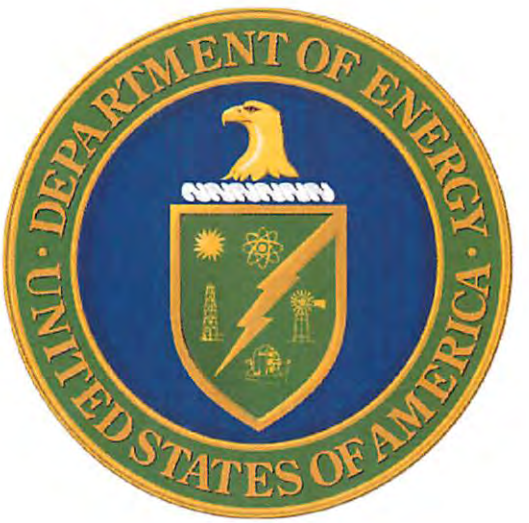
DOE/EIS-0026-SA-07

# Supplement Analysis for the Waste Isolation Pilot Plant Site-Wide Operations

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# TABLE OF CONTENTS



## List of Tables

# ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| CEQ | Council on Environmental Quality |
| CFR | Code of Federal Regulations |
| CH | contact-handled |
| CRA | Compliance Recertification Application |
| DOE | U.S. Department of Energy |
| EIS | environmental impact statement |
| EPA | U.S. Environmental Protection Agency |
| FEPs | features, events, and processes |
| INEEL | Idaho National Engineering and Environmental Laboratory |
| INL | Idaho National Laboratory (formerly INEEL) |
| LANL | Los Alamos National Laboratory |
| LCF | latent cancer fatality |
| MEI | maximally exposed individual |
| NEPA | National Environmental Policy Act |
| NTS | Nevada Test Site |
| ORNL | Oak Ridge National Laboratory |
| PA | performance assessment |
| PCB | polychlorinated biphenyls |
| RCRA | Resource Conservation and Recovery Act |
| rem | roentgen equivalent man |
| RH | remote-handled |
| ROD | Record of Decision |
| SEIS-II | *Waste Isolation Pilot Plant Disposal Phase Final Supplemental Environment Impact Statement* |
| SNL | Sandia National Laboratories |
| SRS | Savannah River Site |
| TA | transportation analysis |
| TRU | transuranic (waste) |
| TRUPACT-II | Transuranic Package Transporter Model 2 |
| TSCA | Toxic Substances Control Act |
| VOC | volatile organic compound |
| WIPP | Waste Isolation Pilot Plant |

# Supplement Analysis for the Waste Isolation Pilot Plant Site-Wide Operations

## 1.0 PURPOSE AND NEED FOR ACTION

The Waste Isolation Pilot Plant (WIPP), located near Carlsbad, New Mexico, is the only facility licensed to dispose of transuranic (TRU) waste generated by U.S. Department of Energy (DOE) defense activities. TRU waste is waste that contains alpha particle-emitting radionuclides with atomic numbers greater than uranium (92) and half-lives greater than 20 years in concentrations greater than 100 nanocuries per gram of waste. TRU waste is categorized as either contact-handled (CH) or remote-handled (RH), based on the radiation level at the surface of the waste container. TRU mixed waste is CH-TRU or RH-TRU waste that also contains toxic/hazardous materials, such as metals or organic solvents regulated by the Resource Conservation and Recovery Act (RCRA), and toxic materials, such as polychlorinated biphenyls (PCBs), regulated by the Toxic Substances Control Act (TSCA).

In its *Waste Isolation Pilot Plant Disposal Phase Final Supplemental Environmental Impact Statement* (SEIS-II) (DOE/EIS-0026-S-2, September 1997), DOE analyzed the potential environmental impacts associated with disposing of TRU waste at WIPP. DOE's Proposed Action was to open WIPP and dispose of up to 175,600 cubic meters of defense TRU waste. DOE announced its decision to implement the Proposed Action in the *Record of Decision for the Department of Energy's Waste Isolation Pilot Plant Disposal Phase*, 63 Fed. Reg. 3623 (January, 1998) (WIPP ROD).

DOE National Environmental Policy Act (NEPA) regulations [10 Code of Federal Regulations (CFR) 1021.330(d)] state that DOE shall periodically evaluate site-wide NEPA documents by means of a supplement analysis. This supplement analysis examines changes to WIPP site-wide and transportation operations, and new information gathered since the preparation of the SEIS-II and the *Supplement Analysis for the Waste Isolation Pilot Plant Site Wide Operations* (DOE/EIS-0026-SA05). This supplement analysis also determines whether the site-wide analysis contained in WIPP SEIS-II remains adequate, or whether significant new circumstances or information exist relevant to the environmental concerns and bearing on the proposed activities and their impacts, that would require preparation of a new or supplemental environmental impact statement (EIS).

