

June 1997



ICPP Environmental Monitoring Report CY-1996

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J. K. Neff

ICPP Environmental Monitoring Report for CY-1996

J. K. Neff

Published June 1997

**Idaho National Engineering and Environmental Laboratory
Environmental Support
Lockheed Martin Idaho Technologies Company
Idaho Falls, Idaho 83415**

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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
FAST	Fluorinel Dissolution Process & Fuel Storage Facility
ICPP	Idaho Chemical Processing Plant
LMITCO	Lockheed Martin Idaho Technologies Company
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
STP	Sewage Treatment Plant
SO ₂	Sulfur Dioxide
VOG	Ventilation Off-Gas

ICPP ENVIRONMENTAL MONITORING REPORT 1996

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 Affairs Department. This report is published in response to DOE Order 5400.1.

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 nonradiological waste resulting from the ICPP operations including airborne, liquid, and solid waste.

Quality Assurance 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, Lockheed Martin Idaho Technologies Company (LMITCO) 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 volume & airborne releases and Figure 1-2 depicts cumulative volume & liquid releases for the year. The graphs allow trends to be made of waste volume and activity released for the year. The Main Stack gaseous monitor was not in operation until May 1996. New Waste Calcining Facility (NWCF) was not in operation in 1996. During 1996 the cumulative airborne and liquid release of radionuclides was $3.2\text{E-}2$ curies. Airborne releases to the atmosphere contributed $3.1\text{E-}02$ curies and liquid effluent released to the Percolation Pond contributed $1.3\text{E-}03$ curies. 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.

Table 1-1
SUMMARY OF RELEASE DATA FOR 1996

<u>AIREORNE</u>					<u>LIQUID</u>			
	Volume (E+09 m3)		Activity (curies)		Volume (E+09 L)		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	0.220	0.220	4.58E-06	4.58E-06	0.212	0.212	7.12E-04	7.12E-04
Feb	0.260	0.480	1.52E-05	1.98E-05	0.175	0.387		7.12E-04
Mar	0.330	0.810	7.83E-06	2.76E-05	0.161	0.548	5.83E-04	1.30E-03
Apr	0.275	1.085	1.10E-05	3.86E-05	0.202	0.750		1.30E-03
May	0.254	1.339	2.41E-04	2.80E-04	0.151	0.901		1.30E-03
Jun	0.340	1.679	9.37E-05	3.73E-04	0.176	1.077		1.30E-03
Jul	0.366	2.045	4.64E-03	5.01E-03	0.188	1.265		1.30E-03
Aug	0.236	2.281	8.01E-03	1.30E-02	0.186	1.451		1.30E-03
Sep	0.339	2.620	4.92E-03	1.79E-02	0.172	1.623		1.30E-03
Oct	0.203	2.823	1.26E-02	3.05E-02	0.205	1.828		1.30E-03
Nov	0.187	3.010	4.34E-04	3.10E-02	0.190	2.018		1.30E-03
Dec	0.253	3.263	3.75E-05	3.10E-02	0.201	2.219		1.30E-03

Figure 1-1
AIRBORNE RELEASES
CY-1996

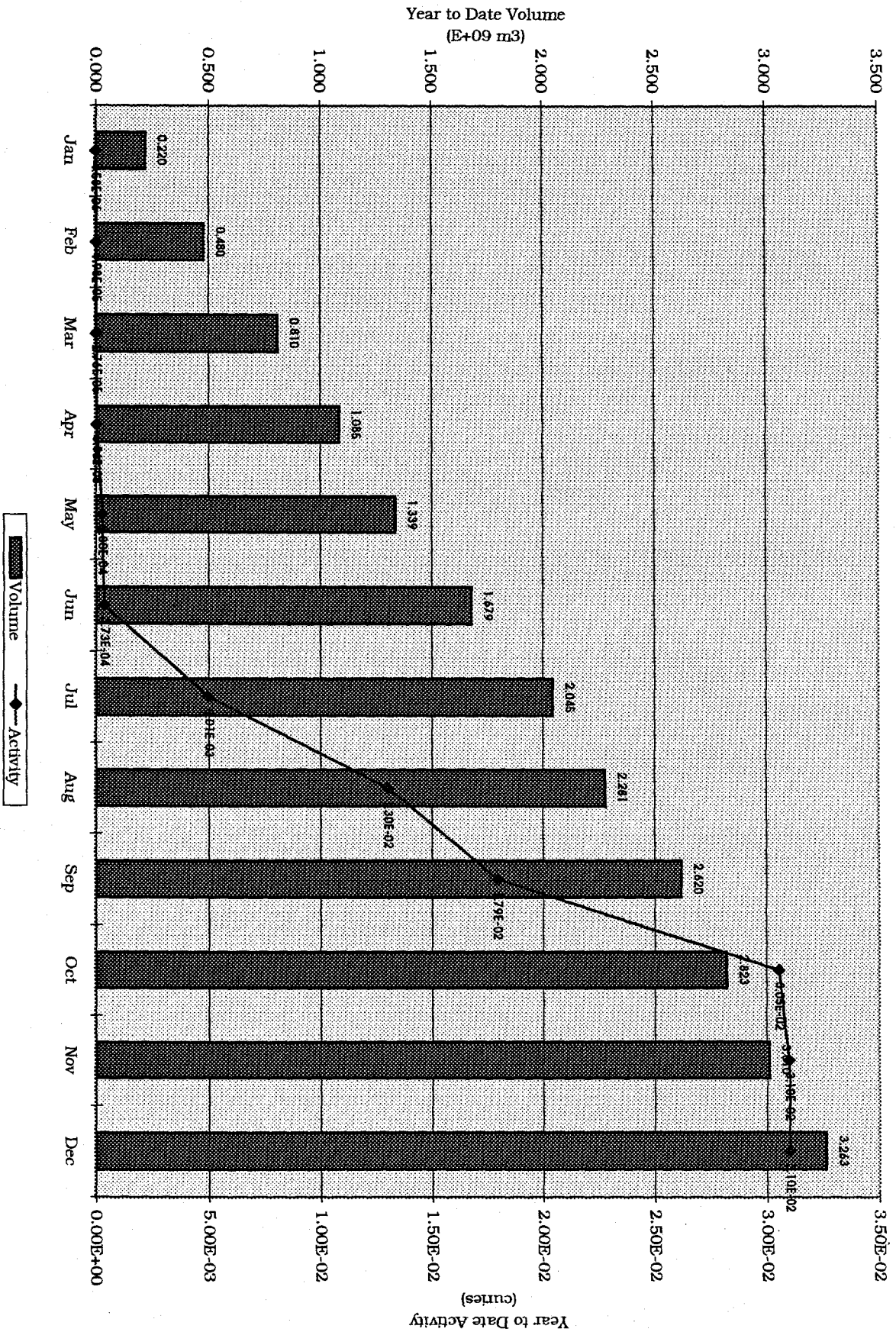
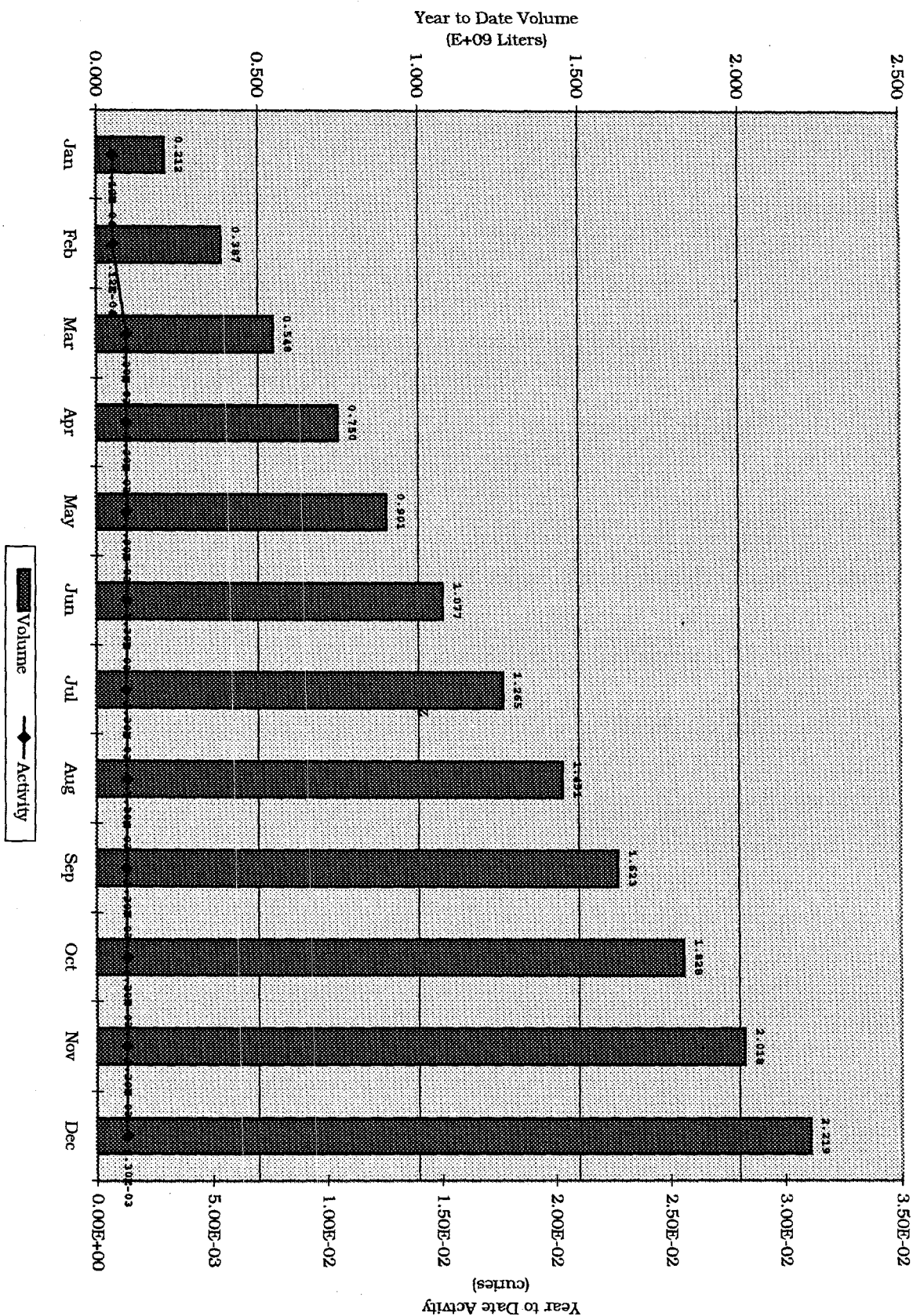


Figure 1-2
LIQUID EFFLUENT RELEASES
CY-1996



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 not in operation in 1996. The Main Stack is equipped with radiological particulate and gaseous monitoring systems and the FAST Stack is equipped with a particulate monitoring system. The Main Stack gaseous monitor was not in operation until May 1996. The airborne monitoring systems are based upon a proportional isokinetic sample. Particulate filters are collected and analyzed daily on the Main Stack. Nitrogen oxide (NO_x) emissions are the only nonradioactive airborne contaminant that is monitored from the Main Stack.

Particulate filters for the RAL Stack are pulled and analyzed monthly and the FAST Stack filter is pulled and analyzed quarterly. The NWCF HVAC stack monitor filters were collected weekly through September 1996. Beginning in October 1996 the filters were collected monthly excluding December due to the previous month's filters reporting extremely low or below detection levels. The Ventilation Off-Gas (VOG) system is continuously monitored for radioactive particulates. The CFSGF is monitored for NO_x , SO_2 , carbon monoxide (carbon monoxide emissions are monitored using coal feed rate and EPA AP-42 emission factors), 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 1996. DCGs at the INEL boundary are reference values for conducting radiological environmental protection programs at operational DOE facilities and sites. Final data reduction is performed by the Environmental Support section of the Environmental Affairs 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 showing yearly trends for radionuclides most likely to be present (iodine-129, cesium-137, strontium-90, ruthenium-106, plutonium (total), and antimony-125), are given in Figures 2-2 through 2-7, 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 472 pounds per hour and 1700 tons per year. The total NO_x released in 1996 was 0 tons.

Table 2-1
AIRBORNE RELEASES FROM ICPP MAIN STACK CY-96 (curies)

RADIONUCLIDES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Co-60	1.40E-08		1.16E-07										1.30E-07
Cs-134							8.16E-08						8.16E-08
Cs-137	4.31E-06	1.50E-05	4.39E-06	9.44E-06	2.55E-05	7.15E-05	3.35E-05	1.44E-05	2.63E-05	1.23E-07	3.06E-06	2.24E-05	2.30E-04
I-129					2.13E-04	1.05E-05	4.59E-03	7.99E-03	4.88E-03	1.26E-02	4.31E-04		3.07E-02
Eu-154						1.99E-07							1.99E-07
Pu-238	2.49E-08	6.57E-08	9.57E-10	8.13E-08		5.54E-08	5.82E-06	8.69E-08			1.84E-08	3.52E-09	6.16E-06
Pu-239	5.12E-09	4.93E-09	1.21E-09	5.22E-09	1.27E-08	4.25E-09		6.45E-08			3.66E-09	2.30E-09	1.04E-07
Ru-106	2.26E-07						1.02E-06	7.13E-07	3.93E-07				2.35E-06
Sb-125		1.18E-07		1.46E-07	3.02E-07		4.62E-07	3.28E-07	1.67E-07				1.52E-06
Sr-90				1.07E-06	2.15E-06	1.45E-06	6.18E-06	3.23E-06	3.34E-06			3.00E-06	2.04E-05
TOTAL ACTIVITY	4.58E-06	1.52E-05	4.51E-06	1.07E-05	2.41E-04	8.37E-05	4.64E-03	8.01E-03	4.91E-03	1.26E-02	4.34E-04	2.54E-05	3.10E-02
TOTAL VOLUME (cubic meters)	1.29E+08	1.27E+08	1.38E+08	1.37E+08	1.40E+08	1.28E+08	1.37E+08	1.37E+08	1.38E+08	1.39E+08	1.25E+08	1.27E+08	
CUMULATIVE ACTIVITY	4.58E-06	1.98E-05	2.43E-05	3.50E-05	2.76E-04	3.60E-04	5.00E-03	1.30E-02	1.79E-02	3.05E-02	3.09E-02	3.10E-02	

BLANKS FOR Sr-90 AND Pu REPRESENT BELOW DETECTION AND REMAINING BLANKS REPRESENT NOT DETECTED IN THE GAMMA SCAN

Figure 2-1
MAIN STACK EFFLUENT
Total Activity (curies)

