In 2006, the Desert Research Institute completed the results of a study assessing potential exposure to the public from truck transport of low-level radioactive waste to the Nevada Test Site, or NTS. The NTS, located 65 miles north of Las Vegas, is administered by the U.S. Department of Energy (DOE) National Nuclear Security Administration’s Nevada Site Office (NNSA/NSO), which funded the study. DRI researchers set up a solar-powered array of four Pressurized Ion Chambers, or PICs, to collect data from February through December 2003, at a pull-out area outside the entrance to the NTS.

The Nevada Site Office was interested in addressing public concern over the safety of low-level radioactive waste, or LLW, shipments to the NTS. The study addressed whether residents along transportation routes receive cumulative exposure from individual LLW shipments that poses a long-term health risk. DOE and U.S. Department of Transportation regulations ensure that radiation exposure from truck shipments is negligible. However, most LLW shipments travel through rural communities in Utah and Nevada (sometimes where “Main Street” and the LLW truck routes are one in the same) where some stakeholders are concerned because they come in contact with LLW trucks more often. Most studies of radiation exposure from radioactive waste transportation are based on calculations of potential exposure. The study was designed to help answer the question, what do the trucks really measure?

**HOW THE STUDY WORKED:** The PIC arrays took gamma radiation readings from 1,012, or nearly 47 percent of the 2,260 trucks that delivered LLW to the NTS during the test period. The Nevada Site Office could not contractually require waste generators to participate in the study, so the database is biased to voluntary participants. Drivers parked their trucks in a marked “footprint” within the array and recorded shipment information, including date, time and Waste Shipment Identification Number into a logbook located at the PIC array.

The PICs were positioned three and one-third feet from the truck trailer at a height of five feet to simulate exposure to the chest and organs of a citizen standing on a sidewalk next to a LLW truck on a standard two-lane highway in the U.S. The use of four PICs, two on each side of the truck, was to account for variations in gamma radiation levels at different locations around the trucks because of differences in the radioactivity among waste containers.

In addition to the PICs, photoacoustic sensors, positioned between the PICs on each side of the array, were used to detect when a truck entered and departed the array. Data from the PICs and photoacoustic sensors were recorded on data loggers. Because LLW trucks could arrive at the NTS “around the clock,” it was not feasible to have someone at the array so it was completely automated.
RESULTS: Of 1,012 trucks measured, about 70 percent could not be distinguished from background radiation levels or were less than 1/10,000 of the DOT shipping standard. Only 54 trucks, or 5.3 percent of the trucks in the study, had exposures greater than or equal to 10 percent of the DOT standard as measured at one meter.

When cumulative exposures were considered, the few trucks with comparatively higher measurements could strongly influence the results. For example, in the unlikely event that a person had been standing by the road for the 42 LLW trucks that traveled through Amargosa Valley on their way to the NTS, 35 percent of the person’s total exposure would have come from just one truck. Although it was not actually an objective of the study, when results have been presented at public meetings, the fact that no truck exceeded the DOT shipping standard was an important result.