Drinking Water Program 1992 Annual Report

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ABSTRACT

EG&G Idaho, Inc., initiated a monitoring program for drinking water in 1988 for the U.S. Department of Energy at the Idaho National Engineering Laboratory. EG&G Idaho structured this monitoring program to ensure that they exceeded the minimum regulatory requirements for monitoring drinking water. This program involves tracking the bacteriological, chemical, and radiological parameters that are required for a "community water system" (maximum requirements). This annual report describes the drinking water monitoring activities conducted at the 17 EG&G Idaho operated production wells and 11 distribution systems. It also contains all of the drinking water parameters that were detected and the regulatory limits that were exceeded during 1992. In addition, ground water quality is discussed as it relates to contaminants identified at the wellhead for EG&G Idaho production wells.

SUMMARY

The Drinking Water Program (DWP) annual report will focus on drinking water used at the Idaho National Engineering Laboratory (INEL). In addition, ground water quality will be discussed as it relates to the contaminants identified at the wellhead for EG&G Idaho production wells. The goal of the EG&G Idaho DWP is to comply with Environmental Protection Agency (EPA) and State of Idaho regulations, as well as applicable DOE orders.

Sampling is performed under the direction of EG&G Idaho's Environmental Monitoring (EM) Unit DWP. This program monitors all drinking water at EG&G Idaho operated facilities located at the INEL. During 1992, personnel conducted drinking water sampling at 17 EG&G Idaho operated production wells and 11 distribution systems.

The drinking water parameters sampled for in 1992 are monitored once every three years in accordance with community water system standards. These parameters are listed in the Idaho Regulations for Public Drinking Water Systems [Administrative Procedures Act (IDAPA) 16.01.08100,01., 04., and 12.] Semiannual monitoring for lead and copper was initiated in accordance with 40 CFR 141.80 through 141.90 during May and September of 1992. As of June 7, 1991, the lead and copper rule replaced the existing interim maximum contaminant level (MCL) of 0.050 mg/L for lead with a treatment technique action level of 0.015 mg/L. Also, proposed parameters for future regulations were monitored to help prevent future noncompliance issues.

Drinking water was monitored and analyzed for bacteriological, radiological, and chemical constituents. Sampling was conducted at production wellheads and distribution systems. The following production wells and distribution systems were sampled:

- Central Facilities Area (CFA) #1 well, #2 well, and distribution system

- Main Gate well and distribution system
- Power Burst Facility (PBF) #1 well, #2 well, and distribution system
- Experimental Breeder Reactor I (EBR-I) well and distribution system
- Gun Range well and distribution system
- Fire Station #2 well and distribution system
- Test Reactor Area (TRA) #1 well, #3 well, #4 well, and distribution system
- Test Area North/Test Support Facility (TAN/TSF) #1 well, #2 well, and distribution system
- TAN/Containment Test Facility (TAN/CTF) #1 well, #2 well, and distribution system
- TAN/Water Reactor Research Test Facility (WRRTF) well and distribution system
- Radioactive Waste Management Complex (RWMC) well and distribution system.

The State of Idaho and EPA require laboratories to be State of Idaho certified for drinking water analyses or have reciprocity with the State of Idaho (IDAPA 16.01.08100,10). The following laboratories were used for drinking water analyses:

- Montgomery Laboratory, located in Pasadena, California, conducted the chemical analyses.
- Alpha Analytical Laboratory, located in Sparks, Nevada, conducted the volatile organic compound analyses (monthly/quarterly).
- Accu-Lab Research, located in Golden, Colorado, conducted radiological analyses for tritium (quarterly).
- Lockheed Analytical Laboratory, located in Las Vegas, Nevada, conducted the lead and copper analyses (semiannual).

- Radiological and Environmental Sciences Laboratory (RESL), located at CFA-690, conducted monthly radiological analyses. Their data provide information for ground water quality assessment and the INEL Environmental Surveillance Program.
- The EG&G Idaho Environmental Hygiene Laboratory, located at CFA-612, conducted monthly bacteriological analyses.
- District 7 Health Department, located in Idaho Falls, conducted bacteriological analyses.

Note: Since the EPA audited both RESL and District 7 Health Department for laboratory certification for drinking water analyses, EG&G Idaho did not audit these two laboratories.

This annual report lists all drinking water parameters that were detected and the regulatory limits that were exceeded during 1992. The samples were analyzed using approved EPA drinking water methods as listed in the *Code of Federal Regulations* (40 CFR Parts 141-143). All data undergo technical review, data evaluation, and data assessment before being reported.

Maximum contaminant levels are levels established for primary drinking water standards by EPA Standards. The only parameters that were exceeded for 1992 were trichloroethylene (TCE) at the inactive water system of TAN/WRRTF and coliform bacteria at PBF (June and November), TRA (August and December), TAN/CTF (July and September), and TAN/TSF (July and August). TCE levels at the TAN/WRRTF system have remained constant since they were first detected in 1988. This well is used only to monitor water quality. Personnel at TAN/WRRTF use bottled water, and all drinking fountains have

been taken out of service and posted as nonpotable.

Investigations at TAN/TSF, TRA, and PBF where transition phase for determining the source of coliform bacteria have been completed and the actual source of the contamination could not be determined. The information obtained indicates that the coliform bacteria is related to water line deterioration from the older water systems at the INEL and stagnant water. Since TAN and PBF personnel work four ten-hour days, the water system is essentially not used from Thursday evening to Monday morning thus allowing bacteria to build up within the water systems. After the water systems containing the coliform bacteria were flushed, the test results were negative for coliform bacteria (that is, no coliform bacteria present).

In 1988, water samples collected at the well-head of the TAN/TSF #1 well exceeded the MCL established for TCE. A sparger system was installed into the TAN/TSF water system to reduce the TCE concentration to acceptable limits. The sparger system has corrected the excessive TCE concentrations and the water system is safe for drinking water.

Sample results from TAN/TSF #1 well are used for ground water quality assessment only and not for drinking water compliance purposes. Samples are collected from the distribution system to demonstrate compliance with the State of Idaho Drinking Water Regulations. Maximum contaminant level limits for TCE have not been exceeded since 1988 in the distribution system.

The data in this report have met the quality assurance objectives of the program (see Appendix A). Laboratories that were used during 1992 successfully passed a quality assurance and technical audit before samples were submitted to them.

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ACRONYMS

ALR	Accu-Lab Research	OMRE	Organic Moderate Reactor Experiment
CFA	Central Facilities Area	PBF	Power Burst Facility
CFR	Code of Federal Regulations	PCE	tetrachloroethylene
CT	carbon tetrachloride	QA	quality assurance
CTF	Containment Test Facility	RESL	Radiological and Environmental Sciences Laboratory
CY	calendar year	RSD	Relative Standard Deviation
DOE	U.S. Department of Energy	RWMC	Radioactive Waste Management Complex
DOE-ID	U.S. Department of Energy Idaho Operations Office	SDWA	Safe Drinking Water Act
DWP	Drinking Water Program	SMCL	secondary maximum contaminant level
EBR-I	Experimental Breeder Reactor I	STF	Security Training Facilities
EHL	Environmental Hygiene Laboratory	TAN	Test Area North
EM	Environmental Monitoring	TCA	1,1,1-trichloroethane
EPA	Environmental Protection Agency	TCE	trichloroethylene
ESRP	Eastern Snake River Plain	TTHM	total trihalomethane
ICPP	Idaho Chemical Processing Plant	TRA	Test Reactor Area
IDAPA	Idaho Administrative Procedures Act	TSF	Test Support Facility
INEL	Idaho National Engineering Laboratory	VOC	volatile organic compound
LAL	Lockheed Analytical Laboratory	WRRTF	Water Reactor Research Test Facility
MCL	maximum contaminant level		

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INTRODUCTION

The Snake River Plain aquifer, approximately 320 km (200 mi) long and 32 to 97 km (20 to 60 mi) wide, comprises an area of about 25,000 km² (9650 mi²), and is the source of groundwater that underlies the Eastern Snake River Plain (ESRP). The aquifer may contain as much as 2.5×10^{12} m³ (2×10^9 acre-ft) of water. Discharges of approximately 8×10^9 m³ (6.5×10^6 acre-ft) occur annually through springs in the Hagerman area, upstream from American Falls Reservoir and through irrigation well withdrawals. Discharges from the springs make a significant contribution to the flow of the Snake River downstream from Twin Falls, Idaho. Aquifer recharge occurs mostly from infiltration of ground irrigation water (6.3×10^9 m³, 5.1×10^6 acre-ft) and from valley underflow from the recharge area to the north and northeast of the ESRP (1.9×10^9 m³, 1.5×10^6 acre-ft).¹ Other contributions are from river seepage (1.6×10^9 m³, 1.3×10^6 acre-ft) and infiltration of precipitation (1.0×10^9 m³, 0.6×10^6 acre-ft).

The depth to the Snake River Plain aquifer varies from 61 m (200 ft) in the northeast corner of the Idaho National Engineering Laboratory (INEL) to 270 m (900 ft) in the southeast corner. The thickness of the aquifer is considered to be approximately 76 m (250 ft).² Ground water in the aquifer flows generally to the southwest, although locally the direction of flow is influenced by recharge from rivers, surface water spreading areas, and heterogeneities in the aquifer. Tracer studies at the INEL indicate that natural flow rates range from 1.5 to 6.1 m/d (5 to 20 ft/d). Aquifer transmissivities range from 3.7×10^5 to 2.2×10^8 L/d/m (3×10^4 to 1.8×10^7 gal/d/ft); storage coefficients range from 0.01 to 0.06.³

In 1988, in response to a U.S. Department of Energy Idaho Operations Office (DOE-ID)

request, EG&G Idaho, Inc., established an INEL Drinking Water Program (DWP). This program was established for sampling production wells and distribution systems on a routine schedule at facilities operated by EG&G Idaho. The DWP was structured to ensure that EG&G Idaho exceeded the minimum regulatory requirements for monitoring drinking water systems. Under the Idaho Regulations for Public Drinking Water Systems [Idaho Administrative Procedures Act (IDAPA) 16.01.08003,32.],⁴ EG&G Idaho drinking water systems are classified as "nontransient, noncommunity water systems." Regulations for such systems are less stringent than those required for "community water systems." However, EG&G Idaho has taken a proactive approach to water monitoring by adopting the more stringent regulations of a community water system classification. Regulations governing the DWP are discussed in greater detail in the Regulation section of this document.

Currently, the DWP monitors 17 wells and 11 distribution systems on a routine schedule at the INEL (see Figure 1 for a map of the INEL). Monthly or quarterly drinking water samples are collected from all water systems and are analyzed for the following: (a) radiological contamination, (b) volatile organic compounds (VOCs), (c) coliform bacteria, and (d) other chemical parameters.

Quarterly monitoring was conducted for total trihalomethanes (TTHM) at the CFA water system. TTHM monitoring is required for community water systems that chlorinate their water.

In addition, semiannual monitoring was initiated in 1992 for lead and copper levels, according to EPA's requirements (40 CFR 141.80 to 141.91). As of June 7, 1991, the lead-and-copper rule replaced the existing interim maximum contaminant level (MCL) of 0.050 mg/L for lead with a treatment technique action level of 0.015 mg/L.

