APPENDIX A

PERMIT CONDITIONS, COL ACTION ITEMS, SITE CHARACTERISTICS, AND BOUNDING PARAMETERS

Figures

A.1 Permit Conditions

Permit Condition: The Commission's regulation in 10 CFR § 52.24 authorizes the inclusion of limitations and conditions in an ESP. A permit condition is not needed when an existing NRC regulation requires a future regulatory review of a matter to ensure adequate safety during design, construction, or inspection activities for a new plant. The staff is proposing that the Commission include eight permit conditions, which are set forth below, to control various safety matters.

Permit Condition No.	SER Section	Description
		2.1 - Geography and Demography
1	2.1.2	The NRC staff proposes to include a condition in any ESP that might be issued to govern exclusion area control. This permit condition would require that an applicant for a COL referencing this ESP to demonstrate that they have been granted the right to exercise sufficient control within the exclusion area identified in the ESP, including the authority to maintain ingress to and egress from the exclusion area and to evacuate individuals from the exclusion area in the event of an emergency. The permit condition also requires a COL applicant referencing this ESP to secure any necessary arrangements to provide, in the event of a declared emergency, for the control of traffic on county roads and the evacuation of individuals within the ESP exclusion area. The condition requires that these arrangements be obtained and executed before the construction of a nuclear plant begins under a constuction permit or COL referencing the ESP.
		2.4 - Hydrology
2	2.4.13	The NRC staff proposes to include a condition in any ESP that might be issued in connection with this application requiring that an applicant referencing such an ESP design any new unit's radwaste systems with features to preclude any and all accidental releases of radionuclides into any potential liquid pathway.

Permit Condition No.	SER Section	Description
2.5 - Geology, Seismology, and Geotechnical Engineering		
3	2.5.1	The NRC staff proposes to include a condition in any ESP that might be issued in connection with this application requiring that the ESP holder and/or an applicant referencing such an ESP perform geologic mapping of future excavations for safety-related structures, evaluate any unforseen geologic features that are encountered, and notify the NRC no later than 30 days before any excavations for safety-related structures are open for NRC's examination and evaluation.

A.2 COL Action Items

COL Action Items: The combined license (COL) action items set forth in the SER and incorporated herein identify certain matters that shall be addressed in the final safety analysis report (FSAR) by an applicant who submits an application referencing the Grand Gulf ESP. These items constitute information requirements but do not form the only acceptable set of information in the FSAR. An applicant may depart from or omit these items, provided that the departure or omission is identified and justified in the FSAR. In addition, these items do not relieve an applicant from any requirement in 10 CFR Parts 50 and 52 that govern the application. After issuance of a construction permit (CP) or COL, these items are not controlled by NRC requirements unless such items are restated in the preliminary safety analysis report or FSAR, respectively.

The staff identified the following COL action items with respect to individual site characteristics in order to ensure that particular significant issues are tracked and considered during the review of a later application referencing any ESP that might be issued for the Grand Gulf ESP site.

Action Item No.	SER Section	Subject To Be Addressed	Reason for Deferral
2.2 - Nearby Industrial, Transportation, and Military Facilities			
2.2-1	2.2.3	A COL or CP applicant should perform an evaluation of industrial hazards associated with site, and should assess design-specific interactions between the existing and new unit(s) and, if necessary, propose measures to account for such interactions.	New unit design and specific location not known at ESP stage
2.3 - Meteorology			
2.3-1	2.3.3	A COL or CP applicant should evaluate interaction between the existing meteorological tower and the proposed facility's cooling towers.	Design and specific location of cooling tower units are not known at ESP stage.
2.3-2	2.3.4	A COL or CP applicant should evaluate dispersion of airborne radioactive materials to the control room.	Control room location and design not known at ESP stage.
2.3-3	2.3.5	A COL or CP application should confirm specific release point characteristics and locations of potential receptors for routine release dose computations.	Exact release points and receptor locations not known at ESP stage.

