INEEL/EXT-01-00538

Status Update for Implementing Best Available Technology per DOE Order 5400.5

September 2001

Idaho National Engineering and Environmental Laboratory
Bechtel BWXT Idaho, LLC

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Idaho National Engineering and Environmental Laboratory
Idaho Falls, Idaho 83415

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ABSTRACT

This report documents the Bechtel BWXT Idaho, LCC, operated facilities at the Idaho National Engineering and Environmental Laboratory that require the Best Available Technology selection process in accordance with Department of Energy Order 5400.5, Chapter II (3), "Management and Control of Radioactive Materials in Liquid Discharges."[1] This report differs from previous reports in that only those liquid waste streams and facilities requiring the Best Available Technology selection process will be evaluated in detail. In addition, this report will be submitted to the DOE-ID Field Office Manager for approval in accordance with DOE Order 5400.5, Chapter II, Section 3.b.(1).

The report also identifies facilities addressed in last year's report that do not require the Best Available Technology selection process to be completed. These facilities will not be addressed in future reports.

This report reviews the following facilities:

- Auxiliary Reactor Area
- Idaho National Engineering and Environmental Laboratory Block Areas
- Central Facilities Area
- Idaho Nuclear Technology and Engineering Center
- Idaho Falls Facilities
- Power Burst Facility
- Radioactive Waste Management Complex
- Test Area North
- Test Reactor Area.

Three facilities (Central Facilities Area Sewage Treatment Plant, Idaho Nuclear Technology and Engineering Center Percolation Ponds and Test Area North/Technical Support Facility Disposal Pond) at the Idaho National Engineering and Environmental Laboratory required documentation of the Best Available Technology selection process. The Idaho Nuclear Technology and Engineering Center Percolation Ponds and Test Area North/Technical Support Facility Disposal Pond discharge wastewater that may contain process-derived radionuclides to a soil column with average radionuclide concentrations below drinking water MCLs. At the request of the Department of Energy Idaho Operations Office, Bechtel BWXT Idaho, LLC has included the 73.5acre Central Facilities Area Sewage Treatment Plant land application site in Section 4 (Facilities Requiring BAT) of this report to ensure the requirements of DOE Order 5400.5, Chapter II, Section 3 are met. The Central Facilities Area Sewage Treatment Plant effluent may contain process-derived radionuclides. However, the average concentrations of these radionuclides are below MCLs.

According to DOE guidance, “If the liquid waste stream is below MCLs, this indicates that the goals of the Best Available Technology selection process are being met and the liquid waste stream is considered *clean water*. However, it is necessary to document this through the Best Available Technology selection process”.

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ACRONYMS

ARA	Auxiliary Reactor Area
BAT	best available technology
BBWI	Bechtel BWXT Idaho, LLC
BORAX	Boiling Water Reactor Experiment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFA	Central Facilities Area
CFR	Code of Federal Regulations
CTF/SMC	Contained Test Facility/Specific Manufacturing Capability
D&D	decontamination and decommissioning
DCG	Derived Concentration Guides
DOE	Department of Energy
DOE-ID	Department of Energy Idaho Operations Office
ER	Environmental Restoration
HLW	high level waste
ICARE	Issue Communication and Resolution Environment
INEEL	Idaho National Engineering and Environmental Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
IRC	INEEL Research Center
LOFT	Loss-of-Fluid-Test
MCL	maximum contaminant level
OU	operable unit
PBF	Power Burst Facility
pCi/L	picocuries per liter
PEWE	Process Equipment Waste Evaporator
RESL	Radiological and Environmental Services Laboratory
RI/FS	remediation investigation/feasibility study
ROD	Record of Decision
RWMC	Radioactive Waste Management Complex
STF	Sewage Treatment Facility
STP	sewage treatment plant
TAN	Test Area North
TSF	Technical Support Facility
TRA	Test Reactor Area
WAG	Waste Area Group
WERF	Waste Experimental Reduction Facility
WGS	Waste Generator Services
WLAP	Wastewater Land Application Permit
WRRTF	Water Reactor Research Test Facility
WMO	Waste Management Office

Status Update for Implementing Best Available Technology per DOE Order 5400.5

1. INTRODUCTION

This report documents the Bechtel BWXT Idaho, LCC (BBWI)-operated facilities at the Idaho National Engineering and Environmental Laboratory (INEEL) that require the Best Available Technology (BAT) selection process in accordance with Department of Energy (DOE) Order 5400.5, Chapter II (3), "Management and Control of Radioactive Materials in Liquid Discharges." [2] This report differs from previous reports in that only those liquid waste streams and facilities requiring the BAT selection process will be evaluated in detail. In addition, DOE-Idaho Operations Office (DOE-ID) will submit this report to their Field Office Manager for approval in accordance with DOE Order 5400.5, Chapter II, Section 3.b.(1).

A review of last year's "Status Update for Implementing Best Available Technology per DOE Order 5400.5" was performed. The purpose of the review was to determine those liquid waste streams and facilities (Section 4) that required documentation of the BAT selection process. Those liquid waste streams and facilities identified in last year's report that do not require this documentation are listed in Section 3. In addition, facilities were reviewed to determine if there were any previously unidentified liquid waste streams requiring the BAT selection process.

The BAT selection process, as identified in DOE Order 5400.5, Chapter II, Section 3.a.(1)(a), is applicable to the following liquid waste streams:

1. Per DOE Order 5400.5, Chapter II, Section 3.a., liquid wastes containing radionuclides from DOE activities which are discharged to surface water. The BAT selection process is used if the surface waters otherwise would contain, at the point of discharge and prior to dilution, radioactive material at an annual average concentration greater than the Derived Concentration Guide (DCG) values in liquids given in Chapter III of DOE Order 5400.5.

2. Per DOE Order 5400.5, Chapter II, Section 3.b.(1), liquid waste streams that will continue to be discharged to soil columns for indefinite periods and which contain **process-derived** radionuclides.

3. Per DOE Order 5400.5, Chapter II, Section 3.d., liquid wastes discharged from DOE activities into sanitary sewerage containing radionuclides at concentrations, averaged monthly, that would otherwise be greater than five times the DCG values for liquids at the point of discharge.

It was determined from the review that only those liquid waste streams meeting the criteria in Item 2 are being discharged at BBWI-operated facilities at the INEEL. Currently there are no liquid waste streams containing radionuclides that are being discharged to surface waters and no liquid waste streams discharged to a sanitary sewerage at greater than five times DCG values.

This report considers sources of liquid waste (wastewater) at the INEEL from:

- Sewage treatment plants (STP)
- Routine operations that produce process wastewater
- Septic tanks

- Storm water (to or from areas with potential radionuclide contamination)

- Nonroutine projects, such as environmental restoration (ER), decontamination and decommissioning (D&D), surveillance, and maintenance.

All wastewater contains some level of radionuclides. Radionuclides exist throughout nature, in rock, soil, water, and air, and therefore cannot be completely avoided. The primary focus of this report is to document those facilities that require the BAT selection process.

2. SITEWIDE OVERVIEW

The BAT selection process applies to those liquid waste streams that will continue to be discharged to soil columns for indefinite periods and which contain process-derived radionuclides. In addition, the DOE-ID has requested BBWI to include the 73.5-acre Central Facilities Area (CFA) STP land application site in Section 4 (Facilities Requiring BAT) of this report to ensure requirements of DOE Order 5400.5, Chapter II, Section 3 are met. Small quantities of radioactive tracers are used when analyzing bio-assay samples. The wastewater from these analyses is then discharged into the CFA STP. Below, DOE-Headquarters has provided the following guidance[a]:

1. If a liquid waste stream is below one DCG and BAT is being implemented, the discharge is considered to be *clean water* (from a radiological standpoint) and not a discharge to a soil column under DOE Order 5400.5. That is, the soil column is not functioning as a *treatment system* to remove radionuclides.

2. If the liquid waste stream meets BAT (determined there is no need for further treatment or process modifications required to reduce radionuclide concentrations) and is below one DCG but is above maximum contaminant levels (MCLs), it is acceptable to discharge *clean water* to the soil.

3. If the liquid waste stream is below MCLs, this indicates that the goals of the BAT selection process are being met and the liquid waste stream is considered *clean water*. However, it is necessary to document this through the BAT selection process.

A number of different references or screening values have been used at the INEEL to evaluate wastewater for it's associated risk to human health and the environment. Four of these references are DCGs,[2] drinking water standards,[3] 10 Code of Federal Regulations (CFR) 20 "Standards for Protection Against Radiation,"[4] and release levels from the draft *INEEL Management Guidance for Disposal of Wastewater.*[5] The objective is to meet DOE requirements, protect human health, and minimize potential future environmental characterization and cleanup liability at INEEL wastewater disposal sites. Wastewater evaluations are currently performed on a case-by-case basis on wastewater discharged to the soil column. Otherwise, the owner must use an alternative means of disposal.

Drinking water standards (MCLs) (1976 published numerical limits based on 4 mrem/yr dose to critical organs[6]) are currently the primary standard used at BBWI-controlled facilities at the INEEL for evaluating protocol for a wastewater release to a soil column. If a wastewater has a radionuclide concentration below applicable drinking water standards, then the wastewater is considered clean water (from a radiological standpoint) and is safe for disposal to a soil column. Exceptions may be authorized by DOE-ID on a case-by-case basis.

