

U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Reports No. 50-282/90-16(DRP); 50-306/90-17(DRP)

Docket Nos. 50-282; 50-306

License Nos. DPR-42; DPR-60

Licensee: Northern States Power Company
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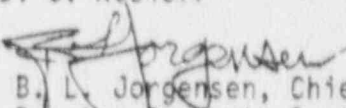
Facility Name: Prairie Island Nuclear Generating Plant

Inspection At: Prairie Island Site, Red Wing, MN

Inspection Conducted: September 25 through November 19, 1990

Inspectors: P. L. Hartmann

D. C. Kosloff

Approved By:  B. L. Jorgensen, Chief
Reactor Projects Section 2A

12/3/90
Date

Inspection Summary

Inspection on September 25 through November 19, 1990 (Reports No. 50-282/90-16(DRP); 50-306/90-17(DRP))

Areas Inspected: Routine unannounced inspection by resident inspectors of Licensee Action on Previous Items, Plant Operational Safety, Maintenance, Surveillance, Inspector Followup and Regional Initiatives.

Results: Unit 1 operated at full power during the report period. Unit 2 was made critical on October 7, 1990, upon completion of a 29-day refueling outage. A reactor trip occurred on October 7 with power less than one percent. The plant was restarted on October 8, 1990, power was slowly increased, and the unit then remained at full power throughout the inspection period. In the six areas inspected, one violation of NRC requirements was identified. This violation discussed in the plant operations section below.

Plant Operations

Unit 1 operated with minimal operational concerns at full power. Unit 2 experienced a refueling outage of 29 days. The startup was delayed due to a reactor trip from an Intermediate Range Flux Trip signal. The signal was generated when an I&C technician removed Intermediate Range drawer fuses instead of the intended Power Range fuses when attempting to provide electrical isolation for removing the reactivity computer following low power physics testing.

The operation of Unit 2 during the refueling outage and startup was well controlled and executed. There were no unplanned Engineered Safety Features (ESF) actuations during this report period. The licensee has had numerous ESFs from chlorine and radiation monitors in the past; performance has improved in this area.

A notice of violation was issued for a technical specification violation. One train of the Shield Building Ventilation System was inoperable for about eight days, which exceeded the Limiting Conditions for Operation. The licensee took prompt corrective action.

Radiological Controls

Radiation Protection efforts remained strong throughout the refueling outage period. Strong health physics technician involvement and control was observed. Followup inspection was conducted of an event where a shield building ventilation stack monitor was taken out of service in an uncontrolled manner. Corrective action taken by the licensee was comprehensive and effective.

Maintenance and Surveillance

No deficiencies were noted by the 'inspectors' observations of work activities. The outage activities during the inspection period progressed in a controlled and well-planned manner. Many major work activities were performed on or ahead of schedule. One work activity was performed by intentionally entering the one hour Limiting Conditions for Operation. This is viewed as non conservative by the NRC.

Engineering and Technical Support

A through-wall leak in a section of cooling water piping was identified. In response, the licensee followed the evaluation guideline of Generic Letter 90-05, "Guidance for Performing Temporary Non-Code Repair of ASME Code Class 1, 2, or 3 Piping." The licensee is submitting a relief request to NRR. The inspectors reviewed the licensee's check valve program and determined that the program appears adequate if planned progress continues.

Emergency Preparedness

A Notification of Unusual Event (NUE) was declared due to minor seismic activity detected at the site. The licensee actions were conservative.

DETAILS

1. Persons Contacted

E. Watzl, General Manager, Prairie Island
M. Sellman, Plant Manager
D. Mendele, General Superintendent, Engineering and Radiation Protection
G. Lenertz, General Superintendent, Maintenance
A. Smith, General Superintendent, Planning and Services
R. Lindsey, Assistant to the Plant Manager
D. Schuelke, Superintendent, Radiation Protection
G. Miller, Superintendent, Operations Engineering
*K. Beadell, Superintendent, Technical Engineering
T. Breene, Superintendent, Technical Engineering
M. Klee, Superintendent, Quality Engineering
R. Conklin, Supervisor, Security and Services
*M. Wadley, General Superintendent, Operations
G. Eckholt, Nuclear Support Services
J. Leveille, Nuclear Support Services
A. Hunstad, Staff Engineer

*Denotes those present at the exit interview of November 21, 1990.

