# KEWAUNEE NUCLEAR POWER PLANT

# ANNUAL OPERATING REPORT

# 1994

**WISCONSIN PUBLIC SERVICE CORPORATION**
**WISCONSIN POWER & LIGHT COMPANY**
**MADISON GAS & ELECTRIC COMPANY**

# TABLE OF CONTENTS

# 1.0 INTRODUCTION

The Kewaunee Nuclear Power Plant is a pressurized water reactor licensed at 1650 megawatts thermal (MWt). It is located in Kewaunee County, Wisconsin, along Lake Michigan's northwest shoreline and is jointly owned by Wisconsin Public Service Corporation, Wisconsin Power and Light Company and Madison Gas and Electric Company. The nuclear steam supply system was purchased from Westinghouse Electric Corporation and is rated for a 1721.4 MWt output. The turbine-generator was also purchased from Westinghouse and is rated at 535 megawatts electric (MWe) net. The architect/engineer was Pioneer Service and Engineering (PSE).

The Kewaunee Nuclear Power Plant achieved initial criticality on March 7, 1974. Initial power generation was reached April 8, 1974, and the plant was declared commercial on June 16, 1974. Since being declared commercial, Kewaunee has generated 76,453,500 MW hours of electricity as of December 31, 1994, with a net plant capacity factor of 82.8 using net maximum dependable capacity (MDC).

## 1.1 Highlights

During 1994, the Kewaunee Nuclear Power Plant was primarily base loaded. The unit was operated at 88.5% capacity factor (using net MDC) with a gross efficiency of 33.4%. The unit and reactor availability were 88.3% and 88.8% respectively. Figure 1.1 provides a histogram of the average daily electrical output of the Kewaunee Plant for 1994.

On April 2, 1994, the unit was removed from service for its nineteenth refueling maintenance overhaul. Thirty-six fresh fuel assemblies were loaded for Cycle XX. The unit was returned to service on May 8, 1994.

As indicated on Figure 1.1, on January 5, 1994, Generator Main Output Breaker (G-1) was opened starting a scheduled outage to correct pressurizer manway leakage. With repairs successfully complete, G-1 was closed on January 12, 1994.

# KEWAUNEE POWER HISTORY - 1994

## AVERAGE DAILY MWE-NET

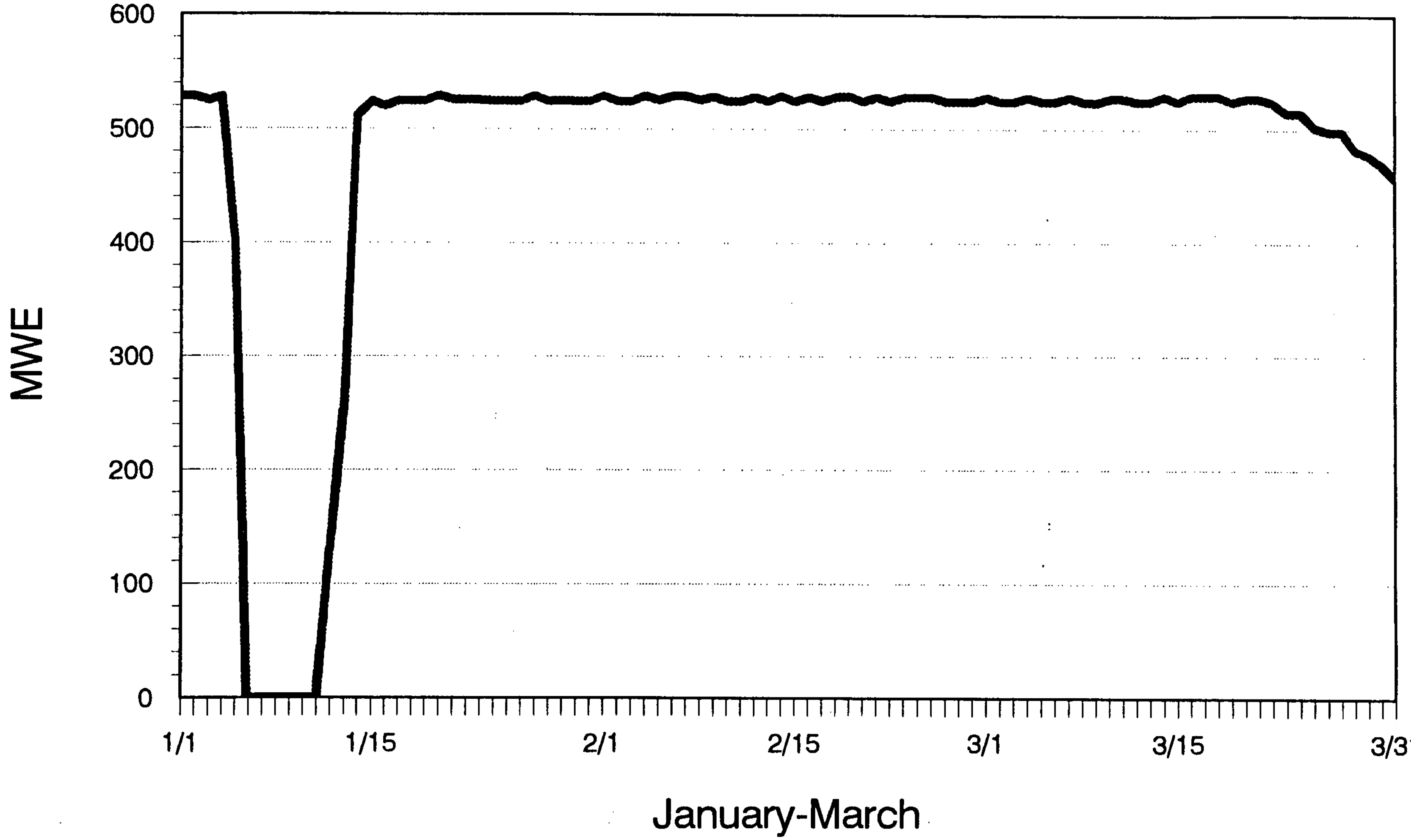


FIGURE 1.1
(Page 1 of 4)

# KEWAUNEE POWER HISTORY - 1994

## AVERAGE DAILY MWE-NET

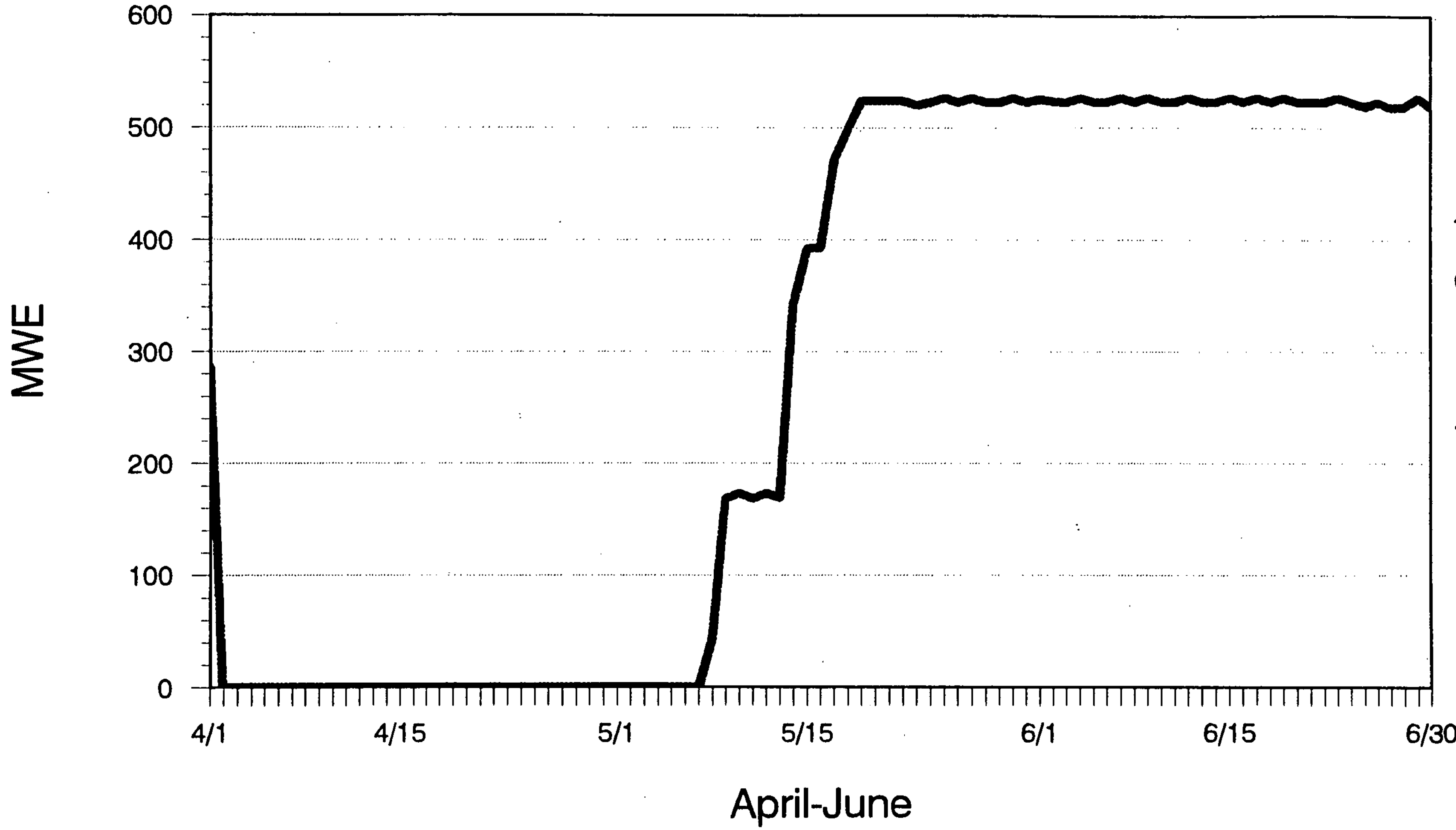


FIGURE 1.1
(Page 2 of 4)

# KEWAUNEE POWER HISTORY - 1994

## AVERAGE DAILY MWE-NET

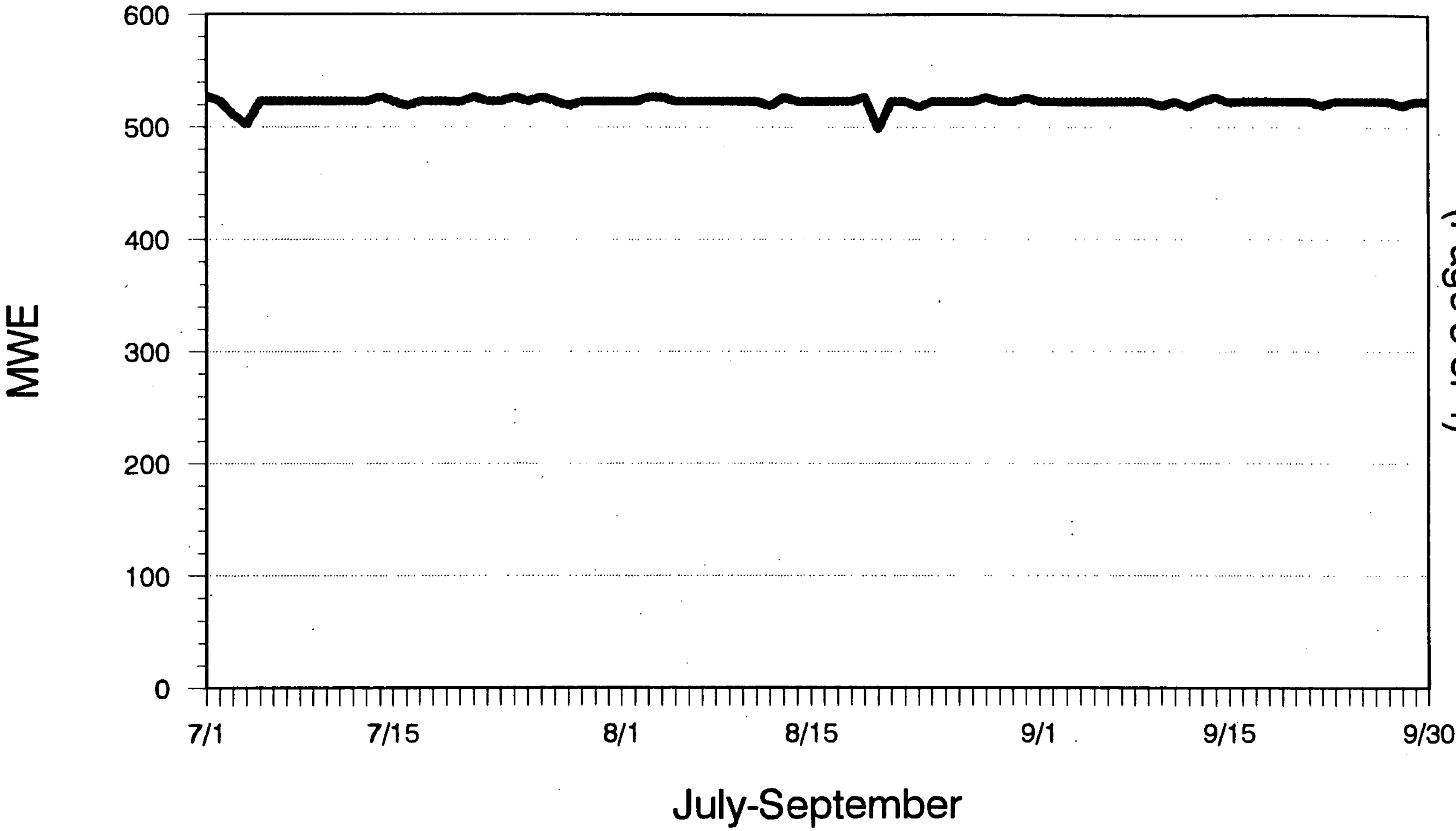


FIGURE 1.1
(Page 3 of 4)

