4. ENVIRONMENTAL IMPACTS

Chapter 4 describes the environmental consequences of the proposed action to replace the Chemistry and Metallurgy Research (CMR) Building at Los Alamos National Laboratory (LANL), as well as the consequences of a No Action Alternative. Chapter 4 also describes the environmental consequences of impacts common to all alternatives, including transportation, CMR Building and CMRR Facility disposition, transition period, and sabotage as well as, cumulative impacts, mitigation measures, and resource commitments.

4.1 INTRODUCTION

The environmental impacts analysis addresses all potentially affected areas in a manner commensurate with the importance of the effects on each area. The methodologies used for preparing the assessments for the following resource areas are discussed in Appendix A of this environmental impact statement (EIS): land use and visual resources; site infrastructure; air quality and noise; geology and soils; surface and groundwater quality; ecological resources; cultural and paleontological resources; socioeconomics; environmental justice; human health; and waste management and pollution prevention. The methodologies used to assess the human health effects from normal operations and facility accidents are presented in Appendices B and C, respectively. The environmental justice methodology is presented in Appendix D.

With the exception of the No Action Alternative, all alternatives would involve construction activities. All construction would take place on land already owned by the Federal Government and administered by the U.S. Department of Energy (DOE), National Nuclear Security Administration (NNSA) and, for the most part, on land that has already been disturbed by other DOE activities. This *Draft Environmental Impact Statement for the Chemistry and Metallurgy Research Building Replacement Project at Los Alamos National Laboratory* (*CMRR EIS*) addresses in detail the effects usually associated with land disturbance that construction activities would have on air and water resources and in lesser detail the effects on ecological, cultural and paleontological resources, and socioeconomic conditions.

As indicated in Chapter 2, the normal operations activities under the proposed action would not be characterized by any significant release of effluent, radiological or nonradiological, hazardous or nonhazardous. Therefore, the effects on the health and safety of workers, the public, and the environment from normal facility operations are presented in detail in deference to public interest rather than an indication of their significance. This is also true of the assessments presented for environmental justice and waste generation.

The effects on the health and safety of workers, the public, and the environment from postulated accident conditions are presented in detail. The accidents selected for evaluation in this EIS are a subset of accidents that have been evaluated in detail and described in the *Basis for Interim*

Radiological Health Effects Risk Factors Used in this EIS

Radiation can cause a variety of adverse health effects in people. Whether from external or internal sources, health impacts of radiation exposure can be "somatic" (affecting the exposed individual) or "genetic" (affecting descendants of the exposed individual). Somatic effects include the inducement of both fatal and nonfatal cancers. It may take years after the radiation exposure for a fatal cancer to develop, so these are referred to as "latent" cancers.

The International Commission on Radiological Protection has developed estimates of the risk of somatic and genetic effects as shown below.

Risk of Health Effects from Exposure to 1 Rem of Radiation [a]

Individual [b]	*Latent Cancer Fatalities*	*Nonfatal Cancers*	*Genetic Effects*	*Total Detriment*
Worker	0.0004	0.00008	0.00008	0.00056
Public	0.0005	0.0001	0.00013	0.00073

[a] When applied to an individual, units are lifetime probability of a latent cancer fatality per rem (1,000 millirem) radiation dose. When applied to a population, units are the excess number of cancers per person-rem of radiation dose. Genetic effects as used here apply to populations, not individuals.
[b] The general public risk is greater than the worker risk due to the presence in the general public of individuals less than 18 years old who are more sensitive to radiation effects.
Source: ICRP 1991.

These risk factors represent the probability that an individual would incur the indicated health effect during his or her lifetime as a result of being exposed to a unit of radiation dose (1 rem). For purposes of comparison, this EIS presents estimated doses and the associated potential latent cancer fatalities. The risk factors used are 0.0004 potential latent cancer fatalities per rem for workers and 0.0005 potential latent cancer fatalities per rem for individuals in the general public. The risk factor for the general public is slightly higher because the public includes children who are more sensitive to radiation than adults.

Examples:

The latent cancer fatality risk for an individual (nonworker) receiving a dose of 0.1 rem would be 0.00005 (0.1 rem × 0.0005 latent cancer fatalities per rem). This risk can also be expressed as 0.005 percent chance or 1 chance in 20,000 of developing a latent cancer.

The same concept is used to calculate the latent cancer fatality risk from exposing a group of individuals to radiation. The latent cancer fatality risk for individuals in a group of 100,000, each receiving a dose of 0.1 rem, would be 0.00005, as indicated above. This individual risk, multiplied by the number of individuals in the group, expresses the number of potential latent cancer fatalities that could occur among the individuals in the group as a result of the radiation dose. In this example, the number would be 5 potential latent cancer fatalities (100,000 × 0.00005).

A number of potential latent cancer fatalities less than 1 means that the radiation exposure is not sufficient to conclude that a latent cancer fatality is likely to occur among the members of the group. In this case, the risk is expressed as a probability that a single latent cancer fatality would occur among the members of the group. For example, 0.05 potential latent cancer fatalities can be stated as a 5 percent chance or 1 chance in 20 that 1 latent cancer fatality would occur among the members of the group.

The EIS provides estimates of the probability of a latent cancer fatality occurring for the general population, an average individual, the maximally exposed offsite individual, the involved, and noninvolved workers. These categories are defined as follows:

Population—Members of the public residing within a 50-mile (80-kilometer) radius of the facility

Average individual—A member of the public receiving an average dose of radiation or exposure to hazardous chemicals

Maximally exposed offsite individual—A hypothetical member of the public residing at the site boundary who could receive the maximum dose of radiation or exposure to hazardous chemicals

Involved worker—An individual worker participating in the operation of the facilities

Noninvolved worker—An individual worker at the site other than the involved worker

Operations for the Los Alamos Chemistry and Metallurgy Research Building (*CMR BIO*) (DOE 2002f). The accidents include a spectrum of events caused by fire, explosion, criticality, natural phenomena (earthquake), and external events (aircraft crash). Specific discussions associated with the description of CMR operations and facilities, as well as the assumptions used for the health and safety impact assessments, are presented in appendices as follows:

Appendix A, Environmental Impacts Methodologies

Appendix B, Evaluation of Radiological Human Health Impacts From Routine Normal Operations

Appendix C, Evaluation of Human Health Impacts From Facility Accidents

Appendix D, Environmental Justice

Chapter 4 is organized by environmental resource areas for each alternative. These sections include discussions of construction (except for the No Action Alternative) and operations impacts on all environmental resources for these alternatives at LANL. Section 4.2 discusses the environmental consequences of the No Action Alternative. Section 4.3 discusses the environmental consequences of Alternative 1, the Preferred Alternative. Section 4.4 discusses the environmental consequences of Alternative 2, the "Greenfield" Alternative. Sections 4.5 and 4.6 discuss the environmental consequences of Alternatives 3 and 4, the "Hybrid Alternatives" at TA-55 and TA-6, respectively. For the CMRR Facility alternatives, the incremental effects of the proposed action at LANL are measured against the Expanded Operations Alternative presented in the *Site-Wide Environmental Impact Statement for Continued Operation of the Los Alamos National Laboratory (LANL SWEIS)* (DOE 1999a).

Chapter 4 also presents a discussion of issues and impacts common to all or some of the alternatives.

Section 4.7 Impacts Common to All Alternatives—Discusses transportation impacts, the disposition of the existing CMR Building and CMRR Facility, impacts during the transition from the CMR Building to the new CMRR Facility, and radiological impacts of sabotage involving the CMRR Facility.

Other sections include:

Section 4.8 Cumulative Impacts—Discusses cumulative impacts at LANL.

Section 4.9 Mitigation Measures—Discusses mitigation measures that could reduce, minimize, or eliminate unavoidable environmental impacts.

Section 4.10 Resource Commitments—Discusses, in general, the resource commitments required for the proposed action including unavoidable adverse impacts, the relationship between short-term uses of the environment and maintenance and enhancement of long-term productivity, and irreversible or irretrievable commitment of resources.

4.2 ENVIRONMENTAL IMPACTS FOR THE NO ACTION ALTERNATIVE

This section presents a discussion of the environmental impacts associated with the No Action Alternative. Under the No Action Alternative, overall activities at LANL would be maintained in accordance with the Expanded Operations Alternative described in the *LANL SWEIS* and its associated Record of Decision (64 FR 50797). The existing CMR Building at TA-3 would continue to be used for CMR operations with minimal necessary structural and systems upgrades and repairs. However, as previously discussed in Chapter 1, NNSA cannot continue to operate the assigned LANL mission-critical CMR support capabilities in the existing CMR Building at an acceptable level of risk to public and worker health and safety without operational restrictions. CMR Building operations and capabilities are currently being restricted to minimal levels and do not meet DOE and NNSA operational requirements. These operational restrictions preclude the full implementation of the level of CMR operations described in the *LANL SWEIS* Expanded Operations Alternative. Therefore, the impacts associated with the No Action Alternative presented below for each environmental resource area only consider the current level of CMR operations specified in the *LANL SWEIS* Record of Decision and not the level described for the Expanded Operations Alternative.

4.2.1 Land Use and Visual Resources

Since no new buildings or facilities would be built under the No Action Alternative and operations would not change, there would be no impact on land use at the laboratory. There would also be no impact on visual resources at LANL or TA-3, TA-6, or TA-55.

4.2.2 Site Infrastructure

Projected site infrastructure requirements of CMR operations under the No Action Alternative are presented in **Table 4–1**. CMR operations consume a relatively small percentage of current available site capacities for electricity and water, with operations under the No Action Alternative essentially reflecting a continuation of current activities. Thus, the net impact on infrastructure is expected to be negligible.

4.2.3 Air Quality and Noise

4.2.3.1 Air Quality

Nonradiological Releases

Under the No Action Alternative criteria and toxic air pollutants would continue to be generated from the operation of the boilers, emergency diesel generators, and other activities at TA-3. The emissions generated are considered part of the baseline concentrations (see Table 3–5). No increases in emissions or air pollutant concentrations are expected under the No Action Alternative. Therefore, a Prevention of Significant Deterioration increment analysis is not required (see Appendix A, Section A.3.1). In addition, LANL is located in an attainment area for criteria air pollutants; therefore, no conformity analysis is required (see Appendix A, Section A.3.2).

Table 4–1 Annual Site Infrastructure Requirements for LANL Operations under the No Action Alternative

Resource	*Available Site Capacity* [a]	*No Action Alternative Requirement* [b]	*Percent of Available Site Capacity*
Electricity			
Energy (megawatt-hours per year)	472,414	No change	0
Peak load demand (megawatts)	24.5	No change	0
Fuel			
Natural gas (cubic feet per year)	5,540,000,000	No change	0
Water (gallons per year)	198,000,000	No change	0

[a] Capacity minus the current site requirements, a calculation based on the data provided in Table 3–2, *CMRR EIS*.
[b] The No Action Alternative is a continuation of current CMR activities and, therefore, associated infrastructure requirements are already accounted for in the "Available Site Capacity."
Source: Table 3–2, *CMRR EIS*. LANL 2002e.

Radiological Releases

It has been estimated that 0.00003 curies per year of actinides could be released to the environment from CMR Building operations at LANL if the No Action Alternative were implemented (LANL 2000d). There would be no other types of radiological releases from CMR operations. Impacts from radiological releases are discussed in Section 4.2.9.1.

4.2.3.2 Noise

Continuing CMR operations at TA-3 would not involve any new building construction, major changes in activities, or major changes in employment levels. Thus, there would be no change in noise impacts on wildlife around the area or on the public under the No Action Alternative.

4.2.4 Geology and Soils

No additional impacts on geology and soils are anticipated at LANL beyond the effects of existing and projected activities independent of this proposed action. Hazards from large-scale geologic conditions, such as earthquakes, and from other site geologic conditions with the potential to affect existing LANL facilities are summarized in Section 3.5 and further detailed in the *LANL SWEIS* (DOE 1999a). In particular, core drilling studies and geologic mapping have established a number of secondary fault features at TA-3, including a southwest to northeast trending fault trace beneath the northern portion of the CMR Building. Although the potential for ground deformation from fault rupture is relatively low, the presence of identified fault structures in association with an identified active and capable fault zone (per 10 CFR 100, Appendix A) restricts the operational capability of the existing CMR Building without substantial upgrades and repairs.

4.2.5 Surface and Groundwater Quality

No additional impacts on surface water resources and groundwater availability or quality are anticipated at LANL under the No Action Alternative beyond the effects of existing and projected activities described in the *LANL SWEIS* Record of Decision. These existing and projected activities are independent of this proposed action.

4.2.6 Ecological Resources

There would be no new impact to terrestrial and aquatic resources, wetlands, or threatened and endangered species at LANL, since no new facilities would be built under the No Action Alternative. The CMR Building at TA-3 does not produce emissions or effluent of a quality or at levels that would likely affect wildlife and other ecological resources.

4.2.7 Cultural and Paleontological Resources

Since there would be no major modifications to the CMR Building, other than minimal necessary structural and systems upgrades and repairs, and CMR operations would not change, there would be no impact on cultural and paleontological resources at LANL under this alternative.

4.2.8 Socioeconomics

Under the No Action Alternative, the current employment of approximately 200 workers at the CMR Building would continue. No new employment or in-migration of workers would be required. Therefore, there would be no additional impact on the socioeconomic conditions around LANL.

4.2.9 Human Health Impacts

4.2.9.1 Normal Operations

Radiological Impacts

Routine CMR operations at the CMR Building at TA-3 would not be expected to result in an increase in latent cancer fatalities. Under the No Action Alternative, expected radiological releases would be 0.00003 curies per year of actinides to the atmosphere (*LANL SWEIS Yearbook 1999*) and radioactive material in liquid effluents. Radioactive liquid effluents would be transferred to the Radioactive Liquid Waste Treatment Facility in TA-50 where they would be treated along with other LANL site liquid wastes. Following treatment, the liquids would be released through an existing National Pollutant Discharge Elimination System (NPDES)-permitted outfall. The treatment residues would be solidified and disposed of as radioactive waste (see Section 4.2.11).

The inventory of radioactive material released in air emissions is less for the No Action Alternative than for other alternatives. Whereas a new CMRR Facility would be designed to support the needs of the Expanded Operations Alternative of the *LANL SWEIS*, current operations at the CMR Building are limited as discussed in Chapter 2. Therefore, the inventory of radionuclides emitted for the No Action Alternative includes only actinides and none of the fission products and tritium associated with a fully operating CMRR Facility.

The air emissions would be in the form of plutonium, uranium, thorium, and americium isotopes. In estimating the human health impacts, all emissions were considered to be plutonium-239. This is conservative because the human health impacts on a per curie basis are greater for

plutonium-239 than for the other actinides associated with CMR activities. The associated calculated impacts on the public are presented in **Table 4–2** for the general public living within 50 miles (80 kilometers) of the CMR Building; an average member of the public; and a maximally exposed offsite individual (a hypothetical member of the public residing at the LANL site boundary who receives the maximum dose). The dose pathways for these receptors include: inhalation, ingestion, and direct exposure from immersion in the passing plume and from materials deposited on the ground. To put the doses into perspective, comparisons with natural background radiation levels are included in the table.

Table 4–2 shows that the annual collective dose to the population living within a 50-mile (80-kilometer) radius of the CMR Building is estimated to be 0.04 person-rem for the No Action Alternative. This population dose increases the annual risk of a fatal cancer in the population by 0.00002. Another way of stating this is that the likelihood of one fatal cancer occurring in the population of over 300,000 people as a result of radiological releases associated with this alternative is about 1 chance in 50,000 per year.

Table 4–2 Annual Radiological Impacts on the Public from CMR Operations under the No Action Alternative

	Population within 50 Miles (80 kilometers)	***Average Individual within 50 Miles (80 kilometers)***	***Maximally Exposed Individual***
Dose	0.04 person-rem	0.0001 mrem	0.006 mrem
Cancer fatality risk [a]	0.00002	6.6×10^{-11}	3.0×10^{-9}
Regulatory dose limit [b]	Not applicable	10 mrem	10 mrem
Dose as a percent of regulatory limit	Not applicable	0.001	0.06
Dose from background radiation [c]	136,000 person-rem	450 mrem	450 mrem
Dose as a percent of background dose	0.0007	0.00003	0.001

[a] Based on a risk estimate of 0.0005 latent cancer fatalities per person-rem (see Appendix B).

[b] 40 CFR 61 establishes an annual limit of 10 mrem via the air pathway to any member of the public from DOE operations. There is no standard for a population dose.

[c] The annual individual dose from background radiation at LANL is 400 to 500 millirem (mrem) (see Section 3.11.1). The population living within 50 miles (80 kilometers) of TA-3 is estimated to be 302,120.

The average annual dose to an individual in the population is 0.0001 millirem. The corresponding increased risk of an individual developing a fatal cancer from receiving the average dose is 6.6×10^{-11}, or about 1 chance in 15 billion per year.

The maximally exposed individual member of the public would receive an estimated annual dose of 0.006 millirem. This dose corresponds to an increased annual risk of developing a fatal cancer of 3.0×10^{-9}. In other words, the likelihood of the maximally exposed individual developing a fatal cancer is about 1 chance in 300 million for each year of CMR Building operation.

Estimated annual doses to workers involved with CMR activities under the No Action Alternative are provided in **Table 4–3**. The estimated worker doses are based on historical exposure data for LANL workers (*DOE Occupational Radiation Exposure 2001 Report*). Based on the reported data, the average annual dose to a LANL worker who received a measurable dose was 104 millirem. A value of 110 millirem has been used as the estimate of the average annual worker dose per year of operation at the CMR Building.

Table 4–3 Annual Radiological Impacts to Workers from CMR Activities under the No Action Alternative

	Individual Worker	*Worker Population* [a]
Dose [b]	110 mrem	22 person-rem
Fatal cancer risk [c]	0.00004	0.009
Dose limit [d]	5,000 mrem	Not applicable
Administrative control level [e]	500 mrem	Not applicable

[a] Based on a worker population of approximately 200 for the CMR Building. Dose limits and administrative control levels do not exist for worker populations.
[b] Based on the average dose to LANL workers who received a measurable dose in the period 1998 to 2000. A program to reduce doses to as low as reasonably achievable (ALARA) would be employed to reduce doses to the extent practicable.
[c] Based on a worker risk estimate of 0.0004 latent cancer fatalities per person-rem (see Appendix B).
[d] 10 CFR 835.202.
[e] DOE 1999b.

The average annual worker dose of 110 millirem is well below the DOE worker dose limit of 5 rem (5,000 millirem) (10 CFR 835) and is significantly less than the recommended Administrative Control Level of 500 millirem (DOE 1999b). This average annual dose corresponds to an increased risk of a fatal cancer of 0.00004. In other words, the likelihood of a CMR worker developing a fatal cancer from work-related exposure is about 1 chance in 25,000 for each year of operation.

Based on a worker population of approximately 200 for the No Action Alternative, the estimated annual worker population dose would be 22 person-rem. This worker population dose would increase the likelihood of a fatal cancer within the worker population by 0.009 per year. In other words, on an annual basis there is less than 1 chance in 100 of one fatal cancer developing in the entire worker population as a result of exposures associated with this alternative.

Hazardous Chemicals Impacts

No chemical-related health impacts would be associated with this alternative. As stated in the *LANL SWEIS*, the quantities of chemicals that could be released to the atmosphere during routine normal operations are minor and would be below the screening levels used to determine the need for additional analysis. There would be no construction and operational increase in the use of chemicals under the No Action Alternative. Workers would be protected from hazardous chemicals by adherence to Occupational Safety and Health Administration (OSHA) and U.S. Environmental Protection Agency (EPA) occupational standards that limit concentrations of potentially hazardous chemicals.

4.2.9.2 Facility Accidents

This section presents a discussion of the potential health impacts to members of the public and workers from postulated accidents at the CMR Building under the No Action Alternative. Under the No Action Alternative, the CMR Building and operations would remain unchanged. Additional details supporting the information presented here are provided in Appendix C.

Radiological Impacts

Table 4–4 presents the frequencies and consequences of a postulated set of accidents for the public, represented by the maximally exposed offsite individual and the general population living within 50 miles (80 kilometers) of the CMR Building and a noninvolved worker located at a distance of 304 yards (278 meters) from the CMR Building. **Table 4–5** presents the cancer risks, obtained by multiplying each accident's consequences by the likelihood (frequency per year) that the accident would occur. The accidents listed in these tables were selected from a wide spectrum of accidents described in Appendix C. The selection process and screening criteria used (see Appendix C) ensure that the accidents chosen for evaluation in this EIS bound the impacts of all reasonably foreseeable accidents that could occur at the existing CMR Building. Thus, in the event that any other accident that was not evaluated in this EIS were to occur, its impacts on workers and the public would be expected to be within the range of the impacts evaluated here.

The accident with the highest potential risk to the offsite population (see Table 4–5) would be an earthquake that would severely damage the CMR Building, with a risk of a latent cancer fatality for the maximally exposed offsite individual of 3.5×10^{-6}. In other words, the maximally exposed offsite individual's likelihood of developing a fatal cancer from this event is about 1 chance in 280,000. The dose to the offsite population would increase the number of fatal cancers in the entire population by 0.002. In other words, the likelihood of developing one fatal cancer from this event in the entire population would be about 1 chance in 500. Statistically, the radiological risk for the average individual in the population would be small. The risk of a latent cancer fatality to a noninvolved worker located at a distance of 304 yards (278 meters) from the CMR Building would be 0.00013, or about 1 chance in 7,000.

Table 4–4 Accident Frequency and Consequences under the No Action Alternative

		Maximally Exposed Offsite Individual		*Offsite Population* [a]		*Noninvolved Worker*	
Accident	*Frequency (per year)*	*Dose (rem)*	*Latent Cancer Fatalities* [b]	*Dose (person-rem)*	*Latent Cancer Fatalities* [c]	*Dose (rem)*	*Latent Cancer Fatalities* [b]
Wing-wide fire	0.00005	0.548	0.00027	1020	0.51	2.67	0.001
Severe earthquake	0.0024	2.92	0.002	1680	0.84	66.9	0.54
Flammable gas explosion	0.0001	0.0725	0.000036	135	0.068	0.353	0.00014
HEPA filter fire	0.01	0.116	0.000058	66.5	0.033	2.65	0.001
Fire in main vault	1×10^{-6}	2.15	0.001	4000	2.0	10.5	0.004
Propane/hydrogen transport explosion	1×10^{-6}	0.53	0.00027	304	0.152	12.1	0.005
Natural gas pipeline rupture	1×10^{-7}	0.548	0.00027	1020	0.51	2.67	0.001
Radioactive spill	0.1	0.00054	3×10^{-7}	0.31	0.00016	0.0124	5×10^{-6}

HEPA = high-efficiency particulate air filter.

[a] Based on a population of 302,130 persons residing within 50 miles (80 kilometers) of the site.

[b] Increased likelihood of a latent cancer fatality.

[c] Increased number of latent cancer fatalities.

Table 4–5 Annual Cancer Risks Due to Accidents under the No Action Alternative

Accident	*Maximally Exposed Offsite Individual* [a]	*Offsite Population* [b, c]	*Noninvolved Worker* [a]
Wing-wide fire	1.4×10^{-8}	0.000026	5.5×10^{-8}
Severe earthquake	3.5×10^{-6}	0.002	0.00013
Flammable gas explosion	3.6×10^{-9}	6.8×10^{-6}	1.4×10^{-8}
HEPA filter fire	5.8×10^{-7}	0.00033	0.000011
Fire in main vault	1.1×10^{-9}	2.0×10^{-6}	4.2×10^{-9}
Propane/hydrogen transport explosion	2.7×10^{-10}	1.5×10^{-7}	4.8×10^{-9}
Natural gas pipeline rupture	2.7×10^{-11}	5.1×10^{-8}	1.1×10^{-10}
Radioactive spill	3.0×10^{-8}	0.000016	5.0×10^{-7}

HEPA = high-efficiency particulate air filter.

[a] Risk of increased likelihood of a latent cancer fatality.

[b] Risk of increased number of latent cancer fatalities.

[c] Based on a population of 302,130 persons residing within 50 miles (80 kilometers) of the site.

