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WINCO-1085  
January 1991

# ICPP ENVIRONMENTAL MONITORING REPORT CY-1989

**Environmental Assurance**



**IDAHO NATIONAL ENGINEERING LABORATORY**  
*Managed by the U.S. Department of Energy*

*Prepared for the  
U.S. Department of Energy  
Idaho Operations Office  
Under DOE Contract No. DE-AC07-84ID12435*

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**Westinghouse Idaho Nuclear Company, Inc.**  
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# ICPP ENVIRONMENTAL MONITORING REPORT 1989

## 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 Assurance (EA) Section of the Environmental Compliance and SIS Operations (EC/SIS) Department. Published in response to DOE Order 5484.1, Chap. III, this report covers the period from December 20, 1988 through December 19, 1989.

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 5400.05, 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 EA Section 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 1989  $2.00 \text{ E}+04$  curies of radionuclides (including calculated krypton) were released from airborne and liquid emission points at the ICPP operations. Airborne releases to the atmosphere contributed  $2.00 \text{ E}+04$  curies and liquid effluent released to the Percolation Pond contributed  $2.71 \text{ E}-01$  curies. As documented in DOE-ID 12089(89) "The INEL Site Environmental Report for 1989" the total contribution from all INEL radioactive sources (including the ICPP) for 1989 was less than 0.002% of the total natural background radiation effective dose equivalent of approximately 350 mrem per year in the area near the INEL. ICPP contributed a fraction of that total.

TABLE 1-1

## SUMMARY OF RELEASE DATA FOR 1989

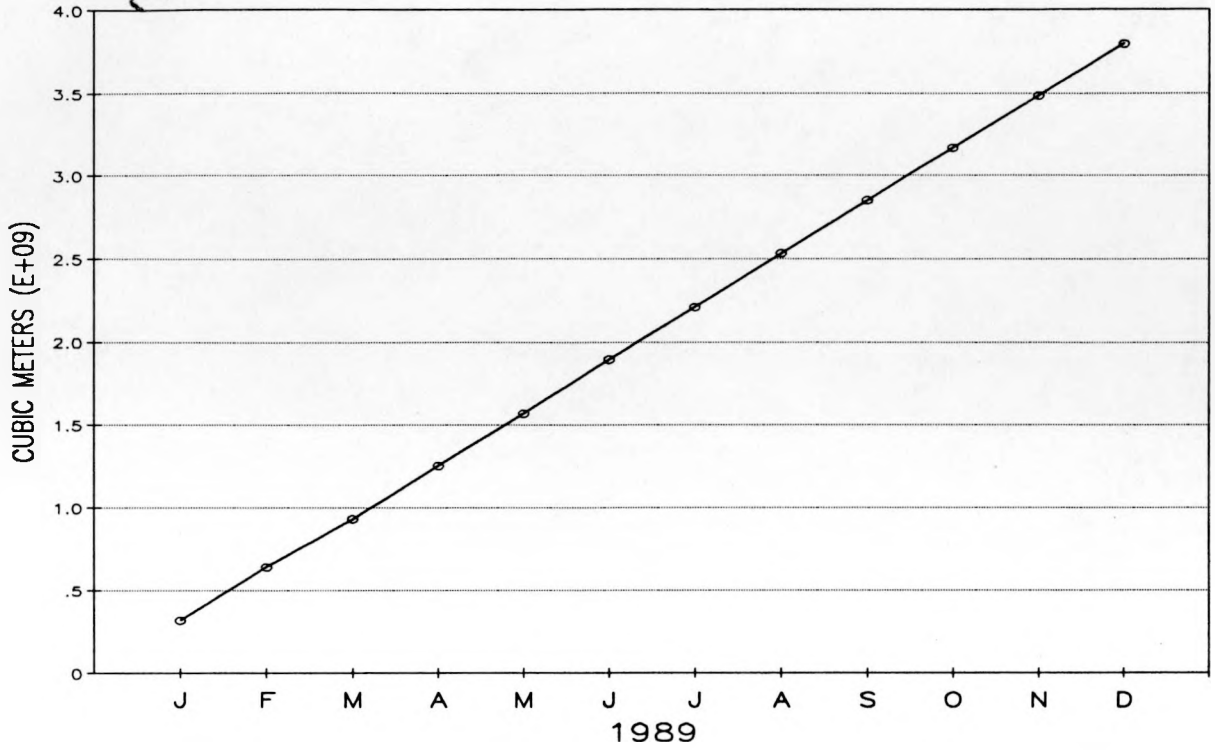
	<u>AIRBORNE</u>				<u>LIQUID</u>			
	<u>VOLUME</u> (E+09 M3)		<u>ACTIVITY</u> (CURIES)		<u>Volume</u> (E+09 LITERS)		<u>Activity</u> (CURIES)	
	<u>Month</u>	<u>YTD</u>	<u>Month</u>	<u>YTD</u>	<u>Month</u>	<u>YTD</u>	<u>Month</u>	<u>YTD</u>
Jan.	0.317	0.317	2.00E+04*	2.00E+04	0.140	0.140	3.10E-02	3.10E-02
Feb.	0.323	0.640	6.15E-02	2.00E+04	0.156	0.296	1.69E-02	4.80E-02
Mar.	0.291	0.931	7.40E-02	2.00E+04	0.151	0.447	5.19E-02	1.00E-01
Apr.	0.322	1.253	9.50E-02	2.00E+04	0.143	0.590	5.75E-02	1.58E-01
May	0.316	1.569	1.90E-01	2.00E+04	0.116	0.706	1.29E-02	1.71E-01
Jun.	0.326	1.895	4.10E-01	2.00E+04	0.139	0.845	2.99E-02	2.01E-01
Jul.	0.315	2.210	2.20E-01	2.00E+04	0.128	0.973	1.69E-02	2.18E-01
Aug.	0.322	2.532	1.20E-01	2.00E+04	0.128	1.101	1.08E-02	2.29E-01
Sep.	0.319	2.851	1.50E-01	2.00E+04	0.146	1.247	9.40E-03	2.38E-01
Oct.	0.315	3.166	1.53E-01	2.00E+04	0.142	1.389	1.51E-02	2.53E-01
Nov.	0.319	3.485	9.30E-02	2.00E+04	0.145	1.534	8.00E-03	2.61E-01
Dec.	0.308	3.793	3.40E-03	2.00E+04	0.168	1.702	9.90E-03	2.71E-01

\*See classified letter for further information.

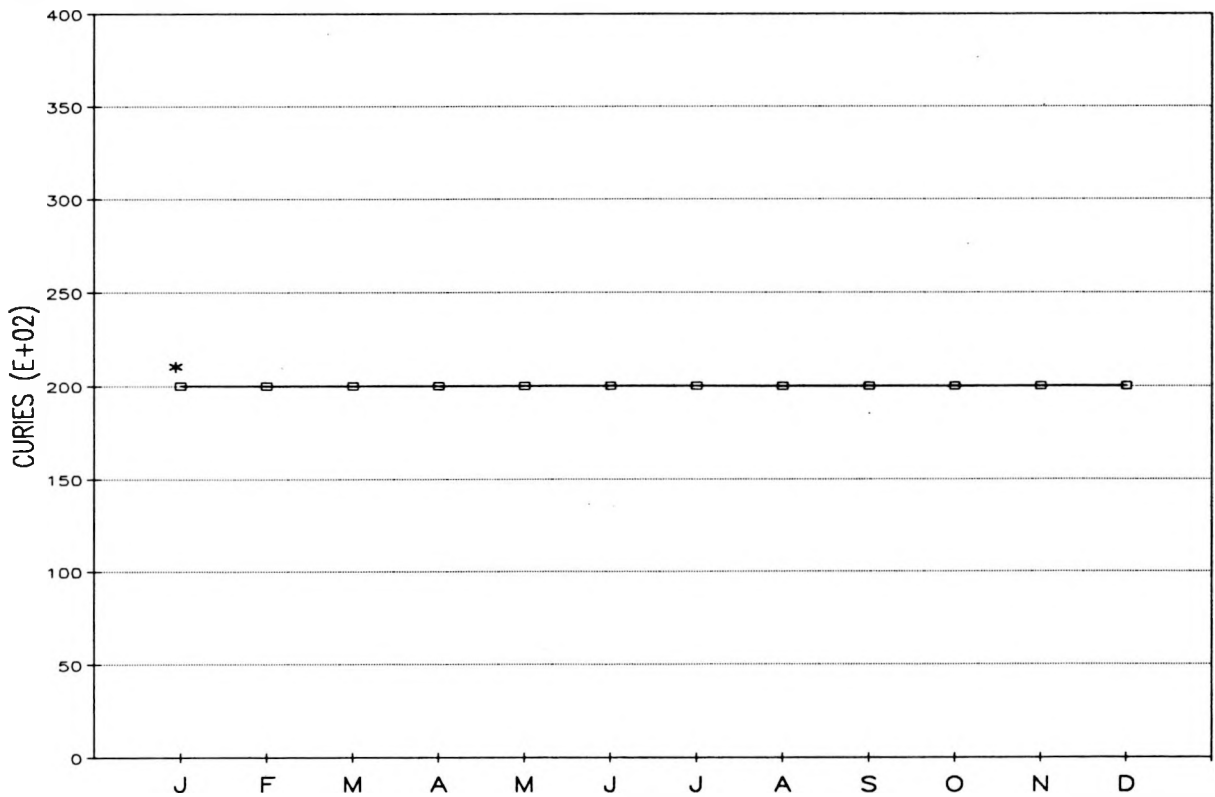
11-20-90

FIGURE 1-1  
SUMMARY OF AIRBORNE RELEASES

CUMULATIVE VOLUME



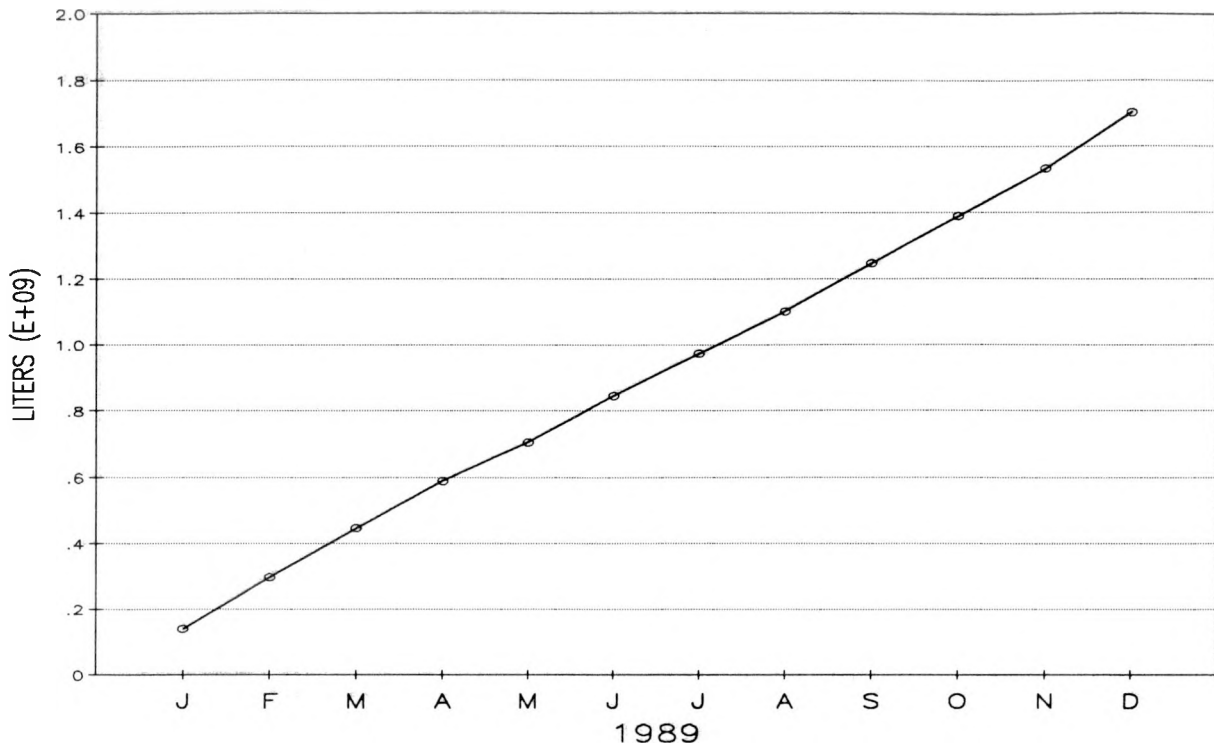
CUMULATIVE ACTIVITY



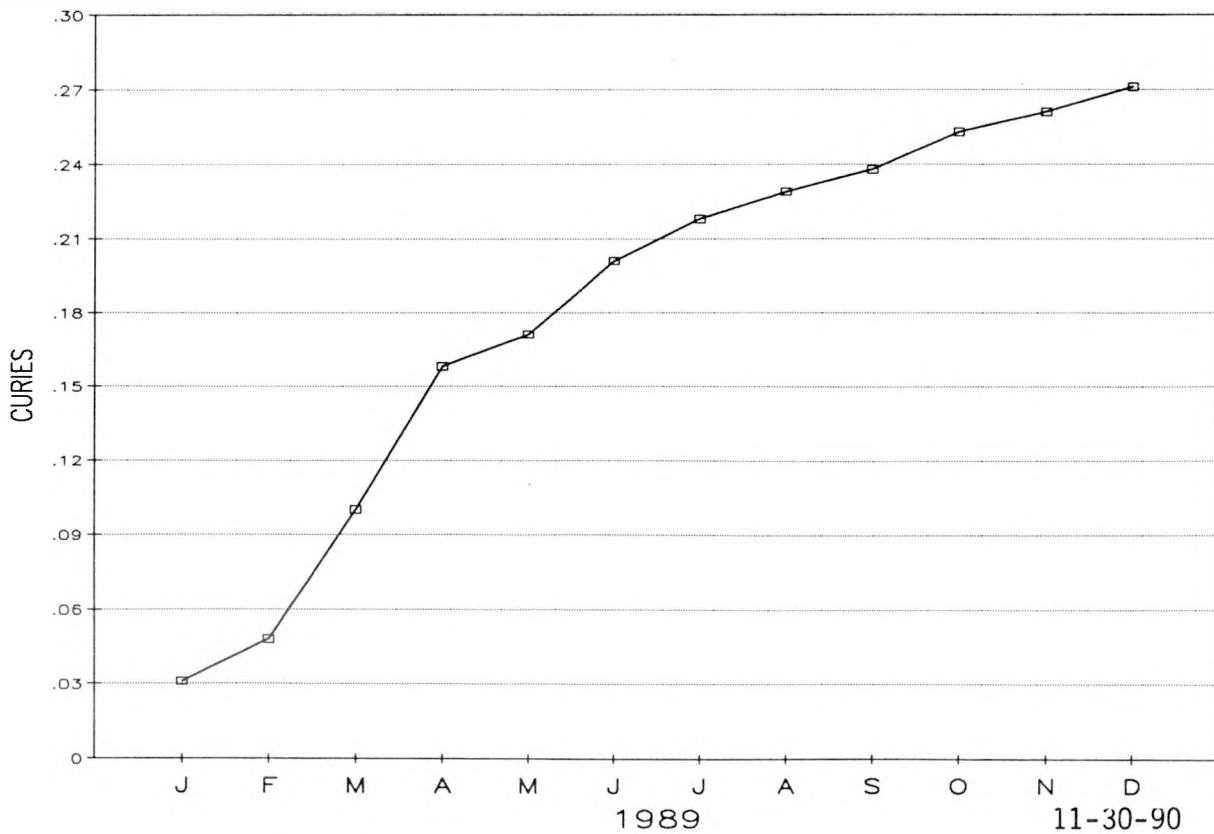
\* See classified letter for further information.

FIGURE 1-2  
SUMMARY OF LIQUID RELEASES

CUMULATIVE VOLUME



CUMULATIVE ACTIVITY



## II. AIRBORNE MONITORING

### 1. INTRODUCTION

Airborne radioactive emissions are monitored from the main stack (CPP-708), the Fluorine 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 ( $\text{NO}_x$ ) emissions are the only nonradioactive airborne contaminant that is continuously monitored from both the main stack and FAST 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  $\text{NO}_x$ ,  $\text{SO}_2$ , 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 Assurance 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.

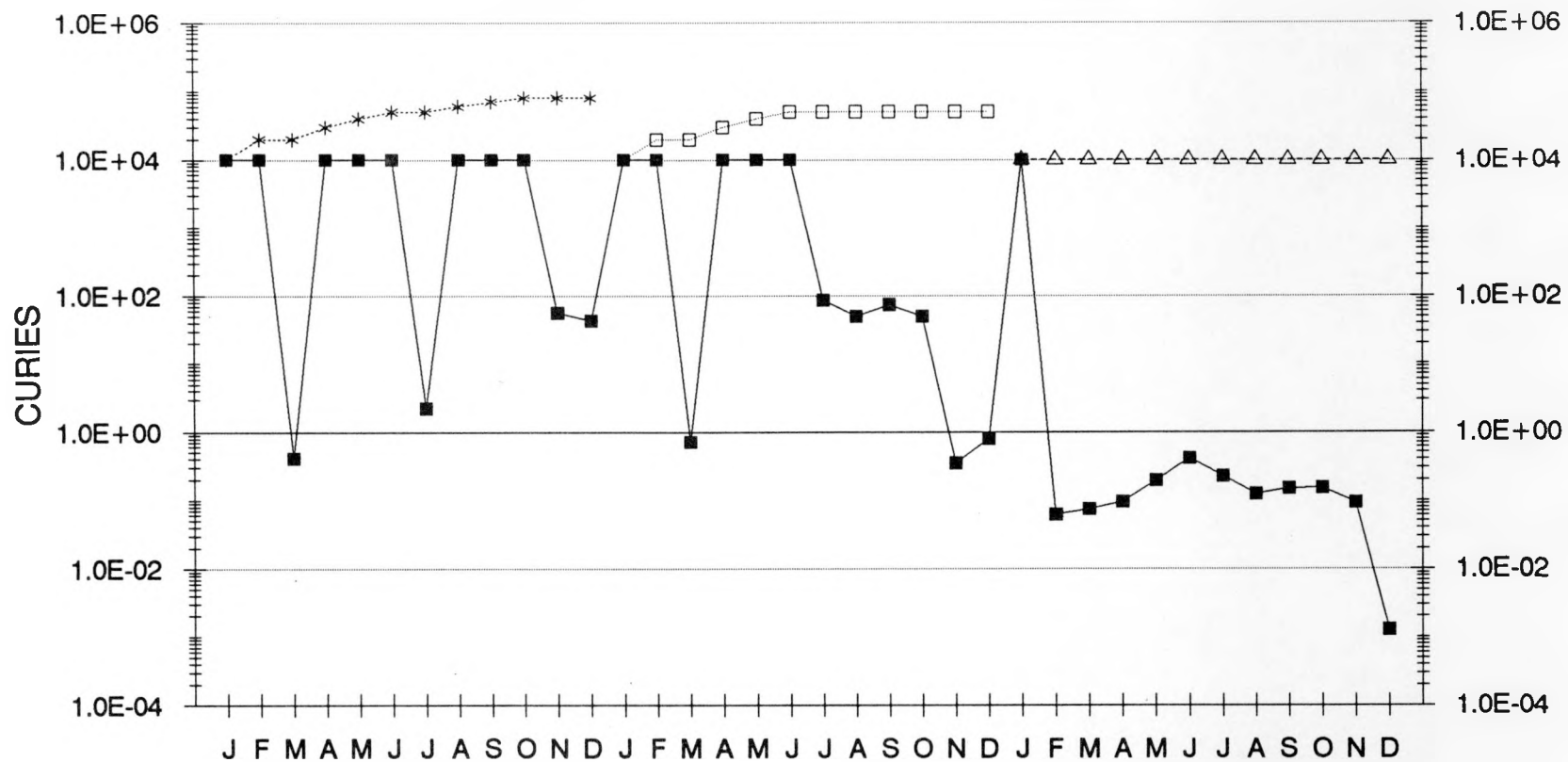
Krypton (Kr-85) was by far the predominant radioactive species in the main stack airborne effluent during 1989. It should be noted that krypton releases are classified and the actual release rates can only be found in the classified appendix to this report. Tritium (H-3) was the next most prevalent radionuclide. 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-1989  
(in curies)

RADIONUCLIDES	J	F	M	A	M	J	J	A	S	O	N	D	YTD
H-3	1.50E-01	5.89E-02	7.30E-02	9.30E-02	1.90E-01	4.00E-01	2.20E-01	1.20E-01	1.47E-01	1.51E-01	9.20E-02	--	1.69E+00
Pu-TOTAL	6.90E-10	--	--	1.30E-09	4.00E-09	1.41E-08	1.10E-09	--	5.50E-10	1.70E-09	4.00E-09	2.30E-09	2.97E-08
Cs-137	8.20E-06	3.80E-06	1.14E-06	3.30E-06	2.70E-06	7.86E-06	5.10E-06	1.20E-05	6.20E-05	2.40E-05	7.80E-06	4.30E-06	1.42E-04
Ru-106	3.10E-04	2.30E-04	1.03E-04	1.10E-04	9.40E-05	1.98E-04	1.50E-04	2.30E-04	2.90E-04	1.30E-04	9.20E-05	6.90E-05	2.01E-03
Sb-125	1.20E-05	1.70E-06	--	--	8.60E-07	1.25E-06	3.60E-07	1.30E-05	6.00E-05	2.20E-05	1.10E-05	6.70E-06	1.29E-04
Sr-90	2.20E-06	--	--	--	2.20E-06	8.67E-06	--	--	2.30E-05	5.40E-06	1.10E-06	--	4.26E-05
C-14	3.50E-03	2.40E-03	9.30E-04	2.20E-03	3.80E-03	7.00E-03	3.00E-03	2.90E-03	2.70E-03	1.50E-03	9.50E-04	1.20E-03	3.21E-02
I-129	--	--	--	1.20E-04	--	4.90E-04	1.90E-04	--	--	1.30E-04	--	--	9.30E-04
Cs-134	--	--	--	--	--	--	--	3.30E-08	5.60E-08	--	--	--	8.90E-08
Kr-85	1.00E+04	--	--	--	--	--	--	--	--	--	--	--	1.00E+04
TOTAL ACTIVITY	1.00E+04	6.15E-02	7.40E-02	9.54E-02	1.94E-01	4.08E-01	2.23E-01	1.23E-01	1.50E-01	1.53E-01	9.31E-02	1.28E-03	1.00E+04
TOT VOL (cubic meters)	1.16E+08	1.22E+08	1.09E+08	1.21E+08	1.21E+08	1.25E+08	1.20E+08	1.21E+08	1.18E+08	1.20E+08	1.18E+08	1.13E+08	1.42E+09

