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July 23, 2013

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555-0001

Subject: Duke Energy Carolinas, LLC (Duke Energy)
Catawba Nuclear Station, Units 1 and 2
Docket Numbers 50-413 and 50-414
Response to Request for Additional Information Regarding Overall
Integrated Plan in Response to Order EA-12-051, "Reliable Spent Fuel
Pool Instrumentation"
(TAC Numbers MF1060 and MF1061)

- References:
1. Letter from Duke Energy to NRC, "Overall Integrated Plans in Response to March 12, 2012, Commission Order Modifying Licenses With Regard to Requirements for Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051)", dated February 28, 2013
 2. Letter from NRC to Duke Energy, "Request for Additional Information Re: Overall Integrated Plan in Response to Order EA-12-051, "Reliable Spent Fuel Pool Instrumentation"", dated June 24, 2013

In Reference 1, Duke Energy submitted an Overall Integrated Plan (OIP) in response to the March 12, 2012 NRC Order modifying licenses with regard to requirements for reliable Spent Fuel Pool (SFP) Instrumentation (Order Number EA-12-051).

In Reference 2, the NRC transmitted Requests for Additional Information (RAIs) regarding the OIP.

The purpose of this letter is to respond to the Reference 2 RAIs. The attachment to this letter constitutes Catawba's response. The format of the attachment is to restate each RAI question, followed by the appropriate response. At this time, only a response to RAI-1 can be provided. The responses to the remaining RAIs will be provided in the February 2014 six-month status report for the implementation of Order EA-12-051.

There are no regulatory commitments contained in this letter or its attachment.

ADD/ NRR

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If you have any questions on this letter or its attachment, please contact L.J. Rudy at (803) 701-3084.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on July 23, 2013.

Very truly yours,

A handwritten signature in black ink, appearing to read "K. Henderson", with a stylized flourish at the end.

Kelvin Henderson

LJR/s

Attachment

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xc (with attachment):

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REQUEST FOR ADDITIONAL INFORMATION
OVERALL INTEGRATED PLAN IN RESPONSE TO
ORDER EA-12-051, "RELIABLE SPENT FUEL POOL INSTRUMENTATION"

DUKE ENERGY

CATAWBA NUCLEAR STATION, UNITS 1 AND 2

DOCKET NOS. 50-369 AND 50-370

1.0 INTRODUCTION

By letter dated February 28, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML13086A095), Duke Energy submitted an Overall Integrated Plan (OIP) in response to the March 12, 2012, U.S. Nuclear Regulatory Commission (NRC), Commission Order modifying licenses with regard to requirements for Reliable Spent Fuel Pool (SFP) Instrumentation (Order Number EA-12-051; ADAMS Accession No. ML12054A679) for Catawba Nuclear Station, Units 1 and 2. The NRC staff endorsed Nuclear Energy Institute (NEI)12-02 "Industry Guidance for Compliance with NRC Order EA-12-051, to Modify Licenses with Regard to Reliable SFP Instrumentation," Revision 1, dated August 2012 (ADAMS Accession No. ML12240A307), with exceptions, as documented in Interim Staff Guidance (ISG) 2012-03 "Compliance with Order EA-12-051, Reliable SFP Instrumentation," Revision 0, dated August 29, 2012 (ADAMS Accession No. ML12221A339).

The NRC staff has reviewed the February 28, 2013, response by the licensee and determined that the following Request for Additional Information (RAI) is needed to complete its Technical Review. If any part of this information is not available within 30 days of this request, please provide the date this information will be submitted.

2.0 LEVELS OF REQUIRED MONITORING

The OIP states, in part, that

Indication of SFP level will be provided from approximately normal pool water level (El. 598' - 6") down to approximately the top of irradiated fuel assemblies seated in the storage racks (El. 573'). In particular, the system will be capable of continuously monitoring SFP level at three distinct water levels described in the Order.

- Level 1 - Level that is adequate to support operation of the normal fuel pool cooling system - indicated level on either channel greater than the point at which pump suction is presumed to be lost (El. 597' - 4").
- Level 2 - Level adequate to provide substantial radiation shielding for a person standing on the spent fuel pool operating deck - indicated level on either channel greater than 10' above the highest point of any fuel racks, or > El. 583'. This monitoring level ensures

there is adequate water level to provide substantial radiation shielding for personnel responding to beyond design-basis external events and to initiate SFP makeup strategies.

- Level 3 - Level where fuel remains covered but actions to implement make-up water addition should no longer be deferred - Indicated level on either channel less than 12 inches above the highest point of any fuel storage rack. This monitoring level ensures there is adequate water level above the stored fuel seated in the storage racks.

