DOE EA – 1404

Finding of No Significant Impact (FONSI) for the Final Environmental Assessment for Actinide Chemistry and Repository Science Laboratory

June 2002

U.S. Department of Energy
Carlsbad Field Office

FINDING OF NO SIGNIFICANT IMPACT

FINAL ENVIRONMENTAL ASSESSMENT FOR ACTINIDE CHEMISTRY AND REPOSITORY SCIENCE LABORATORY

AGENCY: U.S. DEPARTMENT OF ENERGY

ACTION: FINDING OF NO SIGNIFICANT IMPACT

SUMMARY: The U.S. Department of Energy (DOE), Carlsbad Field Office, has prepared an environmental assessment (EA) to analyze the proposed construction and operation of an Actinide Chemistry and Repository Science Laboratory (ACRSL) to support chemical research activities related to the Waste Isolation Pilot Plant (WIPP) near Carlsbad, New Mexico. The laboratory would be located on New Mexico State University property adjacent to the existing Carlsbad Environmental Monitoring and Research Center (CEMRC) in Carlsbad, New Mexico.

In the past, WIPP-related chemical research activities have been performed at several different laboratories located around the country. Now, with the exception of the location at Los Alamos National Laboratory (LANL), WIPP has ended experiments at other sites. DOE has determined that it would be much more efficient and cost-effective to consolidate these activities in a local Carlsbad facility that does not present the difficulties inherent with the distances currently involved or the security requirements at laboratories that primarily perform weapons-related work. To address both near- and long-term scientific issues related to WIPP performance, DOE has identified a need to enhance and consolidate the repository's experimental program at one facility.

Based on the analysis in the EA and after consideration of the comments received on the EA during the 32-day public comment period, DOE has determined that the Proposed Action does not constitute a major federal action significantly affecting the quality of the human environment within the meaning of the National Environmental Policy Act, 42 U.S.C. 4321 et seq. Therefore, preparation of an environmental impact statement is not required.

PUBLIC AVAILABILITY OF EA AND FONSI: The EA and FONSI may be reviewed at and copies of the document obtained from:

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BACKGROUND: DOE is responsible for the management and ultimate disposition of transuranic (TRU) waste generated at DOE sites by defense operations. Pursuant to this responsibility and as directed by Congress, DOE constructed and operates WIPP as a permanent geological repository for the disposal of TRU waste. WIPP is located in Eddy County in southeastern New Mexico, about 50 kilometers (30 miles) east of Carlsbad. The *Waste Isolation Pilot Plant Disposal Phase Final Supplemental Environmental Impact Statement* (DOE/EIS-0026-S-2) (WIPP SEIS-II) describes the potential environmental impacts associated with the disposal of TRU waste at WIPP.

The CEMRC, a division of the College of Engineering at New Mexico State University, was established in 1991 through a grant from DOE to the University. The primary focus of the CEMRC radiochemistry program is the measurement of radioactive substances in various media at environmental background levels. The CEMRC was designed as a low-level radiation facility to perform measurement of actinides, fission products, activated corrosion products, and naturally occurring radionuclides. DOE prepared the *Environmental Assessment of the Carlsbad Environmental Monitoring and Research Center Facility* (DOE/EA-1081) to determine if continued DOE funding of the CEMRC, or alternative actions, would have significant environmental impacts. A FONSI was issued in October 1995.

The current CEMRC research program involves the use of radioactive materials. Pursuant to the New Mexico Radiation Protection Act of 1978 and the Radiation

Protection Regulations Subpart 3, the CEMRC applied for, received, and maintains a Type A Specific License of Broad Scope for radioactive materials. This license allows for the laboratory use and possession of by-product, source, and special nuclear materials at the CEMRC. The current CEMRC license, as amended, would allow the quantities of radioactive materials required for the scientific activities to be conducted in the proposed actinide laboratory.

