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FACT SHEET FOR STATE WASTE DISCHARGE PERMIT NO. ST 4502

ISSUED TO UNITED STATES DEPARTMENT OF ENERGY
RICHLAND OPERATIONS OFFICE
RICHLAND, WASHINGTON

BY WASHINGTON STATE DEPARTMENT OF ECOLOGY
KENNEWICK, WASHINGTON

DRAFT

SUMMARY

The Washington State Department of Ecology (Ecology) is proposing to renew a State Waste Discharge Permit, which will continue to allow discharge of wastewater via infiltration through soils to the groundwaters of the state. The Applicant is the U.S. Department of Energy, Richland Operations Office (Permittee). The disposal facility is called the 200 Area Treated Effluent Disposal Facility (TEDF). It is located east of the 200 East Area of the Hanford Site, and consists of an eleven mile-long pipeline and two adjacent five acre infiltration ponds.

Waters in close proximity to the ponds is found as groundwater at a depth of about 100 to 120 feet below the surface. The disposal site was selected to avoid potential mobilization of contaminants from historical disposal practices or potential impacts to historical, archaeological, and cultural resources. Computer modeling of groundwater flow provides an estimated travel time of approximately 10 to 300 years for the effluent to reach the Columbia River.

The original permitting of the disposal facility's effluent was reviewed under the Washington State Environmental Policy Act (SEPA). An Environmental Checklist was completed at that time. A determination of Nonsignificance under SEPA was made by Ecology. No comments were received during the public comment period.

The effluent consists of individual waste streams from several Hanford facilities. All of these individual waste streams are generated from uses that do not involve direct contact of the water with industrial processes. Uses that generate the effluents are primarily those associated with ventilation, heating, and cooling systems for the buildings; steam condensate from heating potable (drinkable) water; condensate of pressurized potable water; rainwater; and untreated Columbia River water. All of the facilities have been subjected to an extensive program of source controls (pollution prevention) to eliminate or reduce approximately 85% (percent) of prior contaminant loadings. Effluent treatment systems have been constructed at some of the facilities. The only continuing problem at the discharge appears to be high iron from rusty pipes.

The draft permit complies with the regulatory requirements of Chapter 173-200 WAC - Water Quality Standards for Ground Waters of the State of Washington. This regulation is premised on the fact that all contaminants should be regulated to protect all existing and future beneficial uses of the groundwater. Since the use of drinking water is the most restrictive and protective, this regulation and the draft permit protects the groundwater for drinking water purposes. The draft permit establishes enforcement limits for nonradioactive contaminants or maximum allowable concentration levels, in the effluent and/or groundwater that are essentially drinking water standards. Hence, the permit requires that the effluent essentially meets drinking water standards for nonradioactive contaminants before discharge to the disposal ponds.

In the case of this permit, the Permittee shall be self-regulating for radioactive contaminants under the provisions of the Atomic Energy Act. The Permittee plans to meet the intent of 40 CFR Part 141, "National Primary Drinking Water Regulations," in regards to radioactive contaminants; and plans to take investigative and mitigative steps if drinking water standards are exceeded. The effluent has exceeded drinking water standards for radioactive contaminants a couple of times in the last five years. Ecology is requiring monitoring and reporting of radionuclide concentrations in the effluent.

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INTRODUCTION

This fact sheet is a companion document to the draft State Waste Discharge Permit No. ST 4502. The Department of Ecology (Ecology) is proposing to renew this permit, which will allow continued discharge of wastewater to waters of the State of Washington. This fact sheet explains the nature of the proposed discharge, Ecology's decisions on limiting the pollutants in the wastewater, and the regulatory and technical bases for those decisions.

Washington State law (RCW 90.48.080 and 90.48.162) requires that a permit be issued before discharge of wastewater to waters of the state is allowed. Regulations adopted by the state include procedures for issuing permits (Chapter 173-216 WAC), and water quality criteria for groundwaters (Chapter 173-200 WAC). They also establish requirements which are to be included in the permit.

This fact sheet and draft permit are available for review by interested persons as described in Appendix A--Public Involvement Information.

The fact sheet and draft permit have been reviewed by the Permittee. Errors and omissions identified in these reviews have been corrected before going to public notice. After the public comment period has closed, Ecology will summarize the substantive comments and the response to each comment. The summary and response to comments will become part of the file on the permit and parties submitting comments will receive a copy of Ecology's response. The fact sheet will not be revised. Changes to the permit will be addressed in Appendix D--Response to Comments.

GENERAL INFORMATION	
Applicant	United States Department of Energy, Richland Operations Office
Facility Name and Address	200 Area Treated Effluent Disposal Facility (TEDF) 200 East Area on the Hanford Site P.O. Box 550, S7-41 Richland, WA 99352-1000
Type of Facility	Collection system and two disposal/infiltration ponds.
Type of Treatment:	System collects, conveys, and disposes of effluent from various facilities in the 200 Areas of the Hanford Site.
Discharge Location	Waterbody: Discharge will through infiltration reach groundwater. Groundwater is at a depth of about 100 to 120 feet below the facility. The facility is approximately six miles from the Columbia River. Four Corners of TEDF ponds are located at: Latitude:Longitude: 119° 28' 27.884294" 46° 33' 14.396998" 119° 28' 6.767297" 46° 33' 14.248825" 119° 28' 6.982550 " 46° 33' 59.680524" 119° 28' 28.097977" 46° 33' 59.828684"

GENERAL INFORMATION	
Legal Description of Infiltration Area	Section, township, range S 5,6 T 12N R 27E
Contact at Facility	Roger Szelmeczka Telephone #: (509) 373-4200
Responsible Official	R.F. Guercia Acting Division Director, Waste Management Division U.S.D.O.E./Richland Operations Office P.O. Box 550, HO-12 Richland, WA 99352-0550 Telephone #: (509) 376-5494 FAX #: (509) 372-1926

BACKGROUND INFORMATION

DESCRIPTION OF THE FACILITY

The 200 Area Treated Effluent Disposal Facility (TEDF) collects and disposes of treated effluent from the Hanford Site's 200 East and 200 West areas, located about 25 miles northwest of Richland. The facility consists of an 11 mile-long pipeline, which carries the effluent to two rock-lined disposal ponds. The disposal ponds are approximately five acres in size. The effluent evaporates and infiltrates through the soil.

HISTORY

As a requirement for obtaining the original State Waste Discharge Permit, the Permittee had to eliminate or reduce the contaminant loading in the effluent by applying all known, available, and reasonable methods (AKART) of prevention, control, and treatment prior to its discharge to the environment. In addition, AKART was required to be applied to reduce the volume of the effluent. This program of pollution prevention, effluent treatment, and facility construction and operation was also incorporated as a portion of Milestone 17 in the 1989 Hanford Federal Facility Agreement and Consent Order (Tri-Party Agreement) between the Permittee, the U.S. Environmental Protection Agency, and Ecology. The Tri-Party Agreement further requires that the Best Available Technology (BAT) that is economically achievable be applied to the effluent. An extensive engineering report (WHC-SD-W049H-ER-003, Volumes 1 and 2 as listed in the References) describes all of the source controls, technology improvements, operational changes, and treatment technologies applied at all of the original facilities to clean up the effluent and reduce its volume. Compliance inspections conducted by Ecology officials documented the implementation of the required improvements by the Permittee.

As a result of this multi-year effort, the toxic mass of contaminants in the effluent from the original facilities was reduced by approximately 85%. The total cost of pollution prevention and disposal was projected to cost $20 million. The facility began operation in 1995. When the facility became operational, all of the original contributing effluent streams were no longer discharged to their prior disposal sites.

Individual effluent streams from several Hanford facilities were combined and then discharged to the disposal facility. The facilities originally included were: Plutonium Finishing Plant, T Plant, 222-S Laboratory, 284-W Power Plant, B Plant, 242-A-81 Water Services Building, and the PUREX facility. The original permit provided for the addition of a limited quantity of future, potential effluent streams, if they did not contain new contaminants and all permit conditions were met.

During the early years of the operation, new streams were added, including the W-252 streams in 1997. The W-252 streams included discharges from the 242-A Evaporator, the 241-A Tank Farm Complex, the 284-E Powerplant, the B Plant, and the 244-AR Vault. Controls on the W-252 streams are discussed in the engineering report, "Phase II Liquid Effluent Program (Project W-252) Wastewater Engineering Report and BAT/AKART Studies" (WHC-SD-W252-ER-001, Rev. 0) and in subsequent engineering change notices to the report. The latest list of facilities authorized by the existing permit to discharge to TEDF include the following: Plutonium Finishing Plant Wastewater, T Plant Wastewater (including T Plant Laboratory Wastewater), 222-S Laboratory Complex Wastewater, 284-W Power Plant Wastewater, B Plant Chemical Sewer, 242-A-81 Water Services Wastewater, B Plant Process Condensate, B Plant Steam Condensate, B Plant Cooling Water, 242-A Evaporator Cooling Water, 242-A Evaporator Steam Condensate, 241-A Tank Farm Cooling Water, 284-E Power Plant Wastewater (including 283-E Filter Plant Wastewater), miscellaneous streams covered by a categorical discharge permit, and Package Boiler locations 283E, 283W, 225B, 234-5Z, 222 S, and 242-A.

The above list from the existing permit is outdated. Since 1995, both PUREX and B Plant have been deactivated and are no longer a source to TEDF. The following B Plant streams have been eliminated: B Plant Process Condensate, B Plant Steam Condensate, and B Plant Cooling Water. The B Plant Chemical Sewer has been renamed Waste Encapsulation Storage Facility (WESF) Liquid Effluent because all of the B Plant sources have been eliminated. The coal-fired powerhouses (i.e. 284-W and 284-E) have been shut down and replaced by oil-fired package boiler plants, that have a reduced discharge to TEDF. Also, the 200 East Drinking Water Plant, which is part of the 284-E Complex, has been placed into standby. There is no longer any wastewater from the T Plant Laboratory. The 225B Package Boiler location is now 225B-BP.

Future sources of discharges that may be added to the TEDF include discharges from the planned BNFL tank waste vitrification plant. Discharges from this facility may start as soon as 2001. The early discharges would include construction related discharges. Other types of discharges from this facility to TEDF will probably not occur during the effective dates of this draft permit, and will be considered during the next permit cycle.

