WOMBLE BOND DICKINSON

May 4, 2023

Womble Bond Dickinson (US) LLP

Independence Wharf
470 Atlantic Avenue
Suite 600
Boston, MA 02210

t: 857.287.3100
f: 857.287.3101

Jed M. Nosal
Partner
Direct Dial: 857-287-3175
E-mail:Jed.Nosal@wbd-us.com

Tori Kim, Assistant Secretary and MEPA Director
Executive Office of Energy and Environmental Affairs
MEPA Office
100 Cambridge Street, Suite 900
Boston, MA 02114

Re: Holtec Pilgrim, LLC – Request to Modify Surface Water Discharge Permit issued by the Massachusetts Department of Environmental Protection (MassDEP) pursuant to the Massachusetts Clean Waters Act, M.G.L. c. 21, §§ 26-53, and 314 CMR 3.00
Applicability of MEPA Review

Dear Director Kim:

As you are aware, Holtec Decommissioning International, LLC (HDI) is currently seeking a modification of the National Pollutant Discharge Elimination System Permit ("NPDES") permit #MA0003557 for the Pilgrim Nuclear Power Station ("PNPS") located in Plymouth, Massachusetts to allow for the discharge of up to approximately 1.1 million gallons of water from the Spent Fuel Pool, Reactor Cavity/Dryer Separator Pit, and Torus (collectively, the "Plant Water") through an existing discharge point, referred to as Outfall #015. In connection with the modification to the NPDES permit, HDI will also be seeking a corresponding modification to the Surface Water Discharge Permit issued by MassDEP pursuant to the Massachusetts Clean Waters Act, M.G.L. c. 21, §§ 26-53, and 314 CMR 3.00. While HDI acknowledges that the modification to the Surface Water Discharge Permit is a "Permit" under the Massachusetts Environmental Policy Act ("MEPA") Regulations,[1] this letter is being provided to demonstrate that the proposed discharge does not meet or exceed any applicable MEPA review thresholds set forth in 301 CMR 11.03.

Background

The PNPS was constructed in the late 1960s and early 1970s and began operation in late 1972. The facility occupies approximately 140 acres and is located on the western shore of Cape Cod Bay, occupying one mile of continuous shoreline frontage. While operational, the facility used a "once-through" cooling water system designed to withdraw, via a cooling water intake structure ("CWIS"), up to 224 million gallons of seawater per day from Cape Cod Bay to condense steam used in the production of electricity and up to 19,400,000 gallons per day ("GPD") for a Salt Service Water ("SSW") system to cool the Spent Fuel Pool and other plant components. As a

[1] 301 CMR 11.00, *et seq.*

result, the plant discharged heated effluent back into Cape Cod Bay. Both cooling water systems also were used to maintain compliance with radiological liquid discharge requirements.

PNPS operated from 1972 until 2019, when it permanently ceased generating electricity. Pursuant to the authorization under the current NPDES permit, discharges to Cape Cod Bay have continued since 2019 for cooling water, process water, and stormwater.

Activities associated with PNPS underwent MEPA review in the mid-1970s. Since that time, no additional MEPA review occurred for PNPS, including in connection with the issuance of the Surface Water Discharge Permit by MassDEP in 2020, which authorized discharges to Cape Cod Bay that were far less than those authorized by the prior NPDES permit and which occurred during the plant's operation.

Proposed Discharge and Permitting

The Plant Water system has been in continuous service from plant startup through the present. During plant operation, the volume of the Plant Water in the Spent Fuel Pool remained substantially unchanged other than minor cooling system loss and makeup from the condensate storage and transfer system. During biennial refueling outages, the volume of water was interconnected with the water in the reactor cavity and dryer separator pit, commingling these two normally segregated volumes. During refueling and maintenance activities, permanently installed and temporary filtration systems were used to reduce any impurities being generated by the activities. At the end of each refueling outage, a portion of this commingled volume was drained to condensate storage tanks with any remainder that exceeded onsite water volume storage capability being filtered, demineralized, verified to meet radiological and non-radiological quality standards and discharged, in some relying on dilution from the main cooling water and/or SSW systems to comply radiological liquid discharge requirements. The last discharge of any water having resided for any period of time in the Plant Water systems occurred in 2015.