# KEWAUNEE POWER HISTORY - 1994

## AVERAGE DAILY MWE-NET

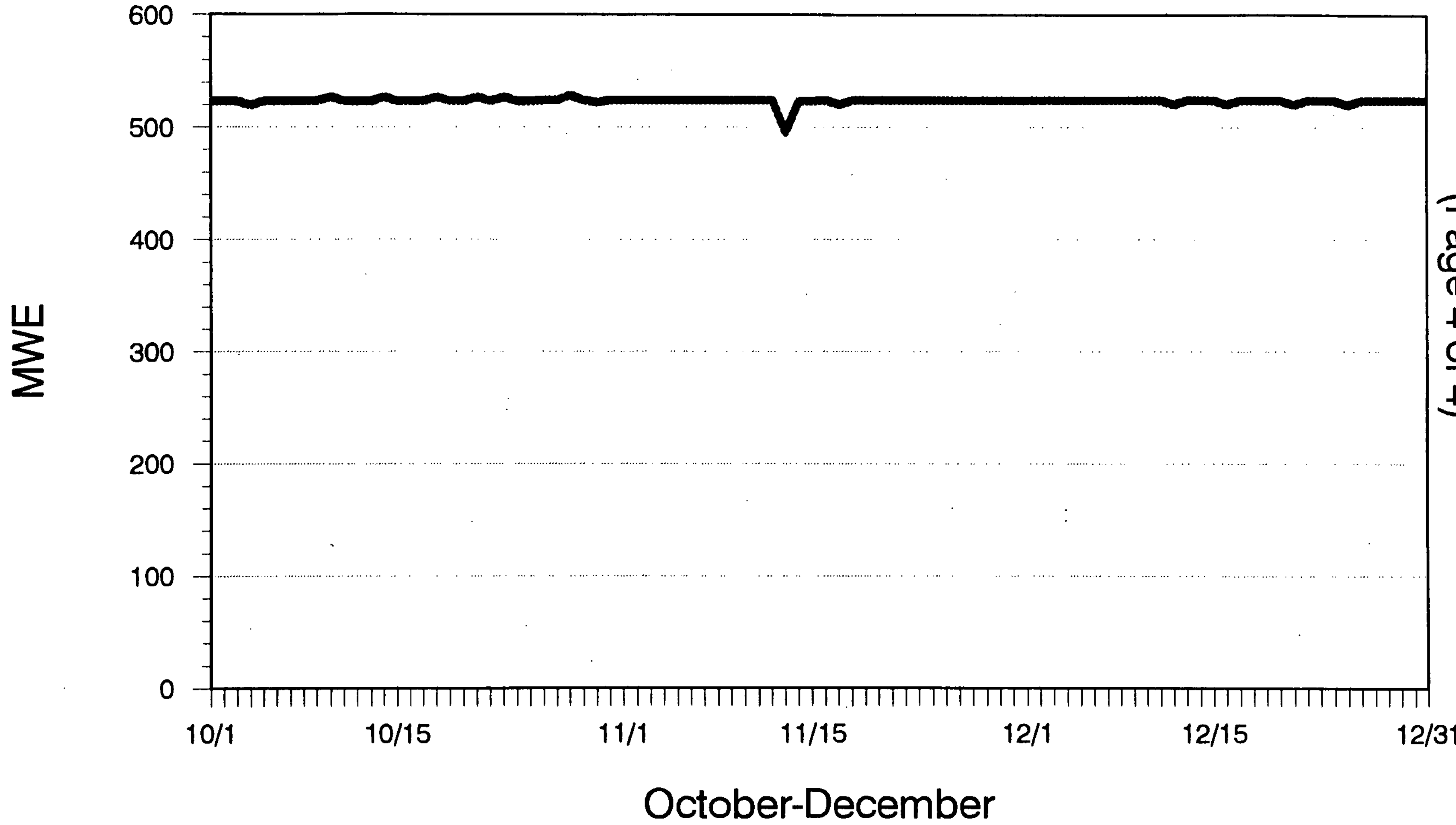


FIGURE 1.1
(Page 4 of 4)

# 2.0 SUMMARY OF OPERATING EXPERIENCE

## JANUARY

On January 5, 1994, G-1 was opened starting a scheduled outage to correct pressurizer manway leakage. With repairs successfully complete, G-1 was closed on January 12, 1994.

PLANT SHUTDOWNS: A scheduled outage of 147.1 hours occurred to correct pressurizer manway leakage.

## FEBRUARY

100 percent steady state power continued during the month.

PLANT SHUTDOWNS: No shutdowns or outages occurred during the month of February.

## MARCH

100 percent steady state power continued until March 22, 1994 at which time the end-of-cycle coast down began. On March 31, 1994 the unit was at 89 percent steady state power.

PLANT SHUTDOWNS: No shutdowns or outages occurred during the month of March.

## APRIL

The unit was shut down for the refueling/maintenance outage on April 2, 1994.

PLANT SHUTDOWNS: Scheduled shutdown of 694.68 hours for Cycle 19-20 refueling outage.

## MAY

The unit was returned to power operation on May 8, 1994. Full power was reached May 18, 1994.

PLANT SHUTDOWNS: Scheduled shutdown of 177.69 hours for Cycle 19-20 refueling outage.

A short outage of 9.68 hours was taken to perform the Turbine Overspeed Trip Test.

JUNE

100 percent steady state power continued during the month.

PLANT SHUTDOWNS: No shutdowns or outages occurred during the month of June.

JULY

100 percent steady state power continued during the month.

PLANT SHUTDOWNS: No shutdowns or outages occurred during the month of July.

AUGUST

100 percent steady state power operation continued during the month. On August 20, 1994, a plant backdown to 390 MWE was begun to perform the quarterly test SP54-086, "Turbine Stop and Governor Valve Operability Test." The plant was returned to 100% power the same day.

PLANT SHUTDOWNS: No shutdowns or outages occurred during the month of August.

SEPTEMBER

100 percent steady state power continued during the month.

PLANT SHUTDOWNS: No shutdowns or outages occurred during the month of September.

OCTOBER

100 percent steady state power continued during the month.

PLANT SHUTDOWNS: No shutdowns or outages occurred during the month of October.

NOVEMBER

100 percent steady state power operation continued during the month. On November 13, 1994, a plant backdown to 390 MWE was begun to perform the quarterly test SP54-086, "Turbine Stop and Governor Valve Operability Test". The plant was returned to 100% power the same day.

PLANT SHUTDOWNS: No shutdowns or outages occurred during the month of November.

DECEMBER

100 percent steady state power continued during the month.

PLANT SHUTDOWNS: No shutdowns or outages occurred during the month of December.

Table 2.1 is a compilation of the monthly summaries of the operating data and Table 2.2 contains the yearly and total summaries of the operating data.

## TABLE 2.1
## ELECTRICAL POWER GENERATION DATA (1994)

| | JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE |
|---|---|---|---|---|---|---|
| Hours RX was Critical | 601.4 | 672.0 | 744.0 | 24.5 | 601.9 | 720.0 |
| RX Reserve Shutdown Hours | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Hours Generator On-Line | 595.6 | 672.0 | 744.0 | 24.3 | 566.3 | 720.0 |
| Unit Reserve Shutdown Hours | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Gross Thermal Energy Generated (MWH) | 929429.0 | 1105268.0 | 1200731.0 | 22616.0 | 751549.0 | 1187510.0 |
| Gross Electrical Energy Generated (MWH) | 310900.0 | 371000.0 | 403200.0 | 7400.0 | 249200.0 | 396600.0 |
| Net Electrical Energy Generated (MWH) | 295900.0 | 353730.0 | 383555.0 | 6862.0 | 235320.0 | 376981.0 |
| RX Service Factor | 80.8 | 100.0 | 100.0 | 3.4 | 80.9 | 100.0 |
| RX Availability Factor | 80.8 | 100.0 | 100.0 | 3.4 | 80.9 | 100.0 |
| Unit Service Factor | 80.1 | 100.0 | 100.0 | 3.4 | 76.1 | 100.0 |
| Unit Availability Factor | 80.1 | 100.0 | 100.0 | 3.4 | 76.1 | 100.0 |
| Unit Capacity Factor Using maximum dependable capacity (MDC) Net | 77.8 | 103.0 | 100.9 | 1.9 | 61.9 | 102.5 |
| Unit Capacity Factor (Using design electrical rating (DER) Net | 74.3 | 98.4 | 96.4 | 1.8 | 59.1 | 97.9 |
| Unit Forced Outage Rate | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Hours in Month | 744.0 | 672.0 | 744.0 | 719.0 | 744.0 | 720.0 |
| Net MDC (MWe) | 511.0 | 511.0 | 511.0 | 511.0 | 511.0 | 511.0 |

# TABLE 2.1
# ELECTRICAL POWER GENERATION DATA (1994)

| | JULY | AUGUST | SEPTEMBER | OCTOBER | NOVEMBER | DECEMBER |
|---|---|---|---|---|---|---|
| Hours RX was Critical | 744.0 | 744.0 | 720.0 | 745.0 | 720.0 | 744.0 |
| RX Reserve Shutdown Hours | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Hours Generator On-Line | 744.0 | 744.0 | 720.0 | 745.0 | 720.0 | 744.0 |
| Unit Reserve Shutdown Hours | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Gross Thermal Energy Generated (MWH) | 1225867.0 | 1225305.0 | 1187543.0 | 1228790.0 | 1185472.0 | 1227116.0 |
| Gross Electrical Energy Generated (MWH) | 408700.0 | 409000.0 | 395700.0 | 410200.0 | 395200.0 | 408800.0 |
| Net Electrical Energy Generated (MWH) | 388408.0 | 388684.0 | 376024.0 | 390053.0 | 376519.0 | 389511.0 |
| RX Service Factor | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| RX Availability Factor | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Unit Service Factor | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Unit Availability Factor | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Unit Capacity Factor (Using MDC Net) | 102.2 | 102.2 | 102.2 | 102.5 | 102.3 | 102.5 |
| Unit Capacity Factor (Using DER Net) | 97.6 | 97.6 | 97.6 | 97.9 | 97.7 | 97.9 |
| Unit Forced Outage Rate | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Hours in Month | 744.0 | 744.0 | 720.0 | 745.0 | 720.0 | 744.0 |
| Net MDC (MWe) | 511.0 | 511.0 | 511.0 | 511.0 | 511.0 | 511.0 |

# TABLE 2.2

# ELECTRICAL POWER GENERATION DATA

## 1994

| | YEAR | CUMULATIVE |
|---|---|---|
| Hours RX was Critical | 7780.8 | 154775.0 |
| RX Reserve Shutdown Hours | 0.0 | 2330.5 |
| Hours Generator On-Line | 7739.2 | 152846.7 |
| Unit Reserve Shutdown Hours | 0.0 | 10.0 |
| Gross Thermal Energy Generated (MWH) | 12477196.0 | 242417342.0 |
| Gross Electrical Energy Generated (MWH) | 4165900.0 | 80327000.0 |
| Net Electrical Energy Generated (MWH) | 3961547.0 | 76453500.0 |
| RX Service Factor | 88.8 | 85.9 |
| RX Availability Factor | 88.8 | 87.2 |
| Unit Service Factor | 88.3 | 84.9 |
| Unit Availability Factor | 88.3 | 84.9 |
| Unit Capacity Factor (Using MDC Net) | 88.5 | 82.8 |
| Unit Capacity Factor (Using DER Net) | 84.5 | 79.3 |
| Unit Forced Outage Rate | 0.0 | 2.1 |
| Hours in Reporting Period | 8760.0 | 180098.0 |

# 3.0 PLANT MODIFICATIONS, TESTS AND EXPERIMENTS

10 CFR 50.59(a)(1) allows licensees to make changes in the facility as described in the Updated Safety Analysis Report and conduct tests and experiments not described in the Updated Safety Analysis Report without prior NRC approval, provided the change, test, or experiment does not involve a change in the Technical Specifications or an unreviewed safety question. 10 CFR 50.59(b)(2) requires those changes, tests, and experiments that do not need prior NRC approval be reported to the NRC on an annual basis.

During 1994 there were no modifications, tests, or experiments performed which introduced an unreviewed safety question.

The following summary of modifications and tests includes those 10 CFR 50.59 activities completed during 1994 and not previously reported. Each activity is briefly described, and a summary of the safety evaluation is provided.

<u>EDPAC A/C (Design Change Request 1922)</u>

This modification removed the former EDPAC A/C from the TSC computer room and replaced the A/C in the TSC equipment area.