The Central Facilities Area (CFA) STP, Idaho Nuclear Technology and Engineering Center (INTEC) Percolation Ponds and the Test Area North/Technical Support Facility (TAN/TSF) Sewage Treatment Facility (STF) Disposal Pond were determined to require documentation of the BAT selection process. The average radionuclide concentrations in the effluent discharged to these three facilities are below MCLs. As indicated above in item #3, the goals of the BAT selection process are being met and the waste stream is considered clean water from a radiological standpoint. However, it is necessary to document this through the BAT selection process.

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a. E-mail note from James R. Cooper, DOE-ID, to Brett R. Bowhan, R. M. Kauffman, etc., subject "Perc Pond Update", dated February 5, 2001, 10:38 am.

Documentation of the BAT selection process is applicable to the INTEC Percolation Ponds and the TAN/TSF STF Disposal Pond due to the potential (although small) for inadvertent releases (e.g. equipment failures) of radionuclides to these facilities. In addition, these facilities may be used for disposal of individual waste streams containing process-derived radionuclides. Only those individual waste streams that have received the appropriate approval may be discharged. At the request of DOE-ID, documentation of the BAT selection process for the CFA STP is also being included in this report. Documentation of the BAT selection process is applicable to the CFA STP due to discharge of wastewater containing radioactive tracers used in certain analytical procedures.

2.1 BAT Selection Process

Typically, selection of BAT for a specific application will be made from among candidate alternative treatment technologies which are identified by an evaluation process in accordance with DOE Order 5400.5, Chapter II, Section 3.a.(1)(a) that includes factors related to technology, economics, and public policy considerations.

BAT analyses are difficult to express quantitatively because the factors do not have a common denominator. However, consideration of the factors will permit qualitative evaluations which will help support judgements.

3. FACILITIES AND ACTIVITIES NOT REQUIRING BAT

The specific facilities and activities (including storm water runoff) listed below were previously addressed in the "Status Update for Implementing Best Available Technology per DOE Order 5400.5," dated May 2000. The INEEL has evaluated these facilities and activities and determined that the BAT selection process does not apply (i.e., no continuing discharge of process-derived radionuclides to a soil column). However, for this report, an overview of those sites considered to have radiological concerns in last year's Status Update report will be given. Next year's annual Status Update report will only include sites that require the BAT selection process.

3.1 Auxiliary Reactor Area Facilities

There are no continuing discharges of process-derived radionuclides to the soil column from the Auxiliary Reactor Area (ARA) facilities listed below. Except for ARA-IV, the ARA facilities are under the Decommission and Decontamination Group's administrative control.[a] The ARA sites are listed below:

<u>ARA-I and ARA-II sites</u>:

- ARA-01 includes chemical evaporation ponds ARA-744 and ARA-745. Both disposal ponds are inactive, with no liquid waste going to them.

- ARA-02 includes the ARA-737 septic tanks and a seepage pit (ARA-746). The contents of the ARA-737 septic tanks, influent lines to the tanks, and ARA-746 seepage pit have been removed.

- ARA-16 site is an underground storage tank (ARA-729). The ARA-729 underground storage tank, concrete vault, and associated contaminated soil and piping will eventually be removed. The sludge and liquid have been removed from the tank. The liquid has been stabilized and will be shipped to RWMC for disposal. The sludge will be sent off-site for further treatment and disposal.

- ARA-23 consists of contaminated surface and subsurface structures (excluding ARA-III structures).

- ARA-25 consists of contaminated soils beneath the ARA-626 Hot Cells.

<u>ARA-III sites</u>:

- ARA-740 consists of a septic tank and distribution box in the ground. The contents have been characterized, removed and disposed in accordance with all regulatory requirements. The structures have been filled with earth and abandoned in place.[b]

- ARA-12 is an inactive disposal (leaching) pond. Wastewater piping, including a storm-water culvert that led to the pond, have either been disconnected or capped. The pond will be managed through institutional controls until remediation is accomplished.

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a. C. A. Major, communication with F. L. Webber, Lockheed Martin Idaho Technologies Company, WAG-5 Manager, April 2000.

b. E-mail note from D. H. Preussner, Bechtel BWXT Idaho, LLC, "Status Update for Implementing Best Available Technology per DOE Order 5400.5," dated July 26, 2001, 1:40 pm.

ARA-IV sites:

- There are two septic tanks associated with ARA-IV. One has had the contents removed and the structure filled with earth and abandoned in place.[a] The other is currently active. Historical information from operations indicates that neither septic tank is a radiological concern.

- ARA-21 was a leaching pit contaminated with radionuclides. The leaching pit was removed and the area backfilled.[7,b]

3.2 INEEL Block Areas

Block areas include buildings or structures not within fenced facilities or administrative areas. The INEEL is geographically divided into numerous block areas, some of which have mini-facilities and/or small operations. There are no continuing discharges of process-derived radionuclides to the soil column from the Block Facilities listed below:

- The original Boiling Water Reactor Experiment (BORAX) I Reactor has undergone D&D, the Record of Decision (OU 5-05/6-01 ROD) regarding it is finalized, the site has been capped, and the facility (BORAX I reactor burial site) is now under surveillance and maintenance by the respective ER WAG organization. In addition, the potential for radionuclide release from this facility is very low, because remediation work on this former facility is finished.[c]

- The BORAX II-V Reactor Facility (also referred to as the BORAX-09 site) will be addressed in the WAG-10 OU 10-04 Record of Decision. A risk assessment and feasibility study will be undertaken to determine final disposition of this facility. The facility has a temporary Herculite cover, but is in need of replacement.

- Experimental Breeder Reactor-I had four septic tanks. The two Waste Management Office (WMO) tanks were removed; the remaining two tanks are still operating. The contents of the two operating tanks have been characterized as not radiologically contaminated.[d] The seepage pit for the former WMO septic tanks had some radiological contamination, but it was remediated, and the contaminated soil, brick, and piping were sent to the Radioactive Waste Management Complex for disposal.[e]

3.3 Central Facilities Area

There are no continuing discharges of process-derived radionuclides to the soil column from the CFA Facilities listed below:

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a. E-mail note from D. H. Preussner, Bechtel BWXT Idaho, LLC, “Status Update for Implementing Best Available Technology per DOE Order 5400.5,” dated July 26, 2001, 1:40 pm.

b. C. A. Major, communication with G. E. Korth, Lockheed Martin Idaho Technologies Company, April 1999.

c. C. A. Major, communications with D. S. Vandel, Bechtel BWXT Idaho, LLC, May 2000.

d. B. D. Andersen, “Radiological Summary of EG&G Operated Septic Tanks at the INEL” Report to C. M. Bennett, Department of Energy-Idaho Operations, October 19, 1993.

e. C. A. Major, communication with T. N. Thiel, Lockheed Martin Idaho Technologies Company, April 1999.

- CF-617 Laundry and Respirator Facility, inactive since 1993, used to be a potential source of significant radionuclide discharges to the soil column. When operating, wastewater from the facility went to the CF-716 septic tank, led to the old CFA drainfield. Since closure, the wastewater lines to the old CF-716 septic tank have been capped.

- The old sewage treatment plant (CF-691), CF-716 septic tank, and lift station (part of WAG 4) were taken out of operation in 1995, underwent D&D, and were removed in 1999. No residual radionuclide contamination was found in the soil.[a] The drainfield, a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) site and also part of WAG 4, will most likely be remediated in 2003. The highest concentration of radiologically contaminated soil found in the OU 4-08 drainfield is Cs-137 at 180 pCi/g. As per the OU 4-13 Proposed Plan and Record of Decision (ROD), an evapotranspiration (ET) cover is the preferred alternative for remediation of the OU 4-08 Drainfield.

3.4 Idaho Falls Facilities

The only potential source for radionuclide discharge to the environment from the Idaho Falls facilities is at the INEEL Research Center (IRC) laboratories. To prevent inadvertent discharges, a hazard review is required by MCP-3571, "Independent Hazard Review" (IHR). The IHR provides the review process for all experimental work conducted at the IRC and IRC Complex facilities. The IHR review process is used to mitigate hazards associated with radiological releases to air, sewer system, or soil columns.[b] Sanitary wastewater goes to the City of Idaho Falls sewer system. All wastes with process-derived radionuclides are put in containers and shipped to an appropriate facility for disposal; no contaminated liquids go down sanitary sewer drains.[c]

3.5 Idaho Nuclear Technology and Engineering Center

There are no continuing discharges of process-derived radionuclides to the soil column from the Idaho Nuclear Technology and Engineering Center (INTEC) facilities listed below:

- The INTEC STP was constructed in 1980 to serve the INTEC facilities need for disposal of sanitary wastewater. Sanitary wastes, primarily from restrooms, showers, and the cafeteria are discharged to the STP. The STP consists of two aerated geo-textile lined lagoons, two geo-textile lined quiescent, facultative stabilization lagoons, and four rapid infiltration (RI) trenches. The effluent from the STP is discharged to one of the four RI trenches. Discharge to the RI trenches is rotated on a weekly basis. In 1991, a safety inspection identified drains from a personnel radiological decontamination shower and sink, located in building CPP-602, that were connected to the STP piping system (Occurrence Report # ID-WINC-ICPP-191-1024). The shower and sink were immediately taken out of service and the drain lines re-routed to the Process Equipment Waste line. All other decontamination shower and sink drain systems were examined. No similar connections to the STP were identified. In 1993, an upgrade to the STP was completed. The upgrade included replacement of the lagoon liners. To replace the liners, the sludge was removed

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a. C. A. Major, communication with T. N. Thiel, Bechtel BWXT Idaho, LLC, April 2000.

b. E-mail note from Kenneth L. Gilbert, BBWI, to M. G. Lewis, "Status Update for Implementing Best Available Technology per DOE Order 5400.5", dated 5/1/2001, 09:34 p.m.

c. C. A. Major, communication with J. M. Welch, Lockheed Martin Idaho Technologies Company, April 1999.

and disposed of in accordance with all applicable requirements. Since the completion of the upgrade project in 1993, there have been no known discharges of process-derived radionuclides to the STP.

