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Your ref: Docket No. 52-006
Our ref: DCP/NRC2401

March 9, 2009

Subject: AP1000 Response to Request for Additional Information (SRP 19)

Westinghouse is submitting a response to the NRC request for additional information (RAI) on SRP Section 19. This RAI response is submitted in support of the AP1000 Design Certification Amendment Application (Docket No. 52-006). The information included in this response is generic and is expected to apply to all COL applications referencing the AP1000 Design Certification and the AP1000 Design Certification Amendment Application.

Enclosure 1 provides the response for the following RAI:

RAI-SRP19.0-SPLA-17

Questions or requests for additional information related to the content and preparation of this response should be directed to Westinghouse. Please send copies of such questions or requests to the prospective applicants for combined licenses referencing the AP1000 Design Certification. A representative for each applicant is included on the cc: list of this letter.

Very truly yours,

Robert Sisk, Manager
Licensing and Customer Interface
Regulatory Affairs and Standardization

/Enclosure

1. Response to Request for Additional Information on SRP Section 19

D063
NRO

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ENCLOSURE 1

Response to Request for Additional Information on SRP Section 19

AP1000 TECHNICAL REPORT REVIEW

Response to Request For Additional Information (RAI)

RAI Response Number: RAI-SRP19.0-SPLA-17
Revision: 0

Question:

The applicant's analysis of external hazards is documented in TR101 and described in the DCD; however, it did not include an explicit discussion of the release of hazardous materials from nearby facilities (other than pipelines), nor identify this as a COL information item. The staff is concerned that some toxic materials are immediately dangerous to life and health at lower concentrations than the materials evaluated for pipelines, and some might not be as readily detected.

Please confirm that the bounding case for toxic material hazard has been addressed in the DCD or provide a COL information item so that COL applicants will consider this potential hazard in their external events PRA.

Westinghouse Response:

TR101, Section 5.2, "Marine Accidents", does discuss the release of hazardous/toxic materials. On page 15 it is written, "The potential exists for a Marine Accident that leads to a release of toxic materials into the atmosphere. This type of event may compromise the safety of the plant operators, resulting in reduced operator reliability. However, the toxic release will not directly lead to any failure of plant equipment. To evaluate the risk impact of this scenario, a CCDP is developed that models a reactor trip followed by the guaranteed failure of all PRA credited operator actions. The resulting CCDP is 6.26E-08."

Although this argument is for marine accidents, this same argument applies to toxic material releases from land based facilities external from the site or from any other mode of transportation. There could be differences in the type and amount of material released and the duration of the release between marine facilities and other sources, but the "guaranteed failure" of all PRA credited operator actions eliminates the need to evaluate specific toxic release events.

TR101 then states, "The initiating event frequency is 1.0E-06 events per year, which was selected as the bounding value of the surveyed sites based on supplied information. Equation 1 is used to determine the resultant CDF. The resultant CDF is 6.26E-14 events per year." On this basis, the event can be screened out from the need to do more extensive analyses at this time because the CDF for this event is less than 1.0E-08. The toxic release event, from all sources, could therefore be screened out if the event frequency is less than (1.0E-08/6.3E-8), or 0.15 events per year. This initiating event frequency represents hazardous chemical releases that exceed the assumptions and screening criteria described in U.S. NRC Regulatory

Guide 1.78 for screening out release events that need not be considered in the evaluation of control room habitability.

TR101 then includes the following discussion; "The above analysis is conservative. The AP1000 has an additional level of defense against toxic airborne material. With advanced warning, the operators may actuate passive control room habitability. This system isolates the control room from normal HVAC and actuates a separate system supplied from compressed air containers. The compressed air slightly pressurizes the control room above atmospheric pressure, preventing the entrance of toxic material in the control room. This system is available for 72 hours, which is adequate time to withstand the event."

There is also concern that some toxic materials are immediately dangerous to life and health (IDLH) at lower concentrations than the materials evaluated for pipelines, and some might not be as readily detected. PRAs are not designed nor intended to address IDLH concerns but the timing or the specific effect of a toxic material on the plant staff is not important to the calculation of the CCDP shown above because no operator action was credited. PRAs evaluate plant risk in terms of core damage frequency.

