ISLAND PARK HYDROELECTRIC PROJECT

FERC No. 2973

1998 WATER QUALITY DATA SUMMARY

Prepared for:

FALL RIVER RURAL ELECTRIC

Prepared by:

ECOSYSTEMS RESEARCH INSTITUTE

MARCH 1999

1.0 INTRODUCTION

Fall River Rural Electric maintains and operates a hydroelectric project at Island Park Dam (FERC No. 2973). Construction on the project was completed in 1994 and full operation commenced in June of that year. During 1998, the plant was online 8,714 hours.

1.1 Project Description

The hydroelectric project is located on Island Park Dam, which is on the Henry's Fork, a tributary of the Snake River, and is located about 0.4 miles upstream of the confluence with the Buffalo River. The site is in eastern Idaho within the Island Park area of the Targhee National Forest and is located approximately 30 miles north of the town of Ashton, Idaho (Figure 1-1 and 1-2). The project is composed of five major elements (Figure 1-3). These include: (1) an intake structure about 350 feet from the face of the dam and 675 feet east of the existing intake; (2) a siphon conduit excavated through the east abutment of the dam, extending from an intake elevation of 6230 feet to the power plant; (3) a 4.8 megawatt power plant located at the toe of the dam on the east side of the river; (4) an aeration basin within the tailrace; and (5) 15,000 feet of buried electrical transmission line extending from the powerhouse located at the base of the existing dam to a point of interconnection to the existing Fall River Rural Electric Cooperatives 46,000 volt line paralleling U.S. Highway 20-91.

1.2 Operating Reporting Requirements

In 1993, Fall River Rural Electric (FRRE) developed a Standard Operating Procedure Plan for the operation and maintenance of the facility. As required by the FERC license, USFS special use permit and Idaho Department of Water Resources, FRRE has maintained mitigation activities at the site. The most notable of these is the integration of an air injection system into the power plant operations. Due to monitoring data collected in 1995, the Standard Operating Procedures (SOP) were amended to change the compliance criteria site to station X4 (USGS gaging station) for dissolved oxygen and total gas pressure (TGP). The plant must operate by maintaining the TGP below 110 percent at station X4. If X4 exceeds 110 percent, the compliance point is moved to site X3 (plant discharge), In addition, the dissolved oxygen cannot fall below 7.0 mg/liter at site X4. The plant will aerate discharge plant water to maintain the dissolved oxygen criteria. Temperature criteria was also amended in 1995. These criteria are now related to the bottom reservoir temperature (X1). X3 (plant outfall) cannot be less than or greater than 1°C when compared to X1.

The amended SOP for the facility defines specific water quality criteria for the facility. These criteria are consistent with FERC articles 106, 107, and 402 as amended.

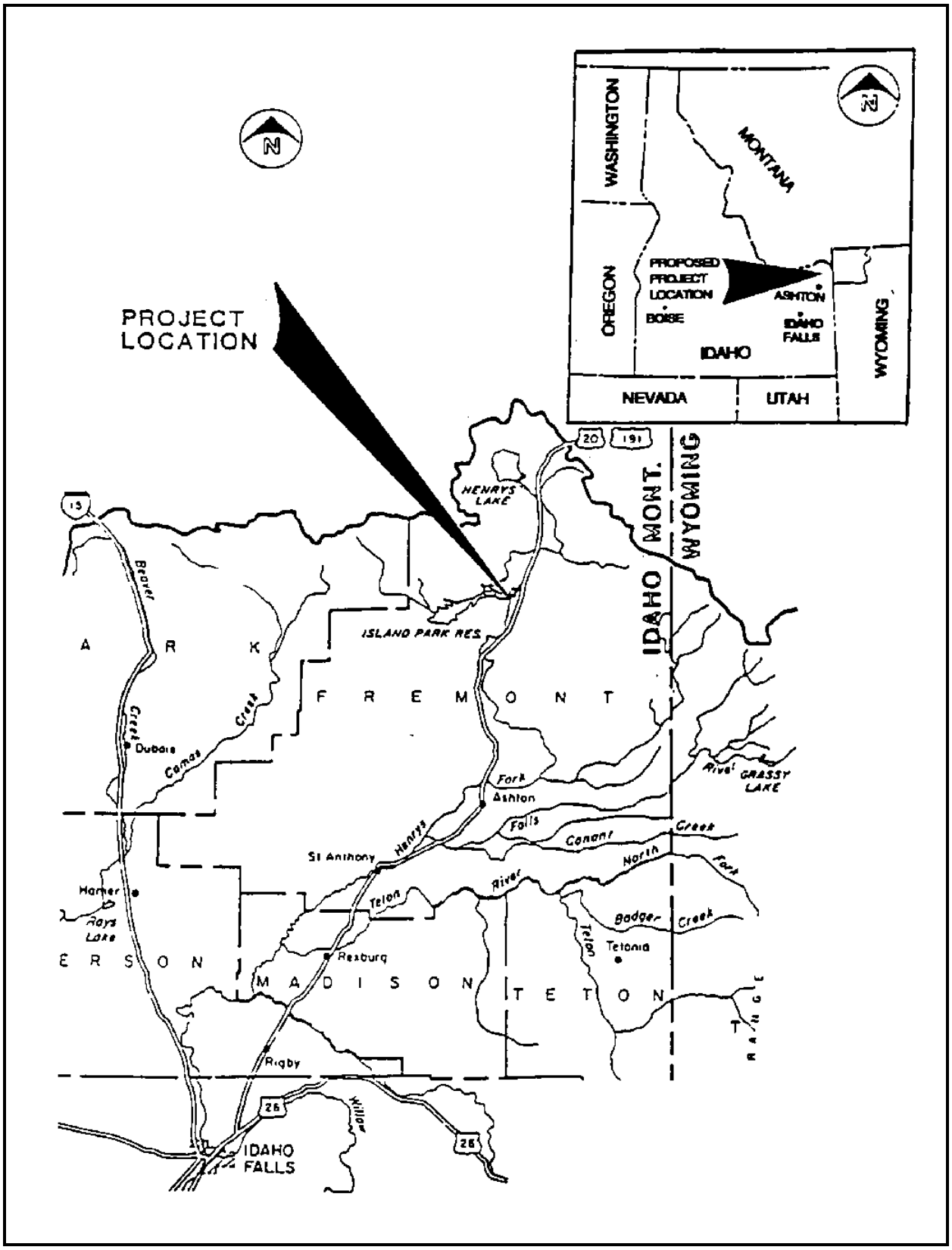

FIGURE 1-1. General location map for the Island Park Hydroelectric facility.

