LMS/DUD/S06350
DOE/EA 1770

Draft Environmental Assessment

Photovoltaic Solar Project at the Durango, Colorado, Site

August 2010

U.S. DEPARTMENT OF ENERGY | Legacy Management

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Summary

The Durango disposal site is located southwest of the city of Durango, in southwestern Colorado. It contains a partially below-grade uranium and vanadium mill tailings pile that has been encapsulated in an engineered cover system that is designed to isolate the mill tailings from the environment. The site is surrounded to the east, north, and west by lands owned by the Colorado Division of Wildlife and to the south by lands owned by the U.S. Bureau of Reclamation. County Road (CR) 211 and CR 212 are used to access the site from U.S. Highway 160/550.

DOE began evaluating the potential for reuse opportunities on its properties in 2006, and by 2007, the National Renewable Energy Laboratory (NREL) began studies on solar and wind energy potential on DOE properties that were remediated but that could not be released for public use (NREL 2007). In 2009, DOE was contacted by a local entrepreneur who wanted to know if the surface of the Durango disposal site could be used for a photovoltaic (PV) system that could be tied into existing transmission lines that cross the disposal site.

DOE subsequently identified two alternatives related to the development of PV systems on the disposal site; these alternatives are evaluated as the action alternatives in this environmental assessment (EA). Alternative 1 would involve placing PV panels on the 18-acre (ac) surface of the disposal cell. Alternative 2 would involve using not only the surface of the disposal cell but also areas covering 3.5 ac or more in the western portion of the disposal site. Alternative 2 would allow for maximum solar development at the site. Under the maximum solar development scenario, approximately 21 ac of the disposal site would contain solar panels and, based on preliminary estimates, Alternative 2 could support a potential to generate 4.5 megawatts (MW), or more, of energy. A 4.5 MW system could supply the energy needs for approximately 900 local residences. It is recognized that a lessee could potentially install a system with a larger capacity.

DOE has two constraints for solar energy development within the Durango disposal site. One of the constraints is that the ground surface of the disposal cell cannot be penetrated by structures related to the solar panels, and the other is that no components may be located on previously undisturbed areas within the disposal site. Advances in PV-system technology have created solar-panel-frame designs that use ballasts to support the structures that hold the solar panels, instead of relying on ground-penetrating structural supports.

DOE intends to publicly offer a 20-year lease, with a 5-year extension possibility, for the purpose of solar energy development on the Durango disposal site. A request for proposals would be expected to be released in early 2011. The lessee would be required to install, operate, and maintain the PV system and reclaim all areas at the termination of the lease. DOE would retain oversight during all phases, from installation through site reclamation. If any lease stipulations or other lease requirements were not being met, or if unanticipated damage to the cell were observed, DOE would be able to revoke the lease. A reclamation bond to cover reclamation costs would be a lease requirement.

This EA, which is prepared as a requirement of the National Environmental Policy Act (NEPA) and the DOE NEPA procedures and guidelines (DOE Order 451.1B, *National Environmental Policy Act Compliance Program*), evaluates the potential impacts of installing, operating, and maintaining a PV system and reclaiming areas used for the solar array. The NEPA process is being completed in parallel with the U.S. Nuclear Regulatory Commission's (NRC) review of a revised Long-Term Surveillance Plan. NRC must approve any change in the disposal site's use. If this EA process does not result in a Finding of No Significant Impact, then DOE would not pursue solar energy development on the disposal site and may consider other reuse opportunities. In addition, if NRC does not approve a change of the disposal site's use to include a PV system, DOE would not pursue renewable energy development on the Durango disposal site.

Early discussions with area political entities have elicited support for the development of solar energy. The local utility, La Plata Electric Association, has been contacted and may have interest in developing a system to tie into its existing transmission line, which crosses the disposal site. The State of Colorado encourages local utilities to use renewable sources of energy.

A public scoping meeting was held on May 3, 2010, in Durango, and 17 area residents attended. La Plata County provided written comments on issues they had concerns over; these included the concern that the presence of and reflection from the PV system would cause area residents—and even travelers on area roads—unacceptable visual intrusion. To address this concern, an extensive visual analysis was completed as a part of the NEPA evaluation. This EA includes the results. It was determined that the disposal cell surface could only be observed for a short time while driving along portions of CR 212, which provides access to the disposal site. Another concern was related to whether solar panels would impede DOE's ability to address potential future cell performance or perform maintenance actions. In accordance with the Uranium Mill Tailings Radiation Control Act of 1978, the disposal cell was designed to be effective for up to 1,000 years to the extent reasonably achievable, but for at least 200 years. At the time of this writing, there are no known reasons to conduct actions related to cell performance on the disposal cell surface. Other concerns were related to wildlife, Lake Nighthorse, trails, permits, and emergency management. This EA addresses wildlife, Lake Nighthorse, and trails. The lessee would be required to obtain all applicable federal, State, and local permits, and DOE would require the lessee to provide them with emergency contacts that could be shared with the County.

All impacts identified in this EA were considered minor or negligible and are summarized in Table 2. Operating a PV system would likely cause the loss of between 3.0 and 3.5 ac of vegetation due to changes in the environment beneath the solar panels. These areas would be reclaimed after the completion of the lease. Temporary to potential permanent displacement of some wildlife that inhabits perimeter areas of the disposal site would be expected related to noise and activity in the area during the installation and removal of the PV system. It is expected that displaced wildlife would move into the adjacent state wildlife area. Adding a renewable source of energy to the existing transmission lines would be beneficial. Mitigation measures related to maintaining site integrity, cultural resources, wildlife, and transportation have been identified and are included in this EA; they would also be included in a potential lease.

1.0 Introduction

1.1 Background

The Durango disposal site is a 120.6-acre (ac) property located southwest of the city of Durango in southwestern Colorado. The disposal site contains uranium and vanadium mill tailings that were removed from a nearby uranium processing site adjacent to the Animas River and near the city of Durango. The site is surrounded to the east, north, and west by lands owned by the Colorado Division of Wildlife (CDOW) and to the south by lands owned by the U.S. Bureau of Reclamation (BOR). County road (CR) 211 and CR 212 are used to access the site from U.S. Highway 160/550 (Figure 1).

In 1978, the Uranium Mill Tailings Radiation Control Act (UMTRCA) authorized the U.S. Department of Energy (DOE) to perform remedial actions at 22 inactive uranium processing sites. The purpose of the UMTRCA was to reduce the potential for adverse health effects on the public from residual radioactive materials in and around uranium mill tailing processing sites. The Durango uranium processing site in La Plata County, Colorado, was one of the 22 sites designated in UMTRCA for remediation. All contaminated materials were moved to a secure location called the Durango disposal site. The DOE Office of Legacy Management (LM) was designated the long-term custodian of all remediated UMTRCA sites.

The Durango disposal site contains an estimated 2.5 million cubic yards of uranium mill tailings and associated contaminated soils and debris that were removed from the former Durango processing site, and from vicinity properties. All contaminated materials were compacted in a disposal cell that was constructed partially below grade. A multi-component cover system, approximately 7 feet (ft) thick, was designed to isolate the contaminated materials. The top layer of the cover system consists of a vegetated rock-and-soil matrix that was graded to achieve a 1.5 to 2 percent slope for positive drainage away from the cell.

After the disposal actions were completed in 1990, the U.S. Nuclear Regulatory Commission (NRC) licensed the site for use as a disposal site. NRC requires continued compliance and adherence to the license terms as well as to the NRC-approved Long-Term Surveillance Plan (LTSP) (DOE 1996). The LTSP contains details on cell construction; general protective measures; and general requirements, including an annual site inspection and monitoring requirements. The LTSP did not consider other land uses within the disposal site, such as a solar project, because at the time of licensing, DOE did not consider other uses. DOE revised the LTSP to include reuse possibilities on the disposal cell and within the disposal site and provided the revised LTSP (DOE 2010a) to NRC for their review and concurrence.

In 2006, DOE began evaluating the potential for reuse opportunities on its properties. By 2007, the potential for developing solar and wind as renewable energy sources on federal properties was being evaluated. During the same period, the National Renewable Energy Laboratory (NREL) began studies on solar and wind energy potential on LM properties that were remediated but could not be released for public use (NREL 2007).

In 2009, a local entrepreneur approached DOE about installing photovoltaic (PV) solar energy panels on the Durango disposal cell. At that time, DOE was evaluating several disposal sites for renewable energy potential. DOE began discussions with NRC to identify potential concerns and

requirements for revising the LTSP to accommodate reuses on the disposal site. DOE also began exploring the terms and requirements that a long-term property lease would need to include.

This environmental assessment (EA) considers two alternative actions and the No Action Alternative. Alternative 1 involves installing an approximate 4 megawatt (MW) PV solar array on the vegetated surface (surface) of the disposal cell. Such a system would connect to existing transmission lines that cross the southwest corner of the disposal site. The surface of the cell takes up 18 ac, and it is assumed that most of the surface could reasonably be used for a PV system. Alternative 2 involves using not only the surface of the disposal cell but also areas in the west portion of the disposal site that were previously disturbed during the remedial action. Depending on a lessee's final acreage and panel capacity, these areas could add 3.5 ac to the PV system and increase the system's capacity to 4.5 MW or more. Either alternative would allow a larger or smaller system to be installed. However, neither alternative considers the use of the disposal cell's side slopes, though the use of the side slopes could be considered in the future.

1.2 Location of the Durango Disposal Site

The Durango disposal site is located in southwestern Colorado, approximately 3.5 road-miles from the city of Durango (Figure 1). The disposal site was originally a part of a large State wildlife area and would be considered remote from human presence and activities. Several transmission lines owned by Tri-State Generation and Transmission Association and La Plata Electric Association (LPEA) cross the site; all lines have excess capacity to accept additional electrical energy. Figure 2 provides a plan view drawing of the disposal site and shows the surface of the cell and previously disturbed areas, all of which could potentially be used to support a PV system. The most suitable areas for a PV system, based on accessibility and slope, are located in the southwest to west areas of the disposal site. Figure 2 also identifies surrounding land ownership.

1.3 Purpose and Need for Action

The proposed action of leasing portions of the Durango disposal site for the purpose of solar energy development would assist in meeting overall national goals related to energy independence as well as local utilities' goals to incorporate sources of renewable energy into their energy supply profile. The United States considers energy independence a top national priority and is committed to reducing its need for foreign energy sources and the burning of fossil fuels that increase greenhouse gases. Although the proposed PV system of 4.5 MW is small by national standards, it would assist in meeting these goals, and it is generally recognized that multiple small systems are an effective way to meet larger goals. DOE's preliminary estimates indicate that there is sufficient suitable area on the disposal site for a 4.5 MW system; a larger PV system could also be developed within the disposal site, depending on the lessee's design and available technology.

In addition to meeting national priorities, DOE is committed to finding appropriate alternative and productive uses for its LM disposal sites that otherwise cannot be released for public use. Leasing portions of the Durango disposal site for solar energy development would help DOE meet agency goals related to reuse and respond to a local request to consider solar development on the Durango disposal site.

