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**ICPP ENVIRONMENTAL MONITORING REPORT
CY-1993**

Environmental Characterization

May 1994

**Westinghouse Idaho
Nuclear Company, Inc.**

PREPARED FOR THE
DEPARTMENT OF ENERGY
IDAHO OPERATIONS OFFICE
UNDER CONTRACT DE-AC07-84ID12435

MASTER

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ACRONYM LIST

BAT	Best Available Technology
BOD	Biological Oxygen Demand
CFSGF	Coal Fired Steam Generating Facility
DCGs	Derived Concentration Guides
DO	Dissolved Oxygen
DOE	Department of Energy
EPA	Environmental Protection Agency
ES&H	Environmental Safety & Health
FAST	Fluorinel Dissolution Process & Fuel Storage Facility
ICPP	Idaho Chemical Processing Plant
NO _x	Nitrogen Oxide
NWCF	New Waste Calcining Facility
Ph	Potential of Hydrogen
QA	Quality Assurance
QAPJP	Quality Assurance Project Plan
RAL	Remote Analytical Laboratory
RESL	Radiological & Environmental Sciences Laboratory
STP	Sewage Treatment Plant
SO ₂	Sulfur Dioxide
VOG	Ventilation Off-Gas
WINCO	Westinghouse Idaho Nuclear Company

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ICPP ENVIRONMENTAL MONITORING REPORT 1993

I. INTRODUCTION

Summarized in this report are the data collected through Environmental Monitoring programs conducted at the Idaho Chemical Processing Plant (ICPP) by the Environmental Safety & Health (ES&H) Department. This report is published in response to DOE Order 5400.1. This report covers the period from December 21, 1992 through December 20, 1993.

The ICPP is responsible for complying with all applicable Federal, State, Local and DOE Rules, Regulations and Orders. Radiological effluent and emissions are regulated by the DOE in accordance with the Derived Concentration Guides (DCGs) as presented in DOE Order 5400.5. The State of Idaho regulates all nonradiological waste resulting from the ICPP operations including all airborne, liquid, and solid waste.

The ES&H Department updated the Quality Assurance (QA) Project Plan for Environmental Monitoring activities during the third quarter of 1992. QA activities have resulted in the ICPP's implementation of the Environmental Protection Agency (EPA) rules and guidelines pertaining to the collection, analyses, and reporting of environmentally related samples. Where no EPA methods for analyses existed for radionuclides, WINCO methods were used.

Table 1-1 summarizes the volumes and activity released from ICPP stacks and liquid release points. Figure 1-1 is a graphic representation of cumulative airborne releases and Figure 1-2 depicts cumulative liquid releases for the year. The Main Stack gaseous monitor was not in operation in January and February, and May through December. The gaseous monitor operated for one two week period in April and one two week period in May. The values calculated for I-129, C-14, and H-3 for the months which the monitor was not in operation are based on a comparison of the 1991 calcining campaign to the 1993 campaign. For each month a conservative value was derived based on the type of feed and the feed volume. In addition, the contribution from LET&D was added to those derived from calcining. New Waste Calcining Facility (NWCF) was in operation from January 24 through November 3, 1993. The graphs allow a comparison to be made of waste volume and activity released for the year. During 1993 the cumulative airborne and liquid release of radionuclides was $2.17\text{E-}02$ curies. Airborne releases to the atmosphere contributed $1.00\text{E-}02$ curies and liquid effluent released to the Percolation Pond contributed $1.17\text{E-}02$ curies. Table 2-5 provides an operations summary for the Coal Fired Steam Generating Facility (CFSGF). Liquid Effluent Treatment and Disposal (LET&D) began operation on January 1, 1993. PEW condensates which previously were discharged to Service Waste are now treated in the LET&D facility. Table 3-1 and 3-2 provide information on radionuclide activity and concentration of inorganic chemicals present in the service waste. The values are compared to regulatory limits where applicable.

TABLE 1-1
SUMMARY OF RELEASE DATA FOR 1993

	<u>AIRBORNE</u>				<u>LIQUID</u>			
	Volume (E+09 m ³)		Activity (Curies)		Volume (E+09 Liters)		Activity (Curies)	
	<u>Month</u>	<u>YTD</u>	<u>Month</u>	<u>YTD</u>	<u>Month</u>	<u>YTD</u>	<u>Month</u>	<u>YTD</u>
Jan.	.386	.386	5.06E+00	5.06E+00	.224	.224	3.21E-03	3.21E-03
Feb.	.359	.745	5.06E+00	1.01E+01	.221	.445	7.23E-04	3.93E-03
Mar.	.329	1.074	6.66E-02	1.02E+01	.242	.687	8.73E-04	4.81E-03
Apr.	.380	1.454	1.50E+01	2.52E+01	.232	.919	1.57E-03	6.38E-03
May	.344	1.798	1.50E+01	4.03E+01	.217	1.136	5.78E-04	6.95E-03
Jun.	.351	2.149	5.35E-01	4.08E+01	.229	1.365	7.19E-04	7.68E-03
Jul.	.366	2.515	1.50E+01	5.58E+01	.206	1.571	7.55E-04	8.42E-03
Aug.	.345	2.860	6.92E-02	5.59E+01	*.206	1.777	7.24E-04	9.15E-03
Sep.	.350	3.210	6.62E-02	5.60E+01	.196	1.973	7.16E-04	9.86E-03
Oct.	.364	3.574	5.33E-01	5.65E+01	.188	2.161	7.26E-04	1.06E-02
Nov.	.342	3.916	5.06E+00	6.16E+00	.193	2.354	4.58E-04	1.10E-02
Dec.	.329	4.245	5.06E+00	6.66E+01	.212	2.566	6.20E-04	1.17E-02

