



LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

|   |  |                |                   |                 |          |        |
|---|--|----------------|-------------------|-----------------|----------|--------|
| FACILITY NAME (1)<br><br>CRYSTAL RIVER UNIT 3 | DOCKET NUMBER (2)<br><br>0 5 0 0 0 3 0 2 | LER NUMBER (6) |                   |                 | PAGE (3) |        |
|   |  | YEAR           | SEQUENTIAL NUMBER | REVISION NUMBER |          |        |
|   |  | 8 8            | - 0 1 3           | - 0 0           | 0 2      | OF 0 7 |

TEXT (If more space is required, use additional NRC Form 366A's) (17)

EVENT DESCRIPTION

On April 19, 1988, during power operation (Mode I), the Control Complex Ventilation (AH), [VI], low pressure control air (AH), [LD], system was being field verified in preparation for a planned modification. During that verification it appeared the as installed seismic qualification of the control air tubing might be questionable and warranted additional investigation and review. Research and review of onsite documentation indicated Seismic Class I criteria were applicable but detailed design and installation documents could not be located for verification of specific applicability and its basis.

On May 25, 1988, Nonconforming Operations Report (NCOOR) 88-75 was written to document the inability to verify whether the control air tubing fully met seismic requirements. The NCOOR stated an outside engineering firm was preparing an assessment of the design basis and of portions of the system required to be seismically qualified. The NCOOR also noted results from this evaluation were necessary to adequately determine the reportability of the event and identify which components within the system might require seismic support.

On June 10, 1988, it was determined the low pressure control air tubing for required components was not supported in accordance with current Seismic Class I criteria. Since the original installation documents could not be located, the determination was based upon engineering judgement utilizing current installation requirements. A one hour verbal report was made to the NRC in accordance with 10 CFR 50.72 (b) (1) (ii) (B). In addition this written report is being submitted in accordance with 10 CFR 50.73 (a) (2) (ii) (B).

CAUSE

The Control Complex low pressure control air tubing was installed by a subcontractor to the original ventilation contractor. The original contractor was working under a contract specification which included Seismic Class I installation requirements for control air tubing.

The root cause cannot be completely determined but it appears the subcontractor failed to develop and submit for approval detailed design documents requiring seismic installation of the control air tubing. There is evidence the subcontractor was aware of both the seismic requirements and his responsibility for developing calculations for seismic installation of the control air tubing. However, since no detailed installation documents can be found and the installation does not fully meet the current criteria, the indications are the subcontractor apparently failed to complete the necessary design calculations and detailed installation documents.

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|   |  |                |                   |                 |          |        |
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|   |  | 8 8            | - 0 1 3           | - 0 0           | 0 3      | OF 0 7 |

TEXT (If more space is required, use additional NRC Form 365A's) (17)

EVENT ANALYSIS

The following is a brief background description relating the basic design functions of the Control Complex Ventilation system and the basis of the review.

The system is designed to continuously maintain the Control Complex atmosphere within the desired limits for temperature, humidity, air quality and radiation during all plant modes. The review considered those components which are necessary to isolate the Control Complex habitability envelope and those components required to assure adequate cooling and ventilation of the Control Complex. There are three basic functions performed by the Control Complex Ventilation system. These functions are as follows: (1) isolate (establish envelope boundary) the control room by closing the envelope dampers [DMP]; (2) operate the ventilation system in the recirculation (normal or emergency) mode; and (3) provide cooling to the required areas.

For control room isolation, all but one of the envelope boundary dampers fail in the closed (automatically actuated) position upon a loss of low pressure control air. The exception is damper AHD-99 which is presently held in the closed (automatically actuated) position by a temporary modification. The recirculation damper (AHD-3), fails open which is its automatically actuated position. However, the worst case seismic event scenario could inhibit proper venting of these damper actuators thus prohibiting the dampers from properly closing (opening for AHD-3) on a loss of control air. This scenario can be prevented by maintaining these dampers in the closed position (open for AHD-3); therefore, maintaining the system in the normal recirculation mode will ensure these dampers are pre-positioned as required for automatic actuation.

Automatic actuation also trips the Control Complex fans and, by design, operator restart action is required to establish recirculation air flow. To restart the fans, the suction and discharge dampers for the Control Complex return fans (AHF-19A or 19B), [FAN], and the emergency supply fans (AHF-18A or 18B), or normal supply fans (AHF-17A or 17B), must be able to be opened. However, upon a loss of low pressure control air these dampers fail closed and the associated damper interlock prevents the respective fans from being restarted.

To achieve single train cooling, the Chilled Water system (CH) flow must be established through a control room cooling coil (AHHE-5A or 5B), [CCL]; therefore, the cooling coil supply valve (CHV-56 or 58), [ISV], must be open while the three-way by-pass valve (CHV-57 or 59), [TCV], modulates to control temperature. However, upon a loss of low pressure control air these valves' failure mode isolates the chiller. The Chilled Water pumps, (CHP-1A or 1B), [P], are not impacted by this event. The heat sink for the Chilled Water system is provided by the Nuclear Services Closed Cycle Cooling (SW), [CC], system, the event does not adversely impact this system.

