NUCLEAR ENERGY INSTITUTE

Dr. Ronald L. Simard
SENIOR DIRECTOR BUSINESS
SERVICES DEPARTMENT
BUSINESS OPERATIONS DIVISION

February 7, 2003

Mr. James E. Lyons
Director, New Reactor Licensing Project Office
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

SUBJECT: ESP Plant Parameters Envelope Worksheet

PROJECT NUMBER: 689

Dear Mr. Lyons:

Enclosure 1 provides for NRC pre-application information and feedback the Plant Parameters Envelope (PPE) Worksheet, Revision 0 (February 2003). An explanatory preface has been provided with the PPE Worksheet. A companion document containing PPE definitions is provided as Enclosure 2.

As described in our December 20, 2002, resolution letter on ESP-6 (PPE Approach for ESP), the PPE Worksheet is a compilation of design parameter information for a range of reactor designs. It is being used by ESP applicants to facilitate comparison of design data and identification of bounding parameter values for use in ESP applications. Neither the PPE Worksheet, nor its companion definition document, will be provided with or form a part of ESP applications; ESP applications will contain only those design parameter bounding values and explanatory definitions deemed necessary by the applicant for a full and complete application.

The technologies reflected in the PPE worksheet are considered representative of designs that may someday be built. As discussed in our December 20, 2002, letter and in public meetings with the staff, reference to an ESP based on the PPE approach in no way limits a combined license applicant to the technologies represented in the PPE Worksheet. The characteristics of the actual plant design selected for construction by a COL applicant will be compared with the design parameters and site characteristics approved in the ESP.

NRC pre-application examination of the PPE Worksheet is intended to enhance understanding as to the origin of bounding PPE values and how they are selected. Pre-application examination of this information is also expected to demonstrate that

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bounding PPE values to be included in ESP applications are based on actual nuclear plant designs and address NRC staff questions regarding the source of the information used in ESP safety and environmental evaluations.

No NRC technical review of PPE Worksheet or any of the data contained therein is expected or required as this information will be subject to detailed technical review or validation in connection with either a design certification or COL proceeding. Not performing a technical review of design information for ESP is consistent with the intended focus of ESP on sites, not designs.

Bounding values ultimately reflected in ESP applications will be based on information available at the time of the application and may differ from that presented in the enclosures. In addition, bounding values reflected in ESP applications may include margin or be otherwise revised, at the discretion of the applicant. While information in the PPE Worksheet is subject to change, the worksheet is sufficiently mature for purposes of furthering NRC understanding of the PPE concept and as a basis for further discussion.

The completeness of the PPE worksheet also continues to be assessed to identify any new design parameters that should be added to support required ESP evaluations and NRC reviews, or unnecessary parameters that may be removed. In particular, additions or subtractions to the current scope of design parameters may be identified in connection with industry review of RS-002, *ESP Review Standard*, and finalization of the initial ESP applications.

We would be pleased to address NRC staff questions or comments about the enclosed PPE Worksheet or to have further discussions of PPE implementation issues to support development of appropriate PPE guidance for the ESP Review Standard. We would be especially interested in early feedback from the NRC staff regarding the completeness of the PPE worksheet parameters to support required safety and environmental reviews.

If you have any questions about the enclosed PPE Worksheet or the PPE approach in general, please contact me (202-739-8087 or rls@nei.org) or Russ Bell (202-739-8087 or rjb@nei.org).

Sincerely,

R. Simard

Ron Simard

Enclosures

c: Ronaldo V. Jenkins, NRC/NRR
NRC Document Control Desk

Enclosure 2
PLANT PARAMETER DEFINITIONS (For Use with PPE Worksheet)

Parameter	Units	Definition
1.1 Building Characteristics		
1.1.1 Height	Feet	The height from finished grade to the top of the tallest power block structure, excluding cooling towers
1 1 2 Foundation Embedment	Feet	The depth from finished grade to the bottom of the basemat for the most deeply embedded power block structure.
1.2 Precipitation (for Roof Design)		
1.2.1 Maximum Rainfall Rate	Inches per hour/ Inches in 5 minutes	The probable maximum precipitation (PMP) value that can be accommodated by a plant design Expressed as maximum precipitation for 1 hour in 1 square mile with a ratio for five minutes to the 1 hour PMP of 32 as found in National Weather Service Publication HMR No 52.
1.2.2 Snow & Ice Load	Pounds per square foot	The maximum load on structure roofs due to the accumulation of snow and ice that can be accommodated by a plant design
1.3 Safe Shutdown Earthquake (SSE)		
1 3 1 Design Response Spectra		The assumed design response spectra used to establish a plant's seismic design
1 3 2 Peak Ground Acceleration	Fraction of gravity accel-eration	The maximum earthquake ground acceleration for which a plant is designed, this is defined as the acceleration which corresponds to the zero period in the response spectra taken in the free field at plant grade elevation
1 3 3 Time History	N/A	The plot of earthquake ground motion as a function of time used to establish a plant's seismic design.
1 3 4 Capable Tectonic Structures or Sources	N/A	The assumption made in a plant design about the presence of capable faults or earthquake sources in the vicinity of the plant site (e g , No fault displacement potential within the investigative area)
1.4 Site Water Level (Allowable)		
1 4 1 Maximum Flood (or Tsunami)	Feet	Design assumption regarding the difference in elevation between finished plant grade and the water level due to the probable maximum flood and probable maximum precipitation (defined in ANSI/ANS 2 8-1992) used in the plant design
1 4 2 Maximum Ground Water	Feet	Design assumption regarding the difference in elevation between finished plant grade and the maximum site ground water level used in the plant design
1.5 Soil Properties Design Bases		
1 5 1 Liquefaction	N/A	Design assumption regarding the presence of potentially liquefying soils at a site (e g , None at Site-Specific SSE)
1 5 2 Minimum Bearing Capacity (Static)	Pounds per square foot	Design assumption regarding the capacity of the competent load-bearing layer required to support the loads exerted by plant structures used in the plant design.
1 5 3 Minimum Shear Wave Velocity	Feet per second	The assumed limiting propagation velocity of shear waves through the foundation materials used in the plant design
1.6 Tornado (Design Bases)		
1 6 1 Maximum Pressure Drop	Pounds per square inch	The design assumption for the decrease in ambient pressure from normal atmospheric pressure due to the passage of the tornado
1 6 2 Maximum Rotational Speed	Miles per hour	The design assumption for the component of tornado wind speed due to the rotation within the tornado.
1 6 3 Maximum Translational Speed	Miles per hour	The design assumption for the component of tornado wind speed due to the movement of the tornado over the ground.
1 6.4 Maximum Wind Speed	Miles per hour	The design assumption for the sum of maximum rotational and maximum translational wind speed components
1 6.5 Missile Spectra	Units as appro-priate.	The design assumptions regarding missiles that could be ejected either horizontally or vertically from a tornado The spectra identify mass, dimensions and velocity of credible missiles.
1.6 6 Radius of Maximum Rotational Speed	Feet	The design assumption for distance from the center of the tornado at which the maximum rotational wind speed occurs

Parameter	Units	Definition
1 6 7 Rate of Pressure Drop	Pounds per square inch per second	The assumed design rate at which the pressure drops due to the passage of the tornado.
1.7 Wind		
1.7.1 Basic Wind Speed	Miles per hour	The design wind, or "fastest mile of wind" with a 100-year return period (NUREG-0800, Sections 2 3 1 and 3 3.1) for which the facility is designed.
1.7.2 Importance Factors	N/A	Multiplication factors (as defined in ANSI A58 1-1982) applied to basic wind speed to develop the plant design
2. Normal Plant Heat Sink		
2.1 Ambient Air Requirements		
2.1.1 Normal Shutdown Max Ambient Temp (1% Exceedance)	°F	Assumption used for the maximum ambient temperature that will be exceeded no more than 1% of the time, to design plant systems capable of effecting normal shutdown under the assumed temperature condition
2.1.2 Normal Shutdown Max Wet Bulb Temp (1% Exceedance)	°F	Assumption used for the maximum wet bulb temperature that will be exceeded no more than 1% of the time – used in design of plant systems that must be capable of effecting normal shutdown under the assumed temperature condition
2.1.3 Normal Shutdown Min Ambient Temp (1% Exceedance)	°F	Assumption used for the minimum ambient temperature that will be exceeded no more than 1% of the time to design of plant systems that must be capable of effecting normal shutdown under the assumed temperature condition.
2.1.4 Rx Thermal Power Max Ambient Temp (0% Exceedance)	°F	Assumption used for the maximum ambient temperature that will never be exceeded – used in design of plant systems that must be capable of supporting full power operation under the assumed temperature condition
2.1.5 Rx Thermal Power Max Wet Bulb Temp (0% Exceedance)	°F	Assumption used for the maximum wet bulb temperature that will never be exceeded – used in design of plant systems that must be capable of supporting full power operation under the assumed temperature condition
2.1.6 Rx Thermal Power Min Ambient Temp (0% Exceedance)	°F	Assumption used for the minimum ambient temperature that will never be exceeded – used in design of plant systems that must be capable of supporting full power operation under the assumed temperature condition
2.2 Blowdown Pond Acreage (24 hr blowdown)	Acres	The land usage required to provide a pond with a capacity to provide holdup for 24 hours of blowdown water from the plant.
2.3 Condenser		
2.3.1 Max Inlet Temp Condenser/ Heat Exchanger	°F	Design assumption for the maximum acceptable circulating water temperature at the inlet to the condenser or cooling water system heat exchanges
2 3 2 Condenser / Heat Exchanger Duty	BTU per hour	Design value for the waste heat rejected to the circulating water system across the condensers
2.4 Mechanical Draft Cooling Towers		
2.5 Natural Draft Cooling Towers		
2.7 Ponds		
2 4 1, 2 5 1, 2.7.1 Acreage	Acres	The land required for cooling towers or ponds, including support facilities such as equipment sheds, basins, canals, or shoreline buffer areas.
2 4 2, 2 5 2 Approach Temperature	°F	The difference between the cold water temperature and the ambient wet bulb temperature.
2 4 3, 2 5 3, 2.7.2 Blowdown Constituents and Concentrations	Parts per million	The maximum expected concentrations for anticipated constituents in the cooling water systems blowdown to the receiving water body
2.4 4, 2 5 4, 2.7 3 Blowdown Flow Rate	Gallons per minute	The normal (and maximum) flow rate of the blowdown stream from the cooling water systems to the receiving water body for closed system designs
2.4 5, 2.5 5, 2.7.4 Blowdown Temperature	°F	The maximum expected blowdown temperature at the point of discharge to the receiving water body

Parameter	Units	Definition
2.4 6, 2 5 6, 2.7.5 Cycles of Concentration	Number	The ratio of total dissolved solids in the cooling water blowdown streams to the total dissolved solids in the makeup water streams
2 4.7, 2.5 7, 2.7 6 Evaporation Rate	Gallons per minute	The expected (and maximum) rate at which water is lost by evaporation from the cooling water systems
2 4 8, 2.5 8 Height	Feet	The vertical height above finished grade of either natural draft or mechanical draft cooling towers associated with the cooling water systems
2.4 9, 2.5 9, & 2 7 8 Makeup Flow Rate	Gallons per minute	The expected (and maximum) rate of removal of water from a natural source to replace water losses from closed cooling water systems
2 4 10, 2.5 10 Noise	Decibels	The maximum expected sound level produced by operation of cooling towers, measured at 1000 feet from the noise source
2.4 11, 2 5 11, 2.7.10 Cooling Tower/Pond Temperature Range	°F	The temperature difference between the cooling water entering and leaving the towers or ponds
2.4 12, 2.5 12, 2.7.11 Cooling Water Flow Rate	Gallons per minute	The total cooling water flow rate through the condenser/heat exchangers
2.4.13, 2 5.13. 2 7 7 Heat Rejection Rate (blowdown)	Gallons per minute @ °F	The expected heat rejection rate to a receiving water body, expressed as flow rate in gallons per minute at a temperature in degrees Fahrenheit
2.4 14, 2 5 14, 2 7 12 Maximum Consumption of Raw Water	Gallons per minute	The expected maximum short-term consumptive use of water by the cooling water systems (evaporation and drift losses)
2 4 15, 2 5 15, 2 7 13 Monthly Average Consumption of Raw Water	Gallons per minute	The expected normal operating consumption of water by the cooling water systems (evaporation and drift losses)
2 4 16, 2 5 16, 2 7 9 Stored Water Volume	Gallons	The quantity of water stored in cooling water system impoundments, basins, tanks and/or ponds
2.6 Once-Through Cooling		
2.6 1 Cooling Water Discharge Temperature	°F	Expected temperature of the cooling water at the exit of the condenser/heat exchangers
2 6.2 Cooling Water Flow Rate	Gallons per minute	Total cooling water flow rate through the condenser (also the rate of withdrawal from and return to the water source)
2 6.3 Cooling Water Temperature Rise	°F	Temperature rise across the condenser (temperature of water out minus temperature of water in)
2 6.4 Evaporation Rate	Gallons per minute	The expected (and maximum) rate at which water is lost by evaporation from the receiving water body as a result of heating in the condenser.
2 6.5 Heat Rejection Rate	BTU per hour	The expected heat rejection rate to a receiving water body
3. Ultimate Heat Sink		
3.1 Ambient Air Requirements		
3 1.1 Maximum Ambient Temperature (0% Exceedance)	°F	Assumption used for the maximum ambient temperature in designing the UHS system to provide heat rejection for 30 days under the assumed temperature condition
3 1 2 Maximum Wet Bulb Temperature (0% Exceedance)	°F	Assumption used for the maximum wet bulb temperature in designing the UHS system to provide heat rejection for 30 days under the assumed temperature condition
3 1 3 Minimum Ambient Temperature (0% Exceedance)	°F	Assumption used for the minimum ambient temperature in designing the UHS system to provide heat rejection for 30 days under the assumed temperature condition.
3.2 CCW Heat Exchanger		
3 2.1 Maximum Inlet Temp to CCW Heat Exchanger	°F	The maximum temperature of safety-related service water at the inlet of the UHS component cooling water heat exchanger.
3 2 2 CCW Heat Exchanger Duty	BTU per hour	The heat transferred to the safety-related service water system for rejection to the environment in UHS heat removal devices.