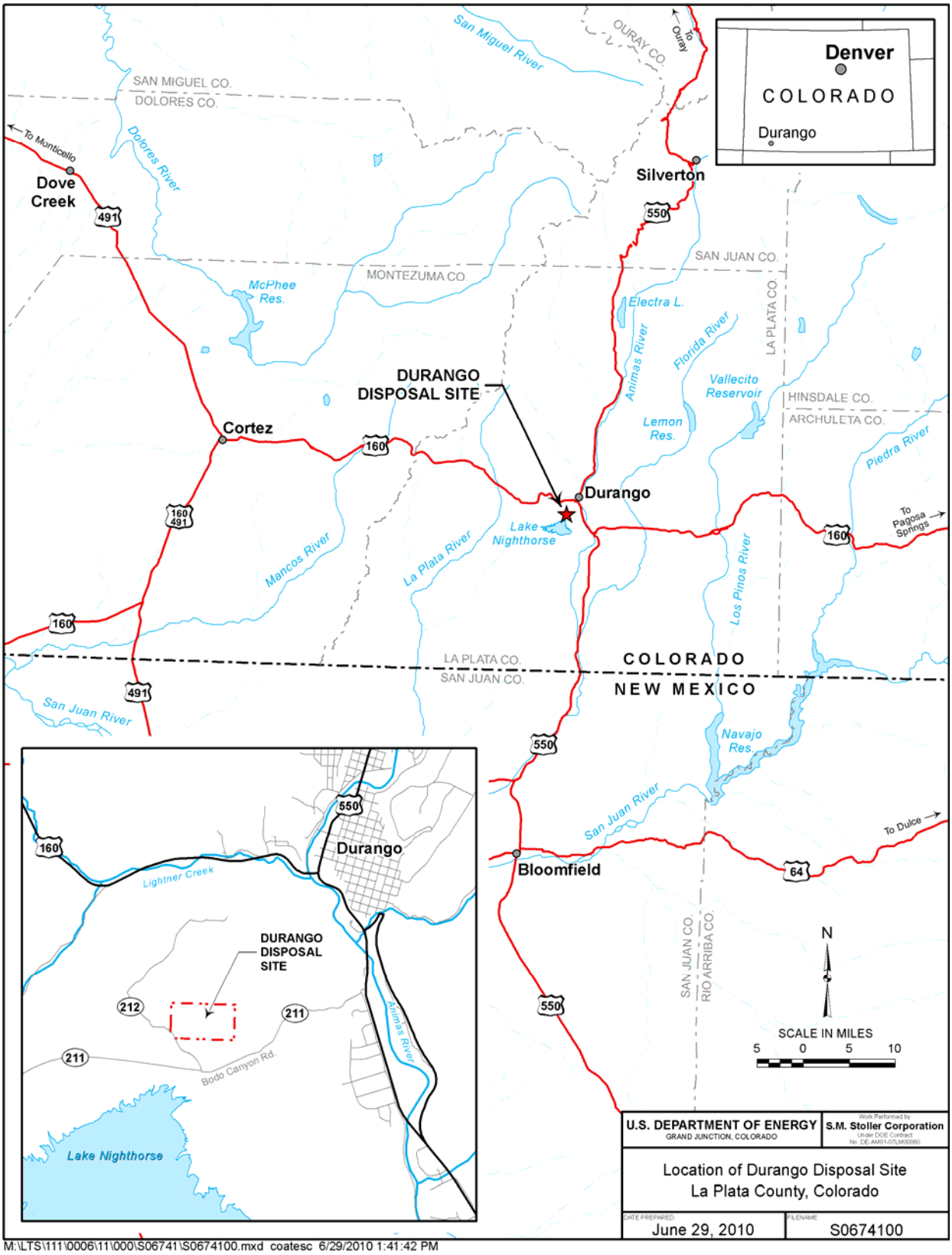

Figure 1. Location of the Durango, Colorado, Disposal Site

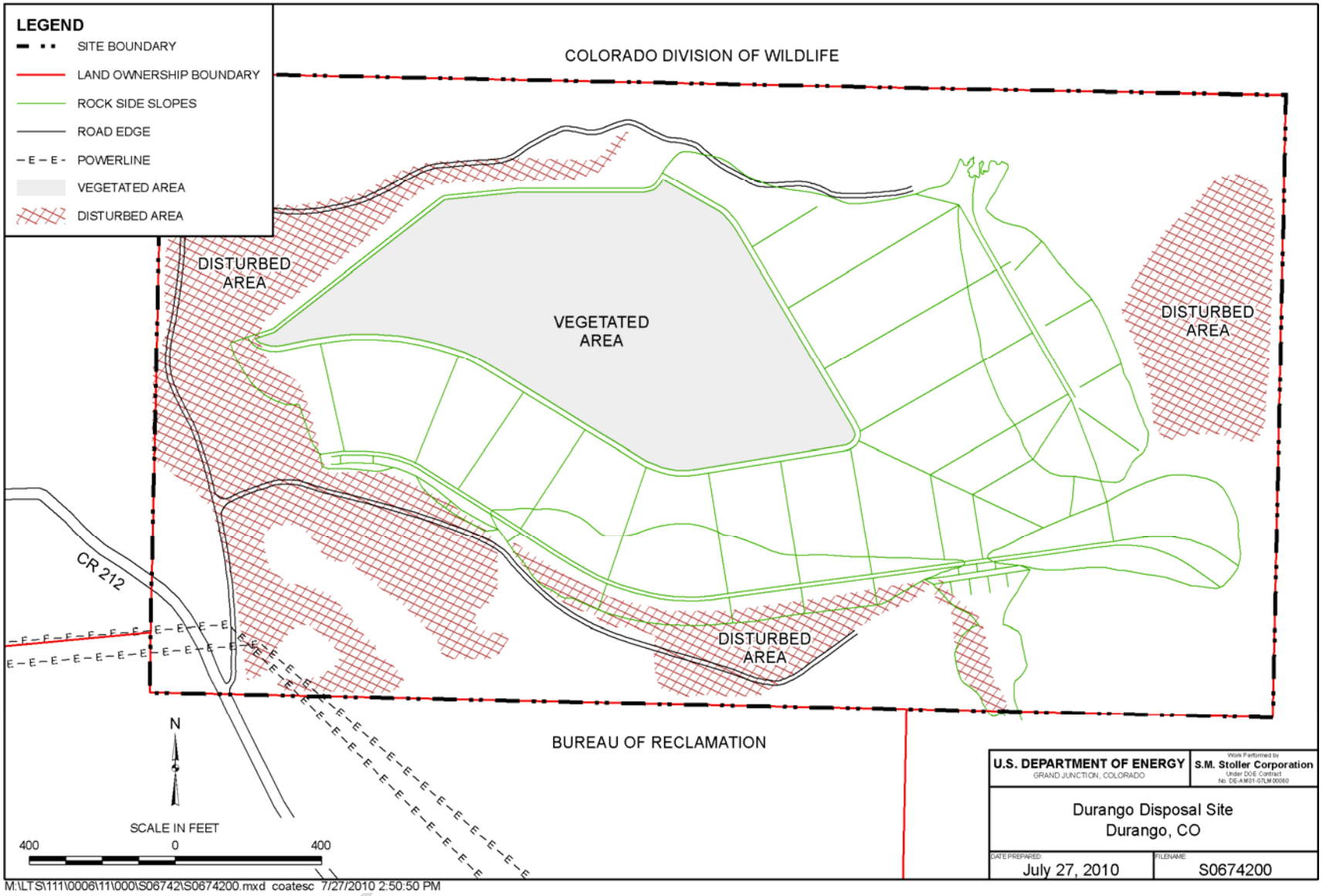

Figure 2. Durango, Colorado, Disposal Site Features and Surrounding Land Ownership

1.4 Relationship to Existing Regulatory and Policy Requirements

This EA is prepared in compliance with the National Environmental Policy Act (NEPA), which requires an analysis of impacts related to the physical, biological, and cultural environments for federal projects that would take place on federal land or that would be financed using federal funds. This EA is also prepared in accordance with requirements under DOE Order 451.1B, *National Environmental Policy Act Compliance Program*, and Title 10 *Code of Federal Regulations* (CFR) Part 1021, "National Environmental Policy Act Implementing Procedures."

The Durango disposal site is regulated for use as a disposal site under a general license issued by NRC. In order for surface portions of the site to be leased for the development of solar energy (or for any other reuse opportunity), NRC would need to approve a change to the license terms through a revised LTSP. DOE has provided a revised LTSP to NRC for their review and concurrence. The revised LTSP discusses the potential reuse of the disposal site, including developing solar energy, as well as mitigative measures to ensure site security. NRC's role is to ensure that DOE properly manages the disposal cell's protectiveness.

DOE would also seek the Colorado Department of Public Health and Environment's (CDPHE) approval of changes to the LTSP. CDPHE approved the original design of the disposal site and would continue to be involved in any land use changes.

Two federal executive orders identify various requirements and goals related to reducing the energy footprint associated with federal agency facilities and activities. These are Executive Order 13514, *Federal Leadership in Environmental Energy, and Economic Performance*, and Executive Order 13423, *Strengthening Federal Environmental, Energy, and Transportation Management*. Although the specific requirements within these orders are related to federal sites that contain buildings, the overarching intent is for federal agencies, through their policies and actions, to improve practices related to sustainability. The lease for the production of renewable energy on the Durango disposal site would not specifically reduce the DOE energy footprint; however, it would benefit overall energy supplies and demonstrate DOE's commitment to finding achievable ways to work toward a sustainable future.

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2.0 Issues, Concerns, and Public and Agency Involvement

2.1 General Background

The NEPA process includes a requirement to involve the public in federal actions that are being evaluated in a NEPA document (Council on Environmental Quality [CEQ], Section 1606.6, "Public Involvement"). Under NEPA, the amount of public involvement is considered on a sliding scale as related to the scope and scale of the proposed project, the level of NEPA documentation (EA versus environmental impact statement), and the potential public interest in the action under consideration. Public involvement could consist of an online announcement, letters, meetings, or a combination of these efforts.

DOE developed a public participation plan to help guide internal processes. To obtain an early understanding of local issues and concerns related to the proposed actions, an informal telephone conference was held with County representatives, which was followed by a formal presentation made by DOE to the La Plata County Commissioners. DOE wanted to identify early whether there would be opposition to or support for the project. These early contacts elicited support for the idea of renewable energy and an expression of interest in participation. In addition, DOE provided a description of the proposed actions to the local congressional representatives. DOE also has met with representatives of LPEA to inform them of the proposed project and to explore if they had potential interest in any phase of the project.

DOE is committed to a transparent process and consideration of local concerns. A website available to the public (DOE 2010b) provides current information. In addition, a database of interested citizens has been established, and the citizens included in it will receive e-mails related to the availability of the EA. The draft and final EA will also be posted on the NEPA website (DOE 2010c).

2.2 Public Scoping

Early in the EA process, a scoping meeting is generally held to provide interested members of the public with information on a proposed federal project, to request contact information for future contacts, and to be available to answer questions raised by the public. On May 3, 2010, a public scoping meeting was held in Durango to provide information on the proposed solar energy alternatives under consideration for the Durango disposal site and to be available to answer questions. Seventeen local residents attended the scoping meeting. Their questions addressed a variety of concerns and interests. Most of the questions—and the corresponding answers given by DOE, CDPHE, or contractor staff present—are summarized as follows:

- *Would DOE consider other types of solar power systems besides PV, such as concentrating solar?* At present, no other types of solar power systems are under consideration. Concentrating solar energy requires infrastructure that NRC would not allow on the disposal site, and it is associated with more maintenance and more visibility issues.
- *Could DOE consider the side slopes of the disposal cell for placement of a system?* DOE will evaluate this.
- *What are the terms of the lease?* DOE would not expect to generate income related to a lease, and the lease term would be 20 years with one 5-year option.

- *Could local involvement, including that of a local office with local staff, be required?* Any operation would involve a local office.
- *Could the contract extend a preference for local ownership?* DOE would consider local procurements as a lease-evaluation criterion.
- *Would the solar panels affect cell performance?* DOE does not expect that the solar panels would affect cell performance.
- *Would water shedding from the solar panels cause erosion?* DOE is concerned about possible erosion. Erosion issues would be addressed through the leasing process with technical specifications and inspection.
- *Would there be on-site access to a grid with sufficient capacity?* Yes.
- *Has DOE considered the installation cost per MW?* No. Doing so would be the developer's responsibility.
- *Will there be an opportunity for local non-profits to create co-ops and have ownership in the project?* The extensive bonding and insurance requirements may be difficult to meet, and a system must be developed within 2 years of a lease being issued.
- *Must local utilities meet any renewable energy goals?* Major utilities have renewable source requirements that they must meet. LPEA has an internal goal but will not be required to meet a State standard.

2.3 Agency Involvement

The NEPA process requires the applicable federal agency to contact other federal or State agencies or other appropriate entities that have a regulatory role or that may have other interests in the project's outcome. DOE contacted the following agencies and entities to determine their interest in being an official reviewer of the EA as a cooperating agency or entity: NRC, CDPHE, the Colorado Governor's Office, CDOW, and the La Plata County Commissioners. The Ute Mountain Ute and Southern Ute tribes were also contacted. In compliance with cultural resource requirements, DOE contacted the State Historic Preservation Office.

NRC responded that they wished to review the EA and would provide comments but did not want to be a cooperating agency. The La Plata County Commissioners responded that they were interested in being a cooperating agency and in reviewing and providing comments on the EA. After the public scooping meeting that was held on May 3, 2010, La Plata County provided comments related to the following concerns: visual intrusion, wildlife, Lake Nighthorse and trails, cell integrity or cell performance, permits, and emergency management (Hughes 2010a). This EA addresses these issues. The Southern Ute Tribe indicated an interest in meeting with DOE, and on July 19, 2010, DOE and contractor representatives met with representatives of the Tribe to answer questions and provide a tour of the disposal site. The remaining contacts either did not respond or responded that they would provide comments but would do so unofficially.

3.0 Description of Alternatives

3.1 PV Solar Energy Production Requirements

PV systems consist of modules (usually flat plates), frames to hold the panels, and electrical infrastructure.

PV panels are mounted on structural steel or aluminum frames that position the panels at the proper angle to the sun. The panels are connected with electrical conduit and wiring aboveground to carry the generated direct current (*dc*) electricity. The *dc* is converted to alternating current (*ac*) through an inverter, and the *ac* then passes through a transformer to increase the voltage so that it equals the connecting line voltage.

Solar panel frames are typically anchored in subsurface foundations to secure the panels from wind damage. However, due to the non-penetration restrictions on the engineered cell cover at the disposal site, an alternative design, based on ballasting instead of on anchoring into the cell surface, would be used to secure the panels. Concrete blocks may be used for ballast for the frame panels. Figure 3 provides a conceptual view of how this system would look. An electrical line would be needed to connect the power from the panels to one of the existing transmission lines. Current restrictions allow a few shallow trenches for high-voltage lines, if needed. If shallow trenches were required, they could not penetrate below the frost barrier.

Solar frame installers prefer flatter slopes in the range of 1 to 2 percent for ease of installation. The cover of the cell was constructed with a slope between 1.5 and 2 percent. No additional grading or disturbance of the cover would be allowed (with the exception of a shallow electrical line trench), and the lessee would be required to maintain the existing vegetation as much as practical.

