

## KHNPDCDRAIsPEm Resource

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**Sent:** Tuesday, March 22, 2016 12:32 PM  
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**Cc:** Dixon-Herrity, Jennifer; Williams, Donna; Ciocco, Jeff; Palmrose, Donald; McCoppin, Michael; Hart, Michelle  
**Subject:** APR1400 ER RAI 1-8428 (Environmental Report Review)  
**Attachments:** APR1400 ER RAI 1-8428.pdf

KHNP,

The attachment contains the subject request for additional information (RAI). This RAI was sent to you in draft form. Your licensing review schedule assumes technically correct and complete responses within 30 days of receipt of RAIs. However, KHNP requests, and we grant, the following RAI question response times. We may adjust the schedule accordingly.

**EIS ACC/SA-1 : 30days**  
**EIS ACC/SA-2 : 180days**  
**EIS ACC/SA-3 : 60days**  
**EIS ACC/SA-4 : 60days**  
**EIS ACC/SA-5 : 30days**  
**EIS ACC/SA-6 : 30days**  
**EIS ACC/SA-7 : 30days**  
**EIS ACC/SA-8 : 60days**  
**EIS ACC/SA-9 : 30days**  
**EIS ACC/SA-10 : 180days**  
**EIS ACC/SA-11 : 30days**  
**EIS ACC/SA-12 : 180days**  
**EIS ACC/SA-13 : 30days**  
**EIS ACC/SA-14 : 30days**  
**EIS ACC/SA-15 : 180days**

Please submit your RAI response to the NRC Document Control Desk.

Thank you,

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## REQUEST FOR ADDITIONAL INFORMATION ER 1-8428

Issue Date: 03/22/2016

Application Title: APR1400 Design Certification Review – 52-046

Operating Company: Korea Hydro & Nuclear Power Co. Ltd.

Docket No. 52-046

Review Section: EIS ACC/SA - Postulated Accidents Impacts / Severe Accidents

Application Section: APR1400 Environmental Report

### QUESTIONS

#### EIS ACC/SA-1

10 CFR 51.55(a) requires each applicant for a standard design certification under subpart B of 10 CFR Part 52 (i.e., 10 CFR 52.47(b)(2)) to submit with its application a separate document entitled, "Applicant's Environmental Report—Standard Design Certification." The environmental report must address the costs and benefits of severe accident mitigation design alternatives, and the bases for not incorporating severe accident mitigation design alternatives in the design to be certified.

The environmental standard review plan (ESRP) Section 7.2, Severe Accidents, of NUREG-1555 directs the staff to evaluate and independently confirm severe accident risks and analyses presented in an Environmental Report (ER) (i.e., the APR1400 ER, "Applicant's Environmental Report – Standard Design Certification," found under ML15006A038 and the proprietary technical report, "Severe Accident Mitigation Design Alternatives (SAMDA) for the APR1400," under ML15012A105) of accidents involving radioactive material that can be postulated for the plant under review. The scope of this review should include probability-weighted consequence (i.e., risks) analysis for severe accidents, including dose and socioeconomic risk impacts based on plant specific data in sufficient detail to appropriately evaluate the risks for severe accidents.

The staff requires the following additional information in order to complete its review of the environmental impacts of severe accidents and to ensure appropriate documentation of the applicant's assessment in the APR1400 Environmental Report.

Provide a detailed discussion in the ER and supporting technical reports of the process and rationale for selecting the year 2030 as the year of maximum environmental impacts for extrapolating grid element (or rosette segment) parameters such as population.

The NRC staff request that any revisions to the ER or supporting technical reports be provided as a markup as part of the response to this RAI.

#### EIS ACC/SA-2

10 CFR 51.55(a) requires each applicant for a standard design certification under subpart B of 10 CFR Part 52 (i.e., 10 CFR 52.47(b)(2)) to submit with its application a separate document entitled, "Applicant's Environmental Report—Standard Design Certification." The environmental report must address the costs and benefits of severe accident mitigation design alternatives, and the bases for not incorporating severe accident mitigation design alternatives in the design to be certified.