*These numbers do not include Sewage Treatment Plant (STP) volume for the reporting period for August (reporting period runs from the 20th of one month until the 21st of the following month). Information not available.

FIGURE 1-1
AIRBORNE RELEASES
CY-1993

FIGURE 1-2
LIQUID RELEASES
CY-1993

II. AIRBORNE MONITORING

1. INTRODUCTION

Airborne radioactive emissions are monitored from the Main Stack (CPP-708), the Fluorinel Dissolution Process and Fuel Storage Facility (FAST) Stack (CPP-767), the New Waste Calcining Facility (NWCF) Stack (CPP-659), and the Remote Analytical Laboratory (RAL) Stack (CPP-684). NWCF was in operation from January 24 through November 3, 1993. The Main Stack is equipped with particulate and gaseous monitoring systems and the FAST Stack is equipped with a particulate monitoring system. The airborne monitoring systems are based upon a proportional isokinetic sample. Particulate filters are collected and analyzed daily on all of the stacks. The Main Stack gaseous monitor was not in operation in January and February, and May through December. The gaseous monitor operated for one two week period in April and one two week period in May. Nitrogen oxide (NO_x) emissions are the only nonradioactive airborne contaminant that is monitored from the Main Stack. The NWCF Ventilation Off-Gas (VOG) and RAL VOG systems are continuously monitored for radioactive particulates and the sample filter is collected periodically. The CFSGF is monitored for NO_x , SO_2 , and opacity in accordance with the State of Idaho, the EPA and the DOE-ID.

Radioactive releases for each emission point were well below the DOE DCGs for 1993. DCGs are reference values for conducting radiological environmental protection programs at operational DOE facilities and sites.

Quality assurance objectives for data measurement and laboratory performance are listed in the Quality Assurance Project Plan (QAPjP-001) for the Analysis of the Environmental Samples by both the WINCO Analytical Chemistry Section and Special Technologies Section. Final data reduction is performed by the Environmental Characterization section of the Environmental Safety & Health Department.

2. AIRBORNE RELEASES TO THE ENVIRONMENT

2.1 Main Stack

Airborne radioactive release data from the Main Stack for each month and the year are given in Table 2-1. This information is presented graphically in Figure 2-1. Graphic presentations for radionuclides which are most likely to be present (iodine-129, cesium-137, strontium-90, ruthenium-106, plutonium (total), antimony-125, C-14, and H-3) showing yearly trends are given in Figures 2-2 through 2-9, respectively.

Nitrogen oxide (NO_x) emission from the Main Stack is the only nonradioactive airborne contaminant continuously monitored. NO_x concentration levels, while they do not violate any ambient air quality standard, must not exceed limits imposed by the FPR PSD permit. The limits set for the Main Stack are 388 pounds per hour and 1700 tons per year. Figure 2-10 provides NO_x emissions for the last three years. The total NO_x released in 1993 was 458 tons, well below the allowable 1700 tons per year.