INDUSTRIAL PROCESSES

Most of the effluent streams are generated from uses that do not involve direct contact of the water with industrial processes. No manufacturing processes or products are associated with the individual effluent streams. Uses that generate the effluent are primarily those associated with the following:

- ventilation, heating, and cooling systems for the buildings,
- steam condensate from heating potable (drinkable) water,
- condensate of pressurized softened or deionized potable water,
- rainwater from parking lots and exterior paved areas,
- potable (treated) water,
- untreated Columbia River water,
- boiler blowdown,
- floor drains with limited and strictly controlled usage, and
- hydrotest, maintenance, construction, cooling water, condensate, and stormwater discharges that are covered by one of the Hanford Site categorical permits (ST 4508, ST 4509, or ST 4510).

The following table summarizes some of the major sources of effluent generated at some of the facilities.

SOURCES OF EFFLUENT

FACILITY	USES GENERATING EFFLUENT
Plutonium finishing plant	Ventilation heating/cooling, steam condensate, cooling water, compressed air production, process water, rainwater, and potable water overflow
222-S Laboratory complex	Steam condensate, potable water, and rainwater
T Plant	Steam condensate, cooling water, heating coil water, and floor drains
242-A Evaporator	Cooling water and steam condensate
242-A-81 Water services building	Untreated Columbia river water, and strainer backwash
Waste Encapsulation Storage Facility (WESF)	Cooling water, rainwater, raw water, and potable water
Package boilers	Boiler blowdown, steam condensate, cooling water, and water softener regenerate flows
284-W and 284-E Water Treatment Plants	Potable (treated water) and steam condensate
241-A Tank Farm Cooling Water	Cooling Water

TREATMENT PROCESSES

The 200 Area TEDF is a pipeline that conveys effluent from several generating facilities to disposal/infiltration ponds, and does not provide any treatment. The effluent will be discharged continuously through the end of a plastic pipe into Pond A or Pond B. Engineering specifications and plans were reviewed and accepted by Ecology before construction. A summary of the major activities conducted at some of the generating facilities is included below. However, the reader should keep in mind that the effluent to be discharged under this draft permit is only generated from the limited activities listed in the preceding table. Hence, it is not subject to contamination from all activities at the facilities.

Plutonium Finishing Plant Effluent

The Plutonium Finishing Plant stabilizes reactive plutonium scrap mixtures and stores these plutonium compounds in secured vault areas. Low level process wastes, produced by these activities, are transferred to double-shell tanks for storage. They are not discharged to the 200 Area TEDF. Source controls and end-of-pipe treatment were implemented as BAT/AKART for the effluent from the Plutonium Finishing Plant. A closed loop cooling system for three buildings and replacement of vacuum pumps with waterless pumps reduced water usage. End-of-pipe treatment includes an equalization tank, microfiltration to remove suspended solids, carbon adsorption to remove organics, bone-char adsorption to remove radionuclides, ion exchange to remove cations and anions, and a system of monitoring and sampling effluent water quality before discharge to the disposal/infiltration ponds.

222-S Laboratory Effluent

The 222-S Laboratory's primary function is to provide chemical and radiological analyses of samples associated with ongoing Hanford Site operations and research programs. Source controls were implemented as BAT/AKART for the 222-S Laboratory's effluent. Improvements included adding corrosion inhibitors to the steam supply to reduce metal concentrations; piping and equipment changes to reduce the potential for contamination; adding new retention tanks; eliminating steam cell heaters to avoid condensate generation; and replacing heating, ventilation, and air conditioning air washers with electric chillers to eliminate blowdown effluent. Spent reagents are not discharged to the 200 Area TEDF.

T Plant Effluent

The T Plant provides decontamination services, waste verification, and other waste handling activities for the Hanford Site. Source controls with retention/diversion capabilities were implemented as BAT/AKART for the T Plant's effluent. Water-cooled air compressors were replaced with air-cooled units. The water-cooled pressurized water reactor chiller was replaced with an air-cooled, refrigerant cooling system. Stored chemicals were removed and sumps and drains were sealed. The associated laboratory is no longer active and is not a source of wastewater.

284-W Water Plant Effluent

Source controls and in-plant treatment were implemented at the 283-W Water Treatment Facility that supplies potable (drinking) water for the Hanford Site. New flocculation and sedimentation units, and meters were installed to better treat filter backwash at the water treatment facility. The treated water will be recycled. Automated level controls for the water treatment facility will be installed to eliminate overflow of untreated river water. Water-cooled compressors were replaced with air-cooled units; and closed-loop refrigeration cooling units were placed on welding machines. Similar controls were not made to the 284-E Water Plant, which has since been put into stand-by mode, and is only used for short periods each year in order to keep it functional.

PUREX Plant Effluent

PUREX has been deactivated and is no longer a source to the TEDF. PUREX was a nuclear fuel processing facility that separated and recovered usable plutonium and uranium from an array of fission products contained in irradiated nuclear reactor fuel.

WESF/B Plant Effluent

B Plant has been deactivated and is no longer a source to the TEDF. The B Plant was used in the past as a fuel reprocessing facility. Currently, the Waste Encapsulation Storage Facility (WESF), which is adjacent to B Plant, ensures safe storage and management of radiological and chemical waste inventories. WESF also stores chemicals and discharges cooling water, rainwater, raw water, and potable water to TEDF.

242-A-81 Water Services Building Effluent

The 242-A-81 Water Services Building houses equipment that strains coarse, suspended solids from untreated Columbia River water. Periodic flushing (backwashing) of the filtering media is required to cleanse the material, and results in an effluent. It was determined that prior pollution prevention controls were adequate at the 242-A-81 Water Services Building.

242-A Evaporator

The Evaporator is used to reduce the volume of waste stored in underground tanks on Hanford. The Evaporator has a large non-contact cooling water discharge to TEDF, which typically operates a few weeks per year when the Evaporator is in operation.

241-A Tank Farm Cooling Water

The 241-A Tank Farm Cooling Water System has recently been reduced from eight sources to one. The remaining source is made up of four 702-AZ Cooling Towers. Each cooling tower is part of a tertiary cooling system for a ventilation system used for cooling hazardous and radioactive wastes stored in underground storage tanks. Heat is removed via heat exchanger,

from a closed loop chilled water system, which in turn removes heat from tank vapor via a shell and tube heat exchanger. Due to the systems arrangement, it is considered unlikely that this stream would be contaminated by radioactive or hazardous material.

Collection System Status

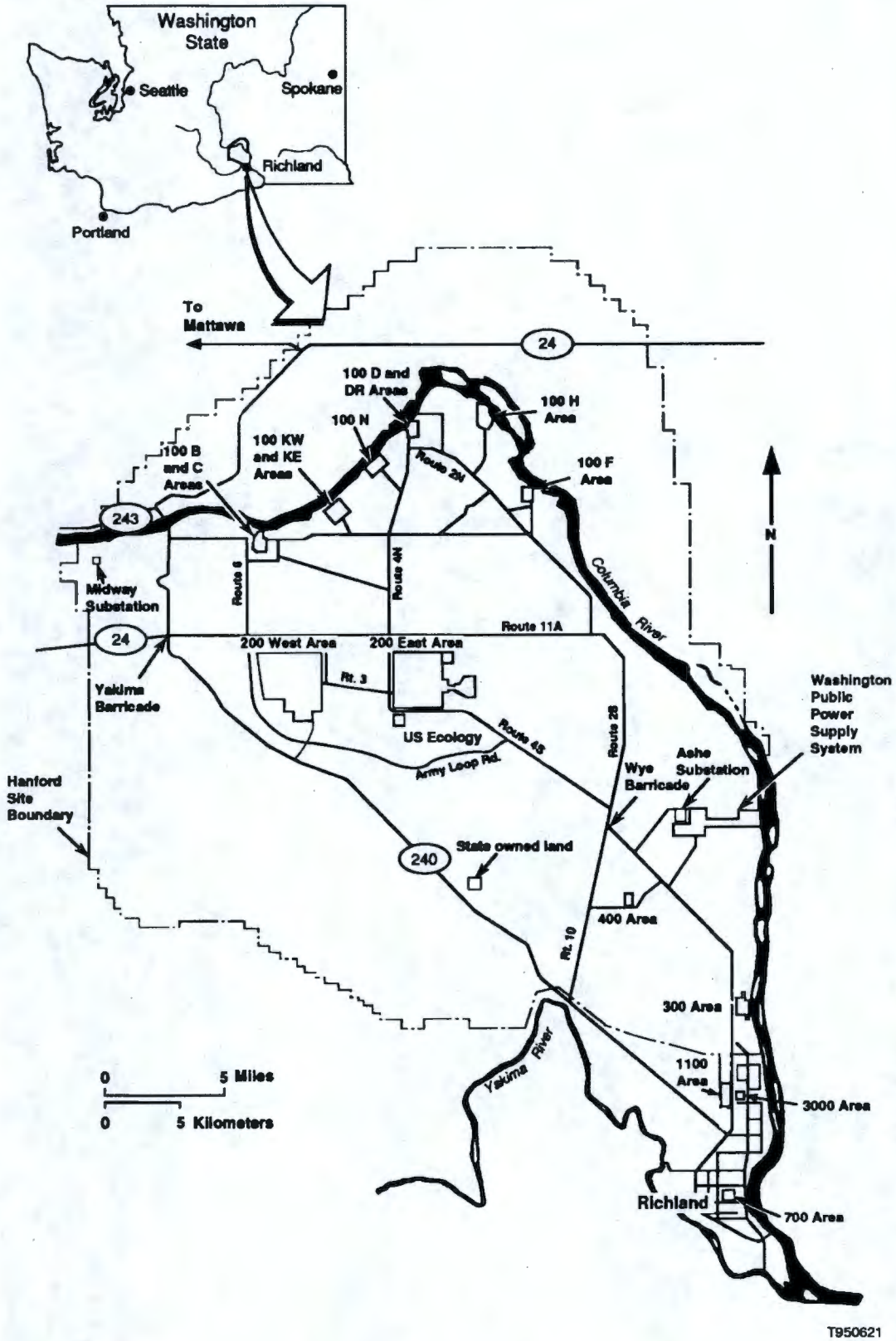
The 11 mile-long pipeline, constructed to collect and convey the effluent to the disposal ponds was tested for integrity prior to use. Older, pre-existing ancillary pipelines at individual facilities have been cleaned or replaced if determined to be a potential source of contamination from deposition of contaminants that were the result of past practices. Inputs to the system are limited in nature, documented, and strictly controlled. All access points to the system are strictly controlled and operated by trained personnel.