PROPOSED ACTION: DOE is proposing to construct and operate a multi-user research laboratory in Carlsbad to support actinide chemistry experiments for WIPP. The ACRSL would be an extension of the existing building that is owned by New Mexico State University and operated by the CEMRC. The CEMRC would manage the proposed new facility and provide coordination of usage; physical plant operation; and management of environmental, safety, and health compliance (including radioactive materials licensing). Research projects to support the operation of WIPP would be performed by research entities identified by the Carlsbad Field Office, and the CEMRC would facilitate such projects through the operations contract.

The new laboratory could be either a permanently sited, "mobile" laboratory facility; a newly constructed permanent laboratory facility; or a combination of these two facilities (currently, it appears that DOE would begin actinide experiments in the mobile facility and use the newly constructed permanent laboratory building for additional experiments when funding for the new building became available). The new permanent laboratory would be a freestanding building approximately 725 square meters (7,800 square feet). The proposed ACRSL facility would use existing CEMRC infrastructure and would also have the support of the CEMRC administrative personnel.

The CEMRC would be funded by DOE to construct and maintain the facility, however, it would be a multi-user facility. Most of the staff at the facility would consist of personnel on long-term assignments from LANL, Sandia National Laboratories, and Westinghouse TRU Solutions LLC. Most of this staff would probably reside permanently in Carlsbad. Some of the staff could consist of personnel on short-term assignments from other DOE laboratories; other federal agencies; American universities or companies; or foreign governments, universities, or companies. The total staff would comprise between 15 and 25 people.

The activities that would be performed in the proposed ACRSL can be generally described as directed research and development in actinide chemistry involving tracer levels of radioactive materials. The activities may involve reactions in the solid state and in aqueous and non-aqueous liquid media (varying with programmatic requirements). No production or process lines or routine waste treatment operations would be carried out in the facility.

The maximum amount of radioactive material housed at the combined CEMRC and proposed ACRSL would not exceed 2 curies (the site-wide limit). Because of the diverse hazards and operations in the proposed ACRSL, special physical and administrative access controls would be in place. For example, physical controls would include double

high-efficiency particulate air (HEPA) filters at a minimum on all exhaust airflows. An additional local HEPA filter in the exhaust would be provided for glove boxes or high-activity fume hoods. There would be no radioactive releases to the sanitary sewer. As part of the administrative controls, facility-specific training would be required for workers to perform any of the operations covered by the active hazard control plans. Activities would include the handling of alpha-emitting actinide elements and beta-emitting elements. Experiments could include solubility and speciation studies, electrochemistry, and calorimetry at ambient and elevated temperature and pressure conditions.

The proposed ACRSL would use special nuclear material, source material, and by-product material. All proposed research activities would be permitted under the existing broad-scope license possessed by the CEMRC. The CEMRC's license has recently been amended to allow for the total radioactivity on site to be 2 curies. However, the CEMRC license does limit the size of a single source to 30 microcuries for special nuclear material, 2 millicuries for source material, and 2 millicuries for byproduct material. If the ACRSL were constructed, it is likely that the single source limit would have to be increased. However, the total site limit at the CEMRC would not be increased beyond 2 curies.

DOE is proposing to conduct several experimental studies of issues relevant to WIPP operations and U.S. Environmental Protection Agency (EPA) recertification in the proposed ACRSL. These studies would help DOE address specific scientific and technical issues related to waste characterization, repository performance, and enhanced operations of the repository. Planned and potential experiments to support WIPP operations and recertification include, but are not necessarily limited to: (1) the effects of WIPP-relevant materials (such as reductants) and potential radiolysis by-products (for example, hypochlorite and peroxide) on the oxidation states and speciation of plutonium, americium, uranium, thorium, and neptunium; (2) the effects of organic ligands on the mobility of plutonium and other actinide elements in WIPP-relevant brines; (3) the demobilization of actinides by borehole fill materials; and (4) the efficacy of oxidation state analogs for predicting the behavior of the actinides. These studies would require the use of the radioactive isotopes of plutonium, americium, uranium, thorium, and neptunium, and perhaps cesium and strontium.

