

ZION STATION RESTORATION PROJECT
LICENSE TERMINATION PLAN
CHAPTER 1, REVISION 2
GENERAL INFORMATION

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LIST OF ACRONYMS AND ABBREVIATIONS

AEC	Atomic Energy Commission
AMSL	Above Mean Sea Level
ALARA	As Low As Reasonably Achievable
AMCG	Average Member of the Critical Group
ComEd	Commonwealth Edison
DQO	Data Quality Objectives
DCGL	Derived Concentration Guideline Level
DSAR	Defueled Safety Analysis Report
DUST-MS	Disposal Unit Source Term - Multiple Species
FSS	Final Status Survey
FSAR	Final Safety Analysis Report
HSA	Historical Site Assessment
ICMP	Illinois Coastal Management Program
ISFSI	Independent Spent Fuel Storage Installation
LTP	License Termination Plan
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
NRC	Nuclear Regulatory Commission
ODCM	Off-Site Dose Calculation Manual
QAPP	Quality Assurance Project Plan for Characterization and FSS
PWR	Pressurized Water Reactors
RESRAD	RESidual RADioactive materials
SFP	Spent Fuel Pool
ZNPS	Zion Nuclear Power Station

1 GENERAL INFORMATION

The Zion Nuclear Power Station (ZNPS) consists of two (Units 1 and 2) Pressurized Water Reactors (PWR). The station is located near the city of Zion in northeast Illinois on the west shore of Lake Michigan. The site is approximately 40 miles north of Chicago, Illinois and 42 miles south of Milwaukee, Wisconsin.

ZNPS was previously operated by Commonwealth Edison (ComEd) until it was permanently shut down on February 13, 1998. In 2000, the license was transferred from ComEd to Exelon Nuclear Generation, LLC (Exelon). On January 25, 2008, Exelon and ZionSolutions, LLC submitted an *Application for License Transfers and Conforming Administrative License Amendments* (Reference 1-1) to the Nuclear Regulatory Commission (NRC) requesting that the NRC consent to the transfer of Exelon's Facility Operating Licenses for ZNPS to ZionSolutions. On September 1, 2010, the licenses were transferred from Exelon to ZionSolutions. ZionSolutions is now the current licensee and the submitter of this License Termination Plan (LTP) ("*Issuance of Conforming Amendments Relating to Transfer of Licenses for Zion Nuclear Power Station, Units 1 and 2*" [Reference 1-2]).

The following provides the licensee name, address, license numbers and docket numbers for ZNPS:

ZionSolutions, LLC

Zion Station
101 Shiloh Boulevard
Zion, IL 60099
License No. DPR-39 & DPR-48
Docket No. 50-295 & 50-304 and 72-1037

As an end-state for the decommissioning of ZNPS, all of the spent nuclear fuel will be stored in the Independent Spent Fuel Storage Installation (ISFSI) which will be maintained under amended Part 50 Licenses.

1.1 Purpose

The objective of decommissioning the ZNPS is to reduce the level of residual radioactivity to levels that permit the release of the site for unrestricted use and allow for the termination of the 10 CFR Part 50 licenses, excluding the ISFSI area. This LTP satisfies the requirement of 10 CFR 50.82(a)(9). This LTP was written following the guidance in Regulatory Guide 1.179, "*Standard Format and Contents for License Termination Plans for Nuclear Power Reactors*" (Reference 1-3) and in NUREG-1700, "*Standard Review Plan for Evaluating Nuclear Power Reactor License Termination Plans*" (Reference 1-4). This LTP is accompanied by a proposed license amendment that establishes the criteria for when changes to the LTP require NRC approval.