2. Licensee Action on Previous Inspection Findings (92701)

(Closed) Unresolved Item (50-282/90-12-01(DRP)): Operation of Shield Building Ventilation System Without Required Radiation Monitor

Background

On July 27, 1990, during review of the Unit 1 Reactor Log, the licensee discovered that radiation monitor 1R-22 had been taken out of service while Surveillance Procedure (SP) 1172 was in progress. This resulted in a period of approximately three hours during which the Shield Building Ventilation System discharged through the Unit 1 Shield Building Stack with 1R-22 being out of service.

The licensee conducted an investigation of the root cause of the event and required corrective actions. The Error Reduction Task Force (ERTF) conducted an operation experience assessment and identified two inappropriate actions: performing SP 1172 and SP 1074 concurrently with the added distraction of stopping and then restarting SP 1172; and removing a radiation monitor from service when ventilation SPs were scheduled to be performed.

Discussion

SP 1172, "Ventilation System Monthly Operation," operates the Auxiliary Building Special Ventilation System, the Shield Building Ventilation System and Spent Fuel Pool Special Ventilation System for a ten hour minimum run period on a monthly basis.

SP 1074, "Auxiliary Building Special Ventilation System (ABSVS) Functional Test," is a performance test to demonstrate that upon initiation of ABSVS, normal ventilation will isolate and the Auxiliary Building Special Ventilation zone will be pulled to a negative pressure (with a superimposed ten square foot leak) within six minutes. ABSVS utilizes radiation monitors other than 1R-22 and 2R-22 for discharge monitors.

On July 27, 1990, both SPs were performed concurrently, which is permissible. However, this caused some confusion regarding the requirement for the 1R-22 (Shield Building Exhaust Stack) Radiation Monitor. After suspending SP 1172, the operators recognized 1R-22 was no longer required to be operable. Work on 1R-22 was commenced at this point which rendered its noble gas analyzer inoperable. However, when SP 1172 was recommenced, the operational requirement for 1R-22 was not realized. Technical Specification 3.9-2, Radioactive Effluents, requires a grab sample of the ventilation path every eight hours in this situation.

The Unit 1 lead operator detected this operability omission while reviewing the Unit 1 reactor log and work in progress and quickly rectified the condition. Since 1R-22 had been inoperable for about three hours, grab samples were not required. The licensee concluded, following a review of other radiation monitor recordings and the recorded radiation levels of 1R-22, that radiation discharge levels were unchanged prior to and following the 1R-22 maintenance period. Thus, the safety significance of this event was very low.

Root Cause

The licensee identified several causes for the event which are listed below.

- Performance of SP 1172 and SP 1074 concurrently which confused the operability requirements of 1R-22. This was further complicated by suspending SP 1172, whereupon corrective maintenance was performed on 1R-22, since its operation was not required. SP 1172 was recommenced without verifying operability of 1R-22.
- SP 1172 did not have specific enough prerequisites for 1R-22 and 2R-22 radiation monitor operation.
- A form identifying a radiation monitor inoperability (PINGP 729) was not used. This form identifies actions required for radiation monitor inoperability.
- Poor communication between involved parties regarding the multiple activities.

Corrective Action

The licensee has identified for implementation or has performed the following corrective actions to prevent recurrence:

- Formalize an Operation Procedure requiring use of PINGP Form 729 and provide training on this requirement.
- Develop signs to be hung on applicable ventilation systems when the associated radiation monitor is out of service, and revise section work instruction procedures to implement the informational sign usage.
- Revise SP 1001t, "Radiation Monitoring System Check," to require the use of form 729 whenever a radiation monitor is out of service.
- SP 1172 has been revised to include a verification step that 1R-22 and 2R-22 are in service.
- Operations Manual C 19.2, "Containment Ventilation System," has been revised to require verification that 1R-22 and 2R-22 are operable prior to startup of the Shield Building Ventilation System.
- Operations Manual Section C 47.22 has been revised to require initiation of form 729 upon receiving an annunciator alarm in several alarm response procedures.

Following inspector review of the event investigation, root cause analysis, and corrective action proposed, the inspector concluded that the licensee investigation was thorough and corrective action comprehensive. Based on these actions, the matter is closed.

