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SUSQUEHANNA STEAM ELECTRIC STATION
REQUEST FOR ADDITIONAL INFORMATION FOR THE REVIEW OF THE SUSQUEHANNA STEAM ELECTRIC STATION UNITS 1 AND 2, LICENSE RENEWAL APPLICATION (LRA) SECTION 4.3
PLA-6513

Docket Nos. 50-387 and 50-388

References:

1) *PLA-6110, Mr. B. T. McKinney (PPL) to Document Control Desk (USNRC), "Application for Renewed Operating License Numbers NPF-14 and NPF-22," dated September 13, 2006.*

2) *Letter from Ms. E. H. Gettys (USNRC) to Mr. W. H. Spence (PPL), "Request for Additional Information for the Review of the Susquehanna Steam Electric Station, Units 1 and 2 License Renewal Application," dated April 27, 2009.*

3) *PLA-6397, Mr. B. T. McKinney (PPL) to Document Control Desk (USNRC), "Request for Additional Information for the Review of the Susquehanna Steam Electric Station Units 1 and 2, License Renewal Application (LRA) Sections B.3.1, 4.3, and 4.7," dated August 1, 2008.*

4) *PLA-6464, Mr. W. H. Spence (PPL) to Document Control Desk (USNRC), "Request for Additional Information for the Review of the Susquehanna Steam Electric Station Units 1 and 2, License Renewal Application, (LRA) Section 4.3 Supplement," dated December 12, 2008.*

In accordance with the requirements of 10 CFR 50, 51, and 54, PPL requested the renewal of the operating licenses for the Susquehanna Steam Electric Station (SSES) Units 1 and 2 in Reference 1.

Reference 2 is a request for additional information (RAI) related to License Renewal Application (LRA) Section 4.3. The enclosure to this letter provides the question responses and the additional requested information. The Attachment contains SSES plant data for dissolved oxygen levels in support of the response to RAI 4.3-9R.

There are no new regulatory commitments contained herein as a result of the attached response.

A120
NRR

If you have any questions, please contact Mr. Duane L. Filchner at (610) 774-7819.

I declare, under penalty of perjury, that the foregoing is true and correct.

Executed on: 5-26-09

Richard D Sagodin for W H Spence

W. H. Spence

Enclosure: PPL Response to NRC's Request for Additional Information (RAI)

Attachment: Dissolved Oxygen Data

Copy: NRC Region I
Ms. E. H. Gettys, NRC Project Manager, License Renewal, Safety
Mr. R. Janati, DEP/BRP
Mr. F. W. Jaxheimer, NRC Sr. Resident Inspector
Mr. A. L. Stuyvenberg, NRC Project Manager, License Renewal, Environmental

Enclosure to PLA-6513
PPL Response to NRC's
Request for Additional Information (RAI)

RAI 4.3.1-1:

The Susquehanna Steam Electric Station (SSES) Fatigue Monitoring Program (FMP) relies on transient cycle monitoring to evaluate the fatigue usage described in the license renewal application. It is essential that all thermal and pressure activities are bounded by the design specifications and cycles of all significant thermal events are captured and logged. In the response to RAI B.3.1-1, dated August 01, 2008, it states that SSES FMP cycle counting assumes every event has a severity equal to that assumed in the design basis.

To ensure effectiveness and validity of the fatigue monitoring program, the staff requests additional information, as described below:

(a) Confirm that all monitored transient events were bounded by the design specifications.

(b) Specify the time (years) over which actual transient monitoring and cycle tracking activities took place. If there have been periods in which transient data are not recorded since the plant startup, for any type of transient, specify the affected time frame. For the time periods for which transients were not monitored, provide justification to demonstrate that the projected cycles for this unmonitored period are conservative.

PPL Response:

Part a

Prior to implementing the on-going SSES Fatigue Monitoring Program (FMP), PPL completed an extensive review to accurately baseline SSES Units 1 and 2. The baselining process evaluated past plant data and records to determine what plant events occurred and the fatigue usage for all monitored components. The SSES Unit 1 baselining covered operation from initial plant startup through December 31, 2002, and the SSES Unit 2 baselining covered operation from initial plant startup through April 13, 2003. This work included the review of nearly 40 years of plant operating data and the assessment of over 3,000 plant events for SSES Units 1 and 2 combined. There were no instances identified in which a plant event had exceeded the expected parameters (i.e., the design specification definitions).

The on-going FMP monitors 38 separate plant events that have been determined to have a measurable fatigue impact on one or more plant components within the ASME Class 1 reactor coolant pressure boundary. The details for how the FMP monitors these events is provided in letter PLA-6397 (Reference 3), in response to RAI B.3.1-1. As described in that response, the FMP assumes every counted event has a severity equal to that assumed

in the design basis. This simplifies the cycle counting process within the FMP, because it eliminates the need to determine a specific severity level of an event. For example, if the plant is starting up from 100°F and the reactor temperature exceeds 225°F, but then immediately begins to cool down, one "Startup" cycle will be counted by the FMP, even though the design basis "Startup" cycle consists of a reactor temperature starting at 100°F and increasing to 551°F. As cycle counting proceeds throughout the life of the plant, this assumption results in a higher (i.e., conservative) total number of cycles than have actually occurred. And, the subsequent assessment of the fatigue usage, for components monitored via the cycle-based fatigue (CBF) methodology, is then also conservative.

The SSES FMP is a procedure-driven program that relies on engineering analysis of plant data and records to accurately identify and track the occurrence of plant events. The procedure requires formal calculations to be prepared, reviewed, and approved under the SSES quality assurance program. In the process of preparing these calculations, two engineers independently review key plant parameters such as reactor pressure and temperature, feedwater flow and temperature, etc. to assess the overall plant operating history for the period of time under review. This review includes identification and investigation of anomalies in the data, including values that are outside of expected ranges.

Therefore, all monitored transient events are conservatively factored into the fatigue usage calculations for the ASME Class 1 reactor coolant pressure boundary components within the FMP, since

1) the review of plant data used in the FMP ensures that the correct events are accurately counted, and

2) full design cycles are considered for all counted events (even when the actual severity is less than that of a full design cycle).

The SSES Technical Specifications (TS) also include requirements to maintain the reactor vessel heatup and cooldown rates to less than or equal to 100°F in any one-hour period and to ensure the reactor vessel is operated within specific pressure-temperature limits. Surveillance procedures ensure the reactor vessel pressure and temperature are closely monitored during heatups and cooldowns to avoid exceeding any TS limit. Whenever a potential TS limit deviation is identified, a condition report (CR) would be initiated and an engineering evaluation would be required to disposition the potential deviation from any TS limit. Additionally, a licensee event report (LER) would be initiated if required. In the operating history of SSES Units 1 and 2, no events have occurred that exceeded any TS limit related to reactor vessel pressure or temperature.

In conclusion, the extensive review of SSES operating experience, as part of the baselining work for the FMP, identified no events that exceeded the design parameters.

And, should any future events exceed the design parameters, the TS requirements and the activities of the FMP will identify and evaluate those events appropriately.

Part b

As discussed in the response to Part a of this RAI, as a result the baselining work that was performed and the on-going monitoring activities, actual transient monitoring and cycle tracking activities cover the entire operating history of SSES Units 1 and 2. There were no time periods for which projected cycles of transients or plant events were used.

RAI 4.3.1-2:

LRA Section 4.3.1 states that "Normal, upset, and test conditions used in the fatigue analyses of the RPV assembly are summarized in Table 4.3-1. Design cumulative usage factors for the limiting RPV assembly locations are obtained from applicable design reports and are summarized in Table 4.3-2." LRA Tables 4.3-1 and 4.3-2 include 60-year cycle projections and 60-year CUF projections, respectively, for Units 1 and 2.

1. LRA Table 4.3-1 shows that the 60-year projected cycles for a majority of transients are lower than the respective design cycles, approximately by a factor between 2 and 3 for both units. For startup and shutdown transients, the 60-year projected cycles are higher than the design cycles, by approximately 30%. LRA Table 4.3-2 shows that for some of the limiting RCPB locations, the 60-year projected CUF values are much lower than the 40-year design CUF values, up to a factor of 10 and even greater.

   Describe the basis for the large reductions in CUF values with relatively minor reduction in cycle projections, in spite of some cases having projected cycles higher than the design cycles.

2. LRA Table 4.3-1 indicates that the ratios of the design cycles to the 60-year projected cycles are distinct for each transient. Describe how 60-year CUF projections were made.

