ENERGY*SOLUTIONS*

January 19, 2011

Ms Janice Owens, Branch Chief
U.S. Nuclear Regulatory Commission
Office of International Programs
Washington, DC 20555-0001

Dear Ms. Owens:

Attached is the Energy*Solutions* response to your December 20, 2010, request for additional information concerning our application for import of radioactive waste from Germany for processing and return (IW029). Please contact me if additional information or clarification is needed.

Respectfully,

Philip Gianutsos, CHP
Radiation Safety Officer
Energy*Solutions*
Bear Creek Processing Facility

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Response to Request for Additional Information on Duratek's Proposed Import and Export of Radioactive Material (IW029 and XW018)

1. § 110.32(a) specifies that the country of origin of equipment or material, and any other countries that have processed the material prior to its import into the U.S., must be identified in the license application. Please state whether the materials to be imported originated in other countries, and if so, which countries.

   Response: All of the radioactive waste to be imported for processing by Energy*Solutions* was generated in Germany and collected by Eckert & Ziegler Nuclitec, GmbH. Any future wastes collected for eventual incineration at the Bear Creek Facility will also originate at facilities in Germany.

2. § 110.32(f)(5) states that the license application should identify, for proposed imports or exports of radioactive waste, the volume, physical and chemical characteristics, and ultimate disposition (including forms of management or treatment) of the waste. In the application, the materials proposed for import are described as "incinerable dry active material" that is in a form suitable for transport under DOT regulations. Please provide information on the physical and chemical characteristic of the materials, such as materials of construction, phase (solid, liquid, or gas), the size (or range of sizes), and waste type (clothing, glassware, sources, paper, hardware, etc.).

   Response: Energy*Solutions*' Tennessee Radioactive Materials License explicitly authorizes possession and processing of radioactive materials in "any form as suitable for transport under DOT regulations." For this project, the incinerable material consists of dry active waste (DAW) in solid forms. The DAW includes personal protective equipment (e.g., gloves, lab coats, coveralls, disposable respirators), laboratory wastes (e.g., pipettes, plastic and glass labware, absorbent pads and decon materials, syringes, and cardboard packing material), contaminated filters, insulating materials, and plastic shielding, hoses and tubing, and empty contaminated bulk storage and waste tanks. The waste may contain inconsequential small metallic items, such as hose clamps, zippers, and snap closures on PPE. These items present no problems for the incineration process. Larger non-incinerables were removed prior to shredding the material into a particle size approximately 0.25" x 0.25". The shredded material is currently packaged in nominal 200 liter steel drums, however it may be repackaged into incinerable (e.g., cardboard) containers prior to import.

   Our customer estimates the material composition to breakout as follows:

   - **Plastic 44%**
   - **Paper 30%**
   - **Wood 10%**
   - **Textiles 10%**
   - **Glass <5%**
   - **Metallic <1%**

   Surfaces may be wetted with aqueous liquids of negligible mass and volume.

A portion of the incinerable material may be shipped to us in steel drums. If suitable for reuse, some of the empty drums may be reused to return incinerator ash to Germany. The remainder may be compacted and returned to Germany as non-incinerable waste, be reused within our facilities, or melted in the Metal Melt Facility. The melt process produces nominal 10-ton steel blocks that are supplied to the nuclear industry, both domestically and internationally, as radiation shielding. Metal melt product is not recycled into the open metals market.

3. § 110.32(f)(6) states that the import application must describe ". . . the industrial or other process responsible for generation of the waste . . " While the application does not address this provision, the cover letter states that the proposed exporter specializes in the collection and conditioning of radioactive waste from hospitals, research, and technical facilities, but no other detail is provided. Please provide additional details on the processes responsible for the generation of the waste, including the types of "technical facilities" that generate the waste.

Response: The radioactive material intended for incineration originates from various end users of radioactive products in different fields of research and development (R&D) in Germany. The material has been generated by R&D-laboratories in Germany that belong to public research organizations or private companies:

- **Generators include research laboratories and hospitals at universities, industrial facilities, and Max-Planck Institutes. Radioactive materials applications include: metabolic studies and bioavailability evaluations of new compounds, molecular and cellular biology investigations (e.g., for autoradiography and cellular process studies), pharmacology (e.g., uptake and retention studies).**
- **R&D laboratories in industrial companies (e.g., wear studies, tracer studies)**

The radioactive waste intended for incineration by Energy*Solutions* is initially pre-processed in Germany. The general process is as follows:

- **The waste is surveyed at customer locations and evaluated for transport to the EZN facility.**
- **Acceptable wastes are transported by truck to the EZN facility.**
- **Materials are received, inspected, and entered into the EZN tracking system.**
- **Waste is presorted by physical type and activity.**
- **Waste is shredded with a nominal 50% volume reduction.**
- **A vibrating sieve separates solids from free liquids.**
- **A paddle mixer is used to homogenize the shredded waste (0.8 – 1.2 m^3 per batch).**
- **The homogenized waste is packaged into nominal 200 L drums (approx 4-6 drums per batch).**
- **A sample is extracted during the filling of each drum.**
- **Samples are prepared for analysis at EZN's accredited measurement laboratory.**
- **Gamma spectrometry and liquid scintillation counting are conducted for each sample.**
- **The 200 L drums are placed in intermediate storage.**

The Environmental Services business unit of Eckert & Ziegler Nuclitec has a separate DIN EN ISO 9001:2008 certified quality assurance system and the

measurement laboratory is accredited by the German calibration service (DKD / DAKKS). Activities conducted at the EZN facility are subject to frequent surveillance and inspection by German regulators.

