Docket No. 50-346

License No. NPF-3

Serial No. 1065

July 30, 1984

TOLEDO EDISON

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(419) 259-5221

Director of Nuclear Reactor Regulation
Attention: Mr. John F. Stolz
Operating Reactor Branch No. 4
Division of Operating Reactors
United States Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Stolz:

By letter dated July 14, 1983 (Serial No. 972), Toledo Edison submitted to the Nuclear Regulatory Commission (NRC) a request for approval for the alternative on-site disposal of very-low-level radioactively contaminated secondary-side clean-up resins. This request was made pursuant to the regulation of 10 CFR 20.302.

The initial design of the Davis-Besse Nuclear Power Station addressed the potential contamination of the secondary system via steam generator leakage and the accumulation of radioactive material on the secondary-side clean-up resin.

The condensate demineralizer backwash receiving tank discharge line, as originally designed included a radiation monitor. However, because of the nature of the resin-slurry mixture and the accumulation of resin beads in the monitor line, the radiation monitor has failed to provide the reliable indication and control of radioactive material contamination as originally intended.

Therefore, discharges from the condensate demineralizer backwash receiving tank are controlled on a batch-by-batch basis, in lieu of continuous radioactive effluent monitoring. This method of operation has been determined to provide better control over the discharge of the backwash receiving tank, preventing any unanticipated, unevaluated releases of radioactively contaminated secondary-side clean-up resins to the on-site settling basin.

Prior to discharge, the contents of the backwash receiving tank are sampled and analyzed for radioactivity. As required, radioactively contaminated resins are transferred to radwaste for processing and disposal at a licensed radioactive waste burial site.

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Over the past years of Davis-Besse operation, very low levels of radioactive material from discharges of slightly contaminated secondary-side clean-up resin have accumulated in the on-site settling basin. It is anticipated that the on-site settling basin will require dredging within the next two years to assure its continued functional availability.

Recognizing the potential regulatory delay, it was thought advisable to pursue, at an early date, the issues that were considered key to the dredging, and ultimately, the on-site disposal of the very-low-level contaminated basin bottoms. And, secondly, due to the recurring generation of very-low-level contaminated secondary-side clean-up resins, it was considered necessary to establish criteria that could be used for the continued use of the on-site basin for the disposal of very-low-level contaminated resin - criteria based on radioactivity levels and the potential environmental doses considering the alternative on-site disposal.

The secondary-side clean-up system is designed for maintaining chemical purity of the secondary water; it is not a radioactive waste processing system. However, during periods of primary-to-secondary leakage, radioactive material contamination will accumulate on these clean-up resins.

For routine, minor leakage typical of thermal expansions and contractions, the contamination levels will be very low. For identifiable steam generator tube leaks, contamination levels will increase, approaching levels clearly requiring control and treatment as radwaste.

As addressed, in order to appropriately identify and evaluate potential radioactive material contamination, each batch from the condensate demineralizer backwash receiver tank is sampled and analyzed by gamma spectroscopy. By sampling and analysis, it is possible to identify exceedingly small levels of radioactive material. However, as identified in NRC IE Information Notice No. 83-05, it is not always prudent to categorically treat large volumes of material contaminated at very low levels as radwaste. Pursuant to the requirements of 10 CFR 20.302, other methods of disposal may provide reasonable alternatives to the high cost disposal at a licensed radioactive waste burial site.

The July 14, 1983 request evaluated upper bound conditions with the purposes of conservatively evaluating radiological consequences (routine environmental doses and potential accident doses) of the disposal of the very-low-level contaminated resin.

The approach was to be a conservative evaluation of the worst case potential situation. Actual conditions (radionuclide inventory and radioactivity levels) will be less than those evaluated. By this conservative evaluation it is reasonable to establish regulatory acceptable cut-off levels that can be used on a continuing bases at the Davis-Besse Nuclear Power Station for the disposal of very-low-level contaminated resin.

Your letter of May 4, 1984 (Log No. 1509) requested additional information to support Toledo Edison's request for approval to dispose on-site certain very low level radioactivity contaminated wastes. Attachment 1 provides the requested information.

Very truly yours,

RPC:DWB:SGW:nlf
encl.
cc: DB-1 NRC Resident Inspector

ADDITIONAL INFORMATION TO TOLEDO EDISON'S SUBMITTAL CONCERNING ON-SITE DISPOSAL OF RESIN

Question 1: Provide the concentrations and quantities of each radionuclide that Toledo Edison plans to transfer to the on-site settling basins at Davis-Besse. Specify the time period in which the radionuclides will be transferred to the on-site settling basin.