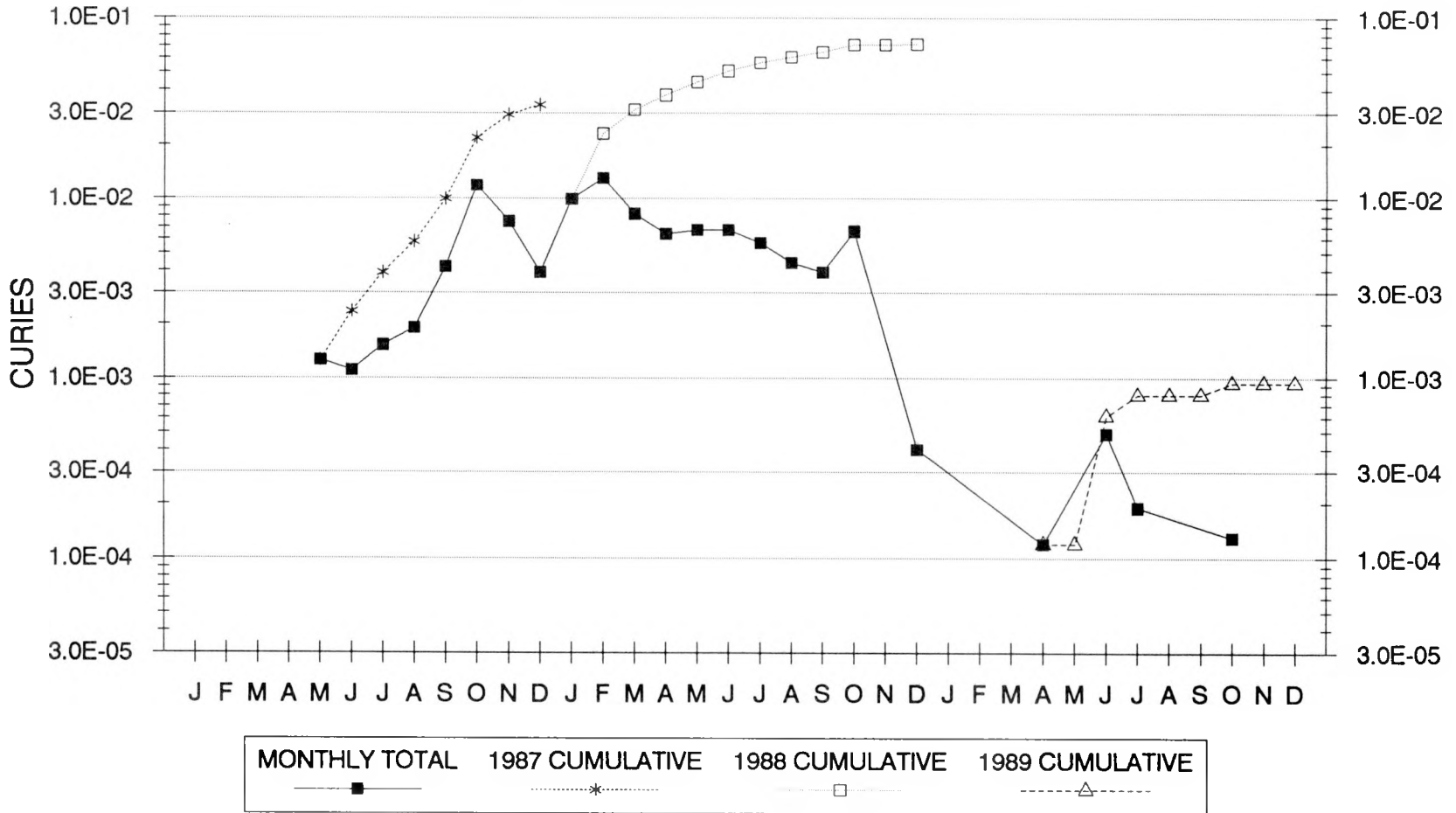
**Figure 2-1**  
**MAIN STACK EFFLUENT**  
**Total Activity**



MONTHLY TOTAL	1987 CUMULATIVE	1988 CUMULATIVE	1989 CUMULATIVE
—■—	·····*·····	- - -□- - -	- - -△- - -

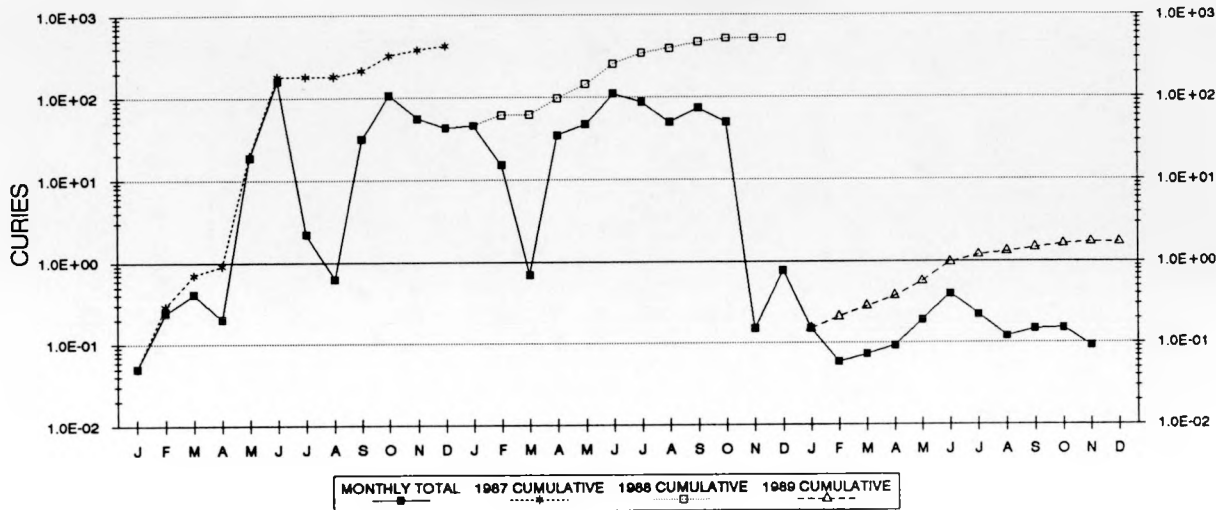
**Figure 2-2**  
**MAIN STACK EFFLUENT**  
**I-129**

8

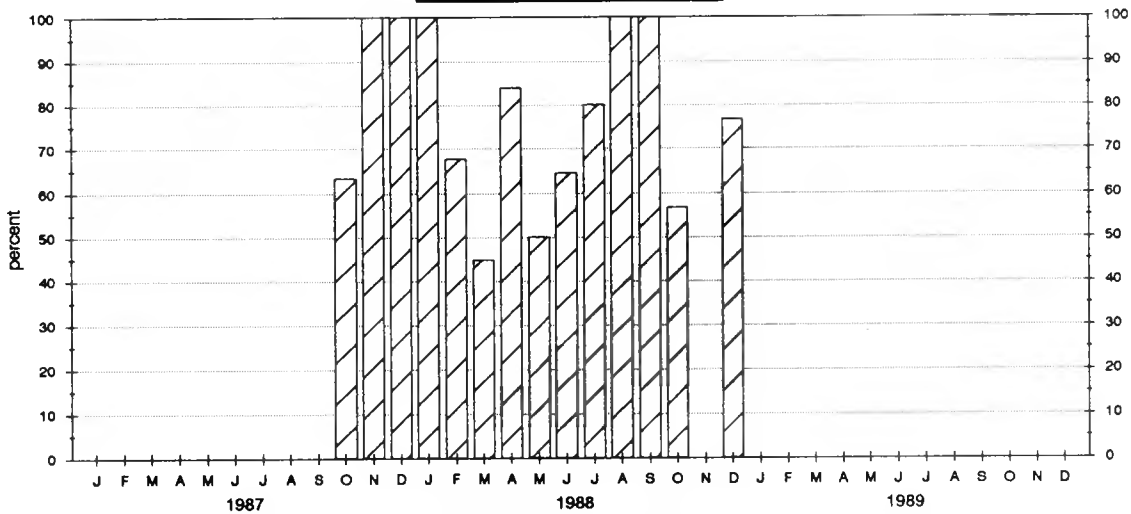


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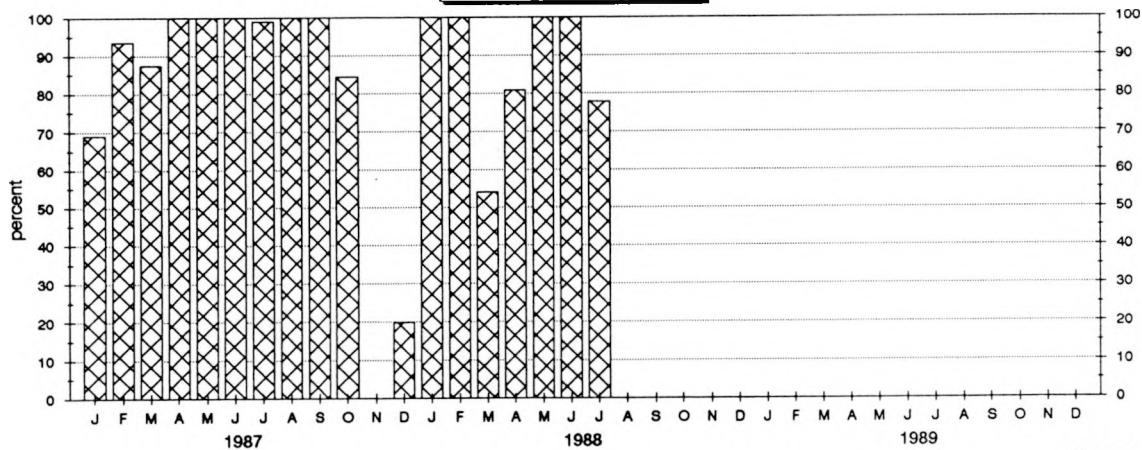
**Figure 2-3  
MAIN STACK EFFLUENT  
H-3**



**NWCF OPERATING TIME**



**FDP OPERATING TIME**



**Figure 2-4**  
**MAIN STACK EFFLUENT**  
**Cs-137**

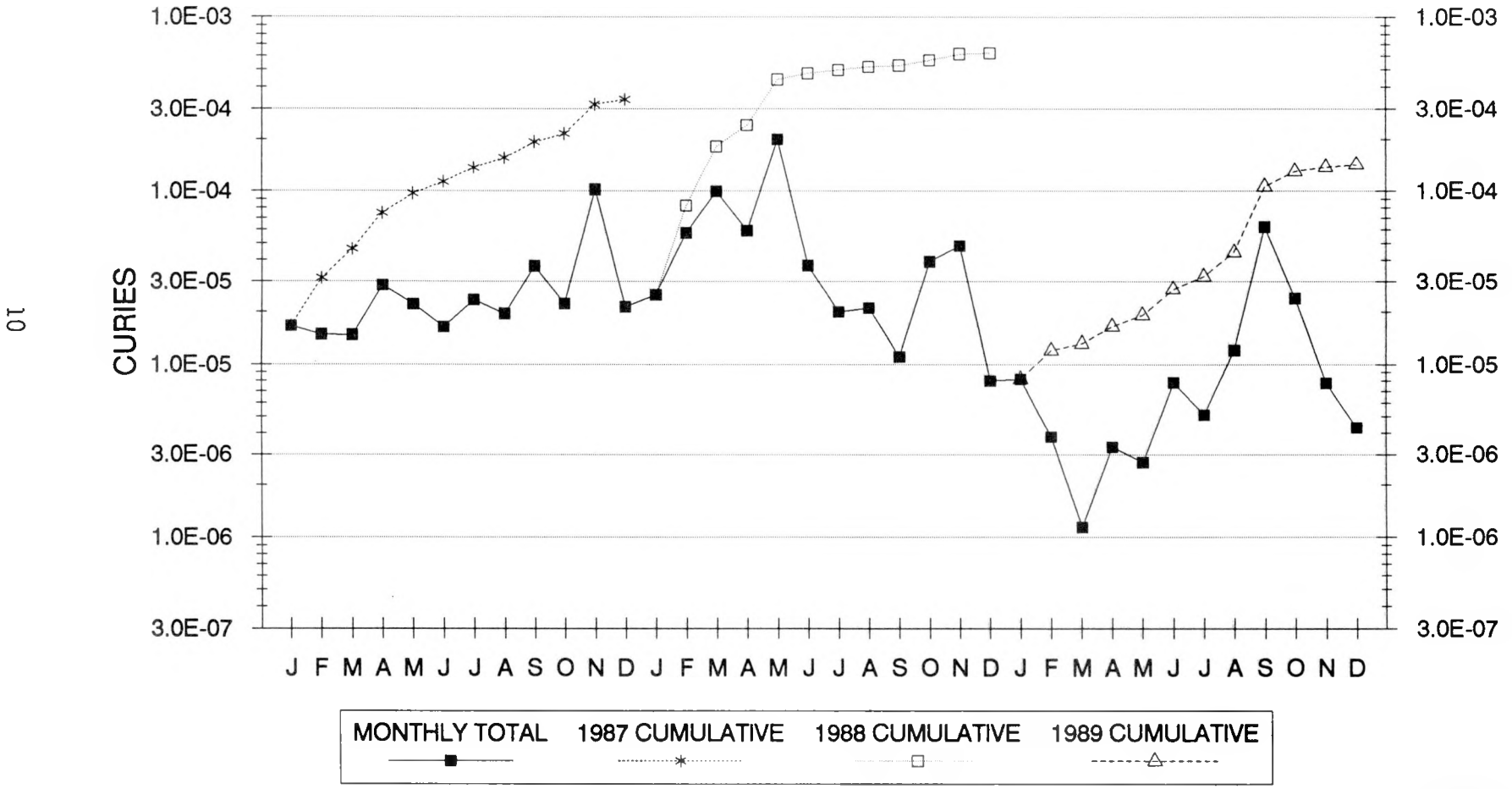
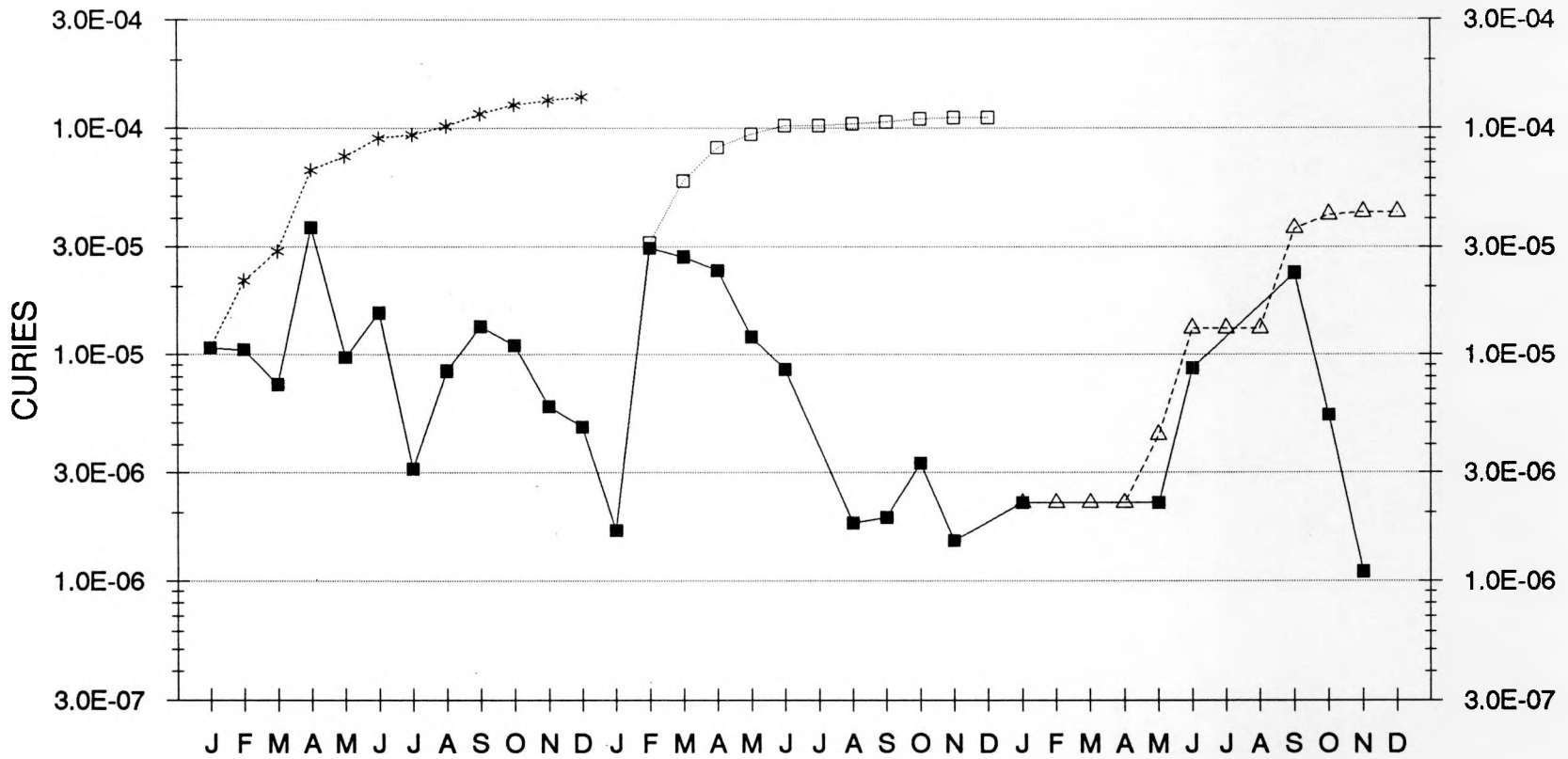
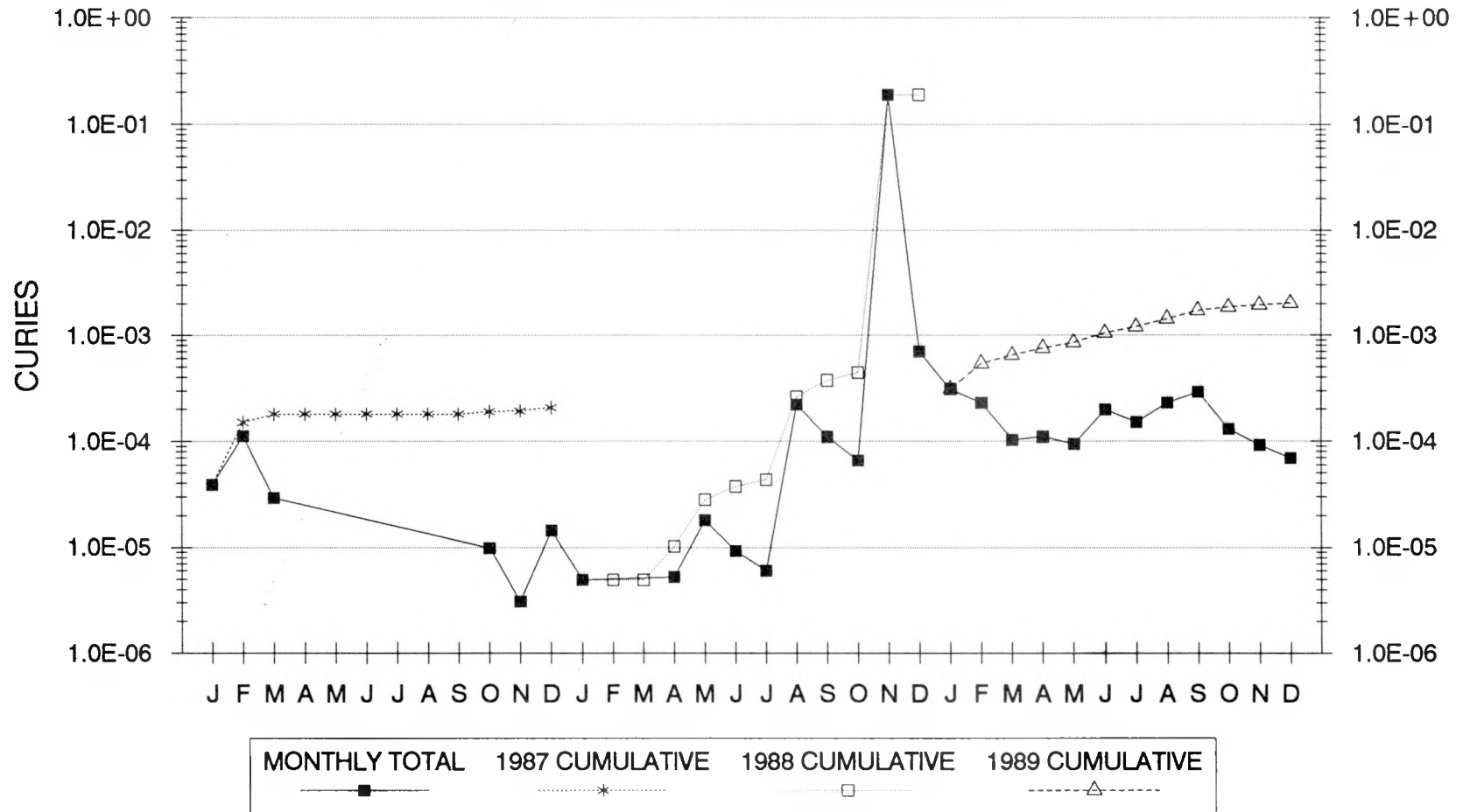