PPL Response:

Part 1

Three of the 26 limiting RCPB locations in LRA Table 4.3-2, the FW Nozzle (N4) Safe End, the FW Nozzle (N4), and the CRD Penetration, are monitored in the SSES Fatigue Monitoring Program (FMP) via the stress-based fatigue (SBF) methodology, which is described in the response to RAI B.3.1-1 in letter PLA-6397 (Reference 3). Since SBF does not rely on cycle counts (or cycle projections) to determine fatigue usage, the

discussion that follows is not applicable to these three locations.

The remaining 23 locations in LRA Table 4.3-2 are monitored in the FMP via the cycle-based fatigue (CBF) methodology, which is described in the response to RAI B.3.1-1 in letter PLA-6397 (Reference 3). For each of these locations, the original design fatigue analysis provides the basis for the on-going assessment of the fatigue usage due to the combination of transient event cycles that have actually occurred. Each location is affected differently for an identical combination of transient event cycles, as reflected in the design CUF values, shown in LRA Table 4.3-2, which are different for every location.

For any transient that would be considered (e.g., boltup, startup, scram, shutdown, loss of feedwater heaters, blowdown, etc.), the fatigue impact will vary from location to location. When transients include severe changes in temperature, pressure, or flow rates (in piping and nozzles), the fatigue usage due to those transients is greater than the usage for milder events. The startup and shutdown events, with design heatup and cooldown rates of 100°F per hour, are considered mild transients and the associated fatigue usage is generally very low (often zero). For example, the fatigue usage due to one startup cycle and one shutdown cycle on several locations is as follows:

	Startup	Shutdown
Reactor Head Closure Flange:	0.001	0.001
Vessel Support Skirt:	0.000286	0*
Main Steam Nozzle:	0.001808	0*
Core Spray Nozzle Safe End:	0.000755	0*
Several Piping Locations:	0*	0*

* Stresses due to event do not exceed the endurance limit (i.e., no fatigue) or the shutdown was considered part of a combined "startup-shutdown" stress cycle.

The results of the FMP baselining work, described in the response to RAI 4.3.1-1, demonstrate that the most severe transients (i.e., the transients with the greatest fatigue impact) occur less frequently than assumed in the original 40-year design fatigue analyses. The 60-year cycle projections in LRA Table 4.3-1, which are based on the baselining results, indicate that the following transients are projected to accrue fewer cycles in 60 years than the number of cycles assumed in the original 40-year design: Bolt Up, Design Hydrostatic Test, Loss of Feedwater Heaters (and Partial Feedwater Heater Bypass), 50% Safe Shutdown Event, Scram, Unbolt, Blowdown, Natural Circulation Startup, and Loss of AC Power (and Natural Circulation Restart). These transients have been shown to have a greater fatigue impact on plant component locations than the relatively mild startup and shutdown transients.

Many of the 60-year CUF projections in LRA Table 4.3-2 are lower than the original design CUF, which covered 40 years of operation. This is expected, since the slight increase in the 60-year fatigue usage due to the higher number of mild transient cycles (startups and shutdowns) is effectively negated by the decrease in the 60-year fatigue usage due to the lower number of severe transient cycles.

For three reactor vessel component locations with 60-year CUF projections that are significantly lower than the original design CUF, the above explanation (i.e., the lower number of severe transients offsets the higher number of mild transients) is not sufficient to address the low values of the 60-year CUF projections. The additional details for these locations are presented below.

The first location, the vessel support skirt, has design CUFs of 0.913 for Unit 1 and 0.888 for Unit 2, which are based on a design adequacy evaluation performed to account for new seismic, hydrodynamic, and annulus pressurization loads that were postulated following the original plant design and construction. When developing the FMP, the design adequacy evaluation for the support skirt was reviewed, and it was determined that a significant portion of the design CUF value was due to these new loads that result from emergency and faulted plant conditions. Since these severe conditions are not anticipated to occur, the 60-year CUF projection, based on the 60-year cycle projections, is significantly lower than the design CUF.

The other two locations, the core spray nozzle forging and the recirculation inlet nozzle, have design CUFs of 0.815, which are based on the design fatigue analysis for the feedwater nozzle. Bounding these nozzles with the feedwater nozzle analysis is conservative because the feedwater nozzle is a similar design and experiences a higher number of more severe transients than either of the bounded nozzles. The design fatigue analysis for the feedwater nozzle was overly conservative, as it had assumed cycle counts that are several times higher than the 60-year cycle projections. For example, the design analysis assumed that 1,306 turbine generator trips would occur, and these cycles accounted for nearly half of the original design CUF. As seen in LRA Table 4.3-1, neither SSES unit is expected to experience nearly that many turbine trip cycles. Therefore, the large reduction in the 60-year CUF projection for these two locations is due to the application of the CBF methodology, combined with an overly conservative original design analysis.

Part 2

A complete description of how the 60-year CUF projection was made for the Unit 1 vessel shell (at shroud support) was previously provided in response to RAI 4.3-10 in letter PLA-6464 (Reference 4), on pages 6 and 7 of the Enclosure. This methodology was followed for all locations in LRA Table 4.3-2.

RAI 4.3-9R:

In letter dated November 26, 2008, the applicant responded to RAI 4.3-9 by stating the following:

> The dissolved oxygen levels in the SSES Unit 1 and Unit 2 feedwater systems, before and after the implementation of hydrogen water chemistry, are maintained at less than 50 parts per billion (ppb).

In addition, footnotes to the tables on page 4 and 5 of Enclosure 1 to PLA-6464 state that the environmental CUF values were determined assuming the following dissolved oxygen levels for the Feedwater system: 47 ppb with Normal Water Chemistry, 40 ppb with Hydrogen Water Chemistry for Unit 1; 40 ppb with Normal Water Chemistry and 39 ppb with Hydrogen Water Chemistry for Unit 2.

To facilitate its review and evaluation, the staff is requesting that the applicant:

a) Provide dissolved oxygen (DO) data for the SSES at full power for the three summer months of each of the following years: 1985, 1988 and 1991, for both Units 1 and 2. If the unit was not at full power during these periods, provide data from the next 3 month period that the unit was at full power.

b) Describe the methodology of Fen calculation which SSES used to deal with the situations where DO content in the feedwater system, over certain periods, has been consistently greater than 50 ppb.

c) Describe how water samples were taken, including the sampling locations, and justify that the DO data in the feedwater system shown in PLA-6464 are applicable to all NUREG/CR6260 components for Fen calculations.

PPL Response:

Part a

Plant performance during 1985, 1988 and 1991 did not always provide for a continuous three summer months of full power operation. PPL searched for the nearest three month period of full power operation, as close as possible to the requested summer months. Data is provided in the Attachment for the following periods of continuous full power operation:

Unit 1: 7/12 – 10/11/1985, 7/1 – 10/1/1988, and 4/1 – 6/30/1991

Unit 2: 2/1 – 5/1/1986 (1), 7/1/1988 – 2/27/1989 (2), and 5/9 – 8/6/1991

Note 1: Unit 2 had no three month period of continuous operation in 1985.

Note 2: The data period was extended beyond three months to show the return to normal oxygen levels following the repair of leaking condensate pump suction line drain valves, which resulted in the higher than normal feedwater system oxygen levels from July to mid-November 1988.

Part b

In the evaluation of the effects of the reactor coolant environment on the fatigue life of the equivalent NUREG/CR-6260 locations identified in LRA Table 4.3-3, there was no special consideration for the limited periods of operation during which the dissolved oxygen (DO) content in the feedwater system may have been consistently greater than 50 parts per billion (ppb). PPL followed the methodology for calculating Fen that is provided in NUREG/CR-6583 (for carbon/low alloy steels) and NUREG/CR-5704 (for stainless steels). The NUREG/CR's do not discuss how to address variable DO levels during operation. There is industry guidance provided in EPRI Final Report 1012017, "Materials Reliability Program: Guidelines for Addressing Fatigue Environmental Effects in a License Renewal Application (MRP-47 Revision 1)." On pages 4-20 and 4-21 of MRP-47, the guidance for addressing variable DO levels throughout the plant operating history is to determine a time-averaged DO level. PPL's evaluation is in accordance with the guidance of MRP-47, Revision 1.

As mentioned in the RAI statement, the environmental CUF values were determined with the assumption that the DO levels in the feedwater system were less than 50 ppb. PPL reviewed all available feedwater DO data from July 1985 through March 2009 for both units. From the review of that data, PPL has determined that while there are feedwater DO data points greater than 50 ppb encountered throughout the history of both units, the time-averaged DO levels in the feedwater systems for both SSES units are less than 50 ppb during operation with normal water chemistry (NWC) and with hydrogen water chemistry (HWC).

