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**Question 45: What are the procedures/rules governing the transportation and disposal of catalyst contaminated with arsenic, mercury, barium, or other heavy metals? Are there maximum limits for any of these?**

**SHARPE** (Flint Hills Resources, LP)

The spent catalyst needs to be shipped offsite and sent for metals reclamation or disposal. If it is going for disposal, it will have to be characterized to determine if 1) it is a hazardous waste, which it is most of the time, and 2) it meets the applicable Land Disposal Restrictions (LDRs). It would have to be treated, as part of disposal, to meet the LDRs.



# Transportation and Disposal of Catalyst

- Spent catalyst may be shipped off-site for metals reclamation or disposal.
- If the spent catalyst is sent for disposal the level of heavy metals would be considered for applicable waste characterization and treatment standards.
- If the waste is hazardous and does not meet applicable land disposal restrictions (LDR, see 40 CFR 268) it would have to be treated prior to land disposal to meet applicable LDR standards.

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Regarding transportation, if the catalyst needs to be shipped offsite for reclamation, it will have to be determined if it is hazardous material or contains hazardous substance. So by default, spent catalysts generally fit into that category. Take a look at the Hazardous Materials' Table listed on the slide.

# Transportation and Disposal of Catalyst

- Regarding transportation, if the spent catalyst is shipped off-site for reclamation or disposal it must be determined if the material would be classified as a hazardous material.
- A hazardous material includes hazardous substances, hazardous wastes, marine pollutants, elevated temperature materials, materials designated as hazardous in the Hazardous Materials Table (see 49 CFR 172.101), and materials that meet the defining criteria for hazard classes and divisions in part 173 of 49 CFR.

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Overall, there are no maximum limits for disposal or transportation, but the catalyst does have to be transported and disposed of properly. It ends up being classified as a hazardous waste and subject to all the laws regarding that classification.



# Transportation and Disposal of Catalyst

- Overall, there are no "maximum limits" regarding disposal or transportation, however, based on the level of heavy metals in the waste the material would have to be transported and disposed of properly.
- Typically, this means that the material would be transported as a hazardous material and disposed of as a hazardous waste subject to applicable treatment standards at the disposal facility.

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**CHRIS STEVES** (Norton Engineering)

The transportation and disposal of spent catalysts are governed by DOT (Department of Transportation) and RCRA (Resource Conservation and Recovery Act) regulations. A spent catalyst with leachable levels of arsenic, mercury, or barium (or five other regulated heavy metals) above their TCLP limit, will be regulated by the U.S. EPA (Environmental Protection Agency) as RCRA hazardous waste. If the material is spent hydrotreating catalyst from the petroleum refining industry, it will automatically be regulated as RCRA hazardous waste regardless of the metals content. Regulated RCRA hazardous waste must be properly disposed of at an approved treatment, storage, and disposal facility (TSDF). The actual levels of contamination will affect the options and cost for disposal. All RCRA hazardous wastes are regulated as DOT hazardous materials when shipped offsite, and all the basic rules for hazardous materials shipment must be followed.

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