Parameter	Units	Definition
3.3 Mechanical Draft Cooling Towers		
3.5 Ponds		
3 3 1, 3.5.1 Acreage	Acres	The land required for UHS cooling towers or ponds, including support facilities such as equipment sheds, basins, canals, or shoreline buffer areas
3 3 2 Approach Temperature	°F	The difference between the cold water temperature and the ambient wet bulb temperature
3 3 3, 3 5 2 Blowdown Constituents and Concentrations	Parts per million	The maximum expected concentrations for anticipated constituents in the UHS blowdown to the receiving water body
3 3 4, 3 5 3 Blowdown Flow Rate	Gallons per minute	The normal (and maximum) flow rate of the blowdown stream from the UHS system to receiving water body for closed system designs
3 3 5, 3 5 4 Blowdown Temperature	°F	The maximum expected UHS blowdown temperature at the point of discharge to the receiving water body
3 3 6, 3 5 5 Cycles of Concentration	Number	The ratio of total dissolved solids in the UHS system blowdown streams to the total dissolved solids in the makeup water streams
3 3 7, 3 5 6 Evaporation Rate	Gallons per minute	The expected (and maximum) rate at which water is lost by evaporation from the UHS system.
3 3 8 Height	Feet	The vertical height above finished grade of mechanical draft cooling towers associated with the UHS system
3 3 9, 3 5 7 Makeup Flow Rate	Gallons per minute	The expected (and maximum) rate of removal of water from a natural source to replace water losses from the UHS system
3 3 10 Noise	Decibels	The maximum expected sound level produced by operation of mechanical draft UHS cooling towers, measured at 1000 feet from the noise source
3 3 11, 3 5 8 Cooling Tower/Pond Temperature Range	°F	The temperature difference between the cooling water entering and leaving the UHS system
3 3 12, 3 5 9 Cooling Water Flow Rate	Gallons per minute	The total cooling water flow rate through the UHS system
3.3.13, 3 5 10 Heat Rejection Rate (blowdown)	Gallons per minute @ °F	The expected heat rejection rate to a receiving water body, expressed as flow rate in gallons per minute at a temperature in degrees Fahrenheit.
3 3.14, 3 5 11 Maximum Consumption of Raw Water	Gallons per minute	The expected maximum short-term consumptive use of water by the UHS system (evaporation and drift losses).
3 3.15, 3 5 12 Monthly Average Consumption of Raw Water	Gallons per minute	The expected normal operating consumption of water by the UHS system (evaporation and drift losses)
3 3 16, 3 5 13 Stored Water Volume	Gallons	The quantity of water stored in UHS impoundments, basins, tanks and/or ponds
3.4 Once-Through Cooling		
3 4 1 Cooling Water Discharge Temperature	°F	Expected temperature of the cooling water at the exit of the UHS system
3 4 2 Cooling Water Flow Rate	Gallons per minute	Total cooling water flow rate through the UHS (also the rate of withdrawal from and return to the water source)
3 4 3 Cooling Water Temperature Rise	°F	Temperature rise across the heat exchangers cooled by the UHS (temperature of water out minus temperature of water in).
3 4 4 Minimum Essential Flow Rate	Gallons per minute	Minimum flow required to maintain required heat removal capacity under design-basis accident conditions

Parameter	Units	Definition
3.4 5 Evaporation Rate	Gallons per minute	The expected (and maximum) rate at which water is lost by evaporation from the UHS a result of heat rejection from the plant
3.4.6 Heat Rejection Rate	BTU per hour	The expected heat rejection rate to the UHS.
4. Containment Heat Removal System (Post-Accident)		
4.1 Ambient Air Requirements		
4 1 1 Maximum Ambient Air Temperature (0% Exceedance)	°F	Assumed maximum ambient temperature used in designing the containment heat removal system
4 1 2 Minimum Ambient Temperature (0% Exceedance)	°F	Assumed minimum ambient temperature used in designing the containment heat removal system
5. Potable Water/Sanitary Waste System		
5.1 Discharge to Site Water Bodies		
5 1 1 Flow Rate	Gallons per minute	The expected (and maximum) effluent flow rate from the potable and sanitary waste water systems to the receiving water body
5.2 Raw Water Requirements		
5 2 1 Maximum Use	Gallons per minute	The maximum short-term rate of withdrawal from the water source for the potable and sanitary waste water systems
5 2 2 Monthly Average Use	Gallons per minute	The average rate of withdrawal from the water source for the potable and sanitary waste water systems
6. Demineralized Water System		
6.1 Discharge to Site Water Bodies		
6 1 1 Flow Rate	Gallons per minute	The expected (and maximum) effluent flow rate from the demineralized system to the receiving water body
6.2 Raw Water Requirements		
6 2 1 Maximum Use	Gallons per minute	The maximum short-term rate of withdrawal from the water source for the demineralized water system.
6 2 2 Monthly Average Use	Gallons per minute	The average rate of withdrawal from the water source for the demineralized water system
7. Fire Protection System		
7.1 Raw Water Requirements		
7.1.1 Maximum Use	Gallons per minute	The maximum short-term rate of withdrawal from the water source for the fire protection water system.
7.1 2 Monthly Average Use	Gallons per minute	The average rate of withdrawal from the water source for the fire protection water system
7.1 3 Stored Water Volume	Gallons	The quantity of water stored in fire protection system impoundments, basins or tanks
8. Miscellaneous Drain		
8.1 Discharge to Site Water Bodies		
8 1.1 Flow Rate	Gallons per minute	The expected (and maximum) effluent flow rate from miscellaneous drains to the receiving water body.
9. Unit Vent/Airborne Effluent Release Point		
9.1 Atmospheric Dispersion (CHI/Q) (Accident)		
9 1 1 0-2 hr @ EAB	Seconds per meter cubed	The atmospheric dispersion co-efficients used in the design safety analysis to estimate dose consequences of accident airborne releases
9 1 2 0-8 hr @ LPZ		
9.1.5 8-24 hr @ LPZ		
9 1 3 1-4 day @ LPZ		
9 1.4 4-30 day @ LPZ		

Parameter	Units	Definition
9.2 Atmospheric Dispersion (CHI/Q) (Annual Average)	Seconds per meter cubed	The atmospheric dispersion co-efficients used in the safety analysis for the dose consequences of normal airborne releases
9.3 Dose Consequences		
9 3 1 Normal	REM	The estimated design radiological dose consequences due to gaseous releases from normal operation of the plant.
9.3 2 Post-Accident	REM	The estimated design radiological dose consequences due to gaseous releases from postulated accidents
9 3.3 Severe Accidents	See Definition column	Pending resolution of ESP-12
9.4 Release Point		
9 4 1 Configuration	Horizontal or Vertical	The orientation of the release point discharge flow
9 4 2 Elevation (Normal Operation)	Feet	The elevation above finished grade of the release point for routine operational releases
9 4 3 Elevation (Post Accident)	Feet	The elevation above finished grade of the release point for accident sequence releases.
9 4 4 Minimum Distance to Site Boundary	Feet	The minimum lateral distance from the release point to the site boundary
9 4 5 Temperature	°F	The temperature of the airborne effluent stream at the release point.
9 4 6 Volumetric Flow Rate	Standard Cubic Feet per Minute	The volumetric flow rate of the airborne effluent stream at the release point.
9.5 Source Term		
9.5 1 Gaseous (Normal)	Curies per year	The annual activity, by isotope, contained in routine plant airborne effluent streams
9.5 2 Gaseous (Post-Accident)	Curies	The activity, by isotope, contained in post-accident airborne effluents.
9 5.3 Tritium	Curies per year	The annual activity of tritium contained in routine plant airborne effluent streams
10. Liquid Radwaste System		
10.1 Dose Consequences		
10 1.1 Normal	REM	The estimated design radiological dose consequences due to liquid effluent releases from normal operation of the plant.
10 1.2 Post-Accident	REM	The estimated design radiological dose consequences due to liquid effluent releases from postulated accidents
10.2 Release Point		
10 2 1 Flow Rate	Gallons per minute	The discharge (including minimum dilution flow, if any) of liquid potentially radioactive effluent streams from plant systems to the receiving water body
10.3 Source Term		
10 3 1 Liquid	Curies per year	The annual activity, by isotope, contained in routine plant liquid effluent streams
10 3 2 Tritium	Curies per year	The annual activity of tritium contained in routine plant liquid effluent streams
11. Solid Radwaste System		
11.1 Acreage		
11.1.1 Low Level Radwaste Storage	Acres	The land usage required to provide onsite storage of low level radioactive wastes
11.2 Solid Radwaste		
11.2.1 Activity	Curies per year	The annual activity, by isotope, contained in solid radioactive wastes generated during routine plant operations
11 2.2 Principal Radionuclides	Curies per year	The principal radionuclides contained in solid radioactive wastes generated during routine plant operations

Parameter	Units	Definition
11 2 3 Volume	Cubic feet per year	The expected volume of solid radioactive wastes generated during routine plant operations.
12. Spent Fuel Storage		
12.1 Spent Fuel Dry Storage		
12 1.1 Acreage	Acres	The land usage required to provide onsite dry storage of spent fuel for the expected plant lifetime, including the fenced off area necessary to provide an acceptable radiation protection and security zone
12.1 2 Minimum Distance to Nearest Residence	Feet	The minimum distance from the spent fuel dry storage facility to the nearest residence to ensure that radiation exposures meet 10CFR72 limitations.
12 1 3 Minimum Distance to Power Block	Feet	The minimum distance from spent fuel dry storage facility to the nearest unit power block necessary to ensure that occupational radiation exposures meet 10CFR20 requirements
12 1 4 Storage Capacity	Years	The years of plant operation for which spent fuel dry storage should be provided without taking credit for capacity in the spent fuel pool
13. Auxiliary Boiler System		
13.1 Exhaust Elevation	Feet	The height above finished plant grade at which the flue gas effluents are released to the environment
13.2 Flue Gas Effluents	Pounds per year	The expected combustion products and anticipated quantities released to the environment due to operation of the auxiliary boilers, diesel engines and gas turbines.
13.3 Fuel Type	N/A	The type of fuel oil required for proper operation of the auxiliary boilers, diesel engines and gas turbines
13 4 Heat Input Rate	BTU per hour	The average heat input rate due to the periodic operation of the auxiliary boilers.
14. Heating, Ventilation and Air Conditioning System		
14.1 Ambient Air Requirements		
14 1.1 Non-safety HVAC max ambient temp (1% Exceedance)	°F	Assumption used for the maximum ambient temperature that will be exceeded no more than 1% of the time, to design the non-safety HVAC systems.
14 1.2 Non-safety HVAC min ambient temp (1% Exceedance)	°F	Assumption used for the minimum ambient temperature that will be exceeded no more than 1% of the time, to design the non-safety HVAC systems
14 1.3 Safety HVAC max ambient temp (0% Exceedance)	°F	Assumption used for the maximum ambient temperature that will never be exceeded, to design the safety-related HVAC systems
14.1.4 Safety HVAC min ambient temp (0% Exceedance)	°F	Assumption used for the minimum ambient temperature that will never be exceeded, to design the safety-related HVAC systems
14 1.5 Vent System max ambient temp (5% Exceedance)	°F	Assumption used for the maximum ambient temperature that will be exceeded no more than 5% of the time to design the non-HVAC ventilation systems
14.1.6 Vent System min ambient temp (5% Exceedance)	°F	Assumption used for the minimum ambient temperature that will be exceeded no more than 5% of the time to design the non-HVAC ventilation systems
15. Onsite/Offsite Electrical Power System		
15.1 Acreage		
15 1.1 Switchyard	Acres	The land usage required for the high voltage switchyard used to connect the plant to the transmission grid
16. Standby Power System		
16.1 Diesel		
16 1.1 Diesel Capacity	Kilowatts	The capacity of diesel engines used for generation of standby electrical power
16 1 2 Diesel Exhaust Elevation	Feet	The elevation above finished grade of the release point for standby diesel exhaust releases
16 1 3 Diesel Flue Gas Effluents	Pounds per year	The expected combustion products and anticipated quantities released to the environment due to operation of the emergency standby diesel generators
16 1 4 Diesel Noise	Decibels	The maximum expected sound level produced by operation of diesel engines turbines, measured at 50 feet from the noise source
16 1 5 Diesel Fuel Type	N/A	The type of fuel oil required for proper operation of the diesel engines
16.2 Gas-Turbine		
16 2.1 Gas-Turbine Capacity	Kilowatts	The capacity of gas-turbines used for generation of standby electrical power

Parameter	Units	Definition
16 2 2 Gas-Turbine Exhaust Elevation	Feet	The elevation above finished grade of the release point for standby gas-turbine exhaust releases
16 2 3 Gas-Turbine Flue Gas Effluents	Pounds per year	The expected combustion products and anticipated quantities released to the environment due to operation of the emergency standby gas-turbine generators
16 2 4 Gas-Turbine Noise	Decibels	The maximum expected sound level produced by operation of gas-turbines, measured at 50 feet from the noise source
16 2 5 Gas-Turbine Fuel Type	N/A	The type of fuel oil required for proper operation of the gas-turbines
17. Plant Characteristics		
17.1 Access Routes		
17.1 1 Heavy Haul Routes	Acres	The land usage required for permanent heavy haul routes to support normal operations and refueling
17 1 2 Spent Fuel Cask Weight	Tons	The weight of the heaviest expected shipment during normal plant operations and refueling.
17.2 Acreage	Acres	The land area required to provide space for plant facilities
17 2 1 Office Facilities		
17.2 2 Parking Lots		
17 2 3 Permanent Support Facilities		
17 2 4 Power Block		
17.2 5 Protected Area		
17.3 Megawatts Thermal	Mega-watts	The thermal power generated by all units
17.4 Plant Design Life	Years	The operational life for which the plant is designed.
17.5 Plant Population		
17.5 1 Operation	Persons	The number of people required to operate and maintain the plant
17 5 2 Refueling / Major Maintenance	Persons	The additional number of temporary staff required to conduct refueling and major maintenance activities.
17.6 Station Capacity Factor	Percent	The percentage of time that a plant is capable of providing power to the grid
18. Construction		
18.1 Access Routes		
18 1 1 Construction Module Dimensions	Feet	The maximum expected length, width, and height of the largest construction modules or components and delivery vehicles to be transported to the site during construction
18 1.2 Heaviest Construction Shipment	Tons	The maximum expected weight of the heaviest construction shipment to the site.
18 2 Acreage		
18 2 1 Laydown Area	Acres	The land area required to provide space for construction support facilities
18 2 2 Temporary Construction Facilities		
18.3 Construction		
18 3 1 Noise	Decibels	The maximum expected sound level due to construction activities, measured at 50 feet from the noise source
18.4 Plant Population		
18 4 1 Construction	Persons	Peak employment during plant construction
18.5 Site Preparation Duration	Months	Length of time required to prepare the site for construction

ENCLOSURE 1

EARLY SITE PERMIT TASK FORCE
NUCLEAR ENERGY INSTITUTE
PLANT PARAMETERS ENVELOPE (PPE) WORKSHEET
REVISION: 0
FEBRUARY 2003

PREFACE

(USER NOTES FOR APPLICANTS)

1.	The Plant Parameters Envelope (PPE) Worksheet has been prepared from data supplied by various reactor and component vendors and represents what is believed to be the best information available at this time. The user of the PPE Worksheet accepts the business risk as to whether the values provided by the various vendors (and evaluated in an ESP) will actually bound those of a design selected for a COL application. This document was developed by the NEI ESP Task Force with assistance and information from various vendors and EPRI.	6.	The PPE Worksheet is not intended to contain all of the information used to complete the analysis required to satisfy 10 CFR Part 51, section 51 and 52
2.	The worksheet has been prepared using certain reactor technologies and assumes a certain number of units of modules for each of the specified technologies. It is expected that potential ESP applicants will modify this worksheet to suit its technology and unit quantity preferences. Further, specific design parameter values will require adjustment to reflect quantity preferences.	7.	The PPE Worksheet should be used in conjunction with the associated table of Plant Parameter Definitions.
3.	The PPE Worksheet is intended to satisfy multiple purposes and uses including the following: • It provides many of the vendor-supplied parameters which need to be evaluated in an ESP application • It allows comparison of siting-related design parameters for several reactor technologies • It can be used to determine values which bound the identified technologies and potentially bound those of future similar technologies • It can be an aid during technology selection for a COL application.	8.	Revision 0 is an interim work product: • A placeholder column, "Usage SAR / ER Section", has been established for potential usage. . This column has yet to be populated with data, but is expected to be used during a comparison of the applicant's application with the worksheet. Worksheet parameters not used (i.e. not relied on to develop the ESP permit basis) in the ESP application will be excluded from the application. • Update of final reactor vendor information requested during the fall of 2002 has not been completed. • Explanatory comments have not been finalized. • Usage of various radionuclide information in the ESP Safety Analysis and the Environmental Report is the subject of several open industry issues (ESP-6, ESP-7, ESP-12). Resolution of these issues may affect the worksheet and the companion plant parameter definitions document. • Additional vendor technologies may be added
4.	The PPE Worksheet contains parameters which are not anticipated to be used in an ESP application. Additionally, most of the PPE parameters which are useful for an ESP application would only be used in the environmental report of an ESP.		
5.	The PPE Worksheet does not contain the site characteristics and associated values which will need to be identified and evaluated for an ESP application. Site characteristics should be defined in terms consistent with the corresponding parameters used in this worksheet. The fundamental difference between a site characteristic and a PPE value used herein is that site characteristics are values reflective of the actual selected site; whereas PPE values are those postulated by vendors for their respective designs. The PPE Worksheet user may wish to add a separate column to the worksheet in order to compare PPE values and site characteristics in the same document.		

