

## APPENDIX D

### TECHNICAL BASIS FOR PUBLIC RADIATION SAFETY SIGNIFICANCE DETERMINATION PROCESS

The Public Radiation Safety cornerstone is made up of four program areas which have a potential to impact the public; Radioactive Material Control, Radioactive Effluent Release, Radioactive Environmental Monitoring, and Transportation/Part 61. The Public Radiation Safety SDP is used to assess the risk associated with findings in these areas. The findings are the result of NRC inspections or are licensee self-identified in accordance with plant corrective action programs. The Public Radiation Safety SDP is designed to assess risk for routine plant operation, it does not assess accident conditions. This SDP is used in conjunction with NRC Inspection Procedure 71122, Public Radiation Safety.

The SDP was developed to assess the risk of licensee non-compliance with regulatory requirements and licensee programs and procedures established to ensure compliance with regulatory requirements. Regulatory requirements, values, and limits were used to define risk thresholds (i.e., Green, White, Yellow, and Red) for this cornerstone.

In addition to the regulatory requirements, this cornerstone contains a "public confidence" factor that is used to define the significance of a finding. It was recognized by the NRC and stakeholders that a licensee's control of its radioactive material is a significant issue for members of the public; even when very low levels of radioactive material are involved. Because of this, the Public Radiation Safety SDP was developed with a "public confidence" factor which provides for a higher level of significance than would be warranted based solely on the risk from exposure to the radioactive material.

#### 1 Radioactive Effluent Release Program

This branch of the SDP focuses on the licensee's radioactive effluent release program. It evaluates the significance of findings related to the release of radioactive gaseous and liquid effluents.

10 CFR Part 20, Standards for Protection Against Radiation contains radiation dose limits to members of the public from the release of radioactive gaseous and liquid effluents. Licensees are required to comply with these limits. In addition to the requirements of 10 CFR Part 20, for power reactors there are requirements to maintain radioactive effluents ALARA. These requirements are contained in 10 CFR 50.34a, 10 CFR 50.36a, General Design Criteria 60 of Appendix A to 10 CFR Part 50, 40 CFR Part 190, and Appendix I to 10 CFR Part 50. These regulatory requirements specify the identification of the radioactive effluent design objectives (i.e., radiation dose), and the means to be employed, for keeping levels of radioactive material in effluents ALARA during normal reactor operation, including anticipated operational occurrences.

To evaluate the significance of a finding in this portion of the SDP, the calculated dose from the effluent release must be known. As the dose to a member of the public from the radioactive effluent increases, so does the significance. A Green significance is given to those findings which involved an effluent release in which the licensee had an impaired ability to assess dose which resulted in doses to members of the public which are less than the values in Appendix I to 10 CFR Part 50 and 10 CFR 20.1301(d) (40 CFR Part 190). The basis for the Green finding is that no regulatory limits were exceeded.

A White significance is given to those findings which involved an effluent release in which the calculated dose to a member of the public is greater than the values in Appendix I to 10 CFR Part 50 and/or 10 CFR 20.1301(d) but less than 0.1 rem. The basis for the White finding is that regulatory requirements related to maintaining radioactive effluents ALARA were exceeded, but still below the 10 CFR 20.1301 annual public dose limit of 0.1 rem.

A Yellow significance is given to those findings which involved an effluent release in which the calculated dose to a member of the public is greater than 0.1 rem but less than 0.5 rem. The basis for the Yellow finding is that the 10 CFR 20.1301 annual public dose limit of 0.1 rem was exceeded. This represents a violation of a regulatory safety standard.

A Red significance is given to those findings which involved an effluent release in which the calculated dose to a member of the public is greater than 0.5 rem. The basis for the Red finding is that the 10 CFR 20.1301 annual public dose limit of 0.1 rem is exceeded by a substantial margin. The value of 0.5 rem was chosen because it represents the upper limit that 10 CFR Part 20 would allow, based on specific authorization, for a limited time basis. However, without prior NRC authorization, the dose represents a violation of a regulatory safety standard.

## 2 Radiological Environmental Monitoring Program

This portion of the cornerstone evaluates the significance of findings related to the radiological environmental monitoring program. The significance is related to the licensee's ability to perform sampling and analysis of environmental media for the presence of licensed radioactive material released in gaseous and liquid effluents.

The regulatory basis for requiring radiological environmental monitoring is contained in General Design Criteria 64 of Appendix A to 10 CFR Part 50, and Section IV.B of Appendix I to 10 CFR Part 50.

To evaluate the significance of a finding in this portion of the SDP, the licensee's ability to assess the impact of its radioactive effluent releases on the environment surrounding the plant must be known.

