**Attachment 1 to**

**1CAN111202**

**ANO-1 Flooding Walkdown Report**

Entergy

**ENTERGY NUCLEAR**
**Engineering Report Cover Sheet**

**Engineering Report Title:**
**Arkansas Nuclear One Unit 1 Flooding Walkdown Submittal Report for Resolution of Fukushima Near-Term Task Force Recommendation 2.3: Flooding**

**Engineering Report Type:**

New ☒ Revision ☐ Cancelled ☐ Superseded ☐

**Applicable Site(s)**

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IP1 | ☐ | IP2 | ☐ | IP3 | ☐ | JAF | ☐ | PNPS | ☐ | VY | ☐ | WPO | ☐ |
| ANO1 | ☒ | ANO2 | ☐ | ECH | ☐ | GGNS | ☐ | RBS | ☐ | WF3 | ☐ | PLP | ☐ |

**EC Number** 40635

**Report Origin:** ☐ Entergy ☒ Vendor
Vendor Document Number: CALC-ANO1-CS-12-00003
**Quality-Related:** ☐ Yes ☒ No

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# ENGINEERING REPORT

# ARKANSAS NUCLEAR ONE UNIT 1 FLOODING WALKDOWN SUBMITTAL REPORT FOR RESOLUTION OF FUKUSHIMA NEAR TERM TASK FORCE RECOMMENDATION 2.3: FLOODING

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**ANO Unit 1 Flooding Walkdown Submittal Report for Resolution of Fukushima Near-Term Task Force Recommendation 2.3: Flooding**

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## 1.0 SCOPE AND OBJECTIVE

This report was developed to provide information requested by the United States Nuclear Regulatory Commission (NRC) pursuant to Title 10 of the Code of Federal Regulations, Section 50.54(f) on March 12, 2012 for Arkansas Nuclear One (ANO) Unit 1. In response to the NRC request, Entergy performed walkdowns to verify that plant features credited in the current licensing basis (CLB) for protection and mitigation from external flood events are available, functional, and properly maintained. The walkdowns were performed to verify that structures, systems, and components (SSCs), portable flood mitigation equipment, and the procedures needed to install and/or operate them during a flood are acceptable and capable of performing their design function as credited in the CLB.

This report presents the findings of the flooding walkdown inspections completed at ANO Unit 1. The walkdowns were completed in accordance with the NRC endorsed guidance of NEI 12-07, Rev. 0A, *Guidelines for Performing Verification Walkdown of Plant Flood Protection Features* and Entergy Nuclear procedure EN-DC-170 that was developed to provide instructions for implementation of the NRC endorsed guidelines. The walkdowns completed at ANO Unit 1 were performed to verify that the structures, systems, and components (SSCs) credited for flood protection are capable of performing their design function as described in the current licensing basis. The walkdowns were also used to verify that plant modifications implemented since original construction, such as changes to topography, do not adversely affect flooding protection.

This report identifies the flooding hazards that comprise the current licensing basis and the protection and mitigation features that are credited with preventing the ingress of external water into SSCs important to safety at ANO Unit 1. The effectiveness of the flood protection features is evaluated against a set of acceptance criteria. Results of the walkdowns, including key findings, available physical margin, and any identified degraded, or nonconforming conditions are addressed and a description of the actions taken or planned to address these conditions is provided.

## 2.0 DESIGN BASIS FLOOD HAZARD LEVEL

Sections 2.4 and 5.1.6 of the ANO Unit 1 Final Safety Analysis Report (FSAR) describe the design basis and flood protection features provided at ANO Unit 1 for protection against an external flood.

### 2.1 Flood Hazards Identified

ANO Units 1 & 2 are adjacent nuclear plants located on a peninsula that extends into the Dardanelle Reservoir. The plant is centrally located on the peninsula with a grade elevation (near the center of the site) of 353 feet above Mean Sea Level (MSL). The peninsula is about two miles wide and two miles long. The plant is surrounded on three sides by the Dardanelle reservoir. The shortest stretch of land is approximately one mile in a southeast direction. The ground surface surrounding the plant is predominantly meadow.

