List of SAR Review Areas Potentially Involving More Detailed Review

Area/Topic	Calcs Req	Audit	Data	Analysis	Results	Design	Op. Exp.	Remarks
2.1.1.1 Specification of Location								
UTM co-ordinates (zone no. northing, easting), meters			X					Address
state, County and political subdivisions, in which the site is located			X					Address
Location of site with respect to prominent features (natural and man-made, i.e rivers,lakes, industrial, military and transportation facilities			X					Address
Identification of regulatory requirements								Address
2.1.1.2 Site Area Map								
Plant property lines, stating the area of plant property(in acres)			X					Identification on map
Location of site boundary			X					Identification on map
Location and orientation of principal plant structures within site area (e.g. reactor building, auxiliary building, turbine building)			X					Identification on map
Location of any industrial, military, or transportation facilities and commercial,institutional, recreational, or residential structures within site area			X					Identification on map
Exclusion area distance(meters) in all 16 cardinal compass directions			X					Identification on map
Scale that permits measurement of distances			X					Address/identification
Tue north			X					Identification on map
Highways, railroads, and water ways that traverse or are adjacent to the site			X					Identification on map
Prominent natural and man-made features in the site area			X					Identification on map
2.1.2.1 Authority								
Legal Authority of land, and also include mineral rights and easements								Address
Authority of all activities, including exclusion and removal of personnel and property from area								Address
If ownership is not obtained, areas not owned identification on a map and plans for ownership or authority								Address
Minimum distance and direction of EABs for present and proposed ownership			X					Address
Identification of regulatory requirements								Address
2.1.2.2 Control of Activities Unrelated to Plant Operation								
Description of activities unrelated to plant operation that are permitted in EAB, their location, nature of activities, number of people involved and plans for evacuation in the event of an emergency								Address
2.1.2.3 Arrangements for Traffic control								
Description of traffic control arrangements on highway, railroad and waterway traversing through EAB in the event of emergency								Address
2.1.2.4 Abandonment or Relocation of Roads								
Procedures for abandonment, relocation, and understanding with other authorities for control								Address
2.1.3.1 Population Within 10 Miles								
Map showing concentric circles with distances of 1,2,3,4,5, and 10 miles from the center of reactor unit/units having background identifying cities, towns and counties around within 10 miles. The circles should be divided into 16 compass points (e.g true north through north-northwest).								Identification on map
Table providing current resident population within each area of the map formed by the concentric circles and radial lines within 10 miles			X					
Projected population within 10 miles in similar tabular form for the first year plant operation			X					
Decennial projected population within 10 miles through plant life in similar tabular form			X					

List of SAR Review Areas Potentially Involving More Detailed Review

Area/Topic	Calcs Req	Audit	Data	Analysis	Results	Design	Op. Exp.	Remarks
Description of basis and methodology for population projections, population data sources, including projections								Address
Identification of regulatory requirements								Address
2.1.3.2 Population Between 10 and 50 Miles								
Tables and map of suitable scale similar to that presented in Section 2.1.3.1 depicting the population distribution and projections at 10 mile intervals between 10 and 50 mile radii from the center for first year operation through plant life on same decennial basis			X					Plots/maps
2.1.3.3 Transient Population								
Descriptions of seasonal variations in population due to such as recreational and industrial activities and inclusion of population distribution in current and projected population determinations presented in Sections 2.1.3.1 and 2.1.3.2			X					
2.1.3.4 Low Population Zone								
Specification of low-polation zone(LPZ) in accordance with 10 CFR 100, and RG 4.7								Address the issue
Scaled map of LPZ showing topographic features; highways, railroads, waterways, transportation routes, locations of facilities and institutions such as schools, hospitals, prisons, beaches and parks								Indentification on map
Identification of any facilities and institutions beyond 5 miles of LPZ, that may require special consideration in emergency evacuations								Indentification on map
A table of population distribution within LPZ including transient population			X					
Determination of LPZ such that appropriate protective measures could be taken on behalf of populace in the event of emergency								Address of the issue
2.1.3.5 Population Center								
Indentification of the nearest population center(as defined in 10 CFR Part 100)specifying its population, distance and direction from the reactor. The distance from the reactor to the nearest boundary of population center should be related to the LPZ radius to demonstrate compliance with the requirements in 10 CFR Part 100 (1.334 times outer boundary of LPZ) and RG 4.7			X					Address of the issue
Provide bases for selection of boundary considered for transient population in establishing the population center			X					Address of the issue
Discussion of present and projected population distribution and population density within and adjacent to adjacent to local population groupings			X					Address of the issue
2.1.3.6 Population Density								
Provide a plot out a distance of at least 20 miles showing cumulative resident population(incldluing the weighted transient population) at the time of the projected COL approval and within about 5 years thereafter			X		X			Figure/Plot
Demonstrate resulting uniform population density (defined as the cumulative population at a distance divided by the circular area at that distance) from the cumulative populations averaged over any radial distance out to 20 miles does not exceed 500 persons/square mile in accordance with RG 4.7			X		X			address of the issue
2.2.1 Locations and Routes								
Identification of regulatory requirements								address

List of SAR Review Areas Potentially Involving More Detailed Review

Area/Topic	Calcs Req	Audit	Data	Analysis	Results	Design	Op. Exp.	Remarks
Maps showing the location and distances from the nuclear plant of all significant manufacturing plants; chemical plants; refineries; storage facilities; mining and quarrying operations; military bases; missile sites; transportation routes(air, land, and water); transportation facilities; oil and gas pipelines, drilling operations, and wells; and underground gas storage facilities								address
Any other facilities handling toxic, flammable and explosive substances; any military firing or bombing ranges and any nearby aircraft flight, holding , and landing patterns that may have potential for adverse effects should be shown on the maps								address
2.2.2.1 Description of Facilities								
Provide a concise description								
Provide in tabular form of each facility including its primary function, major products, and the number of persons employed			X					
2.2.2.2 Description of products and materials								
Describe the products and materials regularly manufactured, stored, used, or transported in the vicinity of the plant or onsite.			X					
Identification and Description of hazardous materials								
Provide toxicity limits for each hazardous material			X					
Statistically data on amounts involved, modes of transportation, frequency of shipment, and maximum quantity of hazardous materials likely to be processed stored , or transported								
Applicable toxicity limits for each								
2.2.2.3 Description of Pipelines								
Indicate pipe size, age, operating pressure, depth of burial, location and type of isolation valves			X					
Type of gas or liquid			X					
2.2.2.4 Description of Waterways								
If site is adjacent to a navigable waterway, information on the location of the intake structures in relation to shipping channel, the depth of channel, the locations of locks, the types of ships and barges using waterway and any nearby docks and anchorages should be provided								
2.2.2.5 Description of Highways								
Description of major highways or other roadways								
frequency and quantities of hazardous substances transported by truck in the vicinity of the plant site			X					
2.2.2.6 Description of Railroads								
Identify nearby railroads								
Provide information on the frequency and quantities of hazardous materials transported in the vicinity of the plant site			X					
2.2.2.7 Description of Airports								
Provide information the length and orientation of runways, types of aircraft using the facility, number of operations per year by aircraft type, and the flying patterns associated with the airport			X					
Provide plans for future use of the airport, possible construction of new runways, increased traffic, or use of larger aircraft								
All airports within 5 miles of the nuclear power plant			X					
Airports with projected operations greater than $500d^2$(where "d" is distance in miles from the site) movements per year within 10 miles of the plant			X					