## 2.0 PROPOSED ACTION

The Proposed Action is to continue the transportation of waste to WIPP by truck and the operation of the WIPP for the disposal of TRU waste generated by DOE defense activities. Since WIPP operations began, WIPP has implemented or proposed several initiatives to increase the efficiency of its operations. To meet the requirement that the U.S. Environmental Protection Agency (EPA) shall recertify WIPP's continued compliance with EPA Disposal regulations every five years on the anniversary of first waste receipt, DOE continues to update its TRU waste inventory on a yearly basis and has submitted two Compliance Recertification Applications (CRAs) to the EPA, in 2004 and 2009. These CRAs assess the impacts of the inventory changes and WIPP operational changes on WIPP's ability to meet the EPA's regulatory requirements. This supplement analysis will examine any changes to transportation, operational, or long-term performance impacts as a result of changed information contained in the TRU waste inventory and WIPP's CRA submitted to EPA in March 2009.

## 3.0 EXISTING NEPA ANALYSES

The 1997 WIPP SEIS-II analyzed the impacts associated with shipping CH- and RH-TRU wastes to WIPP and disposing of it there. Under the Proposed Action, most CH-TRU waste was assumed to move directly to WIPP from the site where it was stored or generated. Some CH-TRU waste from sites with

smaller waste inventories was assumed to be consolidated at the Nevada Test Site (NTS), Los Alamos National Laboratory (LANL), or Oak Ridge National Laboratory (ORNL). RH-TRU waste was assumed to be moved directly to WIPP from Hanford, the Idaho National Engineering and Environmental Laboratory (INEEL, now known as the Idaho National Laboratory or INL), LANL, and ORNL. RH-TRU waste from some smaller sites was assumed to be moved to Hanford or ORNL prior to shipment to WIPP. The total projected WIPP CH and RH waste disposal volumes for the Proposed Action were 143,000 cubic meters of CH-TRU waste (for the purposes of analysis in the WIPP SEIS-II, this was scaled up to 168,500 cubic meters for performance assessment in order to analyze the impacts of fully utilizing the authorized disposal capacity of WIPP) and 7,080 cubic meters of RH-TRU waste during an operations timeframe through the year 2033.

Also pertinent to this analysis is WIPP-SEIS-II Action Alternative 1, which is similar to the Proposed Action, except it examined the impacts of disposing of TRU waste volumes that exceed the disposal volume of WIPP that was established by Congress and includes the impacts of disposal of types of wastes that were not planned or authorized for WIPP disposal at the time the WIPP-SEIS-II was prepared. Action Alternative 1 examined the impacts of disposal of 281,000 cubic meters of CH-TRU waste and 55,000 cubic meters of RH-TRU waste at WIPP during an operations timeframe through the year 2158.

In the WIPP ROD, the Department decided to implement a modified version of the Proposed Action. Pursuant to a Record of Decision for the *Waste Management Programmatic Environmental Impact Statement* (WM-PEIS ROD), TRU waste would move directly to WIPP from the point of its generation (except waste at Sandia National Laboratories (SNL), which would move to LANL prior to being moved to WIPP), instead of being consolidated, as was assumed in the WIPP SEIS-II Proposed Action. Since issuance of the WIPP ROD, the Department has issued a revision to the WM-PEIS ROD to send CH- and RH-TRU waste from several small quantity sites and the Hanford Site to the INL to be treated and characterized prior to shipment to WIPP for disposal (*Amendment to the Record of Decision for the Department of Energy's Waste Management Program: Treatment and Storage of Transuranic Waste*, 73 Fed. Reg. 12401, March 2008).

## 4.0 IS A SUPPLEMENTAL EIS NEEDED?

DOE considered the extent to which DOE's current proposals have been previously analyzed in the WIPP SEIS-II and considered whether the new information or changes constitute significant new circumstances or information relevant to environmental concerns and bearing on the actions or impacts previously analyzed. For all impacts, DOE compared the current proposals to the WIPP SEIS-II Proposed Action and/or Action Alternative 1.

***Changes and New Information***

- Changes in inventory and routine operations
- Changes to transportation
  - Number of shipments
  - Shipping containers
  - Route and census information
- Changes to long-term performance (compliance certification)

None of the changes or activities to be conducted at WIPP would require any expansion of existing facilities or new excavation, or facility construction beyond the excavations and facilities considered in the WIPP SEIS-II. Therefore, impacts at the WIPP site to geological and hydrological resources, land use, biological resources, cultural resources, noise, and air quality evaluated in the WIPP SEIS-II would remain unchanged.

To determine whether the human health (worker and public) impacts of the current proposals fall within the range of impacts set forth in the WIPP SEIS-II, DOE examined the impacts that could occur under its current proposals from transportation and routine operations, facility accidents, and disposal at WIPP. These impacts are considered in the next section.

