2.0 EXPERIENCE

2.1 Point Beach Unit 1

2.1.3 Licensee Remedial Measures and Regulatory Actions

2.1.3.1 Plant System Modifications

High Level Alarm Monitor

A lock-in high level alarm on the R-15 monitors was temporarily wired in; this alarm to stay in should the monitor peg momentarily at full-scale prior to saturation and the resulting downscale reading.

Auxiliary Building Exhaust Stack Monitor

During the incident the R-14 monitor gave incorrect information as it reacted to "shine" from sources of radiation outside of the stack, i.e., the main steam line and the air ejector piping. This caused the monitor to indicate larger releases than were, in fact, occurring. Investigations disclosed that lead shielding of the monitor, where presently installed, was totally unfeasible.

An in-plant modification request was prepared to change the existing in-stack monitoring system to an off-line sampling system in which gases would be drawn off the stack via an isokinetic sampling probe by a vacuum pump and then passed through particulate and charcoal sample for release accountability. The monitor was placed at a shielded remote location.

Air Ejector Monitors

One of the first indications of a problem with Unit 1 at the time of the incident was a "RMS Process Monitor Activity High" alarm. When the specific channels were visually observed, however, no significant abnormalities were seen, although R-15 was noted to be dropping somewhat. Because of the saturation of R-15 the resulting downscale reading gave operating personnel a false picture of the actual events at that time. The Incident Report described their subsequent and correct reactions to this misleading information.

Detailed examination of the circuitry of the R-15 monitor determined that should the monitor encounter a field greater than the instrument's fullscale reading, the preamp would cease to output pulses as the GM tube saturated. The meter would then give a false low readout indication. To correct this, modification requests IC-77 (Unit 1) and IC-78 (Unit 2) were issued to install a detector and oscillator in parallel with the preamp. Should the GM tube again saturate the detector will sense this and the oscillator would send out a full-scale pulse rate to the control room electronics such that the meter will remain at full scale during the saturation period. Recovery of the GM tube from saturation would cancel the oscillator pulsing.

Steam Generator Blowdown Samping Monitor

While this instrument would have performed its intended function of isolating the blowdown and sampling lines during the incident, the delay time involved in producing the required response has been shown to be excessive, i.e., approximately 20 minutes. Manual actuation on the part of operating personnel reduced this delay time during the incident described by these reports.

Modification requests M-251 (Unit 1) and M-252 (Unit 2) were issued to improve the reliability of the R-19 monitors and, additionally, to provide redundancy and an improved transit time for the function of isolating the steam generator blowdown lines.

To improve the reliability of flow and the transit time of R-19, these monitors were provided with a separate tap off the steam generator blowdown sample line upstream of an existing pressure reducing valve. Following flow rate measurement and sampling, the discharge will be directed to the service water outlet piping as opposed to the present path to the steam generator blowdown tank.

This new and more direct path reduces the complexity of the original system which required dividing the flow, using manually operated valves, between radiation monitoring, pH and conductivity sampling, leading to possible inadequate flow for any given sampling point.

To provide redundancy and improve speed of response of the steam generator blowdown isolation function, a strap-on type detector was attached to the liquid discharge pipe of each steam generator blowdown tank. Upon receipt of a radiation signal the monitor will initiate closure of both steam generator blowdown valves, 2042 and 2045, and the steam generator blowdown tank liquid discharge valve, 2040. This monitor will not initiate closure of the steam generator blowdown sampling valves, therefore, a redundant closing signal will later be received by the above valves following time lapse of the sample liquid R-19.

2.1.3.2 Operations Modifications

Immediate Actions

The first reviews of the incident copies of the abnormal occurrence report were expeditiously routed to all Point Beach Operations Group personnel to alert them to the various characteristics of the incident and particularly, to the response of the R-14, R-15 and R-19 radiation monitors.

Any adjustment of flow through steam generator blowdown sampling monitors 1R19 and 1R19 (i.e., Unit Nos. 1 and 2) was placed clearly under the jurisdiction of Operations Group personnel only, to avoid any possible misunderstanding between operating and chemistry personnel.

Steam Generator Tube Rupture Procedure Modified

The emergency operating procedure, EOP-3A, "Steam Generator Tube Rupture" was modified as follows:

1. Step 2.7. A new unique symptom was added to warn that local radiation levels in the vicinity of the air ejectors and associated piping will increase in the event of a steam generator tube failure.

