2.1.3 CURRENT MISSION

The current INEEL mission is to develop, demonstrate, and deploy advanced engineering technology and systems to improve national competitiveness and security, to make the production and use of energy more efficient, and to improve the quality of the environment. Areas of primary emphasis at INEEL include waste management and waste minimization, environmental engineering and restoration, energy efficiency, renewable energy, national security and defense, nuclear technologies, and advanced technologies and methods. INEEL is the lead laboratory for the National Spent Nuclear Fuel Management Program, which sets standards for developing and maintaining the capability to safely manage DOE's spent nuclear fuel. DOE considers the Environmental Management Program a top priority at INEEL (DOE 1995).

The Environmental Restoration mission is to (1) assess and clean up sites where there are known or suspected releases of hazardous substances into the environment and (2) safely manage contaminated surplus nuclear facilities as they are decommissioned. The Waste Management mission is to (1) protect the safety of INEEL employees, the public, and the environment in the design, construction, operation, and maintenance of INEEL treatment, storage, and disposal facilities and (2) operate these facilities in a manner that is cost-effective, is environmentally sound, complies with regulations, and is publicly acceptable. DOE is committed to fulfilling these missions while bringing all INEEL facilities into compliance with local, State, and Federal regulations.

Mission activities, including those associated with environmental restoration and waste management, occur primarily in nine major facility areas that were developed since the INEEL site was established in May 1949. Figure 2-2 shows the location of these major facility areas. These areas and their transportation corridors encompass the majority of industrial development and land disturbances on the INEEL site, but make up only 2 percent of the total land area of the site. Public roads and utility rights of way that cross the site make up an additional 6 percent of the total land area (DOE 1995). Selected land uses at the INEEL and in the surrounding region are shown on Figure 2-3. Detailed descriptions of the major facility areas at the INEEL can be found in Volume 2 of the *DOE Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement*, referred to in this document as the SNF & INEL EIS (DOE 1995) and in the *Idaho National Engineering and Environmental Laboratory Comprehensive Facility and Land Use Plan* (DOE 1997a).

The INEEL High-Level Waste Program is conducted at the Idaho Nuclear Technology and Engineering Center (INTEC). Prior to 1998, this area of the INEEL was known as the Idaho Chemical Processing Plant (ICPP). INTEC is located in the southwestern part of the INEEL site. The INTEC facilities cover approximately 250 acres and contain more than 150 buildings.

INTEC's original purpose was to function as a one-of-a-kind processing facility for government-owned nuclear fuels from research and defense reactors. The facility recovered rare gases and uranium for reuse from spent nuclear fuel. DOE stopped processing spent nuclear fuel nationwide in 1992 (DOE 1992).

INTEC's current purpose is to:

- Receive and store DOE-assigned (including naval) spent nuclear fuels
- Treat and store HLW until disposal
- Develop technologies for final disposition of spent nuclear fuel, HLW and mixed transuranic waste [sodium-bearing waste (SBW) and newly generated liquid waste]
- Develop and apply technologies to minimize waste generation and manage radioactive and hazardous wastes

Major operating facilities at INTEC include storage and treatment facilities for spent nuclear fuel, HLW, and mixed transuranic waste/SBW. Mixed and low-level wastes are also managed at INTEC. Other operating facilities at INTEC include process development, analytical, and robotics laboratories.