RAI-1

Please provide the following:

- 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.

Catawba Response:

Instrument Channel Design Overview/Background

The new Catawba Nuclear Station Wide Range (WR) Spent Fuel Pool (SFP) level instrumentation will consist of a primary and a backup channel for each SFP (i.e., Unit 1 SFP and Unit 2 SFP). Both the primary and backup channels will be permanently installed. Per NEI 12-02 guidance, neither of these channels requires access to the SFP area during a Beyond Design Basis (BDB) event.

The primary SFP level channel will utilize wave guided radar technology, which will have a wave guided pipe and receiving horn located in the SFP area. The wave guided pipe and horn will contain no organic materials and will not be susceptible to degradation due to exposure to radiation, heat, or steam. The associated primary channel electronics will be remotely located from the SFP inside the Seismic Category I Auxiliary Building. This channel will have battery backup capacity and will provide remote control room level monitoring capability.

The backup SFP level channel will consist of a pressure transmitter that senses SFP head (level) based on a process connection to the SFP transfer tube. The SFP is normally aligned to the fuel transfer canal to support the Standby Shutdown Facility that

has provisions for primary system makeup with pump suction supply from the SFP during various fire, security, and station blackout events. The backup level instrument readout will be located in the main control room. The backup level instrument will be powered from the unit vital batteries.

- a) The normal SFP water level is 598'-6" elevation (reference drawing CN-1680-0123, Revision 6). The SFP cooling pump suction piping submergence is lost when water level decreases below 597'-4" elevation (reference calculation CNC-1223.20-00-0008, Revision 0). Abnormal procedures secure the SFP cooling pump when water level decreases to 1' below normal (reference procedures AP/1/A/5500/026, Revision 15 and AP/2/A/5500/026, Revision 16). Thus, the NEI 12-02 "Level 1" datum is considered to be 597'-6" elevation.
- b) The radar level instrument design will locate components in the SFP area such that they will remain above the maximum water level in the SFP, and the equipment mounts will not require any connections to be made to the pool liner. The mounting brackets for the wave guided assemblies and receiving horns will be secured to the SFP operating deck which is at 605'-10" elevation (reference drawing CN-1680-0123, Revision 6). The specific installation locations for the wave guided assemblies and receiving horns have not been finalized. Additional information on equipment elevation, equipment orientation, and mounting for both the primary and the backup channel devices will be included in the response to RAI-2. Figure 1 at the end of this attachment provides the elevations representing Level 1, Level 2, and Level 3, the top of the fuel storage racks, and the level monitoring range.

3.0 Instrumentation Design Features

3.2 Arrangement

The OIP states, in part, that

The two SFP level instrument channels will be installed in spatially separated locations and arranged in a manner to reduce the potential for common damage to both channels. Each channel will be installed within or adjacent to the Spent Fuel Buildings on Unit 1 & 2, which are Category I structures capable of withstanding missiles and other external events.

RAI-2

Please provide 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 mounting brackets, and the proposed routing of the cables that will extend from the sensors toward the location of the read-out/display device.

Catawba Response:

Information is not available within the 30-day response period for this RAI. Duke Energy anticipates submitting a response to this RAI for Catawba in the February 2014 six-month status report for the implementation of Order EA-12-051.

3.3 Mounting

The OIP states, in part, that

Each permanently installed instrument channel will be mounted to retain design configuration during and following the maximum seismic ground motion considered in the design of the spent fuel pool structure.

RAI-3

Please provide the following:

- 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.

Catawba Response:

Information is not available within the 30-day response period for this RAI. Duke Energy anticipates submitting a response to this RAI for Catawba in the February 2014 six-month status report for the implementation of Order EA-12-051.

3.4 Qualification

The OIP states, in part, that

Both instrument channels for each pool will be specified to be reliable at the maximum temperature, humidity, and radiation levels predicted during an extended loss of AC power (ELAP) event at their installed locations.

The instrumentation reliability will be demonstrated by appropriate combination of design, analysis, operating experience and/or testing as outlined by NEI 12-02.

This reliability will be established through vendor qualification documents procured under an augmented quality assurance process defined by Duke Energy.

The level instrumentation is to be designed to remain functional following a Safe Shutdown Earthquake.

RAI-4

Please provide the following:

- 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 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) 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.

Catawba Response:

Information is not available within the 30-day response period for this RAI. Duke Energy anticipates submitting a response to this RAI for Catawba in the February 2014 six-month status report for the implementation of Order EA-12-051.

3.5 Independence

The OIP states, in part, that

The two SFP level instrument channels for each pool will be physically and electrically independent of one another. The associated cabling, power supplies and indication for each level instrument channel will be routed separately from each other.