External events, or any initiating events for that matter, are evaluated with respect to the plant response to an initiator that somehow leads to a condition that requires reactor trip.

The toxic release, from all possible sources, event can be screened out from the need to do additional detailed analyses if the COL applicant can confirm that the frequency of these events is less than 0.15 per year. The number of events considered in this calculation could be determined by the applicant contacting the county public safety or emergency management departments and requesting a list of chemical spills that occurred within 5 miles of the plant and required HAZMAT intervention. Only these cases would need to be screened in accordance with Regulatory Guide 1.78 to determine if each event warranted the classification of a toxic release initiating event.

Reference:

1. AP1000 DCD Revision 17

2. APP-GW-GLR-101 (TR-101) Revision 1, "AP1000 Probabilistic Risk Assessment Site-Specific Considerations"

3. USNRC Regulatory Guide 1.78 Revision 1, "Evaluating the Habitability of a Nuclear Power Plant Control Room During a Postulated Hazardous Chemical Release"

Design Control Document (DCD) Revision:

19.58.2.3 Transportation and Nearby Facility Accidents

These events consist of accidents related to transportation near the nuclear power plant and accidents at industrial and military facilities in the vicinity. The following hazard sources are considered:

- Aviation (commercial/general/military)
- Marine (ship/barge) and nearby facility
- Pipeline (gas/oil)
- Railroad
- Truck

19.58.2.3.2 Marine and Nearby Facility Accidents

Only sites with large waterways with ship and/or barge traffic that goes through or near the site need to consider marine accidents.

Marine (ship/barge) accidents and nearby land based facility accidents pose a potential hazard to a nuclear power plant due to two possibilities:

1. Release of hazardous material towards the plant
2. Explosion with resulting damage to the plant

The potential exists for a marine (or any other mode of transportation) or nearby facility accident that leads to a release of toxic materials into the atmosphere. This type of event may compromise the safety of the plant operators, resulting in reduced operator reliability. However, the toxic release does not directly lead to any failure of plant equipment. To evaluate the risk impact of this scenario, a CCDP is developed that models a reactor trip followed by the guaranteed failure of all PRA credited operator actions. Failure of all PRA credited operator actions obviates the need to evaluate specific toxic release events with respect to differences in the type and amount of material released and duration of the release. The resulting CCDP is 6.26E-08.

Equation 19.58-1 (CDF = IEF * CCDP) is used to determine the maximum frequency for toxic releases, from all sources combined, that would keep the resulting CDF below the 1.0E-08 screening threshold. That maximum value is (1.0E-08/6.3E-08) or 0.15 events per year. This initiating event frequency represents hazardous chemical releases that exceed the assumptions and screening criteria described in U.S. NRC Regulatory Guide 1.78 for screening out release events that need not be considered in the evaluation of control room habitability. The number of events to consider could be determined by the COL applicant contacting the county public safety or emergency management departments and requesting a list of chemical spills that occurred within 5 miles of the plant and required HAZMAT intervention. Only these cases would need to be screened in accordance with Regulatory Guide 1.78 to determine if each event warranted the classification of a toxic release initiating event. If the frequency of toxic releases from all possible sources is demonstrated to be less than 0.15 events per year, the toxic release event is screened out from the need to do additional detailed PRA analyses.

The above analysis is conservative. The AP1000 has an additional level of defense against toxic airborne material. With advanced warning, the operators may actuate passive control room habitability. This system isolates the control room from normal HVAC and actuates a separate system supplied from compressed air containers. The compressed air slightly pressurizes the control room above atmospheric pressure, preventing the entrance of toxic material in the control room. This system is available for 72 hours, which is adequate time to withstand the event.

There is also a potential for marine explosion accidents. The AP1000 is not designed with a service water intake structure. Therefore, loss of service water events as a consequence of marine explosions are not a concern for the AP1000 design. As long as Regulatory Guide 1.91 acceptance criterion is met, marine explosion accidents do not need to be considered further for the AP1000 PRA.

