X	X	X	X
Ion chromatography	X	X	X	X
Lead				X
Mercury	X	X	X	X
pH-field	X	X	X	X
Semivolatile organics (GC/MS)	X	X	X	X
Sulfide	X	X	X	X
Temperature-field	X	X	X	
Total organic carbon	X	X	X	X
Total organic halides	X	X	X	X
Total organic halides (LDL)				
Uranium	X	X	X	X
Volatile organics (GC/MS)	X	X	X	X

LEAD# / CofC#		50051B / 50052	50089B / 50090	50167B / 50168
Volatile organics (GC/MS)		X	X	X

Table 3-1. Procedures for 2101-M Laboratory Wastewater Samples. (sheet 2 of 2)

LEAD#	50232
CofC#	50232
Alpha counting	
Ammonia	X
Atomic emission spectroscopy	X
Beta counting	X
Conductivity-field	X
Cyanide	X
Direct aqueous injection (GC/MS)	X
Hydrazine	X
Ion chromatography	X
Lead	X
Mercury	X
pH-field	X
Semivolatile organics (GC/MS)	X
Sulfide	X
Temperature-field	X
Total organic carbon	X
Total organic halides	
Total organic halides (LDL)	X
Uranium	X
Volatile organics (GC/MS)	X
LEAD#	50232B
CofC#	50233
Volatile organics (GC/MS)	X

Notes: Procedures that were performed for a given sample are identified by an "X". Procedure references appear with the data. LEAD# is the Liquid Effluent Analytical Data number that appears in the data reports. CofC# is the chain-of-custody number. Abbreviations: gas chromatography (GC), low-detection limit (LDL), mass spectrometry (MS).

Table 3-2. Statistics for 2101-M Laboratory Wastewater.

Constituent	N	MDA	Method	Mean	StdErr	90%CILim	Maximum
Aluminum	5	2	DL	2.12E+02	3.37E+01	2.64E+02	3.32E+02
Barium	5	0	n/a	2.16E+01	3.85E+00	2.75E+01	3.00E+01
Calcium	5	0	n/a	1.31E+04	2.22E+03	1.65E+04	1.77E+04
Chloride	5	0	n/a	2.43E+03	4.75E+02	3.16E+03	3.54E+03
Chromium	5	4	DL	1.00E+01	3.02E-07	1.00E+01	1.00E+01
Copper	5	0	n/a	2.59E+02	9.92E+01	4.11E+02	5.33E+02
Iron	5	0	n/a	4.75E+02	2.07E+02	7.92E+02	1.26E+03
Lead	3	2	DL	2.37E+01	9.49E+00	4.16E+01	3.60E+01
Magnesium	5	0	n/a	2.98E+03	5.60E+02	3.84E+03	4.16E+03
Manganese	5	0	n/a	9.20E+00	2.48E+00	1.30E+01	1.90E+01
Mercury	5	3	DL	4.20E-01	2.73E-01	8.38E-01	1.50E+00
Nitrate	5	4	DL	5.00E+02	1.93E-05	5.00E+02	5.00E+02
Phosphate	5	4	DL	1.09E+03	9.20E+01	1.23E+03	1.46E+03
Potassium	5	0	n/a	6.85E+02	9.86E+01	8.36E+02	8.82E+02
Sodium	5	0	n/a	1.70E+03	5.02E+02	2.47E+03	2.82E+03
Sulfate	5	0	n/a	1.08E+04	1.75E+03	1.35E+04	1.42E+04
Uranium	5	0	n/a	4.59E-01	7.05E-02	5.67E-01	6.81E-01
Zinc	5	0	n/a	8.14E+01	1.60E+01	1.06E+02	1.41E+02
Acetone	1	0	n/a	4.00E+01	n/a	n/a	4.00E+01
Ammonia	5	3	DL	8.96E+01	2.57E+01	1.29E+02	1.76E+02
Bis(2-ethylhexyl) phthalate	5	4	DL	1.50E+02	1.40E+02	3.65E+02	7.10E+02
Trichloromethane	5	2	DL	1.76E+01	4.59E+00	2.46E+01	3.20E+01
Alpha Activity (pCi/L)	4	0	n/a	6.49E-01	2.43E-01	1.05E+00	1.30E+00
Beta Activity (pCi/L)	5	0	n/a	5.07E+00	1.57E+00	7.48E+00	1.12E+01
Conductivity (uS)	5	0	n/a	8.52E+01	2.16E+01	1.18E+02	1.30E+02
pH (dimensionless)	5	0	n/a	6.20E+00	4.83E-01	5.46E+00	5.10E+00
Temperature (degrees C)	4	0	n/a	2.46E+01	2.37E+00	2.85E+01	3.17E+01
TOC	5	0	n/a	4.17E+03	2.16E+03	7.49E+03	1.28E+04
TOX (as Cl)	5	2	DL	1.13E+02	2.72E+01	1.54E+02	1.91E+02

STATISTICS REPORT FOOTNOTES

Mean values, standard errors, confidence interval limits and maxima are in ppb (parts per billion) unless indicated otherwise.

The column headed MDA (Minimum Detectable Amount) is the number of results in each data set below the detection limit.

The column headed Method shows the MDA replacement method used: replacement by the detection limit (DL), replacement of single-valued MDAs by the log-normal plotting position method (LM), or replacement of multiple valued MDAs by the normal plotting position method (MR).

The column headed "90%CILim" (90% Confidence Interval Limit) is the lower limit of the one-tailed 90% confidence interval for all ignitability data sets and pH data sets with mean values below 7.25. For all other data sets it is the upper limit of the one-tailed 90% confidence interval.

The column headed "Maximum" is the minimum value in the data set for ignitability, the value furthest from 7.25 for pH, and the maximum value for all other analytes.

3.1.2 Background Data

The 2101-M Building uses sanitary water in its process. This water is drawn from the Columbia River, piped to the 200 East Water Treatment Facility, where it is filtered, treated with alum, clarified, and chlorinated. It is then supplied to the 2101-M Building as needed.

3.2 DATA PRESENTATION

The samples were analyzed for a wide range of chemical constituents. This is because the procedures used included sophisticated, modern techniques of chemical analysis combined with computerized spectra comparison.

It should be noted that detection limits are reported based on the contract laboratory detection limits. These limits are usually moderately higher than instrument detection limits or state of the art detection limits currently reported in scientific literature.

The analytical data have been evaluated to determine what chemical compounds are present that would be subject to environmental regulations. The procedure used was to consider all the possible chemical compounds that could be made from the chemical species found in the five samples. This was done by comparing all the possible cation-anion pairs for the ions found in the samples and adding to this list all the organic compounds found. The listing is shown in Chapter 5.0.

This page intentionally left blank.

4.0 DATA OVERVIEW

This section presents a comparison of the process knowledge (Section 2.0) with the sampling data set (Section 3.0) to determine the identity and concentration levels of the chemical analytes present in the 2101-M Laboratory wastewater stream. Stream loadings for the chemical constituents will also be presented.

4.1 DATA COMPARISON

Primary identification of chemicals is made using the sampling and analytical data. This is a conservative approach because it assumes all the species so identified are possible contributors to the effluent. This implies they are associated with some activity or other in the plant. The other source of chemical identification is process knowledge, which is based on procurement records, plant history, and operational experience. Table 4-1 gives a comparison of wastewater constituent concentrations to those stipulated by regulation for drinking water. It also includes a comparison of radiological values. Table 4-2 is a listing of deposition rates on the soil column of the wastewater constituents per an average monthly basis.

4.2 CHEMICAL SPECIES CONCENTRATIONS

Characterization of the composite also requires knowledge of the concentration of the chemical species present at any given time. This information is most readily obtained from chemical analysis. This is because analysis takes into consideration species concentrations and waste flows contributed by other activities discharging to the effluent stream. There are only five sample data sets available; therefore, information for species concentrations is limited. Process knowledge is not well enough known to make accurate estimates of species concentrations. This is because the activities in the 2101-M Building that are not associated with building climate activities, such as laboratory and janitorial cleaning activities, occur on such an infrequent basis.

4.3 STREAM DEPOSITION RATES

Deposition rates are shown in Table 4-2. These deposition rates are based on the average monthly flowrate of 568,000 L/mo and the concentrations of constituents found from the sample chemical analysis.

Table 4-1. Evaluation of 2101-M Laboratory Wastewater.

Constituent	Result a	SV1 b	SV2 c
Aluminum	2.1E-01	5.0E-02 f *	
Barium	2.2E-02	5.0E+00 g	
Chloride	2.4E+00	2.5E+02 h	
Chromium	1.0E-02	1.0E-01 e	
Copper	2.6E-01	1.0E+00 h	
Iron	4.8E-01	3.0E-01 h *	
Lead	2.4E-02	5.0E-02 g	
Manganese	9.2E-03	5.0E-02 h	
Mercury	4.2E-04	2.0E-03 g	
Nitrate	5.0E-01	4.5E+01 e	
Sulfate	1.1E+01	2.5E+02 h	
Zinc	8.1E-02	5.0E+00 h	
Bis(2-ethylhexyl) phthalate	1.5E-01	4.0E-03 e *	
Trichloromethane (j)	1.8E-02	1.0E-01 g	
Alpha Activity (pCi/L) (n)	6.5E-01	1.5E+01 g	3.0E+01
Beta Activity (pCi/L)	5.1E+00		1.0E+03

Footnotes:

(a) Units of results are mg/L unless indicated otherwise. The results are the mean values reported in the Statistics table of Chapter 3.

(b) Screening Value 1 (SV1) lists the value first, basis second and an asterisk (*) third if the result exceeds the regulatory value. The basis is the proposed primary MCL (e), the proposed secondary MCL (f), the primary MCL (g), or the secondary MCL (h). The value is the smaller of two MCLs: the proposed primary MCL (or the primary MCL as a default) or the proposed secondary MCL (or the secondary MCL as a default).

(c) Screening Value 2 (SV2) lists the value first and an asterisk (*) second if the result exceeds the SV2). These values are derived concentration guides obtained from Appendix A of WHC-CM-7-5, "Environmental Compliance Manual", Revision 1, January 1990.

