Exelon Generation®

Order No. EA-12-051

RS-15-137

July 15, 2015

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Clinton Power Station, Unit 1
Facility Operating License No. NPF-62
NRC Docket No. 50-461

Subject: Report of Full Compliance with March 12, 2012 Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051)

References:

1. NRC Order Number EA-12-051, "Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation," dated March 12, 2012
2. 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
3. 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, dated August 2012
4. Exelon Generation Company, LLC's Initial Status Report 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 October 25, 2012
5. Exelon Generation Company, LLC Overall Integrated Plan in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051), dated February 28, 2013 (RS-13-029)
6. NRC letter to Exelon Generation Company, LLC, Request for Additional Information Regarding Overall Integrated Plan for Reliable Spent Fuel Pool Instrumentation, dated June 7, 2013
7. Exelon Generation Company, LLC letter to NRC, Response to Request For Additional Information - Overall Integrated Plan in Response to Commission Order Modifying License Requirements for Reliable Spent Fuel Pool Instrumentation (Order EA-12-051), dated July 3, 2013 (RS-13-157)
8. Exelon Generation Company, LLC First Six-Month Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051), dated August 28, 2013 (RS-13-116)

9. Exelon Generation Company, LLC Second Six-Month Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051), dated February 28, 2014 (RS-14-019)
10. Exelon Generation Company, LLC Third Six-Month Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051), dated August 28, 2014 (RS-14-197)
11. Exelon Generation Company, LLC Fourth Six-Month Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051), dated February 27, 2015 (RS-15-027)
12. NRC letter to Exelon Generation Company, LLC, Clinton Power Station, Unit 1 – Interim Staff Evaluation and Request for Additional Information Regarding the Overall Integrated Plan for Implementation of Order EA-12-051, Reliable Spent Fuel Pool Instrumentation (TAC No. MF0791), dated November 15, 2013
13. NRC letter to Exelon Generation Company, LLC, Clinton Power Station, Unit 1 – Report for the Audit Regarding Implementation of Mitigating Strategies and Reliable Spent Fuel Pool Instrumentation Related to Orders EA-12-049 and EA-12-051 (TAC No. MF0791), dated April 27, 2015

On March 12, 2012, the Nuclear Regulatory Commission ("NRC" or "Commission") issued Order EA-12-051, "Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation," (Reference 1) to Exelon Generation Company, LLC (EGC). Reference 1 was immediately effective and directed EGC to install reliable spent fuel pool level instrumentation. Specific requirements are outlined in Attachment 2 of Reference 1.

Reference 1 required submission of an initial status report 60 days following issuance of the final interim staff guidance (Reference 2) and an overall integrated plan (OIP) pursuant to Section IV, Condition C. Reference 2 endorsed industry guidance document NEI 12-02, Revision 1 (Reference 3) with clarifications and exceptions identified in Reference 2. Reference 4 provided the EGC initial status report regarding reliable spent fuel pool instrumentation. Reference 5 provided the Clinton Power Station, Unit 1 OIP.

Reference 1 required submission of a status report at six-month intervals following submittal of the OIP. References 8, 9, 10, and 11 provided the first, second, third, and fourth six-month status reports, respectively, pursuant to Section IV, Condition C.2, of Reference 1 for Clinton Power Station, Unit 1.

The purpose of this letter is to provide the report of full compliance with the March 12, 2012 Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051) (Reference 1) pursuant to Section IV, Condition C.3 of the Order for Clinton Power Station, Unit 1.

Clinton Power Station has installed two independent full scale level monitors for the Spent Fuel Pool (SFP) in response to Order EA-12-051. Clinton Power Station OIP Open Items have been addressed and closed as documented in References 8, 9, 10, and 11, and are considered complete pending NRC Closure. The information provided herein documents full compliance for Clinton Power Station, Unit 1 with Reference 1.

EGC's response to the NRC OIP Requests for Additional Information (OIP RAIs), and the NRC Interim Staff Evaluation (ISE) Open Items (ISE RAIs) identified in References 6 and 12 have been addressed and closed as documented in References 7, 8, 9, 10, and 11, and below, and are considered complete pending NRC Closure. EGC response to the NRC audit questions and additional audit open items have been addressed as documented in the NRC Site Audit Report (Reference 13).

The following table provides completion references for each NRC OIP RAI and ISE RAI.

