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10 CFR 50.4(b)(6)
10 CFR 50.71(e)
10 CFR 50.59(d)(2)

RS-04-155

October 11, 2004

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

Zion Nuclear Power Station, Units 1 and 2
Facility Operating License Nos. DPR-39 and DPR-48
NRC Docket Nos. 50-295 and 50-304

Subject: Submittal of Defueled Safety Analysis Report Update, Revision 3
Report of Changes, Tests and Experiments

References: (1) Exelon Generation Company, LLC (EGC) letter, "Submittal of Defueled Safety Analysis Report Update," dated October 22, 2002

(2) Exelon Generation Company, LLC (EGC) letter, "Report of Changes, Tests And Experiments," dated December 11, 2002

In accordance with the requirements of 10 CFR 50.71, "Maintenance of records, making of reports," paragraph (e), Exelon Generation Company, LLC (EGC) is submitting Revision 3 of the Defueled Safety Analysis Report (DSAR) for the Zion Nuclear Power Station (ZNPS). In accordance with 10 CFR 50.71(e)(4), the DSAR update is being submitted within 24 months of the previous ZNPS DSAR revision which was submitted in Reference (1).

In accordance with 10 CFR 50.59, "Changes, tests, and experiments," paragraph (d)(2), a report of changes, tests, and experiments, including a summary of the 10 CFR 50.59 evaluation of each change is also required to be submitted on a biennial basis. In Reference (2), the previous ZNPS 10 CFR 50.59 report was submitted. There were no 10 CFR 50.59 evaluations performed for ZNPS in the reporting period from December 11, 2002 to September 30, 2004 and therefore, a summary of evaluations is not required to be submitted.

The changes to the DSAR reflect administrative changes (i.e., editorial and DSAR text changes) and plant design changes. Revision 3 includes changes made from October 22, 2002, through August 31, 2004. We have evaluated the DSAR changes and determined the changes screened out as not requiring an evaluation under 10 CFR 50.59.

Attachment 1 contains a summary of the DSAR changes. Attachment 2 contains page change instructions. Attachment 3 contains the update to the ZNPS DSAR. As required by 10 CFR 50.71(e), this attachment consists of replacement pages to be inserted the DSAR. Changes to the DSAR are indicated by revision bars.

As Manager – Licensing, I certify that the information in this submittal accurately presents changes made since the previous submittals necessary to reflect information and analyses submitted to the NRC or prepared in accordance with NRC requirements.

Should you have any questions concerning this letter, please contact Ms. Alison M. Mackellar at (630) 657-2817.

Respectfully,

Kenneth A. Ainger
Manager – Licensing

Attachment 1: Summary of Changes
Attachment 2: Page Change Instructions
Attachment 3: ZNPS DSAR Revision 3

ATTACHMENT 1

Changes Made to the DSAR But Not Previously Submitted

Pages	Description of Change
LOEP-1, 4-ii, 4-6, 4-7, 4-14, Table 4-1, Table 4-3, Figure 4-1	Delete List of Effective Pages (LOEP) page 1. This administrative information is obsolete. Delete references to the Lake Discharge Tanks (LDTs) and insert references to the Boric Acid Monitoring Tanks (BAMTs). The LDTs have been abandoned. The liquid effluent system has been modified to use the BAMTs as the liquid effluent release tanks.
4-16, Table 4-2	Delete description for Fuel Building area radiation monitors 0RE-0005 and 0RT-AR03. Insert discussion for Fuel Building area radiation monitors 0RT-AR21 and 0RT-AR22. The area radiation monitor system has been modified to replace area radiation monitors 0RE-0005 and 0RT-AR03 with 0RT-AR22 and 0RT-AR21 respectively.
3-v, 3-53, 3-54	Revise description of control room design. Add discussion of plant pager alarm system.