1.2 Decommissioning Objective

The decommissioning objective is to conduct remediation and survey operations such that ZionSolutions can submit a request to the NRC for the unrestricted release of the site (other than

the remaining licensed ISFSI facility) in accordance with Subpart E of 10 CFR Part 20 and meeting the unrestricted release requirements of 10 CFR 20.1402, “Radiological Criteria for Unrestricted Use.” The LTP documents the process that will be used to demonstrate that the dose from residual radioactivity that is distinguishable from background radiation does not exceed 25 mrem/yr to the Average Member of the Critical Group (AMCG) from all appropriate pathways over a 1,000 yr period and, to also demonstrate that the residual radioactivity has been reduced to levels that are “As Low As Reasonably Achievable” (ALARA).

1.3 Facility

1.3.1 Site Description

The ZNPS site is located in Northeast Illinois on the west shore of Lake Michigan. Figure 1-1 shows the geographical location of the plant relative to nearby towns, cities, river and the lake. The site is approximately 40 miles north of Chicago, Illinois, and 42 miles south of Milwaukee, Wisconsin. The site is in the extreme eastern portion of the city of Zion, in Lake County, Illinois, on the west shore of Lake Michigan approximately 6 miles NNE of the center of the city of Waukegan, Illinois and 8 miles south of the center of the city of Kenosha, Wisconsin. The US Census Bureau listed the estimated 2011 population of Zion as 24,508.

The site is located at longitude 87 degrees 48.1 minutes west and latitude 42 degrees 26.8 minutes north. The site occupies portions of Sections 22, 23, 26, and 27 in Township 46 North, Range 23 East.

The owner-controlled site is approximately 331 acres and within the owner-controlled area is an approximate 87 acre, fence-enclosed nuclear facility. The Zion Station “*Defueled Safety Analysis Report*” (DSAR) (Reference 1-5) states that the licensee maintains “exclusion-area” control over approximately 250 acres. However during site characterization (see Chapter 2 of this LTP), the total acreage surveyed as impacted and non-impacted open land survey units totaled 331 acres. No other major changes to the site boundary have been made. Figure 1-2 shows the main plant structures and the boundaries of the owner-controlled property.

The topography of the site and its immediate environs is relatively flat; elevations vary from the Lake Michigan shoreline (low water level is 577.4 feet Above Mean Sea Level [AMSL]) to approximately 20 feet above the level of the lake. The elevation of the developed portion of the site is 591 feet. A series of low, parallel beach ridges separated by marshy depressions crosses the site. This topography represents recessional beach lines deposited along the Lake Michigan shoreline subsequent to the most recent period of glaciations. The beach ridges are composed primarily of sand. Figure 1-3 provides a topographical map of the site and the surrounding area.

1.3.2 Current/Future Land Use

The 87 acre, fence-enclosed nuclear facility is within an area zoned for industrial use in accordance with “*The City of Zion, Illinois, Comprehensive Plan 2010*” (Reference 1-6). This industrially developed area, which currently includes the major buildings (Containment Buildings, Turbine Building, Spent Fuel Building, Auxiliary Building), the switchyard, parking areas, rail lines, haul paths and the ISFSI, will continue as an industrial-zoned property throughout the decommissioning and for future use. The ISFSI as well as the Commonwealth

Edison switchyard to the west of the plant will remain after the decommissioning of ZNPS is completed. Most of the overall site that lies to the west of the 87 acre developed plant site is designated as wetland according to Chapter 9 of the “*Lake County Illinois, Regional Framework Plan*” (Reference 1-7) and the site property is also identified as an environmentally sensitive area to be protected from development in the City of Zion Comprehensive Plan 2010. None of the land within approximately 4 miles of the Zion property is zoned as agricultural.

The site is bounded by park areas, including the City of Zion’s Park District, Hosah Park as well as the Illinois State Beach Park to the north, and another Illinois State Beach Park parcel to the south. These park areas, which are adjacent to Lake Michigan to the east, include various boardwalks, paved walking trails, picnic and camping areas. The parks promote recreational use, including boating, fishing, camping and bird watching. The “*Illinois Coastal Management Program, Issue Paper - Illinois Beach State Park and North Point Marina Including the Dead River and Kellogg Creek Watersheds*” (Reference 1-8) concluded that the presence of the surrounding recreational property has limited residential, commercial or agricultural land use in the land surrounding ZNPS.