The Dardanelle Reservoir is part of the Arkansas River navigation project. The Dardanelle Dam impounds the Arkansas River, creating the Dardanelle Reservoir (also known as Lake Dardanelle). The dam is managed and controlled by the United States Army Corps of Engineers (USACE). The reservoir fluctuates between 336 feet (normal pool) and 338 feet (maximum controlled pool) above MSL. The upper end of the Dardanelle Reservoir lies beneath the Ozark Dam, which is approximately 51 miles upstream.

The safety-related structures, systems, and components at ANO Unit 1 are capable of withstanding the worst flooding caused by any of a number of hypothetical events. The Probable Maximum Flood (PMF) level is 358' MSL considering maximum probable flooding flows and a maximum flood level on the downstream side of the Ozark Dam. An instantaneous failure of the Ozark Dam coupled with the PMF results in a maximum potential flood level of 361' MSL. The effects of wind and wave action on a PMF event would add approximately 2.5' MSL to the PMF of 358' MSL, or approximately an effective 360.5' MSL flood level. Therefore, the combined effects of wave action and PMF are bounded by the combination of a hypothetical Ozark Dam failure event and PMF event and thus the design flood elevation for ANO Unit 1 was determined to be 361' MSL. According to the ANO Unit 1 FSAR, Class 1 equipment is protected from splash effects up to 10 feet above the PMF level of 358' (i.e. 368' MSL) as follows: "All Class 1 structures are designed to resist this flood and all Class 1 equipment is either located above elevation 369 feet or protected from flooding by the Class 1 structures."

Groundwater intrusion into safety related structures is considered a credible source during flooding events. The design of the Seismic Class 1 structures considers the source as credible and provides protection against groundwater intrusion into these structures as low as the base grade level at elevation 317' MSL. Minor groundwater leaks are anticipated and discussed in the ANO Unit 1 FSAR.

## 2.2 Assumptions

With respect to probable maximum precipitation, there are no Unit 1 FSAR commitments. However, as an ANO response to NRC Generic Letter 88-20, the site is required to provide drain and scupper inspection on the Unit 1 roof. These actions ensure the drains and parapet scuppers are not blocked and thus can be counted upon to provide adequate drainage in the event of local intense precipitation. This ensures that structural roof loads due to ponding effects are not exceeded. Thus the assumption is that the Unit 1 Auxiliary building roof scuppers and roof drains are free from debris and blockage.

No assumptions apply to establish a current licensing basis (CLB) threshold with respect to wind and waves. As discussed above the effect of wind and waves were considered but were bounded by the combination of a PMF and Ozark Dam failure events and thus do not apply.

With the exception of watertight doors and hatches, the FSAR is silent with respect to non-piping penetrations being a credible flooding pathway. Therefore, it is assumed that when the FSAR refers to piping penetrations being sealed, it implicitly also includes conduit, HVAC, and other similar penetrations that pose a credible flooding pathway and that they should be similarly sealed.

## 2.3 Methodology

The PMF for the Arkansas River is estimated based upon the project flood defined by the USACE. USACE has computed the maximum probable flood flow at the Dardanelle Dam as 1,500,000 cubic feet per second. At this flow, the water level at the Dardanelle Dam would be 353 feet. The upper end of the Dardanelle Reservoir is at the Ozark Dam, about 51 miles upstream. During PMF conditions, the level of the Dardanelle Reservoir at the downstream side of Ozark Dam would be 389.5 feet. No profile for this condition is available, but it is reasonable to assume a straight-line variation. On this basis, the PMF level at the plant site is 358 feet.

Wind and wave activity are considered but are bounded by the possibility of a coincidental Ozark dam failure with the PMF. For the purpose of the estimate of wind and wave activity, the results indicate an approximately 2.5' additional effective flood level and utilized a calculation input for wind speeds of 45 mph from the south west direction and a fetch of 18,000'.