In accordance with the guidance of NUREG/CR-6583, a DO level of less than 50 ppb results in a constant value of 0 (zero) for the transformed oxygen parameter, O*, in the Fen expression for carbon and low alloy steels. In accordance with the guidance of NUREG/CR-5704, a DO level of less than 50 ppb results in a constant value of 0.260 for O* in the Fen expression for stainless steels. Therefore, since the time-averaged DO levels for the SSES Units 1 and 2 feedwater systems have been determined to be less than 50 ppb for operation with NWC and with HWC, and since these DO levels result in a constant value for O* for carbon/low alloy and stainless steels, the Fen calculations performed for the SSES LRA are in accordance with the guidance provided in NUREG/CR-6583 and NUREG/CR-5704.

Part c

The DO levels in the SSES Units 1 and 2 feedwater systems are normally determined by in-line DO monitors, which continuously sample the feedwater flowing to the Reactor Building Sample Station via the sample line. The feedwater sample line ties into the main feedwater header pipe inside the reactor building. Therefore, the feedwater being sampled is representative of the feedwater flowing to the reactor vessel.

The DO levels in the SSES Units 1 and 2 reactor water are also normally determined by in-line DO monitors, which continuously sample the reactor water flowing to the Reactor Building Sample Station via the sample line. The reactor water sample line ties into the reactor water cleanup line upstream of the filter demineralizer inlet. The reactor water cleanup system draws water from the reactor vessel bottom head drain and from each of the recirculation pump suction lines. Therefore, the reactor water being sampled is representative of a mixture of the water in the reactor bottom head and of the water in the reactor annulus region.

While the in-line monitors are continuously monitoring the sample streams, readings from the monitors are normally taken and recorded once per day. During transient conditions, or any time additional data is requested, readings may be obtained more frequently. If the in-line monitors malfunction or require maintenance, the daily readings are taken with a portable monitor or with manual testing via DO ampoules.

PPL did not apply the DO data from only the feedwater system to all equivalent NUREG/CR-6260 locations in LRA Table 4.3-3. Depending on the specific location, PPL applied either the DO level from the feedwater system or the recirculation system (i.e., reactor water). The DO levels that were applied are documented in the notes to the tables included in the response to RAI 4.3-9 in letter PLA-6464 (Reference 4). The feedwater system DO levels were applied to the determination of the Fen values for the feedwater nozzle safe end, the feedwater nozzle forging, and the Class 1 feedwater piping location. And, the reactor water DO levels were applied to the determination of the Fen values for the reactor vessel (shell at shroud support), recirculation inlet and outlet nozzle forgings, core spray nozzle forging and safe end, Class 1 RHR supply line piping location, and the Class 1 recirculation suction line piping locations (Loop A and Loop B).

As presented in LRA Table 4.3-3, PPL determined that the 60-year environmental CUFs exceed 1.0 for seven of the eleven locations, indicating the need for an aging management program to address the potential for unacceptable environmental effects. In accordance with 10 CFR 54.21(c)(iii), PPL committed to manage the effects of environmentally-assisted fatigue with the SSES Fatigue Monitoring Program (FMP) and, recognizing that the FMP does not currently account for environmental effects, license renewal commitment # 43 (LRA Table A-1) includes requirements to enhance the existing FMP to account for these effects.

Attachment to PLA-6513
Dissolved Oxygen Data
To Support Response to RAI 4.3-9R

Unit 1 Dissolved Oxygen (DO) Data - 1985			
Reactor Water		Feedwater	
Date/Time	DO, ppb	Date/Time	DO, ppb
7/12/1985 0:00	283	7/12/1985 0:00	53
7/13/1985 0:00	289	7/13/1985 0:00	45
7/14/1985 0:00	297	7/14/1985 0:00	44.5
7/15/1985 0:00	290	7/15/1985 0:00	45
7/16/1985 0:00	294	7/16/1985 0:00	43
7/17/1985 0:00	215	7/17/1985 0:00	44.1
7/18/1985 0:00	257	7/18/1985 0:00	43.4
7/19/1985 0:00	287	7/19/1985 0:00	48
7/20/1985 0:00	289	7/20/1985 0:00	46.7
7/21/1985 0:00	273	7/21/1985 0:00	48.6
7/22/1985 0:00	283	7/22/1985 0:00	48.7
7/23/1985 0:00	245	7/23/1985 0:00	46.4
7/24/1985 0:00	200	7/24/1985 0:00	46.5
7/25/1985 0:00	245	7/25/1985 0:00	46.9
7/26/1985 0:00	250	7/26/1985 0:00	47.6
7/27/1985 0:00	255	7/27/1985 0:00	47.4
7/28/1985 0:00	200	7/28/1985 0:00	34
7/29/1985 0:00	250	7/29/1985 0:00	43
7/30/1985 0:00	250	7/30/1985 0:00	48
7/31/1985 0:00	300	7/31/1985 0:00	47
8/1/1985 0:00	300	8/1/1985 0:00	46.9
8/2/1985 0:00	300	8/2/1985 0:00	48.9
8/3/1985 0:00	300	8/3/1985 0:00	57.4
8/4/1985 0:00	250	8/4/1985 0:00	48.6
8/5/1985 0:00	300	8/5/1985 0:00	48.3
8/6/1985 0:00	200	8/6/1985 0:00	45.6
8/7/1985 0:00	200	8/7/1985 0:00	52.7
8/8/1985 0:00	200	8/8/1985 0:00	50.8
8/9/1985 0:00	250	8/9/1985 0:00	51.8
8/10/1985 0:00	350	8/10/1985 0:00	50.6
8/11/1985 0:00	340	8/11/1985 0:00	52
8/12/1985 0:00	350	8/12/1985 0:00	30
8/13/1985 0:00	370	8/13/1985 0:00	50.5
8/14/1985 0:00	335	8/14/1985 0:00	50
8/15/1985 0:00	240	8/15/1985 0:00	50.6
8/16/1985 0:00	350	8/16/1985 0:00	40
8/17/1985 0:00	150	8/17/1985 0:00	50
8/18/1985 0:00	150	8/18/1985 0:00	45
8/19/1985 0:00	250	8/19/1985 0:00	50
8/20/1985 0:00	200	8/20/1985 0:00	51
8/21/1985 0:00	200	8/21/1985 0:00	52
8/22/1985 0:00	250	8/22/1985 0:00	51
8/23/1985 0:00	250	8/23/1985 0:00	51
8/24/1985 0:00	250	8/24/1985 0:00	51
8/25/1985 0:00	250	8/25/1985 0:00	50
8/26/1985 0:00	250	8/26/1985 0:00	50.3
8/27/1985 0:00	250	8/27/1985 0:00	50.1
8/28/1985 0:00	240	8/28/1985 0:00	49.7
8/29/1985 0:00	240	8/29/1985 0:00	48.8

Unit 1 Dissolved Oxygen (DO) Data - 1985			
Reactor Water		Feedwater	
Date/Time	DO, ppb	Date/Time	DO, ppb
8/30/1985 0:00	240	8/30/1985 0:00	39.2
8/31/1985 0:00	248	8/31/1985 0:00	48.3
9/1/1985 0:00	280	9/1/1985 0:00	48.6
9/2/1985 0:00	274	9/2/1985 0:00	49.8
9/3/1985 0:00	266	9/3/1985 0:00	46.6
9/4/1985 0:00	274	9/4/1985 0:00	48.2
9/5/1985 0:00	263	9/5/1985 0:00	45.5
9/6/1985 0:00	277	9/6/1985 0:00	46
9/7/1985 0:00	257	9/7/1985 0:00	58.3
9/8/1985 0:00	179	9/8/1985 0:00	32.3
9/9/1985 0:00	230	9/9/1985 0:00	38.5
9/10/1985 0:00	243	9/10/1985 0:00	45.1
9/11/1985 0:00	259	9/11/1985 0:00	43.7
9/12/1985 0:00	272	9/12/1985 0:00	44.5
9/13/1985 0:00	262	9/13/1985 0:00	43.7
9/14/1985 0:00	200	9/14/1985 0:00	46.9
9/15/1985 0:00	250	9/15/1985 0:00	45.7
9/16/1985 0:00	250	9/16/1985 0:00	46.1
9/17/1985 0:00	250	9/17/1985 0:00	43.9
9/18/1985 0:00	250	9/18/1985 0:00	43.4
9/19/1985 0:00	250	9/19/1985 0:00	42.9
9/20/1985 0:00	250	9/20/1985 0:00	42.1
9/21/1985 0:00	250	9/21/1985 0:00	41
9/22/1985 0:00	250	9/22/1985 0:00	40.3
9/23/1985 0:00	250	9/23/1985 0:00	40.8
9/24/1985 0:00	240	9/24/1985 0:00	42.2
9/25/1985 0:00	255	9/25/1985 0:00	41.7
9/26/1985 0:00	250	9/26/1985 0:00	42.5
9/27/1985 0:00	255	9/27/1985 0:00	40.5
9/28/1985 0:00	200	9/28/1985 0:00	41
9/29/1985 0:00	250	9/29/1985 0:00	40
9/30/1985 0:00	250	9/30/1985 0:00	40
10/1/1985 0:00	260	10/1/1985 0:00	40
10/2/1985 0:00	260	10/2/1985 0:00	39.5
10/3/1985 0:00	270	10/3/1985 0:00	37
10/4/1985 0:00	260	10/4/1985 0:00	36.5
10/5/1985 0:00	200	10/5/1985 0:00	35.8
10/6/1985 0:00	200	10/6/1985 0:00	36.2
10/7/1985 0:00	200	10/7/1985 0:00	36.5
10/8/1985 0:00	200	10/8/1985 0:00	36.5
10/9/1985 0:00	300	10/9/1985 0:00	35.9
10/10/1985 0:00	300	10/10/1985 0:00	35.9
10/11/1985 0:00	260	10/11/1985 0:00	35.4

