License Amendment Request for Storing Exelon Sister Nuclear Stations Class B/C LLRW in the LaSalle Station Interim Radwaste Storage Facility - 13620

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ABSTRACT

Exelon Nuclear (Exelon) designed and constructed an Interim Radwaste Storage Facility (IRSF) in the mid-1980s at LaSalle County Nuclear Station (LaSalle). The facility was designed to store low-level radioactive waste (LLRW) on an interim basis, i.e., up to five years. The primary reason for the IRSF was to offset lack of disposal in case existing disposal facilities, such as the Southeast Compact's Barnwell Disposal Facility in Barnwell, South Carolina, ceased accepting radioactive waste from utilities not in the Southeast Compact.

Approximately ninety percent of the Radwaste projected to be stored in the LaSalle IRSF in that period of time was Class A, with the balance being Class B/C waste.

On July 1, 2008 the Barnwell Disposal Facility in the Southeast Compact closed its doors to out-of-compact Radwaste, which precluded LaSalle from shipping Class B/C Radwaste to an outside disposal facility. Class A waste generated by LaSalle is still able to be disposed at the "Envirocare of Utah LLRW Disposal Complex" in Clive, Utah. Thus the need for utilizing the LaSalle IRSF for storing Class B/C Radwaste for an extended period, perhaps life-of-plant or more became apparent.

Additionally, other Exelon Midwest nuclear stations located in Illinois that did not build an IRSF heretofore also needed extended Radwaste storage. In early 2009, Exelon made a decision to forward Radwaste from the Byron Nuclear Station (Byron), Braidwood Nuclear Station (Braidwood), and Clinton Nuclear Station (Clinton) to LaSalle's IRSF. As only Class B/C Radwaste would need to be forwarded to LaSalle, the original volumetric capacity of the LaSalle IRSF was capable of handling the small number of additional expected shipments annually from the Exelon sister nuclear stations in Illinois.

Forwarding Class B/C Radwaste from the Exelon sister nuclear stations in Illinois to LaSalle would require an amendment to the LaSalle Station operating license. Exelon submitted the License Amendment Request (LAR) to NRC on January 6, 2010; NRC approved the LAR on July 21, 2011.

A similar decision was made by Exelon in early 2009 to forward Radwaste from Limerick Nuclear Station to its sister station, the Peach Bottom Atomic Power Station; both in Pennsylvania. A LAR submittal to the NRC was also provided and NRC approval was received in 2011.

INTRODUCTION

Exelon Nuclear (Exelon) designed and constructed an Interim Radwaste Storage Facility (IRSF) in the mid-1980s at LaSalle County Nuclear Station (LaSalle). The facility was designed to store radioactive waste on an interim basis, i.e., at the time arbitrarily specified by NRC as up to five years. The primary reason for the IRSF was to offset lack of disposal in case existing disposal facilities, such as the Southeast Compact's Barnwell Disposal Facility in Barnwell, South Carolina, ceased accepting radioactive waste from utilities not in the Southeast Compact. The Low-Level Radioactive Waste (LLRW) Policy Amendments Act of 1985 (LLRWPAA) allows compacts with operating LLRW disposal sites to deny access to generators in States and compacts that have not developed disposal capacity on their own.

The LaSalle IRSF was designed to specific NRC regulatory guidance documents at the time, primarily Generic Letter (GL) 81-38 entitled "Storage of Low-Level Radioactive Wastes at Power Reactor Sites" [1]. Other regulatory guidance documents that were utilized for radiological dose criteria were 10 CFR 20 for dose outside the building shield walls, and, 40 CFR 190 for dose at the nearest public dose receptor [2, 3]. Waste containers were accepted for interim storage if they met NRC and DOT requirements, as well as burial site waste acceptance criteria requirements, for eventual shipment to the disposal facility.

Approximately ninety per cent of the Radwaste projected to be stored in the LaSalle IRSF in that period of time was Class A, with the balance being Class B/C waste. Class A, B, and C low-level radioactive wastes are generally acceptable for near-surface disposal and are defined in 10 CFR 61 [4]. Section 10 CFR 61.55 lists the radioactivity concentration limits of specific radioactive materials allowed in each low-level waste class [4]. Class A low-level radioactive waste contains the lowest radioactive concentration and constitutes the vast bulk of radioactive waste. Class B contains the next lowest radioactive concentration. Class C waste has the highest radioactive concentration allowed to be disposed of in a low-level waste disposal facility.