INFILTRATION BASINS AND SITE DESCRIPTION

TEDF discharges to two infiltration/disposal basins of approximately five acres in size. They have proven to be very capable of handling the flows involved. These basins are located on the Hanford Site, east of the 200 East Area. The Hanford Site is located within the semiarid Pasco Basin of the Columbia Plateau in south-central Washington State. The Hanford Site occupies an area of about 560 square miles northwest of the confluence of the Snake and Yakima rivers with the Columbia River. It comprises an area of about 30 miles north to south, and 24 miles east to west. This land has restricted public access and provides a buffer for the smaller areas currently used for storage of nuclear materials, waste storage, and waste disposal. Only about 6% of the land area has been disturbed and is actively used.

The Columbia River flows through the northern part of the Hanford Site. It then turns south and forms part of the Site's eastern boundary (see Figure). The Yakima River runs along part of the southern boundary and joins the Columbia River below the City of Richland. Richland borders the Hanford Site on the southeast. Rattlesnake Mountain, the Yakima Ridge, and Umtanum Ridge form the southwestern and western boundaries of the Hanford Site. The Saddle Mountains form the northern boundary. Two small east-west ridges, Gable Butte and Gable Mountain, rise above the plateau of the central part of the Hanford Site. Adjoining lands to the west, north, and east are principally range and agricultural lands. The cities of Richland, Kennewick, and Pasco constitute the nearest population centers and are located southeast of the Hanford Site.

The Hanford Site encompasses more than 1500 waste management units and four groundwater contamination plumes that have been grouped into 78 operable units. The 200 Area TEDF is located near the center of the Hanford Site, approximately two miles east of the eastern boundary of the 200 East Area. The site was chosen due to the fact that area soils were essentially uncontaminated; and modeling indicated that additional infiltration would not mobilize contaminants or contribute to contamination plume migration originating from other locations.


Washington State
Seattle
Spokane
Richland
Portland
To Mattawa
24
100 D and DR Areas
100 H Area
100 N
100 KW and KE Areas
100 B and C Areas
Route 2N
100 F Area
243
N
Midway Substation
Route 6
Route 4N
Columbia River
Route 11A
24
200 West Area
200 East Area
Rt. 3
Yakima Barricade
Washington Public Power Supply System
US Ecology
Route 4S
Route 2S
Ashe Substation
Army Loop Rd.
Wye Barricade
Hanford Site Boundary
State owned land
240
400 Area
Rt. 10
300 Area
Yakima River
1100 Area
3000 Area
0 5 Miles
0 5 Kilometers
Richland
700 Area
T950621

GROUNDWATER AND GEOLOGY OF THE SITE

The 200 Area TEDF is underlain by geologically young sediments that, in turn, are underlain by bedrock. The bedrock is Columbia River Basalt, at a depth of about 250 feet below the surface. The bedrock slopes gently (approximately one-half of a degree) toward the south-southwest. The sediments that lie immediately above the basalt are called the Ringold Formation. The Hanford Formation lies above the Ringold Formation. Alluvium and dune sand cover part of the surface of the site.

The upper part of the Hanford Formation consists of highly permeable, unconsolidated gravel. The lower part of the formation consists of silt and sandy gravel. The thickness of the formation varies from approximately 80 feet north, to about 120 feet south of the site. The hydraulic conductivity (permeability) of this formation is very high.

The Ringold Formation at the disposal site consists of lenses (localized pockets) composed of partially consolidated sand and gravel, fine-grained sand, and silt and clay locally cemented by caliche. The Ringold Formation contacts the Hanford Formation at approximately 90 to 110 feet beneath the surface. The uppermost part of the Ringold Formation consists of relatively impermeable silt and clay that varies from about 40 feet thick at the northwest corner to about 80 feet thick at the southeast corner of the site. These silts and clays are called the Lower Mud Sequence of the Ringold formation. The lower part of the Ringold Formation, below this Lower Mud Sequence, consists of a 75 to 120 (approximate) foot thick zone of gravel that is named Unit A. The uppermost aquifer below the disposal site is found primarily in this gravel zone. The three groundwater monitoring wells, installed to monitor this disposal activity, penetrate to this aquifer. The static water level in the uppermost aquifer currently varies from approximately 100 to 120 feet below the surface. Both the Lower Mud Sequence and Unit A slope gradually to the south-southeast.

It has been demonstrated by hydrologic and geochemical monitoring at the site, that the Lower Mud Sequence of the Ringold Formation is acting as an effective retardant to movement of overlying water (originating from the disposal ponds) down to the uppermost groundwater aquifer in the Unit A gravels. This phenomenon is occurring because the mud unit is highly impermeable, and does not conduct water well. Hence, the presence of the mud sequence will naturally prevent water from moving directly downward below the Hanford formation. The muds also act to confine the groundwater in the Unit A gravels beneath the site such that it has a positive upward pressure gradient. This positive pressure also impedes the entry of the treated effluent into the aquifer in the immediate vicinity of the disposal facility.

Groundwater flows down-gradient at a flow rate of less than one foot per day in the uppermost aquifer. Recent hydrologic tests and head measurements indicate that the groundwater flow may be as low as less than 0.02 feet per day. Groundwater is currently flowing radially outward from the 216-B-3 Pond complex (located west-northwest of the 200 Area TEDF). The hydraulic gradient is currently about 0.002 foot per foot.

The Lower Mud Sequence of the Ringold formation is absent beneath portions of the main, A, and B lobes of the 216-B-3 Pond complex. Consequently, effluent previously discharged to these ponds migrated directly downward into the uppermost aquifer of the Ringold Unit A gravel. The additional volume and down-gradient movement of these B pond discharges contributes to the upward pressure gradient currently observed in the upper-most aquifer beneath the 200 Area TEDF. Since effluent discharge to the main pond, and A and B lobes of the 216-B-3 Pond complex has ceased, the magnitude of the hydraulic head in the aquifer beneath the 200 Area TEDF is gradually decreasing.

Effluent was directed to the 3C expansion pond of the 216-B-3 Pond complex, prior to being directed to the 200 Area TEDF in 1997. The draft permit still allows for emergency overflows to this pond. At this location, the Lower Mud Sequence is known to be present. Consequently, the water infiltrating downward from this pond likely did not directly enter the upper most aquifer. Instead, the water may flow laterally down-gradient along the top of the Lower Mud Sequence until it reaches an area where the mud does not exist, or is offset by a fault.

The May Junction Fault is found approximately 1 mile east, and down-gradient from the 200 Area TEDF. It trends north-south. The fault may hydraulically connect the confined aquifer in the unit A gravel of the Ringold formation with water perched in the Hanford formation at the top of the Lower Mud Sequence. Recent research makes it appear likely that the May Junction Fault is an impediment to eastward movement of groundwater in the Ringold (confined) aquifer.

East of the May Junction Fault to the Columbia River, the upper most aquifer is found in the Hanford formation gravels, with the possible exception of the area east-northeast of Gable Mountain. Geologic processes in this area have resulted in the upper most aquifer likely occurring in Unit A of the Ringold Formation.

The disposal facility is located approximately six miles west of the Columbia River. Prior to discharge, computer modeling of groundwater flow provided an estimated travel time of approximately 10 to 20 years for effluent discharged at the 200 Area TEDF to reach the Columbia River. Other more recent modeling estimate travel times approaching 120 to 300 years for effluent to reach the Columbia River.

The average annual precipitation at the Hanford Site is 6.3 inches. Minor local variations occur. Most of the precipitation occurs during the winter, with nearly half of the annual amount occurring from November through February. Snowfall accounts for about 38% of all precipitation. Days with greater than 0.51 inch of precipitation occur less than 1% of the year. These semiarid conditions mitigate the development of groundwater contamination plumes.

Projections are that the probable maximum flood on the Columbia River would not encroach within 3 miles of the 200 Area TEDF Site.

The Hanford Site has been botanically characterized as a shrub-steppe. The major plant community in the vicinity of the 200 Area TEDF is Sagebrush/Cheatgrass or Sandberg Bluegrass

and Greasewood/Cheatgrass-Saltgrass. The disposal site was selected to avoid impact on historical, archaeological, and cultural resources.

PERMIT STATUS

The previous permit for this facility was issued on April 18, 1995.

An application for permit renewal was submitted to Ecology on August 30, 1999 and accepted by Ecology on November 23, 1999.

SUMMARY OF COMPLIANCE WITH THE PREVIOUS PERMIT

During the history of the previous permit, the Permittee has remained in compliance based on Discharge Monitoring Reports (DMRs) and other reports submitted to Ecology and inspections conducted by Ecology. The only exceptions have been a few high discharges of iron and one high discharge of manganese, at the effluent. These high iron and manganese discharges, while not the norm, were not surprising given the age and condition of much of the water and wastewater piping at the Hanford Site.

The first high iron event at TEDF occurred on April 7, 1996, when the analysis of a composite sample gave a level of 3100 ppb. The average for that month ended up at 1820 ppb iron, compared to an effluent limit in the old permit of 258 ppb. The second event occurred on January 12, 1997, when the analysis of a composite sample gave a level of 1780 ppb iron. The average for that month ended up at 480 ppb. The third event occurred on June 7, 1999, when a composite sample gave a level of 18900 ppb and the monthly average turned out to be 2811 ppb iron. The same June 7th sample also showed high manganese of 1120 ppb, which led to a monthly average of 161 ppb, compared to the 50 ppb effluent limit in the old permit. The June 7th sample may have also had high chromium. The last event just occurred on September 23, 1999, when the analysis of a composite sample gave a level of 771 ppb iron. The average for that month ended up at 298 ppb. None of high readings in the effluent appear to have affected groundwater quality, and most appear to be caused by rust particles.

The Permittee has also recently reported that from April 1996 until November 2, 1999, their lab failed to digest samples as required by EPA method 200.8 for metals, therefore making much of their metals data of questionable quality. Metals affected include arsenic, cadmium, chromium, lead, mercury, and uranium, in both effluent and groundwater samples.

The Permittee has recently done reanalysis of preserved samples by method 200.8. Forty-nine samples of effluent and groundwater were re-analyzed using mixed-acid digestion, as is called for by method 200.8. It has been reported that the reanalysis indicate the effect from not digesting when determining total metals in TEDF effluent and groundwater was not significant to metals data previously reported. Data from the reanalysis did not exceed or approach permit limits or early warning values. Ecology has not yet been provided with the reanalysis data.

