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WHC-EP-0342
Addendum 11

2724-W Laundry 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

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Operations Support Services Department

Date Published
August 1990

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**2724-W LAUNDRY WASTEWATER
STREAM-SPECIFIC REPORT**

Operations Support Services Department

ABSTRACT

The proposed wastestream designation for the 2742-W Laundry wastewater wastestream is that this stream is not a dangerous waste, pursuant to the Washington (State) Administration Code (WAC) 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.

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EXECUTIVE SUMMARY

The proposed wastestream designation for the 2724-W Laundry wastewater wastestream, located in the 200 West Area of the Hanford Site, is that this stream 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 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. The "listed" dangerous waste determination was made with process data supplemented with sampling data; the "criteria" and "characteristic" dangerous waste determinations were made with sampling data. Process data were based on process knowledge of laundry chemical processing products using Material Safety Data Sheets and present operating knowledge. Sample data were based on samples downstream of all process contributors. Sample data consist of four random samples taken from a single sampling point from October 1989 through March 1990. Additional "non-validated" data were taken prior to October 1989. These data, though not used for making the proposed designation, are included in Appendix A for completeness.

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

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LIST OF TERMS

CERCLA	<i>Comprehensive Environmental Response, Compensation, and Liability Act</i>
CY	calendar year
DCG	derived concentration guidelines
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
MCL	maximum concentration level
MSDS	Material Safety Data Sheet
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
SARA	<i>Superfund Amendments and Reauthorization Act</i>
Tri-Party Agreement	<i>Hanford Federal Facility Agreement and Consent Order</i>
WAC	Washington (State) Administrative Code
wt%	weight %
90%CI	90% confidence interval

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**2724-W LAUNDRY WASTEWATER
STREAM-SPECIFIC 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 were received from the public 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 1990d), a portion of which characterizes 33 liquid effluent streams. This characterization integrates process data, sampling data, and dangerous waste regulations, pursuant to the Washington (State) Administrative Code (WAC) 173-303, *Dangerous Waste Regulations* (Ecology 1989).

The results of the characterization study are documented in 33 separate reports, one report per wastestream. The complete list of stream-specific reports appears in Table 1-1. This document is one of the 33 reports.

1.2 APPROACH

This report characterizes the 2724-W Laundry wastewater wastestream, located in the 200 West Area of the Hanford Site. This characterization contains sufficient detail so that a wastestream designation, in accordance with WAC 173-303, can be proposed and an assessment of the relative effluent priorities can be made with regard to the need for treatment and for alternative disposal practice.

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

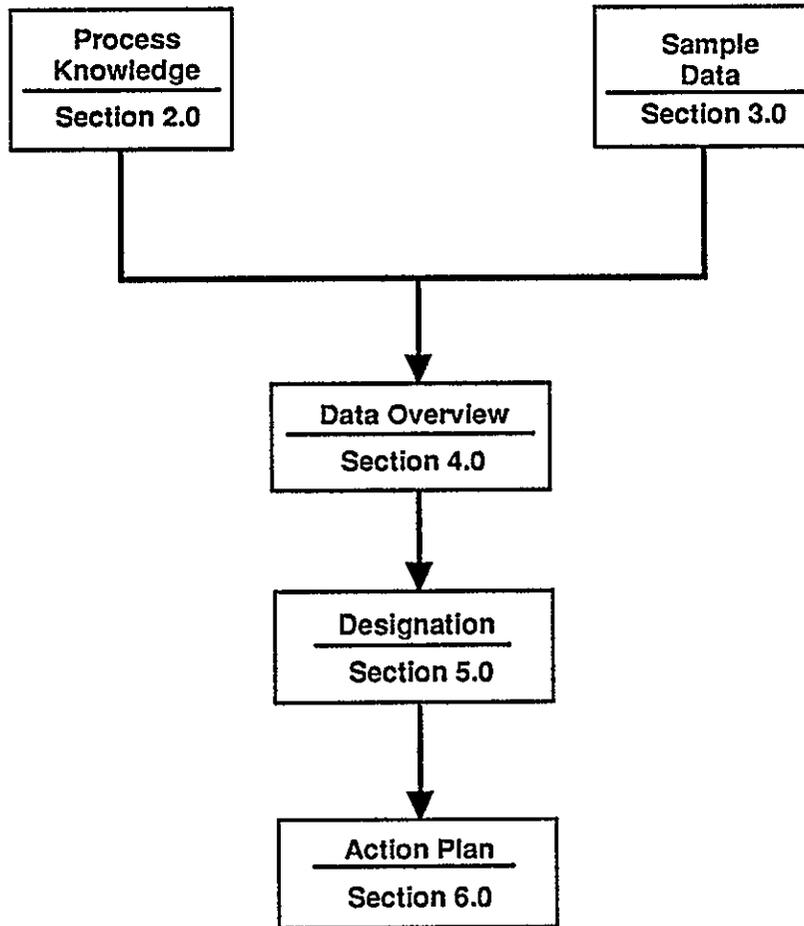
1. Describe both process and sampling data (Sections 2.0 and 3.0, respectively).
2. Integrate the data (Section 4.0).
3. Propose a designation (Section 5.0).
4. Design an action plan, if needed, to obtain additional characterization data (Section 6.0).

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2724-W Laundry Wastewater

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.



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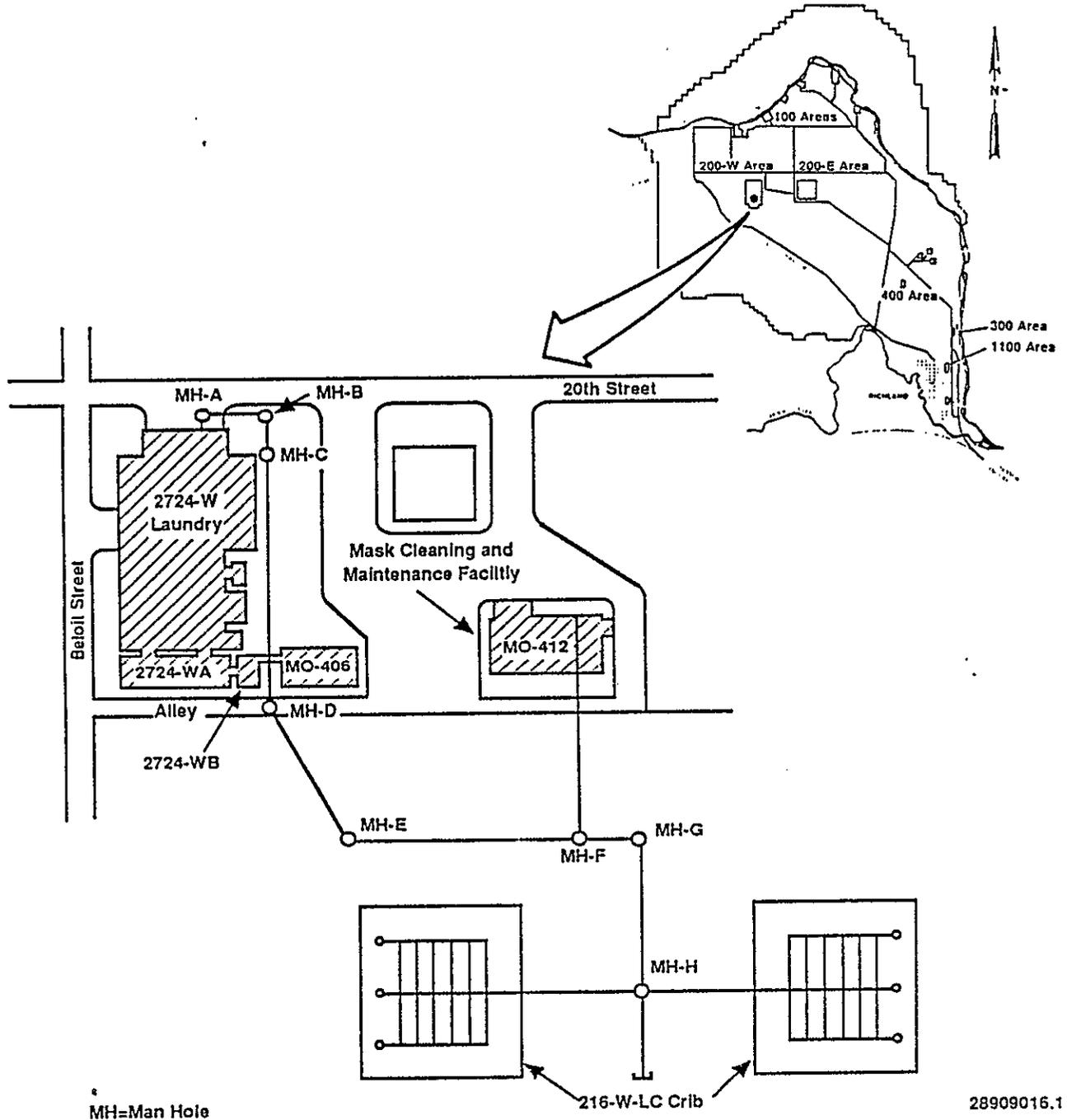
1.3 SCOPE

The scope of this report is to perform a chemical and radiological characterization of the effluent from the 2724-W Laundry (Figure 1-2) in order to propose a designation.

The 2724-W Laundry wastewater stream enters the soil column at 216-W-LC Crib. In addition to the laundry effluent, the 216-W-LC Crib did receive wastewater from the Mask Cleaning and Maintenance facility during a 6-wk mask decontamination test. The process was determined to be ineffective and is not anticipated to be restarted. Because the concern is for liquid waste going to the soil column, samples were taken at manhole H, the piping juncture immediately prior to connecting to the crib. This report does not address any other wastestream leaving the laundry such as solid, gaseous, or sanitary waste.

This review is based on data taken during the sampling period of October 1989 to March 1990. Future configuration and process modifications are addressed only if they will significantly alter the present effluent.

Figure 1-2. Aerial View of the Laundry Facility and Mask Cleaning and Maintenance Facility.



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2.0 PROCESS KNOWLEDGE

This section presents a qualitative and quantitative process-knowledge-based characterization of the chemical constituents of the 2724-W Laundry wastewater wastestream. These process data are discussed in terms of the following factors:

1. The location and physical layout of the process facility
2. The identification of the wastestream contributors
3. A general description of the present, past, and future activities of the process, as well as administrative controls put in place to keep the wastestream within regulatory limits
4. The identification of the constituent concentration for each contributor.

2.1 PHYSICAL LAYOUT

The original laundry building is a wood and concrete structure that was constructed in 1952, and subsequently expanded. The present Laundry complex is a series of buildings connected together: 2724-W, 2724-WA, 2724-WB, and MO-406. This complex covers approximately 25,000 ft². The floor plan is diagramed in Appendix A-1. The major areas of the laundry complex are the radioactive (regulated) washing and drying area, nonradioactive (nonregulated) washing and drying area, regulated storage areas, nonregulated storage areas, folding and monitoring areas, changerooms, and adjacent lunchrooms and administrative offices. The Mask Cleaning and Maintenance facility (MO-412) is adjacent to the laundry complex and is considered part of the laundry facility. An aerial-view diagram of the laundry facility can be seen in Figure 1-2.

The Mask Cleaning and Maintenance facility (MO-412) sanitizes and repairs all respirators used on the Hanford Site. The MO-412 is a 6-wide portable trailer located directly east of the 2724-W Building. It was installed in 1984. Trailer MO-412 covers approximately 5,400 ft² (84 ft x 66 ft). A schematic is presented in Appendix A-2. The major areas of this facility are as follows: decontamination station, respiratory protection, incoming storage, outgoing storage, clean mask room, lavatories, and covered dock. Of these major areas, the decontamination station is the only area that is physically connected to the 216-W-LC Crib. As mentioned in Section 1.3, the decontamination station added water to the crib during a 6-wk trial period. The process producing the wastestream to the crib was discontinued after the trial period and is not expected to run again, due to operational inefficiencies.

The liquid effluent from the 2724-W Laundry is discharged to the soil column via the 216-W-LC Crib. The 216-W-LC Crib was installed in 1981 along with its associated influent piping. The first wastewater was received in September 1982. A diagram of the crib is shown in Appendix A-3. The 216-W-LC Crib is not currently regulated under WAC 173-303.

2.2 CONTRIBUTORS

There are 78 possible contributors or points of entry into the 216-W-LC Crib, 34 of which come from the laundry facility. The laundry is the only routine wastewater source to the crib and is the subject of this report. A summary of the 78 possible contributors to the crib is presented in Table 2-1 and a schematic drawing of the laundry points of entry are shown in Figure 2-1.

Of the 78 possible contributors to the 216-W-LC Crib, 62 are infrequent sources. An infrequent source is considered as a possible entry point for chemicals to be added to the wastestream as a result of a spill or a process upset. These nonroutine additions to the effluent have all been identified as floor drains, manholes, crib vent risers, and sinks from the mask decontamination station.

Sixteen of the possible contributors are routine sources to the wastestream and are all located within the laundry. These sources are: washing machines (5), dryer steam condensate (4), heating, ventilation, and air conditioning systems (HVAC) (2), Roto-clone* hydrostatic precipitator, hot water tank heating coils, nonradioactive trench, radioactive trench, and handwashing sink.

Laundry effluent leaves the laundry through either the vibrating filter or a bag filter and enters manhole A. From manhole A the effluent flows by gravity to the 216-W-LC Crib, passing seven other manholes. During routine laundry operation, the machines are at different points in their respective cycles. Laundry wastewater is the combination of effluents from many simultaneous activities. Consequently, point source sampling at the various machines, while providing information about discharges from a particular machine, does not adequately characterize the composition of routine laundry wastewater. For this reason, samples for this proposed characterization were taken at manhole H, which provides a representative sample for the entire laundry wastewater. Since the only routine sources to the wastestream are within the laundry, they are more important to this report than the others and will be discussed in detail.

The sump has a storage capacity of 580 gal and serves as a collection basin for all laundry effluents. The three routine contributors that feed into the sump are the Roto-clone, the steam condensate line, and the wash

*Roto-clone is a trademark of Allis-Chalmers, West Allis, Wisconsin.

Table 2-1. List of Potential Contributors.

Potential Contributor	Units	Location	
2724-W Laundry Building			
Clothes washing machines	3*	Radioactive laundry room	
	2*	Nonradioactive laundry room	
	2*	Steam condensate drain	
Clothes dryer condensate	3*	Regulated laundry room	
	1*	Nonregulated laundry room	
Hot Water Tank	1*	Boiler room	
Roto-clone	1*	East side 2724-W	
Floor drains	12	Radioactive laundry room	
	2	Nonradioactive laundry room	
	1	Boiler room	
Cleanouts	2	Radioactive laundry room	
	1	Nonradioactive laundry room	
Sink	1*	Regulated storage room	
Heating, Ventilation, and Air Conditioning			
	Hot (thermal)	1*	Boiler room
	Cold (thermal)	1*	Radioactive laundry room
Subtotal	34		
MO-412 Mask Cleaning and Maintenance Building			
Mask Decontamination Station			
Sink	1	Mask decontamination room	
Washer/sink	1	Mask decontamination room	
Subtotal	2		
Outside piping			
Manholes (A-H)	8	Outside	
Subtotal	8		
216-W-LC Crib			
Manholes	6	Crib area	
Cleanouts	4	Crib area	
Vent risers	24	Crib area	
Subtotals	34		
Total	78		

*Routine contributors (16)

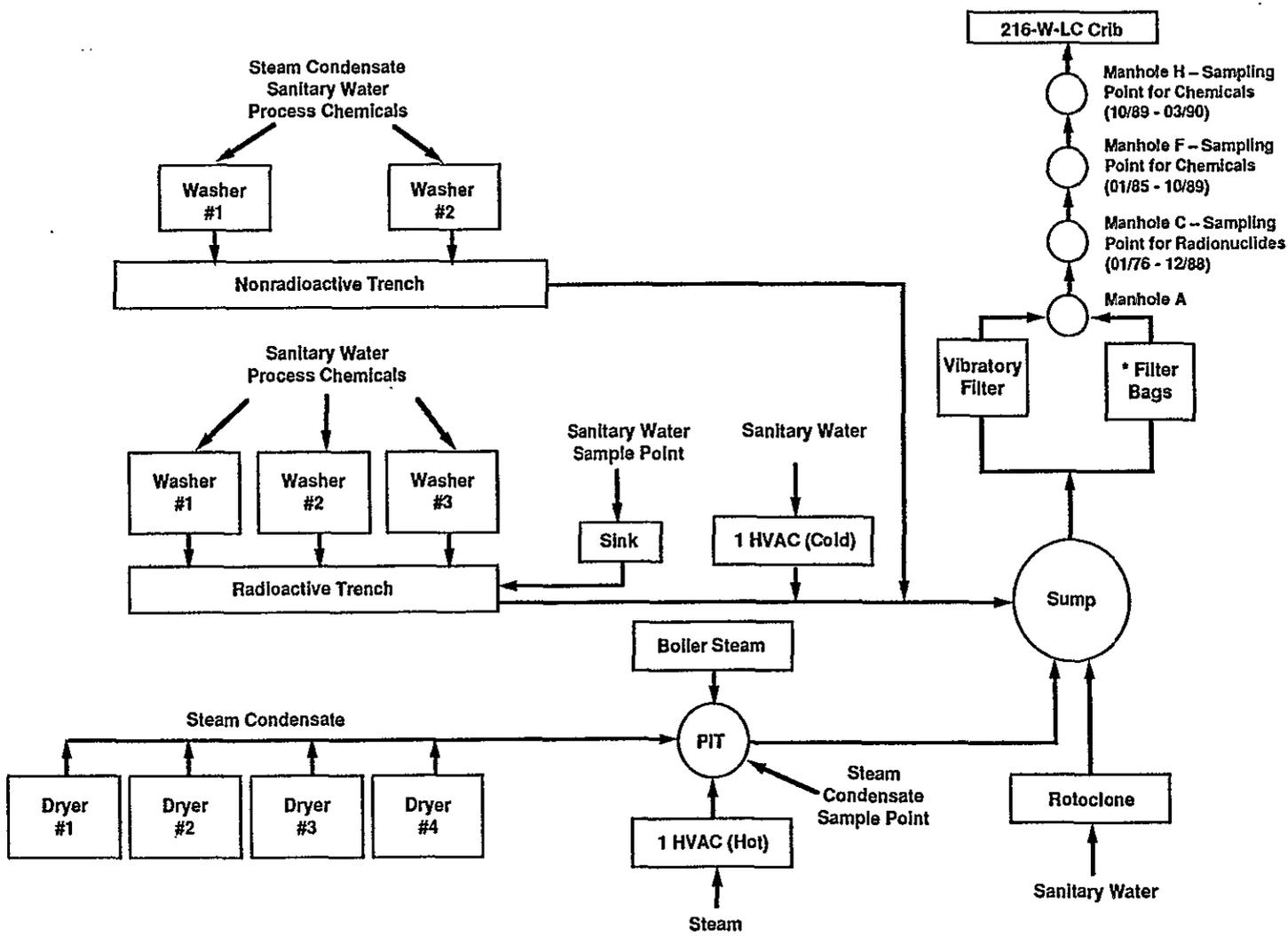


Figure 2-1. Wastewater Flow Schematic of Major Contributors (July 1989).

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2724-W Laundry Wastewater

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* The filter system in the laundry is presently being upgraded. The filter bags were removed January 1, 1990, and are presently being replaced by a new filtering system (Project B-697) as described in Section 2.3.3.

water. The Roto-clone generates approximately 2,000 gal/d of water in scavenging lint from the air exhaust from the three radioactive clothes dryers by hydrostatic precipitation. The steam condensate lines come into the sump from a concrete pit near the Roto-clone. This pit receives steam condensate from the four dryers, the boiler (hot water tank for the washing machines), and the hot side of the HVAC. The wash water lines into the sump come from both the radioactive and nonradioactive washers. The discharge from the three radioactive washers and two nonradioactive washers are discharged into separate trenches before being piped to the sump. The trenches are made of concrete and are part of the floor. The trenches have the following dimensions: radioactive trench--24 in. wide, 12 in. deep, and 75 ft long; and nonradioactive trench--28 in. wide, 12 in. deep, and 50 ft long.

The volumes of water used in the different types of washes range from 200 gal to 1,400 gal per washing, depending on wash type. The hand washing sink discharges in the end of the radioactive trench and the cold portion of the HVAC discharges into the pipe between the radioactive trench and the sump.

The measurement of contributor wastewater volume cannot be taken because there is no flow meter in the wastewater stream either at the exit of the Laundry or at any of the individual contributors. However, a volume estimate can be made from influent water meter readings for the total contribution of the washing machines, Roto-clone, cold portion of the HVAC, and the handwashing sink. Volume estimates for the steam condensate lines can be made from the laundry steam use data.

Estimates for water flow from the laundry facility to the crib over the period of time covered by the samples range from 520,000 gal/mo to 951,000 gal/mo with an average of 691,000 gal/mo.

2.3 PROCESS DESCRIPTION

The process is discussed by considering the present, past, and future activities. The present is defined to be from October 1989 to March 1990.

2.3.1 Present Activities (October 1989 through March 1990)

All soiled protective work clothing used on the Hanford Site is sent to the laundry for cleaning. At the present time, the laundry handles approximately 3.3M lb of clothing per year. Approximately two-thirds of this amount is radioactively-contaminated clothing. Radioactively-contaminated clothing is defined as special protective clothing that has been worn in radiation areas and has the potential of being contaminated.

All clothing is delivered to the laundry in large canvas bags holding an average of 75 lb, with a range from 50 to 140 lbs. These bags are transported by hand either to the radioactive or to the nonradioactive storage area, as appropriate.

Radioactive bags are withdrawn from the storage area and handloaded into one of the regulated laundry's three 600-lb-capacity washing machines. The canvas bags are arranged in the washer in such a way as to allow the clothing inside to fall out of the bags when agitated by the washing action. The complete cycle (on the average) takes approximately 23 to 42 min depending on the level of cleaning needed to remove the radiological contamination (i.e., low, medium, or high).

The essential chemicals utilized are 5 to 10 lb of Turco¹ Aviation and 0 to 5 lb of Turco Decontamination. The wash cycles range from 0 to 1 pre-wash, 1 to 2 wash, and 1 to 6 rinse cycles. The total volume of wastewater generated in a cycle is from 200 to 1,400 gal. On the average, the laundry processes 16 radioactive wash loads per day; with 8 to 10 laundry bags per load.

After washing and rinsing, the clothing is removed from the washer and put into a carousel for sorting by item type in an interim wet laundry storage area. The sorted clothing is then handloaded into one of the three 400-lb capacity dryers. After drying, all laundry noted to be heavily radioactively-contaminated on entry to the laundry is monitored; and 10 to 15% of other contaminated laundry is randomly checked. If the processed clothing is above release limit, the clothing is handled as low-level waste. Garments within the release limits are handfolded and stored until being redistributed to the users.

The process for nonradioactive laundry is essentially the same as that for the regulated laundry except that the nonregulated clothing is sorted by garment type before being washed. The nonradioactive laundry has one 300-lb and one 400-lb capacity washer, and one 400-lb capacity dryer. Although the clothing being processed is not contaminated, contamination spot checks are made by the radiation protection technicians.

The nonradioactive laundry uses 0 to 3 lb of Olde Worlde² detergent or 3 to 5 lb of Turco Aviation per wash load of regular laundry. The bath towels receive 0-3 lb of Olde Worlde detergent or 3-5 lbs of Turco Aviation, and 0-3 lbs of Silver-Wyte³ bleach per load. The washing machines have one wash and two or three rinse cycles. The total volume of water generated on each cycle ranges from 600 to 900 gal. On the average, the laundry processes 12 nonradioactive wash loads per day, with 4 to 13 laundry bags per load.