(Closed) Unresolved Item (50-282/90-14-05(DRP)): Operability of Auxiliary Feedwater (AFW) Pump and Control and Testing of Check Valves

During surveillance testing of the 11 Turbine Driven (TD) AFW pump, the auxiliary lube oil pump did not stop as expected after the turbine started. Because the TDAFW pump must be capable of operating without alternating current (AC) electric power, the turbine shaft-driven lube oil pump must be operable for the TDAFW pump to be considered operable. This is normally demonstrated during testing when the oil pressure developed by the shaft-driven oil pump causes the auxiliary oil pump to stop. The licensee declared the 11 TDAFW pump inoperable after the auxiliary oil pump did not stop and investigated further. The licensee determined that air was entering the lube oil system, requiring the positive displacement shaft-driven lube oil pump to prime itself before it could pump enough oil to increase oil pressure enough to shut off the auxiliary oil pump. As long as the auxiliary lube oil pump was running and supplying oil to the bearings, it reduced the shaft-driven oil pump's ability to prime itself by providing back pressure which inhibited the expulsion of air. The inspectors reviewed licensee Significant Operating Event Report (SOE) 1-87-8, which documented an earlier, similar lube oil pump problem and the draft SOE for the recent problem; discussed the event with the system engineer; and inspected the TDAFW pumps to verify the licensee's conclusions. The licensee's conclusion that the shaft-driven lube oil pump would have supplied lube oil if the auxiliary pump was not operating is reasonable, and it was reasonable to consider the 11 TDAFW pump operable prior to raising the lube oil sump level.

The licensee also found that the check valves installed on the pump were not as shown on the TDAFW pump vendor drawings. The licensee determined that the difference did not affect the operability of the TDAFW pump. Because the check valves were supplied as part of the pump, they are not shown on flow diagrams. The inspector determined that the licensee has not yet begun its planned formal assessment of individual check valves not shown on flow diagrams in the AFW system. This item is closed; however, the inspectors will continue to review the development of the licensee's check valve assessment program.

(Closed) Unresolved Item (50-306/90-14-04): Autostart of Component Cooling (CC) Water Pump

The licensee has submitted LER 50-282/90-09 regarding the September 23, 1990, autostart of the 22 Component Cooling Water Pump. The licensee performed a special test of the Unit 2 Component Cooling Water System to recreate the conditions at the time of the auto restart of 22 CC pump. The test successfully duplicated the auto restart of 22 CC pump. The test also verified that due to system configuration the only CC pump/RHR heat exchanger combination where CC discharge pressure spiked low and remained low was when 21 CC pumps supplied 22 RHR heat exchanger. The test noted discharge pressure in this case stabilized 15-20 psig lower than other possible pump and heat exchanger combinations. The licensee has implemented procedure changes to allow only the same train CC pump and RHR heat exchanger combination, and notified licensed operators of the requirement. This corrective action appears adequate to prevent recurrence. The licensee intends to perform a similar test on Unit 1 during similar outage conditions. The inspectors will review implementation of the corrective actions stated in the LER in a future inspection report.

No violations or deviations were identified.

3. Plant Operations (71707, 93702)

a. Operational Safety

Unit 1 operated at full power through the entire report period. Unit 2 began a refueling outage on September 10, 1990, and the reactor was made critical at 0501 hours on October 7, 1990. Following low power physics testing, a reactor trip occurred at 1712 hours on October 7, 1990, which is discussed below. The reactor was again made critical at 1242 hours on October 8, 1990, with the Point Of Adding Heat (POAH) being reached at 2230 hours. Following main generator testing, the main generator was placed on line at 1835 hours on October 9, 1990. Full power operation ensued and was maintained throughout the remainder of the inspection period.