ATTACHMENT 2

PAGE CHANGE INSTRUCTIONS

To perform the October 2004 Zion Defueled Safety Analysis Report (DSAR) update, please remove the existing pages and insert pages dated October 2004 as follows:

SECTION	REMOVE	INSERT
List of Effective Pages	LOEP-1	LOEP-1
List of Effective Pages	LOEP-2	LOEP-2
List of Effective Pages	LOEP-4	LOEP-4
List of Effective Pages	LOEP-5	LOEP-5
List of Effective Pages	LOEP-6	LOEP-6
Master Table of Contents	page 3-v	page 3-v
Master Table of Contents	page 4-ii	page 4-ii
Chapter 3	page 3-v	page 3-v
Chapter 3	page 3-53	page 3-53
Chapter 3	page 3-54	page 3-54
Chapter 4	page 4-ii	page 4-ii
Chapter 4	page 4-6	page 4-6
Chapter 4	page 4-7	page 4-7
Chapter 4	page 4-14	page 4-14
Chapter 4	page 4-16	page 4-16
Chapter 4	Table 4-1	Table 4-1
Chapter 4	Table 4-2	Table 4-2
Chapter 4	Table 4-3	Table 4-3
Chapter 4	Figure 4-1	Figure 4-1

ATTACHMENT 3

ZION NUCLEAR POWER STATION
DEFUELED SAFETY ANALYSIS REPORT REVISION 3

Zion Station Defueled Safety Analysis Report (DSAR)
Approved Site Change
Information Sheet

THIS PAGE HAS BEEN DELETED

LIST OF EFFECTIVE PAGES

LIST OF EFFECTIVE PAGES

PAGE	DATE	PAGE	DATE
2C-17	AUGUST 1998	2C-61	AUGUST 1998
2C-18	AUGUST 1998	2C-62	AUGUST 1998
2C-19	AUGUST 1998	2C-63	AUGUST 1998
2C-20	AUGUST 1998	2C-64	AUGUST 1998
2C-21	AUGUST 1998	2C-65	AUGUST 1998
2C-22	AUGUST 1998	2C-66	AUGUST 1998
2C-23	AUGUST 1998	2C-67	AUGUST 1998
2C-24	AUGUST 1998	2C-68	AUGUST 1998
2C-25	AUGUST 1998	2C-69	AUGUST 1998
2C-26	AUGUST 1998	2C-70	AUGUST 1998
2C-27	AUGUST 1998	2C-71	AUGUST 1998
2C-28	AUGUST 1998	2C-72	AUGUST 1998
2C-29	AUGUST 1998	2C-73	AUGUST 1998
2C-30	AUGUST 1998	2C-74	AUGUST 1998
2C-31	AUGUST 1998	2C-75	AUGUST 1998
2C-32	AUGUST 1998	2C-76	AUGUST 1998
2C-33	AUGUST 1998	2C-77	AUGUST 1998
2C-34	AUGUST 1998	2C-78	AUGUST 1998
2C-35	AUGUST 1998	2C-79	AUGUST 1998
2C-36	AUGUST 1998	2C-80	AUGUST 1998
2C-37	AUGUST 1998	2C-81	AUGUST 1998
2C-38	AUGUST 1998	2C-82	AUGUST 1998
2C-39	AUGUST 1998	2C-83	AUGUST 1998
2C-40	AUGUST 1998	2C-84	AUGUST 1998
2C-41	AUGUST 1998	2C-85	AUGUST 1998
2C-42	AUGUST 1998	Chapter 3 Tab	
2C-43	AUGUST 1998	3-i	AUGUST 1998
2C-44	AUGUST 1998	3-ii	OCTOBER 2002
2C-45	AUGUST 1998	3-iii	AUGUST 1998
2C-46	AUGUST 1998	3-iv	OCTOBER 2000
2C-47	AUGUST 1998	3-v	OCTOBER 2004
2C-48	AUGUST 1998	3-vi	OCTOBER 2000
2C-49	AUGUST 1998	3-vii	OCTOBER 2000
2C-50	AUGUST 1998	3-viii	OCTOBER 2000
2C-51	AUGUST 1998	3-1	AUGUST 1998
2C-52	AUGUST 1998	3-2	AUGUST 1998
2C-53	AUGUST 1998	3-3	AUGUST 1998
2C-54	AUGUST 1998	3-4	OCTOBER 2002
2C-55	AUGUST 1998	3-5	AUGUST 1998
2C-56	AUGUST 1998	3-6	AUGUST 1998
2C-57	AUGUST 1998	3-7	AUGUST 1998
2C-58	AUGUST 1998	3-8	OCTOBER 2000
2C-59	AUGUST 1998	3-9	AUGUST 1998
2C-60	AUGUST 1998	3-10	AUGUST 1998