Table 2-1
AIRBORNE RELEASES FROM ICPP MAIN STACK CY-1993

RADIONUCLIDES (curies)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
C-14	1.00E-03	1.00E-03				2.80E-03				2.80E-03	1.00E-03	1.00E-03	9.60E-03
Co-57						3.27E-08		2.64E-08	1.87E-08				7.78E-08
Co-60		3.27E-08	1.78E-07	5.99E-07	5.92E-07	1.20E-06		1.75E-06	3.72E-08				4.39E-06
Cs-134	7.35E-07	7.02E-06	4.96E-06	1.37E-05	1.04E-05	2.13E-05	8.24E-08	2.75E-05	1.46E-06	2.13E-07		3.52E-08	8.74E-05
Cs-137	7.78E-05	5.24E-04	3.84E-04	1.04E-03	8.88E-04	1.84E-03	2.52E-05	2.52E-03	1.07E-04	4.22E-05	2.57E-05	7.42E-06	7.48E-03
Eu-152						1.80E-06							1.80E-06
Eu-154			3.65E-07	1.09E-06	9.36E-08	2.98E-06		5.33E-06					9.86E-06
Eu-155						1.62E-07							1.62E-07
H-3	5.06E+00	5.06E+00	6.31E-02	1.50E+01	1.50E+01	5.25E-01	1.50E+01	6.31E-02	6.31E-02	5.25E-01	5.06E+00	5.06E+00	6.65E+01
I-129	3.54E-03	3.54E-03	2.96E-03	2.12E-02	2.12E-02	5.59E-03	2.12E-02	2.96E-03	2.96E-03	5.59E-03	3.54E-03	3.54E-03	9.79E-02
Pu-Total				2.54E-09									2.54E-09
Ru-106	8.64E-06	1.47E-05	1.29E-05	4.24E-05	4.23E-05	7.34E-05	2.11E-04	5.06E-04	3.00E-05	3.07E-05	2.88E-05	4.65E-06	1.01E-03
Sb-125	2.12E-06	2.01E-06	3.18E-06	1.21E-05	7.58E-06	1.57E-05	9.84E-07		4.29E-07	5.08E-08			4.42E-05
Sr-90		4.40E-06	9.04E-05	1.94E-04	3.05E-05	4.20E-04	2.45E-06	1.58E-05	1.46E-05	1.89E-04	1.62E-06		9.63E-04
TOTAL ACTIVITY	5.06E+00	5.06E+00	6.66E-02	1.50E+01	1.50E+01	5.35E-01	1.50E+01	6.92E-02	6.62E-02	5.33E-01	5.06E+00	5.06E+00	6.66E+01
TOTAL VOLUME (cubic meters)	1.28E+08	1.34E+08	1.21E+08	1.34E+08	1.28E+08	1.30E+08	1.18E+08	1.23E+08	1.25E+08	1.19E+08	1.21E+08	1.18E+08	
CUMULATIVE ACTIVITY	5.06E+00	1.01E+01	1.02E+01	2.52E+01	4.03E+01	4.08E+01	5.58E+01	5.59E+01	5.60E+01	5.65E+01	6.16E+01	6.66E+01	

NOTE: Gaseous monitor not in operation in January & February, & May through December. The gaseous monitor operated for one two week period in April & one two week period in May which resulted in below detection limits for H-3, C-14 and I-129. The values for the months which the monitor was not in operation are based on comparison of the 1991 calcing campaign.

Blanks for Sr-90 and Pu-Total represent below detection limits.

Remaining radionuclides which are blank were not detected in the gamma scan for that reporting month.

Figure 2-1
MAIN STACK EFFLUENT
Total Activity

Figure 2-2
MAIN STACK EFFLUENT
I-129

Figure 2-3
MAIN STACK EFFLUENT
Cs-137

Figure 2-4
MAIN STACK EFFLUENT
Sr-90

Figure 2-5
MAIN STACK EFFLUENT
Ru-106

Figure 2-6
MAIN STACK EFFLUENT
Pu-Total

Figure 2-7
MAIN STACK EFFLUENT
Sb-125

Figure 2-8
MAIN STACK EFFLUENT
C-14

Figure 2-9
MAIN STACK EFFLUENT
H-3

2-10
NOx RELEASED FROM ICPP MAIN STACK

2.2 FAST Stack

Table 2-2 lists the total radionuclide releases in curies from the FAST Stack per month by radionuclide and Figure 2-11 depicts the total monthly activity. Graphic presentations for tritium (H-3), plutonium (Total), antimony-125, and cesium 137 showing yearly trends are given in Figures 2-12 through 2-15, respectively.

2.3 NWCF Stack

Table 2-3 presents the radioactive emissions from the NWCF VOG system. The radionuclides reported are those that have been routinely analyzed for in the ventilation stack emissions. Figure 2-16 depicts the total monthly activity.

2.4 RAL Stack

Table 2-4 presents the radioactive emissions from the RAL VOG system. The radionuclides reported are those that have been identified in the ventilation stack emissions. Figure 2-17 depicts the total monthly activity.

2.5 Coal Fired Steam Generating Facility (CFSGF)

The CFSGF stack is monitored for sulfur dioxide (SO₂), nitrogen oxide (NO_x), and opacity. Emission limits for the stack are set by the Environmental Protection Agency (EPA) and the State of Idaho. Table 2-5 lists the releases per month for the CFSGF. The facility must provide a minimum removal efficiency of 70% for SO₂ calculated as an average over a 30 day period. SO₂ emissions shall not exceed an average of 0.6 pounds per MM/Btu of fuel input averaged over a 24 hour period. NO_x emissions shall not exceed an average of 0.5 pounds per MM/Btu of fuel input averaged over a 24 hour period when the steam load is equal to or greater than 35,000 pounds per hour. NO_x emissions shall not exceed 0.7 pounds per MM/Btu of fuel input averaged over a 24 hour period when the steam load is less than 35,000 pounds per hour. Opacity limit for the CFSGF is 20%.

During the month of February, the average NO_x emissions was 0.5 pounds per MM/Btu. However, the NO_x emissions did not exceed an average of 0.5 pound per million Btu's (Range B) for steam flow greater or equal to 35000 lbs/hr average over a 24 hour period.

