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ICPP ENVIRONMENTAL MONITORING REPORT
CY-1988

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Westinghouse Idaho
Nuclear Company, Inc.

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ICPP ENVIRONMENTAL MONITORING REPORT
1988

I. INTRODUCTION

Summarized in this report are the date collected through Environmental Monitoring programs conducted at the Idaho Chemical Processing Plant (ICPP) by the Environmental Engineering (EE) Section of the Nuclear and Industrial Safety (N&IS) Department. Published in response to DOE Order 5484.1, Chap. III, this report covers the period from December 20, 1987 through December 19, 1988.

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 Draft Order 5400.XX, and the State of Idaho Maximum Permissible Concentrations (MPCs). The Environmental Protection Agency (EPA) regulates all nonradiological waste resulting from the ICPP operations including all airborne, liquid, and solid waste.

The EE subsection completed a Quality Assurance (QA) Plan for Environmental Monitoring activities during the third quarter of 1986. QA activities have resulted in the ICPP's implementation of the Environmental Protection Agency rules and guidelines pertaining to the collection, analyses, and reporting of environmentally related samples. Where no approved methods for analyses existed for radionuclides, currently used methods were submitted for the EPA approval.

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. Note that Table 1-1 and Figure 1-1 do not present actual Kr-85 release information but rather calculated releases. The actual krypton information is classified and can be found in the classified appendix to this report. The graphs allow a comparison to be made of waste volume and activity released for the year. During 1988 1.705 E+05 curies of radionuclides (including calculated krypton) were released from airborne and liquid emission points at the ICPP operations. Airborne releases to the atmosphere contributed 1.704 E+05 curies and liquid effluent released to the Percolation Pond contributed 8.9 E+01 curies.

TABLE 1-1

SUMMARY OF RELEASE DATA FOR 1988

	AIRBORNE				LIQUID			
	VOLUME (E+09 M3)		ACTIVITY (CURIES)		Volume (E+09 LITERS)		Activity (CURIES)	
	Month	YTD	Month	YTD	Month	YTD	Month	YTD
Jan.	.332	.332	2.00E+04	2.00E+04	.205	.205	1.03E-02	1.03E-02
Feb.	.334	.666	3.00E+04	5.00E+04	.190	.395	2.8E+00	2.8E+00
Mar.	.320	.986	1.00E+04	6.00E+04	.181	.576	6.8E-01	3.5E+00
Apr.	.340	1.326	3.00E+04	9.00E+04	.198	.774	7.0E+00	1.05E+01
May	.314	1.640	3.00E+04	1.200E+05	.182	.956	2.0E+01	3.1E+01
Jun.	.322	1.962	2.01E+04	1.401E+05	.193	1.149	7.3E+00	3.8E+01
Jul.	.323	2.285	2.01E+04	1.602E+05	.185	1.334	4.5E+01	8.3E+01
Aug.	.329	2.614	1.01E+04	1.703E+05	.185	1.519	3.4E+00	8.6E+01
Sep.	.330	2.944	7.4E+01	1.704E+05	.164	1.683	7.8E-01	8.7E+01
Oct.	.314	3.258	5.0E+01	1.704E+05	.173	1.856	1.4E+00	8.8E+01
Nov.	.325	3.583	3.9E-01	1.704E+05	.159	2.015	8.4E-01	8.9E+01
Dec.	.307	3.890	7.9E-01	1.704E+05	.160	2.175	4.86E-02	8.9E+01

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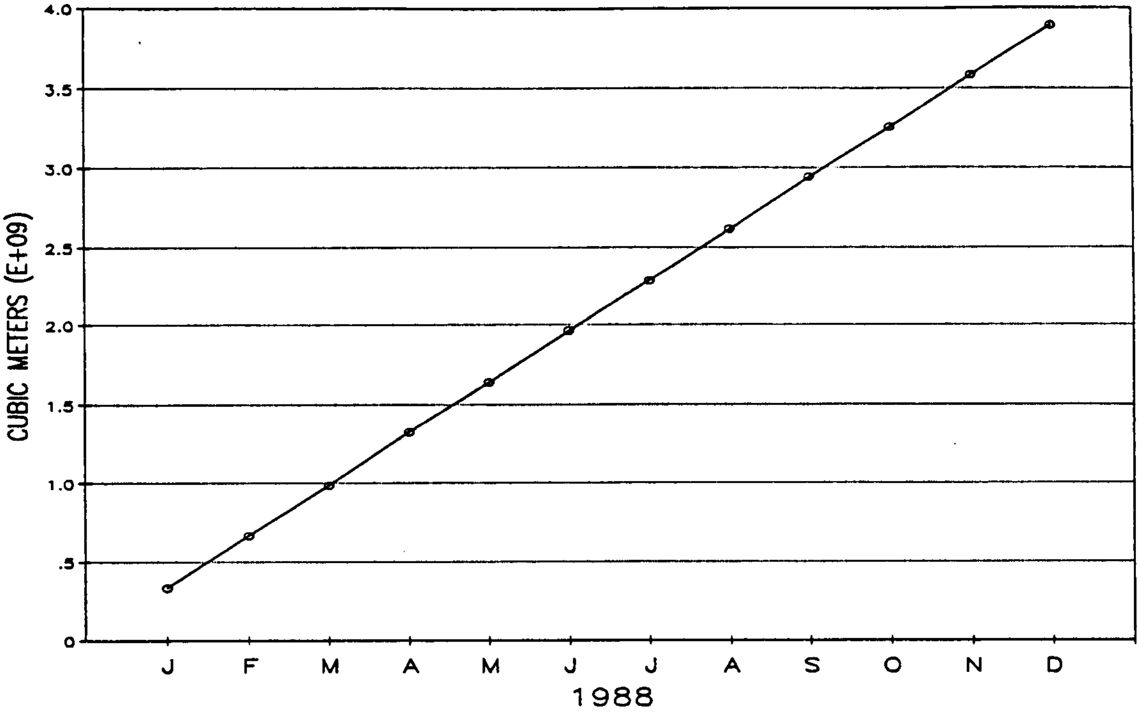
FIGURE 1-1

AIRBORNE RELEASES

CUMULATIVE VOLUME



CUMULATIVE ACTIVITY

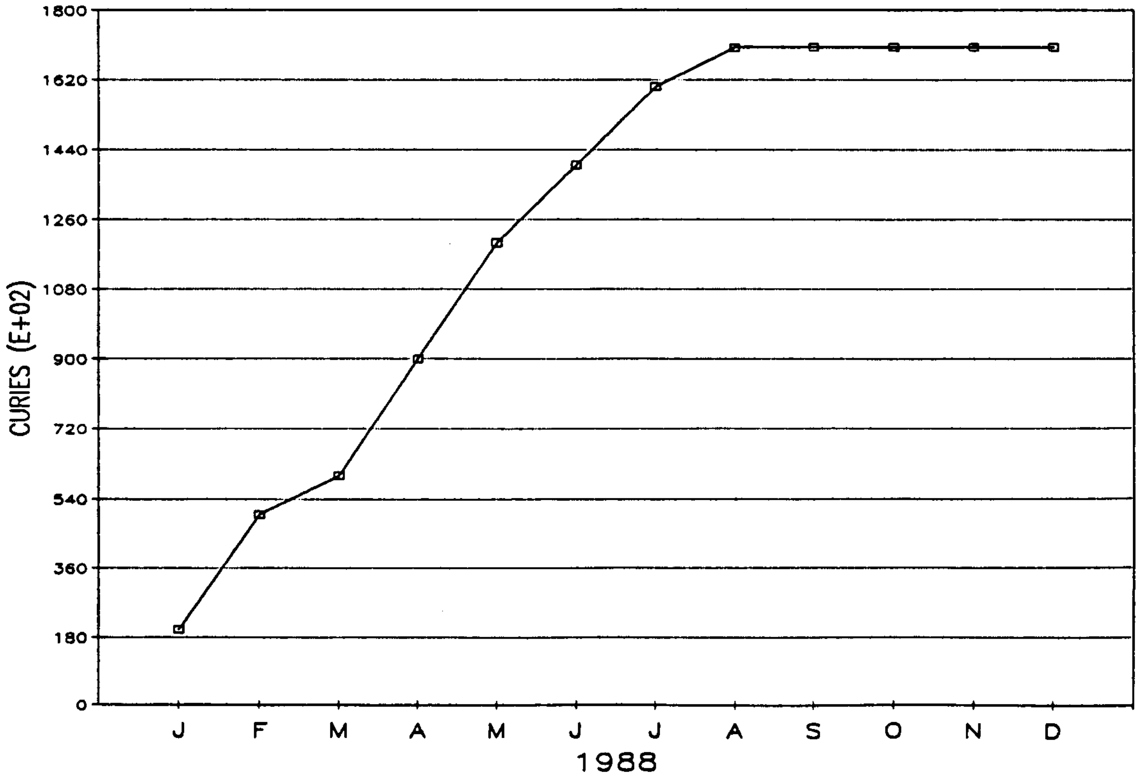


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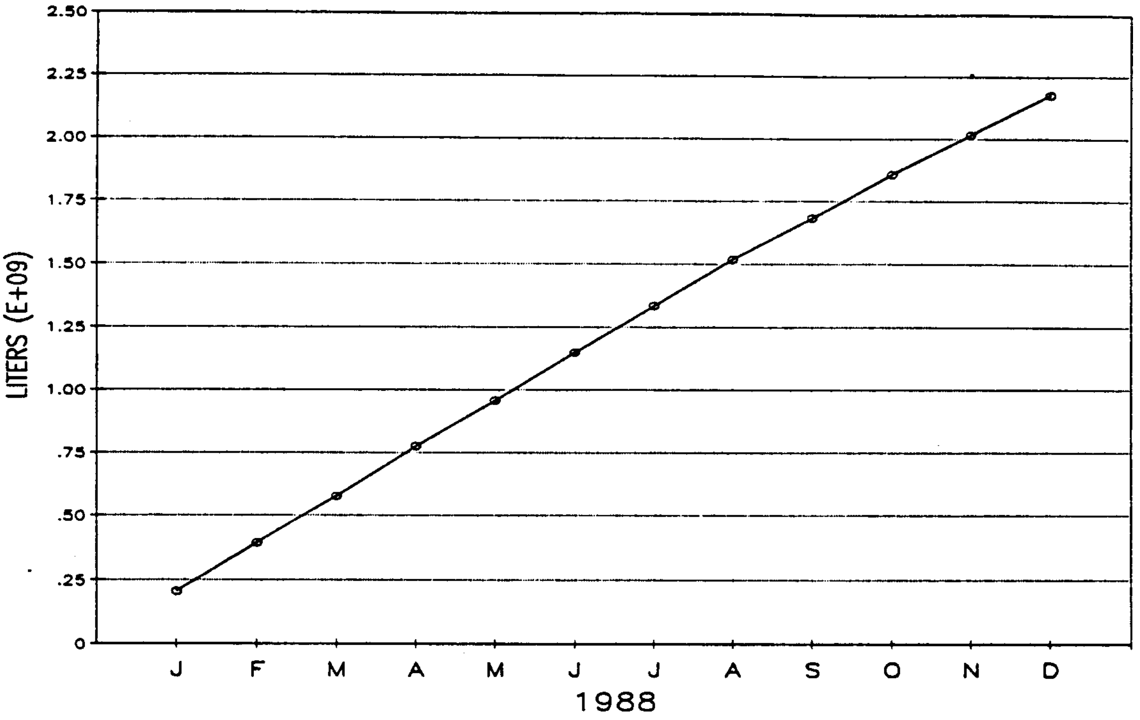
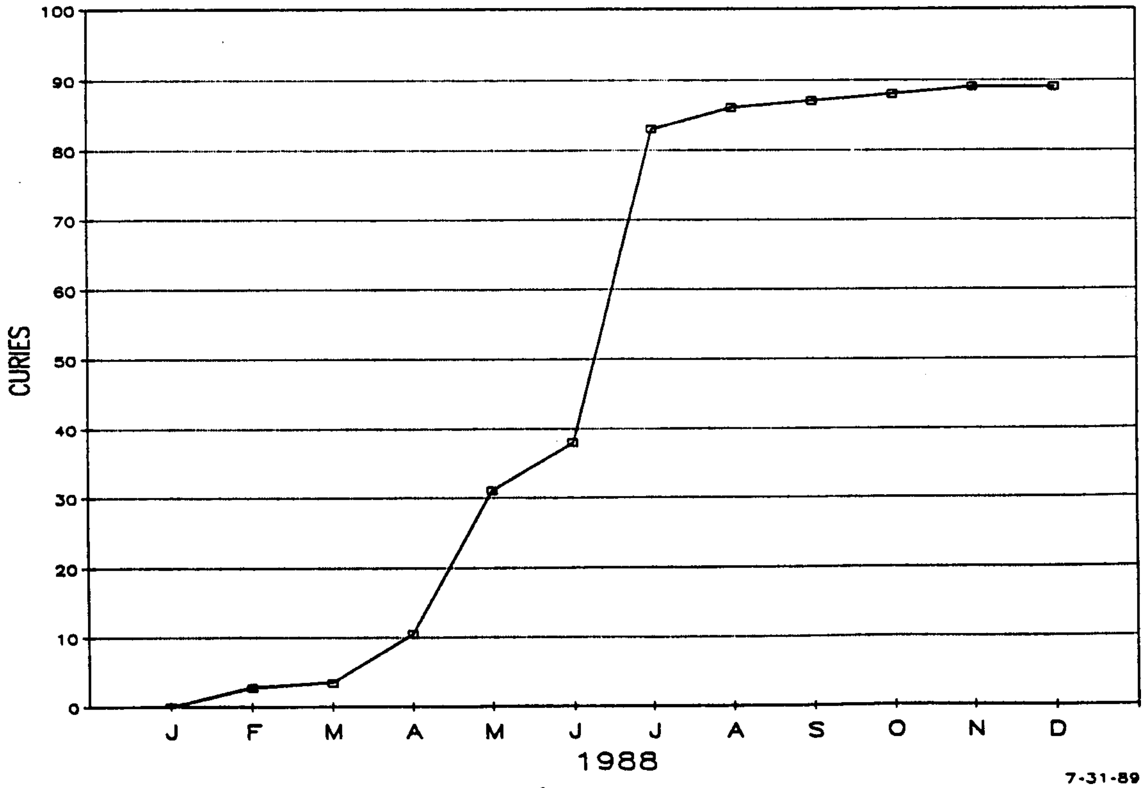
FIGURE 1-2
LIQUID RELEASES

CUMULATIVE VOLUME



CUMULATIVE ACTIVITY



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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). The Main Stack and FAST Stack are equipped with particulate and gaseous monitoring systems. The airborne monitoring systems operate continuously and are based upon a proportional isokinetic sample. Particulate filters are collected and analyzed daily and the gaseous samples are collected and analyzed every two weeks. Nitrogen oxide (NO_x) emissions are the only nonradioactive airborne contaminant that is continuously monitored from the Main Stack. The NWCF ventilation Off-Gas (VOG) and the RAL VOG systems are continuously monitored for radioactive particulates and the sample filter is collected periodically. The Coal Fired Steam Generating Facility (CFSGF) is monitored for NO_x, SO_2, and opacity in accordance with the State of Idaho, the EPA and the DOE-ID.

Quality assurance objectives for data measurement and laboratory performance are listed in the Quality Assurance Program Plan for the Chemical Analysis of the Environmental Samples by both the WINCO Analytical Chemistry Section and the Nuclear and Environmental Measurements Section. Final data reduction is performed by the Environmental Engineering Section. All environmental release sampling and reporting is subject to the EE QA Plan for Environmental Monitoring.

2. AIRBORNE RELEASES TO THE ENVIRONMENT

2.1 Main Stack

Airborne radioactive release data from the Main Stack for each month and the year-to-date are given in Table 2-1. This information is presented graphically in Figure 2-1. Graphic presentations for iodine-129, tritium (H-3), cesium-137, strontium-90, ruthenium-106, plutonium (Total), and antimony-125 showing yearly trends are given in Figures 2-2 through 2-8, respectively.

Krypton (Kr-85) was by far the predominant radioactive species in the Main Stack airborne effluent during 1988. It should be noted that krypton releases are classified and the actual release rates can only be found in the classified appendix to this report. Tritium (H-3) was the next most prevalent radionuclide. It should also be noted that plutonium isotopic information is classified and will only be discussed as Pu-TOTAL. Isotopic information for Pu-TOTAL can be found in the classified appendix.

TABLE 2-1

AIRBORNE RELEASES FROM ICPP MAIN STACK - CY-1988
(in curies)

RADIONUCLIDES	J	F	M	A	M	J	J	A	S	O	N	D	YTD
H-3	4.6E+01	1.5E+01	7.0E-01	3.5E+01	4.7E+01	1.1E+02	8.7E+01	5.0E+01	7.4E+01	5.0E+01	1.5E-01	7.8E-01	5.2E+02
Pu-TOTAL	5.10E-07	9.34E-07	6.11E-08	3.46E-07	2.8E-07	3.9E-08	2.8E-09	1.1E-08	9.4E-08	9.2E-10	6.6E-10	--	2.28E-06
Cs-137	2.51E-05	5.72E-05	9.94E-05	5.88E-05	2.0E-04	3.7E-05	2.0E-05	2.1E-05	1.1E-05	3.9E-05	4.8E-05	8.0E-06	6.2E-04
Ru-106	4.90E-06	--	--	5.24E-06	1.8E-05	9.2E-06	6.0E-06	2.2E-04	1.1E-04	6.6E-05	1.9E-01	7.0E-04	1.9E-01
Sb-125	3.98E-03	3.97E-05	4.68E-05	1.44E-04	1.8E-03	1.1E-04	4.7E-03	5.5E-05	2.3E-05	3.70E-04	2.3E-04	9.3E-06	1.15E-02
Sr-90	1.67E-06	2.96E-05	2.70E-05	2.35E-05	1.2E-05	8.6E-06	--	1.8E-06	1.9E-06	3.3E-06	1.5E-06	--	1.11E-04
C-14	1.09E-01	1.7E-03	--	2.9E-02	9.11E-02	2.3E-01	1.5E-01	2.3E-02	2.3E-02	3.1E-02	6.26E-03	5.7E-03	7.0E-01
I-129	9.92E-03	1.308E-02	8.22E-03	6.4E-03	6.7E-03	6.7E-03	5.7E-03	4.4E-03	3.9E-03	6.6E-03	--	4.0E-04	7.20E-02
Cs-134	1.38E-07	--	8.97E-07	--	2.4E-06	--	--	--	--	2.9E-07	--	--	3.7E-06
Pa-231	--	--	--	--	--	--	--	8.1E-06	--	--	--	--	8.1E-06
Kr-85	1.00E+04	1.00E+04	--	1.00E+04	1.00E+04	1.00E+04	--	--	--	--	--	--	5.0E+04
TOTAL ACTIVITY	1.00E+04	1.00E+04	7.08E-01	1.00E+04	1.00E+04	1.01E+04	8.72E+01	5.00E+01	7.40E+01	5.00E+01	3.5E-01	7.87E-01	5.05E+04
TOT VOL (cubic meters)	1.31E+08	1.33E+08	1.31E+08	1.39E+08	1.19E+08	1.21E+08	1.28E+08	1.28E+08	1.31E+08	1.19E+08	1.24E+08	1.12E+08	1.516E+09