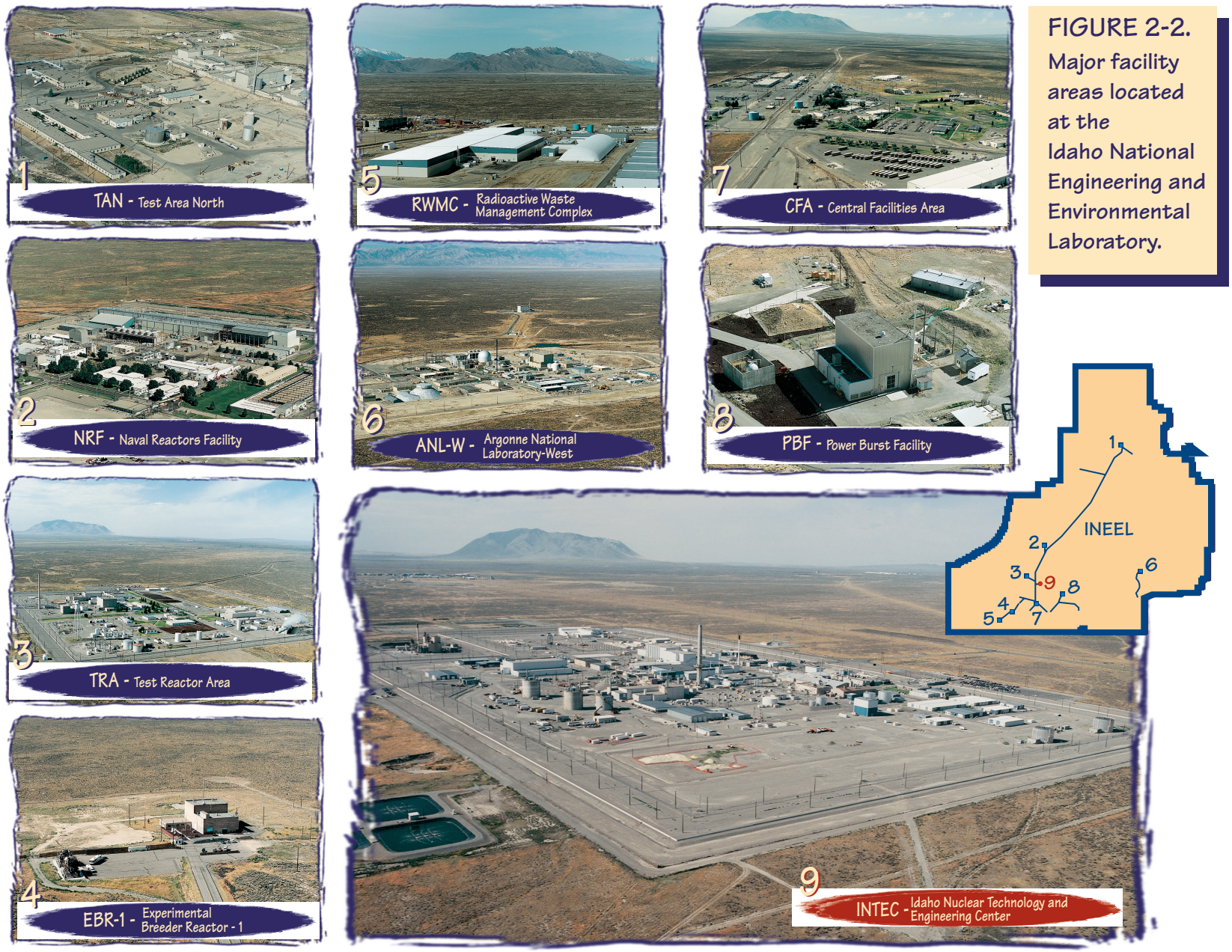

FIGURE 2-2. Major facility areas located at the Idaho National Engineering and Environmental Laboratory.

