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License No. DPR 59 Priority ____ Category ____

Licensee: New York Power Authority
P. O. Box 41
Lycoming, New York 13093

Facility Name: James A. Fitzpatrick Nuclear Power Plant

Inspection At: Lycoming, New York

Inspection Conducted: May 16-20, 1988

Inspectors: [signature] 7/5/88
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Accompanying Personnel

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Inspection Summary: Inspection on May 16-20, 1988 (Report No. 50-333/88-07)

Areas Inspected: Scope: This special, announced inspection was an emergency response facility appraisal. Areas examined during the appraisal included a review of selected procedures, supporting documents and representatives records, the ERFs and related equipment and interviews with licensee personnel. Selected activities were observed during the 1988 annual exercise to ascertain the adequacy of the ERFs and related equipment.

Results: No violations were identified. One (1) Deviation was identified involving the failure to meet the commitments to NUREG-0737, Supplement 1, Part 8 in that the technical support center will be (1) environmentally controlled and (2) provided with radiological protection necessary to assure that radioactive exposure to any person working in the TSC would not exceed 5 rem whole body or its equivalent in any part of the body for the duration of the accident. Areas needing increased licensee attention include the need to revise dose calculation procedures to consider calculating offsite doses for credible unmonitored accidental release pathways; provide validation and verification documentation for the Class A Dose assessment model; and provide a formalized method for controlling and documenting maintenance of the dose assessment models.

TABLE OF CONTENTS

6.0 Emergency Operations Facility (EOF)

6.1 EOF Habitability

6.1.1 Backup EOF

6.1.2 EOF Reliability

6.2 EOF Functional Capabilities

6.2.1 Data Analyses Adequacy

6.2.2 EOF Data Availability

6.2.3 EOF Data Collection Storage Analysis and Display

7.0 TMI Action Plan Requirements

8.0 Exit interview

Details

1.0 Persons Contacted

L. Beale	Computer Software Specialist (JKF)
*D. Bell	Emergency Planning, (NYPA)
R. Burns	VP Nuclear Operations, (NYPA)
*T. Coffey	Software Specialist (JKF)
R. Converse	Resident Manager (JKF)
*G. Varg	Radiological Engineering General Supervisor (JKF)
*A. Zaremba	EP Coordinator (JKF)
S. Murawski	Computer Systems Consultant (JKF)
*M. Prarie	Assistant EP Coordinator (JKF)
D. Berry	Communications (JKF)
*J. Elmers	Supervisory Licensing Engineer (NYPA)
S. Horvath	Technician (NYPA)
*D. Lindsey	Operations Superintendent (JKF)
*S. Pobutkiewicz	Supervisor Computer Specialist (JKF)
J. Street	Technical Services (JKF)
R. Sullivan	Reactor Operator (JKF)
K. Rao	Superintendent (NYPA-EE)
T. Galleta	Staff Meteorologist (NMP)
C. Faison	Supervisor Nuclear Emergency Preparedness (NYPA)
*W. Fernandez	Superintendent Operations (JKF)
*T. Herrman	SNR Plant Engineer (NMP)
D. Johnson	Drill Controller (JKF)
*B. Mathe	Emergency Planning (NYPA)
*E. Mulcahey	RESS (JKF)
G. Tavick	Supervisor Quality Assurance (JKF)
W. Robinson	Quality Assurance Engineer (JKF)
*V. Waltz	Superintendent Technical Support (JKF)
G. Tavick	Supervisor Quality Assurance (JKF)

Other licensee personnel were contacted or observed either during the exercise or the appraisal.

*Denotes those who attended exit meeting on May 20, 1988.

FITZPATRICK ERF INSPECTION

2.0 Assessment of Radiological Releases

2.1 Source Term

The primary monitored gaseous release pathways to the environment are the turbine building, reactor building, radwaste building, and plant stack. The reactor building and the refueling floor exhaust through a common vent. In the event the normal ventilation or stack monitors are inoperable or off scale, the stack, turbine building, and radwaste buildings are equipped with high-range effluent monitors. Procedures are in place to calculate source term information for releases via all monitored release pathways. The primary unmonitored release pathways are via the pressure relief panels on the reactor building, the heat actuated fire dampers on the turbine building, and through reactor containment.