Following the permanent shutdown of Pilgrim in 2019, spent fuel assemblies stored in the pool were transferred to dry cask storage in a stand-alone Independent Spent Fuel Storage Installation ("ISFSI"). The racks that stored the fuel have been removed and disposed of and the pool is currently being used to package radiological materials such as the reactor vessel internal components for ultimate disposal. Following the completion of the packaging campaign the SFP water will be drained to the Torus for final disposition.

On January 30, 2020, EPA issued the Final NPDES Permit covering ongoing wastewater discharges at the Facility. While the Station permanently ceased generating electricity on May 31, 2019, certain discharges to Cape Cod Bay continued, including cooling water used to absorb waste heat from the spent fuel pool, process water, and stormwater. With the removal of the remaining spent fuel rods from the spent fuel pool, permitted Clean Water Act ("CWA") discharges from the site are limited to stormwater and cooling water used for auxiliary systems and dilution. There remains approximately 1.1 million gallons of water stored at the facility, comprised of water from the spent fuel pool, reactor cavity/dryer separator pit torus that contain varying levels of radioactivity. The term "pollutant" in the CWA excludes "radioactive materials" regulated by the Nuclear Regulatory Commission ("NRC") under the Atomic Energy Act. Consequently, the Final NPDES Permit does not include any numeric limits on such radioactive materials. Rather, the

disposal of radioactive materials is overseen by the NRC[2]. The existing permit does not authorize the discharge of non-radiological pollutants in the spent fuel pool water (including but not limited to boron). See Section B, Paragraph 2 of the NPDES Permit.

On March 31, 2023, Holtec submitted a modification to the existing NPDES Permit to authorize a temporary discharge of non-radiological pollutants in an industrial wastewater at PNPS into Cape Cod Bay. Under the terms of this proposed NPDES Permit modification, the water will be mechanically filtered using a solids collection filter top-loading canister system, routed to a mixed bed resin/charcoal demineralizer for radiological and chemical (including organic) contaminant removal, radiologically characterized, and then discharged via Outfall #015 in batches of approximately 19,000 GPD, diluted by mixing with SSW system seawater at a minimum ratio of 1:20, respectively, in the plant's discharge canal (and further diluted by mixing (dispersion and diffusion) in the Cape Cod Bay. The SSW discharge into Cape Cod Bay is a permitted discharge, classified as a low volume waste, under the current NPDES permit (designated as Outfall #010) and the use of the SSW for dilution purposes is consistent with, and does not change or modify, the characteristics of the permitted discharge.

Review of MEPA Review Thresholds

(1) Land

The proposed discharge will not result in a direct alteration of land or the creation of any impervious area. The project does not involve the use of any Article 97 land, any agricultural or conservation land, nor does it involve an urban renewal project or plan under MGL c. 121A or c. 121 B.

(2) State-listed Species under M.G.L. c. 131A (Massachusetts Endangered Species Act)

There is no designated significant habitat in the vicinity of the proposed discharge, and the project will not result in the disturbance of any amount of designated priority habitat that would result in a take of a state-listed endangered or threatened species or species of special concern.

(3) Wetlands, Waterways and Tidelands

The new proposed discharge will utilize the existing discharge canal and will not require any construction, nor will it result in a change to the existing discharge characteristics. Accordingly, there will no alterations to any wetland resource areas. The project does not involve a new or modified dam, it does not involve dredging or the discharge of dredged material, and it does not involve a non-water dependent use under Chapter 91. The project will also not propose any modifications to a structure in flowed tidelands or other waterways.

[2] Part I, Section A, Paragraph 23: The discharge of radioactive materials shall be in accordance with and regulated by the Nuclear Regulatory Commission (NRC) requirements (10 C.F.R Part 20 and NRC Technical Specifications set forth in facility operating license, DPR-35)

(4) Water

The project does not involve any new water withdrawals, interbasin transfers, or construction of water infrastructure.

(5) Wastewater.