If areas off of the cover and outside of the riprapped (rock-covered) side slopes were used for panels (Alternative 2), they would be graded to a flatter slope. Existing slopes range from 2 to 15 percent. Steeper areas are not envisioned for installation of panels. Figure 4 shows areas within the disposal site that may be considered for the placement of solar panels.

Concern has been raised about potential unacceptable erosion that could result if the solar panels concentrate runoff. Lease conditions would include a requirement that the installers would be responsible for any panel design modifications that would be needed to minimize erosion. Ideas being considered are gutters, splash plates, or additional rock placed under the panels. Moreover, to ensure that erosion does not occur or progress and cause site damage, DOE would increase the frequency of their inspections of the site from annually to monthly, when the site is accessible, or schedule inspections on an as-needed basis.

A standard solar array is composed of individual solar modules. A typical module is sized between 170 and 220 watts and has the following dimensions:

- 170-watt module—dimensions: 62 inches × 31 inches; weight: 34 pounds
- 220-watt module—dimensions: 66 inches × 40 inches; weight: 43 pounds

Modules are typically tied into sub-arrays consisting of rows of modules. The energy from the sub-array is fed into an inverter that changes the *dc* to *ac*. The transformer then converts the voltage to the line voltage to which it is connecting.

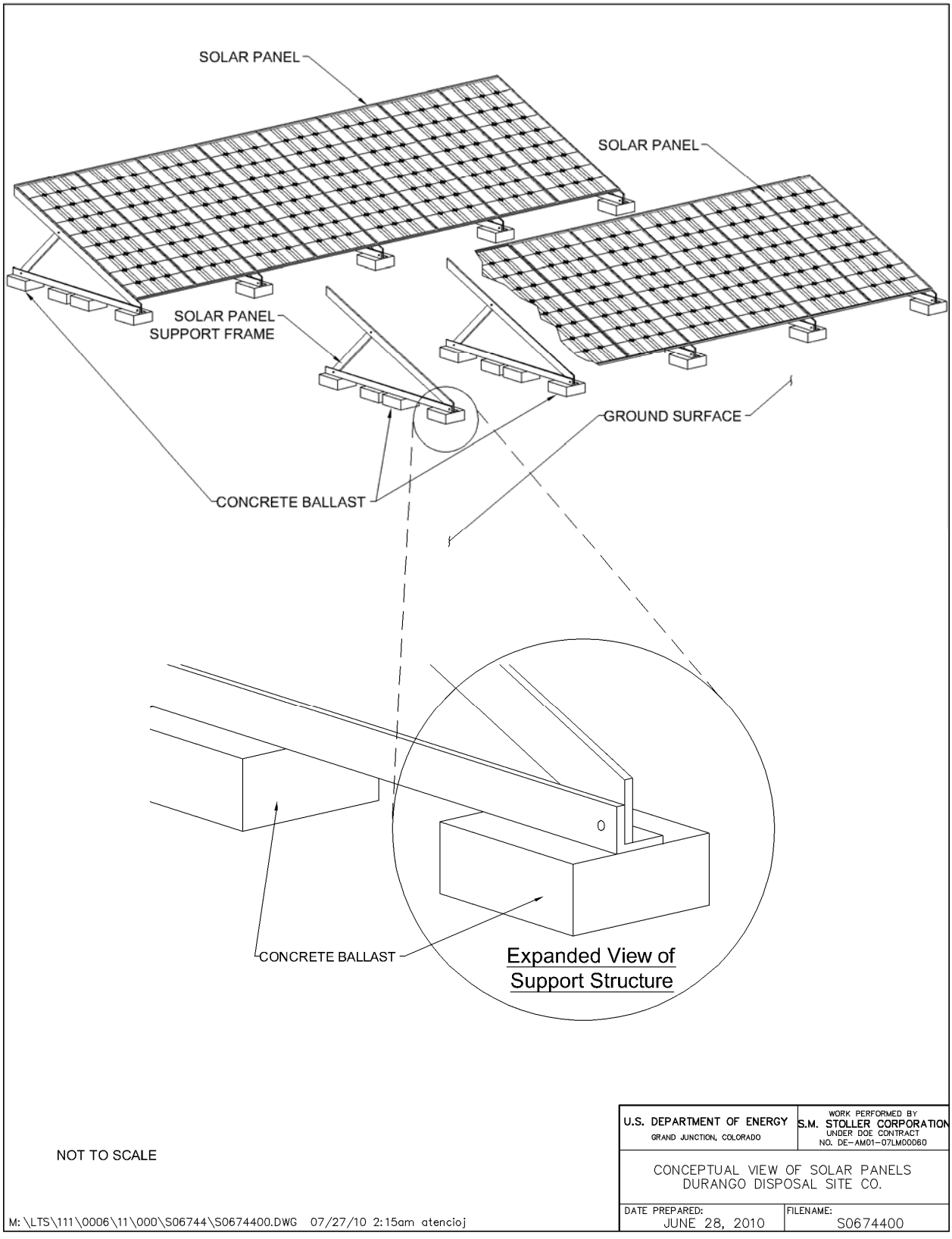

Figure 3. Conceptual View of Solar Panels under Consideration

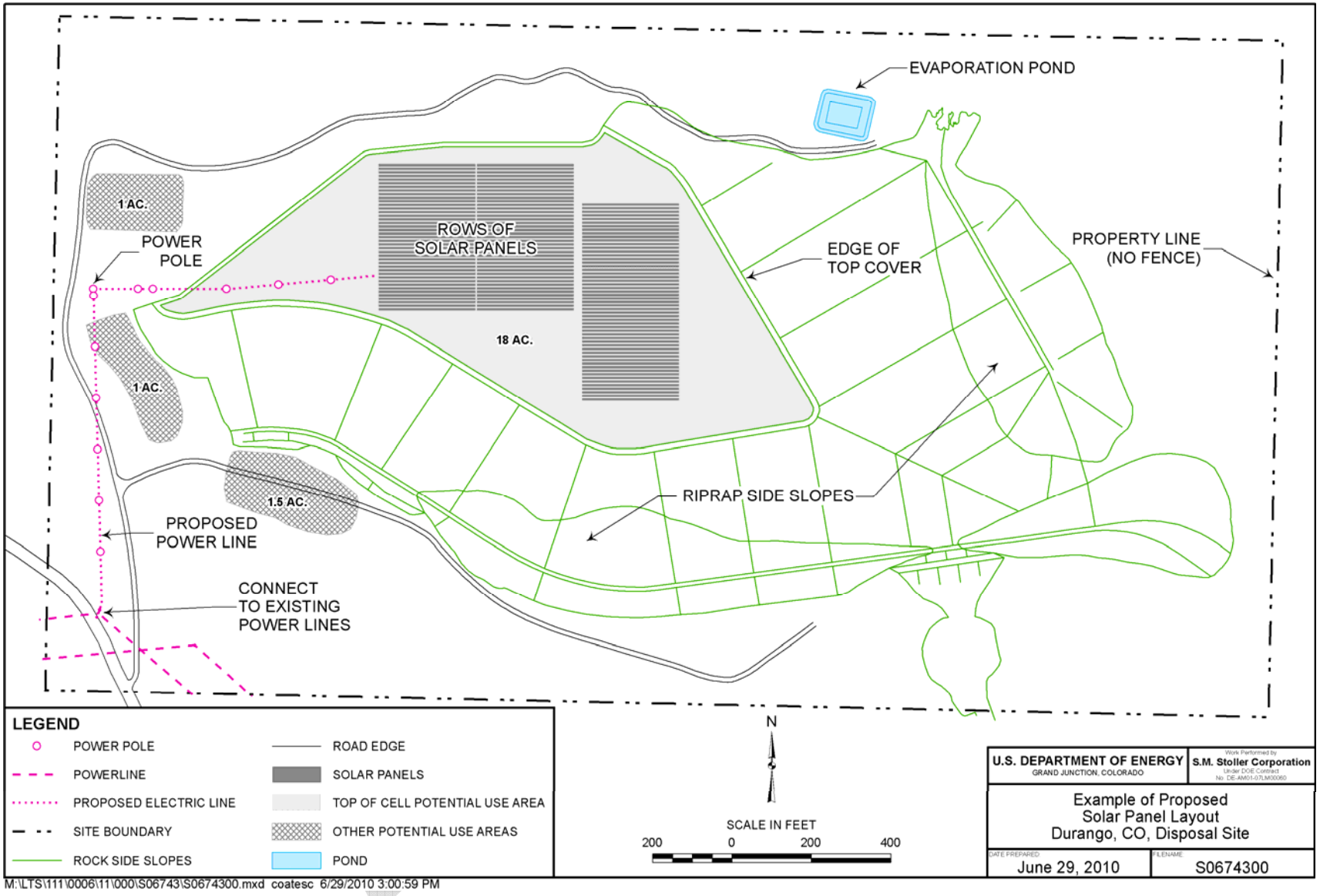

Figure 4. Example of Possible Solar Panel Use Areas

An array of fixed-tilt panels would occupy approximately 33 percent of the ground, leaving room for roads and access between them. A 500 kilowatt (KW) *ac*-rated system would cover approximately 2.3 ac, while a 1 MW system would cover 4.6 ac. A 4.5 MW system would cover approximately 21 ac. The exact energy-to-acreage conversion depends on solar conditions for a particular location. Based on an average home use of 700 KW hours per month, which LPEA has calculated, a 4.5 MW system may supply an estimated 900 residences in the Durango area with power.

The lessee may require some fencing improvements to deter intruders from accessing the site on CR 212. Fencing around the entire site is not practical. Some fencing improvement is envisioned around the southwest corner of the site, which is also the entrance area.

To ensure access, the dirt road on site would be bladed and improved with gravel. If access across a rock-lined storm channel is needed, the crossing could be designed with geotextile fabrics and rock, so that water could still flow through the channel.

Construction of the system would be primarily by a mobile workforce or possibly a local installation company that would need an estimated 10 workers, including oversight and supervisory personnel. A temporary construction trailer and generator would provide office space during the installation of the panels. The proposed maximum solar development of 4.5 MW that would occur under Alternative 2 would take approximately 4 months to complete. Solar development on the disposal cell surface may be completed in 1 month. If a lessee could configure a larger- or smaller-capacity system, incremental changes in expected installation time and necessary workforce would be considered minor.

All of the areas considered for the two action alternatives have been disturbed either through the installation of the engineered cover or were disturbed by activities related to the remedial action. DOE would restrict the location of system components to previously disturbed areas.

Fixed-tilt systems do not require significant maintenance. Any water used to wash panels would have to be trucked onto the site, using long hoses as necessary. A small shed may be constructed on the disposal site (but off the cell) to contain some supplies, tools, and spare parts.

No provisions for upgrades to an installed PV system are under consideration in a lease at this time. However, it is anticipated that technological advances might warrant changing out the panels in 10 to 15 years to improve efficiency. This EA does not evaluate impacts related to potential system upgrades.

PV arrays have an estimated lifetime of 30 to 40 years. Due to degradation of the panels over time and technological advances in panel efficiencies, it is assumed that a potential 25-year lease would provide a suitable investment period. After the completion of the lease, the lessee would be responsible for removing the panels and associated components, and reclaiming all areas to their original condition. The reclamation of disturbed areas would likely include tilling the top 6 inches of soil to improve soil structure before reseeding.

3.2 Alternative 1—Use Surface of Disposal Cell

Under this alternative, only the surface of the disposal cell would be available for solar panel installation. The surface of the disposal cell covers 18 ac. Because the surface of the disposal cell has an irregular shape, it would not be possible to use the entire surface. Figure 4 illustrates one possible area of panels on the disposal cell; however, it doesn't show the maximum extent of the

area that could be covered. In addition to the solar panels, a shallow trench to convey electrical lines would be excavated from the solar panels to an inverter off of the cell, but within the disposal site. One of the existing transmission lines that cross the disposal site would be used to convey the electrical energy. It would take approximately 1 month for a 10-person work crew to install the system components. DOE would additionally have one inspector on site for all or part of this time. The surface of the disposal cell would be expected to support a 4.0 MW PV system; however, a lessee may choose to install a larger- or smaller-capacity system that is compatible with the available surface area and specific PV system requirements.

3.3 Alternative 2—Maximize Use of Disposal Site

This alternative includes the use of the disposal cell surface area described in Alternative 1 and, in addition, the use of previously disturbed areas adjacent to the disposal cell. Areas considered potentially available for locating solar panels are in the southwest and west areas of the disposal site (Figure 4). It is expected that, in addition to a 4.0 MW system on the surface of the disposal cell, a 0.5 MW PV system could be reasonably located on 3.5 ac adjacent to the disposal cell. Although this alternative considers a total system capacity of 4.5 MW, it is reasonable to expect that a final system may have a larger or smaller capacity based on the specific system configuration, available system components, and DOE requirements. This alternative would require an estimated 4 months to install and may require a slightly larger workforce than identified for Alternative 1 (10 workers).

3.4 No Action Alternative

The No Action Alternative is the continuation of the existing situation. The disposal site would continue to be managed strictly as a disposal site, and no other uses of surface areas would be allowed. The current activities of monitoring the cell would continue as required by NRC and described in the LTSP (DOE 1996, 2010a). These activities include general maintenance of site features (e.g., weed control, sign replacement), groundwater monitoring, and an annual site inspection.