(j) The SV1 value for trihalomethanes is used to evaluate trichloromethane results.

(n) The SV1 and SV2 values for Gross Alpha are used to evaluate Alpha Activity.

(o) The SV2 for Gross Beta is used to evaluate Beta Activity.

Table 4-2. Deposition Rate for 2101-M Laboratory Wastewater (Flowrate: 5.68E+05 L/mo).

Constituent	Kg/L*	Kg/mo*
Aluminum	2.12E-07	1.20E-01
Barium	2.16E-08	1.23E-02
Calcium	1.31E-05	7.44E+00
Chloride	2.43E-06	1.38E+00
Chromium	1.00E-08	5.68E-03
Copper	2.59E-07	1.47E-01
Iron	4.75E-07	2.70E-01
Lead	2.37E-08	1.35E-02
Magnesium	2.98E-06	1.69E+00
Manganese	9.20E-09	5.22E-03
Mercury	4.20E-10	2.38E-04
Nitrate	5.00E-07	2.84E-01
Phosphate	1.09E-06	6.19E-01
Potassium	6.85E-07	3.89E-01
Sodium	1.70E-06	9.65E-01
Sulfate	1.08E-05	6.13E+00
Uranium	4.59E-10	2.61E-04
Zinc	8.14E-08	4.62E-02
Acetone	4.00E-08	2.27E-02
Ammonia	8.96E-08	5.09E-02
Bis(2-ethylhexyl) phthalate	1.50E-07	8.52E-02
Trichloromethane	1.76E-08	9.99E-03
Alpha Activity *	6.49E-13	3.68E-07
Beta Activity *	5.07E-12	2.88E-06
TOC	4.17E-06	2.37E+00
TOX (as Cl)	1.13E-07	6.42E-02

Footnotes:

Data collected during September 1985, May 1986, July 1986, October 1986 and January 1987.

Flow rate is estimated in Chapter 2.

Constituent concentrations are average values from the Statistics Report in Chapter 3.

Concentration units of flagged (*) constituents are reported as curies per liter.

Deposition rate units of flagged (*) constituents are reported as curies per month.

This page intentionally left blank.

5.0 DESIGNATION

This section proposes that the 2101-M Laboratory wastewater stream not be designated a dangerous waste. This proposed designation uses data from both the effluent source description and sample data (Sections 2.0 through 4.0) and complies with the designation requirements of WAC 173-303-070.

The Washington State Dangerous Waste Regulations (WAC 173-303-070) contains a procedure for determining if a waste is dangerous. This procedure is illustrated in Figure 5-1 and includes the following:

- Listed Dangerous Waste, WAC 173-303(080)
- Dangerous Waste Criteria, WAC 173-303(100)
- Dangerous Waste Characteristics WAC 173-303(090).

5.1 DANGEROUS WASTE LISTS

A waste is considered a dangerous waste if it either contains a discarded chemical product (WAC 173-303-081) or originates from a dangerous waste source (per WAC 173-303-082). The proposed designation was based on a combination of process knowledge and sampling data.

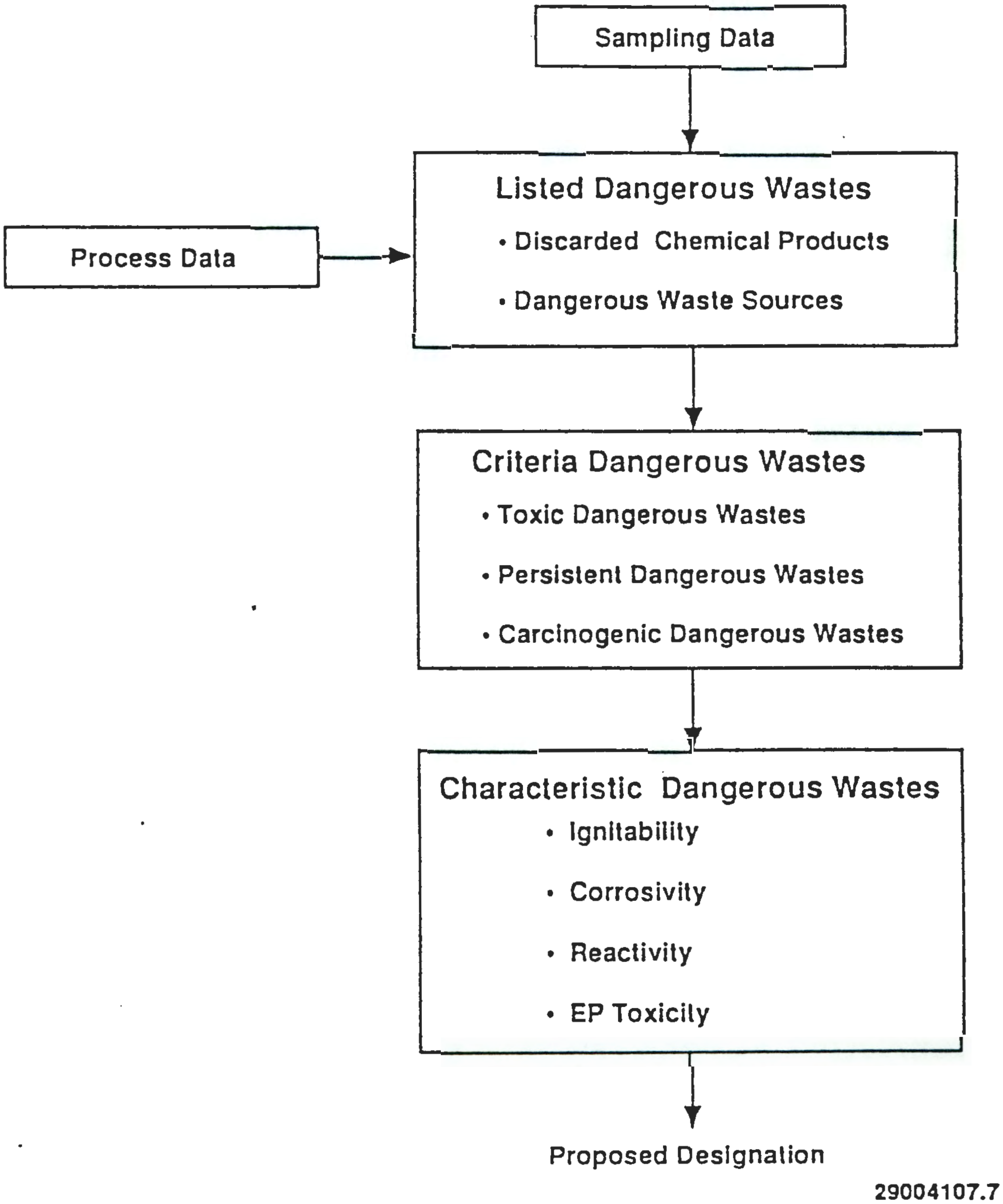
5.1.1 Discarded Chemical Products

A wastestream constituent is a discarded chemical product (WAC 173-303-081) if it is listed in WAC 173-303-9903 and is characterized by one or more of the following descriptions.

- The constituent is the sole active ingredient in the substance being discarded. (Mixtures that contain two or more active ingredients are not designated as discarded chemical products. However, mixtures containing nonactive components such as water, would be designated if one active ingredient is on the discarded chemical products list.)

- The constituent results from a spill of unused chemicals. (A spill of a discarded chemical product would cause a wastestream to be designated during the time that the discharge is occurring. The approach taken is that the current wastestream would not be designated unless a review of past spill events indicates that the spills are predictable, systematic events that are ongoing or are reasonably anticipated to occur in the future. In this report, the evaluation of this criterion is based on a review of spill data reported to Ecology.)

Figure 5-1. Designation Strategy.



- The constituent is discarded in the form of a residue resulting from cleanup of a spill of an unused commercial chemical on the discarded chemical products list. (A chemical product that is used in a process and then is released in a wastewater is not a discarded chemical product. Off-specification, unused chemicals, and chemicals that have exceeded a shelf life but have not been used are considered discarded chemical products.)

5.1.2 Dangerous Waste Sources

A list of dangerous waste sources is contained in WAC 173-303-9904, pursuant to WAC 173-303-082. There are three major categories of sources in WAC 173-303-9904. The first is nonspecific sources from routine operations occurring at many industries. The second is specific sources (e.g., wastes from ink formulation, etc.). The third is state sources which are limited to PCB-contaminated transformers and capacitors resulting from salvaging, rebuilding or discarding.

5.2 LISTED WASTE DATA CONSIDERATIONS

The proposed designation of the wastestream described in this report is based on an evaluation of process and sampling data. The following sections described the type of information used in this designation.

5.2.1 Process Evaluation

The process evaluation began with a thorough review of the processes contributing to the wastestream. Processes were reviewed and compared with the discarded chemical products list and the dangerous waste source list. This process evaluation is necessary because the stream could be a listed waste if a listed waste was known to have been added at any upstream location, even if a listed constituent was not detected at the sample point. The process evaluation included a review of the following information sources:

- Material Safety Data Sheets
- SARA Inventory reports
- Operating procedures
- Process chemical inventories
- Physical inspections, where possible.

Additionally, appropriate interviews with facility personnel were conducted to determine if there were any activities or laboratory processes that generated a listed waste which may not have been evident during other portions of the process evaluation.

If a listed chemical was identified, the specific use of the chemical was evaluated to determine if such use resulted in the generation of a listed waste.

5.2.2 Sampling Data

Sampling data were used as screening tools to enhance and support the results of the process evaluation. This screening compared the results of the sampling data with the WAC 173-303-9903 and -9904 lists. If a constituent was cited on one or both of these lists, an engineering evaluation was performed to determine if the constituent had entered the wastestream as a discarded chemical product or came from a dangerous waste source.

Screening organic constituents is a simple procedure because analytical data for organic constituents are reported as neutral compounds and are easily compared to the WAC 173-303-9903 and -9904 lists. It is not as simple to screen inorganic analytical data because inorganic data are reported as ions rather than as neutral compounds. For example, an analysis may show that a wastestream contains the cations sodium and calcium along with the anions chloride and nitrate. The possible combinations of neutral substances in this simple example include: sodium chloride, sodium nitrate, calcium chloride, and calcium nitrate. In a situation with many cation and anions, however, the list of possible combinations is extensive.