Approximately 200 workers (including security guards) would be at the CMR Building during operations in the event of an accident. Workers near an accident could be at risk of serious injury or death. The impacts from the high-efficiency particulate air filter fire provide an indication of typical worker impacts during accident conditions. Following initiation of accident and site emergency alarms, workers in adjacent areas of the facility would evacuate the area in accordance with technical area and facility emergency operating procedures and training in place.

Hazardous Chemicals and Explosives Impacts

Some of the chemicals used in the CMR Building are both toxic and carcinogenic. The quantities of the regulated hazardous chemicals and explosive materials stored and used in the facility are well below the threshold quantities set by the EPA (40 CFR 68), and pose minimal potential hazards to the public health and the environment in an accident condition. These chemicals are stored and handled in small quantities (10 to a few hundred milliliters), and would only be a hazard to the involved worker under accident conditions.

4.2.9.3 Emergency Preparedness and Security Impacts

Under the No Action Alternative, there would be no change to the emergency management and response program at LANL. Security arrangements for the existing CMR Building would not change.

4.2.10 Environmental Justice

Under the No Action Alternative, CMR activities would continue in the existing CMR Building and no new facilities would be constructed. As discussed in Section 4.2.9.1, radiological and hazardous chemical risks to the public resulting from normal operations would be small. As shown in Table 4–2, the health risks associated with these releases would be small. Routine normal operations at the existing CMR Building would not be expected to cause fatalities or illness among the general population surrounding TA-3, including minority and low-income populations living within the potentially affected area.

The annual radiological risks to the offsite population that could result from accidents at the existing CMR Building are estimated to be less than 0.002 latent cancer fatalities (see Table 4–5). Hence, the annual risks of a latent cancer fatality in the entire offsite population resulting from an accident under the No Action Alternative would be less than 1 in 500 or essentially no chance of cancer for the average individual in the population.

In summary, implementation of the No Action Alternative would not pose disproportionately high or adverse health and safety risks to low-income or minority populations living in the potentially affected area surrounding the existing CMR Building.

4.2.11 Waste Management and Pollution Prevention

4.2.11.1 Waste Management

The impacts of managing waste from the existing CMR Building under the No Action Alternative would be the same as those currently experienced at LANL. This is because waste generation during CMR operations would not change due to operational restrictions and, therefore, the same types and volumes of waste would be generated. See Section 3.12.1 for waste types and quantities generated by current CMR activities.

4.2.11.2 Pollution Prevention

At the CMR Building, wastes are minimized, where feasible, by:

- Recycling;
- Processing waste to reduce its quantity, volume, or toxicity;
- Substituting materials or processes that generate hazardous wastes with materials or processes that result in fewer hazardous wastes being produced, and
- Segregating waste materials to prevent contamination of nonhazardous materials.

4.3 Environmental Impacts for Alternative 1 (Preferred Alternative)

This section presents a discussion of the environmental impacts associated with Alternative 1 (Preferred Alternative). Under Alternative 1, CMR operations at LANL would be relocated and consolidated at TA-55 in a new CMRR Facility consisting of two or three buildings. One of the new buildings would provide space for administrative offices and support activities. The other building(s) would provide secure laboratory spaces for research and analytical support activities. The buildings would be expected to operate for a minimum of 50 years, and tunnels might be constructed to connect them. The impacts from construction and operation of these proposed facilities are described below. Disposition of the existing CMR Building is discussed later in Section 4.7.2.

CMRR Facility operations at TA-55 under this alternative would be conducted at the levels of activity described for the Expanded Operations Alternative in the *LANL SWEIS*. The Expanded Operations Alternative presented in the *LANL SWEIS* provides the reference point from which incremental effects of this proposed action are measured.

4.3.1 Land Use and Visual Resources

4.3.1.1 Land Use

Construction and Operations Impacts—Total land disturbance during construction of the new CMRR Facility at TA-55, would involve 26.75 acres (10.8 hectares). Permanent disturbance, consisting of land used for buildings and parking lots, would impact 13.75 acres (5.6 hectares). The remaining 13 acres (5.26 hectares) would consist of a construction laydown area of 2 acres (0.8 hectares), an area for a concrete batch plant of 5 acres (2 hectares) maximum, and land affected by a road realignment of 6 acres (2.4 hectares). Potential development sites at TA-55 include some areas that have already been disturbed, as well as others that are currently covered with native vegetation including some mature trees that would have to be cleared prior to construction. Construction and operation of a new CMRR Facility at TA-55 would be consistent with both the *LANL SWEIS* and *LANL Comprehensive Site Plan* designations of the area for Research and Development and Nuclear Materials Research and Development, respectively (see Section 3.2.1).

4.3.1.2 Visual Resources

Construction and Operations Impacts—Impacts to visual resources resulting from the construction of the new CMRR Facility at TA-55 would be temporary in nature and could include increased levels of dust and human activity. Once completed, the administrative offices and support functions building would be three stories above grade. Regardless of the construction option selected under this alternative, the Hazard Category 2 and Hazard Category 3 Laboratory Building(s) would be no more than one story in height. The general appearance of the new CMRR Facility would be consistent with other buildings located within TA-55. Facilities would be readily visible from Pajarito Road and from the upper reaches of the Pajarito Plateau rim. Although the new CMRR Facility would add to the overall development at TA-55, it would not alter the industrial nature of the area. Accordingly, the current Class IV Visual Resource Contrast rating for TA-55 would not change.

4.3.2 Site Infrastructure

Annual site infrastructure requirements for current LANL operations, as well as current site infrastructure capacities, are presented in **Table 4–6**. These values provide the reference point for the LANL site infrastructure impact analyses presented in this section. The table also presents projected site infrastructure requirements that incorporate both the forecasted demands of the *LANL SWEIS* Expanded Operations Alternative and those of non-LANL users relying on the same utility systems. The *LANL SWEIS* identified that peak electrical demand could exceed site electrical capacity. In addition, whereas the *LANL SWEIS* had projected that water use would remain within DOE water rights, DOE recently conveyed 70 percent of its water rights to

Los Alamos County, and leases the remaining 30 percent to the County (see Section 3.3.4). As a result, site electric peak load and water capacities could also be exceeded at LANL in the future, even in the absence of new demands, should projected site requirements be realized. However, no infrastructure capacity constraints are anticipated in the near term, as LANL operational demands to date on key infrastructure resources (natural gas, water, and electricity) have been well below projected levels and well within the site capacities shown in Table 4–6. DOE is currently pursuing actions to increase the reliability and availability of electrical power to LANL (see Section 3.3.2). DOE could also purchase additional water from the county, if needed and available. Any potential shortfalls in available capacity would be addressed as increased site requirements are realized.

Table 4–6 Current and Projected Site Infrastructure Requirements for LANL Operations

Resource	*Site Capacity*	*Current Site Requirement*	*Projected Site Requirement* [a]	*Potential Exceeded Capacity*
Electricity [b]				
Energy (megawatt-hours per year)	963,600	491,186	898,043	0
Peak load demand (megawatts)	110	85.5	128	18
Fuel				
Natural gas (cubic feet per year)	8,070,000,000	2,530,000,000	1,840,000,000	0
Water (gallons per year)	542,000,000 [c]	344,000,000	759,000,000	217,000,000

[a] Projected requirements over 25 years under the *LANL SWEIS* Expanded Operations Alternative (DOE 1999a). Projections for electrical energy, peak load, and natural gas also include usage for other Los Alamos County users that rely upon the same utility system (DOE 1999c).

[b] Electrical site capacity and current requirements are for the entire Los Alamos Power Pool, which includes LANL and other Los Alamos County users.

[c] Equivalent to DOE's leased water rights.

Source: Table 3–2, *CMRR EIS*.

Construction Impacts—The projected demands on key site infrastructure resources associated with construction under this alternative on an annualized basis are presented in **Table 4–7**. Existing LANL infrastructure would easily be capable of supporting the construction requirements for the new CMRR Facility proposed under this alternative without exceeding site capacities. Although gasoline and diesel fuel would be required to operate construction vehicles, generators, and other construction equipment, fuel would be procured from offsite sources and, therefore, would not be a limited resource. Construction Impacts on the local transportation network would be negligible.

Operations Impacts—Resources needed to support operations under Alternative 1 (Preferred Alternative) are presented in **Table 4–8**. It is projected that existing LANL infrastructure resources would be adequate to support proposed mission activities over 50 years. In general, infrastructure requirements for the new CMRR Facility under this alternative would approximate and would be bound by those of the Expanded Operations Alternative presented in the *LANL SWEIS* for the CMR Building.

Table 4–7 Site Infrastructure Requirements for Facility Construction under Alternative 1 (Preferred Alternative)

Resource	*Available Site Capacity* [a]	*Total Requirement* [b]	*Percent of Available Site Capacity*
Electricity			
Energy (megawatt-hours per year)	472,414	312.5	0.07
Peak load demand (megawatts)	24.5	0.3	1.2
Fuel			
Natural gas (cubic feet per year)	5,540,000,000	0	0
Water (gallons per year)	198,000,000	3,745,300	1.9

[a] Capacity minus the current site requirements, a calculation based on the data provided in Table 3–2, *CMRR EIS*.
[b] Total estimated infrastructure requirements for the projected construction period.
Source: Table 2–1, Table 3–2, *CMRR EIS*.

Table 4–8 Annual Site Infrastructure Requirements for Facility Operations under Alternative 1 (Preferred Alternative)

Resource	*Available Site Capacity* [a]	*Requirement*	*Percent of Available Site Capacity*
Electricity			
Energy (megawatt-hours per year)	472,414	19,272	4.1
Peak load demand (megawatts)	24.5	2.6	10.6
Fuel			
Natural gas (cubic feet per year)	5,540,000,000	Not available	Not available
Water (gallons per year)	198,000,000	10,400,000	5.3

[a] Capacity minus the current site requirements, a calculation based on the data provided in Table 3–2, *CMRR EIS*.
Sources: Table 2–2, Table 3–2, *CMRR EIS*.

4.3.3 Air Quality and Noise

Overall air quality at LANL would remain within standards during construction and operation of the new CMRR Facility. In addition, overall noise levels at LANL during construction and operation would also remain within regulatory limits.

4.3.3.1 Air Quality

Nonradiological Releases

Construction Impacts—Construction of a new CMRR Facility at TA-55 would result in temporary emissions from construction equipment, trucks, and employee vehicles. Criteria pollutant concentrations were modeled for the construction of the new CMRR Facility at TA-55 and compared to the most stringent standards (**Table 4–9**). The maximum ground-level concentrations offsite or along the perimeter road to which the public has regular access would be below the ambient air quality standards. Concentrations along Pajarito Road adjacent to the construction site would be higher and could exceed the 24-hour ambient standards for nitrogen dioxide, particulate matter less than or equal to 10 microns in aerodynamic diameter (PM_{10}), and total suspended particulates. However, the public would not be allowed access to this section of road during construction. Actual criteria pollutant concentrations are expected to be less, since conservative emission factors and other assumptions were used in the modeling of construction activities and tend to overestimate impacts. The maximum short-term concentrations for

construction would occur at the eastern site boundary for points at which the public has regular access. Air quality modeling considered particulate emissions from construction activities in an area of 20.75 acres (8.4 hectares) and emissions from various earthmoving and material-handling equipment. This is the area consisting of land that would be used for building and parking lot construction (13.75 acres [5.6 hectares]) and laydown and the concrete batch plant (7 acres [2.8 hectares]). The maximum annual criteria pollutant concentrations occur at a receptor located to the north at the Royal Crest Trailer Park.

Table 4–9 Nonradiological Air Quality Concentrations at the Site Boundary at TA-55 (Alternative 1, Preferred Alternative) – Construction

Criteria Pollutant	*Averaging Period*	*Most Stringent Standard or Guideline (micrograms per cubic meter)* [a]	*Maximum Incremental Concentration (micrograms per cubic meter)* [b]
Carbon monoxide	8 hours 1 hour	7,800 11,700	22.8 182
Nitrogen dioxide	Annual 24 hours	73.7 147	0.86 23.1
PM_{10}	Annual 24 hours	50 150	2.02 34.4
Sulfur dioxide	Annual 24 hours 3 hours	41 205 1,030	0.079 2.26 18.1
Total suspended particulates	Annual 24 hours	60 150	3.96 66.7

PM_{10} = particulate matter less than or equal to 10 microns in diameter.

[a] The more stringent of the Federal and state standards is presented if both exist for the averaging period. The National Ambient Air Quality Standards (NAAQS) (40 CFR 50), other than those for ozone, particulate matter, and lead, and those based on annual averages, are not to be exceeded more than once per year. The annual arithmetic mean PM_{10} standard is attained when the expected annual arithmetic mean concentration is less than or equal to the standard. Standards and monitored values for pollutants other than particulate matter are stated in parts per million (ppm). These values have been converted to micrograms per cubic meter ($\mu g/m^3$) with appropriate corrections for temperature (21 degrees C [60 degrees F]) and pressure (elevation 7,005 feet [2,135 meters]) following New Mexico dispersion modeling guidelines (revised 1998) (NMAQB 1998).

[b] The annual concentrations were analyzed at locations to which the public has access – the site boundary and nearby sensitive areas. Short-term concentrations were analyzed at the site boundary and at the fence line of the technical area to which the public has short-term access.

Source: DOE 1999a.

Operations Impacts—Under Alternative 1 (Preferred Alternative), criteria and toxic air pollutants would be generated from operation and testing of an emergency generator at TA-55. **Table 4–10** summarizes the concentrations of criteria pollutants from CMR operations at TA-55. The concentrations are compared to their corresponding ambient air quality standards. The maximum ground-level concentrations that would result from CMR operations at TA-55 would be below the ambient air quality standards. Actual criteria pollutant concentrations are expected to be less because conservative stack parameters were assumed in the modeling of the diesel emergency generator. The maximum annual criteria pollutant concentrations would occur at the Royal Crest Trailer Park. The maximum short-term concentrations would also occur at receptors at the Royal Crest Trailer Park and north of TA-55 at the LANL site boundary. No major change in emissions or air pollutant concentrations at LANL are expected under this alternative.

Table 4–10 Nonradiological Air Quality Concentrations at the Site Boundary at TA-55 (Alternative 1, Preferred Alternative) – Operations

Criteria Pollutant	*Averaging Period*	*Most Stringent Standard or Guideline (micrograms per cubic meter)* [a]	*Maximum Incremental Concentration (micrograms per cubic meter)* [b]
Carbon monoxide	8 hours 1 hour	7,800 11,700	53.2 23.9
Nitrogen dioxide	Annual 24 hours	73.7 147	0.0182 45.1
PM_{10}	Annual 24 hours	50 150	0.001 1.39
Sulfur dioxide	Annual 24 hours 3 hours	41 205 1,030	0.0113 28.1 207
Total suspended particulates	Annual 24 hours	60 150	0.001 2.43

PM_{10} = particulate matter less than or equal to 10 microns in diameter.

[a] The more stringent of the Federal and state standards is presented if both exist for the averaging period. The NAAQS (40 CFR 50), other than those for ozone, particulate matter, and lead, and those based on annual averages, are not to be exceeded more than once per year. The annual arithmetic mean PM_{10} standard is attained when the expected annual arithmetic mean concentration is less than or equal to the standard. Standards and monitored values for pollutants other than particulate matter are stated in parts per million (ppm). These values have been converted to micrograms per cubic meter ($\mu g/m^3$) with appropriate corrections for temperature (21 degrees C [60 degrees F]) and pressure (elevation 7,005 feet [2,135 meters]) following New Mexico dispersion modeling guidelines (revised 1998) (NMAQB 1998).

[b] The annual concentrations were analyzed at locations to which the public has access – the site boundary and nearby sensitive areas. Short-term concentrations were analyzed at the site boundary and at the fence line of the technical area to which the public has short-term access.

Source: DOE 1999a.

Radiological Releases

Construction Impacts—While no radiological releases to the environment would be expected in association with construction activities at TA-55, the potential exists for contaminated soils and possibly other media to be disturbed during excavation and other site activities. Prior to commencing ground disturbance, NNSA would survey potentially affected areas to determine the extent and nature of contamination and would be required to remediate contamination in accordance with procedures established under LANL's environmental restoration program and LANL's Hazardous Waste Facility Permit.

Operations Impacts—Approximately 0.00076 curies per year of actinides and 2,645 curies of fission products and tritium would be released to the environment from relocated CMR operations at TA-55 (DOE 1999a, LANL 2000d). Releases of radiological air pollutants are discussed in section 4.3.9.1.

4.3.3.2 Noise

Construction Impacts—Construction of the new CMRR Facility at TA-55 would result in some temporary increase in noise levels near the area from construction equipment and activities. Some disturbance to wildlife near the area could occur as a result of the operation of construction equipment. There would be no change in noise impacts on the public outside of LANL as a result of construction activities, except for a small increase in traffic noise levels from

construction employees' vehicles and materials shipment. Noise sources associated with construction at TA-55 are not expected to include loud impulsive sources such as from blasting.

Operations Impacts—Noise impacts from CMRR Facility operations at TA-55 would be similar to those from existing operations at TA-55. Although there would be a small increase in traffic and equipment noise (such as heating and cooling systems) near the area, there would be little change in noise impacts on wildlife and no change in noise impacts to the public outside of LANL as a result of moving CMR activities to TA-55.

4.3.4 Geology and Soils

Construction Impacts—Construction of the CMRR Facility under this alternative would be expected to disturb a total of 26.75 acres (10.8 hectares) of land at TA-55. Aggregate and other geologic resources would be required to support construction activities at TA-55, but these resources are abundant in Los Alamos County. Relatively deep sub-surface excavation would be required to construct below-grade portions of the new CMRR Facility.

A site survey and foundation study would be conducted as necessary to confirm site geologic characteristics for facility engineering purposes. The potential also exists for contaminated soils to be encountered during excavation and other site activities. Prior to commencing ground disturbance, NNSA would survey potentially affected contaminated areas to determine the extent and nature of any contamination and required remediation in accordance with procedures established under the LANL environmental restoration program. Other buried objects would be surveyed and removed as appropriate.

As discussed in Section 3.5, LANL is located in a region of low to moderate seismicity overall. Ground shaking of Modified Mercalli Intensity (MMI) VII (see Appendix A, Table A–6) associated with postulated earthquakes is possible and supported by the historical record for the region. MMI VII would be expected to primarily affect the integrity of inadequately designed or nonreinforced structures, but damage to properly designed or specially designed or upgraded facilities would not be expected. The Rendija Canyon Fault terminates approximately 0.8 miles (1.3 kilometers) northwest of TA-55, but may extend further south near TA-6 (see Section 3.5.1.3). However, the new CMRR Facility proposed under this alternative would be designed and constructed in accordance with DOE Order 420.1A and other applicable DOE orders and standards (DOE Standard 1020-2002) to ensure that workers, the public, and the environment are protected from any adverse impacts caused by the CMRR Facility from natural phenomena including earthquakes.

Operations Impacts—CMR operations under this alternative would not impact geologic and soil resources at LANL. As discussed above, new buildings would be designed and constructed in accordance with DOE Order 420.1A and sited to minimize the risk from geologic hazards. Thus, site geologic conditions would be unlikely to affect the facilities over the 50-year operational life expectancy.

4.3.5 Surface and Groundwater Quality

4.3.5.1 Surface Water

Construction Impacts—There are no natural surface water drainages in the vicinity of the Plutonium Facility at TA-55 or Mesita del Buey and no surface water would be used to support facility construction. It is expected that portable toilets would be used for construction personnel, resulting in no onsite discharge of sanitary wastewater and no impact on surface waters. Waste generation and management activities are detailed in Section 4.3.11.

Storm water runoff from construction areas could potentially impact downstream surface water quality. Appropriate soil erosion and sediment control measures (such as sediment fences, stacked hay bales, and mulching disturbed areas) and spill prevention practices would be employed during construction to minimize suspended sediment and material transport and potential water quality impacts. An NPDES General Permit Notice of Intent would be filed to address storm water discharges associated with construction activity. Also, development and implementation of a Storm Water Pollution Prevention Plan would be required for the construction activity, and the existing Storm Water Pollution Prevention Plan for the TA-55 Plutonium Facility would have to be updated before construction is completed. TA-55 is not in an area prone to flooding and the nearest floodplains are located in Mortandad and Two Mile Canyon to the north and south, respectively.

Operations Impacts—No impacts on surface water resources are expected as a result of CMR operations at TA-55 under this alternative. No surface water would be used to support facility activities and there would be no direct discharge of sanitary or industrial effluent to surface waters. Sanitary wastewater would be generated by facility staff use of lavatory, shower, and break room facilities and from miscellaneous potable and sanitary uses. It is planned that this wastewater would be collected and conveyed by an expanded TA-55 sanitary sewer system for ultimate disposal via appropriate wastewater treatment facilities. Radioactive liquid waste would be transported via a radioactive liquid waste pipeline to the existing TA-50 Radioactive Liquid Waste Treatment Facility. Waste generation and management activities are detailed in Section 4.3.11. The design and operation of new buildings would incorporate appropriate storm water management controls to safely collect and convey storm water from facilities while minimizing washout and soil erosion. Overall, operational impacts on site surface waters and downstream water quality would be expected to be negligible.

4.3.5.2 Groundwater

Construction Impacts—Groundwater would be required to support construction activities at TA-55. It is estimated that construction activities under Alternative 1 (Preferred Alternative) would require approximately 3.7 million gallons (14 million liters) of groundwater (see Table 4–7). The volume of groundwater required for construction would be small compared to site availability and historic usage, and there would be no onsite discharge of wastewater to the surface or subsurface. Also, appropriate spill prevention controls, countermeasures, and procedures would be employed to minimize the potential for releases of materials to the surface

or subsurface. No impact on groundwater availability or quality is anticipated from construction activities in TA-55.

Operations Impacts—Relocated CMR operations and activities at TA-55 under Alternative 1 (Preferred Alternative) would use groundwater primarily to meet the potable and sanitary needs of facility support personnel, as well as for miscellaneous building mechanical uses. It is estimated that new building operations under this alternative would require about 10.4 million gallons (39.4 million liters) per year of groundwater. This demand is a small fraction of total LANL usage and would not exceed site availability (see Table 4–8). Therefore, no additional impact on regional groundwater availability would be anticipated.

No sanitary or industrial effluent would be discharged directly to the surface or subsurface. Waste generation and management activities are detailed in Section 4.3.11. Thus, no operational impacts on groundwater quality would be expected.

4.3.6 Ecological Resources

4.3.6.1 Terrestrial Resources

Construction Impacts—Although TA-55 is located within the ponderosa pine forest vegetation zone, few trees exist in developed portions of the area. However, several potential sites for locating the new CMRR Facility at TA-55 contain small patches of woodland. Since the specific building locations within TA-55 would be established based on site-studies that would not occur until NNSA reached its decision on the CMRR Facility, it is not possible to determine how much of the 26.75 acres (10.8 hectares) of land to be disturbed during construction is wooded. Where construction would occur on previously disturbed land, there would be little or no impact to terrestrial resources. However, construction would remove some previously undisturbed ponderosa pine forest, resulting in the loss of less mobile wildlife such as reptiles and small mammals, and causing more mobile species, such as birds or large mammals, to be displaced. The success of displaced animals would depend on the carrying capacity of the area into which they move. If the area were at its carrying capacity, displaced animals would not be likely to survive. Indirect impacts from construction, such as noise or human disturbance, could also impact wildlife living adjacent to the construction zone. Although temporary, such disturbance would span the construction period. The work area would be clearly marked to prevent construction equipment and workers from disturbing adjacent natural habitat.

Operations Impacts—CMRR Facility operations would have minimum impact on terrestrial resources within or adjacent to TA-55. Since wildlife residing in the area has already adjusted to current levels of noise and human activity associated with current TA-55 operations, it is unlikely that it would be adversely affected by similar types of activity involved with CMRR Facility operations what about loss of physical space occupied by operations. Areas not permanently disturbed by the new CMRR Facility (for example, construction laydown areas) would be landscaped. While these areas would provide some habitat for wildlife, it is likely that species composition and density would differ from preconstruction conditions.