LIST OF EFFECTIVE PAGES

PAGE	DATE	PAGE	DATE
3-11	AUGUST 1998	3-52	OCTOBER 2000
3-12	AUGUST 1998	3-52a	OCTOBER 2000
3-13	AUGUST 1998	3-53	OCTOBER 2004
3-14	AUGUST 1998	3-54	OCTOBER 2004
3-15	AUGUST 1998	3-55	OCTOBER 2000
3-16	AUGUST 1998	3-55a	OCTOBER 2000
3-17	AUGUST 1998	3-56	OCTOBER 2000
3-18	AUGUST 1998	3-57	AUGUST 1998
3-19	AUGUST 1998	3-58	OCTOBER 2002
3-20	OCTOBER 2002	3-59	OCTOBER 2000
3-21	AUGUST 1998	3-60	OCTOBER 2000
3-22	AUGUST 1998	3-61	OCTOBER 2000
3-23	AUGUST 1998	Table 3-1(1)	AUGUST 1998
3-24	AUGUST 1998	Table 3-2(1)	AUGUST 1998
3-25	AUGUST 1998	Table 3-3(1)	OCTOBER 2000
3-26	OCTOBER 2000	Table 3-4(1)	AUGUST 1998
3-27	OCTOBER 2000	Table 3-4(2)	AUGUST 1998
3-27a	OCTOBER 2000	Table 3-4(3)	AUGUST 1998
3-28	OCTOBER 2000	Table 3-4(4)	AUGUST 1998
3-29	OCTOBER 2000	Table 3-4(5)	AUGUST 1998
3-30	AUGUST 1998	Table 3-5(1)	AUGUST 1998
3-31	OCTOBER 2000	Table 3-6(1)	AUGUST 1998
3-32	AUGUST 1998	Table 3-7(1)	AUGUST 1998
3-33	AUGUST 1998	Table 3-8(1)	AUGUST 1998
3-34	AUGUST 1998	Table 3-9(1)	OCTOBER 2000
3-35	OCTOBER 2000	Table 3-9(2)	OCTOBER 2000
3-36	OCTOBER 2000	Table 3-9(3)	AUGUST 1998
3-37	OCTOBER 2000	Table 3-10(1)	OCTOBER 2000
3-38	OCTOBER 2002	Table 3-11(1)	OCTOBER 2000
3-39	AUGUST 1998	Table 3-12(1)	OCTOBER 2000
3-40	AUGUST 1998	Table 3-13(1)	OCTOBER 2000
3-41	AUGUST 1998	Table 3-14(1)	OCTOBER 2000
3-42	AUGUST 1998	Table 3-15(1)	AUGUST 1998
3-43	OCTOBER 2000	Figure 3-1	AUGUST 1998
3-43a	OCTOBER 2000	Figure 3-2	AUGUST 1998
3-43b	OCTOBER 2000	Figure 3-3	AUGUST 1998
3-44	OCTOBER 2000	Figure 3-4	AUGUST 1998
3-45	OCTOBER 2000	Figure 3-5	AUGUST 1998
3-46	OCTOBER 2000	Figure 3-6	AUGUST 1998
3-47	OCTOBER 2002	Figure 3-7	AUGUST 1998
3-48	OCTOBER 2000	Figure 3-8	AUGUST 1998
3-49	AUGUST 1998	Figure 3-9	AUGUST 1998
3-50	OCTOBER 2000	Figure 3-10	AUGUST 1998
3-51	OCTOBER 2000	Figure 3-11	AUGUST 1998