3.5 Other Alternatives Considered but Dismissed from Detailed Evaluation

A participant at the May 3, 2010, public scoping meeting raised the possibility of developing a concentrating solar power renewable energy system instead of a PV solar energy system. DOE did consider this option but, upon evaluation, decided not to pursue this as an alternative, for the following reasons: concentrating solar power requires infrastructure that would be ground-penetrating; concentrating solar power requires a greater degree of cleaning and other maintenance; concentrating solar power reflects light to a much greater degree than do PV systems. DOE does not believe that NRC would grant a license change to include facilities to support a concentrating solar energy system.

Another alternative raised at the May 3, 2010, public meeting related to configuring panels to go down the side slopes of the disposal cell. The individual who brought up this alternative believed that the panels could be engineered by using ballast at the top and bottom of the slopes to avoid penetration. DOE engineers do not believe this is a feasible alternative and are not considering it at this time. This option may be considered in the future after more traditional configurations have been developed, if the lease is granted, and if NRC consents to this alternative use of the disposal site.

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4.0 Affected Environment

4.1 Introduction

The Durango area is well known regionally and throughout Colorado for its recreation opportunities and numerous tourist attractions, which include the Durango to Silverton Narrow Gauge train, nearby Mesa Verde National Park, and a variety of outdoor recreation opportunities. Area recreation includes prime fishing, rafting, and kayaking on the Animas and other nearby rivers; hunting; running, hiking, and mountain-bike trails; alpine and cross-country skiing; and incomparable photographic opportunities. The local branch of the State college system, Fort Lewis College, provides many 4-year degree opportunities. A recent sustainability fair held in Durango featured alternative transportation, which speaks to the local interest in sustainability and renewable energy. Several area businesses design and install solar energy systems. In response to the area interest in renewable energy and sustainable living, the City of Durango has established a sustainability coordinator position. All aspects of City energy use are routinely evaluated, and the use of green products is required as appropriate (City of Durango 2010).

The Durango disposal site is located southwest of the city of Durango within La Plata County. Uninhabited land managed by CDOW for wildlife habitat surrounds the disposal site to the north, east, and west. Uninhabited land managed by BOR is to the south of the disposal site. Several miles west of the disposal site are subdivisions that were largely developed since 2000 and contain single-family homes. Several miles to the east is U.S. Highway 160/550, a main north–south travel route that has commercial business development along the highway corridor (Figure 5).

Future residential and commercial development in La Plata County could occur on areas of private land. The proposed installation, operation, maintenance, and reclamation of a small PV system would not impact County plans or resources because all actions would occur on DOE property. Proposed county-area developments would not affect the installation, operation, maintenance, or reclamation of a solar array system.

Once a system was installed, only minor site visitation would occur. The proposed workforce necessary to install or remove a PV system would consist of an estimated 10 workers. Depending on the final level of development pursued by the lessee, it is anticipated that between 1 and 4 months would be required to complete the installation. Neither the potential workforce needed to install a system nor the anticipated time to complete the installation would have any impact on the existing employment, schools, or other related socioeconomic factors.

Most of the disposal site was extensively disturbed during the remediation. The site has no natural surface water sources. A small evaporation pond is located in the northeast portion of the site and was developed to contain water draining from the disposal cell. The presence of panels on the surface of the site would not affect groundwater. The LTSP (DOE 1996, 2010a) describes groundwater conditions at the site.

Only one natural hazard was identified for the disposal site area. The La Plata County website rates the area as having a high wildland fire risk (La Plata County 2009a). Emergency personnel would be identified in the final lease agreement, and appropriate contacts for the leaseholder would be provided to local emergency personnel.

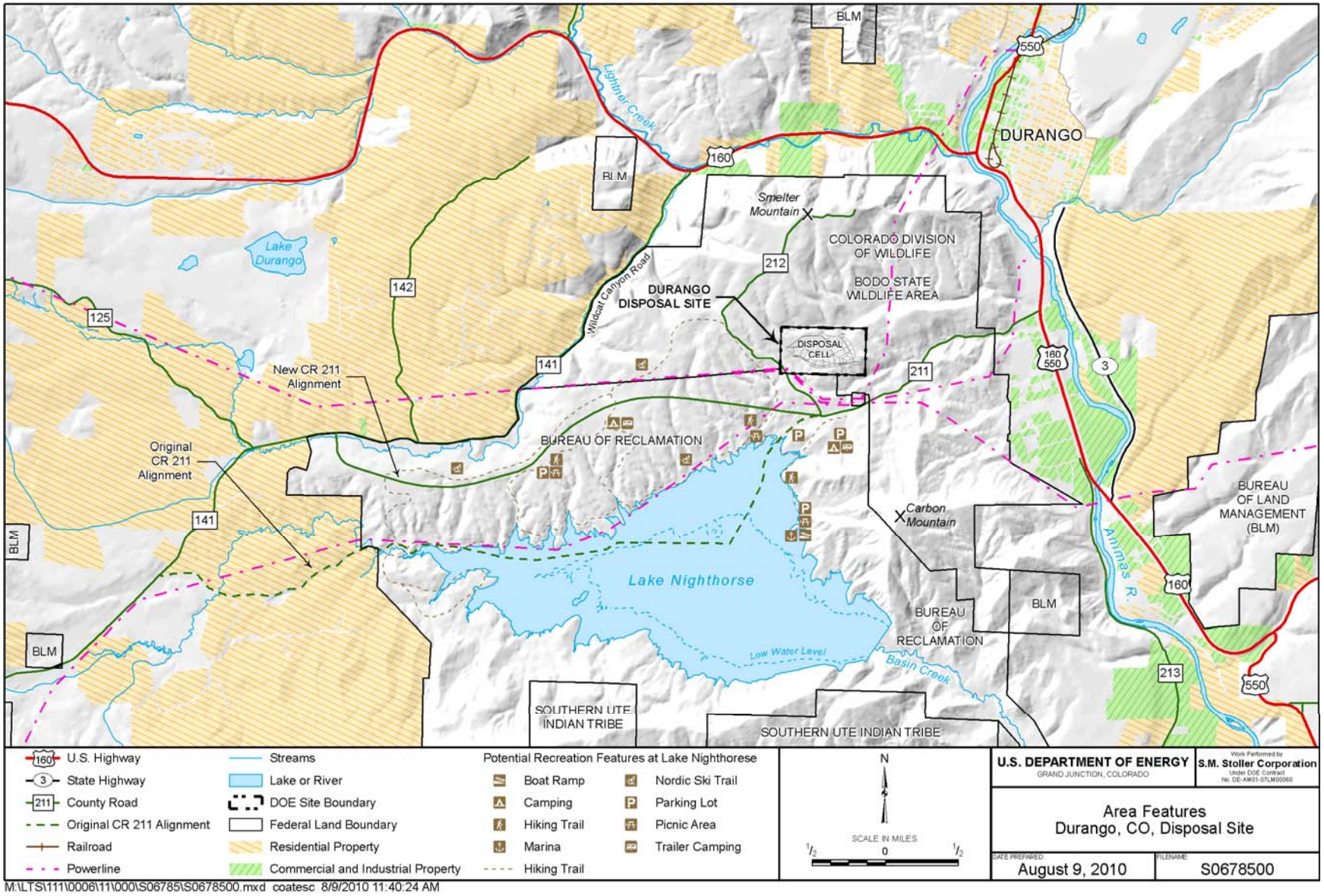

Figure 5. Existing and Proposed Features near the Durango Disposal Site

4.2 Environmental Justice, Noise, Occupational Worker Health and Safety, and Intentional Destructive Acts

4.2.1 Environmental Justice

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, requires that each federal agency consider and address "disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." One of the terms and conditions in the lease would be: "the Lessee agrees not to discriminate by segregation or otherwise against any person or persons because of race, color, creed, sex, or national origin in furnishing, or by refusing to furnish to such person or persons the use of any facility, including any and all services, privileges, accommodations, and activities provided therein." In addition, the location of a PV system in an area surrounded by public land and on a disposal site could not affect any minority communities or their environment. Therefore, this element is not considered further in this EA.

4.2.2 Noise

Noise levels are measured in decibels, and maximum decibel levels considered protective of human hearing are identified for various activities and pieces of equipment. As appropriate, hearing protection would be required for workers under Occupational Safety and Health Administration regulations during the installation of the solar array.

There are no noise sources on site or from immediately adjacent areas. The combination of vegetation screening and land configuration blocks noise, but more important, the area is remote from noise-generating activities. The short-term activities and equipment related to the installation of the solar array would not likely cause noise impacts to off-site areas.

PV systems do not generate noise once they are installed. Consequently, the presence of a solar array on the Durango disposal site would not introduce a source of noise to the area. For this reason, this resource is not considered further in this EA.

4.2.3 Occupational Worker Health and Safety

Neither DOE nor its contractors would perform any of the proposed actions. If DOE or its contractors were on site, they would be required to comply with existing processes and procedures implemented under 10 CFR 851, "Worker Safety and Health Program." The winning bidder would be required to abide by the various laws governing occupational health and safety for its own employees (such as 29 CFR 1926, "Safety and Health Regulations for Construction") but would not be subject to 10 CFR 851.

The PV system is expected to be limited to the surface of the disposal cell. However, to avoid creating overhead electrical lines, a shallow trench may need to be dug into the cell, depending on approval from NRC. Or, electrical conduit may be used to run electrical lines across the surface of the cell. The conduit, if used, would be required to be weather-resistant and strong enough for vehicles to drive over. The lessee would be required to supply DOE with as-built drawings that detail the location of any buried electrical lines installed.

The disposal cell was designed to contain radioactivity and to prevent the emanation of radon from the cell. The top of the uranium tailings are approximately 7 ft below the surface of the cell. The National Emission Standards for Hazardous Air Pollutants places a limit of 20 picocuries per meter squared per second (20 pCi/m^2/sec) on the release of radon to the ambient environment (40 CFR 61.222[a]) from non-operational uranium tailings piles, which is considered comparable to closed uranium cells. The radon flux measured across the Durango disposal cell cover after it was completed was 0.2 pCi/m^2/sec, or a factor that is 100 times smaller than the allowable limit. Because the tailings would not be breached, there would be no radiological exposure related to the buried uranium mill tailings. Therefore, this resource is not considered further in this EA.

4.2.4 Intentional Destructive Acts

The installation and operation of a PV system would not involve the transportation, storage, or use of radioactive, explosive, or toxic materials. In addition, the small size of the system (approximately 4.5 MW) would not provide an inviting target that would result in an interruption of a power grid. Consequently, it is highly unlikely that terrorists would view the installation or operational aspects of the system as a potential target. It is expected that the current known acts of vandalism, which include removing signs, shooting signs and markers, and littering, would continue after the installation of a solar array. Once Lake Nighthorse becomes fully developed as a recreational center for the area, there would be greater volumes of traffic and people in the general area, and recreationists would use CR 211 to access the lake. Additional traffic on CR 212 is also expected, and it is likely that greater occurrences of vandalism, regardless of the presence of a solar array on the site, would occur. If any of the panels were shot at as part of an act of vandalism, no fluids or hazardous materials would leak from an opening. If the lessee decides to fence the perimeter of the site or provide security patrols, the existing or potential vandalism may decrease.

The proposed actions of installing and operating a PV system on the disposal cell surface or on previously disturbed areas within the disposal site would not provide an attractive target or opportunity for terrorists to cause adverse impacts to life, health, or safety. For this reason, this element is not considered further in this EA.

4.3 Resources Considered but Not Present or Impacted by Any Alternatives

4.3.1 Floodplains and Wetlands

No 100-year floodplains exist on or adjacent to the Durango disposal site. Floodplains associated with the Animas River occur approximately 1.5 miles east of the site and would not be affected by the proposed work (La Plata County 2009b).

Wetland vegetation associated with a human-made evaporation pond is in the northeast portion of the disposal site. Because the hydrology in this vegetated area is sustained by pumping, it is not a jurisdictional wetland. However, several small potential wetland areas have formed in drainage features at the site, and these areas, though never delineated, may be jurisdictional. They are located in deep drainages in the southwestern and eastern portions of the site and would not be affected by site activities.

Because no floodplains or wetlands are present or would be affected by site activities, no consultation or permitting is required with the U.S. Army Corps of Engineers. For this reason, these resources are not considered further in this EA.

4.3.2 Prime and Unique Farmlands or Soils

Prime and unique soils are protected under the Farmland Protection Policy Act of 1981. The purpose of the law it is to minimize the extent to which federal activities contribute to the irreversible and unnecessary loss of agricultural land to non-agricultural uses. No prime and unique soils or agricultural lands are present on the Durango disposal site. Therefore, this resource is not considered further in this EA.

4.3.3 Wild and Scenic Rivers, State or National Parks or Forests, or Other Areas of Scenic or Aesthetic Importance

The Wild and Scenic Rivers Act designates selected rivers of the United States for protection. No designated wild and scenic rivers cross or are near the Durango disposal site or would be impacted by this project. There are no State or national parks, forests, or other areas of scenic or aesthetic importance near the Durango disposal site. Therefore, these resources are not considered further in this EA.