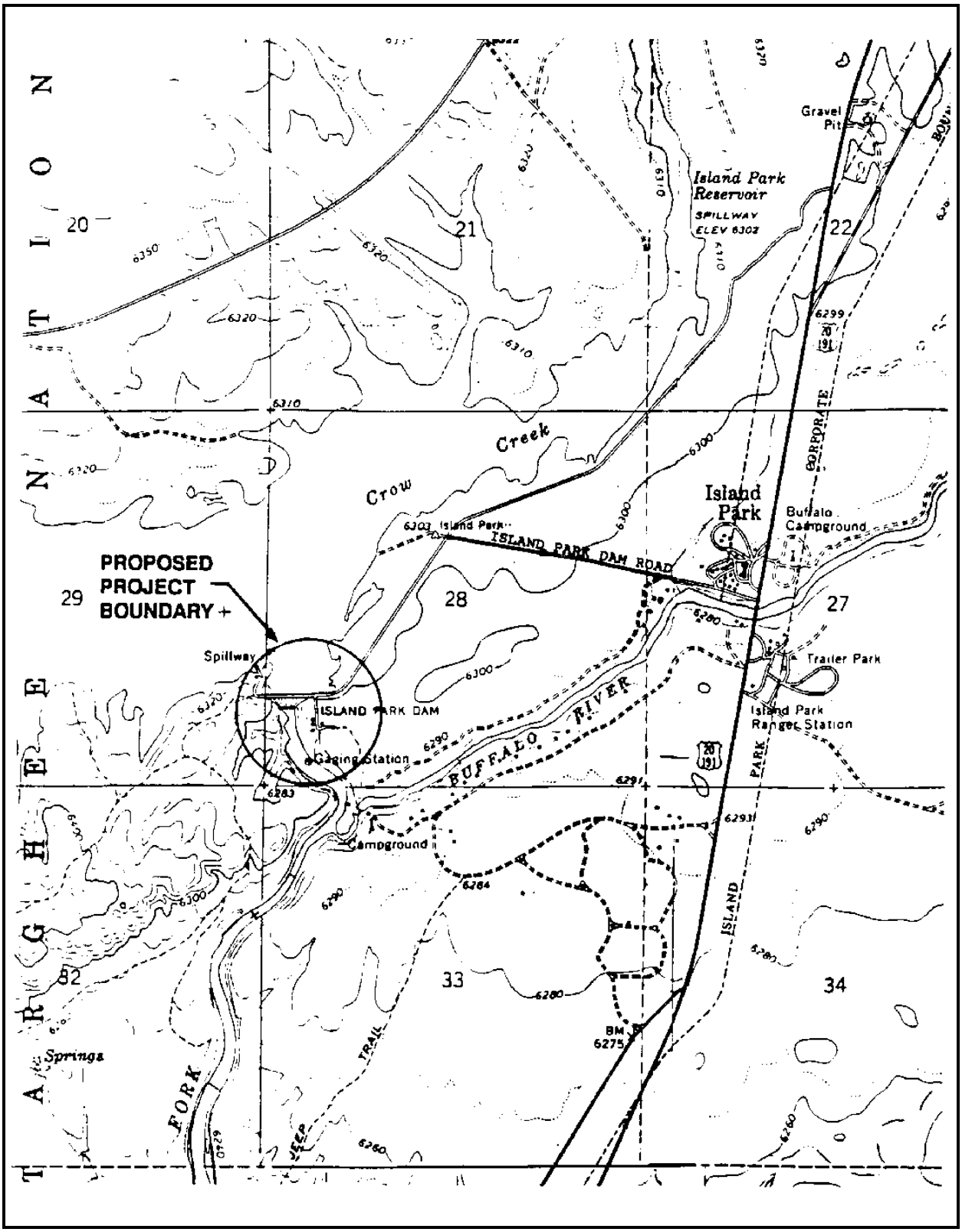

FIGURE 1-2. Detailed location map for the Island Park Hydroelectric facility.