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FIGURE 2-1

MAIN STACK EFFLUENT

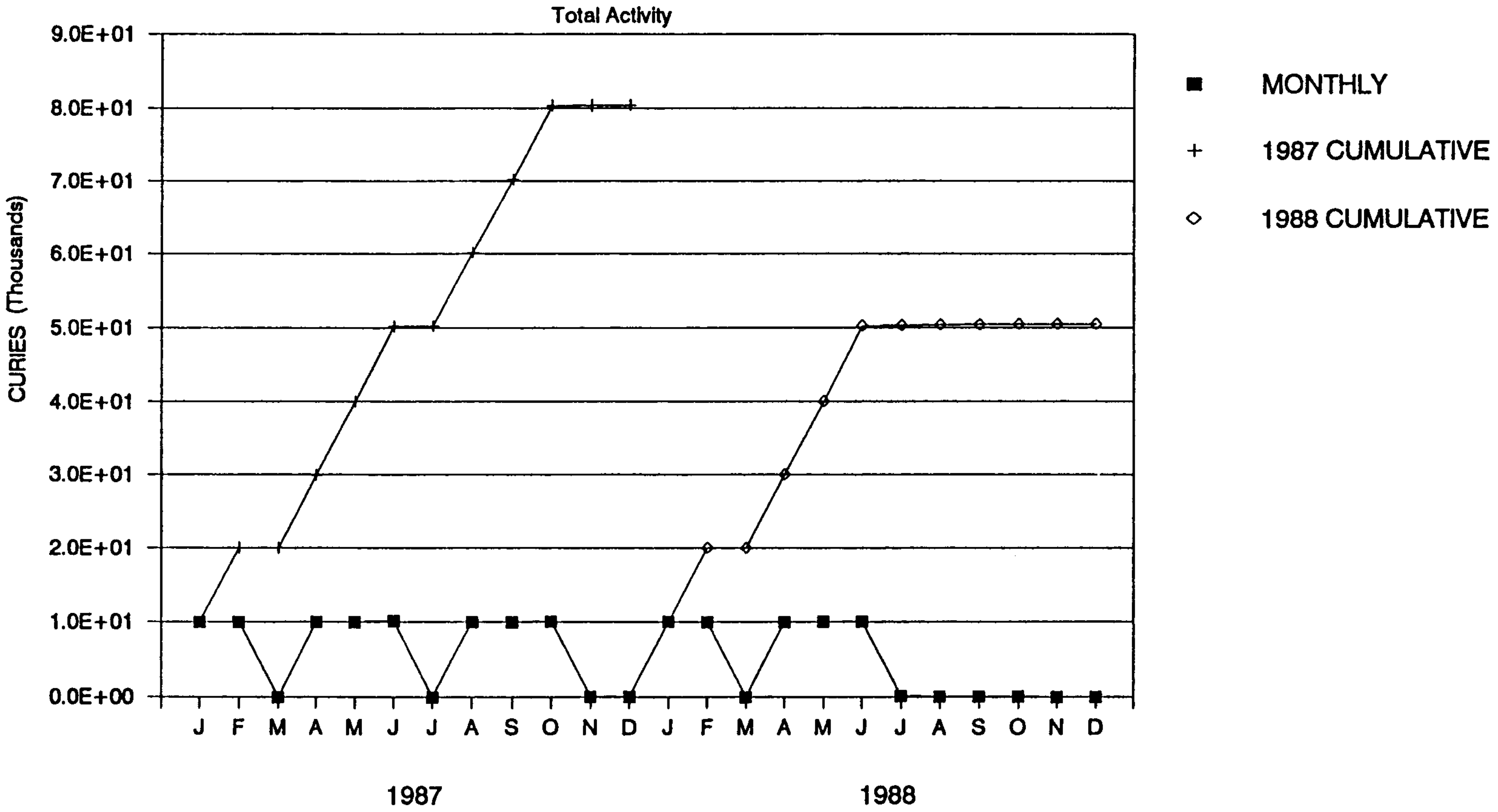

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FIGURE 2-2

MAIN STACK EFFLUENT

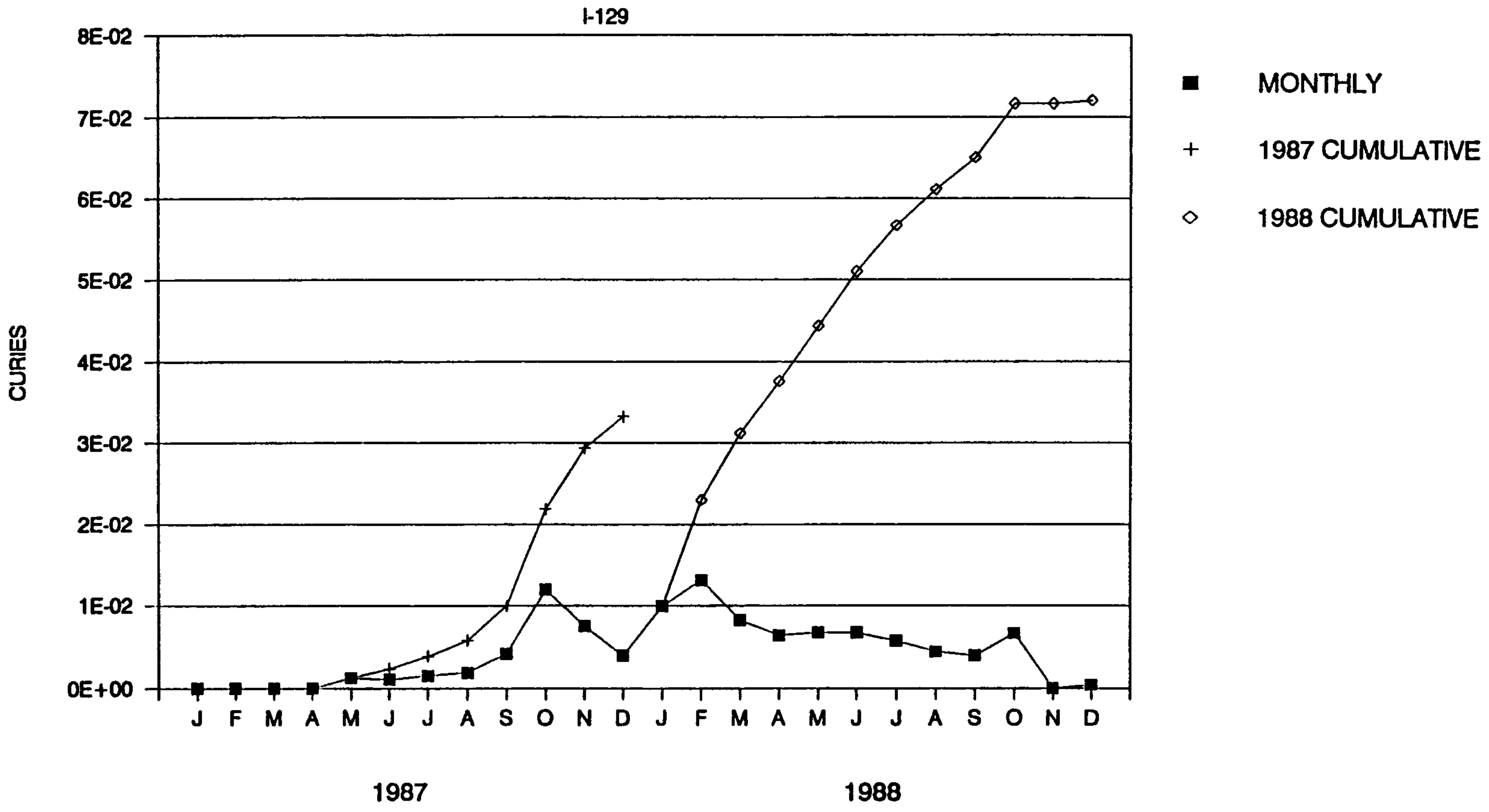

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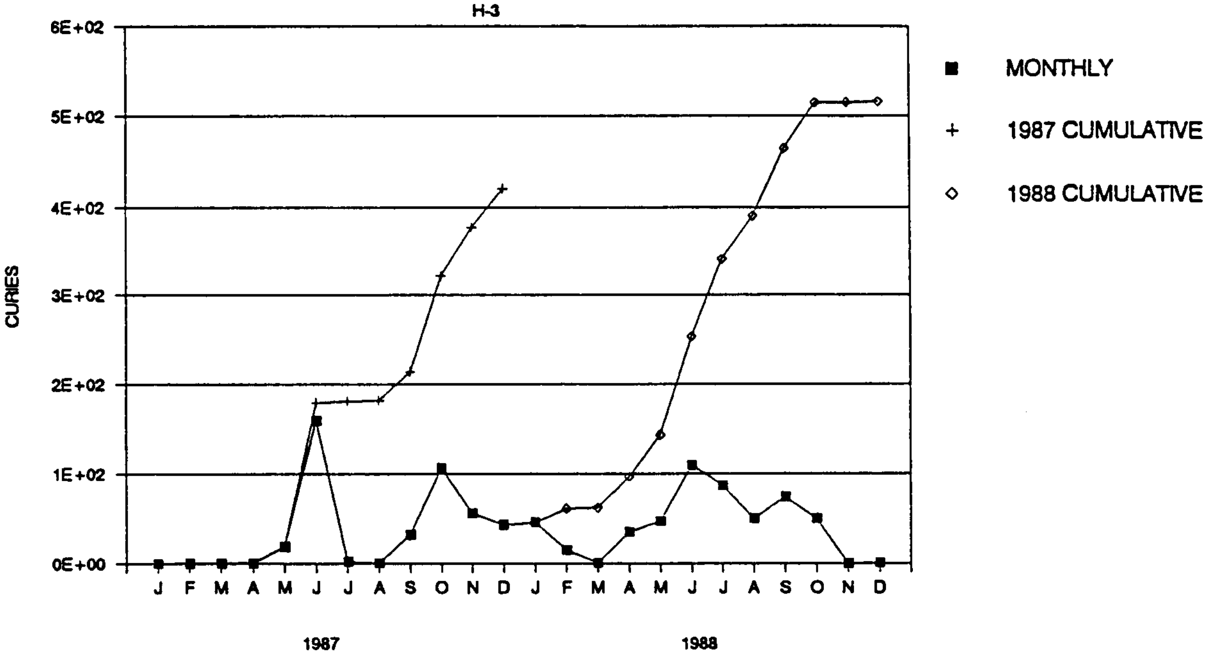
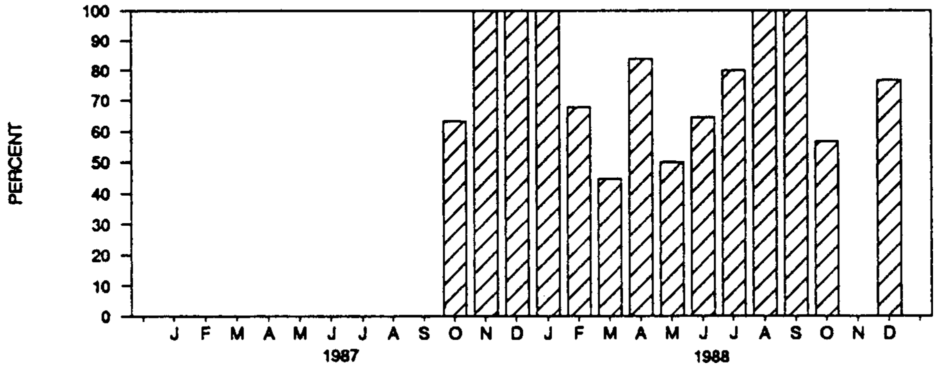
FIGURE 2-3

