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CENG
a joint venture of
Constellation Energy
EDF

February 28, 2013

U.S. Nuclear Regulatory Commission
11555 Rockville Pike
Rockville, MD 20852

ATTENTION: Document Control Desk

SUBJECT: **Calvert Cliffs Nuclear Power Plant, Units 1 and 2**
Renewed Facility Operating License Nos. DPR-53 and DPR-69
Docket Nos. 50-317 and 50-318
Nine Mile Point Nuclear Station, Units 1 and 2
Renewed Facility Operating License Nos. DPR-63 and NPF-69
Docket Nos. 50-220 and 50-410
R.E. Ginna Nuclear Power Plant
Renewed Facility Operating License No. DPR-18
Docket No. 50-244

Overall Integrated Plan for Reliable Spent Fuel Pool Instrumentation

REFERENCES:
(a) NRC Order Number EA-12-051, Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation, dated March 12, 2012
(b) NRC Interim Staff Guidance JLD-ISG-2012-03, Compliance with Order EA-12-051, Reliable Spent Fuel Pool Instrumentation, Revision 0, dated August 29, 2012
(c) Letter from M. G. Korsnick (CENG) to Document Control Desk (NRC), Initial Status Report in Response to Commission Order Modifying Licenses with Regard to Requirements for Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051), dated October 26, 2012

On March 12, 2012, the Nuclear Regulatory Commission issued an Order (Reference a), which was immediately effective. The Order directs licensees to have a reliable indication of the water level in associated Spent Fuel Pools (SFP) capable of supporting identification of the following SFP water level conditions by trained personnel: (1) level that is adequate to support operation of the normal SFP cooling system, (2) level that is adequate to provide substantial radiation shielding for a person standing on the SFP operating deck, and (3) level where fuel remains covered and actions to implement make-up water addition should no longer be deferred. The Order also requires that an overall integrated plan be prepared that provides a description of how the requirements of the Order will be achieved.

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NRR

Reference (a) requires submission of an Overall Integrated Plan by February 28, 2013. Nuclear Energy Institute (NEI) 12-02, Industry Guidance for Compliance with Nuclear Regulatory Commission Order EA-12-051, "To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation," Revision 1, provides an approach for complying with Order EA-12-051. Nuclear Regulatory Commission Interim Staff Guidance (Reference b) considers that the methodologies and guidance in conformance with the guidelines provided in NEI 12-02, Revision 1, subject to the clarifications and exceptions specific to Section 3.4, Qualification, are an acceptable means of meeting the requirements of Order EA-12-051.

Reference (c) provided the initial status report regarding spent fuel pool instrumentation, as required by Reference (a).

The purpose of this letter is to provide the Overall Integrated Plan required by Section IV, Condition C.1, of Reference (a). This letter confirms that R.E. Ginna Nuclear Power Plant, Calvert Cliffs Nuclear Power Plant, and Nine Mile Point Nuclear Station have received Reference (b) and have developed the Overall Integrated Plans presented in Attachments 1 - 4.

The Integrated Plans are based on conceptual design information. Final design details and associated procedure guidance, as well as any revisions to the information contained in the attachments, will be provided in the 6-month Integrated Plan updates required by Reference (a).

This letter contains a regulatory commitment as listed in Attachment (5).

If there are any questions regarding this submittal, please contact Everett (Chip) Perkins everett.perkins@cengllc.com at 410-470-3928.

I declare under penalty of perjury that the foregoing is true and correct. Executed on February 28, 2013.

Sincerely,

Mary G. Korsnick

Mary G. Korsnick

MGK/EMT/bjd

Attachments:
(1) R.E. Ginna Integrated Plan for Reliable Spent Fuel Pool Instrumentation
(2) Nine Mile Point Unit 1 Integrated Plan for Reliable Spent Fuel Pool Instrumentation
(3) Nine Mile Point Unit 2 Integrated Plan for Reliable Spent Fuel Pool Instrumentation
(4) Calvert Cliffs Integrated Plan for Reliable Spent Fuel Pool Instrumentation
(5) Regulatory Commitments Contained in this Correspondence.

cc:
B. K. Vaidya, NRC
M. C. Thadani, NRC
W. M. Dean, NRC
Resident Inspector, Calvert Cliffs
Resident Inspector, Ginna
Resident Inspector, Nine Mile Point
S. Gray, DNR

ATTACHMENT (1)

R.E. GINNA INTEGRATED PLAN FOR RELIABLE SPENT FUEL POOL INSTRUMENTATION

Constellation Energy Nuclear Group, LLC
February 28, 2013

ATTACHMENT 1

R.E. GINNA INTEGRATED PLAN FOR RELIABLE SPENT FUEL POOL INSTRUMENTATION

I. Introduction

This integrated plan provides the R.E. Ginna Nuclear Power Plant (Ginna) approach for complying with Order EA-12-051 (Reference 1) using the methods described in NRC JLD-ISG-2012-03 (Reference 3). The current revision of the Ginna Integrated Plan is based on conceptual design information and will be revised as detailed design engineering is complete. Consistent with the requirements of Order EA-12-051 and the guidance in NEI 12-02 (Reference 4), six-month reports will delineate progress made, any proposed changes in compliance methods, updates to the schedule, and if needed, requests for relief and their bases.

II. Schedule

Installation of reliable Spent Fuel Pool (SFP) water level instrumentation will be completed prior to startup from the second refueling outage after submittal of this plan, but no later than December 31, 2016, (Reference 6).

The current milestones are:

- Commence Engineering and Design — 1Q2014
- Complete Engineering and Design — 2Q2014
- Receipt of SFP Instruments — 1Q2015
- Commence Installation of SFP Instruments — 1Q2015
- Close out Project/Plant Turnover — 2Q2015

III. Identification of Spent Fuel Pool Water Levels

The SFP is located in the west end of the Auxiliary building. It provides specially designed underwater storage space for the spent fuel pool assemblies which require shielding and cooling during storage and handling. Normal makeup water sources to the SFP are from the refueling water storage tank or one of the chemical and volume control system holdup tanks. The important levels for the pool are as follows:

<u>Key SFP water levels:</u>

1. **Level adequate to support operation of the normal SFP cooling system** – Indicated water level on either the primary or backup instrument channel of greater than elevation 275'-11.5" (based on the low water level trip of SFP Pump B (Ginna Updated Final Safety Analysis Report (UFSAR) Section 9.1.3.2.2, Reference 10) plus the accuracy of the SFP water level instrument channel, which will be determined during the engineering and design phase. (Ginna UFSAR Section 9.1.3.2.2, Reference 10).

2. **Level adequate to provide substantial radiation shielding for a person standing on the SFP operating deck** - Indicated water level on either the primary or backup instrument channel of greater than elevation 257'-0" plus the accuracy of the SFP water level instrument channel, which will be determined during the engineering and design phase. This elevation is approximately 5'-7" above the top of the fuel racks and ensures a minimum water level of 5'-9" above the top of the fuel. With 5'-7" of water above the top of the fuel racks, the calculated dose rate near the edge of the pool is less than 100 mrem/hr. This monitoring level ensures there is adequate water level to provide substantial radiation shielding for personnel to respond to Beyond-Design-Basis External Events and to initiate SFP makeup strategies. Calculations to determine dose rates near the edge of the SFP with 5'-7" of water above the top of the fuel racks were performed using SAS2H/ORIGEN-S or ORIGEN-ARP for source term calculations and MCNP5 code was used to calculate gamma (primary and capture) and neutron dose rates at the locations of interest. MCNP5 is a general-purpose Monte-Carlo N-Particle code that can be used for neutron, photon, electron, or coupled neutron/photon/electron transport.
3. **Level where fuel remains covered** – Indicated water level on either the primary or backup instrument channel of greater than elevation 251'-5" plus the accuracy of the SFP water level instrument channel, which will be determined during the engineering and design phase. This monitoring level assures that there is adequate water level above the stored fuel seated in the rack.

IV. Instruments

The design of the instruments will be consistent with the guidelines of NRC JLD-ISG-2012-03 and NEI 12-02 as discussed below.

Primary and backup instrument channels will consist of fixed components. The primary and backup instrument channel level sensing components will be located and permanently mounted in the SFP. The primary and backup instrument channels will provide continuous level indication over a minimum range of about 25 feet 7 inches from the high SFP water level elevation of 277'-0" to the top of the spent fuel racks at elevation 251'-5". This continuous level indication will be provided by a guided wave radar system, through air radar system, or other appropriate level sensing technology that will be determined during the detailed engineering design phase of the project.

Primary instrument channel level sensing components will be located in the southeast corner of the SFP. Backup instrument channel level sensing components will be located in the southwest corner of the SFP. The locations of the sensors and transmitters are depicted on the *Plan View of SFP Showing New SFP Water Level Instrumentation* provided in Section XVIII, New SFP Water Level Instrumentation.

Reliability:

Reliability of the primary and backup instrument channels will be assured by conformance with the guidelines of NRC JLD-ISG-2012-03 and NEI 12-02, as discussed in Section VII, Qualification. Reliable

water level indication will be functional during all modes of operation consistent with Section XV, Testing and Calibration.

Instrument Channel Design Criteria:
Instrument channel design criteria will be consistent with the guidelines of NRC JLD-ISG-2012-03 and NEI 12-02 and applicable sections of the Ginna UFSAR. If wireless or other advanced technologies are used:

- An evaluation will be performed to address their interaction with other plant systems, failure modes, and impact on cyber security controls.
- The use of such technologies will be evaluated for any possible adverse impact they may have on other plant equipment likely to be used at the same time as the SFP instrumentation is functioning.
- The ability to perform in the environment in which they may be called upon to function will be demonstrated consistent with the Qualification requirements of this Integrated Plan.
- They will meet the same requirements as wired technologies as specified in this Integrated Plan.

Wireless technologies that might be used are not Critical Digital Assets as defined in NEI 08-09, *Cyber Security Plan for Nuclear Power Reactors* (Reference 11); however, if a wireless technology is utilized, the Ginna cyber security plan will be adhered to with respect to its implementation.

The remaining design requirements will be met through the selection of the sensors during the engineering and design phase.

V. Arrangement

SFP water level sensors will be installed in the southwest and southeast corners of the SFP. Transmitters will be located in the decontamination pit. The decontamination pit is located approximately six feet south of the SFP. The SFP and decontamination pit are separated by a reinforced concrete wall which will provide suitable radiation shielding for the electronics. The decontamination pit walls and cover will also provide protection from event generated missiles. These locations provide reasonable protection against missiles and will not interfere with SFP activities.

The block walls in the vicinity of the SFP have been seismically evaluated and are provided with restraints. The East, West and South sides of the SFP are provided with metal and glass barriers that are seismically installed. These barriers will also provide protection for SFP instrumentation. The design will credit these barriers where possible.