LIST OF EFFECTIVE PAGES

PAGE	DATE
Figure 3-12	AUGUST 1998
Figure 3-13	AUGUST 1998
Figure 3-14	AUGUST 1998
Figure 3-15	AUGUST 1998
Figure 3-16	AUGUST 1998
Figure 3-17	AUGUST 1998
Figure 3-18	AUGUST 1998
Figure 3-19	AUGUST 1998
Figure 3-20	AUGUST 1998
Figure 3-21	AUGUST 1998
Figure 3-22	AUGUST 1998
Figure 3-23	AUGUST 1998
Figure 3-24	AUGUST 1998
Figure 3-25	AUGUST 1998
Figure 3-26	AUGUST 1998
Figure 3-27	AUGUST 1998
Figure 3-28	AUGUST 1998
Figure 3-29	AUGUST 1998
Figure 3-30	AUGUST 1998
Figure 3-31	AUGUST 1998
Figure 3-32	OCTOBER 2000
Figure 3-33	AUGUST 1998
Figure 3-34	AUGUST 1998
Figure 3-35	AUGUST 1998
Figure 3-36	AUGUST 1998
Figure 3-37	AUGUST 1998
Figure 3-38	AUGUST 1998
Figure 3-39	OCTOBER 2000
Figure 3-39A	OCTOBER 2000
Figure 3-40	OCTOBER 2002
Figure 3-41	OCTOBER 2000
Figure 3-42	OCTOBER 2000
Figure 3-42A	OCTOBER 2000
Figure 3-43	AUGUST 1998
Figure 3-44	AUGUST 1998
Figure 3-45	AUGUST 1998
Figure 3-45A	OCTOBER 2000
Figure 3-46	OCTOBER 2000
Figure 3-47	OCTOBER 2000
Figure 3-48	AUGUST 1998
Chapter 4 Tab	
4-i	AUGUST 1998
4-ii	OCTOBER 2004
4-iii	AUGUST 1998
4-iv	AUGUST 1998
4-1	OCTOBER 2002
4-2	OCTOBER 2000
4-3	OCTOBER 2002
4-4	AUGUST 1998
4-5	OCTOBER 2002
4-6	OCTOBER 2004
4-7	OCTOBER 2004
4-8	AUGUST 1998
4-9	AUGUST 1998
4-10	OCTOBER 2000
4-11	OCTOBER 2000
4-12	OCTOBER 2000
4-13	OCTOBER 2000
4-14	OCTOBER 2004
4-15	OCTOBER 2000
4-16	OCTOBER 2004
4-17	OCTOBER 2000
Table 4-1(1)	OCTOBER 2004
Table 4-2(1)	OCTOBER 2004
Table 4-3(1)	OCTOBER 2004
Figure 4-1	OCTOBER 2004
Chapter 5 Tab	
5-i	AUGUST 1998
5-ii	AUGUST 1998
5-iii	AUGUST 1998
5-1	AUGUST 1998
5-2	OCTOBER 2000
5-3	OCTOBER 2000
5-4	OCTOBER 2000
5-5	OCTOBER 2000
5-6	AUGUST 1998
5-7	AUGUST 1998
5-8	OCTOBER 2000
Table 5-1(1)	AUGUST 1998
Table 5-2(1)	AUGUST 1998
Table 5-3(1)	OCTOBER 2000
Table 5-4(1)	OCTOBER 2000
Table 5-5(1)	OCTOBER 2000
Table 5-6(1)	AUGUST 1998
Table 5-7(1)	OCTOBER 2000
Figure 5-1	AUGUST 1998
Figure 5-2	AUGUST 1998
Figure 5-3	AUGUST 1998

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

3.10.5 Operating Control Stations

3.10.5.1 General Layout

The operating control stations consist of the Main Control Room for centralized control of the facility during defueled operations; and local stations for normal operation of the Radioactive Waste System and miscellaneous noncritical systems.

3.10.5.2 Design Basis

3.10.5.2.1 Control Room Design

The facility is equipped with a Control Room which contains controls and instrumentation for centralized operation of select plant equipment.

The main control panels for the facility are totally enclosed walk-in panels, which are located in the Main Control Room. The front portion of each main panel is a duplex bench board which contains the operating controls. The rear portion consists of instrument racks containing power supplies, amplifiers, relays, etc., for the radiation monitoring and miscellaneous facility control systems. The front operating bench boards contain controls for the Service Water system. The 345-kV switchyard controls are located on a vertical panel near the center of the Main Control Room. Heating, Ventilating, and Air Conditioning controls are on a vertical panel near the center of the Main Control Room. A separate general services panel, also located near the center of the Main Control Room, contains controls for the Fire Protection System.

3.10.5.2.2 Annunciator and Audible Alarm System

A visual annunciator system with audible signals is provided to alert the operator to off-normal conditions requiring corrective action. Audible alarms will be sounded in appropriate areas throughout the facility if high radiation conditions are present.

3.10.5.2.3 Radwaste System Control Panels

The liquid and solid radwaste control panels are located in the Auxiliary Building. These panels contain all the controls and instruments to control and monitor the Radioactive Liquid and Solid Waste Disposal Systems.

3.10.5.2.4 Miscellaneous Local Control Panels

Miscellaneous noncritical systems are controlled from local panels and control stations throughout the facility. Off-normal conditions on systems controlled from local panels are alarmed on the local panel annunciators.