ARA	Auxiliary Reactor Area
ANL-W	Argonne National Laboratory-West
CFA	Central Facilities Area
CTF	Contained Test Facility
EBR-I	Experimental Breeder Reactor I
EBR-II	Experimental Breeder Reactor II
ICPP	Idaho Chemical Processing Plant
IET	Initial Engine Test
NRF	Naval Reactor Facility
PBF	Power Burst Facility
RWMC	Radioactive Waste Management Complex
STF	Security Training Facility
TAN	Test Area North
TRA	Test Reactor Area
TREAT	Transient Reactor Test (Facility)
TSF	Technical Support Facility
WRRTF	Water Reactor Research Test Facility

✱ National Historic Landmark

Figure 1. INEL facilities.

Monthly water samples are collected and analyzed for gross alpha and beta radioactivity and tritium contamination. Radiological analyses are performed by the DOE's Radiological Environmental Sciences Laboratory (RESL), located at CFA-690. RESL provides the certified bottles for water sample collection and sends the sample analysis results to the DWP for ground water quality assessment purposes, as well as the INEL Environmental Surveillance Program.

The State of Idaho requires that drinking water analysis be conducted by a State of Idaho certified laboratory or a laboratory with reciprocity status with the State (IDAPA 16.01.08100,10.).⁴ Therefore, Accu-Lab Research (ALR) in Denver, Colorado, analyzed samples collected in 1992 for tritium at the CFA wells and distribution system. ALR has reciprocity with the State of Idaho for radiological drinking water analysis, and their samples are used for compliance purposes.

All ALR sample analysis results have been comparable to RESL's sample analysis results. All samples analyzed by ALR had radionuclide concentrations under the MCL for drinking water standards. Contamination levels for radiological parameters are determined by averaging laboratory results of drinking water samples from four consecutive quarters of monitoring. Drinking water analysis for radiological contaminants is required only once every four years for community water systems by the State of Idaho (IDAPA 16.01.08100,06.).⁴

The second set of contaminants monitored is VOCs. Samples to be analyzed for VOCs are collected quarterly from almost all active EG&G Idaho water systems. The exception is the Test Area North/Test Support Facility (TAN/TSF), where trichloroethylene (TCE) has been detected. This water system is on a routine monthly sampling schedule and samples are submitted to Alpha Analytical Laboratory in Sparks, Nevada.

Samples analyzed for coliform bacteria are collected monthly and analyzed by the Industrial Hygiene Laboratory (IHL), located at CFA-612. Occasionally, District 7 Health Department conducts bacteriological analyses for EG&G Idaho.

Sampling for chemical parameters is done monthly or quarterly, depending on the parameter of interest and regulatory requirements.

During 1992, the DWP collected samples that were analyzed for organic parameters (herbicides, pesticides, and trihalomethane) listed in IDAPA 16.01.08100,04 and 12⁴ and also contaminants that may be regulated in the near future. These samples were sent to Montgomery Laboratory in Pasadena, California. See Table 1 for the list of parameters analyzed in 1992.

The results of the analyses performed by the Montgomery Laboratory were reported to the DWP. Personnel verified the accuracy and integrity of the data through a technical review, data evaluation, and data validation assessment.

In addition, Lockheed Analytical Laboratory (LAL) performed analyses for lead and copper, according to the regulations found in 40 CFR 141.80 to 141.90. Samples were collected May 18-22 and September 14-18, 1992.

The following production wells and distribution systems were sampled during 1992:

- Central Facilities Area (CFA) #1 well, #2 well, and distribution system
- Main Gate well and distribution system
- Power Burst Facility (PBF) #1 well, #2 well, and distribution system
- Experimental Breeder Reactor I (EBR-I) well and distribution system
- Gun Range well and distribution system
- Fire Station #2 well and distribution system
- Test Reactor Area (TRA) #1 well, #3 well, #4 well, and distribution system
- Test Area North/Test Support Facility (TAN/TSF) #1 well, #2 well, and distribution system
- TAN/Containment Test Facility (TAN/CTF) #1 well, #2 well, and distribution system
- TAN/Water Reactor Research Test Facility (WRRTF) well and distribution system
- Radioactive Waste Management Complex (RWMC) well and distribution system.

REGULATIONS

The INEL is a U.S. Department of Energy (DOE) facility and is therefore required to comply with Federal, state, and site-specific regulations. These regulations include the *Code of Federal Regulations* (CFR), DOE and DOE-ID orders, Idaho regulations, and INEL site compliance requirements. Table 2 lists regulations that apply to the EG&G Idaho EM Drinking Water Program.

Table 1 lists the primary drinking water parameters that are specified in the Idaho Regulations for Public Drinking Water Systems. For compliance purposes, samples are collected from the distribution system; and for ground water information, samples are collected from the well-head. Therefore, all sampling points were not sampled for the complete set of parameters. See specific facility tables for details of specific parameters. Sampling for primary standards is required at least once every three years. Maximum contaminant levels are primary drinking water standards and are enforceable regulatory limits.

The Safe Drinking Water Act [40 CFR Part 141.61(a)(1) through (18)]⁵ and the Idaho Regulations for Public Drinking Water Systems (IDAPA 16.01.08900,03)⁴ presently list standards for regulated VOCs and additional unregulated VOCs 40 CFR Part 141.40 (see Table 1). The regulated VOCs have MCLs because of associated health problems at these concentration levels. At this time, the unregulated VOCs have no established regulatory limits. The regulated VOCs were analyzed using EPA Method 524.2 (revision 3).⁶

The INEL is a nuclear facility, which implies that radiological contamination of the drinking water is a possibility. Because of the possibility of radiological contaminants, EG&G Idaho monitors for gross alpha and beta radioactivity and tritium as recommended for community water systems in the Idaho Regulations for Public Drinking Water Systems (IDAPA 16.01.08100,06).⁴ Radiological analysis of the drinking water samples is conducted by RESL, located at CFA-690, and ALR in Denver, Colorado.

SAMPLE COLLECTION PROCEDURES

The DWP follows established procedures for sample collection and analytical methodology which includes the following: (a) use of standard operating procedures, which are based on EPA sampling protocols, (b) specific site training, (c) use of approved Environmental Protection Agency (EPA) analytical methods, (d) collecting quality control samples, and (e) conducting data validation.

Standard operating procedures were followed to ensure consistent collection of representative samples. The following is a description of the sampling techniques used and the quality control measures taken in accordance with DWP standard operating procedures.⁷

Sampling personnel wear a new pair of vinyl or latex gloves for each well and/or distribution system sampled to reduce the possibility of contaminating the samples during the collection process. Field measurements such as pH, conductivity, and temperature are taken using a portable water quality detector.

Each day before the water quality detector is used, the detector is standardized as recommended by the manufacturer. This water quality detector is used to ensure that the water has stabilized before the collecting process begins. Readings are taken at the wellhead for 1–2 minute intervals until the readings are consistently within ± 0.05 units for the pH and $\pm 10 \mu\text{mhos}/\text{cm}^2$ for conductivity. Consistent readings indicate the water has stabilized. When wells rather than distribution systems are being sampled, three well bore volumes are purged from the drinking water well prior to sample collection. This helps to ensure that the sample collected is representative of the water being analyzed.

The bottles used to collect the samples are purchased precleaned to EPA approved protocols A, B, or C and inspected by Quality Inspectors

ensuring that the bottles have been precleaned and are certified. The parameter of interest determines the bottle-type used and EPA cleaning protocol for each type. The bottles are documented with preassigned lot numbers ensuring traceability. Sampling personnel add preservative to the bottles that require preservation, to minimize biological and chemical degradation. Adding the preservative to the bottles before going into the field helps minimize contamination of the samples.

After the sampling is completed, each sample set is placed in its own cooler with blue ice or ice to preserve the sample, if required, until it reaches the laboratory. To ensure high quality sample collection and documentation, one sample team member collects the samples while the other sample team member records all applicable information about the sampling activities in the field logbook (see Figure 2).

Specific site training is required for collection of representative samples. Personnel are trained for sampling procedures and field quality control practices on a task-specific basis.⁷ The samples for this report were collected directly from the wellhead for ground water quality information and throughout the distribution system for compliance purposes.

Sampling personnel collect samples to be analyzed for radiological parameters from the wellhead and distribution systems. Sampling from the wellhead provides information about the ground water quality but would not indicate contamination in the distribution system. Due to possible interference and bias that might be introduced by the pump and associated piping, these results may not be representative of the Snake River Plain aquifer. Sampling from the distribution system ensures that the quality of the drinking water that the personnel drink meets or exceeds health standards set forth by the regulatory agencies.

Figure 2. Sample collector recording applicable information in the field logbook.

Sampling for water quality parameters is done monthly, quarterly, or annually, depending on the parameter of interest and regulatory requirements. Figure 3 shows the collection of a drinking water sample. All water systems in service at EG&G Idaho areas are sampled quarterly for VOC's. In addition, TTHMs were monitored quarterly at the CEA water system due to chlorination of this system. Quarterly sampling was conducted for organic drinking water contaminants listed in 40 CFR 141.24 and 141.61⁵ (see Table 1). Also, lead and copper were monitored for all EG&G Idaho facilities at the INEL according to 40 CFR Part 141.80 to 141.91. Bacteriological sampling is conducted on a monthly schedule to ensure the water is safe for human consumption. Results of both sampling and quality assurance (QA) analyses are stored into the drinking water monitoring database. Contract laboratories perform the analyses according to specified EPA methods, protocols, and procedures (see 40 CFR Part 141-143) and *Standard Methods for the Examination of Water and Wastewater*.⁸ Data collected in 1992 have been reported to the State of Idaho.

The DWP uses EPA approved analytical methods for drinking water analyses in compliance with IDAPA 16.01.08100.10.⁴ These EPA methods have specific detection limits and holding times that are listed in 40 CFR Part 141-143⁵ and *Standard Methods for the Examination of Water and Wastewater*.⁸ The Regulations section of this document lists the primary drinking water parameters of interest and the specific EPA methods that were used for the analyses.

Quality control samples (duplicates, trip blanks, and spikes) are collected and sent as blind samples to ensure that bias does not enter into the analyses at the laboratory. The laboratory also runs quality control samples as required by the EPA methods. Quality control samples provide a check on the field sampling techniques, sample shipment, and laboratory handling and analyses.

All data used for compliance purposes is validated in accordance with the Drinking Water Program Plan objectives.⁷ Personnel assigned to perform data validation are knowledgeable of sampling techniques and analytical methods practiced.

Figure 3. Collection of a drinking water sample.

WELLS AND DISTRIBUTION SYSTEMS AND DISCUSSION OF RESULTS

General Sampling Information

The following sections describe the location of the 11 distribution systems and 17 INEL, EG&G Idaho operated, drinking water wells that were sampled during 1992. These wells and distribution systems are located at: CFA, Main Gate, PBF, EBR-I, Gun Range, Fire Station (inactive), TRA, TAN, and RWMC.

The analytical results for each of the 17 wells and 11 distribution systems are also described and tabulated in the following subsections. See Appendix B for a detailed description of each production well.

During the quarterly organic sampling campaign, 10 drinking water distribution systems were sampled. Sampling occurred at the following water systems: EBR-I, Fire Station #2, Main Gate, TAN/CTF, Gun Range, RWMC-603, PBF, TRA, TAN/TSF, and CFA. The TAN/WRRTF distribution system was not sampled because it has been designated as an inactive water system.

Analytical results of the water samples collected during 1992 indicated that coliform bacteria and TCE were detected at concentrations exceeding the MCL established for each parameter (see Table 3).

Table 4 shows the VOC averages for EG&G Idaho water systems detected in 1992. In addition to TCE, concentrations of tetrachloroethylene, trichloroethane, and carbon tetrachloride were detected but did not exceed the MCL established for each parameter. Radiological analyses results for gross alpha, gross beta, and tritium concentrations at each facility are listed in Table 5.