*Summary of Safety Evaluation*

The investment of the computer equipment requires reliable environmental conditions. The previous A/C experienced excessive maintenance down times. The replacement equipment uses an outside condenser cooled by atmospheric air. The previous connection to service water was capped off. All power changes and additions were to the nonsafeguards power systems. Changes to the TSC ventilation system were limited to closed room cooling of the computer room itself. A new humidifier was also installed that will properly control room humidity within the required tolerances. There is no safeguards equipment which is adversely impacted, no changes to the TSC ventilation system, and no additional waste loads were placed on the sewage treatment plant. Therefore, this modification does not adversely affect plant safety.

<u>HEAT EXCHANGER INSTRUMENTATION (DCR 2396)</u>

This modification installed instrumentation on select safety related heat exchangers cooled by service water to determine overall heat transfer capability during accident conditions.

*Summary of the Safety Evaluation*

This modification did not change the original flowpaths of the service water (SW) system. The SW system will continue to provide redundant coolant water supplies. New components installed under this change were consistent with existing specifications. This modification provides enhanced performance monitoring of safety related equipment, which will ultimately improve the operation of the safety related equipment. Sufficient instrumentation was installed to conform with NRC Generic Letter 89-13, "Service Water System Problems Affecting Safety-Related Equipment." Therefore, plant safety is not adversely affected.

## MAIN FEEDWATER PIPING RUPTURE ANALYSIS (DCR 2506)

As part of ongoing IE Bulletin 79-14 efforts, stress analysis of as-built feedwater piping resulted in an additional postulated break location (FCI1169B(16)). A rupture restraint serving as a lateral restraint was modified to provide additional safety margin.

*Summary of the Safety Evaluation*

The new break location was addressed as being well protected by existing rupture restraints, and the environmental consequences of the new break were enveloped by an existing break. Therefore, plant safety was not adversely affected.

## AIR COMPRESSOR REPLACEMENT (DCR 2513)

A plant modification was made to the Station and Instrument Air System to replace two water-cooled air compressors with one air-cooled compressor.

*Safety Evaluation Summary*

This modification and associated equipment are non-safety related. An analysis which was performed shows the air compressor replacement improves air system reliability; therefore, plant safety is not adversely affected.

## WATER TREATMENT SYSTEM (DCR 2549)

The purpose of this modification was to install a system that would allow water treatment to combat zebra mussels and microbiologically induced corrosion (MIC) in the Service Water (SW), Circulating Water (CW), and Fire Protection (FP) Systems. Equipment was installed to allow chemical addition into these systems.

*Summary of the Safety Evaluation*

The actual operation and the safety requirements of these systems will not be altered by the injection system. The low levels of concentration and industry experience assure that the chemicals will not have an adverse affect on safety related components. The system was designed with appropriate safety features; therefore, plant safety is not adversely affected.

## UNDERVOLTAGE RELAYS (DCR 2565)

The TAT source available undervoltage (UV) relays' test switches, jacks, and lights were rewired as degraded grid UV relays' test switches, jacks, and lights. This is to provide the capability for test and calibration during power or the degraded grid UV relays as required by Branch Technical Position PSB-1. In the past, this requirement was waived due to the presence of a shared single four-minute time delay relay. This relay was later removed, so it became necessary to have provisions for at power testing. Test jacks will also be added to allow grid UV relays to be placed in trip during testing.

Reserve Auxiliary Transformer (RAT) and Tertiary Auxiliary Transformer (TAT) source available relays will be replaced with relays with setpoint ranges which will allow setpoint to be raised to 97.3 %. TAT source available relays' test switches, lights, and jacks were added to existing UV relay test boards to allow for annual test and calibration. And lastly, replacement relays for discontinued ASCO models were sought.

### *Summary of the Safety Evaluation*

The new relays will have setpoints for voltage and time delay that ensure AC power is available to accident initigating equipment as assumed in the USAR Chapter 14 accident analysis. The test switches, jacks, lights, terminal blocks, and wiring additions are for ease of testing and the evaluation concluded no impact on accident consequences. Therefore, these changes do not adversely affect plant safety.

## BORON CONCENTRATION MEASUREMENT SYSTEM (DCR 2601)

This modification removed the Boron Concentration Measurement System (BCMS) from service. The BCMS was previously used for continuous indication of boron concentration. As the BCMS aged, calibration and repair of the system became difficult and time consuming. Since the system provided inaccurate readings, its use was discontinued several years ago. A decision to abandon the system in-place instead of incurring high system removal costs was made in 1993. Instead, manual grab samples are taken to determine boron concentration. The manual sample is more accurate and covers a greater range.

### *Summary of the Safety Evaluation*

The sampling method is consistent with Regulatory Guide 1.97 guidance for class III variables. Use of approved procedures ensures that sample and analysis methods, as well as appropriate test periodicity are used to conform to the KNPP Technical Specification Requirements. Therefore, this change does not adversely affect plant safety.

## STATIC TRIP UNITS (DCR 2603)

This design change provided replacement static trip units for the Safeguards 480V switchgear. The replacement units were procured as commercial grade equipment. The construction of the replacement units was similar to that of the former units and the replacement units were dedicated internally for Class 1E use. The mounting arrangement for the static trip units was verified by analysis.

*Summary of the Safety Evaluation*

A safety evaluation was performed to document the acceptability of using the SQUG Generic Implementation Procedure (GIP) for verifying the seismic adequacy of the relay internals for the static trip units. Use of the GIP for new and replacement equipment is allowed as stated in Section 2.3.4 of Part I of the GIP and is accepted by the NRC. Therefore, plant safety is not adversely affected.

## POWER RANGE NUCLEAR INSTRUMENTATION (DCR 2645)

This modification replaced the four channels of Power Range (PR) Nuclear Instrumentation processing drawers located in the Control Room. The original drawers had been experiencing signal noise and several age-related failures. Therefore, the original PR drawers were replaced with new PR drawers designed to be equivalent in form, fit, and function.

*Summary of the Safety Evaluation*

The PR drawers for the Nuclear Instrumentation System in the control room were replaced with new PR drawers having equivalent form, fit, and function. This change does not adversely impact the safety-related functions of the NIS circuitry used to mitigate the consequences of accidents. The replacement equipment is also seismically and environmentally qualified in accordance with IEEE 344-1987 and IEEE 323-1983. Since the existing PR drawers are replaced with PR drawers of equivalent form, fit, and function, this modification does not adversely affect plant safety.

## PENETRATION 36N (X1) (DCR 2663)

This modification was completed to provide Health Physics with a sample line, from the annulus, through the shield building, into the Auxiliary Building.

*Summary of the Safety Evaluation*

Penetration 36N (X1) was originally designed as an instrumentation line penetrating both the shield building and containment. As a result of a previous design change this line was abandoned. A design change completed in 1994 modified this line to provide Annulus air sampling capability from the Auxiliary Building, thus eliminating the need to make repeated shield building entries. The portion of the line which penetrated the containment building was seal welded, thus the line will not carry any fluids or gases into or out of containment. This change will not degrade the containment integrity or shield building barriers, shows no increase in the consequences of an accident, and has no connection or relationship to any equipment. Therefore, this change does not adversely affect plant safety.

## AUXILIARY FEEDWATER SYSTEM (DCR 2668)

In response to NUREG-0737, "Clarification of TMI Action Plan Requirements," this modification added automatic pump protection for the low probability event of a loss of the condensate supply to the auxiliary feedwater (AFW) pumps due to a seismic event or tornado.

*Safety Evaluation Summary*

This modification will ensure an adequate supply of water to the steam generators by protecting the AFW pumps from inadequate net positive suction head. If the condensate supply is needed to mitigate an accident and is lost, the pump will trip to avoid pump damage. Service water can then be supplied to provide sufficient cooling. This modification does not decrease the availability of the AFW system or the ability to maintain a heat sink, therefore, plant safety is not adversely affected.

## STEAM EXCLUSION DAMPERS (DCR 2690)

This design modification removed steam exclusion dampers to the Turbine Driven Auxiliary Feedwater (TDAFW) pump room from the turbine building and screenhouse ventilation systems. Steam exclusion zones previously protected by the dampers are now protected by permanently sealed ducts which formerly contained steam exclusion dampers.

*Summary of the Safety Evaluation*

This design modification removed steam exclusion dampers and sealed their associated ductwork and penetrations from the TDAFW pump room. The TDAFW pump room is not considered part of the steam exclusion area in the Class I aisle of the turbine building. The evaluation concluded that forced air cooling from the turbine building basement fan coil units is not necessary. This change does not adversely affect plant safety.

## LUBE OIL PRESSURE (DCR 2695)

This modification added a Safety Injection (SI) step zero start to the control circuitry of Auxiliary Feedwater (AFW) Pump 1A and 1B Auxiliary Lube Oil Pumps. This will ensure adequate lube oil pressure for the AFW pump lube oil pressure permissive at SI step 6. This will eliminate the potential for overloading an Emergency Diesel Generator (EDG) as a result of simultaneously starting an ICS Pump and an AFW Pump (SI step 6) with a Component Cooling Pump starting in SI step 7.

*Safety Evaluation Summary*

Allowing the Auxiliary Lube Oil Pumps to start at SI step zero will provide the necessary pressure to successfully start the AFW pumps. This significantly reduces the possibility of overloading an EDG at Sl step 7. In addition, adding the electrical load to SI step zero does not affect the conclusions drawn by Kewaunee's Diesel Generator loading study. As a result, the reliability of the EDG during an Sl sequence has been significantly enhanced. Therefore, this change does not adversely affect plant safety.

TRANSPORMER WELDS (DCR 2696)

The existing anchorage for 480 V station service transformers 51 and 52 was in accordance with the plant design basis. An operability assessment was performed by the USI A-46 walkdown team which demonstrated that the transformers were operable with the existing anchorage. However, the anchorage was modified to address a USI A-46 walkdown concern. New welds were added to the bases of the transformers to ensure adequate restraint for seismic forces.

*Summary of the Safety Evaluation*

This modification affects the anchorage only and does not affect the transformer function. This modification involves the improvement of the transformers ability to withstand a seismic event and is considered an improvement in design. Therefore, plant safety is not adversely affected.

CONTROL ROOM HVAC PANEL (DCR 2704)

This modification removed the control room HVAC panel located outside the control room in the Auxiliary Building. Removal of the panel resolved an Environmental Qualification Discrepancy which identified that certain components within the panel may not be environmentally qualified for a High Energy Line Break (HELB) of the Turbine Driven Auxiliary Feedwater (TDAFW) Pump steam supply line and of a main steam line. The control room HVAC system is required to be operable during both main steam line and TDAFW pump steam supply line HELB Design Bases Accidents.

*Summary of the Safety Evaluation*

The original function of the control room ventilation panel was to provide a remote location for the control room to be cleared of smoke in the event the control room was uninhabitable due to smoke. In compliance with 10CFR50, App. R, safe shutdown in event of fire within the Control Room, Relay Room, Control Room HVAC Equipment Room, or any other Alternate Fire Area is assured by the Dedicated Shutdown System. The installation of the Dedicated Shutdown system eliminated the necessity of maintaining the control room ventilation panel. Therefore, the removal of the control room ventilation panel is acceptable, since it will not reduce operations ability to safely shut down the plan in the event of a fire. This modification does not adversely affect plant safety.

## STEAM GENERATOR BLOWDOWN CONTAINMENT ISOLATION VALVES (DCR 2710)

NRC Generic Letter 89-10 mandated testing programs for motor operated valves. The steam generator blowdown containment isolation valves, BT-2A, BT-2B, BT-3A, and BT-3B,.had rotating rising valve stems and were not compatible with the testing equipment used at Kewaunee. This modification was initiated to modify these valves from rotating rising stem to a non-rotating rising stem configuration compatible with the MOVATS Torque Thrust Cell (TTC) testing equipment.

*Summary of the Safety Evaluation*

This modification replaced the valve stem and disc assembly with an identical disc but longer stem to accommodate the MOVATS TTC testing equipment. The identical disc in size and function assures no change to the flow characteristics of the valve. The disc retains the same dimension and total linear travel from open to close. As the disc is free to rotate with respect to the stem, the change from a rotating rising stem to a non-rotating rising stem has no effect on the seating characteristics of the disc. The disc will be seated with the same degree of axial thrust. Therefore, the isolation characteristics of the valve will not change. The stem travel and actuator speed were not changed by this modification, therefore, the valve will close in the same amount of time. This modification does not adversely affect plant safety.

## AMMONIUM CHLORIDE ADDITION TO STEAM GENERATORS (Engineering Support Request 92-169)

The addition of Ammonium Chloride to the steam generators for mole ratio control of sodium and chloride was initiated. This modification did not require any hardware changes. Control of the mole ratio in the steam generator bulk water is intended to control the pH in the tube sheet and tube support plate crevices. Control of the crevice pH minimizes the caustic environment in the crevices which is thought to promote the outer diameter stress corrosion cracking seen at KNPP.

*Summary of the Safety Evaluation*

The net effect of mole ratio control is to eliminate some of the conditions which support the initiation of new cracks or indications. Mole ratio control has a positive effect on tube integrity. By controlling the environment for crack initiation, the probability of a tube failure is reduced. Therefore, plant safety is not adversely affected.

## CARBOHYDRAZIDE AS AN ALTERNATIVE TO HYDRAZINE (ESR 93-144)

This change replaced Hydrazine with Carbohydrazide (Nalco Chemical Company trade name - ELIMIN-OX) in the Condensate, Feedwater, and Main Steam Systems for personnel safety in handling the chemical.