4. § 110.32(f)(6) states that the import application must describe the ultimate disposition (including forms of management or treatment) of the waste. The application states that residual radioactive material from processing the material, such as floor sweepings, booties, slag, etc. which is attributable to Duratek under its Tennessee license will be disposed of in accordance with the license. Please describe all of the types of residual waste that will result from incineration of these materials.

   Response: Considerations related to attribution of waste generated through the waste preparation and incineration processes are explicitly addressed in our Tennessee Radioactive Materials Licenses and are derived from information and guidance contained in Schedule RHS 8-33 of Tennessee Regulation 1200-2-5. This rule is the TN equivalent to Appendix G to NRC Regulation 10 CFR 20. The following definition of residual waste is used by both regulators:

   > ***'Residual Waste' means low-level radioactive waste resulting from processing or decontamination activities that cannot be easily separated into distinct batches attributable to specific waste generators. This waste is attributable to the processor or decontamination facility, as applicable.***

   Based upon Northwest Interstate Low Level Radioactive Waste Compact (NWIC) restrictions on wastes acceptable for disposal at the Clive facility, primary hearth ash resulting from incineration of wastes from the proposed project with Eckert and Ziegler Nuclitec will be attributed to them and returned to their facility in Germany. As a precaution against cross contamination from wastes burned in the previous incineration cycles, extensive manual cleanout of our continuous-feed incinerator must be conducted prior to initiating the dedicated campaign.

   Even with the noted cleanout efforts, the design for safe, efficient incineration results in practical limitations on cleanout effectiveness. Radioactivity from some waste streams associated with incineration cannot be attributed to a single generator. This is the case where small quantities of material are collected over a longer time period. A comprehensive list of residual wastes follows.

Item	Description
Mops and rags from process area, equipment, and sorting table decontamination	**General material handling, waste inspection or sorting prior to incineration inevitably results in the need to periodically reduce contamination levels to acceptable levels.**
Floor sweepings	**Floor sweepings from contaminated process areas are generally collected in small quantities over an extended time.**
Incinerator off-gas system wastes: boiler ash, fly ash, bag house bags, HEPA filters, scrubber salts	**These systems cannot be effectively decontaminated for a campaign and have service lives that exceed the length of a dedicated campaign.**
Replacement parts for the incinerator: thermocouples, flow meters, pH probes, gaskets, augers, and refractory linings	**Parts that become contaminated over long periods of time and must be replaced upon failure**
Reusable personal protective equipment: laundered cloth coveralls, hoods, rubber and cut-resistant gloves, respirators, and respirator filters	**Most PPE is suitable for multiple uses until wear or slow buildup of contamination renders them waste**
Health physics and laboratory wastes	**Commingled swipes and process samples: scrubber brine, ash, and refractory**
Maintenance and support equipment: reusable contaminated pumps, valves, hoses, hand tools, test and inspection hardware, jacks, hoists, and rebuilt spare parts	**Long-life tools and components or support equipment are an integral part of equipment operation.**

5. § 110.32(f)(6) states that the import application must describe the industrial or other process responsible for generation of the waste and the ultimate disposition (including forms of management or treatment) of the waste. Please describe in greater detail how a "dedicated campaign" for incineration will work in practice, and how it differs from conventional incineration at the facility.

   Response: A dedicated campaign is undertaken when a sufficiently large amount of waste from a single generator is received (typically >100,000 pounds) with the intent that the resultant hearth ash be attributed to that single generator. The initial step is a cool down followed by an extensive cleanout of the primary hearth, as described in item #4, above. In order to attribute the resultant hearth ash to the designated generator, incinerable wastes from other generators are not included in the campaign. In addition, cooling of the primary incinerator hearth (i.e., when incinerating high BTU wastes) is accomplished by spraying radiologically "clean" water into the incinerator.

The following steps are taken prior to initiating a dedicated incineration campaign:

- Upon completion of a conventional campaign and prior to initiation of a dedicated campaign, a 24 hour burnout takes place. This burnout allows the complete incineration of waste in the hearth and the transport of ash from the hearth to the collection drums via the twin augers.

- After the 24-hour burnout period, the hearth is allowed to cool to a temperature low enough to allow personnel entry. Upon entry, personnel begin physical removal of accessible ash not removed by the auger transport system.

- The refractory is inspected by Operations Management to confirm that the hearth is as clean as can practically be achieved.

- Upon completion of the hearth cleanout/inspection, the incinerator is restarted for the dedicated campaign.

- At the completion of the dedicated campaign, an 18-hour burnout period is performed. The ash collection drums are changed out and replaced with empty drums.

- At this time the incinerator can be returned to a conventional campaign mode.

A conventional incineration campaign processes smaller quantities of comingled incinerable waste resulting in a final ash product that cannot be differentiated by customer. This also allows appropriate management of BTU value of the waste by combining wastes with differing incineration characteristics in a single charge box (e.g., wet mop heads may be combined with contaminated wood for good combustion). When primary hearth cooling is required during a conventional incineration cycle, contaminated waste water from our operations (e.g., decon and respirator waste water) or from domestic customers is used in the spray system. The majority of our incineration work is performed in this manner. The resultant hearth ash is physically and chemically a new waste stream that cannot be separated into distinct batches originating from a specific generator.