Unit 1 Dissolved Oxygen (DO) Data - 1988			
Reactor Water		Feedwater	
Date/Time	DO, ppb	Date/Time	DO, ppb
7/1/1988 0:00	268	7/1/1988 0:00	25.3
7/2/1988 0:00	267	7/2/1988 0:00	26.1
7/3/1988 0:00	272	7/3/1988 0:00	26
7/4/1988 0:00	288	7/4/1988 0:00	26.4
7/5/1988 0:00	276	7/5/1988 0:00	27.4
7/6/1988 0:00	258	7/6/1988 0:00	27.4
7/7/1988 0:00	272	7/7/1988 0:00	26.4
7/8/1988 0:00	279	7/8/1988 0:00	27.2
7/9/1988 0:00	272	7/9/1988 0:00	20
7/10/1988 0:00	280	7/10/1988 0:00	22.4
7/11/1988 0:00	294	7/11/1988 0:00	22.4
7/12/1988 0:00	288	7/12/1988 0:00	21.5
7/13/1988 0:00	278	7/13/1988 0:00	21.7
7/14/1988 0:00	285	7/14/1988 0:00	23.2
7/15/1988 0:00	290	7/15/1988 0:00	23.9
7/16/1988 0:00	303	7/16/1988 0:00	40
7/17/1988 0:00	300	7/17/1988 0:00	40
7/18/1988 0:00	305	7/18/1988 0:00	35
7/19/1988 0:00	284	7/19/1988 0:00	37.6
7/20/1988 0:00	260	7/20/1988 0:00	38.5
7/21/1988 0:00	219	7/21/1988 0:00	36.6
7/22/1988 0:00	342	7/22/1988 0:00	36.2
7/23/1988 0:00	200	7/23/1988 0:00	30
7/24/1988 0:00	200	7/24/1988 0:00	30
7/25/1988 0:00	175	7/25/1988 0:00	30
7/26/1988 0:00	175	7/26/1988 0:00	30
7/27/1988 0:00	175	7/27/1988 0:00	35
7/28/1988 0:00	200	7/28/1988 0:00	40
7/29/1988 0:00	175	7/29/1988 0:00	35
7/30/1988 0:00	222	7/30/1988 0:00	26.7
7/31/1988 0:00	262	7/31/1988 0:00	45.5
8/1/1988 0:00	298	8/1/1988 0:00	36
8/2/1988 0:00	268	8/2/1988 0:00	35.6
8/3/1988 0:00	294	8/3/1988 0:00	37.6
8/4/1988 0:00	282	8/4/1988 0:00	37
8/5/1988 0:00	297	8/5/1988 0:00	37.2
8/6/1988 0:00	297	8/6/1988 0:00	37.4
8/7/1988 0:00	287	8/7/1988 0:00	37
8/8/1988 0:00	302	8/8/1988 0:00	37.2
8/9/1988 0:00	298	8/9/1988 0:00	38.1
8/10/1988 0:00	299	8/10/1988 0:00	36.3
8/11/1988 0:00	301	8/11/1988 0:00	36.9
8/12/1988 0:00	303	8/12/1988 0:00	38.3
8/13/1988 0:00	311	8/13/1988 0:00	38.3
8/14/1988 0:00	307	8/14/1988 0:00	35
8/15/1988 0:00	304	8/15/1988 0:00	26.5
8/16/1988 0:00	310	8/16/1988 0:00	26.4
8/17/1988 0:00	310	8/17/1988 0:00	26.5

Unit 1 Dissolved Oxygen (DO) Data - 1988			
Reactor Water		Feedwater	
Date/Time	DO, ppb	Date/Time	DO, ppb
8/18/1988 0:00	314	8/18/1988 0:00	26.9
8/19/1988 0:00	309	8/19/1988 0:00	26.2
8/20/1988 0:00	311	8/20/1988 0:00	26.6
8/21/1988 0:00	294	8/21/1988 0:00	26.4
8/22/1988 0:00	303	8/22/1988 0:00	26
8/23/1988 0:00	318	8/23/1988 0:00	25.7
8/24/1988 0:00	298	8/24/1988 0:00	26.7
8/25/1988 0:00	319	8/25/1988 0:00	27
8/26/1988 0:00	289	8/26/1988 0:00	27
8/27/1988 0:00	284	8/27/1988 0:00	28
8/28/1988 0:00	285	8/28/1988 0:00	28.7
8/29/1988 0:00	285	8/29/1988 0:00	28.6
8/30/1988 0:00	295	8/30/1988 0:00	27.2
8/31/1988 0:00	288	8/31/1988 0:00	27.3
9/1/1988 0:00	290	9/1/1988 0:00	27.6
9/2/1988 0:00	290	9/2/1988 0:00	27
9/3/1988 0:00	284	9/3/1988 0:00	35
9/4/1988 0:00	284	9/4/1988 0:00	35
9/5/1988 0:00	284	9/5/1988 0:00	27.8
9/6/1988 0:00	281	9/6/1988 0:00	25.4
9/7/1988 0:00	290	9/7/1988 0:00	26.7
9/8/1988 0:00	298	9/8/1988 0:00	26.5
9/9/1988 0:00	293	9/9/1988 0:00	26.8
9/10/1988 0:00	298	9/10/1988 0:00	36
9/11/1988 0:00	306	9/11/1988 0:00	40
9/12/1988 0:00	304	9/12/1988 0:00	36
9/13/1988 0:00	309	9/13/1988 0:00	30
9/14/1988 0:00	308	9/14/1988 0:00	33
9/15/1988 0:00	314	9/15/1988 0:00	34
9/16/1988 0:00	320	9/16/1988 0:00	32
9/17/1988 0:00	322	9/17/1988 0:00	30
9/18/1988 0:00	322	9/18/1988 0:00	30
9/19/1988 0:00	312	9/19/1988 0:00	30
9/20/1988 0:00	311	9/20/1988 0:00	30
9/21/1988 0:00	310	9/21/1988 0:00	30
9/22/1988 0:00	295	9/22/1988 0:00	20
9/23/1988 0:00	255	9/23/1988 0:00	30
9/24/1988 0:00	193	9/24/1988 0:00	20
9/25/1988 0:00	226	9/25/1988 0:00	40
9/26/1988 0:00	260	9/26/1988 0:00	30
9/27/1988 0:00	268	9/27/1988 0:00	35
9/28/1988 0:00	272	9/28/1988 0:00	35
9/29/1988 0:00	275	9/29/1988 0:00	30
9/30/1988 0:00	274	9/30/1988 0:00	30
10/1/1988 0:00	287	10/1/1988 0:00	20