4.3.6.2 Wetlands

Construction and Operations Impacts—Although there are three areas of wetlands located within TA-55, none are present in the proposed CMRR Facility construction area. Thus, there would be no direct impacts to wetlands. Further, indirect impacts to these wetlands due to erosion should not occur since water from the site drains into the Pajarito watershed and not the Mortandad watershed in which these wetlands are located. Further, a sediment and erosion control plan would be implemented to control stormwater runoff during construction and operation, thus preventing impacts to wetlands located further down Pajarito Canyon.

4.3.6.3 Aquatic Resources

Construction and Operations Impacts—As noted in Section 3.7.3, the only aquatic resources present at TA-55 are small pools associated with wetlands. There would be no impact to these resources from the construction or operation of a new CMRR Facility.

4.3.6.4 Threatened and Endangered Species

Construction Impacts—As noted in Section 3.7.4, areas of environmental interest (AEIs) have been established for the Mexican spotted owl, bald eagle, and southwestern willow flycatcher. Portions of TA-55 include both core and buffer zones for the Federally threatened Mexican spotted owl (see Section 3.7.4); however, surveys have not identified the spotted owl within these zones. Construction of the new CMRR Facility would not be expected to directly affect individuals of this species but could remove a small portion of the Mexican spotted owl habitat area. Core and buffer zones for the bald eagle and southwestern willow flycatcher do not overlap TA-55.

Operation Impacts—CMRR Facility operations at TA-55 would not directly affect any endangered, threatened, or special status species. Noise levels associated with a new CMRR Facility would be low and human disturbance would be similar to that which already occurs within TA-55; however, parking activities at the CMRR Facility could be in close proximity to the Mexican spotted owl critical habitat area and may indirectly affect that potential habitat. In addition, nighttime lighting at the parking lot could also indirectly affect prey species activities.

4.3.7 Cultural and Paleontological Resources

4.3.7.1 Prehistoric Resources

Construction and Operations Impacts—As noted in Section 3.8.1, there are no prehistoric sites located within TA-55; therefore, construction and CMR operations would not impact these resources. If unexpected prehistoric resources were uncovered during construction, work would stop and appropriate assessment, regulatory compliance, and recovery measures would be undertaken.

4.3.7.2 Historic Resources

Construction and Operations Impacts— Adverse impacts to historic resources at TA-55 from construction and operation of the CMRR Facility would not be expected. However, some of the 10 historic sites located within TA-55 could be disturbed by the construction of the new CMRR Facility, the extent of which would not be determined until planning details were finalized. Consultation with the State Historic Preservation Officer would be undertaken, if necessary, in order to determine the eligibility of any potentially disturbed sites for listing on the National Register of Historic Places and, if appropriate, data and artifact recovery would be conducted.

4.3.7.3 Traditional Cultural Properties

Construction and Operations Impacts—The area at TA-55 proposed to house the new CMRR Facility has not been surveyed for traditional cultural properties. Prior to construction, a traditional cultural properties consultation would be undertaken and, if needed, site removal or avoidance would be conducted. If any traditional cultural properties were located during construction, work would stop while appropriate action would be undertaken.

4.3.7.4 Paleontological Resources

Construction and Operations Impacts—As noted in Section 3.8.4, there are no known paleontological resources present at TA-55 at LANL. Thus, there would be no impacts to these resources.

4.3.8 Socioeconomics

Construction Impacts—Construction of new buildings at TA-55 to house CMR activities would require a peak construction employment level of 300 workers. This level of employment would generate about 852 indirect jobs in the region around LANL. The potential total employment increase of 1,152 direct and indirect jobs represents an approximate 1.3 percent increase in the workforce and would occur over the 60 months of construction. It would have little or no noticeable impact on the socioeconomic conditions of the region of influence.

Operations Impacts—As previously noted in Section 2.7.4, the operational characteristics of the CMRR Facility are based on the level of CMR operations required to support the Expanded Operations Alternative analyzed in the *LANL SWEIS*. As noted in Table 2–2, CMRR Facility operations would require a workforce of approximately 550 workers. This would be an increase of 346 workers over currently restricted CMR operational requirements, but approximately equal to the number of CMR workers projected for the Expanded Operations Alternative in the *LANL SWEIS*. The *LANL SWEIS* presents a discussion of the socioeconomic impacts from an increase in total employment at LANL under the Expanded Operations Alternative, which includes the contributory affect of expanded CMR operations and an increase in workforce.

Nevertheless, the increase in the number of workers in support of expanded CMR operations would have little or no noticeable impact on socioeconomic conditions in the LANL Tri-County region of influence. Workers assigned to the new CMRR Facility would be drawn for the most

part from existing LANL missions, including consolidated AC and MC activities. The contributory effect of the remaining new employment, in combination with the potential effects from other industrial and economic sectors within the regional economic area, would serve to reduce or mask any effect on the regional economy. New LANL employees hired to support CMRR facilities would comprise a small fraction of the LANL workforce (more than 9,000 in 1996), and an even smaller fraction of the regional workforce (more than 92,000 in 1999).

4.3.9 Human Health Impacts

4.3.9.1 Construction and Normal Operations

Radiological Impacts

Construction Impacts—No radiological risks would be incurred by members of the public from construction activities. Construction workers would be at a small risk for construction related accidents and radiological exposures. They could receive doses above natural background radiation levels from exposure to radiation from other past or present activities at the site. However, these workers would be protected through appropriate training, monitoring, and management controls. Their exposure would be limited to ensure that doses were kept as low as is reasonably achievable.

Operations Impacts—Routine operation of the CMRR Facility at TA-55 would not be expected to result in an increase in latent cancer fatalities. Under this alternative, the radiological releases to the atmosphere from the new CMRR Facility at TA-55 would be those shown in **Table 4–11**. The actinide emissions listed in this table are in the form of plutonium, uranium, thorium, and americium isotopes. In estimating the human health impacts, all emissions were considered to be plutonium-239. This is conservative because the human health impacts on a per-curie basis are greater for plutonium-239 than for the other actinides associated with CMR activities. Liquid radiological effluents would be routed through an existing pipeline to the TA-50 Radioactive Liquid Waste Treatment Facility where they would be treated along with other LANL site liquid wastes. Following treatment, the liquid would be released through an existing NPDES-permitted outfall. The treatment residues would be solidified and disposed of as radioactive waste (see Section 4.3.11).

Table 4–11 Emission from the CMRR Facility under Alternative 1

Nuclide	*Emission (curies per year)*
Actinides	0.00076
Krypton-85	100
Xenon-131m	45
Xenon-133	1,500
H-3 (Tritium) [a]	1,000

[a] The tritium release is in the form of both tritium oxide (750 curies) and elemental tritium (250 curies). Tritium oxide is more readily absorbed by the body and, therefore, the health impact of tritium oxide on a receptor is greater than that for elemental tritium. Therefore, all of the tritium release has been conservatively modeled as if it were tritium oxide.

Source: DOE 1999a, LANL 2000d.

Table 4–12 shows that the annual collective dose to the population living within a 50-mile (80-kilometer) radius of the new CMRR Facility at TA-55 is estimated to be 1.9 person-rem for Alternative 1. This population dose increases the annual risk of a fatal cancer in the population by 0.001. Another way of stating this is that the likelihood of one fatal cancer occurring in the population as a result of radiological releases associated with this alternative is about 1 chance in 1,000 per year. Statistically, latent cancer fatalities would not be expected to occur in the population from CMR operations at TA-55.

Table 4–12 Annual Radiological Impacts on the Public from CMRR Operations under Alternative 1

	Population within 50 Miles (80 kilometers)	***Average Individual within 50 Miles (80 kilometers)***	***Maximally Exposed Individual***
Dose	1.9 person-rem	0.006 mrem	0.33 mrem
Cancer fatality risk [a]	0.001	3.1×10^{-9}	1.7×10^{-7}
Regulatory dose limit [b]	Not applicable	10 mrem	10 mrem
Dose as a percent of the regulatory limit	Not applicable	0.06	3.3
Dose from background radiation [c]	139,000 person-rem	450 mrem	450 mrem
Dose as a percent of background dose	0.0014	0.0014	0.07

[a] Based on a risk estimate of 0.0005 latent cancer fatalities per person-rem (see Appendix B).

[b] 40 CFR 61 establishes an annual limit of 10 mrem via the air pathway to any member of the public from DOE operations. There is no standard for a population dose.

[c] The annual individual dose from background radiation at LANL is 400 to 500 millirem (see Section 3.11.1). The population living within 50 miles (80 kilometers) of TA-3 is estimated to be 309,143.

The average annual dose to an individual in the population is 0.006 millirem. The corresponding increased risk of an individual developing a fatal cancer from receiving the average dose is 3.1×10^{-9} or about 1 chance in 300 million per year.

The maximally exposed individual member of the public would receive an estimated annual dose of 0.33 millirem. This dose corresponds to an increased annual risk of developing a fatal cancer of 1.7×10^{-7}. In other words, the likelihood of the maximally exposed individual developing a fatal cancer is about 1 chance in 6 million for each year of operation.

Estimated annual doses to workers involved with CMRR Facility operations under Alternative 1 are provided in **Table 4–13**. The estimated worker doses are based on historical exposure data for LANL workers (*DOE Occupational Radiation Exposure 2001 Report*). Based on the reported data, the average annual dose to a LANL worker who received a measurable dose was 104 millirem. A value of 110 millirem has been used as the estimate of the average annual worker dose per year of operation at the new CMRR Facility at TA-55.

The average annual worker dose of 110 millirem is well below the DOE worker dose limit of 5 rem (5,000 millirem) (10 CFR 835), and is significantly less than the recommended Administrative Control Level of 500 millirem (DOE 1999b). This average annual dose corresponds to an increased risk of a fatal cancer of 0.00004 for each year of operation. In other words, the likelihood of a worker at the new CMRR Facility developing a fatal cancer from annual work-related exposure is about 1 chance in 25,000.

Table 4–13 Annual Radiological Impacts to Workers from CMRR Facility Operations under Alternative 1

	Individual Worker	*Worker Population* [a]
Dose [b]	110 mrem	61 person-rem
Fatal cancer risk [c]	0.00004	0.02
Dose limit [d]	5,000 mrem	Not available
Administrative control level [e]	500 mrem	Not available

[a] Based on a worker population of 550 for the new CMRR Facility at TA-55. Dose limits and administrative control levels do not exist for worker populations.
[b] Based on the average dose to LANL workers that received a measurable dose in the period 1998 to 2000. A program to reduce doses to as low as reasonably achievable (ALARA) would be employed to reduce doses to the extent practicable.
[c] Based on a worker risk estimate of 0.0004 latent cancer fatalities per person-rem (see Appendix B).
[d] 10 CFR 835.202.
[e] DOE 1999b.

Based on a worker population of 550 for Alternative 1, the estimated annual worker population dose would be 61 person-rem. This would increase the likelihood of a fatal cancer within the worker population by 0.02 per year. In other words, on an annual basis there is less than 1 chance in 50 of one fatal cancer developing in the entire worker population as a result of exposures associated with this alternative.

Hazardous Chemicals Impacts

No chemical-related health impacts to the public would be associated with this alternative. As stated in the *LANL SWEIS*, the laboratory quantities of chemicals that could be released to the atmosphere during routine normal operations are minor quantities and would be below the screening levels used to determine the need for additional analysis. Workers would be protected from adverse effects from the use of hazardous chemicals by adherence to OSHA and EPA occupational standards that limit concentrations of potentially hazardous chemicals.

4.3.9.2 Facility Accidents

This section presents a discussion of the potential health impacts to members of the public and workers from postulated accidents at the new CMRR Facility under Alternative 1. Additional details supporting the information presented here are provided in Appendix C.

Under Alternative 1, the CMR Building capabilities and materials would be relocated to a new CMRR Facility to be constructed at LANL TA-55. The new CMRR Facility would include safety features that would reduce the risks of accidents that currently exist under the No Action Alternative. From an accident perspective, the proposed CMRR Facility would be designed to meet the Performance Category 3 seismic requirements, and have a full confinement system that includes tiered pressure zone ventilation and high-efficiency particulate air filters.

Radiological Impacts

Table 4–14 presents the frequencies and consequences of the postulated set of accidents for a noninvolved worker and the public (maximally exposed offsite individual and the general population living within 50 miles [80 kilometers] of the facility), and a noninvolved worker

located at a distance of 239 yards (219 meters) from the CMRR Facility. **Table 4–15** presents the accident risks, obtained by multiplying each accident's consequences by the likelihood (frequency per year) that the accident would occur. The accidents listed in these tables were selected from a wide spectrum of accidents described in Appendix C. The selection process and screening criteria used (see Appendix C) ensure that the accidents chosen for evaluation in this EIS bound the impacts of all reasonably foreseeable accidents that could occur at the new CMRR Facility at TA-55. Conservative estimates were also made for data used to calculate the source terms for low frequency – high consequence accidents (e.g., facility-wide fire) for CMRR Facility alternatives. These included assumptions that the most hazardous form of the radioactive material (e.g., metal, liquid or powder depending on the accident conditions) was present at the time of the accident, all of the material at risk was damaged in the accident (damage ratio = 1.0) and containment and filtration of airborne radioactive material was lost (leak path factor = 1.0). Thus, in the event that any other accident that was not evaluated in this EIS were to occur, its impacts on workers and the public would be expected to be within the range of the impacts evaluated.

Table 4–14 Accident Frequency and Consequences under Alternative 1

Accident	*Frequency (per year)*	*Maximally Exposed Offsite Individual*		*Offsite Population* [a]		*Noninvolved Worker*	
		Dose (rem)	*Latent Cancer Fatalities* [b]	*Dose (person-rem)*	*Latent Cancer Fatalities* [c]	*Dose (rem)*	*Latent Cancer Fatalities* [b]
Facility-wide fire	5.0×10^{-6}	7.0	0.0035	17,029	8.5	51.4	0.041
Process fire	0.001	0.004	2.0×10^{-6}	9.78	0.0049	0.03	0.000012
Fire in the main vault	1.0×10^{-6}	5.92	0.003	14,500	7.25	43.88	0.035
Process explosion	0.001	0.0036	1.8×10^{-6}	2.5	0.0013	0.15	0.000059
Process spill	0.1	0.0046	2.3×10^{-6}	3.19	0.0016	0.19	0.000076
Seismic-induced laboratory spill	0.0001	12.1	0.0061	8,394	4.2	495	0.4
Seismic-induced fire	0.00001	2.5	0.0013	6,125	3.1	18.5	0.0074
Facility-wide spill	5.0×10^{-6}	243.1	0.24	167,705	83.9	9,352	1.0

[a] Based on a population of 309,154 persons residing within 50 miles (80 kilometers) of the site.
[b] Increased likelihood of latent cancer fatality for an individual assuming the accident occurs.
[c] Increased number of latent cancer fatalities for the offsite population assuming the accident occurs.

Table 4–15 Annual Cancer Risks Due to Accidents under Alternative 1

Accident	*Maximally Exposed Offsite Individual* [a]	*Offsite Population* [b,c]	*Noninvolved Worker* [a]
Facility-wide fire	1.7×10^{-8}	0.000043	2.1×10^{-7}
Process fire	2.0×10^{-9}	4.9×10^{-6}	1.2×10^{-8}
Fire in the main vault	3.0×10^{-9}	7.3×10^{-6}	3.5×10^{-8}
Process explosion	1.8×10^{-9}	1.3×10^{-6}	5.9×10^{-8}
Process spill	2.3×10^{-7}	0.00016	7.6×10^{-6}
Seismic-induced laboratory spill	6.4×10^{-7}	0.00044	4.2×10^{-6}
Seismic-induced Fire	1.3×10^{-8}	0.000031	7.4×10^{-8}
Facility-wide spill	1.2×10^{-6}	0.00042	0.000038

[a] Risk of increased likelihood of a latent cancer fatality.
[b] Risk of increased number of latent cancer fatalities.
[c] Based on a population of 309,154 persons residing within 50 miles (80 kilometers) of the site.

The accident with the highest potential risk to the offsite population (see Table 4–15) would be a facility-wide spill caused by an earthquake that would severely damage the CMRR Facility with a risk of a latent cancer fatality for the maximally exposed offsite individual of 1.2×10^{-6}. In other words, the maximally exposed offsite individual's likelihood of developing a fatal cancer from this event is about 1 chance in 800,000. The dose to the offsite population would increase the number of fatal cancers in the entire population by 0.00042; the likelihood of developing one fatal cancer from this event in the entire population would be about 1 chance in 2,380. Statistically, latent cancer fatalities would not be expected to occur in the population. The risk of a latent cancer fatality to a noninvolved worker located at a distance of 239 yards (219 meters) from the new CMRR Facility would be 0.000038 or about 1 chance in 26,000.

Involved Worker Impacts – Approximately 550 workers (including security guards) would be at the new CMRR Facility during operations. Workers near an accident could be at risk of serious injury or death. The impacts from a process spill accident provides an indication of typical worker impacts during accident conditions. Following initiation of accident and site emergency alarms, workers in adjacent areas of the facility would evacuate the area in accordance with technical area and facility emergency operating procedures and training in place.

Hazardous Chemicals and Explosives Impacts

Some of the chemicals used in LANL CMR operations are toxic and carcinogenic. The quantities of the regulated hazardous chemicals and explosive materials stored and used in the new CMRR Facility would be well below threshold quantities set by the EPA (40 CFR 68), and would pose minimal potential hazards to the public health and the environment in an accident condition. These chemicals would be stored and handled in small quantities (10 to a few hundred milliliters), and would only be a hazard to the involved worker under accident conditions.

4.3.9.3 Emergency Preparedness and Security Impacts

There would be no impacts on the emergency management and response program at LANL from the construction and operation of the new CMRR Facility at TA-55. Existing memoranda of understanding between NNSA, Los Alamos County, and the State of New Mexico to provide mutual assistance during emergencies and to provide open access to medical facilities would continue with minor administrative updates. Equipment and procedures used to respond to emergencies would continue to be maintained by NNSA.

4.3.10 Environmental Justice

Construction Impacts—Under Alternative 1, a new administration building and new laboratory buildings would be constructed at TA-55. As discussed throughout the other subsections of Section 4.4, environmental impacts due to construction for all of the construction options would be temporary and would not extend beyond the boundary of LANL. Under Alternative 1, construction at TA-55 would not result in adverse environmental impacts on the public living within the potentially affected area surrounding TA-55, including low-income and minority populations.

Operations Impacts—As discussed in Section 4.3.9.1, radiological and hazardous chemical risks to the public resulting from normal operations would be small. Table 4–12 shows the health risks associated with these releases would be small. Routine normal operations at the new CMRR Facility would not be expected to cause fatalities or illness among the general population surrounding TA-55, including minority and low-income populations living within the potentially affected area.

Radiological risks to the public that could result from accidents at new laboratory buildings are estimated to be less than 0.0042 latent cancer fatalities (see Table 4–15). Hence, the likelihood of a latent cancer fatality resulting from an accident under Alternative 1 would be less than 1 in 238. As described in Section 4.3.9.2, accidents involving hazardous chemicals or explosives would not result in airborne or water-borne contamination beyond the LANL boundary that would be hazardous to human health.

Residents of Pueblo San Ildefonso have expressed concern that pollution from CMR operations could contaminate Mortandad Canyon, which drains onto Pueblo land and sacred areas. As discussed in Sections 4.3.3, 4.3.5, and 4.3.9, CMR operations under this alternative would not be expected to adversely affect air or water quality, or result in contamination of Tribal lands adjacent to the LANL boundary. In summary, implementation of Alternative 1 would not pose disproportionately high or adverse environmental risks to low-income or minority populations living in the potentially affected area around the new CMRR Facility at TA-55.

4.3.11 Waste Management and Pollution Prevention

This section presents an analysis of waste management and pollution prevention impacts for Alternative 1.

4.3.11.1 Waste Management

Construction Impacts—Before construction activities would begin at TA-55, LANL's Environmental Restoration Project would perform a radiological survey of the construction area to determine whether the Potential Release Sites are located in the construction area. Based on these survey results, further actions, including appropriate documentation and contaminate removal, if necessary, would be completed by the LANL Environmental Restoration Project in accordance with LANL's Hazardous Waste Facility Permit. Potential wastes generated from such remediation activities have not been included in this impact analysis, because the type and amount of waste are unknown and cannot be adequately projected. Impacts from waste disposal of contaminated soil could be similar to the waste management impacts from CMRR Facility operation.

Only nonhazardous waste would be generated from the construction activities to relocate CMR operations and materials to a new facility at TA-55. No radioactive or hazardous waste would be generated during construction activities.

Solid nonhazardous waste generated from construction activities associated with the new CMRR Facility would be disposed of at the Los Alamos County Landfill located at LANL or its

replacement facility. Approximately 578 tons (524 metric tons) of solid nonhazardous waste, consisting primarily of gypsum board, wood scraps, non-recyclable scrap metals, concrete, steel, and other construction waste would be generated from the construction activities. This represents about 20 percent of the current annual solid nonhazardous waste generation rate at LANL of 2,860 tons (2,600 metric tons) per year. Management of this additional waste at LANL would be within the capabilities of the LANL waste management program, but additional waste management personnel may be required.

Construction debris would be collected in appropriate waste containers and transported to the receiving landfill on a regular basis. This additional construction waste would only increase LANL's total wastes going to the landfill by 3 percent.

Sanitary wastewater generated as a result of construction activities would be managed using portable toilet systems. No other nonhazardous liquid wastes are expected.

Operations Impacts—The expected waste generation rates for the new CMRR Facility at TA-55 would be consistent with the Expanded Operations Alternative as described in the *LANL SWEIS* (DOE 1999a) for 10 years of continued operations (from 2000 to 2010). These waste generation rates are compared with LANL' s treatment, storage, and disposal capacities in the following sections for each category of waste. The impacts on the LANL waste management systems, in terms of managing the waste, are discussed in this section. Waste generation rates, by waste type, are summarized in **Table 4–16** for CMR operations and overall LANL activities. Radioactive solid and liquid wastes from CMR operations would constitute only a portion of the total amounts of these wastes generated, treated, and/or disposed of at LANL (see Table 4–16). The radiological and chemical impacts on workers and the public from managing CMRR radioactive wastes have been evaluated along with the other LANL site wastes in other environmental documentation (DOE 1999a).

Table 4–16 Selected Waste Generation Rates from CMR Operations and LANL Activities

Waste Type	*Units*	*CMR Generation Rate*	*LANL Generation Rate*
Transuranic	Cubic yards per year	61 [a]	556 [a]
Mixed Transuranic	Cubic yards per year	27 [a]	160 [a]
Low-level radioactive	Cubic yards per year	2,433 [a]	16,009 [a]
Mixed low-level radioactive	Cubic yards per year	26 [a]	828 [a]
Hazardous	Pounds per year	24,692 [a, b]	7,163,407 [a, b]
Sanitary	Gallons per day	27,500 [c]	250,000 [d]

[a] *LANL SWEIS* DOE 1999a, Expanded Operations Alternative.
[b] This waste type also includes biomedical waste and Toxic Substance Control Act waste.
[c] Calculated assuming 550 CMR workers, each generating 50 gallons per day.
[d] TA-18 Relocation EIS (DOE 2002e).
Note: The generation rates are attributed to facility operations and do not include the waste generated from environmental restoration actions.

Transuranic Waste

Analytical, processing, fabrication, and research and development activities at the new CMRR Facility would generate transuranic waste. Approximately 61 cubic yards (47 cubic meters) of transuranic waste would be generated each year. This transuranic waste represents about 2.2 percent of the current transuranic and mixed transuranic waste compactions and volume reduction capacity of 2,786 cubic yards (2,130 cubic meters) per year at LANL. Transuranic waste would be compacted at the new CMRR Facility. Any TRU waste generated by CMRR Facility operations would be treated and packaged in accordance with the WIPP Waste Acceptance Criteria and transported to WIPP or a similar facility for disposition. Transuranic waste volumes generated through CMRR operations over the life of the facility are estimated to be less than two percent of the Waste Isolation Pilot Plant capacity. Offsite disposal capacities for transuranic waste are expected to be adequate for LANL, including CMR operations, disposal needs.