Locations and Summary of Results

CFA #1 Well

The CFA #1 well, located in CFA-651, is part of the CFA water system (see Figure 4). The CFA #1 well is primarily used as a back-up system for CFA #2 well and for fire protection. When CFA #1 well is used, the water is mixed with CFA #2 well water in the water storage tank before entering the distribution system. The CFA #1 well water is not chlorinated.

The CFA #1 well was completed at a depth of 639 ft with the water level at 468 ft and has been in service since July 1942. This well is equipped with a 150-hp, submersible pump and is capable of pumping water at 650 gallons per minute (gpm).

Water samples were collected at the CFA #1 well house for radiological analyses by RESL. Samples are collected for measuring ground water quality and not for compliance purposes. For compliance purposes, data obtained from the distribution system is used.

Figure 5 illustrates the monthly tritium concentrations. Tritium contamination in this well is believed to be due to previous disposal of waste water from 1952 until 1984 at the Idaho Chemical Processing Plant (ICPP) and from 1952 until 1982 at TRA.³ Tritium continues to be released into the groundwater via percolation ponds at ICPP and TRA.

The results of the detected parameters of the sample analyses for CFA #1 well are listed in Tables 6 and 7.

Figure 4. Plot plan of CFA showing the locations of CFA-651 and -642.

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Figure 5. Monthly concentrations of tritium in CFA drinking water during 1992.

CFA #2 Well

The CFA #2 well, located in CFA-642, is a potable drinking water source and serves approximately 1500 people on a daily basis (see Figure 4). The well water is continuously disinfected with chlorine.

The CFA #2 well was completed at a depth of 681 ft with the water level at 471 ft and has been in service since May 1944. This well is equipped with a 125-hp, submersible pump and is capable of pumping water at 600 gpm.

No parameters were detected at levels exceeding the Federal or State regulated MCLs at the CFA wells. Figure 5 illustrates the monthly tritium concentrations. Tritium contamination for this well is believed to enter into this system from the same sources described for the CFA #1 well. The results of the 1992 drinking water analyses are listed in Tables 6 and 7.

CFA Distribution System

The CFA distribution system, located in CFA-641 was analyzed for the following parameters:

- Bacteriological (coliform bacteria), monthly on a rotated schedule to ensure each building was sampled at least once during the year
- TTHMs and VOCs, quarterly
- Gross alpha, beta, and tritium, monthly (from July to December) for RESL
- Tritium, quarterly by Accu-Lab
- Organic drinking water standards, quarterly (quarters 3 and 4 for 1992)
- Lead and copper, May and September of 1992.

The parameters detected in the CFA water system for 1992 are listed in Tables 6 and 7. Table 8 lists the results of the lead and copper sampling at

CFA during May and September of 1992. No MCL drinking water standards were exceeded at the CFA wells or distribution systems for 1992.

At the point of entry to the distribution system, RESL's mean average concentration of tritium was 16,470 pCi/L for 1992. Results for samples sent to ALR indicated that the mean concentration at the point of entry to the distribution system for 1992 was 17,750 pCi/L. Figure 5 illustrates the monthly tritium concentrations.

Main Gate Well and Distribution System

The Main Gate well, located in B27-605, which is the main entrance of the INEL, supplies drinking water to visitors and personnel (see Figure 6).

The Main Gate well was completed at a depth of 644 ft with the water level at 489 ft and has been in service since January 1985. This well is equipped with a 5-hp, submersible pump and is capable of pumping water at 20 gpm. The Main Gate well water is not chlorinated.

No Federal or State MCLs were exceeded at the Main Gate well or distribution system in 1992. This result is consistent with prior monitoring results. The results of the 1992 Main Gate well and distribution system drinking water analyses are listed in Tables 9, 10, and 11.

PBF #1 Well

The PBF #1 well, located in PBF-602, is one of two wells that supply water to the PBF area (see Figure 7). There are approximately 120 people using the PBF water system.

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Figure 6. Plot plan showing approximate location of the Main Gate well, B27-605.

Figure 7. Plot plan of PBF showing the location of PBF-602 and the approximate location of PBF-614.

The PBF #1 well was completed at a depth of 653 ft with the water level at 456 ft and has been in service since February 1955. This well is equipped with a 80-hp, submersible pump and is capable of pumping water at 400 gpm.

None of the parameters of concern were detected at concentrations exceeding the Federal and State MCLs. The 1992 data are consistent with previous data. The drinking water at PBF has consistently met the drinking water quality standards. The concentration of detected parameters of the 1992 drinking water analyses for the PBF #1 well are listed in Tables 12 and 13.

PBF #2 Well

The PBF #2 well, located in PBF-614, is one of two wells that supply all the water to the PBF area (see Figure 7). There are approximately 120 people using the PBF water system.

The PBF #2 well was completed at a depth of 1,217 ft with the water level at 463 ft and has been in service since April 1960. This well is equipped with a line-shaft pump, driven by a 200-hp motor and is capable of pumping water at 800 gpm.

Tables 12 and 13 list the parameters that were detected during 1992. No MCLs were exceeded.

PBF Distribution System

The water from both wells flows into a water storage tank, and then is distributed to all facilities located at PBF. Water samples analyzed for coliform bacteria are collected on a monthly schedule. Coliform bacteria was detected in the PBF water system for the months of June and November. After the water systems containing coliform bacteria have been flushed, the test results have been negative for coliform bacteria. An investigation was conducted to determine the source of coliform bacteria, but the actual source of contamination could not be determined. The information that was gathered through the investigation suggests that the presence of coliform bacteria is related to water line deterioration of the older water systems at the INEL and stagnant water. No other parameters analyzed exceeded the MCLs established for those parameters by the

State of Idaho and the EPA. The concentration of detected parameters for the PBF distribution system are listed in Tables 12 and 13. Table 14 lists the results of the lead and copper sampling at PBF during May and September of 1992.

EBR-I Well and Distribution System

The EBR-I well is located in the Experimental Breeder Reactor (EBR) area (see Figure 8). The EBR-I well was completed at a depth of 1075 ft with the water level at 596 ft and has been in service since May 1949. This well is equipped with a 200-hp, submersible pump and is capable of pumping water at 800 gpm.

Samples collected from the EBR-I water system were collected from the wellhead and distribution system. There were no MCLs exceeded at the wellhead or distribution system. Concentrations of detected parameters for 1992 drinking water analyses of EBR-I are listed in Tables 15, 16, and 17.

Gun Range Well and Distribution System

The Gun Range well, located in B21-607 at the Gun Range on the INEL, supplies drinking water to visitors and personnel (see Figure 9). The Gun Range well was completed at a depth of 620 ft with the water level at 508 ft and has been in service since January 1990. This well is equipped with a 5-hp, submersible pump and is capable of pumping water at 20 gpm.

The Gun Range water system was inactive for 1992 due to general bacteria problems detected in 1991. General bacteria is classified as a secondary drinking water standard. Secondary drinking water standards pertain to the aesthetic quality of water (i.e., odor, color, and taste). Investigations were conducted to determine the source of general bacteria. General bacteria growth that was seen in this system is believed to be the result of natural bacteria growth. Since it has not been possible to rid the system of general bacteria, a chlorination system will be installed in 1993 to correct the problem. No MCL (including coliform bacteria) was exceeded either at the wellhead and/or the distribution system for 1992 drinking water analyses. Parameters detected for 1992 at the Gun Range are listed in Tables 18, 19, and 20.

Figure 8. Plot plan of EBR-I.

Figure 9. Plot plan of the Gun Range showing the location of B21-607.

Fire Station #2 Well and Distribution System

The Fire Station #2 well, is located in B16-602, approximately two miles north of ICPP on Lincoln Boulevard. A site-specific map of the Fire Station is not available. The Fire Station #2 well was completed at a depth of 516 ft with the water level at 420 ft and has been in service since December 1957. This well is equipped with a line-shaft pump, driven by a 75-hp motor and is capable of pumping water at 400 gpm. This water system is inactive and does not supply drinking water to personnel and is used for ground water monitoring information purposes.

All contaminants detected for 1992 were below the MCLs established for the respective parameters. Parameters detected at the Fire Station water system during the drinking water analyses are listed in Tables 21 and 22.

TRA #1 Well

The TRA #1 well, located in TRA-601, is one of three wells monitored at TRA (see Figure 10). The TRA #1 well was completed at a depth of 600 ft with the water level at 453 ft and has been in service since February 1950. This well is equipped with a line-shaft pump, driven by a 700-hp motor and is capable of pumping water at 3200 gpm. The TRA water supply from all wells serves approximately 539 personnel. Tables 23 and 24 list the parameters that were detected for 1992. No MCL was exceeded.

TRA #3 Well

The TRA #3 well, located in TRA-650, is one of three wells tested at TRA (see Figure 10). The TRA #3 well was completed at a depth of 602 ft with the water level at 456 ft and has been in service since March 1957. This well is equipped with a line-shaft pump driven by a 700-hp motor and is capable of pumping water at 3800 gpm. Tables 23 and 24 list the parameters that were detected for 1992. No MCL was exceeded.

TRA #4 Well

The TRA #4 well, located in TRA-642, is one of three wells monitored at TRA (see Figure 10). The TRA #4 well was completed at a depth of 965 ft with the water level at 463 ft and has been in service since July 1963. This well is equipped with a line-shaft pump driven by a 350-hp motor and is capable of pumping water at 2000 gpm. Tables 23 and 24 list the parameters that were detected for 1992. No MCL was exceeded.

TRA Distribution System

The TRA #1, #3, and #4 well water is pumped into storage tanks at TRA and then is distributed as one source. TRA-608 is the point of entry where the water from the 3 wells is distributed throughout the TRA water system. This is where most of the samples are collected (except for coliform bacteria, which is done on a monthly rotating schedule for each building).

Water samples analyzed for coliform bacteria are collected routinely on a monthly schedule. Coliform bacteria was detected in the TRA water system for the months of August and December. Investigations were conducted to try to determine the source of bacteria. In August, a drinking fountain was identified as a single point source for coliform bacteria. The drinking fountain was tagged out of service and then replaced with a new one. The new drinking fountain and the TRA water system were resampled. No coliform bacteria was detected from the resampling effort. In December, stagnant water in one of the storage tanks was believed to be the source of coliform bacteria detected in the system. After flushing and chlorinating the water system and recirculating all of the water from the storage tank, the presence of coliform bacteria was not detected in the water system. Results for parameters detected at TRA are listed in Tables 23 and 24. Table 25 lists the results of lead and copper sampling at the TRA distribution system during May and September of 1992.

Figure 10. Plot plan of TRA showing the locations of TRA-601, -650, and -672.

TAN/TSF #1 Well

The TAN/TSF #1 well is located in TAN-612 (see Figure 11). The TSF #1 well was completed at a depth of 360 ft with the water level at 208 ft and has been in service since January 1953. This well is equipped with a line-shaft pump driven by a 80-hp motor and is capable of pumping water at 1000 gpm.

Concentrations of TCE averaged 9.1 µg/L, which exceeds the MCL of 5.0 µg/L. Since the installation of a sparger system (see Figure 12), which volatilizes TCE from the water, the MCL has not been exceeded at the entry point of the distribution system for water consumption. Tables 26 and 27 list the parameters detected during 1992.

The TAN injection wells are considered to be the most likely source of the TCE contamination. Figure 13 illustrates the concentrations of TCE in the two wells during 1992. The differences in concentrations of TCE between the two wells are probably related to different usage rates of the wells, proximity to the contamination source, and ground water mobility.