PPE Section	ABWR One Unit	ABWR Notes See Table 1 4-9	AP-1000 Two Units	AP-1000 Notes See Table 1 4-10	IRIS Three Units	IRIS Notes See Table 1.4-11	GT-MHR 4 Modules	GT-MHR Notes See Table 1 4-12	PBMR 8 Modules	PBMR Notes See Table 1 4-13	ACR-700 Two Units	ACR-700 Notes See Table 1 4-14	Bounding-Composite Note 1	Usage SAR/ER Section	Comments
1. Structure															
1 1 Building Characteristics															
1 1 1 Height	123 ft- 8 in (Does not include stack)	1	234 ft	1	105 ft above plant grade	1	81 5 ft	1	134 ft-6 in	1	177 ft	1	234 ft above grade		
1 1.2 Foundation Embedment	66 ft-4 in to top of basement	1	39 ft-6 in to bottom of basemat from plant grade	1	49 ft-2 in from plant grade to bottom of basemat	1	140 ft below grade	1	32.8 ft	1	72 ft	1	140 ft below grade		
1.2 Precipitation (for Roof Design)															
1 2.1 Maximum Rainfall Rate	19 4 in/hr (6.2 in/5 min)	1	19 4 in/hr (6 3 in/5 min)	1	19 4 in/hr (6.3 in/5 min)	1	19 4 in/hr (6.2 in/5 min.)	1	19 4 in/hr (6 2 in/5 min)	1	19 4 in/hr (6.2 in/5 min)	2	19.4 in/hr (6.2 in/5 min)		
1.2.2 Snow & Ice Load	50 lb/sq ft	1	75 lbs/sq ft	1	75 lbs/sq ft	1	50 lb/sq ft	1	50 lb/sq ft	1	60 lb/sq ft	1	50 lb/sq ft		
1 3 Safe Shutdown Earthquake (SSE)															
1 3.1 Design Response Spectra	Per RG 1 60	1	Modified RG 1 60 Spectra	1	Reg Guide 1 60	1	Reg Guide 1 60	1	Per RG 1 60 and 1 165	1	Per RG 1 60 and modified CSA	1	Per RG 1.60		
1 3.2 Peak Ground Acceleration	0 30 g at plant grade	1	0 30 g at plant grade	1	0 30 g at basemat (49 in embedment)	1	0 30 g	1	0 30 g	1	0 30 g at plant grade	1	0.30 g at plant grade		
1 3.3 Time History	Envelope SSE Response Spectra	1	Envelope SSE Response Spectra	1	Envelope SSE Response Spectra	1	Envelope SSE Response	1	Envelope SSE Response Spectra	1	Envelope SSE (DBE) Response Spectra	1	Envelope SSE Response Spectra		
1 3 4 Capable Tectonic Structures or Sources			No fault displacement potential within the investigative area	1									No fault displacement potential within the investigative area)		
1 4 Site Water Level (Allowable)															
1 4 1 Maximum Flood (or Tsunami)	1 ft below grade	1	Plant Design Grade Elevation	1	To Grade Level	1	1 ft below plant grade	1	1 ft below plant grade	1	Plant Grade Elevation	1	1 ft below grade		
1 4.2 Maximum Ground Water	2 ft below plant grade	1	2 ft below plant grade	1	3.3 ft below grade level	1	2 ft below plant grade	1	2 ft below plant grade	1	2 ft below plant grade	1	3 3 ft below grade level		
1 5 Soil Properties Design Bases															
1 5 1 Liquefaction	None at site from SSE	1	None	1	None for site specific SSE	1	None	1	None at site from SSE	1	None	1	None at site from SSE		
1 5.2 Minimum Bearing Capacity (Static)	15 ksf	1	8 0 ksf	1	8 ksf	1	15 ksf	1	10 2 ksf	1	10 ksf	1	15 ksf		
1 5.3 Minimum Shear Wave Velocity	1000 ft/sec	1	1000 ft/sec	1	1000 ft/sec	1	1000 ft/sec	1	1000 ft/sec	1	1000 ft/sec	1	1000 ft/sec		
1 6 Tornado (Design Bases)															
1 6.1 Maximum Pressure Drop	2 0 psi	1	2.0 psi	1	2 0 psi	1	2 0 psi	1	2 0 psi	1	2.0 psi	1	2.0 psi		
1 6.2 Maximum Rotational Speed	240 MPH	1	240 MPH	1	240 MPH	1	240 MPH	1	240 MPH	1	240 MPH	1	240 MPH		
1 6.3 Maximum Translational Speed	60 MPH	1	60 MPH	1	60 MPH	1	60 MPH	1	60 MPH	1	60 MPH	1	60 MPH		
1 6 4 Maximum Wind Speed	300 MPH	1	300 MPH	1	300 MPH	1	300 MPH	1	300 MPH	1	300 MPH	1	300 MPH		
1 6.5 Missile Spectra	Spectrum A of SRP 3.5.1 4	1	4000 lb auto at 105 mph horizontal, 74 mph vertical; 275 lb 8-in shell at 105 mph horizontal, 74 mph vertical: 1-in diameter steel ball at 105 mph horizontal and vertical	1	4000 lb auto at 105 mph horizontal, 74 mph vertical	1	Spectrum A of SRP 3 5.1 4	1	Spectrum II from NUREG-0800 SRP 3.5.1.4	1	Spectrum A of SRP 3 5.1 4	1	Spectrum II from NUREG-0800 SRP 3 5 1 4		

PPE Section	ABWR One Unit	ABWR Notes See Table 1 4-9	AP-1000 Two Units	AP-1000 Notes See Table 1 4-10	IRIS Three Units	IRIS Notes See Table 1 4-11	GT-MHR 4 Modules	GT-MHR Notes See Table 1 4-12	PBMR 8 Modules	PBMR Notes See Table 1 4-13	ACR-700 Two Units	ACR-700 Notes See Table 1 4-14	Bounding-Composite Note 1	Usage SAR/ER Section	Comments
1 6 6 Radius of Maximum Rotational Speed	150 ft	1	150 ft	1	150 ft	1	150 ft	1	150 ft	1	150 ft	1	150 ft		
1 6 7 Rate of Pressure Drop	1.2 psi/sec	1	1.2 psi/sec	1	1.2 psi/sec	1	1.2 psi/sec	1	1.2 psi/sec	1	1.2 psi/sec	1	1.2 psi/sec		
1 7 Wind															
1 7 1 Basic Wind Speed	110 MPH	1	145 MPH	1	145 MPH	1	110 MPH	1	110 MPH	1	145 MPH	1	110 MPH		
1 7.2 Importance Factors	1.11 SR	1	1 15 SR	1	1 15 SR	1	1.11 SR	1	Per ACI 349	1	1 15 SR	1	1 11 SR		
2. Normal Plant Heat Sink			Note 2												
2.1 Ambient Air Requirements															
2.1 1 Norm Shutdown Max Ambient Temp (1% Exceed)	100 F DB/77 F WB coincident	1	100 F DB/77 F WB coincident	1	100 F DB/77 F WB coincident	1	100 F DB 77 F WB coincident	11	100 F DB/77 F WB coincident	1	100 F DB/77 F WB coincident	1	100 F DB/77 F WB coincident		
2.1.2 Norm Shutdown Max Wet Bulb Temp (1% Exceed)	80 F WB non-coincident	1	80 F WB non-coincident	1	80 F WB non-coincident	1	80 F WB non-coincident	1	80 F WB non-coincident	1	80 F WB non-coincident	1	80 F WB non-coincident		
2.1 3 Normal Shutdown Min Ambient Temp (1% Exceed)	-10 F	1	- 10 F	1	-10 F	1	-10 F	1	- 10 F	1	- 10 F	1	-10 F		
2.1 4 RX Thermal Power Max Ambient Temp (0% Exceed)	115 F DB, 80 F coincident WB	1	115 F DB/80 F WB coincident	1	115 F DB/80 F WB coincident	1	115 F DB 80 F WB coincident	1	115 F DB/80 F WB coincident	1	115 F DB/80 F WB coincident	1	115 F DB/80 F WB coincident		
2.1 5 Rx Thermal Pwr Max Wet Bulb Temp (0% Exceed)	81 F WB non coincident	1	81 F WB non-coincident	1	81 F WB non-coincident	1	81 F WB non-coincident	1	81 F WB non-coincident	1	81 F WB non-coincident	1	81 F WB non-coincident		
2.1 6 Rx Thermal Power Min Ambient Temp (0% Exceed)	-40 F	1	- 40 F	1	-40 F	1	-40 F	1	- 40 F	1	-40 F	1	-40 F		
2.2 Blowdown Pond Acreage (24 hr blowdown)	4 acres	1	24 hour blowdown	1	4 acres	1	NA	1	24 hour blowdown	1	4 acres	1	4 acres		
2.3 Condenser															
2.3 1 Maximum Inlet Temp Condenser/Heat Exchanger	100 F	1	91 F	1	91 F based on 1.48 in Hg abs	1	100 F	1	100 F (with 10% derate)	1	95 F	1	91 F		
2.3.2 Condenser / Heat Exchanger Duty	10 7 E9 BTU/hr	1	4500 MWt (15.08 E9 BTU/hr)	1	6 68 E9 BTU/hr total	1	4 31 x E9 BTU/hr See Note 4	1	6 48 E9 BTU/hr See Note 3		9 7 E9 BTU/lb for 2 units	1	15 08 E9 BTU/hr		
2.4 Mechanical Draft Cooling Towers			Note 2	2			4 @ 316 MWt = 4 x 1 078 x E9 BTU/hr Note 5	1							See Note 6
2.4 1 Acreage	50 acres	1	50 acres	1	9 acres total	1	13 5 acres (4 x 55' x 506')	1	18 acres	1	50 acres	1	50 acres		
2.4 2 Approach Temperature	15 F	1	10 F	1	10 F	1	13 F	1	10 F	1	15 F	1	10 F		
2.4 3 Blowdown Constituents and Concentrations	See Table 1 4-2	1	See Table 1 4-2	1	Note 7	1	See Table 1 4-2	1	See Table 1 4-2	1	See Table 1 4-2	1	See Table 1.4-2		
2.4 4 Blowdown Flow Rate	5850 gpm (19,500 gpm max)	1	12,000 gpm (49,000 gpm max)	1, 2	5,250 gpm expected (12,750 gpm total max)	1	4 x 600 gpm = 2400 gpm	1	3915 expected (4700 max) gpm	1	6400 gpm expected (18,200 gpm max)	1	12,000 gpm (49,000 gpm max)		
2.4 5 Blowdown Temperature	100 F	1	100 F	1, 2	91°F	1	100 F	1	100 F	1	100 F	1	100 F		