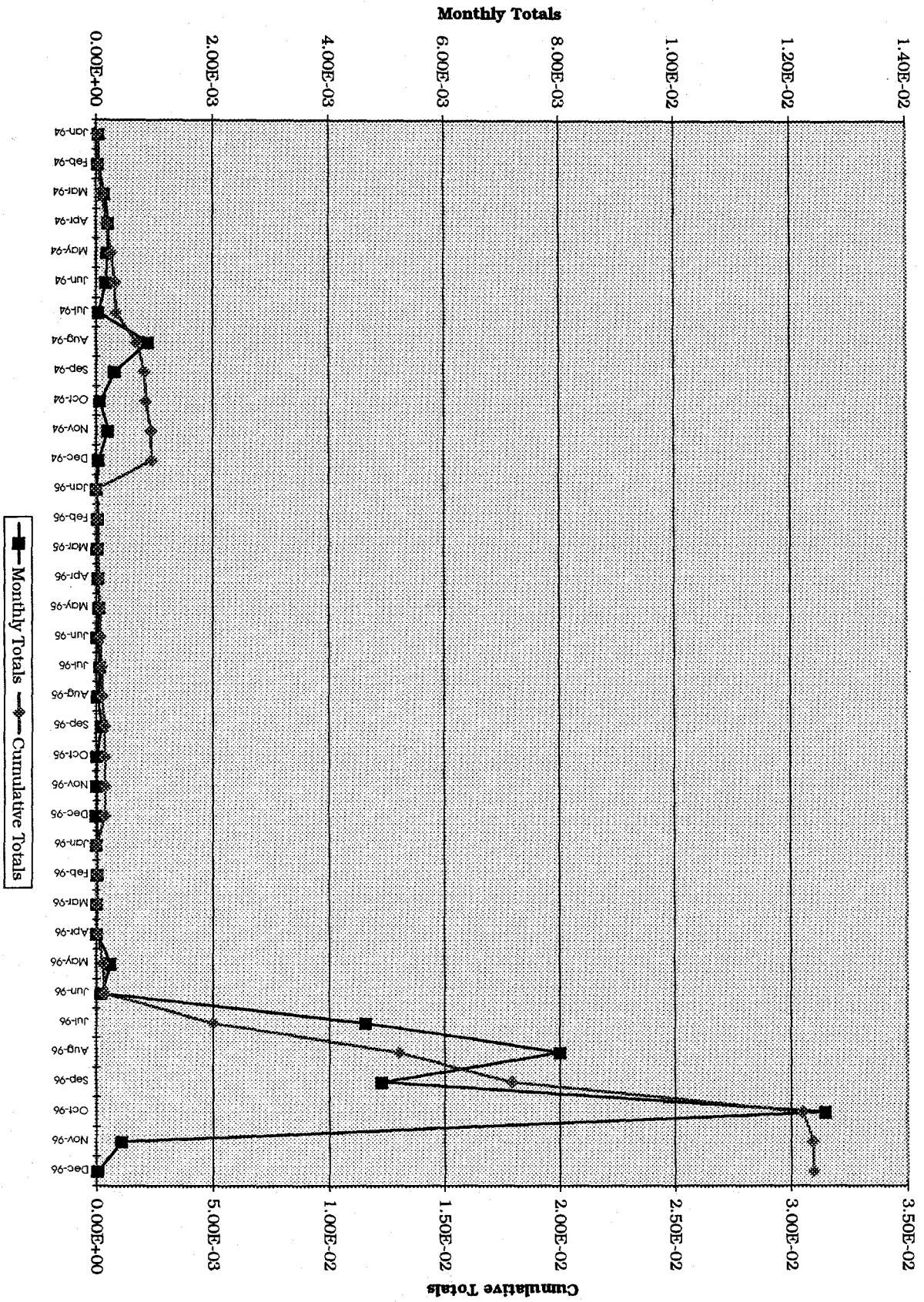


Figure 2-2
MAIN STACK EFFLUENT
1-129 (curies)

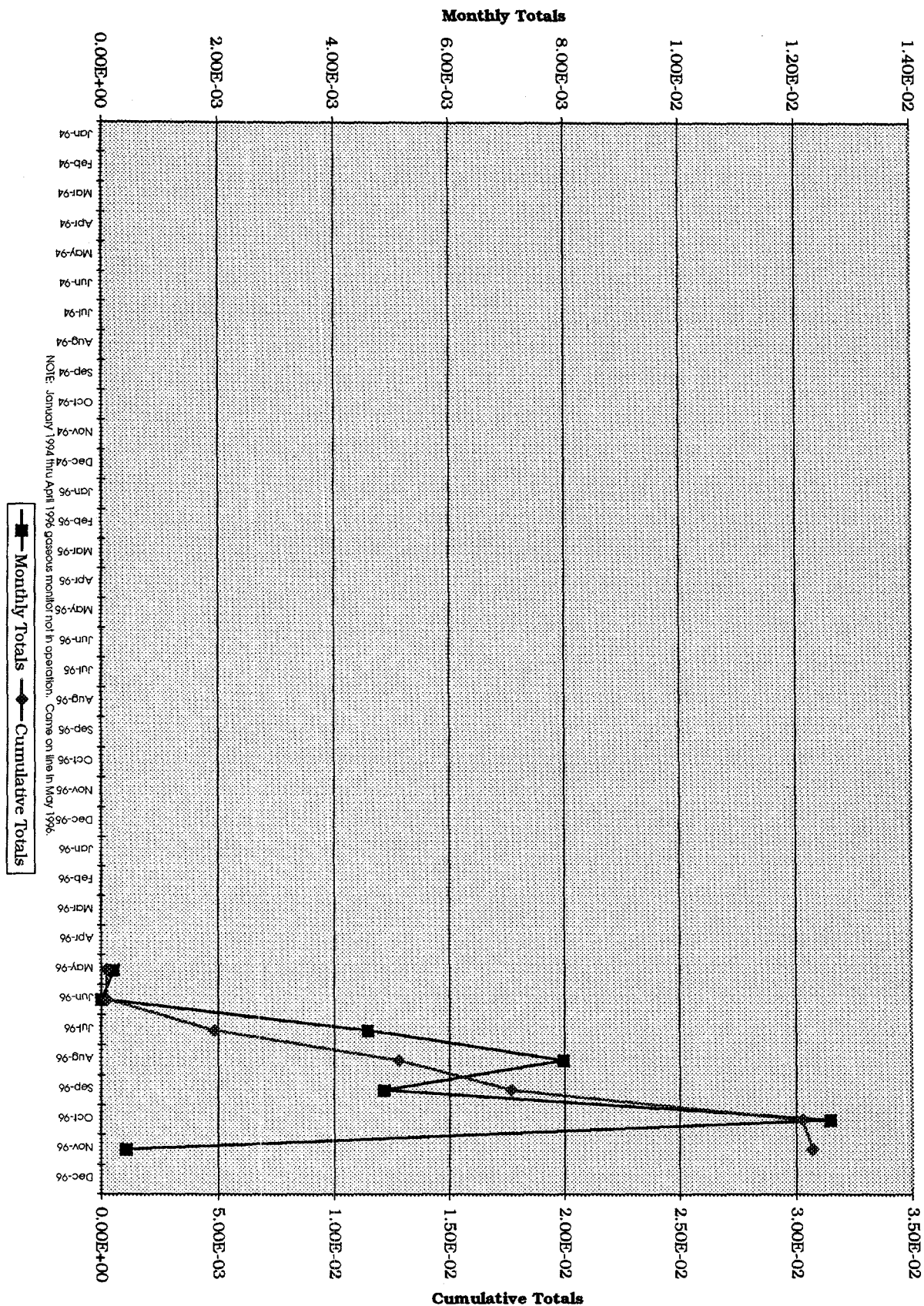


Figure 2-3
MAIN STACK EFFLUENT
Cs-137 (curies)

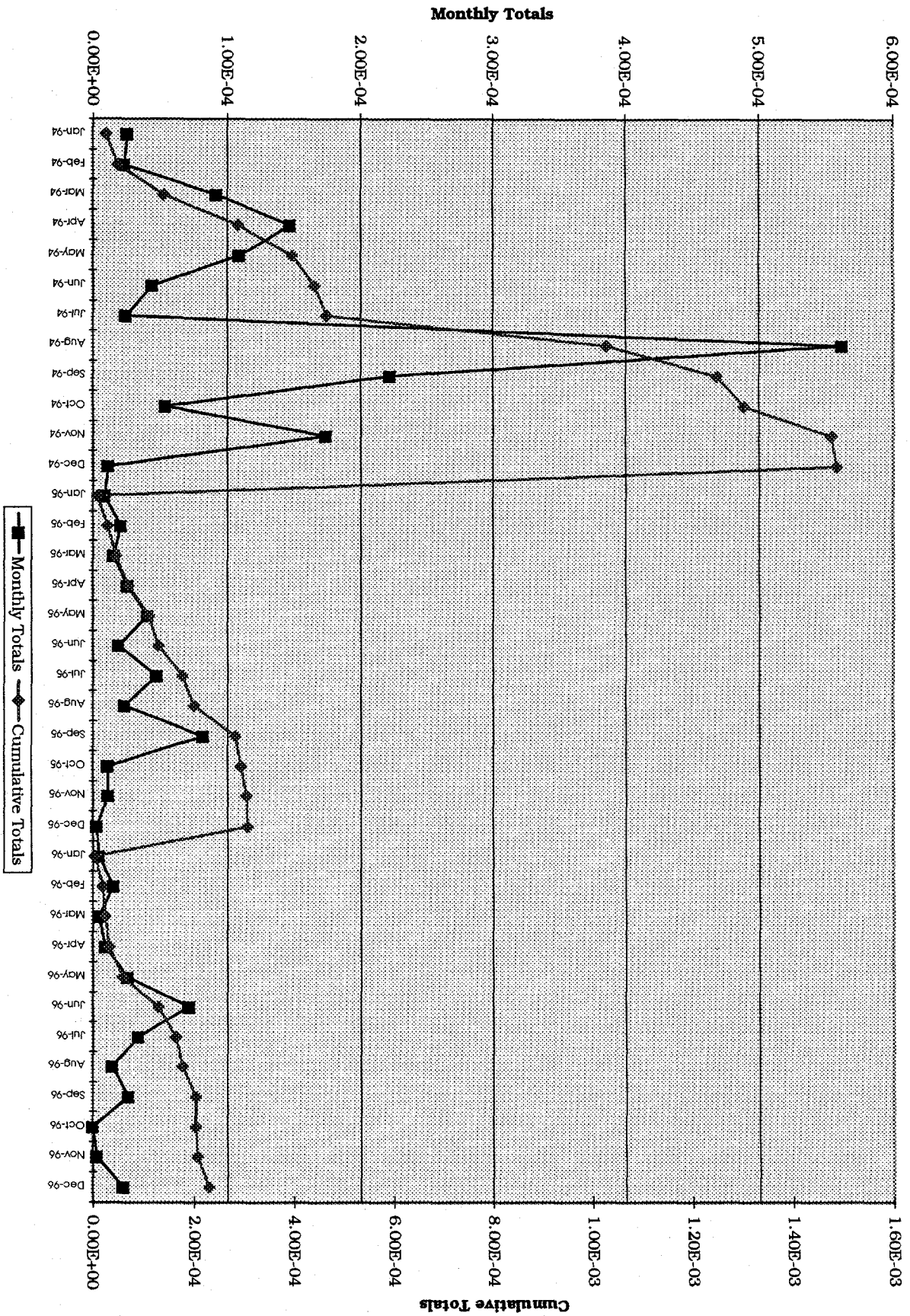


Figure 2-4
MAIN STACK EFFLUENT
Sr-90 (curies)

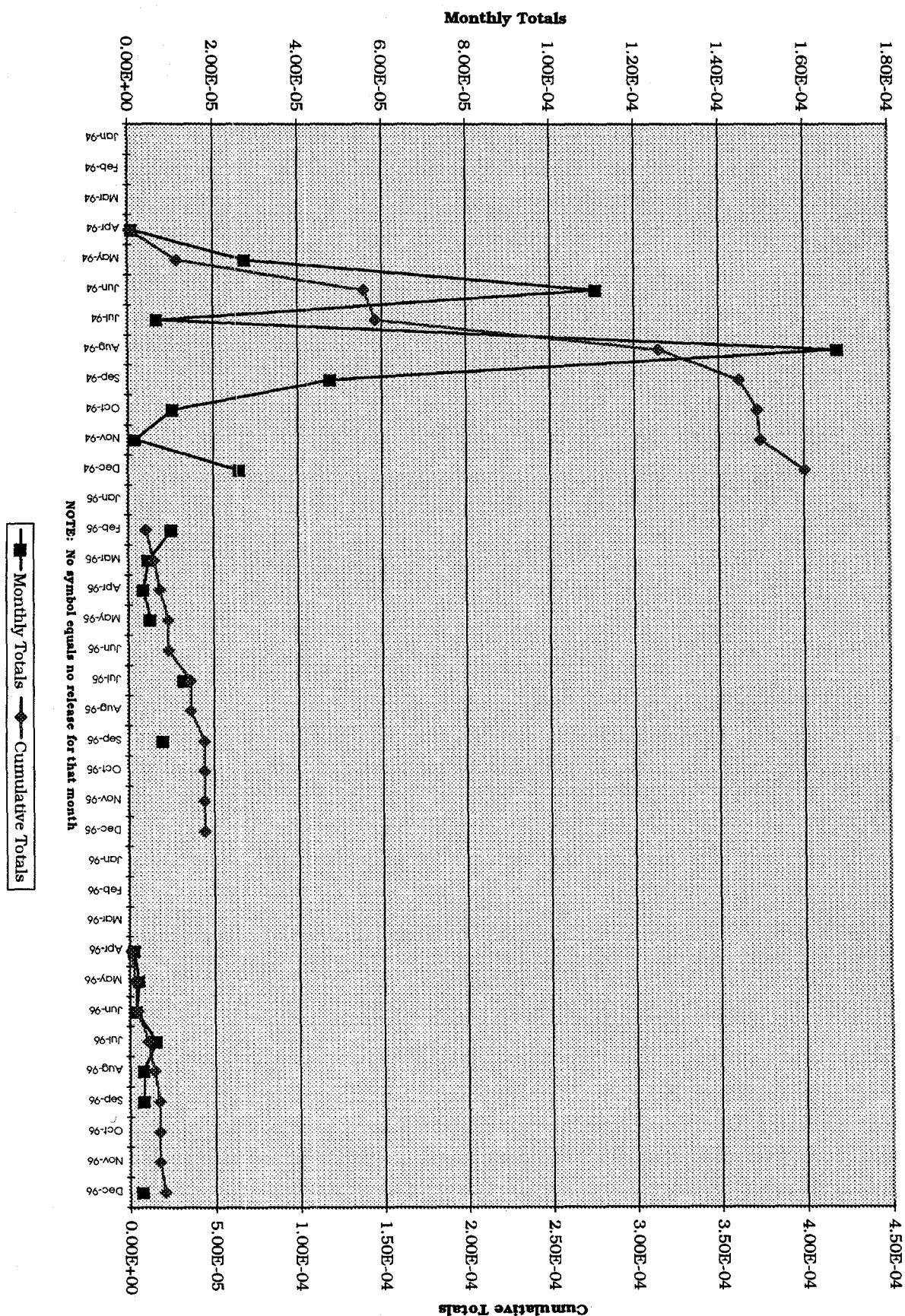


Figure 2-5
MAIN STACK EFFLUENT
Ru-106 (curies)

