

An overview of the NRAP Project and the NRAP toolset for risk assessment of long-term CO₂ storage

The United States Department of Energy's (DOE) is conducting research to advance the science and engineering knowledge base for technologies that will accelerate the business case for carbon dioxide (CO₂) capture and storage, including prediction and quantification of risks that may relate to potential liabilities. As part of this effort, a multi-DOE National Lab effort named NRAP (National Risk Assessment Partnership), is leveraging broad technical capabilities across the DOE complex into a mission-focused platform that will develop the integrated science base that can be applied to risk assessment for engineered-natural systems, and specifically the long-term storage of CO₂. NRAP involves five DOE national laboratories (NLs): National Energy Technology Laboratory (NETL), Lawrence Berkeley National Laboratory (LBNL), Lawrence Livermore National Laboratory (LLNL), Los Alamos National Laboratory (LANL), and Pacific Northwest National Laboratory (PNNL).

The overall NRAP effort is divided into three general technical components:

1. Development of a methodology and computational platform for quantifying risk profiles based on integrated assessment models (IAMs) and UQ
2. Targeted scientific investigations at the laboratory and field scale to help quantify and reduce uncertainties in the predicted risk profiles
3. Integration of risk-based monitoring and mitigation strategies to reduce both uncertainty and overall risk

Through its efforts to date, NRAP has developed a number of tools that can be used to quantify the long-term environmental risks at CO₂ storage sites. This set of tools has collectively received the R&D 100 award. They are currently being applied by a number of CO₂ storage field projects including the ones that are part of DOE's CarbonSAFE project. They are also available for broader applications including to international field projects. Current NRAP efforts are focused around application of the tools and development of approaches that integrate risk quantification with monitoring and mitigation as part of overall risk management and uncertainty reduction. This talk will provide an overview of NRAP, the NRAP toolset and introduction to NRAP's current efforts around risk management.

Dr. Rajesh Pawar is a Senior Scientist and Senior Project Leader for Fossil Energy Programs at the Los Alamos National Laboratory where he has worked since 1997. His primary research interests are in the areas of multi-phase fluid flow and coupled thermal-hydrological-geomechanical processes in subsurface, with primary applications to long-term geologic storage of carbon dioxide (CO₂) and hydrocarbon extraction from conventional as well as unconventional petroleum reservoirs. He has led multiple, multi-disciplinary, multi-organizational projects in above-mentioned research areas. He has over 100 publications. Dr. Pawar is a recipient of the 2011 United States Secretary of Energy's award for exceptional service and 2010 United States Geologic Survey's Director's Award for Exemplary Service to the Nation for his contributions to the Macondo well-Deepwater Horizon Accident Response Team. Dr. Pawar holds a Ph.D. in Chemical Engineering from the University of Utah.