Evaluation of the instantaneous and coincidental Ozark dam failure with the PMF determines a theoretical water level rise of 6.8 feet, but then describes this outcome as "so unlikely as to be practically impossible." The estimate uses a uniform river channel assumption which is considered very conservative. Furthermore, an additional 50 square miles of flood plain would be a consequence not accounted for in the original computations and it would result in a "great amount of extra storage". Thus the calculation estimates a 3 foot rise in flood elevation over the PMF level of 358' MSL. Thus the overall design basis for the ANO Unit 1 site was calculated to be 361' MSL.

### 2.4 Non Conformance

No differences or contradictions in flood hazard levels were found in design or licensing basis documentation.

## 3.0 EXTERNAL FLOOD PROTECTION AND MITIGATION FEATURES

### 3.1 Flooding Licensing Basis

The safety-related structures, systems, and components at ANO are designed to withstand the worst flooding caused by a combination of hypothetical events. These events are the probable maximum flood of the Arkansas River coincident with the Ozark Dam failure.

Based on the current licensing basis at ANO, the current maximum design basis flood level is 361' MSL. Furthermore, critical components and equipment are protected by flood rated Seismic Class 1 structures or placed at elevations above 369' to protect against splash effects.

The following Category I structures are designed to withstand external flooding: Reactor Building, Auxiliary Building, Emergency Diesel Fuel Storage Vaults, and the Post Accident Sampling System (PASS) Building.

As discussed in Section 2.2 of this report, in order to address NRC Generic Letter 88-20 ANO has made a licensing commitment to ensure that Unit 1 Auxiliary Building Roof Drains and Scuppers are unblocked in order to allow adequate drainage to avoid exceeding the roof structural design basis. The addition of scuppers to the parapets along the Unit 1 Auxiliary building roof and the routine surveillance to ensure both scuppers and drains are unblocked provides assurance that there is the required drainage to withstand local intense precipitation events without compromising the structural integrity of the roof.

### 3.2 Flood Duration

A total duration for the probable maximum flood of the Arkansas River coincident with the Ozark Dam failure is not discussed in the ANO Unit 1 plant's current licensing basis.

### 3.3 Flood Protection Features

Safety-related systems and components are flood protected either because of their location above the postulated maximum flood level, or because they are enclosed in reinforced concrete Seismic Class 1 structures. The Seismic Class 1 structures that may be affected by a design basis flood at the site are designed to withstand the postulated floods for the site using the "hardened" flood protection approach. The hardened protection approach means structural provisions are incorporated in the plant's design that will protect safety-related structures, systems, and components from the static and dynamic effects of a flood. As part of the hardened approach, watertight doors and equipment hatches as well as watertight piping and electrical penetrations are installed below the maximum flood level.

Each of the Seismic Class 1 structures discussed in Section 3.1 is protected by:

Wall thicknesses below flood level are a minimum of two feet.

Waterstops are provided in all construction joints below flood level.

The number of openings in walls and slabs below flood level are kept to a minimum.

Waterproof doors and equipment hatches are installed.

Possible local seepage through the walls will be controlled by sumps and sump pumps.

With respect to the Reactor Building, the Reactor Equipment Hatch and Building Escape hatch are double sealed openings. The Tendon Gallery Access Hatch is protected using a water tight hatch cover.

With respect to the Auxiliary Building, door openings are protected utilizing watertight doors; floor openings are protected utilizing watertight hatch covers; roof openings over underground vaults are protected utilizing concrete plugs with neoprene seals; conduit penetrations are externally and internally sealed, and pipe penetrations are protected utilizing rubber seals or closure plates.

With respect to the Emergency Diesel Fuel Storage Vaults, door openings are protected utilizing watertight doors; roof openings are protected utilizing concrete plugs with neoprene seals; conduit penetrations are externally and internally sealed, and pipe penetration are protected utilizing rubber seals or closure plates.

With respect to the PASS building, door openings are protected utilizing watertight doors; that floor openings are protected utilizing watertight hatch covers; conduit penetrations are externally and internally sealed; and that pipe penetrations are protected utilizing rubber seals or closure plates.