Upon license termination, ZionSolutions will be returning ownership and management of the property back to Exelon, which will make the ultimate determination about future use of the property after the completion of the decommissioning activities described in this LTP.

1.3.3 Meteorology and Climatology

Zion’s climate is continental with cold winters, warm summers, and frequent short fluctuations in temperature, humidity, cloudiness, and wind direction. The average temperature in the summer is 72°F and the average temperature in the winter is 24°F. Because the eastern edge of Zion is bounded by Lake Michigan, inland lake breezes can cool the air along the lake shore by 10°F to 15°F in the summer and can warm the air by as much as 20°F in the winter. The average annual rainfall is 32.0 inches and the average annual snowfall is 41.0 inches.

1.3.4 Geology and Seismology

As stated in the Commonwealth Edison Company, “*Zion Nuclear Power Station Final Safety Analysis Report*” (FSAR) (Reference 1-9), and “*Environmental Report, Zion Nuclear Power Station*” (Reference 1-10), the near-surface geology of northeastern Illinois is comprised of unconsolidated deposits which range from 90 to 150 feet in thickness. The surface deposits are comprised mostly of unconsolidated glacial deposits which rest on a series of sedimentary rock layers that were deposited in the Paleozoic Era. The thickness of the Paleozoic sedimentary rocks in northeastern Illinois is approximately 4,000 feet. These sedimentary bedrock layers dip gently toward the east at the rate of about 10 feet per mile and rest on Precambrian basement rock.

The upper portion of surface deposits in the vicinity of the ZNPS is comprised of unconsolidated sand, silt and peat derived from Lake Michigan shore deposits. This is overlaid on a mixture of unconsolidated material ranging from sand, clay to boulders deposited as glacial till, outwash, loess and lake sediments.

As stated in the Conestoga-Rovers and Associates, “*Hydrogeologic Investigation Report, Fleetwide Assessment, Zion Station*”, Revision 1 (Reference 1-11), the surface deposits in the

vicinity of the ZNPS structures are comprised of three layers, or units, of irregular thickness. The uppermost layer is identified as the upper sand unit and ranges from about 30 to 35 feet in thickness. Immediately below the upper sand unit lies a layer comprised predominantly of silt and clay. This layer, identified as the silt-clay unit, ranges from about 20 to 40 feet in thickness. The lower unconsolidated layer, which rests on the upper bedrock layer, is a mixture of sand and glacial deposits. This unit, called the lower sand layer ranges from about 30 to 50 feet in thickness.

The upper bedrock layer is the Niagara Dolomite, a consolidated layer of carbonaceous marine sediments laid down in the Silurian Period. It is about 200 feet thick in the vicinity of the ZNPS site.

There is no indication of faulting beneath the site. The area within 100 miles of the site is considered to be one of minor seismic activity. Few events of moderate significance have occurred in the region in the last 150 to 200 years.

Near Des Plaines, approximately 25 miles southwest of the site, a highly complex faulted zone exists which appears to bear no relationship to the regional structure. The zone is roughly circular and covers an area of 25 square miles. Within the faulted zone, the bedrock generally has been up-thrown. Some faulting also exists in southern Wisconsin and the closest known fault in Southern Wisconsin is approximately 45 miles from the site and has a northeast orientation.

Recent minor earthquakes which occurred near the site include a small 2.4-magnitude earthquake on January 30, 2010 which occurred 2 miles east of McHenry and approximately 30 miles West of the Zion plant and a previous earthquake of 3.8 magnitude which occurred about 2 miles northwest of Lily Lake, approximately 70 miles from ZNPS.

1.3.5 Surface Water Hydrology

ZNPS is located on the shores of Lake Michigan. The lake is 307 miles long from north to south and has an average width of 70 miles. In the general vicinity of the site, the 30-foot depth contour of the lake is 1.2 miles, and the 60-foot depth contour is 2.0 miles from the shore.