The project does not involve the construction, modification, or expansion of a wastewater treatment or disposal facility, nor does it involve the construction of any new sewer mains. The project will not involve a discharge to a sewer system or groundwater, nor will it involve the combustion, disposal, storage, treatment, or processing of any amount of sewage sludge, sludge ash, grit, screenings, or other sewage sludge residual materials.

The project will propose a new permit outfall to a surface water from industrial wastewater; however, the discharge will not meet or exceed the MEPA threshold of 20,000 GPD at 301 CMR 11.03(5)(b)4.b.ii. Based on the operation protocols of PNPS, the discharge of the processed Plant Water will be conducted through controlled discharges, through the use of one of two treated water (discharge) tanks, each having a storage capacity of less than 20,000 gallons (the tanks have a rated capacity of 18,500 gallons each). One tank can be made available for discharge while the second tank remains in service for processed water collection. Prerequisites associated with a tank discharge and facility staffing of qualified personnel make it impractical to discharge greater than one tank per day.

(6) Transportation.

The project will not involve or otherwise affect any roadways, railroads, or airports, nor will it involve any new vehicle trips or new parking spaces.

(7) Energy.

The project will not involve the construction or expansion of any electric generating facility, or any new pipeline or transmission lines.

(8) Air.

The project will not involve the construction or modification of a stationary air source.

(9) Solid and Hazardous Waste.

The project does not involve any non-radiological solid waste, nor does it involve the storage, recycling, treatment, or disposal of hazardous waste. As reflected in the materials submitted with the request to modify the NPDES permit. A small quantity of treatment media (filters, spent resin and spent charcoal) will be generated and disposed of as low-level radioactive waste in accordance with NRC requirements.

(10) Historical and Archaeological Resources.

The project will not involve the demolition or destruction of any Historic Structure or Archaeological Site.

(11) Areas of Critical Environmental Concern.

The project does not take place within a designated ACEC.

(12) Regulations.

The project does not involve the promulgation of any regulations.

Conclusion

As demonstrated above, the proposed discharge of the SFP water will not meet or exceed any MEPA review thresholds. In addition, HDI has and continues to be fully committed to obtaining the required permits and approvals necessary to authorize the proposed discharge, and that any reasonable concern of potential Damage to the Environment related to the discharge will be addressed through the permitting processes.

Alternatives Evaluation

Notwithstanding the foregoing, HDI has undertaken an extensive analysis of feasible alternatives to the proposed discharge, which has been summarized in a separate document for inclusion with applicable permitting applications. Recognizing that the evaluation of alternatives is a critical aspect of MEPA review, HDI is providing the alternatives evaluation in connection with this memorandum. As demonstrated in this evaluation, the proposed discharge of the SFP water is, among all other practical alternatives, the alternative that is the least likely to cause Damage to the Environment.

If you have any questions about this analysis, please do not hesitate to contact Dave Noyes at Holtec or the undersigned.

Sincerely,

Womble Bond Dickinson (US) LLP

Jed M. Nosal
Partner

Alternatives Evaluation

Introduction

The project is a modification of the National Pollutant Discharge Elimination System Permit (NPDES) permit #MA0003557 for the Pilgrim Nuclear Power Station (PNPS) located in Plymouth, Massachusetts to allow for the discharge of up to approximately 1.1 million gallons of water from the Spent Fuel Pool, Reactor Cavity/Dryer Separator Pit and Torus (Plant Water) through a discharge point, referred to as Outfall #015. In connection with the modification to the NPDES permit, a modification to the Surface Water Discharge Permit issued by MassDEP pursuant to the Massachusetts Clean Waters Act, M.G.L. c. 21, §§ 26-53, and 314 CMR 3.00 is also being pursued. The proposed discharge of the Plant Water to Cape Cod Bay will be performed in accordance with the terms and conditions of the modified NPDES permit for discharge of non-radiological constituents that are subject to federal and state regulation and in accordance with Nuclear Regulatory Commission (NRC) requirements for management of radioactive materials.

Four technologies were considered for disposition of the Plant Water at PNPS. A preliminary analysis of the technologies resulted in three being retained for consideration of disposition alternatives. From these retained technologies, three disposition alternatives were developed for detailed evaluation.