Spartan⁴ flame retardant is used in the nonradioactive laundry to flameproof welder coveralls. The Spartan flame retardant is added to the rinse cycle and the coveralls are soaked for 0.5 h before they are spun

¹Turco is a trademark of TP Industrial, Inc., Lakewood, California.

²Olde Worlde is a trademark of Olde Worlde Products, North Canton, Ohio.

³Silver-Wyte is a trademark of Fabrilife Chemical Company, Cincinnati, Ohio.

⁴Spartan is a trademark of Spartan Adhesive and Coating Company, Crystal Lake, Illinois.

dry. Spartan flame retardant is still in the laundry inventory, but is only rarely used as the coveralls currently used by the welders are permanently treated to be flame retardant.

2.3.2 Past Activities (before October 1989)

The laundry effluent was routed to the 216-W-LC Crib in September 1981. Before that time, the laundry wastewater was discharged to U-Pond via the U-14 Ditch. After 6 mo of operation, the crib began to experience problems with water backing up into the supply piping. In 1983, the distribution lateral in the crib was found to be 40-50% plugged with gelatinous sludge that blocked piping perforations, preventing distribution of the wastewater to gravel within the crib. It was discovered that waste oils from the nearby fabrication shop was entering the wastestream at manhole B. The connection between the fabrication shop waste oil drain and manhole B was blocked with a cement plug. Sludge was cleaned out of the crib piping and the crib has operated normally since that time. The connection between the fabrication shop and manhole B was closed off three years before the first chemical sample was taken. Considering the flow of laundry wastewater, residual effects from the fabrication shop are not expected in the present wastewater.

2.3.3 Future Activities (after March 1990)

Planned upgrades for the current laundry facility are as follows:

- **Project B-691**--The HVAC upgrade will provide air conditioning and directional air flows in the laundry from the least potentially contaminated to the most potentially contaminated areas. Construction was completed during the first quarter of calendar year (CY) 1990. Operation began in April 1990. This project only added to the existing air conditioning capabilities. It is a closed system and does not add to the effluent stream going to the 216-W-LC Crib.
- **Project B-697**--The effluent filtration system will provide back-up particulate filtration (vibratory filter) and a pressure precoat filter to remove oil and grease from the laundry wastewater. The future filtered wastewater will contain fewer organic chemicals because of the filter process. Justification for this system was based on the need to help extend the life of the 216-W-LC Crib rather than to meet environmental requirements.

Waste management and decommissioning activities at the Hanford Site are expected to increase while the material production activity is expected to

decrease in the near term. The laundry wastestream volume is not expected to change appreciably; however, the radiological character of the wastestream is expected to change to reflect site activities. Future activities will only affect the radiologic profile of the wastestream and will not change the proposed waste designation from WAC 173-303.

A new laundry building in the 200 East Area is being designed and is scheduled to be operational sometime after 1995. The laundry effluent stream to the 216-W-LC Crib will cease when the new 200 East laundry becomes operational and the 200 West laundry is shut down.

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.

It is recognized that dirty laundry is an important source of contaminants in the 2724-W Laundry wastewater stream. For this reason, "launderable articles" have been defined to exclude items that have contacted listed waste or which might otherwise cause the laundry wastewater to become designated as a dangerous waste. Site policy is that nonlaunderable articles will be disposed of as solid waste.

2.3.4.1 General 2724-W Laundry Wastewater Management. Since current technology does not exist for on-line (real-time) monitoring of the laundry wastewater stream, the laundry management has incorporated administrative controls as an aid to regulate use of the 2724-W Laundry 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 the 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.

2.3.4.3 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 Site sewer systems or other soil column entry points.

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 are mandated.

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 2724-W Laundry 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 entering the Hanford soil columns are minimized. This is achieved by placing them, wherever possible, at distances removed from entry points to wastestreams going to a soil column. 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 course of preparation for 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 designation proposal for the 2724-W Laundry wastewater could be presented in this report.

Documentation reviewed included Material Safety Data Sheets (MSDS), *Superfund Amendments and Reauthorization Act (SARA)* (EPA 1988) 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 2724-W Laundry 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 2724-W Laundry wastewater are incorporated in the discussion of Section 5.0.

2.4 CONSTITUENTS

Each of the 78 routine contributors has the potential for being a source of chemical or radioactive constituents to the wastewater stream. The concentration of these constituents was estimated by the following strategy:

1. List all chemicals used or stored at the laundry facility.
2. Determine which chemicals are constituents used in the process, routine maintenance, and other categories.
3. Calculate the average and peak concentration for the process constituents.
4. Sort the constituents into chemical classes to compare data to sampling data.

Sixty-five chemical products were found to be used or stored at the laundry. The number or kinds of chemical products has not changed since 1985. Using Material Safety Data Sheets (MSDS), 183 different chemical constituents were identified, accounting for duplicates (Appendix A-4).

Although each of these 183 constituents has a possibility for entering the wastestream, the likelihood of their doing so varies with each chemical's use. The probability that these constituents will enter the wastestream has been approximated by grouping the 183 constituents into the following three categories: process chemicals, routine maintenance chemicals, and other chemicals. The process chemicals category was determined to be the major source of constituents entering the crib, the routine maintenance category was determined to be a possible source of constituents, and the other chemicals category containing nonprocess and nonroutine chemicals was determined to be an unlikely source of constituents.

Using these category definitions, 17 of the 183 constituents were identified as process constituents, 39 were identified as routine maintenance constituents, and 127 were determined to be other constituents. All of the process constituents entered the wastestream from the five washing machines.

2.5 PROCESS DATA

Old purchase records were used to determine average monthly loading of the crib with process chemicals. On the average, a total of 1,645 lb/mo of process chemicals are used at the laundry facility. The highest constituent concentration is sodium metasilicate pentahydrate, with 516 lb/mo. The lowest constituent concentration is sodium dodecylbenzene sulfonate, which has a 9 lb/mo loading.

Information on maintenance and other chemicals was insufficient to predict calculations. Maintenance and other chemicals can be introduced only through process upsets or spills. There have been no Ecology or EPA reportable spills at the laundry. Any process upset is likely only to be a plugging of the drainage system that would have resulted in the mobilizing of spilled process chemicals into the wastewater.

The wastestream constituents are affected by the following four sources of variability:

- Amount of process chemicals purchased each month
- Weight percent of constituents in the process chemical MSDS
- Wastewater flow
- Wash cycle data (i.e., amount of soap and water used).

3.0 SAMPLE DATA

This section provides an evaluation of the sampling data pertaining to 2724-W Laundry wastewater wastestream. These data are divided into two categories, chemical data and radiological data. Radiological data are included for completeness of information only, as WAC 173-303 does not regulate radioactive waste.

3.1 DATA SOURCE

During routine laundry operation, the machines are at different points in their respective cycles. Laundry wastewater is the combination of effluents from many simultaneous activities. Consequently, point source sampling at the various machines, while providing information about discharges from a particular machine, does not adequately characterize the composition of routine laundry wastewater. For this reason, samples for this proposed characterization were taken at manhole H, which provides a representative sample for the entire laundry wastewater.

3.1.1 Sample Data

The wastestream data are made up of two distinct sources: the chemical data set and the radiological data set. All data utilized in this section are contained in Appendix A-5.

Sample names and the analyses performed on them are contained in Table 3-1; the statistical summary of the chemical and radiological data is shown in Table 3-2.

It is recognized that cleaning laundry is a batch process and effluent from it varies from batch to batch. Samples were grab samples taken randomly, and data varies accordingly.

3.1.1.1 Chemical. The chemical data set comprises four samples that were taken between October 1989 and March 1990 from manhole H.

All samples were taken to a contract laboratory for analysis. The details of the sampling, analytical, quality control, and quality assurance procedures utilized are contained in Volume 4, Appendix 29 of the *Waste Stream Characterization Report* (WHC 1989b). The variability introduced by the laboratory is not addressed in this report.

3.1.1.2 Radiological. The radionuclide data are supplied to provide as complete a characterization picture as possible. The radionuclide discussion will not be pursued beyond this section because it is not directly related to the designation process. Radiological data from "new" validated samples

Table 3-1. Analytical Methods Report.
 (All numbers are in ppb unless otherwise noted.)
 (sheet 1 of 4)

LEAD# CofC#	50677 50677	50772 50772	50780 50780	50857 50857
Alkalinity	X	X	X	X
Alpha counting	X	X	X	X
²⁴¹ Am	X	X		X
Ammonia	X	X	X	X
Arsenic	X	X	X	X
Atomic emission spectroscopy	X	X	X	X
Beta counting	X	X	X	X
¹⁴ C	X	X	X	
Conductivity-field	X	X	X	X
Curium isotopes	X	X		X
Cyanide	X	X	X	X
Direct aqueous injection (GC)	X	X	X	X
Fluoride (LDL)	X	X	X	X
Gamma energy analysis	X	X	X	X
Hydrazine	X	X	X	X
Ion chromatography	X	X	X	X
Lead	X	X	X	X
Low-energy photon detection		X	X	X
Mercury	X	X	X	X
pH-field	X	X	X	X
Plutonium isotopes	X	X	X	X
Selenium	X	X	X	X
Semivolatile organics (GC/MS)	X	X	X	X
Strontium beta counting	X	X	X	X
Sulfide	X	X	X	X
Suspended solids	X	X	X	X
Temperature-field	X	X	X	X
Thallium	X	X	X	X
Total carbon	X	X	X	X
Total dissolved solids	X	X	X	X
Total organic carbon	X	X	X	X
Total organic halides (LDL)	X	X	X	X
Total radium alpha counting	X	X	X	X
Tritium	X		X	X
Uranium	X	X	X	X
Uranium isotopes	X	X	X	X
Volatile organics (GC/MS)	X	X	X	X
LEAD# CofC#	50677B 50678	50772B 50773	50780B 50781	50857B 50858

Table 3-1. Analytical Methods Report.
(All numbers are in ppb unless otherwise noted.)
(sheet 2 of 4)

Volatile organics (GC/MS)	X	X	X	X
LEAD#	50677T	50772T	50780T	50857T
CofC#	50679	50774	50782	50859
Volatile organics (GC/MS)	X	X	X	X
LEAD#	50677E	50772E	50780E	50857E
CofC#	50680	50775	50783	50860
Atomic emission spectroscopy	X	X	X	X
Ignitability	X	X	X	X
Mercury (mixed matrix)	X	X	X	X
Reactive cyanide	X	X	X	X
Reactive sulfide	X	X	X	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)

Sample# is the number of the sample. See Section 3.0 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	²⁴¹ Am	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	⁹⁰ Sr	UST-20Sr02
COLIF	Coliform Bacteria	USEPA-9131
COLIFMF	Coliform Bacteria (Membrane Filter)	USEPA-9132

Table 3-1. Analytical Methods Report.
(All numbers are in ppb unless otherwise noted.)
(sheet 3 of 4)

Code	Analytical Method	Reference
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
LEPD	¹²⁹ I	UST-20I02
LSC	¹⁴ C	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)

Table 3-1. Analytical Methods Report.
(All numbers are in ppb unless otherwise noted.)
(sheet 4 of 4)

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.

Table 3-2. Chemical Analysis Statistics Report.
(All numbers are in ppb unless otherwise noted.)
(sheet 1 of 3)

Constituent	N	MDA	Method	Mean	StdErr	90%CILim	Maximum
Aluminum	4	0	n/a	1.76E+03	1.25E+03	3.81E+03	5.51E+03
Arsenic	4	3	DL	6.25E+00	1.25E+00	8.30E+00	1.00E+01
Arsenic (EP Toxic)	4	4	n/a	<5.00E+02	0.00E+00	<5.00E+02	<5.00E+02
Barium	4	0	n/a	5.44E+02	4.39E+02	1.26E+03	1.86E+03
Barium (EP Toxic)	4	4	n/a	<1.00E+03	0.00E+00	<1.00E+03	<1.00E+03
Boron	4	0	n/a	1.26E+02	4.16E+01	1.94E+02	2.13E+02
Cadmium	4	2	DL	1.05E+01	6.93E+00	2.19E+01	3.10E+01
Cadmium (EP Toxic)	4	4	n/a	<1.00E+02	0.00E+00	<1.00E+02	<1.00E+02
Calcium	4	0	n/a	2.13E+04	3.71E+03	2.74E+04	3.18E+04
Chloride	4	0	n/a	1.51E+04	8.35E+03	2.87E+04	3.97E+04
Chromium	4	2	DL	3.20E+01	1.97E+01	6.43E+01	9.10E+01
Chromium (EP Toxic)	4	4	n/a	<5.00E+02	0.00E+00	<5.00E+02	<5.00E+02
Copper	4	0	n/a	2.23E+02	1.52E+02	4.71E+02	6.78E+02
Cyanide	4	1	DL	2.65E+01	7.20E+00	3.83E+01	4.45E+01
Fluoride	4	0	n/a	7.15E+02	2.15E+02	1.07E+03	1.16E+03
Iron	4	0	n/a	5.06E+03	4.05E+03	1.17E+04	1.72E+04
Lead	4	0	n/a	1.08E+02	7.16E+01	2.26E+02	3.19E+02
Lead (EP Toxic)	4	4	n/a	<5.00E+02	0.00E+00	<5.00E+02	<5.00E+02
Lithium	4	1	DL	4.45E+02	3.83E+02	1.07E+03	1.59E+03
Magnesium	4	0	n/a	5.98E+03	1.03E+03	7.66E+03	7.57E+03
Manganese	4	0	n/a	6.65E+01	4.13E+01	1.34E+02	1.90E+02
Mercury	4	1	DL	3.10E-01	1.23E-01	5.12E-01	6.50E-01
Mercury (EP Toxic)	4	4	n/a	<4.00E+01	2.00E+01	<7.28E+01	<1.00E+02
Nickel	4	2	DL	4.85E+01	3.82E+01	1.11E+02	1.63E+02
Nitrate	4	0	n/a	1.37E+03	4.48E+02	2.11E+03	2.60E+03
Phosphate	4	0	n/a	9.31E+04	3.08E+04	1.44E+05	1.83E+05
Potassium	4	0	n/a	9.34E+03	3.94E+03	1.58E+04	1.82E+04
Selenium (EP Toxic)	4	4	n/a	<5.00E+02	0.00E+00	<5.00E+02	<5.00E+02
Silicon	4	0	n/a	2.72E+04	5.91E+03	3.69E+04	3.97E+04
Silver (EP Toxic)	4	4	n/a	<5.00E+02	0.00E+00	<5.00E+02	<5.00E+02
Sodium	4	0	n/a	1.09E+05	2.18E+04	1.45E+05	1.42E+05
Strontium	4	0	n/a	1.11E+02	2.46E+01	1.51E+02	1.83E+02
Sulfate	4	0	n/a	1.77E+04	2.54E+03	2.19E+04	2.30E+04
Sulfide	4	2	DL	1.40E+03	2.43E+02	1.80E+03	1.97E+03
Titanium	4	3	DL	1.80E+02	1.20E+02	3.78E+02	5.42E+02
Uranium	4	0	n/a	1.13E+02	9.08E+01	2.61E+02	3.83E+02
Vanadium	4	3	DL	8.00E+00	3.00E+00	1.29E+01	1.70E+01
Zinc	4	0	n/a	6.08E+02	3.77E+02	1.23E+03	1.73E+03
Acetone	4	2	DL	1.40E+01	3.54E+00	1.98E+01	2.30E+01
Ammonia	4	0	n/a	1.82E+04	5.49E+03	2.72E+04	3.27E+04
Benzoic acid	3	0	n/a	1.54E+02	6.55E+01	2.78E+02	2.80E+02
Benzyl alcohol	4	0	n/a	1.43E+02	6.03E+01	2.42E+02	3.22E+02
Bis(2-ethylhexyl) phthalate	4	0	n/a	7.15E+01	1.51E+01	9.63E+01	1.00E+02

Table 3-2. Chemical Analysis Statistics Report.
(All numbers are in ppb unless otherwise noted.)
(sheet 2 of 3)

Constituent	N	MDA	Method	Mean	StdErr	90%CILim	Maximum
1-Butoxy-2-propanol	1	0	n/a	1.20E+02	n/a	n/a	1.20E+02
Butylbenzyl phthalate	4	0	n/a	3.95E+01	1.32E+01	6.11E+01	7.80E+01
Di-n-octyl phthalate	4	0	n/a	1.11E+02	3.15E+01	1.63E+02	1.86E+02
Hydrazine	4	1	DL	5.32E+01	1.18E+01	7.25E+01	7.50E+01
Phthalic anhydride	1	0	n/a	1.20E+01	n/a	n/a	1.20E+01
Trichloromethane	4	0	n/a	3.32E+01	2.09E+01	6.74E+01	9.50E+01
Unknown	4	0	n/a	5.52E+01	8.44E+00	6.91E+01	7.70E+01
Unknown acid	1	0	n/a	2.20E+01	n/a	n/a	2.20E+01
Unknown aliphatic alcohol	1	0	n/a	1.60E+01	n/a	n/a	1.60E+01
Unknown aliphatic HC	4	0	n/a	2.42E+01	6.41E+00	3.47E+01	3.60E+01
Unknown amine	1	0	n/a	2.10E+01	n/a	n/a	2.10E+01
Unknown fatty acid	4	0	n/a	1.59E+02	8.39E+01	2.96E+02	4.10E+02
Unknown glycol	1	0	n/a	9.20E+01	n/a	n/a	9.20E+01
Unknown hydrocarbon	1	0	n/a	9.00E+01	n/a	n/a	9.00E+01
Unknown phthalate	4	0	n/a	4.70E+01	1.57E+01	7.27E+01	9.10E+01
Unknown polycyclic HC	2	0	n/a	5.40E+01	2.20E+01	1.22E+02	7.60E+01
Unknown sulfur compound	1	0	n/a	1.30E+01	n/a	n/a	1.30E+01
Alkalinity (Method B)	4	0	n/a	2.57E+05	6.50E+04	3.64E+05	4.36E+05
Alpha Activity (pCi/L)	4	0	n/a	2.09E+02	1.48E+02	4.51E+02	6.34E+02
Beta Activity (pCi/L)	4	0	n/a	1.66E+03	9.61E+02	3.24E+03	3.70E+03
Conductivity (μS)	4	0	n/a	7.69E+02	1.64E+02	1.04E+03	1.01E+03
Ignitability (°F)	4	0	n/a	2.10E+02	1.41E+00	2.08E+02	2.06E+02
pH (dimensionless)	4	0	n/a	8.45E+00	6.69E-01	9.55E+00	9.55E+00
Reactivity Cyanide (mg/kg)	4	4	n/a	<1.00E+02	0.00E+00	<1.00E+02	<1.00E+02
Reactivity Sulfide (mg/kg)	4	4	n/a	<1.00E+02	0.00E+00	<1.00E+02	<1.00E+02
Suspended Solids	4	0	n/a	1.53E+05	7.84E+04	2.81E+05	3.85E+05
TDS	4	0	n/a	4.95E+05	1.26E+05	7.02E+05	7.51E+05
Temperature (°C)	4	0	n/a	4.57E+01	1.99E+00	4.90E+01	5.06E+01
TOC	4	0	n/a	4.86E+04	1.31E+04	7.01E+04	8.71E+04
Total Carbon	4	0	n/a	1.10E+05	1.13E+04	1.28E+05	1.36E+05
TOX (as Cl)	4	0	n/a	4.21E+02	2.70E+02	8.63E+02	1.23E+03
²⁴¹ Am (pCi/L)	3	1	DL	4.41E+01	3.81E+01	1.16E+02	1.20E+02
²⁴⁴ Cm (pCi/L)	2	0	n/a	6.05E-01	4.86E-01	2.10E+00	1.09E+00
⁶⁰ Co (pCi/L)	4	1	DL	2.93E+02	1.54E+02	5.45E+02	5.76E+02
¹³⁷ Cs (pCi/L)	4	1	DL	1.70E+02	1.14E+02	3.57E+02	5.02E+02
³ H (pCi/L)	3	2	DL	1.27E+03	1.25E+03	3.64E+03	3.78E+03
⁵⁴ Mn (pCi/L)	3	0	n/a	4.04E+01	1.81E+01	7.45E+01	6.18E+01
²² Na (pCi/L)	1	0	n/a	8.88E+01	n/a	n/a	8.88E+01
²¹⁰ Pb (pCi/L)	4	2	DL	1.22E+00	4.94E-01	2.03E+00	2.63E+00
²³⁸ Pu (pCi/L)	4	0	n/a	1.76E+01	9.98E+00	3.39E+01	3.61E+01
^{239,240} Pu (pCi/L)	4	0	n/a	2.04E+02	1.16E+02	3.95E+02	4.16E+02
Radium Total (pCi/L)	4	1	DL	7.51E-01	2.67E-01	1.19E+00	1.41E+00

Table 3-2. Chemical Analysis Statistics Report.
 (All numbers are in ppb unless otherwise noted.)
 (sheet 3 of 3)

Constituent	N	MDA	Method	Mean	StdErr	90%CILim	Maximum
²²⁸ Ra (pCi/L)	1	0	n/a	2.50E+02	n/a	n/a	2.50E+02
¹⁰⁶ Ru (pCi/L)	4	3	DL	3.27E+01	1.65E+01	5.98E+01	7.79E+01
⁹⁰ Sr (pCi/L)	4	0	n/a	1.46E+03	1.07E+03	3.22E+03	4.56E+03
²³⁴ U (pCi/L)	4	0	n/a	5.84E+01	5.13E+01	1.42E+02	2.12E+02
²³⁵ U (pCi/L)	4	1	DL	5.96E+00	5.71E+00	1.53E+01	2.31E+01
²³⁸ U (pCi/L)	4	0	n/a	6.60E+01	5.91E+01	1.63E+02	2.43E+02

NOTES:

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.

are in Appendix A-5. A summary of "old" nonvalidated data is contained in Appendix A-6. The data base of "old" data is 168 monthly composite and grab samples taken from January 1976 to December 1988.

3.2 DATA PRESENTATION

The range of the data encompasses all the chemical species for which the samples were analyzed. This range is wide because of the utilization of sophisticated, modern techniques of chemical analysis with computerized spectra comparison capability.

One of the analytical techniques used was gas chromatography combined with mass spectrometry. The spectra obtained from the mass spectrometry were compared to the known spectra of more than 40,000 chemical species, which have been cataloged by the EPA, National Institute of Occupational Safety and Health, and National Bureau of Standards.

Inductive coupled plasma was used for the analysis of metals. This technique is highly sensitive and can detect most metals of regulatory interest.

Chemical species are identified in Table 3-2 that could be of regulatory interest if they exist in high enough concentrations or result from a listed waste source.

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

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4.0 DATA OVERVIEW

This section presents a comparison of the sampling data set (see Section 3.0) with current drinking water standards. This section also presents calculated 2724-W Laundry contaminant deposition rates to the 216-W-LC Crib, and hence, to the soil column.

4.1 DATA COMPARISON

Table 4-1 compares the 2724-W Laundry wastewater with current drinking water standards for chemicals and the derived concentration guidelines (DCG) for radioactivity.

4.2 STREAM DEPOSITION RATES

Table 4-2 has been included to provide deposition rates using the average data from Table 3-2 adjusted according to flow data from Section 2-2.