List of SAR Review Areas Potentially Involving More Detailed Review

Area/Topic	Calcs Req	Audit	Data	Analysis	Results	Design	Op. Exp.	Remarks
Airports with projected operations greater than 1000d²(where "d" is distance in miles from the site) movements per year outside 10 miles of the plant			X					
Equivalent information should be included for aviation routes, pilot training areas, and landing and approach paths to airports and military facilities								
2.2.2.8 Projections of Industrial Growth								
For each of the categories given in Section 2.2.2 above, provide changes due to possible growth of present activities and new types of activities			X					
2.2.3.1 Determination of Design-Basis Events								
Consideration of potential Design Basis Accidents(DBAs) identifying effects of those accidents in terms of design parameters(e.g. overpressure, missile energies) or physical phenomena(e.g. concentration of flammable or toxic cloud outside building structures	X		X	X	X			
Identification of applicable regulatory requirements								
DBAs internal and external to the nuclear plant are defined as those accidents that a probability of occurrence on the order of magnitude of 10^{-7} per year or greater and potential consequences exceeding 10 CFR Part 100 dose guidelines	X			X	X			
Probability of occurrence of potential accidents should be determined based on analysis of the available statistical data on the frequency of occurrence for the type of accident under consideration	X			X	X			
Accident categories in selecting design-basis events should include explosions, flammable vapor clouds, toxic chemicals, fires, collisions with intake structures, and liquid spills								
Should consider accidents involving detonations of high explosives, munitions, chemicals, or liquid and gaseous fuels for facilities and activities in the vicinity of the plant or on site, where materials are processed, stored, used, or transported in quantity			X	X				
Particular attention to potential accidental explosions that could produce a blast overpressure of 1psi or greater, using quantity-distance relationships should be given	X			X				
If the blast overpressure criterion is not met or if the probability of occurrence of the subject event is greater than 10^{-7}/year , it should consider missisle generated by explosion and provide analysis in Section 3.5 of the FSAR . RG 1.91 provides guidance for evaluating the postulated explosions on transportation routes near nuclear facility	X		X	X				
Accidental releases of flammable liquids or vapors that result in the formation of unconfined vapor clouds should be considered. Assuming no explosion occurs, calculation of extent of cloud and concentration of gas that could reach the plant under worst-case meteorological conditions should be determined	X		X	X	X			
Release of toxic chemicals from onsite storage facilities and nearby mobile and stationary sources should be evaluated under worst meteorological conditions. These calculated chemical concentrations should be considered in the evaluation of control room habitability in Section 6.4 of the FSAR	X		X	X	X			

List of SAR Review Areas Potentially Involving More Detailed Review

Area/Topic	Calcs Req	Audit	Data	Analysis	Results	Design	Op. Exp.	Remarks
Accidents leading to high heat fluxes or smoke and nonflammable gas or chemical release as the consequence of fires in the vicinity of the plant should be evaluated. Evaluation of fires in adjacent industrial and chemical plants, storage facilities, oil and gas pipelines, brush and forest fires, and fires from transportation accidents that lead to high heat fluxes or formation of clouds should also be evaluated under worst meteorological conditions. These calculated concentrations should be considered in the evaluation of control room habitability in Section 6.4 of FSAR	X		X	X	X			
For power plants sites located near the navigable waterways, the evaluation should consider the probability and potential effects of impact on the plant cooling water intake structure and enclosed pumps by the barges or ships that pass, including any explosions incident to the collision				X	X			
Release of oil or liquids due to spills that could affect the plant's safe operation				X				
2.2.3.2 Effects of Design-Basis Events								
Provide an analysis of the effects of DBAs identified in Section 2.2.3.1 of FSAR on the safety-related components, and discussion of mitigation of consequences of those accidents				X				
2.3.1.1 General Climate								
General Climate Description				X				Types of air masses
				X				Synoptic features (high- and low-pressure systems, frontal systems)
				X				General airflow patterns (wind direction and speed)
				X				Temperature and humidity
				X				Precipitation (rain, snow, sleet, and freezing rain)
				X				Potential influences from regional topography
				X				State climatic division identified
				X				Relationships between synoptic-scale atmospheric processes and local (site) meteorological conditions
2.3.1.2 Regional Meteorological Conditions for Design and Operating Bases								
Severe Weather				X				**Frequency**: Seasonal and Annual Hurricanes, tornadoes, waterspouts, thunderstorms, severe wind events, lightning, hail (including maximum probable size), and high air pollution potential
Freezing Rain (ice storms)				X				**Frequency**: Annual Probable maximum frequency of occurrence, amount, and time duration
Dust (sand) Storms				X				**Frequency**: Annual - Probable maximum frequency of occurrence and time duration
Air Quality				X				Interstate Air Quality Control Region and attainment designations
Snow and Ice				X				Weight of the 100-yr return period snowpack 48-hour probable maximum winter precipitation
Ultimate Heat Sink				X				Meteorological data for evaluating UHS performance (maximum evaporation and drift loss; minimum water cooling; potential for water freezing). Include period of record examined and bases/procedures for selecting critical meteorological data
Tornado Parameters				X				Translational speed, rotational speed, maximum pressure differential with the associated time interval
Wind Speed				X				**Frequency**: 100-year return period "3-second gust"
Dry- and Wet-bulb Temperatures				X				2% and 1% annual exceedance and 100-yr maximum dry bulb temperature and coincident wet bulb temperature; 2% and 1% annual exceedance and 100-yr maximum wet bulb temperature (non-coincident); 98% and 99% annual exceedance and 100-yr minimum dry bulb temperature
All Other Meteorological Conditions				X				Any other meteorological conditions used for design and operating bases, including their bases
2.3.2.1 Normal and Extreme Values of Meteorological Parameters								

List of SAR Review Areas Potentially Involving More Detailed Review

Area/Topic	Calcs Req	Audit	Data	Analysis	Results	Design	Op. Exp.	Remarks
Wind Roses and Wind Direction Persistence				X				**Frequency**: Monthly and Annual Summaries Wind speed classes in accordance with RG 1.23 Wind direction persistence summaries at all heights at which wind characteristics data are applicable or have been measured
Air Temperature				X				**Frequency**: Monthly and Annual Summaries Averages, Measured Extremes, and Diurnal Range
Atmospheric Water Vapor (e.g., wet bulb temp, dewpoint temp, or relative humidity)				X				**Frequency**: Monthly and Annual Summaries Averages, Measured Extremes, and Diurnal Range
Precipitation				X				**Frequency**: Monthly and Annual Summaries Averages, Measured Extremes, Number of Hours with Precipitation, Rainfall Rate Distribution (i.e., maximum distributions for 1-hour intervals up to 24 hours)
Precipitation Wind Roses				X				**Frequency**: Monthly Summaries Wind roses based on precipitation rate classes
Fog (and smog)				X				**Frequency**: Monthly and Annual Summaries Included expected values and extremes of frequency and duration
Atmospheric Stability				X				**Frequency**: Monthly and Annual Summaries Stability defined by vertical temperature gradient or other well-documented parameters that have been substantiated by diffusion data
Mixing Height				X				**Frequency**: Monthly Summaries Included frequency and duration (persistence) of inversion conditions
Wind Speed and Direction by Atmospheric Stability				X				**Frequency**: Annual Summaries - Joint frequency distributions of wind speed and wind direction by atmospheric stability for all measurement levels
2.3.2.2 Potential Influence of the Plant and Its Facilities on Local Meteorology								
Potential Modification of Meteorological Values				X				Influence of plant structures, terrain modifications, and cooling towers or water impoundment features
Topographic Features (as modified by the plant)				X				Within a 5-mile (8 km) radius
Topography Map				X				Within a 50-mile (80 km) radius Include a plot of maximum elevation versus distance from the center of the plant in the 16 compass directions
2.3.2.3 Local Meteorological Conditions for Design and Operating Bases								
Design- and Operating-basis Considerations				X				All local meteorological and air quality conditions used for design- and operation-basis considerations
2.3.3 ONSITE METEOROLOGICAL MEASUREMENTS PROGRAM								
Site Description				X				Include a site map showing meteorological tower location with respect to manmade structures, topographic features, and other site features that may influence site measurements and it should indicate distance to nearby obstructions to flow in each downwind sector.
Onsite Monitoring Program Description (pre-operational)				X				Measurements made (locations and elevations)
				X				Exposure of instruments
				X				Descriptions of instruments used
				X				Instrument performance specifications
				X				Calibration and maintenance procedures
				X				Data output and recording systems and locations
				X				Data processing, archiving, and analysis procedures
Onsite Monitoring Program Description (operational)				X				Measurements made (locations and elevations)
				X				Exposure of instruments
				X				Descriptions of instruments used
				X				Instrument performance specifications
				X				Calibration and maintenance procedures
				X				Data output and recording systems and locations
				X				Data processing, archiving, and analysis procedures
Additional Sources of Meteorological Information				X				Measurements made (locations and elevations)
				X				Exposure of instruments