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The environmental standard review plan (ESRP) Section 7.2, Severe Accidents, of NUREG 1555 directs the staff to evaluate and independently confirm severe accident risks and analyses presented in an Environmental Report (ER) (i.e., the APR1400 ER, "Applicant's Environmental Report – Standard Design Certification," found under ML15006A038 and the proprietary technical report, "Severe Accident Mitigation Design Alternatives (SAMDAs) for the APR1400," under ML15012A105) of accidents involving radioactive material that can be postulated for the plant under review. The scope of this review should include probability-weighted consequence (i.e., risks) analysis for severe accidents, including dose and socioeconomic risk impacts based on plant specific data in sufficient detail to appropriately evaluate the risks for severe accidents.

The staff requires the following additional information in order to complete its review of the environmental impacts of severe accidents and to ensure appropriate documentation of the applicant's assessment in the APR1400 Environmental Report.

Provide justification why the use of an older version of the SecPop computer code, which is based on Census 2000 data (SecPop2000), should be acceptable for supporting the severe accident analysis when Census 2010 data is readily available via the latest version of SecPop (SecPop v4.3).

The NRC staff request that any revisions to the ER or supporting technical reports be provided as a markup as part of the response to this RAI.

This RAI is related to the Environmental Audit Information Needs ER-TI-4 (ML15198A023).

### EIS ACC/SA-3

10 CFR 51.55(a) requires each applicant for a standard design certification under subpart B of 10 CFR Part 52 (i.e., 10 CFR 52.47(b)(2)) to submit with its application a separate document entitled, "Applicant's Environmental Report—Standard Design Certification." The environmental report must address the costs and benefits of severe accident mitigation design alternatives, and the bases for not incorporating severe accident mitigation design alternatives in the design to be certified.

The environmental standard review plan (ESRP) Section 7.2, Severe Accidents, of NUREG 1555 directs the staff to evaluate and independently confirm severe accident risks and analyses presented in an Environmental Report (ER) (i.e., the APR1400 ER, "Applicant's Environmental Report – Standard Design Certification," found under ML15006A038 and the proprietary technical report, "Severe Accident Mitigation Design Alternatives (SAMDAs) for the APR1400," under ML15012A105) of accidents involving radioactive material that can be postulated for the plant under review. The scope of this review should include probability-weighted consequence (i.e., risks) analysis for severe accidents, including dose and socioeconomic risk impacts based on plant specific data in sufficient detail to appropriately evaluate the risks for severe accidents.

The staff requires the following additional information in order to complete its review of the environmental impacts of severe accidents and to ensure appropriate documentation of the applicant's assessment in the APR1400 Environmental Report.

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Provide a detailed explanation on how the population values for each grid element (or rosette segment) taken from SecPop2000 were extrapolated out to the year 2030. Although a process is described in Section 5.5.1, Population Distribution, on pages A21 and A22 of APR1400-E-P-NR-14006-P, the staff requires additional details including the information obtained from references used for determining the 2030 year population distribution, especially given that some grid elements (or rosette segments) contain two or more county segments. In particular, the response should provide the information obtained from References 17 and 19 of APR1400-E-P-NR-14006-P along with explaining how information from Tables 5.5.1-1, 5.5.1-2, and 5.5.1-3 and other data sources, providing example calculations as necessary, were applied to create Tables 5.5.1-4 and 5.5.1-5.

The NRC staff request that any revisions to the ER or supporting technical reports be provided as a markup as part of the response to this RAI.

### EIS ACC/SA-4

10 CFR 51.55(a) requires each applicant for a standard design certification under subpart B of 10 CFR Part 52 (i.e., 10 CFR 52.47(b)(2)) to submit with its application a separate document entitled, "Applicant's Environmental Report—Standard Design Certification." The environmental report must address the costs and benefits of severe accident mitigation design alternatives, and the bases for not incorporating severe accident mitigation design alternatives in the design to be certified.