Radionuclide mixes have been taken from the Final Safety Analysis Report (FSAR) to characterize five classes of accidents. These include: steam line break; loss of coolant; containment design basis accident; refueling; and control rod drop. These serve as the default radionuclide mixes for the dose assessment methods. A review of FSAR section 14.6, Analysis of Design Basis Accidents, shows that the five accident sequences considered result in minimal fuel damage and are therefore not representative of accidents resulting in major fuel damage. The exercise conducted during the week of this inspection resulted in a source term which did not fit well into one of the five default accident classes. The default accident class used resulted in an isotopic mix higher in radioiodines than was realistic. Isotopic mixes can also be entered into the models from post accident sample and grab sample results.

Procedures EAP-18, Protective Action Recommendations, and RTP-46, Core Damage Estimation/PASS, contain precalculated relationships between various plant parameters and percent fuel damage. Section 4.10.5 of procedure RTP-46 contains a reference to curves of hydrogen concentration versus percent cladding failure, however, the procedure does not contain these curves nor does it direct the user to where they can be found. Procedure EAP-18 provides a relationship between the drywell high-range radiation monitor and percent fuel damage. However, no procedure was found that allows the use of the high-range drywell radiation monitors, drywell technical specification leak rate, or temperature and pressure to determine a source term for use in dose calculations. Discussions with licensee personnel indicate that they had already recognized this need and are in the process of developing a procedure to address this.

Based on the above review this portion of the licensee's program is adequate.

The following item will be reviewed during a subsequent inspection.

- Complete work on a procedure which will allow the use of real time plant parameters to calculate an offsite dose due to leakage through the drywell boundary. Some of the parameters to consider are drywell high range radiation monitors, drywell temperature, and drywell pressure. (50-333/88-05-01)

The following items are suggested for program improvement:

- Consider developing radionuclide mixes for use as source term input to the dose assessment models which are more representative of the range of accidents normally considered for emergency planning purposes. For instance, consider mixes which cover the range of severe accident sequences resulting in major fuel damage to minor accidents resulting in releases near the normal levels of the reactor coolant (such as the release presented in the exercise scenario).

- In Procedure RTP-46, Core Damage Estimation/PASS, either include the hydrogen versus percent fuel damage curves referred to in section 4.10.5 or include a reference to where they can be located.

2.2 Dose Assessment

At present there are four dose assessment methods available to licensee personnel. The primary model for use in the Technical Support Center (TSC) and Emergency Operations Facility (EOF) is a Class A atmospheric transport and diffusion model which is part of the Meteorological Monitoring and Radiological Assessment System (MMRAS). The backup model and the primary method for use in the Control Room (CR) is the Initial Dose Assessment Calculation (IDAC) model. The dose assessment calculator provides a manual means of performing dose assessment and a manual method based on output from IDAC is also available. Procedure EAP-4, Dose Assessment Calculations, deals with all four methods. All of the models examined employed well-accepted dose calculational methods. During the review of procedure EAP-4, it was noticed that the manual method based on the IDAC model outputs, contained in tables 4.7-4.10, was not described or referenced in the body of the procedure. Also, section 4.4.3., Back Calculation of Release Rate, states that it is possible to back calculate the release rate from field data, however, it does not describe the method or provide an appropriate reference.

A review was conducted of the validation and verification documentation for the MMRAS dose assessment model. The current documentation consists of several sets of test cases. The test cases are mostly handwritten and poorly organized. It is not clear what has been tested in each case or what the results of the test were. The documentation contains no description of the validation and verification methodology or a description of an overall test plan. In general, the documentation is incomplete and it was not possible from the review to determine whether the methodology used was adequate to validate and verify the model.

Some limited calculational comparisons between IDAC and MMRAS and between IRDAM and the dose calculator have been performed by the licensee. However, no fully documented comparison between the primary and all backup dose assessment models has been made nor has there been a comparison between the primary model and the State and NRC models. Documentation resulting from such a comparison should include a discussion of the differences identified and relate them to the differing methodologies employed. Discussions with licensee personnel revealed that no formalized method existed for controlling and documenting the maintenance of the dose assessment computer source code (i.e. MMRAS and IDAC).

The Meteorological Monitoring and Radiological Assessment System (MMRAS) contains an atmospheric dispersion computer code developed by Energy Impact Associates. The model is based on the plume element concept (as discussed in Regulatory Guide 1.111) with a wind field that varies temporally and spatially. Plume elements are described using a three-dimensional puff. The model has the capability of handling continuous or noncontinuous elevated and ground level releases. Plume diffusion is computed using a split-sigma approach. The split-sigma approach uses the standard deviation of the wind direction (sigma theta) over a specified period of time for the horizontal diffusion and the vertical temperature gradient (delta-temperature) for the vertical diffusion. This approach is encouraged as it provides a better estimate of the horizontal diffusion of the plume elements. Ground-level relative concentrations are computed using the standard Gaussian equation adjusted for the puff concept.