Unit 1 Dissolved Oxygen (DO) Data - 1991			
Reactor Water		Feedwater	
Date/Time	DO, ppb	Date/Time	DO, ppb
4/1/1991 0:40	198	4/1/1991 0:40	30
4/2/1991 0:45	200	4/2/1991 0:45	30
4/3/1991 2:00	198	4/3/1991 2:00	30
4/4/1991 0:30	196	4/4/1991 0:30	30
4/5/1991 0:15	229	4/5/1991 0:15	30
4/6/1991 1:10	230	4/6/1991 1:10	36.8
4/7/1991 0:45	220	4/7/1991 0:45	39.5
4/8/1991 0:45	233	4/8/1991 0:45	35.2
4/9/1991 0:55	219	4/9/1991 0:55	34.5
4/10/1991 0:55	219	4/10/1991 0:55	34.6
4/11/1991 1:35	209	4/11/1991 1:35	38.3
4/12/1991 0:50	232	4/12/1991 0:50	37.9
4/13/1991 1:00	228	4/13/1991 1:00	39.1
4/14/1991 0:35	216	4/14/1991 0:35	39.3
4/15/1991 0:30	233	4/15/1991 0:30	41.3
4/16/1991 0:50	234	4/16/1991 0:50	41.7
4/17/1991 0:25	229	4/17/1991 0:25	38.9
4/18/1991 0:30	167	4/18/1991 0:30	35
4/19/1991 0:55	173	4/19/1991 0:55	36.9
4/20/1991 0:45	230	4/20/1991 0:45	30
4/21/1991 0:45	230	4/21/1991 0:45	41
4/22/1991 1:30	238	4/22/1991 1:30	43
4/23/1991 1:00	240	4/23/1991 1:00	42
4/24/1991 0:45	235	4/24/1991 0:45	41
4/25/1991 1:15	240	4/25/1991 1:15	40
4/26/1991 1:30	245	4/26/1991 1:30	40
4/27/1991 0:45	247	4/27/1991 0:45	30
4/28/1991 0:40	247	4/28/1991 0:40	30
4/29/1991 0:50	246	4/29/1991 0:50	40
4/30/1991 0:25	247	4/30/1991 0:25	30
5/1/1991 1:30	248	5/1/1991 1:30	30
5/2/1991 1:40	250	5/2/1991 1:40	30
5/3/1991 0:25	246	5/3/1991 0:25	30
5/4/1991 1:15	255	5/4/1991 1:15	30
5/5/1991 0:40	252	5/5/1991 0:40	40
5/6/1991 1:30	250	5/6/1991 1:30	30
5/7/1991 0:30	252	5/7/1991 0:30	40
5/8/1991 0:45	253	5/8/1991 0:45	30
5/9/1991 0:40	249	5/9/1991 0:40	30
5/10/1991 0:40	253	5/10/1991 0:40	30
5/11/1991 1:35	249	5/11/1991 1:35	41
5/12/1991 0:50	254	5/12/1991 0:50	45.4
5/13/1991 0:45	244	5/13/1991 0:45	39.1
5/14/1991 0:45	355	5/14/1991 0:45	38.7
5/15/1991 0:45	242	5/15/1991 0:45	38.5
5/16/1991 1:45	242	5/16/1991 1:45	36.1
5/17/1991 0:20	243	5/17/1991 0:20	36.5
5/18/1991 0:45	231	5/18/1991 0:45	36.8

Unit 1 Dissolved Oxygen (DO) Data - 1991

Reactor Water		Feedwater	
Date/Time	DO, ppb	Date/Time	DO, ppb
5/19/1991 0:40	267	5/19/1991 0:40	30
5/20/1991 1:05	270	5/20/1991 1:05	38.2
5/21/1991 1:10	274	5/21/1991 1:10	37
5/22/1991 1:05	269	5/22/1991 1:05	30
5/23/1991 1:00	272	5/23/1991 1:00	40.8
5/24/1991 1:40	276	5/24/1991 1:40	38
5/25/1991 0:45	271	5/25/1991 0:45	36.3
5/26/1991 0:45	266	5/26/1991 0:45	30
5/27/1991 0:45	264	5/27/1991 0:45	36.4
5/28/1991 0:45	267	5/28/1991 0:45	37.4
5/29/1991 0:45	269	5/29/1991 0:45	36.9
5/30/1991 0:45	268	5/30/1991 0:45	40.1
5/31/1991 0:45	263	5/31/1991 0:45	36.8
5/31/1991 15:45	264	5/31/1991 15:45	40
6/1/1991 1:00	252	6/1/1991 1:00	40
6/2/1991 1:00	269	6/2/1991 1:00	40
6/3/1991 1:00	262	6/3/1991 1:00	100
6/4/1991 1:00	242	6/3/1991 6:15	25
6/5/1991 0:50	259	6/3/1991 6:16	25
6/6/1991 0:50	251	6/4/1991 6:05	25
6/7/1991 0:50	269	6/4/1991 6:06	40
6/8/1991 0:05	261	6/4/1991 6:07	25
6/9/1991 0:45	258	6/5/1991 0:50	20
6/10/1991 0:55	250	6/6/1991 0:50	20
6/11/1991 1:50	258	6/7/1991 0:50	30
6/12/1991 0:30	260	6/8/1991 0:05	30
6/13/1991 1:45	259	6/9/1991 0:45	30
6/14/1991 0:30	259	6/10/1991 0:55	30
6/15/1991 0:40	250	6/11/1991 1:50	20
6/16/1991 0:50	251	6/12/1991 0:30	30
6/17/1991 0:20	260	6/13/1991 1:30	20
6/18/1991 0:30	253	6/14/1991 0:30	20
6/19/1991 1:00	251	6/15/1991 0:40	20
6/20/1991 0:30	253	6/16/1991 0:50	20
6/21/1991 0:35	262	6/17/1991 0:20	30
6/22/1991 1:25	250	6/18/1991 0:30	30
6/23/1991 1:35	240	6/19/1991 1:00	34.7
6/24/1991 1:00	246	6/20/1991 0:30	32
6/25/1991 0:50	244	6/21/1991 0:35	37.5
6/26/1991 1:15	245	6/22/1991 1:25	33.9
6/27/1991 1:00	237	6/23/1991 1:00	33
6/28/1991 0:50	238	6/24/1991 1:00	10
6/29/1991 1:15	260	6/25/1991 0:50	15
6/30/1991 1:00	260	6/25/1991 7:30	30
		6/26/1991 1:15	10
		6/27/1991 1:00	20
		6/28/1991 0:50	20
		6/29/1991 1:15	30
		6/30/1991 1:00	30

Unit 2 Dissolved Oxygen (DO) Data - 1986			
Reactor Water		Feedwater	
Date/Time	DO, ppb	Date/Time	DO, ppb
2/1/1986 0:00	200	2/1/1986 0:00	40
2/2/1986 0:00	200	2/2/1986 0:00	38
2/3/1986 0:00	251	2/3/1986 0:00	37
2/4/1986 0:00	235	2/4/1986 0:00	38
2/5/1986 0:00	240	2/5/1986 0:00	36
2/6/1986 0:00	259	2/6/1986 0:00	34
2/7/1986 0:00	259	2/7/1986 0:00	32
2/8/1986 0:00	251	2/8/1986 0:00	32
2/9/1986 0:00	225	2/9/1986 0:00	29
2/10/1986 0:00	249	2/10/1986 0:00	40
2/11/1986 0:00	250	2/11/1986 0:00	40
2/12/1986 0:00	254	2/12/1986 0:00	27
2/13/1986 0:00	247	2/13/1986 0:00	27
2/14/1986 0:00	249	2/14/1986 0:00	27
2/15/1986 0:00	248	2/15/1986 0:00	30
2/16/1986 0:00	247	2/16/1986 0:00	28.9
2/17/1986 0:00	246	2/17/1986 0:00	29.2
2/18/1986 0:00	248	2/18/1986 0:00	29.8
2/19/1986 0:00	249	2/19/1986 0:00	30.2
2/20/1986 0:00	249	2/20/1986 0:00	29.2
2/21/1986 0:00	250	2/21/1986 0:00	29
2/22/1986 0:00	230	2/22/1986 0:00	27.4
2/23/1986 0:00	240	2/23/1986 0:00	20
2/24/1986 0:00	243	2/24/1986 0:00	29
2/25/1986 0:00	244	2/25/1986 0:00	30
2/26/1986 0:00	241	2/26/1986 0:00	28
2/27/1986 0:00	239	2/27/1986 0:00	28.8
2/28/1986 0:00	260	2/28/1986 0:00	28.7
3/1/1986 0:00	253	3/1/1986 0:00	29.8
3/2/1986 0:00	225	3/2/1986 0:00	32
3/3/1986 0:00	224	3/3/1986 0:00	29.6
3/4/1986 0:00	223	3/4/1986 0:00	29.2
3/5/1986 0:00	224	3/5/1986 0:00	29.2
3/6/1986 0:00	269	3/6/1986 0:00	29.8
3/7/1986 0:00	238	3/7/1986 0:00	28.6
3/8/1986 0:00	250	3/8/1986 0:00	26.8
3/9/1986 0:00	213	3/9/1986 0:00	25
3/10/1986 0:00	255	3/10/1986 0:00	30.3
3/11/1986 0:00	255	3/11/1986 0:00	34
3/12/1986 0:00	258	3/12/1986 0:00	29.4
3/13/1986 0:00	268	3/13/1986 0:00	29.7
3/14/1986 0:00	263	3/14/1986 0:00	30.9
3/15/1986 0:00	257	3/15/1986 0:00	27.8
3/16/1986 0:00	261	3/16/1986 0:00	27.3
3/17/1986 0:00	262	3/17/1986 0:00	26.7
3/18/1986 0:00	261	3/18/1986 0:00	25.5
3/19/1986 0:00	259	3/19/1986 0:00	28.3
3/20/1986 0:00	257	3/20/1986 0:00	27