A major responsibility of the CEMRC would be to provide a safe working environment for all users. DOE would ensure that all activities performed in the proposed ACRSL facility would be conducted in accordance with the requirements of the CEMRC's Radioactive Materials License, Radiation Control Manual, and Chemical Hygiene Plan, under direct supervision of the Radiation Safety Officer and Chemical Hygiene Officer. These requirements would apply to any user present or experiment being conducted at the ACRSL. The CEMRC would provide all safety-related infrastructure support (for example, training and orientation, contamination surveys, fume hood audits, chemical and waste inventory tracking). The CEMRC would also manage the proposed ACRSL facility's chemical and radioactive material and waste inventories to ensure compliance with the CEMRC's Radioactive Materials License, Radiation Control Manual, Chemical

Hygiene Plan, and other applicable state and federal regulations. The proposed ACRSL and CEMRC would continue to be regulated and audited by the New Mexico Environment Department, Radiation Protection Bureau in accordance with the CEMRC's Type A Specific License of Broad Scope for radioactive materials.

The CEMRC would be responsible for the management and disposal of industrial, hazardous and low-level, Class A, radioactive waste generated from experiments conducted in the proposed ACRSL. No user would generate mixed waste without prior approval by the CEMRC Radiation Safety Officer and Chemical Hygiene Officer, who would require the user to provide a plan for expedient disposal or removal from the proposed ACRSL. User organizations would be responsible for the disposal of any mixed waste or radioactive waste (other than Class A) that is generated from experiments conducted at the ACRSL.

ALTERNATIVES: DOE analyzed two alternatives in addition to the Proposed Action. The WIPP Alternative was to design, construct, and operate a new actinide chemistry laboratory inside the fence at the WIPP site. Although the design of the laboratory would be similar to the design of the ACRSL facility for the Proposed Action, the new laboratory at WIPP would be a larger building, in order to accommodate meeting rooms, administrative offices, and a reception area (like those already existing at the CEMRC under the Proposed Action). Construction of a larger building means there would be increased construction costs and the potential for a slightly higher number of construction accidents and injuries under the WIPP Alternative as compared to the Proposed Action. Impacts of operation at the WIPP site would be similar to those under the Proposed Action; however, operational costs would be higher under the WIPP Alternative without the benefit of the administrative infrastructure at the CEMRC that would be available under the Proposed Action.

Under the No Action Alternative, DOE would continue experimental activities in actinide chemistry at the existing laboratory facilities at LANL. Currently, these experiments are conducted primarily in the Radiochemistry Laboratory at Technical Area (TA) 48. The Radiochemistry Laboratory is designed as an actinide chemistry and metallurgy building with full capabilities for performing special nuclear material analytical chemistry and materials science. Use of the existing LANL laboratory would not involve any new construction costs, potential construction accidents, or land use impacts; therefore, they would all be less than those associated with the Proposed Action. During operation, the estimated dose to the noninvolved worker from the radiological bounding accident described for the Proposed Action would be slightly higher for the No Action Alternative at LANL because the noninvolved worker would be located closer to the facility. However, this still would not result in any incremental latent cancer fatalities to the noninvolved worker for either alternative. The managerial costs associated with operations at LANL under the No Action Alternative are expected to be higher than those under the Proposed Action because the WIPP program would remain decentralized under the No Action Alternative.

ENVIRONMENTAL IMPACTS: The EA considered all natural and human resources in its evaluation. This FONSI addresses those that offered the potential for the greatest impacts. Because the proposed ACRSL would be constructed on a very small area of land that was previously disturbed during the original construction of the CEMRC, the impacts of the Proposed Action on land use, geology and hydrology, biological resources, and cultural resources would be expected to be very small or nonexistent. Previous surveys conducted on the CEMRC property did not find any threatened or endangered species or locate any cultural resources on the proposed ACRSL site.

The impact evaluation of the Proposed Action included an analysis of human health impacts under normal operations and a bounding analysis of potential accidents. The analyses were based on a maximum permitted site-wide inventory of 2 curies of radiological material for both the proposed ACRSL and the existing CEMRC. The combined hazardous chemical inventory for both laboratories would be no more than double the current inventory for the CEMRC alone.