2. Step 4.17. Install main steam blocks, if possible, on the affected generator.

3. Step 4.18. Separate the condensate storage tanks by closing of interconnecting piping.

4. Step 4.19. Avoid using the steam-driven auxiliary feed pump if possible as it may likely be a radioactive release path.

5. Step 4.20. An attempt should be made to gather samples of all known radiation release points. The affected unit turbine building sump pumps were secured and tagged so samples can be taken before pumping the drains.

6. Step 4.21. If required, and with proper health-physics monitoring, vent the affected generator to the main condenser via the main steam stop bypass valves.

2.1.3.3 Steam Generator Modifications

Long-Term Corrective Action

The long-term corrective actions to prevent or reduce the possibility of a recurrence of this incident were centered upon removing sludge remaining in the secondary sides of the steam generators by sludge lancing during refueling shutdowns. This sludge is, very largely, the residue left from the phosphate treatment previously practiced prior to the present all volatile treatment water chemistry control. Attempts were also being made to minimize the further buildup of sludge by making mechanical modifications to the internals of the steam generators to promote a higher recirculation ratio, and specifically, a higher flow of water across the hot leg side of the tube plate in the area where sludge is now known to precipitate. Moreover, the use of AVT for steam generator chemistry control will preclude tubing attack which was previously attributed to phosphate chemistry control.

Tubes Tested:

Essentially all tubes were inspected except those previously plugged or tubes (21 in "A", 33 in "B") in peripheral locations which were not accessible

due to interference with the eddy current inspection equipment supports. The number of tubes inspected was as follows:

"A" 3,137 Hot leg; 121 Cold Leg
"B" 3,132 Hot leg; 55 Cold leg

Tubes Plugged:

All tubes with defect indications greater than 30% were plugged. Additionally, one tube (Row 8 Column 41) in the "B" steam generator with an indication near 30% was plugged. The number of tubes plugged was as follows:

"A" 59
"B" 98

2.1.3.4 Regulatory Actions

Technical Specifications

Technical Specification Change No. 15, which was submitted to the NRC on August 30, 1974, provided the inservice inspection program for steam generator tubing as requested in Regulatory Guide 1.83, Section D.4. The steam generator tube inspection performed during this repair outage was in conformance with the submitted Technical Specification Change No. 15.

Compliance with Regulations

A 10 CFR Part 50 K 50.59 review was conducted by the licensee according to the NRC regulations.

NRC Requests

On March 24, 1975 the NRC staff requested certain information on an expedited basis.

NRC Requirements

On July 14, 1975 the NRC staff completed a review of the steam generator tube leakage incident. The review included the steam generator water chemistry history, the steam generator water chemistry currently in use, the steam generator tube corrosion observed by inspection, and the corrective measures which were to be implemented prior to the resumption of operation on April 5, 1975.

Based on this review, the NRC staff concluded that the WEPCO program of steam generator water chemistry control was acceptable and that no additional requirements regarding steam generator water chemistry control were necessary at the time.

In view of the tube degradation which has been experienced at Point Beach Unit 1, the NRC staff also concluded that revision of the primary to secondary leak rate limits, as specified in the Point Beach Technical Specifications, was desirable. Therefore, the NRC staff requested that these leak rate limits be revised to require that the plant be placed in cold shutdown within 36 hours after detection of primary to secondary leakage in excess of 1 GPM. This Technical Specification change provided an additional margin of safety with regard to the potential for large tube failures in that action to shutdown the plant will be explicitly required at a lower leakage rate threshold.

Since the Point Beach Unit 2 steam generators are of the same design as the Point Beach Unit 1 steam generators, the NRC staff also concluded that it would be appropriate to revise the primary to secondary leak rate limits for Point Beach Unit 2. Although the Point Beach Unit 2 steam generators had not evidenced the same level of tube degradation as was experienced at Point Beach Unit 1, the NRC staff concluded that revision of the primary to secondary leak rate limits would provide an additional margin of safety without sacrificing operational flexibility.

The NRC staff requested WEPCO to submit, within 30 days of July 14, 1975, appropriate revisions to existing Technical Specification 15.3.1.D for Point Beach Units 1 and 2, which incorporate a primary to secondary leak rate limit of 1 GPM, with the requirement that the plant shall be placed in cold shutdown within 36 hours if this leak rate limit is exceeded.