Mixed Transuranic Waste

Approximately 27 cubic yards (20 cubic meters) of mixed transuranic waste would be generated each year. This would represent about 1.0 percent of the current transuranic and mixed transuranic waste compactions and volume reduction capacity of 2,786 cubic yards (2,130 cubic meters) per year at LANL. Most mixed transuranic waste would continue to be disposed of at the Waste Isolation Pilot Plant.

Low-Level Radioactive Waste

Solid low-level radioactive waste generated from CMR operations at TA-55 would continue to be characterized and packaged for disposal at the onsite Low-Level Radioactive Waste Disposal Facility at TA-54, Area G. About 2,433 cubic yards (1,860 cubic meters) of solid low-level radioactive waste would be generated each year. This would represent about 0.7 percent of the current disposal capacity of 330,257 cubic yards (252,500 cubic meters) in the TA-54 Area G Low-Level Radioactive Waste Disposal Facility. As part of the implementation of the Record of Decision for the *LANL SWEIS,* the disposal capacity of the TA-54 Area G Low-Level Radioactive Waste Disposal Facility will be expanded into Zones 4 and 6 at Area G. The impacts of managing this waste at LANL would be minimal.

Mixed Low-level Radioactive Waste

Mixed low-level radioactive waste generated from CMR operations at TA-55 would continue to be surveyed and decontaminated on site, if possible. The remaining waste would be stored and processed at TA-54, Area G or Area L, and transported to a commercial or DOE offsite treatment and disposal facility. This waste would be managed in accordance with the LANL Site Treatment Plan. About 26 cubic yards (20 cubic meters) of mixed low-level radioactive waste would be generated each year. This represents about 3.4 percent of the current mixed low-level radioactive waste storage capacity at LANL. The impacts of managing this waste at LANL would be minimal.

Hazardous Waste

Hazardous waste generated from CMR operations at TA-55 would continue to be decontaminated or recycled, if possible. The remaining waste would be packaged and shipped to offsite Resource Conservation and Recovery Act (RCRA)-permitted treatment and disposal facilities. Typically, hazardous waste is not held in long-term storage at LANL. Approximately 24,692 pounds (11,200 kilograms) of hazardous waste would be generated each year. This represents about 1.3 percent of the annual hazardous waste generation rate of 1,896,000 pounds (860,000 kilograms) for the entire LANL site. The impacts of managing this waste at LANL would be minimal.

Nonhazardous Waste

Sanitary wastewater generated from CMR operations at TA-55 would continue to be sent to the Sanitary Wastewater Systems Consolidation Plant. Approximately 27,500 gallons per day (for 260 working days per year) of sanitary wastewater would be generated. This would represent about 4.6 percent of the 600,000 gallons-per-day (2.27 million liters-per-day) design capacity of the Sanitary Wastewater Systems Consolidation Plant.

4.3.11.2 Pollution Prevention

At the new CMRR Facility, wastes would be minimized, where feasible, by:

- Recycling;
- Processing waste to reduce its quantity, volume or toxicity;
- Substituting materials or processes that generate hazardous wastes with materials or processes that result in less hazardous wastes being produced, and
- Segregating waste materials to prevent contamination of nonhazardous materials.

4.4 Environmental Impacts for Alternative 2 (the "Greenfield" Alternative)

This section presents a discussion of the environmental impacts associated with Alternative 2 ("Greenfield" Alternative). Under the Greenfield Alternative, CMR operations at LANL would be relocated and consolidated at TA-6 in a new CMRR Facility consisting of two or three buildings. One of the new buildings would provide space for administrative offices and support functions activities. The other building(s) would provide secure laboratory spaces for research and analytical support activities. The buildings would be expected to operate for a minimum of 50 years, and roads would be constructed to connect them. The impacts from construction and operation of these proposed facilities are described below. Deposition of the existing CMR Building is discussed later in Section 4.7.2.

CMR operations at TA-6 under this alternative would be conducted at the levels of activity described for the Expanded Operations Alternative in the *LANL SWEIS*. The Expanded

Operations Alternative presented in the *LANL SWEIS* provides the reference point from which incremental effects of this proposed action are measured.

4.4.1 Land Use and Visual Resources

4.4.1.1 Land Use

Construction and Operations Impacts—The new CMRR Facility would be constructed within the north central wooded portion of TA-6. The area to be disturbed during construction, would be 26.75 acres (10.8 hectares). During CMR operations, 15.25 acres (6.2 hectares) would be permanently disturbed at TA-6 including building footprints, parking lot, and access road. The remaining 11.5 acres (4.65 hectares) would consist of a construction laydown area of 2 acres (0.8 hectares), an area for a concrete batch plant of 5 acres (2 hectares) maximum, trenching for utility lines of 1.5 acres (0.6 hectares), and trenching for a potential radioactive liquid waste pipeline of 3 acres (1.2 hectares). Most of the acreage to be disturbed within TA-6 is covered with native vegetation including many mature trees, which would have to be cleared prior to construction. As noted in Section 3.2.1, TA-6 falls within the *LANL SWEIS* defined Research and Development/Waste Disposal land use category and is designated in the *LANL Comprehensive Site Plan* for Experimental Science and High-Explosives Research and Development. Therefore, the use of TA-6 for CMR operations would be consistent with both the *LANL SWEIS* and *LANL Comprehensive Site Plan* designations for the area.

As noted above, in order to provide access to the new CMRR Facility at TA-6, it would be necessary to construct an access road from Pajarito Road into the site. In addition, it would be necessary to bring utilities into the site. Electric power service, communications lines, potable water, sewage, and radioactive liquid waste pipelines would all be brought to the site.

4.4.1.2 Visual Resources

Construction and Operations Impacts—Due to the undeveloped nature of TA-6, construction activity and CMRR Facility operations would alter the existing visual character of the proposed site from natural woodland to an industrial site. Impacts to visual resources resulting from construction activity would be temporary in nature and would include increased levels of dust and human activity. Once completed, the administrative offices and support functions building would be three stories above grade while the Hazard Category 2 and 3 laboratory buildings would be no more than one story in height. All buildings would be readily visible from Pajarito Road and the upper reaches of the Pajarito Plateau rim. At night, security lighting would add to the overall glow produced by facilities at LANL. Construction of the new CMRR Facility would result in a change in the Visual Resource Contrast rating of TA-6 from Class III to Class IV.

While most of the utilities would be placed underground and not impact visual resources, the access road would alter the visual environment and would change the Visual Resource Contrast rating of the area from Class III to Class IV.

4.4.2 Site Infrastructure

Construction Impacts—The projected demands on key site infrastructure resources associated with construction under this alternative are presented in **Table 4–17**. Existing LANL infrastructure would easily be capable of supporting the construction requirements for the new CMRR Facility proposed under this alternative without exceeding site capacities. Although gasoline and diesel fuel would be required to operate construction vehicles, generators, and other construction equipment, fuel would be procured from offsite sources and, therefore, would not be a limited resource. Construction impacts on the local transportation network would be negligible.

Table 4–17 Site Infrastructure Requirements for Facility Construction under Alternative 2 (Greenfield Alternative)

Resource	*Available Site Capacity* [a]	*Total Requirement* [b]	*Percent of Available Site Capacity*
Electricity			
Energy (megawatt-hours per year)	472,414	312.5	0.07
Peak load demand (megawatts)	24.5	0.3	1.2
Fuel			
Natural gas (cubic feet per year)	5,540,000,000	0	0
Water (gallons per year)	198,000,000	3,745,300	1.9

[a] Capacity minus the current site requirements, a calculation based on the data provided in Table 3–2, *CMRR EIS*.
[b] Total estimated infrastructure requirements for the projected construction period.
Sources: Table 2–1, Table 3–2, *CMRR EIS*.

Operations Impacts—Resources needed to support operations under Alternative 2 (Greenfield Alternative) are presented in **Table 4–18**. It is projected that existing LANL infrastructure resources would be adequate to support proposed mission activities over 50 years. In general, CMR infrastructure requirements under this alternative would approximate those of the Expanded Operations Alternative presented in the *LANL SWEIS* for the CMR Building.

Table 4–18 Annual Site Infrastructure Requirements for Facility Operations under Alternative 2 (Greenfield Alternative)

Resource	*Available Site Capacity* [a]	*Requirement*	*Percent of Available Site Capacity*
Electricity			
Energy (megawatt-hours per year)	472,414	19,272	4.1
Peak load demand (megawatts)	24.5	2.6	10.6
Fuel			
Natural gas (cubic feet per year)	5,540,000,000	Not available	Not available
Water (gallons per year)	198,000,000	10,400,000	5.3

[a] Capacity minus the current site requirements, a calculation based on the data provided in Table 3–2, *CMRR EIS*.
Sources: Table 2–2, Table 3–2, *CMRR EIS*.

4.4.3 Air Quality and Noise

4.4.3.1 Air Quality

Overall air quality at LANL would remain within standards during construction and operation of the new CMRR Facility. In addition, overall noise levels at LANL during construction and operation would also remain within regulatory limits.

Nonradiological Releases

Construction Impacts—Construction of the new CMRR Facility at TA-6 would result in temporary emissions from construction equipment, trucks, and employee vehicles. Criteria pollutant concentrations were modeled for the construction of the new CMRR Facility at TA-6 and compared to the most stringent standards (**Table 4–19**). The maximum ground-level concentrations offsite or along the perimeter road to which the public has regular access would be below the ambient air quality standards. Concentrations along Pajarito Road north and east of the construction area would be higher and could exceed the 24-hour ambient standards for particulate matter less than or equal to 10 microns in aerodynamic diameter (PM_{10}) and total suspended particulates. However, the public would not be allowed access to this section of road during construction. Actual criteria pollutant concentrations are expected to be less, since conservative emission factors and other assumptions were used in the modeling of construction activities and tend to overestimate impacts. The maximum short-term and annual criteria pollutant concentrations for construction would occur north of the construction site along Highway 501 and at the Royal Crest Trailer Park. Air quality modeling considered particulate emissions from construction activities in an area of 20.75 acres (8.4 hectares) and emissions from various earthmoving and material-handling equipment. This is the area consisting of land that would be used for building and parking lot construction (13.75 acres [5.6 hectares]) and laydown and the concrete batch plant (7 acres [2.8 hectares]).

Operations Impacts—Under Alternative 2 (Greenfield Alternative), criteria and toxic air pollutants would be generated from operation and testing of an emergency generator at TA-6. **Table 4–20** summarizes the concentrations of criteria pollutants from CMR operations at TA-6. The concentrations are compared to their corresponding ambient air quality standards. The maximum ground-level concentrations that would result from CMR operations at TA-6 would be below the ambient air quality standards. Actual criteria pollutant concentrations are expected to be less because conservative stack parameters were assumed in the modeling of the diesel emergency generator. The maximum annual criteria pollutant concentrations would occur north of the proposed TA-6 CMRR Facility operations area along Highway 501. The maximum short-term concentrations would also occur north of the CMRR Facility along Highway 501 and to the south along the LANL site boundary. Concentrations along Pajarito Road north of the proposed CMRR Facility would be higher and could exceed the 24-hour ambient standards for nitrogen dioxide. However, the public would not be allowed access to this section of road for periods of that duration. No major change in emissions or air pollutant concentrations at LANL are expected under this alternative.

Table 4–19 Nonradiological Air Quality Concentrations at the Site Boundary at TA-6 (Alternative 2, Greenfield Alternative) – Construction

Criteria Pollutant	*Averaging Period*	*Most Stringent Standard or Guideline (micrograms per cubic meter)* [a]	*Maximum Incremental Concentration (micrograms per cubic meter)* [b]
Carbon monoxide	8 hours 1 hour	7,800 11,700	96.9 775
Nitrogen dioxide	Annual 24 hours	73.7 147	0.92 24.1
PM_{10}	Annual 24 hours	50 150	2.11 35
Sulfur dioxide	Annual 24 hours 3 hours	41 205 1,030	0.084 2.33 18.7
Total suspended particulates	Annual 24 hours	60 150	4.14 67.8

PM_{10} = particulate matter less than or equal to 10 microns in diameter.

[a] The more stringent of the Federal and state standards is presented if both exist for the averaging period. The NAAQS (40 CFR 50), other than those for ozone, particulate matter, and lead, and those based on annual averages, are not to be exceeded more than once per year. The annual arithmetic mean PM_{10} standard is attained when the expected annual arithmetic mean concentration is less than or equal to the standard. Standards and monitored values for pollutants other than particulate matter are stated in parts per million (ppm). These values have been converted to micrograms per cubic meter ($\mu g/m^3$) with appropriate corrections for temperature (21 degrees C [60 degrees F]) and pressure (elevation 7,005 feet [2,135 meters]) following New Mexico dispersion modeling guidelines (revised 1998) (NMAQB 1998).

[b] The annual concentrations were analyzed at locations to which the public has access – the site boundary and nearby sensitive areas. Short-term concentrations were analyzed at the site boundary and at the fence line of the technical area to which the public has short-term access.

Source: DOE 1999a.

Table 4–20 Nonradiological Air Quality Concentrations at the Site Boundary at TA-6 (Alternative 2, Greenfield Alternative) – Operations

Criteria Pollutant	*Averaging Period*	*Most Stringent Standard or Guideline (micrograms per cubic meter)* [a]	*Maximum Incremental Concentration (micrograms per cubic meter)* [b]
Carbon monoxide	8 hours 1 hour	7,800 11,700	71.4 414
Nitrogen dioxide	Annual 24 hours	73.7 147	0.0141 56.3
PM_{10}	Annual 24 hours	50 150	0.0004 1.74
Sulfur dioxide	Annual 24 hours 3 hours	41 205 1,030	0.0088 35 260
Total suspended particulates	Annual 24 hours	60 150	0.0008 3.03

PM_{10} = particulate matter less than or equal to 10 microns in diameter.

[a] The more stringent of the Federal and state standards is presented if both exist for the averaging period. The NAAQS (40 CFR 50), other than those for ozone, particulate matter, and lead, and those based on annual averages, are not to be exceeded more than once per year. The annual arithmetic mean PM_{10} standard is attained when the expected annual arithmetic mean concentration is less than or equal to the standard. Standards and monitored values for pollutants other than particulate matter are stated in parts per million (ppm). These values have been converted to micrograms per cubic meter ($\mu g/m^3$) with appropriate corrections for temperature (21 degrees C [60 degrees F]) and pressure (elevation 7,005 feet [2,135 meters]) following New Mexico dispersion modeling guidelines (revised 1998) (NMAQB 1998).

[b] The annual concentrations were analyzed at locations to which the public has access – the site boundary and nearby sensitive areas. Short-term concentrations were analyzed at the site boundary and at the fence line of the technical area to which the public has short-term access.

Source: DOE 1999a.

Radiological Releases

Construction Impacts—While no radiological releases to the environment would be expected in association with construction activities at TA-6, the potential exists for contaminated soils and possibly other media to be disturbed during excavation and other site activities. Prior to commencing ground disturbance, NNSA would survey potentially affected areas to determine the extent and nature of any contamination and would remediate any contamination in accordance with procedures established under LANL's environmental restoration program and LANL's Hazardous Waste Facility Permit.

Operations Impacts—Approximately 0.00076 curies per year of actinides and 2,645 curies of fission products and tritium would be released to the environment from relocated CMR operations at TA-6 (DOE 1999a, LANL 2000d). Releases of radiological air pollutants are discussed in Section 4.4.9.1.

4.4.3.2 Noise

Construction Impacts—Construction of the new CMRR Facility at TA-6 would result in some temporary increase in noise levels near the area from construction equipment and activities. Some disturbance to wildlife near the area may occur as a result of the operation of construction equipment. There would be no change in noise impacts on the public outside of LANL as a result of construction activities, except for a small increase in traffic noise levels from construction employees and materials shipment. Noise sources associated with construction at TA-6 are not expected to include loud impulsive sources such as from blasting.

Operations Impacts—Noise impacts from CMR operations at TA-6 would increase from those at existing operations at TA-6. There would be an increase in traffic and equipment noise (such as heating and cooling systems) in the area. The increase of noise from CMR operations at TA-6 would impact wildlife in the area. There would be little or no change in noise impacts to the public outside of LANL as a result of moving CMR activities to TA-6.

4.4.4 Geology and Soils

Construction Impacts—Construction of the CMRR Facility under this alternative would be expected to disturb a total of approximately 26.75 acres (10.8 hectares) of land in north central TA-6. Aggregate and other geologic resources would be required to support construction activities at TA-6, but these resources are abundant in Los Alamos County. Relatively deep sub-surface excavation would be required to construct below-grade portions of the new CMRR Facility. In addition, excavation and trenching would be required to extend utilities to the site and to remove and replace some existing utility systems. However, as explosives blasting should not be necessary and the land area to be disturbed is relatively limited, the impact on geologic and soil resources would be relatively minor.

A site survey and foundation study would be conducted as necessary to confirm site geologic characteristics for facility engineering purposes. The potential also exists for contaminated soils to be encountered during excavation and other site activities. Prior to commencing ground

disturbance, NNSA would survey potentially affected areas to determine the extent and nature of any contamination and required remediation in accordance with procedures established under the LANL environmental restoration program. Other buried objects would be surveyed and removed as appropriate.

As discussed in Section 3.5, LANL is located in a region of low to moderate seismicity overall. Ground shaking of MMI VII (see Appendix A, Table A–6) associated with postulated earthquakes is possible and supported by the historical record for the region. MMI VII would be expected to affect primarily the integrity of inadequately designed or nonreinforced structures, but damage to properly designed or specially designed or upgraded facilities would not be expected. The Rendija Canyon Fault terminates approximately 1 mile (1.6 kilometers) north of TA-6 but may extend further south encroaching on the northern portion of TA-6 (see Section 3.5.1.3). However, the new CMRR Facility proposed under this alternative would be designed and constructed in accordance with applicable DOE orders and standards (DOE Standard 1020-2002 that implements DOE Order 420.1A) to provide criteria for the design of new structures, systems, and components and for evaluation, modification, or upgrade of existing structures, systems, and components so that DOE facilities safely withstand the effects of natural phenomena, such as earthquakes. As stated in DOE Order 420.1A, DOE is required to ensure that nuclear and nonnuclear facilities be designed, constructed, and operated so that workers, the public, and the environment are protected from any adverse impacts caused by the CMRR Facility from natural phenomena hazards, including earthquakes.

Operations Impacts—CMR operations under this alternative would not impact geologic and soil resources at LANL. As discussed above, new buildings would be designed and constructed in accordance with DOE Order 420.1A and sited to minimize the risk from geologic hazards. Thus, site geologic conditions would be unlikely to affect the facilities over the 50-year operational life expectancy.

4.4.5 Surface and Groundwater Quality

4.4.5.1 Surface Water

Construction Impacts—There are no natural surface water drainages in the vicinity of the TA-6 construction site on South Mesa and no surface water would be used to support facility construction. It is expected that portable toilets would be used for construction personnel, resulting in no onsite discharge of sanitary wastewater and no impact on surface waters. Waste generation and management activities are detailed in Section 4.4.11.

Storm water runoff from construction areas could potentially impact downstream surface water quality. Appropriate soil erosion and sediment control measures (sediment fences, stacked hay bales, and mulching disturbed areas) and spill prevention practices would be employed during construction to minimize suspended sediment and material transport and potential water quality impacts. An NPDES General Permit Notice of Intent would be filed to address storm water discharges associated with construction activity. Also, development and implementation of a Storm Water Pollution Prevention Plan would be required for the construction activity. TA-6 is

not in an area prone to flooding, and no floodplains exist in the immediate vicinity of the proposed construction site.

Operations Impacts—No impacts on surface water resources are expected as a result of CMR operations at TA-6 under this alternative. No surface water would be used to support facility activities and there would be no direct discharge of sanitary or industrial effluent to surface waters. Sanitary wastewater would be generated as a result of facility operations stemming from facility staff use of lavatory, shower, and break room facilities and from miscellaneous potable and sanitary uses. This wastewater would be collected and conveyed by a new sanitary sewer system for ultimate disposal via appropriate wastewater treatment facilities. Radioactive liquid waste would either be contained onsite and transported by truck to the existing TA-50 Radioactive Liquid Waste Treatment Facility, or transported via a radioactive liquid waste pipeline extended to the site. An NPDES Permit and Storm Water Pollution Prevention Plan for facility operations would also be required to address storm water discharges associated with the operation of the new CMRR Facility. Waste generation and management activities are detailed in Section 4.4.11. The design and operation of new buildings would incorporate appropriate storm water management controls to safely collect and convey storm water from facilities while minimizing washout and soil erosion. Overall, operational impacts on site surface waters and downstream water quality would be expected to be negligible.

4.4.5.2 Groundwater

Construction Impacts—Groundwater would be required to support construction activities at TA-6. It is estimated that construction activities under Alternative 2 (Greenfield Alternative) would require approximately 3.7 million gallons (14 million liters) of groundwater (see Table 4–17). The volume of groundwater required for construction would be small compared to site availability and historic usage, and there would be no onsite discharge of wastewater to the surface or subsurface. Appropriate spill prevention controls, countermeasures, and procedures would be employed to minimize the potential for releases of materials to the surface or subsurface. No impact on groundwater availability or quality is anticipated from construction activities in TA-6.

Operations Impacts—Relocated CMR operations and activities at TA-6 under Alternative 2 (Greenfield Alternative) would use groundwater primarily to meet the potable and sanitary needs of facility support personnel, as well as for miscellaneous building mechanical uses. It is estimated that new building operations under this alternative would require about 10.4 million gallons (39.4 million liters) per year of groundwater. This demand is a small fraction of total LANL usage and would not exceed site availability (see Table 4–18). Therefore, no additional impact on regional groundwater availability would be anticipated.

No sanitary or industrial effluent would be discharged directly to the surface or subsurface. Waste generation and management activities are detailed in Section 4.4.11. Thus, no operational impacts on groundwater quality would be expected.

4.4.6 Ecological Resources

4.4.6.1 Terrestrial Resources

Construction Impacts—As noted in Section 3.7.1, TA-6 lies within both the mixed conifer forest and ponderosa pine forest zones of LANL. However, since the new CMRR Facility would be placed in the north central portion of the area, only ponderosa pine forest would be removed during clearing operations. The total area to be cleared, including the access road and utility corridors would require 26.75 acres (10.8 hectares). Following construction, 13.75 acres (5.6 hectares) for building and parking lot construction would be permanently disturbed. Clearing operations would result in the loss of less mobile wildlife such as reptiles and small mammals, and cause more mobile species such as birds or large mammals to be displaced. The success of displaced animals would depend on the carrying capacity of the area into which they move. If the area were at its carrying capacity, displaced animals would likely survive. Indirect impacts from construction, such as from noise or human disturbance, could also impact wildlife living adjacent to the construction zone. Although temporary, such disturbance would span the construction period. The work area would be clearly marked to prevent construction equipment and workers from disturbing adjacent natural habitat.

Operations Impacts—CMR operations would have minimal impact on terrestrial resources within or adjacent to TA-6. Since wildlife residing in the area would not have previously adjusted to the noise and human disturbance associated with CMR operations, some species could be permanently displaced. However, many animals would become accustomed to the disturbance and would return to the vicinity of the CMRR Facility following construction. Since the CMRR Facility would be permanently fenced, larger mammals would be excluded from future use of developed portions of TA-6. Areas not permanently disturbed by the new CMRR Facility (for example, construction laydown area) would be landscaped. While this would provide some habitat for wildlife, it is likely that species composition would differ from preconstruction conditions.

4.4.6.2 Wetlands

Construction and Operations Impacts—As noted previously in Section 3.7.2, there are no wetlands located within TA-6. Therefore, impacts to wetlands would not occur. Although some riparian habitat exists along stream channels, it would not be impacted by the project since all construction would take place on the mesa tops. In order to prevent indirect impacts, a sediment and erosion control plan would be implemented to control stormwater runoff during construction and operations.

4.4.6.3 Aquatic Resources

Construction and Operations Impacts—There are no aquatic resources at TA-6. Therefore, no aquatic resources would be impacted by this alternative.