The human health analysis considered the impacts of the hazardous chemical and radiological material inventories at the proposed ACRSL and concluded that no impacts on worker health or the general public would result from normal operations. Chemical emissions from fume hoods would be extremely small, because only small quantities would be used at any one time. The facility would be designed with the best available radionuclide-control technology, including HEPA filters on all fume hoods and glove boxes. No radionuclides would be released in sanitary sewage streams.

The human health analysis of normal operations indicated that the highest occupational radiation dose to a staff member at the proposed ACRSL facility would be less than 100 millirem per year. This applies to both the CEMRC and proposed ACRSL combined because it was based on the maximum permitted inventory of 2 curies. The probability of a latent cancer fatality from a 100-millirem dose to staff member would be about 0.00004 per year. The potential radiation dose to the public was also estimated based upon a maximum permitted inventory of 2 curies for both laboratories combined. Given the combined inventory of 2 curies, the dose to the population within 1.6 kilometers (1 mile) of the CEMRC/ACRSL under normal operating conditions would be less than 0.006 person-rem. There would be no latent cancer fatality expected in the exposed population on either an annual basis (less than 0.000003) or hypothetical 30-year facility lifetime (about 0.00009).

The accident analysis considered the impacts of the hazardous chemical and radiological material inventories at the proposed new ACRSL, and DOE concluded that no impacts on worker health or the general public would result. The accident analysis calculated concentrations of hazardous chemicals resulting from a hypothetical, bounding scenario affecting the release of the entire inventory of each chemical. The consequences of exposure to potentially hazardous chemical concentrations resulting from the bounding analysis were evaluated by comparing against Temporary Emergency Exposure Levels (TEELs). None of the chemical concentrations exceeded TEEL-3, which indicates that no life-threatening health effects are anticipated. The concentration of one chemical, nitric

acid, approaches the TEEL-2 concentration (that is, it is near the concentration at which the exposure could impair a person's ability to take protective action). The other chemicals are all less than one-half of the TEEL-2 value and would not be expected to affect a person's ability to take protective action.

However, it is not considered credible that the full inventory of nitric acid would be released in the same accident. The chemical inventories would be received and moved around the facility in small quantities, and the largest container of any chemical would be 3.8 liters (1 gallon). Given the administrative and physical barriers that would be in place to prevent accidents and uncontrolled releases of hazardous chemicals, an accidental release of a chemical would most likely not involve the entire inventory but rather a small fraction of the inventory that represents, at most, a few containers. Therefore, the results are conservative and represent more than the maximum credible amount that would be released from an accident.

The accident analysis also considered the impacts of the combined radiological material inventories for both the CEMRC and the proposed ACRSL, and it concluded that no impacts to worker health or the general public would result. For this hypothetical, bounding assessment, it was conservatively assumed that a severe seismic event could potentially affect the entire 2-curie inventory (the site-wide limit) of radioactive material, which is the maximum quantity permitted at the combined CEMRC and proposed ACRSL. It was further assumed the entire release would be plutonium-239 because it is the dominant radiological hazard of the radiological materials proposed for use. However, release of this quantity of plutonium-239 from the building would not be possible given the administrative controls and physical barriers in place designed to prevent such an occurrence and the fact that plutonium-239 is not expected to comprise more than half of the 2-curie limit. The overall respirable release quantity was calculated to be 2×10^{-4} curies of plutonium-239. The total dose to the maximally exposed individual of the public or noninvolved worker from a release of this quantity of plutonium at the combined facilities would each be about 18 millirem. The probability of this maximally exposed individual contracting a fatal cancer is about 0.00001 or 1 chance in 100,000. Thus, there would be no public health impacts from this conservative release scenario at the combined CEMRC and proposed ACRSL facilities.

The operation phase of the proposed ACRSL facility would have a very minor, positive impact on income in the Carlsbad economy from employment.

Although low levels of air emissions will be released during construction and operation, the impacts on air quality are expected to be insignificant. The proposed ACRSL would release extremely low levels of hazardous air pollutants resulting from the use of volatile solvents and reagents. The potential for the release of these same hazardous air pollutants during operation were calculated for the CEMRC and submitted to the New Mexico Environment Department Air Quality Bureau for informal review prior to construction of the CEMRC. The New Mexico Environment Department accepted the results and concluded that there would be no need for the CEMRC to seek an air quality permit.