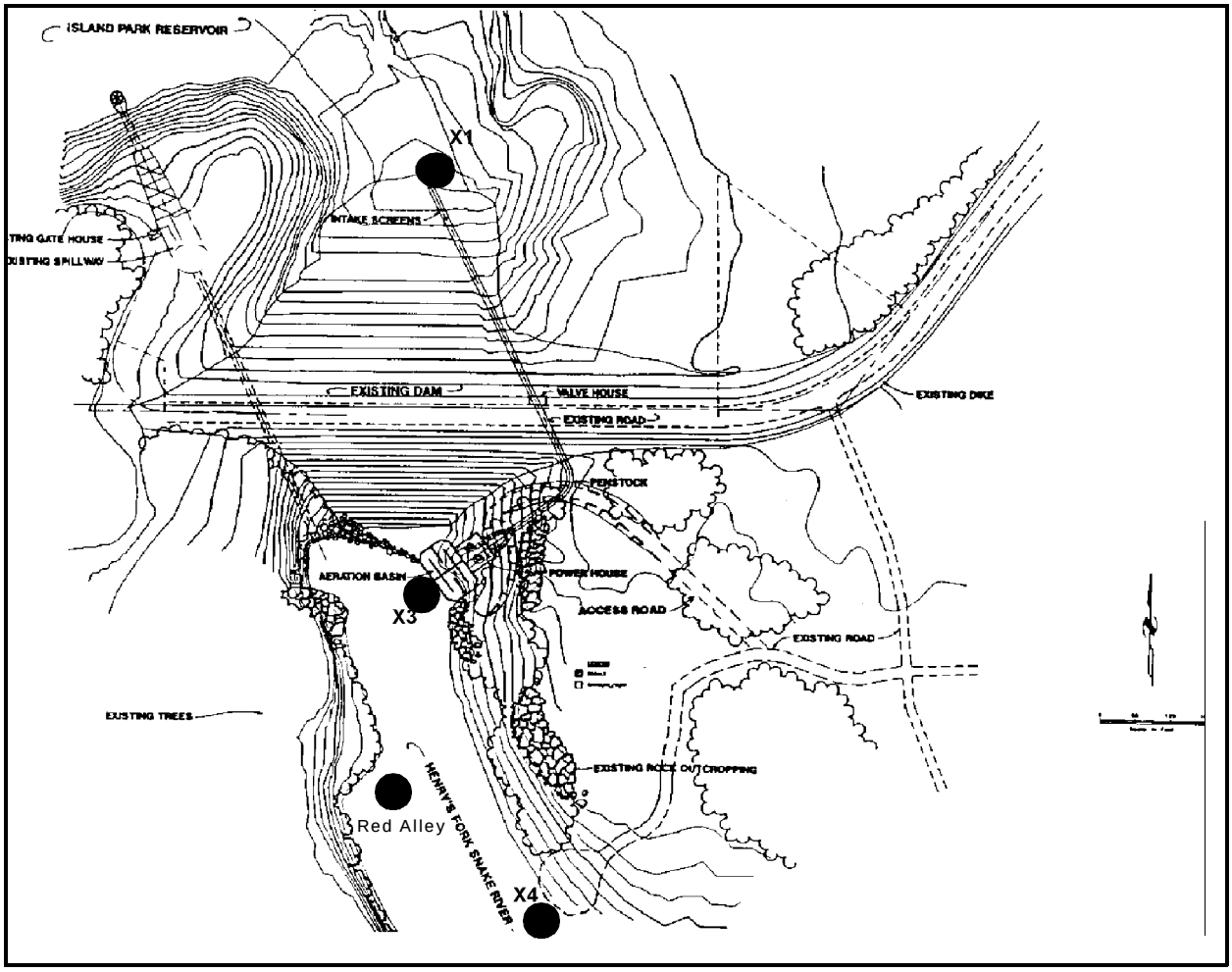

FIGURE 1-3. Location of the main features and monitoring sites at the Island Park Hydroelectric Project.

2.0 PLANT MONITORING AND ENVIRONMENTAL COMPLIANCE

As noted in Section 1.2, the environmental mitigation for water quality impacts are closely integrated into the operations of the Island Park Hydroelectric Project. In order to ensure that these mitigation are effective, a comprehensive monitoring program is necessary. Associated with an environmental monitoring program are compliance criteria by which mitigation efforts can be judged.

As part of the water quality monitoring program, three stations were monitored during 1998. In addition, temperatures were added at Red Alley as part of the operations of the new reservoir collar. These sites can be seen in Figure 1-3. Each specific station is described in Table 2-1. The FERC license conditions 106 and 107 require the monitoring of the following parameters at the stations specified.

A compliance data point was based upon an hourly average. At a minimum, 120 individual values (30 seconds between readings) were utilized in taking the average. This average value, as well as the hourly minimum and maximum were recorded and are available in Appendix I. The average value was determined by a continuous moving average over the previous hour. Remedial activities (plant shutdown, operator action, etc) occurs once and average hourly value is recorded by the plant. The magnitude of remedial action is based on reservoir condition (red, yellow or green).

2.1 Monitoring Compliance Levels

Island Park Hydroelectric Project has four parameters which must be complied with during all periods of operation (Figures 2-1, 2-2, 2-3 and 2-4). The numeric standards for the monitoring parameters is provided in Table 2-2 and the parameter standard deviations in Table 2-3. A comparison of the compliance records relative to the numeric standards for the Island Park Hydroelectric Project (station X3) compared to the other three monitoring stations can be seen in Table 2-4.

Consultation with the Island Park Advisory Committee, and resource agencies as well as the FERC has resulted in the amendment of the Standard Operating Procedures and the FERC license relative to the location of the compliance point. The compliance site has been moved from the reservoir outlet (X3) to the USGS gage (X4). If X4 exceeds standards for total gas pressure, the site is immediately moved to X3. Temperature criteria is now at the plant outfall (X3) relative to the reservoir bottom (X1 $\pm 1^{\circ}C$).

Analysis of the data in Appendix I indicates that at station X4, dissolved oxygen was below criteria 0.15% of the time (13 observations out of 8,714 hours). Total gas pressures exceeded criteria 0.06% of the time. Temperature at station X3 was greater or less than $1^{\circ}C$ relative to X1 1.7% percent of the time (135 observations out of 8,714 measurements). The summary of these exceedences can be seen in Table 2-4. Remedial actions taken for each criteria exceedence can be seen in Appendix II.

TABLE 2-1. The descriptions of the locations for operational water quality monitoring for the Island Park Hydroelectric Project.

X1	**RESERVOIR BOTTOM OF INTAKE** This station will reflect the environmental conditions of the reservoir bottom waters. For ease of maintenance, this station may be located within the penstock.
X2	**RESERVOIR OUTFALL** This site was intended to represent the "background" or control station for the project's compliance monitoring. The conditions at this station were found to be affected by site X3 at all flow levels. This site has been abandoned.
X3	**POWER PLANT OUTFALL** The outflow from the aeration basin will be monitored by this station. The site temperature must be ±1°C compared to X1. It is the TGP compliance point if X4 is greater than 110 percent atmospheric pressure.
X4	**USGS GAGING STATION** This is the historic water quality monitoring site. It will be continuously monitored during operation to maintain the long term record of water quality downstream from the dam. This site is the compliance point for TGP and must have a dissolved oxygen concentration greater than or equal to 7.0 mg/liter.
Red Alley	**COLLAR OPERATIONS STATION** This is the new site added in 1997 to monitor water temperature at the locations of spawning rainbow trout. This site is associated with the operations of the new reservoir collar.

TABLE 2-2. The water quality criteria for the operation of the Island Park Hydroelectric Plant.

SOP - All Parameters

- IDEQ/FERC standards at station and/or the outlet (X3) concentrations.

Dissolved Oxygen

- IDEQ - minimum oxygen (6.5 mg/l) at X4
- FERC - Article 107: minimum oxygen (6.0 mg/l) at X4
- FERC - Article 401: minimum oxygen (7.0 mg/l) at X4

Temperature

- FERC - match tailrace (X3) temperature to reservoir bottom (X1) temperature ± 1°C.

Total Gas Pressure

- FERC - Article 107: Total Gas Pressure no greater than 110% at X4. If X4 exceeds 110 percent, then maintain at tailrace (X3), not to exceed 110 percent.

Flow

- FERC - Article 403: up and down ramping no greater than 50 cfs per 30 minutes at X4
- As specified by USBOR

TABLE 2-3. A listing of parameter characteristics for Island Park Hydroelectric Project.