The inspector observed control room operations, reviewed applicable logs, conducted discussions with control room operators and observed shift turnovers. The inspector verified operability of selected emergency systems, reviewed equipment control records, and verified the proper return to service of affected components, conducted tours of the auxiliary building, turbine building and external areas of

the plant to observe plant equipment conditions, including potential fire hazards, and to verify that maintenance work requests had been initiated for the equipment in need of maintenance.

b. Onsite Followup of Events

On October 7, 1990, a reactor trip occurred from 0 percent power. Following the low power physics testing, the Unit 2 reactor was at zero power above the point of adding heat (POAH) when the low power physics testing procedure (D-30) required the reactivity computer to be removed from the N41 Power Range (PR) channel. An I&C technician understood he was required to electrically isolate the power source to the reactivity computer by removing the N41 PR channel control and instrument power fuses. The I&C technician unintentionally removed the control and instrument power fuses for the vertically adjacent Intermediate Range N35 Channel which causes an immediate reactor trip signal. The trip occurred at 1712 hours and all systems functioned as designed. Following confirmation of the reactor trip source and re-energization of all nuclear instruments, the licensee restarted the reactor. The inspectors will review the licensee corrective actions stated within LER 50-306/90-09.

On October 17, 1990, at 1300 hours an Unusual Event was declared by the licensee due to a minimal amount of seismic activity. The control room received a Seismic Event Annunciator Alarm at 0950 hours. The results of a seismic event monitor graphic recording review were inconclusive. The recorded indications appeared to be electronic noise. The U.S. Geological Earthquake Information Center was contacted and the licensee learned a 6.5 Richter Scale earthquake had occurred on the Peru/Brazil border at 0930. Based on the relative contemporaneousness of the event and alarm, the licensee considered additional investigation was warranted. Review of inplant accelerometers were conducted and none produced a reliable indication of a detected seismic event (3% gravity horizontal or vertical movement). The licensee conservatively declared an Unusual Event based on the classification guideline of "any earthquake." The licensee performed inspections of plant systems and structures, disclosing no indication of any seismic activity. The inspection included systems in containment for both units. At 1630 the Unusual Event was terminated based on the results of the inspections.

On November 6, 1990, the licensee initiated a procedure which required isolation of deluge fire suppression in the D1 and D2 Emergency Generator Room. Apparently due to a delay in performing the surveillance, a continuous watch was established in about an hour and five minutes; contrary to a one hour Technical Specification requirement. This event and corrective action will be reviewed by the inspectors following submittal of LER 50-282/90-16.

No violations or deviations were identified.

4. Maintenance Observation (71707, 37700, 62703, 92701)

Routine, preventive, and corrective maintenance activities were observed to ascertain that they were conducted in accordance with approved procedures, regulatory guides, industry codes or standards, and in conformance with Technical Specifications. The following items were considered during this review: adherence to Limiting Conditions for Operation while components or systems were removed from service, approvals were obtained prior to initiating the work, activities were accomplished using approved procedures and were inspected as applicable, functional testing and/or calibrations were performed prior to returning components or systems to service, quality control records were maintained, activities were accomplished by qualified personnel, radiological controls were implemented, and fire prevention controls were implemented.

Portions of the following maintenance activities were observed during the inspection period:

- Replacement of 121 cooling water pump.
- Ultrasonic examination of cooling water piping due to identification of a pinhole leak. The inspectors observed that the leak was only a few drops per minute. The licensee followed the evaluation guideline of Generic Letter 90-05, Guidance for Performing Temporary Non-Code Repair of ASME Code Class 1, 2, or 3 Piping. The licensee is submitting a relief request to NRR.
- Repair of Emergency Diesel Generator (EDG) dry tank check valve.
- Modification to EDG control circuit.
- Modification of the Anticipated Transient Without Scram Mitigating System Actuating Circuitry (AMSAC). On October 9, 1990, during post modification testing of this modification, the licensee placed the selector switches for both auxiliary feedwater (AFW) pumps in the SHUTDOWN AUTO position to prevent unnecessary starts of the pumps during the AMSAC test. At this time, the plant was at 3 percent power and the licensee considered both AFW pumps inoperable in this condition and followed the requirements of Technical Specification 3.0.C which required the plant to be in hot shutdown within one hour. This was done twice and the total time that both switches were in SHUTDOWN AUTO was less than one hour. The inspectors informed the licensee that intentional entry into 3.0.C was to be avoided and that any entry into 3.0.C was reportable based on specific guidance in NUREG 1022, Supplement 1. The licensee submitted LER 306/90-11. The inspectors will review the licensee's implementation of corrective actions for this event in a future inspection.

No violations or deviations were identified.

5. Surveillance (61726, 71707)

The inspector witnessed portions of surveillance testing of safety-related systems and components. The inspection included verifying that the tests were scheduled and performed within Technical Specification requirements, by observing that procedures were being followed by qualified operators, that Limiting Conditions for Operation

(LCOs) were not violated, that system and equipment restoration was completed, and that test results were acceptable to test and Technical Specification requirements.

