July 28, 2011

CD11-0212

Mr. Rusty Lundberg
Director
Utah Division of Radiation Control
P.O. Box 144810
Salt Lake City, UT 84114-4810

Re: Radioactive Material License #UT2300249; Justification for Disposal of SempraSafe Processed Waste at the Clive Containerized Waste Facility

Dear Mr. Lundberg:

In a letter dated February 14, 2011 (CD11-0034), Energy*Solutions* provided an analysis of the disposal of thermally processed, low-level radioactive waste (LLRW) at the Clive Containerized Waste Facility (CWF). At the March 8, 2011 Radiation Control Board meeting, Energy*Solutions* together with Studsvik presented information regarding the SempraSafe joint venture. This joint venture will perform thermal processing of ion-exchange resins from nuclear power plants at the Studsvik facility located in Erwin, Tennessee.

The purpose of this letter is to supplement the analysis provided in the February 14, 2011 letter by addressing two questions that have arisen since the analysis was submitted. First, does R313-25-8, Technical Analysis, of the Radiation Control Rules, require the preparation of a performance assessment prior to the disposal of waste generated by the Semprasafe process? And second, is disposal of the waste generated by the Semprasafe process consistent with the "Position Statement on Down-Blending Radioactive Waste," adopted by the Radiation Control Board April 13, 2010?

Because R313-25-8(1) contains four tests, each of which would trigger a site-specific performance assessment, we have evaluated each separately.

Does R313-25-8, Technical Analysis, of the Radiation Control Rules, require the preparation of a performance assessment prior to the disposal of waste generated by the Semprasafe process?

(1) The licensee or applicant shall conduct a site-specific performance assessment and receive Executive Secretary approval prior to accepting any radioactive waste if:

(a) the waste was not considered in the development of the limits on Class A waste and not included in the analyses of the Draft Environmental Impact Statement

on 10 CFR Part 61 "Licensing Requirements for Land Disposal of Radioactive Waste," NUREG-0782. U.S. Nuclear Regulatory Commission. September 1981, or

Evaluation: Ion-exchange resins from pressurized water reactors and boiling water reactors were explicitly considered in NUREG-0782.[1] Furthermore, as stated in Section 3.4.3.3 of NUREG-0782, "NRC also analyzed the various types of processing and treatment options to which the waste, as generated, could be subjected that would change the as generated waste characteristics. Such processing and treatment could reduce the volume of the waste... Such processing would also change the chemical and physical properties of the waste as well as the activity concentration."

SempraSafe is a thermal treatment process that breaks down the organic component of ion-exchange resins into fixed carbon, salts, metal oxides, spinels, and aluminates. The final waste form is homogenously mixed and non-degradable. As such, it changes the chemical and physical properties of the waste as well as the activity concentration. As noted above, NUREG-0782 specifically accounted for processing that could change the chemical and physical nature of the waste. Waste classification criteria were developed independent of waste form. Therefore, SempraSafe processed waste does not require a site-specific performance assessment under this test.

The primary consideration in the calculation of the waste classification limits in 10 CFR Part 61 was protection of the inadvertent intruder. In the development of Part 61, NRC noted that it was "...assumed that not all of the waste encountered by an inadvertent intruder would be present at the classification limits. The staff assumed that any waste at the classification limit would be mixed with a significant amount of waste with radionuclide concentrations far below the classification limit."[2] It is important to note that this assumption remains valid even if one assumes that large quantities of Semprasafe waste at or near the Class A limit are disposed in close proximity. Energy*Solutions* proposes to dispose of the SempraSafe waste at the Containerized Waste Facility (CWF), which is greater than 5 meters below the surface of the cell. Wastes disposed between SempraSafe waste and the surface will have much lower radionuclide concentrations typical of the bulk soils and debris which make up the vast majority of waste disposed at Clive. Even should an intruder occupy the site and undertake some activity that would result in encountering this waste, any waste exhumed by an intruder would include a significant fraction of the overlying lower activity waste, as was assumed by the NRC in the generation of the classification limits. Disposal greater than 5 meters below the surface of the cell affords enhanced protection both by reducing the likelihood that an intruder might encounter the waste and by ensuring that any waste thus encountered is mixed as assumed in the EIS.

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[1] Draft Environmental Impact Statement on 10 CFR Part 61 "Licensing Requirements for Land Disposal of Radioactive Waste", NUREG-0782, September 1981, Table 3-1

[2] NRC, "Guidance for Reviewing Proposals for Large-Scale Blending of Low-Level Radioactive Waste," March 17, 2011, page 2

(b) the waste is likely to result in greater than 10 percent of the dose limits in R313-25-19 during the time period at which peak dose would occur, or

Evaluation: R313-25-19 states:

"Concentrations of radioactive material which may be released to the general environment in ground water, surface water, air, soil, plants or animals shall not result in an annual dose exceeding an equivalent of 0.25 mSv (0.025 rem) to the whole body, 0.75 mSv (0.075 rem) to the thyroid, and 0.25 mSv (0.025 rem) to any other organ of any member of the public. No greater than 0.04 mSv (0.004 rem)committed effective dose equivalent or total effective dose equivalent to any member of the public shall come from groundwater. Reasonable efforts should be made to maintain releases of radioactivity in effluents to the general environment as low as is reasonably achievable."