A procedure was developed by Westinghouse Hanford Company (Westinghouse Hanford) for combining the inorganic constituents into neutral compounds. This screening procedure is described in Jungfleisch (1990) and is intended to be a tool in the evaluation of a wastestream. The listing of the inorganic compounds developed by this screening procedure is not intended to be an indication that the compound was discharged to the wastestream, only that the necessary cations and anions are present and an investigation should be conducted to determine how they entered the wastestream.

5.3 PROPOSED LISTED WASTE DESIGNATIONS

A "diligent search," as described in Section 2.3.4.4, was conducted at the 2101-M Laboratory facility. One of the purposes of this search was to determine if any of the potentially discarded chemical products listed in the Waste Designation Report of Table 5-2 were indeed located or inventoried in the facilities that discharge wastewaters to the 2101-M Laboratory Wastewater. Another important purpose of the search was to verify that if such listed chemical products were found in the facilities, they were not being improperly disposed of into the wastestream. During the course of the search, no chemical products on the WAC 173-303-9903 "Discarded chemical products list" were discovered in the facilities.

For the purposes of this section two sources for wastewater constituents are defined. A "primary" source for a constituent is one associated with a routine or normal facility activity. A "secondary" source for a constituent is one that is identified as only a potential source for that constituent. A secondary source may be proposed on the basis of process knowledge, known chemical principles, or chemical engineering principles.

Table 5-1. Inorganic Chemistry for 2101-M Laboratory Wastewater. (sheet 1 of 2)

CHARGE NORMALIZATION

Constituent	ppb	Ion	Eq/g	Normalized
Aluminum	2.64E+02	Al+3	2.93E-08	
Barium	2.75E+01	Ba+2	4.01E-10	
Calcium	1.65E+04	Ca+2	8.21E-07	
Chloride	3.16E+03	Cl-1	8.91E-08	3.04E-07
Chromium	1.00E+01	CrO4-2	3.85E-10	1.31E-09
Copper	4.11E+02	Cu+2	1.29E-08	
Iron	7.92E+02	Fe+3	4.25E-08	
Lead	4.16E+01	Pb+2	4.01E-10	
Magnesium	3.84E+03	Mg+2	3.16E-07	
Manganese	1.30E+01	Mn+2	4.73E-10	
Mercury	8.38E-01	Hg+2	8.36E-12	
Nitrate	5.00E+02	NO3-1	8.06E-09	2.76E-08
Phosphate	1.23E+03	HPO4-2	1.96E-08	6.69E-08
Potassium	8.36E+02	K+1	2.14E-08	
Sodium	2.47E+03	Na+1	1.07E-07	
Sulfate	1.35E+04	SO4-2	2.81E-07	9.59E-07
Uranium	5.67E-01	UO2+2	4.77E-12	
Zinc	1.06E+02	Zn+2	3.24E-09	
Hydrogen Ion (from pH 5.5)		H+	(3.44E-09)	
Hydroxide Ion (from pH)		OH-	(2.90E-12)	
Cation total			1.36E-06	
Anion total			3.98E-07	

Anion normalization factor: 3.417

SUBSTANCE FORMATION

Substance	%	Cation Out	Anion Out
Calcium chromate(VI)	1.03E-05	8.20E-07	0.00E+00
Copper(II) chloride	8.70E-05	0.00E+00	2.91E-07
Mercury(II) chloride	1.13E-07	0.00E+00	2.91E-07
Uranyl nitrate	9.39E-08	0.00E+00	2.76E-08
Lead chloride	5.58E-06	0.00E+00	2.91E-07
Barium chloride	4.17E-06	0.00E+00	2.91E-07
Zinc nitrate	3.07E-05	0.00E+00	2.43E-08
Iron(III) chloride	2.30E-04	0.00E+00	2.48E-07
Aluminum nitrate	3.04E-04	5.00E-09	0.00E+00
Magnesium chloride	1.18E-03	6.78E-08	0.00E+00
Magnesium sulfate	4.08E-04	0.00E+00	8.91E-07
Sodium phosphate, DB	4.75E-04	4.05E-08	0.00E+00
Aluminum sulfate	1.50E-05	0.00E+00	8.86E-07

Table 5-1. Inorganic Chemistry for 2101-M Laboratory Wastewater. (sheet 2 of 2)

SUBSTANCE FORMATION

Substance	%	Cation Out	Anion Out
Manganese(II) sulfate	3.57E-06	0.00E+00	8.85E-07
Sodium sulfate	2.87E-04	0.00E+00	8.45E-07
Potassium sulfate	1.86E-04	0.00E+00	8.24E-07
Calcium sulfate	5.58E-03	0.00E+00	3.43E-09

CHEMISTRY REPORT FOOTNOTES

Statistics based on a single datum are noted by an asterisk (*). With the exception of hydrogen ion and hydroxide, others report the upper limit of the one-tailed 90% confidence interval. Hydrogen ion is based on the lower limit of the one-tailed 90% confidence interval for pH sets with mean values below 7.25 and on the upper limit of the one-tailed 90% confidence interval for pH data sets with mean values of 7.25 or higher. The hydroxide magnitude is equal to 1.00E-20 (Eq/g)**2 divided by the hydrogen ion value (in Eq/g).

Ion concentrations in equivalents per gram (Eq/g) are based on the statistic. Conversions include scale (ppb to g/g), molecular weight (constituent form to ionic form), and equivalents (charges per ion). The column headed "Normalized" shows normalized concentrations (also in Eq/g) calculated by increasing concentrations of cations, excluding Hydrogen ion, or anions, excluding hydroxide, by the normalization factor. The normalization factor is the larger of the cation total, including Hydrogen ion, or anion total, including hydroxide, divided by the smaller total.

Substance names may include MB (monobasic), DB (dibasic), TB (tribasic) to identify the equivalents of hydrogen ion that have been neutralized from polyprotic weak acids to form their conjugate bases.

Substances are formulated in the order listed. The column headed "%" is the percent of the substance in the waste (g/100g). Substances formulated with oxygen are based on the residual concentration of the counterion. Other substance concentrations are based on the limiting residual concentration of the cation or anion. The columns headed "Cation Out" and "Anion Out" indicate the residual concentrations (in Eq/g) of each ion after a substance concentration has been calculated.

Table 5-2. Dangerous Waste Designation Report. (sheet 1 of 2)

Dangerous Waste Data Designation Report for 2101-M Laboratory Wastewater

Finding: Undesignated

Discarded Chemical Products - WAC 173-303-081

Substance	Review Number	Status	DW Number
Calcium chromate(VI)	U032(EHW)	Not Discarded	Undesignated
Lead phosphate, TB	U145(DW)	Not Discarded	Undesignated
Mercury	U151(EHW)	Not Discarded	Undesignated
*Acetone	U002(DW)	Not Discarded	Undesignated
Bis(2-ethylhexyl) phthalate	U028(DW)	Not Discarded	Undesignated
Trichloromethane	U044(EHW)	Not Discarded	Undesignated

Dangerous Waste Sources - WAC 173-303-082

Substance	Review Number	Status	DW Number
*Acetone	F003	Unlisted Source	Undesignated

Infectous Dangerous Waste - WAC 173-303-083

No regulatory guidance

Dangerous Waste Mixtures - WAC 173-303-084

Substance	Toxic EC%	Persistant HH%	Persistant PAH%	Carcinogenic Total%
Aluminum nitrate	3.04E-07	0.00E+00	0.00E+00	0.00E+00
Aluminum sulfate	1.50E-09	0.00E+00	0.00E+00	0.00E+00
Barium chloride	4.17E-09	0.00E+00	0.00E+00	0.00E+00
Calcium chromate(VI)	1.03E-08	0.00E+00	0.00E+00	1.03E-05
Copper(II) chloride	8.70E-06	0.00E+00	0.00E+00	0.00E+00
Iron(III) chloride	2.30E-07	0.00E+00	0.00E+00	0.00E+00
Lead chloride	5.58E-08	0.00E+00	0.00E+00	0.00E+00
Magnesium chloride	1.18E-07	0.00E+00	0.00E+00	0.00E+00
Magnesium sulfate	4.08E-08	0.00E+00	0.00E+00	0.00E+00
Mercury(II) chloride	1.13E-08	0.00E+00	0.00E+00	0.00E+00
Sodium phosphate, DB	4.75E-08	0.00E+00	0.00E+00	0.00E+00
Uranyl nitrate	9.39E-10	0.00E+00	0.00E+00	0.00E+00
Zinc nitrate	3.07E-08	0.00E+00	0.00E+00	0.00E+00
*Acetone	4.00E-10	0.00E+00	0.00E+00	0.00E+00
Ammonia	1.29E-07	0.00E+00	0.00E+00	0.00E+00
Bis(2-ethylhexyl) phthalate	3.65E-05	0.00E+00	0.00E+00	3.65E-05
Trichloromethane	2.46E-07	2.46E-06	0.00E+00	2.46E-06
Total	4.64E-05	2.46E-06	0.00E+00	4.92E-05
DW Number	Undesignated	Undesignated	Undesignated	Undesignated

Dangerous Waste Characteristics - WAC 173-303-090

Characteristic	Value	DW Number
Ignitables % (Calc.)	4.00E-06	Undesignated
Corrosivity-pH	5.46	Undesignated
Total Cyanide (mg/kg)	0.00E+00	Undesignated
Total Sulfide (mg/kg)	0.00E+00	Undesignated
Total Barium (mg/L)	2.75E-02	Undesignated
Total Chromium (mg/L)	1.00E-02	Undesignated
Total Lead (mg/L)	4.16E-02	Undesignated
Total Mercury (mg/L)	8.38E-04	Undesignated

Table 5-2. Dangerous Waste Designation Report. (sheet 2 of 2)