Action Item No.	SER Section	Subject To Be Addressed	Reason for Deferral
2.4 - Hydrology			
2.4-1	2.4.1.3	A COL or CP application should demonstrate that sufficient separation between the new ESP intake and the combined effluent outfall is provided so that the effluent recirculating back to the new ESP intake will not adversely affect the intake.	Design of ESP facility intake and outfall will be completed only at the COL stage after a reactor design is chosen at the COL stage.
2.4-2	2.4.1.3	A COL or CP applicant should demonstrate that if dewatering is necessary for the operation of the ESP facility, it will be considered a safety-related facility and must be designed, operated, and maintained as such.	Detailed design of the facility is not known at ESP stage.
2.4-3	2.4.1.3	A COL or CP applicant should design the site grading to provide flooding protection to safety-related structures at the ESP site based on a comprehensive flood water routing analysis for a local PMP event on the ESP site.	Detailed design of the facility, including the site grade are beyond the scope of an ESP review.
2.4-4	2.4.1.3	A COL or CP applicant should design the ESP facility with a maximum withdrawal of 85,000 gpm from the Mississippi River for makeup water requirement for the ESP facility	Detailed design of the facility, including its makeup water requirements are not available at the ESP stage.
2.4-5	2.4.2.3	A COL or CP applicant should demonstrate that the ESP plant grade is safe from the flooding effects of maximum water surface elevation during local intense precipitation without relying on any active surface drainage systems that may be blocked during this event.	Certain locations within the ESP site area can be at the flood elevation of the site in response to local intense precipitation. It is not feasible to determine flooding protection needs at the ESP stage in response to local intense precipitation because final site grade and drainage patterns are not yet known.

Action Item No.	SER Section	Subject To Be Addressed	Reason for Deferral
2.4-6	2.4.8.3	A COL or CP applicant should demonstrate that 30-day cooling water supply for the ESP facility UHS will be available as liquid water in any dedicated water storage basin(s) accounting for any losses including, but not limited to, those resulting from evaporation, seepage, icing, and a margin of safety.	Detailed engineering design of underground UHS reservoirs, should they be needed, to ensure adequate capacity is not within the scope of ESP review.
2.4-7	2.4.8.3	A COL or CP applicant should demonstrate that the ESP facility UHS will not be used frequently for non emergency operation of the ESP facility.	The ESP water budget analysis relies on independent UHS reservoirs only, but need for a UHS is not known at the ESP stage.
2.4-8	2.4.12.3	A COL or CP applicant should demonstrate that an adequately designed ground water well system capable of withdrawing a maximum of 3570 gpm is provided for the ESP facility.	Detailed design of the facility is not known at the ESP stage.
2.4-9	2.4.12.3	A COL or CP applicant should provide detailed ground water information including location and depth of perched aquifers	Additional ground water characterization is not known at the ESP stage.

Action Item No.	SER Section	Subject To Be Addressed	Reason for Deferral
2.5 - Geology, Seismology, and Geotechnical Information			
2.5-1	2.5.4	A COL or CP applicant should use excavation walls (or a combination of ground improvement with tied-back walls) and control the ground water during the excavations at the COL stage.	Exact unit locations not known at ESP stage.
2.5-2	2.5.4	A COL or CP applicant should conduct detailed studies on the fill material and the required treatment to the fill material.	Exact unit locations and design not known at ESP stage.
2.5-3	2.5.4	A COL or CP applicant should perform additional borings, laboratory testing, and a geophysical survey to confirm the current base case material properties and their variabilities throughout the site during the COL stage. If the investigations to be performed during the COL stage indicate differences in material properties which may have significantly impact to design ground motions, the applicant should evaluate the need to perform additional site response analyses with the updated properties to develop updated design ground motions.	Exact unit locations and design not known at ESP stage.
2.5-4	2.5.4	A COL or CP applicant should perform geotechnical investigations during the COL stage to provide additional verification regarding the soil properties of the zone with rise and fall of P-wave velocity, indicated in the SSAR.	Exact unit locations and design not known at ESP stage.
2.5-5	2.5.4	A COL or CP applicant should provide information to correlate plot plans and profiles of each seismic Category I facility with subsurface profiles and material properties to ascertain the sufficiency of selected borings to represent soil variations under each structure.	Exact unit locations not known at ESP stage.
2.5-6	2.5.4	A COL or CP applicant should evaluate potential excavation procedures that may be used, as well as the impact of the adjacent bluff on temporary support conditions and on standoff distance in the ESP area.	Exact unit locations and design not known at ESP stage.