## 3.4 Procedures

ANO's Unit 1 site adverse weather procedure describes the actions to be taken in the event of plant flooding caused by natural phenomena at the site. This procedure provides actions to be taken based on different levels of the Dardanelle Reservoir as measured at the Unit 1 Intake Structure. In order to maintain offsite power to the plant, where flood levels exceed 356.5' MSL, temporary jumper cables are installed from the 161 kV Pleasant Hill transmission line to Startup Transformer #2. The site adverse weather procedure not only addresses plant actions to address flooding, but also provides directions to mobilize outside parties to perform the jumper hookups.

ANO's site preventative maintenance procedures address the required maintenance for components such as doors and hatches that require procedural actions in order to maintain flood protection. The inspection interval of the doors and seals is not associated with a specific water level or flood situation at ANO but is established as part of the maintenance work order planning system.

Entergy Corporate procedures associated with condition monitoring of maintenance rule structures, per 10 CFR 50.65, provide the programmatic instructions for preventative maintenance and surveillance for the Seismic Class 1 structures that are protected from flooding.

### 3.5 Adverse Weather

In accordance with the current licensing basis, with the exception of the aforementioned temporary action to install jumpers from the 161 kV Pleasant Hill transmission line to the Startup Transformer #2, temporary active or passive flood protection measures are not required to be installed for protection of safety-related SSCs during flooding conditions at ANO Unit 1. Based on the current licensing basis, several Unit 1 doors are assumed to remain closed or be verified as closed during a flooding event. ANO's site adverse weather procedure provides instructions to verify and/or close the doors as part of the response in accordance with anticipated and measured flood levels. All doors with the exception of the Emergency Diesel Fuel Vault doors can be accessed without requiring personnel to travel outdoors. Therefore, only the Emergency Diesel Fuel Vault doors would require personnel to travel outside into potentially adverse weather conditions. However, these doors are maintained in a normally closed position, thus adverse weather impacts are not considered a credible hindrance to the flooding response.

## 4.0 **INTERNAL WARNING SYSTEMS**

### 4.1 Room Water Level Warning Systems

No interior water level warning systems or alarms are credited for external flood protection in the plant's CLB.

## 5.0 **EFFECTIVENESS OF FLOOD PROTECTION SYSTEMS**

### 5.1 Acceptance Criteria

The flood protection features credited in the current licensing basis for Arkansas Nuclear One Unit 1 are incorporated active and passive features and include 8 doors and door seals, exterior structural walls, penetration seals through exterior walls, neoprene sealed hatches, and Reactor Building, Auxiliary Building and Tendon Gallery equipment and escape hatches. The site topography, and existing drainage ditches and culverts are not licensing basis credited features for flood protection although natural drainage patterns and drainage designs are consistent with ensuring that flood waters drain away from protected areas and that critical equipment and systems are in elevated areas where applicable. These flood protection features were visually inspected in accordance with the acceptance criteria described in Section 6 of the NEI 12-07 document and as discussed below.

ANO Unit 1 maintenance procedure for watertight doors was used as a reference to determine the acceptance criteria for the doors. Based on the instruction, the seals are to be installed between the door and the frame, with the seal being slightly compressed and maintaining solid contact at all locations. Therefore, with the door closed, the seal was visually inspected to ensure no gaps are seen between the seal and the door. The door was then opened to inspect the seal and ensure that no visible cracks or deterioration was present. The sealing

mechanisms and latches were inspected for functionality. The seal was determined to be acceptable if there appeared to be contact between the seal and door at all points, no degradation or deterioration on the seal was observed, and the seals on the doors were installed to an elevation that ensure the door was protected to the maximum elevation of 361' MSL.

