Draft
Environmental Impact Report/ Environmental Impact Statement

Southern California Edison's Eldorado–Ivanpah Transmission Line Project

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Needles Field Office

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Acronyms and Abbreviations

AADT	Annual Average Daily Traffic
AAQS	ambient air quality standards
AB	Assembly Bill
AC	Alternating Current
ACEC	Area of Critical Environmental Concern
ACHP	Advisory Council on Historic Preservation
ACSR	Aluminum Conductor Steel Reinforced
AEP	Association of Environmental Professionals
ANCA	Airport Noise Compatibility Area
APM	Applicant Proposed Measure
AQCMM	Air Quality Construction Mitigation Manager
ARPA	Archaeological Resources Protection Act
ASTM	American Society for Testing Materials
ATC	Authority to Construct
BCC	Birds of Conservation Concern
BCCE	Boulder City Conservation Easement
BCI	Bat Conservation International
BGEPA	Bald and Golden Eagle Protection Act
BMP	best management practice
BRMIMP	Biological Resources Mitigation Implementation and Monitoring Plan
BVUSD	Baker Valley Unified School District
C	Celsius
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CAISO	California Independent System Operator
cal BP	calibrated years before the present
Cal/EMA	California Emergency Management Agency
Cal/EPA	California Environmental Protection Agency
Cal/OSHA	California Occupational Safety and Health Administration
Caltrans	California State Department of Transportation
CARB	California Air Resources Board
CBC	California Building Code
CCCP	Clark County Comprehensive Plan
CC-DAQEM	Clark County Department of Air Quality and Environmental Management
CCDOA	Clark County Department of Aviation
CCR	California Code of Regulations
CCSD	Clark County School District
CDCA	California Desert Conservation Area
CDE	Department of Education, California
CDF	California Department of Finance
CDFG	California Department of Fish and Game
CDWR	California Department of Water Resources
CEC	California Energy Commission
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act

CERTS/EPG	Consortium for Electric Reliability Technology Solutions/Electric Power Group
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
CH_4	Methane
CIPC	California Invasive Plant Council
CIWMB	California Integrated Waste Management Board
cm	Centimeter
CNDDB	California Natural Diversity Database
CNEL	Community Noise Equivalent Level
CNPS	California Native Plant Society
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	CO_2 equivalent
COC	Condition of Certification
CPM	Compliance Project Manager
CPUC	California Public Utilities Commission
CREZ	California Renewable Energy Zone
CRHR	California Register of Historical Resources
CRS	Cultural Resources Specialist
CSC	California species of special concern
Cumulative dBA	Allowable Increase in Cumulative Noise Level
CUPA	Certified Unified Program Agency
CWA	Clean Water Act
dBA	A-weighted decibel
DEHS	Department of Environmental Health and Safety, San Bernardino County
DEIR	Draft Environmental Report
DESCP	Drainage, Erosion, and Sedimentation Control Plan
DHS	Department of Health Services, California
dm	Decimeters
DNL	Daytime-Nighttime Noise Level
DOC	U.S. Department of Commerce
DOD	U.S. Department of Defense
DOE	U.S. Department of Energy
DOI	U.S. Department of the Interior
DPM	diesel particulate matter
DTSC	Department of Toxic Substances Control, California
DWMA	Desert Wildlife Management Area
EAP	Energy Action Plan
EIR/EIS	Environmental Impact Report/Environmental Impact Statement
EITP	Eldorado–Ivanpah Transmission Project
ELF	Extremely low frequency
EMF	electromagnetic field
EO	element occurrence
EPAct	Energy Policy Act
EPRI	Electric Power Research Institute
ESA	Endangered Species Act
F	Fahrenheit
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission

FHWA	Federal Highway Administration
FLPMA	Federal Land Policy and Management Act
FRP	Facility Response Plan
FSA/DEIS	Final Staff Assessment / Draft Environmental Impact Statement
FTA	Federal Transit Administration
g	acceleration of gravity
GHG	greenhouse gas
GO	General Order
GWP	global warming potential
H_2S	hydrogen sulfide
HAER	Historic American Engineering Record
HAPs	hazardous air pollutants
HAZMAT	hazardous materials
HCP	Habitat Conservation Plan
HMBP	Hazardous Materials Business Plan
hp	horsepower
HSC	Health and Safety Code
HSWA	Hazardous and Solid Waste Act
HWCL	Hazardous Waste Control Law, California
HWMP	Hazardous Waste Management Plan
Hz	Hertz
I-15	Interstate 15
IARC	International Agency for Research on Cancer
IBC	International Building Code
ICC	International Code Council
IEPR	Integrated Energy Policy Report
IMA	Intensively Managed Area
IMACS	Intermountain Archaeological Computer System
IPCC	Intergovernmental Panel on Climate Change
ISEGS	Ivanpah Solar Electric Generating System
kcmil	kilo circular mils
km	Kilometer
KOP	key observation point
kV	kilovolt
kV/m	kilovolts per meter
kW	kilowatt
LADWP	Los Angeles Department of Water and Power
L_{dn}	Daytime-Nighttime Noise Level
L_{eq}	equivalent sound pressure level
LGIP	Large Generator Interconnection Procedures
LIMA	Less Intensively Managed Area
LORS	Laws, Ordinance, Regulations, and Standards
LOS	Level of Service
LST	lattice steel tower
LVCVA	Las Vegas Convention and Visitors Authority
$\mu g/m^3$	micrograms per cubic meter
m	meter
MBTA	Migratory Bird Treaty Act
MDAQMD	Mojave Desert Air Quality Management District
MEER	mechanical and electrical equipment room

mG	milliGauss
mgd	million gallons per day
MM	mitigation measure
MMP	mitigation and monitoring program
MMT	million metric tons
$MMTCO_2e$	million metric tons of CO_2 equivalents
MNP	Mojave National Preserve
MP	milepost
MRDS	Mineral Resource Data System
MSHCP	Multiple Species Habitat Conservation Plan
MUMA	Multiple Use Managed Area
MVA	megavolt ampere
MW	megawatt
mybp	million years before present
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NAC	Nevada Administrative Code
NAHC	Native American Heritage Commission
NAWS	Naval Air Weapons Station
NCCP	Natural Communities Conservation Plan
NCDC	National Climatic Data Center
NCP	National Contingency Plan
NDEP	Nevada Department of Environmental Protection
NDEP	Nevada Division of Environmental Protection
NDOT	Nevada Department of Transportation
NDOW	Nevada Department of Wildlife
NDWR	Nevada Division of Water Resources
NEMO	Northern and Eastern Mojave
NEPA	National Environmental Policy Act
NERC	North American Electric Reliability Corporation
NFIP	National Flood Insurance Program
NGS	National Geographic Society
NHPA	National Historic Preservation Act
NHPC	National Historic Preservation Council
NIEHS	National Institute of Environmental Health Sciences
NNHP	Nevada Natural Heritage Program
NNPS	Nevada Native Plant Society
NO_2	nitrogen dioxide
NO_X	oxides of nitrogen
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRHP	National Register of Historic Places
NRS	Nevada Revised Statutes
NSPS	New Source Performance Standards
OES	Governor's Office of Emergency Services
OHV	off-highway vehicle
OPGW	optical ground wire
OPR	Office of Planning and Research
OSHA	Occupational Safety and Health Administration
PCB	polychlorinated biphenyl

PE	professional engineer
PEA	Proponent's Environmental Assessment
PFYC	Potential Fossil Yield Classification
PG	professional geologist
PM_{10}	particulate matter less than or equal to 10 micrometers in diameter
$PM_{2.5}$	particulate matter less than or equal to 2.5 micrometers in diameter
PPA	Purchase Power Agreement
ppm	parts per million
PRC	Public Resources Code
PRMMP	Paleontological Resource Management and Monitoring Plan
PRR	Paleontological Resources Report
PRS	Paleontological Resource Specialist
PSD	Prevention of Significant Deterioration
PTO	Permit to Operate
PU	Public Utilities
PUCN	Public Utilities Commission of Nevada
RCRA	Resource Conservation and Recovery Act
RCS	Remote Control Switch
RETI	Renewable Energy Transmission Initiative
RMP	Resource Management Plan
ROD	Record of Decision
ROW	right-of-way
RPS	Renewables Portfolio Standard
RWD	Report of Waste Discharge
RWQCB	Regional Water Quality Control Board
SAA	Streambed Alteration Agreement
SARA	Superfund Amendments and Reauthorization Act
SB	Senate Bill
SBCFD	San Bernardino County Fire Department
SBCM	San Bernardino County Museum
SCADA	supervisory control and data acquisition
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
SCE	Southern California Edison
SCORP	Statewide Comprehensive Outdoor Recreation Plan
SEL	sound exposure level
SF_6	sulfur hexafluoride
SFS	Stateline Fault System
SIP	State Implementation Plan
SNSA	Southern Nevada Supplemental Airport
SO_2	sulfur dioxide
SPCCP	Spill Prevention, Countermeasure, and Control Plan
SPLA&SL	San Pedro, Los Angeles, and Salt Lake Railroad
SPS	Special Protection System
SR	State Route
SRMA	Special Recreation Management Area
Staff	Bureau of Land Management and California Energy Commission Staff
STG	steam turbine-generator
SVP	Society of Vertebrate Paleontology
SWPPP	stormwater pollution prevention plan

SWRCB	State Water Resources Control Board, California
TAC	toxic air contaminant
TSD	treatment, storage, and disposal
TSP	tubular steel pole
U.S. EPA	U.S. Environmental Protection Agency
UBC	Uniform Building Code
UEPA	Utility Environmental Protection Act
UFT	underground fuel tank
UMA	Unmanaged Area
UPRR	Union Pacific Railroad
URTD	upper respiratory tract disease
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
USC	United States Code
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
UST	underground storage tank
VdB	vibration velocity level in decibels
VOC	volatile organic compound
VRI	Visual Resource Inventory
VRM	Visual Resource Management
VRP	visibility-reducing particle
WBWG	Western Bat Working Group
WEAP	Worker Environmental Awareness Program
WECC	Western Electricity Coordinating Council
WECC PEIS	West-wide Energy Corridor Programmatic Environmental Impact Statement
WHBA	Wild Free-Roaming Horses and Burros Act
WHO	World Health Organization
WQMP	Water Quality Management Plan

Appendix A-1
Alternatives Screening Report

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APPENDIX A-1

Eldorado to Ivanpah Transmission Project EIR/EIS

Alternatives Screening Report

Lead Agencies:
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Acronyms

AC	alternating current
ADSS	All Dielectric Self Supporting
AFC	Application for Certification
BLM	Bureau of Land Management
CAISO	California Independent System Operator Corporation
CEC	California Energy Commission
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CPUC	California Public Utilities Commission
CREZs	competitive renewable energy zones
DC	Direct Current
EAP	Energy Action Plan
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EITP	Eldorado–Ivanpah Transmission Project
EPAct	Energy Policy Act
GHG	greenhouse gas
IEPR	Integrated Energy Policy Report
kV	kilovolt
LADWP	Los Angeles Department of Water and Power
LGIP	Large Generator Interconnection Procedure
LSTs	lattice steel towers
MP	mile post
MW	megawatt
NEPA	National Environmental Policy Act
NERC	North American Electric Reliability Corporation
OHGW	overhead ground wire
OPGW	optical ground wire
PEA	Proponent's Environmental Assessment
PPA	Power Purchase Agreement
RETI	Renewable Energy Transmission Initiative
ROW	right-of-way
RPS	Renewable Portfolio Standards

SCADA	Supervisory Control and Data Acquisition
SCE	Southern California Edison
SPS	Special Protection Systems
T/L	transmission line
TC	telecommunication
TSPs	tubular steel poles
USC	United States Code
WECC	Western Electricity Coordinating Council
WECC	Western Electricity Coordinating Council
WGA	Western Governors' Association
WREZ	Western Renewable Energy Zones

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1. Introduction

1.1 Purpose of Alternatives Screening Report

On May 28, 2009, Southern California Edison (SCE) submitted Application A.09-05-027 seeking authorization by the California Public Utilities Commission (CPUC) for a Certificate of Public Convenience and Necessity for the Eldorado–Ivanpah Transmission Project (proposed project). Because the proposed project would traverse public land administered by the Bureau of Land Management (BLM), SCE will need right-of-way (ROW) authorization and special use permits from the BLM. This document describes the alternatives screening analysis that has been conducted for the proposed project, supplementing the detailed project description information presented in Chapter 2 of the Draft Environmental Impact Report (EIR)/Environmental Impact Statement (EIS). Under the direction of the CPUC as the lead California State agency, and the BLM as the lead federal agency, the EIR/EIS will be prepared to comply with the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA).

Alternatives to the proposed project were suggested by the CPUC, the BLM, and the California Independent System Operator Corporation (CAISO). Alternatives were also suggested by SCE as part of the Proponent's Environmental Assessment (PEA) and by the general public during the public scoping period (July 23 to August 26, 2009; SCE 2009a). This report summarizes how alternatives were screened and provides a record of the screening criteria and conclusions about alternatives carried forward for full EIR/EIS analysis. This report documents:

- the range of alternatives that have been suggested and evaluated,
- the approach and methods used in screening the feasibility of these alternatives according to guidelines established under CEQA and NEPA, and
- the results of the alternatives screening analysis and identifies those alternatives will be carried forward for full analysis in the EIR/EIS).

This Alternatives Screening Report is incorporated as Appendix A to the EIR/EIS, providing the basis and rationale for whether an alternative has been carried forward for full evaluation in the EIR/EIS. For each alternative that was eliminated from further consideration, this document explains in detail the rationale for elimination. Since full consideration of the No Project/No Action Alternative is required by CEQA and NEPA, and must automatically be considered fully in the EIR/EIS, this report does not address this alternative (it is defined in Chapter 2 of the EIR/EIS).

1.2 Background – Transmission Requirements and SCE's Service Profile

Several federal, state, and regional initiatives require creation of renewable energy generation and delivery mechanisms to meet energy demand and replace traditional fossil fuel sources of energy. The Eldorado–Ivanpah Transmission Project would assist with meeting the renewable energy objectives of the Energy Policy Act (EPAct) of 2005, Western Renewable Energy Zones (WREZ), California Renewable Portfolio Standards (RPS), Nevada RPS, and the Renewable Energy Transmission Initiative (RETI). These plans are summarized below.

In 2005, the EPAct was signed into law by President George W. Bush. Section 368 of the EPAct required, among other things, the designation of energy corridors on federal lands in 11 western states. Section 368 also directed federal agencies to take into account the need for upgraded and new infrastructure and to take actions to improve reliability, relieve congestion, and enhance the capability of the national grid to deliver energy (WECC 2009).

The Western Governors' Association (WGA) and U.S. Department of Energy launched the WREZ initiative in May 2008. The purpose of WREZ is to identify areas in the West with vast renewable resources to expedite the development and delivery of renewable energy to where it is needed. Renewable energy resources are being analyzed within 11 states, two Canadian provinces, and areas in Mexico that are part of the "Western

Interconnection." The WGA and the U.S. Department of Energy released a joint WREZ Phase 1 Report on June 15, 2009. The report identified "Western Renewable Energy Zones" as those areas throughout the Western Interconnection with the potential for large-scale development of renewable resources (at least 1,500 megawatts [MWs]) with low environmental impacts. The WREZ initiative also developed a publicly available modeling tool to allow load-serving entities, regional planners, renewable energy developers, state and provincial regulators, and other interested parties to estimate the relative economic attractiveness of delivering power from specific Western Renewable Energy Zones to existing load centers across the Western Interconnection.

The State of California and the State of Nevada have adopted RPS that require an increased use of renewable resources for generation of electricity. In order meet the state RPS goals and provide cost-effective, reliable, and renewable power to consumers, the electric transmission facilities will need to be upgraded in each state. California's RETI is a statewide, multi-stakeholder initiative designed to identify and quantify renewable resources that can provide cost-effective energy sources to meet the RPS requirements. RETI is also intended to identify the transmission investments necessary to ensure delivery of that energy to California consumers.

To date, RETI has finalized three reports. The RETI Phase 1A Report, accepted by the RETI Stakeholder Steering Committee on May 21, 2008, described the methodology, assumptions, and resource information to be used in Phase 1B of the RETI project. The RETI Phase 1B Report, updated March 4, 2009, is a high-level screening analysis that applies the resource valuation methodology developed in Phase 1A. Potential renewable energy projects were grouped into California Renewable Energy Zones, or CREZs, based on geographical proximity, development timeframe, shared transmission constraints, and additive economic benefits.

The RETI Phase 2A Final Report, dated September 2009, identified potential transmission projects that should be considered priorities for future study based on information about the potential for renewable development available at the time the report was written. Included in this listing is replacement of the existing 115-kilovolt (kV) Coolwater–Eldorado line with a new 500-kV Mountain Pass 1–El Dorado line (RETI 2009).[1]

Phase 3 of the RETI project will advance this plan into proposals for specific transmission projects that can be approved, financed, and built to provide renewable energy to customers across the state in the most cost-competitive and least environmentally harmful ways.

The RETI effort is being supervised by a coordinating committee comprised of the CPUC, California Energy Commission (CEC), CAISO, and publicly owned utilities including the Southern California Public Power Authority, the Sacramento Municipal Utility District and the Northern California Policy Area (RETI 2009). CAISO is also developing a framework for multiple projects within a transmission-constrained renewable resource area to share the costs of connecting to the grid. CAISO conducts an annual review of transmission upgrades that are needed to maintain North American Electric Reliability Corporation (NERC) and Western Electricity Coordinating Council (WECC) Reliability Criteria in the SCE service area.

SCE Service Profile

SCE provides energy to over 13 million people; the service area is 50,000 square miles in central, coastal, and southern California, excluding the city of Los Angeles and some other cities (SCE 2009b). Most of the SCE load is within the Los Angeles Basin; however, the highest load growth occurs in the Inland Empire area.

The SCE transmission system includes various 500-kV lines that are part of WECC Path 49 (East of River) and Path 46 (West of River) linking Southern California to Arizona and Southern Nevada. Most of the SCE area load is served

[1] Source: RETI Phase 2A Final Report, September 2009 – Appendix I List of Component Facilities, p. I-87.

by local generation that includes nuclear, Qualified Facilities[2], hydropower, and oil/gas-fired power plants. The remaining demand is served by power transfers into Southern California on alternating current (AC) and direct current (DC) transmission lines (T/Ls) from the Pacific Northwest and Desert Southwest (CAISO 2009).

The SCE system load peaked at 22,405 MW on June 20, 2008. The CEC's load forecast for the entire SCE is 400 MW per year, and for the Inland Empire area, it is 180 MW per year. The transmission system consists of 500-kV and 230-kV transmission facilities. The proposed project would include construction of new T/Ls to connect new renewable generation facilities in the Ivanpah area by 2013. This project would include construction of a new 230-kV/115-kV substation and a new double-circuit 230-kV T/L. This project was studied in the CAISO 2009 Transmission Plan. While it passed the initial CAISO screening process, additional information was requested and it was recommended for study as part of the 2010 Transmission Plan (CAISO 2009).

As part of California's RETI, the Ivanpah Dry Lake Area, mostly under BLM jurisdiction, has been identified to be a rich solar resource area in the State of California, and the construction of new T/Ls and facilities will be required to tap this potential solar resource. These new T/Ls and facilities, together with existing facilities, will be used to deliver the power produced from the Ivanpah Dry Lake Area to utility load centers.

1.3 Summary of the Proposed Project

SCE proposes to construct, operate, and maintain new and upgraded transmission facilities to deliver electricity from expected solar generation developments in the Ivanpah Dry Lake Area to accommodate projected load growth in the SCE service area in the Los Angeles region. The proposed project is described in detail in Chapter 2 of the Draft EIR/EIS. The project, as proposed by the applicant, generally includes:

- New Ivanpah Substation – Construction of a new Ivanpah Substation in San Bernardino County, California, to serve as a collector hub for the solar generation projects identified in the Ivanpah Dry Lake Area. The proposed Ivanpah Substation would include 230-kV and 115-kV switchracks.
- Replacement 230-kV Transmission Line – Replacement of 35 miles of the Eldorado–Ivanpah portion of the existing SCE Eldorado–Baker–Cool Water–Dunn Siding–Mountain Pass 115-kV T/L with double-circuit 230-kV lines connecting the new Ivanpah Substation to SCE's existing Eldorado Substation.
- Eldorado Substation Upgrades – Upgrades inside the existing Eldorado Substation to accommodate the new 230-kV T/Ls and support the connection of new T/Ls.
- New Telecommunication System – The proposed project also includes a new telecommunication system routed along two fully diverse and redundant paths to provide protective relay circuit, Supervisory Control and Data Acquisition (SCADA) circuit, data, and telephone services to the proposed Ivanpah Substation. The telecommunication system would also support a special protection system that would trip the SCE Eldorado–Ivanpah 230-kV T/L relays under specific outage contingencies, and would also support the operating and monitoring of the substation and T/L equipment. The paths would connect the Eldorado Substation to the proposed Ivanpah Substation.

  The proposed telecommunication system would consist of an optical ground wire (OPGW) and combined microwave system along two diverse telecommunication paths referred to as Path 1 and Path 2. Path 1 would be from the existing Eldorado Substation to the proposed Ivanpah Substation and would use new OPGW along the proposed Eldorado–Ivanpah 230-kV T/L alignment. Along Path 1, the proposed project would use OPGW on overhead transmission towers between the existing Eldorado Substation and the proposed Ivanpah Substation. Along Path 2, the proposed project would include OPGW placed on overhead transmission towers along an approximately 25-mile section of the existing SCE Eldorado-Lugo 500-kV T/L.

[2] Defined by the Federal Energy Regulatory Commission as smaller generating units that use renewable resources, such as solar and wind energy, or alternative technologies, such as cogeneration.

Approximately 5 miles of fiber optic cable would be placed in an underground duct from the Eldorado–Lugo T/L to the town of Nipton. This portion of the telecommunication system is referred to as Path 2, Sections 1 and 2. Path 2 would then follow a route from the town of Nipton to the proposed Ivanpah Substation on a microwave path referred to as Path 2, Section 3.

- Proposed Transmission Structures and Finish. The proposed project would include approximately 216 double-circuit 230-kV lattice steel towers (LSTs) and 42 steel H-Frame structures. The double-circuit LSTs would range between 110 and 180 feet in height. The single-circuit steel H-Frame structures would be between 45 and 75 feet tall. Tubular steel poles (TSPs) approximately 75 feet in height and would be installed near the proposed Ivanpah Substation. The project proposes to galvanize the transmission structures to protect against corrosion using a non-paint treatment applied at the factory.

The entire proposed project would span approximately 28 miles in Nevada and approximately 7 miles in California (Figure 1). It would start at the existing Eldorado Substation, located about 14 miles southwest of Boulder City in the State of Nevada. It would be located on BLM land and private lands and would generally follow SCE's existing ROW for the Eldorado–Baker–Coolwater–Dunn Siding–Mountain Pass 115-kV T/L. The line would head generally west and cross below the following five existing T/Ls:

- Eldorado–McCullough (500-kV T/L),
- Mead–Victorville (287-kV T/L),
- McCullough–Victorville 1 (500-kV T/L),
- McCullough–Victorville 2 (500-kV T/L), and
- Intermountain–Adelanto (500-kV Direct Current T/L).

The proposed 230-kV T/L would be constructed on double-circuit LSTs for most of the route (Figure 2). Where required, additional ROW and single-circuit steel H-frame structures would be used to facilitate the crossing of existing T/Ls noted above (Figure 3). In certain locations where the ROW is narrow or the T/L would need to cross existing T/Ls, SCE would use tubular steel structures (Figure 4). SCE's existing 75-foot ROW would be widened to 100 feet to accommodate installation of the proposed 230-kV T/L.

1.4 Project Objectives, Purpose, and Need

1.4.1 Purpose and Need for the Project

The purpose of the Eldorado–Ivanpah Transmission Project is to provide the electrical facilities necessary to integrate up to 1,400 MW of new solar generation in the Ivanpah Dry Lake Area. The proposed project consists of a new, approximately 35-mile double-circuit 230-kV T/L between the Ivanpah Dry Lake Area and the existing Eldorado Substation and construction of a new 230/115-kV Ivanpah Substation. As discussed below, the proposed project is needed to:

1. Comply with the state-mandated RPS (20% renewable by year 2010 per California Senate Bill 107[3]) in an orderly, rational, and cost-effective manner, while also considering the need for maintaining reliable electric service during the upgrade and/or construction of new facilities.
2. Integrate planned renewable generation resources,[4] including up to 1,400 MW from the Ivanpah Dry Lake Area, with a Power Purchase Agreement (PPA) executed by a CPUC-jurisdictional private transmission

3 SB 107; Chapter 464, Statutes of 2006. SB 107 amends pertinent provisions in Public Resources Code Sections 25740 through 25751 and Public Utilities Code Sections 399.11 through 399.16.

owners group in a manner that minimizes potential environmental impacts and impacts to existing and planned residences, where feasible, by maximizing the use of existing transmission corridors in order to:

a. maximize the use of existing, previously disturbed T/L ROW to minimize effects on previously undisturbed land and resources,

b. select route and tower locations with the lowest potential for environmental impacts while still meeting proposed project objectives, and

c. select the shortest feasible route that minimizes environmental impacts and proposed project costs.

3. Interconnect and deliver energy up to 1,400 MW of renewable resources located in the Ivanpah Dry Lake Area in a way that complies with all applicable NERC/WECC Planning Standards, and in a manner that minimizes T/L crossings.
4. Support the State of California Greenhouse Gas Reduction Program.
5. Assist the BLM in meeting the federal directive to develop 10,000 MW of renewable generation. [5]

Compliance with California's Renewable Portfolio Standard

The California RPS was established in 2002 by Senate Bill 1078.[6] The RPS requires investor-owned utilities, including retail sellers of electricity such as SCE, to increase their sale of electricity produced by renewable energy sources (such as wind and solar) by at least 1% per year so that by the year 2017, at latest, 20% of its total retail sales are procured from renewable sources. These requirements were accelerated by the passage of Senate Bill 107[7] to be consistent with the Energy Action Plan (EAP). The EAP adopted by the CPUC, the CEC, and the now-defunct California Power Authority pledged that the agencies would accelerate RPS implementation to meet the 20% goal by 2010 instead of 2017. In order for investor-owned utilities (including retail sellers of electricity such as SCE) to satisfy these target goals, new transmission facilities will be required to interconnect remote areas of high renewable generation concentration. One of these remote areas is referred to as the Ivanpah Dry Lake Area.

The CEC's 2006 Integrated Energy Policy Report (IEPR) Update Report (January 2007) encourages development of additional transmission infrastructure to interconnect and deliver renewable resources. The IEPR Update Report identified the lack of transmission infrastructure to access remote renewable resources as the most critical barrier to meeting California's 20% target by 2010. Furthermore, the IEPR Update Report states that achieving the state's RPS is an essential component of California's greenhouse gas (GHG) emission reduction targets.

Integration of Planned Renewable Generation Resources

Under Sections 210 and 212 of the Federal Power Act (16 U.S.C § 824 [i] and [k]) and Section 25 of the CAISO's[8] Tariff, SCE is obligated to interconnect and integrate power generation facilities into its electric system. As of April 22, 2009, there were eight active interconnection requests in the Ivanpah Dry Lake Area totaling 1,677 MW of new renewable generation interconnections. Table A-1 lists planned solar and wind energy projects in the Ivanpah Valley Area awaiting CAISO evaluation in the CAISO queue.

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[4] Under Sections 210 and 212 of the Federal Power Act (16 U.S.C § 824 [i] and [k]) and Section 25 of the California Independent System Operator's (CAISO) Tariff, Southern California Edison (SCE) is obligated to interconnect and integrate power generation facilities into its electric system.

[5] Executive Order 13212, Actions to Expedite Energy-Related Projects, requires federal agencies to expedite review of energy project applications; and the Energy Policy Act of 2005 (Title II, Sec. 211) requires the Department of Interior to approve at least 10,000 MW of renewable energy on public lands by 2015 (CEQ 2001).

[6] SB1078 (Stats. 2002, Ch. 516), adding Article 16 (California RPS Program) to the CPUC § 399.11, et seq. (2004) (SB 1078).

[7] SB 107, Chapter 464, Statutes of 2006. SB 107 amends pertinent provisions in Public Resources Code Sections 25740 through 25751 and Public Utilities Code Sections 399.11 through 399.16

[8] CAISO plans and operates the California transmission grid.

Table A-1 Ivanpah Dry Lake Area New Generation Interconnection Requests

CAISO Queue Position	Type	Size (MW)
CAISO Queue #11	New Wind Project	63
CAISO Queue #131[1]	New Solar Project	100
CAISO Queue #162[1]	New Solar Project	114
CAISO Queue #233[1]	New Solar Project	200
Total Continuing under LGIP Serial Approach		477
CAISO Queue #163	New Solar Project	300
CAISO Queue #234	New Solar Project	400
CAISO Queue #382	New Solar Project	270
CAISO Queue #467	New Solar Project	230
Total Continuing under Transitional Queue Cluster Approach		1,200
GRAND TOTAL INTERCONNECTION REQUESTS		1,677

Notes:
[1]Currently under review at the California Energy Commission (Docket 07-AFC-05)
Key:
CAISO = California Independent System Operator's (CAISO) Tariff
LGIP = Large Generator Interconnection Procedure
MW = Megawatt

SCE understands that PG&E has executed a PPA with two of the eight active projects, and SCE recently executed a PPA with one of the active projects. The eight anticipated projects have a combined generation output in excess of 1,400 MW.

On August 31, 2007, an Application for Certification (AFC) with the CEC was filed for the three projects with CPUC-approved PPAs (Docket 07-AFC05). The AFC indicates that the three plants (projects) would be developed in concert, and a joint environmental assessment by the BLM and the CEC is underway. Consequently, the proposed project will enable California utilities to access renewable generation in the Ivanpah Dry Lake Area, and thus satisfy SCE's obligation to interconnect and integrate power generation facilities into the electric grid.

Compliance with NERC/WECC Reliability Planning Criteria

T/Ls must be constructed in accordance with reliability planning criteria, including criteria developed by the CAISO, WECC, and NERC. These criteria require that the potential loss of T/Ls (proposed and existing) be analyzed and the transmission system be designed to continue to function if a loss occurs. To the extent that simultaneous loss of two or more T/Ls occurs within the same transmission corridor and impacts system reliability, SCE must use acceptable mitigation measures such as Special Protection Systems (SPS) or construction of additional facility upgrades.

Support California's Greenhouse Gas Reduction Program

With the recent signing of Assembly Bill 32 (Nuñez), Chapter 488, Statutes of 2006, California will embark on an ambitious program to reduce GHG emissions. The 2006 IEPR Update states that "achieving the state's Renewable Portfolio Standard goals is an essential component of California's greenhouse gas emission reduction targets."

Consequently, the proposed project will enable California to integrate renewable resources (such as solar) with no GHG emissions, which could help the state achieve GHG emissions reduction targets.

Support Federal Renewable Energy Mandates

Executive Order 13212 – Actions to Expedite Energy-Related Projects requires federal agencies to expedite review of energy project applications (CEQ 2001). In addition, the Energy Policy Act of 2005 (Title II, Sec. 211) requires the Department of Interior to approve at least 10,000 MW of renewable energy on public lands by 2015.

1.4.2 Project Objectives

1.4.2.1 Lead Agency Objectives

The project objectives reflect the stated purpose and need of the project and will be considered in the comparison of alternatives, as required under both NEPA and CEQA. The CPUC and BLM developed the following three objectives for the project:

- To connect renewable energy sources in the Ivanpah Valley area in compliance with Executive Order 13212, the Energy Policy Act of 2005, the Federal Power Act, California Senate Bill 1078, and California Senate Bill 107;
- To improve reliability in compliance with applicable standards including NERC, WECC, CAISO, and Southern California Edison standards; and
- To maximize the use of existing ROW and designated utility corridors to minimize impacts to environmental resources.

1.4.2.2 Applicant's Project Objectives

In its PEA, SCE identified the following seven objectives for the project:

- Reliably interconnect new solar generation resources in the Ivanpah Dry Lake Area and help enable SCE and other California utilities to comply with California's RPS in an expedited manner
- Comply with all applicable reliability planning criteria required by NERC, WECC, and the CAISO;[9]
- Construct facilities in an orderly, rational, and cost-effective manner to maintain reliable electric service by minimizing service interruptions during construction;
- Maximize the use of existing T/L ROWs in order to minimize effects on previously undisturbed land and resources;
- Minimize environmental impacts through selection of routes, tower types, and locations;
- Where existing ROW is not available, use the shortest feasible route that minimizes environmental impacts; and
- Meet project needs in a cost-effective and timely manner.

1.5 Organization of the Alternatives Screening Report

The remainder of this Alternatives Screening Report provides an overview of the alternative evaluation process (Section 2), detailed determinations on individual alternatives (Section 3), and a summary of the alternative screening results (Section 4).

2. Overview of Alternatives Evaluation Process

The range of alternatives in this report was identified through the CEQA/NEPA scoping process and through supplemental studies and consultations that were conducted during this analysis. The range of alternatives considered in the screening analysis encompasses:

[9] Includes provision of a telecommunications system to support a special protection system (SPS) and a second telecommunication route to support WECC redundant telecommunication requirements for an SPS.

- Alternatives identified by SCE as part of the PEA;
- Alternatives requested by the CEQA Lead Agency (CPUC) or the NEPA Lead Agency (BLM); and
- Alternatives identified by the general public during the 30-day public scoping period (July 23 to August 22, 2009) held in accordance with CEQA and NEPA requirements.

2.1 Alternatives Screening Methodology

Evaluation of the alternatives used a screening process with three steps:

Step 1 Clarify the description of each alternative to allow comparative evaluation.

Step 2 Evaluate each alternative in comparison with the proposed project, using CEQA/NEPA criteria (defined below).

Step 3 Based on the results of Step 2, if the alternative met the CEQA/NEPA criteria it was retained for full analysis in the EIR/EIS. If the alternative did not meet the CEQA/NEPA criteria, it was eliminated from further consideration.

As noted above for Step 2, the advantages and disadvantages of alternatives were carefully weighed with respect to CEQA and NEPA criteria for consideration of alternatives. These criteria are discussed in the following section.

2.2 CEQA and NEPA Requirements for Alternatives

Both CEQA and NEPA provide guidance on selecting a reasonable range of alternatives for evaluation in an EIR and EIS. The CEQA and NEPA requirements for selection and analysis of alternatives are similar, thereby allowing the use of an alternatives screening and evaluation process that satisfies both state and federal requirements. The CEQA and NEPA requirements for selection of alternatives are described below.

2.2.1 CEQA Alternative Requirements

An important aspect of EIR preparation is identification and assessment of reasonable alternatives that have the potential to avoid or minimize the impacts of a proposed project. In addition to mandating consideration of the No Project Alternative, the State CEQA Guidelines (Section 15126.6(e)) emphasize selection of a reasonable range of feasible alternatives and adequate assessment of these alternatives to allow for a comparative analysis for decision makers to consider. The State CEQA Guidelines (Section 15126.6(a)) state that:

> *An EIR shall describe a reasonable range of alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives. An EIR need not consider every conceivable alternative to a project. Rather, it must consider a reasonable range of potentially feasible alternatives that will foster informed decision making and public participation.*

To comply with CEQA's requirements, each alternative that has been suggested or developed for this project has been evaluated in three ways:

- Does the alternative accomplish all or most of the basic project objectives?
- Is the alternative feasible (from economic, environmental, legal, social, and technological standpoints)?

- Does the alternative avoid or substantially lessen any significant effects of the proposed project (including consideration of whether the alternative itself could create significant effects potentially greater than those of the proposed project)?

2.2.1.1 Consistency with Project Objectives

A project's statement of objectives (required by CEQA) and purpose of and need for action (required by NEPA) describe the underlying purpose of the project and the reasons for undertaking the project. The purpose and need statement is used to identify a range of reasonable alternatives to be analyzed in the EIR/EIS. To fulfill this requirement, the project proponent must define its objectives for the project and provide a description of the need for the project. The purpose and need for the proposed project, and the applicant's project objectives, are presented in Section 1.4.1 and 1.4.2 of this report, respectively.

The State CEQA Guidelines require consideration of alternatives capable of eliminating or reducing significant environmental effects even though they may "impede to some degree the attainment of project objectives" (Section 15126.6(b)). Therefore, it is not required that each alternative meet all of the project objectives.

2.2.1.2 Feasibility

The State CEQA Guidelines (Section 15364) define feasibility as "capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors."

The alternatives screening analysis is largely governed by what CEQA terms the "rule of reason," meaning that the analysis should remain focused not on every possible eventuality but rather on the alternatives necessary to permit a reasoned choice. Furthermore, of the alternatives identified, the EIR/EIS is expected to fully analyze those alternatives that are feasible, while still meeting most of the project objectives.

According to the State CEQA Guidelines (Section 15126.6(f)(1)), among the factors that may be taken into account when addressing the feasibility of alternatives are site suitability, economic viability, availability of infrastructure, general plan consistency, other plans or other regulatory limitations, jurisdictional boundaries, and proponent's control over alternative sites in determining the range of alternatives to be evaluated in the EIR. For the screening analysis, the feasibility of potential alternatives was assessed considering the following factors:

- Technical Feasibility. Is the alternative feasible from a technological perspective, considering available technology? Are there any construction, operation, or maintenance constraints that cannot be overcome?
- Legal Feasibility. Do legal protections on lands preclude or substantially limit the feasibility of permitting a high-voltage T/L? Do regulatory restrictions substantially limit the feasibility or successful permitting of a high-voltage T/L? Is the alternative consistent with regulatory standards for transmission system design, operation, and maintenance?
- Economic Feasibility. Is the alternative so costly that implementation would be prohibitive?

The State CEQA Guidelines require consideration of alternatives capable of eliminating or reducing significant environmental effects even though they may "impede to some degree the attainment of project objectives or would be more costly" (Guidelines Section 15126.6(b)).

2.2.1.3 Potential to Eliminate Significant Environmental Effects

A key CEQA requirement for an alternative is that it must have the potential to “avoid or substantially lessen any of the significant effects of the project” (State CEQA Guidelines Section 15126.6(a)). At the screening stage, it is not possible to evaluate all of the impacts of the alternatives compared with the proposed project with absolute certainty, and it may not be possible to quantify impacts. However, it is possible to identify elements of an alternative that are likely to be the sources of impact and to relate them, to the extent possible, to general conditions in the subject area.

Table A-2 presents a summary of the potential significant effects of the proposed project. This impact summary was prepared prior to completion of the EIR/EIS analysis, so it may not include everything in the detailed analysis that will be included in the EIR/EIS. The impacts stated below are based on a preliminary assessment of potential project impacts and were used to determine whether an alternative met the CEQA requirement to reduce or avoid potentially significant effects of the proposed project. Resources that are not anticipated to be significantly impacted are agriculture, air quality, mineral resources and soils, hazards and hazardous materials, hydrology and water quality, land use and planning, population and housing, public services, recreation, transportation and traffic, and utilities and service systems. These resource areas are not included in Table A-2.

Table A-2 Summary of Preliminary Significant Impacts of the Proposed Project

Issue Area	Impact
Aesthetics/Visual Resources	• Permanent impacts may result related to visual contrast, alterations in existing scenic integrity, blocked or partially blocked views, and the introduction of industrial-like facilities and new sources of light and glare due to the placement of towers, new or expanded substations, and new access and spur roads in all project segments, including scenic vistas and other designated scenic resources. • Construction-related activities would result in temporary degradation of existing visual character and quality in all project segments, including scenic vistas and other designated scenic resources. • Potential conflicts with federal, state, and local plans, regulations, or standards applicable to the protection of visual resources. • Long-term changes in the visual character would result from the addition of lattice steel towers, associated conductors, microwave tower, telecommunications system, the Ivanpah Substation, and vegetation clearing.
Biological Resources	• Construction activities and project facilities would result in temporary and permanent loss of wildlife and habitat of state and/or federal sensitive species. • Construction and operation of the project could disturb wildlife and cause changes in wildlife behavior. • Construction activities may conflict with local policies or ordinances protecting biological resources. • The proposed project would result in permanent loss of sensitive vegetation communities, and some sensitive plant and animal species. • The entire project area is within the range of the desert tortoise, and most of the area provides some suitable habitat. Portions of the project would be located within Desert Tortoise Critical Habitat in the Ivanpah Recovery Unit. • Areas of potential impact to bighorn sheep include the proposed transmission line route through the McCullough Mountains and the telecommunication route segment in the southern portion of the Eldorado Valley between the Highland Range and the Southern McCullough Mountains. • Four sensitive species of bats could occur within the project area in the Nevada segment. • The portion of the proposed telecommunication route (Path 2) located on the Eldorado-Lugo 500-kV transmission line passes through a historic mining area at the south end of the

Table A-2 Summary of Preliminary Significant Impacts of the Proposed Project

Issue Area	Impact
	McCullough Mountains. Old mine adits and shafts in the area may provide suitable roosting habitat for the California leaf-nosed bat and/or Townsend's big-eared bat. • Vegetation clearing for access to tower sites and at tower sites has the potential to remove plants that may provide forage and cover for some wildlife species. • Removal of vegetation will increase the potential for post-construction erosion. • Removal of vegetation and ground-disturbing activities may impact burrowing owls' nests and habitat. • New access and spur roads could increase public access to desert tortoise habitat. • The project could have potentially significant impacts on species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or United States Fish and Wildlife Service. • The project could interfere substantially with the movement of native or migratory fish or wildlife species.
Cultural and Paleontological Resources	• The project would remove several wooden poles along a segment of the Boulder Dam 115-kV transmission line (36-10315), which has been deemed to contribute to the Southern Sierras Power Company Boulder Line Historic District. • Construction of new towers and access roads could damage or destroy historic and archaeological sites, traditional cultural properties, or areas containing paleontological resources. • Temporary use of staging areas and conductor pull sites could damage or destroy historic and archaeological sites, traditional cultural properties, or areas containing paleontological resources.
Geology	• Construction and maintenance of access roads could contribute to runoff water that causes minor erosion and to wind erosion with re-deposition of sand away from the roads. • The project could be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project and potentially result in a landslide, lateral spreading, subsidence, liquefaction or collapse.

Source: E & E 2009.
Key:
kV = Kilovolt.

Reliability

In addition to the above feasibility considerations, the reliability of the transmission system must also be considered, including planning criteria developed by the CAISO, WECC, and NERC.

2.2.2 NEPA Alternative Requirements

According to the Council on Environmental Quality (CEQ) NEPA Regulations (40 CFR 1502.14), the EIS must present the environmental impacts of the proposed action and alternatives in forms that can be readily compared, defining the issues and providing a clear basis for choice by decision-makers and the public. The alternatives section must:

- Rigorously explore and objectively evaluate all reasonable alternatives, and, for alternatives that were eliminated from detailed study, briefly discuss the reasons for their elimination.
- Devote substantial treatment to each alternative considered in detail including the proposed action so reviewers may evaluate their comparative merits.

- Include reasonable alternatives not within the jurisdiction of the lead agency.
- Include the alternative of no action.
- Identify the agency's preferred alternative or alternatives, if one or more exists, in the draft statement and identify such alternatives in the final statement unless another law prohibits the expression of such a preference.
- Include appropriate mitigation measures not already included in the proposed action or alternatives.

The CEQ has stated that "[r]easonable alternatives include those that are practical or feasible from the technical and economic standpoint and using common sense rather than simply desirable from the standpoint of the applicant" (CEQ 1983). In order to comply with NEPA's requirements, each alternative that has been suggested or developed for this project has been evaluated in two ways (Bass et al. 2001):

- Does the alternative meet the statement of purpose and need?
- Is the alternative feasible?

2.2.2.1 Consistency with Purpose and Need

NEPA (40 CFR 1502.13) and CEQA (State CEQA Guidelines Section 15124[b]) both explain that an agency's statement of objectives or purpose and need should describe the underlying purpose of the proposed project and reasons for undertaking the project. The purpose and need for the proposed project, and the lead agency and the applicant's project objectives, are presented in Sections 1.4.2.1 and 1.4.2.2 of this report, respectively.

2.2.2.2 Feasibility

The environmental consequences of the alternatives, including the proposed action, are to be discussed in the EIS per CEQ NEPA Regulations (40 CFR 1502.16). The discussion shall include "possible conflicts between the proposed action and the objectives of federal, regional, state, and local…land use plans, policies and controls for the area concerned." Other feasibility factors to be considered may include cost, logistics technology, and social, environmental, and legal factors. The feasibility factors are substantially the same as described for CEQA in Section 2.3.1.2.

2.2.3 Summary of CEQA and NEPA Screening Methodology

Unlike CEQA's requirements, NEPA does not screen out alternatives based on avoiding or lessening significant environmental effects. However, to assure that the alternatives considered for the EIR/EIS would meet the requirements of both CEQA and NEPA, a reasonable range of alternatives has been considered and evaluated as to whether or not they (1) meet most of the project objectives/purpose and need, (2) are feasible, and (3) would avoid or minimize any adverse effects of the proposed project.

3. Alternative Descriptions and Determinations

3.1 Introduction

The alternatives screening process has culminated in the identification and screening of 19 potential alternatives or combinations of alternatives. This section considers alternatives in the transmission system, transmission routing, telecommunication, and technology. Each category of alternative is described below, but not all options described below are analyzed in detail in the EIR/EIS.

This section includes detailed descriptions of each alternative considered and detailed explanations of why each was selected or eliminated. After initial screening, if a potential alternative was unable to meet the project objectives, purpose, and need, or it was proven infeasible, or if it did not appear to reduce or avoid adverse effects (NEPA) and potentially significant impacts (CEQA) of the proposed project without creating additional adverse effects of its own, then it was eliminated from full evaluation. The alternatives that have been determined to meet the CEQA/NEPA alternatives screening criteria have been retained for full analysis in the EIR/EIS.

3.2 System Alternatives

This section addresses the four system alternatives to the proposed project. The transmission system alternatives that were considered are:

- Non-Transmission System Alternative (System Alternative 1)
- Reconductoring Alternative (System Alternative 2)
- Lower Voltage Alternative – New 115-kv Transmission Line (System Alternative 3)
- Higher Voltage Alternative – New 500-kV Transmission Line (System Alternative 4)
- Single Circuit Alternative – New 230-kV Transmission Line (System Alternative 5)

The discussions below explain why each potential alternative was eliminated or retained for full analysis.

3.2.1 Non-Transmission System Alternative (System Alternative 1)

Alternative Description

This system alternative was suggested by SCE in its PEA (System Alternative 1). It includes the development of in-basin generation, such as new solar, wind, and/or geothermal power plants, instead of developing new and upgraded transmission facilities to interconnect solar generation from the Ivanpah Dry Lake Area. In addition, demand-side management and energy efficiency programs would be implemented.

Consideration of CEQA/NEPA Criteria

Project Objectives, Purpose, and Need

The Non-Transmission System Alternative would not meet the project objective of providing an interconnection for solar resources in the Ivanpah Dry Lake Area because no transmission system upgrades to the existing Eldorado–Baker–Cool Water–Dunn Siding–Mountain Pass 115-kV T/L would be constructed. In addition, this alternative would not comply with Sections 210 and 212 of the Federal Power Act (16 United States Code [USC] § 824 [i] and [k]) and Sections 3.2 and 5.7 of the CAISO Tariff that requires SCE to interconnect and integrate power generation facilities into its electric system.

Feasibility

This alternative would be feasible from a technical, legal, and regulatory perspective. However, new sources of in-basin generation would need to be identified, evaluated, and constructed and would result in environmental impacts in the areas where the projects would be developed.

Environmental Advantages

The Non-Transmission System Alternative would avoid impacts to resources in the vicinity of the proposed project. However, these impacts would be transferred to the areas where in-basin generation would be developed. In addition, upgrades to SCE's existing transmission system could be required to integrate up to 1,400 MW of new power generation within its service area.

Environmental Disadvantages

New sources of in-basin generation would result in site-specific impacts associated with construction and operation of new power plants. This could result in air quality, biology, cultural resource, land use, noise, and visual impacts, among others.

Alternative Conclusion

ELIMINATED. The Non-Transmission System alternative would not provide an interconnection for new solar resources, it would not integrate generation resources in the Ivanpah Dry Lake Area, and it would not enable SCE to comply with California's RPS. This alternative does not meet the project's purpose, need, and objectives. Also, because it would require development of new energy resources within the SCE service area, it might not avoid the adverse effects of the proposed project, including those potentially significant. Therefore, this alternative was eliminated from further consideration.

3.2.2 Reconductoring Existing 115-kV Line Alternative (System Alternative 2)

Alternative Description

"Reconductoring" refers to the installation of new, higher capacity conductors, generally on existing towers. Reconductoring of the existing 115-kV Eldorado–Baker–Cool Water–Dunn Siding–Mountain Pass 115-kV T/L between the Ivanpah Dry Lake Area and the existing Eldorado Substation would involve replacing the existing low capacity conductor with a new higher capacity conductor. This alternative was suggested by SCE in its PEA (System Alternative 2).

Consideration of CEQA/NEPA Criteria

Project Objectives, Purpose, and Need

Under Sections 210 and 212 of the Federal Power Act (16 USC § 824 [i] and [k]) and Sections 3.2 and 5.7 of the CAISO Tariff, SCE is obligated to interconnect and integrate power generation facilities into its electric system. The total amount of generation interconnection requests received in the Ivanpah Dry Lake Area would exceed the amount of transmission capacity made available under a reconductoring alternative.[10]

Also, SCE is obligated to interconnect generation as requested. The Reconductoring Alternative would not provide the needed capacity to integrate up to 1,400 MW of new generation in the Ivanpah Dry Lake Area. It would not meet the project objective of providing an interconnection for solar resources in the Ivanpah Dry Lake Area.

Feasibility

This alternative would be a "feasible" alternative from a technical, legal, and economic standpoint. There are no construction, operation, or maintenance constraints for this alternative that could not be overcome. There are no legal protections on lands that would preclude or substantially limit permitting this alternative, nor is it anticipated that the implementation costs would be prohibitive. However, it would not meet a basic objective of the project.

[10] E&E submitted a data gap request to SCE (No. 2.35) requiring additional information on capacity of this alternative. Per data gap response received on 10-05-2009, the capacity of conductor installed on the existing Eldorado–Baker–Cool Water–Dunn Siding–Mountain Pass 115-kV transmission line is rated at 83 MVA, which would be insufficient to support future generation interconnection. The engineering constraints of reconductoring the existing line by installing a higher capacity conductor on the existing tower infrastructure is currently unknown by the applicant.

Environmental Advantages

The Reconductoring Alternative would avoid or minimize the potentially significant construction-related environmental adverse effects identified for the proposed project because it would replace low capacity conductors with higher capacity conductors on the existing towers. However, potential impacts from operations and maintenance would be similar to those of the proposed project since the 115-kV lines would be retained within the existing ROW.

Environmental Disadvantages

Reconductoring of the 115-kV would result in minor, temporary, construction-related impacts.

Alternative Conclusion

ELIMINATED. The Reconductoring Alternative would not provide an interconnect for new solar generation in the Ivanpah Dry Lake Area. This alternative does not meet the project's purpose, need, and objectives. Therefore, this alternative was eliminated from further consideration.

3.2.3 Lower Voltage Alternative – New 115-kV Transmission Line (System Alternative 3)

Alternative Description

Construction of a new 115-kv T/L would involve construction of lower voltage transmission facilities between the Ivanpah Dry Lake Area and the existing Eldorado Substation. Under this alternative, SCE's standard 115-kV conductor would provide up to 217 megavolt amperes of capacity. Within the existing ROW, the maximum number of 115-kV lines that can be accommodated is two sets of double-circuit structures or four individual 115-kV lines. This would limit the maximum amount of generation that can be accommodated to no more than 80 MW. The alternative was addressed in SCE's PEA as System Alternative 3.

Consideration of CEQA/NEPA Criteria

Project Objectives, Purpose, and Need

The use of a lower voltage transmission system alternative would not meet the project's purpose, need, and objectives because it would result in an undersized method of service and would not interconnect and integrate up to 1,400 MW of generation resources in the Ivanpah Dry Lake Area. Because it would not maximize the amount of energy that could be transmitted within the current ROW, this alternative does not meet the project objective of maximizing the use of existing ROW and corridors.

Feasibility

Replacement of the existing 115-kV line is technically, financially, and economically feasible, however, it would not substantially increase the capacity of the existing line.

Environmental Advantages

Construction impacts would be similar to those identified for the proposed project.

Environmental Disadvantages

Construction impacts would be similar to those identified for the proposed project.

Alternative Conclusion

ELIMINATED. The Lower Voltage System Alternative would not accommodate interconnection and integration of up to 1,400 MW of generation resources in the Ivanpah Dry Lake Area. It would not avoid or minimize the construction-related adverse effects identified for the proposed action, nor would it maximize the transmission capacity of the existing ROW. Therefore, this alternative was eliminated from further consideration.

3.2.4 Higher Voltage Alternative – New 500-kV Transmission Line (System Alternative 4)

Alternative Description

The Higher Voltage Alternative would include construction of new 500-kV transmission facilities between the Ivanpah Dry Lake Area and the existing Eldorado Substation and was addressed in SCE's PEA as System Alternative 4.

The use of the Higher Voltage Alternative would require expansion of the existing 100-foot-wide ROW. The amount of ROW expansion would depend on the construction design. If a single-circuit design standard were selected, the maximum amount of generation that could be interconnected would be limited by the CAISO single contingency maximum generation tripping limit to 1,150 MW. The use of a double-circuit 500-kV design standard would increase the maximum amount of generation that could be interconnected to 1,400 MW according to CAISO.

To further increase the amount of generation that could be interconnected, additional transmission not currently defined would be needed. In addition, although the number of towers required could be reduced, this alternative could require taller and wider towers with a greater physical separation compared with that of the proposed project (Harries 2009).

Consideration of CEQA/NEPA Criteria

Project Objectives, Purpose, and Need

The Higher Voltage Transmission Alternative would meet the project objectives, purpose, and need in that it would facilitate the interconnection and integration of new solar power in the Ivanpah Dry Lake area. While expansion of the existing ROW could be required to accommodate the Higher Voltage Alternative, this alternative would not increase the generation interconnection capacity above that identified for the proposed project.

Feasibility

This alternative would be feasible from a regulatory and technical perspective. However, the higher voltage transmission alternative would not result in additional interconnection capability as compared with a 230-kV system and would require a greater land disturbance associated. A higher voltage transmission line would require the use of a wider ROW (150 to 250 feet) to accommodate the required transmission structures, and the construction and operation and maintenance of new 500/230/115-kV substations to interconnect renewable resources locating in Nevada and seeking interconnection to the CAISO-controlled grid.

Environmental Advantages

None identified.

Environmental Disadvantages

Greater impacts to sensitive resources may occur as a result of increased ROW and land to accommodate additional substations and switching stations. Visual impacts may increase due to construction of structures to accommodate the 500-kV line, especially if the transmission structures are taller, wider, or bulkier than those required for a 230-kV line construction.

Alternative Conclusion

ELIMINATED. The construction of 500-kV transmission, instead of 230-kV, would require greater amounts of ROW for interconnecting up to the same amount of generation resources that could be interconnected with the proposed project at 230-kV. The maximum amount of interconnection in this area with a new transmission facility regardless of voltage design standard is limited by the CAISO Spinning Reserve Criteria to no more than 1,150 MW if only one line is built and 1,400 MW if constructed as a double-circuit facility or two single circuit facilities in a common ROW. The need to implement an SPS to trip generation in the Ivanpah Dry Lake Area under simultaneous outage of the new Eldorado–Ivanpah T/Ls is the basis for the limitation as provided in the CAISO Grid Planning Standard (in ISO G4) under Section IV (ISO

Grid Planning Guides for New Generator Special Protection Systems). Therefore, this alternative would not meet the project's purpose, need, and objectives and has been eliminated from further consideration.

3.2.5 New Single-Circuit 230-kV Transmission Line (System Alternative 5)

Alternative Description

This Alternative would be identical to the proposed project except that it would include only one 230-kV transmission line instead of two. This Alternative would only allow for integration of up to 1150 MW of new generation resources in the Ivanpah Valley instead of 1400 MW provided by the proposed Project.

Consideration of CEQA/NEPA Criteria

Project Objectives, Purpose, and Need

The use of a single-circuit 230-kV transmission system alternative would not meet the project's purpose, need, or objectives because it would not interconnect and integrate up to 1,400 MW of generation resources in the Ivanpah Dry Lake Area. Because it would not maximize the amount of energy that could be transmitted within the current ROW, this alternative does not meet the project objective to maximize use of existing ROW and corridors.

Feasibility

This transmission alternative would be feasible from a technical and regulatory perspective because it would increase the transmission capacity. However, the use of 230-kV single-circuit design would not achieve the most efficient use of land for energy within the existing transmission corridor.

Additional Note on Meetings with the CAISO Regarding System Alternative 5

The CPUC was made aware of this Alternative though a meeting with the CAISO on September 28, 2009. Normally the CAISO planning process occurs before the CEQA/NEPA process, but for this project they are concurrent and therefore holding a meeting to discuss the simultaneous processes was appropriate. The CAISO engineering team noted that to maximize the *transmission capacity coming out of Ivanpah Valley an additional project would be necessary. If, in addition to building System Alternative 5 mentioned above, an additional single-circuit 230-kV transmission line were built to connect the proposed Ivanpah substation to another new substation in the Nipton area and this system was connected to the existing network, then the CAISO rating for the combined system would be 3000 MW due to the enhanced reliability that would be achieved through physical separation of two different 230-kV transmission lines. The CAISO suggested this as a way to increase transmission capacity for the SCE transmission network throughout the Ivanpah Valley Area beyond the 1400 MW proposed for this project if enough new renewables projects were eventually built to warrant this level of capacity.*

The need for 3,000 MW of capacity rather than 1,400 MW is not currently demonstrated by the CAISO queue. Additionally, CAISO participated in the preparation of the Renewable Energy Transmission Report (RETI) along with the CPUC, the CEC, and the public owned utilities. The report is a cooperative effort to identify areas with potential for renewable energy generation development and develop and rank a conceptual transmission plan to provide those areas interconnection with the statewide electric transmission grid. The report considers a combination of factors including the likely scope of renewable generation development, potential environmental concerns, and regulatory or legislative restrictions. The Ivanpah Valley area is within the Mountain Pass California Renewable Energy Zone (CREZ), however, the report does not identify the need for a new a transmission line or substation in the Nipton area as part of its conceptual transmission plan.

Further, the BLM noted that no ROW or designated corridor currently exists between the proposed Ivanpah substation and Nipton. If an application for a new transmission project was filed with the BLM to connect the proposed Ivanpah Substation with a new substation in Nipton an amendment to the California Desert Conservation Area Plan (CDCA), as amended, would be required. A CDCA plan amendment is not required for the proposed Project since it is already in a BLM designated corridor.

In addition, the BLM, jointly with the Department of Energy, published the West-wide Energy Corridor Programmatic Environmental Impact Statement (WWEC PEIS) in January 2009. The report establishes energy corridors on public lands in the western United States and serves as an amendment to existing management plans, including the CDCA Plan and the Las Vegas Resource Management Plan. Energy corridors established by the WWEC PEIS were developed by federal agency staff and informed by the public involvement and met specific criteria, including location on federal lands, ability to establish connectivity with the energy grid, feasibility, legal and regulatory compliance, and compatibility with local BLM land use plans. The corridors were established using information provided by local government officials, resource specialists, stakeholder groups, and the public; an approach designed in part to ensure avoidance of potential environmental issues with corridor siting. A second 230-kV transmission line to another new substation in the Nipton area would not be located within one of the Section 368 corridors. This area between the proposed Ivanpah substation and Nipton is also known to include critical habitat for Desert Tortoise.

Because a new ROW and new substation in the Nipton area would be located outside of energy corridors established through public vetting processes with the involvement of multiple government agencies that were designed to service anticipated generation while minimizing environmental impacts, environmental impacts related to pursuing a separate project such as this to further increase the capacity of the network coming out of the Ivanpah Valley would be formidable as compared to the proposed Project.

Alternative Conclusion

ELIMINATED. This alternative would not meet the project’s purpose, need, and objectives, and would also result in greater impacts than those identified for the proposed action. Therefore, this alternative has been eliminated from further consideration.

3.3 Transmission Line Routing Alternatives

This section describes the five T/L routing alternatives, which are minor routing adjustments to SCE’s proposed 230-kV route. Each routing alternative would replace a specific segment of the proposed T/L alignment, as shown in Figure 5.

The transmission system alternatives that were considered are:

- Parallel to Los Angeles Department of Water and Power (LADWP) Corridor Alternative (Transmission Alternative A)
- North of Eldorado Alternative (Transmission Alternative B)
- North Dry Lakes Reroute Alternative (Transmission Alternative C)

- South Dry Lakes Reroute Alternative (Transmission Alternative D)
- South Dry Lakes Bypass Alternative (Transmission Alternative E)
- New ROW Alternative (Transmission Alternative F)

A summary of the T/L route alternatives is provided in Table A-3.

Table A-3 Summary of Transmission Line Route Alternatives

	Proposed T/L Route	Alt. Route A	Alt. Route B	Alt. Route C	Alt. Route D	Alt. Route E
Dimensions						
Length of Line (miles)	34.7	33.8	38.4	35.4	35.1	35.1
Alternate Route Segment Length (miles)	N/A	5.0	5.7	5.5	3.5	3.0
Portion of Proposed Route that Alternate Route Replaces (miles)	N/A	6.0	2.0	4.5	3.0	2.5
New Permanent Area Occupied (acres)						
Structure Footings – Proposed and Complete Alternate Routes[1]	36.8	35.5	41.3	37.9	36.9	37.0
Alternate Route Segment	N/A	4.9	7.4	5.3	3.2	2.9
Area Difference in Structure Footing Area Compared to the Proposed Route	N/A	-1.3	+4.5	+1.1	+0.1	+0.2
Access Roads	0	0	0	1.6	0	0
Spur Roads	2.1	3.6	1.0	1.1	0.7	0.6
Ivanpah Substation[2]	0	0	0	0	0	0
Eldorado Substation[3]	0	0	0	0	0	0
115-kV Subtransmission	1.0	1.0	1.0	1.0	1.0	1.0
33-kV Distribution	0.4	0.4	0.4	0.4	0.4	0.4
Telecommunication[3/4/5/6]	0/0.3/0.1/0.1	0/0.3/0.1/0.1	0/0.3/0.1/0.1	0/0.3/0.1/0.1	0/0.3/0.1/0.1	0/0.3/0.1/0.1
Total Permanent Area Occupied[4/5/6/7]	40.3/40.6/ 40.4/40.4	40.5/40.8/ 40.6/40.6	43.7/44.0/ 43.8/43.8	42.0/42.3/ 42.1/42.1	39.0/39.3/ 39.1/39.1	39.0/39.3/ 39.1/39.1
New Temporary Area Occupied (acres)						
T/L Structures, Proposed and Complete Alternate Routes[1]	256.8	273.7	305.0	286.6	282.0	282.0
Alternate Route Segments	N/A	29.4	41.3	31.2	19.3	17.4
Area Difference in T/L Structures Compared with the Proposed Route	N/A	-7.4	+23.9	+5.5	+0.9	+0.9
Construction Yards, Pulling/Splicing and Batch Plant Areas, Proposed and Complete Alternative Routes	141.9	141.5	171.4	150.9	144.9	144.9
Substation[2,3]	0	0	0	0	0	0
115-kV Subtransmission	7.3	7.3	7.3	7.3	7.3	7.3
33-kV Distribution	2.0	2.0	2.0	2.0	2.0	2.0
Telecommunication[3,4,5,6]	0.2/18.4/ 21.4/21.2	0.2/18.4/ 21.4/21.2	0.2/18.4/ 21.4/21.2	0.2/18.4/ 21.4/21.2	0.2/18.4/ 21.4/21.2	0.2/18.7/ 21.4/21.2
Total Temporary Area Occupied (acres; rounded to 0.5 acre)	408.0/ 426.0/ 429.0/429.0	425.0/443.0/ 446.0/446.0	486.0/504.0/ 507.0/507.0	447.0/465.0/ 468.0/468.0	436.0/454.0/ 457.0/457.0	436.0/455.0/ 458.0/458.0
Number of Structures (approximate)						
New Double-Circuit LSTs	216	30	33	34	21	19
New Single-Circuit H-Frame Structures	42	4	24	0	0	0
Overall Difference in Structure Count Compared with the Proposed Route	N/A	-7	+31	+6	+1	+1
Total	258	34	57	34	21	19

Table A-3 Summary of Transmission Line Route Alternatives

	Proposed T/L Route	Alt. Route A	Alt. Route B	Alt. Route C	Alt. Route D	Alt. Route E
Land Ownership[8] (miles)						
Land Ownership (miles), Alternate Route Segment						
Federal, BLM – California	N/A	0.0	0.0	3.2	1.4	0.0
Federal, BLM – Nevada	N/A	0.0	0.0	1.8	1.3	0.1
Private – California	N/A	0.0	0.0	0.0	0.0	0.0
Private – Nevada[9]	N/A	5.0	5.8	0.3	0/6	0.4
Federal, BLM - California	6.1	6.1	6.1	6.5	6.3	6.3
Federal, BLM – Nevada	20.3	20.0	20.0	21.4	21.0	21.0
Private – California	0.0	0.0	0.0	0.0	0.0	0.0
Private – Nevada[9]	8.6	7.7	12.3	7.5	7.8	7.8
Total	35	33.8	38.4	35.4	35.1	35.1
ROW (miles)						
Existing T/L ROW	35	2.7	0.0	0.0	0.0	0.0
New T/L ROW	35	5.0	5.6	5.2	3.2	0.7
Number of Crossings						
Primary Highways	1	0	0	1	1	1
Secondary Highways	8	0	0	0	2	2
Rivers and Streams	0	0	0	0	0	0
Railroads	1	0	0	0	0	0

Source: SCE 2009.

Notes:

[1]Does not include overlapping area between structure removal and new structure installation.

[2]The grading and other ground-disturbing activities of the Ivanpah Substation site would be approved under the application of BrightSource with the California Energy Commission for its solar power generation facility.

[3]All work will be done within the existing fence line.

[4]Proposed telecommunication system Path 1.

[5]Proposed Telecommunication System Path 2

[6]Mountain Pass Telecommunication System.

[7]Golf Course Telecommunication System

[8]There is no land under the jurisdiction of the states of California or Nevada.

[9]Located in Boulder City jurisdiction.

BLM = Bureau of Land Management.
LST = Lattice steel tower.
OPGW = Optical ground wire.
ROW = Right-of-way.
T/L = Transmission line.

3.3.1 Parallel to Los Angeles DWP Corridor Alternative (Transmission Alternative Route A)

Alternative Description

The purpose of the Parallel to Los Angeles DWP Corridor Alternative is to bypass a segment of the proposed project route where the proposed project would deviate from designated transmission corridors and would cross an approximately 0.8-mile segment within the Boulder City Conservation Easement. Although this 0.8-mile ROW currently contains the existing 115-kV line, as stated above, it falls outside of the BLM-designated corridors. Therefore, the applicant may need to obtain Clark County and City of Boulder City approval to widen the ROW to the 100 to 130 feet required for the upgraded 230-kV line. Transmission Alternative Route A would bypass this segment by heading north from the Eldorado Substation following existing designated transmission corridors.

This alternative begins at the Eldorado Substation and would deviate from the proposed T/L alignment between MP 1 and MP 7 using a new ROW adjacent to the existing LADWP's transmission corridor. It would head generally west for approximately 5 miles on a new 130-foot ROW, cross three LADWP T/Ls (McCullough–Victorville 1 500-kV T/L; McCullough–Victorville 2 500-kV T/L; and the Mead–Victorville 287-kV T/L). It would then turn north for approximately 1,000 feet before crossing the LADWP Marketplace–Adelanto 500-kV T/L and joining the existing ROW at MP 7.

Consideration of CEQA/NEPA Criteria

Project Objectives, Purpose, and Need

This alternative would meet the project objectives, purpose, and need and would eliminate several difficult utility crossovers near the Eldorado Substation. This alternative would fall within a designated BLM utility corridor.

Feasibility

This alternative is feasible from a regulatory, technological, and economic standpoint. This route would be shorter than the segment of the proposed alignment it replaces and would require fewer transmission structures, which would likely reduce construction costs. The reduction, however, could be offset by the need to acquire additional ROW.

Environmental Advantages

This alternative would reduce impacts to cultural resources, as none were identified for this alternative. In addition, this route would cross fewer intermittent streams.

Environmental Disadvantages

This route would cause greater habitat disturbance than the proposed project because the construction area west of the existing Eldorado Substation consists of previously undisturbed desert habitat. As a result, there could be a greater impact to tortoises, tortoise habitat, other wildlife, rare plant species, and desert vegetation.

Alternative Conclusion

RETAINED. Use of the Parallel to Los Angeles DWP Corridor Alternative would meet the project objectives, purpose, and need and would be a feasible alternative. It would reduce impacts to cultural resources, avoid several utility crossings, and cross fewer intermittent streams. Therefore, this alternative was retained for further consideration.

3.3.2 North of Eldorado Alternative (Transmission Alternative Route B)

Alternative Description

The purpose of the North of Eldorado Alternative is to bypass a segment of approximately 0.8 miles where the proposed project would deviate from existing designated transmission corridor and would cross lands administered by the City of Boulder (Boulder City Conservation Easement). Transmission Alternative Route B was created to bypass these segments by heading southwest from the Eldorado Substation to join the existing ROW. The alternative would involve deviating from the proposed route near the Eldorado Substation.

The North of Eldorado Alternative begins at the existing Eldorado Substation and would replace MP 1 to MP 2 of the proposed route (Figure 5). The line exits the substation to the north and parallels the Eldorado–Mead 230-kV T/L within the existing ROW for approximately 2.5 miles before turning southwest. It then extends for approximately 2.8 miles and rejoins the proposed route at MP 2. To reach this point, there are numerous utility T/L crossings. Several of these overhead utility lines may have to be modified or relocated to accommodate this alternative.

Consideration of CEQA/NEPA Criteria

Project Objectives, Purpose, and Need

The North of Eldorado Alternative would meet the project objectives, purpose, and need.

Feasibility

This alternative is feasible from a technical and regulatory perspective. The North of Eldorado Alternative is only approximately 4 miles longer than the portion of the proposed route it is replacing, and would not be expected to require a longer project schedule.

Environmental Advantages

This alternative would not impact cultural resources as none were identified within this segment. Potential impacts to intermittent streams would be lessened due to fewer stream crossings than the proposed project would have.

Environmental Disadvantages

There is a greater potential for ground disturbance because an additional 5.3 miles of new T/L ROW would be required for the project.

Alternative Conclusion

RETAINED. The use of the North of Eldorado Alternative would meet the project objectives, purpose, and need. It would avoid cultural resource impacts, but the addition 5.3 miles of new ROW could result in greater ground disturbance. Nonetheless, this alternative will be retained for further analysis.

3.3.3 North Dry Lakes Reroute Alternative (Transmission Alternative Route C)

Alternative Description

Transmission Alternative C was suggested by BLM to minimize impacts to Ivanpah Dry Lake by rerouting a portion of the T/L. The T/L would be routed off the existing SCE transmission ROW at MP 27, just before entering the Ivanpah Dry Lake. It would head north around the dry lake on new ROW and would extend a total of 5.3 miles. The alternative would then reconnect with the proposed alignment at a point northeast of Primm near MP 35.

Consideration of CEQA/NEPA Criteria

Project Objectives, Purpose, and Need

The use of the alternative route would meet the objectives, purpose, and need of the proposed project and would be consistent with the plan of service.

Feasibility

This alternative is feasible from a technical, regulatory, and economic perspective. It would avoid impacts to Ivanpah Dry Lake and would not likely require a longer project construction schedule.

Environmental Advantages

This alternate route would completely avoid Ivanpah Dry Lake. It would have a reduced visual impact than the proposed project and would involve the removal and relocation/re-route of the existing T/L. It would not be visible from nearby residential uses. In addition, there would be reduced impacts to paleontological resources, and fewer intermittent streams would be crossed.

Environmental Disadvantages

There would be a greater potential for erosion and ground disturbance due to development of new access roads and new T/L ROW, which could cause impacts to sensitive plants and animal species. There would be a greater potential for impacts to rare plants and desert tortoise because this route traverses higher quality desert tortoise habitat than does the proposed route.

There would be a greater potential for impacts to cultural resources. Specifically, the Arrowhead Trail Highway (36-7689) and associated artifacts have not been evaluated; if evaluated as eligible during the Section 106/PA process, construction of this route could result in a substantial adverse change to this historical resource. Finally, there would be a greater potential for erosion, landslides, unstable soil, and fault rupture due to ground-disturbing activities such as construction of access and spur roads and towers, additional pulling and tensioning sites, and construction of 5.2 miles of new T/L ROW.

Alternative Conclusion

RETAINED. This alternative would generally meet the project objectives, purpose, and need and provide an interconnection of solar generation resources in the Ivanpah Dry Lake Area. While it could result in greater environmental impacts than the proposed project would, it would avoid impacts to Ivanpah Dry Lake. Therefore, this alternative was retained for further analysis.

3.3.4 South Dry Lakes Reroute Alternative (Transmission Alternative Route D)

Alternative Description

Alternative Route D would reduce the overall transmission footprint, since the EITP towers would follow to the extent feasible the existing LADWP 500-kV ROW.. Where feasible, Alternative Route D would parallel structure-for-structure the existing LADWP Marketplace–Adelanto 500-kV T/L through the Ivanpah Dry Lake. Alternative Route D would begin at the Eldorado Substation and follow the proposed route to the northeastern edge of the Ivanpah Dry Lake (MP 27, Tower 184). The line would then be re-routed west and southwest on new 130-foot ROW around Ivanpah Dry Lake for approximately 3.3 miles before rejoining the existing ROW at MP 30, Tower 203. The line would parallel the LADWP Marketplace–Adelanto 500-kV T/L as it crossed through the Ivanpah Dry Lake (Figure 5).

In summary, Transmission Alternative D has the following features:

- Avoids impacts to Ivanpah Dry Lake.
- Replaces MP 28 to MP 30 of the existing route.
- Requires 3.3 miles of 130-foot new ROW east of the Ivanpah Dry Lake toward the existing LADWP AC transmission corridor.
- Requires expansion of the existing LADWP Marketplace–Adelanto 500-kV ROW until the line joined the existing SCE ROW.

Consideration of CEQA/NEPA Criteria

Project Objectives, Purpose, and Need

The route would meet the objectives, purpose, and need of the proposed project and is consistent with the plan of service.

Feasibility

This alternative is feasible from a technical, regulatory, and economic perspective. It would avoid impacts to Ivanpah Dry Lake and would not likely require a longer project construction schedule.

Environmental Advantages

This route would reduce the overall transmission footprint, since the EITP towers would follow to the extent feasible the existing LADWP 500-kV ROW. There would be a reduced visual impact since it would relocate/re-route the existing T/L away from the sensitive viewer at the Desert Oasis Apartments (Key Observation Point 4 [KOP 4]) where it would no longer be visible. The route would be closer to the recreational viewer at Ivanpah Lake (KOP 5) but would not be more prominent than the proposed line. There would be a lower presence of sensitive wildlife or plant species occurring within the limits of this alternative and impacts to sensitive species and habitat would be reduced. There would be a reduced potential for landslides and unstable soil and a reduced impact to intermittent streams due to fewer crossings.

Environmental Disadvantages

There could be greater potential impacts to cultural resources due to greater ground disturbance for new access roads and approximately 3.3 miles of new ROW. In addition, there could be impacts to sensitive species that could occur in the area.

Alternative Conclusion

RETAINED. This alternative would generally meet the project objectives, purpose, and need and provide an interconnection of solar generation resources in the Ivanpah Dry Lake Area. It would reduce the overall transmission footprint, since the EITP towers would follow to the extent feasible the existing LADWP 500-kV ROW and could also reduce visual impacts since a segment of the T/L would be routed away from sensitive viewers at the Desert Oasis Apartments. Therefore, this alternative was retained for further analysis.

3.3.5 South Dry Lakes Bypass Route Alternative (Transmission Alternative Route E)

Alternative Description

The South Dry Lakes Bypass Route Alternative would reduce the overall transmission footprint, since the EITP towers would follow to the extent feasible the existing LADWP 500-kV ROW and was addressed in the PEA as Transmission Alternative Route E. This alternative is a sub-alternative of Alternative D, and would replace the northernmost portion of the Alternative D route, as shown in Figure 5.

Consideration of CEQA/NEPA Criteria

Project Objectives, Purpose, and Need

Alternative E is a minor subalternative to Alternative D and would meet the objectives of the project and the purpose and need.

Feasibility

Alternative E is a minor subalternative to Alternative D; therefore, impacts would be similar.

Environmental Advantages

Alternative E is a minor subalternative to Alternative D; therefore, the environmental advantages would be similar.

Environmental Disadvantages

Alternative E is a minor subalternative to Alternative D; therefore, the environmental disadvantages would be similar.

Alternative Conclusion

RETAINED. This alternative would generally meet the project objectives, purpose, and need and provide the critical interconnection of solar generation resources in the Ivanpah Dry Lake Area to comply with California's RPS.

3.3.6 New ROW for the 230-kV Transmission Line (Alternative F)

Alternative Description

This alternative would create an entirely new ROW for the 230-kV T/L between the proposed Ivanpah Substation and the existing Eldorado Substation at a distance of at least 2,000 feet on either side of the existing SCE 100-foot corridor. The width of the new, separate ROW would be at least 100 feet or greater.

In summary, Transmission Alternative F has the following features:

- The ROW could accommodate a 230-kV;
- The ROW would be between the proposed Ivanpah Substation and the existing Eldorado Substation;
- The ROW would be at least 2,000 feet from either side of the existing ROW; and
- ROW width would be at least 100 feet or greater.

Consideration of CEQA/NEPA Criteria

Project Objectives, Purpose, and Need

This alternative would not improve system reliability because there is currently no risk of simultaneous outage of T/Ls contained within a common transmission corridor beyond the proposed project. However, placement of the new 230-kV T/L in a new, separate ROW would require new access roads. The width of the new, separate ROW would be at least 100 feet. This alternative would not maximize the use of existing ROW and would therefore result in greater environmental effects and costs than the proposed project.

Feasibility

This alternative is technically feasible; however, there may be greater environmental impacts associated with construction within a new and/or expanded ROW.

Environmental Advantages

None identified.

Environmental Disadvantages

The new ROW would create greater visual impacts due to the new location, which would be 2,000 feet from the existing SCE ROW. Greater ground disturbance could occur due to wider ROW requirements. There could be greater impacts to sensitive resources for any area that is undisturbed/undeveloped. The structures associated with this system could increase the potential for avian collision/electrocution with the addition of new T/Ls and poles.

Alternative Conclusion

ELIMINATED. This alternative would not maximize the use of the existing ROW and would result in greater environmental effects than would the proposed project route. Therefore, this alternative was eliminated from further consideration.

3.4 Telecommunication Alternatives

As described in Section 1.3, the proposed project includes a new telecommunication system consisting of an optical ground wire (OPGW) system on overhead transmission towers, combined with a microwave system, routed along two fully diverse and redundant paths. Path 1 would use the overhead OPGW along the proposed T/L route. Along Path 2, the proposed project would include overhead OPGW along an approximately 25-mile section of the existing SCE Eldorado–Lugo 500-kV T/L, followed by an approximately 5-mile segment of underground fiber optic cable from the Eldorado–Lugo line to the town of Nipton. This portion of the telecommunication system is referred to as Path 2, Sections 1 and 2. The last segment of Path 2 (referred to as Path 2, Segment 3) would consist of a microwave system from the town of Nipton to the proposed Ivanpah Substation.

Three telecommunication system alternatives were considered. The first two telecommunication alternatives would replace the microwave system within Path 2, Segment 3. The rest of the telecommunication system included in the proposed project would remain the same. The final telecommunication system alternative considered would be a replacement of the entire telecommunication system included in the proposed project, Paths 1 and 2.

3.4.1 Golf Course Telecommunication Alternative

Alternative Description

This alternative to Path 2, Section 3, would consist of OPGW and overhead ground wire (OHGW) that would be aboveground and underground from the town of Nipton, past the Primm Golf Course, to the proposed Ivanpah Substation (Figure 6).

The Golf Course Telecommunication Alternative is a 10-mile segment that proceeds from the town of Nipton to I-15 (MP 1 to MP 10) along the north side of Nipton Road, parallel to the northern boundary of the Mojave National Preserve. This 10-mile segment consists of 1 mile of All Dielectric Self Supporting (ADSS) fiber cable installed on the existing Nipton 33-kV distribution line immediately west of the town of Nipton, on the north side of Nipton Road. A number of poles could need replacement to meet the new loading requirement of the ADSS fiber cable. In addition, approximately 9 miles of fiber optic cable would be installed in an underground duct on the north side of Nipton Road.

Another 10-mile segment would stretch from I-15 to Primm Golf Course to the Ivanpah Substation (MP 1 to MP 8). This segment would parallel I-15 in a northerly direction on existing Nipton 33-kV distribution line poles, cross over I-15 near the Primm Golf Course, and then cross the golf course in an underground duct. After the segment left the golf course, it would continue overhead on existing Nipton 33-kV distribution line poles to a point approximately 1.0 mile from the Ivanpah Substation where a cable would be installed in an underground duct for approximately 1.0 mile to enter the north side of the Ivanpah Substation.

Consideration of CEQA/NEPA Criteria

Project Objectives, Purpose, and Need

The proposed project requires construction of two fully diverse and redundant communication paths that would (1) support a special protection system that would trip the SCE Eldorado-Ivanpah 230-kV T/L relays under specific outage contingencies, and (2) allow operating and monitoring of the substation and T/L equipment. The paths would connect the Eldorado Substation to the proposed Ivanpah Substation.

Feasibility

This alternative is technically, legally, and economically feasible and would meet most of the project objectives, as well as the purpose and need. However, underground construction could involve additional environmental adverse effects and extend the time needed to repair and maintain this alternative.

Environmental Advantages

Visual impacts may be reduced for certain portions of the telecommunication line located underground or out of line-of-sight of sensitive viewers.

Environmental Disadvantages

The underground construction would cause greater ground disturbance and potential impacts to sensitive habitat, cultural, and paleontological resources. There would also be an increased potential for hazards and hazardous impacts since there would be construction of 20 miles of additional telecommunication lines from the town of Nipton to the proposed Ivanpah Substation.

Alternative Conclusion

RETAINED. This telecommunication alternative meets the project purpose, need and objectives. While placing a portion of the telecommunication system underground would cause greater ground disturbance and increase potential impacts to sensitive habitat, cultural, and paleontological resources, visual impacts would be reduced. Therefore, this alternative will be retained for further evaluation.

3.4.2 Mountain Pass Telecommunication System Alternative

Alternative Description

This telecommunication path would consist of OPGW that would be located partially aboveground and partially underground from Nipton to Mountain Pass to the Ivanpah Substation. This alternative route would include a 10-mile segment that would begin at Highway 164 near Nipton and continue to I-15 (MP 1 to MP 10) along the north side of Nipton Road, parallel to the northern boundary of the Mojave National Preserve. This segment would consist of a combination of ADSS fiber cable on existing Nipton 33-kV wood pole lines and underground fiber cable. This 10-mile segment would include 1 mile of ADSS fiber cable and would be installed on the existing Nipton 33-kV distribution line immediately west of Nipton, on the north side of Nipton Road. An unknown number of poles may need to be replaced to meet the new loading requirement of the ADSS fiber cable, and 9 miles of fiber optic cable would be installed in an underground duct along on the north side of Nipton Road in new ROW to the intersection of Nipton Road and I-15 (undergrounding would start at the westernmost pole on the Nipton line before it crosses Nipton Road to the south).

Another 15-mile segment would begin at I-15 and go to the town of Mountain Pass and then to the Ivanpah Substation. This route would parallel I-15 in an underground duct for approximately 1.0 mile and then continue overhead on the existing Nipton 33-kV distribution line poles west to Mountain Pass. The route would continue north to the Mountain Pass Substation. From the Mountain Pass Substation, the cable route would turn northeast and proceed on the existing Nipton 33-kV distribution line poles toward the Ivanpah Substation. At the last Nipton Line Pole, 500 feet of underground conduit would be installed and the cable would enter on the south side of the Ivanpah Substation.

Another component to this system would be a dedicated communication enclosure within the Mountain Pass Substation located 6.0 miles southwest of the Proposed Ivanpah Substation to house communication equipment (MP 8). This communication equipment is required as a repeater to re-generate the optical signals from/to Eldorado via telecommunication. The communication enclosures would be equipped with AC power interface, batteries and battery chargers, air conditioners, and conduits for connection to fiber optic cables from distribution pole lines (Figure 7).

Consideration of CEQA/NEPA Criteria

Project Objectives, Purpose, and Need

The proposed project requires construction of two fully diverse and redundant communication paths to (1) support a special protection system that would trip the SCE Eldorado-Ivanpah 230-kV T/L relays under specific outage contingencies, and (2) operate and monitor the substation and T/L equipment. The paths would connect the Eldorado Substation to the proposed Ivanpah Substation. This alternative would be consistent with the project objectives and the purpose and need.

Feasibility

This alternative is technically feasible; however, it could involve additional adverse environmental impacts associated with underground construction.

Environmental Advantages

Visual impacts may be reduced for certain portions of the telecommunication line located underground or out of line-of-sight of sensitive viewers.

Environmental Disadvantages

There would be a greater potential for ground disturbance and impacts to sensitive habitat and cultural and paleontological resources. There would also be an increased potential for hazards and hazardous impacts since there would be construction of 20 miles of additional telecommunications lines between the Nipton Road-UPRR intersection and the proposed Ivanpah Substation, which would result in an increase in the routine transport, use, or disposal of hazardous materials and the potential for reasonably foreseeable upsets and accidents involving releases of hazardous materials.

Alternative Conclusion

RETAINED. This telecommunication alternative meets the purpose and need and most of the project objectives. Therefore, this alternative will be retained for further evaluation.

3.4.3 Microwave-Only Telecommunication Alternative (Microwave Towers Only)

Alternative Description

In brief, the Microwave Towers Only system would consist of the following components:

- Six microwave towers,
- Four new communication buildings, and
- One passive reflector site.

Consideration of CEQA/NEPA

Project Objectives, Purpose, and Need

This telecommunication alternative meets the purpose and need. However, this alternative could result in increased environmental impacts and a longer construction period and higher costs for transport of materials and installation of towers and development of new access roads and communication buildings.

Feasibility

This alternative is technically feasible; however, there may involve additional environmental impacts associated with construction of six new microwave towers and four communication buildings and one passive reflector site as well as new access roads for these facilities.

Environmental Advantages

Construction of the microwave towers would avoid the use of overhead or underground wires. Visual impacts could be lower than those of the proposed project.

Environmental Disadvantages

There could be a greater potential for ground disturbance and impacts to sensitive habitat and cultural and paleontological resources due to development of access roads that would be needed for construction and maintenance of the microwave towers. There could be adverse visual impacts depending on height and location of the microwave towers. All of these sites would require helicopter transport to deliver large items. Helicopter transport requires a large staging area for helicopter pick-up, resulting in significant land disturbance. The alternate option for transport to these microwave sites is to widen and improve the roadways to these sites, but this would cause even more land disturbance. The microwave sites identified have may require significant grading for access roads, foundations for the towers, and communication buildings.

Alternative Conclusion

ELIMINATED. This telecommunication alternative meets the purpose and need, and most of the project objectives. This alternative would result in development of more communication buildings, access roads, and microwave towers and could result in greater potential for ground disturbance and impacts to sensitive habitat and cultural and paleontological resources; therefore, this alternative will be eliminated from further consideration.

3.5 Technology Alternatives

This section addresses the five technology/construction alternatives for the proposed project. The technologies that were considered are as follows:

- Composite Core Conductor (Tech 1 – Alternative to Standard Core Conductor)
- Painted Structures (Tech 2 – Alternative to Galvanized Structures)
- Underground Construction (Tech 3 – Alternative to Overhead)
- All Tubular Steel Poles (Tech 4 – Alternative to LST)

The discussions below explain why each potential alternative was eliminated or retained for full analysis.

3.5.1 Composite Core Conductor (Technology Alternative 1 – Alternative to Standard Core Conductor)

Alternative Description

This alternative involves replacing the standard conductor between the Ivanpah Dry Lake Area and the Eldorado Substation with a composite core conductor. The composite core conductor alternative is a new commercial technology.

Consideration of CEQA/NEPA Criteria

Project Objectives, Purpose, and Need

Because composite core conductors are a new technology, their use has several drawbacks compared with standard core conductors, While the U.S. Department of Energy Technical Review Committee on Composite Core Conductors has deemed several composite core conductors “commercial products,” the technology is not supported by sufficient field experience; therefore, its reliability in long-term use is unknown. Furthermore, the amount of generation requesting interconnection significantly exceeds the amount of transmission capacity that can be gained with the use of a composite core conductor, so the alternative would be short-lived. Therefore, this alternative would not reduce environmental impacts as well as the retained project alternatives would. In addition, implementation of this alternative would increase the cost of the proposed project, because the need to remove the existing 115-kV line to upgrade corridor capability would not be eliminated.

Feasibility

This alternative would meet the project purpose and need; however, it would not meet the project objectives. This alternative is technically feasible; however, it may be more fragile and more expensive than the standard core conductor.

Environmental Advantages

Same as the proposed project.

Environmental Disadvantages

Same as the proposed project.

Alternative Conclusion

ELIMINATED. The composite core conductor may not be as durable or reliable for long-term use and therefore would not meet the project objectives, whereas the standard conductor technology is older and more reliable and economical technology. In addition, it provided no environmental advantage over the proposed project. Therefore, the composite core conductor alternative was eliminated for use on the proposed project.

3.5.2 Painted Structures Alternative (Technology Alternative 2 – Alternative to Galvanized Structures)

Alternative Description

Under this alternative, the proposed galvanized structures, which do not require painting after construction, would not be used, and the transmission structures would be painted after construction to protect the steel surfaces. Paint treatments can range from light to dark.

In brief, the paint coatings for transmission structures have the following features:

- Steel surfaces would be protected;
- Application to structures would occur on site after construction; and
- Structures could be painted to blend in with the surrounding area.

Consideration of CEQA/NEPA Criteria

Project Objectives, Purpose, and Need

The paint alternative meets the purpose and need; however, it would not meet some project objectives. Painting or powder-coating of steel lattice structure elements prior to assembly impedes the continuous electric path because it creates an insulator between the elements. Therefore, paint applications for lattice steel structures would need to be applied in the field *after* assembly of the individual pieces into a tower, which could increase environmental hazards related to spills or impacts to air quality. This would not meet the objective of minimizing environmental impacts. This option may increase the time for construction and operation, which would not meet the objective of proceeding in a cost-effective, timely manner.

Feasibility

From a practical perspective, SCE can paint structures in the field and has done so for very specific, limited purposes. However, painting in the field could present additional safety concerns, higher operating and maintenance costs, and more long-term environmental effects associated with ongoing maintenance than galvanizing, including emission and inadvertent paint spills.

Environmental Advantages

The paint alternative may reduce aesthetic impacts since colors ranges from light to dark. In addition, paint provides a durable method of shading transmission structures and protecting them from corrosion.

Environmental Disadvantages

The paint alternative may result in a reduced aesthetic quality over time since structures are exposed to the weather elements and paint may peel or chip. There could be greater impacts to air quality due to painting in the open air where volatile organic compound emissions would occur and paint spills could occur. There is the potential for greater ground disturbance since equipment is painted after construction/installation. Additionally, there are increased safety concerns associated with mobilizing personnel and equipment because re-painting of structures may occur over the life of the proposed project.

Alternative Conclusion

ELIMINATED. Although the paint alternative would provide a durable method of shading transmission structures and protecting them from corrosion and it would protect steel surfaces, this alternative may require more time and resources and involve increased worker safety risks since color applications would need to take place on a frequent basis after construction in order to preserve the continuous electrical path for the sake of safety and reliability.

3.5.3 Underground Construction (Technology Alternative 3 – Alternative to Overhead Construction)

Alternative Description

This alternative would allow undergrounding of transmission cables with voltages up to 500 kV. Trenching and tunneling would occur in order to place T/Ls underground.

Consideration of CEQA/NEPA Criteria

Project Objectives, Purpose, and Need

Underground construction would partially meet the project purpose and need; however, undergrounding would not minimize environmental impacts and construction could take longer and be more expensive.

Feasibility

Underground construction of the T/L facilities is technically feasible; however, this method of construction could result in greater land disturbance, a longer construction period, and specialized manufacturing and construction requirements that could not be economically or technically feasible to implement in the proposed project area. In addition, underground technologies in geographic areas with active fault zones have a greater potential, compared with overhead construction, to result in prolonged service interruptions, because sections requiring repair would be more difficult to identify and would take longer to repair. While overhead T/Ls can be repaired within days, underground cables might take months to repair.

Environmental Advantages

Undergrounding of T/Ls would reduce avian impacts with wires and electrocution. In addition, visual impacts could be reduced since there would be fewer wires or structures aboveground.

Environmental Disadvantages

Trenching and tunneling for underground construction would result in several resource impacts. There could be greater land disturbance due to construction activities. A greater potential could exist for long-term impacts to air quality, biological resources, traffic, noise, and geology/soils (erosion) that could result from maintenance problems or system failures, which could require re-excavation to replace underground cables. There could be impacts to air quality from emissions from construction equipment and an increase in dust generation during construction and the use of unpaved access roads. There may be greater disturbances of habitat, soils, surface water, and cultural and paleontological resources due to trenching and tunneling. Finally, there could be temporary increases in noise and vibration due to tunneling, potentially affecting nearby structures and protected species.

Alternative Conclusion

ELIMINATED. Installation of T/Ls underground is a feasible alternative that would achieve some of the project objectives and would reduce visual impacts of overhead wires. However, this alternative would result in greater impacts than those identified for the proposed project; therefore this alternative has been eliminated from further consideration..

3.5.4 All Tubular Steel Poles (Technology Alternative 4 – Alternative to Lattice Steel Poles)

Alternative Description

TSPs are relatively new structures used by utilities. TSPs are steel poles manufactured in long sections that taper in cross-sections from the base of the pole to top of the pole. Most new transmission structures would be LSTs approximately 113 to 180 feet in height. In certain locations where the ROW is narrow or the T/L would need to cross under other lines, SCE has proposed to use tubular steel structures.

Consideration of CEQA/NEPA Criteria

Project Objectives, Purpose, and Need

TSPs meet the purpose and need and partially meet the project objectives. The use of TSPs can offer an advantage over LSTs in certain types of applications, such as locations where ROW width is constrained or space for structure installation is limited—for example, in developed urban areas. Since TSPs require large footings and are manufactured in long sections, they would require the use of long-bed trucks for transportation and heavy cranes that can lift and stack the TSP sections for assembly, which can make them more expensive to install. Because TSPs are long and heavy they cannot be transported by helicopter and new/additional access roads could be necessary for truck transport of the TSPs to the site.

Feasibility

TSPs would be viable for use in the proposed project where the ROW is constrained (i.e., site-specific locations) and where construction equipment can be mobilized to the area.

Environmental Advantages

They could reduce land use impacts since they can be placed in "site specific" locations where ROW width is constrained.

Environmental Disadvantages

Installation of TSPs may result in greater disturbances of habitat, soils, groundwater, cultural and paleontological resources, and hazardous waste such as mining waste, since they would require deeper footing and increased construction activities including possible drilling for large footings, long-bed trucks for transportation, and heavy cranes to lift and stack the TSP sections for assembly. TSPs are sometimes used to reduce visual impacts due to the fact that they have a more streamlined appearance than LSTs; however, in an undeveloped, desert setting, LSTs appear less visible than TSPs because they are less consolidated and appear less prominent.

Alternative Conclusion

ELIMINATED. The use of TSPs can offer an advantage over LSTs in certain types of applications, such as locations where ROW width is constrained or space for structure installation is limited. However, due to the increased ground disturbance and impacts to visual resources, this technology alternative has been eliminated from further consideration.

4. Summary of Alternative Screening Results

Proposed alternatives identified by the applicant (SCE), the CEQA lead agency (CPUC), the NEPA lead agency (BLM), the EIR/EIS team, and the public are listed in Table A-4 according to the determination made for EIR/EIS analysis (i.e., whether or not each is analyzed in the EIR/EIS or eliminated from further analysis). Section 3 described each of the listed alternatives in detail and presented the rationale for elimination of each alternative that is not analyzed. This section presents a summary of the conclusions of Section 3, identifying alternatives that were eliminated and those that are carried forward for full EIR/EIS analysis.

Criterion 1: Project Objectives, Purpose, and Need

Several of the alternatives described in Section 3 are modifications to SCE's proposed T/L route between the Eldorado and Ivanpah Substations. All of these alternatives would meet the basic project objectives, purpose, and need and may be considered as mitigation measures to the proposed project.