The Plant Water is presently contained in the three structures described above and will be combined into the Torus. Disposition of the water is required to complete decommissioning of the PNPS, which includes demolition of the three structures, and the associated buildings.

Wastewater Disposition Technology Selection

The technologies were selected to include a No Action (Long-Term On-Site Storage), and three technologies expected to be technically feasible based on knowledge of the Plant Water waste stream and accepted industry practices. Regulatory feasibility was also considered because the available alternatives are constrained by federal and state laws and regulations. Disposition of the water is required for completion of PNPS decommissioning and partial release of the NRC license. The decommissioning method selected for PNPS is DECON,[1] intended to result in prompt decommissioning and partial release of the NRC license, excluding spent fuel storage at the Independent Spent Fuel Storage Installation (ISFSI). Consequently, impacts to the decommissioning schedule are a factor in the evaluation of alternatives.

The technologies and corresponding alternatives selected for evaluation are listed below.

- No Action - Long-Term On-Site Storage

[1] Decommissioning using the NRC-defined DECON method means: The equipment, structures, and portions of the facility and site that contain radioactive contaminants are promptly removed or decontaminated to a level that permits termination of the license shortly after cessation of operations.

- Liquid Wastewater Treatment (mechanical filtering, ion exchange/carbon adsorption, and dilution) - Discharge to Cape Cod Bay
- Wastewater Distillation and Vapor Treatment (thermal heating and particulate removal) - Evaporation to the Atmosphere
- Wastewater Stabilization and Landfilling - Off-Site Transport and Disposal at a Landfill

The threshold objectives of this project for technology selection are to: (1) permanently disposition the Plant Water in a manner protective of human health and the environment, and (2) disposition of the water within a timeframe that is consistent with the prompt decommissioning of PNPS.

Based on a preliminary evaluation of the disposal technologies, the No Action technology of Long-Term On-Site Storage does not meet the threshold objectives. Long-Term On-Site Storage will not reduce the concentrations of non-radiological constituents in the Plant Water that are subject to federal and state regulation and will require continued use of the Torus as the containment vessel because it is the only container on site large enough to store the water and designed in a manner to safely store the water for an extended period. At the end of long-term storage, the water will still require dispositioning, most likely by one of the other three technologies considered in this evaluation. Finally, long-term storage will prevent completion of decommissioning for the length of the storage because the water and the Torus will remain on-site until final disposition. This technology will delay dismantling and decommissioning of the Torus and appurtenances until the water is removed from the site. Subsequently, additional time will be needed to complete NRC-required final survey investigations for the Torus area, and to receive partial license termination from the NRC.

Based on the preliminary evaluation, the No Action technology is therefore not considered further in this evaluation.

Description of Technology Based Alternatives Retained for Evaluation

<u>Discharge to Cape Cod Bay</u>

The three sources of Plant Water will be combined in the Torus, treated through a mechanical filter to remove suspended solids, further treated with ion exchange resins and charcoal to remove dissolved contaminants, stored temporarily in a treated water tank, characterized for radioactivity and (as needed) non-radiological parameters, and then discharged in batches of up to 18,500 gallons per day to the discharge canal at PNPS through proposed Outfall 015. The compliance point for meeting discharge limits (volume, quality, etc.) will be at the treated water tank. In the discharge canal, the water will be combined with non-contact, once-through Salt Service Water (SSW) cooling water drawn from Cape Cod Bay at the existing PNPS intake structure at a minimum dilution ratio of 1:20, respectively. The SSW water will be discharged through the existing, authorized Outfall 010. The use of once-through cooling water is solely for the purposes of complying with NRC conditions for discharge of radioactive materials and is authorized for that purpose in the existing permit[2]. The combined flow from Outfalls 015 and

[2] NPDES Permit MA0003557, Part 1.A.23. Radioactive materials. The discharge of radioactive materials shall be in accordance with and regulated by the Nuclear Regulatory Commission (NRC) requirements (10 C.F.R Part 20 and NRC Technical Specifications set forth in facility operating license, DPR-35.)