MAIN STACK EFFLUENT



NWCF OPERATING TIME



FDP OPERATING TIME

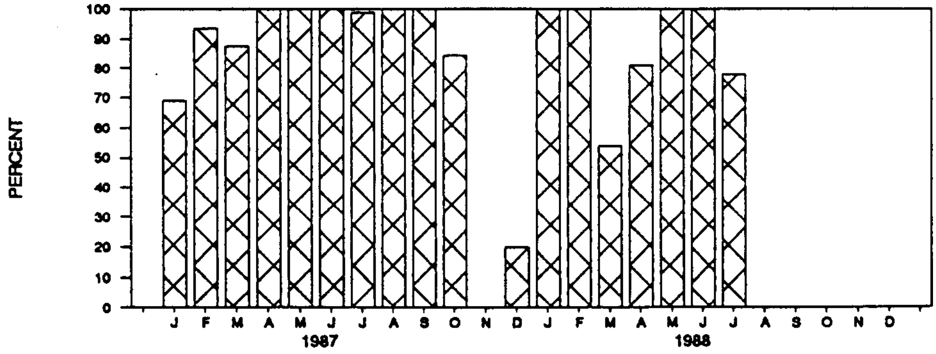


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FIGURE 2-4

MAIN STACK EFFLUENT

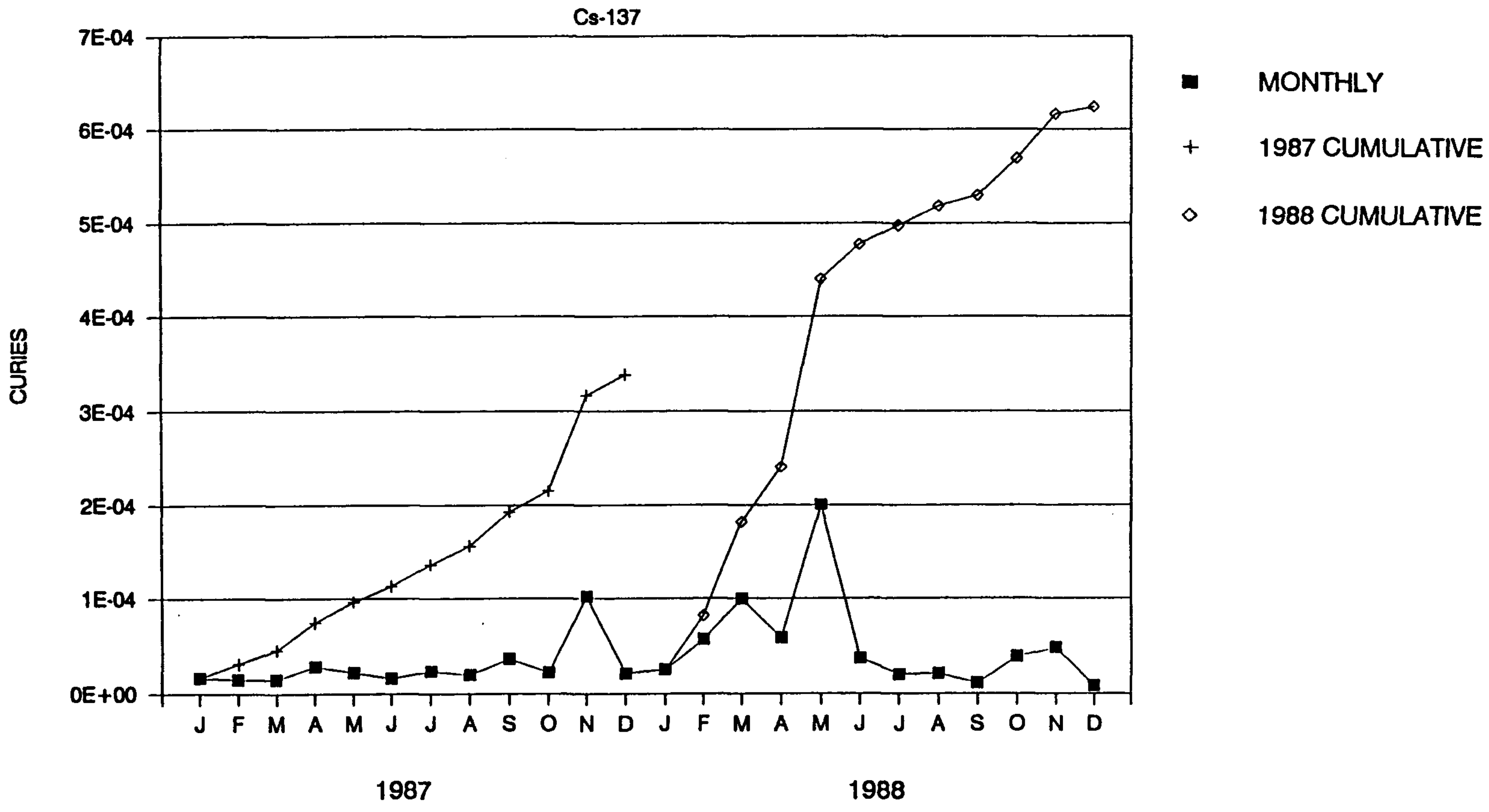

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FIGURE 2-5

MAIN STACK EFFLUENT

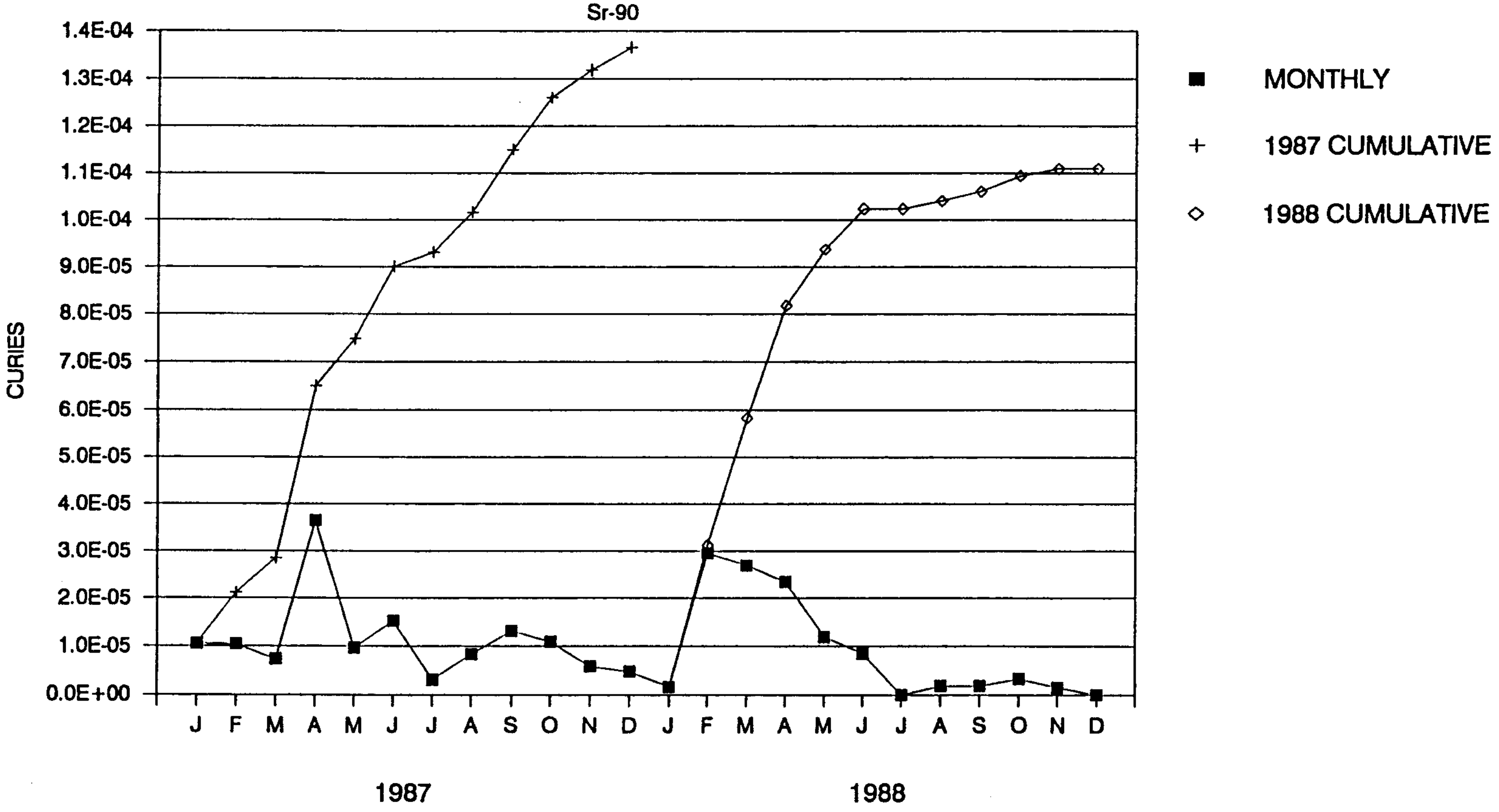

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FIGURE 2-6

MAIN STACK EFFLUENT

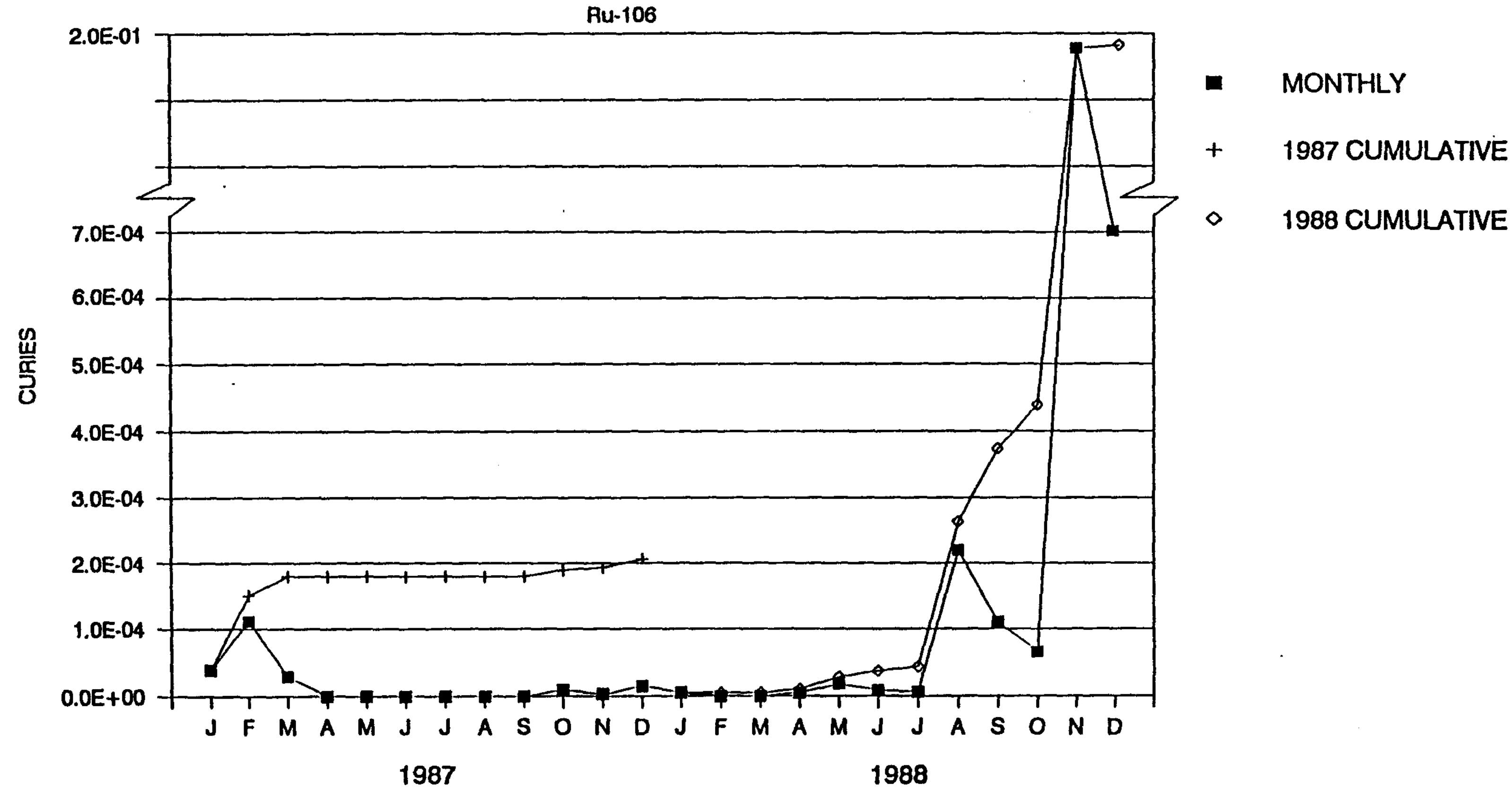

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FIGURE 2-7

MAIN STACK EFFLUENT

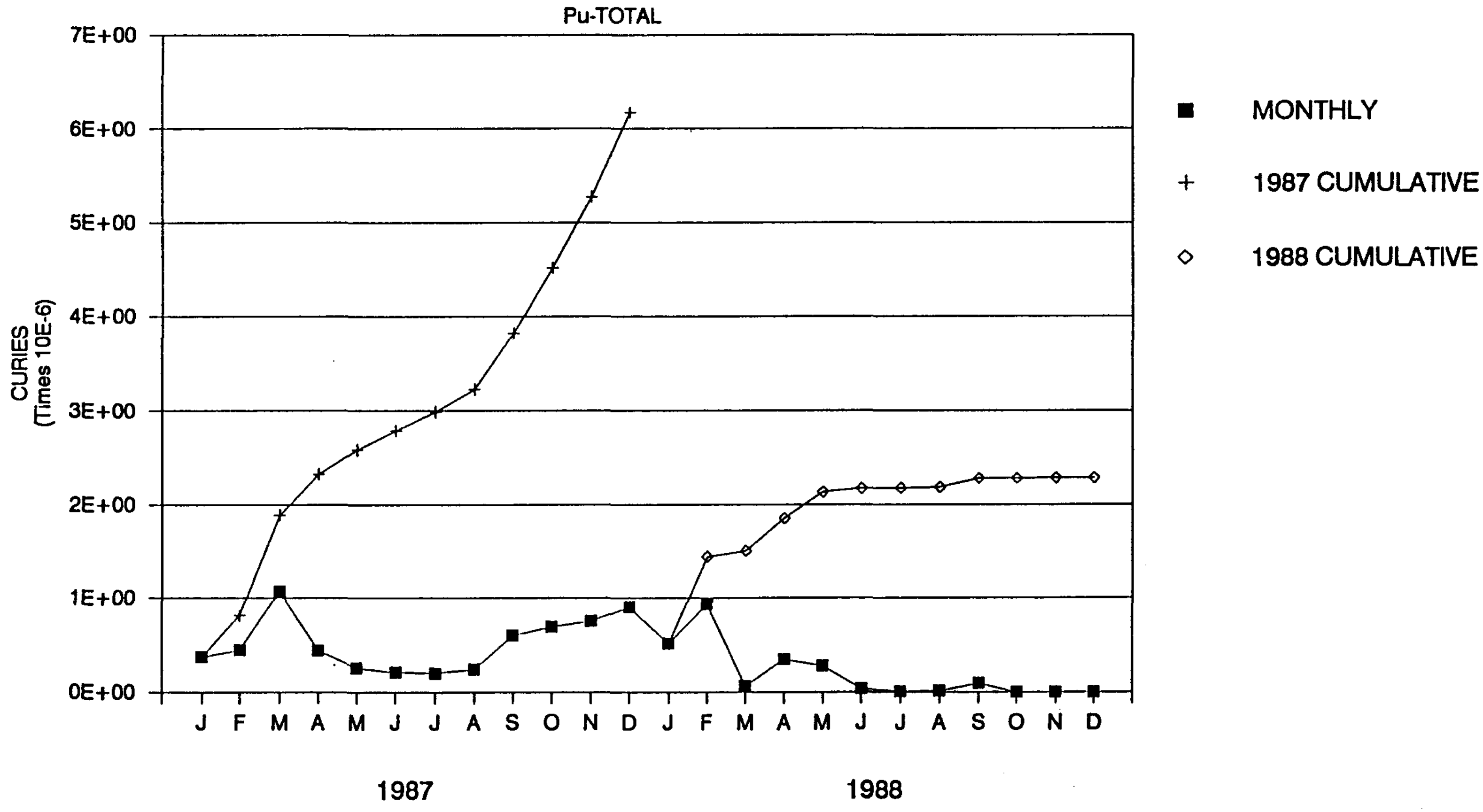

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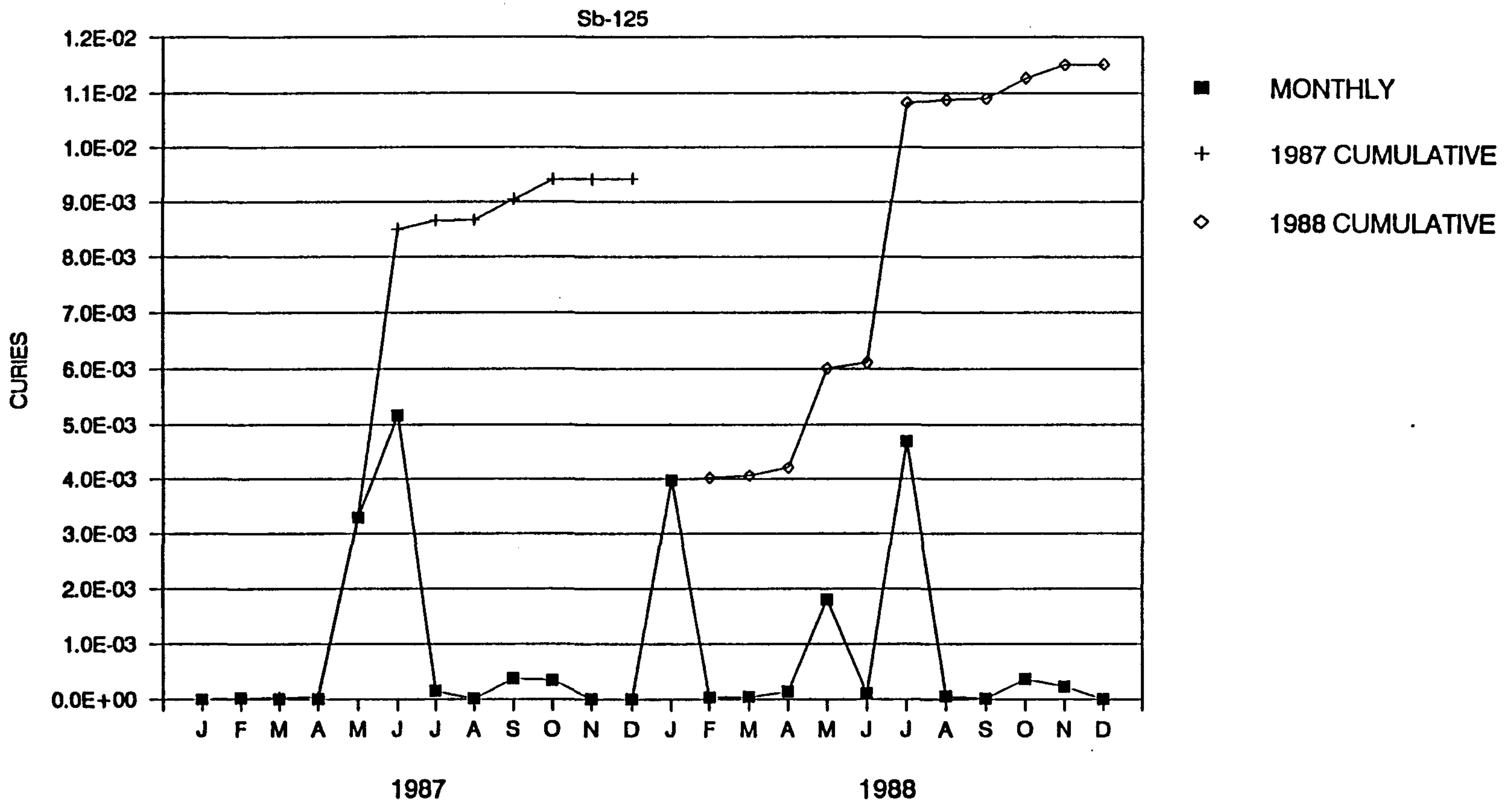
FIGURE 2-8

MAIN STACK EFFLUENT



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Airborne releases of I-129 from the Main Stack remained at relatively low levels throughout the year. As shown in Figure 2-2, I-129 releases fell off in March when the NWCF was shut down. I-129 levels never regained the levels seen in the first quarter during the rest of the year.

Tritium (H-3) releases for 1988 are shown in Figure 2-3. Tritium is a fission product associated with the spent nuclear fuel that is processed at the ICPP. It can be noted that H-3 emissions follow the dissolution and/or calcination process.

Cesium-137 releases (Figure 2-4) fluctuated throughout the year. However, cesium emissions continued to range between 10 and 100 microcuries per month except for May when nearly 200 microcuries were released.

Strontium-90 (Figure 2-5) concentrations in the Main Stack emissions remained relatively constant during the last half of 1988. Emission rates of Sr-90 during 1988 continued at their reduced rates as first noticed during fourth quarter 1985.

Ruthenium (Ru-106) releases increased during the month of November to 0.19 Ci (Figure 2-6). Ruthenium emissions remained constant at 1987 levels during the first two quarters of 1988 and increased during the last part of 1988. Overall Ru-106 emissions continue their long trend downward started in 1982. The large increase in November was due to dissolution of the NWCF calciner bed on October 30, 1988.

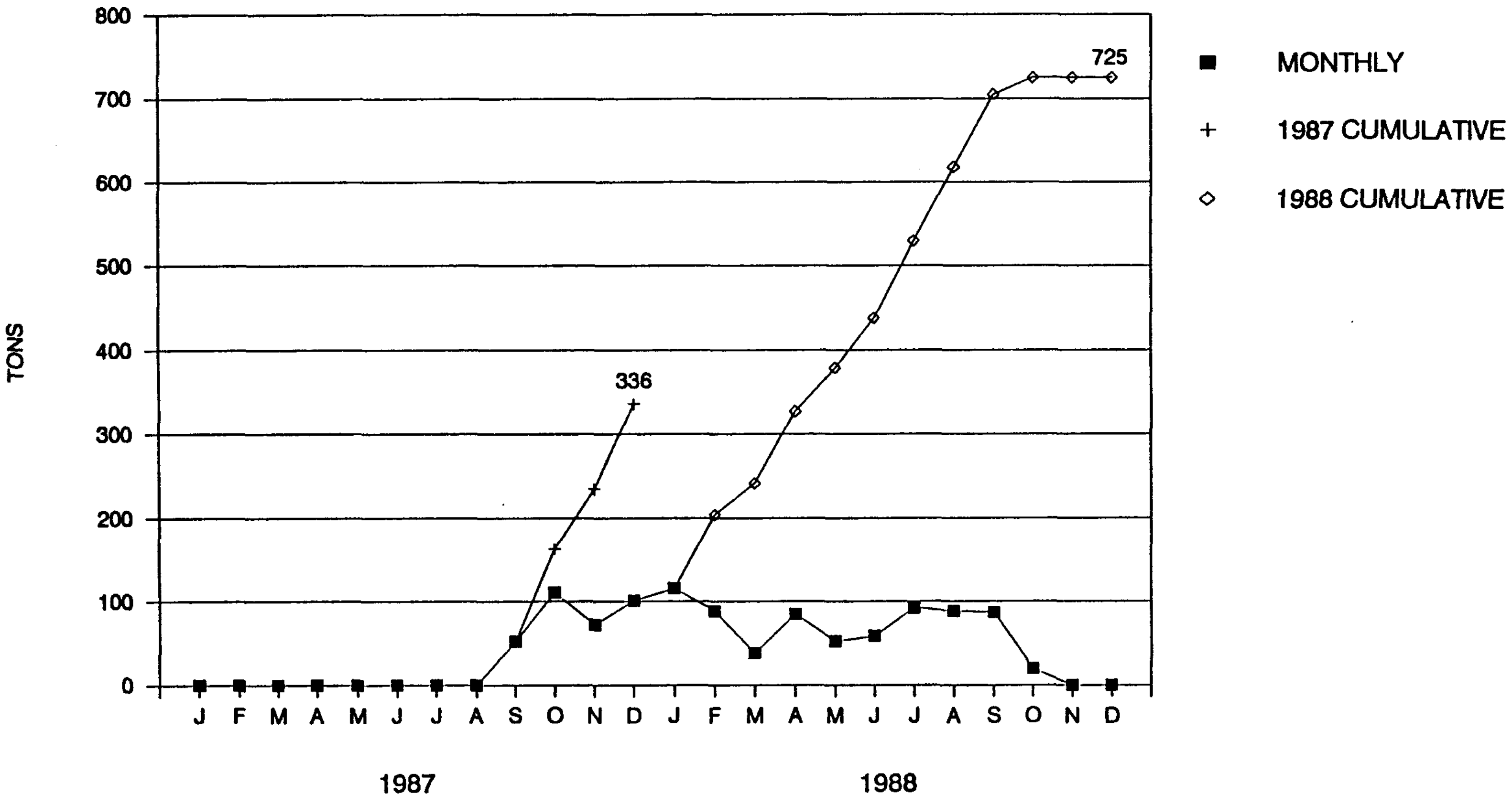
Plutonium emissions (Figure 2-7) continued at their very low levels that were first observed in the third and fourth quarters of 1985.

Antimony-125 (Figure 2-8) releases from the Main Stack rose whenever off-gas from FAST was diverted to the Rare Gas Plant (RGP) for Kr-85 recovery.

Nitrogen oxide (NO_x) emissions from the Main Stack is the only nonradioactive airborne contaminant that is continuously monitored. NO_x concentration levels, while they do not cause violation of any ambient air quality standards, must not exceed limits imposed by the draft FPR PSD permit. The limits set for the Main Stack are 388 pounds per hour and 1700 tons per year. Figure 2-9 provides the NO_x emissions for the last two years. The total NO_x released in 1988 was 725 tons, well below the allowable 1700 tons per year. During 1988 the hourly limit for NO_x releases was not exceeded.

FIGURE 2-9

NOx RELEASED FROM ICPP MAIN STACK



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2.2 FAST Stack

Table 2-2 list the total releases in curies from the FAST Stack per month by individual radionuclides and Figure 2-10 depicts the total monthly activity. Krypton (Kr-85) was by far the predominant radioactive species in the airborne effluent from FAST during 1988. Tritium (H-3) was the next most prevalent radionuclide. Graphic presentations for iodine-129, tritium (H-3), plutonium (Total), and antimony-125 showing yearly trends are given in Figures 2-11 through 2-14, respectively.

Airborne releases of I-129, H-3, Pu-TOTAL, and Sb-125 from the FAST Stack show a sharp drop in June as dissolution was curtailed.

2.3 NWCF Stack

Table 2-3 presents the radioactive emissions from the NWCF VOG system. The radionuclides reported are those that have been identified in the ventilation stack emissions. As new radionuclides are identified Table 2-3 will be expanded appropriately.

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. As new radionuclides are identified Table 2-4 will be expanded appropriately.

2.5 Coal Fired Steam Generating Facility (CFSGF)

The CFSGF stack is monitored for sulfur dioxide (SO_2), nitrogen oxide (NO_x), and opacity. Emission limits for this stack are set by the Environmental Protection Agency (EPA). Table 2-5 lists the releases per month for the CFSGF. The facility must provide a minimum removal efficiency of 70% for SO_2. The NO_x limit is 0.5 lbs/mm Btu at a steam load greater than or equal to 35,000 pounds per hour and 0.7 lbs/mm Btu at steam loads less than 35,000 pounds per hour, and the opacity limit is 20%. SO_2, NO_x and opacity limits were not exceeded during CY-1988.

TABLE 2-2

AIRBORNE RELEASES FROM ICPP FAST STACK - CY-1988
(in curies)

RADIONUCLIDES	J	F	M	A	M	J	J	A	S	O	N	D	YTD
Pu-TOTAL	2.4E-07	1.2E-06	4.7E-06	4.64E-06	9.2E-07	1.0E-08	1.2E-09	2.0E-08	--	3.2E-10	3.5E-10	--	1.17E-05
Sr-90	--	--	--	--	--	--	3.8E-06	--	--	--	--	--	3.8E-06
Co-60	--	--	--	--	--	2.4E-07	1.8E-07	--	--	--	--	--	4.2E-07
Sb-125	2.15E+00	1.82E+00	7.69E-01	5.00E-01	1.274E+00	4.2E-01	4.12E-01	3.3E-04	8.6E-05	2.1E-05	1.1E-04	5.7E-05	7.35E+00
I-129	2.2E-02	1.47E-02	1.8E-02	1.71E-02	2.9E-02	2.4E-02	1.49E-02	6.7E-03	2.9E-03	1.8E-03	9.0E-04	8.0E-04	1.53E-01
C-14	2.0E-01	2.7E-01	3.1E-01	2.2E-01	4.9E-01	2.5E-01	1.19E-01	3.3E-03	--	--	--	--	1.86E+00
H-3	2.2E+01	4.0E+01	2.3E+01	2.7E+01	3.7E+01	1.5E+01	1.8E+01	3.1E-01	8.0E-02	9.0E-02	4.3E-02	--	1.83E+02
Ru-106	9.1E-07	--	--	--	--	--	--	--	--	--	--	--	9.1E-07
Cs-137	--	--	--	--	--	--	--	--	--	1.6E-07	--	--	1.6E-07
Kr-85	1.00E+04	2.00E+04	1.00E+04	2.00E+04	2.00E+04	1.00E+04	2.00E+04	1.00E+04	--	--	--	--	1.200E+05
TOTAL ACTIVITY	1.00E+04	2.00E+04	1.00E+04	2.00E+04	2.00E+04	1.00E+04	2.00E+04	1.00E+04	8.30E-02	9.18E-02	4.40E-02	8.57E-04	1.202E+05
TOT VOL (cubic meters)	9.19E+07	9.19E+07	8.63E+07	9.19E+07	8.95E+07	9.19E+07	8.95E+07	9.19E+07	9.19E+07	8.95E+07	9.19E+07	8.95E+07	1.088E+09