Table A-4 Alternatives Retained for EIR/EIS Consideration

Alternative	Project Objective, Purpose, and Need	Feasibility	Environmental Advantages/Disadvantages Compared with Proposed Project/Action
TRANSMISSION LINE ROUTING ALTERNATIVES			
Parallel to LADWP Line Segment Alternative (Transmission Alternative Route A)	Meets project purpose and need and objectives.	Feasible.	Advantages • Route would fall within BLM-designated utility corridor • Would eliminate several transmission crossovers near the Eldorado Substation by using a new ROW adjacent to the LADWP AC transmission corridor. • Reduced impacts to cultural resources. None were identified for Alternative A. • Reduced impacts to intermittent streams due to fewer crossings. Disadvantages • Potential for greater habitat disturbance since the construction area west of the existing Eldorado Substation consists of previously undisturbed desert habitat. • Potential for greater impact to tortoise habitat, other wildlife, rare plant species, and desert vegetation.
North of Eldorado Alternative (Transmission Alternative Route B)	Meets project purpose and need and objectives.	Feasible.	Advantages • Reduced impact to cultural resources. None were identified for this alternative route. • Reduced impacts to intermittent streams due to fewer crossings. Disadvantages • Would require 5.3 miles of new transmission line ROW. • Greater potential for ground disturbance from new transmission line ROW.
North Dry Lakes Reroute Alternative (Transmission Alternative Route C)	Meets project purpose and need and objectives.	Feasible.	Advantages • Avoids crossing Ivanpah Dry Lake. • Reduced visual impact compared with the proposed project; existing transmission line would be removed and relocated and it would not be visible from nearby residential use. • Reduced impacts to paleontological resources. • Reduced impacts to intermittent streams due to fewer crossings. Disadvantages • Potential for greater impacts to desert tortoise and its habitat since this alternative has a higher quality desert tortoise habitat than proposed route does. • Potential for greater impacts to cultural resources associated with disturbance of

Table A-4 Alternatives Retained for EIR/EIS Consideration

Alternative	Project Objective, Purpose, and Need	Feasibility	Environmental Advantages/Disadvantages Compared with Proposed Project/Action
			Arrowhead Trail Highway. • Would require 5.3 miles of new 130 foot ROW north of the Ivanpah Dry Lake and Primm, Nevada.
South Dry Lakes Reroute Alternative (Transmission Alternative Route D)	Meets project purpose and need and objectives.	Feasible.	Advantages • Reduces overall transmission footprint on the Ivanpah Dry Lake. • Reduced visual impact compared with the proposed project; existing transmission line would be removed and relocated and it would not be visible from nearby residential use. This route would be closer to the recreational viewer at Ivanpah Lake but proposed facilities would not be more prominent than the proposed line. • Reduced potential for the presence of other sensitive wildlife or plant species occurring within the limits of this alternative. • Reduced impacts to intermittent streams due to fewer crossings. Disadvantages • Potential for greater impacts to cultural resources. • Potential for greater ground disturbance for new access roads. • Would require approximately 3.3 miles of new ROW.
South Dry Lakes Bypass Alternative (Transmission Alternative Route E)	Meets project purpose and need and objectives.	Feasible.	Advantages • Similar to those identified for South Dry Lakes Reroute Alternative (Transmission Alternative Route D). Disadvantages • Similar to those identified for South Dry Lakes Reroute Alternative (Transmission Alternative Route D).
TELECOMMUNICATION ALTERNATIVES			
Golf Course Telecommunication Alternative	Meets purpose and need. Meets most project objectives. The underground portion would have a greater project cost, longer construction period, and longer repair time.	Feasible.	Advantage • Visual impacts may be reduced for certain portions of the telecommunication line that is located underground. Disadvantage • Potential for greater ground disturbance and impacts to paleontological resources for portion of TC line that would be placed underground. • Underground construction has potential for greater impacts to sensitive habitat, cultural and paleontological resources.

Table A-4 Alternatives Retained for EIR/EIS Consideration

Alternative	Project Objective, Purpose, and Need	Feasibility	Environmental Advantages/Disadvantages Compared with Proposed Project/Action
Mountain Pass Telecommunication Alternative	Meets purpose and need. Partially meets project objectives. The underground construction would have a longer construction period and longer repair time.	Feasible.	Advantage • Visual impacts may be reduced for certain portions of the telecommunication line that is located underground or out of line-of-sight of sensitive viewers. Disadvantage • Greater potential for ground disturbance and impacts to paleontological resources for portion of TC line that would be placed underground. • Potential for greater construction-related hazards due to transport, use, or disposal of hazardous materials and for upsets or accidents involving releases of hazardous materials.
TECHNOLOGY ALTERNATIVES			
No Technology Alternatives were retained.			

Source: E & E 2009.

Key:

AC	=	Alternating current.	ROW	=	Right-of-way.
BLM	=	Bureau of Land Management.	TC	=	Telecommunication.
LADWP	=	Los Angeles Department of Water and Power.	TSPs	=	Tubular steel poles.

Criterion 2: Feasibility

The alternatives vary in their ability to meet economic, environmental, legal, social, and technical feasibility criteria described in Section 2 above. Technical feasibility issues for alternatives are primarily related to physical constraints, such as engineering/design limitations for construction on steep slopes. Other alternatives had legal feasibility problems related to consistency with regulatory standards for operational reliability.

Criterion 3: Environmental Effects

The preliminary potentially significant environmental impacts of the proposed project are summarized in Table A-2. Each alternative is evaluated on its overall ability to reduce or avoid significant effects of the proposed project. In some cases, an alternative may reduce or eliminate a proposed project effect, but create a new significant effect in a different discipline or geographic area. In these cases, the aggregate environmental effects of the proposed project segment and the alternative segment have been compared to determine whether the alternative meets the overall CEQA/NEPA requirements.

4.1 Alternatives to be Analyzed in the EIR/EIS

The alternatives listed in Table A-4 have been chosen for detailed analysis in the EIR/EIS through the alternative screening process. These alternatives are described in Section 3.

4.2 Alternatives Eliminated from EIR/EIS Consideration

The alternatives eliminated from detailed EIR/EIS consideration are listed in Table A-5.

Table A-5 Alternatives Eliminated from EIR/EIS Consideration

Alternative	Project Objective, Purpose, and Need	Feasibility	Environmental Advantages/Disadvantages Compared with Proposed Project/Action
TRANSMISSION SYSTEM ALTERNATIVES			
Non-Transmission System Alternative (System Alternative 1)	Would not meet purpose and need and objectives since it would not interconnect solar resources in the Ivanpah Dry Lake area with the SCE transmission system. In addition, new sources of in-basin generation would need to be identified, evaluated, and built.	Feasible.	Advantages • Would avoid impacts to resources in the vicinity of the EITP. However, upgrades to SCE's existing transmission system could be required to integrate up to 1,400 MW of new power generation within its service area. Disadvantages • New sources of in-basin generation would result in site-specific impacts associated with construction and operation of new power plants. This could result in air quality, biology, cultural resources, land use, noise, and visual impacts, among others. • Transmission upgrades may also be required to integrate new in-basin generation sources into the transmission system.
Reconductoring Alternative (System Alternative 2)	Would not meet the project purpose and need since it would not provide sufficient capacity, nor would it meet the project objective of providing an interconnect for planned solar resources in the Ivanpah Dry Lake area.	Feasible.	Advantages • Reconductoring alternative would avoid and/or lessen construction-related environmental impacts identified for the proposed project because it would replace low capacity conductors with higher capacity conductors on the existing towers. Operation impacts would be similar to existing conditions. Disadvantages • None identified.
Lower Voltage Alternative – New 115-kv Transmission Line (System Alternative 3)	Would not meet the project's purpose, need, or objectives because it would not interconnect and integrate up to 1,400 MW of generation resources in the Ivanpah Dry Lake Area. It would not meet the objective of maximizing the use of existing ROW and corridors.	Feasible.	Advantages • Construction-related impacts would be similar to those of the proposed project if new poles would be installed. Disadvantages • Construction-related impacts would be similar to those of the proposed project if new poles would be installed.
Higher Voltage Alternative – New 500-kV Transmission Line (System Alternative 4)	Would not meet the project's purpose and need or objectives.	Feasible.	Advantage • None identified. Disadvantage • Potential for greater visual impacts than proposed project because

Table A-5 Alternatives Eliminated from EIR/EIS Consideration

Alternative	Project Objective, Purpose, and Need	Feasibility	Environmental Advantages/Disadvantages Compared with Proposed Project/Action
			existing transmission structures (towers) would be replaced with structures that are taller, wider, and bulkier than those of proposed project. • Would potentially require a wider ROW to accommodate the 500-kV replacement line.
230-kV Single Circuit Transmission Line (System Alternative 5)	Would not meet purpose and need. Would only provide capacity for interconnection maximum of 1,150 MW. Would not meet the purpose and need of providing transmission capacity for 1,400 MW.	Feasible.	Advantages • Potential reduction in aesthetic impacts due to use of fewer wires. Disadvantages • None identified.
TRANSMISSION LINE ROUTING ALTERNATIVES			
New ROW for 230-kV Transmission Line Alternative (Transmission Alternative F)	Would not meet the purpose and need of providing transmission capacity for 1,400 MW. Would require new ROW that is 2,000 feet away from existing SCE 100-foot corridor. Therefore, it would not meet the objective of maximizing the use of the existing ROW.	Feasible.	Advantages • None identified. Disadvantages • Would require new ROW that would be 100 feet or greater in width and located at least 2,000 feet on either side of the existing SCE 100-foot corridor. • Potential for greater visual impacts would occur due to introduction of additional set of transmission facilities within the project area. • Potential for greater ground disturbance may occur due to wider right-of-way requirements. • Potential for greater impacts to sensitive resources for any area that is undisturbed or undeveloped.
TELECOMMUNICATION SYSTEM ALTERNATIVES			
Microwave Tower Only – Telecommunication Alternative	Meets purpose and need, but would not meet the project objective of minimizing environmental Impacts	Feasible.	Advantage • Construction of the microwave towers would avoid the use overhead or underground wires. There could be reduced visual impacts compared with those of the proposed project. Disadvantage • Potential for greater ground disturbance and impacts to sensitive biological, cultural, visual, and other resources from construction of six new microwave towers.

Table A-5 Alternatives Eliminated from EIR/EIS Consideration

Alternative	Project Objective, Purpose, and Need	Feasibility	Environmental Advantages/Disadvantages Compared with Proposed Project/Action
			• Potential for greater visual impacts compared with proposed project, depending on height and location of six new microwave towers.
TECHNOLOGY ALTERNATIVE			
Composite Core Conductor Alternative (Technology Alternative 1)	Meets purpose and need. The composite core is more expensive and fragile than the standard core conductor. Would not meet the project objective of providing reliability.	Feasible.	Advantages • Same as the proposed project. Disadvantages • Same as the proposed project.
Painted Structures Alternative – Alternative to Galvanized Structures (Technology Alternative 2)	Meets purpose and need. Partially meets project objectives. Painting would take longer and increase potential for spills and hazards.	Feasible.	Advantages • Reduces aesthetic impacts since colors range from light to dark. Disadvantages • Aesthetic quality may be reduced over time as structures are exposed to weather and paint may peel or chip and become unsightly. • Increased air quality impacts due to painting in the open air where volatile organic compound emissions would occur and paint spills could occur. • Increased safety concerns associated with mobilizing personnel and equipment since re-painting of structures may occur over the life of the project.
Underground Construction (Technology Alternative 3)	Underground construction would meet the project purpose and need; however, it would only meet some of the project objectives. Undergrounding would not minimize environmental impacts and construction could take longer and be more expensive.	Feasible	Advantages • Reduces avian impacts with wires and electrocution. • Visual impacts could be reduced since there would be fewer wires or structures aboveground. Disadvantages • Greater land disturbance due to construction activities. • Greater potential for long-term impacts to air quality, biological resources, traffic, noise, and geology/soils (erosion) due to higher incidence of maintenance problems or system failures, which could require re-excavation to replace underground cables. • Greater impacts to air quality from emissions from construction equipment and an increase in dust generation during construction and

Table A-5 Alternatives Eliminated from EIR/EIS Consideration

Alternative	Project Objective, Purpose, and Need	Feasibility	Environmental Advantages/Disadvantages Compared with Proposed Project/Action
			the use of unpaved access roads. • Greater disturbances of habitat, soils, surface water, and cultural and paleontological resources due to trenching and tunneling. • Temporary increases in noise and vibration due to tunneling, potentially affecting nearby structures and protected species.
All Tubular Steel Poles Alternative (Technology Alternative 4)	Meets purpose and need. However, the use of TSP for all transmission structures would have greater project costs due to special manufacturing and construction requirements.	Feasible.	Advantages • Reduced impacts to ROW since TSPs can be placed in “site specific” locations where ROW width is constrained. Disadvantages • Potential for greater disturbances of habitat, soils, and surface water, cultural and paleontological resources, hazardous waste (e.g., mining waste) due to construction activities including possible drilling for the large footings, long-bed trucks for transportation, heavy cranes needed to lift and stack the TSP sections for assembly.

Source: E & E 2009.
Key:
EITP = Eldorado–Ivanpah Transmission Project.
MW = Megawatt.
SCE = Southern California Edison.

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Figure 1 Proposed Project Map

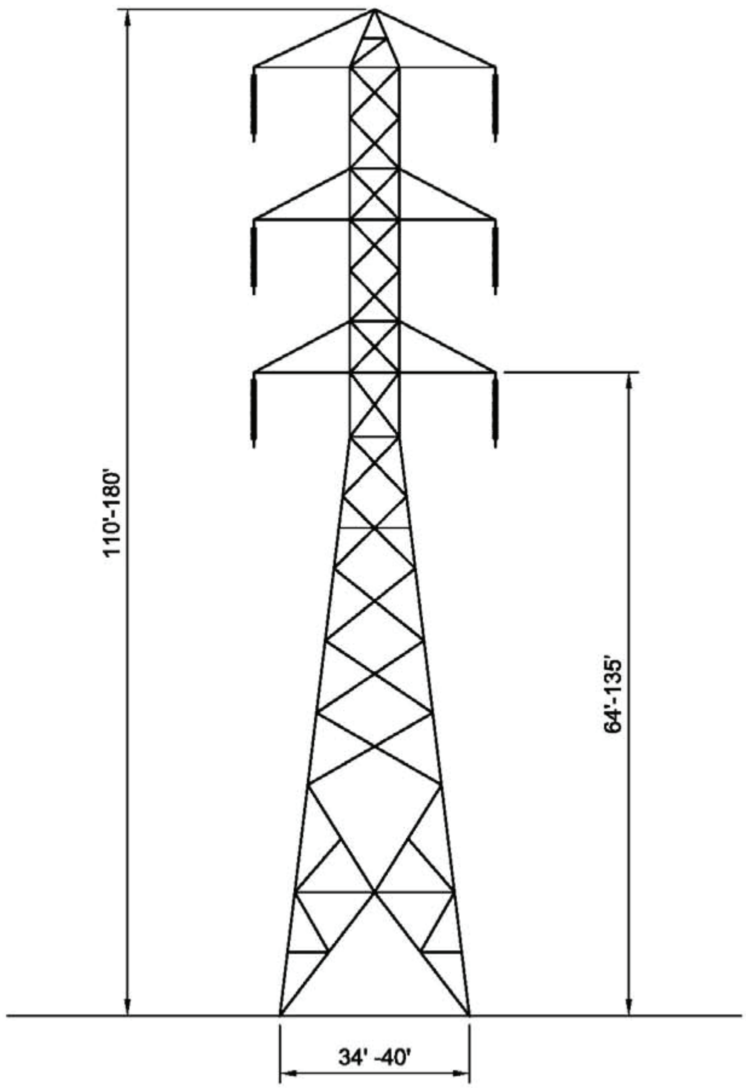

Figure 2 230-kV Double-Circuit Lattice Steel Tower

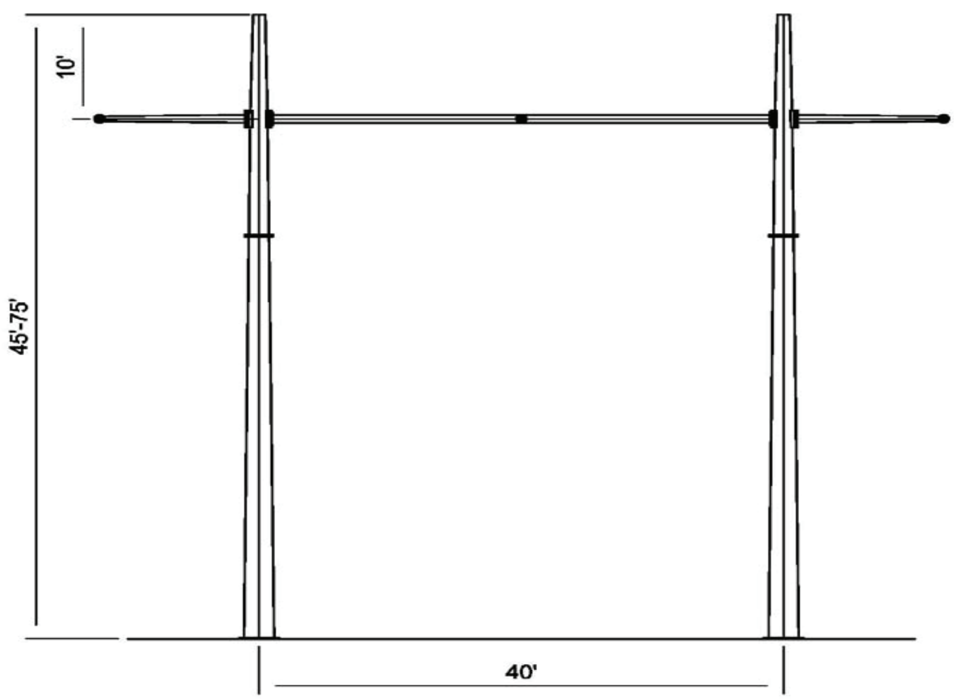

Figure 3 230-kV Single-Circuit H-Frame Steel Poles

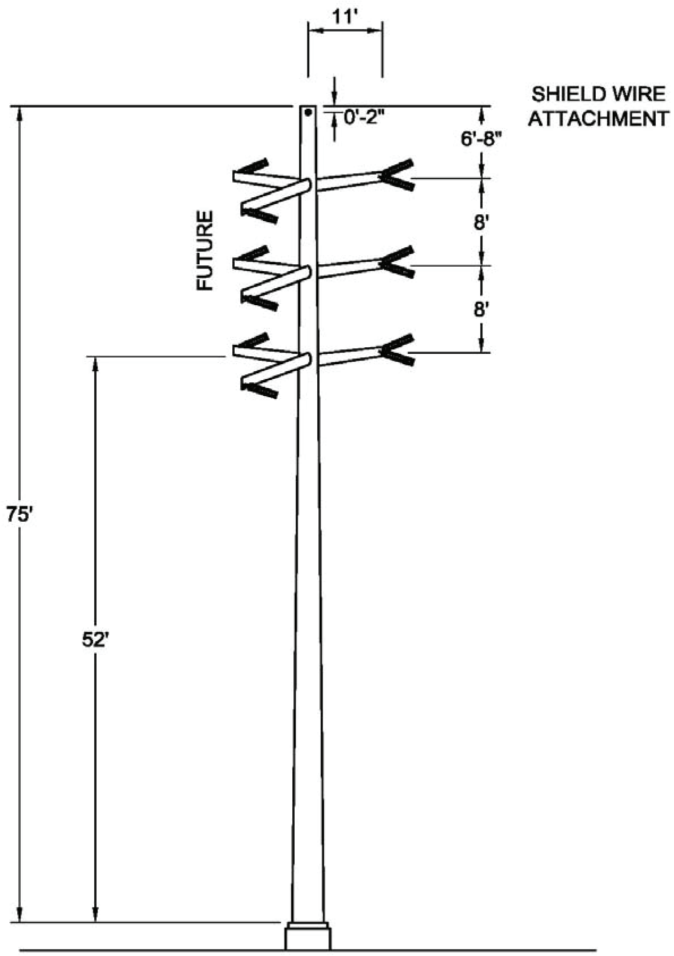

Figure 4 115-kV Single-Circuit Tubular Steel Poles

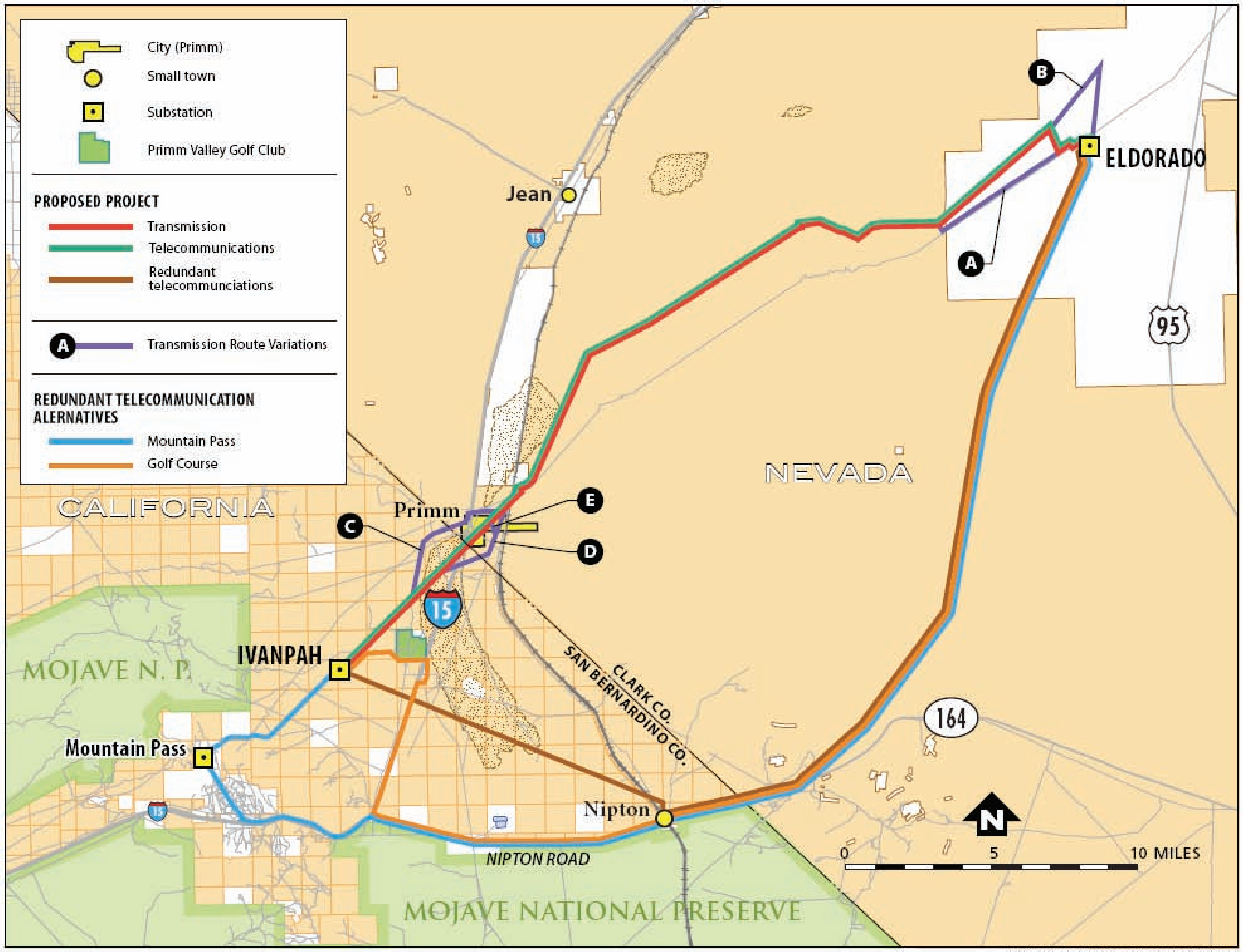

Figure 5 Transmission Line Routing Alternatives

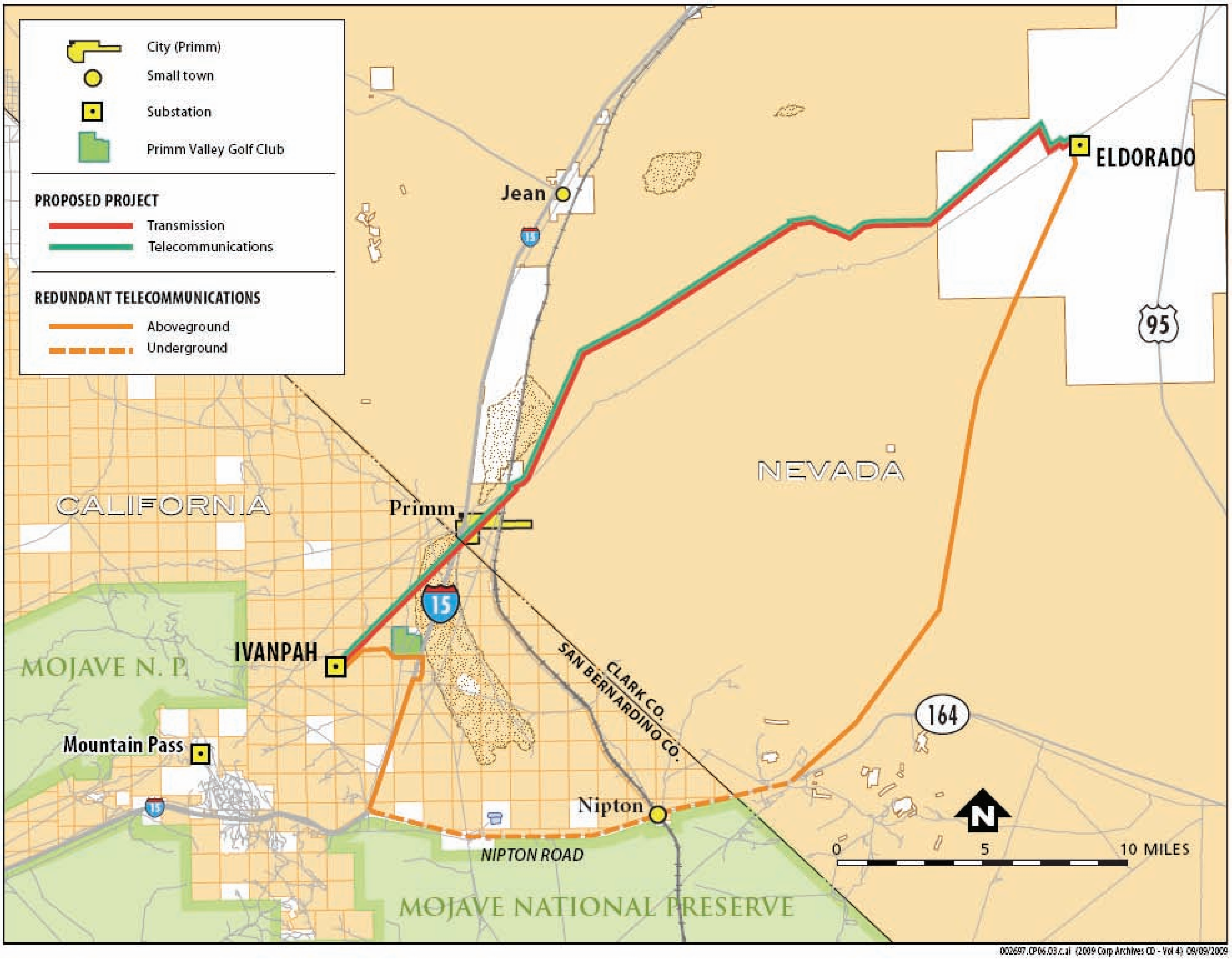

Figure 6 **Golf Course Telecommunication Alternative**

Figure 7 Mountain Pass Telecommunication Alternative

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Appendix A-2
Construction Workforce and Equipment

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Table A-1 Construction Workforce Required for the Proposed Project

Project Component	Construction Activity	Total Estimated Workforce	Estimated Schedule (days)	Activity Production
230-kV transmission line	Survey	4	36	35.5 miles
	Construction yard	4	--	
	Roads and landing work	5	101	18.0 miles, 258 pads
	Install guard structure	6	4	16 structures
	Remove existing conductors and OHGW	14	71	35.5 miles
	Remove existing structures	6	75	221 structures
	Remove existing foundations	8	67	208 H-frames 13 LSTs
	Remove existing wood poles	6	7	23 H-frames 6 poles
	Install LST foundations	18	144	216 LSTs
	LST steel haul	8	108	216 LSTs
	LST steel assembly	42	144	216 LSTs
	LST erection	16	108	216 LSTs
	Tubular steel H-frame foundations	7	42	42 H-frames
	Tubular steel H-frame haul	4	21	42 H-frames
	Tubular steel H-frame assembly	8	42	42 H-frames
	Tubular steel H-frame erection	8	42	42 H-frames
	Install conductor and optical ground wire	32	205	71.0 miles
	Remove guard structure	6	4	16 structures
	Restore	7	36	35.5 miles
115-kV subtransmission line	Survey	4	1	1.0 mile
	Roads and landing work	5	5	0. 5 miles 16 pads
	Remove existing H-frame poles	6	3	7 steel poles
	Remove existing H-frame foundations	4	2	7 steel poles
	Install tubular steel pole foundations	7	2	4 TSPs
	Tubular steel pole/light weight steel H-frame haul	4	4	16 steel poles
115-kV subtransmission line	Tubular steel pole/ light weight steel H-frame assembly	8	8	16 steel poles
	Tubular steel pole/ light weight steel H-frame erection	8	8	16 steel poles
	Installing conductor	16	1	0.15 miles
	Restoration	7	1	1.0 mile

Table A-1 Construction Workforce Required for the Proposed Project

Project Component	Construction Activity	Total Estimated Workforce	Estimated Schedule (days)	Activity Production
33-kV distribution line	Trenching, structure excavation	4	8	--
	Overhead line	4	3	--
	Underground cable pulling	4	2	--
	Underground cable makeup	8	60	--
Ivanpah Substation	Survey crew	2	15	--
	Grading crew	5	40	--
	Civil crew	7	60	--
	Electrical crew	8	60	--
Telecommunication System	Path 1 optical ground wire splice	3	30	30 splices
	Path 2 – Section 1 Marshalling yard Roads and landing work LST steel haul LST retrofit Remove existing OHGW / install optical ground wire Restoration	4 5 4 14 15 7	-- 13 45 45 72 25	25 miles 45 LSTs 45 LSTs 25 circuit miles 25 miles
	Path 2 – Section 2 Installing underground cable Pulling/installing fiber cable Installing underground duct	4 4 4	5 5 66	4.8 miles 6,000 feet/day 400 feet/day
	Path 2 – Section 3 - Microwave Path Installing microwave site tower/shelter Installing underground fiber cable Pulling/installing fiber cable Installing underground duct	4 4 4 4	8 1 1 10	-- 0.7 miles 6,000 feet/day 400 feet/day
	Path 3 – Section 3 - Golf Course Alternative Installing underground fiber cable Pulling/installing fiber cable Installing underground duct Installing ADSS fiber on pole line Installing cross arms on poles Installing ADSS fiber on pole line	4 4 4 4 4 4	8 8 119 7 7 4	9 miles 6,000 feet/day 400 feet/day 6 miles 5,000 feet/day 8,000 feet/day
	Path 3 – Section 3 - Mountain Pass Alternative Installing underground fiber cable Pulling/installing fiber cable Installing underground duct Installing ADSS fiber on pole line Installing cross arms on poles Installing ADSS fiber on pole line	4 4 4 4 4 8	9 132 8 8 5 68	6,000 feet/day 400 feet/day 7 miles 5,000 feet/day 8,000 feet/ day n/a

Table A-2 Construction Equipment for the 230-kV Transmission Line Construction

Activity and Equipment Required				Duration	
Equipment Description per Construction Activity	Estimated Power (HP)	Fuel Type	Number of Units	Estimated Schedule (Days)	Estimated Daily Usage (Hrs/Day)
Survey				36	
1/2-ton pickup truck, 4x4	200	Gas	2	36	8
Construction Yard					
1-ton crew cab, 4x4	300	Diesel	1	Project duration	2
30-ton crane truck	300	Diesel	1		2
10,000-pound rough-terrain fork lift	200	Diesel	1		5
Truck, semi-tractor	350	Diesel	1		1
Roads and Landing Work				101	
1-ton crew cab, 4x4	300	Diesel	2	101	2
Road grader	350	Diesel	1	101	4
Track-type dozer	350	Diesel	1	101	6
Drum-type compactor	250	Diesel	1	101	4
Water truck	350	Diesel	2	Project duration	8
Lowboy truck/trailer	500	Diesel	1	51	2
Backhoe/front loader	350	Diesel	1	101	6
Installing Guard Structure				4	
3/4-ton pickup truck, 4x4	300	Diesel	2	4	6
1-ton crew cab flatbed, 4x4	300	Diesel	1	4	6
Compressor trailer	120	Diesel	1	4	6
Auger truck	500	Diesel	1	4	6
Pole truck/trailer	350	Diesel	1	4	6
80-foot hydraulic man-lift/bucket truck	350	Diesel	1	4	4
30-ton crane truck	500	Diesel	1	4	8
Removing Existing Conductor and OHGW				71	
1-ton crew cab, 4x4	300	Diesel	4	71	8
80-foot hydraulic man-lift/bucket truck	350	Diesel	3	71	8
Sleeving truck	300	Diesel	1	71	4
30-ton crane truck	300	Diesel	1	71	4
Flatbed trailer	N/A	N/A	3	64	2
Truck, semi, tractor	350	Diesel	1	64	1
Bull wheel puller	500	Diesel	1	48	4
Hydraulic rewind puller	300	Diesel	1	48	4
Removing Existing Structures				75	
1-ton crew cab, 4x4	300	Diesel	2	75	5
80-ton rough-terrain crane	350	Diesel	1	40	8
30-ton crane truck	300	Diesel	2	75	6
Compressor trailer	120	Diesel	2	40	8
Flatbed truck/trailer	350	Diesel	1	35	8
10,000-pound rough-terrain forklift	200	Diesel	1	35	4
Removing Existing Foundations				67	
1-ton crew cab flatbed, 4x4	300	Diesel	2	67	8

Table A-2 Construction Equipment for the 230-kV Transmission Line Construction

Activity and Equipment Required				Duration	
Equipment Description per Construction Activity	Estimated Power (HP)	Fuel Type	Number of Units	Estimated Schedule (Days)	Estimated Daily Usage (Hrs/Day)
10-cubic yard dump truck	350	Diesel	2	67	8
Backhoe/front loader	350	Diesel	2	67	8
Compressor trailer	120	Diesel	2	67	8
Removing Existing Wood Poles				7	
3/4-ton pickup truck, 4x4	300	Diesel	2	7	5
1-ton crew cab flatbed, 4x4	300	Diesel	1	7	5
30-ton crane truck	300	Diesel	1	7	6
Pole truck/trailer	350	Diesel	2	7	8
Installing LST Foundations				144	
1-ton crew cab flatbed, 4x4	300	Diesel	4	144	2
30-ton crane truck	300	Diesel	2	144	5
Backhoe/front loader	200	Diesel	2	144	8
Auger truck	500	Diesel	2	144	8
10-cubic-yard dump truck	350	Diesel	4	144	8
4,000-gallon water truck	350	Diesel	2	144	8
10-cubic-yard concrete mixer truck	425	Diesel	6	144	5
Hauling LSTs				108	
1-ton crew cab flatbed, 4x4	300	Diesel	4	108	2
Flatbed truck/trailer	350	Diesel	2	108	8
10,000-pound rough-terrain fork lift	200	Diesel	2	108	6
Assembling LSTs				144	
3/4-ton pickup truck, 4x4	300	Diesel	6	144	4
1-ton crew cab flatbed, 4x4	300	Diesel	9	144	4
30-ton crane truck	300	Diesel	6	144	8
Compressor trailer	120	Diesel	6	144	6
Erecting LSTs				108	
3/4-ton pickup truck, 4x4	300	Diesel	4	108	5
1-ton crew cab flatbed, 4x4	300	Diesel	4	108	5
Compressor trailer	120	Diesel	2	108	6
80-ton rough-terrain crane	350	Diesel	2	108	6
Installing Tubular Steel H-Frame Foundations				42	
1-ton crew cab flatbed, 4x4	300	Diesel	3	42	2
30-ton crane truck	300	Diesel	1	42	5
Backhoe/front loader	200	Diesel	1	42	8
Auger truck	500	Diesel	1	42	8
10-cubic yard dump truck	350	Diesel	2	42	8
4,000-gallon water truck	350	Diesel	1	42	8
10-cubic yard concrete mixer truck	425	Diesel	3	42	3
Tubular Steel H-Frame Haul				21	
3/4-ton pickup truck, 4x4	300	Diesel	2	21	5
Flatbed truck/trailer	350	Diesel	2	21	8
80-ton rough-terrain crane	350	Diesel	1	21	6
Assembling Tubular Steel H-Frame				42	

Table A-2 Construction Equipment for the 230-kV Transmission Line Construction

Activity and Equipment Required				Duration	
Equipment Description per Construction Activity	Estimated Power (HP)	Fuel Type	Number of Units	Estimated Schedule (Days)	Estimated Daily Usage (Hrs/Day)
3/4-ton pickup truck, 4x4	300	Diesel	2	42	5
1-ton crew cab flatbed, 4x4	300	Diesel	2	42	5
Compressor trailer	120	Diesel	1	42	5
80-ton rough-terrain crane	350	Diesel	1	42	6
Erecting Tubular Steel H-Frame Erection				42	
3/4-ton pickup truck, 4x4	300	Diesel	2	42	5
1-ton crew cab flatbed, 4x4	300	Diesel	2	42	5
Compressor trailer	120	Diesel	1	42	5
80-ton rough-terrain crane	350	Diesel	1	42	6
Installing Conductor and Optical Ground Wire				205	
1-ton crew cab flatbed, 4x4	300	Diesel	5	205	8
Wire truck/trailer	350	Diesel	6	205	2
Dump truck (trash)	350	Diesel	1	205	2
3/4-ton pickup truck, 4x4	300	Diesel	6	205	8
22-ton Manitex boom truck crane	350	Diesel	1	205	8
30-ton Manitex boom truck crane	350	Diesel	4	205	6
Splicing rig	350	Diesel	2	205	2
Splicing lab	300	Diesel	2	48	2
20,000-pound rough-terrain fork lift	350	Diesel	1	205	2
580 case backhoe	120	Diesel	1	205	2
Spacing cart	10	Diesel	3	51	8
Static truck/tensioner	350	Diesel	1	205	2
Conductor puller	300	Diesel	2	205	4
30-ton puller	525	Diesel	1	205	3
Sagging dozer with 2 winch	350	Diesel	2	205	2
Bulldozer (D8 cat)	300	Diesel	4	205	1
Hughes 500 E helicopter		Jet A	1	52	6
Fuel, helicopter support truck	300	Diesel	1	52	2
Lowboy truck/trailer	500	Diesel	1	205	2
Removing guard structure				4	
3/4-ton pickup truck, 4x4	300	Diesel	2	4	6
1-ton crew cab flatbed, 4x4	300	Diesel	2	4	6
Compressor trailer	120	Diesel	2	4	6
Pole truck/trailer	350	Diesel	2	4	6
80-foot hydraulic man-lift/bucket truck	350	Diesel	1	4	4
30-ton crane truck	500	Diesel	1	4	8
Restoration				36	
1-ton crew cab, 4x4	300	Diesel	2	36	2
Road grader	350	Diesel	1	36	6
Backhoe	350	Diesel	1	36	6
Front end loader	350	Diesel	1	36	6
Track type dozer	350	Diesel	1	36	6

Table A-2 Construction Equipment for the 230-kV Transmission Line Construction

Activity and Equipment Required				Duration	
Equipment Description per Construction Activity	Estimated Power (HP)	Fuel Type	Number of Units	Estimated Schedule (Days)	Estimated Daily Usage (Hrs/Day)
Drum type compactor	250	Diesel	1	36	6
Water truck	350	Diesel	1	36	8
Lowboy truck/trailer	500	Diesel	1	36	3

Table A-3 Construction Equipment for the 115-kV Subtransmission Line Construction

Activity and Equipment Required				Duration	
Equipment Description per Construction Activity	Estimated Power (HP)	Fuel Type	Number of Units	Estimated Schedule (Days)	Estimated Daily Usage (Hrs/Day)
Survey				1	
1/2-ton pickup truck, 4x4	200	Gas	2	1	8
Roads and Landing Work				5	
1-ton crew cab, 4x4	300	Diesel	2	5	2
Road grader	350	Diesel	1	5	4
Track type dozer	350	Diesel	1	5	6
Drum type compactor	250	Diesel	1	5	4
Water truck	350	Diesel	2	Project Duration	8
Lowboy truck/trailer	500	Diesel	1	5	2
Backhoe/front loader	350	Diesel	1	5	6
Removing Existing H-Frame Poles				3	
1-ton crew cab, 4x4	300	Diesel	2	3	5
30-ton crane truck	300	Diesel	2	3	6
Compressor trailer	120	Diesel	2	3	8
Flatbed truck/trailer	350	Diesel	1	3	8
10,000-pound rough-terrain forklift	200	Diesel	1	3	4
Removing Existing H-Frame Foundations				2	
1-ton crew cab flatbed, 4x4	300	Diesel	1	2	8
10-cubic-yard dump truck	350	Diesel	1	2	8
Compressor trailer	120	Diesel	1	2	8
Backhoe/front loader	350	Diesel	1	2	8
Installing Tubular Steel Pole Foundations				2	
1-ton crew cab flatbed, 4x4	300	Diesel	3	2	2
30-ton crane truck	300	Diesel	1	2	5
Backhoe/front loader	200	Diesel	1	2	8
Auger truck	500	Diesel	1	2	8
10-cubic-yard dump truck	350	Diesel	2	2	8
Water truck	350	Diesel	1	2	8
10-cubic-yard concrete mixer truck	425	Diesel	3	2	3
Tubular Steel Pole/ Light Weight Steel H-Frame Haul				4	
3/4-ton pickup truck, 4x4	300	Diesel	2	4	5
40-foot flatbed truck/trailer	350	Diesel	2	4	8
80-ton rough-terrain crane	350	Diesel	1	4	6
Assembling Tubular Steel Pole/Light Weight Steel H-Frame				8	
3/4-ton pickup truck, 4x4	300	Diesel	2	8	5
1-ton crew cab flatbed, 4x4	300	Diesel	2	8	5
Compressor trailer	120	Diesel	1	8	5
80-ton rough-terrain crane	350	Diesel	1	8	6
Erecting Tubular Steel Pole/Light Weight Steel H-Frame				8	
3/4-ton pickup truck, 4x4	300	Diesel	2	8	5
1-ton crew cab flatbed, 4x4	300	Diesel	2	8	5
Compressor trailer	120	Diesel	1	8	5

Table A-3 Construction Equipment for the 115-kV Subtransmission Line Construction

Activity and Equipment Required				Duration	
Equipment Description per Construction Activity	Estimated Power (HP)	Fuel Type	Number of Units	Estimated Schedule (Days)	Estimated Daily Usage (Hrs/Day)
80-ton rough-terrain crane	350	Diesel	1	8	6
Installing Conductor				1	
3/4-ton pickup truck, 4x4	300	Diesel	3	1	8
1-ton crew cab flatbed, 4x4	300	Diesel	2	1	8
Wire truck/trailer	350	Diesel	2	1	2
Dump truck (trash)	350	Diesel	1	1	2
22-ton Manitex	350	Diesel	1	1	8
Splicing rig	350	Diesel	1	1	2
3 drum straw line puller	300	Diesel	1	1	4
Lowboy truck/trailer	500	Diesel	1	1	2
Restoration				1	
1-ton crew cab, 4x4	300	Diesel	2	1	2
Road grader	350	Diesel	1	1	6
Backhoe	350	Diesel	1	1	6
Front end loader	350	Diesel	1	1	6
Track type dozer	350	Diesel	1	1	6
Drum type compactor	250	Diesel	1	1	6
Water truck	350	Diesel	1	1	8
Lowboy truck/trailer	500	Diesel	1	1	3

Table A-4 Construction Equipment for the 33-kV Distribution Line Construction

Activity and Equipment Required				Duration	
Equipment Description per Construction Activity	Estimated Power (HP)	Fuel Type	Number of Units	Estimated Schedule (Days)	Estimated Daily Usage (Hrs/Day)
Trenching, Structure Excavation				8	
1-ton crew cab	300	Diesel	1		2
Backhoe front loader	300	Diesel	1		8
Overhead Line (2)				3	
1-ton crew cab, 4x4	300	Diesel	1	3	2
55-foot double-bucket truck	350	Diesel	1	3	7
50-foot digger derrick	350	Diesel	1	3	4
Underground Cable Pulling				2	
1-ton crew cab, 4x4	300	Diesel	1	2	2
Router placer truck	350	Diesel	1	2	6
Hydraulic rewind puller	300	Diesel	1	2	6
Underground Cable Makeup				60	10
1-ton crew cab, 4x4	300	Diesel	1	4	2
55-foot double-bucket truck	350	Diesel	1	4	4

Table A-5 Construction Equipment for the Ivanpah Substation

Activity and Equipment Required				Duration	
Equipment Description per Construction Activity	Estimated Power (HP)	Fuel Type	Number of Units	Estimated Schedule (Days)	Estimated Daily Usage (Hrs/Day)
Survey Crew				15	10
¾-ton pickup truck, 4x4	300	Diesel	2	15	4
Utility vehicle	20	Gas	2	40	6
Grading Crew				40	10
¾-ton pickup truck, 4x4	300	Diesel	5	40	4
Bulldozer	350	Diesel	1	40	4
Dump truck	350	Diesel	1	40	6
Paddle graders	350	Diesel	3	40	8
Water truck	300	Diesel	1	40	4
Front end loader	350	Diesel	1	40	8
Maintenance truck	350	Diesel	1	40	4
Compactor	350	Diesel	1	40	8
Generator	20	Gas	1	40	4
Fuel truck	350	Diesel	1	40	2
Civil Crew				60	10
¾-ton pickup truck, 4x4	300	Diesel	7	60	4
Bobcat	200	Diesel	1	60	8
Backhoe	200	Diesel	1	60	8
Drilling rig	350	Diesel	1	60	6
Water truck	350	Diesel	1	60	4
Compactor	200	Diesel	1	60	4
Utility vehicle	20	Gas	2	60	4
Generator	20	Gas	1	60	4
Electrical Crew				60	10
¾-ton pickup truck, 4x4	300	Diesel	8	60	4
45-foot man-lift	150	Diesel	1	60	6
60-foot man-lift	150	Diesel	1	60	6
80-ton crane	300	Diesel	1	45	8
Forklift	150	Diesel	1	60	6
Generator	20	Gas	1	60	4
Utility vehicle	20	Gas	2	60	4

Table A-6 Construction Equipment for the Telecommunication System

Activity and Equipment Required			Duration	
Equipment Description per Construction Activity	Fuel Type	Number of Units	Estimated Schedule (Days)	Estimated Daily Usage (Hrs/Day)
Path 1 – Optical Ground Wire Splice				
Outside plant splicing lab vehicle	--	1	30	8
½-ton pickup truck, 4x4	--	1	30	8
Path 2 – Section 2				
Installing underground fiber cable	--	--	--	--
Pulling fiber cable	--	--	5	--
½-ton pickup truck	Diesel	1	5	8
4 x 4 Telsa cable-stringing truck	Diesel	1	5	8
Splicing van	Diesel	1	5	8
Installing underground duct	--	--	66	--
Backhoe/front loader	Diesel	1	66	8
Dump truck	Diesel	1	66	8
½ ton pickup truck, 4x4	Diesel	1	66	8
Path 2 – Section 3 – Microwave Path				
Installing microwave site tower			15	
1-ton crew cab 4x4	Diesel	1	15	4
Crane	Diesel	1	8	4
Flatbed truck	Diesel	1	3	2
Drill rig	Diesel	1	7	6
Dump truck	Diesel	1	7	6
2-ton truck	Diesel	1	15	4
Concrete truck	Diesel	1	2	6
Concrete pump	Diesel	1	2	6
Fork lift	Diesel	1	10	4
Backhoe/front loader	Diesel	1	10	6
Installing underground fiber cable				
Pulling fiber cable			1	
½-ton pickup truck, 4x4	Diesel	1	1	8
Telsa cable-stringing truck	Diesel	1	4	10
Splicing van	Diesel	1	1	8
Installing underground duct			10	
Backhoe/front loader	Diesel	1	10	8
Dump truck	Diesel	1	10	8
½-ton pickup truck, 4x4	Diesel	1	10	8
Path 2 – Section 3 – Golf Course Alternative				
Installing underground fiber cable				
Pulling fiber cable			8	
½-ton pickup truck, 4x4	Diesel	1	8	8
Telsa cable-stringing truck	Diesel	1	8	8
Splicing van	Diesel	1	4	8
Installing underground duct			119	
Backhoe/front loader	Diesel	1	119	8

Table A-6 Construction Equipment for the Telecommunication System

Activity and Equipment Required			Duration	
Equipment Description per Construction Activity	Fuel Type	Number of Units	Estimated Schedule (Days)	Estimated Daily Usage (Hrs/Day)
Dump truck	Diesel	1	119	8
½-ton pickup truck, 4x4	Diesel	1	119	8
Installing ADSS				
Installing cross arms on poles			7	
½-ton pickup truck, 4x4	Diesel	1	7	8
Telsa cable-stringing truck	Diesel	1	7	8
Installing ADSS fiber on pole line			4	
½-ton pickup truck, 4x4	Diesel	1	4	8
Telsa cable-stringing truck	Diesel	2	4	8
Path 2 – Section 3, Mountain Pass Alternative				
Installing underground fiber cable				
Pulling fiber cable			9	
½-ton pick up truck, 4x4	Diesel	1	9	8
Telsa cable-stringing truck	Diesel	1	9	8
Splicing van	Diesel	1	9	8
Installing underground duct			132	
Backhoe/front loader	Diesel	1	132	8
Dump truck	Diesel	1	132	8
½-ton pickup	Diesel	1	132	8
Installing ADSS				
Installing cross arms on poles			8	
½-ton pickup truck, 4x4	Diesel	1	8	8
Bucket truck	Diesel	2	8	8
Installing ADSS fiber on pole line			5	
½-ton pickup truck, 4x4	Diesel	1	5	8
Telsa cable-stringing truck	Diesel	1	5	8
Splicing van	Diesel	1	2	8

Table A-7 Construction Equipment for Telecommunication Path 2, Section 1

Activity and Equipment Required				Duration	
Equipment Description per Construction Activity	Estimated Power (HP)	Fuel Type	Number of Units	Estimated Schedule (Days)	Estimated Daily Usage (Hrs/Day)
Construction Yard					
1-ton crew cab 4x4	300	Diesel	1	Construction period	2
30-ton crane truck	300	Diesel	1		2
10,000-pound rough-terrain fork lift	200	Diesel	1		5
Truck, semi, tractor	350	Diesel	1		1
Roads and Landing Work				13	
1-ton crew cab, 4x4	300	Diesel	2	13	2
Road grader	350	Diesel	1	13	4
Track-type dozer	350	Diesel	1	13	6
Drum-type compactor	250	Diesel	1	13	4
Water truck	350	Diesel	2	Construction period	8
Lowboy truck/trailer	500	Diesel	1	6	2
Backhoe/front loader	350	Diesel	1	13	6
LST Steel Haul				45	
1-ton crew cab flatbed, 4x4	300	Diesel	2	45	2
40-foot flatbed truck/trailer	350	Diesel	1	45	8
10,000-pound rough-terrain fork lift	200	Diesel	1	45	6
LST Retrofit				45	
¾-ton pickup truck, 4x4	300	Diesel	3	45	4
1-ton crew cab flatbed, 4x4	300	Diesel	2	45	4
30-ton crane truck	300	Diesel	2	45	8
80-ton rough-terrain crane	350	Diesel	1	45	8
80-foot hydraulic man-lift/bucket truck	350	Diesel	1	45	6
Removing Existing OHGW, Installing Optical Ground Wire				72	
1-ton crew cab flatbed, 4x4	300	Diesel	2	72	8
¾-ton pickup truck, 4x4	300	Diesel	4	72	8
Dump truck (trash)	350	Diesel	1	72	2
20,000-pound rough-terrain fork lift	350	Diesel	1	72	2
30-ton crane truck	300	Diesel	1	72	4
Bull wheel puller	500	Diesel	1	24	4

Table A-7 Construction Equipment for Telecommunication Path 2, Section 1

Activity and Equipment Required				Duration	
Equipment Description per Construction Activity	Estimated Power (HP)	Fuel Type	Number of Units	Estimated Schedule (Days)	Estimated Daily Usage (Hrs/Day)
Splicing lab	300	Diesel	4	9	8
80-foot hydraulic man-lift/bucket truck	350	Diesel	1	36	6
Static truck/tensioner	350	Diesel	1	72	2
Hydraulic rewind puller	300	Diesel	1	24	4
Hughes 500 E helicopter		Jet A	1	24	4
Fuel, helicopter support truck	300	Diesel	1	24	2
Restoration				25	
1-ton crew cab, 4x4	300	Diesel	2	25	2
Road grader	350	Diesel	1	25	6
Backhoe	350	Diesel	1	25	6
Front end loader	350	Diesel	1	25	6
Track-type dozer	350	Diesel	1	25	6
Drum-type compactor	250	Diesel	1	25	6
Water truck	350	Diesel	1	25	8
Lowboy truck/trailer	300	Diesel	1	25	3

Appendix B-1
Biological Technical Report

ELDORADO-IVANPAH TRANSMISSION PROJECT

BIOLOGICAL TECHNICAL REPORT

Prepared for:

Southern California Edison

Prepared by:

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Tucson, Arizona 85701

May 2009

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INTRODUCTION

The proposed Southern California Edison (SCE) Eldorado-Ivanpah Transmission Project (project) proposes to replace the existing 115 kilovolt (kV) Eldorado-Coolwater-Dunn Siding transmission line with a new 230kV line between the existing Eldorado Substation and the proposed Ivanpah Substation (Figure 1). The purpose of the project is to transmit the power from solar energy generation plants proposed to be constructed in the Ivanpah Valley area.

SCE contracted with the Environmental Planning Group (EPG) to conduct biological investigations along the existing right-of-way, alternates to the right-of-way, at the site of a proposed Ivanpah Substation, and for proposed telecommunication facilities and supporting optic fiber placement associated with the project. The following report summarizes findings made by EPG biologists during the spring and fall of 2008.

PROJECT DESCRIPTION

The proposed project consists of replacement of an existing 115kV transmission line constructed in the early 1930s to provide electrical power for the construction of Hoover Dam. Replacement of the line will occur between the existing Eldorado Substation in the Eldorado Valley of southern Nevada and the proposed Ivanpah Substation in Ivanpah Valley in California. SCE will not rebuild between the Ivanpah and Mountain Pass substations. Modification of this link will consist only of placement of an optical communications line on the existing Nipton 33kV wood distribution poles. The existing 115kV line is composed primarily of steel lattice H-frame structures with three conductors, although there are also two- and three-pole wooden structures near the Eldorado Substation and at other locations along the line where some of the original steel structures have been replaced.

The new 230kV line will be constructed of steel lattice towers or steel poles. Due to the increased tower heights and span lengths, it is likely that the majority of the new towers will be placed in new locations that will require construction of new temporary or permanent spur roads from the existing main access road. The new transmission line will deviate from the existing SCE right-of-way at several locations either to provide a more efficient route, to cross other transmission lines, or to avoid resources.

The proposed Ivanpah Substation will be constructed west of Ivanpah Lake adjacent to the existing SCE right-of-way. In addition to an optical ground wire on the new 230kV transmission line, potential alternative routes for the telecommunications facilities associated with the Ivanpah Substation and the new 230kV transmission line include using new fiber optic cable on the existing Nipton 33kV distribution line between Mountain Pass Substation and Ivanpah Substation, optical ground wire on the Eldorado-Lugo 500kV line, undergrounding fiber optic cable along existing roads, microwave communication systems, or other methods to be determined.

METHODOLOGY

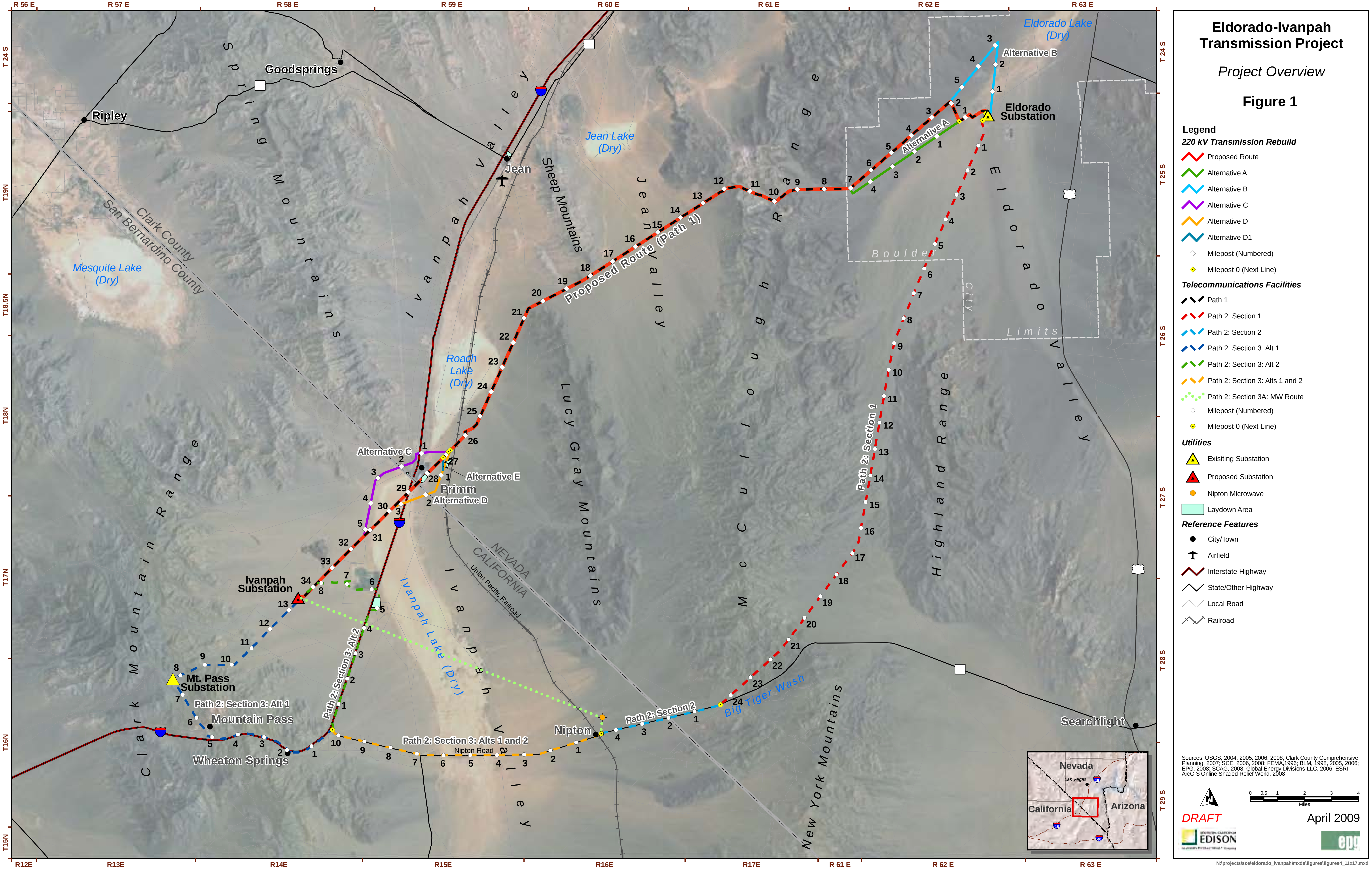
Biologists for EPG visited the project area on the following dates: April 7 to 10, 14 and 15; August 25 and 26; and October 27 and 28, 2008. Biological resources were assessed within a 250-foot width along the transmission and telecommunication lines. The survey included the entire existing transmission line route from Eldorado Substation west to the proposed Ivanpah Substation site, and from the proposed Ivanpah Substation site west to the Mountain Pass Substation. Also surveyed was the proposed fiber optic route along the Nipton 33kV distribution line from the Ivanpah Substation site to Mountain Pass Substation, and the Nipton 33kV/Earth 12kV link from Mountain Pass Substation south to an existing AT&T microwave site. Additional areas surveyed include the proposed areas for alternative routes for the transmission line (Alternatives A – E), fiber optic communication route alternatives on the Eldorado-Lugo 500kV transmission line, and Nipton 33kV distribution line.

Surveys consisted of driving or walking all survey areas and identifying vegetation types and all plants and animals observed. Special attention was given to recording any state or federally listed plants and animals, Bureau of Land Management (BLM) sensitive species, and state-listed species of special concern. All transmission towers along the rights-of-way were scanned with binoculars to identify large stick nests, and all observations of wildlife and plants were recorded.

Photo points and locations of all species of special concern encountered were recorded with a hand-held global positioning system. Locations were recorded using the Universal Transverse Mercator, North American Datum (NAD 83).

Weather conditions April 7 to 10 were sunny, but cool (approximately 60 degrees Fahrenheit daytime high) and windy, with wind gusts above 35 miles per hour. Conditions on April 14 and 15 were sunny and warm, with temperatures to 85 degrees Fahrenheit. August 25 and 26, the weather was hot (near 100 degrees each day) with light intermittent breezes and localized thunderstorms, and cooler temperatures in the vicinity of the McCullough Mountains and the Ivanpah Valley. October 27 and 28, daytime highs were in the upper 80s and skies were clear.

In addition to field studies, EPG biologists also conducted an areally-limited regional literature search and consulted the Nevada Natural Heritage Program (NNHP) database, California Natural Diversity Database (CNDDB), California Department of Fish and Game - Nongame Wildlife Program, U.S. Fish and Wildlife Service (USFWS), and BLM Internet resources. The CNDDB search was performed for the following eight U.S. Geological Survey (USGS) quadrangles: State Line Pass, Clark Mountain, Ivanpah Lake, Desert, Mescal Range, Mineral Hill, Nipton, and Crescent Peak. No federal (Endangered Species Act [ESA]) Candidate species are currently listed for any of these quadrangles in the CNDDB database.


Eldorado-Ivanpah Transmission Project
Project Overview
Figure 1
Legend
220 kV Transmission Rebuild
Proposed Route
Alternative A
Alternative B
Alternative C
Alternative D
Alternative D1
Milepost (Numbered)
Milepost 0 (Next Line)
Telecommunications Facilities
Path 1
Path 2: Section 1
Path 2: Section 2
Path 2: Section 3: Alt 1
Path 2: Section 3: Alt 2
Path 2: Section 3: Alts 1 and 2
Path 2: Section 3A: MW Route
Milepost (Numbered)
Milepost 0 (Next Line)
Utilities
Exisiting Substation
Proposed Substation
Nipton Microwave
Laydown Area
Reference Features
City/Town
Airfield
Interstate Highway
State/Other Highway
Local Road
Railroad
Sources: USGS, 2004, 2005, 2006, 2008; Clark County Comprehensive Planning, 2007; SCE, 2006, 2008; FEMA,1996; BLM, 1998, 2005, 2006; EPG, 2008; SCAG, 2008; Global Energy Divisions LLC, 2006; ESRI ArcGIS Online Shaded Relief World, 2008
DRAFT
April 2009
Miles
Nevada
California
Arizona
Las Vegas
Goodsprings
Ripley
Jean
Primm
Nipton
Searchlight
Mountain Pass
Wheaton Springs
Eldorado Substation
Ivanpah Substation
Mt. Pass Substation
Eldorado Lake (Dry)
Jean Lake (Dry)
Mesquite Lake (Dry)
Roach Lake (Dry)
Ivanpah Lake (Dry)
Big Tiger Wash
Spring Mountains
Ivanpah Valley
Sheep Mountains
Jean Valley
Lucy Gray Mountains
McCullough Range
Highland Range
Eldorado Valley
Clark Mountain Range
New York Mountains
Boulder City Limits
Clark County
San Bernardino County
NEVADA
CALIFORNIA
Union Pacific Railroad
Nipton Road
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Path 2: Section 2
Path 2: Section 3: Alt 1
Path 2: Section 3: Alt 2
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R 56 E
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R 58 E
R 59 E
R 60 E
R 61 E
R 62 E
R 63 E
T 24 S
T 25 S
T 26 S
T 27 S
T 28 S
T 29 S
T19N
T18.5N
T18N
T17N
T16N
T15N
R12E
R13E
R14E
R15E
R16E
R17E
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Rare, invasive, and noxious plant surveys for this project were conducted in April and May 2008, and in April of 2009 by Mr. Glenn Clifton, GLC Consulting, Kingman, Arizona. Results and discussion of these surveys is found in Appendix C of this document.

VEGETATION RESOURCES

The Eldorado to Ivanpah Transmission Line and telecommunication routes occur in southern Nevada and southeastern California, from near Boulder City, Nevada in the east, and west to the Clark Mountains in southeastern California. The project occurs in an area defined as the Mojave Desert, and vegetation over most of the project is characteristic of the creosote bush-white bursage (*Larrea tridentata-Ambrosia dumosa*) series (Sawyer and Keeler-Wolf 1995). Exceptions to this occur in the area around the Mountain Pass Substation, which is sited in black bush (*Coleogyne ramosissima*) series habitat, with Utah juniper (*Juniperus osteosperma*) being an important element of the plant community. Species of *Yucca* (*Y. baccata*, *Y. brevifolia*, and *Y. schidigera*) are common and locally abundant in some areas; and several species of cacti, including *Opuntia* spp., *Cylindropuntia* spp., and others, are also present. The approach to the Mountain Pass substation from the east supports a few singleleaf piñon (*Pinus monophylla*). Other habitat types in the project area include saltbush (*Atriplex* spp.) scrub, Joshua tree (*Yucca brevifolia*) woodland, and catclaw acacia (*Acacia greggii*) scrub. Brief descriptions of the primary vegetation communities occurring within the project are given below, followed by more detailed discussions for each project segment, including the transmission line right-of-way, alternative areas, proposed and existing substations, telecommunications sites, and optic fiber cable routes. A listing of plant species observed on the project is found in Appendix B.

Vegetation Type Descriptions

Six main vegetation types are located within the project area, including saltbush scrub, creosote bush scrub/creosote bush-white bursage scrub, Mojave yucca desertscrub, Joshua tree woodland, black bush scrub, and catclaw acacia scrub (Figures 2a-2f). In addition, there are areas relatively devoid of native vegetation, including the dry lake beds, developed areas, paved roads, highways, and access roads and other disturbed areas associated with construction and mining operations.

Saltbush Scrub

Saltbush scrub typically has low plant species diversity, and on the project is dominated by saltbush species, white bursage, and big galleta (*Pleuraphis rigida*) located in alkaline soils around the perimeter of the dry lake beds. Vegetation is an intermittent to open canopy, generally less than 2 feet in height.

Creosote Bush Scrub/Creosote Bush-White Bursage Scrub

The creosote bush-white bursage series, which is dominated by creosote bush, is augmented by a variety of other shrubs, including four-wing saltbush (*Atriplex canescens*), all-scale (*A. polycarpa*), desertsenna (*Senna armata*), cheesebush (*Hymenoclea salsola*), sweetbush (*Bebbia juncea*), and other less common shrubs. Numerous annual plants and forbs are present to varying degrees, including pincushion flower (*Chaenactis fremontii*), bristly fiddleneck (*Amsinckia tessellate*), desert globemallow (*Sphaeralcea ambigua*), cryptantha (*Cryptantha* sp.), combseed (*Pectocarya* sp.), and Mediterranean grass (*Schismus barbatus*). Cacti are not common at lower elevation; they are more common at higher elevations and on steeper slopes. Cacti species present include Wiggins' cholla (*Cylindropuntia echinocarpa*), Engelmann's hedgehog cactus (*Echinocereus engelmannii*), California barrel cactus (*Ferocactus cylindraceus*), diamond cholla (*Cylindropuntia ramosissima*), and beavertail pricklypear (*Opuntia basilaris*).

Mojave Yucca Desertscrub

Mojave yucca (*Yucca schidigera*) is the dominant over-story plant in this plant community, which is ecotonal between creosote bush-white bursage scrub and Joshua tree woodland communities. This plant community has a greater abundance of plant species than creosote bush communities, including more species of cacti. Cactus species include California barrel cactus, cottontop cactus (*Echinocereus polycephalus*), Wiggins' and diamond chollas, Engelmann's hedgehog cactus, and beavertail pricklypear. Shrub species include Virgin River brittlebush (*Encelia virginensis*), with white bursage at the lower, and black bush at the upper limits of the plant community.

Joshua Tree Woodland

Joshua tree woodland occurs at middle elevations in the project area. Joshua tree woodland is dominated by Joshua trees as the over-story plant with Mojave yucca, ephedras (*Ephedra* sp.), cheesebush, California buckwheat (*Eriogonum fasciculatum*), and wolfberry (*Lycium andersonii*) present as common shrub species. Creosote bush and black bush typically occur at ecotonal boundaries with lower and upper bounding plant communities respectively.

Black Bush Scrub

This plant community, typical of mid-elevation desert mountains, is dominated by black bush and features emergent Utah juniper (*Juniperus osteosperma*), singleleaf piñon (*Pinus monophylla*), and numerous shrub species, which includes ephedra, annuals and perennial plants, including turpentinebroom (*Thamnosma montana*), goldenbush (*Ericameria* sp.), Mexican bladder sage (*Salazaria mexicana*), desert lupine (*Lupinus shockleyi*), freckled milkvetch

Eldorado-Ivanpah Transmission Project

Biological Technical Report

Vegetation Types

Figure 2a

Legend

Vegetation Types

- **JT** Joshua Tree Woodland
- **BBS** Black Bush Scrub
- **BBJT** Black Bush Scrub- Joshua Tree Woodland
- **BBJS** Black Bush-Juniper Scrub
- **CS** Creosote Scrub
- **CWB** Creosote-White Bursage Scrub
- **CYS** Creosote-Yucca Scrub
- **DW** Desert Wash
- **DEV** Developed
- **DST** Disturbed
- **DCS** Disturbed Creosote Scrub
- **DL** Dry Lake Bed
- **PPL** Pinon Pine-Juniper
- **SBS** Saltbush Scrub

220kV Transmission Rebuild

- Proposed Route
- Alternative A
- Alternative B
- Alternative C
- Alternative D
- Alternative E
- Milepost (Numbered)
- Milepost 0 (New Line)

Telecommunications Facilities

- Path 1
- Path 2: Section 1
- Path 2: Section 2
- Path 2: Section 3: Alt 1
- Path 2: Section 3: Alt 2
- Path 2: Section 3: Alts 1 and 2
- Path 2: Section 3A: Proposed MW Route
- Milepost (Numbered)
- Milepost 0 (New Line)

Utilities

- Existing Substation
- Proposed Substation
- Nipton Microwave
- Laydown Area

0 0.5 1 2
Miles

Scale = 1:65,000

Sources: USGS, 2004, 2005, 2006, 2008; Clark County Comprehensive Planning, 2007; SCE, 2006, 2008; FEMA,1996; BLM, 1998, 2005, 2006; EPG, 2008; SCAG, 2008; Global Energy Divisions LLC, 2006; ESRI ArcGIS Online Shaded Relief World, 2008

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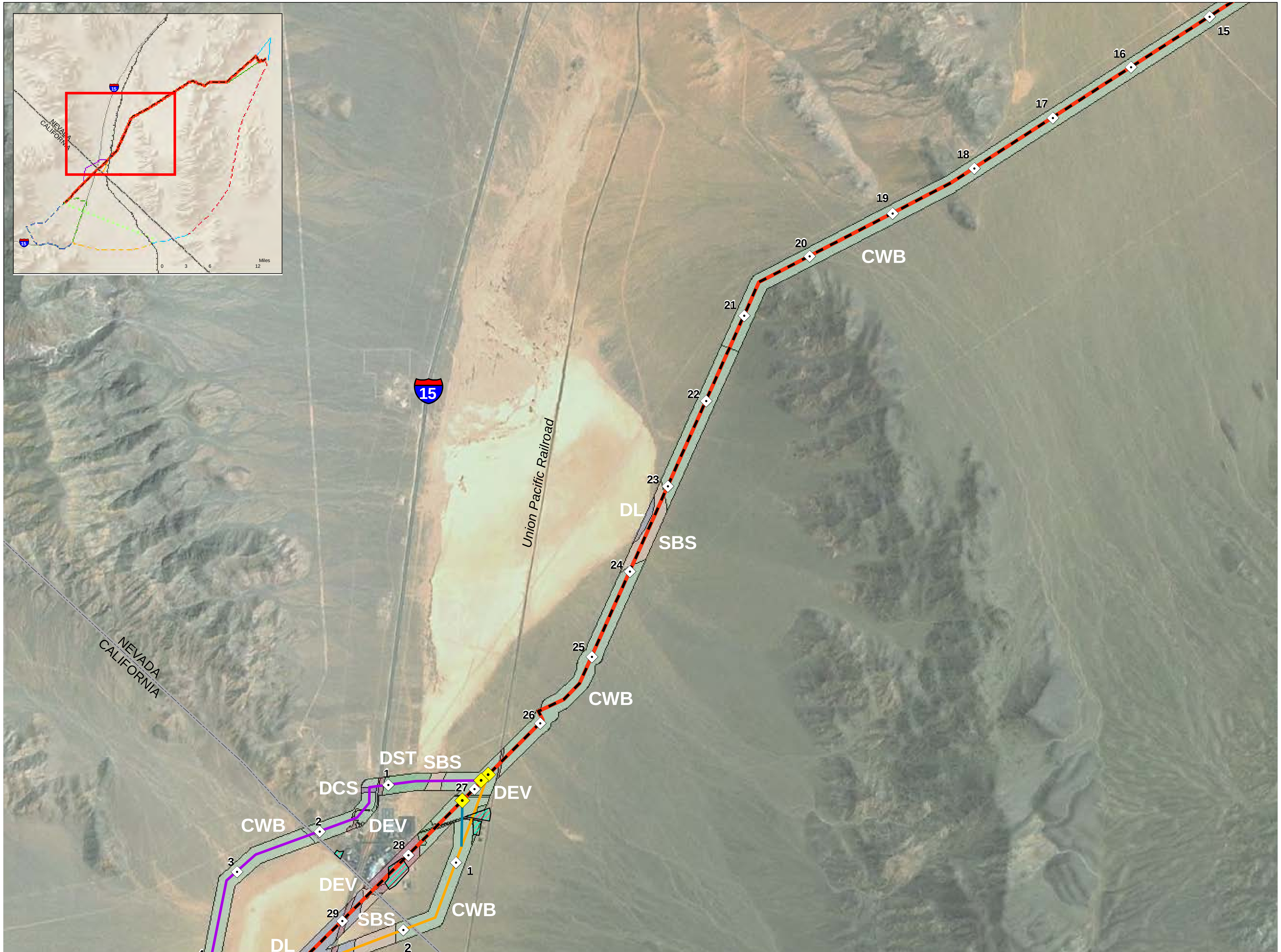

Eldorado-Ivanpah Transmission Project

Biological Technical Report

Vegetation Types

Figure 2b

Legend

Vegetation Types

- **JT** Joshua Tree Woodland
- **BBS** Black Bush Scrub
- **BBJT** Black Bush Scrub- Joshua Tree Woodland
- **BBJS** Black Bush-Juniper Scrub
- **CS** Creosote Scrub
- **CWB** Creosote-White Bursage Scrub
- **CYS** Creosote-Yucca Scrub
- **DW** Desert Wash
- **DEV** Developed
- **DST** Disturbed
- **DCS** Disturbed Creosote Scrub
- **DL** Dry Lake Bed
- **PPL** Pinon Pine-Juniper
- **SBS** Saltbush Scrub

220kV Transmission Rebuild

- Proposed Route
- Alternative A
- Alternative B
- Alternative C
- Alternative D
- Alternative E
- Milepost (Numbered)
- Milepost 0 (New Line)

Telecommunications Facilities

- Path 1
- Path 2: Section 1
- Path 2: Section 2
- Path 2: Section 3: Alt 1
- Path 2: Section 3: Alt 2
- Path 2: Section 3: Alts 1 and 2
- Path 2: Section 3A: Proposed MW Route
- Milepost (Numbered)
- Milepost 0 (New Line)

Utilities

- Existing Substation
- Proposed Substation
- Nipton Microwave
- Laydown Area

0 0.5 1 2
Miles

Scale = 1:65,000

Sources: USGS, 2004, 2005, 2006, 2008; Clark County Comprehensive Planning, 2007; SCE, 2006, 2008; FEMA,1996; BLM, 1998, 2005, 2006; EPG, 2008; SCAG, 2008; Global Energy Divisions LLC, 2006; ESRI ArcGIS Online Shaded Relief World, 2008

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Eldorado-Ivanpah Transmission Project

Biological Technical Report

Vegetation Types

Figure 2c

Legend

Vegetation Types

- **JT** Joshua Tree Woodland
- **BBS** Black Bush Scrub
- **BBJT** Black Bush Scrub- Joshua Tree Woodland
- **BBJS** Black Bush-Juniper Scrub
- **CS** Creosote Scrub
- **CWB** Creosote-White Bursage Scrub
- **CYS** Creosote-Yucca Scrub
- **DW** Desert Wash
- **DEV** Developed
- **DST** Disturbed
- **DCS** Disturbed Creosote Scrub
- **DL** Dry Lake Bed
- **PPL** Pinon Pine-Juniper
- **SBS** Saltbush Scrub

220kV Transmission Rebuild

- Proposed Route
- Alternative A
- Alternative B
- Alternative C
- Alternative D
- Alternative E
- Milepost (Numbered)
- Milepost 0 (New Line)

Telecommunications Facilities

- Path 1
- Path 2: Section 1
- Path 2: Section 2
- Path 2: Section 3: Alt 1
- Path 2: Section 3: Alt 2
- Path 2: Section 3: Alts 1 and 2
- Path 2: Section 3A: Proposed MW Route
- Milepost (Numbered)
- Milepost 0 (New Line)

Utilities

- Existing Substation
- Proposed Substation
- Nipton Microwave
- Laydown Area

0 0.5 1 2
Miles

Scale = 1:60,000

Sources: USGS, 2004, 2005, 2006, 2008; Clark County Comprehensive Planning, 2007; SCE, 2006, 2008; FEMA,1996; BLM, 1998, 2005, 2006; EPG, 2008; SCAG, 2008; Global Energy Divisions LLC, 2006; ESRI ArcGIS Online Shaded Relief World, 2008

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Eldorado-Ivanpah Transmission Project

Biological Technical Report

Vegetation Types

Figure 2d

Legend

Vegetation Types

- **JT** Joshua Tree Woodland
- **BBS** Black Bush Scrub
- **BBJT** Black Bush Scrub- Joshua Tree Woodland
- **BBJS** Black Bush-Juniper Scrub
- **CS** Creosote Scrub
- **CWB** Creosote-White Bursage Scrub
- **CYS** Creosote-Yucca Scrub
- **DW** Desert Wash
- **DEV** Developed
- **DST** Disturbed
- **DCS** Disturbed Creosote Scrub
- **DL** Dry Lake Bed
- **PPL** Pinon Pine-Juniper
- **SBS** Saltbush Scrub

220kV Transmission Rebuild

- Proposed Route
- Alternative A
- Alternative B
- Alternative C
- Alternative D
- Alternative E
- Milepost (Numbered)
- Milepost 0 (New Line)

Telecommunications Facilities

- Path 1
- Path 2: Section 1
- Path 2: Section 2
- Path 2: Section 3: Alt 1
- Path 2: Section 3: Alt 2
- Path 2: Section 3: Alts 1 and 2
- Path 2: Section 3A: Proposed MW Route
- Milepost (Numbered)
- Milepost 0 (New Line)

Utilities

- Existing Substation
- Proposed Substation
- Nipton Microwave
- Laydown Area

0 0.5 1 2
Miles

Scale = 1:65,000

Sources: USGS, 2004, 2005, 2006, 2008; Clark County Comprehensive Planning, 2007; SCE, 2006, 2008; FEMA,1996; BLM, 1998, 2005, 2006; EPG, 2008; SCAG, 2008; Global Energy Divisions LLC, 2006; ESRI ArcGIS Online Shaded Relief World, 2008

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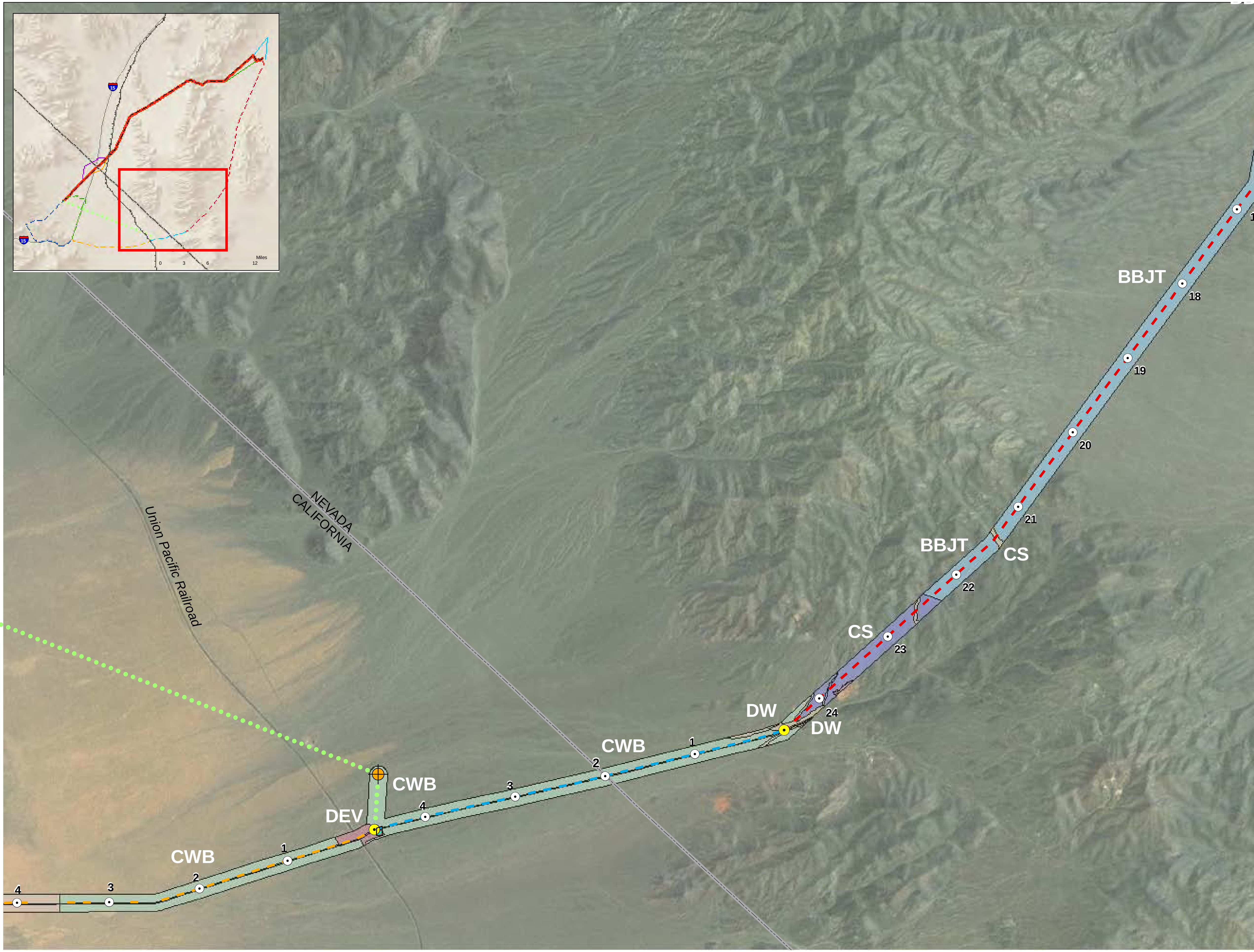

Eldorado-Ivanpah Transmission Project

Biological Technical Report

Vegetation Types

Figure 2e

Legend

Vegetation Types

- **JT** Joshua Tree Woodland
- **BBS** Black Bush Scrub
- **BBJT** Black Bush Scrub- Joshua Tree Woodland
- **BBJS** Black Bush-Juniper Scrub
- **CS** Creosote Scrub
- **CWB** Creosote-White Bursage Scrub
- **CYS** Creosote-Yucca Scrub
- **DW** Desert Wash
- **DEV** Developed
- **DST** Disturbed
- **DCS** Disturbed Creosote Scrub
- **DL** Dry Lake Bed
- **PPL** Pinon Pine-Juniper
- **SBS** Saltbush Scrub

220kV Transmission Rebuild

- Proposed Route
- Alternative A
- Alternative B
- Alternative C
- Alternative D
- Alternative E
- Milepost (Numbered)
- Milepost 0 (New Line)

Telecommunications Facilities

- Path 1
- Path 2: Section 1
- Path 2: Section 2
- Path 2: Section 3: Alt 1
- Path 2: Section 3: Alt 2
- Path 2: Section 3: Alts 1 and 2
- Path 2: Section 3A: Proposed MW Route
- Milepost (Numbered)
- Milepost 0 (New Line)

Utilities

- Existing Substation
- Proposed Substation
- Nipton Microwave
- Laydown Area

0 0.5 1 2
Miles

Scale = 1:65,000

Sources: USGS, 2004, 2005, 2006, 2008; Clark County Comprehensive Planning, 2007; SCE, 2006, 2008; FEMA,1996; BLM, 1998, 2005, 2006; EPG, 2008; SCAG, 2008; Global Energy Divisions LLC, 2006; ESRI ArcGIS Online Shaded Relief World, 2008

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Eldorado-Ivanpah Transmission Project

Biological Technical Report

Vegetation Types

Figure 2f

Legend

Vegetation Types

- **JT** Joshua Tree Woodland
- **BBS** Black Bush Scrub
- **BBJT** Black Bush Scrub- Joshua Tree Woodland
- **BBJS** Black Bush-Juniper Scrub
- **CS** Creosote Scrub
- **CWB** Creosote-White Bursage Scrub
- **CYS** Creosote-Yucca Scrub
- **DW** Desert Wash
- **DEV** Developed
- **DST** Disturbed
- **DCS** Disturbed Creosote Scrub
- **DL** Dry Lake Bed
- **PPL** Pinon Pine-Juniper
- **SBS** Saltbush Scrub

220kV Transmission Rebuild

- Proposed Route
- Alternative A
- Alternative B
- Alternative C
- Alternative D
- Alternative E
- Milepost (Numbered)
- Milepost 0 (New Line)

Telecommunications Facilities

- Path 1
- Path 2: Section 1
- Path 2: Section 2
- Path 2: Section 3: Alt 1
- Path 2: Section 3: Alt 2
- Path 2: Section 3: Alts 1 and 2
- Path 2: Section 3A: Proposed MW Route
- Milepost (Numbered)
- Milepost 0 (New Line)

Utilities

- Existing Substation
- Proposed Substation
- Nipton Microwave
- Laydown Area

0 0.5 1 2
Miles

Scale = 1:65,000

Sources: USGS, 2004, 2005, 2006, 2008; Clark County Comprehensive Planning, 2007; SCE, 2006, 2008; FEMA,1996; BLM, 1998, 2005, 2006; EPG, 2008; SCAG, 2008; Global Energy Divisions LLC, 2006; ESRI ArcGIS Online Shaded Relief World, 2008

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(*Astragalus lentiginosus*), and desert paintbrush (*Castilleja angustifolia*). Black bush scrub intergrades with creosote bush scrub at lower elevations and Joshua tree woodland at higher elevations.

Catclaw Acacia Series (Desert Wash Habitat)

Vegetation present within the numerous desert washes support widely scattered catclaw acacia and more commonly ephedra, cheesebush, and sweetbush. Mesquite mistletoe (*Phoradendron californicum*) occurs in some of the catclaw acacia in wash areas. Vegetation along canyon bottoms and washes in the McCullough Mountains is shrub-dominated with no emergent tree species. Shrubs present include catclaw acacia, wolfberry, California trixis (*Trixis californica*), Virgin River brittlebush, and California buckwheat.

Proposed Transmission Route

Eldorado Substation to the McCullough Mountains – In the Eldorado Valley, from the Eldorado Substation west to the beginning of the McCullough Mountains, the main vegetation type is the creosote bush-white bursage series of Sawyer and Keeler-Wolf (1995), which is dominated by creosote bush and augmented by a variety of other shrubs, including four-wing saltbush (*Atriplex canescens*), all-scale (*A. polycarpa*), desertsenna (*Senna armata*), cheesebush (*Hymenoclea salsola*), sweetbush (*Bebbia juncea*), and other less common shrubs (Appendix A, Photographs 1 through 4). Numerous annual plants and forbs were noted, including *Chaenactis fremontii*, *Amsinckia intermedia*, *Sphaeralcea ambigua*, *Cryptantha* sp., *Pectocarya* sp., and *Schismus* sp. Cacti are not common, but include Wiggins' cholla (*Cylindropuntia echinocarpa*), Engelmann's hedgehog cactus (*Echinocereus engelmannii*), California barrel cactus (*Ferocactus cylindraceus*), diamond cholla (*Cylindropuntia ramosissima*), and beavertail cactus (*Opuntia basilaris*). Numerous small desert washes are present within this area and support widely scattered catclaw acacia (*Acacia greggii*) and more commonly ephedra (*Ephedra* sp.), cheesebush, and sweetbush. Mesquite mistletoe (*Phoradendron californicum*) occurs in some of the catclaw acacia in wash areas.

Soils are generally sandy with some areas having rocks or cobbles. Numerous small washes are located in the area. Topographically, the Eldorado Valley is quite flat with elevations ranging from approximately 1,800 feet at the Eldorado Substation to 2,300 feet on the lower slope of the McCullough Mountains.

McCullough Mountains – Continuing west into the McCullough Mountains through a canyon pass north of McCullough Pass, rock outcrops became commonplace (Appendix A, Photographs 5 and 6) with increase in elevation. The existing access road through the pass follows an alluvial fan and desert wash up through the canyon, while the existing SCE 115kV transmission line is located on slopes and peaks to the north and south. The dominant vegetation type on slopes is the creosote bush series of Sawyer and Keeler-Wolf (1995), but plant diversity increases to include more individual cacti, mostly diamond and silver cholla, and Mojave yucca (*Y. schidigera*), as well as many more subshrubs and forbs. Among these, threadleaf snakeweed (*Gutierrezia microcephala*), Palmer's penstemon (*Penstemon palmeri*), Virgin River brittlebush (*Encelia virginensis*), California trixis (*Trixis californicum*), tobacco (*Nicotiana obtusifolia*), and phacelias (*Phacelia* spp.) were commonly noted. Vegetation along canyon bottoms and washes in the McCulloughs is shrub-dominated with no emergent tree species. Shrubs present include catclaw acacia, wolfberry (*Lycium andersonii*), California trixis, Virgin River brittlebush, and California buckwheat (*Eriogonum fasciculatum*).

Elevation in this area ranges from approximately 2,300 feet at the lower slopes to 3,370 feet at the highest point where the access road attains the drainage divide at the saddle. Topographically, the area is fairly rugged and mountainous with deeply incised, rocky canyons and frequent cliffs.

Ivanpah Valley east of Primm – West of the McCullough Mountains, the transmission line descends into the eastern side of Ivanpah Valley and continues west to Primm, Nevada. The existing 115kV transmission line is generally located on broad, sandy alluvial fans where the creosote bush-white bursage series is augmented by all-scale, and on sandier soils, big galleta (*Pleuraphis rigida*). A variety of other plants are also present, including Mojave yucca, diamond and silver chollas, beavertail cactus, Engelmann's hedgehog, ephedras, and cheesebush. The winter-spring annual plants listed earlier for the Eldorado Valley are also present on this reach of the transmission line along with Great Basin langloisia (*Langloisia setosissima*) and desert dock (*Rumex* sp.). This portion of the transmission line right-of-way crosses numerous small to relatively large dry washes that flow out of the McCullough Mountains. Vegetation along these washes is not dramatically different from adjacent interfluvial areas. The primary difference is that individual plants along the wash borders tend to be larger than plants of the same species on interfluvial areas. Catclaw acacia is present but not abundant along washes, and it is rarely found on interfluvial areas.

The elevation in this area ranges from approximately 3,200 feet at the west base of the McCullough Mountains to 2,600 feet at Primm, where the existing line crosses Interstate 15 (I-15) and the dry lake bed. Topographically, this reach of the project consists of a gently sloping bajada between the west flank of the McCullough Mountains and Ivanpah Lake southwest of Primm.

Ivanpah Valley West of Primm to the Clark Mountains – West of I-15, the existing right-of-way traverses the playa of Ivanpah Lake, which is devoid of vegetation (Appendix A, Photograph 7). Elevation increases slowly southwest from Primm and off of the playa toward the Clark Mountains. Near Ivanpah Lake the creosote bush scrub is moderately disturbed in some areas with non-native species, including common Mediterranean grass (*Schismus barbatus*), filaree (*Erodium cicutarium*), compact brome (*Bromus madritensis*) and Russian thistle (*Salsola tragus*). However, the level of disturbance decreases as the transmission line leaves the Ivanpah Lake area and continues southwest. Once beyond the Playa, vegetation is dominated by the creosote bush-white bursage series, giving way to a distinctive black bush series, where Utah juniper is an important species, and Mojave yucca and cacti are present as the transmission line ascends into the Clark Mountains. The existing 115kV transmission line tops out at the Mountain

Pass Substation (in San Bernardino County, California) at an elevation of approximately 5,320 feet (Appendix A, Photograph 8). The plant community at this elevation is typical of mid-elevation desert mountains, and features emergent Utah juniper singleleaf piñon, ephedra (*Ephedra* sp.), and numerous shrubs, annuals, and perennial plants, including turpentinebroom (*Thamnosma montana*), goldenbush (*Ericameria* sp.), Mexican bladder sage (*Salazaria mexicana*), desert lupine (*Lupinus shockleyi*), freckled milkvetch (*Astragalus lentiginosus*), and desert paintbrush (*Castilleja angustifolia*). South of the Mountain Pass Substation, the black bush scrub transitions to a mixture of black bush scrub and Joshua Tree woodland.

Alternative Transmission Routes

Alternatives A and B

Vegetation present in Alternatives A and B, west and north of Eldorado Substation, is a virtual monoculture of creosote bush and white bursage; the creosote bush-white bursage series. Topography is of low relief, flat, with sandy to slightly rocky soils and numerous small washes. Other plants present in low abundance are brittlebush (*Encelia farinosa*), cheesebush, and the introduced common Mediterranean grass (Appendix A, Photograph 9).

Alternative C

This alternative occurs in an area of rugged, rocky topography with elevations approaching 4,000 feet. Vegetation is more diverse here than on Alternatives A and B, with barrel cactus, Mojave yucca, green ephedra (*Ephedra viridis*), orange globemallow, Virgin River brittlebush, and silver cholla occurring in addition to the ubiquitous creosote bush and white bursage (Appendix A, Photograph 10). Overall, vegetation in the area is relatively sparse. Red brome (*Bromus rubens*) and purple three-awn (*Aristida purpurea*) are common grasses within this alternative.

Alternatives D and E

Alternatives D and E are west of the McCullough Mountains and east of I-15 in an area peripheral to Primm, Nevada. There are numerous access roads and other disturbed areas associated with the developed area of Primm, the existing power plant and electrical and gas transmission lines. (Appendix A, Photograph 11). Topography is flat and soils are sandy and dominated by creosote bush and white bursage, with the exception of areas adjacent to the dry lake bed which are dominated by saltbush scrub.

Substations

Eldorado Substation

The Eldorado Substation is located in the broad, alluvial, closed-basin of the Eldorado Valley about 35 miles southeast of Las Vegas, Nevada. The elevation at the site is approximately 1,800 feet above sea level. Vegetation in the vicinity of this site consists almost entirely of creosote bush with very limited presence of white bursage. Winter-spring annuals were not in abundance on fine sandy soils when the site was visited in April 2008 (see Appendix A, Photographs 1 to 4).

Ivanpah Substation

The proposed Ivanpah Substation is located adjacent to the existing Eldorado-Mountain Pass 115kV transmission line. It is immediately southwest of the proposed location of the BrightSource solar facilities. The plant community at the Ivanpah Substation site is the creosote bush-white bursage series (Appendix A, Photograph 14). Other plant species that occur in association with the two dominants include Mojave yucca, ephedra, diamond cholla, silver cholla, beavertail cactus, and California buckwheat.

Matted cholla (*Grusonia parishii*), a California Native Plant Society (CNPS) list 2.3 species is present on this site (a 2.3 ranking indicates a moderate threat, but the species is not very rare in California).

Mountain Pass Substation

Mountain Pass Substation is approximately 2.0 miles north of I-15 and approximately 5.6 miles southwest of the proposed Ivanpah Substation in the Clark Mountains, at an elevation of approximately 5,320 feet (Appendix A, Photograph 15). Terrain is flat to gently rolling, with a steep drop-off in elevation about 0.6 mile east of the site at Antimony Gulch. Vegetation is dominated by black bush, with Utah juniper being fairly common. Species of yucca are common, including banana yucca, Mojave yucca, and Joshua trees. Nevada jointfir and Mormon tea (*Ephedra nevadensis* and *E. viridis*) are fairly common. Cattle saltbush (*Atriplex polycarpa*), threadleaf snakeweed, turpentinebroom, and globemallow are present in small numbers. Two species of pricklypear cacti were observed in the area; tulip pricklypear (*Opuntia phaeacantha*) and grizzlybear pricklypear (*O. polyacantha* var. *erinacea*). The approach to the substation from the east supports a few singleleaf piñon in Antimony Gulch.