Dangerous Waste Data Designation Report for 2101-M Laboratory Wastewater

Dangerous Waste Criteria - WAC 173-303-100

Substance	Toxic EC%	Persistant HH%	Persistant PAH%	Carcinogenic Total%	DW Number-Positive
Aluminum nitrate	3.04E-07	0.00E+00	0.00E+00	0.00E+00	
Aluminum sulfate	1.50E-09	0.00E+00	0.00E+00	0.00E+00	
Barium chloride	4.17E-09	0.00E+00	0.00E+00	0.00E+00	
Calcium chromate(VI)	1.03E-08	0.00E+00	0.00E+00	1.03E-05	Undesignated
Copper(II) chloride	8.70E-06	0.00E+00	0.00E+00	0.00E+00	
Iron(III) chloride	2.30E-07	0.00E+00	0.00E+00	0.00E+00	
Lead chloride	5.58E-08	0.00E+00	0.00E+00	0.00E+00	
Magnesium chloride	1.18E-07	0.00E+00	0.00E+00	0.00E+00	
Magnesium sulfate	4.08E-08	0.00E+00	0.00E+00	0.00E+00	
Mercury(II) chloride	1.13E-08	0.00E+00	0.00E+00	0.00E+00	
Sodium phosphate, DB	4.75E-08	0.00E+00	0.00E+00	0.00E+00	
Uranyl nitrate	9.39E-10	0.00E+00	0.00E+00	0.00E+00	
Zinc nitrate	3.07E-08	0.00E+00	0.00E+00	0.00E+00	
*Acetone	4.00E-10	0.00E+00	0.00E+00	0.00E+00	
Ammonia	1.29E-07	0.00E+00	0.00E+00	0.00E+00	
Bis(2-ethylhexyl) phthalate	3.65E-05	0.00E+00	0.00E+00	3.65E-05	Undesignated
Trichloromethane	2.46E-07	2.46E-06	0.00E+00	2.46E-06	Undesignated
Total	4.64E-05	2.46E-06	0.00E+00	4.92E-05	
DW Number	Undesignated	Undesignated	Undesignated	Undesignated	

Dangerous Waste Constituents - WAC 173-303-9905

Substance
Calcium chromate(VI)
*Acetone
Bis(2-ethylhexyl) phthalate
Trichloromethane
Barium and compounds,NOS
Chromium and compounds,NOS
Lead and compounds,NOS
Mercury and compounds,NOS

Substance names may include MB (monobasic), DB (dibasic), or TB (tribasic) to identify the equivalence of hydrogen ion that have been nutralized from polyprotic weak acids to form their conjugate bases.

Results based on a single datum are noted by an asterisk (*). Others are based on the lower limit of the one-tailed 90% confidence interval for pH data sets with mean values below 7.25 or by the upper limit of the one-tailed 90% confidence interval for all other data sets.

EP Toxic contaminants, ignitability, and reactivity are reported by standard methods when available. In the absence of EP Toxicity data, total contaminant concentrations are evaluated. In lieu of closed cup ignition results, ignitability is estimated from the sum of the contributions of all substances that are ignitable when pure. A waste is flagged as dangerous if sum of the ignitable substances exceeds one percent. Reactivity is by SW-846: 250 mg of cyanide as hydrogen cyanide per kg of waste or 500 mg of sulfide as hydrogen sulfide per kg of waste. Total cyanide and total sulfide are used in lieu of amenable cyanide and amenable sulfide.

Inorganic substances are fomulated and their possible concentrations calculated for designation purposes only. The actual existance in the waste of these substances is not implied and should not be infered.

5.3.1 Discarded Chemical Products

The "diligent search" conducted at the 2101-M Laboratory found only one of the chemical products listed in WAC 173-303-9903, "Discarded chemical products list." The chemical that was found was acetone. The "diligent search" also revealed that there is no evidence of acetone currently being discharged into the 2101-M Laboratory wastewater stream.

Table 5-2 contains a listing of the six potential discarded chemical products identified from sampling data (using the screening procedure described in Section 5.2). Of these six compounds, only acetone was identified as being present in the facility during the process evaluation. None of the other chemicals were found to be present in the facility. The use of acetone in the 2101-M Laboratory is discussed in the following section and an attempt has been made to address the most probable sources of the other five chemicals listed in Table 5-2.

5.3.1.1 Acetone. Acetone was only found in one sample out of five, at a concentration of 40 ppb. Thus, it was not a normal constituent of the wastewater. It might have been present in the one sample due to a single improper disposal of it into the wastewater. The "diligent search" conducted at the facility found no evidence that acetone is being improperly discarded at the present time. Currently, it is not used in any 2101-M Building work activities.

The sample which showed acetone in the wastewater was taken in October of 1986 and no blanks were analyzed, contrary to current practices. Before June 1989, acetone was commonly used at 2101-M Laboratory facility and throughout the Hanford Site as a drying agent for laboratory glassware. Since June 1989, Westinghouse Hanford ceased all discharges of laboratory acetone into wastewater streams that did not have a permit for receipt of this chemical. Because these samples date prior to June 1989 it is highly probable that glassware residue is the source of the acetone found in the one sample.

It is also noted that acetone has periodically been identified in the analyses of blank samples performed by the contract laboratory utilized for the analyses of this study. The rejection criteria for acetone based on blank analyses from October 1989 through March 1990 is 37 ppb as presented in Section 5.2 of the *Hanford Site Stream-Specific Reports*. It is unclear whether the single analytical result received for acetone in 1986 is the result of improper disposal of acetone into the 2101-M Laboratory wastewater or whether it is the result of contamination during the analysis.

5.3.1.2 Trichloromethane. Trichloromethane was found in three of five samples taken from the wastewater in the range of 11 to 32 ppb. However, it is not used in any of the facilities associated with the wastewater.

Trichloromethane is commonly found in purified municipal water in parts per billion concentrations. The primary source of it is the reaction of dissolved chlorine gas with organic matter during the disinfection step of the water purification process.

5.3.1.3 Bis(ethylhexyl)phthalate. Bis(ethylhexyl)phthalate was found in one of five samples taken from September 1985 through January 1987. However, it is not used in any of the facilities associated with the wastewater.

A secondary source of bis(ethylhexyl)phthalate is the polyvinyl chloride piping utilized in the 2101-M Building waste system. It is used as a plasticizer in the manufacturing process and may now be very slowly leaching from the piping.

5.3.1.4 Lead phosphate. Lead was found in one of three samples at 36 ppb. Consequently, the compound lead phosphate is presented in the computer listing of chemical products in Table 5-2. However, it is not used in the facilities associated with the wastewater.

Lead may have been present as a result of an improper discharge but more likely was present as a residual from former work activities associated with the 2101-M Building. In the past, lead reagents were used in the BWIP chemical procedures. The listing of reagents used in the BWIP is given in Appendix B. It may also be present in the building piping system and is now slowly leaching out. Much of the piping is old and was installed when lead solder was commonly employed in the installation of piping.

5.3.1.5 Calcium chromate(VI). Chromium was found in one of five samples at the detection level of 10 ppb. However, calcium chromate(VI) is not used in the facilities associated with the wastewater.

Chromium may have been present as a result of an improper discharge but more likely is present as a residual from former work activities associated with the 2101-M Building. In the past, chromium(III) and chromium(VI) were reagents used in the BWIP chemical analytical procedures (Appendix B listing of chemicals). Identification of the chromium present as the product calcium chromate(VI) may be an artifact of the computer screening in which cation-anion pairs are matched for possible chemical compounds.

5.3.1.6 Mercury. Mercury was detected in two out of five samples in concentrations comparable to the background from the supply water. Mercury is not used in any of the facilities associated with the 2101-M Laboratory wastewater. A secondary source of the mercury is the supply water.

5.3.2 Dangerous Waste Sources

Another purpose of the "diligent search," as described in Section 2.3.4.4, was to determine if any of the waste sources of the 2101-M Laboratory Wastewater included any specific waste sources (K and W wastes) or any nonspecific waste sources (F wastes) in the "Dangerous waste source list," WAC 173-303-9904. The search verified that no regulated sources exist at the 2101-M Laboratory Wastewater facility which generate wastes that are improperly disposed of in the wastewater.

Sampling data were utilized to enhance the process evaluation. One potential listed solvent was identified by the sampling data: acetone. Acetone appears on the plant chemical inventories.

5.3.2.1 Acetone. Before June of 1989, acetone was commonly used at 2101-M Laboratory facility and throughout the Hanford Site as a drying agent for laboratory glassware. Acetone used in this manner may have been discarded via the 2101-M Laboratory wastewater stream. Based upon undocumented discussions with the EPA, Westinghouse Hanford interpreted this use of acetone to be outside of the definition of "solvent use" found in the December 31, 1985, Federal Register.

In June of 1989, Ecology provided an interpretation which indicated that, in their opinion, use of acetone as a drying agent constituted a solvent use. In response to this interpretation, Westinghouse Hanford, while not agreeing with Ecology's regulatory interpretation, agreed to cease discharges of laboratory acetone via unpermitted wastewater streams. No acetone attributable to this source has been seen in samples taken of the 2101-M Laboratory wastewater stream since 1988.

All use of acetone in the 2101-M Laboratory facility has now been discontinued.

5.4 DANGEROUS WASTE CRITERIA

A waste is considered a dangerous waste if it meets any of the following criteria categories (WAC 173-303-100): toxic dangerous waste, persistent dangerous waste, or carcinogenic dangerous waste. A description of the methods used to test the sampling data against the criteria is contained in Jungfleisch (1990). Summaries of the methods, along with the results, are contained in the following sections.

5.4.1 Toxic Dangerous Wastes

The procedure for determining if a wastestream is a toxic dangerous waste is as follows (WAC 173-303-101).

- Collect and analyze multiple samples from the wastestream.
- Calculate the upper limit of the one-sided U90% confidence level for each analyte in the wastestream.

- Formulate neutral substances from the analytical data.

  NOTE: This step is only required for inorganic analytes since it is not possible to complete the evaluation based on the concentration of cations and anions. This methodology is described in Jungfleisch (1990) and is based on an evaluation of the most toxic compounds that can exist in an aqueous environment under normal temperatures and pressures.

- Assign toxic categories to the neutral substances formulated for the wastestream.

- Calculate the percent equivalent concentration (EC%) for each chemical compound.

- Sum the resulting EC% contributors.