Unit 2 Dissolved Oxygen (DO) Data - 1986			
Reactor Water		Feedwater	
Date/Time	DO, ppb	Date/Time	DO, ppb
3/22/1986 0:00	258	3/21/1986 0:00	23.3
3/23/1986 0:00	247	3/22/1986 0:00	22.2
3/24/1986 0:00	255	3/23/1986 0:00	22.1
3/25/1986 0:00	258	3/24/1986 0:00	24.2
3/26/1986 0:00	260	3/25/1986 0:00	24.3
3/27/1986 0:00	255	3/26/1986 0:00	27.5
3/28/1986 0:00	256	3/27/1986 0:00	25.5
3/29/1986 0:00	259	3/28/1986 0:00	25.2
3/30/1986 0:00	255	3/29/1986 0:00	27.3
3/31/1986 0:00	256	3/30/1986 0:00	28.5
4/1/1986 0:00	262	3/31/1986 0:00	28.7
4/2/1986 0:00	260	4/1/1986 0:00	29.4
4/3/1986 0:00	264	4/2/1986 0:00	30.6
4/4/1986 0:00	264	4/3/1986 0:00	27.7
4/5/1986 0:00	195	4/4/1986 0:00	29.4
4/6/1986 0:00	227	4/5/1986 0:00	28.2
4/7/1986 0:00	263	4/6/1986 0:00	21.5
4/8/1986 0:00	261	4/7/1986 0:00	27.3
4/9/1986 0:00	263	4/8/1986 0:00	28.8
4/10/1986 0:00	264	4/9/1986 0:00	27.2
4/11/1986 0:00	264	4/10/1986 0:00	25.8
4/12/1986 0:00	254	4/11/1986 0:00	24.8
4/13/1986 0:00	210	4/12/1986 0:00	24.7
4/14/1986 0:00	269	4/13/1986 0:00	22.4
4/15/1986 0:00	241	4/14/1986 0:00	29.4
4/16/1986 0:00	242	4/15/1986 0:00	25
4/17/1986 0:00	269	4/16/1986 0:00	26.9
4/18/1986 0:00	244	4/17/1986 0:00	29.4
4/19/1986 0:00	267	4/18/1986 0:00	35.1
4/20/1986 0:00	267	4/19/1986 0:00	29
4/21/1986 0:00	269	4/20/1986 0:00	30.7
4/22/1986 0:00	268	4/21/1986 0:00	30
4/23/1986 0:00	268	4/22/1986 0:00	28.8
4/24/1986 0:00	270	4/23/1986 0:00	25.3
4/25/1986 0:00	262	4/24/1986 0:00	26.5
4/26/1986 0:00	265	4/25/1986 0:00	29
4/27/1986 0:00	261	4/26/1986 0:00	25
4/28/1986 0:00	276	4/27/1986 0:00	29.9
4/29/1986 0:00	210	4/28/1986 0:00	31.6
4/30/1986 0:00	229	4/29/1986 0:00	31.5
5/1/1986 0:00	216	4/30/1986 0:00	30.9
		5/1/1986 0:00	31.1

Unit 2 Dissolved Oxygen (DO) Data – 1988-1989			
Reactor Water		Feedwater	
Date/Time	DO, ppb	Date/Time	DO, ppb
7/1/1988 0:00	202	7/1/1988 0:00	80
7/2/1988 0:00	42	7/2/1988 0:00	70
7/3/1988 0:00	11	7/6/1988 0:00	50
7/4/1988 0:00	440	7/7/1988 0:00	80
7/5/1988 0:00	39	7/8/1988 0:00	80
7/6/1988 0:00	162	7/9/1988 0:00	80
7/7/1988 0:00	216	7/10/1988 0:00	60
7/8/1988 0:00	223	7/11/1988 0:00	80
7/9/1988 0:00	138	7/12/1988 0:00	90
7/10/1988 0:00	132	7/13/1988 0:00	100
7/11/1988 0:00	153	7/14/1988 0:00	100
7/12/1988 0:00	155	7/15/1988 0:00	60
7/13/1988 0:00	150	7/16/1988 0:00	70
7/14/1988 0:00	150	7/17/1988 0:00	60
7/15/1988 0:00	150	7/18/1988 0:00	140
7/16/1988 0:00	164	7/19/1988 0:00	100
7/17/1988 0:00	158	7/20/1988 0:00	100
7/18/1988 0:00	286	7/21/1988 0:00	80
7/19/1988 0:00	171	7/22/1988 0:00	80
7/20/1988 0:00	163	7/23/1988 0:00	70
7/21/1988 0:00	162.8	7/24/1988 0:00	70
7/22/1988 0:00	186.4	7/25/1988 0:00	70
7/23/1988 0:00	280	7/26/1988 0:00	70
7/24/1988 0:00	253	7/27/1988 0:00	70
7/25/1988 0:00	236	7/28/1988 0:00	70
7/26/1988 0:00	200	7/29/1988 0:00	70
7/27/1988 0:00	187	7/30/1988 0:00	118
7/28/1988 0:00	199	7/31/1988 0:00	118
7/29/1988 0:00	179	8/1/1988 0:00	114.5
7/30/1988 0:00	181	8/2/1988 0:00	100
7/31/1988 0:00	180	8/3/1988 0:00	112
8/1/1988 0:00	190	8/4/1988 0:00	110
8/2/1988 0:00	190	8/5/1988 0:00	109.5
8/3/1988 0:00	195	8/6/1988 0:00	109
8/4/1988 0:00	205	8/7/1988 0:00	104
8/5/1988 0:00	216	8/8/1988 0:00	102
8/6/1988 0:00	222	8/9/1988 0:00	102
8/7/1988 0:00	258	8/10/1988 0:00	101
8/8/1988 0:00	268	8/11/1988 0:00	99
8/9/1988 0:00	265	8/12/1988 0:00	99
8/10/1988 0:00	268	8/13/1988 0:00	60
8/11/1988 0:00	267	8/14/1988 0:00	60
8/12/1988 0:00	266	8/15/1988 0:00	60
8/13/1988 0:00	150	8/16/1988 0:00	70
8/14/1988 0:00	232	8/17/1988 0:00	60
8/15/1988 0:00	261	8/18/1988 0:00	70
8/16/1988 0:00	265	8/19/1988 0:00	60
8/17/1988 0:00	270	8/20/1988 0:00	109

Unit 2 Dissolved Oxygen (DO) Data – 1988-1989			
Reactor Water		Feedwater	
Date/Time	DO, ppb	Date/Time	DO, ppb
8/18/1988 0:00	265	8/21/1988 0:00	80
8/19/1988 0:00	273	8/22/1988 0:00	80
8/20/1988 0:00	270	8/23/1988 0:00	80
8/21/1988 0:00	265	8/24/1988 0:00	70
8/22/1988 0:00	271	8/25/1988 0:00	104
8/23/1988 0:00	267	8/26/1988 0:00	70
8/24/1988 0:00	278	8/27/1988 0:00	80
8/25/1988 0:00	273	8/28/1988 0:00	50
8/26/1988 0:00	277	8/29/1988 0:00	60
8/27/1988 0:00	277	8/30/1988 0:00	70
8/28/1988 0:00	247	8/31/1988 0:00	60
8/29/1988 0:00	272	9/1/1988 0:00	70
8/30/1988 0:00	270	9/2/1988 0:00	60
8/31/1988 0:00	278	9/3/1988 0:00	60
9/1/1988 0:00	278	9/4/1988 0:00	60
9/2/1988 0:00	271	9/5/1988 0:00	60
9/3/1988 0:00	259	9/6/1988 0:00	60
9/4/1988 0:00	262	9/7/1988 0:00	60
9/5/1988 0:00	264	9/8/1988 0:00	60
9/6/1988 0:00	264	9/9/1988 0:00	60
9/7/1988 0:00	264	9/10/1988 0:00	99
9/8/1988 0:00	262	9/11/1988 0:00	98
9/9/1988 0:00	263	9/12/1988 0:00	101
9/10/1988 0:00	263	9/13/1988 0:00	96
9/11/1988 0:00	254	9/14/1988 0:00	98
9/12/1988 0:00	255	9/15/1988 0:00	96
9/13/1988 0:00	258	9/16/1988 0:00	98
9/14/1988 0:00	262	9/17/1988 0:00	103
9/15/1988 0:00	261	9/18/1988 0:00	82
9/16/1988 0:00	244	9/19/1988 0:00	102
9/17/1988 0:00	268	9/20/1988 0:00	100
9/18/1988 0:00	228	9/21/1988 0:00	99
9/19/1988 0:00	245	9/22/1988 0:00	99
9/20/1988 0:00	276	9/23/1988 0:00	103
9/21/1988 0:00	279	9/24/1988 0:00	100
9/22/1988 0:00	279	9/25/1988 0:00	100
9/23/1988 0:00	281	9/26/1988 0:00	100
9/24/1988 0:00	280	9/27/1988 0:00	99
9/25/1988 0:00	290	9/28/1988 0:00	104
9/26/1988 0:00	287	9/29/1988 0:00	101
9/27/1988 0:00	261	9/30/1988 0:00	102
9/28/1988 0:00	284	10/1/1988 0:00	100
9/29/1988 0:00	262	10/2/1988 0:00	99
9/30/1988 0:00	280	10/3/1988 0:00	96
10/1/1988 0:00	264	10/4/1988 0:00	98
10/2/1988 0:00	262	10/5/1988 0:00	96
10/3/1988 0:00	260	10/6/1988 0:00	94
10/4/1988 0:00	266	10/7/1988 0:00	96
10/5/1988 0:00	261	10/8/1988 0:00	97