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|   |  | YEAR           | SEQUENTIAL NUMBER | REVISION NUMBER |          |        |
|   |  | 8 8            | 0 1 3             | 0 0             | 0 4      | OF 0 7 |

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The basis for this review was to provide required Control Room habitability under various accident scenarios. The review concluded that from a permanent aspect, some Control Complex dampers and Chilled Water system valves require air tubing to be seismically supported or otherwise designed to ensure their safety functions can be accomplished during a seismic event. However, considering the above requirements the Control Complex Ventilation and low pressure control air systems can continue to operate safely in the normal recirculation mode until appropriate modifications can be completed and the circumstances of the event will not impact plant safety. This engineering judgement is based upon the following:

- 1) Upon detection of a toxic gas, high radiation, or Engineered Safeguards actuation signal the envelope dampers automatically close to establish the required envelope boundary isolation necessary for recirculation; therefore, the recirculation mode is the preferred mode during accident conditions.
- 2) Upon a loss of low pressure control air the Control Complex envelope dampers will fail to their required automatic positions;
- 3) Upon a loss of low pressure control air, the suction and discharge dampers for the normal supply, emergency supply and the return fans also fail closed, thus tripping and preventing a re-start or starting of the associated fans. However, the required time for re-starting the normal duty fans (normal recirculation or toxic gas release scenario) is dependent upon the rate of ambient temperature rise in the control room. Prior experience (i.e. temporary loss of chiller units) has shown this temperature rise is gradual thereby providing sufficient time to locally access the appropriate dampers and manually secure them in the open position allowing the required fan(s) to be re-started.
- 4) Upon a loss of low pressure control air the Chilled Water system flow control and isolation valves will fail closed stopping flow to the control room cooling coils. However, since the resulting temperature rise is gradual, there is sufficient time to locally access these valves and reposition them to the required positions.
- 5) For a LOCA or Waste Gas Decay Tank Rupture scenario the Control Complex Ventilation system is required to operate in the emergency recirculation mode using the emergency supply fan and charcoal filter. By design the emergency supply fan requires operator action for starting since it has no automatic start feature. But for a loss of low pressure control air the emergency supply fan suction and discharge dampers fail closed which would prevent fan starting (damper open/fan run permissive interlock). However, a seismic event which causes a LOCA or Waste Gas Tank Rupture is not considered credible since both the Nuclear Steam Supply System (NSSS) piping and the Waste Gas Decay Tanks and piping are designed to withstand the effects of the design basis seismic event.

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|   |  |                |                   |                 |          |    |     |
|---|--|----------------|-------------------|-----------------|----------|----|-----|
| FACILITY NAME (1)<br><br>CRYSTAL RIVER UNIT 3 | DOCKET NUMBER (2)<br><br>0 5 0 0 0 3 0 2 | LER NUMBER (6) |                   |                 | PAGE (3) |    |     |
|   |  | YEAR           | SEQUENTIAL NUMBER | REVISION NUMBER |          |    |     |
|   |  | 8 8            | - 0 1 3           | - 0 0           | 0 5      | OF | 0 7 |

TEXT (If more space is required, use additional NRC Form 366A 1/17)

- 6) Additionally, the simultaneous occurrence of a LOCA and a seismic event is considered to be an extremely low probability event.

The conclusions of items five and six above are consistent with the NRC approach utilized during the seismic review conducted by the Systematic Evaluation Program (SEP) and with current NRC thinking on simultaneous occurrence of a LOCA with a seismic event. For example in NUREG-1030, "Seismic Qualification of Equipment in Operating Nuclear Power Plants", the NRC staff assumptions for defining the scope of Equipment necessary to assure safety during and after a seismic event include:

- 1) The seismic event does not cause LOCA, Steam Line Break Accident (SLBA), or a High Energy Line Break (HELB).
- 2) The LOCA, SLBA, or HELB will not be postulated to occur simultaneously with or during a seismic event.

Since an accident (LOCA or Waste Gas Tank Rupture) and a seismic event are not considered to occur concurrently and because of the low probability of such an accident, the current seismic qualification of the Control Complex Ventilation components required for the emergency recirculation mode is not considered necessary for the interim.

Until the appropriate modifications are completed, the operability of the Control Complex Ventilation and low pressure control air systems during a design basis seismic event is based on the following:

- 1) Establishment of the habitability envelope is independent of the event because operation of the Control Complex Ventilation system is being administratively maintained in the normal recirculation mode and upon loss of low pressure control air the associated envelope dampers will fail closed;
- 2) The ambient temperature rise is gradual thus allowing sufficient time to locally access and manually secure appropriate fan dampers and chilled water valves in the required positions;
- 3) Because the habitability envelope is assured there is sufficient time to locally access the dampers and secure them in the position required for emergency recirculation;
- 4) The extremely low probability of a seismic occurrence, especially within the time frame required to make the necessary modifications, provides adequate assurance of operability;
- 5) A field verification indicates the low pressure control air tubing is adequately supported for dead weight. When considering the low magnitude of seismic forces, additional assurance for continued short-term operability of the low pressure control air system is provided.