- There are seven active septic tanks at INTEC (Table 1). Preliminary characterization of the active septic tanks using process knowledge has been completed.[8] Three of the septic tanks, VES-MA-107, VES-CA-101, and ST-SFE-102, were identified as meeting the "domestic sewage exclusion" under 40 CFR 261.4. Two other tanks, VES-CFE-6012 and VES-CFE-6013 are being considered for the exclusion.[a] In order to meet the "domestic sewage exclusion", only typical domestic waste and not process waste can be discharged to the system. The preliminary characterization concluded that these five tanks were not radioactively contaminated and in compliance with DOE Order 5400.5. However, it was determined during the preliminary characterization effort that two of the septic tanks, VES-MA-107 and VES-CW-100, required the collection of samples. Sampling of these two septic tanks has been completed and the data will be evaluated. Dependant on the results of the characterization for these two tanks, a determination will be made as to whether they will be included in this report for next year. Final approval of the characterization efforts has not been received.

- The old cesspool for buildings CPP-626 and CPP-603, which has been replaced with a septic tank system, has been sampled. Some radiological contamination was found, but it was investigated and declared a CERCLA no-action site, which ER now manages. The discharge lines from CPP-626 and CPP-603 leading to the old cesspool have been disconnected.

Table 1. Active septic tanks at INTEC.

Tank	Comments
VES-YDB-102	For CPP-T1 & T5
VES-MA-107	For CPP-662
VES-CW-100	For CPP-655
ST-SFE-102	New tank for CPP-626
VES-CA-101	For CPP-656
VES-CFE-6012	For CPP-687
VES-CFE-6013	For CPP-696 and overflow from VES-CFE-6012

3.6 Power Burst Facility

There are no continuing discharges of process-derived radionuclides to the soil column from the Power Burst Facility (PBF) listed below:

- There is no central sewage disposal facility at the PBF facility. Instead, there are seven septic tanks (Table 2) that are designed to receive only sanitary and janitorial wastewater. All seven septic tanks were characterized; none showed radionuclide levels above background levels.[9] It was determined in the 2000 Status Update that based on the above information and the implementation of administrative controls, there is no significant potential to discharge radionuclides to a soil column.

a. E-mail note from G. F. Beck, Bechtel BWXT Idaho, LLC, to M. G. Lewis, "Septic Tank Comments", dated July 31, 2001, 1:25 pm.

Table 2. Active septic tanks at PBF.

Tank	Comments
PBF-724	Control Area
PBF-744	Control Area
PBF-767	Control Area
PBF-728	Reactor Area
PBF-725	Waste Engineering Development Facility Area
PBF-726	Waste Experimental Reduction Facility (WERF) Area
PBF-727	Mixed Waste Storage Facility Area

3.7 Radioactive Waste Management Complex

The main wastewater stream from the RWMC is the sewage system effluent to the four wastewater ponds on the south side of the facility. Two of the sewage system disposal ponds have a geo-textile liner. The other two have high clay content soil liners. Geo-textile and clay-lined ponds are considered evaporation ponds and do not discharge to a soil column. There are no waste streams containing process-derived radionuclides discharged to the wastewater ponds.[a] Based on the results of a risk-based statistical evaluation of data from the disposal ponds, the radiological concern was low enough that radiological monitoring was discontinued at the ponds.[10]

3.8 Test Area North

There are no continuing discharges of process-derived radionuclides to the soil column from the Test Area North (TAN) Facilities listed below:

- The Specific Manufacturing Capability/Contained Test Facility pond is double-lined with high-density polyethylene and has interstitial monitoring to detect any leakage in the first liner. There is no discharge to a soil column from this facility. Effluent to the pond is monitored quarterly by a taking a grab sample; radionuclide levels have been below DCGs since the pond was put into operation.[b] Secondary heat exchangers are used in the processes at SMC to ensure that radiological contaminants are not accidentally discharged. Recently, liquid has been detected in the interstitial space of one of the cells of the pond. Discharges to that cell were rerouted and repairs were made in 2000. However, upon refilling, liquid was detected in the sump. Plans are to pump the water out before attempting to use the cell. Once the water is removed from the sump, the cell will be put back into use. The cell will be monitored to determine if the repairs were successful.[c]

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a. E-mail note from R. A. Hannah, BBWI, to M. G. Lewis, “RWMC Disposal Ponds”, dated July 19, 2001, 10:20 am.

b. C. A. Major, communication with M. J. Edwards, Bechtel BWXT Idaho, LLC, April 1999.

c. M. G. Lewis, communication with M. J. Edwards, BBWI, July 2001.

- At the Water Reactor Research Test Facility (WRRTF), the TAN-642A sewage wastewater and TAN-642B process wastewater ponds were constructed in 1981. Due to the limited number of personnel and operations at the facility, discharge volume to the ponds was low and intermittent. WRRTF is now being placed in a standdown condition. This includes discontinuing (shutting off) the potable water system. Projects are being relocated, and there are no current or anticipated future discharges to the wastewater ponds.

- The TAN area has septic systems servicing the Fire Station (TAN-687) and construction trailers (TAN-671 and 672). Septic systems receive only sanitary wastewaters and are located outside the TAN perimeter fence. There are no continuing discharges of liquid waste streams containing process-derived radionuclides from these tanks.

3.9 Test Reactor Area

The Test Reactor Area (TRA) facilities listed below have either been taken out of service, filled and capped, lined, or do not receive process-derived radionuclides, and are not considered as having the potential to discharge process-derived radionuclides to a soil column.

- The TRA-701 Chemical Waste Pond was taken out of service in April 1999, and was filled and capped with native soils during the summer of 1999. Effluent to the pond came from the treatment processes at the TRA demineralizer facility (TRA-608). When in operation, the pond was not a radiation-controlled area, and there were no radiological sources likely to have contributed to the wastewater stream.[11] Effluent samples taken generally showed no detectable radiological constituents.[a,b]

- The TRA-702 Cold Waste Pond, which consists of two cells, is not a radiation-controlled area. Operational monitoring includes a grab sample collected biweekly at TRA-764 which are subsequently analyzed for gross alpha and beta. In addition, Environmental Monitoring collects a 24-hour timed composite sample taken quarterly and analyzed for gross alpha, gross beta and gamma emitters. Samples taken generally show no detectable radiological constituents with the exception of gross beta and gross alpha which are at concentrations typically below MCLs.

- The old TRA-758 Warm Waste Leaching Pond was taken out of service and as an interim measure, capped with a layer of native soil in 1993. In 1999, a multi-layered engineered cover was placed over the pond. The TRA-758 Warm Waste Leaching Pond was replaced by the new TRA-715 Warm Waste Evaporation Pond.[c]

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a. C. A. Major, communication with T. A. Brock, Lockheed Martin Idaho Technologies Company, April 1999.

b. C. A. Major, communication with J. O. Brower, Lockheed Martin Idaho Technologies Company, May 1999.

c. C. A. Major, communication with O. Adams, Lockheed Martin Idaho Technologies Company, February 1998.

- The TRA-715 Warm Waste Evaporation Pond has two sections, both of which are double-lined with high-density polyethylene, and have an interstitial leak detection system. Effluent to the TRA-715 Warm Waste Evaporation Pond comes from low-level radioactive waste drains in laboratories, craft shops, and reactor facilities throughout TRA. Effluent streams are collected at the inlet distribution box of the TRA-712 Retention Basin. The TRA-712 retention basin (excluding the inlet portion) was taken out of service in 1993 because of leakage. The extent of the radionuclide contamination outside the basin is unknown. Current plans for the retention basin are to disconnect and cap the inlet distribution box and reroute piping directly to the pump station for the evaporation pond. However, the DOE redirected funding to perform this work scheduled for 2001 to another project. It is anticipated that the earliest funding will be available is fiscal year 2003. After that, the retention basin will be transferred to D&D.[a]

- The old TRA-624 STP and lagoons are out of service. The lagoons were a radiation-controlled area, and have been filled and capped with native soils under CERCLA action OU 2-13.[12] The sewage plant is scheduled for D&D. Without a wastewater stream, there is no potential for radionuclide discharges to the soil column.