Seismic Class I structures at ANO Unit 1 are protected from the affects of a design basis flood based on the hardened flood protection approach and include the following structures: the Reactor Building, the Auxiliary Building, the Emergency Diesel Fuel Vault, and the PASS Building. The hardened approach requires structural provisions, such as watertight doors and penetrations to be incorporated into the plant design to protect safety-related structures, systems, and components from the effects of a flood. Based on the hardened approach the following Seismic Class I walls, including the associated penetrations, were required to be walked down as they were located on the exterior of the structure and were not shielded from potential flooding by other structures: the exposed Western portion of the Reactor Building at elevations 335' and 354'; the North, South, East and West exterior walls of the Auxiliary Building at elevations 317', 335', and 354'; the exterior North, South East, West Walls and associated ground level covers of the Emergency Diesel Fuel Vault; and the exterior PASS Building West wall at elevation 354' and East wall adjoining the Auxiliary Building at elevation 354'. The walls and penetrations act as an external flood barrier and prevent water intrusion into the structures.

Groundwater may be present to within 9.5 feet of the ground surface, therefore flooding sources from below the ground surface are considered. Seismic Class 1 structures are designed for flood protection below CLB 361'. Exterior walls below grade were inaccessible from the outside; therefore, the walls were inspected from the interior.

Drainage characteristics associated with site topography are not a credited licensing basis feature. However topography was visually inspected against the ANO site drainage drawings. The walkdowns visually verified that the topography of the site allowed water to drain as depicted in the drawings. Engineering changes including those completed for security reasons were reviewed to ensure that any obstructions or changes made to the site did not adversely impact site flooding protection.

Per the ANO response to NRC Generic Letter 88-20, the site is required to provide drain and scupper inspection on the Unit 1 Auxiliary Building roof to ensure the drains and scuppers are not blocked in order to provide adequate drainage and limit roof ponding, which is not to exceed structural design limits in the event of local intense precipitation. The Unit 1 Auxiliary Building roof scuppers and roof drains are maintained free from debris and blockage. Walkdowns were completed to confirm the Unit 1 Auxiliary Building roofs were free of any potential blockage or debris that could impede roof drainage.

Portions of the Unit 1 Intake Structure are Seismic Class 1 structures, but are not specifically discussed in the CLB as providing flooding protection. Walkdowns were completed in these areas to determine if Seismic Class 1 equipment in these areas was adequately protected against flooding. Equipment inspected includes control

boards, switchgear, load centers, batteries, transformers and cable runs serving Seismic Class 1 equipment namely the Service Water System including service water pumps, valves, connecting piping, and intake structure sluice gates. Equipment likely to be rendered inoperable due to flooding was walked down to determine if the equipment was above the CLB, 361' MSL flood level, or whether the equipment was above the 369' elevation, or protected from splash effects.

Portions of the ANO Emergency Cooling Pond Intake and Discharge Structures are Seismic Class 1 structures, but are not specifically discussed in the CLB as providing flooding protection. These areas were walked down to ensure that protection was evident in the event flooding was to occur that might transport debris and render these systems inoperable due to blockage. The acceptance criteria for these features were to verify the presence of trash racks and debris blocking features.

Unit 1 Auxiliary Building sumps and sump pumps are a credited licensing basis flood protection measure. Therefore sumps, sump pumps and level instrumentation were visually inspected in accordance with the acceptance criteria described in Section 6 of the NEI 12-07 document and EN-DC-170.

ANO's Unit 1 site adverse weather procedure provides the procedures and instructions for site responses to flooding events. As described in Section 3.4 the procedure provides the instructions to contact a third party to make jumper connections from the Pleasant Hill 161 kV transmission line to the Startup Transformer #2. No additional time dependent actions are specified in the ANO Unit 1 licensing basis.

The site adverse weather procedure was tested step by step through posing questions to address the guidance found in section 5.5.6 of NEI 12-07. Namely:

1. Can the procedural step be executed as written?
2. Can any time dependent activities be completed in the time frame required?
3. Are specified equipment or tools properly staged and in good working order?
4. Will completion of the activity not be impeded by the flood event?
5. Is it certain that there is no over reliance on the staff and that the staff can complete the necessary steps?

The acceptance criteria are positive answers to the above questions against each procedural step.

