Paul M. Swift
Manager – Engineering Services

P.O. Box 63
Lycoming, New York 13093
315.349.5208

CENG
a joint venture of
Constellation Energy
EDF

July 5, 2013

U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

ATTENTION: Document Control Desk

SUBJECT: **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

Response to Request for Additional Information Re: Overall Integrated Plan for Reliable Spent Fuel Pool Instrumentation (Order EA-12-051) (TAC Nos. MF1131 and MF1132)

REFERENCE:

(a) Letter from M. G. Korsnick (CENG) to the U.S. NRC, Overall Integrated Plan for Reliable Spent Fuel Pool Instrumentation, dated February 28, 2013 (ML13066A172)

(b) NRC Order Number EA-12-051, Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation, dated March 12, 2012 (ML12054A679)

(c) Letter from M. C. Thadani (NRC) to M. G. Korsnick (CENG), Nine Mile Point Nuclear Station, Units 1 and 2 – Request for Additional Information Re: Overall Integrated Plan for Reliable Spent Fuel Pool Instrumentation (Order EA-12-051) (TAC NOS. MF1131 and MF1132), dated June 5, 2013 (ML13154A399)

By letter dated February 28, 2013 (Reference a), Constellation Energy Nuclear Group, LLC (CENG) submitted an Overall Integrated Plan in response to the March 12, 2012 (Reference b), NRC Order modifying licenses with regard to requirements for Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051) for the Nine Mile Point Nuclear Station, LLC (NMPNS), Units 1 and 2 (NMP1 and NMP2). By letter dated June 5, 2013 (Reference c), the NRC requested that CENG respond to a request for additional information by July 5, 2013. Attachment (1) provides the requested response.

Attachment (2) defines the regulatory commitments contained within this correspondence.

A001
NRR

If there are any questions concerning this letter, please contact John Dosa, Director - Licensing, at john.dosa@cengllc.com or (315) 349-5219.

I declare under penalty of perjury that the foregoing is true and correct. Executed on July 5, 2013.

Sincerely,

Paul M. Swift

PMS/STD

Attachments: (1) Nine Mile Point Nuclear Station Response to Request for Additional Information
(2) Regulatory Commitments Contained in this Correspondence

cc: B. K. Vaidya, NRC
M. C. Thadani, NRC
N. S. Morgan, NRC
W. M. Dean, NRC
Resident Inspector, Nine Mile Point

ATTACHMENT (1)

NINE MILE POINT NUCLEAR STATION

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Constellation Energy Nuclear Group, LLC
July 5, 2013

NRC RAI-1

Please provide the following for both units:

a) *For Level 1, specify how the identified location represents the HIGHER of the two points described in the NEI 12-02 guidance for this level.*

b) *A clearly labeled sketch depicting the elevation view of the proposed typical mounting arrangement for the portions of instrument channel consisting of permanent measurement channel equipment (e.g., fixed level sensors and/or stilling wells, and mounting brackets). Indicate on this sketch the datum values representing Level 1, Level 2, and Level 3, as well as the top of the fuel. Indicate on this sketch the portion of the level sensor measurement range that is sensitive to measurement of the fuel pool level, with respect to the Level 1, Level 2, and Level 3 datum points.*

c) *Detailed information regarding the analysis used to determine Level 2 including assumptions for amount and location of source material, assumptions regarding future changes to amount of source material and locations that are valid for the stated 100 mrem/hr dose rate appropriately marked on the floor plan. Include a discussion regarding dose rates for stored spent fuel versus that of other material that may be stored in the pool.*

Nine Mile Point Unit 1 (NMP1) Response

a) The Level 1 value is established at NMP1 based on the Spent Fuel Pool (SFP) skimmer weir elevation. The bottom elevation of the weir is 338'-10.5". When water level in the SFP lowers to below this elevation, inflow to the SFP Surge tanks terminates breaking the closed loop flow cycle. Refer to Figure 1 which shows the relative orientation of the skimmer weir. With SFP Pumps in service taking suction on the surge tank, the surge tank will pump down and the pumps will trip on low tank level. The pumps are located on elevation 281' in the Reactor Building with a centerline suction elevation of 282'-7". The Net Positive Suction Head (NPSH) required for each pump at runout flow of 1,150 gallons per minute (gpm) is 16 feet. Available NPSH based on saturation temperature of 212°F is 39 feet with surge tank level at the low level alarm point of the 324'-9" elevation. This is lower than the elevation at which the SFP skimmer weirs lose inflow (338'-10.5") making the bottom of the skimmer weirs the higher of the two points selected for the Level 1 value.

b) The instrument chosen for both primary and backup channels is the AREVA VEGAPULS 62ER Through Air Radar manufactured by VEGA Americas, Inc. Each channel will be mounted at the SFP edge and comprised of a horn antenna, waveguide assembly and mounting bracket, electronic sensor, and a display panel. The radar horn antenna is positioned above the SFP water surface and is capable of measuring from the mounting location on the SFP curb to the top of the fuel racks. Figure 1 shows an elevation view sketch of the instrumentation arrangement for NMP1. The sketch shows the datum values of Levels 1, 2, and 3, and the top of the Spent Fuel Racks as previously described in the submitted Overall Integrated Plan. The Through Air Radar sensor measurement range, labeled "Minimum Sensor Range / Sensitive Range" in Figure 1, encompasses the Level 1, Level 2, and Level 3 datum points.

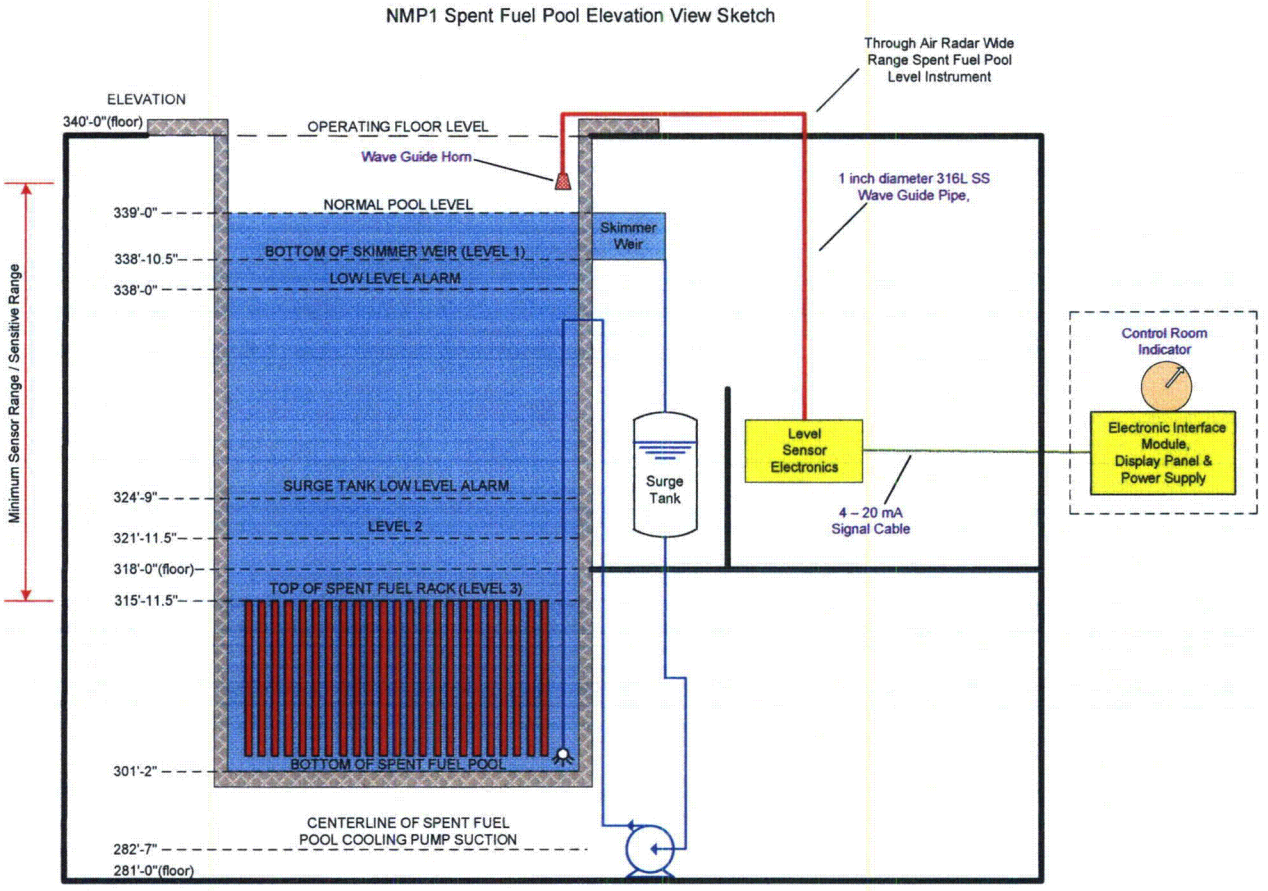

Figure 1

c) Calculations for determination of the dose projected at the top edge of the SFP in the event of lowering SFP water level were performed using ORIGEN-ARP data libraries and computational models for source term calculations and MCNP5 code was used to calculate gamma (primary and capture) and neutron dose rates at the edge of the top edge of the SFP.