PARAMETER	DETECTION LEVEL	STANDARD DEVIATION	STATIONS	FREQUENCY
Dissolved Oxygen	0.10 mg O_2/l	±0.28 mg O_2/l	X1 - X4	Continuous
Temperature	0.10°C	±0.88°C	X1 - X4	Continuous
Total Gas Pressure	0.10% ATM	±1.1 mm	X1 - X4	Continuous
Turbidity	0.10 NTU	±5.6 NTU	X1 - X4	Continuous
Flow	20	---	X4	Continuous

TABLE 2-4. A comparison between monitoring stations and parameters relative to the established criteria during 1998. ***Shaded boxes indicate site of compliance.***

			TOTAL OBSERVATIONS BELOW CRITERIA (HOURLY)		
	NUMERIC CRITERIA	**STD DEVIATION**	**X1 (Reservoir Bottom)**	**X3 (Plant-when necessary)**	**X4 (USGS gaging station)**
DO	7.0 ppm O_2	±0.28 ppm O_2	4,982	320	13
TGP	110% atm	±1.1% ATM	2	1	5
Temp	X3=X1±1°C	±0.1°C	--	146	--
Total Observations for plant on-line			8,714	8,714	8,714

PERCENT CRITERIA VIOLATION	**X1**	**X3**	**X4**
DO	**57%**	**3.6%**	**0.15%**
TGP	**0.02%**	**0.01%**	**0.06%**
Temp	**--**	**1.7%**	**--**

Compliance location

No compliance required

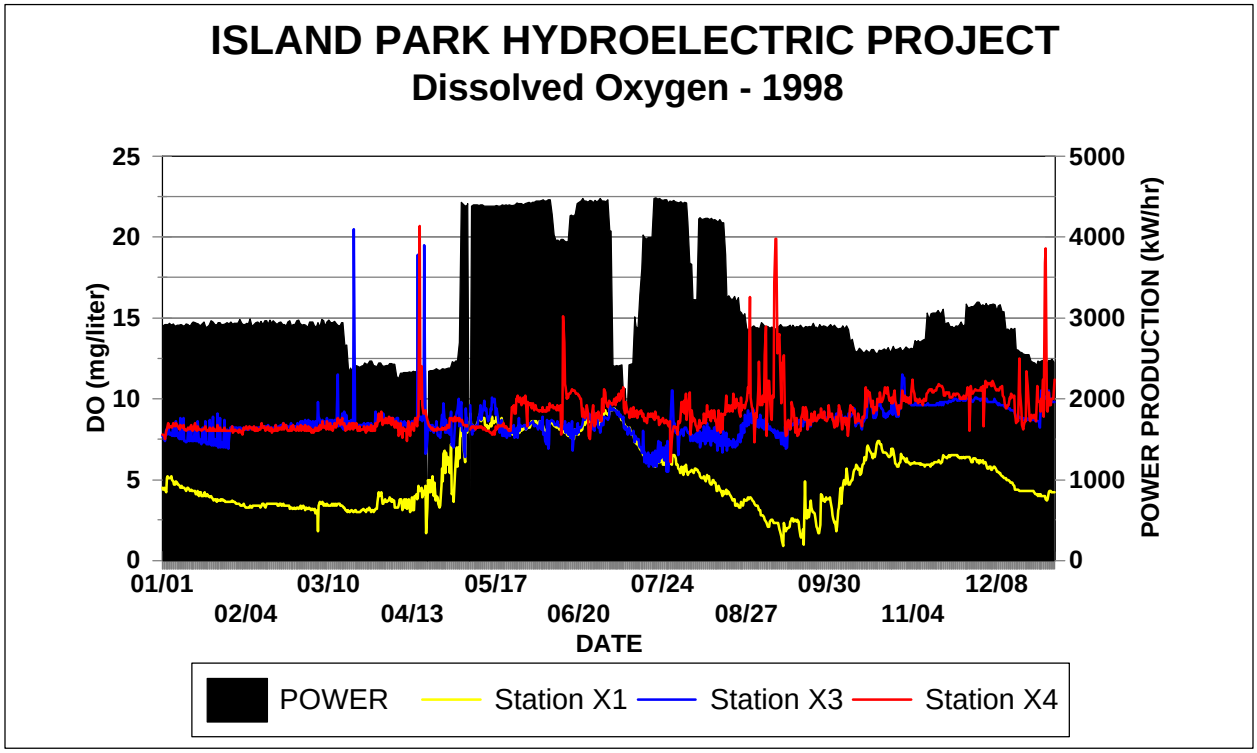

Figure 2-1. Dissolved oxygen concentrations at Island Park Hydroelectric Project during 1998.