The personnel walkway located on the East and South sides of the SFP is seismically supported, located above floor level and will provide protection for conduit and equipment located beneath it from seismically generated missiles generated by the event. Credited equipment and cables will be protected

from event-generated missiles such as light fixtures and ductwork. On the operating floor cables will be routed under the existing elevated walkway located on the east and south sides of the SFP. Beyond the walkway the cable will be routed in rigid steel conduit that will be protected as necessary from seismically and event generated missiles.

There is an existing pipe penetration from the decontamination pit to the Auxiliary Building mezzanine level. Cables from the transmitters to the remote indication will be routed through this penetration. The Auxiliary Building mezzanine level is protected against external missiles.

Sensor supports will be designed to shield the sensor from event-generated missiles. The sensor will be located such that they cannot interfere with movement of the fuel handling machine. The design of the sensor located in the fuel cask loading area will consider fuel cask transfers.

Cabling for power supplies and indications for each channel will be routed in separate conduits from cabling for the other channel.

VI. Mounting

Mounting will be Seismic Class I. Installed equipment will be seismically qualified to withstand the maximum seismic motion considered in the design of the plant area in which it is installed. An evaluation of other hardware stored in the SFP will be conducted to ensure it will not create an adverse interaction with the fixed SFP instrument locations.

VII. Qualification

The primary and backup channels will be reliable at temperature, humidity, and radiation levels consistent with the SFP water at saturation conditions for an extended period. Saturation temperature at the bottom of the SFP assuming normal water level will be approximately 255°F. Post-event temperature at sensors located above the SFP is assumed to be 212°F. Post event humidity near and above the SFP is assumed to be 100% with condensing steam. Equipment will be qualified for expected conditions at the installed location assuming that normal power is unavailable and that the SFP has been at saturation for an extended period. Equipment located in the vicinity of the SFP will be qualified to withstand peak and total integrated radiation dose levels for its installed location assuming that post-event SFP water level is equal to the top of the spent fuel racks (Level 3) for an extended period of time.

The equipment mounted in the decontamination pit is at a lower elevation than the operating floor and the temperature in the pit is expected to be lower than the temperature above the SFP. The sensor and cables are relatively insensitive to temperature. Exposure of the electronics to temperatures above 150°F may result in equipment failure. Expected decontamination pit temperatures will be determined during the

engineering and design phase to develop the equipment specification and to verify that the equipment will operate at the expected temperatures. As the decontamination pit could flood should the SFP overflow or as a result of efforts to restore SFP water level, equipment mounted in the pit will be installed such that it is protected from flooding.

Sensor mount locations will not be subject to SFP overflow and the mounts and cables connecting the sensor to the transmitters will be qualified for the SFP environment.

Instrument channel reliability will be demonstrated via an appropriate combination of design, analyses, operating experience, and/or testing of channel components for the following sets of parameters:

- conditions in the area of the instrument channel component use, for all instrument components,
- effects of shock and vibration on all instrument channel components, and
- seismic effects on instrument channel components used during and following a potential seismic event for installed components.

Augmented quality requirements, similar to those applied to fire protection equipment, will be applied to this project.

Temperature, humidity and radiation levels consistent with conditions in the vicinity of the SFP and the area of use considering normal operational, event and post-event conditions for no fewer than seven days post-event or until off-site resources can be deployed by the mitigating strategies resulting from Order EA-12-049 (Reference 2) will be addressed in the engineering and design phase. Examples of post-event (beyond-design-basis) conditions that will be considered are:

- radiological conditions for a normal refueling quantity of freshly discharged (100 hours) fuel with the SFP water at level 3 as described in this plan,
- temperatures of 212°F and 100% relative humidity environment,
- boiling water and/or steam environment,
- a concentrated borated water environment, and
- the impact of FLEX mitigating strategies.

Components of the instrument channels will be qualified for shock and vibration using one or more of the following methods:

- Components will be supplied by manufacturers using commercial quality programs (such as ISO9001, *Quality management systems – Requirements* (Reference 8)) with shock and vibration requirements included in the purchase specification at levels commensurate with portable hand-held device or transportation applications;
- Components will have a substantial history of operational reliability in environments with significant shock and vibration loading, such as portable hand-held device or transportation applications; or

- Components will be inherently resistant to shock and vibration loadings, such as cables.

The following measures will be used to verify that the design and installation is adequate for seismic effects on instrument channel components used after a potential seismic event for installed components (with the exception of battery chargers and replaceable batteries). Applicable components of the instrument channels will be rated by the manufacturer (or otherwise tested) for seismic effects at levels commensurate with those of postulated design basis event conditions in the location of the instrument channel component using one or more of the following methods:

- a substantial history of operational reliability in environments with significant vibration, such as for portable hand-held devices or transportation applications. Such a vibration design envelope will be inclusive of the effects of seismic motion imparted to the components proposed at the location of the proposed installation;
- adequacy of seismic design and installation will be demonstrated based on the guidance in Sections 7, 8, 9, and 10 of IEEE Standard 344-2004, *IEEE Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations*, (Reference 9) or a substantially similar industrial standard;
- proposed devices will be demonstrated to be substantially similar in design to models that have been previously tested for seismic effects in excess of the plant design basis at the location where the instruments will be installed (g-levels and frequency ranges); or
- the capability to withstand seismic motion consistent with that of existing design basis loads at the installed location will be demonstrated.

VIII. Independence

The primary instrument channel will be redundant to and independent of the backup instrument channel, including power supplies.

IX. Power Supplies

The primary and backup channels will be powered from dedicated batteries and local battery chargers. The battery chargers for both channels will normally be powered from independent, non-safety related, 120V AC power supplies. Minimum battery life of 72 hours will be provided. The battery systems will include provision for battery replacement should the battery charger be unavailable following the event. Spare batteries will be readily available.

During the loss of normal power the battery chargers will be connectable to another 120V AC power source. This will be from portable generators stored onsite, consistent with the reasonable protection requirements associated with NEI 12-06 (Reference 5), or from generators deployed from off-site by the mitigating strategies resulting from Order EA-12-049, at approximately 24 hours after the event.

X. Accuracy

The accuracy will be consistent with the guidelines of NRC JLD-ISG-2012-03 and NEI 12-02. Instrument channels will be designed such that they will maintain their design accuracy following a power interruption or change in power source without recalibration.

Accuracy will consider SFP conditions, e.g., saturated water, steam environment, or concentrated borated water. Additionally, instrument accuracy will be sufficient to allow trained personnel to determine when the actual water level exceeds the specified lower level of each indicating range (levels 1, 2 and 3) without conflicting or ambiguous indication. The accuracy will consider the resolution requirements of Figure 1 of NEI 12-02. Actual accuracy for the indication under all required conditions will be determined during the engineering and design phase.

XI. Testing

Testing will be consistent with the guidelines of NRC JLD-ISG-2012-03 and NEI 12-02. Instrument channel design will provide for routine testing and calibration that can be performed in-situ consistent with Order EA-12-051 and the guidance in NEI 12-02. Details will be determined during the engineering and design phase. Additional testing and calibration information is provided in Section XV of this plan.

XII. Display

Remote indication will be provided in the new Standby Auxiliary Feedwater Diesel Generator Building. The display will be consistent with the guidelines of NRC JLD-ISG-2012-03 and NEI 12-02.

The new Standby Auxiliary Feedwater Diesel Generator Building will be:

- promptly accessible to the appropriate plant staff, including during the occurrence of a SFP drain down event,
- located outside of the area surrounding the SFP floor at an appropriate distance from the radiological sources resulting from an event impacting the SFP,
- a structure that provides protection against adverse weather, and
- located outside of any high radiation areas or LOCKED HIGH RAD AREA during normal operation.

XIII. Training

The Systematic Approach to Training (SAT) will be used to identify the population to be trained and to determine both the initial and continuing elements of the required training. Training will be completed prior to placing the instrumentation in service.

XIV. Procedures

Procedures will be developed using guidelines and vendor instructions to address the maintenance, operation, and abnormal response issues associated with the new SFP instrumentation.

Procedures will address a strategy to ensure SFP water level addition is initiated at an appropriate time consistent with implementation of NEI 12-06, *Diverse and Flexible Coping Strategies (FLEX) Implementation Guide* (References 5 and 7).

Procedures will also address the following situations:

- In the event an instrument channel ceases to function during an event, the methodology for returning an instrument channel to normal service within a period of time consistent with the emergency conditions that may apply at the time.
- In the event an instrument channel must be replaced during an event, the methodology for utilizing commercially available components that may or may not meet all of the qualifications stated in (Section VII of this plan) to maintain the instrument channel functionality, until the instrument channel is restored to normal service.

XV. Testing and Calibration

Processes will be established and maintained for scheduling and implementing necessary testing and calibration of the primary and backup SFP water level instrument channels to maintain the instrument channels at the design accuracy. Testing and calibration of the instrumentation will be consistent with vendor recommendations and any other documented basis. Calibration will be specific to the mounted instrument and the monitor. Out of service time as identified in NEI 12-02 will be incorporated consistent with the programmatic process used for compliance with NRC Order EA-12-049, Issuance of Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Reference 2). Functionality testing will be performed at the frequency specified in NEI 12-02. Additional testing and calibration information is provided in Section XI of this plan.

Instrument channel out of service times as identified in NEI 12-02 will be implemented and controlled consistent with the programmatic process used for compliance with NRC Order EA-12-051.

XVI. Need for Relief and Basis

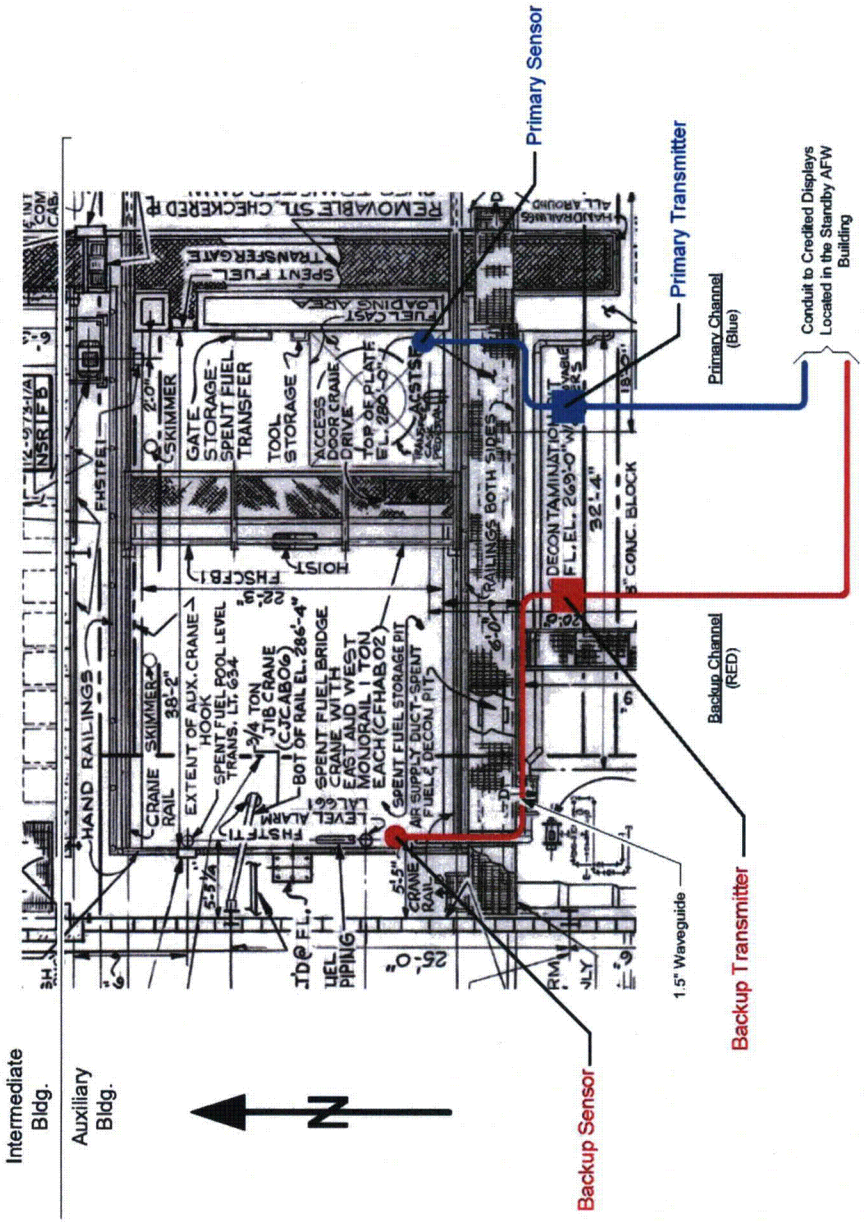
CENG is not requesting relief from the requirements of Order EA-12-051 or the guidance in NRC JLD-ISG-2012-03 at this time.