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FIGURE 2-10

FAST STACK EFFLUENT

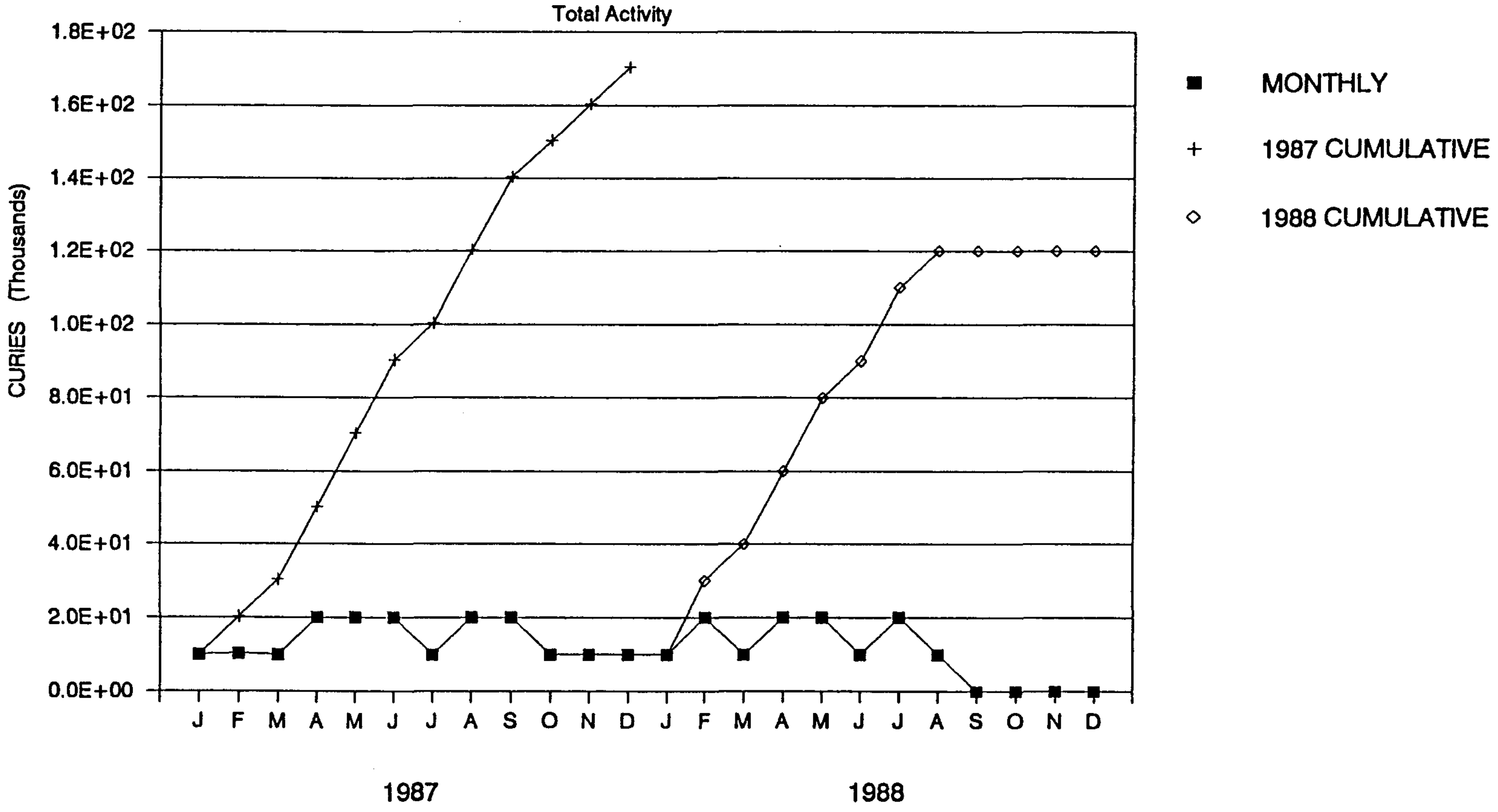

FIGURE 2-11

FAST STACK EFFLUENT

I-129

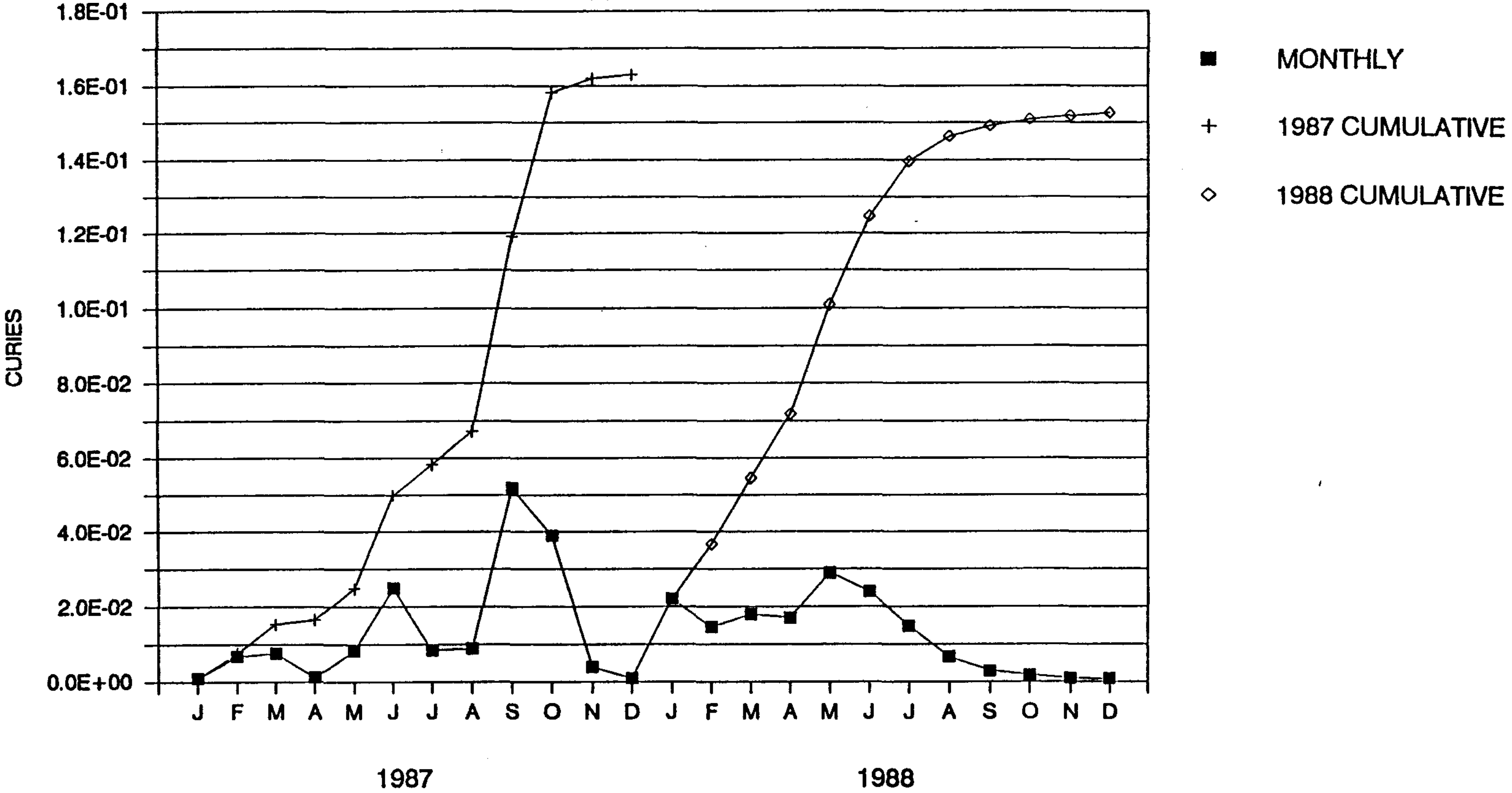

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FIGURE 2-12

FAST STACK EFFLUENT

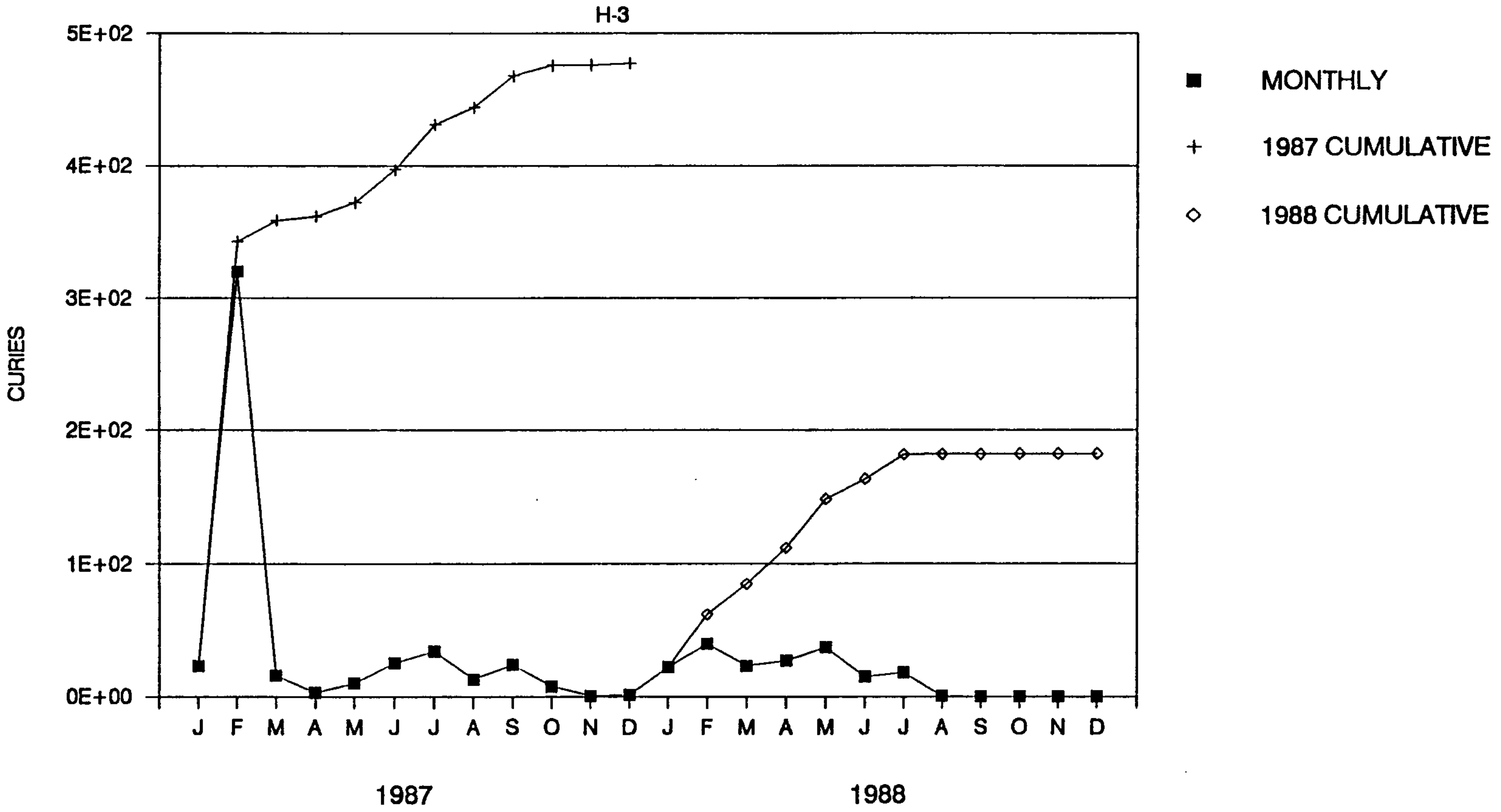

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FIGURE 2-13

FAST STACK EFFLUENT

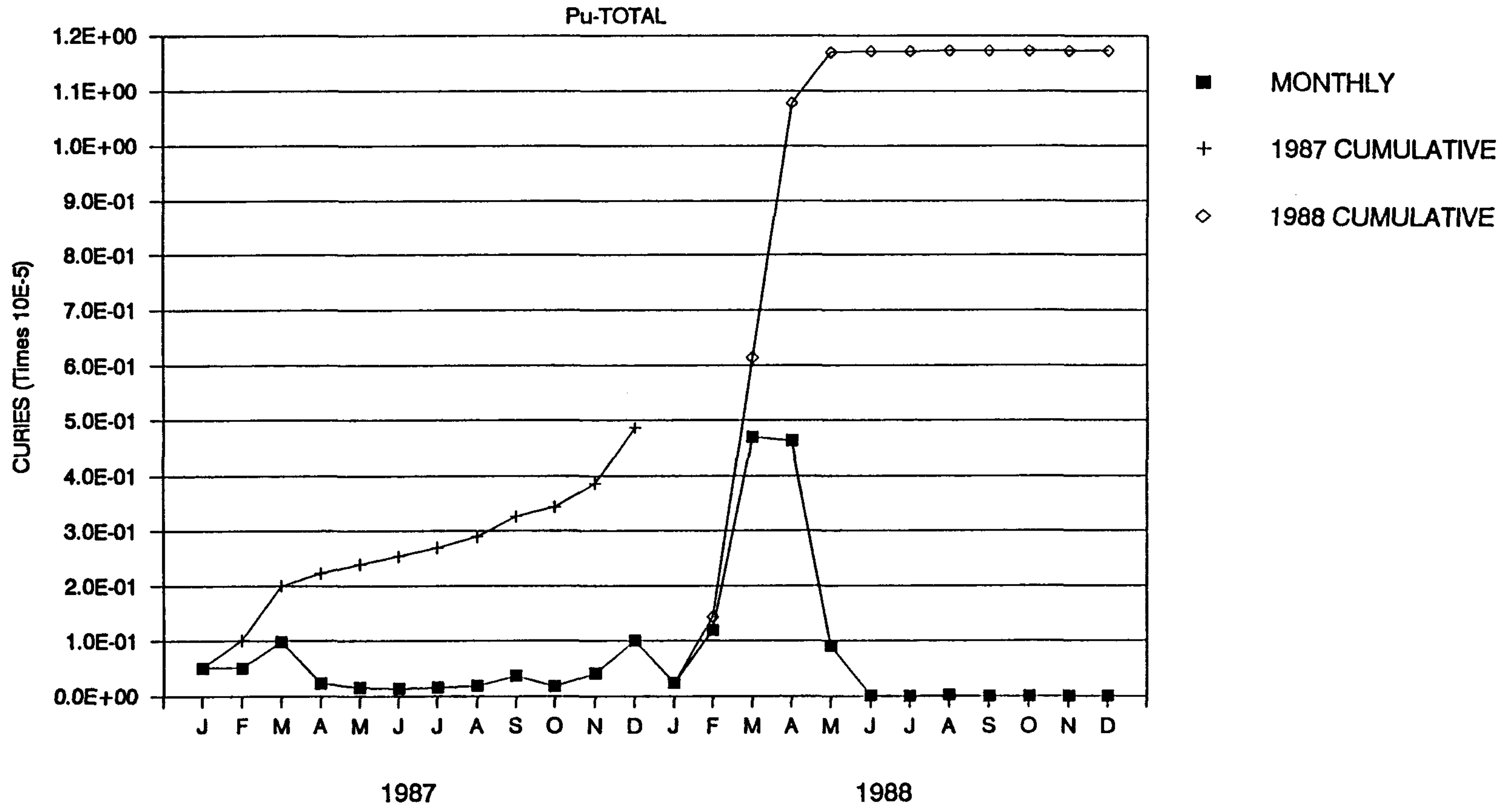

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FIGURE 2-14

FAST STACK EFFLUENT

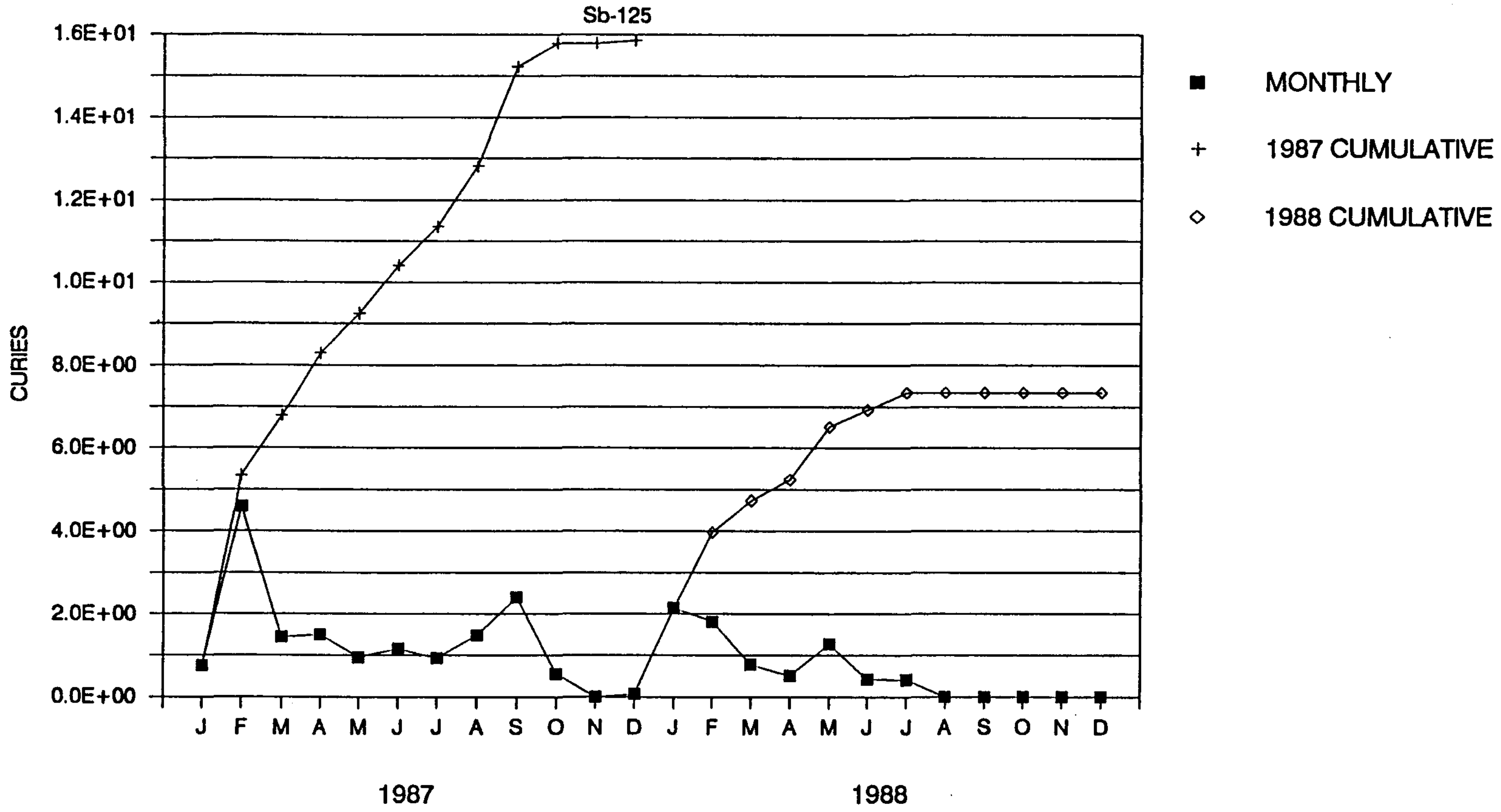

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TABLE 2-3

AIRBORNE RELEASES FROM ICPP NWCF STACK - CY-1988
(in curies)

RADIONUCLIDES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YTD
Pu-TOTAL	8E-10	--	--	6E-10	7E-10	9.3E-09	--	3E-09	--	8E-10	8E-10	1E-09	1.7E-08
Sr-90	--	--	--	--	--	--	--	--	--	--	3.8E-08	--	3.8E-08
Cs-137	2.4E-07	--	--	--	1.7E-07	--	--	--	--	--	--	--	4.1E-07
TOTAL ACTIVITY	2.4E-07	--	--	6E-10	1.7E-07	9.3E-09	--	3E-09	--	8E-10	3.9E-08	1E-09	4.7E-07
TOT VOL (m3)	8.84E+07	8.84E+07	8.27E+07	8.84E+07	8.55E+07	8.84E+07	8.55E+07	8.84E+07	8.84E+07	8.55E+07	8.84E+07	8.55E+07	1.044E+09

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TABLE 2-4

AIRBORNE RELEASES FROM RAL STACK - CY-1988
(in curies)

RADIONUCLIDES	J	F	M	A	M	J	J	A	S	O	N	D	YTD
Pu-TOTAL	2.7E-07	3.2E-07	1.5E-06	1.7E-07	1.3E-07	4.9E-08	6.6E-09	1.0E-08	--	1.1E-09	5.5E-10	--	2.5E-06
Sr-90	--	--	--	--	--	--	--	--	--	--	--	--	--
Ru-106	7.9E-07	--	--	--	--	7.3E-06	--	--	--	--	--	--	8.1E-06
Cs-137	2.7E-06	3.9E-06	2.8E-06	1.4E-06	8.5E-08	1.6E-06	1.3E-07	5.5E-07	2.2E-07	8.2E-07	8.6E-08	--	1.43E-05
Sb-125	2.1E-07	--	--	--	2.2E-07	--	--	--	5.1E-07	5.7E-07	--	2.2E-07	1.73E-06
Th-234	--	--	--	--	--	--	--	--	--	--	--	--	--
Co-60	--	--	--	--	1.0E-07	--	--	--	--	--	--	--	1.0E-07
TOTAL ACTIVITY	4.0E-06	4.2E-06	4.3E-06	1.6E-06	5.4E-07	8.9E-06	1.4E-07	5.6E-07	7.3E-07	1.39E-06	8.7E-08	2.2E-07	2.67E-05
TOT VOL (m3)	2.08E+07	2.08E+07	1.95E+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	2.459E+08

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TABLE 2-5

COAL FIRED STEAM GENERATING FACILITY - CY-1988

UNIT #1

	% SO_2 Removed	lbs NO_x/mm Btu	Steam Load lbs of steam/hr	% Opacity
Jan.	91	0.36	52,260	0
Feb.	95	0.42	45,524	0
Mar.	85	0.49	38,550	0
Apr.	89	0.59	28.252	0
May	88	0.50	27,281	0
Jun. 1-23	96	0.56	27.746	0
Jul. 27-31	89	0.59	23,584	0
Aug. 1-16	83	0.61	24,151	0
Dec.	91	0.38	52,605	0
Requirements	>70	0.5 (>35,000 lbs/hr steam load) 0.7 (<35,000 lbs/hr steam load)		<20

UNIT #2

	% SO_2 Removed	lbs NO_x/mm Btu	Steam Load lbs of steam/hr	% Opacity
Jun. 24-30	96	0.54	16,889	0.7
Jul. 1-26	93	0.58	23,584	0.1
Aug. 17-31	95	0.38	24,151	0
Sep.	92	0.58	21,944	0
Oct.	90	0.47	21,452	0.7
Nov.	92	0.35	37,560	0
Requirements	>70	0.5 (>35,000 lbs/hr steam load) 0.7 (<35,000 lbs/hr steam load)		<20

Coal Burned	13,568 tons
Avg. Btu/lb	12,508 (As received)
Avg. % Sulfur	0.66 (As received)

III. LIQUID MONITORING

1. INTRODUCTION

Liquid monitoring discussed in this report includes: 1) Service Waste Systems, 2) Sewage Treatment Facility, 3) Percolation Pond, 4) Injection Well, and 5) Production and Potable Water Wells. Both radioactive and RCRA regulated hazardous elements are analyzed in the ICPP liquid effluent streams.