4.4.6.4 Threatened and Endangered Species

Construction Impacts—As noted in Section 3.7.4, AEIs have been established at LANL for the Mexican spotted owl, bald eagle, and southwestern willow flycatcher. However, core and buffer areas for the Federally threatened Mexican spotted owl do not overlap the proposed location of the new CMRR Facility within TA-6. Core and buffer areas for the Federally threatened bald eagle and Federally endangered southwestern willow flycatcher also do not overlap any portion of TA-6. Therefore, neither individual animals of these three species nor their designated habitat areas would be impacted by the implementation of this alternative.

Operations Impacts—CMR operations at TA-6 would not affect any Federally endangered or threatened species since none of these species occur within the area to be developed. Noise levels associated with CMRR Facilities would be low and would be similar to other technical areas at LANL.

4.4.7 Cultural and Paleontological Resources

4.4.7.1 Prehistoric Resources

Construction and Operations Impacts—Adverse impacts to prehistoric resources from construction and operation of the new CMRR Facility at TA-6 would not be expected. However, as noted in Section 3.8.1, one prehistoric site has been identified within TA-6. The extent to which this site may be disturbed cannot be determined until planning details for the new CMRR Facility are finalized. If unexpected prehistoric resources were uncovered during construction, work would stop and appropriate assessment, regulatory compliance, and recovery measures would be undertaken.

4.4.7.2 Historic Resources

Construction and Operations Impacts—Adverse impacts to historic resources from construction and operation of the new CMRR Facility at TA-6 would not be expected. However, some of the 20 historic sites located within TA-6 may be disturbed by the construction of the new CMRR Facility, the extent of which would not be determined until planning details were finalized. Consultation with the State Historic Preservation Officer, if necessary, would be undertaken in order to determine the eligibility of any potentially disturbed sites for listing on the National Register of Historic Places and, if appropriate, data and artifact recovery would be conducted.

4.4.7.3 Traditional Cultural Properties

Construction and Operations Impacts—The area at TA-6 proposed to house the new CMRR Facility has not been surveyed for traditional cultural properties. Prior to construction, a traditional cultural properties consultation would be undertaken and site removal or avoidance, if needed, would be conducted. If any traditional cultural properties were located during construction, work would stop while appropriate action would be undertaken.

4.4.7.4 Paleontological Resources

Construction and Operations Impacts—As noted in Section 3.8.4, there are no known paleontological resources present at TA-6 at LANL. Thus, there would be no impacts to these resources.

4.4.8 Socioeconomics

Construction Impacts—Construction of new buildings at TA-6 to house CMR activities would require a peak construction employment level of 300 workers. This level of employment would generate about 852 indirect jobs in the region around LANL. The potential total employment increase of 1,152 direct and indirect jobs represents an approximate 1.3 percent increase in the workforce and would occur over the 60 months of construction. It would have little or no noticeable impact on the socioeconomic conditions of the region of influence.

Operations Impacts—As previously noted in Section 2.7.4, the operational characteristics of the CMRR Facility are based on the level of CMR operations required to support the Expanded Operations Alternative analyzed in the *LANL SWEIS*. As noted in Table 2–2, CMRR Facility operations would require a workforce of approximately 550 workers. This would be an increase of 346 workers over currently restricted CMR operational requirements, but approximately equal to the number of CMR workers projected for the Expanded Operations Alternative in the *LANL SWEIS*. The *LANL SWEIS* presents a discussion of the socioeconomic impacts from an increase in total employment at LANL under the Expanded Operations Alternative, which includes the contributory affect of expanded CMR operations and an increase in workforce.

Nevertheless, the increase in the number of workers in support of expanded CMR operations would have little or no noticeable impact on socioeconomic conditions in the LANL Tri-County region of influence. Workers assigned to the new CMRR Facility would be drawn for the most part from existing LANL missions, including consolidated AC and MC activities. The contributory effect of the remaining new employment, in combination with the potential effects from other industrial and economic sectors within the regional economic area, would serve to reduce or mask any effect on the regional economy. New LANL employees hired to support CMRR facilities would comprise a small fraction of the LANL workforce (more than 9,000 in 1996), and an even smaller fraction of the regional workforce (more than 92,000 in 1999).

4.4.9 Human Health Impacts

4.4.9.1 Construction and Normal Operations

Radiological Impacts

Construction Impacts—No radiological risks would be incurred by members of the public from construction activities. Construction workers would be at a small risk for construction related accidents and radiological exposures. They could receive doses above natural background radiation levels from exposure to radiation from other past or present activities near the site. However, these workers would be protected through appropriate training, monitoring, and

management controls. Their exposure would be limited to ensure that doses were kept as low as is reasonably achievable.

Operations Impacts—Routine operation of the CMRR Facility at TA-6 would not be expected to result in an increase in latent cancer fatalities. Under this alternative, the radiological releases to the atmosphere from the CMRR Facility would be those shown in **Table 4–21**. The actinide emissions listed in this table are in the form of plutonium, uranium, thorium, and americium isotopes. In estimating the human health impacts for actinides, all emissions were considered to be plutonium-239. This is conservative because the human health impacts on a per-curie basis are greater for plutonium-239 than for the other actinides associated with CMR activities. Liquid radioactive effluents would be transported by tanker truck or routed through a new pipeline to the TA-50 Radioactive Liquid Effluent Treatment Facility where they would be treated along with other LANL site liquid wastes. Following treatment, the liquid would be released through an existing NPDES-permitted outfall. The treatment residues would be solidified and disposed of as solid waste (see Section 4.4.11).

Table 4–21 Emissions from the CMRR Facility under Alternative 2

Nuclide	*Emissions (curies per year)*
Actinides	0.00076
Kr-85	100
Xe-131m	45
Xe-133	1,500
H-3 (Tritium) [a]	1,000

[a] The tritium release is in the form of both tritium oxide (750 curies) and elemental tritium (250 curies). Tritium oxide is more readily absorbed by the body; therefore, the health impact of tritium oxide on a receptor is greater than that for elemental tritium. Therefore, all of the tritium release has been modeled as if it were tritium oxide.

Source: DOE 1999a, LANL 2000d.

Table 4–22 shows that the annual collective dose to the population living within a 50-mile (80-kilometer) radius of the CMRR Facility is estimated to be 2.0 person-rem for Alternative 2. This population dose increases the annual risk of a fatal cancer in the population by 0.001. Another way of stating this is that the likelihood of one fatal cancer occurring in the population as a result of radiological releases associated with this alternative is about 1 chance in 1,000 per year. Statistically, latent cancer fatalities would not be expected to occur in the population from CMR operations at TA-6.

The average annual dose to an individual in the population is 0.006 millirem. The corresponding increased risk of an individual developing a fatal cancer from receiving the average dose is 3.2×10^{-9} or about 1 chance in 300 million per year.

The maximally exposed individual member of the public would receive an estimated annual dose of 0.35 millirem. This dose corresponds to an increased annual risk of developing a fatal cancer of 1.8×10^{-7}. In other words, the likelihood of the maximally exposed individual developing a fatal cancer is about 1 chance in 6 million during each year of operation.

Table 4–22 Annual Radiological Impacts on the Public from CMRR Facility Operations under Alternative 2

	Population within 50 Miles (80 kilometers)	*Average Individual within 50 Miles (80 kilometers)*	*Maximally Exposed Individual*
Dose	2.0 person-rem	0.006 mrem	0.35 mrem
Cancer fatality risk [a]	0.001	3.2×10^{-9}	1.8×10^{-7}
Regulatory dose limit [b]	Not available	10 mrem	10 mrem
Dose as a percentage of the regulatory limit	Not available	0.06	3.5
Dose from background radiation [c]	139,000 person-rem	450 mrem	450 mrem
Dose as a percentage of background dose	0.0014	0.0014	0.08

[a] Based on a risk estimate of 0.0005 latent cancer fatalities per person-rem (see Appendix B).
[b] 40 CFR 61 establishes an annual limit of 10 mrem via the air pathway to any member of the public from DOE operations. There is no standard for a population dose.
[c] The annual individual dose from background radiation at LANL is 400 to 500 millirem (see Section 3.11.1). The population living within 50 miles (80 kilometers) of TA-3 is estimated to be 308,062.

Estimated annual doses to workers involved with CMR activities under Alternative 2 are provided in **Table 4–23**. Estimated worker doses are based on historical exposure data for LANL workers (*DOE Occupational Radiation Exposure 2001 Report*). Based on the reported data, the average annual dose to a LANL worker who received a measurable dose was 104 millirem. A value of 110 millirem has been used as the estimate of the average annual worker dose per year of operation at the new CMRR Facility.

Table 4–23 Annual Radiological Impacts to Workers from CMRR Facility Operations under Alternative 2 (Greenfield Alternative)

	Individual Worker	*Worker Population* [a]
Dose [b]	110 mrem	61 person-rem
Fatal cancer risk [c]	0.00004	0.02
Dose limit [d]	5,000 mrem	Not available
Administrative control level [e]	500 mrem	Not available

[a] Based on a worker population of 550 for the new CMRR Facility. Dose limits and administrative control levels do not exist for worker populations.
[b] Based on the average dose to LANL workers who received a measurable dose in the period 1998 to 2000. A program to reduce doses to as low as reasonably achievable (ALARA) would be employed to reduce doses to the extent practicable.
[c] Based on a worker risk estimate of 0.0004 latent cancer fatalities per person-rem (see Appendix B).
[d] 10 CFR 835.202.
[e] DOE 1999b.

The average annual worker dose of 110 millirem is well below the DOE worker dose limit of 5 rem (5,000 millirem) (10 CFR 835) and is significantly less than the recommended Administrative Control Level of 500 millirem (DOE 1999b). This average annual dose corresponds to an increased risk of a fatal cancer of 0.00004. In other words, the likelihood of a worker at the CMRR Facility developing a fatal cancer from work-related exposure is about 1 chance in 25,000 for each year of operation.

Based on a worker population of 550 for Alternative 2 (Greenfield Alternative), the estimated annual worker population dose would be 61 person-rem. This worker population dose would increase the likelihood of a fatal cancer within the worker population by 0.02 per year. In other

words, on an annual basis there is less than 1 chance in 50 of one fatal cancer developing in the entire worker population as a result of exposures associated with this alternative.

Hazardous Chemicals Impacts

No chemical-related health impacts to the public would be associated with this alternative. As stated in the *LANL SWEIS*, the laboratory quantities of chemicals that could be released to the atmosphere during routine normal operations are minor quantities and would be below the screening levels used to determine the need for additional analysis. There would be no construction and operational increase in the use of chemicals as a result of the alternative. Construction workers would be protected from adverse effects from the use of hazardous chemicals by adherence to OSHA and EPA occupational standards that limit concentrations of potentially hazardous chemicals.

4.4.9.2 Facility Accidents

This section presents a discussion of the potential health impacts to members of the public and workers from postulated accidents at the new CMRR Facility under the Alternative 2 (Greenfield Alternative). Additional details supporting the information presented here are provided in Appendix C.

Under the Alternative 2 (Greenfield Alternative), CMR capabilities and materials would be relocated to a new CMRR Facility to be constructed at LANL TA-6. The new CMRR Facility would include safety features that would reduce the risks of accidents that currently exist under the No Action Alternative. From an accident perspective, the proposed CMRR Facility would be designed to meet the performance Category 3 seismic requirements, and have a full confinement system that would include tiered pressure zone ventilation and high-efficiency particulate air filters.

Radiological Impacts

Table 4–24 shows the frequencies and consequences of the postulated set of accidents for the public, represented by the maximally exposed offsite individual and the general population living within 50 miles (80 kilometers) of the CMRR Facility, and a noninvolved worker located at a distance of 264 yards (241 meters) from the CMRR Facility**.** **Table 4–25** presents the accident risks, obtained by multiplying each accident's consequences by the likelihood (frequency per year) that the accident would occur. The accidents listed in these tables were selected from a wide spectrum of accidents described in Appendix C. The selection process and screening criteria used (see Appendix C) ensure that the accidents chosen for evaluation in this EIS bound the impacts of all reasonably foreseeable accidents that could occur at existing CMRR Facility. Conservative estimates were also made for data used to calculate the source terms for low frequency – high consequence accidents (e.g., facility-wide fire) for CMRR Facility alternatives. These included assumptions that the most hazardous form of the radioactive material (e.g., metal, liquid or powder depending on the accident conditions) was present at the time of the accident, all of the material at risk was damaged in the accident (damage ratio = 1.0) and containment and filtration of airborne radioactive material was lost (leak path factor = 1.0). Thus, in the event that

any other accident that was not evaluated in this EIS were to occur, its impacts on workers and the public would be expected to be within the range of the impacts evaluated.

Table 4–24 Accident Frequency and Consequences under Alternative 2 (Greenfield Alternative)

Accident	Frequency (per year)	Maximally Exposed Offsite Individual		Offsite Population [a]		Noninvolved Worker	
		Dose (rem)	Latent Cancer Fatalities [b]	Dose (person-rem)	Latent Cancer Fatalities [c]	Dose (rem)	Latent Cancer Fatalities [b]
Facility-wide fire	5.0×10^{-6}	4.0	0.002	15,173	7.58	44.98	0.036
Process fire	0.001	0.0023	1.1×10^{-6}	8.71	0.0044	0.026	0.00001
Fire in the main vault	1.0×10^{-6}	3.41	0.0017	12,938	6.47	38.3	0.031
Process explosion	0.001	0.0017	8.3×10^{-7}	2.37	0.0012	0.08	0.000032
Process spill	0.1	0.002	1.1×10^{-6}	3.01	0.0015	0.172	0.000069
Seismic-induced laboratory spill	0.0001	5.54	0.0028	7,920	3.96	453	0.36
Seismic-induced fire	0.00001	1.44	0.00072	5,440	2.72	16.1	0.0065
Facility-wide spill	5.0×10^{-6}	111.3	0.11	158,000	79.2	9,100	1.0

[a] Based on a population of 315,296 persons residing within 50 miles (80 kilometers) of the site.
[b] Increased likelihood of a latent cancer fatality.
[c] Increased number of latent cancer fatalities.

Table 4–25 Accident Risks under Alternative 2 (Greenfield Alternative)

Accident	Risk of Latent Cancer Fatality		
	Maximally Exposed Offsite Individual [a]	Offsite Population [b, c]	Noninvolved Worker [a]
Facility-wide fire	1.0×10^{-8}	0.000038	1.8×10^{-7}
Process fire	1.2×10^{-9}	4.4×10^{-6}	1.0×10^{-8}
Fire in the main vault	1.7×10^{-9}	6.5×10^{-6}	3.1×10^{-8}
Process explosion	8.3×10^{-10}	1.2×10^{-6}	3.2×10^{-8}
Process spill	1.1×10^{-7}	0.00015	6.9×10^{-6}
Seismic-induced laboratory spill	2.8×10^{-7}	0.00038	0.000036
Seismic-induced fire	7.2×10^{-9}	0.000027	6.5×10^{-8}
Facility-wide spill	5.6×10^{-7}	0.0004	0.000036

[a] Risk of increased likelihood of a latent cancer fatality to the individual.
[b] Risk of the increased number of latent cancer fatalities for the offsite population.
[c] Based on a population of 315,296 persons residing within 50 miles (80 kilometers) of the site.

The accident with the highest potential risk to the offsite population (see Table 4–25) would be a facility-wide spill caused by an earthquake that would severely damage the new CMRR Facility, resulting in with a risk of a latent cancer fatality for the maximally exposed offsite individual of 5.6×10^{-7}. In other words, the maximally exposed offsite individual's likelihood of developing a fatal cancer from this event is about 1 chance in 1.8 million. The dose to the offsite population would increase the number of fatal cancers in the entire population by 0.0004; the likelihood of developing one fatal cancer from this event in the entire population would be about 1 chance in 2,500. Statistically, latent cancer fatalities would not be expected to occur in the population. The risk of a latent cancer fatality to a noninvolved worker located at a distance of 264 yards

(241 meters) from the new CMRR Facility would be 0.000036 or about 1 chance in 27,000 of a latent cancer fatality.

Involved Worker Impacts – Approximately 550 workers (including security guards) would be at CMRR Facilities during operations. Workers near an accident could be at risk of serious injury or death. The impacts from a process spill accident provides an indication of typical worker impacts during accident conditions. Following initiation of accident and site emergency alarms, workers in adjacent areas of the facility would evacuate the area in accordance with technical area and facility emergency operating procedures and training.

Hazardous Chemicals and Explosives Impacts

Some of the chemicals used in CMR operations are toxic and carcinogenic. The quantities of the regulated hazardous chemicals and explosive materials stored and used in the new CMRR Facility would be well below the threshold quantities set by the EPA (40 CFR 68), and would pose minimal potential hazards to public health and the environment in an accident condition. These chemicals would be stored and handled in small quantities (10 to a few hundred milliliters), and would only be a hazard to the involved worker under accident conditions.

4.4.9.3 Emergency Preparedness and Security Impacts

There would be no impacts on the emergency management and response program at LANL from the construction and operation of the new CMRR Facility at TA-6. Existing memoranda of understanding among NNSA, Los Alamos County, and the State of New Mexico to provide mutual assistance during emergencies and to provide open access to medical facilities would continue with minor administrative updates. Equipment and procedures used to respond to emergencies would continue to be maintained by NNSA.

4.4.10 Environmental Justice

Construction Impacts—Under Alternative 2 (Greenfield Alternative), a new CMRR Facility would be constructed at TA-6. As discussed throughout the other subsections of Section 4.5, environmental impacts under all of the construction options would be temporary and would not extend beyond the boundary of LANL. Under Alternative 2, construction at TA-6 would not result in adverse environmental impacts on the public living within the potentially affected area surrounding TA-6, including low-income and minority populations.

Operations Impacts—As discussed in Section 4.4.9.1, radiological and hazardous chemical risks to the public resulting from normal operations would be small. As shown in Table 4–22, the health risks associated with these releases would be small. Routine normal operations at the new CMRR Facility would not be expected to cause fatalities or illness among the general population surrounding TA-6, including minority and low-income populations living within the potentially affected area.

Radiological risks to the public that could result from accidents at new laboratory buildings are estimated to be less than 0.004 latent cancer fatalities (see Table 4–25). Hence, the likelihood of

a latent cancer fatality resulting from an accident under Alternative 2 (Greenfield Alternative) would be less than 1 in 250. As described in Section 4.4.9.2, accidents involving hazardous chemicals or explosives would not result in airborne or water-borne contamination beyond the LANL boundary that would be hazardous to human health.

Residents of Pueblo San Ildefonso have expressed concern that pollution from CMR operations could contaminate Mortandad Canyon, which drains onto Pueblo land and sacred areas. As discussed in Sections 4.4.3, 4.4.5, and 4.4.9, CMR operations under this alternative would not be expected to adversely affect air or water quality, or result in contamination of Tribal lands adjacent to the LANL boundary. In summary, implementation of Alternative 2 (Greenfield Alternative) would not pose disproportionately high or adverse environmental risks to low-income or minority populations living in the potentially affected area around the new CMRR Facility at TA-6.

4.4.11 Waste Management and Pollution Prevention

This section presents an analysis of waste management and pollution prevention impacts for Alternative 2 (Greenfield Alternative).

4.4.11.1 Waste Management

Construction Impacts—Before construction activities would begin at TA-6, LANL's Environmental Restoration Project would perform a radiological survey of the area to determine whether the Potential Release Sites are located in the construction area. Based on these survey results, further actions, including appropriate documentation, and contaminate removal, if necessary, would be completed by the LANL Environmental Restoration Project in accordance with LANL's Hazardous Waste Facility Permit. Potential wastes generated from such remediation activities have not been included in this impact analysis, because the type and amount of waste are unknown and cannot be adequately projected. Impacts from the disposal of contaminated soil could be similar to waste management impacts from CMRR Facility operations.

Only nonhazardous waste would be generated from the construction activities to relocate CMR operations and materials to a new CMRR Facility at TA-6. No radioactive or hazardous waste would be generated during construction activities.

Solid nonhazardous waste generated from construction activities associated with the new CMRR Facility would be disposed of at the Los Alamos County Landfill located at LANL or its replacement facility. Approximately 578 tons (524 metric tons) of solid nonhazardous waste, consisting primarily of gypsum board, wood scraps, scrap metals, concrete, steel and other construction waste would be generated from the construction activities. This waste represents about 20 percent of the current annual solid nonhazardous waste generation rates at LANL of 2,860 tons (2,600 metric tons) per year. Management of this additional waste at LANL would be within the capabilities of the LANL waste management program, but additional waste management personnel may be required. The construction debris would be collected in appropriate waste containers and transported to the landfill on a regular basis. This additional

construction waste would only increase LANL's proportion of total wastes going to the landfill by three percent.

Sanitary wastewater generated as a result of construction activities would be managed using portable toilet systems. No other nonhazardous liquid wastes are expected.

Operations Impacts—The impacts of managing waste associated with relocated CMR operations under this Alternative are assumed to be the same as for Alternative 1 (Preferred Alternative). This is because waste generation by CMRR Facility operations would not be affected by the relocation of these activities to new facilities and, therefore, the same types and volumes of waste would be generated. See Section 4.3.11.1, Table 4–16, for waste types and quantities generated by CMR activities. Small quantities of waste would be generated during the transition phase to the new CMRR Facility, resulting from the shutdown of operations in the existing CMR Building, decontamination of equipment prior to movement, packaging of SNM, and preoperational testing activities.

Locating the new CMRR Facility at TA-6 would result in new impacts related to management of radioactive liquid wastes generated during CMR operations. Radioactive liquid wastes would be transferred to the Radioactive Liquid Waste Treatment Facility in TA-50 by truck transport or via a new pipeline across Two Mile Canyon. Possible transportation impacts arise from additional truck trips on public roads. Possible pipeline impacts include construction costs and disturbance of the pipeline corridor.

4.4.11.2 Pollution Prevention

At the new CMRR Facility, wastes would be minimized, where feasible, by:

- Recycling;
- Processing waste to reduce its quantity, volume or toxicity;
- Substituting materials or processes that generate hazardous wastes with materials or processes that result in less hazardous wastes being produced; and
- Segregating waste materials to prevent contamination of nonhazardous materials.

4.5 Environmental Impacts for Alternative 3 (the "Hybrid Alternative at TA-55")

This section presents a discussion of the environmental impacts associated with Alternative 3 (the Hybrid Alternative at TA-55). Under Alternative 3, CMR administrative offices and support functions activities would remain in a portion of the existing CMR Building at TA-3, with only necessary structural and system upgrades and repairs. The balance of CMR operations at LANL would be relocated to TA-55 in a new CMRR Facility consisting of one or two buildings that would provide secure laboratory spaces for research and analytical support activities. The buildings would be expected to operate for a minimum of 50 years, and tunnels could or might be

constructed to connect the buildings. The impacts from construction and operation of these proposed facilities are described below. Disposition of the remaining unused portions of the CMR Building is discussed later in Section 4.7.2.

CMR operations at TA-55 under this alternative would be conducted at the levels of activity described for the Expanded Operations Alternative in the *LANL SWEIS*. The Expanded Operations Alternative presented in the *LANL SWEIS* provides the reference point from which incremental effects of this proposed action are measured.

4.5.1 Land Use and Visual Resources

4.5.1.1 Land Use

Construction and Operations Impacts—Under this alternative, space within Wings 1, 3, 5, and 7 of the existing CMR Building at TA-3 would be used for the administrative offices and support functions building. Wings 2 and 4 would be decommissioned and used for storage. Since this would not represent a change in the present use of those portions of the building, and would be consistent with current *LANL SWEIS* and *LANL Comprehensive Site Plan* designations of the area for Research and Development, and Nuclear Materials Research and Development, respectively (see Section 3.2.1), there would be no impact on land use under this alternative.

In addition, new CMRR Facility laboratory building(s) would be constructed at TA-55. This would disturb 22.75 acres (9.2 hectares) of land during construction. During CMR operations, 9.75 acres (3.9 hectares) would be permanently disturbed at TA-55. Impacts to land use at TA-55 from this alternative would be the same as those addressed in Section 4.3.1.1.