Consistent with the requirements of Order EA-12-051 and the guidance in NEI 12-02, CENG will submit six-month reports that will delineate the progress made, any proposed changes in the compliance methods, updates to the schedule, and if needed, requests for relief and their bases.

XVII. References

1) EA-12-051, *Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation*, March 12, 2012
2) EA-12-049, *Issuance of Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events*, March 12, 2012
3) NRC JLD-ISG-2012-03, *Compliance with Order EA-12-051, Reliable Spent Fuel Pool Instrumentation*, Revision 0, August 29, 2012
4) NEI 12-02, *Industry Guidance for Compliance with NRC Order EA-12-051, "To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation,"* Revision 1, August 2012
5) NEI 12-06, *Diverse and Flexible Coping Strategies (FLEX) Implementation Guide*, Revision 0, August 2012
6) Letter from M. G. Korsnick (CENG) to Document Control Desk (NRC), dated October 26, 2012, *Initial Status Report in Response to Commission Order Modifying Licenses with Regard to Requirements for Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051)*
7) Letter from M. G. Korsnick (CENG) to Document Control Desk (NRC), dated October 26, 2012, *Initial Status Report in Response to Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049)*
8) ISO9001, *Quality management systems – Requirements*
9) IEEE Standard 344-2004, *IEEE Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations*
10) R.E Ginna Nuclear Power Plant Updated Final Safety Analysis Report, Revision 23.14, January 28, 2013
11) NEI 08-09, *Cyber Security Plan for Nuclear Power Reactors*, April 2010

XVIII. New SFP Water Level Instrumentation



Plan View of SFP Showing New SFP Level Instrumentation

ATTACHMENT (2)

NINE MILE POINT UNIT 1 INTEGRATED PLAN FOR RELIABLE SPENT FUEL POOL INSTRUMENTATION

Constellation Energy Nuclear Group, LLC
February 28, 2013

ATTACHMENT 2

NINE MILE POINT UNIT 1 INTEGRATED PLAN FOR RELIABLE SPENT FUEL POOL INSTRUMENTATION

I. Introduction

This integrated plan provides the Nine Mile Point Unit 1 (NMP1) approach for complying with Order EA-12-051 (Reference 1) using the methods described in NRC JLD-ISG-2012-03 (Reference 3). The current revision of the NMP1 Integrated Plan is based on our conceptual design information and will be revised as we proceed with detailed design engineering. Consistent with the requirements of Order EA-12-051 and the guidance in NEI 12-02, our six-month reports will delineate progress made, any proposed changes in our compliance methods, updates to the schedule, and if needed, requests for relief and the bases.

II. Schedule

Installation of reliable SFP level instrumentation is scheduled to be completed prior to startup from the Spring 2015 refueling outage (Reference 6).

The current milestones are:

- Commence Engineering and Design — 2Q2013
- Complete Engineering and Design — 4Q2013
- Receipt of SFP Instruments — 3Q2014
- Commence Installation of SFP Instruments — 3Q2014
- Close out Project/Plant Turnover — 2Q2015

III. Identification of Spent Fuel Pool Water Levels

The wet spent-fuel storage facility (SFP) is located on the refueling floor in the secondary containment. It provides specially designed underwater storage space for the spent fuel assemblies which require shielding and cooling during storage and handling. Normal makeup water source to the SFP is from the condensate transfer system. The important levels for the SFP are list as follows:

<u>Key SFP water levels:</u>

1. **Level adequate to support operation of the normal SFP cooling system** – Indicated water level on either the primary or backup instrument channel of greater than elevation 338' – 10.5" (based on loss of inlet flow to the SFP Surge Tanks as water level lowers below the skimmer weirs which results in a loss of reliable suction to SFP Cooling Pumps) plus the accuracy of the SFP water level instrument channel, which will be determined during the engineering and design phase (NMP1 UFSAR Section X.H, Reference 10). Normal operating level is maintained at elevation 339'- 0" (+/- 1").

2. **Level adequate to provide substantial radiation shielding for a person standing on the SFP operating deck** - Indicated water level on either the primary or backup instrument channel of greater than elevation 320' – 11.5" plus the accuracy of the SFP water level instrument channel, which will be determined during the engineering and design phase. This elevation is approximately 5' above the top of the fuel racks and ensures a minimum level of water shielding above the top of the fuel racks. Calculations performed determined that with 5' of water above the top of the racks, the largest calculated dose rate near the edge of the SFP would be well below 100 mRem/hr. Calculations to determine dose rates near the edge of the SFP with 5' of water above the top of the fuel racks were performed using SAS2H/ORIGEN-S or ORIGEN-ARP for source term calculations and MCNP5 code was used to calculate gamma (primary and capture) and neutron dose rates at the locations of interest. MCNP5 is a general-purpose Monte-Carlo N-Particle code that can be used for neutron, photon, electron, or coupled neutron/photon/electron transport. This monitoring level ensures there is adequate water level to provide substantial radiation shielding for personnel to respond to Beyond-Design-Basis External Events and to initiate SFP makeup strategies consistent with guidelines provided in NEI 12-02, Revision 1 (Reference 4).

3. **Level where fuel remains covered** - Indicated level on either the primary or backup instrument channel of greater than elevation 315'-11.5", which is the elevation of the top of the Spent Fuel Racks plus the accuracy of the SFP level instrument channel, will determined during the engineering and design phase. This monitoring level assures that there is adequate water level above the stored fuel seated in the rack.

IV. Instruments

The design of the instruments will be consistent with the guidelines of NRC JLD-ISG-2012-03 and NEI 12-02 as discussed below.

Primary and backup instrument channels will consist of fixed components. The primary and backup instrument channel level sensing components will be located and permanently mounted in the SFP. Primary and backup level indication will be installed in the Main Control Room. The primary and backup instrument channels will provide continuous level indication over a minimum range of about 24 feet from the high SFP water level elevation of 340'-0" to the top of the spent fuel racks at elevation 315'-11.5". This continuous level indication will be provided by a guided wave radar system, submersible pressure transducer, or other appropriate level sensing technology that will be determined during the detailed engineering design phase of the project.

Primary instrument channel level sensing components will be located in the northeast corner of the SFP. Backup instrument channel level sensing components will be located near the northwest corner of the SFP. The locations of the sensors are depicted on the *Plan View of SFP Showing New SFP Level Instrumentation* in Section XVIII, Drawings.

Reliability:

Reliability of the primary and backup instrument channels will be assured by conformance with the guidelines of NRC JLD-ISG-2012-03 and NEI 12-02, as discussed in Section VII, Qualification. Reliable water level indication will be functional during all modes of operation consistent with Section XV, Testing and Calibration.

Instrument Channel Design Criteria:

Instrument channel design criteria will be consistent with the guidelines of NRC JLD-ISG-2012-03, NEI 12-02, and the applicable portions of the NMP1 UFSAR. If wireless or other advanced technologies are used:

- An evaluation will be performed to address their interaction with other plant systems, failure modes, and impact on cyber security controls.
- The use of such technologies will be evaluated for any possible adverse impact it may have on other plant equipment likely to be used at the same time as the SFP instrumentation is functioning.
- The ability to perform in the environment in which it may be called upon to function will be demonstrated consistent with the Qualification requirements of this Integrated Plan.
- They will meet the same requirements as wired technologies as specified in this Integrated Plan.

Wireless technologies that might be used are not Critical Digital Assets as defined in NEI 08-09, *Cyber Security Plan for Nuclear Power Reactors* (Reference 11); however, if a wireless technology is utilized, the NMP1 cyber security plan will be adhered to with respect to its implementation.

The remaining design requirements will be met through the selection of the sensors during the engineering and design phase.

V. Arrangement

SFP water level sensors will be installed in the northeast corner and near the northwest corner of the SFP at elevation 340 feet. Transmitters will be located in the Reactor Building at elevation 318 feet immediately below the SFP operating floor. This elevation is expected to have a lower temperature and will not have a 100% steam condensing environment. The radiation dose at the transmitter location will also be less as the concrete SFP walls will provide significant radiation shielding. The SFP walls will also provide protection from event generated missiles. These locations provide reasonable protection against missiles and will not interfere with SFP activities. The SFP is seismically qualified for a Design Basis Earthquake. Credited equipment and cables will be protected from event generated missiles by use of new or existing barriers.

The sensors will be located such that they cannot interfere with movement of the fuel handling machine and will not interfere with fuel cask transfers to the onsite Independent Spent Fuel Storage Installation.

Cabling for power supplies and indications for each channel will be routed in separate conduits from cabling for the other channels. Separation will be maintained between the primary and backup channel cables and enclosures.

VI. Mounting

Mounting will be Seismic Class 1. Installed equipment will be seismically qualified to maintain the current seismic class of the SFP which is Seismic Class 1 (NMP1 UFSAR section X.H.2.0 and X.J.2.1, Reference 10). An evaluation of other hardware stored in the SFP will be conducted to ensure it will not create an adverse interaction with the fixed SFP instrument locations.