PPE Section	ABWR One Unit	ABWR Notes See Table 1 4-9	AP-1000 Two Units	AP-1000 Notes See Table 1 4-10	IRIS Three Units	IRIS Notes See Table 1 4-11	GT-MHR 4 Modules	GT-MHR Notes See Table 1 4-12	PBMR 8 Modules	PBMR Notes See Table 1 4-13	ACR-700 Two Units	ACR-700 Notes See Table 1 4-14	Bounding-Composite Note 1	Usage SAR/ER Section	Comments
2.4 6 Cycles of Concentration	4		4	1	4	1	4	1	4	1	4	1	4		
2.4 7 Evaporation Rate	17,550 [F] expected (19,500 max [F]) gpm	1	30,000 gpm		11,100 gpm expected (15,054 gpm total maximum)	1	4 x 2000 gpm = 8000 gpm	1	11,745 expected (14,093 max) gpm	1	16,800 gpm expected (18,200 gpm max)	1	30,000 gpm		
2.4 8 Height	60 ft	1	60 ft	1	60 ft	1	~ 55 ft	1	60 ft	1	60 ft	1	60 ft		
2.4 9 Makeup Flow Rate	23,400 [F] expected (39,000 [F] max) gpm	1	42,000 gpm	1, 2	16,350 gpm total expected (27,804 gpm total maximum)	1	4 x 2600 gpm = 10,400 gpm	1	15,659 expected (26,621 max) gpm	1	23,200 gpm expected (25,100 max)	1	42,000 gpm		
2.4 10 Noise	55 dba @ 1000 ft	1	55 dba @ 1000 ft	1	55 dba @ 1000 ft	1	55 dba @ 1000 ft	1	55 dba @ 1000 ft	1	55 dba @ 1000 ft	1	55 dba @ 1000 ft		
2.4 11 Cooling Tower Temperature Range	Condenser Temp Rise 25 F	1	25.2 F	1, 2	23°F	1	40 F	1	50 F	1	25 F	1	23°F		
2.4 12 Cooling Water Flow Rate	865,000 gpm	1	1,200,000 gpm	1, 2	699,000 gpm total	1	4 x 6050 lb/sec (174,240 gpm)	1	260,991 gpm	1	800,000 gpm	1	1,200,000 gpm		
2.4 13 Heat Rejection Rate (Blowdown)	5850 gpm (19,500 Max) @ 100 F	1	12,000 gpm @ 100 F 49,000 gpm max	1	5,250 gpm expected (12,750 gpm total max) at 91°F		4 x 600 gpm = 2400 gpm @ 100F	1	3915 expected (4700 max) gpm @ 100F	1	6400 gpm at 100 F	1	12,000 gpm @ 100 F 49,000 gpm max.		
2.4 14 Maximum Consumption of Raw Water	19,500 gpm	1	60,000 gpm	1, 2	15,054 GPM	1	4 x 2200 gpm	1	26,621 gpm	1	18,200 gpm	1	60,000 gpm		
2.4 15 Monthly Average Consumption of Raw Water	17,550 gpm	1	42,000 gpm	1, 2	11,100 gpm	1	4 x 2000 gpm	1	13,050 gpm	1	16,800 gpm	1	42,000 gpm		
2.4 16 Stored Water Volume	12,975,000 gal	1	14,000,000 gal	1	10,500,000 gal	1	Not specified		5,220,000 gal	1	11,800,000 gal	1	14,000,000 gal		
2.5 Natural Draft Cooling Towers							NA								See Note 6
2.5 1 Acreage	6 acres	1	4 6 acres without basins	1	34.5 acres total (with 3 X 2.75 acres per reactor basin, 8.25 acres total for basins)	1	NA		4 acres	1	5 5 acres	1	34 5 acres total (with 3 X 2.75 acres per reactor basin, 8.25 acres total for basins)		
2.5.2 Approach Temperature	15 F	1	10 F	1	10 F	1	NA		10 F	1	15 F	1	10 F		
2.5 3 Blowdown Constituents and Concentrations	See Table 1 4-2	1	See Table 1 4-2	1	Note 7	1	NA		See Table 1 4-2	1	See Table 1 4-2	1	See Table 1 4-2		
2.5.4 Blowdown Flow Rate	5850 expected (19,500 [F] max) gpm	1	12,000 gpm (49,000 gpm max	1, 2	5,250 gpm total expected (12,750 gpm maximum)	1	NA		4176 gpm expected (5011 gpm max)	1	6400 gpm expected (18,200 gpm max)	1	12,000 gpm (49,000 gpm max)		
2.5 5 Blowdown Temperature	100 F	1	100 F	1, 2	91°F	1	NA		100 F	1	100 F	1	100 F		
2 5 6 Cycles of Concentration	4	1	4	1	4	1	NA		4	1	4	1	4		
2 5 7 Evaporation Rate	17,550 gpm expected (19,500 max) gpm	1	Assume makeup-blowdown = 30,000 gpm		11,100 gpm total expected (15,054 gpm maximum)	1	NA		15,659 gpm (18,791 gpm max)	1	16,800 gpm expected (18,200 gpm max)	1	30,000 gpm		
2.5 8 Height	550 ft	1	500 ft	1	550 ft	1	NA		490 ft	1	550 ft	1	550 ft		
2.5 9 Makeup Flow Rate	23,400 expected (39,000 [F] max) gpm	1	42,000 gpm	1, 2	16,350 gpm total expected (27,804 gpm maximum)	1	NA		19,835 expected (33,720 max) gpm	1	23,200 gpm expected (25,100 max)	1	42,000 gpm		
2.5 10 Noise	55 dba @ 1000'	1	55 dba @ 1000'	1	55 dba @ 1000'	1	NA		55 dba @ 1000'	1	55 dba @ 1000'	1	55 dba @ 1000'		
2.5 11 Cooling Tower Temperature Range	Condenser Temp Rise 25F	1	25.2 F	1, 2	23°F	1	NA		50 F	1	25 F	1	23°F		
2.5 12 Cooling Water Flow rate	865,000 gpm	1	1,200,000 gpm	1	699,000 gpm	1	NA		260,991 gpm	1	800,000 gpm	1	1,200,000 gpm		
2.5 13 Heat Rejection Rate (Blowdown)	5850 gpm (19,500 Max) @ 100F	1	12,000 gpm norm, 49,000 gpm max @ 100 F	1	5,250 gpm total expected (12,750 gpm maximum) at 91°F		NA		4176 gpm expected (5011 gpm max) @ 100F	1	6400 gpm at 100 F	1	12,000 gpm norm, 49,000 gpm max@ 100 F		
2 5 14 Maximum Consumption of Raw Water	19,500 gpm	1	60,000 gpm	1, 2	15,054 gpm	1	NA		33,720 gpm	1	18,200 gpm	1	60,000 gpm		

PPE Section	ABWR One Unit	ABWR Notes See Table 1 4-9	AP-1000 Two Units	AP-1000 Notes See Table 1 4-10	IRIS Three Units	IRIS Notes See Table 1 4-11	GT-MHR 4 Modules	GT-MHR Notes See Table 1 4-12	PBMR 8 Modules	PBMR Notes See Table 1 4-13	ACR-700 Two Units	ACR-700 Notes See Table 1 4-14	Bounding-Composite Note 1	Usage SAR/ER Section	Comments
2.5 15 Monthly Average Consumption of Raw Water	17,550 gpm	1	42,000 gpm	1, 2	11,100 gpm	1	NA		16,964 gpm	1	16,800 gpm	1	42,000 gpm		
2.5.16 Stored Water Volume	12,975,000 gal	1	11,000,000 gal	1	10,500,000 gal	1	NA		5,220,000 gal	1	11,800,000 gal	1	12,975,000 gal		
2.6 Once-Through Cooling							Estimate								See Note 6
2.6 1 Cooling Water Discharge Temperature	118 F	1	88 F		110°F	1	127 F max	1	118 F	1	113 F	1	127 F		
2 6.2 Cooling Water Flow Rate	1,200,000 gpm	1	1,700,000 gpm	1	699,000 gpm	1	4 x 12,100 lb/sec = 348,480 gpm	1	724,974 gpm	1	1,140,000 gpm	1	1,700,000 gpm		
2.6 3 Cooling Water Temperature Rise	18 F	1	18 F	1	20°F	1	27 F	1	18 F	1	18 F	1	27 F		
2 6.4 Evaporation Rate	9,300 [F]expected (10,700 [F] max) gpm	1	29,000 gpm		5,500 gpm total expected (7,527 gpm maximum)	2	4 x 1250 gpm = 5000 gpm	1	6162 gpm	1	9300 gpm expected (10,700 gpm max)	1	29,000 gpm		
2 6 5 Heat Rejection Rate	10 7 E9 BTU/hr	1	(15.52 E9 BTU/hr) based on 4500 mw	1	8 68 E9 BTU/hr	1	4 x 312 MW = 4 x 1 064 E9 BTU/hr	1	6 5 E9 BTU/hr for active cooling sys	1	9 7 E9 BTU/hr normal	1	(15 52 E9 BTU/hr) based on 4500 mw		
2.7 Ponds															See Note 6
2.7 1 Acreage	3000 acres w/o sprays	1	2600 acres w/o spray	2	1,200 acres	1	NA		1174 acres	1	NA		3000 acres w/o sprays		
2.7 2 Blowdown Constituents and Concentrations	See Table 1.4-2	1	See Table 1.4-2	2	Note 7	1	NA		See Table 1.4-2	1	NA		See Table 1 4-2		
2.7 3 Blowdown Flow Rate	5,850 expected (19,500 max) gpm	1	12,000 gpm (Max 49,000 gpm)	2		1	NA		3915 gpm expected (4698 max)	1	NA		12,000 gpm (Max 49,000 gpm)		
2.7 4 Blowdown Temperature	100 F	1	100 F	2		1	NA		100 F	1	NA		100 F		
2.7 5 Cycles of Concentration	4	1	4	2	4	1	NA		4	1	NA		4		
2.7 6 Evaporation Rate	17,550 [F] expected (19,500 [F] max) gpm	1	Estimate as makeup-blowdown ~30,000 gpm	2		1	NA		11,745 expected (14,093 max) gpm	1	NA		30,000 gpm		
2.7 7 Heat Rejection Rate (Blowdown)	5,850 expected (19,500 max) gpm @ 100F	1	12,000 gpm norm, 49,000 gpm max @ 100 F	2			NA		3915 gpm expected (4698 max) @ 100F	1	NA		12,000 gpm norm, 49,000 gpm max @ 100 F		
2.7 8 Makeup Flow Rate	23,400 [F] expected (39,000 [F] max) gpm	1	42,000 gpm	2		1	NA		15,659 expected (26,621 max) gpm	1	NA		42,000 gpm		
2.7 9 Stored Water Volume	14.7 E9 gal	1	12.8 E9 gal	2	5 7 E9 gal	1	NA		5.26 E9 gal	1	NA		14 7 E9 gal		
2.710 Cooling pond Temperature Range	Condenser, Temp Rise 25 F	1	25.2 F	1, 2		1	NA		50 F	1	NA		Condenser Temp Rise 25 F		
2.7 11 Cooling Water Flow Rate	865,000 gpm	1	~1,200,000 gpm	2		1	NA		260,991 gpm	1	NA		~1,200,000 gpm		
2.7 12 Maximum Consumption of Raw Water	19,500 gpm	1	61,000 gpm	2		1	NA		26,621 gpm , 18,635 gpm without spray	1	NA		61,000 gpm		
2.7 13 Monthly Average Consumption of Raw Water	17,550 gpm	1	42,000 gpm	2		1	NA		16,964 gpm , 11,875 gpm without sprays	1	NA		42,000 gpm		
3. Ultimate Heat Sink			None	1			Note 8		None						See Note 9
3.1 Ambient Air Requirements			NA						NA						
3.1 1 Maximum Ambient Temp (0% Exceedance)	115 F DB, 80 F WB coincident	1	NA		115 F DB, 80 F WB coincident	1	115 F DB 80 F WB (Note 8)	1	NA		115 F DB, 80 F WB Coincident	1	115 F DB, 80 F WB Coincident		
3.1.2 Maximum Wet Bulb Temp (0% Exceedance)	81 F WB (non-coincident)	1	NA		81 F WB (non-coincident)	1	81 F WB (Note 8)	1	NA		81 F WB (non-coincident)	1	81 F WB (non-coincident)		
3.1 3 Minimum Ambient Temp (0% Exceedance)	-40 F	1	NA		-40 F	1	-40 F (Note 8)	1	NA		-40 F	1	-40 F		
3.2 CCW Heat Exchanger															

PPE Section	ABWR One Unit	ABWR Notes See Table 1 4-9	AP-1000 Two Units	AP-1000 Notes See Table 1 4-10	IRIS Three Units	IRIS Notes See Table 1 4-11	GT-MHR 4 Modules	GT-MHR Notes See Table 1 4-12	PBMR 8 Modules	PBMR Notes See Table 1 4-13	ACR-700 Two Units	ACR-700 Notes See Table 1 4-14	Bounding-Composite Note 1	Usage SAR/ER Section	Comments
3.2.1 Maximum Inlet Temp to CCW Heat Exchanger	95 F	1	NA		95°F to 105°F depending on site conditions	1	SCS air blast	1	NA		95 F	1	95 F		
3.2.2 CCW (RCW) Heat Exchanger Duty	114 4 [411.4 SD] E6 BTU/hr	1	NA		225 E6 BTU/hr	1	Not specified		NA		112 6 E6 BTU/hr normal (365 4 E6 BTU/hr max)	1	225 E6 BTU/hr 411 4E6 BTU/hr (SD)		
3.3 Mechanical Draft Cooling Towers			NA				Note 8		NA						
3.3.1 Acreage	0.5 acre	1	NA		N/A	1	NA		NA		0.5 acre	1	0 5 acre		See Note 9
3.3.2 Approach Temperature	15 F	1	NA		10°F	1	NA		NA		15F	1	10 F		
3.3 3 Blowdown Constituents and Concentrations	See Table 1.4-2	1	NA		Note 7	1	NA		NA		See Table 1 4-2	1	See Table 1 4-2		See Note 9
3.3 4 Blowdown Flow Rate	100 expected (700 max) gpm	1	NA		Limited blowdown required during shutdown operations		NA		NA		100 expected (700 max) gpm	1	100 expected (700 max) gpm		See Note 9
3 3 5 Blowdown Temperature	95 F	1	NA		91	1	NA		NA		95 F	1	95 F		See Note 9
3.3 6 Cycles of Concentration	4	1	NA		4	1	NA		NA		4	1	4		See Note 9
3.3 7 Evaporation Rate	250 expected (700 max) gpm	1	NA		450 gpm (estimated)	1	NA		NA		250 expected (700 max) gpm	1	450 gpm (700 max)		See Note 9
3.3 8 Height	60 ft	1	NA		60 ft	1	< 43 ft	1	NA		60 ft	1	60 ft		See Note 9
3.3 9 Makeup Flow Rate	350 expected (1,400 max) gpm	1	NA		450 gpm plus blowdown	1	NA		NA		350 expected (1400 max) gpm	1	450 gpm (1400 max)		See Note 9
3.3 10 Noise	55 dba @ 1000'	1	NA		55 dba @ 1000'	1	55 dba @ 1000'	1	NA		55 dba @ 1000'	1	55 dba @ 1000'		See Note 9
3.3.11 Cooling Tower Temperature Range	16 F	1	NA		23°F	1	NA		NA		16 F	1	16 F		
3.3 12 Cooling Water Flow rate	26,125 gpm normal, 52,250 shutdown, Note 11	2	NA		21,000 gpm	1	NA		NA		25,800 gpm expected (46,300 gpm max)	1	26,125 gpm normal 52,250 gpm shutdown Note 11		
3.3.13 Heat Rejection Rate (blowdown	100 expected (700 max) gpm @ 95F	1	NA				NA		NA		100 gpm @ 95F	1	100 expected (700 max) gpm @ 95F		
3 3.14 Maximum Consumption of Raw Water	700 gpm	1	NA		Not specified	1	NA		NA		700 gpm	1	700 gpm		
3.3 15 Monthly Average Consumption of Raw Water	250 gpm	1	NA		450 gpm	1	NA		NA		250 gpm	1	450 gpm		
3 3.16 Stored Water Volume	30.6 E6 gal	1	NA		10,500,000 gal	1	NA		NA		28 0 E6 gal	1	30 6 E6 gal		
3.4 Once-Through Cooling			NA				Note 8		NA						
3.4 1 Cooling Water Discharge Temperature	120 F	1	NA		120 F	1	NA		NA		111 F	1	120 F		
3 4 2 Cooling Water Flow Rate	26,125 gpm normal, 52,250 gpm shutdown, Note 11	2	NA		21,000 gpm	1	NA		NA		25,800 gpm expected (46,300 gpm max)	1	26,125 gpm normal, (52,250 gpm shutdown)		
3.4 3 Cooling Water Temperature Rise	25 F	1	NA		20 F	1	NA		NA		16 F	1	25 F		See Note 9
3 4 4 Minimum Essential Flow Rate	34,850 gpm (2 of 3 divisions in operation with 2 pumps running in each division)	2	NA		12,000 gpm	2	NA		NA		31,000 gpm	1	34,850 gpm (2 of 3 divisions in operation with 2 pumps running in each division)		See Note 9
3.4 5 Evaporation Rate	150 expected (400 max) gpm	1	NA		225 gpm (estimated)	2	NA		NA		150 expected (400 max) gpm	1	225 estimated (400 max) gpm		See Note 9
3 4 6 Heat Rejection Rate	114 4 [411.4 SD] E6 btu/hr	1	NA		225 E6 btu/hr	1	NA		NA		112.2 E6 normal (365 E6 max) btu/hr	1	225 E6 btu/hr 411 4E6 btu/hr		See Note 9