OIP Open Item No. 1	Reference 5
OIP RAI No. 1	Reference 7
OIP RAI Nos. 3, 4, 6, 7a, 11b, 11c	Reference 11
OIP RAI Nos. 2, 5, 7b, 8a, 8b, 8c, 8d, 11a	Reference 11 and updated with this submittal as provided below
ISE RAI Nos. 3, 4, 6, 8	Reference 11
ISE RAI Nos. 11, 12	Reference 11 and updated with this submittal as provided below

Note: ISE RAIs are not duplicated in the table above if previously issued as OIP RAIs in Reference 6.

The table below documents the completion of the final remaining open actions as identified in Reference 11, and the revised response to OIP RAI Nos. 2 and 5 and ISE RAI No.11 regarding the additional instrument channel separation provided as described in Reference 13. Additionally, response to the SFPI audit item listed in Attachment 3 of Reference 13 is documented below. Since the NRC SFPI Order audit at Clinton Power Station, the response to ISE RAI No. 11 has been revised due to constructability issues in the field. The revised response for ISE RAI No. 11 is also provided below. As stated above, EGC provides the response for the following items and considers them to be complete for Clinton Power Station, Unit 1.

Item	Description	Reference
OIP Item 5 (RAI- 5, Ref. 3) **OIP Item 2 (RAI- 2, Ref. 3)** b) Further information on the use of physical and spatial separation	The following is a summary of the additional actions taken to provide as much physical and spatial separation within the Spent Fuel Building area utilizing, to the maximum extent practical, inherent shielding from missiles provided by existing recesses and corners in the Spent Fuel Building structure at Clinton Power Station (CPS) (Reference enclosed Sketch #2). Spent Fuel Probes: The two spent fuel probes were moved at opposite corners of the Spent Fuel Pool, one on the NE corner and the other on the SE	Complete

	corner of the pool, to obtain the maximum extent practical separation. The original design had a separation of approximately 34 feet, and the final installed configuration has a separation of 45 feet, which meets the NEI 12-02 requirement of separating the sensors at least by the shortest distance of the pool edge (i.e., 32 feet). Probe Coax Cable Signal Routing: Where the channels leave the spent fuel area, a change was made so the signal cable is routed in conduit on opposite faces of a two (2) foot wide webbed column, which is part of the support for the Fuel Building, a seismically designed and constructed structure. The channel cables are then routed, after leaving the top of the column, with one conduit (primary) being four (4) feet higher than the other to provide practically achievable separation due to interferences at the top of the column. After approximately eighteen (18) inches, the conduits maintain a separation of six (6) feet for a distance of approximately 10 feet into a separate conduit and a cable tray. At the cable tray, the primary channel is routed in a robust cable tray, and the secondary channel is routed in its own conduit outside the cable tray. The cable tray provides reasonable protection to the primary channel. Both channels are supported by seismically installed support hangers. The cable tray and conduit remain common to the tray supports until approximately ten (10) feet from the North Fuel Building wall, where they then separate, one in the tray and the other in a conduit by a distance of approximately five (5) feet until penetrating the North Fuel Building wall. Structural calculations IP-S-0303 and IP-S-0311 were revised, as required, to address the structural adequacy of conduit supports due to additional separation being provided from the column to the cable tray in the Fuel Building. The above described changes further enhance the design for the SFPI at Clinton Power Station and meet the NEI 12-02 requirements.	

	Justification for considering the cable tray to be robust: Structural Design Criteria DC-SD-01-CP provides guidance for load combination of component supports and various structures, specifically Section 6.1.4 "Abnormal Loads", which provides the guidance to consider the different environmental conditions (when applicable) during design and qualification of the component supports. The subject cable tray and conduit support are designed to be redundant in the safety related building. Both supports and cable tray are evaluated for impacts caused by internally generated missiles in the Fuel Building. The supports that hold the cable trays are designed seismically, and thus will not fail during a seismic event. Evaluation of missile impacts is explained below: If the supports or the cable trays are subjected to a missile strike, the cable tray though a non-safety related component, is considered robust since it is constructed of 14 gauge material, as specified in the Clinton Power Station design specification K-2980, and provides reasonable assurance to resist a missile strike. The seismically installed supports are robust as well in order to meet the design basis seismic standards for Clinton Power Station. In conclusion, with the supports being designed seismically, as required per DC-SD-01-CP, and the cable tray being sufficiently robust, the supports and cable tray are expected to be capable of surviving an internal missile impact.	
OIP Item 7 (RAI- 7b, Ref. 3) 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	The Westinghouse document WNA-TP-04709-GEN describes the methodology for routine testing/calibration verification and calibration methodology. This document also specifies the required accuracy criteria under normal operating conditions. Clinton Power Station calibration and channel verification procedures followed the guidance and criteria provided in this document and developed site specific procedures.	Complete