# 5.0 ENVIRONMENTAL IMPACTS

## 5.1 Facility Impacts

### 5.1.1 *Routine Operations at WIPP*

DOE estimates, based on the most recent TRU waste inventory data (DOE 2008c), that approximately 137,000 cubic meters of CH-TRU waste and 2,900 cubic meters of RH-TRU waste exist in the DOE complex that has been disposed of or could be eligible for disposal at WIPP. These inventory volumes of CH-TRU and RH-TRU wastes are less than the waste volumes analyzed in the Proposed Action in the WIPP SEIS-II (168,500 cubic meters of CH-TRU waste and 7,080 cubic meters of RH-TRU waste, rounded to 175,600 cubic meters total) and much less than the volumes analyzed in Action Alternative 1 (281,000 cubic meters of CH-TRU waste and 55,000 cubic meters of RH-TRU waste). The estimated total radionuclide inventory for CH-TRU waste in the most recent inventory is approximately 39% less than the total radionuclide inventory used for the SEIS-II Proposed Action analysis, while the most recent radionuclide inventory for RH-TRU waste is about 10% less than that used for the SEIS-II Proposed Action. Therefore, the impacts from routine operations at WIPP are expected to be less than those previously analyzed in the SEIS-II.

***Inventories Analyzed in the WIPP SEIS-II***

In the WIPP SEIS-II Proposed Action, DOE analyzed the impacts of disposing of a basic TRU waste inventory. Action Alternative 1 analyzed the impacts of disposal of a TRU waste inventory consisting of the basic and additional inventories.

The basic inventory was (1) TRU waste that resulted from defense activities and that was placed in retrievable storage pursuant to Atomic Energy Commission policy of 1970, and (2) TRU waste reasonably expected to be generated by these ongoing activities through 2033. The volume of the basic inventory identified in the WIPP SEIS-II was 170,000 cubic meters (WIPP SEIS-II, Table 2-2), although the statutory limit of 175,600 cubic meters was analyzed for the Proposed Action (see the WIPP SEIS-II, p. 3-2).

The additional inventory consisted of (1) TRU waste that is commingled with PCBs, (2) commercial/nondefense TRU waste, and (3) TRU waste disposed of prior to the Atomic Energy Commission policy of 1970. The volume of the additional inventory analyzed in the WIPP SEIS-II was 142,500 cubic meters (see the WIPP SEIS-II, Table 2-3).

## 5.2 Transportation Impacts

### 5.2.1 *Updated Assessment of Transportation Impacts*

The SEIS-II used estimates of the potential waste activity (by isotope) that could be shipped to WIPP to calculate the impacts of "worst case" accidents involving both TRUPACT-II shipping containers for CH-TRU waste as well as RH-72B shipping containers for RH-TRU waste. The isotopic mixtures in these "worst case" accidents were estimated from inventory data developed very early in DOE's National TRU Program.

For this supplement analysis, an updated transportation analysis (TA) was conducted using an updated version of the RADTRAN code used for the SEIS-II analysis to evaluate the impacts associated with the transportation of CH-TRU and RH-TRU waste from waste generator sites to the WIPP (SNL 2009). The updated TA incorporated updated census data and the most recent TRU waste inventory numbers available at the time of the analysis (DOE 2008a), and used the WebTRAGIS code (the updated version of the HIGHWAY code) to determine the routes, instead of the HIGHWAY code used previously in the SEIS-II. In addition, the SEIS-II estimated latent cancer fatalities (LCFs) for members of the public at $5 \times 10^{-4}$ per person-rem and for workers at $4 \times 10^{-4}$ person-rem in accordance with the guidance in effect at the time it was prepared; updated DOE guidance suggesting the use of $6 \times 10^{-4}$ LCFs per person-rem for both the public and workers was used in estimating LCF impacts in the updated TA. The updated TA also included changes in the overall number of shipments due to the proposed use of the TRUPACT-III and

lead-shielded shipping containers that were not designed or certified at the time of the SEIS-II analysis. A supplement analysis for the transportation of TRU waste in TRUPACT-III containers, DOE/EIS-0026-SA-06, was prepared by the Department in 2007.

The improvements to RADTRAN that allow for a more realistic representation of transportation conditions, as well as the use of updated inventory data to calculate more realistic parameter values, have resulted in overall smaller doses than those calculated in the SEIS-II for the same set of receptors. The number of shipments represents a more realistic value as it was determined using the most recent inventory and the current and anticipated shipping containers. The use of WebTRAGIS resulted in more accurate routes and therefore a more accurate simulation. The total population along shipping routes has increased according to new census data, and has shifted from both urban and rural areas to suburbs. The net result is relative increases in doses for the transportation impacts that are proportional to changes in population, and a relative increase in impacts to suburban populations.

### 5.2.2 *Accidents, Fatalities, and Pollution-Related Health Effects from Truck Transportation*

The updated TA included calculations for nonradiological impacts associated with the transportation of TRU waste to WIPP, as was done in the SEIS-II. For this analysis, no assumption was made that the carrier drivers of TRU waste would be held to higher qualification, training, or safety requirements than other truck drivers on the nation's roads. Route-specific accident and fatality rates were multiplied by the number of route shipments along each route, and were estimated using round-trip mileage. Similarly, estimated pollution health effects due to exposure to diesel exhaust during transportation were calculated using an updated risk factor that estimates vehicle exhaust impacts on the public. A comparison of the impacts for all shipments to WIPP as estimated in the updated TA, to those estimated in the SEIS-II (Table 5-6) is provided in Table 1 below.