### *Summary of the Safety Evaluation*

The chemistry of Carbohydrazide is similar to that of Hydrazine. The substitute chemical is less toxic than Hydrazine, it breaks down to Hydrazine and Carbon Dioxide at temperatures above 275 F, and is a better passivator of Iron at Condensate temperatures. Therefore, plant safety is not adversely affected.

# ADDITIONAL MODIFICATIONS

The following design changes did not require a 10 CFR 50.59 safety evaluation (i.e., an unreviewed safety question evaluation); however, are being reported for information only due to their significance.

## CONTROL ROOM ANNUNCIATOR REPLACEMENT (DCR 849)

This modification replaced Kewaunee's Panalarm Annunciator/SER System. A Detailed Control Room Design Review (DCRDR) was performed by Torey Pines Technology which presented multiple Human Engineering Observations (HEO's) about Kewaunee's Control Room. It was recommended by the DCRDR to replace the existing annunciator system and consider each HEO accordingly. After all the HEO's were reviewed, it was obvious the existing Panalarm Annunciator System could not satisfy all of the HEO recommendations. Although, the previous system was considered a reliable operating system, the old system was replaced with a new Beta System to meet all the applicable HEO's.

## EMERGENCY DIESEL GENERATORS (DCR 2571)

A concern was raised regarding the continued practice of fast starting (0 to 925 RPM in less than 10 seconds) the Kewaunee Emergency Diesel Generators (EDG). Per discussions with the manufacturer of the EDG's, the fast start feature used for the diesels is a major factor in the cause of premature diesel engine degradation. This was also acknowledged by the NRC in Generic Letter 84-15.

This design change modified the EDG control circuity by addition of a control room test switch to allow for slow starting of the EDG's. This switch enables the operators to lower and maintain the EDG governors to the low governor limit switch position, 460 RPM. Per discussions with the manufacturer of the EDG's, 460 is an acceptable idle speed. The EDG will continue to be fast started at least once a year.

## ZEBRA MUSSEL CONTROL - FIRE SYSTEM (DCR 2590)

The original intent of this modification was to treat the dead leg areas of the service water system for the control of zebra mussels. This is covered by the injection of Chem-Trol 1 (CT1) into the dead legs from a portable injection cart fabricated under this modification. Since the fire main takes water from the same supply as the service water system and is a stagnant flow system most times of the year, it falls into the same category as the service water system.

Dealing with the higher static pressures and the larger quantities of water in this system, the fire main needs to be treated slightly different than the dead leg injection for the service water. An additional pump was connected between the fire test header and the siamese fire department connect. This additional pump is needed to circulate the fire main at an acceptable flow so than an adequate amount of chemical can be diffused into the system from the chemical injection pump.

## AFW-10A/B ACTUATORS (DCR 2720)

During diagnostic testing on AFW-10A/B, the valves would not close against the test differential pressure (DP). Actuator output was limited by the torque switch setting which limited thrust and prevented the valve from closing. To take advantage of actuator thrust capability, a limit switch contact was wired into the closing control circuit preventing the motor from de-energizing until the valve disc is at a predetermined point of the valve stroke. This will eliminate the limitation created by rate-of-loading and torque switch repeatability.

Since the torque switch was eliminated with a limit switch in the control circuits, the motor thermal overloads were replaced with thermal overloads re-sized to enhance motor protection. Calculations show that the AFW-10A/B will close against maximum differential pressure without tripping the thermal overloads.

## CORROSION INHIBITOR IN COMPONENT COOLING WATER (DCR 2738)

The corrosion inhibitor for the Component Cooling Water (CCW) system was previously Potassium Chromate. Although this additive is an effective corrosion inhibitor, it is a hazardous chemical with known carcinogenic properties. This modification replaced Potassium Chromate with an inhibitor significantly less toxic and as effective in controlling corrosion.

## INCORE THIMBLE TUBES (DCR 2742)

This modification involved shortening 7 of the 36 incore thimble tubes. The change was required in order to move the wear scar away from the bearing surface (at the bottom of the fuel assembly). At the current rate of degradation the wear scar areas would have exceeded the 60% acceptance value during cycle 20. Approximately 1-1/2" of material was removed from the end of the seven thimble tubes and the connections re-swagged. This will allow the thimbles to function as required.

# TEMPORARY MODIFICATIONS

## CARBOHYDRAZIDE AS AN ALTERNATIVE TO HYDRAZINE (TCR 93-21)

This temporary change covered a test designed to evaluate Carbohydrazide (Nalco Chemical Company trade name - ELIMIN-OX) as an alternative for Hydrazine in the Condensate, Feedwater, and Main Steam Systems.

*Summary of the Safety Evaluation*

The chemistry of Carbohydrazide is similar to that of Hydrazine. The substitute chemical is less toxic than Hydrazine, it breaks down to Hydrazine and Carbon Dioxide at temperatures above 275 F, and is a better passivator of Iron at Condensate temperatures. Therefore, plant safety is not adversely affected.

## SAMPLING SYSTEM (TCR 94-03)

As part of a design change to replace some of the existing radiation monitoring system, the R-13A sampler was taken out of service (Auxiliary Building Vent Stack). A temporary sampler was provided until the portions of the design change were completed on the Auxiliary building exhaust stack.

*Summary of the Safety Evaluation*

R-13A is used for sampling only, and a temporary sampler was provided. Therefore, there is no reduction in plant safety.

## COMPONENT COOLING WATER (CCW) SURGE TANK (TCR 94-10)

A design change was initiated to change out the Potassium Chromate corrosion inhibitor used in the Component Cooling System with a more desirable corrosion inhibitor. In association with the design change, this temporary change installed and connected a chromate removal skid, a corrosion monitoring skid, and a standpipe to the CCW Surge Tank located on the 657' elevation of the Auxiliary Building. This equipment was used to remove the Potassium Chromate and monitor the corrosion rates of the major materials in the Component Cooling System during the inhibitor transition phases.

*Summary of the Safety Evaluation*

This temporary change did not jeopardize the integrity of the surge tank nor increase the chance of a loss of component cooling water. The design functions and integrity of the Component Cooling System were not affected by this change, therefore, there is no reduction in plant safety.

## VALVE CC-600 (TCR 94-16)

Valve CC-600 was over-thrusted and can no longer be relied on to operate properly. This temporary change lifted leads on valve CC-600 to prevent it from being operated remotely and changed valve CC-650 from a normally open valve to a normally closed valve.

### *Summary of the Safety Evaluation*

This change removed the remote close feature from valve CC-600 requiring valve CC-650 to be normally closed, or if open, to be closed locally in the unlikely event of a pipe rupture in containment. When closed, CC-650 provides the isolation function of CC-600. If open, the local actions to close valve CC-650 provide an acceptable alternative for containment isolation and CCW system operability in the event of a line break. The Component Cooling Water System will continue to be operable and the containment isolation requirements described in the Kewaunee Technical Specifications will be met. Therefore, there is no reduction in plant safety.

## REACTOR COOLANT LOW FLOW BISTABLES (TCR 94-19)

This temporary change raised the trip setpoints of the reactor coolant low flow bistables from 90 percent to 93 percent.

### *Summary of the Safety Evaluation*

The purpose of the reactor trip is to protect the core against Departure from Nucleate Boiling. This temporary change is conservative in that the reactor trip will occur at a higher flow value which corresponds to a point further from Departure from Nucleate Boiling. This change increases the margin of safety, therefore, there is no reduction in plant safety.

# EQ PLAN REVISION

Revisions made to the EQ Plan in 1994 involved numerous administrative changes. These changes included the following:

- The responsibility for reviewing purchase orders to ensure that EQ requirements are met was transferred from the EQ group to a technical reviewer.

- The required operability duration, post-accident, for the reactor building ventilation system was split into four different sections. Several equipment functions that fall within this system (e.g., CFU, Containment Dome Vent, Containment Vacuum Breakers, Isolation Valves) are now required to be operational for up to one year postaccident. A review was performed which determined that all of this equipment is environmentally qualified for one year postaccident.

- Various clarifications/updates were made as part of a general review of the Plan.

*Summary of Safety Evaluation*

Changes made to the EQ Plan increased the effectiveness of the plan by either clarifying sections of the plan, updating necessary sections, or outlining current responsibilities. Therefore, plant safety is not affected.

# FIRE PLAN REVISIONS

There were no changes to the Fire Plan during 1994.

# RG 1.97 PLAN REVISION

Revisions made to the RG 1.97 Plan in 1994 involved numerous administrative changes. These changes included the following:

- The master equipment list was updated to correct several typographical errors that were made in earlier plan revisions.
- Updated the calibration section of various data sheets due to a general review of applicable calibration procedures.
- Completed 1993 RG 1.97 design changes were incorporated.
- Kewaunee Technical Specification Amendment No. 105 was incorporated. This amendment added operability and surveillance requirements for the reactor vessel level indication and core exit thermocouple instrumentation to satisfy the recommendations of Generic Letter 83-37, "NUREG-0737 Technical Specifications."
- Various clarifications/updates were made as part of a general review of the Plan.

*Summary of the Safety Evaluation*

These changes have no safety impact. These changes update necessary sections, incorporate the completion of scheduled RG 1.97 modifications, and further clarify WPSC's licensing position on RG 1.97. Therefore, there is no impact on plant safety.

# MISCELLANEOUS

## NOTRUMP AND SBLOCTA COMPUTER CODES

Westinghouse WCAP 14103, "Small Break Loss-Of-Coolant Accident Kewaunee NOTRUMP Analysis" provides a more accurate analysis of the small break loss-of-coolant accident (SBLOCA) due to implementation of new NRC-approved computer codes. The previous analysis used the computer code "WFLASH", which has become obsolete. "WFLASH" has been superseded by the "NOTRUMP" and "SBLOCTA" computer codes.

*Safety Evaluation Summary*

The Small Break LOCA analysis of record has been updated. The Westinghouse digital computer codes WFLASH and LOCTA4 were used for the previous analysis of record. The NRC has approved the use of Westinghouse's new digital computer codes, NOTRUMP and SBLOCTA. Kewaunee's USAR has been updated to incorporate the conclusions of these more current digital computer codes, which are included in WCAP 14103, "Small Break Loss-Of-Coolant Accident Kewaunee NOTRUMP Analysis." These codes provide a better analytical tool for assessing the Kewaunee plant response during a small break LOCA, and their use has previously been approved by the NRC. Therefore, plant safety is not adversely affected.

## DIMETHYLAMINE (DMA) ADDITION TO THE CONDENSATE SYSTEM

Dimethylamine (DMA) was added to the condensate to supplement the pH(T) control previously provided by morpholine and ammonia. DMA is more volatile than morpholine, and a stronger base than ammonia.

*Safety Evaluation Summary*

Plant modelling indicates DMA will increase the pH(T) throughout the balance of plant system. The primary goal is to reduce Iron transport to the steam generators to the 1 to 3 ppb range. Previous experience illustrates the efficacy of DMA to reach this goal.

DMA is currently in the secondary system at 10 to 50 ppb as a decomposition product of Morpholine. The feedwater DMA concentration will be increased to 150 ppb then taken up in 50 ppb increments to 600 ppb. The stepwise increase will allow balance of plant (BOP) chemical equilibrium to be established prior to operation at higher DMA concentrations.

This modification does not affect plant safety.

# 4.0 LICENSEE EVENT REPORTS

This section is a reprint of the abstracts of the Licensee Event Reports (LER) submitted to the NRC in 1994, in accordance with the requirements of 10 CFR 50.73. None of the events described in the 1994 LERs posed a threat to the health and safety of the public.

## LER 94-001-00

This event was reportable as an actuation of steam generator (SG) blowdown isolation valves which are engineered safety features. On January 7, 1994 at 0100 hours, the condenser air ejector radiation monitor, R-15, suddenly increased from its normal reading of 60 counts per minute (CPM) to 1.0E5 CPM which activated its high alarm. The high alarm from the monitor caused the SG blowdown isolation valves and the SG blowdown sample isolation valves to close as designed. The plant was in cold shutdown when the actuations occurred.

The high alarm signal from R-15 and the subsequent associated engineered safety feature actuations were caused by the failure of the monitor's Geiger Mueller tube. The tube was replaced during the monitor repair process. Two additional electrical components in R-15's circuitry were conservatively replaced because they had apparently experienced mild degradation.

The radiation monitor was returned to service on January 13, 1994 at 1700 hours.

## LER 94-002-00

On January 10, 1994, the plant was in intermediate shutdown and in the process of heating-up. Plant personnel realized that two containment isolation valves may not have been tested in accordance with Kewaunee Nuclear Power Plant's (KNPP's) Technical Specifications (TS). KNPP TS 4.4.b has been interpreted to require a Type C local leak rate test be performed on containment isolation valves after making torque switch adjustments followed by motor operated valve (MOV) diagnostic testing. Although Wisconsin Public Service Corporation (WPSC) does not agree with this interpretation, this event is being reported as a violation of KNPP's TS. However, WPSC management conservatively decided to stop the plant heat up and return the plant to a cold shutdown condition to perform a local leak rate test on the valves. The appropriate leak rate testing was successfully completed in accordance with surveillance procedure SP 56A-090, Containment Local Leak Rate Type B & C Test. Plant heat up was resumed the same day.