and to technicians that the channel requires adjustment to within the normal condition design accuracy.	Instrument channel calibration will be performed if the level indication reflects a value that is outside the acceptance band established in the Clinton Power Station calibration and channel verification procedures. Per Westinghouse document WNA-TP-04709-GEN calibration on a SFP level channel is to be completed within 60 days of a planned refueling outage considering normal test scheduling allowances (e.g., 25%). This is in compliance with the NEI 12-02 guidance for Spent Fuel Pool Instrumentation.	
OIP Item 8 (RAI-8a, 8b, 8c, 8d, Ref. 3) 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. Provide a discussion as to how these surveillances will be incorporated into the plant surveillance program.	a) Westinghouse calibration procedure WNA-TP-04709-GEN and functional test procedure WNA-TP-04613-GEN describe the capabilities and provisions of SFPI periodic testing and calibration, including in-situ testing. Clinton Power Station used the above described Westinghouse procedures and developed site specific calibration, channel verification and in-situ testing procedures. b) The level displayed by the channels will be verified per the Clinton Power Station administrative and operating procedures, as recommended by Westinghouse vendor technical manual WNA-GO-00127-GEN. If the level is not within the specified accuracy, per Westinghouse recommended tolerance in WNA-TP-04709-GEN, then channel calibration will be performed. c) Functional checks will be performed by Clinton Power Station per the Westinghouse functionality test procedure WNA-TP-04613-GEN and at the Westinghouse recommended frequency. Calibration checks will be performed by Clinton Power Station per the Westinghouse calibration procedure WNA-TP-04709-GEN and at the Westinghouse recommended frequency in accordance with	Complete

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.	Clinton Power Station maintenance and operating programs. The performance of these procedures will ensure reliable, accurate and continuous SFPI functionality. d) Clinton Power Station developed preventive maintenance tasks for the SFPI per Westinghouse recommendations identified in the technical manual WNA-GO- 00127-GEN. These preventative maintenance tasks will be performed as a minimum, at the Westinghouse recommended frequency, and will ensure that the channels are fully conditioned to accurately and reliably perform their functions when needed.	
OIP Item 11 (RAI- 11a, Ref. 3) 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. Please 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.	Performance tests (functional checks) and Operator performance checks were described in detail in the vendor operator's manual, and the applicable information is captured in plant operating procedures. Operator performance tests will be performed by Clinton Power Station periodically as recommended by the equipment vendor via Preventive Maintenance task process. Channel functional tests per operating procedures with limits established in consideration of vendor equipment specifications will be performed by Clinton Power Station at appropriate frequencies established per the Preventive Maintenance task process. Manual calibration and operator performance checks will be performed by Clinton Power Station per established preventive maintenance tasks with additional maintenance on an as-needed basis when flagged by the system's automated diagnostic testing features. Channel calibration tests per maintenance procedures with limits established in consideration of vendor equipment specifications will be performed by Clinton Power Station at frequencies established in	Complete

	consideration of vendor recommendations. SFPI channel/equipment maintenance/preventative maintenance and testing program requirements to ensure design and system readiness are established in accordance with Exelon's processes and procedures and in consideration of vendor recommendations to ensure that appropriate regular testing, channel checks, functional tests, periodic calibration, and maintenance is performed. Subject maintenance and testing program requirements are developed during the SFPI modification design process. All of these activities are subject to the inspection and audit process defined in the Exelon Quality Assurance Manual.	
ISE Item 6 (RAI- 11, Ref. 5) Please provide the following: a) The specific location for the primary and backup instrument channel display. b) If a display will be located somewhere other than the control room or alternate shutdown panel, please describe the evaluation used to validate that the display location can be accessed without unreasonable delay following a BDB event. Include the time available for personnel to access the display as credited in the evaluation, as well as the actual time (e.g., based on walk-throughs) that it will take for personnel to access the display. Additionally, please include a description of the radiological and environmental conditions on the paths personnel might take.	a) An updated sketch of the specific location of the primary and backup instrument channel display (monitor) is depicted on the enclosed revised Sketch #1, NRC RAI Question 1. b) Clinton Power Station revised the location of the Primary display near the Remote (alternate) Shutdown Panel as shown on the enclosed revised Sketch #1 NRC RAI Question 1 due to constructability issues. This revised location is as close to the Main Control Room as the original location described in Reference 11 (Fourth Six Month Update). The time to access the display is approximately eight (8) minutes. The Primary display is still within the Remote Shutdown Panel area and environmental conditions remain as previously described. No changes to the location of the Backup channel display were made.	Complete