PPE Section	ABWR One Unit	ABWR Notes See Table 1 4-9	AP-1000 Two Units	AP-1000 Notes See Table 1 4-10	IRIS Three Units	IRIS Notes See Table 1 4-11	GT-MHR 4 Modules	GT-MHR Notes See Table 1 4-12	PBMR 8 Modules	PBMR Notes See Table 1 4-13	ACR-700 Two Units	ACR-700 Notes See Table 1 4-14	Bounding-Composite Note 1	Usage SAR/ER Section	Comments
3.5 Ponds			NA				Note 8		NA						
3.5 1 Acreage	60 acres (no spray)	1	NA		45 acres	1	NA		NA		NA		60 acres (no spray)		
3.5.2 Blowdown Constituents and Concentrations	See Table 1.4-2	1	NA		Note 7	1	NA		NA		NA		See Table 1 4-2		See Note 9
3 5.3 Blowdown Flow Rate	100 expected (700 max) gpm	1	NA		Limited blowdown required during shutdown operations	1	NA		NA		NA		100 expected (700 max) gpm		See Note 9
3.5 4 Blowdown Temperature	95 F	1	NA		95 F	1	NA		NA		NA		95 F		See Note 9
3.5 5 Cycles of Concentration	4	1	NA		4	1	NA		NA		NA		4		See Note 9
3.5 6 Evaporation Rate	250 expected (700 max) gpm	1	NA		450 gpm	1	NA		NA		NA		450 (700 max) gpm		See Note 9
3.5 7 Makeup Flow Rate	350 expected (1,400 max) gpm	1	NA		450 gpm	1	NA		NA		NA		450 (1400 max) gpm		
3.5 8 Cooling Pond Temperature Range	25 F	1	NA		25 F	1	NA		NA		NA		25 F		
3.5 9 Cooling Water Flow Rate	26,125 gpm normal, 52,250 gpm shutdown Note 11	1	NA		21,000 gpm	1	NA		NA		NA		26,125 gpm normal, 52,250 gpm shutdown. Note 11		
3 5.10 Heat Rejection Rate (Blowdown)	100 gpm normal (200 gpm max) @ 95 F	1	NA				NA		NA		NA		100 gpm normal (200 gpm max) @ 95 F		
3.5 11 Maximum Consumption of Raw Water	700 gpm (500 w/o spray)	1	NA		Not specified	1	NA		NA		NA		700 gpm (500 w/o spray)		
3.5 12 Monthly Average Consumption of Raw Water	250 gpm (150 w/o spray)	1	NA		450 gpm	1	NA		NA		NA		450 gpm		
3.5 13 Stored Water Volume	196,000,000 gallons	1	NA		120,000,000 gal	1	NA		NA		NA		196,000,000 gallons		
4. Containment Heat Removal System (Post-Accident)															
4.1 Ambient Air Requirements															
4 1 1 Maximum Ambient Air Temperature (0% Exceedance)	NA	1	115 F DB/80 F WB	1	115 F DB/80 F WB	1	NA		NA	1	NA		115 F DB/80 F WB		
4 1 2 Minimum Ambient Temperature (0% Exceedance)	NA	1	-40 F	1	-40 F	1	NA		NA	1	NA		-40 F		
5. Potable Water/Sanitary Waste System															
5.1 Discharge to Site Water Bodies															
5.1.1 Flow Rate	50 expected (198 max) gpm	3, 4	30 gpm normal, 69 gpm max	2	90 gpm expected (105 max gpm)	1	8 gpm	1	11 expected gpm	1	27 expected, 50 gpm max.	1	60 gpm expected (198 max gpm)		
5.2 Raw Water Requirements															
5.2.1 Maximum Use	45 cu m/hr from ABWR SSAR Section 9.2.8.2 = 198 gpm	3	69 gpm	2	105 gpm	1	10 gpm	1	23775 gpd (17 gpm)	1	120 gpm max	1	198 gpm		
5.2 2 Monthly Average Use	use 25% of max = 50 gpm (/22/02 GE Email)	4	30 gpm	2	60 gpm	1	8 gpm	1	710,000 gal/month (16 4 gpm)	1	90 gpm	1	90 gpm		

PPE Section	ABWR One Unit	ABWR Notes See Table 1 4-9	AP-1000 Two Units	AP-1000 Notes See Table 1 4-10	IRIS Three Units	IRIS Notes See Table 1 4-11	GT-MHR 4 Modules	GT-MHR Notes See Table 1 4-12	PBMR 8 Modules	PBMR Notes See Table 1 4-13	ACR-700 Two Units	ACR-700 Notes See Table 1 4-14	Bounding-Composite Note 1	Usage SAR/ER Section	Comments
6. Demineralized Water System															
6.1 Discharge to Site Water Bodies															
6 1 1 Flow Rate	50 expected (135 max) gpm	1, 5	50 gpm expected, (140 max)	1	75 gpm	2	10 gpm	1	Included in 5.1 1	1	110 gpm expected (145 max)	1	110 gpm expected (145 max)		
6.2 Raw Water Requirements															
6.2.1 Maximum Use	400 gpm	1, 5	400 gpm	1	600 gpm	2	50 gpm	1	8 gpm	1	720 gpm max	1	720 gpm		
6.2.2 Monthly Average Use	150 gpm	1, 5	150 gpm	1	225 gpm	2	20 gpm	1	3 gpm	1	550 gpm	1	550 gpm		
7. Fire Protection System															
7.1 Raw Water Requirements															
7.1 1 Maximum Use	625 gpm	1	625 gpm	1	625 gpm	1	370 gpm	1	635 gpm	1	625 gpm	1	635 gpm		
7 1 2 Monthly Average Use	0 gpm	1	450,000 gal/mo (10 gpm)	1	5 gpm	1	0 gpm	1	0 gpm	1	0 gpm	1	450,000 gal/mo (10 gpm)		
7 1 3 Stored Water Volume	600,000 gal	1	1,550,000 gal	1	775,000 gal	1			600,000 gal	1	600,000 gal	1	1,550,000 gal		
8. Miscellaneous Drain															
8.1 Discharge to Site Water Bodies															
8 1 1 Flow Rate	25 expected (50 max) gpm	1	50 (100 max) gpm	1	75 gpm total (150 gpm maximum)	1	NA		Included in 5.1 1	1	25 expected 50 gpm max.	1	75 gpm total (150 gpm maximum)		
9. Unit Vent/Airborne Effluent Release Point															
9.1 Atmospheric Dispersion (χ/Q) (Accident)	EAB = 0 5 mi LPZ = 2 mi		EAB = 0 5 mi LPZ = 2 mi.		EAB = 0 5 mi. LPZ = 2 mi.		EAB = 0.25 mi. LPZ = 0 25 mi.		EAB = 0 25 mi. LPZ = 0 25 mi		EAB = 0 3 mi. LPZ = 2 mi.	1			
9 1 1 0-2 hr @ EAB	1 37E-03 sec/m³ 2.18E-03 sec/m³ (Max. to meet 10CFR100 limits)	1	6.10E-04 sec/m³	1, 4	1 0 E-03 sec/m³	1	1.20E-03 sec/m³	1	1 20E-03 sec/m³	1	1 0E-03 sec/m³	1	6.10E-04 sec/m³		
9 1.2 0-8 hr @ LPZ	1 56E-04 sec/m³	1	1.35E-04 sec/m³	1, 4	1.35E-04 sec/m³	1	1.20E-03 sec/m³	1	1 20E-03 sec/m³	1	1 30E -04 sec/m3	1	1 35E-04 sec/m³		
9 1 3 8-24 hr @ LPZ	1 17E-04 sec/m³	1	1.00E-04 sec/m³	1, 4	1.0E-04 sec/m³	1	2.70E-04 sec/m³	1	2 70E-04 sec/m³	1	1.0E-04 sec/m³	1	1 00E-04 sec/m³		
9 1 4 1-4 day @ LPZ	4.18E-05 sec/m³	1	5 40E-05 sec/m³	1, 4	5 40E-05 sec/m³	1	2.70E-04 sec/m³	1	2.70E-04 sec/m³	1	5 0E-05 sec/m³	1	4 18E-05 sec/m³		
9 1 5 4-30 day @ LPZ	9.24E-06 sec/m³	1	2.20E-05 sec/m³	1,4	2.20E-05 sec/m³	1	2.70E-04 sec/m³	1	2.70E-04 sec/m³	1	2.0E-05 sec/m³	1	9.24E-06 sec/m³		
9.2 Atmospheric Dispersion (χ/Q)(Annual Average)	1.17E-06 sec/m³ @ EAB	1	2 00E-05 sec/m³ @ EAB	1	2 0E-05 sec/m³	2	2.70E-05 sec/m³ @ EAB	1	2.70E-05 sec/m³ @ EAB	1	2.00E-05 sec/m³ @ EAB	1	1.17E-06 sec/m³ @ EAB		
9 3 Dose Consequences															
9 3 1 Normal	10CFR20 10CFR50 APP I	1	10CFR20 10CFR50 APP I	1	10CFR20 10CFR50 APP I	1	10CFR20 10CFR50 APP I	1	10CFR20 10CFR50 APP I	1	10CFR20 10CFR50 APP I	1	10CFR20 10CFR50 APP I		
9.3.2 Post-Accident	10CFR20 10CFR50 APP I 10CFR100	1	10CFR20 10CFR50 APP I 10CFR100	1	10CFR20 10CFR50 APP I 10CFR100	1	<<1 Rem WB in 30 days @ 0.25 mi. <<5 Rem Thyroid in 30 days @ 0 25 mi	1	10CFR20 10CFR50 APP I 10CFR100	1	10CFR20 10CFR50 APP I 10CFR100	1	10CFR20 10CFR50 APP I 10CFR100		

PPE Section	ABWR One Unit	ABWR Notes See Table 1 4-9	AP-1000 Two Units	AP-1000 Notes See Table 1 4-10	IRIS Three Units	IRIS Notes See Table 1 4-11	GT-MHR 4 Modules	GT-MHR Notes See Table 1 4-12	PBMR 8 Modules	PBMR Notes See Table 1 4-13	ACR-700 Two Units	ACR-700 Notes See Table 1 4-14	Bounding-Composite Note 1	Usage SAR/ER Section	Comments
9 3.3 Severe Accidents	25 rem WB in 24 hr@ 0 5 mi < 1E-06 / rx-yr	1	25 rem WB in 24 hr @ 0 5 mi < 1E-06 / rx-yr	1	25 rem WB in 24 hr @ 0 5 mi < 1E-06 / rx-yr	1	< 1 Rem WB in 30 days @ 0 25 mi < 5 Rem Thyroid in 30 days @ 0.25 mi	1	5 rem WB TEDE in 30 days @ 0 25 mi. (No severe dose consequences identified)	1	25 rem WB in 30 days @ 0 3mi <1E-06/rx-yr	1	25 rem WB in 24 hr @ 0.5 mi <1E-06 / rx-yr		
9 4 Release Point															
9 4 1 Configuration (Horizontal vs Vertical)	Vertical	1	Vertical	1	Vertical	1	Horizontal	1	Vertical	1	Vertical	1	Horizontal		
9 4.2 Elevation (Normal)	249 ft-4 in	1	160 ft	1	135 ft	1	95.5 ft	1	134 ft	1	213 ft	1	95 5 ft		
9 4 3 Elevation (Post Accident)	Ground level	1	Ground Level	1	Ground Level	1	Ground Level	1	134'	1	Ground Level	1	Ground Level		
9 4 4 Minimum Distance to Site Boundary	0 5 mi exclusion area	1	0 5 mile exclusion area	1	0 5 mile exclusion area	1	0.25 mi exclusion area	1	0.25 mi exclusion area	1	0 3 mi	1	0 25 mi exclusion area		
9 4 5 Temperature	105 F max	1	50-120 F Est.	1	35 F – 100 F	1	Peaks at~450F in 10 seconds, falls to 130F 3 minutes after transient		104 F	1	104 F	1	35 F		
9 4 6 Volumetric Flow Rate	323,750 scfm	1	343,000 scfm (norm)	1	340,000 scfm	1	Starts at 670 lb/sec and falls to zero in approximately 1 minute d		203,400 scfm	1	118,000 scfm for 2 units/ normal operation	1	118,000 scfm		
9 5 Source Term															
9 5 1 Gaseous (Normal)	5186 Ci/yr See Table 1 4-7a for isotopic source term breakdown.	9	22,138 Ci/yr For isotopic breakdown, see Table 1 4-7b.	4	10,000 Ci/yr See Table 1 4 –7c for isotopic source term breakdown	1	182 Ci/yr See Table 1 4-7d for isotopic source term breakdown	1	400 Ci/yr Mainly Ar-41, all other nuclides have a negligible release	1	2000 Ci/yr See Tables 1 4-7e & f for source term breakdown This value does not include tritium, which is reported in Item 9 5.3	1	Maximum individual isotope from AP-1000 or ABWR except for Ar-41 which is based on PBMR. See Table T 4-7g for isotopic breakdown		
9 5.2 Gaseous (Post-Accident)	See Chap 15 (ABWR Std SAR TID 14844 Basis)		See Chap 15 (AP1000 Std SAR w/ Alternative Source Term Basis)	1	See Table 1 4-7k	1	See Table 1 4-7h	1	See Table 1 4-7l	1	See Table 1 4-7j for LLOCA.	1	Composite based on limiting LWR DBEs.		
9 5.3 Tritium (Normal)	72 9 Ci/yr	8	700 Ci/yr (GALE output per Table 11 3-3 Std SAR)	1	100 Ci/yr	1	75 Ci as HTO	1	1720 Ci/yr	1	3530 Ci/yr	3	3530 Ci/yr		
10. Liquid Radwaste System															
10.1 Dose Consequences															
10 1 1 Normal	10CFR50 APP I 10CFR 20	1	10CFR50 APP I 10CFR 20	1	0 16 Ci/yr (non-tritiated, 690 Ci/yr (tritium)	1	Normal Ops <10% 10CFR 20 10CFR50 App I	1	10CFR50 APP I 10CFR 20	1	10CFR50 APP I 10CFR 20	1	10CFR50 APP I 10CFR 20		1
10 1.2 Post-Accident	10CFR 20 10CFR100	1	10CFR 20 10CFR100	1	10CFR 20 10CFR100	2	Post Accident << 0 5 rem	1	10CFR 20 10CFR100	1	10CFR 20 10CFR100	1	10CFR 20 10CFR100		1
10.2 Release Point															
10.2.1 Flow Rate	100 gpm + 10,000 gpm dilution	1	2 8 gpm average at release point Std SAR Table 11 2-8 for a single unit, average daily discharge for 292 days per year with dilution flow of 3500 gpm	1, 4	3 6 gpm + 1150 gpm dilution per 8 hrs	1	50 gpm + dilution	1	0 8 gpm +1 6 gpm dilution	1	13 5 gpm for 2 units	1	Average daily discharge for 292 days per year with dilution flow of 2400 gpm		
10 3 Source Term															
10 3 1 Liquid	0 1 Ci/yr See Table 1 4-8a for isotopic listing	6	0 52 Ci/yr See Table 1 4-8b for isotopic listing.	1	0 16 Ci/yr	1	0.25 Ci/yr Isotopic breakdown not provided.	1	8 6 Ci/yr (Isotopic breakdown not provided) This is assumed to be Ci/yr generated, prior to processing for discharge.	1	0 07 Ci/yr (gross beta, gamma) See Table 1 4-8c for Isotopic breakdown	1	Maximum individual isotope from AP-1000, ABWR or ACR-700 See Table 1 4-8d for isotopic listing		
10 3.2 Tritium	60 Ci/yr Std SAR Table 12 2-22	6	2020 Ci/yr (GALE output per Std SAR Table 11 2-7)	1, 4	690 Ci/yr	1	< 35 Ci/yr as HTO	1	~0 Ci/yr	1	3100 Ci/yr	2	3100 Ci/yr		
11. Solid Radwaste System															