Table 2-2
AIRBORNE RELEASES FROM ICPP FAST STACK CY-1993
(in curies)

RADIONUCLIDES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Co-57													
Co-60				8.05E-07							2.65E-08		8.32E-07
Cs-134													
Cs-137	5.54E-07	8.34E-07	8.44E-07	2.75E-06	5.62E-07	2.11E-07	5.89E-08	3.10E-07	7.72E-07	4.54E-07	4.74E-07	5.68E-07	8.39E-06
Eu-152													
Eu-154													
H-3													
Pu-Total													
Ru-106													
Sb-125	2.50E-06	4.54E-06	1.30E-06	7.11E-07	6.11E-06	2.13E-06	4.47E-07	1.93E-06	1.04E-06	8.11E-08	8.12E-07	2.38E-07	2.18E-05
Sr-90					1.94E-05	4.65E-06	2.87E-06		1.95E-06				2.89E-05
Ti-208													
TOTAL ACTIVITY	3.05E-06	5.37E-06	2.14E-06	4.27E-06	2.61E-05	6.99E-06	3.38E-06	2.24E-06	3.76E-06	5.35E-07	1.31E-06	8.06E-07	5.99E-05
TOTAL VOLUME (cubic meters)	1.15E+08	1.13E+08	9.70E+07	1.12E+08	1.05E+08	1.03E+08	1.02E+08	1.05E+08	1.05E+08	1.02E+08	1.04E+08	1.01E+08	
CUMULATIVE ACTIVITY	3.05E-06	8.42E-06	1.06E-05	1.48E-05	4.09E-05	4.79E-05	5.13E-05	5.35E-05	5.73E-05	5.78E-05	5.91E-05	5.99E-05	

NOTE: Blanks for Sr-90 and Pu-Total represent below detection limit.

Remaining radionuclides which are blank were not detected in the gamma scan for that reporting month.

No H-3 data is available for 1993 due to gaseous monitor no longer in operation.

Figure 2-11
FAST STACK EFFLUENT
Total Activity

Figure 2-12
FAST STACK EFFLUENT
H-3

Figure 2-13
FAST STACK EFFLUENT
Pu-Total

Figure 2-14
FAST STACK EFFLUENT
Sb-125

Figure 2-15
FAST STACK EFFLUENT
Cs-137

Table 2-3
AIRBORNE RELEASES FROM ICPP NWCF CY-1993
(in curies)

RADIONUCLIDES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Cs-137													
Pu-Total													
Ru-106													
Sb-125													
Sr-90		5.59E-08							2.10E-08		3.34E-08		1.10E-07
TOTAL ACTIVITY		5.59E-08							2.10E-08		3.34E-08		1.10E-07
TOTAL VOLUME (cubic meters)	1.22E+08	9.16E+07	9.19E+07	1.13E+08	9.04E+07	9.76E+07	1.26E+08	9.59E+07	9.93E+07	1.23E+08	9.57E+07	8.93E+07	
CUMULATIVE ACTIVITY	0.00E+00	5.59E-08	5.59E-08	5.59E-08	5.59E-08	5.59E-08	5.59E-08	5.59E-08	7.69E-08	7.69E-08	1.10E-07	1.10E-07	

NOTE: Blanks represent below detection limits.

Figure 2-16
NWCF STACK EFFLUENT
Total Activity

Table 2-4
AIRBORNE RELEASES FROM ICPP RAL STACK CY-1993
(in curies)

RADIONUCLIDES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Co-60													
Cs-134													
Cs-137	2.48E-08	3.38E-07			4.63E-07	3.28E-08				2.54E-08			8.84E-07
Pu-Total													
Ru-106													
Sb-125													
Sr-90					3.12E-06					6.17E-05			6.48E-05
TOTAL ACTIVITY	2.48E-08	3.38E-07			3.58E-06	3.28E-08				6.17E-05			6.57E-05
TOTAL VOLUME (cubic meters)	2.08E+07	2.08E+07	1.88E+07	2.08E+07	2.02E+07	2.08E+07	2.02E+07	2.08E+07	2.08E+07	2.02E+07	2.08E+07	2.02E+07	
CUMULATIVE ACTIVITY	2.48E-08	3.63E-07	3.63E-07	3.63E-07	3.95E-06	3.98E-06	3.98E-06	3.98E-06	3.98E-06	6.57E-05	6.57E-05	6.57E-05	

NOTE: Blanks for Sr-90 and Pu-Total represent below detection limit.

Remaining radionuclides which are blank were not detected in the gamma scan for that reporting month.