**Table 1 Comparison of Nonradiological Impacts of Transportation TRU Waste in the Updated TA to Those in the SEIS-II (All Shipments)**

| Impact | Updated TA | SEIS-II |
|---|---|---|
| Accidents | 366 | 56 |
| Traffic Fatalities | 1 | 5 |
| Pollution Health Effects (fatalities) | .95 | .1 |

The updated analysis shows an increase in the estimated number of accidents as compared to the SEIS-II overall, but the updated TA estimate for traffic-related fatalities is less than that in the SEIS-II. Also, the estimate for fatalities resulting from pollution health effects during transportation is higher in the updated TA than in the SEIS-II. Changes in population and overall growth of suburban and urban areas, along with updates to route-specific accident and fatality rates, may have contributed to the differences in impacts relative to the SEIS-II. It is important to note, however, that measures in place to mitigate transportation impacts, such as rigorous vehicle inspection and maintenance criteria, and strict driver selection and training criteria, have been effective in minimizing TRU waste transportation accidents. As a result, the actual number of transportation accidents is much lower than the estimates. In the first 10 years of WIPP operations there were a total of 8 traffic accidents involving WIPP trucks.

### 5.2.3 *Routine Incident-Free Transportation Impacts*

Incident-free radiological impacts occur during the routine transportation of radioactive material and result from direct public and worker exposure to radiation at levels allowed by transportation regulations.

Although the transport packaging provides radiation shielding, workers, vehicle crew members, and the public along the transportation routes would be exposed to radiation at very low dose rates during transportation. Calculations for incident-free transportation impacts in the updated transportation analysis evaluated the same scenarios that were used in the WIPP SEIS-II and, as in the SEIS-II, evaluated the following categories of exposures: exposure to individuals adjacent to routes of travel (along route); exposure to individuals sharing the right-of-way (sharing route); exposure to individuals while shipments are at rest stops (stops); and exposure to vehicle crews (occupational).

Table 2 shows the aggregate population dose and LCF risks from routine transportation estimated in the updated TA as compared to results from similar analyses as reported in the SEIS-II for the Proposed Action (Table E-14).

**Table 2 Comparison of Updated TA Incident-Free Transportation Impacts to Those in the SEIS-II (CH-TRU and RH-TRU Shipments)**

| Exposure Category | Dose (person-rem) Updated TA | | Dose (person-rem) SEIS-II | | LCF Updated TA | | LCF SEIS-II | |
|---|---|---|---|---|---|---|---|---|
| Occupational | CH | RH | CH | RH | CH | RH | CH | RH |
| Total | 207 | 285 | 705 | 80 | .12 | .17 | .30 | .03 |
| Non-Occupational | | | | | | | | |
| Stops | 131 | 47 | $3.9E^{+03}$ | $1.6E^{+03}$ | .08 | .03 | 2 | .8 |
| Along Route | 6.9 | 70 | 220 | 90 | $4.1E^{-03}$ | .04 | .1 | .05 |
| Sharing Route | 67 | 71 | 85 | 35 | .04 | .04 | .04 | .02 |
| Total | 205 | 178 | $4.2E^{+03}$ | $1.7E^{+03}$ | .12 | .11 | 2.14 | .87 |

Although incident-free transportation population impacts estimated in the updated TA show an increase in some cases as compared to those in the SEIS-II (such as for the occupational exposure category for RH shipments and for those sharing the route with RH shipments), the total estimated impacts (CH-TRU plus RH-TRU) for the occupational and non-occupational exposure categories are less in the updated analysis.

### 5.2.4 *Transportation Accident Impacts*

The updated TA conducted two analyses for radiological impacts due to transportation accidents, similar to what was done in the SEIS-II. The first analysis assessed the radiological impact due to an accident occurring on the transportation routes from each of the origin sites to the WIPP. The second analysis assessed four severe bounding accidents. The updated analyses used the maximum curie content for a TRUPACT-II and a RH-72B taken from the most recent WIPP inventory report (DOE 2008a); the curie content was from a Savannah River Site (SRS) waste stream for CH-TRU waste and from a Bettis Atomic Power Laboratory for RH-TRU waste. In addition, the updated analyses used more accurately calculated conditional probabilities of accidents (severity fractions), and used the same severity fractions on all three population zones (rural, suburban, and urban). As in the SEIS-II, the accidents here were assumed to occur under conditions which maximized, within reasonable bounds, the impacts to exposed populations. Assumptions made regarding the bounding-case transportation accident scenarios in the WIPP SEIS-II were retained for this TA.

Results of this analysis show that the total dose for both CH-TRU and RH-TRU shipments, and the expected LCFs, are less than those estimated in the SEIS-II. The updated TA results for the first type of accident analysis, route-specific accidents summed over the entire shipping campaign, as compared to those presented in the SEIS-II (Table E-22), are shown in Table 3.