4.3.4 Threatened or Endangered Species

The U.S. Fish and Wildlife Service (USFWS) website (USFWS 2010a) is updated daily and was accessed to determine whether any federally listed plant or wildlife species may be present in the Durango disposal site area. Ten wildlife species were listed as present in La Plata County. Either habitat for these species is not present or the species is no longer listed as threatened or endangered in the disposal site area. These species include the following:

- Arctic peregrine falcon (*Falco peregrinus tundrius*): no longer listed
- Yellow-billed cuckoo (*Coccyzus americanus*): a candidate species; habitat not present
- Mexican spotted owl (*Strix occidentalis lucida*): habitat not present
- Southwestern willow flycatcher (*Empidonax traillii extimus*): habitat not present
- Colorado pikeminnow (*Ptychocheilus lucius*): habitat not present
- Razorback sucker (*Xyrauchen texanus*): habitat not present
- Uncompahgre fritillary butterfly (*Boloria acrocnema*): habitat not present
- Black-footed ferret (*Mustela nigripes*): habitat not present
- Canada lynx (*Lynx canadensis*): habitat not present

The Knowlton cactus (*Pediocactus knowltonii*) was listed as potentially present in La Plata County. However, the most recent 5-year review (USFWS 2010b) confirms that the species is restricted to New Mexico.

Under Section 7 of the Endangered Species Act, no consultation is required with USFWS if a federal agency determines that a proposed action will not affect a listed species or critical habitat.

No federally listed wildlife or plant species are present or potentially present on the surface of the disposal cell or in previously disturbed areas.

4.4 Other Resources Considered

4.4.1 Climate, Air Quality, and Greenhouse Gas

The following information characterizes the climate at Durango, which is situated at 6,512 ft above sea level. In general, the climate in the Durango area is characterized by warm summers, cold springs and autumns, and moderately cold winters. Winter temperatures average a high of 41.9 degrees Fahrenheit (°F) and a low of 13 °F. Average snowfall is approximately 70 inches. Summer temperatures average a high of 83 °F and a low of 47 °F. Wind blows from the north at between 5 and 10 miles per hour. It is assumed that the climate at the disposal site, located at 7,100 ft above sea level, would be similar but colder during all times of the year and would have a greater snow depth. The Durango area generally experiences an average of 300 sunny days a year.

Air quality at the disposal site is free of any pollutants or recognized elements of concern (e.g., ozone). The remoteness of the area and lack of adjacent developments contribute to excellent air quality.

4.4.2 Visual Resources

Visual resources are the visible physical features of a landscape that impart scenic value. Currently, the physical features at the Durango disposal site contrast sharply with the surrounding natural landscape as a result of past disposal cell construction. The disposal site consists of simple, smooth forms created by the flat, grass-covered cell top and bright-colored, riprapped side slopes. Immediately surrounding the disposal cell are smooth, gently sloping, reclaimed grassland areas. In contrast, the surrounding natural areas consist of more-complex, textured forms created by dense stands of dark-green trees and rugged hillsides.

The scenery in the general vicinity of the disposal cell consists of a mixture of landscape types, from (1) a smooth, reflective lake and barren construction areas associated with the new Lake Nighthorse in the nearby valley bottom; to (2) clear-cut pipeline and power line rights-of-way; (3) smooth, linear dirt roads; and (4) rugged, dark mountains in the background. Scattered throughout the landscape are numerous steel-colored, vertical communication towers and electrical transmission poles. Although it is a rural landscape, it has been highly transected by human-made geometric forms.

The disposal site can be viewed primarily from CR 212, an improved dirt road, which provides access to the disposal site as well as to numerous communication towers on the top of nearby Smelter Mountain. Communication companies that maintain the towers, transmission-line employees, BOR personnel associated with Lake Nighthorse, hunters, mountain-bikers, and other recreationists use this road. DOE staff members often see local inhabitants parked on CR 212 near the disposal site, or hiking or sitting in nearby wooded areas. Figure 6 shows a typical view of the disposal site by a northbound traveler on CR 212. When a person is traveling northbound, he or she can barely see the top of the disposal cell. The disposal cell's riprapped side slopes are intermittently visible for a total time of approximately 1.5 minutes by northbound travelers and 1.6 minutes by southbound travelers.

Figure 6. View of the Durango Disposal Site Looking North from CR 212 (Transmission lines and a pole are visible in the foreground.)

4.4.3 Wildlife

The CDOW-owned and -managed Bodo State Wildlife Area (SWA) surrounds most of the Durango disposal site. This large area encompasses 2,293 ac. Deer, elk, rabbit, dusky (blue) grouse, band-tail pigeon, and dove can be hunted within the SWA. No hunting is allowed within the disposal site. Large herds of elk and deer winter north of the disposal site in the SWA. Bald eagles (*Haliaeetus leucocephalus*) are known in the area, and three nests are typically seasonally occupied just east of Lake Nighthorse on Mount Carbon, several miles southeast of the disposal site. When Lake Nighthorse is completely full, Osprey (*Pandion haliaetus*) are expected to frequent the area. Ferruginous hawks (*Buteo regalis*) are known to hunt in the SWA.

CDOW provided the following information on wildlife and bird species that are known to, or have the potential to, occur within the SWA. None of the species are federally listed. With the exception of the bald eagle, ferruginous hawk, and midget faded rattlesnake, which the State has deemed threatened or a "species of special concern," all of the species are listed as "species of greatest conservation need" in the Colorado Wildlife Conservation Strategy (Schuler 2010).

Bald eagle (*Haliaeetus leucocephalus*)
Golden eagle (*Aquila chrysaetos*)
Ferruginous hawk (*Buteo regalis*)
Swanson's hawk (*Buteo swainsoni*)

Band-tailed pigeon (*Patagioenas fasciata*)
Black-throated warbler (*Dendroica nigrescens*)
Pinyon jay (*Gymnorhinus cyanocephalus*)

Olive-sided flycatcher (*Contopus cooperi*)
Gray vireo (*Vireo vicinior*)
Lewis's woodpecker (*Melanerpes lewis*)

Flammulated owl (*Otus flammeolus*)
Brewer's sparrow (*Spizella breweri*)
Loggerhead shrike (*Lanius ludovicianus*)
American peregrine falcon (*Falco peregrinus anatum*)
Northern goshawk (*Accipiter gentilis*)
Juniper titmouse (*Baeolophus ridgwayi*)
Midget faded rattlesnake (*Crotalus viridis concolor*)
Fringed myotis (*Myotis thysanodes*)
Gunnison prairie dog (*Cynomys gunnisoni*)
Meadow jumping mouse (*Zapus hudsonius*)

4.4.4 Vegetation

Vegetation on the cell cover and on disturbed portions of the site consists primarily of seeded reclamation grasses—smooth brome (*Bromus inermis*) and blue grama (*Bouteloua gracilis*). Other species, including western wheatgrass (*Pascopyrum smithii*) and hairy golden aster (*Heterotheca villosa*), occur in smaller amounts. Deep-rooted plant species on the cell cover (including shrubs and alfalfa) are routinely treated with herbicides to prevent growth.

Native shrub lands and forests dominate the perimeter of the disposal site. Shrub lands contain predominantly big sagebrush (*Artemisia tridentata*) and rubber rabbitbrush (*Ericameria nauseosa*), and forests contain predominantly Gambel oak (*Quercus gambelii*), piñon pine (*Pinus edulis*), and Utah juniper (*Juniperus osteosperma*). A diverse understory of native grasses, flowers, and cacti exists under the shrub lands and forests. Noxious weed species include spotted knapweed (*Centaurea maculosa*), yellow toadflax (*Linaria vulgaris*), musk thistle (*Carduus nutans*), and Canada thistle (*Cirsium arvense*). They are routinely treated with herbicides in the native and disturbed areas of the site.

4.4.5 Cultural Resources

Humans have lived and hunted in the area of the Durango disposal site since prehistoric times. Several present-day Indian tribes have historic ties to the land, including the Ute Mountain Ute, Southern Ute, Ohkay Owingeh (Pueblo of San Juan), and Pueblo of Picuris. These tribes have been contacted about the proposed actions.

The area potentially affected by the proposed actions was inventoried for cultural resources in 1981 (Nickens and Chandler 1981), 1986 (Horn et al. 1986), and 1999 (Honeycutt and Fetterman 1999). Most of the inventory work was conducted before DOE began construction of the uranium mill tailings disposal cell in 1987. A total of 13 cultural sites were identified within the project area. All but two of them were completely excavated or tested before 1988 (Fuller 1985a, 1985b, 1988). One of the two untested sites is a probable prehistoric habitation site, and the other is a lithic scatter. Both are considered eligible for inclusion in the National Register of Historic Places.

DOE completed a Class I inventory—an archive and literature search—in May 2010 (Hammack 2010) to determine if new cultural sites had been identified in or near the project area

since the earlier inventories. No additional sites had been identified, and no new field inventories were recommended.

4.4.6 Recreation and Lake Nighthorse

Recreation is not permitted on the disposal site. The Bodo SWA surrounds three sides of the site. Its dedicated purpose is to maintain the historical wildlife values and habitat that are present in the area. Hunting for large and small game and birds is seasonally allowed within the SWA (Section 4.4.3).

Approximately 1 road-mile south of the disposal site, the newly completed Lake Nighthorse, which is still being filled, is expected to become a center for a variety of recreational opportunities that would service the area. In addition to its primary purpose as a water supply reservoir, the lake would provide a resource for water sports. The lake was originally known as the Ridges Basin Reservoir and is located on Basin Creek, a tributary of the Animas River in Colorado. In 2004, Ridges Basin Reservoir was re-designated as Lake Nighthorse through an act of Congress.

When the entire lake is filled, it will hold a maximum of 120,000 acre-feet of water and will cover 1,500 ac. Adjacent BOR lands comprise an additional 4,000 ac and are located adjacent to the disposal site and to the Bodo SWA (Chiarito 2010; Christensen 2010).

Recreational developments related to Lake Nighthorse are expected to be located north of the lake and south of CR 211. Areas to the south and west of the lake would not have any trail or campground development or use due to the steepness of the terrain and seasonal closures related to big-game migrations. The area to the east of the lake is also expected to remain largely undeveloped due to closures related to eagle nesting on nearby Mount Carbon. A boat ramp and small parking areas would be located on the northeast portion of the lake (Figure 5) (Chiarito 2010).

A realistic date for the complete filling of Lake Nighthorse is 2012. A boat ramp and marina must be completed before the lake can finish being filled. BOR would like to have a completed and approved master plan for recreational facilities when the lake is full. At the time of this writing, funding opportunities and partnerships to prepare a master plan are being sought (Chiarito 2010).

La Plata County, BOR, and the City emphasize the importance of creating a hiking/biking trail system that would link existing trail segments along the Animas River and proposed trails along Lake Nighthorse. Due to the contiguous border of the Durango disposal site and the BOR lands with the nearby proposed trails related to Lake Nighthorse, there is interest in creating a potential trail link through a portion of the disposal site. The City of Durango has recently completed a recreation master plan for the development of trails within the city; the County continues to operate under a trails plan completed in 2000 that does indicate a need for a bike/pedestrian trail near the disposal site (Chiarito 2010; Christensen 2010; Hughes 2010b).

4.4.7 Transportation

The Durango disposal site is accessed by turning west from U.S. Highway 160/550 onto CR 211 (Figure 5). U.S. Highway 160/550 is the main north–south highway that connects points north of Durango to New Mexico. It is four lanes wide in the Durango area. In the area of the CR 211 turnoff, there is a frontage road with signals.

CR 211 extends from U.S. Highway 160/550 to Wildcat Canyon Road (CR 141) to the west and services residential homes off Wildcat Canyon Road. It is currently a paved two-lane road for a short distance west of U.S. Highway 160/550, before changing to a dirt-surface road for the remainder of the distance. Existing traffic use is light. As a result of activities related to Lake Nighthorse and the expected increase in traffic volume related to the lake and residential use, a large portion of CR 211 was realigned and will be chip-sealed before it is opened to the public, which is expected to occur in 2010. Because of recreational uses of Lake Nighthorse and residential use, CR 211 is expected to eventually carry a traffic volume (average daily traffic of 1,500 vehicles) significantly larger than the current casual-use traffic.

Approximately 1 mile west of the interchange with U.S. Highway 160/550 and on CR 211, CR 212 intersects with CR 211 and provides direct access to the disposal site. The disposal site is approximately 0.4 mile north of the intersection with CR 211. CR 212 is used to access the top of Smelter Mountain and a microwave tower north of the disposal site. It does not provide access to other county roads but does experience casual use. CR 212 is a two-lane dirt-surface road. Current use of both county roads is light.

5.0 Environmental Impacts

5.1 Introduction and Impact Assumptions

Impacts in the following sections are considered for all alternatives. An impacts assessment generally includes long-term, short-term, and direct and indirect impacts. These are provided as applicable. As described in Section 3.1, installation of the panels would take between 1 and 4 months, depending on whether development was limited to the surface of the disposal cell (Alternative 1) or also included the adjacent areas near the footprint of the cell (Alternative 2). The operation phase, which would include maintenance actions as needed, would occur over the potential 25-year life of the lease. After the lease is completed, all components related to the solar array would be removed from the site, and the surface would be reclaimed to the existing surface situation. To reduce compaction of surface areas, after components have been removed, the affected surfaces would be tilled to improve soil texture, and disturbed areas would be seeded with species native to the area. Table 2, in Section 5.11, compares the alternatives' potential impacts.