3.10.5.2.5 Pager Alarm System

The auto-dial pager alarm system interfaces with the Spent Fuel Nuclear Island (SFNI) Data Acquisition System (DAS) and miscellaneous radiation monitoring equipment. Remote monitoring of alarm conditions for select plant parameters considered Important to the Defueled Condition (ITDC) is provided by the system. A designated pager, which alarms when abnormal conditions are present, is worn by on shift operating personnel. The alarm initiating condition can be determined by reviewing the status of monitoring devices locally or in the control room. The remote alarm feature provided by this system allows the control room to be unattended without compromising ITDC alarm monitoring capabilities.

3.10.5.2.6 Design Features Important to the Defueled Condition

The controls, instrumentation, annunciators, and alarms associated with the equipment identified as Important to the Defueled Condition for the storage and control of spent fuel in a safe condition, for the handling of radioactive waste, and for monitoring and controlling radiological effluent release paths is considered Important to the Defueled Condition. This includes the pager alarm system which consists of the phone system, plant pager system, Data Acquisition System (DAS), auto-dialer devices, and parameter monitoring devices.

3.10.6 Lighting Systems

Normal lighting for the facility is energized from the 480 V switchgear buses.

Stand-by lighting is also provided to supplement lighting in essential equipment areas and fire routes. These lighting units are each equipped with dual lamps and a battery. The lighting units are plugged into convenience outlets and turn on automatically if power to the receptacle fails.

DC emergency lighting is provided in the Control Room, at stairwells, and at points leading to the facility exits. These fixtures are energized from the 125 V batteries only when the AC lighting fails.

DC lighting is provided on doors exiting from the facility and on doors leading to the facility exits. Each is equipped with a battery and battery charger arrangement.

Lighting required per the Fire Protection Report is considered Important to the Defueled Condition.

3.10.7 Communications System

Normal and emergency communication systems are described in the Zion Annex of the Generating Stations Emergency Plan. These systems include those required to contact external emergency management agencies, officials and other government entities, and the general public. The communication systems relied upon per the Zion Annex of the Generating Stations Emergency Plan is, therefore, considered Important to the Defueled Condition.

TABLE OF CONTENTS

4.5.2 Liquid Waste Management System

4.5.2.1 Design Basis

The Liquid Waste Systems are designed to collect, store, process, monitor, and dispose of liquid radioactive waste from the station. The principle design criteria for the Liquid Waste Systems are as follows:

1. Ensure that the quantities of radioactive waste discharged from the plant during normal operation are as low as practicable and, in any event, well within the allowable concentration limits; and

2. Limit the inadvertent release of radioactive material from the plant so that the resulting radiation exposure to the public is as low as practicable and, in any event, well within the allowable concentration limits.

The allowable concentration limits described above are defined as 10 times 10CFR20 limits for batch releases from the Boric Acid Monitor Tanks.

4.5.2.2 System Description

Liquid waste is processed on a batch basis using filtration and/or demineralization. The method of processing that is utilized is dependent on the type of waste.

Processed waste to be released is discharged from one of four Boric Acid Monitor Tanks into the circulating water discharge canal for dilution before entering the lake and, in the case of turbine building wastes and other low level secondary wastes, they may be sent to the Wastewater Treatment Facility (WWTF) which discharges to the intake fore-bay.

Surveillance requirements for radioactive liquid releases are stipulated in the Offsite Dose Calculation Manual, Section 12.3. Liquid waste, low enough in activity level to be released, is discharged on a batch basis from one of four 21,600 gallon Boric Acid Monitor Tanks. The tank containing the batch to be discharged is isolated so that no additional waste can be added to it. The batch of liquid waste is mixed by recirculation to assure uniformity and is then sampled. The sample drawn from the Boric Acid Monitor Tank is analyzed for gross alpha, gross beta, radio-isotopic profile, and tritium activity. Based upon this analysis, a discharge rate is determined so that when the batch is released and diluted by the plant circulating water and/or service water, the individual radio-isotopic concentrations in the discharge leaving the plant site is less than the allowable concentration limits. Normally, the waste discharge is a small percentage of allowable concentration limits. At no time during waste discharge is the water leaving the plant and entering the lake above the allowable concentration limits.