Action Item No.	SER Section	Subject To Be Addressed	Reason for Deferral
2.5-7	2.5.4	A COL or CP applicant should provide a detailed dewatering plan for evaluating the ground water conditions (procedure for dewatering during construction, and ground water control throughout the life of the plant) regarding their effects on the foundation stability.	Exact unit locations and design not known at ESP stage.
2.5-8	2.5.4	A COL or CP applicant should perform additional site investigations during the COL stage, including deep borings in the footprint of the powerblock structures to evaluate the potential for karst formation.	Exact unit locations and design not known at ESP stage.
2.5-9	2.5-4	A COL or CP applicant should develop specific design criteria (such as potential wall rotations, facility sliding, and overturning) during the COL stage when the specific characteristics of the operating system are known.	Site average shear-wave velocity of the Zone III-IV bedrock slightly less than design value provided at ESP stage.
2.5-10	2.5.5	A COL or CP applicant should incorporate the effects resulting from the local topography or possible changes in topography in the future SSI analyses	Locations of safety-related structures relative to the existing or new slopes not known at ESP stage.
2.5-11	2.5.6	A COL or CP applicant should evaluate the effect of potential flooding of the Mississippi River and possible future erosion of the bluff, including their impacts on SSI effects of the plant.	Locations of safety-related structures relative to the existing or new slopes not known at ESP stage.
11.1 - Radioactive Effluent Dose Consequences from Normal Operations			
11.1-1	11.1.4	A COL or CP applicant should verify that the calculated radiological doses to members of the public from radioactive gaseous and liquid effluents for any facility to be built on the Grand Gulf site are bounded by the radiological doses included in the ESP application and reviewed by the NRC.	Specific details of how the new facility will control, monitor, and maintain radioactive gaseous and liquid effluents not known at ESP stage.
13.6 - Industrial Security			
13.6-1	13.6.3	A COL or CP applicant should provide specific designs for protected area barriers.	Exact locations and design of barriers not known at ESP stage.

A.3 Site Characteristics

Site Characteristics: Based on site investigation, exploration, analysis and testing, the applicant initially proposes a set of site characteristics. These site characteristics are specific physical attributes of the site, whether natural or man-made. Site characteristics, if reviewed and approved by the staff, are specified in the ESP. The staff proposes to include the following site characteristics in any ESP that might be issued for the Grand Gulf site.

Site Characteristic	Value	Definition
2.1 - Geography and Demography		
Exclusion Area Boundary	The perimeter of a 2760 ft radius circle from the circumference of a 630 ft circle encompassing the proposed power block housing the reactor containment structure for new unit	The area surrounding the reactor, in which the reactor licensee has the authority to determine all activities including exclusion or removal of personnel and property from the area
Low Population Zone	2 mile radius circle from the circumference of a 630 ft circle encompassing the proposed power block housing the reactor containment structure for new unit	The area immediately surrounding the exclusion area which contains residents
Population Center Distance	2.7 miles	The minimum allowable distance from the reactor to the nearest boundary of a densely populated center containing more than about 25,000 residents
2.2 - Nearby Industrial, Transportation, and Military Facilities		
Minimum separation distance from GGNS onsite storage of liquid hydrogen.	737 ft	Minimum distance between GGNS onsite storage of 20,000 gallons of liquid hydrogen and safety related systems of a new plant at the proposed ESPsite.