5
7
0
1
5
1
1
1
1
6

Table 4-1. Effluent Constituent Comparison to Drinking Water Standards/Derived Concentration Guidelines.
(All numbers are in ppb unless otherwise noted.)
(sheet 1 of 2)

Constituent	Result ^a	SV1 ^b	SV2 ^c
Aluminum	1.8E+00	5.0E-02	f *
Arsenic	6.3E-03	5.0E-02	g
Barium	5.4E-01	5.0E+00	g
Cadmium	1.1E-02	5.0E-03	e *
Chloride	1.5E+01	2.5E+02	h
Chromium	3.2E-02	1.0E-01	e
Copper	2.2E-01	1.0E+00	h
Cyanide	2.6E-02	2.0E-01	e
Fluoride	7.1E-01	2.0E+00	g
Iron	5.1E+00	3.0E-01	h *
Lead	1.1E-01	5.0E-02	g *
Manganese	6.7E-02	5.0E-02	h *
Mercury	3.1E-04	2.0E-03	g
Nickel	4.9E-02	1.0E-01	e
Nitrate	1.4E+00	4.5E+01	e
Sulfate	1.8E+01	2.5E+02	h
Zinc	6.1E-01	5.0E+00	h
Bis(2-ethylhexyl) phthalate	7.2E-02	4.0E-03	e *
Trichloromethane ^j	3.3E-02	1.0E-01	g
Alpha Activity (pCi/L) ^k	2.1E+02	1.5E+01	g * 3.0E+01 *
²⁴¹ Am (pCi/L)	4.4E+01	4.0E+00	e * 3.0E+01 *
Beta Activity (pCi/L)	1.7E+03		1.0E+03 ^l *
²⁴⁴ Cm (pCi/L)	6.0E-01		6.0E+01
⁶⁰ C (pCi/L)	2.9E+02	2.0E+02	e * 5.0E+03
¹³⁷ Cs (pCi/L)	1.7E+02	1.0E+02	e * 3.0E+03
³ H (pCi/L)	1.3E+03	9.0E+04	e 2.0E+06
⁵⁴ Mn (pCi/L)	4.0E+01	3.0E+03	e 5.0E+04
²² Na (pCi/L)	8.9E+01	5.0E+02	e 1.0E+04
²³⁸ Pu (pCi/L)	1.8E+01		4.0E+01
^{239,240} Pu (pCi/L) ⁿ	2.0E+02	4.0E+01	e * 3.0E+01 *
²²⁸ Ra (pCi/L) ^o	2.5E+02	5.0E+00	e * 1.0E+02 *
¹⁰⁶ Ru (pCi/L)	3.3E+01	3.0E+02	e 6.0E+03
⁹⁰ Sr (pCi/L)	1.5E+03	5.0E+01	e * 1.0E+03 *
²³⁴ U (pCi/L)	5.8E+01		5.0E+02
²³⁵ U (pCi/L)	6.0E+00		6.0E+02
²³⁸ U (pCi/L)	6.6E+01		6.0E+02
TDS	5.0E+02	5.0E+02	h *

Notes:

^aUnits of results are mg/L unless indicated otherwise. The results are the mean values reported in the Statistics table of Section 3.0.

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Table 4-1. Effluent Constituent Comparison to Drinking Water Standards/Derived Concentration Guidelines.
(All numbers are in ppb unless otherwise noted.)
(sheet 2 of 2)

^bScreening 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). See WHC-EP-0342, *Hanford Site Stream-Specific Reports*, August 1990.

^cScreening Value 2 (SV2) lists the value first and an asterisk (*) second if the result exceeds the SV2). These values are derived concentration guidelines obtained from Appendix A of WHC-CM-7-5, *Environmental Compliance*, January 1990.

^jThe SV1 value for trihalomethanes is used to evaluate trichloromethane results.

^kThe SV1 and SV2 values for Gross Alpha are used to evaluate Alpha Activity.

^lThe SV2 for Gross Beta is used to evaluate Beta Activity.

ⁿThe SV1 value for ²³⁹Pu is used to evaluate ²³⁹Pu/²⁴⁰Pu.

^oThe SV1 value for ²²⁶Ra/²²⁸Ra is used to evaluate ²²⁸Ra.

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Table 4-2. 216-W-LC Crib Chemical Deposition Rates.
(All numbers are in ppb unless otherwise noted.)
Flowrate: 2.61 E+06 L/mo.
(sheet 1 of 2)

Constituent	Kg/L*	Kg/mo*
Aluminum	1.76E-06	4.60E+00
Arsenic	6.25E-09	1.63E-02
Barium	5.44E-07	1.42E+00
Boron	1.26E-07	3.29E-01
Cadmium	1.05E-08	2.75E-02
Calcium	2.13E-05	5.57E+01
Chloride	1.51E-05	3.95E+01
Chromium	3.20E-08	8.37E-02
Copper	2.23E-07	5.83E-01
Cyanide	2.65E-08	6.93E-02
Fluoride	7.15E-07	1.87E+00
Iron	5.06E-06	1.32E+01
Lead	1.08E-07	2.82E-01
Lithium	4.45E-07	1.16E+00
Magnesium	5.98E-06	1.56E+01
Manganese	6.65E-08	1.74E-01
Mercury	3.10E-10	8.10E-04
Nickel	4.85E-08	1.27E-01
Nitrate	1.37E-06	3.58E+00
Phosphate	9.31E-05	2.43E+02
Potassium	9.34E-06	2.44E+01
Silicon	2.72E-05	7.11E+01
Sodium	1.09E-04	2.85E+02
Strontium	1.11E-07	2.90E-01
Sulfate	1.77E-05	4.63E+01
Sulfide	1.40E-06	3.66E+00
Titanium	1.80E-07	4.71E-01
Uranium	1.13E-07	2.95E-01
Vanadium	8.00E-09	2.09E-02
Zinc	6.08E-07	1.59E+00
Acetone	1.40E-08	3.66E-02
Ammonia	1.82E-05	4.76E+01
Benzoic acid	1.54E-07	4.03E-01
Benzyl alcohol	1.43E-07	3.74E-01
Bis(2-ethylhexyl) phthalate	7.15E-08	1.87E-01
1-Butoxy-2-propanol	1.20E-07	3.14E-01
Butylbenzyl phthalate	3.95E-08	1.03E-01
Di-n-octyl phthalate	1.11E-07	2.90E-01
Hydrazine	5.32E-08	1.39E-01
Phthalic anhydride	1.20E-08	3.14E-02
Trichloromethane	3.32E-08	8.68E-02
Unknown	5.52E-08	1.44E-01
Unknown acid	2.20E-08	5.75E-02
Unknown aliphatic alcohol	1.60E-08	4.18E-02

Table 4-2. 216-W-LC Crib Chemical Deposition Rates.
(All numbers are in ppb unless otherwise noted.)
Flowrate: 2.61 E+06 L/mo.
(sheet 2 of 2)

Constituent	Kg/L*	Kg/mo*
Unknown aliphatic HC	2.42E-08	6.33E-02
Unknown amine	2.10E-08	5.49E-02
Unknown fatty acid	1.59E-07	4.16E-01
Unknown glycol	9.20E-08	2.41E-01
Unknown hydrocarbon	9.00E-08	2.35E-01
Unknown phthalate	4.70E-08	1.23E-01
Unknown polycyclic HC	5.40E-08	1.41E-01
Unknown sulfur compound	1.30E-08	3.40E-02
Alpha Activity *	2.09E-10	5.46E-04
Beta Activity *	1.66E-09	4.34E-03
Suspended Solids	1.53E-04	4.00E+02
TDS	4.95E-04	1.29E+03
TOC	4.86E-05	1.27E+02
TOX (as Cl)	1.10E-04	2.88E+02
Total Carbon	4.21E-07	1.10E+00
²⁴¹ Am *	4.41E-11	1.15E-04
²⁴⁴ Cm *	6.05E-13	1.58E-06
⁶⁰ Co *	2.93E-10	7.66E-04
¹³⁷ Cs *	1.70E-10	4.44E-04
³ H *	1.27E-09	3.32E-03
⁵⁴ Mn *	4.04E-11	1.06E-04
²² Na *	8.88E-11	2.32E-04
²¹⁰ Pb *	1.22E-12	3.19E-06
²³⁸ Pu *	1.76E-11	4.60E-05
^{239,240} Pu*	2.04E-10	5.33E-04
Radium Total *	7.51E-13	1.96E-06
²²⁸ Ra *	2.50E-10	6.54E-04
¹⁰⁶ Ru *	3.27E-11	8.55E-05
⁹⁰ Sr *	1.46E-09	3.82E-03
²³⁴ U *	5.84E-11	1.53E-04
²³⁵ U *	5.96E-12	1.56E-05
²³⁸ U *	6.60E-11	1.73E-04

Footnotes:

Data collected from October 1989 through March 1990.

Flowrate is the average of rates from chapter 2.

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

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

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

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5.0 PROPOSED DESIGNATION

This section proposes that the 2724-W Laundry wastewater wastestream not be designated a dangerous waste. This proposed designation uses data from both the effluent source description and sample data (Sections 2.0 and 3.0) and complies with the designation requirements of WAC 173-303-070.

The procedure for determining whether a waste is a dangerous or extremely hazardous waste is contained in the Washington State *Dangerous Waste Regulations* (WAC 173-303). This procedure is illustrated in Figure 5-1 and includes the following:

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

5.1 DANGEROUS WASTE LISTS

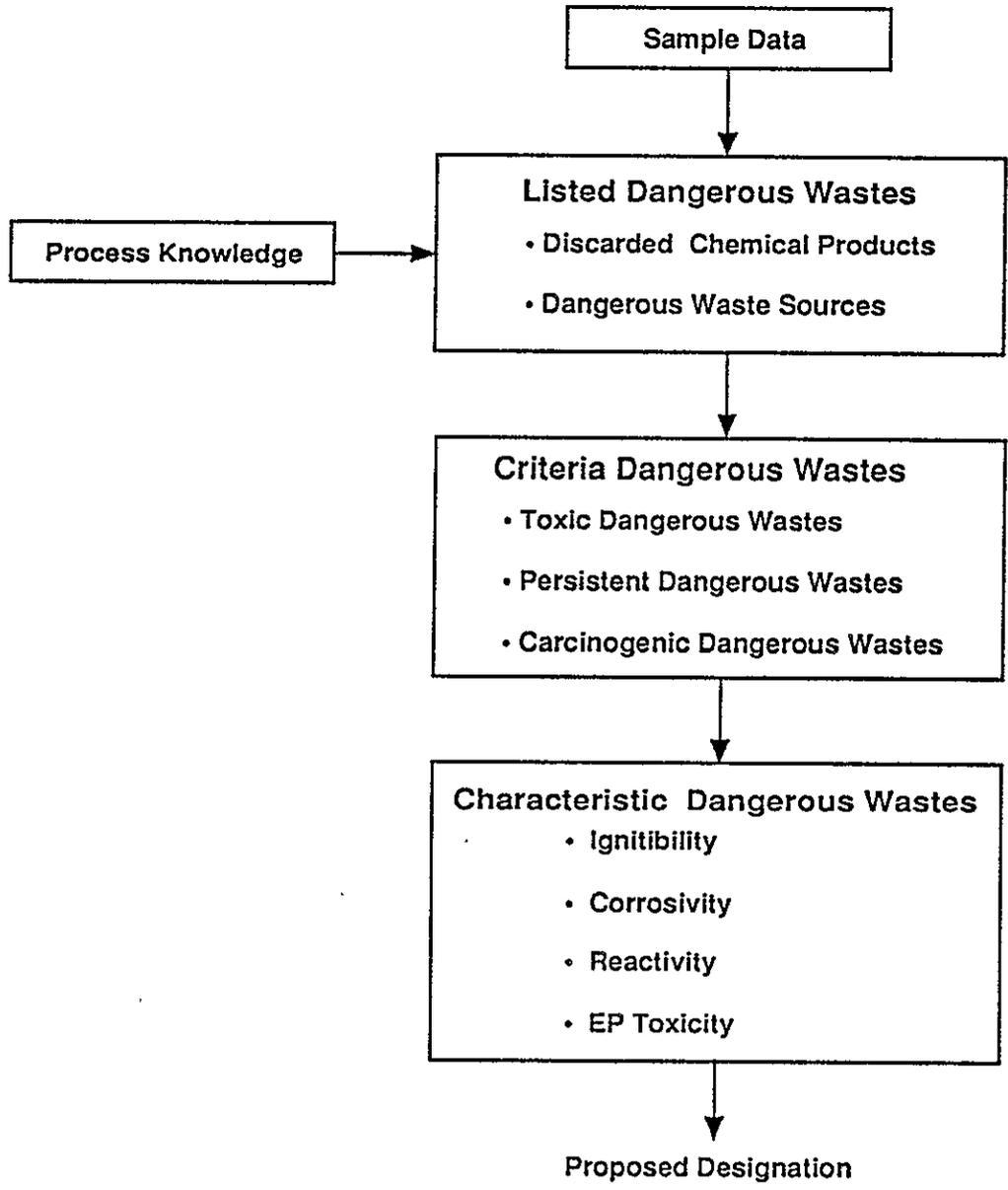
A waste is considered a listed dangerous waste if it either contains a discarded chemical product (WAC 173-303-081) or originates from a dangerous waste source (per WAC 173-303-082). The proposed designation was based upon a combination of process knowledge and sampling data.

5.1.1 Discarded Chemical Products

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

- The listed constituent is the sole active ingredient in a commercial chemical product which had been discarded. Mixtures that contain two or more active ingredients are not designated as discarded chemical products. Mixtures containing nonactive components such as water, however, were designated if the sole active ingredient in the mixture was listed in WAC 173-303-9903.
- The constituent results from a spill of unused commercial chemical products. A spill of a discarded chemical product could cause a wastestream to be designated during the time that the discharge is occurring. 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 can be reasonably anticipated to occur in the future. In this report, the evaluation of this criterion is based on a review of spill data reported in accordance with the *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA) (EPA 1980).

Figure 5-1. Designation Procedure.



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- The constituent is discarded in the form of a residue resulting from cleanup of a spill of an unused commercial chemical product on the discarded chemical products list. A chemical product that is used in a process and then released to the wastestream 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 maintenance operations occurring at many industries. The second is specific sources (e.g., wastes from ink formulation, etc.). The third is state sources, which is limited to polychlorinated biphenyl (PCB)-contaminated transformers and capacitors resulting from salvaging, rebuilding, or discarding activities.

5.2 LISTED WASTE DATA CONSIDERATIONS

The wastestream designation proposed in this report is based on an evaluation of process knowledge and sampling data. The following sections describe the types 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 is a listed waste in accordance with the mixture rule if a listed waste is known to have been added at any upstream location, even if a listed constituent could not be detected at the sample point. The process evaluation includes a review of the following information sources:

- Material Safety Data Sheets (MSDS)
- *Superfund Amendments and Reauthorization Act* (EPA 1988) Inventory reports
- Operating procedures
- Process chemical inventories
- Physical inspections, where possible.

Additionally, appropriate interviews of facility personnel were conducted to determine if there were any procedures 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 is 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 step compared the results of the sampling data to 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 has entered the wastestream as a discarded chemical product or came from a dangerous waste source.

Screening organic constituents is a relatively simple procedure because analytical data for organic constituents are reported as substance 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 or elements rather than as substances. 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 substances 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 for combining the inorganic constituents into substances. This screening procedure is described in WHC (1990) and is intended to be a tool in the evaluation of a wastestream. The listing of the inorganic substances 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. A listing of inorganic ions and their computer-paired results is provided in Table 5-1.

5.3 PROPOSED LISTED WASTE DESIGNATION

A diligent search, as described in Section 2.3.4.4, was conducted at the 2724-W Laundry 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, Table 5-2, were indeed located or inventoried in the facilities that discharge wastewaters to the 2724-W Laundry wastewater. Another important purpose of the search was to verify that if such listed chemical products were found in the facilities, no activities were being performed that included improper disposal of the chemical products into the

Table 5-1. Inorganic Ion Computer Pairing Report.
 (All numbers are in ppb unless otherwise noted.)
 (sheet 1 of 3)

Constituent	ppb	Ion	Eq/g	Normalized
Charge Normalization:				
Aluminum	3.81E+03	Al+3	4.24E-07	
Arsenic	8.30E+00	As+3	3.32E-10	
Barium	1.26E+03	Ba+2	1.84E-08	
Boron	1.94E+02	B4O7-2	8.98E-09	1.40E-08
Cadmium	2.19E+01	Cd+2	3.89E-10	
Calcium	2.74E+04	Ca+2	1.36E-06	
Chloride	2.87E+04	Cl-1	8.11E-07	1.27E-06
Chromium	6.43E+01	CrO4-2	2.47E-09	3.86E-09
Copper	4.71E+02	Cu+2	1.48E-08	
Cyanide	3.83E+01	CN-1	1.47E-09	2.30E-09
Fluoride	1.07E+03	F-1	5.62E-08	8.77E-08
Iron	1.17E+04	Fe+3	6.28E-07	
Lead	2.26E+02	Pb+2	2.18E-09	
Lithium	1.07E+03	Li+1	1.55E-07	
Magnesium	7.66E+03	Mg+2	6.31E-07	
Manganese	1.34E+02	Mn+2	4.89E-09	
Mercury	5.12E-01	Hg+2	5.11E-12	
Nickel	1.11E+02	Ni+2	3.78E-09	
Nitrate	2.11E+03	NO3-1	3.40E-08	5.31E-08
Phosphate	1.44E+05	HPO4-2	2.28E-06	3.56E-06
Potassium	1.58E+04	K+1	4.04E-07	
Silicon	3.69E+04	SiO3-2	2.63E-06	4.10E-06
Sodium	1.45E+05	Na+1	6.30E-06	
Strontium	1.51E+02	Sr+2	3.45E-09	
Sulfate	2.19E+04	SO4-2	4.56E-07	7.12E-07
Sulfide	1.80E+03	S-2	1.12E-07	1.76E-07
Titanium	3.78E+02	Ti+4	3.16E-08	
Uranium	2.61E+02	UO2+2	2.20E-09	
Vanadium	1.29E+01	V+5	1.27E-09	
Zinc	1.23E+03	Zn+2	3.75E-08	
Hydrogen Ion (from pH 9.5)		H+	(2.83E-13)	
Hydroxide Ion (from pH)		OH-	(3.53E-08)	
Cation total			1.00E-05	
Anion total			6.42E-06	

Anion normalization factor: 1.562

Table 5-1. Inorganic Ion Computer Pairing Report.
 (All numbers are in ppb unless otherwise noted.)
 (sheet 2 of 3)

Substance Formation: Substance	%	Cation Out	Anion Out
Nickel(II) cyanide	1.27E-05	1.48E-09	0.00E+00
Cadmium chloride	3.56E-06	0.00E+00	1.27E-06
Arsenic(III) oxide	1.10E-06	0.00E+00	
Calcium chromate(VI)	3.02E-05	1.36E-06	0.00E+00
Nickel(II) hydroxide	6.88E-06	0.00E+00	
Copper(II) chloride	9.97E-05	0.00E+00	1.25E-06
Mercury(II) chloride	6.93E-09	0.00E+00	1.25E-06
Potassium sulfide, DB	9.68E-04	2.28E-07	0.00E+00
Titanium(IV) chloride	1.50E-04	0.00E+00	1.22E-06
Uranyl nitrate	4.33E-05	0.00E+00	5.09E-08
Vanadium(V) oxide	2.31E-06	0.00E+00	
Iron(III) fluoride	3.30E-04	5.40E-07	0.00E+00
Lead chloride	3.03E-05	0.00E+00	1.22E-06
Barium chloride	1.91E-04	0.00E+00	1.20E-06
Zinc nitrate	3.55E-04	0.00E+00	1.34E-08
Iron(III) chloride	2.92E-03	0.00E+00	6.59E-07
Aluminum nitrate	1.68E-04	4.10E-07	0.00E+00
Magnesium chloride	3.00E-03	0.00E+00	2.82E-08
Potassium chloride	2.10E-04	2.00E-07	0.00E+00
Calcium tetraborate	1.37E-04	1.35E-06	0.00E+00
Sodium metasilicate	2.50E-02	2.20E-06	0.00E+00
Sodium phosphate, DB	1.56E-02	0.00E+00	1.36E-06
Aluminum sulfate	1.23E-03	0.00E+00	3.02E-07
Lithium sulfate	8.49E-04	0.00E+00	1.48E-07
Manganese(II) phosphate, DB	3.69E-05	0.00E+00	1.35E-06
Potassium phosphate, DB	1.74E-03	0.00E+00	1.15E-06
Strontium sulfate	3.16E-05	0.00E+00	1.44E-07
Calcium phosphate, DB	7.83E-03	1.96E-07	0.00E+00
Calcium sulfate	9.81E-04	5.21E-08	0.00E+00

NOTES:

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).

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Table 5-1. Inorganic Ion Computer Pairing Report.
(All numbers are in ppb unless otherwise noted.)
(sheet 3 of 3)

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 polycrotic 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 (gms/100gms). 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.