Before liquid waste can be released from a Boric Acid Monitor Tank, a locked closed valve must be opened. The key for this valve is retained by the operations department personnel, and the analysis of the sample must be approved by the shift supervisor or his designated alternate. As a further backup, a radiation detector monitors the radioactive system discharge line that feeds the circulating water discharge line. Upon detecting an abnormal level, a valve closes and an alarm signal is actuated. Detailed records are maintained of all radioactive waste discharged to the environs. A simplified sketch of the Liquid Waste System is provided as Figure 4-1. Specific tank details are listed in Table 4-1.

4.5.2.3 Design Features Important to the Defueled Condition

The Liquid Waste Management System, as described in section 4.5.2.2, is considered Important to the Defueled Condition.

4.5.2.4 Wastewater Treatment Facility

The Wastewater Treatment Facility (WWTF) is designed to treat nonradioactive and low level radioactive liquid from many facility sources including building roof runoff and the turbine building fire sump, which receives input from the turbine building equipment and floor drains, and the fuel pool cooling tower blowdown. The Steam Generators may also be drained to the turbine building fire sump in the future. To prevent excessive contamination of the WWTF, the fire sump discharge is monitored for radioactivity and sampled and analyzed per the ODCM. Should high radioactivity be detected, piping connections are in place to divert sump fluids for radwaste processing. The critical treatment units in the WWTF are provided in duplicate to provide operational reliability and maintenance capability.

The WWTF is designed to remove suspended solids and oil to the level acceptable to the Illinois Environmental Protection Agency and to ensure compliance with the facility National Pollutant Discharge Elimination System (NPDES) permit. Since the wastewater discharge rates are variable, an equalization tank is provided to maintain a more nearly uniform flow to the treatment facilities. The WWTF also includes other equipment such as: mixing tanks, mixers, oil skimmers, flocculators, oil coalescers, clarifiers, sludge drying beds, filters, etc.

Discharge from the WWTF is by gravity to the Intake forebay.

4.6.2.1.2.1 Waste Disposal System Liquid Effluent Monitor

This channel continuously monitors all Liquid Waste System releases from the Boric Acid Monitor Tanks. A scintillation detector in a shielded assembly monitors all effluent discharges. Automatic valve closure action is initiated by the waste disposal system liquid effluent monitor to prevent further release after a high radioactivity condition is indicated or alarmed. The valve is located over 250 feet downstream of the monitor to allow closure prior to any radioactive release to the lake.

The accuracy of these monitors will be maintained to provide a highly reliable backup to the multiple sample analyses prior to discharge. A single monitor is provided on each discharge line and is considered adequate since the tank sample analyses are the primary method for determination of allowable discharge volume and flow. The release of liquid waste is performed under administrative control and these channels provide continuous monitoring during the release.

4.6.2.1.2.2 Fire Sump Discharge Liquid Monitor

The fire sump discharge liquid monitor is installed on the discharge of the fire sump pumps. A liquid proportional composite sampler is also installed on this discharge line. Upon actuation of the high radiation alarm from the fire sump discharge liquid monitor, the permanently installed fire sump pumps are automatically tripped to terminate release of radioactivity to the lake.

4.6.2.2 Calibration and Testing

Each channel employs an isotopic check source for channel testing. For many of these channels, the check source test is initiated at the Radiation Monitoring System cabinets or RMDS console. Check source testing of selected monitors requires local operation. Westinghouse supplied monitors can be tested online, without actuating interlocks, by increasing the interlock setpoint above the check source activity level.

All radiation monitors are calibrated by exposing the detectors to an isotope(s) of known activity. By changing the distance or placing filters between detector and the standard isotope, the field intensity is varied thereby allowing for a multi-point calibration. Channels employing count rate meters may be electronically calibrated via a pulse generator input.

The waste disposal system liquid effluent monitors are calibrated by the use of two (2) isotopic standards of different intermediate activity levels. The standards are monitored during calibration in a configuration similar to that of the monitored sample during normal operation. This method allows for an accurate isotopic calibration without contamination of the system.

The method of calibration of laboratory radiation counting instrumentation is in accordance with the vendor's manual. Complete documentation of calibration checks is maintained.

4.6.3 Area Radiation Monitoring Instrumentation

4.6.3.1 System Description

The Area Radiation Monitoring System consists of channels which indicate radiation levels in the fuel building.