- When originally built, the new TRA-735 and -736 Sewage Lagoon Ponds had compacted soil/polymer mixture liners. In 1996, it was determined that Pond 2 (TRA-736) had a leak. In 1997, the pond was drained and a geotextile liner installed, which corrected the leak and eliminated the potential to discharge to the soil column. Both Ponds 1 and 2 were designed as evaporation ponds and not to be used as soil columns. Radiological parameters in the effluent were less than 1% of applicable DCGs. As a result of that and an evaluation of previous historical data showing no risk, regular radiological monitoring was discontinued.[b,c]

3.10 Storm Water Runoff at INEEL Facilities

Last years report addressed storm water at the INEEL Block Areas, CFA, INTEC, PBF (SPERT 2 and 3, WERF), RWMC, TAN, and TRA. In the report, only storm water at the INTEC facility was of concern and it was recommended that the new storm water evaporation pond be constructed. This year's evaluation has determined that BAT does not apply to storm water runoff. In accordance with DOE Order 5400.5, Chapter II, Section 3, the requirements of BAT apply at the point of discharge from the conduit to the environment. Radioactive contamination found in storm water is the result of atmospheric deposition or the result of past operations or activities. Radioactive contamination resulting from past operations or practices is defined as Residual Radioactive Material per DOE Order 5400.5. Furthermore, the BAT selection process is only applicable to continuing discharges of process-derived radionuclides from liquid waste streams to a soil column. Exceptions to this definition may be determined by the regulating agency on a case by case basis. No discharges of this nature were identified at the INEEL.

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a. M. G. Lewis, communication with D. M. Ceci, Bechtel BWXT Idaho, LLC, July 2001.

b. C. A. Major, communication with D. M. Ceci, Lockheed Martin Idaho Technologies Company, April 1999.

c. C. A. Major, communication with M. A. Sorce, Lockheed Martin Idaho Technologies Company, April 1999.

4. FACILITIES REQUIRING BAT

The following sections describe applicable INEEL facilities (see Figure 1) that require the BAT selection process and their respective wastewater disposal sites, and review their potential to discharge radionuclides to a soil column, where applicable.

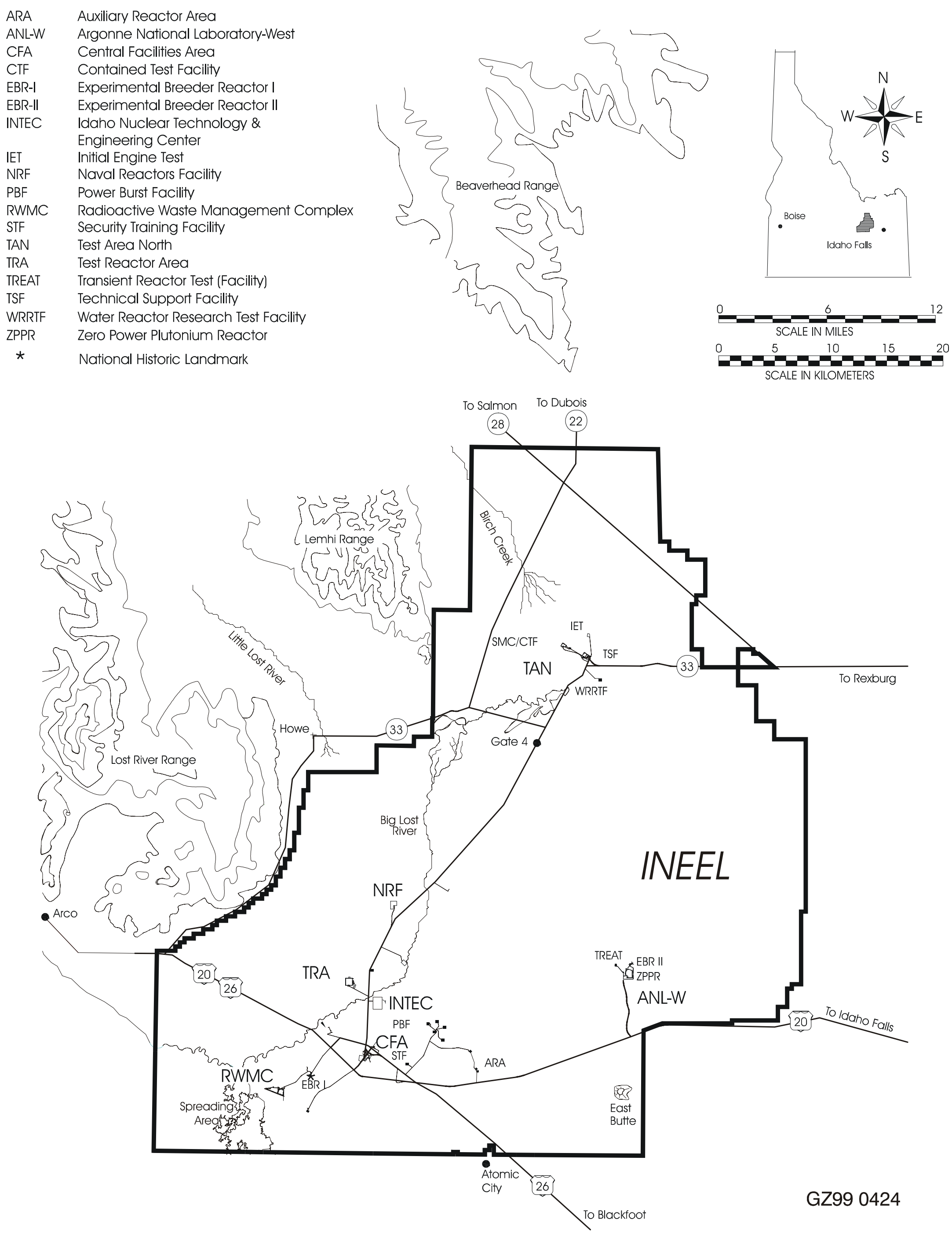

Figure 1. INEEL facilities.

4.1 CFA Facility Requiring BAT Selection Process

The CFA STP serves all major facilities at CFA. The STP is southeast of the CFA area, approximately 2,200 ft down gradient of the nearest drinking water well (Figure 2). Wastewater from the CFA STP is applied to a maximum of 73.5 acres (maximum of 65 acres when end gun is not in use) by a pivot sprinkler system. The CF-625 laboratory uses radionuclide tracers while performing bio-assay analyses. These radionuclides (considered process-derived) are discharged to the CFA STP. DOE-ID has requested the inclusion of the CFA STP into this section in order to ensure the requirements of DOE Order 5400.5, Chapter II, Section 3 are met.

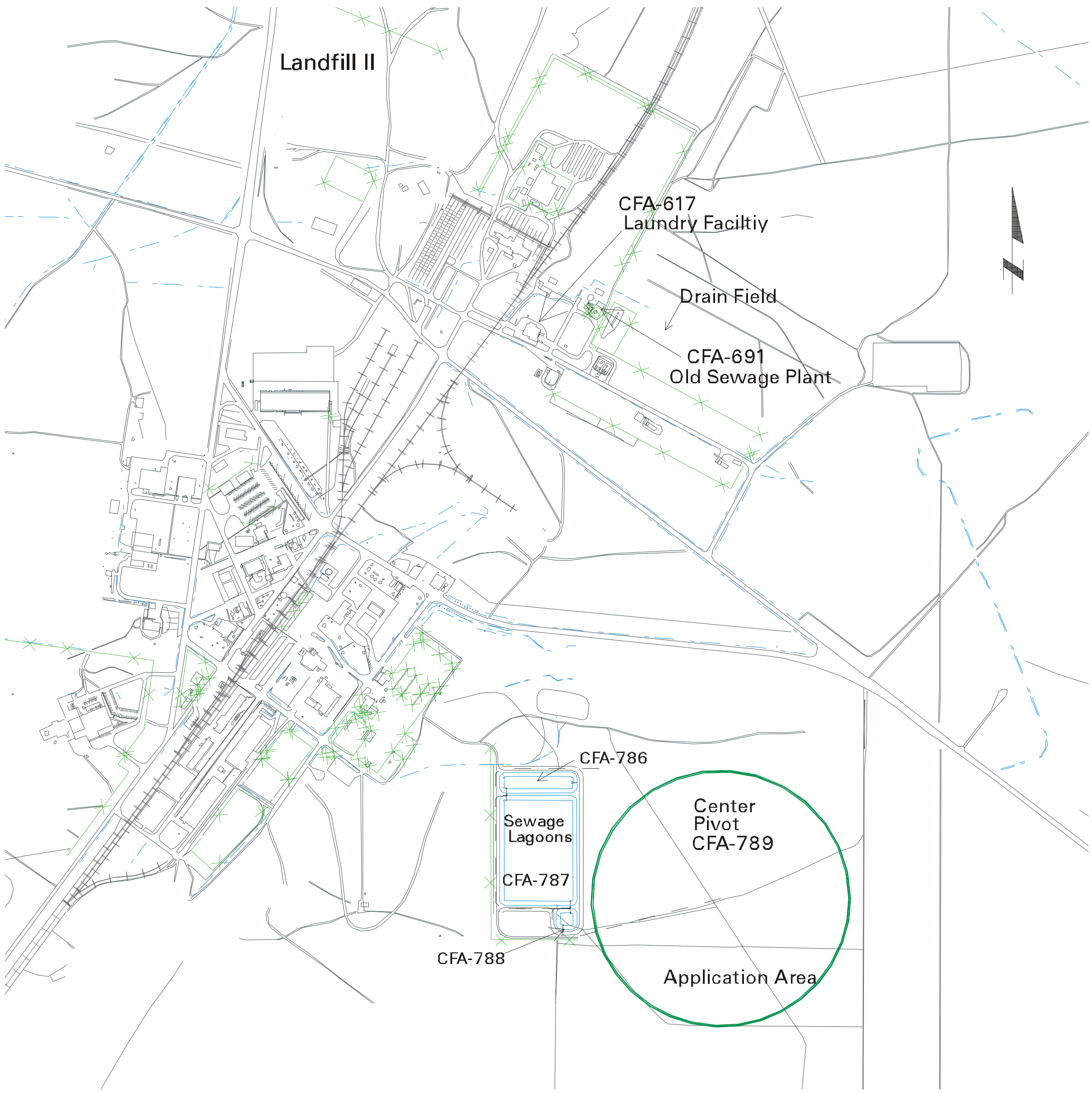

Figure 2. Map of CFA.