Lake Michigan is used by recreational boaters. The nearest marina/public boat launch to ZNPS is located approximately 2.5 miles north of the site. There are also several fishing charter services that are located approximately 3 miles north of the site. Lake Michigan is also used for commercial barge and ship traffic, however these activities typically do not ordinarily operate within 5 miles of the site.

Water from Lake Michigan is used for municipal and domestic water supplies. There are multiple potable water intakes located in Lake Michigan in the vicinity of ZNPS. The nearest lake source water supply is located approximately 1 mile north of the site with the intake located approximately 3,000 feet out in the lake.

Other surface water features near the site include Kellogg Creek (1.25 mile north), Dead River (3 miles south), and Bull Creek (0.2 mile south). Kellogg Creek is a perennial stream that drains to the north property of the Illinois Beach State Park through a bluff/ravine system that is moderately to severely eroded. The creek has a reduced natural function as it has been channelized since early industrial development. Bull Creek is also a perennial stream that drains

to the south property of the Illinois Beach State Park. Similar to Kellogg Creek, the bluff/ravine system for Bull Creek is severely eroded along most of the length. Bull Creek becomes Dead River once it begins to cross the sand plain. The Dead River is an unaltered natural tributary to Lake Michigan that flows through an extensive high quality coastal wetland complex, which is a rare habitat type in the Illinois Lake Michigan watershed.

1.3.6 Ground Water Hydrology

The groundwater table in the area is close to the ground surface and has a flat gradient to the east and south. Shallow groundwater movement in the area is to the east towards Lake Michigan. The upper sand unit is a high permeability unit that is directly connected to Lake Michigan, which is a regional discharge feature and which generally allows unrestricted lateral groundwater flow. Vertical groundwater flow is limited by the underlying silt-clay unit which has a low permeability and is approximately 30 feet thick.

1.3.7 Environs and Natural Resources

Of the 331 acre ZNPS site, about 87 acres is enclosed within the perimeter security fence. This is called the “Radiological-Restricted Area”. The remainder, which lies mostly to the west of the ComEd Switchyard, is an open marshy area. This area is undeveloped except for overhead transmission lines and dirt roads maintained by ComEd.

The land area immediately west of the site up to the rail track owned by Chicago & Northwestern is zoned light industrial by the City of Zion. This area is about five blocks long, extending from 29th Street on the south to Shiloh Boulevard on the north and is about four blocks wide in the east-west direction centered on Deborah Avenue. It is currently occupied by several warehouses and associated truck shipping operations, an industrial cleaning-service company, several auto service garages, a salvage yard, a former manufacturing facility and a number of vacant lots.

The center of the community of Zion is approximately 1.6 miles from the plant location on the site. There are no schools or hospitals within one mile of the site and there are no residences within 2,000 feet of any ZNPS structures.

There are no potable wells on or near the site. Water service is provided through the City of Zion municipal water supply which draws water from Lake Michigan via a water intake about one mile north of the site.

A significant factor which affects land use in the near vicinity of ZNPS is the Illinois Beach State Park. The park has been expanded since the construction of ZNPS. The present day north and south Illinois Beach State Park properties are part of a state-owned costal management area which extends from Winthrop Harbor about 3 miles north of the ZNPS site to about 3 miles south of the ZNPS site. The area from Winthrop Harbor Marina on the north to the southern end of the Illinois Beach State Park has been incorporated into the Illinois Coastal Management Program (ICMP). The ICMP has identified this area as a unique public resource requiring special attention for preservation, protection and restoration of areas impacted by shoreline erosion, invasive species and damage caused by previous industrial activities.