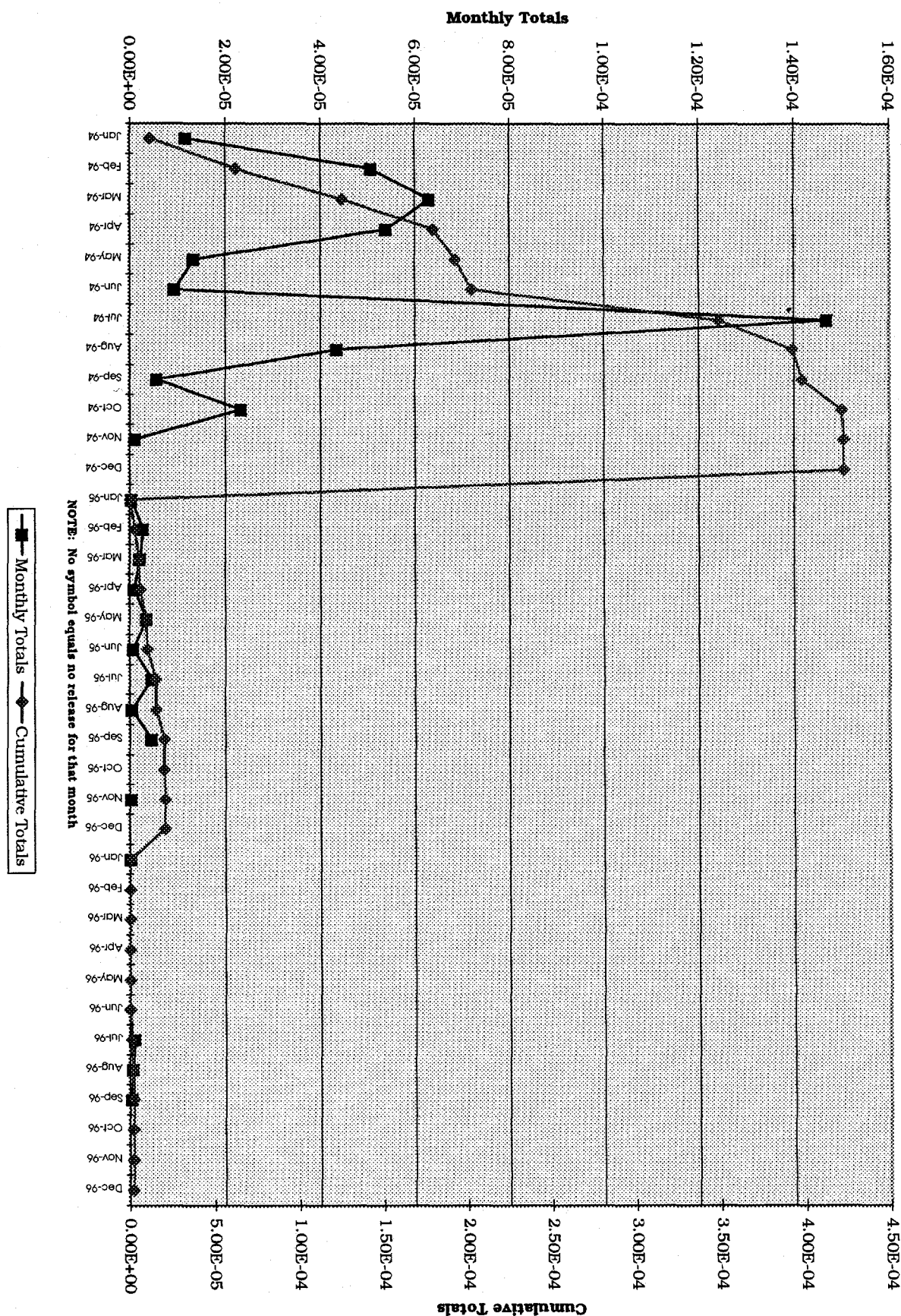


Figure 2-6
MAIN STACK EFFLUENT
Pu-Total (curies)

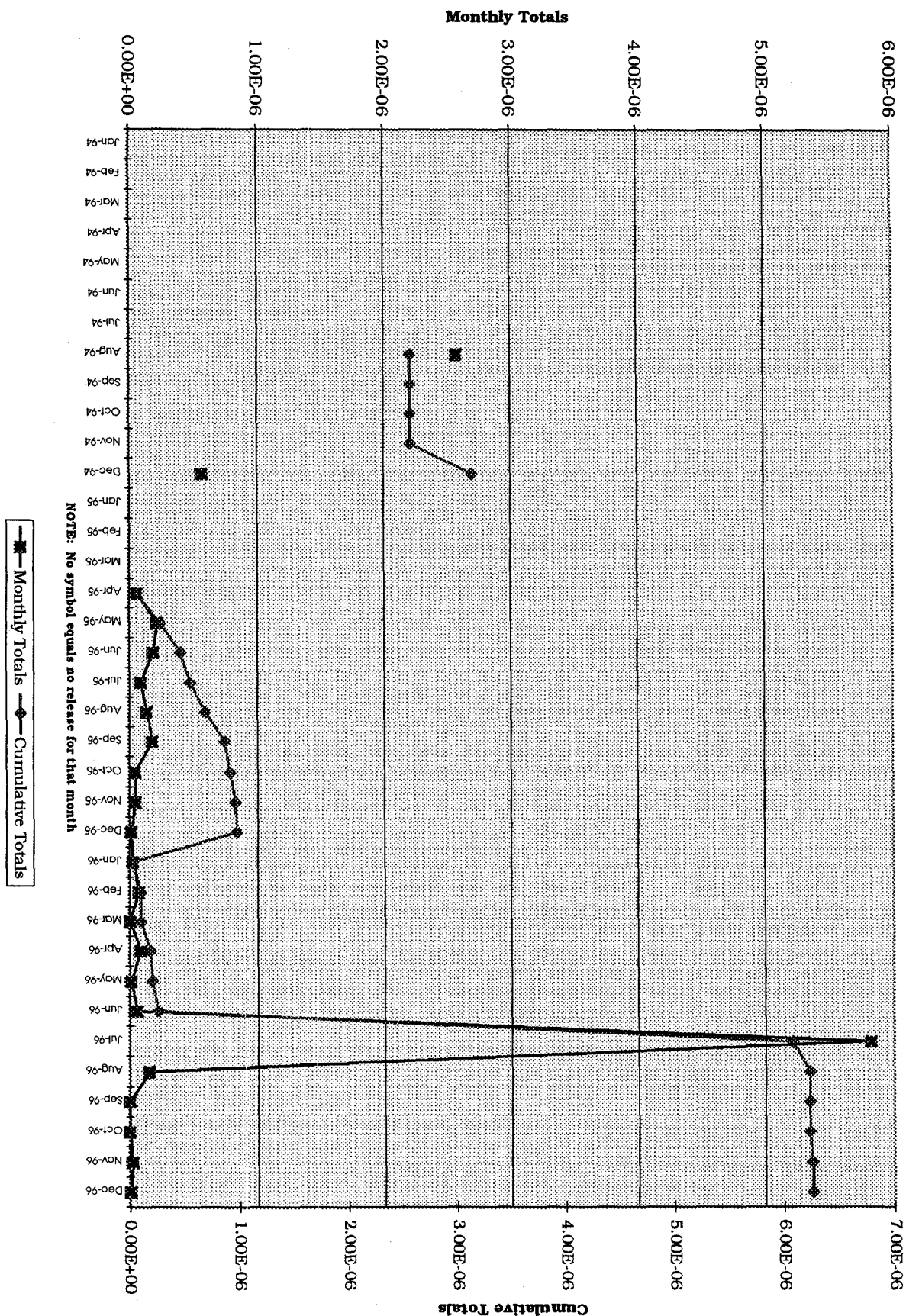
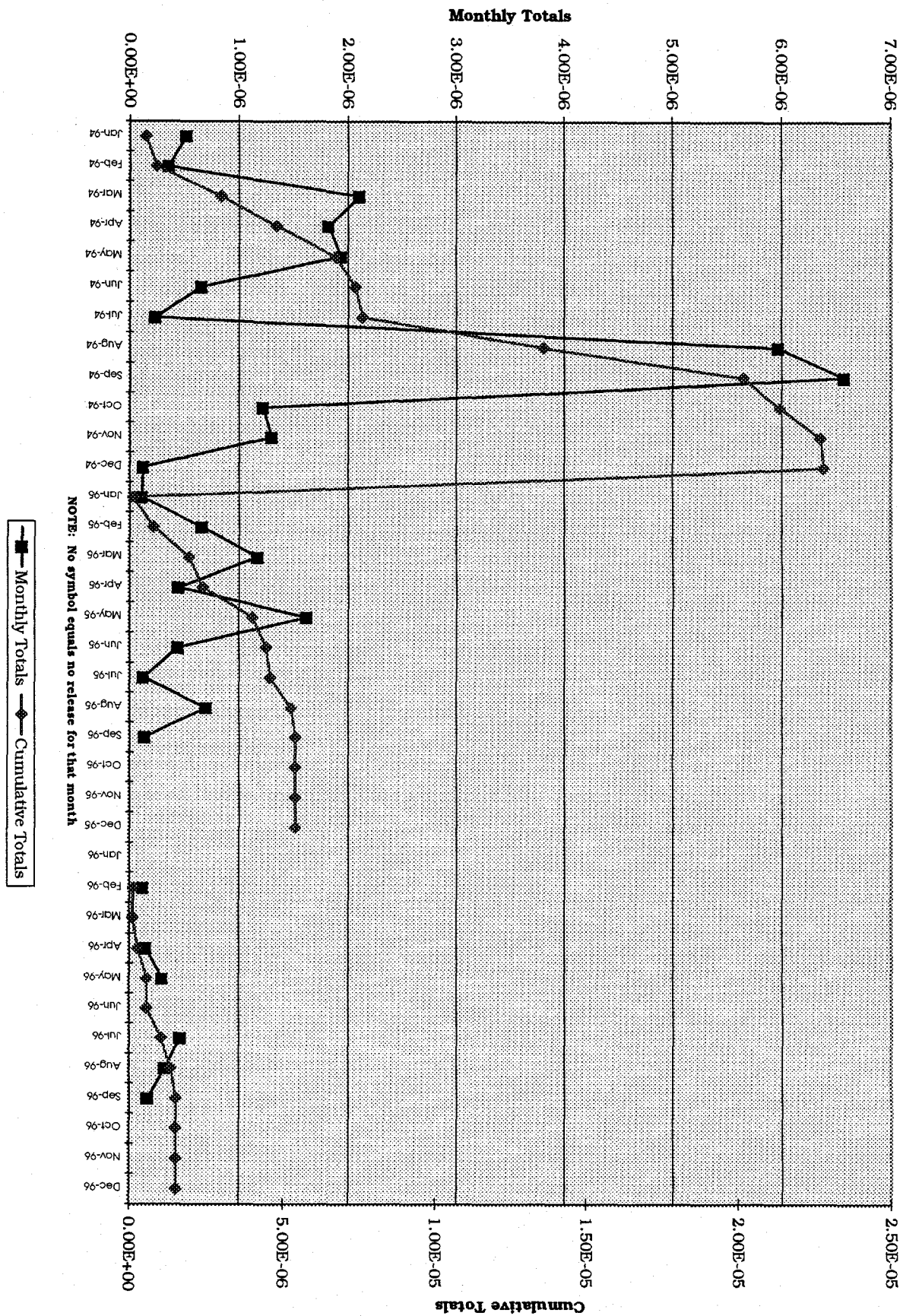


Figure 2-7
MAIN STACK EFFLUENT
Sb-125 (curies)



2.2 FAST Stack

Table 2-2 lists the total radionuclide releases in curies from the FAST Stack per month by radionuclide and Figure 2-8 depicts the total activity. Graphic presentations for plutonium 238, plutonium 239, antimony-125, and cesium 137 showing yearly trends are given in Figures 2-9 through 2-12, 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 2-13 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 2-14 depicts the total monthly activity.

2.5 Coal Fired Steam Generating Facility (CFSGF)

The CFSGF stack is monitored continuously for sulfur dioxide (SO_2), nitrogen oxide (NO_x), and opacity. Carbon monoxide (CO) is calculated by using AP-42 emission factors and fuel consumption rates. 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 SO_2 calculated as an average over a 30 day period. SO_2 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. Carbon monoxide shall not exceed 148.5 lbs/hr or 650.4 tons/yr. Opacity limit for the CFSGF is 20%.

Table 2-2
AIRBORNE RELEASES FROM ICPP FAST STACK FY-1996
(curies)

RADIONUCLIDES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Co-60													
Cs-134						5.08E-07							
Cs-137			3.19E-08										3.19E-08
Ba-152													
Ba-154													
Pu-238			1.83E-09			8.50E-10	1.03E-07		5.47E-09				1.11E-07
Pu-239			1.66E-09			7.24E-10			5.04E-09				7.42E-09
Ru-106													
Sb-125			3.28E-06			9.42E-06	1.36E-06		8.18E-06			1.21E-05	3.43E-05
Sr-90													0.00E+00
TOTAL ACTIVITY			3.32E-06			9.93E-06	1.46E-06		8.19E-06			1.21E-05	3.50E-05
TOTAL VOLUME (cubic meters)			1.05E+08			1.05E+08	1.05E+08		1.05E+08			1.05E+08	
CUMULATIVE ACTIVITY			3.32E-06	3.32E-06	3.32E-06	1.32E-05	1.47E-05	1.47E-05	2.29E-05	2.29E-05	2.29E-05	3.50E-05	

Figure 2-8
FAST STACK EFFLUENT
Total Activity (curies)

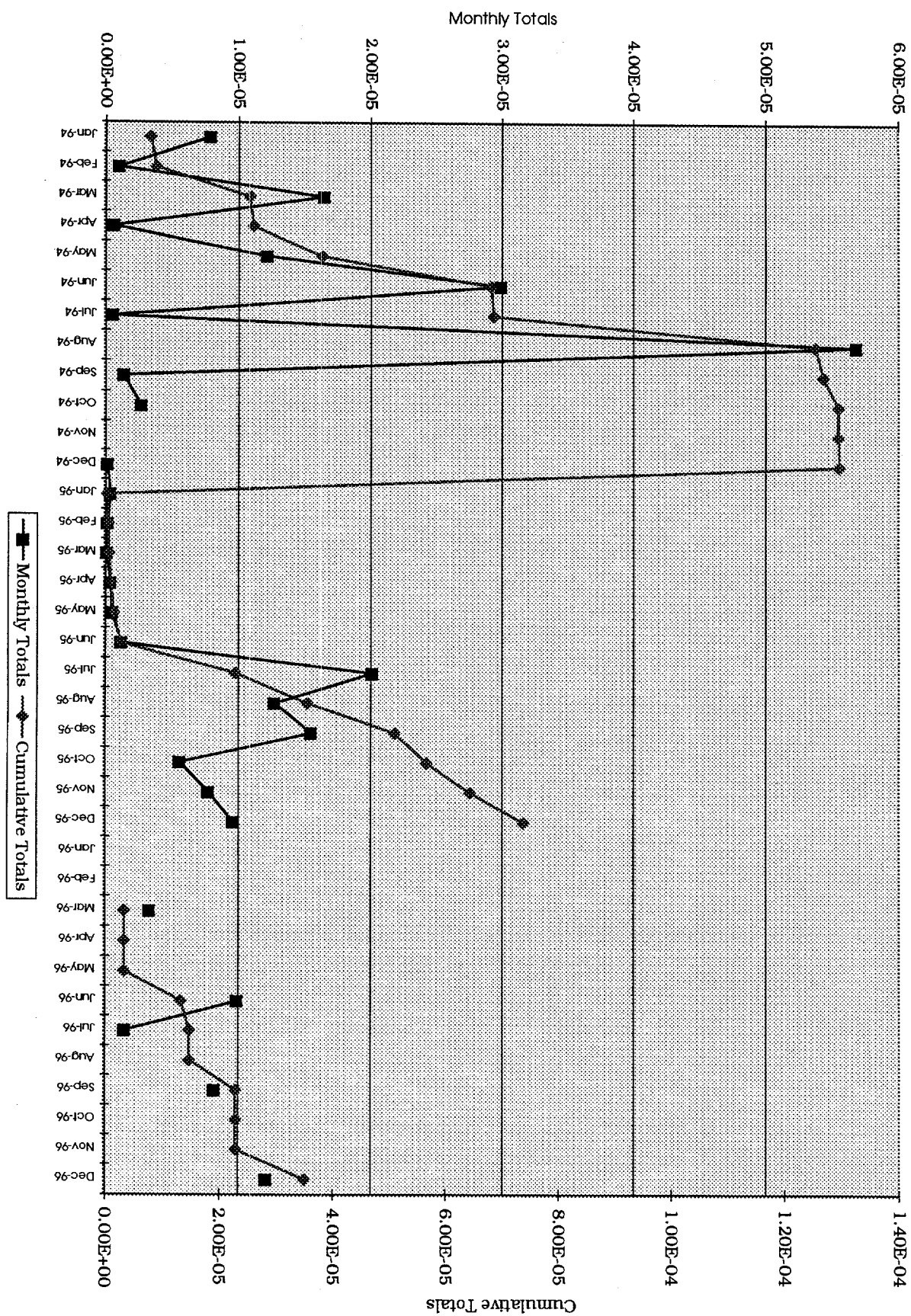


Figure 2-9
FAST STACK EFFLUENT
Pu-238 (curies)