Corrective actions included revising MOV test procedures to incorporate the requirement to consult the Appendix J Leak Rate Test Coordinator prior to performing diagnostic testing of containment isolation valves, presenting training to the maintenance groups on containment integrity regnlations, performing local leak rate testing of containment isolation valves following torque switch adjustments, and reviewing the implementation of the post maintenance test program.

LER 94-003-00

On April 7, 1994, with the plant in refueling shutdown, two local leak rate test volumes associated with the reactor coolant pump A and B seal injection lines could not be pressurized to the required 46 psig. The test volumes did not pressurize due to check valves CVC-206A and CVC-205B not seating properly. As a result, Kewaunee's total "as found" maximum pathway leakage exceeded 0.60 La. For Kewaunee, 0.60 La is equal to a leakage of 322,800 standard cubic centimeters per minute (sccm). The redundant seal injection line check valves indicated acceptable leakages of 227 sccm and 12.2 sccm. The seal injection lines are 2-inch lines that supply water to the seals on each reactor coolant pump. On April 20, 1994, a 2-inch check valve in the charging line also failed to seat preventing the associated test volume from pressurizing to 46 psig. The redundant valves indicated an acceptable combined leakage of 58.4 sccm.

There are no safety implications associated with this event since in each instance a valve had a high leak rate, the redundant valve had an acceptable leak rate as shown by the total "as found" minimum pathway leakage of 3,561.1 sccm. As of May 4, 1994, Kewaunee's total "as left" maximum pathway leakage was 7,496.8 sccm. An engineering support request was initiated to further investigate the failures of these valves and determine if acceptable replacement options are available.

LER 94-004-00

On April 22, 1994, with the plant in refueling shutdown, the in-service inspection and resultant plugging of SG tubes was completed for the 1994 refueling outage. The in-service inspection found 77 tubes in SG A and 28 tubes in SG B which were considered defective. In accordance with the KNPP TS, SG A was categorized as C-3, since more than 1 percent of the inspected tubes were considered defective in the sleeve upper expansion joint region. As required by KNPP's TS, this LER provided the 30-day written report to the NRC.

The predominant SG tube degradation mode at KNPP is outside diameter intergranular attack and outside diameter intergranular stress corrosion cracking (IGA/IGSCC). In accordance with KNPP's TS, all defective tubes were plugged. This increased the overall equivalent plugging percentage from 10.37 percent to 11.87 percent for the 1994-1995 operating cycle.

The secondary side boric acid and Morpholine (or alternative amine) addition program will continue during the 1994-1995 operating cycle to reduce the caustic environment and corrosion/erosion on the secondary side.

LER 94-005-00

The following is a description of an actuation of SG blowdown isolation valves which are engineered safety features. At 1318 hours on May 9, 1994, the condenser air ejector radiation monitor, R-15, suddenly increased to 1.0E6 CPM which activated its high alarm. The monitor's high alarm caused the steam generator blowdown isolation valves and the steam generator blowdown sample isolation valves to close as designed. Sampling determined that the high alarm on R-15 was not caused by primary to secondary leakage.

The plant was at 35 percent power when the actuations occurred.

The cause of the high alarm signal from R-15 could not be conclusively determined. However, corrective actions were taken to isolate the pre-amplifier from its ground to decrease the interference on the detector channel. It appears that this action has decreased the interference on the channel.

The radiation monitor was returned to service on May 13, 1994 at 0904 hours.

# 5.0 FUEL INSPECTION REPORT

Thirty-six (36) fresh Region Z assemblies were loaded for Cycle XX. Startup physics testing was performed and reported in the Cycle XX Startup Report.

The irradiated fuel inspection was performed with an underwater TV camera. All peripheral fuel rods were examined using one-half face scans. Four assemblies were inspected, including one in Region M, one in Region W, and two in Region X. All assemblies exhibited rod slippage to various degrees, and the two oldest assemblies have rods in contact with the bottom nozzle. Numerous scrapes to the rodlets, grids, and top and bottom nozzles were noted on all assemblies. However, no damage to the cladding or supporting structures was observed. Two assemblies exhibited axially varying crud deposits. Overall condition of the fuel was very good, with no evidence of fuel cladding degradation on the fuel rods examined. Videotapes were made of all examinations.

# 6.0 CHALLENGES TO AND FAILURES OF PRESSURIZER SAFETY AND RELIEF VALVES

In response to NUREG-0737, item II.K.3.3, and in accordance with KNPP Technical Specification 6.9.a.2.C, WPSC is committed to reporting challenges to and failures of pressurizer safety and pressurizer power-operated relief valves. There were no challenges to or failures of pressurizer safety or pressurizer power-operated relief valves during 1994.

# 7.0 SUMMARY OF THE 1994 STEAM GENERATOR EDDY CURRENT EXAMINATION

During the Kewaunee Nuclear Power Plant's 1994 refueling outage, the following steam generator (SG) services were performed.

Eddy Current Inspection (Table 7.1)

The 1994 SG tube eddy current inspection program included:

1) A bobbin coil inspection of 100% of the nonplugged, nonrepaired tubes through their entire length (1985 tubes).

2) A bobbin coil inspection of 100% of the nonplugged, repaired tubes through their entire length.

   Kewaunee has installed sleeves in a large portion of its hot leg tubesheet. The inspection consisted of an examination from the top of the sleeve to the end of the tube on the cold leg side (4274 tubes).

3) An inspection of 100% of the repaired tubes' sleeves (4270 sleeves).

4) A motorized rotating pancake coil (MRPC) examination of 100% of the nonplugged tubes row 1 U-bends (66 tubes) and 32% of the nonplugged row 2 U-bends (60 tubes).

5) Motorized rotating pancake coil examinations of all locations with distorted bobbin coil indications.

Table 7.1 is a summary of the 1994 steam generator eddy current inspection.

Mechanical Plugging (Table 7.2)

Table 7.2 summarizes the defect location for which plugging was required.

**Steam Generator A**

A total of 77 tubes were fitted with mechanical plugs (see Table 7.2). Of the 77 tubes plugged, 13 were plugged for indications at the tube support plates, 15 were plugged for indications in the hot leg tubesheet crevice, and 49 were plugged for indications in sleeved tubes. All plugs installed were ABB/CE Inconel 690 mechanical plugs. All installation parameters were met.

**Steam Generator B**

A total of 28 tubes were fitted with mechanical plugs (see Table 7.2). Of the 28 tubes plugged, 3 were plugged for indications at the tube support plates, 7 were plugged for indications in the hot leg tubesheet crevice, and 18 were plugged for indications in sleeved tubes. In addition, one plug was removed from the hot leg of steam generator B due to evidence of leakage. The tube was replugged with a welded tube plug. All plugs installed were ABB/CE Inconel 690 mechanical and welded tube plugs. All installation parameters were met.

As required by Technical Specifications 4.2.b.5.b, Tables 7.3 and 7.4 list the location and percent of wall thickness penetration for each indication of degradation.

## Applicable Definitions

**Degraded Tube** - A tube with a 20% or greater thru-wall indication.

**Defective Tube** - A tube with a 50% or greater thru-wall indication. If significant tube thinning has occurred in the area of the indication, the defective tube criteria reduces to greater than 40% thru-wall. Defective tube plugging and repair are performed in accordance with approved Technical Specifications.

## TABLE 7.1

## SUMMARY OF THE 1994 STEAM GENERATOR EDDY CURRENT EXAMINATION

### STEAM GENERATOR A

| EXTENT OF INSPECTION | NUMBER TESTED |
|---|---|
| Top of slceve to TEC[1] | 2172 |
| TEC to TEH | 965 |
| U-bend | 86 |
| Sleeve inspection TEH to STH[2] | 225 |
| Sleeve inspection STH to BUE [3] | 2172 |
| Sleeve inspection TEH to TLE [4] | 491 |

### STEAM GENERATOR B

| EXTENT OF INSPECTION | NUMBER TESTED |
|---|---|
| Top of sleeve to TEC | 2102 |
| TEC to TEH | 1020 |
| U-bend | 40 |
| Sleeve inspection TEH to STH | 68 |
| Sleeve inspection STH to BUE | 2160 |
| Sleeve inspection TEH to TLE | 850 |

---

(1)TEC - tube end cold

(2)STH - top of sleeve

(3)BUE - bottom of Westinghouse HEJ upper expansion joint

(4)TLE - top of Westinghouse HEJ lower expansion joint

TABLE 7.2

## LOCATION FOR WHICH MECHANICAL PLUGGING WAS REQUIRED

| | SG A | SG B |
|---|---|---|
| Hot leg tubesheet | 15 | 7 |
| Hot leg support plates | 12 | 3 |
| Cold leg support plates | 1 | 0 |
| Installed Sleeves | 49 | 18 |
| TOTAL: | 77 | 28 |

# TABLE 7.3

## 1994 EDDY CURRENT EXAMINATION REPORTABLE INDICATIONS

| STEAM GENERATOR A | | | | |
|---|---|---|---|---|
| ROW | COLUMN | % THRU-WALL PENETRATION | INDICATION LOCATION | SLEEVED/PLUGGED |
| 1 | 5 | 43 | TSH + 17.66 | - |
| 1 | 5 | 32 | TSC + 17.50 | - |
| 3 | 6 | DCI/SAI | TEH + 11.13 | P |
| 14 | 6 | DCI/SAI | TEH + 9.03 | P |
| 18 | 6 | 25 | 1H | - |
| 18 | 6 | 22 | AV2 | - |
| 18 | 6 | 20 | 2C | - |
| 15 | 7 | DCI/MAI | TEH + 8.73 | P |
| 13 | 8 | 34 | 1H | - |
| 15 | 8 | DSI/SAI | 1H | P |
| 7 | 9 | 41 | 2H | - |
| 19 | 9 | 21 | AV2 | - |
| 21 | 9 | 22 | AV2 | - |
| 22 | 9 | DSI/SAI | 1H | P |
| 12 | 10 | DSI/SAI | 1H | P |
| 20 | 10 | 22 | AV2 | - |
| 22 | 10 | 21 | AV2 | - |
| 23 | 10 | DSI/SAI | 1H | P |
| 24 | 10 | 34 | 4H + 1.43 | - |
| 27 | 10 | 23 | AV2 | - |
| 18 | 13 | 21 | AV2 | - |
| 23 | 13 | 25 | AV2 | - |
| 24 | 13 | 23 | 7C | - |
| 21 | 14 | DCI/SAI | TEH + 7.24 | P |
| 24 | 14 | DCI/SAI | TEH + 6.76 | P |
| 3 | 15 | DCI/SAI | TEH + 7.01 | P |
| 14 | 16 | 52/SAI | 1H | P |
| 31 | 16 | 29 | 1C | - |

# TABLE 7.3

## 1994 EDDY CURRENT EXAMINATION REPORTABLE INDICATIONS

| STEAM GENERATOR A | | | | |
|---|---|---|---|---|
| ROW | COLUMN | % THRU-WALL PENETRATION | INDICATION LOCATION | SLEEVED/PLUGGED |
| 11 | 17 | PTF | BUE + 1.44 | P |
| 13 | 17 | DSI/SAI | 1H | P |
| 21 | 17 | DCI/MAI | TEH + 1.43 | P |
| 27 | 17 | 29 | 6C | - |
| 13 | 18 | 24 | AV2 | - |
| 14 | 18 | 20 | AV2 | - |
| 14 | 18 | 22 | AV3 | - |
| 16 | 18 | 20 | AV2 | - |
| 26 | 18 | 33 | 7H | - |
| 26 | 18 | 20 | AV2 | - |
| 24 | 19 | 33 | 7C | - |
| 24 | 19 | 38 | 6C | - |
| 27 | 19 | 24 | 6C | - |
| 37 | 19 | 24 | AV2 | - |
| 20 | 20 | DSI/SAI | 1H | P |
| 14 | 21 | 24 | AV2 | - |
| 36 | 21 | 20 | AV2 | - |
| 11 | 23 | 24 | 1H | - |
| 19 | 23 | 37 | 1H | - |
| 23 | 24 | PTF | BUE +1.70 | P |
| 25 | 24 | PTF | BUE + 1.58 | P |
| 26 | 24 | 51/SAI | 6C | P |
| 34 | 26 | 27 | AV3 | - |
| 40 | 26 | DSI/MAI | 1H | P |
| 40 | 26 | 23 | AV2 | P |
| 40 | 26 | 28 | 2C | P |
| 37 | 27 | 21 | AV2 | - |
| 41 | 27 | 22 | AV2 | - |