ISE Item 6 (RAI- 12, Ref. 5) Please provide a list of the procedures addressing operation (both normal and abnormal response), calibration, test, maintenance, and inspection procedures that will be developed for use of the SFP instrumentation. The licensee is requested to include a brief description of the specific technical objectives to be achieved within each procedure.	Normal/Inspection procedure to monitor the Spent Fuel Pool level is implemented in accordance with Operations Procedure OP-AA-102-102 "General Area Checks and Operator Field Rounds" and readings are noted by using a "Hand Held Electronic Data Device" with predefined acceptance criteria. Abnormal procedures are implemented when an out of the predefined values condition is observed as a result of performing the OP-AA-102-102, or on the receipt of annunciator 5040-2F, described in procedure 5040.02 "Low Level Spent Fuel Storage Pool", and initiates, if required, CPS 4011.02 "Spent Fuel Pool Abnormal Water Level Decrease." Calibration/Testing procedures 9577.01 "Spent Fuel Pool Level Indication Primary 1LT-FC221A / Backup 1LT-FC221B Channel Functional Test," and 9477.01A(01B) "Spent Fuel Pool Level Primary 1LT-FC221A (Backup 1LT-FC221B) Channel Calibration" define the periodicity, functional testing and loop calibrations for the Spent Fuel Pool Level Indication system. Maintenance procedures consist of a series of Preventative Maintenance activities in accordance with ER-AA-200 "Preventive Maintenance Program" which define the periodicity for calibration, battery replacement, electronic component replacements, probe replacement, transmitter replacement, sensor probe inspection, and coax cable replacement.	Complete

MILESTONE SCHEDULE – ITEMS COMPLETE

Milestone	Completion Date
Submit 60 Day Status Report	October 25, 2012
Submit Overall Integrated Plan	February 28, 2013
Submit Responses to RAIs	July 5, 2013
Submit 6 Month Updates:	
Update 1	August 28, 2013
Update 2	February 28, 2014
Update 3	August 28, 2014
Provide Final Safety Evaluation (SE) Information	September 30, 2014

Milestone	Completion Date
Update 4	February 27, 2015
Modifications:	
Conceptual Design	3Q2012
Issue Exelon Fleet contract to procure SFPI Equipment	2Q2013
Begin Detailed Design Engineering	4Q2013
Complete and Issue SFPI Modification Package	2Q2015
Begin Installation	4Q2014
Complete SFPI Installation and Put Into Service	May 15, 2015

ORDER EA-12-051 COMPLIANCE ELEMENTS SUMMARY

The elements identified below for Clinton Power Station, as well as the site overall integrated plan response submittal (Reference 5), the 6-Month Status Reports (References 8, 9, 10, and 11), and any additional docketed correspondence, demonstrate compliance with Order EA-12-051.

IDENTIFICATION OF LEVELS OF REQUIRED MONITORING - COMPLETE

Clinton Power Station has previously identified the three required levels for monitoring SFP level in compliance with Order EA-12-051. These levels have been integrated into the site processes for monitoring level during events and responding to loss of SFP inventory.

INSTRUMENT DESIGN FEATURES - COMPLETE

The design of the instruments installed at Clinton Power Station complies with the requirements specified in the Order and described in NEI 12-02 "Industry Guidance for Compliance with NRC Order EA-12-051". The instruments have been installed in accordance with the station design control process.

The instruments have been arranged to provide reasonable protection against missiles. The instruments have been mounted to retain design configuration during and following the maximum expected ground motion. The instruments will be reliable during expected environmental and radiological conditions when the SFP is at saturation for extended periods. The instruments are independent of each other and have separate and diverse power supplies. The instruments will maintain their design accuracy following a power interruption and are designed to allow for routine testing and calibration.

The instrument display is readily accessible during postulated events and allows for SFP level information to be promptly available to decision makers.

PROGRAM FEATURES - COMPLETE

Training for Clinton Power Station, Unit 1, has been completed in accordance with an accepted training process as recommended in NEI 12-02, Section 4.1.

Operating and maintenance procedures for Clinton Power Station have been developed and integrated with existing procedures. Procedures have been verified and are available for use in accordance with the site procedure control program.

Site processes have been established to ensure the instruments are maintained at their design accuracy.

