The purpose of hazard analyses and accident analyses in Los Alamos National Laboratory (LANL) is to establish the safety basis for LANL facilities and to comply with different regulations and integrated safety management requirements. In modeling atmospheric dispersion of accident release, one of the common statistical analysis methods at LANL is MACCS2, a DOE Safety Analysis Toolbox code. However, there are some limitations and shortfalls of MACCS2 for both onsite and offsite dispersion analyses. One of the often concerns is the over-conservatism in MACCS2 methodology and parameters. Alternative computer codes are investigated to provide more realistic calculations to support the safety basis analyses at LANL.

In the early development of Yucca Mountain Project (YMP), similar concerns were raised for the suitability of MACCS2 for onsite worker doses and ARCON96 was chosen to replace MACCS2. The control room habitability design and improved building wake algorithm of ARCON96 are particularly useful for the wide range of facility configurations in YMP. The flexible meteorological input of ARCON96 is also easier for analyses of long-term trends (95th percentile $\chi/Q$). The application of ARCON96 in YMP licensing application clearly demonstrates the merit for onsite worker safety analyses in various complex configurations and accident scenarios.

For offsite general public, AERMOD could be a good candidate. AERMOD is a next generation air dispersion model based on planetary boundary theory, and is adopted by EPA as a preferred model since 2005. AERMOD fully incorporates the PRIME building downwash algorithms, advanced depositional parameters, local terrain effects, and advanced meteorological turbulence calculations. Overall, the advanced capacity of AERMOD will provide more confidence in accuracy of offsite public doses.