Quality Assurance objectives for measurement data and laboratory performance are listed in both the Quality Assurance Program Plan for the Chemical Analysis of Environmental Samples by the WINCO Analytical Chemistry Section and the Nuclear and Environmental Measurements Quality Assurance Project Plans for Work Subject to EPA QAMS-005/80. All environmental release sampling and reporting is subject to the EE QA Plan for Environmental Monitoring.

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 and degree of contamination. Waste streams are disposed of through the East Side Service Waste (ESSW, CPP-709) and West Side Service Waste (WSSW, CPP-734). Both of the service waste streams enter the Percolation Pond YDG-326 or YDG-327, whichever is in operation at the time.

Isotopic release data for the combined ESSW and WSSW systems for each month and Year-To-Date totals are presented in Table 3-1. 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. If other radionuclides should be observed in the future, the table will be expanded to include them. 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. Isotopic information can be found in the classified appendix. Figure 3-1 depicts the total monthly activity released to the active percolation pond at ICPP.

Figure 3-2 depicts total plutonium found in the service waste stream. The quantity of plutonium released to the pond remained relatively constant during 1988, with only a small spike during August. Plutonium releases have remained relatively stable since the fourth quarter of 1985.

Figures 3-3 through 3-6 present trend information for select radionuclides in the service waste.

TABLE 3-1

SERVICE WASTE RELEASES - CY-1988
(in curies)

RADIONUCLIDES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YTD
Ce-144	8.55E-04	--	--	--	--	--	1.40E-03	2.88E-04	5.27E-04	--	5.54E-04	3.74E-04	4.00E-03
Co-60	--	--	--	--	--	7.85E-05	--	--	--	--	3.70E-05	6.44E-04	7.60E-04
Cs-134	1.94E-04	9.88E-05	5.25E-04	3.99E-04	8.52E-04	1.47E-03	1.35E-03	2.03E-03	5.43E-04	9.59E-04	2.11E-03	1.98E-03	1.251E-02
Cs-137	3.93E-03	4.85E-03	6.52E-03	6.09E-03	9.69E-03	1.36E-02	9.10E-03	1.26E-02	3.55E-03	7.37E-03	1.94E-02	1.67E-02	1.134E-01
H-3	--	2.8E+00	6.6E-01	7.0E+00	2.0E+01	7.3E+00	4.5E+01	3.3E+00	7.6E-01	1.4E+00	8.0E-01	--	8.9E+01
I-129	--	8.6E-04	6.4E-04	7.0E-04	1.1E-03	1.1E-03	7.2E-04	--	--	--	--	3E-05	5.2E-03
Nb-95	--	--	--	--	--	--	--	--	--	--	--	--	--
Pu-TOTAL	1.8E-04	1.9E-04	3.1E-04	1.9E-04	3.0E-04	3.8E-04	4.6E-04	2.15E-03	2.3E-04	1.6E-04	2.0E-04	2.1E-04	4.96E-03
Ru-106	1.96E-03	3.52E-04	2.50E-03	1.73E-02	1.80E-02	5.74E-03	3.71E-03	6.31E-02	9.68E-03	9.74E-03	1.48E-02	1.84E-02	1.653E-01
Sb-125	--	--	4.31E-03	--	5.62E-04	8.30E-05	2.31E-04	2.50E-03	4.26E-04	7.53E-04	1.57E-03	1.27E-03	1.171E-02
Sr-89	6E-04	--	--	--	1.1E-04	--	--	--	--	--	--	7E-04	1.4E-03
Sr-90	2.04E-03	2.85E-03	4.9E-03	1.3E-03	2.5E-03	4.1E-03	4.6E-03	5.3E-03	1.69E-03	1.90E-03	5.3E-03	7.9E-03	4.44E-02
U-TOTAL	5E-04	4.7E-04	4.1E-04	4E-04	6.7E-04	5.4E-04	4E-04	5E-04	4E-04	4.8E-04	4E-04	4E-04	5.6E-03
Zr-95	--	--	--	--	--	--	--	--	--	--	--	--	--
Eu-154	--	--	--	--	--	--	--	--	--	--	--	--	--
TOTAL ACTIVITY	1.026E-02	2.8E+00	6.8E-01	7.0E+00	2.0E+01	7.3E+00	4.5E+01	3.4E+00	7.8E-01	1.4E+00	8.4E-01	4.9E-02	8.9E+01
TOT VOL (L)	2.02E+08	1.87E+08	1.78E+08	1.95E+08	1.79E+08	1.90E+08	1.82E+08	1.83E+08	1.61E+08	1.70E+08	1.56E+08	1.57E+08	2.140E+09