5.2 Disposal Cell Performance

Uranium mill tailings disposal cells were engineered and designed "To be effective for up to one thousand years, to the extent reasonably achievable, and in any case, for at least 200 years" (40 CFR 192). To meet this requirement, a variety of cover materials were used to limit radon escape, keep moisture out of the tailings, physically protect the cell from natural or human-caused erosion, and prevent deep-rooted vegetation from penetrating the cell into the tailings. The vegetated soil-and-rock matrix that forms the outer cover would provide a stable and durable base for a PV system.

Many factors may affect the longevity of any disposal cell—among them, the durability of the rock on the side slopes, surrounding activities, changes in moisture regimes, soil development, and ecological succession. For these reasons, NRC requires annual inspections of the disposal site as part of their license terms with DOE to monitor the integrity of the engineering design. DOE expects only minor maintenance activities over a potential lease term of 25 years. Under a worst-case scenario, DOE would always retain the right to have solar panels removed if cell performance became compromised, and the lease would state this fact.

5.2.1 Alternative 1—Use Surface of Disposal Cell

During the installation of the PV system, there would be travel on the cell surface to drop off supplies and workers. Temporary compaction of surface layers from equipment is not expected to influence the gravel/soil surface layer. With the exception of excavating a shallow trench to convey an electrical line from the solar panels to an inverter, no surface disturbance would be allowed.

During operation, solar panels would likely change the existing vegetation (Section 5.6). It is expected that, due to the presence of the panels and required space between the arrays, vegetation and subsurface moisture would become less homogeneous. The Durango disposal cell was designed to meet U.S. Environmental Protection Agency criteria without the presence of vegetation. There is no known research related to impacts associated with the presence of solar

panels on disposal cells. DOE does not expect solar panels to have a measurable effect on the cell performance due to the cover design.

After completion of the lease, the PV system and all associated infrastructure would be removed, and the disturbed surfaces would be reclaimed by tilling 6 inches of surface-compacted soils and seeding with native plant species.

5.2.2 Alternative 2—Maximize Use of Disposal Site

None of the actions related to using previously disturbed areas adjacent to the disposal cell would impact cell performance. Impacts related to the placement of solar panels on the surface of the cell would be the same as described in Section 5.2.1.

5.2.3 No Action

The disposal cell would continue to function as it does currently.

5.3 Air Quality and Greenhouse Gas

5.3.1 Alternative 1—Use Surface of Disposal Cell

During the installation of the PV system, no grading would be allowed on the surface of the cell; however, it would be necessary to excavate a shallow trench that would convey an electrical line from the solar panels to an inverter off the cell, and this activity may cause minor amounts of fugitive dust. The dirt access road on the site would also be upgraded by grading and adding a graveled surface. If necessary, small quantities of water would be used as a fugitive-dust control measure. Vehicles on CR 212 would not be expected to generate fugitive dust due to the short distance (0.4 mile) traveled on the unpaved road and the need to reduce speed at the turnoff from CR 211 onto CR 212. Minor amounts of greenhouse gas associated with vehicle emissions related to workers and suppliers traveling to the disposal site and miscellaneous trips in the city of Durango would occur for approximately 1 month.

Because no trees are expected to be removed as a result of this alternative, no change to carbon absorption or storage sources is expected.

During operation and maintenance actions, no changes to air quality are expected. The addition of a renewable source of energy to the electrical grid would (slightly) reduce greenhouse gas emissions. Travel to the site for inspection or maintenance purposes would likely happen no more frequently than once a month and involve one vehicle. However, DOE personnel would travel from Grand Junction, Colorado, when site inspections were necessary. Impacts to greenhouse gases related to vehicle emissions would be negligible.

During the restoration of the site, the actions associated with disassembling and removing the PV system and reclaiming the disposal cell surface would likely cause more fugitive dust than would the activities associated with installation. Once PV system components were removed, all areas would be tilled prior to reseeding. Fugitive dust would be controlled in accordance with applicable laws and regulations. Minor increases in greenhouse gas may be associated with vehicle use, but this impact would be negligible.

5.3.2 Alternative 2—Maximize Use of the Disposal Site

During the installation of the panels, potential impacts would be similar to those addressed in Section 5.3.1. In addition, new disturbance to previously disturbed areas that have a light vegetation cover (such as grading to reduce the degree of slope on off-cell areas) may cause minor amounts of fugitive dust, which would be controlled as necessary. Greenhouse gas associated with vehicle travel emissions over a period of 4 months would be negligible.

During the potential 25-year operation and maintenance period, greenhouse gas would be reduced as described in Section 5.3.1. DOE's vehicle trips from Grand Junction to the disposal site for inspection purposes would have negligible impacts on greenhouse gas.

During the restoration and reclamation of affected areas on the disposal site, impacts to air quality would be similar to those discussed in Section 5.3.1. The greater time period required to remove a larger PV system from the off-cell areas would extend the period of potential impact, but the impact would still be minor. All off-cell areas would be tilled prior to reseeding, and fugitive-dust control would be in accordance with applicable laws and regulations.

Any increase in greenhouse gas related to vehicle emissions would be negligible.

5.3.3 No Action

The existing air quality at the disposal site would continue with no changes.

5.4 Visual Resources

5.4.1 Alternative 1—Use Surface of Disposal Cell

To assess impacts to visual resources, DOE used geographic-information-system software to map all areas within 10 miles of the disposal site from which the proposed project could be viewed. The software is based on elevation and topography and does not take into account the potential obstruction of views from cultural modifications (such as buildings and roads) and vegetation. Once this map was generated, DOE overlaid the area's primary travel routes, subdivisions, and other cultural features onto it and then selected 17 key observation points (KOPs), from which potential views of the PV panels could be field-verified (Figure 7). Table 1 lists the KOP locations, lists the approximate distance of each KOP from the disposal site, and states whether the disposal site was visible from the KOP.

The field verification of KOP locations indicated that the top of the disposal cell, on which the PV panels would be constructed, would not be noticeable from known public areas, with the exception of CR 212 adjacent to the disposal site. For example, Figure 8 shows a view toward the disposal cell from KOP 17, the site of La Plata County's future fairgrounds. The disposal cell's riprapped side slope is barely visible in the center background, but the top of the disposal cell is not visible.

Table 1. Descriptions of Key Observation Points and Results of Field Verification of Potential Views

KOP Description[a]	Straight-Line Distance from Disposal Site	Is the Disposal Site Target Visible from the KOP?
KOP 1: Wildcat Canyon Road (CR 141)	6.5 miles	No. View is too diverse and target too small to see, even with binoculars.
KOP 2: Wildcat Canyon Road (CR 141)	6.0 miles	No. View is too diverse and target too small to see, even with binoculars.
KOP 3: Subdivision south of Wildcat Canyon, from subdivision road	4.7 miles	No. Trees and homes block potential view.
KOP 4: Subdivision south of Wildcat Canyon, near driveway of home	4.8 miles	No. Trees block potential view.
KOP 5: Subdivision south of Wildcat Canyon, from back deck of home	4.6 miles	No. Trees block potential view.
KOP 6: Subdivision south of Wildcat Canyon, from subdivision road	4.2 miles	No. Trees block potential view.
KOP 7: CR 211, southwest of disposal site	1.5 miles	No. View is too diverse and target too small to see, even with binoculars.
KOP 8: CR 212, directly adjacent to disposal site	0.1-0.2 mile	Yes. Target is to viewer's right when northbound on CR 212, and to viewer's left (and briefly at center) when southbound on CR 212.
KOP 9: CR 212, northwest of disposal site	0.6 mile	No. Trees block potential view.
KOP 10: CR 212, near top of Smelter Mountain	0.7 mile	Yes. Target is in background but not a focal point, as it is "overwhelmed" by diverse landforms, rugged skyline, and complex lines formed by multiple ridgelines.
KOP 11: Ewing Mesa, on road	2.0 miles	No. Not visible, even with binoculars.
KOP 12: Ewing Mesa, on road	2.2 miles	No. Not visible, even with binoculars.
KOP 13: CR 220, rural farmland southeast of Durango	3.8 miles	No. Top of disposal cell is not visible from KOP 13; however, the disposal cell's riprapped side slope is visible briefly (for about 1 second) when westbound on CR 220. The cell constitutes 0.01 percent of the viewer's entire viewshed and is unlikely to be noticed.
KOP 14: Rural road off CR 220, rural farmland southeast of Durango	4.2 miles	No. Trees block all potential views of target.
KOP 15: Dreamy Draw Road, rural farmland southeast of Durango	4.3 miles	No. Same as KOP 13, except viewer would be northbound on Dreamy Draw Road.
KOP 16: Dreamy Draw Road, rural farmland southeast of Durango	4.4 miles	No. Trees block all potential views of target.
KOP 17: Gravel pit on top of mesa southeast of Durango, potential future site of La Plata County Multi-Event Center (fairgrounds)	3.0 miles	No. Top of disposal cell is not visible from KOP 17; however, a thin sliver of the disposal cell's riprapped side slope is visible. The cell constitutes 0.1 percent of the viewer's entire viewshed and is unlikely to be noticed.

[a] DOE attempted to establish a KOP at Lake Nighthorse, but potential viewing areas were under water and not accessible.

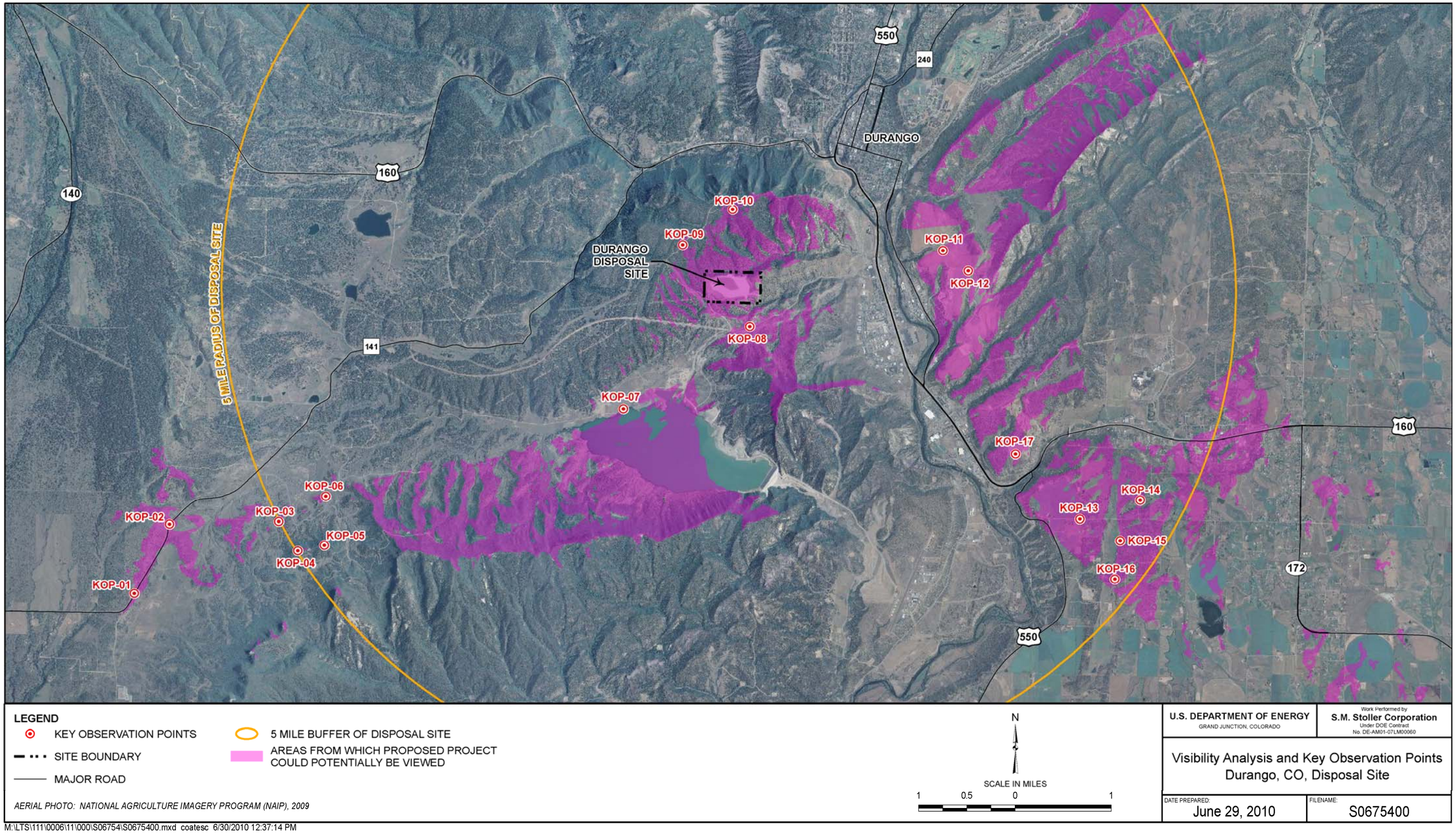

Figure 7. Location of Key Observation Points from which Potential Views of PV Panels were Field-Verified

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Figure 8. View to the Northwest from the Site of the La Plata County Future Fairgrounds (The rock side slopes of the disposal dell are visible as the tan area in the center background.)

DOE visual resource specialists attempted to establish a KOP at Lake Nighthorse, but potential viewing areas were under water and not accessible. Given the variety of landscapes and nearby anthropogenic landscape alterations in the area of Lake Nighthorse, it is not likely that recreationists would notice PV panels in the distant background.