Only the NMP2 SFP was modeled, and was assumed to contain all of the fuel discharged up to the 4,049 assembly capacity of the NMP2 SFP. The NMP1 SFP capacity at 4,086 assemblies is only slightly greater, however the NMP2 SFP bounds the NMP1 SFP. This is because NMP2 fuel operates at a higher specific power than NMP1 fuel; the higher specific power fuel will have the higher source term.

The SFP source term was taken as if all 4,049 spent fuel rack locations in the NMP2 SFP are filled. Although the spent fuel racks contain different fuel designs, all discharged fuel for the dose evaluation was assumed to be NMP2, GE14 fuel.

Calculations were performed at water levels of 5-foot above the rack and 1-foot above the rack. The modeling included the SFP and the general NMP2 reactor building area adjacent to the SFP. The roof and closest wall adjacent to the SFP are modeled but other walls were excluded. Concrete around the SFP was only modeled to a thickness of 1-foot since gamma photons which penetrate greater than that depth are unlikely to significantly contribute to dose in the SFP top edge area.

Dose rates in the SFP area are determined using grid configured to provide vertical slices of the SFP and SFP area. Dose rates at the SFP edge utilize the maximum dose rate from either the north or east edge of the SFP. These dose rates were calculated using grid cells running the entire length of the SFP edge. Dose rates at the water surface are taken from a circular surface tally with a radius of 240 centimeters (cm) centered over the middle of the racks at 1-foot intervals in the water for the 5-foot case.

Based on the calculation performed, with 6 feet of water over the SFP racks, Figure 2 depicts the projected dose rate locations on a plan view sketch, from the edge of the SFP up to 2 foot back from the SFP edge, and up to 6 foot high. All areas surrounding the SFP under this condition are calculated to be less than 100 milli-Rem/hour (mRem/hr).

The dose calculation assumed no other irradiated equipment or materials are stored in the SFP. If irradiated materials are planned to be stored in the SFP in the future, additional analysis will be performed to determine the projected dose rate impact and the appropriate Level 2 value. The addition of irradiated materials to the SFP and any additional analysis will be controlled by a station procedure. Specific requirements of the procedure, including details of the analysis to be performed, will be developed as part of the final instrument design and will be forwarded to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.

NMP1 Refueling Floor
Elev 340'-0"

Radiation Area
60 – 87 mRem/Hr

- Dose Rate applicable for minimum 6 Ft water over Spent Fuel Storage Racks
- Radiation area at edge of SFP is 2 ft wide and 6 ft high

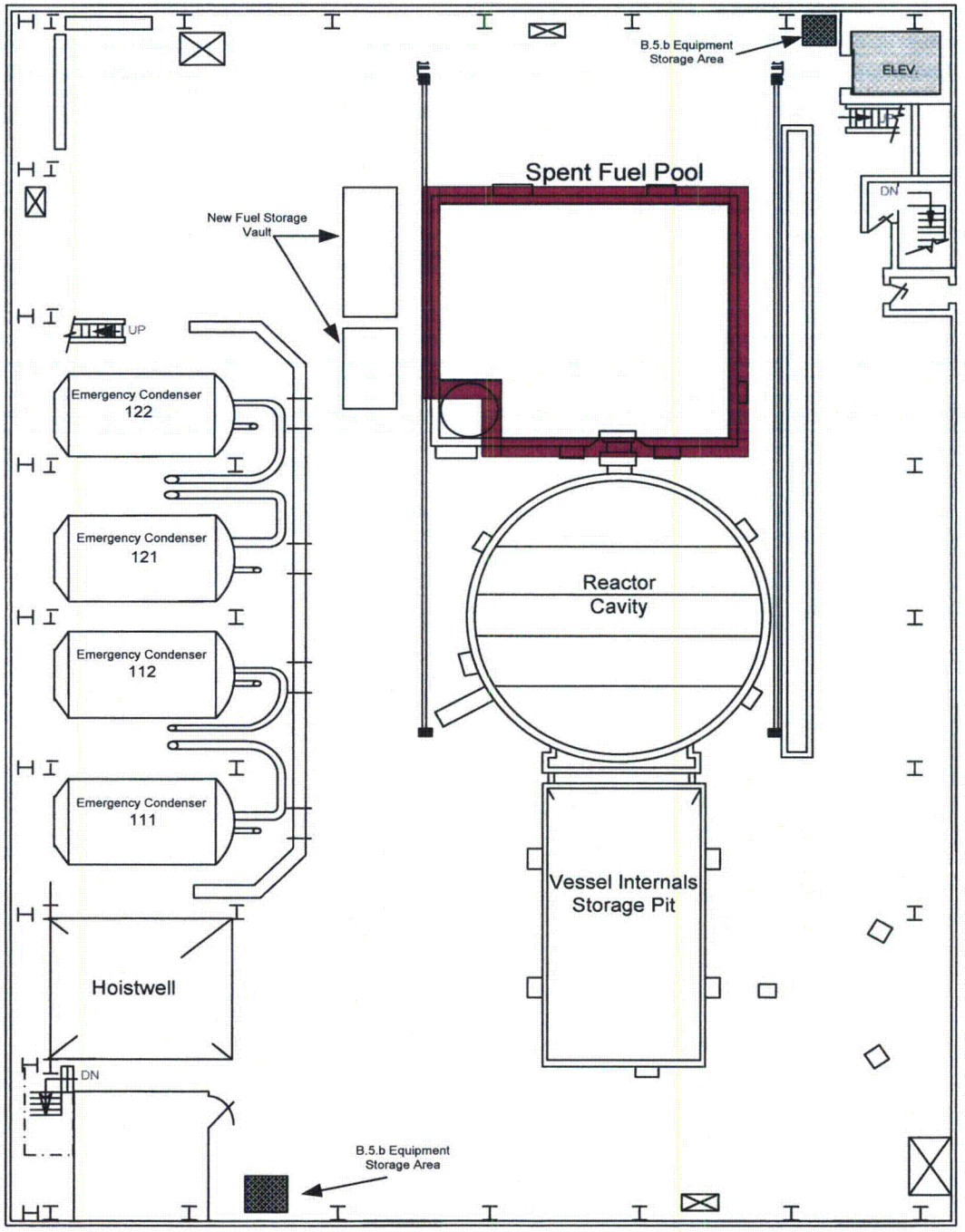

Figure 2

Nine Mile Point Unit 2 (NMP2) Response

a) The Level 1 value is established at NMP2 based on the SFP weir elevation. The bottom elevation of the weir is 352'-7.5". When water level in the SFP lowers to below this elevation, inflow to the SFP Surge tanks terminates breaking the closed loop flow cycle. Refer to Figure 3 which shows the relative orientation. With SFP Pumps in service taking suction on the surge tank, the surge tank will pump down and the pumps will trip on low flow. The pumps are located on elevation 289' in the Reactor Building with a centerline suction elevation of 291'-3". The NPSH required for each pump at a flow of 2,400 gpm is 13 feet. Available NPSH based on saturation temperature of 212°F is 27 feet with surge tank level at the low level alarm point of the 339'-11.5" elevation. This is lower than the elevation at which the SFP skimmer weirs lose inflow (352'-7.5") making the bottom of the skimmer weirs the higher of the two points selected for the Level 1 value.

b) The instrument chosen for both primary and backup channels is the AREVA VEGAPULS 62ER Through Air Radar manufactured by VEGA Americas, Inc. Each channel will be mounted at the SFP edge and comprised of a horn antenna, waveguide assembly and mounting bracket, electronic sensor, and a display panel. The radar horn antenna is positioned above the SFP water surface and is capable of measuring from the mounting location on the SFP curb to the top of the fuel racks. Figure 3 shows an elevation view sketch of the instrumentation arrangement for NMP2. The sketch shows the datum values of Levels 1, 2, and 3, and the top of the Spent Fuel Racks as previously described in the submitted Overall Integrated Plan. The Through Air Radar sensor measurement range, labeled "Minimum Sensor Range / Sensitive Range" in Figure 3, encompasses the Level 1, Level 2, and Level 3 datum points.