Telecommunication Alternatives

Eldorado-Lugo 500kV Transmission Line – Eldorado Substation to Nipton, California

This portion of the line is being considered as one potential route to support the new optic fiber communications line for the project; the existing ground wire on the transmission line would be replaced with an optical ground wire (OPGW). In the vicinity of the Eldorado Substation the line passes through several miles of habitat that is dominated by creosote bush and white bursage. As the line climbs in elevation to the south, on the east flank of the South McCullough Mountains, vegetation diversity and density gradually increase. Shrubby vegetation, including jointfir (*Ephedra* sp.), Virgin River brittlebush, Mojave indigobush (*Psorothamnus arborescens*), Mexican bladdersage, Eastern Mojave buckwheat, and Mojave yucca are common. Burrobrush and catclaw acacia are common along washes. Cactus species are few, with the most common being Wiggins' cholla and California barrel cactus. As the line reaches about 3,200 feet, Joshua trees begin to appear in the vegetation community, and farther to the south with increased elevation they become a prominent feature of the landscape. Farther south, black bush appears and eventually becomes almost a monoculture above approximately 4,500 feet. Once the line begins its descent into the Ivanpah Valley, the vegetation reverts to typical Mojave desertscrub habitat dominated by a variety of shrub species, and with Joshua trees and eventually Mojave yucca becoming less common with the decrease in elevation towards the valley floor south of Nipton.

Nipton 33kV and Nipton Road Telecommunications Line Alternatives

Several of the fiber optic telecommunication line options would use portions of the existing Nipton 33kV distribution line between the Eldorado-Lugo 500kV transmission line near Nipton, California and the Mountain Pass Substation. At the point where the Eldorado-Lugo line crosses Nipton Road (Highway 164) the OPGW would transition to an underground fiber optic cable installed on the north side of Nipton Road in the existing road shoulder. The line segment continues to Nipton where it will then take one of two alternative routes: one alternative route segment would use the existing Nipton 33kV wood pole distribution line west of Nipton approximately 1 mile and then transition to a new underground fiber optic on the north side of Nipton Road to Interstate 15; the second alternative route would involve constructing a new line to a microwave tower located approximately 0.6 mile north of Nipton. The fiber optic cable and electrical power will be extended from the Nipton 33kV line in Nipton to the proposed microwave tower site. The microwave tower will be used to transmit the telecommunication data from Eldorado Substation to a corresponding microwave transmitter located within the proposed Ivanpah Substation.

The section of the telecommunication line in the southern Ivanpah Valley, along Nipton Road/Highway 164 between Nipton and I-15 is mostly dominated by creosote bush and white bursage, except on the fringe of the dry lake bed where saltbush (*Atriplex* sp.) and big galleta is dominant for a distance of about 1 mile. West of the south finger of Ivanpah Lake the line eventually climbs the bajada onto the east slope of the Ivanpah Mountains, where there is a slight increase in plant diversity and density, but with vegetation remaining rather sparse. Plants beginning to appear in this area include Mojave yucca, burrobrush, and a few cacti.

From the intersection of Nipton Road and I-15 there are two alternatives for the telecommunication route.

One alternative, going north, would mostly use the existing Nipton 33kV line for overhead installation of the fiber optic cable. The existing Nipton 33kV line is located parallel to and approximately 30 to 40 feet east of 1-15. Approximately 0.5 mile north of Yates Well Road, the Nipton 33kV line crosses I-15 to the southeast corner of the golf course. Approximately 1.25 miles of new overhead pole line or underground fiber optic cable will be required on the south side of the golf course. This new section will be located along the existing roads and will connect the terminal end of the Nipton 33kV line on the southeast corner of the golf course with the terminal end of the Nipton 33kV line on the west side of the golf course. The line continues west and south from the golf course to the proposed Ivanpah Substation site.

The segment of the 33kV Nipton line near the proposed Ivanpah Substation (Ivanpah Substation to Mountain Pass Substation) continues southwest into the Clark Mountains. Vegetation in the vicinity of the Ivanpah Substation is predominantly creosote bush and white bursage with a few scattered Mojave yuccas. To the west where the line climbs the bajada, plant species diversity and vegetation density gradually increase, with shrub species making up the bulk of the vegetation cover. Some of the common plants observed in the area include ephedra, white bursage, Virgin River brittlebush, snakeweed (*Gutierrezia* sp.), wirelettuce (*Stephanomeria* sp.), Mexican bladdersage, Eastern Mojave buckwheat (*Eriogonum fasciculatum*), turpentinebroom, Mojave yucca, and a few creosote bushes. Catclaw acacia and burrobrush are the dominant plants within many of the xeric washes in the area.

The second alternative, going south, would require the construction of approximately 1.7 miles of new underground fiber optic cable from Nipton Road to the existing Nipton 33kV distribution line where the line would continue overhead west along I-15 to the Mountain Pass Interchange (Bailey Road), where it would turn north towards the Mountain Pass Substation. The elevation along this segment varies from about 3,700 feet just east of the I-15 turn to about 4,600 feet at the Mountain Pass interchange. Vegetation at the eastern end of this segment is dominated by creosote bush and white bursage with some Mojave yucca present, gradually changes to a slightly shrubbier Mojave desertscrub, and eventually becomes a mostly black bush dominated cover near the Mountain Pass interchange. The area south of Mountain Pass Substation features rolling topography draining south toward I-15. The dominant vegetation type is the black bush series (Appendix A, Photograph 12) with Joshua trees (*Yucca brevifolia*) conspicuously present, but a less dominant element (Appendix A, Photograph 13). Other plants include Mojave yucca, snakeweed, green ephedra, desert almond (*Prunus fasciculata*), burrobrush, and Utah juniper.

WILDLIFE RESOURCES

Wildlife populations in the project area consist of assemblages of species that are characteristic of low, arid Mojave Desertscrub plant communities. Although elements of piñon-juniper woodland are present at some sites in the project area, no vertebrate species that are characteristic of this woodland type were observed during site reconnaissance.

The following is a brief discussion of the vertebrate wildlife species that are likely to be present in the project area. This discussion is intended to address the vertebrate faunas along the project right-of-way, along alternative rights-of-way, at proposed substation sites, optic fiber communications routes, and at proposed microwave telecommunication sites.

Mammals

The mammalian fauna of the project area is dominated by small, mostly nocturnal species of rodents and bats. Some species, such as Kangaroo Rats and Pocket Mice have remarkable adaptations that facilitate their existence in a hot, arid region. Notably, they can survive on the water that is produced during metabolism of food they have eaten, and they have fur-lined cheek pouches which allow them to collect dry seeds and not lose any body moisture to the seeds. Diurnal mammals are fairly common and tend to be most active during cooler, wetter months and/or cooler portions of the daylight hours. Diurnal mammals include hares and rabbits, ground squirrels, and ungulates. Diurnal forms, although they may be seen abroad during daylight hours, may also be active after dark (e.g., Mule Deer Desert Bighorn and Coyote).

Table 1 contains an inventory of mammalian species with potential to occur in the Eldorado-Ivanpah project area. With respect to potential presence in Nevada and California, a review of literature and websites suggests that the Pocketed Free-tailed Bat, which has not been recorded in Nevada, is the only mammalian species not shared by both states.

TABLE 1
MAMMALIAN SPECIES WITH POTENTIAL TO OCCUR IN THE PROJECT AREA

Common Name	Scientific Name	Habitat	Potential
Desert Shrew	*Notiosorex crawfordi*	Moister microhabitats (brush piles, under plant debris, woodrat nests) within desertscrub.	U
California Leaf-nosed Bat	*Macrotus californicus*	Desertscrub where they are active year -round. They require warm roosts in winter as they are intolerant of cold.	L
California Myotis	*Myotis californicus*	Dry, brushy habitats up to ponderosa pine forest. Probably roost mostly in cracks and crevices in canyon walls.	U
Western Small-footed Bat	*Myotis ciliolabrum*	Prefers moister areas; oak, juniper, chaparral, and riparian areas. Roosts in crevices, cracks, loose tree bark, caves, and mine tunnels.	U
Yuma Myotis	*Myotis yumanensis*	Most commonly associated with water and most likely to occur in the project area as a rare transient.	U

TABLE 1 MAMMALIAN SPECIES WITH POTENTIAL TO OCCUR IN THE PROJECT AREA			
Common Name	**Scientific Name**	**Habitat**	**Potential**
Little Brown Bat	*Myotis lucifugus*	Most often present in pine and pine-oak at 6,000-9,000 feet elevation near water. Has been found at 1,000 feet near the Colorado River.	U
Long-legged Bat	*Myotis volans*	Mostly coniferous forest, but has been found in the desert near water. Most likely a rare transient in the project area.	U
Fringed Bat	*Myotis thysanodes*	Desertscrub to pine forest, most common in pine and pine-oak. Probably uncommon to rare in the project area.	U
Long-eared Bat	*Myotis evotis*	Occurs primarily in forested areas, and is expected to be uncommon to rare in the project area	U
Western Pipistrelle	*Pipistrellus hesperus*	Found primarily in desertscrub and arid grasslands, but usually not far from a water source, which could be a stock tank.	L
Big Brown Bat	*Eptesicus fuscus*	Mostly in mid to higher elevation forests, but does occur in lower elevation habitats. Closely associated with man.	U
Western Red Bat	*Lasiurus blossevillii*	Generally less common in deserts and usually associated with water. Presence in the project area is probably as a spring or fall transient only.	L
Hoary Bat	*Lasiurus cinereus*	Found mostly in wooded habitats in summer. They roost in trees. Likely to occur in the project area only during spring or fall migration.	L
Spotted Bat	*Euderma maculatum*	Found in desertscrub to coniferous forest. This bat is rarely caught and its habits are poorly known.	U
Townsend's Long-eared Bat	*Corynorhinus townsendii*	Desertscrub to conifer woodland and pine forest. Least common in desertscrub and probably very uncommon in the project area.	U
Pallid Bat	*Antrozous pallidus*	Primarily a desertscrub species that prefers areas with rocky outcrops.	L
Pocketed Free-tailed Bat	*Nyctinomops femorosaccus*	Primarily a desertscrub dweller that roosts in caves and crevices of canyon walls. This species has not been recorded in Nevada.	U
Big Free-tailed Bat	*Nyctinomops macrotis*	These bats prefer to roost in rugged rocky areas in desertscrub. Their known range barely includes the project area and they are likely uncommon there.	U
Brazilian Free-tailed Bat	*Tadarida brasiliensis*	Occupies desertscrub upslope into piñon-juniper woodland. This bat is famous for its roosting colonies containing millions of individuals in the southwest. Winters outside the United States.	L
Western Mastiff Bat	*Eumops perotis*	A resident of upper elevation desertscrub where it roosts in natural and man-made crevices. The project area is just barely within its known range.	U
Black-tailed Jack Rabbit	*Lepus californicus*	This species survives in some of the hottest, driest habitats in North America. In very arid areas, creosote bush forms a major portion of the diet.	O
Desert Cottontail	*Sylvilagus audubonii*	Desertscrub up to grassland and woodland. This rabbit occupies Death Valley.	L
Botta's Pocket Gopher	*Thomomys bottae*	The presence of tuberous roots and other plant material, along with soil suitable for digging, are the primary habitat requirements. From near sea level to over 11,000 feet above sea level.	L

TABLE 1 MAMMALIAN SPECIES WITH POTENTIAL TO OCCUR IN THE PROJECT AREA			
Common Name	**Scientific Name**	**Habitat**	**Potential**
Great Basin Pocket Mouse	*Perognathus parvus*	Arid and semi-arid areas, particularly where sagebrush is present. The project area is barely within the known range of this species.	U
Desert Pocket Mouse	*Chaetodipus penicillatus*	Desertscrub, primarily with mesquite and palo verde. This species is likely to be uncommon to rare in most of the project area.	U
Long-tailed Pocket Mouse	*Chaetodipus formosus*	Rocky areas in the Mojave and Colorado deserts.	L
Chisel-toothed Kangaroo Rat	*Dipodomys microps*	Primarily a Great Basin species that forages on the leaves of *Atriplex*. Species range barely includes the project area.	U
Merriam's Kangaroo Rat	*Dipodomys merriami*	An arid habitat generalist that occupies rocky, sandy, or clayey areas in desertscrub.	L
Desert Kangaroo Rat	*Dipodomys deserti*	Lives in sand dune areas with deep soils. Prefers very hot, arid areas and is present in Death Valley.	L
Western Harvest Mouse	*Reithrodontomys megalotis*	These mice occupy a wide range of habitats from near sea level to over 9,000 feet. They are more common in moister habitats, but have been observed in the same habitat occupied by Desert Kangaroo Rats.	L
Cactus Mouse	*Peromyscus eremicus*	Primarily found in desert areas with sandy soil and scattered vegetation.	L
Deer Mouse	*Peromyscus maniculatus*	Desertscrub to pine forests. The species is decidedly more common in higher elevation habitats, but is present in lowland desertscrub.	L
Canyon Mouse	*Peromyscus crinitus*	Arid shrublands of slickrock deserts, including canyon walls and cliffs. Feeds primarily on green vegetation and insects.	L
Southern Grasshopper Mouse	*Onychomys torridus*	Lowland desertscrub. This species may be able to survive on the water in its prey (beetles, grasshoppers, and scorpions).	L
Desert Wood Rat	*Neotoma lepida*	Lowland, rocky desertscrub upslope to black bush-Joshua tree and piñon-juniper.	O
Rock Squirrel	*Spermophilus variegatus*	Occurs from sea level to 8,000 feet. Prefers rocky canyons and cliffs in a variety of vegetation types.	L
Round-tailed Ground Squirrel	*Spermophilus tereticaudus*	Sandy, relatively flat desert from Death Valley up to about 3,400 feet above sea level.	L
White-tailed Antelope Squirrel	*Ammospermophilus leucurus*	Shrubby, rocky desertscrub areas with creosote bush-bursage or black bush-Joshua tree.	O
Coyote	*Canis latrans*	Ubiquitous from below sea level to near timberline. The presence of prey and water are probably the only limiting factors.	L
Gray Fox	*Urocyon cinereoargenteus*	Rocky desert canyons and hillsides up into piñon-juniper woodland. Occasionally in pine forest.	O
Kit Fox	*Vulpes macrotis*	Desertscrub and grassland. The primary habitat factor appears to be friable soils in which burrows can be constructed.	L
Ringtail Cat	*Bassariscus astutus*	Rocky canyons, hillsides, and peaks that are not heavily wooded. Absent from non-rocky desert areas.	L

TABLE 1 MAMMALIAN SPECIES WITH POTENTIAL TO OCCUR IN THE PROJECT AREA			
Common Name	**Scientific Name**	**Habitat**	**Potential**
American Badger	*Taxidea taxus*	Friable soils and presence of prey species (ground squirrels and pocket gophers primarily) seem to be the primary limiting factors for this species.	U
Western Spotted Skunk	*Spilogale putorius*	Semi-arid brushlands, rocky canyons and outcrops, riparian areas, and agricultural lands. The project area is likely too arid for this species.	U
Bobcat	*Lynx rufus*	Occupies a wide range of habitats from low deserts to high mountains. Most likely present in rocky canyons and on wooded hillsides.	L
Mountain Lion	*Puma concolor*	Rocky desert mountain ranges. They avoid open, lowland desert and are probably limited in the desert by prey availability, especially Mule Deer and Bighorn Sheep.	U
Wild Burro	*Equus asinus*	Desert hills and mountains with available forage and proximity to free water. Likely to be very uncommon in the project area.	O
Feral Horse	*Equus caballus*	Desert flats and hills with available forage and proximity to free water. Likely to be very uncommon in the project area.	U
Mule Deer	*Odocoileus hemionus*	Well vegetated washes and canyons in the desert. Likely to be uncommon in the project area.	U
Desert Bighorn Sheep	*Ovis canadensis nelsoni*	Upper elevations of rugged desert mountain ranges. Desert Bighorn are known from the McCullough Range and the vicinity of the Mountain Pass Substation.	O
Potential of Occurrence: L – Likely (moderate or better potential) U – Unlikely (low potential) O – Observed During Reconnaissance Studies			

Birds

The avifauna of the project area is composed of mainly terrestrial, non-aquatic species of songbirds, woodpeckers, hummingbirds, owls, raptors, and others (Table 2). Some species of more montane, upland habitats such as the Western Bluebird, Virginia's Warbler, Cassin's Kingbird, and Bushtit are likely to occur in the project area as transients rather than as breeding species, although they may breed very near the project area in the upper elevations of Clark Mountain where piñon-juniper woodland and a small amount of fir forest is present (Miller 1940). Of the species listed in Table 2, only the LeConte's Thrasher could be considered to be centered in, or characteristic of, the Mojave Desert; the remaining species in the table have much wider distribution and/or are more characteristic of other desert types (e.g., Cactus Wren is more typical of Sonoran Desert habitats) (Turner1994).

As was the case with mammals, most of the birds in Table 2 are shared by California and Nevada. Species known in the California portion of the project area, but not Nevada, include Western Bluebird and Virginia's Warbler, both known from Clark Mountain in California. Both of these species do breed in Nevada, but not in the project area (Floyd et al. 2007).

TABLE 2 BIRD SPECIES WITH POTENTIAL TO OCCUR IN THE PROJECT AREA				
Common Name	**Scientific Name**	**Nevada**	**California**	**Potential**
New World Vultures				
Turkey Vulture	*Cathartes aura*	B	B	O
Eagles, Hawks, and Falcons				
Northern Harrier	*Circus cyaneus*	W	W	L
Golden Eagle	*Aquila chrysaetos*	R	R	U
Sharp-shinned Hawk	*Accipiter striatus*	W	W	U
Cooper's Hawk	*Accipiter cooperii*	R	R	O
Red-tailed Hawk	*Buteo jamaicensis*	R	R	O
Ferruginous Hawk	*Buteo regalis*	W	W	U
American Kestrel	*Falco sparverius*	R	R	O
Prairie Falcon	*Falco mexicanus*	R	R	L
Merlin	*Falco columbarius*	W	W	U
Quail and Allies				
Chukar	*Alectoris chukar*	R	R	O
Gambel's Quail	*Callipepla gambelii*	R	R	O
Plovers				
Killdeer	*Charadrius vociferus*	R	R	U
Pigeons and Doves				
Mourning Dove	*Zenaida macroura*	R	R	O
Cuckoos				
Greater Roadrunner	*Geococcyx californianus*	R	R	O
Owls				
Barn Owl	*Tyto alba*	R	R	L
Great Horned Owl	*Bubo virginianus*	R	R	L
Western Screech-owl	*Megascops kennicottii*	R	R	U
Burrowing Owl	*Athene cunicularia*	B	B	L
Nighthawks and Allies				
Lesser Nighthawk	*Chordeiles acutipennis*	B	B	L
Common Poorwill	*Phalaenoptilus nuttallii*	B	R	L
Swifts and Hummingbirds				
White-throated Swift	*Aeronautes saxatalis*	R	R	U
Black-chinned Hummingbird	*Archilochus alexandri*	B	B	U
Costa's Hummingbird	*Calypte costae*	B	B	U
Woodpeckers				
Northern Flicker	*Colaptes auratus*	W	W	L
Gilded Flicker	*Colaptes chrysoides*	B	R	U
Ladder-backed Woodpecker	*Picoides scalaris*	R	R	U
Flycatchers				
Say's Phoebe	*Sayornis saya*	R	R	O
Ash-throated Flycatcher	*Myiarchus cinerascens*	B	B	O
Cassin's Kingbird	*Tyrannus vociferans*	B	T	U
Western Kingbird	*Tyrannus verticalis*	B	B	U
Shrikes				
Loggerhead Shrike	*Lanius ludovicianus*	R	R	O
Vireos				
Gray Vireo	*Vireo vicinior*	T	T	U
Crows, Ravens, and Allies				
Common Raven	*Corvus corax*	R	R	O

TABLE 2 BIRD SPECIES WITH POTENTIAL TO OCCUR IN THE PROJECT AREA				
Common Name	**Scientific Name**	**Nevada**	**California**	**Potential**
Larks				
Horned Lark	*Eremophila alpestris*	R	R	L
Swallows				
Cliff Swallow	*Petrochelidon pyrrhonota*	T	T	L
Violet-green Swallow	*Tachycineta thalassina*	T	T	O
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	T	T	L
Verdin and Bushtit				
Verdin	*Auriparus flaviceps*	R	R	L
Bushtit	*Psaltriparis minimus*	R	R	L
Wrens				
Cactus Wren	*Campylorhynchus brunneicapillus*	R	R	O
Rock Wren	*Salpinctes obsoletus*	R	R	O
Canyon Wren	*Catherpes mexicanus*	R	R	O
Kinglets and Gnatcatchers				
Ruby-crowned Kinglet	*Regulus calendula*	W	W	L
Blue-gray Gnatcatcher	*Polioptila caerulea*	B	B	U
Black-tailed Gnatcatcher	*Polioptila melanura*	R	R	L
Thrushes				
Western Bluebird	*Sialia mexicana*	----	T	U
Mockingbird and Thrashers				
Northern Mockingbird	*Mimus polyglottos*	R	R	O
Sage Thrasher	*Oreoscoptes montanus*	W	W	L
Bendire's Thrasher	*Toxostoma bendirei*	B	B	U
Le Conte's Thrasher	*Toxostoma lecontei*	R	R	L
Starlings				
European Starling	*Sturnus vulgaris*	R	R	O
Silky Flycatchers				
Phainopepla	*Phainopepla nitens*	B	B	U
Wood Warblers				
Virginia's Warbler	*Vermivora virginiae*	----	T	U
Yellow-rumped Warbler	*Dendroica coronata*	W	W	L
Black-throated Gray Warbler	*Dendroica nigrescens*	T	T	L
Tanagers				
Western Tanager	*Piranga ludoviciana*	T	T	L
Emberizid Finches				
Green-tailed Towhee	*Pipilo chlorurus*	W	W	L
Spotted Towhee	*Pipilo maculatus*	R	R	U
Brewer's Sparrow	*Spizella breweri*	T	T	O
Vesper Sparrow	*Pooecetes gramineus*	W	W	U
Black-throated Sparrow	*Amphispiza bilineata*	B	B	O
Sage Sparrow	*Amphispiza belli*	W	W	L
Savannah Sparrow	*Passerculus sandwichensis*	T	T	U
Lincoln's Sparrow	*Melospiza lincolnii*	T	T	U
White-crowned Sparrow	*Zonotrichia leucophrys*	W	W	O
Cardinals, Saltators, and Allies				
Black-headed Grosbeak	*Pheucticus melanocephalus*	T	T	L
Blue Grosbeak	*Passerina caerulea*	B	B	U
Lazuli Bunting	*Passerina amoena*	T	T	U

TABLE 2 BIRD SPECIES WITH POTENTIAL TO OCCUR IN THE PROJECT AREA				
Common Name	**Scientific Name**	**Nevada**	**California**	**Potential**
Icterids, Blackbirds and Allies				
Western Meadowlark	*Sturnella neglecta*	R	R	O
Brewer's Blackbird	*Euphagus cyanocephalus*	W	W	U
Cardueline Finches				
House Finch	*Carpodacus mexicanus*	B	B	O
American Goldfinch	*Carduelis tristis*	W	W	U
Lesser Goldfinch	*Carduelis psaltria*	T	T	U
B – Breeding R – Resident W – Wintering T – Spring/Fall Transient Potential of Occurrence: L – Likely (moderate or better potential) U – Unlikely (low potential) O – Observed During Reconnaissance Studies Sources: Cornell 2008; National Geographic Society 2002.				

Amphibians and Reptiles

The amphibian fauna of the project area is depauperate with two species potentially occurring in California and four in Nevada (Table 3). The Red-spotted Toad is likely to be present in the project area in both states as is the Bullfrog, but the latter requires a permanent water source. The Great Plains Toad and Woodhouse's Toad are not likely to be present in the California portion of the project area.

Conversely, the reptile fauna is very diverse in both states. It is estimated that the California portion of the project area hosts 15 species of lizards, 18 species of snakes, and 1 tortoise. The Nevada portion hosts 17 species of lizards, the same 18 snakes that are present in California, and the 1 tortoise that is also shared with California. Two lizards, the Sagebrush Lizard and the Ornate Tree Lizard, may be present in the Nevada portion of the project area but not the California portion.

TABLE 3 AMPHIBIAN AND REPTILE SPECIES WITH POTENTIAL TO OCCUR IN THE PROJECT AREA			
Common Name	**Scientific Name**	**Habitat**	**Potential**
CALIFORNIA			
Amphibians			
Red-spotted Toad	*Bufo punctatus*	Occurs from desertscrub up to Petran Montane Conifer Forest; creeks, washes, rocky hillsides, cattle tanks	L
Bullfrog	*Rana catesbeiana*	Highly aquatic, remaining in or near permanent water; frequents prairie, woodland, chaparral, forests, desert oases, and farmland; enters marshes, ponds, lakes, reservoirs, and streams – usually quiet water with thick growth of cattails or other aquatic vegetation	U
Tortoises			
Mojave Population Desert Tortoise	*Gopherus agassizii*	Completely terrestrial desert species requiring firm but not hard ground for construction of burrows; frequents desert oases, riverbanks, washes, and rocky slopes	O

TABLE 3 AMPHIBIAN AND REPTILE SPECIES WITH POTENTIAL TO OCCUR IN THE PROJECT AREA			
Common Name	**Scientific Name**	**Habitat**	**Potential**
		Lizards	
Desert Iguana	*Dipsosaurus dorsalis dorsalis*	Creosote bush desert to subtropical scrub, most common in sandy habitats, but also occurs along rocky streambeds, on bajadas, silty floodplains, and on clay soils	L
Common Chuckwalla	*Sauromalus ater*	Rocky habitats such as boulder piles, outcrops, and lava fields	L
Long-Nosed Leopard Lizard	*Gambelia wislizenii wislizenii*	Arid and semiarid plains grown to bunch grass, alkali bush, sagebrush, creosote bush, or other scattered low plants; ground may be hardpan, gravel, or sand	O
Great Basin Collared Lizard	*Crotaphytus bicinctores*	Typically present in rocky, hilly terrain with sparse vegetation	O
Western Zebra-tailed Lizard	*Callisaurus draconoides rhodostictus*	Frequents washes, desert pavements of small rocks, and hardpan	O
Desert Horned Lizard	*Phrynosoma platyrhinos calidiarum*	Arid lands on sandy flats, alluvial fans, along washes, and at the edges of dunes, associated with creosote bush, saltbush, greasewood, cactus, and ocotillo in the desert	O
Yellow-backed Spiny Lizard	*Sceloporus magister uniformis*	Arid and semiarid regions on plains and lower slopes of mountains, found in Joshua-tree, creosote bush, and shad-scale deserts, mesquite-yucca grassland, juniper and mesquite woodland, subtropical thornscrub, and along rivers grown to willows and cottonwoods	L
Great Basin Fence Lizard	*Sceloporus occidentalis longipes*	A variety of habitats, generally above the lowest deserts, likely present in the Clark Mountains	L
Long-tailed Brush Lizard	*Urosaurus graciosus*	Mojave Desertscrub; brushy habitats along drainages and also on valley flats	L
Side-Blotched Lizard	*Uta stansburiana*	Arid or semiarid regions with sand, rock, hardpan, or loam with grass, shrubs, and scattered trees, often found along sandy washes	O
Western Red-tailed Skink	*Eumeces gilberti rubicaudatus*	Rocky areas associated with drainages and shrubby vegetation cover from high desert to piñon-juniper woodland	U
Great Basin Whiptail	*Aspidoscelis tigris tigris*	Inhabits deserts and semiarid habitats, usually where plants are sparse; also found in woodland, streamside growth, and in the warmer, drier parts of forests	O
Yucca Night Lizard	*Xantusia vigilis*	Found in arid and semi-arid habitats beneath surface debris, including rocks, vegetation, and particularly dead parts of species of *Yucca*, particularly Joshua tree	L
Desert Banded Gecko	*Coleonyx variegatus variegatus*	Resident of desertscrub communities	L
Gila Monster	*Heloderma suspectum*	Canyon bottoms and washes in desert or desert grassland	U
		Snakes	
Western Thread Snake	*Leptotyphlops humilis*	Inhabits elevations from desertscrub up to chaparral; primarily nocturnal	U

TABLE 3 AMPHIBIAN AND REPTILE SPECIES WITH POTENTIAL TO OCCUR IN THE PROJECT AREA			
Common Name	**Scientific Name**	**Habitat**	**Potential**
Desert Glossy Snake	*Arizona elegans eburnata*	Below 6,000 feet in sparsely vegetated woodland, chaparral, grassland, or desertscrub with loose soil	L
Mojave Shovel-Nosed Snake	*Chionactis occipitalis occipitalis*	Dunes or washes in the Mojave Desert	U
Desert Nightsnake	*Hypsiglena torquata deserticola*	Inhabits desertscrub up into Petran Montane Conifer Forest; crepuscular to nocturnal	L
California Kingsnake	*Lampropeltis getula californiae*	Wide variety of habitats from deserts to forest; likely at least in the Clark Mountains	L
Red Coachwhip	*Masticophis flagellum piceus*	Sparsely vegetated areas from juniper woodland to low desert	L
Striped Whipsnake	*Masticophis taeniatus taeniatus*	Occurs in areas with ground cover consisting of dense vegetation or rock outcrops; from upper desertscrub to open pine-oak woodland elevations	L
Spotted Leaf-nosed Snake	*Phyllorhynchus decurtatus*	Open desert with finer loose soils, especially creosote bush desert	L
Great Basin Gopher Snake	*Pituophis catenifer deserticola*	Various habitats from mountain to low desert and coastal	L
Long-nosed Snake	*Rhinocheilus lecontei*	Desertscrub, prairie, tropical woodland to 5,500 feet	L
Mojave Patch-nosed Snake	*Salvadora hexalepis mojavensis*	Piñon-juniper woodland to low deserts on variety of soil types	L
Groundsnake	*Sonora semiannulata semiannulata*	Inhabit elevations from desertscrub up into woodland habitats	U
Smith's Black-headed Snake	*Tantilla hobartsmithi*	Found among rocks and brushy vegetation in canon bottoms and drainages from desert to open coniferous forest elevations	U
Sonoran Lyresnake	*Trimorphodon biscutatus lambda*	Canyons, rocky foothills, and slopes from desertscrub to Great Basin Conifer Woodland elevations	L
Western Diamondback Rattlesnake	*Crotalus atrox*	Wide range of habitats below 7,000 feet; predominantly nocturnal	L
Northern Mojave Rattlesnake	*Crotalus scutulatus scutulatus*	Desertscrub and semi-desert grassland habitats; predominantly nocturnal	L
Sidewinder	*Crotalus cerastes*	Desertscrub elevations; flat, open desert in the presence of sandy or loamy soils; predominantly in stabilized aeolian sands	U
Panamint Rattlesnake	*Crotalus stephensi*	Primarily a rock-dwelling species from creosote bush to piñon-juniper elevations	U
Sources: California Reptiles and Amphibians 2008; Stebbins 2003.			

TABLE 3 AMPHIBIAN AND REPTILE SPECIES WITH POTENTIAL TO OCCUR IN THE PROJECT AREA			
Common Name	**Scientific Name**	**Habitat**	**Potential**
NEVADA			
Amphibians			
Red-spotted Toad	*Bufo punctatus*	Occurs from desertscrub up to Petran Montane Conifer Forest; creeks, washes, rocky hillsides, cattle tanks	L
Bullfrog	*Rana catesbeiana*	Highly aquatic, remaining in or near permanent water, frequents prairie, woodland, chaparral, forests, desert oases, and farmland, enters marshes, ponds, lakes, reservoirs, and streams – usually quiet water with thick growth of cattails or other aquatic vegetation	U
Great Plains Toad	*Bufo cognatus*	Inhabits prairies or deserts, often breeding after heavy rains in summer in shallow temporary pools or quiet water of streams, marshes, irrigation ditches, and flooded fields; frequents creosote bush desert, mesquite woodland, and sagebrush plains	L
Woodhouse's Toad	*Bufo woodhousii*	Desertscrub, woodland, and agricultural habitats	U
Tortoises			
Mojave Population Desert Tortoise	*Gopherus agassizii*	Completely terrestrial desert species requiring firm but not hard ground for construction of burrows; frequents desert oases, riverbanks, washes, and rocky slopes	O
Lizards			
Desert Iguana	*Dipsosaurus dorsalis dorsalis*	Creosote bush desert to subtropical scrub, most common in sandy habitats but also occurs along rocky streambeds, on bajadas, silty floodplains, and on clay soils	L
Common Chuckwalla	*Sauromalus ater*	Rocky habitats such as boulder piles, outcrops, and lava fields	O
Long-nosed Leopard lizard	*Gambelia wislizenii*	Arid and semiarid plains grown to bunch grass, alkali bush, sagebrush, creosote bush, or other scattered low plants; ground may be hardpan, gravel, or sand	O
Great Basin Collared Lizard	*Crotaphytus bicinctores*	Typically present in rocky, hilly terrain with sparse vegetation	O
Western Zebra-tailed Lizard	*Callisaurus draconoides rhodostictus*	Frequents washes, desert pavements of small rocks, and hardpan	O
Desert Horned Lizard	*Phrynosoma platyrhinos*	Arid lands on sandy flats, alluvial fans, along washes, and at the edges of dunes; associated with creosote bush, saltbush, greasewood, cactus, and ocotillo in the desert	O
Great Basin Fence Lizard	*Sceloporus occidentalis longipes*	A variety of habitats, generally above the lowest deserts, likely present in the McCullough Mountains	L
Long-tailed Brush Lizard	*Urosaurus graciosus*	Desertscrub; brushy habitats along drainages and also on valley flats	L
Side-blotched Lizard	*Uta stansburiana*	Arid or semiarid regions with sand, rock, hardpan, or loam, with grass, shrubs, and scattered trees, often found along sandy washes	O
Western Red-tailed Skink	*Eumeces gilberti rubicaudatus*	Rocky areas associated with drainages and shrubby vegetation cover from high desert to piñon-juniper woodland	U

TABLE 3 AMPHIBIAN AND REPTILE SPECIES WITH POTENTIAL TO OCCUR IN THE PROJECT AREA			
Common Name	**Scientific Name**	**Habitat**	**Potential**
Great Basin Whiptail	*Aspidoscelis tigris tigris*	Inhabits deserts and semiarid habitats, usually where plants are sparse; also found in woodland, streamside growth, and in the warmer, drier parts of forests	O
Yucca Night Lizard	*Xantusia vigilis*	Found in arid and semi-arid habitats beneath surface debris, including rocks, vegetation, and particularly dead parts of species of *Yucca*, particularly Joshua tree	L
Desert Banded Gecko	*Coleonyx variegatus variegatus*	Resident of desertscrub communities	L
Gila Monster	*Heloderma suspectum*	Canyon bottoms and washes in desert or desert grassland	U
Yellow-backed Spiny Lizard	*Sceloporus magister uniformis*	Arid and semiarid regions on plains and lower slopes of mountains, found in Joshua-tree, creosote bush, and shad-scale deserts, mesquite-yucca grassland, juniper and mesquite woodland, subtropical thornscrub, and along rivers grown to willows and cottonwoods	L
Sagebrush Lizard	*Sceloporus graciosus*	Brushy habitats; possibly in the McCullough Range	U
Ornate Tree Lizard	*Urosaurus ornatus*	Frequents mesquite, oak, pine, juniper, alder, cottonwood, and non-native trees such as tamarisk and rough-bark eucalyptus, but also may occur in treeless areas, especially attracted to river courses	L
Snakes			
Western Thread Snake	*Leptotyphlops humilis*	Inhabits elevations from desertscrub up to chaparral; primarily nocturnal	U
Desert Glossy Snake	*Arizona elegans eburnata*	Below 6,000 feet in sparsely vegetated woodland, chaparral, grassland, or desertscrub with loose soil	L
Mojave Shovel-nosed Snake	*Chionactis occipitalis occipitalis*	Dunes or washes in the Mojave Desert	U
Nightsnake	*Hypsiglena torquata*	Inhabits desertscrub up into Petran Montane Conifer Forest; crepuscular to nocturnal	L
California Kingsnake	*Lampropeltis getula californiae*	Wide variety of habitats from deserts to forest; likely at least in the McCullough Range	L
Red Coachwhip	*Masticophis flagellum piceus*	Sparsely vegetated areas from juniper woodland to low desert	L
Striped Whipsnake	*Masticophis taeniatus taeniatus*	Occurs in areas with ground cover consisting of dense vegetation or rock outcrops; from upper desertscrub to open pine-oak woodland elevations	L
Spotted Leaf-nosed Snake	*Phyllorhynchus decurtatus*	Open desert with finer loose soils, especially creosote bush desert	L
Great Basin Gopher Snake	*Pituophis catenifer deserticola*	Various habitats from mountain to low desert and coastal	L
Long-nosed Snake	*Rhinocheilus lecontei*	Desertscrub, prairie, tropical woodland to 5,500 feet	L

TABLE 3 AMPHIBIAN AND REPTILE SPECIES WITH POTENTIAL TO OCCUR IN THE PROJECT AREA			
Common Name	**Scientific Name**	**Habitat**	**Potential**
Mojave Patch-nosed Snake	*Salvadora hexalepis mojavensis*	Piñon-juniper woodland to low deserts on variety of soil types	L
Groundsnake	*Sonora semiannulata semiannulata*	Inhabit elevations from desertscrub up into woodland habitats	U
Smith's Black-headed Snake	*Tantilla hobartsmithi*	Found among rocks and brushy vegetation in canon bottoms and drainages from desert to open coniferous forest elevations	U
Sonoran Lyresnake	*Trimorphodon biscutatus lambda*	Canyons, rocky foothills, and slopes from desertscrub to Great Basin Conifer Woodland elevations	L
Western Diamondback Rattlesnake	*Crotalus atrox*	Wide range of habitats below 7,000 feet; predominantly nocturnal	L
Northern Mojave Rattlesnake	*Crotalus scutulatus scutulatus*	Desertscrub and semi-desert grassland habitats; predominantly nocturnal	L
Sidewinder	*Crotalus cerastes*	Desertscrub elevations; flat, open desert in the presence of sandy or loamy soils; predominantly in stabilized aeolian sands	U
Panamint Rattlesnake	*Crotalus stephensi*	Primarily a rock-dwelling species from creosote bush to piñon-juniper elevations	U
Sources: Stebbins 2003 Potential of Occurrence: L – Likely (moderate or better potential) U – Unlikely (low potential) O – Observed During Reconnaissance Studies			

SPECIAL STATUS SPECIES

Some species of plants and animals are accorded special status by state and federal agencies largely because they are either scarce on a regional level, facing clearly defined threats, or in a position within the regional landscape to potentially become scarce. Special status species at the federal level include those listed as threatened or endangered under the ESA. BLM-designated sensitive species are designated by the BLM State Director's Office. Still other species are tracked by state heritage programs and assigned different levels of concern based on rarity and perceived level of threat.

In California, plant and animal taxa are tracked and monitored by the California Department of Fish and Game (CDFG) via their CNDDB. The State of California through the Fish and Game Code may also formally designate plants and animals as state-listed threatened or endangered. The CDFG also maintains a list of fully protected species which may not be taken or possessed at any time, and permits are required for scientific collecting and/or relocation (for the protection of livestock).

In the State of Nevada, at-risk taxa are tracked through the NNHP within the Department of Conservation and Natural Resources. The NNHP also assigns rank indicators to plant and animal species based on rarity and perceived level of threat. The State of Nevada can also fully protect wildlife species through the stipulations of Nevada Revised Statute (NRS) 501. The State of Nevada also protects "critically endangered" plant species as well as cacti and yuccas under NRS 527.

Special status species with the greatest probability of occurrence within the California and Nevada portions of the project area are listed in Tables 4 and 5. The California list was derived from an online search of the CNDDB coupled with additional review of published literature. Similarly, the Nevada list was derived from an online review of the NNHP listing of special status species in Clark County.

The narrative following the tables addresses those species that are either federal or state listed, or BLM sensitive species with highest degree of rarity and threat, and sensitive species that were identified by the BLM as being of special concern within the general project area. Species considered to have a low potential for occurrence (U = unlikely in Tables 4 and 5) are not discussed.

Sensitive Species – California Segment

American Badger

The American Badger (*Taxidea taxus*) is a BLM sensitive species in California, and does not have a CNDDB threat ranking as it is considered secure.

The American Badger (*Taxidea taxus*) is frequently found on the flats and alluvial fans next to desert mountains (Hoffmeister 1986). They occupy a diversity of habitats in California, particularly with the following elements: sufficient food, friable soils, and relatively open uncultivated land. Their diet consists primarily of burrowing rodents such as Pocket Gophers (*Thomomys* spp.), Ground Squirrels (*Spermophilus* spp.), Marmots (*Marmota* spp.), and Kangaroo Rats (*Dipodomys* spp.). They will also eat mice, woodrats (*Neotoma* spp.), reptiles, birds and their eggs, and bees and other insects (CDFG 1986).

Badger populations have declined drastically in California. They do not survive on cultivated land. Urban and agricultural development has probably had the greatest detrimental effect on badgers. They were also targets of deliberate killing for many years, and have suffered from rodent and predator poisoning (CDFG 1986).

No badgers or their burrows were observed during any of the project surveys or reconnaissance efforts for this project, but a badger was observed during field surveys for the Ivanpah Solar Electric Generating System in 2007 (California Energy Commission [CEC] 2008), so the species is confirmed in the immediate project area. They are more likely to occur on upper portions of bajadas where greater plant species diversity and cover provides better habitat for prey species.

Desert Bighorn Sheep

The subspecies of Desert Bighorn Sheep, *Ovis canadensis nelsoni*, that is present in the project area has no status except that the State of California affords it a ranking of S3 (21-100 element occurrences OR 3,000 – 10,000 individuals, or 2,000 – 10,000 acres of habitat), and the BLM considers it a sensitive species. Nelson's Bighorn Sheep is classified by the CDFG as a Big Game mammal, and annual hunting seasons allow for a very limited take of this species. The Clark Mountains and the entire California portion of the project right-of-way are in the CDFG Zone 3 for Desert Bighorn Sheep hunting.

Desert Bighorn are creatures of rugged, open mountainous terrain where adequate forage, water, and escape terrain are available. Bighorn, especially rams, will move between mountain ranges provided the distance of flat open desert to be crossed is not great or their route between ranges is not bisected by intense human activity (e.g., freeways). Ewes generally tend to be more sedentary and long movements by ewes between mountain ranges are unusual.

Within the project area in California, Nelson's Bighorn is likely confined to the rugged, upland topography associated with the Clark Mountain Range. Predation of Bighorn Sheep in the Kingston, Clark, and Granite mountains in California by Mountain Lion (*Felis concolor*), in recent years, has depressed Bighorn populations in these areas (Wehausen, J.D. 2006).

Wild Burros

Wild Burros (*Equus asinus*) receive protection under the 1971 federal Wild Free-Roaming Horses and Burros Act (16 USC 1331-1340). The act protects wild horses and burros within designated allotments on lands administered by the United States Forest Service and the BLM. The rationale is to maintain populations of these animals in ecological balance within the designated areas. The species is not listed as threatened or endangered by the USFWS (ESA) or the State of California. The California Fish and Game Code (No. 4600) provides additional protection for these animals (MacDonald 2006). The genus *Equus* evolved in North America contemporaneously with grassland habitats and only later expanded to South America and Europe.

As of 2006 there were only three remaining Wild Burro herds in California, none of which are considered genetically viable populations. The combined California populations consist of approximately 345 animals (MacDonald 2006). Wild burros are present on the California portion of this project. Recent burro scat was observed on the west edge of Ivanpah Lake during the August 2008 site visit.

TABLE 4 SPECIAL STATUS SPECIES OF WILDLIFE AND PLANTS WITH POTENTIAL TO OCCUR IN THE CALIFORNIA PORTION OF THE PROJECT AREA				
Common Name	**Scientific Name**	**Habitat**	**Status**	**Potential**
WILDLIFE				
Townsend's Big-eared Bat	*Plecotus townsendii*	Mines, caves, and buildings in Mojave desertscrub	BLM, S2, S3	U
Hoary Bat	*Lasiurus cinereus*	Areas with trees in Mojave desertscrub and piñon-juniper	S4?	U
Ringtail	*Bassariscus astutus*	Rocky and brushy terrain in foothills and desert; use mines	FPS	U
American Badger	*Taxidea taxus*	Mojave desertscrub	BLM, S4	L
Desert Bighorn Sheep	*Ovis canadensis nelsoni*	Steep mountainous terrain	BLM, S3	L
Golden Eagle	*Aquila chrysaetos*	Open country	FPS	L
Western Burrowing Owl	*Athene cunicularia hypugaea*	Flat, open areas at low elevations; often associated with agricultural areas	BLM, S2	L
Gray Vireo	*Vireo vicinior*	Piñon-juniper	BLM, S2	L
Bendire's Thrasher	*Toxostoma bendirei*	Dense brushlands within Mojave desertscrub	BLM, S3	U
Crissal Thrasher	*Toxostoma crissale*	Mojave desertscrub	S3	U
Le Conte's Thrasher	*Toxostoma lecontei*	Sparsely vegetated desert	BLM‡	L
Virginia's Warbler	*Vermivora virginiae*	Chaparral and other brushy habitats at mid to higher elevations	S2, S3	U
Hepatic Tanager	*Piranga flava*	Forested areas	S1	U
Summer Tanager	*Piranga rubra*	Pine – oak woodland	S2	U
Gray-headed Junco	*Junco hyemalis (caniceps* group)	Mixed woodland, may occur in piñon-juniper habitat	S1	U
Desert Tortoise	*Gopherus agassizii*	Mojave desertscrub	FT, ST, S2	L
Gila Monster	*Heloderma suspectum*	Mojave desertscrub	BLM‡, S4	L
Kokoweef Crystal Cave Harvestman	*Texella kokoweef*	Kokoweef Cave endemic species	S1	U
PLANTS				
Mormon needle grass	*Achnatherum aridum*	Outcrops in shrub-steppe, piñon-juniper and Joshua tree habitats	S2.2	L
Small-flowered androstephium	*Androstephium breviflorum*	Mojave desertscrub	S1.3	O
White bearpoppy	*Arctomecon merriamii*	Mojave desertscrub	S2.2	L
Desert Ageratina	*Ageratina herbacea*	Rocky, piñon-juniper; New York and Clark mountains	S2.3	U
Mojave milkweed	*Asclepias nyctaginifolia*	Arroyos and dry slopes in Mojave desertscrub	S2	O
Cima milkvetch	*Astragalus cimae* var. *cimae*	Calcareous soils in piñon-juniper and Joshua tree habitats	S2.2	U
Scaly cloak fern	*Astrolepis cochisensis cochisensis*	Piñon-juniper and Joshua tree habitats	S2.3	L

TABLE 4 SPECIAL STATUS SPECIES OF WILDLIFE AND PLANTS WITH POTENTIAL TO OCCUR IN THE CALIFORNIA PORTION OF THE PROJECT AREA				
Common Name	**Scientific Name**	**Habitat**	**Status**	**Potential**
Black grama	*Bouteloua eriopoda*	Dry, open, sandy to rocky slopes, flats, washes, scrub, woodland.	S3.2	O
Gilman's Cymopterus	*Cymopterus gilmanii*	Limestone or gypseous soils at 1,000 to 2,000 meters	S2.2	L
Utah vine milkweed	*Cynanchum utahense*	Sandy to gravelly soils in Mojave Desertscrub at 150-1,420 meters	BLM, S3.3	O
Howe's hedgehog cactus	*Echinocereus engelmannii* var. *howei*	Mojave desertscrub	BLM‡	U
Desert pincushion	*Escobaria vivipara* var. *deserti**	Limestone soils 1,000 to 2,400 meters	S2.2	†
Viviparous foxtail cactus	*Escobaria vivipara* var. *rosea***	Sandy to rocky soils	S1, S2	†
Nine-awned pappus grass	*Enneapogon desvauxi*	Rocky slopes or in crevices on calcareous soils in desert woodland; piñon-juniper at 1,275 to 1,825 meters	S2?	O
Limestone daisy	*Erigeron uncialis* var. *uncialis*	Limestone crevices between 2,100 and 2,900 meters	S2.2	U
Clark Mountain spurge	*Euphorbia exstipulata* var. *exstipulata*	Rocky slopes at 1,800 to 2,000 meters; only in the Clark Mountains	S1.3	U
Hairy Erioneuron	*Erioneuron pilosum*	Rocky slopes in piñon-juniper woodland	S2, S3	U
California barrel cactus	*Ferocactus cylindraceus*	Gravelly or rocky hillsides, canyons, and alluvial fans	BLM‡	O
Wright's bedstraw	*Galium wrightii*	Rocky habitat in shady canyons; piñon-juniper; Clark Mountains	S1.2	U
Pungent glossopetalon	*Glossopetalon pungens*	Limestone cliffs from chaparral to piñon-juniper; only in the Clark Mountains	BLM, S1.3	U
Parish club cholla	*Grusonia parishii*	Joshua tree habitat, this plant is present on the proposed Ivanpah Substation site	S2.3	O
Hairy-podded fine-leaf Hymenopappus	*Hymenopappus filifolius* var. *eriopodus*	Limestone soils in piñon-juniper habitat in the New York and Clark mountains	S1.3	L
Jaeger's ivesia	*Ivesia jaegeri*	Limestone crevices at 2,100 to 3,600 meters in the Clark Mountains	BLM, S1.3	U
Knotted rush	*Juncus nodosus*	Stream banks, lake shores, marshes, and swamps	S2.3	U
Hillside wheat grass	*Leymus salinus mojavensis*	Hillsides in desert mountains between 1,350 and 2,000 meters; pinyon-juniper	S1.3	L
Plains flax	*Linum puberulum*	Dry ridges of desert mountains at 1,000 to 2,500 meters	S2.3	L
Rough Menodora	*Menodora scabra*	Rocky soils of canyons in the New York and Clark Mountains	S2.3	L

TABLE 4 SPECIAL STATUS SPECIES OF WILDLIFE AND PLANTS WITH POTENTIAL TO OCCUR IN THE CALIFORNIA PORTION OF THE PROJECT AREA				
Common Name	**Scientific Name**	**Habitat**	**Status**	**Potential**
Polished blazing star	*Mentzelia polita*	Limestone or gypseous soils between 1,200 and 1,500 meters in the Clark Mountains; associated with *Ephedra nevadensis* and *Rhus* spp.	S1.2	L
Red four o'clock	*Mirabilis coccinea*	Dry, rocky slopes and washes; piñon-juniper habitat	S2.3	L
Tough muhly	*Muhlenbergia arsenei*	Limestone rock outcrops and slopes; Clark Mountains	S1, S2	L
False buffalo grass	*Munroa squarrosa*	Open, gravelly, or rocky places from 1,500 to 1,800 meters; Clark Mountains	S1, S2	U
Beavertail pricklypear	*Opuntia basilaris* var. *brachyclada*	Occurs in chaparral habitats	BLM‡	U
Curved-spine beavertail	*Opuntia curvospina*	Mojave desertscrub	S1.2	L
Spiny cliffbrake	*Pellaea truncata*	Granitic or igneous outcrops from 1,200 to 1,900 meters; piñon-juniper habitat in the New York mountains	S2	L
Rosy two-toned beardtongue	*Penstemon bicolor* ssp. *roseus*	Mojave desertscrub	S1.3	L
Stephens' penstemon	*Penstemon stephensii*	Mojave desertscrub or piñon-juniper woodland	BLM‡	L
Thompson's beardtongue	*Penstemon thompsoniae*	Piñon-juniper habitat on white calcareous soils; New York and Clark Mountains	S1.3	U
Aven Nelson's phacelia	*Phacelia anelsonii*	Sandy or gravelly soils in creosote bush, piñon-juniper, or Joshua tree habitats from 1,200 to 1,500 meters	S2.3?	O
Barneby's phacelia	*Phacelia barnebyana*	On limestone talus in the Clark Mountains between 1,600 and 2,700 meters	S2.3	L
Sky-blue phacelia	*Phacelia coerulea*	Open, sandy to rocky areas in Mojave desertscrub and piñon-juniper habitats from 1,400 to 2,000 meters	S2.3	O
Jaeger's phacelia	*Phacelia perityloides* var. *jaegeri*	Crevices on cliffs and rocky, often calcareous slopes from 1,900 to 2,300 meters in the Clark Mountains	S1.3	U
Chamber's physaria	*Physaria chambersii*	Limestone soils in piñon-juniper habitat from 1,500 to 2,500 meters in the Clark Mountains	S2.3	L
Small-flowered rice grass	*Piptatherum micranthum*	Gravel benches or rocky slopes from 700 to 2,950 meters	S2, S3	U
New Mexico locust	*Robinia neomexicana*	Canyons below 1,500 meters in piñon-juniper habitat in the Mid Hills	S1.3	U
Abert's sanvitalia	*Sanvitalia aberti*	Dry slopes at about 1,800 meters; New York and Clark Mountains	S1, S2	L
Many-flowered schkuhria	*Schkuhria multiflora* var. *multiflora*	Dry, sandy soils of Mojave desertscrub from 1,500 to 1,700 meters	S1.3	U

TABLE 4 SPECIAL STATUS SPECIES OF WILDLIFE AND PLANTS WITH POTENTIAL TO OCCUR IN THE CALIFORNIA PORTION OF THE PROJECT AREA				
Common Name	**Scientific Name**	**Habitat**	**Status**	**Potential**
Johnson's beehive cactus	*Sclerocactus johnsonii*	Creosote bush habitat on granitic soils from 500 to 1,200 meters	S1.3	U
Rusby's desert mallow	*Sphaeralcea rusbyi* var. *eremicola*	Mojave desertscrub and Joshua tree habitats from 1,300 to 1,500 meters; Clark Mountains	BLM, S1.3	L

Status:
FT = Federally listed as Threatened (ESA)
BLM = Bureau of Land Management sensitive species; BLM? – not on BLM list of sensitive plants
FPS = State of California Fully Protected Species
ST = California listed Threatened

CNDDB State Ranking:
- S1 = Less than 6 Eos, OR less than 1,000 individuals, Or less than 2,000 acres
  - S1.1 = very threatened S1.2 = threatened S1.3 = no current threats known
- S2 = 6-20 Eos, OR 1,000-3,000 individuals, OR 2,000-10,000 acres
  - S2.1 = very threatened S2.2 = threatened S2.3 = no current threats known
- S3 = 21-100 Eos, OR 3,000-10,000 individuals, OR 10,000-50,000 acres
  - S3.1 = very threatened S3.2 = threatened S3.3 = no current threats known
- S4 = Apparently secure within California. NO THREAT RANK
- S5 = Demonstrably secure to ineradicable in California. NO THREAT RANK

Potential of Occurrence: L – Likely (moderate or better potential) U – Unlikely (low potential) O – Observed During Reconnaissance Studies

References: Benson, L. 1982; CDFG 2003; Jepson 2008.

*Formerly *Coryphantha chlorantha.*
** Formerly *Coryphantha vivipara* var. r*osea*
† Individuals of a species of *Escobaria* (*Coryphantha*) were located; species determination will require presence of flowers.
‡ BLM sensitive species not listed in the CNDDB database.

TABLE 5 SPECIAL STATUS SPECIES WITH POTENTIAL TO OCCUR IN THE NEVADA PORTION OF THE PROJECT AREA				
Common Name	**Scientific Name**	**Habitat**	**Status**	**Potential**
WILDLIFE-MAMMALS				
California Leaf-nosed Bat	*Macrotus californicus*	Desertscrub, warm roost sites required in winter	BLM, ART	L
California Myotis	*Myotis californicus*	Dry, brushy habitats, roosts in cracks and crevices	BLM, ART	L
Small-footed Myotis	*Myotis ciliolabrum*	Moister areas; oak, juniper, chaparral, and riparian areas	BLM, ART	U
Little Brown Bat	*Myotis lucifugus*	Mostly pine and pine-oak, has occurred at 1,000 feet near the Colorado River	BLM, ART	U
Fringed Myotis	*Myotis thysanodes*	Desertscrub to pine forest, most common in pine forest	BLM, ART	U
Cave Myotis	*Myotis velifer*	Caves, mines, buildings, bridges, usually near water	BLM, ART	U
Townsend's Big-eared Bat	*Plecotus townsendii*	Mines, caves, and buildings in Mojave desertscrub	BLM, ART	L
Spotted Bat	*Euderma maculatum*	Low desert to coniferous forest, rocky cliffs near water	BLM, 501	U
Big Free-tailed Bat	*Nyctinomops macrotis*	Rugged, rocky areas in desertscrub	BLM, ART	L
Desert Bighorn Sheep	*Ovis canadensis nelsoni*	Rugged, mountainous terrain, known to be present in the McCullough Range	BLM	O
WILDLIFE-BIRDS				
Western Burrowing Owl	*Athene cunicularia hypugaea*	Flat, open, sparsely vegetated land with animal burrows	BLM, 501	L
Peregrine Falcon	*Falco peregrinus*	Cliffs with large gulfs of open air	BLM, 501	U
Prairie Falcon	*Falco mexicanus*	Cliffs and deep canyons	BLM	L
Phainopepla	*Phainopepla nitens*	Mesquite thickets along washes	BLM, 501	O
Loggerhead Shrike	*Lanius ludovicianus*	Open desertscub and in denser vegetation along washes	BLM	L
WILDLIFE-REPTILES				
Desert Tortoise	*Gopherus agassizii*	Mojave desertscrub, especially on lowland flats	FT, 501	O
Chuckwalla	*Sauromalus ater*	Rocky outcrops in Mojave Desertscrub	BLM	O
Gila Monster	*Heloderma suspectum*	Mojave desertscrub	BLM, 501	L
PLANTS				
White bearpoppy	*Arctomecon merriamii*	Creosote bush scrub, limestone outcrops, and dry lake beds	BLM, W	L
Scrub lotus	*Lotus argyraeus* var. *multicaulis*	Piñon-juniper woodland, uncommon	BLM, W	U
Rosy two-toned beardtongue	*Penstemon bicolor* ssp. *roseus*	Rocky, calcareous soils in washes, on roadsides, or in scree at the base of outcrops – creosote bush or black bush desertscrub	BLM, ART	O
White-margined beardtongue	*Penstemon albomarginatus*	Sand dunes and/or deep, sandy soils	BLM, ART	O

TABLE 5
SPECIAL STATUS SPECIES WITH POTENTIAL TO OCCUR IN THE NEVADA PORTION OF THE PROJECT AREA

Common Name	Scientific Name	Habitat	Status	Potential

Status Codes:

FT – Federally listed as threatened
BLM – BLM sensitive species
ST – Listed by the State of Nevada as threatened
W – Nevada Native Plant Society Watch List species; potentially vulnerable to becoming threatened or endangered
ART – NNHP At Risk Taxa
501 – Protected under NRS 501

* Species detected during rare plant and/or reconnaissance surveys in spring 2008

Potential of Occurrence: L – Likely (moderate or better potential) U – Unlikely (low potential) O – Observed During Reconnaissance Studies

Golden Eagle

The Golden Eagle is relatively common in the western United States and can be found in a variety of habitats, but prefers open ground or low hills where visibility is good for hunting (Ehrlich et al. 1988; Glinski 1998). They nest on cliffs, large or small trees, and sometimes telephone poles (Glinski 1998). The Golden Eagle feeds primarily on mammals, preferring rabbits (*Lepus* spp.) and ground squirrels, but also will feed on snakes, birds, and large insects when mammals are unavailable (Ehrlich et al. 1988; Glinski 1998; Terres 1980).

Suitable nesting habitat for the Golden Eagle is present in the Clark Mountains, but primarily in rockier areas at higher elevations, and not within the project corridor. There is also potential for Golden Eagles nesting in the upper elevations of the McCullough Mountains, and there is a probable nesting record for the Highland Range (Floyd et al 2007), which is east of the Eldorado-Lugo 500kV alignment that is proposed for use to support the fiber optic telecommunications line. The lands through which the project passes are quite open, and provide suitable hunting habitat for the Golden Eagle. The Golden Eagle was recorded near the Ivanpah Substation site during biological surveys for the Ivanpah Solar Electric Generating System (ISEGS) site in 2008 (CEC 2008), and is thus known to be present in the area.

Western Burrowing Owl

The Western Burrowing Owl (*Athene cunicularia hypugaea*) is considered a sensitive species by the BLM in California, and the species has a CNDDB ranking of S2. These small owls use a variety of habitat types, including shortgrass prairie, open scrublands of mesquite (*Prosopis* spp.), creosote bush, or rabbit-brush (*Chrysothamnus* spp.), agricultural fields, airports, and golf courses (Terres 1980, Ehrlich et al. 1988, Dechant et al. 1999). In desert areas, habitat is typically treeless, open, and relatively level. Burrowing Owls often select burrows where surrounding vegetation is kept short by grazing, dry conditions, or burning (Hjertaas et al. 1995; Dechant et al. 1999). The Burrowing Owl is unique among North American owls in that they nest in burrows in the ground. They are semi-colonial and usually occupy burrows excavated by small mammals, often at the edges of active colonies of Prairie Dogs (*Cynomys* spp.) or Ground Squirrels. They may also use natural cavities in rocks and openings in man-made structures.

The project is within the greater limits of the known range of the Burrowing Owl, and is within the historic and current breeding ranges of the species (Shufford and Gardali 2008). A review of current information shows almost no recent breeding records in the eastern portion of the Mojave Desert that includes the project area (CDFG 2003; Institute for Bird Populations 2008; State of California 2008; Bates 2006). However, while no Burrowing Owls have as yet been observed within the limits of the California portion of the project, they were observed on the adjacent proposed ISEGS site in 2008 (CEC 2008). The ISEGS site is proximal to the proposed Ivanpah Substation site, thus the owls are documented in the immediate area.

Gray Vireo

The Gray Vireo is considered to be a sensitive species by the BLM in California, and has a CNDDB ranking of S2. The gray vireo is found in a variety of habitats from desertscrub up into piñon-juniper and oak juniper associations where it forages for insects among low vegetation. The gray vireo prefers dry slopes, and is unique among vireos in this respect (Terres 1980). The Gray Vireo may occur in the vicinity of the Mountain Pass Substation during the summer breeding season.

LeConte's Thrasher

LeConte's Thrasher (*Toxostoma lecontei*) is considered a sensitive species by the BLM in California. LeConte's Thrasher is very sparsely distributed in southern California, western Arizona, southern Nevada, and extreme southwestern Utah (Schram 1998). It is generally restricted to the lowest, hottest, and most barren desert plains, particularly in saltbush and creosote bush habitats (Terres 1980). LeConte's Thrashers feed primarily on large insects and other terrestrial invertebrates, and they occasionally eat lizards, other vertebrates, seeds, or fruit (Dobkin and Granholm 2005; Ehrlich et al. 1988). Populations of this species are very sparse, with densities in optimum habitat of five pairs or fewer per square mile (Remsen 1978). This species is very secretive and sensitive to human disturbance. Specific threats include off-highway vehicle (OHV) activity and clearing of shrubs for agriculture or other development (Dobkin and Granholm 2005).

LeConte's Thrashers are very likely to occur within the project area, mostly on lower portions of the bajada on the east side of the Clark Mountains where vegetation is sparse and where chollas provide suitable nesting sites.

Raptor Nests

There is a general lack of natural potential roosting habitat for raptors along most of the California portion of the project. There is some potential nesting habitat in the Clark Mountains near the Mountain Pass Substation where there are rocky cliffs and a few piñon pine. Electrical transmission line lattice towers probably provide most of the potential raptor nesting habitat in the area. A single raptor nest was observed being constructed by a pair of Red-tailed Hawks (*Buteo jamaicensis*) in a lattice tower in the east foothills of the Clark Mountains in April of 2008. No other stick nests were observed. Stick nests in lattice towers are often re-occupied or modified and re-used intermittently by raptors and corvids returning to an area annually. The nests are generally persistent in the towers for years. An apparent lack of stick nests in lattice structures along the existing transmission line may reflect depressed raptor populations in the area. A pre-construction survey for raptor/corvid nests in the existing lattice towers should be performed prior to initiation of construction.

Migratory Bird Treaty Act

The federal Migratory Bird Treaty Act (MBTA) of 1918 (16 USC 703-712) provides protection for a majority of bird species occurring in the United States. The major goal of the MBTA as it was originally conceived was to put an end to the commercial trade in birds and their feathers that, by the early years of the twentieth century, had wreaked havoc on the populations of many native bird species (USFWS 2002). The MBTA makes it unlawful to pursue, hunt, take, capture, kill, or sell birds listed under the Act. The statute does not discriminate between live or dead birds and also grants full protection to any bird parts, including feathers, eggs, and nests.

There have been several amendments to the original law (including the Migratory Bird Treaty Reform Act of 1998) and currently, penalties include a fine of not more than $15,000 or imprisonment of not more than 2 years for misdemeanor violations of the Act. The 1998 Act also amended the law to make it unlawful to take migratory game birds by the aid of bait if the person knows or reasonably should know that the area is baited. Violations of the 1998 baiting amendment are punishable under title 18 United States Code (with fines up to $100,000 for individuals and $200,000 for organizations), with imprisonment for not more than 1 year, or both.

The majority of bird species that occur in the United States as either residents or migratory species are covered by the MBTA. Common species that are not protected include the Rock Dove (*Columba livia*), the European Starling (*Sturnus vulgaris*), the House Sparrow (*Passer domesticus*), and gallinaceous bird species of the family Phasianidae. The Phasianidae includes species of grouse, turkey, and ptarmigan, most of which are managed as game animals (USFWS 2005). The MBTA protects individual birds, their nests, eggs, and parts. The principal potential impacts that might result in violation of this law are associated with activities that would destroy nests, eggs, and young birds during the nesting season. In the project area the avian nesting season for most species is from late February to early July.

Given the higher elevation and greater diversity (species and structure) in the plant community in the Mountain Pass area and on the southern portion of the Eldorado-Lugo 500kV, it may be that these areas are utilized more by transient, summer visitor, and permanent resident birds than lower elevation areas. Indeed, Clark Mountain has been identified as a rather unique situation in its upper elevations due to populations of more montane species, including Flammulated Owl (*Otus flammeolus*), Broad-tailed Hummingbird (*Selasphorus platycercus*), Hairy Woodpecker (*Picoides villosus*), Mountain Chickadee (*Poecile gambeli*), Hermit Thrush (*Catharus guttatus*), and Western Bluebird (*Sialia Mexicana*) (Miller 1940). With this information in hand, close attention will be paid to the avian community and any future impacts the project may have in these areas.

Pre-construction surveys for nesting birds should be conducted to preclude violation of the MBTA. Active nests may be avoided until the young have fledged or eggs and/or young may be moved by a licensed rehabilitation contractor. Performing vegetation clearing and other ground disturbing activities outside of the avian nesting season will minimize the potential for impacts to birds and violation of the MBTA.

Mojave Population Desert Tortoise

The Mojave population of the Desert Tortoise is federally listed as a Threatened species (Federal Register 1990), and a recovery plan was prepared in 1994 (USFWS 1994). A draft revised recovery plan was released in 2008 by the USFWS (USFWS 2008). The revision redraws most of the Recovery Unit boundaries, but the draft includes no proposed changes to the limits of designated Critical Habitat for the species. The State of California also lists the Mojave population of the Desert Tortoise as threatened (CDFG 2008). The CNDDB ranking for the Desert Tortoise is S2.

The Mojave population of the Desert Tortoise is found primarily in Mojave desertscrub, but it also occurs in the Lower Colorado River Subdivision of Sonoran desertscrub in southeastern California. They are generally associated with communities dominated by creosote bush (*Larrea tridentata*), with other sclerophyllous shrubs and small cacti present (Arizona Game and Fish Department [AZGFD] 2001). Some parts of their habitat may contain abundant Joshua trees. The Mojave Desert Tortoise prefers sandy loam or rocky soils in valleys, bajadas, and hills (AZGFD 2001). They may be found at elevations below sea level in Death Valley, California, and up to about 1,500 meters (4,922 feet) at Yucca Mountain, Nevada (Arizona Game and Fish Department 2001). Desert Tortoises are facing numerous threats to their survival. Livestock grazing, recreational OHV use, military training activities, urban development, and increases in predation are some of the factors that affect tortoise survival (Lovich 2003). Additional threats are takes of tortoises for commercial sale as pets, from vandalism (shooting, crushing, or mutilation), and for food (USFWS 1994).

The entire project area is within the range of the species, and most of the area provides some suitable habitat for tortoises. The California segment of the proposed project alignment does not pass through any federally designated (ESA) Critical Habitat for the Desert Tortoise. However, placement of the fiber optic telecommunications cable associated with the Nipton 33kV distribution line east of I-15 is wholly within Desert Tortoise Critical Habitat in the Ivanpah Recovery Unit. The length of this segment is approximately 13 miles. Placement of the telecommunications cable will involve minimal disturbance to this area. Installation of the line on the east to west portion of the line (10.5 miles) will be on existing wooden poles. Some pole replacement may be required if poles are not structurally sound. Except for a wire pulling station(s), installation can be accomplished primarily using pedestrian access. New poles will be required along the existing Nipton Moore Road, parallel with the Union Pacific Railroad (UPRR) tracks, to connect the Nipton line with the existing 500kV transmission line, approximately 2.5 miles south of Nipton.

A project protocol level survey for the Desert Tortoise was performed by Karl and Associates in May of 2008 for the main portions of the transmission line route. The project alternative routes will be surveyed in the spring of 2009, after the alternative corridors are more precisely defined. The 2008 Desert Tortoise survey results will be presented as a stand-alone report.

Gila Monster

The Gila Monster has no federal status under the ESA; it is a BLM sensitive species in California and is accorded a State of California Rank of S4 (Apparently Secure in California, no threat rank). The State of California considers the Gila Monster to be a species of special concern and it is listed and tracked by the CNDDB. While it appears that Gila Monster populations in the state are not faced with any immediate threat, their numbers are very low, with only 26 credible records from four counties in the past 153 years (Beaman and Lovich 2007).

Most records of Gila Monsters in California have come from areas characterized by steep, rocky topography associated with large, relatively high mountain ranges. Most localities are associated with canyons and riparian areas, including the lower Colorado River. Brown and Carmony (1991) stress that rough, rocky country is an important component of Gila Monster habitat and that the animal eschews flat plains thinly populated by creosote bush. Habitat of this type provides many opportunities for crevices under rocks and similar structures that can be used for winter hibernacula and/or summer dens. Trees and shrubbery are an important part of Gila Monster habitat that provide shade and cover, but also because such plants support larger populations of prey species.

Gila Monsters utilize dry washes and their edges, as well as mesquite thickets for foraging. Given that the Gila Monster is a comparatively slow-moving lizard, its prey consists mostly of defenseless baby animals and eggs which they detect by chemical cues and odors. Prey items include baby Cottontails, Round-tailed Ground Squirrels, and other small mammal species. Gambel's Quail and Desert Tortoise eggs are often taken, as well the eggs of doves and other birds. In Arizona, foraging activity occurs in two seasonal peaks that coincide with the nesting of quail and doves, and births of Cottontails during the spring months of April and May. A second surge in activity occurs in response to Cottontail births and dove nesting that begins with the onset of the summer rains (Brown and Carmony 1991). Beaman and Lovich (2007) suggest that summer rains may be important to the foraging ecology of the species in California.

With respect to the project area, the only potentially suitable Gila Monster habitat in California is the rougher terrain near Clark Mountain, and on the mountain slopes and canyons associated with telecommunications sites at Cima Peak and Mountain Pass.

Mormon Needle Grass

Mormon needle grass (*Achnatherum aridum*) has a CNDDB ranking of S2.2. Mormon needle grass is associated with rock outcrops or shrub-steppe habitats where Joshua tree or piñon-juniper woodland habitats on carbonate soils are present between approximately 3,940 and 5,100 feet (1,200 and 1,550 meters) elevation (CNPS 2001). Stems may approach 3 feet in height, with the inflorescence 2 to 7 inches in length, and may be partially enclosed by the upper leaf sheath. Plants flower in May or June (Jepson Interchange 2008).

Mormon needle grass was not observed during the project plant or reconnaissance surveys, but suitable habitat is present for the species in Antimony Canyon east of the Mountain Pass Substation.

Small-flowered Androstephium

Small-flowered androstephium (*Androstephium breviflorum*) has a CNDDB ranking of S1.3. Small-flowered androstephium is a perennial herb from a bulb, which occurs in creosote bush habitat in California. The pale pink flowers appear between March and June. The plants occur in dry habitats on dry sandy to rocky soils between 100 and 1,600 meters elevation (Flora of North America [FNA] 2009). The species is known only from Inyo, Riverside, and San Bernardino counties in California, but also occurs in several southwestern states (Jepson 2008; U.S. Department of Agriculture [USDA] 2009). This plant is present on the project near Milepost 2 of Alternative D, where at least 27 plants were documented (Figure C1c), and at the proposed Ivanpah Substation, where a few small individuals of this species were located on the Ivanpah Substation site in 2009.

White Bearpoppy

White bearpoppy (*Arctomecon merriamii*) has no federal status. It has a CNDDB ranking of S2.2. The white bearpoppy is an evergreen perennial herb. The leaves are basal, rounded-dentate, and moderately pilose, the hairs long and erect, which give the leaves a bluish-green appearance. The emerging flower stalks have the typical poppy family nodding habit of the flower bud, which becomes erect at maturity. The flowers, which have white petals on stalks 12 to 16 inches in height, appear in the spring (NNHP 2001a; CalFlora 2008). The white bearpoppy is found from Death Valley in southeastern California to the Meadow Valley Wash of southeastern Nevada (FNA 2009). The plants occur on generally barren, calcareous soils, alluvial gravels and carbonate rock outcrops at elevations of 2,000 to 6,280 feet (NNHP 2001a; FNA 2008). The species has not been observed within the project limits, but suitable habitat is present.

Mojave Milkweed

Mojave milkweed (*Asclepias nyctaginifolia*) has a CNDDB status of S2. Mojave milkweed occurs along arroyos and on dry slopes in the Mojave Desert between 1,000 and 1,700 meters elevation. The greenish-white flowers appear in May and June (Jepson 2008). Mojave milkweed was found at one location within the California segment of the project during the 2008 project rare plant survey, approximately .5- mile southwest of the proposed Ivanpah Substation site.

Scaly Cloak Fern

The scaly cloak fern (*Astrolepis c.* var. *cochisensis*) has a CNDDB ranking of S2.3. Scaly cloak fern is a perennial herb of small stature, generally between 1 and 4 inches in height, associated with limestone outcrops and associated rocky slopes between approximately 2,950 and 5,900 feet elevation in piñon-juniper woodland or in habitats that contain Joshua trees (CNPS 2001; Jepson 2008). The species occurs from California east to New Mexico.

Suitable habitat for the scaly cloak fern may be present in the vicinity of the Mountain Pass Substation, but the plant was not observed during the rare plant surveys conducted for the project in 2008 and 2009.

Black Grama

Black grama has a CNDDB ranking of S3.2. Black grama is a tufted perennial herb of the western United States and northern Mexico that has decumbent to erect stems to approximately 2 feet in height. Inflorescences are generally present between May and October (CNPS 2001; Gould 1951). Black grama most commonly occurs in dry habitats with sandy or rocky soils in flats, on slopes, along washes, and in scrub and woodland communities, including piñon-juniper habitat between 2,950 to 6,230 feet elevation (CNPS 2001; Gould 1951; Jepson 2008).

Black grama is present on the project, and was observed in more than one location in Antimony Canyon east of the Mountain Pass Substation during the 2008 project rare plant survey.

Gilman's Cymopterus

Gilman's cymopterus (*Cymopterus gilmanii*) has a CNDDB ranking of S2.2. Gilman's cymopterus is known only from Nevada and California, and occurs in Mojavean desertscrub habitat, often on carbonate substrates, between approximately 3,280 and 6,560 feet elevation (CNPS 2001). Flower stalks are usually less than 9 inches in height, with the greenish-purple flowers appearing between April and May (Jepson 2008).

Gilman's cymopterus was not observed during any of the project surveys, but there are CNDDB records for the species in the Clark Mountains, and suitable habitat may be present in the project area near the Mountain Pass Substation. There are also CNDDB records of the species at "Bear Poppy Saddle," which is approximately 4 miles west of the north end of Transmission Line Alternative C, and additional records to the north near Kally Mine and the vicinity of Stateline Pass. Gilman's cymopterus was not located anywhere on the project during the 2008 and 2009 rare plant surveys.

Utah Vine Milkweed

Utah vine milkweed has no federal status, but is listed by the BLM as a sensitive species. It is accorded a state ranking in California of S3.3 (see Table 4). The species is native to the Mojave Desert and is known from the states of Utah, Arizona, Nevada, and California

Utah vine milkweed is a member of the dogbane family (Apocynaceae). It is a small (up to approximately 1 meter), highly branched vine that grows up through other desert shrubs for support. It has small, narrow leaves, only a few centimeters long and bright yellow to orange flowers that grow in umbels. The plant typically grows on sandy to gravelly flats in creosote bush desert.

A single individual of this species was located near the Ivanpah Substation site during the 2008 project rare plant survey (see Appendix C, Figure C1d). Several individuals of this species were located near Milepost 3.6 of the Path 2: Section 2 telecommunications link during the 2009 project rare plant survey (see Appendix C; Figure C1f).

Viviparous Foxtail Cactus

The viviparous foxtail cactus has a CNDDB state ranking of S1/S2. This species was formerly known as *Coryphantha chlorantha*. The range of this species includes northwestern Arizona, southern Nevada, and southeast California (Benson 1982). This cactus occurs on limestone substrates in piñon-juniper woodland or on low hills and slopes in Mojavean desertscrub between 1,250 and 2,700 meters (4,100 and 8,860 feet) elevation (Benson 1982; CNPS 2001; Jepson 2008). The plants may have one to several heads, and produce magenta to purplish blooms in May or June (Benson 1982; CNPS 2001). The species is considered rare, and is threatened by over-collection (Hickman 1993; Jepson 2008). The viviparous foxtail cactus could occur in the Clark Mountains or the Mid Hills. There is a chance it could be present in the vicinity of the Mountain Pass Substation.

Nine-awned Pappus Grass

Nine-awned pappus grass (*Enneapogon desvauxi*) has a CNDDB ranking of S2?. Nine-awned pappus grass occurs on calcareous soils, usually associated with slopes or rocky crevices in desert woodland habitat between approximately 4,180 and 5,990 feet elevation. The species ranges from Colorado and southern California east to west Texas, and south to Peru. Plant stems may reach about 20 inches in height, with the inflorescences present in August and September (Gould 1951; Jepson 2008).

Nine-awned pappus grass was found during the project rare plant survey conducted in May of 2008. Two occurrences of this species were recorded, one near the proposed Ivanpah Substation site and a second approximately 2.2 miles southwest of the substation site (Appendix C; Figure C1d).

California Barrel Cactus

The California barrel cactus has no federal status under the ESA, is not listed on the California BLM list of sensitive species, is not afforded any status in the CNDDB (it is not tracked), and was considered too common to be included in the CNPS Inventory of Rare and Endangered Plants of California (2001). The Needles Office of the BLM has expressed some concern for the species in its district.

This cactus and its varieties occur widely in Arizona, Nevada, California, and Utah in desert habitats. The plants prefer gravelly to rocky hillsides, canyon walls, and wash margins in the desert between about 200 and 5,000 feet. In the current taxonomy there are two varieties that could be present in our project area; var. *lecontei* occurs from roughly between 2,500 and 5,000 feet while var. *acanthodes* occurs between 200 and 1,500 feet elevation.

This species was not on the target list for rare plant studies, but it was found along the project right-of-way in California west of Ivanpah Lake.

Parrish Club Cholla (Matted Cholla)

Parrish club cholla has no federal status, but is considered a sensitive species by the BLM. It is according a State of California ranking of S2.3 (see Table 4). The species is known from the Mojave and Sonoran Deserts of Arizona, California, and Nevada.

Parish club cholla grows in mats, hence the alternate common name of "matted cholla." The mats are close to the ground and this cactus never "emerges" from the shrubby desert vegetation surrounding it. Plants flower in late spring and early summer and are usually found on silty, sandy, or gravelly flats, dunelets, and hills.

Parish club cholla was found on the proposed Ivanpah Substation site and at four other locations in California during rare plant surveys in May 2008 (see rare plant survey, Appendix C).

Hairy-podded Fine-leaf Hymenopappus

Hairy-podded, fine-leaf hymenopappus (*Hymenopappus filifolius* var. *eriopodus*) has a CNDDB state ranking of S1.3. This species inhabits limestone soils among pines and/or junipers at elevations of about 1,600 to 1,700 meters (5,250 to 5,580 feet) (Jepson 2008). Plants may reach 8 decimeters (30 inches) in height and produce whitish flowers in May or June, and occasionally again in the fall (October) (Jepson 2008). This species is recorded in the Clark and New York mountains. This species is unlikely to occur within the transmission line right-of-way, but could occur near the Mountain Pass Substation.

Hillside Wheat Grass

Hillside wheat grass (*Leymus salinus mojavensis*) has a CNDDB state ranking of S1.3. Hillside wheat grass grows to about 14 decimeters (55 inches) in height with an inflorescence to 14 centimeters (5.5 inches) long, and flowers between May and June. This grass occurs on rocky hillsides in piñon-juniper habitat between 1,350 and 2,135 meters (4,430 and 7,000 feet) elevation (CNPS 2001; Jepson 2008). The only portion of the project right-of-way where this species might occur is the vicinity of the Mountain Pass Substation.

Plains Flax

Plains flax (*Linum puberulum*) has a CNDDB ranking of S2.3. Plains flax inhabits dry ridges of deserts, mesas, or mountains from California to Colorado and Texas (Jepson 2008). Plains flax is a perennial species to about 15 inches in height, which may occur between approximately 2,000 and 8,200 feet elevation (Epple and Epple 1995; Jepson 2008; Kearney and Peebles 1960). The flowers, which have yellow to orange petals, may bloom anytime between April and October (Epple and Epple 1995; Jepson 2008). Plains flax was not observed on the project during any of the project surveys, but is likely to be present in some areas.

Rough Menodora

Rough menodora (*Menodora scabra*) has a CNDDB ranking of S2.3. Rough menodora is a shrub to about 18 inches in height that produces light canary yellow flowers anytime between May and September, which are followed by distinctive translucent, paired fruit (Epple and Epple 1995; Kearney and Peebles 1960). Rough menodora occurs on rocky soils of slopes, dry mesas, foothills, and canyons between approximately 1,500 and 7,500 feet elevation (Jepson 2008; Kearney and Peebles 1960). In California, rough Menodora is recorded from the Clark, Eagle, and New York Mountains (Jepson 2008). A single individual of rough menodora was observed near milepost 3.7 of the Path 2: Section 3: Alt. 1 project segment during the 2009 project rare plant survey (Appendix C; Figure C1e).

Polished Blazing Star

The polished blazing star (*Mentzelia polita*) has a CNDDB state ranking of S1.2. Polished blazing star is a perennial plant to about 31 centimeters (1 foot) in height with white, peeling stems and linear to lanceolate leaves less than 7 centimeters (2.75 inches) in length. The white to pale yellow flowers appear in April or May (Charters 2008). The plants occur on limestone or gypseous soils between 1,200 and 1,500 meters (3,940 and 4,920 feet) elevation. The polished blazing star is known from the Clark Mountains (Charters 2008; Jepson 2008). This species could occur on suitable substrate on the project in the Clark Mountains.

Red Four-o'clock

Red four o'clock (*Mirabilis coccinea*) has a CNDDB ranking of S2.3. Red four o'clock has ascending to erect stems to nearly 2 feet in height. The fleshy, linear leaves are sessile, and the intense red blossoms may be present between May and July (Jepson 2008). This plant occurs on dry soils of rocky slopes and along washes, often associated with piñon-juniper habitat, between approximately 3,510 and 5,900 feet elevation (CNPS 2001; Jepson 2008). Red four o'clock was not observed during any of the project surveys, but suitable habitat for the species is present near the Mountain Pass Substation.

Tough Muhly

Tough muhly (*Muhlenbergia arsenei*) has a CNDDB state ranking of S1/S2. This perennial grass may reach 4 decimeters (16.0 inches) in height with a 12 centimeters (4.7 inches) long inflorescence that may be present from August to October. Tough muhly occurs on rock outcrops and limestone slopes in the Clark and New York mountains between 1,400 and 1,860 meters (4,590 and 6,100 feet) (CNPS 2001; Jepson 2008). Tough muhly could be present on the project near the Mountain Pass Substation.

Curve-spined Beavertail

The curve-spined beavertail cactus (*Opuntia curvospina*) has a CNDDB state ranking of S1.2. The curve-spined beavertail cactus, also known as the Searchlight pricklypear, is a recognized hybrid between *O. phaeacantha* and *O. chlorotica* that has been proposed as a distinct species (CNPS 2001; USDA 2009). The species occurs in Mojavean desertscrub, chaparral, and piñon-juniper woodland from 1,000 to 1,400 meters elevation (3,280 to 4,590 feet). Blooms appear on the plants between April and June (CNPS 2001). The curve-spined beavertail cactus could be present within the project limits in suitable habitat.

Spiny Cliffbrake

Spiny cliffbrake (*Pellaea truncata*) has a CNDDB ranking of S2. Spiny cliffbrake occurs in rock crevices, on cliffs, and in boulder piles of granite or other igneous rocks in piñon-juniper habitat between approximately 3,900 and 7,050 feet elevation (CNPS 2001; Jepson 2008). Spiny cliffbrake was not observed during any of the project surveys, but suitable habitat may be present in the steep, rocky terrain near the Mountain Pass Substation.

Rosy Two-toned Beardtongue

The rosy two-toned beardtongue (*Penstemon bicolor* ssp. *roseus*) has no federal status and is not listed as a BLM sensitive species in California (BLM 2004). The State of California assigns it a rank of S1.3 (less than six element occurrences with no identifiable threat).

This species is known from three occurrences in California: one east of Keany Pass on the Clark Mountain USGS Quad; one near Heart in the Castle Mountains on the Heart Peak USGS Quad; and one vague location on the Homer Mountain USGS Quad, all in San Bernardino County. The Keany Pass location was situated in a limestone wash, which follows most of the Nevada and Arizona sites for this plant – it is a calcareous soil obligate or near-obligate. Plants are perennial herbs up to about 5 feet tall, leaves have strongly toothed margins, and are clasping. The corolla is trumpet-shaped and the flowers are rose to rose-purple.

This species was on the target list for rare plant surveys in the California portion of the project area, but no individuals of this species were found during 2008 or 2009 project rare plants surveys.

Stephen's Penstemon

Stephens' penstemon (*Penstemon stephensii*) is considered a sensitive species by the BLM in California. Stephen's penstemon occurs on rocky slopes or in bedrock crevices, and along washes, usually associated with carbonate soils, in habitats from creosote bush scrub up to piñon-juniper at elevations ranging from approximately 3,800 to 6,070 feet elevation. The rose to magenta flowers may be present between April and June (CNPS 2001; Jepson 2008). Stephens' penstemon has not been observed during any of the project field surveys, but suitable habitat is present in the Project area.

Aven Nelson's Phacelia

Aven Nelson's phacelia (*Phacelia anelsonii*) has a CNDDB ranking of S2.3?. Aven Nelson's phacelia is an annual herb that occurs on carbonate, sandy, or gravelly soils in a variety of habitats between approximately 3,900 and 4,920 feet elevation (Jepson 2008). The species is known in southern California only from the New York Mountains, but the species range extends to southwest Utah. It is an erect annual plant to about 20 inches in height, with white or pale blue to lavender flowers that may be present in April or May (CNPS 2001; Jepson 2008).

Aven Nelson's phacelia was observed at four closely spaced localities on the project, about 1 mile northeast of the Mountain Pass Substation during the project rare plant survey conducted in May of 2008 (Appendix C; Figure C1e).

Barneby's Phacelia

Barneby's phacelia (*Phacelia barnebyana*) has a CNDDB ranking of S2.3. Barneby's phacelia occurs on limestone scree between 1,600 and 2,700 meters elevation in California and western Nevada. Barneby's phacelia is an erect annual plant to 30 centimeters in height with pale lavender petals (Jepson 2008). The only portion of the project where this species may occur is in the vicinity of the Mountain Pass Substation. The elevation at the substation is at the lower end of the known elevation range of the species. No individuals of this species were observed during the rare plant surveys of 2008 and 2009.

Sky-blue Phacelia

Sky-blue phacelia (*Phacelia coerulea*) has a CNDDB ranking of S2.3. Sky-blue phacelia is an ascending to erect annual plant to 40 centimeters in height that occurs in open creosote bush habitat on sandy to rocky substrates between about 1,400 and 2,000 meters elevation. The bell-shaped pale blue-to-purple flowers appear in April or May (Jepson 2008). Sky-blue phacelia was located at three locations along the project route during the 2009 rare plant survey (Appendix C; see Figures C1e and C1f). A combined total of at least 30 plants were documented at these sites.

Chamber's Physaria

Chamber's physaria (*Physaria chambersii*) has a CNDDB ranking of S2.3. Chamber's physaria is an herbaceous tufted plant that is usually no more than 6 inches in height. Leaves are basal and spatulate with an acute tip. Chamber's physaria is a limestone soil endemic species that occurs between approximately 4,920 and 8,500 feet elevation, usually associated with piñon-juniper habitat. The species is recorded from the Clark and Grapevine mountains in California, and occurs north to Oregon, east to Utah, and Arizona. The yellow flowers usually appear in April or May (CNPS 2001; Jepson 2008; Kearney and Peebles 1960). Chamber's physaria was not observed during the project rare plant survey, but there may be suitable habitat for the species in the Clark Mountains.

Abert's Sanvitalia

Abert's sanvitalia (*Sanvitalia aberti*) has a CNDDB state ranking of S1/S2. Abert's sanvitalia is an annual plant occurring on dry slopes in piñon-juniper woodland from 1,570 to 1,800 meters (5,150 to 5,900 feet) elevation (CNPS 2001; Jepson 2008). Plants may reach 29 centimeters (11 inches) in height (Jepson 2008). The yellow flowers are present in August or September. In California the species is known from the Clark and New York mountains (Jepson 2008). There is a small chance that Abert's sanvitalia might occur on the project in the vicinity of the Mountain Pass Substation.

Rusby's Desert Mallow

Rusby's desert mallow (*Sphaeralcea rusbyi* var. *eremicola*) has a CNDDB state ranking of S1.3. Rusby's desert mallow occurs in Joshua tree woodland and Mojavean desertscrub habitats between 975 and 1,500 meters (3,200 and 4,920 feet) elevation (CNPS 2001; Jepson 2008). The species is relatively short for a *Sphaeralcea* sp., reaching only about 3 decimeters (12 inches) in height. Rusby's desert mallow occurs only in Death Valley and the Clark Mountains (Jepson 2008). There is some possibility this species could occur within the project limits near the Mountain Pass Substation.

Cactus and Yucca

The BLM normally requires transplanting or salvage of certain native plant species that would be lost to development on lands under their jurisdiction. Species typically involved in these efforts include all cacti except chollas (*Cylindropuntia* spp.), which are left on the site to regenerate from stem segments, *Yucca* spp., and ocotillo (*Fouquieria splendens*).

<u>Sensitive Species – Nevada Segment</u>

Bat Species

Table 5 lists nine bat species all of which are designated BLM sensitive species. These species are considered sensitive by the BLM because they typically consist of small and widely dispersed populations and they inhabit ecological refugia or specialized or unique habitats.

None of the bats listed in Table 5 were observed during field studies in May 2008. However, no specific effort was expended to document bat presence or absence. It is likely that any bats present in the project area would be associated with old mine or natural structures in the McCullough and Lucy Gray mountains.

Desert Bighorn Sheep

The subspecies of Desert Bighorn Sheep (*O. c. nelsoni*) that is present in the Nevada portion of the project area has no federal status. The Nevada office of the BLM considers it a sensitive species. The Desert Bighorn Sheep is managed as a big game animal in Nevada by the Nevada Department of Wildlife (NDOW), and an annual hunt allows for a very limited take of the species. The McCullough Mountains are within the NDOW Area 26 Unit 263 hunting area. The 2008 quota for Bighorn for Unit 263 is set at 10 animals, and the hunt period in Unit 263 is from November 10 through December 10. The NDOW would likely restrict construction of this project through the McCullough Mountains during the Bighorn hunting season.

Within the project area in Nevada, Nelson's Bighorn is likely mostly confined to the rugged, upland topography associated with the McCullough Range. Within that range are Bighorn special use areas that are of concern to wildlife and land managers. Lambing grounds are generally higher elevation portions of mountain ranges where ewes go in the winter or spring to drop their lambs. It is believed that the higher, less accessible terrain affords the ewes and lambs greater protection from certain predators such as Coyotes. Summer grounds are those portions of the mountain range occupied by sheep during the hot summer months. Summer grounds must provide adequate forage and not be at too great a distance from water. The only water development in the McCullough Mountains available to Bighorn Sheep in summer is the "Linda" guzzler, approximately 1.3 miles north of the north McCullough Pass. Because Bighorn mostly move during daylight, which is when construction would occur, there is potential for project activities to interfere with Bighorn accessing this resource. Construction of the portion of the line through the north McCullough Pass area should occur outside of the hot summer season (June through September) when Bighorn may be dependent on this water source.

The BLM Rangewide Plan for Managing Habitat of Desert Bighorn Sheep on Public Lands identifies the McCullough Mountains as a Category II (Crucial Habitat) area. Continuous suitable habitat for Bighorn Sheep exists from the McCullough Range to the southeast, including the nearby Highland Range Crucial Bighorn Habitat Area (approximately 7 miles south-southeast of the proposed transmission line alignment through the McCullough Mountains). The proximity of the two ranges, with the relatively narrow, high valley in between, is favorable to regular movements of Bighorn Sheep between the two ranges. The Eldorado-Lugo 500kV transmission line, which will support the optic fiber communications line, passes through this habitat between the two ranges, but does not enter either the South McCullough Wilderness Area or the Highland Range Crucial Bighorn Habitat Area. The population of Bighorn Sheep in the McCullough Range was estimated at greater than 237 animals in 2005 (NDOW 2006). Bighorn were observed along the project alignment in the north McCullough Pass area by SCE personnel in August of 2008. Bighorn may also be present on Sheep Mountain and the Lucy Gray Mountains. The transmission line right-of-way passes between these two ranges east of I-15 and north of Primm, Nevada.

Wild Burros

Wild Burros (*Equus asinus*) receive protection under the 1971 Federal Wild Free-Roaming Horses and Burros Act (16 USC 1331-1340). The Act protects wild horses and burros within designated allotments on lands administered by the United States Forest Service and the BLM. The Nevada office of the BLM has designated numerous Herd Management Areas (HMA) within the State of Nevada. There are no established BLM-HMAs near the Nevada portion of this project that would be affected by this action. It is not known whether Wild Burros are present in the Nevada segment of the project.

Western Burrowing Owl

The Western Burrowing Owl is not federally listed as threatened or endangered. It was formerly listed as a Category 2 Candidate species, but that classification was dropped in 1996, and it is now a federal species of concern. The Nevada office of the BLM considers it a sensitive species, and it is also protected by the State of Nevada under NRS 501 (NNHP 2004).

Burrowing Owls inhabit open areas in deserts, grasslands, and agricultural and range lands. They use well-drained areas with gentle slopes and sparse vegetation, and may occupy areas near human habitation such as golf courses and airports (Dechant et al. 1999; Ehrlich et al. 1988; Terres 1980). Burrowing Owls often select burrows where surrounding vegetation is kept short by grazing, dry conditions, or burning (Dechant et al. 1999; Hjertaas et al. 1995).

Burrowing Owls are semi-colonial and usually occupy burrows excavated by small mammals. In areas that lack colonial burrowing mammals, Burrowing Owls will use excavations made by other mammals such as Badgers, Woodchucks, Skunks, Foxes, Armadillos, and Coyotes. They also use Desert Tortoise burrows, and may use natural cavities in rocks. In addition to the nest burrow, these owls may also use several satellite burrows. Satellite burrows may serve as protection from predators and parasites (Dechant et al. 1999).

Widespread declines in the range and abundance of Burrowing Owls have been attributed to habitat loss and fragmentation, and to control and extermination of colonial burrowing mammals (Dechant et al. 1999; Hjertaas et al. 1995).

Burrowing Owls occur over much of Nevada, but their density is generally very low (Floyd et al. 2007). There is probably suitable habitat for the Burrowing Owl along portions of the project right-of-way, but the probability that they will occur on the project is considered low. The probability of their presence on the project would be linked to the abundance of suitable burrow habitat.

Prairie Falcon

The Prairie Falcon is a BLM sensitive species in Nevada because of a perceived downward trend in the species distribution and population numbers, and because the species typically consists of small and widely dispersed populations. The Prairie Falcon is on the "watch" list of the NNHP.

Prairie Falcons inhabit dry environments of North America from southern Canada into central Mexico and from the Great Plains west to the Pacific Coast. They are often found in open plains and shrub-steppe deserts that are punctuated by cliffs or bluffs (Steenhof 1998). Prairie Falcons forage widely, seeking areas of patchily distributed prey which includes several species of ground squirrels (*Spermophilus* sp.) during the summer months. When ground squirrels go underground to escape summer heat and drought, Prairie Falcons shift their foraging attention to other species, primarily birds such as Horned Larks and Meadowlarks (*Sturnella* sp.).

In the project area it is likely that individual pairs of Prairie Falcons are very widely dispersed. No Prairie Falcons were observed during biological site reconnaissance in April 2008. If they occur in the project area, it is most likely that nesting Prairie Falcons would be found in the McCullough Mountain Range or the Lucy Gray Mountains.

Phainopepla

The Phainopepla (*Phainopepla nitens*) is not federally listed as threatened or endangered. The Nevada office of the BLM considers it a sensitive species, and it is also protected by the State of Nevada under NRS 501 (NNHP 2004).