**Table 3 Comparison of the Aggregate Radiological Impacts from Potential Truck Transportation Accidents Along the Transportation Routes.**

| All Shipments | Updated TA | | SEIS-II Proposed Action | |
|---|---|---|---|---|
| | Dose (person-rem) | LCFs | Dose (person-rem) | LCFs |
| CH-TRU | $1.01\ E^{-01}$ | $6.06\ E^{-06}$ | 829 | .42 |
| RH-TRU | 3.86 | $2.32\ E^{-03}$ | 15 | .01 |

rem = roentgen equivalent man

As part of the updated TA, a bounding-case accident analysis was also conducted to assess the radiological impact due to four bounding-case accident scenarios, two involving a breach of a TRUPACT-II (impact only and impact with fire), and two involving the breach of an RH-72B (impact only and impact with fire). Table 4 presents a comparison of the radiological consequences for the worst-case severe accident scenarios involving a breach of a TRUPACT-II with fire for CH-TRU shipments and a breach of the RH-72B container with fire for RH-TRU shipments from the updated TA to an analogous analysis for the proposed action in the SEIS-II. Results of the analysis showed that the estimated total dose and dose to the maximally exposed individual (MEI) and resulting LCF risks were less than those expected for similar bounding-case accident scenarios for the Proposed Action in the SEIS-II (Appendix E, page E-56).

**Table 4 Comparison of the Radiological Consequences of the Postulated Severe Accident Scenarios.**

| | Total Dose (person-rem) | | LCFs | | MEI Dose (rem) | | Probability of an LCF | |
|---|---|---|---|---|---|---|---|---|
| | CH | RH | CH | RH | CH | RH | CH | RH |
| Updated TA | 83.8 | 97.2 | .05 | .05 | $1.94E^{-05}$ | $3.62E^{-04}$ | $1.18E^{-08}$ | $2.17E^{-07}$ |
| SEIS-II | $3.18E^{+04}$ | $3.25E^{+04}$ | 16 | 16 | 123 | 125 | .06 | .06 |

rem = roentgen equivalent man

For non-radiological impacts due to transportation accidents, the updated transportation analysis evaluated acute-release events involving hazardous chemicals and metals with respect to potential exposures and associated impacts. During routine, incident-free transportation, exposure to hazardous non-radioactive constituents of the transported waste would not occur because the hazardous components in the waste are completely contained in the transportation container/cask. The hazardous chemical assessment in the updated transportation analysis was conservatively based on a very severe transportation accident involving one breached shipping container, and assumed that the entire releasable fraction of each chemical considered was released. The current inventory of non-radioactive, potentially hazardous constituents occurring in CH- and RH-TRU wastes were considered in the calculation of impacts for this accident scenario, and included volatile organic compounds (VOCs) and heavy metals (see Table 5-10 of the SEIS-II). For purposes of the analysis, these constituents were grouped according to the method of release: VOC, particulate matter, or no release. In Table 5, the calculated hazardous chemical impacts from this analysis are compared to the maximum airborne chemical concentrations allowed by regulation and the immediately dangerous to life or health (IDLH) values provided by the National Institute of Occupational Safety and Health (NIOSH). IDLH values were used in the WIPP SEIS-II (Table 5-10), and are used in this updated TA because no ambient concentration values exist to which chemically hazardous emissions can be compared. For the heavy metals, lead was the only heavy metal found in the analysis to be released, and is released as particulate matter.

**Table 5 Air Concentrations of Non-Radioactive Releases for a Severe Accident Scenario.**

| Accident Scenario | Receptor VOCs Concentration (milligrams per cubic meter) | Percent of IDLH Value | Receptor Particulate Lead Concentration (milligrams per cubic meter) | Percent of IDLH Value |
|---|---|---|---|---|
| **CH-No Fire** | 4.93 | .018% | N/A | NA |
| **CH-Fire** | $5.42E^{-04}$ | 1.93E-6% | N/A | N/A |
| **RH-No Fire** | 1.73 | $6.0E^{-03}$% | $4.6E^{-03}$ | $4.6E^{-03}$% |
| **RH-Fire** | $8.34E^{-04}$ | $2.97E^{-06}$% | $4.8E^{-06}$ | $4.8E^{-06}$% |

VOCs = volatile organic compounds

For all chemicals analyzed, the highest concentration to which the MEI would be exposed would be no more than approximately .018% (for VOCs) of the IDLH value. Therefore, similar to what was found in the SEIS-II severe transportation accident analyses for the Proposed Action (page 5-25), the updated transportation analysis indicates that no human health effects would be expected from acute exposure to hazardous chemicals released from a severe transportation accident.

## 5.3 Environmental Justice

Environmental justice refers to the fair and equitable treatment of all people with respect to environmental and health consequences of Federal laws, regulations, policies, and actions. Executive Order 12898, Federal Actions to Address Environmental Justice in Minority and Low Income Populations (February 11, 1994) requires all Federal agencies to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations. Since the Federal Executive Order directs DOE to consider environmental justice impacts as part of its NEPA process, it is appropriate to examine such effects in the context of this supplemental analysis. Also pertinent to our analysis here is the State of New Mexico's Environmental Justice Executive Order (Executive Order 2005-056). The analysis below includes an examination of New Mexico-specific impacts on minority and low-income populations to aid the New Mexico Environment Department in addressing the requirements of that Executive Order.