All observations which were not immediately able to be judged as acceptable on the walkdowns were entered into the Arkansas Nuclear One Corrective Action Program to allow for a more detailed evaluation to be completed.

## 5.2 Discussion

### 5.2.1 Overall Effectiveness

ANO Unit 1 is determined to have sufficient protection available at the site to ensure the safe operation of the plant in the event of an external flood based on the walkdowns completed at ANO Unit 1 and the results of the operability determinations associated with the observations that were entered into the site Corrective Action Program system.

Except as noted in Sections 7.1 and 7.2;

Walls and penetrations located below the CLB flood level of 361' were walked down to ensure no credible flood pathways exist. No cracks or leaks which would allow credible flooding pathways of the structures were observed below the CLB 361' MSL elevation.

Doors and door seals were observed to ensure the proper operation of water tight doors, and were found to be in working order with proper seals, and that their function would not allow flooding of structures.

Site topography, although not a credited flood protection feature, was verified against site drainage drawings and was determined to not direct flood waters towards protected features.

Critical equipment and components installed in the Unit 1 Intake Structure Building were observed to be above CLB 361' MSL. Furthermore, they were confirmed to be splash protected.

The Emergency Cooling Pond Intake and Discharge structures were confirmed to have debris blocking features.

Unit 1 Auxiliary Building Roof Drains and Scuppers were observed to be free from debris and able to provide the required drainage.

The Unit 1 Auxiliary Building sump pumps and level instrumentation were observed to be in working order and were verified as being maintained.

The reasonable simulations applied to the site adverse weather procedures confirmed that 5 guidance questions, per Section 5.5.6 of NEI 12-07, could be answered in the affirmative for each of the procedural steps.

During the walkdowns, conditions that did not meet the acceptance criteria discussed in Section 5.1 above were entered into the Corrective Action Program at ANO.

### 5.2.2 Other SSCs and Procedures

Entergy Corporate procedures associated with the Maintenance Rule Program provide the guidance and requirements for conducting a structural condition monitoring program to meet the requirements of 10 CFR 50.65. At ANO Unit 1, Maintenance Rule walkdowns are conducted a minimum of every five (5) years and are completed in accordance with the procedures. This program provides a systematic approach for evaluation of plant systems/structure which will provide a reasonable assurance that the structures are capable of fulfilling their intended 10 CFR 50.65 functions. The program consists of periodic reviews of the condition of

the plant structures via periodic inspections, routine walkdowns, surveillance tests, and ongoing review of the effect of the condition of plant structures on significant plant equipment. The program consists of defining and performing periodic structural evaluation which will ensure the timely identification, assessment, and repair of degraded structural elements. Concrete structures and penetration seals are inspected for cracking, spalling, erosion, corrosion of reinforcing bars, settlement, deformation, leaching, discoloration, groundwater leakage, rust stains, exposed rebar, rust bleeding, and other surface irregularities. All flood barriers and seals, with the exception of the watertight doors, hatches and internal conduit seals, for structures were determined to be within the scope of the Maintenance Rule and are therefore examined in accordance with these procedures. Maintaining the structures and materials monitored under these procedures provides a reasonable assurance that those structures that fall under the program will be able to perform their intended function.

The Auxiliary Building and Emergency Diesel Fuel Vault are equipped with floor drainage systems. Water entering these structures would flow across sloped floors and enter the floor drainage systems to be collected in sumps at the bottom floor elevations. However, the CLB takes no credit for the lowering of water levels by the operation of the floor drainage system. The floor drainage system would assist in the lowering of water levels caused by in-leakage at ANO and would help prevent water from pooling inside structures.

## 6.0 **IMPLEMENTATION OF WALKDOWNS**

### 6.1 NEI-12-07 Guidance

The verification walkdowns were performed in accordance with the NRC endorsed guidance of NEI 12-07, Rev. 0A, "Guidelines for Performing Verification Walkdowns of Plant Flood Protection Features" dated May 31, 2012, and Entergy Nuclear procedure EN-DC-170 that was developed to provide instructions for implementation of the NRC endorsed guidelines. Additional guidance for implementation was also obtained from the Flooding Walkdown Frequently Asked Questions (FAQs) and NRC responses, which are based on discussions between NEI and the NRC.