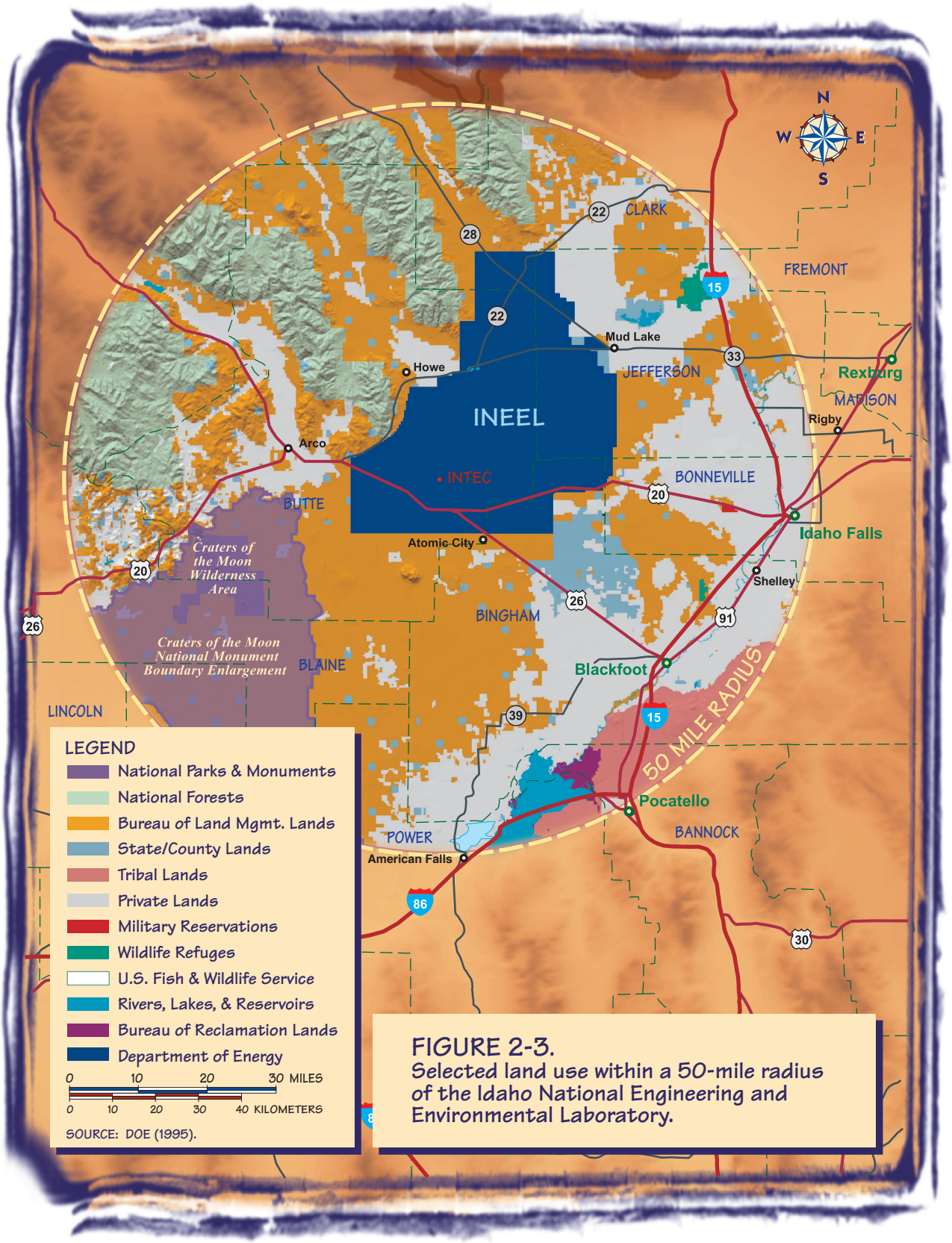

FIGURE 2-3.
Selected land use within a 50-mile radius of the Idaho National Engineering and Environmental Laboratory.

What is...

High-level waste?

HLW is the highly radioactive material resulting from reprocessing spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid material derived from the liquid waste that contains fission products in sufficient concentrations, and other highly radioactive material that is determined, consistent with existing law, to require permanent isolation (DOE 1999a). HLW stored at INTEC contains a combination of:

- ***Highly radioactive, but relatively short-lived (approximately 30 year half-life) fission products (primarily cesium-137 and strontium-90)***
- ***Long-lived radionuclides - technetium-99, carbon-14, and iodine-129 as well as transuranics (elements with atomic numbers greater than uranium).***

At INTEC, all the liquid HLW recoverable with the use of the existing transfer equipment has been converted to a granular solid called calcine, which is stored in bin sets. HLW calcine is considered mixed HLW because it contains hazardous waste subject to the Resource Conservation and Recovery Act (RCRA), as amended.