The environmental standard review plan (ESRP) Section 7.2, Severe Accidents, of NUREG 1555 directs the staff to evaluate and independently confirm severe accident risks and analyses presented in an Environmental Report (ER) (i.e., the APR1400 ER, "Applicant's Environmental Report – Standard Design Certification," found under ML15006A038 and the proprietary technical report, "Severe Accident Mitigation Design Alternatives (SAMDAs) for the APR1400," under ML15012A105) of accidents involving radioactive material that can be postulated for the plant under review. The scope of this review should include probability-weighted consequence (i.e., risks) analysis for severe accidents, including dose and socioeconomic risk impacts based on plant specific data in sufficient detail to appropriately evaluate the risks for severe accidents.

The staff requires the following additional information in order to complete its review of the environmental impacts of severe accidents and to ensure appropriate documentation of the applicant's assessment in the APR1400 Environmental Report.

The staff requires additional information on the information taken from the Level 2 PRA analysis to be used as input to the severe accident consequence analyses for each of the event categories (internal and low-power/shutdown (LPSD)) and source term categories (STC01 to STC21) in order to determine the reasonable expected total offsite risk calculations.

- a. Provide separate results and information from the Level 2 PRA on each of the containment releases (i.e., source terms/release fractions) for internal events, internal fire, internal flooding, LPSD internal events, LPSD fire, and LPSD flooding.
- b. Discuss how the fission product groups from the Level 2 PRA MAAP calculations were mapped into the fission product groups for MACCS input.

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- c. Provide and discuss the basis for the release plume segments for each source term category which were applied in in each event category.
- d. Provide the MACCS results for each event category.

It appears from the information provided in Tables 2a through 2f and Tables 3a through 3f, the same offsite consequence results were applied regardless of the event category (i.e., internal events, internal fire, internal flooding, LPSD internal events, LPSD fire, and LPSD flooding). Namely, the release fractions given on pages A9 through A19 (note, no table number is provided for this information) appear to be the only one applied in all MACCS calculations and Reference 7 of Appendix A was not provided in the DC application. However, it is expected that the source term information and plume segments for each event category would not be the same from the Level 2 PRA, especially for LPSD events.

The response to this RAI also may need to be reflected in the DCD's FSAR Chapter 19.

The NRC staff request that any revisions to the ER or supporting technical reports be provided as a markup as part of the response to this RAI.

This RAI is related to the Environmental Audit Information Needs ER-TI-2 (ML15198A023).

### EIS ACC/SA-5

10 CFR 51.55(a) requires each applicant for a standard design certification under subpart B of 10 CFR Part 52 (i.e., 10 CFR 52.47(b)(2)) to submit with its application a separate document entitled, "Applicant's Environmental Report—Standard Design Certification." The environmental report must address the costs and benefits of severe accident mitigation design alternatives, and the bases for not incorporating severe accident mitigation design alternatives in the design to be certified.

The environmental standard review plan (ESRP) Section 7.2, Severe Accidents, of NUREG 1555 directs the staff to evaluate and independently confirm severe accident risks and analyses presented in an Environmental Report (ER) (i.e., the APR1400 ER, "Applicant's Environmental Report – Standard Design Certification," found under ML15006A038 and the proprietary technical report, "Severe Accident Mitigation Design Alternatives (SAMDAs) for the APR1400," under ML15012A105) of accidents involving radioactive material that can be postulated for the plant under review. The scope of this review should include probability-weighted consequence (i.e., risks) analysis for severe accidents, including dose and socioeconomic risk impacts based on plant specific data in sufficient detail to appropriately evaluate the risks for severe accidents.

The staff requires the following additional information in order to complete its review of the environmental impacts of severe accidents and to ensure appropriate documentation of the applicant's assessment in the APR1400 Environmental Report.

Provide in Environmental Report (ER) Section 3, Base Risk, a clear summary of the basis and details on the data sources used for determining the base risk, including such site data as meteorological, population, and land use data and design specific information such as core damage frequencies and radioactive material release data that would originate from the Level 1

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and Level 2 PRAs. While some of this information may be in an associated technical report, the ER does not make this clear nor provides adequate documentation and references.

