Department of Energy
Washington, DC 20585

June 9, 2015

The Honorable Jessie H. Roberson
Vice Chairman
Defense Nuclear Facilities Safety Board
625 Indiana Avenue NW, Suite 700
Washington, DC 20004

Dear Ms. Vice Chairman:

Enclosed is the Department of Energy's (DOE) Office of Environmental Management (EM) Office of Packaging and Transportation (OPT) response to the Defense Nuclear Facilities Safety Board's (Board) letter, dated March 16, 2015. The letter requested a written response documenting DOE's federal oversight activities and risk assessments related to the RADCALC safety software used at DOE sites by personal computer (PC) users.

In response to the Board's letter, OPT prepared the enclosed response detailing interim and future actions being taken to mitigate risks of the undocumented pedigree of PC-based RADCALC 4.1 and to establish a documented accountability of the software. Interim actions include releasing version 4.2 of the RADCALC software which will address the more immediate issues; however, it will not fully resolve the configuration management and control issue of the correct version of the software code utilized by the users. Therefore, we plan to release a version 5.0 of RADCALC on the DOE Cloud platform by the end of fiscal year 2016. This web-based software will provide version control and retrievable documentation of users' access to the program.

EM has discussed the enclosed response with Board staff and we will continue to keep Board staff informed of the progress being made in implementing our corrective actions.

If you have any questions, please contact me or Mr. Frank Marcinowski, Deputy Assistant Secretary for Waste Management, at (202) 586-0370.

Sincerely,

Mark Whitney
Acting Assistant Secretary
   for Environmental Management

Enclosure

U.S. Department of Energy's Office of Environmental Management Office of Packaging and Transportation Corrective Actions to Remedy RADCALC Software Issues Identified by the Defense Nuclear Facilities Safety Board

RADCALC is a Department of Energy (DOE)-Office of Environmental Management (EM) acquired safety software computer program that is used to assist DOE in making radioactive material and waste packaging and transportation determinations that comply with applicable Federal regulations and DOE Orders and Standards. The RADCALC software performs transportation classifications and calculations ensuring shipment compliance with:

- Department of Transportation (DOT) regulations such as those for low specific activity, Type A, Type B fissile, and non-fissile materials;

- DOE Requirements such as those for transuranic (TRU) waste and DOE-Standard (STD) 1027-92, *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports*; and

- Radioactive decay and gas pressure determination methodologies.

An authorized user can access and download this software to a personal computer from the RADCALC web site.

In 2008, Project Enhancement Corporation (under contract to EM Headquarters Support Services) and through its subcontractor Energy Solutions, issued RADCALC 4.1. RADCALC 4.1 was developed by Energy Solutions in compliance with the applicable requirements listed in ASME NQA-1, *Quality Assurance Requirements for Nuclear Facility Applications*. However, no evidence has been found indicating Energy Solutions' quality assurance (QA) program was qualified by DOE. Currently, EM Headquarters Support Services has a contract with Boston Government Services Corporation (BGS) to manage RADCALC 4.1 under its NQA-1 Quality Assurance Program (QAP). The BGS QAP is being qualified by the EM Office of Standards and Quality Assurance. EM recognizes that at the present time, RADCALC 4.1 software pedigree remains undocumented and the program is maintained under an unapproved NQA-1 program by BGS.

Since the release of RADCALC 4.1 in 2008, the EM Office of Packaging and Transportation (OPT) and users have identified one major issue and several minor issues in the software. Problem reports and correction reports were issued to all users and were also posted on the RADCALC web site for each issue. Upon the discovery of each issue that may have required a change in the software and the QA documents, OPT consulted with the appropriate subject matter experts both within and outside the Department to

determine whether to open the source code or modify QA documents. OPT then conveyed each decision to the RADCALC user community. This enabled the user to apply solutions provided in correction reports and avoid using the affected module of the code.

OPT's decision to not revise the RADCALC source code also took into consideration anticipated changes to transportation regulations that were then under consideration by DOT with respect to radioactive materials; such a change to the rule would have necessitated a revision to the RADCALC source code. In 2011, DOT issued a Notice of Proposed Rulemaking (HM-250) to harmonize with the Regulations of the International Atomic Energy Agency. In light of the proposed rulemaking and by addressing the limited number of technical issues with the software, OPT believes that the process of addressing identified issues through correction reports have been technically appropriate and cost-effective. DOT issued a final rule in July, 2014, requiring compliance with regulatory changes by July 13, 2015.

OPT also assessed the risks associated with the suspension of the use of the RADCALC 4.1 software on sites' radioactive material and waste shipping operations. OPT concluded that the probability, and ultimately the consequences, of sites making shipping errors through hand calculations would be high and therefore unacceptable to the safety of DOE waste shipping operations. OPT's decision also took into consideration that the user base of the RADCALC software was broader than just DOE contractors and subcontractors. Since 2011, RADCALC has had a history of reliable use; DOE has not had an incident where the use of the RADCALC software was at fault. We believe that if the use of RADCALC was suspended, it would most likely be supplemented with rogue unqualified software or hand calculations by users. Therefore, to mitigate the risks due to the pedigree of RADCALC 4.1, DOE will first qualify the BGS quality program under ASME NQA-1 2008/9 and then implement the following four-step process designed to establish accountability of the software and users:

1. Issue a Safety Advisory to all users and site transportation managers alerting them to issues associated with the pedigree of RADCALC software, and making them aware of alternatives (such as hand calculations or new commercial software) to the continued use of RADCALC 4.1;

2. Develop and issue a set of test criteria for RADCALC 4.1 that will allow the user to test the software on its platform to ensure the software is functioning to specifications;

3. Direct all known users of the software to go to the RADCALC website where registered users will authenticate and access the verification guide. This will provide evidence that an individual is registered (updating our list of registered users). This will confirm that users are running the latest version of RADCALC 4.1. This will also provide documentation that RADCALC 4.1 is installed and functioning properly in their environment; and

4. Update the code to resolve known issues and incorporate DOT mandated HM-250 regulatory changes by releasing the NQA-qualified RADCALC 4.2.

This interim four-step process does not fully resolve the issue of configuration management and control over the use of the software code, Therefore, OPT plans to release version 5.0 of RADCALC on the DOE Cloud platform by the end of fiscal year 2016. The web-based software will provide effective version control and knowledge of users. RADCALC 4.2 will be automatically deactivated upon implementation of RADCALC 5.0

In conclusion, OPT has established a systematic plan that will bring the RADCALC software in compliance with DOE safety software standards. Federal oversight of the current and any future contractors maintaining the RADCALC safety software code will be managed and overseen according to DOE requirements. Finally, DOE will keep the Board staff informed of our progress in implementing the above stated interim as well as long-term corrective actions.