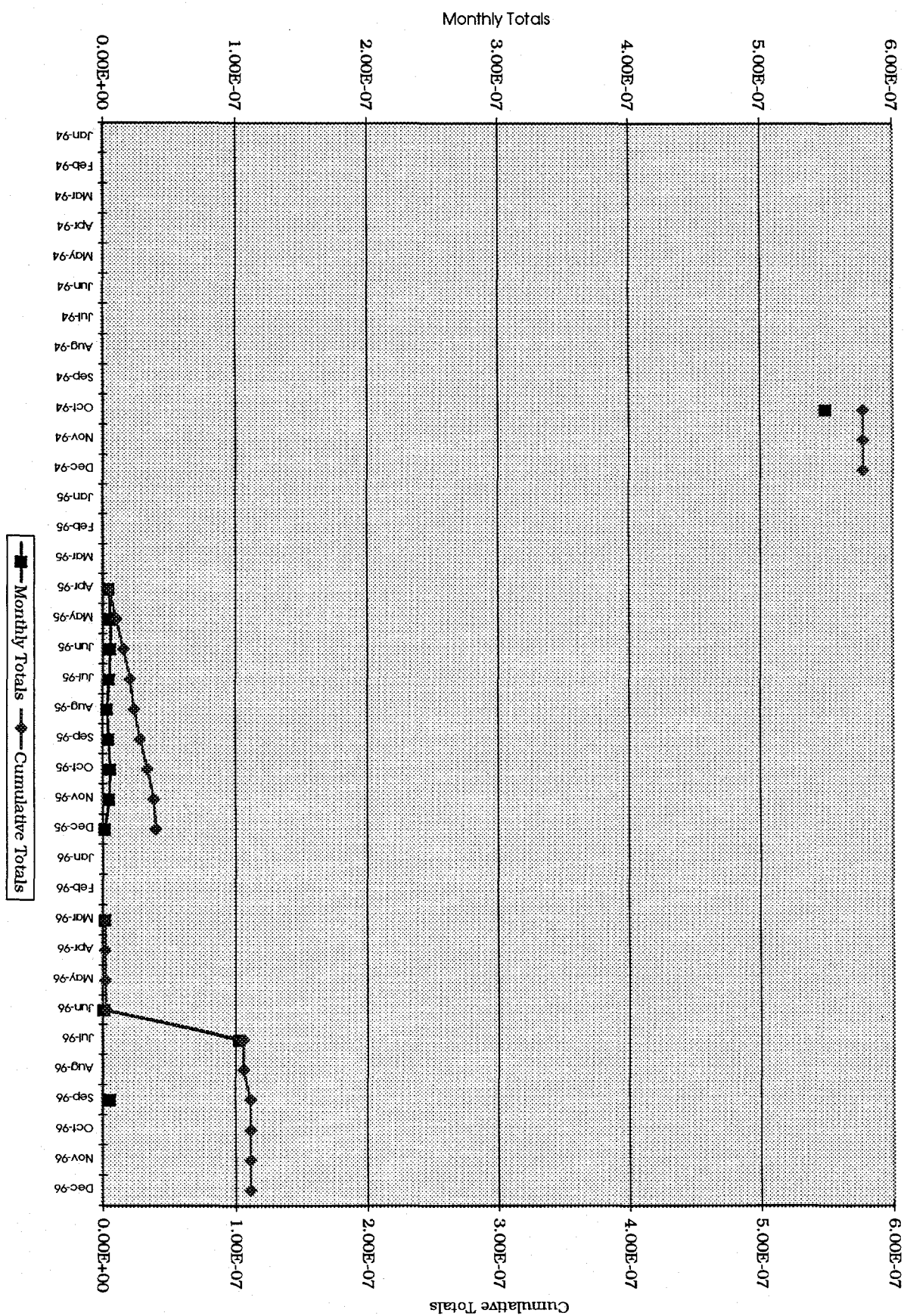


Figure 2-10
FAST STACK EFFLUENT
Pu-239 (curies)

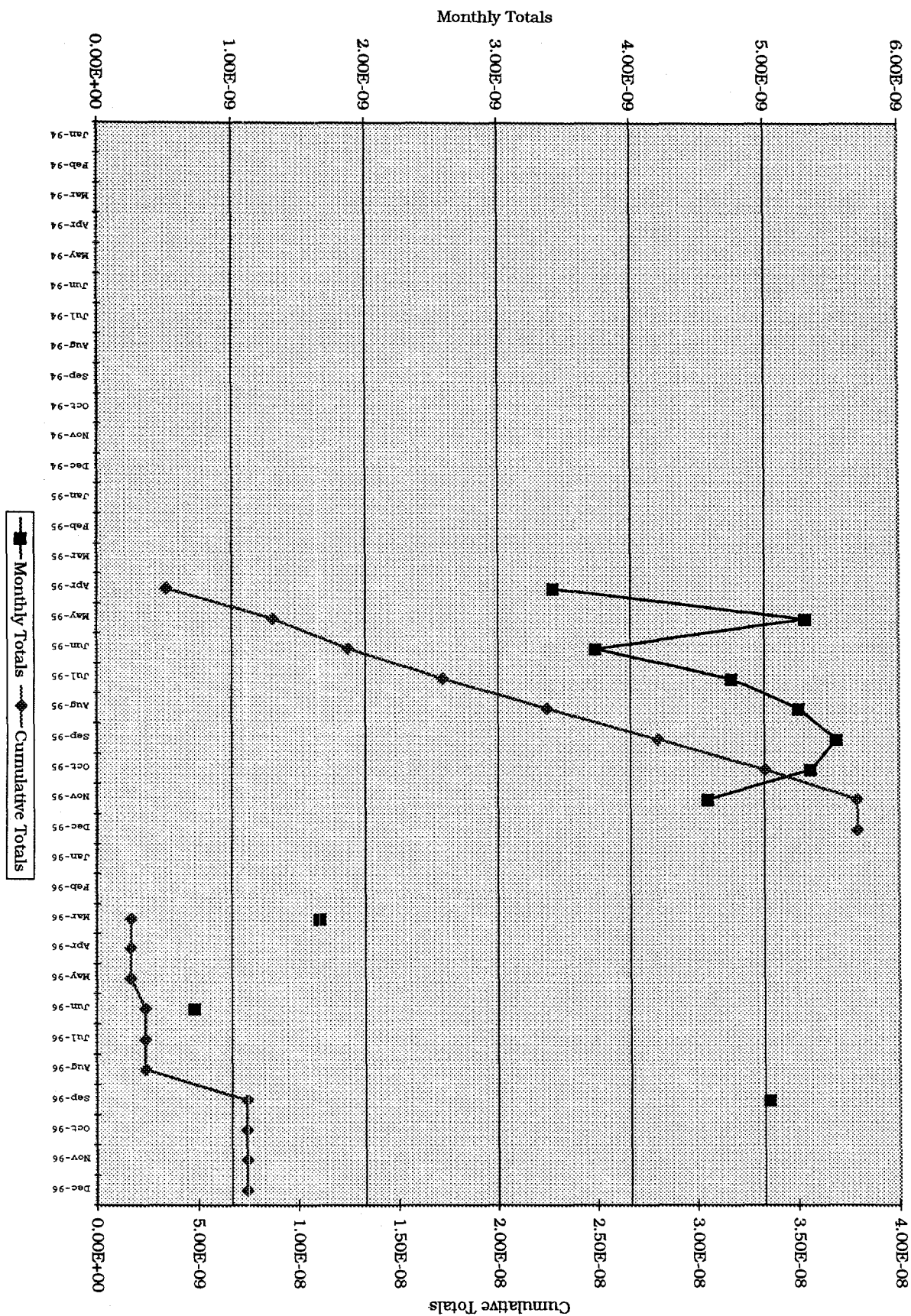


Figure 2-11
FAST STACK EFFLUENT
Sb-125 (curies)

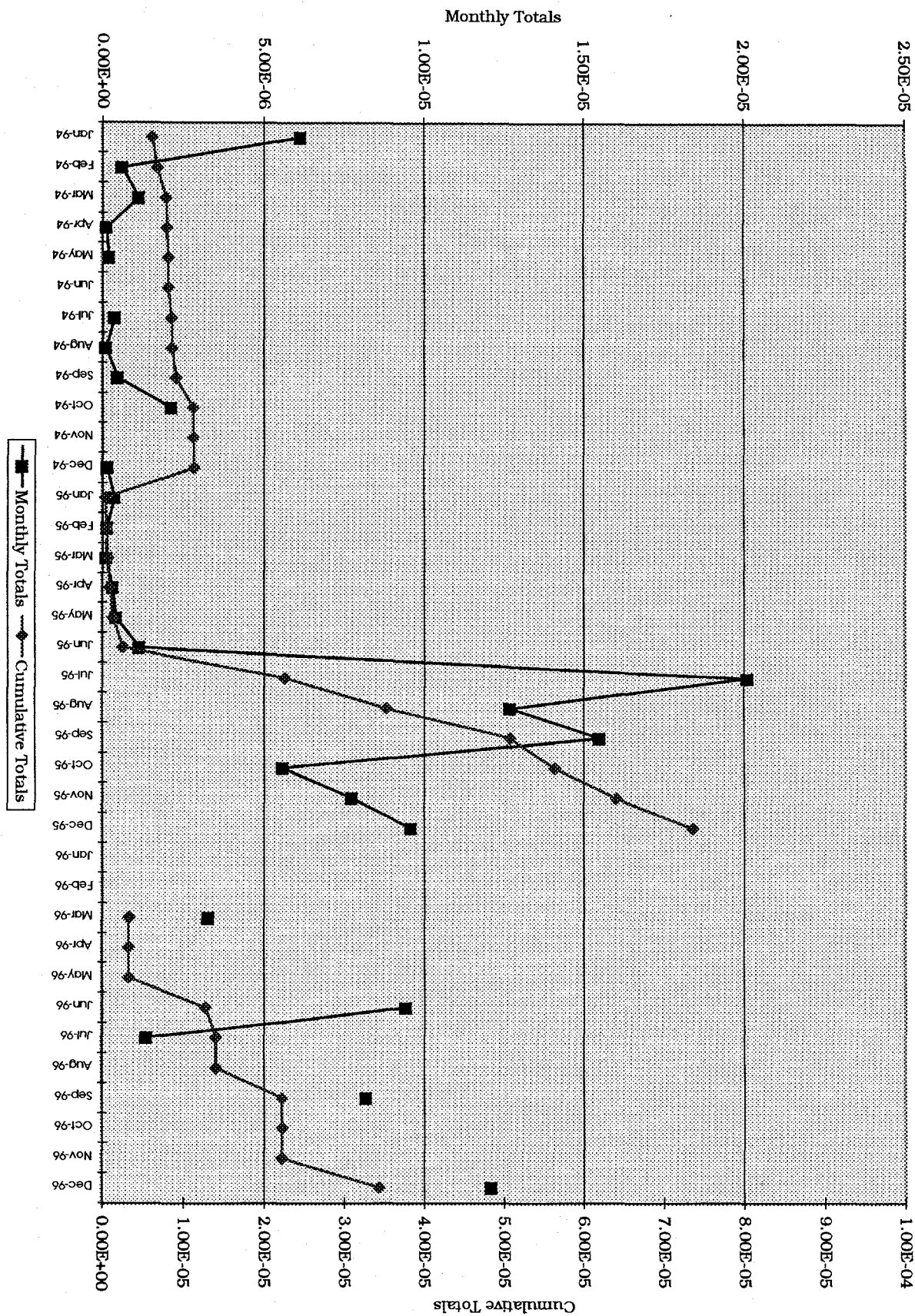


Figure 2-12
FAST STACK EFFLUENT
Cs-137 (curies)

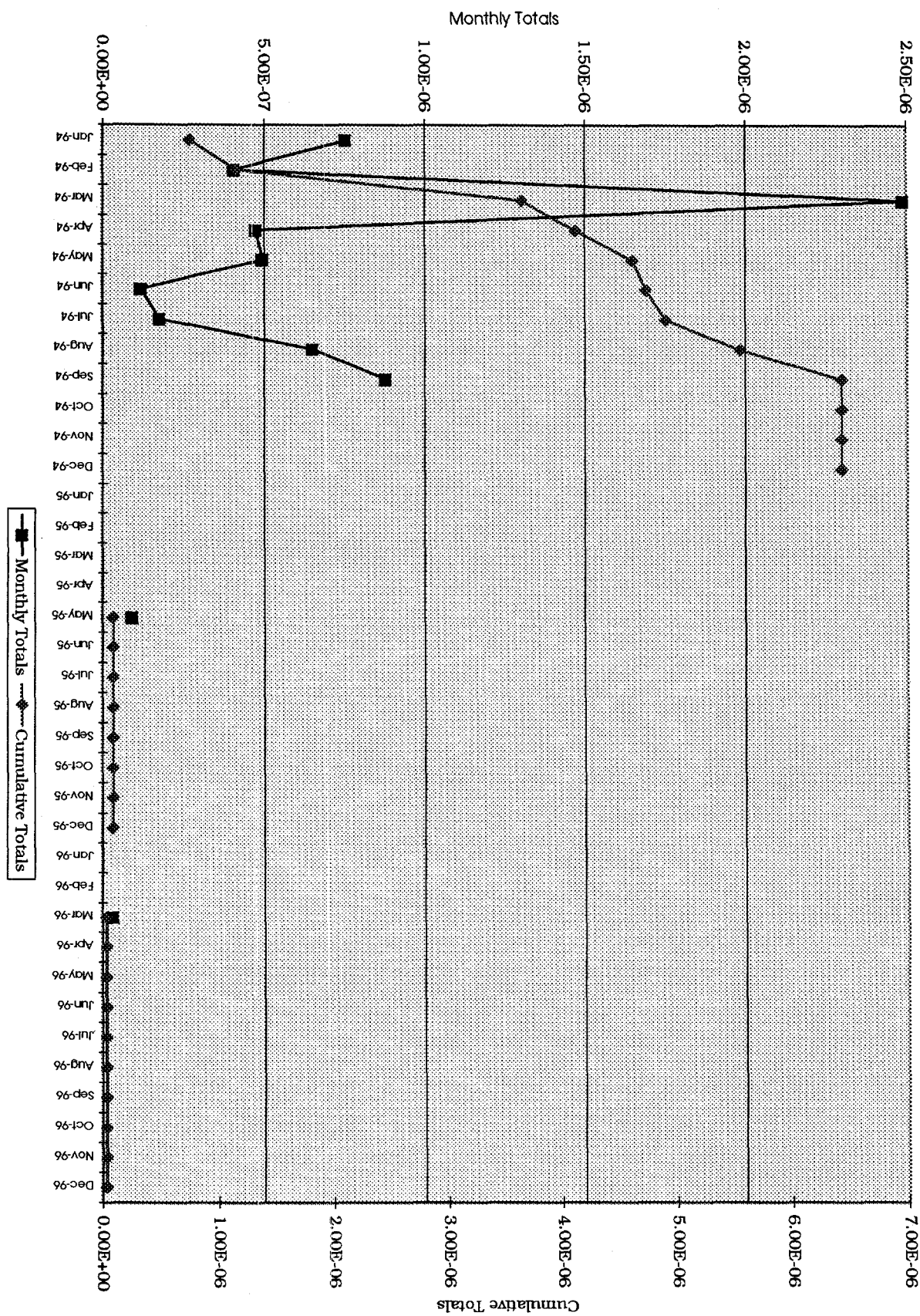


Table 2-3
AIRBORNE RELEASES FROM ICPP NWCF CY-1996
(curies)