Most Class A waste meets categorization as Low Specific Activity (LSA) waste, such as condensate resin. The class B/C waste is typically high specific activity resins generally with isotopics being driven by high levels of Co-60, thereby resulting in relatively high container contact dose rates 0.00387 C/kg/hr (15 R/hr) or greater). Class B/C Radwaste is typically generated at the Station by the Reactor Water Cleanup System (RWCS) and the Spent Fuel Cleanup System (SFCS) and stored in High Density Polyethylene (HDPE) High Integrity Containers (HICs) in a dewatered bead resin waste form. The dewatered resins meet Generic Letter 81-38 requirements for "Stabilized Waste" [1].

On July 1, 2008 the Barnwell Disposal Facility in the Southeast Compact closed its doors to out-of-compact Radwaste, which precluded LaSalle from shipping Class B/C Radwaste to an outside disposal facility. Class A waste generated by LaSalle is still able to be disposed at the "Envirocare of Utah LLRW Disposal Complex" in Clive, Utah. Thus the need for utilizing the LaSalle IRSF for storing Class B/C Radwaste for an extended period, perhaps life-of-plant or more, became apparent. The LaSalle IRSF new purpose is limited to storing Class B/C Radwaste only. Class A Radwaste may continue to be staged in this facility awaiting shipment to a disposal facility.

Additionally, other Exelon Midwest nuclear stations located in Illinois that did not build an IRSF heretofore will also need extended Radwaste storage. In early 2009, Exelon made a decision to store Radwaste from the Byron Nuclear Station (Byron), Braidwood Nuclear Station (Braidwood), and Clinton Nuclear Station (Clinton) at the LaSalle IRSF. As only Class B/C Radwaste will need extended storage, the original volumetric capacity of the LaSalle IRSF is capable of handling the small number of additional expected shipments annually from the Exelon sister nuclear stations in Illinois.

A Technical Report was developed to provide the technical basis for Exelon's LaSalle License Amendment Request (LAR); it was based on Regulatory guidance related to extended Radwaste storage in IRSFs to determine whether current design and operations of the existing LaSalle IRSF were acceptable, including review of prior Safety Evaluation (50.59) Reports, for this new mission. Additionally, this Technical Report provided the technical bases for Exelon's LAR to be submitted to NRC to allow possession of Class B/C waste from the Byron, Braidwood, and Clinton Stations.

Review of a previous applicable precedent regarding Radwaste shipment to the Tennessee Valley Authority Sequoyah Nuclear Station from their Watts Bar Nuclear Station was carried out prior to making the decision to ship Exelon sister station Radwaste to LaSalle. The NRC approved a LAR dated December 17, 1999 regarding the shipment of Radwaste to the Sequoyah Station IRSF on July 18, 2000 (Amendment No. 257 to Facility Operating License No. DPR-77 and Amendment No. 248 to Facility Operating License No. DPR-79 for the Sequoyah Nuclear Plants, Units 1 and 3, respectively) from Watts Bar.

FACILITY DESCRIPTION

The LaSalle Interim Radwaste Storage Facility (IRSF) is located within the protected area (PA) of LaSalle County Nuclear Station, in the agricultural area of Brookfield Township, LaSalle County, Illinois. The LaSalle IRSF was designed to provide temporary storage for LLRW generated by Unit 1 and Unit 2 if disposal capability became unavailable.

The IRSF provides a LLRW storage system including radiation shielding, remote loading and unloading of containers, heating, ventilation and air conditioning (HVAC) systems, and containment of potential spills, as further described below:

Physical Description

The LaSalle IRSF is a separate physical area that provides contingency for storing Radwaste at the site location. The building is approximately 19.812 meters (65 feet) wide by 40.996 meters (134.5 feet) long and 14.935 meters (49 feet) high. See Figure 1 - Google Satellite IRSF Location. The LaSalle IRSF features 76.2-centimeter (30-inch) concrete shield walls on the peripheral wall system for direct transmission protection and a concrete roof that is 30.48 to 38.1

cm (12 to 15 inches) thick for skyshine protection purposes. The IRSF is composed of four areas: truck bay, control room, mechanical/electric equipment room, and storage area.