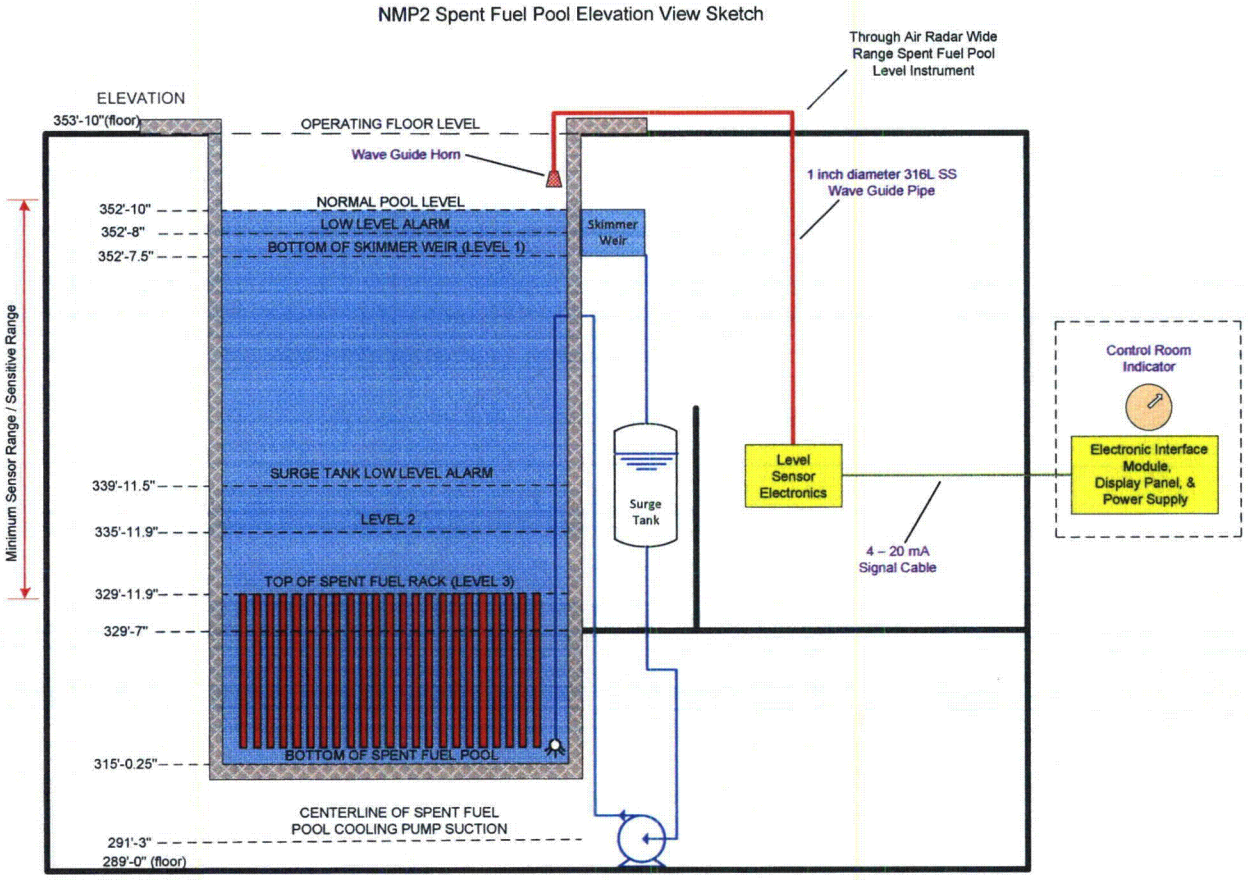

Figure 3

c) See the NMP1 Response to this Request for Additional Information for information on how the dose rates were calculated. Based on the calculation performed, with 6 feet of water over the SFP racks, Figure 4 depicts the projected dose rate locations on a plan view sketch, from the edge of the SFP up to 2 foot back from the SFP edge, and up to 6 foot high. All areas surrounding the SFP under this condition are calculated to be less than 100 mRem/Hr.

The dose calculation assumed no other irradiated equipment or materials are stored in the SFP. A SFP cleanup activity is planned for the Fall of 2013 to remove source terms other than irradiated fuel from the NMP2 SFP. If irradiated materials are planned to be stored in the SFP in the future, additional analysis will be performed to determine the projected dose rate impact and the appropriate Level 2 value. The addition of irradiated materials to the SFP and any additional analysis will be controlled by a station procedure. Specific requirements of the procedure, including details of the analysis to be performed, will be developed as part of the final instrument design and will be forwarded to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.

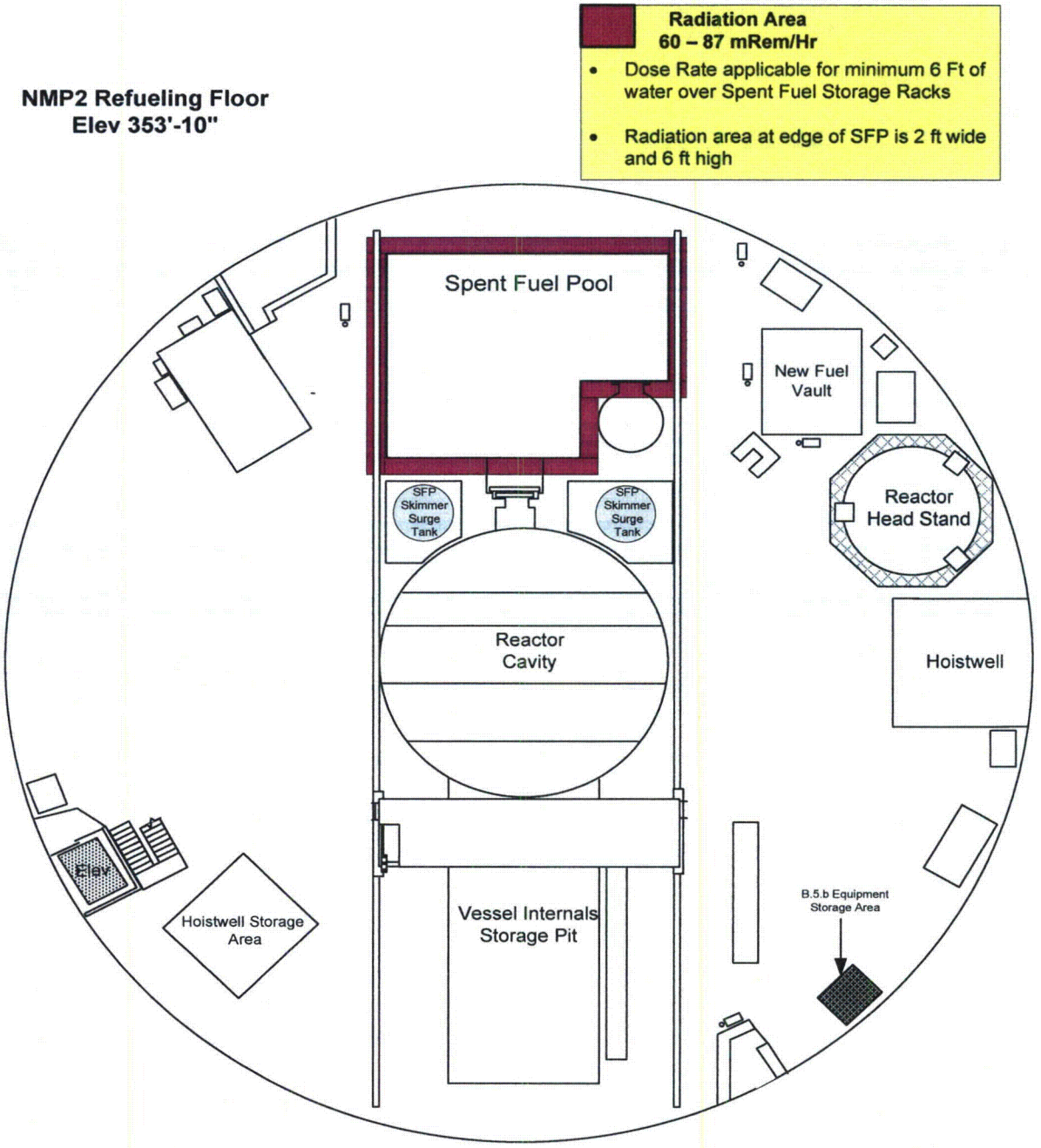
Radiation Area
60 – 87 mRem/Hr
• Dose Rate applicable for minimum 6 Ft of water over Spent Fuel Storage Racks
• Radiation area at edge of SFP is 2 ft wide and 6 ft high
NMP2 Refueling Floor
Elev 353'-10"
Spent Fuel Pool
New Fuel Vault
SFP Skimmer Surge Tank
SFP Skimmer Surge Tank
Reactor Head Stand
Reactor Cavity
Hoistwell
Elev
Hoistwell Storage Area
Vessel Internals Storage Pit
B.5.b Equipment Storage Area