Figure 9 shows a simulation of a view that a southbound traveler on CR 212 might have of the PV panel array. The photo simulation represents a worst-case scenario, as the actual configuration would likely have rows of panels with spaces between them (for access) rather than one or two solid areas of panels. Additionally, the angle of view shown in Figure 9 would be visible only for a number of seconds as travelers on CR 212 drove by the site. The longest continuous view-time (about 1 minute) would be from viewpoints on CR 212 that would be level with or below the elevation of the disposal cell top, making the view less direct.

The geometrical shape and dark, reflective surface of the PV panel array would contrast sharply with the surrounding natural landscape and disposal cell feature itself. Overall, however, the riprapped side slopes of the disposal cell would likely be the more noticeable of the two human-made features, as the side slopes (1) encompass more area, (2) have a brighter, more contrasting color than the solar array, and (3) can be seen from a greater number of viewpoints than the proposed solar array on top of the disposal cell.

Figure 9. View East from CR 212 of the Disposal Cell Top with Simulated PV Panels

There would not be any change in impacts to this resource during the potential 25-year operation (including maintenance) and the restoration of the PV system. However, new residential development continues to occur throughout the county, and it is improbable, but possible, that a new subdivision may have a view of the disposal site. The disposal site is surrounded by land with State and federal protections that would preclude development close to the site. Any new development would likely be sufficiently far from the site that any view of the solar panels would be minimal within the total landscape view.

5.4.2 Alternative 2—Maximize Use of Disposal Site

Visual resource impacts related to the installation, operation, and restoration of the surface of the disposal cell and adjacent use areas would be similar to those described in Section 5.4.1 with one exception: views of the solar panels in adjacent use areas would be more on eye level; hence, the solar panels would be more noticeable. The total viewing times for travelers on CR 212 would be approximately 1.5 minutes by northbound travelers and 1.6 minutes by southbound travelers.

5.4.3 No Action Alternative

No impacts to visual resources would occur under the No Action Alternative, as no physical changes would take place at the disposal cell site.

5.5 Wildlife

5.5.1 Alternative 1—Use of Surface of Disposal Cell

The general disturbance in the area from vehicles and workers during the solar panels' installation would likely result in temporary displacement of various common wildlife species to nearby areas. Birds are known to hunt the surface of the cell and may or may not return to the area. Disturbance to wildlife is a spatial consideration and not related to the specific area of disturbance. Noise and human presence would be sufficient to result in avoidance behavior.

Although it is unlikely that nesting or breeding birds would occur on the disposal cell surface, they may nest in nearby areas. Conducting activities during migratory bird nesting and breeding periods would need to be in accordance with the requirements of the Migratory Bird Treaty Act (MBTA). The MBTA requires avoidance of disturbing activities during designated breeding and nesting periods, which generally includes the March-through-July time period, if nesting or breeding birds are present. The wetland area surrounding the evaporation pond in the northeast corner of the disposal site may seasonally host nesting migratory birds, and the ferruginous hawk is a known visitor to the area. Raptors are very sensitive to noise and may leave nests. Avoidance of raptors while nesting may require up to a 0.5-mile avoidance area due to sensitivities to noise during nesting.

During the operation (including maintenance) of the solar array, it is likely that former resident or transient wildlife would return to use the general disposal site area. Some small species may find nesting under the panels attractive as a shield from weather elements or for use as cover. It is unlikely that any short-term maintenance actions (lasting a few hours to a day) would disturb birds or other wildlife in the area.

During the restoration activities, which would again bring noise and people to the area, impacts to wildlife would be similar to those that are projected to occur during installation.

5.5.2 Alternative 2—Maximize Use of the Disposal Site

During the PV system's installation, impacts to resident or transient wildlife would be considered similar to those described in Section 5.5.1. The longer duration of the activities may cause fewer wildlife to return to the site once the arrays are in place, due to seasonal changes and the potential establishment of territory in a new or nearby area.

During the potential 25-year operation (including maintenance) of the solar arrays, area wildlife would adjust to the presence of the panels, and many species would likely return to the general disposal site area. The change in site conditions may benefit some species, as described in Section 5.5.1.

During the disposal site's restoration, wildlife would again leave the site in a way similar to that described in Section 5.5.1, and considerations related to the MBTA would also apply. However, the larger area disturbed and longer period of disturbance may cause fewer species to return to the disposal site.

5.5.3 No Action Alternative

Under this alternative, wildlife presence would continue as currently observed.

5.6 Vegetation

5.6.1 Alternative 1—Use Surface of Disposal Cell

During installation activities on the disposal cell, it is expected that some surface grass cover would be lost due to vehicles carrying supplies and workers, and due to the general activity on the disposal cell. In addition, there would be a loss of surface grass related to excavating the shallow trench that would convey the electrical line from the solar panels to an inverter. Although the amount of disturbed area would depend on the size and configuration of the PV system designed by the lessee, it is estimated that surface disturbance may affect 2 ac of the 18 ac disposal cell surface. After the PV system is installed, disturbed areas would be reseeded with an appropriate grass species. The lessee would not be allowed to grade the disposal cell surface, and it is expected that the grass cover under the solar panels would not be disturbed during installation activities.

The proposed work would not affect native shrub lands and forests present in other areas on the site.

During the operation of the PV system, changes in vegetation may occur over approximately 9 ac of soils. Changes may include increased vegetative cover in some areas, decreased cover in other areas, and changes in plant species composition. Shading and soil moisture retention may increase under the solar panels although total precipitation may decrease. These effects would be greater under the edge of the panels nearest the ground. In between the panels, runoff may increase, and some plants may be crushed by occasional maintenance-vehicle traffic. All of these changes could cause shifts in plant community composition because ambient species more adapted to the changed conditions may gradually outcompete the existing dominant plants. However, it is unlikely that large, unvegetated areas would develop, and net vegetative cover would likely increase or remain the same. Under a worst-case scenario, loss of vegetation over approximately 3 of the 9 affected acres may be expected. Gravels in the soil surface, the relatively flat slope, and the surrounding well-established vegetation would protect against potential erosion; if erosion should occur, the lessee would be required to install additional protections.

An indirect impact may occur as a result of installation activities and miscellaneous site visits during the facility's operation. The unintentional importation of weeds that would hitchhike on vehicle tires and shoes may increase weed management by DOE. DOE has a weed management protocol that is followed to prevent the establishment of noxious weeds.

During reclamation, after the removal of all PV system components, disturbed areas would be tilled to improve soil texture and then revegetated with an appropriate seed mix that would consist of species native to the region.

5.6.2 Alternative 2—Maximize Use of Disposal Cell

During installation activities, impacts related to use of the disposal cell surface would be the same as described in Section 5.6.1. In addition, for areas adjacent to the disposal cell that are disturbed, the existing sparse vegetation would likely be lost since these areas may need grading to achieve required slopes. It could be expected that up to 5.5 ac (3.5 ac in adjacent areas and 2 ac on the surface of the disposal cell) would be disturbed during installation actions. Surface disturbed areas adjacent to the panels would be seeded to prevent erosion if necessary.

During the operation of the solar arrays, impacts to all areas would be similar to those described in Section 5.6.1. Vegetation would be expected to establish under the solar panels in graded areas over time. Up to 0.5 ac of soils under the panels in graded areas (off of the disposal cell) may not reestablish.

Impacts related to reclamation activities would be similar to those presented in Section 5.6.1.

5.6.3 No Action Alternative

There would be no change to the existing situation under this alternative.

5.7 Cultural Resources

5.7.1 Alternative 1—Use Surface of the Disposal Cell

The project area encompasses two cultural sites eligible for inclusion in the National Register of Historic Places. One of the cultural sites would not be affected, as it is located at a significant distance from proposed activities. The other cultural site could be affected, as it is located near the on-site transmission line. However, DOE would require the lessee to entirely avoid this site, which could be easily accomplished and would be stated in the lease. The Colorado State Historic Preservation Office concurred in this approach in July 2010.

During the operation of the PV system, there would be no impacts to the cultural resources in the area.

When the system is being dismantled and reclaimed, the lessee would be required to avoid the known cultural resource site, as described above.

5.7.2 Alternative 2—Maximize Use of Disposal Site

All impacts related to the installation, operation, and site reclamation would be the same as those described in Section 5.7.1.

5.7.3 No Action Alternative

Under the No Action Alternative, neither of the two eligible cultural sites would be affected, as no land-disturbing activity would take place.

5.8 Recreation and Lake Nighthorse

5.8.1 Alternative 1—Use Surface of Disposal Cell

Installation activities would occur on the disposal site and would not impact users of Lake Nighthorse.

During the potential 25-year operation phase, recreational facilities related to Lake Nighthorse are expected to be fully operational. The presence of a PV system on the disposal site would not impact recreational use in the area. Recreational users would not experience a degradation of views related to the presence of the solar array. The visual analysis (Section 5.4) did not identify any areas that recreationists would use, on or adjacent to Lake Nighthorse, whose views would be marred by a PV system on the disposal cell. However, as discussed in Section 5.10, it is expected that the increased traffic on CR 211 to access Lake Nighthorse and associated recreational facilities would result in increased casual vehicle travel on CR 212. As a result of this increased use, there may be an increase in acts of vandalism related to littering or shooting disposal site perimeter signs or even the PV system components.

Actions taken during the reclamation of the disposal site would not impact recreational users of Lake Nighthorse or its associated facilities.

5.8.2 Alternative 2—Maximize Use of Disposal Site

During the installation, operation, and reclamation of the site, all impacts would be the same as described in Section 5.8.1.

5.8.3 No Action Alternative

With the completion of Lake Nighthorse and associated recreation facilities, it is assumed that, due to the greater presence of people in the area, vandals would be more likely to breach site security and damage site features.

5.9 Transportation

5.9.1 Alternative 1—Use Surface of Disposal Cell

Installation of a PV system would likely begin in 2011 or 2012. At that time, the recreational facilities at the lake would not be developed, and use of the marina would be light. The small amount of vehicle traffic associated with installing solar panels and the expected short duration (1 month) of the installation process would not impact vehicle use of CR 211. Worker and supply trips may result in an additional 30 vehicles per day on CR 211 and CR 212. If necessary for public safety, temporary traffic control (such as signage) at the CR 212 turnoff would be considered.

During the operation and removal of the PV system and the reclamation of disturbed areas, it is expected that recreational use of Lake Nighthorse, in combination with residential traffic, would result in daily traffic volume increases of up to 1,500 vehicles on CR 211 (Chiarito 2010). One trip a month during operation of the PV system might be made to inspect the site or perform maintenance actions.

The amount of vehicle traffic associated with removing the PV system and reclamation of disturbed areas would be similar to that described above. If necessary for public health and safety during reclamation activities, temporary traffic control may be needed at the intersection of CR 211 with CR 212 (Chiarito 2010).

5.9.2 Alternative 2—Maximize Use of Disposal Site

Traffic impacts related to the installation of the solar array system would not likely affect existing uses of CR 211 and CR 212. Worker and supply trips may result in an additional 30 vehicles per day on CR 211 and CR 212 over a 4-month period. However, if necessary for public safety, temporary traffic control at the CR 212 turnoff would be considered.

Similarly to Alternative 1, discussed in Section 5.9.1, no impacts to area roads would be associated with the operation phase.

During the reclamation phase, impacts would be similar to those described in Section 5.9.1.

5.9.3 No Action

As described in Section 4.4.6, it is expected that the recreational developments at Lake Nighthorse and use of CR 211 by residents to the west would significantly increase vehicle traffic on CR 211. Currently, the use of CR 211 is extremely light, but traffic is expected to increase to 1,500 vehicles per day. The increase in traffic would not impact the disposal site, but the increase in people in the area may result is more casual use of CR 212.

5.10 Cumulative Impacts

CEQ regulations for implementing NEPA-define cumulative effects as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1508.7). CEQ Guidance states: "It is not practical to analyze the cumulative effects of an action on the universe; the list of environmental effects must focus on those that are truly meaningful."

Land controlled by CDOW and BOR surrounds the disposal site. CDOW has no specific plans related to future wildlife improvements near the Durango disposal site. Their preference is to maintain and improve the area for wildlife values.

BOR was contacted for information related to their future plans; Section 4.4.6 describes their plans. Adding solar panels to the disposal site would not affect the eventual recreational development at Lake Nighthorse; in fact, BOR has an interest in potentially tying into the system to provide power for their proposed campgrounds. However, the development of recreational opportunities related to Lake Nighthorse would increase vehicle traffic on CR 211 and human presence in the area. These increases could make vandalism on the disposal site more likely, regardless of the presence of a PV system.

Many people in residential developments, planned or existing, west of the disposal site would use the newly aligned CR 211 to travel from subdivisions west of Wildcat Canyon past CR 212

en route to U.S. 160/550. The increased travel in the general area and potential for side travel on CR 212 could result in increased vandalism to site features.

Potential site security issues related to increased travel on CR 211 and CR 212 may require DOE, in conjunction with a lessee, to evaluate whether site security is sufficient.

A potential positive cumulative impact would be related to the general requirement to develop renewable sources of energy. The potential development of PV power on the Durango disposal site would, in combination with other renewable energy projects, benefit local utilities.