A finding of Green significance typically involves situations where environmental sampling stations are not operable and/or where required environmental samples were not collected and/or analyzed as a result of the licensee not following its procedures or because of some error. However, although the licensee was missing required environmental sample data, the licensee was still able to perform and report a reasonable assessment of the environmental impacts.

The more significant White finding occurs when a licensee failed to assess the environmental impact for a dose pathway from its radioactive effluent releases. This failure is linked to the licensee's failure to obtain an adequate number of environmental samples to make an assessment, or the samples were improperly analyzed so that the data is not usable. A White findings is given for the failure to assess the environmental impact from radioactive effluent releases for a pathway because it is contrary to a regulatory requirements.

There are no findings of significance greater than White in this portion of the SDP.

## 3 Radioactive Material Control Program

This branch of the SDP focuses on the licensee's radioactive material control program. It assesses the significance of findings related to the licensee's failure to control licensed radioactive material in accordance with the regulations and its program and procedures. This is the licensee's program which conducts radiation surveys of tools, equipment, and material (not personnel) that have the potential to have licensed radioactive material in or on it. In the absence of clearance limits in 10 CFR Part 20, licensees must perform a radiation survey of potentially contaminated items to ensure that no detectable licensed radioactive material is released from their control.

The regulatory basis for this program is contained in 10 CFR Part 20, Standards for Protection Against Radiation. 10 CFR Part 20, Subpart K - Waste Disposal contains the acceptable ways to dispose of licensed radioactive material. Additionally, 10 CFR Part 20, Subpart F - Survey and Monitoring, contains the requirement that a radiation survey must be performed to assess the potential radiological hazard of licensed radioactive material. Also, 10 CFR 20, Subpart I - Storage and Control of Licensed Material, contains the requirements for the security and control of licensed material. In combination, these requirements form the regulatory basis of NRC's program for the control of licensed radioactive material.

Information and guidance on acceptable radiation survey methodology to detect the presence of licensed radioactive material was issued by the NRC in Circular 81-07, Information Notice 85-92, and Information Notice 88-22.

To evaluate the significance of a finding in this portion of the SDP, the calculated dose to a member of the public from the licensed radioactive material must be known. As the dose to a member of the public from the radioactive material increases, so does the significance. A Green significance is given to those situations where the calculated dose is less than 0.005 rem total effective dose equivalent (TEDE). The basis for the Green finding is that no regulatory limits were exceeded and it is a dose value comparable to a Green finding in Radioactive Effluent Release Program SDP (i.e., it is comparable to the values in Appendix I to 10 CFR Part 50, which defines ALARA for radioactive effluents).

Discrete radioactive particles (also known as hot particles or fuel fleas) are handled differently because the dose from a discrete radioactive particle generally does not result in a TEDE dose as defined in 10 CFR Part 20. Generally, the dose from the particle is to a very small localized area of the skin and is not equivalent to the risk from a TEDE dose. However, if the discrete radioactive particle is of such a magnitude that a TEDE dose (a mrem or more) is received, then the finding should be assessed through the SDP. While the skin dose from a discrete radioactive particle is not assessed through the SDP, except as described above, it would still be counted as an occurrence.

A White significance is given to those situations where the calculated dose to a member of the public from the licensed radioactive material is greater than 0.005 rem, but less than 0.1 rem. The basis for the White finding is to be consistent with the ALARA dose values in Appendix I of 10 CFR Part 50 in the Radioactive Effluent Release Program portion of the SDP. A White finding is also given when the licensee has had greater than five occurrences where it failed to adequately control licensed radioactive material in a two year period. This assessment of the greater than five occurrences in a two year period is to be consistent with the use of 10 CFR 20.1301(d) (i.e., 0.025 rem) in the Radioactive Effluent Release Program portion of the SDP. The integration of the potential dose from more than five occurrences, each one being up to but less than 0.005 rem brings the total significance to more than 0.025 rem. The SDP is designed to parallel the significance determination used in the Radioactive Effluent Release Program portion of the SDP.

A Yellow significance is given to those findings in which the calculated dose to a member of the public from the licensed radioactive material is greater than 0.1 rem but less than 0.5 rem. The basis for the Yellow finding is that the 10 CFR 20.1301 annual public dose limit of 0.1 rem was exceeded. This represents a violation of a regulatory safety standard.

A Red significance is given to those findings in which the calculated dose to a member of the public from the licensed radioactive material is greater than 0.5 rem. The basis for the Red finding is that the 10 CFR 20.1301 annual public dose limit of 0.1 rem was exceeded by a substantial margin. The value of 0.5 rem was chosen because it represents the upper limit that 10 CFR Part 20 would allow, based on specific authorization, for a limited time

basis. Without prior authorization, the dose represents a violation of a regulatory safety standard.