010 will flow into the Cape Cod Bay at the end of the discharge canal and mix with the ambient seawater.

An application to modify existing NPDES Permit MA0003557 has been submitted to the U.S. Environmental Protection Agency (USEPA) for authorization to discharge non-radiological contaminants in the Plant Water to Cape Cod Bay. A detailed description of the proposed water management, treatment and discharge plan is included in the application. An application for a Surface Water Discharge Permit has also been submitted to the state for authorization of the same discharge.

Evaporation to the Atmosphere

The three sources of Plant Water will be combined in the Torus then routed to heating systems designed and operated to add sufficient thermal energy to the water to cause evaporation at a rate sufficient to meet regulatory limits and overall decommissioning schedule requirements. The water vapor will be routed to a scrubber system consisting of filters to remove particulates (mechanical filtration). The vapor will then be released through a vent in the PNPS Reactor Building and dispersed through atmospheric processes.

Off-Site Transport and Disposal at Landfill

The three sources of Plant Water will be combined in the Torus and then shipped in small volumes (approximately 5,000 gallons) by truck to a disposal facility or trans-shipment location where the water can be transferred to rail cars. The nearest trans-shipment facility is in Pennsylvania. The most likely disposal facility to receive the wastewater is in Texas. At the disposal facility, the wastewater will be blended with a solidifying matrix (e.g., bentonite or similar) to stabilize the wastewater and then landfilled for final disposition.

Alternative Evaluation Design

The three alternatives that were retained through the selection process are being evaluated in comparison to specific criteria. The criteria used for this analysis were developed, in part, by adapting USEPA remedial Feasibility Study guidance[3]. Criteria relevant to the USEPA guidance as well as this evaluation of wastewater disposition include overall protection of human health and the environment, compliance, long-term effectiveness, reduction of toxicity, mobility, or volume through treatment, short-term effectiveness, implementability, and cost[4]. A CERCLA evaluation model was selected because it is inclusive of all evaluation criteria generally considered applicable to ranking environmental actions and remedies. In addition, this analysis includes a sustainability criterion to evaluate the general consistency of retained disposition alternatives with federal best management practices of sustainable and greener cleanup principles[5] as well as state climate change adaption and resiliency policies.

Detailed Evaluation of Alternatives

A summary of the evaluation of retained alternatives is provided in Table 1.

[3] Conducting Remedial Investigations/Feasibility Studies for CERCLA Municipal Landfill Sites, USEPA, February 1991.
[4] Stakeholder acceptance criteria is not included in this evaluation as those topics are generally not formalized until after public comment periods.
[5] https://www.epa.gov/greenercleanups/epa-principles-greener-cleanups#policy

Discharge to Cape Cod Bay

This alternative is the most protective of human health and the environment because of the level of treatment prior to discharge, capacity to control and monitor the quality of the treated water and the added benefit of dilution in the discharge canal for the purpose of complying with NRC requirements. The treated, diluted water will contain contaminants at levels that are: (i) not detectable in the discharged water; (ii) below any background concentrations; and (iii) well below all applicable water quality criteria.

The proposed discharge is compliant with NRC requirements for discharge of radioactive materials and will also comply with the terms and conditions of the modified NPDES and State Water Discharge Permit (applied for in March /April 2023). The alternative is effective in the short- and long-term and will result in permanent, safe disposition of the Plant Water. The program is expected to be complete within 1 year from initiation, ensuring effectiveness over the long-term.

Discharge to Cape Cod Bay is the lowest-cost and most implementable option because the facilities and procedures to conduct the program are in place at PNPS and consistent with historical plant operations for management of wastewater. Exposure risks to potential receptors (workers, public, and environment) are limited due to treatment and disposal methods and established site infrastructure to control accidental release. Discharge to Cape Cod Bay also is the most sustainable alternative because the energy required to conduct the discharge program is not expected to significantly increase the energy consumption associated with current and future plant operations and decommissioning, thus minimizing the potential for greenhouse gas generation.