Figure 4

NRC RAI-2

Please provide, for both units, a clearly labeled sketch or marked-up plant drawing of the plan view of the SFP area, depicting the SFP inside dimensions, the planned locations/placement of the primary and back-up SFP level sensor, and the proposed routing of the cables that will extend from the sensors toward the location of the read-out/display device.

NMP1 Response

Figure 5 is a plan view sketch of the NMP1 SFP with the inside dimensions indicated. The new wide range level instrumentation channel configuration desired placement layout is also shown on Figure 5 for the Primary and Backup channels. They will be mounted at the SFP edge as shown and be comprised of a horn antenna and waveguide assembly which is routed to the sensor on the 318' elevation below through a floor core bored hole. The proposed routing of the cables that will extend from the sensors toward the location of the read-out/display device has not been determined.

The final locations for the level sensor, electronics and display units have not been determined. The sensor will be wall mounted on the elevation below the Refuel Floor on Elevation 318' in the Reactor Building. As shown on Figure 1, the electronics and display units will be mounted in the NMP1 Main Control Room. The final system component locations and wire routings will be available upon completion of the final design, and will be forwarded to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.

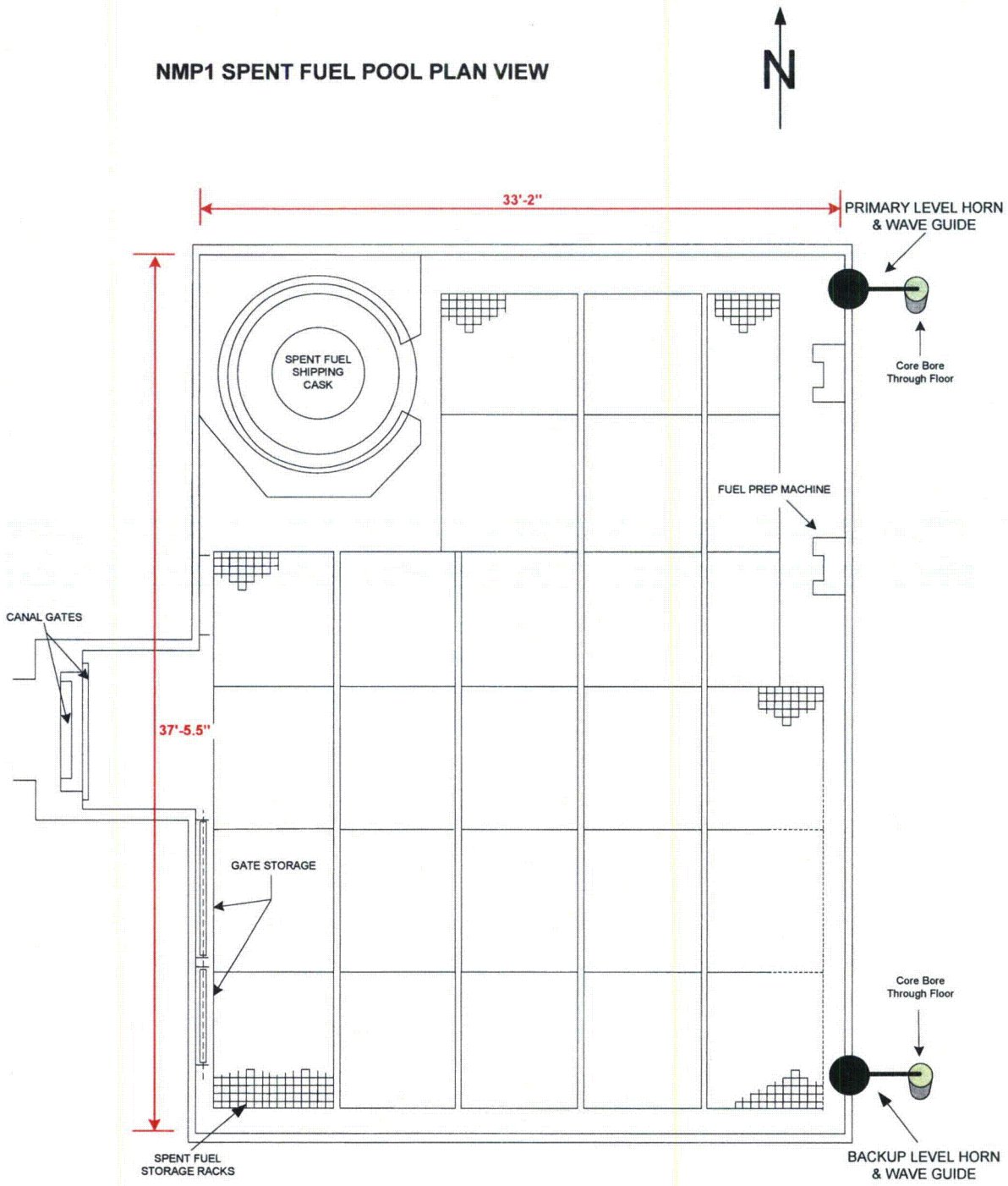
NMP1 SPENT FUEL POOL PLAN VIEW
N
33'-2"
PRIMARY LEVEL HORN
& WAVE GUIDE
SPENT FUEL
SHIPPING
CASK
Core Bore
Through Floor
FUEL PREP MACHINE
CANAL GATES
37'-5.5"
GATE STORAGE
Core Bore
Through Floor
SPENT FUEL
STORAGE RACKS
BACKUP LEVEL HORN
& WAVE GUIDE

Figure 5

NMP2 Response

Figure 6 is a plan view sketch of the NMP2 SFP with the inside dimensions indicated. The new wide range level instrumentation channel configuration desired placement layout is also shown on Figure 6 for the Primary and Backup channels. They will be mounted at the SFP edge as shown and be comprised of a horn antenna and waveguide assembly which is routed to the sensor on the 328' elevation below through a floor core bored hole. The proposed routing of the cables that will extend from the sensors toward the location of the read-out/display device has not been determined.

The final locations for the level sensor, electronics and display units have not been determined. The sensor will be wall mounted on the elevation below the Refuel Floor on Elevation 328' in the Reactor Building. As shown on Figure 3, the electronics and display units will be mounted in the NMP2 Main Control Room. The final system component locations and wire routings will be available upon completion of the final design and will be forwarded to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.