The model also computes the Thermal Internal Boundary Layer (TIBL) which is common to most coastal areas during onshore flow. In general, the TIBL delineates the boundary between the stable marine atmosphere and the unstable land atmosphere. Defining the TIBL is essential to providing credible diffusion parameters to the plume elements. Also, the model has a number of features to handle effects on the plume. Some of them are:

- plume rise during stable, neutral, and unstable atmospheric conditions;
- buoyant plume rise;
- adjustment in the stability class at the lake/land interface (e.g., TIBL);
- adjustment for night stability and meandering;
- building wake effects;
- dry and wet deposition; and
- cooling tower entrainment.

Graphical output from the atmospheric dispersion model displays all the necessary information needed to interpret plume movement. However, the time of day for which the plume plot is valid is not included on the graphical output. Strong consideration should be given to adding the time of day to the graphical output for which the plot is valid. This may prevent misinterpretation of the valid time of the plume plot.

Based upon the above review this portion of the licensee's program is adequate. The following items will be reviewed in a subsequent inspection:

- Insure that a thorough validation and verification has been performed for MMRAS and provide comprehensive documentation (50-333/88-05-02); and

- Develop and implement a software control procedure to insure adequate control and documentation is maintained for the dose assessment software models throughout their useful lifetimes (50-333/88-05-03).

The following items are suggested for program improvement:

- Revise procedure EAP-4, Dose Assessment Calculations, to include in the body a description of, and reference to, the manual calculational method contained in tables 4.7-4.10.

- Perform and document a calculational comparison between primary and backup dose assessment models and between these models and the State and NRC models. The resulting documentation should include a description of the differences identified and a discussion relating them to the differing methodologies employed.

3.0 Meteorological Information

Onsite meteorological data for the James A. FitzPatrick (JAF) nuclear power plant are monitored from primary, backup, and inland towers. The primary tower is located between the James A. FitzPatrick and Nine Mile Point (NMP) nuclear power plants and approximately one half mile from the shore of Lake Ontario. The two plants are adjacent to each other. Sensors on the primary tower measure the following atmospheric phenomena:

30-ft	100-ft	200-ft
Wind Speed	Wind Speed	Wind Speed
Wind Direction	Wind Direction	Wind Direction
Sigma Theta	Sigma Theta	Sigma Theta
Temperature		
Atmospheric Pressure		
Dew Point		

In addition, there are two delta-temperature (vertical temperature gradient) sensors for the 30-ft to 100-ft levels and the 30-ft to 200-ft levels. The backup tower is located on JAF plant grounds approximately

100 to 200 yards from Lake Ontario. The backup tower measures wind speed, wind direction, and sigma theta at the 90-ft level. The inland tower is located at the Fulton Airport next to the Emergency Operations Facility (EOF) approximately ten miles inland. The inland tower measures wind speed, wind direction, and sigma theta at the 30-ft level.

The immediate surroundings near the towers are clear of obstructions (e.g., foliage and buildings) and sensors on all the towers are well exposed, thus providing representative and reliable measurements of the "free" atmosphere near the JAF site.

All of the towers are grounded for protection from lightning and contain current-surge protectors to protect sensors from large spikes of electrical current. Tower electronics are housed in sheds at the base of the towers.

The sheds provide adequate environmental control for protection against adverse weather. Electronics placed outside of the sheds contain heaters to prevent freezing during the winter months. Voltages from the sensors are converted to digital form at the sheds. The digital data are then sent via dedicated lines to Microcat computers located in the Technical Support Center (TSC) where the data are validated and formatted. Validation software was checked and it appeared sufficient for validating the meteorological data. The meteorological data are averaged for two time periods: fifteen minutes and hourly. The data are stored in fifteen-minute and hourly databases on a Data General (DG) MV8000 located with the Microcat computers in the TSC. At least two years of fifteen minute and hourly meteorological data are kept on-line for immediate use.

Meteorological data are available in the Control Room from a terminal which is connected to the DG MV8000. As a backup to the terminal, wind speed and direction and delta-temperature information at various levels are available from the primary tower on strip chart recorders. The readouts are available in the TSC. The delta-temperature information are difficult to read off the strip chart due to the plotting of other variables (e.g., temperature). In the event the computer averaged delta-temperature data is inaccessible during an emergency, it would be difficult to determine precisely a fifteen minute or hourly average for the delta-temperature. Serious consideration should be given to dedicating one strip chart to plot the delta-temperature.