Response: The maximum, discrete volume concentration and quantity of any single resin batch discharge to the basin will not exceed the values specified in Table 1. If more than one radionuclide is identified, the maximum concentration (and corresponding quantity) will be based on the sum-of-fractions rule. As opposed to the listing of all nuclides as done in the July 14, 1983 submittal, only the principal radionuclides are included. Other radionuclides may potentially be present (i.e. all nuclides listed in Table 2 of the July 14, 1983 submittal); however, their contribution to the total activity and dose consequences will be insignificant.

Estimated average concentrations and total quantities of the principal radionuclides in the basin have been conservatively evaluated and are presented in Table 2. These values are based on estimated volume of basin bottoms at time of dredging and considers uniform discharge to the basin of secondary-side clean-up resin at concentration limits corresponding to the values in Table 1 (i.e. 20 ft^3/week at Table 1 limits for a nominal 5 year operating life of basin). An estimated radionuclide distribution has been based on a calculated secondary water radionuclide concentration as presented in the Davis-Besse Appendix I Evaluation, dated June 4, 1976.

The evaluation of the average concentration for short half-life radionuclides that may be discharged to the basin is not pertinent. The acceptable transfer of radionuclides, such as Mo-99, I-131/133, and Ba/La-140, is based on accident considerations; any average concentrations resulting from cumulative discharges over the operating life of the basin (i.e., 5 years) would be exceedingly small - below levels of detection due to radioactive decay.

Question 2: Specify the total number of times (and the frequency) the resins will be dredged from the on-site settling basin.

Response: The basin is designed for a 5 year operating life with dredging by clamming required to assure its continued functional availability. Actual time period between dredgings is dependent on waste volumes input to the basin which is more of a function of the demand of the water treatment facility than of the inputs from the condensate demineralizer backwash receiving tank. Over the remaining operational life of the Davis-Besse Nuclear Power Station, it is anticipated that the basin will require dredging around 6 times.

Question 3: For each time the resins will be dredged from the on-site settling basins, provide the estimated concentrations and quantities of each radionuclide in the dredged material, and the volume of the dredged material. Describe any chemicals in the dredged material that would make the dredged material unsuitable for disposition in the manner described.

Response: The estimated maximum concentration and quantity of the radionuclides in the dredged basin bottoms are presented in Table 2. These estimates are based on the principal radionuclides in the waste streams at Davis-Besse, an estimated volume of 34,000 ft^3 of dredged material, and a nominal basin operating life of 5 years.

The inputs to the basin are from the water treatment facility and the condensate demineralizer backwash receiving tank; neither of which are known to contain any chemical contaminants that would yield the dredged bottoms unsuitable for disposition in the manner described.

Question 4: Describe the planned disposal site for the dredged material. For the planned on-site disposal, the disposal site description should include (1) a numbered and captioned figure of the disposal site showing its proximity to areas frequently occupied by workers, and to the unrestricted area; (2) the area of the disposal site, and the planned thickness of the disposed material; (3) a description of any physical barriers or administrative procedures that would be used to reduce exposure of workers or the general public; (4) the type of and thickness of any covering material that will be placed over the dredged material to reduce exposure; and (5) the time frame in which any covering will be placed over the dredged material.

Response: While the specific on-site location for the actual disposal of the dredged basin bottoms remains to be identified, the following particulars of the site selection and disposal method are applicable:

- The Davis-Besse site contains approximately 954 acres. There exist numerous on-site locations that are remote from frequently occupied areas and that are acceptable for use as a final disposal area for the dredged basin bottoms. The selected disposal site will be a minimum of 100 yards from any area frequently occupied, either on-site or off-site. The attached site area map (Figure 1) indicates the general characteristics of the Davis-Besse site.

- The final disposal site will be stabilized with a nominal 4 inch clean soil cover and appropriately seeded (or use of an alternative suitable stabilizer) to limit erosion. The stabilization of the disposal site will be accomplished in a manner consistent with the principles of preventing the unwanted dispersal of the dredged bottoms. A fixed time schedule cannot be identified at this time, however, if final stabilization cannot be completed in a timely manner due to unforeseen reasons, interim measures will be taken to limit the potential of any unwanted dispersal.