Minority persons are those who identify themselves as Hispanic or Latino, Asian, Black or African American, American Indian or Alaska Native, Native Hawaiian or Other Pacific Islander, or multi-racial. Persons whose income is below the Federal poverty threshold are designated as low income. The Council on Environmental Quality (CEQ) identifies minority and low-income populations when either (1) the minority or low-income population of the affected area exceeds 50 percent, or (2) the minority or low-income population in the affected area is meaningfully greater (i.e., 20 percentage points greater) than the minority or low-income population percentage in the general population or appropriate unit of geographical analysis. To explore potential environmental justice concerns specific to New Mexico, the demographics of populations living along the WIPP New Mexico transportation route was identified using a geographic information system linked to 2000 census data. The data were organized into statistical geographic entities by Zip Code Tabulation Areas (ZCTA). The U.S. Census Bureau has established ZCTAs as a new geographic entity similar to, but replacing, data tabulations for Zip Codes undertaken in conjunction with the 1990 and earlier censuses. Demographic census information was obtained for each of the 71 ZCTAs that contained a portion of the WIPP transportation route in New Mexico. Analysis of the data obtained showed that minority populations exceeded 50% in 20 of the 71 ZCTAs, and no additional ZCTA areas were found to have minority populations meaningfully greater than that of the total population analyzed. Low-income populations exceeded 50% in two of the 71 ZCTAs along the route, and were found to be meaningfully greater than the population analyzed in three additional ZCTAs. Most of the minority populations identified (17 out of 20) were located along

Interstate 40 from the Arizona/New Mexico border to Interstate 25 near Albuquerque, near or in the communities of Houck, AZ, and Gallup, Mentmore, Rehoboth, Church Rock, Fort Wingate, Continental Divide, Thoreau, Prewitt, San Fidel, Pueblo of Acoma, Cubero, New Laguna, Casa Blanca, Laguna, and Albuquerque, NM. In addition, minority populations were found along I-25 in or near the communities of Serafina, Ribera, and Rowe, NM. Low-income populations were found in or near Houck, AZ, and Prewitt, Gallup, and Church Rock, NM.

### *5.3.1 Public Involvement Efforts*

Federal environmental justice guidance makes it clear that public involvement is essential in the NEPA process, especially by minority and low-income ("environmental justice") populations and in the identification of potential environmental impacts. Thus, in the preparation of this SA, public input regarding WIPP transportation and site operations was sought with an emphasis on obtaining input from minority and low-income communities located adjacent to the active WIPP shipping corridors in New Mexico.

To initially determine public opinion along the active WIPP shipping corridors, a telephone survey of 600 adults who live within one mile of active WIPP shipping corridors in New Mexico was conducted October 30 through November 5, 2007 (Baselice & Associates 2007). The survey area was divided into four regions, with Region 1 covering the northeast I-25 corridor, Region 2 including Santa Fe, Region 3 covering U.S. 285 south of I-40, and Region 4 including Artesia, Carlsbad, and the WIPP site. Information was gathered regarding environmental impacts and concerns as perceived by the respondents, as well as regarding respondent ethnicity and income level. Most respondents to the survey categorized themselves as Anglo/White or Hispanic, while low-income respondents were identified for purposes of the survey as Low-income (all households with income less than $20,000), and Low-income Hispanic (Hispanic annual household income under $30,000).

Results of the telephone survey were used to focus further public involvement efforts in the form of personal interviews. Residents were screened by telephone and asked to participate in an in-person interview to further discuss perceived impacts as a result of WIPP shipments and/or operations (Galloway Research Service 2008). Personal interviews were held in an attempt to obtain a more in-depth, open, and honest communication of public perception concerning WIPP, which may be difficult to obtain in a public meeting forum. The personal interviews were held at times and places convenient for the respondent, and were conducted in English or Spanish, according to the choice of the respondent. A total of 61 interviews were conducted in July 2008 of adults who live within 5 miles of the WIPP shipping corridors in New Mexico. Six communities were selected for interviews in New Mexico (Raton, Las Vegas, Santa Fe, Vaughn, Artesia, and Carlsbad). Due to the small sample size, the survey was used largely to collect verbatim responses and not for statistical representativeness.

Among all survey respondents, support for the transportation of radioactive waste on New Mexico highways was higher among those who had seen, read, or heard something recently about WIPP. Additionally, among all survey respondents, support was higher among those who recalled seeing a WIPP truck recently. A higher percentage of Anglo/White respondents had seen, read, or heard something recently about WIPP, compared to Hispanic, Low-income, and Low-income Hispanic respondents. The frequency that a WIPP truck was seen on or along a shipping route was higher among Anglo/White respondents than among Hispanic or Low-income respondents.

Hispanic respondents were evenly split among those in favor of transporting radioactive waste to WIPP and those opposed, while a higher percentage of Anglo/White respondents were in favor compared to opposed. Compared to all Hispanic respondents, a higher percentage of Low-income Hispanic

respondents were opposed. Additionally, a higher percentage of Anglo/White respondents, compared to Hispanic respondents, had no concerns about the way waste is transported to WIPP.