TAN/TSF #2 Well

The TAN/TSF #2 well is located in TAN-613 (see Figure 11). The TAN/TSF water system from all wells serves approximately 450 people. The TSF #2 well was completed at a depth of 340 ft with the water level at 211 ft and has been in service since August 1953. This well is equipped with a line-shaft pump driven by a 80-hp motor and is capable of pumping water at 1000 gpm. Tables 26 and 27 list the parameters detected during 1992. No MCLs were exceeded. See Figure 13 for TCE concentration during 1992.

TAN/TSF Distribution System

The TAN/TSF distribution system is located in TAN-610 (see Figure 11) and is the point of

entry for water entering the distribution system. In 1987, TCE was detected at both TAN/TSF #1 and #2 wells, which supply water to the employees at TSF. In 1988, a sparger system was installed in the water storage tank reducing the TCE concentrations, providing drinking water safe for consumption. Concentrations of TCE have decreased in the distribution system since the introduction of the sparger system. The average concentration for TCE was 1.6 µg/L at the point of entry to the distribution system. Sampling has also been conducted at drinking fountains downstream from the sparger, to verify the effectiveness of the system at the point of consumption.

To date, the system has proven to be very effective, as Figure 13 illustrates. Monitoring will continue monthly to verify the efficiency and effectiveness of the sparger system to ensure the water remains safe for human consumption. Tables 26 and 27 list the parameters detected during 1992. Table 28 lists the results of lead and copper sampling at the TAN/TSF distribution system during May and September of 1992. Water samples analyzed for coliform bacteria are collected routinely on a monthly schedule. Coliform bacteria was detected in the TAN/TSF water system for the months of July and August. Investigations conducted were not successful in determining the actual source of coliform bacteria. The presence of coliform bacteria is believed to result from a combination of old deteriorating pipes and stagnant water build up. The work schedule for personnel at TAN is four ten-hour days, Monday through Thursday. The water system is not used from Thursday night until Monday morning. Environmental Monitoring has recommended to TAN management that the water system be flushed and personnel should run water in the buildings for four to five minutes. The presence of coliform bacteria has not been detected in the water system at TAN since implementing the procedure of purging the water system. No other MCL drinking water standards were exceeded.

Figure 11. Plot plan of TAN/TSF showing the locations of TAN-610, -612, and -613.

Figure 12. Sparger system installed in the water storage tank at TAN/TSF distribution system, TAN-610.

Figure 13. Monthly concentrations of TCE in TAN/TSF drinking water during 1992.

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TAN/CTF #1 Well

The TAN/CTF #1 well is located in TAN-632 (see Figure 14). The TAN/CTF water system from all wells serves approximately 350 people. The CTF #1 well was completed at a depth of 330 ft with the water level at 199 ft and has been in service since November 1957. This well is equipped with a line-shaft pump driven by a 100-hp motor and is capable of pumping water at 1000 gpm. The detected parameters for the drinking water analyses are listed in Tables 29 and 30. No MCLs were exceeded.

TAN/CTF #2 Well

The TAN/CTF #2 well is located in the proximity of TAN-639 (see Figure 14). The TAN/CTF water system serves approximately 350 people. The CTF #2 well was completed at a depth of 455 ft with the water level at 200 ft and has been in service since April 1958. This well is equipped with a line-shaft pump driven by a 100-hp motor and is capable of pumping water at 1000 gpm. Tables 29 and 30 list the parameters detected during 1992. No MCLs were exceeded.

TAN/CTF Distribution System

The TAN/CTF distribution system, located in TAN-614, serves approximately 350 people each day. Water from TAN/CTF #1 and #2 wells is pumped into a storage tank and then is distributed throughout the system. Samples are collected from the distribution system to ensure the water is safe for consumption. Water samples analyzed for coliform bacteria are collected routinely on a monthly schedule. Coliform bacteria was detected in the TAN/CTF water system for the months of July and September. Investigations conducted determined that the source of coliform bacteria was an isolated case related to the drinking fountain. In September, stagnant water in a storage tank was believed to be the source of coliform bacteria detected in the system. Since that time, coliform bacteria has not been detected in the water system. Tables 29 and 30 list the parameters that were detected during 1992. Table 31 lists the results of lead and copper sampling at the TAN/CTF distribution system during May and September of 1992. No other MCLs were exceeded.

Figure 14. Plot plan of TAN/CTF showing the locations of TAN-632 and -639 (upper right hand corner).

TAN/WRRTF Well

The TAN/WRRTF well, located near TAN-644, is inactive and does not supply drinking water to personnel (see Figure 15). The WRRTF well was completed at a depth of 309 ft with the water level at 209 ft and has been in service since July 1956. This well is equipped with a line-shaft pump driven by a 50-hp motor and is capable of pumping water at 400 gpm. The well is used for ground water information purposes.

Trichloroethylene was detected in the TAN/WRRTF distribution system at a concentration exceeding the MCL. The concentration of TCE has remained consistent each month since having been first detected in 1988. The well at TAN/WRRTF is sampled for analyses of radiological constituents for trend analyses. Water from this well is not used as a drinking water source. The drinking fountains have been taken out of service to prevent personnel from consuming the water. Personnel assigned to TAN/WRRTF use bottled water. The bottled water consumed by the personnel at TAN/WRRTF is sampled monthly for bacteriological analyses, as is all bottled water, to ensure the quality of water that the EG&G Idaho personnel are drinking is safe. The well has been put on inactive status by the State of Idaho, EG&G Idaho, and DOE-ID. Detected parameters for drinking water analyses at TAN/WRRTF are listed in Tables 32 and 33.

RWMC Well

The RWMC well, located in WMF-603, serves 107 people (see Figure 16). The RWMC well was completed at a depth of 685 ft with the water level at 568 ft and has been in service since November 1974. This well is equipped with a line-shaft pump driven by a 75-hp motor and is capable of pumping water at 240 gpm. Carbon tetrachloride was discovered in this well in 1987. Monthly monitoring was conducted from 1989 to 1990. Concentrations of carbon tetrachloride remained consistent at 1.7 $\mu\text{g/L}$ for 1992, which is less than the MCL of 5.0 $\mu\text{g/L}$. Figure 17 shows the quarterly concentrations of carbon tetrachloride in RWMC drinking water during 1992. The production well at the RWMC is being monitored for trends and VOC regulatory limits; however, at this time sampling has been reduced to quarterly sampling because detected concentrations are stable and are less than the MCL. Tables 34 and 35 list the parameters that were detected during 1992. No MCL was exceeded.

RWMC Distribution System

The concentration of carbon tetrachloride was 0.73 $\mu\text{g/L}$ for 1992 which is less than the MCL of 5.0 $\mu\text{g/L}$. The results of the detected parameters for the RWMC well are listed in Tables 34, 35, and 36.

Figure 15. Plot plan of TAN/WRRTF showing the location of TAN-645.

Figure 16. Plot plan of RWMC showing the location of WMF-603.

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Figure 17. Monthly concentrations of carbon tetrachloride in RWMC drinking water during 1992.

Table 1. List of parameters analyzed for calendar year 1992.

Primary drinking water parameters	
Coliform Bacteria, Copper, Lead, and Organics	
Coliform bacteria	Chlorthalonil
Copper	Delta-BHC
Lead	P,P' DDD
2,4-D	P,P' DDE
2,4,5-T	P,P' DDT
2,4,5-TP (Silvex)	Dieldrin
Aldrin	Endrin Aldehyde
Alachlor	Endrin
Aldicarb Sulfoxide	Endosulfan I, II
Aldicarb	Endosulfan Sulfate
Aldicarb Sulfone	Heptachlor
Dalapon (Dowpon)	Heptachlor Epoxide
Dinoseb	Lindane
Pentachlorophenol	Methoxychlor
Pichloram	Toxaphene
Atrazine	Ethylene dibromide (EDB)
Bromacil	1,2-Dibromo-3-Chloropropane (DBCP)
Dimethoate	Thiobencarb
Molinate	3-Hydroxycarbofuran
Prometryn	Baygon
Simazine	Carbofuran (Furadan)
Chlordane	Carbaryl

Table 1. (continued).

Primary drinking water parameters	
Methiocarb	PCB 1016,1221,1232,1242,1248,1254,1260 Arochlor
Methomyl	Alpha-BHC
Oxamyl (Vydate)	Beta-BHC
Radiological (Monthly Monitoring)	
Gross Alpha (including radium 226, excluding radon and uranium)	Gross Beta Tritium
Regulated VOCs (Quarterly Monitoring)	
Benzene	1,1,1-Trichloroethane (TCA)
CIS-1,2-Dichloroethylene	O-Dichlorobenzene
Vinyl Chloride	para-Dichlorobenzene
1,2-Dichloropropane	Styrene
Carbon Tetrachloride	Trichloroethylene
Ethylbenzene	Tetrachloroethylene (PCE)
1,2-Dichloroethane	1,1-Dichloroethylene
(Mono) Chlorobenzene	Toluene
Trans-1,2-Dichloroethylene	Xylenes (total)
Unregulated VOCs (Quarterly Monitoring)	
Chloroform ^a	Bromoform ^a
Bromodichloromethane ^a	m-Dichlorobenzene
Chlorodibromomethane ^a	Dichloromethane

Table 1. (continued).

Primary water parameters	
Unregulated VOCs (Quarterly Monitoring) continued	
1,1-Dichloroethane	n-Propylbenzene
1,1,2,2-Tetrachloroethane	Napthalene
Bromobenzene	1,3-Dichloropropane
1,2,4-Trimethylbenzene	Chloromethane
1,2,3-Trichlorobenzene	Bromomethane
n-Butylbenzene	Hexachlorobutadiene
Dibromomethane	1,3,5-Trimethylbenzene
1,1-Dichloropropene	p-Isopropyltoluene
1,1,1,2-Tetrachloroethane	Isopropylbenzene
Chloroethane	Tert-butylbenzene
1,1,2-Trichloroethane	Sec-butylbenzene
2,2-Dichloropropane	Fluorotrichloromethane
o-Chlorotoluene	Dichlorodifluoromethane
p-Chlorotoluene	Bromochloromethane
1,3-Dichloropropene	1,2,3-Trichloropropane
1,2,4-Trichlorobenzene	
a. This parameter is a constituent of the total trihalomethanes.	

Table 2. Pertinent drinking water regulatory codes and orders.

Source	Title
1. DOE 5400.5 Part D ^a	Radiation Protection of the Public and the Environment
2. IDAPA 16.01.08000–16.01.08999 ^b	Idaho Regulations for Public Drinking Water Systems
3. 40 CFR 141–143 ^c	Protection of Environment
4. Section 2.2.9 ^d	Environmental Compliance Planning Manual at the INEL

a. DOE Order 5400.5, Part D — This DOE policy was written to provide a level of protection for people consuming drinking water at the INEL. The level of protection should be no less than the equivalence of the confidence levels listed in 40 CFR Part 141. This policy is upheld whether the INEL is operated by DOE, or through a DOE contractor such as EG&G Idaho.

b. IDAPA 16.01.08000–.08999, Idaho regulations for Public Drinking Water Systems — The INEL drinking water must meet the standards of the Idaho regulations to be in compliance. The regulations list the parameters to be analyzed and the frequency at which the analyses should take place. The scope of the regulations is to provide a degree of assurance that public drinking water systems are protected from contamination and maintained free from contaminants that may injure the health of the consuming public.

c. 40 CFR Parts 141–143 — All states are required to comply with the Safe Drinking Water Act (SDWA) set forth by EPA, and the state regulations must be at least as stringent as the federal regulations to be in compliance. The drinking regulations for Idaho are as strict as the SDWA; therefore, the Idaho regulations have primacy.

d. DOE–ID *Environmental Compliance Planning Manual*, Section 2.2.9 — This section provides guidelines to the INEL contractor (EG&G Idaho) for frequency and selection of parameters monitored in a community drinking water system. These guidelines are in accordance with the Idaho Regulations for Public Drinking Water Systems (IDAPA 16.01.08100,).