Site Characteristic		Value	Definition
2.3 - Meteorology			
Ambient Air Temperature and Humidity			
Maximum Dry-Bulb Temperature	2% annual exceedance	92 °F	The ambient dry-bulb temperature that will be exceeded 2% of the time annually
	0.4% annual exceedance	95 °F	The ambient dry-bulb temperature that will be exceeded 0.4% of the time annually
	average annual highest	98 °F	The average of the maximum temperatures recorded each year
	100-year return period	108 °F	The ambient dry-bulb temperature that has a 1% annual probability of being exceeded (100-year mean recurrence interval)
Minimum Dry-Bulb Temperature	99% annual exceedance	25 °F	The ambient dry-bulb temperature below which dry-bulb temperatures will fall 1% of the time annually
	99.6% annual exceedance	21 °F	The ambient dry-bulb temperature below which dry-bulb temperature will fall 0.4% of the time annually
	average annual lowest	14 °F	The average of the minimum temperatures recorded each year
	100-year return period	-6 °F	The ambient dry-bulb temperature for which a 1% annual probability of a lower dry-bulb temperature exists (100-year mean recurrence interval)

Site Characteristic		Value	Definition
Maximum Wet-Bulb Temperature	2% annual exceedance	78 °F	The ambient wet-bulb temperature that will be exceeded 2% of the time annually
	0.4% annual exceedance	80 °F	The ambient wet-bulb temperature that will be exceeded 0.4% of the time annually
Basic Wind Speed			
Fastest-mile		83 mi/h	The fastest-mile wind speed to be used in determining wind loads, defined as the fastest-mile wind speed at 33 feet above the ground that has a 1% annual probability of being exceeded (100-year mean recurrence interval)
3-Second Gust		96 mi/h	The 3-second gust wind speed to be used in determining wind loads, defined as the 3-second gust wind speed at 33 feet above the ground that has a 1% annual probability of being exceeded (100-year mean recurrence interval)
Tornado			
Maximum Wind Speed		300 mi/h	Maximum wind speed resulting from passage of a tornado having a probability of occurrence of 10^{-7} per year
Translational Speed		60 mi/h	Translation component of the maximum tornado wind speed
Maximum Rotational Speed		240 mi/h	Rotation component of the maximum tornado wind speed
Radius of Maximum Rotational Speed		150 feet	Distance from the center of the tornado at which the maximum rotational wind speed occurs
Pressure Drop		2.0 lbf/in.^{2}	Decrease in ambient pressure from normal atmospheric pressure resulting from passage of the tornado

Site Characteristic	Value	Definition
Rate of Pressure Drop	1.2 lbf/in.^{2}/s	Rate of pressure drop resulting from the passage of the tornado
Winter Precipitation		
100-Year Snowpack	6.1 lbf/ft^2	Weight of the 100-year return period snowpack (to be used in determining normal precipitation loads for roofs)
48-Hour Probable Maximum Winter Precipitation	35 inches of water	Probable maximum precipitation during the winter months (to be used in conjunction with the 100-year snowpack in determining extreme winter precipitation loads for roofs)
Ultimate Heat Sink		
Meteorological Conditions Resulting in the Minimum Water Cooling during Any 1 Day	81.0 °F wet-bulb temperature with coincident 86.3 °F dry-bulb temperature	Historic worst 1-day daily average of wet-bulb temperatures and coincident dry-bulb temperatures
Meteorological Conditions Resulting in the Minimum Water Cooling during Any Consecutive 5 Days	80.2 °F wet-bulb temperature with coincident 86.2 °F dry-bulb temperature	Historic worst 5-day daily average of wet-bulb temperatures and coincident dry-bulb temperatures
Meteorological Conditions Resulting in the Maximum Evaporation and Drift Loss during Any Consecutive 30 Days	78.5 °F wet-bulb temperature with coincident 83.1 °F dry-bulb temperature	Historic worst 30-day daily average of wet-bulb temperatures and coincident dry-bulb temperatures
Meteorological Conditions Resulting in Maximum Water Freezing in the UHS Water Storage Facility	98 °F degree days below freezing	Historic maximum cumulative degree days below freezing
Short-Term (Accident Release) Atmospheric Dispersion		
0–2-H χ/Q Value @ EAB	5.95×10^{-4} s/m^3	The 0–2-hour atmospheric dispersion factor to be used to estimate dose consequences of accidental airborne releases at the EAB