The installation, operation, maintenance, and reclamation of the proposed PV system is expected to have negligible impacts on the use or enjoyment of the environment. Furthermore, a PV system, in concert with other potential changes related to recreational developments associated with Lake Nighthorse or general growth in the area, would not decrease opportunities to develop other projects or harm environmental quality.

5.11 Comparison of Impacts

Very few impacts were identified during the analysis of the alternatives, and those impacts were considered minor. Table 2 summarizes all expected impacts.

Table 2. Summary of Potential Environmental Impacts

Resource	Use Surface of Disposal Cell	Maximize Use of Disposal Site	No Action
Support Renewable Energy Initiatives	Benefit to DOE and to the nation in support of renewable energy initiatives.	Benefit to DOE and to the nation in support of renewable energy initiatives.	No change.
Cell Performance All phases	No impacts.	No impacts.	No change.
Greenhouse Gas Installation	Minor increase in greenhouse gas related to vehicle emissions from travel to and from the disposal site or city of Durango.	Minor increase in greenhouse gas related to vehicle emissions from travel to and from the disposal site or city of Durango.	No change.
Operation and Maintenance	Minor beneficial effect on greenhouse gas emissions related to providing a renewable energy source. Negligible greenhouse gas associated with travel from Grand Junction to Durango for inspections.	Minor beneficial effect on greenhouse gas emissions related to providing a renewable energy source. Negligible greenhouse gas associated with travel from Grand Junction to Durango for inspections.	No change.
Reclamation	Minor increase in greenhouse gas related to vehicle emissions from travel to and from the disposal site or city of Durango.	Minor increase in greenhouse gas related to vehicle emissions from travel to and from the disposal site or city of Durango.	No change.
Visual Resources All phases	Views during all phases primarily would be above eye level. The longest continuous viewing time from CR 212 would be about 1 minute.	Views during all phases would be more on eye level and more noticeable. The total viewing times from CR 212 would be approximately 1.5 minutes for northbound travelers and 1.6 minutes for southbound travelers.	No change.

Table 2 (continued). Summary of Environmental Impacts

Resource	Use Surface of Disposal Cell	Maximize Use of Disposal Site	No Action
Wildlife Installation	Temporary to permanent displacement of resident and transient wildlife related to area noise and human presence.	Temporary to permanent displacement of resident and transient wildlife related to area noise and human presence.	No change.
Operation	Potential benefit to wildlife that may use the solar panels for cover.	Potential benefit to wildlife that may use the solar panels for cover.	No change.
Reclamation	Temporary to permanent displacement of resident and transient wildlife related to area noise and human presence.	Temporary to permanent displacement of resident and transient wildlife related to area noise and human presence.	No change.
Vegetation Installation	Potential surface disturbance of 2 ac.	Potential surface disturbance of 2 ac on the disposal cell and 3.5 ac in adjacent areas.	No change.
	Potential introduction of weeds that would require management.	Potential introduction of weeds that would require management.	No change.
Operation	Up to 9 ac of vegetation may be positively or negatively impacted by the presence of solar panels. Of these 9 ac, up to 3 ac may lose surface vegetation.	Up to 12.5 ac of vegetation may be positively or negatively impacted by the presence of solar panels: 9 ac on the disposal cell cover and 3.5 ac in nearby areas. Of these 12.5 ac, up to 3.5 ac may lose surface vegetation.	No change.
	Potential introduction of weeds that would require management.	Potential introduction of weeds that would require management.	No change.
Reclamation	Benefit related to removing the PV system and establishing preexisting conditions.	Benefit related to removing the PV system and establishing preexisting conditions.	No change.
Cultural Resources All phases	No impact.	No impact.	No change.
Recreation and Lake Nighthorse All phases	No impact.	No impact.	No change.
Transportation Installation	Potential for traffic congestion at turnoff to CR 212 may require temporary traffic control.	Potential for traffic congestion at turnoff to CR 212 may require temporary traffic control.	No change.
Operation	No impacts.	No impacts.	Traffic volumes on CR 211 are expected to increase because of traffic by residents to the west and recreationists at Lake Nighthorse.
Reclamation	Potential for congestion at the turnoff to CR 212 may require temporary traffic control.	Potential for congestion at the turnoff to CR 212 may require temporary traffic control.	Traffic volumes on CR 211 are expected to increase because of traffic by residents to the west and recreationists at Lake Nighthorse.

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6.0 Mitigation Measures

Mitigation measures are largely related to the protection of the disposal cell and site security. The revised LTSP (DOE 2010a) states most of the measures discussed below. However, the LTSP is subject to NRC concurrence, and NRC may require additional measures that are protective of the disposal cell and site, as related to potential renewable uses of any kind on the disposal site. These measures also would be included in the lease, if one is awarded. Mitigation measures related to either action alternative are summarized as follows:

- The site needs to remain locked at all times. DOE and the lessee would daisy-chain locks on the entrance gate.
- The lessee could only access the site using designated routes and could only conduct operations in areas designated by DOE.
- Access roads and paths on the site that DOE needs may not be blocked. Clear paths must be maintained for all-terrain-vehicle access.
- Solar infrastructure would not be allowed within 5 ft of the site markers.
- Loads from the panels may not exceed 300 pounds per square foot bearing pressure on the ground.
- Machinery used on the cover must have rubber tires, be considered low-ground-pressure equipment, and not cause visible rutting.
- If electrical lines are installed in a conduit on the disposal cell, the conduit must be weather-resistant and capable of being driven over by vehicles. The lessee is responsible for all improvements required for connections to the local grid or substations. As much of the infrastructure as possible should be placed off of the cover.
- Utility trenching or small foundations are limited to a maximum depth of excavation into the cover of 24 inches. The top 6 inches of material (a soil-and-rock matrix) must be separated from deeper excavated soils. Soils must be compacted to meet design specifications.
- No grading may be performed on the disposal cell cover.
- The overall integrity of the disposal cell cover must remain intact. No breaching of the side slope areas would be allowed.
- Panels must not concentrate runoff to create a new runoff pattern across the cell cover. Water running off panels cannot erode the surface. The lessee must repair any erosion that occurs on the surface.
- DOE would increase the frequency of site inspections, as necessary, to ensure that potential erosion or any other negative impacts are identified and remedied before they become significant. Site inspections would include evaluating the condition of the diversion channels to ensure that they remain functional as engineered.
- The rock armor on the channels and side slope may not be disturbed (this also includes the diversion channels). However, an access road may be built on the northern end (high point of the diversion channel) by using geotextile and road-base materials.
- Any cut slopes required as part of grading on areas off of the disposal cell cover could not be steeper than 4:1. Natural drainage channels could not be disturbed.

- All maintenance areas, including sheds, shall be off of the cover in areas designated by DOE. Any hazardous materials required for construction or maintenance must be approved by DOE before they are brought on site. Any hazardous material approved for use or storage shall have a material safety data sheet on site. Any spills must be properly cleaned up and reported to DOE, and any other agencies as required. Fuel for equipment may not be stored on site. Vehicles and machinery can only be fueled off of the disposal cell.
- No water is currently available on the site. No wells may be drilled within the property boundaries.
- All disturbed areas would be revegetated with an approved seed mixture after the installation and removal of the solar panels and associated infrastructure.
- Existing grasses within the solar panel footprint are to remain undisturbed and growing as much as practicable.
- Panels would be placed in rows not exceeding 10 ft in width with a clear path between the panels to allow access by an all-terrain vehicle. Material safety data sheets for herbicides used by DOE for spraying weeds would be given to the lessee so that the lessee could determine the herbicides' compatibility with the solar panels.
- DOE must have access to the solar facility for spraying noxious weeds, conducting inspections, and maintaining the cell cover.
- After the end of the lease, all equipment, fencing, electrical infrastructure, and other associated improvements shall be removed from the site. Except for approved grading changes, all disturbed areas related to the PV system should be restored to preexisting conditions.
- Under either of the proposed action alternatives, DOE would require the lessee to avoid cultural site 5LP1986, located near the on-site transmission line. No activity would be allowed within 150 ft of the cultural site. Additionally, the lessee would be responsible for informing all persons associated with the project that they would be subject to prosecution for knowingly disturbing cultural sites or collecting artifacts of any kind.
- During the installation and reclamation of the panels and infrastructure, if potential traffic congestion at the turnoff to CR 212 occurs, temporary traffic control measures may be required.
- If fencing is required for site security, CDOW has requested that wildlife-exclusion fencing, or fencing that is wildlife-friendly, be installed. Any site fencing related to wildlife concerns should be minimal.
- If an overhead electrical line is required, CDOW would require that a raptor-proof system be installed. Any overhead electrical line may be installed only with advance approval by DOE.
- DOE would control invasive plant species during the installation, operation, maintenance, and reclamation of the affected areas.
- Either avoidance of the area or migratory bird species surveys would be required during migratory bird nesting or breeding seasons in accordance with the MBTA. The lease terms would include a requirement to conduct work in compliance with applicable federal and State requirements.

7.0 Persons or Agencies Consulted

During the preparation of this draft EA, DOE invited NRC, CDPHE, the Colorado Governor's Office, CDOW, the La Plata County Commissioners, the Ute Mountain Ute Tribe, and the Southern Ute Tribe to be cooperating agencies, based on the agencies' respective areas of expertise, jurisdictional responsibilities, or potential interest in the project. In addition, during the preparation of this EA, various subject matter experts were contacted, and the staff of the S.M. Stoller Corporation, a contractor to DOE, also participated in providing sections or reviews.

Agency or Company	Name	Title
La Plata County Board of Commissioners (Durango, Colorado)	Kellie Hotter	La Plata County Commissioner
	Shawn Nau	La Plata County Manager
	Joelle Riddle	La Plata County Commissioner
	Sheryl Rogers	La Plata County Attorney
	Wally White	La Plata County Commissioner
La Plata County Planning Department (Durango, Colorado)	Tracie Hughes	Planner
	Katherine Harrison-Rogers	Planner
	Robby Overfield	Planner
U.S. Nuclear Regulatory Commission (Washington, DC)	Lydia W. Chang	Branch Chief Special Projects Branch
Colorado Division of Wildlife (Durango, Colorado)	Bob Watson	Wildlife Biologist
	Stephanie Schuler	Wildlife Biologist
Colorado Department of Public Health and Environment (Denver, Colorado)	Wendy Naugle	Professional Engineer
	Michael Cosby	Uranium Mill Tailings Remedial Action Program Manager
Governor's Energy Office (Denver, Colorado)	Tom Plant	Director
Ute Mountain Ute Tribe (Towaoc, Colorado)	Ernest House	Chairman
	Terry Knight, Sr.	Native American Graves Protection and Repatriation Act Representative
Southern Ute Indian Tribe (Ignacio, Colorado)	Matthew Box	Chairman
	Neil Cloud	Native American Graves Protection and Repatriation Act Representative

Agency or Company	Name	Title
Southern Ute Indian Tribe Environmental Programs Division (Ignacio, Colorado)	Tom Johnson	Representative
Southern Ute Alternative Energy LLC (Ignacio, Colorado)	Rebecca Kauffman Tom Phare	Representative Representative
Southern Ute Growth Fund - Safety & Environmental Compliance Management Group (Ignacio, Colorado)	Jeff Stephens	Representative
Pueblo of Picuris (Penasco, New Mexico)	Richard Mermejo	Native American Graves Protection and Repatriation Act Representative
Ohkay Owingeh (Pueblo of San Juan) (San Juan, New Mexico)	Larry Phillips	Native American Graves Protection and Repatriation Act Representative
State Historic Preservation Office, Colorado History Museum (Denver, Colorado)	Ed Nichols	State Historic Preservation Officer
Tri-State Generation and Transmission Association (Westminster, Colorado)	Gerald Brooks	Utility Engineer
La Plata Electric Association (Durango, Colorado)	Nancy Andrews Mark Schwantes	Energy Management Advisor Director of Corporate Service and Planning
U.S. Bureau of Reclamation (Durango, Colorado)	Mark Chiarito	Land and Recreation Management Team Leader
DHM (Durango, Colorado)	Ann Christensen	Principal
Battelle Memorial Institute (Buena Vista, Colorado)	Tom Anderson	National Environmental Policy Act Expert

8.0 Abbreviations

ac	acre(s)
ac	alternating current
BOR	U.S. Bureau of Reclamation
CDOW	Colorado Division of Wildlife
CDPHE	Colorado Department of Public Health and Environment
CEQ	Council on Environmental Quality
CFR	*Code of Federal Regulations*
CR	County Road
dc	direct current
DOE	U.S. Department of Energy
EA	Environmental Assessment
°F	degree(s) Fahrenheit
ft	foot (or feet)
KOP	key observation point
KW	kilowatt(s)
LM	Office of Legacy Management
LPEA	La Plata Electric Association
LTSP	Long-Term Surveillance Plan
MBTA	Migratory Bird Treaty Act
MW	megawatt(s)
NEPA	National Environmental Policy Act
NRC	U.S. Nuclear Regulatory Commission
NREL	National Renewable Energy Laboratory
$pCi/m^2/sec$	picocurie(s) per meter squared per second
PV	photovoltaic
SWA	State Wildlife Area
UMTRCA	Uranium Mill Tailings Radiation Control Act
USFWS	U.S. Fish and Wildlife Service

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