PPE Section	ABWR One Unit	ABWR Notes See Table 1 4-9	AP-1000 Two Units	AP-1000 Notes See Table 1 4-10	IRIS Three Units	IRIS Notes See Table 1 4-11	GT-MHR 4 Modules	GT-MHR Notes See Table 1 4-12	PBMR 8 Modules	PBMR Notes See Table 1 4-13	ACR-700 Two Units	ACR-700 Notes See Table 1 4-14	Bounding-Composite Note 1	Usage SAR/ER Section	Comments
11.1 Acreage															
11 1 1 Low Level Radwaste Storage	6 mo (internal to building)	1	2 years (Std SAR Section 11 4.2.1 storage in radwaste bldg @ expected generation rate)	1, 4	No on-site storage assumed – periodic pick-up at site.	1	Approx <1	1	36 mo	1	2 months (typical)	1	< I acre		
11.2 Solid Radwaste															
11.2.1 Activity	2700 Ci/yr	1	3,660 Ci/yr	1	900 Ci/yr total	1	1100 Ci/yr	1	100 Ci/yr		500 Ci/yr	1	See Table 1.4-3		
11.2.2 Principal Radionuclides	See Table 1 4-3	1	See Table 1 4-3	1	See Table 1 4-3	1	See Table 1 4-3	1	See Table 1 4-3	1	See Table 1 4-3	1	See Table 1.4-3		
11.2.3 Volume	Std SAR Tables 11.4-1 & 2 gives 15,087 ft³/yr expected wet/dry generation. Expected shipped is 5825 ft³/yr per Table 11 4-3	7	11,518 ft³/yr expected wet/dry generation per Std SAR Table 11 4-1 Expected shipped is 3928 ft³/yr		2610 ft³/yr	1	1341 ft³/yr (38 m³/year) side reflectors, 2118 ft³/yr (60 m³/year) Total = 3460 ft³/yr	1	9041 ft³/yr avg	2	2590 cu ft/yr total composed of 1550 cu ft/yr low-level compactable, (compaction ratio 4 1). 640 ft³/yr low level Non-compactable, 290 ft³/yr spent resin and 110 ft³/yr spent filters.	1	15,087 ft³/yr avg		
12. Spent Fuel Storage															
12.1 Spent Fuel Dry Storage															
12.1 1 Acreage	15 acres	1	30 acres	1	15 acres	1	5 acres	1	0 acreage, Stored inside power block	1	6 acres	1	30 acres		
12.1.2 Minimum Distance to Nearest Residence	3500 ft	1	3500 ft	1	3500 ft	1	1395 ft	1	1312 ft	1	At EAB = 1640 ft	1	3500 ft		
12.1 3 Minimum Distance to Power Block	1500 - 2200 ft	1	1500 - 2200 ft	1	1500 ft	1	300 ft	1	0 ft	1	Dry storage and Power Block buildings can be accommodated within EAB	1	1500 - 2200 ft		
12 1 4 Storage Capacity	60 years	1	60 years	1	60 years	1			40 years	1	60 years	2	40 years		
13. Auxiliary Boiler System															
13.1 Exhaust Elevation	150 ft above plant grade	1	150 ft above plant grade	1	135 ft	1	NA		NA		110 ft above plant grade	1	110 ft above plant grade		
13.2 Flue Gas Effluents	See Table 1 4-4	1	See Table 1 4-4	1	See Table 1 4-4	1	NA		NA		See Table 1 4-4	1, 3	See Table 1.4-4		
13.3 Fuel Type	No 2	1	No. 2	1	No 2	1	NA		NA		No 2	1	No 2		
13.4 Heat Input Rate (BTU/hr)	70,000,000 BTU/hr	1	312,000,000 BTU/hr	1	90,000,000 BTU/hr	1	NA		NA		6 8 E7 BTU/hr	1	312,000,000 BTU/hr		
14. Heating, Ventilation and Air Conditioning System															
14.1 Ambient Air Requirements															
14 1 1 Non-safety HVAC max ambient temp (1% Exceed)	100 F DB/77F WB Coincident	1	100 F DB/77F WB Coincident	1	100 F DB/77F WB Coincident	1	100 F DB/77 WB coincident	1	100 F DB/77F WB Coincident	1	100 F DB/77F WB Coincident	1	100 F DB/77F WB Coincident		
14 1.2 Non-safety HVAC min ambient temp (1% Exceed)	-10 F	1	-10 F	1	-10 F	1	- 10 F	1	-10 F	1	-10 F	1	-10 F		
14 1 3 Safety HVAC max ambient temp (0% Exceed)	115 F DB/80 F WB Coincident	1	115 F DB/80 F WB Coincident	1	115 F DB/80 F WB Coincident	1	NA		No SR HVAC	1	115 F DB/80 F WB Coincident	1	115 F DB/80 F WB Coincident		
14 1 4 Safety HVAC min ambient temp (0% Exceed)	-40 F	1	-40 F	1	-40 F	1	NA		No SR HVAC	1	-40 F	1	-40 F		

PPE Section	ABWR One Unit	ABWR Notes See Table 1 4-9	AP-1000 Two Units	AP-1000 Notes See Table 1 4-10	IRIS Three Units	IRIS Notes See Table 1 4-11	GT-MHR 4 Modules	GT-MHR Notes See Table 1 4-12	PBMR 8 Modules	PBMR Notes See Table 1 4-13	ACR-700 Two Units	ACR-700 Notes See Table 1 4-14	Bounding-Composite Note 1	Usage SAR/ER Section	Comments
14 1 5 Vent System max ambient temp (5% Exceed)	95 F DB, 77 F WB coincident 79 F WB non-coincident (5 % exceedance)	1	95F DB/77F coincident WB	1	115 F	2	115 FDB /80f wb COINCIDENT	1	NA	1	95 F DB, 77 F WB coincident 79 F WB non-coincident (5 % exceedance)	1	95 F DB, 77 F WB coincident 79 F WB non-coincident (5 % exceedance)		
14 1 6 Vent System Min ambient Temperature (5% exceed)	5 F	1	-5F	1	- 40 F	2	-40F		NA	1	Not Specified		-5 F		
15. Onsite/Offsite Electrical Power System															
15 1 Acreage															
15 1 1 Switchyard	12 acres	1	12 acres	1	15 acres	2	4.5 acres	1	3 acres	1	5 acres	1	15 acres		
16 Standby Power System															
16.1 Diesel															
16.1 1 Diesel Capacity	3 x 6000/6500 kw	1	4 x 4000 kw + 4 x 35 kw	1	6 X 2000 kw	1	NA		8x 1000 kw plus 2 x 25 kw	2	4 x 6500 kw	1	4 x 6500 kw		
16 1 2 Diesel Exhaust Elevation	~ 85 ft	1	50 ft	1	60 ft	1	NA		30 ft	1	33 ft above grade	1	30 ft		
16 1 3 Diesel Flue Gas Effluents	See Table 1 4-5	1	See Table 1 4-5	1	See Table 1 4-5	1	NA		See Table 1 4-5	1	See Table 1 4-5	1, 2	See Table 1 4-5		
16.1 4 Diesel Noise	55 dba at 1000 ft	1	55 dba at 1000 ft	1	55 dba at 1000 ft	1	NA		55 dba at 1000 ft	1	55 dba at 1000 ft	1	55 dba at 1000 ft		
16.1 5 Diesel Fuel Type	2D per ASTM D975-1974	1	No 2 Oil per ASTM D 975	1	No 2 Oil per ASTM D 975	1	NA		Diesel #2	1	Not Specified		N0 2 Oil per ASTM D 975		
16.2 Gas Turbine															
162 1 Gas Turbine Capacity (kw)	20 MWe at limiting site conditions	1	NA	1	NA	1	3 x 2500 kw	1	NA		NA		20 MWe at limiting site conditions		
16 2.2 Gas-Turbine Exhaust Elevation	60 to 100 ft	1	none		None	1	100 ft	1	none		NA		60 ft		
16.2 3 Gas-Turbine Flue Gas Effluents	See Table 1.4-6	1	none		None	1	See Table 1.4-6	1	none		NA		See Table 1 4-6		
16.2 4 Gas-Turbine Noise	55 dba @ 1000 ft	1	none		None	1	55 dba @ 1000 ft	1	none		NA		55 dba @ 1000 ft		
16.2 5 Gas-Turbine Fue Type	Distillate	1	none		None	1	Distillate	1	none		NA		Distillate		
17. Plant Characteristics															
17 1 Access Routes															
17 1 1 Heavy Haul Routes	7 acres	1	4 acres	1	7 acres	2	3 acres	1	6 acres		4 acres	1	7 acres		
17 1.2 Spent Fuel Cask Weight	150 tons	1	100 tons	1	100 tons	1	46,025 lbs (23 Tons)	1	less than 100 tons	1	less than 100 tons	1	150 tons		
17 2 Acreage							Total 87 See Note 10	1							
17.2.1 Office Facilities	1 09 (47,600 sq ft)	1			1 acre	1	1.8 acres	1	0 5 acre	1	0 7 acres	1	1 8 acres		
17.2.2 Parking Lots	3.88 acres	1			3 5 acres	1	3 5 acres	1	1 5 acre	1	2.9 acres	3	3 88 acres		
17 2.3 Permanent Support Facilities	~4.2 acres	1	*		4 acres	2	12 acres	1	1 0 acre	1	7.1 acres	3	12 acres		

PPE Section	ABWR One Unit	ABWR Notes See Table 1 4-9	AP-1000 Two Units	AP-1000 Notes See Table 1 4-10	IRIS Three Units	IRIS Notes See Table 1 4-11	GT-MHR 4 Modules	GT-MHR Notes See Table 1 4-12	PBMR 8 Modules	PBMR Notes See Table 1 4-13	ACR-700 Two Units	ACR-700 Notes See Table 1 4-14	Bounding-Composite Note 1	Usage SAR/ER Section	Comments
17.2.4 Power Block	~2 5 acres	1			16 acres	1	2.5 acres	1	2.6 acres	1	4 4 acres	3	16 acres		
17.2.5 Protected Areas	~38 acres	1	Total = 54 acres	1	40 acres	1	33 acres	1	~ 21 acres	1	27 acres	3	54 acres		
17 3 Megawatts Thermal	3926 MWth	1	6800 MWth core, 6860 MWth NSSS	1	3000 MWth	1	4 x 600 MWth	1	3200 MWth	1	2x1983 MWth	1	6800 MWth core , 6860 NSSS		
17 4 Plant Design Life	60 years	1	60 years	1	60 years	1	60 years	1	40 years	1	60 years	1	60 years		
17.5 Plant Population															
17 5 1 Operation	531 people	1	300 for first plant, 200 for each following plant. = 500	1	300 people for a 3 reactor site	1	< 240 people	1	130 people	1	580 people	1	580 people		
17 5.2 Refueling / Major Maintenance	781 people	1	1000 people	1	700 people	2	240 people	1	On line refueling, 330 for major maintenance / module, every 6 years	1	500 people additional	1	1000 people		
17 6 Station Capacity Factor	87%	1	93%	1	98%	2	96%		95%	1	93%	2	98%		
18. Construction															
18.1 Access Routes															
18 1 1 Construction Module Dimensions	23' H x 23' W x 63 L	1	Reactor Vessel 22' D x 34' L, Steam Generator 20' D x 80' L, Turbine Rotor 18' D x 29' L, Generator Stator 18' D x 40' L, Modules by Rail 12' H x 12' W x 80' L, Modules by Barge 90' H x 82' W x 93' L or 130' D x 51 ' H	1	Reactor Vessel 22' D x 59' L, Steam Generator 6' D x 30' L, Reactor Vessel Head 24' D x 15' H, Cont. Vessel Lower Half 82' D Hemisphere, Cont. Vessel Upper Half 82' D Hemisphere,Cont. Vessel Closure Head 33' D x 30' H, Modules by Rail 12' H x 12' W x 80' L, Modules by Barge 90' H x 82' W x 93' L	1	28' H x 28' W x 80' L	1	26' H x 33' W x 66' L	1	Reactor Assembly 32.8' H x 32 8' W x 25 5' L, Steam Generator 16' D x 78' L, Modules by rail 12' x 12' x 80'	1, 2	32.8' x 32.8' x 80' L (Road Access) Modules by Barge 90' H x 82' W x 93' L or 130' D x 51 ' H		
18 1.2 Heaviest Construction Shipment	1,516,000 lbs (758 tons)	1	1,900,000 lbs (950 tons)	1	2,090,000 lbs (1045 tons)	1	2,200,000 lbs (1100 tons)	1	1,764,000 lbs (882 tons)	1	700 US tons	1	1100 tons		
18.2 Acreage															
18 2.1 Laydown Area	29 acres	1	20 acres	1	17 acres	2	Note 10		7 4 acres	1	20 acres	1	29 acres		
18.2.2 Temporary Construction Facilities	52 acres	1	4 7 acres	1	31 acres	2	Note 10		2 0 acres	1	25 acres	1	52 acres		
18.3 Construction															
18 3 1 Noise	76-101 db @ 50 ft	1	76-101 db @ 50 ft	1	76-101 db @ 50 ft	1	75-100 db @ 50'	1	76-101 db @ 50 ft	1	76-101 db @ 50 ft	1	76- 101 db @ 50 ft		
18.4 Plant Population															
18 4 1 Construction	3150 people (max)	1	1200 (max monthly avg)	3	1200 people	2	2500 max	1	1200 people	1	2000 people	1	3150 people (max)		
18 5 Site Preparation Duration	18 months	1	18 months	1	18 months	1	12 months	1	6 months	1	6 - 12 months	1	18 months		