Table 4-2 identifies the radiation monitors that are important to the defueled condition, including their location and a summary of the important features of each monitor. The detector output is amplified and the log count-rate is determined by the integral amplifier at the detector. The radiation level is typically shown at the detector and is transmitted to the radiation monitoring system cabinets in the Fuel Building and Control Room where it is indicated on a meter, Data Acquisition System (DAS) computer system and the Radiation Monitor Display System (RMDS) and recorded. Most area radiation alarms are displayed locally and on DAS/RMDS in the Control Room.

The Fuel Building overhead crane radiation monitor utilizes a gamma scintillation type detector with an integral amplifier at the detector. Since this type unit is a current integrating device rather than a pulse system, it is not affected by stray electro-static or electro-magnetic fields. In addition, this detector will not saturate in high radiation fields. When the level exceeds the range of the instrument, it merely reads full scale until such time as the level recedes to a point within the instrument's range. This radiation monitor, which is mounted in the cab of the crane, is interlocked with the crane hoists such that a high radiation level will stop upward motion of the main and auxiliary hoists.

4.6.3.2 Design Features Important to the Defueled Condition

The Area Radiation Monitoring System Components, as described above, are considered Important to the Defueled Condition.

4.7 Sealed Sources

Departmental procedures detail methods of leak testing sealed sources and receipt, handling and storage of radioactive sources. Approved calibration procedures outline specific techniques for the safe handling of calibration sources.

Accountability of sources is maintained in inventory records that are routinely updated. Source accessibility control is achieved through storage areas that are maintained locked to unauthorized personnel. While in use, sources are kept under the control of an authorized individual.

Radioactive sealed sources shall be leak tested for contamination. Any licensed sealed source is exempt from such leak tests if the source contains 100 microcuries or less of beta and/or gamma emitting material or 5 microcuries or less alpha emitting material.

TABLE 4-1
LIQUID RADWASTE SYSTEM TANKS

Tank Room	Number	Location	Capacity (gallons)	Material	Design Pressure	Design Temperature (degrees F)
Waste Evaporator Monitor Tanks	2	Auxiliary Building, El 614'	8000 each	Type 304 Stainless Steel	Atmospheric	200
Blowdown Monitor Tanks	3	Auxiliary Building, El 542'	20,000 each	Type 304 Stainless Steel	Atmospheric	150
Boric Acid Monitor Tanks	4	Auxiliary Building, El 592'	21,600 each	Type 304 Stainless Steel	Atmospheric	150