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Dangerous Waste Data Designation Report for 2724-W Laundry Wastewater

Finding: Undesignated

Discarded Chemical Products - WAC 173-303-081

Substance	Review Number	Status	DW Number
Ammonium metavanadate	P119(EHW)	Not Discarded	Undesignated
Arsenic acid	P010(EHW)	Not Discarded	Undesignated
Arsenic(III) oxide	P012(EHW)	Not Discarded	Undesignated
Arsenic(V) oxide	P011(EHW)	Not Discarded	Undesignated
Barium cyanide	P013(EHW)	Not Discarded	Undesignated
Calcium chromate(VI)	U032(EHW)	Not Discarded	Undesignated
Calcium cyanide	P021(EHW)	Not Discarded	Undesignated
Copper(II) cyanide	P029(EHW)	Not Discarded	Undesignated
Hydrogen cyanide	P063(EHW)	Not Discarded	Undesignated
Hydrogen fluoride	U134(DW)	Not Discarded	Undesignated
Hydrogen sulfide, DB	U135(EHW)	Not Discarded	Undesignated
Lead phosphate, TB	U145(DW)	Not Discarded	Undesignated
Mercury	U151(EHW)	Not Discarded	Undesignated
Nickel(II) cyanide	P074(EHW)	Not Discarded	Undesignated
Potassium cyanide	P098(EHW)	Not Discarded	Undesignated
Sodium cyanide	P106(EHW)	Not Discarded	Undesignated
Strontium sulfide, DB	P107(EHW)	Not Discarded	Undesignated
Vanadium(V) oxide	P120(EHW)	Not Discarded	Undesignated
Zinc cyanide	P121(EHW)	Not Discarded	Undesignated
Acetone	U002(DW)	Not Discarded	Undesignated
Bis(2-ethylhexyl) phthalate	U028(DW)	Not Discarded	Undesignated
Di-n-octyl phthalate	U107(DW)	Not Discarded	Undesignated
Hydrazine	U133(EHW)	Not Discarded	Undesignated
Trichloromethane	U044(EHW)	Not Discarded	Undesignated
Cyanides(soluble salts),NOS	P030(EHW)	Not Discarded	Undesignated

Dangerous Waste Sources - WAC 173-303-082

Substance	Review Number	Status	DW Number
Acetone	F003	Unlisted Source	Undesignated
Cyanides(soluble salts),NOS	F007 thru F012	Unlisted Source	Undesignated

Infectious Dangerous Waste - WAC 173-303-083

No regulatory guidance

Dangerous Waste Mixtures - WAC 173-303-084

Substance	Toxic EC%	Persistent		Carcinogenic Total%
		HH%	PAH%	
Aluminum nitrate	1.68E-07	0.00E+00	0.00E+00	0.00E+00
Aluminum sulfate	1.23E-07	0.00E+00	0.00E+00	0.00E+00
Arsenic(III) oxide	1.10E-08	0.00E+00	0.00E+00	1.10E-06
Barium chloride	1.91E-07	0.00E+00	0.00E+00	0.00E+00
Cadmium chloride	3.56E-08	0.00E+00	0.00E+00	3.56E-06
Calcium chromate(VI)	3.02E-08	0.00E+00	0.00E+00	3.02E-05
Calcium tetraborate	1.37E-08	0.00E+00	0.00E+00	0.00E+00
Copper(II) chloride	9.97E-06	0.00E+00	0.00E+00	0.00E+00
Iron(III) chloride	2.92E-06	0.00E+00	0.00E+00	0.00E+00
Iron(III) fluoride	3.30E-06	0.00E+00	0.00E+00	0.00E+00
Lead chloride	3.03E-07	0.00E+00	0.00E+00	0.00E+00
Magnesium chloride	3.00E-07	0.00E+00	0.00E+00	0.00E+00
Mercury(II) chloride	6.93E-09	0.00E+00	0.00E+00	0.00E+00
Nickel(II) cyanide	1.27E-05	0.00E+00	0.00E+00	0.00E+00
Nickel(II) hydroxide	6.88E-09	0.00E+00	0.00E+00	6.88E-06
Potassium chloride	2.10E-08	0.00E+00	0.00E+00	0.00E+00

Table 5-2. Dangerous Waste Designation Report for
 2724-W Laundry Wastewater.
 (All numbers are in ppb unless otherwise noted.)
 (sheet 1 of 4)

Dangerous Waste Data Designation Report for 2724-W Laundry Wastewater

Dangerous Waste Mixtures - WAC 173-303-084 - Continued

Substance	Toxic	Persistant		Carcinogenic
	EC%	HH%	PAH%	Total%
Potassium sulfide, DB	9.68E-06	0.00E+00	0.00E+00	0.00E+00
Sodium metasilicate	2.50E-06	0.00E+00	0.00E+00	0.00E+00
Sodium phosphate, DB	1.56E-06	0.00E+00	0.00E+00	0.00E+00
Titanium(IV) chloride	1.50E-06	0.00E+00	0.00E+00	0.00E+00
Uranyl nitrate	4.33E-07	0.00E+00	0.00E+00	0.00E+00
Vanadium(V) oxide	2.31E-08	0.00E+00	0.00E+00	0.00E+00
Zinc nitrate	3.55E-07	0.00E+00	0.00E+00	0.00E+00
Acetone	1.98E-10	0.00E+00	0.00E+00	0.00E+00
Ammonia	2.72E-05	0.00E+00	0.00E+00	0.00E+00
Benzoic acid	2.78E-09	0.00E+00	0.00E+00	0.00E+00
Benzyl alcohol	2.42E-09	0.00E+00	0.00E+00	0.00E+00
Bis(2-ethylhexyl) phthalate	9.63E-06	0.00E+00	0.00E+00	9.63E-06
*1-Butoxy-2-propanol	1.20E-09	0.00E+00	0.00E+00	0.00E+00
Butylbenzyl phthalate	6.11E-08	0.00E+00	0.00E+00	0.00E+00
Di-n-octyl phthalate	1.63E-09	0.00E+00	0.00E+00	0.00E+00
Hydrazine	7.25E-06	0.00E+00	0.00E+00	7.25E-06
*Phthalic anhydride	1.20E-09	0.00E+00	0.00E+00	0.00E+00
Trichloromethane	6.74E-07	6.74E-06	0.00E+00	6.74E-06
Total	9.10E-05	6.74E-06	0.00E+00	6.53E-05
DW Number	Undesignated	Undesignated	Undesignated	Undesignated

Dangerous Waste Characteristics - WAC 173-303-090

Characteristic	Value	DW Number
Ignitability (Degrees F)	>207	Undesignated
Corrosivity-pH	9.55	Undesignated
Reactivity Cyanide (mg/kg)	<1.00E+02	Undesignated
Reactivity Sulfide (mg/kg)	<1.00E+02	Undesignated
EP Toxic Arsenic (mg/L)	<5.00E-01	Undesignated
EP Toxic Barium (mg/L)	<1.00E+00	Undesignated
EP Toxic Cadmium (mg/L)	<1.00E-01	Undesignated
EP Toxic Chromium (mg/L)	<5.00E-01	Undesignated
EP Toxic Lead (mg/L)	<5.00E-01	Undesignated
EP Toxic Mercury (mg/L)	<7.28E-02	Undesignated
EP Toxic Selenium (mg/L)	<5.00E-01	Undesignated
EP Toxic Silver (mg/L)	<5.00E-01	Undesignated

Dangerous Waste Criteria - WAC 173-303-100

Substance	Toxic	Persistant		Carcinogenic	
	EC%	HH%	PAH%	Total%	DW Number-Positive
Aluminum nitrate	1.68E-07	0.00E+00	0.00E+00	0.00E+00	
Aluminum sulfate	1.23E-07	0.00E+00	0.00E+00	0.00E+00	
Arsenic(III) oxide	1.10E-08	0.00E+00	0.00E+00	1.10E-06	Undesignated
Barium chloride	1.91E-07	0.00E+00	0.00E+00	0.00E+00	
Cadmium chloride	3.56E-08	0.00E+00	0.00E+00	3.56E-06	Undesignated
Calcium chromate(VI)	3.02E-08	0.00E+00	0.00E+00	3.02E-05	Undesignated
Calcium tetraborate	1.37E-08	0.00E+00	0.00E+00	0.00E+00	
Copper(II) chloride	9.97E-06	0.00E+00	0.00E+00	0.00E+00	
Iron(III) chloride	2.92E-06	0.00E+00	0.00E+00	0.00E+00	
Iron(III) fluoride	3.30E-06	0.00E+00	0.00E+00	0.00E+00	
Lead chloride	3.03E-07	0.00E+00	0.00E+00	0.00E+00	
Magnesium chloride	3.00E-07	0.00E+00	0.00E+00	0.00E+00	
Mercury(II) chloride	6.93E-09	0.00E+00	0.00E+00	0.00E+00	
Nickel(II) cyanide	1.27E-05	0.00E+00	0.00E+00	0.00E+00	
Nickel(II) hydroxide	6.88E-09	0.00E+00	0.00E+00	6.88E-06	Undesignated

Table 5-2. Dangerous Waste Designation Report for 2724-W Laundry Wastewater. (All numbers are in ppb unless otherwise noted.) (sheet 2 of 4)

Dangerous Waste Data Designation Report for 2724-W Laundry Wastewater

Dangerous Waste Criteria - WAC 173-303-100 - Continued

Substance	Toxic	Persistent		Carcinogenic	
	EC%	HH%	PAH%	Total%	DW Number-Positive
Potassium chloride	2.10E-08	0.00E+00	0.00E+00	0.00E+00	
Potassium sulfide, DB	9.68E-06	0.00E+00	0.00E+00	0.00E+00	
Sodium metasilicate	2.50E-06	0.00E+00	0.00E+00	0.00E+00	
Sodium phosphate, DB	1.56E-06	0.00E+00	0.00E+00	0.00E+00	
Titanium(IV) chloride	1.50E-06	0.00E+00	0.00E+00	0.00E+00	
Uranyl nitrate	4.33E-07	0.00E+00	0.00E+00	0.00E+00	
Vanadium(V) oxide	2.31E-08	0.00E+00	0.00E+00	0.00E+00	
Zinc nitrate	3.55E-07	0.00E+00	0.00E+00	0.00E+00	
Acetone	1.98E-10	0.00E+00	0.00E+00	0.00E+00	
Ammonia	2.72E-05	0.00E+00	0.00E+00	0.00E+00	
Benzoic acid	2.78E-09	0.00E+00	0.00E+00	0.00E+00	
Benzyl alcohol	2.42E-09	0.00E+00	0.00E+00	0.00E+00	
Bis(2-ethylhexyl) phthalate	9.63E-06	0.00E+00	0.00E+00	9.63E-06	Undesignated
*1-Butoxy-2-propanol	1.20E-09	0.00E+00	0.00E+00	0.00E+00	
Butylbenzyl phthalate	6.11E-08	0.00E+00	0.00E+00	0.00E+00	
Di-n-octyl phthalate	1.63E-09	0.00E+00	0.00E+00	0.00E+00	
Hydrazine	7.25E-06	0.00E+00	0.00E+00	7.25E-06	Undesignated
*Phthalic anhydride	1.20E-09	0.00E+00	0.00E+00	0.00E+00	
Trichloromethane	6.74E-07	6.74E-06	0.00E+00	6.74E-06	Undesignated
Total	9.10E-05	6.74E-06	0.00E+00	6.53E-05	
DW Number	Undesignated	Undesignated	Undesignated	Undesignated	

Dangerous Waste Constituents - WAC 173-303-9905

- Substance
- Ammonium metavanadate
- Arsenic acid
- Arsenic(III) oxide
- Arsenic(V) oxide
- Barium cyanide
- Calcium chromate(VI)
- Calcium cyanide
- Copper(II) cyanide
- Hydrogen cyanide
- Hydrogen fluoride
- Hydrogen sulfide, DB
- Nickel(II) cyanide
- Potassium cyanide
- Sodium cyanide
- Strontium sulfide, DB
- Zinc cyanide
- Acetone
- Bis(2-ethylhexyl) phthalate
- Butylbenzyl phthalate
- Di-n-octyl phthalate
- Hydrazine
- Trichloromethane
- Arsenic and compounds,NOS
- Barium and compounds,NOS
- Cadmium and compounds,NOS
- Chromium and compounds,NOS
- Cyanides(soluble salts),NOS
- Lead and compounds,NOS
- Mercury and compounds,NOS
- Nickel and compounds,NOS

Table 5-2. Dangerous Waste Designation Report for
 2724-W Laundry Wastewater.
 (All numbers are in ppb unless otherwise noted.)
 (sheet 3 of 4)

WMC-EP-0342 Addendum 11 08/31/90
 2724-W Laundry Wastewater

Table 5-2. Dangerous Waste Designation Report for
2724-W Laundry Wastewater.
(All numbers are in ppb unless otherwise noted.)
(sheet 4 of 4)

Dangerous Waste Data Designation Report for 2724-W Laundry Wastewater

Substance names may include MB (monobasic), DB (dibasic), or TB (tribasic) to identify the equivalence of hydrogen ion that have been neutralized 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 formulated and their possible concentrations calculated for designation purposes only. The actual existence in the waste of these substances is not implied and should not be inferred.

wastewater. 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.

5.3.1 Discarded Chemical Products

Table 5-2 contains a list of 25 chemical products identified from sampling data. For these 25 compounds, although none were identified as being present in the facility or having primary sources, secondary sources have been proposed to account for their appearance in Table 5-2.

5.3.1.1 Phthalate Compounds. Bis(2-ethylhexyl) phthalate was detected in four out of four samples from the wastestream and di-n-octyl phthalate was detected in four out of four samples, as shown in Table 5-2. However, phthalate compounds are not used in the facilities associated with the laundry wastewater.

A secondary source for phthalate in the wastewater is leaching of phthalates from the plasticizers in the rubber/plastic boots and shoes which are washed daily.

5.3.1.2 Trichloromethane (Chloroform). Trichloromethane was detected in four out of four samples from the wastestream at the 33 ppb level. However, it is not used in any of the facilities associated with the laundry wastewater.

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

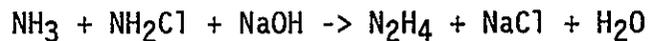
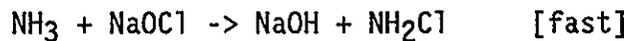
5.3.1.3 Mercury. Mercury was detected in three out of four samples in concentrations comparable to the background from the supply water. Mercury is not used in any of the facilities associated with the laundry wastewater. A secondary source of the mercury is the supply water.

5.3.1.4 Arsenic Acid, Arsenic (III) Oxide, Arsenic (V) Oxide. Arsenic (III) or (V) ions were identified in the low concentration of 10 ppb in one of the four samples from the wastewater. Consequently, these three chemical compounds are presented in the computer listing of discarded chemical products in Table 5-2. None of these chemical products are used in the facilities associated with the wastewater.

Arsenic has been detected at low concentrations in the laundry supply water, Turco Aviation cleaner, and in Turco Decontamination 4128-A cleaner. These three are all secondary sources for occasional concentrations of arsenic in the wastewater.

5.3.1.5 Hydrazine. Hydrazine was detected in the wastewater from concentrations less than 30 ppb to concentrations of 75 ppb. Hydrazine is not used in any of the facilities associated with the laundry wastewater.

A secondary source for hydrazine in the wastewater is a chemical reaction between wastewater constituents. An example of this is a reaction equivalent to the Raschig synthesis of hydrazine. This is a two step reaction between solvated ammonia and Silver-Wyde bleach.



[overall reaction] $2\text{NH}_3 + \text{NaOCl} \rightarrow \text{N}_2\text{H}_4 + \text{NaCl} + \text{H}_2\text{O}$

5.3.1.6 Ammonium Metavanadate and Vanadium(V) Oxide. Vanadium ion was detected in four out of four samples from the wastewater at the 8 ppb level. Consequently, these two chemical compounds are presented in the computer listing of discarded chemical products in Table 5-2. Neither of these chemical products are used in the facilities associated with the wastewater.

Vanadium is a common trace element in the soil at the Hanford Site and has also been detected in two of the process chemicals. These chemicals were Turco Decontamination 4128-A and Spartan Flame Retardant. A secondary source of vanadium is the dirt that comes off the soiled clothing when it is washed.

5.3.1.7 Barium Cyanide, Calcium Cyanide, Copper Cyanide, Hydrogen Cyanide, Nickel(II) Cyanide, Potassium Cyanide, Sodium Cyanide, Zinc Cyanide and Cyanides NOS. Cyanide ion was detected in three out of four samples in low concentrations (22-44 ppb). Consequently, these cyanide compounds are presented in the computer listing of discarded chemical products in Table 5-2. None of these chemical products are used in the facilities associated with the wastewater.

A secondary source for cyanide ion is thermally degraded oils that are found on articles in the laundry. The listing of cyanide salts above is a consequence of computer pairing of all possible cations and anions to identify potential discarded chemical products.

5.3.1.8 Calcium Chromate. Chromium ion was identified in the wastewater in two of the four samples taken. Consequently, the compound calcium chromate(VI) 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.

A secondary source for chromium ion is Hanford Site soils, as it is commonly found in parts per million concentrations in many types of soils.

5.3.1.9 Hydrogen Fluoride. Fluoride ion was identified in the wastewater. Consequently, the compound hydrogen fluoride 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.

A secondary source of fluoride ion in the 2724-W Laundry wastewater is the Columbia River because the water treatment process does not remove it. Fluoride ion is found in the river and in the 2724-W Laundry wastewater at comparable concentrations.

5.3.1.10 Hydrogen Sulfide. Sulfide ion was identified in the wastewater. Consequently, the compound hydrogen sulfide 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.

Sulfide ion is found in the supply water to the laundry at about the same concentration as found in the samples of laundry waste. It is also found at about the same concentration in Turco Aviation Cleaner. These are the primary sources for sulfide ion in the wastewater.

5.3.1.11 Lead Phosphate. Lead ions were found in the laundry wastewater. 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.

A secondary source for lead is the possibility of dissolving it from the lead in the piping joints. Dissolution could occur by the reaction of lead with warm caustic detergent waste solution.

5.3.1.12 Acetone. Acetone was detected in samples of the laundry wastewater. Consequently, it is presented in the computer listing of chemical products in Table 5-2. However, acetone is not used in the facilities associated with the wastewater.

Acetone was found in two of the four samples used for this proposed designation. The concentration of acetone in all samples ranged from the detection limit (10 ppb) to 23 ppb. The threshold limit for acetone based on blank analyses is 37 ppb as presented in Section 5.2 of the *Hanford Site Preliminary Stream-Specific Reports* (WHC 1990b). As the concentration of acetone seen in all samples of this wastewater stream is less than the threshold limit, these data will not be considered in the designation of the wastewater as it is likely that acetone is present in these wastewater samples because of sample contamination.

5.3.1.13 Strontium Sulfide. Sulfide ion was detected in concentrations of about one part per million in two of the four samples of the laundry wastewater. Consequently, the compound strontium sulfide is presented in the

computer listing of chemical products in Table 5-2. However, strontium sulfide is not used in the facilities associated with the wastewater.

A secondary source for sulfide ion is the supply water to the laundry. It has a concentration of sulfide ion comparable to that found in the wastewater.

5.3.2 Dangerous Waste Sources

The process evaluation (see Section 5.2) was also used to determine if the wastestream included any specific waste sources (K wastes) or any nonspecific waste sources (F Wastes) in the Dangerous Waste Source List WAC 173-303-9904. No dangerous waste sources were identified by process data (e.g., spent solvents). Based upon a diligent search, the wastestream does not contain a dangerous waste source. It is proposed that this wastestream not be designated a dangerous waste due to having a dangerous waste source.

Sampling data were utilized to enhance the process evaluation. Two potential listed sources were identified by sampling data; these are acetone and cyanides NOS.

5.3.2.1 Acetone. Acetone is not used in the laundry facility, therefore, it has no avenue into the 2724-W Laundry wastewater. As discussed in Section 5.3.1.12 above, the presence of it in the wastewater is questionable.

5.3.2.2 Cyanides NOS. Cyanides NOS are discussed in Section 5.3.1.7 above. They are not a dangerous waste source for the 2724-W Laundry wastewater because there are no cyanide containing products used in the laundry and no electroplating is done in the facility.

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 WHC (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 (WAC 173-303-101) is as follows.

- Collect and analyze multiple samples from the wastestream.

- Calculate the upper limit of the one-sided 90% confidence interval (90%CI) for each analyte in the wastestream.
- Formulate 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 WHC 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 substances detected (or in the case of inorganics) postulated to be in the wastestream.
- Calculate the contributions of each substance to the percent equivalent concentration (EC%).
- Calculate the EC% by summing the contributions of each substance.
- Designate the wastestream as a toxic dangerous waste if the EC% sum is greater than 0.001%, per WAC 173-303-9906.

Thirty-four substances potentially present in the 2724-W Laundry wastewater were determined to have toxic categories associated with them. The individual and sum EC% values for these substances are listed in Table 5-2. Since the EC% sum is 0.000091%, less than the regulatory threshold of 0.001%, the wastestream is not a toxic dangerous waste.

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 substances 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 substance of interest.
- Calculate the weight percent (wt%) contribution of each halogenated hydrocarbon and polycyclic aromatic hydrocarbon.
- Sum the resulting percent concentration for both HH% and PAH%, separately.

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

Only one substance potentially present in the 2724-W Laundry wastewater was determined to be HH% and no substances were determined to be PAH (Table 5-1). The HH% value for this chemical, trichloromethane, is 0.00000674 HH%. Since this HH% is less than the regulatory threshold of 0.01 HH%, the 2724-W Laundry 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 substances of interest.
- Formulate 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 WHC (1990d) and is based on an evaluation of the carcinogenic substances that exist in an aqueous environment under normal temperatures and pressures.
- Determine which substances in the wastestream are human or animal carcinogen according to the International Agency for Research on Cancer.
- Calculate the weight percent (wt%) concentration for each carcinogen.
- Sum the resulting wt%.
- Designate the wastestream as carcinogenic if any of the positive (human or animal) carcinogens are above 0.01% (specific carcinogen) or if the total concentration of positive and suspected human/animal carcinogens are above 1.0% (total carcinogen).

Seven chemical compounds potentially present in the 2724-W Laundry wastewater stream were determined to be carcinogenic chemical compounds. The individual and sum percent carcinogens for these chemicals are listed in Table 5-2. Since none of the positive carcinogens exceed 0.01% and the Carcinogenic Total % of 0.0000653% is less than the regulatory threshold of 1.0%, the 2724-W Laundry is not a carcinogenic dangerous waste.

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 WHC (1990d). Summaries of the methods, along with the results, are contained in the following sections.

5.5.1 Ignitability

Pure substances with a flashpoint below 140 °F were considered ignitable.

Since July 1989, flashpoint testing has been performed on many of the liquid effluent samples. All samples were lost at the boiling temperature of water without igniting. Therefore, the 2724-W Laundry wastewater is not an ignitable waste.

5.5.2 Corrosivity

A waste is a corrosive dangerous waste if the stream exhibited a pH of ≤ 2.0 or ≥ 12.5 . Because the pH values observed during sampling were between 6.75 and 9.55, 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]).

Both the cyanide reactivity test and the sulfide reactivity test were reported less than the regulatory threshold values. Therefore, the laundry wastewater stream is not regulated due to reactivity.

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). Extraction procedure toxic tests for all regulated metals returned results less than the regulatory threshold for EP toxicity.

5.6 PROPOSED DESIGNATION

The 2724-W Laundry wastewater stream has been evaluated in accordance with the procedure defined in WAC 173-303-070 to determine if it should be

designated as a dangerous waste. It has been demonstrated that this stream is not a dangerous waste, based on the following criteria:

- Dangerous Waste Lists (WAC 173-3-3-080)
- Dangerous Waste Criteria (WAC 173-303-100)
- Dangerous Waste Characteristics (WAC 173-303-090)

Therefore, it is proposed that the wastestream not be designated a dangerous waste.

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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-RL. 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, EPA, and DOE 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 9, 1988).

6.1 FUTURE SAMPLING

The random sampling conducted during the October 1989 to March 1990 time period covered the process configuration discussed in Section 2.3.1. Since this is the only process configuration used at the laundry and no new configurations are planned at the laundry, no additional sampling is needed to properly designate the wastestream. It is, however, recognized that cleaning laundry is a batch process and effluent from it varies from batch to batch. There is no evidence in the current body of data that the wastestream ever exceeds regulatory thresholds. Future sampling should be done only to verify the designation proposed in this report.

6.2 TECHNICAL ISSUES

As described in Section 2.0, the effluent was sampled for new data at manhole H. 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.

