U. S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-289/90-01

Docket No. 50-289

License No. DPR-50

Licensee: GPUN Nuclear Corporation
P. O. Box 480
Middletown, Pennsylvania 17057

Facility Name: Three Mile Island Generating Station Unit 1

Inspection At: Parsippany, N. J. and Middletown, Pa.

Inspection Conducted: January 8 - 26, 1990

Inspectors: Robert A. McBrearty — March 6 1990
R. A. McBrearty, Reactor Inspector — date

Approved by: Jack Strosnider — 3/7/90
J. R. Strosnider, Chief, M&P Section, EB, DRS — date

Inspection Summary: Inspection on January 8-26, 1990 (Report No. 50-289/90-01)

Areas Inspected: A routine unannounced inspection was conducted of engineering support provided by the off-site Technical Functions Department to site activities and inservice inspection activities to ascertain whether the licensee's activities were conducted in compliance with applicable ASME code and regulatory requirements. In addition, the effectiveness of the water chemistry control program and licensee actions regarding a control rod drive mechanism leaking problem were inspected.

Results: No violations were identified. One unresolved item was identified regarding compliance of the ISI contractor's NDE personnel certification program with the intent of SNT-TC-1A.

Details

1.0 Persons Contacted

General Public Utilities Nuclear Corporation

**A. Asarpota, Project Manager TMI 1 - Parsippany
*W. County, Quality Assurance Audit Manager - TMI
*J. Colitz, Plant Engineering Director - TMI
*D. Covill, Quality Assurance/NDE/ISI - TMI
**J. Devine, Vice President Technical Functions - Parsippany
D. Fultonberg, Manager TMI-1 Long Range Planning - Parsippany
*R. Glaviano, Manager Technical Functions - TMI
**D. Grace, Director Engineering Projects - Parsippany
D. Harper, Maintenance Manager - TMI
*D. Hassler, Licensing Engineer - TMI
*W. Heysek, Licensing Engineer - TMI
*H. Hukill, Vice President/Director TMI-1
C. Incorvati, Quality Control Manger TMI-1
*J. Jandovitz, Quality Assurance/NDE/ISI - TMI
W. Kimmick, ISI Engineer - TMI
*M. Knight, Licensing Engineer - TMI
**R. McGoey, Manager - PWR Licensing - Parsippany
*S. Mervine, Fire Protection Training Supervisor TMI
*T. O'Connor, Lead Fire Protection Engineer TMI - 1/2
**E. Pagan, Licensing Engineer - Parsippany
C. Shorts, Project Manager TMI-1 - Parsippany
**D. Slear, Plant Systems Director - Parsippany
*C. Smyth, Licensing Manager - TMI-1
**J. Sullivan Jr., Licensing Director - Parsippany
M. Torberg, ISI Engineer - TMI
**E. Wallace, Engineering Services Director - Parsippany
R. Wayne, Manager QA Procurement - Parsippany

Babcock & Wilcox Company

D. Cislo, Eddy Current Examination Field Operations Manager

U.S. Nuclear Regulaotry Commission

*R. Paolino, Senior Reactor Engineer
*F. Young, Senior Resident Inspector

*Denotes those present at the exit meeting at TMI on January 26, 1990.

**Denotes those attending the interim exit meeting at Parsippany, New Jersey on January 12, 1990.

2 0 Off-Site Engineering

Technical functions Division

The licensee's engineering operations are grouped in the Technical Functions division headed by a Vice President. The division is comprised of five departments, each headed by a director, with responsibilities to provide technical support.

The licensee supports participation in industry, owners groups, and professional societies. This was evident by the large number of people representing GPUN and actively participating on the owners and other industry groups and financial support to INPO and the owners groups.

Engineering Services

As of November 1989 the department was comprised of 83 employees and is authorized to expand to 87 employees in 1990.

This department is organized to provide support services, such as drawing and document control, design and drafting. The department is engaged in a program to enhance drawing legibility at the operating plants and in a verification of as-built conditions at the plants. An initiative undertaken by Engineering Services has to do with a long term effort to provide three dimensional modeling of plant components to permit personnel to familiarize themselves with the various components without entering radiation areas. This could prove helpful to maintenance personnel and to NDE technicians responsible for performing inservice inspection. Additionally, the department is responsible for planning and scheduling of modifications and outage activities and the preparation and coordination of engineering and licensing procedures and standards.