4.5.1.2 Visual Resources

Construction and Operations Impacts—Under this alternative, there would be no external change to the present CMR Building at TA-3. Thus, there would be no impact to visual resources or the current Class IV Visual Resource Contrast rating.

Visual impacts related to the construction of the new CMRR laboratory building(s) at TA-55 would be the same as those described in Section 4.3.1.2, except the three-story administrative offices and support functions building would not be constructed. The Class IV Visual Resource Contrast rating for the area would remain unchanged.

4.5.2 Site Infrastructure

Construction Impacts—The projected demands on key site infrastructure resources associated with construction under this alternative would be the same as, but less than, those presented for construction under Alternative 1 (Section 4.3.2). Existing LANL infrastructure would easily be capable of supporting the construction requirements for the new CMRR Facility laboratory building(s) proposed under this alternative without exceeding site capacities. Although gasoline and diesel fuel would be required to operate construction vehicles, generators, and other

construction equipment, fuel would be procured from offsite sources and, therefore, would not be a limited resource. Impacts on the local transportation network are expected to be negligible.

Operations Impacts—Resources needed to support operations under Alternative 3 would be the same as those presented for Alternative 1 operations. As such, it is likewise projected that existing LANL infrastructure resources would be adequate to support proposed mission activities over 50 years, and that CMR infrastructure requirements under this hybrid alternative would generally approximate those of the Expanded Operations Alternative presented in the *LANL SWEIS* for the CMR Building.

4.5.3 Air Quality and Noise

4.5.3.1 Air Quality

No change to overall air quality would result from the construction and operation of the proposed new CMRR Facility laboratory building(s).

Nonradiological Releases

Construction Impacts—Construction of the new CMRR Facility laboratory building(s) at TA-55 would result in temporary emissions from construction equipment, trucks, and employee vehicles. Construction activities would be the same as those described for Alternative 1, except that the administrative offices and support functions building would not be constructed. Criteria pollutant concentrations from construction would be less than for Alternative 1.

Operations Impacts—Under this alternative, criteria and toxic pollutants would be generated from operation and testing of an emergency generator at TA-55. Air emissions from CMR operations at TA-55 under Alternative 3 are expected to be similar to or slightly less than for Alternative 1. Air emissions from the existing CMR Building at TA-3 would likely be reduced.

Radiological Releases

Construction Impacts—While no radiological releases to the environment would be expected in association with construction activities at TA-55, the potential exists for contaminated soils and possibly other media to be disturbed during excavation and other site activities. Prior to commencing ground disturbance, NNSA would survey potentially affected areas to determine the extent and nature of any contamination and would be required to remediate any contamination in accordance with procedures established under LANL's environmental restoration program and in accordance with LANL's Hazardous Waste Facility Permit.

Operations Impacts—Releases of radionuclides under this alternative would be the same as those described for Alternative 1 (see Section 4.3.3.1).

4.5.3.2 Noise

Construction Impacts—Construction of the new CMRR Facility laboratory building(s) at TA-55 would result in some temporary increase in noise levels near the area from construction equipment and activities. Some disturbance of wildlife near the area could occur as a result of the operation of construction equipment. Noise impacts from construction under this alternative would be similar to those described for Alternative 1 (see section 4.3.3.2).

Operations Impacts—Noise impacts from CMRR Facility operations at TA-55 are expected to be similar to existing operations at TA-55. Although there will be a small increase in traffic noise and equipment noise (such as heating and cooling systems) near the area, there would be little change in noise impacts on wildlife and no change in noise impacts to the public outside of LANL as a result of moving these activities to TA-55. Noise impacts would be similar to those described for Alternative 1.

4.5.4 Geology and Soils

Construction and Operations Impacts—Construction of the CMRR Facility and its operation would not impact geologic resources at LANL. As discussed previously, new buildings would be designed and constructed in accordance with DOE Order 420.1A and sited to minimize the risk from geologic hazards. Thus, site geologic conditions would be unlikely to affect the facilities over the 50-year operational life expectancy.

The potential also exists for contaminated soils to be encountered during excavation and other site activities. Prior to commencing ground disturbance, NNSA would survey potentially affected contaminated areas to determine the extent and nature of any contamination and required remediation in accordance with procedures established under the LANL environmental restoration program.

4.5.5 Surface and Groundwater Quality

4.5.5.1 Surface Water

Construction Impacts—Impacts to surface water associated with construction of Alternative 3 would be the same as those presented for Alternative 1 (Section 4.3.5.1). There are no natural surface water drainages in the vicinity of the TA-55 Plutonium Facility Complex and no surface water would be used to support facility construction. It is also expected that portable toilets would be used for construction personnel, resulting in no onsite discharge of sanitary wastewater and no impact on surface waters. Although storm-water runoff from construction areas could potentially impact downstream surface water quality, appropriate soil erosion and sediment control measures and spill prevention practices would similarly be employed during construction to minimize potential water quality impacts.

Operations Impacts—Impacts to surface water associated with operation of Alternative 3 would be identical to those presented for Alternative 1 (Section 4.3.5.1). Overall, operational impacts on site surface waters and downstream water quality would be expected to be negligible.

4.5.5.2 Groundwater

Construction Impacts—Groundwater required to support construction activities for Alternative 3 would be similar to, but less than, that presented for Alternative 1 (Section 4.3.5.2). The volume of groundwater required for construction of this hybrid alternative would also be small compared to site availability and historic usage, and there would be no onsite discharge of wastewater to the surface or subsurface. Appropriate spill prevention controls, countermeasures, and procedures would similarly be employed, and no impact on groundwater availability or quality from construction activities in TA-55 would be anticipated.

Operations Impacts—Under Alternative 3, buildings housing CMR operations and activities at TA-3 and TA-55 would use the same volume of groundwater as used to support Alternative 1. Therefore, no additional impact on regional groundwater availability would be anticipated. Similarly, no sanitary or industrial effluent would be discharged directly to the surface or subsurface, and no operational impacts on groundwater quality would be expected.

4.5.6 Ecological Resources

Construction and Operations Impacts—Since the existing CMR Building would continue to be used for administrative offices and support functions, there would be no new development within the already highly developed TA-3. Thus, impacts to ecological resources would not occur within TA-3.

Although less acreage would be disturbed, impacts on terrestrial resources, wetlands, aquatic resources, and threatened and endangered species from the construction and operation of new CMRR Facility laboratory building(s) at TA-55 would be the same as those described in Section 4.3.6.

4.5.7 Cultural and Paleontological Resources

4.5.7.1 Prehistoric Resources

Construction and Operations Impacts—As previously noted in Section 3.8.1, there are two prehistoric sites located within TA-3. However, these prehistoric sites, which the New Mexico State Historic Preservation Office has determined to be not eligible for the National Register of Historic Places, would not be affected by the continued use of the existing CMR Building under this alternative.

There are no prehistoric sites located within TA-55; therefore, construction and operation of the new CMRR Facility laboratory building(s) would not impact these resources. If unexpected prehistoric resources were uncovered during construction, work would stop and appropriate assessment, regulatory compliance, and recovery measures would be undertaken.

4.5.7.2 Historic Resources

Construction and Operations Impacts—The use of the existing CMR Building under this alternative would involve internal modifications to the existing structure, which has been modified and changed over the last 60 years. There would be no adverse impacts to historic resources at TA-3.

As noted in Section 3.8.2, there are 10 historic sites located within TA-55. Adverse impacts to historic resources at TA-55 from construction or operation of the CMRR Facility would not be expected. Potential impacts from the construction and operation of new CMRR Facility laboratory building(s) to these historic resources would be similar to those described for Alternative 1 in Section 4.3.7.2.

4.5.7.3 Traditional Cultural Properties

Construction and Operations Impacts—Under this alternative, the existing CMR Building at TA-3 would continue to be used. Thus, there would be no impact to traditional cultural properties within the TA-3 area.

The area at TA-55 proposed to house the new CMRR Facility laboratory building(s) has not been surveyed for traditional cultural properties. Prior to construction, traditional cultural properties consultations would be undertaken and site removal or avoidance, if needed, would be conducted. If any traditional cultural properties were located during construction, work would stop while appropriate action would be undertaken.

4.5.7.4 Paleontological Resources

Construction and Operations Impacts—As noted in Section 3.8.4, there are no paleontological resources present at TA-55 or TA-3. Thus, there would be no impacts to these resources from the use of the existing CMR building at TA-3 and the construction and operation of new CMRR Facility laboratory building(s) at TA-55.

4.5.8 Socioeconomics

Construction Impacts—Construction of new buildings at TA-55 to house CMR activities under Alternative 3 would require a peak construction employment level of 300 workers. This level of employment would generate about 852 indirect jobs in the region around LANL. The potential total employment increase of 1,152 direct and indirect jobs represents an approximate 1.3 percent increase in the workforce and would occur over the 34 months of construction. Under Alternative 3, fewer new buildings would be constructed at TA-55 than under Alternative 1 (the Preferred Alternative), but the peak number of construction workers would remain the same, while the duration of construction activities would be shorter. As such, little or no noticeable impact on the socioeconomic conditions of the region of influence would be expected.

Operations Impacts—As previously noted in Section 2.7.4, the operational characteristics of the CMRR Facility are based on the level of CMR operations required to support the Expanded

Operations Alternative analyzed in the *LANL SWEIS*. As noted in Table 2–2, CMRR Facility operations would require a workforce of approximately 550 workers. This would be an increase of 346 workers over currently restricted CMR operational requirements, but approximately equal to the number of CMR workers projected for the Expanded Operations Alternative in the *LANL SWEIS*. The *LANL SWEIS* presents a discussion of the socioeconomic impacts from an increase in total employment at LANL under the Expanded Operations Alternative, which includes the contributory affect of expanded CMR operations and an increase in workforce.

Nevertheless, the increase in the number of workers in support of expanded CMR operations would have little or no noticeable impact on socioeconomic conditions in the LANL Tri-County region of influence. Workers assigned to the new CMRR Facility would be drawn for the most part from existing LANL missions, including consolidated AC and MC activities. The contributory effect of the remaining new employment, in combination with the potential effects from other industrial and economic sectors within the regional economic area, would serve to reduce or mask any effect on the regional economy. New LANL employees hired to support CMRR facilities would comprise a small fraction of the LANL workforce (more than 9,000 in 1996), and an even smaller fraction of the regional workforce (more than 92,000 in 1999).

4.5.9 Human Health Impacts

4.5.9.1 Construction and Normal Operations

Radiological Impacts

Alternative 3 involves the continued use of the existing CMR Building in addition to the construction of new CMRR Facility laboratory building(s) at TA-55. The activities to be moved to TA-55 would include most of the activities that would result in routine normal radiological releases identified for Alternative 1. The activities that would remain at the existing CMR Building would be primarily administrative and support functions activities. Therefore, there is no difference between the human health impacts from normal operations associated with this alternative and Alternative 1. These impacts are summarized in Section 4.3.9.1.

Hazardous Chemicals and Explosives Impacts

No chemical-related health impacts to the public would be associated with Alternative 3. As stated in the *LANL SWEIS*, the laboratory quantities of chemicals that could be released to the atmosphere during routine normal operations are minor quantities and would be below the screening levels used to determine the need for additional analysis. There would also be no construction and operational increase in the use of chemicals as a result of this hybrid alternative. Construction workers would be protected from adverse effects from the use of hazardous chemicals by adherence to OSHA and EPA occupational standards that limit concentrations of potentially hazardous chemicals.

4.5.9.2 Facility Accidents

This section addresses the potential impacts to workers at the facility and others onsite and the public due to accidents for Alternative 3. Additional details supporting the information presented here are provided in Appendix C.

Under Alternative 3, the existing CMR Building would continue to be used for administrative offices and support functions together with construction and operation of the new CMRR Facility laboratory building(s) at TA-55 where CMR capabilities and materials would be relocated. The new CMRR Facility would include safety features that would reduce the risks of accidents that currently exist under the No Action Alternative. From an accident perspective, the proposed CMRR Facility would be designed to meet the performance category 3 seismic requirements, and have a full confinement system that includes tiered pressure zone ventilation and high-efficiency particulate air filters.

Radiological Impacts

The frequencies and consequences of potential accidents are the same as those described for the new CMRR Facility under Alternative 1 in Section 4.3.9.2. Continued used of the CMR Building for administrative offices and support functions purposes would involve small quantities of radioactive materials, and the consequences of any accident would be dominated by the consequences of postulated accidents at the new CMRR Facility.

Hazardous Chemicals and Explosives Impacts

Some of the chemicals used in LANL CMR operations are toxic and carcinogenic. The quantities of the regulated hazardous chemicals and explosive materials stored and used in the CMRR Facility would be well below the threshold quantities set by the EPA (40 CFR 68), and would pose minimal potential hazards to the public health and the environment in an accident condition. These chemicals would be stored and handled in small quantities (10 to a few hundred milliliters), and would only be a hazard to the involved worker under accident conditions.

4.5.9.3 Emergency Preparedness and Security Impacts

There would be no impacts on the emergency management and response program at LANL from the construction and operation of the new CMRR Facility laboratory building(s) at TA-55. Existing memoranda of understanding among NNSA, Los Alamos County, and the State of New Mexico to provide mutual assistance during emergencies and to provide open access to medical facilities would continue with minor administrative updates. Equipment and procedures used to respond to emergencies would continue to be maintained by NNSA. Security arrangements for the existing CMR Building would not change.

4.5.10 Environmental Justice

Construction Impacts—Under Alternative 3, CMR administrative offices and support activities would continue in the existing CMR Building, and new CMRR Facility laboratory building(s) would be constructed in TA-55. Construction impacts would be less than those presented for Alternative 1 because no new administration building would be constructed. Thus, under Alternative 3, construction at TA-55 would not result in adverse environmental impacts on the public living within the potentially affected area surrounding TA-55, including low-income and minority populations.

Operations Impacts—Environmental impacts due to normal operations at the new CMRR Facility laboratory building(s) at TA-55 would be identical to those presented for Alternative 1. Routine normal operations at the new CMRR Facility laboratory building(s) would not be expected to cause fatalities or illness among the general population surrounding TA-55, including minority and low-income populations living within the potentially affected area.

Radiological risks to the public that could result from accidents at the new CMRR Facility laboratory building(s) at TA-55 would also be identical to those presented for Alternative 1. Accidents that could occur under implementation of this hybrid alternative would therefore not pose adverse environmental risks to low-income or minority populations living in the potentially affected area surrounding TA-55.

Residents of Pueblo San Ildefonso have expressed concern that pollution from CMR operations could contaminate Mortandad Canyon, which drains onto Pueblo land and sacred areas. As discussed in Sections 4.5.3, 4.5.5, and 4.5.9, CMR operations under this alternative would not be expected to adversely affect air or water quality, or result in contamination of Tribal lands adjacent to the LANL boundary. In summary, implementation of Alternative 3 would not pose disproportionately high or adverse environmental risks to low-income or minority populations living in the potentially affected area around the new CMRR Facility laboratory building(s) at TA-55.

4.5.11 Waste Management and Pollution Prevention

This section presents an analysis of waste management and pollution prevention impacts for Alternative 3 (Hybrid Alternative at TA-55).

4.5.11.1 Waste Management

Construction Impacts—Before construction activities would begin at TA-55, LANL's Environmental Restoration Project would perform a radiological survey of the construction area to determine whether the Potential Release Sites are located in the construction area. Based on these survey results, further actions, including appropriate documentation, and contaminate removal, if necessary, would be completed by the LANL Environmental Restoration Project in accordance with LANL's Hazardous Waste Facility Permit. Potential wastes generated from such remediation activities have not been included in this impact analysis, because the type and amount of waste are unknown and cannot be adequately projected. Impacts from the disposal of

contaminated soil could be similar to waste management impacts from CMRR Facility operations.

Only nonhazardous waste would be generated from the construction activities to relocate CMR operations and materials to new CMRR Facility laboratory building(s) at TA-55. No radioactive or hazardous waste would be generated during construction activities.

Solid nonhazardous waste generated from construction activities associated with new CMRR Facility laboratory building(s) would be disposed of at the Los Alamos County Landfill located at LANL or its replacement facility. Approximately 263 tons (239 metric tons) of solid nonhazardous waste, consisting primarily of gypsum board, wood scraps, scrap metals, concrete, steel and other construction waste would be generated from the construction activities for the new laboratory facilities. This waste represents about 9 percent of the current annual solid nonhazardous waste generation rates at LANL of 2,860 tons (2,600 metric tons) per year. Management of this additional waste at LANL would be within the capabilities of the LANL waste management program, but additional waste management personnel may be required. The construction debris would be collected in appropriate waste containers and transported to the landfill on a regular basis. This additional construction waste would only increase LANL's proportion of total wastes going to the landfill by three percent.

Sanitary wastewater generated as a result of construction activities would be managed using portable toilet systems. No other nonhazardous liquid wastes are expected.

Operations Impacts—The impacts of managing waste associated with relocated CMR operations under this Alternative are assumed to be the same as for Alternative 1 (Preferred Alternative). This is because waste generation by CMRR Facility operations would not be affected by the relocation of these activities to new facilities, and therefore, the same types and volumes of waste would be generated. See Section 4.3.11.1, Table 4–16, for waste types and quantities generated by CMR activities. Small quantities of waste would be generated during the transition phase to the new CMRR Facility laboratory building(s) at TA-55, resulting from the shutdown of operations in the existing CMR Building, decontamination of equipment prior to movement, packaging of SNM, and preoperational testing activities.

4.5.11.2 Pollution Prevention

At the new CMRR Facility, wastes would be minimized, where feasible, by:

- Recycling;
- Processing waste to reduce its quantity, volume or toxicity;
- Substituting materials or processes that generate hazardous wastes with materials or processes that will result in less hazardous wastes being produced; and
- Segregating waste materials to prevent contamination of nonhazardous materials.

4.6 ENVIRONMENTAL IMPACTS FOR ALTERNATIVE 4 (THE "HYBRID ALTERNATIVE AT TA-6")

This section presents a discussion of the environmental impacts associated with Alternative 4 (the Hybrid Alternative at TA-6). Under Alternative 4, CMR administrative offices and support functions activities would remain in a portion of the existing CMR Building at TA-3 with only necessary structural and systems upgrades and repairs. The balance of CMR operations at LANL would be relocated to TA-6 in a new CMRR Facility consisting of one or two buildings that would provide secure laboratory spaces for research and analytical support activities. The buildings would be expected to operate for a minimum of 50 years, and roads would be constructed to connect the buildings. The impacts from construction and operation of these proposed facilities are described below. Disposition of the remaining unused portions of the CMR Building is discussed later in Section 4.7.2.

CMR operations at TA-6 under this alternative would be conducted at the levels of activity described for the Expanded Operations Alternative in the *LANL SWEIS*. The Expanded Operations Alternative presented in the *LANL SWEIS* provides the reference point from which incremental effects of this proposed action are measured.

4.6.1 Land Use and Visual Resources

4.6.1.1 Land Use

Construction and Operations Impacts—Under this alternative, space within Wings 1, 3, 5, and 7 of the existing CMR Building at TA-3 would be used for the administrative offices and support functions building. Wings 2 and 4 would be decommissioned and used for storage. Since this would not represent a change in the present use of those portions of the building, and would be consistent with current *LANL SWEIS* and *LANL Comprehensive Site Plan* designations of the area for Research and Development and Nuclear Materials Research and Development, respectively (see Section 3.2.1), there would be no impact on land use under this alternative.

In addition, new CMRR Facility laboratory building(s) would be constructed on undeveloped land within the north central portion of TA-6. This would disturb 22.75 acres (9.2 hectares) of land during construction. During CMR operations, 11.25 acres (4.55 hectares) would be permanently disturbed at TA-6. Impacts to land use at TA-6 from this alternative would be the same as those previously addressed in Section 4.4.1.1.

4.6.1.2 Visual Resources

Construction and Operations Impacts—Under this alternative, there would be no external change to the present CMR Building at TA-3. Thus, there would be no impact to visual resources or the current Class IV Visual Resource Contrast rating.

Visual impacts related to the construction of the CMRR Facility laboratory building(s) at TA-6 would be the same as those described in Section 4.4.1.2, except the three-story administrative

offices and support functions building would be not constructed. The Visual Resource Contrast rating for the area would change from Class III to Class IV.

4.6.2 Site Infrastructure

Construction Impacts—The projected demands on key site infrastructure resources associated with construction under this alternative would be similar to, but less than, those presented for construction of Alternative 2 (Section 4.4.2). Existing LANL infrastructure would easily be capable of supporting the construction requirements for the new CMRR Facility laboratory building(s) at TA-6 proposed under this alternative without exceeding site capacities. Although gasoline and diesel fuel would be required to operate construction vehicles, generators, and other construction equipment, fuel would be procured from offsite sources and, therefore, would not be a limited resource. Impacts on the local transportation network are expected to be negligible.

Operations Impacts—Resources needed to support operations under Alternative 4 would be the same as those presented for Alternative 2 operations. As such, it is likewise projected that existing LANL infrastructure resources would be adequate to support proposed mission activities over 50 years, and that CMR infrastructure requirements under this hybrid alternative would generally approximate those of the Expanded Operations Alternative presented in the *LANL SWEIS* for the CMR Building.

4.6.3 Air Quality and Noise

4.6.3.1 Air Quality

No changes to overall air quality would result from the construction and operation of the proposed new CMRR Facility laboratory building(s).

Nonradiological Impacts

Construction Impacts—Construction of the new CMRR Facility laboratory building(s) at TA-6 would result in temporary emissions from construction equipment, trucks, and employee vehicles. Construction activities would be the same as those for Alternative 2, except that the administrative offices and support functions building would not be constructed. Criteria pollutant concentrations from construction would be less than for Alternative 2.

Operations Impacts—Under this alternative, criteria and toxic pollutants would be generated from operation and testing of an emergency generator at TA-6. Air emissions from CMR operations at TA-6 under Alternative 4 are expected to be similar to or slightly less than for Alternative 2. Air emissions from the existing CMR Building at TA-3 would be reduced.

Radiological Releases

Construction Impacts—While no radiological releases to the environment would be expected in association with construction activities at TA-6, the potential exists for contaminated soils and possibly other media to be disturbed during excavation and other site activities. Prior to

commencing ground disturbance, NNSA would survey potentially affected areas to determine the extent and nature of any contamination and would be required to remediate any contamination in accordance with procedures established under LANL's environmental restoration program and in accordance with LANL's Hazardous Waste Facility Permit.

Operations Impacts—Releases of radionuclides under this alternative would be the same as those described for Alternative 2 (see Section 4.4.3.1).

4.6.3.2 Noise

Construction Impacts—Construction of the new CMRR Facility laboratory building(s) at TA-6 would result in some temporary increase in noise levels near the area from construction equipment and activities. Some disturbance of wildlife near the area could occur as a result of the operation of construction equipment. Noise impacts from construction under this alternative would be similar to those described for Alternative 2 (see Section 4.4.3.2).

Operations Impacts—Noise impacts from CMR operations at TA-6 would increase from those at existing operations at TA-6. There would be an increase in traffic and equipment noise (such as heating and cooling systems) in the area. The increase of noise from CMR operations at TA-6 could impact wildlife in the area. There would be little or no change in noise impacts to the public outside of LANL as a result of moving CMR activities to TA-6. These impacts would be similar to those for Alternative 2.

4.6.4 Geology and Soils

Construction and Operations Impacts—Construction of the CMRR Facility and its operation would not impact geologic resources at LANL. As discussed previously, new buildings would be designed and constructed in accordance with DOE Order 420.1A and sited to minimize the risk from geologic hazards. No known fault traces are located within the potential TA-6 site for the proposed new CMRR Facility. Thus, site geologic conditions would be unlikely to affect the facilities over the 50-year operational life expectancy.

The potential also exists for contaminated soils to be encountered during excavation and other site activities. Prior to commencing ground disturbance, NNSA would survey potentially affected contaminated areas to determine the extent and nature of any contamination and required remediation in accordance with procedures established under the LANL environmental restoration program.