Wind direction displays on strip chart recorders in the TSC and Control Room are inadequate during meteorological conditions that yield wind directions from the north (i.e., 360 degrees). Apparently, Niagara Mohawk has modified their wind direction sensors resulting in an increase in voltage level. The current strip chart recorders (Tigraph 100A) are unable to properly handle this change in voltage level. The resulting trace on the strip chart is one that covers the entire scale thus making it impossible to determine a fifteen minute or hourly average during an emergency. The New York Power Authority (NYPA) is aware of this problem and has taken action to correct it (see JAF Nuclear Safety Evaluation No. JAF-SE-87-136). However, at the time of the inspection the problem still existed.

Historical records (1985 through 1987) showed that the meteorological data from all the towers are reliable. In most cases, the data exceeded the ninety-five percent data recovery level for 1987. This implies the meteorological sensors and related instrumentation are well maintained. In addition, the meteorological sensors and instrumentation are calibrated on a semi-annual basis. Historical calibration records were checked and the records correspond with the semi-annual schedule.

Meteorological data from other sources are available through Weather Services Incorporated (WSI). The WSI service is available in the EOF. WSI provides access to all National Weather Service products for the United States. This service is more than adequate for providing accurate current and forecast meteorological data for dose assessment purposes.

During an emergency requiring dose assessment, the NYPA corporate meteorologist interprets WSI forecast data from his White Plains, New York office and provides that information to the TSC and EOF via telefax. Also, he has the capability to review plume projections produced by the Meteorological Monitoring and Radiological Assessment System.

Based upon the above review, this portion of the licensee's program is adequate.

The following items are suggested for program improvement:

- One strip chart should contain just the delta-temperature information to improve readability. It may be necessary to obtained a fifteen minute or hourly average when the primary source is not available; and
- The problem with the wind directions on the strip chart recorders in the TSC and Control Room should be corrected as soon as possible in order to provide adequate backup to the delta-temperature information.

4.0 Technical Support Center

4.1 TSC Data Availability

4.1.1 Documentation of Regulatory Guide (RG) 1.97 Variables

The Safety Evaluation Report (3/14/88) determined that the licensee conformed to RG 1.97 Rev. 2, or adequately justified deviations therefrom, except in the case of neutron flux. There, the licensee has installed category 2 instrumentation, some of which is not environmentally qualified, whereas RG 1.97 specifies category 1 instrumentation. Existing instrumentation was accepted for interim use pending implementation of a fully qualified system.

4.1.2 RG 1.97 Variable Availability and Sufficiency

The licensee committed to Revision 2 of RG 1.97, with some exceptions. For instance, no in-core thermocouples are installed. When the Revision 2 requirement for BWR in-core thermocouples was deleted from RG 1.97 Rev. 3, the licensee committed to Rev. 3 for this parameter, thus resolving the issue.

Meteorological data is available from trend recorders and the MMRAS computer systems. Remaining RG 1.97 variables are available in the TSC from computer systems, principally the Emergency and Plant Information Computer (EPIC), except for:

- Variables not readily connected to EPIC (e.g., chemistry sample results, data from portable radiation survey meters, etc.); and

- Variables to be added to EPIC prior to the end of the next refueling outage at the end of CY 88 (e.g., containment isolation valve position and cooling water flow to ESF components).

Based upon the above review this portion of the licensee's program is adequate.

4.1.3 Computer Data

At the time of the inspection, the licensee was operating two computer systems in parallel on some applications following the relatively recent implementation of the EPIC system. The Honeywell Plant Process Computer System will be phased out after successful parallel operations. Currently, it is not a TSC/EOF data source. EPIC uses a fiber optic cable to link the data acquisition equipment, a VAX 11/785, to the EPIC host, another larger VAX 11/785. Two redundant trains feed the failover monitor switch. Output is provided to the EOF and the programmer's terminal via dial up access, to the Control Room and the Reactor Engineers' office by fiber optic links, and to the computer room and the TSC by direct wire linkage. Output is also provided to disk and tape on off-line storage devices. The EPIC and the Safety Parameter Display System (SPDS), a subset of EPIC, were operated by the licensee and the inspectors during the appraisal. Although the systems were not evaluated in depth, the inspector found them generally user friendly, except that some displays were cluttered. System time response was excellent, most screens were painted in 2-4 seconds. Computer points which were invalid or of poor quality had been removed from scan to preclude misleading operators by erroneous data. No incorrect alarm displays were noted. EPIC can be switched to non-plant data for use in drills. Except for an inconspicuous screen flag, that shift is transparent to the user. Therefore, the licensee has adopted the practice of posting portable signs at each terminal when the system is switched to non-plant data. Although the inspector concurred with this as an interim solution, it is recommended that the screen flag indicating shift to non-plant data be made more conspicuous. The Safety Evaluation Report (SER) (3/18/88) determined there were no serious safety questions with the SPDS design. The SER also directed that containment radiation, containment combustible gas, and source range monitor input be added to the SPDS. Containment radiation is currently available on the system and containment hydrogen (and other gases required) will be added during the first half of 1989.