The Phainopepla is a member of the silky-flycatcher family, Ptilogonatidae, a primarily tropical family of birds. The Phainopepla is a readily identified resident of the southwest deserts. It possesses a sharp crest and eyes that have a red iris. The males are uniformly glossy black with a distinct white wing patch in flight. The Phainopepla primarily feeds on a variety of berries, but will supplement its diet with insects (Ehrlich et al. 1988; Terres 1980). In desertscrub habitats desert mistletoe berries are an important food source. In other areas they feed on juniper, elderberry, grape, buckthorn, Russian olive, and other berries (Martin et al. 1951). The first nest of the year is produced in low desertscrub or mesquite habitat. As the warmer weather approaches, the Phainopepla moves to higher elevations into piñon-juniper or oak forest where it will nest a second time. In Nevada, the Phainopepla is strongly associated with concentrations of western honey mesquite (*Prosopis glandulosa* var. *torreyana*) and catclaw acacia (*Acacia greggii*) that support desert mistletoe (Floyd et al. 2007).

The creosote bush-white bursage habitat on much of the project is mostly unfavorable to the presence of Phainopeplas. However, there is a moderate probability that the Phainopepla will occur within the project limits in areas with suitable habitat, such as desert washes where mistletoe often is present in catclaw acacias. Two Phainopeplas were observed on the project on October 27, 2008. A female was observed perched on vegetation in a small wash low on the east side of the north McCullough Pass, and a male was observed along the Eldorado-Lugo optic fiber alternative.

Loggerhead Shrike

The Loggerhead Shrike is not federally listed as threatened or endangered. The Nevada office of the BLM considers it a sensitive species.

The Loggerhead Shrike is found in a variety of habitats from low desert to middle elevations, including open country, thinly wooded or shrubby areas with clearings, meadows, pastures, old orchards, and thickets along roadsides (Terres 1980). The presence of medium to high perches used for hunting are an important habitat element for these birds. They prey primarily on invertebrates, but commonly take small birds, lizards, amphibians, and mice (Ehrlich et al.

1988). The birds commonly impale their prey on sharp twigs, spines of plants, or barbed wire for later consumption. The birds are evidently proficient at relocating cached prey.

Suitable habitat for the species in the project area occurs above areas dominated by creosote, where yuccas and other higher vegetation begin to appear in the plant community. Shrikes are less likely to be present near the Eldorado Substation and the area around the periphery of Roach Lake.

Raptor Nests

There is a general lack of natural roosting habitat for raptors along most of the Nevada portion of the project. There is some potential nesting habitat in the McCullough Mountains where there are rocky cliffs present. Electrical transmission line lattice towers probably provide most of the potential raptor nesting habitat in the area. Stick nests in lattice towers are typically re-occupied or modified and re-used intermittently by raptors and corvids returning to an area annually. The nests are generally persistent in the towers for years. An apparent lack of stick nests in lattice structures along the existing transmission line may reflect depressed raptor nesting activity in the area. Two Red-tailed Hawks (*Buteo jamaicensis*) were observed on October 28, 2008 along the Eldorado-Lugo 500kV transmission line between the section of the line south of State Highway 164 and the UPRR tracks. Both birds were using lattice towers as perches. There was no evidence of any stick nests in any of the lattice towers along the entire length of the Eldorado-Lugo route between the Eldorado Substation and the UPRR tracks, a distance of about 30 miles. A pre-construction survey for raptor/corvid nests in the existing lattice towers should be performed prior to initiation of construction.

Migratory Bird Treaty Act

A general discussion of the MBTA was given earlier in this document under the section for the California segment of the project.

The somewhat higher elevation and greater species diversity in the plant community where the project right-of-way passes through the McCullough Mountains, and along the Eldorado-Lugo optic fiber communications option, may support a greater diversity of transient, summer visitor, and permanent resident birds than other, lower portions of the project in Nevada.

Pre-construction surveys for nesting birds should be conducted to preclude violation of the MBTA. Active nests may be avoided until the young have fledged or eggs and/or young may be moved by a licensed rehabilitation contractor. Clearing of vegetation and other ground disturbing activities that may affect nesting birds outside of the nesting season will minimize the potential for impacts to birds and violation of the MBTA.

Mojave Population Desert Tortoise

The Mojave population of the Desert Tortoise is federally listed as a Threatened species (Federal Register 1990), and a recovery plan has been prepared (USFWS 1994). A draft revised recovery plan was released in 2008 by the USFWS (USFWS 2008). The revision redraws most of the Recovery Unit boundaries, but the draft includes no proposed changes to the limits of designated Critical Habitat for the species. The species is also provided protection by the State of Nevada under NRS 501 (NNHP 2004).

The Mojave population of the Desert Tortoise is found primarily in Mojave desertscrub, but it also occurs in the Lower Colorado River Subdivision of Sonoran desertscrub in southern Nevada. They are generally associated with communities dominated by creosote bush (*Larrea tridentata*), with other sclerophyllous shrubs and small cacti present (AZGFD 2001). Some parts of their habitat may contain abundant Joshua trees (*Yucca brevifolia*). The Mojave Desert Tortoise prefers sandy loam or rocky soils in valleys, bajadas, and hills (AZGFD 2001). They may be found at elevations below sea level in Death Valley, California, and up to about 1,500 meters (4,922 feet) at Yucca Mountain, Nevada (AZGFD 2001). Desert Tortoises are facing numerous threats to their survival. Livestock grazing, recreational OHV use, military training activities, urban development, and increases in predation are some of the factors that affect tortoise survival (Lovich 2003). Additional threats are takes of tortoises for commercial sale as pets, from vandalism (shooting, crushing, or mutilation), and for food (USFWS 1994).

The entire project area is within the range of the species, and most of the area provides some suitable habitat for tortoises. There is federally designated Critical Habitat for the Desert Tortoise southwest of the Eldorado Substation in the Eldorado Valley. The transmission line route passes through approximately 6 miles of Critical Habitat within the Piute-Eldorado Recovery Unit for the species (USFWS 1994; 2008).

Almost the entire 30-mile length of the portion of the Eldorado-Lugo 500kV Line that will support the optic fiber line (Eldorado Substation to Highway 164) is within suitable habitat for the Desert Tortoise. Only the higher elevations in black bush habitat are probably not favorable for tortoises. Approximately 2 miles south of the Eldorado Substation the Eldorado-Lugo line enters the Piute-Eldorado, Nevada unit of designated Critical Habitat for the Mojave population Desert Tortoise. The line is within this unit continuously for approximately 9 miles to the south. The southern portion of the section of the Eldorado-Lugo line in California southwest to the UPRR tracks (Highway 164 to the UPRR tracks) is within the Ivanpah unit of designated Critical Habitat for the species. This southern portion is also within the Mojave National Preserve.

Except for a small private in-holding at Ivanpah Road, the segment of the Nipton 33kV distribution line south of State Highway 164, and west of Nipton (I-15 to Nipton), is within both the Mojave National Preserve and the Ivanpah unit of designated Critical Habitat for the Mojave population Desert Tortoise. Approximately 2 miles of this segment is on the Ivanpah Lake playa, and is not considered suitable Desert Tortoise habitat. The western portion of this segment, where it climbs the bajada, is the best tortoise habitat along this segment of the Nipton line.

A project protocol level survey for the desert tortoise was performed by Karl and Associates in May of 2008 for the main portions of the transmission line route. The project alternative routes will probably be surveyed in the spring of 2009, after the alternative corridors are more precisely defined. The tortoise survey results will be presented as a stand-alone report.

Common Chuckwalla

The Common Chuckwalla is a former Category 2 Candidate for federal listing, but currently has no federal status. Because it inhabits ecological refugia or specialized or unique habitats, the BLM considers the Common Chuckwalla to be a sensitive species. The species is currently a "watch list" taxon with the State of NNHP.

Common Chuckwallas occupy rocky habitats of hillsides, canyons and flats, or large rocky outcrops where they seek shelter in crevices. The Chuckwalla is widely distributed in suitable habitats in the Sonoran and Mojave Deserts in Nevada, Utah, California, and Arizona; and the Mexican states of Sonoran and Baja California. Creosote bush is found throughout most of the range and the species is known to eat the flowers of creosote bush as well as those of indigo bush (*Psorothamnus* sp.), desert mallow (*Sphaeralcea ambigua*), and others (Stebbins 1954). Sherburn (1972), studying food habits of this species on the Nevada Test Site, found that *Sphaeralcea ambigua, Krameria parvifolia,* and *Stephanomeria pauciflora* were the dominant plants in Chuckwalla diets on a volume basis.

In the project area, suitable Chuckwalla habitat was found in the McCullough Mountains and in the mountains associated with most of the proposed telecommunications sites. Chuckwalla sign (scat) was found in the McCullough Mountains although no individual animals were observed.

Gila Monster

The Gila Monster is not federally listed as threatened or endangered. It was formerly listed as a Category 2 Candidate species, but that classification was dropped in 1996, and it is now a federal species of concern. The Nevada office of the BLM considers it a sensitive species, and it is also protected by the State of Nevada under NRS 501 (NNHP 2004).

The Gila Monster is one of two species in the family Helodermatidae, venomous lizards. The full range of the species includes extreme southwestern Utah west to southern California, through Arizona, to northern Sinaloa, Mexico (Beck 2005; Stebbins 2003). The two recognized subspecies of the Gila Monster are the Reticulated Gila Monster (*H. s. suspectum*) and the Banded Gila Monster (*H. s. cinctum*). The latter subspecies occurs in Nevada in Clark, Lincoln, and Nye counties (NNHP 2004).

Gila Monsters are largely species of the Sonoran Desert, and seem to prefer undulating rocky foothills, bajadas, and canyons, and tend to avoid open sandy plains. The Gila Monster is most common from sea level to approximately 4,100 feet (Beck 2005). It is the largest lizard in the

United States, measuring from 9 to 14 inches, snout to vent length, with the tail an additional one-third to one-half of the body length (Stebbins 2003, 1954). Gila Monsters are primarily diurnal, but because of their ability to eat large amounts of food, they do not need to forage often. It has been estimated that they may spend up to 98 percent of their time in their burrows (Ivanyi et al. 2000).

Suitable habitat for the Gila Monster, along dry washes, and in the upper rocky canyon habitat in the McCullough Mountains, is present within the project corridor and this species could be present in the project area.

White Bearpoppy

The white bearpoppy is a BLM sensitive species and the Nevada Native Plant Society has it on their watch list of potentially threatened species.

The white bearpoppy occurs on calcareous soils derived from limestone or gypsum, or on rock outcrops between 2,000 and 6,280 feet elevation. Substrates are generally dry, but the species may occur on damp soils. The bulk of the known range of the white bearpoppy is north and west of Las Vegas, with a disjunct record of the species north of Goodsprings, Nevada in the Bird Spring Range, approximately 20 miles north of the project (NNHP 2001a).

Suitable habitat for the white bearpoppy is present in the project area, but the species is considered unlikely to occur here since the known distribution of the species is some distance from the area. The species was not encountered during plant surveys conducted for the project in April and May of 2008.

Rosy Two-tone Beardtongue

The rosy two-tone beardtongue is a BLM sensitive species and it is considered an at-risk taxon by the NNHP.

The rosy two-tone beardtongue is found in rocky soils of calcareous, granitic, or igneous origin, in drainages, along roads, on scree at the bases of rock outcrops, and other places receiving enhanced runoff. The species is a disturbed ground colonizer, and may be important in soil stabilization. The plants are found in creosote bush-bursage, black bush, and mixed shrub associations, at elevations from 1,800 to 5,480 feet (Hickman 1993; NNHP 2001b; Smith 2005).

The rosy two-tone beardtongue is present on the project and was observed at several locations in the McCullough Mountains area during the April to May 2008 project plant survey. A single dormant penstemon, which may represent this species, was observed on the Eldorado-Lugo optic fiber alternative on October 27, 2008.

White-margined Beardtongue

The white-margined beardtongue is a former Category 2 Candidate for federal listing, is currently a federal species of concern, and is designated a sensitive species by the BLM in Nevada. It is also listed as an "at-risk" taxon by the NNHP.

White-margined beardtongue is known from the Mojave Desert of southern Nevada, southeastern California, and northwestern Arizona. The distribution is quite distinctive with plants occurring in four discrete areas, one each in Nye and Clark counties, Nevada, in Mojave County, Arizona near Yucca, and along I-40 near the Pisgah Railroad siding in San Bernardino County (Smith 2001).

White-margined beardtongue is a perennial forb that grows to 15 to 35 centimeters in height, has pale green, opposite leaves, and pink to lavender flowers with darker purple markings. The species is easy to identify in the field owing to the distinctive white margins on the leaves (Smith 2001). White-margined beardtongue was found on the Nevada segment of the project during rare plant surveys in April and May 2008 (see Appendix C).

Cactus and Yucca

The BLM normally requires transplanting or salvage of certain native plant species that would be lost to development on lands under their jurisdiction. Species typically involved in these efforts include all cacti except chollas (*Cylindropuntia* spp.), which are left on the site to regenerate from stem segments, *Yucca* spp., and ocotillo (*Fouquieria splendens*).

Rare, Invasive, and Noxious Plant Surveys

Rare, invasive, and noxious plant surveys for this project were conducted in April and May 2008, and in April of 2009 by Mr. Glenn Clifton, GLC Consulting, Kingman, Arizona. Results and discussion of these surveys is found in Appendix C of this document. A compiled list of plant species observed on the project during all reconnaissance and focused surveys is located in Appendix B.

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APPENDIX A

SITE PHOTOGRAPHS

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Photograph 1. Creosote bush-white bursage series. Looking west in the Eldorado Valley.

Photograph 2. Looking northeast in the Eldorado Valley across a vast expanse of creosote bush.

Photograph 3. Looking south in the Eldorado Valley.

Photograph 4. Looking west in the Eldorado Valley.

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Photograph 5. Looking east from the right-of-way in the McCullough Mountains.

Photograph 6. Looking west from the right-of-way in the McCullough Mountains.

Photograph 7. The dry bed of Ivanpah Lake.

Photograph 8. Looking west towards the Mountain Pass Substation – black bush and juniper habitat.

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Photograph 9. Looking northeast across the creosote bush; vegetation traversed by Alternatives A and B.

Photograph 10. Looking west across the rugged terrain traversed by Alternatives C and D.

Photograph 11. Cleared, disturbed lands at Alternative E.

Photograph 12. Looking north along the right-of-way for the Nipton 33kV transmission line.

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Photograph 13. Looking south along the Nipton 33kV right-of-way.

Photograph 14. Creosote bush scrub and Mojave yucca at the site of the Ivanpah Substation.

Photograph 15. The existing Mountain Pass Substation. Black bush is dominant here with scattered piñon and juniper.

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APPENDIX B

PLANT SPECIES INVENTORY

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PLANT SPECIES OBSERVED ON THE CALIFORNIA SEGMENT OF THE IVANPAH TO ELDORADO PROJECT

Scientific Name	Common Name
PTERIDACEAE	
Cheilanthes covillei	Coville's lipfern
Pentagramma triangularis ssp. *triangularis*	Gold-back fern
CUPRESSACEAE	
Juniperus osteosperma	Utah juniper
EPHEDRACEAE	
Ephedra nevadensis	Nevada jointfir
Ephedra viridis	Mormon tea
PINACEAE	
Pinus monophylla	Singleleaf piñon
AIZOACEAE	
Sesuvium verrucosum	Verrucose seapurslane
Trianthema portulacastrum	Desert horsepurslane
AMARANTHACEAE	
Amaranthus fimbriatus	Fringed amaranth
Tidestromia oblongifolia	Arizona honeysweet
ANACARDIACEAE	
Rhus aromatica var. *trilobata*	Skunkbush sumac
APIACEAE	
Lomatium nevadense var. *parishii*	Parish's biscuitroot
APOCYNACEAE	
Amsonia tomentosa	Woolly bluestar
ASCLEPIADACEAE	
Asclepias erosa	Desert milkweed
Asclepias nyctaginifolia	Mojave milkweed
Cynanchum utahense	Utah swallow-wort
ASTERACEAE	
Acamptopappus shockleyi	Shockley's goldenhead
Adenophyllum cooperi	Cooper's dogweed
Ambrosia acanthicarpa	Flatspine bur ragweed
Ambrosia dumosa	White bursage (burrobush)
Ambrosia eriocentra	Woolly fruit bur ragweed
Antheropeas wallacei	Woolly easterbonnets
Artemisia ludoviciana var. *albula*	White sagebrush
Baccharis brachyphylla	Shortleaf baccharis
Baccharis sergiloides	Desert baccharis
Baileya multiradiata	Desert marigold
Baileya pleniradiata	Woolly desert marigold
Brickellia californica	California brickellbush
Brickellia incana	Woolly brickellbush
Brickellia oblongifolia var. *linifolia*	Narrowleaf brickellbush
Chaenactis carphoclinia	Pebble pincushion
Chaenactis fremontii	Pincushion flower
Chaenactis macrantha	Bighead dustymaiden
Chaenactis stevioides	Esteve's pincushion
Chaetopappa ericoides	Rose heath
Chrysothamnus depressus	Longflower rabbitbrush

Scientific Name	Common Name
Chrysothamnus paniculatus	Mojave rabbitbrush
Cirsium neomexicanum	New Mexico thistle
Encelia virginensis	Virgin River brittlebush
Ericameria cooperi	Cooper’s goldenbush
Ericameria laricifolia	Turpentine bush
Ericameria linearifolia	Narrowleaf goldenbush
Eriophyllum pringlei	Pringle’s woolly sunflower
Eriophyllum wallacei	Woolly easterbonnets
Gutierrezia microcephala	Threadleaf snakeweed
Gutierrezia sarothrae	Broom snakeweed
Heliomeris multiflora var. *nevadensis*	Nevada goldeneye
Hymenoclea salsola	Burrobrush
Layia glandulosa	Whitedaisy tidytips
Machaeranthera arida	Arid tansyaster
Malacothrix glabrata	Smooth desert dandelion
Monoptilon bellidiforme	Daisy desertstar
Monoptilon bellioides	Mojave desertstar
Pectis papposa	Manybristle chinchweed
Porophyllum gracile	Slender poreleaf
Prenanthella exigua	Brightwhite
Psilostrophe cooperi	Whitestem paperflower
Rafinesquia californica	California plumeseed
Rafinesquia neomexicana	New Mexico plumeseed
Senecio multilobatus	Lobeleaf groundsel
Stephanomeria parryi	Parry’s wirelettuce
Stephanomeria pauciflora	Brownplume wirelettuce
Stylocline micropoides	Woollyhead neststraw
Tetradymia stenolepis	Mojave cottonthorn
Thymophylla pentachaeta var. *belenidium*	Fiveneedle pricklyleaf
Uropappus lindleyi	Lindley’s silverpuffs
Xylorhiza tortifolia	Mojave woodyaster
BIGNONIACEAE	
Chilopsis linearis	Desert willow
BORAGINACEAE	
Amsinckia tessellata	Bristly fiddleneck
Cryptantha angustifolia	Panamint cryptantha
Cryptantha barbigera	Bearded cryptantha
Cryptantha circumscissa	Cushion cryptantha
Cryptantha pterocarya var. *cycloptera*	Wingnut cryptantha
Cryptantha dumetorum	Bushloving cryptantha
Cryptantha gracilis	Narrowstem cryptantha
Cryptantha micrantha	Redroot cryptantha
Cryptantha nevadensis	Nevada cryptantha
Cryptantha pterocarya	Wingnut cryptantha
Pectocarya heterocarpa	Chuckwalla combseed
Pectocarya platycarpa	Broadfruit combseed
Pectocarya recurvata	Curvenut combseed
Pectocarya setosa	Moth combseed
Plagiobothrys arizonicus	Arizona popcornflower
Plagiobothrys jonesii	Mojave popcornflower
Tiquilia plicata	Fanleaf crinklemat

Scientific Name	Common Name
BRASSICACEAE	
Arabis perennans	Perennial rockcress
Arabis pulchra var. *gracilis*	Beautiful rockcress
Brassica tournefortii	Asian mustard
Caulanthus cooperi	Cooper's wild cabbage
Caulanthus crassicaulis	Thickstem wild cabbage
Descurainia pinnata var. *glabra*	Western tansymustard
Descurainia sophia	Herb sophia
Dithyrea californica	California shieldpod
Draba cuneifolia var. *integrifolia*	Wedgeleaf draba
Guillenia lasiophylla	California mustard
Hirschfeldia incana	Shortpod mustard
Lepidium lasiocarpum	Shaggyfruit pepperweed
Lepidium sp.	Pepperweed
Malcolmia africana	African mustard
Sisymbrium altissimum	Tall tumblemustard
Sisymbrium irio	London rocket
Sisymbrium orientale	Indian hedgemustard
Stanleya pinnata	Desert princesplume
Streptanthella longirostris	Longbeak streptanthella
Thysanocarpus curvipes	Sand fringepod
CACTACEAE	
Coryphantha sp.	Beehive cactus
Cylindropuntia acanthocarpa var. *coloradensis*	Colorado buckhorn cholla
Cylindropuntia echinocarpa	Wiggins' cholla
Cylindropuntia ramosissima	Branched pencil cholla
Echinocactus polycephalus	Cottontop cactus
Echinocereus engelmannii	Engelmann's hedgehog cactus
Escobaria sp.	Beehive cactus
Ferocactus cylindraceus	California barrel cactus
Grusonia parishii	Matted cholla
Mammillaria tetrancistra	Common fishhook cactus
Opuntia basilaris	Beavertail pricklypear
Opuntia chlorotica	Dollarjoint pricklypear
Opuntia phaeacantha	Tulip pricklypear
Opuntia polyacantha var. *erinacea*	Grizzlybear pricklypear
CAMPANULACEAE	
Nemacladus glanduliferus var. *orientalis*	Glandular threadplant
CARYOPHYLLACEAE	
Arenaria macradenia	Mojave sandwort
Silene antirrhina	Sleepy silene
CHENOPODIACEAE	
Atriplex canescens	Fourwing saltbush
Atriplex confertifolia	Shadscale saltbush
Atriplex elegans var. *fasciculata*	Wheelscale saltbush
Atriplex polycarpa	Cattle saltbush
Chenopodium incanum var. *occidentale*	Mealy goosefoot
Krascheninnikovia lanata	Winterfat
Monolepis nuttalliana	Nuttall's povertyweed
Salsola tragus	Prickly Russian thistle
Suaeda nigra	Mojave seablite

Scientific Name	Common Name
CUCURBITACEAE	
Cucurbita palmata	Coyote gourd
CUPRESSACEAE	
Juniperus osteosperma	Utah juniper
EPHEDRACEAE	
Ephedra nevadensis	Nevada jointfir
Ephedra viridis	Mormon tea
EUPHORBIACEAE	
Chamaesyce albomarginata	Whitemargin sandmat
Chamaesyce revoluta	Threadstem sandmat
FABACEAE	
Astragalus bernardinus	San Bernardino milkvetch
Astragalus didymocarpus var. *dispermus*	Dwarf white milkvetch
Astragalus lentiginosus var. *borreganus*	Borrego milkvetch
Astragalus lentiginosus var. *fremontii*	Fremont’s milkvetch
Astragalus minthorniae var. *villosus*	Minthorn’s milkvetch
Astragalus nuttallianus var. *imperfectus*	Turkeypeas
Dalea mollissima	Soft prairie clover
Lotus rigidus	Shrubby deervetch
Lotus salsuginosus var. *brevivexillus*	Coastal bird’s-foot trefoil
Lotus strigosus var. *tomentellus*	Strigose bird’s-foot trefoil
Lupinus brevicaulis	Shortstem lupine
Lupinus concinnus var. *orcuttii*	Orcutt’s lupine
Lupinus flavoculatus	Yelloweyes
Lupinus shockleyi	Purple desert lupine
GERANIACEAE	
Erodium cicutarium	Redstem stork’s bill
HELLEBORACEAE	
Delphinium parishii	Desert larkspur
HYDROPHYLLACEAE	
Eucrypta micrantha	Dainty desert hideseed
Nama demissum	Purplemat
Phacelia crenulata var. *ambigua*	Purplestem phacelia
Phacelia anelsonii	Aven Nelson’s phacelia
Phacelia coerulea	Skyblue phacelia
Phacelia cryptantha	Hiddenflower phacelia
Phacelia distans	Distant phacelia
Phacelia fremontii	Fremont’s phacelia
KRAMERIACEAE	
Krameria grayi	White ratany
LAMIACEAE	
Salazaria mexicana	Mexican bladdersage
Salvia columbariae	Chia
Salvia dorrii	Purple sage
Salvia mohavensis	Mojave sage
LOASACEAE	
Mentzelia albicaulis	Whitestem blazingstar
MALVACEAE	
Eremalche rotundifolia	Desert fivespot
Sphaeralcea ambigua	Desert globemallow
Sphaeralcea emoryi	Emory’s globemallow

Scientific Name	Common Name
MIMOSACEAE	
Acacia greggii	Catclaw acacia
MENODORACEAE	
Menodora scabra	Rough menodora
Menodora spinescens	Spiny menodora
NYCTAGINACEAE	
Allionia incarnata var. *villosa*	Trailing windmills
Boerhavia wrightii	Largebract spiderling
Mirabilis laevis var. *villosa*	Wishbone-bush
Mirabilis multiflora	Colorado four o'clock
OLEACEAE	
Forestiera pubescens	Stretchberry
ONAGRACEAE	
Camissonia boothii var. *condensata*	Shredding suncup
Camissonia brevipes	Yellow cups
Camissonia campestris	Mojave suncup
Camissonia chamaenerioides	Longcapsule suncup
Camissonia claviformis var. *aurantiaca*	Browneyes
Camissonia refracta	Narrowleaf suncup
Oenothera caespitosa ssp. *crinita*	Tufted evening primrose
Oenothera primiveris ssp. *bufonis*	Desert evening primrose
Oenothera primiveris ssp. *primiveris*	Desert evening primrose
OROBANCHACEAE	
Orobanche cooperi	Desert broomrape
PAPAVERACEAE	
Argemone corymbosa	Mojave pricklypoppy
Eschscholzia glyptosperma	Desert poppy
Eschscholzia minutiflora	Pygmy poppy
PLANTAGINACEAE	
Plantago ovata	Desert Indianwheat
POLEMONIACEAE	
Aliciella hutchinsifolia	Desert pale gilia
Eriastrum diffusum	Miniature woollystar
Gilia cana ssp. *speciformis*	Showy gilia
Gilia clokeyi	Clokey's gilia
Gilia ophthalmoides	Eyed gilia
Gilia scopulorum	Rock gilia
Gilia sinuata	Rosy gilia
Gilia stellata	Star gilia
Gilia transmontana	Transmontane gilia
Ipomopsis polycladon	Manybranched ipomopsis
Langloisia punctata	Great Basin langloisia
Langloisia setosissima ssp. *punctata*	Great Basin langloisia
Langloisia setosissima ssp. *setosissima*	Moth langloisia
Linanthus aureus	Golden linanthus
Linanthus bigelovii (probable, but don't have the seeds of that taxon)	Bigelow's linanthus
Linanthus demissus	Desertsnow
Linanthus filiformis	Yellow gilia
Linanthus jonesii	Jones' linanthus
Loeseliastrum matthewsii	Desert calico
Loeseliastrum schottii	Schott's calico

Scientific Name	Common Name
POLYGONACEAE	
Chorizanthe brevicornu	Brittle spineflower
Chorizanthe rigida	Devil's spineflower
Eriogonum brachypodum	Parry's buckwheat
Eriogonum deflexum	Flatcrown buckwheat
Eriogonum fasciculatum var. *polifolium*	Eastern Mojave buckwheat
Eriogonum heermannii var. *floccosum*	Clark Mountain buckwheat
Eriogonum inflatum	Desert trumpet
Eriogonum maculatum	Spotted buckwheat
Eriogonum microthecum var. ?	Slender buckwheat
Eriogonum nidularium	Birdnest buckwheat
Eriogonum palmerianum	Palmer's buckwheat
Eriogonum pusillum	Yellowturbans
Eriogonum thomasii	Thomas' buckwheat
Eriogonum trichopes	Little deserttrumpet
Eriogonum umbellatum var. not in flower	Sulphur-flower buckwheat
Eriogonum wrightii	Bastardsage
Rumex hymenosepalus	Canaigre dock
PORTULACACEAE	
Claytonia parviflora complex	Streambank springbeauty
RESEDACEAE	
Oligomeris linifolia	Lineleaf whitepuff
ROSACEAE	
Coleogyne ramosissima	Black bush
Fallugia paradoxa	Apache plume
Prunus fasciculata	Desert almond
Purshia glandulosa	Desert bitterbrush
Purshia stansburiana	Stansbury cliffrose
Purshia tridentata	Antelope bitterbrush
RUBIACEAE	
Galium sp. several that were not flowering yet	Bedstraw
RUTACEAE	
Thamnosma montana	Turpentinebroom
SALICACEAE	
Salix gooddingii	Goodding's willow
SCROPHULARIACEAE	
Castilleja applegatei ssp. *martinii*	Wavyleaf Indian paintbrush
Castilleja angustifolia	Northwestern Indian paintbrush
Mimulus bigelovii	Bigelow's monkeyflower
Mimulus guttatus	Seep monkeyflower
Neogaerrhinum filipes	Yellow twining snapdragon
Penstemon palmeri	Palmer's penstemon
SOLANACEAE	
Datura wrightii	Sacred thorn-apple
Lycium andersonii	Water jacket
Lycium cooperi	Peach thorn
Nicotiana obtusifolia	Desert tobacco
Physalis crassifolia	Yellow nightshade groundcherry
Physalis hederifolia var. *fendleri*	Fendler's groundcherry
VERBENACEAE	
Verbena gooddingii	Southwestern mock vervain

Scientific Name	Common Name
TAMARICACEAE	
Tamarix aphylla	Athel tamarisk
Tamarix parviflora	Smallflower tamarisk
Tamarix ramosissima	Saltcedar
VISCACEAE	
Phoradendron californicum	Mesquite mistletoe
ZYGOPHYLLACEAE	
Kallstroemia californica	California caltrop
Kallstroemia parviflora	Warty caltrop
Larrea tridentata	Creosote bush
AGAVACEAE	
Yucca baccata	Banana yucca
Yucca brevifolia	Joshua tree
Yucca schidigera	Mojave yucca
CYPERACEAE	
Eleocharis parishii	Parish's spikerush
LILIACEAE	
Calochortus kennedyi	Desert mariposa lily
POACEAE	
Achnatherum hymenoides	Indian ricegrass
Achnatherum speciosum	Desert needlegrass
Aristida adscensionis	Sixweeks threeawn
Aristida purpurea var. *longiseta*	Fendler threeawn
Aristida purpurea complex	Purple threeawn
Avena fatua	Wild oat
Bouteloua barbata	Sixweeks grama
Bouteloua curtipendula	Sideoats grama
Bouteloua eriopoda	Black grama
Bromus rigidus	Ripgut brome
Bromus rubens	Red brome
Bromus tectorum	Cheatgrass
Bromus trinii	Chilean chess
Dasyochloa pulchella	Low woollygrass
Elymus elymoides var. *brevifolius*	Squirreltail
Enneapogon desvauxii	Nineawn pappusgrass
Eragrostis cilianensis	Stinkgrass
Hordeum murinum	Mouse barley
Koeleria nitida	Prairie Junegrass
Muhlenbergia porteri	Bush muhly
Pleuraphis jamesii	James' galleta
Pleuraphis rigida	Big galleta
Poa fendleriana	Muttongrass
Polypogon sp.	Rabbitsfoot grass
Schismus barbatus	Common Mediterranean grass
Sporobolus contractus	Spike dropseed
Sporobolus cryptandrus	Sand dropseed
Vulpia octoflora var. *hirtella*	Sixweeks fescue
Vulpia octoflora var. *octoflora*	Sixweeks fescue
THEMIDACEAE	
Androstephium breviflorum	Pink funnel lily
Dichelostemma capitatum	Bluedicks

PLANT SPECIES OBSERVED ON THE NEVADA SEGMENT OF THE IVANPAH TO ELDORADO PROJECT

Scientific Name	Common Name
AIZOACEAE	
Trianthema portulacastrum	Desert horsepurslane
AMARANTHACEAE	
Amaranthus crassipes	Spreading amaranth
Amaranthus fimbriatus	Fringed amaranth
Tidestromia oblongifolia	Arizona honeysweet
ANACARDIACEAE	
Rhus aromatica var. *trilobata*	Skunkbush sumac
APOCYNACEAE	
Amsonia tomentosa	Woolly bluestar
ASCLEPIADACEAE	
Asclepias nyctaginifolia	Mojave milkweed
ASTERACEAE	
Acamptopappus shockleyi	Shockley’s goldenhead
Acamptopappus sphaerocephalus	Rayless goldenhead
Adenophyllum cooperi	Cooper’s dogweed
Ambrosia dumosa	White bursage (burrobush)
Ambrosia eriocentra	Woolly fruit bur ragweed
Anisocoma acaulis	Scalebud
Antheropeas wallacei	Woolly easterbonnets
Baccharis brachyphylla	Shortleaf baccharis
Baileya multiradiata	Desert marigold
Baileya pleniradiata	Woolly desert marigold
Bebbia juncea var. *aspera*	Sweetbush
Brickellia arguta	Pungent brickellbush
Brickellia desertorum	Desert brickellbush
Brickellia incana	Woolly brickellbush
Brickellia oblongifolia var. *linifolia*	Narrowleaf brickellbush
Calycoseris parryi	Yellow tackstem
Calycoseris wrightii	White tackstem
Chaenactis carphoclinia	Pebble pincushion
Chaenactis fremontii	Pincushion flower
Chaenactis macrantha	Bighead dustymaiden
Chaenactis stevioides	Esteve's pincushion
Chaetopappa ericoides	Rose heath
Chrysothamnus paniculatus	Mojave rabbitbrush
Encelia farinosa	Brittlebush
Encelia virginensis	Virgin River brittlebush
Enceliopsis nudicaulis	Nakedstem sunray
Ericameria laricifolia	Turpentine bush
Ericameria linearifolia	Narrowleaf goldenbush
Eriophyllum pringlei	Pringle’s woolly sunflower
Eriophyllum wallacei	Woolly easterbonnets
Glyptopleura marginata	Carveseed
Gutierrezia microcephala	Threadleaf snakeweed
Hymenoclea salsola	Burrobrush
Logfia depressa	Dwarf cottonrose

Scientific Name	Common Name
Machaeranthera arida	Arid tansyaster
Malacothrix glabrata	Smooth desertdandelion
Malacothrix sonchoides	Sowthistle desertdandelion
Monoptilon bellidiforme	Daisy desertstar
Monoptilon bellioides	Mojave desertstar
Palafoxia arida	Desert palafox
Porophyllum gracile	Slender poreleaf
Prenanthella exigua	Brightwhite
Rafinesquia neomexicana	New Mexico plumeseed
Stephanomeria exigua	Small wirelettuce
Stephanomeria pauciflora	Brownplume wirelettuce
Stylocline intertexta	Morefield's neststraw
Stylocline micropoides	Woollyhead neststraw
Thymophylla pentachaeta var. *belenidium*	Fiveneedle pricklyleaf
Uropappus lindleyi	Lindley's silverpuffs
Viguiera parishii	Parish's goldeneye
Xylorhiza tortifolia	Mojave woodyaster
BIGNONIACEAE	
Chilopsis linearis	Desert willow
BORAGINACEAE	
Amsinckia tessellata	Bristly fiddleneck
Cryptantha angustifolia	Panamint cryptantha
Cryptantha barbigera	Bearded cryptantha
Cryptantha circumscissa	Cushion cryptantha
Cryptantha pterocarya var. *cycloptera*	Wingnut cryptantha
Cryptantha pterocarya var. *stenoloba*	Wingnut cryptantha
Cryptantha dumetorum	Bushloving cryptantha
Cryptantha maritima	Guadalupe cryptantha
Cryptantha micrantha	Redroot cryptantha
Cryptantha nevadensis	Nevada cryptantha
Cryptantha utahensis	Scented cryptantha
Cryptantha virginensis	Virgin River cryptantha
Pectocarya heterocarpa	Chuckwalla combseed
Pectocarya platycarpa	Broadfruit combseed
Pectocarya recurvata	Curvenut combseed
Pectocarya setosa	Moth combseed
Plagiobothrys arizonicus	Arizona popcornflower
Plagiobothrys jonesii	Mojave popcornflower
Tiquilia canescens	Woody crinklemat
Tiquilia plicata	Fanleaf crinklemat
BRASSICACEAE	
Arabis pulchra	Beautiful rockcress
Caulanthus cooperi	Cooper's wild cabbage
Descurainia pinnata var. *glabra*	Western tansymustard
Descurainia sophia	Herb sophia
Dithyrea californica	California shieldpod
Draba cuneifolia var. *integrifolia*	Wedgeleaf draba
Guillenia lasiophylla	California mustard
Lepidium fremontii	Desert pepperweed
Lepidium lasiocarpum	Shaggyfruit pepperweed
Lepidium virginicum var. *pubescens*	Hairy pepperweed

Scientific Name	Common Name
Malcolmia africana	African mustard
Sisymbrium irio	London rocket
Streptanthella longirostris	Longbeak streptanthella
Thysanocarpus curvipes	Sand fringepod
CACTACEAE	
Cylindropuntia echinocarpa	Wiggins' cholla
Cylindropuntia ramosissima	Branched pencil cholla
Echinocactus polycephalus	Cottontop cactus
Echinocereus engelmannii	Engelmann's hedgehog cactus
Echinomastus johnsonii	Johnson's fishhook cactus
Escobaria vivipara var. *rosea*	Spinystar
Ferocactus cylindraceus	California barrel cactus
Grusonia parishii	Matted cholla
Mammillaria tetrancistra	Common fishhook cactus
Opuntia basilaris	Beavertail pricklypear
Opuntia polyacantha var. *erinacea*	Grizzlybear pricklypear
CAESALPINIACEAE	
Parkinsonia aculeata	Jerusalem thorn
Senna armata	Desertsenna
Senna armata	Desertsenna
CAMPANULACEAE	
Nemacladus glanduliferus var. *orientalis*	Glandular threadplant
CHENOPODIACEAE	
Atriplex confertifolia	Shadscale saltbush
Atriplex elegans var. *fasciculate*	Wheelscale saltbush
Atriplex hymenelytra	Desertholly
Atriplex polycarpa	Cattle saltbush
Chenopodium incanum var. *occidentale*	Mealy goosefoot
Grayia spinosa	Spiny hopsage
Krascheninnikovia lanata	Winterfat
Salsola tragus	Prickly Russian thistle
Suaeda nigra	Mojave seablite
CUCURBITACEAE	
Cucurbita palmata	Coyote gourd
CUSCUTACEAE	
Cuscuta californica var. *apiculata*	Chaparral dodder
EPHEDRACEAE	
Ephedra nevadensis	Jointfir
EUPHORBIACEAE	
Argythamnia neomexicana	New Mexico silverbush
Chamaesyce albomarginata	Whitemargin sandmat
Chamaesyce polycarpa	Smallseed sandmat
FABACEAE	
Astragalus didymocarpus var. *dispermus*	Dwarf white milkvetch
Astragalus lentiginosus var. *fremontii*	Fremont's milkvetch
Astragalus nuttallianus	Smallflowered milkvetch
Astragalus sabulonum	Gravel milkvetch
Dalea mollissima	Soft prairie clover
Lotus salsuginosus var. *brevivexillus*	Coastal bird's-foot trefoil
Lupinus concinnus var. *orcuttii*	Orcutt's lupine
Lupinus flavoculatus	Yelloweyes

Scientific Name	Common Name
Lupinus shockleyi	Purple desert lupine
Psorothamnus arborescens var. *minutifolius*	Johnson's indigobush
Psorothamnus fremontii	Fremont's dalea
Psorothamnus fremontii complex	Fremont's dalea
GERANIACEAE	
Erodium cicutarium	Redstem stork's bill
HELLEBORACEAE	
Delphinium parishii ssp. *parishii*	Parish's larkspur
HYDROPHYLLACEAE	
Eucrypta micrantha	Dainty desert hideseed
Nama demissum	Purplemat
Nama pusillum	Eggleaf fiddleleaf
Phacelia crenulata var. *ambigua*	Purplestem phacelia
Phacelia fremontii	Fremont's phacelia
Phacelia rotundifolia	Roundleaf phacelia
KRAMERIACEAE	
Krameria grayi	White ratany
LAMIACEAE	
Salazaria mexicana	Mexican bladdersage
Salvia columbariae	Chia
Salvia dorrii	Purple sage
LOASACEAE	
Mentzelia albicaulis	Whitestem blazingstar
Mentzelia obscura	Pacific blazingstar
Mentzelia tricuspis	Spinyhair blazingstar
Petalonyx thurberi	Thurber's sandpaper plant
MALVACEAE	
Sphaeralcea ambigua	Desert globemallow
Sphaeralcea angustifolia	Copper globemallow
Sphaeralcea emoryi	Emory's globemallow
Sphaeralcea parvifolia	Smallflower globemallow
MENODORACEAE	
Menodora spinescens	Spiny menodora
MIMOSACEAE	
Acacia greggii	Catclaw acacia
MOLLUGINACEAE	
Mollugo cerviana	Threadstem carpetweed
NYCTAGINACEAE	
Abronia villosa	Desert sand verbena
Allionia incarnata var. *villosa*	Trailing windmills
Boerhavia wrightii	Largebract spiderling
Mirabilis laevis var. *retrorsa*	Wishbone-bush
Mirabilis multiflora var. *pubescens*	Colorado four o'clock
ONAGRACEAE	
Camissonia boothii var. *condensata*	Shredding suncup
Camissonia brevipes	Yellow cups
Camissonia campestris	Mojave suncup
Camissonia chamaenerioides	Longcapsule suncup
Camissonia claviformis var. *aurantiaca*	Browneyes
Camissonia refracta	Narrowleaf suncup
Oenothera cavernae	Cavedwelling evening primrose

Scientific Name	Common Name
Oenothera caespitosa ssp. *marginata*	Tufted evening primrose
Oenothera deltoides ssp. *deltoides*	Birdcage evening primrose
Oenothera primiveris ssp. *bufonis*	Desert evening primrose
OROBANCHACEAE	
Orobanche cooperi	Desert broomrape
PAPAVERACEAE	
Argemone minuta ssp. *rotundata*	Flatbud pricklypoppy
Eschscholzia glyptosperma	Desert poppy
Eschscholzia minutiflora	Pygmy poppy
PLANTAGINACEAE	
Plantago ovata	Desert Indianwheat
POLEMONIACEAE	
Aliciella hutchinsifolia	Desert pale gilia
Aliciella subacaulis	Pinyon gilia
Eriastrum diffusum	Miniature woollystar
Eriastrum eremicum	Desert woollystar
Gilia cana ssp. *speciformis*	Showy gilia
Gilia hutchinsifolia	Desert pale gilia
Gilia ophthalmoides	Eyed gilia
Gilia scopulorum	Rock gilia
Gilia sinuata	Rosy gilia
Gilia stellata	Star gilia
Gilia subacaulis	Pinyon gilia
Gilia transmontana	Transmontane gilia
Ipomopsis polycladon	Manybranched ipomopsis
Langloisia setosissima ssp. *setosissima*	Moth langloisia
Linanthus aureus	Golden linanthus
Linanthus demissus	Desertsnow
Linanthus filiformis	Yellow gilia
Linanthus jonesii	Jones’ linanthus
Linanthus sp. (like *bigelovii* but need seeds for I.D.)	Linanthus
Loeseliastrum matthewsii	Desert calico
Loeseliastrum schottii	Schott’s calico
POLYGONACEAE	
Chorizanthe brevicornu	Brittle spineflower
Chorizanthe rigida	Devil’s spineflower
Chorizanthe watsonii	Fivetooth spineflower
Eriogonum brachypodum	Parry’s buckwheat
Eriogonum fasciculatum var. *polifolium*	Eastern Mojave buckwheat
Eriogonum inflatum	Desert trumpet
Eriogonum maculatum	Spotted buckwheat
Eriogonum palmerianum	Palmer’s buckwheat
Eriogonum plumatella	Yucca buckwheat
Eriogonum pusillum	Yellowturbans
Eriogonum reniforme	Kidneyleaf buckwheat
Eriogonum thomasii	Thomas' buckwheat
Eriogonum trichopes	Little deserttrumpet
Rumex hymenosepalus	Canaigre dock
Rumex violascens	Violet dock
RANUNCULACEAE	
Anemone tuberosa	Tuber anemone

Scientific Name	Common Name
RESEDACEAE	
Oligomeris linifolia	Lineleaf whitepuff
SCROPHULARIACEAE	
Castilleja angustifolia	Northwestern Indian paintbrush
Neogaerrhinum filipes	Yellow twining snapdragon
Penstemon albomarginatus	Whitemargin beardtongue
Penstemon bicolor ssp. *roseus*	Pinto beardtongue
SOLANACEAE	
Datura wrightii	Sacred thorn-apple
Lycium andersonii	Water jacket
Lycium cooperi	Peach thorn
Nicotiana obtusifolia	Desert tobacco
Physalis crassifolia	Yellow nightshade groundcherry
Physalis hederifolia var. *palmeri*	Palmer's groundcherry
Quincula lobata	Chinese lantern
TAMARICACEAE	
VERBENACEAE	
Aloysia wrightii	Wright's beebrush
Tamarix ramosissima	Saltcedar
VISCACEAE	
Phoradendron californicum	Mesquite mistletoe
ZYGOPHYLLACEAE	
Larrea tridentata	Creosote bush
AGAVACEAE	
Yucca schidigera	Mojave yucca
POACEAE	
Achnatherum speciosum	Desert needlegrass
Aristida adscensionis	Sixweeks threeawn
Aristida purpurea	Purple threeawn
Bouteloua aristidoides	Needle grama
Bouteloua barbata	Sixweeks grama
Bromus madritensis	Compact brome
Bromus rubens	Red brome
Bromus tectorum	Cheatgrass
Cynodon dactylon	Bermudagrass
Dasyochloa pulchella	Low woollygrass
Enneapogon desvauxii	Nineawn pappusgrass
Eragrostis cilianensis	Stinkgrass
Hordeum murinum	Mouse barley
Muhlenbergia porteri	Bush muhly
Pleuraphis rigida	Big galleta
Poa bigelovii	Bigelow's bluegrass
Schismus barbatus	Common Mediterranean grass
Sporobolus cryptandrus	Sand dropseed
Sporobolus flexosus	Mesa dropseed
Tridens muticus var. *elongatus*	Slim tridens
Vulpia octoflora var. *hirtella*	Sixweeks fescue
THEMIDACEAE	
Androstephium breviflorum	Pink funnel lily

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APPENDIX C

RARE, INVASIVE, AND NOXIOUS PLANT SURVEYS

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RARE PLANTS

Rare, invasive, and noxious plant surveys for this project were conducted on April 7, 8, 13, 14, May 1, and September 24, 2008, and April 7 and 13-17, 2009 by Mr. Glenn Clifton, GLC Consulting, Kingman, Arizona. Mr. Clifton developed a target species list by consulting lists of state and federally listed species and similar species lists maintained by the California Native Plant Society (CNPS), the California Natural Diversity Database, the Nevada Natural Heritage Program, the Nevada Native Plant Society, and the Bureau of Land Management (BLM) in California and Nevada. Following development of the target list (Table C1), Mr. Clifton initiated field surveys.

Field surveys were conducted along the project right-of-way and at all ancillary facilities that were on maps provided by Southern California Edison (SCE). Surveys were conducted by driving and walking the right-of-way, and driving along the right-of-way until suitable habitat for one or more of the target species was encountered, then searching that habitat for the species in question. Areas not surveyed included existing substation facilities, the Ivanpah Lake dry playa, and disturbed ground areas and paved roads and parking lots near Primm, Nevada.

All rare plant localities were recorded using a handheld global positioning system unit. Locations were recorded in Universal Transverse Mercator (UTM), North American Datum (NAD 83). Point locations for individuals or small groups of plants were recorded. For larger patches of plants, the width of the patch was recorded by taking a GPS reading at the beginning and end of the patch. Unless patches were very large with many plants, the numbers of plants present at a location was also recorded.

TABLE C1
RARE PLANT TARGET LIST
WITH THE CNPS LIST ON WHICH EACH SPECIES IS LOCATED

Common Name	Scientific Name	CNPS List
LIST 1		
Cima milkvetch	*Astragalus cimae*	1B.2
Limestone daisy	*Erigeron uncialis*	1B.2
Pungent glossopetalon	*Glossopetalon pungens*	1B.2
Jaeger's ivesia	*Ivesia jaegeri*	1B.3
Polished blazing star	*Mentzelia polita*	1B.2
White-margined beardtongue	*Penstemon albomarginatus*	1B.2
Jaeger's phacelia	*Phacelia perityloides* var. *jaegeri*	1B.3
Rusby's desert mallow	*Sphaeralcea rusbyi* var. *eremicola*	1B.2
LIST 2		
Desert ageratina	*Ageratina herbacea*	2.3
Coyote gilia	*Aliciella triodon*	2.2
White bear poppy	*Arctomecon merriamii*	2.2
Mojave milkweed	*Asclepias nyctaginifolia*	2.3
Scaly cloak fern	*Astrolepis cochisensis*	2.3
Red grama	*Bouteloua trifida*	2.3
Viviparous foxtail cactus	*Escobaria vivipara* var. *rosea*	2.2
Gilman's cymopterus	*Cymopterus gilmanii*	2.3
Nine-awned pappus grass	*Enneapogon desvauxii*	2.3
Juniper buckwheat	*Eriogonum umbellatum* var. *juniperinum*	2.3

TABLE C1 RARE PLANT TARGET LIST WITH THE CNPS LIST ON WHICH EACH SPECIES IS LOCATED		
Common Name	**Scientific Name**	**CNPS List**
Hairy erioneuron	*Erioneuron pilosum*	2.3
Clark Mountain spurge	*Euphorbia exstipulata*	2.1
Wright's bedstraw	*Galium wrightii*	2.3
Parish's club cholla	*Grusonia parishii*	2.3
Hairy-podded five-leaf hymenopappus	*Hymenopappus filifolius* var. *eriopodus*	2.3
Knotted rush	*Juncus nodosus*	2.3
Hillside wheat grass	*Leymus salinus mojavensis*	2.3
Plains flax	*Linum puberulum*	2.3
Rough menodora	*Menodora scabra*	2.3
Wing-seed blazing star	*Mentzelia pterosperma*	2.2
Tough muhly	*Muhlenbergia arsenic*	2.3
Delicate muhly	*Muhlenbergia fragilis*	2.2
False buffalo grass	*Munroa squarrosa*	2.2
Cliff brake	*Pellaea truncate*	2.3
Rosy two-toned beardtongue	*Penstemon bicolor* ssp. *roseus*	2.3
Thompson's beardtongue	*Penstemon thompsoniae*	2.3
Utah beardtongue	*Penstemon utahensis*	2.3
Aven Nelson's phacelia	*Phacelia anelsonii*	2.3
Barneby's phacelia	*Phacelia barnebyana*	2.3
Sky-blue phacelia	*Phacelia coerulea*	2.3
Goodding's phacelia	*Phacelia pulchella* var. *gooddingii*	2.3
Chamber's physaria	*Physaria chambersii*	2.3
Small-flowered rice grass	*Piptatherum micranthum*	2.3
Abert's sanvitalia	*Sanvitalia abertii*	2.2
Many-flowered schkuhria	*Schkuhria multiflora*	2.3
Mormon needle grass	*Stipa* (*Achnatherum aridum*) *arida*	2.3
List 4		
Clark Mountain agave	*Agave utahensis* var. *Nevadensis*	4.2
Antelope horns	*Asclepias asperula*	4.3
Black grama	*Bouteloua eriopoda*	4.2
Revolute spurge	*Chamaesyce revolute*	4.3
Utah vine milkweed	*Cynanchum utahense*	4.3
Ash Meadows daisy	*Enceliopsis nudicaulis*	4.3
Dwarf goldenbush	*Ericameria nana*	4.3
Munz's bedstraw	*Galium munzii*	4.3
California mock-pennyroyal	*Hedeoma nana* var. *californica*	4.3
Utah mortonia	*Mortonia utahensis*	4.3
Caespitose evening primrose	*Oenothera caespitosa crinita*	4.2
Rock goldenrod	*Petradoria pumila*	4.3
Desert portulaca	*Portulaca halimoides*	4.2
CNPS Codes: List 1B: Plants rare, threatened or endangered in California and elsewhere List 2: Plants rare, threatened, or endangered in California, but more common elsewhere List 4: Plants of limited distribution, a watch list Threat Codes: 0.1 Seriously endangered in California (high degree/immediacy of threat) 0.2 Fairly endangered in California (moderate degree/immediacy of threat) 0.3 Not very endangered in California (low degree/immediacy of threats or no current threats known)		

Of the target species listed in Table C1, two were found in Nevada; *Penstemon albomarginatus* and *Penstemon bicolor* ssp. *roseus*. Eight different target species, none from List 1.B, were found in the California portion of the project area (Table C2). Figures C1a to C1f show the locations of the target species located by the surveys.

TABLE C2
RARE PLANT SPECIES THAT WERE FOUND DURING FIELD SURVEYS

Common Name	Scientific Name	Number of Plants[1]
NEVADA		
White-margined beardtongue	*Penstemon albomarginatus*	NR
Rosy two-toned beardtongue	*Penstemon bicolor* ssp. *roseus*	42
CALIFORNIA – LIST 2 PLANTS		
Small-flowered androstephium	*Androstephium breviflorum*	NR
Mojave milkweed	*Asclepias nyctaginifolia*	1
Viviparous foxtail cactus	*Coryphantha* sp.	NR
Nine-awned pappus grass	*Enneapogon desvauxii*	2
Parish's club cholla	*Grusonia parishii*	4
Rough menodora	*Menodora scabra*	1
Aven Nelson's phacelia	*Phacelia anelsonii*	NR
Sky-blue phacelia	*Phacelia coerulea*	1
CALIFORNIA – LIST 4 PLANTS		
Borrego milkvetch	*Astragalus lentiginosus* var. *borreganus*	4
Clark Mountain buckwheat	*Eriogonum heermannii* var. *floccosum*	NR
Black grama	*Bouteloua eriopoda*	NR
Utah vine milkweed	*Cynanchum utahense*	1

Number of Plants:
1 – specific UTMs for these observations will be provided to the BLM.
NR – number not recorded – see text under individual species.

White-margined beardtongue – This species was found in the eastern Ivanpah Valley west of the Lucy Gray Mountains and northeast of Primm. Numerous plants were found, all within the area identified by Smith (2001) as Site 9 for *Penstemon albomarginatus*. The plants found during the spring of 2008 are, apparently, part of this previously known population of the species.

Rosy two-toned beardtongue – 42 individuals of this species were found in Nevada, all in the McCullough Mountains. The plants were found at 18 different locations with the number of plants per location ranging between 1 and 11 individuals. The locations of these plants coincide very closely with previously mapped locations for this species (Nevada Natural Heritage Program 2006) and it is likely the plants found during spring 2008 represent previously documented occurrences of this species.

Mojave milkweed – An individual occurrence of this species was recorded in the project right-of-way a little less than 1 mile southwest of the proposed Ivanpah substation.

Viviparous foxtail cactus – *Coryphantha* sp. was found at nine locations with more than one plant present at some locations. Rare plant biologist Mr. Glenn Clifton included both species of

Coryphantha (i.e., *C. chlorantha* and *C. vivipara rosea*) in the project list. However, the plants he found were not in flower and, therefore, could not be ascribed to either species. Others have combined these two species into *Escobaria vivipara* var. *rosea*.

Nine-awned pappus grass – This species was found approximately 2-3 miles southwest of the proposed Ivanpah Substation. Individual plants were found at two locations.

Parish's club cholla- Four individuals of this species were found on and immediately south of the proposed Ivanpah Substation. Plants were found by both the rare plant biologist and biologists conducting general site reconnaissance at different times. It is assumed, therefore, that the same plants were found by both biologists. For that reason we report here only those plants recorded by the rare plant biologist.

Aven Nelson's phacelia – This species was found scattered over a fairly large area just north of the Mountain Pass Substation. Rare plant biologist Glenn Clifton noted, "This is the largest population that has been seen in California." None of the plants were under existing towers.

Sky-blue phacelia – A single individual of this plant was found near the Mountain Pass Substation

Black grama – This plant was found less than .5 mile north of the Mountain Pass Substation.

Utah vine milkweed – This species was found right at the northern edge of the proposed Ivanpah Substation.

INVASIVE SPECIES AND NOXIOUS WEEDS

Noxious weeds by definition are species of weedy, generally non-native, aggressive, and overly competitive plants that have been officially placed on agency lists of noxious weeds. Noxious weeds in the State of Nevada are designated by the Nevada State Department of Agriculture. In California, such designations are made by the California Department of Food and Agriculture.

Noxious Weeds on the California Segment of the Project

The State of California noxious weed list has weeds segregated by pest rating into four groups:

A. Eradication, containment, rejection, or other holding action at the state-county level. Quarantine interceptions to be rejected or treated at any point in the state.
B. Eradication, containment, control, or other holding action at the discretion of the Commissioner.
C. State-endorsed holding action and eradication only when found in a nursery; action to retard spread outside of nurseries at the discretion of the commissioner; reject only when found in cropseed.

Eldorado-Ivanpah Transmission Project

Biological Technical Report

Rare Plants

Figure C1a

Legend

Rare Plants

- ANDBRE *Androstephium breviflorum*
- ASCNYC *Asclepias nyctaginifolia*
- ASTLENBO *Astragalus lentiginosus* var. *borreganus*
- BOUERI *Bouteloua eriopoda*
- CORsp. *Coryphantha* sp.
- CYNUTA *Cynanchum utahensis*
- ENNDES *Enneapogon desvauxii*
- ERIHEEFLO *Eriogonum heermannii* var. *floccosum*
- GRUPAR *Grusonia parishii*
- MENSCA *Menodora scabra*
- PENALB *Penstemon albomarginatus*
- PENBICROS *Penstemon bicolor* var. *roseus*
- PHAANE *Phacelia anelsonii*
- PHACOE *Phacelia coerulea*

220kV Transmission Rebuild

- Proposed Route
- Alternative A
- Alternative B
- Alternative C
- Alternative D
- Alternative E
- Milepost (Numbered)
- Milepost 0 (New Line)

Telecommunications Facilities

- Path 1
- Path 2: Section 1
- Path 2: Section 2
- Path 2: Section 3: Alt 1
- Path 2: Section 3: Alt 2
- Path 2: Section 3: Alts 1 and 2
- Path 2: Section 3A: Proposed MW Route
- Milepost (Numbered)
- Milepost 0 (New Line)

Utilities

- Existing Substation
- Proposed Substation
- Nipton Microwave
- Laydown Area

0 0.25 0.5 1
Miles

Scale = 1:30,000

Sources: USGS, 2004, 2005, 2006, 2008; Clark County Comprehensive Planning, 2007; SCE, 2006, 2008; FEMA,1996; BLM, 1998, 2005, 2006; EPG, 2008; SCAG, 2008; Global Energy Divisions LLC, 2006; ESRI ArcGIS Online Shaded Relief World, 2008

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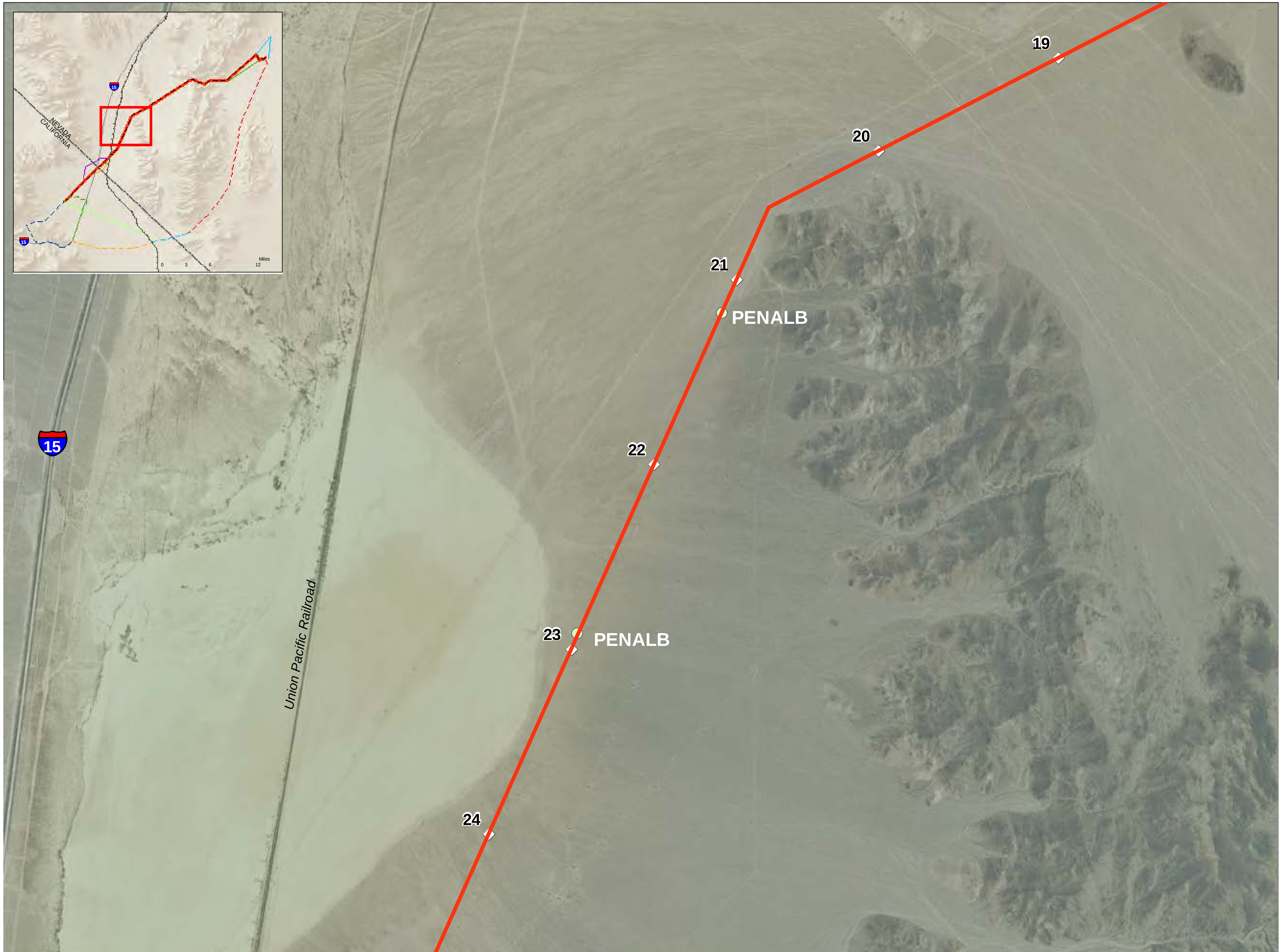

Eldorado-Ivanpah Transmission Project

Biological Technical Report

Rare Plants

Figure C1b

Legend

Rare Plants

- ANDBRE *Androstephium breviflorum*
- ASCNYC *Asclepias nyctaginifolia*
- ASTLENBO *Astragalus lentiginosus* var. *borreganus*
- BOUERI *Bouteloua eriopoda*
- CORsp. *Coryphantha* sp.
- CYNUTA *Cynanchum utahensis*
- ENNDES *Enneapogon desvauxii*
- ERIHEEFLO *Eriogonum heermannii* var. *floccosum*
- GRUPAR *Grusonia parishii*
- MENSCA *Menodora scabra*
- PENALB *Penstemon albomarginatus*
- PENBICROS *Penstemon bicolor* var. *roseus*
- PHAANE *Phacelia anelsonii*
- PHACOE *Phacelia coerulea*

220kV Transmission Rebuild

- Proposed Route
- Alternative A
- Alternative B
- Alternative C
- Alternative D
- Alternative E
- Milepost (Numbered)
- Milepost 0 (New Line)

Telecommunications Facilities

- Path 1
- Path 2: Section 1
- Path 2: Section 2
- Path 2: Section 3: Alt 1
- Path 2: Section 3: Alt 2
- Path 2: Section 3: Alts 1 and 2
- Path 2: Section 3A: Proposed MW Route
- Milepost (Numbered)
- Milepost 0 (New Line)

Utilities

- Existing Substation
- Proposed Substation
- Nipton Microwave
- Laydown Area

0 0.25 0.5 1
Miles

Scale = 1:30,000

Sources: USGS, 2004, 2005, 2006, 2008; Clark County Comprehensive Planning, 2007; SCE, 2006, 2008; FEMA,1996; BLM, 1998, 2005, 2006; EPG, 2008; SCAG, 2008; Global Energy Divisions LLC, 2006; ESRI ArcGIS Online Shaded Relief World, 2008

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Eldorado-Ivanpah Transmission Project

Biological Technical Report

Rare Plants

Figure C1c

Legend

Rare Plants

- ANDBRE *Androstephium breviflorum*
- ASCNYC *Asclepias nyctaginifolia*
- ASTLENBO *Astragalus lentiginosus* var. *borreganus*
- BOUERI *Bouteloua eriopoda*
- CORsp. *Coryphantha* sp.
- CYNUTA *Cynanchum utahensis*
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- PENALB *Penstemon albomarginatus*
- PENBICROS *Penstemon bicolor* var. *roseus*
- PHAANE *Phacelia anelsonii*
- PHACOE *Phacelia coerulea*

220kV Transmission Rebuild

- Proposed Route
- Alternative A
- Alternative B
- Alternative C
- Alternative D
- Alternative E
- Milepost (Numbered)
- Milepost 0 (New Line)

Telecommunications Facilities

- Path 1
- Path 2: Section 1
- Path 2: Section 2
- Path 2: Section 3: Alt 1
- Path 2: Section 3: Alt 2
- Path 2: Section 3: Alts 1 and 2
- Path 2: Section 3A: Proposed MW Route
- Milepost (Numbered)
- Milepost 0 (New Line)

Utilities

- Existing Substation
- Proposed Substation
- Nipton Microwave
- Laydown Area

0 0.25 0.5 1
Miles

Scale = 1:30,000

Sources: USGS, 2004, 2005, 2006, 2008; Clark County Comprehensive Planning, 2007; SCE, 2006, 2008; FEMA,1996; BLM, 1998, 2005, 2006; EPG, 2008; SCAG, 2008; Global Energy Divisions LLC, 2006; ESRI ArcGIS Online Shaded Relief World, 2008

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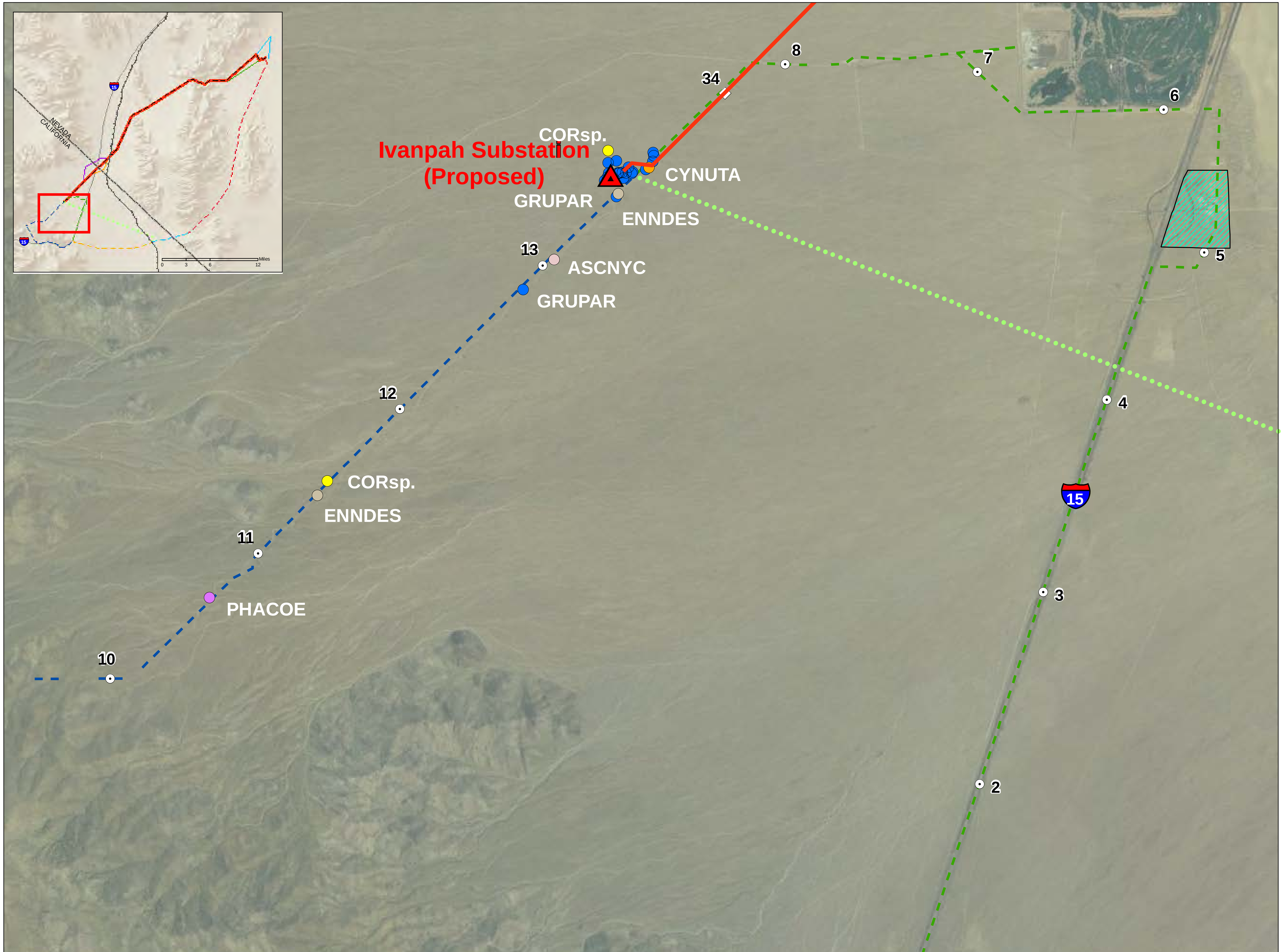

Eldorado-Ivanpah Transmission Project

Biological Technical Report

Rare Plants

Figure C1d

Legend

Rare Plants

- ANDBRE *Androstephium breviflorum*
- ASCNYC *Asclepias nyctaginifolia*
- ASTLENBO *Astragalus lentiginosus* var. *borreganus*
- BOUERI *Bouteloua eriopoda*
- CORsp. *Coryphantha* sp.
- CYNUTA *Cynanchum utahensis*
- ENNDES *Enneapogon desvauxii*
- ERIHEEFLO *Eriogonum heermannii* var. *floccosum*
- GRUPAR *Grusonia parishii*
- MENSCA *Menodora scabra*
- PENALB *Penstemon albomarginatus*
- PENBICROS *Penstemon bicolor* var. *roseus*
- PHAANE *Phacelia anelsonii*
- PHACOE *Phacelia coerulea*

220kV Transmission Rebuild

- Proposed Route
- Alternative A
- Alternative B
- Alternative C
- Alternative D
- Alternative E
- Milepost (Numbered)
- Milepost 0 (New Line)

Telecommunications Facilities

- Path 1
- Path 2: Section 1
- Path 2: Section 2
- Path 2: Section 3: Alt 1
- Path 2: Section 3: Alt 2
- Path 2: Section 3: Alts 1 and 2
- Path 2: Section 3A: Proposed MW Route
- Milepost (Numbered)
- Milepost 0 (New Line)

Utilities

- Existing Substation
- Proposed Substation
- Nipton Microwave
- Laydown Area

0 0.25 0.5 1
Miles

Scale = 1:30,000

Sources: USGS, 2004, 2005, 2006, 2008; Clark County Comprehensive Planning, 2007; SCE, 2006, 2008; FEMA,1996; BLM, 1998, 2005, 2006; EPG, 2008; SCAG, 2008; Global Energy Divisions LLC, 2006; ESRI ArcGIS Online Shaded Relief World, 2008

SOUTHERN CALIFORNIA EDISON

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Eldorado-Ivanpah Transmission Project

Biological Technical Report

Rare Plants

Figure C1e

Legend

Rare Plants

- ANDBRE *Androstephium breviflorum*
- ASCNYC *Asclepias nyctaginifolia*
- ASTLENBO *Astragalus lentiginosus* var. *borreganus*
- BOUERI *Bouteloua eriopoda*
- CORsp. *Coryphantha* sp.
- CYNUTA *Cynanchum utahensis*
- ENNDES *Enneapogon desvauxii*
- ERIHEEFLO *Eriogonum heermannii* var. *floccosum*
- GRUPAR *Grusonia parishii*
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- PENALB *Penstemon albomarginatus*
- PENBICROS *Penstemon bicolor* var. *roseus*
- PHAANE *Phacelia anelsonii*
- PHACOE *Phacelia coerulea*

220kV Transmission Rebuild

- Proposed Route
- Alternative A
- Alternative B
- Alternative C
- Alternative D
- Alternative E
- Milepost (Numbered)
- Milepost 0 (New Line)

Telecommunications Facilities

- Path 1
- Path 2: Section 1
- Path 2: Section 2
- Path 2: Section 3: Alt 1
- Path 2: Section 3: Alt 2
- Path 2: Section 3: Alts 1 and 2
- Path 2: Section 3A: Proposed MW Route
- Milepost (Numbered)
- Milepost 0 (New Line)

Utilities

- Existing Substation
- Proposed Substation
- Nipton Microwave
- Laydown Area

0 0.25 0.5 1
Miles

Scale = 1:30,000

Sources: USGS, 2004, 2005, 2006, 2008; Clark County Comprehensive Planning, 2007; SCE, 2006, 2008; FEMA,1996; BLM, 1998, 2005, 2006; EPG, 2008; SCAG, 2008; Global Energy Divisions LLC, 2006; ESRI ArcGIS Online Shaded Relief World, 2008

SOUTHERN CALIFORNIA EDISON

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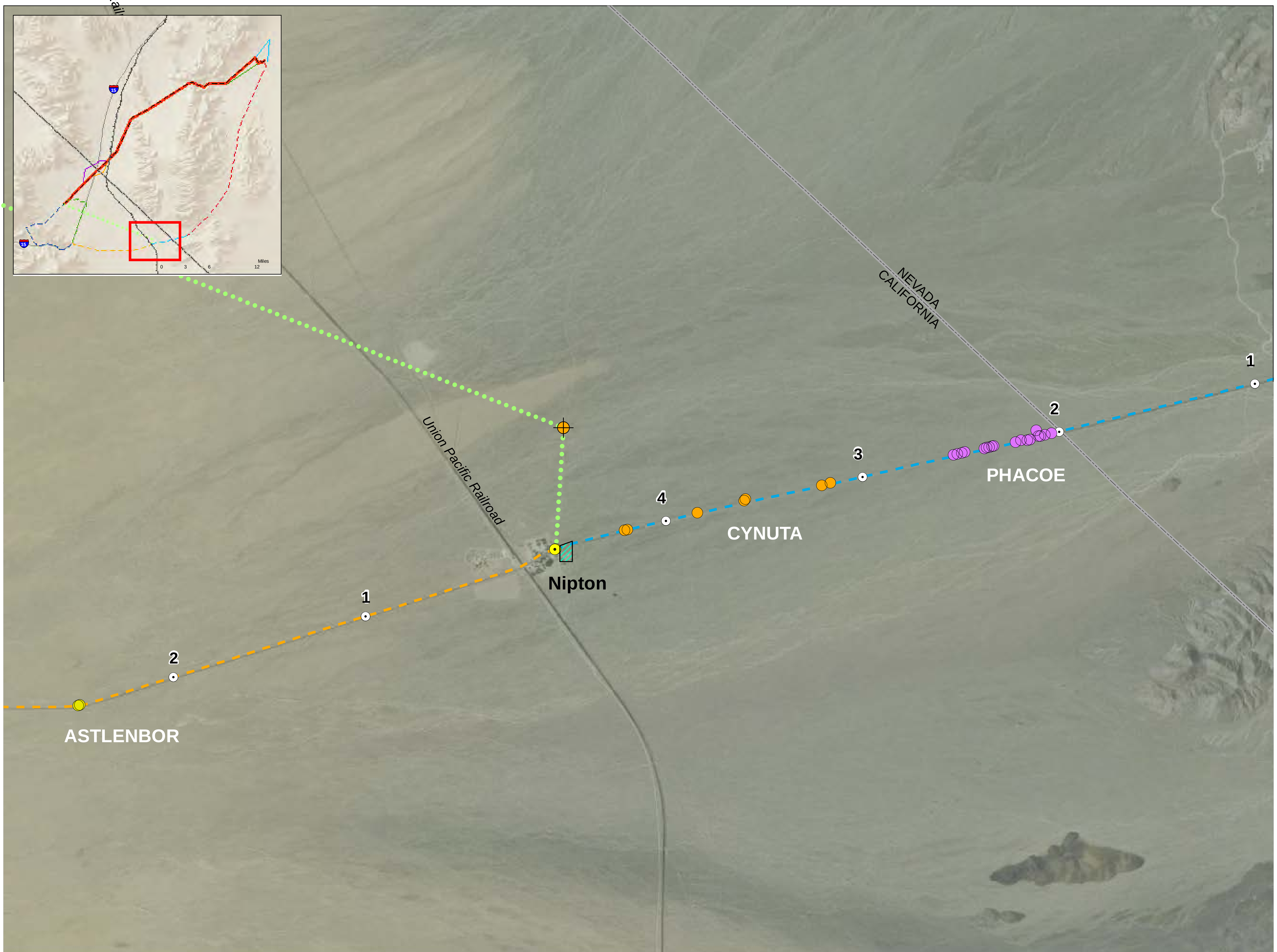

Eldorado-Ivanpah Transmission Project

Biological Technical Report

Rare Plants

Figure C1f

Legend

Rare Plants

- ANDBRE *Androstephium breviflorum*
- ASCNYC *Asclepias nyctaginifolia*
- ASTLENBO *Astragalus lentiginosus* var. *borreganus*
- BOUERI *Bouteloua eriopoda*
- CORsp. *Coryphantha* sp.
- CYNUTA *Cynanchum utahensis*
- ENNDES *Enneapogon desvauxii*
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- PENBICROS *Penstemon bicolor* var. *roseus*
- PHAANE *Phacelia anelsonii*
- PHACOE *Phacelia coerulea*

220kV Transmission Rebuild

- Proposed Route
- Alternative A
- Alternative B
- Alternative C
- Alternative D
- Alternative E
- Milepost (Numbered)
- Milepost 0 (New Line)

Telecommunications Facilities

- Path 1
- Path 2: Section 1
- Path 2: Section 2
- Path 2: Section 3: Alt 1
- Path 2: Section 3: Alt 2
- Path 2: Section 3: Alts 1 and 2
- Path 2: Section 3A: Proposed MW Route
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Utilities

- Existing Substation
- Proposed Substation
- Nipton Microwave
- Laydown Area

0 0.25 0.5 1
Miles

Scale = 1:30,000

Sources: USGS, 2004, 2005, 2006, 2008; Clark County Comprehensive Planning, 2007; SCE, 2006, 2008; FEMA,1996; BLM, 1998, 2005, 2006; EPG, 2008; SCAG, 2008; Global Energy Divisions LLC, 2006; ESRI ArcGIS Online Shaded Relief World, 2008

SOUTHERN CALIFORNIA EDISON

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Q Temporary "A" action outside of nurseries at the state-county level pending Determination of permanent rating. Species on List 2 "Federal Noxious Weed Regulation" are given an automatic "Q" rating when evaluated in California.

In meetings between SCE and the Needles Field Office of the BLM, the BLM expressed concern about saltcedar (*Tamarix ramosissima*), Sahara mustard (*Brassica tournefortii*), cheatgrass (*Bromus tectorum*), other species of *Bromus*, and *Schismus* spp. None of these plants are on the California State Noxious Weed List, although most of these plants are invasive and all are non-native to the region. There are several species of *Bromus* that are native to North America, but most of the species currently included in the flora of the southwestern United States are not native. *Bromus tectorum* and another common species *B. madritensis rubens* are native to Europe and Eurasia, respectively.

Saltcedar was encountered during surveys at one location in California just barely within the proposed right-of-way at the state line. Mr. Clifton did not specify the location of his observation, but we surmise he observed the same patch of saltcedar east of Interstate 15 near Ivanpah Lake that was documented in the biological resources report for the Brightsource Solar Project.

Bromus tectorum and *B. madritensis rubens* were both found in the California segment of the project. *Bromus madritensis rubens* (red brome) was noted to be particularly common on the south side of Ivanpah Lake, but the species is widely distributed in the project area and generally established to the point that control of it is impractical. *Bromus tectorum (*cheatgrass) is less widely distributed, but still established to the point that control or eradication is not feasible. *Bromus tectorum*, while it does occur in the project area, is much more common farther north in the ecotone between the Mojave and Great Basin Desert and in the Great Basin Desert proper.

Schismus barbatus (Mediterranean grass) was noted by the biological resources reconnaissance team to be widely distributed in the project area, particularly on fine-soiled creosote bush-white bursage flats.

Brassica tournefortii (Sahara mustard) was not observed in California by either the rare plant biologist or the biological reconnaissance team.

Of the species that are included on the California Noxious Weed List, only *Salsola tragus* (Russian thistle) and *Orobanche cooperi* (desert broomrape) were observed during field studies in April and May 2008. Russian thistle may occur at almost any location in the project area where soils have been disturbed. Russian thistle is not a native species and is included in Group C on the California Noxious Weed List. Desert broomrape is parasitic on *Ambrosia* spp. (bursage), *Hymenoclea salsola* (cheese bush), and *Encelia* spp. (brittlebush) and is likely to occur anywhere in the project area these species occur. Desert broomrape is a native species that occurs in Utah, Arizona, southern California, and Baja California (Baldwin et al. 2002) and is included in Group A on the California State Noxious Weed List.

Noxious Weeds on the Nevada Segment of the Project

The State of Nevada Noxious Weed List is divided into three categories (Bartz 2006):

> Category A weeds are generally not found or are limited in distribution throughout the State. Such weeds are subject to:
> 1. Active exclusion from the state and active eradication wherever found.
> 2. Active eradication from the premises of a dealer of nursery stock.
>
> Category B weeds are generally established in scattered populations in some counties of the State. Such weeds are subject to:
> 1. Active exclusion where possible
> 2. Active eradication from the premises of a dealer or nursery stock.
>
> Category C weeds are generally established and widespread in many counties of the state. Such weeds are subject to active eradication from the premises of a dealer or nursery stock.

In meetings between SCE and the BLM Las Vegas Field Office, concern was expressed about the possible occurrence of Sahara mustard (*Brassica tournefortii*), a species that is native to the Mediterranean region of Europe (Baldwin et al. 2002) and north Africa (Munz 1974) and is included on the Nevada State Noxious Weed List in Category B.

An individual plant of *Brassica* cf. *tournefortii* was found on the west side of the McCullough Mountains on 7 April 2008. The plant was found by the biology reconnaissance team in an area dominated by creosote bush, white bursage, and Wiggins' cholla on fairly level terrain. The UTMs (NAD 83) for this plant are 11S E 0664134 – N 3958802. No other individual of this plant was recorded by either the biology reconnaissance team or the rare plant biologist. Saltcedar was observed at one location in Nevada on Alternative C at a manmade depression next to the State Line. Saltcedar is on the Nevada State Noxious Weed List in Category C. A summary of noxious weed species observed on the project are given in Table C3.

TABLE C3
NOXIOUS WEED SPECIES DOCUMENTED ON THE PROJECT

Common Name	Scientific Name	CIPI Invasiveness Rating	Control	Project Segment
Wild oat	*Avena fatua*	Moderate	Control	CA
Asian mustard	*Brassica tournefortii*	High	Eradicate	CA & NV
Compact brome	*Bromus madritensis* var. *rubens*	High	Not feasible	CA & NV
Cheatgrass	*Bromus tectorum*	High	Not feasible	CA
Chilean chess	*Bromus trinii*	Not rated*	Not rated*	CA
Bermudagrass	*Cynodon dactylon*	Moderate	Control	NV
Redstem stork's bill	*Erodium cicutarium*	Limited	Not feasible	CA & NV
African mustard	*Malcolmia africana*	Not rated*	Not rated*	CA & NV
Russian thistle	*Salsola tragus*	Limited	Eradicate	CA & NV
Mediterranean grass	*Schismus barbatus*	Limited	Not feasible	CA & NV

TABLE C3 NOXIOUS WEED SPECIES DOCUMENTED ON THE PROJECT				
Common Name	**Scientific Name**	**CIPI Invasiveness Rating**	**Control**	**Project Segment**
London rocket	*Sysimbrium irio*	Moderate	Control	NV
Saltcedar	*Tamarix ramosissima*	High	Eradicate	CA & NV

*USDA listing as invasive, not rated.
CIPI Ratings:
High – These species have severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. Most are widely distributed ecologically.
Moderate – These species have substantial and apparent, but generally not severe, ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal, though establishment is generally dependent upon ecological disturbance. Ecological amplitude and distribution may range from limited to widespread.
Limited – These species are invasive but their ecological impacts are minor on a statewide level or there was not enough information to justify a higher score. Their reproductive biology and other attributes result in low to moderate rates of invasiveness. Ecological amplitude and distribution are generally limited, but these species may be locally persistent and problematic.

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APPENDIX D

DESERT TORTOISE REPORT 2008

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Alice E. Karl, Ph.D.
P.O. Box 74006
Davis, California
95617

May 18, 2009

Dr. E. Linwood Smith
Environmental Planning Group, Inc.
4141 North 32nd Street, Suite 102
Phoenix, Arizona 85018

Re: Eldorado-Transmission Project, 2008 Desert Tortoise Survey of the Proposed Route

INTRODUCTION

Southern California Edison (SCE) is proposing to develop the Eldorado-Ivanpah Transmission Project (Project) near Primm, Clark County, Nevada. The Project includes the replacement of the existing 115kV transmission line with a new double-circuit 220kV line between the Eldorado Substation (Nevada) and Ivanpah Substation (California) ("proposed route"). In addition, several alternative routes are under examination, as are two substation sites and several telecommunications routes. The latter would require new lines and/or the upgrade of existing facilities.

The purpose of the present survey was to identify the presence of desert tortoise on and adjacent to the proposed (i.e., preferred) transmission line route and to map sign concentrations. These data will enter into an ultimate analysis of all Project effects on desert tortoise, which will be used to support consultation with state and federal agencies and several plans and permits. The 2008 survey was the initial survey in an ultimate suite of surveys that will be finished in 2009, including more on the proposed route. This report presents a summary of 2008 results. A thorough analysis of desert tortoise impacts will be completed following the data collection for the rest of the proposed route and other Project elements in 2009.

ENVIRONMENTAL SETTING

The proposed route extends for approximately 41 miles from the Eldorado Substation in Clark County, Nevada, to the Mountain Pass Substation in San Bernardino County, California (Figure 1). The route is located in the same right-of-way as the existing transmission line and was assumed to be 200 feet wide to accommodate new spur roads and some flexibility in tower placement.

Topography along the route ranges from playas (Roach and Ivanpah dry lakes) in Ivanpah Valley, through bajadas and to mountains. Elevations range from approximately 2,000 feet in the valley to approximately 3,400 feet in McCullough Pass and 5,200 feet near Mountain Pass Substation.

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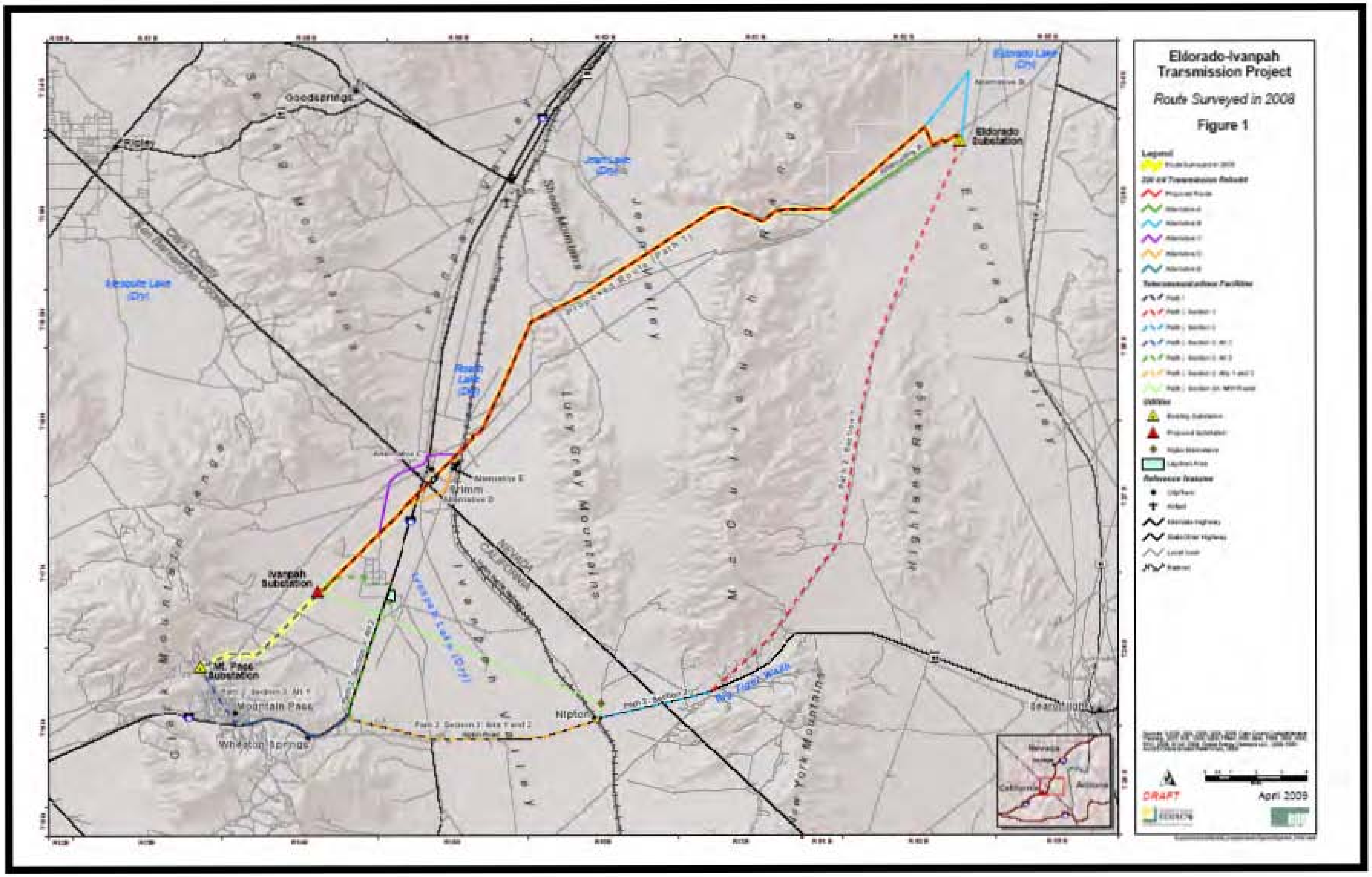

Eldorado-Ivanpah
Trarsmission Project
Route Surveyed in 2008
Figure 1
Goodsprings
Eldorado Subestation
Ivanpah Substation
Mt. Pass Substation
Mountain Pass
Wheaton Springs
Nipton
Primm
Proposed Route (Path 1)
Mesquite Lake (Dry)
Ivanpah Lake (Dry)
Eldorado Lake (Dry)
Roach Lake (Dry)
Lucy Gray Mountains
New York Mountains
Highland Range
McCullough Mountains
Searchlight
Nevada
California
Arizona
DRAFT
April 2009

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SURVEY METHODS

Surveys were conducted between 13 and 23 May 2008, inclusive. Pedestrian transects were completed consistent with the U.S. Fish and Wildlife Service (USFWS) "protocol" desert tortoise transects (USFWS 1992[1]). One-hundred percent of the transmission line right-of-way (ROW) was surveyed using parallel, 30-foot-wide belt transects; the ROW was assumed to be 200 feet (seven transects). In addition, 30-foot-wide, "Zone-of-influence" (ZOI) transects were walked on both sides of the ROW at 100, 300, 600, 1200, and 2400 feet from the outer edges of the ROW. The only exception was on Ivanpah and Roach dry lakes, where ZOIs on unvegetated portions of the lake (not tortoise habitat) were not walked.

On all transects, all tortoise sign (e.g., individuals, dens, burrows, scat, tracks, pellets, skeletal remains) observed was measured, mapped and described relative to condition, size, and (where applicable) gender. Current and recent weather conditions were recorded to identify the potential for tortoise activity and the topography, drainage patterns, soils, substrates, plant cover, anthropogenic disturbances, and aspect-dominant, common and occasional plant species were described and mapped. Mapping sign and habitat features was achieved using Global Positioning System (GPS) units. All transect data were recorded on specially-designed forms (Attachment 1). Every mile of ROW was photographed, as well as zone-of-influence transects.

Six very experienced personnel walked the survey, each with between six and 30 years experience searching for and studying tortoises on many types of surveys, including tortoise mark-recapture plots, telemetry studies, behavioral studies, and linear surveys. In addition, Environmental Planning Group (EPG) supplied three biologists who were familiar with conducting field surveys and knew many of the species. Less experienced surveyors were familiarized with desert tortoise sign and only walked the ROW initially, in order to learn about desert tortoises and where to look for sign. In the ROW they were always adjacent to experienced surveyors. Inexperienced personnel conducted some ZOI transects after the initial learning period, but their transects were always adjacent to those of more experienced surveyors.

The weather was clear, warm, and calm during the surveys, with maximum daily air temperatures of approximately 100 degrees Fahrenheit (38 degrees Celsius).

Although the goal of the survey was to search for desert tortoise, other special-status species known to be in the survey area were also sought. An inventory was also kept of all species observed. These results will be reported during the comprehensive report for the Project.

SURVEY RESULTS

[1] United States Department of the Interior Fish and Wildlife Service. 1992. Field Survey Protocol for Any Federal Action That May Occur within the Range of the Desert Tortoise. Available online at http://ventura.fws.gov/es/protocols/de_tortoise_fsp.pdf

A total of 302 tortoise sign was observed, including 19 tortoises, 177 burrows,74 scat, 20 carcasses or carcass parts and 12 other types of sign (e.g., tracks, drinking depressions) (Table 1, Figure 2). Most of the sign was observed in Nevada, on the east side of the McCullough Mountains, on the northern edge of the Lucy Gray range, and southeast of Roach Lake.

CONTINUED PROJECT SURVEYS AND FUTURE ANALYSIS

The data presented in this letter report are only part of the data set that is currently being collected for the Project. Because of gaps in that data set, the analysis of Project impacts to desert tortoises from the 2008 data alone is premature. Surveys will be completed in 2009 for the remainder of the proposed route, alternatives, substations, telecommunications alternatives, laydown areas, pulling and tensioning sites, and other Project features. Based on the complete data set, as well as discussions with SCE on the Project description (about which I have almost no information), a comprehensive report will be written to include all Project data and analyze the following:

- Project impacts to the affected desert tortoise population from the Project in its entirety and from individual Project elements
- Project impacts to desert tortoise recovery
- Cumulative impacts based on other energy developments in the area
- Project impacts to other special-status species observed

A mitigation plan will be developed based on Project effects and standard and suggested agency practices. Habitat compensation will be analyzed based on the requirements of both Nevada and California resource agencies.

Respectfully,

Alice E. Karl

Alice E. Karl, Ph.D.