The basis for establishing the walkdown scope and the flood protection features included the preparation of a walkdown list in accordance with the guidance provided in Section 4 of NEI 12-07. As part of this preparation, the current licensing basis was reviewed to determine the flood protection features and actions that are necessary to prevent an external flooding event at the site from adversely impacting safety-related SSCs. In addition to the identification of passive and active protection features, existing site and Entergy Corporate procedures were reviewed to determine if any procedures were necessary to ensure existing flood protection features would be functional in the event of a flood at the site.

Walkdown packages were prepared in accordance with the guidance provided in Section 5.2 and walkdown team personnel were selected based on the requirements provided in Section 5.3 of NEI 12-07.

Prior to each walkdown, a pre-job brief was conducted. All walkdown results were documented in accordance with the recommendations of Section 7 of NEI 12-07 on the Flooding Walkdown Record Form provided in Attachment 9.3 of EN-DC-170. The walkdown record form provided in Attachment 9.3 is consistent with the record form template provided in Appendix B of NEI 12-07.

### 6.2 Team Organization

Consistent with Section 5.3 of NEI 12-07, the walkdown team consisted of two trained individuals with a complementary set of skills. The walkdown team consisted of two degreed engineers (or equivalent) and had familiarity with the site. The walkdown team was supplemented as required by plant maintenance and/or operations personnel.

### 6.3 Training Approach

Consistent with Section 5.3 of NEI 12-07 and Section 4.1 of EN-DC-170, personnel selected to perform walkdown inspection activities were experienced and knowledgeable of the site current licensing basis. Personnel were also trained to perform the visual inspections and met the knowledge requirements specified in EN-DC-170 and Appendix C of NEI 12-07. Team members associated with the flooding walkdowns also satisfactorily completed the NANTEL Generic Verification Walkdowns of Plant Flood Protection Features lesson and were knowledgeable of the 50.54(f) letter dated March 12, 2012.

Plant maintenance and/or operations personnel who supplemented the walkdown teams did not need to be qualified to the aforementioned requirements.

## 7.0 **WALKDOWN RESULTS**

A total of 68 work packages were associated with the walkdowns completed for ANO Unit 1, with each package containing a single feature. The features and attributes walked down as part of this package are broken down into flood protection type (incorporated passive, temporary passive, incorporated active, and temporary active) as shown in the table below.

**Table #1: Summary – Features Included in the Walkdown Scope**

| Flood Protection Type | Total Number of Features | Total Number of Attributes |
|---|---|---|
| Passive – Incorporated | 67 | 920 |
| Passive – Temporary | 0 | 0 |
| Active – Incorporated | 1 | 12 |
| Active – Temporary | 0 | 0 |

## 7.1 Deficiencies

There were some observed conditions of features that did not meet the NEI 12-07 acceptance criteria. These conditions were entered into the Corrective Action Program; however, none of these observations were determined to be deficiencies as defined in NEI 12-07. The operability determinations for these conditions concluded that the feature could perform its intended flood protection function when subject to its design basis flooding hazard.

## 7.2 Observations

All Condition Reports (CRs) that were written due to a potential deficiency on the site were input into the corrective action program and an operability determination associated with the deficiency was completed prior to this report being written. Based on the operability determinations associated with the CRs, none of the flooding conditions observed during the walkdowns were determined to pose a risk to the safe operation of the plant and no safety-related or safe-shutdown equipment is adversely impacted by these conditions

## 7.3 Corrective Actions

There were no observations identified that required actions to address a deficiency. Since the CAP has determined that there are no deficiencies there are no planned actions pending. However, the CAP did initiate a work order to repair a watertight door in order to restore available flood margin back to design conditions. The watertight door was observed to be in a degraded condition with evident gaps between the door and door seal at the top of the door. While the observation was not a deficiency as the gap was above the CLB flood level of 361', the repair to the door will restore the door condition to non-degraded so that full flooding margin will be available.