#### 4 Transportation / Part 61 Program

This branch of the SDP focuses on the licensee's radioactive material packaging and transportation program. It assesses the significance of findings related to the licensee's failure to comply with requirements for the safe transport of radioactive materials on public roadways in accordance with NRC and Department of Transportation regulations.

The SDP is intended to be used for those radioactive material shipments classified as Schedule 5 (Low Specific Activity-1) through 11 (Fissile Material).

The regulatory basis for the Transportation program is contained in 10 CFR Parts 20, 61, and 71, and Department of Transportation regulations contained in 49 CFR Parts 170-189.

The Transportation SDP is comprised of six separate significance determination sections.

##### 4.1 Radiation Limits Exceeded

This portion of the cornerstone evaluates findings related to the licensee's failure to properly package and transport licensed radioactive material, on the public roads, which resulted in a situation where the external and/or surface contamination regulatory limits for the package were exceeded.

The regulatory basis for this portion of the SDP is found in 10 CFR 71.47, 49 CFR 173.441, and 49 CFR 173.443.

To evaluate the significance of a finding in this portion of the SDP, the external dose rate and/or the surface contamination levels on the package being transported must be known. As the radiation and/or activity levels increase, so does the significance.

A Green significance is given to those findings in which the external dose rate limit was not exceeded and/or the surface contamination limit was exceeded but was less than five times the limit. The basis for the Green finding is that there is little to no risk to members of the public.

A White significance is given to those findings in which the external dose rate was exceeded but is less than five times the limit and/or the surface contamination limit was exceeded by five times but less than 50 times the limit. The basis for the White finding is that a regulatory limit was exceeded and there is some radiation risk to members of the public.

A Yellow significance is given to those findings in which the external dose rate was exceeded by five times but is less than ten times the limit and/or the surface contamination limit was exceeded by 50 times but less than 100 times the limit. The basis for the Yellow finding is that the regulatory limit was greatly exceeded and there is an increased radiation risk to members of the public.

A Red significance is given to those findings in which the external dose rate was exceeded by 10 times the limit and/or the surface contamination limit was exceeded by 100 times with radioactive contamination spread in an unrestricted area. The basis for the Red finding is that the regulatory limit was exceeded and thus, represents an actual radiation hazard to members of the public.

## 4.2 Breach of Package During Transit

This portion of the cornerstone assesses the significance of findings which involve the licensee's failure to properly package and transport licensed radioactive material, on the public roads, and resulted in a breach of the package.

The regulatory basis for this portion of the SDP is found in 10 CFR Part 71 and 49 CFR Part 173.

To evaluate the significance of a finding in this portion of the SDP, the quantity, Class, and form (i.e., readily dispersible) of radioactive material must be known. As the quantity, Class, and form of radioactive material varies (increases), then the potential impact (radiation dose) to members of the public increases as a result of a package breach during shipment.

A Green significance is given to those findings in which the radioactive material was classified as less than a Type A shipment and there was no loss of contents from the package. The basis for the Green finding is that there is little to no risk to members of the public.

A White significance is given to those findings in which the radioactive material was classified as Type A (or less) shipment with a loss of contents from the package where the dose to a member of the public was less than or equal to 25 mrem and/or the dose to an radiation worker was less than or equal to 5 rem. The basis for the White finding is that a regulatory limit was exceeded and there is some radiation risk to members of the public and radiation workers.

A Yellow significance is given to those findings in which the radioactive material was classified as less than Type A shipment with a loss of contents from the package where the dose to a member of the public was greater than 25 mrem but less than or equal to 100 mrem and/or the dose to an radiation worker was greater than 5 rem but less than or equal to 25 rem. A Yellow significance is also given to those findings in which the radioactive material was classified as greater than Type A shipment and there was no loss of contents from the package. The basis for the Yellow finding is that the event resulted in increased radiation risk to members of the public and/or radiation workers because of radioactive material being released from a shipping package or from the potential for material in a greater than Type A shipment to be released.

A Red significance is given to those findings in which the radioactive material was less than Class A quantity with a loss of contents from the package where the dose to a member of the public was greater than 100 mrem and/or the dose to a radiation worker was greater than 25 rem. A Red significance is also given to those findings in which the radioactive material is greater than Class A quantity and there was a loss of contents from the package. The basis for the Red finding is that the event results in a radiation dose to members of the public and radiation workers in excess of the annual dose limits in 10 CFR Part 20 and for the significant potential radiation risk to radiation workers and members of the public from the potential loss of greater than Class A radioactive material from a package that was breached.

## 4.3 Low Level Burial Ground Access

This portion of the cornerstone evaluates findings which involve a licensee being denied access to a licensed low level radioactive waste burial facility.