WASTEWATER CHARACTERIZATION

The concentration of pollutants in the discharge was reported in the permit reapplication and in discharge monitoring reports. The proposed wastewater discharge prior to infiltration is characterized for the following parameters:

WASTEWATER CHARACTERIZATION

Parameter	Average Concentration	Parameter	Average Concentration
1,1,1-Trichloroethane	0.67	Cerium/Praseodymium-144	98.09
1,1-Dichloroethene	0.53	Cesium-134	7.73
1,2,4-Trichlorobenzene	3.33	Cesium-137	7.73
1,4-Dichlorobenzene	3.53	Chloride	6389.17
2,4-Dinitrotoluene	1.40	Chlorobenzene	0.53
2-Chlorophenol	0.90	Chloroform	3.24
4-Chloro-3-Methylphenol	0.83	Chromium	0.98
4-Nitrophenol	1.57	Cobalt	10.45
Acenaphthene	1.77	Cobalt-60	7.23
Aluminum	225.08	Conductivity	182
Antimony	44.58	Copper	12.12
Antimony-125	21.08	Cyanide	5.00
Arsenic	1.03	Dibromochloromethane	0.85
Barium	30.14	Europium-152	23.01
Benzene	0.58	Europium-154	19.98
Beryllium	4.44	Europium-155	24.20
Bis(2-Ethylhexyl) Phthalate	2.11	Fluoride	98.75
Bromide	104.79	Gross Alpha	1.42
Bromodichloromethane	0.55	Gross Beta	1.45
Bromoform	1.15	Iron	139.41
Cadmium	0.21	Lead	0.54
Calcium	22325.00	Magnesium	4619.17
Carbon Tetrachloride	0.62	Manganese	7.61

Parameter	Average Concentration	Parameter	Average Concentration
Mercury	0.17	Sodium	4834.17
Methylene Chloride	0.58	Strontium-90	1.51
Nickel	18.34	Sulfate	15836.25
Niobium-94	7.42	Thallium	82.39
Nitrate(as N)	177.29	Tin-113	9.62
Nitrite(as N)	11.88	Titanium	5.25
N-Nitrosodi-N-Propylamine	1.00	Toluene	0.75
Oil & Grease	7875.00	Total Dissolved Solids	90979.17
Pentachlorophenol	1.60	Total Trihalomethanes	3.44
pH	7.57	Trichloroethene	0.60
Phenol	0.95	Uranium (Total)	0.36
Phosphate	80.83	Vanadium	8.94
Potassium	1413.80	WTPH-G	50.00
Pyrene	0.70	Zinc	59.96
Radium-226	0.06	Zinc-65	15.23
Radium-226 and –228	3.05		
Ruthenium-103	7.53		
Ruthenium-106	70.11		
Selenium	2.67		
Silver	6.75		

Units are in µg/l, except for the radionuclides, which are in pCi/l

Average concentrations are over the last year.

The old permit required an effluent variability study be completed during the first year of operation to better define the wastewater being discharged. The Permittee submitted "Effluent Variability Study Results for the 200 Area Treated Effluent Disposal Facility (ST 4502) (WHC-SD-LEF-EV-001, Rev. 0) on July 17, 1996 to fulfill the permit requirement. The study results seemed to justify a reduction in monitoring frequency for some parameters, since the parameters proved to have little probability to exceed a permit limit. Only iron and chloride had a reasonable probability to exceed the limits in the old permit. No action was taken to change the monitoring requirements in the old permit based on the study, due to the decision to add the W-252 streams to the discharge to TEDF soon after the study was complete. Even with the addition of these new streams, the overall conclusion of the study, that the effluent is similar in composition to local drinking water (i.e., chlorinated Columbia River water), still appears to be valid.

SEPA COMPLIANCE

Permitting of the 200 Area TEDF was reviewed under the Washington State Environmental Policy Act (SEPA). An Environmental Checklist was completed before the start of discharge. A Determination of Nonsignificance under SEPA was made by Ecology's Nuclear Waste Program. It was announced in the November 22, 1993 SEPA Register and in a public mailing. Comments were accepted until November 22, 1993. During the comment period, no comments were received. No special SEPA compliance issues were identified.

PROPOSED PERMIT LIMITATIONS

State regulations require that limitations set forth in a waste discharge permit must be either technology- or water quality-based. Wastewater must be treated using all known, available, and reasonable treatment (AKART) and not pollute the waters of the State. The minimum requirements to demonstrate compliance with the AKART standard were determined in the engineering reports "200 Area Treated Effluent Disposal Facility (Project W-049H) Effluent Engineering Report," February 1992, WHC-SD-W049H-ER-003, Rev. 0, Volumes 1 and 2, and in "Phase II Liquid Effluent Program (Project W-252) Wastewater Engineering Report and BAT/AKART Studies," September 1992, WHC-SD-W252-ER-001, Rev. 0.

The permit also includes limitations on the quantity and quality of the wastewater discharged to the infiltration basins that have been determined to protect the quality of the groundwater. The approved engineering reports include specific design criteria for this facility. Water quality-based limitations are based upon compliance with the Ground Water Quality Standards (Chapter 173-200 WAC).

The more stringent of the water quality-based or technology-based limits are applied to each of the parameters of concern. Each of these types of limits is described in more detail below.

TECHNOLOGY-BASED EFFLUENT AND GROUNDWATER LIMITATIONS

All waste discharge permits issued by Ecology must specify conditions requiring available and reasonable methods of prevention, control, and treatment of discharges to waters of the state (WAC 173-216-110). The following permit limitations are necessary to satisfy the requirement for AKART:

TECHNOLOGY-BASED EFFLUENT AND GROUNDWATER LIMITATIONS

Parameter	Effluent and Groundwater Limitations	
	Average Monthly [a]	Maximum Daily [b]
Total Trihalomethanes	20 µg/l	--
Methylene Chloride	5 µg/l	--
Cadmium (total)	5 µg/l	--
Chromium (total)	20 µg/l	--
Lead (total)	10 µg/l	--
Chloride	58,000 µg/l	116,000 µg/l

Parameter	Effluent and Groundwater Limitations	
	Average Monthly [a]	Maximum Daily [b]
Nitrate (as N)	620 µg/l	1,240 µg/l
Total Dissolved Solids	250,000 µg/l	500,000 µg/l
[a] The average monthly effluent limitation is defined as the highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.		
[b] The maximum daily effluent limitation is defined as the highest allowable daily discharge. The daily discharge means the discharge of a pollutant measured during a calendar day. The daily discharge is the average measurement of the pollutant over the day.		
µg/l means micrograms per liter (parts per billion).		

The organics with technology-based limits, total trihalomethanes and methylene chloride, had their limits set at the lowest level reliably measured in the laboratory, the Practical Quantification Limit (PQL). Effluent source and technology controls have and should continue to maintain the levels in the effluent below the PQL levels. Total trihalomethanes are by-products of disinfecting water for drinking water purposes. Chloroform and bromodichloromethane are known to be the residual by-products of chlorinating the Columbia River water to render it suitable for human consumption by Hanford Site employees. These two constituents are two species of the four trihalomethanes by-products commonly found in public drinking water supplies that have been chlorinated for disinfection purposes. Current drinking water standards allow a residual concentration of 100 ppb of total trihalomethanes in drinking water delivered to the publics' homes. There is also a groundwater quality criterion for chloroform. An enforcement limit, based on technology, has been established for total trihalomethanes. The anticipated concentrations in the effluent do not exceed the levels considered acceptable for human consumption. All other constituents that are considered contaminants in drinking water do not exceed concentrations considered acceptable for human consumption. Methylene chloride is a common solvent. The likely sources, if any, are facility laboratories, resulting from trace contaminants on glassware, for example. Another potential source is Columbia River water, source of the Hanford Site's drinking water supply.

The metals with technology-based limits, cadmium, chromium, and lead, also had their limits set at the PQL levels for each. Effluent source and technology controls have and should continue to maintain the levels in the effluent below the PQL levels. The cadmium and lead limits are placed on the groundwater rather than the effluent. The point of compliance for these parameters is monitoring wells numbers 699-40-36 and 699-41-35. One source of these metals is the Columbia River source water. Another source may be rusting and deteriorating piping that is used to transport the water and wastewater on the Hanford Site.

The other parameters with technology-based limits, chloride, nitrate, and total dissolved solids, had their limits set based on the levels expected to be in the effluent based on AKART. Effluent source and technology controls have and should continue to maintain the levels in the effluent below the limits in the permit. The limits in the permit are below the groundwater quality limits for these parameters.

GROUNDWATER QUALITY-BASED EFFLUENT AND GROUNDWATER LIMITATIONS

In order to protect existing water quality and preserve the designated beneficial uses of Washington's groundwaters including the protection of human health, WAC 173-200-100 states that waste discharge permits shall be conditioned in such a manner as to authorize only activities that will not cause violations of the Ground Water Quality Standards. Drinking water is the beneficial use generally requiring the highest quality of groundwater. Providing protection to the level of drinking water standards will protect a great variety of existing and future beneficial uses.

Applicable groundwater criteria as defined in Chapter 173-200 WAC and in RCW 90.48.520 for this discharge include the following:

GROUNDWATER QUALITY CRITERIA

Parameter	Groundwater Quality Criteria
Bis (2-ethylhexyl) phthalate	6.0 µg/l
Carbon Tetrachloride	0.3 µg/l
Chloroform	7.0 µg/l
Methylene chloride	5.0 µg/l
Tritium	20,000 pCi/l
Gross alpha	15 pCi/l
Gross beta	50 pCi/l
Arsenic (total)	0.05 µg/l
Cadmium (total)	10 µg/l
Chromium (total)	50 µg/l
Iron (total)	300 µg/l
Lead (total)	50 µg/l
Manganese (total)	50 µg/l
Mercury (total)	2 µg/l
Chloride	250,000 µg/l
Nitrate (as N)	10,000 µg/l
Sulfate	250,000 µg/l
Total dissolved solids	500,000 µg/l
pH	6.5-8.5

Ecology has reviewed existing records and was able to determine if background groundwater quality is higher or lower than the criteria given in Chapter 173-200 WAC. The discharges authorized by this proposed permit are not expected to interfere with beneficial uses.

A statistical evaluation of 7 quarters (pre TEDF discharge) of monitoring data from groundwater monitoring wells 699-42-37 (upgradient), 699-41-35 and 699-40-36 (downgradient), located within approximately one thousand feet of the TEDF is presented in the following table. The wells are completed in, and sample, the upper most aquifer. The values found in the table represent conditions present in the upper most aquifer prior to discharge. Recommended

statistical evaluation methods of the U.S. Environmental Protection Agency (see References) were used.