1.4 Operational Background

Key station milestones are presented in Table 2-1 of Chapter 2 of this LTP. Several key significant milestones are reproduced below:

- ComEd dockets application for construction: July 1967
- Operating license issued: April 6, 1973 for Unit 1 and November 14, 1973 for Unit 2
- Commercial operations achieved: December 1973 for Unit 1 and September 1974 for Unit 2
- Final reactor operation: February 21, 1997 for Unit 1; September 19, 1996 for Unit 2
- Cessation of operations: February 13, 1998
- All fuel removed from the reactor and placed in the Spent Fuel Pool (SFP): April 27, 1997 for Unit 1 and February 25, 1998 for Unit 2
- Decommissioning operations begin: October 1, 2010
- Spent fuel and Greater Than Class C (GTCC) waste transferred to ISFSI: 2015

1.5 Plan Summary

1.5.1 General Information

The LTP describes the process used to meet the requirements for terminating the 10 CFR Part 50 license and to release the site for unrestricted use. The LTP has been prepared in accordance with the requirements in 10 CFR 50.82(a)(9) and is submitted as a supplement to the DSAR. The LTP submittal is accompanied by a proposed license amendment that establishes the criteria for when changes to the LTP require prior NRC approval. The subsections below provide a brief summary of the other seven chapters of the LTP.

1.5.2 Site Characterization

LTP Chapter 2 discusses the site characterization that has been conducted to determine the extent and range of radioactive contamination on site prior to remediation, including structures that will remain at the time of license termination, soils, and ground water. Based on the results of the site characterization, ZionSolutions will plan remediation and Final Status Surveys (FSS) in areas determined to be impacted by the operation of ZNPS.

The Zion “*Historical Site Assessment*” (HSA) (Reference 1-12) provided the initial foundation for further site characterization and the basis for dividing the site into survey units. The survey units were evaluated against the criteria specified in NUREG-1575, “*Multi-Agency Radiation Survey and Site Investigation Manual*” (MARSSIM) (Reference 1-13) for classification. Data from subsequent characterization may be used to change the original classification of an area, within the requirements of this LTP, up to the time of Final Status Survey (FSS), as long as the classification reflects the level of residual activity existing prior to any remediation in the area.

1.5.3 Identification of Remaining Site Dismantlement Activities

LTP Chapter 3 identifies the remaining site dismantlement and decontamination activities. The information provided in Chapter 3 includes:

- A description of the areas and equipment that need further remediation,
- A summary of radiological conditions that may be encountered,

- Estimates of associated occupational radiation dose,
- An estimate of the types and quantities of radioactive material generated for release and disposal, and,
- Descriptions of proposed control mechanisms to ensure areas are not re-contaminated.

ZionSolutions is decommissioning ZNPS in accordance with the DECON alternative described in NUREG-0586 “*Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities, Supplement 1, Volume 1*” (Reference 1-14). The decommissioning activities will be conducted in accordance with the ZionSolutions Health and Safety Program, Radiation Protection Program, Radioactive Waste Program, Off-Site Dose Calculation Manual (ODCM), and plant administrative, work control and decommissioning implementation procedures. These are established programs that are routinely inspected by the NRC.

Activities conducted during decommissioning do not pose any greater radiological or safety risk than those conducted during plant operations. The radiological risk associated with decommissioning activities is bounded by previously analyzed radiological risk for former operating activities that occurred during major maintenance and outage activities.

The information provided in Chapter 3 supports the assessment of impacts considered in other sections of the LTP and provides sufficient detail to identify resources needed during the remaining dismantlement activities.

1.5.4 Remediation Plans

LTP Chapter 4 discusses the various remediation techniques that may be used during decommissioning to reduce residual contamination to levels that comply with the release criteria in 10 CFR 20.1402. This chapter also discusses the ALARA evaluation and the impact of remediation activities on the Radiation Protection Program.

The selected remediation methods used are dependent upon the contaminated material and extent of contamination. The principal materials that may be subject to remediation are structural surfaces. Very limited soil contamination is expected and no groundwater or surface water contamination has been identified to date. Remediation techniques that may be used for structural surfaces include scabbling and shaving, chipping, sponge and abrasive blasting, standard and pressure washing, wiping, grit blasting, mechanical fracturing and cutting, and other methods. Surface and subsurface soil with activity levels in excess of the appropriate Derived Concentration Guideline Level (DCGL) will be removed and disposed as radioactive waste. Soil remediation equipment will include, but not be limited to, back and track hoe excavators. Remediation of soils will include the use of established excavation safety and environmental control procedures as well as appropriate work package instructions to ensure adequate erosion, sediment and air emission controls during soil remediation.