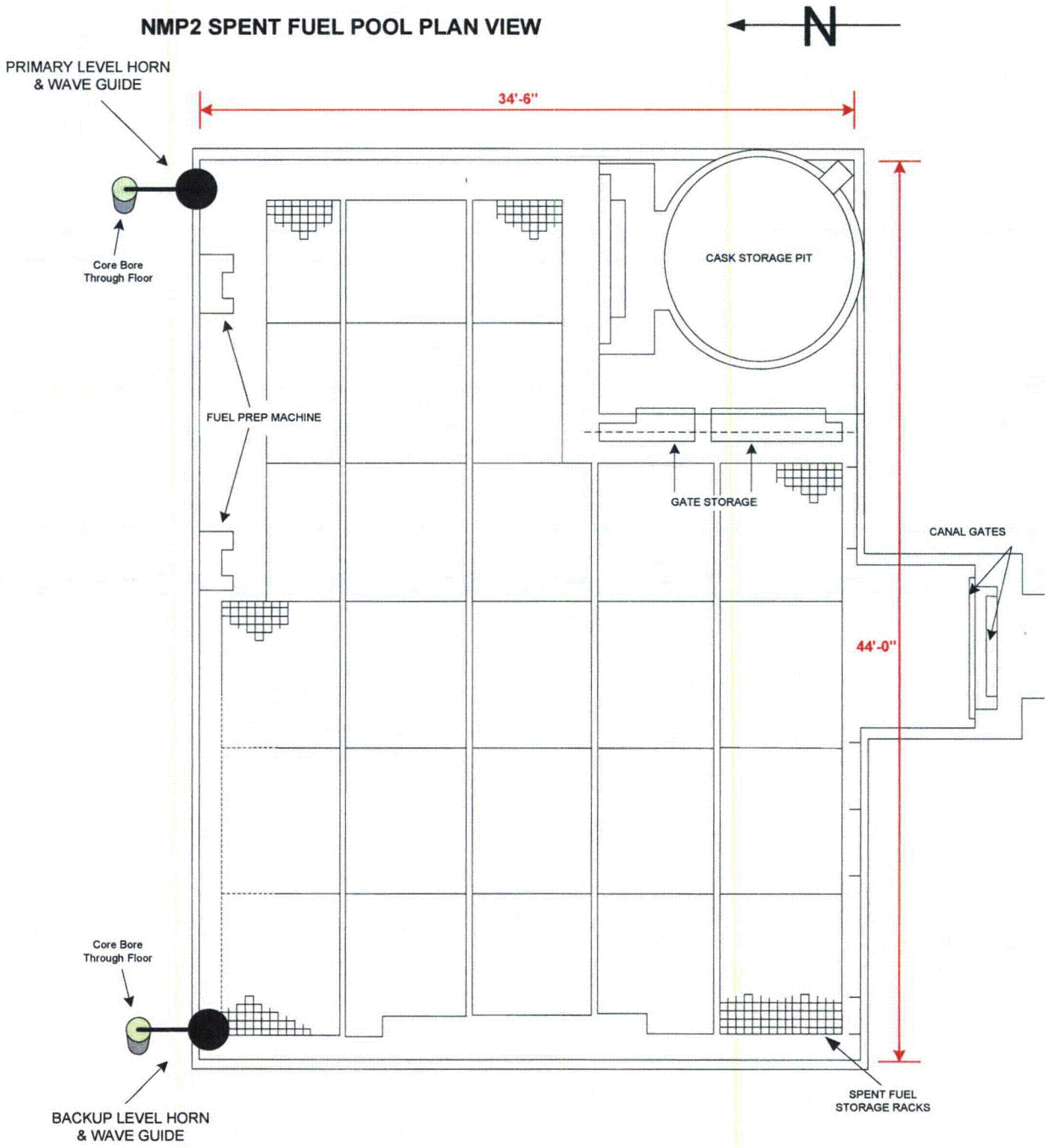
NMP2 SPENT FUEL POOL PLAN VIEW
N
PRIMARY LEVEL HORN
& WAVE GUIDE
34'-6"
Core Bore
Through Floor
CASK STORAGE PIT
FUEL PREP MACHINE
GATE STORAGE
CANAL GATES
44'-0"
Core Bore
Through Floor
BACKUP LEVEL HORN
& WAVE GUIDE
SPENT FUEL
STORAGE RACKS

Figure 6

NRC RAI-3

Please provide the following for both units:

a) *The design criteria that will be used to estimate the total loading on the mounting device(s), including static weight loads and dynamic loads. Describe the methodology that will be used to estimate the total loading, inclusive of design basis maximum seismic loads and the hydrodynamic loads that could result from pool sloshing or other effects that could accompany such seismic forces.*

b) *A description of the manner in which the level sensor (and stilling well, if appropriate) will be attached to the refueling floor and/or other support structures for each planned point of attachment of the probe assembly. Indicate in a schematic the portions of the level sensor that will serve as points of attachment for mechanical/mounting or electrical connections.*

c) *A description of the manner by which the mechanical connections will attach the level instrument to permanent SFP structures so as to support the level sensor assembly.*

d) *Address how other hardware stored in the SFP will not create adverse interaction with the fixed instrument location(s).*

NMP1 and NMP2 Response

a) The NMP SFP level instrumentation components that are mounted at the SFP edge include a horn antenna, waveguide assembly and mounting bracket. The radar horn antenna is positioned above the SFP water surface. The loading on the mounting bracket includes the static weight loads and dynamic loads of the horn antenna, waveguide assembly and attached waveguide pipe up to the nearest pipe support. The dynamic loads on the mounting bracket consist of design basis maximum seismic loads of the bracket and the mounted components, along with hydrodynamic loads produced by impinging surface waves caused by seismically-induced SFP sloshing. The design criteria to be used to estimate the total loading on the mounting devices will be based on the plant seismic design bases.

   The methodology for ensuring that the mounting bracket and attached equipment can withstand the seismic dynamic forces will be by analysis and/or test of the combined maximum seismic and hydrodynamic forces on the cantilevered portion of the waveguide assembly and horn antenna exposed to potential seismically induced wave action. In addition to the analysis described above, seismic qualification testing will be performed to seismic response spectra that envelope the maximum seismic ground motion for the installed location.

   Further details of the hydrodynamic/seismic evaluation will be provided by the vendor in accordance with the final procurement specification. It is anticipated that the full qualification will be available upon completion of the final design and will be forwarded to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.

b) The Through Air Radar waveguide horn and waveguide piping assembly is attached to a waveguide assembly mounting bracket. Figure 7 provides a visual representation of the SFP edge mounting configuration. There is no portion of the Through Air Radar level equipment that contacts the SFP water, nor is there any connection to the SFP liner. The horn antenna is cantilevered over the edge of the SFP and firmly fixed in a direction perpendicular to the SFP water surface. The bracket provides the attachment point for the horn and waveguide assembly to the refueling floor. Four bolts at the base of the bracket fasten the bracket to the refueling floor. For mounting to a concrete floor, the bolts may be anchor bolts in a range of sizes from 3/8 inch to 3/4 inch. The distance of the two nearest

bolts to the SFP edge will be determined by the specific requirements of the anchor bolt size used. For mounting to metal floor, the bracket base may be fastened to the floor by welding. The horn can be away from or next to the SFP liner without impacting the functionality of the level measurement.