No organic or man-made contaminants are suspected of contaminating the existing ground-water prior to discharge (background). Based on evaluation of available data, background groundwater concentrations of arsenic, chromium, iron, and manganese exceed groundwater (drinking water) criteria. These exceedances are thought to be due to natural, not man-made causes.

BACKGROUND GROUNDWATER CHARACTERISTICS

Parameter	Well 699-42-37 Background Before Discharge	Well 699-41-35 Background Before Discharge	Well 699-40-36 Background Before Discharge
Bis (2-ethylhexyl) phthalate	NQ	NQ	NQ
Total trihalomethanes	NQ	NQ	NQ
Carbon tetrachloride	NQ	NQ	NQ
Chloroform	ND	ND	ND
Methylene chloride	NQ	NQ	NQ
1,1,1 Trichloroethane	NQ	NQ	NQ
Phenol	NQ	NQ	NQ
Tritium	ND	ND	ND
Gross alpha	13.3 pCi/l	24 pCi/l	18.3 pCi/l
Gross beta	12.8 pCi/l	20 pCi/l	17.5 pCi/l
Radium, total	INSD	INSD	INSD
Radium, 226	ND	ND	ND
Arsenic (total)	7 µg/l	6 µg/l	21 µg/l
Barium (total)	119 µg/l	171 µg/l	107 µg/l
Cadmium (total)	NQ	NQ	NQ
Chromium (total)	165 µg/l	781 µg/l	776 µg/l
Iron (total)	16,941 µg/l	948 µg/l	5,243 µg/l
Lead (total)	NQ	NQ	NQ
Manganese (total)	431 µg/l	283 µg/l	307 µg/l
Mercury (total)	NQ	NQ	NQ
Chloride	8,434 µg/l	3,800 µg/l	3,708 µg/l
Cyanide (total)	NQ	NQ	NQ
Nitrate (as N)	8,167 µg/l	1,168 µg/l	1,085 µg/l
Sulfate	31,806 µg/l	10,849 µg/l	28,143 µg/l
Total dissolved solids	332,000 µg/l	246,000 µg/l	266,000 µg/l
pH, in pH units	7.31-8.59	6.9-8.94	7.26-8.46
Specific conductivity, micromhos/cm	415	340	352
NQ means not quantifiable, ND means no data, INSD means insufficient data			

More recent data about the groundwater quality was included in the permit reapplication. No effect of 200 Area TEDF discharge is shown in the recent results. For this latest data, only iron and manganese exceed groundwater criteria, and they only exceed in one of the three wells, 699-40-36. Potentially, arsenic may exceed the groundwater criteria, but since the PQL is above the criteria, it cannot be known for sure. The level of iron and manganese in the groundwater has decreased since the start of discharge, and chromium has also decreased, to the point that it no longer exceeds groundwater criteria. The exceedances are thought to be due to natural, not man-made causes.

RECENT GROUNDWATER CHARACTERISTICS

Parameter	Well 699-42-37 Recent Range of Measurements	Well 699-41-35 Recent Range of Measurements	Well 699-40-36 Recent Range of Measurements
Bis (2-ethylhexyl) phthalate	NQ	NQ	NQ
Total trihalomethanes	NQ	NQ	NQ
Carbon tetrachloride	NQ	NQ	NQ
Chloroform	NQ	NQ	NQ
Methylene chloride	NQ	NQ	NQ
1,1,1 Trichloroethane	NQ	NQ	NQ
Phenol	NQ	NQ	NQ
Tritium	ND	ND	ND
Gross alpha	4.4-5.2 pCi/l	3.31-4.5 pCi/l	NQ-4.4 pCi/l
Gross beta	NQ-23 pCi/l	NQ	NQ
Radium, total	NQ	NQ	NQ
Radium, 226	NQ	NQ	NQ
Arsenic (total)	NQ	NQ	NQ
Barium (total)	52-55 µg/l	143-151 µg/l	61.9-74.8 µg/l
Cadmium (total)	NQ	NQ	NQ
Chromium (total)	NQ	NQ	NQ
Iron (total)	NQ-249	NQ-104 µg/l	143-488 µg/l
Lead (total)	NQ	NQ	NQ
Manganese (total)	NQ	NQ	NQ-90.1 µg/l
Mercury (total)	NQ	NQ	NQ
Chloride	7,590-8,600 µg/l	3,270-3,420 µg/l	3,300-3,440 µg/l
Cyanide (total)	NQ	NQ	NQ
Nitrate (as N)	1,180-1,240 µg/l	100-150 µg/l	NQ-100 µg/l
Sulfate	22,260-24,500 µg/l	NQ	NQ
Total dissolved solids(µg/l)	227,000-240,000	198,000-214,000	173,000-210,000
pH, in pH units	7.89-8.2	8.02-8.11	8.17-8.24
Specific conductivity	356-379 micromhos/cm	323-335 micromhos/cm	311-323 micromhos/cm
Temperature	16.5-17.4 °C	16.4-17.6 °C	16.6-17.5 °C

Parameter	Well 699-42-37 Recent Range of Measurements	Well 699-41-35 Recent Range of Measurements	Well 699-40-36 Recent Range of Measurements
WTPH-G	NQ	NQ	NQ
Water level	411.46-412.95'	410.44-410.93'	408.94-409.69'
NQ means not quantifiable, ND means no data, INSD means insufficient data			

Pollutant concentrations in the discharge do not exceed groundwater quality criteria with technology-based controls, which the Ecology has determined to be AKART. The only exception to this is the occasional spikes of iron that have occurred in the discharge. Limits based on groundwater criteria are established and applied at the end of pipe and in the groundwater. The resultant effluent limits are as follows:

WATER QUALITY-BASED LIMITATIONS

Parameter	Effluent and Groundwater Limitations Average Monthly [a]
Bis (2-ethylhexyl) phthalate	10 µg/l
Carbon Tetrachloride	5 µg/l
Chloroform	7 µg/l
Arsenic (total)	15 µg/l
Iron (total)	300 µg/l
Manganese (total)	50 µg/l
Mercury (total)	2 µg/l
pH	6.5-8.5
[a] The average monthly effluent limitation is defined as the highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.	
pH is limited both in the effluent and the groundwater. Groundwater limitations shall be met in groundwaters collected from the point of compliance monitoring wells numbers 699-40-36 and 699-41-35.	
µg/l means micrograms per liter (parts per billion).	

Bis (2-ethylhexyl) phthalate is a common contaminant from using plastic pipes to carry water. The low levels found in the effluent are indicative of this source. Carbon tetrachloride is a common solvent. The likely sources, if any, are facility laboratories, resulting from trace contaminants on glassware, for example. Chloroform is a known residual by-product of chlorinating the Columbia River water to render it suitable for human consumption by Hanford Site employees.

The metals with groundwater quality-based limitations come from various sources. Arsenic is a known contaminant that exists in Columbia River water and groundwaters of the state. Arsenic in the effluent is probably just from the background levels. Mercury could come from various sources, such as labs or river water, but has not been detected in the effluent. Iron and

manganese have been a problem in the past, particularly iron. The main source of both appears

to be the deteriorating piping on the Hanford Site. The old, rusting pipes seem to be causing occasional spikes of metals at the effluent. This has just been an occasional problem, with the average levels of these parameters being quite low. The old permit had a technology-based limit for iron. This limit was based on the expected levels of iron in the effluent. Due to the spikes of iron, this limit was exceeded a few times in the past. Ecology has switched the iron limit to a groundwater quality based limit, since that now appears to be the lower limit that can be achieved by the effluent. Iron levels in the effluent will need continuing evaluation to determine if current status is still AKART for control of iron discharges. If iron routinely exceeds the new groundwater quality-based limit in the permit, Ecology would require the Permittee to do an updated AKART evaluation of the discharge. For now, it at least seems clear that the occasional spikes of iron have yet to effect groundwater quality.

The only other groundwater quality-based limit is for pH. The pH is expected to be from 6.5 to 8.5, which has not been a problem in the past in the groundwater. The effluent has had a pH as high as 8.7, as reported in the reapplication. Because of this high pH, and since the effluent has yet to reach the groundwater monitoring wells, Ecology determined that limiting the pH at the effluent was also justified. The limit on the effluent will give early warning of problems.

Certain other constituents, such as fluoride and silver, were measured at concentrations in the effluent that were much lower than groundwater quality criteria. If such constituents were not known to be added to the effluents at any of the facilities, they were determined not to be constituents of concern.

There are no scheduled or planned discharges of radionuclides such as tritium or radium to the effluent from the facilities discharging to the 200 Area TEDF. Hence, the likely source of any concentrations found in the effluent is the Columbia River water that is treated and used for human consumption on the Hanford Site. In the case of this permit, the Permittee shall be self-regulating for radioactive contaminants under the provisions of the Atomic Energy Act. The Permittee plans to meet the intent of 40 CFR Part 141, "National Primary Drinking Water Regulations," in regards to radioactive contaminants; and plans to take investigative and mitigative steps if drinking water standards are exceeded. Ecology is requiring monitoring and reporting of radionuclide concentrations in the effluent and groundwater.

The Permittee has had a couple of spikes of radionuclides while self-regulating for radioactive discharges under the old permit. In the first year of operation of the 200 Area TEDF, contaminated stormwater from the PUREX area was discharged causing high gross beta in the effluent. The gross beta levels in the effluent approached 80 pCi/l (due to strontium-90), compared to the groundwater quality standard of 50 pCi/l. Then in January 1999, breakthrough from an effluent treatment filter bed at the Plutonium Finishing Plant (PFP) caused a high gross alpha level. The gross alpha level approached a high of 60 pCi/l, and the average for the month was 24 pCi/l, compared to a groundwater quality standard of 15 pCi/l.

After the high gross beta level in 1995, the Permittee thought it would be appropriate to discharge a second basin of contaminated stormwater to the 200 Area TEDF, but Ecology convinced the Permittee to send the stormwater to a treatment facility instead. The Permittee did

not initially report the high alpha in 1999, until they submitted their quarterly DMRs. The DMRs made no note of the high value and gave no explanation. Ecology intends to continue to work with the Permittee about the radioactive component of the discharge, through the monitoring required in the permit.

COMPARISON OF LIMITATIONS WITH THE EXISTING PERMIT ISSUED APRIL 18, 1995

The following table compares the limitations in the old permit with the limitations planned for the new permit.