1.5.5 Final Radiation Survey Plan

LTP Chapter 5 presents the Final Status Survey (FSS) Plan which will be used to develop the site procedures, survey packages and instructions to perform the FSS of the Zion Station site. The FSS Plan describes the final survey process used to demonstrate that the ZNPS facility and site comply with radiological criteria for unrestricted use specified in 10 CFR 20.1402 (e.g. annual dose limit of 25 mrem to AMCG plus ALARA for all dose pathways).

The FSS Plan describes the development of the survey plan, survey design and Data Quality Objectives (DQO), survey method and instrumentation, data collection and processing, data assessment and compliance, and the ZionSolutions ZS-LT-01, “*Quality Assurance Project Plan (for Characterization and FSS)*” (QAPP) (Reference 1-15). The FSS Plan addresses only ZNPS structures and land areas that are identified as impacted. The adjacent areas that were classified as non-impacted and the ISFSI, which will still remain a licensed area, will not be subject to FSS.

1.5.6 Compliance with the Radiological Criteria for License Termination

LTP Chapter 6 presents the radiological information and methods used to demonstrate compliance with the radiological criteria for license termination and release of the site for unrestricted use. Chapter 6 discusses the site-specific inventory of radionuclide, future land use scenarios, exposure pathways, computational models used for dose modeling, sensitivity analysis, DCGLs, the derivation of area factors, the basis for the selected exposure compliance scenario and evaluation of alternative exposure scenarios.

LTP Chapter 6 utilizes radiological information from Chapter 2 and establishes the allowable contamination and radioactivity concentration levels that Chapter 4 remediation methods will work towards and be verified by the FSS discussed in Chapter 5. ZionSolutions applied the Disposal Unit Source Term - Multiple Species (DUST-MS) model and the RESidual RADioactive materials (RESRAD) v7.0 model to determine the radiological release criteria for remaining structures and soils to enable license termination.

1.5.7 Update of the Site-Specific Decommissioning Costs

LTP Chapter 7 provides an updated estimate of the remaining decommissioning costs for releasing the site for unrestricted use. This chapter also compares the estimated remaining cost with the funds currently available in the decommissioning trust fund.

1.5.8 Supplement to the Environmental Report

LTP Chapter 8 updates the environmental report for ZNPS with new information and any significant environmental impacts associated with the site’s decommissioning and license termination activities. This section of the LTP is prepared pursuant to 10 CFR 51.53(d) and 10 CFR 50.82(a)(9)(ii)(G). In accordance with 10 CFR 51.53(d), ZionSolutions considers Chapter 8 as a supplement to the Environmental Report addressing the actual or potential environmental impacts associated with the execution of the described decommissioning activities.

LTP Chapter 8 compares the described decommissioning attributes to those identified in NUREG-0586, which provides a generic environmental assessment for the decommissioning of a reference nuclear facility. The environmental assessment performed by ZionSolutions determined that the environmental effects for decommissioning ZNPS are minimal and there are no adverse effects outside the bounds of NUREG-0586. Additionally, the conclusions contained in the United States Atomic Energy Commission (AEC) “*Final Environmental Statement related to operation of Zion Nuclear Power Station Units 1 and 2*”, - December 1972 (AEC Environmental Statement) (Reference 1-16), used as the original basis for the decommissioning

environmental assessment of radiological and non-radiological effects of decommissioning, are still valid.

1.6 Regulatory Notifications of Changes

ZionSolutions is submitting the LTP as a supplement to the DSAR. Accordingly, *ZionSolutions* will update the LTP in accordance with 10 CFR 50.71(e). Once approved, *ZionSolutions* may make changes to the LTP, without prior NRC approval, in accordance with the criteria in 10 CFR 50.59, 10 CFR 50.82(a)(6), and 10 CFR 50.82(a)(7).

