The Project has Identified Abnormal Retrieval Scenarios:

- Derailment of an emplacement gantry in an emplacement drift.
- Rockfall or emplacement drift ground failure.
Remember, such scenarios have to be dealt with and successfully accomplished in an environment of:

- From zero to as much as 300 years after emplacement
- 50°C (122°F) or higher temperature environment
- Radioactive environment
- Ventilated at overall 15m³/second airflow which will carry dust
- Tight clearances
- Very dusty environment
- Likely corroded steel or copper electric third rail
- Likely corroded mild steel railroad rails
If emplacement gantry derails, it will damage and dig into side walls of drift, severely complicating recovery.
Large Ground Collapse in Emplacement Drift with Ventilation Airflow Unaffected

Usually-depicted major ground failure situation in tuff
Large Ground Collapse in Emplacement Drift with Ventilation Airflow Blocked

Most likely major ground failure situation in tuff
Large Ground Collapse in Emplacement Drift with Ventilation Airflow Blocked

- Buried waste packages
- Blocked airflow
- Heat not dissipating
- Dangerous radioactive environment
- Rising temperatures
- Tunneling in from adjacent drift or raise boring up from ventilation level will be slow and difficult
Common Problems

Repository Locomotive

- 50-ton class electric no longer manufactured except in Sweden by special order
- No non-coal rail haulage mines remaining in United States to our knowledge
- All operators switching to continuous belt haulage or trackless haulage
Mining Locomotives

Yucca Mountain Project is quite likely the last remaining United States market for large electric mining locomotives
Common Problems

- 750-V wet cell batteries do not exist
- Above ~300-V cell-to-cell arcing and creep occur
- 750-V locomotive will operate at 300-V but slower with less power
- Wet cell battery discharge increases rapidly above 60°C (140°F) due to Pb → PbO2 reaction in acid
Drip Shield Issues

1. Titanium supply
2. Achieving drip shield interlock
Retrieval Issues

1. Retrieval under realistic expected environment
2. Manipulating derailed gantries in tight clearances
3. Recovering waste packages from ground failures in tight clearances
4. Clearing ground failures remotely
5. Blocked ventilation causing heat rise before recovery and retrieval
Common Issues

1. Availability of repository locomotives
2. Availability and performance of locomotive and other batteries in the anticipated environment
3. Steel rail corrosion
4. Third rail corrosion
5. Remote controlled optics and equipment operation in dusty environment
Issues

If these operations are integral to safety and licensing, there must be an up-front and credible plan and design (using currently available technologies) for how they are to be accomplished; and we do not see such plans and designs in the Project documents.