- Designate the wastestream as a toxic dangerous waste if the EC% sum is greater than 0.001%, per WAC 173-303-9906.

Seventeen chemical compounds potentially present in the 2101-M Laboratory wastewater wastestream were determined to have toxic categories associated with them. These compounds are listed in Table 5-2. The individual and sum EC% values for these chemical compounds are listed in Table 5-2. Since the EC% sum is 0.0000464, which is less than the cutoff of 0.001%. Hence, the wastestream is not a toxic dangerous waste. The three highest contributors to the EC% sum are ammonia, bis(ethylhexyl) phthalate, and chloroform.

5.4.2 Persistent Dangerous Wastes

The procedure for determining if a wastestream is a persistent dangerous waste is as follows (WAC 173-303-102).

- Collect multiple grab samples of the wastestream.

- Determine which chemical compounds in the wastestream are halogenated hydrocarbons (HH) and which are polycyclic aromatic hydrocarbons (PAH).

- Determine the upper limit of the one-sided 90%CI for the compounds of interest.

- Calculate HH% and PAH%, separately.

- Sum the resulting HH% and PAH% contributions separately.

- Designate the wastestream as persistent if the HH% concentration is greater than 0.01% or if the PAH% is greater than 1.0%, per WAC 173-303-9907.

Only the chemical compound chloroform potentially present in the 2101-M Laboratory wastewater wastestream was determined to be HH; no chemical compounds were determined to be PAH. The HH% value for chloroform is listed in Table 5-2. Since the HH% is 0.00000246%, which is less than the value 0.01%, the wastestream is not a persistent dangerous waste.

5.4.3 Carcinogenic Dangerous Wastes

The procedure for determining if a wastestream is a carcinogenic dangerous waste is as follows (WAC 173-303-103).

- Collect multiple grab samples of the wastestream.

- Determine the upper limit of the one-sided 90%CI for the compounds of interest.

- Formulate neutral substances from the analytical data.

  NOTE: This step is only required for inorganic analytes since it is not possible to complete the evaluation based on the concentration of cations and anions. This methodology is described in Jungfleisch (1990) and is based on an evaluation of the carcinogenic compounds that can exist in an aqueous environment under normal temperatures and pressures.

- Determine which chemical compounds in the wastestream are human or animal carcinogens according to the International Agency for Research on Cancer.

- Calculate the weight percent concentration for each carcinogen.

- Sum the resulting weight percent.

- Designate the wastestream as carcinogenic if any of the positive carcinogens are above 0.01% or if the total concentration of positive and suspected carcinogens is above 1.0%.

Two chemical compounds potentially present in the 2101-M Laboratory wastewater wastestream were determined to be carcinogenic chemical compounds. The values for these chemicals are listed in Table 5-1. Since none of the specific carcinogens exceed 0.01%, and the sum (0.0000492%) is less than 1.0%, the 2101-M Laboratory wastewater is not a carcinogenic dangerous waste. The two contributors to the carcinogens are chloroform and bis(2-ethylhexyl) phthalate.

5.5 DANGEROUS WASTE CHARACTERISTICS

A waste is considered a dangerous waste if it is ignitable, corrosive, reactive, or extraction procedure (EP) toxic (WAC 173-303-090). A description of the methods used to evaluate the data in terms of these characteristics is contained in Jungfleisch (1990). Summaries of the methods, along with the results, are contained in the following sections.

5.5.1 Ignitability

Because of the dilute aqueous nature of these wastes, flashpoint testing was not performed on the initial wastestream samples. The ignitability index is the sum of the concentrations of all ignitable contributors in the waste. Pure substances with a flashpoint below 140° F are considered ignitable.

Since July 1989, flashpoint testing has been performed on the liquid effluent samples. All samples reached the boiling temperature of water without igniting. The 2101-M Laboratory Wastewater Stream is similar in total organic carbon to a number of other streams that reached the boiling point of water without ignition.

One or more chemical compounds potentially present in the 2101-M Laboratory wastewater wastestream are ignitable substances. The value of the index calculated from these constituents (presented in Table 5-1) is 4.00×10^{-6}. Therefore, the 2101-M Laboratory wastewater wastestream Stream is not an ignitable waste.

5.5.2 Corrosivity

A waste is a corrosive dangerous waste if it has a pH value outside the range of equal or greater than 2.0 and equal to or less than 12.5. Because the pH values observed during sampling ranged between 7.51 and 5.10, the wastestream is not a corrosive dangerous waste (WAC 173-303-090[6]).

5.5.3 Reactivity

An aqueous waste is reactive if the waste contains an amount of cyanide or sulfide under conditions near corrosivity to threaten human health or the environment (WAC 173-303-090[7]). A recent revision to *Test Methods for Evaluating Solid Waste* (EPA 1986) provides more quantitative indicator levels for cyanide and sulfide. It states that levels of (equivalent) hydrogen cyanide below 250 mg/kg or of (equivalent) H_2S below 500 mg/kg would not be considered reactive.

For samples collected before July 1989, total cyanide and total sulfide were used to evaluate reactivity.

Total cyanide and sulfide were both below the detection limits and thus were undetected. Thus, this wastestream is not a reactive dangerous waste.

5.5.4 Extraction Procedure Toxicity

A waste is an EP toxic dangerous waste if contaminant results from EP toxicity testing exceed the limits of WAC 173-303-090(8)(c). In the absence of specific EP toxicity test results, total analyte concentrations are used. Four analytes with concentrations above detection limits are on the EP toxic list and were found in the 2101-M Laboratory wastewater stream. The concentrations of these analytes are listed in Table 5-1. Because the barium concentration of 0.0275 mg/L does not exceed the limit of 100 mg/L, the chromium concentration of 0.010 mg/L does not exceed the limit of 5.00 mg/L, the lead concentration of 0.0416 mg/L does not exceed the limit of 5 mg/L, and the mercury concentration of 8.38×10^{-4} mg/L does not exceed the limit of 0.2 mg/L, the 2101-M Laboratory wastewater wastestream is not an EP toxic dangerous waste.

5.6 PROPOSED DESIGNATIONS

The 2101-M Laboratory wastewater wastestream does not contain any dangerous waste, as defined in WAC 173-303-070. Hence, it is proposed that the wastestream not be designated a dangerous waste.

This page intentionally left blank.

6.0 ACTION PLAN

This chapter addresses recommendations for future waste characterization tasks for the liquid effluents that are within the scope of the Liquid Effluent Study. The final extent of and schedule for any recommended tasks are subject to negotiation between Ecology, EPA, and DOE. An implementation schedule for the completion of these tasks will give consideration to other compliance actions already under way as part of the Tri-Party Agreement (Ecology et al. 1989), and on the availability of funding. All effluent monitoring and sampling will be conducted according to DOE Order 5400.1 ("General Environmental Protection Program," issued November 8, 1988).

6.1 FUTURE SAMPLING

The random sampling conducted during the period between September 9, 1985 and January 26, 1987 was performed during normal operations of the 2101-M Building facility. Since that time much more stringent administrative controls have been implemented and much of the hazardous material inventory has been removed from the building. Also, the activities associated with BWIP have now been discontinued. Hence, the sampling and chemical analysis that forms the basis of this addendum is a conservative representation of what the current chemical constituents of the wastewater are likely to be.

Future sampling and chemical analysis aimed at more accurately characterizing the wastewater is not necessary. Future sampling for monitoring purposes is all that is required. It may be necessary to install a new sampling point since the current sample point lies below the level of the 2101-M Pond for several months each year.

6.2 TECHNICAL ISSUES

As described in Section 2.0, the effluent was sampled at the point that it discharges into the 2101-M Pond. This sample point was chosen because it is a common, accessible location downstream of all the contributing wastestreams. The samples collected at this point are considered to be representative of the types of constituents present in the contributing wastestreams. As a result, the characterization data presented in this report is considered to be representative of the effluent stream.

The data presented in this report are probably more representative of the character of the wastestream during BWIP laboratory activities than of the current wastestream. Thus, new data could be taken to characterize the wastestream as it is today. The present day configuration of the 2101-M Building is of office spaces and a large warehouse with the effluent being characteristic of these activities. Today, none of the chemicals that were released during BWIP testing activities are now being released. Implementation of stringent administrative controls, removal of the chemical inventories, and the placement of physical barriers effectively prevent the release of such chemicals.

This page intentionally left blank.

7.0 REFERENCES

Ecology, 1989, *Dangerous Waste Regulations*, Washington (State) Administrative Code (WAC) 173-303, Washington State Department of Ecology, Olympia, Washington.

- 173-303-070, Designation of Dangerous Waste
- 173-303-080, Dangerous Waste Lists
- 173-303-081, Discarded Chemical Product
- 173-303-082, Dangerous Waste Sources
- 173-303-090, Dangerous Waste Characteristics
- 173-303-090(5), Characteristics of Ignitability
- 173-303-090(6), Characteristics of Corrosivity
- 173-303-090(7), Characteristics of Reactivity
- 173-303-090(8), Characteristics of Extraction Procedure Toxicity
- 173-303-100, Dangerous Waste Criteria
- 173-303-101, Toxic Dangerous Wastes
- 173-303-102, Persistent Dangerous Wastes
- 173-303-103, Carcinogenic Dangerous Wastes
- 173-303-9903, Discarded Chemical Products List
- 173-303-9904, Dangerous Waste Sources List
- 173-303-9905, Dangerous Waste Constituents List
- 173-303-9907, Persistent Dangerous Waste Mixtures Graph

Ecology, EPA, and DOE, 1989, Hanford Federal Facility Agreement and Consent Order, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington.

EPA, 1986, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods*, SW-846, 3rd Edition, U.S. Environmental Protection Agency, Washington, D.C.

Jungfleisch, F. M., 1990, *Wastestream Designation for Liquid Effluent Analytical Data*, WHC-EP-0334, Westinghouse Hanford Company, Richland, Washington.

Lawrence, M. J., 1989, "Liquid Effluent Study" (External Letter 89-2106 to C. Gregorie, Washington State Department of Ecology, and R. Russell, U.S. Environmental Protection Agency, May 13, 1989), U.S. Department of Energy-Richland Operations Office, Richland, Washington.