4.6.5 Surface and Groundwater Quality

4.6.5.1 Surface Water

Construction Impacts—Impacts to surface water associated with construction of Alternative 4 would be the same as those presented for Alternative 2 (Section 4.4.5.1). There are no natural surface water drainages in the vicinity of the TA-6 construction site, and no surface water would be used to support facility construction. It is expected that portable toilets would be used for

construction personnel, resulting in no onsite discharge of sanitary wastewater and no impact on surface waters. Although storm water runoff from construction areas could potentially impact downstream surface water quality, appropriate soil erosion and sediment control measures and spill prevention practices would similarly be employed during construction to minimize potential water quality impacts.

Operations Impacts—Impacts to surface water associated with operation of Alternative 4 would be identical to those presented for Alternative 2 (Section 4.4.5.1). Overall, operational impacts on site surface waters and downstream water quality would be expected to be negligible.

4.6.5.2 Groundwater

Construction Impacts—Groundwater required to support construction activities for Alternative 4 would be similar to, but less than, those presented for Alternative 2 (Section 4.4.5.2). The volume of groundwater required for construction would also be small compared to site availability and historic usage, and there would be no onsite discharge of wastewater to the surface or subsurface. Appropriate spill prevention controls, countermeasures, and procedures would similarly be employed, and no impact on groundwater availability or quality from construction activities in TA-6 would be anticipated.

Operations Impacts—Under Alternative 4, buildings housing CMR operations and activities at TA-3 and TA-6 would use the same volume of groundwater as used to support Alternative 2. Therefore, no additional impact on regional groundwater availability would be anticipated. Similarly, no sanitary or industrial effluent would be discharged directly to the surface or subsurface, and no operational impacts on groundwater quality would be expected.

4.6.6 Ecological Resources

Construction and Operations Impacts—Since the existing CMR Building would be used for lite laboratory/office functions, there would be no new development within the already highly developed TA-3 area. Thus, impacts to ecological resources would not occur.

Although less acreage would be disturbed, impacts to terrestrial resources, wetlands, aquatic resources, and threatened and endangered species would be the same as those described in Section 4.4.6 from the construction and operation of new CMRR Facility laboratory building(s) at TA-6.

4.6.7 Cultural and Paleontological Resources

4.6.7.1 Prehistoric Resources

Construction and Operations Impacts—As previously noted in Section 3.8.1, there are two prehistoric sites located within TA-3. However, these prehistoric sites, which the New Mexico State Historic Preservation Office has determined to be not eligible for the National Register of Historic Places, would not be affected by the continued use of the existing CMR Building under this alternative.

As noted in Section 3.8.1, one prehistoric site exists within TA-6. Adverse impacts to this prehistoric resource from construction and operation of the new CMRR Facility laboratory building(s) at TA-6 would not be expected. Potential impacts to this resource from the construction and operation of new CMRR Facility laboratory building(s) would be the same as those described for Alternative 2 in Section 4.4.7.1. If unexpected prehistoric resources were uncovered during construction, work would stop and appropriate assessment, regulatory compliance, and recovery measures would be undertaken.

4.6.7.2 Historic Resources

Construction and Operations Impacts—The use of the existing CMR Building under this alternative would only involve internal modifications to the existing structure, which has been modified and changed over the last 60 years. There would be no adverse impacts to historic resources at TA-3.

As noted in Section 3.8.2, there are 20 historic sites located within TA-6. Adverse impacts to historic resources at TA-6 from construction and operation of the new CMRR Facility laboratory building(s) would not be expected. Potential impacts to these historic resources from the construction and operation of new CMRR Facility laboratory building(s) would be the same as those described for Alternative 2 in Section 4.4.7.2.

4.6.7.3 Traditional Cultural Properties

Construction and Operations Impacts—Under this alternative, the existing CMR Building at TA-3 would continue to be used. Thus, there would be no impact to traditional cultural properties within the area.

The area at TA-6 proposed to house the new CMRR Facility laboratory building(s) has not been surveyed for traditional cultural properties. Prior to construction, a traditional cultural properties would be undertaken and site removal or avoidance, if needed, would be conducted. If any traditional cultural properties were located during construction, work would stop while appropriate action would be undertaken.

4.6.7.4 Paleontological Resources

Construction and Operations Impacts—As noted in Section 3.8.4, there are no paleontological resources present at TA-3 or TA-6. Thus, there would be no impacts to these resources from the use of the existing CMR Building at TA-3 and the construction of new CMRR Facility laboratory building(s) at TA-6.

4.6.8 Socioeconomics

Construction Impacts—Construction of new buildings at TA-6 to house CMR activities would require a peak construction employment level of 300 workers. This level of employment would generate about 852 indirect jobs in the region around LANL. The potential total employment increase of 1,152 direct and indirect jobs represents an approximate 1.3 percent increase in the

workforce and would occur over the 34 months of construction. Under Alternative 4, fewer new buildings would be constructed at TA-6 than under Alternative 2 (Greenfield Alternative), but the peak number of construction workers would remain the same while the duration of construction activities would be shorter. Similarly, little or no noticeable impact on the socioeconomic conditions of the region of influence would be expected.

Operations Impacts—As previously noted in Section 2.7.4, the operational characteristics of the CMRR Facility are based on the level of CMR operations required to support the Expanded Operations Alternative analyzed in the *LANL SWEIS*. As noted in Table 2–2, CMRR Facility operations would require a workforce of approximately 550 workers. This would be an increase of 346 workers over currently restricted CMR operational requirements, but approximately equal to the number of CMR workers projected for the Expanded Operations Alternative in the *LANL SWEIS*. The *LANL SWEIS* presents a discussion of the socioeconomic impacts from an increase in total employment at LANL under the Expanded Operations Alternative, which includes the contributory affect of expanded CMR operations and an increase in workforce.

Nevertheless, the increase in the number of workers in support of expanded CMR operations would have little or no noticeable impact on socioeconomic conditions in the LANL Tri-County region of influence. Workers assigned to the new CMRR Facility would be drawn for the most part from existing LANL missions, including consolidated AC and MC activities. The contributory effect of the remaining new employment, in combination with the potential effects from other industrial and economic sectors within the regional economic area, would serve to reduce or mask any effect on the regional economy. New LANL employees hired to support CMRR facilities would comprise a small fraction of the LANL workforce (more than 9,000 in 1996), and an even smaller fraction of the regional workforce (more than 92,000 in 1999).

4.6.9 Human Health Impacts

4.6.9.1 Construction and Normal Operations

Radiological Impacts

Alternative 4 involves the continued use of the existing CMR Building in addition to the construction of new CMRR Facility laboratory building(s) at TA-6. The activities to be moved to TA-6 would include most of the activities that would result in routine normal radiological releases identified for Alternative 2. The activities that would remain at the existing CMR Building would be primarily administrative and support functions activities. Therefore, the human health impacts from routine normal operations associated with this alternative would be the same as those associated with Alternative 2. These impacts are summarized in Section 4.4.9.1.

Hazardous Chemicals and Explosives Impacts

No chemical-related health impacts to the public would be associated with Alternative 4. As stated in the *LANL SWEIS*, the laboratory quantities of chemicals that could be released to the atmosphere during routine normal operations are minor quantities and would be below the

screening levels used to determine the need for additional analysis. There would also be no construction and operational increase in the use of chemicals as a result of this hybrid alternative. Construction workers would be protected from adverse effects from the use of hazardous chemicals by adherence to OSHA and EPA occupational standards that limit concentrations of potentially hazardous chemicals.

4.6.9.2 Facility Accidents

This section addresses the potential impacts to workers at the facility and others onsite and the public due to accidents for Alternative 4. Additional details supporting the information presented here are provided in Appendix C.

Under Alternative 4, the existing CMR Building would continue to be used for administrative offices and support functions together with construction and operation of the new CMRR Facility laboratory building(s) at TA-6 where CMR capabilities and materials would be relocated. The new CMRR Facility would include safety features that would reduce the risks of accidents that currently exist under the No Action Alternative. From an accident perspective, the proposed CMRR Facility would be designed to meet performance Category 3 seismic requirements, and have a full confinement system that includes tiered pressure zone ventilation and high-efficiency particulate air filters.

Radiological Impacts

The frequency and consequences of potential accidents are the same as those described for the new CMRR Facility under Alternative 2 in Section 4.4.9.2. Continued use of the CMR Building for administrative offices and support functions purposes would involve small quantities of radioactive materials and the consequences of any accident would be dominated by the consequences of postulated accidents at the new CMRR Facility laboratory building(s).

Hazardous Chemicals and Explosives Impacts

Some of the chemicals used in LANL CMR operations are toxic and carcinogenic. The quantities of the regulated hazardous chemicals and explosive materials stored and used in the new CMRR Facility would be well below the threshold quantities set by the EPA (40 CFR 68), and would pose minimal potential hazards to the public health and the environment in an accident condition. These chemicals would be stored and handled in small quantities (10 to a few hundred milliliters), and would only be a hazard to the involved worker under accident conditions.

4.6.9.3 Emergency Preparedness and Security Impacts

There would be no impacts on the emergency management and response program at LANL from the construction and operation of the new CMRR Facility laboratory building(s) at TA-6. Existing memoranda of understanding among NNSA, Los Alamos County, and the State of New Mexico to provide mutual assistance during emergencies and to provide open access to medical facilities would continue with minor administrative updates. Equipment and procedures used to

respond to emergencies would continue to be maintained by NNSA. Security arrangements for the existing CMR Building would not change.

4.6.10 Environmental Justice

Construction Impacts—Under Alternative 4, CMR administrative offices and support functions activities would continue in the existing CMR Building, and new CMRR Facility laboratory building(s) would be constructed in TA-6. Construction impacts would be less than those presented for Alternative 2 because no new administration building would be constructed. Thus, under Alternative 4, construction at TA-6 would not result in adverse environmental impacts on the public living within the potentially affected area surrounding TA-6, including low-income and minority populations.

Operations Impacts—Environmental impacts due to normal operations at the new CMRR Facility laboratory building(s) at TA-6 would be identical to those presented for Alternative 2. Routine normal operations at the new CMRR Facility would not be expected to cause fatalities or illness among the general population surrounding TA-6, including minority and low-income populations living within the potentially affected area.

Radiological risks to the public that could result from accidents at the new CMRR Facility laboratory building(s) at TA-6 would also be identical to those presented for Alternative 2, and would not pose adverse environmental risks to low-income or minority populations living in the potentially affected area surrounding TA-6.

Residents of Pueblo San Ildefonso have expressed concern that pollution from CMR operations could contaminate Mortandad Canyon, which drains onto Pueblo land and sacred areas. As discussed in Sections 4.6.3, 4.6.5, and 4.6.9, CMR operations under this alternative would not be expected to adversely affect air or water quality, or result in contamination of Tribal lands adjacent to the LANL boundary. In summary, implementation of Alternative 4 would not pose disproportionately high or adverse environmental risks to low-income or minority populations living in the potentially affected area around the new CMRR Facility laboratory building(s) at TA-6.

4.6.11 Waste Management and Pollution Prevention

This sections presents an analysis of waste management and pollution prevention impacts for Alternative 4 (Hybrid Alternative at TA-6).

4.6.11.1 Waste Management

Construction Impacts—Before construction activities would begin at TA-6, LANL's Environmental Restoration Project would perform a radiological survey of the construction area to determine whether the Potential Release Sites are located in the construction area. Based on these survey results, further actions, including appropriate documentation, and contaminate removal, if necessary, would be completed under the LANL Environmental Restoration Project in accordance with LANL's Hazardous Waste Facility Permit. Potential wastes generated from

such remediation activities have not been included in this impact analysis, because the type and amount of waste are unknown and cannot be adequately projected. Impacts from the disposal of contaminated soil could be similar to waste management impacts from CMRR Facility operations.

Only nonhazardous waste would be generated from construction activities to relocate CMR operations and materials to new CMRR Facility laboratory building(s) at TA-6. No radioactive or hazardous waste would be generated during construction activities.

Solid nonhazardous waste generated from construction activities associated with new CMRR Facility laboratory building(s) would be disposed of at the Los Alamos County Landfill located at LANL or its replacement facility. Approximately 263 tons (239 metric tons) of solid nonhazardous waste, consisting primarily of gypsum board, wood scraps, scrap metals, concrete, steel and other construction waste would be generated from the construction activities for the new laboratory facilities. This waste represents about 9 percent of the current annual solid nonhazardous waste generation rates at LANL of 2,860 tons (2,600 metric tons) per year. Management of this additional waste at LANL would be within the capabilities of the LANL waste management program, but additional waste management personnel may be required.

The construction debris would be collected in appropriate waste containers and transported to the landfill on a regular basis. This additional construction waste would only increase LANL's proportion of total wastes going to the landfill by three percent.

Sanitary wastewater generated as a result of construction activities would be managed using portable toilet systems. No other nonhazardous liquid wastes are expected.

Operations Impacts—The impacts of managing waste associated with relocated CMR operations under this Alternative are assumed to be the same as for Alternative 1 (Preferred Alternative). This is because waste generation by CMRR Facility operations would not be affected by the relocation of these activities to new facilities, and therefore, the same types and volumes of waste would be generated. See Section 4.3.11.1, Table 4–16, for waste types and quantities generated by CMR activities. Small quantities of waste would be generated during the transition phase to the new CMRR Facility, resulting from the shutdown of operations in the existing CMR Building, decontamination of equipment prior to movement, packaging of SNM, and preoperational testing activities.

Locating new CMRR Facility laboratory building(s) at TA-6 would result in new impacts related to management of radioactive liquid wastes generated during CMR operations. Radioactive liquid wastes would be transferred to the Radioactive Liquid Waste Treatment Facility in TA-50 by truck transport or via a new pipeline installed across Two Mile Canyon. Possible transportation impacts arise from additional truck trips on public roads. Possible pipeline impacts include construction costs and disturbance of the pipeline corridor.

4.6.11.2 Pollution Prevention

At the new CMRR Facility, wastes would be minimized, where feasible, by:

- Recycling;
- Processing waste to reduce its quantity, volume or toxicity;
- Substituting materials or processes that generate hazardous wastes with materials or processes that would result in less hazardous wastes being produced; and
- Segregating waste materials to prevent contamination of nonhazardous materials.

4.7 IMPACTS COMMON TO ALL ALTERNATIVES

As previously stated in Chapter 2, overall CMR operational characteristics at LANL would not change, regardless of the ultimate location of the replacement facility and the alternative implemented. Sampling methods and mission support operations associated with AC and MC would not change and, therefore, would not result in any additional environmental or health and safety impacts at LANL. Each of the alternatives would generally have the same number of operational impacts. In other words, all of the alternatives would have the same levels of emissions and releases into the environment, infrastructure requirements would be the same, and the same levels of radioactive and nonradioactive waste would be generated from CMR operations regardless of the ultimate location of the new CMRR Facility at LANL.

Other impacts not previously discussed in this chapter that would also be common to each of the proposed alternatives include transportation impacts (see Section 4.7.1), CMR Building disposition impacts (see Section 4.7.2), CMRR Facility disposition impacts (see Section 4.7.3), impacts during the transition from the CMR Building to the new CMRR Facility (see Section 4.7.4), and radiological impacts of sabotage involving the CMRR Facility (see Section 4.7.5). Transportation impacts could result from: (1) the one-time movement of SNM, equipment, and other materials during the transition from the existing CMR Building to the new CMRR Facility, and (2) the routine onsite shipment of AC and MC samples between the Plutonium Facility at TA-55 and the new CMRR Facility. Impacts from the disposition of the existing CMR Building and ultimately the CMRR Facility when no longer needed, would result from the decontamination and demolition of the building and the transport and disposal of radiological and nonradiological waste materials. Radiological impacts of sabotage involving the CMRR Facility could result in building damage, loss of material containment and confinement, dispersion of radioactive materials, and population exposure.

4.7.1 Transportation Impacts

A transportation impact assessment was conducted for: (1) the one-time movement of SNM, equipment, and other materials during the transition from the existing CMR Building to the new CMRR Facility, and (2) the routine onsite shipment of AC and MC samples between the Plutonium Facility at TA-55 and the new CMRR Facility. The results of this impact assessment

are presented below for incident-free and transportation accident impacts to the public and workers.

One-time Movement of SNM, Equipment, and Other Materials—Under each alternative, SNM, equipment, and other materials would be moved during the transition from the existing CMR Building to the new CMRR Facility. Transport would be conducted within the LANL site. Movement distances would vary among the alternatives, from a very short distance, (about 100 to 300 feet [30 to 90 meters]) for Alternative 1 (Preferred Alternative) and Alternative 3 at TA-55, to about 3 to 5 miles (5 to 8 kilometers) for Alternatives 2 and 4 at TA-6. Movement of SNM outside of TA-55 would occur on DOE-controlled roads. DOE procedures and U.S. Nuclear Regulatory Commission regulations do not require the use of certified Type B casks within DOE sites. However, DOE procedures require closing the roads and stopping traffic for shipment of material (fissile or SNM) in noncertified packages. Shipment using certified packages, or smaller quantities of radioactive materials and SNM, could be performed while site roads are open. Under current LANL security procedures, the roads used to transport SNM and other radioactive materials under this EIS would have limited public access capability.

Routine Onsite Shipment of AC and MC Samples—Under each alternative, small quantities of radioactive materials and SNM samples would be shipped from the Plutonium Facility at TA-55 to the new CMRR Facility for AC and MC operations at either TA-55 or TA-6. This movement of samples would be performed on DOE-controlled roads, or on limited public access roads under current LANL security procedures.

4.7.1.1 Incident-free Transportation Impacts

One-time Movement of SNM, Equipment, and Other Materials—Transport of SNM, equipment, and other materials currently located at the CMR Building to a new CMRR Facility at TA-55 or TA-6 would occur over a period of 2 to 4 years on open or closed roads. The public is not expected to receive any measurable exposure from the one-time movement of radiological materials associated with this action.

CMR workers could receive a minimal dose from shipping and handling of SNM during the transition from the existing CMR Building to the new CMRR Facility. Based on a review of radiological exposure information in calendar year 2001, the average dose to CMR workers (including material handlers) is about 110 millirem per year. Since the transition to operations at the new CMRR Facility would occur over a 2- to 4-year period, the material handler worker dose would be similar to those for routine operations currently performed at the CMR Building.

Routine Onsite Shipment of AC and MC Samples—The public would not be expected to receive any additional measurable exposure from the movement of small quantities of radioactive materials and SNM samples between the Plutonium Facility at TA-55 and the new CMRR Facility. These include metal, liquid, or powder samples of weapons-grade plutonium, plutonium-238, uranium-235, uranium-233, and other actinide isotopes.

CMR workers routinely receive minimal doses from the shipping and handling of SNM samples between the Plutonium Facility at TA-55 and the CMR Building. Estimates of radiation doses

likely to be received by CMRR Facility workers (which includes handling, packaging, loading, and unloading) were based on a review of workforce doses at CMR and TA-55 facilities. As previously noted, based on a review of radiological exposure information in calendar year 2001, the average dose to CMR workers (including material handlers) is about 110 millirem per year. Since the distance for shipping small quantities of radioactive material and samples between the Plutonium Facility at TA-55 and the existing CMR Building at TA-3 and shipping to TA-6 are not that different, additional worker dose impacts would not be expected.

4.7.1.2 Impacts From Transportation Accidents

One-time Movement of SNM, Equipment, and Other Materials—Potential handling and transport accidents during the one-time movement of SNM, equipment, and other materials during the transition from the existing CMR Building to the new CMRR Facility would be bounded in frequency and consequence by other facility accidents, for each alternative presented earlier in this Chapter. Once a shipment is prepared for low-speed movement, the likelihood and consequence of any foreseeable accident are considered to be very small.

Routine Onsite Shipment of AC and MC Samples—For all alternatives, sample quantities of SNM transported between the Plutonium Facility at TA-55 and the new CMRR Facility would be small. These include metal, liquid, or powder samples of weapons-grade plutonium, plutonium-238, uranium-235, uranium-233, and other actinide isotopes. The *LANL SWEIS* included a bounding transportation accident scenario involving shipments of liquid plutonium-238 samples between the Plutonium Facility at TA-55 and the existing CMR Building at TA-3, which resulted in a calculated dose of 8.7 rem to a maximally exposed individual standing very close to the evaporating liquid for 10 minutes. Under this scenario, a truck accident rate for a closed road under administrative controls was also estimated to be 8.59×10^{-9} per kilometer (*LANL SWEIS*, DOE 1999a). Therefore the accident rate for a 5-mile (8-kilometer) distance (such as the movement of SNM between TA-55 and TA-6) would be 7.16×10^{-8} per trip. The estimate provided for the Expanded Operations Alternative in the *LANL SWEIS*, assumed that there would be about 240 shipments of liquid plutonium-238 per year. Using this data, the onsite transportation accident risk to the maximally exposed individual member of the public is presented in **Table 4–26** below.

Table 4–26 Transportation Accident Impacts to the Maximally Exposed Individual Member of the Public

Factor	*No Action*	*Alternatives 1 and 3 at TA-55*	*Alternatives 2 and 4 at TA-6*
Accident frequency (per year)	8.85×10^{-8} [a]	0 [b]	0.0000172
Dose (rem per year)	7.7×10^{-7} [a]	0 [b]	0.00015
Risk (latent cancer fatality per year)	3.1×10^{-10} [a]	0 [b]	6.0×10^{-8}

[a] Values are taken from *LANL SWEIS* under no Action Alternative.

[b] The distance between the Plutonium Facility and the new CMRR Facility at TA-55 would be very short, and no truck would be used.

4.7.2 CMR Building Disposition Impacts

As previously discussed in Chapter 2, certain areas within the existing CMR Building, pieces of equipment, and building systems have become contaminated over the past 50 years of operation,

with radioactive material and operations involving SNM. These areas include about 3,100 square feet (290 square meters) of contaminated conveyors, gloveboxes, hoods and other equipment items; 760 cubic feet (20 cubic meters) of contaminated ducts; 580 square feet (50 square meters) of contaminated hot cell floor space; and 40,320 square feet (3,750 square meters) of laboratory floor space.

The disposition options for the existing CMR Building include:

- *Disposition Option 1:* reuse of the building for administrative and other activities appropriate to the physical conditions of the structure with the performance of necessary structural and systems upgrades and repairs. No demolition of any portions of the CMR Building would occur under this option.

- *Disposition Option 2:* decontamination, decommission and demolition of selected parts of the existing CMR Building with some reuse of portions of the CMR Building.

- *Disposition Option 3:* decontamination, decommission and demolition of the entire existing CMR Building.

For the purpose of this EIS only Disposition Option 3 is discussed in detail with regard to its potential impacts, because activities associated with this option would have the greatest potential environmental consequence, including generating the largest volume of waste material.

Disposition impacts from the demolition of the CMR Building are discussed qualitatively below for air quality and noise, surface and groundwater quality, ecological resources, human health, and transportation. Quantitative information has not been presented for these resource areas, since project-specific work plans have not been prepared nor has the CMR Building been completely characterized with regards to types and locations of contamination. Preliminary estimates on the amount of waste material that could be generated by the demolition of the CMR Building are discussed in waste management in this section.

Air Quality and Noise

Removal of the existing CMR Building would result in emissions associated with equipment and vehicle exhaust as well as particulate emissions (fugitive dust) from demolition activities. The demolition effects would be expected to result in elevated concentrations of particulate matter in the immediate vicinity of TA-3. Concentrations of other criteria pollutants would increase but would not be expected to exceed the ambient standards in areas to which the public has regular access. Demolition activities may also result in radiological releases.

Noise levels during disposition activities at the CMR Building would be consistent with those typical of construction activities. As appropriate, workers would be required to wear hearing protection to avoid adverse effects on hearing. Non-involved workers at nearby facilities within TA-3 would be able to hear some of the activities; however, the level of noise would not likely be distracting. Construction noise at LANL is common. Some wildlife species may avoid the

immediate vicinity of the CMR Building as demolition proceeds due to noise; however, any effects on wildlife resulting from noise associated with demolition activities would be temporary.

Surface and Groundwater Quality

Little or no effect on water resources would be anticipated. The demolition of the CMR Building would not disturb surface water or generate liquid effluents that would be released to the surrounding environment. Silt fences, hay bales, or other appropriate Best Management Practices would be employed to ensure that fine particulates are not transported by stormwater into surface water features in the vicinity of the CMR Building. Potable water use at the site would be limited to that necessary for washing equipment, dust control, and sanitary facilities for workers.