Figure 2-5  
**MAIN STACK EFFLUENT**  
 Sr-90

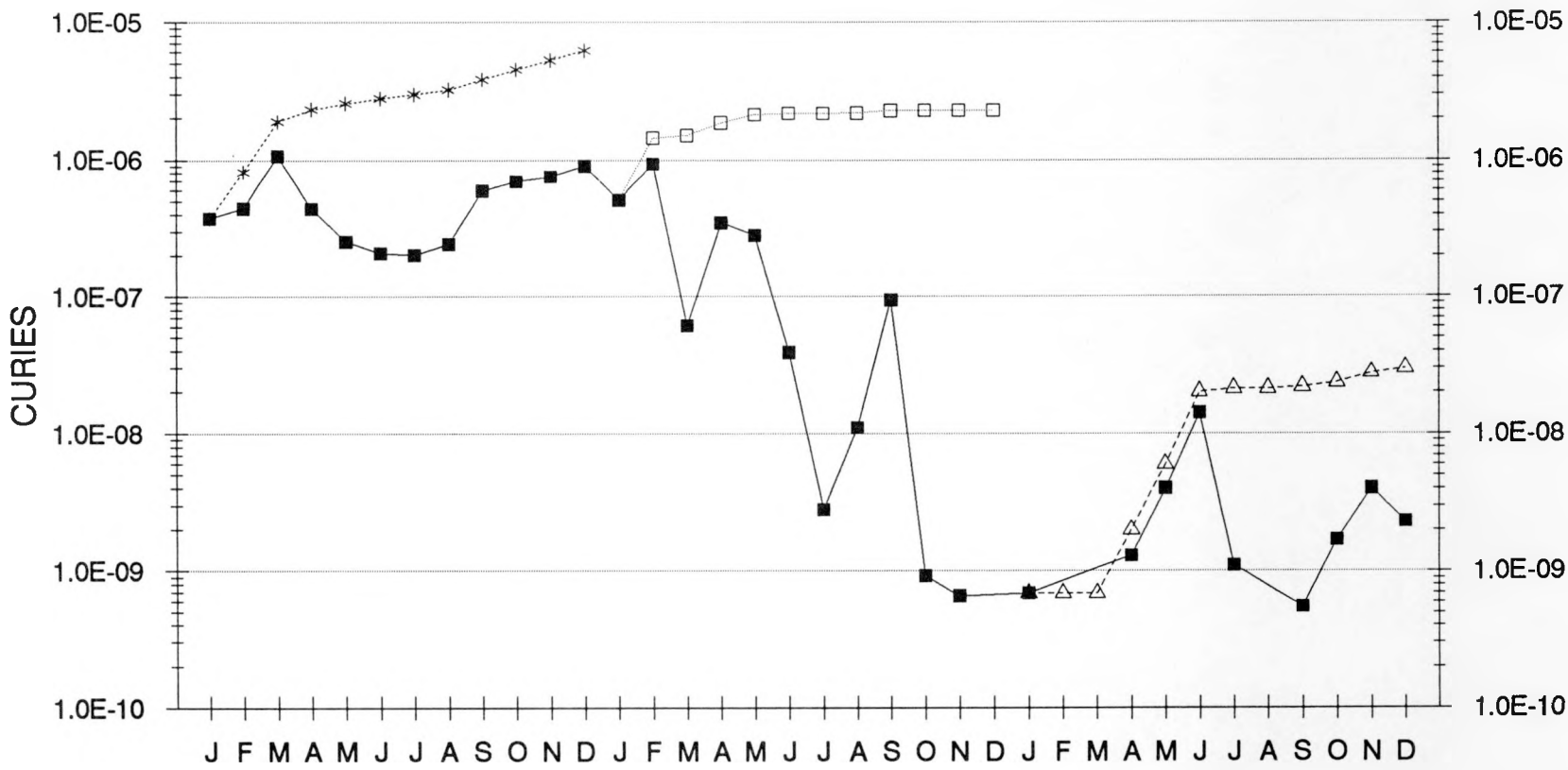


MONTHLY TOTAL	1987 CUMULATIVE	1988 CUMULATIVE	1989 CUMULATIVE
—■—	·····*·····	—□—	---△---

Figure 2-6  
**MAIN STACK EFFLUENT**  
 Ru-106

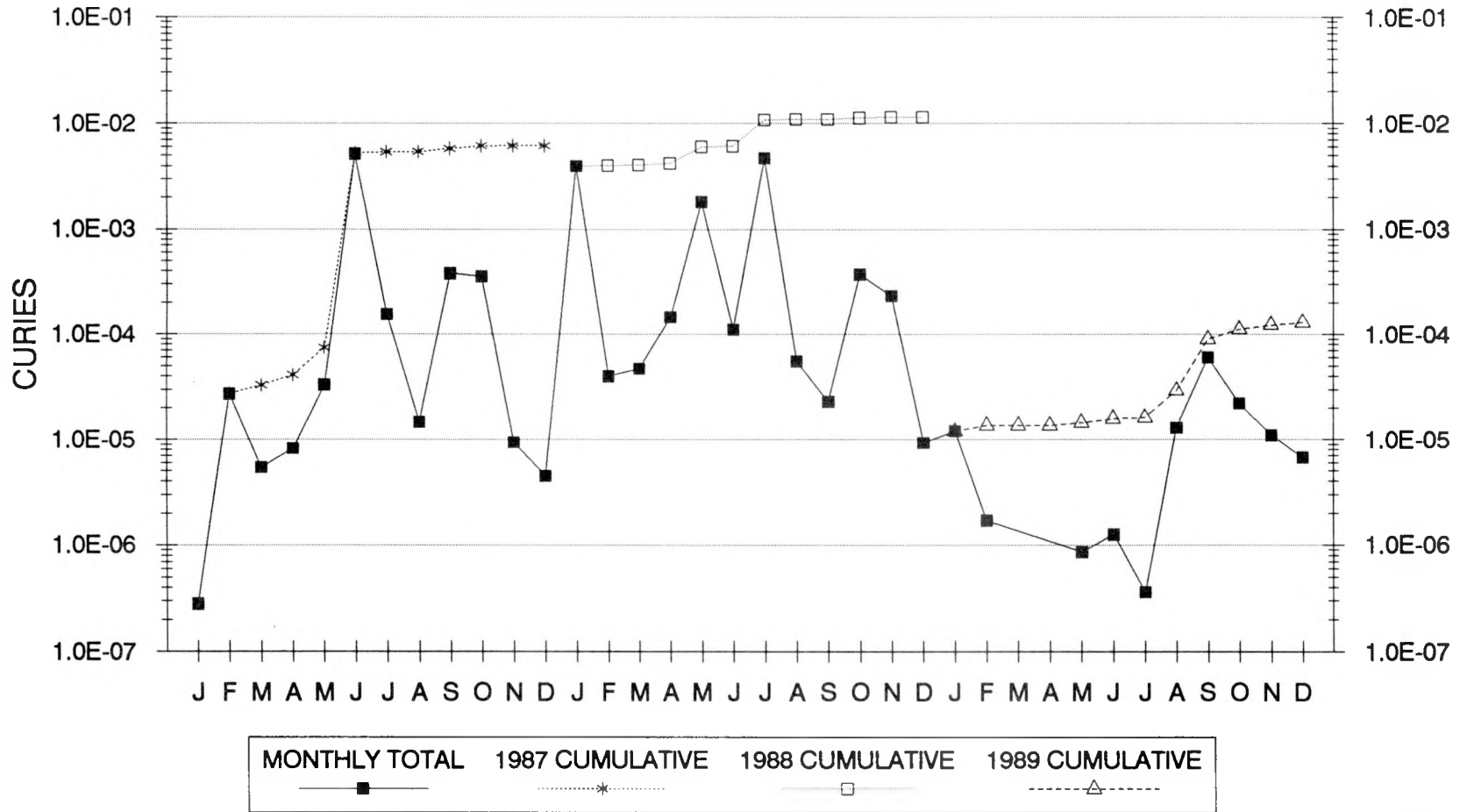


**Figure 2-7**  
**MAIN STACK EFFLUENT**  
**Pu-Total**



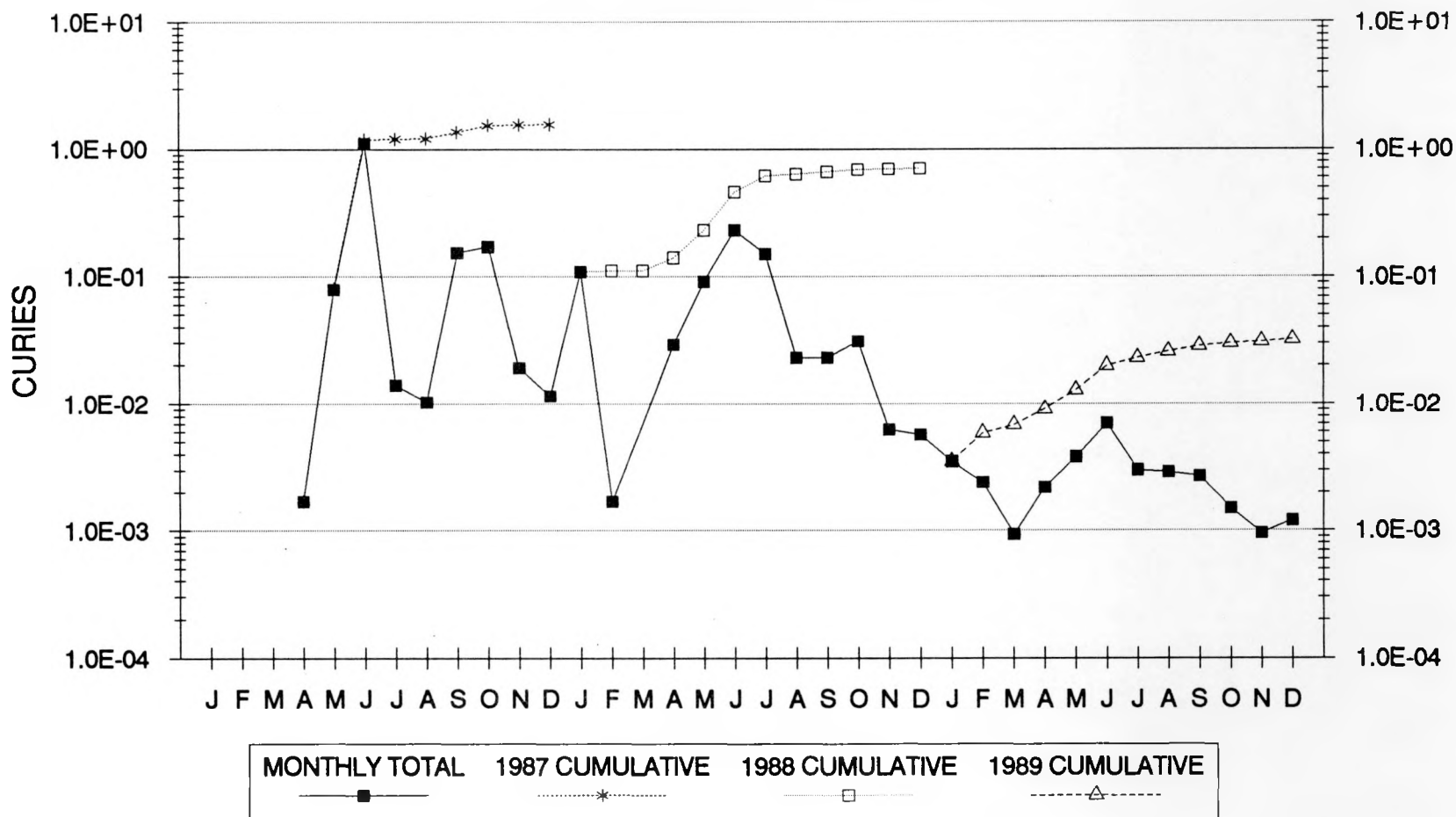
MONTHLY TOTAL	1987 CUMULATIVE	1988 CUMULATIVE	1989 CUMULATIVE
—■—	- - - * - - -	—□—	- - - △ - - -

**Figure 2-8**  
**MAIN STACK EFFLUENT**  
**Sb-125**

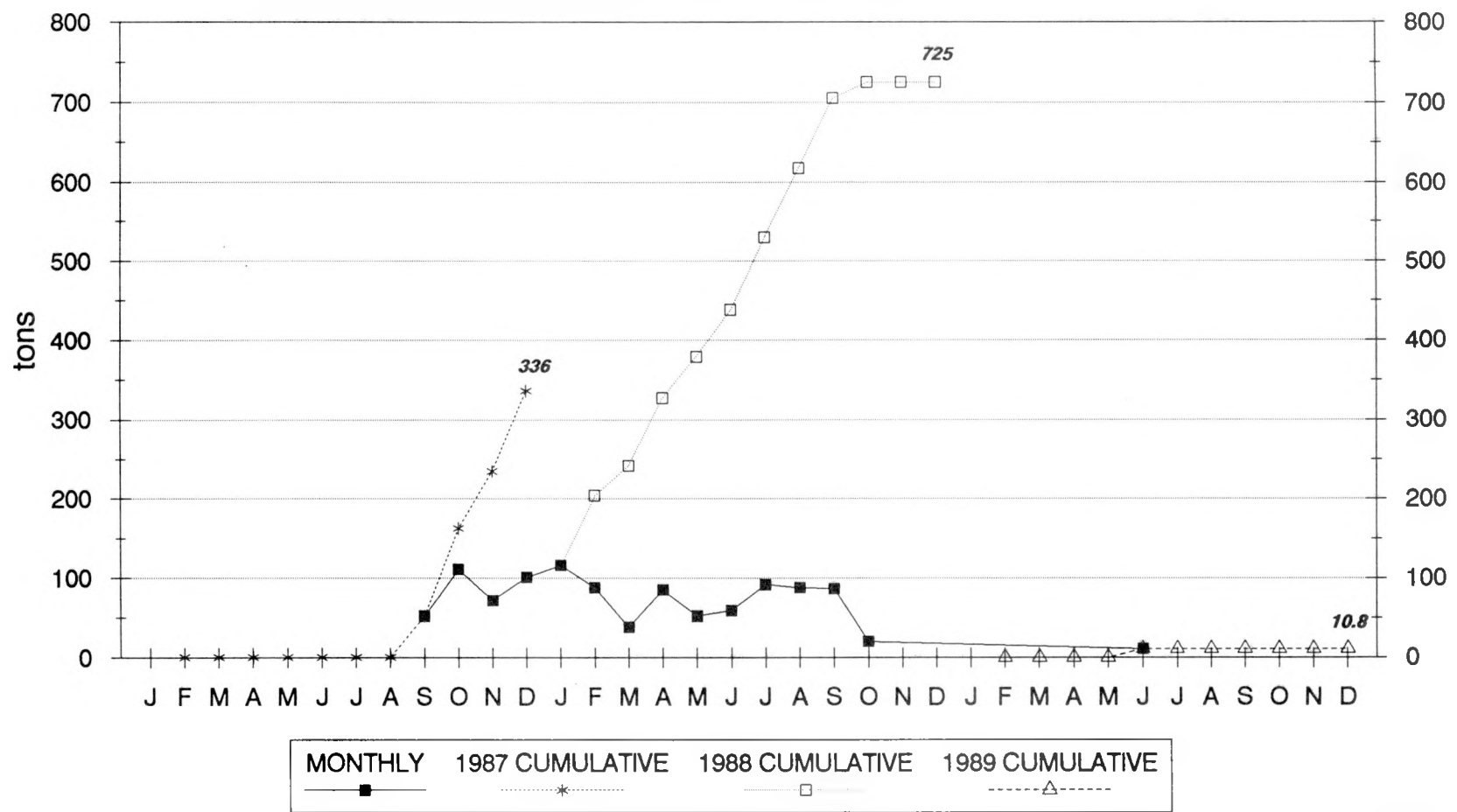


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**Figure 2-9  
MAIN STACK EFFLUENT  
C-14**



**Figure 2-10**  
**NOx RELEASED FROM ICPP MAIN STACK**



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 were very low throughout the year.

Tritium (H-3) releases for 1989 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. Very little tritium was released during 1989 because no dissolution activity occurred.

Cesium-137 releases (Figure 2-4) fluctuated throughout the year. However, cesium emissions continued to range between 1 and 100 microcuries per month.

Strontium-90 (Figure 2-5) concentrations in the main stack emissions remained relatively constant during the first four months of 1989, rising during the second and third quarters before falling during the last quarter. However, emission rates of Sr-90 during 1989 continued at their reduced rates as first noticed during fourth quarter 1985.

Ruthenium (Ru-106) releases (Figure 2-6) remained constant during most of 1989.

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 were relatively low for the entire year, increasing slightly during the third and fourth quarters of 1989.

Carbon-14 (Figure 2-9) releases from the main stack were very low and relatively constant for most of 1989.

Nitrogen oxide ( $\text{NO}_x$ ) emission from the Main Stack is the only nonradioactive airborne contaminant continuously monitored.  $\text{NO}_x$  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 the  $\text{NO}_x$  emissions for the last three years. The total  $\text{NO}_x$  released in 1989 was 10.8 tons, well below the allowable 1700 tons per year. During 1989 the hourly limit for  $\text{NO}_x$  releases was not exceeded. The reason for the very low level of  $\text{NO}_x$  emitted was that the calciner did not operate "hot" in 1989. The NWCF only ran on "cold" feed for a few days in June when  $\text{NO}_x$  emissions occurred.

## 2.2 FAST Stack

Table 2-2 lists the total releases in curies from the FAST stack per month by individual radionuclides and Figure 2-11 depicts the total monthly activity. Krypton (Kr-85) was by far the predominant radioactive species in the airborne effluent from FAST during 1989. Graphic presentations for iodine-129, tritium (H-3), plutonium (Total), and antimony-125 showing yearly trends are given in Figures 2-12 through 2-15, respectively.

Airborne releases of I-129, H-3, Pu-Total, and Sb-125 from the FAST stack remained very low during 1989 because of the lack of fuel dissolution at FAST.

## 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)

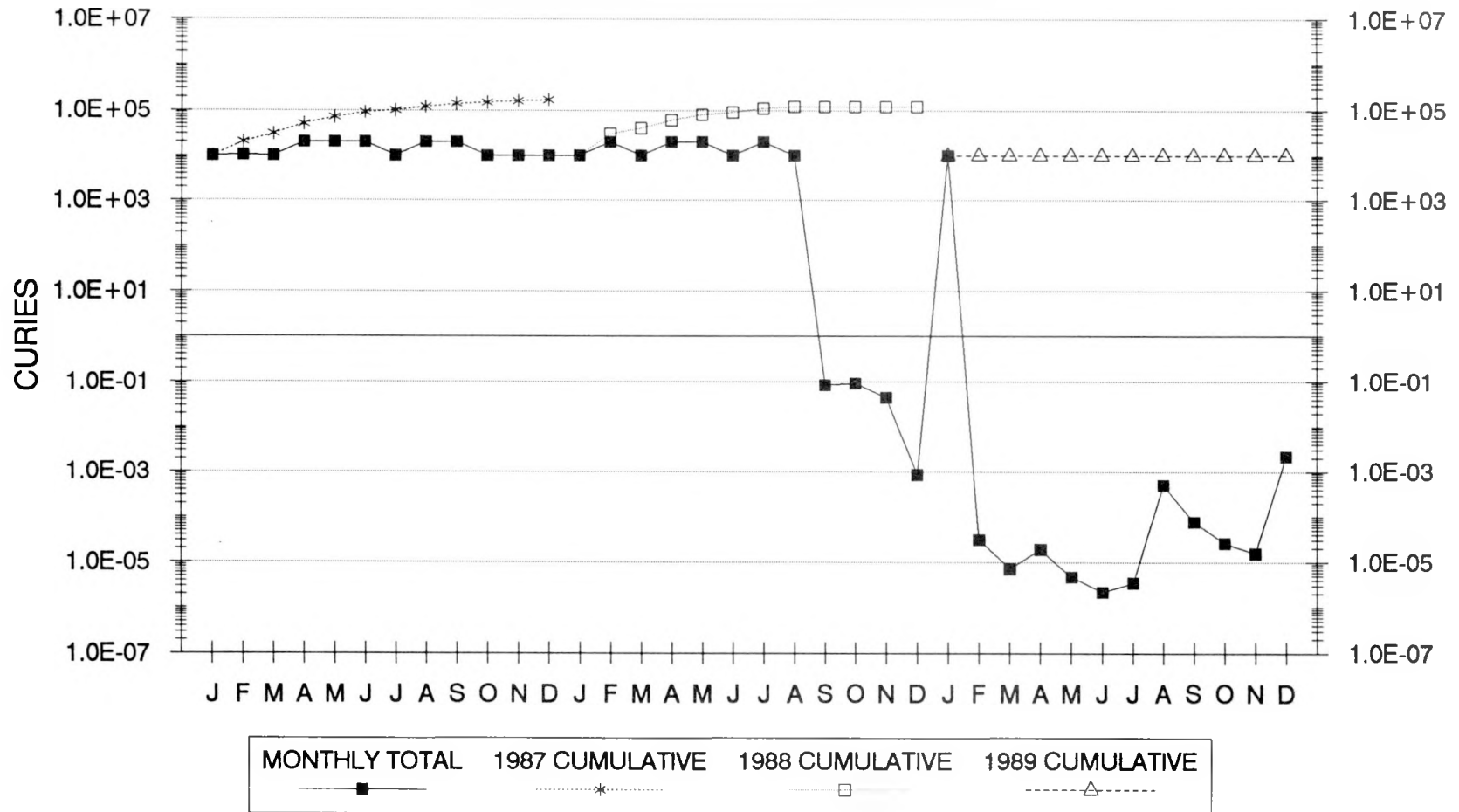
The CFSGF stack is monitored for sulfur dioxide (SO<sub>2</sub>), nitrogen oxide (NO<sub>x</sub>), and opacity. Emission limits for this stack are set by the Environmental Protection Agency (EPA). Table 2-5 lists the releases per month for the CFSGF. The facility must provide a minimum removal efficiency of 70% for SO<sub>2</sub>. The NO<sub>x</sub> 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<sub>2</sub>, NO<sub>x</sub> and opacity limits were not exceeded during CY-1989.