ZionSolutions is also submitting a proposed amendment to the ZNPS licenses that adds a license condition that establishes the criteria for determining when changes to the LTP require prior NRC approval. Changes to the LTP require prior NRC approval when the change:

- Require Commission approval pursuant to 10 CFR 50.59.
- Result in significant environmental impacts not previously reviewed.
- Detract or negate the reasonable assurance that adequate funds will be available for decommissioning
- Decrease a survey unit area classification (i.e., impacted to not impacted, Class 1 to Class 2; Class 2 to Class 3; or Class 1 to Class 3 without providing NRC a minimum 14 day notification prior to implementing the change in classification.
- Increase the derived concentration guideline levels and related minimum detectable concentrations (for both scan and fixed measurement methods).
- Increase the radioactivity level, relative to the applicable derived concentration guideline level, at which an investigation occurs.
- Change the statistical test applied to one other than the Sign test.
- Increase the Type I decision error

The LTP will also be updated every two years. The contact for LTP information, including any submitted changes and updates, is:

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(224) 789-4025
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1.7 References

- 1-1 Letter from T.S. O'Neill (Exelon Generation Company) and J. Christian (ZionSolutions) to NRC, "Application for License Transfers and Conforming Administrative License Amendments" – January 2008
- 1-2 Letter from J.B. Hickman (U.S. Nuclear Regulatory Commission) to J. Christian (ZionSolutions), "Issuance of Conforming Amendments Relating to Transfer of Licenses for Zion Nuclear Power Station, Units 1 and 2" – September 2010
- 1-3 U.S. Nuclear Regulatory Commission Regulatory Guide 1.179, "Standard Format and Content of License Termination Plans for Nuclear Power Reactors" – January 1999
- 1-4 U.S. Nuclear Regulatory Commission NUREG-1700, Revision 1, "Standard Review Plan for Evaluating Nuclear Power Reactor License Termination Plans" – April 2003
- 1-5 Zion Station, "Defueled Safety Analysis Report" (DSAR) – September 2014
- 1-6 The City of Zion, Illinois, "Comprehensive Plan 2010" – January 1992
- 1-7 Lake County Illinois, "Regional Framework Plan, Chapter 9, Land Use" – February 13, 2007
- 1-8 Illinois Coastal Management Program, "Illinois Beach State Park and North Point Marina Including the Dead River and Kellogg Creek Watersheds" – 2011
- 1-9 Commonwealth Edison Company, "Zion Nuclear Power Station - Final Safety Analysis Report" (FSAR) – November 1970
- 1-10 Commonwealth Edison Company, "Environmental Report - Zion Nuclear Power Station" – May 1971, Supplement 1 – November 1971, Supplement II – December 1971, Supplement III – February 1972, Supplement IV – April 1972, Supplement V – May 1972
- 1-11 Conestoga-Rovers and Associates, "Hydrogeologic Investigation Report, Fleetwide Assessment, Zion Station, Zion Illinois", Revision 1 – September 2006
- 1-12 "Zion Station Historical Site Assessment" (HSA) – September 2006
- 1-13 U.S. Nuclear Regulatory Commission NUREG-1575, Revision 1, "Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)" – August 2000
- 1-14 U.S. Nuclear Regulatory Commission NUREG-0586, "Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities", Supplement 1, Volume 1" – November 2002

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- 1-15 ZionSolutions ZS-LT-01, Revision 6, “Quality Assurance Project Plan (for Characterization and FSS)” (QAPP)
- 1-16 United States Atomic Energy Commission, Directorate of Licensing, “Final Environmental Statement related to the Operation of Zion Nuclear Power Station Units 1 and 2”, Docket Nos. 50-295 and 50-304 – December 1972

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Figure 1-1 Zion Nuclear Power Station Geographical Location