Unit 2 Dissolved Oxygen (DO) Data – 1988-1989			
Reactor Water		Feedwater	
Date/Time	DO, ppb	Date/Time	DO, ppb
10/6/1988 0:00	267	10/9/1988 0:00	50
10/7/1988 0:00	269	10/10/1988 0:00	78
10/8/1988 0:00	250	10/11/1988 0:00	88
10/9/1988 0:00	174	10/12/1988 0:00	85
10/10/1988 0:00	234	10/13/1988 0:00	90
10/11/1988 0:00	256	10/19/1988 0:00	50
10/12/1988 0:00	280	10/20/1988 0:00	50
10/13/1988 0:00	175	10/21/1988 0:00	35
10/14/1988 0:00	194	10/22/1988 0:00	40
10/15/1988 0:00	264	10/23/1988 0:00	50
10/16/1988 0:00	269	10/24/1988 0:00	50
10/17/1988 0:00	273	10/25/1988 0:00	40
10/18/1988 0:00	272	10/26/1988 0:00	40
10/19/1988 0:00	266	10/27/1988 0:00	50
10/20/1988 0:00	271	10/28/1988 0:00	50
10/21/1988 0:00	193	10/29/1988 0:00	60
10/22/1988 0:00	150	10/30/1988 0:00	60
10/23/1988 0:00	150	10/31/1988 0:00	70
10/24/1988 0:00	150	11/1/1988 0:00	60
10/25/1988 0:00	272	11/2/1988 0:00	60
10/26/1988 0:00	273	11/3/1988 0:00	70
10/27/1988 0:00	274	11/4/1988 0:00	30
10/28/1988 0:00	275	11/5/1988 0:00	59
10/29/1988 0:00	283	11/6/1988 0:00	68
10/30/1988 0:00	285	11/7/1988 0:00	92
10/31/1988 0:00	256	11/8/1988 0:00	102
11/1/1988 0:00	282	11/9/1988 0:00	104
11/2/1988 0:00	273	11/10/1988 0:00	104
11/3/1988 0:00	273	11/11/1988 0:00	99
11/4/1988 0:00	191	11/12/1988 0:00	97
11/5/1988 0:00	209	11/13/1988 0:00	95
11/6/1988 0:00	228	11/14/1988 0:00	94
11/7/1988 0:00	255	11/15/1988 0:00	95
11/8/1988 0:00	269	11/16/1988 0:00	38
11/9/1988 0:00	269	11/17/1988 0:00	25
11/10/1988 0:00	274	11/18/1988 0:00	20
11/11/1988 0:00	150	11/19/1988 0:00	50
11/12/1988 0:00	268	11/20/1988 0:00	25
11/13/1988 0:00	260	11/21/1988 0:00	50
11/14/1988 0:00	250	11/22/1988 0:00	50
11/15/1988 0:00	150	11/23/1988 0:00	50
11/16/1988 0:00	150	11/24/1988 0:00	40
11/17/1988 0:00	249	11/25/1988 0:00	50
11/18/1988 0:00	233	11/26/1988 0:00	30
11/19/1988 0:00	242	11/27/1988 0:00	30
11/20/1988 0:00	263	11/28/1988 0:00	30
11/21/1988 0:00	330	11/29/1988 0:00	30
11/22/1988 0:00	322	11/30/1988 0:00	35
11/23/1988 0:00	229	12/1/1988 0:00	30

Unit 2 Dissolved Oxygen (DO) Data – 1988-1989			
Reactor Water		Feedwater	
Date/Time	DO, ppb	Date/Time	DO, ppb
11/24/1988 0:00	196	12/2/1988 0:00	30
11/25/1988 0:00	222	12/3/1988 0:00	30
11/26/1988 0:00	256	12/4/1988 0:00	34
11/27/1988 0:00	247	12/5/1988 0:00	33
11/28/1988 0:00	243	12/6/1988 0:00	32
11/29/1988 0:00	247	12/7/1988 0:00	30
11/30/1988 0:00	248	12/8/1988 0:00	30
12/1/1988 0:00	246	12/9/1988 0:00	32
12/2/1988 0:00	248	12/10/1988 0:00	33
12/3/1988 0:00	238	12/11/1988 0:00	36
12/4/1988 0:00	246	12/12/1988 0:00	36
12/5/1988 0:00	255	12/13/1988 0:00	37
12/6/1988 0:00	252	12/14/1988 0:00	33
12/7/1988 0:00	249	12/15/1988 0:00	34
12/8/1988 0:00	251	12/16/1988 0:00	33
12/9/1988 0:00	252	12/17/1988 0:00	32
12/10/1988 0:00	250	12/18/1988 0:00	34
12/11/1988 0:00	243	12/19/1988 0:00	33
12/12/1988 0:00	243	12/20/1988 0:00	36
12/13/1988 0:00	216	12/21/1988 0:00	35
12/14/1988 0:00	223	12/27/1988 0:00	20
12/15/1988 0:00	247	12/28/1988 0:00	19
12/16/1988 0:00	243	12/29/1988 0:00	17
12/17/1988 0:00	275	12/30/1988 0:00	15
12/18/1988 0:00	250	1/1/1989 0:00	15
12/19/1988 0:00	245	1/2/1989 0:00	15
12/20/1988 0:00	245	1/3/1989 0:00	15
12/21/1988 0:00	243	1/4/1989 0:00	15
12/27/1988 0:00	257	1/5/1989 0:00	15
12/28/1988 0:00	257	1/6/1989 0:00	15
12/29/1988 0:00	259	1/7/1989 0:00	27.7
12/30/1988 0:00	255	1/8/1989 0:00	27.5
1/1/1989 0:00	255	1/9/1989 0:00	26.8
1/2/1989 0:00	259	1/10/1989 0:00	26.5
1/3/1989 0:00	258	1/11/1989 0:00	24.8
1/4/1989 0:00	257	1/12/1989 0:00	25.8
1/5/1989 0:00	256	1/13/1989 0:00	25.5
1/6/1989 0:00	258	1/14/1989 0:00	23.8
1/7/1989 0:00	255	1/15/1989 0:00	25.8
1/8/1989 0:00	250	1/16/1989 0:00	25
1/9/1989 0:00	258	1/17/1989 0:00	25.2
1/10/1989 0:00	257	1/18/1989 0:00	25.3
1/11/1989 0:00	256	1/19/1989 0:00	25.6
1/12/1989 0:00	280	1/20/1989 0:00	24.8
1/13/1989 0:00	255	1/21/1989 0:00	21
1/14/1989 0:00	265	1/22/1989 0:00	22.8
1/15/1989 0:00	250	1/23/1989 0:00	25.7
1/16/1989 0:00	250	1/24/1989 0:00	25.2
1/17/1989 0:00	250	1/25/1989 0:00	26