Table 2-2

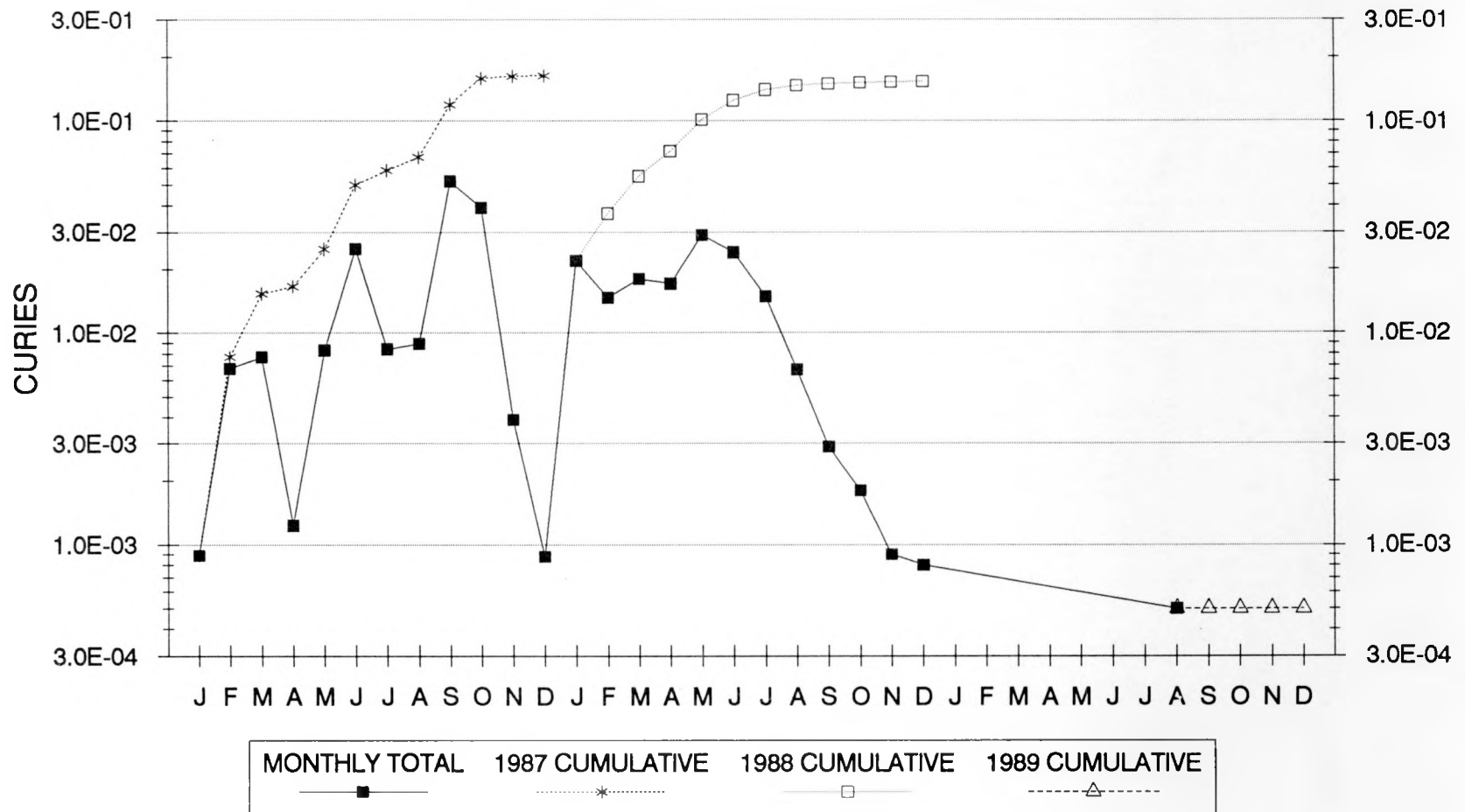
AIRBORNE RELEASES FROM ICPP FAST STACK - CY-1989  
(in curies)

RADIONUCLIDES	J	F	M	A	M	J	J	A	S	O	N	D	YTD
Pu-TOTAL	7.40E-10	--	--	3.70E-09	1.00E-08	8.35E-09	2.50E-09	--	1.20E-09	7.30E-10	3.80E-09	--	3.10E-08
Sr-90	--	--	--	--	--	--	--	--	2.10E-06	--	--	--	2.10E-06
Co-60	--	--	--	--	--	--	--	6.00E-08	--	--	1.70E-07	--	2.30E-07
Sb-125	3.90E-05	3.10E-05	7.20E-06	1.90E-05	4.70E-06	2.18E-06	2.30E-06	9.20E-06	7.60E-05	2.60E-05	1.50E-05	2.60E-05	2.58E-04
I-129	--	--	--	--	--	--	--	5.00E-04	--	--	--	--	5.00E-04
C-14	--	--	--	--	--	--	--	--	--	--	--	2.10E-03	2.10E-03
H-3	--	--	--	--	--	--	--	--	--	--	--	--	0.00E+00
Ru-106	--	--	--	--	--	--	1.20E-06	8.50E-07	--	--	2.50E-07	--	2.30E-06
Cs-137	--	--	--	--	--	--	--	2.50E-08	--	--	3.30E-08	2.30E-08	8.10E-08
Kr-85	1.00E+04	--	--	--	--	--	--	--	--	--	--	--	1.00E+04
TOTAL ACTIVITY	1.00E+04	3.10E-05	7.20E-06	1.90E-05	4.71E-06	2.19E-06	3.50E-06	5.10E-04	7.81E-05	2.60E-05	1.55E-05	2.13E-03	1.00E+04
TOT VOL (cubic meters)	9.19E+07	9.19E+07	8.30E+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	1.08E+09

Figure 2-11  
**FAST STACK EFFLUENT**  
 Total Activity



**Figure 2-12**  
**FAST STACK EFFLUENT**  
**I-129**



**Figure 2-13**  
**FAST STACK EFFLUENT**  
**H-3**

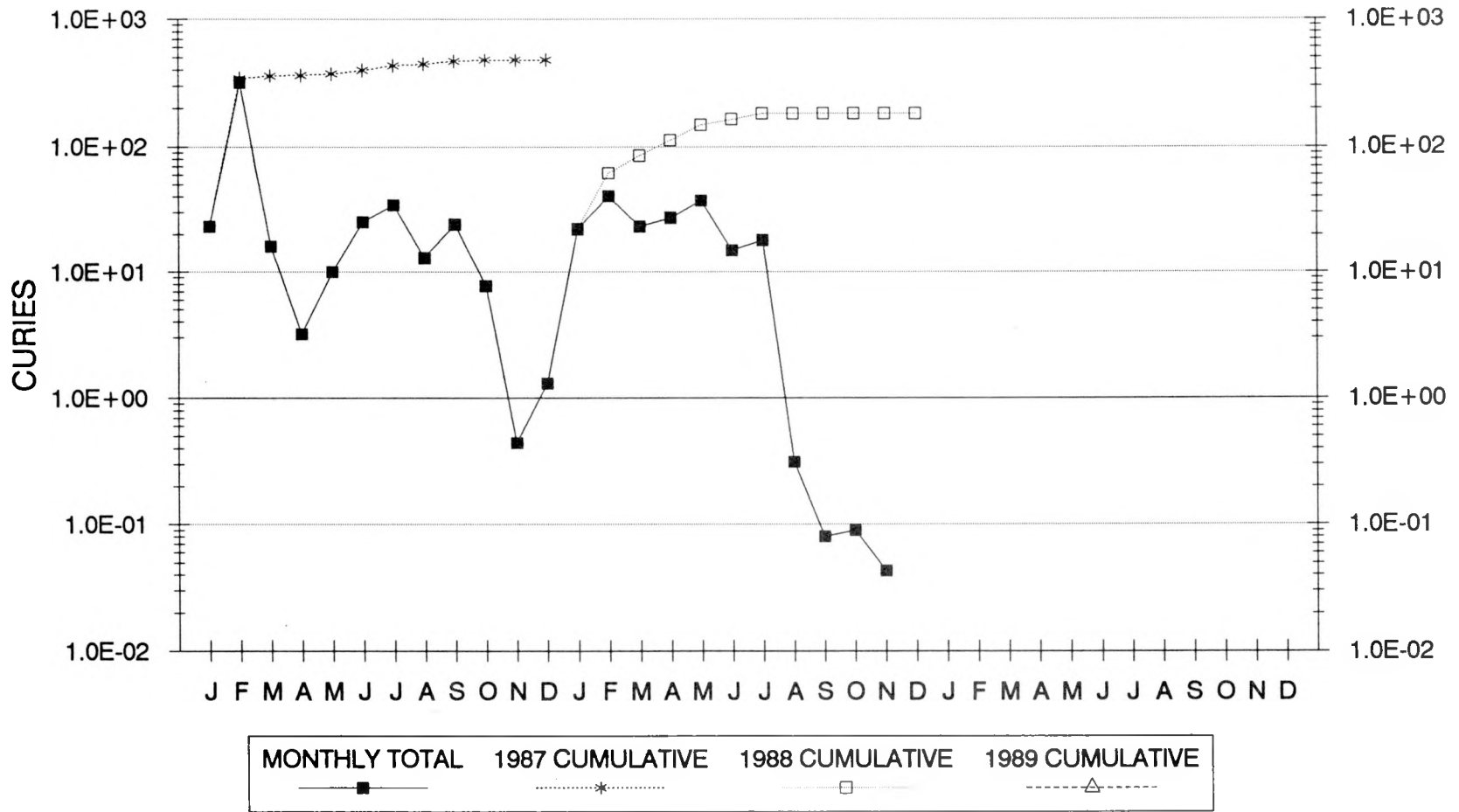
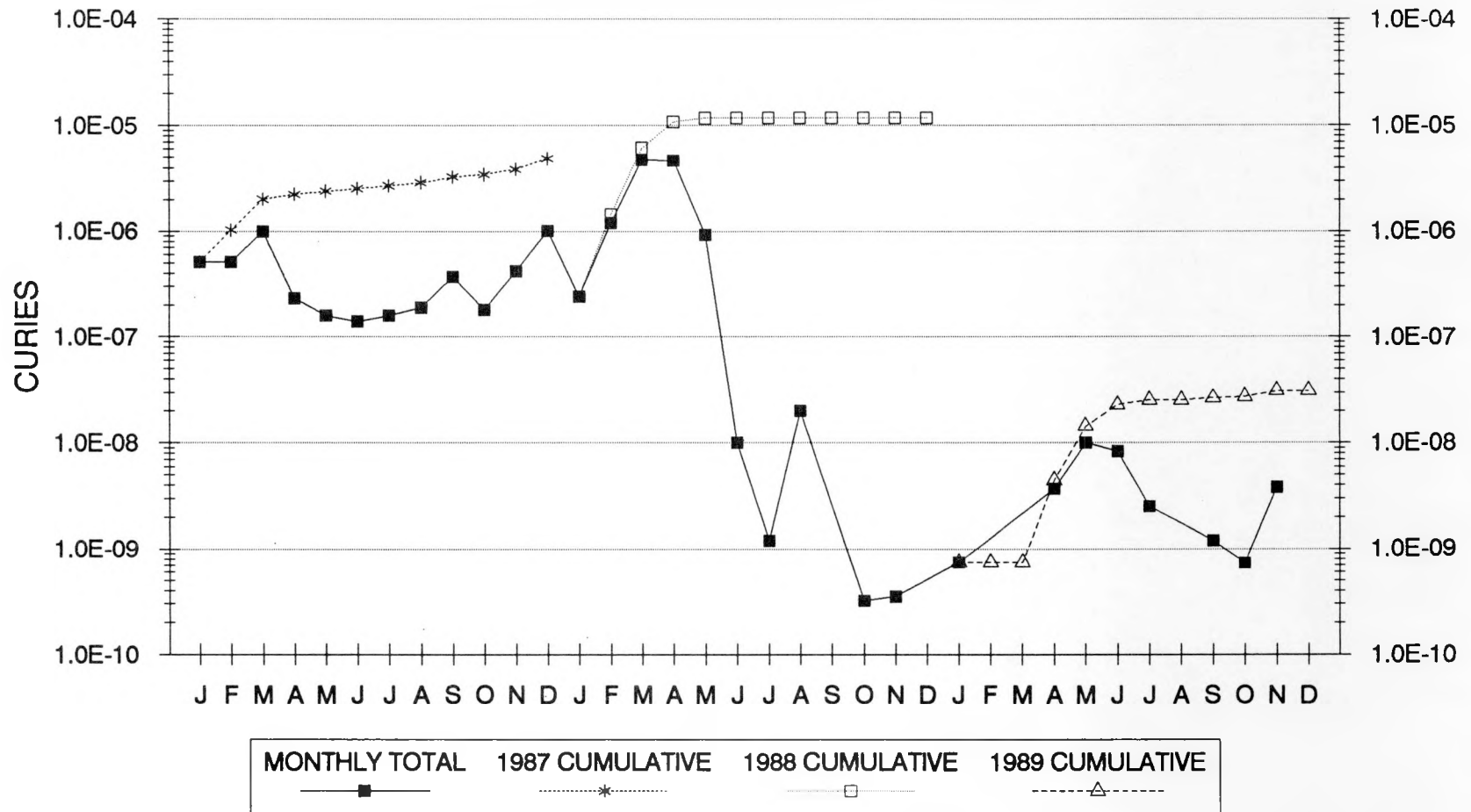


Figure 2-14  
**FAST STACK EFFLUENT**  
 Pu-Total



**Figure 2-15**  
**FAST STACK EFFLUENT**  
**Sb-125**

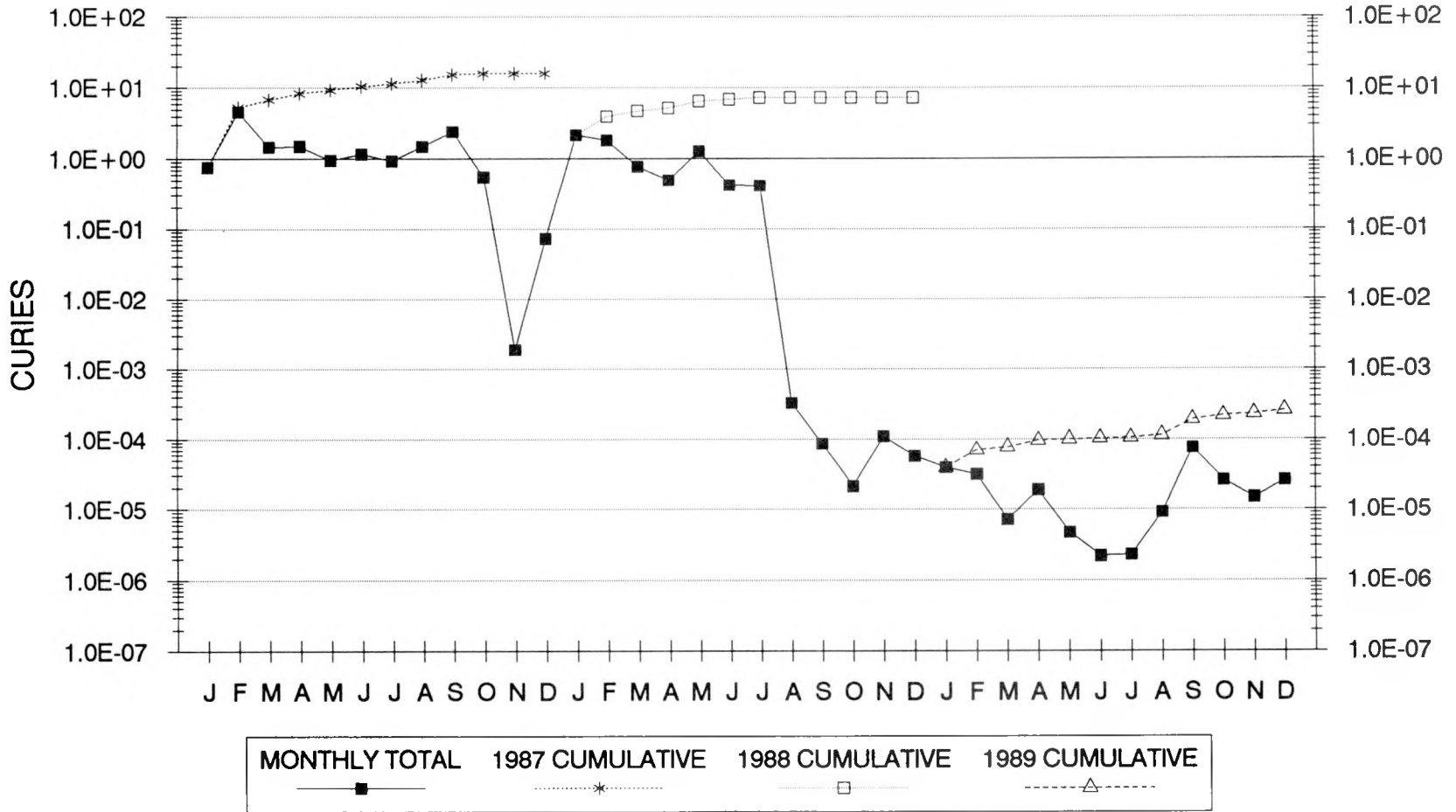


Table 2-3

AIRBORNE RELEASES FROM ICPP NWCF STACK - CY-1989  
(in curies)

RADIONUCLIDES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YTD
Pu-TOTAL	--	--	--	1.00E-09	--	--	--	--	1.40E-10	1.00E-09	7.00E-10	2.00E-09	4.84E-09
Sr-90	--	--	--	--	--	--	--	--	--	7.70E-08	--	--	7.70E-08
Cs-137	--	--	--	--	--	4.40E-07	--	--	--	--	--	--	4.40E-07
TOTAL ACTIVITY	0.00E+00	0.00E+00	0.00E+00	1.00E-09	0.00E+00	4.40E-07	0.00E+00	0.00E+00	1.40E-10	7.80E-08	7.00E-10	2.00E-09	5.22E-07
TOT VOL (m3)	8.84E+07	8.84E+07	7.98E+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	1.04E+09

2-27-90

Table 2-4

AIRBORNE RELEASES FROM RAL STACK - CY-1989  
(in curies)

RADIONUCLIDES	J	F	M	A	M	J	J	A	S	O	N	D	YTD
Pu-TOTAL	8.30E-10	--	--	2.40E-09	1.70E-09	4.28E-09	1.70E-09	--	1.00E-09	8.10E-10	1.60E-09	1.20E-09	1.55E-08
Sr-90	--	--	--	--	--	--	--	--	--	--	--	--	0.00E+00
Ru-106	--	--	--	--	--	--	--	1.50E-07	--	--	--	--	1.50E-07
Cs-137	4.50E-07	3.50E-07	3.50E-07	4.10E-07	2.70E-07	2.09E-07	1.60E-07	--	--	7.70E-08	3.50E-08	--	2.31E-06
Sb-125	4.00E-07	--	--	--	1.70E-07	--	5.70E-07	--	--	--	--	--	1.14E-06
Th-234	--	--	--	--	--	--	--	--	--	--	--	--	0.00E+00
Co-60	--	--	--	--	--	--	--	--	--	3.50E-08	--	--	3.50E-08
Cs-134	--	--	--	--	--	5.63E-08	--	--	--	--	--	--	5.63E-08
TOTAL ACTIVITY	8.51E-07	3.50E-07	3.50E-07	4.12E-07	4.42E-07	2.70E-07	7.32E-07	1.50E-07	1.00E-09	1.13E-07	3.66E-08	1.20E-09	3.71E-06
TOT VOL (m3)	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	2.45E+08

2-27-90

TABLE 2-5  
 COAL FIRED STEAM GENERATING FACILITY - CY-1989  
 OPERATIONS SUMMARY

<u>UNIT #1</u>					
	<u>% SO<sub>2</sub> Removed</u>	<u>lbs NO<sub>x</sub>/ mm Btu</u>	<u>lbs SO<sub>2</sub>/ mm Btu</u>	<u>Steam Load lbs of steam/hr</u>	<u>% Opacity</u>
Jan.	89	0.34	0.14	55,546	0
Feb.	89	0.42	0.14	54,363	1.7
Mar.	89	0.43	0.13	48,998	1.8
Apr.	83	0.57	0.17	28,784	0.2
May	82	0.57	0.17	29,136	6.3
Jun.	80	0.59	0.20	24,895	2.0
Jul.	82	0.58	0.18	23,909	5.1
Aug	83	0.53	0.16	22,214	4.2
Sep. 1-25	82	0.52	0.17	23,675	4.3
Oct. 20-25, 27-28	87	0.47	0.12	34,253	0.8
Nov. 1-2, 5-15*	87	0.40	0.13	41,728	2.2
Requirements	>70	0.5 (>35,000 lbs/hr steam load) 0.7 (<35,000 lbs/hr steam load)			<20
<u>UNIT #2</u>					
May 3-5	94	0.40	0.05	34,912	1.0
Sep. 23-30	88	0.41	0.12	23,377	3.4
Oct. 1-19, 26-30	87	0.44	0.13	31,063	0.6
Dec. 15-31*	90	0.40	0.10	43,474	3.7
Requirements	>70	0.5 (>35,000 lbs/hr steam load) 0.7 (<35,000 lbs/hr steam load)			<20
Coal Burned	13,700 tons				
Avg. Btu/lb	12,596 (As received)				
Avg. % Sulfur	0.60 (As received)				

\* The Coal Fired Steam Generating Facility was not operating during November 3 and 4, 16 through 30, or December 1 through 15, 1989.

### 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. 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 EA 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 Service Waste System to the Percolation Pond YDG-326 or YDG-327, whichever is in operation at the time. During 1989 the new service waste system (CPP-796/-797) was placed in service.

Isotopic release data for the service waste system 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 are 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 for plutonium and uranium 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 and total uranium found in the service waste stream. The quantity of plutonium and uranium released to the pond remained relatively constant during 1989. Plutonium and uranium releases have remained relatively stable since the fourth quarter of 1985.

Figures 3-3 through 3-7 present trend information for select radionuclides in the service waste.