VII. Qualification

The primary and backup channel sensors will be reliable at temperature, humidity, and radiation levels consistent with the SFP water at saturation conditions for an extended period. Saturation temperature at the bottom of the SFP, assuming normal water level will be approximately 255°F. Post event temperature at sensors located above the SFP is assumed to be 212°F. Post event humidity near and above the SFP is assumed to be 100% with condensing steam. Equipment will be qualified for expected conditions at the installed location assuming that normal power is unavailable and that the SFP has been at saturation for an extended period. Equipment located in the vicinity of the SFP will be qualified to withstand peak and total integrated dose radiation levels for its installed location assuming that post event SFP water level is equal to the top of the spent fuel racks (Level 3) for an extended period of time. Impact from a concentrated borated water environment condition is not applicable to the NMP1 SFP.

Transmitters will be located in the Reactor Building at elevation 318 feet immediately below the SFP operating floor. This elevation is expected to have a lower temperature. Exposure of the electronics to temperatures above 150°F may result in equipment failure. Expected area environmental conditions will be determined during the engineering and design phase to verify that the equipment will operate at the expected temperatures.

Cables coupling the sensor to the transmitter will be installed in dedicated conduit. The cables from the transmitter to the control room will be routed through existing or new cable raceways such that they will be protected from event generated missiles.

Instrument channel reliability will be demonstrated through a combination of design, analyses, operating experience, and/or testing of channel components for the following sets of parameters:

- Conditions in the area of instrument channel component use for all instrument components,
- Effects of shock and vibration on all instrument channel components, and
- Seismic effects on instrument channel components used during and following a potential seismic event for only installed components.

Augmented quality requirements, similar to those applied to fire protection, will be applied to this project.

Temperature, humidity and radiation levels consistent with conditions in the vicinity of the SFP and the area of use, considering normal operational, event, and post-event conditions for no fewer than seven days post-event, or until off-site resources can be deployed by the mitigating strategies resulting from Order EA-12-049 (Reference 2), will be addressed in the engineering and design phase. Examples of post-event (beyond-design-basis) conditions that will be considered are:

- Radiological conditions for a normal refueling quantity of freshly discharged (100 hours) fuel with the SFP water level 3 as described in this plan,
- Temperatures of 212 degrees F and 100% relative humidity environment,
- Boiling water and/or steam environment, and
- The impact of FLEX mitigating strategies.

Components of the instrument channels will be qualified for shock and vibration using one or more of the following methods:

- Components will be supplied by manufacturers using commercial quality programs (such as ISO9001, *Quality management systems – Requirements* (Reference 8)) with shock and vibration requirements included in the purchase specification at levels commensurate with portable hand-held device or transportation applications;
- Components will have a substantial history of operational reliability in environments with significant shock and vibration loading, such as portable hand-held device or transportation applications; or
- Components will be inherently resistant to shock and vibration loadings, such as cables.

The following measures will be used to verify that the design and installation is adequate for seismic effects on instrument channel components used after a potential seismic event for installed components (with the exception of battery chargers and replaceable batteries). Applicable components of the instrument channels will be rated by the manufacturer (or otherwise tested) for seismic effects at levels commensurate with those of postulated design basis event conditions in the location of the instrument channel component using one or more of the following methods:

- A substantial history of operational reliability in environments with significant vibration, such as for portable hand-held devices or transportation applications. Such a vibration design envelope will be inclusive of the effects of seismic motion imparted to the components proposed at the location of the proposed installation;

- Adequacy of seismic design and installation will be demonstrated based on the guidance in Sections 7, 8, 9, and 10 of IEEE Standard 344-2004, *IEEE Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations*, (Reference 9) or a substantially similar industrial standard;
- Proposed devices will be demonstrated to be substantially similar in design to models that have been previously tested for seismic effects in excess of the plant design basis at the location where the instrument will be installed (g-levels and frequency ranges); or
- The capability to withstand seismic motion consistent with that of existing design basis loads at the installed locations will be demonstrated

VIII. Independence

The primary instrument channel will be redundant to and independent of the backup instrument channel, including power supplies.

IX. Power Supplies

The primary and backup channels will be powered from dedicated batteries and local battery chargers. The battery chargers for both channels will normally be powered from non-safety related 120V AC power. Minimum battery life of 72 hours will be provided. The battery systems will include provision for battery replacement should the battery charger be unavailable following the event. Spare batteries will be readily available.

During a loss of normal power, the battery chargers will be connectable to another 120V AC power source. This will be from portable generators stored onsite, consistent with the reasonable protection requirements associated with NEI 12-06 (Reference 5), or from generators deployed from off-site by the mitigating strategies resulting from Order EA-12-049, at approximately 24 hours after the event.

X. Accuracy

The accuracy will be consistent with the guidelines of NRC JLD-ISG-2012-03 and NEI 12-02. Instrument channels will be designed such that they will maintain their design accuracy following a power interruption or change in power source without recalibration.

Accuracy will consider SFP conditions, e.g., saturated water and steam environment. Additionally, instrument accuracy will be sufficient to allow trained personnel to determine when the actual water level exceeds the specified lower level of each indicating range (levels 1, 2 and 3) without conflicting or ambiguous indication. The accuracy will consider the resolution requirements of Figure 1 of NEI 12-02.

Actual accuracy for the indication under all required conditions will be determined during the engineering and design phase.

XI. Testing

Testing will be consistent with the guidelines of NRC JLD-ISG-2012-03 and NEI 12-02. Instrument channel design will provide for routine testing and calibration that can be performed in-situ consistent with Order EA-12-051 and the guidance in NEI 12-02. Details will be determined during the engineering and design phase. Additional testing and calibration information is provided in Section XV of this plan.

XII. Display

Primary and backup channel remote SFP water level indication will be provided in the NMP1 Control Room. The displays will be consistent with the guidelines of NRC JLD-ISG-2012-03 and NEI 12-02 by providing on-demand or continuous indication of SFP water level.

The NMP1 Control Room location for the SFP water level indicators meets the following requirements:

- Promptly accessible to the appropriate plant staff, including during the occurrence of a SFP drain down event,
- Located outside of the area surrounding the SFP floor at an appropriate distance from the radiological sources resulting from an event impacting the SFP,
- Inside a structure providing protection against adverse weather, and
- Located outside of any very high radiation areas or LOCKED HIGH RAD AREA during normal operation.

XIII. Training

The Systematic Approach to Training (SAT) will be used to identify the population to be trained and to determine both the initial and continuing elements of the required training. Training will be completed prior to placing the instrumentation in service.

XIV. Procedures

Procedures will be developed using guidelines and vendor instructions to address the maintenance, operation, and abnormal response issues associated with the new SFP instrumentation.

Procedures will address a strategy to ensure SFP water level addition is initiated at an appropriate time consistent with implementation of NEI 12-06, *Diverse and Flexible Coping Strategies (FLEX) Implementation Guide* (References 5 and 7).

Procedures will also address the following situations:

- In the event an instrument channel ceases to function during an event, the methodology for returning an instrument channel to normal service within a period of time consistent with the emergency conditions that may apply at the time.
- In the event an instrument channel must be replaced during an event, the methodology for utilizing commercially available components that may or may not meet all of the qualifications stated in Section VII of this plan to maintain the instrument channel functionality until the instrument channel is restored to normal service.

XV. Testing and Calibration

Processes will be established and maintained for scheduling and implementing necessary testing and calibration of the primary and backup SFP water level instrument channels to maintain the instrument channels at the design accuracy. Testing and calibration of the instrumentation will be consistent with vendor recommendations and any other documented basis. Calibration will be specific to the mounted instrument and the monitor. Out of service time as identified in NEI 12-02 will be incorporated consistent with the programmatic process used for compliance with NRC Order EA-12-049, Issuance of Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Reference 2). Functionality testing will be performed at the frequency delineated in NEI 12-02. Additional testing information is provided in Section XI of this plan.

Instrument channel out of service times as identified in NEI 12-02 will be implemented and controlled consistent with the programmatic process used for compliance with NRC Order EA-12-051.

XVI. Need for Relief and Basis

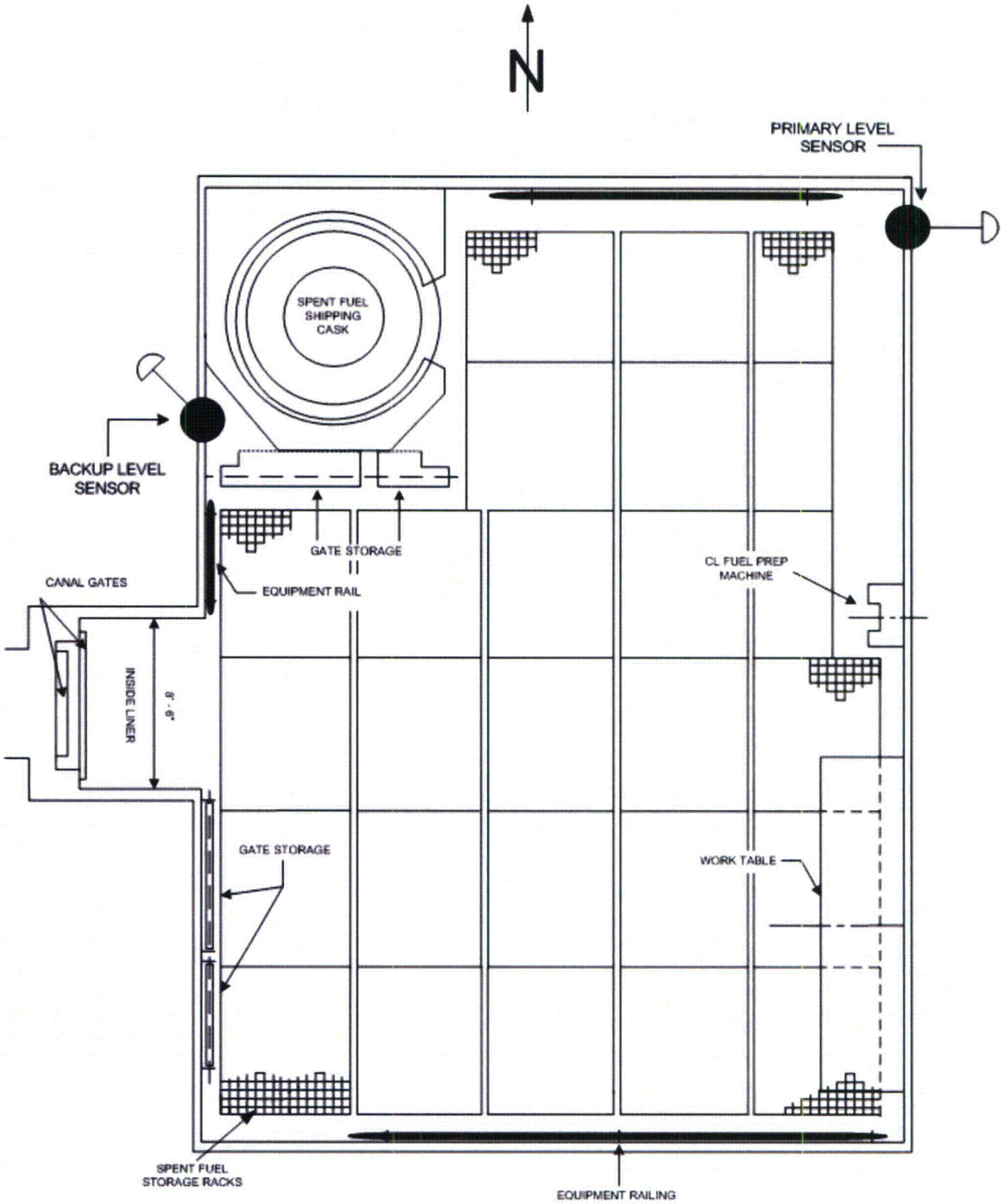
CENG is not requesting relief from the requirements of Order EA-12-051 or the guidance in NRC JLD-ISG-2012-03 at this time.