NOTES:

1. The Bounding or Composite PPE values provide an envelope (most restrictive values selected) for the ABWR, AP1000, IRIS, PBMR, GT-MHR, and ACR-700 designs and serves as a surrogate for evaluating the acceptability of the site.
2. The AP 1000 plant uses a separate mechanical draft cooling tower for the non-safety service water system which is separate from the Condenser Circulating Water System. The duty values for the Service Water System are 166E6 btu/hr (592 max btu/hr) The data in table sections 2 4 and 2 5 are for both the Circulating Water and Service Water System combined .
3. PBMR does not have a condenser. This is the heat load for the active cooling system
4. The GT-MHR does not have a condenser. Steady state heat rejection from all sources, includes 4 x 314 mw to mechanical draft cooling tower and 4 x 4 mw to RCCS.
5. Steady state heat load from all sources to Mechanical Draft towers - estimate of upper bound
6. Applicants must identify main condenser cooling system alternatives (e g , mechanical or natural draft cooling towers, cooling ponds, or once-through cooling). To maintain multiple options, the most restrictive value for each cooling system PPE section should be used in the ESP application (e g , 550 feet cooling tower height selected if both mechanical and natural draft towers are being considered)
7. Values not specified -- dependent on-site specific water supply and treatment.
8. GT-MHR does not have a CCW system This is for the Shutdown Cooling System (SCS) The loop is entirely closed and heat rejected through an air blast Heat Exchanger.
9. Impacts of the main condenser cooling system will usually bound impacts from operation of the Ultimate Heat Sink. No water cooling system is required for the AP1000 Ultimate Heat Sink.
10. Laydown and temporary construction facilities fall within the 87 acre site footprint (Section 17 2).
11. 10% margin added to vendor supplied PPE quantity to establish value

Table 1.4-2 Blowdown Constituents and Concentrations – All Plants			
Constituent	Concentration (ppm)[1]		
	River Source	Well/ Treated Water	Envelope
Chlorine demand	10.1		10.1
Free available chlorine	0 5		0 5
Chromium			NA
Copper		6	6
Iron	0 9	3 5	3 5
Zinc		0 6	0 6
Phosphate		7.2	7.2
Sulfate	599	3500	3500
Oil and grease			NA
Total dissolved solids		17,000	17,000
Total suspended solids	49 5	150	150
BOD, 5-day			
Notes			
(1) Assumed cycles of concentration equals 4			

TABLE 1.4-3 PRINCIPAL RADIONUCLIDES IN SOLID RADWASTE (1)

Radionuclide	ABWR (1 Unit)	AP-1000 (2 Units)	IRIS (2) (3 Units)	GT-MHR (4 Modules)	PBMR (8 Modules)	ACR-700 (2 Units)	Composite
	Quantity (Ci/yr)	Quantity (Ci/yr)	Quantity (Ci/yr)	Quantity (Ci/yr)	Quantity (Ci/yr)	Quantity (Ci/yr)	Quantity (Ci/yr)
Fe-55	1761.37	622 976	276	NA	NA	32 89	1761.37
Fe-59	0 0819	NA	NA	NA	NA	0.64	0 64
Co-60	395 92	574.512	255	NA	NA	17.66	574 512
Mn-54	347.22	44 856	21	NA	NA	0 55	347.22
Cr-51	97.138	0 58302	0 3	NA	NA	45 51	97.138
C0-58	NA	124.578	55 5	NA	NA	0	124 578
NI-63	NA	632.772	279	NA	NA	NA	632 772
H-3	NA	3.2114	1.5	NA	NA	NA	3 2114
C-14	NA	0.57	0 3	NA	NA	NA	0 57
Nb-95	NA	0 6466	0 3	NA	NA	162	162
Ag-110m	NA	0 092 8	0 03	9	0 064	2.18	2.18
Zr-95	NA	0 14326	0 06	NA	NA	76.45	76 45
Ba-137m	NA	NA	NA	254	NA	254	254
Ba-140	NA	0.1745	0 09	0 05	NA	0	0.1745
Pu-241	NA	0.22805	0 09	NA	NA	NA	0.22805
La-140	NA	0.08022	0 03	0 05	NA	NA	0 08022
Cs 134	NA	NA	NA	605	15 2	0 12	605
Cs 137	NA	NA	NA	256	50	3 82	256
Sr 90	NA	NA	NA	NA	0.16	0.11	0.16
I-131	NA	NA	NA	0.40	NA	81.91	81 91
I-133	NA	NA	NA	NA	NA	4.55	4 55
Na-24	NA	NA	NA	NA	NA	0.44	0 44
Ru-103	NA	NA	NA	NA	NA	2.18	2.18
Ru-106	NA	NA	NA	NA	NA	1.37	1 37
Sb-124	NA	NA	NA	NA	NA	11.29	11 29
Ce-141	NA	NA	NA	NA	NA	0.14	0.14
Ce-144	NA	NA	NA	NA	NA	0.11	0.11
Gd-153	NA	NA	NA	NA	NA	3.09	3 09
Other	72.858	59 964	27	NA	NA	NA	72 858
Total (rounded to nearest hundred)	2700	**2200**	**900**	**1100**	**100**	**500**	**5100**

Notes: (1) See PPE Section 11.2 2
(2) Based on IRIS/AP-1000 power ratio

Table 1.4-4 Yearly Emissions Auxiliary Boilers[1]							
DATA FOR	PBMR	ABWR	Twin AP 1000	IRIS	GT-MHR	Twin ACR-700 (2)	Bounding Value
Pollutant Discharged							
	Quantity (lbs)	Quantity (lbs)	Quantity (lbs)	Quantity (lbs)	Quantity (lbs)	Quantity (lbs)	Quantity (lbs)
Particulates	NA	9,900	34,500	345	NA	3,170	34,500
Sulfur oxides	NA	29,600	115,000	1,035	NA	31,703	115,000
Carbon monoxide	NA				NA	1,749	1,749
Hydrocarbons	NA	28,600	100,200	1,002	NA	88	100,200
Nitrogen oxides	NA				NA	19,022	19,022

Notes:

(1) Table 1 4-1, Section 13.2

(2) Emissions are based on 30 days of operation per year

Table 1. 4-5 Yearly Emissions From Standby Diesel Generators (2)							
DATA FOR	PBMR (8 Modules)	ABWR	Twin AP 1000	IRIS (3-Units)	GTMHR	Twin ACR-700	Bounding Value
	8 x 1000 & 2 x 25 kw (3)	3 x 6000 to 6500 kw (1)	Four 4000 kw + four 35 kw (3)	Six 2000 kw (3)	3 x 2500 kw	4 x 6500 kw (4)	(6)
Pollutant Discharged (3)							
	Quantity (lbs)	Quantity (lbs)	Quantity (lbs)	Quantity (lbs)	Quantity (lbs)	Quantity (lbs)	Quantity (lbs)
Particulates	402 5	1050	1220	600	22	576	1400
Sulfur Oxides	1955	5100	3760	2,910	550	2,300 (5)	6,800
Carbon Monoxide	5 75	15	1560	9	85	4,600	4,600
Hydrocarbons	80 5	210	922	120	20	3,070	3 070
Nitrogen oxides	1610	4200	18,280	2,400	725	17,700	18,280

Notes· (1) Quantity based on 150 % of value for two 7000 kw

(2) See Table 1 4-1 Section 16 1 3

(3) Emissions are based on 4hrs/month operation for each of the generators

(4) Emissions are based on 4 hrs/month of operation of each standby diesel generator (4 D G s in total)

(5) Assumes 0 2 wt% of sulfur content in the No 2 fuel

(6) Further reduction in emission can be achieved with the addition of emission control equipment on the reference D G s.

Table 1.4-6
Standby Power System Gas Turbine Flue Gas Effluents[1]

	ABWR		GT-MHR (BOUNDING)	
FUEL:	Distillate 20F Ambient 9,890 BTU/KWH (LHV) 10,480 BTU/KWH (HHV) 96,960 LB/HR Fuel Consumption Rate		Distillate 20F Ambient 9,890 BTU/KWH (LHV) 10,480 BTU/KWH (HHV) 96,960 LB/HR Fuel Consumption Rate	
Effluent	**PPMVD**	**Quantity[2] (lbs)**	**PPMVD**	**Quantity[2] (lbs)**
NO_x (PPMVD @ 15% O_2	77		95	
NO_x as NO_2		583		725
CO	20	67	25	85
UHC	7	15	10	20
VOC	3 5	7.5	5	10
SO_2	44	370	55	470
SO_3	3	24	5	30
SULFUR MIST		39		50
PARTICULATES		17		22
Exhaust Analysis	**% Vol**		**% Vol**	
ARGON	0 86		0 86	
NITROGEN	72 56		72 56	
OXYGEN	11.2		11.2	
CARBON DIOXIDE	5.19		5 19	
WATER	9 87		9 87	

Notes:
(1) See PPE Section 16.2 3
(2) Emissions are based on 4 hrs/month operation for each of the generators

Table 1.4-7a
ABWR Average Annual Normal Gaseous Release(1)

Isotope	Release – 1 unit Ci/yr	Isotope	Release – 1 unit Ci/yr
Kr-83m	8 38E-04	Sr-89	5 68E-03
Kr-85m	2 11E+01	Sr-90	7 03E-05
Kr-85	5 68E+02	Y-90	4 59E-05
Kr-87	2 51E+01	Sr-91	1 00E-03
Kr-88	3 78E+01	Sr-92	7 84E-04
Kr-89	2 41E+02	Y-91	2 41E-04
Kr-90	3.24E-04	Y-92	6 22E-04
Xe-131m	5 14E+01	Y-93	1.11E-03
Xe-133m	8 65E-02	Zr-95	1 59E-03
Xe-133	2 41E+03	Nb-95	8 38E-03
Xe-135m	4 05E+02	Mo-99	5 95E-02
Xe-135	4 59E+02	Tc-99m	2 97E-04
Xe-137	5 14E+02	Ru-103	3 51E-03
Xe-138	4 32E+02	Rh-103m	1.11E-04
Xe-139	4 05E-04	Ru-106	1 89E-05
I-131	2 59E-01	Rh-106	1 89E-05
I-132	2 19E+00	Ag-110m	2 00E-06
I-133	1.70E+00	Sb-124	1 81E-04
I-134	3 78E+00	Te-129m	2.19E-04
I-135	2 41E+00	Te-131m	7 57E-05
C-14	9.19E+00	Te-132	1.89E-05
Na-24	4 05E-03	Cs-134	6 22E-03
P-32	9 19E-04	Cs-136	5 95E-04
Ar-41	6 76E+00	Cs-137	9 46E-03
Cr-51	3 51E-02	Cs-138	1 70E-04
Mn-54	5 41E-03	Ba-140	2.70E-02
Mn-56	3 51E-03	La-140	1 81E-03
Fe-55	6 49E-03	Ce-141	9.19E-03
Co-58	2 41E-03	Ce-144	1 89E-05
Co-60	1 30E-02	Pr-144	1 89E-05
Fe-59	8 11E-04	W-187	1 89E-04
Ni-63	6 49E-06	Np-239	1.19E-02
Cu-64	1 00E-02	Total	5186
Zn-65	1.11E-02		
Rb-89	4 32E-05		

Notes: (1) See PPE Section 9 5 1

Table 1.4-7b
AP-1000 Average Annual Normal Gas Release(1)

Isotope	Release 2 Unit Ci/yr
Kr-85m	7 20E+01
Kr-85	8.20E+03
Kr-87	3 00E+01
Kr-88	9.20E+01
Xe-131m	3 60E+03
Xe-133m	1.74E+02
Xe-133	9.20E+03
Xe-135m	1.40E+01
Xe-135	6 60E+02
Xe-138	1 20E+01
I-131	2.40E-01
I-133	8 00E-01
C-14	1.46E+01
Ar-41	6 80E+01
Cr-51	1.22E-03
Mn-54	8 60E-04
Co-57	1 64E-05
Co-58	4 60E-02
Co-60	1.74E-02
Fe-59	1 58E-04
Sr-89	6 00E-03
Sr-90	2 40E-03
Zr-95	2 00E-03
Nb-95	5 00E-03
Ru-103	1 60E-04
Ru-106	1 56E-04
Sb-125	1 22E-04
Cs-134	4 60E-03
Cs-136	1.70E-04
Cs-137	7 20E-03
Ba-140	8 40E-04
Ce-141	8 40E-05
Total	22,138

Notes: (1) See PPE Section 9 5 1

Table 1.4-7c
IRIS Average Annual Normal Gas Release(1)

Isotope	Release 3 Unit Ci/yr
Kr-85m	3 25E+01
Kr-85	3 70E+03
Kr-87	1.36E+01
Kr-88	4 16E+01
Xe-131m	1 63E+03
Xe-133m	7 86E+01
Xe-133	4 16E+03
Xe-135m	6 32E+00
Xe-135	2.98E+02
Xe-138	5 42E+00
I-131	1 04E-01
I-133	3 46E-01
C-14	5 76E+00
Ar-41	3 07E+01
Cr-51	9 05E-04
Mn-54	6.38E-04
Co-57	1.22E-05
Co-58	3 41E-02
Co-60	1.29E-02
Fe-59	1.17E-04
Sr-89	4 45E-03
Sr-90	1 78E-03
Zr-95	1 48E-03
Nb-95	3 71E-03
Ru-103	1.19E-04
Ru-106	1.16E-04
Sb-125	9 05E-05
Cs-134	3 41E-03
Cs-136	1.26E-04
Cs-137	5 34E-03
Ba-140	6 23E-04
Ce-141	6.23E-05
Total Nobles	10,000
Total Iodine	0 45
Total Other	0 07

Notes· (1) See PPE Section 9 5.1

* Values normalized to the AP-1000 isotopic distribution.

