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Mr. Don Lowman

Project Manager
Low-Level Waste Branch
Division of Waste Management and Environmental Protection
Office of Federal and State Materials and Environmental Management Programs

(5)

Comments on Proposed Revision to NUREG/BR-0204, "Instructions for completing NRC's Uniform Low-Level Radioactive Waste Manifest" – Project No. 0800

Dear Mr. Lowman;

DW James Consulting, LLC (DWJC) is an independent company providing technical consulting services and software to the nuclear power industry. We thank the NRC for allowing entertaining comments on a proposed revision to NUREG/BR-0204, "Instructions for completing NRC's Uniform Low-Level Radioactive Waste Manifest". (U.S. Nuclear Regulatory Commission 1998)

NUREG/BR-0204 Rev 2 issued in July 1998, provides instructions to LLW generators for the preparation of the NRC's Uniform LLW Manifest. It includes instructions for meeting federal regulatory requirements as well as identifying items that have optional reporting requirements. It also identifies that Agreement States (with LLRW disposal sites) have the authority to require their own special reporting requirements. In practice, each sited Agreement State has at some level modified some of the reporting requirements thereby negating some of the advantage gained from the "uniform" manifest. We recognize that NRC may not be able to change this situation in the course of a revision to a NUREG but we encourage NRC and Agreement States to consider the advantages to a truly uniform reporting structure.

Form 540, Block 10, Certification.

NUREG/BR-0204 and Form 540 require a certification statement that requires the shipper to attest that the material is properly packaged, classified and described for both shipment and disposal. The certification statement is in two parts; the first corresponds to the requirements in 49 CFR 172.204, the second corresponds to the requirements of 10CFR 20 Appendix G. (U.S. Department of Transportation n.d.) (U.S. Nuclear Regulatory Commission n.d.) The statement is continuous and there is one signature to attest to both parts. The statement in full is not consistent with the use of the Uniform Manifest when shipping to in intermediary site (processor) prior to disposal. In this case, the waste may not be properly packaged for disposal and on page 21 of the NUREG, the instructions for Block 16 of the Form 541 states that waste classification is not required when shipping to a processor. This forces the shipper to essentially make a material false statement and be open to enforcement action and penalties as per 10 CFR Parts 19.30 and 19.40. (U.S. Nuclear Regulatory Commission n.d.)

DWJC recommends that Form 540 be revised to separate the two statements and allow a check box to indicate which statement(s) may be applicable at the time of shipment. Alternately, revise the NUREG to explicitly permit the shipper to line out the waste certification statement when shipping to an intermediary facility (i.e. not directly for disposal).

Form 541, Block 1, Manifest Totals.

NUREG/BR-0204 identifies a requirement from 10 CFR 20 Appendix G for the separate reporting of specific radionuclides (^{3}H, ^{14}C, ^{99}Tc, ^{129}I, ^{233}U, ^{235}U, plutonium and uranium and thorium in source material). (U.S. Nuclear Regulatory Commission n.d.) The requirement is derived from the importance of these radionuclides to the long-term performance of the disposal site as anticipated from NUREG-0782.

(U.S. Nuclear Regulatory Commission 1981) Data collected from waste manifests over the last 30 years as shown in the Manifest Information Management Database (MIMS) and research documented by the Electric Power Research Institute (EPRI) indicate that the quantities of these radionuclides are minimal as they are most often reported as Lower Limit of Detection (LLD) values. (U.S. Department of Energy 2013) (EPRI 2009) Further, the requirement to report and use the LLD values as essentially real values included in the total promotes over-reporting of these radionuclides. In addition, there is no guidance for disposal sites as to how LLD values are to be used in the development of the site inventory. The combination can affect the decision to close existing LLW Disposal facilities prematurely (based on the perceived inventory of these radionuclides).

There are three issues that arise from the language of this section of the guidance:

1. While the specific radionuclides identified may be important to the theoretical disposal site evaluated for the development of 10 CFR Part 61, they may not be the most critical radionuclides for a specific site. Given the NRC's direction to develop more risk-informed regulations and the current development of specific Performance Assessment objectives, it is reasonable to expect that other radionuclides could be identified as more critical to disposal site inventory. (U.S. Nuclear Regulatory Commission 2011)

   DWJC recommends that NRC consider removing the specific identification of radionuclides for separate reporting from both NUREG/BR-0204 and 10 CFR 20 Appendix G and allowing disposal sites to establish their own list based on Performance Assessment data.

2. The NRC Branch Technical Position on Radioactive Waste Classification (U.S. Nuclear Regulatory Commission May 1983) provides guidance for the measurement of specific radionuclides. This guidance establishes the LLD for direct measurement of a radionuclide for compliance with 10 CFR Part 61 to be 0.01 times the concentration listed in Table 1 (i.e. the Class C limit) and 0.01 times the smallest concentration listed in Table 2 (i.e. the Class A limit) for the respective radionuclides. For the three Table 1 radionuclides in particular, these minimum detection levels may be insufficient for the final disposal site performance assessment. Laboratory techniques to achieve lower detection levels are impractical and unnecessarily costly.

   DWJC recognizes that there are alternate methods identified in the Branch Technical Position (1983) that the industry could employ to obtain better values for these radionuclides. These may include improved process knowledge techniques (U.S. Nuclear Regulatory Commission May 1983), constant scaling factors (EPRI 1992) and software calculation methods (Vance & Associates, Inc. 1994). However, given current industry practices and NRC inspection and enforcement implementation, these techniques are not universally viewed as acceptable. The nuclear utility industry is conservative by nature and will tend to implement the approved methodology that is least challenged during inspections.