Consistent with the requirements of Order EA-12-051 and the guidance in NEI 12-02, CENG will submit six-month reports that will delineate the progress made, any proposed changes in the compliance methods, updates to the schedule, and if needed, requests for relief and their bases.

XVII. References

1) EA-12-051, *Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation*, March 12, 2012
2) EA-12-049, *Issuance of Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events*, March 12, 2012
3) NRC JLD-ISG-2012-03, *Compliance with Order EA-12-051, Reliable Spent Fuel Pool Instrumentation*, Revision 0, August 29, 2012
4) NEI 12-02, *Industry Guidance for Compliance with NRC Order EA-12-051, "To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation"*, Revision 1, August 2012
5) NEI 12-06, *Diverse and Flexible Coping Strategies (FLEX) Implementation Guide*, Revision 0, August 2012
6) Letter from M. G. Korsnick (CENG) to Document Control Desk (NRC), dated October 26, 2012, *Initial Status Report in Response to Commission Order Modifying Licenses with Regard to Requirements for Reliable Spent Fuel Pool Instrumentation* (Order Number EA-12-051)
7) Letter from M. G. Korsnick (CENG) to Document Control Desk (NRC), dated October 26, 2012, *Initial Status Report in Response to Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049)*
8) ISO9001, *Quality Management Systems – Requirements*
9) IEEE Standard 344-2004, *IEEE Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations*
10) Nine Mile Point Unit 1 Updated Final Safety Analysis Report, Revision 22, October 2011
11) NEI 08-09, *Cyber Security Plan for Nuclear Power Reactors*, April 2010

XVIII. Drawing



Plan View of NMP1 SFP Showing New Level Instrumentation

ATTACHMENT (3)

NINE MILE POINT UNIT 2 INTEGRATED PLAN FOR RELIABLE SPENT FUEL POOL INSTRUMENTATION

Constellation Energy Nuclear Group, LLC
February 28, 2013

ATTACHMENT 3

NINE MILE POINT UNIT 2 INTEGRATED PLAN FOR RELIABLE SPENT FUEL POOL INSTRUMENTATION

I. Introduction

This integrated plan provides the Nine Mile Point Unit 2 (NMP2) approach for complying with Order EA-12-051 (Reference 1) using the methods described in NRC JLD-ISG-2012-03 (Reference 3). The current revision of the NMP2 Integrated Plan is based on our conceptual design information and will be revised as we proceed with detailed design engineering. Consistent with the requirements of Order EA-12-051 and the guidance in NEI 12-02, our six-month reports will delineate progress made, any proposed changes in our compliance methods, updates to the schedule, and if needed, requests for relief and the bases.

II. Schedule

Installation of reliable SFP water level instrumentation is scheduled to be completed prior to startup from the Spring 2016 refueling outage (Reference 6).

The current milestones are:

- Commence Engineering and Design 2Q2013
- Complete Engineering and Design 1Q2014
- Receipt of SFP Instruments 3Q2014
- Commence Installation of SFP Instruments 4Q2014
- Close out Project/Plant Turnover 2Q2015

III. Identification of Spent Fuel Pool Water Levels

The wet spent-fuel storage facility (SFP) is located on the refueling floor in the secondary containment. It provides specially designed underwater storage space for the spent fuel assemblies which require shielding and cooling during storage and handling. Normal makeup water source to the SFP is from the condensate transfer system. The important levels for the SFP are list as follows:

<u>Key SFP water levels:</u>

1. **Level adequate to support operation of the normal SFP cooling system** – Indicated water level on either the primary or backup instrument channel of greater than elevation 352' – 7.5" (based on loss of inlet flow to the SFP Surge Tanks as water level lowers below the skimmer weirs which results in a loss of reliable suction to SFP Cooling Pumps) plus the accuracy of the SFP level instrument channel, which will be determined during the engineering and design phase (NMP2 USAR Section 9.1, Reference 10). Normal operating level is maintained at elevation 352'-10" (+/- 1").

2. **Level adequate to provide substantial radiation shielding for a person standing on the SFP operating deck** - Indicated water level on either the primary or backup instrument channel of greater than elevation 334' – 11.9" plus the accuracy of the SFP water level instrument channel, which will be determined during the engineering and design phase. This elevation is approximately 5' above the top of the fuel racks and ensures a minimum level of water shielding above the top of the fuel racks. Calculations performed determined that with 5' of water above the top of the racks, the largest calculated dose rate near the edge of the SFP would be well below 100 mRem/hr. Calculations to determine dose rates near the edge of the SFP with 5' of water above the top of the fuel racks were performed using SAS2H/ORIGEN-S or ORIGEN-ARP for source term calculations and MCNP5 code was used to calculate gamma (primary and capture) and neutron dose rates at the locations of interest. MCNP5 is a general-purpose Monte-Carlo N-Particle code that can be used for neutron, photon, electron, or coupled neutron/photon/electron transport. This monitoring level ensures there is adequate water level to provide substantial radiation shielding for personnel to respond to Beyond-Design-Basis External Events and to initiate SFP makeup strategies consistent with guidelines provided in NEI 12-02, Revision 1 (Reference 4).

3. **Level where fuel remains covered** - Indicated water level on either the primary or backup instrument channel of greater than elevation 329'-11.9", which is the elevation of the top of the Spent Fuel Racks plus the accuracy of the SFP water level instrument channel, will be determined during the engineering and design phase. This monitoring level assures that there is adequate water level above the stored fuel seated in the rack.

IV. Instruments

The design of the instruments will be consistent with the guidelines of NRC JLD-ISG-2012-03 and NEI 12-02 as discussed below.

Primary and backup instrument channels will consist of fixed components. The primary and backup instrument channel level sensing components will be located and permanently mounted in the SFP. Primary and backup level indication will be installed in the Main Control Room. The primary and backup instrument channels will provide continuous level indication over a minimum range of about 24 feet from the high SFP water level elevation of 354'-0" to the top of the spent fuel racks at elevation 329'-11.9". This continuous level indication will be provided by a guided wave radar system, submersible pressure transducer, or other appropriate level sensing technology that will be determined during the detailed engineering design phase of the project.

Primary instrument channel level sensing components will be located in the northeast corner of the SFP. Backup instrument channel level sensing components will be located in the northwest corner of the SFP. The locations of the sensors are depicted on the *Plan View of SFP Showing New SFP Level Instrumentation* in Section XVIII, Drawings.

Reliability:

Reliability of the primary and backup instrument channels will be assured by conformance with the guidelines of NRC JLD-ISG-2012-03 and NEI 12-02, as discussed in Section VII, Qualification. Reliable water level indication will be functional during all modes of operation consistent with Section XV, Testing and Calibration.

Instrument Channel Design Criteria:

Instrument channel design criteria will be consistent with the guidelines of NRC JLD-ISG-2012-03, NEI 12-02, and the applicable portions of the NMP2 USAR. If wireless or other advanced technologies are used:

- An evaluation will be performed to address their interaction with other plant systems, failure modes, and impact on cyber security controls.
- The use of such technologies will be evaluated for any possible adverse impact it may have on other plant equipment likely to be used at the same time as the SFP instrumentation is functioning.
- The ability to perform in the environment in which it may be called upon to function will be demonstrated consistent with the Qualification requirements of this Integrated Plan.
- They will meet the same requirements as wired technologies as specified in this Integrated Plan.

Wireless technologies that might be used are not Critical Digital Assets as defined in NEI 08-09, *Cyber Security Plan for Nuclear Power Reactors* (Reference 12); however, if a wireless technology is utilized, the NMP2 cyber security plan will be adhered to with respect to its implementation.

The remaining design requirements will be met through the selection of the sensors during the engineering and design phase.

V. Arrangement

SFP water level sensors will be installed in the northeast corner and in the northwest corner of the SFP at elevation 353'-10". Transmitters will be located in the Reactor Building at elevation 328'-10" immediately below the SFP operating floor. This elevation is expected to have a lower temperature and will not have a 100% steam condensing environment. The radiation dose at the transmitter location will also be less as the concrete SFP walls will provide significant radiation shielding. The SFP walls will also provide protection from event generated missiles. These locations provide reasonable protection against missiles and will not interfere with SFP activities. The SFP is seismically qualified for a Design Basis Earthquake. Credited equipment and cables will be protected from event generated missiles by use of new or existing barriers.

The sensors will be located such that they cannot interfere with movement of the fuel handling machine and will not interfere with fuel cask transfers to the onsite Independent Spent Fuel Storage Installation.

Cabling for power supplies and indications for each channel will be routed in separate conduits from cabling for the other channels. Separation will be maintained between the primary and backup channel cables and enclosures.

VI. Mounting

Mounting will be Seismic Class 1. Installed equipment will be seismically qualified to maintain the current seismic class of the SFP which is Seismic Class 1 (NMP2 USAR section 9.1, Reference 10). An evaluation of other hardware stored in the SFP will be conducted to ensure it will not create an adverse interaction with the fixed SFP instrument locations.

VII. Qualification

The primary and backup channel sensors will be reliable at temperature, humidity, and radiation levels consistent with the SFP water at saturation conditions for an extended period. Saturation temperature at the bottom of the SFP, assuming normal water level will be approximately 255°F. Post event temperature at sensors located above the SFP is assumed to be 212°F. Post event humidity near and above the SFP is assumed to be 100% with condensing steam. Equipment will be qualified for expected conditions at the installed location assuming that normal power is unavailable and that the SFP has been at saturation for an extended period. Equipment located in the vicinity of the SFP will be qualified to withstand peak and total integrated dose radiation levels for its installed location assuming that post event SFP water level is equal to the top of the spent fuel racks (Level 3) for an extended period of time. Impact from a concentrated borated water environment condition is not applicable to the NMP2 SFP.

Transmitters will be located in the Reactor Building at elevation 328' 10" immediately below the SFP operating floor. This elevation is expected to have lower temperature. Exposure of the electronics to temperatures above 150°F may result in equipment failure. Expected area environmental conditions will be determined during the engineering and design phase to verify that the equipment will operate at the expected temperatures.

Cables coupling the sensor to the transmitter will be installed in dedicated conduit. The cables from the transmitter to the control room will be routed through existing or new cable raceways such that they will be protected from event generated missiles.

Instrument channel reliability will be demonstrated through a combination of design, analyses, operating experience, and/or testing of channel components for the following sets of parameters:

- Conditions in the area of instrument channel component use for all instrument components,
- Effects of shock and vibration on all instrument channel components, and
- Seismic effects on instrument channel components used during and following a potential seismic event for only installed components.