A higher percentage of Anglo/White respondents — compared to Hispanic, Low-income, and Low-income Hispanic respondents — said the transporting of radioactive waste to WIPP does not impact how they live their lives on a daily basis. The impacts that garnered the highest percentages were related to accidents/trucks and the thought of it (e.g., worry, fear). During the 61 in-person interviews, only one respondent mentioned a behavioral change (pulling over when seeing a WIPP truck on the road). Ten respondents described worries or concerns about what might happen in the event of an accident.

When asked about disposing radioactive waste 2,000 feet underground at WIPP, the percentage of Anglo/ White respondents in favor was higher than the percentages of Hispanic, Low-income, and Low-income Hispanic respondents in favor. Still, among all categories, the percentages in favor were higher than the percentages opposed (although Hispanic respondents were almost evenly split). When asked about the operation of WIPP, the percentage of Hispanics in favor increased over the prior question, although the percentage of Anglo/White respondents in favor was still higher. Reasons for WIPP support fell into several categories: WIPP is necessary, WIPP is safe, and because of how waste is stored.

### *5.3.2 WIPP Site Operations*

The WIPP SEIS-II (Section 5.8) evaluated the potential for disproportionately high and adverse human health or environmental impacts to minority and low-income populations within an 80-kilometer (50-mile) area of the WIPP site. The SEIS-II analysis found that normal, accident-free operations at WIPP would not cause significant adverse human health or environmental impacts; and, therefore, no disproportionately high impacts to minority or low-income populations would be expected. The SEIS-II analysis also found that the annual probability of the most severe operational accident occurring at WIPP is so low ($4.5 \times 10^{-7}$) that disproportionately high and adverse effects on minority or low-income populations from such an accident would also not be expected. With regard to continuing operations at the WIPP, including the changes evaluated as part of this SA, there are no additional or newly-identified impacts not previously discussed in the SEIS-II that would cause significant adverse human health or environmental impacts to the area surrounding the WIPP site. Thus, there are no **disproportionately high and adverse impacts to minority or low-income populations expected as a result of continuing operations at the WIPP site.**

### *5.3.3 Transportation Impacts*

As part of considering WIPP impacts to environmental justice populations, specific transportation-related radiological impacts to populations along the New Mexico transportation route were analyzed as part of the updated TA discussed in Section 5.2.1. Radiological impacts of WIPP transportation operations on New Mexico populations were determined by applying the same methodology used to determine impacts of WIPP transportation operations on the general population (see Section 5.2). The exposure scenarios used to model impacts to New Mexico populations assume that these individuals would be exposed in the same manner as the general population, that is, by external exposure to the plume and deposited radioactive materials and by internal exposure from inhalation of contaminated air and deposited radioactive materials, and ingestion. For purposes of evaluating the potential for disproportionately high and adverse impacts caused by radiological emissions from WIPP transportation operations specifically to New Mexicans, the calculated dose to an individual or total population along the New Mexico WIPP transportation route is compared to the calculated dose to an individual or total population for the entire route as shown in Section 5.2.

Incident-free radiological impacts specific to the population sharing and along the New Mexico WIPP transportation route were calculated separately as part of the updated TA. Table 6 presents a comparison of the incident-free impacts to populations along and sharing the New Mexico route to those to populations along and sharing the total route.

**Table 6 Comparison of the Aggregate Incident-Free Transportation Radiological Impacts Along the New Mexico Transportation Route to Those Along the Total Transportation Route.**

| | New Mexico Route | | Total Route | |
|---|---|---|---|---|
| | Dose (person-rem) | LCFs | Dose (person-rem) | LCFs |
| **CH Shipments** | | | | |
| Along | .42 | $2.4\ E^{-05}$ | 6.9 | $4.1E^{-03}$ |
| Sharing | 14 | $8.4\ E^{-03}$ | 67 | .04 |
| **RH Shipments** | | | | |
| Along | 15 | $9\ E^{-03}$ | 70 | .04 |
| Sharing | 1.6 | $9.6\ E^{-04}$ | 71 | .04 |

With regard to radiological impacts to populations due to transportation accidents, estimated doses to those populations along the WIPP New Mexico transportation routes were provided in the updated TA. Table 7 provides a comparison of estimated radiological impacts of transportation accidents of all shipments along the transportation route outside of New Mexico to those along the transportation route only in New Mexico.

**Table 7 Comparison of the Aggregate Radiological Impacts from Potential Truck Transportation Accidents Along the New Mexico Transportation Route to Those Along the Total Transportation Route.**

| All Shipments | New Mexico Route | | Total Route | |
|---|---|---|---|---|
| | Dose (person-rem) | LCFs | Dose (person-rem) | LCFs |
| CH-TRU | $1.18\ E^{-04}$ | $7.08\ E^{-08}$ | $1.01\ E^{-01}$ | $6.06\ E^{-06}$ |
| RH-TRU | $5.72\ E^{-05}$ | $3.16\ E^{-08}$ | 3.86 | $2.32\ E^{-03}$ |

As shown in the tables above, exposure impacts specific to the New Mexico population from transportation activities along the New Mexico portion of the WIPP transportation route are expected to be low overall. Therefore, WIPP transportation impacts to the total New Mexico population, including those minority or low-income populations located along the New Mexico portion of the route, would not be disproportionately high and adverse.