AIRBORNE RELEASES FROM ICPP NWCF STACK CY-1996
(curies)

RADIONUCLIDES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Cs-137										2.00E-08	3.50E-09		2.35E-08
Co-60						7.95E-08							7.95E-08
Pu-238										4.61E-12	7.50E-11		7.96E-11
Pu-239										2.75E-11	1.72E-11		4.47E-11
Ru-106										1.00E-08	-2.50E-07		-2.40E-07
Sb-125										-1.50E-08			-1.50E-08
Sr-90										2.00E-09	-3.50E-09		2.73E-07
TOTAL ACTIVITY				2.74E-07		7.95E-08				1.70E-08	-2.50E-07		1.21E-07
TOTAL VOLUME (cubic meters)	7.03E+07	1.13E+08	6.88E+07	1.18E+08	9.34E+07	8.68E+07	1.03E+08	7.77E+07	8.57E+07	4.33E+07	4.14E+07		
CUMULATIVE ACTIVITY				2.74E-07	2.74E-07	3.54E-07	3.54E-07	3.54E-07	3.54E-07	3.71E-07	1.21E-07	1.21E-07	

BEGINNING IN OCTOBER CALCULATIONS SHEETS WERE REVISED, NOW USING ALL VALUES INCLUDING NON-DETECTABLES.

BLANKS REPRESENT BELOW DETECTION LIMITS

No filter pulled in December

Figure 2-13
NWCFF STACK EFFLUENT
Total Activity (curies)

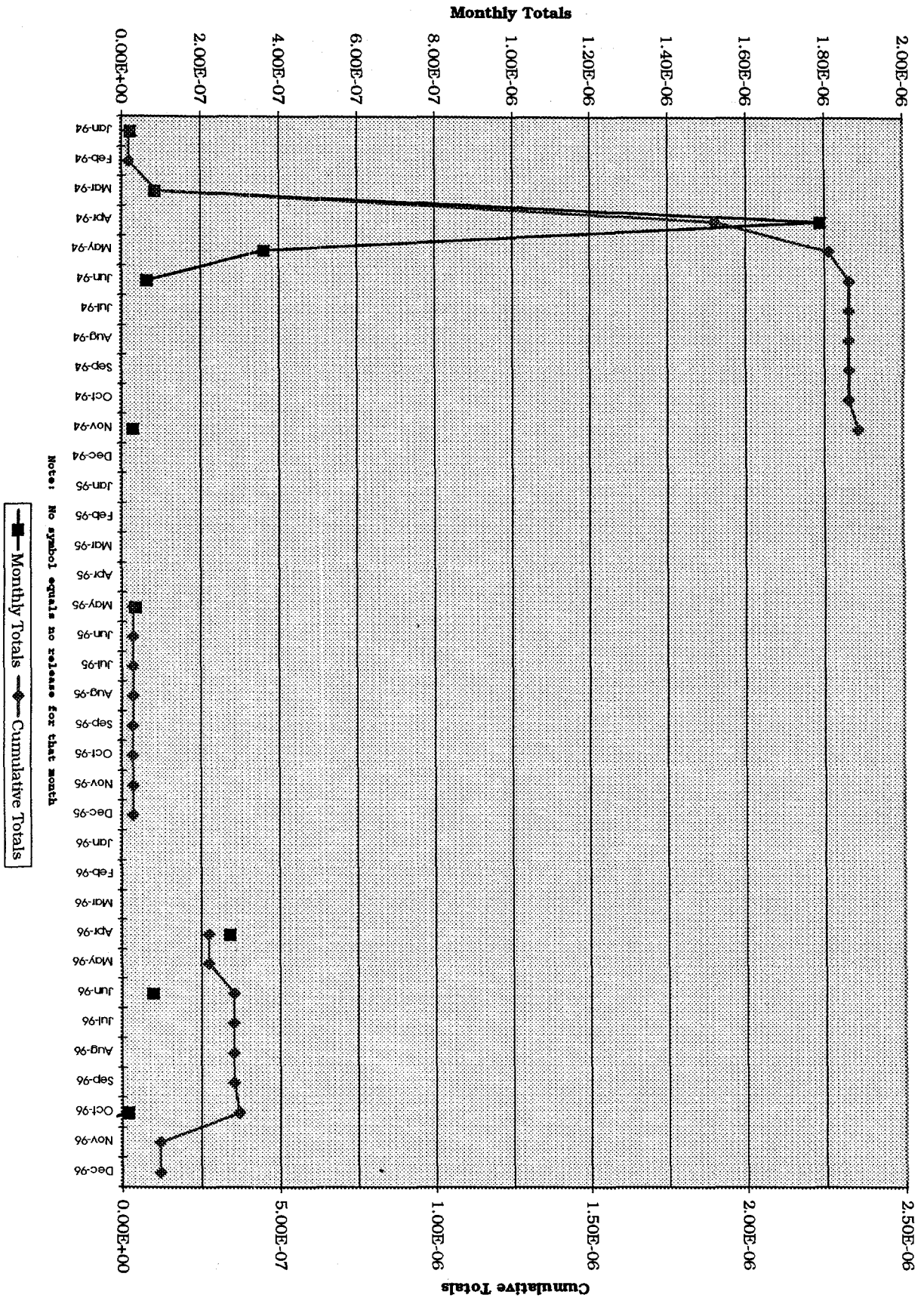


Table 2-4
AIRBORNE RELEASES FROM ICPP RAL STACK CY-1996
(curies)

RADIONUCLIDES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Co-60													0.00E+00
Cs-134													0.00E+00
Cs-137													0.00E+00
Pu-238	2.07E-09	1.45E-09	9.81E-10	7.52E-10	2.83E-09	8.75E-10	3.50E-08	5.20E-10	4.12E-09	5.56E-09	3.11E-09	3.61E-09	6.09E-08
Pu-239	1.23E-10	1.02E-09	1.24E-09	9.27E-11	1.39E-09		2.83E-09	1.44E-09	3.25E-09	2.29E-09	2.70E-09	4.32E-09	2.07E-08
Ru-106													0.00E+00
Sb-125													0.00E+00
Sr-90													0.00E+00
TOTAL ACTIVITY	2.19E-09	2.47E-09	2.22E-09	8.45E-10	4.22E-09	8.75E-10	3.78E-08	1.96E-09	7.37E-09	7.85E-09	5.81E-09	7.93E-09	8.16E-08
TOTAL VOLUME (cubic meters)	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	2.08E+07	2.08E+07
CUMULATIVE ACTIVITY	2.19E-09	4.66E-09	6.88E-09	7.73E-09	1.19E-08	1.28E-08	5.07E-08	5.26E-08	6.00E-08	6.78E-08	7.36E-08	8.16E-08	

Filters are pulled monthly

Blanks for Sr-90 and Pu represent below detection and remaining blanks represent not detected in the gamma scan

Figure 2-14
RAL STACK EFFLUENT
Total Activity (curies)

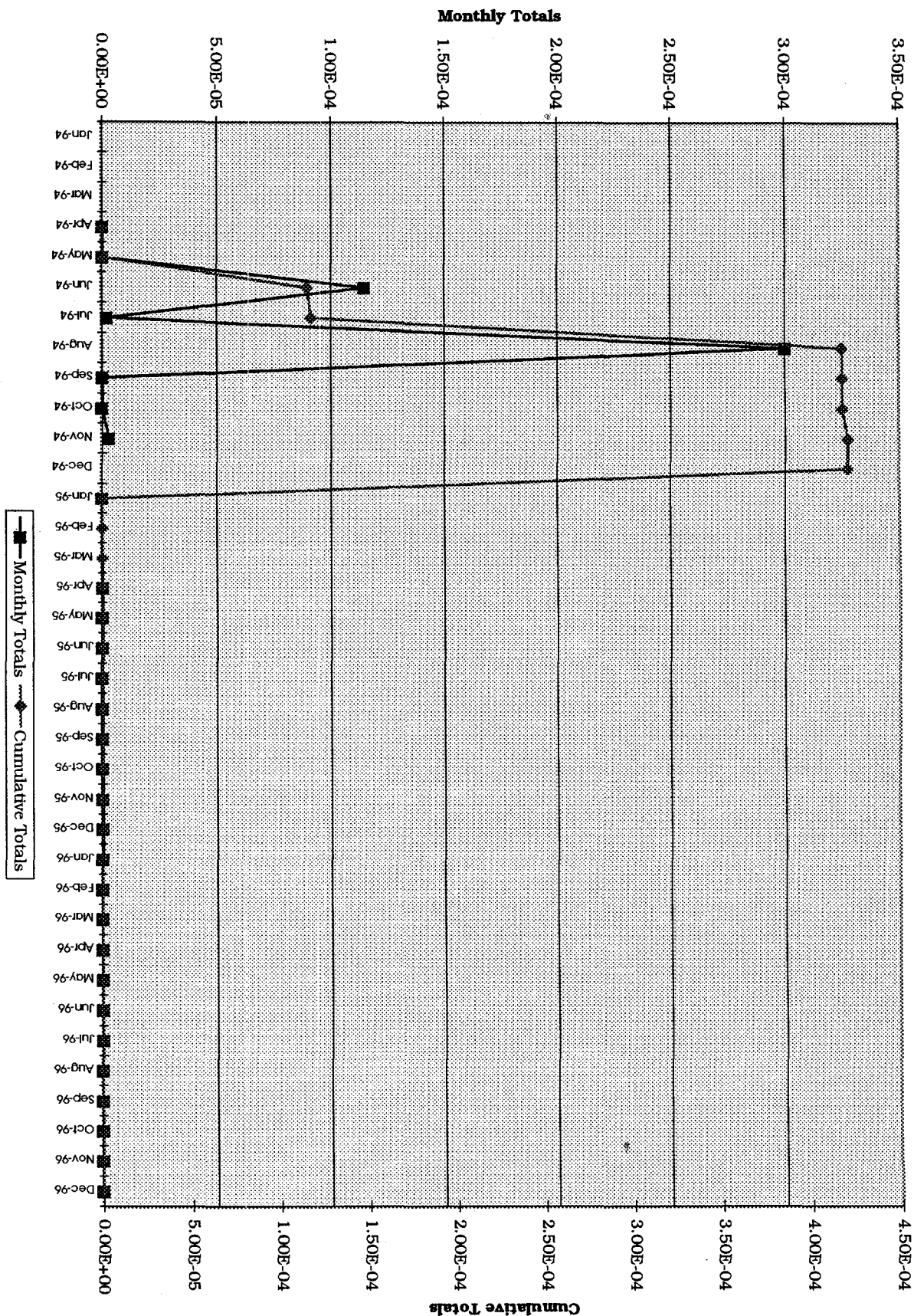


Table 2-5
CY-1996

COAL FIRED STEAM GENERATOR FACILITY

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	EMISSION LIMITATIONS
COAL BURNED (TONS)	1833	1805	1581	1351	1169	916			596	1177	1461	2001	N/A
CUMULATIVE COAL BURNED (TONS)	1833	3638	5219	6570	7739	8655	8655	8655	9251	10428	11889	13890	N/A
MM/Btu/#Burned	0.012668	0.012668	0.012668	0.012668	0.012668	0.012685		0.012685	0.012685	0.012685	0.012685	0.012685	N/A
% Sulfur	0.37	0.37	0.37	0.37	0.37	0.43		0.43	0.43	0.43	0.43	0.43	N/A
#NOX/MM/Btu	0.39	0.36	0.44	0.4	0.37	0.43		0.46	0.51	0.43	0.48		0.45 SEE FOOTNOTE
#SO2/MM/Btu	0.11	0.09	0.11	0.09	0.11	0.1		0.08	0.09	0.06	0.04		0.05 0.6
Permit Steam Flow Range A or B	B	A	A	B	B	A		A	A	A	A		A SEE FOOTNOTE
% SO2 Removed	81.7	83.9	81	83.5	82	83.2		84.8	82.9	89.2	92.1	91.1	70% OR GREATER
% Opacity	3	2	2	1	1	1		1	1	1	1	1	
*Carbon Monoxide (CO) lbs/hr	81.6	39.3	29.5	29	28.3	22.4		18	18.6	89.2	31.86	44.4	148.5
Carbon Monoxide (CO) tons	12.98	14.62	10.98	10.44	10.53	8.63		5.78	4.93	9.04	11.47	16.52	
Carbon Monoxide (CO) TONS CUMULATIVE	12.98	27.6	38.58	49.02	59.55	68.18	68.18	73.96	78.89	87.93	99.4	115.92	650.4

Opacity = <20%

Coal Burned (tons) = N/A

mm BTU/burned = NA

% Sulfur = N/A

Nitrogen oxide (lbs. NOx/mmBTU) emissions shall not exceed an average of 0.5 pounds per million BTU's (Range B) averaged over a 24-hour period for steam flow greater or equal to 35000 lbs/hr.

Nitrogen oxide (lbs. NOx/mmBTU) emissions shall not exceed an average of 0.7 pounds per million BTU's (Range A) averaged over a 24-hour period for steam flow less than 35000 lbs/hr.

Sulfur dioxide (lbs. SO2/mmBTU) 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)

Carbon monoxide (CO) emissions for the boilers shall not exceed an average of 148.5 lbs/hr averaged over a 30 day period.

REGULATORY WINCO DRIVERS: DOE 5400.1, PSD PERMIT PSD-XB1-11 (2/86) AND REVISION TO PSD PERMIT PSD-XB1-11 (2/94)

III. LIQUID MONITORING

1. INTRODUCTION

Liquid monitoring discussed in this report includes Service Waste System, and Sewage Treatment Plant. 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 LITCO 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. The Liquid Effluent Treatment and Disposal (LET&D) Facility began operation on January 1, 1993.

Wastewater Land Application Permit (WLAP) LA-000130 for the Idaho Chemical Processing Plant (ICPP) percolation ponds was effective September 20, 1995. The permit authorizes construction, installation, modification or operation of a WLAP treatment system in conformance with requirements, limitations and conditions required in the permit.

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. 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 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. Figure 3-1 depicts the total monthly activity released to the active Percolation Pond at ICPP.

Figure 3-2 depicts plutonium and figures 3-3 through 3-5 depicts uranium-234, uranium-235, and uranium-238 found in the service waste stream. Figures 3-6 present trend information for Sr-90 in the Service Waste.