Transuranic waste?

Transuranic waste is radioactive waste that contains isotopes with 93 or greater protons (atomic number) in the nucleus of each atom (such as neptunium or plutonium), a half-life greater than 20 years, and an alpha-emitting radionuclide concentration of greater than 100 nanocuries per gram of waste.

Low-level waste?

Low-level waste (LLW) is radioactive waste that is not high-level radioactive waste, spent nuclear fuel, transuranic waste, byproduct material (as defined in section 11e(2) of the Atomic Energy Act of 1954, amended), or naturally occurring radioactive material (DOE 1999a). The Nuclear Regulatory Commission regulations (10 CFR Part 61) provide a classification system for LLW. This classification system includes:

- ***Class A waste - radioactive waste that is usually segregated from other wastes at disposal sites to ensure stability of the disposal site. Class A waste can be disposed of along with other wastes if the requirements for stability are met. Class A waste usually has lower concentrations of radionuclides than Class C waste.***
- ***Class C waste - radioactive waste that is suitable for near surface disposal but due to its radionuclide concentrations must meet more rigorous requirements for waste form stability. Class C waste requires protective measures at the disposal facility to protect against inadvertent intrusion.***

These waste classifications are not applicable to DOE LLW. However, the terms Class A-type and Class C-type are used in this EIS to refer to DOE LLW streams that could be disposed of at offsite facilities licensed by the Nuclear Regulatory Commission.

Mixed waste?

Mixed waste is waste that contains both source, special nuclear, or by-product material subject to the Atomic Energy Act of 1954, as amended, and hazardous waste subject to RCRA, as amended (DOE 1999a). When referring to a specific classification of radioactive waste that also contains hazardous waste, "mixed" is used as an adjective, followed by high-level, transuranic, or low-level, as appropriate.

What is...

Spent nuclear fuel?

Spent nuclear fuel is fuel that has been withdrawn from a nuclear reactor following irradiation. When it is taken out of a reactor, spent nuclear fuel contains some unused enriched uranium, radioactive fission products, and activation products. Because of its high radioactivity (including gamma-ray emitters), it must be properly shielded.

Waste fractions?

Waste fractions are produced when radioactive waste is treated to separate radionuclides according to activity level. Depending upon the characteristics of resulting fractions, waste may be classified as high-level, transuranic, or low-level.

Sodium-bearing waste?

Sodium-bearing waste (SBW) is a liquid mixed radioactive waste produced from the second and third cycles of spent nuclear fuel reprocessing and waste calcination, liquid wastes from INTEC closure activities stored in the Tank Farm, solids in the bottom of the tanks, and trace contamination from first cycle reprocessing extraction waste. SBW contains large quantities of sodium and potassium nitrates. Typically, SBW is processed through an evaporator to reduce the volume, then stored in the Tank Farm. It has historically been managed within the HLW program because of the existing plant configuration and some physical and chemical properties that are similar to HLW. Radionuclide concentrations for liquid SBW are generally 10 to 1,000 times less than for liquid HLW. SBW contains hazardous and radioactive components and is a mixed waste. DOE assumes that the SBW is mixed transuranic waste. This EIS refers to SBW as mixed transuranic waste/SBW (the text box on page 2-9 discusses how the waste incidental to reprocessing process will be applied with regard to how SBW will be managed).

Newly generated liquid waste?