Augmented quality requirements, similar to those applied to fire protection, will be applied to this project.

Temperature, humidity and radiation levels consistent with conditions in the vicinity of the SFP and the area of use, considering normal operational, event, and post-event conditions for no fewer than seven days post-event, or until off-site resources can be deployed by the mitigating strategies resulting from Order EA-12-049 (Reference 2), will be addressed in the engineering and design phase. Examples of post-event (beyond-design-basis) conditions that will be considered are:

- Radiological conditions for a normal refueling quantity of freshly discharged (100 hours) fuel with the SFP water level 3 as described in this plan,
- Temperatures of 212°F and 100% relative humidity environment,
- Boiling water and/or steam environment, and
- The impact of FLEX mitigating strategies.

Components of the instrument channels will be qualified for shock and vibration using one or more of the following methods:

- Components will be supplied by manufacturers using commercial quality programs (such as ISO9001, *Quality management systems – Requirements* (Reference 8)) with shock and vibration requirements included in the purchase specification at levels commensurate with portable hand-held device or transportation applications;
- Components will have a substantial history of operational reliability in environments with significant shock and vibration loading, such as portable hand-held device or transportation applications; or
- Components will be inherently resistant to shock and vibration loadings, such as cables.

The following measures will be used to verify that the design and installation is adequate for seismic effects on instrument channel components used after a potential seismic event for installed components (with the exception of battery chargers and replaceable batteries). Applicable components of the instrument channels will be rated by the manufacturer (or otherwise tested) for seismic effects at levels commensurate with those of postulated design basis event conditions in the location of the instrument channel component using one or more of the following methods:

- A substantial history of operational reliability in environments with significant vibration, such as for portable hand-held devices or transportation applications. Such a vibration design envelope will be inclusive of the effects of seismic motion imparted to the components proposed at the location of the proposed installation;

- Adequacy of seismic design and installation will be demonstrated based on the guidance in Sections 7, 8, 9, and 10 of IEEE Standard 344-2004, *IEEE Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations*, (Reference 9) or a substantially similar industrial standard; or
- Proposed devices will be demonstrated to be substantially similar in design to models that have been previously tested for seismic effects in excess of the plant design basis at the location where the instrument will be installed (g-levels and frequency ranges); or
- The capability to withstand seismic motion consistent with that of existing design basis loads at the installed locations will be demonstrated.

VIII. Independence

The primary instrument channel will be redundant to and independent of the backup instrument channel, including power supplies.

IX. Power Supplies

The primary and backup channels will be powered from dedicated batteries and local battery chargers. The battery chargers for both channels will normally be powered from non-safety related 120V AC power. Minimum battery life of 72 hours will be provided.

During a loss of normal power, the battery chargers will be connectable to another 120V AC power source. This will be from portable generators stored onsite, consistent with the reasonable protection requirements associated with NEI 12-06 (Reference 5), or from generators deployed from off-site by the mitigating strategies resulting from Order EA-12-049, at approximately 24 hours after the event. The battery systems will include provision for battery replacement should the battery charger be unavailable following the event. Spare batteries will be readily available.

X. Accuracy

The accuracy will be consistent with the guidelines of NRC JLD-ISG-2012-03 and NEI 12-02. Instrument channels will be designed such that they will maintain their design accuracy following a power interruption or change in power source without recalibration.

Accuracy will consider SFP conditions, e.g., saturated water and steam environment. Additionally, instrument accuracy will be sufficient to allow trained personnel to determine when the actual water level exceeds the specified lower level of each indicating range (levels 1, 2 and 3) without conflicting or ambiguous indication. The accuracy will consider the resolution requirements of Figure 1 of NEI 12-02.

Actual accuracy for the indication under all required conditions will be determined during the engineering and design phase.

XI. Testing

Testing will be consistent with the guidelines of NRC JLD-ISG-2012-03 and NEI 12-02. Instrument channel design will provide for routine testing and calibration that can be performed in-situ consistent with Order EA-12-051 and the guidance in NEI 12-02. Details will be determined during the engineering and design phase. Additional testing and calibration information is provided in Section XV of this plan.

XII. Display

Primary and backup channel remote SFP water level indication will be provided in the NMP2 Control Room. The displays will be consistent with the guidelines of NRC JLD-ISG-2012-03 and NEI 12-02 by providing on-demand or continuous indication of SFP water level.

The NMP2 Control Room location for the SFP water level indicators meets the following requirements:

- Promptly accessible to the appropriate plant staff, including during the occurrence of a SFP drain down event,
- Located outside of the area surrounding the SFP floor at an appropriate distance from the radiological sources resulting from an event impacting the SFP,
- Inside a structure providing protection against adverse weather, and
- Located outside of any very high radiation areas or LOCKED HIGH RAD AREA during normal operation.

XIII. Training

The Systematic Approach to Training (SAT) will be used to identify the population to be trained and to determine both the initial and continuing elements of the required training. Training will be completed prior to placing the instrumentation in service.

XIV. Procedures

Procedures will be developed using guidelines and vendor instructions to address the maintenance, operation, and abnormal response issues associated with the new SFP instrumentation.

Procedures will address a strategy to ensure SFP water level addition is initiated at an appropriate time consistent with implementation of NEI 12-06, *Diverse and Flexible Coping Strategies (FLEX) Implementation Guide* (References 5 and 7).

Procedures will also address the following situations:

- In the event an instrument channel ceases to function during an event, the methodology for returning an instrument channel to normal service within a period of time consistent with the emergency conditions that may apply at the time.
- In the event an instrument channel must be replaced during an event, the methodology for utilizing commercially available components that may or may not meet all of the qualifications stated in Section VII of this plan to maintain the instrument channel functionality until the instrument channel is restored to normal service.

XV. Testing and Calibration

Processes will be established and maintained for scheduling and implementing necessary testing and calibration of the primary and backup SFP water level instrument channels to maintain the instrument channels at the design accuracy. Testing and calibration of the instrumentation will be consistent with vendor recommendations and any other documented basis. Calibration will be specific to the mounted instrument and the monitor. Out of service time as identified in NEI 12-02 will be incorporated consistent with the programmatic process used for compliance with NRC Order EA-12-049, Issuance of Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Reference 2). Functionality testing will be performed at the frequency delineated in NEI 12-02. Additional testing information is provided in Section XI of this plan.

Instrument channel out of service times as identified in NEI 12-02 will be implemented and controlled consistent with the programmatic process used for compliance with NRC Order EA-12-051.

XVI. Need for Relief and Basis

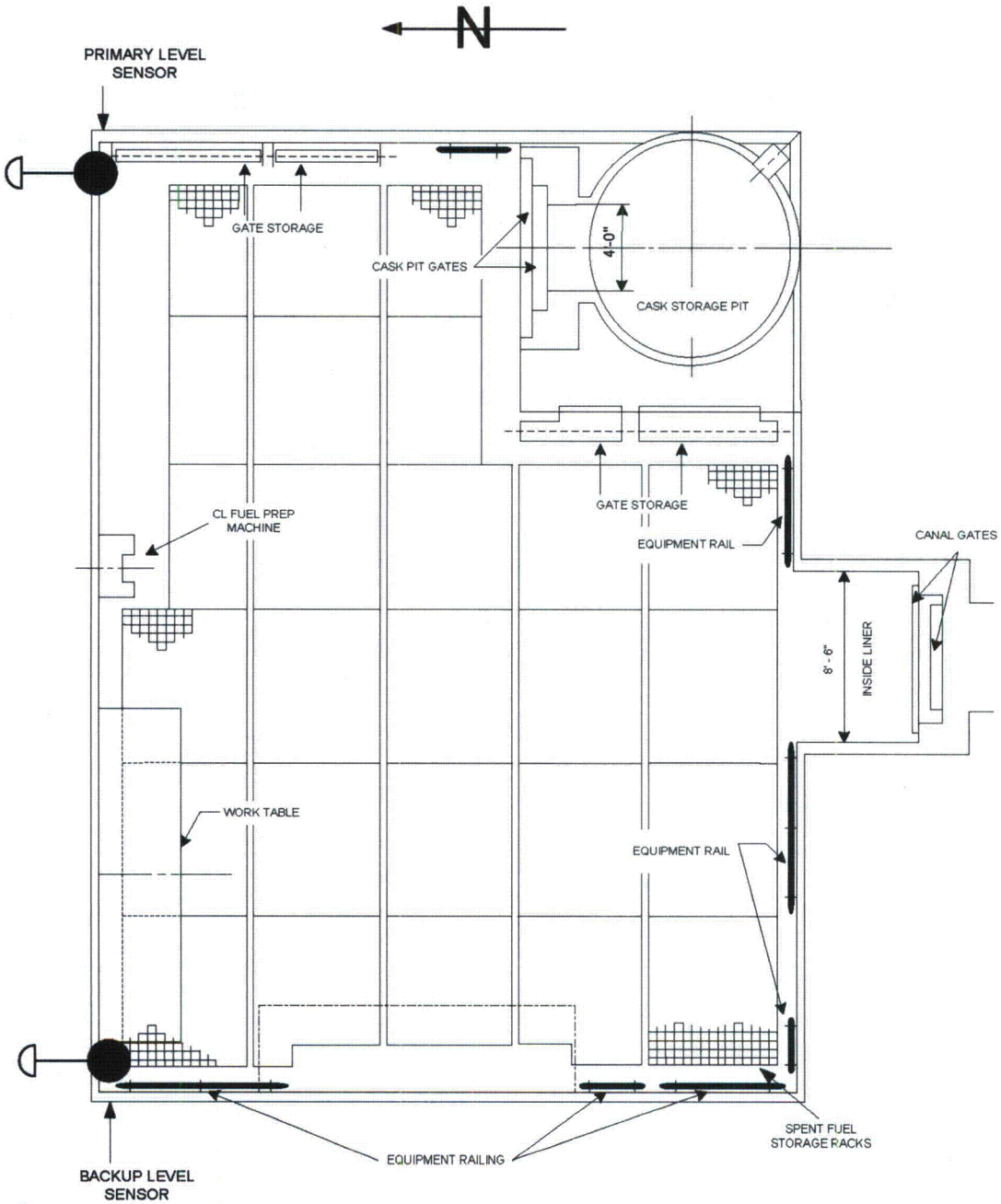
CENG is not requesting relief from the requirements of Order EA-12-051 or the guidance in NRC JLD-ISG-2012-03 at this time.

Consistent with the requirements of Order EA-12-051 and the guidance in NEI 12-02, CENG will submit six-month reports that will delineate the progress made, any proposed changes in the compliance methods, updates to the schedule, and if needed, requests for relief and their bases.