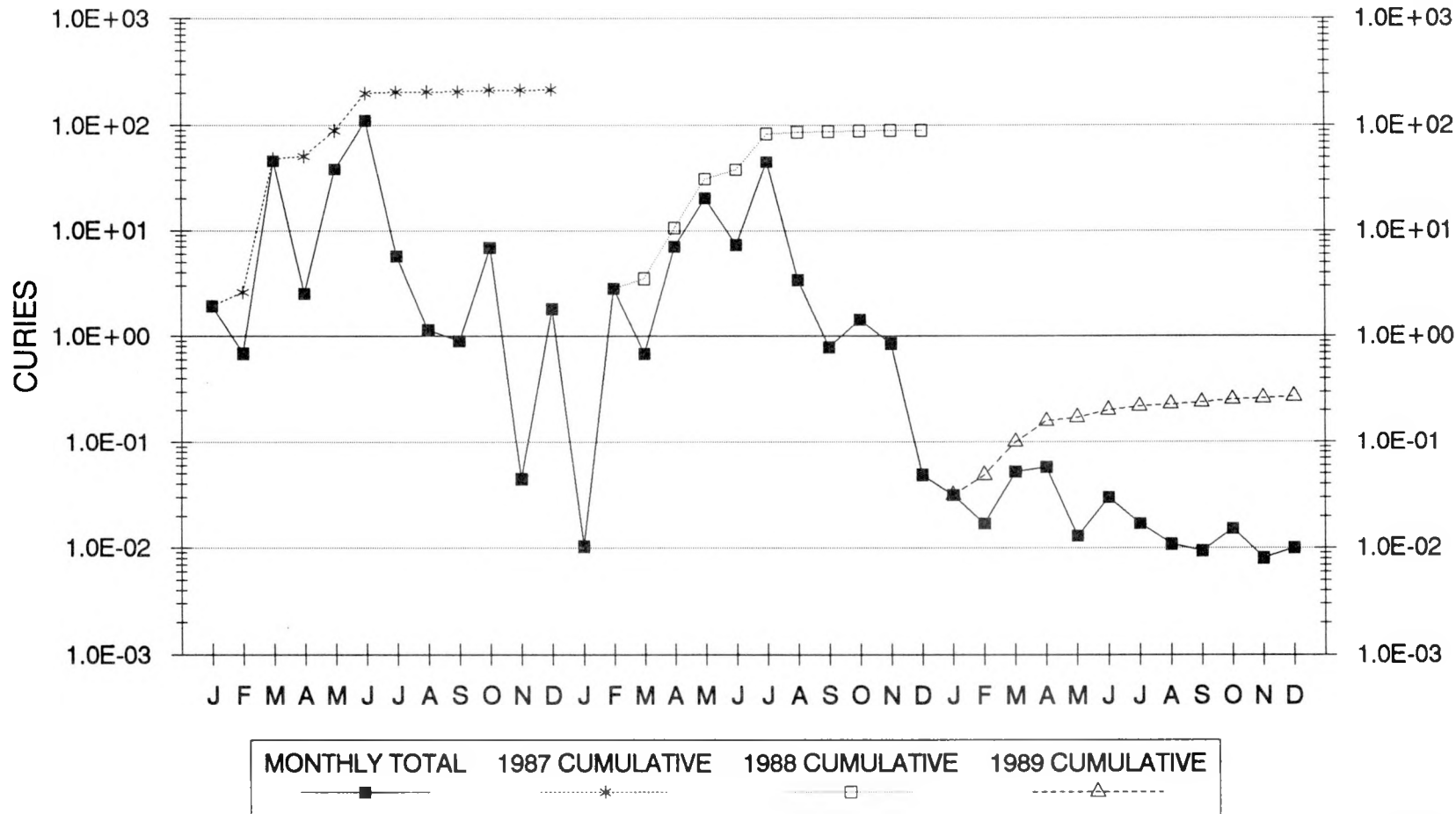
Table 3-1

SERVICE WASTE RELEASES - CY-1989  
(in curies)

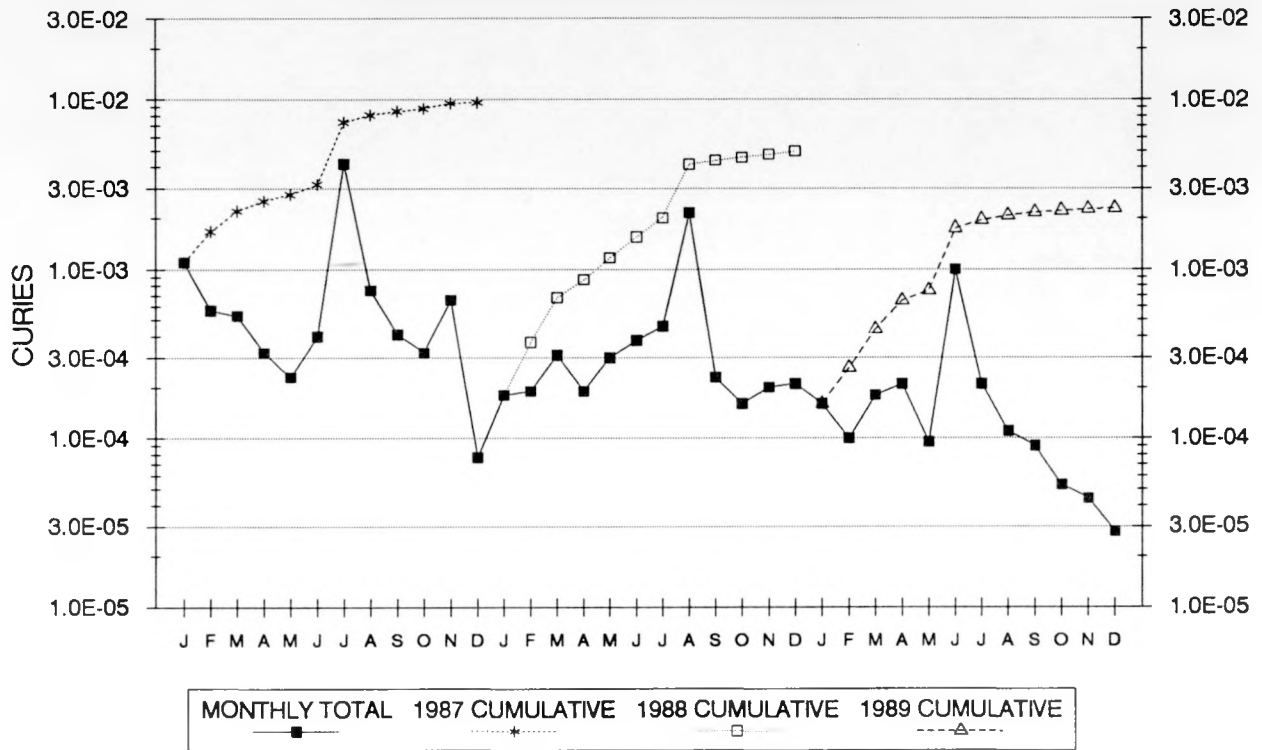
RADIONUCLIDES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YTD
C-14	--	--	--	--	--	--	--	--	--	--	3.1E-03	--	3.10E-03
Ce-144	2.00E-04	--	2.64E-04	--	--	3.97E-04	--	--	--	--	--	--	8.61E-04
Co-60	--	--	--	--	2.24E-05	--	7.53E-05	--	9.84E-05	3.71E-03	6.70E-05	--	3.97E-03
Cs-134	1.74E-03	9.23E-04	1.15E-03	4.60E-04	4.50E-04	8.24E-04	1.42E-04	1.88E-04	1.24E-04	1.97E-04	1.26E-04	8.53E-05	6.41E-03
Cs-137	1.54E-02	8.59E-03	1.64E-02	7.22E-03	6.28E-03	8.76E-03	4.08E-03	3.47E-03	3.11E-03	3.05E-03	1.57E-03	1.35E-03	7.93E-02
Pu-TOTAL	1.6E-04	1E-04	1.8E-04	2.1E-04	9.5E-05	1.0E-03	2.1E-04	1.1E-04	9E-05	5.3E-05	4.4E-05	2.8E-05	2.3E-03
Ru-106	5.14E-03	2.22E-03	2.85E-02	4.62E-02	4.16E-03	1.10E-02	6.49E-03	5.39E-03	3.70E-03	1.81E-03	9.26E-04	7.38E-03	1.229E-01
Sb-125	--	1.67E-04	2.81E-04	2.05E-04	2.55E-04	4.08E-03	4.90E-03	6.00E-04	--	1.29E-04	5.27E-05	--	1.07E-02
Sr-89	1E-03	4E-04	--	--	3E-04	--	--	--	--	--	--	--	2E-03
Sr-90	7.30E-03	4.1E-03	4.8E-03	2.7E-03	1.05E-03	3.5E-03	6.4E-04	7E-04	1.7E-03	4.2E-03	1.63E-03	6.9E-04	3.30E-02
U-TOTAL	4E-04	4.0E-04	3E-04	3.5E-04	2.9E-04	3E-04	3E-04	3.1E-04	3.8E-04	3E-04	3E-04	4E-04	4.0E-03
Mn-54	--	--	--	--	--	--	--	--	--	4.28E-05	--	--	4.28E-05
Eu-152	--	--	--	--	--	--	--	--	--	1.18E-03	1.93E-04	--	1.37E-03
Eu-154	--	--	--	--	--	--	--	--	1.44E-04	3.91E-04	--	--	5.35E-04
TOTAL ACTIVITY	3.13E-02	1.69E-02	5.19E-02	5.73E-02	1.290E-02	2.99E-02	1.684E-02	1.077E-02	9.3E-03	1.51E-02	8.0E-03	9.93E-03	2.702E-01
TOT VOL (L)	1.37E+08	1.52E+08	1.48E+08	1.39E+08	1.13E+08	1.36E+08	1.25E+08	1.26E+08	1.43E+08	1.39E+08	1.42E+08	1.64E+08	1.664E+09

**Figure 3-1**  
**SERVICE WASTE EFFLUENT**  
**Total Activity**

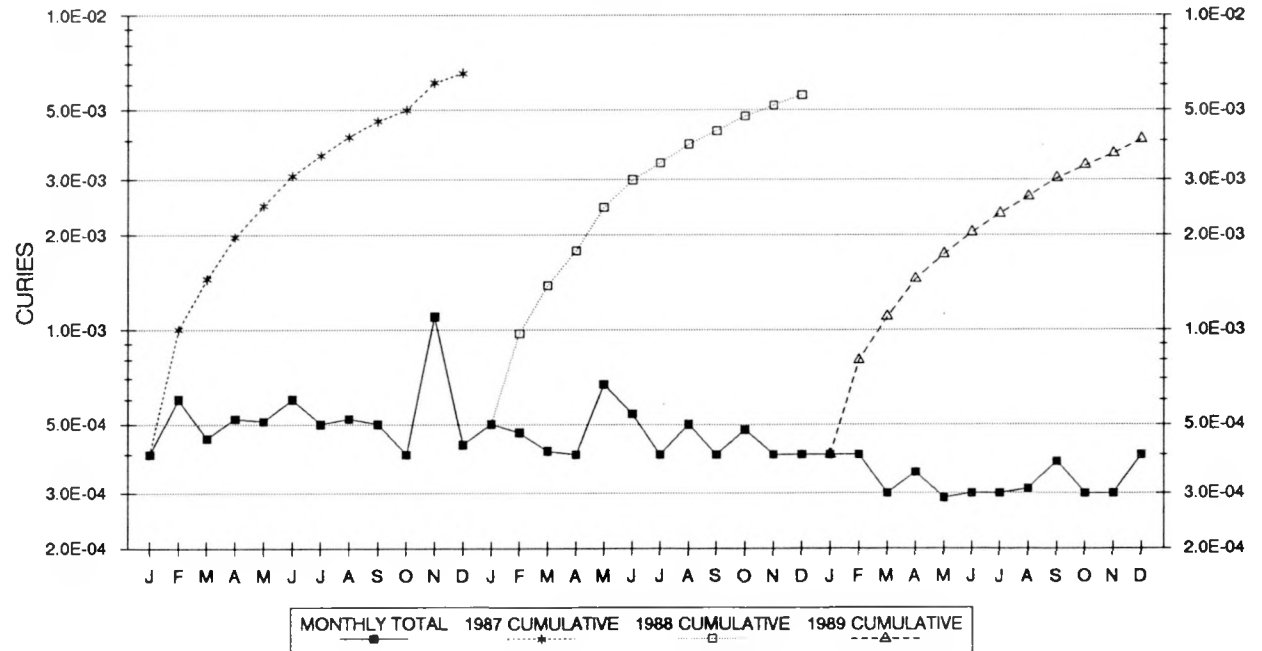
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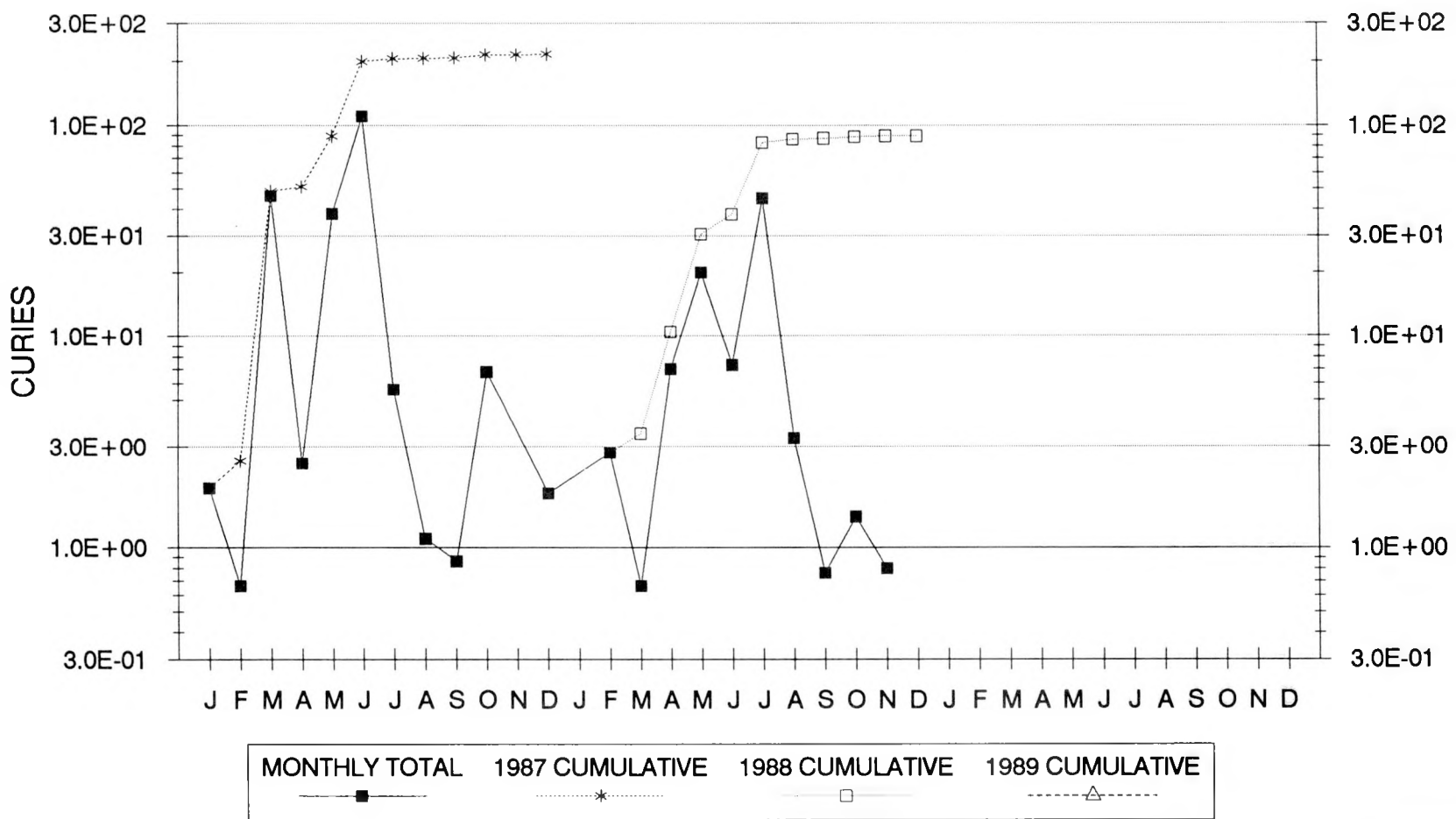
**Figure 3-2**  
**SERVICE WASTE EFFLUENT**  
**Pu-Total**



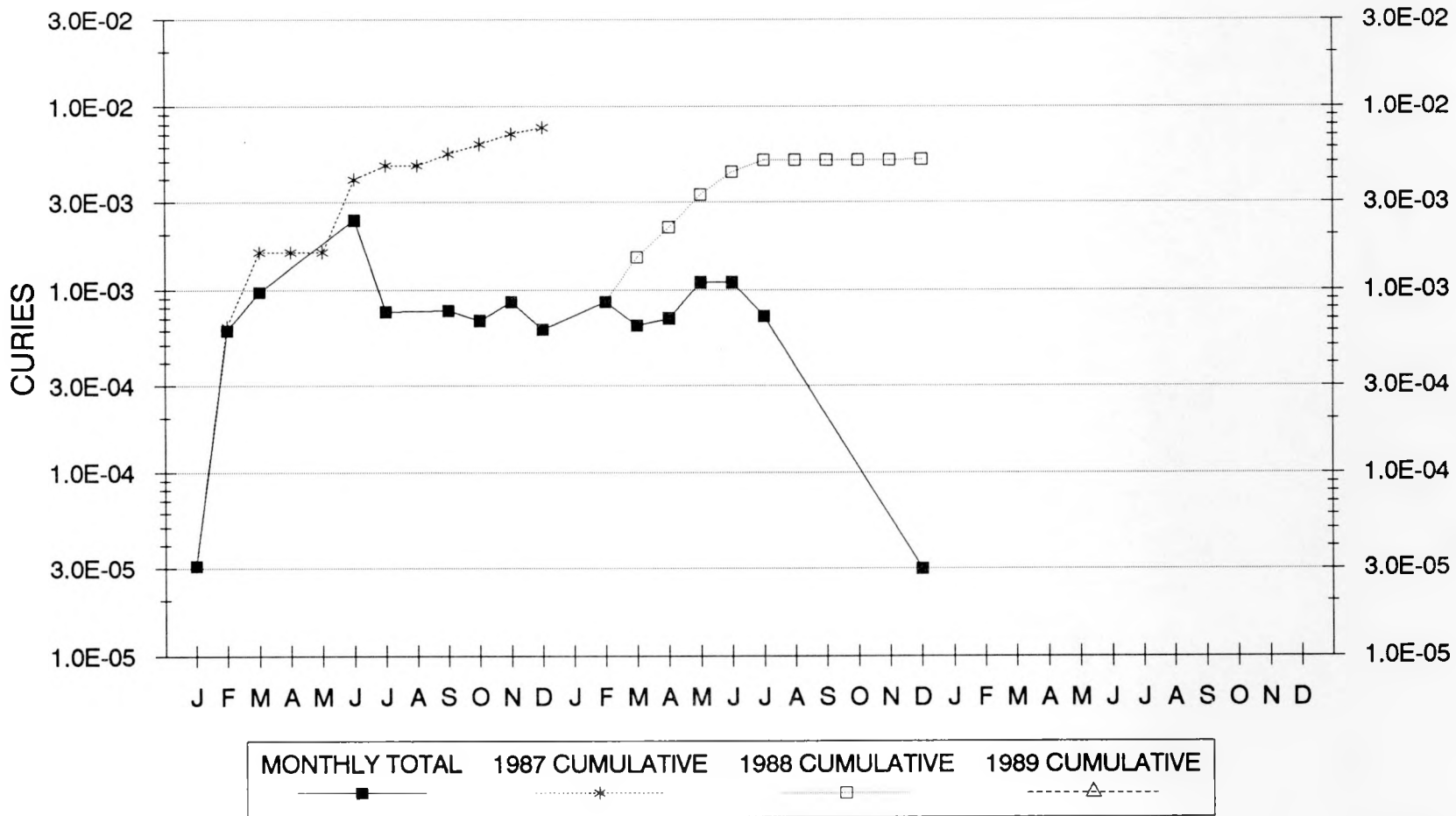
**U-Total**



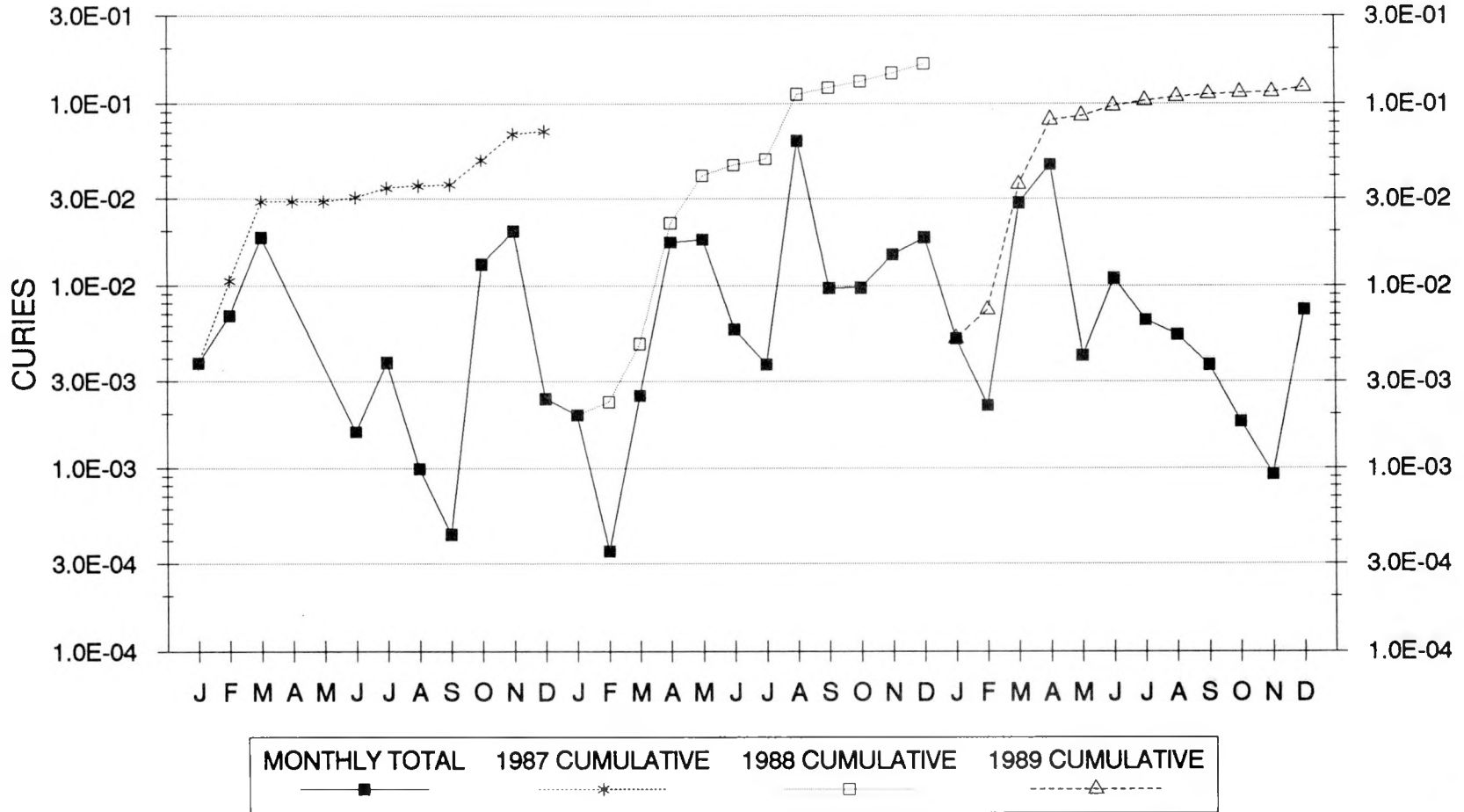
**Figure 3-3**  
**SERVICE WASTE EFFLUENT**  
**H-3**