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Area/Topic	Calcs Req	Audit	Data	Analysis	Results	Design	Op. Exp.	Remarks
				X				Descriptions of instruments used
				X				Instrument performance specifications
Onsite Meteorological Data (supplemental submittal)			X					Joint frequency distributions of wind speed and direction by atmospheric stability
			X					Hour-by-hour listing of hourly-average parameters
				X				Evidence as to how well these data represent long-term conditions at the site
2.3.4 SHORT-TERM ATMOSPHERIC DISPERSION ESTIMATES FOR ACCIDENT RELEASES								
2.3.4.2 Calculations				X				
Dispersion Model				X				A detailed description of the model values
				X				Discuss the effects of topography and nearby bodies of water on short-term dispersion estimates
				X				Information provided should be sufficient to allow the staff to perform its own confirmatory calculations
X/Q Estimates				X				Should be based on the most representative (preferably onsite) meteorological data and present evidence showing how well these dispersion estimates represent conditions that would be estimated from anticipated long term conditions at the site
Postulated Accidental Radioactive Releases								
Offsite Dispersion Estimates	X			X	X			Provide hourly cumulative frequency distributions of X/Q values. Use onsite data at appropriate distances from the effluent release point(s), such as the minimum site boundary distance (exclusion area). Report the X/Q values from each of the distributions that area exceeded 5 percent of the time
	X			X	X			For the outer boundary of the LPZ, it should provide cumulative frequency of X/Q estimates for: (1) the 8-hour time period from 0 to 8 hours (2) the 16-hour period from 8 to 24 hours (3) the 3-day period from 1 to 4 days (4) the 26-day period from 4 to 30 days The worst condition and the 5-percent probability level conditions reported
Control Room Dispersion Estimates	X			X	X			X/Q values that are not exceeded more than 5 percent of the time for all potential accident release points
				X				For the purposes of control room radiological habitability analyses, a site plan showing true north and indicating locations of all potential accident release pathways and control room intake and unfiltered in-leakage pathways
Hazardous Material Releases								
Atmospheric Dispersion Model				X				A description of the atmospheric dispersion model used in evaluating potential DBAs to calculate concentrations of hazardous materials (e.g., flammable or toxic clouds) outside building structures resulting from the onsite and/or offsite airborne releases of such materials
				X				Justification of the appropriateness of the use of the model(s) with regard to release characteristics, plant configuration, plume density, meteorological conditions, and site topography
2.3.5 LONG-TERM ATMOSPHERIC DISPERSION ESTIMATES FOR ROUTINE RELEASES								
2.3.5.2 Calculations								
Dispersion Model				X				A detailed description of the model used to calculate dispersion and deposition values
				X				Accuracy and validity of the model, suitability of input parameters, source configuration, and topography
				X				Meteorological data (onsite and regional) used as input
				X				Information provided should be sufficient to allow the staff to perform its own confirmatory calculations
Atmospheric Dispersion (X/Q) and Deposition (D/Q) Values	X			X	X			For each venting location, X/Q and D/Q values at the site boundary, nearest vegetable garden, nearest residence, nearest milk animal, and nearest meat cow in each 22.5 degree direction sectors within a 5-mile radius of the site
	X			X	X			The calculations provided include estimates of annual average X/Q and D/Q values for 16 radial sectors to a distance of 50 miles (80 km) from the plant using appropriate meteorological data
X/Q and D/Q Estimates				X				Evidence provided to show how well these estimates represent conditions that would be estimated from climatologically representative data

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Area/Topic	Calcs Req	Audit	Data	Analysis	Results	Design	Op. Exp.	Remarks
2.4.1 HYDROLOGIC DESCRIPTION								
Interface of the Plant with the Hydrosphere		X	X					Adequate description of the hydrology of the site and its vicinity, elevation of safety related structures to determine potentials of flooding, topographic maps of sufficient level of details and scale, quantity and type of water use
Hydrological Causal Mechanisms		X	X					Description of hydrologic and climatic causal mechanisms that can cause flooding, low-flow, or drought
Surface and Groundwater Uses		X	X					Description of current and future surface water and groundwater uses in the vicinity
Data		X	X					Description of spatial and temporal data with length of record and any data processing that has been done to generate refined data or derived data
Alternate Conceptual Models		X	X					Adequate description of alternate conceptual models including the model boundings and assumptions that were adopted
Consideration of Other Site-Related Evaluation Criteria		X	X					Demonstrate that potential effects of site-related proximity and of seismic and non-seismic information as they relate to hydrologic description in the vicinity are properly taken into account
2.4.2 FLOODS								
Local Flooding on the Site and Drainage Design	X	X	X	X	X			Specify final grade elevation, estimate local intense precipitation, specify design bases
Stream Flooding		X	X					Historical record
Surges		X	X					Historical record
Seiches		X	X					Historical record
Tsunami		X	X					Historical record
Seismically Induced Dam Failures (or Breaches)		X	X					Historical record
Flooding Caused by Land Slides		X	X					Historical record
Effects of Ice Formation in Water Bodies		X	X					Historical record
Combined Effects Criteria		X	X					Description
2.4.3 PROBABLE MAXIMUM FLOOD (PMF) ON STREAMS AND RIVERS								
Design Bases for Flooding in Streams and Rivers	X	X	X	X	X			Specify flood water elevation during PMF or some other appropriate design-basis flood in nearby streams and rivers; used for design-basis flood water elevation
Design Bases for Site Drainage	X	X	X	X	X			Estimate flood water elevation due to local intense precipitation on-site and in local streams, specify design bases; used for design-basis flood water elevation
2.4.4 POTENTIAL DAM FAILURES								
Flood Waves from Severe Breaching of an Upstream Dam	X	X	X	X	X			Specify flood water elevation during worst-cause dam-breach scenario; used for design-basis flood water elevation
Domino-Type or Cascading Dam Failures	X	X	X	X	X			Specify flood water elevation during worst-cause cascading dam-breach scenario; used for design-basis flood water elevation
Dynamic Effects on Structures	X	X	X	X	X			Specify design bases for safety-related SSC
Loss of Water Supply Due to Failure of a Downstream Dam	X	X	X	X	X			Low-water level for safety-related water supply
Effects of Sediment Deposition and Erosion	X	X	X	X	X			Specify design bases for safety-related SSC
Failure of Onsite Water Control or Storage Structures	X	X	X	X	X			flood water elevation
2.4.5 PROBABLE MAXIMUM SURGE AND SEICHE FLOODING								
Probable Maximum Hurricane	X	X	X	X	X			Used for design-basis flood water elevation and low-water elevation
Probable Maximum Wind Storm		X	X					Used for design-basis flood water elevation and low-water elevation
Seiche and Resonance	X	X	X	X	X			Used for design-basis flood water elevation and low-water elevation
Wave Runup	X	X	X	X	X			
Effects of Sediment Erosion and Deposition	X	X	X	X	X			Specify design-bases for safety-related SSC
2.4.6 PROBABLE MAXIMUM TSUNAMI HAZARDS								
Historical Tsunami Data		X	X					Historical record
Probable Maximum Tsunami	X	X	X	X	X			Specify candidate PMTs
Tsunami Propagation Models	X	X	X	X	X			
Wave Runup, Inundation, and Drawdown	X	X	X	X	X			PMT hazards