4.1.1 CFA STP General Information

The CFA STP was built in 1994 and put into service on February 6, 1995. It processes approximately 110,000 gallons per day (gpd) of water from sanitary sewage drains throughout the CFA. Wastewater is derived from restrooms, showers, and the cafeteria, a significant portion of which is comprised of non-contact cooling water from air conditioners and heating systems. This large volume of cooling water dilutes and weakens the wastewater effluent. Other contributing discharge sources include those from bus and vehicle maintenance areas, analytical laboratories, and a medical dispensary.

The STP consists of:

- 1-acre partial-mix, aerated lagoon (Lagoon No. 1)
- .9-acre facultative lagoon (Lagoon No. 2)
- 0.5-acre polishing pond (Lagoon No. 3)
- Sprinkler pivot irrigation system, which applies wastewater on up to 73.5 acres of native desert range land.

Under existing flow conditions, the winter storage capacity of the ponds has been at least 8 months worth. Three floating-type aerators mix, aerate, and agitate the wastewater within the cell of the first lagoon.

A 400-gallon-per-minute pump applies wastewater from the lagoons to the land through a computerized center pivot system. The center pivot operates at low pressures (30 lbs/in.^{2}) to minimize aerosols and spray drift. The WLAP limits wastewater application to 25 acre-in./acre/year from March 15 through November 15 and limits leaching losses to 3 in./year.[13]

4.1.2 Sources and Controls for Radionuclide Contamination

Analyses on bioassay samples (urine and fecal matter) are performed at the CF-625 laboratory. Minute quantities of radioactive tracers are added to the samples prior to the analysis. Therefore, the wastewater generated by performing these analyses, contain both process-derived and naturally occurring radionuclides. Approximately 550 gallons of this wastewater is generated annually and discharged to the CFA STP. It has been determined through analysis and process knowledge, the concentrations of radionuclides in the wastewater are below MCLs prior to discharge into the sewage system.[a]

4.1.3 Radiological Sample Results

A total of four samples were collected from the CFA-STF (CFA-STF is the designation for the sampling point located just prior to the wastewater being discharged to the sprinkler pivot) and analyzed for gross alpha in 1999 and 2000. All results were reported as undetected. All detection limits were less than 2.7 pCi/L, which is considerably less than the MCL of 15 pCi/L for gross alpha.

a. E-mail note from A. R. Bhatt, Bechtel BWXT Idaho, LLC, to M. G. Lewis, “Radionuclide Discharges to the CFA Sewage Treatment Plant”, dated September 4, 2001, 4:56 pm.

Cerium-144 (Table 3) was detected in one of the two samples taken in 1999 at a concentration of 45.7 pCi/L which is above the MCL of 30 pCi/L. However, the sample result was J flagged. A J flag indicates the radionuclide is considered to be present in the sample, but the result may be inaccurate or imprecise. The sample was not re-analyzed, so the actual concentration is unknown. To put this in perspective, the other sample collected in 1999 and the two samples collected in 2000 showed Ce-144 as undetected. The highest detection limit for these three samples was 9.37 pCi/L and well below the MCL. The 1999 average was also below the MCL. The 2000 average was not calculated because all results were below the detection limit. No other gamma emitters were detected.

Gross beta (Table 3) was detected in all samples collected in 1999 and 2000. The average for 1999 and 2000 was 7.84 pCi/L and 10.97 pCi/L, respectively. The 1999 and 2000 average and maximum gross beta results were all below the MCL of 15 pCi/L. It is expected that naturally occurring radionuclides found in sanitary waste are contributing to the gross beta concentrations.

Table 3. CFA STP effluent (CFA-STF) to the pivot sprinkler system radiological data summaries for years 1999 and 2000.[a]

Effluent	Parameter	1999 average [a,b]	2000 average [a,b]	1999 maximum [b,c]	2000 maximum [b,c]	# samples/ # detections from 1999 and 2000	MCL[d]
CFA-STF	Ce-144 (pCi/L)	20.37 (21.58)	NC[e]	45.70 (39.40) J[f]	NC[e]	4/1	30
CFA-STF	Gross Beta (pCi/L)	7.84 (1.23)	10.97 (2.07)	11.80 (2.24)	11.10 (2.76)	4/4	15

a. Averages (and associated uncertainties) are weighted. Calculations include less-than-detected results (those not considered statistically positive), including negative values.
b. Uncertainties are shown as 2 sigma.
c. Maximum is determined from detected results for the year.
d. Maximum Contaminant Level, 40 CFR 141.
e. Not calculated since all results for the year were less-than-detected.
f. The radionuclide is considered to be present in the sample, but the result may be inaccurate or imprecise.

4.1.4 Conclusion

The average concentrations of radionuclides found in the effluent from the CFA STP are below MCLs. As discussed in Section 2, wastewater below MCLs indicates that the goals of the BAT selection process are being met and that the wastewater is considered “clean” for radionuclides. However, it is necessary to document this through the BAT selection process.

Because of the already low concentration of radionuclides in the wastewater discharged from the CFA to the land application area, the cost consideration component of the BAT selection process precludes the need for additional treatment, since any additional treatment would be unjustifiable on a cost-benefit basis. Discharges of wastewater with radionuclide concentrations at or below drinking water standards are protective of human health and the environment.

All new discharges (other than from new projects) to the CFA STP that may contain process-derived radionuclides are evaluated by WGS. The mission of the WGS is “to provide the INEEL on-site and off-site waste generators with professional waste management services and to disposition legacy and newly generated waste in a safe, compliant, timely, and cost effective manner.” The WGS ensures the liquid waste will be disposed of in accordance with federal, state, and local regulations, and DOE Orders. For new projects, the generation of liquid waste is evaluated through the NEPA/Environmental Checklist process.

Before discharge of any new liquid waste streams containing process-derived radionuclides into the CFA STP, an evaluation will be performed as a Best Management Practice. To ensure the effluent discharged from the CFA STP is in compliance with DOE Order 5400.5, newly identified liquid waste streams must be below MCLs prior to discharge into the CFA STP. If the wastewater is above MCLs but below one DCG, the BAT selection process must be completed. The BAT selection process will determine if additional treatment of the wastewater is required prior to discharge.

4.2 INTEC Facilities Requiring BAT Selection Process

The main wastewater discharges to the environment from INTEC (see Figure 3) are the effluent from the sewage treatment plant to the rapid infiltration trenches and effluent from the Service Waste System to the Percolation Ponds.[a] Only the Service Waste System and Percolation Ponds require further consideration in this section. Documentation of the BAT selection process is applicable to the INTEC Percolation Ponds due to the potential (although small) for inadvertent releases (e.g. equipment failures) of radionuclides to this facility. In addition, this facility may be used for disposal of individual waste streams containing process-derived radionuclides. Only those individual waste streams that have received the appropriate approval may be discharged.