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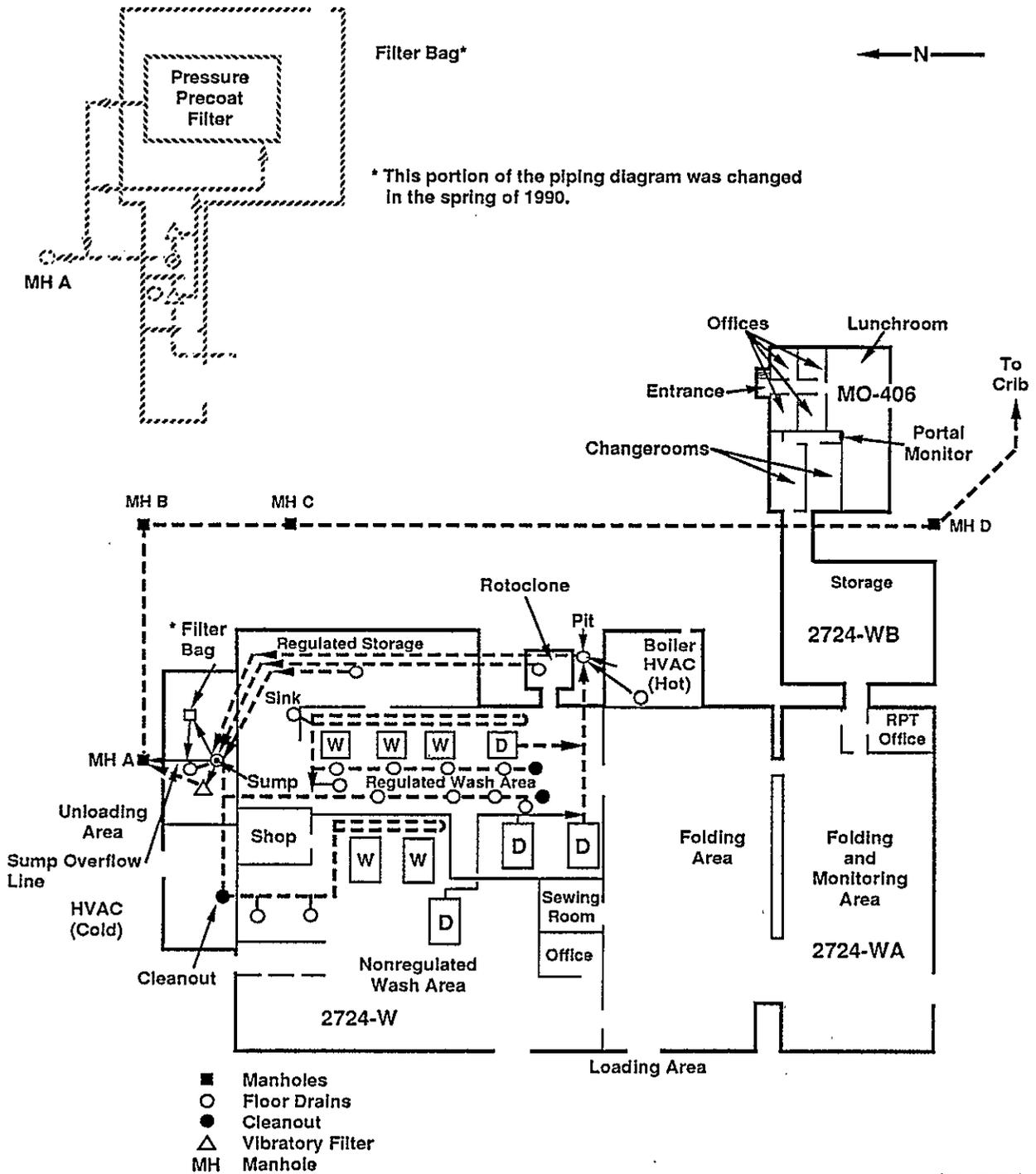
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APPENDIX A
BACKGROUND INFORMATION

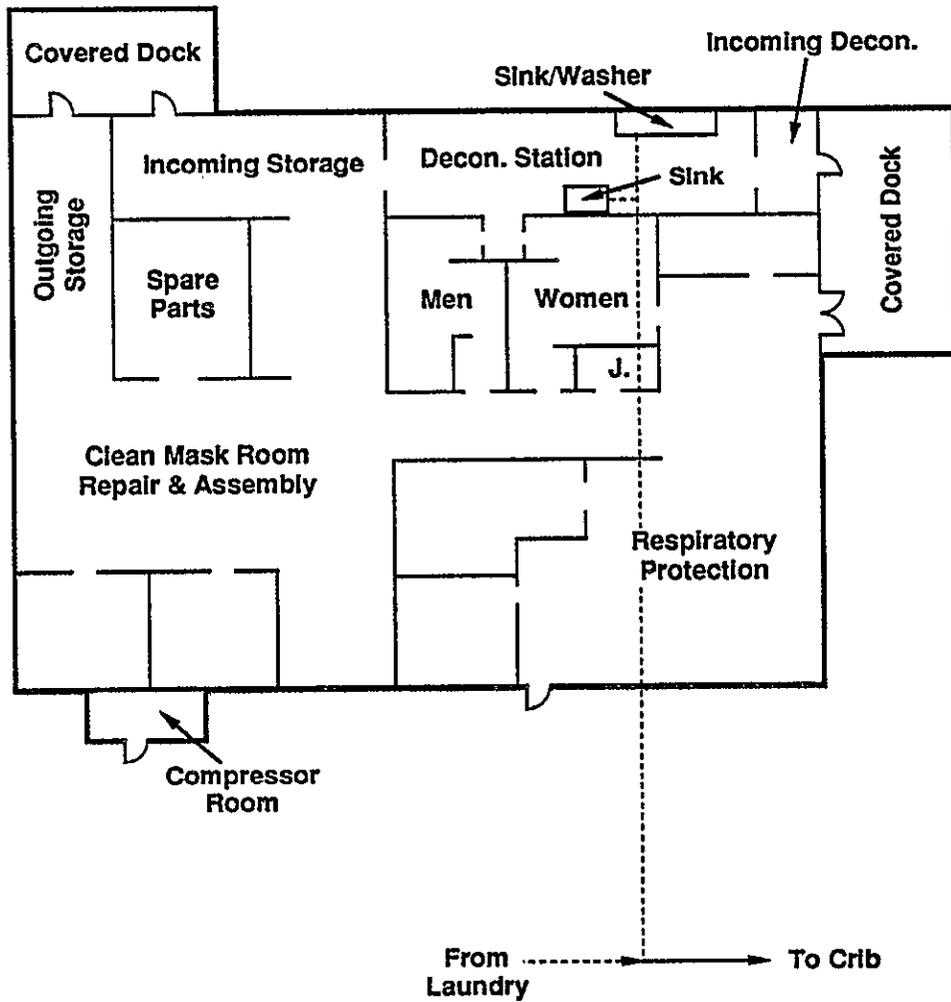
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Figure A-1. Floorplan and Piping Diagram of
 2724-W Laundry (July 1989).



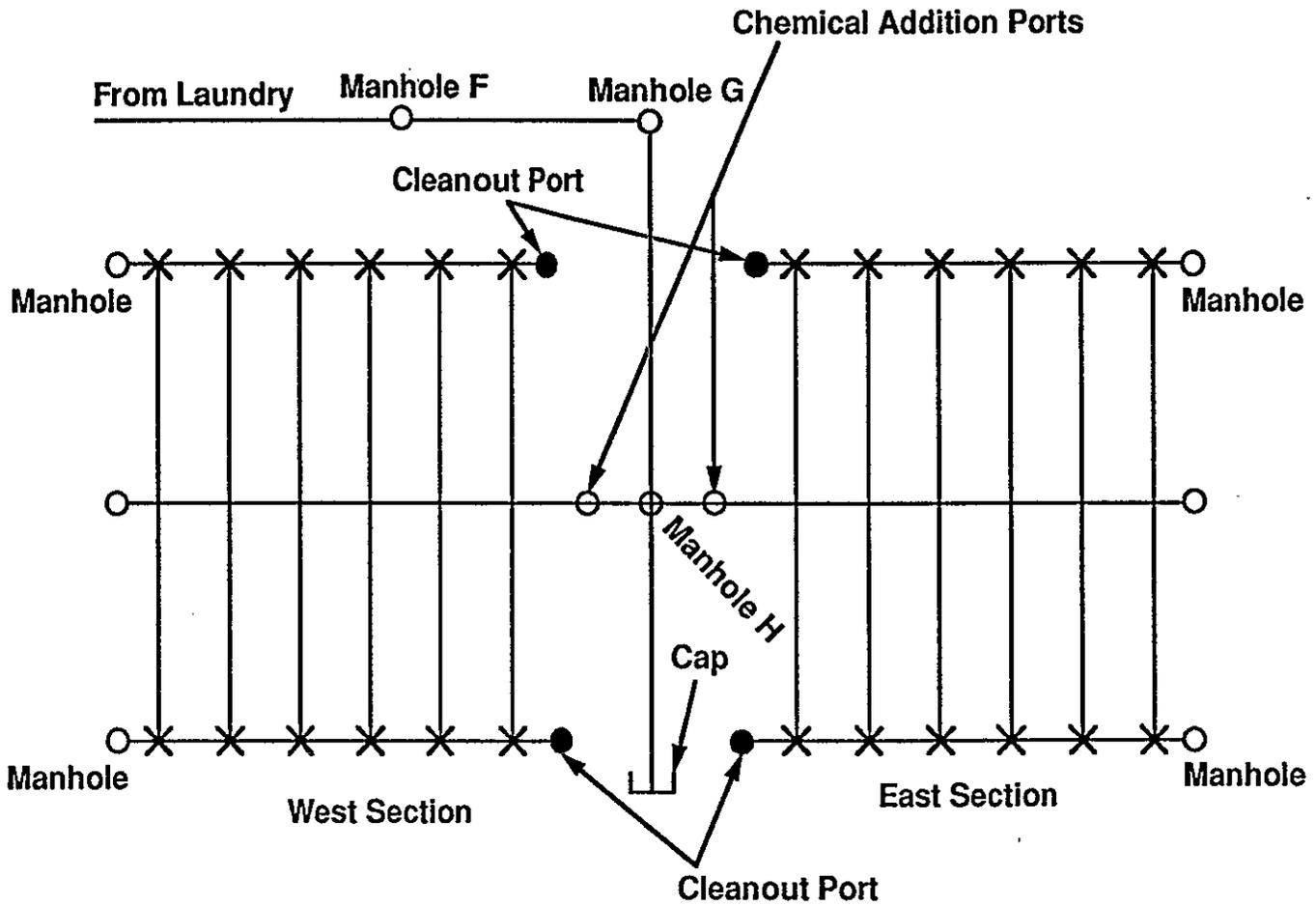
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Figure A-2. Floorplan and Piping Diagram for the Mask
Cleaning and Maintenance Facility (MO-412).



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X = Vent Riser (1 each section)

● = Cleanout Port

O = Manhole

Figure A-3. Diagram for the 216-W-LC Crib.

MSDS *	Product Name	Chemical Constituent	Category	Percentage (wt%)
1144	Universal Absorbent (HAZORB)	sodium/calcium borosilicate	0	-
2893	Silica Gel	silicon oxide	0	-
10176	A-9 Aluminum cutting fluid	New Mown Hay perfume	M	<1
10176	A-9 Aluminum cutting fluid	semi-solid animal fat	M	<15
10176	A-9 Aluminum cutting fluid	white mineral oil	M	<85
10176	A-9 Aluminum cutting fluid	natural fatty acid	M	<5
10176	A-9 Aluminum cutting fluid	Green dye, pharmacy grade	M	tr
10176	Absorb-It	opal clay	0	-
10179	Absorb-It	silica	0	-
10231	Aero-Kroil	DuPont 152A	0	-
10231	Aero-Kroil	Oil	0	-
10342	AJAX	ammonia	0	-
10313	Anchor Lube G-771	Mica	0	-
10421	ATF Dextron #2	Hydrocarbon base oils	0	-
10421	ATF Dextron #2	zinc dithiophosphate	0	-
10488	Blue Tool Markers Ink 6001	methyl ethyl ketone	0	-
10488	Blue Tool Markers Ink 6001	propylene glycol methyl ether acetate	0	-
10488	Blue Tool Markers Ink 6001	trichlorotrifluorethane	0	-
10488	Blue Tool Markers Ink 6001	toluene	0	-
10629	Chevron Polyurea EP Grease 2	polyurea-calcium acetate thickeners	M	15
10629	Chevron Polyurea EP Grease 2	additives	M	6
10629	Chevron Polyurea EP Grease 2	hydrocarbon base oils	M	79
10708	Cool Amp Silver Plating	silver chloride	0	-
10708	Cool Amp Silver Plating	sodium chloride	0	-
10708	Cool Amp Silver Plating	calcium carbonate	0	-

Table A-1. Laundry MSDS Inventory. (sheet 1 of 9)

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P = Chemicals used in the process (i.e., process chemicals).

M = Maintenance chemicals used on a routine basis.

0 = Other chemicals that are neither P and/or M but which are unlikely but capable of entering the wastestream.

*MSDS = Material Safety Data Sheet; 96 individual MSDS sheets containing 277 constituents.

- = No data

b**Additional information obtained from company per phone call.

MSDS *	Product Name	Chemical Constituent	Category	Percentage (wt%)
10739	D-CON Mouse Proof	warfarin	0	.
10885	Dry Moly Lubricant	methyl alcohol	0	.
10885	Dry Moly Lubricant	1,1,1 trichloromethane	0	.
10885	Dry Moly Lubricant	methylene chloride	0	.
11106	Permatex Form-A-Gasket	modified natural resins	0	.
11106	Permatex Form-A-Gasket	clay (kaolin)	0	.
11106	Permatex Form-A-Gasket	isopropyl alcohol	0	.
11108	Wite Out (White) Formula 109	resins	0	.
11108	Wite Out (White) Formula 109	titanium dioxide	0	.
11108	Wite Out (White) Formula 109	trichloroethylene	0	.
11108	Wite Out (White) Formula 109	dispersants	0	.
11108	Wite Out (White) Formula 109	mustard oil	0	.
11108	Wite Out (White) Formula 109	colorants	0	.
11108	Wite Out (White) Formula 109	1,1,1 trichloromethane	0	.
11236	GSI-112	butyl cellosolve	0	5
11268	Olde Worlde Heavy Duty Conc.	ethylene glycol monobutyl ether	P	5
11287	High Tack Spray-A-Gasket	propane/isobutane	0	.
11287	High Tack Spray-A-Gasket	hydrocarbon resins	0	.
11287	High Tack Spray-A-Gasket	acetone	0	.
11287	High Tack Spray-A-Gasket	methylene chloride	0	.
11422	Krylon Int/Ext Enam or Eng Blk	methyl isobutyl ketone	0	.
11422	Krylon Int/Ext Enam or Eng Blk	xylene	0	.
11422	Krylon Int/Ext Enam or Eng Blk	toluene	0	.
11422	Krylon Int/Ext Enam or Eng Blk	2-propanol 1-methoxy acetate	0	.
11422	Krylon Int/Ext Enam or Eng Blk	butyl alcohol	0	.
11422	Krylon Int/Ext Enam or Eng Blk	propane	0	.
11422	Krylon Int/Ext Enam or Eng Blk	methyl ethyl ketone	0	.
11422	Krylon Int/Ext Enam or Eng Blk	acetone	0	.
11423	Krylon Matte Finish	toluene	0	.
11423	Krylon Matte Finish	methylene chloride	0	.
11423	Krylon Matte Finish	acetone	0	.
11423	Krylon Matte Finish	propane	0	.
11423	Krylon Matte Finish	silica gel	0	.
11423	Krylon Matte Finish	film forming acrylic ester resin	0	.

Table A-1. Laundry MSDS Inventory. (sheet 2 of 9)

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MSDS *	Product Name	Chemical Constituent	Category	Percentage (wt%)
11447	Lectra Clean	perchloroethylene	0	-
11447	Lectra Clean	1,1,1 trichloromethane	0	-
11447	Lectra Clean	carbon dioxide	0	-
11449	LED Plate #250	metallic lead powder	0	-
11485	LPS Greaseless Lubricant	aliphatic petroleum naphtha	0	-
11485	LPS Greaseless Lubricant	aliphatic hydrocarbon	0	-
11485	LPS Greaseless Lubricant	carbon dioxide propellant	0	-
11522	Met Kool	mixed sulfochlorinated ali. hydrocarbons	0	-
11527	Metal Magic	soybean oil	0	5
11527	Metal Magic	1,1,1 trichloromethane	0	95
11625	Sanford Mucilage Glue	thickeners	0	-
11625	Sanford Mucilage Glue	dextrine	0	-
11702	ND-150	ethylene glycol monobutyl ether	M	1-5
11702	ND-150	proprietary ingredient	M	85-94
11702	ND-150	sodium metasilicate	M	5-10
11757	Oakite Swiff	1,1,1 trichloromethane	0	-
11822	Oven & Grill Cleaner	sodium carbonate	0	-
11822	Oven & Grill Cleaner	ethylene glycol	0	-
11822	Oven & Grill Cleaner	isobutane	0	-
11822	Oven & Grill Cleaner	ethylene glycol monobutyl ether	0	-
11822	Oven & Grill Cleaner	sodium hydroxide	0	-
11847	Parker 0 Lube	petroleum oil	0	-
11847	Parker 0 Lube	barium soap	0	-
11861	Permatex Penetrating Oil 22D	petroleum	M	45-50
11861	Permatex Penetrating Oil 22D	mineral oil	M	50-54
11861	Permatex Penetrating Oil 22D	high b.p alpha olefin	M	2
11861	Permatex Penetrating Oil 22D	surfactant	M	<0.5
12134	RTV Silicone Rubber #108	methyltriacetoxysilane	0	-
12191	Scotch Grip #1711	toluene	0	-
12191	Scotch Grip #1711	petroleum distillate	0	-
12191	Scotch Grip #1711	ethyl alcohol	0	-
12191	Scotch Grip #1711	n-hexane	0	-
12191	Scotch Grip #1711	chloroprene polymer	0	-

Table A-1. Laundry MSDS Inventory. (sheet 3 of 9)

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MSDS *	Product Name	Chemical Constituent	Category	Percentage (wt%)
12191	Scotch Grip #1711	magnesium resinate	O	-
12191	Scotch Grip #1711	thermoplastic resins	O	-
12191	Scotch Grip #1711	zinc oxide	O	-
12191	Scotch Grip #1711	calcium carbonate	O	-
12259	Silver-Wyte	lithium hypochlorite	P	45**
12259	Silver-Wyte	sodium metasilicate	P	12
12259	Silver-Wyte	sodium chloride	P	43**
12332	SSS Blue Bowl Cleaner	dioctyl dimethyl ammonium chloride	M	0.0075
12332	SSS Blue Bowl Cleaner	Inert ingredients	M	90.95
12332	SSS Blue Bowl Cleaner	hydrochloric acid	M	9
12332	SSS Blue Bowl Cleaner	didecyl dimethyl ammonium chloride	M	0.0075
12332	SSS Blue Bowl Cleaner	alkyl dimethyl benzyl ammonium chloride	M	0.02
12332	SSS Blue Bowl Cleaner	octyl decyl dimethyl ammonium chloride	M	0.015
12393	Super Westone	hexylene glycol	O	-
12436	Task Masters Bayberry	methylene chloride	O	8
12436	Task Masters Bayberry	isopropyl alcohol	O	-
12437	Task Masters Glass Cleaner	isobutane/propane blend	O	-
12437	Task Masters Glass Cleaner	propylene glycol methyl ether	O	-
12437	Task Masters Glass Cleaner	ammonium hydroxide	O	-
12437	Task Masters Glass Cleaner	ethyl alcohol	O	-
12452	Thermalcote Thermal	fumed silica	O	-
12452	Thermalcote Thermal	silicone fluid	O	-
12452	Thermalcote Thermal	zinc oxide	O	-
12544	Conoco Super Hydraulic Oil 32	hydrocarbon oil	M	-
12554	Turco Aviation Cleaner	sodium metasilicate pentahydrate	P	50
12554	Turco Aviation Cleaner	disodium phosphate	P	30
12554	Turco Aviation Cleaner	nonyl phenol polyethylene glycol ether	P	<5**
12554	Turco Aviation Cleaner	silicone antifoaming agents	P	<1**
12554	Turco Aviation Cleaner	sodium tripolyphosphate	P	20
12554	Turco Aviation Cleaner	alkyl polyoxyalkylene glycol ether	P	<5**
12555	Turco Decon 4182-A	ammonium bicarbonate	P	50
12555	Turco Decon 4182-A	surfactant	P	-
12555	Turco Decon 4182-A	sodium hexametaphosphate	P	45
12555	Turco Decon 4182-A	antifoam (alcohol)	P	-

Table A-1. Laundry MSDS Inventory. (sheet 4 of 9)

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MSDS *	Product Name	Chemical Constituent	Category	Percentage (wt%)
12555	Turco Decon 4182-A	sodium dodecylbenzene sulfonate	P	5**
12608	Union Guardol SAE 30 Oil	petroleum	M	-
12672	Weld-On #711	dimethylformamide	O	-
12672	Weld-On #711	tetrahydrofuran	O	-
12672	Weld-On #711	pvc resin	O	-
12674	Weld-On P-70	dimethylformamide	O	-
12674	Weld-On P-70	purple dye	O	-
12674	Weld-On P-70	tetrahydrofuran	O	-
12674	Weld-On P-70	methyl ethyl ketone	O	-
12674	Weld-On P-70	cyclohexanone	O	-
12716	Wite Out Thinner	1,1,1 trichloromethane	O	-
13023	Formula 409	ethylene glycol monobutyl ether	O	-
13138	Leak Tracy	surfactants	M	99
13367	Weld-On #717	tetrahydrofuran	O	-
13367	Weld-On #717	pvc resin	O	-
13367	Weld-On #717	cyclohexanone	O	-
13367	Weld-On #717	methyl ethyl ketone	O	-
13377	Yellow 77	paraffin wax	O	-
13377	Yellow 77	mineral oil	O	-
13589	Misty Glass & Mirror Cleaner	ammonium hydroxide	O	-
13589	Misty Glass & Mirror Cleaner	propylene glycol methyl ether	O	-
13589	Misty Glass & Mirror Cleaner	isobutane/propane blend	O	-
13589	Misty Glass & Mirror Cleaner	ethyl alcohol	O	-
13590	Dualcide	tetramethrin (insect.)	O	-
13590	Dualcide	phenothrin (insect.)	O	-
13590	Dualcide	petroleum distillates	O	-
13590	Dualcide	propane/isobutane blend	O	-
13672	Task Masters Insect Killer	petroleum distillate	O	-
13672	Task Masters Insect Killer	pyrethrins	O	-
13672	Task Masters Insect Killer	technical piperonyl butoxide	O	-
13757	Clover Compound Grease Mix	grease	O	-
13757	Glover Compound Grease Mix	silicon carbide grit	O	-
13903	Inco Oil 7161	petroleum hydrocarbons	O	-
13919	Slide Thin Line Blue Layout	acetone & other lacquer solvents	O	-

Table A-1. Laundry MSDS Inventory. (sheet 5 of 9)

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MSDS *	Product Name	Chemical Constituent	Category	Percentage (wt%)
13919	Slide Thin Line Blue Layout	pigments	0	-
13919	Slide Thin Line Blue Layout	A-108	0	-
13919	Slide Thin Line Blue Layout	nitrocellulose & plasticisers	0	-
14086	Misty Bayberry Air Freshener	isobutane	0	-
14086	Misty Bayberry Air Freshener	petroleum distillates	0	-
14219	Spray & Wipe Clear Degreasers	2-butoxyethanol	0	-
14277	Lubriko-Grease M-32	calcium stearate	0	-
14277	Lubriko-Grease M-32	mineral oil	0	-
14277	Lubriko-Grease M-32	sodium stearate	0	-
14331	COMET Liquid Disinfectant Cleaner	colorants	0	-
14331	COMET Liquid Disinfectant Cleaner	cleaning and polishing agents	0	-
14331	COMET Liquid Disinfectant Cleaner	sodium hypochlorite	0	-
14331	COMET Liquid Disinfectant Cleaner	perfume	0	-
14344	GO-JO Hand Cleaner	nonoxynol-10	0	-
14344	GO-JO Hand Cleaner	petroleum distillates	0	-
14369	SSS Glass Cleaner	ammonium hydroxide	0	-
14369	SSS Glass Cleaner	ethyl alcohol	0	-
14369	SSS Glass Cleaner	isobutane/propane blend	0	-
14369	SSS Glass Cleaner	propylene glycol methyl ether	0	-
14372	Sportan Flame Retardant - CM,X-12	ammonium phosphate	P	50**
14372	Sportan Flame Retardant - CM,X-12	ammonium sulfate	P	50**
14484	Slip Plate	propane	0	-
14484	Slip Plate	naphtha	0	-
14484	Slip Plate	syn. resin	0	-
14484	Slip Plate	petroleum hydrocarbon	0	-
14484	Slip Plate	zirconium	0	-
14484	Slip Plate	graphite	0	-
14484	Slip Plate	isobutane	0	-
14484	Slip Plate	cobalt	0	-
14486	Chevron Automatic Trans. Fl.	zinc dialkyl dithiophosphate	M	-
14486	Chevron Automatic Trans. Fl.	base oils - highly refined	M	<85
14486	Chevron Automatic Trans. Fl.	inhibitors	M	-
14508	Flo-Kling Bowl Cleaner	isopropyl alcohol	M	<1
14508	Flo-Kling Bowl Cleaner	sugar	M	<1