COMPARISON OF PREVIOUS AND NEW LIMITS

Parameter	Existing Limits	Proposed Limits
Bis (2-ethylhexyl) phthalate	10 µg/l AM EFF	10 µg/l AM EFF
Total trihalomethanes	66 µg/l GW 50 µg/l EW GW 66 µg/l EW EFF	20 µg/l AM EFF
Carbon tetrachloride	5 µg/l AM EFF	5 µg/l AM EFF
Chloroform	No Limit	7 µg/l AM EFF
Methylene chloride	5 µg/l AM EFF	5 µg/l AM EFF
1,1,1 Trichloroethane	5 µg/l GW 5 µg/l EW EFF	No Limit
Phenol	10 µg/l AM EFF	No Limit
Arsenic (total)	15 µg/l AM EFF	15 µg/l AM EFF
Cadmium (total)	5 µg/l GW 5 µg/l EW EFF	5 µg/l GW
Chromium (total)	20 µg/l AM EFF	20 µg/l AM EFF
Iron (total)	258 µg/l AM EFF	300 µg/l AM EFF
Lead (total)	10 µg/l GW	10 µg/l GW
Manganese (total)	50 µg/l AM EFF	50 µg/l AM EFF
Mercury (total)	2 µg/l AM EFF	2 µg/l AM EFF
Chloride	58,000 µg/l AM EFF 116,000 µg/l DM EFF	58,000 µg/l AM EFF 116,000 µg/l DM EFF
Cyanide (total)	50 µg/l GW	No Limit
Nitrate (as N)	620 µg/l AM EFF 1,240 µg/l DM EFF	620 µg/l AM EFF 1,240 µg/l DM EFF
Total dissolved solids	250,000 µg/l AM EFF	250,000 µg/l AM EFF 500,000 µg/l DM EFF
pH, in pH units	6.5-8.5 GW	6.5-8.5 GW & EFF
Flow	3,400 gpm AM EFF 1,200 gpm AY EFF	5.5 MGD AM EFF 1.7 MGD AY EFF
EFF means a limit in the effluent, GW means a limit in the groundwater, AM means an average monthly limit, DM means a daily maximum limit, EW means an early warning value, and AY means average yearly.		

Most of the limits in the new permit match the limits in the old permit. Differences include limits for total trihalomethanes, chloroform, 1,1,1 trichloroethane, phenol, cadmium (total), iron (total), cyanide, total dissolved solids, pH, and flow. For total trihalomethanes, the old limit in the groundwater and early warning values in the groundwater and effluent were removed. A new, lower limit was placed on the effluent and monitoring in the groundwater was discontinued. This was done since no hits have been recorded for total trihalomethanes since the beginning of discharge. Since much of the discharge is chlorinated water, the presence of total trihalomethanes is to be expected, but with the history of sampling, spot checks of the effluent should be all that is required to assure continued protection of the environment. The new limit in the effluent was set at the PQL, since all previous results have been below this level.

A new limit was added in the effluent for chloroform. Chloroform, a product of the chlorinating of water was monitored in the old permit, but was only indirectly limited by the total trihalomethanes limit. Chloroform has been detected in the effluent, with a maximum level of 10 µg/l, compared to the groundwater quality-based standard of 7 µg/l. Therefore, a limit has been added to control chloroform discharges.

Since there have been only very low values for 1,1,1 trichloroethane and phenol, both limits and monitoring for these parameters were discontinued. For cadmium, the limit in the groundwater was kept the same, but the early warning value in the effluent was discontinued. This was done since neither limit has been approached yet, and one limit should be enough to protect the groundwater.

Iron was the one parameter that had its limit raised. The old technology-based limit, which the technology proved to be unable to always meet, was replaced by a higher groundwater quality-based limit. If this new higher limit is not consistently met, then the Permittee may be required to take action to reduce the iron level in the discharge.

Both the limit and monitoring for cyanide have been eliminated, since no indication of cyanide has been discovered. For total dissolved solids, the average monthly limit in the effluent was left the same, and a new daily maximum was added. This new daily maximum is based on the groundwater quality standards.

For pH, the old limit in the groundwater was maintained, and the same limit was also placed on the effluent. The limit was placed on the effluent to give real-time protection to the environment, since the groundwater monitoring wells may only show problems years later. The new limit will allow for any necessary action, if required, prior to effects appearing in the groundwater.

The flow limit was changed slightly based on the reapplication. The old monthly average flow limit of 3,400 gallons per minute was increased to a new limit of 5.5 million gallons per day (3,819 gpm). The old yearly average of 1,200 gallons per minute was only slightly changed to 1.7 million gallons per day (1,181 gpm). The flow is limited to prevent the capacity of the system from being exceeded. Both the collection system capacity and the capacity of the infiltration ponds was considered in assigning these flow limits.

MONITORING REQUIREMENTS

Monitoring, recording, and reporting are specified to verify that the system is functioning correctly, that groundwater criteria are not violated, and that effluent limitations are being achieved (WAC 173-216-110). The discharge is monitored both at the end of pipe (effluent) and in the groundwater at three monitoring wells.

WASTEWATER MONITORING

The monitoring schedule is detailed in the proposed permit under Condition S2. Specified monitoring frequencies take into account the quantity and variability of the discharge, the lack of treatment, past compliance, significance of pollutants, and cost of monitoring. The effluent is monitored at sampling station 6653. A composite sampler and continuous meters for pH, conductivity, and flow are at this location. The composite sampler is used to take 24 hour composites of the discharge. Problems with the sampler and continuous monitoring have occurred in the past due to low flows. Ecology expects these problems to be solved during the term of the new permit.

GROUNDWATER MONITORING

The monitoring of ground water at the site is required in accordance with the Ground Water Quality Standards, Chapter 173-200 WAC. Ecology has determined that this discharge has a potential to pollute the groundwater. Therefore the Permittee is required to evaluate the impacts on ground water quality. Monitoring of the groundwater at the site boundaries and within the site is an integral component of such an evaluation. Groundwater monitoring is done at monitoring wells 699-42-37 (upgradient), 699-41-35 (downgradient), and 699-40-36 (downgradient). Since the wells were constructed, the groundwater flow potential has shifted to more of a southwesterly direction. This shift in potential flow gives some indication that well 699-49-35 may not be downgradient anymore, but the well may still be within the lateral spread of the discharge. There is no indication the effluent has reached any of the wells, and the effluent may not ever reach any of these wells, due to the Lower Mud Sequence. The wells do at least show that the effluent is not impacting the groundwater that is directly under the disposal site, which is all we can expect given the peculiar hydrogeologic conditions at this site.

COMPARISON OF MONITORING WITH THE EXISTING PERMIT ISSUED APRIL 18, 1995

The monitoring for this permit has been reduced from the monitoring required by the existing permit. All of the reductions in monitoring were based on the results of the last five years of monitoring. The reductions also took into account the potential environmental threat of each parameter and the likely sources of each parameter. The monitoring was also shifted to put more emphasis on the effluent, since the effluent may bypass the groundwater monitoring wells on its way to the aquifer and river.

Reductions in monitoring for organics include that all monitoring in the groundwater has been eliminated and monitoring has been either eliminated or reduced from monthly to quarterly in the effluent. For oil and grease, the monitoring in the effluent has been reduced from monthly to quarterly.

For radionuclides, monitoring for radium 226 and total radium was eliminated in the groundwater and the effluent, and tritium was added. Tritium was originally considered for addition based on the advice of the Permittee. The Permittee suggested that the exceptionally low levels of tritium in the groundwater beneath the 200 Area TEDF show the groundwater is virtually sequestered from Hanford Site influences. Because of the value of tritium in demonstrating the isolated nature of the groundwater, tritium analyses for all three wells were added to the permit as annual samples. These analyses will be compared with the quarterly tritium analyses from the effluent.

For metals, the monitoring was kept at quarterly in the groundwater, and reduced from weekly to monthly in the effluent. Cyanide monitoring was eliminated in the groundwater and the effluent. Monitoring for WTPH-G was also eliminated in both the groundwater and the effluent. Monitoring for water level in the groundwater was added on a quarterly basis.

The following table compares the monitoring requirements in the old permit with the monitoring requirements planned for the new permit.

MONITORING REQUIREMENTS TO DEMONSTRATE PERMIT COMPLIANCE

Constituent or Characteristic	Existing Groundwater Sample Type and Analysis Frequency	Proposed Groundwater Sample Type and Analysis Frequency	Existing Effluent Sample Type and Analysis Frequency	Proposed Effluent Sample Type and Analysis Frequency
Bis (2-ethylhexyl) phthalate	Grab-quarterly	Eliminate	Composite-4/month	Grab-1/quarter
Total trihalomethanes	Grab-quarterly	Eliminate	Grab-4/month	Grab-1/quarter
Carbon tetrachloride	Grab-quarterly	Eliminate	Grab-4/month	Grab-1/quarter
Chloroform	Grab-quarterly	Eliminate	Grab-4/month	Grab-1/quarter
Methylene chloride	Grab-quarterly	Eliminate	Grab-4/month	Grab-1/quarter
1,1,1-Trichloroethane	Grab-quarterly	Eliminate	Grab-4/month	Eliminate
Phenol	Grab-quarterly	Eliminate	Composite-4/month	Eliminate
Oil and grease	Not required	Not required	Grab-1/month	Grab-1/quarter
Tritium	Not required	Grab-annual	Not required	Grab-1/quarter
Gross alpha	Grab-quarterly	Grab-quarterly	Grab-1/month	Grab-1/month
Gross beta	Grab-quarterly	Grab-quarterly	Grab-1/month	Grab-1/month
Radium, sum of 226 and 228	Grab-quarterly	Eliminate	Grab-1/month	Eliminate
Radium 226	Grab-quarterly	Eliminate	Grab-1/month	Eliminate
Arsenic (total)	Grab-quarterly	Grab-quarterly	Composite-4/month	Composite-1/month
Cadmium (total)	Grab-quarterly	Grab-quarterly	Composite-4/month	Composite-1/month

Constituent or Characteristic	Existing Groundwater Sample Type and Analysis Frequency	Proposed Groundwater Sample Type and Analysis Frequency	Existing Effluent Sample Type and Analysis Frequency	Proposed Effluent Sample Type and Analysis Frequency
Chromium (total)	Grab-quarterly	Grab-quarterly	Composite-4/month	Composite-1/month
Iron (total)	Grab-quarterly	Grab-quarterly	Composite-1/month	Composite-1/month
Lead (total)	Grab-quarterly	Grab-quarterly	Composite-4/month	Composite-1/month
Manganese (total)	Grab-quarterly	Grab-quarterly	Composite-1/month	Composite-1/month
Mercury (total)	Grab-quarterly	Grab-quarterly	Composite-4/month	Composite-1/month
Chloride	Grab-quarterly	Grab-quarterly	Composite-1/month	Composite-1/month
Cyanide (total)	Grab-quarterly	Eliminate	Composite-4/month	Eliminate
Nitrate	Grab-quarterly	Grab-quarterly	Composite-1/month	Composite-1/month
Sulfate	Grab-quarterly	Grab-quarterly	Composite-1/month	Composite-1/month
Total dissolved solids	Grab-quarterly	Grab-quarterly	Composite-1/month	Composite-1/month
pH	Grab-quarterly	Grab-quarterly	Continuous	Continuous
Conductivity	Grab-quarterly	Grab-quarterly	Continuous	Continuous
Temperature	Grab-quarterly	Grab-quarterly	Not required	Not required
WTPH-G	Grab-quarterly	Eliminate	Grab-1/month	Eliminate
Flow	Not required	Not required	Continuous	Continuous
Water level	Not required	Quarterly	Not required	Not required
Quarterly is defined as the four quarters of the calendar year: January through March, April through June, July through September, and October through December.				