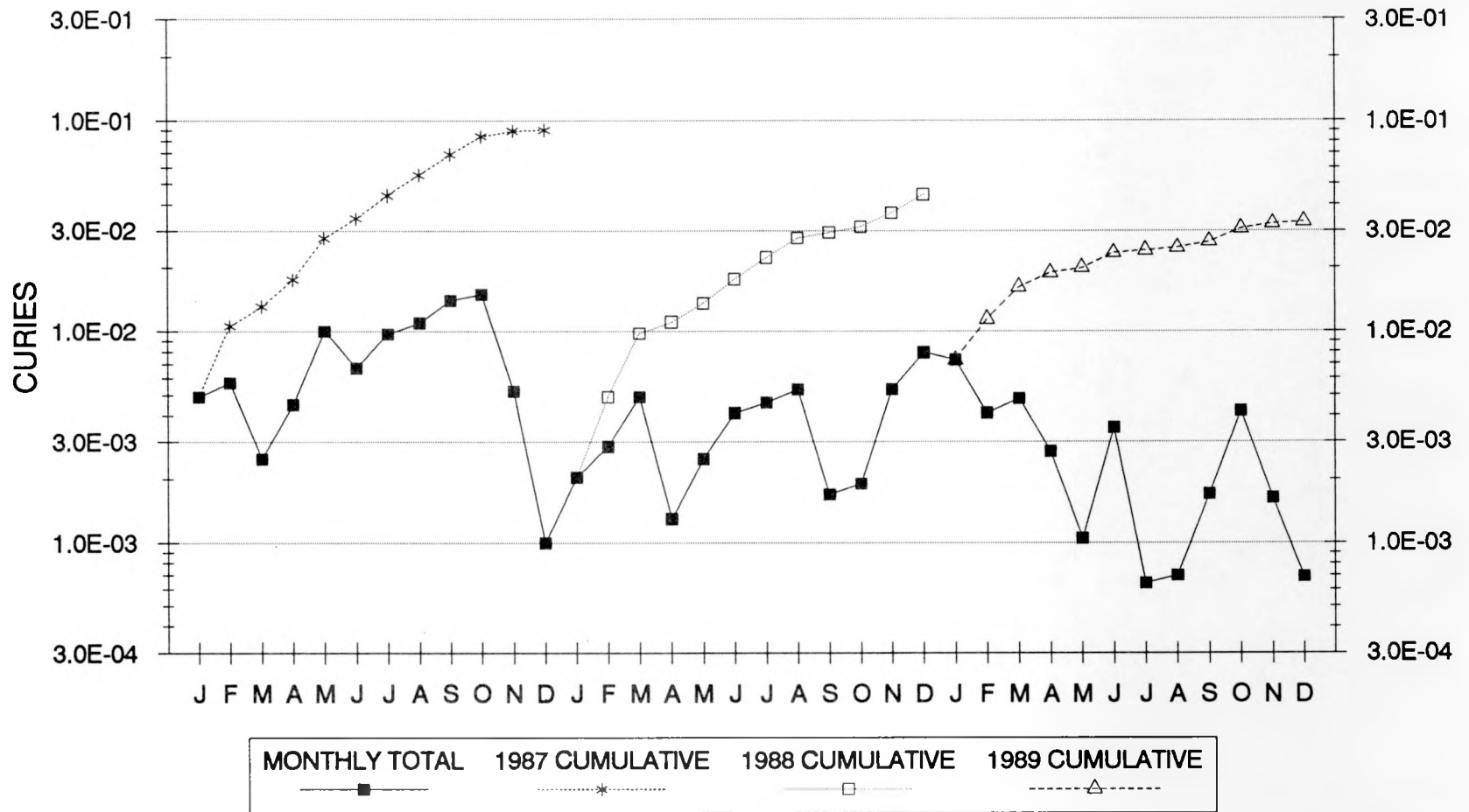
**Figure 3-4**  
**SERVICE WASTE EFFLUENT**  
**I-129**



**Figure 3-5**  
**SERVICE WASTE EFFLUENT**  
**Ru-106**

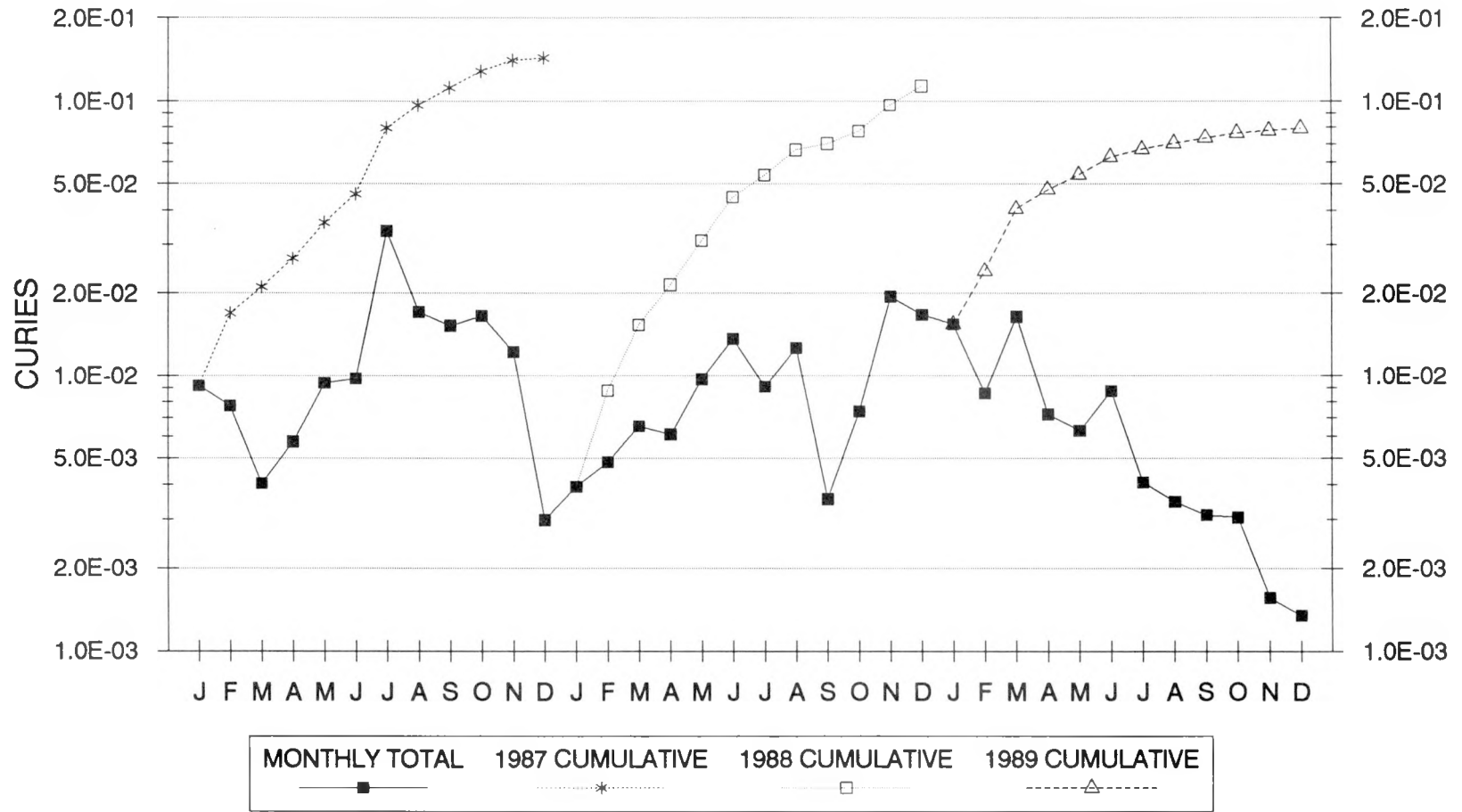


**Figure 3-6**  
**SERVICE WASTE EFFLUENT**  
**Sr-90**



35

Figure 3-7  
**SERVICE WASTE EFFLUENT**  
 Cs-137



Tritium releases to service waste over the year are shown in Figure 3-3. No tritium was released to service waste during 1989.

Information on iodine-129 releases to the service waste is presented in Figure 3-4. No iodine-129 was released to service waste during 1989..

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  $1.0 \text{ E-}04$  and  $8.0 \text{ E-}02$  curies per month.

Data plotted on Figure 3-6 shows strontium releases for 1989. Strontium releases have fluctuated since 1982 in the range between  $3.0 \text{ E-}04$  and  $1.5 \text{ E-}02$ . This trend has continued through 1989.

Figure 3-7 presents cesium-137 release data. Cesium releases went down for most of 1989.

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

Figure 3-8 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 1989 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 3-9 continue to fluctuate between  $2\text{E-}03$  and  $3\text{E-}02$  mg/l. At no time during 1989 did chromium releases exceed the EPA EP Toxicity limit or the drinking water standards.

Lead (Figure 3-10) and mercury (Figure 3-11) both indicate fairly constant release levels. Both remained below EPA EP Toxicity limits and State of Idaho drinking water limits during 1989.

Barium release rates are shown in Figure 3-12. The amount of barium released to the environment from ICPP remained fairly constant during 1989. At no time during 1989 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 1989. Figure 3-13 shows a comparison of the two regulatory ratios. As shown, the ICPP did not approach the total allowable release at any time during 1989. Furthermore, the annual DCG and MPC ratios for 1989 were both zero.

Table 3-2

PERCOLATION POND - CY-1989  
(in mg/l)

INORGANIC CHEMICALS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	EP	DRINKING
													TOXICITY LIMIT	WATER STANDARDS
Arsenic (As)	--	--	--	--	--	--	--	--	--	--	--	--	5.00E+00	5.00E-02
Barium (Ba)	1.19E-01	9.81E-02	9.70E-02	1.08E-01	7.73E-02	8.30E-02	7.73E-02	7.66E-02	7.82E-02	7.22E-02	6.77E-02	8.55E-02	1.00E+02	1.00E+00
Cadmium (Cd)	--	--	--	--	--	--	--	2.13E-03	9.29E-03	7.05E-03	--	2.50E-03	1.00E+00	1.00E-02
Chromium (Cr)	1.42E-02	8.30E-03	4.94E-03	--	6.72E-03	4.65E-03	--	2.60E-03	6.00E-03	3.98E-03	3.80E-03	6.00E-03	5.00E+00	5.00E-02
Lead (Pb)	--	--	1.90E-02	--	--	--	--	--	--	1.80E-02	--	2.31E-02	5.00E+00	5.00E-02
Mercury (Hg)	6.50E-04	1.20E-03	--	4.60E-04	--	--	7.31E-04	--	--	--	--	--	2.00E-01	2.00E-03
Selenium (Se)	--	--	--	--	--	--	--	--	--	--	--	--	1.00E+00	1.00E-02
Silver (Ag)	--	2.24E-03	--	--	--	--	1.32E-03	--	--	--	--	--	5.00E+00	5.00E-02
Chloride Ion	3.32E+02	3.13E+02	3.09E+02	3.50E+02	2.65E+02	2.46E+02	2.30E+02	2.62E+02	3.09E+02	2.30E+02	2.52E+02	2.45E+02	NONE	2.50E+02
Fluoride Ion	6.97E-01	7.44E-01	8.84E-01	7.27E+00	2.56E-01	8.57E-01	4.94E-01	2.28E-01	2.24E-01	2.16E-01	2.06E-01	2.18E-01	NONE	2.20E+00
Nitrate Ion	5.07E+01	2.36E+01	3.12E+01	4.04E+01	1.70E+01	3.00E+01	2.09E+01	7.63E+00	9.80E+00	9.46E+00	8.89E+00	7.43E+00	NONE	4.50E+01
Sulfate Ion	9.41E+01	8.73E+01	7.07E+01	8.36E+01	8.57E+01	7.58E+01	7.60E+01	6.74E+01	5.67E+01	7.00E+01	6.98E+01	4.99E+01	NONE	2.50E+02
Phosphate Ion	--	--	--	--	--	--	--	--	--	--	1.88E-01	--	NONE	NONE
WATER QUALITY PARAMETERS													AVERAGE	
TDS (mg/l)	9.10E-01	6.70E-01	8.00E-01	1.00E+00	8.90E-01	6.10E-01	3.80E-01	7.20E-01	7.90E-01	1.20E+00	6.50E-01	5.90E-01	7.70E-01	
Conductivity (µMHOS)	1372	1305	1368	1509	1188	1088	835	1083	1414	1200	1100	1800	1287	
pH	7.7	8.3	8.0	7.9	8.3	8.4	8.3	8.3	8.3	7.8	8.0	8.0	8.1	