TABLE 4-2
AREA RADIATION MONITORS

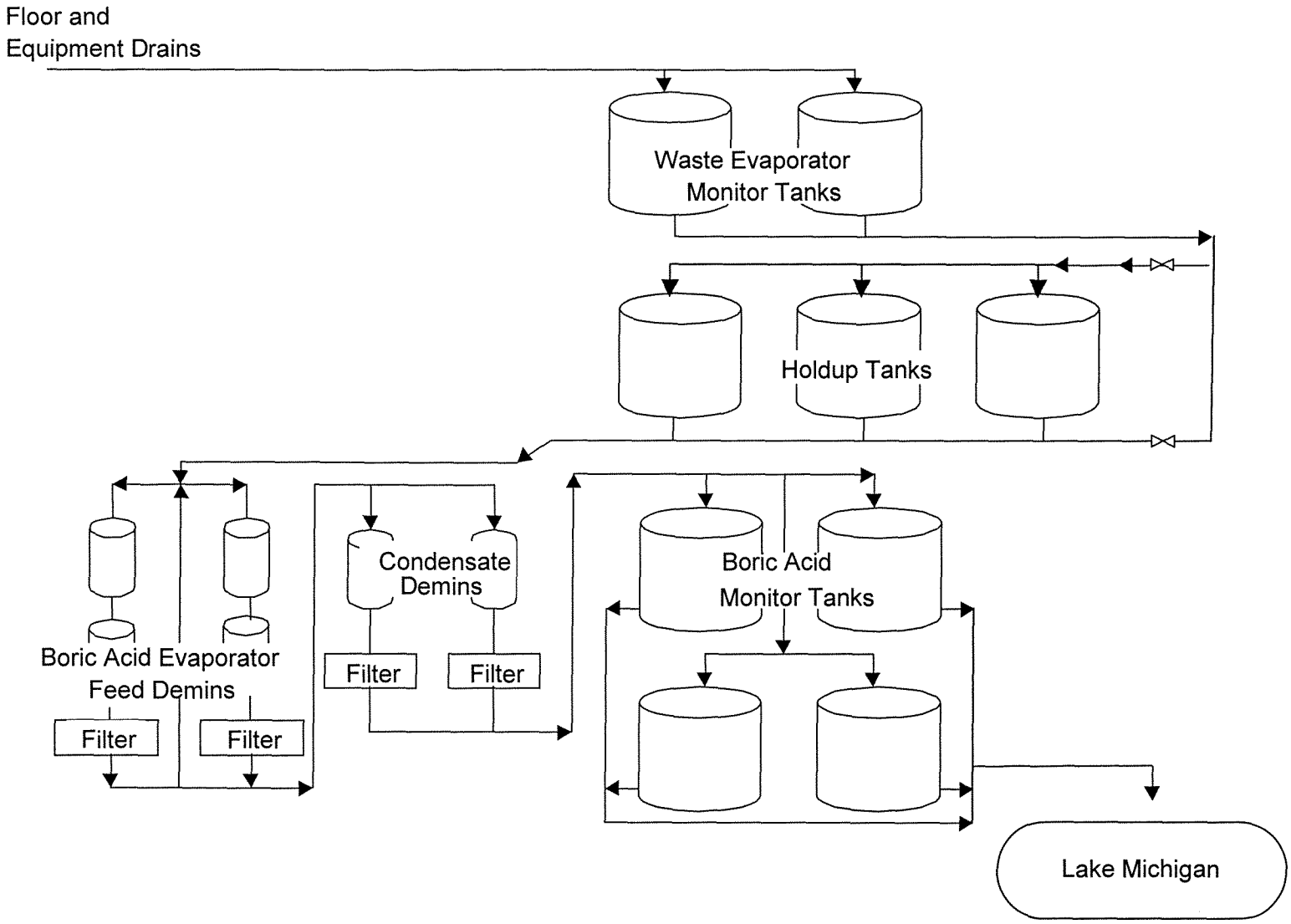
Location	Monitor	Type	Range	Type of Readout	
				Control Room	Local
Fuel Handling Building, Decontamination Area	0RT-AR22	Proportional Counter	10 μR/hr – 10 R/hr	High Alarm Ind / DAS Computer	Digital Meter
Fuel Handling Building, Pool Area	0RT-AR21	Proportional Counter	10 μR/hr – 10 R/hr	High Alarm Ind / DAS Computer	Digital Meter
Fuel Building Overhead Crane	0RT-AR13	Gamma Scintillation	0.1 mR/hr – 1 R/hr	None	Log Meter

(1) 0RT-AR22 and 0RT-AR21 are credited with satisfying the radiation monitor requirements as defined in 10 CFR 50.68(b)(6).

TABLE 4-3
PROCESS RADIATION MONITORS

SERVICE	MONITOR NO.	INSTRUMENT CHANNEL	DETECTOR TYPE	SENSITIVITY	ISOTOPE (1)
Containment Air	1RIA-PR40 2RIA-PR40	Particulate	Beta Scintillation	1.09 E 5 cpm/μCi	Sr-90/Y-90
Auxiliary Building Vent Stack	1RIA-PR49 2RIA-PR49	Particulate	Beta Scintillation	1.09 E 5 cpm/μCi	Sr-90/Y-90
		Low Range Noble Gas	Beta Scintillation	5.0 E-7 to 1.0 E-2 μCi/cc	Kr-85
		Mid Range Noble Gas	G-M	1.0 E-2 to 1.0 E 4 μCi/cc	Kr-85
		High Range Noble Gas	G-M	1.0 to 5.0 E 5 μCi/cc	Kr-85
Fire Sump Discharge	0RT-PR25		Scintillation	9.0 E-7 to 8.0 E-2 μCi/ml	Cs-137
Waste Disposal System Lake Discharge Effluent	0RT-PR05		Scintillation	1.0 E-7 to 5.0 E-3 μCi/ml	Cs-137
Fuel Building Exhaust	0RT-PR30	Particulate Noble Gas	Sealed Gas Proportional	1.28 E5 cpm/μCi 3.5 E-3 to 2E-3 μCi/cc	Tc-99 Kr-85

(1) Sensitivity Ranges are based on these isotope



ZION STATION DSAR

Figure 4-1

Zion Station Liquid Processing Flowchart

October 2004