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Area/Topic	Calcs Req	Audit	Data	Analysis	Results	Design	Op. Exp.	Remarks
Hydrostatic and Hydrodynamic Forces	X	X	X	X	X			PMT hazards
Debris and Water-Borne Projectiles	X	X	X	X	X			PMT hazards
Effects of Sediment Erosion and Deposition	X	X	X	X	X			PMT hazards; specify design-bases for safety-related SSC
2.4.7 ICE EFFECTS								
Historical Ice Accumulation		X	X					Historical record
High and Low Water Levels	X	X	X	X	X			Specify flood water elevation and low-water elevation; used for specification of design bases for safety-related SSC
Ice Sheet Formation	X	X	X	X	X			Specify design bases for safety-related SSC
Ice-Induced Forces and Blockages	X	X	X	X	X			Specify design bases for safety-related SSC
2.4.8 COOLING WATER CANALS AND RESERVOIRS								
Hydraulic Design Bases for Protection of Structures	X	X	X	X	X			Specify design bases for safety-related SSC
Hydraulic Design Bases of Canals	X	X	X	X	X			Specify design bases for safety-related SSC
Hydraulic Design Bases of Reservoirs	X	X	X	X	X			Specify design bases for safety-related SSC
2.4.9 CHANNEL DIVERSIONS								
Historical Channel Diversions		X	X					Historical record
Regional Topographic Evidences		X	X					
Ice Causes	X	X	X	X	X			Specify flood water elevation, used for design bases for safety-related water supply
Flooding of Site Due to Channel Diversion		X	X					Specify design bases for safety-related SSC
Human-Induced Causes of Channel Diversion		X	X					Specify design bases for safety-related SSC
Alternative Water Sources		X	X					Used for design bases for safety-related water supply
2.4.10 FLOODING PROTECTON REQUIREMENTS								
Safety Related Facilities Exposed to Flooding		X	X		X			design bases for flooding protection
Type of Flood Protection		X	X		X			design bases for flooding protection
Emergency Procedures		X	X		X			design bases for flooding protection
2.4.11 LOW WATER CONSIDERATIONS								
Low Water from Drought		X	X	X	X			Used for design bases for safety-related water supply
Low Water from Other Phenomena	X	X	X	X	X			Used for design bases for safety-related water supply
Effects of Low Water on Safety Related Water Supply		X	X					Used for design bases for safety-related water supply
Water Use Limits		X	X					Used for design bases for safety-related water supply
2.4.12 GROUNDWATER								
Local and Regional Groundwater Characteristics and Use		X	X					subsurface characteristics
Effects on Plant Foundations and Other Safety Related Structures, Systems, and Components		X	X					Specify design bases for safety-related SSC
Reliability of Groundwater Resources and Systems Used fro Safety Related Purposes	X	X	X	X	X			Used for design bases for safety-related water supply
Reliability of Dewatering Systems	X	X	X	X	X			Specify design bases for safety-related SSC
2.4.13 ACCIDENTAL RELEASES OF RADIOACTIVE LIQUID EFFLUENTS IN GROUND AND SURFACE WATERS								
Alternate Conceptual Models		X	X					Examine a set of alternate conceptual models of groundwater hydrology to bound uncertainty in sufsurface processes
Pathways	X	X	X	X	X			Used for subsurface transport of accidental liquid effluent to accessible environment
Characteristics that Affect Transport	X	X	X	X	X			Used for subsurface transport of accidental liquid effluent to accessible environment
2.4.14 TECHINICAL SPECIFICATIONS AND EMERGENCY OPERATION REQUIREMENTS								
Bases for Emergency Actions		X	X					Specify bases for emergency actions during controlling hydrological events
Available Response Time	X	X	X	X	X			Review available response times to implement required emergency actions during controlling hydrological events
Technical Specifications		X	X					

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Area/Topic	Calcs Req	Audit	Data	Analysis	Results	Design	Op. Exp.	Remarks
SRP 2.5.1 Basic Geologic and Seismic Information								
Define all the sources geologically hazardous to the site (rejection if not fully defined and characterized)			X	X	X			
Coastal Site - Tsunami Review - Potential near and far-field sources well-defined; earthquake, landslide, and other sources fully described (otherwise potential schedule delays/rejection)			X	X	X			
SRP 2.5.2 Vibratory Ground Motion								
Verify Method to determine Safe Shutdown Earthquake follows RG 1.165 or RG 1.208 (otherwise potential schedule delays); rejection if new method and not fully described	X		X	X	X			Surface Seismic Hazards Curves as specified in RG 1.206
Verify Site Response Method Previously Reviewed (otherwise potential schedule delays); rejection if new method and not fully described	X		X	X	X			
Verify Probabilistic Seismic Hazard Analysis Method Source Models Updated and detailed basis for updates provided (otherwise potential schedule delays)	X		X	X	X			
Verify Ground Motion Attenuation Model Previously Reviewed (otherwise potential schedule delays); rejection if new method and not fully described	X		X	X	X			
SRP 2.5.3 Surface Faulting								
Verify no Previously Unreviewed Local Capable Geologic Fault Exists At Site (otherwise potential schedule delays)		X	X	X	X			Geologic Maps, Cross-Sections
SRP 2.5.4 Stability of Subsurface Materials and Foundations								
Verify There Is not a Significant Extent of Unstable Rock or Soil (otherwise potential schedule delays/rejection)	X		X	X	X			Cross-Section Maps
Verify Application Includes Soil Dynamic Testing Data (if applicant has proposed to supply at a later date, potential schedule delays)	X		X	X	X			
Verify Adequacy of New Geotechnical Exploration for Planned Units (vs. Reliance on Prior Data) - (potential rejection)	X		X	X	X			
SRP 2.5.5 Stability of Slopes								
Verify Slopes Fully Analyzed for Stability	X		X	X	X			
3.2.1 Seismic Classification								
Supplemental requirements for RTNSS componetnts is to be identified								
Basis should be provided if risk-informed classification is proposed							X	50.69 does not apply to design certifications or COLs
Electrical Seismic Classification Issues								Battery charger classification basis and qualification method and ancillary DG classification basis.
Reference Documents								Verify that industry standards are currrent and endorsed by NRC. Otherwise classifiation criteria should be adequately defined.
3.2.2 System Quality Group Classification								
N-Stamp for systems designed to ASME Section III								Justification if ASME Section III systems or components are not to be N-stampedper RG 1.26 Rev. 4 and RIS 2005-17 with corresponding ISI and IST.
3.5.1.3 Turbine Missiles								
Turbine missile generation probability calculations								
3.5.1.5 Site Proximity Missiles (Except Aircraft)								
Identification of all missile sources resulting from accidental explosions in the site vicinity of the site, based on the nature and extent of nearby industrial, transportation, and military facilities (other than aircraft) identified in Section 2.2.1-2.2.3 of the FSAR should be addressed								Address

List of SAR Review Areas Potentially Involving More Detailed Review

Area/Topic	Calcs Req	Audit	Data	Analysis	Results	Design	Op. Exp.	Remarks
The missile sources that should be considered include train explosions(including rocket effects); truck explosions; ship or barge explosions; industrial facilities (where different types of chemicals are processed, stored, used, or transported); pipeline explosions; and military facilities								Address
Identification of SSCs that have potential for unacceptable missile damage and estimation of total probability of the missiles striking a vulnerable critical area of the plant			X	X				Address
If the total probability is greater than an order of magnitude of 10^{-7} per year, a specific missile description along with description of missile effects on the SSCs is required to addressed			X	X				Address
3.5.1.6 Aircraft Hazards								
Federal airways, holding patterns, or approach patterns with 2 miles of nuclear facility			X					Address
All airports located within 5 statue miles of the site			X					Address
Airports with projected operations greater than $500d^2$ movements per year located within 10 statue miles of the site and greater than $1000d^2$ per year outside 10 statue miles, where "d" is distance in miles from the site	X		X	X				Address
Military installation or any air space usage that might present a hazard to the site (unusual stress due to practice bombing ranges) as far as 20 statue miles from the site			X	X				Address
Hazards may be resulting in structural damage or involving fire. Analyses should be based on projected traffic, aircraft accident statistics			X					Address
The aircraft hazard analysis should provide an estimate of the total aircraft probability per year.	X		X	X				Address
The plant design should consider aircraft accidents that could lead to radiological consequences in excess of the exposure guidelines of 10 CFR 50.34(a)(1) and 10 CFR 52.79 with a probability of occurrence greater than an order of magnitude of 10^{-7} per year	X		X	X				Address
SRP 3.6.2 Determination of Rupture Locations and Dynamic Effects Associated with the Postulated Rupture of Piping								
Methodology of Jet Expansion Modeling				X				Pending on the ESBWR's resolution of the ACRS's concerns on the potential non-conservatism of ANS 58-2 Standard for jet expansion modeling, this issue may result in an area for which extensive review effort is needed for EPR DC and COLs, APWR DC and COLs, and ESBWR COLs.
Pipe Break analysis Results					X	X		Should include a discussion of the implementation of the pipe break design criteria as well as the results of the analysis (e.g., sketches of applicable piping systems showing the location, size and orientation of postulated pipe breaks and the location of pipe whip restraints and jet impingement barriers).
SRP 3.7.4 Seismic Instrumentation								
Verify Positioning of Seismic Monitors Is Based on RG 1.166 (including free field)	X		X	X	X			
Verify Shutdown Criteria Is Based on RG 1.166	X		X	X	X			
SRP 3.9.1 Special Topics for Mechanical Components								
Design transients, resulting loads and load combinations	X	X	X	X	X	X	X	A list of design transients, resulting loads, and load combinations (including no. of events for each transient as well as the no. of load and stress cycles per event) used in the design and fatige analysis of all ASME Class 1 and CS components, component supports, and reactor internals should be included.
Computer Programs	X	X	X	X	X	X		Computer programs used in load definition and the dynamic and static analyses to determine the structural and functional integrity of seismic Category I ASME Code and non-ASME Code items should be listed and must have been previously reviewed and approved by the NRC.