Based upon the above review portion of the licensee's program is adequate.

The following item is suggested for program improvement.

- The EPIC screen flag indicating that the display contains non-plant (drill or exercise) data should be made more conspicuous.

4.1.4 Manual Data

Telephone communications and status boards provide an adequate backup to the primary computer based information systems.

4.1.5 Data Adequacy

All RG 1.97 variables are available in the TSC. The wind direction trend recorders range from 0-360 degrees true. As a result, when the wind oscillates near 0 degrees, the recorder is useless. A design change has been authorized to eliminate this problem by extending the scale to 540 degrees true. The inspector determined that the variables provided to the TSC were adequate to allow the staff to perform its function.

Based upon the above review, this portion of the licensee's program is adequate.

4.2 TSC Functional Capabilities

4.2.1. TSC Power Supplies

TSC electrical power is supplied from lighting panel LPA3. Two alternate non-vital power paths exist. The preferred path is from the 115 KV switchyard service transformer T2, through non-vital 4160 VAC bus 10300 and transformer T9 to 600 V bus 13300 and MCC C332, then to lighting panel LPA3. Alternately, power may be fed from 115 KV transformer T3 via 4160 VAC bus 10400 and transformer T10 to 600 V bus 13400, then across to bus 13300 and MCC C332. No diesel generator backup is provided. The EPIC computer system is powered from a dual unit uninterruptable power supply (UPS) installation located in the Administration Building HVAC room. At the request of the inspector, TSC power was killed. No attempt was made to shift to alternate power. The EPIC and its TSC terminals survived without rebooting. The balance of the TSC went dead with the exception of battery powered emergency lighting. Lighting was more than adequate to allow the TSC staff to relocate safely. With the exception of the New York telephone T-1 off-site connection lines, all phone circuits were provided with on-site backup battery power supplies including the alternate to T-1, the SLC-96 system. The inspector noted one serious weakness which jeopardized the reliability of the plant telephone system. All telephone voice and data communications circuits pass through the Administration Building PBX room. The room is equipped with a wet stand pipe fire suppression system. If the PBX room were flooded or gutted by fire, the FitzPatrick site would experience a communications blackout, except for one outside security phone at the gate house, GAITRONICS (plant page system), UHF radio, and Messengers.

Although the EOF would survive, it's effectiveness would be severely degraded by the loss of communications with the site. The inspector found that the TSC power supplies were adequate to insure a high probability that the TSC would operate uninterrupted and that the TSC could perform EOF functions until the EOF were activated.

Based upon the above review, this portion of the licensee's program is adequate.

The following item is suggested for program improvement:

- Selected telephone lines should be rerouted to bypass the PBX room in order to enhance survivability in the event of a loss of the PBX room.

4.2.2 TSC Data Analysis

In addition to the systems already described, the TSC is outfitted with a complete set of plant drawings, reference material, and other data analysis aids.

Based upon the above review, this portion of the licensee's program is adequate.

4.3 TSC Habitability

The only documentation supplied concerning TSC habitability was contained in a report titled, Post Accident Shielding Analysis (Deems Report) - Response to NRC NUREG-0578 Item 2.1.6.b, dated March 29, 1981. The report contains a general statement that the TSC shielding is adequate to meet NRC requirements and guidance. The report does not contain the supporting calculations nor does it describe the specific methodology used to arrive at the statement of adequacy. Neither the FSAR or the shielding report provide detailed information concerning TSC construction. The inspectors did note a large number of windows in the west wall of the Administration Building which contains the TSC. It was clear from the review of the shielding report that, although radiation sources due to plant systems were considered in the analysis, the immersion of the TSC in an infinite cloud of radionuclides was not. The licensee was unable to provide further supporting documentation during the inspection. Due to the concerns over TSC construction, the methodology used in the shielding analysis report which appeared not to consider the glass west wall and the add on shield wall for the condensate storage tank outside the TSC, and the lack of supporting documentation for conclusions reached in the study, it was not possible for the inspectors to determine the adequacy of the TSC shielding.