The modification planning process has been enhanced by involving the operating plants early in the process. A kickoff meeting prior to the preliminary engineering design review meeting allows plant personnel to provide input at an early stage of modification planning. Additionally, plant personnel are included in the preliminary engineering design review. Planned activities and new activities are discussed at meetings held twice a month for each operating plant.

The computer assisted records and information retrieval system (CARIRS) is a corporate record management system. The system has numerous databases used by various corporate entities including indices of currently applicable documents for each plant and superseded and historical information regarding each plant. The Technical Functions Division for GPUN controls and maintains databases applicable to the operating nuclear facilities. The input to these data bases is controlled by the Engineering Services group. The output of the CARIRS system is available throughout the corporation on an authorized access basis which is also controlled by the Engineering Services Department.

Projects Engineering

Plant modifications may be initiated for various reasons by the operating plants, or as a result of owners group or NRC recommendations. The Projects Engineering Department is assigned the responsibility to manage and assure completion of plant modifications, additions, or major non-routine repairs. The department coordinates Technical Functions Division personnel and activities on the plant sites, and provides approval and release of detailed engineering for all Technical Functions sponsored projects. In general, this department functions as project engineers in organizing, planning, and coordinating all engineering efforts for projects for which GPUN performs the design engineering.

The inspector selected the following modification packages for inspection to assess the adequacy of the Technical Functions Division effort in planning and managing a typical plant modification:

°BA# 412538 - Heat Sink Protection System (HSPS) Upgrade
°BA# 412562 - OTSG Cold Leg Nozzle Dams
°BA# 128135 - OTSG Maine Feedwater Nozzle Replacement
°BA# 412571 - EWF Flow Element Replacement

The inspector determined that various Technical Functions Division departments are involved in the planning and processing of plant modifications. Preliminary meetings with cognizant plant personnel were held to discuss development of the modifications and to establish implementation schedules. Typical decisions included the specific outage when the work would be performed, and whether or not a portion of the work could efficiently be performed with the plant operating. Those efforts were coordinated by the Project Engineering Department as was the Preliminary Engineering Design Review (PEDR) meeting. In the case of the HSPS modification a preliminary "kickoff" meeting was held approximately four months prior to the PEDR meeting and included a representative of the licensee's TMI contractor. PEDR meeting notices are routinely sent to various corporate and site organizations including corporate and site QA. Attendees at the PEDR meeting for the OTSG Cold Leg Nozzle Dams modification included representatives of the following groups:

°Plant Engineering
°Site QA Engineering
°Corporate QA
°Engineering and Design - Mechanical Systems
°Startup and Test
°Manager of Special Projects, Systems Engineering
(PEDR Chairman)
°Welding Engineering QA

The Modification packages were of acceptable quality and produced on a schedule to support activities in the plant. Required safety evaluations were clearly written and included all the pertinent areas. Excellent cooperation, coordination, and communication between corporate and site groups was evident.

Training

A two year, comprehensive training program was developed for entry level engineers and includes one year at Parsippany with classroom instruction and periodic assignments at each of the nuclear sites, and a year at one of the sites. An ongoing program involves weekly training sessions covering a specific plant system. Additionally, the licensee supports an educational assistance program and encourages employee participation in industry and technical society seminars and training.

Communications

Evidence of effective communications between the various Technical Functions departments, and corporate and site organizations was noted in the modification packages. The licensee's self assessment program, in response to an earlier NRC Systematic Assessment of Licensee Performance report, found a need for improved communications between corporate and site engineering personnel. A program whereby corporate engineers are rotated between the site and the home office has been instituted and appears to be effective in that corporate engineering personnel are aware of their counterparts at the sites, and also, have become familiar with the site. During the portion of this inspection that was conducted at TMI-1 the inspector confirmed that several Technical Functions Division engineers were at the site to discuss various outage activities. Another aspect of improving communications is evidenced by the increased plant involvement in the early planning of modifications and in the preliminary engineering design review.

3.0 Inservice Inspection (ISI) Data (73755)

Examination data for the following welds were selected for inspection to ascertain that the data were complete and that ASME Code and regulatory requirements were complied with:

Ultrasonic Examination

°Makeup system manifold long seam weld number MU-1022L - Valve to Tee

°Makeup System weld number MU-0139 - Elbow to Pipe

°OTSG manway studs (Primary side) - studs BUP - 1x thru - 16x, BLP - 1x thru - 16x and ALP - 16x

Decay heat system weld number DH-0020 - Valve to Tee

Magnetic Particle Examination

°OTSG A&B Primary manway studs

Liquid Penetrant Examination

°Reactor Coolant System weld number RC-0173BM-safe end to elbow

The OTSG primary side manway studs were newly installed replacement studs and the record indicated that the ultrasonic examination was performed to comply with ASME Code Section XI preservice examination requirements. The remaining examinations complied with the inservice inspection requirements of Section XI.