List of SAR Review Areas Potentially Involving More Detailed Review

Area/Topic	Calcs Req	Audit	Data	Analysis	Results	Design	Op. Exp.	Remarks
Stress analysis method used in design	X	X	X	X	X	X	X	Sufficient information should be provided for use of (1) experimental stress analysis techniques in lieu of theoretical stress analysis, (2) elastic-plastic or ideal plastic analysis method instead of elastic analysis, or (3) other non-classical analytical and design methods such as load and resistance factor design technique or the load definition based on scale model testing for potential adverse effects of acoustic resonance loading for structural component i9ntegrity as depicted in SRP Sections 3.9.3 and 3.9.5.
Environmental and service conditions	X	X	X	X	X	X	X	Components must be designed adequately with reasonable assurance that they will remain functional under all postulated pipe breaks and seismic events over the design life of the plants. The methods of analysis to calculate stresses and deformations should conform to methods outlined in App F to ASME Code, Section III, Div. 1.
SRP 3.9.2 Dynamic Testing and Analysis of Systems, Structures, and Components								
Seismic Analysis and Qualification of Seismic Category I Mechanical Equipment						X		Description of mathematical models for major mechanical equipment and components, including control rod drive (CRD) housing (including CRD).
Expected and acceptable responses of equipment during preoperational Vibration Program	X		X	X	X	X		First of a kind analysis possibly required in response to RG 1.20 to address potentioal adverse flow effects from acoustic resonance and hydrodynamic loads that can impact reactor vessel internals and steam and feedwater coomponents. Description of analytical methods to determine potential adverse flow effects (flow-excited resonances and flow induced vibration) which may impact equipment.
Monitoring and assessment of flow-induced acoustic and structural resonances during preoperational and start-up testing			X	X				Determination of the test acceptance criteria in terms of the maximum allowable response levels at the sensor locations.
Area/Topic	**Calcs Req**	**Audit**	**Data**	**Analysis**	**Results**	**Design**	**Op. Exp.**	**Remarks**
SRP 3.9.3 ASME Code Class 1, 2, and 3 Components, and Component Supports, and Core Support Structures								
Component Supports				X				Approaches used to account for the snubber end fitting clearance and lost motion in piping analysis. Description of snubber production testing and qualification testing, including those for large-bore hydraulic snubbers.
3.9.5 Reactor Pressure Vessel Internals								
RPV Internal Structures (PWR and BWR)	X							Predictive analysis calculations are necessary to address the potential adverse effects of flow-induced vibration and acoustic resonances in order to meet guidelines/requirements of the following: SRP 3.9.5, Section II, Acceptance Criterion II.6, and specific review area I.6; SRP 3.9.2, Section II, Acceptance Criterion II.3; R.G. 1.20, Section 2.1 (required only for a prototype reactor design); 10CFR 52.47(a)(2), specifically for an application for Design Certification of a prototype reactor
RPV Internals Other than Core Support Structures				X		X		Identification of the design criteria, loading conditions, and analyses methods that provide the basis for design of reactor internal structures not designated as core support structures should be provided in sufficient detail to satisfy the SRP 3.9.5 Acceptance Criterion II.3.
Plant Systems attached to the RPV						X	X	Sufficient design information should be provided for potential adverse effects of flow-induced vibratory loadings on plant systems associated with the RPV to allow the staff to make a determination that the these flow induced loadings from systems external to the RPV will not adversely affect the reactor internals. (Ref. SRP 3.9.5, Section III.6, and SRP 3.9.5 Acceptance Criterion II.6).
RPV Internals Design Basis						X	X	The basis of the design of all reactor internal structures, including definition of loadings and load combinations for normal operating conditions, anticipated operational occurrences, flow-induced vibratory loads, acoustic resonances, and postulated accidents should be provided in sufficient detail to satisfy the SRP 3.9.5 specific review area I.2.
3.9.6 Functional Design, Qualification, and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints								
Flow induced vibration	X		X	X	X	X		First of a kind analysis possibly required in response to RG 1.20 to address potentioal adverse flow effects from acoustic resonance and hydrodynamic loads that can impact reactor vessel internals and steam and feedwater coomponents.
Full description of operational programs needed							X	Guidance in RG 1.206 with updated valve diagnostics and transfer of snubber inspection and testing from ASME BPV Code to ASME OM Code. Where an applicant plans to apply updated valve diagnostics, detailed justification of the new methodology shoudl be included.
3.9.7 Risk-Informed Inservice Testing of Pumps and Valves								

List of SAR Review Areas Potentially Involving More Detailed Review

Area/Topic	Calcs Req	Audit	Data	Analysis	Results	Design	Op. Exp.	Remarks
Treatment process for low-risk safety-related components								In generic guidance for risk-informed IST Program, treatment has not been developed by industry or accepted by staff. A strong justification for such a program is required.
3.9.8 Risk Informed ISI of Piping								
Risk informed ISI program								Requires detailed review of PRA results, as-built drawings, id of piping segments/elements, identification of degradation mechanisms, identfication of failure consequences, and delta risk calculations.
SRP 3.10 Seismic and Dynamic Qualification of Mechanical and Electrical Equipment								
Seismic and Dynamic Qualification of Mechanical and Electrical Equipment		X	X	X	X	X	X	Where experience-based (earthquake experience and/or test experience) approach to be used, staff needs details of the experience database, including applicable implementation procedures. Difficulty experienced in past with establishing the equipment similarity for an equipment class.
SRP 3.12 ASME Code Class 1, 2, and 3 Piping Systems, Piping Components and their Associated Supports								
Design Reports for ASME Class 1, 2 , & 3 available		X			X			
Environmental Fatigue					X			
Appendix S for OBE					X			
SRP 4.2 Fuel Design								
Cladding Embrittlement				X	X	X		Analyses must be performed using NRC approved methodologies. Demonstrate that the calculation results conform to the respective requirements or acceptance limits.
Fuel Rod Ballooning				X	X			Analyses must be performed using NRC approved methodologies. Demonstrate that the calculation results conform to the respective requirements or acceptance limits.
Structural Deformation			X	X	X	X		Analyses must be performed using NRC approved methodologies. Demonstrate that the calculation results conform to the respective requirements or acceptance limits.
Interim Criteria for RIA			X	X	X			Analyses must be performed using NRC approved methodologies. Demonstrate that the calculation results conform to the respective requirements or acceptance limits. New interim acceptance criteria are specified in SRP Section 4.2, Rev. 3, Appendix B. These acceptance criteria are applicable to the control rod ejection and drop events.
4.3 Nuclear Design								
Nuclear Analysis Methods			X	X	X			Use of new nuclear analysis methodologies and computer codes will be subjected to extensive review. Use of NRC approved methodologies and codes will be evaluated for applicability to the applied core design.
Initial Core Design				X	X	X		Adequacy of Initial core design should be demonstrated with analyses. Provide a comparison to existing design for reference.
4.4 Thermal and Hydraulic Design								
Critical heat flux correlations			X	X	X	X		New CHF correlations are subjected to extensive review, including test data base, test assembly geometry, test ranges, thermal-hydraulic analysis, and the methodology and statistical analyses for the development of the DNBR limits. Use of approved CHF correlations will require justification of their applicability to the applied fuel design.
Core analysis methods				X	X	X		Use of new thermal-hydraulic methodologies will require extensive review. Use of NRC approved codes will require evaluation of their applicability to the applied core design.
Uncertainty treatment in thermal-hydraulic and DNBR calculations			X	X	X			For those uncertainties not treated deterministically, the statistical uncertainty treatment must use approved methodologies.
BWR stability evaluation(			X	X	X	X		BWR stability should be evaluated using approved methodologies, such as the methods for detection and suppression of power oscillation proposed by the BWR Owners Group stability long-term solution options. New methodologies will be subjected to extensive review. NRC audit and calculations of setpoints may be necessary on proposed methods other than the standard methods approved. Revised BWR stability review guidance is described in SRP 15.9.
4.6 Functional Design of Control Rod Drive System								
Rod Insertion and Withdrawal			X	X	X	X		
Scram Operation and Scram Time			X	X	X	X		
SRP 5.2.2 Over-pressure Protection								