The TSC is in a separate habitability envelope from that of the control room. The inspector reviewed OP-59B, the TSC HVAC procedure, examined the TSC boundaries and the HVAC system, and witnessed repetitive mode shifts from normal to emergency ventilation. The following was noted:

- The TSC ventilation system was inoperative in the emergency mode. As a result of damper failures, the system inducted identical amounts of external air via the unfiltered path in both modes of operation;

- HVAC components were poorly labeled with felt pen; no open/closed damper markings are provided;

- One motor operated damper (MOD 107) could not be located, although it's operation was verified by air flow changes;

- Damper AOD 146 is contained entirely inside the duct; no external position indication is available. A ladder is required to open the inspection plate to verify damper position. No ladder is available on the third floor of the Administration Building;

- Although the HEPA and charcoal filters are tested periodically, the total system is not included in a preventative maintenance program nor is it subject to periodic testing;

- The elevator is not marked as a TSC boundary, although all other accesses are so marked; and

- The procedure provides sufficient instruction to permit shifting ventilation modes but provides no method to verify that the shift has been successful. The change in pressure alone is insufficient to verify the change over to emergency operation since the system displayed the same pressure differential in both modes of operation.

Based upon the above review, this portion of the licensee's program is not adequate.

The following items will be reviewed in a subsequent inspection:

- TSC shielding analysis documentation is insufficient to determine the adequacy of TSC shielding; and

- The TSC HVAC system is not currently being maintained in an adequate state of readiness (50-333/88-05-04). This is a deviation.

The following items should be considered for program improvement:

- Place the TSC HVAC system on a routine preventative maintenance program; and

- Insure that the TSC HVAC system is fully operationally checked on a periodic basis.

4.4 TSC Data Collection, Storage, Analysis, and Display

Licensee system hardware and corresponding documentation was reviewed to determine whether Emergency Response Facility (ERF) functions would be adequately supported. Data collection, storage, display, and communications were found to be adequate.

4.4.1 Methods of Data Collection

Real-time data acquisition, display, and storage to support ERF functions are performed by a distributed computer system called the Emergency and Plant Information Computer (EPIC). The distributed system includes a data gathering front end based on Motorola 68000 microprocessors, a Data Acquisition System (DAS) based on a DEC VAX 11/785, a host data display system based on a DEC VAX 11/785, and a Micro-VAX II to perform MONICORE calculations (core performance computations).

The data acquisition, host, and MicroVAX II systems have redundant processors for continuous backup. Switchover to backup computers can happen in three different ways: (1) a "watchdog" process running on the backup system monitors the primary system - if the primary system fails to respond to requests within a fixed time period, the backup system automatically assumes primary system functions; (2) the primary and backup systems can be switched using software commands; and (3) computer panel switches can be manually switched to swap the primary and backup systems.

The configurations and primary functions of the EPIC computers are as follows:

COMPUTER PRODUCTS INC. (CPI) - Front Ends

Motorola 68000
32 kilobytes (KB)
no disk and no tape drives
one of these units is used for each 2000 plant sensors

Function: Collect data from plant sensors, perform signal conditioning, multiplex data, and transmit sensor data in binary format to the DAS via a serial link

Digital Equipment Co. (DEC) - Data Acquisition System

VAX 11/785
4 Megabytes (MB) Random Access Memory (RAM)
1 - 456 MB hard disk unit (with 1 spare 456 MB disk drive)
no tape drives

Function: Collect data from CPI front ends, convert binary values to values with engineering units, store data, and transmit data to the Host computer for further processing

DEC - Host System

VAX 11/785
12 MB RAM
2 · 456 MB hard disk units (with 1 spare 456 MB disk drive)
2 tape drives (1600/6250 bits per inch)

Function: Receive data from DAS, compute calculated points (points that are defined using different combinations of plant sensor data and mathematical equations to compute values called C Points or calculated points).

DEC - MONICORE Calculations

DEC MICROVAX II
13 MB RAM
1 - 71 MB hard disk
1 - 680 MB hard disk
1 - 95 MB tape drive
1 - 290 MB tape drive
Function: Collect data from the DAS and calculate data values to update displays showing current reactor core status (e.g., reactor state parameters, thermal limits, radial and axial power distributions, etc.). Also, perform data archival to disk and tape.