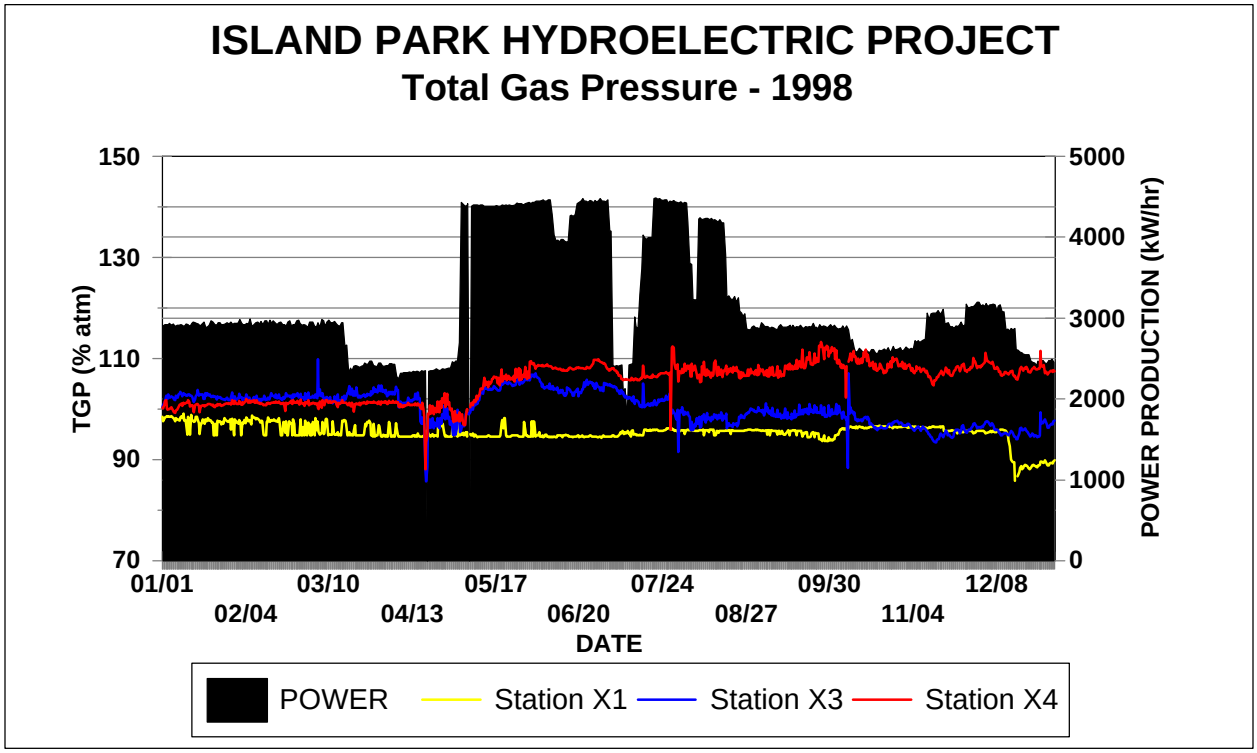

Figure 2-2. Total gas pressure at Island Park Hydroelectric Project during 1998.

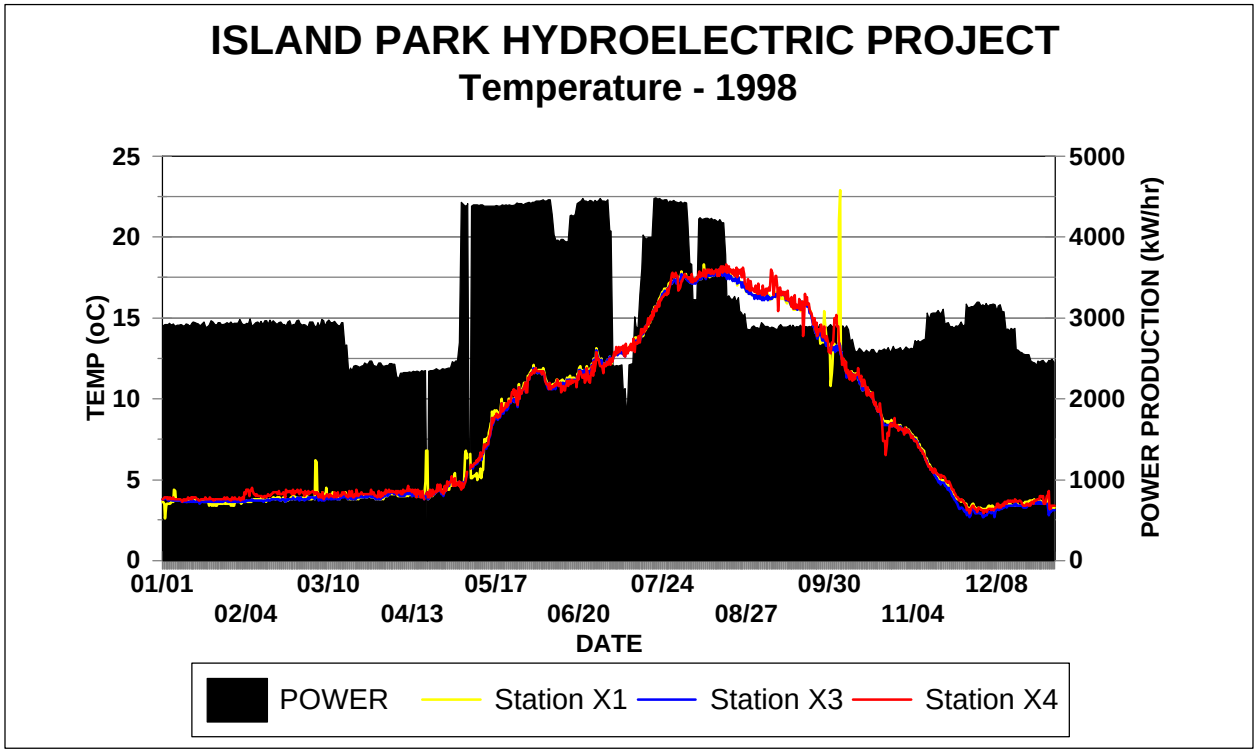

Figure 2-3. Temperature at Island Park Hydroelectric Project during 1998.

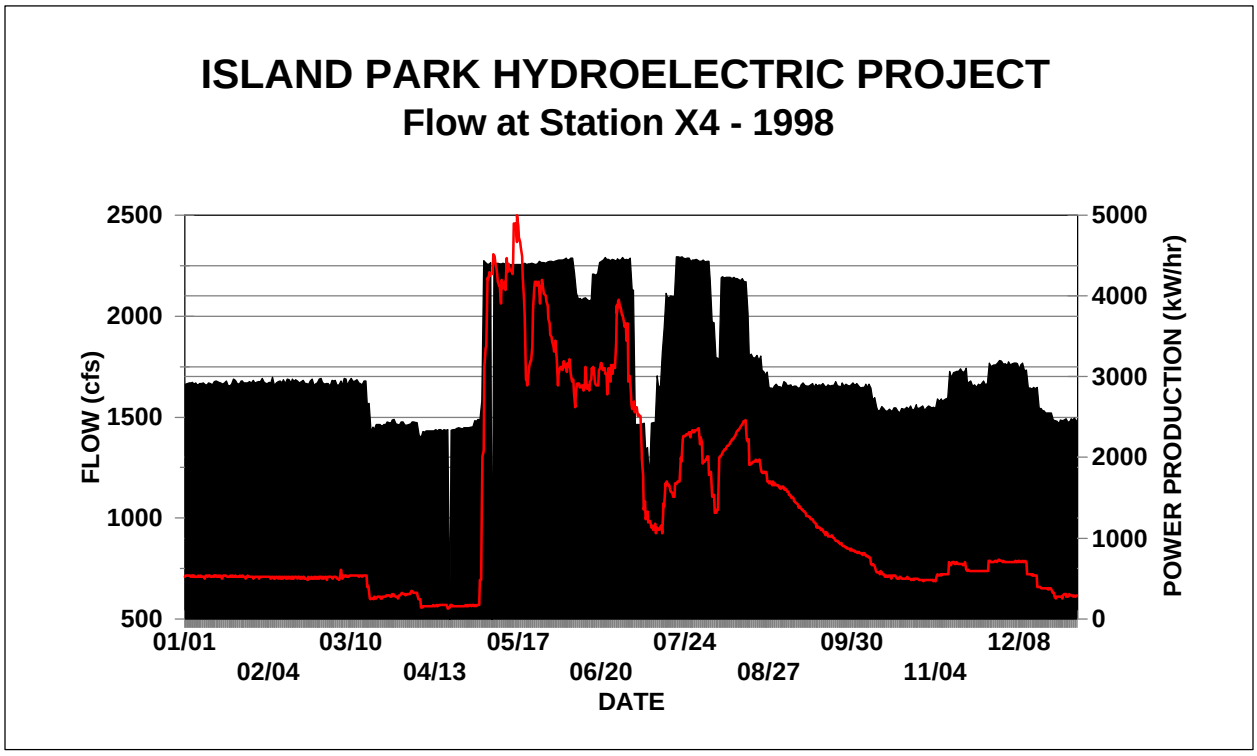

Figure 2-4. Flow at station X4 at Island Park Hydroelectric Project during 1998.

