ALION
SCIENCE AND TECHNOLOGY

SOFTWARE ERROR NOTIFICATION

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ERROR IDENTIFICATION

Error Notice Identification Number: 18 Page 1 of 2

Program Name: RADTRAD

Versions Affected: 3.03 and Alion-RADTRAD v3.10

Error Classification: ☒ Safety-Related ☐ Non Safety-Related

Associated CAR Number(s): 2017-07

DESCRIPTION OF PROGRAM ERROR

RADTRAD software allows the user to model certain *compartment features*, including radionuclide removal via *Sprays* and *Natural Deposition*. The *runtime model information* (if selected) displayed in the output file is mislabeled for certain situations. This error has two effects, which apply to both RADTRAD v. 3.03 and Alion-RADTRAD v. 3.10 unless otherwise stated in the description:

1. If the user selects the *user-defined coefficients Natural Deposition Aerosol Model*, no values of deposition lambda or decontamination factor are included in the output file even if the *show results control option* to *include runtime model information* is enabled. Furthermore, in RADTRAD 3.10 only, if the user selects the *Henry natural deposition model* with *runtime model information* requested, the output is mislabeled as "user removal coefficients" instead of "Henry's correlation."

2. According to Section 2.3.2 of the Alion-RADTRAD 3.10 User's Manual (ALION-UGM-RADTRAD-2408-02), "It is not consistent to select both Sprays and Natural Deposition to be active at the same time in the same compartment." However, the RADTRAD software allows users to model both *Sprays* and *Natural Deposition* in the same *compartment* without a warning or error statement. Furthermore, when the user selects both *Sprays* and *Natural Deposition* for a single *compartment* with the *control option* to *show results – include runtime model information* enabled, the values of *deposition lambda* for the *Sprays* model may be erroneously reported as the *deposition lambda* values for *Natural Deposition* in addition to *Sprays*. Also note that the reported *decontamination factors* are for each individual model and may be difficult to interpret. The *decontamination factor* for *Sprays* is the amount of a transport group's radionuclides in the sump pool and containment atmosphere divided by just what is in the containment atmosphere. Similarly, the *decontamination factor* for *Natural Deposition* is the amount of a transport group's radionuclides deposited on surfaces and in the containment atmosphere divided by what is in the containment atmosphere. Since both removal models deplete the containment atmosphere source term, the *decontamination factors* reported will be greater than if only a single model was used. In order to calculate a combined *decontamination factor,* the values for *Sprays* and *Natural Deposition* should be added together and then a value of 1.0 should be subtracted. The user must ensure that undue credit for radionuclide removal is not taken by implementing both *Sprays* and *Natural Deposition.*

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PROGRAM USER NOTIFICATION

S/W Users Notified: Jamie L. Gerard 2018.01.30 11:13:16 -07'00' (Signature) 1/30/18 (Date)

RECOMMENDATIONS TO PROGRAM USERS

It is recommended that the user select either *Sprays* or *Natural Deposition* for containment, not both. If the user desires to model both *Sprays* and *Natural Deposition*, it is recommended that containment be split into two *compartments*, one corresponding to the "sprayed" region and a second corresponding to the "unsprayed" region, with volume and source term fraction updated accordingly. The interested user should consult regulatory documentation for further guidance (e.g. Sections 3.2 and 3.3 of Appendix A of Reg. Guide 1.183 and Chapter 6.5.2 of the SRP – NUREG-0800).

If the user desires to model both *Sprays* and *Natural Deposition* in a single *compartment*, the user should either model *Natural Deposition* in an additional, separate file to obtain *deposition lambda* for *Natural Deposition* or refer to the original model documentation or RADTRAD documentation (Section 2.2.2 of NUREG/CR-6604).

COMPLETION/APPROVAL/CLOSE-OUT

	Printed/Typed Name	Signature	Date
Program Manager:	Jamie L. Gerard	Jamie L. Gerard 2018.01.30 11:13:41 -07'00'	1/30/18
Program POC:	William M. Cook	William M. Cook 2018.01.30 11:10:26 -07'00'	01/30/2018
QA Manager:	Andy Roudenko	Digitally signed by Andy Roudenko DN: cn=Andy Roudenko, o=Alion Science and Technology, ou=Nuclear Services Division, email=aroudenko@alionscience.com, c=US Date: 2018.01.31 10:08:10 -08'00'	31-JAN-2018