The bulk of the ERF software is written in FORTRAN 77 with some routines written in assembly language. Supporting documentation (e.g., user's guide, programmer's reference manual, and test acceptance documentation) was found to be comprehensive and professionally done.

The following is a table of analog (continuously variable) and digital (2 state) plant sensors routinely sampled and used to assess plant safety status:

Analog Sensors	Digital Sensors	Computed Points	Total Sensors
1487	2009	612	4108

Based upon the above review, this portion of the licensee's program is adequate.

5.0 Emergency Response Facility (ERF)

5.1 Data Displays

Data displays supporting ERF functions include:

Control Room (CR)

2 - 19 inch CRTs for CR operators
3 - 19 inch CRTs for shift supervisors
2 - 25 inch slave units (can be set to specified display)

TSC (Technical Support Center)

2 - 19 inch CRTs
2 - color copiers (hard copy units)
1 - 600 line per minute printer

EOF (Emergency Operations Facility)

1 - 19 inch CRT
1 - 20 inch slave CRT
1 - color copier
1 - printer

Display generation is a strong feature of this ERF supporting system. Users are given the option of selecting displays by: (1) pressing function keys, (2) typing in display selection parameters on a keyboard, and (3) using a track ball (this is a ball in a socket that can be manually rotated to control a screen cursor used to make menu selections). Also, the display menu includes a "help" feature to provide additional information on the use of the display system.

Displays were generated on the CRTs in 1 to 5 seconds with no significant delays in response to display requests.

Based upon the above review, this portion of the licensee's program is adequate.

The following item is suggested for program improvement.

- It is the practice of the licensee to place printed labels on ERF display CRTs during system tests or plant exercises to inform the user that the data displayed is computer generated and is not real plant data. It is suggested that displays updated by computer generated data be tagged by the computer as "Simulated Data" or any other appropriate label to avoid possible confusion.

5.2 ERF Time Resolution

ERF supporting computers read, analyze, and store to hard disk data from 3496 analog and digital sensors. The sampling rate for data sets (there are 40 different scan classes) varies between 1 second and 60 seconds for ERF related plant sensors. The data sampling rate is considered low to moderate speed. The data acquisition tasks are assigned a high priority and are not delayed by waiting on other supporting tasks. Further, data acquisition tasks are partitioned between computer systems. For example, signal conditioning and multiplexing is done by the CPI front ends, data conversion to engineering units is done by the Data Acquisition System VAX 11/785, calculated point computations and display devices are driven by the Host VAX 11-785, and MONICORE calculations are performed by the DEC MicroVAX II.

Based upon the above review, this portion of the licensee's program is adequate.

5.3 ERF Signal Isolation

Adequate isolation is documented by a letter "Safety Parameter Display System", to J. C. Brons of the Power Authority of the State of New York from H. I. Abelson of the NRC, dated March 18, 1988. Section 4 of this letter states "the SPDS is suitably isolated".

Based upon the above findings, this portion of the licensee's program is adequate.

5.4 ERF Data Communications

Data communications capabilities were reviewed, including the front ends, the VAX 11/785 DAS, the VAX 11/785 Host, and the MicroVAX II communications. It was reported that error checking and correcting functions were performed.

Modem firmware and operating system software for EOF telecommunications support was reported as using error detection and correction or request for re-transmission on error detection. Data communications between processors was reported to use high speed data links (approximately 10 megabits/second).

Data communications between the Host VAX and the EOF display devices was via telephone modem and was reported to be 4800 bits per second. This data rate is viewed as adequate, but the licensee should consider obtaining higher speed telecommunications equipment to support high data rates in case of emergency situations.

Based upon the above review, this portion of the licensee's program is adequate.

5.5 ERF Processing Capacities

The DEC VAX's, MicroVAX's and peripheral computer systems were configured to support plant safety monitoring and reporting needs. Processing is based on multitasking to allow several software functions to be processed concurrently. Data acquisition and storage tasks are high priority tasks and are executed before supporting tasks. Licensee contacts reported the DAS VAX and MicroVAX to be 60% loaded and the Host VAX to be 75% loaded for normal operation.

Based upon the above review, this portion of the licensee's program is adequate.

The following item is suggested for program improvement.

- Further loading of the Host VAX through the addition of displays or calculated points is expected to result in performance degradation at peak load times. It is suggested that the licensee either limit software enhancements to the current level (don't add other calculated points or displays) or acquire additional computing capability for the Host VAX.