- SP 2090 Containment Spray Pump and Spray Additive Valve Test
- SP 1106A Diesel Cooling Water Pump Test (12)
- SP 1750 Post Outage Containment Closeout Inspection
- SP 2032A Safeguards Logic Test. At 0800 hours on October 23, 1990, during preparations for the performance of this test the logic cabinet door was closed. A box of spare indicating light bulbs inside the door depressed the system test button blocking any safety injection signal for train A and placing the plant in Technical Specification 3.0.C. Because the test button was depressed out of its normal sequence in the test procedure, initial attempts to reset the system were unsuccessful. A work request was written with instructions for manually resetting the test relay. Completion of the work request restored the system to normal within the time limit of Technical Specification 3.0.C. The inspectors will complete their review of this event upon receipt of the licensee's LER.
- SP 2001AA Reactor Coolant System Leakage Test

No violations or deviations were identified.

6. Inspector Followup (92702)

BACKGROUND

The licensee discovered that the 11 SBVS was inoperable on August 30, 1990, due to the heater control switch being in the off position. This rendered one of the two trains of SBVS inoperable. The heater function is needed for the charcoal filters to perform the design task of iodine absorption. Since the shield building is designed to accommodate steam escaping from containment and into the shield building (annulus) upon a Design Basis Accident (DBA), the SBVS will have humid air passing through the system. Without the heaters to dry this air, the charcoal will not absorb iodine as efficiently since charcoal "sites" can be saturated with water molecules.

EVENT DISCUSSION

August 22, 1990: Initial Conditions: Unit 1 at 99.9 percent steady state power; Unit 2 at 83 percent power (in coastdown). Surveillance Procedure (SP) 1073, "Unit 1 Shield Building Ventilation System (SBVS) Functional Test," was performed. During this surveillance the heater monitor light was verified on, which indicated that the charcoal filter heaters were energized. The test was logged complete at 0449 hours.

August 30, 1990: 1730 hours: SP 1172, "Ventilation System Monthly

Operation," was performed. This test runs all ventilation systems and verifies the heaters energize for each system. The operator, by procedure, observed that the heater monitor light was not energized for the 11 SBVS. The auxiliary building operator was notified and found that the control switch for the 11 SBVS was in the "off" position. The auxiliary operator was instructed to return the control switch to "auto."

1804 hours: The control switch was positioned to auto and the heaters energized. The surveillance was completed without further incident.

August 31, 1990: 0433 hours: The 10 hour run of ventilation systems was logged complete.

METHOD OF DISCOVERY

Unit 1 operations personnel were performing normal monthly surveillance SP 1172, "Ventilation System Monthly Operation," when the control room operator noticed that Monitor Light ML-44184-A1 (11 Shield Building Vent Filter Heater On) was not illuminated. This surveillance specifically requires an operator to verify illumination of the "heater on" monitor lights (located on the main control board) for each ventilation system.

APPARENT ROOT CAUSE (Unidentifiable) Human Error

Licensee Investigation

The licensee conducted an investigation which included a three part analysis. The investigation is described below:

Part one searched for any work requests on the 11 and 12 Shield Building Vent systems during the eight days preceding this event. A similar investigation was done for the Aux Building Special Vent and Spent Fuel Special Vent systems which have identical switches. This investigation revealed no work on any of the ventilation systems during this period. The licensee concluded that the switch had not been repositioned due to work. A search of a computer database revealed that no HOLD or SECURE cards were issued for this switch during August. The licensee concluded that this analysis ruled out a procedural cause of the event, such as positioning the switch closed and omitting restoration.

Part two of the investigation was to interview operators to determine if this switch ever has a position change as part of any routine operation procedure, or any surveillance procedure. No circumstance of planned or unplanned practice or routine use of the heater control switch was identified.

Part three of the investigation involved an analysis of the likelihood that the switch was bumped or moved by accident, without being noticed.

All personnel that might have had a reason to be in the area were interviewed. No person interviewed was cognizant of the repositioning of the switch, either accidentally or intentionally. This included helpers, painters, operations personnel (including an auxiliary building operator), electricians and I&C technicians. The licensee did not consider interviewing all persons who had access to the auxiliary building relevant since the event apparently occurred without the knowledge of the person doing it.