XVII. References

1) EA-12-051, *Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation*, March 12, 2012
2) EA-12-049, *Issuance of Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events*, March 12, 2012
3) NRC JLD-ISG-2012-03, *Compliance with Order EA-12-051, Reliable Spent Fuel Pool Instrumentation*, Revision 0, August 29, 2012
4) NEI 12-02, *Industry Guidance for Compliance with NRC Order EA-12-051, "To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation"*, Revision 1, August 2012
5) NEI 12-06, *Diverse and Flexible Coping Strategies (FLEX) Implementation Guide*, Revision 0, August 2012
6) Letter from M. G. Korsnick (CENG) to Document Control Desk (NRC), dated October 26, 2012, *Initial Status Report in Response to Commission Order Modifying Licenses with Regard to Requirements for Reliable Spent Fuel Pool Instrumentation* (Order Number EA-12-051)
7) Letter from M. G. Korsnick (CENG) to Document Control Desk (NRC), dated October 26, 2012, *Initial Status Report in Response to Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049)*
8) ISO9001, *Quality management systems – Requirements*
9) IEEE Standard 344-2004, *IEEE Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations*
10) Nine Mile Point Unit 2 Updated Safety Analysis Report, Revision 21, October 2012
11) NEI 08-09, *Cyber Security Plan for Nuclear Power Reactors*, April 2010

XVIII. Drawings



Plan View of Unit 2 SFP Showing New Level Instrumentation

ATTACHMENT (4)

CALVERT CLIFFS INTEGRATED PLAN FOR RELIABLE SPENT FUEL POOL INSTRUMENTATION

Constellation Energy Nuclear Group, LLC
February 28, 2013

ATTACHMENT 4

CALVERT CLIFFS INTEGRATED PLAN FOR RELIABLE SPENT FUEL POOL INSTRUMENTATION

I. Introduction

This integrated plan provides the Calvert Cliffs Nuclear Power Plant, Units 1 and 2 (CCNPP) approach for complying with Order EA-12-051 (Reference 1) using the methods described in NRC JLD-ISG-2012-03 (Reference 3). The current revision of the CCNPP Integrated Plan is based on conceptual design information and will be revised with detailed design engineering is completed. Consistent with the requirements of Order EA-12-051 and the guidance in NEI 12-02 (Reference 4), six-month reports will delineate progress made, any proposed changes in compliance methods, updates to the schedule, and if needed, requests for relief and their bases.

II. Schedule

Installation of reliable Spent Fuel Pool (SFP) water level instrumentation for the SFPs associated with CCNPP Unit 1 and Unit 2 is scheduled to be completed prior to startup from the Unit 2 Spring 2015 refueling outage (Reference 6).

The current milestones are:

- Commence Engineering and Design — 2Q2013
- Complete Engineering and Design — 3Q2013
- Receipt of SFP Instruments — 1Q2014
- Commence Installation of SFP Instruments — 2Q2014
- Close out Project/Plant Turnover — 3Q2014

III. Identification of Spent Fuel Pool Water Levels

CCNPP Unit 1 and Unit 2 discharge irradiated fuel to a set of 2 interconnected SFPs. The gate between the Unit 1 SFP (No. 11) and the Unit 2 SFP (No. 21) is maintained open under administrative controls in accordance with the applicable procedure, OI-24A, Spent Fuel Pool Cooling Pump and Cooler Operation on Spent Fuel Pool Operating Instructions, Revision 00808. Thus, these SFPs are normally inter-connected and at the same water level when the water level in the SFPs is greater than elevation 42'-8", which is above the top of stored fuel seated in the storage racks. It provides specially designed underwater storage space for the spent fuel pool assemblies which require shielding and cooling during storage and handling. The normal makeup water sources to the SFP are from the 11 or 21 refueling water tanks. The important water levels for the pool are as follows:

Key SFP water levels:

1. **Level adequate to support operation of the normal SFP cooling system** – Indicated water level on either the primary or backup instrument channel of greater than elevation 65'-8.5" (based on ensuring the open end of the normal suction lines will not become uncovered) plus the accuracy of the SFP water level instrument channel, which will be determined during the engineering and design phase. (Reference 10).
2. **Level adequate to provide substantial radiation shielding for a person standing on the SFP operating deck** - Indicated water level on either the primary or backup instrument channel of greater than elevation 50'-2" plus the accuracy of the SFP water level instrument channel, which will be determined during the engineering and design phase. This elevation is approximately 5' above the top of the fuel racks and ensures a minimum water level of 5' above the top of the Fuel (Reference 10). CCNPP determined that with 5' of water above the top of the racks, the largest calculated dose rate near the edge of the SFP would be well below 100 mrem/hr. Calculations to determine dose rates near the edge of the SFP with 5' of water above the top of the fuel racks were performed using SAS2H/ORIGEN-S or ORIGEN-ARP for source term calculations and MCNP5 code was used to calculate gamma (primary and capture) and neutron dose rates at the locations of interest. MCNP5 is a general-purpose Monte-Carlo N-Particle code that can be used for neutron, photon, electron, or coupled neutron/ photon/ electron transport. This monitoring level ensures there is adequate water level to provide substantial radiation shielding for personnel to respond to Beyond-Design-Basis External Events and to initiate SFP makeup strategies.
3. **Level where fuel remains covered** - Indicated water level on either the primary or backup instrument channel of greater than elevation 45'-2" plus the accuracy of the SFP water level instrument channel, which will be determined during the design and engineering phase. This monitoring level assures that there is adequate water level above the stored fuel seated in the rack. (Reference 10)

IV. Instruments

The design of the instruments will be consistent with the guidelines of NRC JLD-ISG-2012-03 and NEI 12-02 as discussed below.

Primary and backup instrument channels will consist of fixed components. The primary and backup instrument channel level sensing components will be located and permanently mounted in the SFP.
Measured range will be continuous from the high SFP alarm elevation 67'-2.75" plus the accuracy of the SFP water level instrument channel to the top of the spent fuel racks at elevation 45'-2" minus the accuracy of the SFP water level instrument channel. This continuous level indication will be provided by a guided wave radar system, through air radar, or other appropriate level sensing technology that will be determined during the detailed engineering design phase of the project.

Primary instrument channel level sensing components will be located in the northeast corner of Unit 1 SFP (No. 11). Backup instrument channel level sensing components will be located in the southwest corner of Unit 2 SFP (No. 21). The locations of the sensors are depicted on the *Plan View of Unit 1 & 2 SFPs Showing New SFP Water Level Instrumentation* provided in Section XVIII, Drawings.

Reliability:
Reliability of the primary and backup instrument channels will be assured by conformance with the guidelines of NRC JLD-ISG-2012-03 and NEI 12-02, as discussed in Section VII, Qualification. Reliable water level indication will be functional during all modes of operation consistent with Section XV, Testing and Calibration.

Instrument Channel Design Criteria:
Instrument channel design criteria will be consistent with the guidelines of NRC JLD-ISG-2012-03 and NEI 12-02. If wireless or other advanced technologies are used:

- An evaluation will be performed to address their interaction with other plant systems, failure modes, and impact on cyber security controls.
- The use of such technologies will be evaluated for any possible adverse impact they may have on other plant equipment likely to be used at the same time as the SFP instrumentation is functioning.
- The ability to perform in the environment in which they may be called upon to function will be demonstrated consistent with the Qualification requirements of this Integrated Plan.
- They will meet the same requirements as wired technologies as specified in this Integrated Plan.

Wireless technologies that might be used are not Critical Digital Assets as defined in NEI 08-09, *Cyber Security Plan for Nuclear Power Reactors* (Reference 11); however, if a wireless technology is utilized, the CCNPP cyber security plan will be adhered to with respect to its implementation.

The remaining design requirements will be met through the selection of the sensors during the engineering and design phase.

V. Arrangement

SFP water level sensors will be installed in the northeast corner of Unit 1 SFP (No. 11) and southwest corner of Unit 2 SFP (No. 21). Transmitters will be located on the 45' elevation of the Auxiliary Building, which is below the SFP operating level. This location will provide protection from external missiles and offer lower dose, temperature and humidity levels when compared to equipment located directly above the SFP (Elevation 69').

Only the sensor assemblies will be located above the SFP operating level. Section 5.6.1.3 of the Calvert Cliffs Unit 1 and Unit 2 UFSAR (Reference 10) states in part:

> "In addition to all other loads including OBE and SSE, the steel-framed structure over the spent fuel pool is designed to resist tornadoes and missiles without partial or complete collapse, except for the west wall. A study indicates that the possibility of tornado missiles impacting the spent fuel pool from the west side is remote. Two foot thick concrete for missile protection is provided in the roof and the north, east, and south walls. Since the steel-framed structure is designed to resist tornadoes with all other load combinations as listed in UFSAR Table 5-6 and the cask handling crane is supported by the steel-framed structure, the cask handling crane will not be damaged during the tornado loading."

Based on the above, external missiles will not penetrate the SFP enclosure at the 69' or the 45' elevation. No event-generated missiles are postulated with the exception of items that could fail during a severe earthquake such as glass/plastic portions of light fixtures and pipe insulation. The design will provide adequate protection against these items.

The sensor supports will be designed to shield the sensor from event-generated missiles. The sensor will be located such that they cannot interfere with movement of the spent fuel handling machine and the transfer system carriage.

Cabling for power supplies and indications for each channel will be routed in separate conduits from cabling for the other channel.

VI. Mounting

Mounting will be Seismic Class I. Installed equipment will be seismically qualified to withstand the maximum seismic motion considered in the design of the plant area in which it is installed. An engineering analysis will be conducted during the design to ensure any other hardware stored in the SFP area will not create an adverse interaction with the fixed instrument location.

VII. Qualification

The primary and backup channels will be reliable at temperature, humidity, and radiation levels consistent with the SFP water at saturation conditions for an extended period. Saturation temperature at the bottom of the SFP assuming normal water level will be approximately 255°F. Post-event temperature at sensors located above the SFP is assumed to be 212°F. Post-event humidity near and above the SFP is assumed to be 100% with condensing steam. Equipment will be qualified for expected conditions at the installed location assuming that normal power is unavailable and that the SFP has been at saturation for an

extended period. Equipment located in the vicinity of the SFP will be qualified to withstand peak and total integrated radiation dose levels for its installed location assuming that post-event SFP water level is equal to the top of the spent fuel racks (Level 3) for an extended period of time.

The transmitters will be located on the auxiliary building elevation immediately below the SFP operating floor. This elevation is expected to have a lower temperature and will not have a 100% steam condensing environment. The radiation dose at the transmitters locations will also be less as the concrete SFP walls will provide significant radiation shielding.

Sensor mount locations will not be subject to SFP overflow and the mounts and cables connecting the sensor to the transmitters will be qualified for the SFP environment. Cables coupling the sensor to the transmitters will be installed in dedicated conduit. The amount of exposed cable and conduit on the 69' elevation will be limited to the coax cable required to connect the sensor to the transmitters. The cables from the transmitters to the common control room will be routed through safety related structures and will be protected from event generated missiles.

Instrument channel reliability will be demonstrated via an appropriate combination of design, analyses, operating experience, and/or testing of channel components for the following sets of parameters:

- conditions in the area of the instrument channel component use, for all instrument components,
- effects of shock and vibration on all instrument channel components, and
- seismic effects on instrument channel components used during and following a potential seismic event for installed components.