## 6.0 PERFORMANCE ASSESSMENT

### 6.1 Compliance Recertification Application

Performance Assessment (PA) is the primary tool used by DOE to demonstrate compliance with the long-term disposal regulations in 40 CFR 191 (Subparts B and C) and the compliance criteria in 40 CFR 194. Future state assumptions related to hydrogeologic, geologic, and climatic conditions for the next 10,000

years in the WIPP vicinity are derived from the development of features, events, and processes (FEPs) that are potentially relevant to the performance of the WIPP repository. FEPs are screened using specific criteria to determine what phenomena and components of the disposal system can and should be dealt with in PA calculations. The PA determines the effects of all significant processes and events that may affect the disposal system, considers the uncertainties associated with these processes and events, and estimates the cumulative releases of radionuclides over a 10,000-year period. The WIPP is required to be recertified every five years after the date of initial waste receipt to demonstrate continued compliance with these regulations.

The initial PA for the WIPP was submitted to EPA as part of the Compliance Certification Application in 1996. A revised PA was included in the first Compliance Recertification Application in 2004 (CRA-2004), and impacts to WIPP with regard to the CRA-2004 PA were considered in the 2005 Supplement Analysis for the Waste Isolation Pilot Plant Site Wide Operations. The DOE later submitted a Performance Assessment Baseline Calculation (PABC) in support of EPA's review of the CRA-2004, but the PABC was not considered in the 2005 Supplement Analysis for the WIPP Site Wide Operations. A second Compliance Recertification Application (CRA-2009) was submitted to EPA in March 2009. The PA included in CRA-2009 examines how the changes in WIPP operations and in the projected waste inventory for the PABC have impacted the predicted WIPP performance. This supplement analysis considers whether the results of this latest PA for CRA-2009 significantly change the predicted impacts related to the PA presented in the SEIS-II.

Changes to the PA for CRA-2009 include changes in the duration of direct brine releases, gas generation modeling from biodegradation, room chemistry, capillary pressure and relative permeability modeling, the drilling rate, and parameter error corrections. The PA for CRA-2009 shows that changes since CRA-2004 have had little impact on WIPP's expected performance and, as in previous analyses, shows that there would be no releases from an undisturbed repository without human-induced changes from borehole intrusions and mining. The PA for CRA-2009 also demonstrates that the WIPP continues to comply with the individual and groundwater protection standards in 40 CFR 191 Subparts B and C.

The WIPP SEIS examined the impacts of drilling intrusions into the repository (SEIS-II, Section 5.1.12.2 and Appendix H). The maximum radiation impacts from drilling intrusions predicted in the SEIS-II resulted from scenarios where workers would come in direct contact with drill cuttings that contain TRU waste. For a scenario involving a member of the drilling crew, the amount of radioactivity contributing to the worker radiation dose for CH- and RH-TRU waste from the CRA-2009 inventory is less that that used in the WIPP-SEIS-II analysis, and thus the projected radiation dose would decrease from that calculated in the WIPP SEIS when the updated CRA inventory is used.

Indirect impacts from eating beef consuming radiologically contaminated water from a stock well were also assessed in the SEIS-II. These impacts should remain the same as or lower than those predicted in the SEIS-II because they depend primarily on the amount of radionuclides in the inventory and on the solubility of those radionuclides. The amount of radionuclides in the inventory is less than that analyzed in the SEIS-II scenario, and solubilities used in the CRA are substantially unchanged from those used in the SEIS-II analysis. The CRA-2009 PA results continue to indicate that release of radionuclides by subsurface transport in groundwater makes essentially no contribution to total releases from intrusions into the WIPP repository.

## 7.0 INTENTIONAL DESTRUCTIVE ACTS

DOE also considered the potential impacts of intentional destructive acts (i.e., acts of sabotage or terrorism) and estimated that the impacts would be no greater than the impacts of an accident as analyzed in this supplement analysis because the initiating forces and resulting quantities of radioactive or

hazardous material potentially released by an intentional destructive act would be similar to those for the severe accident scenarios as discussed previously in the SEIS-II and in this supplement analysis.

## 8.0 DETERMINATION

Based on the analyses discussed in this supplement analysis, DOE concludes that its current proposals do not substantially change the risks estimated in the WM-PEIS or the WIPP SEIS-II in terms of human health, safety, and the environment. Further, there are no significant new circumstances or information relevant to environmental concerns and bearing on the proposals analyzed in the WIPP SEIS-II or the impacts of those proposals. Therefore, a supplement to the WIPP SEIS-II or amendment to the existing WIPP ROD is not needed.

Approved May 29, 2009

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## 9.0 REFERENCES

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