# TABLE 7.3

## 1994 EDDY CURRENT EXAMINATION REPORTABLE INDICATIONS

| STEAM GENERATOR A | | | | |
|---|---|---|---|---|
| ROW | COLUMN | % THRU-WALL PENETRATION | INDICATION LOCATION | SLEEVED/PLUGGED |
| 10 | 28 | PTF | BUE + 1.79 | P |
| 16 | 28 | 21 | 1H | - |
| 27 | 28 | PTF | BUE + 1.61 | P |
| 27 | 28 | 20 | AV2 | P |
| 28 | 28 | PTF | BUE + 1.55 | P |
| 30 | 28 | 21 | AV2 | - |
| 41 | 28 | 22 | AV2 | - |
| 23 | 29 | DSI/SAI | 3H | P |
| 23 | 30 | PTF | BUE + 1.66 | P |
| 38 | 30 | DCI/SAI | TEH + 13.03 | P |
| 28 | 31 | PTF | BUE + 1.60 | P |
| 40 | 31 | 33 | 2H | - |
| 42 | 31 | 21 | AV2 | - |
| 26 | 32 | PTF | BUE + 0.88 | P |
| 26 | 32 | 26 | AV3 | P |
| 27 | 32 | 23 | AV3 | - |
| 30 | 32 | PTF | BUE + 1.54 | P |
| 41 | 33 | 22 | AV2 | - |
| 17 | 35 | PTF | BUE + 1.46 | P |
| 43 | 35 | 34 | 7C | - |
| 40 | 36 | 31 | AV3 | - |
| 42 | 36 | 33 | 3H | - |
| 42 | 36 | 25 | AV2 | - |
| 44 | 36 | 23 | AV2 | - |
| 45 | 36 | 22 | AV2 | - |
| 28 | 38 | PTF | BUE + 1.75 | P |
| 22 | 39 | PTF | BUE + 1.70 | P |
| 28 | 39 | PTF | BUE + 1.84 | P |

# TABLE 7.3

## 1994 EDDY CURRENT EXAMINATION REPORTABLE INDICATIONS

| STEAM GENERATOR A | | | | |
|---|---|---|---|---|
| ROW | COLUMN | % THRU-WALL PENETRATION | INDICATION LOCATION | SLEEVED/PLUGGED |
| 22 | 40 | PTF | BUE + 1.72 | P |
| 30 | 40 | PTF | BUE + 1.65 | P |
| 35 | 42 | PTF | BUE + 1.57 | P |
| 43 | 42 | 37 | 7H | - |
| 43 | 42 | 31 | 4C + 31.36 | - |
| 12 | 44 | 30 | 1C | - |
| 28 | 44 | PTF | BUE + 1.62 | P |
| 16 | 45 | PTF | BUE + 1.57 | P |
| 18 | 45 | PTF | BUE + 1.63 | P |
| 25 | 45 | PTF | BUE + 1.68 | P |
| 44 | 45 | 29 | 1H | - |
| 35 | 46 | PTF | BUE + 1.62 | P |
| 32 | 49 | PTF | BUE + 1.76 | P |
| 38 | 49 | 26 | 7C | - |
| 14 | 50 | PTF | BUE + 1.99 | P |
| 9 | 51 | PTF | BUE + 1.71 | P |
| 27 | 51 | PTF | BUE + 1.68 | P |
| 30 | 51 | PTF | BUE + 1.73 | P |
| 1 | 52 | 80/SAI | TEH + 4.33 | P |
| 3 | 52 | PTF | BUE + 0.00 | - |
| 13 | 52 | PTF | BUE + 1.68 | P |
| 32 | 52 | PTF | BUE + 1.70 | P |
| 11 | 53 | 28 | AV1 | - |
| 18 | 53 | PTF | BUE + 1.54 | P |
| 27 | 53 | PTF | BUE + 1.62 | P |
| 29 | 53 | PTF | BUE + 1.72 | P |
| 35 | 53 | 30 | 1H | - |
| 42 | 53 | DSI/SAI | 5H | P |

# TABLE 7.3

## 1994 EDDY CURRENT EXAMINATION REPORTABLE INDICATIONS

| STEAM GENERATOR A | | | | |
|---|---|---|---|---|
| ROW | COLUMN | % THRU-WALL PENETRATION | INDICATION LOCATION | SLEEVED/PLUGGED |
| 29 | 54 | PTF | BUE + 1.62 | P |
| 12 | 55 | 41 | 2C | - |
| 13 | 55 | 27 | 2C | - |
| 18 | 55 | 27 | AV2 | - |
| 18 | 55 | 20 | AV3 | - |
| 20 | 55 | PTF | BUE + 1.59 | P |
| 21 | 55 | PTF | BUE + 1.55 | P |
| 31 | 55 | PTF | BUE + 1.54 | P |
| 35 | 55 | PTF | BUE + 1.68 | P |
| 18 | 57 | 21 | AV2 | - |
| 29 | 57 | PTF | BUE + 1.63 | P |
| 31 | 57 | PTF | BUE + 1.64 | P |
| 13 | 58 | DSI/MAI | 1H | P |
| 18 | 58 | 23 | AV3 | - |
| 18 | 58 | 27 | AV4 | - |
| 31 | 58 | PTF | BUE + 1.62 | P |
| 36 | 58 | DCI/SAI | TEH + 11.24 | P |
| 34 | 60 | PTF | BUE + 1.77 | P |
| 37 | 61 | DCI/SAI | TEH + 3.42 | P |
| 33 | 62 | PTF | BUE + 1.63 | P |
| 34 | 62 | PTF | BUE + 0.00 | - |
| 34 | 62 | 32 | 76 | - |
| 15 | 63 | 21 | AV3 | - |
| 19 | 63 | 22 | AV3 | - |
| 21 | 63 | PTF | BUE + 1.83 | P |
| 29 | 64 | PTF | BUE + 1.70 | P |
| 37 | 64 | DCI/SAI | TEH + 4.30 | P |
| 23 | 65 | PTF | BUE + 1.76 | P |

# TABLE 7.3

## 1994 EDDY CURRENT EXAMINATION REPORTABLE INDICATIONS

| STEAM GENERATOR A | | | | |
|---|---|---|---|---|
| ROW | COLUMN | % THRU-WALL PENETRATION | INDICATION LOCATION | SLEEVED/PLUGGED |
| 39 | 65 | 22 | AV2 | - |
| 15 | 67 | 23 | AV1 | - |
| 18 | 67 | 31 | AV1 | - |
| 18 | 67 | 38 | AV2 | - |
| 18 | 67 | 34 | AV3 | - |
| 19 | 67 | 20 | AV1 | - |
| 19 | 67 | 20 | AV2 | - |
| 21 | 67 | PTF | BUE + 1.70 | P |
| 38 | 67 | 20 | AV2 | - |
| 39 | 67 | 22 | AV2 | - |
| 36 | 70 | DCI/SAI | TEH + 2.87 | P |
| 37 | 72 | 20 | AV3 | - |
| 39 | 73 | 23 | AV3 | - |
| 4 | 74 | 30 | 1C | - |
| 29 | 74 | 44 | 7C | - |
| 32 | 74 | 37 | 7C | - |
| 24 | 75 | PTF | BUE + 1.60 | P |
| 17 | 76 | 24 | AV3 | - |
| 25 | 76 | 28 | AV3 | - |
| 28 | 76 | DCI/SAI | TEH + 3.57 | P |
| 18 | 77 | 39 | 1H | - |
| 36 | 77 | 21 | 3H | - |
| 23 | 78 | 21 | 7C | - |
| 24 | 78 | 34 | 7C | - |
| 24 | 78 | 25 | 6C | - |
| 31 | 78 | DSI/SAI | 3H | P |
| 24 | 79 | DCI/SAI | TEH + 4.11 | P |
| 2 | 80 | PTF | BUE + 1.64 | P |

# TABLE 7.3

## 1994 EDDY CURRENT EXAMINATION REPORTABLE INDICATIONS

| STEAM GENERATOR A | | | | |
|---|---|---|---|---|
| ROW | COLUMN | % THRU-WALL PENETRATION | INDICATION LOCATION | SLEEVED/PLUGGED |
| 2 | 80 | 25 | 7C | P |
| 2 | 80 | 25 | 5C | P |
| 3 | 80 | 21 | 4C | - |
| 24 | 80 | 32 | 3C | - |
| 24 | 80 | 21 | 2C | - |
| 28 | 80 | 36 | 1H | - |
| 24 | 83 | 38 | 7C | - |
| 24 | 84 | 21 | AV2 | - |
| 24 | 84 | 46 | 6C | - |
| 5 | 87 | 38 | 1C | - |
| 20 | 89 | 27 | 1C | - |

AV# - Antivibration bar
BUE - Bottom of upper hydraulic expansion joint
DCI - Distorted Crevice Indication
DSI - Distorted Support Plate Indication
#H, #C - Tube support plate hot and cold
MAI - Multiple Axial Indication
P - Plugged
PTF - Parent Tube Flaw
SAI - Single Axial Indication
TEH, TEC - Tube end bot and cold
TSH, TSC - Top of tube sheet hot and cold

Note that numbers added to TEH, TSH, BUE, etc., are distances in inches above or below the indicated reference point.

## TABLE 7.4

### 1994 EDDY CURRENT EXAMINATION REPORTABLE INDICATIONS

| STEAM GENERATOR B | | | | |
|---|---|---|---|---|
| ROW | COLUMN | % THRU-WALL PENETRATION | INDICATION LOCATION | PLUGGED/SLEEVED |
| 9 | 2 | 28 | TSC + 1.84 | - |
| 12 | 3 | 25 | 2C | - |
| 15 | 3 | 26 | 2C | - |
| 7 | 4 | DSI/SAI | 5H | P |
| 11 | 4 | 39 | 2C | - |
| 15 | 4 | 49 | 2C | - |
| 13 | 5 | 24 | AV1 | - |
| 15 | 5 | 22 | AV2 | - |
| 15 | 5 | 26 | AV3 | - |
| 17 | 5 | 21 | AV2 | - |
| 17 | 6 | 22 | AV2 | - |
| 17 | 6 | 20 | AV3 | - |
| 17 | 6 | 29 | 6C | - |
| 18 | 6 | 35 | 4H | - |
| 20 | 6 | 29 | AV3 | - |
| 21 | 6 | 48 | 2C | - |
| 17 | 7 | 34 | 2C | - |
| 20 | 7 | 20 | AV1 | - |
| 20 | 7 | 24 | AV3 | - |
| 20 | 7 | 26 | 2C | - |
| 3 | 8 | 32 | 1C | - |
| 14 | 8 | 24 | AV1 | - |
| 15 | 8 | 21 | AV1 | - |
| 15 | 8 | 22 | AV2 | - |
| 15 | 8 | 22 | AV3 | - |
| 16 | 8 | 22 | AV2 | - |
| 16 | 8 | 27 | AV3 | - |
| 17 | 8 | 23 | AV1 | - |

# TABLE 7.4

## 1994 EDDY CURRENT EXAMINATION REPORTABLE INDICATIONS

| STEAM GENERATOR B | | | | |
|---|---|---|---|---|
| ROW | COLUMN | % THRU-WALL PENETRATION | INDICATION LOCATION | PLUGGED/SLEEVED |
| 17 | 8 | 20 | AV2 | - |
| 17 | 8 | 25 | AV3 | - |
| 18 | 8 | 24 | AV2 | - |
| 19 | 8 | 20 | AV2 | - |
| 19 | 8 | 21 | AV3 | - |
| 20 | 8 | 24 | 6H | - |
| 20 | 8 | 23 | AV2 | - |
| 15 | 9 | 20 | AV2 | - |
| 20 | 9 | 21 | AV1 | - |
| 20 | 9 | 20 | AV2 | - |
| 13 | 10 | 30 | TSH + 49.65 | - |
| 13 | 10 | 32 | 4C | - |
| 13 | 10 | 20 | 2C | - |
| 15 | 10 | 24 | AV1 | - |
| 27 | 10 | 34 | 7C | - |
| 5 | 12 | 34 | 1C | - |
| 11 | 12 | DCI/SAI | TEH + 3.82 | P |
| 27 | 12 | 23 | AV2 | - |
| 2 | 13 | 23 | 6C | - |
| 17 | 13 | 46 | 6C | - |
| 31 | 15 | 25 | AV2 | - |
| 18 | 16 | 25 | 2C | - |
| 25 | 16 | 38 | 7C | - |
| 13 | 17 | 20 | 4C | - |
| 25 | 18 | 24 | 6C | - |
| 25 | 18 | 36 | 3C | - |
| 9 | 19 | PTF | BUE - 0.08 | - |
| 9 | 19 | 29 | 1H - 30.43 | - |

# TABLE 7.4

## 1994 EDDY CURRENT EXAMINATION REPORTABLE INDICATIONS

| STEAM GENERATOR B | | | | |
|---|---|---|---|---|
| ROW | COLUMN | % THRU-WALL PENETRATION | INDICATION LOCATION | PLUGGED/SLEEVED |
| 37 | 19 | 22 | AV2 | - |
| 4 | 20 | PTF | BUE + 1.86 | P |
| 27 | 23 | 40 | 2C | - |
| 29 | 23 | 35 | 6C | - |
| 31 | 23 | DCI/SAI | TEH + 12.63 | P |
| 28 | 24 | 21 | AV2 | - |
| 39 | 24 | 25 | AV2 | - |
| 39 | 24 | 23 | AV3 | - |
| 40 | 24 | 21 | AV2 | - |
| 40 | 24 | 21 | 6C | - |
| 16 | 25 | 20 | AV1 | - |
| 30 | 26 | DCI/SAI | TEH + 10.85 | P |
| 40 | 26 | 25 | 6C | - |
| 16 | 28 | 42 | 4C | - |
| 16 | 28 | 21 | 1C | - |
| 28 | 28 | PTF | BUE + 1.71 | P |
| 34 | 28 | 32 | 7C | - |
| 41 | 28 | 20 | AV2 | - |
| 42 | 28 | 20 | AV2 | - |
| 5 | 29 | PTF | BUE + 1.93 | P |
| 17 | 29 | 23 | 2C | - |
| 20 | 29 | 20 | 1C | - |
| 42 | 29 | 21 | AV2 | - |
| 31 | 30 | PTF | BUE + 1.75 | P |
| 41 | 30 | 24 | 6C | - |
| 13 | 31 | 21 | 1C | - |
| 16 | 31 | 29 | 2C | - |
| 16 | 31 | 35 | 1C | - |