Augmented quality requirements, similar to those applied to fire protection equipment, will be applied to this project.

Temperature, humidity and radiation levels consistent with conditions in the vicinity of the SFP and the area of use considering normal operational, event and post-event conditions for no fewer than seven days post-event or until off-site resources can be deployed by the mitigating strategies resulting from Order EA-12-049 (Reference 2) will be addressed in the engineering and design phase. Examples of post-event (beyond-design-basis) conditions that will be considered are:

- radiological conditions for a normal refueling quantity of freshly discharged (100 hours) fuel with the SFP water at level 3 as described in this plan,
- temperatures of 212°F and 100% relative humidity environment,
- boiling water and/or steam environment,
- a concentrated borated water environment, and
- the impact of FLEX mitigating strategies.

Components of the instrument channels will be qualified for shock and vibration using one or more of the following methods:

- Components will be supplied by manufacturers using commercial quality programs (such as ISO9001, *Quality management systems – Requirements* (Reference 8)) with shock and vibration requirements included in the purchase specification at levels commensurate with portable hand-held device or transportation applications;
- Components will have a substantial history of operational reliability in environments with significant shock and vibration loading, such as portable hand-held device or transportation applications; or
- Components will be inherently resistant to shock and vibration loadings, such as cables.

The following measures will be used to verify that the design and installation is adequate for seismic effects on instrument channel components used after a potential seismic event for installed components (with the exception of battery chargers and replaceable batteries). Applicable components of the instrument channels will be rated by the manufacturer (or otherwise tested) for seismic effects at levels commensurate with those of postulated design basis event conditions in the location of the instrument channel component using one or more of the following methods:

- a substantial history of operational reliability in environments with significant vibration, such as for portable hand-held devices or transportation applications. Such a vibration design envelope will be inclusive of the effects of seismic motion imparted to the components proposed at the locations of the proposed installation;
- adequacy of seismic design and installation will be demonstrated based on the guidance in Sections 7, 8, 9, and 10 of IEEE Standard 344-2004, *IEEE Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations*, (Reference 9) or a substantially similar industrial standard;
- proposed devices will be demonstrated to be substantially similar in design to models that have been previously tested for seismic effects in excess of the plant design basis at the locations where the instruments will be installed (g-levels and frequency ranges); or
- the capability to withstand seismic motion consistent with that of existing design basis loads at the installed locations will be demonstrated.

VIII. Independence

The primary instrument channel will be redundant to and independent of the backup instrument channel.

IX. Power Supplies

The primary and backup channels will be powered from dedicated batteries and local battery chargers. The battery chargers for both channels will normally be powered from non-safety related 120V AC power. Minimum battery life of 72 hours will be provided. The battery systems will include provision for battery replacement should the battery charger be unavailable following the event.

During the loss of normal power the battery chargers will be connectable to another 120V AC power source. This will be from portable generators stored onsite, consistent with the reasonable protection requirements associated with NEI 12-06 Reference 5), or from generators deployed from off-site by the mitigating strategies resulting from Order EA-12-049, at approximately 24 hours after the event.

X. Accuracy

The accuracy will be consistent with the guidelines of NRC JLD-ISG-2012-03 and NEI 12-02. Instrument channels will be designed such that they will maintain their design accuracy following a power interruption or change in power source without recalibration.

Accuracy will consider SFP conditions, e.g., saturated water, steam environment, or concentrated borated water. Additionally, instrument accuracy will be sufficient to allow trained personnel to determine when the actual water level exceeds the specified lower level of each indicating range (levels 1, 2 and 3) without conflicting or ambiguous indication. The accuracy will consider the resolution requirements of Figure 1 of NEI 12-02. Actual accuracy for the indication under all required conditions will be determined during the engineering and design phase.

XI. Testing

Testing will be consistent with the guidelines of NRC JLD-ISG-2012-03 and NEI 12-02. Instrument channel design will provide for routine testing and calibration that can be performed in-situ consistent with Order EA-12-051 and the guidance in NEI 12-02. Details will be determined during the engineering and design phase. Additional testing and calibration information is provided in Section XV of this plan.

XII. Display

Credited SFP water level indication will be provided in the common Control Room. The display will be consistent with the guidelines of NRC JLD-ISG-2012-03 and NEI 12-02.

Pre-event indication will be continuous. Post-event indication may be continuous or intermediate. The requirement for continuous or intermittent indication and the frequency of readings will be determined during the engineering and design phase.

The Control Room is:

- promptly accessible to the appropriate plant staff, including during the occurrence of a SFP drain down event,

- located outside of the area surrounding the SFP floor at an appropriate distance from the radiological sources resulting from an event impacting the SFP,
- located in a structure that provides protection against adverse weather, and
- located outside of any high radiation areas or LOCKED HIGH RAD AREA during normal operation.

XIII. Training

The Systematic Approach to Training (SAT) will be used to identify the population to be trained and to determine both the initial and continuing elements of the required training. Training will be completed prior to placing the instrumentation in service.

XIV. Procedures

Procedures will be developed using guidelines and vendor instructions to address the maintenance, operation, and abnormal response issues associated with the new SFP instrumentation.

Procedures will address a strategy to ensure SFP water level addition is initiated at an appropriate time consistent with implementation of NEI 12-06, *Diverse and Flexible Coping Strategies (FLEX) Implementation Guide* (References 5 and 7).

Procedures will also address the following situations:

- In the event an instrument channel ceases to function during an event, the methodology for returning an instrument channel to normal service within a period of time consistent with the emergency conditions that may apply at the time.
- In the event an instrument channel must be replaced during an event, the methodology for utilizing commercially available components that may or may not meet all of the qualifications stated in Section VII of this plan to maintain the instrument channel functionality, until the instrument channel is restored to normal service.

XV. Testing and Calibration

Processes will be established and maintained for scheduling and implementing necessary testing and calibration of the primary and backup SFP water level instrument channels to maintain the instrument channels at the design accuracy. Testing and calibration of the instrumentation will be consistent with vendor recommendations and any other documented basis. Calibration will be specific to the mounted instrument and the monitor. Out of service time as identified in NEI 12-02 will be incorporated consistent with the programmatic process used for compliance with NRC Order EA-12-049, Issuance of Order to

Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Reference 2). Functionality testing will be performed at the frequency specified in NEI 12-02. Additional testing and calibration information is provided in Section XI of this plan.

Instrument channel out of service times as identified in NEI 12-02 will be implemented and controlled consistent with the programmatic process used for compliance with NRC Order EA-12-051.

XVI. Need for Relief and Basis

CENG is not requesting relief from the requirements of Order EA-12-051 or the guidance in NRC JLD-ISG-2012-03 at this time.

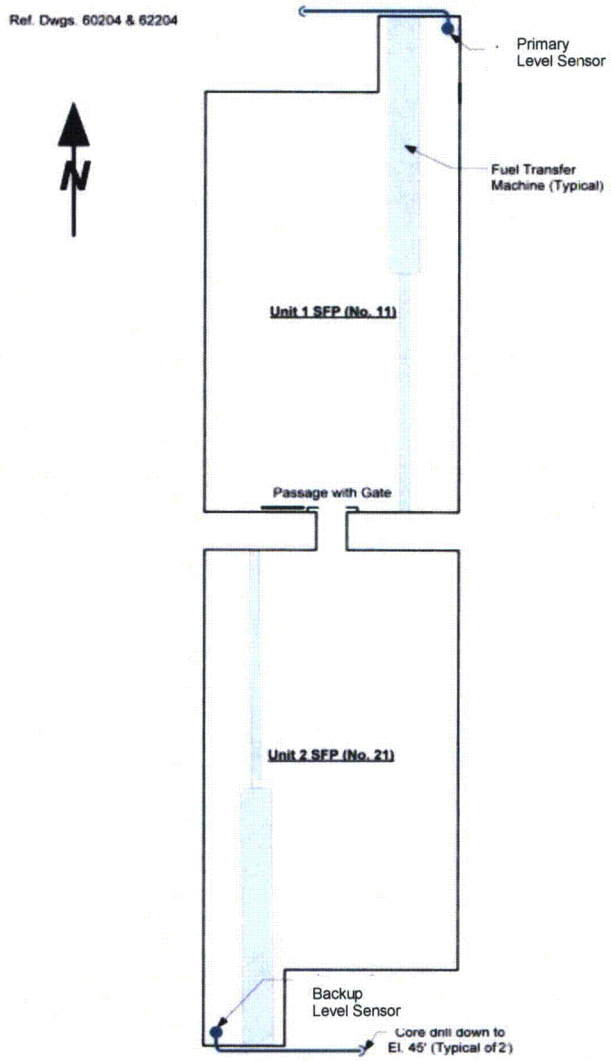
Consistent with the requirements of Order EA-12-051 and the guidance in NEI 12-02, CENG will submit six-month reports that will delineate the progress made, any proposed changes in the compliance methods, updates to the schedule, and if needed, requests for relief and their bases.

XVII. References

1) EA-12-051, *Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation*, March 12, 2012
2) EA-12-049, *Issuance of Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events*, March 12, 2012
3) NRC JLD-ISG-2012-03, *Compliance with Order EA-12-051, Reliable Spent Fuel Pool Instrumentation*, Revision 0, August 29, 2012
4) NEI 12-02, *Industry Guidance for Compliance with NRC Order EA-12-051, "To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation,"* Revision 1, August 2012
5) NEI 12-06, *Diverse and Flexible Coping Strategies (FLEX) Implementation Guide*, Revision 0, August 2012
6) Letter from M. G. Korsnick (CENG) to Document Control Desk (NRC), dated October 26, 2012, *Initial Status Report in Response to Commission Order Modifying Licenses with Regard to Requirements for Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051)*
7) Letter from M. G. Korsnick (CENG) to Document Control Desk (NRC), dated October 26, 2012, *Initial Status Report in Response to Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049)*
8) ISO9001, *Quality management systems – Requirements*
9) IEEE Standard 344-2004, *IEEE Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations*
10) Calvert Cliffs Unit 1 and Unit 2 UFSAR, Revision 45

11) NEI 08-09, *Cyber Security Plan for Nuclear Power Reactors*

XVIII. New SFP Water Level Instrumentation



Plan View of Unit 1 & 2 SFPs Showing New Level Instrumentation

ATTACHMENT (5)

REGULATORY COMMITMENTS CONTAINED IN THIS CORRESPONDENCE

ATTACHMENT (5)

REGULATORY COMMITMENTS CONTAINED IN THIS CORRESPONDENCE

The following table identifies actions committed to in this document. Any other statements in this submittal are provided for information purposes and are not considered to be regulatory commitments.

REGULATORY COMMITMENT	DUE DATE
Ensure the final design details and associated procedure guidance for the SFP Integrated Plan, as well as any revisions to the information contained in the attachments, is provided in the 6-month Integrated Plan updates required by NRC Order Number EA-12-051.	Six month intervals from February 28, 2013