Table 3. Parameters for EG&G Idaho production wells and distribution systems found to be above the EPA and State of Idaho MCLs for 1992.

Parameter	Location	Results (mg/L)	MCL (mg/L)
Coliform Bacteria	PBF Water System	(P) ^a June/Nov.	p ^b
	TSF Water System	(P) July/August	P
	TRA Water System	(P) August/December	P
	CTF Water System	(P) July/September	P
Trichloroethylene ^c (TCE)	TAN/WRRTF, Water System	0.00658	0.005
TCE	TAN/TSF ^d #1, Well 612	0.0091	0.005

a. Presence of coliform bacteria.

b. Coliform bacteria was detected at the following systems during 1992: PBF, TSF, TRA, and CTF water system. The detection of coliform bacteria at the CTF water system (July and September) was limited to stagnant water and an isolated case (drinking fountain). Also, at TRA (August) the coliform bacteria was limited to a drinking fountain.

At PBF (June and November), TSF (July and August), and TRA (December), the coliform bacteria was throughout the water systems. Coliform bacteria could be due to many reasons, but through investigations the main reason at the INEL is old piping (water systems), and stagnant water which causes bacteria build up.

c. At the TAN/WRRTF distribution system, located at building 645, the trichlorethylene (TCE) was 0.00658 µg/L and the MCL is 0.005 µg/L. The concentration of TCE at TAN/WRRTF, 645, has been identified since the beginning of 1988 and is consistent with previous data. At WRRTF, all drinking fountains are tagged out. Bottled water is provided for personnel at WRRTF.

d. At the TAN/TSF well #1, located at building 612, the TCE concentration was 0.0091 mg/L for 1992. This concentration level is at the wellhead, which is before the sparger system which removes TCE from the water. The sparger system reduces the TCE concentration below the MCL of 0.005 mg/L thereby making the water safe for consumption. The actual TCE concentration at the point of entry to the distribution system for public consumption is 0.0016 mg/L.

Table 4. 1992 regulated VOCs detected and average concentrations.

Location	Parameter (concentration $\mu\text{g/L}$)				
	TCE	PCE	TCA	CT	P-D
CFA #1, Well, CFA-651	0.57	—	—	—	—
CFA #2, Well, CFA-642	0.83	—	—	—	—
CFA Distribution System, CFA-641	0.65	—	—	—	—
Main Gate Distribution System, B27-603	—	—	1.1	—	—
Fire Station #2 Distribution System, B16-602	—	—	0.75	—	—
RWMC Well, WMF-603	0.9	—	—	1.7	—
RWMC Distribution System, WMF-604	0.6	—	—	0.73	—
TAN/WRRTF Distribution System, TAN-645	6.58	2.45	—	—	—
TAN/TSF #1 Well, TAN-612	9.1	2.5	—	—	—
TAN/TSF #2 Well, TAN-613	4.1	1.17	—	—	—
TAN/TSF (TANK) Distribution System, TAN-610	1.6	0.55	—	—	—
EBR-1 Distribution System, EBR-601	—	—	—	—	0.5
Maximum Contaminant Level	5.0	5.0	200.0	5.0	75.0

TCE = Trichloroethylene

PCE = Tetrachloroethylene

TCA = 1,1,1-Trichloroethane

CT = Carbon tetrachloride

P-D = P-dichlorobenzene

Note: Water systems at TAN/CTF, EBR-I, Gun Range, PBF, and TRA had no detection of regulated VOCs in 1992.

Table 5. 1992 average radiological concentrations from RESL.

Location	Parameter (concentration $\mu\text{Ci/mL}$) ^a		
	Gross Alpha ^b	Gross Beta ^b	Tritium ^b
Two quarters of sampling:			
CFA (July 1, 1992 to December 30, 1992) Distribution System, CFA-641 ^a	7.167 E-10	5.50 E-10	1.647 E-05
Four quarters and/or monthly sampling:			
CFA #1 Well, CFA-651	1.25 E-09	2.108 E-09	1.792 E-05
CFA #2, Well, CFA-642	9.175 E-10	2.083 E-09	1.602 E-05
Main Gate Well, B27-605	1.25 E-09	1.892 E-09	-2.083 E-08
Fire Station #2 Well, B16-602	8.90 E-10	6.00 E-10	-2.800 E-08
RWMC Well, WMF-603	1.65 E-09	1.125 E-09	1.567 E-06
TAN/WRRTF Well, TAN-645	1.318 E-09	1.827 E-09	-9.091 E-10
TAN/TSF #1 Well, TAN-612	1.092 E-09	1.00 E-09	7.417 E-08
TAN/TSF #2 Well, TAN-613	1.291 E-09	1.755 E-09	3.455 E-08
TAN/CTF Well, TAN-632	1.275 E-09	1.908 E-09	-2.167 E-08
TAN/CTF Well, TAN-639	1.117 E-09	1.442 E-09	-8.167 E-08
TRA #1 Well, TRA-601	1.245 E-09	2.218 E-09	-9.091 E-10
TRA #3 Well, TRA-650	1.370 E-09	9.100 E-10	7.600 E-08
TRA #4 Well, TRA-672	1.182 E-09	2.082 E-09	-3.364 E-08
TRA Distribution System, TRA-608	1.383 E-09	1.308 E-09	-1.500 E-08
PBF #1 Well, PBF-602	1.158 E-09	1.642 E-09	-2.167 E-08
PBF #2 Well, PBF-614	1.233 E-09	1.642 E-09	-4.000 E-08
EBR-I Well, EBR-711	1.300 E-09	7.50 E-10	-7.083 E-08
Gun Range Well, B21-607	1.667 E-09	9.500 E-10	4.375 E-06
Maximum Contaminant Level (MCL) pCi/L	15	50	20,000

a. To convert $\mu\text{Ci/mL}$ to pCi/L, multiply the $\mu\text{Ci/mL}$ unit by 10^9 .

b. Estimated random uncertainty report is one standard deviation.

Table 6. Results of detected radiological parameters of the drinking water analyses for samples collected at the CFA #1 well, CFA-651; CFA #2 well, CFA-642; and distribution system, CFA-641.

Location ^a	Parameter ^b	No. of months monitored	Results (pCi/L)	MCL (pCi/L)
CFA #1 Well	Tritium	12	19,000 ^c	20,000
	Gross Alpha	12	1.25 ^d	15
	Gross Beta	12	2.11 ^d	50
	Tritium	12	17,920 ^d	20,000
CFA #2 Well	Tritium	12	17,250 ^c	20,000
	Gross Alpha	12	0.917 ^d	15
	Gross Beta	12	2.09 ^d	50
	Tritium	12	16,020 ^d	20,000
CFA Distribution System	Tritium	4 quarters	17,750 ^c	20,000
	Gross Alpha	6	0.716 ^d	15
	Gross Beta	6	0.55	50
	Tritium	6	16,470 ^d	20,000

a. Wells were only sampled for VOCs and radiological constituents. The distribution system was sampled for all parameters listed in Table 1.

b. Only the parameters detected are listed.

c. Accu-Lab data: counting error—The variability of the radioactive disintegration process at the 95% confidence level is 1.96 σ .

d. RESL data: The estimated random uncertainty is 1.0 σ .

Table 7. Results of detected nonradiological parameters of the drinking water analyses for samples collected at the CFA #1 well, CFA-651; CFA #2 well, CFA-642; and distribution system, CFA-641.

Location ^a	Parameter ^b	Results ^c (mg/L)	MCL (mg/L)
CFA #1 Well	Trichloroethylene	0.00057	0.005
CFA #2 Well	Trichloroethylene	0.00083	0.005
CFA Distribution System	Trichloroethylene	0.00065	0.005
	TTHM	0.0046	0.10

a. Wells were only sampled for VOCs and radiological constituents. The distribution system was sampled for all parameters listed in Table 1.

b. Only the parameters detected are listed.

c. Four quarters of monitoring.

Table 8. Results of the lead and copper sampling at CFA during May and September of 1992.

Location	Parameter	May Results (mg/L)	Sept. Results (mg/L)	MCL (mg/L)
CFA-674	Lead	0.0028	0.0021	0.015
	Copper	0.0047	0.0093	1.3
	Lead	0.0077	0.0028	0.015
	Copper	0.0093	0.012	1.3
CFA-663	Lead	0.0063	0.0043	0.015
	Copper	0.280	0.350	1.3
CFA-602	Lead	0.0022	0.0008	0.015
	Copper	0.012	0.003	1.3
	Lead	0.0035	0.0006	0.015
	Copper	0.011	0.0045	1.3
CFA-607	Lead	0.0045	0.0007	0.015
	Copper	0.0048	0.0059	1.3
	Lead	0.013	0.005	0.015
	Copper	0.041	0.0055	1.3
	Lead	—	0.0012	0.015
	Copper	—	0.0066	1.3
CFA-674	Lead	—	0.0063	0.015
	Copper	—	0.009	1.3
	Lead	—	0.005	0.015
	Copper	—	0.018	1.3
CFA-606	Lead	0.0013	0.001	0.015
	Copper	0.0037	0.0089	1.3
	Lead	0.0047	0.0017	0.015
	Copper	0.014	0.0044	1.3
	Lead	0.011	0.0	0.015
	Copper	0.010	0.0048	1.3
CFA-681	Lead	0.0048	0.002	0.015
	Copper	0.100	0.046	1.3
	Lead	—	0.0015	0.015
	Copper	—	0.058	1.3
CFA-643	Lead	0.0014	0.0	0.015
	Copper	0.026	0.032	1.3
CFA-615	Lead	0.0024	0.0016	0.015

Table 8. (continued).

Location	Parameter	May Results (mg/L)	Sept. Results (mg/L)	MCL (mg/L)
CFA-614	Copper	0.390	0.390	1.3
	Lead	0.0043	0.0011	0.015
	Copper	0.580	0.340	1.3
	Lead	0.0053	0.0013	0.015
	Copper	0.440	0.320	1.3
	Lead	0.0045	—	0.015
	Copper	0.200	—	1.3
	Lead	0.0035	—	0.015
CFA-612	Copper	0.017	—	1.3
	Lead	0.0084	—	0.015
CFA-663	Copper	0.380	—	1.3
	Lead	0.0019	—	0.015
CFA-652	Copper	0.023	—	1.3

Table 9. Results of detected radiological parameters of the 1992 drinking water analyses for Main Gate well, B27-605.

Location ^a	Parameter	No. of months monitored	Results ^b (pCi/L)	MCL (pCi/L)
Main Gate Well	Gross Alpha	12	1.25	15
	Gross Beta	12	1.89	50
	Tritium	12	< 0	20,000

a. The Main Gate well was sampled only for the radiological parameters listed in Table 1.

b. RESL data: The estimated random uncertainty is 1.0 σ .

Table 10. Results of detected nonradiological parameters of the 1992 drinking water analyses for Main Gate distribution system, B27-603.

Location ^a	Parameter ^b	Results ^c (mg/L)	MCL (mg/L)
Main Gate Distribution System	1,1,1-Trichloroethane	0.0011	0.200

a. The Main Gate distribution system was sampled for all parameters listed in Table 1, except for the radiological parameters.

b. Only the parameters detected are listed.

c. Four quarters of monitoring.