Newly generated liquid waste refers to liquid waste from a variety of sources that has been evaporated and added to the liquid mixed HLW and mixed transuranic waste/SBW in the below-grade tanks at INTEC. Sources include leachates from treating contaminated high efficiency particulate air filters, decontamination liquids from INTEC operations that are not associated with HLW management activities, and liquid wastes from other INEEL facilities. Newly generated liquid waste is used in this EIS because INTEC has historically used this term to refer to liquid waste streams (past and future) that were not part of spent fuel reprocessing.

Tank heel?

A tank heel is the amount of liquid remaining in each tank after lowering to the greatest extent possible by use of the existing transfer equipment, such as ejectors.

Tank residual?

The tank residual is the amount of radioactive waste remaining in each tank, the removal of which is not considered to be technically and economically practical (DOE 1999a). This could be the tank heel or the amount of radioactive waste remaining after additional removal using other methods than the existing transfer equipment.

Waste Incidental to Reprocessing Determinations Under Development at INTEC

In developing the waste processing alternatives analyzed in this EIS, DOE made certain assumptions about how the radioactive waste streams that would go into and come out of the selected treatment processes would be classified. DOE will classify all wastes in accordance with the processes described in DOE Manual 435.1-1 (DOE 1999a). The term "waste incidental to reprocessing" refers to a process for identifying wastes that might be considered HLW due to their origin, but would be managed as low-level or transuranic waste if the waste incidental to reprocessing requirements contained in DOE Manual 435.1-1 are met.

Waste Incidental to Reprocessing Determinations are being developed for several waste streams at INTEC. These waste streams include the existing mixed transuranic waste/SBW in the Tank Farm, the residual waste material projected to remain in the Tank Farm tanks after cleaning and closure, and contaminated equipment (pumps, valves, etc.) which were used in HLW process systems.

Mixed transuranic waste/SBW

The existing inventory of mixed transuranic waste/SBW in the Tank Farm tanks at INTEC includes waste streams associated with spent fuel reprocessing. However, most of the liquid wastes sent to the Tank Farm during past reprocessing operations have been removed from the tanks and solidified by the calcination process. The bulk of the remaining inventory is comprised of waste solutions from plant decontamination activities and processes ancillary to reprocessing, although a small fraction of the Tank Farm inventory is attributed directly to reprocessing extraction wastes. When compared to first cycle extraction wastes, the current inventory of mixed transuranic waste/SBW is generally much lower in radioactivity, and therefore poses significantly less risk. In fact, a comparison of the amount of curies which remain in the tanks with the amount of curies which have already been removed and treated shows that almost all the curies which were transferred into the Tank Farm have been removed during calcination or have undergone radioactive decay. A Waste Incidental to Reprocessing Determination (by the evaluation method) draft has been prepared to evaluate whether the remaining mixed transuranic waste/SBW should be managed and disposed of as transuranic waste. The Nuclear Regulatory Commission is performing a technical review of the draft Waste Incidental to Reprocessing Determination prior to its finalization by DOE, which is anticipated in 2002.

Tank Farm Residuals

Closure of the HLW tanks is planned at INTEC. As treatment of the mixed transuranic waste/SBW is completed and the Tank Farm tanks are emptied, the tanks will be flushed to maximize waste removal. Flushing activities will remove waste to the maximum extent that is technically and economically feasible, and to a level that meets regulatory requirements for long term protection of the environment. However, some amount of residual waste will likely be unable to be retrieved from the tanks. A Waste Incidental to Reprocessing Determination (by the evaluation method) has been prepared for these Tank Farm residuals, which evaluates whether the waste remaining in the tanks after closure should be managed as low-level waste. The Nuclear Regulatory Commission is performing a technical review of the draft Waste Incidental to Reprocessing Determination prior to its finalization by DOE, which is anticipated in 2003.

Contaminated Job and Equipment Wastes

A Waste Incidental to Reprocessing Citation determination has been completed for contaminated job wastes. A Waste Incidental to Reprocessing Evaluation determination for contaminated equipment and material is currently being developed. These determinations will establish whether the contaminated job wastes and equipment can be managed and disposed of as low-level or transuranic waste.