WHC, 1989, *Waste Stream Characterization Report*, WHC-EP-0287, Volumes 1 through 4, Westinghouse Hanford Company, Richland, Washington.

WHC, 1990, *Liquid Effluent Study Project Plan*, WHC-EP-0275, Revision 2, Westinghouse Hanford Company, Richland, Washington.

This page intentionally left blank.

APPENDIX A

DETECTED ANALYTES

This page intentionally left blank.

Data for 2101-M Laborartory Wastewater.

Constituent	Sample #	Date	Method	Result
Aluminum	50019	9/17/85	ICP	<1.50E+02
Aluminum	50051	5/23/86	ICP	3.32E+02
Aluminum	50089	7/17/86	ICP	1.95E+02
Aluminum	50167	10/30/86	ICP	2.32E+02
Aluminum	50232	1/26/87	ICP	<1.50E+02
Barium	50019	9/17/85	ICP	2.10E+01
Barium	50051	5/23/86	ICP	3.00E+01
Barium	50089	7/17/86	ICP	3.00E+01
Barium	50167	10/30/86	ICP	1.70E+01
Barium	50232	1/26/87	ICP	1.00E+01
Calcium	50019	9/17/85	ICP	1.42E+04
Calcium	50051	5/23/86	ICP	1.71E+04
Calcium	50089	7/17/86	ICP	1.77E+04
Calcium	50167	10/30/86	ICP	1.05E+04
Calcium	50232	1/26/87	ICP	5.80E+03
Chloride	50019	9/17/85	IC	2.34E+03
Chloride	50051	5/23/86	IC	2.68E+03
Chloride	50089	7/17/86	IC	3.54E+03
Chloride	50167	10/30/86	IC	2.89E+03
Chloride	50232	1/26/87	IC	7.00E+02
Chromium	50019	9/17/85	ICP	1.00E+01
Chromium	50051	5/23/86	ICP	<1.00E+01
Chromium	50089	7/17/86	ICP	<1.00E+01
Chromium	50167	10/30/86	ICP	<1.00E+01
Chromium	50232	1/26/87	ICP	<1.00E+01
Copper	50019	9/17/85	ICP	4.20E+01
Copper	50051	5/23/86	ICP	1.76E+02
Copper	50089	7/17/86	ICP	8.90E+01
Copper	50167	10/30/86	ICP	5.33E+02
Copper	50232	1/26/87	ICP	4.56E+02
Iron	50019	9/17/85	ICP	9.40E+01
Iron	50051	5/23/86	ICP	5.01E+02
Iron	50089	7/17/86	ICP	2.80E+02
Iron	50167	10/30/86	ICP	1.26E+03
Iron	50232	1/26/87	ICP	2.41E+02
Lead	50019	9/17/85	ICP	<3.00E+01
Lead	50167	10/30/86	GFAA	3.60E+01
Lead	50232	1/26/87	GFAA	<5.00E+00
Magnesium	50019	9/17/85	ICP	3.20E+03
Magnesium	50051	5/23/86	ICP	4.11E+03
Magnesium	50089	7/17/86	ICP	4.16E+03
Magnesium	50167	10/30/86	ICP	2.13E+03
Magnesium	50232	1/26/87	ICP	1.30E+03
Manganese	50019	9/17/85	ICP	6.00E+00
Manganese	50051	5/23/86	ICP	8.00E+00
Manganese	50089	7/17/86	ICP	6.00E+00
Manganese	50167	10/30/86	ICP	1.90E+01
Manganese	50232	1/26/87	ICP	7.00E+00

Data for 2101-M Laborartory Wastewater.

Constituent	Sample #	Date	Method	Result
Mercury	50019	9/17/85	CVAA	<1.00E-01
Mercury	50051	5/23/86	CVAA	1.50E+00
Mercury	50089	7/17/86	CVAA	3.00E-01
Mercury	50167	10/30/86	CVAA	<1.00E-01
Mercury	50232	1/26/87	CVAA	<1.00E-01
Nitrate	50019	9/17/85	IC	5.00E+02
Nitrate	50051	5/23/86	IC	<5.00E+02
Nitrate	50089	7/17/86	IC	<5.00E+02
Nitrate	50167	10/30/86	IC	<5.00E+02
Nitrate	50232	1/26/87	IC	<5.00E+02
Phosphate	50019	9/17/85	IC	1.46E+03
Phosphate	50051	5/23/86	IC	<1.00E+03
Phosphate	50089	7/17/86	IC	<1.00E+03
Phosphate	50167	10/30/86	IC	<1.00E+03
Phosphate	50232	1/26/87	IC	<1.00E+03
Potassium	50019	9/17/85	ICP	8.82E+02
Potassium	50051	5/23/86	ICP	7.66E+02
Potassium	50089	7/17/86	ICP	7.97E+02
Potassium	50167	10/30/86	ICP	6.63E+02
Potassium	50232	1/26/87	ICP	3.16E+02
Sodium	50019	9/17/85	ICP	2.69E+02
Sodium	50051	5/23/86	ICP	2.29E+03
Sodium	50089	7/17/86	ICP	2.38E+03
Sodium	50167	10/30/86	ICP	2.82E+03
Sodium	50232	1/26/87	ICP	7.39E+02
Sulfate	50019	9/17/85	IC	1.34E+04
Sulfate	50051	5/23/86	IC	1.28E+04
Sulfate	50089	7/17/86	IC	1.42E+04
Sulfate	50167	10/30/86	IC	8.60E+03
Sulfate	50232	1/26/87	IC	4.97E+03
Uranium	50019	9/17/85	FLUOR	3.48E-01
Uranium	50051	5/23/86	FLUOR	6.81E-01
Uranium	50089	7/17/86	FLUOR	5.66E-01
Uranium	50167	10/30/86	FLUOR	3.90E-01
Uranium	50232	1/26/87	FLUOR	3.12E-01
Zinc	50019	9/17/85	ICP	8.10E+01
Zinc	50051	5/23/86	ICP	6.90E+01
Zinc	50089	7/17/86	ICP	7.00E+01
Zinc	50167	10/30/86	ICP	1.41E+02
Zinc	50232	1/26/87	ICP	4.60E+01
Acetone	50167	10/30/86	VOA	4.00E+01
Ammonia	50019	9/17/85	ISE	<5.00E+01
Ammonia	50051	5/23/86	ISE	<5.00E+01
Ammonia	50089	7/17/86	ISE	<5.00E+01
Ammonia	50167	10/30/86	ISE	1.22E+02
Ammonia	50232	1/26/87	ISE	1.76E+02
Bis(2-ethylhexyl) phthalate	50019	9/17/85	ABN	7.10E+02
Bis(2-ethylhexyl) phthalate	50051	5/23/86	ABN	<1.00E+01

Data for 2101-M Laborartory Wastewater.

Constituent	Sample #	Date	Method	Result
Bis(2-ethylhexyl) phthalate	50089	7/17/86	ABN	<1.00E+01
Bis(2-ethylhexyl) phthalate	50167	10/30/86	ABN	<1.00E+01
Bis(2-ethylhexyl) phthalate	50232	1/26/87	ABN	<1.00E+01
Dichloromethane	50019	9/17/85	VOA	<1.00E+01
Dichloromethane	50051	5/23/86	VOA	<1.00E+01
Dichloromethane	50051B	5/23/86	VOA	2.10E+02
Dichloromethane	50089	7/17/86	VOA	<1.00E+01
Dichloromethane	50089B	7/17/86	VOA	1.70E+02
Dichloromethane	50167	10/30/86	VOA	<1.00E+01
Dichloromethane	50167B	10/30/86	VOA	1.20E+02
Dichloromethane	50232	1/26/87	VOA	<1.00E+01
Dichloromethane	50232B	1/26/87	VOA	5.50E+01
Trichloromethane	50019	9/17/85	VOA	1.10E+01
Trichloromethane	50051	5/23/86	VOA	2.50E+01
Trichloromethane	50051B	5/23/86	VOA	<1.00E+01
Trichloromethane	50089	7/17/86	VOA	3.20E+01
Trichloromethane	50089B	7/17/86	VOA	<1.00E+01
Trichloromethane	50167	10/30/86	VOA	<1.00E+01
Trichloromethane	50167B	10/30/86	VOA	<1.00E+01
Trichloromethane	50232	1/26/87	VOA	<1.00E+01
Trichloromethane	50232B	1/26/87	VOA	<1.00E+01
Alpha Activity (pCi/L)	50019	9/17/85	Alpha	1.30E+00
Alpha Activity (pCi/L)	50051	5/23/86	Alpha	5.89E-01
Alpha Activity (pCi/L)	50089	7/17/86	Alpha	1.20E-01
Alpha Activity (pCi/L)	50167	10/30/86	Alpha	5.88E-01
Beta Activity (pCi/L)	50019	9/17/85	Beta	4.33E+00
Beta Activity (pCi/L)	50051	5/23/86	Beta	1.12E+01
Beta Activity (pCi/L)	50089	7/17/86	Beta	3.02E+00
Beta Activity (pCi/L)	50167	10/30/86	Beta	4.24E+00
Beta Activity (pCi/L)	50232	1/26/87	Beta	2.57E+00
Conductivity (uS)	50019	9/17/85	COND-Fld	1.27E+02
Conductivity (uS)	50051	5/23/86	COND-Fld	1.40E+01
Conductivity (uS)	50089	7/17/86	COND-Fld	1.30E+02
Conductivity (uS)	50167	10/30/86	COND-Fld	9.20E+01
Conductivity (uS)	50232	1/26/87	COND-Fld	6.30E+01
pH (dimensionless)	50019	9/17/85	PH-Fld	7.51E+00
pH (dimensionless)	50051	5/23/86	PH-Fld	7.10E+00
pH (dimensionless)	50089	7/17/86	PH-Fld	6.07E+00
pH (dimensionless)	50167	10/30/86	PH-Fld	5.10E+00
pH (dimensionless)	50232	1/26/87	PH-Fld	5.24E+00
Temperature (degrees C)	50019	9/17/85	TEMP-Fld	2.24E+01
Temperature (degrees C)	50051	5/23/86	TEMP-Fld	2.19E+01
Temperature (degrees C)	50089	7/17/86	TEMP-Fld	2.24E+01
Temperature (degrees C)	50232	1/26/87	TEMP-Fld	3.17E+01
TOC	50019	9/17/85	TOC	1.43E+03
TOC	50051	5/23/86	TOC	2.47E+03
TOC	50089	7/17/86	TOC	1.96E+03
TOC	50167	10/30/86	TOC	2.18E+03

Data for 2101-M Laborartory Wastewater.