OTHER PERMIT CONDITIONS

REPORTING AND RECORDKEEPING

The conditions of S3 are based on the authority to specify any appropriate reporting and recordkeeping requirements to prevent and control waste discharges (WAC 273-216-110).

FACILITY LOADING

The flow criteria for this disposal facility are taken from the reapplication and past performance and are as follows:

Average monthly flow:	5.5 mgd
Average yearly flow:	1.7 mgd

The permit requires the Permittee to maintain adequate capacity to handle the flows and waste loading to the disposal facility (WAC 173-216-110[4]). For significant changes in loadings to the disposal facility, the permit requires a new application and an engineering report (WAC 173-216-110[5]).

OPERATIONS AND MAINTENANCE

The proposed permit contains condition S.5. as authorized under Chapter 173-240-150 WAC and Chapter 173-216-110 WAC. It is included to ensure proper operation and regular maintenance of equipment, and to ensure that adequate safeguards are taken so that constructed facilities are used to their optimum potential in terms of pollutant capture and treatment.

SOLID WASTE PLAN

Ecology has determined that the Permittee has a potential to cause pollution of the waters of the state from solid waste. This proposed permit requires, under the authority of RCW 90.48.080, that the Permittee maintain a solid waste plan designed to prevent solid waste from causing pollution of the waters of the state.

NON-ROUTINE AND UNANTICIPATED DISCHARGES

Occasionally, this facility may generate wastewater, which is not characterized in their permit application because it is not a routine discharge, and was not anticipated at the time of application.. These are typically clean waste waters but may be contaminated with pollutants. The permit contains an authorization for non-routine and unanticipated discharges. The permit requires a characterization of these waste waters for pollutants and examination of the opportunities for reuse. Depending on the nature and extent of pollutants in this wastewater and opportunities for reuse, Ecology may authorize a direct discharge via the process wastewater outfall for clean water, require the wastewater to be placed through a wastewater treatment process or require the water to be reused.

SPILL PLAN

Ecology has determined that the Permittee stores a quantity of chemicals that have the potential to cause water pollution if accidentally released. Ecology has the authority to require the Permittee to develop best management plans to prevent this accidental release under section 402(a)(1) of the Federal Water Pollution Control Act (FWPCA) and RCW 90.48.080.

The Permittee has developed a plan for preventing the accidental release of pollutants to state waters and for minimizing damages if such a spill occurs. The proposed permit requires the Permittee to keep the plan updated and submit major changes to the Ecology.

GENERAL CONDITIONS

General Conditions are based directly on state laws and regulations and have been standardized for all industrial waste discharge to groundwater permits issued by Ecology.

Condition G1 requires responsible officials or their designated representatives to sign submittals to Ecology. Condition G2 requires the Permittee to allow Ecology to access the system, production facility, and records related to the permit. Condition G3 specifies conditions for modifying, suspending or terminating the permit. Condition G4 requires the Permittee to apply to Ecology prior to increasing or varying the discharge from the levels stated in the permit application. Condition G5 requires the Permittee to construct, modify, and operate the permitted facility in accordance with approved engineering documents. Condition G6 prohibits the Permittee from using the permit as a basis for violating any laws, statutes or regulations. Conditions G7 and G8 relate to permit renewal and transfer. Condition G9 requires the payment of permit fees. Condition G10 and G11 describes the penalties for violating permit conditions.

RECOMMENDATION FOR PERMIT ISSUANCE

This proposed permit meets all statutory requirements for authorizing a wastewater discharge, including those limitations and conditions believed necessary to control toxics, and to protect human health and the beneficial uses of waters of the State of Washington. Ecology proposes that the permit be issued for five years.

REFERENCES FOR TEXT AND APPENDICES

Reapplication for State Waste Discharge Permit ST 4502 for the 200 Area Treated Effluent Disposal Facility (TEDF), August 1999, United Stated Department of Energy (USDOE), 99-EAP-462.

Implementation Guidance for the Ground Water Quality Standards, 1996, Washington State Department of Ecology, Ecology Publication # 96-02.

Quarterly Discharge Monitoring Reports for the 200 Area TEDF, April 1995 through September 1999 reporting periods, USDOE.

200 Area Treated Effluent Disposal Facility (Project W-049H) Wastewater Engineering Report, February 1992, USDOE, WHC-SD-W049H-ER-003, Rev. 0, Volumes 1 and 2.

Phase II Liquid Effluent Program (Project W-252) Wastewater Engineering Report and BAT/AKART Studies, September 1992, USDOE, WHC-SD-W252-ER-001, Rev. 0, and all subsequent Engineering Change Notices, 609362, 60936, and 607698.

Draft Groundwater Monitoring Plan for the Hanford Site 200 Area Treated Effluent Disposal Facility, September 1999, USDOE, PNNL-13032.

Draft Statistical Evaluation of Effluent Monitoring Data for the 200 Area Treated Effluent Disposal Facility, October 1999, USDOE, PNNL-XXXXX.

200 Area Treated Effluent Disposal Facility (ST 4502) Supplemental Permit Application, November 1996, USDOE, 97-EAP-001.

B Plant Wastewater Information, July 1996, USDOE, 96-EAP-199.

State Waste Discharge Permit Application for Industrial Discharge to Land, 200 East Area W-252 Streams, December 1993, USDOE, DOE/RL/93-61, Rev 0.

Groundwater Screening Evaluation/Monitoring Plan for the 200 Area TEDF (Project W-049), May 1995, USDOE, WHC-SD-EN-WP-012, Rev. 1, and subsequent Evaluation Reports.

Effluent Variability Study Results for the 200 Area TEDF (ST 4502), July 1996, USDOE, WHC-SD-LEF-EV-001, Rev. 0.

200 Area TEDF Discharge Permit ST 4502 Noncompliance Report, June 1996, USDOE, 96-EAP-131.

Noncompliance Report for Iron – State Waste Discharge Permit ST 4502, 200 Area TEDF, February 1997, USDOE, 97-EAP-296.

State Waste Discharge Permit ST 4502 Emergency Overflow Report for the 200 Area Treated Effluent Disposal Facility (TEDF), June 1999, USDOE, 99-EAP-374.

Noncompliance Report Regarding the State Waste Discharge Permit ST 4502 Excursion for Iron, Manganese, and Chromium, September 1999, USDOE, 99-EAP-478.

Noncompliance Report Regarding the Sate Waste Discharge Permits ST 4500 and ST 4502, November 1999, USDOE, 00-OS0-70.

Informational Update for the Waste Sampling and Characterization Facility (WSCF) Sample Analysis and Accreditation Issues, November 1999, USDOE, 00-OSS-071.

Noncompliance Report Regarding the State Waste Discharge Permit, ST 4502, Total Iron Exceedance on Monthly Average, December 1999, USDOE, 00-OSS-078.

Best Available Technology (Economically Achievable) Guidance Document for the Hanford Site, 1988, Westinghouse Hanford Company (WHC), WHC-EP-0137.

Hanford Site Stream Specific Reports, 1990, WHC, WHC-EP-0342, Addenda 1-33.

Site Evaluation Report - Site Screening, Evaluation, and Selection, Project W049-H, 200 Area Treated Effluent Disposal Basin, 1991, WHC, WHC-SD-W049H-SE-004, Rev. 0.

Site Characterization Report for the 200 Area Treated Effluent Disposal Facility (Project W-049H), WHC-SD-EN-SE-004, Rev. 0.

Functional Design Criteria (FDC), WHC-SD-W049H-FDC-001, Rev. 1.

Conceptual Design Report; 200 Area Treated Effluent Disposal Facility, Project W049H, WHC-SD-W049H-CDR-002, Rev. 1.

Preliminary Safety Evaluation, 200 Area Treated Effluent Disposal Facility, WHC-SD-W049H-PSE-001.

200 Area Treated Effluent Disposal Facility Project Management Plan, WHC-SD-W049H-PMP-001.

Verification of Source Controls for W049H Treated Effluent Disposal Facility, Milestone 17, September 23, 1994 and October 10, 1994, report of Joanne C. Chance, P.E., Nuclear Waste Program, Washington State Department of Ecology.

Hanford Site National Environmental Policy Act (NEPA) Characterization, December 1991, Pacific Northwest Laboratory (PNL), PNL-6415, Rev. 4, UC-600.

State Waste Discharge Permit Application, 200 Area Treated Effluent Disposal Facility (Project W-049H), August 1994, USDOE, DOE/RL-94-29, Revision 0.

Permit Writers Manual, Washington State Department of Ecology, Procedures for Writing Effluent Discharge Permits, Water Quality Program, Publication Number 92-109.

Water Quality Standards for Ground Waters of the State of Washington, Chapter 173-200 WAC, 10/31/90.

State Waste Discharge Permit Program, Chapter 173-216 WAC, 9/22/93.

Washington State Law, RCW 90.48.

State Waste Discharge Permit ST 4502 and Fact Sheet, issued April 18, 1995, Ecology.

Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities - Interim Final Guidance, 1989, Environmental Protection Agency (EPA), PB89-151047.

Technical Support Document for Water Quality-based Toxics Control, March 1991, EPA, Office of Water (EN-336), EPA/505/2-90-001, PB91-127415.

Implementation Memo No. 3, November 1993, Washington State Department of Ecology, Toxics Cleanup Program, No. 93-100.

Model Toxics Control Act, Cleanup Levels and Risk Calculation (CLARC II) Update, August 31, 1994, Washington State Department of Ecology, Publication No. 94-145.