The qualification/certification records of the NDE personnel associated with the above listed examinations were selected for inspection to ascertain that applicable certification requirements were complied with. Additionally, the Level II Specific examinations and associated reference material used by Nuclear Energy Services (NES), the licensee's ISI contractor, to certify ultrasonic, liquid penetrant, and magnetic particle examination personnel were selected for inspection to determine whether the certification program met the intent of SNT-TC-1A regarding "closed book" examinations.

Each candidate for Level II certification is required to take a written specific examination in addition to the general and practical examination in each NDE method. SNT-TC-1A intends that the written examinations all be of the "closed book" variety such that reference material provided to the examinee should not be capable of being used to answer all questions on the test. That intent is stated in SNT-TC-1A interpretation 77-05, and is restated in an interpretation issued in 1989.

The inspector determined that the reference material provided for his inspection contained the answers to all the questions on the liquid penetrant and magnetic particle examination. The ultrasonic examination contained 20 questions of which all but two were answerable using the reference material.

The specific examinations notwithstanding, based on performance tests, training, and experience, the individual NDE technicians were judged to be competent and qualified to perform their assigned responsibilities. The technicians competence was further evidenced by the quality of their performance of inservice examinations during the refueling outage.

The use of reference material with specific examinations, as used by NES, has been an industry wide practice with few exceptions. The inspector advised the licensee of that, and stated that the item is considered unresolved pending revision of the NES certification program to bring it into compliance with the intent of SNT-TC-1A (289.90-01-01).

4.0 Observations of Work in Progress (73753)

The inspector observed the eddy current examination of plugs and tubes in the "A" and "B" steam generator. In addition, the data analysis process was observed and discussed with the licensee.

The examinations and data collection involved the use of the MIZ-18 system. The examination personnel showed familiarity with the equipment and were qualified to perform their assigned duties. Additionally, the personnel on duty during the inspection were qualified to analyze data although they were not performing that function at the time. Subsequent to its collection the data were sent to the on-site group of data analysts where additional MIZ-18 equipment was set up for the display and analysis of the data.

The analysis process incorporated the use of a primary and secondary analyst and for the case of disputed results, a Level III referee analyst. The referee Level III had the authority to make the final decision with no further review. The inspectors suggested that the licensee consider a process which is now in use at other facilities and is intended to minimize or preclude problems resulting from a plugging decision being incorrectly overruled by one referee analyst. The process requires concurrence of a second Level III when a plugging call is overruled by the referee analyst.

Although the eddy current examinations to date had not resulted in the situation described above, the licensee stated at the exit meeting that it would consider requiring the concurrence of a second Level III analyst.

No violations were identified.

5.0 QA/QC Involvement in ISI

Inservice inspection examination results that do not clearly meet applicable requirements are documented and tracked via a Material Nonconformance Report (MNCR). At the time of this inspection no ISI related MNCRs were closed out and two were selected for inspection.

MNCR number 900009 was issued to document loose bolts on valve MS-V20D on the main steam system. Plant engineering provided the appropriate corrective action and disposition, ISI concurrence was documented, and the maintenance department was given the responsibility for performing the work required to put the component in an acceptable condition. At the time of this inspection the work was not completed.

MNCR number 900034 documented magnetic particle examination results which required evaluation and disposition. The MNCR had been forwarded to the Plant Engineering Department for evaluation which was not yet completed.

A record of ISI related MNCRs is maintained in the ISI department but tracking MNCRs is the responsibility of QC. The inspector determined that QC carried out its responsibility with the aid of a computer based tracking system which is capable of displaying the status of an MNCR at any specific time.

No violations were identified.

6.0 Control Rod Drive Mechanism (CRDM) Boron Leak (57050)

During the refueling outage preceding the present (1990) refueling outage the licensee observed evidence of CRDM leakage (boron buildup).

At the beginning of the ongoing refueling outage the licensee, in conjunction with Babcock & Wilcox, its contractor, performed a remote visual inspection through fan holes to assess the extent of the leaking problem. The inspection was conducted using an EMCO Model N 750-P video camera with a self contained lighting source. The camera and 4mm wide angle lens measured 2 1/2" long x 5/8" wide. The camera assembly including the light source measured 4" long x 1" wide x 2 1/4" high. The picture quality and clarity was excellent and provided the basis for a knowledgeable assessment of the condition of the CRDMs.