List of SAR Review Areas Potentially Involving More Detailed Review

Area/Topic	Calcs Req	Audit	Data	Analysis	Results	Design	Op. Exp.	Remarks
Safety Analysis for Low Temperature Overpressure Protection				X	X	X		The safety analyses to support the safety valve sizing for overpressure protection at power operation conditions are addressed in Chapter 15. The analyses for supporting the design of low temperature overpressure protection (LTOP) system design should be performed using NRC approved methodology. The LTOP system is required for PWRs only. Branch Technical Position 5-2 provides guidance for the LTOP system design. The BWR plant generally do not have an LTOP system because their plant operational characteristics and administrative control during low temperature operation preclude potential LTOP events. The BWR applicants should provide detailed description of their administrative controls and the results of analysis to assure that the reactor vessel pressure will not exceed the pressure/temperature limits during plant startup and shutdown.
SRP 5.4.6 Reactor Core Isolation Cooling System (BWR)								
RCIC system evaluation				X	X	X	X	RCIC system is not identified in RG 1.206. However RCIC is part of the ECCS in the BWR designs, and must be qualified as such. Heat removal capability of the RCIC system during station blackout should be addressed, including the time duration the RCIC will work with only reactor steam and the DC power during the SBO. For ESBWR design, the ECCS function of the RCIC system is replaced by the isolation condenser.
SRP 5.4.7 Residual Heat Removal System								
Design Requirements					X	X		Description should be provided of implementation of and conformance to Branch Technical Position 5-4 (previously BTP RSB 5-1). For passive plant design such as AP1000 that relies on passive RHR system for mitigation of design basis events, the regulatory oversight of the non-safety related active RHR system is evaluated with the process of "regulatory treatment of non-safety systems" described in SECY-93-087.
Mid-loop operation					X	X		Description should be provided of the RHR system design features that are used in low power and shutdown operation, including mid-loop operation.
ISLOCA				X	X	X		Description of the RHR system design features for isolating the system from the reactor coolant system to prevent Interfacing system LOCA.
RHR (BWR)				X	X	X	X	In the BWR design, low-pressure flooder mode of the RHR is part of the ECCS, and this portion of the RHR system should be qualified as such. This aspect of design is not identified in RG 1.206.
SRP 5.4.12 RCS Vent System								
Design Features						X		Description should be provided of the RCS vent system design feature for compliance with TMI Action Item II.B.1 to prevent inadvertent or irreversible actuation of a vent path following a single failure of an active component.
Operating procedures								Description of the operating procedures of the RCS vent system, which are normally developed based on the reactor owners group's emergency response guidelines
SRP 5.4.13 Isolation Condenser System (BWR)								
Isolation condenser system evaluation				X	X	X	X	The isolation condenser (IC) system is not identified in RG 1.206. For ESBWR design, the isolation condenser performs the ECCS function of the reactor core isolation cooling system, therefore. must be qualified as the ECCS. Heat removal capability of the IC system should be addressed.
SRP 6.2.1 Containment Functional Design								
Suppression Pool					X			Review for compliance
Subcompartment	X				X	X		Review for compliance
M&E release					X			Review for compliance
M&E release for secondary piping (PWR)					X			Review for compliance
Cont Peak Pressure for ECCS performance study					X			Review for compliance
Testing/Inspection					X		X	Review for compliance
Instrumentation					X		X	Review for compliance
SRP 6.2.2 Containment Heat Removal								
Design Basis								Review for compliance
System Description								Review for compliance
Design Evaluation	X			X	X			Review for compliance
Testing/Inspection						X	X	Review for compliance
Instrumentation						X		Review for compliance
SRP 6.2.3 Secondary Containment Functional Design								
Radioactive release control including Mixing Assumptions				X	X			Review for compliance
Reactor Building Isolation and Leakage Rates								Review for compliance
Test programs and Inspections							X	Review for compliance

List of SAR Review Areas Potentially Involving More Detailed Review

Area/Topic	Calcs Req	Audit	Data	Analysis	Results	Design	Op. Exp.	Remarks
Post Accident temperature control								Review for compliance
Consistency with design basis accident assumptions								Review for compliance
Use of non-safety systems for atmospheric clean up								Review for compliance
SRP 6.3 Emergency Core Cooling System								
ECCS System Design						X		ECCS safety design basis should be consistent with requirements of 10CFR40.46 and applicable GDCs. Detailed design description of the ECCS, including schematic piping and instrumentation diagrams
Performance evaluation			X	X	X	X		For the ECCS design which differs significantly from current operating plant designs, or utilizes simplified, inherent, passive, or other innovative means to accomplish its safety functions, separate effects and or integral test data are required per 10CFR52.47(b). Evaluation of ECCS system capability to perform all design safety functions during all modes of plant operation
Failure mode and effects Analysis			X	X	X	X		Description of the failure modes and effects analysis of the ECCS to identify functional consequences of each possible single failure.
Low pressure Opening check valves			X	X	X	X		Check valves in the passive safety systems are considered passive components subjected to single failure assumption. The bases should be provided for not treating check valves in the passive ECCS design that operate with low-differential pressure and requiring repositioning to perform their safety function as active components.
Resolution of GSI 191			X	X	X	X		Description of design features and operating procedures for preventing blockage of containment sump and in-containment refueling water storage screens, and implementation of guidance for resolution design GSI-191.
SRP 6.4 Control Room Habitability								
Temperature Control with Passive heat sink				X	X			Review for compliance
Leaktightness - Unfiltered inleakage							X	Review for compliance
Toxic Gas Control (COL item)			X	X	X			Review for compliance
CRHA Envelope								Review for compliance
Ventilation System Design (See also 9.4.1)								Review for compliance
Interactions with other zones								Review for compliance
Shielding Design								Review for compliance
System operating procedures							X	Review for compliance
Radiological Protection (See also chapter 15) Assumptions in design basis analyses and specific design features								Review for compliance
Instrumentation and Monitoring								Review for compliance
Potential Pathways for Radioactivity and Radiation that affect CRHA								Review for compliance
Testing and Inspecting Features							X	Review for compliance
SRP 6.5.3, Fission Product Control Systems and Structures								
Information regarding the ability of the primary containment to control fission product releases following a design basis accident			X	X		X		
Design and operation of containment purge systems prior to and during a design basis accident			X	X		X		
Design and operation of each system in the secondary containment used to control the release of fission products leaking from the primary containment following a design basis accident			X	X		X		
Evaluation and description of suppression pool design basis for the fission product removal function			X	X		X		
7.1 Instrumentation and Controls -- Introduction								
Identification of safety-related systems						X		
Identification of safety criteria						X		
7.2 Reactor Trip System								
Design criteria (IEEE-603 compliance)				X		X		
Defense -in-depth & diversity				X		X		
Life cycle design process				X		X		
Equipment qualification				X		X		
System testing capability				X		X		
Failure mode and effect analyses				X		X		