The quantities of hazardous and radioactive wastes at the expanded CEMRC would not pose an environmental impact. Current levels of hazardous and radioactive wastes generated at the CEMRC would double with the addition of the ACRSL. However, the new quantity and types of wastes would be well within the capabilities of commercial disposal companies already used at the CEMRC.

The proportions of minority or low-income persons in the region of influence for the Proposed Action are greater than in the United States and the region as a whole. However, based on the accident evaluation discussed above, releases of radioactive or hazardous chemical materials from the proposed laboratory during an accident would not be expected to be sufficient to result in any public health impacts because of the very low volume of materials present. Therefore, it is not expected that there will be disproportionate impacts to any minority or low-income portion of the community.

DOE analyzed potential cumulative effects of the Proposed Action, particularly the use of radiological materials and hazardous chemicals at the combined ACRSL and CEMRC laboratories. The radiological materials inventory for both laboratories combined would be no more than 2 curies (the site-wide limit). The combined hazardous chemical inventory for both laboratories would be no more than double the current inventory for the CEMRC alone. Under normal operations, there would be no cumulative impacts on worker health or the general public due to the combined CEMRC and proposed ACRSL because chemical emissions from fume hoods would be extremely small and both facilities would be designed with the best available radionuclide-control technology, including HEPA filters on all fume hoods and glove boxes.

The radiation accident scenario also used the combined inventory of 2 curies for both the CEMRC and ACRSL. Thus, the cumulative impact of the combined laboratories would not result in any impacts to the noninvolved worker or general public.

The accident analysis discussed above considered the impacts of the hazardous chemical and radiological material inventories for the proposed new ACRSL, and DOE concluded that there would be no impacts on worker health or the general public. The concentrations calculated were based on a hypothetical, bounding scenario that would affect the entire inventory of each chemical. However, doubling the inventory to consider the cumulative effects of both laboratories combined (ACRSL and CEMRC) doubles each of the TEEL fractions. Even with the increase from doubling the inventories, only one chemical (nitric acid) would exceed TEEL-2 and no chemicals would exceed TEEL-3. As discussed above for the ACRSL alone, it is not considered credible that the combined inventory of nitric acid at both laboratories would be released in the same accident.

If the Proposed Action were implemented, there would be an increase in the inventory and estimated total annual use of some volatile solvents and reagents whose use would result in toxic air emissions. A conservative projection for both the CEMRC and ACRSL would double the estimated total annual use and, therefore, potentially double the emission rates or concentrations evaluated for the CEMRC alone. For most of the

chemicals, the projected increase in the inventory and use rates of volatile solvents and reagents would not result in aggregate emission rates or concentrations that would require permitting under air quality regulations. However, a permit could be needed for nitric and sulfuric acids because doubling the existing rates for these two chemicals could exceed New Mexico Environment Department air quality standard 20.2.72.502. The CEMRC would apply for, and obtain, any necessary air permit before proceeding with construction of the proposed ACRSL.

RESPONSE TO COMMENTS: The EA was made available for public review for a period of 32 days (March 22 through April 22, 2002). During the comment period, DOE also held two public meetings in Carlsbad, New Mexico (two sessions on April 16, 2002). DOE received 51 oral and written comments on the Draft EA. These included formal written comments from the New Mexico Environment Department, Environmental Evaluation Group, Mescalero Apache Tribe, and four letters from private citizens. Changes were made to the Draft EA as a result of a number of these comments. The comments and DOE responses are presented as an appendix to the EA.

DETERMINATION: Based on the analyses in the EA and after consideration of the comments received, DOE has determined that neither the Proposed Action to construct and operate the ACRSL in Carlsbad nor the alternatives considered constitute a major federal action significantly affecting the quality of the human or physical environment within the meaning of the National Environmental Policy Act, 42 U.S.C. 4321 et seq. Therefore, the preparation of an environmental impact statement is not required and DOE is issuing this FONSI.

Issued in Carlsbad, New Mexico
June 19, 2002

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