RAI-5

Please provide the following:

- a) A description of 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 minimized to the extent practicable.
- b) Further information on the planned design and installation of each level measurement system, consisting of level sensor electronics, cabling, and readout devices, in order to address independence through independent power sources, physical and spatial separation, independence of signals sent to the location(s) of the readout devices, and the independence of the displays.

Catawba Response:

Information is not available within the 30-day response period for this RAI. Duke Energy anticipates submitting a response to this RAI for Catawba in the February 2014 six-month status report for the implementation of Order EA-12-051.

3.6 Power Supplies

The OIP states, in part, that

The two instrumentation channels for each unit will be powered normally by separate power supplies backed up by rechargeable or replaceable batteries. The backup power sources will have sufficient capacity to maintain the level indication function until offsite power or other emergency resource availability is reasonably assured.

RAI-6

Please provide the following:

- a) A description of the electrical AC power sources and capacities for the primary and backup channels.
- b) If the level measurement channels are to be powered through a battery system (either directly or through an Uninterruptible Power Supply (UPS)), provide 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 Mitigation strategies for BDB external events (Order EA-12-049).

Catawba Response:

Information is not available within the 30-day response period for this RAI. Duke Energy anticipates submitting a response to this RAI for Catawba in the February 2014 six-month status report for the implementation of Order EA-12-051.

3.7 Accuracy

The OIP states, in part, that

The instrument accuracy will be consistent with the guidelines of NRC JLD-ISG-2012-03 and NEI 12-02. The new SFP level instrumentation will be designed to maintain their design accuracy without recalibration following a power interruption or change in power source. Additionally, instrument accuracy will be designed to allow trained personnel to determine when the actual level exceeds the specified lower level of each indicating range (water levels 1, 2, 3 as identified by NEI 12-02 guidance) without conflicting or ambiguous indication.

RAI-7

Please provide the following:

- 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.

Catawba Response:

Information is not available within the 30-day response period for this RAI. Duke Energy anticipates submitting a response to this RAI for Catawba in the February 2014 six-month status report for the implementation of Order EA-12-051.

3.8 Testing

The OIP states, in part, that

The instrument channel design shall provide for routine testing and calibration. Testing will be consistent with the guidelines of NRC JLD-ISG-2012-03 and NEI 12-02. The

standard CNS processes for scheduling and implementing testing and calibration will ensure that the SFP level instruments are maintained by trained technicians using approved test procedures.

RAI-8

Please provide the following:

- 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. Discuss how these surveillances will be incorporated into the plant surveillance program.
- d) A description of what preventive 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.

Catawba Response:

Information is not available within the 30-day response period for this RAI. Duke Energy anticipates submitting a response to this RAI for Catawba in the February 2014 six-month status report for the implementation of Order EA-12-051.

3.9 Display

The OIP states, in part, that

The instrument displays for each SFP level instrument will be provided in the main control room or other accessible location. The displays will be consistent with the guidelines of NRC JLDISG-2012-03 and NEI 12-02.

RAI-9

Please provide the following:

- a) The specific location for the primary and backup instrument channel display.

- b) If the primary and backup location is other than the main control room, then provide justification for prompt accessibility to displays including primary and alternate route evaluation, habitability at display location(s), continual resource availability for personnel responsible to promptly read displays, and provisions for communications with decision makers for the various SFP drain down scenarios and external events.
- c) The reasons justifying the locations selected enable the information from these instruments to be considered "promptly accessible". Include with consideration of various drain-down scenarios.

Catawba Response:

Information is not available within the 30-day response period for this RAI. Duke Energy anticipates submitting a response to this RAI for Catawba in the February 2014 six-month status report for the implementation of Order EA-12-051.

4.0 PROGRAM FEATURES

4.2 Procedures

The OIP states, in part, that

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

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

RAI-10

Please provide a description of the standards, guidelines and/or criteria that will be used to develop procedures for inspection, maintenance, repair, operation, abnormal response, and administrative controls associated with the SFP level instrumentation.

Catawba Response:

Information is not available within the 30-day response period for this RAI. Duke Energy anticipates submitting a response to this RAI for Catawba in the February 2014 six-month status report for the implementation of Order EA-12-051.

4.3 Testing and Calibration

The OIP states, in part, that

Testing and calibration of the instrumentation will be consistent with vendor recommendations or other documented basis. Calibration will be specific to the mounted instrument(s) and the display(s). Existing station work control processes will be used to control maintenance and testing.

RAI-11

Please provide the following:

- 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 licensee 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 licensee will implement the guidance in NEI 12-02 Section 4.3 regarding compensatory actions for one or both non-functioning channels.
- c) A description of the compensatory actions to be taken in the event that one of the instrument channels cannot be restored to functional status within 90 days.