Figure 3-8  
**PERCOLATION POND**  
Cadmium Concentration

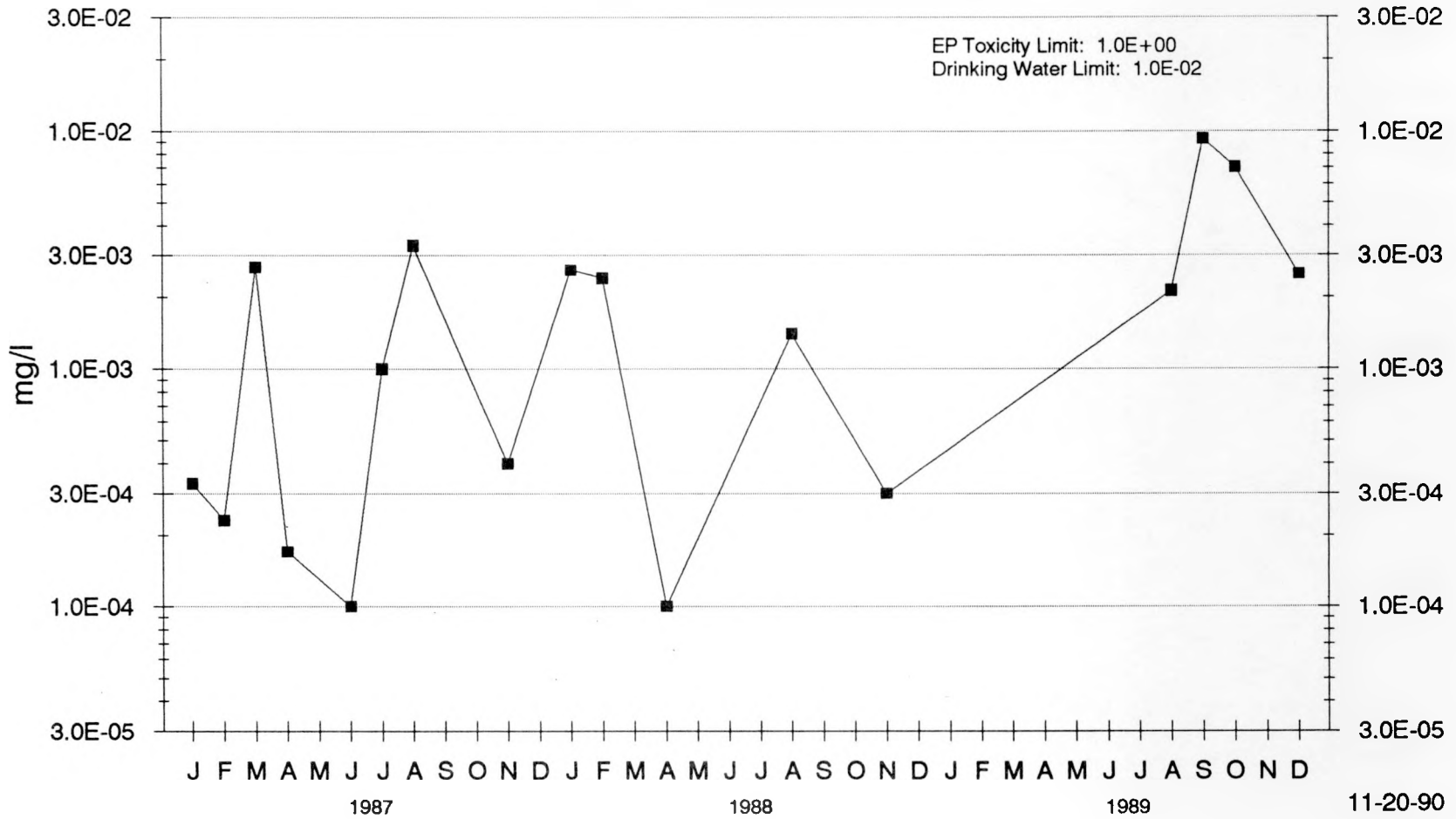


Figure 3-9  
**PERCOLATION POND**  
Chromium Concentration

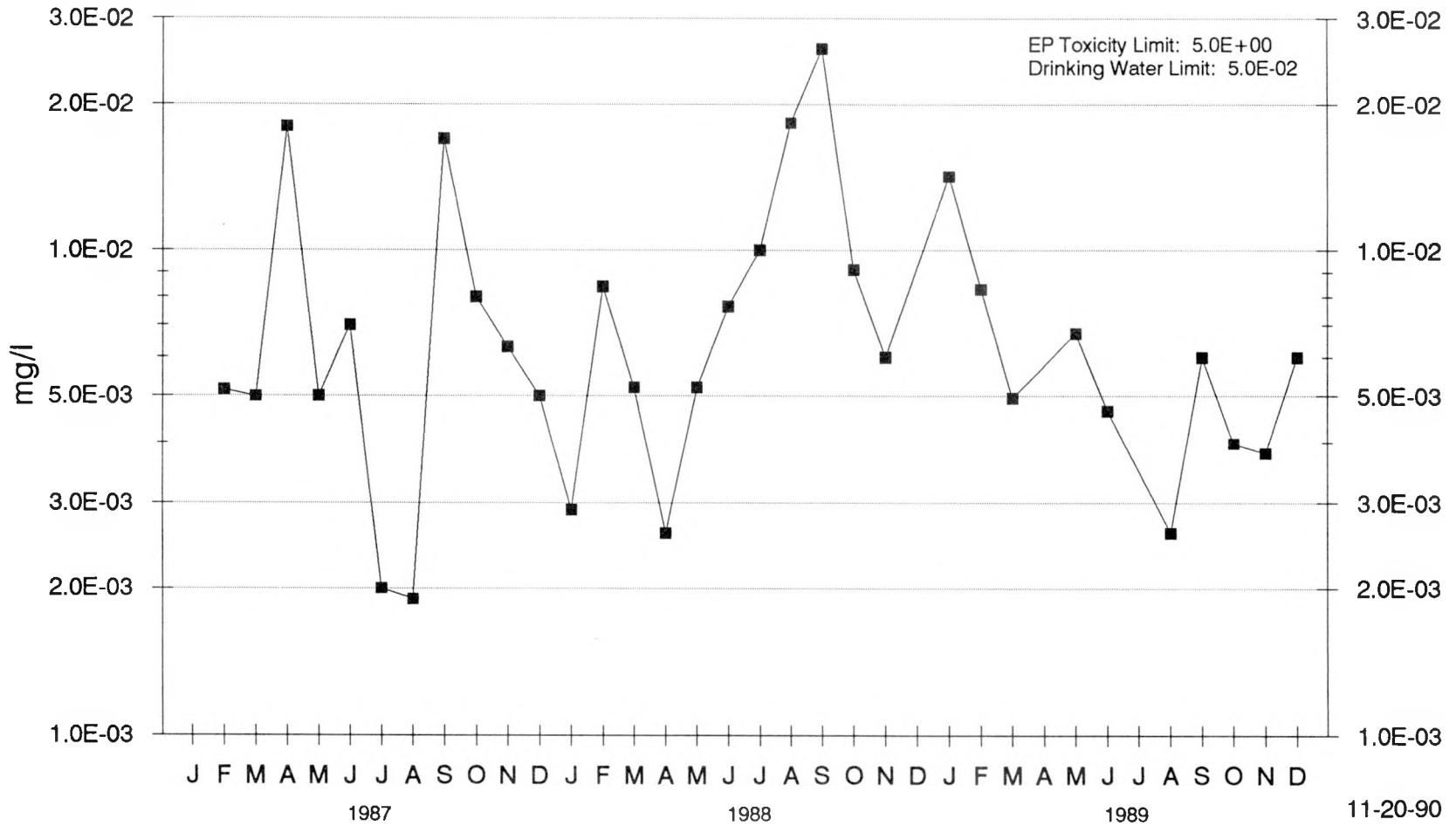


Figure 3-10  
**PERCOLATION POND**  
Lead Concentration

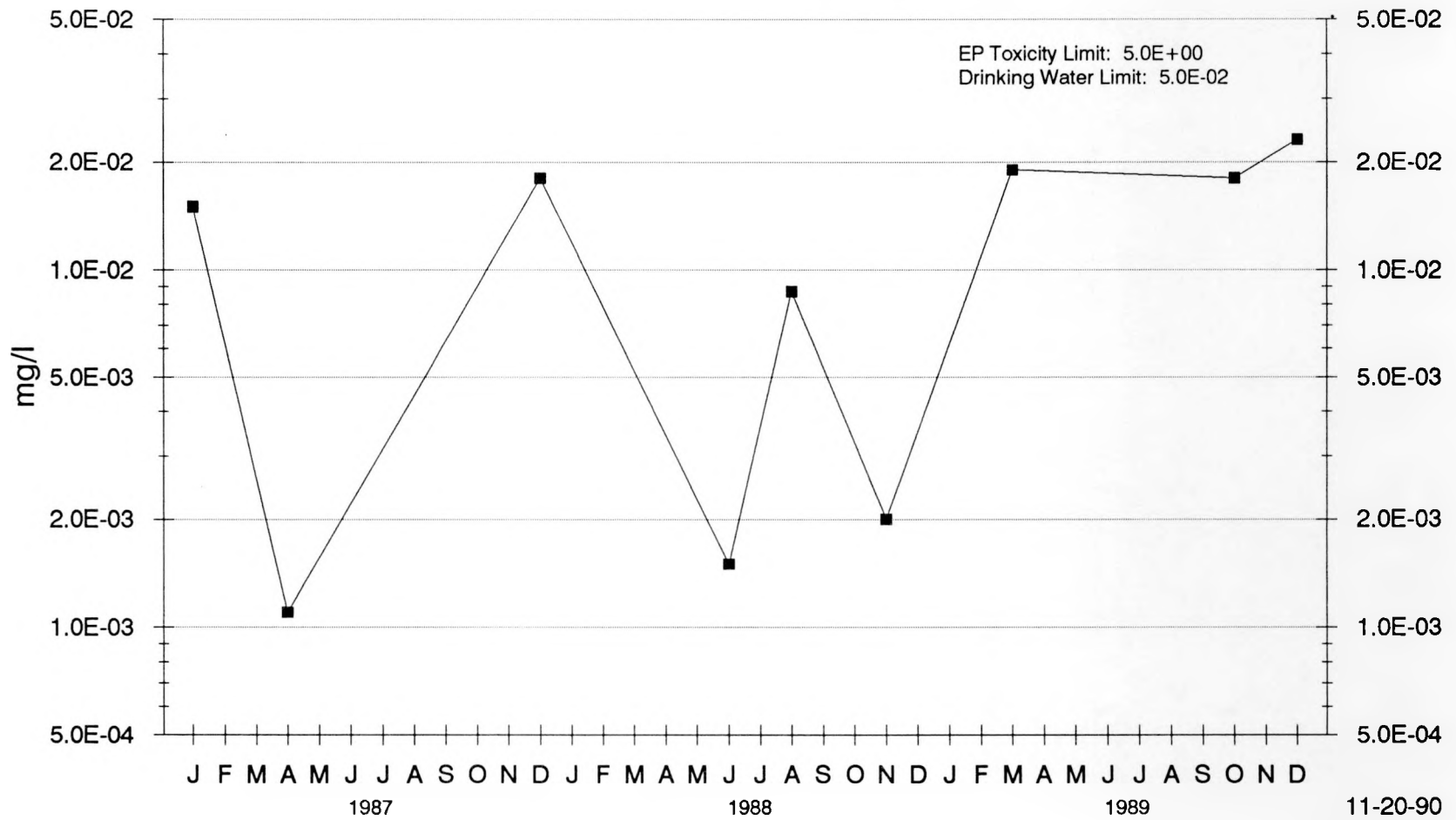


Figure 3-11  
**PERCOLATION POND**  
 Mercury Concentration

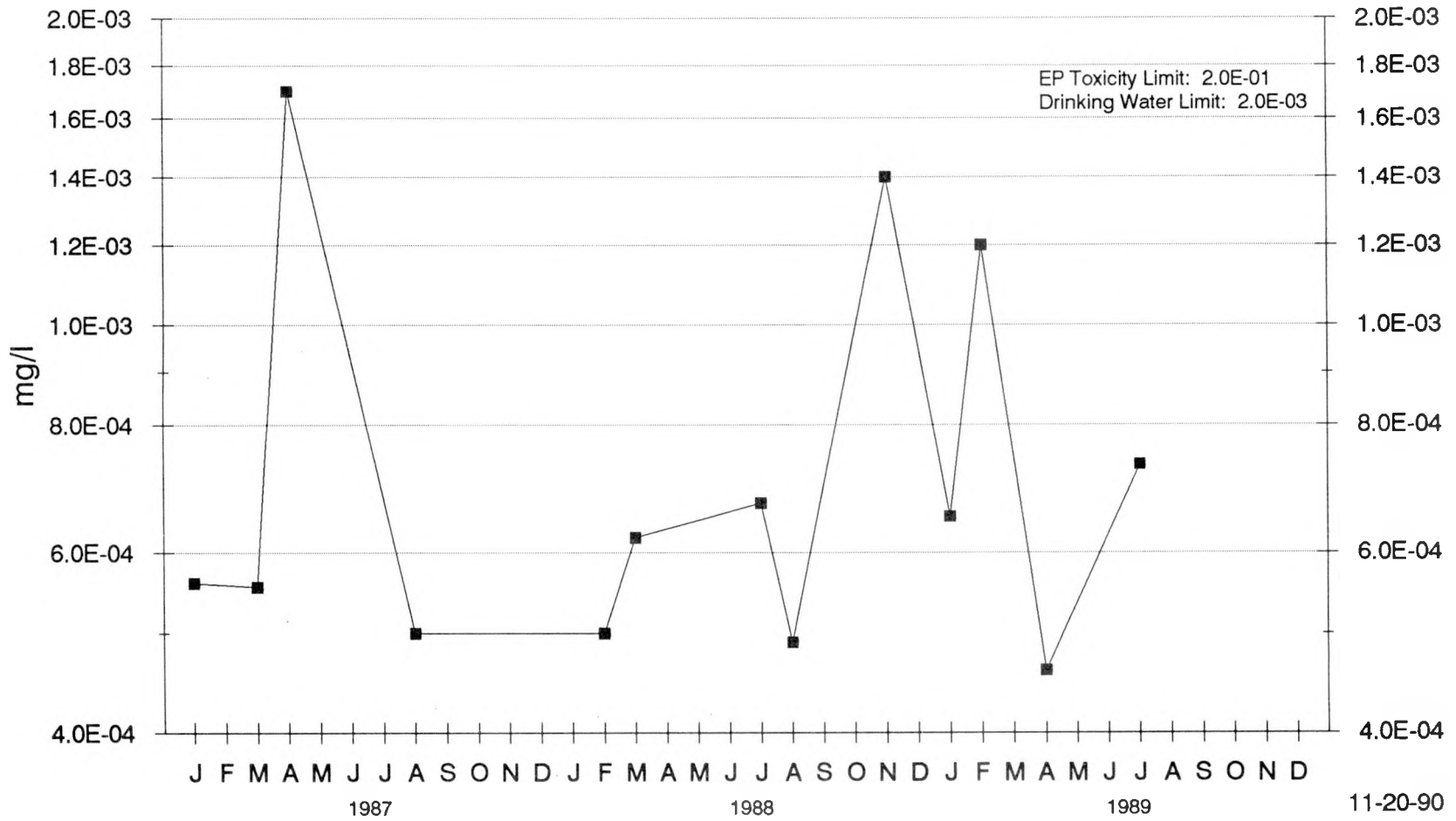


Figure 3-12  
**PERCOLATION POND**  
 Barium Concentration

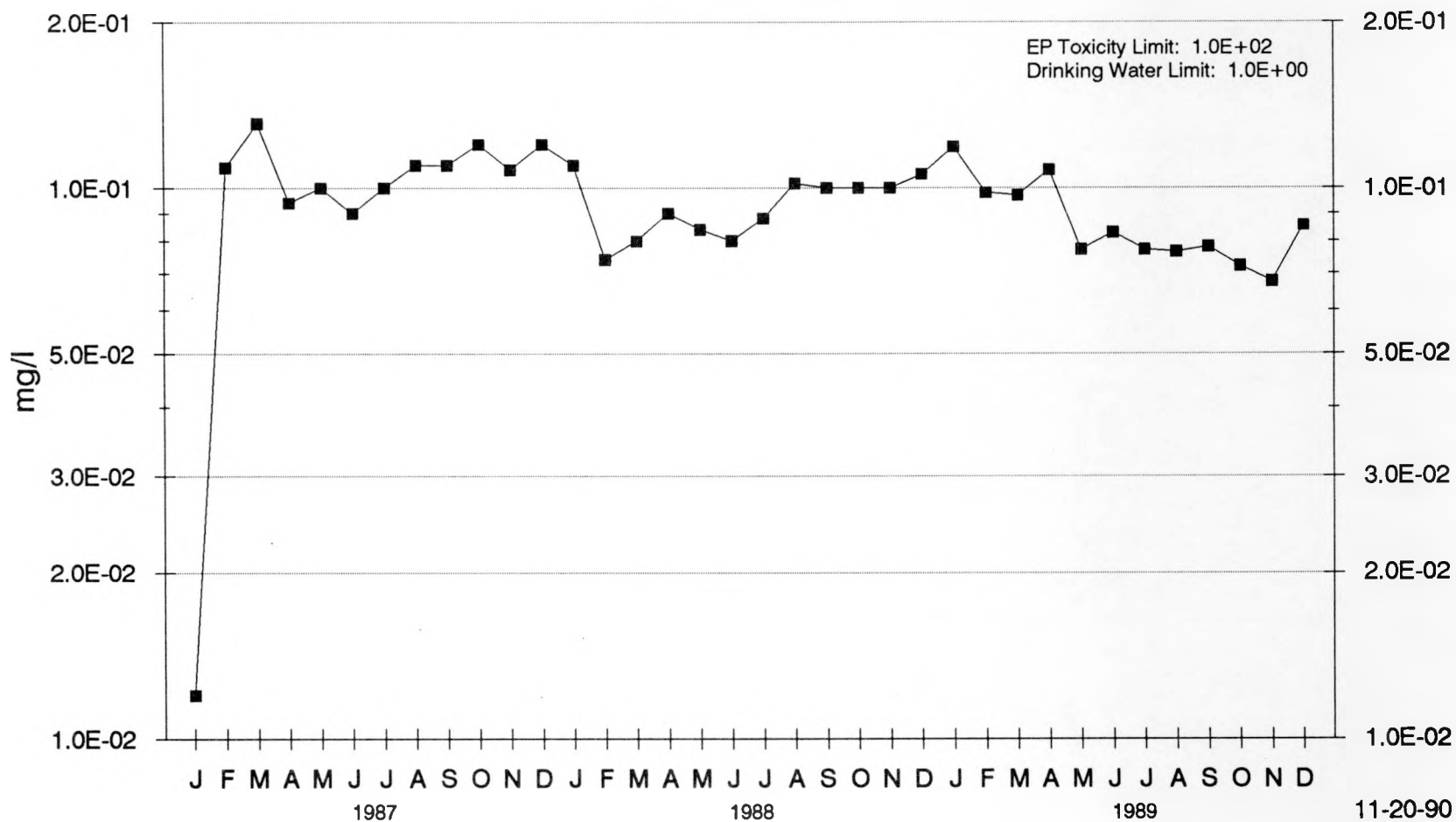


Table 3-3

MPC RATIOS - IDAHO - CY-1989

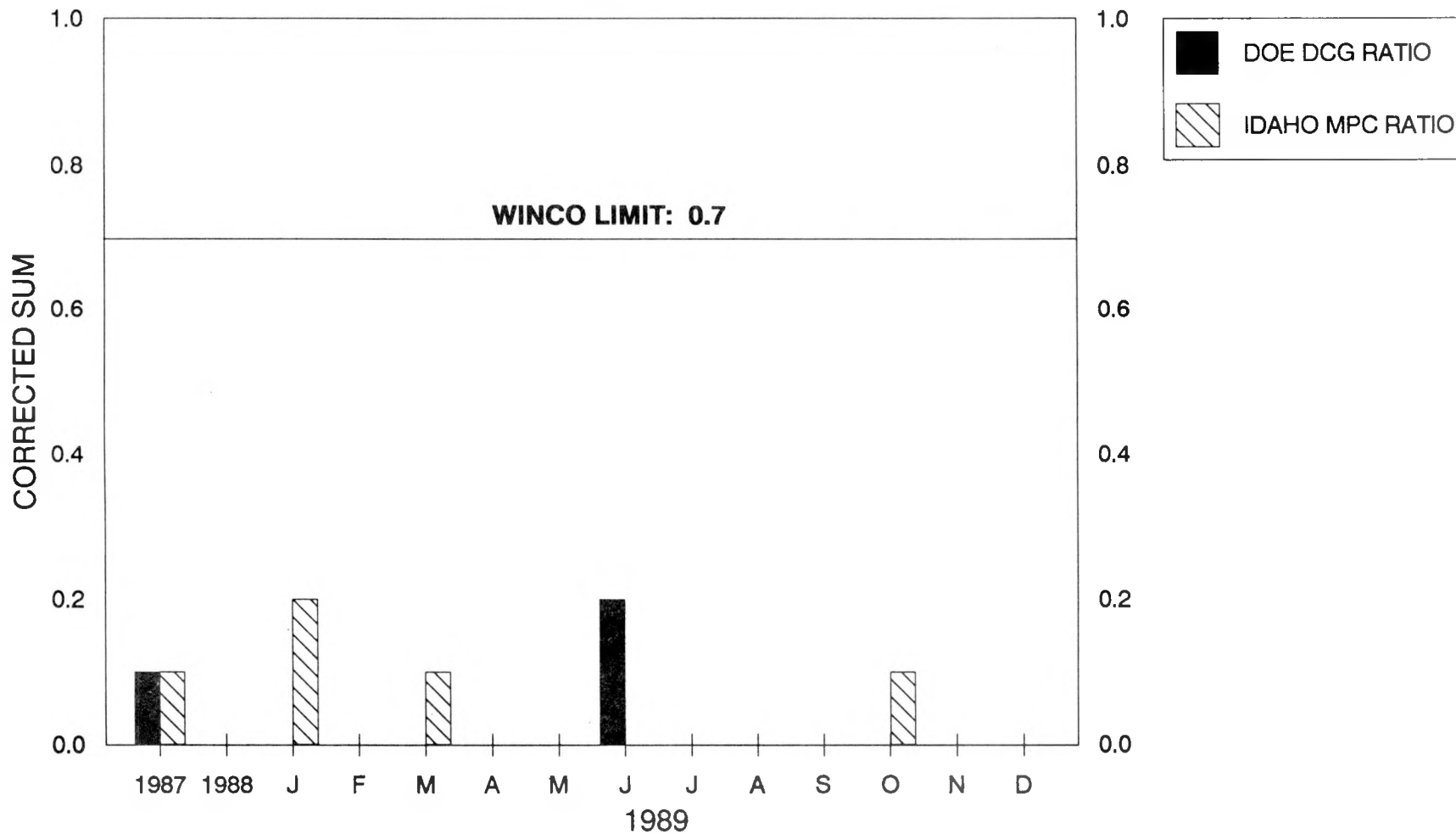
RADIONUCLIDES	J	F	M	A	M	J	J	A	S	O	N	D
C-14	--	--	--	--	--	--	--	--	--	--	3E-05	--
Ce-144	1E-04	--	2E-04	--	--	3E-04	--	--	--	--	--	--
Co-60	--	--	--	--	7E-06	--	2E-05	--	2E-05	9E-04	2E-05	--
Cs-134	1E-03	7E-04	9E-04	4E-04	4E-04	7E-04	1E-04	2E-04	1E-04	2E-04	1E-04	6E-05
Cs-137	6E-03	3E-03	6E-03	3E-03	3E-03	3E-03	2E-03	1E-03	1E-03	1E-03	6E-04	4E-04
H-3	--	--	--	--	--	--	--	--	--	--	--	--
I-129	--	--	--	--	--	--	--	--	--	--	--	--
Nb-95	--	--	--	--	--	--	--	--	--	--	--	--
Pu-TOTAL	2E-04	1E-04	2E-04	3E-04	2E-04	1E-03	3E-04	1E-04	1E-04	8E-05	6E-05	4E-05
Ru-106	4E-03	1E-03	2E-02	3E-02	4E-03	8E-03	5E-03	4E-03	3E-03	1E-03	7E-04	5E-03
Sb-125	--	1E-05	2E-05	1E-05	2E-05	3E-04	4E-04	5E-05	--	9E-06	4E-06	--
Sr-89	2E-03	1E-03	--	--	1E-03	--	--	--	--	--	--	--
Sr-90	2E-01	9E-02	1E-01	6E-02	3E-02	9E-02	2E-02	2E-02	4E-02	1E-01	4E-02	1E-02
U-TOTAL	8E-05	8E-05	7E-05	8E-05	8E-05	7E-05	8E-05	8E-05	8E-05	7E-05	7E-05	7E-05
Zr-95	--	--	--	--	--	--	--	--	--	--	--	--
Eu-152	--	--	--	--	--	--	--	--	--	1E-04	2E-05	--
Eu-154	--	--	--	--	--	--	--	--	5E-05	1E-04	--	--
Mn-54	--	--	--	--	--	--	--	--	--	3E-06	--	--
TOTAL	2E-01	1E-01	1E-01	9E-02	4E-02	1E-01	3E-02	3E-02	4E-02	1E-01	4E-02	2E-02
TOTAL AFTER 10% EXCLUSION	2E-01	--	1E-01	--	--	--	--	--	--	1E-01	--	--

Table 3-4

DCG RATIOS - DOE - CY-1989

RADIONUCLIDES	J	F	M	A	M	J	J	A	S	O	N	D
C-14	--	--	--	--	--	--	--	--	--	--	3E-04	--
Ce-144	2E-04	--	3E-04	--	--	4E-04	--	--	--	--	--	--
Co-60	--	--	--	--	4E-05	--	1E-04	--	1E-04	5E-03	9E-05	--
Cs-134	6E-03	3E-03	4E-03	2E-03	2E-03	3E-03	6E-04	7E-04	4E-04	7E-04	4E-04	3E-04
Cs-137	4E-02	2E-02	4E-02	2E-02	2E-02	2E-02	1E-02	9E-03	7E-03	7E-03	4E-03	3E-03
H-3	--	--	--	--	--	--	--	--	--	--	--	--
I-129	--	--	--	--	--	--	--	--	--	--	--	--
Nb-95	--	--	--	--	--	--	--	--	--	--	--	--
Pu-TOTAL	3E-02	2E-02	3E-02	4E-02	2E-02	2E-01	4E-02	3E-02	2E-02	1E-02	8E-03	4E-03
Ru-106	6E-03	2E-03	3E-02	6E-02	6E-03	1E-02	9E-03	7E-03	4E-03	2E-03	1E-03	8E-03
Sb-125	--	2E-05	4E-05	3E-05	5E-05	6E-04	8E-04	1E-04	--	2E-05	7E-06	--
Sr-89	4E-04	2E-04	--	--	2E-04	--	--	--	--	--	--	--
Sr-90	5E-02	3E-02	3E-02	2E-02	9E-03	3E-02	5E-03	6E-03	1E-02	3E-02	1E-02	4E-03
U-TOTAL	5E-03	5E-03	4E-03	4E-03	5E-03	4E-03	5E-03	4E-03	4E-03	4E-03	4E-03	4E-03
Zr-95	--	--	--	--	--	--	--	--	--	--	--	--
Eu-152	--	--	--	--	--	--	--	--	--	4E-04	7E-05	--
Eu-154	--	--	--	--	--	--	--	--	5E-05	1E-04	--	--
Mn-54	--	--	--	--	--	--	--	--	--	6E-06	--	--
TOTAL	1E-01	8E-02	1E-01	1E-01	6E-02	3E-01	7E-02	5E-02	5E-02	6E-02	3E-02	2E-02
TOTAL AFTER 10% EXCLUSION	--	--	--	--	--	2E-01	--	--	--	--	--	--

**Figure 3-13**  
**MPC AND DCG RATIOS**  
 For Service Waste Releases



## 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 Assurance 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 1989. Table 3-7B lists the monthly strontium and quarterly plutonium (total) values for 1989.