List of SAR Review Areas Potentially Involving More Detailed Review

Area/Topic	Calcs Req	Audit	Data	Analysis	Results	Design	Op. Exp.	Remarks
Cyber security requirements				X		X		
Setpoint determination				X		X		
Preliminary logic diagrams						X		
7.3 Engineered Safety Features Systems								
Design criteria (IEEE-603 compliance)				X		X		
Defense -in-depth & diversity				X		X		
Life cycle design process				X		X		
Equipment qualification				X		X		
System testing capability				X		X		
Failure mode and effect analyses				X		X		
Cyber security requirements				X		X		
Setpoint determination				X		X		
Preliminary logic diagrams						X		
7.4 Safe Shutdown Systems								
Design criteria (IEEE-603 compliance)				X		X		
Defense -in-depth & diversity				X		X		
Life cycle design process				X		X		
Equipment qualification				X		X		
System testing capability				X		X		
Failure mode and effect analyses				X		X		
Cyber security requirements				X		X		
Setpoint determination				X		X		
Preliminary logic diagrams						X		
Remote Shutdown Capability				X		X		
7.5 Information Systems Important to Safety								
Design criteria (IEEE-603 compliance)				X		X		
Defense -in-depth & diversity				X		X		
Life cycle design process				X		X		
Equipment qualification				X		X		
System testing capability				X		X		
Failure mode and effect analyses				X		X		
Cyber security requirements				X		X		
Setpoint determination				X		X		
Preliminary logic diagrams						X		
Post-accident monitoring				X		X		
7.6 Interlock Systems Important to Safety								
Design criteria (IEEE-603 compliance)				X		X		
Defense -in-depth & diversity				X		X		
Life cycle design process				X		X		
Equipment qualification				X		X		
System testing capability				X		X		
Failure mode and effect analyses				X		X		
Cyber security requirements				X		X		
Setpoint determination				X		X		
Preliminary logic diagrams						X		
7.7 Control Systems								
Design-basis Information				X		X		
Effects of control system failures				X		X		
independence from safety system				X		X		
Defense -in-depth & diversity				X		X		
System testing capability				X		X		

List of SAR Review Areas Potentially Involving More Detailed Review

Area/Topic	Calcs Req	Audit	Data	Analysis	Results	Design	Op. Exp.	Remarks
Preliminary logic diagrams						X		
7.8 Diverse Instrumentation and Control Systems								
Design-basis Information (10 CFR 50.62 compliance)				X		X		
Effects of diverse protection system failures				X		X		
independence from safety system				X		X		
Defense -in-depth & diversity				X		X		
System testing capability				X		X		
Preliminary logic diagrams						X		
7.9 Data Communication Systems								
Design-basis Information (see RG 1.206 C.I.7.9.2)				X		X		
8.2 Offsite Power System								
Grid(Reliability, Protocols)				X	X			Emerging Technical Issues Grid reliability. Protocol between grid operators and plant operator. Real time contingency analysis software tool.
Performance of FMEA of the switchyard				X	X	X		
8.3.1 A-C Power Systems (Onsite)								
Diesel generator capacity and capability	X			X	X	X		First-of-a-Kind Technical Review Use of Combustion Turbine Generator as emergency power sources in lieu of diesel generators.
Penetrations over load protection	X			X		X		
Degraded voltage protection	X			X		X		
8.3.2 D-C Power Systems (Onsite)								
Battery capacity and capability	X			X	X	X		
Battery Charger design	X			X	X	X		
9.1.1 New Fuel Storage								
Criticality Analysis				X	X	X		Criticality analysis should be performed with NRC approved methodologies, preferably 3-D methods.
Subcritical geometry (minimum boron credit)								10CFR50.68 and GDC 62 require that a subcritical geometry be maintained in the spent fuel pool. Boron credit may be taken to meet the K_{eff} = 0.95.
9.1.5 Heavy Load Handling Systems								
Load Drop Analysis				X				Needed for non-signle failure proof crane
9.3.4 Chemical and Volume Control System (PWR)								
Description of CVCS design						X		Description of the CVCS system and components, including a simplified piping and instrumentation diagram.
Failure Modes and Effects Analyses				X	X	X		If the CVCS is used for accident mitigation, the results of failure modes and effects analyses performed to identify limiting single failures consideration should be provided.
SRP 9.3.5 Standby Liquid Control System (BWR)								
ATWS				X	X	X	X	Description of use of SLCS for compliance with anticipated transients w/o scram (ATWS) rule of 10CFR50.62
ECCS Function of SLCS				X	X	X		For ESBWR design only, SLCS system is part of the ECCS and is to be designed and qualified as such.
SRP 9.4.1 Control Room HVAC CRHAVS								
Adequacy of air supply, cooling, heating, humidity control, recirculation and freshness in all modes								Review for Compliance
Emergency air supply/filter unit								Review for Compliance
Toxic gas design features								Review for Compliance
Testing programs and Inspection								Review for Compliance
Post accident isolation								Review for Compliance
Power supplies for SBO with LOCA								Review for Compliance
Release monitoring								Review for Compliance
Use of RTNSS systems								Review for Compliance
Safety related component evaluation								Review for Compliance
SRP 9.4.2 Spent Fuel Pool Ventilation Area FBVS								
Radiation release control features								Review for Compliance
Building isolation adequacy								Review for Compliance
Temperature control normal and post accident								Review for Compliance

List of SAR Review Areas Potentially Involving More Detailed Review

Area/Topic	Calcs Req	Audit	Data	Analysis	Results	Design	Op. Exp.	Remarks
Use of RTNSS systems								Review for Compliance
Safety related component evaluation								Review for Compliance
SRP 9.4.3 Auxiliary and Radwaste Area Ventilation System RWVS, RBVS, EBVS, DCS								
Radiation release control features								Review for Compliance
Building isolation adequacy								Review for Compliance
Temperature control normal and post accident								Review for Compliance
Use of RTNSS systems								Review for Compliance
Safety related component evaluation								Review for Compliance
TSC radiation protection and ventilation								Review for Compliance
9.4.4 Turbine Area Ventilation System TBVS								
Radiation release control features						X	X	Review for Compliance
Building isolation adequacy						X		Review for Compliance
Temperature control normal and post accident						X	X	Review for Compliance
Use of RTNSS systems						X		Review for Compliance
Safety related component evaluation						X		Review for Compliance
SRP 9.4.5 Engineered Safety Feature Ventilation System								
Only the CRHAVS is considered as an ESF safety system. See (9.4.1)								Review for Compliance
9.5.1 Fire Protection Program								
Detailed Fire PRA				X	X			No DCD applicants have submitted a detailed fire PRA to date. If a COL applicant submits a detailed fire PRA the review will be extensive and the lead branch will be SPLA.
Fire Hazards Analysis				X	X			All DCD applicants have submitted a reasonably complete fire hazards analysis. COL applicants must finalize the FHA and provide site-specific analyses. COL's that do not reference a certified design will have to provide the complete FHA.
Post-Fire Safe-Shutdown Circuit Analysis				X	X			DCD's include a high level analysis. COL applications should include a more detailed analysis based on the physical routing of circuits.
Multiple spurious actuations						X		Design refers to the licensee's assumptions applicable to multiple spurious actuations caused by fire-induced failure of safe-shutdown electrical circuits. This issue is currently under review by an industry working group in cooperation with the NRC. Category 2 of the survey would apply – may require first-of-a-kind technical reviews, as well as Category 3 – new technical issue.
Operator manual actions						X		Design refers to licensee's acceptance criteria for operator manual actions credited for post-fire safe shutdown. RIS 2006-10 and NUREG-1852 (Draft) have been issued recently on this issue.
Fire models	X			X	X			No applicant has credited detailed fire models to justify their design to date. It a COL applicant credits a detailed fire model, the review could be extensive. The model will provide input to an analysis (possibly the fire PRA).
13.3 Emergency Planning								
EALs								Complete set needed.
emergency plan								Clearly define the extent to which an existing site's Emergency plan is part of the application
EP ITAAC								Fully address each individual reactor unit covered by the COLA
Security related requirements								Fully address.
State and Local emergency plans								Include complete plans
Cross reference								Include a complete and clear cross-reference to requirements and acceptance criteria
13.5.2.1 Operating and Emergency Operating Procedures								
Compliance with TMI Action Item I.C				X	X			TMI Action Item I.C.1 specifies the requirements for operating procedures. Plant emergency operating procedures (EOP) are generally developed from vendors emergency procedures guidelines (EPG) or emergency response guidelines (ERG). The EPG should: (a) include both optimum recovery (event oriented) guidelines and system recovery (function oriented) guidelines; (b) include clear entry and exit conditions, and technically sound and unambiguous instructions to operators; (c) include technical information, including analyses, to support each step instruction used; and (d) be verified and validated by simulator exercise using NRC-approved simulator design.
15.0, Accident Analyses								
Classification of Plant Conditions					X			SRP Section 15.0, Revision 3 (March 2007), revised the event classification by combining the moderate frequency events and infrequent events into anticipated operational occurrences (AOOs). The acceptance criteria for AOOs are specified in Appendix A to Part 50.