Figure 2-17
RAL STACK EFFLUENT
Total Activity

Table 2-5
CY-1993
COAL FIRED STEAM GENERATOR FACILITY

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
COAL BURNED (TONS)	1695	1398	1453	857	804	1148	532	620	103	642	1180	1203	
CUMULATIVE COAL BURNED (TONS)	1695	3093	4546	5403	6207	7355	7887	8507	8610	9252	10432	11635	
MM/Btu/#Burned	0.01309	0.01309	0.01309	0.01309	0.01309	0.01309	0.0128	0.0128	0.0128	0.0128	0.0128	0.0128	
% Sulfur	0.42	0.42	0.42	0.42	0.42	0.42	0.41	0.41	0.41	0.41	0.41	0.41	
#NOx/MM/Btu	0.42	0.5	0.41	0.48	0.4	0.42	0.33	0.28	0.37	0.4	0.42	0.38	
#SO2/MM/Btu	0.09	0.09	0.02	0.02	0.07	0.07	0.04	0.07	0.07	0.09	0.08	0.04	
Permit Steam Flow Range A or B	B	B	B	A	A	A	B	A	A	B	B	B	
% SO2 Removed	85.5	85.4	95	97	89	89	94	89	89	86.1	87	93.3	
% Opacity	2	2	1	2	1	2	1	1	1	1	1	2	
Per PSD Permit PSD-X81-11 (2/86) the following limits are established:													
Opacity = <20%													
Coal Burned (tons) = N/A													
MM/Btu burned = NA													
% Sulfur = IDAPA 16.01.01.355 states "no person shall sell, distribute, use or make available for use, any coal containing greater than 1% sulfur by weight."													
Nitrogen oxide (lbs. NOx/MM/Btu) emissions shall not exceed an average of 0.5 pounds per million Btu's (Range B) for steam flow greater or equal to 35000 lbs/hr averaged over a 24 hr. period.													
Nitrogen oxide (lbs. NOx/MM/Btu) emissions shall not exceed an average of 0.7 pounds per million Btu's (Range A) for steam flow less than 35000 lbs/hr averaged over a 24 hr. period.													
Sulfur dioxide (lbs. SO2/MM/Btu) emissions shall not exceed an average of 0.6 pounds per million Btu of fuel input, averaged over a 24 hour period.													
%SO2 removal = 70% or greater and shall be calculated as an average over a 30 day period.													
Steam flow = N/A (Range B = steam load equal to or greater than 35000 pounds per hour and Range A = steam load less than 35000 pounds per hour)													

III. LIQUID MONITORING

1. INTRODUCTION

Liquid monitoring discussed in this report includes: 1) Service Waste System, 2) Sewage Treatment Plant, and 3) Production and Potable Water Wells. Quality Assurance objectives for measurement data and laboratory performance are listed in both the Quality Assurance Project Plan for the Analysis of Environmental Samples by the WINCO Analytical Chemistry Section and the Special Technologies Quality Assurance Project Plans for Work Subject to EPA QAMS-005/80.

2. LIQUID RELEASES TO THE ENVIRONMENT

2.1 Service Waste System

Liquid waste streams are generated from all areas of the ICPP. The waste streams vary in volume. Waste streams are disposed of through the Service Waste System to the Percolation Pond #2. Liquid Effluent Treatment and Disposal (LET&D) began operation on January 1, 1993. PEW condensates which previously were discharged to Service Waste are now treated in the LET&D facility.

Isotopic radionuclide and inorganic chemical release data for the Service Waste System for each month and year totals are presented in Table 3-1 and 3-2. The radionuclides reported are those that have been found in the past. Listed radionuclides that do not have values shown were not observed during the reporting month or were below detection limits. Note that for liquid releases to the environment, isotopic plutonium and uranium data is classified and thus will only be discussed as Pu-Total or U-Total. Figure 3-1 depicts the total monthly activity released to the active Percolation Pond at ICPP. January 1993 Service Waste samples include the last eleven days of December 1992 during which the PEW condensate was still being discharged to Service Waste. This resulted in elevated radionuclide activity during January. However, the radionuclide activity for January and the remaining months did not exceed the maximum contaminant levels for radionuclides in drinking water.

Figure 3-2 depicts total plutonium and figure 3-3 depicts total uranium found in the service waste stream. The quantity of plutonium and uranium released to the Pond remained relatively constant during 1993. Figures 3-4 through 3-7 present trend information for select radionuclides in the Service Waste.

Table 3-3 lists the monthly DCG release ratios respectively for individual radionuclides. DCGs are not release limits, but rather are screening values for considering Best Available Technology (BAT) for discharges and dose estimates.

The ratio is calculated by dividing the detected radionuclide concentration by the established limit. Governmental regulations state that a corrected total ratio of 1.0 equals allowable radionuclide concentrations. WINCO has set an additional restriction on the allowable release of total radionuclides; i.e. WINCO will not exceed a DCG ratio of 1.0. The ICPP did not approach the total allowable release at any time during 1993. The ICPP did not exceed a ratio of 1.0 during any month in 1993.