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. The ICPP did not approach the total allowable release at any time during 1996. The ICPP did not exceed a ratio of 1.0 during any month in 1996.

Table 3-1
LIQUID RELEASES FROM ICPP SERVICE WASTE CY-1996
(curies)

RADIONUCLIDES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Cs-134													
Cs-137			5.83E-04										5.83E-04
Eu-152													
Pu-238	2.96E-06												2.96E-06
Pu-239													
Pu-241													
Ru-106													
Sb-125													
Sr-90	1.69E-04												1.69E-04
U-234	3.60E-04												3.60E-04
U-235	1.06E-05												1.06E-05
U-238	1.69E-04												1.69E-04
TOTAL ACTIVITY	7.12E-04		5.83E-04										1.29E-03
TOTAL VOLUME (liters)	2.12E+08	1.75E+08	1.61E+08	2.02E+08	1.51E+08	1.76E+08	1.88E+08	1.86E+08	1.72E+07	2.05E+08	1.90E+08	2.01E+08	
CUMULATIVE ACTIVITY	7.12E-04	7.12E-04	1.29E-03	1.29E-03	1.29E-03	1.29E-03	1.29E-03	1.29E-03	1.29E-03	1.29E-03	1.29E-03	1.29E-03	

Table 3-2
ICPP SERVICE WASTE CY-1996
(mg/L)

SUBSTANCE	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.
Aluminum (Al)			3.72E-02									
Arsenic (As)												
Barium (Ba)	1.09E-01	8.10E-02	9.49E-02	7.90E-02	6.15E-02	1.07E-01	1.33E-01	1.00E-01	7.35E-02	6.32E-02	9.61E-02	8.00E-02
Cadmium (Cd)							4.30E-03					
Chloride Ion	3.49E+02	2.94E+02	2.65E+02	3.42E+02	2.10E+02	2.86E+02	3.29E+02	2.77E+02	2.06E+02	2.47E+02	2.80E+02	2.56E+02
Chromium (Cr)	5.20E-03	7.70E-03	5.40E-03		4.10E-03			5.20E-03		3.40E-03		5.40E-03
Copper (Cu)	5.80E-03	9.80E-03										
Fluoride Ion				2.10E-01		2.41E-01	2.40E-01	2.48E-01	2.40E-01	2.90E-01	2.40E-01	2.70E-01
Iron (Fe)	5.63E-02	2.01E-02	1.90E-02	2.08E-02	1.66E-02	1.87E-02	1.00E-02	8.00E-03	2.89E-02	8.60E-03	1.62E-02	2.22E-02
Lead (Pb)						2.19E-02			0.0311			
Manganese (Mn)	3.20E-03	3.50E-03	2.60E-03			1.80E-03	8.00E-04	9.00E-04	1.30E-03	1.80E-03	2.00E-03	1.60E-03
Mercury (Hg)												
Nitrate (NO3-N)	4.21E+00	5.70E+00	4.60E+00	5.40E+00	5.10E+00	5.10E+00	4.43E+00	5.28E+00	4.30E+00		4.90E+00	5.30E+00
Nitrite Ion (NO2)											3.30E-01	3.30E-01
Phosphate Ion	4.10E-01				3.60E-01						2.60E-01	
Selenium (Se)	3.01E-03		4.20E-03									
Silver (Ag)												
Sodium (Na)	1.92E+02	1.66E+02	1.78E+02	1.67E+02	1.36E+02	1.77E+02	1.70E+02	1.77E+02	1.45E+02	1.51E+02	1.57E+02	1.39E+02
Sulfate Ion	2.80E+01	3.41E+01	2.76E+01	2.81E+01	2.78E+01	2.80E+01	2.65E+01	2.68E+01	2.68E+01	2.68E+01	2.82E+01	2.78E+01
Total Dissolved Solids (TDS)	6.98E+02	5.66E+02	6.55E+02	6.32E+02	5.49E+02	6.86E+02	7.04E+02	6.70E+02	5.60E+02	4.73E+02	6.64E+02	6.29E+02
Conductivity (uMhos)	1,500	1,036	1,250	1,150	1,030	1,350	1,400	1,275	1,070	1,160	1,280	1,190
pH	8.46	8.5	8.42	8.5	8.27	8.56	8.66	8.55	8.39	8.45	8.59	8.64
TKN								0.276				0.225

Blanks equal below detection limits or not detected

Table 3-3
DOE DCG RATIOS CY-1996

RADIONUCLIDES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	DCG
Cs-134													2.00E-06
Cs-137			1.21E-03										3.00E-06
Eu-152													1.00E-05
Pu-238	3.50E-04												4.00E-08
Pu-239													3.00E-08
Pu-241													2.00E-06
Ru-106													6.00E-06
Sb-125													5.00E-05
St-90	7.97E-04												1.00E-06
U-234	3.40E-03												5.00E-07
U-235	8.33E-05												6.00E-07
U-238	1.33E-03												6.00E-07

Figure 3-1
SERVICE WASTE EFFLUENT
Total Activity (curies)

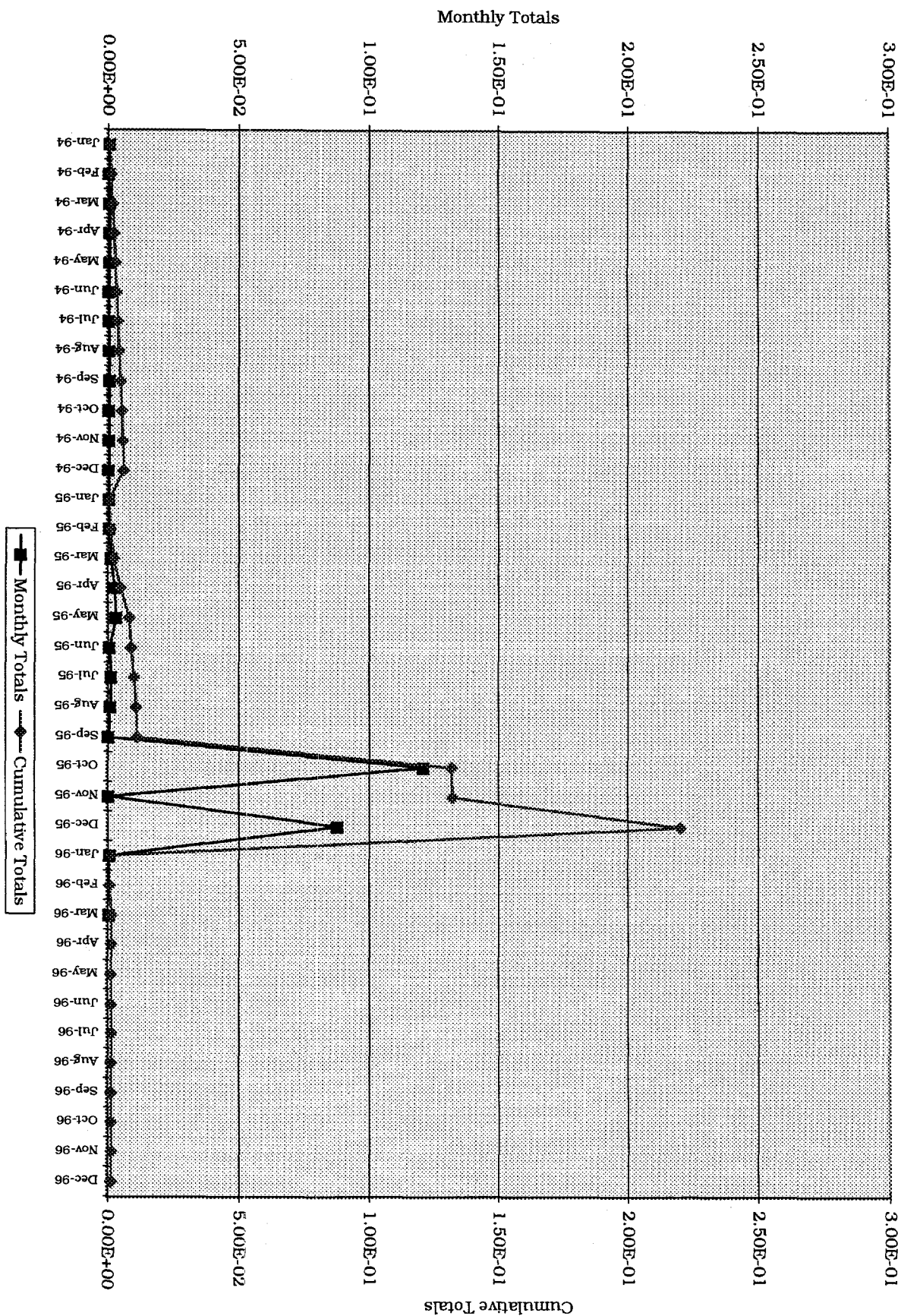


Figure 3-2
SERVICE WASTE EFFLUENT
Pu-238 (curies)

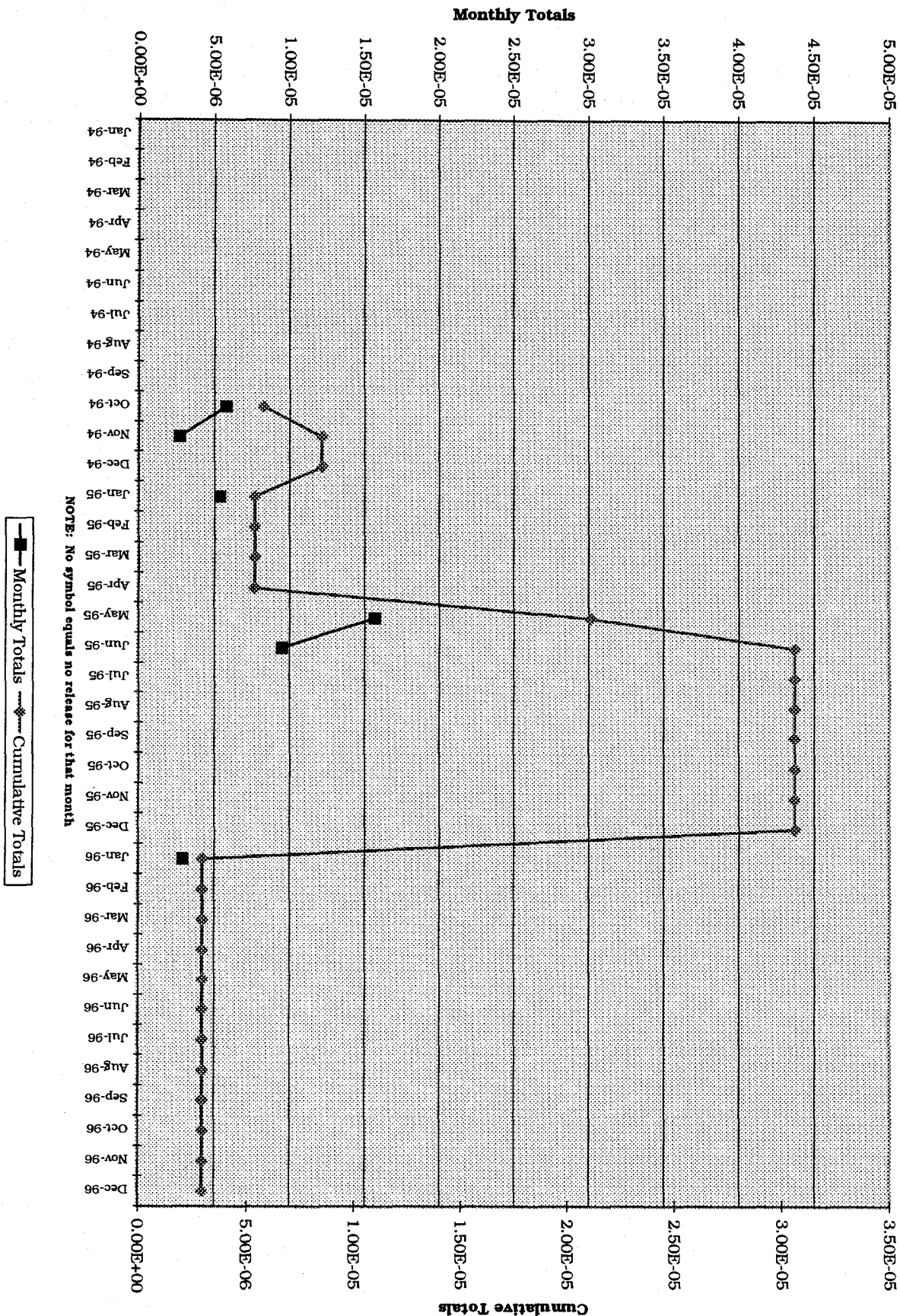


Figure 3-3
SERVICE WASTE EFFLUENT
U-234 (curies)

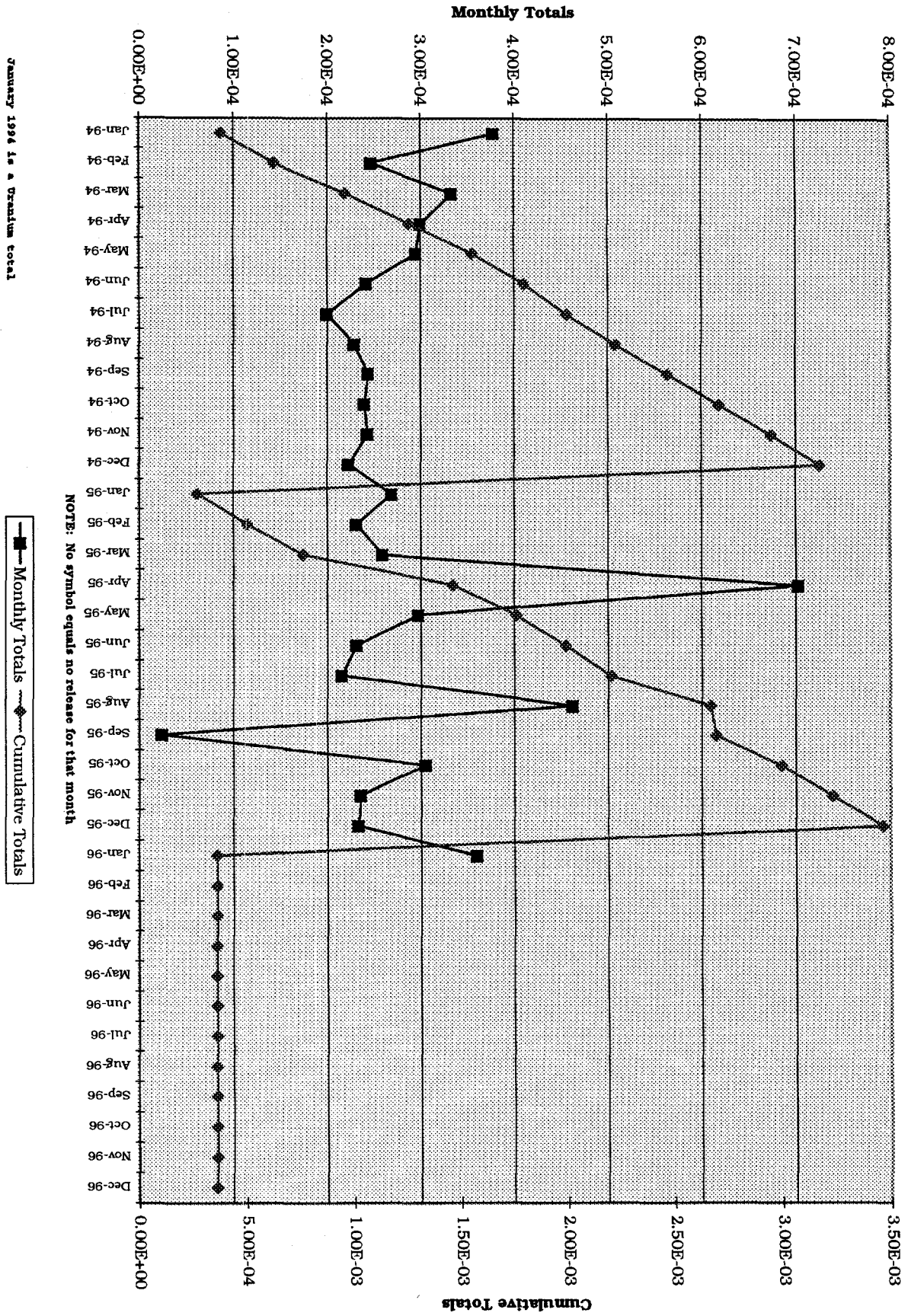


Figure 3-4
SERVICE WASTE EFFLUENT
U-235 (curies)