# TABLE 7.4

## 1994 EDDY CURRENT EXAMINATION REPORTABLE INDICATIONS

| STEAM GENERATOR B | | | | |
|---|---|---|---|---|
| ROW | COLUMN | % THRU-WALL PENETRATION | INDICATION LOCATION | PLUGGED/SLEEVED |
| 10 | 32 | 43 | 5C | - |
| 11 | 33 | PTF | BUE - 0.83 | - |
| 16 | 34 | 22 | 2C | - |
| 22 | 34 | 20 | 1C | - |
| 33 | 34 | PTF | BUE + 1.71 | P |
| 10 | 35 | PTF | BUE - 1.17 | - |
| 14 | 35 | 34 | 1C | - |
| 16 | 35 | 22 | 2C | - |
| 18 | 35 | 20 | AV2 | - |
| 31 | 35 | PTF | BUE + 1.62 | P |
| 38 | 35 | 26 | 3C | - |
| 41 | 35 | 26 | 3H | - |
| 43 | 35 | 21 | 5H | - |
| 16 | 36 | 22 | 6C | - |
| 38 | 36 | 26 | 4H | - |
| 38 | 36 | 21 | 7H | - |
| 16 | 37 | 24 | AV1 | - |
| 19 | 37 | 24 | AV1 | - |
| 30 | 37 | PTF | BUE + 1.57 | P |
| 32 | 37 | 35 | 7H | - |
| 38 | 37 | 34 | 4H | - |
| 38 | 37 | 26 | 5H | - |
| 38 | 37 | 21 | 7H | - |
| 38 | 37 | 27 | TSC - 0.04 | - |
| 8 | 38 | PTF | BUE + 4.15 | P |
| 20 | 38 | 20 | AV1 | - |
| 20 | 38 | 20 | AV3 | - |
| 22 | 38 | 24 | AV3 | - |

# TABLE 7.4

## 1994 EDDY CURRENT EXAMINATION REPORTABLE INDICATIONS

| STEAM GENERATOR B | | | | |
|---|---|---|---|---|
| ROW | COLUMN | % THRU-WALL PENETRATION | INDICATION LOCATION | PLUGGED/SLEEVED |
| 27 | 38 | PTF | BUE + 1.74 | P |
| 28 | 38 | PTF | BUE + 1.87 | P |
| 40 | 38 | DCI/SAI | TEH + 8.91 TO 14.11 | P |
| 40 | 38 | 21 | 3H | P |
| 40 | 38 | 36 | 6H | P |
| 40 | 38 | 24 | 5C | P |
| 40 | 38 | 24 | 6C | P |
| 44 | 38 | 23 | 5C | - |
| 45 | 38 | 22 | 7C | - |
| 30 | 39 | PTF | BUE + 1.80 | P |
| 38 | 39 | DCI/MAI | TEH + 7.63 | P |
| 17 | 40 | 31 | 6C | - |
| 32 | 40 | PTF | BUE + 1.78 | P |
| 36 | 40 | 27 | AV1 | - |
| 36 | 40 | 20 | AV2 | - |
| 39 | 40 | 22 | AV2 | - |
| 44 | 40 | 23 | AV2 | - |
| 17 | 41 | 39 | 2C | - |
| 30 | 41 | 25 | 1H | - |
| 38 | 41 | 21 | 6C | - |
| 8 | 42 | 22 | 1H - 9.51 | - |
| 15 | 42 | 33 | 3C | - |
| 19 | 42 | 24 | AV1 | - |
| 38 | 42 | 29 | 7C | - |
| 38 | 42 | 27 | 3C | - |
| 44 | 42 | 23 | 5H | - |
| 41 | 43 | 26 | 4C | - |
| 44 | 43 | 23 | 7H | - |

# TABLE 7.4

## 1994 EDDY CURRENT EXAMINATION REPORTABLE INDICATIONS

| STEAM GENERATOR B | | | | |
|---|---|---|---|---|
| ROW | COLUMN | % THRU-WALL PENETRATION | INDICATION LOCATION | PLUGGED/SLEEVED |
| 13 | 44 | 30 | 1C | - |
| 17 | 44 | 35 | 1C | - |
| 22 | 44 | 38 | 6C | - |
| 44 | 44 | 20 | 5H | - |
| 44 | 44 | 37 | 6C | - |
| 13 | 45 | 23 | 2C | - |
| 31 | 46 | PTF | BUE - 2.08 | - |
| 32 | 46 | PTF | BUE + 1.88 | P |
| 33 | 46 | PTF | BUE + 0.00 | - |
| 36 | 46 | 43 | 7C | - |
| 7 | 47 | PTF | BUE - 0.01 | - |
| 16 | 47 | 22 | AV3 | - |
| 36 | 47 | 20 | 6C | - |
| 17 | 48 | 21 | 6C | - |
| 17 | 48 | 25 | TSC + 0.31 | - |
| 17 | 48 | 35 | TSC + 0.12 | - |
| 26 | 48 | PTF | BUE - 0.35 | - |
| 38 | 48 | 33 | 4H | - |
| 38 | 48 | 47 | 6H | - |
| 38 | 48 | 32 | 6C | - |
| 38 | 48 | 30 | 4C | - |
| 38 | 48 | 22 | 2C | - |
| 43 | 48 | 25 | 7C | - |
| 43 | 48 | 27 | 6C | - |
| 4 | 49 | 39 | 5C | - |
| 4 | 49 | 46 | 3C | - |
| 21 | 49 | 28 | 1C | - |
| 27 | 49 | PTF | BUE - 0.53 | - |

# TABLE 7.4

## 1994 EDDY CURRENT EXAMINATION REPORTABLE INDICATIONS

| STEAM GENERATOR B | | | | |
|---|---|---|---|---|
| ROW | COLUMN | % THRU-WALL PENETRATION | INDICATION LOCATION | PLUGGED/SLEEVED |
| 38 | 49 | 25 | 7H | - |
| 38 | 49 | 29 | 7C | - |
| 38 | 49 | 29 | 6C | - |
| 38 | 49 | 24 | 5C | - |
| 40 | 49 | 20 | 1C | - |
| 12 | 50 | 28 | 5C | - |
| 12 | 50 | 23 | 3C | - |
| 38 | 50 | 24 | 7C | - |
| 42 | 50 | 28 | 7H | - |
| 6 | 51 | PTF | BUE - 0.11 | - |
| 16 | 51 | 27 | AV4 | - |
| 19 | 51 | 24 | AV3 | - |
| 20 | 51 | 21 | AV2 | - |
| 21 | 51 | 20 | AV2 | - |
| 21 | 51 | 20 | AV3 | - |
| 30 | 51 | 34 | 2H | - |
| 36 | 51 | 25 | AV2 | - |
| 38 | 51 | 30 | 7H | - |
| 38 | 51 | 20 | AV2 | - |
| 38 | 51 | 34 | 7C | - |
| 38 | 51 | 29 | 6C | - |
| 39 | 51 | 20 | AV2 | - |
| 39 | 51 | 21 | AV3 | - |
| 40 | 51 | 20 | AV2 | - |
| 40 | 51 | 20 | AV3 | - |
| 42 | 51 | 22 | AV3 | - |
| 44 | 51 | 21 | AV2 | - |
| 2 | 52 | 21 | 7C | - |

# TABLE 7.4

## 1994 EDDY CURRENT EXAMINATION REPORTABLE INDICATIONS

| STEAM GENERATOR B | | | | |
|---|---|---|---|---|
| ROW | COLUMN | % THRU-WALL PENETRATION | INDICATION LOCATION | PLUGGED/SLEEVED |
| 8 | 52 | PTF | BUE - 0.83 | - |
| 20 | 52 | 28 | 1C | - |
| 24 | 52 | 34 | 6C | - |
| 34 | 52 | 21 | AV2 | - |
| 34 | 52 | 20 | TSC - 0.48 | - |
| 38 | 52 | 20 | AV2 | - |
| 38 | 52 | 20 | AV3 | - |
| 38 | 52 | 30 | 6C | - |
| 40 | 52 | 23 | AV2 | - |
| 40 | 52 | 20 | AV3 | - |
| 43 | 52 | 28 | 7H | - |
| 43 | 52 | 35 | 7C | - |
| 43 | 52 | 26 | 6C | - |
| 43 | 52 | 28 | 4C | - |
| 45 | 52 | 28 | AV1 | - |
| 2 | 53 | 38 | 7C | - |
| 38 | 53 | 25 | 7C | - |
| 43 | 53 | 34 | 5H | - |
| 43 | 53 | 38 | 7C | - |
| 43 | 53 | 23 | 5C | - |
| 22 | 55 | 27 | 7C | - |
| 31 | 55 | PTF | BUE + 2.28 | P |
| 41 | 56 | 37 | 6C | - |
| 42 | 56 | 37 | 5H | - |
| 30 | 57 | 26 | 7C | - |
| 34 | 57 | 20 | 7C | - |
| 45 | 57 | 20 | AV3 | - |
| 5 | 58 | 24 | TSC + 0.58 | - |

# TABLE 7.4

## 1994 EDDY CURRENT EXAMINATION REPORTABLE INDICATIONS

| STEAM GENERATOR B | | | | |
|---|---|---|---|---|
| ROW | COLUMN | % THRU-WALL PENETRATION | INDICATION LOCATION | PLUGGED/SLEEVED |
| 17 | 58 | 33 | 7C | - |
| 33 | 58 | PTF | BUE - 0.42 | - |
| 40 | 58 | 20 | AV3 | - |
| 45 | 58 | 25 | 1C | - |
| 32 | 59 | PTF | BUE - 0.19 | - |
| 43 | 59 | 33 | 1C | - |
| 32 | 60 | 53/SAI | 7H | P |
| 15 | 61 | 32 | 2C | - |
| 27 | 62 | PTF | BUE + 1.70 | P |
| 37 | 62 | 30 | 6C | - |
| 39 | 62 | 34 | 7C | - |
| 39 | 62 | 31 | 2C | - |
| 15 | 63 | 27 | 6C | - |
| 31 | 63 | 41 | 1H | - |
| 31 | 63 | 47 | 6C | - |
| 38 | 63 | 29 | 6C | - |
| 43 | 63 | 37 | 1C | - |
| 25 | 64 | 33 | 1H | - |
| 27 | 64 | PTF | BUE + 1.86 | P |
| 36 | 64 | 30 | 7C | - |
| 37 | 64 | 23 | AV3 | - |
| 37 | 64 | 39 | AV4 | - |
| 37 | 64 | 23 | 7C | - |
| 37 | 64 | 41 | 6C | - |
| 24 | 66 | 29 | 2H | - |
| 35 | 66 | 20 | 6C + 5.26 | - |
| 37 | 66 | 23 | 6C | - |
| 39 | 66 | 25 | 7C | - |

# TABLE 7.4

## 1994 EDDY CURRENT EXAMINATION REPORTABLE INDICATIONS

| STEAM GENERATOR B | | | | |
|---|---|---|---|---|
| ROW | COLUMN | % THRU-WALL PENETRATION | INDICATION LOCATION | PLUGGED/SLEEVED |
| 39 | 67 | 23 | 7C | - |
| 31 | 68 | DCI/SAI | TEH + 10.04 | P |
| 40 | 68 | 25 | AV2 | - |
| 14 | 69 | 27 | 1C | - |
| 16 | 69 | 28 | AV2 | - |
| 20 | 69 | 21 | AV2 | - |
| 27 | 69 | PTF | BUE + 1.69 | P |
| 41 | 69 | 37 | 5H | - |
| 14 | 70 | 24 | 1C | - |
| 35 | 70 | 20 | AV2 | - |
| 36 | 72 | 25 | AV2 | - |
| 36 | 72 | 20 | AV3 | - |
| 27 | 73 | 36 | 3H | - |
| 27 | 73 | 28 | 7H | - |
| 38 | 73 | 36 | 1H | - |
| 30 | 74 | 20 | 2H | - |
| 37 | 74 | 23 | AV2 | - |
| 34 | 75 | 24 | AV2 | - |
| 34 | 75 | 24 | AV3 | - |
| 35 | 75 | DSI/SAI | 2H | P |
| 36 | 75 | 33 | 6C | - |
| 36 | 76 | 34 | 2C | - |
| 10 | 77 | BUE - 0.58 | PTF | - |
| 18 | 77 | 32 | 6C | - |
| 34 | 78 | 23 | AV2 | - |
| 27 | 79 | DCI/SAI | TEH + 6.84 | P |
| 29 | 81 | 46 | 1H | - |
| 10 | 82 | PTF | BUE + 1.73 | P |

# TABLE 7.4

## 1994 EDDY CURRENT EXAMINATION REPORTABLE INDICATIONS

| STEAM GENERATOR B | | | | |
|---|---|---|---|---|
| ROW | COLUMN | % THRU-WALL PENETRATION | INDICATION LOCATION | PLUGGED/SLEEVED |
| 30 | 82 | 25 | 1H | - |
| 30 | 82 | 30 | 2H | - |
| 14 | 83 | 35 | 2C | - |
| 14 | 87 | 22 | 6C | - |
| 2 | 90 | PTF | BUE - 0.72 | - |
| 6 | 91 | 27 | 4H | - |
| 13 | 92 | 31 | 2C | - |

AV# - Antivibration bar
BUE - Bottom of upper hydraulic expansion joint
DCI - Distorted Crevice Indication
DSI - Distorted Support Plate Indication
#H, #C - Tube support plate hot and cold
MAI - Multiple Axial Indication
P - Plugged
PTF - Parent Tube Flow
SAI - Single Axial Indication
TEH, TEC - Tube end bot and cold
TSH, TSC - Top of tube sheet hot and cold

Note that numbers added to TEH, TSH, BUE, etc., are distances in inches above or below the indicated reference point.