The large majority of contaminants in the wastewater will be removed through treatment, producing a small volume of treatment waste that will be properly disposed off-site using established waste profiling, transport and disposal procedures. The volume of wastewater dispositioned will not be reduced, but nearly all of the contaminants in the untreated wastewater will be transferred to the treatment media and disposed as a small volume waste at a landfill licensed and designed for permanent disposal. Thus, potential toxicity will be greatly reduced in the treated, diluted discharged water and increased in the small volume waste requiring off-site disposal. Mobility of the contaminants in the small volume waste is unlikely because the materials will be contained and managed to prevent release.

Evaporation to Atmosphere

Evaporation, treatment, and release of the water as vapor to the atmosphere is highly protective of human health and the environment but includes somewhat lower-level treatment than the discharge alternative prior to release. Evaporation will distill the wastewater, leaving non-volatile contaminants in the residual water. The vapor will then be treated to remove particulates and released in a manner that results in air quality conditions meeting all applicable criteria.

The release rate will be consistent with NRC requirements for emissions of radioactive materials to the atmosphere. Air quality will be monitored as required by the NRC, and if needed for potential non-radiologic contaminants that may be present in the vapor. The program will be conducted in

compliance with applicable laws, regulations and permit conditions. Compliance with air quality standards will be confirmed through monitoring.

Evaporation and release to the atmosphere will be effective in the short- term in eliminating most of the wastewater, leaving a relatively small volume of concentrated residual water and small volume of treatment media waste. Variability of atmospheric conditions during release could result in less predictable deposition concentrations on land or in water, including sensitive public and/or environmental areas. The volume of wastewater dispositioned will not be reduced. Contaminants removed by distillation will remain in the residual water, or in the vapor treatment media, and properly disposed as a relatively small volume waste at facilities licensed and designed to receive and permanently dispose of them.

This alternative will be effective in the long term, because all of the wastewater will be dispositioned, and once completed the program will be permanently terminated.

Potential toxicity will be reduced in the treated vapor and increased in the small volume waste requiring off-site disposal; however, mobility of the contaminants in the small volume waste is unlikely because the materials will be contained and managed to prevent release.

The infrastructure needed to implement large scale distillation/evaporation of the wastewater is not in place at PNPS and would require design, procurement, installation, and testing before use; thus this alternative would require increased effort, time and cost to implement when compared to the discharge option above. The energy required to heat the wastewater for evaporation/distillation will increase overall energy consumption at PNPS and result in generation of more greenhouse gases than would the Discharge to Cape Cod Bay alternative. The timeframe for elimination of the Plant Water cannot be determined at this time but is likely longer than the one-year (or less) timeframe estimated for the discharge option. Consequently, the potential for significant impacts to the PNPS decommissioning schedule for implementing the evaporation option exists.

Off-Site Transport and Disposal at Landfill

Overall protectiveness of this alternative is considered to be moderate. The water will not be treated prior to shipment, and the volume and equipment requirements for each load will be governed by applicable regulations (NRC, USDOT, etc.). The water will most likely be shipped from the site to a disposal facility by a truck/rail combination. Relatively small volume truck loads of approximately 5,000-gallons, would necessitate approximately 220 truck loads leaving the site and traveling over the roads through several states. It is likely that many of the trucking and rail routes travel through and/or adjacent to environmentally sensitive communities. The number of shipments required, and the distance of the shipments, poses a risk of release to the environment resulting from vehicle accidents.

This option can be implemented in compliance with applicable laws and regulations and will be effective in the short- and long-term. The toxicity, potential mobility of contaminants in the wastewater, and the waste volume, will not be reduced during loading and transportation. The volume of the wastewater will be significantly increased through the addition of solidification agents at the receiving disposal facility, which will stabilize but not remove contaminants in the waste. The mobility of contaminants will likely be reduced by the solidification agent, and further constrained by placement of the waste in a landfill designed to permanently contain and isolate the material from the environment.