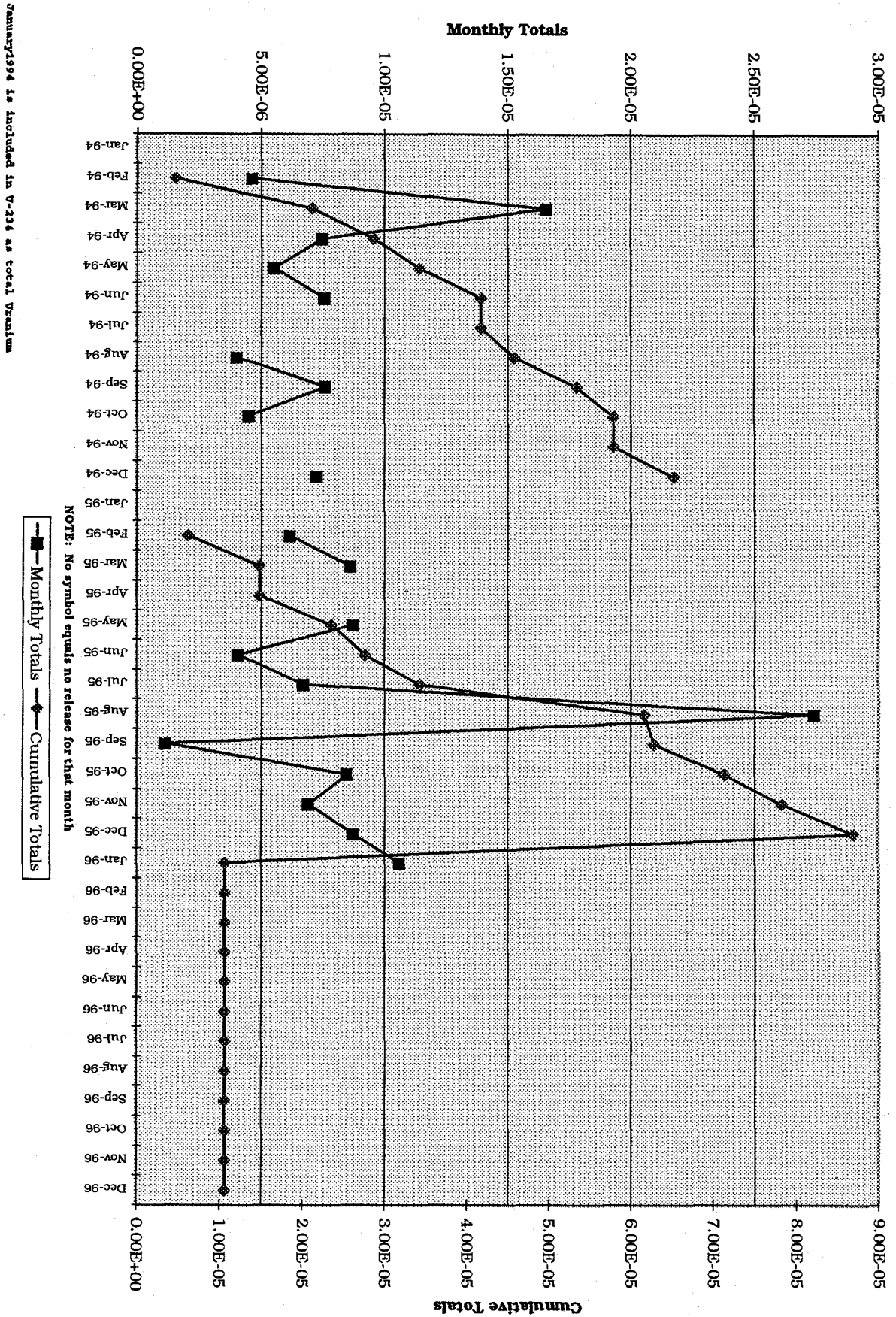
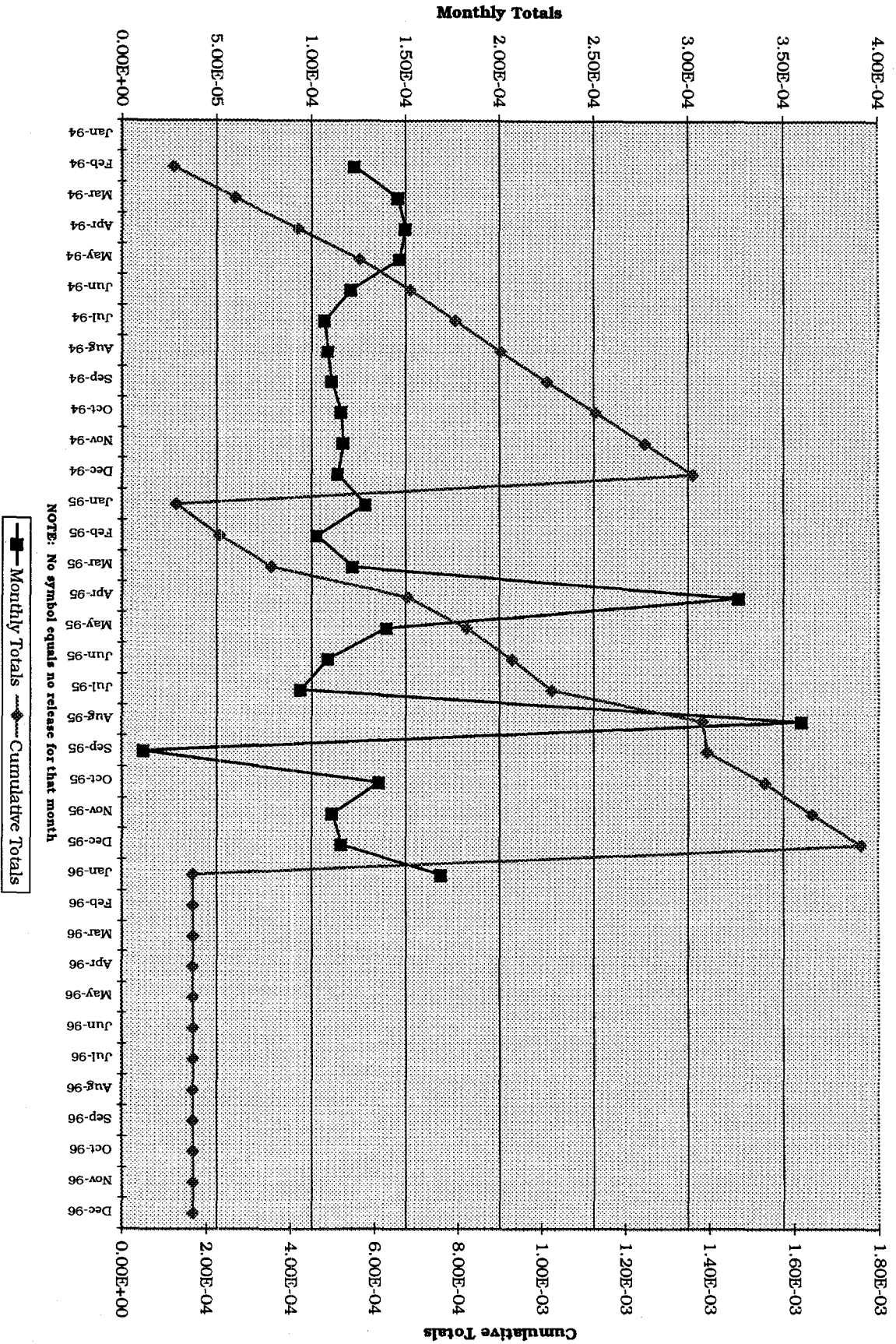
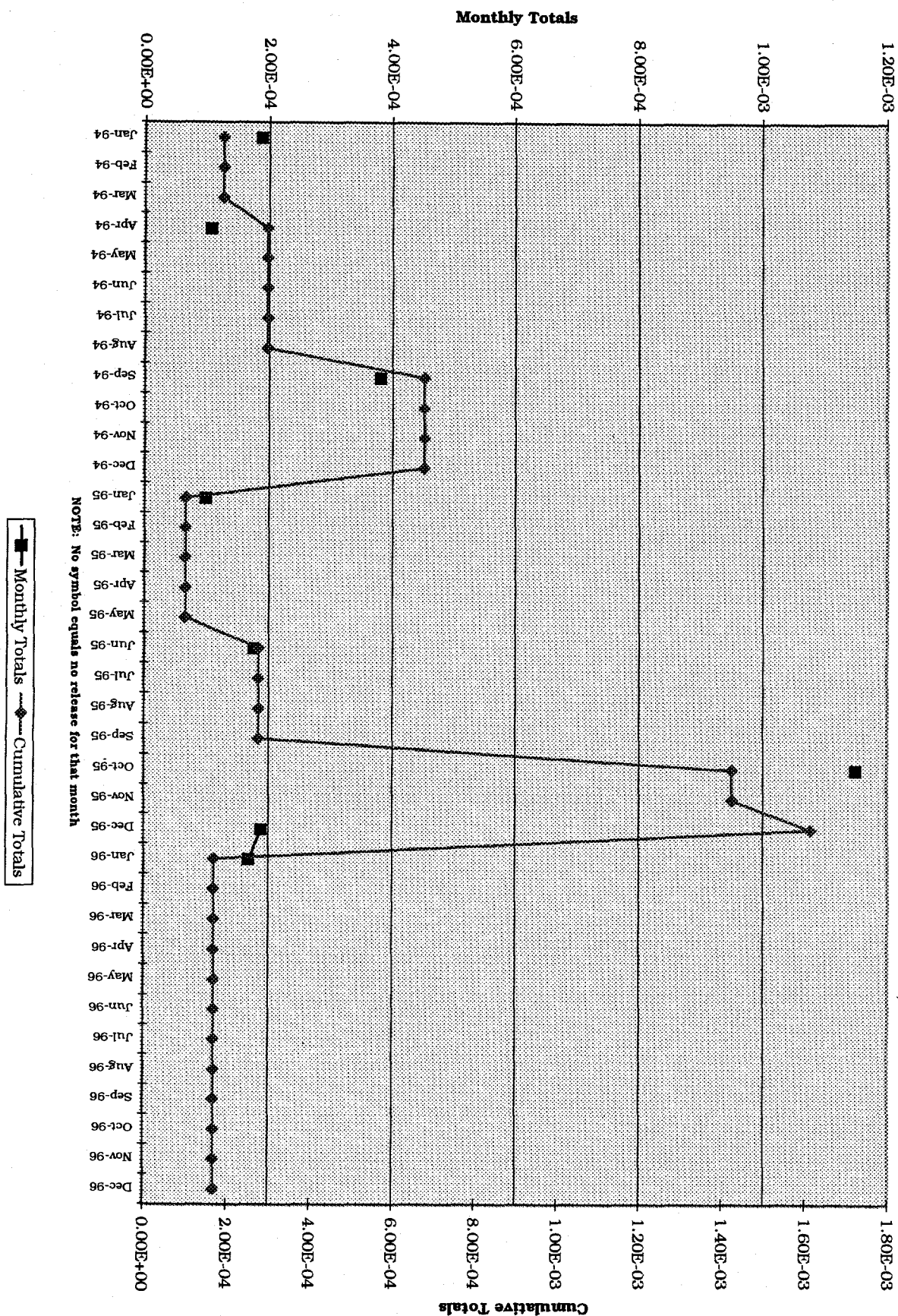


Figure 3-5
SERVICE WASTE EFFLUENT
U-238 (curies)



January 1994 is included in U-234 as total Uranium

Figure 3-6
SERVICE WASTE EFFLUENT
Sr-90 (curies)



2.2 Sewage Treatment Plant

Domestic waste water at the ICPP is pumped to the Waste Water Treatment Facility that is located outside the security fence. LITCO Power Plant Services is responsible for the operation and maintenance of the Waste Water Treatment Facility. Wastewater Land Application Permit (WLAP) LA-000115-02 became effective September 17, 1995. The permit authorizes the wastewater facility to operate subject to specific requirements specified in the permit. LITCO Environmental takes monthly 24 hour composite samples for permit compliance and radionuclides. The radionuclides sample is analyzed for gross alpha, gross beta and gamma.

The LITCO Environmental Affairs Department monitors the operation and performance of the domestic Waste Water Treatment Plant. Table 3-4 lists the monthly Biological Oxygen Demand (BOD), Dissolved Oxygen (DO) and pH for 1996.

Monthly influent (raw) and effluent (final) Biological Oxygen Demand (BOD) concentrations are shown in Figure 3-7. The difference in concentrations between influent BOD and effluent BOD represents the treatment efficiency. Dissolved Oxygen (DO) levels in the influent and effluent are indicators of proper operation. Values for influent and effluent DO are shown in Figure 3-8. Figure 3-9 lists the pH and Figure 3-10 represents STP volume.

2.3 ICPP Injection Well

The ICPP injection well was permanently sealed in November 1989.