- **Truck Bay**

  The truck bay area is utilized for receiving Radwaste in containers acceptable for off-site disposal and is equipped with an overhead crane. The truck bay area includes a container monitoring system and swipe area, and liquid collection sumps for the truck and storage bays. All loading and unloading of containers is performed after the truck cab is disconnected from its trailer and removed from the truck bay. Personnel are restricted from the truck bay during radiologically hot container movement to ensure ALARA. Subsequently, the container is remotely removed from the truck bay area to the storage area through a 2.13 meter by 2.13 meter (7 ft by 7 ft) notch opening.

- **Control Room**

  The control room provides remote monitoring/supervision of the IRSF overhead crane operations via closed circuit television (CCTV) monitors. A record board mounted on the control room wall provides a location record of all containers by placing a circular disc with container identification number, weight, date placed in storage, and its contact radiation level on the date stored.

- **Equipment Room**

  The equipment room contains the facility's utilities and HVAC system.

- **Storage Bay**

  The storage bay area is used strictly for Class B/C Radwaste storage, usually as dewatered resins. There is no routine personnel accessibility to this area, with storage movement provided by a remotely operated crane to load and unload the waste containers through the wall notch. The storage area has a triangular pitch arrangement, which accommodates 135 containers per layer (270 containers double stacked).

- **Fire Detection System**

  The IRSF fire detection system is an alarm system only. The IRSF fire alarm system is designed as "Class A" in accordance with National Fire Protection Association (NFPA) 72, 1990 and NFPA 72E, 1990 and Uniform Building Code (UBC) 1990. The IRSF fire detection system design incorporates good engineering features and capabilities for early detection, prevention and mitigation of fires. The IRSF local fire alarm panel is connected to annunciators in the IRSF control room and the Station's Main Control Room. Three IRSF areas receive continuous fire detection monitoring, 1) the truck bay/storage bay, 2) the control room, and 3) the equipment room. Within these areas, there are 18 smoke detectors spread throughout the ductwork and ceilings. The three IRSF fire detection areas are discussed below:

A. **Truck Bay/Storage Bay**

The truck bay area contains two pyrotronics thermal fire detectors mounted on the ceiling and two on the adjacent corners of the room manual pull stations – 1.37 meters (4.5 feet) from floor with horn-strobe located above at 3.05 meters (10 feet) high. The IRSF fire detection system is an alarm system only. Fire hydrants are provided for IRSF fire fighting; with spacing provided as specified by NFPA 10 allowable distance criteria.

There is one local smoke detector located directly over the storage bay/truck bay interface wall. This detector provides some level of detection for fires in that area. Additionally, there are duct fire detectors and ionization detectors located in the truck bay and equipment room recirculation air ducts that are capable of detecting smoke in the storage bay area during all operational fan modes.

Fire detectors in the storage area are extremely difficult to maintain since there is no routine human accessibility in that area.

B. **Control Room**

The control room area contains one ionization smoke detector and one manual pull station.

C. **Equipment Room**

In the equipment room, there are five duct smoke detectors, three ionization smoke detectors, and one manual pull station. Installed within the HVAC ductwork are five dampers that are actuated by fusible links. The fire dampers are not operated by the fire alarm system. The fire dampers operate only when the fusible link is subjected to sufficient heat to melt the fusible links. The automatic dampers installed in the HVAC provide no fire protection features.

- **Heating and Ventilation System**

The IRSF contains two patterns of ventilation and heating system for cooling and heating. The HVAC provides a 9.2 m^3/s (19,500 cfm) fan capacity with an electric heating coil. There are four (4) exhaust ducts of 0.7844 m^3/s (1,662 cfm) covering the storage area and one exhaust duct of 0.7844 m^3/s (1,662 cfm) covering the truck bay area maintaining a temperature range of 10°C (50°F) to 48.89°C (120°F). There is one air intake in the storage bay area of 7.575 m^3/s (16,050 cfm).

During the cooling season, the system operates on 100% external air. And during the heating season, the outside air dampers move to the minimum position, where only

1.6282 m^3/s (3,450 cfm) of external air is allowed into the building, and the remaining 7.575 m^3/s (16,050 cfm) of ventilation air gets recirculated. In the truck bay area, a positive pressure duct-mounted electrical coil provides an additional heating supply located at the mezzanine level.