TABLE 1

ELDORADO-IVANPAH TRANSMISSION PROJECT
RESULTS OF 2008 DESERT TORTOISE SURVEYS
ON THE PROPOSED ROUTE

Species	Easting[1]	Northing	Sign Type[2]	Class[3]	Width/Size[4]	Surveyor's Additional Notes
Desert Tortoise	667507	3958333	Burrow	4	various	7-10 possible burrows in caliche. Cleaned out, no other tortoise sign. Rodent scat in some.
	654603	3952873	Burrow	5	210	Opposite bush from Sign No. LB04
	653680	3952392	Burrow	2	370	
	642422	3937852	Burrow	2	280	
	640181	3935608	Burrow	5	280	
	678319	3963352	Burrow	5	180	
	676079	3962639	Burrow	4	310	Berm of roadside
	669796	3959727	Burrow	3	530	Caliche burrow, TY-2/3 scat outside and inside, 13mm
	668667	3959766	Burrow	4	260	
	668584	3959363	Burrow	2	290	
	669850	3959303	Burrow	4	230	Caliche burrow, bank of wash, raised 0.5m
	669316	3959207	Burrow	4	240	Caliche burrow, bank of wash, no other sign
	669156	3959204	Burrow	6	180	
	668886	3959189	Burrow	4	260-330	3 caliche burrows together rodent and canine scat, no other tort.
	651770	3949908	Burrow	3	200	
	639575	3935000	Burrow	4	230	No other sign, can't see end
	651646	3947447	Burrow	3	270	
	651728	3947580	Burrow	3	240	1 foot deep, under *Larrea tridentata*
	652351	3949241	Burrow	3	300	~5' south is another tortoise burrow - 190 mm wide
	652539	3949722	Burrow	6	220	Rocky upper bajada, next to old canid(?) burrow

Species	Easting[1]	Northin g	Sign Type[2]	Class[3]	Width/Size[4]	Surveyor's Additional Notes
	650268	3945811	Burrow	4	280	Canid scat, possibly modified by canid?
	671219	3958572	Burrow	2		Caliche, scat
	671176	3958550	Burrow	2		Caliche
	670921	3958516	Burrow	2		Caliche
	670877	3958757	Burrow	2/4	340	Caliche
	670507	3958811	Burrow	2	340	
	670383	3958846	Burrow	2/4		Caliche, series of 3 caves, clean and flat, goes back at least 3m
	670844	3958925	Burrow	1	220	
	671327	3958939	Burrow	1	320	With tortoise
	667316	3958196	Burrow	1	205	2 burrows and 1 pallet(205) burrows under boulders, 1 goes back at least 1.5m another is shallow, pallet in gravelly soil.
	667433	3958223	Burrow	>2 and 4	Not Measured	With 1 scat (18mm); series of 7 caliche caves
	667711	3958393	Burrow	1	340	With tracks
	669951	3958920	Burrow	4	170	Small but goes back 0.4m
	664709	3959011	Burrow	3	215	
	666624	3958554	Burrow	4	340	Dug out under large boulder, tortoise shaped, but sloppy inside
	661421	3957017	Burrow	4	130	Very small, entrance deteriorated
	658795	3955302	Burrow	6	340	
	653498	3952257	Burrow	5	245	Now used by something else
	654274	3952619	Burrow	2	255	
	654676	3952864	Burrow	5	300	Collapsed
	651756	3949864	Burrow	5	400	Cobbly soil, slightly caved in inside
	649187	3944552	Burrow	3	260	
	649902	3945681	Burrow	3	290	
	650414	3946816	Burrow	3	180	
	639152	3934527	Burrow	4	340	Cobbly wash, has flat bottom
	638827	3934310	Burrow	6	360	Caved in and full of webs, looks like tortoise

Species	Easting[1]	Northin g	Sign Type[2]	Class[3]	Width/Size[4]	Surveyor's Additional Notes
	640223	3935525	Burrow	1	310	With tortoise, fresh tracks on mound
	651619	3950044	Burrow	1	225	With tortoise; burrow is 12 m from dirt road
	651718	3950257	Burrow	2	205	
	652162	3951064	Burrow	2	230	
	652337	3951446	Burrow	3	240	
	652501	3951864	Burrow	3	200	
	652697	3951772	Burrow	2	340	In road berm under 220kV like enroute to transect
	653230	3952037	Burrow	6	320	
	653761	3951611	Burrow	3	340	Burrow is 5m off 220kV access road to a tower and has a 0.25 inch mesh fence halfway around it (photo)
	652910	3950591	Burrow	1	225	With tortoise inside
	652824	3950413	Burrow	2	255	
	652725	3950172	Burrow	1	250	
	652280	3950522	Burrow	5	245	
	652287	3950536	Burrow	3	260	
	652569	3951233	Burrow	3	240	
	652699	3951485	Burrow	2	245	
	652879	3951888	Burrow	1	155	
	653193	3952046	Burrow	1	250	With tortoise, dirt-bike trail runs over it and may have collapsed part of the burrow at an earlier date (photo)
	653438	3952170	Burrow	2	240	
	654275	3952594	Burrow	1	300	Under a group of 8 *Yucca schidigera*
	654495	3952824	Burrow	2 & 1	160	2 burrows- 1 short, the other 0.5 m deep under LAARTR 2 m apart, short burrow is Class 1
	654385	3952794	Burrow	2	240	
	654196	3952684	Burrow	1	240	With tortoise
	653944	3952547	Burrow	3	150	

Species	Easting[1]	Northing	Sign Type[2]	Class[3]	Width/Size[4]	Surveyor's Additional Notes
	653934	3952541	Burrow	1	160	Deep for a small tortoise, 1.5m with dirt-bike tracks criss-crossing it(photo)
	653402	3952264	Burrow	5	265	
	653367	3952254	Burrow	1	300	With scat (2) 17mm
	652891	3952031	Burrow	5	300	
	652877	3952022	Burrow	3	265	
	652462	3951204	Burrow	2	330	2 burrows and a pallet within 2m of each other. In a 0.5 m high berm under wires of 220 kV line
	652451	3951173	Burrow	5	330?	Collapsed
	652288	3950847	Burrow	1	290	
	665964	3958723	Burrow	2	470	Caliche burrow, scat outside TY-3, 15 and 17 mm
	654679	3952874	Burrow	2	332	
	654524	3952798	Burrow	3	335	In bank
	654527	3952791	Burrow	4	190	
	653794	3952444	Burrow	3	275	
	652227	3951009	Burrow	3	360	NTY scat (16 mm) on burrow apron
	652097	3950746	Burrow	3	380	
	672672	3959643	Burrow	3	281	NTY-3 scat
	667699	3957854	Burrow		392	
	667927	3958020	Burrow	2	290	
	667193	3957954	Burrow	1	290	Under boulder with tracks
	667147	3957962	Burrow	4	192	
	666912	3958079	Burrow	5	318	
	672424	3959382	Burrow	3	268	Seen en route to transect
	673588	3960029	Burrow	5	272	
	672105	3958345	Burrow	2	282	
	674014	3959737	Burrow	2	262	
	675334	3960796	Burrow	5	220	Seen en route to transect
	674587	3960341	Burrow	6	230	
	673307	3959388	Burrow	3	400	Probably same tortoise as Sign Nos. KB15, 16, 17

Species	Easting[1]	Northing	Sign Type[2]	Class[3]	Width/Size[4]	Surveyor's Additional Notes
	673309	3959389	Burrow	3	360	Cluster of 3 burrows, probably same tortoise as Sign Nos. KB14, 16, and 17
	673306	3959385	Burrow	2	350	Probably same tortoise as Sign Nos. KB14, 15, 17
	673284	3959380	Burrow	2	330	Probably same tortoise as Sign Nos. KB14, 15, 16
	678251	3961898	Burrow	3	325	In a kit fox den
	677994	3962191	Burrow	6	230	
	675696	3961222	Burrow	3	309	
	672643	3959547	Burrow	5	270	Probably same tortoise as Sign No. KB22.
	672653	3959557	Burrow	3	310	Same wash as KB21
	672927	3959779	Burrow	3	260	
	672704	3959655	Burrow	1	301	With tortoise
	669899	3958152	Burrow	3/4	279	Caliche
	654640	3952886	Burrow	2	263	
	654604	3952870	Burrow	1	309	Fresh tracks inside burrow
	652602	3951798	Burrow	4	280	
	651683	3949826	Burrow	3	260	
	650323	3946722	Burrow	5	210	
	650677	3946485	Burrow	2	340	Modified canid
	651925	3949271	Burrow	5	260	
	651920	3949942	Burrow	5	295	Old scat inside
	652302	3950924	Burrow	1	285	With tracks
	652386	3951117	Burrow	3	280	
	652442	3951264	Burrow	5	290	
	652307	3951282	Burrow	2	235	
	662665	3958120	Burrow	4	270	Dug by canid , but tortoise shape inside, wouldn't need much work to make nest
	659652	3956040	Burrow	4	160	*Neotoma lepida* debris outside
	654432	3952296	Burrow	5	205	
	654691	3952429	Burrow	2	270	
	654768	3952476	Burrow	1	320	

Species	Easting[1]	Northing	Sign Type[2]	Class[3]	Width/Size[4]	Surveyor's Additional Notes
	654999	3952573	Burrow	2	280	
	655026	3952585	Burrow	2	150	
	655186	3952671	Burrow	3	140	
	655399	3952787	Burrow	1	275	
	655630	3952899	Burrow	3	305	
	656276	3953216	Burrow	2	145	
	656737	3953438	Burrow	3	290	
	654228	3952508	Burrow	2	135	
	654581	3952689	Burrow	2	325	
	654809	3952797	Burrow	3	350	
	651559	3950431	Burrow	5	180	
	654709	3953743	Burrow	1	290	
	652306	3952129	Burrow	1	240	
	656202	3953911	Burrow	2	170	
	653607	3952465	Burrow	5	210	Mouth broken down inside looks like tortoise
	666661	3957865	Burrow	4	310	Under boulders, looks like used by tortoise
	666349	3958312	Burrow	1	350	
	671615	3959035	Burrow	2	24	
	671290	3959041	Burrow	4	400	Caliche cave, tort shape, no other sign
	672125	3959956	Burrow	4	290	Caliche cave, no tracks or scat, very tort shaped
	672401	3959747	Burrow	4	340	Excellent cave, recently had a lot of *Neotoma* debris cleaned out
	672267	3959513	Burrow	2	380	4 caves, also 320, 340, 400 mm, scat and recently used
	672964	3960115	Burrow	3	310	Modified canid dig
	675470	3962517	Burrow	3	230	
	675629	3963133	Burrow	2	320	Caliche cave; scat inside
	675640	3963122	Burrow	3	360	
	649457	3943900	Burrow	3	320	Modified fox den
	650012	3944608	Burrow	3	210	

Species	Easting[1]	Northing	Sign Type[2]	Class[3]	Width/Size[4]	Surveyor's Additional Notes
	650255	3944959	Burrow	2	340	Modified fox den
	649528	3944343	Burrow	3	350	
	648857	3943648	Burrow	5	280	Mostly filled in and old
	649907	3945931	Burrow	2	250	
	649783	3945662	Burrow	5	290	Mostly filled in
	649242	3944681	Burrow	2	270	Modified fox den, old tracks
	649238	3944678	Burrow	1	370	Modified fox den, fresh tracks
	649024	3944482	Burrow	6	260	Probably old tortoise, mostly filled in
	648971	3944419	Burrow	3	250	
	648990	3944266	Burrow	3	210	
	649991	3945475	Burrow	4	320	Kit fox den that appears to have been modified by a tortoise
	649819	3945893	Burrow	2	290	
	649882	3945976	Burrow	1	Not Measured	Tortoise resting inside
	667421	3958265	Burrow	3	176	
	641281	3936412	Burrow	3	304	Originally made by canid
	649081	3944182	Burrow	3	291	
	649203	3944401	Burrow	3	280	
	649122	3944317	Burrow	3	310	
	667598	3958209	Burrow	2	355	
	666881	3958346	Burrow	3	280	
	667301	3958594	Burrow	3	280	
	672672	3959643	Burrow	3	281	With NTY3 adult scat inside
	669950	3958420	Burrow	4	170	0.4 m long
	668565	3959105	Carcass	4 years	180	Half of carcass, unknown gender
	671195	3958559	Carcass	4 years	Adult	Disarticulated
	670779	3958541	Carcass	>4 years	>230	40% intact
	670610	3958514	Carcass	>4 years	>240	60% intact
	636190	3931629	Carcass		130	Freshly dead (3 photos); 2 burrows (360 and 340)
	652348	3950246	Carcass	4 years	~240	Female, 70% intact
	652846	3951532	Carcass	>4 years	Unknown	8 pieces of bone frags
	668768	3958852	Carcass	>4 years	190	Plastron only

Species	Easting[1]	Northin g	Sign Type[2]	Class[3]	Width/Size[4]	Surveyor's Additional Notes
	665264	3959126	Carcass	>4	Unknown	Scattered under tower 1380
	668086	3958094	Carcass	>4 years	Large adult	Half carcass, probably male, very broken, possibly lion
	667852	3958233	Carcass	>1 year	Small adult/subadult	One pectoral scute
	669965	3958152	Carcass	>4 years	Adult	Female
	669620	3958820	Carcass	>4 years	220	Probably female
	652429	3951377	Carcass	1-2 years	92	Plastron fractured; May have been dropped from tower or run over
	652134	3950742	Carcass	>2 years	220	Female
	675638	3962673	Carcass	2-3 years	210	Female, badly broken, mountain lion?
	676621	3963180	Carcass	>4 years	Adult	Single piece of shell bone
	673110	3959825	Carcass	2-3 years	230	Little sign of trauma, very blond
	673927	3960728	Carcass	1 year	182	Female shell
	667301	3958594	Carcass	2-3 years	190	
	669458	3959755	Tortoise		200	Female, standing in open
	654247	3952675	Tortoise		188	Probable male (longish tail and gular)
	653632	3952364	Tortoise		275	Male
	667598	3957797	Tortoise		280	Male, face looks good except slightly bloody below R nares
	666094	3958701	Tortoise		199	Eating between large boulders in rocky wash; female
	649145	3944558	Tortoise		215	Female
	654331	3952569	Tortoise		>250	Male; associated burrow is 290 mm
	648828	3944997	Tortoise		230	Healthy looking male
	653633	3952479	Tortoise		200	
	666107	3958403	Tortoise			In burrow, mouth of burrow 270mm
	650064	3946173	Scat	NTY-3	18	
	669801	3958979	Scat	TY-2	15	
	655386	3953250	Scat	TY-2	21	
	652715	3951876	Scat	TY-2	17	
	650293	3946725	Scat	NTY-3	16	
	650233	3946590	Scat	NTY-3	18	
	650192	3946495	Scat	NTY-4	13	

Species	Easting[1]	Northing	Sign Type[2]	Class[3]	Width/Size[4]	Surveyor's Additional Notes
	649076	3944493	Scat	NTY-4	18	
	651785	3947726	Scat	NTY	20	In runnel
	651984	3949363	Scat	TY-2	25	gravelly slope
	666576	3959090	Scat	NTY-3	23	Very pale
	665972	3959135	Scat	TY-2	15	
	666163	3959014	Scat	TY-1	12	
	666599	3958955	Scat	TY-2	17	
	651987	3950331	Scat	TY-2	13	Another scat, NTY-4, 14mm at same location
	651992	3950386	Scat	TY-2	11	
	652728	3951842	Scat	TY-2/3	16	En route to transect, near Tower No. 1316
	650405	3946821	Scat	NTY-3	17	
	650009	3946268	Scat	NTY-3	12	
	650148	3946611	Scat	TY-2	15	
	651569	3949885	Scat	NTY-3	17	Pale, but tight and dark inside
	651603	3949970	Scat	TY-2	13	
	651927	3950573	Scat	TY-2	16 & 10	2 scat, stuck together, same event
	651947	3950625	Scat	TY-2	21	
	653846	3952167	Scat	TY-2	13	En route to transect
	652972	3951622	Scat	TY-1	12	Incidentally seen off the transect
	669139	3958959	Scat	TY-1	15	
	650290	3946625	Scat	NTY-3	20	
	650062	3946116	Scat	TY-2	15	
	640929	3936345	Scat	TY-1	19	
	667870	3958027	Scat	TY-2	Juvenile	Possible chuckwalla, but location, length, width suggest tortoise
	668306	3958304	Scat	TY-2	17	Off Transect
	667855	3958234	Scat	TY-2	18	
	667722	3958159	Scat	TY-2	19	
	667544	3958040	Scat	TY-3/NTY-3	13	
	667014	3957996	Scat	NTY-4	13	

Species	Easting[1]	Northing	Sign Type[2]	Class[3]	Width/Size[4]	Surveyor's Additional Notes
	667023	3958203	Scat	TY-2	18	
	672944	3959985	Scat	NTY-4	16	
	669781	3958166	Scat	TY-2	13	
	668479	3958203	Scat	TY-2	16	
	667623	3958412	Scat	TY-3	19	
	666577	3958608	Scat	TY-2	14	Slope of cobble hill
	666134	3958688	Scat	TY-3	16	Between rocky hills
	653749	3952410	Scat	TY-2	15	
	651781	3949619	Scat	NTY-3	21	A lot of soil in it
	651733	3949509	Scat	TY-2	17	
	650398	3946538	Scat	TY-3	19	Contains thick stems
	651654	3949483	Scat	NTY-4	16	
	651991	3950583	Scat	TY-2	15	
	654854	3952049	Scat	TY-2	18	
	651483	3952368	Scat	TY-2	18	
	651528	3951227	Scat	TY-2	13	2 pieces
	651589	3951374	Scat	TY-2	20	
	653015	3952154	Scat	TY-2	18	
	666477	3957868	Scat	TY-2	16	En route to transect
	676590	3963236	Scat	NTY-4	22	Almost white
	676714	3963727	Scat	NTY-4	19	White scat, in wash and could have been washed here
	649882	3945877	Scat	TY-2	12	
	649088	3944654	Scat	NTY-4	16	
	649519	3945205	Scat	TY-2	15	
	649855	3945925	Scat	TY-2	21	
	664557	3958352	Scat	TY-2	15	Gravel and cobble ridge
	667647	3958451	Scat	NTY-3	15	
	653467	3952270	Scat	TY-2	19	
	667020	3959346	Scat	TY-2	12	
	667728	3959022	Scat	TY-2	17	
	667494	3958991	Scat	TY-1	9	
	667478	3958989	Scat	NTY-4	20	

Species	Easting[1]	Northin g	Sign Type[2]	Class[3]	Width/Size[4]	Surveyor's Additional Notes
	667301	3958594	Scat	NTY-3	15	
	640995	3936295	Scat (2)	TY-2	9	
	652706	3951883	Scat (2)	TY-2	13	
	653467	3952270	Scat (2)	TY-2	19	
	653512	3952297	Scat (3)	TY-2	16	
	640984	3936280	Scat (5)	TY-2	9, 16	
	670251	3958185	Tracks	1	190	In gravel wash with caliche caves
	639902	3934237	Tracks		150	
	648630	3944033	Tracks		150	Fresh
	640941	3936388	Tracks		190	
	640393	3935625	Tracks		280	19mm scat, TY-2, 2m away
	648300	3943373	Tracks		202	Fresh
	651890	3950017	Tracks		240	Fresh
	654513	3952340	Tracks		235	
	649659	3944092	Tracks		26	Fresh
	649648	3944543	Tracks		198	
	648397	3943547	Tracks	1	176	
	648251	3943465	Tracks	1	163	En route to transect

1. All coordinates are Universal Transverse Mercator North American Datum 83, Zone 11S.
2. Number in parentheses is number of sign.
3. See Appendix 1 for key to sign type.
4. All units are millimeters unless otherwise noted.

KEY TO SIGN CLASSES

(Alice Karl, 2001)

BURROWS

1 - DEFINITELY TORTOISE - FRESH (TRACKS, TORTOISE INSIDE, FRESHLY DISTURBED SOIL ON MOUND/RUNWAY)
2 - DEFINITELY TORTOISE - USED THIS SEASON (CLEARED OF ANNUALS, BUT NO FRESHLY DISTURBED SOIL)
3 - DEFINITELY TORTOISE – NOT USED THIS SEASON (PROBABLY HAS ANNUALS GROWING IN RUNWAY)
4 - POSSIBLY TORTOISE – IN GOOD CONDITION BY UNSURE OF SPECIES USING BURROW
5 - DEFINITELY TORTOISE – DETERIORATED SUCH THAT IT WOULD REQUIRE SUBSTANTIAL REMODELING TO BE USABLE
6 - POSSIBLY TORTOISE – DETERIORATED

SCAT

TY1 - WET OR FRESH, DARK, ODORIFEROUS
TY2 - DRIED, POSSIBLE GLAZE ON PART; UNEXPOSED SURFACES DARK BROWN; SLIGHT ODOR
TY3 - DRIED, NO GLAZE; AT LEAST PARTIALLY FADED ON EXTERIOR; VERY SLIGHT ODOR
NTY3- DRIED, NO GLAZE; AT LEAST PARTIALLY FADED ON EXTERIOR; NO ODOR (DISTINGUISHES FROM TY3)
NTY4- DRIED, LOOSENING, PALE OR BLEACHED

CARCASSES – GENERAL INDICATORS FOR TIME SINCE DEATH

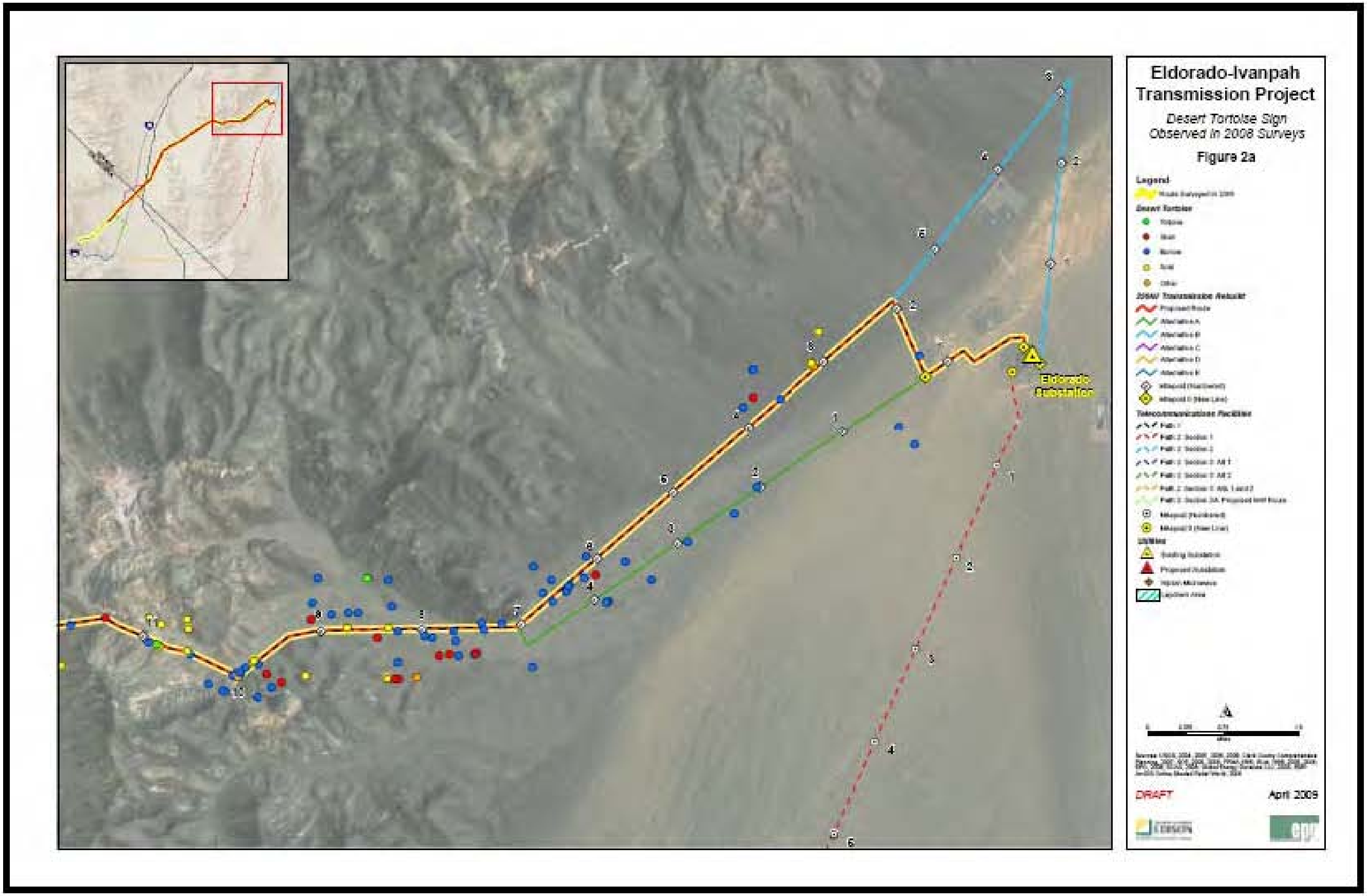
<1 YR - UNEXPOSED SCUTES NORMAL COLOR AND SHEEN, ADHERE TIGHTLY. EXPOSED SCUTES PALING AND MAY BE LIFTING OR OFF. UNEXPOSED BONE WAXY AND SOLID.

1-2 YRS - UNEXPOSED SCUTES NORMAL COLOR WITH SLIGHT SHEEN, MOSTLY TIGHTLY ATTACHED. EXPOSED SCUTES SLIGHTLY PALE WITH NO SHEEN AND NO TO SLIGHT GROWTH RING PEELING. NO ODOR. UNEXPOSED BONE SILKY.

2-3 YRS - UNEXPOSED SCUTES PALE AND WITHOUT SHEEN BUT NO GROWTH RING PEELING. EXPOSED SCUTES PALE WITH SLIGHT PEELING. SCUTES LOOSE, OFF AND/OR TIGHT. BONE SUTURES GENERALLY TIGHT.

4 YRS - UNEXPOSED SCUTES NORMAL COLOR TO SLIGHTLY PALE, NO SHEEN, NO PEELING. EXPOSED SCUTES LOOSE, PALE, DULL, WITH MODERATE PEELING. SUTURES SEPARATING AND BONE SURFACE IS FISSURED, EDGES ARE ROUGHENED (FISSURED UNDER HAND LENS) AND CHIP FAIRLY EASILY

>>4 YRS- DISARTICULATED AND DISARTICULATING. BONE EDGES CHIP AND MAY CRUMBLE EASILY. SCUTES ARE PEELING AND CURLED


Eldorado-Ivanpah
Transmission Project
Desert Tortoise Sign
Observed in 2008 Surveys
Figure 2a
Legend
Eldorado
Substation
DRAFT
April 2009

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Eldorado-Ivanpah
Transmission Project
Desert Tortoise Sign
Observed in 2008 Surveys
Figure 2b
Legend
Union Pacific Railroad
12
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DRAFT
April 2009

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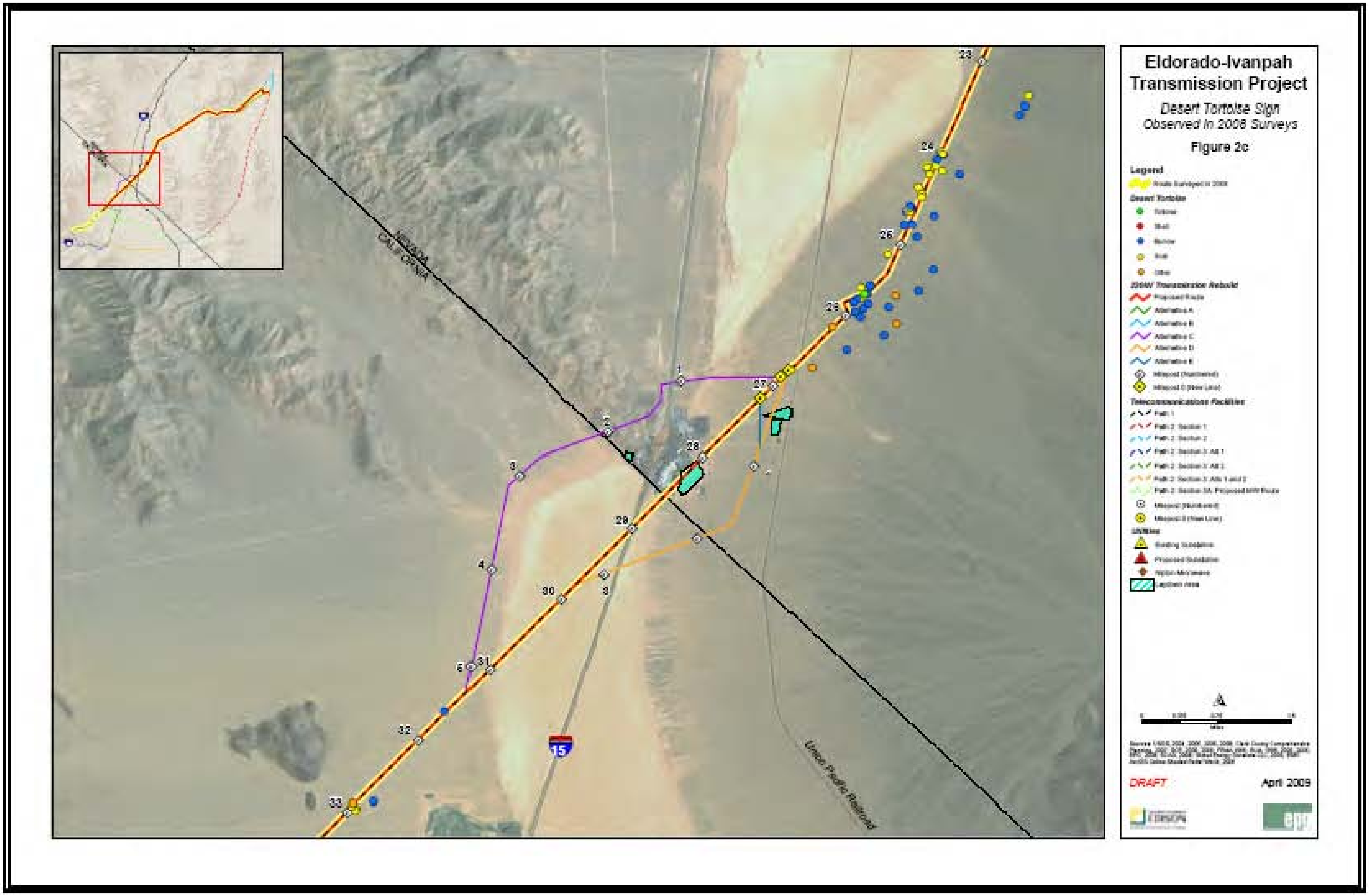
Eldorado-Ivanpah
Transmission Project
Desert Tortoise Sign
Observed in 2008 Surveys
Figure 2c
Legend
NEVADA
CALIFORNIA
Union Pacific Railroad
DRAFT
April 2009

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Eldorado-Ivanpah Transmission Project
Desert Tortoise Sign Observed in 2008 Surveys
Figure 2d
Legend
Mt. Pass Substation
15
DRAFT
April 2009

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KEY TO SIGN CLASSES

(Alice Karl, 2001)

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SCAT

TY1 - WET OR FRESH, DARK, ODORIFEROUS

TY2 - DRIED, POSSIBLE GLAZE ON PART; UNEXPOSED SURFACES DARK BROWN; SLIGHT ODOR

TY3 - DRIED, NO GLAZE; AT LEAST PARTIALLY FADED ON EXTERIOR; VERY SLIGHT ODOR

NTY3- DRIED, NO GLAZE; AT LEAST PARTIALLY FADED ON EXTERIOR; NO ODOR (DISTINGUISHES FROM TY3)

NTY4- DRIED, LOOSENING, PALE OR BLEACHED

CARCASSES – GENERAL INDICATORS FOR TIME SINCE DEATH

<1 YR - UNEXPOSED SCUTES NORMAL COLOR AND SHEEN, ADHERE TIGHTLY. EXPOSED SCUTES PALING AND MAY BE LIFTING OR OFF. UNEXPOSED BONE WAXY AND SOLID.

1-2 YRS - UNEXPOSED SCUTES NORMAL COLOR WITH SLIGHT SHEEN, MOSTLY TIGHTLY ATTACHED. EXPOSED SCUTES SLIGHTLY PALE WITH NO SHEEN AND NO TO SLIGHT GROWTH RING PEELING. NO ODOR. UNEXPOSED BONE SILKY.

2-3 YRS - UNEXPOSED SCUTES PALE AND WITHOUT SHEEN BUT NO GROWTH RING PEELING. EXPOSED SCUTES PALE WITH SLIGHT PEELING. SCUTES LOOSE, OFF AND/OR TIGHT. BONE SUTURES GENERALLY TIGHT.

4 YRS - UNEXPOSED SCUTES NORMAL COLOR TO SLIGHTLY PALE. NO SHEEN, NO PEELING. EXPOSED SCUTES LOOSE, PALE, DULL, WITH MODERATE PEELING. SUTURES SEPARATING AND BONE SURFACE IS FISSURED. EDGES ARE ROUGHENED (FISSURED UNDER HAND LENS) AND CHIP FAIRLY EASILY

>>4 YRS- DISARTICULATED AND DISARTICULATING. BONE EDGES CHIP AND MAY CRUMBLE EASILY. SCUTES ARE PEELING AND CURLED

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ATTACHMENT 1

Sample Desert Tortoise and Special-Status Species Data Form and Key for the Eldorado-Ivanpah 2008 Desert Tortoise Surveys

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Attachment 1. Sample Desert Tortoise and Special-Status Species Form, Front Side

SCE BRIGHTSOURCE PROJECT
2008 DESERT TORTOISE SURVEYS

OBSERVER: Karl
LOCATION:
REGION: El Dorado Substn
TRANSECT: ROW LOCATION: MILE 1+2
ZONE (distance and direction from ROW): 1200 S
Segmt 1 — Starting ~~Tower~~ Due S of N-S dog-leg
UTM(NAD 83) 0678568 E 3962698 N
Ending ~~Tower~~ @Substn. -
UTM 0679632 E 3963337 N
TRANSECT WIDTH 30'
TRANSECT LENGTH 0.77 + 0.6 + 0.44 = 1.8 mi

DATE: May 16, 08
TIME (START) Segmt 1 1406 - 1441
(FINISH) Segmt 2 - 1707
WEATHER: Clear
WIND SPEED ENE 3-6
T_{AIR}(°C) 33.5 $T_{GD\ SURF}$ (°C) 48.5
RECENT WEATHER Clear

GENERAL SITE DESCRIPTION:

VEGETATION, SHRUB LAYER (INCLUDING HERBACEOUS PERENNIALS):

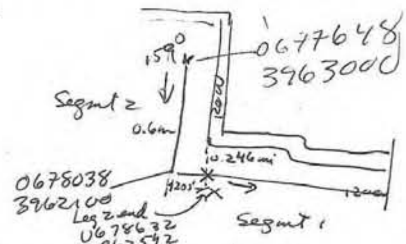
ASPECT DOMINANTS LATR

Leg 1 (E-W)

COMMON SPECIES AmDU

OCCASIONAL SPECIES

% COVER Low - ~11%
DIVERSITY (RICHNESS) Low
AVERAGE HEIGHT (BY LAYER), 1700'



Leg 2 is like Leg 2, on 2400

VEGETATION, UNDERSTORY:
ABUNDANT SPECIES

TOPOGRAPHY
LANDFORM Valley

DRAINAGE TYPE Percolation + sheet

ELEVATION (STATE METERS OR FEET)

SUBSTRATE: COLOR Pale, mottled dk gray in rills only
COARSE PARTICLES (TYPE, % COVER) Scattered sm. basaltic cobbles + rcks of lg. gravel w/ occa. cobbles (~15-20% cover). Rest is scatt. fine gravel. To east is just scattered gravel, ~~—~~ ~25-40% total cover
SOIL CONSISTENCE Loose to soft sand. Stabilized

PRESENCE OF PREDATORS:
Kit fox (den + digs)

HUMAN RELATED DISTURBANCES (ON SITE AND ADJACENT)
Substn; T-lines

SITE PICTURE: (Take a picture of the form first, then describe wht you are photographing on the project.) None

COMMENTS:

AEK 1987: REV 1992

Reverse Side of Data Form

See map on reverse for config. & starting pt of this transect

0.77mi — N (SHOW DIRECTION)

SIGN (BY NUMBER)

Segment 3 0678038 @621 00N

→56°

→56°

0679632 3963337

Substn.

0 →159°

0.25

0.5

very low 0.75 washy & also holds water

1.0MILE

HABITAT (show towers)

@62100N

loose sandy but still wood Not hummock

(TOPOGRAPHY, ROADS, OTHER DISTURBANCES)

SIGN #	UTM (NAD 83)	DESERT TORTOISE			OTHER SPECIES		
		SIGN TYPE	CLASS	width (sc, bur, tr) MCL (shell, tort)	SPECIES	SIGN TYPE	FURTHER DESCRIPTION
1	0677999 3962191	Burrow	6	230			KB19

Appendix B-2
Desert Tortoise Surveys

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SOUTHERN CALIFORNIA EDISON ELDORADO-IVANPAH TRANSMISSION LINE PROJECT

DESERT TORTOISE SURVEYS

DRAFT

Prepared By:

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January 2010

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EXECUTIVE SUMMARY

Southern California Edison (SCE) is proposing to develop the Eldorado-Ivanpah Transmission Project (Project) in order to provide transmission of power generated by several solar power projects proposed for Ivanpah Valley. The Project will include replacement of the existing Eldorado-Coolwater-Dunn Siding 115kV transmission line with a new double-circuit 220kV line between a new substation at the existing Eldorado Substation (Nevada) and another new substation, Ivanpah Substation (California) ("Proposed Route"). Until Project design is finalized, several alternative routes remain under examination, as well as several telecommunications routes and supporting fiberoptic placement. The Proposed Route was surveyed in 2008. In 2009, following further Project engineering, alternatives to the Proposed Route, the proposed Ivanpah Substation, some access roads, and the telecommunications' (telecom) alternatives, including a microwave tower location, were surveyed. Results for both year's surveys are presented in this report.

Tortoise sign was observed on the Proposed Route and all alternatives. On the Proposed Route, most of the sign was observed in three areas in Nevada: on the east side of the McCullough Mountains; on the northern edge of the Lucy Gray Mountains; and southeast of Roach Lake. The greatest amount of sign observed on any Project alternatives was on Alternatives A and B, along Telecom Path 2: Section 2 and Section 3: Alternatives 1 and 2 (Nipton Road and north along Interstate 15) and at the Microwave tower for Telecom Path 2: Section 3A.

Based on survey results demonstrating the presence of desert tortoises in the Project area, construction and operation of the EITP Project would result in permanent and temporary, as well as direct and minor indirect, impacts to desert tortoise. The loss of generalized foraging and coversite habitat that would be removed on the already-disturbed transmission line may not create a biologically significant impact. With the exception of possible re-grading of access and spur roads, no additional habitat would be removed for the overhead installation of telecom facilities on any alternatives or underground installation of telecom facilities in the Nipton Road shoulder. Several alternatives partially intersect both Desert Wildlife Management Areas (DWMAs) and designated critical habitat.

SOUTHERN CALIFORNIA EDISON
ELDORADO-IVANPAH
TRANSMISSION LINE PROJECT

DESERT TORTOISE SURVEY

1.0 INTRODUCTION

Southern California Edison (SCE) is proposing to develop the Eldorado-Ivanpah Transmission Project (Project) in order to provide transmission of power generated by several solar power projects proposed for Ivanpah Valley. The Project will include replacement of the existing Eldorado-Coolwater-Dunn Siding 115kV transmission line with a new double-circuit 220kV line between a new substation at the existing Eldorado Substation (Nevada) and another new substation, Ivanpah Substation (California) ("Proposed Route"). Until Project design is finalized, several alternative routes remain under examination, as well as several telecommunications routes and supporting fiberoptic placement.

The Proposed Route was surveyed in 2008 (Karl 2008) to provide initial data for the analysis of Project effects on the desert tortoise (*Gopherus agassizii*), a federally listed Threatened species through California and Nevada, a California state-listed Threatened species, a Nevada state-protected reptile, and a U.S. Bureau of Land Management (BLM) "sensitive" species. In 2009, following further Project engineering, alternatives to the Proposed Route, the proposed Ivanpah Substation, some access roads, and the telecommunications' (telecom) alternatives, including a microwave tower location, were surveyed. Results for both year's surveys are presented in this report. Environmental Planning Group [EPG] (2008) also surveyed the Proposed Route for other special-status biological resources.

2.0 PROJECT SETTING AND DESCRIPTION

2.1 Project Location

The Proposed Route extends for approximately 35 miles from the Eldorado Substation in Clark County, Nevada, to the proposed Ivanpah Substation in San Bernardino County, California. The Project and the alternatives that were surveyed in 2008 and 2009 are shown in Figure 1.

2.2 Project Description

Each of the Project alternatives identified in Figure 1 is described below[1]:

[1] Information supplied by SCE

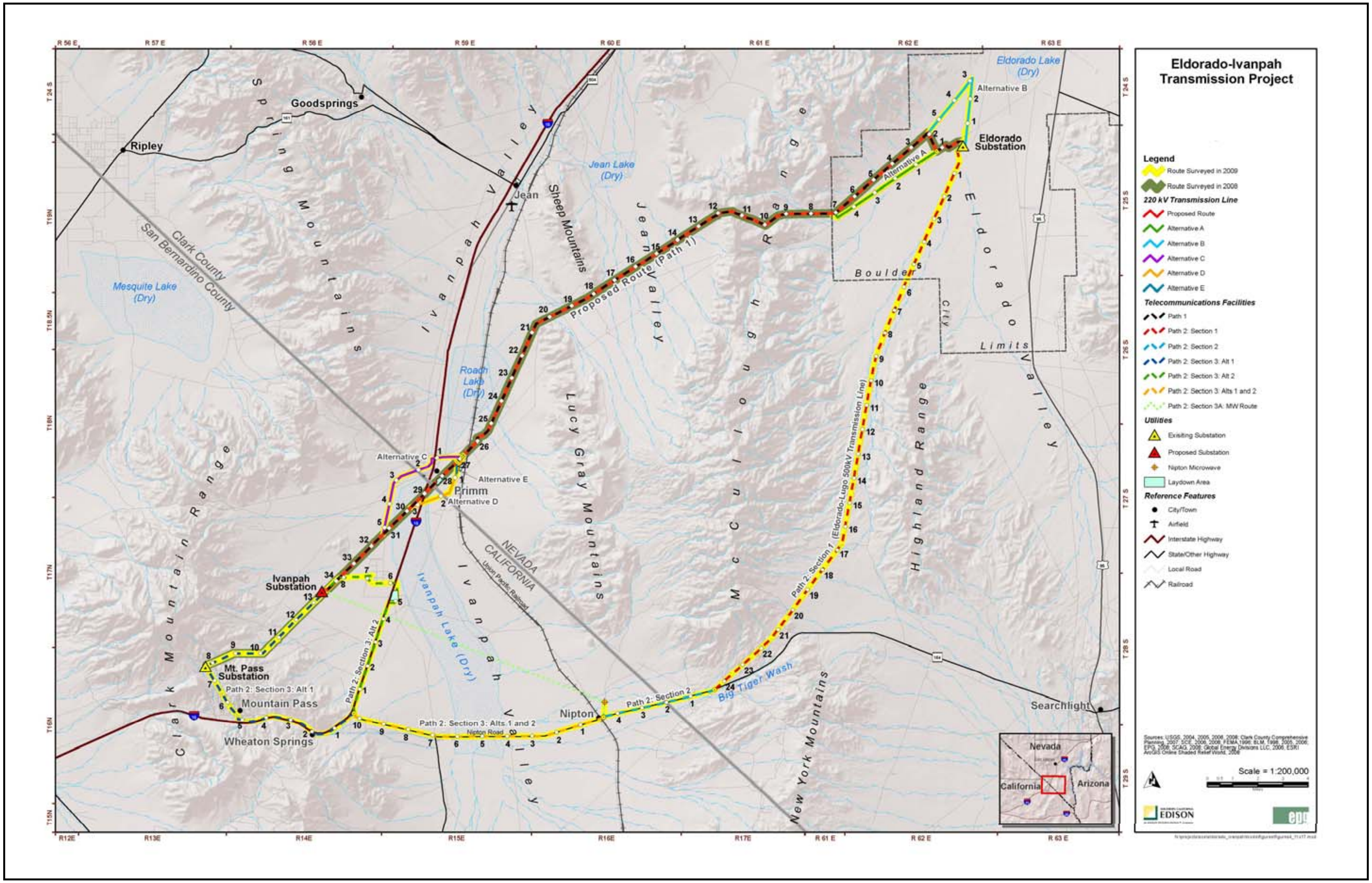

FIGURE 1. Routes surveyed for desert tortoise in 2008 and 2009. See text for explanation of Project elements.

- **Proposed Route** - This would involve removing the existing 115kV line and replacing it with a 220 kV line. The existing 115kV line is composed primarily of steel lattice H-frame structures with three conductors, although there are also two- and three-pole wooden structures near the Eldorado Substation and at other locations along the line where some of the original steel structures have been replaced. The new 230kV line will be constructed of steel lattice towers or steel poles. Due to the increased tower heights and span lengths it is likely that the majority of the new towers will be placed in new locations that will require construction of new temporary or permanent spur roads from the existing main access road. The new transmission line will deviate from the existing SCE right-of-way at several locations either to provide a more efficient route, to cross other transmission lines, or to avoid resources.
- **Alternative Routes A, B, C, D, and E** - Alternatives to the Proposed Route.
- **Ivanpah Substation** - A new, approximately 18-acre substation at the western terminus of the Proposed Route, adjacent to the existing 115kV line.
- **Telecom Path 1 –** The optical ground wire (OPGW) would be installed on the new 220 kV transmission line.
- **Telecom Path 2: Section 1 –** This telecom path is along the existing 500 kV Eldorado-Lugo Transmission Line. An OPGW would be installed on fewer than 45 towers, requiring tower reinforcment. The existing stub roads and access road would be used for the upgrades.
- **Telecom Path 2: Section 2 -** From the intersection of Nipton Road with the Eldorado-Lugo Transmission Line, to Nipton, the OPGW would be installed underground along the northern road shoulder.
- **Telecom Path 2: Section 3: Alternatives 1 and 2 (Nipton Road)-** From Nipton west to Interstate-15 (I-15), the OPGW would be installed underground along the northern road shoulder, except for an approximately one-mile segment from Nipton west, where it would be overhead on the existing Nipton 33 kV distribution line.
- **Microwave Tower for Telecom Path 2: Section 3A** - A new microwave tower would be constructed northeast of Nipton, with microwave communication to Ivanpah Substation. An access road for construction and maintenance would extend approximately 0.6 miles north from Nipton Road to the microwave tower.
- **Telecom Path 2, Section 3: Alternative 2 (I-15 at the Nipton exit to Primm golf course, and west)** - From the Nipton exit at I-15, the OPGW would be installed overhead on the existing distribution line to the Yates Well exit, then would run west along the south side of the Primm golf course to the Proposed Route, and south to the Ivanpah Substation.
- **Telecom Path 2:, Section 3: Alternative 1 (I-15 at the Nipton exit to the Mountain Pass Substation, and northeast) –** From the Nipton exit for one mile south, the OPGW would be underground, but the exact location is unknown. From this point to the Mountain Pass Substation, the OPGW would be overhead on the existing 33 kV distribution line, and then overhead on the existing 115 kV transmission line to Ivanpah Substation.

2.3 Environmental Setting

The reader is referred to EPG (2008) for a detailed habitat description of the Project area.

3.0 SURVEY METHODS

In 2008, surveys were completed between 13 and 23 May, inclusive. In 2009, they were conducted between 14 and 29 May, inclusive; additional surveys on some spur and access roads were conducted on 2 November. Pedestrian transects were completed consistent with the U.S. Fish and Wildlife Service (USFWS) "protocol" desert tortoise transects (USFWS 1992)[2]. The basic method was to survey 100% of the ROWs, or the potential disturbance area in the case of the non-linear facilities (microwave tower site and Ivanpah Substation), using parallel, 30-foot-wide belt transects. In addition, 30-foot-wide, "Zone-of-influence" (ZOI) transects were walked on both sides of the ROWs and around the non-linear facilities at 100, 300, 600, 1200, and 2400 feet from the outer edges of the ROW. The rare exceptions were those locations where no tortoise habitat existed – e.g., on unvegetated portions of Ivanpah and Roach Dry Lakes, on the Primm golf course, and on paved roads (e.g., Interstate-15 [I-15], Nipton Road).

On all transects, all tortoise sign (e.g., individuals, dens, burrows, scat, tracks, pellets, skeletal remains) observed was measured, mapped and described relative to condition, size, and (where applicable) gender. Current and recent weather conditions were recorded to identify the potential for tortoise activity and the topography, drainage patterns, soils, substrates, plant cover, anthropogenic disturbances, and aspect-dominant, common and occasional plant species were described and mapped. Mapping sign and habitat features was achieved using Global Positioning System (GPS) units. All transect data were recorded on specially-designed forms (Appendix 2). Every mile of ROW was photographed, as well as zone-of-influence transects.

In 2008, six very experienced surveyors conducted the surveys (Appendix 5). Each had between six and 30 years experience searching for and studying tortoises on many types of surveys, including tortoise mark-recapture plots, telemetry studies, behavioral studies, and linear surveys. Environmental Planning Group (EPG) also supplied three biologists who were familiar with conducting field surveys and knew many of the species. These less experienced surveyors were familiarized with desert tortoise sign and only walked the ROW initially, in order to learn about desert tortoises and where to look for sign. In the ROW they were always adjacent to experienced surveyors.

[2] The 1992 USFWS protocols were used in 2008, so were also used in 2009 for consistency, even though the USFWS had established a new set of protocols in 2009 (USFWS 2009).

Inexperienced personnel conducted some ZOI transects after the initial learning period, but their transects were always adjacent to those of more experienced surveyors.

In 2009, ten people walked the surveys, eight of whom were very experienced, as identified above (Appendix 5). Of the remaining two surveyors, one had between a year's experience (on the same project in 2008 as well as several tortoise projects since then) and the other was an experienced field geologist who had been conducting tortoise surveys all spring with the more experienced crew.

In 2008, the weather was clear, warm, and calm during the surveys, with maximum daily air temperatures of approximately 100º F. In May 2009, similar conditions occurred, with daily air temperature maxima between 87 and 104 º F. During Fall 2009, daily maximum air temperatures were 84-85 º F, with overnight lows of 44 to 54 º F.

Although the primary goal of the survey was to search for desert tortoise, other special-status species known to be in the survey area were also sought. An inventory was also kept of all species observed. This inventory and a discussion of special-status species observed are presented in a separate document (Karl 2009).

Because of the variety of elements surveyed, variations in the above methods were applied to ensure a comprehensive survey. Each is described below.

Proposed Route

The Proposed Route assumed a 200-foot-wide right-of-way (ROW) (seven, 30-foot-wide transects). The entire Proposed Route ROW, including the segment from the proposed Ivanpah Substation to Mountain Pass Substation that was originally part of the Proposed Route, was surveyed in 2008. ZOI transects were completed on this originally Proposed Route in 2008 from Eldorado Substation to slightly past the proposed Ivanpah Substation site; the 100-foot ZOI was also completed to Mountain Pass Substation. In 2009, the remaining ZOI transects, from the proposed Ivanpah Substation site to Mountain Pass Substation, were completed. Because the segment of the Project (Ivanpah Substation to Mountain Pass Substation) is currently part of Telecom Path 2: Section 3: Alternative 1, all results will be discussed in that section.)

Ancillary construction sites considered for surveying included laydown and staging areas and pulling, tensioning, and splicing sites. Laydown/staging areas were assumed to be in previously disturbed sites (R. Overstreet, SCE, pers. comm.. to A. Karl). The remaining construction facilities were scattered to clustered and appeared to be mostly inside the 200-foot ROW. Because the locations of these small, individual sites were both imprecise and subject to change, SCE determined that these would best be surveyed at a later date, when the locations were finalized (R. Overstreet, SCE, pers. comm.. to A. Karl).

Four access roads in Eldorado Valley and 18 spur roads in the McCullough Mountains that had not previously been identified were surveyed on 2 November 2009 because they partly or fully fell outside the 200-foot-wide ROW previously surveyed (Appendix 3). A sixty-foot ROW was assumed for these roads; no ZOIs were conducted because ZOIs for the Proposed Route completely overlapped those for these access roads and spur roads.

Alternative Routes A, B, C, D, and E

All ROWs were assumed to be 200 feet wide to accommodate new spur roads and some flexibility in tower placement. Again, laydown/staging areas were assumed to be in previously disturbed sites and most pulling, tensioning and splicing sites were too imprecise or inside the surveyed 200-foot ROW. However, because there was a large cluster of these sites in the Alternative B triangle tip, 100% percent of this cluster was surveyed, plus 100 feet outside the 200-foot Alternative B ROW.

All ZOI transects were walked unless they had been covered by transects for other alternatives or the Proposed Route.

Ivanpah Substation

One-hundred percent of the proposed substation, plus ZOI's parallel to the northwest side at 100, 300, 600, 1200, and 2400 feet, were surveyed. The ZOIs on the remaining sides of the proposed substation site were covered by those walked for the Proposed Route.

Telecom Path 2: Section 1 (Eldorado-Lugo 500 kV Transmission Line)

Forty-five tower pads were surveyed for potential retrofitting (Appendix 4), with 1-4 towers surveyed in nearly every mile of transmission line between Nipton Road and Eldorado Substation. A 200 by 200-foot rectangle was surveyed, centered on the existing pad. Generally, the stub road was completely or nearly completely surveyed in this square.

Telecom Path 2: Section 2, and Section 3: Alternatives 1 and 2 (Nipton Road)

The ROW was 60 feet wide, with 30 feet in the road and road shoulder and 30 feet north of the shoulder. The latter 30 feet plus all ZOI transects on both sides of Nipton Road were walked.

Microwave Tower for Telecom Path 2: Section 3A

A 60-foot access road ROW was surveyed (100%), plus a 100 by 100-foot microwave tower site. All ZOI transects along the access road and around the tower site were conducted, except near Nipton Road, where ZOIs for the Nipton Road telecom path overlapped those for the microwave tower.

Telecom Path 2: Section 3: Alternative 2 (I-15 at the Nipton exit to Primm golf course, and west)

The surveyed ROW was 30 feet wide, centered on the existing distribution line from the Nipton Road exit to the Yates Well exit. ZOIs were conducted only on the east side of the ROW in this section, as the west side was I-15. From the Yates Well exit, west along the south side of the Primm golf course to the Proposed Route, the 30 foot ROW was walked, as well as all ZOIs to the south. ZOIs to the north were conducted from the golf course, west. Both the north and south ZOIs stopped at 2400 feet from the Proposed Route, where ZOIs for the Proposed Route overlapped the telecom path ZOIs.

Telecom Path 2: Section 3:Alternative 1 (I-15 at the Nipton exit to the Mountain Pass Substation, and northeast)
Where the OPGW was underground, a general habitat reconnaissance and assessment for potential tortoise presence was made. Where the OPGW was overhead, the surveyed ROW was 30 feet wide, centered on the existing distribution line. All ZOIs were conducted adjacent to the Proposed Route except where they intersected the freeway. (No ZOIs were conducted on the opposite side of I-15 from the ROW.) No surveys were conducted between Molycorp Mine and Mountain Pass Substation because there is no tortoise habitat in that segment.

4.0 SURVEY RESULTS

Proposed Route
Tortoise sign was seen along the entire Proposed Route, except for Ivanpah Dry Lake (Figure 2 – Panels A-D; Appendix 1). A total of 305 tortoise sign was observed, including 18 tortoises, 180 burrows, 74 scat, 20 carcasses or shell parts and 12 other types of sign (e.g., tracks, drinking depressions). Most of the sign was observed in three areas in Nevada: on the east side of the McCullough Mountains; on the northern edge of the Lucy Gray Mountains; and southeast of Roach Lake.

Alternative Routes A, B, C, D, and E
Most of the tortoise sign seen in Eldorado Valley (see "Proposed Route") was on Alternatives A and B, in contrast to the Proposed Route (Figure 2 – Panel A; Appendix 1). A total of 49 sign, including 27 burrows and one tortoise, was observed on Alternative A; 32 sign, including 16 burrows and three tortoises, were observed on Alternative B.

Tortoise sign was observed on Alternatives C and D, mostly in the Nevada segments (Figure 2 – Panel C; Appendix 1). A total of 18 sign was observed. No sign was observed on Alternative E.

Ivanpah Substation
Three tortoise sign were seen on the Ivanpah substation and associated ZOIs (Figure 2 – Panel D; Appendix 1).

Telecom Path 2: Section 1 (Eldorado-Lugo 500 kV Transmission Line)
Seven tortoise sign were observed on tower surveys associated with the Eldorado-Lugo 500 kV Transmission Line (Figure 2 – Panels A, F and G; Appendix 1). All of the sign were located in Eldorado Valley, between approximately Milepost (MP) 9 and the Eldorado Substation. Not surprisingly, none was observed in the McCullough Mountains portion of the line, where tortoise habitat is largely absent (Karl 1983). The

vegetation there is characterized by a diverse Mojave mixed woody scrub (*sensu* Holland 1986) and Joshua tree forest communities, dominated by blackbrush (*Coleogyne ramossissima*), buckhorn cholla (*Cylindropuntia acanthocarpa*), and Joshua tree (*Yucca brevifolia*), needle-and-thread grass (*Achnatherum speciosum*), and buckwheat (*Eriogonum fasciculatum*); Spanish bayonet (*Yucca baccata*) and Apache plume (*Fallugia paradoxica*) are common to occasional. Creosote bush (*Larrea tridentata*) enters the shrub community in approximately Mile 14, but remains a subdominant until approximately Mile 10, where it becomes dominant. Elevations reach approximately 4900 ft, decreasing toward Eldorado Valley (they are approximately 3700 ft near MP 11). Marginal tortoise habitat begins at approximately MP 11, with increasing habitat quality to the north.

Telecom Path 2: Section 2, and Section 3: Alternatives 1 and 2 (Nipton Road)

The greatest relative amount of sign was found along Nipton Road - 105 sign, including 39 burrows, 21 carcasses or shell parts, 29 scat, 1 tortoise, and 5 sets of tracks (Figure 2 – Panels D, E, and F; Appendix 1). The amount of sign is especially notable given the short length of the route (approximately 10 mi), narrow width of the surveyed ROW (30 ft) and the absence of habitat for about two miles where the route crosses Ivanpah Lake.

Microwave Tower for Telecom Path 2: Section 3A

Similar to the Nipton Road surveys (see above), a high relative quantity of sign was observed on the microwave tower site and ZOI surveys, 22 sign (Figure 2 – Panel F; Appendix 1).

Telecom Path 2: Section 3: Alternative 2 (I-15 at the Nipton exit to Primm golf course, and west)

As with the Nipton Road surveys (see above) a high relative amount of sign was observed on this alternative, 16 total sign (Figure 2 – Panel D; Appendix 1). Because 14 of these sign were along the 5 mi adjacent to I-15, where the ZOIs were only completed on one side of the narrow (30 ft) ROW, this area has a relatively high tortoise abundance.

Telecom Path 2: Section 3:Alternative 1 (I-15 at the Nipton exit to the Mountain Pass Substation, and northeast)

Seven definite tortoise sign and an additional seven potential burrows were observed (Figure 2 – Panel D; Appendix 1). All sign were seen from the edge of the mountains to the adjoining bajadas. Not surprisingly, none was observed higher in the mountains, where the habitat is characterized by a mixed pinyon-juniper/Mojave woody scrub dominated by blackbrush, buckwheat, buckhorn cholla, and matchweed (*Gutierrezia sarothrae*). Common species include Spanish bayonet, Joshua tree, Mojave yucca (*Yucca schidigera*), spiny menodora (*Menodora spinescens*), juniper (*Juniperus* sp.), pinyon pine (*Pinus monophylla*), Nevada ephedra (*Ephedra nevadensis*), green ephedra (*E. viridis*), and thamnosma (*Thamnosma montana*).

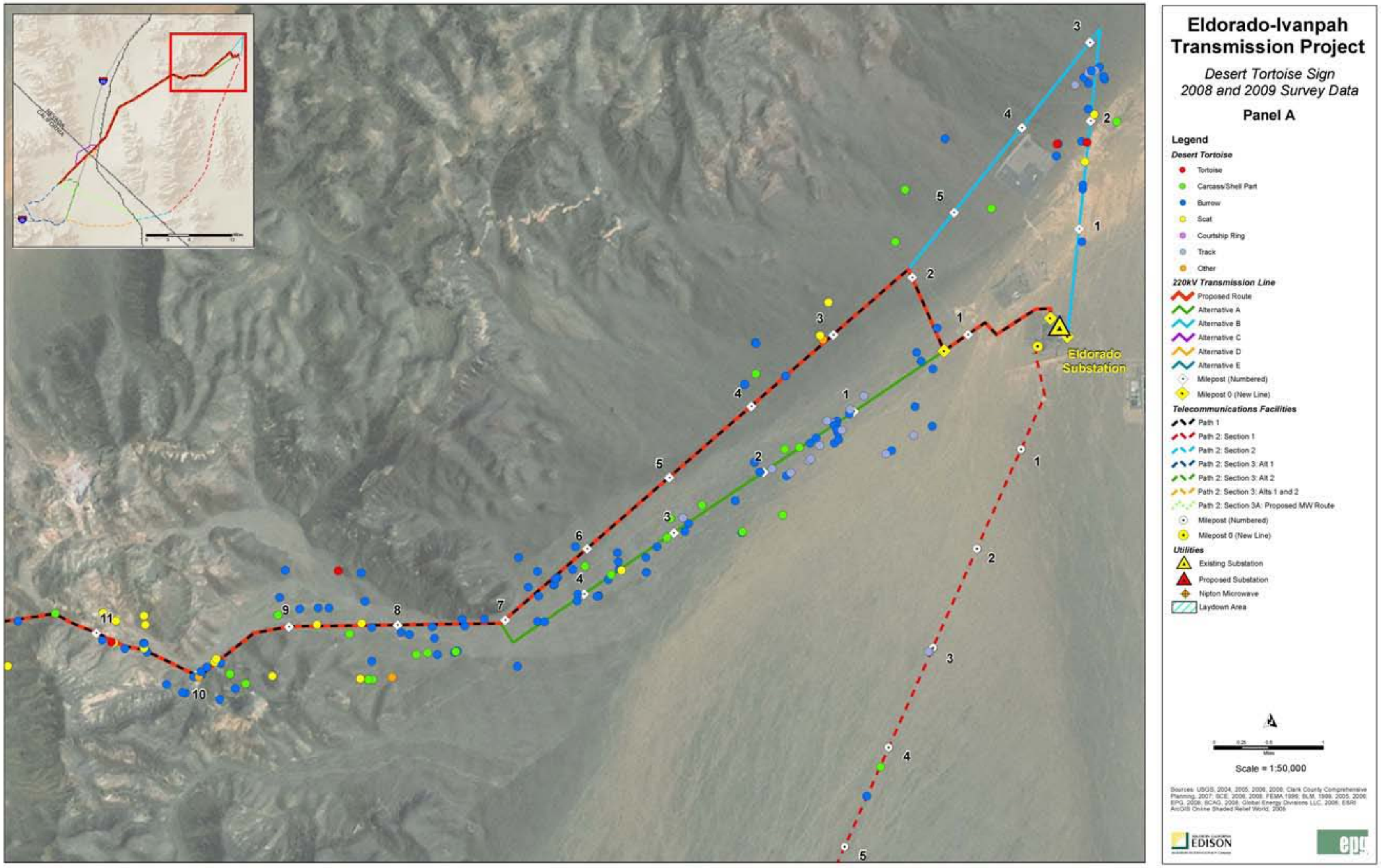

FIGURE 2. Desert tortoise sign observed in 2008 and 2009.

FIGURE 2, continued.

FIGURE 2, continued.

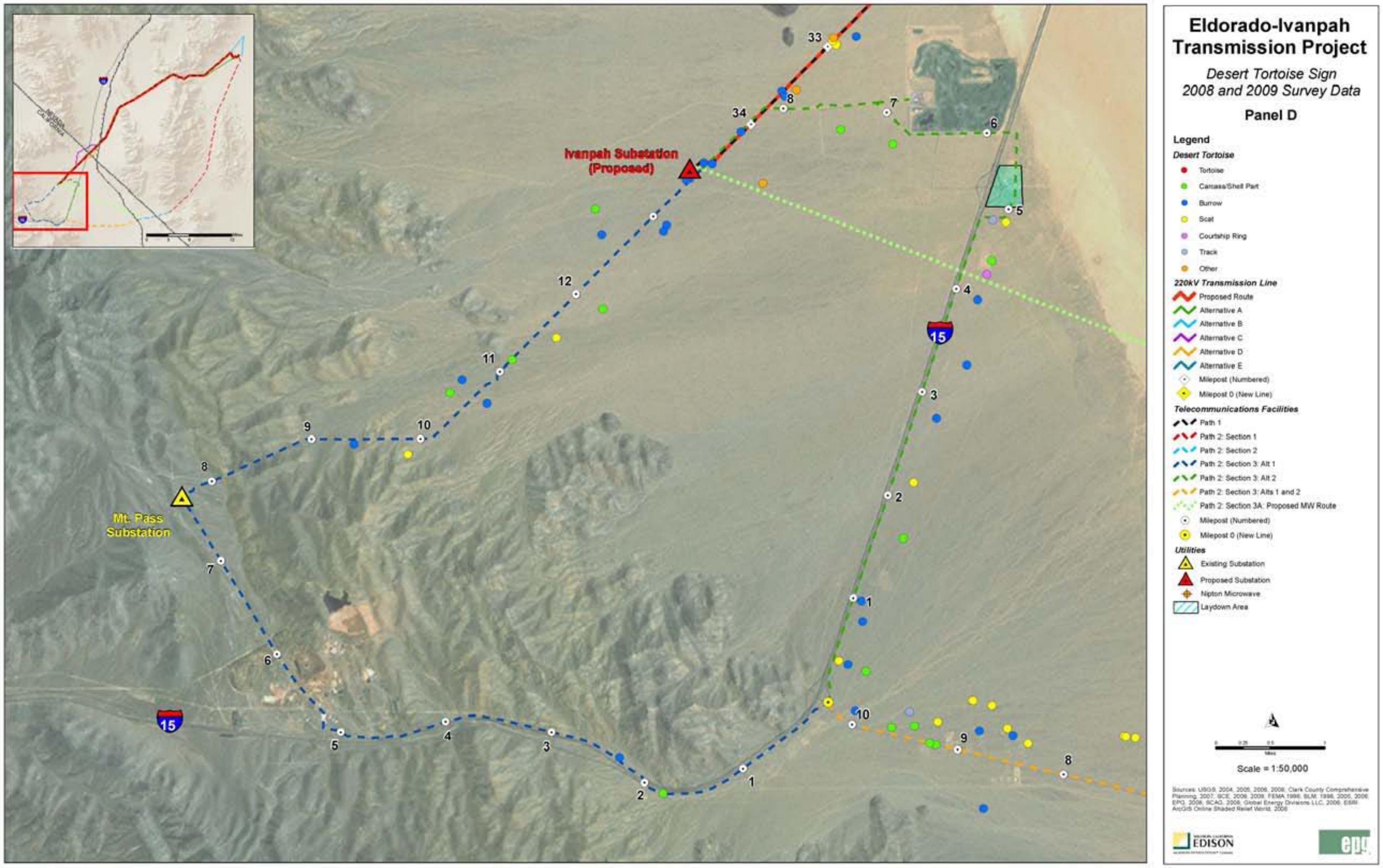

FIGURE 2, continued.

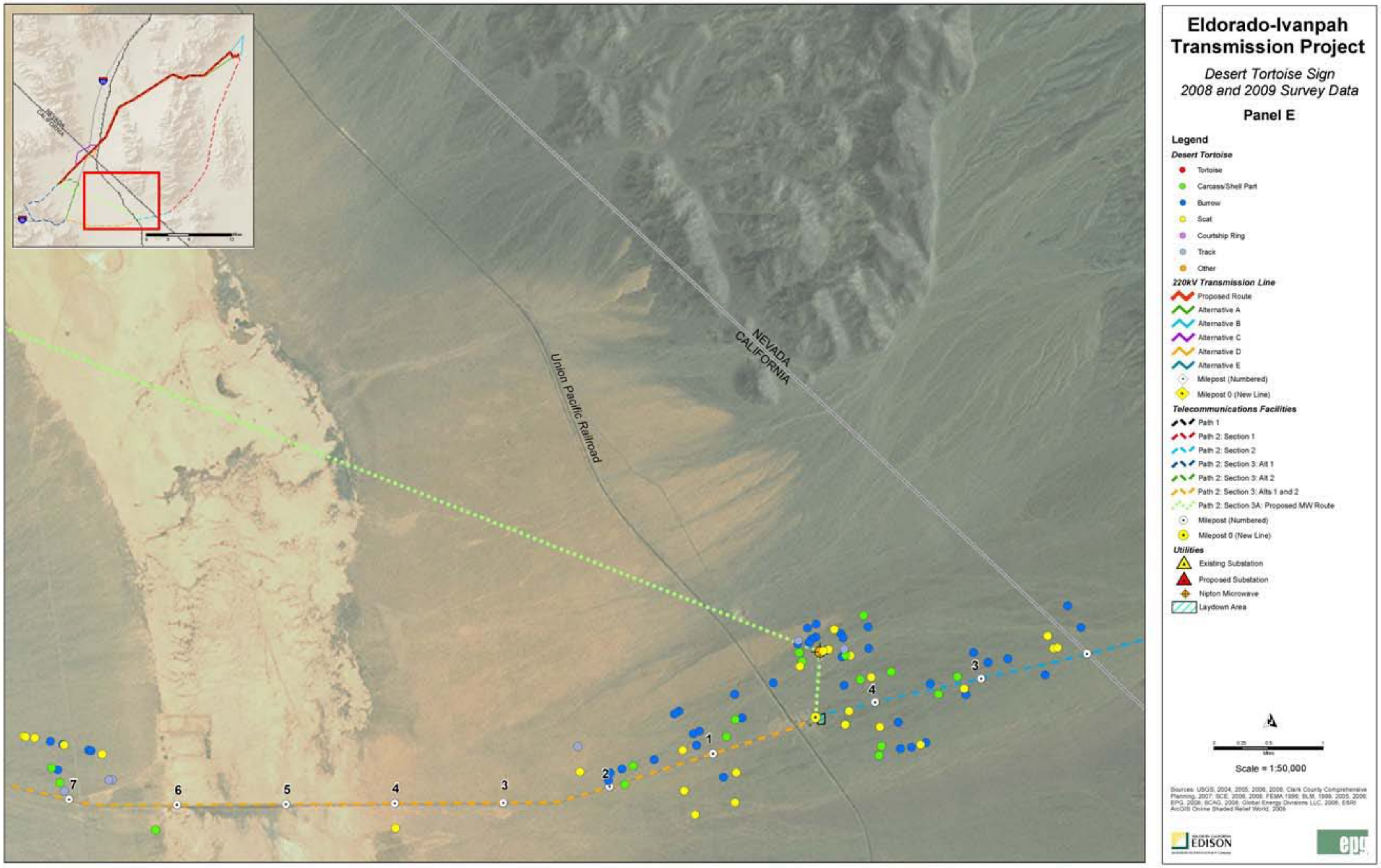

FIGURE 2, continued.

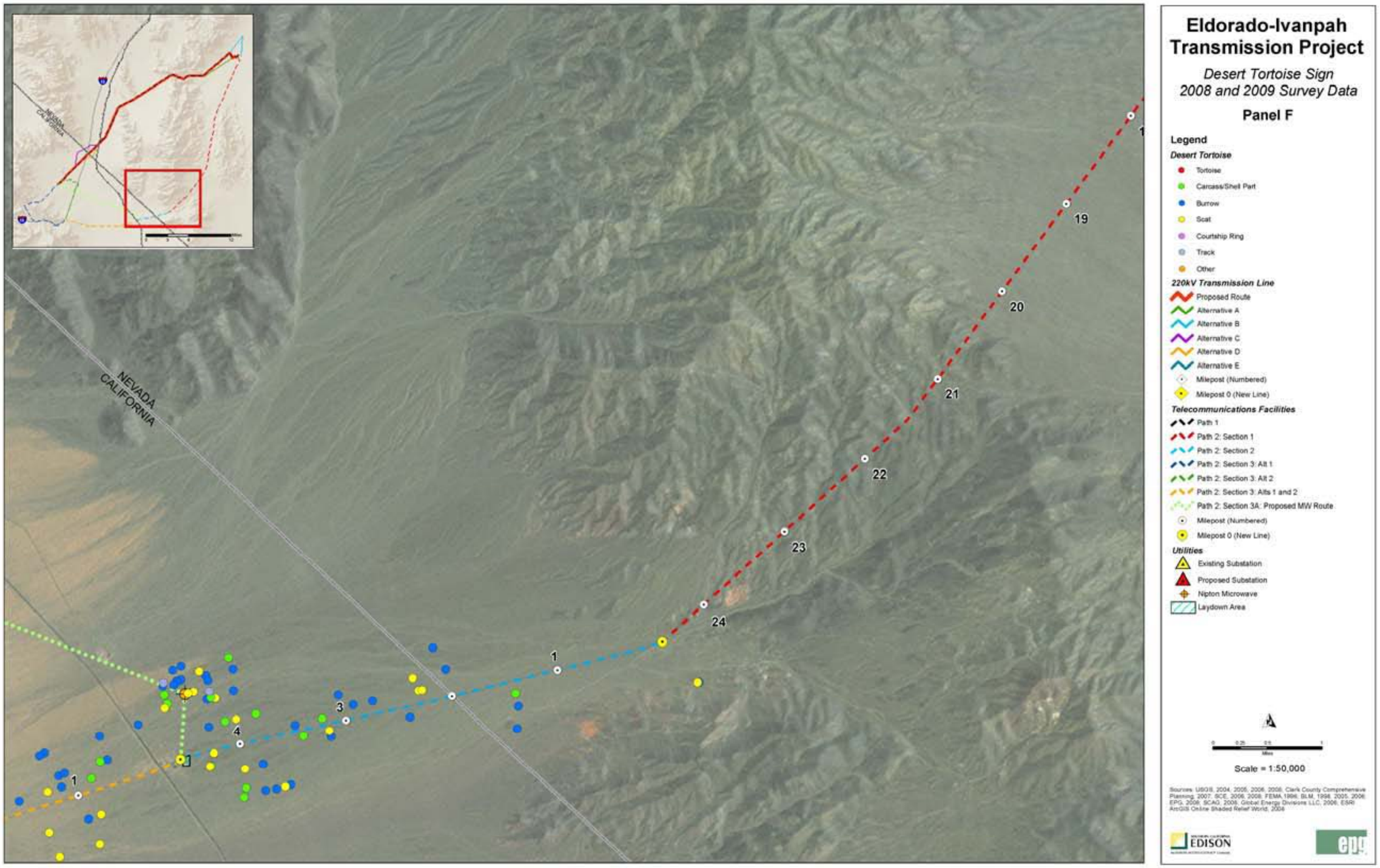

FIGURE 2, continued.

FIGURE 2, continued.

5.0 DISCUSSION AND RECOMMENDATIONS

5.1 Anticipated Impacts

5.1.1 General Project Impacts

Based on survey results demonstrating the presence of desert tortoises in the Project area, construction and operation of the EITP Project would result in permanent and temporary, as well as direct and minor indirect, impacts to desert tortoise. A detailed analysis of impacts and potential mitigation measures is somewhat premature at this time because Project design is not finalized. This technical report on survey results will provide input to facilitate final Project design and choice of alternatives. Final Project design can be followed by a detailed assessment of the Project's impacts and mitigation. However, a preliminary summary of impacts and mitigation is provided here based on what is known about current Project alternatives and reasonable expectations for construction and operation the Project.

The Project will include the following:

- Removal and disturbance of vegetation on an unknown amount of acreage for transmission line tower pads and stub roads, plus the upgrade of the existing access road; vegetation will also be removed or disturbed for pulling and tensioning sites;
- Removal of vegetation on an unknown amount of acreage for two new substation sites plus permanent removal of these sites from use by desert tortoises;
- Potential removal of vegetation on an unknown amount of acreage for construction of a microwave tower and access road;
- No additional habitat removal for the overhead installation of OPGWs or underground installation of an OPGW in the Nipton Road shoulder, with the possible exception of re-grading of access and spur roads;
- A construction period with increased workers and traffic to construction areas for at least one to two years; and
- Maintenance of the facilities, including, at a minimum, access and spur road grading , as needed, to facilitate maintenance.

In general, direct impacts to desert tortoises from construction and operation of the Project would include loss of habitat and could include the loss of individuals. Loss of habitat, even in temporary disturbance areas for construction purposes, would be considered permanent based on slow recovery time of habitats in desert ecosystems. Special habitat resources, such as specific burrowing or nesting sites, could be lost during project construction, especially in the mountains and associated washes. This would largely apply to fossorial animals, such as the desert tortoise, because of site fidelity and unidentified factors that foster continued use of specific sites. While the loss of specialized resources could be biologically important, the loss of generalized foraging and coversite habitat that would be removed on most of the transmission line is unlikely to create a biologically significant impact because: (1) the transmission line is already disturbed habitat; (2) the loss and/or degradation of habitat is anticipated to be a relatively small amount of total acreage that would be split into discontinuous, small patches that would still be usable by desert tortoises; (3) there is ample, similar habitat surrounding the Project area; and (4) this loss would not impede connectivity within the population. Similarly, the substations would not block connectivity because of their small size and the similar habitat surrounding the substation sites.

Indirect impacts that could result from Project construction include the introduction and/or spread of exotic plant species. With appropriate mitigation however, indirect impacts resulting from Project operation are likely to be negligible. Upgrading the transmission line and installing the OPGW would not create a new type of subsidy in the area that could attract tortoise predators, specifically ravens. Also, there are existing recreational routes through the Project area, so new recreational access would not be provided by the Project.

During Project operation, direct impacts could include the loss of individuals as a result of vehicle collisions during routine maintenance activities.

5.1.2 Desert Tortoise Population Impacts

Portions of the Project intersect areas targeted by USFWS for desert tortoise recovery. Telecom Path 2: Sections 1 (Eldorado-Lugo Transmission Line), 2 and 3 (Nipton Road and approximately 1.4 miles along I-15), and 3A (Microwave Tower) intersect the Ivanpah and Piute-Eldorado Desert Tortoise Wildlife Management Area (DWMAs) (Figure 3). DWMAs, established by the land management agencies to receive reserve-level management, were recommended by the 1994 Desert Tortoise Recovery Plan (USFWS 1994a) to promote desert tortoise recovery. BLM's Northern and Eastern Mojave (NEMO) Plan (BLM 2002), the planning area of which encompasses the California portion of the Project, and the Las Vegas BLM District provide a desert tortoise conservation strategy that focuses on tortoises inside DWMAs. For the NEMO Planning area, there are no specific management prescriptions for lands outside DWMAs, where all habitats are considered to be Category III[3].

The Proposed Route, Alternative A, and Telecom Path 2: Sections 1 (Eldorado-Lugo Transmission Line), 2 and 3 (Nipton Road), and 3A (Microwave Tower) also intersect designated desert tortoise critical habitat (Figure 4). Critical habitat encompasses those habitats that are deemed essential for tortoise conservation; the federal designation of critical habitat provides legal protection for these habitats.

[3] BLM habitat categories (BLM 1988), ranging in decreasing importance from Category I to Category III, were designed as management tools to ensure future protection and management of desert tortoise habitat and its populations. These designations were based on tortoise density, estimated local tortoise population trends, habitat quality, and other land-use conflicts. Category I habitat areas are considered essential to the maintenance of large, viable populations.

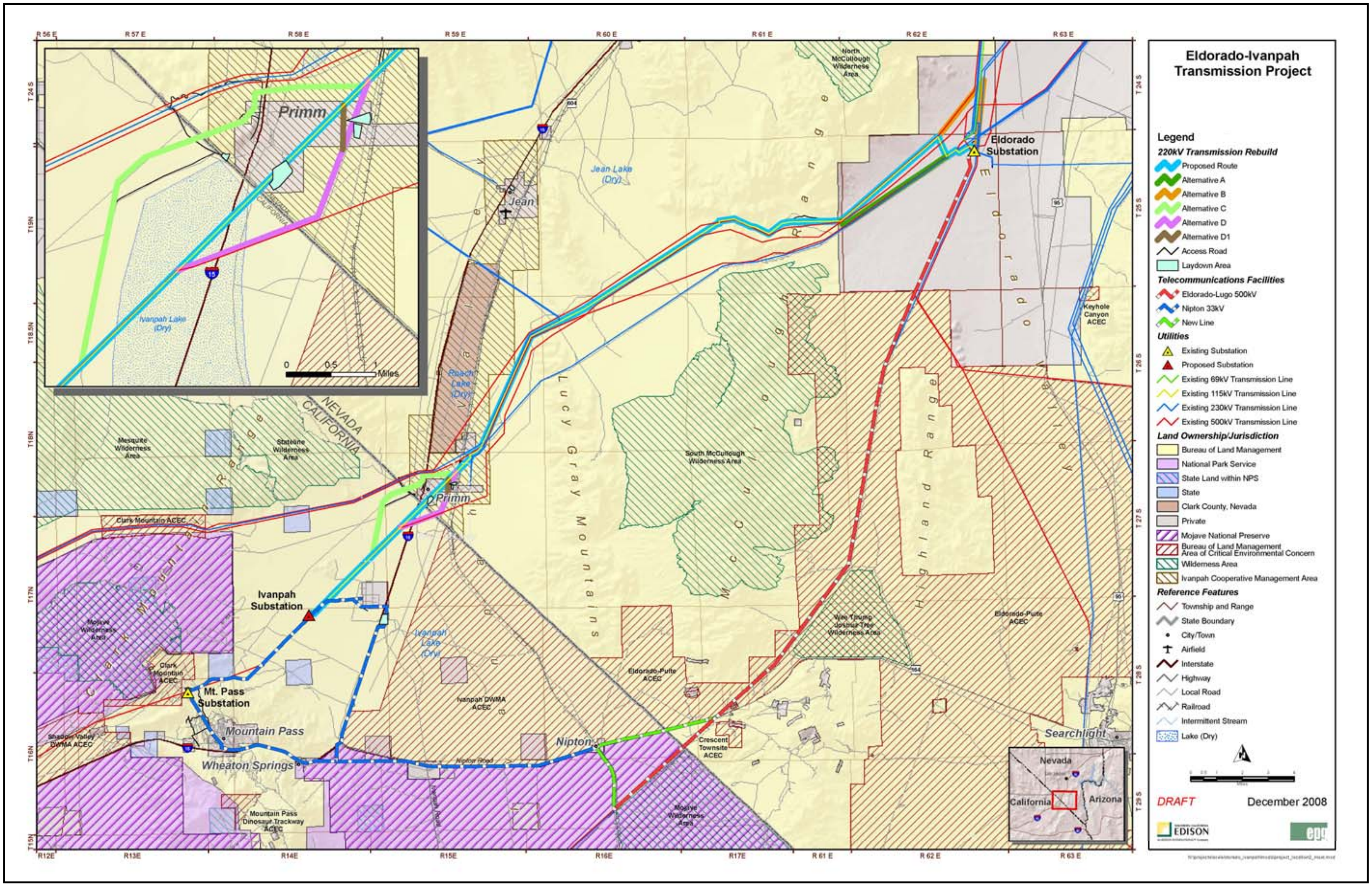

FIGURE 3. Federal and state management areas and land ownership in the Eldorado-Ivanpah Transmission Line Project area.

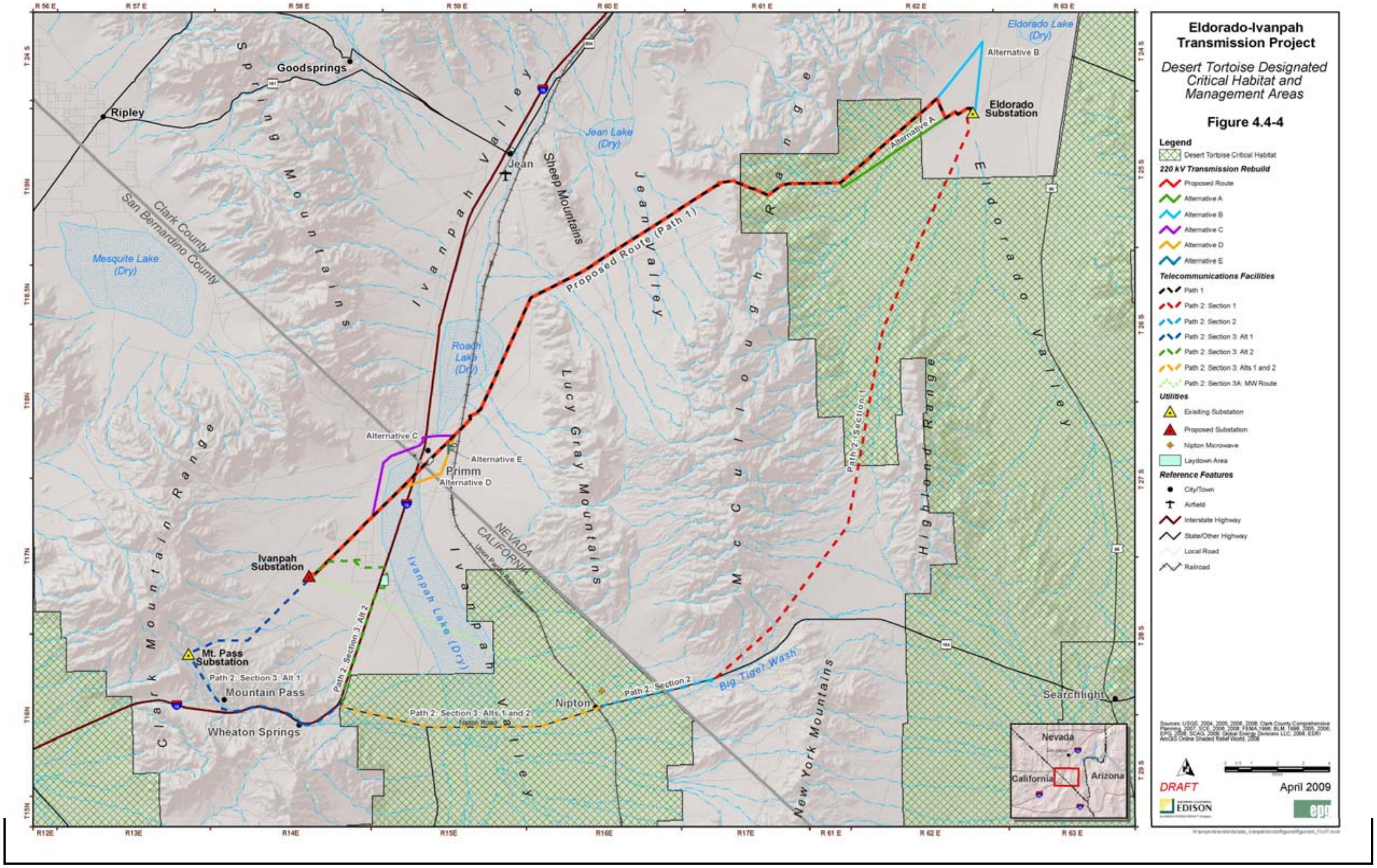

FIGURE 4. Designated desert tortoise critical habitat in the Project area.

5.1.3 Recommended Mitigation

A mitigation and monitoring plan, to be approved by all of the relevant resource agencies, must be developed to minimize project effects on desert tortoises and other biological resources. The USFWS protocol survey results will provide an important data set for this plan because they identify the distribution of tortoises and areas of tortoise concentration. The level of construction monitoring and mitigation efforts in those areas will be directed by these data. The NEMO Plan also lists several standard mitigation measures for work in desert tortoise habitat that must be incorporated into the construction monitoring program.

The following are recommendations that have been accepted by resource agencies for similar projects, have been shown to be successful, and should be incorporated into the Project mitigation and monitoring plan.

5.1.3.1 Onsite Mitigation – General Measures

Minimization of Habitat Degradation. In general, disruption of ecological processes should be minimized. For construction of linear facilities, including access roads and stub roads, habitat degradation should be limited to essential areas only. Where practical, previously disturbed areas should be used for construction staging and laydown areas, parking areas, and driving. All construction support facilities would be delineated in the field and shown on a location plan.

Avoidance. Avoidance of biological resources through appropriate seasonal construction restrictios and pre-construction surveys will minimize impacts. To minimize construction-related mortalities of nocturnally active species (e.g., snakes), it is recommended that all construction activities be conducted during daylight hours.

Construction- and Operations-related Environmental Protection. Prior to the start of construction, all activities, contingencies, and environmental protection measures related to construction and operation must be detailed relative to environmental protection. Issues addressed should include, but not be limited to, pre-construction clearance and species presence surveys, biological monitoring, designated working areas and equipment storage, stream protection, equipment maintenance and cleaning, fueling and accidental fuel spills, and removal of hazardous waste and construction-related materials.

Designation of a Project Biologist. A Project biologist should be assigned to ensure successful monitoring of construction activities and successful mitigation implementation, and to implement the worker education program. The Project biologist would be approved by the resource agencies and would be responsible for approving biological monitors. The Project biologist would work with the construction foreman and Project Environmental Compliance Coordinator and would have the authority to halt construction to ensure successful mitigation. Finally, the Project biologist would be responsible for reports to the agencies.

Raven Monitoring and Control Plan. In order to monitor the effectiveness of Project Design Features (PDFs) to minimize the attractiveness of ravens to the Project, a monitoring plan should be developed. This plan would also address measures for control, collaboration with the USFWS range-wide raven control program (USFWS 2008), and adaptive management.

Weed Control. A weed control program should be developed that delineates methods to monitor and minimize the introduction and/or spread of weeds and methods for weed eradication, should populations increase in response to the Project.

Restoration. For all temporary surface disturbance areas, including those external to the Project due to erosion or other Project factors, a restoration program should be implemented to reclaim temporarily disturbed habitats as close to pre-disturbance conditions as possible. The restoration program would include relevant techniques, principles, and success standards in the context of desert restoration. The NEMO Plan (BLM 2002) also provides guidance for site rehabilitation and rehabilitation credits.

Worker Environmental Awareness Program (WEAP). A WEAP will be developed to ensure that project construction and operation occur within a framework of safeguarding environmentally sensitive resources. Although facility construction has the greatest potential to harm environmental resources, the WEAP will also address those environmental issues that pertain to Project operations, such as general conduct, repairs and maintenance.

Reporting. During construction, the Project biologist should provide progress reports to relevant agencies to describe the extent of construction, mitigation measures implemented, mitigation successes or difficulties, and suggestions. Any harassment or mortality take of listed species, with suggestions for mitigation improvement, would be documented.

Adaptive Management. When data show that alterations in the Project Design Features (PDFs) and mitigation measures are required to adequately protect wildlife and habitats, then these should be analyzed with the resource agencies and changes implemented, as feasible.

5.1.3.2 Onsite Mitigation - Desert Tortoise-Specific Measures

To minimize direct and indirect impacts to desert tortoise from the Project, a detailed suite of measures, in addition to those outlined above, must be developed and incorporated into the mitigation and monitoring plan prior to construction. The most important onsite protection measure for desert tortoises is a thorough construction-associated clearance and monitoring program to minimize tortoise injuries and loss. This program will include, at a minimum:

- Pre-construction surveys
- Clearance surveys
- Adequate monitoring of construction and maintenance activities in unfenced habitat
- Relocation/translocation plan
- Permanent desert tortoise exclusion fencing for the substations; temporary or semi-permanent exclusion fencing where needed for construction
- Methods to accommodate routine maintenance and repair activities

5.1.3.3 Offsite Habitat Compensation

Onsite mitigation will strongly assist in species protection. Offsite mitigation (habitat compensation) will fully mitigate for Project-associated direct and indirect impacts to desert tortoise and other special-status species. All compensation should be scientifically supportable and based upon species impacts (Project and Project in light of other impacts), Project location, and direct as well as indirect impacts. Habitat for compensation should be acquired based on wildlife and plant values that are specifically impacted and the quality and conservation value afforded by the compensation lands. Habitat enhancement for compensation lands should be considered when analyzing compensation acreage.

Compensation ratios will be agreed upon in consultation with the resource agencies. The NEMO Plan (2002) requires habitat compensation inside DWMAs and designated critical habitat at a 5:1 ratio; habitat compensation for Category III habitat is 1:1 (BLM 2002).