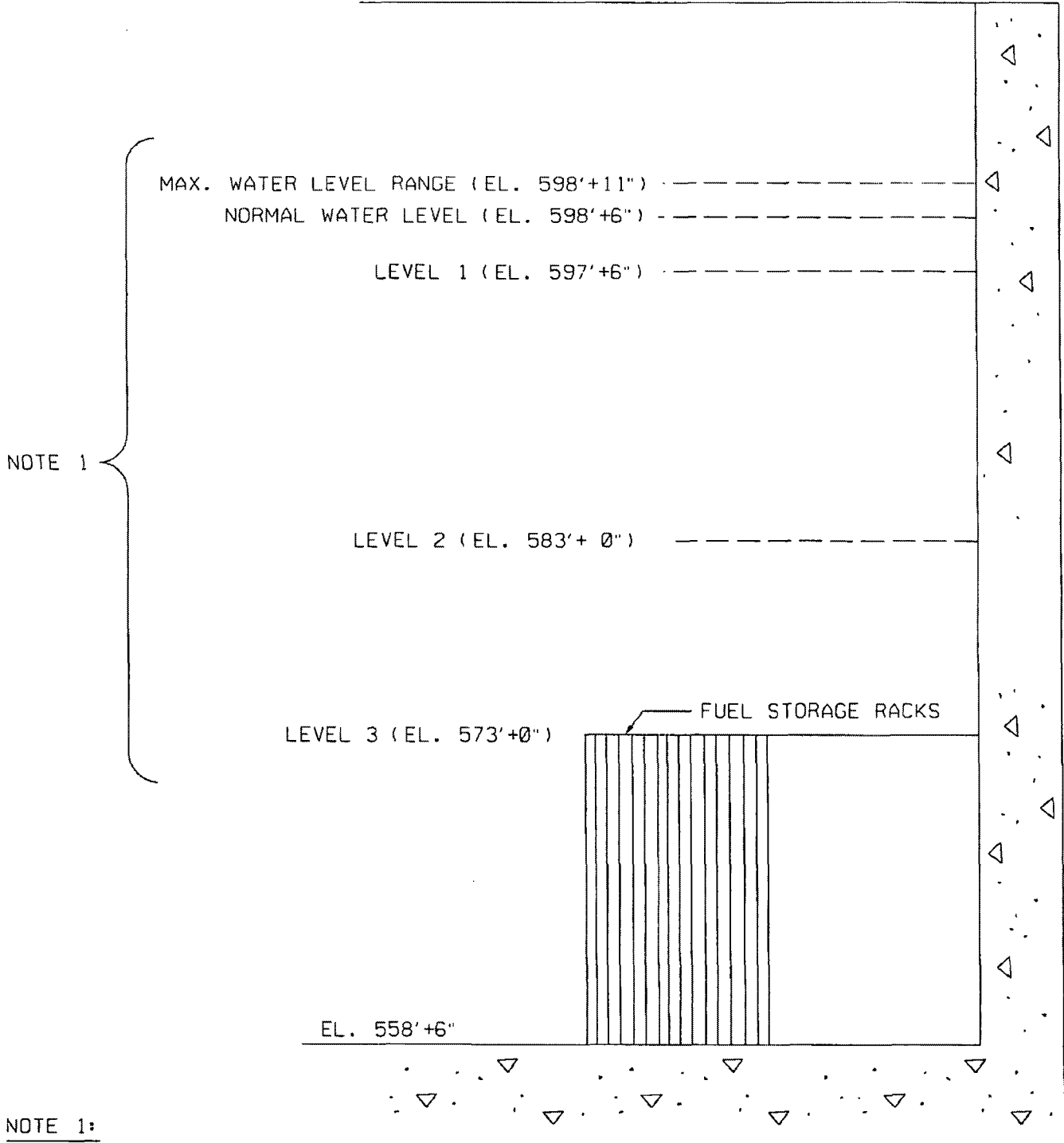
Catawba Response:

Information is not available within the 30-day response period for this RAI. Duke Energy anticipates submitting a response to this RAI for Catawba in the February 2014 six-month status report for the implementation of Order EA-12-051.

FIGURE 1

LEVEL RANGE MINIMUM EL. 573'+0" TO APPROXIMATELY EL. 599'+0"

EL. 605'+10" OPERATING DECK



NOTE 1:

FINAL LOCATION OF EQUIPMENT IS NOT DETERMINED, BUT THE RANGE WILL MEET OR EXCEED ELEVATIONS DEFINED BY THE MAXIMUM POOL LEVEL AND THE TOP OF THE FUEL RACKS.