Table 11. Results of the lead and copper sampling at the Main Gate during May and September of 1992.

Location	Parameter	May Results (mg/L)	Sept. Results (mg/L)	MCL (mg/L)
Main Gate Distribution System	Lead	0.0035	0.0058	0.015
	Copper	0.170	0.083	1.3
	Lead	0.0032	0.0049	0.015
	Copper	0.170	0.027	1.3
	Lead	0.0048	0.0018	0.015
	Copper	0.026	0.025	1.3
	Lead	0.0054	0.0019	0.015
	Copper	0.080	0.150	1.3
	Lead	0.0053	0.012	0.015
	Copper	0.049	0.140	1.3

Table 12. Results of detected radiological parameters of the drinking water analyses for PBF #1 well, PBF-602; PBF #2 well, PBF-614.

Location ^a	Parameter	No. of months monitored	Results ^b (pCi/L)	MCL (pCi/L)
PBF #1 Well	Gross Alpha	12	1.158	15
	Gross Beta	12	1.642	50
	Tritium	12	< 0	20,000
PBF #2 Well	Gross Alpha	12	1.233	15
	Gross Beta	12	1.642	50
	Tritium	12	< 0	20,000

a. Wells were only sampled for radiological constituents listed in Table 1.

b. RESL data: The estimated random uncertainty is 1.0 σ .

Table 13. Results of detected nonradiological parameters of the drinking water analyses for PBF distribution system, PBF-602.

Location ^a	Parameter ^b	Results	MCL
PBF Distribution System	Coliform Bacteria	p ^c	P

a. The distribution system was sampled for all parameters listed in Table 1, except for the radiological parameters.

b. Only the parameters detected are listed.

c. P = Presence for coliform bacteria only for June and November.

Table 14. Results of the lead and copper sampling at PBF during May and September of 1992.

Location	Parameter	May Results (mg/L)	Sept. Results (mg/L)	MCL (mg/L)
PBF-612	Lead	0.0016	0.0	0.015
	Copper	0.0044	0.0027	1.3
	Lead	0.012	0.0011	0.015
	Copper	0.016	0.0019	1.3
	Lead	0.0014	0.0019	0.015
	Copper	0.0021	0.0021	1.3
PBF-601	Lead	0.0012	0.0021	0.015
	Copper	0.051	0.049	1.3
	Lead	0.0013	—	0.015
	Copper	0.013	—	1.3
	Lead	0.011	0.002	0.015
	Copper	0.340	0.013	1.3
	Lead	0.0024	0.0082	0.015
	Copper	0.030	0.051	1.3
PBF-632	Lead	0.0012	0.0	0.015
	Copper	0.0041	0.0064	1.3
	Lead	0.0027	0.0011	0.015
	Copper	0.0061	0.0042	1.3
	Lead	0.0011	—	0.015
	Copper	0.0053	0.003	1.3
	Lead	—	0.0014	0.015
	Copper	—	0.0045	1.3

Table 15. Results of detected radiological parameters of the drinking water analyses for EBR-I well, EBR-711.

Location ^a	Parameter	No. of months monitored	Results ^b (pCi/L)	MCL (pCi/L)
EBR-I Well	Gross Alpha	12	1.3	15
	Gross Beta	12	0.75	50
	Tritium	12	< 0	20,000

a. The EBR-I well was sampled only for the radiological parameters listed in Table 1.

b. RESL data: The estimated random uncertainty is 1.0 σ .

Table 16. Results of detected nonradiological parameters of the drinking water analyses for EBR-I distribution system, EBR-601.

Location ^a	Parameter ^b	Results (mg/L)	MCL (mg/L)
EBR-I Distribution System	Para-Dichlorobenzene	0.0005 ^c	0.075

a. The EBR-I distribution system was sampled for all parameters listed in Table 1, except for the radiological parameters.

b. Only the parameters detected are listed.

c. Detected only once in 4 quarters of monitoring.

Table 17. Results of the lead and copper sampling at EBR-I during May and September of 1992.

Location	Parameter	May Results (mg/L)	Sept. Results (mg/L)	MCL (mg/L)
EBR-I Distribution System	Lead	0.0078	0.0047	0.015
	Copper	0.017	0.067	1.3
	Lead	0.0055	0.012	0.015
	Copper	0.022	0.100	1.3
	Lead	0.0031	0.0018	0.015
	Copper	0.012	0.007	1.3
	Lead	0.005	0.0048	0.015
	Copper	0.075	0.015	1.3
	Lead	0.0026	0.0035	0.015
	Copper	0.0072	0.016	1.3

Table 18. Results of detected radiological parameters of the drinking water analyses for Gun Range well, B21-607.

Location ^a	Parameter	No. of months monitored	Results ^b (pCi/L)	MCL (pCi/L)
Gun Range Well	Gross Alpha	12	1.667	15
	Gross Beta	12	0.95	50
	Tritium	12	4,375	20,000

a. The Gun Range well was sampled for only the radiological parameters listed in Table 1.

b. RESL data: The estimated random uncertainty is 1.0 σ .

Table 19. Results of detected nonradiological parameters of the drinking water analyses for the Gun Range distribution system, B21-608.

Location ^a	Parameter ^b	Results (mg/L)	MCL (mg/L)
Gun Range Distribution System	No Detections		

a. The Gun Range distribution system was sampled for all parameters listed in Table 1, except for the radiological parameters.

b. Only the parameters detected are listed.

Table 20. Results of lead and copper sampling at the Gun Range distribution system during May and September of 1992.

Location	Parameter	May Results (mg/L)	Sept. Results (mg/L)	MCL (mg/L)
Gun Range Distribution System	Lead	0.0029	0.0038	0.015
	Copper	0.074	0.420	1.3
	Lead	0.0025	0.0025	0.015
	Copper	0.048	0.400	1.3
	Lead	0.0034	0.0016	0.015
	Copper	0.190	0.180	1.3
	Lead	0.0034	0.0032	0.015
	Copper	0.370	0.310	1.3
	Lead	0.0029	0.0034	0.015
	Copper	0.200	0.300	1.3

Table 21. Results of detected radiological parameters of the drinking water analyses for the Fire Station #2 well, B16-602.

Location ^a	Parameter	No. of months monitored	Results ^b (pCi/L)	MCL (pCi/L)
Fire Station #2 Well	Gross Alpha	10	0.89	15
	Gross Beta	10	0.60	50
	Tritium	10	< 0	20,000

a. The Fire Station #2 well was sampled for only the radiological parameters listed in Table 1.

b. RESL data: The estimated random uncertainty is 1.0 σ .

Table 22. Results of detected nonradiological parameters of the drinking water analyses for Fire Station #2 distribution system, B16-601.

Location ^a	Parameter ^b	Results (mg/L)	MCL (mg/L)
Fire Station #2 Distribution System	1,1,1-Trichloroethane	0.00075	0.2

a. The Fire Station #2 distribution system was sampled for all parameters listed in Table 1, except for the radiological, lead, and copper parameters.

b. Only the parameters detected are listed.

Table 23. Results of detected radiological parameters of the drinking water analyses for the TRA #1 well, TRA-601; TRA #3 well, TRA-650; TRA #4 well, TRA-672; and distribution system, TRA-608.

Location ^a	Parameter	No. of months monitored	Results ^b (pCi/L)	MCL (pCi/L)
TRA #1 Well	Gross Alpha	11	1.25	15
	Gross Beta	11	2.22	50
	Tritium	11	< 0	20,000
TRA #3 Well	Gross Alpha	10	1.37	15
	Gross Beta	10	0.91	50
	Tritium	10	76.0	20,000
TRA #4 Well	Gross Alpha	11	1.18	15
	Gross Beta	11	2.08	50
	Tritium	11	< 0	20,000
TRA Distribution System	Gross Alpha	12	1.38	15
	Gross Beta	12	1.31	50
	Tritium	12	< 0	20,000

a. Wells and distribution system were only sampled for radiological constituents listed on Table 1.

b. RESL data: The estimated random uncertainty is 1.0 σ .

Table 24. Results of detected nonradiological parameters of the drinking water analyses for TRA distribution system, TRA-608.

Location ^a	Parameter ^b	Results	MCL
TRA, 608 Distribution System	Coliform Bacteria	pc,d	P

a. The distribution system was sampled for all parameters listed in Table 1, except for the radiological parameters.

b. Only the parameters detected are listed.

c. Presence of coliform bacteria.

d. August and December TRA water system was positive for coliform bacteria. Water samples are collected monthly and analyzed for coliform bacteria.

Table 25. Results of lead and copper sampling at the TRA distribution system during May and September of 1992.

Location	Parameter	May Results (mg/L)	Sept. Results (mg/L)	MCL (mg/L)
TRA-679	Lead	0.0	0.0032	0.015
	Copper	0.430	0.620	1.3
	Lead	0.0	0.0	0.015
	Copper	0.370	0.250	1.3
	Lead	0.0	0.0	0.015
	Copper	0.350	0.240	1.3
	Lead	0.0	0.0015	0.015
	Copper	0.360	0.310	1.3
	Lead	0.0	0.0	0.015
	Copper	0.280	0.210	1.3
	Lead	0.0	0.0	0.015
	Copper	0.280	0.210	1.3
TRA-680	Lead	0.0017	0.0017	0.015
	Copper	0.510	0.350	1.3
	Lead	0.0011	0.0	0.015
	Copper	0.530	0.450	1.3
TRA-614	Lead	0.004	0.0037	0.015
	Copper	0.018	0.0095	1.3
	Lead	0.008	0.011	0.015
	Copper	0.110	0.120	1.3
	Lead	0.0037	0.0062	0.015
	Copper	0.083	0.070	1.3
TRA-608	Lead	0.0	0.0018	0.015
	Copper	0.064	0.086	1.3
TRA-609	Lead	0.011	0.011	0.015
	Copper	0.250	0.270	1.3
	Lead	—	0.0039	0.015
	Copper	—	0.230	1.3
TRA-647	Lead	0.0024	0.014	0.015
	Copper	0.140	0.089	1.3
	Lead	0.0012	0.0023	0.015
	Copper	0.0064	0.120	1.3

Table 25. (continued).

Location	Parameter	May Results (mg/L)	Sept. Results (mg/L)	MCL (mg/L)
TRA-647 (continued)	Lead	0.0029	0.010	0.015
	Copper	0.016	0.038	1.3
	Lead	0.005	0.0087	0.015
	Copper	0.077	0.032	1.3
	Lead	0.0013	0.0071	0.015
	Copper	0.014	0.016	1.3
	Lead	0.0	—	0.015
	Copper	0.022	—	1.3

Table 26. Results of detected radiological parameters of the drinking water analyses for TAN/TSF #1 well, TAN-612; TAN/TSF #2 well, TAN-613.

Location ^a	Parameter	No. of months monitored	Results ^b (pCi/L)	MCL (pCi/L)
TAN/TSF #1 Well	Gross Alpha	12	1.09	15
	Gross Beta	12	1.00	50
	Tritium	12	74.0	20,000
TAN/TSF #2 Well	Gross Alpha	11	1.29	15
	Gross Beta	11	1.76	50
	Tritium	11	35.0	20,000

a. Wells were only sampled for VOCs and radiological parameters.

b. RESL data: The estimated random uncertainty is 1.0 σ .

Table 27. Results of detected nonradiological parameters of the drinking water analyses for the TAN/TSF #1 well, TAN-612; TAN/TSF #2 well, TAN-613; and distribution system, TAN-610.