Monthly influent (raw) and effluent (final) Biological Oxygen Demand (BOD) concentrations are shown in Figure 3-14A. The difference in concentrations between influent BOD and effluent BOD represents the treatment efficiency (Figure 3-14B). Since the facility has been operational, treatment efficiency has met design (80%) criteria except during algae blooms when excess algae overflows the effluent weir. One distinctive algae bloom occurred during 1989, it peaked in April. 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 3-15. The increased effluent DO in April is a result of the algae bloom. 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 (1.5 mg/l) in July and August is the result of the decay of the algae that grew

Table 3-5  
 PRODUCTION WELL - CY-1989  
 (in mg/l)

TRACE METALS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	DRINKING WATER STANDARDS
Arsenic (As)	--	--	--	--	--	--	--	--	--	--	--	--	5.00E-02
Barium (Ba)	7.44E-02	7.71E-02	6.79E-02	6.72E-02	7.38E-02	8.81E-02	7.46E-02	7.67E-02	7.28E-02	6.76E-02	7.72E-02	7.42E-02	1.00E+00
Cadmium (Cd)	--	--	--	--	--	--	--	1.61E-03	1.45E-03	2.80E-03	--	--	1.00E-02
Chromium (Cr)	8.29E-03	7.58E-03	5.85E-03	--	8.07E-03	3.48E-03	--	--	6.99E-03	5.68E-03	6.69E-03	7.42E-03	5.00E-02
Lead (Pb)	--	--	--	--	--	--	--	--	--	--	--	--	5.00E-02
Mercury (Hg)	--	--	--	--	--	--	--	--	--	--	--	--	2.00E-03
Selenium (Se)	--	--	--	--	--	--	--	--	--	--	--	--	1.00E-02
Silver (Ag)	1.73E-03	1.68E-03	--	--	--	--	1.50E-03	--	--	--	--	--	5.00E-02
Chloride Ion	1.66E+01	2.44E+01	1.68E+01	1.65E+01	1.64E+01	1.74E+01	1.60E+01	1.79E+01	1.63E+01	1.71E+01	1.75E+01	1.70E+01	2.50E+02
Fluoride Ion	3.16E-01	2.50E-01	2.36E-01	2.30E-01	2.44E-01	2.39E-01	2.33E-01	2.24E-01	2.00E-01	1.93E-01	2.01E-01	3.42E-01	2.20E+00
Nitrate Ion	3.76E+00	3.77E+00	3.79E+00	3.31E+00	3.82E+00	3.27E+00	3.54E+00	3.62E+00	3.40E+00	3.74E+00	3.93E+00	3.84E+00	4.50E+01
Sulfate Ion	2.47E+01	2.52E+01	2.44E+01	2.51E+01	2.52E+01	2.38E+01	2.46E+01	2.43E+01	2.44E+01	2.42E+01	2.51E+01	2.48E+01	2.50E+02
Phosphate Ion	--	--	--	--	--	--	--	--	--	1.13E+00	--	2.37E-01	NONE

ORGANIC CHEMICALS - APRIL 1988

	ANALYSIS RESULTS	EP TOXICITY LIMITS	DRINKING WATER STANDARDS
Endrin	ND	2.00E-02	2.00E-04
Lindane	ND	4.00E-01	4.00E-03
Toxaphene	ND	5.00E-01	5.00E-03
2, 4-D	ND	1.00E+01	1.00E-01
Methoxychlor	ND	1.00E+01	1.00E-01
2,4,5-TP Silvex	ND	None	1.00E-02

Table 3-6

POTABLE WATER WELL - CY-1989  
(in mg/l)

TRACE METALS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	DRINKING WATER STANDARDS
Arsenic (As)	--	--	--	--	--	--	--	--	--	--	--	--	5.00E-02
Barium (Ba)	8.24E-02	7.90E-02	7.37E-02	7.26E-02	8.24E-02	7.66E-02	8.17E-02	7.79E-02	8.29E-02	7.12E-02	7.66E-02	7.25E-02	1.00E+00
Cadmium (Cd)	--	--	--	--	4.69E-03	--	--	1.34E-03	--	2.40E-03	--	--	1.00E-02
Chromium (Cr)	1.33E-02	4.68E-03	5.97E-03	--	8.89E-03	5.85E-03	--	--	6.04E-03	4.99E-03	7.07E-03	7.78E-03	5.00E-02
Lead (Pb)	--	--	--	--	--	--	--	--	--	--	--	--	5.00E-02
Mercury (Hg)	--	--	--	--	--	--	--	--	--	--	--	--	2.00E-03
Selenium (Se)	--	--	--	--	--	--	--	--	--	--	--	--	1.00E-02
Silver (Ag)	--	--	--	--	--	--	1.36E-03	--	--	--	--	--	5.00E-02
Chloride Ion	1.56E+01	1.61E+01	1.65E+01	1.59E+01	1.85E+01	1.65E+01	1.44E+01	1.70E+01	1.53E+01	1.67E+01	1.59E+01	1.62E+01	2.50E+02
Fluoride Ion	2.32E-01	2.22E-01	2.16E-01	2.14E-01	2.36E-01	2.45E-01	2.07E-01	2.35E-01	--	1.97E-01	1.96E-01	2.82E-01	2.20E+00
Nitrate Ion	3.74E+00	3.69E+00	3.58E+00	3.17E+00	3.56E+00	3.46E+00	2.83E+00	3.49E+00	2.48E+00	2.09E+00	3.59E+00	3.51E+00	4.50E+01
Sulfate Ion	2.45E+01	2.40E+01	2.50E+01	2.39E+01	2.38E+00	2.43E+01	2.36E+01	2.39E+01	2.42E+01	2.37E+01	2.39E+01	2.40E+01	2.50E+02
Phosphate Ion	--	--	--	--	--	--	--	--	--	1.13E+00	--	2.37E-01	NONE

## ORGANIC CHEMICALS - APRIL 1988

	ANALYSIS RESULTS	EP TOXICITY LIMITS	DRINKING WATER STANDARDS
Endrin	ND	2.00E-02	2.00E-04
Lindane	ND	4.00E-01	4.00E-03
Toxaphene	ND	5.00E-01	5.00E-03
2, 4-D	ND	1.00E+01	1.00E-01
Methoxychlor	ND	1.00E+01	1.00E-01
2,4,5-TP Silvex	ND	None	1.00E-02

Table 3-7A

SEWAGE TREATMENT PLANT ANALYSIS - CY-1989  
(in mg/l)

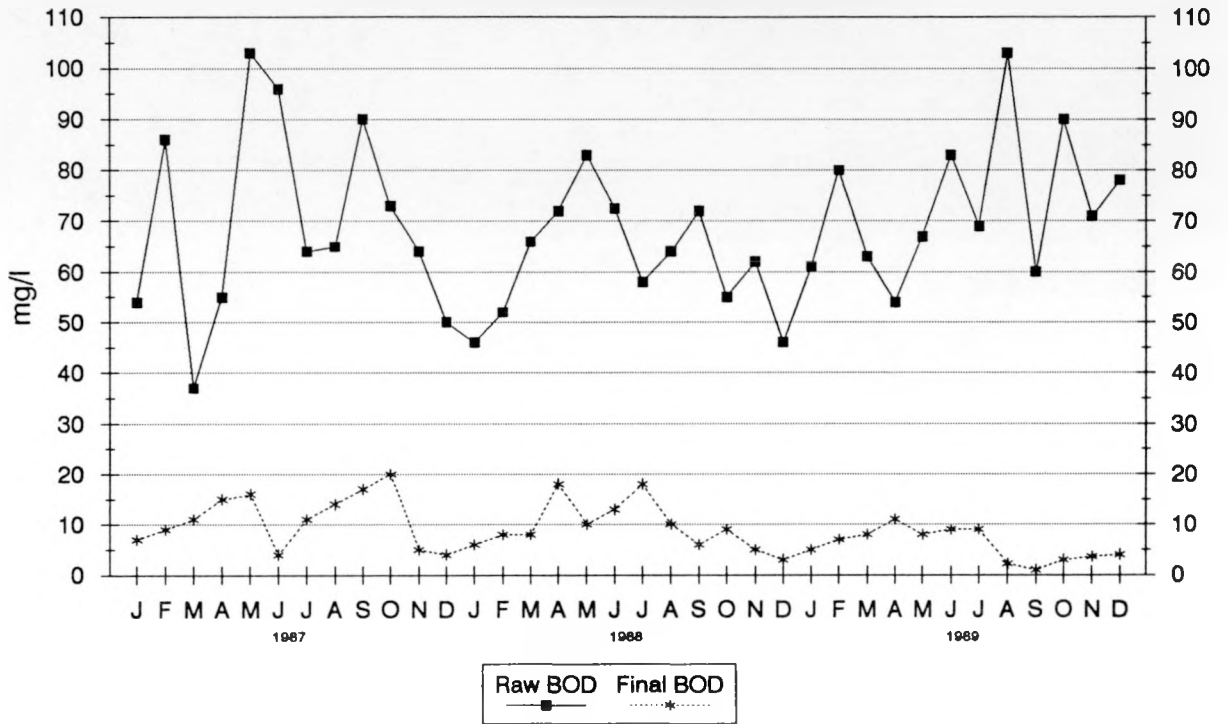
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Design Standard
Raw BOD	61	80	63	54	67	83	69	103	60	90	71	78	150
Final BOD	5	7	8	11	8	9	9	2	1	3	4	4	30
Efficiency	92%	91%	87%	80%	88%	89%	87%	98%	98%	97%	95%	95%	> 80%
Raw DO	4E-01	5E-01	5E-01	3E-01	4E-01	6E-01	1E+00	5E-01	5E-01	5E-01	1E+00	4E-01	< 1E-01
Final DO	6E+00	7E+00	7E+00	1E+01	5E+00	6E+00	2E+00	2E+00	3E+00	6E+00	9E+00	7E+00	> 3E+00
Raw pH	8.0	8.3	7.9	8.0	8.4	8.0	8.2	8.3	7.9	7.9	8.1	8.2	< 6.0
Final pH	7.5	7.5	7.5	8.2	8.4	8.6	7.8	7.7	7.8	7.8	7.9	7.7	> 6.5
TOT VOL (L)	2.99E+06	3.46E+06	3.40E+06	3.21E+06	3.03E+06	2.96E+06	2.72E+06	2.63E+06	2.73E+06	3.26E+06	3.07E+06	3.44E+06	

Table 3-7B

SEWAGE TREATMENT PLANT RADIONUCLIDE ANALYSIS - CY-1989  
(curies)

RADIONUCLIDES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YTD
Sr-89	--	--	--	--	--	--	--	--	--	--	--	--	0.00E+00
Sr-90	--	1.40E-06	--	--	1.00E-06	--	--	1.00E-06	1.30E-06	1.20E-06	1.00E-06	2.00E-06	8.90E-06
Pu-Total (Qtr)			--			--			4.00E-08			8.00E-08	1.20E-07

**Figure 3-14A**  
**SEWAGE TREATMENT PLANT**  
**BOD**



**Figure 3-14B**  
**SEWAGE TREATMENT PLANT**  
**BOD Efficiency**

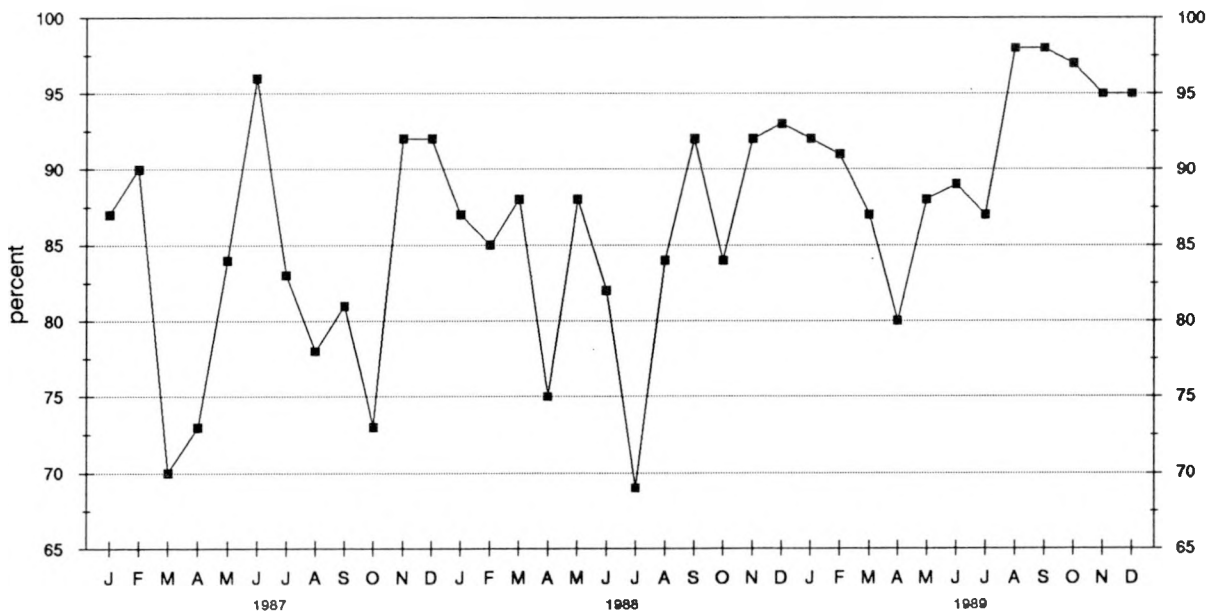
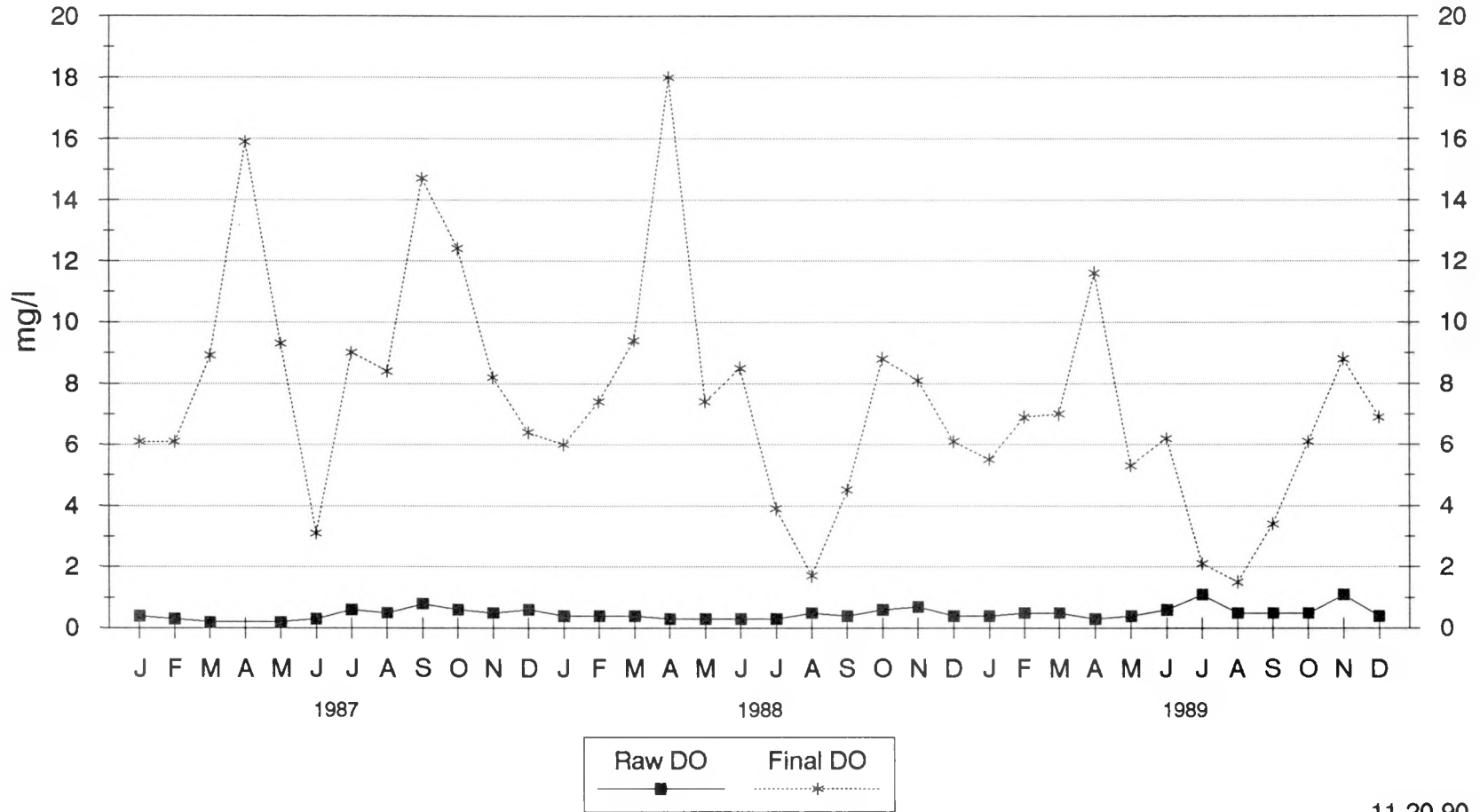


Figure 3-15  
**SEWAGE TREATMENT PLANT**  
 DO

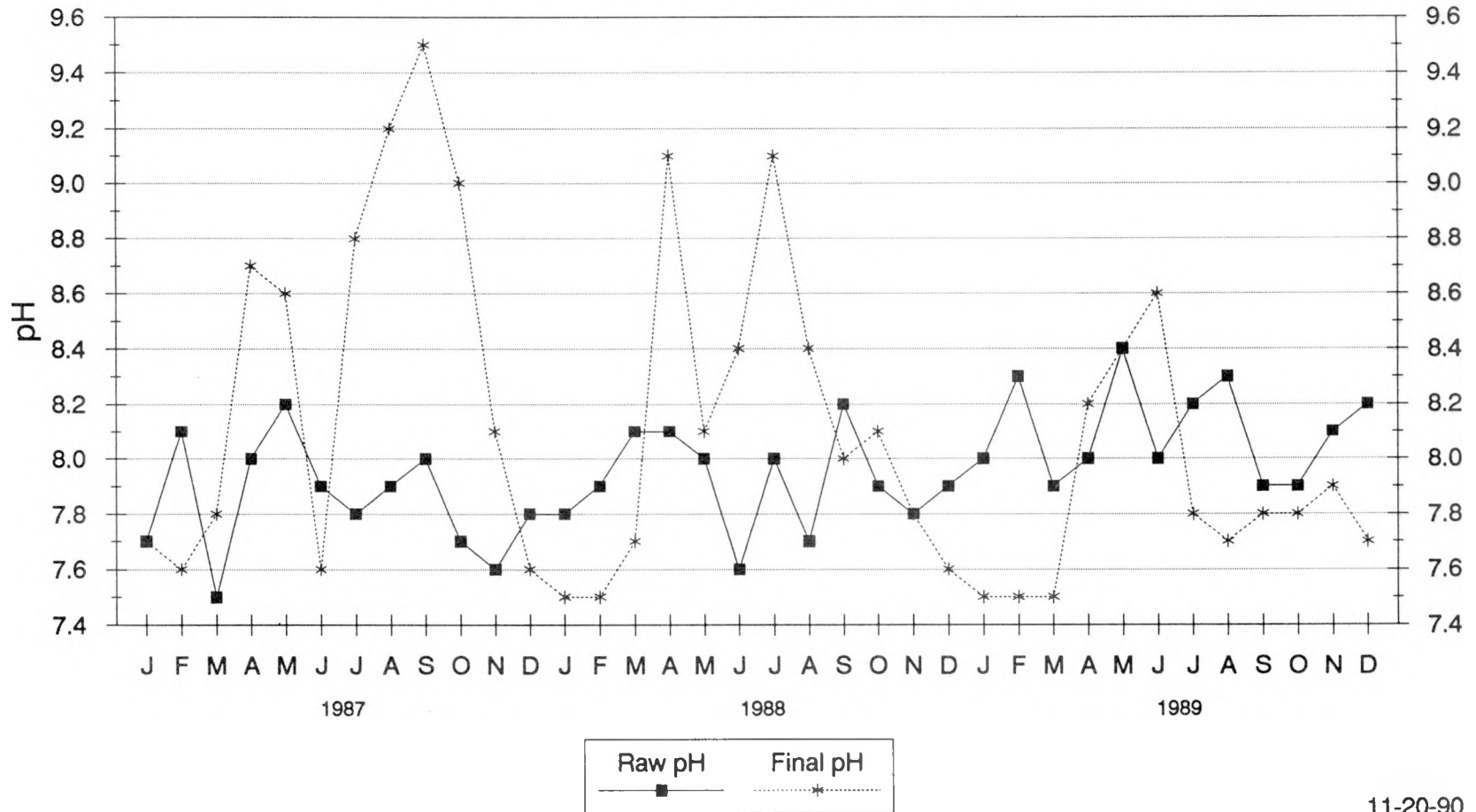


in April, May, and June. Effluent stream pH values from the waste water treatment facility are shown in Figure 3-16. The final pH values during the year continued in the normal design range of the sewage treatment plant. However, the pH spike during 1989 is attributed to the algae bloom. Figure 3-17 provides a summary of total flow through the sewage treatment plant.

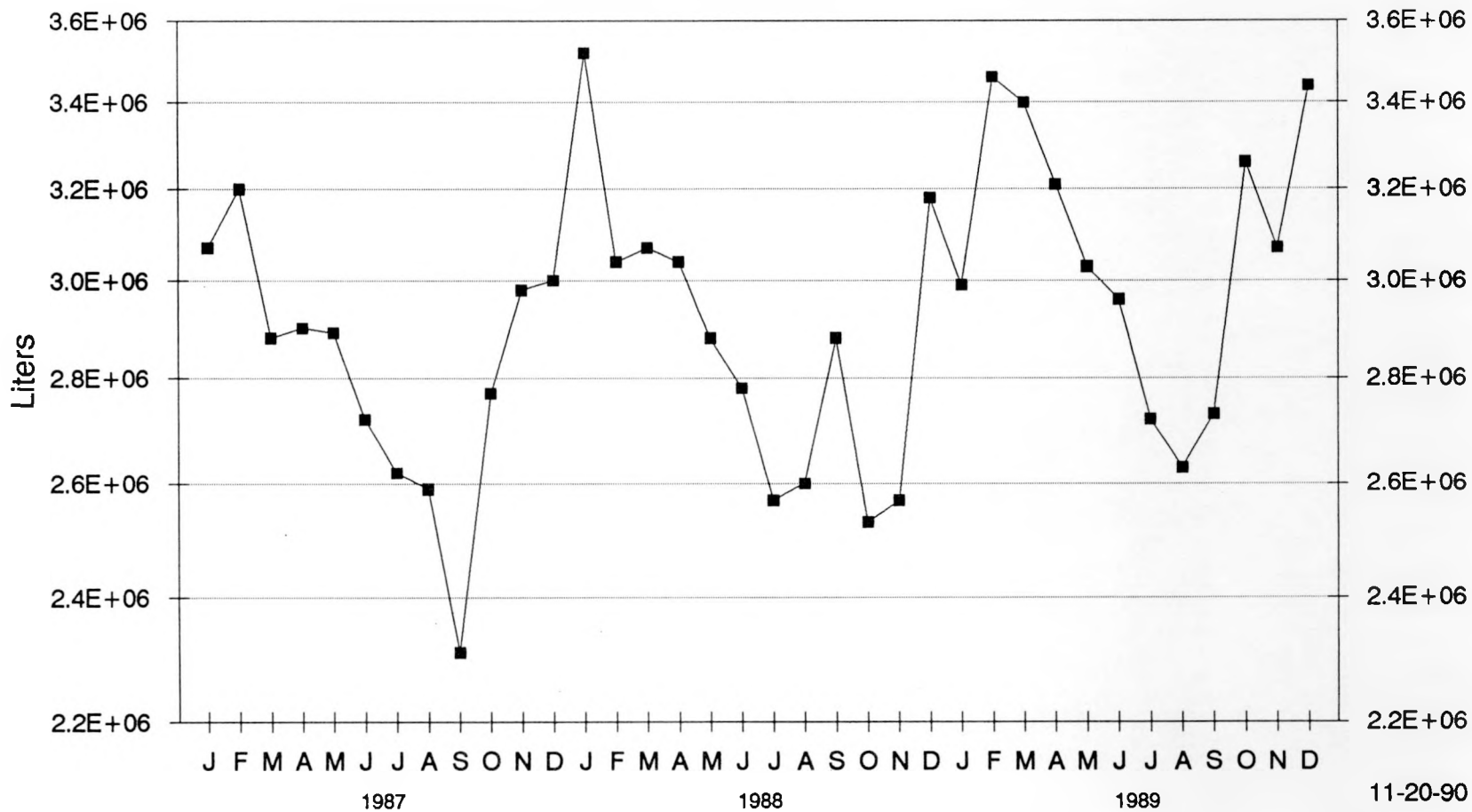
#### 2.4 ICPP Injection Well

The ICPP injection well was permanently sealed in December 1989. During 1989 no emergency use of the well occurred.

Figure 3-16  
**SEWAGE TREATMENT PLANT**  
 pH



**Figure 3-17**  
**SEWAGE TREATMENT PLANT**  
**Volume**



DISTRIBUTION

WINCO Staff:

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