Site Characteristic	Value	Definition
0–8-H χ/Q Value @ LPZ	8.83×10^{-5} s/m^3	The 0–8-hour atmospheric dispersion factor to be used to estimate dose consequences of accidental airborne releases at the LPZ
8–24-H χ/Q Value @ LPZ	6.16×10^{-5} s/m^3	The 8–24-hour atmospheric dispersion factor to be used to estimate dose consequences of accidental airborne releases at the LPZ
1–4-Day χ/Q Value @ LPZ	2.82×10^{-5} s/m^3	The 1–4-day-atmospheric dispersion factor to be used to estimate dose consequences of accidental airborne releases at the LPZ
4–30-Day χ/Q Value @ LPZ	9.15×10^{-6} s/m^3	The 4–30-day atmospheric dispersion factor to be used to estimate dose consequences of accidental airborne releases at the LPZ
Long-Term (Routine Release) Atmospheric Dispersion		
Annual Average Undepleted/No Decay χ/Q Value @ Site Boundary	8.8×10^{-6} s/m^3	The maximum annual average site boundary undepleted/no decay χ/Q value for use in determining gaseous pathway doses to the maximally exposed individual
Annual Average Depleted/No Decay χ/Q Value @ Site Boundary	7.8×10^{-6} s/m^3	The maximum annual average site boundary depleted/no decay χ/Q value for use in determining gaseous pathway doses to the maximally exposed individual
Annual Average D/Q Value @ Site Boundary	1.2×10^{-8} 1/m^2	The maximum annual average site boundary D/Q value for use in determining gaseous pathway doses to the maximally exposed individual
Annual Average Undepleted/No Decay χ/Q Value @ Nearest Home	2.2×10^{-6} s/m^3	The maximum annual average home undepleted/no decay χ/Q value for use in determining gaseous pathway doses to the maximally exposed individual

Site Characteristic	Value	Definition
Annual Average Depleted/No Decay χ/Q Value @ Nearest Home	1.9×10^{-6} s/m^3	The maximum annual average home depleted/no decay χ/Q value for use in determining gaseous pathway doses to the maximally exposed individual
Annual Average D/Q Value @ Nearest Home	7.0×10^{-9} 1/m^2	The maximum annual average home D/Q value for use in determining gaseous pathway doses to the maximally exposed individual
Annual Average Undepleted/No Decay χ/Q Value @ Nearest Garden	2.0×10^{-6} s/m^3	The maximum annual average garden undepleted/no decay χ/Q value for use in determining gaseous pathway doses to the maximally exposed individual
Annual Average Depleted/No Decay χ/Q Value @ Nearest Garden	1.7×10^{-6} s/m^3	The maximum annual average garden depleted/no decay χ/Q value for use in determining gaseous pathway doses to the maximally exposed individual
Annual Average D/Q Value @ Nearest Garden	5.4×10^{-9} 1/m^2	The maximum annual average garden D/Q value for use in determining gaseous pathway doses to the maximally exposed individual
Annual Average Undepleted/No Decay χ/Q Value @ Nearest Milk Cow	7.0×10^{-8} s/m^3	The maximum annual average milk cow undepleted/no decay χ/Q value for use in determining gaseous pathway doses to the maximally exposed individual
Annual Average Depleted/No Decay χ/Q Value @ Nearest Milk Cow	4.7×10^{-8} s/m^3	The maximum annual average milk cow depleted/no decay χ/Q value for use in determining gaseous pathway doses to the maximally exposed individual
Annual Average D/Q Value @ Nearest Milk Cow	8.7×10^{-11} 1/m^2	The maximum annual average milk cow D/Q value for use in determining gaseous pathway doses to the maximally exposed individual