In Figure 2-2, total gas pressure had only five exceedence values during the 1998. ***Explanations of actions taken are given in Appendix II.*** All exceedences were associated with equipment problems or calibration periods. As noted in Table 2-4, dissolved oxygen values were logging out of compliance 0.15% of the time (13 observations). Explanations for remedial actions taken can be found in Appendix II. It should be noted that a vast majority of the exceedence observations occurred during July. These occurred because of a lightening strike which took out two of the four probes.

In a similar manner, temperature probes at station X3 also demonstrated problems associated with miscalibration problems in the spring and fall of 1998. Hand-held probes verified that the temperatures logged at station X3 were erroneous. A complete breakdown of the response actions taken for each out of compliance data point logged can be seen in Appendix II.

2.2 Equipment Calibration-QA/QC

The monitoring equipment was maintained and calibrated according to the Standard Operating Procedure manual (Section 4.0). Lightning strikes did affect monitoring equipment at stations X1, X3 and X4 during 1998. During equipment repairs, handheld equipment was utilized in monitoring stations X1, X3 and X4 as per the SOP.

3.0 RECOMMENDATIONS

The current monitoring program appears to be working effectively. As with 1995, lightening strikes represent the major operation and maintenance problem with the monitoring program. Due to the uniqueness of the monitoring equipment and the lag time in replacing parts, it is recommended that key parameters have backup spare parts (temperature, DO and TGP). No other recommendations are made for the 1999 monitoring year.

APPENDIX I

Due to the size of this appendix, we have posted the following ASCII text files at our FTP site.

X1-1998.TXT
X3-1998.TXT
X4-1998.TXT
X4FLOW98.TXT
KEYLOG98.TXT

Please visit our WWW site at

http://www.ecosysres.com/projects/idaho.html

for an electronic version of this report (PDF format) and the data files.

If you do not have internet access and are interested in acquiring the data, please contact our office at (435) 752-2580 to make other arrangements.

APPENDIX II

TEMPERATURE VIOLATIONS AT X3

		TEMPERATURE			REASON FOR VIOLATION
DATE	**TIME**	**X1+1**	**X1-1**	**X3 TEMP**	
01/01/98	10:00 PM	3.6	1.6	3.8	X-1 probe miscalibrated
01/01/98	11:00 PM	3.5	1.5	3.8	X-1 probe miscalibrated
01/02/98	12:00 AM	3.8	1.8	3.9	X-1 probe miscalibrated
01/02/98	01:00 AM	3.8	1.8	3.9	X-1 probe miscalibrated
01/02/98	02:00 AM	3.6	1.6	3.9	X-1 probe miscalibrated
01/02/98	03:00 AM	3.6	1.6	3.9	X-1 probe miscalibrated
01/02/98	04:00 AM	3.6	1.6	3.9	X-1 probe miscalibrated
01/02/98	05:00 AM	3.6	1.6	3.9	X-1 probe miscalibrated
01/02/98	06:00 AM	3.7	1.7	3.9	X-1 probe miscalibrated
01/02/98	07:00 AM	3.6	1.6	3.9	X-1 probe miscalibrated
01/02/98	08:00 AM	3.7	1.7	3.9	X-1 probe miscalibrated
01/02/98	01:00 PM	6.1	4.1	3.9	X-1 probe miscalibrated
01/19/98	01:00 PM	4.7	2.7	-0.3	probe off for maintenance
03/04/98	02:00 PM	7.2	5.2	3.9	X-1 probe miscalibrated
03/04/98	03:00 PM	7.2	5.2	3.9	X-1 probe miscalibrated
03/04/98	04:00 PM	7.2	5.2	3.9	X-1 probe miscalibrated
03/04/98	05:00 PM	7.2	5.2	3.9	X-1 probe miscalibrated
03/04/98	06:00 PM	7.2	5.2	3.9	X-1 probe miscalibrated
03/04/98	07:00 PM	7.2	5.2	3.9	X-1 probe miscalibrated
03/04/98	08:00 PM	7.2	5.2	3.9	X-1 probe miscalibrated
03/04/98	09:00 PM	7.1	5.1	3.8	X-1 probe miscalibrated
03/04/98	10:00 PM	7.1	5.1	3.9	X-1 probe miscalibrated
03/04/98	11:00 PM	7.1	5.1	3.9	X-1 probe miscalibrated
03/05/98	12:00 AM	7.1	5.1	3.9	X-1 probe miscalibrated
03/05/98	01:00 AM	7.1	5.1	3.9	X-1 probe miscalibrated
03/05/98	02:00 AM	7.1	5.1	3.8	X-1 probe miscalibrated
03/05/98	03:00 AM	7.1	5.1	3.8	X-1 probe miscalibrated
03/05/98	04:00 AM	7.1	5.1	3.8	X-1 probe miscalibrated
03/05/98	05:00 AM	7.1	5.1	3.9	X-1 probe miscalibrated
03/05/98	06:00 AM	7.1	5.1	3.9	X-1 probe miscalibrated
04/16/98	12:00 PM	6.9	4.9	4	X-1 probe miscalibrated
04/18/98	11:00 AM	5	3	-0.2	probe off for maintenance
04/18/98	05:00 PM	6.5	4.5	4.1	Plant was off-line
04/18/98	06:00 PM	7	5	4.2	Plant was off-line
04/18/98	07:00 PM	7.2	5.2	4.2	Plant was off-line
04/18/98	08:00 PM	7.4	5.4	4.2	Plant was off-line
04/18/98	09:00 PM	7.5	5.5	4.1	Plant was off-line
04/18/98	10:00 PM	7.7	5.7	4.1	Plant was off-line
04/18/98	11:00 PM	7.7	5.7	4.1	Plant was off-line
04/19/98	12:00 AM	7.8	5.8	4.2	Plant was off-line
04/19/98	01:00 AM	7.8	5.8	4.1	Plant was off-line
04/19/98	02:00 AM	7.8	5.8	4.1	Plant was off-line
04/19/98	03:00 AM	7.9	5.9	4.1	Plant was off-line
04/19/98	04:00 AM	7.9	5.9	4.2	Plant was off-line
04/19/98	05:00 AM	8	6	4.1	Plant was off-line
04/19/98	06:00 AM	7.9	5.9	4.1	Plant was off-line
04/19/98	07:00 AM	7.8	5.8	4.1	Plant was off-line