There are fire dampers in all the duct penetrations providing fire barriers in case of a fire event.

- **Overhead Bridge Crane**

  The truck and storage bay is covered by an 18,143-kg (20-ton) trolley-mounted overhead crane. Five (5) CCTV cameras fixed to the crane in several orientations provide real time monitoring of the container loading/unloading processes from the IRSF control room under ALARA conditions. Two cameras are fixed to observe grid system coordinates, and the other three can be remotely moved to several orientations facilitating container placement and surveillance routines. A grid indexing system is used to maximize the use of the storage area and to meticulously control and confirm container location.

  In addition, lighting located at the top of the crane hook provides visibility in the storage bay area; there is no fixed lighting in this area.

- **Surveillance System**

  IRSF operations personnel perform a periodic visual inspection and surveillance of the storage bay with the crane mounted CCTV cameras and associated monitors. Inspections performed include surveillance for container swelling, corrosion products, and signs of breaching. Inspections and surveillances are performed in accordance with written procedures.

DISCUSSION OF EVALUATIONS

IRSF Acceptance Criteria

Primary NRC regulatory guidance for interim storage of radioactive waste was reviewed to identify criteria that need to be met for continued operation of the existing IRSF for an extended storage function and for receiving Class B/C Radwaste either from the LaSalle station of from sister stations in Illinois.

Key NRC guidance documents evaluated were:

1. Generic Letter 81-38 entitled “Storage of Low-Level Radioactive Wastes at Power Reactor Sites”, [1]

2. NUREG 0800 SRP 11.4-A entitled, “ Design Guidance for Temporary Storage of Low-Level radioactive Waste” and, [5]

3. Regulatory Issue Summary (RIS) 2008-32 entitled, “Interim Low Level Radioactive Waste Storage at Reactor Sites” [6].

A thorough review of these guidance documents resulted in a tabulation of “LaSalle IRSF Regulatory Acceptance Criteria” (Acceptance Criteria) that define the minimum essential design and operational requirements for the LaSalle IRSF. Many of the Acceptance Criteria are bounded by previous 50.59 assessment findings, but a number required new evaluation and analysis to confirm the criteria are adequately met. The technical report fully documented the acceptability of the existing IRSF for meeting the Acceptance Criteria and forms a licensing basis for applying for an LAR for the LaSalle station.

Initial Duration of Storage

The expected initial duration of storage of Radwaste in the existing LaSalle IRSF is established as 80 years. This is anticipated to be the maximum storage duration required to accommodate life-of-plant plus 40 years of projected radioactive waste of Class B/C type. In 2010, a permanent disposal facility in the United States was not available for out-of-compact Class B/C radioactive waste. Never-the-less, Exelon Nuclear will endeavor to identify a suitable permanent disposal facility in the near future and will work to establish a contract with a new permanent disposal facility for accepting shipment of stored Class B/C Radioactive waste from the LaSalle IRSF as soon as feasible.

Dewatered Resin Flammable Gas Generation Assessment

The Dewatered Resin Flammable Gas Generation Assessment evaluated hydrogen gas generated in bead resin Radwaste based on dose rates. The assessment was needed to make sure that the hydrogen gas Lower Flammability Limit (LFL) of 4.0% in the IRSF storage area was never reached. An Administrative Limit of 2.0 % of hydrogen gas accumulated was stipulated per IRSF storage bay volume for analysis purposes. The LaSalle storage bay Administrative Limit is 109,730 liters of hydrogen gas, and the combustible gas generated per 270 HICs is 21,287 liters/year is conservatively based on 0.129 C/kg/hr (500 R/hr) hot containers. It is not anticipated that the administrative limit would be reached due to ambient air exchanges even without the forced air ventilation system in operation.

Assessment results concluded that flammable gas generation in the LaSalle IRSF storage bay for the proposed waste forms, even at maximum theoretical container quantities and dose rates, is not of concern as long as the containers (and shield bells, if used) are adequately vented. This conclusion holds even without storage bay forced ventilation in operation for extended periods.