Location ^a	Parameter ^b	Results (mg/L)	MCL (mg/L)
TAN/TSF #1 Well	Trichloroethylene	0.0091	0.005
	Tetrachloroethane	0.0025	0.005
TAN/TSF #2 Well	Trichloroethylene	0.0041	0.005
	Tetrachloroethane	0.00117	0.005
TAN/TSF Distribution System	Trichloroethylene	0.0016	0.005
	Tetrachloroethane	0.00055 ^c	0.005
	Coliform Bacteria	pd,e	P

a. Wells were only sampled for VOCs and radiological parameters. The distribution system was sampled for the parameters listed in Table 1.

b. Only the parameters detected are listed.

c. Only detected twice during 10 months of sampling.

d. Presence of coliform bacteria.

e. Coliform bacteria was detected in July and August. Water samples are collected monthly and analyzed for coliform bacteria.

Table 28. Results of lead and copper sampling at the TAN/TSF distribution system during May and September of 1992.

Location	Parameter	May Results (mg/L)	Sept. Results (mg/L)	MCL (mg/L)
TAN/TSF-653	Lead	0.0034	0.0056	0.015
	Copper	0.098	0.110	1.3
	Lead	0.0049	0.0052	0.015
	Copper	0.094	0.130	1.3
	Lead	0.0052	0.008	0.015
	Copper	0.095	0.088	1.3
TAN/TSF-602	Lead	0.0026	0.0038	0.015
	Copper	0.120	0.011	1.3
	Lead	0.0015	0.0015	0.015
	Copper	0.066	0.010	1.3
TAN/TSF-687	Lead	0.0059	0.0038	0.015
	Copper	0.034	0.034	1.3
	Lead	0.0037	0.0032	0.015
	Copper	0.015	0.033	1.3
TAN/TSF-615	Lead	0.0024	—	0.015
	Copper	0.012	—	1.3
	Lead	0.0024	—	0.015
	Copper	0.011	—	1.3
TAN/TSF-607	Lead	0.0043	0.0083	0.015
	Copper	0.018	0.020	1.3
TAN/TSF-653	Lead	0.0024	0.0025	0.015
	Copper	0.069	0.093	1.3

Table 29. Results of detected radiological parameters of the drinking water analyses for TAN/CTF #1 well, TAN-632; TAN/CTF #2 well, TAN-639.

Location ^a	Parameter	No. of months monitored	Results ^b (pCi/L)	MCL (pCi/L)
TAN/CTF #1 Well	Gross Alpha	12	1.28	15
	Gross Beta	12	1.91	50
	Tritium	12	< 0	20,000
TAN/CTF #2 Well	Gross Alpha	12	1.12	15
	Gross Beta	12	1.44	50
	Tritium	12	< 0	20,000

a. Wells were only sampled for radiological constituents listed in Table 1.

b. RESL data: The estimated random uncertainty is 1.0 σ .

Table 30. Results of detected nonradiological parameters of the drinking water analyses for TAN/CTF distribution system, TAN-614.

Location ^a	Parameter ^b	Results	MCL
TAN/CTF Distribution System	Coliform Bacteria	pc,d	P

a. The distribution system was sampled for all parameters listed in Table 1, except for the radiological parameters.

b. Only the parameters detected are listed.

c. Presence of coliform bacteria.

d. Coliform bacteria was detected in July and September. Water samples are collected monthly and analyzed for coliform bacteria.

Table 31. Results of lead and copper sampling at the TAN/CTF distribution system during May and September of 1992.

Location	Parameter	May Results (mg/L)	Sept. Results (mg/L)	MCL (mg/L)
TAN/CTF-678	Lead	0.0014	0.0018	0.015
	Copper	0.097	0.110	1.3
	Lead	0.0029	0.0037	0.015
	Copper	0.074	0.089	1.3
	Lead	0.0023	0.0029	0.015
	Copper	0.076	0.065	1.3
	Lead	0.0012	0.0017	0.015
	Copper	0.097	0.094	1.3
	Lead	0.0029	0.0026	0.015
	Copper	0.100	0.130	1.3
	Lead	0.0033	0.0023	0.015
	Copper	0.070	0.079	1.3
	Lead	0.002	0.0014	0.015
	Copper	0.110	0.120	1.3
	Lead	0.0031	0.0	0.015
	Copper	0.150	0.120	1.3
TAN/CTF-676	Lead	0.0024	0.0018	0.015
	Copper	0.820	0.074	1.3

Table 32. Results of detected radiological parameters of the drinking water analyses for TAN/WRRTF well, TAN-644.

Location ^a	Parameter	No. of months monitored	Results ^b (pCi/L)	MCL (pCi/L)
TAN/WRRTF Well	Gross Alpha	11	1.32	15
	Gross Beta	11	1.83	50
	Tritium	11	< 0	20,000

a. The TAN/WRRTF well was sampled for only the radiological parameters listed in Table 1.

b. RESL data: The estimated random uncertainty is 1.0 σ .

Table 33. Results of detected nonradiological parameters of the drinking water analyses for TAN/WRRTF distribution system, TAN-645.

Location ^a	Parameter ^b	Results (mg/L)	MCL (mg/L)
TAN/WRRTF Distribution System	Trichloroethylene	0.00658	0.005
	Tetrachloroethane	0.00245	0.005

a. The TAN/WRRTF distribution system was sampled for only VOCs and coliform bacteria.

b. Only the parameters detected are listed.

Table 34. Results of detected radiological parameters of the drinking water analyses for RWMC well, WMF-603.

Location ^a	Parameter	No. of months monitored	Results ^b (pCi/L)	MCL (pCi/L)
RWMC Well	Gross Alpha	12	1.65	15
	Gross Beta	12	1.13	50
	Tritium	12	1,567	20,000

a. The RWMC well was sampled for VOCs and radiological parameters listed on Table 1.

b. RESL data: The estimated random uncertainty is 1.0 σ .

Table 35. Results of detected nonradiological parameters of the drinking water analyses for RWMC well and distribution system, WMF-603.

Location ^a	Parameter ^b	No. of months monitored	Results (mg/L)	MCL (mg/L)
RWMC, 603 Well	Carbon Tetrachloride	12	0.0017	0.005
	Trichloroethylene	12	0.0009	0.005
RWMC Distribution System	Carbon Tetrachloride	12	0.00073	0.005
	Trichloroethylene	12	0.0006	0.005

a. The distribution system was sampled for all parameters listed on Table 1, except for the radiological parameters.

b. Only the parameters detected are listed.

Table 36. Results of lead and copper sampling at the RWMC distribution system during May and September of 1992.

Location	Parameter	May Results (mg/L)	Sept. Results (mg/L)	MCL (mg/L)
RWMC-604	Lead	0.0019	0.0018	0.015
	Copper	0.0056	0.0084	1.3
	Lead	0.0027	0.0018	0.015
	Copper	0.005	0.015	1.3
RWMC-601	Lead	0.0015	0.0012	0.015
	Copper	0.0079	0.012	1.3
	Lead	0.0021	0.0	0.015
	Copper	0.031	0.025	1.3
RWMC-617	Lead	0.003	0.0037	0.015
	Copper	0.083	0.130	1.3
	Lead	0.0045	—	0.015
	Copper	0.240	—	1.3
RWMC-613	Lead	0.0022	0.0019	0.015
	Copper	0.041	0.089	1.3
	Lead	0.0025	—	0.015
	Copper	0.049	—	1.3
	Lead	0.0023	—	0.015
	Copper	0.069	—	1.3
RWMC-610	Lead	—	0.0024	0.015
	Copper	—	0.099	1.3
	Lead	—	0.0051	0.015
	Copper	—	0.130	1.3
	Lead	—	0.0029	0.015
	Copper	—	0.140	1.3

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Appendix A

Quality Assurance

Appendix A

Quality Assurance

RADIOLOGICAL MEASUREMENTS

The objectives of the Quality Assurance (QA) Program for the DWP at EG&G Idaho facilities at the INEL are to: (a) identify deficiencies in the sampling and measurement processes so that corrective action can be taken, and (b) ensure that the analytical results of the DWP are valid.

Specific elements used to ensure that the objectives of the QA Program are met include:

- Organizational structure and responsibilities of managerial and program personnel
- Documented procedures that describe the materials and equipment needed, specific precautions, prerequisites, and step-by-step sampling procedures for monitoring activities
- Document-control processes for the preparation, revision, and approval of procedures
- Maintenance of records pertaining to monitoring activities, such as planning documents, data sheets, sample results, and calibration records
- Proper calibration and preventive maintenance
- Analyses of quality control (QC) samples (known standards, blank samples, split samples and replicates) to assess accuracy and precision of monitoring results
- Planned and periodic self-assessments.

The DWP determines whether the analytical results for the control samples are acceptable. The activity in the QC sample, and type of analysis are taken into consideration. Each set of known values and laboratory results receives individual consideration. QC samples representative of the DWP water samples are submitted for each analysis type.

NONRADIOLOGICAL MEASUREMENTS

The DWP follows the guidance provided in QAMS-001 80).^{A-1} This ensures that the program provides adequate QC practices to verify the representativeness of the sampling methods and the integrity of the samples themselves. Other supporting documentation includes calibration requirements for field instruments, and criteria for ensuring that field personnel are properly trained.

The portion of the QA program dealing with analytical concerns is designed to assure that data of a known quality are produced by the analyses. QC practices are used to identify and resolve any problems caused by possible matrix effects, contamination, or instrument malfunction. Addressed and documented in the QA program are such issues as intended data use, training/qualification of personnel, organization and responsibilities, corrective action in case of an out-of-control operation, calibration and standardization of analytical instrumentation, sampling and analytical methodology, source and submission of QC samples, sample and data tracking chain of custody, and audit/evaluation programs. The standard operating procedures that document operation of the QA Program are appended to the *Quality Program Plan*.^{A-2}

For all chemical measurements (excluding radiochemical procedures) the uncertainty in an analytical result for a single sample is created by a combination of the following portions of the analytical process:

1. Sample heterogeneity
2. Analysis equipment calibration
3. Analysis equipment noise
4. Laboratory contamination
5. Sample contamination

6. Analyte extraction efficiency

7. Chemical interferences.

Laboratory analysis procedures are designed to minimize the uncertainties as much as practical. The uncertainties are largely a result of limitations in the analytical methods and are acceptable by approved EPA methods, including EPA Contract Laboratory Program methods.

Determining the uncertainty of each sample is not usually practical, so the normal approach is to conduct QC measurements on 10 to 20% of the samples and assume that the observed uncertainty applies to all samples. This is a valid assumption as long as monitoring of the QC results indicates results are consistently within established control limits. The control limits then indicate the maximum uncertainty of each component of the measurements.

Data undergoes a validation for conformance to three main program integrity areas: sample integrity, method validity and adherence to program data quality objectives. Logbook entries are compared against the chain of custody forms and laboratory deliverables verifying that requested analyses were performed and proper preservation techniques were employed. Next the analytical method is validated by reviewing such quality control indicators as holding time, calibrations, associated blanks, and associated laboratory control standards. Finally the data is compared against program data quality objectives which have been set to provide a level of false positives of 5% at the regulatory level based on historical method combined accuracy and precision.

Analytical uncertainty does not include uncertainties introduced by field-sampling variability and by natural spatial and temporal variability of the medium sampled in the field. A true statistical evaluation of these uncertainties can be made only by collection and analysis of multiple samples in both space and time from each sampling site. Sampling bias or contamination of samples

can also greatly increase the uncertainty associated with the analytical result for a sample. These uncertainties can and often do exceed the analytical uncertainty. The sampling and natural field variability components of uncertainty should be established, or at least estimated, and added to analytical uncertainty before any analytical results are assumed to represent concentrations at the site of collection.