The actual thickness of the disposed material will depend on the characteristics of the specific disposal location selected; however, in order to accomodate a volume of 34,000 ft^3, a minimum thickness of 2 to 5 feet is anticipated. As addressed in the July 14, 1983 submittal, any thickness over about 1 foot does not result in increased radiation exposures. Therefore, the conservative use of a 1 foot depth in evaluating potential radiation dose is consistent with the anticipated bounds of the disposal method.

The need of additional physical barriers for limiting access (and resulting exposure) to the disposed basin bottoms is not anticipated at this time. Though access to the site is not totally restricted, the existing site boundary fencing and surrounding environmental characteristics (i.e. Navarre Marsh in the southeast sector of the site) provide restricted access; no uncontrolled areas on-site are frequented by members of the public.

Question 5: Provide estimates of doses to: (1) workers from the major potential pathways of exposure (e.g., inhalation, and ground shine) during the operating life of the plant; and (2) members of the public from the major potential pathways of exposure (e.g. inhalation, ground shine, ingestion of food, and ground water contamination) during the operating life of the plant, and after the operating license is terminated. Dose estimates should take into account the possibility that the radionuclides may not be mixed uniformly in the disposed material.

Response: Due to the nature of the disposal method (i.e., removed from frequently accessed areas), it is not unrealistic to assume an average material concentration for determining potential doses. Even if localized radioactive material levels are up to 10, the average (a worst case situation), cumulative individual exposures can still be best evaluated based on an average material concentration. This conclusion is supported by the numerical equivalence of a time/exposure rate average accounting for the potential of localized higher activity levels compared with an assumed average concentration and a cumulative exposure.

The estimated dose to a maximum exposed individual, either worker or member of the public, has been conservatively calculated to be less than 0.5 mrem/year. The calculation models used for the dose assessment are those as presented in the July 14, 1983 submittal; pathways of exposure include inhalation and ground shine. Assumptions different from those of the July 14, 1983 submittal, as needed to address the on-site exposure pathways, are presented in Table 3; radioactive material concentrations are presented in Table 2. The clean soil cover will restrict any resuspension of the radioactive material. However, for conservatism in assessing any potential worker exposures during the transfer of the dredged bottoms, no reduction in resuspension has been considered.

The post decommissioning pathways of exposure can be potentially different from those while restricted access to the disposal area is assured. The conservatism of the July 14, 1983 submittal in evaluating maximum individual doses appropriately bounds the potential exposure pathways post decommissioning. The July 14, 1983 submittal evaluated the exposure pahtways of inhalation, ground shine, and ingestion of food. Ground water contamination was not identified as a viable, controlling pathway of exposure. Due to radioactive decay, actual radioactive material concentrations post decommissioning will be less than those evaluated; therefore, any actual exposures are expected to be much less than 1 mrem/year.

Question 6: Briefly describe credible accidents, if any, involving exposure of workers or the general public due to the transfer of resins to the settling basins and the storage of the resins in the settling basins. Estimate doses to workers and the general public from these accidents; provide a rough estimate of the probability of the accident.

Response: The only credible accident of any potential consequences, as addressed in the submittal, is the inadvertent release of a resin batch directly to Lake Erie. The establishing of acceptable radionuclide concentrations for discharge to the basin has included the consequences of this accidental release. Conservatively evaluated, the maximum potential dose has been calculated to be less than 1 mrem. The probability of the accident is very remote; the valves that require opening for an accidental release are manually operated and are only operated during basin cleaning. They are not routinely manipulated valves that would lend themselves to increased probability of operator error.

Table 1

Maximum Radionuclide Concentration and Total Quantity for Resin Transfer to Basin

Radionuclide	Maximum Concentration ($\mu Ci/cm^3$)	Maximum Quantity* (μCi)
Mn-54	6.2×10^{-4}	350
Co-58	3.0×10^{-3}	1,700
Co-60	5.4×10^{-5}	31
I-131	1.1×10^{-3}	620
Cs-134	1.1×10^{-4}	62
Cs-137	1.0×10^{-4}	57

* Based on a single batch resin discharge volume of 20 ft^3

Table 2

Estimated Average Radionuclide Concentration and Total Quantity for Basin Dredgings

Radionuclide	Average Concentration ($\mu Ci/cm^3$)	Total Quantity* (μCi)
Mn-54	1.5×10^{-7}	140
Co-58	3.0×10^{-6}	2,900
Co-60	7.9×10^{-8}	76
Cs-134	2.4×10^{-6}	2,300
Cs-137	3.2×10^{-6}	3,100

