

**CLARIFICATION NUMBER CAO-00-016, REV. 2**  
**DETERMINING PHYSICAL WASTE FORM**  
**(SECTION B-3c)**

**ISSUE**

1. How is a waste stream defined?
2. Is it necessary to determine volume percentages of specific matrix parameter categories for each container?
3. What is the radiography operator required to confirm with regard to the waste matrix code?

**CONCLUSION**

1. Waste streams are not pre-designated by the permit. However, as a general guideline, the designation of waste streams should not deviate from the information given in the permit application. As a minimum, the “single process” or “activity” in the definition of a waste stream should relate to the four broad categories of DOE waste production process. Similarly, the “similar in material, physical form, and hazardous constituents” in the definition should relate to the eleven Waste Matrix Code Groups.
2. -No, it is not necessary to determine volume percentages of matrix parameter categories (assumed to be the same as summary categories in the permit) on a container basis; this information is needed on a waste stream basis. The wastes are defined as being divided into streams according to their source process or activity. The streams are grouped into three Summary Category Groups, and each of these may be subdivided into Waste Matrix Code Groups. The Summary Category Group codes are defined by the majority (i.e. at least 50 percent by volume unless none of the categories exceeds 50% in which case assignment is made based on the summary category with the greatest volume) components of their waste material parameters. This information is defined initially from acceptable knowledge (AK) and confirmed by radiography and/or visual examination. Volumetric information is required to characterize waste as belonging to a Summary Category Group. Per Attachment B, Introduction, the procedures for waste characterization will be selected according to the Summary Category Group that is the volumetric plurality.

3. The radiography operator will view containers and determine if the contents match the waste stream description. The operator does not view the drum and attempt to determine what the waste matrix code is. Rather, the operator's role is one of verifying that the waste matrix code assignment is reasonable.

## DISCUSSION

1. In the permit application, the Permittees provided information regarding the designation of waste streams throughout the DOE system. Table C-1 in the permit application contained 180 separate waste streams from the various DOE sites.

In negotiating the permit, the Permittees were careful not to be locked into the specific waste stream numbers or designations. The NMED agreed that the designations in Table C-1 were not necessary to accomplish the purposes of the permit and did not repeat them in the permit, nor did the NMED require that the DOE assign waste to any of the specific waste streams in the application.

Based on the permit application the permit described four waste generating processes in the Introduction of Attachment B. These include:

- Production of Nuclear Products—Production of nuclear products includes reactor operation, radionuclide separation/finishing, and weapons fabrication and manufacturing. The majority of the TRU mixed waste was generated by weapons fabrication and radionuclide separation/finishing processes. More specifically, wastes consist of residues from chemical processes, air and liquid filtration, casting, machining, cleaning, product quality sampling, analytical activities, and maintenance and refurbishment of equipment and facilities.
- Plutonium Recovery—Plutonium recovery wastes are residues from the recovery of plutonium-contaminated molds, metals, glass, plastics, rags, salts used in electrorefining, precipitates, firebrick, soot, and filters.
- Research and Development (R&D)—R&D projects include a variety of hot cell or glovebox activities that often simulate full-scale operations described above, producing similar TRU mixed wastes. Other types of R&D projects include metallurgical research, actinide separations, process demonstrations, and chemical and physical properties determinations.

- Decontamination and Decommissioning—Facilities and equipment that are no longer needed or useable are decontaminated and decommissioned, resulting in TRU mixed wastes consisting of scrap materials, cleaning agents, tools, piping, filters, Plexiglas™, gloveboxes, concrete rubble, asphalt, cinder blocks, and other building materials. This is expected to be the largest category by volume of TRU mixed waste to be generated in the future.

These processes result in waste in one or more of the eleven following Waste Matrix Code Groups: solidified inorganics, solidified organics, salt waste, soils, lead/cadmium metal, inorganic nonmetal waste, combustible waste, graphite, filters, heterogeneous debris waste, or uncategorized metal.

The Waste Matrix Code Groups are further categorized as broad Summary Category Groups related to:

S3000—Homogeneous Solids  
S4000—Soils/Gravel  
S5000—Debris Waste

2. Attachment B Introduction, states:

If a waste does not include at least 50 percent of any given category by volume, characterization shall be performed using the waste characterization process required for the category constituting the greatest volume of waste for that waste stream (see Section B-3d).

3. Section B-3d(2) states:

All retrievably stored waste containers will first be delineated into waste streams using acceptable knowledge. All retrievably stored waste containers will be examined using radiography to confirm the physical waste form (Summary Category Group), to verify the absence of prohibited items, and to determine the waste characterization techniques to be used based on the Summary Category Groups (i.e., S3000, S4000, S5000). Repackaged retrievably stored waste, or any retrievably stored waste with inadequate acceptable knowledge, will be characterized using either the retrievably stored or newly generated waste characterization process, whichever results in greater sampling requirements,

unless it is demonstrated that control charting cannot be applied effectively. Solids sampling for repackaged or treated S3000 waste may be characterized as retrievably stored waste if the generator/storage sites demonstrates that control charting cannot be applied effectively to the repackaging or treatment process. This determination by the generator/storage site must be documented on the Characterization Information Summary and will be examined by the Permittees during audits (Permit Attachment 6). In this case, the minimum number of solids samples required for any S3000 waste stream lot is the number of samples determined in accordance with Section B2-2a. Radiographic results will be compared to acceptable knowledge results to ensure correct Waste Matrix Code assignment and identification of prohibited items. If radiographic analysis do not confirm the physical waste form, waste will be reassigned as specified in Section B-3c. Generator/storage sites may elect to substitute visual examination for radiographic analysis.

Under the conditions of the permit, acceptable knowledge (AK) will be used to make the initial designation of a waste stream. Based on this description, the waste stream will be assigned a Waste Matrix Code. Radiography is used to verify the waste stream description and Waste Matrix Code (by the four-digit code) assignment to each container. The waste stream description provided by AK needs to be detailed enough for the radiography operator to match it to the Waste Matrix Code assigned to the container. This does not mean that the AK list needs to include every item that could be in the drums, but rather the description needs to be sufficient to give the operator knowledge of what is generally expected and what is not. For example, the description will include the origin of the waste. If the operator sees an item known not to come from that area, he will identify it as a discrepancy. The generator site will investigate each discrepancy and determine if the description was wrong or if the operator called it wrong, and take appropriate corrective actions.