Ecological Resources

All disposition activities would take place within TA-3, an area that has been dedicated to industrial use since the early 1940s. There are some small trees and shrubs around the CMR Building, but it is mostly roads, parking areas, and concrete pads. Wildlife in the vicinity could be disturbed by demolition activity and noise when the building is razed, building foundation and buried utilities removed, contaminated soils excavated, and waste trucked to disposal sites.

Human Health

The primary source of potential consequences to workers and members of the public would be associated with the release of radiological contaminants during the demolition process. The only radiological effect on noninvolved workers or members of the public would be from radiological air emissions. Any emissions of contaminated particulates would be reduced by the use of plastic draping and contaminate containment coupled with HEPA filters. Contaminate releases of radioactive particulate from disposition activities are expected to be lower than releases from past CMR operations.

The demolition of the CMR Building would also involve the removal of some asbestos-contaminated material. Removal of asbestos-contaminated material would be conducted according to existing asbestos management programs at LANL in compliance with strict asbestos abatement guidelines. Workers would be protected by personal protective equipment and other engineered and administrative controls, and no asbestos would likely be released that could be inhaled by members of the public.

Transportation

Demolition wastes would need to be transported to storage or disposal sites at LANL or offsite location(s). Transport of contaminated waste material would present potential risks to workers and the public from radiation exposure as the waste packages are transported along roads and highways. There would also be increased risk from traffic accidents (without release of radioactive material) and radiological accidents (in which radioactive material is released).

Waste Management

The amount and type of waste material that would be generated by the demolition of the CMR Building would be expected to be within the capacity of existing waste management systems, and would not be expected to substantially impact existing waste management disposal operations at LANL. Waste minimization and pollution prevention principles would be used to the maximum extent practicable under DOE policy. It is anticipated that the majority of waste material produced by the demolition of the CMR Building would be solid waste and recyclable materials (about 20,000 cubic yards [15,300 cubic meters]). The amount of radioactive waste material is anticipated to be slightly less (about 16,000 cubic yards [12,200 cubic meters]) (LANL 2003 - *Preliminary Chemistry and Metallurgy Research Building Disposition Study*, February 11, 2003, LA-UR-03-1122). Solid waste would be disposed of at the Los Alamos County landfill at LANL or at a replacement facility. It is expected that most of the low-level radioactive waste could be transported offsite to commercially-licensed facilities for disposal and the remainder would be disposed of onsite at LANL's TA-54, Area G. For the purposes of this discussion, NNSA has evaluated using both onsite and offsite disposal options for low-level radioactive waste and that the potential environmental consequences of these two waste management disposition options would be bounding.

It is anticipated that most of the low level radioactive waste, including concrete, soil, steel, and personal protective equipment, could be accepted at commercially-licensed offsite waste disposal facilities, and that NNSA would likely pursue this offsite disposal. Some of the low level radioactive waste would be disposed of at LANL's TA-54, Area G. It is anticipated that this amount of material would not affect Area G operations. Therefore, most of the low-level radioactive waste generated by the demolition of the CMR Building, would likely be disposed of at facilities at the Nevada Test Site and the existing commercial facility at Clive, Utah with the capacity to accept this low-level radioactive waste. Using either of these two offsite facilities (or other facilities that may become available in the future when NNSA makes a decision on the disposition of the CMR Building) would result in only a small impact on LANL's TA-54, Area G low-level radioactive waste disposal capacity.

All other wastes generated by the CMR Building disposition activities would be handled, managed, packaged, and disposed of in the same manner as the same wastes generated by other activities at LANL (see Section 3.12). Any contaminated debris that would be characterized as mixed low-level radioactive waste would also be stored onsite at TA-54, Area G pending identification of an offsite treatment and disposal facility. Currently, most of LANL's mixed low-level radioactive waste is sent offsite to other DOE or commercial facilities for treatment and disposal. It is anticipated that the demolition of the CMR Building would likely generate an amount of mixed low-level radioactive waste that would be within the current disposal capacity of both the Nevada Test Site and the commercial facility at Clive, Utah. If either of these sites were closed by the time of the CMR Building demolition, alternate waste disposal facilities would be sought.

Asbestos contaminated radioactive material from the demolition of the CMR Building would be disposed of in a disposal cell in TA-54, Area G, which is dedicated to the disposal of radioactively contaminated asbestos waste. It is anticipated that the amount of this material

would be within the current capacity of the disposal cell. Asbestos that is not radiologically contaminated would be packaged and sent to the LANL asbestos transfer station for shipment offsite to a permitted asbestos disposal facility along with other asbestos waste generated at LANL. It is anticipated that the amount of asbestos generated by the demolition of the CMR Building would not exceed the disposal capacity of existing facilities.

Some of the wastes generated from the CMR Building disposition activities would be considered residual radioactive material. Some of these materials can be recycled or reused as backfill, or topsoil cover. Steel and lead could be stored, reused, or recycled at LANL to the extent practicable and in accordance with DOE policy. It is not expected that the amount of lead would be beyond the management or storage capacity at LANL. Any radioactive liquid waste generated during disposition activities would be transferred to the RLWTF at TA-50 at LANL for treatment. It is anticipated that the amount of radioactive liquid waste from the demolition of the CMR Building would be well within the treatment and disposal capacity of the RLWTF. No affect on RLWTF is anticipated.

Although not anticipated, any hazardous waste generated during the demolition of the CMR Building would be handled, packaged, and disposed of according to LANL's hazardous waste management program. The amount is expected to be well within the management capacity of LANL's hazardous waste management and disposal program.

4.7.3 Disposition of the CMRR Facility

The ultimate disposition of the new CMRR Facility would be considered at the end of its design life-time operation of at least 50 years. It is anticipated that the impacts from the disposition of the CMRR Facility would be similar to those discussed for the disposition of the existing CMR Building.

4.7.4 Impacts During the Transition from the CMR Building to the New CMRR Facility

During a four-year transition period, CMR operations at the existing CMR Building would be moved to the new CMRR Facility. During this time both CMR facilities would be operating, although at reduced levels. At the existing CMR Building, where restrictions would remain in effect, operations would decrease as CMR operations move to the new CMRR Facility. At the new CMRR Facility, levels of CMR operations would increase as the facility becomes fully operational. In addition, the transport of routine onsite shipment of AC and MC samples would continue to take place while both facilities are operating. Transportation impacts from the one-time movement of SNM, equipment, and other materials from the CMR Building to the new CMRR Facility and the routine onsite shipment of AC and MC samples are discussed in Section 4.7.1. With both facilities operating at reduced levels at the same time, the combined demand for electricity, water, and manpower to support transition activities during this period may be higher than what would be required by the separate facilities. Nevertheless, the combined total impacts during this transition phase from both these facilities would be expected to be less than the impacts attributed to the Expanded Operations Alternative and the level of CMR operations analyzed in the *LANL SWEIS*.

Also during the transition phase, the risk of accidents would be changing at both the existing CMR Building and the new CMRR Facility. At the existing CMR Building, the radiological material at risk and associated operations and storage would decline as material and equipment are transferred to the new CMRR Facility. This would have the positive effect of reducing the risk of accidents at the CMR Building. Conversely, at the new CMRR Facility, as the amount of radioactive material at risk and associated operations increases to full operations, the risk of accidents would also increase. However, the improvements in design and technology at the new CMRR Facility would also have a positive effect of reducing overall accident risks when compared to the accident risks at the existing CMR Building. The expected net effect of both of these facilities operating at the same time during the transition period would be for the risk of accidents to be lower than the accident risks at either the existing CMR Building or the fully operational new CMRR Facility. Transportation accident impacts from the one-time movement of SNM, equipment, and other materials from the CMR Building to the new CMRR Facility and the routine onsite shipment of AC and MC samples are discussed in Section 4.7.1.2.

4.7.5 Radiological Impacts of Sabotage Involving the CMRR Facility

An act of sabotage involving the CMRR Facility is not predictable, although the possibility cannot be dismissed. Furthermore, the nature of such an act and the extent of damage can be postulated to cover a wide range of possibilities. If an act of sabotage were directed at the CMRR Facility with the intent of releasing radioactive materials, it could involve building damage including loss of material containment and confinement followed by the dispersion of radioactive materials and exposure of the population.

The consequences of an act of sabotage have not been analyzed in this EIS. However, the consequences of a facility-wide spill and facility-wide fire involving the entire CMRR Facility's radioactive material inventory have been provided. These accidents, along with a vault spill accident, were determined to have the greatest potential consequences. To the extent that an act of sabotage could involve the entire CMRR Facility's radioactive material inventory, it would be expected that the consequences would be similar. In addition, there would be no large inventories of hazardous chemicals at the CMRR Facility. A discussion of severe accident scenarios and their consequences for the CMRR Facility can be found in Appendix C.4 and C.5, respectively.

4.8 CUMULATIVE IMPACTS

As previously discussed in Chapter 4, impacts associated with the Expanded Operations Alternative presented in the *LANL SWEIS* provide the reference point from which incremental effects of the proposed action at LANL are measured. In this section, the projected incremental environmental impacts of constructing a new CMRR Facility at TA-55 were added to the environmental impacts of other present and reasonably foreseeable future actions to determine cumulative impacts at LANL.

Most present and reasonably foreseeable future actions planned for LANL were addressed in the *LANL SWEIS* and were included in the impacts discussed for Alternative 1 presented in Section 4.4. However, a number of NNSA proposed actions affecting LANL and TA-55 have

been identified since the publication of the *LANL SWEIS* in January 1999. Impacts resulting from these actions were addressed in the following environmental documents:

- *Special Environmental Analysis for the Department of Energy, National Nuclear Security Administration: Actions Taken in Response to the Cerro Grande Fire at Los Alamos National Laboratory, Los Alamos, New Mexico* (DOE/SEA-03) (DOE 2000b)

- *Environmental Assessment for the Proposed Construction and Operation of a New Interagency Emergency Operations Center at Los Alamos National Laboratory, Los Alamos, New Mexico* (DOE/EA-1376) (DOE 2001)

- *Environmental Assessment of the Proposed Disposition of the Omega West Facility at Los Alamos National Laboratory, Los Alamos, New Mexico* (DOE/EA-1410) (DOE 2002a)

- *Environmental Assessment for the Proposed Future Disposition of Certain Cerro Grande Fire Flood and Sediment Retention Structures at Los Alamos National Laboratory, Los Alamos, New Mexico* (DOE/EA-1408) (DOE 2002c)

- *Environmental Assessment for Proposed Access Control and Traffic Improvements at Los Alamos National Laboratory, Los Alamos, New Mexico* (DOE/EA-1429) (DOE 2002d)

- *Environmental Assessment for the Installation and Operation of Combustion Turbine Generators at Los Alamos National Laboratory, Los Alamos, New Mexico* (DOE/EA-1430) (DOE 2002g)

- *Environmental Impact Statement for the Proposed Relocation of Technical Area 18 Capabilities and Materials at the Los Alamos National Laboratory* (DOE/EIS-319) (DOE 2002e)

- *Environmental Assessment for Conversion of an Existing Building into a Proposed Radiography Facility at TA-55 at Los Alamos National Laboratory, Los Alamos, New Mexico*

In addition, DOE NNSA recently issued a Notice of Intent to prepare a *Supplemental Programmatic EIS on Stockpile and Stewardship for a Modern Pit Facility* (67 FR 59577). This Supplemental EIS will support two decisions: (1) whether to proceed with the Modern Pit Facility, and (2) if so, where to locate the Modern Pit Facility. LANL is one of the potential locations for the Modern Pit Facility, evaluated in this Supplemental EIS. The Supplemental EIS will also evaluate the reasonability of upgrading existing LANL facilities to increase pit production capacity. The contributory effect of this action at LANL is discussed in this section.

These completed and ongoing actions at LANL were identified and discussed in Sections 1.6.1 and 1.6.2, respectively. Impacts from these actions were factored into the estimates of total cumulative impacts, where possible, for the 50-year operating period for the potentially affected resource areas presented in this section. The potential cumulative impacts of present and reasonably foreseeable future actions at LANL in the area of TA-3, TA-6, and TA-55 are discussed below. The cumulative impacts of relocating CMR operations to TA-55 are not

expected to exceed the level of operations and impacts described by the Expanded Operations Alternative in the *LANL SWEIS*.

In this section, cumulative site impacts are presented only for those "resources" that reasonably could be expected to be affected by the proposed action. These include site infrastructure requirements, air quality, human health, and waste management. The methodology for assessing cumulative impacts is presented in Appendix A.

Site Infrastructure Requirement Impacts—As previously discussed in Section 4.4.2, site electrical capacity in terms of peak load demand and available site water capacity could be exceeded in the future, even in the absence of any new demands associated with expanded CMR operations. This potential exists based on the projected infrastructure requirements of the *LANL SWEIS* Expanded Operations Alternative and the forecasted demands of other non-LANL users. Should these projections be fully realized over the 50-year timeframe analyzed in this document, LANL could cumulatively require 118 percent of the current peak load capacity, 95 percent of its total available electrical capacity, and 142 percent of the available water capacity. Thus, additional peak load and water supply capacity would be needed.

Implementation of Alternative 1 (Preferred Alternative) would account for about two percent of the site's use of electric peak load capacity, total electrical capacity, and water supply, respectively. The Modern Pit Facility, if located at LANL, could require another 2 percent of the available electrical load and water supply. No infrastructure capacity constraints are anticipated in the near term, as LANL operational demands to date on key infrastructure resources, including electricity and water, have been well below projected levels and well within site capacities.

DOE and NNSA are currently pursuing actions to increase the reliability and availability of electric power at LANL including the construction and installation of new gas-fired combustion turbine generators at the TA-3 Co-generation Complex. This project would increase LANL's onsite electric generation capacity by 20 megawatts by the end of fiscal year 2004 and by an additional 20 megawatts after fiscal year 2007 (see Section 3.3.2). Los Alamos County, as owner and operator of the Los Alamos Water Supply System, is now the primary water supplier serving LANL. DOE transferred ownership of 70 percent of its water rights to the county and leases the remaining 30 percent. Los Alamos County is currently pursuing the use of San Juan-Chama Transmountain Diversion Project water to secure additional water rights and supply for its remaining water customers. Any potential shortfalls in available capacity would be addressed as increased site requirements are realized.

Air Quality Impacts—Cumulative impacts on air quality at LANL from expanded CMR operations would be the same as analyzed in the *LANL SWEIS*. As such, LANL would remain in compliance with all Federal and state ambient air quality standards. Criteria pollutant air emissions from the Modern Pit Facility and other proposed actions at LANL would not result in cumulatively significant impacts. Effects on air quality from associated construction and excavation activities would be temporary and localized.

Public and Occupational Health and Safety – Normal Operations Impacts—Cumulative impacts in terms of radiation exposure to the public and workers at LANL would be expected to remain

within the level of impacts forecasted under the Expanded Operations Alternative described in the *LANL SWEIS*. There would be no increase expected in the number of latent cancer fatalities in the population from site operations if CMR and Modern Pit Facility operations were both located at LANL. The dose limits for individual members of the public are given in DOE Order 5400.5. As discussed in that Order, the dose limit from airborne emissions is 10 millirem per year, as required by the Clean Air Act; the dose limit from drinking water is 4 millirem per year, as required by the Safe Drinking Water Act; and the dose limit from all pathways combined is 100 millirem per year. Therefore, the dose to the maximally exposed offsite individual would be expected to remain well within the regulatory limits. No increase in the number of latent cancer fatalities among onsite workers would be expected due to radiation from CMR and Modern Pit Facility operations, regardless of location, over the 50-year operating period. The contribution to cumulative public and occupational health and safety impacts from other proposed actions at LANL is expected to be minor.

Waste Management Impacts—Cumulative amounts of waste generated at LANL from CMR operations would remain within the level of impacts forecast under the Expanded Operations Alternative described in the *LANL SWEIS*. It is unlikely that increased CMR and Modern Pit Facility or upgraded plutonium facility operations would have a major impact on waste management at LANL, because sufficient capacity exists to manage waste from these operations. However, the contribution to cumulative waste management impacts from other proposed actions at LANL, particularly the overall waste generation at LANL during the next 10 years from the disposition of buildings and environmental restoration efforts, could be large. Construction and demolition wastes would be recycled and reused to the extent practicable. Existing waste treatment and disposal facilities would be used according to specific waste types. Solid wastes would be disposed of at the Los Alamos County Landfill or other appropriate permitted solid waste landfills. Demolition wastes would similarly be disposed of at appropriate facilities.

Transuranic wastes generated during the operational phases of the CMRR Facility would be within the level of impacts forecast under the Expanded Operations Alternative described in the *LANL SWEIS*, however Modern Pit Facility operations over 50 years, depending upon the manufacturing level, could result in the generation of very large amounts of TRU waste. The available capacity of WIPP, or the new capacity of its replacement facility, is expected to be sufficient to accommodate the estimated cumulative volumes of TRU waste from CMRR, Modern Pit Facility, and other DOE facility operations.

4.9 MITIGATION MEASURES

Following the completion of an EIS and its associated Record of Decision, NNSA is required to prepare a Mitigation Action Plan that addresses any mitigation commitments expressed in the Record of Decision (10 CFR 1021.331). The Mitigation Action Plan would explain how certain measures would be planned and implemented to mitigate any adverse environmental impacts identified in the Record of Decision. The Mitigation Action Plan would be prepared before NNSA would take any action requiring mitigation.

Based on the analyses of the environmental consequences resulting from the proposed action, no mitigation measures would be necessary since all potential environmental impacts would be

substantially below acceptable levels of promulgated standards. Activities associated with the proposed construction of the new CMRR Facility would follow standard procedures for minimizing construction impacts to air and surface water quality, noise, operational and public health and safety, and accident prevention. These practices are required by Federal and state licensing and permitting requirements, as discussed in Chapter 5.

4.10 RESOURCE COMMITMENTS

This section describes the unavoidable adverse environmental impacts that could result from the proposed action; the relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity; and irreversible and irretrievable commitments of resources. Unavoidable adverse environmental impacts are impacts that would occur after implementation of all feasible mitigation measures. The relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity addresses issues associated with the condition and maintenance of existing environmental resources used to support the proposed action and the utility of these resources after their use. Resources that would be irreversibly and irretrievably committed are those that cannot be recovered or recycled and those that are consumed or reduced to unrecoverable forms.

4.10.1 Unavoidable Adverse Environmental Impacts

Implementing the alternatives considered in this EIS would result in unavoidable adverse impacts on the human environment. In general, these impacts are expected to be minimal and would come from incremental impacts attributed to the operations of either the existing CMR Building or new CMRR buildings at LANL.

CMR operations at LANL would result in unavoidable radiation exposure to workers and the general public. Workers would be exposed to radiation and other chemicals associated with analytical chemistry, and materials characterization, uranium processing, actinide research and processing and fabrication and metallography. The incremental annual dose contribution from CMR operations to the maximally exposed offsite individual, general population, and workers is discussed in Sections 4.2.9, 4.3.9, 4.4.9, 4.5.9, and 4.6.9.

The generation of fission products would also be unavoidable. Any other waste generated during operations would be collected, treated and stored, and eventually removed for suitable recycling or disposal in accordance with applicable EPA regulations.

CMR operations in new CMRR Facility buildings at LANL have minimal unavoidable adverse impacts related to air emissions. Air emissions would include various chemical or radiological constituents in the routine emissions typical of nuclear facility operations, although CMR activities do not release major emissions to the atmosphere at the laboratory. Air emissions at LANL would occur regardless of CMR activities. These routine impacts have been addressed in various LANL NEPA documents. Overall air quality at LANL would not be changed by implementing any of the alternatives analyzed in this EIS. The decontamination and decommissioning of the CMR Building would result in the one-time generation of radioactive and non-radioactive waste material that could affect storage requirements. This would be an

unavoidable impact on the amount of available and anticipated storage space and the requirements of disposal facilities at LANL.

Temporary construction impacts associated with the construction of the new CMRR Facility at LANL would also be unavoidable. These impacts would include the generation of fugitive dust, noise, and increased construction vehicle traffic.

4.10.2 Relationship Between Local Short-Term Uses of the Environment and the Maintenance and Enhancement of Long-Term Productivity

Implementation of the alternatives, including the No Action Alternative, would cause short-term commitments of resources and would permanently commit certain resources (such as energy). For each alternative, the short-term use of resources would result in potential long-term benefits to the environment and the enhancement of long-term productivity by decreasing overall health risks to workers, the public, and the surrounding environment by reducing their exposure to hazardous and radioactive substances.

Under the No Action Alternative, environmental resources have already been committed to operations at the CMR Building. This commitment would serve to maintain existing environmental conditions with little or no impact on the long-term productivity of the environment.

Under the proposed action, overall CMR operations would not change from those operations described by the *LANL SWEIS* Expanded Operations Alternative for the CMR Building. Therefore, each of the alternatives would exhibit similar relationships between local short-term uses of the environment and the maintenance and enhancement of long-term productivity, with minimal differences in resource commitments. The short-term use of environmental resources at LANL would be greater than for the No Action Alternative. The short-term commitments of resources would include the space and materials required to construct new buildings, the commitment of new operations support facilities, transportation, and other disposal resources and materials for CMR operations. Workers, the public, and the environment would be exposed to increased amounts of hazardous and radioactive materials over the short term from the relocation of CMR operations and the associated materials, including process emissions and the handling of waste from equipment refurbishment.

Regardless of location, air emissions associated with the new CMRR Facility would introduce small amounts of radiological and nonradiological constituents to the air of the regions around LANL. Over the 50-year operating period, these emissions would result in additional loading and exposure, but would not impact compliance with air quality or radiation exposure standards at LANL. There would be no significant residual environmental effects on long-term environmental viability.

The management and disposal of sanitary solid waste and nonrecyclable radiological waste over the project's life would require a small increase in energy and space at LANL treatment, storage, or disposal facilities or their replacement offsite disposal facilities. Regardless of the location, the land required to meet the solid waste needs would require a long-term commitment of

terrestrial resources. Upon the closure of the CMR Building and the new CMRR Facility, NNSA could decontaminate and decommission the buildings and equipment and restore them to brown-field sites, which could be available for future reuse.

Regardless of location, continued employment, expenditures, and tax revenues generated during the implementation of any of the alternatives would directly benefit the local, regional, and state economies over the short term. Long-term economic productivity could be facilitated by local governments investing project-generated tax revenues into infrastructure and other required services.

The short-term resources needed to operate the new CMRR Facility at LANL would not affect the long-term productivity of the laboratory.

4.10.3 Irreversible and Irretrievable Commitments of Resources

Irreversible and irretrievable commitments of resources for each alternative, including the No Action Alternative, potentially would include mineral resources during the life of the project and energy and water used in operating the existing CMR Building and the new CMRR Facility. The commitments of capital, energy, labor, and materials during the implementation of the alternatives generally would be irreversible.

Energy expended would be in the form of fuel for equipment and vehicles, electricity for facility operations, and human labor. The energy consumption of facilities to support CMR operations would be a small fraction of the total energy used at the laboratory. None of the alternatives evaluated in this EIS would require significantly higher or lower energy consumption. CMR operations would generate nonrecyclable waste steams, such as radiological and nonradiological solid waste and some wastewater. However, certain materials and equipment used during operations could be recycled when the buildings are decontaminated and decommissioned.

The implementation of the alternatives considered in this EIS, including the No Action Alternative, would require water, electricity, and diesel fuel. Water would be obtained from onsite sources. Electricity and diesel fuel would be purchased from commercial sources. These commodities are readily available and the amounts required would not have an appreciable impact on available supplies or capacities. From a material and energy resource commitment perspective, resource requirements would be minimal.

The disposal of hazardous and radioactive waste would also cause irreversible and irretrievable commitments of land, mineral, and energy resources. Hazardous waste and low-level radioactive waste disposal would irreversibly and irretrievably commit land for its disposal. For each of the alternatives analyzed in this document, the No Action Alternative would require the least commitment of land, mineral, and energy resources.