This alternative requires the development of procedures for bulk loading of liquid radioactive effluents for transportation and disposal, and will require design, procurement, and construction of facilities at PNPS for loading, and the associated costs and time for these activities. The cost for shipping and disposal will be significantly higher than the discharge and evaporation alternatives. The time needed to load, transport and dispose of all of the wastewater has not been estimated because it will depend on the time needed for loading, the size and availability of the transportation fleet and methods (truck or truck/rail) and the receiving limitations of the disposal facility. Impacts to the decommissioning schedule are therefore uncertain for Off-Site Transport and Disposal of the wastewater.

This alternative is substantially less sustainable than discharge or evaporation because the long-distance transportation requirements will result in much higher generation of greenhouse gases than either of the alternatives discussed above.

Conclusions

All three alternatives are anticipated to be protective and performed in accordance with state and federal regulation.

However, based on the evaluation of alternatives presented in Table 1, Discharge to Cape Cod Bay ranks as the most favorable alternative that is least likely to cause damage to the environment. This alternative provides the highest level of overall protectiveness, short- and long-term effectiveness and permanence, highest level of toxicity and mobility reduction through treatment, and the lowest potential for increases in generation of greenhouse gases. Discharge to Cape Cod Bay is also the most implementable because the procedures and infrastructure are in place at PNPS to control and implement the program and presents the lowest potential to delay overall decommissioning and partial release of the NRC license. Although not relied on for compliance with discharge criteria that may be set in the modified discharge permit(s), dilution of pollutants with ambient seawater within the discharge canal (solely for purposes of meeting NRC requirements for discharge) will provide an additional level of protectiveness prior to release to the environment compared to other alternatives.