Based on the remote visual inspection results, the licensee and B&W concluded that 14 of the CRDMs required repair during the present outage.

The licensee plans to replace the gaskets, rings and bolting on the 14 CRDMs unless inspection of the removed installations shows a need for more extensive repairs.

The present assemblies use asbestos containing gaskets which are thought by the licensee to be the cause of the leaking. The replacement gaskets are of a different material which contains no asbestos and is expected to provide enhanced leak tightness.

The licensee stated that all of the installations will eventually be replaced, but the scheduling has not yet been finalized. During reactor operations borated water leaking from the CRD mechanisms could potentially find its way to the RPV head through separations in the head insulation. Inspections to date have determined this to not be a problem in that no boron buildup has been noted on the carbon steel surface of the RPV head. When resuming operations after the refueling outage, the licensee performed a visual inspection to ascertain whether leakage was occurring from the CRD mechanisms at pressure prior to criticality. No leakage was identified.

No violations were identified.

7.0 Water Chemistry (84750)

Water chemistry data were reviewed as part of this inspection. The methods of collecting and verifying the accuracy of these data were not included in the scope of this inspection.

The inspector reviewed the secondary plant water chemistry for the period of January 1989 through December 1989 and discussed these data with responsible individuals in the licensee's chemistry department.

The average monthly conductivity in the feedwater during the reviewed period ranged from 0.093 umho/cm to 0.166 umho/cm. Chlorides were reported as ranging from 1.0 parts per billion (ppb) to 2.99ppb, sodium ranged from 0.4 ppb to 2.1 ppb, and iron ranged from <1.0 ppb to 3.0 ppb. All of the values were within plant specification limits.

Reactor Coolant System chemistry parameters were within the limits identified in the corporate water chemistry specification in excess of 97% of the time (216 hours out of spec compared to a department goal of 400 hours for the year). The out of specification parameters were limited to lithium and dissolved hydrogen concentrations, both of which generally take some time to reach specified limits following start ups. Sodium, chloride and sulfate concentrations were maintained at a small fraction of their limits and there was no evidence of any problems related to system chemical contaminants during the year.

Feedwater chemistry parameters were maintained within the limits in the corporate water chemistry specification approximately 98% of the time. Instances of out of specification chemistry in the feedwater system were limited to hydrazine and morpholine caused by problems with the chemical feed pumps, low ph after powdex changeout, and high dissolved oxygen after the condensate expansion boot repair.

The Plant Chemistry Department provided support to the project to install systems that do not use gaseous chlorine to prevent biofouling of the main circulating water and river water cooling systems. Gaseous chlorine was determined to be an unacceptable personnel hazard as well as having a significant potential impact on control room habitability and hazardous environmental releases. Plant chemistry identified and evaluated possible replacement biocides and established a program to test, license, and implement the operation of the selected systems.

During 1989, a project to enhance the on-line analyzer capability for secondary plant sample points neared completion. The work remaining involves completion of the startup process and integration of the new equipment into the chemistry data generation process. The added equipment includes a computer system to log data collected on recorders in the sample room.

No violations were identified.

8.0 Unresolved Items

Unresolved items are matters about which more information is required to ascertain whether they are acceptable items or violations. An unresolved item is discussed in paragraph 3.

9.0 Exit Meeting

The inspector met with licensee representatives (denoted in paragraph 1) at Parsippany, New Jersey on January 12, 1990, and at the conclusion of the inspection at Three Mile Island on January 26, 1990. The inspector summarized the scope and findings of the inspection.

At no time during the inspection was written material provided by the inspectors to the licensee. The licensee did not indicate that proprietary information was involved within the scope of this information.

Attachment A

Documents Reviewed

Administrative Procedures

1000-ADM-7314.01 (EMP-001), Revision 3, Technical Functions Work Request/Task Request

5000-ADM-5110.01 (EMP-003), Revision 8-03, Project Approval and Work Authorization

5000-ADM-7311.01 (EP-006), Revision 3, Calculations

5000-ADM-7311.02 (EP-009), Revision 3, Design Verification

5000-ADM-7311.03 (EMP-014), Revision 4, Project Reviews

5000-ADM-7313.01 (EP-005_, Revision 3-03, Modification and System Design Descriptions

5000-ADM-7350.03 (EMP-015), Revision 4-03, Field Questionnaires, Change Notices, and Change Requests

5000-ADM-7350.05 (EMP-002), Revision 2, Requirements For Modifications, Corrective Changes and Facility Changes