Figure 1-2 Zion Nuclear Power Station Owner Controlled Area

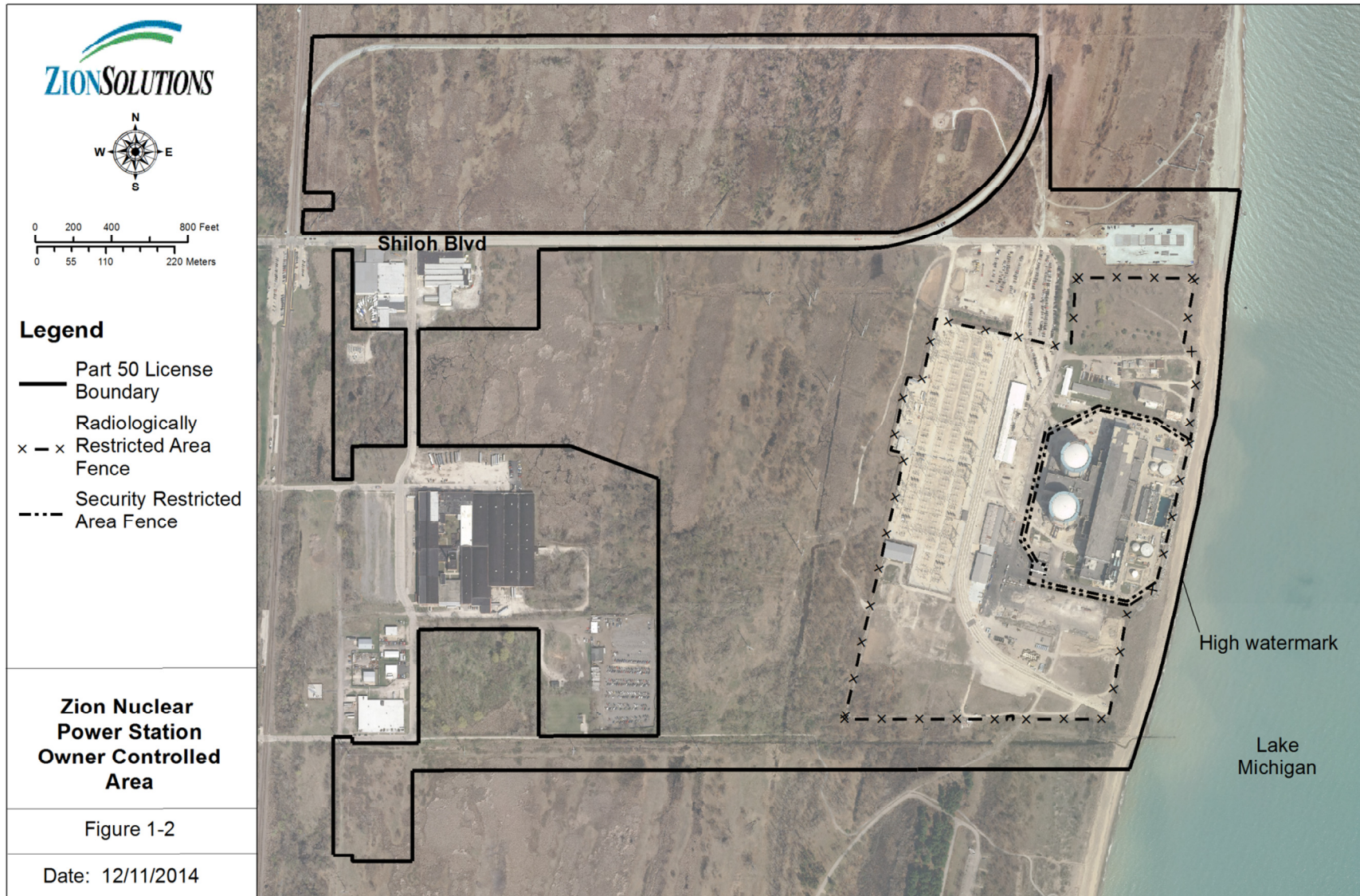


Figure 1-3 Zion Nuclear Power Station Topographical Map