Compliance with R313-25-19 was evaluated during the initial and subsequent licensing of the Clive facility. Specifically, conservative dose calculations were prepared assuming that all waste would be disposed at the Class A limits. Since all dose calculations met the requirement found in R313-25-19, the disposal of SempraSafe processed resins will not increase the dose limits already accounted for in the initial analysis. Therefore, SempraSafe processed waste does not require a site-specific performance assessment under this test.

(c) the waste will result in greater than 10 percent of the total site source term over the operational life of the facility, or

Evaluation: The site source term for the operational life of the facility was evaluated during the initial and subsequent licensing of the Clive facility. Specifically, for purposes of the performance assessment, the total site source term was set at the Class A limits to ensure that the analysis was conservative in nature. Assuming that all the waste in the cell is at the Class A limits, the performance assessments demonstrate compliance with all regulatory requirements. Thus, since the total site source term was assumed to be at the Class A limits, the SempraSafe processed resins will not increase the total site source term by greater than 10%. Therefore, SempraSafe processed waste does not require a site-specific performance assessment under this test.

(d) the disposal of the waste would result in an unanalyzed condition not considered in R313-25.

Evaluation: The analysis provided in our February 14, 2011 submittal demonstrated that the Clive site is suitably sited and licensed for the disposal of Class A waste, including large quantities of waste at or near the Class A limits. This conclusion was based on the performance assessment previously conducted for the site. That assessment demonstrated that consumption of groundwater would not result in an exceedence of the 4-mrem dose standard even when assuming that the entire disposal

cell consisted of waste at the Class A limits and despite the fact that the groundwater underlying the site is not potable. Furthermore, disposal in CWF provides inherent additional intruder protection, even though there are no credible intrusion scenarios for the Clive facility. Therefore, SempraSafe processed waste does not require a site-specific performance assessment under this test.

R313-25-8 Conclusion: As demonstrated above, wastes produced using the SempraSafe process do not require a site-specific performance assessment under the tests of R313-25-8(1).

Is disposal of the waste generated by the Semprasafe process consistent with the "Position Statement on Down-Blending Radioactive Waste," adopted by the Radiation Control Board April 13, 2010?

On April 13, 2010, the Radiation Control Board adopted a "Position Statement on Down-Blending Radioactive Waste." This statement opens by stating: *"The Utah Radiation Control Board (Board) recognizes that down-blended radioactive waste does not pose any unique health and safety issues to the public that are not observed in other classes of low-level radioactive waste."* The position statement then consists of 3 parts. Each will be evaluated separately.

1. *The Board is opposed to waste blending when the intent is to alter the waste classification for the purposes of disposal site access.*

Evaluation: SempraSafe is an LLRW treatment process, not blending. Because this type of processing alters the chemical and physical form as well as the volume of the waste, it is not possible to accurately classify materials prior to entering them into the treatment process. Once processed, wastes can then properly be classified for disposal.

2. *Dilution of radioactive wastes with uncontaminated materials should be explicitly prohibited.*

Evaluation: The SempraSafe process does not include dilution of radioactive waste with uncontaminated materials. A small amount of non-contaminated mineral former is added in the processing in accordance with NRC guidelines contained in the "Branch Technical Position on Concentration Averaging and Encapsulation" (BTP). This addition ensures stability of the final waste form and is not used for the purpose of altering disposal classification.

3. *Current guidance documents dealing with concentration averaging and mixing should be updated to address the current understanding of the possible down-blending issues. Important matters dealing with waste blending, such as prohibition of certain practices, currently in guidance should be put into regulation.*

Evaluation: This third point is not specifically relevant to the question of whether or not the disposal of the waste resulting from the Semprasafe process is consistent with the Board's position statement. Nonetheless, we would point out that the NRC *has* provided updated guidance and is in the process of addressing other issues in its recently initiated Site Specific Analysis rulemaking. On March 17, 2011, NRC issued "Guidance for Reviewing Proposals for Large-Scale Blending of Low-Level Radioactive Waste." This guidance is intended to provide "...interim guidance to Agreement States on how to review proposals for large-scale blending of LLW."[3] In addition, the NRC is in the process of updating the BTP, with a draft expected to be available in last quarter of this year.

Although SempraSafe is a treatment process as opposed to blending, this guidance document can still be used to inform review of the issues and concerns associated with the final waste form. Application of this guidance to the SempraSafe process ensures that the safety of disposing of wastes at or near the Class A limits is analyzed.

The one addition that this guidance would make to existing requirements is the consideration of the inadvertent intruder. As noted above, Energy*Solutions* included an inadvertent intruder analysis in our February 14, 2011 submittal, this despite the fact that throughout the licensing history of the Clive facility, DRC and NRC have evaluated intruder scenarios and accepted the conclusion that they are not reasonable. This is due to the natural characteristics of the disposal facility, as more thoroughly discussed in that report.[4]

Please contact me at 801-649-2109 with any questions regarding this issue.

Sincerely,

Daniel B. Shrum
Senior Vice President, Regulatory Affairs

cc: John Hultquist, DRC

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[3] NRC, "Guidance for Reviewing Proposals for Large-Scale Blending of Low-Level Radioactive Waste," March 17, 2011, page 2

[4] Energy*Solutions*, "Justification for the Disposal of Blended Low Level Radioactive Waste at the Containerized Waste Facility," February 14, 2011, p. 5-7.