TEMPERATURE VIOLATIONS AT X3

		TEMPERATURE			REASON FOR VIOLATION
DATE	**TIME**	**X1+1**	**X1-1**	**X3 TEMP**	
04/19/98	08:00 AM	7.8	5.8	4.1	Plant was off-line
04/19/98	09:00 AM	7.7	5.7	4.1	Plant was off-line
04/19/98	10:00 AM	7.8	5.8	4.2	Plant was off-line
04/19/98	11:00 AM	7.9	5.9	4.2	Plant was off-line
04/19/98	12:00 PM	8	6	4.3	Plant was off-line
04/19/98	01:00 PM	8	6	4	X-1 probe miscalibrated
04/19/98	02:00 PM	6.1	4.1	4	re-calibrated probe
05/04/98	02:00 PM	7.7	5.7	5	X-1 probe miscalibrated
05/04/98	03:00 PM	7.6	5.6	5	X-1 probe miscalibrated
05/04/98	04:00 PM	7.7	5.7	5	X-1 probe miscalibrated
05/04/98	05:00 PM	7.7	5.7	4.9	X-1 probe miscalibrated
05/04/98	06:00 PM	7.7	5.7	4.9	X-1 probe miscalibrated
05/04/98	07:00 PM	7.6	5.6	4.9	X-1 probe miscalibrated
05/04/98	08:00 PM	7.6	5.6	4.9	X-1 probe miscalibrated
05/04/98	09:00 PM	7.5	5.5	5	X-1 probe miscalibrated
05/04/98	10:00 PM	7.9	5.9	5.3	X-1 probe miscalibrated
05/04/98	11:00 PM	8	6	5.4	X-1 probe miscalibrated
05/05/98	12:00 AM	7.9	5.9	5.2	X-1 probe miscalibrated
05/05/98	01:00 AM	7.8	5.8	5.1	X-1 probe miscalibrated
05/05/98	02:00 AM	7.8	5.8	5.2	X-1 probe miscalibrated
05/05/98	03:00 AM	7.8	5.8	5.1	X-1 probe miscalibrated
05/05/98	04:00 AM	7.8	5.8	5.1	X-1 probe miscalibrated
05/05/98	05:00 AM	7.9	5.9	5.1	X-1 probe miscalibrated
05/05/98	06:00 AM	7.9	5.9	5	X-1 probe miscalibrated
05/05/98	07:00 AM	7.5	5.5	5.1	X-1 probe miscalibrated
05/05/98	08:00 AM	7.6	5.6	5.1	X-1 probe miscalibrated
05/05/98	09:00 AM	7.7	5.7	5.2	X-1 probe miscalibrated
05/05/98	10:00 AM	7.8	5.8	5.2	X-1 probe miscalibrated
05/05/98	11:00 AM	7.7	5.7	5.2	X-1 probe miscalibrated
05/05/98	12:00 PM	7.6	5.6	5.3	X-1 probe miscalibrated
05/05/98	10:00 PM	7.6	5.6	5.4	X-1 probe miscalibrated
05/05/98	11:00 PM	7.7	5.7	5.5	X-1 probe miscalibrated
05/10/98	11:00 AM	6.1	4.1	6.2	X-1 probe miscalibrated
05/10/98	12:00 PM	6.1	4.1	6.2	X-1 probe miscalibrated
05/10/98	01:00 PM	6	4	6.1	X-1 probe miscalibrated
05/10/98	02:00 PM	6.1	4.1	6.2	X-1 probe miscalibrated
05/11/98	08:00 AM	6.3	4.3	6.4	X-1 probe miscalibrated
05/11/98	11:00 AM	6.2	4.2	6.3	X-1 probe miscalibrated
05/11/98	01:00 PM	6.1	4.1	6.2	X-1 probe miscalibrated
05/11/98	02:00 PM	6.2	4.2	6.3	X-1 probe miscalibrated
05/11/98	03:00 PM	6.2	4.2	6.4	X-1 probe miscalibrated
05/11/98	06:00 PM	6.2	4.2	6.3	X-1 probe miscalibrated
05/12/98	12:00 AM	6.5	6.4	4.4	X-3 probe re-calibrated
07/07/98	12:00 PM	14.5	14	12	Plant was off-line
07/07/98	01:00 PM	15.1	13.9	11.9	Plant was off-line
07/07/98	02:00 PM	15.4	13.9	11.9	Plant was off-line
07/07/98	03:00 PM	15.6	13.9	11.9	Plant was off-line