Hanford Federal Facility Agreement and Consent Order, 4th Amendment, January 1994, by Washington State Department of Ecology, U.S. Environmental Protection Agency, U.S. Department of Energy, No. 89-10 Rev. 3.

Consent Order No. DE-91NM-177 for the Permitting of Liquid Effluent Discharges under the Washington Administrative Code (WAC) 173-216, December 1991.

APPENDICES

APPENDIX A--PUBLIC INVOLVEMENT INFORMATION

Ecology has tentatively determined to renew the permit of the applicant listed on page 1 of this fact sheet. The permit contains conditions and effluent limitations, which are described in the rest of this fact sheet.

Public notice of application was published on November 22, 1999 and November 29, 1999 in Tri-City Herald to inform the public that an application had been submitted and to invite comment on the reissuance of this permit.

Ecology will publish a Public Notice of Draft (PNOD) on February 9, 2000 in Tri-City Herald to inform the public that a draft permit and fact sheet are available for review. Interested persons are invited to submit written comments regarding the draft permit. The draft permit, fact sheet, and related documents are available for inspection and copying between the hours of 8:00 a.m. and 5:00 p.m. weekdays, by appointment, at the office listed below. Written comments should be mailed to:

Dave Dougherty
Water Quality Permit Coordinator
Department of Ecology
Kennewick Office
1315 W. 4th Avenue
Kennewick, WA 99336-6018

Any interested party may comment on the draft permit or request a public hearing on this draft permit within the thirty (30) day comment period to the address above. The request for a hearing shall indicate the interest of the party and reasons why the hearing is warranted. Ecology will hold a hearing if it determines there is a significant public interest in the draft permit (WAC 173-216-100). Public notice regarding any hearing will be circulated at least thirty (30) days in advance of the hearing. People expressing an interest in this permit will be mailed an individual notice of hearing.

Comments should reference specific text followed by proposed modification or concern when possible. Comments may address technical issues, accuracy and completeness of information, the scope of the facility's proposed coverage, adequacy of environmental protection, permit conditions, or any other concern that would result from issuance of this permit.

Ecology will consider all comments received within thirty (30) days from the date of public notice of draft indicated above, in formulating a final determination to issue, revise, or deny the permit. Ecology's response to all significant comments is available upon request and will be mailed directly to people expressing an interest in this permit.

Further information may be obtained from Ecology by telephone, (509) 736-3047, or by writing to the address listed above.

This permit was written by Dave Dougherty.

APPENDIX B—GLOSSARY

Alluvium--Sedimentary material deposited by flowing water, as in a riverbed or delta.

Ambient Water Quality--The existing environmental condition of the water in a receiving water body.

Average Monthly Discharge Limitation--The average of the measured values obtained over a calendar month's time.

Best Management Practices (BMPs)--Schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the State. BMPs include treatment systems, operating procedures, and practices to control: plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may be further categorized as operational, source control, erosion and sediment control, and treatment BMPs.

Bypass--The intentional diversion of waste streams from any portion of the collection or treatment facility.

Caliche--A hard soil layer cemented by calcium carbonate and found in deserts and other arid or semiarid regions.

Compliance Inspection - Without Sampling--A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations.

Compliance Inspection - With Sampling---A site visit to accomplish the purpose of a Compliance Inspection - Without Sampling and as a minimum, sampling and analysis for all parameters with limits in the permit to ascertain compliance with those limits; and, for municipal facilities, sampling of influent to ascertain compliance with the 85 percent removal requirement. Additional sampling may be conducted.

Composite Sample--A mixture of grab samples collected at the same sampling point at different times, formed either by continuous sampling or by mixing discrete samples. May be "time-composite"(collected at constant time intervals) or "flow-proportional" (collected either as a constant sample volume at time intervals proportional to stream flow, or collected by increasing the volume of each aliquot as the flow increased while maintaining a constant time interval between the aliquots.

Confidence Interval--A statistical range with a specified probability (ex. 95%) that a given parameter lies within the range.

Construction Activity--Clearing, grading, excavation and any other activity which disturbs the surface of the land. Such activities may include road building, construction of residential houses, office buildings, or industrial buildings, and demolition activity.

Continuous Monitoring –Uninterrupted, unless otherwise noted in the permit.

Engineering Report--A document, signed by a professional licensed engineer, which thoroughly examines the engineering and administrative aspects of a particular domestic or industrial wastewater facility. The report shall contain the appropriate information required in WAC 173-240-060 or 173-240-130.

Grab Sample--A single sample or measurement taken at a specific time or over as short period of time as is feasible.

Gross Alpha--A measurement of radioactive decay of an atomic nucleus by emission of an alpha (positively charged) particle.

Gross Beta--A measurement of radioactive decay of a high-speed electron or positron.

Industrial Wastewater--Water or liquid-carried waste from industrial or commercial processes, as distinct from domestic wastewater. These wastes may result from any process or activity of industry, manufacture, trade or business, from the development of any natural resource, or from animal operations such as feed lots, poultry houses, or dairies. The term includes contaminated storm water and, also, leachate from solid waste facilities.

Lognormal--Of, pertaining to, or being a logarithmic function with a normal distribution; where a logarithmic function is an exponential one, and a normal distribution is represented by a bell-shaded curve that is symmetrical about the statistical mean.

Maximum Daily Discharge Limitation--The highest allowable daily discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. The daily discharge is calculated as the average measurement of the pollutant over the day.

Method Detection Level (MDL)--The minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is above zero and is determined from analysis of a sample in a given matrix containing the analyte.

pH--The pH of a liquid measures its acidity or alkalinity. A pH of 7 is defined as neutral, and large variations above or below this value are considered harmful to most aquatic life.

Practical Quantitation Level (PQL)-- A calculated value normally about five times the MDL (method detection level). When a WAC 173-200 groundwater criterion is at a level less than the PQL, then an enforcement limit may be established at the PQL. Compliance cannot be determined at levels below the PQL, since by definition, this is the lowest level that an analytical laboratory can reliably detect. Compliance may not be definitively determined by using the PQL as a limit, but it will act as the first reliable and reproducible point which can be accurately measured.

State Waters--Lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, and all other surface waters and watercourses within the jurisdiction of the state of Washington.

Stormwater--That portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a storm water drainage system into a defined surface water body, or a constructed infiltration facility.

Technology-based Effluent Limit--A permit limit that is based on the ability of a treatment method to reduce the pollutant.

Total Dissolved Solids--That portion of total solids in water or wastewater that passes through a specific filter.

Water Quality-based Effluent Limit--A limit on the concentration of an effluent parameter that is intended to prevent pollution of the receiving water.

APPENDIX C--TECHNICAL CALCULATIONS

ENFORCEMENT LIMIT DERIVATION SUMMARY

Constituent or Characteristic	Enforcement Limit	Point of Compliance	Type of Limit	Rationale/ Method of Derivation
Bis (2-ethylhexyl) phthalate	10 µg/l	Effluent	Water quality-based	Criteria too low to discern (reliably) in laboratory. Limit set at PQL.
Total trihalomethanes	20 µg/l	Effluent	Technology-based	Criteria met. Limit set at lowest level achievable in effluent by source and technology controls. Limit set at PQL.
Carbon tetrachloride	5 µg/l	Effluent	Water quality-based	Criteria too low to discern (reliably) in laboratory. Limit set at PQL.
Chloroform	7 µg/l	Effluent	Water quality-based	Limit set at criteria.
Methylene chloride	5 µg/l	Effluent	Technology-based	Criteria met. Limit set at PQL, which also happens to be the criteria..
Arsenic	15 µg/l	Effluent	Water quality-based	Criteria too low to discern (reliably) in laboratory. Limit set at PQL
Cadmium	5 µg/l	Groundwater	Technology-based	Criteria met. Limit set at PQL.
Chromium	20 µg/l	Effluent	Technology-based	Criteria met. Limit set at PQL. Background groundwater value may exceed criteria.
Iron	300 µg/l	Effluent	Water quality-based	Criteria normally met. Background groundwater value may exceed criteria.
Lead	10 µg/l	Groundwater	Technology-based	Criteria met. Limit set at PQL.
Manganese	50 µg/l	Effluent	Technology-based	Criteria met. Limit set at PQL.

Constituent or Characteristic	Enforcement Limit	Point of Compliance	Type of Limit	Rationale/ Method of Derivation
Mercury	2 µg/l	Effluent	Technology-based	Criteria met. Limit set at PQL.
Chloride	58,000 µg/l	Effluent	Technology-based	Criteria met. Limit set at as low a level as source and technology controls can achieve.
Nitrate (as N)	620 µg/l	Effluent	Technology-based	Criteria met. Limit set at as low a level as source and technology controls can achieve.
Total dissolved solids	250,000 µg/l	Effluent	Technology-based	Criteria met. Limit set at as low a level as source and technology controls can achieve.
pH, in pH units	6.5 to 8.5	Groundwater and Effluent	Water quality-based	Criteria met. Range provided due to natural variability in groundwater.

TECHNICAL METHODOLOGY

The following equation was used to calculate the theoretical concentration at which a carcinogen would cause an increased risk of one additional cancer case in every one million persons exposed.

$$\text{Groundwater criteria, ppb} = \frac{\text{RISK x BW x LIFE x UCF}}{\text{CPF x DWIR x DUR}} = 0.08167/\text{CPF}$$

Where the terms are defined as follows:

RISK = human cancer risk level (1 in 1,000,000)
BW = body weight (70 kilograms)
LIFE = lifetime (70 years)
UCF = unit conversion factor (1,000 micrograms per milligram)
CPF = cancer potency factor from EPA's Integrated Risk Information System database.
DWIR = drinking water ingestion rate (2 liters per day)
DUR = duration of exposure (30 years)

Volatile carcinogens incorporate inhalation from showering as a potential exposure route by doubling the drinking water ingestion rate.

Five carcinogens are potentially present in the effluent. The effects were assumed to be additive, and the following equation was used:

Maximum Concentration, ppb = 1/n 0.08167/CPF(1) + 1/n 0.08167/CPF(2)

+....1/n 0.08167/CPF(n)

which estimates a total risk of 1 in 1,000,000.

This theoretical calculation resulted in a concentration which is much lower than reliably measurable by laboratories (the summed PQLs). Hence, this evaluation did not result in modification of enforcement limits. The limits for carcinogens are set at the PQL or at the groundwater quality standard.

APPENDIX D--RESPONSE TO COMMENTS