HDPE (Poly) High Integrity Containers (HIC) Container Integrity Assessment

HDPE 8-120B containers for the storage of Class B/C Radwaste for extended periods will be exposed to air, gamma radiation, and stacking stresses under storage conditions in the LaSalle IRSF. These containers were reviewed to ensure the containers will maintain their integrity for the duration of the extended storage period (Exelon has established the extended storage period to be 80 years) and will not rupture when subjected to handling for transportation to a future disposal site.

Evaluation indicates that a creep type failure mode is not of concern for HDPE containers storage in air for the 80 year established storage duration. The design of the HDPE container assembly isolates the HDPE container from service loads during stacking and lifting.

Oxidative Induction Time testing of actual samples from the Energy Solutions 8-120B HDPE container was used to conservatively predict overall service life of this container for storage in air. Test results indicated that the estimated service life for HDPE containers in air for extended storage inside an ambient temperature storage bay is at least 100 years.

Waste Acceptance Criteria (WAC)

Proposed LaSalle IRSF Waste Acceptance Criteria was developed, it was based on the Barnwell Waste Management Facility (Barnwell, South Carolina) License Amendment No. 49.

Effluent Release Monitoring Assessment

URS reviewed monitoring needs and capabilities for potential releases (effluents) specifically for the LaSalle County IRSF against regulatory requirements/guidance and industry standards. Conclusions reached were that monitoring may or may not be continuous. Since the assessments were generic, conclusions reached are also applicable to all Exelon Interim Radwaste Storage Facilities.

The assessment indicated that the LaSalle County Station IRSF fully complies with all identified monitoring requirements/guidance. With regards to continuous air effluent release monitoring, the facilities' Continuous Air Monitors (CAMs) are not required.

Offsite Radiation Protection Considerations

Offsite dose rates are controlled in conformance with 10 CFR 20.1301 (a), where dose rates to a member of the public in an unrestricted area is limited to 0.02 mSv/hr (2 mrem/hr) or 1 mSv/yr (100 mrem/year) [2]. The restricted area boundary nearest to the IRSF (i.e., to the west of the IRSF) is at 395 meters from the center of IRSF. Calculations show that doses will be well within these limits.

Annual doses to offsite public dose receptors are also required to be within 0.25 mSv/yr (25 mrem/year) for all nuclear fuel cycle activities. The unrestricted area boundary dose limits selected for the analysis in the Offsite Dose Calculation Manual (ODCM) is 10% of this value or 0.025 mSv/yr (2.5 mrem/year). Additionally, a limit of 0.01 mSv/yr (1 mrem/year) is applied, for at the nearest resident, with 24/7 occupancy assumed. Calculations performed showed that annual doses to offsite public dose receptors were acceptable.

Fire Assessment

Calculations performed show that no additional active fire detection or suppression is needed for the LaSalle IRSF if the Design Basis Fire Hazard Analysis Storage Area layout is followed. In this case, 100 double stacked poly HICs are interspersed according to the LaSalle existing crane index system provided in Figure 2, HDPE HICs Arrayed with Adequate Separation Distance to Other HICs to Eliminate Fire Spread.

The arrangement provides for approximately 13 years of capacity based on an average container storage rate of 8 HICs per year. After this period, if necessary, steel shell poly HICs can be placed in the open residual spaces, and stacked two high. Using this proposed approach the full capacity of 270 HIC's is attainable, and, additional fire protection systems in the IRSF is not considered necessary.

Current fire protection systems provided in the Truck Bay, Mechanical Equipment Room, and IRSF Control Room were found acceptable.

