

of the ISFSI, this places the boundary at least 22 feet from the center of the module. Calculations were conservatively performed with the 6.5 ft remaining fill (soil is used in the model) around a loaded VVM instead of the 10.75 ft required by the RPS. The dose rates at the surface of the excavation are presented in table 5.4.4 for both MPC-32 and MPC-37. This dose rate is very low, specifically lower than the dose rates at 1 m from the inlet/outlet vents of the modules. The dose rates at a construction site might therefore be dominated by the dose rates from the inlet/outlet vents, and depending on the loading condition of the operating part of the ISFSI, temporary shielding might be used to reduce dose rates to the construction site. It is to be noted that 6.5 feet of soil is considered for this purpose without any concrete enclosure wall.

#### **5.4.2 Design Basis Dose Rate Limits**

*As discussed in Appendix 13.A, Section B 5.3, dose rate measurements are to be performed, amongst other locations, on top of the VVM and compared with calculated values. Even though comparison of dose rates can occur across any location, the locations chosen are based on positions where higher dose rates are expected. Higher dose rates provide better measurements to protect against measurement inaccuracy. Based on this, dose rate locations are selected to be on the side of the closure lid. For the standard HI-STORM UMAX lid design, the results shown in Tables 5.1.1 and 5.1.2 together with the information in Figure 5.1.1 show that this would be location 1. Dose rates on the corresponding location have also been evaluated for the Version B lid, and are shown in Table 5.4.6. Based on this, the limit values listed in Table 5.4.7 are specified. These values are larger than the highest expected value, to assure that measurement and location uncertainties will not result in an inadvertent failure of the comparison. It should be noted that this value is an overall bounding limit, which is used in addition to a site specific limit that typically is significantly lower, and hence is typically the more limiting condition.*

*The standard lid is essentially rotational symmetric, and hence the azimuthal orientation of the 4 required dose rate locations is not critical. The Version B lid is not round, and hence the shielding configurations vary azimuthally. It is therefore recommended to have the dose rate locations on each side of the square lid rotationally symmetric at 0, 90, 180 and 270 degrees of the lid.*

*Finally, an important aspect is that the locations of the calculations to determine the limits and the locations where the measurements are taken are as close as possible to each other, so that a valid comparison is made. This needs to be recognized when selecting and identifying the locations.*

*For the side of the HI-TRAC VW, evaluations are performed in HI-STORM FW, Chapter 5 [5.0.3]. The dose rate limit based on those evaluations is specified in Table 5.4.6.*

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*Table 5.4.6*

*DOSE RATES ADJACENT TO THE HI-STORM UMAX  
MODULE WITH VERSION B LID FOR NORMAL  
CONDITIONS  
MPC-37 DESIGN BASIS ZIRCALOY CLAD FUEL*

<i>Location</i>	<i>Value</i>
<i>Side of the VVM lid Adjacent to the Inlet Vent</i>	<i>22 mrem/hr</i>

*Table 5.4.7*

*DESIGN BASIS DOSE RATE LIMITS*

<i>Location</i>	<i>Value</i>
<i>Side of HI-TRAC</i>	<i>3500 mrem/hr</i>
<i>Standard Lid (On the side of the closure lid approximately midheight)</i>	<i>180 mrem/hr</i>
<i>Version B Lid (On the side of the closure lid approximately midheight and adjacent to the inlet vent)</i>	<i>60 mrem/hr</i>

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*B.5.0 Administrative Controls and Programs (LCO) APPLICABILITY**B.5.3 Radiation Protection Program**BASES*

- B.5.3.1 5.3.1 requires that the licensee appropriately includes provisions in their radiation protection program to account for the dry storage system from loading through unloading. These provisions should also include the requirements included in Section 5.3 of the CoC.*
- B.5.3.2 5.3.2 includes the requirements of 10CFR72.212(b)(5)(iii) for a documented evaluation that the dose limits of 10CFR72.104(a) are met. This evaluation should utilize the site-specific ISFSI layout, the planned number of casks, and the cask contents to demonstrate compliance with 10CFR72.104.*
- B.5.3.3 In accordance with 5.3.3, licensees should use the analysis performed in 5.3.2 to also establish dose rate limits at the top of the VVM (in accordance with the measurement location specified in 5.3.8), and the outlet vents on the VVM. If measured dose rates exceed these limits, it could be an indication of a loading error that may require corrective actions. These calculated limits are used in comparison with the measured values in 5.3.8.*
- B.5.3.4 5.3.4 contains additional dose rate limits for a loaded VVM and transfer cask. These dose rate limits are set at a value above the maximum expected dose rates at the locations described in 5.3.8, from a system loaded with design basis fuel. If measured dose rates exceed these limits, it could be an indication of a gross design or loading error that may require corrective actions. Section 5.4.2 of this FSAR contains additional discussions on the selection of the location and dose rate limits.*
- B.5.3.5 5.3.5 provides the requirement that the licensee measure dose rates at the locations outlined in 5.3.8 and compare them to the lower of the two limits established in Section 5.3.3 or 5.3.4. This ensures that the most conservative limit is used.*
- B.5.3.6 5.3.6 establishes corrective actions that shall be taken in the event of measured dose rates that exceed the lower of the two limits in Section 5.3.3 or 5.3.4. These corrective actions include verifying that contents were loaded correctly, performing analyses to ensure 10CFR72.104 dose limits are met, and determining the cause of the higher dose rate.*
- B.5.3.7 5.3.7 states that any evaluation under 5.3.6 that shows that 10CFR72.104 dose rates limits will not be met will prevent the MPC from being installed in the VVM or it will be removed from the VVM. This control ensures that the site continues to meet all regulatory requirements.*

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**BASES**

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- B.5.3.8** *5.3.8 establishes locations for surface dose rate measurements. Compliance with 10CFR72.104 dose limits are confirmed with a comparison between these measured dose rates and the dose limits of the system set by calculation and maximum limits in 5.3.3 and 5.3.4 as described in 5.3.5. The measurement locations specified in 5.3.8 ensure the measured dose rates are compared with the analysis described in 5.3.3 at the same geometric location. Showing that the calculated dose rates at the same location provides assurance that the calculated dose (from 5.3.2) bound the actual doses at the site boundary, and therefore assures compliance with 10CFR72.104(a).*
- Even though comparison of dose rates can occur across any location, the locations chosen in 5.3.8 were based on positions where higher dose rates are expected. Higher dose rates provide better measurements to protect against measurement inaccuracy and the additional actions of 5.3.6 and 5.3.7 for compliance to 10CFR72.104.*
- B.5.3.9** *5.3.9 establishes a “Radiation Protection Space” around the HI-STORM UMAX ISFSI, down to the depth of the Support Foundation Pad. This RPS only applies during construction activities, and provides assurance that there is no loss of shielding due to an event occurring during construction activities adjacent to the HI-STORM UMAX.*