Table 3-1
LIQUID RELEASES FROM ICPP SERVICE WASTE CY-1993
(in curies)

RADIONUCLIDES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Co-60			1.10E-04	5.37E-04		9.47E-05		6.82E-05	4.26E-05	4.58E-05	6.36E-05	3.97E-05	1.00E-03
Cs-134													
Cs-137	1.23E-03	2.13E-05	1.76E-04	4.10E-04	3.17E-05	7.31E-05	2.14E-05	5.58E-05	3.86E-05	6.67E-05	5.26E-05		2.18E-03
H-3													
Pu-TOTAL	6.38E-06		6.19E-06	7.75E-06	8.48E-06	3.58E-06	3.82E-06		5.79E-06	2.21E-06	3.95E-06		4.82E-05
Ru-106													
Sb-125													
Sr-90	1.43E-03	1.51E-04		1.37E-04			2.41E-04	1.43E-04	1.54E-04	2.76E-04		2.07E-04	2.74E-03
U-TOTAL	5.41E-04	5.51E-04	5.81E-04	4.74E-04	5.38E-04	5.48E-04	4.89E-04	4.57E-04	4.75E-04	3.35E-04	3.38E-04	3.73E-04	5.70E-03
TOTAL ACTIVITY	3.21E-03	7.23E-04	8.73E-04	1.57E-03	5.78E-04	7.19E-04	7.55E-04	7.24E-04	7.16E-04	7.26E-04	4.58E-04	6.20E-04	1.17E-02
TOTAL VOLUME (liters)	2.20E+08	2.16E+08	2.38E+08	2.28E+08	2.12E+08	2.24E+08	2.01E+08	2.04E+08	1.93E+08	1.84E+08	1.88E+08	2.07E+08	
CUMULATIVE ACTIVITY	3.21E-03	3.93E-03	4.81E-03	6.38E-03	6.95E-03	7.67E-03	8.43E-03	9.15E-03	9.87E-03	1.06E-02	1.11E-02	1.17E-02	

NOTE: Blanks for H-3, Pu-Total and Sr-90 represent below detection limit.

Remaining radionuclides which are blank were not detected in the gamma scan for that reporting month.

Table 3-2
ICPP SERVICE WASTE CY-1993
(in mg/L)

INORGANIC CHEMICALS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	EPA TOXICITY LIMIT
Arsenic (As)					1.11E-03								5.00E+00
Barium (Ba)	9.91E-02	8.80E-02	9.79E-02	7.14E-02	8.16E-02	8.98E-02	9.40E-02	9.00E-02	1.04E-01	9.78E-02	9.28E-02	1.01E-01	1.00E+02
Cadmium (Cd)	1.50E-02												1.00E+00
Chromium (Cr)					1.04E-02							1.98E-02	5.00E+00
Mercury (Hg)													
Selenium (Se)			2.20E-03										1.00E+00
Silver (Ag)					3.35E-03							3.32E-02	5.00E+00
Sodium (Na)	1.70E+02	1.50E+02	1.80E+02	1.80E+02	1.80E+02	1.50E+02	1.80E+02	1.60E+02	1.80E+02	1.70E+02	1.70E+02	1.50E+02	
Chloride Ion	2.85E+02	2.62E+02	2.69E+02	2.91E+02	2.83E+02	2.87E+02	2.71E+02	2.77E+02	3.02E+02	2.84E+02	2.90E+02	2.90E+02	
Fluoride Ion	2.39E-01	2.15E-01	2.46E-01	2.14E-01	2.13E-01	2.27E-01	2.30E-01	2.15E-01	2.13E-01	2.09E-01	2.34E-01	2.18E-01	
Nitrate Ion	5.35E+00	5.23E+00	5.13E+00	4.68E+00	4.66E+00	4.64E+00	4.55E+00	4.91E+00	4.76E+00	8.71E+00	4.96E+00	9.46E+00	
Sulfate Ion	2.67E+01	2.83E+01	2.73E+01	2.70E+01	2.76E+01	2.73E+01	2.86E+01	2.86E+01	2.73E+01	2.69E+01	2.85E+01	2.68E+01	
Phosphate Ion													
TDS (mg/L)	6.70E+02	6.80E+02	6.70E+02	6.70E+02	7.10E+02	6.90E+02	7.10E+02	7.20E+02	7.00E+02	7.50E+02	6.80E+02	6.90E+02	
Conductivity (uMhos)	1100	1200	1200	1200	1300	1300	1300	1300	1300	1400	1300	1300	
pH	8.5	8.4	8.4	8.2	8.5	8.2	8.2	8.2	8.4	8.2	8.1	8.2	between 2 and 12.5