The licensee has concluded that the cause was an inadvertent "bumping" of the switch. This conclusion was based on the routine activities that are present in the area. The switch position is not alarmed; thus, inadvertent movement of the switch would not be noticed.

The licensee concluded that the event did not involve an act of sabotage. This was based largely on the absence of sabotage/vandalism at the site, and the obscure accident mitigating function of this switch.

CORRECTIVE ACTION

The licensee's immediate corrective action was to energize the heaters and verify operability of the affected SBVS train. Additionally, the licensee immediately verified other control switches of this type and application (four per unit) were in the correct position. The licensee initiated a high priority investigation and the Operations Committee (OC) reviewed the event and investigation results on September 6, 1990. The requirement to notify the control room upon any inadvertent switch/breaker positioning was reemphasized to all work groups via the written daily plant update and at morning workgroup meetings. The OC decided protective cover switches should be installed on these particular switches as a long term corrective action. Additionally, daily orders were written to address the September 30 event and order daily position verification of the eight control switches until the protective covers are in place.

Technical Specification 3.6 Containment System Specification, H.1. Shield Building Ventilation System, requires that a reactor shall not be made or maintained critical nor shall reactor coolant system average temperature exceed 200°F unless both trains of the Shield Building Ventilation System are OPERABLE. The Limiting Conditions of Operation in 3.6.H.2 allows one train of the Shield Building Ventilation System to be inoperable for seven days.

Contrary to this requirement, during the period of 4:49 a.m. on August 22 through 6:04 p.m. on August 30, 1990, the #11 Shield Building Ventilation System was inoperable due to the heater control switch CS 57054-01 being in the "off" position. This is a violation of NRC regulations 50-282/90-16-01(DRP).

No other violations or deviations were identified.

7. Regional Initiatives (73756)

Effectiveness of Check Valve Activities

In response to a request from the Director of the Division of Reactor Projects to the Senior Resident Inspectors, an assessment of the licensee's check valve review program was performed to determine if the program provided assurance for the reliability and operability of check valves.

The licensee's current check valve review program was formally established on March 19, 1990, when Procedure H12, "Plant Check Valve Program" was approved. The procedure defines the duties of a Check Valve Program Coordinator and assigns primary assessment responsibilities to the plant system engineers. The licensee used INPO SOER 86-3, INPO SER 28-89 and EPRI report NP-5479, "Application Guidelines for Check Valves," in developing its current program.

The licensee has identified more than 1,000 check valves in the plant that are shown on flow diagrams. There are also many check valves which were supplied with equipment and are not shown on flow diagrams. Each system engineer is responsible for evaluating all check valves in his or her system to identify which valves should be included in the check valve program. The evaluation process is still in progress for valves identified on flow diagrams and the evaluation of check valves not shown on flow diagrams has just begun. So far 201 valves have been included in the check valve program. Check valves in the station and instrument air systems are not considered for the plant check valve program because they are different from other check valves in the plant and are similar to one another. The performance and reliability of the station and instrument air check valves are monitored by the cognizant system engineer.

The "Plant Check Valve Program" procedure specifies the methods to be used to assess check valve condition and reliability. Methods included are inspection, testing, performance trending, design review and review of performance of other valves. The licensee is evaluating the effectiveness of non-intrusive testing methodologies. To assist in this evaluation the licensee has funded testing at the University of Utah in conjunction with other members of the Nuclear Industry Check Valve group.

All check valves in the program are listed on a Sperry computer display which is accessible throughout the plant. The listing includes a summary of design and test data. More detailed information on each valve is also available on individual Sperry displays for each valve.

Procedure D72, "Check Valve Disassembly and Inspection Procedures" includes detailed instructions for disassembly and inspection of each type of check valve in the licensee's program.

No violations or deviations were identified.

8. Exit (30703)

The inspectors met with the licensee representatives denoted in paragraph 1 at the conclusion of the report period on November 21, 1990. The

inspectors discussed the purpose and scope of the inspection and the findings. The inspectors also discussed the likely information content of the inspection report with regard to documents or processes reviewed by the inspector during the inspection. The licensee did not identify any documents or processes as proprietary.