APPENDIX 2A

SITE CHARACTERISTICS - INTERFACES

2A.2 Nearby Industrial, Transportation, and Military Facilities

The NPB is not designed for design basis events external to the plant. However, due to specified design conditions associated with earthquakes, wind loading and radiation shielding the plant has inherent capability to withstand certain types of external accidents.

For each site, the owner will provide analyses of accidents external to the nuclear plant and must demonstrate a probability of occurrence of less than the order of 10 E-7 per year for an accident that has potential consequences serious enough to affect the safety of the plant to the extent that Part 100 guidelines could be exceeded. The determination of the probability of occurrence of potential accidents having severe consequences will be based on analyses of available statistical data on the occurrence of the accident together with analyses of the effects of the accident on the plant's safety related structures and components. If an accident is identified for which the probability of severe consequences is unacceptable utilizing the Standard Nuclear Power Block, specific changes to the NPB will be identified in the site specific SAR. The accident categories below will be considered:

1. Explosions. Accidents involving detonations of high explosives, munitions, chemicals, or liquid gaseous fluid will be considered for facilities and activities in the vicinity of the plant where such materials are processed, stored, used, or transported in quantity.

2. Flammable Vapor Clouds (delayed ignition). Accidental releases of flammable liquids or vapors that result in the formation of unconfined vapor clouds will be considered.

3. Toxic Chemicals. Accidents involving the release of toxic chemicals (e.g., chlorine) from onsite storage facilities and nearby mobile and stationary sources will be considered.

4. Fires. Accidents leading to the high heat fluxes or to smoke, and non-flammable gas-or chemical-bearing clouds from the release of materials as the consequences of fires in the vicinity of the plant will be considered.

2A.5 Site Interface for Geology, Seismology and Geotechnical Engineering

2A.5.1 Introduction

The WAPWR NPB is a standard design intended to be applicable at a wide range of sites. Major structures, equipment and layout will be standardized. Supports and other miscellaneous structures will be standardized to the extent practicable; however due to the wide range of potential site conditions and the resulting frequency content of the seismic input it may be necessary to modify support locations to avoid the resonant conditions between the distributive systems and the soil-structure system.

The interface between the NPB and the site is defined in a manner to permit design of the NPB to proceed independently of site specific analyses. Generic analyses of the NPB are performed including parameter variations of the site specific data. Site specific analyses will be performed and documented in the site specific SAR; these analyses must demonstrate the adequacy of the supporting material and that the site specific floor response spectra at specified key locations on the plant do not exceed the generic floor response spectra utilized in design of the plant.

The NPB is analyzed using a lumped spring approach for soil structure interaction analysis. The analysis utilizes soil springs calculated for a uniform half space with soil parameters as follows:

Shear wave velocity, V_s: varies from 1000 ft/sec to infinite (rigid base).

Poisson's ratio, r: 0.40

This wide range of parametric analyses will provide a design that can encompass many sites. Analyses on a site specific basis will include consideration of foundation embedment depth, depth of soil over bedrock, soil layering characteristics and soil properties. These analyses will be reviewed as part of the site specific application and will generally include both a half space analysis and a finite boundary analysis. Acceptability of the results of this analysis will be based on comparison of representative floor response spectra against those used in the design of the NPB. These spectra will be provided at the final design stage.

2A.5.2 Seismic Input

The NPB is designed for the following seismic input:

Safe Shutdown Earthquake

Zero period acceleration = 0.3G in both horizontal and vertical directions with ground response spectra in accordance with Regulatory Guide 1.60 Rev. 1.

Operating Basis Earthquake

Zero period acceleration = 0.1G in both horizontal and vertical directions with ground response spectra in accordance with Regulatory Guide 1.60 Rev. 1. The spectra for the OBE are one third of those shown for the SSE.

The selection of 0.3G for the SSE is based on review of seismic data for existing and future sites. Existing Westinghouse PWR's outside of California are designed for SSE magnitudes equal to or less than 0.3g. NUREG/CR-1582, Volume 4 (D. L. Bernreuter, 1981, Seismic Hazard Analysis - Application of Methodology, Result and Sensitivity Studies) shows that seismic experts expect the peak ground acceleration at Central and Eastern U.S. sites to be well within 0.3g for a return period of 1000 years for the many sites studied. It is anticipated that the selection of a WAPWR site will not result in higher seismic risks than the nuclear power plant sites currently in existence.

The OBE magnitude is chosen to minimize the anomaly that OBE may govern component designs. The magnitude of the OBE is determined recognizing that shutdown will be required if vibratory ground motion exceeding that of the OBE occurs. Any safety consideration is associated with the determination of the SSE level.

The OBE magnitude is selected to correspond to the frequency inferred from 10CFR 100 Appendix A as "reasonably expected to occur during the life of the plant." As discussed in ANS 51.1 - 1983, the frequency of an earthquake of a 1/2 SSE magnitude is in the range of 10^{-2} to 10^{-3} per year and is thus too rare an event to merit the substantial margins inherent in the code design limit and Level B service limits. Design to such conservative limits requires component overdesign and excessive use of snubbers which may decrease the overall safety of the plant.

The OBE is therefore defined on the basis of an expected frequency of 10E-2 per year. The seismic experts in the study of NUREG/CR-1582 have chosen a maximum of close to 0.1g for a return period of 200 years for the same sites studied. This shows that a 0.1g OBE is indeed a realistic and conservative value.

2A.5.3 Supporting Media for Nuclear Power Block

The site must be capable of supporting the foundation mat of the NPB under all specified site conditions. The average bearing reaction of the NPB under dead and live loads is approximately 8 kips/sq. ft. (This magnitude will be identified during final design).

Bearing requirements during seismic conditions will be identified from site specific soil-structure interaction analyses. Foundation adequacy must be demonstrated in the site specific SAR.