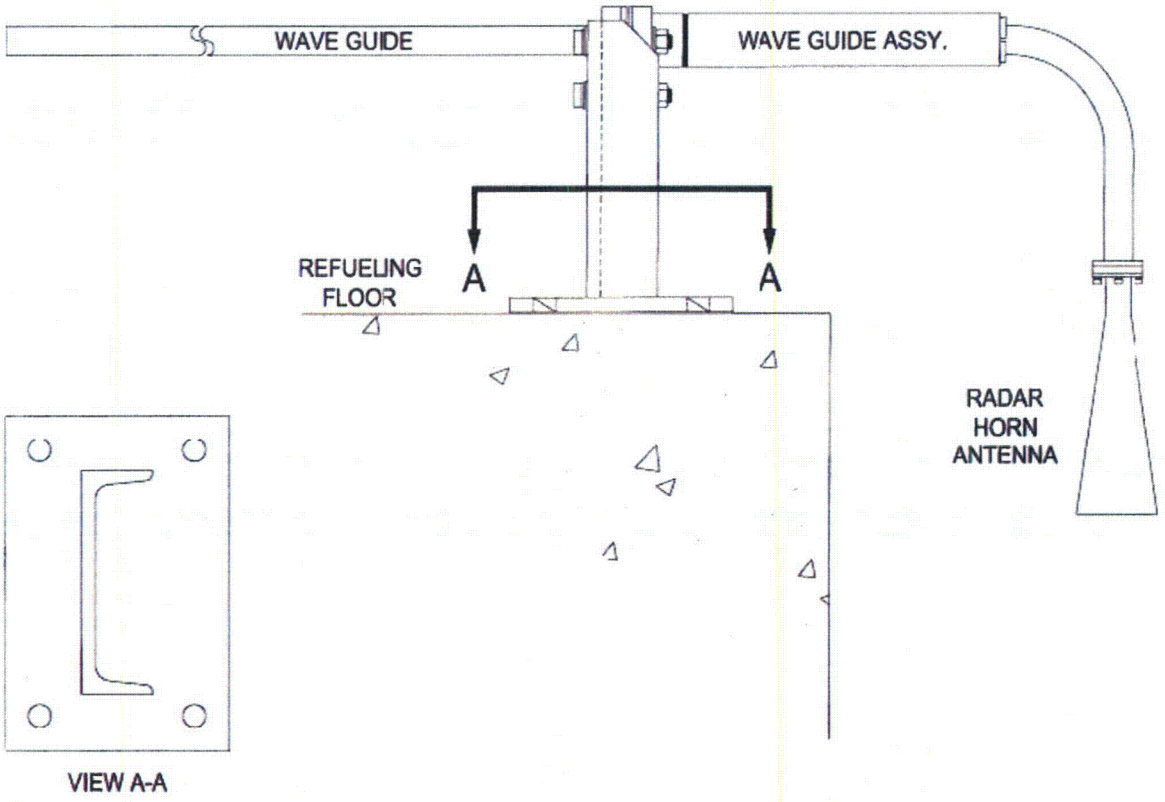

Figure 7

The final mounting details for the horn antenna and waveguide assembly will be available upon completion of the final design and will be forwarded to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.

c) Figure 8 provides a *standard* conceptual arrangement of the elements of the Through Air Radar system. The waveguide piping that is connected between the waveguide assembly at the SFP edge and the remotely located sensor will be attached to building structures using the applicable site design standards for seismic small bore pipe and supports in accordance with the design change process.

The radar sensor is mounted on a mounting bracket that is fastened to seismically-qualified mounting points, either building structural steel or a concrete wall. Four bolts at the base of the bracket fasten the bracket to the building structure. The fastening method described for the SFP edge mounting bracket applies also to the sensor mounting bracket. Electrical connections to the sensor are made using flexible conduit into one of two available 1/2" NPT threaded openings in the sensor housing.

The final mounting details for the waveguide piping and radar sensor will be available upon completion of the final design and will be forwarded to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.

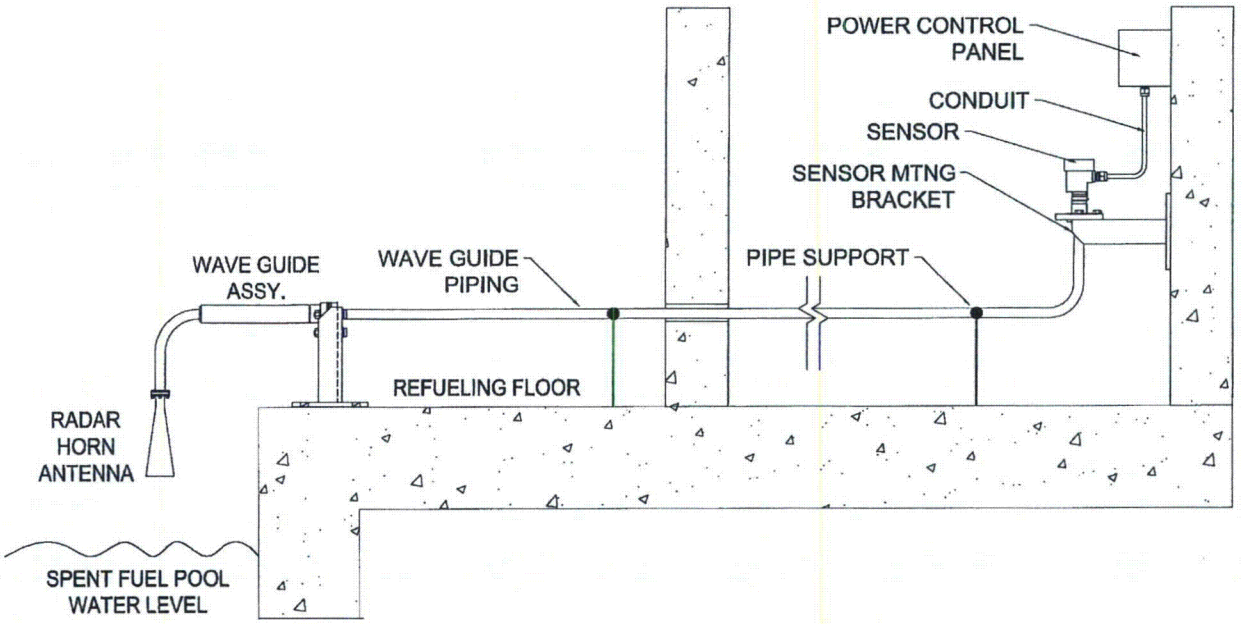

Figure 8

d) The Through Air Radar level instrument horn antenna locations are in the corners of the SFPs. The corner locations for each channel were chosen to preclude interference with fuel handling operations. Other hardware located in the SFP will not adversely impact the level instrumentation because the horn antenna is cantilevered over the edge of the SFP and there is no portion that contacts the SFP water. Therefore, interaction with other hardware located in the SFP is not possible.

NRC RAI-4

Please provide the following for both units:

a) *A description of the specific method or combination of methods you intend to apply to demonstrate the reliability of the permanently installed equipment under Beyond-Design-Basis (BDB) ambient temperature, humidity, shock, vibration, and radiation conditions.*

b) *A description of the testing and/or analyses that will be conducted to provide assurance that the equipment will perform reliably under the worst-case credible design basis loading at the location where the equipment will be mounted. Include a discussion of this seismic reliability demonstration as it applies to a) the level sensor mounted in the SFP area, and b) any control boxes, electronics, or read-out and re-transmitting devices that will be employed to convey the level information from the level sensor to the plant operators or emergency responders.*

c) *Please provide a description of the specific method or combination of methods that will be used to confirm the reliability of the permanently installed equipment during and following seismic conditions to maintain its required accuracy.*

NMP1 and NMP2 Response

a) Reliability of the permanently installed equipment under BDB ambient temperature, humidity, shock, vibration, and radiation conditions will be demonstrated through the equipment design, testing, or analysis performed by the vendor. The following qualification elements will be evaluated.

Temperature

The postulated ambient temperature in the SFP area that results from a boiling SFP is 100°C (212°F). The electronics in the sensor are rated for a maximum ambient temperature of 80°C (176°F) on the condition that the process temperature (that which the flange connection is in contact with) is not greater than 130°C (266°F). The level sensor electronics will be located outside of the SFP area in the lower building elevation. The temperature will not exceed the rated temperature. See Figures 1 and 3.

Humidity

The maximum humidity postulated for the SFP floor elevation is 100% Relative Humidity (RH), saturated steam. The VEGA electronics will be located outside of the SFP floor area in an area away from the steam atmosphere. The waveguide pipe can withstand condensation formed on the inside walls provided there is no pooling of the condensate in the waveguide pipe. This is ensured by installing a weep hole(s) at the low spots in the wave guide pipe.

The ability of the radar to "see through" the steam has been demonstrated by testing performed by AREVA. In addition to the AREVA test, VEGA Through Air Radar has been used in numerous applications that involve measuring the level of boiling liquids. Therefore, operating experience has shown that the Through Air Radar functions at high levels of steam saturation.