Constituent	Sample #	Date	Method	Result
TOC	50232	1/26/87	TOC	1.28E+04
TOX (as Cl)	50019	9/17/85	TOX	<7.54E+01
TOX (as Cl)	50051	5/23/86	TOX	1.56E+02
TOX (as Cl)	50089	7/17/86	TOX	1.91E+02
TOX (as Cl)	50167	10/30/86	TOX	<1.00E+02
TOX (as Cl)	50232	1/26/87	LTOX	4.02E+01

DATA REPORT FOOTNOTES

Sample# is the number of the sample. See chapter three for corresponding chain-of-custody number.
Date is the sampling date.
Results are in ppb (parts per billion) unless otherwise indicated.
The following table lists the methods that are coded in the method column.

Code	Analytical Method	Reference
ABN	Semivolatile Organics (GC/MS)	USEPA-8270
AEA	Americium-241	UST-20Am01
AEA	Curium Isotopes	UST-20Am/Cm01
AEA	Plutonium Isotopes	UST-20Pu01
AEA	Uranium Isotopes	UST-20U01
ALPHA	Alpha Counting	EPA-680/4-75/1
ALPHA-Ra	Total Radium Alpha Counting	ASTM-D2460
BETA	Beta Counting	EPA-680/4-75/1
BETA	Strontium-90	UST-20Sr02
COLIF	Coliform Bacteria	USEPA-9131
COLIFMF	Coliform Bacteria (Membrane Filter)	USEPA-9132
COND-Fld	Conductivity-Field	ASTM-D1125A
COND-Lab	Conductivity-Laboratory	ASTM-D1125A
CVAA	Mercury	USEPA-7470
CVAA/M	Mercury-Mixed Matrix	USEPA-7470
DIGC	Direct Aqueous Injection (GC)	UST-70DIGC
DIMS	Direct Aqueous Injection (GC/MS)	"USEPA-8240"
DSPEC	Reactive Cyanide (Distillation, Spectroscopy)	USEPA-CHAPTER 7
DTITRA	Reactive Sulfide (Distillation, Titration)	USEPA-CHAPTER 7
FLUOR	Uranium (Fluorometry)	ASTM-D2907-83
GEA	Gamma Energy Analysis Spectroscopy	ASTM-D3649-85
GFAA	Arsenic (AA, Furnace Technique)	USEPA-7060
GFAA	Lead (AA, Furnace Technique)	USEPA-7421
GFAA	Selenium (AA, Furnace Technique)	USEPA-7740
GFAA	Thallium (AA, Furnace Technique)	USEPA-7841
IC	Ion Chromatography	EPA-600/4-84-01
ICP	Atomic Emission Spectroscopy (ICP)	USEPA-6010
ICP/M	Atomic Emission Spectroscopy (ICP)-Mixed Matrix	USEPA-6010
IGNIT	Pensky-Martens Closed-Cup Ignitability	USEPA-1010
ISE	Fluoride-Low Detection Limit	ASTM-D1179-80-B
ISE	Ammonium Ion	ASTM-D1426-D
LALPHA	Alpha Activity-Low Detection Limit	EPA-680/4-75/1

Data for 2101-M Laborartory Wastewater.

DATA REPORT FOOTNOTES (continued)

LEPD	Iodine-129	UST-20I02
LSC	C-14	UST-20C01
LSC	Tritium	UST-20H03
LTOX	Total Organic Halides-Low Detection Limit	USEPA-9020
PH-Fld	pH-Field	USEPA-9040
PH-Lab	pH-Laboratory	USEPA-9040
SPEC	Total and Amenable Cyanide (Spectroscopy)	USEPA-9010
SPEC	Hydrazine-Low Detection Limit (Spectroscopy)	ASTM-D1385
SSOLID	Suspended Solids	SM-208D
TC	Total Carbon	USEPA-9060
TDS	Total Dissolved Solids	SM-208B
TEMP-Fld	Temperature-Field	Local
TITRA	Alkalinity-Method B (Titration)	ASTM-D1067B
TITRA	Sulfides (Titration)	USEPA-9030
TOC	Total Organic Carbon	USEPA-9060
TOX	Total Organic Halides	USEPA-9020
VOA	Volatile Organics (GC/MS)	USEPA-8240

Analytical Method Acronyms:
atomic absorption spectroscopy (AA), gas chromatography (GC), mass spectrometry (MS), inductively-coupled plasma spectroscopy (ICP)

References:

ASTM - "1986 Annual Book of ASTM Standards", American Society for Testing and Materials, Philadelphia, Pennsylvania.

EPA - Various methods of the U.S. Environmental Protection Agency, Washington, D.C.

UST - Methods of the United States Testing Company, Incorporated, Richland, Washington.

SM - "Standard Methods for the Examination of Water and Wastewater", 16th ed., American Public Health Association, American Water Works Association and Water Pollution Control Federation, Washington, D.C.

USEPA- "Test Methods for Evaluating Solid Waste Physical/Chemical Methods", 3rd ed., SW-846, U.S. Environmental Protection Agency, Washington, D.C.

This page intentionally left blank.

APPENDIX B

BASALT WASTE ISOLATION PROGRAM CHEMICAL INVENTORY

This page intentionally left blank.

APPENDIX B

BASALT WASTE ISOLATION PROGRAM CHEMICAL INVENTORY

This appendix is a listing of chemicals that the project may have had available in the laboratories. It has been compared to the discarded chemical products listing of WAC 173-303-9903 and those chemicals present on both lists have been marked with an "X."

This page intentionally left blank.

CHEMICAL/REAGENT/CHEMICAL PRODUCT	APP. IX
Acetic Acid	
Acetone	X
Acetone, Em Grade	X
Acetonitride	
Acetronitrile (UV)	X
Acid, Ammonium Salt	
Acidic Surface Cleaner	
Acrylic Spray Coating	
Actyl Alcohol	
Alkaline Surface Cleaner	
Deagglomerated Alpha Alumina	
Gamma Alumince	
Aluminium Orthophosphate	
Aluminum Hydroxide Gel	
Aluminum Powder	
Aluminum Sulfate	
Ammonia Based Cleaner	
Ammonium Acetate	
Ammonium Chloride	
Ammonium Hydroxide	
Ammonium Molybdate	
Ammonium Nitrate	
Ammonium Sulfate	
Ammonium Thiocyanate	X
Amyl Acetate	
Anion Exchange Resin	
Antipyrene	
Arsenic (III) Oxide	X
Arsenic (V) Oxide	X
Arsenic (V) conc. 1,000 p/m	X
Arsenic (V) conc. 20 p/m	X
Ascorbic Acid	
L-Ascorbic Acid	
Barium Chloride, Dihydrate	X
Barium Diphenylamine sulfonate	X
Bentonite	
Benzene	X
Benzoic Acid	
Aminobenzoic Acid	
P-Aminobenzoic Acid	
3(Trifluoromethyl) Benzoic Acid	
Beryllium Nitrate	
Boric Acid	
Boron (reagent)	
Bromcresol Green, 0.1%	
Bromcresol Purple	
Brucine Sulfate	
Cadmium Acetate, Dihydrate	X
Cadium Nitrate	X

CHEMICAL/REAGENT/CHEMICAL PRODUCT	APP. IX
Cadmium Sulfate, Crystal	X
Calcium (reagent)	
Calcium Carbonate	
Calcium Chloride, Dihydrate	
Calcium Hydroxide	
Calcium Sulfate, Anhydrous	
Carbon Tetrachloride	
Cation Exchange Resin	
Cement	
Acrylic Cement (chlorinated solvents)	
Cesium Chloride	
Cesium Iodide	
Chlorathene trichloroethane (degreaser)	
Chloride (reagent)	
Chloroform HPLC Grade	X
Chromic Acid	X
Chromium Nitrate	X
Cobalt Metal (Powder)	
Cobalt Oxide (Coo)	
Cobalt (III) Oxide	
Cobalt Nitrate	
Cobaltous Chloride	
Copper II Chloride	
Copper II Nitrate	
Copper Metal (Powder)	
Cupferron	
Cupric Chloride, Dehydrate	
Deuterium Oxide	
Diallyl Methalate (Mounting Compound)	
trans-1,2-Diaminocyclohexane tetraacetic acid	
2′,7′ - Dichlorofluorescien	
2.6 Dichloro-indophenol Sodium Salt	
Dimethylaniline	
N,N-Dimethylformamide	
N,N-Dimethyl-P-Phenylenediamine	
1,4-Dioxane	X
Diphendiphenylamine	
s-Diphenyl-Carbazide	
2,2-Dipyridyl Sodium Salt	
Disodium Ethylenediamine tetraacetate	
dl Mandelic Acid 98%	
Epoxy Accelerator B BDMA (N-Benzyl Dimethylamine)	
Epoxy Plasticizer DBP (Dibutyl Phthalate)	
Epoxy Hardner DDSA (Dodecenylsuccinic Anhydride)	
Epoxy Resins (contains amines)	
Ethanol (ethyl alcohol)	