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Table A-1. Laundry MSDS Inventory. (sheet 6 of 9)

MSDS *	Product Name	Chemical Constituent	Category	Percentage (wt%)
14508	Flo-Kling Bowl Cleaner	xanthan gum	M	<1
14508	Flo-Kling Bowl Cleaner	methyl cellulose	M	<1
14508	Flo-Kling Bowl Cleaner	methyl salicylate	M	<1
14508	Flo-Kling Bowl Cleaner	dye	M	<1
14508	Flo-Kling Bowl Cleaner	hydrochloric acid	M	7
14511	Krylon-Let-Go Penetrating Oil	propane	O	-
14511	Krylon-Let-Go Penetrating Oil	1,1,1 trichloromethane	O	-
14511	Krylon-Let-Go Penetrating Oil	isopropyl alcohol	O	-
14511	Krylon-LeGo Penetrating Oil	hydrotreated light distillate petroleum	O	-
14518	Chevron NL Gear Compound 320	sulfur phosphorus extreme	M	-
14518	Chevron NL Gear Compound 320	hydrocarbon oil	M	-
14518	Chevron NL Gear Compound 320	pressure additive	M	-
14541	RMC All Purpose Cleaner	sodium hydroxide	M	0.25
14541	RMC All Purpose Cleaner	sodium tripolyphosphate	M	-
14541	RMC All Purpose Cleaner	ethylene glycol N-butyl ether	M	<5
14541	RMC All Purpose Cleaner	ethoxylated nonyl phenol	M	-
14541	RMC All Purpose Cleaner	sodium EDTA	M	<1
14541	RMC All Purpose Cleaner	wintergreen perfume	M	0.1
14550	Dry Erase Markers	n-butyl acetate	O	-
14550	Dry Erase Markers methyl isobutyl	ketone	O	-
14550	Dry Erase Markers	pigments and resins	O	-
14551	Sanford Roll-On	glycerine	O	-
14551	Sanford Roll-On	diethylene glycol	O	-
14551	Sanford Roll-On	polyethylene glycol	O	-
14635	Liquid Wrench No. 1	aliphatic petroleum compounds	M	-
14635	Liquid Wrench No. 1	carbon dioxide propellant	M	-
14823	Crystal 3C's Cleaner	hydrocarbon blend isobutane/propane	O	-
14823	Crystal 3C's Cleaner	butyl cellosolve	O	-
14823	Crystal 3C's Cleaner	isopropyl alcohol	O	-
14824	Silicone Emulsion Furn. Polish	propane/isobutane/n-butane	O	-
14824	Silicone Emulsion Furn. Polish	petroleum solvent	O	-
14824	Silicone Emulsion Furn. Polish	sodium nitrite	O	-

Table A-1: Laundry MSDS Inventory. (sheet 7 of 9)

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Table A-1. Laundry MSDS Inventory. (sheet 8 of 9)

MSDS *	Product Name	Chemical Constituent	Category	Percentage (wt%)
14948	Minolita Mt. Toner #4 EP-350	carbon black	0	-
14948	Minolita Mt. Toner #4 EP-350	silica	0	-
15594	Silicone Rubber Sealant	petroleum solvent	0	-
15594	Silicone Rubber Sealant	acetoxysilane	0	-
15757	Scotch-Weld Gray Epoxy Adh. 2216A	amide	0	-
15757	Scotch-Weld Gray Epoxy Adh. 2216A	aluminum silicate pigment	0	-
15757	Scotch-Weld Gray Epoxy Adh. 2216A	carbon black	0	-
15993	Spice #401 Air Deodorant	isopropanol	0	-
15993	Spice #401 Air Deodorant	sodium nitrite	0	-
16030	P-10-GAS	argon	0	-
16030	P-10-GAS	methane	0	-
17001	Grown Anti Static	fatty alcohol phosphate	0	-
17001	Crown Anti Static	carbon dioxide	0	-
17001	Crown Anti Static	1,1,1 trichloromethane	0	-
17001	Crown Anti Static	isopropyl alcohol	0	-
17321	Fantastik All Purpose Cleaner	2-butoxyethanol	0	-
17321	Fantastik All Purpose Cleaner	alkaline builders, dye & perfume	0	-
17321	Fantastik All Purpose Cleaner	surface active agents	0	-
17420	Mint #403 Air Freshener	isopropyl alcohol	0	-
17420	Mint #403 Air Freshener	propane/isobutane	0	-
17420	Mint #403 Air Freshener	sodium nitrite	0	-
18237	Cleanup #4	opal clay	0	-
18237	Cleanup #4	silica	0	-
18358	Thunderbird Motor Oil 20	petroleum	M	-
18360	Primer for PVC or CPVC	cyclohexanone	0	-
18360	Primer for PVC or CPVC	methyl ethyl ketone	0	-
18360	Primer for PVC or CPVC	tetrahydrofuran	0	-
18381	Air Kontrol	isopropyl alcohol	0	-
18381	Air Kontrol	isobutane/propane hydrocarbon blend	0	-
18392	White Petroleum	polyethylene glycols	0	-
18392	White Petroleum	benzoic acid	0	-
18392	White Petroleum	salicylic acid	0	-
18396	Super Gloss Flexible Enamel	lead chromate	0	-
18396	Super Gloss Flexible Enamel	hydrocarbon mixture	0	-

Table A-1. Laundry MSDS Inventory. (sheet 9 of 9)

MSDS *	Product Name	Chemical Constituent	Category	Percentage (wt%)
18398	T-9-10 Thinner	aromatic petroleum naphtha	0	-
18400	Fresh-N-Clean #345	n-alkyl dimethyl benzyl ammonium chloride	0	-
18400	Fresh-N-Clean #345	isopropanol	0	-
18400	Fresh-N-Clean #345	propylene glycol	0	-
18423	Lemon Lime Room Deodorant	butane/propane/isobutane propellant	0	-
18423	Lemon Lime Room Deodorant	isopropyl alcohol	0	-
18424	Evergreen Room Deodorant	butane/propane/isobutane propellant	0	-
18424	Evergreen Room Deodorant	isopropyl alcohol	0	-
18459	SSR	polyoxyalkylene glycol	0	-
Total 269				

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2724-W Laundry Wastewater

Table A-2. Data for 2724-W Laundry Wastewater.
(All numbers are in ppb unless otherwise noted.)
(sheet 1 of 10)

Constituent	Sample #	Date	Method	Result
Aluminum	50677	10/12/89	ICP	5.51E+03
Aluminum	50772	11/16/89	ICP	3.45E+02
Aluminum	50780	11/21/89	ICP	6.67E+02
Aluminum	50857	12/21/89	ICP	5.06E+02
Arsenic	50677	10/12/89	GFAA	1.00E+01
Arsenic	50772	11/16/89	GFAA	<5.00E+00
Arsenic	50780	11/21/89	GFAA	<5.00E+00
Arsenic	50857	12/21/89	GFAA	<5.00E+00
Arsenic (EP Toxic)	50677E	10/12/89	ICP	<5.00E+02
Arsenic (EP Toxic)	50772E	11/16/89	ICP	<5.00E+02
Arsenic (EP Toxic)	50780E	11/21/89	ICP	<5.00E+02
Arsenic (EP Toxic)	50857E	12/21/89	ICP	<5.00E+02
Barium	50677	10/12/89	ICP	1.86E+03
Barium	50772	11/16/89	ICP	9.70E+01
Barium	50780	11/21/89	ICP	8.50E+01
Barium	50857	12/21/89	ICP	1.36E+02
Barium (EP Toxic)	50677E	10/12/89	ICP	<1.00E+03
Barium (EP Toxic)	50772E	11/16/89	ICP	<1.00E+03
Barium (EP Toxic)	50780E	11/21/89	ICP	<1.00E+03
Barium (EP Toxic)	50857E	12/21/89	ICP	<1.00E+03
Boron	50677	10/12/89	ICP	1.08E+02
Boron	50772	11/16/89	ICP	1.64E+02
Boron	50780	11/21/89	ICP	2.13E+02
Boron	50857	12/21/89	ICP	1.90E+01
Cadmium	50677	10/12/89	ICP	3.10E+01
Cadmium	50772	11/16/89	ICP	<2.00E+00
Cadmium	50780	11/21/89	ICP	7.00E+00
Cadmium	50857	12/21/89	ICP	<2.00E+00
Cadmium (EP Toxic)	50677E	10/12/89	ICP	<1.00E+02
Cadmium (EP Toxic)	50772E	11/16/89	ICP	<1.00E+02
Cadmium (EP Toxic)	50780E	11/21/89	ICP	<1.00E+02
Cadmium (EP Toxic)	50857E	12/21/89	ICP	<1.00E+02
Calcium	50677	10/12/89	ICP	3.18E+04
Calcium	50772	11/16/89	ICP	1.74E+04
Calcium	50780	11/21/89	ICP	2.09E+04
Calcium	50857	12/21/89	ICP	1.50E+04
Chloride	50677	10/12/89	IC	9.00E+03
Chloride	50772	11/16/89	IC	3.97E+04
Chloride	50780	11/21/89	IC	9.00E+03
Chloride	50857	12/21/89	IC	2.60E+03
Chromium	50677	10/12/89	ICP	9.10E+01
Chromium	50772	11/16/89	ICP	<1.00E+01
Chromium	50780	11/21/89	ICP	1.70E+01
Chromium	50857	12/21/89	ICP	<1.00E+01

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2724-W Laundry Wastewater

Table A-2. Data for 2724-W Laundry Wastewater.
(All numbers are in ppb unless otherwise noted.)
(sheet 2 of 10)

Constituent	Sample #	Date	Method	Result
Chromium (EP Toxic)	50677E	10/12/89	ICP	<5.00E+02
Chromium (EP Toxic)	50772E	11/16/89	ICP	<5.00E+02
Chromium (EP Toxic)	50780E	11/21/89	ICP	<5.00E+02
Chromium (EP Toxic)	50857E	12/21/89	ICP	<5.00E+02
Copper	50677	10/12/89	ICP	6.78E+02
Copper	50772	11/16/89	ICP	6.70E+01
Copper	50780	11/21/89	ICP	7.30E+01
Copper	50857	12/21/89	ICP	7.40E+01
Cyanide	50677	10/12/89	SPEC	<1.00E+01
Cyanide	50772	11/16/89	SPEC	4.45E+01
Cyanide	50780	11/21/89	SPEC	2.93E+01
Cyanide	50857	12/21/89	SPEC	2.22E+01
Fluoride	50677	10/12/89	IC	2.10E+03
Fluoride	50677	10/12/89	ISE	2.25E+02
Fluoride	50772	11/16/89	IC	1.60E+03
Fluoride	50772	11/16/89	ISE	1.75E+02
Fluoride	50780	11/21/89	IC	1.10E+03
Fluoride	50780	11/21/89	ISE	2.26E+02
Fluoride	50857	12/21/89	IC	<5.00E+02
Fluoride	50857	12/21/89	ISE	1.47E+02
Iron	50677	10/12/89	ICP	1.72E+04
Iron	50772	11/16/89	ICP	6.66E+02
Iron	50780	11/21/89	ICP	1.36E+03
Iron	50857	12/21/89	ICP	1.01E+03
Lead	50677	10/12/89	GFAA	3.19E+02
Lead	50772	11/16/89	GFAA	1.80E+01
Lead	50780	11/21/89	GFAA	7.70E+01
Lead	50857	12/21/89	GFAA	1.90E+01
Lead (EP Toxic)	50677E	10/12/89	ICP	<5.00E+02
Lead (EP Toxic)	50772E	11/16/89	ICP	<5.00E+02
Lead (EP Toxic)	50780E	11/21/89	ICP	<5.00E+02
Lead (EP Toxic)	50857E	12/21/89	ICP	<5.00E+02
Lithium	50677	10/12/89	ICP	1.56E+02
Lithium	50772	11/16/89	ICP	1.59E+03
Lithium	50780	11/21/89	ICP	2.30E+01
Lithium	50857	12/21/89	ICP	<1.00E+01
Magnesium	50677	10/12/89	ICP	7.57E+03
Magnesium	50772	11/16/89	ICP	5.74E+03
Magnesium	50780	11/21/89	ICP	7.44E+03
Magnesium	50857	12/21/89	ICP	3.16E+03
Manganese	50677	10/12/89	ICP	1.90E+02
Manganese	50772	11/16/89	ICP	2.20E+01
Manganese	50780	11/21/89	ICP	3.60E+01
Manganese	50857	12/21/89	ICP	1.80E+01
Mercury	50677	10/12/89	CVAA	6.50E-01

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Table A-2. Data for 2724-W Laundry Wastewater.
(All numbers are in ppb unless otherwise noted.)
(sheet 3 of 10)

Constituent	Sample #	Date	Method	Result
Mercury	50772	11/16/89	CVAA	<1.00E-01
Mercury	50780	11/21/89	CVAA	3.30E-01
Mercury	50857	12/21/89	CVAA	1.60E-01
Mercury (EP Toxic)	50677E	10/12/89	CVAA/M	<1.00E+02
Mercury (EP Toxic)	50772E	11/16/89	CVAA/M	<2.00E+01
Mercury (EP Toxic)	50780E	11/21/89	CVAA/M	<2.00E+01
Mercury (EP Toxic)	50857E	12/21/89	CVAA/M	<2.00E+01
Nickel	50677	10/12/89	ICP	1.63E+02
Nickel	50772	11/16/89	ICP	<1.00E+01
Nickel	50780	11/21/89	ICP	1.10E+01
Nickel	50857	12/21/89	ICP	<1.00E+01
Nitrate	50677	10/12/89	IC	1.00E+03
Nitrate	50772	11/16/89	IC	2.60E+03
Nitrate	50780	11/21/89	IC	1.40E+03
Nitrate	50857	12/21/89	IC	5.00E+02
Phosphate	50677	10/12/89	IC	1.83E+05
Phosphate	50772	11/16/89	IC	7.28E+04
Phosphate	50780	11/21/89	IC	7.33E+04
Phosphate	50857	12/21/89	IC	4.33E+04
Potassium	50677	10/12/89	ICP	4.53E+03
Potassium	50772	11/16/89	ICP	1.82E+04
Potassium	50780	11/21/89	ICP	1.35E+04
Potassium	50857	12/21/89	ICP	1.14E+03
Selenium (EP Toxic)	50677E	10/12/89	ICP	<5.00E+02
Selenium (EP Toxic)	50772E	11/16/89	ICP	<5.00E+02
Selenium (EP Toxic)	50780E	11/21/89	ICP	<5.00E+02
Selenium (EP Toxic)	50857E	12/21/89	ICP	<5.00E+02
Silicon	50677	10/12/89	ICP	3.97E+04
Silicon	50772	11/16/89	ICP	2.48E+04
Silicon	50780	11/21/89	ICP	3.23E+04
Silicon	50857	12/21/89	ICP	1.20E+04
Silver (EP Toxic)	50677E	10/12/89	ICP	<5.00E+02
Silver (EP Toxic)	50772E	11/16/89	ICP	<5.00E+02
Silver (EP Toxic)	50780E	11/21/89	ICP	<5.00E+02
Silver (EP Toxic)	50857E	12/21/89	ICP	<5.00E+02
Sodium	50677	10/12/89	ICP	1.27E+05
Sodium	50772	11/16/89	ICP	1.23E+05
Sodium	50780	11/21/89	ICP	1.42E+05
Sodium	50857	12/21/89	ICP	4.51E+04
Strontium	50677	10/12/89	ICP	1.83E+02
Strontium	50772	11/16/89	ICP	8.90E+01
Strontium	50780	11/21/89	ICP	9.70E+01
Strontium	50857	12/21/89	ICP	7.40E+01
Sulfate	50677	10/12/89	IC	1.87E+04
Sulfate	50772	11/16/89	IC	2.30E+04

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Table A-2. Data for 2724-W Laundry Wastewater.
(All numbers are in ppb unless otherwise noted.)
(sheet 4 of 10)

Constituent	Sample #	Date	Method	Result
Sulfate	50780	11/21/89	IC	1.85E+04
Sulfate	50857	12/21/89	IC	1.08E+04
Sulfide	50677	10/12/89	TITRA	1.97E+03
Sulfide	50772	11/16/89	TITRA	<1.00E+03
Sulfide	50780	11/21/89	TITRA	1.65E+03
Sulfide	50857	12/21/89	TITRA	<1.00E+03
Titanium	50677	10/12/89	ICP	5.42E+02
Titanium	50772	11/16/89	ICP	<6.00E+01
Titanium	50780	11/21/89	ICP	<6.00E+01
Titanium	50857	12/21/89	ICP	<6.00E+01
Uranium	50677	10/12/89	FLUOR	5.44E+01
Uranium	50772	11/16/89	FLUOR	3.83E+02
Uranium	50780	11/21/89	FLUOR	3.28E+00
Uranium	50857	12/21/89	FLUOR	1.06E+01
Vanadium	50677	10/12/89	ICP	1.70E+01
Vanadium	50772	11/16/89	ICP	<5.00E+00
Vanadium	50780	11/21/89	ICP	<5.00E+00
Vanadium	50857	12/21/89	ICP	<5.00E+00
Zinc	50677	10/12/89	ICP	1.73E+03
Zinc	50772	11/16/89	ICP	1.95E+02
Zinc	50780	11/21/89	ICP	3.68E+02
Zinc	50857	12/21/89	ICP	1.40E+02
Acetone	50677	10/12/89	VOA	2.30E+01
Acetone	50677	10/12/89	ABN	<1.00E+01
Acetone	50677B	10/12/89	VOA	<6.00E+00
Acetone	50677T	10/12/89	VOA	1.20E+01
Acetone	50772	11/16/89	VOA	1.60E+01
Acetone	50772	11/16/89	ABN	<1.00E+01
Acetone	50772B	11/16/89	VOA	<1.00E+01
Acetone	50772T	11/16/89	VOA	<1.00E+01
Acetone	50780	11/21/89	VOA	<7.00E+00
Acetone	50780	11/21/89	ABN	<1.00E+01
Acetone	50780B	11/21/89	VOA	<1.00E+01
Acetone	50780T	11/21/89	VOA	<1.00E+01
Acetone	50857	12/21/89	VOA	<1.00E+01
Acetone	50857	12/21/89	ABN	<1.00E+01
Acetone	50857B	12/21/89	VOA	<1.00E+01
Acetone	50857T	12/21/89	VOA	<1.00E+01
Ammonia	50677	10/12/89	ISE	1.71E+04
Ammonia	50772	11/16/89	ISE	5.99E+03
Ammonia	50780	11/21/89	ISE	1.71E+04
Ammonia	50857	12/21/89	ISE	3.27E+04
Benzoic acid	50772	11/16/89	ABN	1.22E+02
Benzoic acid	50780	11/21/89	ABN	2.80E+02
Benzoic acid	50857	12/21/89	ABN	6.00E+01

Table A-2. Data for 2724-W Laundry Wastewater.
(All numbers are in ppb unless otherwise noted.)
(sheet 5 of 10)

Constituent	Sample #	Date	Method	Result
Benzyl alcohol	50677	10/12/89	ABN	3.22E+02
Benzyl alcohol	50772	11/16/89	ABN	5.80E+01
Benzyl alcohol	50780	11/21/89	ABN	1.04E+02
Benzyl alcohol	50857	12/21/89	ABN	9.00E+01
Bis(2-ethylhexyl) phthalate	50677	10/12/89	ABN	8.80E+01
Bis(2-ethylhexyl) phthalate	50772	11/16/89	ABN	3.10E+01
Bis(2-ethylhexyl) phthalate	50780	11/21/89	ABN	1.00E+02
Bis(2-ethylhexyl) phthalate	50857	12/21/89	ABN	6.70E+01
1-Butoxy-2-propanol	50857	12/21/89	ABN	1.20E+02
Butylbenzyl phthalate	50677	10/12/89	ABN	7.80E+01
Butylbenzyl phthalate	50772	11/16/89	ABN	1.80E+01
Butylbenzyl phthalate	50780	11/21/89	ABN	3.20E+01
Butylbenzyl phthalate	50857	12/21/89	ABN	3.00E+01
Dichloromethane	50677	10/12/89	VOA	<5.00E+00
Dichloromethane	50677B	10/12/89	VOA	3.90E+02
Dichloromethane	50677T	10/12/89	VOA	4.20E+02
Dichloromethane	50772	11/16/89	VOA	<5.00E+00
Dichloromethane	50772B	11/16/89	VOA	<5.00E+00
Dichloromethane	50772T	11/16/89	VOA	<5.00E+00
Dichloromethane	50780	11/21/89	VOA	<5.00E+00
Dichloromethane	50780B	11/21/89	VOA	<3.00E+00
Dichloromethane	50780T	11/21/89	VOA	<3.00E+00
Dichloromethane	50857	12/21/89	VOA	<5.00E+00
Dichloromethane	50857B	12/21/89	VOA	1.30E+03
Dichloromethane	50857T	12/21/89	VOA	<3.00E+00
Di-n-octyl phthalate	50677	10/12/89	ABN	1.86E+02
Di-n-octyl phthalate	50772	11/16/89	ABN	3.20E+01
Di-n-octyl phthalate	50780	11/21/89	ABN	1.18E+02
Di-n-octyl phthalate	50857	12/21/89	ABN	1.10E+02
Hydrazine	50677	10/12/89	SPEC	<3.00E+01
Hydrazine	50772	11/16/89	SPEC	7.20E+01
Hydrazine	50780	11/21/89	SPEC	7.50E+01
Hydrazine	50857	12/21/89	SPEC	3.60E+01
Phthalic anhydride	50857	12/21/89	ABN	1.20E+01
Trichloromethane	50677	10/12/89	VOA	2.20E+01
Trichloromethane	50677B	10/12/89	VOA	<5.00E+00
Trichloromethane	50677T	10/12/89	VOA	<5.00E+00
Trichloromethane	50772	11/16/89	VOA	9.50E+01
Trichloromethane	50772B	11/16/89	VOA	5.00E+00
Trichloromethane	50772T	11/16/89	VOA	5.00E+00
Trichloromethane	50780	11/21/89	VOA	6.00E+00
Trichloromethane	50780B	11/21/89	VOA	<4.00E+00
Trichloromethane	50780T	11/21/89	VOA	9.00E+00
Trichloromethane	50857	12/21/89	VOA	1.00E+01
Trichloromethane	50857B	12/21/89	VOA	<5.00E+00

Table A-2. Data for 2724-W Laundry Wastewater.
(All numbers are in ppb unless otherwise noted.)
(sheet 6 of 10)