6.0 LITERATURE CITED

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APPENDIX 1

Eldorado-Ivanpah Transmission Project
Results of 2008 and 2009 Desert Tortoise Surveys

APPENDIX 1

Eldorado-Ivanpah transmission project
results of 2008 and 2009 desert tortoise surveys

Project Element	Easting[1]	Northing	Sign Type[2]	Class[3]	Width/Size[4]	Surveyor's Additional Notes
2008 Surveys						
Proposed Route						
	667507	3958333	Burrow	4	various	7-10 possible burrows in caliche. Cleaned out, no other tortoise sign. Rodent scat in some.
	654603	3952873	Burrow	5	210	
	653680	3952392	Burrow	2	370	
	642422	3937852	Burrow	2	280	
	640181	3935608	Burrow	5	280	
	678319	3963352	Burrow	5	180	
	676079	3962639	Burrow	4	310	Berm of roadside
	669796	3959727	Burrow	3	530	Caliche burrow, TY-2/3 scat outside and inside, 13mm
	668667	3959766	Burrow	4	260	
	668584	3959363	Burrow	2	290	
	669850	3959303	Burrow	4	230	Caliche burrow, bank of wash, raised 0.5m
	669316	3959207	Burrow	4	240	Caliche burrow, bank of wash, no other sign
	669156	3959204	Burrow	6	180	
	668886	3959189	Burrow	4	260-330	3 caliche burrows together rodent and canine scat, no other tort.
	651770	3949908	Burrow	3	200	
	639575	3935000	Burrow	4	230	No other sign, can't see end
	651646	3947447	Burrow	3	270	
	651728	3947580	Burrow	3	240	1 foot deep, under *Larrea tridentata*
	652351	3949241	Burrow	3	300	~5' south is another tortoise burrow - 190 mm wide
	652539	3949722	Burrow	6	220	Rocky upper bajada, next to old canid(?) burrow

Project Element	Easting[1]	Northing	Sign Type[2]	Class[3]	Width/Size[4]	Surveyor's Additional Notes
	650268	3945811	Burrow	4	280	Canid scat, possibly modified by canid?
	671219	3958572	Burrow	2		Caliche, scat
	671176	3958550	Burrow	2		Caliche
	670921	3958516	Burrow	2		Caliche
	670877	3958757	Burrow	2/4	340	Caliche
	670507	3958811	Burrow	2	340	
	670383	3958846	Burrow	2/4		Caliche, series of 3 caves, clean and flat, goes back at least 3m
	670844	3958925	Burrow	1	220	
	671327	3958939	Burrow	1	320	With tortoise
	667316	3958196	Burrow	1	205	2 burrows and 1 pallet(205) burrows under boulders, 1 goes back at least 1.5m another is shallow, pallet in gravelly soil.
	667433	3958223	Burrow	>2 and 4	Not Measured	With 1 scat (18mm); series of 7 caliche caves
	667711	3958393	Burrow	1	340	With tracks
	669951	3958920	Burrow	4	170	Small but goes back 0.4m
	664709	3959011	Burrow	3	215	
	666624	3958554	Burrow	4	340	Dug out under large boulder, tortoise shaped, but sloppy inside
	661421	3957017	Burrow	4	130	Very small, entrance deteriorated
	658795	3955302	Burrow	6	340	
	653498	3952257	Burrow	5	245	Now used by something else
	654274	3952619	Burrow	2	255	
	654676	3952864	Burrow	5	300	Collapsed
	651756	3949864	Burrow	5	400	Cobbly soil, slightly caved in inside
	649187	3944552	Burrow	3	260	
	649902	3945681	Burrow	3	290	
	650414	3946816	Burrow	3	180	
	639152	3934527	Burrow	4	340	Cobbly wash, has flat bottom
	638827	3934310	Burrow	6	360	Caved in and full of webs, looks like tortoise

Project Element	Easting[1]	Northing	Sign Type[2]	Class[3]	Width/Size[4]	Surveyor's Additional Notes
	640223	3935525	Burrow	1	310	With tortoise, fresh tracks on mound
	651619	3950044	Burrow	1	225	With tortoise; burrow is 12 m from dirt road
	651718	3950257	Burrow	2	205	
	652162	3951064	Burrow	2	230	
	652337	3951446	Burrow	3	240	
	652501	3951864	Burrow	3	200	
	652697	3951772	Burrow	2	340	In road berm under 220kV like enroute to transect
	653230	3952037	Burrow	6	320	
	653761	3951611	Burrow	3	340	Burrow is 5m off 220kV access road to a tower and has a 0.25 inch mesh fence halfway around it (photo)
	652910	3950591	Burrow	1	225	With tortoise inside
	652824	3950413	Burrow	2	255	
	652725	3950172	Burrow	1	250	
	652280	3950522	Burrow	5	245	
	652287	3950536	Burrow	3	260	
	652569	3951233	Burrow	3	240	
	652699	3951485	Burrow	2	245	
	652879	3951888	Burrow	1	155	
	653193	3952046	Burrow	1	250	With tortoise, dirt bike trail runs over it and may have collapsed part of the burrow at an earlier date (photo)
	653438	3952170	Burrow	2	240	
	654275	3952594	Burrow	1	300	Under a group of 8 *Yucca schidigera*
	654495	3952824	Burrow	2 & 1	160	2 burrows- 1 short, the other 0.5 m deep under LAARTR 2 m apart, short burrow is Class 1
	654385	3952794	Burrow	2	240	
	654196	3952684	Burrow	1	240	With tortoise
	653944	3952547	Burrow	3	150	

Project Element	Easting[1]	Northing	Sign Type[2]	Class[3]	Width/Size[4]	Surveyor's Additional Notes
	653934	3952541	Burrow	1	160	Deep for a small tortoise, 1.5m with dirtbike tracks criss-crossing it(photo)
	653402	3952264	Burrow	5	265	
	653367	3952254	Burrow	1	300	With scat (2) 17mm
	652891	3952031	Burrow	5	300	
	652877	3952022	Burrow	3	265	
	652462	3951204	Burrow	2	330	2 burrows and a pallet within 2m of each other. In a 0.5 m high berm under wires of 220 kV line
	652451	3951173	Burrow	5	330?	Collapased
	652288	3950847	Burrow	1	290	
	665964	3958723	Burrow	2	470	Caliche burrow, scat outside TY-3, 15 and 17 mm
	654679	3952874	Burrow	2	332	
	654524	3952798	Burrow	3	335	In bank
	654527	3952791	Burrow	4	190	
	653794	3952444	Burrow	3	275	
	652227	3951009	Burrow	3	360	NTY scat (16 mm) on burrow apron
	652097	3950746	Burrow	3	380	
	672672	3959643	Burrow	3	281	NTY-3 scat
	667699	3957854	Burrow		392	
	667927	3958020	Burrow	2	290	
	667193	3957954	Burrow	1	290	Under boulder with tracks
	667147	3957962	Burrow	4	192	
	666912	3958079	Burrow	5	318	
	672424	3959382	Burrow	3	268	Seen en route to transect
	673588	3960029	Burrow	5	272	
	672105	3958345	Burrow	2	282	
	674014	3959737	Burrow	2	262	
	675334	3960796	Burrow	5	220	Seen en route to transect
	674587	3960341	Burrow	6	230	
	673307	3959388	Burrow	3	400	Probably same tortoise as Sign Nos. KB15, 16, 17

Project Element	Easting[1]	Northing	Sign Type[2]	Class[3]	Width/Size[4]	Surveyor's Additional Notes
	673309	3959389	Burrow	3	360	Cluster of 3 burrows, probably same tortoise as Sign Nos. KB14, 16, and 17
	673306	3959385	Burrow	2	350	Probably same tortoise as Sign Nos. KB14, 15, 17
	673284	3959380	Burrow	2	330	Probably same tortoise as Sign Nos. KB14, 15, 16
	678251	3961898	Burrow	3	325	In a kit fox den
	677994	3962191	Burrow	6	230	
	675696	3961222	Burrow	3	309	
	672643	3959547	Burrow	5	270	Probably same tortoise as Sign No. KB22.
	672653	3959557	Burrow	3	310	Same wash as KB21
	672927	3959779	Burrow	3	260	
	672704	3959655	Burrow	1	301	With tortoise
	669899	3958152	Burrow	3/4	279	Caliche
	654640	3952886	Burrow	2	263	
	654604	3952870	Burrow	1	309	Fresh tracks inside burrow
	652602	3951798	Burrow	4	280	
	651683	3949826	Burrow	3	260	
	650323	3946722	Burrow	5	210	
	650677	3946485	Burrow	2	340	Modified canid
	651925	3949271	Burrow	5	260	
	651920	3949942	Burrow	5	295	Old scat inside
	652302	3950924	Burrow	1	285	With tracks
	652386	3951117	Burrow	3	280	
	652442	3951264	Burrow	5	290	
	652307	3951282	Burrow	2	235	
	662665	3958120	Burrow	4	270	Dug by canid , but tortoise shape inside, wouldn't need much work to make nest
	659652	3956040	Burrow	4	160	*Neotoma lepida* debris outside
	654432	3952296	Burrow	5	205	
	654691	3952429	Burrow	2	270	
	654768	3952476	Burrow	1	320	

Project Element	Easting[1]	Northing	Sign Type[2]	Class[3]	Width/Size[4]	Surveyor's Additional Notes
	654999	3952573	Burrow	2	280	
	655026	3952585	Burrow	2	150	
	655186	3952671	Burrow	3	140	
	655399	3952787	Burrow	1	275	
	655630	3952899	Burrow	3	305	
	656276	3953216	Burrow	2	145	
	656737	3953438	Burrow	3	290	
	654228	3952508	Burrow	2	135	
	654581	3952689	Burrow	2	325	
	654809	3952797	Burrow	3	350	
	651559	3950431	Burrow	5	180	
	654709	3953743	Burrow	1	290	
	652306	3952129	Burrow	1	240	
	656202	3953911	Burrow	2	170	
	653607	3952465	Burrow	5	210	Mouth broken down inside looks like tortoise
	666661	3957865	Burrow	4	310	Under boulders, looks like used by tortoise
	666349	3958312	Burrow	1	350	
	671615	3959035	Burrow	2	24	
	671290	3959041	Burrow	4	400	Caliche cave, tort shape, no other sign
	672125	3959956	Burrow	4	290	Caliche cave, no tracks or scat, very tort shaped
	672401	3959747	Burrow	4	340	Excellent cave, recently had a lot of *Neotoma* debris cleaned out
	672267	3959513	Burrow	2	380	4 caves, also 320, 340, 400 mm, scat and recently used
	672964	3960115	Burrow	3	310	Modified canid dig
	675470	3962517	Burrow	3	230	
	675629	3963133	Burrow	2	320	Caliche cave; scat inside
	675640	3963122	Burrow	3	360	
	649457	3943900	Burrow	3	320	Modified fox den
	650012	3944608	Burrow	3	210	

Project Element	**Easting[1]**	**Northing**	**Sign Type[2]**	**Class[3]**	**Width/Size[4]**	**Surveyor's Additional Notes**
	650255	3944959	Burrow	2	340	Modified fox den
	649528	3944343	Burrow	3	350	
	648857	3943648	Burrow	5	280	Mostly filled in and old
	649907	3945931	Burrow	2	250	
	649783	3945662	Burrow	5	290	Mostly filled in
	649242	3944681	Burrow	2	270	Modified fox den, old tracks
	649238	3944678	Burrow	1	370	Modified fox den, fresh tracks
	649024	3944482	Burrow	6	260	Probably old tortoise, mostly filled in
	648971	3944419	Burrow	3	250	
	648990	3944266	Burrow	3	210	
	649991	3945475	Burrow	4	320	Kit fox den that appears to have been modified by a tortoise
	649819	3945893	Burrow	2	290	
	649882	3945976	Burrow	1	Not Measured	Tortoise resting inside
	667421	3958265	Burrow	3	176	
	641281	3936412	Burrow	3	304	Originally made by canid
	649081	3944182	Burrow	3	291	
	649203	3944401	Burrow	3	280	
	649122	3944317	Burrow	3	310	
	667598	3958209	Burrow	2	355	
	666881	3958346	Burrow	3	280	
	667301	3958594	Burrow	3	280	
	672672	3959643	Burrow	3	281	With NTY3 adult scat inside
	669950	3958420	Burrow	4	170	0.4 m long
	668565	3959105	Carcass/Shell Part	4 years	180	Half of carcass, unknown gender
	671195	3958559	Carcass/Shell Part	4 years	Adult	Disarticulated
	670779	3958541	Carcass/Shell Part	>4 years	>230	40% intact
	670610	3958514	Carcass/Shell Part	>4 years	>240	60% intact
	636190	3931629	Carcass/Shell Part		130	Freshly dead (3 photos); 2 burrows (360 and 340)

Project Element	Easting[1]	Northing	Sign Type[2]	Class[3]	Width/Size[4]	Surveyor's Additional Notes
	652348	3950246	Carcass/Shell Part	4 years	~240	Female, 70% intact
	652846	3951532	Carcass/Shell Part	>4 years	Unknown	8 pieces of bone frags
	668768	3958852	Carcass/Shell Part	>4 years	190	Plastron only
	665264	3959126	Carcass/Shell Part	>4	Unknown	Scattered under tower 1380
	668086	3958094	Carcass/Shell Part	>4 years	Large adult	Half carcass, probably male, very broken, possibly lion
	667852	3958233	Carcass/Shell Part	>1 year	Small adult/subadult	One pectoral scute
	669965	3958152	Carcass/Shell Part	>4 years	Adult	Female
	669620	3958820	Carcass/Shell Part	>4 years	220	Probably female
	652429	3951377	Carcass/Shell Part	1-2 years	92	Plastron fractured; May have been dropped from tower or run over
	652134	3950742	Carcass/Shell Part	>2 years	220	Female
	675638	3962673	Carcass/Shell Part	2-3 years	210	Female, badly broken, mountain lion?
	676621	3963180	Carcass/Shell Part	>4 years	Adult	Single piece of shell bone
	673110	3959825	Carcass/Shell Part	2-3 years	230	Little sign of trauma, very blond
	673927	3960728	Carcass/Shell Part	1 year	182	Female shell
	667301	3958594	Carcass/Shell Part	2-3 years	190	
	669458	3959755	Tortoise		200	Female, standing in open
	654247	3952675	Tortoise		188	Probable male (longish tail and gular)
	653632	3952364	Tortoise		275	Male
	667598	3957797	Tortoise		280	Male, face looks good except slightly bloody below R nares

Project Element	Easting[1]	Northing	Sign Type[2]	Class[3]	Width/Size[4]	Surveyor's Additional Notes
	666094	3958701	Tortoise		199	Eating between large boulders in rocky wash; female
	649145	3944558	Tortoise		215	Female
	654331	3952569	Tortoise		>250	Male; associated burrow is 290 mm
	648828	3944997	Tortoise		230	Healthy looking male
	653633	3952479	Tortoise		200	
	666107	3958403	Tortoise			In burrow, mouth of burrow 270mm
	650064	3946173	Scat	NTY-3	18	
	669801	3958979	Scat	TY-2	15	
	655386	3953250	Scat	TY-2	21	
	652715	3951876	Scat	TY-2	17	
	650293	3946725	Scat	NTY-3	16	
	650233	3946590	Scat	NTY-3	18	
	650192	3946495	Scat	NTY-4	13	
	649076	3944493	Scat	NTY-4	18	
	651785	3947726	Scat	NTY	20	In runnel
	651984	3949363	Scat	TY-2	25	gravelly slope
	666576	3959090	Scat	NTY-3	23	Very pale
	665972	3959135	Scat	TY-2	15	
	666163	3959014	Scat	TY-1	12	
	666599	3958955	Scat	TY-2	17	
	651987	3950331	Scat	TY-2	13	Another scat, NTY-4, 14mm at same location
	651992	3950386	Scat	TY-2	11	
	652728	3951842	Scat	TY-2/3	16	En route to transect, near Tower No. 1316
	650405	3946821	Scat	NTY-3	17	
	650009	3946268	Scat	NTY-3	12	
	650148	3946611	Scat	TY-2	15	
	651569	3949885	Scat	NTY-3	17	Pale, but tight and dark inside
	651603	3949970	Scat	TY-2	13	
	651927	3950573	Scat	TY-2	16 & 10	2 scat, stuck together, same event
	651947	3950625	Scat	TY-2	21	

Project Element	Easting[1]	Northing	Sign Type[2]	Class[3]	Width/Size[4]	Surveyor's Additional Notes
	653846	3952167	Scat	TY-2	13	En route to transect
	652972	3951622	Scat	TY-1	12	Incidentally seen off the transect
	669139	3958959	Scat	TY-1	15	
	650290	3946625	Scat	NTY-3	20	
	650062	3946116	Scat	TY-2	15	
	640929	3936345	Scat	TY-1	19	
	667870	3958027	Scat	TY-2	Juvenile	Possible chuckwalla, but location, length, width suggest tortoise
	668306	3958304	Scat	TY-2	17	Off Transect
	667855	3958234	Scat	TY-2	18	
	667722	3958159	Scat	TY-2	19	
	667544	3958040	Scat	TY-3/NTY-3	13	
	667014	3957996	Scat	NTY-4	13	
	667023	3958203	Scat	TY-2	18	
	672944	3959985	Scat	NTY-4	16	
	669781	3958166	Scat	TY-2	13	
	668479	3958203	Scat	TY-2	16	
	667623	3958412	Scat	TY-3	19	
	666577	3958608	Scat	TY-2	14	Slope of cobble hill
	666134	3958688	Scat	TY-3	16	Between rocky hills
	653749	3952410	Scat	TY-2	15	
	651781	3949619	Scat	NTY-3	21	A lot of soil in it
	651733	3949509	Scat	TY-2	17	
	650398	3946538	Scat	TY-3	19	Contains thick stems
	651654	3949483	Scat	NTY-4	16	
	651991	3950583	Scat	TY-2	15	
	654854	3952049	Scat	TY-2	18	
	651483	3952368	Scat	TY-2	18	
	651528	3951227	Scat	TY-2	13	2 pieces
	651589	3951374	Scat	TY-2	20	
	653015	3952154	Scat	TY-2	18	

Project Element	Easting[1]	Northing	Sign Type[2]	Class[3]	Width/Size[4]	Surveyor's Additional Notes
	666477	3957868	Scat	TY-2	16	En route to transect
	676590	3963236	Scat	NTY-4	22	Almost white
	676714	3963727	Scat	NTY-4	19	White scat, in wash and could have been washed here
	649882	3945877	Scat	TY-2	12	
	649088	3944654	Scat	NTY-4	16	
	649519	3945205	Scat	TY-2	15	
	649855	3945925	Scat	TY-2	21	
	664557	3958352	Scat	TY-2	15	Gravel and cobble ridge
	667647	3958451	Scat	NTY-3	15	
	653467	3952270	Scat	TY-2	19	
	667020	3959346	Scat	TY-2	12	
	667728	3959022	Scat	TY-2	17	
	667494	3958991	Scat	TY-1	9	
	667478	3958989	Scat	NTY-4	20	
	667301	3958594	Scat	NTY-3	15	
	640995	3936295	Scat (2)	TY-2	9	
	652706	3951883	Scat (2)	TY-2	13	
	653467	3952270	Scat (2)	TY-2	19	
	653512	3952297	Scat (3)	TY-2	16	
	640984	3936280	Scat (5)	TY-2	9, 16	
	670251	3958185	Tracks	1	190	In gravel wash with caliche caves
	639902	3934237	Tracks		150	
	648630	3944033	Tracks		150	Fresh
	640941	3936388	Tracks		190	
	640393	3935625	Tracks		280	19mm scat, TY-2, 2m away
	648300	3943373	Tracks		202	Fresh
	651890	3950017	Tracks		240	Fresh
	654513	3952340	Tracks		235	
	649659	3944092	Tracks		26	Fresh
	649648	3944543	Tracks		198	
	648397	3943547	Tracks	1	176	
	648251	3943465	Tracks	1	163	En route to transect

Project Element	Easting[1]	Northing	Sign Type[2]	Class[3]	Width/Size[4]	Surveyor's Additional Notes
2009 Surveys						
Proposed Route						
	0666576	3958681	Burrow	2	380	In side of caliche wash
	0666574	3958688	Burrow	2	300	In side of caliche wash; scat and eggshell fragments
	0666293	3958604	Burrow	2	290	Rock burrow, scat
Alternative A						
	677649	3961540	Burrow	1	195	Burrow with tracks
	673599	3959892	Burrow	1	320	
	676826	3961924	Burrow	1	315	Burrow with tracks
	672509	3959004	Burrow	1	320	
	676798	3961912	Burrow	1	220	Female tortoise inside, two other burrows in area, tracks east of wash
	674641	3960453	Burrow	1	275	
	672992	3959306	Burrow	1	340	
	676851	3961801	Burrow	1	260	Tracks all over area 180 mm, 200 m west still many tracks
	672408	3959005	Burrow	2	310	
	673000	3959411	Burrow	2	235	
	676529	3961727	Burrow	2	320+	
	676799	3961648	Burrow	2	240	
	676861	3961700	Burrow	2	300	Tracks 2 m east of burrow
	675430	3960325	Burrow	3	330	May be used by fox now
	674011	3959955	Burrow	3	305	
	678014	3962992	Burrow	3	230	
	677021	3962082	Burrow	3	240	340 mm deep
	674172	3960111	Burrow	3	320	
	673453	3959629	Burrow	3	285	
	673615	3959784	Burrow	3	265	
	676091	3961168	Burrow	3	190	
	676838	3961851	Burrow	3	270	
	676841	3961976	Burrow	5	180	Old, eroded

Project Element	Easting[1]	Northing	Sign Type[2]	Class[3]	Width/Size[4]	Surveyor's Additional Notes
	675614	3961364	Burrow	5	280	
	676442	3961650	Burrow	5	305	Collapsed tortoise burrow, used by other animal
	678257	3962744	Burrow	5	270	On side of bermed wash
	678084	3962859	Burrow	5	180	
	673494	3959697	Carcass/Shell Part	> 4 years	NR	Old fragment
	674322	3960253	Carcass/Shell Part	> 4 years	NR	Scattered old carcass
	674372	3960531	Carcass/Shell Part	1-2 years	145	Female, 12 marginals on left side, 11 on right
	676285	3961584	Carcass/Shell Part	1-2 years	205	Female, possibly shot, took photos
	674840	3960732	Carcass/Shell Part	2-4 years	215	Male
	676064	3961558	Carcass/Shell Part	2-4 years	240	Male
	676041	3960587	Carcass/Shell Part	3 years	255	Male intact shell
	675441	3960337	Carcass/Shell Part	4 years	~210	Shell broken
	673647	3959765	Scat	TY-2	17	
	677564	3961489	Tracks		151	Fresh
	677972	3961768	Tracks		150	Old track
	676790	3961942	Tracks		170	Fresh, in wash
	674557	3960544	Tracks		160	
	677236	3962349	Tracks		180	
	676691	3961981	Tracks		170	
	675873	3961266	Tracks		190	
	676152	3961211	Tracks		195	More tracks 100 m east, same size
	676421	3961389	Tracks		195	
	676451	3961416	Tracks		180	Tracks all over 100 m, tracks at 200 m
	676913	3961842	Tracks		190	
	676583	3961615	Tracks		110	
	677035	3962149	Tracks		170	

Project Element	Easting[1]	Northing	Sign Type[2]	Class[3]	Width/Size[4]	Surveyor's Additional Notes
Alternative B						
	680459	3966115	Burrow	1	290	Live tortoise inside, 40 m east of line
	680480	3965606	Burrow	1	230	With tracks
	680112	3966078	Burrow	1	340	Active, tracks and scat; tortoise Sign QBTT8 came from this burrow
	678439	3966155	Burrow	2	340	Has 5 scat inside, in wash bank
	680796	3967033	Burrow	3	240	
	680562	3966973	Burrow	3	300	
	680498	3967061	Burrow	3	~320	
	680560	3966587	Burrow	3	320	
	680474	3965408	Burrow	3	260	
	680481	3965467	Burrow	3	270	
	680516	3966075	Burrow	3	280	
	680087	3965893	Burrow	3	280	Inactive, not used this year, definitely tortoise
	680725	3967208	Burrow	5	320	
	680466	3964626	Burrow	5	170	
	680784	3967070	Burrow	5	320	
	680606	3967156	Burrow	NR	240	Fox complex, 2 burrows modified by tortoise in the past
	677845	3965397	Carcass/Shell Part	> 4 years	Unknown	May be small adult, scattered disarticulated bone fragments
	677704	3964625	Carcass/Shell Part	> 4 years	Unknown	Single bone fragment in wash
	680981	3966405	Carcass/Shell Part	> 4 years	Adult	Plastron bone fragment
	679124	3965118	Carcass/Shell Part	> 4 years	Adult	5 bone fragments, very old
	680644	3966512	Scat	NTY-3	15	
	680511	3965813	Scat	NTY-3	12	
	680494	3965417	Scat	NTY-3	10	
	380493	3965767	Scat	NTY-3	12	
	680500	3965779	Scat	TY-2	16	
	680538	3966100	Tortoise		285	Female
	680101	3966074	Tortoise		~220	Eating *Schismus;* from burrow Sign No. QBTB9

Project Element	Easting[1]	Northing	Sign Type[2]	Class[3]	Width/Size[4]	Surveyor's Additional Notes
	680661	3967160	Tracks		155	
	680580	3967109	Tracks		150	
	680562	3967127	Tracks		150	
	680365	3966947	Tracks		160	Fresh, in soft soil
Alternative C						
	645918	3943103	Burrow	1	270	
	645464	3942477	Burrow	2	450	Second entrance 310 mm, 3 scat inside 16-19 mm
	647584	3943162	Burrow	3	230	
	642806	3939479	Burrow	4	190	No scat or tracks
	647516	3943221	Burrow	5	NR	
	645294	3942505	Scat	TY-2	12	
	645948	3943170	Scat	TY-2	16	
	645933	3943080	Scat	TY-2	16	
	645142	3942391	Scat	NR	NR	
	643275	3940579	Tracks		190	
Alternative D						
	647314	3940581	Burrow	1	310	With tracks
	646944	3940440	Burrow	5	270	
	646491	3940702	Burrow	5	230	
	647174	3941410	Carcass/Shell Part	> 4 years	Est. Sub-Adult	3 pieces only
	647199	3941020	Scat	TY-2	20	
	646700	3940725	Scat	TY-2	15	
	647125	3940508	Tracks		195	
	647341	3940623	Tracks		200	
	647364	3940706	Tracks		190	
Ivanpah Substation						
	638769	3934281	Burrow	2	300	Nice shape, no scat
	639030	3934544	Burrow	4	165	Entrance dug out, inside of tunnel looks good, can't see back
	638803	3934414	Carcass/Shell Part	> 4 years	> 220	In open, disarticulated

Project Element	Easting[1]	Northing	Sign Type[2]	Class[3]	Width/Size[4]	Surveyor's Additional Notes
Telecom Path 2: Section 1 (Eldorado-Lugo 500 kV Transmission Line)						
	674461	3949440	Burrow	2	320	Recent use, but currently empty, photo D
	675245	3951481	Burrow	3	200	Some debris inside, good condition
	677279	3956429	Burrow	4	210	Starts out with good form but gets mousey in the back, no other sign
	675085	3951102	Burrow	5	Caliche cave	Moderately clean caliche cave. No obvious present occupation by tortoise, but has shape and depth, probable historic use, at least 1.8 m deep. More nice caliche habitat to north, tortoise-looking area
	677484	3956855	Carcass/Shell Part	NR	NR	
	678205	3958553	Tracks		200	
	678195	3958560	Tracks		140	
Telecom Path 2: Section 2, and Section 3: Alternatives 1 and 2 (Nipton Road)						
	660369	3926960	Burrow	1	245	With tracks
	646204	3925849	Burrow	1	120	Tracks, can't see the back, empty
	643600	3926061	Burrow	1	310	Fresh tracks, can't see back, 2nd burow 2 m west, same size
	655207	3925922	Burrow	1	310	Tortoise inside, tracks, scat inside and out (NTY, 15 mm) 2 other burrows 250 mm adjacent
	657364	3927223	Burrow	1	190	
	643159	3924983	Burrow	2	310	Burrow with scat, TY-2 20 mm
	645643	3925977	Burrow	2	230	
	655883	3926329	Burrow	2	260	Two Class 5 burrows of similar size within 6 m
	641263	3926428	Burrow	2	150	
	643100	3926132	Burrow	2	280	Cobwebs, but clean, in wash bank
	653932	3925512	Burrow	2	250	Cobwebs and minor debris at mouth, otherwise quite clean, clasic form
	657391	3926811	Burrow	2	280	Entire tunnel collapsed
	660705	3927983	Burrow	2	390	
	659524	3927145	Burrow	2	310	
	661977	3927119	Burrow	2	340	Under *Yucca*; classic
	655608	3925445	Burrow	3	260	
	659198	3926670	Burrow	3	210	

Project Element	Easting[1]	Northing	Sign Type[2]	Class[3]	Width/Size[4]	Surveyor's Additional Notes
	645822	3925933	Burrow	3	320	
	646242	3925840	Burrow	3	250	
	653905	3925396	Burrow	3	180	Mouth slightly deteriorated, but overall good
	654102	3925571	Burrow	3	140	Good condition, but may be used by other sp.; minor deterioration on apron
	654582	3925711	Burrow	3	230	Mouth deteriorated, cobwebs, but good interior with old scat inside
	664651	3927475	Burrow	3	520	Cave
	659306	3927288	Burrow	3	130	Small, nice shape and mound, unused
	660899	3927661	Burrow	3	410	Perfect burrow, wash bank, rats using now, 1 TY-3 scat 25 mm
	656343	3926844	Burrow	3	300	Long unused in berm/dike
	659814	3927200	Burrow	3	340	
	645750	3925557	Burrow	5	310	Definitely tortoise, somewhat deteriorated
	655770	3926673	Burrow	5	280	
	654952	3926424	Burrow	5	290	
	654877	3926386	Burrow	5	230	
	655164	3926088	Burrow	5	180	May be Class 3, but substrate is so soft and sandy that deteriorates rapidly
	655250	3926128	Burrow	5	290	May be Class 3, but substrate is so soft and sandy that deteriorates rapidly
	658198	3926262	Burrow	5	290	
	658229	3925871	Burrow	5	340	Old and unused
	658392	3925893	Burrow	5	310	0.4 m from tunnel, caved in
	658603	3925959	Burrow	5	~300	Tunnel collapsed
	661954	3926790	Burrow	5	260	Old; hole in roof
	658668	3926834	Burrow	6	170	Tunnel collapsed, old
	642457	3925930	Carcass/Shell Part	> 1 year	Adult	Small adult, fragment on road edge, road kill, scute and bone
	657907	3925770	Carcass/Shell Part	> 4 years	Adult	Broken, likely male
	658792	3926677	Carcass/Shell Part	> 4 years	~200	Broken shell, female
	661936	3927311	Carcass/Shell Part	> 4 years	~220	Half of shell, female, broken up

Project Element	Easting[1]	Northing	Sign Type[2]	Class[3]	Width/Size[4]	Surveyor's Additional Notes
	645658	3925587	Carcass/Shell Part	> 4 years	250	Male, gular chewed off
	641426	3927009	Carcass/Shell Part	> 4 years	Adult	Old male, scutes quite sunken, disarticulated
	655780	3926303	Carcass/Shell Part	> 4 years	Sub-Adult	
	642140	3926207	Carcass/Shell Part	> 4 years	Adult	Disarticulated and scattered
	641801	3926188	Carcass/Shell Part	> 4 years	Sub-Adult	1 piece in wash
	654269	3925618	Carcass/Shell Part	> 4 years	Sub-Adult	Disarticulated and scattered near edge of wash
	655650	3926048	Carcass/Shell Part	> 4 years	Adult	
	654147	3925339	Carcass/Shell Part	> 4 years	Unknown	Bone, size of quarter
	642366	3925951	Carcass/Shell Part	> 4 years	Adult	Bone fragment on road berm
	657943	3925909	Carcass/Shell Part	> 4 years	Adult	65% of shell bones, 5% of scutes present, scattered
	657629	3926894	Carcass/Shell Part	> 4 years	Adult	4 scattered bone fragments
	658088	3927008	Carcass/Shell Part	> 4 years	Adult	Single bone fragment
	659068	3926936	Carcass/Shell Part	1-2 years	130	Canid depredation
	645783	3925368	Carcass/Shell Part	2-3 years	Juvenile	Broken 3 pieces at base of fence post, 2 partial plastrons of different individuals
	657924	3926191	Carcass/Shell Part	2-4 years	275	Old male (Shell Wear Class 7), possible coyote depredation, likely history of chewing by domestic dogs
	647198	3924666	Carcass/Shell Part	4 years		Broken up shell, medium sized tortoise, shell pieces spread out, washed around
	657424	3926231	Carcass/Shell Part	4 years	Adult	Scutes still remain, but shell disfigured
	655026	3925249	Scat	NTY-3	18	
	660496	3927352	Scat	NTY-3	14	

Project Element	Easting[1]	Northing	Sign Type[2]	Class[3]	Width/Size[4]	Surveyor's Additional Notes
	660549	3927361	Scat	NTY-3	15	
	646408	3925788	Scat	NTY-3	12	Bleached, tight, slight odor inside
	664633	3927469	Scat	NTY-3	19	
	659173	3926757	Scat	NTY-4	16	
	657408	3926225	Scat	NTY-4	50	Old, white
	658522	3925930	Scat	NTY-4	15	Almost white
	643820	3925945	Scat	TY-1	21	Very fresh, yesterday, 2 pieces
	657466	3926424	Scat	TY-2	9	
	650751	3924692	Scat	TY-2	18	
	655777	3925073	Scat	TY-2	9	
	643517	3926169	Scat	TY-2	19	2 pieces
	642486	3926266	Scat	TY-2	15	
	641024	3927169	Scat	TY-2	20	< 100 m from I-15
	642993	3926585	Scat	TY-2	20	
	643009	3926580	Scat	TY-2	15	
	643286	3926508	Scat	TY-2	19	3 scats same event
	645244	3926055	Scat	TY-2	25	
	645271	3926048	Scat	TY-2	20	
	645407	3926030	Scat	TY-2	21	
	645846	3925925	Scat	TY-2	20	
	653482	3925526	Scat	TY-2	11	
	655002	3925850	Scat	TY-2	17	2nd piece 18 mm, 1 piece geophagic
	657796	3926929	Scat	TY-2	16	
	657485	3927244	Scat	TY-2	16	
	655183	3924890	Scat	TY-3	15	
	655795	3925516	Scat	TY-3	24	Scat was mostly soil and sand with some veg, Solid, slight odor
	660409	3927532	Scat	NR	NR	
	642068	3926417	Tracks		220	
	646557	3925411	Tracks		160	Probable female, long toenail marks
	646504	3925409	Tracks		220	Many tracks in this area
	653449	3925903	Tracks		230	
	645850	3925244	Tracks		140	

Project Element	Easting[1]	Northing	Sign Type[2]	Class[3]	Width/Size[4]	Surveyor's Additional Notes
Microwave Tower for Telecom Path 2: Section 3A						
	656853	3927653	Burrow	1	290	With tracks
	656973	3927515	Burrow	1	300	With tracks
	657747	3927667	Burrow	2	300	
	656976	3927711	Burrow	3	230	With class 4 scat, 20 mm
	657341	3927572	Burrow	3	300	
	657377	3927502	Burrow	3	250	
	656909	3927486	Burrow	3	300	
	657126	3927328	Burrow	3	290	
	657753	3927353	Burrow	5	270	
	656708	3927418	Burrow	5	250	
	656871	3927438	Burrow	5	260	
	657682	3927840	Carcass/Shell Part	> 4 years	Adult	Female
	656728	3927287	Carcass/Shell Part	> 4 years	~250	Female, chewed and healed gular
	656750	3927100	Carcass/Shell Part	2 years	Immature	Found en route to 1200 ZOI 400 m from tower site
	656772	3927156	Carcass/Shell Part	3-4 years	~230	Female
	657416	3927251	Carcass/Shell Part	3-4 years	Adult	
	657164	3927336	Scat	TY-2	13	Found 100 m from tower site enroute to ZOI start
	657244	3927633	Scat	TY-2	15	
	657078	3927315	Scat	TY-2	18	
	656736	3927088	Scat	TY-4	20	Found en route to start of 1200 ZOI to 2400 ZOI, 410 m from tower site
	657395	3927345	Tracks		210	
	656714	3927467	Tracks		170	
Telecom Path 2: Section 3: Alternative 2 (I15 at the Nipton Exit to Primm Golf Course and West)						
	641157	3927116	Burrow	1	230	Tortoise in burrow
	641374	3927749	Burrow	2	220	
	643078	3932518	Burrow	2	90	
	641356	3928048	Burrow	3	270	Fresh, though with annuals. Has the tracks path

Project Element	Easting[1]	Northing	Sign Type[2]	Class[3]	Width/Size[4]	Surveyor's Additional Notes
	642465	3930759	Burrow	3	240	
	642917	3931552	Burrow	4	220	Not deep, but very good shape and recent
	642613	3932088	Carcass/Shell Part	> 4 years	Adult	Small
	641977	3928986	Carcass/Shell Part	> 4 years		Crumbling, disarticulating
	643281	3933094	Carcass/Shell Part	> 4 years	Adult	One disarticulated piece of shell
	641047	3935034	Carcass/Shell Part	> 4 years	Sub-Adult	Disarticulated
	641820	3934816	Carcass/Shell Part	> 4 years	185	Disarticulated
	643211	3932892	Courtship Ring			Fresh
	643495	3933660	Scat	TY-1	20	2 pieces
	642130	3929808	Scat	TY-2	15	
	643302	3933693	Tracks		190	
Telecom Path 2: Section 3: Alternative 1 (I-15 at the Nipton exit to the Mountain Pass Substation, and northeast)						
	637780	3925744	Burrow	4	220	Clean inside, may have been tortoise at one time, but now other species, nice shape and apron
	638433	3933529	Burrow	3	~220	Part of old kit fox complex
	638478	3933617	Burrow	4	~360	In caliche, lots of *Neotoma* activity, no scat, but shape and apron right
	635821	3930979	Burrow	4	~220	In wash under *Acacia greggii*
	637517	3933478	Burrow	4	230	In wash bank, looks created by tortoise, but now used by a coyote?
	635451	3931329	Burrow	4	250	Classic tortoise design, but not clean and no other sign
	633856	3930377	Burrow	6	200	Outside caved in but deeper inside looks like tortoise
	638423	3925208	Carcass/Shell Part	1-2 years	148	
	635274	3931135	Carcass/Shell Part	> 4 years	Adult	1 piece peripheral
	637419	3933855	Carcass/Shell Part	2-3 years	122	

Project Element	Easting[1]	Northing	Sign Type[2]	Class[3]	Width/Size[4]	Surveyor's Additional Notes
	637530	3932380	Carcass/Shell Part	2-4 years	Adult	
	636850	3931954	Scat	TY-2	11	
	634652	3930222	Scat	TY-2	11	With class 2 burrow, ~220 mm, rock shelter

1. All coordinates are Universal Transverse Mercator North American Datum 83, Zone 11S.
2. Number in parentheses is number of sign.
3. See Appendix 2 for key to sign type.
   NR = Not Recorded
4. All units are millimeters unless otherwise noted.

APPENDIX 2

Sample Desert Tortoise and Special-Status Species Data Form and Key for the Eldorado-Ivanpah 2008 and 2009 Desert Tortoise Surveys

Appendix 2. Sample Desert Tortoise and Special-Status Species Form, Front Side

NIPTON LEG 6
600'N ZOI

PROJECT ELDORADO-IVANPAH TRANSMISSION PROJECT
2009 SPECIAL-STATUS SPECIES SURVEYS

Page 1/2

DATE 21 MAY 2009
TIME: Start 1450
End 1625
WEATHER:

	Ta	Tg	Cloud Cover	Wind
Start	34.0 °C	46.9 °C	90% Strato Cumulus	0-3 mph West
End	32.6 °C	42.4 C	60% Strato Cumulus	0-2 mph West

SURVEYOR: JENNY WEIDENSEE
PROJECT ELEMENT NIPTON ROAD
MILE OR OTHER DESCRIPTOR LEG 6
ROW
ZOI - 600' NORTH
STARTING UTM 6 53 280 E 39 25 305 N
ENDING UTM 6 55 442 E 39 25 991 N
(NAD 83)
TRANSECT WIDTH 30 FT
TRANSECT LENGTH 2.27 Km

GENERAL SITE DESCRIPTION:
VEGETATION SHRUB LAYER AND BUNCH GRASSES)
Aspect Dominants
LARTRI

Common Species
AMBDUM

Occasional Species

% Cover 15-20%
Avg. Height of Dominant Shrub Species
1.4 LARTRI

UNDERSTORY
Abundant Species

Exotics (Map concentrations and describe here relative to population size and geographic breadth.)

TOPOGRAPHY
Landform
Low bajada

Drainage Type
Small wash & sheet wash

Elevation (state meters or feet) 849-888 meters

SUBSTRATE
Color Tan w/ multicolor gravel and black/brown crytobiotic soil
Coarse Particles (Type, % Cover)
Sand f-c 100%, gravel fine-med 30-40%
Soil Texture and Consistence
Soft - loose silty sand

PRESENCE OF PREDATORS: Ravens - # Detected NO # Nests NO
Coyotes - # Detected YES Scat? YES Scat Piles NO
Fox natal den

HUMAN-RELATED DISTURBANCES (Onsite and Adjacent)
Rare vehicle tracks in wash; road trash.

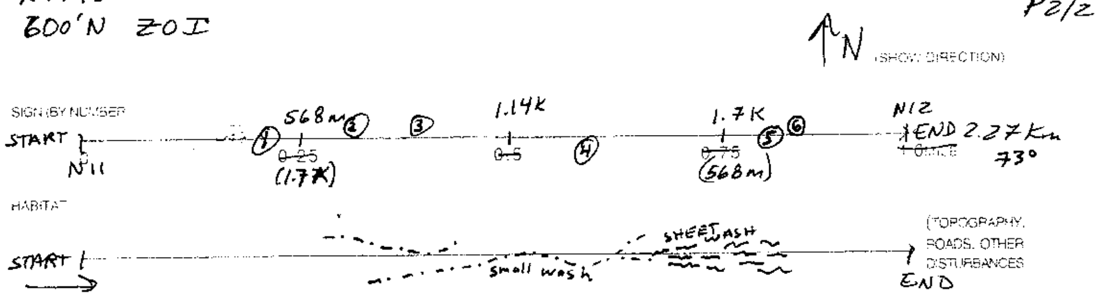
SITE PICTURE: Photographer J. Weidensee
A - Form ☑
(Describe site pictures)
A - Site photo taken east from start @ N11
B - Site photo taken west from end @ N12
C - Photo of scat

COMMENTS

Reverse Side of Data Form

NIPTON LEG 6
600'N ZOI

P2/2



SIGN #	WAYPOINT	UTM (NAD 83)	DESERT TORTOISE SIGN TYPE	CLASS	width (sc, bur, tr) MCL (shell, tort)	OTHER SPECIES SPECIES	SIGN TYPE	FURTHER DESCRIPTION
1	YNTB14	E6 53 931 N39 25 512	Burrow	2	250 mm			Cobwebs + minor debris @ mouth otherwise quite clean - classic form
2	YNTB15	E6 54 101 N39 25 571	Burrow	3	170 mm			~~Excellent~~ good condition but may be used by other sp. minor deterioration on apron.
3	YNTC16	E654 269 N39 25 618	Carcass	>4yrs	UNK est. subadult			disarticulated and scattered near edge of wash
4	YNTB17	E6 54 581 N39 25 711	Burrow	3	230 mm			Mouth deteriorated cobwebs but good interior w/old scat inside
5	YNTS18	E6 55 002 N39 25 850	Scat	TY2	18 mm 17 mm			2 pieces - 1 piece geophagic
6	YNTB19	E655 206 N39 25 922	Burrow	1	310 mm	Tortoise	Inside	Tracks; scat inside and out; CAN HEAR TORTOISE moving inside. (Scat NTY 15 mm)

2 other burrows 250 mm adjacent.

Lar tr. 1.2m Sand sft -15 fine grav 30% rd erog. Natal fgro den Photo D Scat

KEY TO SIGN CLASSES
(Alice Karl, 2001)

BURROWS

1 - DEFINITELY TORTOISE - FRESH (TRACKS, TORTOISE INSIDE, FRESHLY DISTURBED SOIL ON MOUND/RUNWAY)
2 - DEFINITELY TORTOISE - USED THIS SEASON (CLEARED OF ANNUALS, BUT NO FRESHLY DISTURBED SOIL)
3 - DEFINITELY TORTOISE – NOT USED THIS SEASON (PROBABLY HAS ANNUALS GROWING IN RUNWAY)
4 - POSSIBLY TORTOISE – IN GOOD CONDITION BY UNSURE OF SPECIES USING BURROW
5 - DEFINITELY TORTOISE – DETERIORATED SUCH THAT IT WOULD REQUIRE SUBSTANTIAL REMODELING TO BE USABLE
6 - POSSIBLY TORTOISE – DETERIORATED

SCAT

TY1 - WET OR FRESH, DARK, ODORIFEROUS
TY2 - DRIED, POSSIBLE GLAZE ON PART; UNEXPOSED SURFACES DARK BROWN; SLIGHT ODOR
TY3 - DRIED, NO GLAZE; AT LEAST PARTIALLY FADED ON EXTERIOR; VERY SLIGHT ODOR
NTY3- DRIED, NO GLAZE; AT LEAST PARTIALLY FADED ON EXTERIOR; NO ODOR (DISTINGUISHES FROM TY3)
NTY4- DRIED, LOOSENING, PALE OR BLEACHED

CARCASSES – GENERAL INDICATORS FOR TIME SINCE DEATH

<1 YR - UNEXPOSED SCUTES NORMAL COLOR AND SHEEN, ADHERE TIGHTLY. EXPOSED SCUTES PALING AND MAY BE LIFTING OR OFF. UNEXPOSED BONE WAXY AND SOLID.
1-2 YRS - UNEXPOSED SCUTES NORMAL COLOR WITH SLIGHT SHEEN, MOSTLY TIGHTLY ATTACHED. EXPOSED SCUTES SLIGHTLY PALE WITH NO SHEEN AND NO TO SLIGHT GROWTH RING PEELING. NO ODOR. UNEXPOSED BONE SILKY.
2-3 YRS - UNEXPOSED SCUTES PALE AND WITHOUT SHEEN BUT NO GROWTH RING PEELING. EXPOSED SCUTES PALE WITH SLIGHT PEELING. SCUTES LOOSE, OFF AND/OR TIGHT. BONE SUTURES GENERALLY TIGHT.
4 YRS - UNEXPOSED SCUTES NORMAL COLOR TO SLIGHTLY PALE, NO SHEEN, NO PEELING. EXPOSED SCUTES LOOSE, PALE, DULL, WITH MODERATE PEELING. SUTURES SEPARATING AND BONE SURFACE IS FISSURED, EDGES ARE ROUGHENED (FISSURED UNDER HAND LENS) AND CHIP FAIRLY EASILY
>>4 YRS- DISARTICULATED AND DISARTICULATING. BONE EDGES CHIP AND MAY CRUMBLE EASILY. SCUTES ARE PEELING AND CURLED

APPENDIX 3

Access and Stub Roads Surveyed in November 2009

Appendix 3. Access and Stub Roads Surveyed in November 2009

Road	Point along Access Road		Endpoint NearestTower		Notes
Spur Road	Easting	Northing	Easting	Northing	
1	668951	3959147	669119	3958978	Endpoint stops inside ROW, not at Tower
2	668697	3958994	668711	3958959	Endpoint stops inside ROW, not at Tower
3	667901	3958648	667906	3958630	Endpoint stops inside ROW, not at Tower
4	667805	3958609	667855	3958488	
5	667554	3958451	667739	3958292	
5A	667599	3958327	667739	3958292	Endpoint stops inside ROW, not at Tower
6	667357	3958369	667396	3958230	Endpoint stops inside ROW, not at Tower
7	667302	3958369	667236	3958304	Endpoint stops inside ROW, not at Tower
7A	667184	3958381	667184	3958331	Endpoint stops inside ROW, not at Tower
8	667016	3958453	666995	3958420	Endpoint stops inside ROW, not at Tower
9	666559	3958735	666572	3958615	Endpoint stops inside ROW, not at Tower
10	666385	3958677	666299	3958613	Endpoint stops inside ROW, not at Tower
10A	666349	3958689	666312	3958662	
11	665965	3958666	666061	3958803	
11A	666058	3958797	666035	3958789	
12	664839	3959014	664829	3959114	
12A	664830	3959089	664829	3959114	Endpoint stops inside ROW, not at Tower
13	664442	3958921	664352	3958963	Endpoint stops inside ROW, not at Tower
Access Road					
	West End		East End		
1	678199	3962666	680311	3962838	
	South End		North End		
2	678199	3962666	678350	3963177	Endpoint stops inside ROW, not at Tower
3	672259	3958833	672053	3959084	Endpoint stops inside ROW, not at Tower
4	672259	3958833	670953	3959036	Endpoint stops inside ROW, not at Tower

APPENDIX 4

Towers Surveyed on the Telecom Path 2: Section 1
(Eldorado-Lugo 500 kV Transmission Line)

Appendix 4. Towers Surveyed on the Telecom Path 2: Section 1 (Eldorado-Lugo 500 kV Transmission Line)

Tower #	Type	Body Retrofit	Peak Retrofit
152-1	EHT-S-3		X
154-2	EMT-1		X
154-3	EMT-3	X	
155-5	EMT-3	X	
156-1	EMT-2		X
156-3	EMT-3	X	
156-4	EMT-3	X	
157-1	EMT-3	X	
157-2	EMT-3	X	
158-1	EMT-3	X	
158-4	EMT-3	X	
159-3	EMT-3	X	
159-4	EMT-3	X	
161-4	EMT-3	X	
163-1	EMT-3	X	X
163-2	EMT-3	X	
163-4	EMT-3	X	
164-4	EMT-3	X	
166-1	EMT-3	X	
166-3	EMT-3	X	
167-3	EMT-3	X	
168-1	EMT-3	X	
168-2	EMT-3	X	
168-3	EMT-3	X	
168-4	EMT-3	X	X
169-1	EMT-3	X	X
170-1	EMT-3	X	
170-2	EMT-3	X	
170-3	EMT-3	X	
171-1	EMT-3	X	
171-2	EMT-3	X	
171-3	EMT-3	X	
172-1	EMT-3	X	
172-2	EMT-3	X	
172-3	EMT-3	X	
173-1	EMT-3	X	
173-2	EMT-3	X	
173-3	EMT-3	X	
173-4	EMT-3	X	
174-1	EMT-3	X	
174-2	EMT-3	X	X
175-1	EMT-3	X	X
175-2	EMT-3	X	
175-3	EMT-3	X	
175-4	EMT-3	X	
176-2	EHA-1	X	X

APPENDIX 5

Field Personnel for Desert Tortoise Surveys

Appendix 5. Field Personnel

2008

Gavin Bieber
Dave Focardi
Paul Frank
Cathy Halley
Rick Hunter
Alice Karl
Michael Omana
Art Schaub
Lindsay Spenceley

2009

Dave Focardi
Paul Frank
Bill Hasskamp
Mary Ann Hasskamp
Alice Karl
Shawn Lindey
Michael Omana
Art Schaub
Kevin Walsh
Jenny Weidensee

Appendix C
Aesthetic ResourcesDocuments

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Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date: December 1, 2008
District: Las Vegas Field Office
Resource Area:
Activity (program): Energy Transmission

SECTION A. PROJECT INFORMATION

1. Project Name: Eldorado-Ivanpah Transmission Project	**4. Location:** **Township** 25 S **Range** 61 E **Sections** 20	**5. Location Sketch:** The Proposed Transmission Line, Transmission Line Alternative A, Transmission Line Alternative B, Transmission Line Alternative C, Transmission Line Alternative D, or Transmission Line Alternative E would be present in this view. (see Figure 4.1-2). The information on this worksheet pertains to these proposed transmission lines. The view was taken looking northeast. Photograph Date: 11/13/2008
2. Key Observation Point: KOP 1: View from the Transmission Corridor that Includes the Eldorado-Baker-Coolwater-Dunn Siding-Mountain Pass 115 kV Transmission Line – Looking Northeast (Proposed Eldorado-Ivanpah Transmission Project – Transmission Lines)		
3. VRM Class: VRM Class III and VRM Class II The Boundary Between VRM Class III and VRM Class II is Located Between the Foreground and Middleground (Mark Chandler/BLM Las Vegas Field Office 12/15/2008)		

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	**Foreground:** Rolling Hill Sloping Uphill then Downhill from Foreground to Background, Eroded Base of the Mountain Range **Middleground:** Incised Low to Tall Mountains **Background:** Not Visible **No Water Visible**	**Foreground:** Irregularly Rounded Low to Medium High Shrubs and Ground Cover; Interspersed Grasses; Random Irregularly Rounded Joshua Tree **Middleground:** Low Mounded Shrubs **Background:** Not Visible	**Foreground:** Near Vertical Angular Lattice Steel Towers (LSTs) with Associated Conductors; Near Vertical Angular T-framed LSTs, Near Vertical Tubular Steel Poles (TSPs) **Middleground:** Near Vertical Angular LSTs with Associated Conductors; Near Vertical Angular T-framed LSTs, Near Vertical Tubular Steel Poles (TSPs) **Background:** Not Visible from this View
LINE	**Foreground:** Nearly Horizontal Line with Vertical Incline **Middleground:** Varying Topographic Variation in the Horizontal Line, Strong Diagonal Lines at the Base of the Mountain Range, Mountains have a Smooth to Jaggedly Rounded Horizontal Skyline **Background:** Not Visible **No Water Visible**	**Foreground:** Weak Horizontal Line **Middleground:** Undulating Horizontal Line **Background:** Not Visible	**Foreground:** Vertical LSTs and TSPs, Horizontal and Diagonal Conductors with Slight Sag **Middleground:** Vertical LSTs and TSPs, Horizontal and Diagonal Conductors with Slight Sag **Background:** Not Visible from this View
COLOR	**Foreground**: Light Golden Tan; Random Tan, Light Brown, and Black Rock **Middleground:** Predominantly Light Golden Tan to Golden Tan and Slate Gray, Visible Striations of Warm Pink, and Wine-Purple **Background:** Not Visible **No Water Visible**	**Foreground:** Medium Amber, Gray-Brown, Yellow-Green, Sage-Green Shrubs, Ground Cover, and Trees; Very Light Sage Green Grasses **Middleground:** Medium Brown and Dark Dusty Green **Background:** Not Visible	**Foreground:** Medium Gray LSTs and Conductors; Rust Brown TSPs **Middleground:**, Medium Gray LSTs and Conductors; Brown TSPs **Background:** Not Visible from this View

TEXTURE	**Foreground:** Rocky, Granular Soil **Middleground:** Smooth to Granular Soils, Discontinuously Rough Mountains **Background:** Not Visible **No Water Visible**	**Foreground**: Varied: Randomly Spaced, Bristly, Pointy Shrubs, Ground Cover, and Trees; Interspersed with Soft Mounded Grasses **Middleground:** Soft Shrubs **Background:** Not Visible	**Foreground**: Orderly Spaced Pointy LSTs and Smooth, Orderly Spaced Pointy TSPs **Middleground:** Orderly Spaced Pointy LSTs and Smooth, Orderly Spaced Pointy TSPs **Background:** Not Visible from this View

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	**Foreground:** - Grading for Structure Sites and Access Roads May or May Not be Visible in this View **Middleground:** - Grading for Structure Sites and Access Roads May or May Not be Visible in this View **Background:** No Visible Change **No Water Visible**	**Foreground:** - Clearing of Vegetation for Structure Sites and Access Roads May or May Not be Visible in this View **Middleground:** - Clearing of Vegetation for Structure Sites and Access Roads May or May Not be Visible in this View **Background:** No Visible Change	**Foreground:** - Removal of Existing Angular H-Frame, Angular T-Frame LSTs, and Associated Conductors Which are Barely Visible in the Existing Environment in this View - Addition of Angular H-Frame Tubular Steel Poles (TSP) and Associated Conductors Which Would be Visible in this View - Addition of Angular Lattice Steel Towers (LSTs) and Associated Conductors Which Would be Visible in this View - Access Roads May or May Not be Visible in this View **Middleground:** - Removal of Angular Vertical H-Frame LSTs, T-Frame LSTs, and Associated Conductors Which are Visible in the Existing Environment - Addition of Angular LSTs and Associated Conductors Some of Which Would be Visible in this View - Access Roads May or May Not be Visible in this View **Background:** Not Visible in this View

LINE	**Foreground:** - Grading for Structure Sites and Access Roads May or May Not be Visible in this View **Middleground:** - Grading for Structure Sites and Access Roads May or May Not be Visible in this View **Background:** No Visible Change **No Water Visible**	**Foreground:** - Clearing of Vegetation for Structure Sites and Access Roads May or May Not be Visible in this View **Middleground:** - Clearing of Vegetation for Structure Sites and Access Roads May or May Not be Visible in this View **Background:** No Visible Change	**Foreground:** - Removal of Existing Near Vertical H-Frame, T-Frame LSTs, and Associated Horizontal Conductors Which are Barely Visible in the Existing Environment in this View - Addition of Near Vertical H-Frame Tubular Steel Poles (TSP) and Horizontal and Diagonal Conductors Which Would be Visible in this View - Addition of Near Vertical Angular Lattice Steel Towers (LSTs) and Associated Horizontal Conductors Which Would be Visible in this View - Access Roads May or May Not be Visible in this View **Middleground:** - Removal of Existing Near Vertical T-Frame LSTs and Associated Conductors Which are Barely Visible in the Existing Environment in this View - Addition of Near Vertical LSTs and Associated Horizontal Conductors Some of Which Would be Visible in this View - Access Roads May or May Not be Visible in this View **Background:** Not Visible in this View
COLOR	**Foreground:** - Grading for Structure Sites and Access Roads May or May Not be Visible in this View **Middleground:** - Grading for Structure Sites and Access Roads May or May Not be Visible in this View **Background:** No Visible Change **No Water Visible**	**Foreground:** - Clearing of Vegetation for Structure Sites and Access Roads May or May Not be Visible in this View **Middleground:** - Clearing of Vegetation for Structure Sites and Access Roads May or May Not be Visible in this View **Background:** No Visible Change	**Foreground:** - Removal of Existing Gray H-Frame, T-Frame LSTs, and Gray Conductors Which are Barely Visible in the Existing Environment in this View - Addition of Gray H-Frame TSP and Gray Conductors Which Would be Visible in this View - Addition of Gray LSTs and Gray Conductors Which Would be Visible in this View - Access Roads May or May Not be Visible in this View **Middleground:** - Removal of Existing Gray H-Frame, T-Frame LSTs, and Gray Conductors Which are Barely Visible in the Existing Environment - Addition of Gray LSTs and Associated Gray Conductors Some of Which Would be Visible in this View - Access Roads May or May Not be Visible in this View **Background:** Not Visible in this View

TEXTURE	**Foreground:** - Grading for Structure Sites and Access Roads May or May Not be Visible in this View **Middleground:** - Grading for Structure Sites and Access Roads May or May Not be Visible in this View **Background:** No Visible Change **No Water Visible**	**Foreground:** - Clearing of Vegetation for Structure Sites and Access Roads May or May Not be Visible in this View **Middleground:** - Clearing of Vegetation for Structure Sites and Access Roads May or May Not be Visible in this View **Background:** No Visible Change	**Foreground:** - Removal of Existing Pointy H-Frame LSTs, Pointy T-Frame LSTs and Smooth Conductors Which are Barely Visible in the Existing Environment in this View - Addition of Pointy and Smooth H-Frame TSP and Smooth Conductors Which Would be Visible in this View - Addition of Pointy LSTs and Smooth Conductors Which Would be Visible in this View - Access Roads May or May Not be Visible in this View **Middleground:** - Removal of Existing Pointy H-Frame LSTs, Pointy T-Frame LSTs, and Smooth Conductors Which are Barely Visible in the Existing Environment in this View - Addition of Pointy LSTs and Smooth Conductors Some of Which Would be Visible in this View - Access Roads May or May Not be Visible in this View **Background:** Not Visible in this View

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST		FEATURES: LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
ELEMENTS	Form			X				X			X		
	Line			X				X			X		
	Color			X				X			X		
	Texture			X				X			X		

2. Does project design meet visual resource management objectives? ☒ Yes ☐ No (Explain on reverse side)

VRM Class III (Foreground and Middleground)

3. Additional mitigating measures recommended ☐ Yes ☒ No (Explain on reverse side)

Evaluator's Names	Date
Brenda Eells/CH2M HILL	December 1, 2008
Liz Cutler/CH2M HILL	
Colleen Bredensteiner/CH2M HILL	

SECTION D. (Continued)

Comments from Item 2.

VRM Class III (Foreground and Middleground)

In the view from this KOP the foreground and the near middleground are managed by the BLM as VRM Class III. The more distant middleground in this view is managed by the BLM as VRM Class II. This evaluation addresses the foreground and near middleground managed by the BLM as VRM Class III.

BLM's Visual Resource Management (VRM) Class III objective is to "…partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape" (BLM, 2007b).

The Proposed Eldorado-Ivanpah Transmission Project would result in a weak change in the form, line, color, and texture for Land/Water Body and Vegetation and moderate change in the form, line, color, and texture for Structures present in the existing environment. The changes to the existing environment would be consistent with the VRM Class III assignment. Construction, Operation, and Decommissioning would result in no adverse effect and no mitigation would be required.

Bureau of Land Management (BLM). 2007b. *BLM Handbook H-8410-1, Visual Resource Inventory*. http://www.blm.gov/nstc/VRM/8431.html. Accessed January 2009.

Additional Mitigating Measures (See item 3)

Construction and operation of the Proposed Eldorado-Ivanpah Transmission Project would be consistent with the BLM land management objectives of VRM Class III and would result in no adverse effect; therefore no mitigation would be required.

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST	FEATURES											
	LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
ELEMENTS: Form			X				X				X	
Line			X				X				X	
Color			X				X				X	
Texture			X				X				X	

2. Does project design meet visual resource management objectives? ☒ Yes ☐ No
(Explain on reverse side)

VRM Class II (Middleground)

3. Additional mitigating measures recommended
☐ Yes ☒ No (Explain on reverse side)

Evaluator's Names	Date
Brenda Eells/CH2M HILL	December 1, 2008
Liz Cutler/CH2M HILL	
Colleen Bredensteiner/CH2M HILL	

SECTION D. (Continued)

Comments from Item 2.

VRM Class II (Middleground)
In the view from this KOP the foreground and the near middleground are managed by the BLM as VRM Class III. The more distant middleground in this view is managed by the BLM as VRM Class II. This evaluation addresses the distant middleground managed by the BLM as VRM Class II.

BLM's Visual Resource Management (VRM) Class III objective is to "…retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape." (BLM, 2007b).

The Proposed Eldorado-Ivanpah Transmission Project would result in a weak change in the form, line, color, and texture for Land/Water Body, Vegetation, and Structures present in the existing environment. The changes to the existing environment would be consistent with the VRM Class II assignment. Construction, Operation, and Decommissioning would result in no adverse effect and no mitigation is required.

Bureau of Land Management (BLM). 2007b. *BLM Handbook H-8410-1, Visual Resource Inventory*. http://www.blm.gov/nstc/VRM/8431.html. Accessed January 2009.

Additional Mitigating Measures (See item 3)

Construction and operation of the Proposed Eldorado-Ivanpah Transmission Project would be consistent with the BLM land management objectives of VRM Class II and would result in no adverse effect; therefore no mitigation is required.

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date: December 1, 2008
District: Las Vegas Field Office
Resource Area:
Activity (program): Energy Transmission

SECTION A. PROJECT INFORMATION

1. Project Name: Eldorado-Ivanpah Transmission Project	**4. Location:** **Township** 26 S **Range** 61 E **Sections** 7	**5. Location Sketch:** The Proposed Transmission Line, Transmission Line Alternative A, Transmission Line Alternative B, Transmission Line Alternative C, Transmission Line Alternative D, or Transmission Line Alternative E would be present in this view. (see Figure 4.1-3). The information on this worksheet pertains to these proposed transmission lines. The view was taken looking northwest. Photograph Date: 11/13/2008
2. Key Observation Point: KOP 2: Representative View from South McCullough Wilderness (Proposed Eldorado-Ivanpah Transmission Project – Transmission Lines)		
3. VRM Class: VRM Class III (Mark Chandler/BLM Las Vegas Field Office 12/15/2008)		

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	**Foreground:** Nearly Flat Land Sloping Towards Valley in the Distance **Middleground:** Flat Wide Valley Floor, Low Mounding Hill on Right Edge of View **Background:** Flat Valley Floor Including Dry Lake, Low Mounded Weathered Hills, Incised Domed Low Mountains **No Water Visible**	**Foreground:** Irregularly Rounded and Pyramidal Low to Medium High Shrubs and Ground Cover **Middleground and Background:** Vegetation Present but Indistinguishable	**Foreground:** Nearly Flat Slightly Rutted Dirt Road and Low Berm **Middleground:** Near Vertical Angular Lattice Steel Towers (LSTs), Transmission Conductor is Evident, and Nearly Flat Dirt Roads **Background:** Nearly Flat Dirt Roads on Valley Floor, No Visible Structures in Mountains and Hills
LINE	**Foreground:** Near Horizontal Line **Middleground:** Regular Horizontal Line Across Valley Floor, Diagonally Inclined Undulating Over Crest of Hill **Background:** Nearly Horizontal Line with Slight Topographic Variation in the Valley Floor, Diagonally Inclined Undulating Over Crest of Hills, Low Mountains have a Jagged to Smooth Horizontal Line **No Water Visible**	**Foreground:** Weak Horizontal Line **Middleground:** Nearly Horizontal Line **Background:** Nearly Horizontal Line on Valley Floor, Vegetation Present but Indistinguishable in Mountains and Hills	**Foreground:** Diagonal Dirt Road Following Topography in Right Corner of View **Middleground:** Vertical Transmission Towers, Horizontal Conductors with Slight Sag, Diagonal Roads Across Valley Floor **Background:** Diagonal Roads Across Valley Floor, No Visible Structures in Mountains and Hills
COLOR	**Foreground**: Golden Tan, Random Black Rock **Middleground:** Golden Tan Dirt Rd, Valley Floor Color Indistinguishable Due to Vegetation, White Tan Dry Lake Bed **Background:** Golden Tan Dirt Rd, Valley Floor Color Indistinguishable Due to Vegetation, White Tan Dry Lake Bed, Dark Golden Brown to Gray Brown Hills and Mountains, Far Mountains have Purplish Cast **No Water Visible**	**Foreground:** Tan-Brown, Yellow-Green, Dark Brown, Dark Sage Green Shrubs and Ground Cover **Middleground:** Dark Brown and Dark Dusty Green **Background:** Dark Brown and Dark Dusty Green on Valley Floor, Vegetation Indistinguishable but Overall Brown Tone in Mountains and Hills	**Foreground:** Golden Tan Dirt Road and Berm **Middleground:** Medium Gray LSTs and Conductors, Golden Tan Dirt Roads **Background:** Golden Tan Dirt Roads on Valley Floor, No Visible Structures in Mountains and Hills
TEXTURE	**Foreground:** Sandy, Rocky **Middleground:** Smooth Valley Floor, Smooth Hills **Background:** Velvety Smooth Valley Floor and Dry Lake, Discontinuously Rough and Smooth Mountains and Hills **No Water Visible**	**Foreground**: Varied: Randomly Spaced, Bristly, Pointy Shrubs and Ground Cover Interspersed with Soft Mounded Grasses **Middleground and Background:** Vegetation Indistinguishable	**Foreground**: Soft Sandy Road Bed and Coarse Gravel Berm **Middleground:** Orderly Spaced Pointy LSTs, Smooth Overlapping Conductors, Smooth Dirt Road **Background:** Smooth Dirt Road on Valley Floor, No Visible Structures in Mountains and Hills

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	**Foreground:** No Change **Middleground:** Grading for Transmission Structure Sites and Access Roads May or May Not be Visible in this View **Background:** No Change **No Water Visible**	**Foreground:** No Change **Middleground:** Clearing of Vegetation for Transmission Structure Sites and Access Roads May or May Not be Visible in this View **Background:** No Change	**Foreground:** No Change **Middleground:** - Removal of Existing Angular H-Frame and T-Frame LSTs and Associated Conductors Which are Not Visible in the Existing Environment in this View. - Addition of Near Vertical Angular Lattice Steel Towers (LSTs) and Associated Transmission Conductor Which Would be Barely Visible to Not Visible in this View (Access Roads May or May Not Be Visible in this View) **Background:** No Change
LINE	**Foreground:** No Change **Middleground:** Grading for Transmission Structure Sites and Access Roads May or May Not be Visible in this View **Background:** No Change **No Water Visible**	**Foreground:** No Change **Middleground:** Clearing of Vegetation for Transmission Structure Sites and Access Roads May or May Not be Visible in this View **Background:** No Change	**Foreground:** No Change **Middleground:** - Removal of Existing Vertical H-Frame and T-Frame LSTs and Associated Horizontal Conductors Which are Not Visible in the Existing Environment in this View - Addition of Vertical Transmission Towers and Horizontal Conductors with Slight Sag Which Would be Barely Visible to Not Visible in this View (Access Roads May or May Not Be Visible in this View) **Background:** No Change
COLOR	**Foreground:** No Change **Middleground:** Grading for Transmission Structure Sites and Access Roads May or May Not be Visible in this View **Background:** No Change **No Water Visible**	**Foreground:** No Change **Middleground:** Clearing of Vegetation for Transmission Structure Sites and Access Roads May or May Not be Visible in this View **Background:** No Change	**Foreground:** No Change **Middleground:** - Removal of Existing Gray LSTs and Associated Conductors Which are Not Visible in the Existing Environment in this View - Addition of Medium Gray LSTs and Medium Gray Conductors Which Would be Barely Visible to Not Visible in this View (Access Roads May or May Not Be Visible in this View) **Background:** No Change
TEXTURE	**Foreground:** No Change **Middleground:** Grading for Transmission Structure Sites and Access Roads May or May Not be Visible in this View **Background:** No Change **No Water Visible**	**Foreground:** No Change **Middleground:** Clearing of Vegetation for Transmission Structure Sites and Access Roads May or May Not be Visible in this View **Background:** No Change	**Foreground:** No Change **Middleground:** - Removal of Existing Pointy and Smooth H-Frame and T-Frame LSTs and Associated Conductors Which are Not Visible in the Existing Environment in this View - Addition of Orderly Spaced Pointy LSTs and Smooth Overlapping Conductors Which Would be Barely Visible to Not Visible in this View (Access Roads May or May Not Be Visible in this View) **Background:** No Change

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST		FEATURES											
		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
ELEMENTS	Form			X				X				X	
	Line			X				X				X	
	Color			X				X				X	
	Texture			X				X				X	

2. Does project design meet visual resource management objectives? ☒ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended ☐ Yes ☒ No (Explain on reverse side)

Evaluator's Names	Date
Brenda Eells/CH2M HILL	December 1, 2008
Liz Cutler/CH2M HILL	
Colleen Bredensteiner/CH2M HILL	

SECTION D. (Continued)

Comments from Item 2.

BLM's Visual Resource Management (VRM) Class III objective is to "…partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape" (BLM, 2007b).

The Proposed Eldorado-Ivanpah Transmission Project would result in a weak change in the form, line, color, and texture for Land/Water Body, Vegetation, and Structures present in the existing environment. The changes to the existing environment would be consistent with the VRM Class III assignment. Construction, Operation, and Decommissioning would result in no adverse effect and no mitigation would be required.

Bureau of Land Management (BLM). 2007b. *BLM Handbook H-8410-1, Visual Resource Inventory*. http://www.blm.gov/nstc/VRM/8431.html. Accessed January 2009.

Additional Mitigating Measures (See item 3)

Construction and operation of the Proposed Eldorado-Ivanpah Transmission Project would be consistent with the BLM land management objectives of VRM Class III and would result in no adverse effect; therefore no mitigation would be required.

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date: December 1, 2008
District: Las Vegas Field Office
Resource Area:
Activity (program): Energy Transmission

SECTION A. PROJECT INFORMATION

1. Project Name: Eldorado-Ivanpah Transmission Project	**4. Location:** **Township** 24 S **Range** 60 E **Sections** 29	**5. Location Sketch:** The Proposed Transmission Line, Transmission Line Alternative A, Transmission Line Alternative B, Transmission Line Alternative C, Transmission Line Alternative D, or Transmission Line Alternative E would be present in this view. (see Figure 4.1-4). The information on this worksheet pertains to these proposed transmission lines. The view was taken looking southeast. Photograph Date: 11/14/2008
2. Key Observation Point: KOP 3: I-15 Looking Southeast (Proposed Eldorado-Ivanpah Transmission Project – Transmission Lines)		
3. VRM Class: VRM Class III (Mark Chandler/BLM Las Vegas Field Office 12/15/2008)		

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	**Foreground:** Nearly Flat Land Sloping Towards Valley in the Distance **Middleground:** Flat Valley Floor Including Dry Lake **Background:** Flat Valley Floor, Low Mounded Weathered Hills, Incised Domed Low Mountains **No Water Visible**	**Foreground:** Irregularly Rounded and Pyramidal Low to Medium High Shrubs and Ground Cover **Middleground and Background:** Vegetation Present but Indistinguishable	**Foreground:** Low Fence Posts, Nearly Medium Distribution Poles with Associated Cross Arms, Flat Slightly Elevated Railroad **Middleground:** No Visible Structures **Background:** Nearly Flat Dirt Roads Barely Visible in the Valley Floor
LINE	**Foreground:** Near Horizontal Line **Middleground:** Nearly Horizontal Line with Slight Topographic Variation in the Valley Floor **Background:** Nearly Horizontal Line with Slight Topographic Variation in the Valley Floor, Diagonally Inclined Undulating Over Crest of Hills, Mountains have a Jagged Horizontal Line **No Water Visible**	**Foreground:** Weak Horizontal Line **Middleground:** Nearly Horizontal Line **Background:** Nearly Horizontal Line on Valley Floor, Vegetation Present but Indistinguishable in Mountains and Hills	**Foreground:** Nearly Vertical Fence Posts, Nearly Vertical Distribution Poles, Generally Horizontal Railroad **Middleground:** No Visible Structures **Background:** Barely Visible Diagonal Roads Across Valley Floor, No Visible Structures in Mountains and Hills
COLOR	**Foreground**: Light Golden Tan **Middleground:** Golden Tan, Very Light Tan Dry Lake Bed **Background:** Barely Visible Golden Tan Dirt Roads, Dark Slate Brown Hills, Dark Golden Brown Mountains, Far Mountains have Purplish Cast **No Water Visible**	**Foreground:** Red Brown, Yellow-Green, Dark Brown, Dark Sage Shrubs **Middleground:** Dark Brown and Dark Dusty Green **Background:** Dark Brown and Dark Dusty Green on Valley Floor, Vegetation Indistinguishable but Overall Brown Tone in Mountains and Hills	**Foreground:** Light Red Brown Posts with Weathered White Tops, Medium to Dark Brown Distribution Poles, Light Tan Railroad Berm, Dark Gray to Black Railroad Rails **Middleground:** No Visible Structures **Background:** Barely Visible Golden Tan Dirt Roads on Valley Floor, No Visible Structures in Mountains and Hills
TEXTURE	**Foreground:** Sandy, Rocky **Middleground:** Velvety Smooth Valley Floor and Dry Lake **Background:** Smooth Valley Floor, Smooth, Rough, Pockmarked Mountains **No Water Visible**	**Foreground**: Varied: Randomly Spaced, Bristly, Pointy Shrubs **Middleground and Background:** Vegetation Indistinguishable	**Foreground**: Orderly Space Dull Pointed Fence Posts and Distribution Poles, Flat Smooth Railroad **Middleground:** No Visible Structures **Background:** Barely Visible Smooth Dirt Road on Valley Floor, No Visible Structures in Mountains and Hills

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	**Foreground:** No Change **Middleground:** No Change **Background:** Grading for Transmission Structure Sites and Access Roads Would Not be Visible in this View **No Water Visible**	**Foreground:** No Change **Middleground:** No Change **Background:** Clearing of Vegetation for Transmission Structure Sites and Access Roads Would Not be Visible in this View	**Foreground:** No Change **Middleground:** No Change **Background:** - Removal of Existing Angular H-Frame and T-Frame LSTs and Associated Conductors Which are Not Visible in the Existing Environment in this View - Addition of Near Vertical Angular Lattice Steel Towers (LSTs) and Transmission Conductor Which Would Not be Visible in this View (Access Roads Would Not Be Visible in this View)
LINE	**Foreground:** No Change **Middleground:** No Change **Background:** Grading for Transmission Structure Sites and Access Roads Would Not be Visible in this View **No Water Visible**	**Foreground:** No Change **Middleground:** No Change **Background:** Clearing of Vegetation for Transmission Structure Sites and Access Roads Would Not be Visible in this View	**Foreground:** No Change **Middleground:** No Change **Background:** - Removal of Existing Vertical H-Frame and T-Frame LSTs and Associated Conductors Which are Not Visible in the Existing Environment in this View - Addition of Vertical LSTs and Horizontal Conductors with Slight Sag Which Would Not be Visible in this View (Access Roads Would Not Be Visible in this View)
COLOR	**Foreground:** No Change **Middleground:** No Change **Background:** Grading for Transmission Structure Sites and Access Roads Would Not be Visible in this View **No Water Visible**	**Foreground:** No Change **Middleground:** No Change **Background:** Clearing of Vegetation for Transmission Structure Sites and Access Roads Would Not be Visible in this View	**Foreground:** No Change **Middleground:** No Change **Background:** - Removal of Existing Gray LSTs and Associated Conductors Which are Not Visible in the Existing Environment in this View - Addition of Medium Gray LSTs and Medium Gray Conductors Which Would Not be Visible in this View (Access Roads Would Not Be Visible in this View)
TEXTURE	**Foreground:** No Change **Middleground:** No Change **Background:** Grading for Transmission Structure Sites and Access Roads Would Not be Visible in this View **No Water Visible**	**Foreground:** No Change **Middleground:** No Change **Background:** Clearing of Vegetation for Transmission Structure Sites and Access Roads Would Not be Visible in this View	**Foreground:** No Change **Middleground:** No Change **Background:** - Removal of Existing Pointy and Smooth H-Frame and T-Frame LSTs and Associated Conductors Which are Not Visible in the Existing Environment in this View - Addition of Orderly Spaced Pointy LSTs and Smooth Conductors Which Would Not be Visible in this View (Access Roads Would Not Be Visible in this View)

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

<table>
<tr><td colspan="2" rowspan="3">1. DEGREE OF CONTRAST</td><td colspan="12">FEATURES</td><td>2. Does project design meet visual resource management objectives? ☒ Yes ☐ No (Explain on reverse side)</td></tr>
<tr><td colspan="4">LAND/WATER BODY (1)</td><td colspan="4">VEGETATION (2)</td><td colspan="4">STRUCTURES (3)</td><td rowspan="2">3. Additional mitigating measures recommended ☐ Yes ☒ No (Explain on reverse side)</td></tr>
<tr><td>Strong</td><td>Moderate</td><td>Weak</td><td>None</td><td>Strong</td><td>Moderate</td><td>Weak</td><td>None</td><td>Strong</td><td>Moderate</td><td>Weak</td><td>None</td></tr>
<tr><td rowspan="4">ELEMENTS</td><td>Form</td><td></td><td></td><td></td><td>X</td><td></td><td></td><td></td><td>X</td><td></td><td></td><td></td><td>X</td><td rowspan="4">Evaluator’s Names / Date
Brenda Eells/CH2M HILL — December 1, 2008
Liz Cutler/CH2M HILL
Colleen Bredensteiner/CH2M HILL</td></tr>
<tr><td>Line</td><td></td><td></td><td></td><td>X</td><td></td><td></td><td></td><td>X</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td>Color</td><td></td><td></td><td></td><td>X</td><td></td><td></td><td></td><td>X</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td>Texture</td><td></td><td></td><td></td><td>X</td><td></td><td></td><td></td><td>X</td><td></td><td></td><td></td><td>X</td></tr>
</table>

SECTION D. (Continued)

Comments from Item 2.

BLM’s Visual Resource Management (VRM) Class III objective is to “…partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape” (BLM, 2007b).

The Proposed Eldorado-Ivanpah Transmission Project would result in no change in the form, line, color, and texture for Land/Water Body, Vegetation, and Structures present in the existing environment. The changes to the existing environment would be consistent with the VRM Class III assignment. Construction, Operation, and Decommissioning would result in no adverse effect and no mitigation would be required.

Bureau of Land Management (BLM). 2007b. *BLM Handbook H-8410-1, Visual Resource Inventory*. http://www.blm.gov/nstc/VRM/8431.html. Accessed January 2009.

Additional Mitigating Measures (See item 3)

Construction and operation of the Proposed Eldorado-Ivanpah Transmission Project would be consistent with the BLM land management objectives of VRM Class III and would result in no adverse effect; therefore no mitigation would be required.

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date: December 1, 2008
District: Las Vegas Field Office
Resource Area:
Activity (program): Energy Transmission

SECTION A. PROJECT INFORMATION

1. Project Name: Eldorado-Ivanpah Transmission Project	**4. Location:**	**5. Location Sketch:**
2. Key Observation Point: KOP 4: Desert Oasis Apartments (Proposed Eldorado-Ivanpah Transmission Project – Transmission Lines)	**Township** 27 S **Range** 59 E **Sections** 8	The Proposed Transmission Line, Transmission Line Alternative A, Transmission Line Alternative B, Transmission Line Alternative C, Transmission Line Alternative D, or Transmission Line Alternative E would be present in this view. (see Figure 4.1-5). The information on this worksheet pertains to these proposed transmission lines. The view was taken looking southwest. Photograph Date: 10/16/2008
3. VRM Class: VRM Class III (Mark Chandler/BLM Las Vegas Field Office 12/15/2008) VRM Class III (Mona Daniels/BLM Needles Field Office 10/16/2008)		

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	**Foreground:** Flat Within Landscaped Area **Middleground:** Not Visible **Background:** Irregularly Weathered Low Mountains with Some Rounding **No Water Visible**	**Foreground:** Near Vertical Low and Tall, Triangular and Rounded Trees, Low Mounded Shrubs in Landscaped Areas, Near Vertical Palm Trees **Middleground:** Not Visible **Background:** Vegetation Indistinguishable	**Foreground:** Near Flat to Abrupt but Minor Elevation Changes Due to Parcel Grading, Drainage, Curbing, and Road Bed, Blocky Buildings, Low Block Wall, Tall Trapezoidal Lattice Steel Towers (LSTs) and Associated Conductors, Bi-Pole T-Framed Rectangular LSTs, Cylindrical Light Poles with Rectangular and Inverted Hemispherical Tops; Vehicles Present **Middleground:** Not Visible **Background:** Structures Not Visible
LINE	**Foreground:** Horizontal Within Landscaped Area **Middleground:** Not Visible **Background:** Irregular Horizontal Skyline with Some Jagged Elements **No Water Visible**	**Foreground:** Broken Irregular Mounded Horizontal Line in Landscaped Areas, Interspersed Near Vertical Palm Trunks **Middleground**: Not Visible **Background:** Vegetation Indistinguishable	**Foreground:** Near Horizontal Roadway and Drainages, Angular to Curved Curbing, Angular Buildings, Stair Stepped Block Wall, Overall T-Frame LSTs with Internal Angles, Near Vertical and Horizontal Insulators, Near Horizontal and Looped Conductors and with Slight Sag, Bi-Pole T-Frame with Internal Angles, Tall T Shaped Light Pole and Tall Light Pole with Oval Cap **Middleground:** Not Visible **Background:** Structures Not Visible
COLOR	**Foreground:** Light to Medium Brown Dirt **Middleground:** Not Visible **Background:** Dark Brown with Shale Green to Purple Tint **No Water Visible**	**Foreground:** Pine Green and Yellow Green Foliage/Brown Tree Trunks, Dark Green Shrubs in Landscaped Areas, Dark Green Vegetation and Dark Brown Tree Trunks **Middleground:** Not Visible **Background**: Vegetation Indistinguishable	**Foreground:** Dark Gray Asphalt, Light Gray Cement Drainage, Weathered Red and Light Gray Curbs, Tan Block Wall, Terracotta Buildings, and Gray LSTs and Conductors, and Black Light Poles **Middleground:** Not Visible **Background:** Structures Not Visible
TEX-TURE	**Foreground:** Coarse Sandy Granular Dirt **Middleground:** Not Visible **Background:** Smoothly Weathered Mountains with Some Sharp Peaks **No Water Visible**	**Foreground:** Interspersed Bristly and Pointy Trees; Sharp Shrubs **Middleground:** Pointy Trees **Background:** Vegetation Indistinguishable	**Foreground:** Uniform Smooth Road and Drainages, Rough Matte Curbs, Pointy to Smooth Buildings with Sharp Edges, Stucco Finished Block Wall, Smooth and Sharp LSTs and Conductors, Smooth and Pointed Light Poles **Middleground:** Not Visible **Background:** Structures Not Visible

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	**Foreground:** Grading for Transmission Structure Sites and Access Roads Would Not be Visible in this View **Middleground:** No Change **Background:** No Change **No Water Visible**	**Foreground:** Clearing of Vegetation for Transmission Structure Sites and Access Roads Would Not be Visible in this View **Middleground:** No Change **Background:** No Change	**Foreground:** - Removal of Existing Tall Trapezoidal Lattice Steel Towers (LSTs) and Associated Conductors, and Bi-Pole T-Framed Rectangular LSTs Which are Visible in the Existing Environment in this View - Addition of Tall Trapezoidal Lattice Steel Towers (LSTs) and Associated Conductors Which Would be Visible in this View (Access Roads Would Not Be Visible in this View) **Middleground:** No Change **Background:** No Change
LINE	**Foreground:** Grading for Transmission Structure Sites and Access Roads Would Not be Visible in this View **Middleground:** No Change **Background:** No Change **No Water Visible**	**Foreground:** Clearing of Vegetation for Transmission Structure Sites and Access Roads Would Not be Visible in this View **Middleground:** No Change **Background:** No Change	**Foreground:** - Removal of Existing Overall T-Frame LSTs with Internal Angles, Near Vertical and Horizontal Insulators, Near Horizontal and Looped Conductors and with Slight Sag, and Bi-Pole T-Frame with Internal Angles Which are Visible in the Existing Environment in this View - Addition of Near Vertical LSTs with Internal Angles (LST) and Near Horizontal Conductors with Slight Sag Which Would be Visible in this View (Access Roads Would Not Be Visible in this View) **Middleground:** No Change **Background:** No Change
COLOR	**Foreground:** Grading for Transmission Structure Sites and Access Roads Would Not be Visible in this View **Middleground:** No Change **Background:** No Change **No Water Visible**	**Foreground:** Clearing of Vegetation for Transmission Structure Sites and Access Roads Would Not be Visible in this View **Middleground:** No Change **Background:** No Change	**Foreground:** - Removal of Existing Gray LSTs and Conductors Which are Visible in the Existing Environment in this View - Addition of Gray LSTs and Associated Gray Conductors Which Would be Visible in this View (Access Roads Would Not Be Visible in this View) **Middleground:** No Change **Background:** No Change
TEXTURE	**Foreground:** Grading for Transmission Structure Sites and Access Roads Would Not be Visible in this View **Middleground:** No Change **Background:** No Change **No Water Visible**	**Foreground:** Clearing of Vegetation for Transmission Structure Sites and Access Roads Would Not be Visible in this View **Middleground:** No Change **Background:** No Change	**Foreground:** - Removal of Existing Smooth and Sharp LSTs and Conductors Which are Visible in the Existing Environment in this View - Addition of Pointy LSTs and Smooth Conductors Which Would be Visible in this View (Access Roads Would Not Be Visible in this View) **Middleground:** No Change **Background:** No Change

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST		FEATURES											
		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
ELEMENTS	Form				X				X			X	
	Line				X				X			X	
	Color				X				X			X	
	Texture				X				X			X	

2. Does project design meet visual resource management objectives? ☒ Yes ☐ No
(Explain on reverse side)

3. Additional mitigating measures recommended
☐ Yes ☒ No (Explain on reverse side)

Evaluator's Names	Date
Brenda Eells/CH2M HILL	December 1, 2008
Liz Cutler/CH2M HILL	
Colleen Bredensteiner/CH2M HILL	

SECTION D. (Continued)

Comments from Item 2.

BLM's Visual Resource Management (VRM) Class III objective is to "…partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape" (BLM, 2007b).

The Proposed Eldorado-Ivanpah Transmission Project would result in no change in the form, line, color, and texture for Land/Water Body and Vegetation and weak change in the form, line, color, and texture for Structures present in the existing environment. The changes to the existing environment would be consistent with the VRM Class III assignment. Construction, Operation, and Decommissioning would result in no adverse effect and no mitigation would be required.

Bureau of Land Management (BLM). 2007b. *BLM Handbook H-8410-1, Visual Resource Inventory*. http://www.blm.gov/nstc/VRM/8431.html. Accessed January 2009.

Additional Mitigating Measures (See item 3)

Construction and operation of the Proposed Eldorado-Ivanpah Transmission Project would be consistent with the BLM land management objectives of VRM Class III and would result in no adverse effect; therefore no mitigation would be required.

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date: December 1, 2008
District: Needles Field Office
Resource Area:
Activity (program): Energy Transmission

SECTION A. PROJECT INFORMATION

1. Project Name: Eldorado-Ivanpah Transmission Project **2. Key Observation Point:** KOP 5: Ivanpah Lake East of I-15 (Proposed Eldorado-Ivanpah Transmission Project – Transmission Lines) **3. VRM Class:** VRM Class III (Mona Daniels/BLM Needles Field Office 10/16/2008)	**4. Location:** **Township** 17 N **Range** 15 E **Sections** 20	**5. Location Sketch:** The Proposed Transmission Line, Transmission Line Alternative A, Transmission Line Alternative B, Transmission Line Alternative C, Transmission Line Alternative D, or Transmission Line Alternative E would be present in this view. (see Figure 4.1-6). The information on this worksheet pertains to these proposed transmission lines. The view was taken looking north-northwest. Photograph Date: 10/16/2008

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	**Foreground:** Near Flat Dry Lake Bed **Middleground:** Near Flat Dry Lake Bed, Mounded Hills and Weathered Mountains **Background:** Weathered Mountains **No Water Visible**	**Foreground:** Single Short Domed Shrub **Middleground:** Vegetation may be Present but Not Distinguishable in the View **Background:** Vegetation Not Visible	**Foreground:** Slightly Elevated Roadway on Rectangular Base, Short Near Vertical Cylindrical Poles **Middleground:** Slightly Elevated Roadway on Rectangular Base, Triangular Lattice Steel Tower (LST) and Associate Conductors, Square Buildings and Signs, and Conical Rooftops **Background:** Structures Not Visible
LINE	**Foreground: :** Near Horizontal Dry Lake **Middleground:** Near Horizontal Dry Lake, Gently Undulating Crest of Hills, Smooth to Nearly Jagged Mountain Skyline **Background:** Nearly Jagged Mountain Skyline **No Water Visible**	**Foreground:** Single Circle **Middleground:** Vegetation may be Present but Not Distinguishable in the View **Background:** Vegetation Not Visible	**Foreground:** Horizontal I-15, Vertical Poles **Middleground:** Horizontal I-15, Vertical LST with Internal Angles, Near Horizontal Lines Associated with Conductors with Slight Sag, Complex Pattern of Vertical and Horizontal Lines Associated with the Skyline of Primm, **Background:** Structures Not Visible
COLOR	**Foreground:** Striated Light and Golden Tan, **Middleground:** Striated Light and Golden Tan Dry Lake; Variations of Light Tan, Dark Brown, Sandy Beige, Wine-Purple, and Slate in the Hills; Mottled Gray and Dark Purple Interspersed with Dark Magenta in the Mountains **Background:** Purple Cast Mountains **No Water Visible**	**Foreground:** Dark Green Shrub **Middleground:** Vegetation may be Present but Not Distinguishable in the View **Background:** Vegetation Not Visible	**Foreground:** Light Gray Roadway Shoulder, Medium Brown Poles **Middleground:** Light Gray Roadway Shoulder, Dull Gray LST and Conductors, Light Tan Buildings with Green, Black, and Red Signs, Red Rooftop **Background:** Structures Not Visible
TEX-TURE	**Foreground:** Smooth to Slightly Coarse and Cracked Dry Lake Bed **Middleground:** Smooth to Slightly Coarse and Cracked Dry Lake Bed, Discontinuously Rough and Smooth Mountains and Hills **Background:** Smoothly Weathered Mountains **No Water Visible**	**Foreground:** Dense Scrubby Shrub **Middleground:** Vegetation may be Present but Not Distinguishable in the View **Background:** Vegetation Not Visible	**Foreground:** Flat Rough Surface Associated with I-15, Dull Pointed Uniformly Spaced Poles **Middleground:** Flat Rough Surface Associated with I-15, Pointy Topped LST, Smooth Conductors; Smooth, Blocky, and Pointy Buildings of Primm **Background:** Structures Not Visible

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	**Foreground:** No Change **Middleground:** Grading for Transmission Structure Sites and Access Roads Would Not be Visible in this View **Background:** No Change **No Water Visible**	**Foreground:** No Change **Middleground:** Clearing of Vegetation for Transmission Structure Sites and Access Roads Would Not be Visible in this View **Background:** No Change	**Foreground:** No Change **Middleground:** - Removal of Existing Angular H-Frame and T-Frame LSTs and Associated Conductors Which are Barely Visible to Not Visible in the Existing Environment in this View - Addition of Triangular Lattice Steel Towers (LST) and Associated Transmission Conductors Which Would be Barely Visible to Not Visible in this View (Access Roads Would Not Be Visible in this View) **Background:** No Change
LINE	**Foreground:** No Change **Middleground:** Grading for Transmission Structure Sites and Access Roads Would Not be Visible in this View **Background:** No Change **No Water Visible**	**Foreground:** No Change **Middleground:** Clearing of Vegetation for Transmission Structure Sites and Access Roads Would Not be Visible in this View **Background:** No Change	**Foreground:** No Change **Middleground:** - Removal of Existing Vertical H-Frame and T-Frame LSTs and Associated Conductors Which are Barely Visible to Not Visible in the Existing Environment in this View - Addition of Vertical LST with Internal Angles and Near Horizontal Lines Associated Conductors with Slight Sag Which Would be Barely Visible to Not Visible in this View (Access Roads Would Not Be Visible in this View) **Background:** No Change
COLOR	**Foreground:** No Change **Middleground:** Grading for Transmission Structure Sites and Access Roads Would Not be Visible in this View **Background:** No Change **No Water Visible**	**Foreground:** No Change **Middleground:** Clearing of Vegetation for Transmission Structure Sites and Access Roads Would Not be Visible in this View **Background:** No Change	**Foreground:** No Change **Middleground:** - Removal of Existing Gray LSTs and Associated Conductors Which are Barely Visible to Not Visible in the Existing Environment in this View - Addition of Dull Gray LST and Dull Gray Conductors Which Would be Barely Visible to Not Visible in this View (Access Roads Would Not Be Visible in this View) **Background:** No Change
TEXTURE	**Foreground:** No Change **Middleground:** Grading for Transmission Structure Sites and Access Roads Would Not be Visible in this View **Background:** No Change **No Water Visible**	**Foreground:** No Change **Middleground:** Clearing of Vegetation for Transmission Structure Sites and Access Roads Would Not be Visible in this View **Background:** No Change	**Foreground:** No Change **Middleground:** - Removal of Existing Pointy and Smooth H-Frame and T-Frame LSTs and Associated Conductors Which are Barely Visible to Not Visible in the Existing Environment in this View - Addition of Pointy Topped LST and Smooth Conductors Which Would be Barely Visible to Not Visible in this View (Access Roads Would Not Be Visible in this View) **Background:** No Change

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST		FEATURES												2. Does project design meet visual resource management objectives? ☒ Yes ☐ No (Explain on reverse side)
		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)				
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	3. Additional mitigating measures recommended ☐ Yes ☒ No (Explain on reverse side)
ELEMENTS	Form				X				X			X		Evaluator's Names / Date
	Line				X				X			X		Brenda Eells/CH2M HILL — December 1, 2008
	Color				X				X			X		Liz Cutler/CH2M HILL
	Texture				X				X			X		Colleen Bredensteiner/CH2M HILL

SECTION D. (Continued)

Comments from Item 2.

BLM's Visual Resource Management (VRM) Class III objective is to "…partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape" (BLM, 2007b).

The Proposed Eldorado-Ivanpah Transmission Project would result in no change in the form, line, color, and texture for Land/Water Body and Vegetation and weak change in the form, line, color, and texture for Structures present in the existing environment. The changes to the existing environment would be consistent with the VRM Class III assignment. Construction, Operation, and Decommissioning would result in no adverse effect and no mitigation would be required.

Bureau of Land Management (BLM). 2007b. *BLM Handbook H-8410-1, Visual Resource Inventory*. http://www.blm.gov/nstc/VRM/8431.html. Accessed January 2009.

Additional Mitigating Measures (See item 3)

Construction and operation of the Proposed Eldorado-Ivanpah Transmission Project would be consistent with the BLM land management objectives of VRM Class III and would result in no adverse effect; therefore no mitigation would be required.

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date: December 1, 2008	
District: Needles Field Office	
Resource Area:	
Activity (program): Energy Transmission	

SECTION A. PROJECT INFORMATION

1. Project Name: Eldorado-Ivanpah Transmission Project	**4. Location:** **Township** 17 N **Range** 15 E **Sections** 20	**5. Location Sketch:** The Proposed Transmission Line, Transmission Line Alternative A, Transmission Line Alternative B, Transmission Line Alternative C, Transmission Line Alternative D, or Transmission Line Alternative E would be present in this view. (see Figure 4.1-16). The information on this worksheet pertains to Transmission Line Alternative D. The view was taken looking north-northwest. Photograph Date: 10/16/2008
2. Key Observation Point: KOP 5: Ivanpah Dry Lake - East of I-15 (Transmission Line Alternative D) (Proposed Eldorado-Ivanpah Transmission Project – Transmission Line Alternative D)		
3. VRM Class: VRM Class III (Mona Daniels/BLM Needles Field Office 10/16/2008)		

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	**Foreground:** Near Flat Dry Lake Bed **Middleground:** Near Flat Dry Lake Bed, Mounded Hills and Weathered Mountains **Background:** Weathered Mountains **No Water Visible**	**Foreground:** Single Short Domed Shrub **Middleground:** Vegetation may be Present but Not Distinguishable in the View **Background:** Vegetation Not Visible	**Foreground:** Slightly Elevated Roadway on Rectangular Base, Short Near Vertical Cylindrical Poles **Middleground:** Slightly Elevated Roadway on Rectangular Base, Triangular Lattice Steel Tower (LST) and Associate Conductors, Square Buildings and Signs, and Conical Rooftops **Background:** Structures Not Visible
LINE	**Foreground: :** Near Horizontal Dry Lake **Middleground:** Near Horizontal Dry Lake, Gently Undulating Crest of Hills, Smooth to Nearly Jagged Mountain Skyline **Background:** Nearly Jagged Mountain Skyline **No Water Visible**	**Foreground:** Single Circle **Middleground:** Vegetation may be Present but Not Distinguishable in the View **Background:** Vegetation Not Visible	**Foreground:** Horizontal I-15, Vertical Poles **Middleground:** Horizontal I-15, Vertical LST with Internal Angles, Near Horizontal Lines Associated with Conductors with Slight Sag, Complex Pattern of Vertical and Horizontal Lines Associated with the Skyline of Primm, **Background:** Structures Not Visible
COLOR	**Foreground:** Striated Light and Golden Tan, **Middleground:** Striated Light and Golden Tan Dry Lake; Variations of Light Tan, Dark Brown, Sandy Beige, Wine-Purple, and Slate in the Hills; Mottled Gray and Dark Purple Interspersed with Dark Magenta in the Mountains **Background:** Purple Cast Mountains **No Water Visible**	**Foreground:** Dark Green Shrub **Middleground:** Vegetation may be Present but Not Distinguishable in the View **Background:** Vegetation Not Visible	**Foreground:** Light Gray Roadway Shoulder, Medium Brown Poles **Middleground:** Light Gray Roadway Shoulder, Dull Gray LST and Conductors, Light Tan Buildings with Green, Black, and Red Signs, Red Rooftop **Background:** Structures Not Visible
TEX-TURE	**Foreground:** Smooth to Slightly Coarse and Cracked Dry Lake Bed **Middleground:** Smooth to Slightly Coarse and Cracked Dry Lake Bed, Discontinuously Rough and Smooth Mountains and Hills **Background:** Smoothly Weathered Mountains **No Water Visible**	**Foreground:** Dense Scrubby Shrub **Middleground:** Vegetation may be Present but Not Distinguishable in the View **Background:** Vegetation Not Visible	**Foreground:** Flat Rough Surface Associated with I-15, Dull Pointed Uniformly Spaced Poles **Middleground:** Flat Rough Surface Associated with I-15, Pointy Topped LST, Smooth Conductors; Smooth, Blocky, and Pointy Buildings of Primm **Background:** Structures Not Visible

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	**Foreground:** - Grading for Structure Sites and Access Roads May or May Not be Visible in this View **Middleground:** No Change **Background:** No Change **No Water Visible**	**Foreground:** - Clearing of Vegetation for Structure Sites and Access Roads May or May Not be Visible in this View **Middleground:** No Change **Background:** No Change	**Foreground:** - Addition of Triangular Lattice Steel Towers (LST) and Associated Transmission Conductors Some of Which Would Visible in this View (Access Roads May or May Not Be Visible in this View) **Middleground:** - Removal of Existing Angular H-Frame and T-Frame LSTs and Associated Conductors Which are Barely Visible to Not Visible in the Existing Environment in this View **Background:** No Change
LINE	**Foreground:** - Grading for Structure Sites and Access Roads May or May Not be Visible in this View **Middleground:** No Change **Background:** No Change **No Water Visible**	**Foreground:** - Clearing of Vegetation for Structure Sites and Access Roads May or May Not be Visible in this View **Middleground:** No Change **Background:** No Change	**Foreground:** - Addition of Vertical LST with Internal Angles and Near Horizontal Lines Associated Conductors with Slight Sag Some of Which Would be Barely Visible in this View (Access Roads May or May Not Be Visible in this View) **Middleground:** - Removal of Existing Vertical H-Frame and T-Frame LSTs and Associated Conductors Which are Barely Visible to Not Visible in the Existing Environment in this View **Background:** No Change
COLOR	**Foreground:** - Grading for Structure Sites and Access Roads May or May Not be Visible in this View **Middleground:** No Change **Background:** No Change **No Water Visible**	**Foreground:** - Clearing of Vegetation for Structure Sites and Access Roads May or May Not be Visible in this View **Middleground:** No Change **Background:** No Change	**Foreground:** - Addition of Dull Gray LST and Dull Gray Conductors Some of Which Would be Visible in this View (Access Roads May or May Not Be Visible in this View) **Middleground:** - Removal of Existing Gray LSTs and Associated Conductors Which are Barely Visible to Not Visible in the Existing Environment in this View **Background:** No Change
TEXTURE	**Foreground:** - Grading for Structure Sites and Access Roads May or May Not be Visible in this View **Middleground:** No Change **Background:** No Change **No Water Visible**	**Foreground:** - Clearing of Vegetation for Structure Sites and Access Roads May or May Not be Visible in this View **Middleground:** No Change **Background:** No Change	**Foreground:** - Addition of Pointy Topped LST and Smooth Conductors Some of Which Would Visible in this View (Access Roads May or May Not Be Visible in this View) No Change **Middleground:** - Removal of Existing Pointy and Smooth H-Frame and T-Frame LSTs and Associated Conductors Which are Barely Visible to Not Visible in the Existing Environment in this View **Background:** No Change

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST		FEATURES												2. Does project design meet visual resource management objectives? ☒ Yes ☐ No (Explain on reverse side)	
		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)				3. Additional mitigating measures recommended ☐ Yes ☒ No (Explain on reverse side)	
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Evaluator's Names	Date
ELEMENTS	Form			X				X				X		Brenda Eells/CH2M HILL	December 1, 2008
	Line			X				X				X		Liz Cutler/CH2M HILL	
	Color			X				X				X		Colleen Bredensteiner/CH2M HILL	
	Texture			X				X				X			

SECTION D. (Continued)

Comments from Item 2.