Unit 2 Dissolved Oxygen (DO) Data – 1988-1989			
Reactor Water		Feedwater	
Date/Time	DO, ppb	Date/Time	DO, ppb
1/18/1989 0:00	252	1/26/1989 0:00	26.6
1/19/1989 0:00	250	1/27/1989 0:00	27
1/20/1989 0:00	252	1/28/1989 0:00	25
1/21/1989 0:00	170	1/29/1989 0:00	24.7
1/22/1989 0:00	245	1/30/1989 0:00	29.3
1/23/1989 0:00	277	1/31/1989 0:00	23.5
1/24/1989 0:00	283	2/1/1989 0:00	24.3
1/25/1989 0:00	275	2/2/1989 0:00	23.7
1/26/1989 0:00	284	2/3/1989 0:00	23.8
1/27/1989 0:00	281	2/4/1989 0:00	23.9
1/28/1989 0:00	277	2/5/1989 0:00	23.9
1/29/1989 0:00	268	2/6/1989 0:00	23.6
1/30/1989 0:00	265	2/7/1989 0:00	22
1/31/1989 0:00	264	2/8/1989 0:00	20.9
2/1/1989 0:00	253	2/9/1989 0:00	20.8
2/2/1989 0:00	257	2/10/1989 0:00	20.8
2/3/1989 0:00	256	2/11/1989 0:00	21.5
2/4/1989 0:00	239	2/12/1989 0:00	21.1
2/5/1989 0:00	233	2/13/1989 0:00	21.7
2/6/1989 0:00	230	2/16/1989 0:00	25.5
2/7/1989 0:00	226	2/17/1989 0:00	24.4
2/8/1989 0:00	230	2/18/1989 0:00	40
2/9/1989 0:00	231	2/19/1989 0:00	20
2/10/1989 0:00	230	2/20/1989 0:00	24.6
2/11/1989 0:00	217	2/21/1989 0:00	24.3
2/12/1989 0:00	226	2/22/1989 0:00	25
2/13/1989 0:00	216	2/23/1989 0:00	24.3
2/16/1989 0:00	150	2/24/1989 0:00	24
2/17/1989 0:00	150	2/25/1989 0:00	24.2
2/18/1989 0:00	233	2/26/1989 0:00	25
2/19/1989 0:00	226	2/27/1989 0:00	25.5
2/20/1989 0:00	226		
2/21/1989 0:00	234		
2/22/1989 0:00	150		
2/23/1989 0:00	233		
2/24/1989 0:00	236		
2/25/1989 0:00	223		
2/26/1989 0:00	228		
2/27/1989 0:00	220		

Unit 2 Dissolved Oxygen (DO) Data - 1991			
Reactor Water		Feedwater	
Date/Time	DO, ppb	Date/Time	DO, ppb
5/9/1991 0:45	150	5/9/1991 0:45	20
5/10/1991 0:35	150	5/10/1991 0:35	20
5/11/1991 1:05	187	5/11/1991 1:05	30
5/12/1991 0:40	209	5/12/1991 0:40	30
5/13/1991 0:35	189	5/13/1991 0:35	30
5/14/1991 1:15	210	5/14/1991 1:15	25
5/15/1991 0:15	214	5/15/1991 0:15	20
5/16/1991 1:00	261	5/16/1991 1:00	30
5/17/1991 0:50	249	5/17/1991 0:50	20
5/18/1991 0:55	234	5/17/1991 0:50	20
5/19/1991 1:00	235	5/18/1991 0:55	20
5/20/1991 1:30	238	5/19/1991 1:00	30
5/21/1991 0:30	242	5/20/1991 1:30	30
5/22/1991 0:55	239	5/21/1991 0:30	20
5/23/1991 1:05	243	5/22/1991 0:55	30
5/24/1991 2:00	246	5/23/1991 1:05	30
5/25/1991 1:20	260	5/24/1991 1:50	30
5/26/1991 1:00	250	5/25/1991 1:20	43.9
5/27/1991 1:20	241	5/26/1991 1:00	44.7
5/28/1991 1:10	259	5/27/1991 1:20	48.2
5/29/1991 1:00	264	5/28/1991 1:10	43.9
5/30/1991 1:00	265	5/29/1991 1:00	39.6
5/31/1991 1:15	260	5/30/1991 0:50	40.8
6/1/1991 1:00	276	5/31/1991 1:15	41.4
6/2/1991 0:55	254	6/1/1991 1:00	40.7
6/3/1991 1:05	268	6/2/1991 0:55	25
6/4/1991 1:45	240	6/3/1991 1:05	44.8
6/5/1991 0:50	266	6/4/1991 1:45	40
6/6/1991 1:00	258	6/5/1991 0:40	36.9
6/7/1991 1:15	250	6/6/1991 1:00	25
6/8/1991 0:30	175	6/7/1991 1:15	25
6/9/1991 0:25	150	6/8/1991 0:30	20
6/10/1991 0:25	150	6/9/1991 0:25	30
6/11/1991 0:20	287	6/10/1991 0:25	40
6/12/1991 1:15	280	6/11/1991 0:20	30
6/13/1991 0:35	268	6/12/1991 1:15	30
6/14/1991 0:30	268	6/13/1991 0:35	30
6/15/1991 0:40	330	6/14/1991 0:30	20
6/16/1991 0:50	272	6/15/1991 0:40	20
6/17/1991 0:35	230	6/16/1991 0:50	20
6/18/1991 0:20	226	6/17/1991 0:35	20
6/19/1991 0:05	244	6/18/1991 0:20	20
6/20/1991 0:35	243	6/19/1991 0:05	20
6/21/1991 0:40	227	6/20/1991 0:35	20
6/22/1991 1:10	239	6/21/1991 0:40	20
6/23/1991 1:00	237	6/22/1991 1:10	47.9
6/24/1991 0:10	227	6/23/1991 1:00	20
6/25/1991 1:50	233	6/24/1991 0:10	44.9

Unit 2 Dissolved Oxygen (DO) Data - 1991			
Reactor Water		Feedwater	
Date/Time	DO, ppb	Date/Time	DO, ppb
6/26/1991 0:30	226	6/25/1991 1:50	49.1
6/27/1991 2:00	225	6/25/1991 7:40	25
6/28/1991 0:30	221	6/26/1991 0:30	30
6/29/1991 1:35	157	6/27/1991 2:00	30
6/30/1991 1:00	242	6/28/1991 0:30	20
7/1/1991 0:25	216	6/29/1991 1:35	20
7/2/1991 0:50	210	6/30/1991 1:00	20
7/3/1991 0:30	224	7/1/1991 0:25	30
7/4/1991 0:45	219	7/2/1991 0:50	30
7/5/1991 0:55	211	7/3/1991 0:30	30
7/6/1991 0:55	253	7/4/1991 0:45	30
7/7/1991 0:55	239	7/5/1991 0:55	30
7/8/1991 0:10	235	7/6/1991 0:55	41.8
7/9/1991 0:15	244	7/7/1991 0:55	40.6
7/10/1991 0:40	241	7/8/1991 0:10	30
7/11/1991 1:00	235	7/9/1991 0:15	30
7/12/1991 0:30	229	7/10/1991 0:40	30
7/13/1991 0:30	227	7/11/1991 1:00	30
7/14/1991 0:45	228	7/12/1991 0:30	30
7/15/1991 1:00	224	7/13/1991 0:30	30
7/16/1991 0:30	213	7/14/1991 0:45	30
7/17/1991 0:45	230	7/15/1991 1:00	20
7/18/1991 1:00	213	7/16/1991 0:30	30
7/19/1991 0:40	216	7/17/1991 0:45	30
7/20/1991 1:00	274	7/18/1991 1:00	30
7/21/1991 0:55	312	7/19/1991 0:40	20
7/21/1991 10:10	260	7/20/1991 1:00	30
7/22/1991 1:20	314	7/21/1991 0:55	20
7/23/1991 1:15	314	7/22/1991 1:20	20
7/24/1991 1:05	300	7/23/1991 1:15	20
7/25/1991 1:45	300	7/24/1991 1:05	20
7/26/1991 1:30	300	7/25/1991 1:45	30
7/27/1991 0:30	314	7/26/1991 1:30	20
7/28/1991 0:05	310	7/27/1991 0:30	20
7/29/1991 0:20	291	7/28/1991 0:05	20
7/30/1991 0:45	274	7/29/1991 0:20	20
7/31/1991 0:30	309	7/30/1991 0:45	20
8/1/1991 0:30	303	7/31/1991 0:30	20
8/2/1991 0:40	266	8/1/1991 0:30	20
8/3/1991 0:50	259	8/2/1991 0:40	20
8/4/1991 0:40	268	8/3/1991 0:50	20
8/5/1991 0:50	264	8/4/1991 0:40	20
8/6/1991 1:20	266	8/5/1991 0:50	20
		8/6/1991 1:20	20