* Based on an estimated 34,000 ft^3 of basin bottoms

Figure 1

Davis-Besse Site Area Map

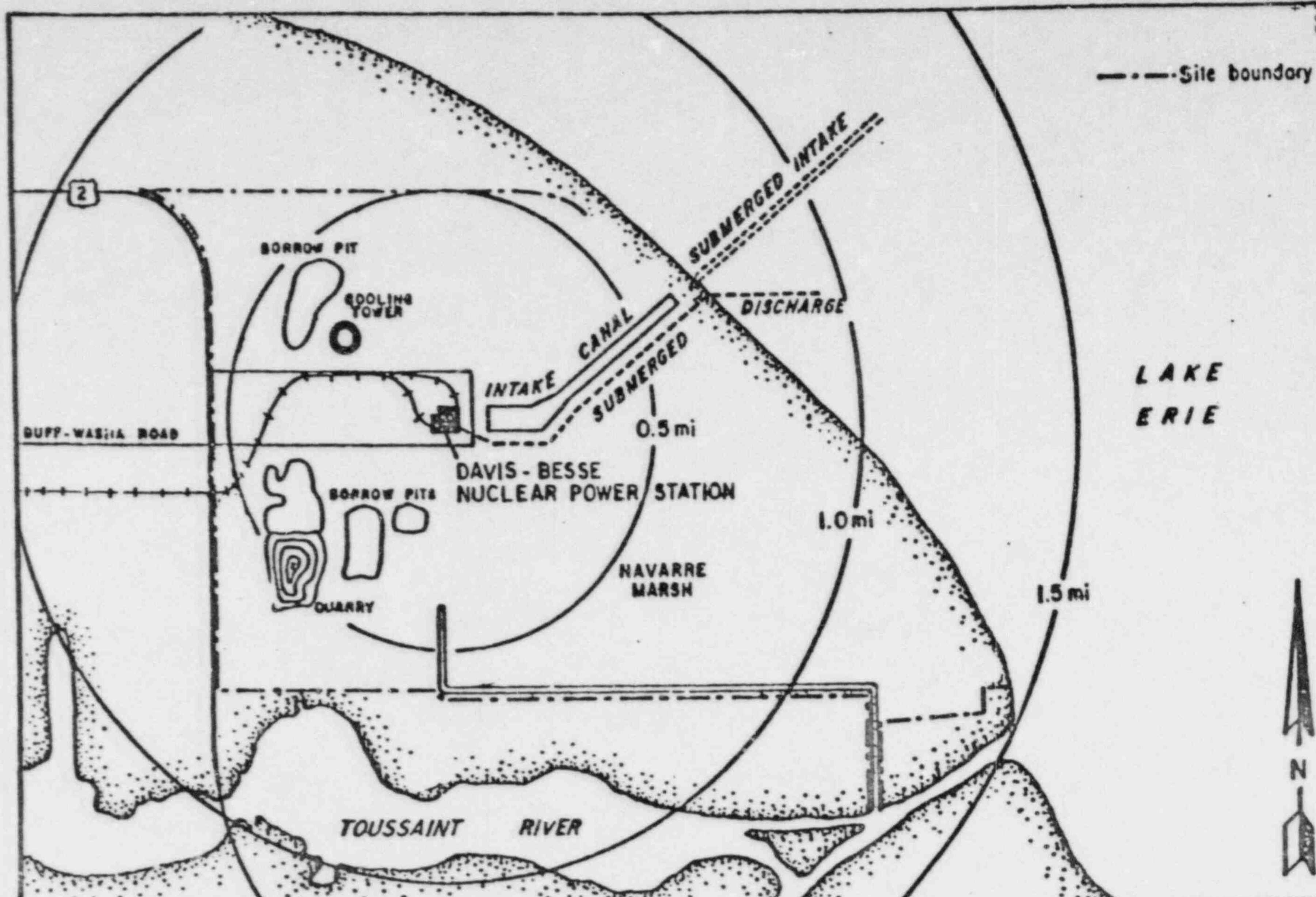

Table 3

On-site Exposure Pathway Assumptions for

Assessing Maximum Exposed Individual

Parameter	Assigned Value
Exposure Time (U)	210 hrs/yr
Fraction of soil constituting settling basin bottoms	1.0
Shielding factor afforded by 4 inch cover	0.25