PRA Revision: No changes

Technical Report (TR) Revision:

5.0 Transportation and Nearby Facilities Accidents

These events consist of accidents related to transportation near the nuclear power plant and accidents at industrial and military facilities in the vicinity. The following hazard sources are considered:

- Aviation (commercial/general/military)
- Marine (ship/barge) and nearby facility
- Pipeline (gas/oil)
- Railroad
- Truck

5.2 Marine and Nearby Facility Accidents

Only sites with large waterways with ship and/or barge traffic that go through or near the site need to consider Marine Accidents. One of the surveyed sites reported that Marine Accidents are a concern. None of the surveyed sites reported on the toxic hazard potential for nearby facilities; there was no specific request for that information.

Marine (ship/barge) accidents and nearby land based facility accidents pose a hazard to a nuclear power plant due to two possibilities:

1. Release of hazardous material towards the plant
2. Explosion with resulting damage to the plant.

The potential exists for a marine (or any other mode of transportation) or nearby facility accident that leads to a release of toxic materials into the atmosphere. This type of event may compromise the safety of the plant operators, resulting in reduced operator reliability. However, the toxic release will not directly lead to any failure of plant equipment. To evaluate the risk impact of this scenario, a CCDP is developed that models a reactor trip followed by the guaranteed failure of all PRA credited operator actions. Failure of all PRA credited operator actions obviates the need evaluate specific toxic release events with respect to differences in the type and amount of material released and the duration of the release. The resulting CCDP is 6.26E-08.

Equation 1 (CDF = IEF * CCDP) is used to determine the maximum frequency for toxic releases, from all sources combined, that would keep the resulting CDF below the 1.0E-08 screening threshold. That maximum value is (1.0E-08/6.3E-08) or 0.15 events per year. This initiating event frequency represents hazardous chemical releases that exceed the assumptions and screening criteria described in U.S. NRC Regulatory Guide 1.78 for screening out release events that need not be considered in the evaluation of control room habitability. The number of events to consider could be determined by the COL applicant contacting the county public safety or emergency management departments and requesting a list of chemical spills that occurred within 5 miles of the plant and required HAZMAT intervention. Only these cases would need to be screened in accordance with Regulatory Guide 1.78 to determine if each event

warranted the classification of a toxic release initiating event. If the frequency of toxic releases from all possible sources is demonstrated to be less than 0.15 events per year, the toxic release event is screened out from the need to do additional detailed PRA analyses.

The above analysis is conservative. The AP1000 has an additional level of defense against toxic airborne material. With advanced warning, the operators may actuate passive control room habitability. This system isolates the control room from normal HVAC and actuates a separate system supplied from compressed air containers. The compressed air slightly pressurizes the control room above atmospheric pressure, preventing the entrance of toxic material in the control room. This system is available for 72 hours, which is adequate time to withstand the event.

There is also a potential for marine explosion accidents. The AP1000 is not designed with a Service Water intake structure; thus, Loss of Service Water events as a consequence of marine explosions are not a nuclear safety concern for the AP1000 design. Regulatory Guide 1.91 (Reference 8) provides the acceptance criterion of an overpressure event in excess of 1 psi at a frequency less than 1E-06 /yr. The initiating event frequency for marine accidents is 1.0E-06 events/yr, which was selected as the bounding value of the surveyed sites based on supplied information.

Additional evaluations were performed in NUREG/CR-5042 (Reference 9), which documents a study performed for the Waterford site. Waterford lies in a heavily trafficked (>100,000 vessels per year) area of the Mississippi River. The Waterford reactor building is located approximately 2,200 feet from the main shipping channel in the Mississippi River.

The Waterford site is of no special relation to the AP1000 design; however, several insights may be gained from the NUREG/CR-5042 evaluation. The NUREG/CR-5042 evaluation considered detonation of a 300,000 barrel barge filled with gasoline. The detonation of this fuel loading produced an acceptable overpressure for the safety-related buildings. This evaluation provides justification that the Regulatory Guide 1.91 acceptance criterion is conservative, at least for the safety-related buildings. Marine explosion accidents do not need to be considered further for the AP1000 PRA as long as the Regulatory Guide 1.91 criterion is met.