

**Regulatory Acceptance of Monolayer Vegetative Cover for the  
Mixed Waste Disposal Unit U-3ax/bl at the Nevada Test Site**

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**ABSTRACT**

Acceptance of new technologies by the regulator starts with a strong position why this new technology/approach will benefit the project. The data necessary for the regulator to verify that the new technology/approach will provide equivalent protection to the environment must be included. The Nevada Test Site (NTS) has numerous low-level waste (LLW) landfills that require closure by 2011. In 1997, a study was conducted on closure covers and subsidence. The study concluded that a monolayer vegetative cover accommodates subsidence better than a traditional multilayered cover. In 1999, planning for the closure of the U-3ax/bl a mixed waste disposal unit was started. It was decided that a monolayer vegetative cover design would be proposed to the Nevada Division of Environmental Protection (NDEP). No Resource Conservation and Recovery Act landfill in the state of Nevada had been closed using a monolayer vegetative cover. Approval of the monolayer vegetative cover design by the NDEP was achieved by careful up front planning. The process was accelerated by anticipating NDEP concerns and preparing technical arguments and data that addressed these concerns during the planning process. Finally, the baseline schedule and budget was designed to support additional regulator interface and meetings.

**BACKGROUND**

A need to economically close landfills was recognized by the U.S. Department of Energy, Nevada Operations Office (DOE/NV) in 1993. DOE/NV, which is responsible for the operation of the NTS, projected that over 90 acres of LLW landfills would require closure by 2011. The U.S. Department of Energy (DOE) requires a 1,000 year operational lifecycle for LLW landfill closures. The typical multilayered landfill cover designs being implemented across the country were

created to meet the requirements outlined under RCRA. RCRA covers have a design life of at least 30 years. These designs are not capable of meeting the 1,000-year standard required for DOE LLW landfills.

Over a 1,000-year period, a number of design parameters need to be addressed. Some of these design parameters, such as climate change, cannot be fully addressed in any design. Other design parameters, such as landfill subsidence, can be estimated and mitigation steps designed. DOE/NV started characterizing the NTS LLW landfill geological/hydrological systems in 1993. Information was gathered on the meteorology, native plant communities, geomorphology, and groundwater and vadose zone hydrology.

In 1997, an internal DOE/NV study concluded that a monolayer evapotranspiration (ET) cover was the best engineering solution to address the DOE closure requirements. A monolayer cover allows self repair in the event of cover subsidence. Installation of native plants on top of the cover allows transpiration of infiltrated precipitation out of the cover prior to entering the waste cell. Cover performance was modeled for 30 years. Prior to running the model, it was calibrated against data collected from a NTS weighing lysimeter site.

## **REGULATORY INTERFACE**

The NDEP does not regulate LLW; however, they do regulate hazardous waste under RCRA. The state regulators did not participate during the initial LLW landfill design process and data collection. When the U-3ax/bl landfill was scheduled for closure, the closure design had to be approved by the NDEP because RCRA hazardous waste had been disposed within the landfill.

To streamline the regulatory approval time line, it was necessary to get NDEP approval of the monolayer vegetative cover concept prior to submitting the closure plan. While the NDEP had not been an active participant in the monolayer vegetative cover development process, they were aware that DOE/NV had conducted research of this technology. To obtain NDEP approval, DOE/NV would need to work with the NDEP to show that a monolayer vegetative cover design was a better solution than a conventional multilayered RCRA design. Extra time and resources were allocated in the resource-loaded project schedule to accomplish this task. Based on our experience, the steps detailed below are essential for the successful deployment of a new technology.

## **EARLY WARNING**

The regulator should never be taken by surprise that a new technology is being considered. Either through meetings or through the alternative selection processes, the regulator should be provided an overview of the proposed technology. These discussions are key as they provide the opportunity to evaluate what specific concerns the regulator has regarding the new technology.

## **STRATEGY DEVELOPMENT**

**Once the regulatory issues have been identified, a comprehensive white paper/presentation needs to be developed to address these specific issues. All regulatory issues need to be addressed. This may mean that some of the identified issues cannot be completely mitigated. Do not avoid these areas of regulatory concern. Provide your best technical arguments and be prepared to negotiate these issues during the presentation.**

## **TECHNOLOGY PRESENTATION**

**Provide the regulator a copy of the white paper at least a week before conducting the presentation. It defeats the purpose of the white paper/presentation if the regulator is unfamiliar with the technology or feels ambushed. Remain flexible during the presentation, areas that you thought were covered may be areas of regulatory concern. Do not approach the presentation with the expectation that your proposal will remain unchanged. You should factor in time and funds into your schedule and budget, respectively, to conduct at least one additional follow-up meeting to address any issues prior to submitting the final closure plan.**

## **REGULATORY APPROVAL**

**The closure plan submitted to the regulator should obtain rapid approval, assuming that all of the issues have been addressed prior to submission of the plan. Do not be surprised if the regulator requests additional testing or monitoring. Remember to be flexible. Uncertainty (i.e., change) regarding the effectiveness of the technology is understandable. Propose a reasonable testing and monitoring plan, but prepare your client that additional tests/monitoring may be required by the regulator. Expect additional regulator participation during the deployment of the technology. This participation can impact the project schedule and increase costs, but with proper planning the impact can be minimized.**

## **SUMMARY**

**The intention of deploying a new technology needs to be identified early in the process. The regulator needs to be alerted to this intention as soon as possible. The project schedule and budget need to be adjusted to allow time to prepare and present the benefits of the technology to the regulator. Be prepared to be flexible and anticipate areas of potential compromise. After regulatory approval of the technology, expect more intense regulatory oversight. Upon successful deployment of the technology, acknowledge the regulator's assistance in the project's success. This will assist in future deployments of new technology.**