Table 1.4-7d
GT-MHR Gaseous Radwaste Release (Normal)

Isotope	Release in Ci/yr - 4 module plant. Assumes holdup prior to release.
Kr-85	112
Kr-88	21
Xe-131m	8
Xe-133	41
Total	182
Tritium (as HTO)	74

Notes: (1) See PPE Section 9 5 1

Table 1.4-7e
ACR-700 Annual Average Normal Gas Release

Emissions	Twin Unit ACR-700 (Ci/yr)	Remarks
Carbon – 14	8 0	
Noble Gases	1992	(See Table 1 4-7f)
Iodine – 131	5 4E-04	
Particulates	1 60E-03	
Total	2000	

Note: See PPE Section 9 5 1

Table 1.4-7f
ACR-700 Breakdown of Radionuclide Activity for Noble Gases (Normal)

Radionuclide	Twin Unit ACR-700 (Ci/yr)
Ar-41	303
Kr-85-m	13
Kr-87	3
Kr-88	18
Xe-131-m	3
Xe-133	1,452
Xe-133-m	30
Xe-135	153
Xe-135-m	8
Xe-137	4
Xe-138	6
Total	1992

Notes: (1) See PPE Section 9 5.1

Table 1.4-7g
Composite Average Annual Normal Gaseous Release

Isotope	Release Ci/yr	Isotope	Release Ci/yr
Kr-83m	8 38E-04	Sr-89	6 00E-03
Kr-85m	7.20E+01	Sr-90	2 40E-03
Kr-85	8.20E+03	Y-90	4 59E-05
Kr-87	3 00E+01	Sr-91	1 00E-03
Kr-88	9 20E+01	Sr-92	7 84E-04
Kr-89	2 41E+02	Y-91	2 41E-04
Kr-90	3 24E-04	Y-92	6 22E-04
Xe-131m	3 60E+03	Y-93	1.11E-03
Xe-133m	1 74E+02	Zr-95	2 00E-03
Xe-133	9 20E+03	Nb-95	8 38E-03
Xe-135m	4 05E+02	Mo-99	5 95E-02
Xe-135	6 60E+02	Tc-99m	2 97E-04
Xe-137	5 14E+02	Ru-103	3 51E-03
Xe-138	4 32E+02	Rh-103m	1.11E-04
Xe-139	4 05E-04	Ru-106	1 56E-04
I-131	2 59E-01	Rh-106	1 89E-05
I-132	2.19E+00	Ag-110m	2 00E-06
I-133	1.70E+00	Sb-124	1 81E-04
I-134	3 78E+00	Sb-125	1 22E-04
I-135	2 41E+00	Te-129m	2.19E-04
C-14	1 46E+01	Te-131m	7 57E-05
Na-24	4 05E-03	Te-132	1 89E-05
P-32	9 19E-04	Cs-134	6 22E-03
Ar-41	4 00E+02	Cs-136	5 95E-04
Cr-51	3 51E-02	Cs-137	9 46E-03
Mn-54	5 41E-03	Cs-138	1 70E-04
Mn-56	3 51E-03	Ba-140	2 70E-02
Fe-55	6 49E-03	La-140	1 81E-03
Co-57	1 64E-05	Ce-141	9 19E-03
Co-58	4 60E-02	Ce-144	1 89E-05
Co-60	1 74E-02	Pr-144	1 89E-05
Fe-59	8 11E-04	W-187	1 89E-04
Ni-63	6 49E-06	Np-239	1.19E-02
Cu-64	1 00E-02	Total (w/o H-3)	24045
Zn-65	1.11E-02	H-3	3530
Rb-89	4.32E-05	Total	27575

Notes· (1) See PPE Section 9 5 1

Table 1.4-7h
GT-MHR Gaseous Release Source Term (Post Accident)

Isotope	Design Basis Event Releases (Ci) 30 day release from building	
	1 Module DBA	
Kr-88	4	~45% whole body gamma
H 3	-	
Sr-90	2 E -05	
I-131	2	~70% of thyroid dose
Cs-137	3 E -04	

Note GT-MHR uses an accident dependent mechanistic source term

Table 1.4-7i
PBMR Design Basis Event Releases

Radionuclide	Design Basis Event Releases (Ci)	
	0-2 hour	2-720 hour
C 14	386 85	0
H 3	0	0
Kr-83m	2 42	0 02
Kr-85m	7.14	0 64
Kr-85	2 6	1 96
Kr-87	9 84	0 02
Kr-88	16 94	0 56
Kr-89	5 85	0
Kr-90	2 92	0
Kr-91	1.39	2 88
Xe-131m	0 49	8.19
Xe-133m	1.38	471 96
Xe-133	60 1	0
Xe-135m	2 36	1 9
Xe-135	9 28	0
Xe-137	6.17	0
Xe-138	11.34	0
Xe-139	1 78	0
Xe-140	0.79	0
Total Noble Gases	142 8	488 10
Br-83	0 02	0
Br-84	0 08	0
Br-85	0 47	0
I 131	0	24 28
I 132	0.11	0 05
I 133	0 03	8.11
I 134	0 38	0
I 135	0 07	0 79
I 136	0 01	0
Total Halogens	1	33 23

Table 1.4-7j
ACR-700 Gaseous Release Source Term (Post Accident) [1]

Isotope	Limiting Design Basis Event Releases (Ci)		
	0 to 2 hour	2 to 8 hours	8 to 720 hours
I-131	566	1,700	40,000
I-132	627	1,200	2,100
I-133	1,169	3,300	17,000
I-134	658	830	1,300
I-135	1,010	2,500	7,000
Kr-83m	2,094	3,600	5,900
Kr-85m	5,702	13,000	30,000
Kr-85	45	140	8,000
Kr-87	7,977	11,600	18,000
Kr-88	14,474	28,900	56,000
Kr-89	864	870	1,300
Xe-131m	252	800	23,000
Xe-133m	1,397	4,100	37,000
Xe-133	45,832	135,400	2,354,000
Xe-135m	1,784	1,800	2,700
Xe-135	3,738	9,700	32,000
Xe-137	1,894	1,900	2,900
Xe-138	6,774	6,800	11,000

Note: See PPE Section 9 5.2

Table 1.4-7k
Post Accident Gaseous Release - IRIS

Isotope	1 – 3 Hours (Ci)	0 – 30 days (Ci)
I-131	9 5E+02	1.7E+03
I-132	8 4E+02	1.1E+03
I-133	2 0E+03	3 1E+03
I-135	1 4E+03	2 3E+03
Kr-88	1 8E+03	5 6E+03
Xe-133	9 0E+03	9.7E+05
Sr-89	4 9E+01	7 9E+01
Sr-90	5 5E+00	8 8E+00
Cs-134	1 5E+02	2.5E+02
Cs-137	1.1E+02	1 8E+02

Table 1.4-8a ABWR
Average Annual Normal Liquid Release(1)

Isotope	Release 1 Unit Ci/yr	Isotope	Release 1 Unit Ci/yr
C 14	1 60E-04	Nb 95	1 00E-03
Na 24	2 81E-03	Mo 99	8 30E-04
P 32	1.80E-04	Tc 99m	8 00E-04
Cr 51	7.70E-03	Ru103	1 80E-04
Mn 54	2 60E-03	Rh103m	9 00E-06
Mn-56	3 81E-03	Ru 106	1.70E-04
Fe 55	5 81E-03	Rh 106	1.70E-04
Fe 59	1 00E-04	Ag 110m	3 30E-04
Ni 63	1 40E-04	Sb 124	3 59E-04
Cu 64	7.51E-03	Te129m	1.70E-05
Co 56	5 19E-03	Te131m	3 41E-05
Co 57	7.19E-05	I 131	3.19E-03
Co 58	9 00E-05	Te132	4.00E-06
Co 60	9.11E-03	I132	2 60E-03
Zn 65	9 00E-05	I133	1 00E-02
W 187	9 51E-05	I134	1.70E-03
Np 239	3 11E-03	Cs134	6 11E-03
Rb 89	4 41E-05	I135	7 51E-03
Sr 89	1.10E-04	Cs136	3 19E-04
Sr 90	3 51E-05	Cs137	8 89E-03
Sr 91	9 00E-04	Cs 138	1 90E-04
Y 90	3.11E-06	Ba140	6 81E-04
Y 91	1.10E-04	La 140	1.70E-04
Sr 92	8 00E-04	Ce 141	1 20E-04
Y 92	6 00E-04	Pr 143	1 30E-06
Y 93	9 00E-04	Ce 144	1 90E-03
Zr 95	8 41E-04	Total	1 00E-01

Notes· (1) See PPE Section 10 3.1

Table 1.4-8b AP-1000
Average Annual Normal Liquid Release(1)

Isotope	Release – 2 Unit Ci/yr	Isotope	Release – 2 Unit Ci/yr
Na 24	3 26E-03	Ag 110m	2.10E-03
Cr 51	3.70E-03	Ag 110	2 80E-04
Mn 54	2 60E-03	Te 129m	2.40E-04
Fe 55	2 00E-03	Te 129	3 00E-04
Fe 59	4 00E-04	Te 131m	1 80E-04
Co 58	6 72E-03	Te 131	6 00E-05
Co 60	8 80E-04	I 131	2 83E-02
Zn 65	8 20E-04	Te132	4 80E-04
W 187	2 60E-04	I 132	3.28E-03
Np239	4 80E-04	I 133	1.34E-02
Br 84	4 00E-05	I 134	1 62E-03
Rb 88	5 40E-04	Cs 134	1.99E-02
Sr 89	2.00E-04	I 135	9 94E-03
Sr 90	2 00E-05	Cs 136	1.26E-03
Sr 91	4 00E-05	Cs 137	2 66E-02
Y 91m	2 00E-05	Ba 137m	2 49E-02
Y 93	1 80E-04	Ba 140	1.10E-02
Zr 95	4 60E-04	La 140	1 49E-02
Nb 95	4 20E-04	Ce 141	1 80E-04
Mo 99	1 14E-03	Ce 143	3 80E-04
Tc 99m	1.10E-03	Pr 143	2 60E-04
Ru103	9 86E-03	Ce 144	6 32E-03
Rh103m	9 86E-03	Pr 144	6 32E-03
Ru 106	1.47E-01	All others	4 0E-05
Rh 106	1 47E-01	Total	5.2E-01

Notes (1) See PPE Section 10 3 1

Table 1.4-8c
ACR-700 Breakdown of Radionuclide Activity for Gross Beta Gamma Activity (Normal - Liquid)(1)

Isotope	Release - Twin Unit Ci/yr
C-14	7 57E-04
Cr-51	9 73E-03
Mn-54	1 41E-03
Co-58	2 65E-05
Fe-59	5 08E-04
Co-60	1 35E-02
Zn-65	1 68E-04
Sr-90	1 51E-05
Zr-95	9 19E-03
Nb-95	1 95E-02
Mo-99	5 95E-05
Ru-103	2 00E-04
Ru-106	1 24E-03
Ag-110m	3 57E-05
Sb-122	4 11E-04
Sb-124	1 78E-03
Sb-125	2 00E-04
I-131	7 03E-03
Te-132	2 49E-05
I-133	3 51E-04
Cs-134	1 03E-04
Cs-137	7 03E-04
La-140	4 49E-06
Ce-141	2 11E-05
Ce-144	6 49E-04
Total	7E-02

Notes: (1) See PPE Section 10 3 1

Table 1.4-8d Composite Average Annual Normal Liquid Release[1]			
Isotope	Release Ci/yr	Isotope	Release Ci/yr
C 14	7.57E-04	Ru 103	9 86E-03
Na 24	3 26E-03	Rh 103M	9 86E-03
P-32	1 80E-04	Ru 106	1 47E-01
Cr 51	9 73E-03	Rh 106	1 47E-01
Mn 54	2 60E-03	Ag 110M	2 10E-03
Mn-56	3 81E-03	Ag 110	2 80E-04
Fe 55	5 81E-03	Sb 122	4 11E-04
Fe 59	5 08E-04	Sb 124	1 78E-03
Ni 63	1 40E-04	Sb 125	2 00E-04
Cu 64	7 51E-03	Te 129M	2 40E-04
Co 56	5.19E-03	Te 129	3 00E-04
Co 57	7.19E-05	Te 131M	1 80E-04
Co 58	6.72E-03	Te 131	6 00E-05
Co 60	1.35E-02	I 131	2 83E-02
Zn 65	8 20E-04	Te 132	4 80E-04
W 187	2 60E-04	I 132	3 28E-03
Np 239	3 11E-03	I 133	1 34E-02
Br 84	4 00E-05	I 134	1.70E-03
Rb 88	5 40E-04	Cs 134	1 99E-02
Rb 89	4 41E-05	I 135	9 94E-03
Sr 89	2.00E-04	Cs 136	1 26E-03
Sr 90	3 51E-05	Cs 137	2 66E-02
Sr 91	9 00E-04	Cs 138	1 90E-04
Y 90	3.11E-06	Ba 137m	2 49E-02
Y 91	1.10E-04	Ba 140	1.10E-02
Sr 92	8 00E-04	La 140	1 49E-02
Y 91M	2 00E-05	Ce 141	1.80E-04
Y 92	6 00E-04	Ce 143	3 80E-04
Y 93	9 00E-04	Pr 143	2 60E-04
Zr 95	9 19E-03	Ce 144	6 32E-03
Nb 95	1 95E-02	Pr 144	6 32E-03
Mo 99	1.14E-03	All others	4 00E-05
Tc 99M	1.10E-03	Total	5.87E-01

Notes: (1) See PPE Section 10 3.1

Table 1.4-9 ABWR (One Unit) Notes	
1	Plant Parameters Envelope for ABWR dated May 2, 2002
1	Value from Plant Parameters Envelope for ABWR dated May 2, 2002 + 10% margin
3	ABWR SSAR Section 9 2.8.2 states 45 m^3/hr = 198 gpm
4	GE E-Mail of 5/22/02 states average daily use is 25% of max.
5	Calculation DMW-1
6	ABWR SSAR Table 12.2-22
7	ABWR SSAR Tables 11.4-1 & 2 gives 15,087 ft^3/yr expected wet/dry generation. Expected shipped is 5825 ft^3/yr per Table 11.4-3
8	GE E-mail to E. Grant, 11-7-02
9	ABWR SSAR Table 12.2-20

Table 1.4-10 AP1000—(Twin Units) Notes	
1	AP1000 Document APP-0000-X1-001, Revision 3
2	AP1000 Document APP-0000-X1-001, Revision 1
3	
4	AP1000 Design Control Document, Tier 2 Material, Revision 0

Table 1.4-11 IRIS —(Three Units) Notes	
1	Westinghouse Letter STD-ES-02-28, dated October 7, 2002
2	Westinghouse Letter dated October 17, 2002, Carelli to Chenault

Table 1.4-12 GT-MHR—(Four Modules) Notes	
1	PPE Table received 6/10/02 from General Atomics

Table 1.4-13 PBMR—(8 Modules) Notes	
1	PBMR Document 011847-425, Revision 1
2	Magugumela to Grant E-Mail dated 10/21/02 with 4 Attachments

Table 1.4-14 ACR-700—(Twin Units) Notes	
1	AECL Document 115-01250-050-002, Revision D1
2	Soulard to Spencer E-Mail dated 10/18/02
3	Chenault to Semmes, Toll, and Cambria E-Mail dated 10/22/02