# 8.0 PERSONNEL EXPOSURE AND MONITORING REPORT

Table 8.1 presents a tabulation of the total number of individuals for whom monitoring was provided, along with information on total station dose for the year.

Table 8.2 presents a tabulation of the number of station, utility, and other personnel (including contractors) receiving exposures greater than 100 mrem/yr (1.0 mSv/yr) and their associated man-rem exposure according to work and job functions. This table is provided per Regulatory Guide 1.16, Section C.1.b.(3), and Kewaunee Technical Specification 6.9.a.2.B.

TABLE 8.1

January 1, 1994 - December 31, 1994

TOTAL STATISTICS

| RANGE | NO. OF INDIVIDUALS IN RANGE |
|---|---|
| NO MEASURABLE | 380 |
| LT 100 MR | 158 |
| 100-249 MR | 98 |
| 250-499 MR | 74 |
| 500-749 MR | 26 |
| 750-999 MR | 7 |
| 1000-1999 MR | 4 |
| 2000-2999 MR | 0 |
| 3000-3999 MR | 0 |
| 4000-4999 MR | 0 |
| 5000-5999 MR | 0 |
| 6000-6999 MR | 0 |
| 7000-7999 MR | 0 |
| 8000-8999 MR | 0 |
| 9000-9999 MR | 0 |
| 10000-10999 MR | 0 |
| 11000-11999 MR | 0 |
| GT 12000 MR | 0 |
| TOTAL BADGED | 747 |

The total actual dose at the Kewaunee Plant for 1994 was 72.662 Person-Rem (TEDE), (726.62 Person-mSv).

STANDARD FORMAT FOR REPORTING NUMBER OF PERSONNEL & MAN-REM BY WORK AND JOB FUNCTION
FOR KEWAUNEE - FROM 1/1/94 to 12/31/94

| WORK & JOB FUNCTION | NUMBER OF PERSONNEL (GT 100 MREM) STATION EMPLOYEES | UTILITY EMPLOYEES | CONTRACT WORK & OTHER | TOTAL MAN-REM STATION EMPLOYEES | UTILITY EMPLOYEES | CONTRACT WORK/OTHER |
|---|---|---|---|---|---|---|
| REACTOR OPERATIONS SURVEILLANCE | | | | | | |
| MAINTENANCE PERSONNEL | 0 | 0 | 1 | 0.046 | 0.000 | 0.210 |
| OPERATING PERSONNEL | 8 | 0 | 0 | 2.020 | 0.000 | 0.000 |
| HEALTH PHYSICS PERSONNEL | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 |
| SUPERVISORY PERSONNEL | 0 | 0 | 0 | 0.013 | 0.000 | 0.000 |
| ENGINEERING PERSONNEL | 0 | 0 | 0 | 0.001 | 0.000 | 0.000 |
| ROUTINE MAINTENANCE | | | | | | |
| MAINTENANCE PERSONNEL | 5 | 1 | 16 | 4.511 | 0.858 | 4.622 |
| OPERATING PERSONNEL | 2 | 0 | 1 | 1.444 | 0.000 | 0.133 |
| HEALTH PHYSICS PERSONNEL | 11 | 0 | 19 | 5.128 | 0.000 | 4.228 |
| SUPERVISORY PERSONNEL | 1 | 0 | 0 | 0.881 | 0.000 | 0.000 |
| ENGINEERING PERSONNEL | 0 | 0 | 1 | 0.007 | 0.000 | 0.611 |
| INSERVICE INSPECTION | | | | | | |
| MAINTENANCE PERSONNEL | 0 | 0 | 3 | 0.076 | 0.000 | 0.622 |
| OPERATING PERSONNEL | 0 | 0 | 0 | 0.012 | 0.000 | 0.000 |
| HEALTH PHYSICS PERSONNEL | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 |
| SUPERVISORY PERSONNEL | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 |
| ENGINEERING PERSONNEL | 1 | 0 | 0 | 0.250 | 0.000 | 0.000 |
| SPECIAL MAINTENANCE | | | | | | |
| MAINTENANCE PERSONNEL | 14 | 0 | 55 | 4.986 | 0.157 | 24.349 |
| OPERATING PERSONNEL | 0 | 0 | 0 | 0.057 | 0.000 | 0.000 |
| HEALTH PHYSICS PERSONNEL | 0 | 0 | 0 | 0.027 | 0.000 | 0.000 |
| SUPERVISORY PERSONNEL | 1 | 0 | 0 | 0.306 | 0.000 | 0.000 |
| ENGINEERING PERSONNEL | 6 | 2 | 0 | 1.789 | 0.331 | 0.000 |
| WASTE PROCESSING | | | | | | |
| MAINTENANCE PERSONNEL | 0 | 0 | 0 | 0.086 | 0.000 | 0.042 |
| OPERATING PERSONNEL | 1 | 0 | 0 | 0.357 | 0.000 | 0.000 |
| HEALTH PHYSICS PERSONNEL | 2 | 0 | 0 | 0.764 | 0.000 | 0.000 |
| SUPERVISORY PERSONNEL | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 |
| ENGINEERING PERSONNEL | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 |
| REFUELING | | | | | | |
| MAINTENANCE PERSONNEL | 10 | 3 | 0 | 4.471 | 1.116 | 0.143 |
| OPERATING PERSONNEL | 5 | 0 | 0 | 1.758 | 0.000 | 0.000 |
| HEALTH PHYSICS PERSONNEL | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 |
| SUPERVISORY PERSONNEL | 2 | 0 | 0 | 0.471 | 0.000 | 0.000 |
| ENGINEERING PERSONNEL | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 |
| TOTAL | | | | | | |
| MAINTENANCE PERSONNEL | 29 | 4 | 75 | 14.176 | 2.131 | 29.988 |
| OPERATING PERSONNEL | 16 | 0 | 1 | 5.648 | 0.000 | 0.133 |
| HEALTH PHYSICS PERSONNEL | 13 | 0 | 19 | 5.919 | 0.000 | 4.228 |
| SUPERVISORY PERSONNEL | 4 | 0 | 0 | 1.671 | 0.000 | 0.000 |
| ENGINEERING PERSONNEL | 7 | 2 | 1 | 2.047 | 0.331 | 0.611 |
| GRAND TOTAL | 69 | 6 | 96 | 29.461 | 2.462 | 34.960 |

## 9.0 CHANGES IN THE EMERGENCY CORE COOLING SYSTEM MODEL

The provisions of 10 CFR 50.46 require the reporting of corrections or changes to the Emergency Core Cooling System (ECCS) evaluation models that are approved for use in performing the loss-of-coolant accident (LOCA) safety analysis.

<u>Small Break LOCA Evaluation Model</u>

1) On February 21, 1994, Westinghouse Electric Corporation (WEC) notified Wisconsin Public Service Corporation (WPSC) of three model refinements to the WFLASH code, the code used in the Kewaunee analysis of record for the SBLOCA. The cumulative impact of these changes was an increase of 47°F and 152°F for the four inch and six inch breaks respectively. The resultant peak clad temperatures were 1900°F and 2110°F for these breaks. This information was reported to the Commission in Reference 1.

2) In July of 1994, WEC completed a reanalysis of the Kewaunee SBLOCA using the NOTRUMP evaluation model. This analysis indicated that the limiting peak clad temperature is 1053°F for a three inch break. The NOTRUMP evaluation model used in the analysis had an outstanding PCT assessment to address Safety Injection flow to the broken loop as reported to the Commission in Reference 2. As described in WCAP-10054-P, Addendum 2 (Reference 4), model changes to reflect safety injection flow to the broken loop and use of the COSI condensation model result in a net PCT benefit. Therefore immediate reanalysis is not required, and WPSC will implement these model changes for the next NOTRUMP SBLOCA analysis.

   The new SBLOCA analysis was incorporated into the Kewaunee Updated Safety Analysis Report on November 1, 1994 and transmitted to the Commission in Reference 3.

3) On November 7, 1994, WEC notified WPSC of model refinements to the SBLOCTA code which is part of the NOTRUMP evaluation model. The cumulative impact of these changes was a decrease of 33°F in the limiting peak clad temperature. This information was reported to the Commission in Reference 5.

Table 9.1 provides the current Kewaunee SBLOCA Peak Clad Temperature Margin Utililization.

<u>Large Break LOCA Evaluation Model</u>

There were no changes in the Large Break LOCA evaluation model during 1994.

References

1: Letter from C. A. Schrock (WPSC) to Document Control Desk dated March 14, 1994

2: Westinghouse Letter ET-NRC-93-3971, N. J. Liparulo to Document Control Desk, "Notification of a Significant Change to the Westinghouse Small Break LOCA ECCS Evaluation Model, Pursuant to 10CFR50.46 (a)(3)(ii): Safety in the Broken Loop", September 21, 1993

3: Letter from C. A. Schrock (WPSC) to Document Control Desk dated November 4, 1994

4: WCAP-10054-P, Addendum 2, "Addendum to the Westinghouse Small Break ECCS Evaluation Model Using the NOTRUMP Code: Safety Injection into the Broken Loop and COSI Condensation Model", August 1994

5: Letter from C. A. Schrock to Document Control Desk dated December 6, 1994

TABLE 9.1

## Small Break Peak Clad Temperature Margin Utilization

Revision Date: 01/27/95

Plant Name: Kewaunee Unit 1
Utility Name: Wisconsin Public Service Corporation

Eval. Model: NOTRUMP Fuel: 14x14 Siemen
FQ=2.50 FdH=1.70 SGTP = 25%

| | Reference* | Clad Temperature | | Notes |
|---|---|---|---|---|
| A. ANALYSIS OF RECORD (6/94) | 1 | PCT= | 1053 °F | |
| B. PRIOR PERMANENT ECCS MODEL ASSESSMENTS | 1 | ΔPCT= | 0 °F | |
| C. 10 CFR 50.59 SAFETY EVALUATIONS | Table A | ΔPCT= | 0 °F | |
| D. 1994 10 CFR 50.46 MODEL ASSESSMENTS (Permanent Assessment of PCT Margin) | | | | |
| 1. Axial Nodalization, RIP Model Revision and SBLOCTA Error Corrections Analysis | 2 | ΔPCT= | -33 °F | |
| 2. Effect of Safety Injection in the Broken Loop | | ΔPCT= | 150 °F | 1 |
| 3. Effect of Improvod SI Condensation Model | | ΔPCT= | -150 °F | 1 |
| E. TEMPORARY ECCS MODEL ISSUES** | | | | |
| 1. None | | ΔPCT= | 0 °F | |
| F. OTHER MARGIN ALLOCATIONS | | | | |
| 1. None | | ΔPCT= | 0 °F | |
| LICENSING BASIS PCT + MARGIN ALLOCATIONS | | PCT= | 1020 °F | |

* References for the Peak Clad Temperature Margin Utilization summary can be found in Table B.
** It is recommendod that these temporary PCT allocations which address current LOCA model issues not be considered with respect to 10 CFR 50.46 reporting requirements.

Notes:
1. The SI in the Broken Loop and Improvod Condensation Model offsetting model changes (ET-NRC-93-3971, NSAL-93-018 and follow-up letter) whose not effect is 0°F are not incoporated in the analysis.

## Table A - 10 CFR 50.59 Safety Evaluations

Revision Date: 01/27/95

Plant Name: Kewaunee Unit 1
Utility Name: Wisconsin Public Service Corporation

| | Reference | Clad Temperature | | Notes |
|---|---|---|---|---|
| I. SMALL BREAK ECCS SAFETY EVALUATIONS | | | | |
| 6 Inch Break: | | | | |
| A. None | 1 | $\Delta$PCT = | 0 °F | |
| **TOTAL 10 CFR 50.59 SMALL BREAK ASSESSMENTS** | | **PCT =** | **0 °F** | |

II. LARGE BREAK ECCS SAFETY EVALUATIONS

Westinghouse does not have cognizance for Kewaunee Unit 1 LBLOCA Analysis

Notes:

None

## Table B - References

1. WPS-94-561, "Kewaunee SB LOCA Analysis Report Transmittal," July 11, 1994.

2. WPS-94-221 (NSAL-94-022AA), "SBLOCTA Axial Nodalization," October 27, 1994.

# 10.0 FAILURES OF TURBINE STOP AND CONTROL VALVES

There were no failures of the turbine stop and control valves during 1994.

# 11.0 MAXIMUM COOLANT ACTIVITY

KNPP TS 6.9.a.2.D requires the documentation of the results of specific activity analysis in which the reactor coolant exceeded the limits of TS 3.1.c.1.A during the past year.

The reactor coolant did not exceed the limits of TS 3.1.c.1.A during 1994.