The degree of detail provided by the applicant in their Environmental Report should satisfy Regulatory Guide 4.2, Revision 2, Preparation of Environmental Reports for Nuclear Power Stations, Section A.7.c, "Presentation of Information," and support the staff guidance in NUREG-1555, Environmental Standard Review Plan, Section 7.2 under "Data and Information Need" and "Review Procedures" for the staff's environmental finding (see Regulatory Guide 4.2 (ML003739519) page x and NUREG-1555 Section 7.2 (ML071690007) pages 7.2-2 through 7.2-5).

The NRC staff request that any revisions to the ER or supporting technical reports be provided as a markup as part of the response to this RAI.

This RAI is related to the Environmental Audit Information Needs ER-TI-3 (ML15198A023).

### EIS ACC/SA-6

10 CFR 51.55(a) requires each applicant for a standard design certification under subpart B of 10 CFR Part 52 (i.e., 10 CFR 52.47(b)(2)) to submit with its application a separate document entitled, "Applicant's Environmental Report—Standard Design Certification." The environmental report must address the costs and benefits of severe accident mitigation design alternatives, and the bases for not incorporating severe accident mitigation design alternatives in the design to be certified.

The environmental standard review plan (ESRP) Section 7.2, Severe Accidents, of NUREG 1555 directs the staff to evaluate and independently confirm severe accident risks and analyses presented in an Environmental Report (ER) (i.e., the APR1400 ER, "Applicant's Environmental Report – Standard Design Certification," found under ML15006A038 and the proprietary technical report, "Severe Accident Mitigation Design Alternatives (SAMDAs) for the APR1400," under ML15012A105) of accidents involving radioactive material that can be postulated for the plant under review. The scope of this review should include probability-weighted consequence (i.e., risks) analysis for severe accidents, including dose and socioeconomic risk impacts based on plant specific data in sufficient detail to appropriately evaluate the risks for severe accidents.

The staff requires the following additional information in order to complete its review of the environmental impacts of severe accidents and to ensure appropriate documentation of the applicant's assessment in the APR1400 Environmental Report.

Provide a discussion in ER Section 3, Base Risk, about what atmospheric, surface water, and groundwater pathways were applied in the severe accident analysis and what the resulting impacts were from these pathways.

The NRC staff request that any revisions to the ER or supporting technical reports be provided as a markup as part of the response to this RAI.

This RAI is related to the Environmental Audit Information Needs ER-IT-5 (ML15198A023).



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### EIS ACC/SA-7

10 CFR 51.55(a) requires each applicant for a standard design certification under subpart B of 10 CFR Part 52 (i.e., 10 CFR 52.47(b)(2)) to submit with its application a separate document entitled, "Applicant's Environmental Report—Standard Design Certification." The environmental report must address the costs and benefits of severe accident mitigation design alternatives, and the bases for not incorporating severe accident mitigation design alternatives in the design to be certified.

The environmental standard review plan (ESRP) Section 7.2, Severe Accidents, of NUREG 1555 directs the staff to evaluate and independently confirm severe accident risks and analyses presented in an Environmental Report (ER) (i.e., the APR1400 ER, "Applicant's Environmental Report – Standard Design Certification," found under ML15006A038 and the proprietary technical report, "Severe Accident Mitigation Design Alternatives (SAMDA) for the APR1400," under ML15012A105) of accidents involving radioactive material that can be postulated for the plant under review. The scope of this review should include probability-weighted consequence (i.e., risks) analysis for severe accidents, including dose and socioeconomic risk impacts based on plant specific data in sufficient detail to appropriately evaluate the risks for severe accidents.

The staff requires the following additional information in order to complete its review of the environmental impacts of severe accidents and to ensure appropriate documentation of the applicant's assessment in the APR1400 Environmental Report.

Provide a discussion in ER Section 3, Base Risk, of the socioeconomic, individual and population health risks from the postulated APR1400 severe accidents.

The NRC staff request that any revisions to the ER or supporting technical reports be provided as a markup as part of the response to this RAI.

This RAI is related to the Environmental Audit Information Needs ER-IT-6 (ML15198A023).