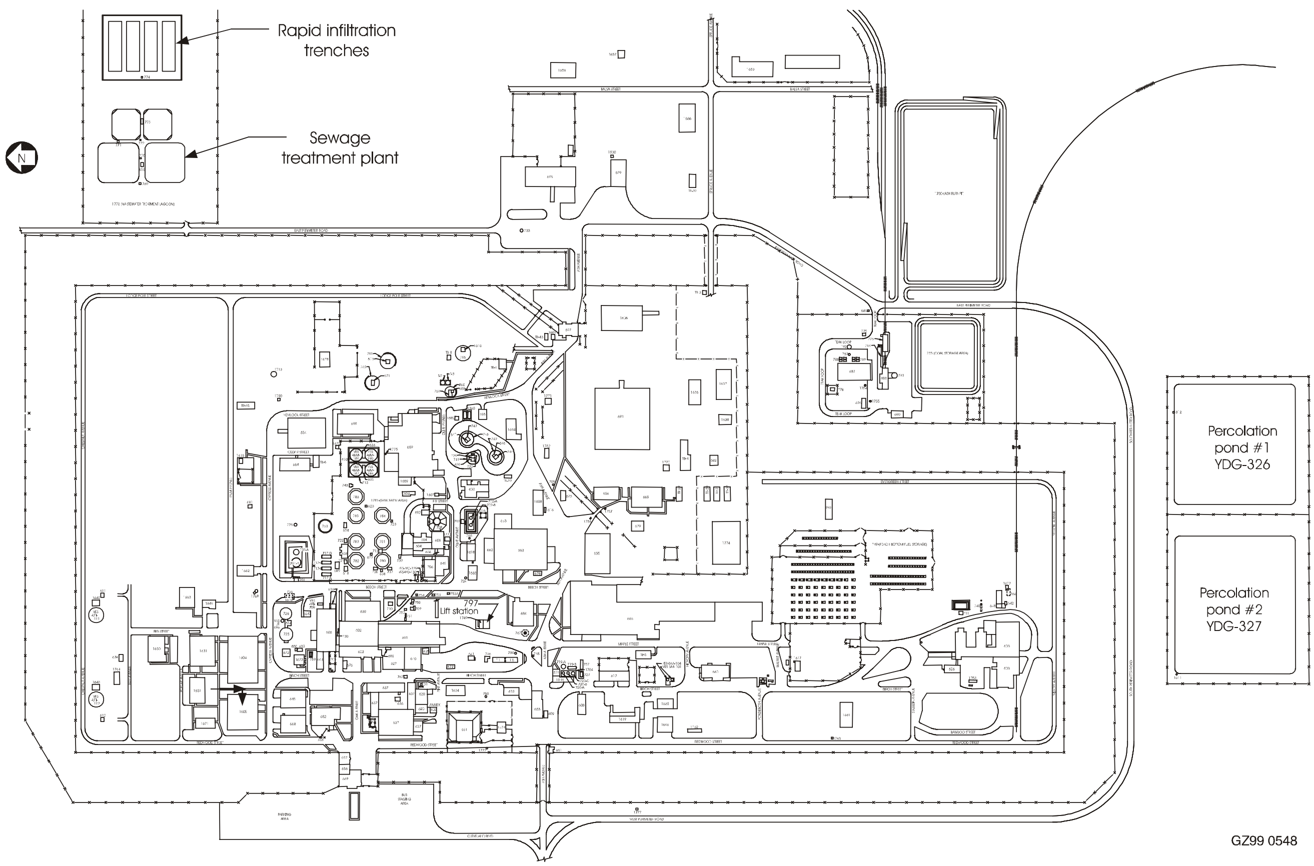

Figure 3. Map of INTEC.

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a. CPP = Chemical Processing Plant, former name of INTEC.

4.2.1 INTEC Service Waste and Percolation Pond General Information

The Service Waste System collects the process wastewater generated at the INTEC, consisting primarily of non-contact cooling water, steam condensate, reverse osmosis regenerate, water softener, boiler blowdown wastewater, and other nonhazardous liquids. The Service Waste System monitors the waste streams for radioactivity and transfers the waste to one of two large Percolation Ponds for surface disposal. The Service Waste System consists of collection headers, pipes, tanks, valves, pumps, monitoring and diversion stations (located in multiple buildings throughout INTEC), and two Percolation Ponds.[14]

Through 1986, service waste was disposed to an injection well. Beginning in 1984, the wastewater has been transferred to one of two percolation surface ponds. The injection well was used only sparingly during the three overlap years (1984–1986), and was in a standby mode until 1989. In 1989, the injection well was closed and capped. On September 20, 1995, the State of Idaho Division of Environmental Quality issued a WLAP for the service waste discharge to the INTEC Percolation Ponds. The WLAP, however does not regulate radionuclides.

Service waste includes only nonhazardous, nonradioactive (less than MCLs or less than one DCG with implementation of BAT) waste streams. Approximately 1.5 million gallons of service wastewater is discharged per day to the Percolation Ponds. Separate hazardous or radioactive wastewater from processes and laboratories are managed by the Process Equipment Waste (PEW) Evaporator (low-activity streams), the New Waste Calcining Facility – Evaporator Tank System (NWCF-ETS) (high-activity streams), the Tank Farm Facility tanks, or packaged and shipped to a treatment, storage, and disposal (TSD) facility. Sanitary wastes from restrooms and the INTEC cafeteria are either discharged to the INTEC STP or directed to on-site septic tank systems.

All service waste enters CPP-797, the final sampling and monitoring station, before discharge to the ponds. In CPP-797, the combined effluent is measured for flow rate and continuously monitored for radioactivity. Samples are also collected monthly for analyses. Wastewater is normally sent to only one of the two ponds at a time.

If the concentration of radioactivity in the service waste at CPP-797 exceeds the set threshold level of the continuous monitor, an alarm sounds, and an operator manually diverts the service waste flow to holding vessel VES-WM-191, usually in less than a minute. VES-WM-191 has a design capacity of approximately 300,000 gallons and would take approximately 2 to 8 hours to fill depending upon the processes in operation. During the diversion, the source of activity would be located and corrected. Radioactively contaminated wastewater would then be sent to the PEW system for disposal.

4.2.2 Interim Control Strategy and New Percolation Ponds

In order to support temporary continued discharge of service wastewater to the existing Percolation Ponds and demonstrate compliance for the new ponds, BBWI prepared an interim control strategy (ICS) for the DOE-ID pursuant to DOE Order 5400.5, Chapter II, Section 3.e(1).[14] The ICS is a documented exception to the liquid waste control requirements of the Order. The ICS was specifically required for the existing Percolation Ponds under DOE Order 5400.5, Chapter II, Section 3.c(2). This requires that "liquid discharges, even though uncontaminated, are prohibited in inactive release areas to prevent further spread of radionuclides previously deposited".

The basis for the ICS are 1) that existing wastewater discharges do not contain radionuclides above established limits; 2) the risk of inadvertent discharge of radionuclides above acceptable limits is acceptably low due to implementation of engineered barriers and the operation of a continuous monitoring and diversion system; and 3) discharges to the existing Percolation Ponds are required to be discontinued before December 2003 per the CERCLA ROD for OU 3-13, WAG 3.[15]

Construction of the new Percolation Ponds is underway at a new location approximately 2 miles southwest of the existing Percolation Ponds. This location was identified in the ROD. Operation of the new Percolation Ponds is expected to begin in 2002.

4.2.3 Sources and Controls for Radionuclide Contamination

Total radioactivity discharged from the Service Waste System averaged hundreds of curies per year through 1988, with tritium being the major contributor. Since 1989, total radioactivity in the service waste discharged to the Percolation Ponds averaged less than one curie per year. This large reduction is mainly due to two factors: (1) the INTEC no longer reprocesses spent nuclear fuel, and (2) the overhead condensates of the process equipment waste (PEW) evaporator are no longer discharged to the service wastewater stream. Since January 1993, the PEW evaporator overhead condensates have been sent to the Liquid Effluent Treatment and Disposal (LET&D) Facility for processing.

In the early 1990s, an effort was made to eliminate all potentially contaminated sources from discharging to Service Waste System. Floor drains were capped, piping was modified, and other physical barriers were implemented to ensure that no known sources of radionuclide contamination are inadvertently discharged to the service waste stream.

An engineering evaluation was performed in 2001.[16] The purpose of the evaluation was to determine the risk of inadvertent discharge of radiologically contaminated liquids into the Service Waste System. This evaluation sought to confirm the results of the earlier evaluation (described above) and identify any deficiencies due to subsequent modifications.

No discharges of process-derived radionuclide-contaminated solutions were identified. In general, INTEC facilities and processes have implemented sufficient engineered physical barriers to prevent inadvertent discharge of radionuclides to the Service Waste System in the event of an operational upset condition, except for two systems.

These two systems are the CPP-666 Sump SU-FT-148 and the CPP-602 LC-Area Sump. The CPP-666 sump is an open sump located in a radiological buffer area that could receive radiologically contaminated water solutions from a variety of locations throughout the CPP-666 facility. The sump is monitored continuously and automatically diverts the sump discharge to a holding tank if radioactivity is detected above 5000 counts per minute.

All of the service waste drains in CPP-602 are routed to the CPP-602 LC-Area Sump. The sump area is currently posted as a Contamination Area. The sump has smearable contamination of 1000 to 2000 disintegrations per minute. The source of contamination is unknown, but is believed to be the result of historical, not ongoing, activities.

INTEC is committed to correct these deficiencies before transition to the new Percolation Ponds. For the CPP-602 LC-Area sump, controls (administrative and engineering) will be implemented to ensure inputs to the sump are radiologically clean. In addition, the sump will be decontaminated or if the contamination is embedded in the concrete, sealed with epoxy or lined with stainless steel. INTEC plans to obtain funding, develop the design, and execute the corrective actions. For the CPP-666 sump, INTEC will redirect the effluent from the sump to the Process Equipment Waste system for processing in the evaporators.[a]

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a. E-mail note from K. C. Barton, Bechtel BWXT Idaho, LLC, to M. G. Lewis, “Status of Corrective Actions”, dated August 1, 2001, 4:04 pm.

All service wastewater flows to the Waste Monitoring Building (CPP-797). In CPP-797 the combined flows are measured, the effluent is continuously monitored for radioactivity, and samples are collected periodically for analyses. CPP-797 provides the last monitoring and sampling of the waste before it is discharged to the Percolation Ponds. If the concentration of radioactivity in the service waste at CPP-797 exceeds the set threshold level, an alarm sounds, and an operator manually diverts streams at CPP-752, -754, and/or -796 to holding vessel VES-WM-191, usually in less than a minute. Then the source of the contamination is located and eliminated.

Based on current information, a single source of radioactive contamination in the effluent cannot be determined with certainty. However, based on data currently available, the source of radioactive contamination in the Service Waste System may be from the raw water obtained from the production wells (CPP-01 and 02). Another possible, but unlikely source may be residual contamination from historical discharges of radionuclides that have accumulated in the Service Waste System piping and continue to leach into the effluent.

4.2.4 Radiological Sample Results

The concentration of chemicals and radionuclides in the service waste is determined from samples taken at the CPP-797 monitoring station. Samples are taken monthly in accordance with approved operating procedures and permits. In addition, ER conducted confirmatory monthly sampling for an expanded list of radionuclides from February 1999 through March 2000. Table 4 shows the average radionuclide concentration for the period of February 1999 through March 2000. The confirmatory monthly sampling showed that the service waste effluent was below MCLs.