Table 1. Summary of Retained Alternatives Evaluation

Alternative	Overall Protectiveness of Human Health and Environment	Compliance	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility and Volume Through Treatment	Short-Term Effectiveness	Cost and Implementability	Sustainability
Discharge to Cape Cod Bay	• **Highly (most) protective** • Water is treated to remove contaminants to non-detect and/or non-toxic levels. • Discharge includes highest level of treatment (mechanical filtering, ion exchange/carbon adsorption, and dilution) prior to final disposition. • Discharge is highly controllable, and process can be started/ stopped, or modified at any time. • Additional dilution and mixing will occur with ambient waters in Cape Cod Bay • Temporary discharge program will be terminated after discharge of the Plant Water volume.	• **Compliant** • Discharge will occur in compliance with state/federal permitting and NRC requirements. • Monitoring and reporting will be conducted in accordance with permits to ensure continuing compliance	• **Highest long-term effectiveness and permanence** • Discharge will meet all applicable permit limits for contaminants prior to release to discharge canal. • Dilution with ambient seawater in discharge canal to comply with NRC requirements will further minimize the potential for adverse impacts from contaminants. • Mixing in Cape Cod Bay will result in permanent, safe disposition of wastewater. • Limited volume discharges (19,000 gpd, 1 to 3 days per week) will occur periodically and discharge program will be completed within 1 year or less. • Plant water will be permanently dispositioned. • Discharges will be temporary and expected to be complete in one year or less.	• **High level of toxicity and mobility reduction through treatment, volume of waste is not reduced.** • Wastewater treatment will reduce pollutant concentrations to non-detect and/or non-toxic level prior to discharge. • Dilution required for compliance with NRC discharge standards will further reduce the potential for toxicity from contaminants at the point of discharge to Cape Cod Bay. • Contaminants anticipated to be non-detectable (either not detectable in the discharged water, not present above background concentrations or present at concentrations well below applicable water quality criteria) in Cape Cod Bay. • Mobility in seawater will occur but at concentrations posing insignificant potential for adverse impacts. • Volume of wastewater will not be reduced, but most contaminants in the wastewater will be removed by treatment and disposed as small-volume waste off-site.	• **Effective in the short term, most protective and most time efficient** • Discharge will meet all applicable permit limits for contaminants prior to release to discharge canal, including limits protective for acute exposure to receptors. • Dilution with ambient seawater in discharge canal to comply with NRC requirements will further minimize the potential for adverse impacts from contaminants. • Mixing in Cape Cod Bay will result in permanent, safe disposition of wastewater.	• **Lowest cost alternative** • Infrastructure and procedures to implement the alternative are in place. • Permit modification process is underway. • Can be implemented and completed in the shortest timeframe. • Likely to result in minimal impact on overall decommissioning schedule when compared to other alternatives.	• **Not anticipated to result in significant electricity consumption or GHG emissions beyond normal plant operations.**
Evaporation to Atmosphere	• **Highly protective** • Evaporation will distill the water, leaving inorganic and non-volatile constituents in the residual water. • Vapor is treated to remove particulates and entrained contaminants prior to release. • Relies in part on atmospheric processes (e.g., diffusion, dispersion, precipitation) • Air monitoring will be conducted to confirm protective implementation. • No anticipated adverse impact to human or ecologic receptors. • Program will be temporary and will be terminated after evaporation of the Plant Water volume.	• **Compliant** • Release will occur in accordance with state/federal and NRC requirements. • Monitoring and reporting will be conducted in accordance with state/federal and NRC requirements, including permit conditions if applicable	• **Moderate long-term effectiveness and permanence** • Release will meet state/federal air quality requirements for contaminants and NRC standards for air emissions. • Dispersion and diffusion by atmospheric processes will result in permanent, safe disposition of the evaporated wastewater. • Potential land/water deposition of released vapor is dependent on atmospheric wind direction. • Emissions will be temporary and will be terminated when Plant Water volume is dispositioned.	• **High level of toxicity reduction through treatment, mobility is somewhat increased in atmosphere, volume of waste is not reduced** • Treatment prior to release (distillation and, particulate filtration) will substantially reduce non-radiological pollutant concentrations and potential toxicity in the wastewater prior to release. • Atmospheric processes (diffusion, dispersion, precipitation, etc.) will further minimize the potential for toxicity associated with non-radiological contaminants in vapor emissions to the atmosphere. • Mobility will be increased due to atmospheric processes, but with minimal potential for adverse effects. • Volume of wastewater will not be reduced, but most contaminants in the wastewater will be removed by treatment and disposed as small-volume waste off-site.	• **Effective in the short term, protective and moderately time efficient** • Release will meet state/federal air quality requirements for contaminants and NRC standards for air emissions. • Monitoring will ensure atmospheric concentrations remain below acceptable levels for human health and ecological receptors.	• **Moderate costs will be incurred.** • Alternative specific procedures, and design/build effort may be required to modify and/or construct needed additional infrastructure. • More likely to result in schedule impacts and decommissioning delay.	• **Energy consumption (electricity or other thermal energy source) to induce evaporation will be significant, resulting in an increase in GHG emissions.**
Off-Site Transport and Disposal at Landfill	• **Moderately Protective** • Increased risk for raw wastewater release to environment and human/ecologic exposure associated with loading, transport, and processing of water at receiving facility. • Once landfilled, protectiveness is high.	• **Compliant** • Loading, transport, processing, and disposal will be conducted in accordance with state/federal and NRC requirements, permits and registrations.	• **High long-term effectiveness and permanence** • Solidified wastewater will be disposed in a permitted, monitored, engineered landfill intended for permanent disposal and management of industrial/radioactive waste.	• **Potential toxicity, mobility and volume will not be reduced until wastewater is received by disposal facility and stabilized with a solidification agent, volume of waste will be substantially increased by stabilization process.** • Toxicity may be reduced by stabilization process. • Contaminants will remain in the solidified waste but will be less mobile and isolated from receptors after encapsulation in a landfill.	• **Effective in the short term, moderately protective and moderately time efficient** • Potential for release to the environment during loading, transport or processing poses risk for short-term adverse impacts to human health and environment. • Loading and transport schedule will be limited by on-site personnel resources, availability of qualified transporters and receiving/processing limits at the disposal facility.	• **Highest-cost alternative** • Substantial costs will be incurred for loading, transport, stabilization, and disposal. • Procedures, design, and construction will be required to implement loading and if, used, trans-shipment. • Additional permitting and registrations may be required. • Impacts to decommissioning schedule are possible based on availability of Site workers.	• **Energy consumption for transportation by truck or truck/rail will be considerable, resulting in the largest increase in GHG emissions of the three retained alternatives.**