### EIS ACC/SA-8

10 CFR 51.55(a) requires each applicant for a standard design certification under subpart B of 10 CFR Part 52 (i.e., 10 CFR 52.47(b)(2)) to submit with its application a separate document entitled, "Applicant's Environmental Report—Standard Design Certification." The environmental report must address the costs and benefits of severe accident mitigation design alternatives, and the bases for not incorporating severe accident mitigation design alternatives in the design to be certified.

The environmental standard review plan (ESRP) Section 7.2, Severe Accidents, of NUREG 1555 directs the staff to evaluate and independently confirm severe accident risks and analyses presented in an Environmental Report (ER) (i.e., the APR1400 ER, "Applicant's Environmental Report – Standard Design Certification," found under ML15006A038 and the proprietary



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technical report, "Severe Accident Mitigation Design Alternatives (SAMDAs) for the APR1400,' under ML15012A105) of accidents involving radioactive material that can be postulated for the plant under review. The scope of this review should include probability-weighted consequence (i.e., risks) analysis for severe accidents, including dose and socioeconomic risk impacts based on plant specific data in sufficient detail to appropriately evaluate the risks for severe accidents.

The staff requires the following additional information in order to complete its review of the environmental impacts of severe accidents and to ensure appropriate documentation of the applicant's assessment in the APR1400 Environmental Report.

Provide a discussion in ER Section 3, Base Risk, on the dominant severe accident sequences for large release evaluated from the Level 2 PRA and how they were determined. This characterizes the risk profile of the plant and should include a list showing leading contributors to large release frequency (e.g., from dominant severe accident sequences from the PRA).

The response to this RAI also may need to be reflected in or based on information contained in the DCD's FSAR Chapter 19.

The NRC staff request that any revisions to the ER or supporting technical reports be provided as a markup as part of the response to this RAI.

This RAI is related to the Environmental Audit Information Needs ER-TI-7 (ML15198A023).

### EIS ACC/SA-9

10 CFR 51.55(a) requires each applicant for a standard design certification under subpart B of 10 CFR Part 52 (i.e., 10 CFR 52.47(b)(2)) to submit with its application a separate document entitled, "Applicant's Environmental Report—Standard Design Certification." The environmental report must address the costs and benefits of severe accident mitigation design alternatives, and the bases for not incorporating severe accident mitigation design alternatives in the design to be certified.

The environmental standard review plan (ESRP) Section 7.2, Severe Accidents, of NUREG 1555 directs the staff to evaluate and independently confirm severe accident risks and analyses presented in an Environmental Report (ER) (i.e., the APR1400 ER, "Applicant's Environmental Report – Standard Design Certification," found under ML15006A038 and the proprietary technical report, "Severe Accident Mitigation Design Alternatives (SAMDAs) for the APR1400,' under ML15012A105) of accidents involving radioactive material that can be postulated for the plant under review. The scope of this review should include probability-weighted consequence (i.e., risks) analysis for severe accidents, including dose and socioeconomic risk impacts based on plant specific data in sufficient detail to appropriately evaluate the risks for severe accidents.

The staff requires the following additional information in order to complete its review of the environmental impacts of severe accidents and to ensure appropriate documentation of the applicant's assessment in the APR1400 Environmental Report.

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Provide a discussion in ER Section 3, Base Risk, on the analytical process used for determining the risks from severe accidents. While Section 4 of APR1400-K-P-NR-013901-P Revision 1, "SAMDA ANALYSIS," contains information about the process, this document is not referenced in the ER as to where this information can be found.

The NRC staff request that any revisions to the ER or supporting technical reports be provided as a markup as part of the response to this RAI.

This RAI is related to the Environmental Audit Information Needs ER-TI-8 (ML15198A023).

### EIS ACC/SA-10

10 CFR 51.55(a) requires each applicant for a standard design certification under subpart B of 10 CFR Part 52 (i.e., 10 CFR 52.47(b)(2)) to submit with its application a separate document entitled, "Applicant's Environmental Report—Standard Design Certification." The environmental report must address the costs and benefits of severe accident mitigation design alternatives, and the bases for not incorporating severe accident mitigation design alternatives in the design to be certified.