TEMPERATURE VIOLATIONS AT X3

		TEMPERATURE			REASON FOR VIOLATION
DATE	**TIME**	**X1+1**	**X1-1**	**X3 TEMP**	
07/12/98	11:00 AM	14.8	14.5	12.5	Plant was off-line
07/15/98	10:00 AM	12.9	15.1	13.1	re-calibrated probe
09/28/98	01:00 PM	13.5	17.3	15.3	cleaned and re-calibrated X-1 probe
09/28/98	02:00 PM	13.6	17.1	15.1	cleaned and re-calibrated X-1 probe
09/28/98	03:00 PM	13.7	16.5	14.5	cleaned and re-calibrated X-1 probe
09/28/98	04:00 PM	13.9	16.4	14.4	cleaned and re-calibrated X-1 probe
09/28/98	05:00 PM	13.8	17	15	cleaned and re-calibrated X-1 probe
09/28/98	07:00 PM	13.7	15.9	13.9	cleaned and re-calibrated X-1 probe
09/28/98	09:00 PM	13.6	16.2	14.2	cleaned and re-calibrated X-1 probe
09/28/98	10:00 PM	13.7	15.8	13.8	cleaned and re-calibrated X-1 probe
09/29/98	01:00 AM	13.6	15.8	13.8	cleaned and re-calibrated X-1 probe
09/29/98	07:00 AM	13.4	12.4	10.4	re-calibrated X-3 probe
09/29/98	02:00 PM	13.4	15.8	13.8	cleaned and re-calibrated X-1 probe
09/29/98	03:00 PM	13.5	17	15	cleaned and re-calibrated X-1 probe
09/29/98	04:00 PM	13.5	16.7	14.7	cleaned and re-calibrated X-1 probe
09/29/98	05:00 PM	13.6	16.7	14.7	cleaned and re-calibrated X-1 probe
09/30/98	05:00 PM	13.2	13.1	11.1	cleaned and re-calibrated X-1 probe
10/01/98	01:00 AM	13	12.9	10.9	cleaned and re-calibrated X-1 probe
10/01/98	03:00 AM	13.2	13.1	11.1	cleaned and re-calibrated X-1 probe
10/01/98	04:00 AM	13.1	12.9	10.9	cleaned and re-calibrated X-1 probe
10/01/98	06:00 AM	13	12.4	10.4	cleaned and re-calibrated X-1 probe
10/01/98	07:00 AM	13	11.8	9.8	cleaned and re-calibrated X-1 probe
10/01/98	08:00 AM	13	12.7	10.7	cleaned and re-calibrated X-1 probe
10/01/98	09:00 AM	13	12.6	10.6	cleaned and re-calibrated X-1 probe
10/01/98	10:00 AM	13.1	12.7	10.7	cleaned and re-calibrated X-1 probe
10/01/98	11:00 AM	13.1	12.6	10.6	cleaned and re-calibrated X-1 probe
10/01/98	12:00 PM	13.1	12.4	10.4	cleaned and re-calibrated X-1 probe
10/01/98	01:00 PM	13	12.5	10.5	cleaned and re-calibrated X-1 probe
10/01/98	02:00 PM	13	12.4	10.4	cleaned and re-calibrated X-1 probe
10/01/98	03:00 PM	13.1	11.9	9.9	cleaned and re-calibrated X-1 probe
10/01/98	04:00 PM	13.2	12.6	10.6	cleaned and re-calibrated X-1 probe
10/01/98	05:00 PM	13.2	11.8	9.8	cleaned and re-calibrated X-1 probe
10/01/98	06:00 PM	13.1	12.7	10.7	cleaned and re-calibrated X-1 probe
10/01/98	07:00 PM	13.2	12.1	10.1	cleaned and re-calibrated X-1 probe
10/01/98	08:00 PM	13	12.2	10.2	cleaned and re-calibrated X-1 probe
10/01/98	09:00 PM	12.9	12.5	10.5	cleaned and re-calibrated X-1 probe
10/01/98	11:00 PM	13.1	12.9	10.9	cleaned and re-calibrated X-1 probe
10/02/98	02:00 AM	13	12.8	10.8	cleaned and re-calibrated X-1 probe
10/02/98	05:00 AM	13	12.9	10.9	cleaned and re-calibrated X-1 probe
10/02/98	06:00 AM	13.1	12.8	10.8	cleaned and re-calibrated X-1 probe
10/02/98	07:00 AM	13	12.7	10.7	cleaned and re-calibrated X-1 probe
10/02/98	08:00 AM	13.1	12.6	10.6	cleaned and re-calibrated X-1 probe
10/04/98	04:00 PM	13.5	22	20	re-calibrated probes at both X-1 and X-3
10/04/98	05:00 PM	13.5	27.6	25.6	re-calibrated probes at both X-1 and X-3
10/04/98	06:00 PM	13.5	27.3	25.3	re-calibrated probes at both X-1 and X-3
10/04/98	07:00 PM	13.5	26.4	24.4	re-calibrated probes at both X-1 and X-3
10/04/98	08:00 PM	13.5	26.8	24.8	re-calibrated probes at both X-1 and X-3

TEMPERATURE VIOLATIONS AT X3

		TEMPERATURE			REASON FOR VIOLATION
DATE	**TIME**	**X1+1**	**X1-1**	**X3 TEMP**	
10/04/98	09:00 PM	13.4	25.4	23.4	re-calibrated probes at both X-1 and X-3
10/04/98	10:00 PM	13.3	27.9	25.9	re-calibrated probes at both X-1 and X-3
10/04/98	11:00 PM	13.3	21.3	19.3	re-calibrated probes at both X-1 and X-3
10/05/98	12:00 AM	13.2	26.4	24.4	re-calibrated probes at both X-1 and X-3
10/05/98	01:00 AM	13.3	23.9	21.9	re-calibrated probes at both X-1 and X-3

DISSOLVED OXYGEN VIOLATIONS AT X4

		X4 DISSOLVED OXYGEN			
DATE	**TIME**	**X4<7**	**X4-MIN**	**X4-MAX**	**REASON**
01/19/98	02:00 PM	2.5	0	8.1	probe off for maintenance
04/16/98	02:00 PM	3.7	-0.5	9.2	probe off for maintenance
07/27/98	08:00 PM	4.5	-0.7	8.4	probe off for maintenance
07/27/98	09:00 PM	-0.3	-0.7	-0.3	probe off for maintenance
07/27/98	10:00 PM	5	-0.4	8.5	probe off for maintenance
07/27/98	11:00 PM	6.9	6.5	7.4	plant alarm, increased aeration
07/28/98	12:00 AM	6.8	-0.4	7	probe off for maintenance
07/28/98	01:00 AM	6.1	-0.4	19.4	probe off for maintenance
07/29/98	10:00 AM	6.1	-1	19.9	probe off for maintenance
09/06/98	08:00 PM	6.6	5.8	8	replaced membrane
09/12/98	12:00 PM	6.3	-0.9	15.5	probe off for maintenance
10/08/98	11:00 AM	3.5	-0.4	16.9	probe off for maintenance
12/18/98	09:00 AM	6.9	5.9	9.4	replaced membrane

TOTAL GAS PRESSURE VIOLATIONS AT X4

DATE	TIME	X4 TOTAL GAS PRESSURE X4>110	X4-MIN	X4-MAX	REASON
07/27/98	20:00	110.2	91.8	253.9	probe disconnected for maintenance
07/27/98	21:00	621.1	-3154.9	1750.7	probe off for maintenance
09/06/98	21:00	117.5	100.6	1750.7	probe disconnected for maintenance
09/12/98	12:00	427.2	-3054.8	1900.8	probe off for maintenance
12/28/98	15:00	599.4	-3054.8	1950.8	probe off for maintenance