This letter contains no new regulatory commitments. If you have any questions regarding this report, please contact David P. Helker at 610-765-5525.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 15th day of July 2015.

Respectfully submitted,

Glen T. Kaegi
Director - Licensing & Regulatory Affairs
Exelon Generation Company, LLC

Enclosure:

Clinton Power Station SFPI Figures:
CPS Revised Sketch #1 (one page) – Transmitter and Electronic Enclosure Layout
CPS Revised Sketch #2 (two pages) – Depiction of Pool Sensor Locations and Cable Routing

cc: Director, Office of Nuclear Reactor Regulation
NRC Regional Administrator - Region III
NRC Senior Resident Inspector – Clinton Power Station, Unit 1
NRC Project Manager, NRR – Clinton Power Station, Unit 1
Mr. Jeremy S. Bowen, NRR/JLD/JOMB, NRC
Ms. Jessica A. Kratchman, NRR/JLD/JPSB, NRC
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Illinois Emergency Management Agency – Division of Nuclear Safety

Enclosure

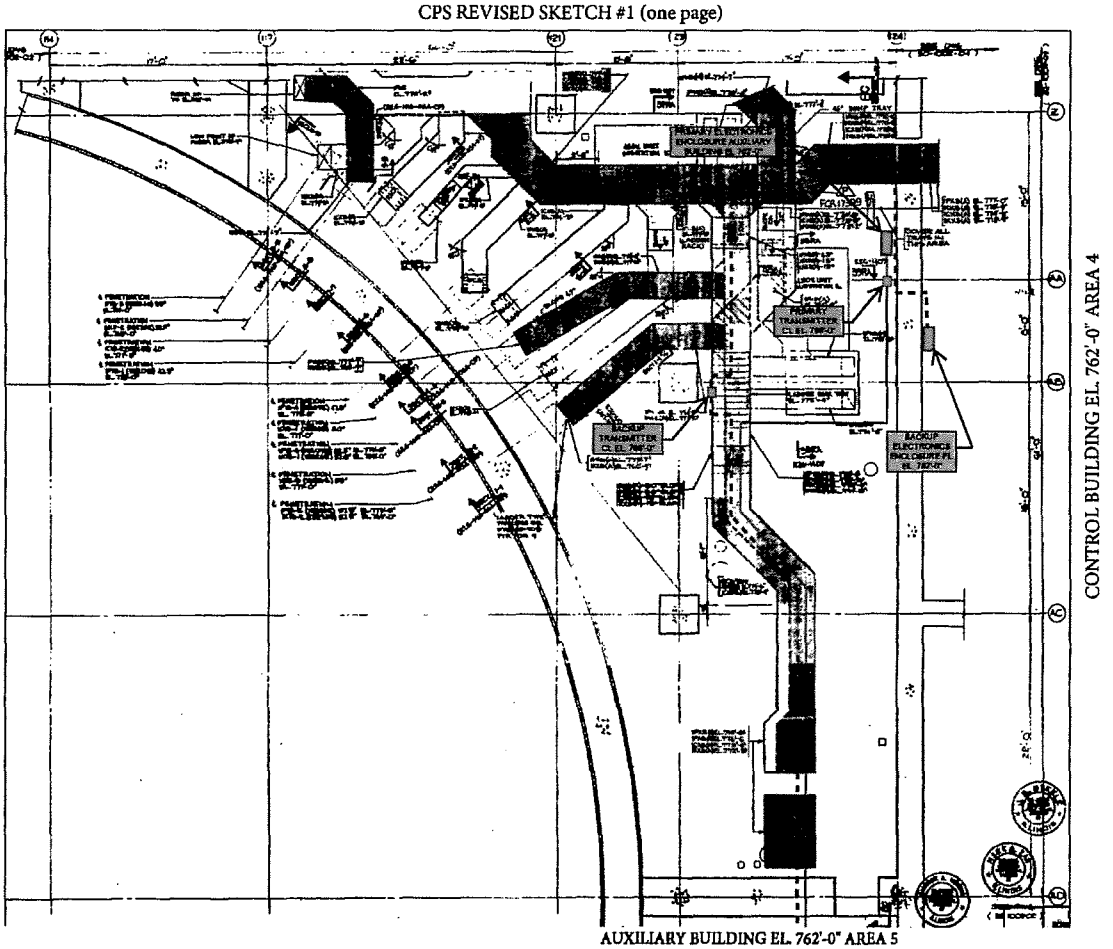
Clinton Power Station SFPI Figures

CPS Revised Sketch #1 (one page) – Transmitter and Electronic Enclosure Layout

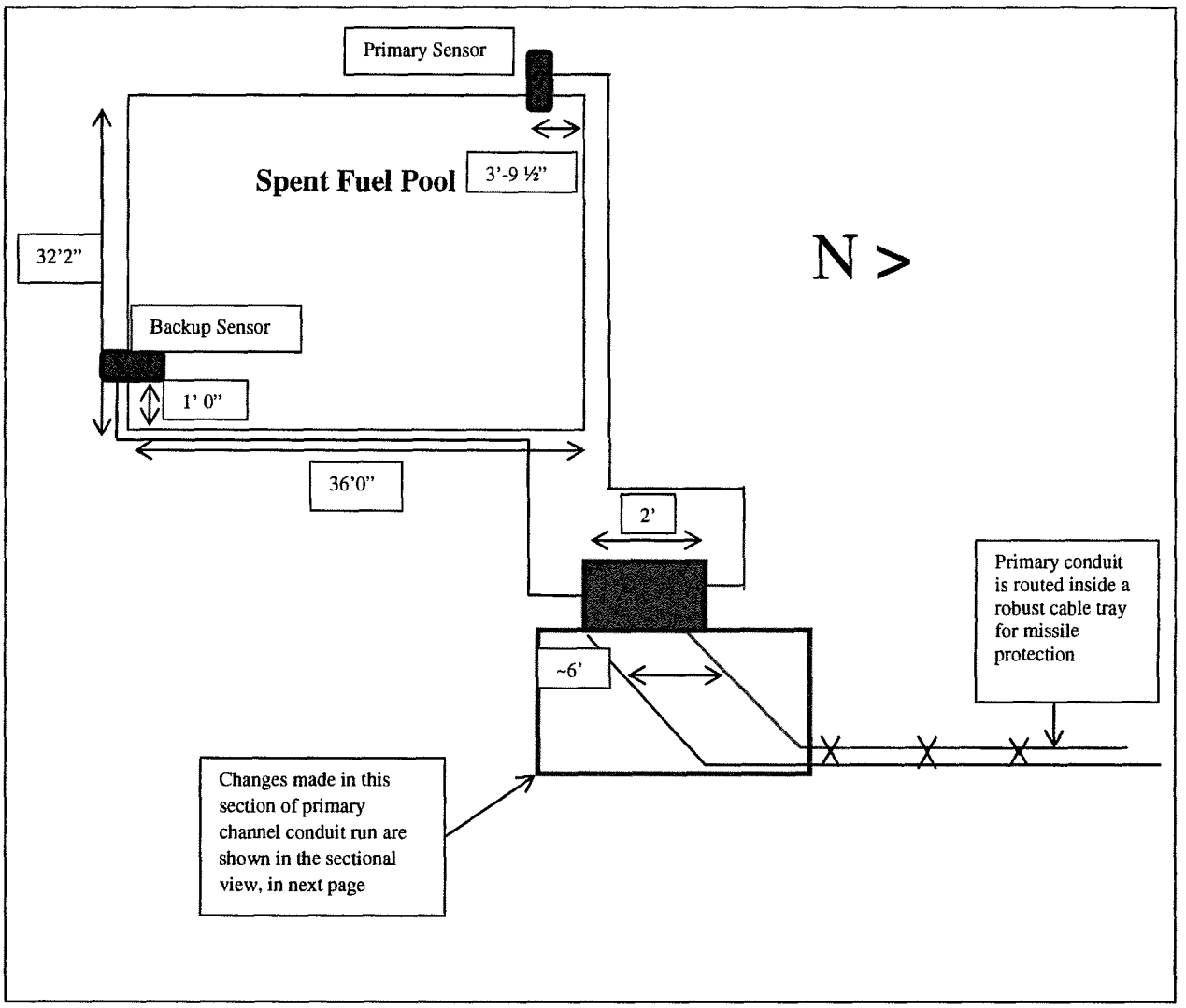
CPS Revised Sketch #2 (two pages) – Depiction of Pool Sensor Locations and Cable Routing

CPS Revised Sketch #1 (one page)
Transmitter and Electronic Enclosure Layout

CPS REVISED SKETCH #1 (one page)



CPS REVISED SKETCH #2 (two pages)
Depiction of Pool Sensor Locations and Cable Routing



SECTIONAL VIEW OF CONDUIT RUNS FROM COLUMN TO CABLE TRAYS