The environmental standard review plan (ESRP) Section 7.2, Severe Accidents, of NUREG 1555 directs the staff to evaluate and independently confirm severe accident risks and analyses presented in an Environmental Report (ER) (i.e., the APR1400 ER, "Applicant's Environmental Report – Standard Design Certification," found under ML15006A038 and the proprietary technical report, "Severe Accident Mitigation Design Alternatives (SAMDAs) for the APR1400," under ML15012A105) of accidents involving radioactive material that can be postulated for the plant under review. The scope of this review should include probability-weighted consequence (i.e., risks) analysis for severe accidents, including dose and socioeconomic risk impacts based on plant specific data in sufficient detail to appropriately evaluate the risks for severe accidents.

The staff requires the following additional information in order to complete its review of the environmental impacts of severe accidents and to ensure appropriate documentation of the applicant's assessment in the APR1400 Environmental Report.

Provide justification on the basis for the statement on page 17 of APR1400-K-PNR-013902-P, Level 3 Notebook, that setting RDPLHEAT to 0.00 watts is conservative or provide analysis to justify the plume heat used in the MACCS calculations and properly document the results in the ER.

The NRC staff request that any revisions to the ER or supporting technical reports be provided as a markup as part of the response to this RAI.

This RAI is related to the Environmental Audit Information Needs ER-TI-14 (ML15198A023).

### EIS ACC/SA-11

## REQUEST FOR ADDITIONAL INFORMATION ER 1-8428

10 CFR 51.55(a) requires each applicant for a standard design certification under subpart B of 10 CFR Part 52 (i.e., 10 CFR 52.47(b)(2)) to submit with its application a separate document entitled, "Applicant's Environmental Report—Standard Design Certification." The environmental report must address the costs and benefits of severe accident mitigation design alternatives, and the bases for not incorporating severe accident mitigation design alternatives in the design to be certified.

The environmental standard review plan (ESRP) Section 7.2, Severe Accidents, of NUREG 1555 directs the staff to evaluate and independently confirm severe accident risks and analyses presented in an Environmental Report (ER) (i.e., the APR1400 ER, "Applicant's Environmental Report – Standard Design Certification," found under ML15006A038 and the proprietary technical report, "Severe Accident Mitigation Design Alternatives (SAMDAs) for the APR1400," under ML15012A105) of accidents involving radioactive material that can be postulated for the plant under review. The scope of this review should include probability-weighted consequence (i.e., risks) analysis for severe accidents, including dose and socioeconomic risk impacts based on plant specific data in sufficient detail to appropriately evaluate the risks for severe accidents.

The staff requires the following additional information in order to complete its review of the environmental impacts of severe accidents and to ensure appropriate documentation of the applicant's assessment in the APR1400 Environmental Report.

Provide the basis for the statement on page A19 of APR1400-E-P-NR-14006-P, Severe Accident Mitigation Design Alternatives (SAMDAs) for the APR1400, Revision 0, that states that "Economic costs are the recommended MACCS values as given for the NUREG-1150 study as updated using recent Consumer Price Indexes from the Bureau of Labor" versus using current local or regional values for the Surry site (i.e., the location of the APR1400 severe accident analysis). Additionally, investigate why the dose increased from Case 1 (Base) to Case 5 (Decontamination Cost Sensitivity) when only cost numbers were increased (Section 5.9 of APR1400-E-P-NR-14006-P). Properly document the results in the ER and APR1400-E-P-NR-14006-P with a discussion of any changes.

The NRC staff request that any revisions to the ER or supporting technical reports be provided as a markup as part of the response to this RAI.

This RAI is related to the Environmental Audit Information Needs ER-TI-15 (ML15198A023).

### EIS ACC/SA-12

10 CFR 51.55(a) requires each applicant for a standard design certification under subpart B of 10 CFR Part 52 (i.e., 10 CFR 52.47(b)(2)) to submit with its application a separate document entitled, "Applicant's Environmental Report—Standard Design Certification." The environmental report must address the costs and benefits of severe accident mitigation design alternatives, and the bases for not incorporating severe accident mitigation design alternatives in the design to be certified.