Site Characteristic	Value	Definition
Annual Average Undepleted/No Decay χ/Q Value @ Nearest Meat Cow	1.4×10^{-7} s/m^3	The maximum annual average meat cow undepleted/no decay χ/Q value for use in determining gaseous pathway doses to the maximally exposed individual
Annual Average Depleted/No Decay χ/Q Value @ Nearest Meat Cow	1.1×10^{-7} s/m^3	The maximum annual average meat cow depleted/no decay χ/Q value for use in determining gaseous pathway doses to the maximally exposed individual
Annual Average D/Q Value @ Nearest Meat Cow	4.0×10^{-10} 1/m^2	The maximum annual average meat cow D/Q value for use in determining gaseous pathway doses to the maximally exposed individual

Site Characteristic	Value	Definition
2.4 - Hydrology		
Hydrology		
Proposed Facility Boundaries	UFSAR Figure 2.4-1 shows the areal extent of proposed facility boundaries. This figure is reproduced below as Figure 1, bounding coordinates of the ESP site are a site characteristic. During construction, the ESP site could be disturbed up to a depth ranging from 35 to 140 feet plus some additional excavation.	ESP site boundary map
Site Grade	132.5 feet above MSL	Finished plant grade of the ESP site
Highest Ground Water Elevation	70 feet below grade; 62.5 feet above MSL; perched water may be present between the site grade at 132.5 feet above MSL and the water table at 62.5 feet above MSL.	The maximum elevation of ground water at the ESP site
Flood Elevation	Flood water elevation at the ESP site caused by local intense precipitation will be established by the COL applicant using local intense precipitation values established in Section 2.4.2.3 of this SER. Local intense precipitation itself is a site characteristic, listed below.	Maximum flood level at the ESP site resulting from local intense precipitation
Local Intense Precipitation	19.2 in./h, of which 6.2 in. falls during the first 5 minutes.	Maximum potential rainfall at the immediate ESP site
Frazil and Anchor Ice	The ESP site does not have the potential for the formation of frazil and anchor ice.	Accumulated ice formation in a turbulent flow condition
Maximum Cumulative Degree Days Below Freezing	98 °F	A measure of severity of winter weather conditions conducive to ice formation (computed using observed air temperature data)

Site Characteristic	Value	Definition
Distance to the Closest Surface Water	Stream B is the closest surface water feature; 1017 ft.	Distance to closest surface water body from center of ESP powerblock
Location of Aquifers Used by Large Population for Domestic, Municipal, Industrial, or Irrigation Water Supplies	2760 ft.	Distance of nearest public water supply well located just outside the exclusion area boundary from center of ESP powerblock
2.5 - Geology, Seismology, and Geotechnical Engineering		
Basic Geologic and Seismic Information		
Capable Tectonic Structures	-----	No fault displacement potential within the Site Area
Vibratory Ground Motion		
Design Response Spectra	Appendix A. Figure 2 (SSER Figure 2.5-68)	Site Specific response spectra
Stability of Subsurface Materials and Foundations		
Minimum shear wave velocity of soil at the proposed plant foundation Level	1000 feet per second (fsp)	Current reactor designs require the minimum shear wave velocity at the foundation level be at least 1000 fsp.

A.4 Bounding Parameters

A plant parameter envelope (PPE) sets forth postulated values of design parameters that provide design details to support the staff's review of an ESP application. A controlling PPE value, or bounding parameter value, is one that necessarily depends on a site characteristic. As the PPE is intended to bound multiple reactor designs, the staff would review the actual design selected in a COL or CP application referencing an ESP to ensure that the design fits within the bounding parameter values. Otherwise, the COL or CP applicant would need to demonstrate that the design, given the site characteristics in the ESP, complies with NRC regulations. Should an applicant reference an ESP for a design that is not certified, the applicant would need to demonstrate that the design's characteristics fall within the bounding parameter values.