BLANKS REPRESENT CONCENTRATION BELOW THE DETECTION LIMIT

TABLE 3-3
DOE DCG RATIOS CY-1993

RADIONUCLIDES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
CO-60			9.24E-05	4.72E-04		8.44E-05		6.68E-05	4.42E-05	4.98E-05	6.76E-05	3.66E-05
CS-134												
CS-137	1.87E-03	3.29E-05	2.46E-04	6.00E-04	5.00E-05	1.09E-04	3.75E-05	9.10E-05	6.67E-05	1.21E-04	9.33E-05	
PU-TOTAL	7.25E-04		6.50E-04	8.50E-04	1.00E-03	4.00E-04	4.75E-04		7.50E-04	3.00E-04	7.00E-04	
RU-106												
SB-125												
SR-90	6.57E-03	5.32E-04		6.01E-04			1.20E-03	7.01E-04	7.98E-04	1.50E-03		1.00E-03
U-TOTAL	3.43E-03	4.82E-03	4.60E-03	3.97E-03	5.86E-03	4.61E-03	4.59E-03	4.24E-03	4.63E-03	3.43E-03	3.60E-03	3.60E-03
TOTAL	1.26E-02	5.38E-03	5.59E-03	6.49E-03	6.91E-03	5.20E-03	6.30E-03	5.10E-03	6.29E-03	5.40E-03	4.46E-03	4.64E-03
TOTAL AFTER 10% EXCLUSION	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

NOTE: Blanks for Pu-Total and Sr-90 represent below detection limit.

Remaining radionuclides which are blank were not detected in the gamma scan for that reporting month.

Figure 3-1
SERVICE WASTE EFFLUENT
Total Activity

Figure 3-2
SERVICE WASTE EFFLUENT
Total-Pu

Figure 3-3
SERVICE WASTE EFFLUENT
Total-U

Figure 3-4
SERVICE WASTE EFFLUENT
H-3

Figure 3-5
SERVICE WASTE EFFLUENT
Ru-106

Figure 3-6
SERVICE WASTE EFFLUENT
Sr-90

Figure 3-7
SERVICE WASTE EFFLUENT
Cs-137

2.2 Production and Potable Water Wells

There are two production wells and one potable water well for influent at the ICPP. The production wells are operated alternately. Grab samples are collected monthly from the operating wells. Radiological analysis of the well water is done by the Department of Energy's Radiological and Environmental Sciences Laboratory (RESL).

Nonradiological analyses for arsenic, barium, cadmium, chloride, chromium, lead, mercury, nitrate, selenium, and silver are performed monthly by the Analytical Chemistry group. Periodically, grab samples are analyzed for the following organic contaminants: total organic carbon; Endrin; Lindane; Methoxychlor; Toxaphene; 2-4-D; and 2,4,5-TP Silex.

Tables 3-4 and 3-5 list the results of the analyses performed on the Production and Potable Water Wells. All results indicate that the ICPP well waters are below all applicable regulatory standards for trace metals and organics. The Industrial Safety section collects monthly samples of the wells to perform analyses for tritium and strontium, and sends the samples off-site to Acculab in Colorado.

2.3 Sewage Treatment Plant

Domestic waste water at the ICPP is pumped to the Waste Water Treatment Facility which is located outside the security fence. WINCO Power Plant Services is responsible for the operation and maintenance of the Waste Water Treatment Facility. The facility was sampled for radionuclides by EG&G personnel up to May, 1993 using grab samples and analyzed for strontium and each quarter analyzed for plutonium. Beginning in June, 1993, WINCO ES&H department began taking monthly grab samples for radionuclides. The samples are analyzed for gross alpha, gross beta and gamma. The WINCO Environmental Safety & Health Department monitors the operation and performance of the domestic Waste Water Treatment Plant. Table 3-6 lists the monthly Biological Oxygen Demand (BOD), Dissolved Oxygen (DO) and pH for 1993. Table 3-6 also lists the monthly strontium, quarterly plutonium (total).

Monthly influent (raw) and effluent (final) Biological Oxygen Demand (BOD) concentrations are shown in Figure 3-8. The difference in concentrations between influent BOD and effluent BOD represents the treatment efficiency.

Since the facility has been operational, treatment efficiency has met design (80%) criteria except during algae blooms when excess algae overflows the effluent weir. Dissolved Oxygen (DO) levels in the influent and effluent are also indicators of proper operation. Values for influent and effluent DO are shown in Figure 3-9. Figure 3-10 lists the pH and Figure 3-11 represents STP volume.

2.4 ICPP Injection Well

The ICPP injection well was permanently sealed in November 1989.

Table 3-4
ICPP PRODUCTION WELL
CY-1993
(in mg/L)