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FIGURE 3-1

SERVICE WASTE EFFLUENT

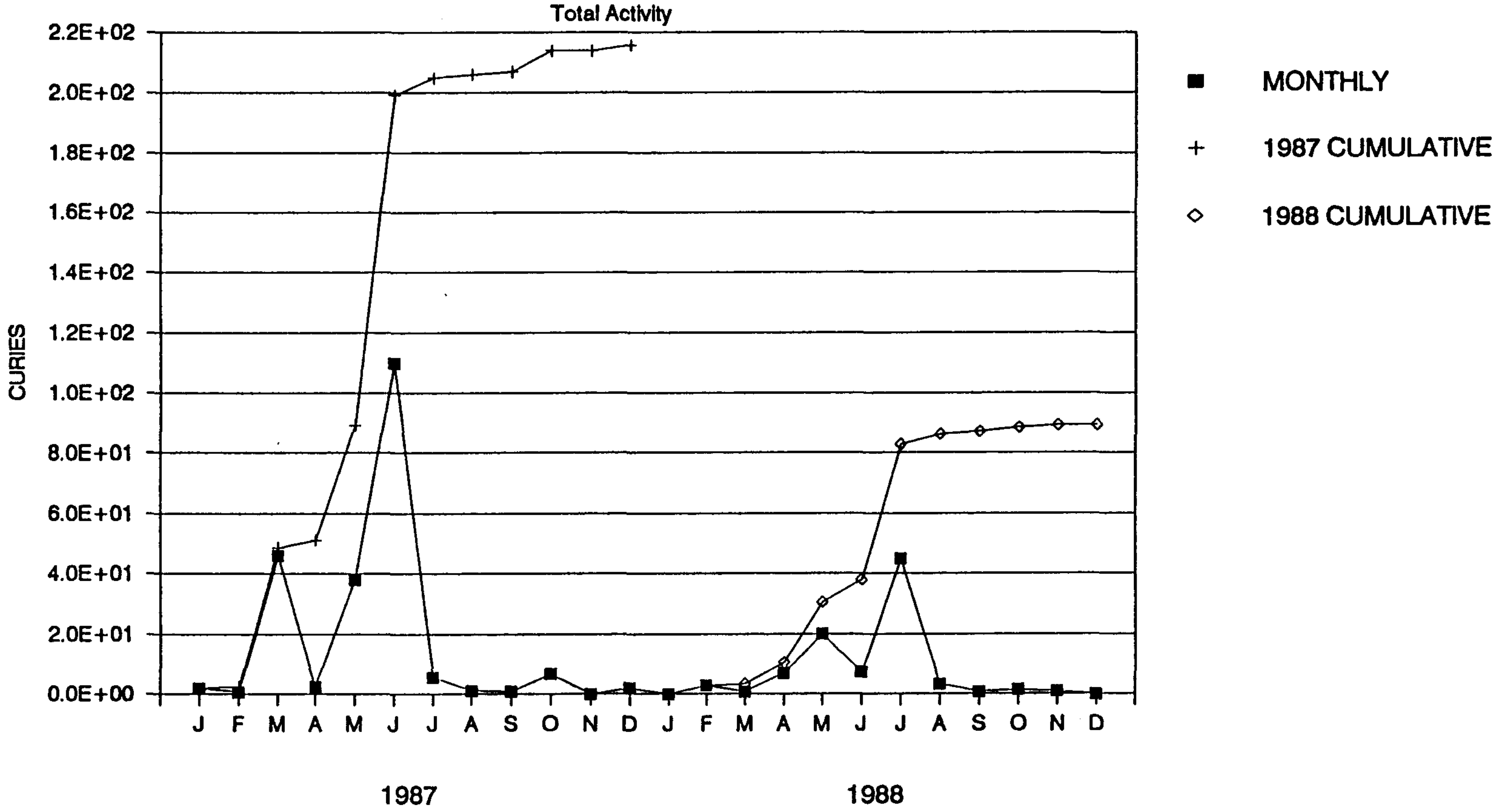

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FIGURE 3-2

SERVICE WASTE EFFLUENT

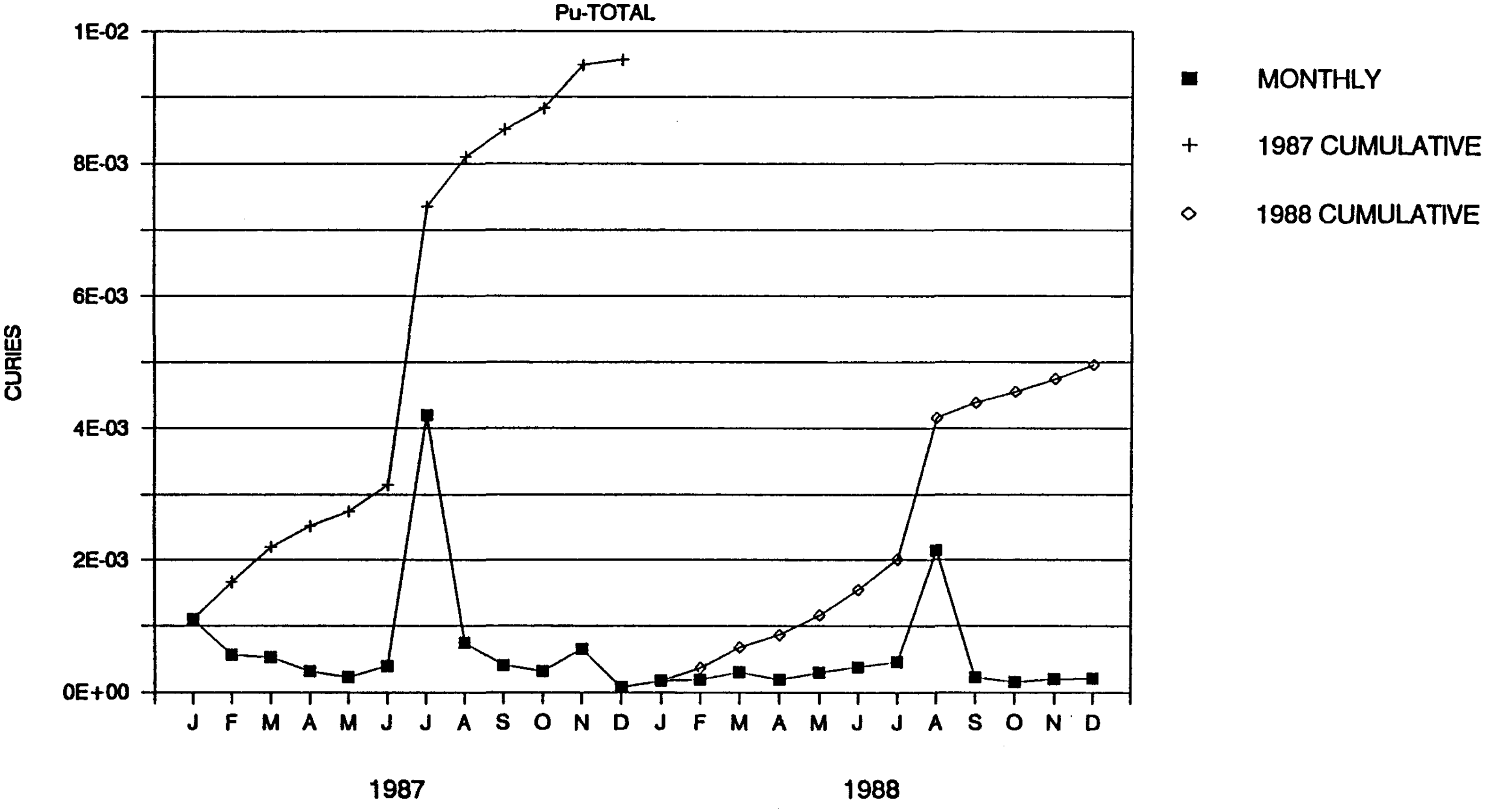

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FIGURE 3-3

SERVICE WASTE EFFLUENT

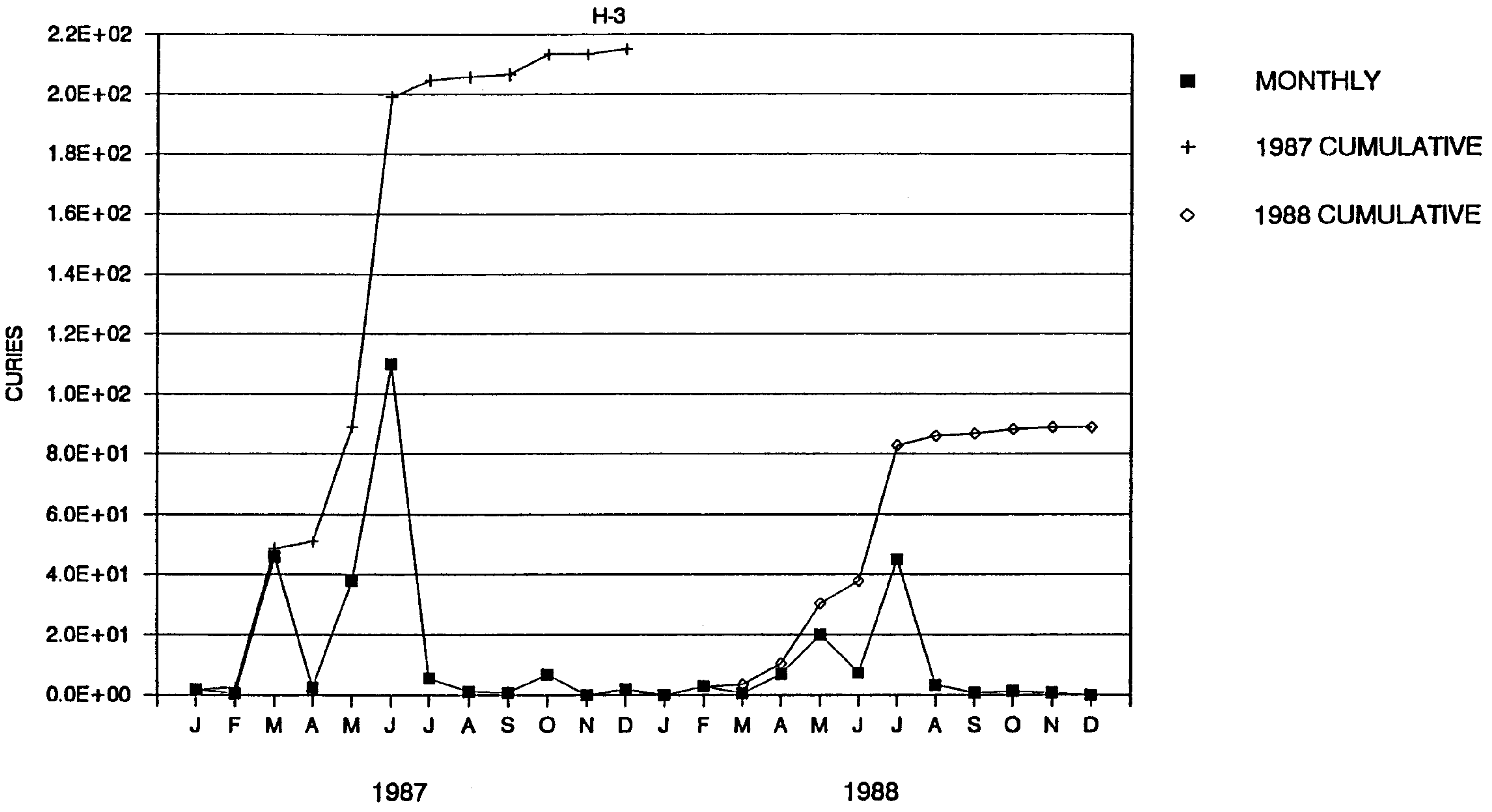

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FIGURE 3-4

SERVICE WASTE EFFLUENT

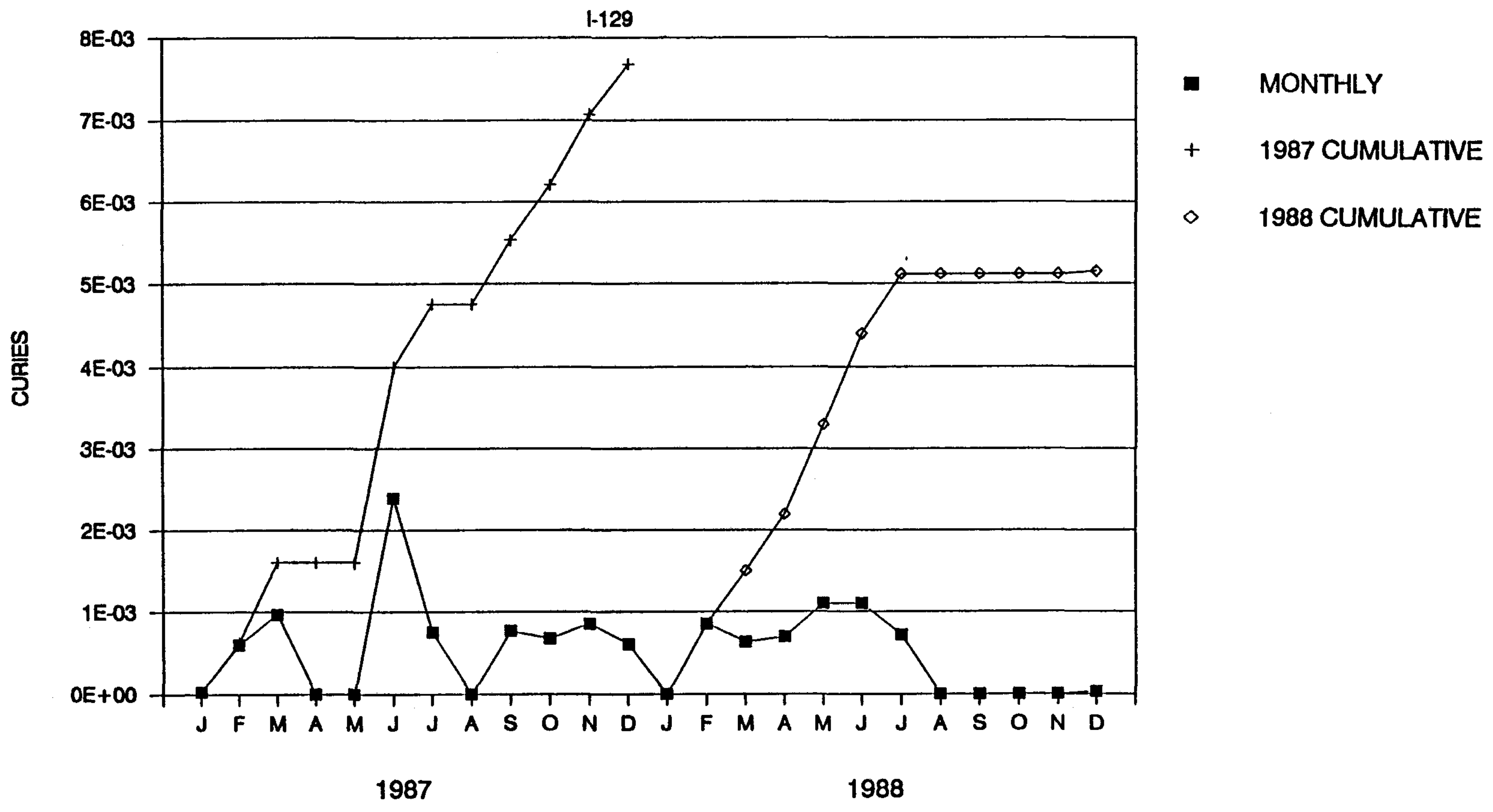

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FIGURE 3-5

SERVICE WASTE EFFLUENT

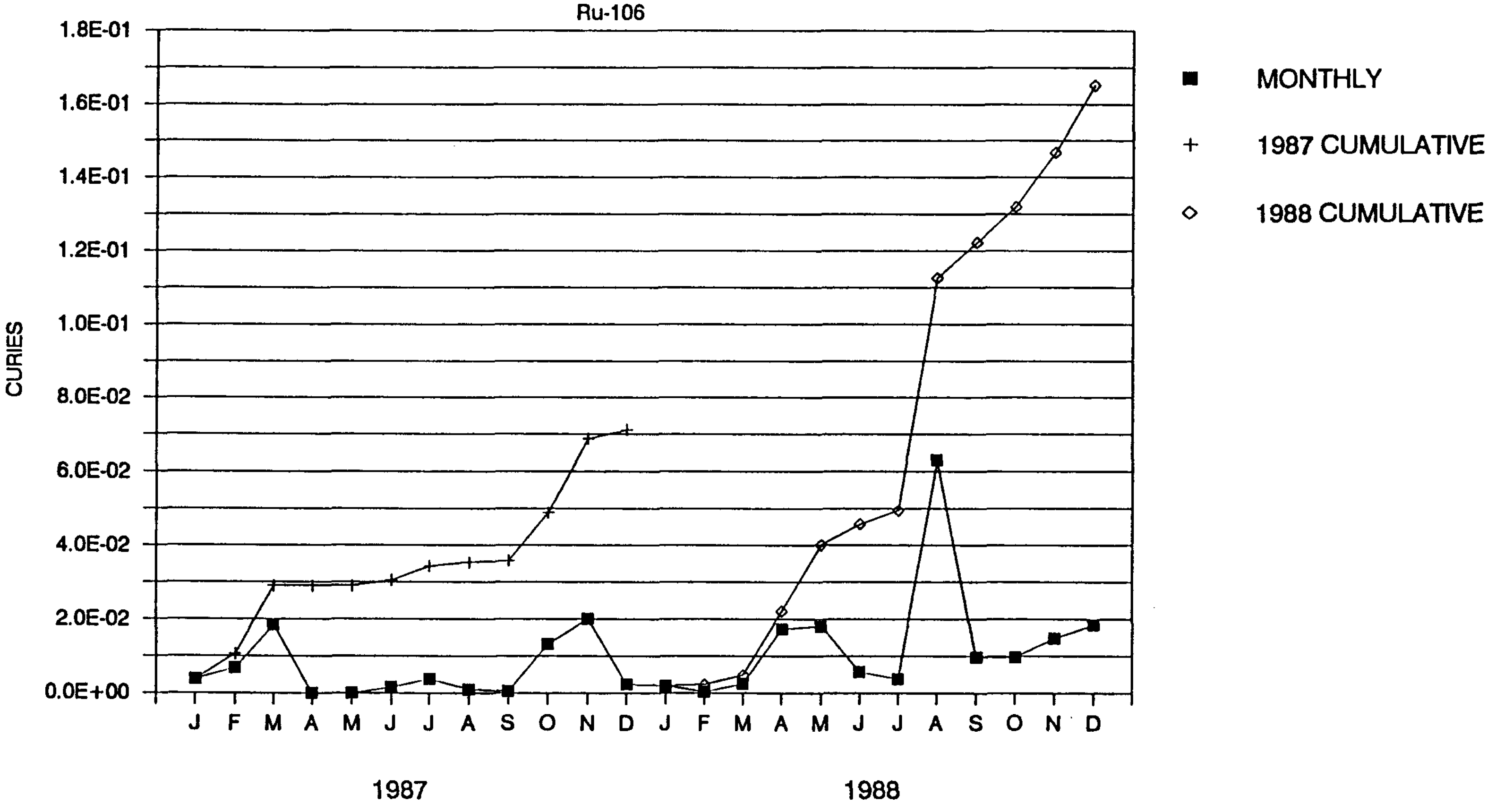

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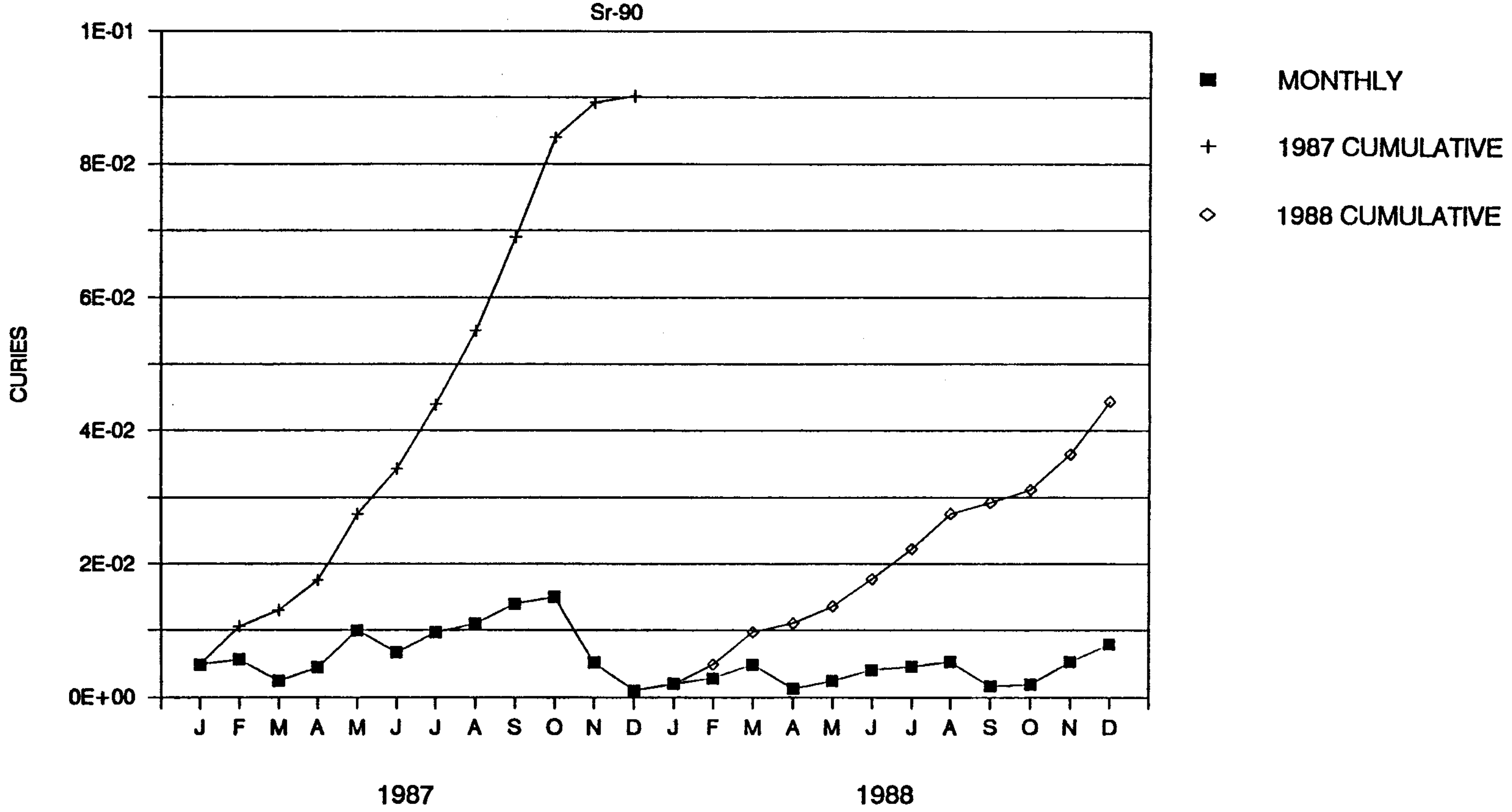
FIGURE 3-6

SERVICE WASTE EFFLUENT



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Tritium releases to service waste over the year are shown in Figure 3-3. Tritium levels rose during the second and third quarters of 1988 and fell during the last quarter of the year.

Information on iodine-129 releases to the service waste is presented in Figure 3-4. The iodine-129 release rate has remained nearly constant since December 1985.

Figure 3-5 presents the data for ruthenium-106 releases to service waste. Ruthenium levels fluctuated during the year but never deviated from their long term trend. Long term release data for Ru-106 shows that Ru-106 can be expected to remain between 1.0 E-04 and 8.0 E-02 curies per month.

Data plotted on Figure 3-6 shows strontium releases for 1988. Strontium releases have fluctuated since 1982 in the range between 3.0 E-04 and 1.5 E-02. This trend has continued through 1988.

Data for nonradioactive contaminants in the service waste disposed of via the Percolation Pond are summarized in Table 3-2.

Figure 3-7 shows the monthly release of cadmium. Cadmium is used as a neutron poison during the fuel dissolution process at FAST. As a result, its use at the ICPP is increasing. At no time during 1988 did cadmium releases to the pond or service waste exceed either the EPA EP toxicity limits or the drinking water standards.

Chromium concentrations depicted in Figure 3-8 continue to fluctuate between 0.03 and 0.1 mg/l. At no time during 1988 did chromium releases exceed the EPA EP Toxicity limit or the drinking water standards.

Lead (Figure 3-9) and Mercury (Figure 3-10) both indicate fairly constant release levels. Both remained below EPA EP Toxicity limits and State of Idaho drinking water limits during 1988.

Barium release rates are shown in Figure 3-11. The amount of barium released to the environment from ICPP remained fairly constant during 1988. At no time during 1988 did barium releases exceed either the EPA EP toxicity limits or the State of Idaho drinking water limits.

Tables 3-3 and 3-4 list the monthly DCG and MPC release ratios respectively for individual radionuclides. 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; ie., WINCO will not exceed either a DCG or an MPC ratio of 0.7. The ICPP did not exceed a ratio of 0.7 during any month in 1988. Figure 3-12 shows a comparison of the two regulatory ratios. As shown, the ICPP did not approach the total allowable release at any time during 1988.

TABLE 3-2

PERCOLATION POND - CY-1988
(in mg/l)

INORGANIC CHEMICALS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	EP TOXICITY LIMIT	DRINKING WATER STANDARDS
Arsenic (As)	--	--	--	--	--	--	--	--	--	--	--	--	5.0E+00	5.0E-02
Barium (Ba)	1.1E-01	7.4E-02	8.0E-02	9.0E-02	8.4E-02	8.01E-02	8.8E-02	1.02E-01	1.0E-01	1.0E-01	1.0E-01	1.06E-01	1.0E+02	1.0E+00
Cadmium (Cd)	2.6E-03	2.4E-03	--	1E-04	--	--	--	1.4E-03	--	--	3E-04	--	1.0E+00	1.0E-02
Chromium (Cr)	2.9E-03	8.4E-03	5.2E-03	2.6E-03	5.2E-03	7.64E-03	1.0E-02	1.83E-02	2.6E-02	9.1E-03	6.0E-03	--	5.0E+00	5.0E-02
Lead (Pb)	--	--	--	--	--	1.5E-03	--	8.7E-03	--	--	2E-03	--	5.0E+00	5.0E-02
Mercury (Hg)	--	5E-04	6.2E-04	--	--	--	6.7E-04	4.9E-04	--	--	1.4E-03	--	2.0E-01	2.0E-03
Selenium (Se)	1E-04	1E-04	1.8E-04	--	--	--	1E-04	--	--	--	--	--	1.0E+00	1.0E-02
Silver (Ag)	--	--	--	--	--	7.39E-04	--	1.5E-03	--	--	8.9E-04	--	5.0E+00	5.0E-02
Chloride Ion	2.48E+02	2.07E+02	2.41E+02	2.37E+02	2.72E+02	2.77E+02	1.59E+01	3.06E+02	3.10E+02	2.96E+02	3.23E+02	2.81E+02	NONE	2.5E+02
Fluoride Ion	6.27E-01	5.49E-01	5.47E-01	5E-01	4.35E-01	3.60E-01	--	--	5.04E-01	5.10E-01	5.44E-01	5.33E-01	NONE	2.2E+00
Nitrate Ion	2.82E+01	1.45E+01	2.49E+01	4.93E+01	3.16E+01	5.74E+01	3.01E+00	3.28E+01	6.43E+00	1.62E+01	4.77E+01	4.68E+01	NONE	4.5E+01
Sulfate Ion	6.07E+01	3.74E+01	6.81E+01	5.15E+01	6.48E+01	5.94E+01	2.41E+01	7.92E+01	6.49E+01	5.61E+01	6.57E+01	9.34E+01	NONE	2.5E+02
Phosphate Ion	--	--	--	--	--	8.50E-01	--	--	--	--	--	--	NONE	NONE

WATER QUALITY PARAMETERS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVERAGES
TDS (mg/l)	7.2E-01	6.3E-01	6.9E-01	5.9E-01	6.9E-01	9.6E-01	7.3E-01	8.6E-01	8.2E-01	6.7E-01	7.9E-01	7.2E-01	7.4E-01
Conductivity (uMHOS)	1216	1024	1038	1065	1240	1318	1155	1326	1304	1274	1214	1134	1192
pH	8.1	8.3	8.2	8.0	8.3	7.3	7.9	7.8	8.0	8.1	7.8	8.3	8.0