## 7.4 Flood Protection Features not Inspected

Room 22 was determined to be inaccessible due to its high radiation fields. The northern wall of this room is considered a flooding barrier. No fire rated penetrations are noted in this northern wall. Because this room is considered to be inaccessible, it is evaluated for acceptance based on other conditions identified in the Unit 1 Auxiliary Building external flooding barriers.

If the worst conditions found in the balance of the Auxiliary Building were assumed to be applied in this area, the condition of the flood barrier would still be acceptable. Therefore, this wall is considered to be an acceptable external flooding barrier given the similar inspections performed on the concrete reinforced walls for the Unit 1 Auxiliary Building external flooding barriers. This evaluation complies with the guidance given in NEI 12-07, that evaluations can use as a rationale: "inspection of justifiably similar installations that are accessible and materials of construction."

A number of features were considered restricted access and were unavailable for inspection. Each of these features has been documented in the site CAP as requiring walkdown at a later date.

| Table #2: Summary – Restricted Access Features Unable to be Inspected | | |
|---|---|---|
| Unit 1 Restricted Access Listing | | |
| **Restricted Access Area & Features** | **Reason** | **Means to Address** |
| Unit 1 Aux Building Room 3 El 317 – Required to verify Walls and Penetrations | Locked High Radiation Area | CAP to address walkdown no later than Sept. 30, 2013 |
| Unit 1 Aux Building Room 76 EL 354' Penetration 76-0050 & 0082 | Need to remove insulation to verify penetration seal | CAP to address walkdown no later than Sept. 30, 2013 |
| Unit 1 Reactor Building EL 336'-6" – Required to verify Walls and Penetrations | Operating at power | CAP to address walkdown no later than Sept. 30, 2013 |
| Unit 1 Reactor Building EL 357' – Required to verify Walls and Penetrations | Operating at power | CAP to address walkdown no later than Sept. 30, 2013 |
| Unit 1 Aux Building Tank Vaults Rooms 16A, 16B, 16C, 16D El 335 – Required to verify Walls and Penetrations | Restricted hatch access and High Radiation Area | CAP to address walkdown no later than Sept. 30, 2013 |

## 8.0 AVAILABLE PHYSICAL MARGIN

As indicated in Section 3.12 of NEI 12-07, Rev. 0A, the NRC is no longer expecting the Recommendation 2.3: Flooding Walkdowns to include an evaluation of the cliff-edge effects at the site. The available physical margin (APM) has been determined and documented on the walkdown record forms. The APMs provided on the walkdown record forms will allow flood hazard reevaluations completed in response to Recommendation 2.1: Flooding to be completed.

With the exception of the watertight door mentioned in Section 7.3, no available physical margins documented in the walkdown record forms were considered to be small APMs at ANO Unit 1. A repair work order has been initiated to restore the watertight door to a non-degraded condition. Upon completion of this work order, there will be no small APM instances at ANO Unit 1.

## 9.0 NEW FLOOD PROTECTION SYSTEMS

There are no planned or newly installed flood protection systems or flood mitigation measures at ANO Unit 1.

## 10.0 REFERENCES

10.1 NRC Letter to Licensees, dated March 12, 2012, "Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3 of the Near Term Task Force Review of Insights from the Fukushima Daiichi Accident."

10.2 Guidelines for Performing Verification Walkdowns of Plant Flood Protection Features (NEI 12-07 [Rev. 0-A]), NEI, dated May 2012.

10.3 EN-DC-170, "Fukushima Near Term Task Force Recommendation 2.3 Flooding Walkdown Procedure"

10.4 NRC Generic Letter 88-20, ANO Summary Report, Unit 1, Individual Plant Examination of External Events (IPEEE) for Severe Accident Vulnerabilities

10.5 ANO Unit 1 Final Safety Analysis Report, Amendment 25

## 11.0 ATTACHMENTS

None