The environmental standard review plan (ESRP) Section 7.2, Severe Accidents, of NUREG 1555 directs the staff to evaluate and independently confirm severe accident risks and analyses

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presented in an Environmental Report (ER) (i.e., the APR1400 ER, "Applicant's Environmental Report – Standard Design Certification," found under ML15006A038 and the proprietary technical report, "Severe Accident Mitigation Design Alternatives (SAMDAs) for the APR1400," under ML15012A105) of accidents involving radioactive material that can be postulated for the plant under review. The scope of this review should include probability-weighted consequence (i.e., risks) analysis for severe accidents, including dose and socioeconomic risk impacts based on plant specific data in sufficient detail to appropriately evaluate the risks for severe accidents.

The staff requires the following additional information in order to complete its review of the environmental impacts of severe accidents and to ensure appropriate documentation of the applicant's assessment in the APR1400 Environmental Report.

Provide in the ER and APR1400-E-NR-14006-P the source of information and specific references regarding the data and results from the Level 1 PRA documents, Level 2 PRA documents, and supporting Level 3 PRA documents that are mentioned throughout the respective document.

The degree of detail provided by the applicant in their Environmental Report should satisfy Regulatory Guide 4.2, Revision 2, Preparation of Environmental Reports for Nuclear Power Stations, Section A.7.c, "Presentation of Information," and support the staff guidance in NUREG-1555, Environmental Standard Review Plan, Section 7.2 under "Data and Information Need" and "Review Procedures" for the staff's environmental finding (see Regulatory Guide 4.2 (ML003739519) page x and NUREG-1555 Section 7.2 (ML071690007) pages 7.2-2 through 7.2-5). For example, for material that can be found in a particular section or chapter of a reference, the location of the information should be provided in the ER.

The NRC staff request that any revisions to the ER or supporting technical reports be provided as a markup as part of the response to this RAI.

This RAI is related to the Environmental Audit Information Needs ER-COM-2 (ML15198A023).

### EIS ACC/SA-13

10 CFR 51.55(a) requires each applicant for a standard design certification under subpart B of 10 CFR Part 52 (i.e., 10 CFR 52.47(b)(2)) to submit with its application a separate document entitled, "Applicant's Environmental Report—Standard Design Certification." The environmental report must address the costs and benefits of severe accident mitigation design alternatives, and the bases for not incorporating severe accident mitigation design alternatives in the design to be certified.

The environmental standard review plan (ESRP) Section 7.2, Severe Accidents, of NUREG 1555 directs the staff to evaluate and independently confirm severe accident risks and analyses presented in an Environmental Report (ER) (i.e., the APR1400 ER, "Applicant's Environmental Report – Standard Design Certification," found under ML15006A038 and the proprietary technical report, "Severe Accident Mitigation Design Alternatives (SAMDAs) for the APR1400," under ML15012A105) of accidents involving radioactive material that can be postulated for the plant under review. The scope of this review should include probability-weighted consequence

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(i.e., risks) analysis for severe accidents, including dose and socioeconomic risk impacts based on plant specific data in sufficient detail to appropriately evaluate the risks for severe accidents.

The staff requires the following additional information in order to complete its review of the environmental impacts of severe accidents and to ensure appropriate documentation of the applicant's assessment in the APR1400 Environmental Report.

Provide a definition for "Group Controller Level 3 analysis" (see page 3 of ANR1400-E-NR-14006-p).

The NRC staff request that any revisions to the ER or supporting technical reports be provided as a markup as part of the response to this RAI.

### EIS ACC/SA-14

10 CFR 51.55(a) requires each applicant for a standard design certification under subpart B of 10 CFR Part 52 (i.e., 10 CFR 52.47(b)(2)) to submit with its application a separate document entitled, "Applicant's Environmental Report—Standard Design Certification." The environmental report must address the costs and benefits of severe accident mitigation design alternatives, and the bases for not incorporating severe accident mitigation design alternatives in the design to be certified.