List of SAR Review Areas Potentially Involving More Detailed Review

Area/Topic	Calcs Req	Audit	Data	Analysis	Results	Design	Op. Exp.	Remarks
Computer codes used			X	X	X			Use of new methodologies (including models and computer codes) will be subjected to extensive review, including test data for validation of the codes and models. Use of approved methodologies will be reviewed for code and model applicability to the applied reactor design. Application should provide a list of safety evaluations approving the topical reports that document the methodologies used in the safety analyses, and address compliance with the restrictions and conditions specified in the SERs for the use of these methodologies.
Single failure assumption				X	X	X		List all single active failures considered for each event analyzed, discuss the effects of single failure assumption on the results of the events, and identify limiting single failure assumed in the analysis.
Loss of Offsite Power				X	X	X		GDC 17 requires assumption of loss of offsite power, in addition to single active failure assumption, in accident analysis. Proper justifications must be provided for assuming a time delay of LOOP following an event initiation
15.0.3, Design Basis Accident Radiological Consequence Analysis for Advanced Light Water Reactors								
Reactor accident source terms used			X					
Identification and selection of representative design basis accidents				X				
Description and analysis of bounding design basis accident scenario and sequence of event				X		X		
Fission product transport and removal models used between major structures and systems and in fission product release pathways to the environment				X		X		
Description of unique and first-of-a-kind design and operational features for passive fission product removal systems						X		
Methodology, and major assumptions and parameters used in calculating radiological consequence doses for each fission product release pathway to the environment			X	X				
Methodology, and major assumptions and parameters used in calculating pH values of water in various pools in the primary containment			X	X				
Radiological dose calculations and resulting doses at the exclusion area boundary, low population zone, and in the main control room for each fission product release pathway	X		X	X	X	X		
15.1, 15.2, 15.3, 15.4, 15.5, Non-LOCA Transients and Accidents								
Analysis methods			X	X	X			Use of new methodologies (including models and computer codes) will require extensive review. Use of approved methodologies will be reviewed for computer code applicability for the reactor design. Test data may be required for validation of models and codes.
Limiting Transient analysis				X	X	X		Description should include Input parameters, initial conditions and assumptions in the analysis, and the analysis results for compliance with acceptance criteria for the event categorization.
Event Spectrum Evaluation					X	X		Limiting initiating events for each combination of category and frequency group should be quantitatively analyzed. For other initiating events that are not analyzed, qualitative evaluation should be provided to demonstrate their being bounded by the limiting events.
New Interim Acceptance Criteria for Reactivity Initiated Accidents			X	X	X			New interim acceptance criteria specified in SRP 4.2, Rev. 3, Appendix B should be applied to the reactivity initiated accidents, i.e., control rod ejection events in PWRs and control rod drop events in BWRs.
15.6.3, SGTR, 15.6.5, Loss-of-Coolant Accidents								
LBLOCA and SBLOCA Evaluation Model			X	X	X			Use of new methodologies (including models and computer codes) will be subjected to extensive review. Integral and/or separate effects test data may be needed to validate models and codes. NRC staff may also perform independent audit calculations to verify acceptability of the codes. Use of approved methodologies will be reviewed for code and model applicability to the applied reactor design. For those evaluation models with realistic analysis, uncertainties must be accounted for using approved methods, such as Code, Scaling, and Application Uncertainties (CSAU).
SBLOCA and LBLOCA Analyses				X	X	X		The LOCA analyses should cover whole spectrum of break sizes and locations. Description should include Input parameters, initial conditions and assumptions in the analysis, and the analysis results for compliance with the acceptance criteria of 10 CFR 50.46. The NRC staff may also perform audit calculations to verify analysis results.
Post-LOCA Long-term Cooling- Boric acid precipitation			X			X		Description of long-term-cooling analysis should include instruction steps in the emergency operating procedures for operator actions during long-term cooling and prevention of boric acid precipitation.
SGTR overfill analysis				X	X			Description of the steam generator tube rupture analysis should include steps in emergency operating procedures for operator actions to terminate primary-to-secondary side leakage and to prevent overfilling of secondary side

List of SAR Review Areas Potentially Involving More Detailed Review

Area/Topic	Calcs Req	Audit	Data	Analysis	Results	Design	Op. Exp.	Remarks
SRP 15.8 ATWS								
Compliance with 10 CFR 50.62						X		Description of the design features for mitigation against ATWS events, and compliance with 10 CFR50.62, "Requirements for reduction of risk from anticipated transients without scram (ATWS) events for light-water-cooled nuclear power plants," if applicable.
Most limiting ATWS events				X	X			Plant-specific ATWS analyses (performed on a best-estimate basis) and results are required if applicant cannot show that the plant design is enveloped by vendor's generic ATWS analyses. Applicant must define the acceptance criteria that apply to the plant design. NRC staff may perform audit calculations to verify applicant's results and justify input assumptions, especially, core physics parameters and relief capacities of safety valves.
SRP 16.0 Technical Specifications								
Risk-Managed AOTs								Risk-Managed AOT would be a first of kind review.
testing and calibration requirements for digital instrumentation								Testing and calibration requirements for digital instrumentation is indeterminate at this time.
18.0, Human Factors Engineering								
HFE Program Mgt					X			
Operating Experience Review					X		X	
Functional Reqmnts Anal. & Allocat.			X	X	X			
Task Analysis		X	X		X			
Staffing and Quals.								
Human Reliability Analysis			X					
Human-System Interface design		X			X	X	X	
Procedure Development		X			X		X	
Training Program Development							X	
Verification/Validation			X		X			
Design Implementation						X	X	
Human Performance Monitoring		X				X	X	
Minimum Inventory			X	X	X			
SRP 19.3 Low Power & Shutdown Operations								
Design features						X		The discussion should include design features that are used in low power and shutdown operation, including mid-loop operation, to detect and mitigate events of a loss of residual heat removal and reactor coolant inventory.
LOCA and Non-LOCA events				X	X			All events in Chapter 15 should be analyzed for low power and shutdown operations. For those events not analyzed, justification should be provided. The analyses should use NRC-approved methodologies and computer codes. Input parameters, assumptions, and single failure assumptions should be discussed.
Emergency Operating Procedures								Guidelines for emergency operating procedures for low power and shutdown operations should be provided.
Tech Specifications								Tech Specifications should include LCOs that are consistent with the assumptions used in the analyses.
Flooding and Fire protection				X	X	X		Description of design and analyses addressing fire and containment flooding protection should be provided.