# White Paper

## Evaluation and Acceptance of Licensee Requests for the Disposal of Materials with Extremely Low Levels of Contamination in Class D Landfills.

### Background Information

Starting in the early 1990s the Division of Radiological Health received several requests to authorize the disposal of materials with extremely low levels of radioactive materials in a few of the class D landfills in the State of Tennessee. These proposals argued that the levels of contamination, while detectable, posed no hazard by being disposed of in this manner. These proposals were supported using a computer software evaluation package called RESRAD. RESRAD was developed by Argonne National Labs to evaluate future doses from residual radiation left in place after decommissioning. Evaluations using RESRAD are conservative for almost all possible scenarios and radionuclides. These proposals were each evaluated on a case-by-case basis and most were approved.

By the mid 1990s, many waste streams were being requested, and approvals became extremely backlogged. Several licensees asked if an evaluation could be made for a worst case waste stream and that any waste stream which was less contaminated than this hypothetical waste stream could be disposed of at the landfills without having to be specifically approved. This was accepted under the following conditions. The worst case waste stream and the actual waste had to be compared on an isotope by isotope basis, and the disposal could only take place at the landfill for which the evaluation was conducted.

### Division Policy

Currently the Division has several facilities approved to do this type of analysis and disposal. Each licensee has its own individual license condition for this disposal but they all meet certain criteria. Currently all these evaluations meet these conditions:

1) The resident farmer scenario, using the NRC's PG8-08 inputs and the RESRAD[1,2] computer code for evaluation, must not show a dose greater than 1 mrem/yr after the first 20 years. (A landfill is required by law to be maintained for 30 years post closure.)

[1] All references to the RESRAD computer code should be understood to include any comparable method, however, other methods may have to be evaluated by the Division as part of its overall review of the request.

[2] New proposals using RESRAD should use the NRC approved version 6.0 or any later version approved by NRC.

2) The worker scenario, using the NRC's PG8-08 inputs and the RESRAD computer code for evaluation, should not show a dose greater than 1 mrem/yr for the first 30 years.

3) The resident farmer scenario must assume that the cap is removed from the site.

4) While a particular waste stream is typically a small percentage of the material going to a particular landfill, in the model it must assume that it is 10% of the total waste stream.

5) Approval is only for the landfill for which the evaluation has been made.

6) Isotopes that are not available in RESRAD due to a short half-life must be compared to radionuclides that are available and this comparison must be supported by similar chemical and radiological characteristics.

7) If approval is made isotope by isotope based on a single isotope resulting in a 1 mrem/yr maximum exposure. For waste streams containing more than one isotope a sum of the fractions[3] can be used to show that any conveyance going to the landfill will not exceed 1 mrem/yr.

8) If more than one licensee is going to any one landfill the total shipments to a landfill under these license conditions will not exceed 5% of all the material going to that landfill. If requests for shipment exceed 5%, all licensees shipping to that landfill will have their mass limits for that landfill reduced so that the total will not exceed 5%. This reduction will be done based on the modeled dose contribution from each licensee.

9) All licensees with amendments of this type will be required to submit quarterly summaries of all shipments. These summaries will include, but are not limited to, the total mass shipped, the average concentration per nuclide shipped, and the maximum concentration of each nuclide shipped.

The intent of this policy is to provide for the health and safety of the citizens of Tennessee. Such policies must evolve with increased technical understanding of long term affects. Accordingly, the Division reserves the right to re-evaluate this policy at any time and for any reason.

[3] Sum of the Fractions – If Isotopes A, B and C are present at concentrations conA, conB, and conC and their limits are limA, limB, and limC respectively then the following must be true.

$$\frac{conA}{\lim A} + \frac{conB}{\lim B} + \frac{conC}{\lim C} \le 1$$

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I have read the attached document. Any comments I have are attached on a separate sheet.

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