Table 3-4
SEWAGE TREATMENT PLANT ANALYSIS
CY-1996

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
INFLUENT BOD	149	106	73	146	129	10	91	86	97	39	193	64
EFFLUENT BOD	4	22	7	7	8	1	6	3	4	4	1	5
EFFICIENCY	97%	79%	90%	95%	94%	90%	93%	97%	96%	90%	99%	92%
INFLUENT DO	0.84	1.27	0.59	0.68	0.5	0.61	0.36	0.71	0.52	1.16	0.59	0.75
EFFLUENT DO	8.08	6.89	7.89	4.92	6.14	3.23	4.97	4.23	6.12	6.72	10.12	8.99
INFLUENT PH	8.23	8.13	8.07	7.98	7.95	7.82	7.99	7.9	8.00	7.92	8.22	8.2
EFFLUENT PH	7.44	7.31	7.38	7.28	7.43	7.16	7.69	7.69	7.73	7.44	7.77	7.62
INFLUENT VOLUME (L)	8.67E+06	6.96E+06	4.88E+06	4.92E+06	5.19E+06	3.52E+06	4.88E+06	6.40E+06	5.64E+06	9.92E+06	7.12E+06	6.78E+06
EFFLUENT VOLUME (L)	4.50E+06	5.49E+06	4.31E+06	3.69E+06	3.50E+06	1.53E+06	1.99E+06	2.56E+06	2.13E+06	3.51E+06	3.26E+06	3.74E+06

Figure 3-7
SEWAGE TREATMENT PLANT
BOD

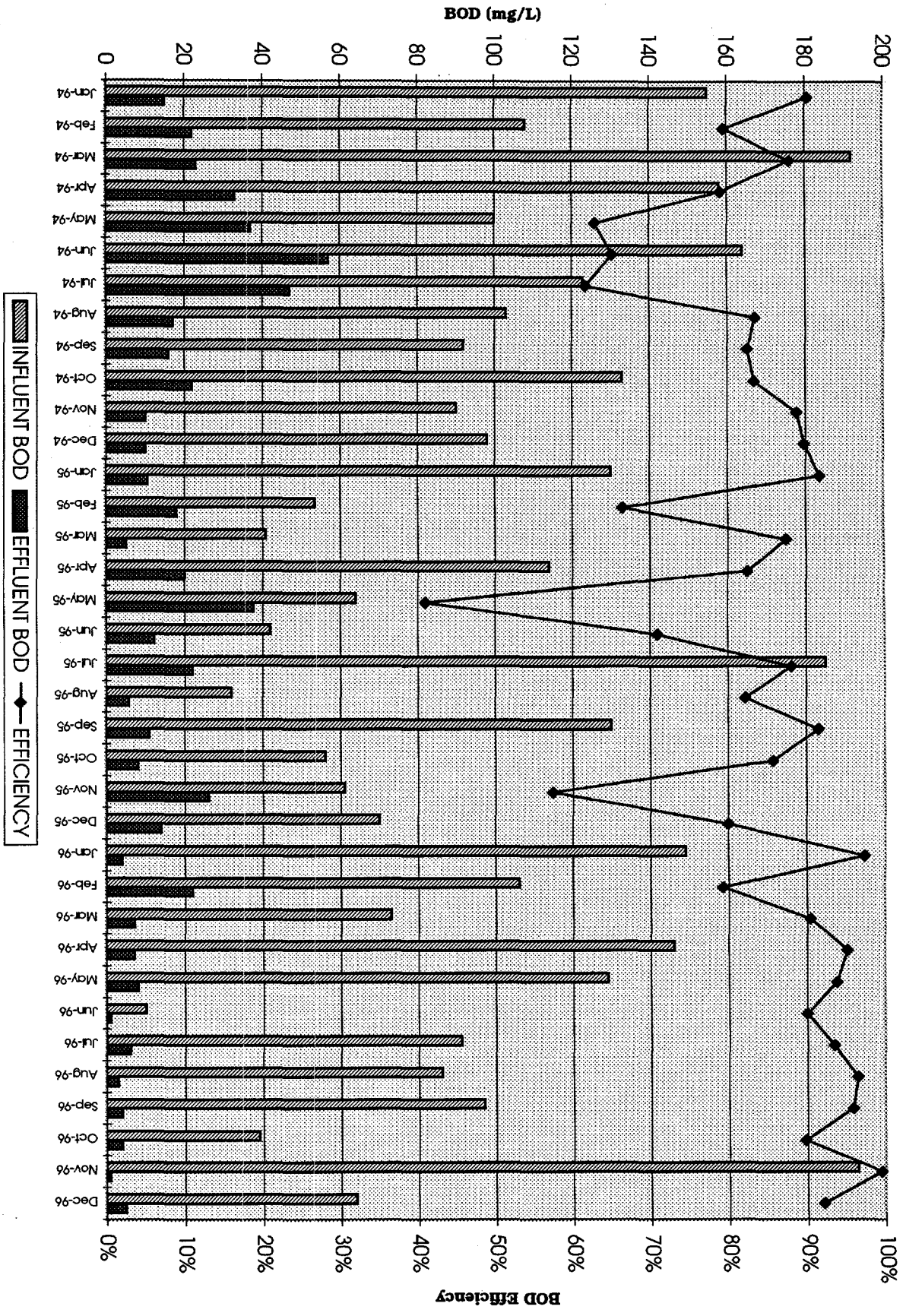


Figure 3-8
SEWAGE TREATMENT PLANT
DO

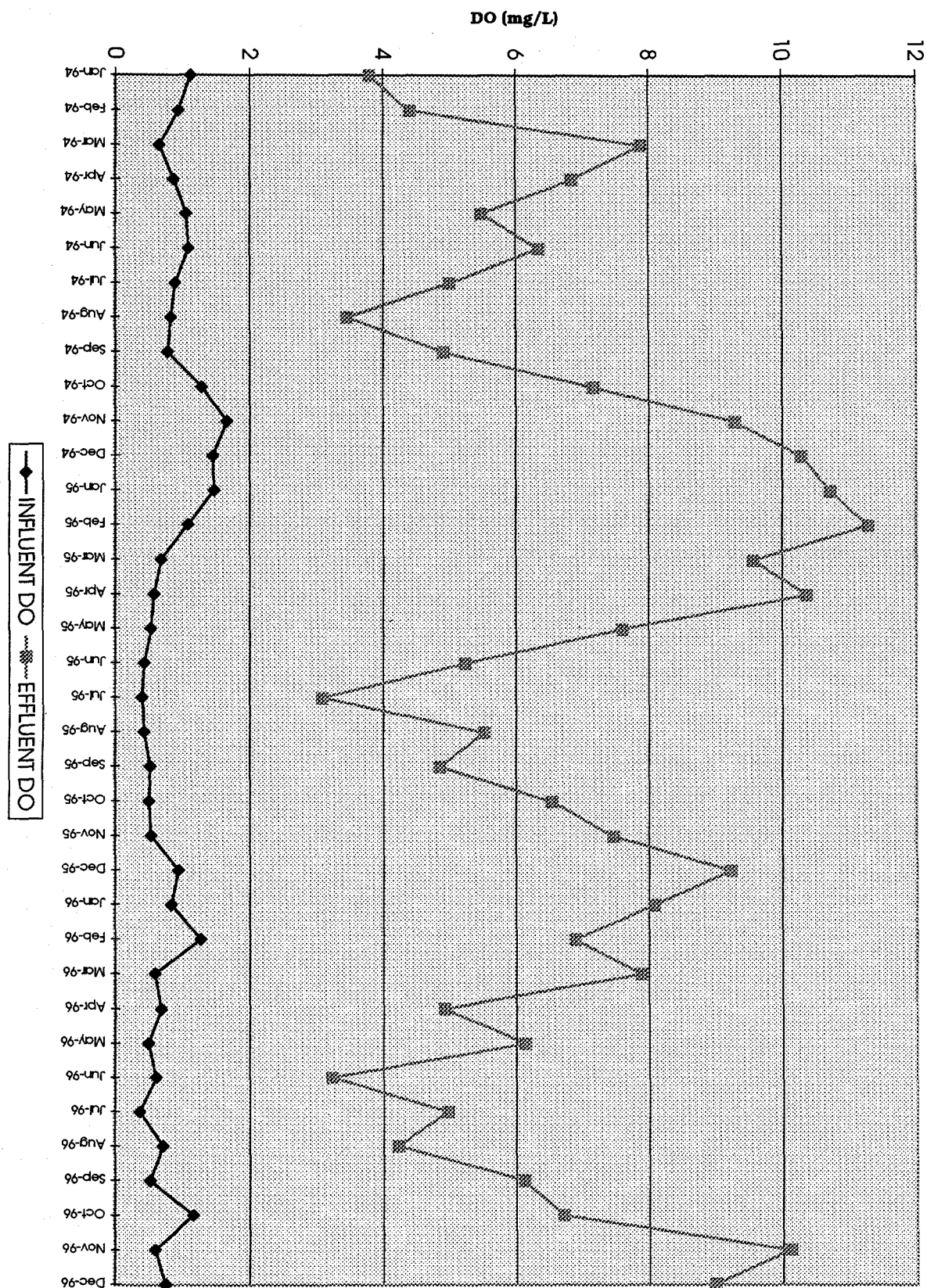


Figure 3-9
SEWAGE TREATMENT PLANT
pH

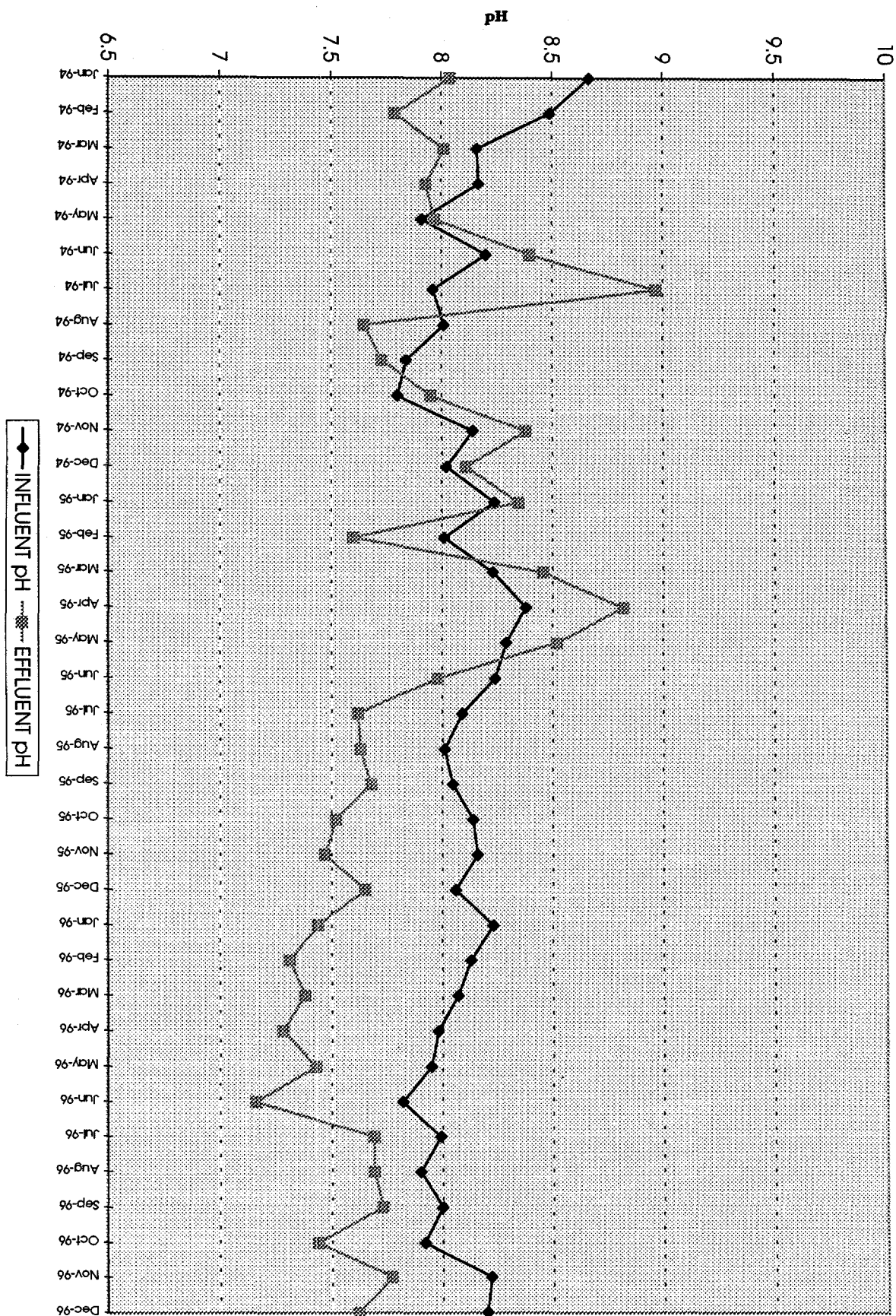
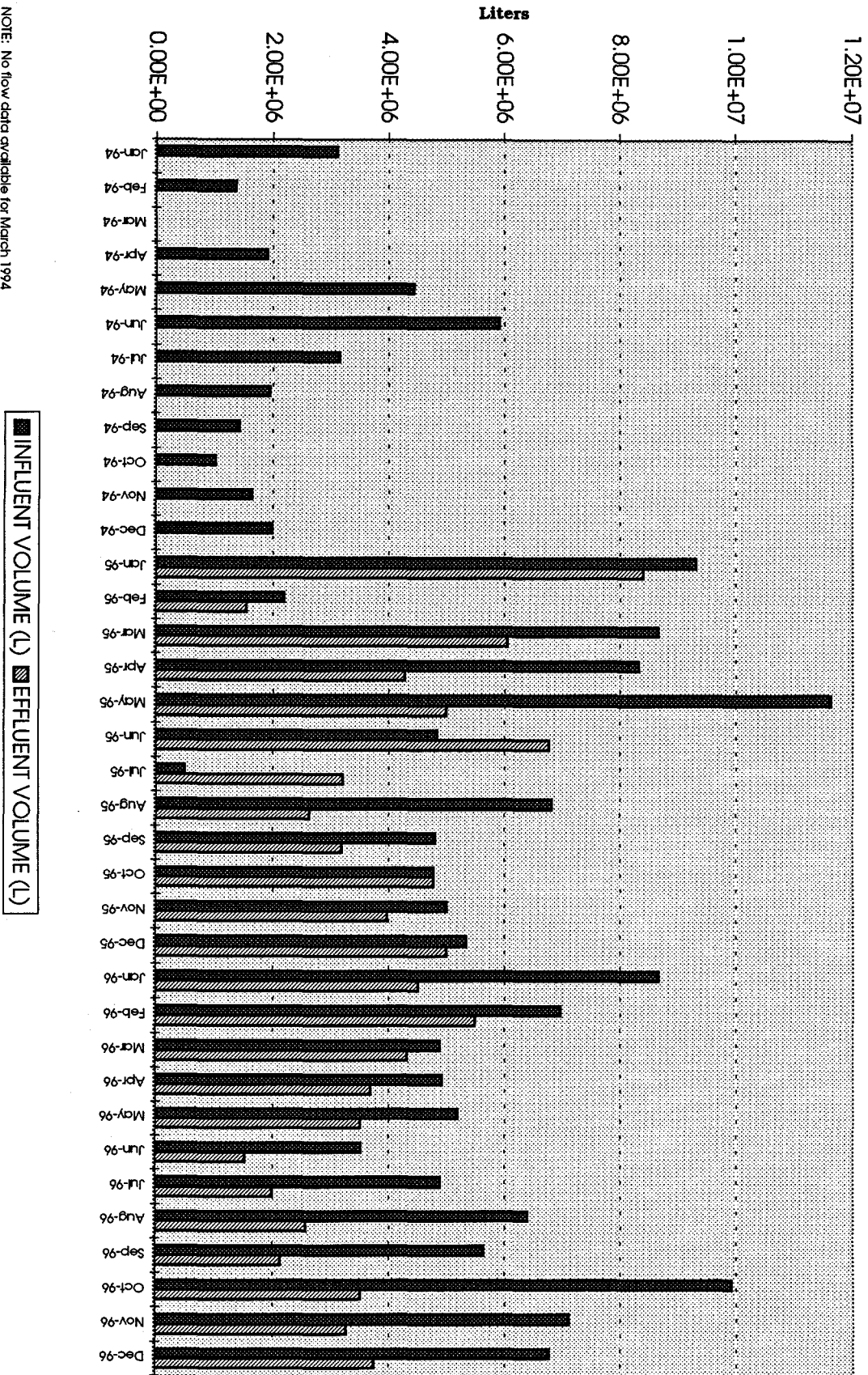


Figure 3-10
SEWAGE TREATMENT PLANT
Volume (liters)



NOTE: No flow data available for March 1994