Shock and Vibration

The VEGAPULS 62ER Through Air Radar sensor is similar in form, fit and function to the VEGAPULS 66 that was shock and vibration tested in accordance with MIL-S-901D and MIL-STD-167-1. This shock and vibration testing only applies to the sensor. The waveguide piping is not shock or vibration sensitive.

The power supply panel contains components that are part of the standard VEGA Mobile Remote Display. In addition, the readout portion of the display panel, the PLICSCOM, was installed in the sensor during the shock and vibration testing. The Mobile Remote Display is designed for truck-mounted mobile applications subject to shock and vibration from normal handling, transportation and setup on the job. Per NEI 12-02, designing instruments for operation in environments where significant shock and vibration loadings are common, such as for portable hand-held devices or transportation applications, is an acceptable measure for verifying that the design is adequate to withstand shock and vibration. This panel is therefore considered to have an acceptable resistance to shock and vibration. There are three components in the AREVA power control panel that are not included with the VEGA Mobile Remote Display but are similar in construction and are tested for shock and vibration and/or mounted on vibration dampeners. This panel also will be subjected to seismic tests.

Radiation

The area above and around the SFP will be subject to large amounts of radiation in the event that the fuel becomes uncovered. The only parts of the measurement channel in the SFP radiation environment are the metallic waveguide and horn, which are not susceptible to the expected levels of radiation. The electronics will be located on the elevation below the refuel floor in an area that does not exceed their $1x10^3$ rad analyzed limit.

Further details of the qualification and test program used to confirm the reliability of the permanently installed equipment during and following BDB events will be available upon completion of the final design and will be forwarded to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.

b) A seismic shake test will be performed to the requirements of IEEE 344-2004 Recommended Practice for Seismic Qualification of Class 1E Equipment for elements of the VEGAPULS 62ER Through Air Radar to levels anticipated to envelop most if not all plants in the US. The equipment to be tested includes the readout and power control panel, and the level sensor electronics. The items will be tested to the Required Response Spectra (RRS) contained in EPRI TR-107330 Qualification of Microprocessor-Based Equipment to account for the potentially high seismic motion that could occur to cabinet-mounted readout and power control panel. This RRS will also envelop the seismic ground motion for items mounted to the building structure, SFP edge, etc.

c) The seismic testing described in Response to Request for Additional Information 5.b) above includes testing the VEGAPULS 62ER for functionality prior to and post seismic testing, which includes verification of the instrument's accuracy.

Further details of the qualification and test program used to confirm the reliability of the permanently installed equipment during and following seismic conditions will be available upon completion of the final design and will be forwarded to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.

Note: The NRC did not provide NMPNS with an RAI-5. The RAI numbers go from 4 to 6 in the NRC letter dated June 5, 2013.

NRC RAI-6

Please provide the following for both units:

a) A description of how the two channels of the proposed level measurement system meet this requirement so that the potential for a common cause event to adversely affect both channels is precluded.

b) Further information on how each level measurement system, consisting of level sensor electronics, cabling, and readout devices will be designed and installed to address independence through the application and selection of independent power sources, the use of physical and spatial separation, independence of signals sent to the location(s) of the readout devices, and the independence of the displays.

NMP1 and NMP2 Response

a) The two channels of the AREVA Through Air Radar SFP Level Measurement system meet the requirement for independence in accordance with the guidance in NRC JLD-ISG-2012-03 and NEI 12-02 through separation by distance and electrical independence of one another. The horn antenna for each level instrument will be installed on opposite corners of the SFP. This separation will be maintained for the routing of the stainless steel waveguide piping and each channel's sensor electronics. Wiring from the sensors and wiring to the power control panels and displays located in the respective Main Control Room for each channel will be routed in separate conduits and cable raceways to maintain separation.

b) The instrumentation power sources are provided with independent and battery backed-up supplies. The 120 VAC power sources will be determined in the final design process. Independence will be maintained throughout the entire train for each channel. Therefore, failure of one power source will not result in a loss of both instrument channels.

Further details on independence and channel separation of the permanently installed equipment will be available upon completion of the final design and will be forwarded to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.

NRC RAI-7

If the level measurement channels are to be powered through a battery system (either directly or through an Uninterruptible Power Supply (UPS) please provide, for both units, the design criteria that will be applied to size the battery in a manner that ensures, with margin, that the channel will be available to run reliably and continuously following the onset of the BDB event for the minimum duration needed, consistent with the plant FLEX Program plans.

NMP1 and NMP2 Response

The primary power supply will be from station 120VAC panels and will be connected to the display panel which will be located in the Main Control Room. As required in NEI 12-02, in the event of loss of primary power the instruments can be manually switched to backup power. The VEGAPULS has a self-contained battery (eight (8) standard AA lithium cells) backup source which is included in the display panel. It will support 2.5 years with 30 minutes of operation per day, or > 300 hours of continuous operation. During this time, it supplies the power to the whole system, i.e., sensor electronics and the display with a power consumption of < 0.5 Watts.

The sizing of the battery back-up for each channel of the VEGAPULS 62ER is based on the ability to supply the sensor at full load (20 milli-amps (mA)) and the level monitoring display, for the duration specified in the plant FLEX program of at least seven days after a Station Black Out (SBO), with built-in margin. The sizing of the battery will be verified by calculation and/or test prior to installation. The self-contained battery system will be independent from existing station batteries.

Further details on the AC and DC power supplies of the permanently installed equipment will be available upon completion of the final design and will be forwarded to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.

NRC RAI-8

Please provide the following for both units:

a) An estimate of the expected instrument channel accuracy performance (e.g. in % of span) under both a) normal SFP level conditions (approximately Level 1 or higher) and, b) at the BDB conditions (i.e., radiation, temperature, humidity, post seismic and post-shock conditions) that would be present if the SFP level were at the Level 2 and Level 3 datum points.

b) A description of the methodology that will be used for determining the maximum allowed deviation from the instrument channel design accuracy that will be employed under normal operating conditions as an acceptance criterion for a calibration procedure to flag to operators and to technicians that the channel requires adjustment to within the normal condition design accuracy.

NMP1 and NMP2 Response

a) The reference accuracy for the instrument defined by the manufacturer is ± 2 millimeters (mm) based on sensor horn without a waveguide using a metal target. However, with a waveguide and water as a target, accuracy under normal SFP level conditions has been demonstrated to be ± 1 inch based on tests performed by AREVA. This is the design accuracy value that will be used for the SFP level instrument channels. This accuracy value is subject to change dependent on the actual performance with the installed waveguide constructed to support the desired installation location for each channel. The final instrument accuracy will be determined following installation testing implemented as part of the design change acceptance process.

   The accuracy of the instrument channel is little affected under BDB conditions (i.e., radiation, temperature, humidity, post-seismic and post shock conditions). It will maintain its design accuracy following a power interruption without the need for recalibration. The stainless steel horn antenna and waveguide pipe that would be exposed to BDB conditions is largely unaffected by radiation, temperature and humidity other than a minor effect of condensation forming on the waveguide inner walls which will have a slight slowing effect on the radar pulse velocity. Condensation is prevented from pooling in the waveguide and thus blocking the radar signal by placement of weep holes at low points in the waveguide pipe. A minor effect on the accuracy based on the length of the overall measurement path can occur due to temperature related expansion of the waveguide pipe. The waveguide pipe permits the sensor to be located on the elevation below the refuel floor in mild environment conditions so that the effect of elevated refuel floor temperatures on accuracy is also limited. A small correction factor is applied to account for the impact of saturated steam at atmospheric pressure on the radar beam velocity. Testing performed by AREVA using saturated steam and saturated steam combined with smoke indicate that the overall effect on the instrument accuracy is minimal. The overall accuracy due at BDB conditions described above is conservatively estimated to not exceed ± 3 inches or 0.926% of the 27 foot instrument span, which is within the required ± 1 foot described in NEI 12-02.

b) The maximum allowed deviation from the instrument channel design accuracy that will be employed under normal operating conditions as an acceptance criterion for a calibration procedure to flag to operators and to technicians that the channel requires adjustment to within the normal condition design accuracy will be based upon the difference between readings of the Primary and Backup level instruments. The estimated design accuracy for each instrument is ± 1 inch. The combined maximum deviation between the two instruments after which calibration is needed is therefore ± 2 inch, based on a still water level in the SFP. A change to design accuracy discussed in the Response to Request

for Additional Information 8.a) above will likewise cause a proportionate change to the maximum allowable deviation value. The final instrument accuracy will be determined following installation testing implemented as part of the design change acceptance process.