CHEMICAL/REAGENT/CHEMICAL PRODUCT	APP. IX
Ethylene Alcohol	
Ethylene Glycol	
Ferric Ammonium Sulfate, 12-hydrate	
Ferric Chloride	
Ferric Nitrate, 9-Hydrate	
Ferrous Ammonium Sulfate, 6-Hydrate	
Ferrozine (iron reagent)	
Floride (reagent)	
Fluorescein, water soluble	
Formaldehyde	X
Formazin (4,000 NTU Turbidity std)	
Glycerin	
Colloidal Graphite	
H_4EDTA	
Hexanol	
1 Hexanol	
Hydraulic Jack Oil	
Hydrochloric Acid	
Hydrogen Peroxide, 30%	
Hydrofluoric Acid	X
Hydrophobic Silica	
Hydrazine Sulfate	X
Hydriodic Acid (HI)	
Hydroxylamine Hydrochloride Crystal Reagent	
Indigo Carmine	
Iodine	
Iodine Oxide	
Iron (reagent)	
Iron Metal (Powder)	
Iron Oxide (Fe-203)	
Iron Sulfate	
Isopropyl alcohol	
Iso-Propyl Ether	
Kryon	
Lanthanum Nitrate, Hexahydrate	
Lead Acetate	X
Lead Acetate, Trihydrate	X
Lead Nitrate	X
Linseed Oil	
Lithium (reagent)	
Lithium Bromide purified	
Lithium Carbonate	
Lithium Nitrate	
Lithium Hydroxide, Monohydrate	
Lithium Metaborate, Anhydrous	
Lithium Tetraborate	
Magnesium (reagent)	
Magnesium Chloride	

CHEMICAL/REAGENT/CHEMICAL PRODUCT	APP. IX
Magnesium Nitrate, 6-Hydrate	
Manganese Oxide	
Manganous Sulfate	
MEK (methyl ethyl ketone) (nitrite rubber)	X
Mercuric Chloride	X
Mercuric Iodide	X
Mercuric Oxide	X
Methanol	
Methyl Alcohol	
Methyl Alcohol, Anhydrous	
Methyl-2-Cyanoacrylate (adhesive/catalyst)	
Methyl Orange Solution 0.1%	
Methyl Red Hydrochloride Crystal	
Methylene Blue	
Mineral Oil	
Naphthol Sulfonic Acid	
Nickelous Nitrate, Hexahydrate	X
Nickel Metal (Powder)	X
Nickel Oxide	X
Niobium Chloride	
Nitric Acid	
Palladium Chloride	
Para-amino	
Pentafluorobenzoic acid	
Petroleum Distillates (cleaning polish, glass cleaner, lubricant, oil)	
Phenanthroline	
Phenol	X
Phenolphthalein Indicator	X
Phenolic Resin Powder (Mounting Compound)	X
Epoxy - Phenolic Adhesive	X
Phenylazoformic acid 2-phenylhydrazide	
Phosphoric acid	
Phosphorous acid	
Pipe Tape (teflon spray)	
Polishing Agents	
Polyurethane (Xylene)	
Potassium Biphthalate Crystal	
Potassium Carbonate	
Potassium Chloride Crystal	
Potassium Dichromate	X
Potassium Dihydrogen Orthophosphate	
Potassium Ferricyanide	X
Potassium Ferrocyanide, Trihydrate	X
Potassium Fluoride	
Potassium Hydrogen Phthalate	
Potassium Hydroxide	

CHEMICAL/REAGENT/CHEMICAL PRODUCT		APP. IX
Potassium Iodate		
Potassium Iodide		
Potassium Nitrate		
Potassium Nitrite		
Potassium Permanganate		
Potassium Persulfate		
Potassium Phosphate, Monobasic		
Potassium Pyrosulfate		
Potassium Sulfate		
Potassium Thiocyanate		X
2-Amino-2-hydroxymethyl-1,3-propanediol		
Pyridine		X
1-Pyrrolidinecarbodithioic Acid Ammonium Salt		
Rhodamine B		
Samarium Chloride		
Selenium (IV) Oxide		X
Selenous Acid		X
Silica Colloidal		
Silicic Acid, n-hydrate		
Silicon Carbide Powder		
Silicon Lubricant		
Silicon Oil		
Silicon Oxide		
Silicon Rubber		
Silicon Rubber Sealant		
Silver Chloride		X
Silver Diethyldithiocarbamate	X	
Silver (II) Oxide		X
Silver Nitrate		X
Sodium Acetate, Anhydrous		
Sodium Acetate, Trihydrate		
Sodium Arsenate		X
Sodium Arsenite		X
Sodium Azide		
Sodium Bicarbonate		
Sodium Bisulfite		
Sodium Borate		
Sodium Bromide		
Sodium Meta-Bisulfite		
Sodium Carbonate, Anhydrous		
Sodium Citrate, Dihydrate		
Sodium Chloride		
Sodium Diphenylamine Sulfonate		
Sodium Fluoride		
Sodium Hydroxide		
Sodium Hypochlorite		
Sodium Hypophosphite		

CHEMICAL/REAGENT/CHEMICAL PRODUCT	APP. IX
Sodium Iodide	
Sodium Molybdate	
Sodium Nitrate	
Sodium Nitrite	
Sodium Nitroprusside (cyanide compound)	X
Sodium Oxalate	
Sodium Phosphate, Dibasic	
Sodium Selenate	X
Sodium Selenite	X
Sodium Meta-Silicate	
Sodium Sulfate Anhydrous (reagent)	
Sodium Sulfide 9-Hydrate	
Sodium Sulfide Anhydrous	
Sodium Sulfite	
Sodium Tartrate, Dihydrate	
Sodium Tetrahydroborate	
Sodium Thiosulfate	
Sodium Thiosulfate, Pentahydrate	
Soluble Oil	
Stannous Chloride, Dihydrate	
Starch, Soluble	
Strontium (reagent)	
Strontium Carbonate	
Strontium Chloride	
Strontium Nitrate	
Structural Adhesive (contains amines and epoxy resins)	
Sucrose (Ultrex)	
Sulfanilic Acid	
Sulfate (reagent)	
Sulfer Capping Compound	
Sulfuric Acid	
Tetraethylorthosilicate	
Thallium (I) Salt	X
Tin, Mossy	
Titanium (III) Chloride	
Titanium Chloride ($TiCl_4$)	
Toluene (acrylic)	
Toluene	X
Trichloroethylene	X
1-1-1 Trichloroethane	X
1,1,2 Trichloro 1,2,2 Trifluoroethane	
Zinc (reagent)	
Zinc Acetate, Dihydrate	
Zinc Dust	
Zinc Granular, 20 mesh	
Zinc Nitrate	
Zinc Sulfate	

CHEMICAL/REAGENT/CHEMICAL PRODUCT	APP. IX
Zirconium tetrachloride	
Additive Cooling Fluid	
Best-Test Paper Cement*	
Bestine Solvent and Thinner*	
Buehler Epoxide Hardner*	
Buehler Epoxide Resin*	
Buehler Polishing Oil*	
Buehler Release Agent*	
200 Catalyst*	
Weld-on 3 Solvent Cement*	
Chem-Grip A*	
Chem-Grip B*	
Chemgrip Treating Agent*	
Collodian Flexible (Topical Protectant)*	
EPO - Kwick Hardner	
EPO - Kwick Resin	
Epomet Molding Compound	
Epoxy Casting Resin A (Araldite 6005)*	
Epoxy Solvent 537*	
Eriochrome Black T Solution*	
Fiberlay Epoxy*	
550 Fluid (contains benzene)*	
Gacoflex Thinner*	
Incal Oil*	
Iso Cut Fluid*	
Leco Microid Diamond Extender*	
Low-Ba Vacuum Oil	
LPS 1 Greaseless Lubricant*	
Magomet Polishing Compound	
M-Bond 200	
Metacoat Protective Lacquer*	
Mitadi Fluid Diamond Paste Extender	
Monometer Fluid*	
Multitherm PG-1 Oil*	
Never-Seez*	
Nitri Ver III*	
PAR Oil*	
Petropoxy 154 Curing Agent	
Petropoxy 154 Resin	
PG-1 Oil*	
711 Plastic Pipe Cement*	
Primer P-70 for PVC*	
E RTV Moldmaking Rubber*	
RTV E Catalist*	
RTV 630 A (Silicone Rubber Compound)*	
RTV 630 B (Curing Agent)*	
RTV Silicone Rubber Sealant*	
Silicones RTV 31 Silicone Rubber Compound*	

CHEMICAL/REAGENT/CHEMICAL PRODUCT	APP. IX
Silicones RTV 60 Silicone Rubber Compound*	
Silicone Mold Release	
Thermoplastic Cement	
Titan Casting Resin*	
Titan Hardener*	
Transoptic Powder (Mounting Compound)	
Triton X-100*	
Ultramet Cleaning Solutions*	

---

*Best-Test is a trademark of Union Rubber, Inc.
Bestine is a trademark of Union Rubber, Inc.
Buehler is a trademark of Buehler, Limited.
200 Catalyst is a trademark of M-Line Accessories.
Weld-on 3 Solvent Cement is a trademark of Industrial Polychemical Services.
Chem-Grip is a trademark of Chemplast, Inc.
Chemgrip Treating Agent is a trademark of Chemplast, Inc.
Collodian is a trademark of J.T. Baker.
Epoxy Casting Resin A is a trademark of R.P. Cargille Labs, Inc.
Epoxy Solvent 537 is a trademark of R.P. Cargille Labs, Inc.
Eriochrome Black T Solution is a trademark of Ciba-Geigy Corporation.
Fiberlay Epoxy is a trademark of Chemical Processing Company.
550 Fluid is a trademark of Dow Corning.
Gacoflex is a trademark of Gaco Western, Inc.
Incal Oil is a trademark of Conoco.
Iso Cut Fluid is a trademark of Buehler, Limited.
Leco is a trademark of Leco Corporation.
LPS 1 is a trademark of Holt Lloyd Company.
Metacoat is a trademark of Buehler, Limited.
Monometer is a trademark of Humbolt Test Equipment.
Multitherm is a trademark of Multitherm Corporation.
Never-Seez is a trademark of Never-Seez Corporation.
Nitri Ver III is a trademark of Hach Company.
PAR Oil is a trademark of Conoco.
PG-1 Oil is a trademark of Multitherm Corporation.
711 Plastic Pipe Cement is a trademark of Industrial Polychemical Services.
Primer P-70 is a trademark of Industrial Polychemical Services.
RTV is a trademark of General Electric Company.
Titan is a trademark of California Titan Products, Inc.
Triton X-100 is a trademark of Spectrum Chemical Manufacturing Corporation.
Ultramet is a trademark of Ultra-met Manufacturing Company.