The regulatory basis for this portion of the SDP is derived primarily from the actions of the licensed burial ground facility's host State. The burial grounds are specifically licensed by the State. Failure of an NRC licensed facility to adhere to the regulatory requirements of

the burial ground facility for the disposal of low level radioactive waste can result in the suspension of their disposal privileges. The licensed burial facility and host State would notify NRC of the suspension of disposal access for a specific licensee.

A Yellow significance is given to those findings in which the licensee's disposal privileges were suspended for greater than 30 days, based on the licensee's failure to meet the regulatory requirements (State or NRC).

The basis for the Yellow significance is that the NRC views the suspension of burial access, for regulatory compliance issues, as a failure by the licensee to meet regulatory requirements designed to protect members of the public, radiation workers, and the environment. This situation represents an increased risk of exposure from licensed radioactive material.

#### 4.4 Part 61 Finding

This portion of the cornerstone evaluates findings related to the classification (i.e., Class A, B, C, etc.) of radioactive material being transported on public roadways.

The regulatory basis for this portion of the SDP is found in 10 CFR Part 61.

To evaluate the significance of a finding in this portion of the SDP, the quantity, Class, and form (i.e., readily dispersible) of radioactive material must be known. As the quantity, type, and form of radioactive material varies (increases), then the potential impact to members of the public, radiation workers, and the environment (licensed facility receiving the material) increases.

A Green significance is given to those findings in which the radioactive material was underclassified (i.e., the waste was classified as Class A, when it should have been Class B) and the information on the waste manifest for the waste characteristics conformed to the requirements in 10 CFR 61.56. The basis for the Green finding is that there is little to no risk to members of the public, radiation workers, and the environment.

A White significance is given to those findings in which the radioactive material was underclassified (i.e., the waste was classified as Class A or B, when it should have been Class C). A White significance will also be given to those findings in which the radioactive material was underclassified (i.e., the waste was classified as Class A, when it should have been Class B) and the information on the waste manifest for the waste characteristics did not conform to the requirements in 10 CFR 61.56. The basis for the White finding is that a regulatory limit was exceeded and there is some radiation risk to members of the public and radiation workers, and the environment.

There are no finding of significance greater than White in this portion of the SDP.

#### 4.5 Failure to Make Notifications or Provide Emergency Information

This portion of the cornerstone has four components which evaluate findings related to the communication, information, emergency response, and notification requirements for radioactive material being transported on public roadways.

The regulatory basis for this portion of the SDP is found in 10 CFR Part 71, 49 CFR Part 172, and 10 CFR Part 20.

A White significance is given to the following events: the licensee failed to comply with 10 CFR 71.97 by making a radioactive material shipment into or through a State without prior notification to the state governor; the licensee failed to provide emergency response

information required by 49 CFR 172.602; the licensee ships radioactive material with external radiation or surface radioactive contamination levels exceeding five times the limits of 10 CFR Part 71; and the licensee failed to respond, when requested, during an emergency in accordance with 49 CFR 172.604.

#### 4.6 Certificates of Compliance (CoC)

This portion of the cornerstone evaluates findings related to the licensee's failure to properly package and transport in accordance with the requirements of its general or specific license.

This portion of the cornerstone has four components which evaluate findings related to the following: Design Documentation Deficiency, Maintenance/Use Performance Deficiency, Minor Contents Deficiency, and >1 Major Contents Deficiency.

For the **Design Documentation Deficiency** component, a Green significance is given to those findings in which there is a design documentation deficiency related to the maintenance or use of an NRC approved package. The deficiencies covered here are expected to be documentation noncompliances, not the failure to perform a required action. There are no findings of higher significance for this area.

For the **Maintenance/Use Performance Deficiency** component, a Green significance is given to those findings in which the licensee has failed to perform required actions, or the improper performance of required actions related to the physical condition or problems with the package. It does not include the physical failure of a package or the results from a physical failure, such as excessive exposures, personnel injury or property damage which are covered elsewhere in the SDP. There are no findings of higher significance for this area.

For the **Minor Contents Deficiency** component, a Green significance is given when a specification regarding cask contents with minor safety significance required by the CoC was not met (e.g., the issue was not a temperature, pressure, geometry, weight, burnup, enrichment, or moderator specification nonconformance). There are no findings of higher significance for this area.

For the **>1 Major Contents Deficiency** component, the significance is determined for a finding in which the package contained radioactive material where a critical parameter was outside the limits of the CoC, or that the closure/containment system was deficient. The critical parameters that are considered for this component of the SDP are as follows: a breach of the package, a radioactive material release, a failure to exercise adequate controls, or a dose exceeding a public or occupational dose limit. A White significance is given when only one critical deficiency was identified. A Yellow significance is given when more than one critical deficiency was identified.