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|   |                                     |                |                   |                 |          |       |
|---|-------------------------------------|----------------|-------------------|-----------------|----------|-------|
| FACILITY NAME (1)<br><br>CRYSTAL RIVER UNIT 3 | DOCKET NUMBER (2)<br><br>0500030288 | LER NUMBER (6) |                   |                 | PAGE (3) |       |
|   |                                     | YEAR           | SEQUENTIAL NUMBER | REVISION NUMBER |          |       |
|   |                                     | 88             | 013               | 000             | 6        | OF 07 |

TEXT (if more space is required, use additional NRC Form 366A (17))

CORRECTIVE ACTION

Short-term Action:

- 1) The Control Complex Ventilation system is being maintained in the normal recirculation mode until appropriate long term modifications are completed. This does not apply when the plant is in operating modes five (cold shutdown) or six (refueling).
- 2) Damper AHD-99 is the only envelope damper which does not fail closed. A temporary modification has been installed to disable the damper actuator and physically restrain or hold the damper in the closed (automatically actuated) position.
- 3) As a backup control air supply, a temporary modification installed a gas bottle with regulator and provided local equipment necessary for connecting it to the appropriate chilled water valves.
- 4) For a loss of Control Complex low pressure control air during a seismic event, members of the operating staff have been provided guidance and training on how to locally position the necessary fan suction and discharge dampers to the open position. They have also received similar guidance and training with regard to positioning the appropriate chilled water valves.

Long-term Action

- 1) With regard to the root cause, the appropriate corrective action has been in place for several years. Plant design changes or modifications receive a more thorough review and are completely documented in the Modification Approval Record (MAR). Existing Nuclear Operations procedures (modification, procurement, design and quality assurance) provide more comprehensive controls which would preclude any reoccurrences.
- 2) An investigation will be conducted to determine whether control air tubing in other seismic ventilation systems were installed by the same subcontractor. If so the tubing will be reviewed to determine whether it meets seismic requirements and upgraded as necessary.
- 3) The suction and discharge dampers for fans AHF-18A, AHF-18B, AHF-19A and AHF-19B will be modified with air reservoirs thus assuring a supply of control air for opening and operator establishment of emergency recirculation air flow.

To ensure proper operation during the worst case scenario, the actuator controls for the envelope boundary dampers, the recirculation damper (AHD-3) and the suction and discharge dampers for fans AHF-17A, AHF-17B, AHF-18A, AHF-18B, AHF-19A and AHF-19B will be installed within a seismically qualified boundary.

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|   |  | YEAR           | SEQUENTIAL NUMBER | REVISION NUMBER |          |        |
|   |  | 88             | - 0 1 3           | - 0 0           | 0 7      | OF 0 7 |

TEXT (If more space is required, use additional NRC Form 366A (1) (17))

Damper AHD-99 will be modified such that it will fail to the closed position upon a loss of low pressure control air.

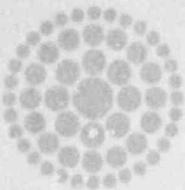
Chilled Water flow valves CHV-56, CHV-57, CHV-58 and CHV-59 will be modified such that they will remain in a pre-set throttled position without any need for low pressure control air.

The modifications of item three above will be completed by November 1, 1988.

PREVIOUS SIMILAR EVENTS

LER 85-04-04, entitled "Improper Installation Of Concrete Anchors For Control Complex HVAC Supports", appears to be similar because it involved the same contract specification and also pertained to seismic supports. However, in actuality they have different causes; in LER 85-04-04 detailed installation documents were developed, and available, but they were not followed; in this event it cannot be verified that detailed installation/design documents with required seismic criteria were developed as required by the contract specification.

The problems of LER 85-04-04 centered on improperly installed anchor bolting or deceit bolts in the ventilation duct work; an improperly installed anchor bolt or deceit bolt is defined in LER 85-04-04 and was used as the primary characteristic or indicator in the follow-up inspections. Being cause oriented the corrective action of LER 85-04-04 focused upon identifying deceit bolts in the system duct work. Since the cause only involved the faulty workmanship of a single contractor it was appropriate for the corrective action to be based upon the scope of work actually performed by the contractor not the subcontractor. Therefore, the control air tubing subsystem was not previously inspected.



**Florida  
Power**  
CORPORATION

July 11, 1988  
3F0788-06

U. S. Nuclear Regulatory Commission  
Attention: Document Control Desk  
Washington, D. C. 20555

Subject: Crystal River Unit 3  
Docket No. 50-302  
Operating License No. DPR-72  
Licensee Event Report No. 88-013-00

Dear Sir:

Enclosed is Licensee Event Report (LER) 88-013-00 which is submitted in accordance with 10 CFR 50.73.

Should there be any questions, please contact this office.

Sincerely,

K. R. Wilson  
Manager, Nuclear Licensing

WLR:mag

Enclosure

xc: Regional Administrator, Region II

Senior Resident Inspector

JF22  
11