5.6 ERF Data Storage Capacity

Historical data can be stored to disk such that any time period of data will be saved. The amount of data is limited by disk resources. Routinely, 2 hours of historical data are available for trending. Utility personnel interviewed reported that every 48 hours, 24 hourly sample sets of historical data are saved to magnetic tape. This process continues for 60 days after which the oldest data tape is overwritten by a new 24 hour data set. This wrapping process of data storage was reported to continue indefinitely.

Based upon the above review, this portion of the licensee's program is adequate.

5.7 ERF Model and System Reliability and Validity

Documentation for the model algorithms was reviewed. Specifically, the "SPDS Algorithm Design Report for New York Power Authority James A. FitzPatrick Nuclear Power Plant Emergency and Plant Information Computer", report numbers CDRL L01 or NYO-83-134 dated February 1986 and revised October 1986 by Energy Inc. Also, the New York Power Authority conducted a "SPDS Algorithm Design Report Review", Dec. 30, 1987 and made recommendations for correction. It was reported that the recommended corrections were being included in the final SPDS Algorithm Design Report.

Based upon the above review, this portion of the licensee's program is adequate.

5.8 ERF Reliability of Computer Systems

Computer system availability was documented by the utility as greater than 90% from October 1987 through the current month.

Based upon the above review, this portion of the licensee's program is adequate.

5.9 ERF Manual Systems

See Section 5.1.4

5.10 ERF Environmental Control Systems

An air conditioning unit was located in the computer room and temperature and humidity were monitored and controlled. The air conditioning unit installed was reported to have approximately twice the required capacity for the computer hardware being protected.

Based upon the above review, this portion of the licensee's program is adequate.

5.11 ERF Regulatory Guide 1.97 Report

The licensee report of the implementation of RG 1.97 was available and was adequate as an appraisal information resource.

Based upon the above review, this portion of the licensee's program is adequate.

6.0 Emergency Operations Facility (EOF)

6.1 EOF Habitability

Since the licensee's primary EOF is located outside of the 10 mile emergency planning zone (EPZ) there are no specific habitability requirements.

6.1.1 Backup EOF

No backup EOF is required nor is one available.

6.1.2 EOF Reliability

The EOF is powered from the Whitaker substation which is fed from the Clay and Oswego power stations. The site is powered from Nine Mile Point #4 and Lighthouse Hill #3. Since the EOF and the site are separated by at least one intermediate substation, each is adequately protected from any single localized grid disturbance affecting the other facility. No alternate EOF power supply is required or installed. The system is designed to accept an emergency diesel generator. Although none is installed, agreements exist with two sources to provide a diesel generator upon request. The inspector concluded that the EOF was equipped to support overall licensee response to accidents at the plant.

Based upon the above review, this portion of the licensee's program is adequate.

6.2 EOF Functional Capabilities

6.2.1 Data Analysis Adequacy

By choice, the EOF depends almost entirely upon the TSC staff in plant assessment matters. An EOF technical staff member interfaces between the TSC and the EOF. In all other areas, EOF data analysis is adequate to support the EOF functions.

Based upon the above review, this portion of the licensee's program is adequate.

6.2.2 EOF Data Availability

The EOF uses the same computer equipment as the TSC. Therefore, the comments of Section 03.04 apply to the EOF as well as to the TSC. The EOF telephones are supported from a dedicated PBX with battery backup. The majority of the status boards are identical to those of the TSC; where there are differences, the EOF boards tend to provide more detailed coverage of the dose projection, PARs, and state actions in response to the PARs.

Based upon the above review, this portion of the licensee's program is adequate.

6.2.3 EOF Data Collection, Storage,Analysis, and Display

The same computers supporting TSC activities support the EOF. These systems and details of their functions have been described above.

Based upon the above review, this portion of the licensee's program is adequate.

7.0 TMI Action Plan Requirements

With regards to the TMI Action Plan Requirements III.A.1.2 (Upgrade Emergency Support Facilities) and III.A.2 (Improving Licensee Emergency Preparedness - Long-Term), the items identified in this report must be resolved prior to the closure of these requirements.

8.0 Exit Interview

The NRC team met with the licensee representatives listed in Section 1.0 of this report at the end of the inspection. The team leader summarized the appraisal scope and specific areas evaluated and discussed in detail all findings and recommendations presented herein.

Licensee management acknowledged the findings and indicated that appropriate action would be taken regarding the identified open items.

At no time during this inspection did the inspectors provide any written information to the licensee.