BLM's Visual Resource Management (VRM) Class III objective is to "…partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape" (BLM, 2007b).

The Proposed Eldorado-Ivanpah Transmission Project would result in a weak change in the form, line, color, and texture for Land/Water Body, Vegetation, and Structures present in the existing environment. The changes to the existing environment would be consistent with the VRM Class III assignment. Construction, Operation, and Decommissioning would result in no adverse effect and no mitigation would be required.

Bureau of Land Management (BLM). 2007b. *BLM Handbook H-8410-1, Visual Resource Inventory*. http://www.blm.gov/nstc/VRM/8431.html. Accessed January 2009.

Additional Mitigating Measures (See item 3)

Construction and operation of the Proposed Eldorado-Ivanpah Transmission Project would be consistent with the BLM land management objectives of VRM Class III and would result in no adverse effect; therefore no mitigation would be required.

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date: December 1, 2008	
District: Needles Field Office	
Resource Area:	
Activity (program): Energy Transmission	

SECTION A. PROJECT INFORMATION

1. **Project Name:** Eldorado-Ivanpah Transmission Project	**4. Location:** **Township** 17 N **Range** 15 E **Sections** 19	5. **Location Sketch:** The Proposed Transmission Line, Transmission Line Alternative A, Transmission Line Alternative B, Transmission Line Alternative C, Transmission Line Alternative D, or Transmission Line Alternative E would be present in this view. (see Figure 4.1-7). The information on this worksheet pertains to these proposed transmission lines. The view was taken looking north-northeast. Photograph Date: 10/16/2008
2. **Key Observation Point:** KOP 6: I-15 Driving North (Proposed Eldorado-Ivanpah Transmission Project – Transmission Lines)		
3. **VRM Class:** VRM Class III (Mona Daniels/BLM Needles Field Office 10/16/2008)		

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	**Foreground:** Flat Dry Lake **Middleground:** Flat Dry Lake, Low Domed Hills at Edge of View **Background:** Irregularly Weathered Mountains Range **No Water Visible**	**Foreground:** Low Mounded Shrubs and Interspersed Grasses **Middleground and Background:** Vegetation Indistinguishable	**Foreground:** Flat I-15, Short Near Vertical Fence Posts and Road Markers **Middleground:** Flat I-15, Tall and Medium Angular Lattice Steel Towers (LSTs); Short Vertical H-Frames; Square Buildings and Signs, and Conical Rooftops; and Rectangular Overpass **Background:** Structures Not Visible
LINE	**Foreground:** Horizontal Dry Lake **Middleground:** Horizontal Dry Lake, Irregular Horizontal Hill Line at Edge of View **Background:** Irregularly Weathered Rugged Skyline **No Water Visible**	**Foreground:** Distinct Diagonal Line Paralleling Road **Middleground and Background:** Vegetation Indistinguishable	**Foreground:** Strong Diagonal Line of I-15 Bisects Valley Floor, Regular Diagonal Fence Wire on Vertical Fence Poles **Middleground:** Strong Diagonal Line of I-15 Bisects Valley Floor, Vertical LST with Internal Angles, Near Horizontal Lines Associated with Conductors with Slight Sag, Vertical H-frames Transmission Structures, Complex Pattern of Vertical and Horizontal Lines Associated with the Skyline of Primm; Horizontal Overpass **Background:** Structures Not Visible
COLOR	**Foreground:** Golden Tan Dry Lake **Middleground:** Golden Tan Dry Lake, Golden Desert Brown Hills **Background:** Slate Brown to Wine-Purple Mountains **No Water Visible**	**Foreground:** Golden Tan and Light Olive Shrubs with Intermittent Medium Brown Grasses **Middleground and Background:** Vegetation Indistinguishable	**Foreground**: Dark Gray Asphalt, Faded Yellow and White Roadway Lines; White, Yellow, and Blue Signs; Medium Gray Fence Posts and Wires **Middleground:** Dark Gray Asphalt, Dull Gray LSTs and Conductors, Red, Yellow, White, and Brown Buildings, White Overpass **Background:** Not Visible
TEX-TURE	**Foreground:** Slightly Rough where Gravel Present **Middleground:** Lumpy Hills **Background:** Pointed Mountain Tops **No Water Visible**	**Foreground:** Bristly Rough Shrubs and Soft Grasses **Middleground and Background:** Vegetation Indistinguishable	**Foreground:** Smooth I-15; Dull pointed Fence Posts; and Smooth Fence Wire **Middleground:** Smooth I-15; Pointy LSTs and Smooth Conductors; Lumpy Buildings; and Smooth Overpass **Background:** Structures Not Visible

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	**Foreground:** No Change **Middleground:** Grading for Transmission Structure Sites and Access Roads Would Not be Visible in this View **Background:** No Change **No Water Visible**	**Foreground:** No Change **Middleground:** Clearing of Vegetation for Transmission Structure Sites and Access Roads Would Not be Visible in this View **Background:** No Change	**Foreground:** No Change **Middleground:** - Removal of Existing Short Vertical H-Frame LSTs and Associated Conductors Which are Barely Visible to Not Visible in the Existing Environment in this View - Addition of Angular Lattice Steel Towers (LSTs) and Conductors Which Would be Barely Visible in this View (Access Roads Would Not Be Visible in this View) **Background:** No Change
LINE	**Foreground:** No Change **Middleground:** Grading for Transmission Structure Sites and Access Roads Would Not be Visible in this View **Background:** No Change **No Water Visible**	**Foreground:** No Change **Middleground:** Clearing of Vegetation for Transmission Structure Sites and Access Roads Would Not be Visible in this View **Background:** No Change	**Foreground:** No Change **Middleground:** - Removal of Existing Vertical H-Frame LSTs and Associated Near Horizontal Conductors with Slight Sag Which are Barely Visible to Not Visible in the Existing Environment in this View - Addition of Vertical LST with Internal Angles and Near Horizontal Lines Associated Conductors with Slight Sag Which Would be Barely Visible in this View (Access Roads Would Not Be Visible in this View) **Background:** No Change
COLOR	**Foreground:** No Change **Middleground:** Grading for Transmission Structure Sites and Access Roads Would Not be Visible in this View **Background:** No Change **No Water Visible**	**Foreground:** No Change **Middleground:** Clearing of Vegetation for Transmission Structure Sites and Access Roads Would Not be Visible in this View **Background:** No Change	**Foreground:** No Change **Middleground:** - Removal of Existing Dull Gray H-Frame LSTs and Associated Conductors Which are Barely Visible to Not Visible in the Existing Environment in this View - Addition of Dull Gray LSTs and Gray Conductors Which Would be Barely Visible in this View (Access Roads Would Not Be Visible in this View) **Background:** No Change
TEXTURE	**Foreground:** No Change **Middleground:** Grading for Transmission Structure Sites and Access Roads Would Not be Visible in this View **Background:** No Change **No Water Visible**	**Foreground:** No Change **Middleground:** Clearing of Vegetation for Transmission Structure Sites and Access Roads Would Not be Visible in this View **Background:** No Change	**Foreground:** No Change **Middleground:** - Removal of Existing Pointy H-Frame LSTs and Associated Smooth Conductors Which are Barely Visible to Not Visible in the Existing Environment from this View - Addition of Pointy LSTs and Smooth Conductors Which Would be Barely Visible in this View (Access Roads Would Not Be Visible in this View) **Background:** No Change

SECTION D. CONTRAST RATING ☐ SHORT TERM X LONG TERM

1. DEGREE OF CONTRAST		FEATURES											
		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
ELEMENTS	Form				X				X			X	
	Line				X				X			X	
	Color				X				X			X	
	Texture				X				X			X	

2. Does project design meet visual resource management objectives? X Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended ☐ Yes X No (Explain on reverse side)

Evaluator's Names	Date
Brenda Eells/CH2M HILL	December 1, 2008
Liz Cutler/CH2M HILL	
Colleen Bredensteiner/CH2M HILL	

SECTION D. (Continued)

Comments from Item 2.

BLM's Visual Resource Management (VRM) Class III objective is to "…partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape" (BLM, 2007b).

The Proposed Eldorado-Ivanpah Transmission Project would result in no change in the form, line, color, and texture for Land/Water Body and Vegetation and weak change in the form, line, color, and texture for Structures present in the existing environment. The changes to the existing environment would be consistent with the VRM Class III assignment. Construction, Operation, and Decommissioning would result in no adverse effect and no mitigation would be required.

Bureau of Land Management (BLM). 2007b. *BLM Handbook H-8410-1, Visual Resource Inventory*. http://www.blm.gov/nstc/VRM/8431.html. Accessed January 2009.

Additional Mitigating Measures (See item 3)

Construction and operation of the Proposed Eldorado-Ivanpah Transmission Project would be consistent with the BLM land management objectives of VRM Class III and would result in no adverse effect; therefore no mitigation would be required.

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date: December 1, 2008
District: Las Vegas Field Office
Resource Area:
Activity (program): Energy Transmission

SECTION A. PROJECT INFORMATION

1. Project Name: Eldorado-Ivanpah Transmission Project **2. Key Observation Point:** KOP 7: Highway 95 View Looking Southwest (Proposed Eldorado-Ivanpah Transmission Project – Eldorado Substation and Transmission Lines) **3. VRM Class:** VRM Class III (Unclassified Boulder City Evaluated for VRM Class III per Mark Chandler/BLM Vegas Field Office 11/14/2008 and 12/15/2008)	**4. Location:** **Township** 25 N **Range** 63 E **Sections** 4	**5. Location Sketch:** The Eldorado Substation, the Proposed Transmission Line, Transmission Line Alternative A, Transmission Line Alternative B, Transmission Line Alternative C, Transmission Line Alternative D, or Transmission Line Alternative E would be present in this view. (see Figure 4.1-8). The information on this worksheet pertains to the Eldorado Substation and these proposed transmission lines. The view was taken looking southwest. Photograph Date: 11/14/2008.

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	**Foreground**: Flat Valley Floor Sloping Downhill from Foreground to Middleground **Middleground:** Flat Wide Valley Floor with Some Topographic Variation, Alluvial Fans at Base of Mountain Range **Background:** Alluvial Fans at Base of Mountain Range and Irregularly Weathered Mountain Range **No Water Visible**	**Foreground:** Low Rounded Scraggly Shrubs **Middleground and Background:** Vegetation Indistinguishable	**Foreground:** Low Wire Fence with Near Vertical Metal Posts and Horizontal Fence Wire **Middleground:** Flat, Slightly Raised Solar Facility; Low Lying Cylindrical and Square to Rectangular Structures and Near Horizontal Solar Panels; and Near Vertical Poles; Vertical Poles and Equipment and Blocky Low Buildings Associated with Two Substations Located Beyond the Solar Facility **Background:** No Visible Structures
LINE	**Foreground:** Near Horizontal Line **Middleground:** Near Horizontal Valley; Diagonally Inclined Alluvial Fans **Background:** Diagonally Inclined Alluvial Fans; Irregular Horizontal Skyline **No Water Visible**	**Foreground:** Generally Horizontal Undulating Shrub Line **Middleground and Background:** Vegetation Indistinguishable	**Foreground:** Weak Horizontal Fence Wire on Vertical Fence Poles **Middleground:** Uniform Horizontal Solar Facility and Complex Horizontal and Vertical Lines Associated with Support Buildings and Poles; Complex Horizontal and Vertical Lines Associated with Support Buildings and Poles Associated with Two Substations Beyond Solar Facility **Background:** No Visible Structures
COLOR	**Foreground:** Light Tan to Ash Brown **Middleground:** Mostly Indistinguishable Due to Vegetation and Paved Areas, Some Light Tan to Golden Tan Visible on Valley Floor; Warm Pink, Dark Golden Brown, Gray Brown Alluvial Fans **Background:** Warm Pink, Dark Golden Brown, Gray Brown, Sage Green **No Water Visible**	**Foreground:** Tan and Light Green and Dark Red-Brown **Middleground:** Dusty Greens and Brown **Background:** Vegetation Indistinguishable	**Foreground:** Light Gray Wire, Light and Dark Gray and Green Fence Posts with White Posts Tops **Middleground:** Reflective Blue Solar Panels; Light Yellow and Light Gray Buildings, and Light Gray Poles **Background:** No Visible Structures
TEX-TURE	**Foreground:** Sandy, Gravelly, Small Random Rocks **Middleground:** Smooth Valley Floor; Intermittent Rough and Smooth Fans **Background:** Intermittent Rough and Smooth Fans and Rugged Peaks **No Water Visible**	**Foreground:** Randomly Spaced, Bristly to Sharp Shrubs **Middleground and Background:** Vegetation Indistinguishable	**Foreground:** Orderly Dull Pointed Fence Posts and Smooth Fence Wire **Middleground:** Smooth Solar Paneling, Pointy and Smooth Buildings, and Sharp Poles **Background:** No Visible Structures

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	**Foreground:** No Change **Middleground:** Grading for Transmission Structure Sites and Access Roads Would Not be Visible in this View **Background:** No Change **No Water Visible**	**Foreground:** No Change **Middleground:** Clearing of Vegetation for Transmission Structure Sites and Access Roads Would Not be Visible in this View **Background**: No Change	**Foreground:** No Change **Middleground:** - Removal of Existing Short Vertical H-Frame LSTs, T-Frame LSTs, and Associated Conductors Which are Not Visible in the Existing Environment in this View - Expansion of the Eldorado Substation Switchyard within the Existing Fence and Addition of Angular Lattice Steel Towers (LSTs) and Conductors Which Would Not be Visible in this View (Access Roads Would Not Be Visible in this View) **Background**: No Change
LINE	**Foreground:** No Change **Middleground:** Grading for Transmission Structure Sites and Access Roads Would Not be Visible in this View **Background:** No Change **No Water Visible**	**Foreground:** No Change **Middleground:** Clearing of Vegetation for Transmission Structure Sites and Access Roads Would Not be Visible in this View **Background**: No Change	**Foreground:** No Change **Middleground:** - Removal of Existing Vertical H-Frame LSTs, T-Frame LSTs, and Associated Near Horizontal Conductors with Slight Sag Which are Not Visible in the Existing Environment in this View - Expanded Switchyard Associated with the Eldorado Substation, Vertical LST with Internal Angles and Additional Near Horizontal Conductors with Slight Sag Which Would not be Visible in this View (Access Roads Would Not Be Visible in this View) - **Background:** No Change **Background**: No Change
COLOR	**Foreground:** No Change **Middleground:** Grading for Transmission Structure Sites and Access Roads Would Not be Visible in this View **Background:** No Change **No Water Visible**	**Foreground:** No Change **Middleground:** Clearing of Vegetation for Transmission Structure Sites and Access Roads Would Not be Visible in this View **Background**: No Change	**Foreground:** No Change **Middleground:** - Removal of Existing Dull Gray H-Frame LSTs, T-Frame LSTs, and Associated Conductors Which are Not Visible in the Existing Environment in this View - Addition of Gray Substation Equipment, Gray LSTs, and Conductors Which Would not be Visible in this View (Access Roads Would Not Be Visible in this View) **Background**: No Change
TEXTURE	**Foreground:** No Change **Middleground:** Grading for Transmission Structure Sites and Access Roads Would Not be Visible in this View **Background:** No Change **No Water Visible**	**Foreground:** No Change **Middleground:** Clearing of Vegetation for Transmission Structure Sites and Access Roads Would Not be Visible in this View **Background**: No Change	**Foreground:** No Change **Middleground:** - Removal of Existing Pointy H-Frame LSTs, T-Frame LSTs, and Associated Smooth Conductors Which are Not Visible in the Existing Environment in this View - Addition of Substation Equipment, Pointy Towers, and Smooth Conductors Which Would not be Visible in this View (Access Roads Would Not Be Visible in this View) **Background**: No Change

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST		FEATURES												2. Does project design meet visual resource management objectives? ☒ Yes ☐ No (Explain on reverse side)
		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)				
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	3. Additional mitigating measures recommended ☐ Yes ☒ No (Explain on reverse side)
ELEMENTS	Form				X				X				X	Evaluator's Names / Date
	Line				X				X				X	Brenda Eells/CH2M HILL — December 1, 2008
	Color				X				X				X	Liz Cutler/CH2M HILL
	Texture				X				X				X	Colleen Bredensteiner/CH2M HILL

SECTION D. (Continued)

Comments from Item 2.

BLM's Visual Resource Management (VRM) Class III objective is to "…partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape" (BLM, 2007b).

The Proposed Eldorado-Ivanpah Transmission Project would result in no change in the form, line, color, and texture for Land/Water Body, Vegetation, and Structures present in the existing environment. The changes to the existing environment would be consistent with the VRM Class III assignment. Construction, Operation, and Decommissioning would result in no adverse effect and no mitigation would be required.

Bureau of Land Management (BLM). 2007b. *BLM Handbook H-8410-1, Visual Resource Inventory*. http://www.blm.gov/nstc/VRM/8431.html. Accessed January 2009.

Additional Mitigating Measures (See item 3)

Construction and operation of the Proposed Eldorado-Ivanpah Transmission Project would be consistent with the BLM land management objectives of VRM Class III and would result in no adverse effect; therefore no mitigation would be required.

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date: December 1, 2008
District: Needles Field Office
Resource Area:
Activity (program): Energy Transmission

SECTION A. PROJECT INFORMATION

1. Project Name: Eldorado-Ivanpah Transmission Project **2. Key Observation Point:** KOP 8: Highway 164 Overpass View Looking North-Northwest (Proposed Eldorado-Ivanpah Transmission Project – Ivanpah Substation and Transmission Lines) **3. VRM Class:** VRM Class III (Mona Daniels/BLM Needles Field Office 10/16/2008)	**4. Location:** **Township** 16 N **Range** 14 E **Sections** 35	**5. Location Sketch:** The Proposed Ivanpah Substation, the Proposed Transmission Line, Transmission Line Alternative A, Transmission Line Alternative B, Transmission Line Alternative C, Transmission Line Alternative D, or Transmission Line Alternative E would be present in this view. (see Figure 4.1-9). The information on this worksheet pertains to the Proposed Ivanpah Substation and these proposed transmission lines. Note: Photograph taken from overpass, elevated view of project area. The view was taken looking north-northwest. Photograph Date: 11/14/2008

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	**Foreground:** Toe of Low Sloping Hill Visible in Left Side of Hill, Near Flat Slope Dropping Toward Valley Floor **Middleground:** Near Flat Valley **Background:** Near Flat Valley Floor and Dry Lake Bed, Isolated Low Conical Hills, Irregularly Weathered Mountains **No Water Visible**	**Foreground:** Low Mounded Randomly Spaced Shrubs **Middleground and Background:** Vegetation Indistinguishable	**Foreground:** Flat Sloping Road Surface, Triangular Highway Dividers; Near Vertical Distribution Poles; and Rectangular Near Vertical Signs and Highway Markers **Middleground:** Flat Road Surface Sloping Downhill; Flat Dirt Roads Across Valley Floor **Background:** Flat Road Surface Sloping Downhill; Flat Dirt Roads Across Valley Floor; Low Buildings Associated with Former Roadside Services; Various Blocky Buildings Associated with Primm
LINE	**Foreground:** Diagonal Line Associated with Hill Toe Intersects Nearly Horizontal Slope Dropping Towards Valley Floor **Middleground:** Continuous Near Horizontal Valley Floor **Background:** Near Horizontal Valley Floor and Dry Lake Bed Broken by Diagonal Incline at Isolated Low Hills, Irregularly Peaked Mountain Skyline **No Water Visible**	**Foreground:** Weak Horizontal Vegetation Line **Middleground and Background:** Vegetation Indistinguishable	**Foreground:** Strong Diagonal Line Curving North; Vertical Poles; Diagonal Signs **Middleground:** Vertical Road, Diagonal and Horizontal Dirt Roads, **Background:** Vertical Road, Diagonal and Horizontal Dirt Roads, Rectangular Buildings Associated with Former Roadside Services, Blocky Buildings Associated with Primm
COLOR	**Foreground:** Golden Tan **Middleground:** Golden Tan **Background:** Golden Tan Valley Floor, Light Tan Dry Lake**,** Striated Light Tan, Dark Golden Brown Isolated Hills, and Light-Dark Brown Mountain Range with a Warm Pink Cast **No Water Visible**	**Foreground:** Sage Green, Red Brown , Light Dusty Tan Shrubs **Middleground:** Green and Brown Cast to Valley Floor **Background:** Green and Brown Cast to Valley Floor	**Foreground:** Gray and Black Asphalt; Faded Yellow and White Roadway Lines; White and Light Gray Highway Dividers; Dark Brown Distribution Poles; and Light Gray, Yellow, White, and Green Road Signs **Middleground:** Dark Gray to Black Asphalt; Tan Dirt Roads **Background:** Gray Asphalt; Tan Dirt Roads; Light Gray Buildings Associated with Former Roadside Services; Muted Gray Buildings Associated with Primm

TEX-TURE	**Foreground:** Gravelly **Middleground:** Generally Smooth Valley Floor **Background:** Generally Smooth Valley Floor and Dry Lake, Isolated Pointy Hills, Intermittent Rough and Smooth Mountains **No Water Visible**	**Foreground:** Rough Bristly Shrubs **Middleground:** Smooth Texture **Background:** Vegetation Indistinguishable:	**Foreground:** Continuous Smooth I-15, Dull Ridged Highway Dividers, Pointly Signs and Highway Markers **Middleground:** Smooth Highway, Smooth Dirt Roads **Background:** Smooth Highway, Smooth Dirt Roads, Chunky Buildings Associated with Former Roadside Services, Lumpy Buildings Associated with Primm Indistinguishable

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	**Foreground:** No Change **Middleground:** No Change **Background:** Grading for Transmission Structure Sites and Access Roads Would Not be Visible in this View **No Water Visible**	**Foreground:** No Change **Middleground:** No Change **Background:** Clearing of Vegetation for Transmission Structure Sites and Access Roads Would Not be Visible in this View	**Foreground:** No Change **Middleground:** No Change **Background:** - Removal of Existing Short Vertical H-Frame LSTs, T-Frame LSTs, and Associated Conductors Which are Not Visible in the Existing Environment in this View - Addition of New Low Structures Associated with the Proposed Ivanpah Substation Which Would be Visible in this View - Addition of Triangular Lattice Steel Towers (LST) and Associated Transmission Conductors Which Would Not be Visible in this View - Addition of One 180 foot Triangular Microwave Tower with Two 8 foot Diameter Circular Microwave Dishes Which Would Not be Visible in this View - Access Roads Would Not Be Visible in this View
LINE	**Foreground:** No Change **Middleground:** No Change **Background:** Grading for Transmission Structure Sites and Access Roads Would Not be Visible in this View **No Water Visible**	**Foreground:** No Change **Middleground:** No Change **Background:** - Vegetation Clearing Associated with the Proposed Ivanpah Substation May Be Visible in this View - Clearing of Vegetation for Transmission Structure Sites and Access Roads Would Not be Visible in this View	**Foreground:** No Change **Middleground:** No Change **Background:** - Removal of Existing Vertical H-Frame LSTs, T-Frame LSTs, and Associated Near Horizontal Conductors with Slight Sag Which are Not Visible in the Existing Environment in this View - Addition of Rectangular Structures Associated with the Proposed Ivanpah Substation Which Would be Visible in this View - Addition of Vertical LST with Internal Angles and Associated Near Horizontal Conductors with Slight Sag Which Would not be Visible in this View - Addition of One Vertical Microwave Tower with Two 8 foot Diameter Circular Microwave Dishes Which Would Not be Visible in this View - Access Roads Would Not Be Visible in this View

COLOR	**Foreground:** No Change **Middleground:** No Change **Background:** - Light Tan Valley Floor Visible Resulting from the Clearing Associated with the Proposed Ivanpah Substation - Grading for Transmission Structure Sites and Access Roads Would Not be Visible in this View **No Water Visible**	**Foreground:** No Change **Middleground:** No Change **Background:** Clearing of Vegetation for Transmission Structure Sites and Access Roads Would Not be Visible in this View	**Foreground:** No Change **Middleground:** No Change **Background:** - Removal of Existing Dull Gray H-Frame LSTs, T-Frame LSTs, and Associated Conductors Which are Not Visible in the Existing Environment in this View - Addition of New Light Gray Structures Associated with the Proposed Ivanpah Substation Which Would be Visible in this View - Addition of Dull Gray LST and Dull Gray Conductors Which Would not be Visible in this View - Addition of One Dull Gray Microwave Tower with Two Off-White Microwave Dishes Which Would Not be Visible in this View - Access Roads Would Not Be Visible in this View
TEXTURE	**Foreground:** No Change **Middleground:** No Change **Background:** Grading for Transmission Structure Sites and Access Roads Would Not be Visible in this View **No Water Visible**	**Foreground:** No Change **Middleground:** No Change **Background:** Clearing of Vegetation for Transmission Structure Sites and Access Roads Would Not be Visible in this View	**Foreground:** No Change **Middleground:** No Change **Background:** - Removal of Existing Pointy H-Frame LSTs, T-Frame LSTs, and Associated Smooth Conductors Which are Not Visible in the Existing Environment in this View - Addition of New Blocky Structures Associated with the Proposed Ivanpah Substation Which Would be Visible in this View - Addition of Pointy Topped LST and Smooth Conductors Which Would Not Visible in this View - Addition of One Pointy Topped Microwave Tower with Two 8 foot Microwave Dishes Which Would Not be Visible in this View - Access Roads Would Not Be Visible in this View

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST		FEATURES											
		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
ELEMENTS	Form				X				X			X	
	Line				X			X				X	
	Color			X					X			X	
	Texture				X				X			X	

2. Does project design meet visual resource management objectives? ☒ Yes ☐ No
(Explain on reverse side)

3. Additional mitigating measures recommended
☐ Yes ☒ No (Explain on reverse side)

Evaluator's Names	Date
Brenda Eells/CH2M HILL	December 1, 2008
Liz Cutler/CH2M HILL	
Colleen Bredensteiner/CH2M HILL	

SECTION D. (Continued)

Comments from Item 2.

BLM's Visual Resource Management (VRM) Class III objective is to "…partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape" (BLM, 2007b).

The Proposed Eldorado-Ivanpah Transmission Project would result in no change in the form, line, and texture for Land/Water Body and in the form, color, and texture for Vegetation present in the existing environment. It would result in a weak change in the color for Land/Water Body, in the line for Vegetation, and in the form, line, color, and texture for Structures present in the existing environment. The changes to the existing environment would be consistent with the VRM Class III assignment. Construction, Operation, and Decommissioning would result in no adverse effect and no mitigation would be required.

Bureau of Land Management (BLM). 2007b. *BLM Handbook H-8410-1, Visual Resource Inventory*. http://www.blm.gov/nstc/VRM/8431.html. Accessed January 2009.

Additional Mitigating Measures (See item 3)

Construction and operation of the Proposed Eldorado-Ivanpah Transmission Project would be consistent with the BLM land management objectives of VRM Class III and would result in no adverse effect; therefore no mitigation would be required.

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Appendix D
Air Quality and Greenhouse Gases

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Ivanpah Substation
Emission Summary

Activity		Total Activity Emissions(lbs)							
		ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4
Phase 1 Grading									
	On-Site	818	2798	7385	8	512	274	740794	52
	On-Road	9	83	9	0.1	2329	471	10957	0.8
Phase 2 Civil									
	On-Site	682	2232	6113	7	340	214	667830	47
	On-Road	19	174	19	0.2	1992	412	23009	1.7
Phase 3 Electrical									
	On-Site	676	2093	6017	7	278	192	634213	44
	On-Road	22	198	22	0.3	2522	516	26296	2.0

Total All Activities (lbs)	2226	7577	19566	22	7972	2079	2103100	147
Total All Activities (tons)	1.1	3.8	10	0.011	4.0	1.0	1052	0.074
Total Construction Days	160	160	160	160	160	160	160	160
Average Daily Emissions (lbs)	13.9	47.4	122	0.14	49.8	13.0	13144	0.92

Assumed that on site combustion PM2.5 is 75% of PM10
Assumed that on site combustion CH4 is 0.00007 of CO2

Ivanpah Substation
Workforce Estimate

Work Activity						Activity Production	
Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Workforce	Estimated Schedule (Days)	Estimated Average Duration of Use (Hrs/Day)	Estimated Production Per Day
Survey Crew				2	15	10	
3/4 ton pick-up truck, 4X4	300	Diesel	2	2	15	4	Vehicle for transportation to and from work
John Deere Gator	20	Gas	2	2	40	6	Transport personnel around site
Grading Crew				5	40	10	
3/4 ton pick-up truck, 4X4	300	Diesel	5	5	40	4	
Bulldozer	350	Diesel	1		40	4	
Dump truck	350	Diesel	1		40	6	
Paddle graders	350	Diesel	3		40	8	
Water truck	300	Diesel	1		40	4	
Front end loader	350	Diesel	1		40	8	
Maintenance truck	350	Diesel	1	1	40	4	
Compactor	350	Diesel	1		40	8	
Generator	20	Gas	1		40	4	
Fuel truck	350	Diesel	1		40	2	Depending on soil conditions
Civil Crew				7	60	10	
3/4 ton pick-up truck, 4X4	300	Diesel	7	7	60	4	
Bobcat	200	Diesel	1		60	8	
Backhoe	200	Diesel	1		60	8	
Drilling rig	350	Diesel	1		60	6	
Water truck	350	Diesel	1		60	4	
Compactor	200	Diesel	1		60	4	
John Deere Gator	20	Gas	2		60	4	
Generator	20	Gas	1		60	4	Depending on soil conditions
Electrical Crew				8	60	10	
3/4 ton pick-up truck, 4X4	300	Diesel	8	8	60	4	
45ft Manlift	150	Diesel	1		60	6	
60ft Manlift	150	Diesel	1		60	6	
80 ton crane	300	Diesel	1		45	8	
10k Reach-all forklift	150	Diesel	1		60	6	
Generator	20	Gas	1		60	4	
John Deere Gator	20	Gas	2		60	4	

Ivanpah Substation

On-Site Fugitive Dust Estimate

Used an uncontrolled emission factor of 10 lbs PM10/day/acre for each acre of land being di
Assumed 50% control for watering.
Assumed PM2.5 is approximately 20% of the PM10 for fugitive dust sources.

Activity	Average Daily Disturbed Land (acres)	Duration (days)	Total Activity Fugitive Dust (lbs)	
			PM10	PM2.5
Phase 1 Grading	1	40	200	40
Phase 2 Civil	0.25	60	75	15
Phase 3 Electrical	0.1	60	30	6

Ivanpah Substation

Grading and Survey Phase (Off-Road Construction Equipment Exhaust Emissions)

Description	Number	Hours per Day	Days of Activity	2010 Emission Factor (lbs/hr)						Emissions (lbs/day)						Total Activity Emissions (lbs)					
				ROG	CO	NOX	SOX	PM	CO2	ROG	CO	NOX	SOX	PM	CO2	ROG	CO	NOX	SOX	PM	CO2
Survey																					
3/4 ton pick-up truck, 4X4	2	4	15	0.248	0.743	2.388	0.003	0.088	260	1.984	5.943	19.108	0.0213	0.7001	2081	29.76	89.145	286.62	0.3191	10.501	31213
John Deere Gator	2	6	40	0.0961	0.3293	0.644	0.0007	0.0396	61	1.1536	3.9515	7.7284	0.0084	0.4755	732	46.142	158.06	309.13	0.335	19.021	29276
Grading																					
Pick-up trucks	5	4	40	0.248	0.743	2.388	0.003	0.088	260	4.96	14.858	47.77	0.0532	1.7502	5202	198.4	594.3	1910.8	2.127	70.008	208083
Bulldozer	1	4	40	0.172	0.631	1.434	0.001	0.075	133	0.6893	2.5255	5.735	0.006	0.3014	531	27.571	101.02	229.4	0.2394	12.055	21239
Dump truck	1	6	40	0.248	0.743	2.388	0.003	0.088	260	1.488	4.4573	14.331	0.016	0.5251	1561	59.52	178.29	573.24	0.6381	21.002	62425
Paddle graders	3	8	40	0.320	1.242	2.908	0.003	0.126	262	7.6845	29.818	69.788	0.0645	3.0133	6300	307.38	1192.7	2791.5	2.5797	120.53	251999
Water truck	1	4	40	0.248	0.743	2.388	0.003	0.088	260	0.992	2.9715	9.554	0.0106	0.35	1040	39.68	118.86	382.16	0.4254	14.002	41617
Front end loader	1	8	40	0.102	0.393	0.675	0.001	0.052	67	0.8164	3.1437	5.3979	0.0062	0.4164	534	32.658	125.75	215.91	0.248	16.657	21378
Maintenance truck	1	4	40	0.248	0.743	2.388	0.003	0.088	260	0.992	2.9715	9.554	0.0106	0.35	1040	39.68	118.86	382.16	0.4254	14.002	41617
Compactor	1	8	40	0.005	0.026	0.032	0.000	0.002	4	0.0404	0.2107	0.2537	0.0005	0.0121	35	1.6152	8.4287	10.149	0.0215	0.483	1380
Generator	1	4	40	0.096	0.329	0.644	0.001	0.040	61	0.3845	1.3172	2.5761	0.0028	0.1585	244	15.381	52.687	103.04	0.1117	6.3405	9759
Fuel truck	1	2	40	0.248	0.743	2.388	0.003	0.088	260	0.496	1.4858	4.777	0.0053	0.175	520	19.84	59.43	191.08	0.2127	7.0008	20808
Total Activity Emissions (lbs)																818	2798	7385	8	312	740794

From SCAQMD offroad emission factors file name "offroadEF07_25.xls"
Used composite generator
emission factors for golf
cart

Ivanpah Substation

Civil Phase (Off-Road Construction Equipment Exhaust Emissions)

Description	Number	Hours per Day	Days of Activity	2010 Emission Factor (lbs/hr)						Emissions (lbs/day)						Total Activity Emissions (lbs)					
				ROG	CO	NOX	SOX	PM	CO2	ROG	CO	NOX	SOX	PM	CO2	ROG	CO	NOX	SOX	PM	CO2
3/4 ton pick-up truck, 4X4	7	4	60	0.248	0.743	2.388	0.003	0.088	260	6.944	20.801	66.878	0.074	2.450	7283	417	1248	4013	4	147	436975
Bobcat	1	8	60	0.102	0.393	0.675	0.001	0.052	67	0.816	3.144	5.398	0.006	0.416	534	49	189	324	0.4	25	32066
Backhoe	1	8	60	0.102	0.393	0.675	0.001	0.052	67	0.816	3.144	5.398	0.006	0.416	534	49	189	324	0.4	25	32066
Drilling rig	1	6	60	0.105	0.515	1.133	0.002	0.050	165	0.631	3.088	6.799	0.010	0.299	989	38	185	408	0.6	18	59347
Water truck	1	4	60	0.248	0.743	2.388	0.003	0.088	260	0.992	2.972	9.554	0.011	0.350	1040	60	178	573	0.6	21	62425
Compactor	1	4	60	0.005	0.026	0.032	0.0001	0.002	4	0.020	0.105	0.127	0.0003	0.006	17	1.2	6	8	0.02	0.4	1035
John Deere Gator	2	4	60	0.096	0.329	0.644	0.001	0.040	61	0.769	2.634	5.152	0.006	0.317	488	46	158	309	0.3	19	29276
Generator	1	4	60	0.096	0.329	0.644	0.001	0.040	61	0.385	1.317	2.576	0.003	0.159	244	23	79	155	0.2	10	14638

Total Activity Emissions (lbs)	682	2232	6113	7	265	667830

From SCAQMD offroad emission factors file name "offroadEF07_25.xls"
Used composite generator
emission factors for golf cart

Ivanpah Substation
Electrical Phase (Off-Road Construction Equipment Exhaust Emissions)

Description	Number	Hours per Day	Days of Activity	2010 Emission Factor (lbs/hr)						Emissions (lbs/day)						Total Activity Emissions (lbs)					
				ROG	CO	NOX	SOX	PM	CO2	ROG	CO	NOX	SOX	PM	CO2	ROG	CO	NOX	SOX	PM	CO2
3/4 ton pick-up truck, 4X4	8	4	60	0.248	0.743	2.388	0.003	0.088	260	7.936	23.8	76.432	0.085	2.800	8323	476	1426	4586	5.1	168	499400
45ft Manlift	1	6	60	0.067	0.2093	0.36	0.0004	0.0248	35	0.402	1.3	2.160	0.002	0.149	208	24	75	130	0.14	9	12500
60ft Manlift	1	6	60	0.067	0.2093	0.36	0.0004	0.0248	35	0.402	1.3	2.160	0.002	0.149	208	24	75	130	0.14	9	12500
80 ton crane	1	8	45	0.1594	0.5431	1.4515	0.0014	0.0642	129	1.275	4.3	11.612	0.011	0.514	1029	57	196	523	0.50	23	46316
10k Reach-all forklift	1	6	60	0.0686	0.2319	0.5161	0.0006	0.0281	54	0.411	1.4	3.097	0.004	0.169	326	25	83	186	0.22	10	19582
Generator	1	4	60	0.096	0.329	0.644	0.001	0.040	61	0.385	1.3	2.576	0.003	0.159	244	23	79	155	0.17	10	14638
John Deere Gator	2	4	60	0.096	0.329	0.644	0.001	0.040	61	0.769	2.6	5.152	0.006	0.317	488	46	158	309	0.34	19	29276

Total Activity Emissions (lbs)	676	2093	6017	7	248	634213

From SCAQMD offroad emission factors file name "offroadEF07_25.xls"
Used composite generator
emission factors for golf cart

Ivanpah Substation
Grading Phase (Mobile Source Emissions)

Exhaust, Tire and Brake Emissions
From SCAQMD file "onroadEF07_26.xls" as of January 2009
Used 2008 Table
Passenger vehicles
Assumed 1 passenger vehicle per crew member
Assumed 50 vmt per day per passenger vehicle
5 crew member
250 Total passenger VMT per work day
40 Work days
See site exhaust calculations, used offroad combustion EF

Passenger Vehicles	<8500 lbs	Emissions (lbs/day)	Total Activity Emissions (lbs)
CO	0.00826	2.1	83
NOx	0.00092	0.2	9
ROG	0.00091	0.2	9
SOx	0.00001	0.003	0.1
PM10	0.00009	0.022	0.9
PM2.5	0.00005	0.014	0.5
CO2	1.095682348	274	10957
CH4	8.14608E-05	0.020	0.8

Paved Road Fugitive Dust Emissions
From SCAQMD CEQA AQ Handbook
Table A9-9-B
Passenger Vehicles on paved road fugitive dust

E=VxG (PM10 with street cleaning)

V= vehicle miles travelled
G=EF from table A9-9-9-B1

Road Type	G(PM10 lb/VMT)
Local Streets	0.018
Collector Streets	0.013
Major Streets/Highways	0.0064
Freeways	0.00065

Crew Personal vehicles

250 Total passenger VMT on paved roads per day
12.5 Local Streets (assumed 5%)
12.5 Collector Streets (assumed 5%)
25 Major Streets/Highways (10%)
200 Freeways (assumed 80%)
40 Work days

Road Type	PM10 (lbs/day)	Activity PM10 (lbs)
Local Streets	0.2	9
Collector Streets	0.2	7
Major Streets/Highways	0.2	6
Freeways	0.1	5
Crew Personal (PM10)	0.7	27

0.169 PM2.5 fraction of PM10 from SCAQMD Table A - Updated CEIDARS Table with PM2.5 Fractions

Crew Personal (PM2.5)	0.1	5

Dump Trucks and other heavy vehicles on paved roads
200 Total VMT on paved roads per day
20 Local Streets (assumed 10%)
20 Collector Streets (assumed 10%)
160 Major Streets/Highways (80%)
0 Freeways (assumed 0%)
40 Work days

Heavy Vehicles on paved road fugitive dust
Use SCAQMD CEQA Table A9-9-C
E=VxF (PM10 without street cleaning)
V= vehicle miles travelled
G from table A9-9-C1
F=0.77*((G*0.35)^0.3) lbs/VMT
Assume 60 percent reduction for street sweeping per Table A9-9

Road Type	G(PM10 oz/sq yd)	F(PM10 lb/VMT)	F with sweeping
Local Streets	0.04	0.2139583	0.085583
Collector Streets	0.03	0.1962671	0.078507
Major Streets/Highways	0.012	0.1490958	0.059638
Freeways	0.00065	0.0621706	0.024868

Road Type	PM10 (lbs/day)	Total Activity PM10 (lbs)
Local Streets	1.7	68
Collector Streets	1.6	63
Major Streets/Highways	9.5	382
Freeways	0.0	0
Heavy Delivery (PM10)	12.8	513

0.169 PM2.5 fraction of PM10 from SCAQMD Table A -

Heavy Delivery (PM2.5)	2.17	87

	PM10 (lbs/day)	Total Activity PM10 (lbs)	PM2.5 (lbs/day)	Total Activity PM2.5 (lbs)
Total Activity Paved Road Fugitive Dust	13.5	540	2.3	91

Unpaved Road Fugitive Dust Emissions
From SCAQMD CEQA AQ Handbook
Table A9-9-D

E=V*F
V= vehicle miles travelled on unpaved roads
F=2.1*(G/12)*(H/30)*((J/3)^.7)*((I/4)^.5)*((365-K)/365)
G= surface silt
H= mean vehicle speed
I= number of wheels

J=vehicle wt
K= days of precip per year at least 0.01 in

Crew Transport
Assumed
3 Miles of unpaved road leading to substation
2 Trips per day per vehicle

10 vehicles to transport crew to site

60 VMT on unpaved roads per day

Assumed
G= 11
H= 15

I= 4 wheels

J= 3 tons
k= 18 precip days

0.9 F PM10 (lbs/VMT)

55 PM10 (lbs per day) Uncontrolled
2196 Total Activity PM10 (lbs) Uncontrolled

0.212 PM2.5 fraction of PM10 from SCAQMD Table A -

12 PM2.5 (lbs per day) Uncontrolled
466 Total Activity PM2.5 (lbs) Uncontrolled

Heavy vehicles
Assumed
3 Miles of unpaved road leading to substation
1 Trips on dirt road per day per heavy vehicle
4 Number of heavy vehicles

12 VMT on unpaved roads per day for heavy vehicles

Assumed
G= 11
H= 15
I= 10 wheels
J= 8 tons

k= 18 precip days

2.9 F PM10 (lbs/VMT)

34 PM10 (lbs per day) Uncontrolled
1380 Total Activity PM10 (lbs) Uncontrolled

0.212 PM2.5 fraction of PM10 from SCAQMD Table A - Updated CEIDARS Table with PM2.5 Fractions

7 PM2.5 (lbs per day) Uncontrolled
293 Total Activity PM2.5 (lbs) Uncontrolled

Assumed
50 Percent reduction in fug em due to using water trucks
45 PM10 (lbs per day) Controlled
1788 Total Activity PM10 (lbs) Controlled

9 PM2.5 (lbs per day) Controlled

379 Total Activity PM2.5 (lbs) Controlled

All On-Road Vehicles for Activity	Emissions (lbs/day)	Total Activity Emissions (lbs)	Notes
CO	2	83	
NOx	0.23	9	
ROG	0.23	9	
SOx	0.003	0.11	
CO2	274	10957	
CH4	0.020	0.81	
PM10 (includes fugitive dust)	103	4117	Uncontrolled
PM2.5 (includes fugitive dust)	21	850	Uncontrolled

All On-Road Vehicles for Activity	Emissions (lbs/day)	Total Activity Emissions (lbs)	Notes
CO	2	83	
NOx	0.23	9	
ROG	0.23	9	
SOx	0.003	0.11	
CO2	274	10957	
CH4	0.020	0.81	
PM10 (includes fugitive dust)	58	2329	Controlled
PM2.5 (includes fugitive dust)	12	471	Controlled

Ivanpah Substation

Civil Phase (Mobile Source Emissions)

Exhaust, Tire and Brake Emissions

From SCAQMD file "onroadEF07_26.xls" as of January 2009

Used 2008 Table

Passenger vehicles

Assumed	1	passenger vehicle per crew member
Assumed	50	vmt per day per passenger vehicle
	7	crew member
	350	Total passenger VMT per work day
	60	Work days
		See site exhaust estimates

	<8500 lbs (pounds/mile)	Emissions (lbs/day)	Emissions (lbs)
CO	0.00826	2.9	174
NOx	0.00092	0.3	19
ROG	0.00091	0.3	19
SOx	0.00001	0.004	0.2
PM10	0.00009	0.030	1.8
PM2.5	0.00005	0.019	1.2
CO2	1.095682348	383.489	23009.3
CH4	8.14608E-05	0.029	1.7

Paved Road Fugitive Dust Emissions

From SCAQMD CEQA AQ Handbook

Table A9-9-B

Passenger Vehicles on paved road fugitive dust

E=VxG (PM10 with street cleaning)

V= vehicle miles travelled

G=EF from table A9-9-9-B1

Road Type	G(PM10 lb/VMT)
Local Streets	0.018
Collector Streets	0.013
Major Streets/Highways	0.0064
Freeways	0.00065

Crew Personal vehicles

350	Total passenger VMT on paved roads per day
17.5	Local Streets (assumed 5%)
17.5	Collector Streets (assumed 5%)
35	Major Streets/Highways (10%)
280	Freeways (assumed 80%)
60	Work days

Road Type	PM10 (lbs/day)	Total Activity
Local Streets	0.3	19
Collector Streets	0.2	14
Major Streets/Highways	0.2	13
Freeways	0.2	11
Crew Personal (PM10)	0.9	57

0.169 PM2.5 fraction of PM10 from SCAQMD Table A - Updated CEIDARS Table with PM2.5 Fractions

Crew Personal (PM2.5)	0.2	10

Dump Trucks and other heavy vehicles on paved roads

50	Total VMT on paved roads per day
5	Local Streets (assumed 10%)
5	Collector Streets (assumed 10%)
40	Major Streets/Highways (80%)
0	Freeways (assumed 0%)
60	Work days

Heavy Vehicles on paved road fugitive dust

Use SCAQMD CEQA Table A9-9-C

E=VxF (PM10 without street cleaning)

V= vehicle miles travelled

G from table A9-9-C1

F=0.77*((G*0.35)^0.3) lbs/VMT

Assume 60 percent reduction for street sweeping per Table A9-9

Road Type	G(PM10 oz/sq yd)	F(PM10 lb/VMT)	F with sweeping
Local Streets	0.04	0.2139583	0.085583
Collector Streets	0.03	0.1962671	0.078507
Major Streets/Highways	0.012	0.14909584	0.059638
Freeways	0.00065	0.06217061	0.024868

Road Type	PM10 (lbs/day)	Total Activity PM10 (lbs)
Local Streets	0.4	26
Collector Streets	0.4	24
Major Streets/Highways	2.4	143
Freeways	0.0	0
Heavy Delivery (PM10)	3.2	192

0.169 PM2.5 fraction of PM10 from SCAQMD Table A - Updated

Heavy Delivery (PM2.5)	0.54	33

	PM10 (lbs/day)	Total Activity	PM2.5 (lbs/day)	Total Activity
Total Activity Paved Road Fugitive Dust	4.2	249	0.7	42

Unpaved Road Fugitive Dust Emissions

From SCAQMD CEQA AQ Handbook

Table A9-9-D

E=V*F

V= vehicle miles travelled on unpaved roads

F=2.1*(G/12)*(H/30)*((J/3)^.7)*((I/4)^.5)*((365-K)/365)

G= surface silt

H= mean vehicle speed

I= number of wheels

J=vehicle wt

K= days of precip per year at least 0.01 in

Crew Transport

Assumed

3	Miles of unpaved road leading to substation
2	Trips per day per vehicle
9	vehicles to transport crew to site
54	VMT on unpaved roads per day

Assumed

G=	11
H=	15
I=	4 wheels
J=	3 tons
k=	18 precip days

0.9	F PM10 (lbs/VMT)
49	PM10 (lbs per day) Uncontrolled
2965	Total Activity PM10 (lbs) Uncontrolled
0.212	PM2.5 fraction of PM10 from SCAQMD Table A -
10	PM2.5 (lbs per day) Uncontrolled
629	Total Activity PM2.5 (lbs) Uncontrolled

Heavy vehicles

Assumed

3	Miles of unpaved road leading to substation
1	Trips on dirt road per day per heavy vehicle
1	Number of heavy vehicles
3	VMT on unpaved roads per day for heavy vehicles

Assumed

G=	11
H=	15
I=	10 wheels
J=	8 tons
k=	18 precip days

2.9	F PM10 (lbs/VMT)
9	PM10 (lbs per day) Uncontrolled
517	Total Activity PM10 (lbs) Uncontrolled
0.212	PM2.5 fraction of PM10 from SCAQMD Table A - Updated CEIDARS Table with PM2.5 Fractions
2	PM2.5 (lbs per day) Uncontrolled
110	Total Activity PM2.5 (lbs) Uncontrolled

Assumed

50	Percent reduction in fug em due to using water trucks
29	PM10 (lbs per day) Controlled
1741	Total Activity PM10 (lbs) Controlled
6	PM2.5 (lbs per day) Controlled
369	Total Activity PM2.5 (lbs) Controlled

All On-Road Vehicles for Activity	Emissions (lbs/day)	Total Activity Emissions (lbs)	Notes
CO	3	174	
NOx	0.32	19	
ROG	0.32	19	
SOx	0.004	0.23	
CO2	383	23009	
CH4	0.03	2	
PM10 (includes fugitive dust)	62	3733	Uncontrolled
PM2.5 (includes fugitive dust)	13	781	Uncontrolled

All On-Road Vehicles for Activity	Emissions (lbs/day)	Total Activity Emissions (lbs)	Notes
CO	3	174	
NOx	0.32	19	
ROG	0.32	19	
SOx	0.004	0.23	
CO2	383	23009	
CH4	0.03	2	
PM10 (includes fugitive dust)	33	1992	Controlled
PM2.5 (includes fugitive dust)	7	412	Controlled

Ivanpah Substation

Electrical Phase (Mobile Source Emissions)

Exhaust, Tire and Brake Emissions

From SCAQMD file "onroadEF07_26.xls" as of January 2009

Used 2008 Table

Passenger vehicles

Assumed 1 passenger vehicle per crew member

Assumed 50 vmt per day per passenger vehicle

8 crew member

400 Total passenger VMT per work day

60 Work days

See site exhaust estimates

Passenger Vehicles <8500 lbs	(pounds/mile)	Emissions (lbs/day)	Total Activity Emissions
CO	0.00826	3.3	198
NOx	0.00092	0.4	22
ROG	0.00091	0.4	22
SOx	0.00001	0.004	0.3
PM10	0.00009	0.035	2.1
PM2.5	0.00005	0.022	1.3
CO2	1.095682348	438.273	26296.4
CH4	8.14608E-05	0.033	2.0

Paved Road Fugitive Dust Emissions

From SCAQMD CEQA AQ Handbook

Table A9-9-B

Passenger Vehicles on paved road fugitive dust

E=VxG (PM10 with street cleaning)

V= vehicle miles travelled

G=EF from table A9-9-9-B1

Road Type	G(PM10 lb/VMT)
Local Streets	0.018
Collector Streets	0.013
Major Streets/Highways	0.0064
Freeways	0.00065

Crew Personal vehicles

400 Total passenger VMT on paved roads per day

20 Local Streets (assumed 5%)

20 Collector Streets (assumed 5%)

40 Major Streets/Highways (10%)

320 Freeways (assumed 80%)

60 Work days

Road Type	PM10 (lbs/day)	Activity PM10 (lbs)
Local Streets	0.4	22
Collector Streets	0.3	16
Major Streets/Highways	0.3	15
Freeways	0.2	12
Crew Personal (PM10)	1.1	65

0.169 PM2.5 fraction of PM10 from SCAQMD Table A - Updated CEIDARS Table with PM2.5 Fractions

Crew Personal (PM2.5)	0.2	11

Dump Trucks and other heavy vehicles on paved roads

100 Total VMT on paved roads per day

10 Local Streets (assumed 10%)

10 Collector Streets (assumed 10%)

80 Major Streets/Highways (80%)

0 Freeways (assumed 0%)

60 Work days

Heavy Vehicles on paved road fugitive dust

Use SCAQMD CEQA Table A9-9-C

E=VxF (PM10 without street cleaning)

V= vehicle miles travelled

G from table A9-9-C1

F=0.77*((G*0.35)^0.3) lbs/VMT

Assume 60 percent reduction for street sweeping per Table A9-9

Road Type	G(PM10 oz/sq yd)	F(PM10 lb/VMT)	F with sweeping
Local Streets	0.04	0.2139583	0.085583
Collector Streets	0.03	0.1962671	0.078507
Major Streets/Highways	0.012	0.14909584	0.059638
Freeways	0.00065	0.06217061	0.024868

Road Type	PM10 (lbs/day)	Total Activity PM10 (lbs)
Local Streets	0.9	51
Collector Streets	0.8	47
Major Streets/Highways	4.8	286
Freeways	0.0	0
Heavy Delivery (PM10)	6.4	385

0.169 PM2.5 fraction of PM10 from SCAQMD Table A -

Heavy Delivery (PM2.5)	1.08	65

	PM10 (lbs/day)	Activity PM10 (lbs)	PM2.5 (lbs/day)	Activity PM2.5 (lbs)
Total Activity Paved Road Fugitive Dust	7.5	450	1.3	76

Unpaved Road Fugitive Dust Emissions

From SCAQMD CEQA AQ Handbook

Table A9-9-D

E=V*F

V= vehicle miles travelled on unpaved roads

F=2.1*(G/12)*(H/30)*((J/3)^.7)*((I/4)^.5)*((365-K)/365)

G= surface silt

H= mean vehicle speed

I= number of wheels

J=vehicle wt

K= days of precip per year at least 0.01 in

Crew Transport

Assumed

3 Miles of unpaved road leading to substation

2 Trips per day per vehicle

11 vehicles to transport crew to site

66 VMT on unpaved roads per day

Assumed

G= 11

H= 15

I= 4 wheels

J= 3 tons

k= 18 precip days

0.9 F PM10 (lbs/VMT)

60 PM10 (lbs per day) Uncontrolled

3624 Total Activity PM10 (lbs) Uncontrolled

0.212 PM2.5 fraction of PM10 from SCAQMD Table A -

13 PM2.5 (lbs per day) Uncontrolled

768 Total Activity PM2.5 (lbs) Uncontrolled

Heavy vehicles

Assumed

3 Miles of unpaved road leading to substation

1 Trips on dirt road per day per heavy vehicle

1 Number of heavy vehicles

3 VMT on unpaved roads per day for heavy vehicles

Assumed

G= 11

H= 15

I= 10 wheels

J= 8 tons

k= 18 precip days

2.9 F PM10 (lbs/VMT)

9 PM10 (lbs per day) Uncontrolled

517 Total Activity PM10 (lbs) Uncontrolled

0.212 PM2.5 fraction of PM10 from SCAQMD Table A - Updated CEIDARS Table with PM2.5 Fractions

2 PM2.5 (lbs per day) Uncontrolled

110 Total Activity PM2.5 (lbs) Uncontrolled

Assumed

50 Percent reduction in fug em due to using water trucks

35 PM10 (lbs per day) Controlled

2070 Total Activity PM10 (lbs) Controlled

7 PM2.5 (lbs per day) Controlled

439 Total Activity PM2.5 (lbs) Controlled

All On-Road Vehicles for Activity	Emissions (lbs/day)	Emissions (lbs)	Notes
CO	3	198	
NOx	0.37	22	
ROG	0.37	22	
SOx	0.004	0.26	
CO2	438	26296	
CH4	0.033	2	
PM10 (includes fugitive dust)	77	4593	Uncontrolled
PM2.5 (includes fugitive dust)	16	955	Uncontrolled

All On-Road Vehicles for Activity	Emissions (lbs/day)	Emissions (lbs)	Notes
CO	3	198	
NOx	0.37	22	
ROG	0.37	22	
SOx	0.004	0.26	
CO2	438	26296	
CH4	0.033	2	
PM10 (includes fugitive dust)	42	2522	Controlled
PM2.5 (includes fugitive dust)	9	516	Controlled

Eldorado-Ivanpah 220kV Construction
Emission Summary

Activity	Emissions (lbs)						
	CO	NOx	ROG	SOx	PM10	PM2.5	CO2
Combustion Related Emissions							
Survey							
On-Road Vehicles	119	13	13	0.2	1.3	0.8	15778
Marshalling Yards							
On-Road Vehicles	2003	770	238	3	37	29	274071
Off-Road Vehicles and Equipment	1382	3089	364	3	155	131	297203
Roads and Landing Work							
On-Road Vehicles	2595	2524	353	4	94	80	378622
Off-Road Vehicles and Equipment	926	3403	326	4	123	105	339755
Guard Structure Installation							
On-Road Vehicles	22	6	3	0.03	0.3	0.2	2957
Off-Road Vehicles and Equipment	42	126	12	0.16	5	4	15593
Remove Existing Conductor & OHGW							
On-Road Vehicles	664	133	75	0.9	9	6	88947
Off-Road Vehicles and Equipment	1415	4545	382	5	152	129	495678
Remove Existing Towers							
On-Road Vehicles	374	107	43	0.5	6	4	50651
Off-Road Vehicles and Equipment	683	1969	227	2	97	82	174730
Remove Existing Foundations							
On-Road Vehicles	524	307	65	1	13	10	73317
Off-Road Vehicles and Equipment	792	2302	261	3	115	97	234433
Remove Existing Wood Poles							
On-Road Vehicles	66	33	8	0.09	1	1	9194
Off-Road Vehicles and Equipment	39	139	14	0.14	5	4	12562
Install LST Foundaions							
On-Road Vehicles	2622	2688	388	5	125	106	473512
Off-Road Vehicles and Equipment	3136	7933	802	11	339	288	1112359
LST Steel Haul							
On-Road Vehicles	1112	525	135	2	24	19	153683
Off-Road Vehicles and Equipment	428	718	96	1	44	37	72646
LST Assembly							
On-Road Vehicles	1309	145	145	2	14	9	173556
Off-Road Vehicles and Equipment	4163	15801	1494	16	564	480	1455486
LST Erection							
On-Road Vehicles	1428	159	158	2	15	9	440267
Off-Road Vehicles and Equipment	883	2378	292	2	132	112	206205
Install Tubular Steel Foundations							
On-Road Vehicles	556	761	90	1	34	29	110497
Off-Road Vehicles and Equipment	457	1157	117	2	49	42	162219
Tubular Steel H-Frame Haul							
On-Road Vehicles	147	94	19	0.2	4	3	20679
Off-Road Vehicles and Equipment	44	156	16	0.2	6	5	14132
Tubular Steel H-Frame Assembly							
On-Road Vehicles	278	31	31	0.4	3	2	36815
Off-Road Vehicles and Equipment	158	437	53	0.4	23	20	38124
Tubular Steel H-Frame Erection							
On-Road Vehicles	278	31	31	0.4	3	2	36815
Off-Road Vehicles and Equipment	158	437	53	0.4	23	20	38124
Install Conductor & OPGW							
On-Road Vehicles	6511	2676	778	9	127	98	893617
Off-Road Vehicles and Equipment	8857	23200	2294	320	1218	1035	2891524
Guard Structure Removal							
On-Road Vehicles	38	19	5	0.1	1	1	5254
Off-Road Vehicles and Equipment	36	99	11	0.1	5	4	9248
Restoration							
On-Road Vehicles	263	130	32	0.4	6	5	36449
Off-Road Vehicles and Equipment	486	1793	171	2	64	55	181611
Fugitive Dust Emissions							
Paved Roads	-	-	-	-	23581	3985	-
Unpaved Roads	-	-	-	-	48659	10316	-
Construction Activities	-	-	-	-	4251	2126	-
Total Activity Emissions (tons)	22	40	4.8	0.20	40	10	5513
Total California Activity Emissions (tons)	4.5	8.1	1.0	0.040	8.0	1.9	1103
Construction Days	586	586	586	586	586	586	586
Average Daily Emissions (lbs)	77	138	16	0.7	137	33	18816

Eldorado-Ivanpah 220kV Construction
Workforce Estimate

Work Activity							Activity Production
Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Workforce	Estimated Schedule (Days)	Estimated Average Duration of Use (Hrs/Day)	Estimated Production Per Day
Survey (1)				**4**	**36**		**35.5 miles**
1/2-ton pick-up truck, 4x4	200	Gas	2		36	8	1 mile/day
Marshalling Yard (2)				**4**			
1-ton crew cab, 4x4	300	Diesel	1			2	
30-ton crane truck	300	Diesel	1			2	
10,000 lb rough terrain fork lift	200	Diesel	1			5	
truck, semi, tractor	350	Diesel	1		Duration of project	1	
Roads and Landing Work (3)				**5**	**101**		**18.0 Miles and 258 Pads**
1-ton crew cab, 4x4	300	Diesel	2		101	2	
Road grader	350	Diesel	1		101	4	
Track type dozer	350	Diesel	1		101	6	
Drum type compactor	250	Diesel	1		101	4	
Water truck	350	Diesel	2		Duration	8	
Lowboy truck/trailer	500	Diesel	1		51	2	
Backhoe/front loader	350	Diesel	1		101	6	0.5 mile/day and 4 structure pads/day
Guard Structure Installation (4)				**6**	**4**		**16 Structures**
3/4-ton pick-up truck, 4x4	300	Diesel	2		4	6	
1-ton crew cab flat bed, 4x4	300	Diesel	1		4	6	
Compressor trailer	120	Diesel	1		4	6	
Auger truck	500	Diesel	1		4	6	
Pole truck/trailer	350	Diesel	1		4	6	
80-foot hydraulic man-lift/bucket truck	350	Diesel	1		4	4	
30-ton crane truck	500	Diesel	1		4	8	4 structures/day
Remove Existing Conductor and OHGW (5)				**14**	**71**		**35.5 Circuit Miles**
1-ton crew cab, 4x4	300	Diesel	4		71	8	
80-foot hydraulic man-lift/bucket truck	350	Diesel	3		71	8	
Sleeving truck	300	Diesel	1		71	4	
30-ton crane truck	300	Diesel	1		71	4	
Flat bed trailer	N/A	N/A	3		64	2	
Truck, semi, tractor	350	Diesel	1		64	1	
Bull wheel puller	500	Diesel	1		48	4	
Hydraulic rewind puller	300	Diesel	1		48	4	0.50 mile/day
Remove Existing Structures (6)				**6**	**75**		**221 Structures**
1-ton crew cab, 4x4	300	Diesel	2		75	5	
80-ton rough terrain crane	350	Diesel	1		40	8	
30-ton crane truck	300	Diesel	2		75	6	
Compressor trailer	120	Diesel	2		40	8	
Flat bed truck/trailer	350	Diesel	1		35	8	
10,000-lb rough terrain forklift	200	Diesel	1		35	4	3 structures/day
Remove Existing Foundations (7)				**8**	**67**		**208 LSH-Frames** **13 LSTs**
1-ton crew cab flat bed, 4x4	300	Diesel	2		67	8	8 grillage
10-cubic yard dump truck	350	Diesel	2		67	8	foundations/day
Backhoe/front loader	350	Diesel	2		67	8	or
Compressor trailer	120	Diesel	2		67	8	4 concrete foundations/day
Remove Existing Wood Poles (8)				**6**	**7**		**23 H-Frames** **6 Poles**
3/4-ton pick-up truck, 4x4	300	Diesel	2		7	5	
1-ton crew cab flat bed, 4x4	300	Diesel	1		7	5	
30-ton crane truck	300	Diesel	1		7	6	
Pole truck/trailer	350	Diesel	2		7	8	8 poles/day
Install LST Foundations (9)				**18**	**144**		**216 LSTs**
1-ton crew cab flat bed, 4x4	300	Diesel	4		144	2	
30-ton crane truck	300	Diesel	2		144	5	
Backhoe/front loader	200	Diesel	2		144	8	
Auger truck	500	Diesel	2		144	8	
10-cubic yard dump truck	350	Diesel	4		144	8	
4,000-gallon water truck	350	Diesel	2		144	8	
10-cubic yard concrete mixer truck	425	Diesel	6		144	5	1.5 LSTs/day
LST Steel Haul (10)				**8**	**108**		**216 LSTs**
1-ton crew cab flat bed, 4x4	300	Diesel	4		108	2	
Flat bed truck/trailer	350	Diesel	2		108	8	
10,000 lb Rough Terrain Fork Lift	200	Diesel	2		108	6	2 LSTs/day
LST Steel Assembly (11)				**42**	**144**		**216 LSTs**
3/4-ton pick-up truck, 4x4	300	Diesel	6		144	4	
1-ton crew cab flat bed, 4x4	300	Diesel	9		144	4	
30-ton crane truck	300	Diesel	6		144	8	
Compressor trailer	120	Diesel	6		144	6	1.5 LSTs/day
LST Erection (12)				**16**	**108**		**216 LSTs**
3/4-ton pick-up truck, 4x4	300	Diesel	4		108	5	
1-ton crew cab flat bed, 4x4	300	Diesel	4		108	5	
Compressor trailer	120	Diesel	2		108	6	
80-ton rough terrain crane	350	Diesel	2		108	6	2 LSTs/day
Install Tubular Steel H-Frame Foundations (13)				**7**	**42**		**42 H-Frames**
1-ton crew cab flat bed, 4x4	300	Diesel	3		42	2	
30-ton crane truck	300	Diesel	1		42	5	
Backhoe/front loader	200	Diesel	1		42	8	
Auger truck	500	Diesel	1		42	8	
10-cubic yard dump truck	350	Diesel	2		42	8	
4,000-gallon water truck	350	Diesel	1		42	8	
10-cubic yard concrete mixer truck	425	Diesel	3		42	3	1 H-frame/day

Eldorado-Ivanpah 220kV Construction
Workforce Estimate

Work Activity							Activity Production
Primary Equipment Description	**Estimated Horse-Power**	**Probable Fuel Type**	**Primary Equipment Quantity**	**Estimated Workforce**	**Estimated Schedule (Days)**	**Estimated Average Duration of Use (Hrs/Day)**	**Estimated Production Per Day**
Tubular Steel H-Frame Haul (14)				**4**	**21**		**42 H-Frames**
3/4-ton pick-up truck, 4x4	300	Diesel	2		21	5	
Flat bed truck/trailer	350	Diesel	2		21	8	
80-ton rough terrain crane	350	Diesel	1		21	6	2 H-frames/day
Tubular Steel H-Frame Assembly (15)				**8**	**42**		**42 H-Frames**
3/4-ton pick-up truck, 4x4	300	Diesel	2		42	5	
1-ton crew cab flat bed, 4x4	300	Diesel	2		42	5	
Compressor trailer	120	Diesel	1		42	5	
80-ton rough terrain crane	350	Diesel	1		42	6	1 H-frame/day
Tubular Steel H-Frame Erection (16)				**8**	**42**		**42 H-Frames**
3/4-ton pick-up truck, 4x4	300	Diesel	2		42	5	
1-ton crew cab flat bed, 4x4	300	Diesel	2		42	5	
Compressor trailer	120	Diesel	1		42	5	
80-ton rough terrain crane	350	Diesel	1		42	6	1 H-frame/day
Install Conductor and OPGW (17)				**32**	**205**		**71.0 Circuit Miles**
1-ton crew cab flat bed, 4x4	300	Diesel	5		205	8	
Wire truck/trailer	350	Diesel	6		205	2	
Dump truck (trash)	350	Diesel	1		205	2	
3/4-ton pick-up truck, 4x4	300	Diesel	6		205	8	
22-ton Manitex	350	Diesel	1		205	8	
30-ton Manitex	350	Diesel	4		205	6	
Splicing rig	350	Diesel	2		205	2	
Splicing lab	300	Diesel	2		48	2	
20,000-lb rough terrain fork lift	350	Diesel	1		205	2	
580 Case Backhoe	120	Diesel	1		205	2	
Spacing cart	10	Diesel	3		51	8	
Static truck/ tensioner	350	Diesel	1		205	2	
3 drum straw line puller	300	Diesel	2		205	4	
30-ton puller	525	Diesel	1		205	3	
Sag Cat w2 winch	350	Diesel	2		205	2	
D8 Cat	300	Diesel	4		205	1	
Hughes 500 E Helicopter		Jet A	1		52	6	
Fuel, helicopter support truck	300	Diesel	1		52	2	
Lowboy truck/trailer	500	Diesel	1		205	2	0.35 mile/day
Guard Structure Removal (18)				**6**	**4**		**16 Structures**
3/4-ton pick-up truck, 4x4	300	Diesel	2		4	6	
1-ton crew cab flat bed, 4x4	300	Diesel	2		4	6	
Compressor trailer	120	Diesel	2		4	6	
Pole truck/trailer	350	Diesel	2		4	6	
80-foot hydraulic man-lift/bucket truck	350	Diesel	1		4	4	
30-ton crane truck	500	Diesel	1		4	8	4 structures/day
Restoration (19)				**7**	**36**		**35.5 Miles**
1-ton crew cab, 4x4	300	Diesel	2		36	2	
Road grader	350	Diesel	1		36	6	
Backhoe	350	Diesel	1		36	6	
Front end loader	350	Diesel	1		36	6	
Track type dozer	350	Diesel	1		36	6	
Drum type compactor	250	Diesel	1		36	6	
Water truck	350	Diesel	1		36	8	
Lowboy truck/trailer	500	Diesel	1		36	3	1 mile/day

Crew Size Assumptions:
#1 Survey = one 4-man crew
#2 Marshalling Yards = one 4-man crew
#3 Roads and Landing Work = one 5-man crew
#4 Guard Structure Installation = one 6-man crew
#5 Remove Existing Conductor and OHGW = one 14-man crew
#6 Remove Existing LSTs and Lattice Steel H (LSH Frames = one 6-man crew
#7 Remove Existing Foundations = two 4-man crews
#8 Remove Existing Wood Poles = one 6-man crew
#9 Install Foundations for LSTs = two 9-man crews
#10 LST Steel Haul = two 4-man crews
#11 LST Steel Assembly = six 7-man crews
#12 LST Erection = two 8-man crews
#13 Install Foundations for Tubular Steel H-Frames = one 7-man crew
#14 Tubular Steel H-Frame Haul = one 4-man crew
#15 Tubular Steel H-Frame Assembly = one 8-man crew
#16 Tubular Steel H-Frame Erection = one 8-man crew
#17 Conductor and OPGW Installation = four 8-man crews
#18 Guard Structure Removal = one 6-man crew
#19 Restoration = one 7-man crew

Eldorado-Ivanpah 220kV Construction
On site fugitive dust during active construction activities

425.1	Distrubed acreage from Proj Discription Table 3.2
589	Project duration (days)
0.7	Average Disturbed acres per day
1.4	Assumed twice the average disturbance for emission calculation
	Assume uncontrolled fugitive dust emission factor of 10 lbs/acre/day for PM10
14.4	Uncontrolled PM10 (lbs/day)
	Assume PM2.5 is 50% of PM10 for fugitive dust
7.2	Uncontrolled PM2.5 (lbs/day)
	Assume 50% controls from watering twice per day
7.2	Controlled PM10 (lbs/day)
3.6	Controlled PM2.5 (lbs/day)
4251.0	Total Controlled PM10 (lbs)
2125.5	Total Controlled PM2.5 (lbs)

Eldorado-Ivanpah 220kV Construction
Unpaved Road Fugitive Dust Emissions

Unpaved Road Fugitive Dust Emissions
From SCAQMD CEQA AQ Handbook
Table A9-9-D

E=V*F
V= vehicle miles travelled on unpaved roads
F=2.1*(G/12)*(H/30)*((J/3)^.7)*((I/4)^.5)*((365-K)/365)
G= surface silt
H= mean vehicle speed
I= number of wheels
J=vehicle wt
K= days of precip per year at least 0.01 in

0.212 PM2.5 fraction of PM10 from SCAQMD Table A - Updated CEIDARS Table with PM2.5 Fractions

Light Vehicles Factor
G= 11 Assumed
H= 15 Assumed
I= 4 wheels
J= 3 tons
k= 18 precip days

0.9 F PM10 (lbs/VMT)
0.19 F PM2.5 (lbs/VMT)

Heavy Vehicles Factor
G= 11 Assumed
H= 15 Assumed
I= 10 wheels
J= 8 tons
k= 18 precip days

2.9 F PM10 (lbs/VMT)
0.61 F PM2.5 (lbs/VMT)

Assumed 50% control for watering
Assumed 95% control of the water truck emissions

							Uncontrolled Emissions				Controlled Emissions (50%)			
				Max	F PM10	F PM2.5	PM10		PM2.5		PM10		PM2.5	
Activity	Equipment	Number	Days	VMT/day	(lbs/VMT)	(lbs/VMT)	(lbs/day)	lbs activity	(lbs/day)	lbs activity	(lbs/day)	lbs activity	(lbs/day)	lbs activity
Survey	1/2 Ton Pick-up Truck, 4X4	2	36	20	0.9	0.19	36.6	1317.6	7.8	279.3	18.3	658.8	3.9	139.7
	Personal Vehicles	4	36	2	0.9	0.19	7.3	263.5	1.6	55.9	3.7	131.8	0.8	27.9
											22.0	*790.6*	*4.7*	*167.6*
Marshalling Yards	1 Ton Crew Cab 4X4	1	589	3	0.9	0.19	2.7	1616.9	0.6	342.8	1.4	808.4	0.3	171.4
	Truck, Semi, Tractor	1	589	3	2.9	0.61	8.6	5079.5	1.8	1076.9	4.3	2539.8	0.9	538.4
	Personal Vehicles	4	589	2	0.9	0.19	7.3	4311.6	1.6	914.1	3.7	2155.8	0.8	457.0
											9.3	*5504.0*	*2.0*	*1166.9*
Roads and Landing Work	1 Ton Crew Cab 4X4	2	101	3	0.9	0.19	5.5	554.5	1.2	117.6	2.7	277.3	0.6	58.8
	Water Trucks	2	589	20	2.9	0.61	115.0	67726.8	24.4	14358.1	5.7	3386.3	1.2	717.9
	Lowboy Trk/Trlr	1	51	3	2.9	0.61	8.6	439.8	1.8	93.2	4.3	219.9	0.9	46.6
	Personal Vehicles	5	101	2	0.9	0.19	9.2	924.2	1.9	195.9	4.6	462.1	1.0	98.0
											17.4	*4345.6*	*3.7*	*921.3*
Guard Structure Installation	3/4 Ton Pick-up Truck, 4X4	2	4	3	0.9	0.19	5.5	22.0	1.2	4.7	2.7	11.0	0.6	2.3
	1 Ton Crew Cab Flat Bed, 4X4	1	4	3	0.9	0.19	2.7	11.0	0.6	2.3	1.4	5.5	0.3	1.2
	Extendable Flat Bed Pole Truck	1	4	3	2.9	0.61	8.6	34.5	1.8	7.3	4.3	17.2	0.9	3.7
	Personal Vehicles	6	4	2	0.9	0.19	11.0	43.9	2.3	9.3	5.5	22.0	1.2	4.7
											13.9	*55.7*	*3.0*	*11.8*
Remove Existing Conductor & OHGW	1 Ton Crew Cab 4X4	4	71	3	0.9	0.19	11.0	779.6	2.3	165.3	5.5	389.8	1.2	82.6
	Truck, Semi, Tractor	1	64	3	2.9	0.61	8.6	551.9	1.8	117.0	4.3	276.0	0.9	58.5
	Personal Vehicles	14	64	2	0.9	0.19	25.6	1639.7	5.4	347.6	12.8	819.9	2.7	173.8
											22.6	*1485.6*	*4.8*	*315.0*
Remove Existing Towers	1 Ton Crew Cab, 4X4	2	75	3	0.9	0.19	5.5	411.8	1.2	87.3	2.7	205.9	0.6	43.6
	Flat Bed Truck & Trailer	1	35	3	2.9	0.61	8.6	301.8	1.8	64.0	4.3	150.9	0.9	32.0
	Personal Vehicles	6	75	2	0.9	0.19	11.0	823.5	2.3	174.6	5.5	411.8	1.2	87.3
											12.5	*768.6*	*2.7*	*162.9*
Remove Existing Foundations	Dump Truck	2	67	3	2.9	0.61	17.2	1155.6	3.7	245.0	8.6	577.8	1.8	122.5
	1 Ton Crew Cab Flat Bed, 4X4	1	67	3	0.9	0.19	2.7	183.9	0.6	39.0	1.4	92.0	0.3	19.5
	Personal Vehicles	8	67	2	0.9	0.19	14.6	980.9	3.1	208.0	7.3	490.5	1.6	104.0
											17.3	*1160.2*	*3.7*	*246.0*
Remove Existing Wood Poles	3/4 Ton Pick-up Truck, 4X4	2	7	3	0.9	0.19	5.5	38.4	1.2	8.1	2.7	19.2	0.6	4.1
	1 Ton Crew Cab Flat Bed, 4X4	2	7	3	0.9	0.19	5.5	38.4	1.2	8.1	2.7	19.2	0.6	4.1
	Extendable Flat Bed Pole Truck	2	7	3	2.9	0.61	17.2	120.7	3.7	25.6	8.6	60.4	1.8	12.8
	Personal Vehicles	6	7	2	0.9	0.19	11.0	76.9	2.3	16.3	5.5	38.4	1.2	8.1
											19.6	*137.2*	*4.2*	*29.1*
Install LST Foundaions	1 Ton Crew Cab Flat Bed, 4X4	2	144	3	0.9	0.19	5.5	790.6	1.2	167.6	2.7	395.3	0.6	83.8
	Dump Truck	2	144	3	2.9	0.61	17.2	2483.7	3.7	526.5	8.6	1241.9	1.8	263.3
	4000 gallon Water Trucks	1	144	20	2.9	0.61	57.5	8279.0	12.2	1755.1	2.9	414.0	0.6	87.8
	10 cu.yd. Concrete Mixer Trucks	3	144	3	2.9	0.61	25.9	3725.6	5.5	789.8	12.9	1862.8	2.7	394.9
	Personal Vehicles	18	144	2	0.9	0.19	32.9	4743.5	7.0	1005.6	16.5	2371.8	3.5	502.8
											43.7	*6285.6*	*9.3*	*1332.6*
LST Steel Haul	1 Ton Crew Cab Flat Bed, 4X4	4	108	3	0.9	0.19	11.0	1185.9	2.3	251.4	5.5	592.9	1.2	125.7
	40' Flat Bed Truck & Trailer	2	108	3	2.9	0.61	17.2	1862.8	3.7	394.9	8.6	931.4	1.8	197.5
	Personal Vehicles	8	108	2	0.9	0.19	14.6	1581.2	3.1	335.2	7.3	790.6	1.6	167.6
											21.4	*2314.9*	*4.5*	*490.8*
LST Assembly	3/4 Ton Pick-up Truck, 4X4	4	144	3	0.9	0.19	11.0	1581.2	2.3	335.2	5.5	790.6	1.2	167.6
	1 Ton Crew Cab Flat Bed, 4X4	6	144	3	0.9	0.19	16.5	2371.8	3.5	502.8	8.2	1185.9	1.7	251.4
	Personal Vehicles	2	144	2	0.9	0.19	3.7	527.1	0.8	111.7	1.8	263.5	0.4	55.9
											15.6	*2240.0*	*3.3*	*474.9*
LST Erection	3/4 Ton Pick-up Truck, 4X4	4	108	3	0.9	0.19	11.0	1185.9	2.3	251.4	5.5	592.9	1.2	125.7
	1 Ton Crew Cab Flat Bed, 4X4	4	108	3	0.9	0.19	11.0	1185.9	2.3	251.4	5.5	592.9	1.2	125.7
	Personal Vehicles	16	108	2	0.9	0.19	29.3	3162.4	6.2	670.4	14.6	1581.2	3.1	335.2
											25.6	*2767.1*	*5.4*	*586.6*
Install Tubular Steel Foundations	1 Ton Crew Cab Flat Bed, 4X4	3	42	3	0.9	0.19	8.2	345.9	1.7	73.3	4.1	172.9	0.9	36.7
	10-cu. Yd. Dump Truck	2	42	3	2.9	0.61	17.2	724.4	3.7	153.6	8.6	362.2	1.8	76.8
	4000 gallon Water Truck	1	42	20	2.9	0.61	57.5	2414.7	12.2	511.9	2.9	120.7	0.6	25.6
	10 cu. Yd. Concrete Mixer Truck	3	42	3	2.9	0.61	25.9	1086.6	5.5	230.4	12.9	543.3	2.7	115.2
	Personal Vehicles	7	42	2	0.9	0.19	12.8	538.0	2.7	114.1	6.4	269.0	1.4	57.0
											35.0	*1468.2*	*7.4*	*311.3*
Tubular Steel H-Frame Haul	3/4 Ton Pick-up Truck, 4X4	2	21	3	0.9	0.19	5.5	115.3	1.2	24.4	2.7	57.6	0.6	12.2
	40' Flat Bed Truck & Trailer	2	21	3	2.9	0.61	17.2	362.2	3.7	76.8	8.6	181.1	1.8	38.4
	Personal Vehicles	4	21	2	0.9	0.19	7.3	153.7	1.6	32.6	3.7	76.9	0.8	16.3
											15.0	*315.6*	*3.2*	*66.9*
Tubular Steel H-Frame Assembly	3/4 Ton Pick-up Truck, 4X4	2	42	3	0.9	0.19	5.5	230.6	1.2	48.9	2.7	115.3	0.6	24.4
	1 Ton Crew Cab Flat Bed, 4X4	2	42	3	0.9	0.19	5.5	230.6	1.2	48.9	2.7	115.3	0.6	24.4
	Personal Vehicles	8	42	2	0.9	0.19	14.6	614.9	3.1	130.4	7.3	307.5	1.6	65.2
											12.8	*538.0*	*2.7*	*114.1*
Tubular Steel H-Frame Erection	3/4 Ton Pick-up Truck, 4X4	2	42	3	0.9	0.19	5.5	230.6	1.2	48.9	2.7	115.3	0.6	24.4
	1 Ton Crew Cab Flat Bed, 4X4	2	42	3	0.9	0.19	5.5	230.6	1.2	48.9	2.7	115.3	0.6	24.4
	Personal Vehicles	8	42	2	0.9	0.19	14.6	614.9	3.1	130.4	7.3	307.5	1.6	65.2
											12.8	*538.0*	*2.7*	*114.1*
Install Conductor & OPGW	1 Ton Crew Cab Flat Bed, 4X4	5	205	3	0.9	0.19	13.7	2813.7	2.9	596.5	6.9	1406.9	1.5	298.3
	Wire Truck & Trailer	6	205	3	2.9	0.61	51.7	10607.5	11.0	2248.8	25.9	5303.7	5.5	1124.4
	Dump Truck (Trash)	1	205	3	2.9	0.61	8.6	1767.9	1.8	374.8	4.3	884.0	0.9	187.4
	3/4 Ton Pick-up Truck, 4X4	6	205	3	0.9	0.19	16.5	3376.5	3.5	715.8	8.2	1688.2	1.7	357.9
	Pole Truck & Trailer	0	0	3	2.9	0.61	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Static Truck	1	205	3	2.9	0.61	8.6	1767.9	1.8	374.8	4.3	884.0	0.9	187.4
	Fuel, Helicopter Support Truck	1	52	3	2.9	0.61	8.6	448.4	1.8	95.1	4.3	224.2	0.9	47.5
	Low Boy Truck & Trailer	1	205	3	2.9	0.61	8.6	1767.9	1.8	374.8	4.3	884.0	0.9	187.4
	Personal Vehicles	32	205	2	0.9	0.19	58.6	12005.2	12.4	2545.1	29.3	6002.6	6.2	1272.6
											87.5	*17277.6*	*18.5*	*3662.8*
Guard Structure Removal	3/4 Ton Pick-up Truck, 4X4	2	4	3	0.9	0.19	5.5	22.0	1.2	4.7	2.7	11.0	0.6	2.3
	1 Ton Crew Cab Flat Bed, 4X4	2	4	3	0.9	0.19	5.5	22.0	1.2	4.7	2.7	11.0	0.6	2.3
	Extendable Flat Bed Pole Truck	2	4	3	2.9	0.61	17.2	69.0	3.7	14.6	8.6	34.5	1.8	7.3
	Personal Vehicles	6	4	2	0.9	0.19	11.0	43.9	2.3	9.3	5.5	22.0	1.2	4.7
											19.6	*78.4*	*4.2*	*16.6*
Restoration	1 Ton Crew Cab 4X4	2	36	3	0.9	0.19	5.5	197.6	1.2	41.9	2.7	98.8	0.6	21.0
	Water Truck	1	36	20	2.9	0.61	57.5	2069.8	12.2	438.8	2.9	103.5	0.6	21.9
	Lowboy Truck/Trailer	1	36	3	2.9	0.61	8.6	310.5	1.8	65.8	4.3	155.2	0.9	32.9
	Personal Vehicles	7	36	2	0.9	0.19	12.8	461.2	2.7	97.8	6.4	230.6	1.4	48.9
											16.3	*588.1*	*3.5*	*124.7*
										Total	**440**	**48659**	**93**	**10316**

Eldorado-Ivanpah 220kV Construction
Paved Road Fugitive Dust Emissions

Light Weight Vehicles on paved road fugitive dust
From SCAQMD CEQA AQ Handbook
Table A9-9-B

E=VxG (PM10 with street cleaning)

V= vehicle miles travelled
G=EF from table A9-9-9-B1

G(PM10 lb/VMT)	Road Type
0.018	Local Streets
0.013	Collector Streets
0.0064	Major Streets/Highways
0.00065	Freeways

Assumed Mix of Roads
0.10 Local Streets (assumed 10%)
0.10 Collector Streets (assumed 10%)
0.10 Major Streets/Highways (10%)
0.70 Freeways (assumed 70%)

Composite light vehicle Emission Factor
0.0042 PM10 per VMT

0.169 PM2.5 fraction of PM10 from SCAQMD Table A - Updated CEIDARS Table with PM2.5 Fractions

0.00071 PM2.5 per VMT

Heavy Vehicles on paved road fugitive dust
Use SCAQMD CEQA Table A9-9-C
E=VxF (PM10 without street cleaning)
V= vehicle miles travelled
G from table A9-9-C1
F=0.77*((G*0.35)^0.3) lbs/VMT

Assume 60 percent reduction for street sweeping per Table A9-9

Road Type	G(PM10 oz/sq yd)	F(PM10 lb/VMT)	F with sweeping
Local Streets	0.04	0.2139583	0.0855833
Collector Streets	0.03	0.1962671	0.0785068
Major Streets/Highways	0.012	0.1490958	0.0596383
Freeways	0.00065	0.0621706	0.0248682

Assumed Mix of Roads
0.10 Local Streets (assumed 10%)
0.10 Collector Streets (assumed 10%)
0.10 Major Streets/Highways (10%)
0.70 Freeways (assumed 70%)

Composite heavy vehicle Emission Factor
0.040 PM10 per VMT

0.169 PM2.5 fraction of PM10 from SCAQMD Table A - Updated CEIDARS Table with PM2.5 Fractions

0.0067 PM2.5 per VMT

							Emissions Assuming Street Cleaning			
							PM10		PM2.5	
Activity	Equipment	Number	Days	VMT/day	F PM10 (lbs/VMT)	F PM2.5 (lbs/VMT)	(lbs/day)	lbs activity	(lbs/day)	lbs activity
Survey	1/2 Ton Pick-up Truck, 4X4	2	36	100	0.0042	0.00071	0.8	30.2	0.1	5.1
	Personal Vehicles	4	36	50	0.0042	0.00071	0.8	30.2	0.1	5.1
							1.7	*60.4*	*0.3*	*10.2*
Marshalling Yards	1 Ton Crew Cab 4X4	1	589	100	0.0042	0.00071	0.4	247.1	0.1	41.8
	Truck, Semi, Tractor	1	589	50	0.0398	0.00672	2.0	1171.5	0.3	198.0
	Personal Vehicles	4	589	50	0.0042	0.00071	0.8	494.2	0.1	83.5
							3.2	*1912.8*	*0.5*	*323.3*
Roads and Landing Work	1 Ton Crew Cab 4X4	2	101	100	0.0042	0.00071	0.8	84.7	0.1	14.3
	Water Trucks	2	589	100	0.0398	0.00672	8.0	4686.2	1.3	792.0
	Lowboy Trk/Trlr	1	51	50	0.0398	0.00672	2.0	101.4	0.3	17.1
	Personal Vehicles	5	101	50	0.0042	0.00071	1.0	105.9	0.2	17.9
							11.8	*4978.3*	*2.0*	*841.3*
Guard Structure Installation	3/4 Ton Pick-up Truck, 4X4	2	4	100	0.0042	0.00071	0.8	3.4	0.1	0.6
	1 Ton Crew Cab Flat Bed, 4X4	1	4	50	0.0042	0.00071	0.2	0.8	0.0	0.1
	Extendable Flat Bed Pole Truck	1	4	50	0.0398	0.00672	2.0	8.0	0.3	1.3
	Personal Vehicles	6	4	50	0.0042	0.00071	1.3	5.0	0.2	0.9
							4.3	*17.2*	*0.7*	*2.9*
Remove Existing Conductor & OHGW	1 Ton Crew Cab 4X4	4	71	100	0.0042	0.00071	1.7	119.1	0.3	20.1
	Truck, Semi, Tractor	1	64	50	0.0398	0.00672	2.0	127.3	0.3	21.5
	Personal Vehicles	14	64	50	0.0042	0.00071	2.9	187.9	0.5	31.8
							6.6	*434.4*	*1.1*	*73.4*
Remove Existing Towers	1 Ton Crew Cab, 4X4	2	75	100	0.0042	0.00071	0.8	62.9	0.1	10.6
	Flat Bed Truck & Trailer	1	35	100	0.0398	0.00672	4.0	139.2	0.7	23.5
	Personal Vehicles	6	75	50	0.0042	0.00071	1.3	94.4	0.2	16.0
							6.1	*296.5*	*1.0*	*50.1*
Remove Existing Foundations	Dump Truck	2	67	100	0.0398	0.00672	8.0	533.1	1.3	90.1
	1 Ton Crew Cab Flat Bed, 4X4	1	67	100	0.0042	0.00071	0.4	28.1	0.1	4.7
	Personal Vehicles	8	67	50	0.0042	0.00071	1.7	112.4	0.3	19.0
							10.1	*673.6*	*1.7*	*113.8*
Remove Existing Wood Poles	3/4 Ton Pick-up Truck, 4X4	2	7	100	0.0042	0.00071	0.8	5.9	0.1	1.0
	1 Ton Crew Cab Flat Bed, 4X4	2	7	100	0.0042	0.00071	0.8	5.9	0.1	1.0
	Extendable Flat Bed Pole Truck	2	7	100	0.0398	0.00672	8.0	55.7	1.3	9.4
	Personal Vehicles	6	7	50	0.0042	0.00071	1.3	8.8	0.2	1.5
							10.9	*76.2*	*1.8*	*12.9*
Install LST Foundaions	1 Ton Crew Cab Flat Bed, 4X4	2	144	100	0.0042	0.00071	0.8	120.8	0.1	20.4
	Dump Truck	2	144	100	0.0398	0.00672	8.0	1145.7	1.3	193.6
	4000 gallon Water Trucks	1	144	100	0.0398	0.00672	4.0	572.8	0.7	96.8
	10 cu.yd. Concrete Mixer Trucks	3	144	100	0.0398	0.00672	11.9	1718.5	2.0	290.4
	Personal Vehicles	18	144	50	0.0042	0.00071	3.8	543.7	0.6	91.9
							28.5	*4101.5*	*4.8*	*693.2*
LST Steel Haul	1 Ton Crew Cab Flat Bed, 4X4	4	108	100	0.0042	0.00071	1.7	181.2	0.3	30.6
	40' Flat Bed Truck & Trailer	2	108	100	0.0398	0.00672	8.0	859.3	1.3	145.2
	Personal Vehicles	8	108	50	0.0042	0.00071	1.7	181.2	0.3	30.6
							11.3	*1221.7*	*1.9*	*206.5*
LST Assembly	3/4 Ton Pick-up Truck, 4X4	4	144	100	0.0042	0.00071	1.7	241.6	0.3	40.8
	1 Ton Crew Cab Flat Bed, 4X4	6	144	100	0.0042	0.00071	2.5	362.4	0.4	61.3
	Personal Vehicles	2	144	50	0.0042	0.00071	0.4	60.4	0.1	10.2
							4.6	*664.5*	*0.8*	*112.3*
LST Erection	3/4 Ton Pick-up Truck, 4X4	4	108	100	0.0042	0.00071	1.7	181.2	0.3	30.6
	1 Ton Crew Cab Flat Bed, 4X4	4	108	100	0.0042	0.00071	1.7	181.2	0.3	30.6
	Personal Vehicles	16	108	50	0.0042	0.00071	3.4	362.4	0.6	61.3
							6.7	*724.9*	*1.1*	*122.5*
Install Tubular Steel Foundations	1 Ton Crew Cab Flat Bed, 4X4	3	42	50	0.0042	0.00071	0.6	26.4	0.1	4.5
	10-cu. Yd. Dump Truck	2	42	100	0.0398	0.00672	8.0	334.2	1.3	56.5
	4000 gallon Water Truck	1	42	100	0.0398	0.00672	4.0	167.1	0.7	28.2
	10 cu. Yd. Concrete Mixer Truck	3	42	100	0.0398	0.00672	11.9	501.2	2.0	84.7
	Personal Vehicles	7	42	50	0.0042	0.00071	1.5	61.7	0.2	10.4
							26.0	*1090.6*	*4.4*	*184.3*
Tubular Steel H-Frame Haul	3/4 Ton Pick-up Truck, 4X4	2	21	100	0.0042	0.00071	0.8	17.6	0.1	3.0
	40' Flat Bed Truck & Trailer	2	21	100	0.0398	0.00672	8.0	167.1	1.3	28.2
	Personal Vehicles	4	21	50	0.0042	0.00071	0.8	17.6	0.1	3.0
							9.6	*202.3*	*1.6*	*34.2*
Tubular Steel H-Frame Assembly	3/4 Ton Pick-up Truck, 4X4	2	42	100	0.0042	0.00071	0.8	35.2	0.1	6.0
	1 Ton Crew Cab Flat Bed, 4X4	2	42	100	0.0042	0.00071	0.8	35.2	0.1	6.0
	Personal Vehicles	8	42	50	0.0042	0.00071	1.7	70.5	0.3	11.9
							3.4	*141.0*	*0.6*	*23.8*
Tubular Steel H-Frame Erection	3/4 Ton Pick-up Truck, 4X4	2	42	100	0.0042	0.00071	0.8	35.2	0.1	6.0
	1 Ton Crew Cab Flat Bed, 4X4	2	42	100	0.0042	0.00071	0.8	35.2	0.1	6.0
	Personal Vehicles	8	42	50	0.0042	0.00071	1.7	70.5	0.3	11.9
							3.4	*141.0*	*0.6*	*23.8*
Install Conductor & OPGW	1 Ton Crew Cab Flat Bed, 4X4	5	205	100	0.0042	0.00071	2.1	430.0	0.4	72.7
	Wire Truck & Trailer	6	205	50	0.0398	0.00672	11.9	2446.5	2.0	413.5
	Dump Truck (Trash)	1	205	100	0.0398	0.00672	4.0	815.5	0.7	137.8
	3/4 Ton Pick-up Truck, 4X4	6	205	100	0.0042	0.00071	2.5	516.0	0.4	87.2
	Pole Truck & Trailer	0	0	50	0.0398	0.00672	0.0	0.0	0.0	0.0
	Static Truck	1	205	50	0.0398	0.00672	2.0	407.8	0.3	68.9
	Fuel, Helicopter Support Truck	1	52	50	0.0398	0.00672	2.0	103.4	0.3	17.5
	Low Boy Truck & Trailer	1	205	50	0.0398	0.00672	2.0	407.8	0.3	68.9
	Personal Vehicles	32	205	50	0.0042	0.00071	6.7	1376.0	1.1	232.5
							33.2	*6502.9*	*5.6*	*1099.0*
Guard Structure Removal	3/4 Ton Pick-up Truck, 4X4	2	4	100	0.0042	0.00071	0.8	3.4	0.1	0.6
	1 Ton Crew Cab Flat Bed, 4X4	2	4	100	0.0042	0.00071	0.8	3.4	0.1	0.6
	Extendable Flat Bed Pole Truck	2	4	100	0.0398	0.00672	8.0	31.8	1.3	5.4
	Personal Vehicles	6	4	50	0.0042	0.00071	1.3	5.0	0.2	0.9
							10.9	*43.6*	*1.8*	*7.4*
Restoration	1 Ton Crew Cab 4X4	2	36	100	0.0042	0.00071	0.8	30.2	0.1	5.1
	Water Truck	1	36	100	0.0398	0.00672	4.0	143.2	0.7	24.2
	Lowboy Truck/Trailer	1	36	50	0.0398	0.00672	2.0	71.6	0.3	12.1
	Personal Vehicles	7	36	50	0.0042	0.00071	1.5	52.9	0.2	8.9
							8.3	*297.9*	*1.4*	*50.3*
						Total	**200.5**	**23581.1**	**33.9**	**3985.2**