Table 4 also presents the drinking water MCLs for comparison purposes. As observed in Table 4, the MCL for beta particle and photon radioactivity is 4 mrem/yr. It is defined as the concentration of man-made radionuclides causing a 4 mrem total body or organ dose calculated on the basis of a 2-liter per-day drinking water intake for 365 days per year. If two or more beta-emitting radionuclides are present in the wastewater, then the sum of all annual dose equivalents shall not exceed 4 mrem/year. In reality, to calculate an actual concentration of gross beta in wastewater, concentrations of all beta-emitting radionuclides must be measured and doses calculated for each beta-emitting isotope. After summing the doses, then comparison to the MCL is possible. As an alternate screening tool, the Federal Drinking Water Standards have provided general guidelines for comparison of gross beta measurements to a concentration rather than a dose. According to 40 CFR 141.26 (b)(4)(i), when monitoring for gross beta particle activity in water contaminated by effluent from nuclear facilities, if the gross beta particle activity in a sample exceeds 15 pCi/L, the same or equivalent sample shall be analyzed for Sr-89 and Cs-134. If the gross beta particle activity exceeds 50 pCi/L, an analysis of the sample must be performed to identify the major radioactive constituents present and the appropriate organ and total body doses shall be calculated to determine compliance with the MCL.

A statistical analysis was conducted (Zohner, letter report September 12, 2000) on the data to determine whether radioactivity detections were statistically positive. The statistical evaluation of this data concluded that the results for gross alpha, tritium, and I-129 were indistinguishable from zero. No gamma-emitting radionuclides were detected. Data for 1999 for gross beta and Sr-90 were statistically positive but below the corresponding MCL. Zohner concluded that small quantities of activity were detected in effluent but that all activity was well below any of the applicable regulatory standards for radionuclides.

Table 4. Radioanalytical results for the INTEC Service Waste effluent for February 1999 through March 2000[a].

Parameter	Average Concentration (pCi/L)[b]	MCL (pCi/L)[b]
Gross Alpha	0.61 (0.27)[c]	15
Gross Beta	5.1 (0.37)	15
I-129	0.12 (0.031)	1
Tritium (H^3)	0.0	20,000
Sr-90	0.31 (0.060)	8
Beta & Gamma Dose	0.62 (0.13) mrem/yr	4 mrem/yr

a. Radionuclide concentrations are averages for the period of February 1999 through March 2000 and include all data (negative and below detection levels).

b. Concentrations are in pCi/L unless specified otherwise.

c. Uncertainties (shown in parenthesis) are shown as 1 sigma.

4.2.5 Conclusion

Best Available Technology process has been implemented with installation of the LET&D Facility in 1993 designed to remove the majority of process-derived radionuclides. In addition, the effort in the early 1990s and the engineering evaluation in 2001 was undertaken to eliminate all potentially contaminated sources from inadvertently discharging to Service Waste System.

Evaluation of the February 1999 through April 2000 sampling data show that radioactivity was detected at minimum concentrations in the service waste effluent and was below MCLs. Only those data for 1999 showed that gross beta and Sr-90 concentrations were statistically positive. The INTEC HLW Operations continues to conduct routine monitoring for radionuclides.

Based on current information, a single source of radioactive contamination in the effluent cannot be determined with certainty. However, based on data currently available, the source of radioactive contamination in the Service Waste System may be from the raw water obtained from the production wells (CPP-01 and 02). Another possible, but unlikely source may be residual contamination from historical discharges of radionuclides that have accumulated in the Service Waste System piping and continue to leach into the effluent.[14]

The radionuclide concentrations in the effluent from the INTEC Service Waste System are below MCLs. As discussed in Section 2, this implies that the goals of the BAT selection process are being met and that the wastewater is considered “clean” for radionuclides. However, it is necessary to document this through the BAT selection process.

In addition, if a liquid waste stream is below one DCG and BAT is being implemented, the discharge is considered to be *clean water* and not a discharge to a soil column under DOE Order 5400.5. That is, the soil column is not needed as a *treatment system* to remove radionuclides. Implementation of BAT for the Service Waste System includes the LET&D facility, engineered barriers to prevent inadvertent discharge, and operation of a continuous monitoring and diversion system.[14]

Because of the already low concentration of radionuclides in the wastewater discharged through the Service Waste System to the Percolation Ponds, the cost consideration component of the BAT selection process precludes the need for additional treatment, since any additional treatment would be unjustifiable on a cost-benefit basis. Discharges of wastewater with radionuclide concentrations at or below drinking water standards are protective of human health and the environment.

All new discharges (other than from new projects) to the Service Waste System that may contain process-derived radionuclides are evaluated by WGS. The mission of the WGS is “to provide the INEEL on-site and off-site waste generators with professional waste management services and to disposition legacy and newly generated waste in a safe, compliant, timely, and cost effective manner.” The WGS ensures the liquid waste will be disposed of in accordance with federal, state, and local regulations, and DOE Orders. For new projects, the generation of liquid waste is evaluated through the NEPA/Environmental Checklist process.

Before discharge of any new liquid waste streams containing process-derived radionuclides into the Service Waste System, an evaluation will be performed as a Best Management Practice. To ensure the effluent discharged to the Percolation Ponds is in compliance with DOE Order 5400.5, newly identified liquid waste streams must be below MCLs prior to discharge into the Service Waste System. If the wastewater is above MCLs but below one DCG, the BAT selection process must be completed. The BAT selection process will determine if additional treatment of the wastewater is required prior to discharge.

4.3 TAN Facilities Requiring the BAT Selection Process

Only the TAN/TSF Disposal Pond (Figure 4) located southwest of the TSF requires a BAT evaluation. Documentation of the BAT selection process is applicable to the TAN/TSF STF Disposal

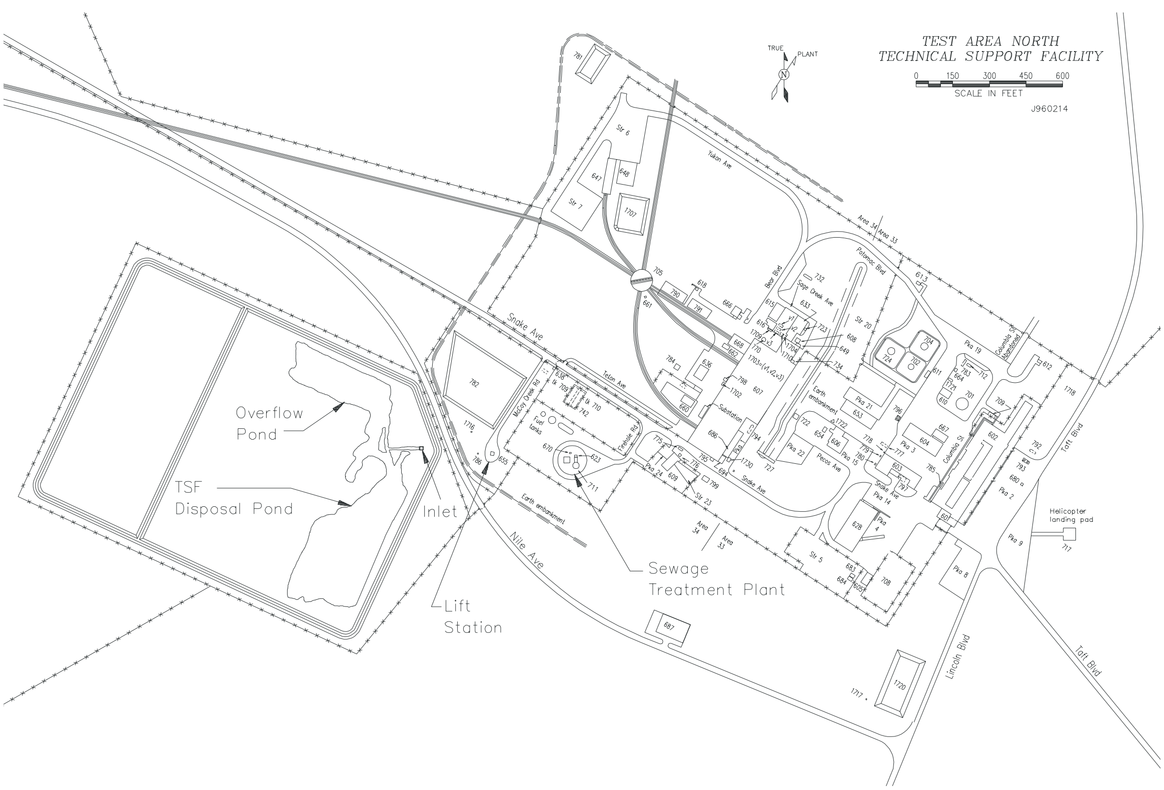

Figure 4.TAN/TSF Map.

Pond due to the potential (although small) for inadvertent releases (e.g. equipment failures) of radionuclides to this facility. In addition, this facility may be used for disposal of individual waste streams containing process-derived radionuclides. Only those individual waste streams that have received the appropriate approval may be discharged

4.3.1 TAN/TSF Sewage Treatment Facility Disposal Pond General Information

The TAN/TSF STF Disposal Pond is located southwest of the TSF area (Figure 4). The TAN/TSF sewage system collects and transports sanitary waste to the STP. Water is treated and discharged to the TAN/TSF STF Disposal Pond. Sewage or sanitary waste consists primarily of spent water containing wastes from rest rooms, sinks, and showers. The process drain system collects wastewater from process drains and building sources originating from various TAN/TSF facilities and transports the wastewater to a sump where it is commingled with treated sanitary water and then discharged to the TAN/TSF STF Disposal Pond. Process water collected from the process drain system is not treated by the sewage system; rather, the process water bypasses the plant and flows directly to the common sump (TAN-655). Wastewater discharged to the process drain includes steam condensate, boiler blow down, water softener regeneration, demineralizer regenerate solution, water tank discharge, cooling water, and pressure relief discharges.