The environmental standard review plan (ESRP) Section 7.2, Severe Accidents, of NUREG 1555 directs the staff to evaluate and independently confirm severe accident risks and analyses presented in an Environmental Report (ER) (i.e., the APR1400 ER, "Applicant's Environmental Report – Standard Design Certification," found under ML15006A038 and the proprietary technical report, "Severe Accident Mitigation Design Alternatives (SAMDA) for the APR1400," under ML15012A105) of accidents involving radioactive material that can be postulated for the plant under review. The scope of this review should include probability-weighted consequence (i.e., risks) analysis for severe accidents, including dose and socioeconomic risk impacts based on plant specific data in sufficient detail to appropriately evaluate the risks for severe accidents.

The staff requires the following additional information in order to complete its review of the environmental impacts of severe accidents and to ensure appropriate documentation of the applicant's assessment in the APR1400 Environmental Report.

References No. 4, No. 6, and No. 7 in APR1400-E-NR-14006-P are the KEPCO E&C documents 1-037-N419-301, "Level I & II Sensitivity Analysis for SAMDA" and 1-035-N392-602, "Containment Event Tree Analysis" and KHNP document APR1400-E-P-NR-14001-P, "PRA Summary Report," Rev. 0, respectively. Provide where in each reference the appropriate information is obtained and applied in the base risk analysis for the SAMDA analysis. Ensure that each of the three references are readily available to the staff for inspection and review.

For example, in Section 2.2 of APR1400-E-NR-14006-P the statement is made that "[t]he source term category release fractions were taken from the APR1400 Level 2 PRA (Reference 7)". In Section 3.0 of APR1400-E-NR-14006-P, the fourth paragraph cites to References 6 through 8 [Note: no Reference 8 is provided in APR1400-E-NR-14006-P] for "representative

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sequences from each STC and develop timing and release characteristic information for representative fission product groups.”

### EIS ACC/SA-15

10 CFR 51.55(a) requires each applicant for a standard design certification under subpart B of 10 CFR Part 52 (i.e., 10 CFR 52.47(b)(2)) to submit with its application a separate document entitled, "Applicant's Environmental Report—Standard Design Certification." The environmental report must address the costs and benefits of severe accident mitigation design alternatives, and the bases for not incorporating severe accident mitigation design alternatives in the design to be certified.

The environmental standard review plan (ESRP) Section 7.2, Severe Accidents, of NUREG 1555 directs the staff to evaluate and independently confirm severe accident risks and analyses presented in an Environmental Report (ER) (i.e., the APR1400 ER, "Applicant's Environmental Report – Standard Design Certification," found under ML15006A038 and the proprietary technical report, "Severe Accident Mitigation Design Alternatives (SAMDAs) for the APR1400," under ML15012A105) of accidents involving radioactive material that can be postulated for the plant under review. The scope of this review should include probability-weighted consequence (i.e., risks) analysis for severe accidents, including dose and socioeconomic risk impacts based on plant specific data in sufficient detail to appropriately evaluate the risks for severe accidents.

The staff requires the following additional information in order to complete its review of the environmental impacts of severe accidents and to ensure appropriate documentation of the applicant's assessment in the APR1400 Environmental Report.

Provide a revised base case analysis by adding modeling of a non-evacuating cohort with appropriate justification and supporting references. As stated in Section 4.6.3, Cohort Modeling, of NUREG/CR-7009, MACCS Best Practices as Applied in the State-of-the-Art Reactor Consequence Analyses (SOARCA) Project, "...only two cohorts were used in Sample Problem A with percentages of 95 percent for the general public and 5 percent for the non-evacuating public. The percentages were adjusted to 99.5% and 0.5%, respectively, in the final NUREG-1150 report. In SOARCA the population fractions were developed based on the actual site population data [shown in Table 4-21]." Note that the evacuation cohort population fraction in the final NUREG-1150 (Cohort 2) and in SOARCA (Cohort 6) were set to 0.005, or 0.5 percent. The staff does not consider that assuming 100 percent evacuation (i.e., not having an evacuation cohort specified in the MACCS calculations) is reasonable to apply for the base case analysis.

The NRC staff request that any revisions to the ER or supporting technical reports be provided as a markup as part of the response to this RAI.