Calibration of the SFP level system will be performed in-situ. Channel check and calibration tolerances will be developed as part of the detailed design and incorporated into station maintenance procedures. The final calibration methodology will be available upon completion of the final design and will be forwarded to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.

NRC RAI-9

Please provide the following for both units:

a) A description of the capability and provisions the proposed level sensing equipment will have to enable periodic testing and calibration, including how this capability enables the equipment to be tested in-situ.

b) A description of how such testing and calibration will enable the conduct of regular channel checks of each independent channel against the other, and against any other permanently-installed SFP level instrumentation.

c) A description of how functional checks will be performed, and the frequency at which they will be conducted. Describe how calibration tests will be performed, and the frequency at which they will be conducted. Provide a discussion as to how these surveillances will be incorporated into the plant surveillance program.

d) A description of what preventative maintenance tasks are required to be performed during normal operation, and the planned maximum surveillance interval that is necessary to ensure that the channels are fully conditioned to accurately and reliably perform their functions when needed.

NMP1 and NMP2 Response

a) Multi-point testing is enabled by means of a radar horn antenna capable of being rotated away from the SFP water surface and aimed at a movable metal target that is positioned at known distances from the horn. This allows checking for correct readings of all indicators along a measurement range and validates the functionality of the installed system.

b) The Primary and Backup instrument channels will have indicators that can be compared against each other and against any other permanently-installed SFP level instrumentation. Since the two level channels are independent, a channel check tolerance based on the final design accuracy of each channel will be applied for cross comparison between the two channels. Refer to the accuracy performance described in the Response to Request for Additional Information 8.a. The final accuracy of the instrumentation will be determined following installation testing to develop acceptance criteria for whether recalibration or troubleshooting is needed.

c) Functional checks will be performed on a regularly scheduled basis. The functional check includes visual inspection, verification of the instrument display reading, verification of proper power supply voltage, and testing of the battery backup on simulated loss of normal power. Multi-point calibration tests will also be made on a regularly scheduled basis. The frequency as prescribed in NEI 12-02 will be adopted to perform functional testing within 60 days of a planned refueling outage considering normal testing schedule allowances (e.g., 25%) and not to exceed more than once every 12 months. The multi-point test method is described in the Response to Request for Additional Information 9.a.

d) The maintenance and testing program for the SFP level instruments will meet the requirements in NEI 12-02. Periodic functional tests will be scheduled to occur within 60 days of each planned refueling outage. The functional tests will verify that the readings for the Primary and Backup channels are consistent with the actual SFP level. The Through Air Radar instrument requires no regular preventative maintenance, except for routine replacement of the backup lithium battery cells in the power control panel. This will be performed during regularly scheduled checks and testing.

Specific details of the functional and calibration test program, including frequencies, will be developed as part of the final instrument design and will be forwarded to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.

NRC RAI-10

Please provide, for both units, a description of the standards, guidelines and/or criteria that will be utilized to develop procedures for inspection, maintenance, repair, operation, abnormal response, and administrative controls associated with the SFP level instrumentation, as well as storage and installation of portable instruments.

NMP1 and NMP2 Response

Procedures for inspection, maintenance, repair, operation, abnormal response, and administrative controls associated with the SFP level instrumentation will be developed utilizing vendor instructions in accordance with existing controlled station administrative procedures that govern procedure development.

These procedures ensure standardization of format, content, and terminology and human performance considerations.

There are no portable level channel instruments associated with the new SFP level instrumentation system that will be installed. Consequently, procedures for storage and installation for portable instruments will not be required.

NRC RAI-11

Please provide the following for both units:

a) Further information describing the maintenance and testing program the licensee will establish and implement to ensure that regular testing and calibration is performed and verified by inspection and audit to demonstrate conformance with design and system readiness requirements. Include a description of your plans for ensuring that necessary channel checks, functional tests, periodic calibration, and maintenance will be conducted for the level measurement system and its supporting equipment.

b) A description of how the guidance in NEI 12-02 Section 4.3 regarding compensatory actions for one or both non-functioning channels will be addressed.

c) A description of what compensatory actions are planned in the event that one of the instrument channels cannot be restored to functional status within 90 days.

NMP1 and NMP2 Response

a) The maintenance and testing of the SFP level instrumentation system will be incorporated into the normal station work control processes based on vendor recommendations for maintenance and periodic testing. The calibration and maintenance program will include testing to validate the functionality of each instrument channel within 60 days of a planned refueling outage considering normal testing scheduling allowances (e.g., 25%).

The preventive maintenance, test and calibration program will be developed consistent with the vendor's recommendations. This information will be available following completion of the final design and will be forwarded to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.

b) The guidance in NEI 12-02, Rev. 1, states:

> The primary or back-up instrument channel can be out of service for testing, maintenance and/or calibration for up to 90 days provided the other channel is functional. Additionally, compensatory actions must be taken if the instrumentation channel is not expected to be restored or is not restored within 90 days. If both channels become non-functioning then initiate actions within 24 hours to restore one of the channels of instrumentation and implement compensatory actions (e.g., use of alternate suitable equipment or supplemental personnel) within 72 hours.

In the event a channel of SPF level instrumentation is out of service for any reason, the out-of-service time will be administratively tracked with an action to restore the channel to service within 90 days. Functionality of the other channel will be confirmed via appropriate testing measures within the following 7 days and every 90 days thereafter until the non-functioning channel is restored to service.

The appropriate compensatory actions have not yet been specified for both channels out of service. The determination of these actions, administrative requirements, and implementation procedures will be available following completion of the final design and will be forwarded to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.

c) In the event that a channel cannot be restored to service within the 90 day period, expedited actions to restore the channel would be initiated and tracked via NMPNS' Corrective Action Program. If both

channels are determined to be non-functional, NMPNS will initiate appropriate compensatory actions within 24 hours. The expedited and compensatory actions will be defined in the applicable maintenance procedure.

The appropriate compensatory actions have not yet been specified. The determination of these actions, administrative requirements, and implementation procedures will be available following completion of the final design and will be forwarded to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.

ATTACHMENT (2)

REGULATORY COMMITMENTS

CONTAINED IN THIS CORRESPONDENCE

ATTACHMENT (2)

REGULATORY COMMITMENTS CONTAINED IN THIS CORRESPONDENCE

The following table defines the Nine Mile Point Nuclear Station, LLC, Units 1 and 2 regulatory commitments contained in this correspondence

DESCRIPTION	DUE DATE
Provide specific requirements of the procedure controlling irradiated equipment or materials stored in the SFP, including details of the analysis to be performed, to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.	February 28, 2014
The final system component locations and wire routings will be forwarded to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.	February 28, 2014
The full hydrodynamic/seismic qualification details will be forwarded to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.	February 28, 2014
The final mounting details for the horn antenna and waveguide assembly will be forwarded to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.	February 28, 2014
Further details of the qualification and test program used to confirm the reliability of the permanently installed equipment during and following Beyond Design Bases Events will be forwarded to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.	February 28, 2014
Further details on independence and channel separation of the permanently installed equipment will be forwarded to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.	February 28, 2014
Further details on the AC and DC power supplies of the permanently installed equipment will be forwarded to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.	February 28, 2014
The final calibration methodology will be forwarded to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.	February 28, 2014
Specific details of the functional and calibration test program, including frequencies, will be forwarded to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.	February 28, 2014
The preventive maintenance, test and calibration program will be forwarded to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.	February 28, 2014
The compensatory actions to take when both channels are out of service, and the applicable administrative requirements and implementation procedures will be forwarded to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.	February 28, 2014
The compensatory actions to take when a channel is not restored within 90 days, and the applicable administrative requirements and implementation procedures will be forwarded to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.	February 28, 2014