The TAN/TSF STF Disposal Pond was constructed in 1971; before that, treated wastewater was disposed through an injection well. The Disposal Pond consists of a primary disposal area and an overflow section, both of which are located within an unlined, fenced 35-acre area. The overflow pond is rarely used, and is used only when the water is diverted to it for brief cleanup and maintenance periods. The Disposal Pond and overflow pond areas are approximately 39,000 ft^2 (0.9 acres) and 14,400 ft^2 (0.33 acres), respectively, for a combined area of approximately 53,400 ft^2 (1.23 acres). In addition to receiving treated sewage wastewater, the pond also receives process wastewater, which enters the facility at the TAN-655 lift station.

The TAN/TSF STF Disposal Pond is a WLAP facility. The WLAP flow limit to the Disposal Pond is 34 million gallons/year. The average daily flow to the Disposal Pond for permit year 2000 (November 1999 through October 2000) was 26,247 gallons/day. The total flow for permit year 2000 was 9.61 million gallons.

4.3.2 Interim Control Strategy for TAN/TSF Disposal Pond

It was verified on May 2, 2001, that an ICS was required for the TAN/TSF Disposal Pond in accordance with DOE Order 5400.5, Chapter II, Section 3.e(1). This requirement was entered into the Issue Communication and Resolution Environment (ICARE) tracking system on May 2, 2001. The ICARE system identifies the issue, assigns a responsible manager, and a completion date. The completion date assigned for the TAN/TSF Disposal Pond ICS is September 30, 2002.

4.3.3 Sources and Control of Radionuclides

The TAN-655 lift station was remediated in August–September 1993 as part of a CERCLA interim action.[a] However, there may be some residual radioactive contamination in the TAN/TSF process wastewater lines, which could result in some continued radiological contaminant discharges to the sewage treatment plant and Disposal Pond.

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a. C. A. Major, communication with T. S. Green, Lockheed Martin Idaho Technologies Company, December 3, 1996.

Because of past discharges and possible residual contamination in wastewater lines, sludge from the TAN/TSF STP normally has detectable amounts of radioactivity, and will, therefore, continue to be disposed of at the RWMC.

For years, the Loss-of-Fluid-Test (LOFT) structure at the Contained Test Facility had rainwater and snow melt entering the basement and migrating to one of the sumps with radiological contamination, creating an ongoing wastewater disposal concern. A number of solutions were tried to minimize rainwater and snow melt from entering the basement, such as capping select pipes and redirecting rainwater that had been leaking through the roof, but they were only partially successful. In calendar year 1998, collected water was transferred to the TAN-607 Storage Pool. That practice, however, was discontinued because of conductivity issues. Water with radionuclide levels less than drinking water MCLs will be disposed of to the TAN/TSF Disposal Pond. In 2000, water with levels greater than MCLs was first treated using a resin column, and with DOE-ID approval, discharged to the Disposal Pond. [a]

Before discharge of any new liquid waste streams containing process-derived radionuclides into the TAN/TSF STF, an evaluation will be performed as a Best Management Practice, using the three criteria listed in Section 2 of this report. To ensure the effluent discharged to the Percolation Ponds is in compliance with DOE Order 5400.5, newly identified liquid waste streams must meet one of the three criteria in Section 2.

4.3.4 Radiological Sample Results

Gross alpha was positively detected in three of the ten samples collected in 1999 through 2000. The maximum gross alpha results for both years 1999 and 2000 (Table 5) were less than 4 pCi/L and less than the MCL of 15 pCi/L.

Europium-155 (Eu-155) was the only gamma emitter detected in the ten samples collected in 1999 through 2000. Eu-155 was detected in one (taken in 1999) out of the ten samples at a concentration of 24.3 pCi/L and well below the MCL of 600 pCi/L.

Table 5. TAN/TSF Sewage Treatment Facility (TAN-655) effluent radiological data summaries for years 1999 and 2000.[a]

Effluent	Parameter	1999 average [a,b]	2000 average [a,b]	1999 maximum [b,c]	2000 maximum [b,c]	# samples/ # detections from 1999 and 2000	MCL[e]
TAN655	Eu-155 (pCi/L)	-0.90 (9.17)	NC[d]	24.30 (22.00) J	NC[d]	10/1	600
TAN655	Gross Alpha (pCi/L)	1.57 (0.76)	2.17 (0.80)	3.65 (1.23)	3.62 (1.88)	10/3	15
TAN655	Gross Beta (pCi/L)	8.68 (0.90)	10.80 (1.14)	15.90 (3.08)	25.60 (4.92)	10/10	15

a. Averages (and associated uncertainties) are weighted. Calculations include less-than-detected results (those not considered statistically positive), including negative values.
b. Uncertainties are shown as 2 sigma.
c. Maximum is determined from detected results for the year.
d. Not calculated since all results for the year were less-than-detected.
e. Maximum Contaminant Level, 40 CFR 141.

a. M. G. Lewis, communication with M. J. Edwards. Bechtel BWXT Idaho, LLC, August 2001.

The maximum concentrations for gross beta in 1999 (15.9 pCi/L) and 2000 (25.6 pCi/L) exceeded the MCL of 15 pCi/L. However, the average concentrations for gross beta for 1999 and 2000 were well below the MCL.

Similar to beta concentrations in the CFA STP effluent, it is likely that naturally occurring beta emitters in the sanitary waste are contributing to the total gross beta concentrations in the TAN/TSF STF effluent.

4.3.5 Conclusion

Major facility construction/expansion is not in the future for the TAN/TSF. Activities will be focused on deactivating facilities and completing ER activities. Increased discharges to the TAN/TSF STF Disposal Pond requiring upgrades are not expected.

The average concentrations of radionuclides found in the effluent from the STF are below MCLs. Although it is unclear, the higher levels of gross beta found in the wastewater may be the result of naturally occurring radionuclides in the sewage discharged to the STF.

As discussed in Section 2, wastewater below MCLs indicates that the goals of the BAT selection process are being met and that the wastewater is considered “clean” for radionuclides. However, it is necessary to document this through the BAT selection process.

Because of the already low concentration of radionuclides in the wastewater discharged to the TAN/TSF STF Disposal Pond, the cost consideration component of the BAT selection process precludes the need for additional treatment, since any additional treatment would be unjustifiable on a cost-benefit basis. Discharges of wastewater with radionuclide concentrations near drinking water standards are protective of human health and the environment.

All new discharges to the TAN/TSF STF containing process-derived radionuclides will be evaluated by WGS. The WGS assures the liquid waste will be disposed of in accordance with federal, state, and local regulations, and DOE Orders. For new projects, the generation of liquid waste is evaluated through the NEPA/Environmental Checklist process.

Before discharge of any new liquid waste streams containing process-derived radionuclides into the TAN/TSF STF, an evaluation will be performed as a Best Management Practice. To ensure the effluent discharged to the TAN/TSF Disposal Pond is in compliance with DOE Order 5400.5, newly identified liquid waste streams must be below MCLs for radionuclides prior to discharge into the TAN/TSF STF. If the wastewater is above MCLs but below one DCG, the BAT selection process must be completed. The BAT selection process will determine if additional treatment of the wastewater is required prior to discharge.

5. CONCLUSION

A review of last year's "Status Update for Implementing Best Available Technology per DOE Order 5400.5" was performed. The purpose of the review was to determine those liquid waste streams and facilities (Section 4) that required documentation of the BAT selection process. Two BBWI facilities, the INTEC Percolation Ponds and TAN/TSF STF Disposal Pond were determined to require documentation of the BAT selection process. In addition, the DOE-ID has requested BBWI to include the 73.5-acre CFA STP land application site into Section 4 (Facilities Requiring BAT) of this report to ensure requirements of DOE Order 5400.5, Chapter II, Section 3 are met.

The review concluded that these facilities were discharging minimal (typically below drinking water MCLs) concentrations of radionuclides (some of which may be process-derived) to a soil column. Guidance defined in Section 2 (item # 3), states "If the liquid waste stream is below MCLs, this indicates that the goals of the BAT selection process are being met and the liquid waste stream is considered clean water. However, it is necessary to document this through the BAT selection process". Section 4 of this report documents the BAT selection process for the CFA STP, INTEC Percolation Ponds and the TAN/TSF STF Disposal Pond in accordance with this guidance.

Those liquid waste streams and facilities identified in last year's report that do not require documentation of the BAT selection process are listed in Section 3. These liquid waste streams and facilities will not be addressed in subsequent reports.

In addition, newly generated liquid wastes containing process-derived radionuclide contamination will be evaluated as a Best Management Practice prior to disposal. Newly identified liquid waste streams must be below MCLs for radionuclides prior to discharge. For liquid waste streams that are below one DCG but above MCLs, the BAT selection process must be completed. The BAT selection process will determine if additional treatment of the wastewater is required prior to discharge. This will ensure compliance with DOE Order 5400.5 and also be protective of human health and the environment.

6. REFERENCES

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