Tornado Assessment

The LaSalle County Station IRSF was designed to Uniform Building Code requirements, with wind design requirements for standard wind loads at a 50 year recurrence interval. As per the 10 CFR 50.59 Safety Evaluation Final Report of July 1992, although the facility is not designed to (then) tornado loads and pressures, its inherent stability provides protection, with the mass of radiological shielding built into the structure's walls and roof resulting in wind and missile protection above the code requirements. LaSalle is in tornado intensity Region I, with a tornado pressure drop of 8.27 kPa (1.2 psi), maximum wind speed of 370.15 km/h (230 miles per hour (mph)), translational speed of 74.03 km/h (46 mph), and maximum rotational speed of 296.12 km/h (184 mph). This compares to a pressure drop of 20.68 kPa (3.0 psi), 579.36 km/h (360 mph) maximum wind speed, 112.65 km/h (70 mph) maximum translational speed, and 466.71 km/h (290 mph) rotational speed in the previous Revision 0 of the Regulatory Guide 1.76 on Design-Basis Tornado and Tornado Missiles for Nuclear Power Plants, dated April 1974. Thus, this significant lowering of applicable tornado parameters for structural design implies that the original IRSF design basis and the 1992 50.59 statements concerning tornado adequacy of the LaSalle IRSF can be considered conservative today. Similarly, a postulated HIC drop onto the storage bay floor would not produce significant floor damage and no through-floor cracking for leakage, as the energy of such a drop was found to be comparable to the worst energy from the missile impact tests, and the floor concrete thickness is greater than the damage depths of any of the tests.

Flood Assessment

As per the facility's 1992 50.59, flooding of the IRSF site is not a consideration, as the Probable Maximum Flood elevation is 151.49 m (497 feet), a full 64.62 m (212 feet) below the floor elevation of the LaSalle IRSF. Also, the LaSalle Updated Final Safety Analysis Report (UFSAR) Section 2.4.3 indicates that the station site is considered "flood-proof" with regard to the Probable Maximum Flood (to elevation 522.5 feet including wave runup, more than 54.86 m (180 feet) below the floor elevation of the IRSF.

Seismic Assessment

As per the facility's 1992 50.59, the LaSalle IRSF is designed to UBC requirements for seismic design meeting Zone I. Per the 50.59, no realistic seismic accident scenarios can be postulated regarding structural failure leading to radiological releases greater than 10% of 10 CFR 100 limits, i.e., 0.025 Sv (2.5 Rem). If an earthquake is assumed to result in an IRSF structural failure that leads to loss of the HIC's containment capability and subsequent release of their dispersible radioactive contents, there is no apparent mechanism for any subsequent release of these contents to the environment or the public, so post-event clean-up activities should assure essentially no radiological release consequences. In any case, the 1992 50.59 consequences of not greater than 10% of 10 CFR 100 limits, i.e., 0.025 Sv (2.5 Rem), would still be expected to apply.

Shielding Assessment

The design function of the IRSF is to store low level radioactive waste, either for staging in preparation for shipping to a disposal site, or for storage on a more extended basis if a disposal site is not available. The IRSF could also be used on a storage for decay basis for some high activity waste. For shielding purposes, these functions must be met with shielding and waste handling processes sufficient to meet regulated exposure limits. Specifically, the LaSalle IRSF shielding design was reanalyzed to credit available design margins and establish new operational limitations. Loading and placement restrictions were applied to assure that the radiation dose requirements are met.

The shielding assessment results are summarized below:

1. Handling is controlled based on container contact dose rates.

2. Shielding analyses are done conservatively, assuming an all Co-60 isotopic mix.

3. Containers on the periphery of the IRSF are limited to a 0.00645 C/kg/hr (25 R/hr) contact.

4. The average contact dose rate limit for upwardly exposed containers (i.e., the upper layer of containers), is 0.0129 C/kg/hr (50 R/hr).

5. Exposure from higher activity containers can be minimized by having intervening containers nearer to outside walls, and by stacking lower activity containers over them.

6. It is recognized that dose rates will build up slowly, particularly for skyshine and scatter into the truckbay due to the cumulative effect of many containers being required. Nonetheless, radiation surveys should be used to confirm that dose limits are being met in the near vicinity of the IRSF as waste packages are introduced.

7. Operational credit for decay in storage can be used, provided it is controlled by procedure.

Container Drop Assessment

A container drop is considered a very unlikely event given crane features, operator training, and procedural controls. However, this has historically been treated as a bounding accident event with a dose limit criterion of 10% of 10 CFR 100 limits [7]. LSCS practices of closing the IRSF openings and stopping ventilation when handling HICs make it unlikely that significant fractions of any potentially airborne activity will escape before settling. This provided some possibility of a qualitative dismissal of this event. However, a new container drop assessment for the IRSF was completed. The approach utilized NUREG-1320 formulations, conservatively treating the resins that could potentially be released from the drop as a dry powder with much smaller than expected particle sizes [8]. The calculation shows the regulatory limit would be met.