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FIGURE 3-7

PERCOLATION POND

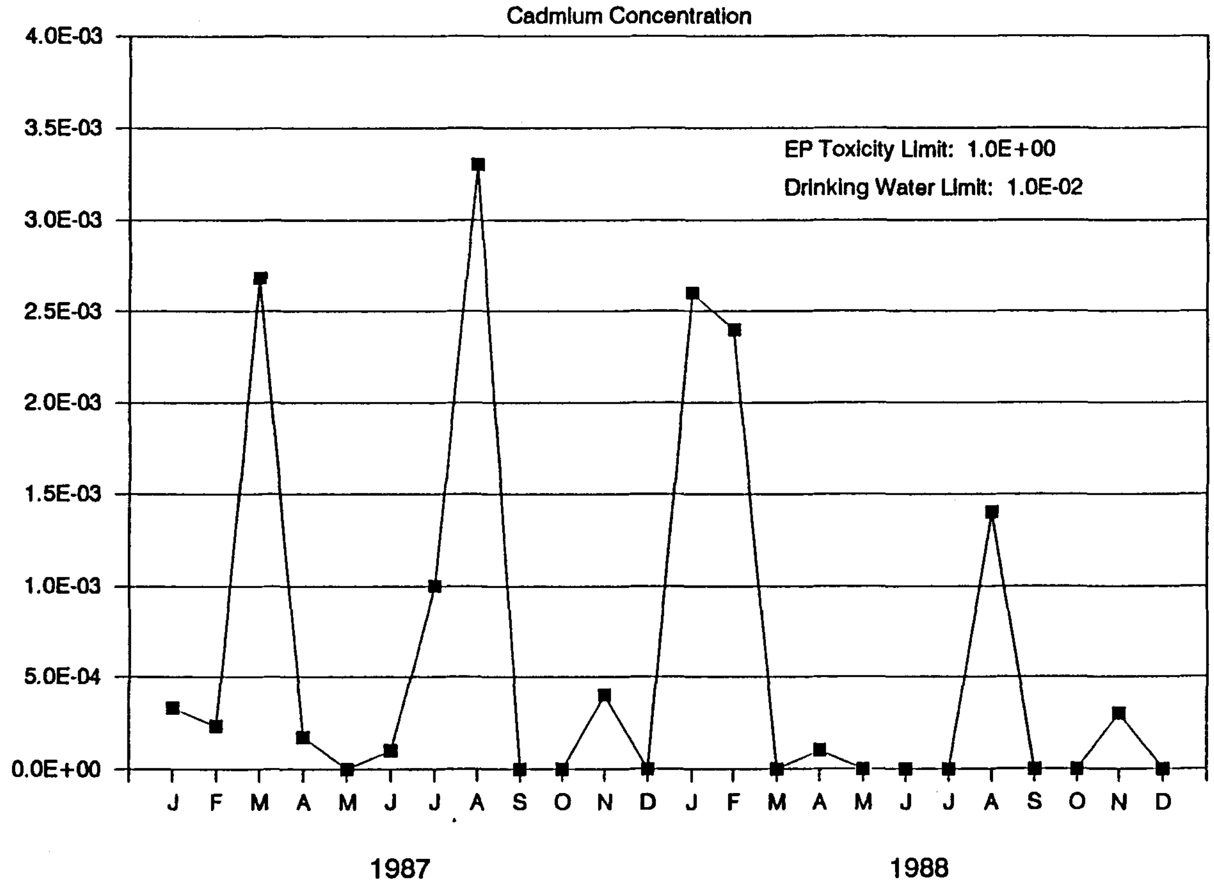

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FIGURE 3-8

PERCOLATION POND

Chromium Concentration

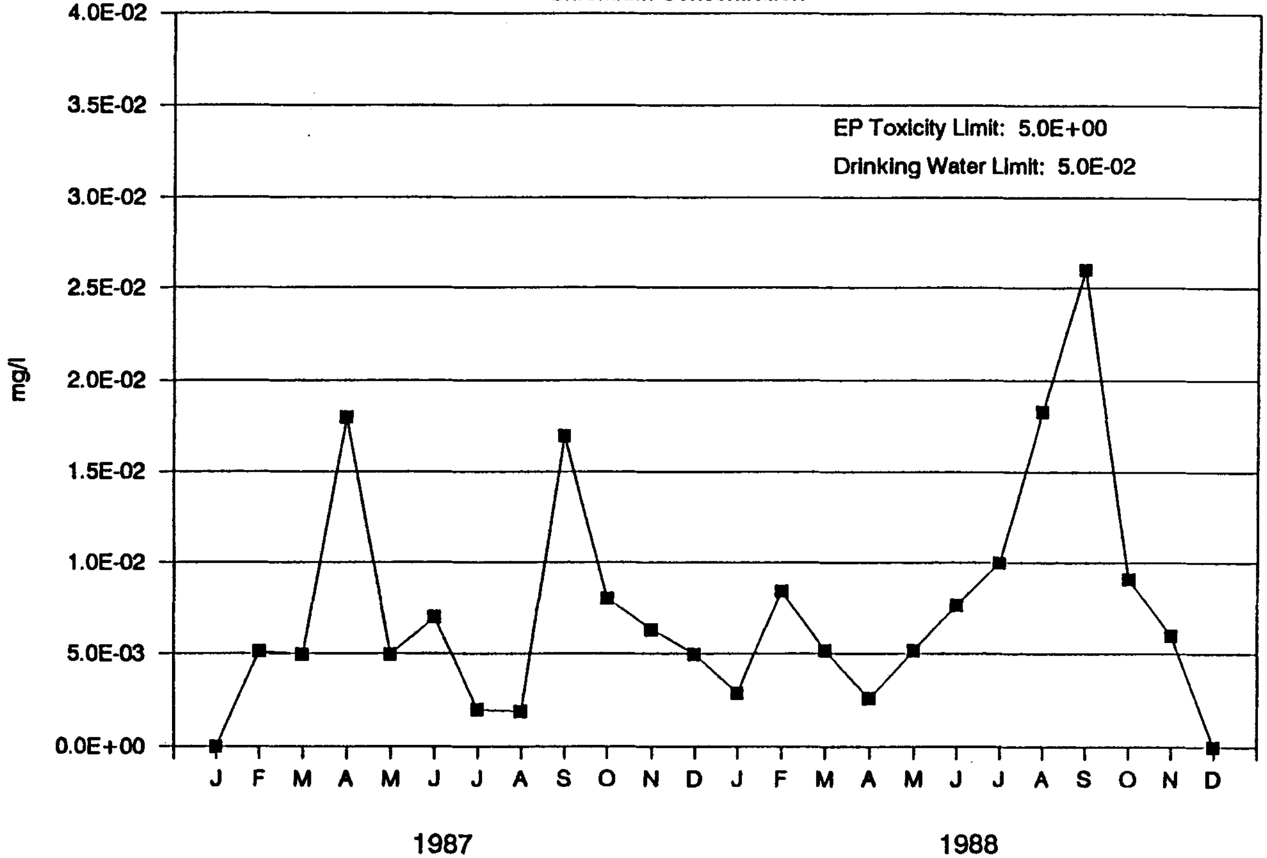

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FIGURE 3-9

PERCOLATION POND

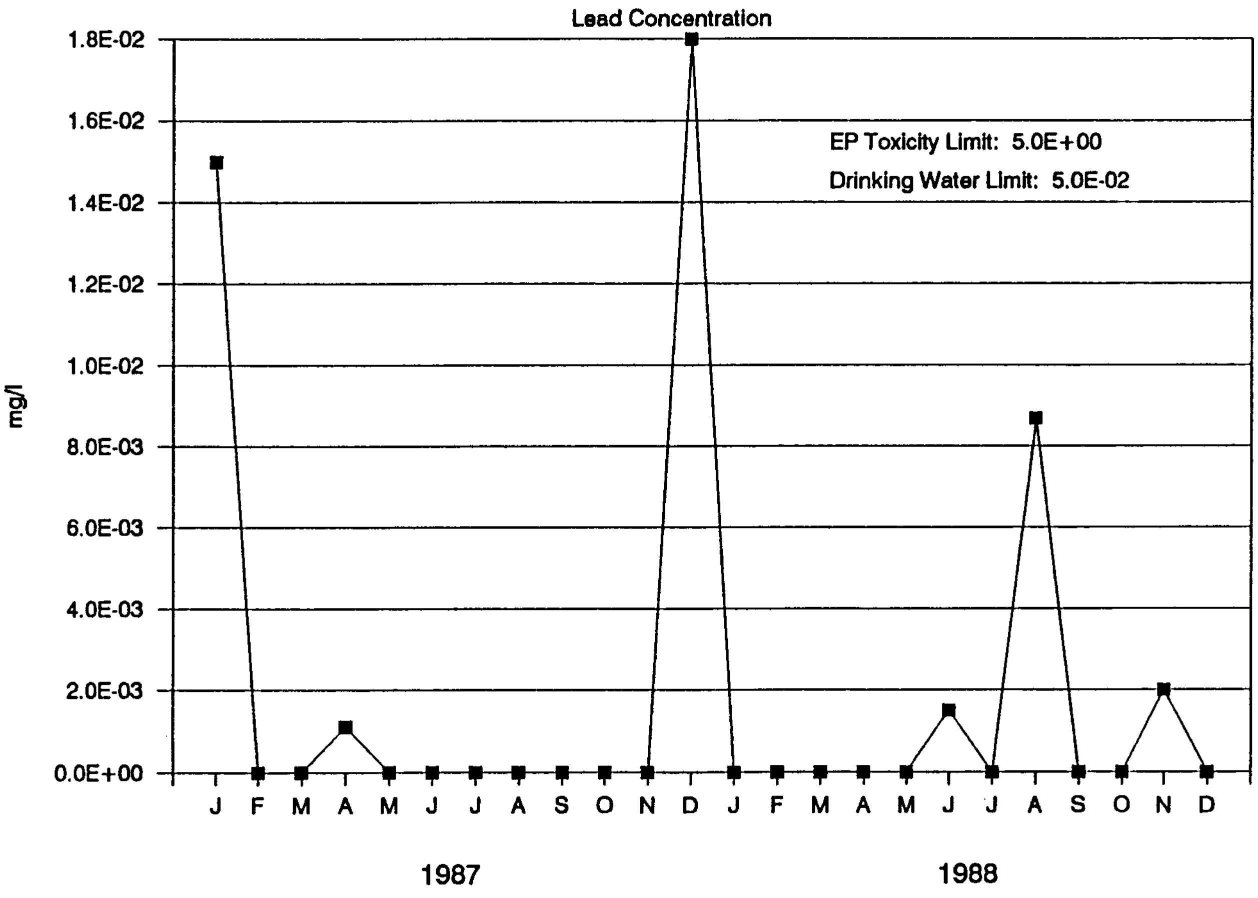

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FIGURE 3-10

PERCOLATION POND

Mercury Concentration

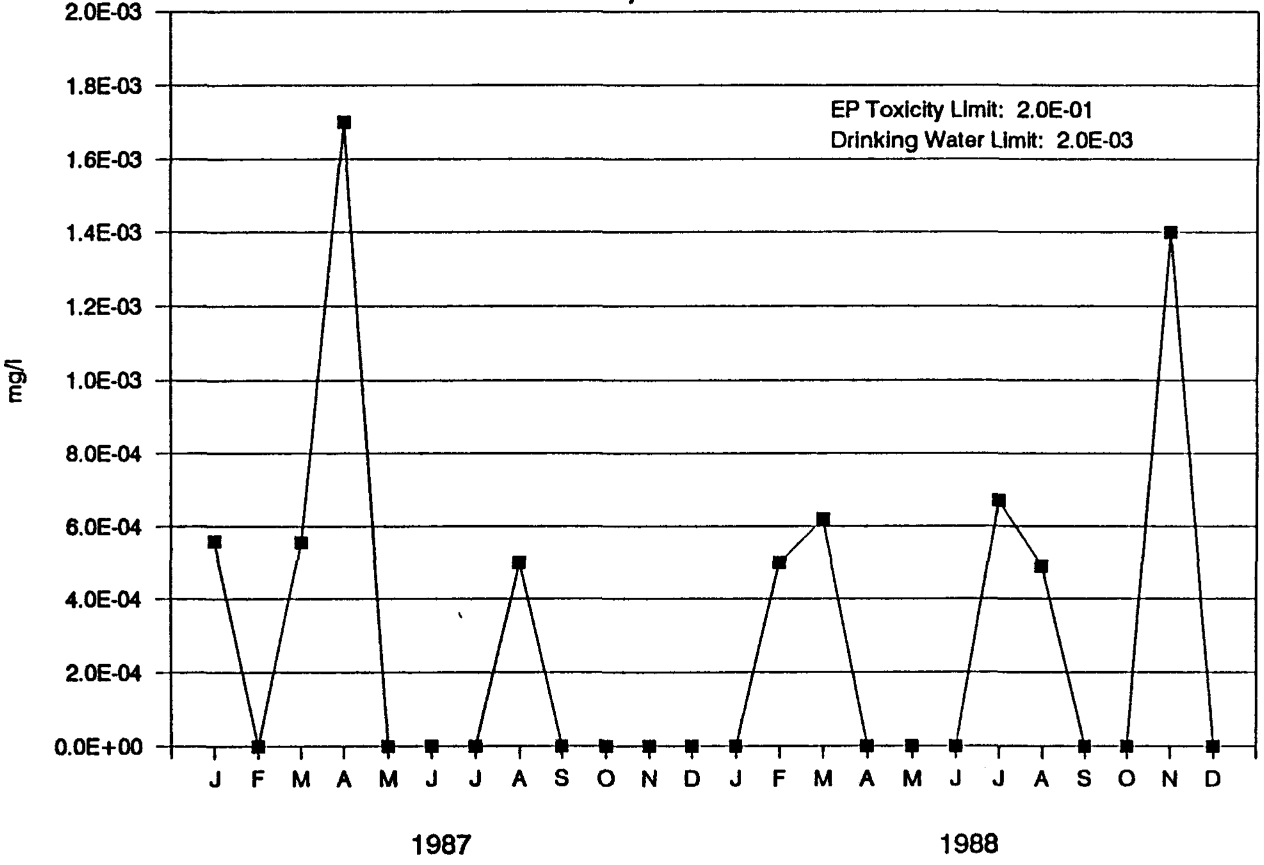

FIGURE 3-11

PERCOLATION POND

Barium Concentration

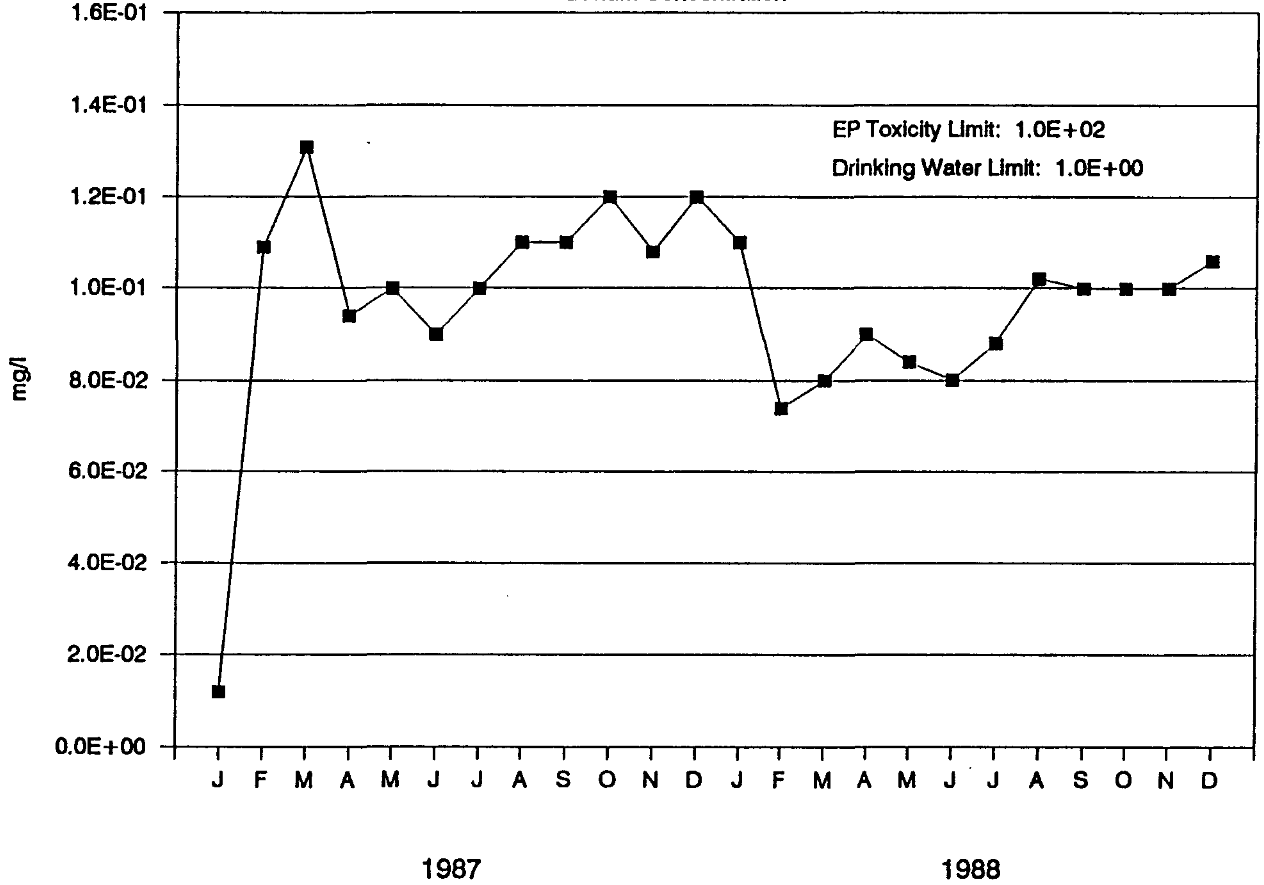

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TABLE 3-3

DCG RATIOS - DOE - CY-1988

RADIONUCLIDES	J	F	M	A	M	J	J	A	S	O	N	D
C-14	--	--	--	--	--	--	--	--	--	--	--	--
Ce-144	6E-04	--	--	--	--	--	1E-03	2E-04	5E-04	--	5E-04	3E-04
Co-60	--	--	--	--	--	8E-05	--	--	--	--	5E-05	8E-04
Cs-134	5E-04	3E-04	1E-03	1E-03	2E-03	4E-03	4E-03	6E-03	2E-03	3E-03	7E-03	6E-03
Cs-137	7E-03	9E-03	1E-02	1E-02	2E-02	2E-02	2E-02	2E-02	7E-03	1E-02	4E-02	4E-02
H-3	--	8E-03	2E-03	2E-02	6E-02	2E-02	1E-01	9E-03	2E-03	4E-03	3E-03	--
I-129	--	9E-03	7E-03	7E-03	1E-02	1E-02	8E-03	--	--	--	--	4E-04
Nb-95	--	--	--	--	--	--	--	--	--	--	--	--
Pu-TOTAL	2E-02	3E-02	4E-02	2E-03	4E-02	5E-02	6E-02	3E-01	4E-02	2E-02	3E-02	3E-02
Ru-106	2E-03	3E-04	2E-03	1E-02	2E-02	5E-03	3E-03	6E-02	1E-02	1E-02	2E-02	2E-02
Sb-125	--	--	5E-04	--	6E-05	9E-06	3E-05	3E-04	5E-05	9E-05	2E-04	2E-04
Sr-89	2E-04	--	--	--	3E-05	--	--	--	--	--	--	2E-04
Sr-90	1E-02	2E-02	3E-02	7E-03	1E-02	2E-02	3E-02	3E-02	1E-02	1E-02	3E-02	5E-02
U-TOTAL	5E-03	4E-03	4E-03	4E-03	7E-03	6E-03	5E-03	5E-03	5E-03	6E-03	5E-03	5E-03
Zr-95	--	--	--	--	--	--	--	--	--	--	--	--
Eu-154	--	--	--	--	--	--	--	--	--	--	--	--
TOTAL	5E-02	8E-02	1E-01	6E-02	2E-01	1E-01	2E-01	4E-01	8E-02	6E-02	1E-01	2E-01
TOTAL AFTER 10% EXCLUSION	--	--	--	--	--	--	1E-01	3E-01	--	--	--	--

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TABLE 3-4

MPC RATIOS - IDAHO - CY-1988

RADIONUCLIDES	J	F	M	A	M	J	J	A	S	O	N	D
C-14	--	--	--	--	--	--	--	--	--	--	--	--
Ce-144	4E-04	--	--	--	--	--	8E-04	2E-04	3E-04	--	4E-04	2E-04
Co-60	--	--	--	--	--	1E-05	--	--	--	--	8E-06	1E-04
Cs-134	1E-04	6E-05	3E-04	2E-04	5E-04	9E-04	8E-04	1E-03	4E-04	6E-04	2E-03	1E-03
Cs-137	1E-03	1E-03	2E-03	2E-03	3E-03	4E-03	3E-03	3E-03	1E-03	2E-03	6E-03	5E-03
H-3	--	5E-03	1E-03	1E-02	4E-02	1E-02	8E-02	6E-03	2E-03	3E-03	2E-03	--
I-129	--	8E-02	6E-02	6E-02	1E-01	1E-01	7E-02	--	--	--	--	3E-03
Nb-95	--	--	--	--	--	--	--	--	--	--	--	--
Pu-TOTAL	2E-04	2E-04	3E-04	2E-04	3E-04	4E-04	5E-04	2E-03	3E-04	2E-04	3E-04	3E-04
Ru-106	1E-03	2E-04	1E-03	9E-03	1E-02	3E-03	2E-03	3E-02	6E-03	6E-03	9E-03	1E-02
Sb-125	--	--	2E-04	--	3E-05	4E-06	1E-05	1E-04	3E-05	4E-05	1E-04	8E-05
Sr-89	1E-03	--	--	--	2E-04	--	--	--	--	--	--	1E-03
Sr-90	3E-02	5E-02	9E-02	2E-02	5E-02	7E-02	8E-02	1E-01	4E-02	4E-02	1E-01	2E-01
U-TOTAL	9E-05	8E-05	8E-05	6E-05	1E-04	8E-05	7E-05	8E-05	8E-05	9E-05	8E-05	9E-05
Zr-95	--	--	--	--	--	--	--	--	--	--	--	--
Eu-154	--	--	--	--	--	--	--	--	--	--	--	--
TOTAL	3E-02	1E-01	2E-01	1E-01	2E-01	2E-01	2E-01	1E-01	5E-02	5E-02	1E-01	2E-01
TOTAL AFTER 10% EXCLUSION	--	--	--	--	1E-01	1E-01	--	1E-01	--	--	1E-01	2E-01

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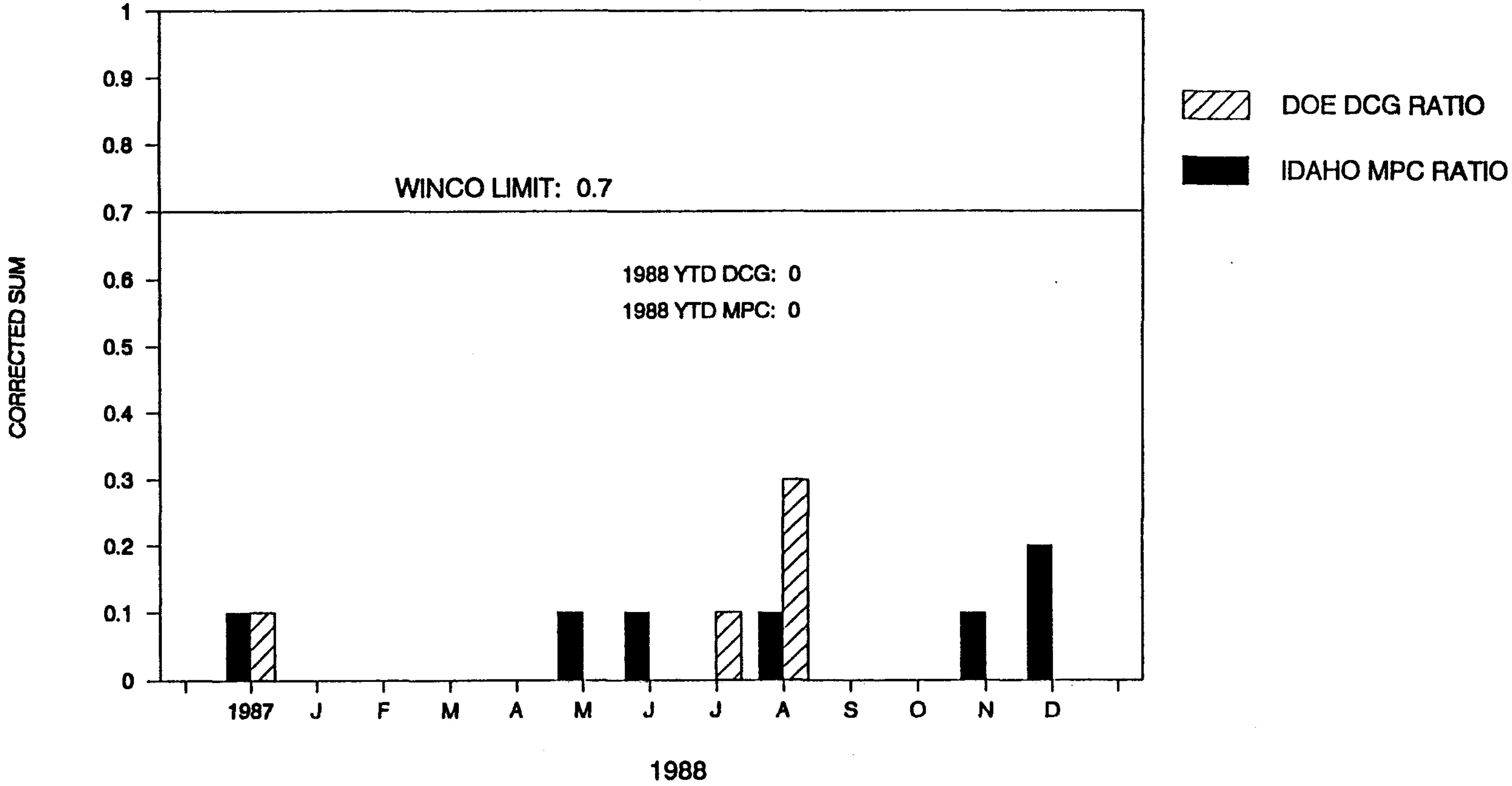
FIGURE 3-12

MPC AND DCG RATIOS

FOR SERVICE WASTE RELEASES



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2.2 Production and Potable Water Wells

There are two production wells and one potable water well 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 Silvex.

Tables 3-5 and 3-6 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 RESL facility collects monthly samples of the wells to perform analyses for tritium and strontium, and reports the results in the Environmental Monitoring Program Report for the Idaho National Engineering Laboratory Site.

2.3 Sewage Treatment Plant

Domestic waste water at the ICPP is pumped to the aerated lagoon 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 is sampled by EG&G personnel using grab samples taken five days per week (Monday through Friday). The WINCO Environmental Engineering Section monitors the operation and performance of the domestic waste water treatment plant. Table 3-7A lists the monthly Biological Oxygen Demand (BOD), Dissolved Oxygen (DO) and pH for 1988. Table 3-7B lists the monthly strontium and quarterly plutonium (total) values for 1988.

