

## Introduction

Nuclear Waste Partnership (NWP) is a URS lead partnership with B&W and AREVA. NWP is responsible for permanently disposing of defense related TRU waste at the Department of Energy's (DOE) Waste Isolation Pilot Plant (WIPP). NWP has been entrusted by the Department of Energy for the safe and compliant characterization, packaging, transportation, and disposition of this nation's TRU defense waste. All aspects of this process are heavily scrutinized and audited regularly by internal and external agencies to ensure a robust system of controls are followed to ensure worker, public, and environment safety.

The NWP Central Characterization Program (CCP) is responsible for implementing the characterization process. This involves Visual Examination (VE) or Real Time Radiography (RTR) of every container to identify prohibited items, Flammable Gas Analysis (FGA) determining gas generation of every container, and quantifying radionuclides in each container using Non-Destructive Assay (NDA) techniques. Over the years CCP has been certified at several DOE sites and has successfully disposed of thousands of cubic meters of waste. CCP currently is certified and operates at Savannah River Site (SRS), Idaho National Laboratory (INL), Oak Ridge National Laboratory (ORNL), Los Alamos National Laboratory (LANL), and Argonne National Laboratory (ANL).

## Non Destructive Assay Process

Each container undergoes nondestructive examination by VE or RTR prior to Non Destructive Assay (NDA). Considerations used to determine the assay method are the physical container construction, expected radio-isotopic composition, and physical waste properties. Both Neutron and Gamma Spectroscopy measurements can be used to quantify radionuclides within each container. Each of these actions are performed by a qualified operator who has demonstrated proficiency and strictly adheres to certified procedures. Once the measurement is complete the raw data is sent to an Expert Analyst (EA) for evaluation. Once the evaluation is complete it undergoes an Independent Technical Review (ITR) to ensure all proper steps were followed, the quality control/quality assurance criteria are met and reported radionuclide properties are within approved ranges. Any discrepancy or failure within the process will result in a Non Conformance Report being written for that container, which will immediately be tagged and set aside until proper resolution is achieved. If the container is evaluated and no errors are found the data is forwarded to the CCP Project Office to undergo additional levels of review and data validation to ensure quality and compliance before each container may be certified for shipment.

EA's within CCP must meet and/or exceed the ASTM C1490 requirements. EA's are highly educated personnel that have several years to decades of experience in neutron and gamma spectroscopy.

To ensure the accuracy and integrity of the radiological data each NDA program/system must undergo a rigorous evaluation by the DOE, an independent subcontract audit/assessment contractor, The Environmental Protection Agency and NWP prior to initial use. This includes evaluating: nuclear material source traceability, system components and process procedures to certified methods and standards. Conformation measurements are performed to test the validity and accuracy of the calibration as well

as minimum detection capabilities. Random waste containers are chosen by a third party or external agency for replicate measurements to ensure measurement precision. Each piece of equipment participates in DOE's Performance Demonstration Program (PDP) prior to certification and every year after. The PDP program is a blind test that evaluates both precision and accuracy of every certified NDA system. If any part of the evaluation mentioned above is not satisfactorily met, the NDA equipment may not be used until appropriate corrective actions are taken and system can be demonstrated to meet performance criteria as specified in the WIPP WAC. Additionally all approved NDA systems perform daily Quality Control checks such as background, measurement performance, and pulsar tests prior to measuring waste for that day to ensure data integrity. Weekly matrix measurements are also evaluated to trend and track NDA performance. Scheduled preventative maintenance is performed to each system on a regular basis to mitigate degradation in system performance. Records are maintained for all approvals, certification, calibration, tests, evaluations and audits. All methods and processes used to evaluate each container are procedurally driven throughout the entire program. The purpose is to guarantee the integrity and quality of data for each container.