CONCLUSIONS

A Technical Report was developed to evaluate the existing LaSalle Station IRSF for operating in an extended storage (i.e., beyond 5 years) mode and receiving Class B/C LLRW for storage from the Byron, Braidwood, and Clinton Stations. The report also supported the LAR for LaSalle since the LaSalle Docket License will need revision to accept LLRW from the Illinois sister stations mentioned. Current NRC regulatory guidance was reviewed to ensure that all regulatory criteria were met.

The Technical Report concluded, after assessing both normal design requirements and potential design basis events, that the existing LaSalle Station IRSF facility meets current NRC regulatory requirements and performs acceptably in an extended storage operational mode (up to 80 years in duration) for LaSalle generated Class B/C LLRW in HDPE (high-density polyethylene, or simply "poly") "High Integrity Containers" (HICs). This conclusion is equally valid for extended storage of Class B/C LLRW from Byron, Braidwood, and/or Clinton Station at the LaSalle IRSF.

In coming to this determination, the following key operational aspects were considered:

- Characterization of probable Class B/C LLRW to be received and stored.
- Assessment of potential container flammable gas generation.
- Assessment of poly HIC integrity for extended storage.
- Development requirements of applicable Waste Acceptance Criteria (WAC).
- Evaluation of the need for continuous effluent monitoring.
- Evaluation of design basis events, including: fire, seismic, flood, tornado, and dropped container.
- Updated shielding and dose acceptability assessments.

Some of the key findings of the URS Technical Report were:

1. With proper container venting, flammable gas generation for Class B/C dewatered resin waste is not of concern, even in the event the storage bay ventilation system is not operating for extended periods.

2. Poly HICs (8-120 units) are expected to retain the physical properties associated with their integrity for extended storage for 100 years or more. Dewatering may be required prior to shipping but would be accomplished in a Station facility away from the IRSF. With low HIC stresses expected because of the two high stacking structural systems provided with the poly HIC, container embrittlement even with high radiation doses is not expected to be an issue. The addition of anti oxidant compounds (AO) also substantially reduces poly HIC physical property degradation impacts associated with extended storage and radioactivity. Poly HIC container storage inside the storage bay in the as-designed controlled temperature environment, with negligible UV exposure, enhances longevity of the poly HICs.

3. Continuous effluent monitoring is not required based on the technical assessment. No credible release mechanism for volatile or liquid container contents has been found that would require continuous monitoring.

4. Seismic, flood, and tornado design basis events are found to be bounded by the previous 50.59 analyses. Dropped container assessment conservatively shows that less than 10% of 10 CRF 100 dose limits would result [7]. Fire hazard assessments show that no credible fire initiation scenario exists, but a non-mechanistic assumed fire evaluation shows that when containers are spaced according to the specified arrangement, a fire in a poly HIC or group of 6 poly HICs would not spread to other non-steel shelled poly HICs, and the potential dose consequences of radiological releases from this event would be less than 10% of 10 CRF 100 dose limits [7]. Up to 122 non-steel shelled poly HICs can be stored without requiring active fire suppression in the Storage Bay. When steel shelled poly HICs are interspersed as specified in this report, full storage capacity (270 HICs in a double-stacked configuration) would result. Therefore no active fire detection or suppression is required in the storage bay under these conditions.

5. Shielding evaluations using state-of-the-art Monte Carlo analytical tools indicate that: (a) containers on the periphery of the IRSF are limited to 0.00645 C/kg/hr (25 R/hr) contact, and (b) the average contact dose rate limit for upwardly exposed containers (i.e., the upper layer of containers), is 0.0129 C/kg/hr (50 R/hr). These operational limits assure that 10 CFR 20 ALARA and 40 CRF 190 dose requirements would be met [2, 3]. Containers with substantially higher contact dose rates (limited to 0.09804 C/kg/hr (380 R/hr) per the ODCM) can be accommodated in the storage bay as long as they are emplaced such that they are located in the interior of the array such that they have no line of site to an outside wall. Furthermore, if necessary to meet (b) above, such a container can be placed on the bottom layer with a lower dose (e.g., 0.0129 C/kg/hr (50 R/hr)) container on the top layer.