Monthly influent (raw) and effluent (final) Biological Oxygen Demand (BOD) concentrations are shown in Figure 3-13A. The difference in concentrations between influent BOD and effluent BOD represents the treatment efficiency (Figure 3-13B). Since the facility has been operational, treatment efficiency has met design (80%) criteria except during algae blooms when excess algae overflows the effluent weir. Two distinctive algae blooms occurred during 1988, one began in April and the second began in July. 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 3-14. The increased effluent DO is a result of the two algae blooms. Algae collected in the sample bottle continues to respire after the sample is collected, as a result the algae in the sample bottle produces an erroneously high DO for the effluent. The low DO (1.7 mg/l) in August is the result of the decay of the algae

TABLE 3-5

PRODUCTION WELL - CY-1988
(in mg/l)

TRACE METALS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	DRINKING WATER STANDARDS
Arsenic (As)	--	--	--	--	--	--	--	--	--	--	--	--	5.0E-02
Barium (Ba)	7.5E-02	7.4E-02	5.5E-02	7.7E-02	7.5E-02	7.11E-02	7.1E-02	7.4E-02	7.4E-02	7.8E-02	7.5E-02	7.3E-02	1.0E+00
Cadmium (Cd)	--	1.8E-03	--	--	--	--	--	--	--	--	--	--	1.0E-02
Chromium (Cr)	4.6E-03	6.9E-03	3.4E-03	3.3E-03	7.5E-03	7.18E-03	7.1E-03	1.1E-02	6.2E-03	8.6E-03	1.1E-02	6.9E-03	5.0E-02
Lead (Pb)	--	--	--	--	--	2.1E-01	--	--	--	--	--	--	5.0E-02
Mercury (Hg)	--	--	--	5.4E-04	--	--	--	--	--	--	--	--	2.0E-03
Selenium (Se)	--	--	--	--	--	--	--	--	--	--	--	--	1.0E-02
Silver (Ag)	--	--	--	--	--	--	--	--	--	--	--	--	5.0E-02

ORGANIC CHEMICALS - APRIL 1988

	ANALYSIS RESULTS	EP TOXICITY LIMITS	DRINKING WATER STANDARDS
Endrin	ND	2.0E-02	2.0E-04
Lindane	ND	4.0E-01	4.0E-03
Toxaphene	ND	5.0E-01	5.0E-03
2, 4-D	ND	1.0E+01	1.0E-01
Methoxychlor	ND	1.0E+01	1.0E-01
2,4,5-TP Silvex	ND	None	1.0E-02

TABLE 3-6

POTABLE WATER WELL - CY-1988
(in mg/l)

TRACE METALS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	DRINKING WATER STANDARDS
Arsenic (As)	--	--	--	--	--	--	--	--	--	--	--	--	5.0E-02
Barium (Ba)	8.1E-02	7.8E-02	6.4E-02	7.8E-02	8.3E-02	7.18E-02	8.2E-02	7.1E-02	8.1E-02	7.7E-02	7.6E-02	7.3E-02	1.0E+00
Cadmium (Cd)	--	2.1E-03	--	3.4E-03	--	--	--	--	--	--	--	--	1.0E-02
Chromium (Cr)	1.9E-03	6.9E-03	5.1E-03	--	2.6E-03	9.05E-03	7.4E-03	8.4E-03	3.8E-03	8.3E-03	8.8E-03	3.0E-03	5.0E-02
Lead (Pb)	2.0E-02	--	--	3.7E-02	--	--	--	--	--	--	--	--	5.0E-02
Mercury (Hg)	--	--	--	--	--	--	--	--	--	--	--	--	2.0E-03
Selenium (Se)	--	--	--	--	--	--	--	--	--	--	--	--	1.0E-02
Silver (Ag)	--	--	--	--	--	--	--	2.2E-03	--	--	8.1E-04	--	5.0E-02

ORGANIC CHEMICALS - APRIL 1988

	ANALYSIS RESULTS	EP TOXICITY LIMITS	DRINKING WATER STANDARDS
Endrin	ND	2.0E-02	2.0E-04
Lindane	ND	4.0E-01	4.0E-03
Toxaphene	ND	5.0E-01	5.0E-03
2, 4-D	ND	1.0E+01	1.0E-01
Methoxychlor	ND	1.0E+01	1.0E-01
2,4,5-TP Silvex	ND	None	1.0E-02

TABLE 3-7A

SEWAGE TREATMENT PLANT ANALYSIS - CY-1988
(in mg/l)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Design Standard
Raw BOD	46	52	66	72	83	72.5	58	64	72	55	62	46	150
Final BOD	6	8	8	18	10	13	18	10	6	9	5	3	30
Efficiency	87%	85%	88%	75%	88%	82%	69%	84%	92%	84%	92%	93%	> 80%
Raw DO	4E-01	4E-01	4E-01	3E-01	3E-01	3E-01	3E-01	5E-01	4E-01	6E-01	7E-01	4E-01	< 1E-01
Final DO	6.0	7.4	9.4	18.0	7.4	8.5	3.9	1.7	4.5	8.8	8.1	6.1	> 3.0
Raw pH	7.8	7.9	8.1	8.1	8.0	7.6	8.0	7.7	8.2	7.9	7.8	7.9	< 6.0
Final pH	7.5	7.5	7.7	9.1	8.1	8.4	9.1	8.4	8.0	8.1	7.8	7.6	> 6.5
TOT VOL (L)	3.52E+06	3.04E+06	3.07E+06	3.04E+06	2.88E+06	2.78E+06	2.57E+06	2.60E+06	2.88E+06	2.53E+06	2.57E+06	3.18E+06	

TABLE 3-7B

SEWAGE TREATMENT PLANT RADIONUCLIDE ANALYSIS - CY-1988
(curies)

RADIONUCLIDES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YTD
Sr-89	6.0E-06	5.2E-06	--	--	--	--	--	--	2.9E-06	--	--	--	1.41E-05
Sr-90	5.3E-06	3.3E-06	2E-06	2E-06	1.3E-06	1.1E-06	--	--	2E-06	2E-06	2E-06	2E-06	2.3E-05
Pu-Total (Qtr)			--			--			--			4.6E-07	4.6E-07

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FIGURE 3-13A

SEWAGE TREATMENT PLANT

BOD

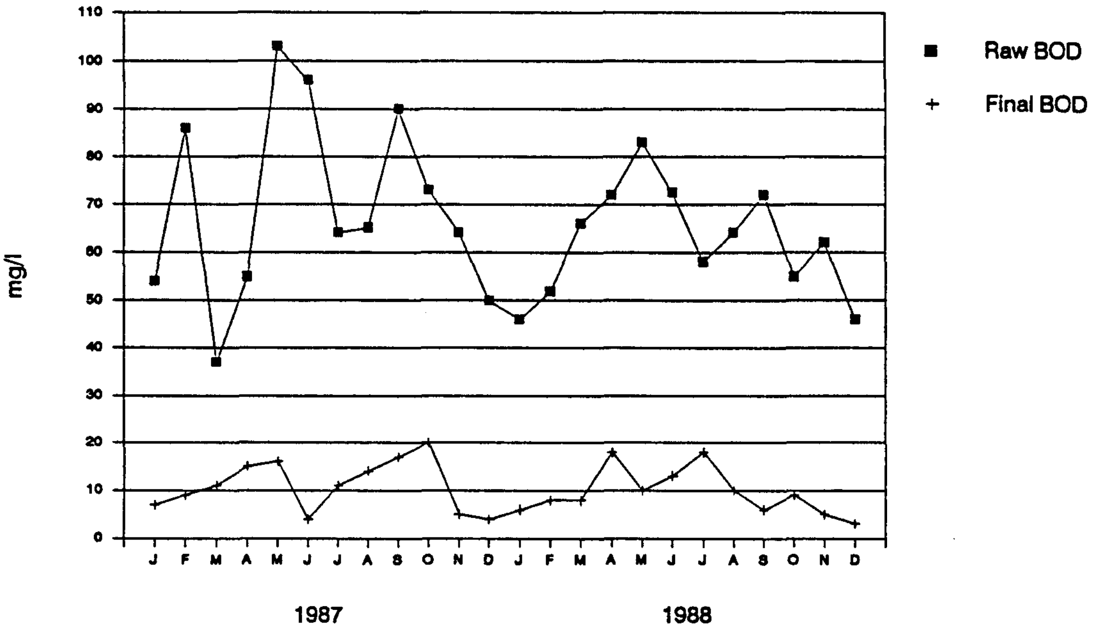

FIGURE 3-13B

SEWAGE TREATMENT PLANT

BOD Efficiency

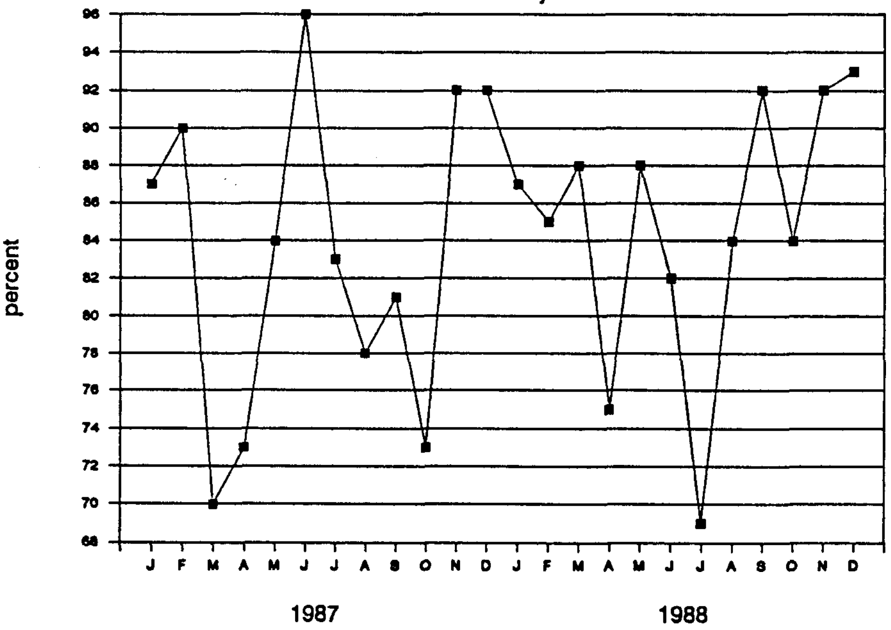

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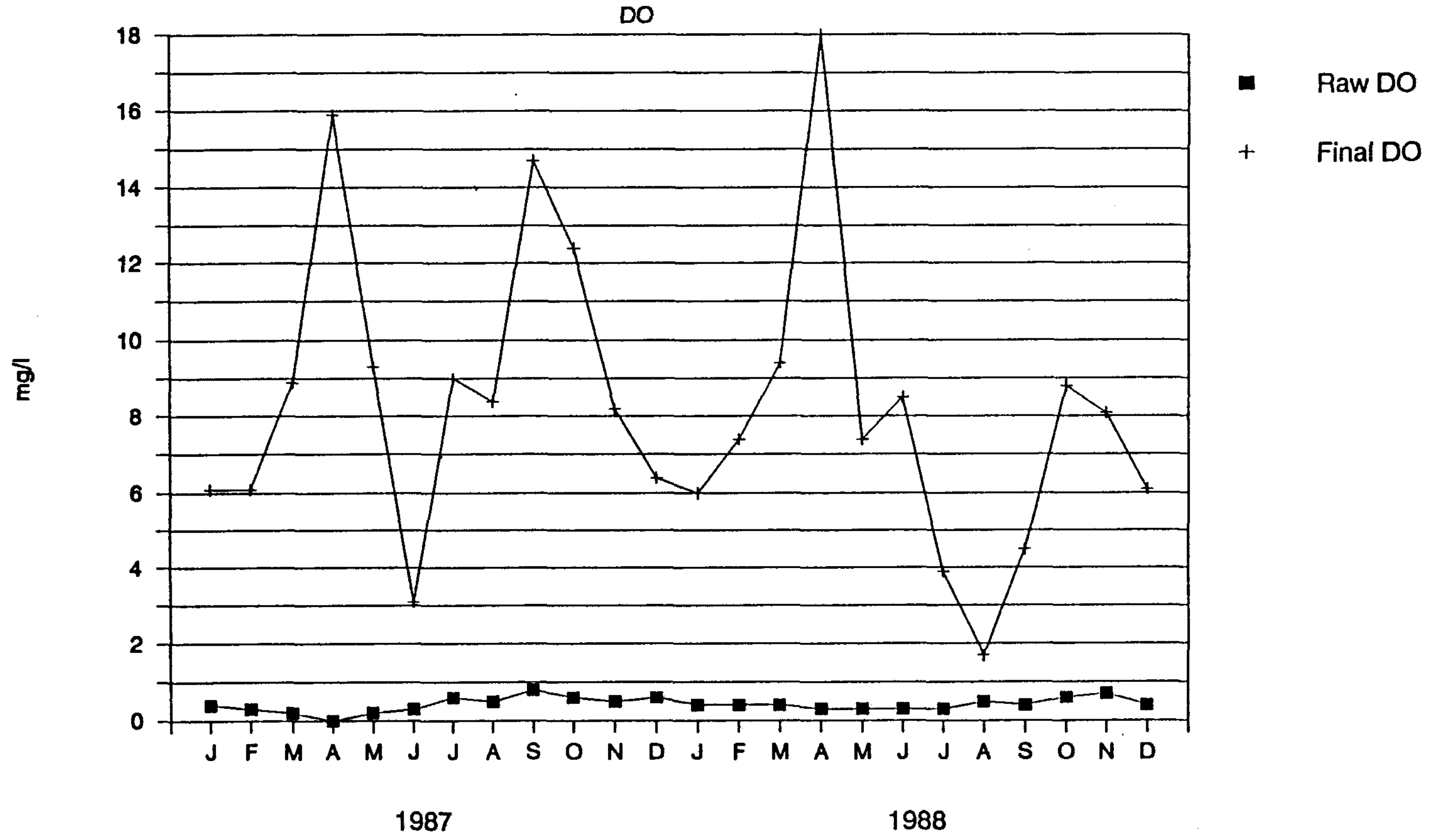
FIGURE 3-14

SEWAGE TREATMENT PLANT



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that grew in July. Effluent stream pH values from the waste water treatment facility are shown in Figure 3-15. The final pH values during the year continued in the normal design range of the sewage treatment plant. However, the two pH spikes during 1988 are attributed to the two algae blooms. Figure 3-16 provides a summary of flow through the sewage treatment plant.

2.4 ICPP Injection Well

The ICPP injection well was available for use during emergency situations. During 1988 no emergency use of the well occurred.

FIGURE 3-15

SEWAGE TREATMENT PLANT

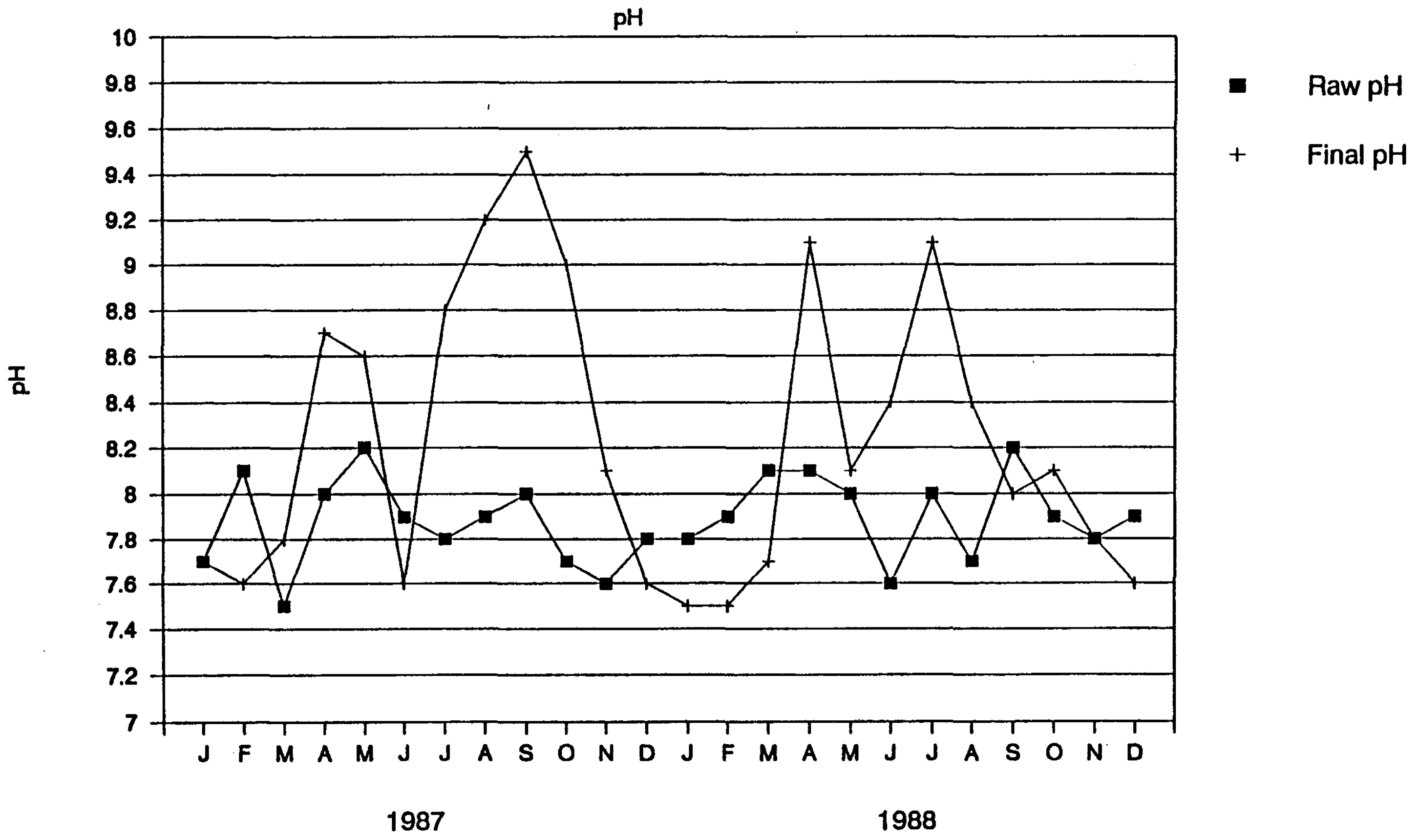

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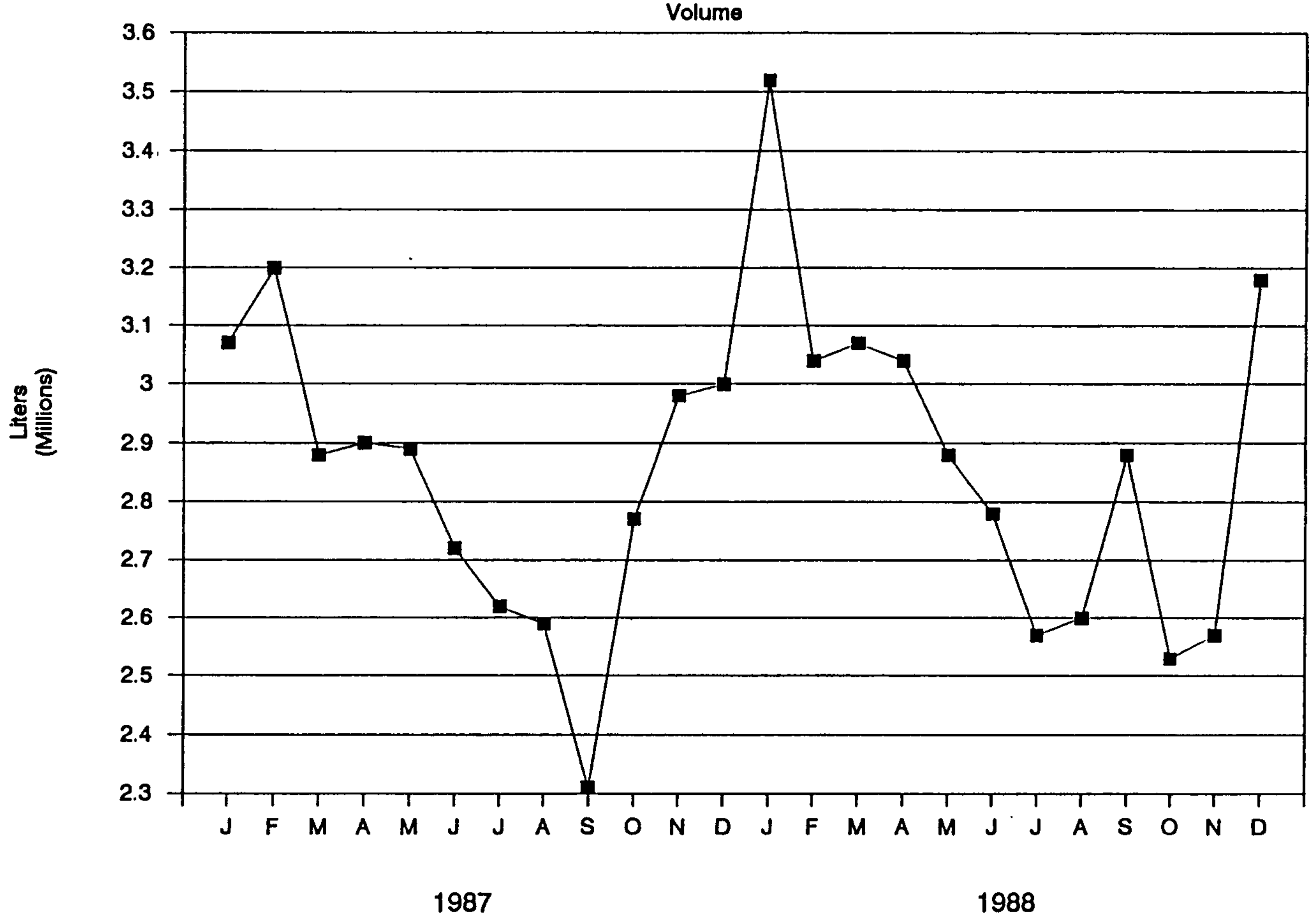
FIGURE 3-16

SEWAGE TREATMENT PLANT



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