Constituent	Sample #	Date	Method	Result
Trichloromethane	50857T	12/21/89	VOA	5.00E+00
Unknown	50677	10/12/89	ABN	5.60E+01
Unknown	50772	11/16/89	ABN	5.20E+01
Unknown	50780	11/21/89	ABN	3.60E+01
Unknown	50857	12/21/89	ABN	7.70E+01
Unknown acid	50677	10/12/89	ABN	2.20E+01
Unknown aliphatic alcohol	50857	12/21/89	ABN	1.60E+01
Unknown aliphatic HC	50677	10/12/89	ABN	3.60E+01
Unknown aliphatic HC	50772	11/16/89	ABN	2.80E+01
Unknown aliphatic HC	50780	11/21/89	ABN	2.70E+01
Unknown aliphatic HC	50857	12/21/89	ABN	6.00E+00
Unknown amine	50772	11/16/89	ABN	2.10E+01
Unknown fatty acid	50677	10/12/89	ABN	4.10E+02
Unknown fatty acid	50772	11/16/89	ABN	7.30E+01
Unknown fatty acid	50780	11/21/89	ABN	6.20E+01
Unknown fatty acid	50857	12/21/89	ABN	9.10E+01
Unknown glycol	50857	12/21/89	ABN	9.20E+01
Unknown hydrocarbon	50857	12/21/89	ABN	9.00E+01
Unknown phthalate	50677	10/12/89	ABN	9.10E+01
Unknown phthalate	50772	11/16/89	ABN	2.20E+01
Unknown phthalate	50780	11/21/89	ABN	4.80E+01
Unknown phthalate	50857	12/21/89	ABN	2.70E+01
Unknown polycyclic HC	50772	11/16/89	ABN	3.20E+01
Unknown polycyclic HC	50780	11/21/89	ABN	7.60E+01
Unknown sulfur compound	50857	12/21/89	ABN	1.30E+01
Alkalinity (Method B)	50677	10/12/89	TITRA	4.36E+05
Alkalinity (Method B)	50772	11/16/89	TITRA	2.18E+05
Alkalinity (Method B)	50780	11/21/89	TITRA	2.50E+05
Alkalinity (Method B)	50857	12/21/89	TITRA	1.26E+05
Alpha Activity (pCi/L)	50677	10/12/89	Alpha	6.34E+02
Alpha Activity (pCi/L)	50772	11/16/89	Alpha	1.84E+02
Alpha Activity (pCi/L)	50780	11/21/89	Alpha	1.90E+00
Alpha Activity (pCi/L)	50857	12/21/89	Alpha	1.68E+01
Beta Activity (pCi/L)	50677	10/12/89	Beta	3.70E+03
Beta Activity (pCi/L)	50772	11/16/89	Beta	2.91E+03
Beta Activity (pCi/L)	50780	11/21/89	Beta	1.23E+01
Beta Activity (pCi/L)	50857	12/21/89	Beta	3.17E+01
Conductivity (μS)	50677	10/12/89	COND-F1d	8.00E+02
Conductivity (μS)	50772	11/16/89	COND-F1d	9.71E+02
Conductivity (μS)	50780	11/21/89	COND-F1d	1.01E+03
Conductivity (μS)	50857	12/21/89	COND-F1d	2.97E+02
Ignitability (°F)	50677E	10/12/89	IGNIT	2.12E+02
Ignitability (°F)	50772E	11/16/89	IGNIT	2.06E+02
Ignitability (°F)	50780E	11/21/89	IGNIT	2.12E+02
Ignitability (°F)	50857E	12/21/89	IGNIT	2.10E+02

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2724-W Laundry Wastewater

Table A-2. Data for 2724-W Laundry Wastewater.
(All numbers are in ppb unless otherwise noted.)
(sheet 7 of 10)

Constituent	Sample #	Date	Method	Result
pH (dimensionless)	50677	10/12/89	PH-F1d	9.49E+00
pH (dimensionless)	50772	11/16/89	PH-F1d	9.55E+00
pH (dimensionless)	50780	11/21/89	PH-F1d	8.02E+00
pH (dimensionless)	50857	12/21/89	PH-F1d	6.75E+00
Reactivity Cyanide (mg/kg)	50677E	10/12/89	DSPEC	<1.00E+02
Reactivity Cyanide (mg/kg)	50772E	11/16/89	DSPEC	<1.00E+02
Reactivity Cyanide (mg/kg)	50780E	11/21/89	DSPEC	<1.00E+02
Reactivity Cyanide (mg/kg)	50857E	12/21/89	DSPEC	<1.00E+02
Reactivity Sulfide (mg/kg)	50677E	10/12/89	DTITRA	<1.00E+02
Reactivity Sulfide (mg/kg)	50772E	11/16/89	DTITRA	<1.00E+02
Reactivity Sulfide (mg/kg)	50780E	11/21/89	DTITRA	<1.00E+02
Reactivity Sulfide (mg/kg)	50857E	12/21/89	DTITRA	<1.00E+02
Suspended Solids	50677	10/12/89	SSOLID	3.85E+05
Suspended Solids	50772	11/16/89	SSOLID	9.90E+04
Suspended Solids	50780	11/21/89	SSOLID	8.40E+04
Suspended Solids	50857	12/21/89	SSOLID	4.26E+04
TDS	50677	10/12/89	TDS	6.33E+05
TDS	50772	11/16/89	TDS	4.19E+05
TDS	50780	11/21/89	TDS	7.51E+05
TDS	50857	12/21/89	TDS	1.77E+05
Temperature (°C)	50677	10/12/89	TEMP-F1d	4.65E+01
Temperature (°C)	50772	11/16/89	TEMP-F1d	4.10E+01
Temperature (°C)	50780	11/21/89	TEMP-F1d	5.06E+01
Temperature (°C)	50857	12/21/89	TEMP-F1d	4.48E+01
TOC	50677	10/12/89	TOC	3.94E+04
TOC	50772	11/16/89	TOC	8.71E+04
TOC	50780	11/21/89	TOC	2.77E+04
TOC	50857	12/21/89	TOC	4.02E+04
Total Carbon	50677	10/12/89	TC	1.36E+05
Total Carbon	50772	11/16/89	TC	1.21E+05
Total Carbon	50780	11/21/89	TC	9.20E+04
Total Carbon	50857	12/21/89	TC	8.97E+04
TOX (as Cl)	50677	10/12/89	LTOX	1.84E+02
TOX (as Cl)	50772	11/16/89	LTOX	1.23E+03
TOX (as Cl)	50780	11/21/89	LTOX	1.49E+02
TOX (as Cl)	50857	12/21/89	LTOX	1.22E+02
²⁴¹ Am (pCi/L)	50677	10/12/89	AEA	1.23E+01
²⁴¹ Am (pCi/L)	50772	11/16/89	AEA	1.20E+02
²⁴¹ Am (pCi/L)	50857	12/21/89	AEA	<9.21E-04
²⁴⁴ Cm (pCi/L)	50677	10/12/89	AEA	1.19E-01
²⁴⁴ Cm (pCi/L)	50772	11/16/89	AEA	1.09E+00
⁶⁰ Co (pCi/L)	50677	10/12/89	GEA	5.76E+02
⁶⁰ Co (pCi/L)	50772	11/16/89	GEA	5.42E+02
⁶⁰ Co (pCi/L)	50780	11/21/89	GEA	<4.82E-02
⁶⁰ Co (pCi/L)	50857	12/21/89	GEA	5.35E+01

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2724-W Laundry Wastewater

Table A-2. Data for 2724-W Laundry Wastewater.
(All numbers are in ppb unless otherwise noted.)
(sheet 8 of 10)

Constituent	Sample #	Date	Method	Result
¹³⁷ Cs (pCi/L)	50677	10/12/89	GEA	1.35E+02
¹³⁷ Cs (pCi/L)	50772	11/16/89	GEA	5.02E+02
¹³⁷ Cs (pCi/L)	50780	11/21/89	GEA	<2.00E-01
¹³⁷ Cs (pCi/L)	50857	12/21/89	GEA	4.33E+01
³ H (pCi/L)	50677	10/12/89	LSC	3.78E+03
³ H (pCi/L)	50780	11/21/89	LSC	<2.68E+01
³ H (pCi/L)	50857	12/21/89	LSC	<1.78E+01
⁵⁴ Mn (pCi/L)	50677	10/12/89	GEA	6.18E+01
⁵⁴ Mn (pCi/L)	50772	11/16/89	GEA	5.49E+01
⁵⁴ Mn (pCi/L)	50857	12/21/89	GEA	4.47E+00
²² Na (pCi/L)	50772	11/16/89	GEA	8.88E+01
²¹⁰ Pb (pCi/L)	50677	10/12/89	GEA	1.09E+00
²¹⁰ Pb (pCi/L)	50772	11/16/89	GEA	2.63E+00
²¹⁰ Pb (pCi/L)	50780	11/21/89	GEA	<8.18E-01
²¹⁰ Pb (pCi/L)	50857	12/21/89	GEA	<3.47E-01
²³⁸ Pu (pCi/L)	50677	10/12/89	AEA	3.36E+01
²³⁸ Pu (pCi/L)	50772	11/16/89	AEA	3.61E+01
²³⁸ Pu (pCi/L)	50780	11/21/89	AEA	1.22E-01
²³⁸ Pu (pCi/L)	50857	12/21/89	AEA	5.15E-01
^{239,240} Pu (pCi/L)	50677	10/12/89	AEA	4.16E+02
^{239,240} Pu (pCi/L)	50772	11/16/89	AEA	3.95E+02
^{239,240} Pu (pCi/L)	50780	11/21/89	AEA	1.23E+00
^{239,240} Pu (pCi/L)	50857	12/21/89	AEA	5.58E+00
Radium Total (pCi/L)	50677	10/12/89	Alpha-Ra	4.87E-01
Radium Total (pCi/L)	50772	11/16/89	Alpha-Ra	1.41E+00
Radium Total (pCi/L)	50780	11/21/89	Alpha-Ra	<9.24E-01
Radium Total (pCi/L)	50857	12/21/89	Alpha-Ra	1.82E-01
²²⁸ Ra (pCi/L)	50772	11/16/89	GEA	2.50E+02
¹⁰⁶ Ru (pCi/L)	50677	10/12/89	GEA	<3.53E+01
¹⁰⁶ Ru (pCi/L)	50772	11/16/89	GEA	7.79E+01
¹⁰⁶ Ru (pCi/L)	50780	11/21/89	GEA	<1.96E+00
¹⁰⁶ Ru (pCi/L)	50857	12/21/89	GEA	<1.57E+01
⁹⁰ Sr (pCi/L)	50677	10/12/89	Beta	1.25E+03
⁹⁰ Sr (pCi/L)	50772	11/16/89	Beta	4.56E+03
⁹⁰ Sr (pCi/L)	50780	11/21/89	Beta	8.07E+00
⁹⁰ Sr (pCi/L)	50857	12/21/89	Beta	1.61E+01
²³⁴ U (pCi/L)	50677	10/12/89	AEA	1.58E+01
²³⁴ U (pCi/L)	50772	11/16/89	AEA	2.12E+02
²³⁴ U (pCi/L)	50780	11/21/89	AEA	1.77E+00
²³⁴ U (pCi/L)	50857	12/21/89	AEA	3.87E+00
²³⁵ U (pCi/L)	50677	10/12/89	AEA	5.31E-01
²³⁵ U (pCi/L)	50772	11/16/89	AEA	2.31E+01
²³⁵ U (pCi/L)	50780	11/21/89	AEA	<2.35E-02
²³⁵ U (pCi/L)	50857	12/21/89	AEA	1.90E-01
²³⁸ U (pCi/L)	50677	10/12/89	AEA	1.60E+01

Table A-2. Data for 2724-W Laundry Wastewater.
(All numbers are in ppb unless otherwise noted.)
(sheet 9 of 10)

Constituent	Sample #	Date	Method	Result
²³⁸ U (pCi/L)	50772	11/16/89	AEA	2.43E+02
²³⁸ U (pCi/L)	50780	11/21/89	AEA	1.45E+00
²³⁸ U (pCi/L)	50857	12/21/89	AEA	3.44E+00

NOTES:

Sample# is the number of the sample. See Section 3 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	Semivolatiles Organics (GC/MS)	USEPA-8270
AEA	²⁴¹ Am	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	⁹⁰ Sr	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

Table A-2. Data for 2724-W Laundry Wastewater.
 (All numbers are in ppb unless otherwise noted.)
 (sheet 10 of 10)

Code	Analytical Method	Reference
LALPHA	Alpha Activity-Low Detection Limit	EPA-680/4-75/1
LEPD	¹²⁹ I	UST-20I02
LSC	¹⁴ C	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.

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2724-W Laundry Wastewater

Table A-3. Data for 2724-W Laundry Wastewater.
(sheet 1 of 13)

Constituent	Sample #	Date	Method	Result
Aluminum	50069	6/17/86	ICP	5.20E+02
Aluminum	50139	9/24/86	ICP	1.85E+03
Aluminum	50157	10/17/86	ICP	5.63E+02
Aluminum	50677	10/12/89	ICP	5.51E+03
Aluminum	50772	11/16/89	ICP	3.45E+02
Aluminum	50780	11/21/89	ICP	6.67E+02
Aluminum	50857	12/21/89	ICP	5.06E+02
Arsenic	50677	10/12/89	GFAA	1.00E+01
Arsenic	50772	11/16/89	GFAA	<5.00E+00
Arsenic	50780	11/21/89	GFAA	<5.00E+00
Arsenic	50857	12/21/89	GFAA	<5.00E+00
Arsenic (EP Toxic)	50677E	10/12/89	ICP	<5.00E+02
Arsenic (EP Toxic)	50772E	11/16/89	ICP	<5.00E+02
Arsenic (EP Toxic)	50780E	11/21/89	ICP	<5.00E+02
Arsenic (EP Toxic)	50857E	12/21/89	ICP	<5.00E+02
Barium	50069	6/17/86	ICP	5.10E+01
Barium	50139	9/24/86	ICP	3.14E+02
Barium	50157	10/17/86	ICP	8.30E+01
Barium	50677	10/12/89	ICP	1.86E+03
Barium	50772	11/16/89	ICP	9.70E+01
Barium	50780	11/21/89	ICP	8.50E+01
Barium	50857	12/21/89	ICP	1.36E+02
Barium (EP Toxic)	50677E	10/12/89	ICP	<1.00E+03
Barium (EP Toxic)	50772E	11/16/89	ICP	<1.00E+03
Barium (EP Toxic)	50780E	11/21/89	ICP	<1.00E+03
Barium (EP Toxic)	50857E	12/21/89	ICP	<1.00E+03
Boron	50677	10/12/89	ICP	1.08E+02
Boron	50772	11/16/89	ICP	1.64E+02
Boron	50780	11/21/89	ICP	2.13E+02
Boron	50857	12/21/89	ICP	1.90E+01
Cadmium	50139	9/24/86	ICP	1.20E+01
Cadmium	50157	10/17/86	ICP	1.10E+01
Cadmium	50677	10/12/89	ICP	3.10E+01
Cadmium	50772	11/16/89	ICP	<2.00E+00
Cadmium	50780	11/21/89	ICP	7.00E+00
Cadmium	50857	12/21/89	ICP	<2.00E+00
Cadmium (EP Toxic)	50677E	10/12/89	ICP	<1.00E+02
Cadmium (EP Toxic)	50772E	11/16/89	ICP	<1.00E+02
Cadmium (EP Toxic)	50780E	11/21/89	ICP	<1.00E+02
Cadmium (EP Toxic)	50857E	12/21/89	ICP	<1.00E+02
Calcium	50069	6/17/86	ICP	1.72E+04
Calcium	50139	9/24/86	ICP	2.15E+04
Calcium	50157	10/17/86	ICP	1.69E+04
Calcium	50677	10/12/89	ICP	3.18E+04
Calcium	50772	11/16/89	ICP	1.74E+04
Calcium	50780	11/21/89	ICP	2.09E+04

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2724-W Laundry Wastewater

Table A-3. Data for 2724-W Laundry Wastewater.
(sheet 2 of 13)

Constituent	Sample #	Date	Method	Result
Calcium	50857	12/21/89	ICP	1.50E+04
Chloride	50069	6/17/86	IC	8.67E+04
Chloride	50139	9/24/86	IC	6.55E+03
Chloride	50157	10/17/86	IC	2.15E+04
Chloride	50677	10/12/89	IC	9.00E+03
Chloride	50772	11/16/89	IC	3.97E+04
Chloride	50780	11/21/89	IC	9.00E+03
Chloride	50857	12/21/89	IC	2.60E+03
Chromium	50069	6/17/86	ICP	1.40E+01
Chromium	50139	9/24/86	ICP	6.00E+01
Chromium	50157	10/17/86	ICP	1.40E+01
Chromium	50677	10/12/89	ICP	9.10E+01
Chromium	50772	11/16/89	ICP	<1.00E+01
Chromium	50780	11/21/89	ICP	1.70E+01
Chromium	50857	12/21/89	ICP	<1.00E+01
Chromium (EP Toxic)	50677E	10/12/89	ICP	<5.00E+02
Chromium (EP Toxic)	50772E	11/16/89	ICP	<5.00E+02
Chromium (EP Toxic)	50780E	11/21/89	ICP	<5.00E+02
Chromium (EP Toxic)	50857E	12/21/89	ICP	<5.00E+02
Copper	50069	6/17/86	ICP	2.58E+02
Copper	50139	9/24/86	ICP	2.79E+02
Copper	50157	10/17/86	ICP	1.16E+02
Copper	50677	10/12/89	ICP	6.78E+02
Copper	50772	11/16/89	ICP	6.70E+01
Copper	50780	11/21/89	ICP	7.30E+01
Copper	50857	12/21/89	ICP	7.40E+01
Cyanide	50069	6/17/86	SPEC	2.25E+01
Cyanide	50139	9/24/86	SPEC	<1.00E+01
Cyanide	50157	10/17/86	SPEC	<1.00E+01
Cyanide	50677	10/12/89	SPEC	<1.00E+01
Cyanide	50772	11/16/89	SPEC	4.45E+01
Cyanide	50780	11/21/89	SPEC	2.93E+01
Cyanide	50857	12/21/89	SPEC	2.22E+01
Fluoride	50069	6/17/86	IC	1.92E+03
Fluoride	50139	9/24/86	IC	5.31E+02
Fluoride	50157	10/17/86	IC	<5.00E+02
Fluoride	50677	10/12/89	IC	2.10E+03
Fluoride	50677	10/12/89	ISE	2.25E+02
Fluoride	50772	11/16/89	IC	1.60E+03
Fluoride	50772	11/16/89	ISE	1.75E+02
Fluoride	50780	11/21/89	IC	1.10E+03
Fluoride	50780	11/21/89	ISE	2.26E+02
Fluoride	50857	12/21/89	IC	<5.00E+02
Fluoride	50857	12/21/89	ISE	1.47E+02
Iron	50069	6/17/86	ICP	8.71E+03
Iron	50139	9/24/86	ICP	4.59E+03

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2724-W Laundry Wastewater

Table A-3. Data for 2724-W Laundry Wastewater.
(sheet 3 of 13)

Constituent	Sample #	Date	Method	Result
Iron	50157	10/17/86	ICP	1.60E+03
Iron	50677	10/12/89	ICP	1.72E+04
Iron	50772	11/16/89	ICP	6.66E+02
Iron	50780	11/21/89	ICP	1.36E+03
Iron	50857	12/21/89	ICP	1.01E+03
Lead	50139	9/24/86	GFAA	1.33E+02
Lead	50157	10/17/86	GFAA	1.03E+02
Lead	50677	10/12/89	GFAA	3.19E+02
Lead	50772	11/16/89	GFAA	1.80E+01
Lead	50780	11/21/89	GFAA	7.70E+01
Lead	50857	12/21/89	GFAA	1.90E+01
Lead (EP Toxic)	50677E	10/12/89	ICP	<5.00E+02
Lead (EP Toxic)	50772E	11/16/89	ICP	<5.00E+02
Lead (EP Toxic)	50780E	11/21/89	ICP	<5.00E+02
Lead (EP Toxic)	50857E	12/21/89	ICP	<5.00E+02
Lithium	50677	10/12/89	ICP	1.56E+02
Lithium	50772	11/16/89	ICP	1.59E+03
Lithium	50780	11/21/89	ICP	2.30E+01
Lithium	50857	12/21/89	ICP	<1.00E+01
Magnesium	50069	6/17/86	ICP	4.24E+03
Magnesium	50139	9/24/86	ICP	6.07E+03
Magnesium	50157	10/17/86	ICP	3.68E+03
Magnesium	50677	10/12/89	ICP	7.57E+03
Magnesium	50772	11/16/89	ICP	5.74E+03
Magnesium	50780	11/21/89	ICP	7.44E+03
Magnesium	50857	12/21/89	ICP	3.16E+03
Manganese	50069	6/17/86	ICP	8.40E+01
Manganese	50139	9/24/86	ICP	6.40E+01
Manganese	50157	10/17/86	ICP	4.90E+01
Manganese	50677	10/12/89	ICP	1.90E+02
Manganese	50772	11/16/89	ICP	2.20E+01
Manganese	50780	11/21/89	ICP	3.60E+01
Manganese	50857	12/21/89	ICP	1.80E+01
Mercury	50069	6/17/86	CVAA	1.50E-01
Mercury	50139	9/24/86	CVAA	<1.00E-01
Mercury	50157	10/17/86	CVAA	8.50E-01
Mercury	50677	10/12/89	CVAA	6.50E-01
Mercury	50772	11/16/89	CVAA	<1.00E-01
Mercury	50780	11/21/89	CVAA	3.30E-01
Mercury	50857	12/21/89	CVAA	1.60E-01
Mercury (EP Toxic)	50677E	10/12/89	CVAA/M	<1.00E+02
Mercury (EP Toxic)	50772E	11/16/89	CVAA/M	<2.00E+01
Mercury (EP Toxic)	50780E	11/21/89	CVAA/M	<2.00E+01
Mercury (EP Toxic)	50857E	12/21/89	CVAA/M	<2.00E+01
Nickel	50069	6/17/86	ICP	1.30E+01
Nickel	50139	9/24/86	ICP	7.60E+01

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2724-W Laundry Wastewater

Table A-3. Data for 2724-W Laundry Wastewater.
(sheet 4 of 13)

Constituent	Sample #	Date	Method	Result
Nickel	50157	10/17/86	ICP	3.10E+01
Nickel	50677	10/12/89	ICP	1.63E+02
Nickel	50772	11/16/89	ICP	<1.00E+01
Nickel	50780	11/21/89	ICP	1.10E+01
Nickel	50857	12/21/89	ICP	<1.00E+01
Nitrate	50069	6/17/86	IC	2.04E+03
Nitrate	50139	9/24/86	IC	1.95E+03
Nitrate	50157	10/17/86	IC	<5.00E+02
Nitrate	50677	10/12/89	IC	1.00E+03
Nitrate	50772	11/16/89	IC	2.60E+03
Nitrate	50780	11/21/89	IC	1.40E+03
Nitrate	50857	12/21/89	IC	5.00E+02
Phosphate	50069	6/17/86	IC	6.21E+04
Phosphate	50139	9/24/86	IC	1.35E+05
Phosphate	50157	10/17/86	IC	<1.00E+03
Phosphate	50677	10/12/89	IC	1.83E+05
Phosphate	50772	11/16/89	IC	7.28E+04
Phosphate	50780	11/21/89	IC	7.33E+04
Phosphate	50857	12/21/89	IC	4.33E+04
Potassium	50069	6/17/86	ICP	4.75E+03
Potassium	50139	9/24/86	ICP	2.74E+03
Potassium	50157	10/17/86	ICP	1.74E+03
Potassium	50677	10/12/89	ICP	4.53E+03
Potassium	50772	11/16/89	ICP	1.82E+04
Potassium	50780	11/21/89	ICP	1.35E+04
Potassium	50857	12/21/89	ICP	1.14E+03
Selenium (EP Toxic)	50677E	10/12/89	ICP	<5.00E+02
Selenium (EP Toxic)	50772E	11/16/89	ICP	<5.00E+02
Selenium (EP Toxic)	50780E	11/21/89	ICP	<5.00E+02
Selenium (EP Toxic)	50857E	12/21/89	ICP	<5.00E+02
Silicon	50677	10/12/89	ICP	3.97E+04
Silicon	50772	11/16/89	ICP	2.48E+04
Silicon	50780	11/21/89	ICP	3.23E+04
Silicon	50857	12/21/89	ICP	1.20E+04
Silver (EP Toxic)	50677E	10/12/89	ICP	<5.00E+02
Silver (EP Toxic)	50772E	11/16/89	ICP	<5.00E+02
Silver (EP Toxic)	50780E	11/21/89	ICP	<5.00E+02
Silver (EP Toxic)	50857E	12/21/89	ICP	<5.00E+02
Sodium	50069	6/17/86	ICP	1.32E+05
Sodium	50139	9/24/86	ICP	1.92E+05
Sodium	50157	10/17/86	ICP	1.28E+05
Sodium	50677	10/12/89	ICP	1.27E+05
Sodium	50772	11/16/89	ICP	1.23E+05
Sodium	50780	11/21/89	ICP	1.42E+05
Sodium	50857	12/21/89	ICP	4.51E+04
Strontium	50069	6/17/86	ICP	<3.00E+02