6. A 50.59 Applicability Review Form was completed per Station procedure LS-AA-104-1002 and determined that a 50.59 screening is not required. A License Amendment

Request (LAR) was necessary, since the current LaSalle Operating License does not allow receipt of LLRW from other stations.

Exelon submitted a LAR to the NRC supported by the URS Technical Evaluation in January 6, 2010 and NRC approved the LAR in July, 21 2011 [9, 10]. LaSalle is currently licensed to receive LLRW from Clinton, Byron, and Braidwood nuclear units for storage in the LaSalle Station IRSF.

REFERENCES

1. US Nuclear Regulatory Commission, Generic Letter 81-38, Storage of Low-Level Radioactive Wastes at Power Reactor Sites, November 10, 1981
2. 10 CFR 20, Standards for Protection Against Radiation
3. 40 CFR 190, Environmental Radiation Protection Standards for nuclear Power Operations
4. 10 CFR 61, Licensing Requirements for Land Disposal of Radioactive Waste
5. US Nuclear Regulatory Commission, Regulatory Issue Summary 2008-32, Interim Low Level Radioactive Waste Storage at Reactor Sites, December 30, 2008
6. US Nuclear Regulatory Commission, NUREG-800, Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition, March 2007
7. 10 CFR 100, Reactor Site Criteria
8. US Nuclear Regulatory Commission, NUREG-1320, Nuclear Fuel Cycle Facility Accident Analysis Handbook, May, 1988f
9. Exelon Nuclear, Request for License Amendment to Allow Receipt and Storage of Low-Level Radioactive Waste at LaSalle County Station, Units 1 and 2, January 6, 2010
10. US Nuclear Regulatory Commission, Exelon Generating Company LLC Docket No. 50-373 LaSalle County Station, Unit 1 Amendment to Facility Operating License, Amendment No. 202, July 21, 2011

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Figure 1-Google Satellite IRSF Location

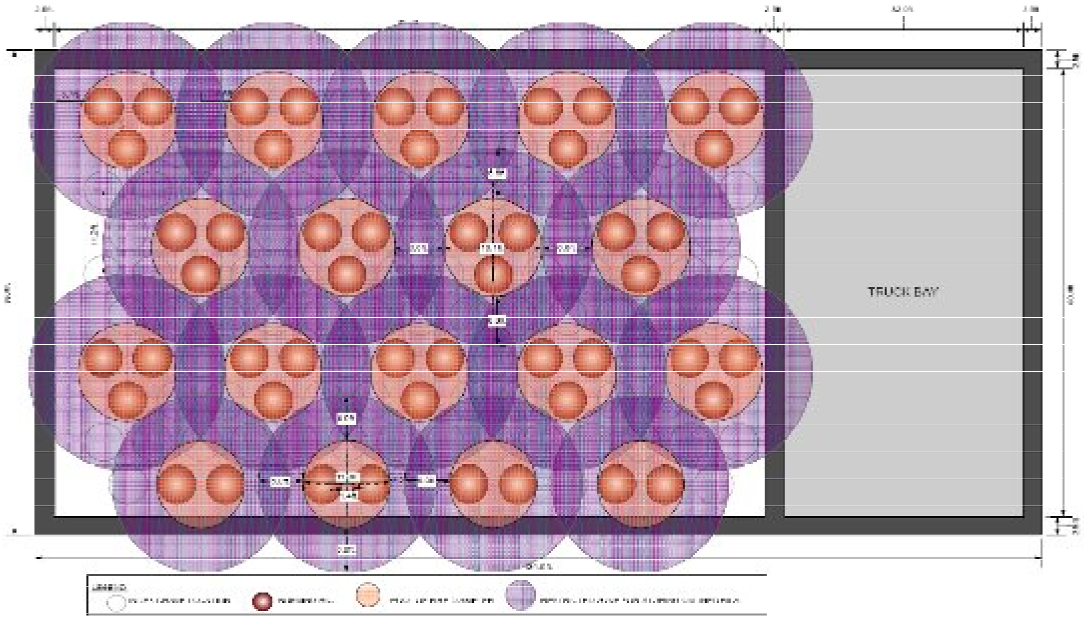

Figure 2- HDPE HICS Arrayed with Adequate Separation Distance to Other HICs to Eliminate Fire Spread