Bounding Parameters	Value	Definition
2.4 - Hydrology		
Makeup water flow (max)	78,000 gpm	Maximum flow required to replenish evaporation and blowdown losses from normal heat sink cooling towers.
Potable Water/Sanitary Waste System (max)	240 gpm	Maximum flow of water for plant housekeeping
Demineralized Water System (max)	1,440 gpm	Maximum water flow for demineralization of blowdown discharge
Fire Protection System (max)	1,890 gpm	Maximum water flow for fire fighting system

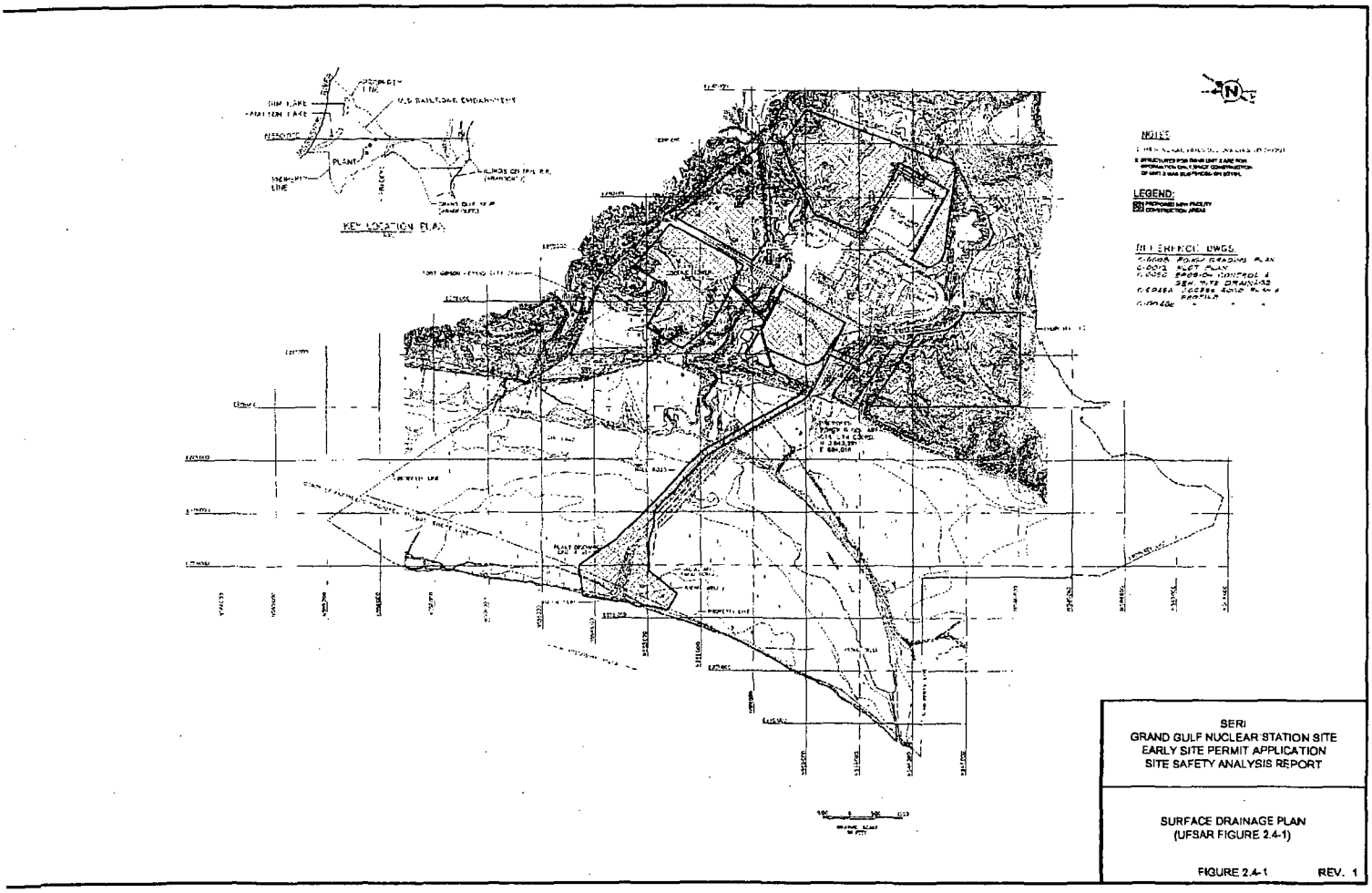

Figure 1- The proposed facility boundary of the ESP site

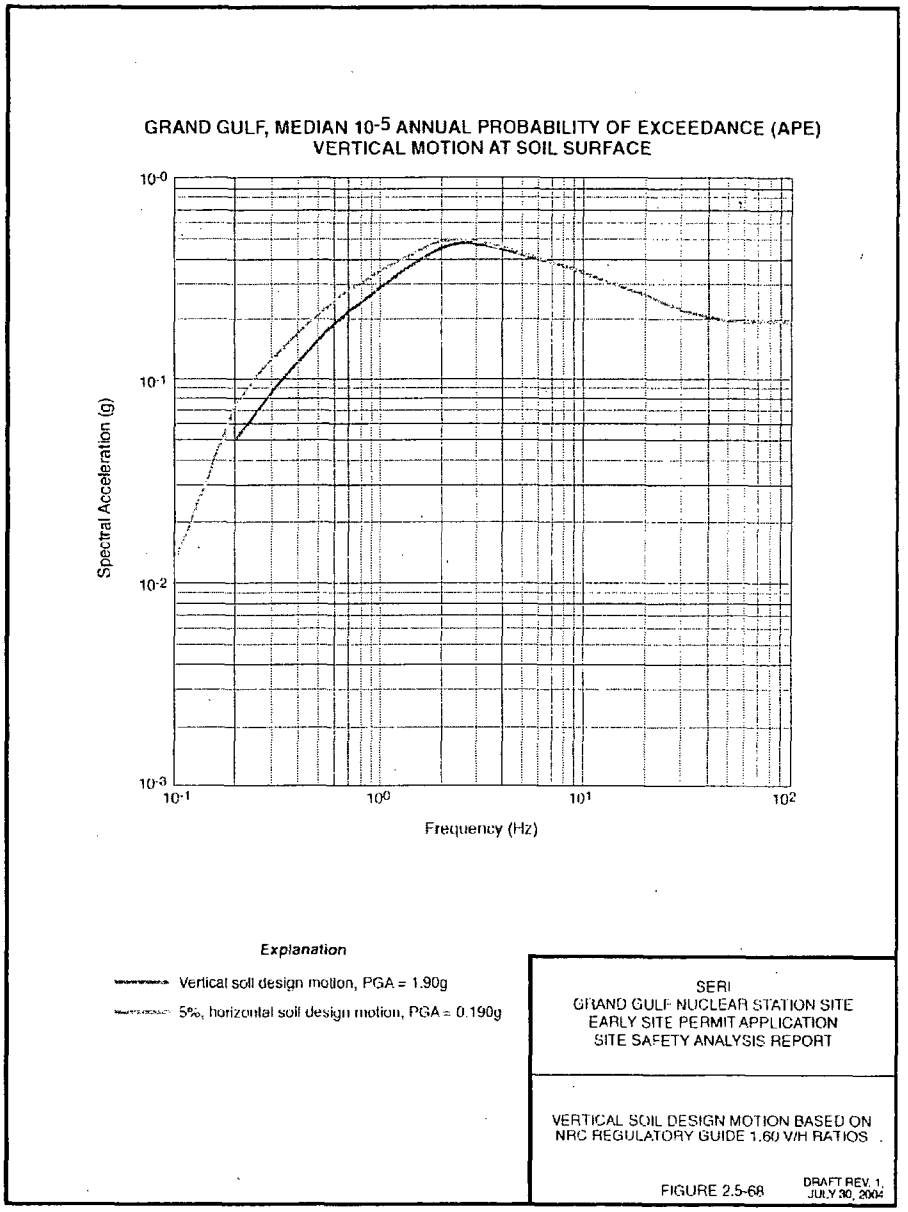

Figure 2-Horizontal and vertical response spectra for the Safe Shutdown Earthquake at the ESP site