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2724-W Laundry Wastewater

Table A-3. Data for 2724-W Laundry Wastewater.
(sheet 5 of 13)

Constituent	Sample #	Date	Method	Result
Strontium	50139	9/24/86	ICP	<3.00E+02
Strontium	50157	10/17/86	ICP	<3.00E+02
Strontium	50677	10/12/89	ICP	1.83E+02
Strontium	50772	11/16/89	ICP	8.90E+01
Strontium	50780	11/21/89	ICP	9.70E+01
Strontium	50857	12/21/89	ICP	7.40E+01
Sulfate	50069	6/17/86	IC	2.77E+04
Sulfate	50139	9/24/86	IC	1.45E+04
Sulfate	50157	10/17/86	IC	1.35E+04
Sulfate	50677	10/12/89	IC	1.87E+04
Sulfate	50772	11/16/89	IC	2.30E+04
Sulfate	50780	11/21/89	IC	1.85E+04
Sulfate	50857	12/21/89	IC	1.08E+04
Sulfide	50069	6/17/86	TITRA	<1.00E+03
Sulfide	50139	9/24/86	TITRA	1.47E+03
Sulfide	50157	10/17/86	TITRA	<1.00E+03
Sulfide	50677	10/12/89	TITRA	1.97E+03
Sulfide	50772	11/16/89	TITRA	<1.00E+03
Sulfide	50780	11/21/89	TITRA	1.65E+03
Sulfide	50857	12/21/89	TITRA	<1.00E+03
Titanium	50677	10/12/89	ICP	5.42E+02
Titanium	50772	11/16/89	ICP	<6.00E+01
Titanium	50780	11/21/89	ICP	<6.00E+01
Titanium	50857	12/21/89	ICP	<6.00E+01
Uranium	50069	6/17/86	FLUOR	8.57E+00
Uranium	50139	9/24/86	FLUOR	1.16E+03
Uranium	50157	10/17/86	FLUOR	5.72E+00
Uranium	50677	10/12/89	FLUOR	5.44E+01
Uranium	50772	11/16/89	FLUOR	3.83E+02
Uranium	50780	11/21/89	FLUOR	3.28E+00
Uranium	50857	12/21/89	FLUOR	1.06E+01
Vanadium	50069	6/17/86	ICP	<5.00E+00
Vanadium	50139	9/24/86	ICP	2.00E+01
Vanadium	50157	10/17/86	ICP	2.00E+01
Vanadium	50677	10/12/89	ICP	1.70E+01
Vanadium	50772	11/16/89	ICP	<5.00E+00
Vanadium	50780	11/21/89	ICP	<5.00E+00
Vanadium	50857	12/21/89	ICP	<5.00E+00
Zinc	50069	6/17/86	ICP	2.00E+02
Zinc	50139	9/24/86	ICP	4.69E+02
Zinc	50157	10/17/86	ICP	3.33E+02
Zinc	50677	10/12/89	ICP	1.73E+03
Zinc	50772	11/16/89	ICP	1.95E+02
Zinc	50780	11/21/89	ICP	3.68E+02
Zinc	50857	12/21/89	ICP	1.40E+02

Table A-3. Data for 2724-W Laundry Wastewater.
(sheet 7 of 13)

Constituent	Sample #	Date	Method	Result
Butylbenzyl phthalate	50677	10/12/89	ABN	7.80E+01
Butylbenzyl phthalate	50772	11/16/89	ABN	1.80E+01
Butylbenzyl phthalate	50780	11/21/89	ABN	3.20E+01
Butylbenzyl phthalate	50857	12/21/89	ABN	3.00E+01
2-Chloro-6-methylphenol	50157	10/17/86	ABN	1.00E+02
Cyclododecane	50157	10/17/86	ABN	9.00E+01
Dichloromethane	50069	6/17/86	VOA	<1.00E+01
Dichloromethane	50069B	6/17/86	VOA	1.90E+02
Dichloromethane	50139	9/24/86	VOA	<1.00E+01
Dichloromethane	50139B	9/24/86	VOA	1.30E+02
Dichloromethane	50157	10/17/86	VOA	<1.00E+01
Dichloromethane	50157B	10/17/86	VOA	8.80E+01
Dichloromethane	50677	10/12/89	VOA	<5.00E+00
Dichloromethane	50677B	10/12/89	VOA	3.90E+02
Dichloromethane	50677T	10/12/89	VOA	4.20E+02
Dichloromethane	50772	11/16/89	VOA	<5.00E+00
Dichloromethane	50772B	11/16/89	VOA	<5.00E+00
Dichloromethane	50772T	11/16/89	VOA	<5.00E+00
Dichloromethane	50780	11/21/89	VOA	<5.00E+00
Dichloromethane	50780B	11/21/89	VOA	<3.00E+00
Dichloromethane	50780T	11/21/89	VOA	<3.00E+00
Dichloromethane	50857	12/21/89	VOA	<5.00E+00
Dichloromethane	50857B	12/21/89	VOA	1.30E+03
Dichloromethane	50857T	12/21/89	VOA	<3.00E+00
Di-n-octyl phthalate	50069	6/17/86	ABN	<1.00E+01
Di-n-octyl phthalate	50139	9/24/86	ABN	1.30E+02
Di-n-octyl phthalate	50157	10/17/86	ABN	4.20E+01
Di-n-octyl phthalate	50677	10/12/89	ABN	1.86E+02
Di-n-octyl phthalate	50772	11/16/89	ABN	3.20E+01
Di-n-octyl phthalate	50780	11/21/89	ABN	1.18E+02
Di-n-octyl phthalate	50857	12/21/89	ABN	1.10E+02
Dodecanoic acid	50069	6/17/86	ABN	1.90E+02
Heptadecane	50139	9/24/86	ABN	2.70E+02
Hexadecane	50139	9/24/86	ABN	3.40E+02
Hexadecanoic acid	50069	6/17/86	ABN	1.40E+02
Hydrazine	50069	6/17/86	DIMS	<3.00E+03
Hydrazine	50139	9/24/86	DIMS	<3.00E+03
Hydrazine	50157	10/17/86	DIMS	<3.00E+03
Hydrazine	50677	10/12/89	SPEC	<3.00E+01
Hydrazine	50772	11/16/89	SPEC	7.20E+01
Hydrazine	50780	11/21/89	SPEC	7.50E+01
Hydrazine	50857	12/21/89	SPEC	3.60E+01
2-Methyl-5-propylnonane	50069	6/17/86	ABN	3.60E+01
Nonanoic acid	50069	6/17/86	ABN	2.20E+01
Octadecane	50139	9/24/86	ABN	2.00E+02
Pentadecane	50139	9/24/86	ABN	2.30E+02

Table A-3. Data for 2724-W Laundry Wastewater.
(sheet 8 of 13)

Constituent	Sample #	Date	Method	Result
Phenol	50069	6/17/86	ABN	2.40E+01
Phenol	50139	9/24/86	ABN	<1.00E+01
Phenol	50157	10/17/86	ABN	<1.00E+01
Phenol	50677	10/12/89	ABN	<1.00E+01
Phenol	50772	11/16/89	ABN	<1.00E+01
Phenol	50780	11/21/89	ABN	<1.00E+01
Phenol	50857	12/21/89	ABN	<1.00E+01
Phthalic anhydride	50857	12/21/89	ABN	1.20E+01
Tetramethylheptadecane	50069	6/17/86	ABN	3.40E+01
Trichloromethane	50069	6/17/86	VOA	1.40E+02
Trichloromethane	50069B	6/17/86	VOA	<1.00E+01
Trichloromethane	50139	9/24/86	VOA	<1.00E+01
Trichloromethane	50139B	9/24/86	VOA	<1.00E+01
Trichloromethane	50157	10/17/86	VOA	2.20E+01
Trichloromethane	50157B	10/17/86	VOA	<1.00E+01
Trichloromethane	50677	10/12/89	VOA	2.20E+01
Trichloromethane	50677B	10/12/89	VOA	<5.00E+00
Trichloromethane	50677T	10/12/89	VOA	<5.00E+00
Trichloromethane	50772	11/16/89	VOA	9.50E+01
Trichloromethane	50772B	11/16/89	VOA	5.00E+00
Trichloromethane	50772T	11/16/89	VOA	5.00E+00
Trichloromethane	50780	11/21/89	VOA	6.00E+00
Trichloromethane	50780B	11/21/89	VOA	<4.00E+00
Trichloromethane	50780T	11/21/89	VOA	9.00E+00
Trichloromethane	50857	12/21/89	VOA	1.00E+01
Trichloromethane	50857B	12/21/89	VOA	<5.00E+00
Trichloromethane	50857T	12/21/89	VOA	5.00E+00
Trimethyl-1,3-pentanediol	50157	10/17/86	ABN	7.00E+01
Unknown	50157	10/17/86	ABN	1.80E+02
Unknown	50677	10/12/89	ABN	5.60E+01
Unknown	50772	11/16/89	ABN	5.20E+01
Unknown	50780	11/21/89	ABN	3.60E+01
Unknown	50857	12/21/89	ABN	7.70E+01
Unknown acid	50677	10/12/89	ABN	2.20E+01
Unknown aliphatic alcohol	50857	12/21/89	ABN	1.60E+01
Unknown aliphatic HC	50677	10/12/89	ABN	3.60E+01
Unknown aliphatic HC	50772	11/16/89	ABN	2.80E+01
Unknown aliphatic HC	50780	11/21/89	ABN	2.70E+01
Unknown aliphatic HC	50857	12/21/89	ABN	6.00E+00
Unknown amine	50772	11/16/89	ABN	2.10E+01
Unknown fatty acid	50677	10/12/89	ABN	4.10E+02
Unknown fatty acid	50772	11/16/89	ABN	7.30E+01
Unknown fatty acid	50780	11/21/89	ABN	6.20E+01
Unknown fatty acid	50857	12/21/89	ABN	9.10E+01
Unknown glycol	50857	12/21/89	ABN	9.20E+01
Unknown hydrocarbon	50857	12/21/89	ABN	9.00E+01

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Table A-3. Data for 2724-W Laundry Wastewater.
(sheet 9 of 13)

Constituent	Sample #	Date	Method	Result
Unknown phthalate	50677	10/12/89	ABN	9.10E+01
Unknown phthalate	50772	11/16/89	ABN	2.20E+01
Unknown phthalate	50780	11/21/89	ABN	4.80E+01
Unknown phthalate	50857	12/21/89	ABN	2.70E+01
Unknown polycyclic HC	50772	11/16/89	ABN	3.20E+01
Unknown polycyclic HC	50780	11/21/89	ABN	7.60E+01
Unknown sulfur compound	50857	12/21/89	ABN	1.30E+01
Alkalinity (Method B)	50677	10/12/89	TITRA	4.36E+05
Alkalinity (Method B)	50772	11/16/89	TITRA	2.18E+05
Alkalinity (Method B)	50780	11/21/89	TITRA	2.50E+05
Alkalinity (Method B)	50857	12/21/89	TITRA	1.26E+05
Alpha Activity (pCi/L)	50069	6/17/86	Alpha	1.63E+01
Alpha Activity (pCi/L)	50139	9/24/86	Alpha	5.48E+02
Alpha Activity (pCi/L)	50157	10/17/86	Alpha	1.65E+01
Alpha Activity (pCi/L)	50677	10/12/89	Alpha	6.34E+02
Alpha Activity (pCi/L)	50772	11/16/89	Alpha	1.84E+02
Alpha Activity (pCi/L)	50780	11/21/89	Alpha	1.90E+00
Alpha Activity (pCi/L)	50857	12/21/89	Alpha	1.68E+01
Beta Activity (pCi/L)	50069	6/17/86	Beta	3.33E+02
Beta Activity (pCi/L)	50139	9/24/86	Beta	6.46E+02
Beta Activity (pCi/L)	50157	10/17/86	Beta	3.73E+03
Beta Activity (pCi/L)	50677	10/12/89	Beta	3.70E+03
Beta Activity (pCi/L)	50772	11/16/89	Beta	2.91E+03
Beta Activity (pCi/L)	50780	11/21/89	Beta	1.23E+01
Beta Activity (pCi/L)	50857	12/21/89	Beta	3.17E+01
Conductivity (μS)	50069	6/17/86	COND-Fld	5.59E+02
Conductivity (μS)	50139	9/24/86	COND-Fld	4.41E+02
Conductivity (μS)	50157	10/17/86	COND-Fld	1.52E+03
Conductivity (μS)	50677	10/12/89	COND-Fld	8.00E+02
Conductivity (μS)	50772	11/16/89	COND-Fld	9.71E+02
Conductivity (μS)	50780	11/21/89	COND-Fld	1.01E+03
Conductivity (μS)	50857	12/21/89	COND-Fld	2.97E+02
Ignitability (°F)	50677E	10/12/89	IGNIT	2.12E+02
Ignitability (°F)	50772E	11/16/89	IGNIT	2.06E+02
Ignitability (°F)	50780E	11/21/89	IGNIT	2.12E+02
Ignitability (°F)	50857E	12/21/89	IGNIT	2.10E+02
pH (dimensionless)	50069	6/17/86	PH-Fld	8.40E+00
pH (dimensionless)	50139	9/24/86	PH-Fld	9.12E+00
pH (dimensionless)	50157	10/17/86	PH-Fld	8.36E+00
pH (dimensionless)	50677	10/12/89	PH-Fld	9.49E+00
pH (dimensionless)	50772	11/16/89	PH-Fld	9.55E+00
pH (dimensionless)	50780	11/21/89	PH-Fld	8.02E+00
pH (dimensionless)	50857	12/21/89	PH-Fld	6.75E+00
Reactivity Cyanide (mg/kg)	50677E	10/12/89	DSPEC	<1.00E+02
Reactivity Cyanide (mg/kg)	50772E	11/16/89	DSPEC	<1.00E+02
Reactivity Cyanide (mg/kg)	50780E	11/21/89	DSPEC	<1.00E+02

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Table A-3. Data for 2724-W Laundry Wastewater.
(sheet 10 of 13)

Constituent	Sample #	Date	Method	Result
Reactivity Cyanide (mg/kg)	50857E	12/21/89	DSPEC	<1.00E+02
Reactivity Sulfide (mg/kg)	50677E	10/12/89	DTITRA	<1.00E+02
Reactivity Sulfide (mg/kg)	50772E	11/16/89	DTITRA	<1.00E+02
Reactivity Sulfide (mg/kg)	50780E	11/21/89	DTITRA	<1.00E+02
Reactivity Sulfide (mg/kg)	50857E	12/21/89	DTITRA	<1.00E+02
Suspended Solids	50677	10/12/89	SSOLID	3.85E+05
Suspended Solids	50772	11/16/89	SSOLID	9.90E+04
Suspended Solids	50780	11/21/89	SSOLID	8.40E+04
Suspended Solids	50857	12/21/89	SSOLID	4.26E+04
TDS	50677	10/12/89	TDS	6.33E+05
TDS	50772	11/16/89	TDS	4.19E+05
TDS	50780	11/21/89	TDS	7.51E+05
TDS	50857	12/21/89	TDS	1.77E+05
Temperature (°C)	50069	6/17/86	TEMP-F1d	4.10E+01
Temperature (°C)	50139	9/24/86	TEMP-F1d	4.35E+01
Temperature (°C)	50157	10/17/86	TEMP-F1d	3.78E+01
Temperature (°C)	50677	10/12/89	TEMP-F1d	4.65E+01
Temperature (°C)	50772	11/16/89	TEMP-F1d	4.10E+01
Temperature (°C)	50780	11/21/89	TEMP-F1d	5.06E+01
Temperature (°C)	50857	12/21/89	TEMP-F1d	4.48E+01
TOC	50069	6/17/86	TOC	4.62E+04
TOC	50139	9/24/86	TOC	3.49E+04
TOC	50157	10/17/86	TOC	1.62E+04
TOC	50677	10/12/89	TOC	3.94E+04
TOC	50772	11/16/89	TOC	8.71E+04
TOC	50780	11/21/89	TOC	2.77E+04
TOC	50857	12/21/89	TOC	4.02E+04
Total Carbon	50677	10/12/89	TC	1.36E+05
Total Carbon	50772	11/16/89	TC	1.21E+05
Total Carbon	50780	11/21/89	TC	9.20E+04
Total Carbon	50857	12/21/89	TC	8.97E+04
TOX (as Cl)	50069	6/17/86	TOX	6.10E+02
TOX (as Cl)	50139	9/24/86	TOX	1.86E+02
TOX (as Cl)	50157	10/17/86	TOX	2.42E+02
TOX (as Cl)	50677	10/12/89	LTOX	1.84E+02
TOX (as Cl)	50772	11/16/89	LTOX	1.23E+03
TOX (as Cl)	50780	11/21/89	LTOX	1.49E+02
TOX (as Cl)	50857	12/21/89	LTOX	1.22E+02
²⁴¹ Am (pCi/L)	50677	10/12/89	AEA	1.23E+01
²⁴¹ Am (pCi/L)	50772	11/16/89	AEA	1.20E+02
²⁴¹ Am (pCi/L)	50857	12/21/89	AEA	<9.21E-04
²⁴⁴ Cm (pCi/L)	50677	10/12/89	AEA	1.19E-01
²⁴⁴ Cm (pCi/L)	50772	11/16/89	AEA	1.09E+00
⁶⁰ Co (pCi/L)	50677	10/12/89	GEA	5.76E+02
⁶⁰ Co (pCi/L)	50772	11/16/89	GEA	5.42E+02
⁶⁰ Co (pCi/L)	50780	11/21/89	GEA	<4.82E-02

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Table A-3. Data for 2724-W Laundry Wastewater.
(sheet 11 of 13)

Constituent	Sample #	Date	Method	Result
⁶⁰ Co (pCi/L)	50857	12/21/89	GEA	5.35E+01
¹³⁷ Cs (pCi/L)	50677	10/12/89	GEA	1.35E+02
¹³⁷ Cs (pCi/L)	50772	11/16/89	GEA	5.02E+02
¹³⁷ Cs (pCi/L)	50780	11/21/89	GEA	<2.00E-01
¹³⁷ Cs (pCi/L)	50857	12/21/89	GEA	4.33E+01
³ H (pCi/L)	50677	10/12/89	LSC	3.78E+03
³ H (pCi/L)	50780	11/21/89	LSC	<2.68E+01
³ H (pCi/L)	50857	12/21/89	LSC	<1.78E+01
⁵⁴ Mn (pCi/L)	50677	10/12/89	GEA	6.18E+01
⁵⁴ Mn (pCi/L)	50772	11/16/89	GEA	5.49E+01
⁵⁴ Mn (pCi/L)	50857	12/21/89	GEA	4.47E+00
²² Na (pCi/L)	50772	11/16/89	GEA	8.88E+01
²¹⁰ Pb (pCi/L)	50677	10/12/89	GEA	1.09E+00
²¹⁰ Pb (pCi/L)	50772	11/16/89	GEA	2.63E+00
²¹⁰ Pb (pCi/L)	50780	11/21/89	GEA	<8.18E-01
²¹⁰ Pb (pCi/L)	50857	12/21/89	GEA	<3.47E-01
²³⁸ Pu (pCi/L)	50677	10/12/89	AEA	3.36E+01
²³⁸ Pu (pCi/L)	50772	11/16/89	AEA	3.61E+01
²³⁸ Pu (pCi/L)	50780	11/21/89	AEA	1.22E-01
²³⁸ Pu (pCi/L)	50857	12/21/89	AEA	5.15E-01
^{239,240} Pu (pCi/L)	50677	10/12/89	AEA	4.16E+02
^{239,240} Pu (pCi/L)	50772	11/16/89	AEA	3.95E+02
^{239,240} Pu (pCi/L)	50780	11/21/89	AEA	1.23E+00
^{239,240} Pu (pCi/L)	50857	12/21/89	AEA	5.58E+00
Radium Total (pCi/L)	50677	10/12/89	Alpha-Ra	4.87E-01
Radium Total (pCi/L)	50772	11/16/89	Alpha-Ra	1.41E+00
Radium Total (pCi/L)	50780	11/21/89	Alpha-Ra	<9.24E-01
Radium Total (pCi/L)	50857	12/21/89	Alpha-Ra	1.82E-01
²²⁸ Ra (pCi/L)	50772	11/16/89	GEA	2.50E+02
¹⁰⁶ Ru (pCi/L)	50677	10/12/89	GEA	<3.53E+01
¹⁰⁶ Ru (pCi/L)	50772	11/16/89	GEA	7.79E+01
¹⁰⁶ Ru (pCi/L)	50780	11/21/89	GEA	<1.96E+00
¹⁰⁶ Ru (pCi/L)	50857	12/21/89	GEA	<1.57E+01
⁹⁰ Sr (pCi/L)	50677	10/12/89	Beta	1.25E+03
⁹⁰ Sr (pCi/L)	50772	11/16/89	Beta	4.56E+03
⁹⁰ Sr (pCi/L)	50780	11/21/89	Beta	8.07E+00
⁹⁰ Sr (pCi/L)	50857	12/21/89	Beta	1.61E+01
²³⁴ U (pCi/L)	50677	10/12/89	AEA	1.58E+01
²³⁴ U (pCi/L)	50772	11/16/89	AEA	2.12E+02
²³⁴ U (pCi/L)	50780	11/21/89	AEA	1.77E+00
²³⁴ U (pCi/L)	50857	12/21/89	AEA	3.87E+00
²³⁵ U (pCi/L)	50677	10/12/89	AEA	5.31E-01
²³⁵ U (pCi/L)	50772	11/16/89	AEA	2.31E+01
²³⁵ U (pCi/L)	50780	11/21/89	AEA	<2.35E-02
²³⁵ U (pCi/L)	50857	12/21/89	AEA	1.90E-01

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Table A-3. Data for 2724-W Laundry Wastewater.
(sheet 12 of 13)

Constituent	Sample #	Date	Method	Result
²³⁸ U (pCi/L)	50677	10/12/89	AEA	1.60E+01
²³⁸ U (pCi/L)	50772	11/16/89	AEA	2.43E+02
²³⁸ U (pCi/L)	50780	11/21/89	AEA	1.45E+00

NOTES:

Sample# is the number of the sample. See Section 3.0 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	²⁴¹ Am	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	⁹⁰ Sr	UST-20Sr02
COLIF	Coliform Bacteria	USEPA-9131
COLIFMF	Coliform Bacteria (Membrane Filter)	USEPA-9132
COND-Field	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

Table A-3. Data for 2724-W Laundry Wastewater.
 (sheet 13 of 13)

Code	Analytical Method	Reference
LEPD	¹²⁹ I	UST-20I02
LSC	¹⁴ C	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.