   DWJC recommends that NRC consider reinforcing those methodologies that are considered by Staff to be acceptable with both the Industry and NRC's Regional offices conducting assessment and enforcement inspections.

3. The guidance to use LLD values to derive and report total activities for the specified radionuclides is not consistent with the statistical definition of the LLD nor necessarily is its use as an actual measurement value. (Currie 1984) The default use of an LLD value as an actual

measurement almost automatically guarantees over-reporting of the true activity. The guidance to use LLD values to complete Block 1 information is also inconsistent with the instructions for completing nuclide information in Block 15. In Block 15, the isotope is required to be entered only if it greater than be 0.01 times the concentration listed in Table 1 (i.e. the Class C limit) and 0.01 times the smallest concentration listed in Table 2 (i.e. the Class A limit) for the respective radionuclides or greater than 0.26 megabecquerels/cm^3 for other radionuclides not listed in Tables 1 or 2. Both sections are written in a manner that is identified as requiring compliance.

DWJC recommends that NRC revise NUREG/BR-0204 to discontinue the requirement to report LLD values and instead establish a minimum activity threshold for reporting.

Form 541, Block 12, Approximate Waste Volume(s) in Container, Block 8, Waste and Container Weight

NUREG/BR-0204 states that the 'approximate volume' of 'waste' in the container is to be indicated in this Block. In practice, there are differences of opinion as to whether this should include fill materials if the fill materials are not radioactive waste and not sorbents or solidification / stabilization media included in the classification basis or the actual package volume if the package is intended to be waste (as in a shipment to an intermediary processor). The volume may also used in different ways by processors, disposal sites and regulators as a check on concentrations for waste classification or a check on actual fill volume. The uses are not always compatible.

DWJC recommends clarification in the instructions for Block 12 to indicate that the waste volume indicated should be the full volume of material in the package inclusive of fillers, solidification or absorption media regardless if these are used in the waste classification basis. The sum of the package totals in Block 12 should then be consistent with the 'Net Waste Volume' in Block 1 which should also include fillers, solidification or absorption media. Volumes and mass used for waste classification, being subject to different rules should be described and documented separately as required by other existing guidance. Similarly in block 8, the weight provided should express the total weight of the package including any filler that may be added without distinction.

Form 541, Block 11, Waste Descriptor

The set of 22 waste descriptor codes included in the uniform manifest were derived in support of the Manifest information tracking system to specify specific material types by volume and activity. In practice these types are often grouped for reporting and classification entries. This is often a convenience for the shipper as well as the disposal site. However, it does blur the distribution of the material types and their activity contributions in the final record for MIMs.

DWJC recommends that NRC consider consolidating the list or optionally clarifying which may be combined for reporting and classification purposes.

Form 542, Manifest Index and Regional Compact Tabulation

NUREG/BR-0204 echoes the requirement in 10 CFR 20 Appendix G for the preparation of Form 542 by waste collectors or processors who ship LLW consolidated from multiple waste generators to a disposal facility. Recently some waste processors have received license amendments from Agreement States to declare the residue of certain processes as 'residual waste' as defined in 10 CFR 20 Appendix G. Some Agreement States with LLW disposal facilities have objected to the decision and seek to require reporting of the origin of the waste through other means if not on Form 542.

DWJC takes no position on the technical merits of either the license amendments provided to processors or on the LLW Disposal Facility Sited States' desire to maintain traceability of the origin of the waste. The intention of the requirement and definitions in 10 CFR 20 Appendix G seem clear; traceability to the original generator is intended in order to facilitate management of the Compact Process under the LLW Policy Act (as amended). (Low Level Radioactive Waste Policy Amendments Act 1985) Some flexibility is also permitted and it is recognized that some waste may be generated at a processor where attribution of specific quantities of activity to the original generator is not practical if even possible. DWJC recognizes that the ultimate responsibility for the safe management of the LLW disposal site and therefore the authority to regulate is with the regulatory authority of the disposal site. Where such authority and direction to provide information is consistent with federal regulations, DWJC recommends that existing documentation methods be implemented consistently rather than a patchwork of individual reporting mechanisms.

General – Reporting Precision

Currently there is no specific guidance as it relates to reporting precision. In general, measured values used in the estimation of activity content and for the derivation of scaling factors are generally not more than 3 decimal places (i.e. four significant digits). When these values are combined for estimating scaling factors or used in conjunction with dose to activity adjustment, the numerical precision is marginally 2 significant digits. When the manifest was initiated most computers were just moving to processors capable of handling 32 bit data types. The computing standard at the time was dictated by 16 bit data types. These computers would overflow on decay calculations at around 10^{-30}. Current computers can handle 64-bit data types and go to ~10^{-5000} before there is a numerical overflow. In addition, meaningful values for activity content reporting are only around 1 Bq (or about 10^{-6} μCi).

DWJC recommends that the NRC change NUREG/BR-0204 to specify numerical reporting to not more than 3 significant digits and to preclude reporting below about 1 Bq or 10^{-6} μCi

We would like to express appreciation to NRC for the public workshop and request for comments. Thank you for consideration of this letter in the NUREG/BR-0204 Revision.

Best Regards,

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Vice President

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Attachment: Works Cited

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Works Cited

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