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# FORT ST. VRAIN SURVEILLANCE AND TESTING PROGRAM

## QUARTERLY PROGRESS REPORT FOR THE PERIOD ENDING JUNE 30, 1976

by
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ABSTRACT

This publication continues the quarterly report series on Fort St. Vrain (FSV) Surveillance and Testing. The program will perform post-startup tests on FSV plant components and systems to increase our knowledge of operating characteristics of large HTGRs. Reference measurements were made of the PCRV deflection at 35, 195, and 295 psig. The results were in close agreement with analytical predictions.

# 1. INTRODUCTION

The Fort St. Vrain (FSV) Surveillance and Testing Program is directed toward applying FSV operating experience to the design of large HTGRs. Six subtasks were approved for FY-76, none of which are expected to be completed in FY-76. The plant rise to power which was last scheduled for June was delayed until July resulting in a similar delay in obtaining plant startup data.

## 2. ACCOMPLISHMENTS

The status of the six subtasks which were active for this program during the quarter is discussed below.

### 2.1. SUBTASK A: STEAM GENERATOR PERFORMANCE AND CORROSION SURVEILLANCE

An installation procedure, "Fort St. Vrain Steam Generator Water-side Pressure Drop Measurement Instrumentation," was completed, and the four differential pressure cells were installed.

The remaining steam generator monitoring instrumentation was checked, calibrated, and made ready for the rise to power.

### 2.2. SUBTASK B: HELIUM PURIFICATION COMPONENT VERIFICATION

The subtask test specification, "Helium Purification System Component Verification Specification," was generated, reviewed, and issued for use.

### 2.3. SUBTASK C: CORE GRAPHITE DUST PRODUCTION MONITORING

The subtask test specification, "Fort St. Vrain Core Graphite Dust Production Monitoring," was reviewed, approved, and released for use.

### 2.4. SUBTASK D: PCRV STRUCTURAL RESPONSE VERIFICATION

In preparation for the zero-power PCRV deflection measurements, a visual inspection was made of the PCRV and the optical equipment used during the 1971 initial proof pressure tests. Targets, scope mounts, and other equipment which were no longer usable were replaced, and a 4-1/2-in. hole

was drilled through the central hold-down plate and refueling penetration cover plate to facilitate top head deflection measurement.

The deflection measurements were conducted by an optical tooling method incorporating three alignment telescopes mounted on massive custom scope mounts. The three horizontal posts used to measure the top head deflection were detachable from the permanently positioned bases. The center target was positioned over a thermal expansion rod to compensate for temperature variations. The expansion of this rod is a consideration in the top head deflection measurement if it exceeds 0.005 in. The coefficient of thermal expansion for the material used was 0.0000119/in./°F and the length of the rod was 30 in.

The initial measurements were taken at 35 psig and these values were adjusted for zero pressure. Deflections were then measured at 195 and 295 psig. The series of measurements was taken during the period of May 3 to May 6, 1976.

The deflections of the top and opposite sides of the PCRV were measured and the results were compared with values during the initial proof pressure test (conducted in 1971). In addition, the data were compared with analytical predictions based on three-dimensional finite element elastic analysis. Good correlations were obtained from both efforts, indicating that the design codes yield good results.

A typical deflection for the FSV PCRV top head at 195 psig is 0.0072 in., while the side deflects 0.0025 in. at this pressure. Similar values for 295 psig are 0.0125 in. for the top head and 0.0130 in. for the side.

The data system which monitors the sensors mounted in the PCRV was checked and made ready for the rise to power. This system is a normal component of the plant instrumentation. Sensor data obtained from tendon load cells and the vibrating wire and Carlson strain gages were plotted

and evaluated. Approximately 65% of the vibrating wire strain gages and 52% of the Carlson strain gages are in good working condition. The PCRV internal sensors will be monitored periodically and the performance of the PCRV will be evaluated.

## 2.5. SUBTASK E. PCRV COOLING SYSTEM SURVEILLANCE

Preliminary testing of the corrosometer probe has been successfully completed and the probe has been installed in the plant. The electronic readout instrumentation is currently being tested and calibrated in the laboratory prior to shipment to the site.

## 2.6. QUALITY ASSURANCE

The Quality Assurance Program Document (QAPD) has been revised to reflect recent organizational changes and to assure consideration of all the applicable requirements in updating the Quality Assurance Program Index (QAPI). In addition, requirements for review of procurement documents have been expanded in order to provide greater assistance to the cognizant engineers.

## 2.7. GENERAL

The terms of agreement between GA and PSC covering that portion of the program which will be executed by PSC have been developed and are currently under review. It is expected that these terms will become a part of a Purchase Order agreement between GA and PSC.