INORGANIC CHEMICALS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MAXIMUM CONTAMINANT LEVELS
Arsenic (As)						1.00E-03		2.30E-03					5.00E-02
Barium (Ba)	7.96E-02	8.34E-02	8.80E-02	8.07E-02	8.40E-02	8.71E-02	8.72E-02	8.98E-02	8.57E-02	9.12E-02	8.97E-02	8.69E-02	2.00E+00
Cadmium (Cd)	1.80E-03												5.00E-03
Chromium (Cr)	5.54E-03	6.75E-03	6.00E-03	5.12E-03	5.45E-03	3.80E-03	5.60E-03	3.34E-03	5.40E-03	5.40E-03	6.60E-03	5.45E-03	1.00E-01
Lead (Pb)	2.30E-02												5.00E-02
Selenium (Se)											3.90E-03		5.00E-02
Silver (Ag)													
Sodium (Na)	7.30E+00	7.40E+00	7.30E+00	8.20E+00	7.70E+00	7.70E+00	7.30E+00	7.50E+00	7.20E+00	8.10E+00	6.60E+00	8.00E+00	
Chloride Ion	1.90E+01	1.83E+01	1.67E+01	1.92E+01	1.85E+01	1.88E+01	1.91E+01	1.78E+01	2.01E+01	1.86E+01	1.82E+01	1.84E+01	
Fluoride Ion	2.23E-01	2.16E-01	2.04E-01	2.09E-01	2.02E-01	2.19E-01	1.97E-01	2.28E-01	2.16E-01	2.16E-01	2.10E-01	2.16E-01	4.00E+00
Nitrate Ion	4.37E+00	4.31E+00	4.58E+00	4.65E+00	4.49E+00	4.57E+00	4.47E+00	4.58E+00	4.58E+00	5.00E+00	4.52E+00	4.68E+00	1.00E+01
Phosphate Ion				7.20E-01									
Sulfate Ion	2.59E+01	2.49E+01	2.35E+01	2.71E+01	2.71E+01	2.60E+01	2.65E+01	2.69E+01	2.62E+01	2.61E+01	2.43E+01	2.34E+01	

*BLANKS = BELOW DETECTION LIMIT

Table 3-5
ICPP POTABLE WELL
CY-1993
(in mg/L)

INORGANIC CHEMICALS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MAXIMUM CONTAMINANT LEVEL
Arsenic (As)													5.00E-02
Barium (Ba)	8.30E-02	9.26E-02	8.60E-02	8.77E-02	9.00E-02	8.82E-02	9.34E-02	8.41E-02	9.14E-02	8.60E-02	8.77E-02	8.52E-02	2.00E+00
Cadmium (Cd)	9.35E-04												5.00E-03
Chromium (Cr)	5.63E-03	7.22E-03	6.00E-03	5.14E-03	5.50E-03		5.60E-03	7.47E-03	5.40E-03	5.00E-03	7.00E-03	5.45E-03	1.00E-01
Lead (Pb)	3.05E-03												5.00E-02
Selenium (Se)											2.80E-03	7.10E-04	5.00E-02
Silver (Ag)													
Sodium (Na)	8.10E+00	7.40E+00	7.30E+00	8.50E+00	7.50E+00	7.80E+00	7.10E+00	7.60E+00	7.70E+00	8.10E+00	6.50E+00	7.70E+00	
Chloride Ion	1.90E+01	1.73E+01	1.86E+01	1.97E+01	1.69E+01	1.79E+01	1.85E+01	1.82E+01	1.88E+01	1.79E+01	2.09E+01	1.77E+01	
Fluoride Ion	2.27E-01	2.20E-01	2.16E-01	2.04E-01	2.01E-01	2.04E-01	1.94E-01	2.26E-01	2.09E-01	2.13E-01	2.07E-01	2.16E-01	4.00E+00
Nitrate Ion	4.65E+00	4.41E+00	4.97E+00	5.00E+00	3.83E+00	4.80E+00	4.61E+00	4.58E+00	4.91E+00	4.70E+00	4.55E+00	4.68E+00	1.00E+01
Phosphate Ion				7.20E-01									
Sulfate Ion	2.54E+01	2.44E+01	2.81E+01	2.73E+01	2.63E+01	2.48E+01	2.57E+01	2.71E+01	2.57E+01	2.69E+01	2.58E+01	2.51E+01	

*BLANKS = BELOW DETECTION LIMIT

Table 3-6
SEWAGE TREATMENT PLANT ANALYSIS
CY-1993

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
RAW BOD	120	142	115	148	216	206	120	138	165	183	152	149
FINAL BOD	15	21	15	29	38	21	27	28	25	23	23	12
EFFICIENCY	88	85	87	80	82	90	78	80	85	87	85	92
RAW DO	2.9	2.5	3.3	2.6	0.6	0.4	0.5	0.4	0.78	0.5	0.67	0.69
FINAL DO	8.7	9.1	8.4	9.1	7.1	4.2	4.1	4.3	5	6.3	7.6	8
RAW pH	8.4	8.3	8.3	8.3	8.5	8.4	8.2	8	8.2	8.3	8.4	8.4
FINAL pH	7.9	7.9	8.1	8.4	9.1	8.1	8	7.8	8.2	8.1	8.2	7.8
TOTAL VOLUME (L)	4.20E+06	4.58E+06	4.20E+06	4.47E+06	4.13E+06	4.58E+06	5.34E+06	2.33E+06	2.93E+06	4.47E+06	4.35E+06	4.16E+06
RADIONUCLIDES												
Sr-89												
Sr-90				1.52E-09								
Pu-Total (Qtr)												

*BLANKS = BELOW DETECTION LIMIT

Figure 3-8
SEWAGE TREATMENT PLANT
BOD

Figure 3-9
SEWAGE TREATMENT PLANT
DO

Figure 3-10
SEWAGE TREATMENT PLANT
pH

Figure 3-11
SEWAGE TREATMENT PLANT
Volume

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