Conclusion

The data in this report have met the quality assurance objectives of the program (see Appendix A). Laboratories that were used during 1992 successfully passed a quality assurance and technical audit before samples were sent to them.

Note: Since the EPA audited both RESL and District 7 Health Department for laboratory certification for drinking water analyses, EG&G Idaho did not audit these two laboratories.

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- A-1. QAMS-001, *Quality Assurance Management Manual*, U.S. Environmental Protection Agency, 1980.
- A-2. *Quality Program Plan for Environmental Monitoring*, Environmental Monitoring Unit, QPP-029, May 1991.

Appendix B

**EG&G Idaho Facilities Water Distribution Systems
and
Production Well Descriptions**

Appendix B

EG&G Idaho Facilities Water Distribution Systems and Production Well Descriptions

EG&G Idaho Facilities Water Distribution Systems

1. Central Facilities Area , CFA-641
2. Main Gate, B27-603
3. Power Burst Facility, PBF-602
4. Experimental Breeder Reactor I, EBR-601
5. Gun Range, B21-608
6. Fire Station #2, B16-601
7. Test Reactor Area, TRA-608
8. Test Area North/Technical Support Facility, TAN-610
9. Test Area North/Containment Test Facility, TAN-614
10. Test Area North/Water Reactor Research Test Facility, TAN-645
11. Radioactive Waste Management Complex, WMF-603

CFA #1 Production Well

USGS Site ID#: 433204112562001

State of Idaho PWS#: 6120008

Location: CFA-651

Depth of hole: 685'

Depth of well: 639'

Depth to water: 468'

Date of completion: July 1942

Size and depth of casing: 16", 6 to 440'

Casing material: Steel

Pump information: Submersible, GPM – 650,
horsepower – 150

Media: Aqueous

Special equipment: None

Access required: None

Support required: Operator (mechanic)

Point of contact: (CFA) Facilities and Manage-
ment Craft Operation

Minimum purge time: 8 minutes

CFA #2 Production Well

USGS Site ID#: 433144112563501

State of Idaho PWS#: 6120008

Location: CFA-642

Depth of hole: 681'

Depth of well: 681'

Depth to water: 471'

Date of completion: May 1944

Size and depth of casing: 20", 6 to 68'; 16", 6 to 681'

Casing material: Steel

Pump information: Submersible, GPM – 600,
horsepower – 125

Media: Aqueous

Special equipment: None

Access required: None

Support required: Operator (mechanic)

Point of contact: (CFA) Facilities and Manage-
ment Craft Operation

Minimum purge time: 11 minutes

Main Gate Production Well

USGS Site ID#: 433042112535101

State of Idaho PWS#: 6120015

Location: B27-605

Depth of hole: 644'

Depth of well: 644'

Depth to water: 489'

Date of completion: January 5, 1985

Size and depth of casing: 6", 0 to 533'; 8", 0 to 181'

Casing material: Steel

Pump information: Submersible, GPM - 20,
Horsepower - 5

Media: Aqueous

Special equipment: None

Access required: None

Support required: Operator (mechanic)

Point of contact: (CFA) Facilities and Manage-
ment Craft Operation

Minimum purge time: 34 minutes

PBF #1 Production Well

USGS Site ID#: 433252112520301

State of Idaho PWS#: 6120019

Location: PBF-602

Depth of hole: 653'

Depth of well: 653'

Depth to water: 456'

Date of completion: February 4, 1955

Size and depth of casing: 14", 0 to 653'

Casing material: Steel

Pump information: Submersible, GPM – 400,
horsepower – 80

Media: Aqueous

Special equipment: None

Access required: None

Support required: Operator

Point of contact: (CFA) Facilities and Manage-
ment Craft Operation

Minimum purge time: 12 minutes

PBF #2 Production Well

USGS site ID#: 433247112515201

State of Idaho PWS#: 6120019

Location: PBF-614

Depth of hole: 1217'

Depth of well: 1217'

Depth to water: 463'

Date of completion: April 14, 1960

Size and depth of casing: 12" 573 to 950'; 16", 0 to 767'

Casing material: Steel

Pump information: Line-shaft, GPM – 800, horsepower – 200

Media: Aqueous

Special equipment: None

Access required: None

Support required: Operator (mechanic)

Point of contact: (CFA) Facilities and Management Craft Operation

Minimum purge time: 22 minutes

EBR-I Production Well

United States Geological Survey (USGS) Site
ID#: 433051113002601

State of Idaho Public Water System Number
(PWS#): 6120009

Location: EBR-I, EBR-711

Depth of hole: 1075'

Depth of well: 1075'

Depth to water: 596'

Date of completion: May 1949

Size and depth of casing: 18", 6 to 750'

Casing material: Steel

Pump information: Submersible, GPM – 800,
horsepower – 200

Media: Aqueous

Special equipment: None

Access required: Confined Space Permit

Support required: Operator (mechanic)

Point of contact: (CFA) Facilities and Manage-
ment Craft Operation

Minimum purge time: 24 minutes

Gun Range Production Well

USGS Site ID#: GUN RANGE

State of Idaho PWS#: 6120025

Location: B21-607

Depth of hole: 626'

Depth of well: 620'

Depth to water: 508'

Date of completion: January 1990

Size and depth of casing: 5", 305 to 625'; 6", 0 to 310'; 8", 0 to 150';

Casing material: Steel

Pump information: Submersible, GPM - 20, horsepower - 5

Media: Aqueous

Special equipment: None

Access required: Contact Range Officer

Support required: Operator (mechanic)

Point of contact: (CFA) Facilities and Management Craft Operation

Minimum purge time: 18 minutes

Fire Station #2 (Inactive)

USGS Site ID#: 433548112562301

State of Idaho PWS#: 6120011

Location: Fire St.#2, B16-602

Depth of hole: 518'

Depth of well: 516'

Depth to water: 420'

Date of completion: December 11, 1957

Size and depth of casing: 10", 0 to 516'

Casing material: Steel

Pump information: Schedule 40 pipe, GPM – 400,
horsepower – 75

Media: Aqueous

Special equipment: None

Access required: None

Support required: Operator (mechanic)

Point of contact: (CFA) Facilities and Manage-
ment Craft Operation

Minimum purge time: 3 minutes

TRA #1 Production Well

USGS Site ID#: 433521112573801

State of Idaho PWS#: 6120020

Location: TRA-601

Depth of hole: 600'

Depth of well: 600'

Depth to water: 453'

Date of completion: February 1, 1950

Size and depth of casing: 18", 0 to 600'

Casing material: Wrought iron

Pump information: Line-shaft, GPM – 3200,
horsepower – 700

Media: Aqueous

Special equipment: Hearing protection

Access required: None

Support required: Operator

Point of contact: (TRA) Utility Operators

Minimum purge time: 2 minutes

TRA #3 Production Well

USGS Site ID#: 433522112573501

State of Idaho PWS#: 6120020

Location: TRA-650

Depth of hole: 602'

Depth of well: 602'

Depth to water: 456'

Date of completion: March 17, 1957

Size and depth of casing: 20", 0 to 597'

Casing material: Steel

Pump information: Line-shaft, GPM – 3800,
horsepower – 700

Media: Aqueous

Special equipment: Hearing protection

Access required: None

Support required: Operator

Point of contact: (TRA) Utility Operators

Minimum purge time: 2 minutes

TRA #4 Production Well

USGS Site ID#: 433521112574201

State of Idaho PWS#: 6120020

Location: TRA-672

Depth of hole: 975'

Depth of well: 965'

Depth to water: 463'

Date of completion: July 25, 1963

Size and depth of casing: 16", 705 to 970' ; 18",
300 to 765'; 20", 0 to 418'; 26", 0 to 50'

Casing material: Steel

Pump information: Line-shaft, GPM – 2000,
horsepower – 350

Media: Aqueous

Special equipment: Hearing protection

Access required: None

Support required: Operator

Point of contact: (TRA) Utility Operators

Minimum purge time: 9 minutes

TSF #1 Production Well

USGS Site ID#: 435056112420001

State of Idaho PWS#: 6120021

Location: TAN-612

Depth of hole: 365'

Depth of well: 360'

Depth to water: 208'

Date of completion: January 26, 1953

Size and depth of casing: 16", 0 to 365'

Casing material: Steel

Pump information: Line-shaft, GPM - 1000,
horsepower - 80

Media: Aqueous

Special equipment: None

Access required: None

Support required: Operator

Point of contact: (TAN) Utility Operators

Minimum purge time: 5 minutes

TSF #2 Production Well

USGS Site ID#: 435100112420701

State of Idaho PWS#: 6120021

Location: TAN-613

Depth of hole: 346'

Depth of well: 340'

Depth to water: 211'

Date of completion: August 29, 1953

Size and depth of casing: 16", 0 to 345'

Casing material: Steel

Pump information: Line-shaft, GPM – 1000,
horsepower – 80

Media: Aqueous

Special equipment: None

Access required: None

Support required: Operator

Point of contact: (TAN) Utility Operators

Minimum purge time: 4 minutes

CTF #1 Production Well

USGS Site ID#: 435120112432101

State of Idaho PWS#: 6120013

Location: TAN-632

Depth of hole: 339'

Depth of well: 330'

Depth to water: 199'

Date of completion: November 1, 1957

Size and Depth of casing: 18", 0 to 330'

Casing material: Steel

Pump information: Line-shaft, GPM – 1000,
horsepower – 100

Media: Aqueous

Special equipment: None

Access required: None

Support required: Operator

Point of contact: (TAN) Utility Operators

Minimum purge time: 5 minutes

CTF #2 Production Well

USGS Site ID#: 435119112431801

State of Idaho PWS#: 6120013

Location: TAN-639

Depth of hole: 462'

Depth of well: 455'

Depth to water: 200'

Date of completion: April 1, 1958

Size and depth of casing: 18", 0 to 455'

Casing material: Steel

Pump information: Line-shaft, GPM - 1000,
horsepower - 100

Media: Aqueous

Special equipment: None

Access required: None

Support required: Operator

Point of contact: (TAN) Utility Operators

Minimum purge time: 10 minutes

WRRTF Production Well (Inactive)

USGS Site ID#: 434952112411301

State of Idaho PWS#: 6120014

Location: TAN-644

Depth of hole: 309'

Depth of well: 309'

Depth to water: 209'

Date of completion: July 12, 1956

Size and depth of casing: 8", 0 to 309'

Casing material: Steel

Pump information: Line-shaft, GPM – 400, horse-power – 50

Media: Aqueous

Special equipment: None

Access required: None

Support required: Operator (mechanic)

Point of contact: (TAN) Utility Operators

Minimum purge time: 2 minutes

RWMC Production Well

USGS Site ID#: 433002113021701

State of Idaho PWS#: 6120018

Location: Waste Management Facility (WMF),
WMF-603

Depth of hole: 685'

Depth of well: 685'

Depth to water: 568'

Date of completion: November 1974

Size and depth of casing: 10", 0 to 658'; 14", 0 to
562'; 18", 0 to 108'

Casing material: Steel

Pump information: Line-shaft, GPM – 240, horse-
power – 75

Media: Aqueous

Special equipment: None

Access required: None

Support required: Operator (mechanic)

Point of contact: (RWMC) Facilities and Manage-
ment Craft Operation

Minimum purge time: 6 minutes

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