Eldorado-Ivanpah 220kV Construction
Helicopter Emission Factors

Emissions lbs/hour					
ROG	CO	NOX	SOX	PM	CO2
1.400	9.994	12.794	0.957	1.595	2831.000

***Assumed a helicopter with 2 GE T58-S engines, used Table 5-7 in "Procedures for Emission Inventory Preparation, Volume IV: Mobile Sources, EPA420-R-92-009, December 1992"
***Assumed 50% power usage for entire period of operation, 14.77 lb/min fuel flow (886 lbs/hr)
***Assumed all of the helicopter emissions were released within the mixing layer

CO2 from: Energy Information Administration, Documentation for Emissions of Greenhouse Gases in the United States 2005, DOE/EIA-0638 (2005), October 2007, Tables 6-1, 6-2, 6-4, and 6-5.
http://www.eia.doe.gov/oiaf/1605/excel/Fuel%20Emission%20Factors.xls

21.09	lb/gal	Jet fuel CO2 emission factor
6.5	lb/gal	assumed density of jet fuel
134.2424	gal/hr	
2831.173	lbs/hr	CO2 emission rate

Eldorado-Ivanpah 220kV Construction

On Site Equipment Exhaust Emissions

From SCAQMD offroad emission factors file name "offroadEF_07_25.xls" 2010

Activity	Equipment	Number	Hours per Day	Days of Activity	2010 Emission Factor (lbs/hr)												Total Activity Emissions (lbs)					
					ROG	CO	NOX	SOX	PM	CO2	CO	NOX	ROG	SOX	PM	CO2	ROG	CO	NOX	SOX	PM	CO2
Marshalling Yards	30 Ton Crane Truck	1	2	589	0.124	0.346	1.237	0.001	0.047	112	0.7	2.5	0.2	0.0	0.1	224	146	408	1457	1	55	132123
	10,000 lb Rough Terrain Fork Lift	1	5	589	0.074	0.331	0.554	0.001	0.034	56	1.7	2.8	0.4	0.0	0.2	280	217	974	1632	2	99	165080
											2.3	*5.2*	*0.6*	*0.0*	*0.3*	*505*	*364*	*1382*	*3089*	*3*	*155*	*297203*
Roads and Landing Work	Road Grader	1	4	101	0.176	0.493	1.790	0.002	0.066	172	2.0	7.2	0.7	0.0	0.3	688	71	199	723	1	27	69534
	Track Type Dozer	1	6	101	0.176	0.493	1.790	0.002	0.066	172	3.0	10.7	1.1	0.0	0.4	1033	107	299	1085	1	40	104301
	Drum Type Compactor	1	4	101	0.154	0.454	1.623	0.002	0.060	153	1.8	6.5	0.6	0.0	0.2	612	62	183	656	1	24	61848
	Backhoe	1	6	101	0.142	0.404	1.549	0.002	0.052	172	2.4	9.3	0.9	0.0	0.3	1030	86	245	939	1	32	104073
											9.2	*33.7*	*3.2*	*0.0*	*1.2*	*3364*	*326*	*926*	*3403*	*4*	*123*	*339755*
Guard Structure Installation	Compressor Trailer	1	6	4	0.101	0.335	0.598	0.001	0.055	47	2.0	3.6	0.6	0.0	0.3	282	2	8	14	0	1	1127
	Auger Truck	1	6	4	0.149	0.557	1.705	0.003	0.061	311	3.3	10.2	0.9	0.0	0.4	1868	4	13	41	0	1	7471
	80ft. Hydraulic Man-lift	1	4	4	0.151	0.580	1.920	0.002	0.060	213	2.3	7.7	0.6	0.0	0.2	851	2	9	31	0	1	3406
	30 Ton Crane Truck	1	8	4	0.124	0.346	1.237	0.001	0.047	112	2.8	9.9	1.0	0.0	0.4	897	4	11	40	0	2	3589
											10.4	*31.4*	*3.1*	*0.0*	*1.3*	*3898*	*12*	*42*	*126*	*0*	*5*	*15593*
Remove Existing Conductor & OHGW	80ft. Hydraulic Man-lift	3	8	71	0.151	0.580	1.920	0.002	0.060	213	13.9	46.1	3.6	0.1	1.4	5109	257	988	3271	4	102	362707
	Sleeving Truck	1	4	71	0.124	0.346	1.237	0.001	0.047	112	1.4	4.9	0.5	0.0	0.2	449	35	98	351	0	13	31853
	30 Ton Crane Truck	1	4	71	0.124	0.346	1.237	0.001	0.047	112	1.4	4.9	0.5	0.0	0.2	449	35	98	351	0	13	31853
	Bull Wheel Puller	1	4	48	0.171	0.607	1.982	0.002	0.068	254	2.4	7.9	0.7	0.0	0.3	1017	33	116	381	0	13	48814
	Hydraulic Rewind Puller	1	4	48	0.117	0.590	0.993	0.001	0.054	107	2.4	4.0	0.5	0.0	0.2	426	22	113	191	0	10	20451
											21.5	*67.9*	*5.8*	*0.1*	*2.3*	*7449*	*382*	*1415*	*4545*	*5*	*152*	*495678*
Remove Existing Structures	80 Ton Rough Terrain Crane	1	8	40	0.124	0.346	1.237	0.001	0.047	112	2.8	9.9	1.0	0.0	0.4	897	40	111	396	0	15	35891
	30 Ton Crane Truck	2	6	75	0.124	0.346	1.237	0.001	0.047	112	4.2	14.8	1.5	0.0	0.6	1346	112	312	1114	1	42	100943
	Compressor Trailer	2	8	40	0.101	0.335	0.598	0.001	0.055	47	5.4	9.6	1.6	0.0	0.9	751	65	214	383	0	35	30048
	Rough Terrain Forklift	1	4	35	0.074	0.331	0.554	0.001	0.034	56	1.3	2.2	0.3	0.0	0.1	224	10	46	78	0	5	7848
											13.6	*36.5*	*4.4*	*0.0*	*1.9*	*3219*	*227*	*683*	*1969*	*2*	*97*	*174730*
Remove Existing Foundations	Backhoe	2	8	67	0.142	0.404	1.549	0.002	0.052	172	6.5	24.8	2.3	0.0	0.8	2748	152	433	1661	2	56	184102
	Compressor Trailer	2	8	67	0.101	0.335	0.598	0.001	0.055	47	5.4	9.6	1.6	0.0	0.9	751	109	359	641	1	58	50331
											11.8	*34.4*	*3.9*	*0.0*	*1.7*	*3499*	*261*	*792*	*2302*	*3*	*115*	*234433*
Remove Existing Wood Poles	30 Ton Crane Truck	2	8	7	0.124	0.346	1.237	0.001	0.047	112	5.5	19.8	2.0	0.0	0.8	1795	14	39	139	0	5	12562
Install LST Foundaions	30 Ton Crane Truck	2	5	144	0.124	0.346	1.237	0.001	0.047	112	3.5	12.4	1.2	0.0	0.5	1122	179	499	1782	2	68	161509
	Backhoe	2	8	144	0.122	0.588	0.965	0.001	0.056	101	9.4	15.4	1.9	0.0	0.9	1622	280	1355	2222	3	129	233595
	Auger Truck	2	8	144	0.149	0.557	1.705	0.003	0.061	311	8.9	27.3	2.4	0.0	1.0	4981	343	1282	3929	7	141	717255
											21.8	*55.1*	*5.6*	*0.1*	*2.4*	*7725*	*802*	*3136*	*7933*	*11*	*339*	*1112359*
LST Steel Haul	10,000 lb Rough Terrain Fork Lift	2	6	108	0.074	0.331	0.554	0.001	0.034	56	4.0	6.6	0.9	0.0	0.4	673	96	428	718	1	44	72646
LST Assembly	30 Ton Crane Truck	6	8	144	0.124	0.346	1.237	0.001	0.047	112	16.6	59.4	6.0	0.1	2.3	5384	859	2394	8552	9	325	775242
	Compressor Trailer	6	6	144	0.123	0.341	1.398	0.001	0.046	131	12.3	50.3	4.4	0.1	1.7	4724	635	1769	7249	8	239	680244
											28.9	*109.7*	*10.4*	*0.1*	*3.9*	*10108*	*1494*	*4163*	*15801*	*16*	*564*	*1455486*
LST Erection	Compressor Trailer	2	6	108	0.101	0.335	0.598	0.001	0.055	47	4.0	7.2	1.2	0.0	0.7	563	131	434	775	1	71	60847
	80 Ton Rough Terrain Crane	2	6	108	0.124	0.346	1.237	0.001	0.047	112	4.2	14.8	1.5	0.0	0.6	1346	161	449	1603	2	61	145358
											8.2	*22.0*	*2.7*	*0.0*	*1.2*	*1909*	*292*	*883*	*2378*	*2*	*132*	*206205*
Install Tubular Steel Foundations	30 Ton Crane Truck	1	5	42	0.124	0.346	1.237	0.001	0.047	112	1.7	6.2	0.6	0.0	0.2	561	26	73	260	0	10	23553
	Backhoe/Front Loader	1	8	42	0.122	0.588	0.965	0.001	0.056	101	4.7	7.7	1.0	0.0	0.4	811	41	198	324	0	19	34066
	Auger Truck	1	8	42	0.149	0.557	1.705	0.003	0.061	311	4.5	13.6	1.2	0.0	0.5	2490	50	187	573	1	21	104600
											10.9	*27.5*	*2.8*	*0.0*	*1.2*	*3862*	*117*	*457*	*1157*	*2*	*49*	*162219*
Tubular Steel H-Frame Haul	80 Ton Rough Terrain Crane	1	6	21	0.124	0.346	1.237	0.001	0.047	112	2.1	7.4	0.7	0.0	0.3	673	16	44	156	0	6	14132
Tubular Steel H-Frame Assembly	Compressor Trailer	1	5	42	0.101	0.335	0.598	0.001	0.055	47	1.7	3.0	0.5	0.0	0.3	235	21	70	126	0	11	9860
	80 Ton Rough Terrain Crane	1	6	42	0.124	0.346	1.237	0.001	0.047	112	2.1	7.4	0.7	0.0	0.3	673	31	87	312	0	12	28264
											3.8	*10.4*	*1.3*	*0.0*	*0.6*	*908*	*53*	*158*	*437*	*0*	*23*	*38124*
Tubular Steel H-Frame Erection	Compressor Trailer	1	5	42	0.101	0.335	0.598	0.001	0.055	47	1.7	3.0	0.5	0.0	0.3	235	21	70	126	0	11	9860
	80 Ton Rough Terrain Crane	1	6	42	0.124	0.346	1.237	0.001	0.047	112	2.1	7.4	0.7	0.0	0.3	673	31	87	312	0	12	28264
											3.8	*10.4*	*1.3*	*0.0*	*0.6*	*908*	*53*	*158*	*437*	*0*	*23*	*38124*
Install Conductor & OPGW	30 Ton Manitex	4	6	205	0.124	0.346	1.237	0.001	0.047	112	8.3	29.7	3.0	0.0	1.1	2692	612	1704	6087	6	231	551822
	22 Ton Manitex	1	8	205	0.124	0.346	1.237	0.001	0.047	112	2.8	9.9	1.0	0.0	0.4	897	204	568	2029	2	77	183941
	Splicing Rig	2	2	205	0.171	0.607	1.982	0.002	0.068	254	2.4	7.9	0.7	0.0	0.3	1017	140	498	1625	2	56	208476
	Splicing Lab	2	2	48	0.171	0.607	1.982	0.002	0.068	254	2.4	7.9	0.7	0.0	0.3	1017	33	116	381	0	13	48814
	20,000 lb. Rough Terrain Fork Lift	1	2	205	0.065	0.171	0.716	0.001	0.023	77	0.3	1.4	0.1	0.0	0.0	154	27	70	294	0	9	31620
	580 Case Backhoe	1	2	205	0.091	0.362	0.566	0.001	0.052	52	0.7	1.1	0.2	0.0	0.1	103	37	149	232	0	21	21208
	Spacing Cart	3	8	51	0.012	0.062	0.074	0.000	0.003	10	1.5	1.8	0.3	0.0	0.1	243	14	76	90	0	4	12371
	Static Tensioner	1	2	205	0.171	0.607	1.982	0.002	0.068	254	1.2	4.0	0.3	0.0	0.1	508	70	249	813	1	28	104238
	3 Drum Straw line Puller	2	4	205	0.171	0.607	1.982	0.002	0.068	254	4.9	15.9	1.4	0.0	0.5	2034	280	995	3251	4	111	416951
	30-ton puller	1	3	205	0.171	0.607	1.982	0.002	0.068	254	1.8	5.9	0.5	0.0	0.2	763	105	373	1219	2	42	156357
	Sag Cat w2 winch	2	2	205	0.205	0.574	1.944	0.002	0.078	166	2.3	7.8	0.8	0.0	0.3	665	168	471	1594	2	64	136228
	D8 Cat	4	1	205	0.205	0.574	1.944	0.002	0.078	166	2.3	7.8	0.8	0.0	0.3	665	168	471	1594	2	64	136228
	Hughes 500 E Helicopter	1	6	52	1.400	9.994	12.794	0.957	1.595	2831	60.0	76.8	8.4	5.7	9.6	16986	437	3118	3992	299	498	883272
											90.9	*177.9*	*18.2*	*5.9*	*13.3*	*27743*	*2294*	*8857*	*23200*	*320*	*1218*	*2891524*
Guard Structure Removal	Compressor Trailer	2	6	4	0.101	0.335	0.598	0.001	0.055	47	4.0	7.2	1.2	0.0	0.7	563	5	16	29	0	3	2254
	80ft. Hydraulic Man-lift	1	4	4	0.151	0.580	1.920	0.002	0.060	213	2.3	7.7	0.6	0.0	0.2	851	2	9	31	0	1	3406
	30 Ton Crane Truck	1	8	4	0.124	0.346	1.237	0.001	0.047	112	2.8	9.9	1.0	0.0	0.4	897	4	11	40	0	2	3589
											9.1	*24.7*	*2.8*	*0.0*	*1.3*	*2312*	*11*	*36*	*99*	*0*	*5*	*9248*
Restoration	Road Grader	1	6	36	0.176	0.493	1.790	0.002	0.066	172	3.0	10.7	1.1	0.0	0.4	1033	38	107	387	0	14	37176
	Backhoe	1	6	36	0.142	0.404	1.549	0.002	0.052	172	2.4	9.3	0.9	0.0	0.3	1030	31	87	335	0	11	37095
	Front End Loader	1	6	36	0.142	0.404	1.549	0.002	0.052	172	2.4	9.3	0.9	0.0	0.3	1030	31	87	335	0	11	37095
	Track Type Dozer	1	6	36	0.176	0.493	1.790	0.002	0.066	172	3.0	10.7	1.1	0.0	0.4	1033	38	107	387	0	14	37176
	Drum Type Compactor	1	6	36	0.154	0.454	1.623	0.002	0.060	153	2.7	9.7	0.9	0.0	0.4	919	33	98	351	0	13	33067
											13.5	*49.8*	*4.7*	*0.1*	*1.8*	*5045*	*171*	*486*	*1793*	*2*	*64*	*181611*

Eldorado-Ivanpah 220kV Construction
Exhaust, Tire and Brake Emissions

From SCAQMD file "onroadEF07_26.xls"
Used 2010 Table

	Vehicles <8500 lbs (lbs/mile)	Vehicles >8500 lbs (lbs/mile)	Vehicles >33000 lbs (lbs/mile)
CO	0.00826	0.01844	0.01195
NOx	0.00092	0.02062	0.03822
ROG	0.00091	0.00259	0.00304
SOx	0.00001	0.00003	0.00004
PM10	0.00009	0.00075	0.00183
PM2.5	0.00005	0.00064	0.00160
CO2	1.0957	2.7322	4.2112

					Emission Factor (lb/VMT)							Emissions (lbs/day)							Activity Emissions (lbs)						
Activity	Equipment	Number	Days	VMT/day	CO	NOx	ROG	SOx	PM10	PM2.5	CO2	CO	NOx	ROG	SOx	PM10	PM2.5	CO2	CO	NOx	ROG	SOx	PM10	PM2.5	CO2
Survey	1/2 Ton Pick-up Truck, 4X5	2	36	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	1.65	0.18	0.18	0.00	0.02	0.01	219	59.49	6.61	6.58	0.08	0.63	0.39	7889
	Personal Vehicles	4	36	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	1.65	0.18	0.18	0.00	0.02	0.01	219	59.49	6.61	6.58	0.08	0.63	0.39	7889
												3.31	*0.37*	*0.37*	*0.00*	*0.03*	*0.02*	*438*	*118.98*	*13.22*	*13.16*	*0.16*	*1.25*	*0.79*	*15778*
Marshalling Yards	2 Ton Crew Cab 4X4	1	589	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	0.83	0.09	0.09	0.00	0.01	0.01	110	486.68	54.08	53.83	0.63	5.12	3.23	64536
	Truck, Semi, Tractor	1	589	50	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	0.92	1.03	0.13	0.00	0.04	0.03	137	542.99	607.39	76.26	0.80	22.12	18.92	80464
	Personal Vehicles	4	589	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	1.65	0.18	0.18	0.00	0.02	0.01	219	973.35	108.16	107.67	1.27	10.25	6.45	129071
												3.40	*1.31*	*0.40*	*0.00*	*0.06*	*0.05*	*465*	*2003.02*	*769.63*	*237.76*	*2.70*	*37.49*	*28.60*	*274071*
Roads and Landing Work	2 Ton Crew Cab 4X4	2	101	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	1.65	0.18	0.18	0.00	0.02	0.01	219	166.91	18.55	18.46	0.22	1.76	1.11	22133
	Water Trucks	2	589	100	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	3.69	4.12	0.52	0.01	0.15	0.13	546	2171.95	2429.58	305.05	3.18	88.49	75.67	321856
	Lowboy Trk/Trlr	1	51	50	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	0.92	1.03	0.13	0.00	0.04	0.03	137	47.02	52.59	6.60	0.07	1.92	1.64	6967
	Personal Vehicles	5	101	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	2.07	0.23	0.23	0.00	0.02	0.01	274	208.63	23.18	23.08	0.27	2.20	1.38	27666
												8.33	*5.57*	*1.06*	*0.01*	*0.23*	*0.19*	*1176*	*2594.51*	*2523.90*	*353.20*	*3.74*	*94.36*	*79.79*	*378622*
Guard Structure Installation	3/4 Ton Pick-up Truck, 4X5	2	4	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	1.65	0.18	0.18	0.00	0.02	0.01	219	6.61	0.73	0.73	0.01	0.07	0.04	877
	2 Ton Crew Cab Flat Bed, 4X4	1	4	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	0.41	0.05	0.05	0.00	0.00	0.00	55	1.65	0.18	0.18	0.00	0.02	0.01	219
	Extendable Flat Bed Pole Truck	1	4	50	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	0.92	1.03	0.13	0.00	0.04	0.03	137	3.69	4.12	0.52	0.01	0.15	0.13	546
	Personal Vehicles	6	4	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	2.48	0.28	0.27	0.00	0.03	0.02	329	9.92	1.10	1.10	0.01	0.10	0.07	1315
												5.47	*1.54*	*0.63*	*0.01*	*0.09*	*0.06*	*739*	*21.87*	*6.14*	*2.53*	*0.03*	*0.34*	*0.25*	*2957*
Remove Existing Conductor & OHGW	2 Ton Crew Cab 4X4	4	71	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	3.31	0.37	0.37	0.00	0.03	0.02	438	234.66	26.08	25.96	0.31	2.47	1.56	31117
	Truck, Semi, Tractor	1	64	50	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	0.92	1.03	0.13	0.00	0.04	0.03	137	59.00	66.00	8.29	0.09	2.40	2.06	8743
	Personal Vehicles	14	64	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	5.78	0.64	0.64	0.01	0.06	0.04	767	370.17	41.13	40.95	0.48	3.90	2.45	49087
												10.01	*2.04*	*1.13*	*0.01*	*0.13*	*0.09*	*1342*	*663.83*	*133.21*	*75.19*	*0.88*	*8.77*	*6.07*	*88947*
Remove Existing Towers	2 Ton Crew Cab, 4X4	2	75	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	1.65	0.18	0.18	0.00	0.02	0.01	219	123.94	13.77	13.71	0.16	1.30	0.82	16435
	Flat Bed Truck & Trailer	1	35	100	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	1.84	2.06	0.26	0.00	0.08	0.06	273	64.53	72.19	9.06	0.09	2.63	2.25	9563
	Personal Vehicles	6	75	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	2.48	0.28	0.27	0.00	0.03	0.02	329	185.91	20.66	20.56	0.24	1.96	1.23	24653
												5.98	*2.52*	*0.72*	*0.01*	*0.12*	*0.09*	*821*	*374.39*	*106.62*	*43.34*	*0.50*	*5.89*	*4.30*	*50651*
Remove Existing Foundations	Dump Truck	2	67	100	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	3.69	4.12	0.52	0.01	0.15	0.13	546	247.06	276.37	34.70	0.36	10.07	8.61	36612
	2 Ton Crew Cab Flat Bed, 4X4	1	67	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	0.83	0.09	0.09	0.00	0.01	0.01	110	55.36	6.15	6.12	0.07	0.58	0.37	7341
	Personal Vehicles	8	67	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	3.31	0.37	0.37	0.00	0.03	0.02	438	221.44	24.61	24.49	0.29	2.33	1.47	29364
												7.82	*4.58*	*0.97*	*0.01*	*0.19*	*0.16*	*1094*	*523.87*	*307.13*	*65.32*	*0.72*	*12.98*	*10.44*	*73317*
Remove Existing Wood Poles	3/4 Ton Pick-up Truck, 4X5	2	7	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	1.65	0.18	0.18	0.00	0.02	0.01	219	11.57	1.29	1.28	0.02	0.12	0.08	1534
	2 Ton Crew Cab Flat Bed, 4X4	2	7	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	1.65	0.18	0.18	0.00	0.02	0.01	219	11.57	1.29	1.28	0.02	0.12	0.08	1534
	Extendable Flat Bed Pole Truck	2	7	100	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	3.69	4.12	0.52	0.01	0.15	0.13	546	25.81	28.87	3.63	0.04	1.05	0.90	3825
	Personal Vehicles	6	7	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	2.48	0.28	0.27	0.00	0.03	0.02	329	17.35	1.93	1.92	0.02	0.18	0.12	2301
												9.47	*4.77*	*1.16*	*0.01*	*0.21*	*0.17*	*1313*	*66.30*	*33.37*	*8.10*	*0.09*	*1.48*	*1.17*	*9194*
Install LST Foundaions	2 Ton Crew Cab Flat Bed, 4X4	2	144	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	1.65	0.18	0.18	0.00	0.02	0.01	219	237.97	26.44	26.32	0.31	2.50	1.58	31556
	Dump Truck	2	144	100	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	3.69	4.12	0.52	0.01	0.15	0.13	546	531.00	593.99	74.58	0.78	21.63	18.50	78688
	4001 gallon Water Trucks	1	144	100	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	1.84	2.06	0.26	0.00	0.08	0.06	273	265.50	296.99	37.29	0.39	10.82	9.25	39344
	11 cu.yd. Concrete Mixer Trucks	3	144	100	0.01195	0.03822	0.00304	0.00004	0.00183	0.00160	4.21121	3.59	11.47	0.91	0.01	0.55	0.48	1263	516.44	1651.15	131.40	1.78	79.08	69.16	181924
	Personal Vehicles	18	144	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	7.44	0.83	0.82	0.01	0.08	0.05	986	1070.85	118.99	118.45	1.40	11.27	7.10	142000
												18.21	*18.66*	*2.69*	*0.03*	*0.87*	*0.73*	*3288*	*2621.76*	*2687.56*	*388.04*	*4.66*	*125.31*	*105.58*	*473512*
LST Steel Haul	2 Ton Crew Cab Flat Bed, 4X4	4	108	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	3.31	0.37	0.37	0.00	0.03	0.02	438	356.95	39.66	39.48	0.47	3.76	2.37	47333
	40' Flat Bed Truck & Trailer	2	108	100	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	3.69	4.12	0.52	0.01	0.15	0.13	546	398.25	445.49	55.93	0.58	16.23	13.87	59016
	Personal Vehicles	8	108	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	3.31	0.37	0.37	0.00	0.03	0.02	438	356.95	39.66	39.48	0.47	3.76	2.37	47333
												10.30	*4.86*	*1.25*	*0.01*	*0.22*	*0.17*	*1423*	*1112.16*	*524.82*	*134.90*	*1.51*	*23.74*	*18.61*	*153683*
LST Assembly	3/4 Ton Pick-up Truck, 4X5	4	144	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	3.31	0.37	0.37	0.00	0.03	0.02	438	475.93	52.88	52.65	0.62	5.01	3.16	63111
	2 Ton Crew Cab Flat Bed, 4X	6	144	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	4.96	0.55	0.55	0.01	0.05	0.03	657	713.90	79.33	78.97	0.93	7.51	4.73	94667
	Personal Vehicles	2	144	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	0.83	0.09	0.09	0.00	0.01	0.01	110	118.98	13.22	13.16	0.16	1.25	0.79	15778
												9.09	*1.01*	*1.01*	*0.01*	*0.10*	*0.06*	*1205*	*1308.82*	*145.43*	*144.78*	*1.71*	*13.78*	*8.68*	*173556*
LST Erection	3/4 Ton Pick-up Truck, 4X5	4	108	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	3.31	0.37	0.37	0.00	0.03	0.02	438	356.95	39.66	39.48	0.47	3.76	2.37	47333
	2 Ton Crew Cab Flat Bed, 4X	4	108	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	3.31	0.37	0.37	0.00	0.03	0.02	438	356.95	39.66	39.48	0.47	3.76	2.37	47333
	Personal Vehicles	16	108	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	4.00000	6.61	0.73	0.73	0.01	0.07	0.04	3200	713.90	79.33	78.97	0.93	7.51	4.73	345600
												13.22	*1.47*	*1.46*	*0.02*	*0.14*	*0.09*	*4077*	*1427.80*	*158.65*	*157.94*	*1.86*	*15.03*	*9.47*	*440267*
Install Tubular Steel Foundations	2 Ton Crew Cab Flat Bed, 4X	3	42	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	1.24	0.14	0.14	0.00	0.01	0.01	164	52.06	5.78	5.76	0.07	0.55	0.35	6903
	10-cu. Yd. Dump Truck	2	42	100	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	3.69	4.12	0.52	0.01	0.15	0.13	546	154.88	173.25	21.75	0.23	6.31	5.40	22951
	4001 gallon Water Truck	1	42	100	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	1.84	2.06	0.26	0.00	0.08	0.06	273	77.44	86.62	10.88	0.11	3.16	2.70	11475
	11 cu. Yd. Concrete Mixer Tr	3	42	100	0.01195	0.03822	0.00304	0.00004	0.00183	0.00160	4.21121	3.59	11.47	0.91	0.01	0.55	0.48	1263	150.63	481.58	38.32	0.52	23.07	20.17	53061
	Personal Vehicles	7	42	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	2.89	0.32	0.32	0.00	0.03	0.02	383	121.46	13.50	13.44	0.16	1.28	0.81	16107
												13.25	*18.11*	*2.15*	*0.03*	*0.82*	*0.70*	*2631*	*556.46*	*760.74*	*90.15*	*1.09*	*34.36*	*29.41*	*110497*
Tubular Steel H-Frame Haul	3/4 Ton Pick-up Truck, 4X5	2	21	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	1.65	0.18	0.18	0.00	0.02	0.01	219	34.70	3.86	3.84	0.05	0.37	0.23	4602
	40' Flat Bed Truck & Trailer	2	21	100	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	3.69	4.12	0.52	0.01	0.15	0.13	546	77.44	86.62	10.88	0.11	3.16	2.70	11475
	Personal Vehicles	4	21	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	1.65	0.18	0.18	0.00	0.02	0.01	219	34.70	3.86	3.84	0.05	0.37	0.23	4602
												6.99	*4.49*	*0.88*	*0.01*	*0.19*	*0.15*	*985*	*146.85*	*94.34*	*18.55*	*0.20*	*3.89*	*3.16*	*20679*
Tubular Steel H-Frame Assembly	3/4 Ton Pick-up Truck, 4X5	2	42	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	1.65	0.18	0.18	0.00	0.02	0.01	219	69.41	7.71	7.68	0.09	0.73	0.46	9204
	2 Ton Crew Cab Flat Bed, 4X	2	42	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	1.65	0.18	0.18	0.00	0.02	0.01	219	69.41	7.71	7.68	0.09	0.73	0.46	9204
	Personal Vehicles	8	42	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	3.31	0.37	0.37	0.00	0.03	0.02	438	138.81	15.42	15.36	0.18	1.46	0.92	18407
												6.61	*0.73*	*0.73*	*0.01*	*0.07*	*0.04*	*877*	*277.63*	*30.85*	*30.71*	*0.36*	*2.92*	*1.84*	*36815*
Tubular Steel H-Frame Erection	3/4 Ton Pick-up Truck, 4X5	2	42	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	1.65	0.18	0.18	0.00	0.02	0.01	219	69.41	7.71	7.68	0.09	0.73	0.46	9204
	2 Ton Crew Cab Flat Bed, 4X	2	42	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	1.65	0.18	0.18	0.00	0.02	0.01	219	69.41	7.71	7.68	0.09	0.73	0.46	9204
	Personal Vehicles	8	42	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	3.31	0.37	0.37	0.00	0.03	0.02	438	138.81	15.42	15.36	0.18	1.46	0.92	18407
												6.61	*0.73*	*0.73*	*0.01*	*0.07*	*0.04*	*877*	*277.63*	*30.85*	*30.71*	*0.36*	*2.92*	*1.84*	*36815*
Install Conductor & OPGW	2 Ton Crew Cab Flat Bed, 4X	5	205	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	4.13	0.46	0.46	0.01	0.04	0.03	548	846.93	94.11	93.68	1.10	8.92	5.62	112307
	Wire Truck & Trailer	6	205	50	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	5.53	6.19	0.78	0.01	0.23	0.19	820	1133.92	1268.41	159.26	1.66	46.20	39.50	168032
	Dump Truck (Trash)	1	205	100	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	1.84	2.06	0.26	0.00	0.08	0.06	273	377.97	422.80	53.09	0.55	15.40	13.17	56011
	3/4 Ton Pick-up Truck, 4X5	6	205	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	4.96	0.55	0.55	0.01	0.05	0.03	657	1016.32	112.93	112.42	1.33	10.70	6.74	134769
	Pole Truck & Trailer	0	0	50	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0
	Static Truck	1	205	50	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	0.92	1.03	0.13	0.00	0.04	0.03	137	188.99	211.40	26.54	0.28	7.70	6.58	28005
	Fuel, Helicopter Support Tru	1	52	50	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	0.92	1.03	0.13	0.00	0.04	0.03	137	47.94	53.62	6.73	0.07	1.95	1.67	7104
	Low Boy Truck & Trailer	1	205	50	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	0.92	1.03	0.13	0.00	0.04	0.03	137	188.99	211.40	26.54	0.28	7.70	6.58	28005
	Personal Vehicles	32	205	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	13.22	1.47	1.46	0.02	0.14	0.09	1753	2710.18	301.15	299.79	3.53	28.53	17.97	359384
												32.45	*13.82*	*3.89*	*0.04*	*0.65*	*0.50*	*4461*	*6511.23*	*2675.84*	*778.06*	*8.80*	*127.10*	*97.83*	*893617*
Guard Structure Removal	3/4 Ton Pick-up Truck, 4X5	2	4	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	1.65	0.18	0.18	0.00	0.02	0.01	219	6.61	0.73	0.73	0.01	0.07	0.04	877
	2 Ton Crew Cab Flat Bed, 4X	2	4	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	1.65	0.18	0.18	0.00	0.02	0.01	219	6.61	0.73	0.73	0.01	0.07	0.04	877
	Extendable Flat Bed Pole Tru	2	4	100	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	3.69	4.12	0.52	0.01	0.15	0.13	546	14.75	16.50	2.07	0.02	0.60	0.51	2186
	Personal Vehicles	6	4	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	2.48	0.28	0.27	0.00	0.03	0.02	329	9.92	1.10	1.10	0.01	0.10	0.07	1315
												9.47	*4.77*	*1.16*	*0.01*	*0.21*	*0.17*	*1313*	*37.89*	*19.07*	*4.63*	*0.05*	*0.84*	*0.67*	*5254*
Restoration	2 Ton Crew Cab 4X4	2	36	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	1.65	0.18	0.18	0.00	0.02	0.01	219	59.49	6.61	6.58	0.08	0.63	0.39	7889
	Water Truck	1	36	100	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	1.84	2.06	0.26	0.00	0.08	0.06	273	66.38	74.25	9.32	0.10	2.70	2.31	9836
	Lowboy Truck/Trailer	1	36	50	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	0.92	1.03	0.13	0.00	0.04	0.03	137	33.19	37.12	4.66	0.05	1.35	1.16	4918
	Personal Vehicles	7	36	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	2.89	0.32	0.32	0.00	0.03	0.02	383	104.11	11.57	11.52	0.14	1.10	0.69	13806
												7.31	*3.60*	*0.89*	*0.01*	*0.16*	*0.13*	*1012*	*263.17*	*129.55*	*32.08*	*0.36*	*5.78*	*4.55*	*36449*

Eldorado-Ivanpah 115kV Construction
Emission Summary

Activity Emissions	Emissions (lbs)						
	CO	NOx	ROG	SOx	PM10	PM2.5	CO2
Combustion Related Emissions							
Survey							
On-Road Vehicles	2	0.3	0.3	0.003	0.026	0.016	329
Roads and Landing Work							
On-Road Vehicles	149	147	20	0.2	5	5	21727
Off-Road Vehicles and Equipment	41	151	14	0.2	5	5	15098
Remove Existing Conductor							
On-Road Vehicles	18	8	2	0.02	0.4	0.3	2463
Off-Road Vehicles and Equipment	33	80	10	0.08	5	4	6964
Remove Existing Foundations							
On-Road Vehicles	9	5	1	0.01	0.20	0.16	1204
Off-Road Vehicles and Equipment	18	59	6	0.1	3	2	6247
Install TSP Foundaions							
On-Road Vehicles	26	36	4	0.1	2	1	5262
Off-Road Vehicles and Equipment	22	55	6	0.1	2	2	7725
TSP Steel Haul							
On-Road Vehicles	28	18	4	0.04	0.7	0.6	3939
Off-Road Vehicles and Equipment	8	30	3	0.03	1	1	2692
TSP Assembly							
On-Road Vehicles	53	6	6	0.07	1	0.4	7012
Off-Road Vehicles and Equipment	30	115	11	0.12	4	3	10632
TSP Erection							
On-Road Vehicles	53	6	6	0.07	1	0.4	9906
Off-Road Vehicles and Equipment	30	83	10	0.08	4	4	7262
Install Conductor							
On-Road Vehicles	15	6	2	0.02	0.3	0.2	2107
Off-Road Vehicles and Equipment	6	22	2	0.03	0.8	0.7	2423
Restoration							
On-Road Vehicles	7	5	1	0.01	0.2	0.2	1040
Off-Road Vehicles and Equipment	13	50	5	0.06	2	2	5045
Fugitive Dust Emissions							
Paved Roads	-	-	-	-	489	83	-
Unpaved Roads	-	-	-	-	4594	974	-
Construction Activities	-	-	-	-	73	37	-

Total Activity Emissions (tons)	0.28	0.44	0.057	0.0006	2.6	0.56	60
Total California Activity Emissions (tons)	0.28	0.44	0.057	0.0006	2.6	0.56	60
Construction Days	34	34	34	34	34	34	34
Average Daily Emissions (lbs)	17	26	3.3	0.036	153	33	3502

Eldorado-Ivanpah 115kV Construction

Workforce Estimate

Work Activity						Activity Production	
Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Workforce	Estimated Schedule (Days)	Estimated Average Duration of Use (Hrs/Day)	Estimated Production Per Day
Survey (1)				**4**	**1**		**1.0 Mile**
1/2-ton pick-up truck, 4x4	200	Gas	2		1	8	1 mile/day
Roads and Landing Work (2)				**5**	**5**		**0. 5 Miles / 16 Pads**
1-ton crew cab, 4x4	300	Diesel	2		5	2	0.5 mile/day
Road grader	350	Diesel	1		5	4	and
Track type dozer	350	Diesel	1		5	6	4 structure pads/day
Drum type compactor	250	Diesel	1		5	4	
Water truck	350	Diesel	2		Duration	8	
Lowboy truck/trailer	500	Diesel	1		5	2	
Backhoe/front loader	350	Diesel	1		5	6	
Remove Existing H-Frame Poles (3)				**6**	**3**		**7 Steel Poles**
1-ton crew cab, 4x4	300	Diesel	2		3	5	
30-ton crane truck	300	Diesel	2		3	6	
Compressor trailer	120	Diesel	2		3	8	
Flat bed truck/trailer	350	Diesel	1		3	8	
10,000-lb rough terrain forklift	200	Diesel	1		3	4	3 poles/day
Remove Existing H-Frame Foundations (4)				**4**	**2**		**7 Steel Poles**
1-ton crew cab flat bed, 4x4	300	Diesel	1		2	8	4 grillage
10-cubic yard dump truck	350	Diesel	1		2	8	foundations/ day
Compressor trailer	120	Diesel	1		2	8	
Backhoe/front loader	350	Diesel	1		2	8	
Install Tubular Steel Pole Foundations (5)				**7**	**2**		**4 TSPs**
1-ton crew cab flat bed, 4x4	300	Diesel	3		2	2	
30-ton crane truck	300	Diesel	1		2	5	
Backhoe/front loader	200	Diesel	1		2	8	
Auger truck	500	Diesel	1		2	8	
10-cubic yard dump truck	350	Diesel	2		2	8	
Water truck	350	Diesel	1		2	8	
10-cubic yard concrete mixer truck	425	Diesel	3		2	3	2 TSPs/day
Tubular Steel Pole/ Light Weight Steel H-Frame Haul (6)				**4**	**4**		**16 Steel Poles**
3/4-ton pick-up truck, 4x4	300	Diesel	2		4	5	
40-foot flat bed truck/trailer	350	Diesel	2		4	8	
80-ton rough terrain crane	350	Diesel	1		4	6	4 steel poles/day
Tubular Steel Pole/ Light Weight Steel H-Frame Assembly (7)				**8**	**8**		**16 Steel Poles**
3/4-ton pick-up truck, 4x4	300	Diesel	2		8	5	
1-ton crew cab flat bed, 4x4	300	Diesel	2		8	5	
Compressor trailer	120	Diesel	1		8	5	
80-ton rough terrain crane	350	Diesel	1		8	6	2 steel poles/day
Tubular Steel Pole/ Light Weight Steel H-Frame Erection (8)				**8**	**8**		**16 Steel Poles**
3/4-ton pick-up truck, 4x4	300	Diesel	2		8	5	
1-ton crew cab flat bed, 4x4	300	Diesel	2		8	5	
Compressor trailer	120	Diesel	1		8	5	
80-Ton Rough Terrain Crane	350	Diesel	1		8	6	2 steel poles/day
Install Conductor (9)				**16**	**1**		**0.15 Circuit Mile**
3/4-ton pick-up truck, 4x4	300	Diesel	3		1	8	
1-ton crew cab flat bed, 4x4	300	Diesel	2		1	8	
Wire truck/trailer	350	Diesel	2		1	2	
Dump truck (trash)	350	Diesel	1		1	2	
22-ton Manitex	350	Diesel	1		1	8	
Splicing rig	350	Diesel	1		1	2	
3 drum straw line puller	300	Diesel	1		1	4	
Lowboy truck/trailer	500	Diesel	1		1	2	0.35 mile/day
Restoration (10)				**7**	**1**		**1.0 Mile**
1-ton crew cab, 4x4	300	Diesel	2		1	2	
Road grader	350	Diesel	1		1	6	
Backhoe	350	Diesel	1		1	6	
Front end loader	350	Diesel	1		1	6	
Track type dozer	350	Diesel	1		1	6	
Drum type compactor	250	Diesel	1		1	6	
Water truck	350	Diesel	1		1	8	
Lowboy truck/trailer	500	Diesel	1		1	3	1 mile/day

Crew Size Assumptions:
#1 Survey = one 4-man crew
#2 Roads and Landing Work = one 5-man crew
#3 Remove Existing Lattice Steel H-Frame = one 6-man crew
#4 Remove Existing H-Frame Foundations = one 4-man crew
#5 Install Foundations for Tubular Steel Poles = one 7-man crew
#6 TSP/LWS H-Frame Haul = one 4-man crew
#7 TSP/LWS H-Frame Assembly = one 8-man crew
#8 TSP/LWS H-Frame Erection = one 8-man crew
#9 Conductor Installation = two 8-man crews
#10 Restoration = one 7-man crew

Eldorado-Ivanpah 115kV Construction

On Site Equipment Exhaust Emissions

From SCAQMD offroad emission factors file name "offroadEF_07_25.xls" 2010

Description	Number	Hours per Day	Days of Activity	2010 Emission Factor (lbs/hr)						Emissions (lbs/day)						Total Activity Emissions (lbs)					
				ROG	CO	NOX	SOX	PM	CO2	CO	NOX	ROG	SOX	PM	CO2	ROG	CO	NOX	SOX	PM	CO2
Roads and Landing Work																					
Road Grader	1	2	5	0.176	0.493	1.790	0.002	0.066	172	1.0	3.6	0.4	0.0	0.1	344	2	5	18	0	1	1721
Track Type Dozer	1	6	5	0.176	0.493	1.790	0.002	0.066	172	3.0	10.7	1.1	0.0	0.4	1033	5	15	54	0	2	5163
Drum Type Compactor	1	4	5	0.154	0.454	1.623	0.002	0.060	153	1.8	6.5	0.6	0.0	0.2	612	3	9	32	0	1	3062
Backhoe	1	6	5	0.142	0.404	1.549	0.002	0.052	172	2.4	9.3	0.9	0.0	0.3	1030	4	12	46	0	2	5152
										8.2	*30.1*	*2.9*	*0.0*	*1.1*	*3020*	*14*	*41*	*151*	*0*	*5*	*15098*
Remove Existing H Frame Poles																					
80 Ton Rough Terrain Crane	0	0	3	0.124	0.346	1.237	0.001	0.047	112	0.0	0.0	0.0	0.0	0.0	0	0	0	0	0	0	0
30 Ton Crane Truck	2	6	3	0.124	0.346	1.237	0.001	0.047	112	4.2	14.8	1.5	0.0	0.6	1346	4	12	45	0	2	4038
Compressor Trailer	2	8	3	0.101	0.335	0.598	0.001	0.055	47	5.4	9.6	1.6	0.0	0.9	751	5	16	29	0	3	2254
Rough Terrain Forklift	1	4	3	0.074	0.331	0.554	0.001	0.034	56	1.3	2.2	0.3	0.0	0.1	224	1	4	7	0	0	673
										10.8	*26.6*	*3.4*	*0.0*	*1.6*	*2321*	*10*	*33*	*80*	*0*	*5*	*6964*
Remove Existing Foundations																					
Compressor Trailer	1	8	2	0.101	0.335	0.598	0.001	0.055	47	2.7	4.8	0.8	0.0	0.4	376	2	5	10	0	1	751
Backhoe	2	8	2	0.142	0.404	1.549	0.002	0.052	172	6.5	24.8	2.3	0.0	0.8	2748	5	13	50	0	2	5496
										9.1	*29.6*	*3.1*	*0.0*	*1.3*	*3123*	*6*	*18*	*59*	*0*	*3*	*6247*
Install TSP Foundaions																					
30 Ton Crane Truck	1	5	2	0.124	0.346	1.237	0.001	0.047	112	1.7	6.2	0.6	0.0	0.2	561	1	3	12	0	0	1122
Backhoe	1	8	2	0.122	0.588	0.965	0.001	0.056	101	4.7	7.7	1.0	0.0	0.4	811	2	9	15	0	1	1622
Auger Truck	1	8	2	0.149	0.557	1.705	0.003	0.061	311	4.5	13.6	1.2	0.0	0.5	2490	2	9	27	0	1	4981
										10.9	*27.5*	*2.8*	*0.0*	*1.2*	*3862*	*6*	*22*	*55*	*0*	*2*	*7725*
TSP Steel Haul																					
80 Ton Rough Terrain Crane	1	6	4	0.124	0.346	1.237	0.001	0.047	112	2.1	7.4	0.7	0.0	0.3	673	3	8	30	0	1	2692
TSP Assembly																					
80 Ton Rough Terrain Crane	1	6	8	0.124	0.346	1.237	0.001	0.047	112	2.1	7.4	0.7	0.0	0.3	673	6	17	59	0	2	5384
Compressor Trailer	1	5	8	0.123	0.341	1.398	0.001	0.046	131	1.7	7.0	0.6	0.0	0.2	656	5	14	56	0	2	5249
										3.8	*14.4*	*1.4*	*0.0*	*0.5*	*1329*	*11*	*30*	*115*	*0*	*4*	*10632*
TSP Erection																					
Compressor Trailer	1	5	8	0.101	0.335	0.598	0.001	0.055	47	1.7	3.0	0.5	0.0	0.3	235	4	13	24	0	2	1878
80 Ton Rough Terrain Crane	1	6	8	0.124	0.346	1.237	0.001	0.047	112	2.1	7.4	0.7	0.0	0.3	673	6	17	59	0	2	5384
										3.8	*10.4*	*1.3*	*0.0*	*0.6*	*908*	*10*	*30*	*83*	*0*	*4*	*7262*
Install Conductor																					
22 Ton Manitex	1	8	1	0.124	0.346	1.237	0.001	0.047	112	2.8	9.9	1.0	0.0	0.4	897	1	3	10	0	0	897
Splicing Rig	1	2	1	0.171	0.607	1.982	0.002	0.068	254	1.2	4.0	0.3	0.0	0.1	508	0	1	4	0	0	508
3 Drum Straw line Puller	1	4	1	0.171	0.607	1.982	0.002	0.068	254	2.4	7.9	0.7	0.0	0.3	1017	1	2	8	0	0	1017
										6.4	*21.8*	*2.0*	*0.0*	*0.8*	*2423*	*2*	*6*	*22*	*0*	*1*	*2423*
Restoration																					
Road Grader	1	6	1	0.176	0.493	1.790	0.002	0.066	172	3.0	10.7	1.1	0.0	0.4	1033	1	3	11	0	0	1033
Backhoe	1	6	1	0.142	0.404	1.549	0.002	0.052	172	2.4	9.3	0.9	0.0	0.3	1030	1	2	9	0	0	1030
Front End Loader	1	6	1	0.142	0.404	1.549	0.002	0.052	172	2.4	9.3	0.9	0.0	0.3	1030	1	2	9	0	0	1030
Track Type Dozer	1	6	1	0.176	0.493	1.790	0.002	0.066	172	3.0	10.7	1.1	0.0	0.4	1033	1	3	11	0	0	1033
Drum Type Compactor	1	6	1	0.154	0.454	1.623	0.002	0.060	153	2.7	9.7	0.9	0.0	0.4	919	1	3	10	0	0	919
										13.5	*49.8*	*4.7*	*0.1*	*1.8*	*5045*	*5*	*13*	*50*	*0*	*2*	*5045*

Eldorado-Ivanpah 115kV Construction
Exhaust, Tire and Brake Emissions

From SCAQMD file "onroadEF07_26.xls"
Used 2010 Table

	Vehicles <8500 lbs (lbs/mile)	Vehicles >8500 lbs (lbs/mile)	Vehicles >33000 lbs (lbs/mile)
CO	0.00826	0.01844	0.01195
NOx	0.00092	0.02062	0.03822
ROG	0.00091	0.00259	0.00304
SOx	0.00001	0.00003	0.00004
PM10	0.00009	0.00075	0.00183
PM2.5	0.00005	0.00064	0.00160
CO2	1.0956823	2.732222	4.21120578

				Emission Factor (lb/VMT)							Emissions (lbs/day)							Activity Emissions (lbs)						
Activity	Number	Days	VMT/day	CO	NOx	ROG	SOx	PM10	PM2.5	CO2	CO	NOx	ROG	SOx	PM10	PM2.5	CO2	CO	NOx	ROG	SOx	PM10	PM2.5	CO2
Survey																								
1/2 Ton Pick-up Truck, 4X4	2	1	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	0.83	0.09	0.09	0.00	0.01	0.01	110	0.83	0.09	0.09	0.00	0.01	0.01	110
Personal Vehicles	4	1	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	1.65	0.18	0.18	0.00	0.02	0.01	219	1.65	0.18	0.18	0.00	0.02	0.01	219
											2.48	*0.28*	*0.27*	*0.00*	*0.03*	*0.02*	*329*	*2.48*	*0.28*	*0.27*	*0.00*	*0.03*	*0.02*	*329*
Roads and Landing Work																								
1 Ton Crew Cab 4X4	2	5	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	1.65	0.18	0.18	0.00	0.02	0.01	219	8.26	0.92	0.91	0.01	0.09	0.05	1096
Water Trucks	2	34	100	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	3.69	4.12	0.52	0.01	0.15	0.13	546	125.38	140.25	17.61	0.18	5.11	4.37	18579
Lowboy Trk/Trlr	1	5	50	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	0.92	1.03	0.13	0.00	0.04	0.03	137	4.61	5.16	0.65	0.01	0.19	0.16	683
Personal Vehicles	5	5	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	2.07	0.23	0.23	0.00	0.02	0.01	274	10.33	1.15	1.14	0.01	0.11	0.07	1370
											8.33	*5.57*	*1.06*	*0.01*	*0.23*	*0.19*	*1176*	*148.58*	*147.47*	*20.31*	*0.21*	*5.49*	*4.65*	*21727*
Remove Existing H Frame Poles																								
1 Ton Crew Cab 4X4	2	3	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	1.65	0.18	0.18	0.00	0.02	0.01	219	4.96	0.55	0.55	0.01	0.05	0.03	657
Truck, Semi, Tractor	1	3	100	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	1.84	2.06	0.26	0.00	0.08	0.06	273	5.53	6.19	0.78	0.01	0.23	0.19	820
Personal Vehicles	6	3	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	2.48	0.28	0.27	0.00	0.03	0.02	329	7.44	0.83	0.82	0.01	0.08	0.05	986
											5.98	*2.52*	*0.72*	*0.01*	*0.12*	*0.09*	*821*	*17.93*	*7.56*	*2.15*	*0.02*	*0.36*	*0.27*	*2463*
Remove Existing Foundations																								
Dump Truck	1	2	100	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	1.84	2.06	0.26	0.00	0.08	0.06	273	3.69	4.12	0.52	0.01	0.15	0.13	546
1 Ton Crew Cab Flat Bed, 4X4	1	2	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	0.83	0.09	0.09	0.00	0.01	0.01	110	1.65	0.18	0.18	0.00	0.02	0.01	219
Personal Vehicles	4	2	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	1.65	0.18	0.18	0.00	0.02	0.01	219	3.31	0.37	0.37	0.00	0.03	0.02	438
											4.32	*2.34*	*0.53*	*0.01*	*0.10*	*0.08*	*602*	*8.65*	*4.68*	*1.07*	*0.01*	*0.20*	*0.16*	*1204*
Install TSP Foundaions																								
1 Ton Crew Cab Flat Bed, 4X4	3	2	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	1.24	0.14	0.14	0.00	0.01	0.01	164	2.48	0.28	0.27	0.00	0.03	0.02	329
Dump Truck	2	2	100	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	3.69	4.12	0.52	0.01	0.15	0.13	546	7.38	8.25	1.04	0.01	0.30	0.26	1093
4000 gallon Water Trucks	1	2	100	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	1.84	2.06	0.26	0.00	0.08	0.06	273	3.69	4.12	0.52	0.01	0.15	0.13	546
10 cu.yd. Concrete Mixer Trucks	3	2	100	0.01195	0.03822	0.00304	0.00004	0.00183	0.00160	4.21121	3.59	11.47	0.91	0.01	0.55	0.48	1263	7.17	22.93	1.82	0.02	1.10	0.96	2527
Personal Vehicles	7	2	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	2.89	0.32	0.32	0.00	0.03	0.02	383	5.78	0.64	0.64	0.01	0.06	0.04	767
											13.25	*18.11*	*2.15*	*0.03*	*0.82*	*0.70*	*2631*	*26.50*	*36.23*	*4.29*	*0.05*	*1.64*	*1.40*	*5262*
TSP Steel Haul																								
3/4 Ton Crew Cab Flat Bed, 4X4	2	4	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	1.65	0.18	0.18	0.00	0.02	0.01	219	6.61	0.73	0.73	0.01	0.07	0.04	877
40' Flat Bed Truck & Trailer	2	4	100	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	3.69	4.12	0.52	0.01	0.15	0.13	546	14.75	16.50	2.07	0.02	0.60	0.51	2186
Personal Vehicles	4	4	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	1.65	0.18	0.18	0.00	0.02	0.01	219	6.61	0.73	0.73	0.01	0.07	0.04	877
											6.99	*4.49*	*0.88*	*0.01*	*0.19*	*0.15*	*985*	*27.97*	*17.97*	*3.53*	*0.04*	*0.74*	*0.60*	*3939*
TSP Assembly																								
3/4 Ton Pick-up Truck, 4X4	2	8	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	1.65	0.18	0.18	0.00	0.02	0.01	219	13.22	1.47	1.46	0.02	0.14	0.09	1753
1 Ton Crew Cab Flat Bed, 4X4	2	8	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	1.65	0.18	0.18	0.00	0.02	0.01	219	13.22	1.47	1.46	0.02	0.14	0.09	1753
Personal Vehicles	8	8	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	3.31	0.37	0.37	0.00	0.03	0.02	438	26.44	2.94	2.92	0.03	0.28	0.18	3506
											6.61	*0.73*	*0.73*	*0.01*	*0.07*	*0.04*	*877*	*52.88*	*5.88*	*5.85*	*0.07*	*0.56*	*0.35*	*7012*
TSP Erection																								
3/4 Ton Pick-up Truck, 4X4	2	8	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	1.65	0.18	0.18	0.00	0.02	0.01	219	13.22	1.47	1.46	0.02	0.14	0.09	1753
1 Ton Crew Cab Flat Bed, 4X4	2	8	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	1.65	0.18	0.18	0.00	0.02	0.01	219	13.22	1.47	1.46	0.02	0.14	0.09	1753
Personal Vehicles	8	8	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	2.00000	3.31	0.37	0.37	0.00	0.03	0.02	800	26.44	2.94	2.92	0.03	0.28	0.18	6400
											6.61	*0.73*	*0.73*	*0.01*	*0.07*	*0.04*	*1238*	*52.88*	*5.88*	*5.85*	*0.07*	*0.56*	*0.35*	*9906*
Install Conductor																								
1 Ton Crew Cab Flat Bed, 4X4	2	1	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	1.65	0.18	0.18	0.00	0.02	0.01	219	1.65	0.18	0.18	0.00	0.02	0.01	219
Wire Truck & Trailer	2	1	50	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	1.84	2.06	0.26	0.00	0.08	0.06	273	1.84	2.06	0.26	0.00	0.08	0.06	273
Dump Truck (Trash)	1	1	100	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	1.84	2.06	0.26	0.00	0.08	0.06	273	1.84	2.06	0.26	0.00	0.08	0.06	273
3/4 Ton Pick-up Truck, 4X4	3	1	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	2.48	0.28	0.27	0.00	0.03	0.02	329	2.48	0.28	0.27	0.00	0.03	0.02	329
Low Boy Truck & Trailer	1	1	50	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	0.92	1.03	0.13	0.00	0.04	0.03	137	0.92	1.03	0.13	0.00	0.04	0.03	137
Personal Vehicles	16	1	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	6.61	0.73	0.73	0.01	0.07	0.04	877	6.61	0.73	0.73	0.01	0.07	0.04	877
											15.35	*6.35*	*1.84*	*0.02*	*0.30*	*0.23*	*2107*	*15.35*	*6.35*	*1.84*	*0.02*	*0.30*	*0.23*	*2107*
Restoration																								
1 Ton Crew Cab 4X4	2	1	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	0.83	0.09	0.09	0.00	0.01	0.01	110	0.83	0.09	0.09	0.00	0.01	0.01	110
Water Truck	1	1	100	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	1.84	2.06	0.26	0.00	0.08	0.06	273	1.84	2.06	0.26	0.00	0.08	0.06	273
Lowboy Truck/Trailer	1	1	100	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	1.84	2.06	0.26	0.00	0.08	0.06	273	1.84	2.06	0.26	0.00	0.08	0.06	273
Personal Vehicles	7	1	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	2.89	0.32	0.32	0.00	0.03	0.02	383	2.89	0.32	0.32	0.00	0.03	0.02	383
											7.41	*4.54*	*0.93*	*0.01*	*0.19*	*0.15*	*1040*	*7.41*	*4.54*	*0.93*	*0.01*	*0.19*	*0.15*	*1040*

Eldorado-Ivanpah 115kV Construction
On site fugitive dust during active construction activities

7.3	Distrubed acreage from Proj Discription Table 3-11
34	Project duration (days)
0.2	Average Disturbed acres per day
0.4	Assumed twice the average disturbance for emission calculation
	Assume uncontrolled fugitive dust emission factor of 10 lbs/acre/day for PM10
4.3	Uncontrolled PM10 (lbs/day)
	Assume PM2.5 is 50% of PM10 for fugitive dust
2.1	Uncontrolled PM2.5 (lbs/day)
	Assume 50% controls from watering twice per day
2.1	Controlled PM10 (lbs/day)
1.1	Controlled PM2.5 (lbs/day)
73.0	Total Controlled PM10 (lbs)
36.5	Total Controlled PM2.5 (lbs)

Eldorado-Ivanpah 115kV Construction
Unpaved Road Fugitive Dust Emissions

Unpaved Road Fugitive Dust Emissions
From SCAQMD CEQA AQ Handbook
Table A9-9-D

E=V*F
V= vehicle miles travelled on unpaved roads
F=2.1*(G/12)*(H/30)*((J/3)^.7)*((I/4)^.5)*((365-K)/365)
G= surface silt
H= mean vehicle speed
I= number of wheels
J=vehicle wt
K= days of precip per year at least 0.01 in

0.212 PM2.5 fraction of PM10 from SCAQMD Table A - Updated CEIDARS Table with PM2.5 Fractions

Light Vehicles Factor
G= 11 Assumed
H= 15 Assumed
I= 4 wheels
J= 3 tons
k= 18 precip days

0.9 F PM10 (lbs/VMT)
0.19 F PM2.5 (lbs/VMT)

Heavy Vehicles Factor
G= 11 Assumed
H= 15 Assumed
I= 10 wheels
J= 8 tons
k= 18 precip days

2.9 F PM10 (lbs/VMT)
0.61 F PM2.5 (lbs/VMT)

Assumed 50% control for watering
Assumed 95% control of the water truck emissions

Activity	Number	Days	Max VMT/day	F PM10 (lbs/VMT)	F PM2.5 (lbs/VMT)	Uncontrolled Emissions PM10 (lbs/day)	Uncontrolled Emissions PM10 lbs activity	Uncontrolled Emissions PM2.5 (lbs/day)	Uncontrolled Emissions PM2.5 lbs activity	Controlled Emissions (50%) PM10 (lbs/day)	Controlled Emissions (50%) PM10 lbs activity	Controlled Emissions (50%) PM2.5 (lbs/day)	Controlled Emissions (50%) PM2.5 lbs activity
Survey													
1/2 Ton Pick-up Truck, 4X4	2	1	3	0.9	0.19	5.5	5.5	1.2	1.2	2.7	2.7	0.6	0.6
Personal Vehicles	4	1	2	0.9	0.19	7.3	7.3	1.6	1.6	3.7	3.7	0.8	0.8
Roads and Landing Work													
1 Ton Crew Cab 4X4	2	5	3	0.9	0.19	5.5	27.5	1.2	5.8	2.7	13.7	0.6	2.9
Water Trucks	2	34	40	2.9	0.61	230.0	7819.1	48.8	1657.6	115.0	3909.5	24.4	828.8
Lowboy Trk/Trlr	1	5	3	2.9	0.61	8.6	43.1	1.8	9.1	4.3	21.6	0.9	4.6
Personal Vehicles	5	5	2	0.9	0.19	9.2	45.8	1.9	9.7	4.6	22.9	1.0	4.8
Remove Existing H Frame Poles													
1 Ton Crew Cab 4X4	2	3	3	0.9	0.19	5.5	16.5	1.2	3.5	2.7	8.2	0.6	1.7
Truck, Semi, Tractor	1	3	3	2.9	0.61	8.6	25.9	1.8	5.5	4.3	12.9	0.9	2.7
Personal Vehicles	6	3	2	0.9	0.19	11.0	32.9	2.3	7.0	5.5	16.5	1.2	3.5
Remove Existing Foundations													
Dump Truck	2	2	3	2.9	0.61	17.2	34.5	3.7	7.3	8.6	17.2	1.8	3.7
1 Ton Crew Cab Flat Bed, 4X4	1	2	3	0.9	0.19	2.7	5.5	0.6	1.2	1.4	2.7	0.3	0.6
Personal Vehicles	4	2	2	0.9	0.19	7.3	14.6	1.6	3.1	3.7	7.3	0.8	1.6
Install TSP Foundaions													
1 Ton Crew Cab Flat Bed, 4X4	3	2	3	0.9	0.19	8.2	16.5	1.7	3.5	4.1	8.2	0.9	1.7
Dump Truck	2	2	3	2.9	0.61	17.2	34.5	3.7	7.3	8.6	17.2	1.8	3.7
4000 gallon Water Trucks	1	2	40	2.9	0.61	115.0	230.0	24.4	48.8	57.5	115.0	12.2	24.4
10 cu.yd. Concrete Mixer Trucks	3	2	3	2.9	0.61	25.9	51.7	5.5	11.0	12.9	25.9	2.7	5.5
Personal Vehicles	7	2	2	0.9	0.19	12.8	25.6	2.7	5.4	6.4	12.8	1.4	2.7
TSP Steel Haul													
3/4 Ton Crew Cab Flat Bed, 4X4	2	4	3	0.9	0.19	5.5	22.0	1.2	4.7	2.7	11.0	0.6	2.3
40' Flat Bed Truck & Trailer	2	4	3	2.9	0.61	17.2	69.0	3.7	14.6	8.6	34.5	1.8	7.3
Personal Vehicles	4	4	2	0.9	0.19	7.3	29.3	1.6	6.2	3.7	14.6	0.8	3.1
TSP Assembly													
3/4 Ton Pick-up Truck, 4X4	2	8	3	0.9	0.19	5.5	43.9	1.2	9.3	2.7	22.0	0.6	4.7
1 Ton Crew Cab Flat Bed, 4X4	2	8	3	0.9	0.19	5.5	43.9	1.2	9.3	2.7	22.0	0.6	4.7
Personal Vehicles	8	8	2	0.9	0.19	14.6	117.1	3.1	24.8	7.3	58.6	1.6	12.4
TSP Erection													
3/4 Ton Pick-up Truck, 4X4	2	8	3	0.9	0.19	5.5	43.9	1.2	9.3	2.7	22.0	0.6	4.7
1 Ton Crew Cab Flat Bed, 4X4	2	8	3	0.9	0.19	5.5	43.9	1.2	9.3	2.7	22.0	0.6	4.7
Personal Vehicles	8	8	2	0.9	0.19	14.6	117.1	3.1	24.8	7.3	58.6	1.6	12.4
Install Conductor													
1 Ton Crew Cab Flat Bed, 4X4	3	1	3	0.9	0.19	8.2	8.2	1.7	1.7	4.1	4.1	0.9	0.9
Wire Truck & Trailer	2	1	3	2.9	0.61	17.2	17.2	3.7	3.7	8.6	8.6	1.8	1.8
Dump Truck (Trash)	1	1	3	2.9	0.61	8.6	8.6	1.8	1.8	4.3	4.3	0.9	0.9
3/4 Ton Pick-up Truck, 4X4	3	1	3	0.9	0.19	8.2	8.2	1.7	1.7	4.1	4.1	0.9	0.9
Low Boy Truck & Trailer	1	1	3	2.9	0.61	8.6	8.6	1.8	1.8	4.3	4.3	0.9	0.9
Personal Vehicles	16	1	2	0.9	0.19	29.3	29.3	6.2	6.2	14.6	14.6	3.1	3.1
Restoration													
1 Ton Crew Cab 4X4	2	1	3	0.9	0.19	5.5	5.5	1.2	1.2	2.7	2.7	0.6	0.6
Water Truck	1	1	40	2.9	0.61	115.0	115.0	24.4	24.4	57.5	57.5	12.2	12.2
Lowboy Truck/Trailer	1	1	3	2.9	0.61	8.6	8.6	1.8	1.8	4.3	4.3	0.9	0.9
Personal Vehicles	7	1	2	0.9	0.19	12.8	12.8	2.7	2.7	6.4	6.4	1.4	1.4
									Total	401	4594	85	974

Eldorado-Ivanpah 115kV Construction

Paved Road Fugitive Dust Emissions

Light Weight Vehicles on paved road fugitive dust
From SCAQMD CEQA AQ Handbook
Table A9-9-B

E=VxG (PM10 with street cleaning)

V= vehicle miles travelled
G=EF from table A9-9-9-B1

G(PM10 lb/VMT)	Road Type
0.018	Local Streets
0.013	Collector Streets
0.0064	Major Streets/Highways
0.00065	Freeways

Assumed Mix of Roads
0.10 Local Streets (assumed 10%)
0.10 Collector Streets (assumed 10%)
0.10 Major Streets/Highways (10%)
0.70 Freeways (assumed 70%)

Composite light vehicle Emission Factor
0.0042 PM10 per VMT

0.169 PM2.5 fraction of PM10 from SCAQMD Table A - Updated CEIDARS Table with PM2.5 Fractions

0.00071 PM2.5 per VMT

Heavy Vehicles on paved road fugitive dust
Use SCAQMD CEQA Table A9-9-C
E=VxF (PM10 without street cleaning)
V= vehicle miles travelled
G from table A9-9-C1
F=0.77*((G*0.35)^0.3) lbs/VMT

Assume 60 percent reduction for street sweeping per Table A9-9

Road Type	G(PM10 oz/sq yd)	F(PM10 lb/VMT)	F with sweeping
Local Streets	0.04	0.213958	0.085583
Collector Streets	0.03	0.196267	0.078507
Major Streets/Highw	0.012	0.149096	0.059638
Freeways	0.00065	0.062171	0.024868

Assumed Mix of Roads
0.10 Local Streets (assumed 10%)
0.10 Collector Streets (assumed 10%)
0.10 Major Streets/Highways (10%)
0.70 Freeways (assumed 70%)

Composite heavy vehicle Emission Factor
0.040 PM10 per VMT

0.169 PM2.5 fraction of PM10 from SCAQMD Table A - Updated CEIDARS Table with PM2.5 Fractions

0.0067 PM2.5 per VMT

						Emissions Assuming Street Cleaning			
				F PM10	F PM2.5	PM10		PM2.5	
Activity	Number	Days	VMT/day	(lbs/VMT)	(lbs/VMT)	(lbs/day)	lbs activity	(lbs/day)	lbs activity
Survey									
1/2 Ton Pick-up Truck, 4X4	2	1	50	0.0042	0.00071	0.4	0.4	0.1	0.1
Personal Vehicles	4	1	50	0.0042	0.00071	0.8	0.8	0.1	0.1
Roads and Landing Work									
1 Ton Crew Cab 4X4	2	5	100	0.0042	0.00071	0.8	4.2	0.1	0.7
Water Trucks	2	34	100	0.0398	0.00672	8.0	270.5	1.3	45.7
Lowboy Trk/Trlr	1	5	50	0.0398	0.00672	2.0	9.9	0.3	1.7
Personal Vehicles	5	5	50	0.0042	0.00071	1.0	5.2	0.2	0.9
Remove Existing H Frame Poles									
1 Ton Crew Cab 4X4	2	3	100	0.0042	0.00071	0.8	2.5	0.1	0.4
Truck, Semi, Tractor	1	3	100	0.0398	0.00672	4.0	11.9	0.7	2.0
Personal Vehicles	6	3	50	0.0042	0.00071	1.3	3.8	0.2	0.6
Remove Existing Foundations									
Dump Truck	1	2	100	0.0398	0.00672	4.0	8.0	0.7	1.3
1 Ton Crew Cab Flat Bed, 4X4	1	2	100	0.0042	0.00071	0.4	0.8	0.1	0.1
Personal Vehicles	4	2	50	0.0042	0.00071	0.8	1.7	0.1	0.3
Install TSP Foundaions									
1 Ton Crew Cab Flat Bed, 4X4	3	2	50	0.0042	0.00071	0.6	1.3	0.1	0.2
Dump Truck	2	2	100	0.0398	0.00672	8.0	15.9	1.3	2.7
4000 gallon Water Trucks	1	2	100	0.0398	0.00672	4.0	8.0	0.7	1.3
10 cu.yd. Concrete Mixer Trucks	3	2	100	0.0398	0.00672	11.9	23.9	2.0	4.0
Personal Vehicles	7	2	50	0.0042	0.00071	1.5	2.9	0.2	0.5
TSP Steel Haul									
3/4 Ton Crew Cab Flat Bed, 4X4	2	4	100	0.0042	0.00071	0.8	3.4	0.1	0.6
40' Flat Bed Truck & Trailer	2	4	100	0.0398	0.00672	8.0	31.8	1.3	5.4
Personal Vehicles	4	4	50	0.0042	0.00071	0.8	3.4	0.1	0.6
TSP Assembly									
3/4 Ton Pick-up Truck, 4X4	2	8	100	0.0042	0.00071	0.8	6.7	0.1	1.1
1 Ton Crew Cab Flat Bed, 4X4	2	8	100	0.0042	0.00071	0.8	6.7	0.1	1.1
Personal Vehicles	8	8	50	0.0042	0.00071	1.7	13.4	0.3	2.3
TSP Erection									
3/4 Ton Pick-up Truck, 4X4	2	8	100	0.0042	0.00071	0.8	6.7	0.1	1.1
1 Ton Crew Cab Flat Bed, 4X4	2	8	100	0.0042	0.00071	0.8	6.7	0.1	1.1
Personal Vehicles	8	8	50	0.0042	0.00071	1.7	13.4	0.3	2.3
Install Conductor									
1 Ton Crew Cab Flat Bed, 4X4	2	1	100	0.0042	0.00071	0.8	0.8	0.1	0.1
Wire Truck & Trailer	2	1	50	0.0398	0.00672	4.0	4.0	0.7	0.7
Dump Truck (Trash)	1	1	100	0.0398	0.00672	4.0	4.0	0.7	0.7
3/4 Ton Pick-up Truck, 4X4	3	1	100	0.0042	0.00071	1.3	1.3	0.2	0.2
Low Boy Truck & Trailer	1	1	50	0.0398	0.00672	2.0	2.0	0.3	0.3
Personal Vehicles	16	1	50	0.0042	0.00071	3.4	3.4	0.6	0.6
Restoration									
1 Ton Crew Cab 4X4	2	1	50	0.0042	0.00071	0.4	0.4	0.1	0.1
Water Truck	1	1	100	0.0398	0.00672	4.0	4.0	0.7	0.7
Lowboy Truck/Trailer	1	1	100	0.0398	0.00672	4.0	4.0	0.7	0.7
Personal Vehicles	7	1	50	0.0042	0.00071	1.5	1.5	0.2	0.2
					Total	92.0	489.3	15.5	82.7

Eldorado-Ivanpah 500kV Construction
Emission Summary

Activity Emissions	Emissions (lbs)						
	CO	NOx	ROG	SOx	PM10	PM2.5	CO2
Combustion Related Emissions							
Marshalling Yards							
On-Road Vehicles	598	252	72	1	12	9	82106
Off-Road Vehicles and Equipment	469	1049	124	1	53	45	100918
Roads and Landing Work							
On-Road Vehicles	91	64	12	0.1	3	2	12909
Off-Road Vehicles and Equipment	119	438	42	0.5	16	13	43731
LST Steel Haul							
On-Road Vehicles	195	105	24	0.3	5	4	27087
Off-Road Vehicles and Equipment	89	150	20	0.2	9	8	15135
LST Retrofit							
On-Road Vehicles	446	50	49	1	5	3	59167
Off-Road Vehicles and Equipment	715	2610	241	3	92	78	249461
Remove/Install OPGW							
On-Road Vehicles	445	139	52	1	7	5	60448
Off-Road Vehicles and Equipment	1304	2378	234	93	192	163	417119
Restoration							
On-Road Vehicles	206	116	26	0	5	4	28727
Off-Road Vehicles and Equipment	337	1245	118	1	45	38	126119
Fugitive Dust Emissions							
Paved Roads	-	-	-	-	1833	310	-
Unpaved Roads	-	-	-	-	7176	1521	-

Total Activity Emissions (tons)	2.5	4.3	0.51	0.05	4.7	1.1	611
Total California Activity Emissions (tons)	0	0	0	0	0	0	0
Construction Days	200	200	200	200	200	200	200
Average Daily Emissions (lbs)	25	43	5	0.5	47	11	6115

Eldorado-Ivanpah 500kV Construction
Workforce Estimate

Work Activity						Activity Production	
Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Workforce	Estimated Schedule (Days)	Estimated Average Duration of Use (Hrs/Day)	Estimated Production Per Day
Marshalling Yard (1)				**4**			
1-ton crew cab 4x4	300	Diesel	1			2	
30-ton crane truck	300	Diesel	1			2	
10,000-lb rough terrain fork lift	200	Diesel	1			5	
Truck, semi, tractor	350	Diesel	1		Duration of project	1	
Roads and Landing Work (2)				**5**	**13**		**25 miles**
1-ton crew cab, 4x4	300	Diesel	2		13	2	
Road grader	350	Diesel	1		13	4	
Track type dozer	350	Diesel	1		13	6	
Drum type compactor	250	Diesel	1		13	4	
Water truck	350	Diesel	2		Duration	8	
Lowboy truck/trailer	500	Diesel	1		6	2	
Backhoe/front loader	350	Diesel	1		13	6	0.5 mile/day and 4 structure pads/day
LST Steel Haul (3)				**4**	**45**		**45 LSTs**
1-ton crew cab flat bed, 4x4	300	Diesel	2		45	2	
40-foot flat bed truck/trailer	350	Diesel	1		45	8	
10,000-lb rough terrain fork lift	200	Diesel	1		45	6	1 LST/day
LST Retrofit (4)				**14**	**45**		**45 LSTs**
¾-ton pick-up truck, 4X4	300	Diesel	3		45	4	
1-ton crew cab flat bed, 4x4	300	Diesel	2		45	4	
30-ton crane truck	300	Diesel	2		45	8	
80-Ton Rough Terrain Crane	350	Diesel	1		45	8	
80-foot hydraulic man-lift/bucket truck	350	Diesel	1		45	6	
Compressor trailer	350	Diesel	2		45	6	1 LST/day
Remove Existing OHGW and Install OPGW (5)				**15**	**72**		**25 circuit miles**
1-ton crew cab flat bed, 4x4	300	Diesel	2		72	8	
¾-ton pick-up truck, 4x4	300	Diesel	4		72	8	
Dump truck (trash)	350	Diesel	1		72	2	
20,000-lb. rough terrain fork lift	350	Diesel	1		72	2	
30-ton crane truck	300	Diesel	1		72	4	
Bull wheel puller	500	Diesel	1		24	4	
Splicing lab	300	Diesel	4		9	8	
80-foot hydraulic man-lift/bucket truck	350	Diesel	1		36	6	
Static truck/ tensioner	350	Diesel	1		72	2	
Hydraulic rewind puller	300	Diesel	1		24	4	
Hughes 500 E Helicopter		Jet A	1		24	4	
Fuel, helicopter support truck	300	Diesel	1		24	2	0.35 mile/day
Restoration (6)				**7**	**25**		**25 miles**
1-ton crew cab, 4x4	300	Diesel	2		25	2	
Road grader	350	Diesel	1		25	6	
Backhoe	350	Diesel	1		25	6	
Front end loader	350	Diesel	1		25	6	
Track Type Dozer	350	Diesel	1		25	6	
Drum type compactor	250	Diesel	1		25	6	
Water truck	350	Diesel	1		25	8	
Lowboy truck/trailer	300	Diesel	1		25	3	1 mile/day

Crew Size Assumptions:
#1 Marshalling Yards = one 4-man crew
#2 Roads and Landing Work = one 5-man crew
#3 LST Steel Haul = one 4-man crew
#4 LST Steel Assembly = two 7-man crews
#5 Remove Existing OHGW and Install OPGW = one 15-man crew
#6 Restoration = one 7-man crew

Eldorado-Ivanpah 500kV Construction
On Site Equipment Exhaust Emissions

From SCAQMD offroad emission factors file name "offroadEF_07_25.xls" 2010

Description	Number	Hours per Day	Days of Activity	2010 Emission Factor (lbs/hr)						Emissions (lbs/day)						Total Activity Emissions (lbs)					
				ROG	CO	NOX	SOX	PM	CO2	CO	NOX	ROG	SOX	PM	CO2	ROG	CO	NOX	SOX	PM	CO2
Marshalling Yards																					
30 Ton Crane Truck	1	2	200	0.124	0.346	1.237	0.001	0.047	112	0.7	2.5	0.2	0.0	0.1	224	50	139	495	1	19	44864
10,000 lb Rough Terrain Fork Lift	1	5	200	0.074	0.331	0.554	0.001	0.034	56	1.7	2.8	0.4	0.0	0.2	280	74	331	554	1	34	56054
										2.3	*5.2*	*0.6*	*0.0*	*0.3*	*505*	*124*	*469*	*1049*	*1*	*53*	*100918*
Roads and Landing Work																					
Road Grader	1	4	13	0.176	0.493	1.790	0.002	0.066	172	2.0	7.2	0.7	0.0	0.3	688	9	26	93	0	3	8950
Track Type Dozer	1	6	13	0.176	0.493	1.790	0.002	0.066	172	3.0	10.7	1.1	0.0	0.4	1033	14	38	140	0	5	13425
Drum Type Compactor	1	4	13	0.154	0.454	1.623	0.002	0.060	153	1.8	6.5	0.6	0.0	0.2	612	8	24	84	0	3	7961
Backhoe	1	6	13	0.142	0.404	1.549	0.002	0.052	172	2.4	9.3	0.9	0.0	0.3	1030	11	31	121	0	4	13395
										9.2	*33.7*	*3.2*	*0.0*	*1.2*	*3364*	*42*	*119*	*438*	*0*	*16*	*43731*
LST Steel Haul																					
10,000 lb Rough Terrain Fork Lift	1	6	45	0.074	0.331	0.554	0.001	0.034	56	2.0	3.3	0.4	0.0	0.2	336	20	89	150	0	9	15135
LST Retrofit																					
30 Ton Crane Truck	2	8	45	0.124	0.346	1.237	0.001	0.047	112	5.5	19.8	2.0	0.0	0.8	1795	89	249	891	1	34	80754
80 Ton Rough Terrain Crane	1	8	45	0.124	0.346	1.237	0.001	0.047	112	2.8	9.9	1.0	0.0	0.4	897	45	125	445	0	17	40377
80ft. Hydraulic Man-lift	1	6	45	0.151	0.580	1.920	0.002	0.060	213	3.5	11.5	0.9	0.0	0.4	1277	41	157	518	1	16	57471
Compressor Trailer	2	6	45	0.123	0.341	1.398	0.001	0.046	131	4.1	16.8	1.5	0.0	0.6	1575	66	184	755	1	25	70859
										15.9	*58.0*	*5.4*	*0.1*	*2.0*	*5544*	*241*	*715*	*2610*	*3*	*92*	*249461*
Remove/Install OPGW																					
30 Ton Manitex	0	0	0	0.124	0.346	1.237	0.001	0.047	112	0.0	0.0	0.0	0.0	0.0	0	0	0	0	0	0	0
22 Ton Manitex	0	0	0	0.124	0.346	1.237	0.001	0.047	112	0.0	0.0	0.0	0.0	0.0	0	0	0	0	0	0	0
Splicing Rig	0	0	0	0.171	0.607	1.982	0.002	0.068	254	0.0	0.0	0.0	0.0	0.0	0	0	0	0	0	0	0
Splicing Lab	4	8	9	0.171	0.607	1.982	0.002	0.068	254	19.4	63.4	5.5	0.1	2.2	8136	49	175	571	1	20	73221
20,000 lb. Rough Terrain Fork Lift	1	2	72	0.065	0.171	0.716	0.001	0.023	77	0.3	1.4	0.1	0.0	0.0	154	9	25	103	0	3	11106
580 Case Backhoe	0	0	0	0.091	0.362	0.566	0.001	0.052	52	0.0	0.0	0.0	0.0	0.0	0	0	0	0	0	0	0
Spacing Cart	0	0	0	0.012	0.062	0.074	0.000	0.003	10	0.0	0.0	0.0	0.0	0.0	0	0	0	0	0	0	0
Static Tensioner	1	2	72	0.171	0.607	1.982	0.002	0.068	254	1.2	4.0	0.3	0.0	0.1	508	25	87	285	0	10	36610
Bull wheel Puller	1	4	24	0.171	0.607	1.982	0.002	0.068	254	2.4	7.9	0.7	0.0	0.3	1017	16	58	190	0	7	24407
60lk Puller	0	0	0	0.171	0.607	1.982	0.002	0.068	254	0.0	0.0	0.0	0.0	0.0	0	0	0	0	0	0	0
Sag Cat w2 winch	0	0	0	0.205	0.574	1.944	0.002	0.078	166	0.0	0.0	0.0	0.0	0.0	0	0	0	0	0	0	0
D8 Cat	0	0	0	0.205	0.574	1.944	0.002	0.078	166	0.0	0.0	0.0	0.0	0.0	0	0	0	0	0	0	0
Hughes 500 E Helicopter	1	4	24	1.400	9.994	12.794	0.957	1.595	2831	40.0	51.2	5.6	3.8	6.4	11324	134	959	1228	92	153	271776
30 Ton Crane Truck	1	4	72	0.124	0.346	1.237	0.001	0.047	112	1.4	4.9	0.5	0.0	0.2	449	36	100	356	0	14	32302
80ft. Hydraulic Man-lift	1	6	36	0.151	0.580	1.920	0.002	0.060	213	3.5	11.5	0.9	0.0	0.4	1277	33	125	415	0	13	45977
Hydraulic Rewind Puller	1	4	24	0.117	0.590	0.993	0.001	0.054	107	2.4	4.0	0.5	0.0	0.2	426	22	113	191	0	10	20451
										63.4	*127.9*	*12.2*	*3.9*	*9.0*	*21139*	*234*	*1304*	*2378*	*93*	*192*	*417119*
Restoration																					
Road Grader	1	6	25	0.176	0.493	1.790	0.002	0.066	172	3.0	10.7	1.1	0.0	0.4	1033	26	74	269	0	10	25817
Backhoe	1	6	25	0.142	0.404	1.549	0.002	0.052	172	2.4	9.3	0.9	0.0	0.3	1030	21	61	232	0	8	25761
Front End Loader	1	6	25	0.142	0.404	1.549	0.002	0.052	172	2.4	9.3	0.9	0.0	0.3	1030	21	61	232	0	8	25761
Track Type Dozer	1	6	25	0.176	0.493	1.790	0.002	0.066	172	3.0	10.7	1.1	0.0	0.4	1033	26	74	269	0	10	25817
Drum Type Compactor	1	6	25	0.154	0.454	1.623	0.002	0.060	153	2.7	9.7	0.9	0.0	0.4	919	23	68	243	0	9	22963
										13.5	*49.8*	*4.7*	*0.1*	*1.8*	*5045*	*118*	*337*	*1245*	*1*	*45*	*126119*

Eldorado-Ivanpah 500kV Construction
Exhaust, Tire and Brake Emissions

From SCAQMD file "onroadEF07_26.xls"
Used 2010 Table

	Vehicles <8500 lbs (lbs/mile)	Vehicles >8500 lbs (lbs/mile)	Vehicles >33000 lbs (lbs/mile)
CO	0.00826	0.01844	0.01195
NOx	0.00092	0.02062	0.03822
ROG	0.00091	0.00259	0.00304
SOx	0.00001	0.00003	0.00004
PM10	0.00009	0.00075	0.00183
PM2.5	0.00005	0.00064	0.00160
CO2	1.0956823	2.732222	4.21120578

				Emission Factor (lb/VMT)							Emissions (lbs/day)							Activity Emissions (lbs)						
Activity	Number	Days	VMT/day	CO	NOx	ROG	SOx	PM10	PM2.5	CO2	CO	NOx	ROG	SOx	PM10	PM2.5	CO2	CO	NOx	ROG	SOx	PM10	PM2.5	CO2
Marshalling Yards																								
1 Ton Crew Cab 4X4	1	200	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	0.41	0.05	0.05	0.00	0.00	0.00	55	82.63	9.18	9.14	0.11	0.87	0.55	10957
Truck, Semi, Tractor	1	200	50	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	0.92	1.03	0.13	0.00	0.04	0.03	137	184.38	206.25	25.90	0.27	7.51	6.42	27322
Personal Vehicles	4	200	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	1.65	0.18	0.18	0.00	0.02	0.01	219	330.51	36.73	36.56	0.43	3.48	2.19	43827
											2.99	*1.26*	*0.36*	*0.00*	*0.06*	*0.05*	*411*	*597.51*	*252.15*	*71.60*	*0.81*	*11.86*	*9.16*	*82106*
Roads and Landing Work																								
1 Ton Crew Cab 4X4	2	13	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	0.83	0.09	0.09	0.00	0.01	0.01	110	10.74	1.19	1.19	0.01	0.11	0.07	1424
Water Trucks	2	13	100	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	3.69	4.12	0.52	0.01	0.15	0.13	546	47.94	53.62	6.73	0.07	1.95	1.67	7104
Lowboy Trk/Trlr	1	6	50	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	0.92	1.03	0.13	0.00	0.04	0.03	137	5.53	6.19	0.78	0.01	0.23	0.19	820
Personal Vehicles	5	13	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	2.07	0.23	0.23	0.00	0.02	0.01	274	26.85	2.98	2.97	0.04	0.28	0.18	3561
											7.50	*5.48*	*0.97*	*0.01*	*0.22*	*0.18*	*1067*	*91.06*	*63.99*	*11.67*	*0.13*	*2.57*	*2.11*	*12909*
LST Steel Haul																								
1 Ton Crew Cab Flat Bed, 4X4	2	45	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	0.83	0.09	0.09	0.00	0.01	0.01	110	37.18	4.13	4.11	0.05	0.39	0.25	4931
40' Flat Bed Truck & Trailer	1	45	100	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	1.84	2.06	0.26	0.00	0.08	0.06	273	82.97	92.81	11.65	0.12	3.38	2.89	12295
Personal Vehicles	4	45	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	1.65	0.18	0.18	0.00	0.02	0.01	219	74.36	8.26	8.23	0.10	0.78	0.49	9861
											4.32	*2.34*	*0.53*	*0.01*	*0.10*	*0.08*	*602*	*194.52*	*105.21*	*23.99*	*0.27*	*4.55*	*3.63*	*27087*
LST Retrofit																								
3/4 Ton Pick-up Truck, 4X4	3	45	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	2.48	0.28	0.27	0.00	0.03	0.02	329	111.55	12.39	12.34	0.15	1.17	0.74	14792
1 Ton Crew Cab Flat Bed, 4X4	2	45	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	1.65	0.18	0.18	0.00	0.02	0.01	219	74.36	8.26	8.23	0.10	0.78	0.49	9861
Personal Vehicles	14	45	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	5.78	0.64	0.64	0.01	0.06	0.04	767	260.28	28.92	28.79	0.34	2.74	1.73	34514
											9.92	*1.10*	*1.10*	*0.01*	*0.10*	*0.07*	*1315*	*446.19*	*49.58*	*49.36*	*0.58*	*4.70*	*2.96*	*59167*
Remove/Install OPGW																								
1 Ton Crew Cab Flat Bed, 4X4	2	72	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	1.65	0.18	0.18	0.00	0.02	0.01	219	118.98	13.22	13.16	0.16	1.25	0.79	15778
Wire Truck & Trailer	0	0	0	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0
Dump Truck (Trash)	1	72	50	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	0.92	1.03	0.13	0.00	0.04	0.03	137	66.38	74.25	9.32	0.10	2.70	2.31	9836
3/4 Ton Pick-up Truck, 4X4	4	72	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	3.31	0.37	0.37	0.00	0.03	0.02	438	237.97	26.44	26.32	0.31	2.50	1.58	31556
Pole Truck & Trailer	0	0	0	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0
Static Truck	0	0	0	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0
Fuel, Helicopter Support Truck	1	24	50	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	0.92	1.03	0.13	0.00	0.04	0.03	137	22.13	24.75	3.11	0.03	0.90	0.77	3279
Low Boy Truck & Trailer	0	0	0	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0
Personal Vehicles	15	0	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	6.20	0.69	0.69	0.01	0.07	0.04	822	0.00	0.00	0.00	0.00	0.00	0.00	0
											13.00	*3.30*	*1.49*	*0.02*	*0.19*	*0.14*	*1752*	*445.45*	*138.66*	*51.91*	*0.60*	*7.36*	*5.45*	*60448*
Restoration																								
1 Ton Crew Cab 4X4	2	25	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	1.65	0.18	0.18	0.00	0.02	0.01	219	41.31	4.59	4.57	0.05	0.43	0.27	5478
Water Truck	1	25	100	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	1.84	2.06	0.26	0.00	0.08	0.06	273	46.09	51.56	6.47	0.07	1.88	1.61	6831
Lowboy Truck/Trailer	1	25	100	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	1.84	2.06	0.26	0.00	0.08	0.06	273	46.09	51.56	6.47	0.07	1.88	1.61	6831
Personal Vehicles	7	25	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	2.89	0.32	0.32	0.00	0.03	0.02	383	72.30	8.03	8.00	0.09	0.76	0.48	9587
											8.23	*4.63*	*1.02*	*0.01*	*0.20*	*0.16*	*1149*	*205.80*	*115.75*	*25.52*	*0.28*	*4.95*	*3.96*	*28727*

Eldorado-Ivanpah 500kV Construction
Paved Road Fugitive Dust Emissions

Light Weight Vehicles on paved road fugitive dust
From SCAQMD CEQA AQ Handbook
Table A9-9-B

E=VxG (PM10 with street cleaning)

V= vehicle miles travelled
G=EF from table A9-9-B1

G(PM10 lb/VMT)	Road Type
0.018	Local Streets
0.013	Collector Streets
0.0064	Major Streets/Highways
0.00065	Freeways

Assumed Mix of Roads
0.10 Local Streets (assumed 10%)
0.10 Collector Streets (assumed 10%)
0.10 Major Streets/Highways (10%)
0.70 Freeways (assumed 70%)

Composite light vehicle Emission Factor
0.0042 PM10 per VMT

0.169 PM2.5 fraction of PM10 from SCAQMD Table A - Updated CEIDARS Table with PM2.5 Fractions

0.00071 PM2.5 per VMT

Heavy Vehicles on paved road fugitive dust
Use SCAQMD CEQA Table A9-9-C
E=VxF (PM10 without street cleaning)
V= vehicle miles travelled
G from table A9-9-C1
F=0.77*((G*0.35)^0.3) lbs/VMT

Assume 60 percent reduction for street sweeping per Table A9-9

Road Type	G(PM10 oz/sq yd)	F(PM10 lb/VMT)	F with sweeping
Local Streets	0.04	0.213958	0.085583
Collector Streets	0.03	0.196267	0.078507
Major Streets/Highwa	0.012	0.149096	0.059638
Freeways	0.00065	0.062171	0.024868

Assumed Mix of Roads
0.10 Local Streets (assumed 10%)
0.10 Collector Streets (assumed 10%)
0.10 Major Streets/Highways (10%)
0.70 Freeways (assumed 70%)

Composite heavy vehicle Emission Factor
0.040 PM10 per VMT

0.169 PM2.5 fraction of PM10 from SCAQMD Table A - Updated CEIDARS Table with PM2.5 Fractions

0.0067 PM2.5 per VMT

						Emissions Assuming Street Cleaning			
				F PM10	F PM2.5	PM10		PM2.5	
Activity	Number	Days	VMT/day	(lbs/VMT)	(lbs/VMT)	(lbs/day)	lbs activity	(lbs/day)	lbs activity
Marshalling Yards									
1 Ton Crew Cab 4X4	1	200	50	0.0042	0.00071	0.2	42.0	0.0	7.1
Truck, Semi, Tractor	1	200	50	0.0398	0.00672	2.0	397.8	0.3	67.2
Personal Vehicles	4	200	50	0.0042	0.00071	0.8	167.8	0.1	28.4
						3.0	*607.6*	*0.5*	*102.7*
Roads and Landing Work									
1 Ton Crew Cab 4X4	2	13	50	0.0042	0.00071	0.4	5.5	0.1	0.9
Water Trucks	2	13	100	0.0398	0.00672	8.0	103.4	1.3	17.5
Lowboy Trk/Trlr	1	6	50	0.0398	0.00672	2.0	11.9	0.3	2.0
Personal Vehicles	5	13	50	0.0042	0.00071	1.0	13.6	0.2	2.3
						11.4	*134.5*	*1.9*	*22.7*
LST Steel Haul									
1 Ton Crew Cab Flat Bed, 4X4	2	45	50	0.0042	0.00071	0.4	18.9	0.1	3.2
40' Flat Bed Truck & Trailer	1	45	100	0.0398	0.00672	4.0	179.0	0.7	30.3
Personal Vehicles	4	45	50	0.0042	0.00071	0.8	37.8	0.1	6.4
						5.2	*235.6*	*0.9*	*39.8*
LST Retrofit									
3/4 Ton Pick-up Truck, 4X4	3	45	100	0.0042	0.00071	1.3	56.6	0.2	9.6
1 Ton Crew Cab Flat Bed, 4X4	2	45	100	0.0042	0.00071	0.8	37.8	0.1	6.4
Personal Vehicles	14	45	50	0.0042	0.00071	2.9	132.1	0.5	22.3
						5.0	*226.5*	*0.9*	*38.3*
Remove/Install OPGW									
1 Ton Crew Cab Flat Bed, 4X4	2	72	100	0.0042	0.00071	0.8	60.4	0.1	10.2
Wire Truck & Trailer	0	0	0	0.0398	0.00672	0.0	0.0	0.0	0.0
Dump Truck (Trash)	1	72	50	0.0398	0.00672	2.0	143.2	0.3	24.2
3/4 Ton Pick-up Truck, 4X4	4	72	100	0.0042	0.00071	1.7	120.8	0.3	20.4
Pole Truck & Trailer	0	0	0	0.0398	0.00672	0.0	0.0	0.0	0.0
Static Truck	0	0	0	0.0398	0.00672	0.0	0.0	0.0	0.0
Fuel, Helicopter Support Truck	1	24	50	0.0398	0.00672	2.0	47.7	0.3	8.1
Low Boy Truck & Trailer	0	0	0	0.0398	0.00672	0.0	0.0	0.0	0.0
Personal Vehicles	15	0	50	0.0042	0.00071	3.1	0.0	0.5	0.0
						9.6	*372.2*	*1.6*	*62.9*
Restoration									
1 Ton Crew Cab 4X4	2	25	100	0.0042	0.00071	0.8	21.0	0.1	3.5
Water Truck	1	25	100	0.0398	0.00672	4.0	99.5	0.7	16.8
Lowboy Truck/Trailer	1	25	100	0.0398	0.00672	4.0	99.5	0.7	16.8
Personal Vehicles	7	25	50	0.0042	0.00071	1.5	36.7	0.2	6.2
						10.3	*256.6*	*1.7*	*43.4*
					Total	44.6	1832.9	7.5	309.8

Eldorado-Ivanpah 500kV Construction

Unpaved Road Fugitive Dust Emissions

Unpaved Road Fugitive Dust Emissions
From SCAQMD CEQA AQ Handbook
Table A9-9-D

E=V*F
V= vehicle miles travelled on unpaved roads
F=2.1*(G/12)*(H/30)*((J/3)^.7)*((I/4)^.5)*((365-K)/365)
G= surface silt
H= mean vehicle speed
I= number of wheels
J=vehicle wt
K= days of precip per year at least 0.01 in

0.212 PM2.5 fraction of PM10 from SCAQMD Table A - Updated CEIDARS Table with PM2.5 Fractions

Light Vehicles Factor
G= 11 Assumed
H= 15 Assumed
I= 4 wheels
J= 3 tons
k= 18 precip days

0.9 F PM10 (lbs/VMT)
0.19 F PM2.5 (lbs/VMT)

Heavy Vehicles Factor
G= 11 Assumed
H= 15 Assumed
I= 10 wheels
J= 8 tons
k= 18 precip days

2.9 F PM10 (lbs/VMT)
0.61 F PM2.5 (lbs/VMT)

Assumed 50% control for watering
Assumed 95% control of the water truck emissions

						Uncontrolled Emissions				Controlled Emissions (50%)			
			Max	F PM10	F PM2.5	PM10		PM2.5		PM10		PM2.5	
Activity	Number	Days	VMT/day	(lbs/VMT)	(lbs/VMT)	(lbs/day)	lbs activity	(lbs/day)	lbs activity	(lbs/day)	lbs activity	(lbs/day)	lbs activity
Marshalling Yards													
1 Ton Crew Cab 4X4	1	200	3	0.9	0.19	2.7	549.0	0.6	116.4	1.4	274.5	0.3	58.2
Truck, Semi, Tractor	1	200	3	2.9	0.61	8.6	1724.8	1.8	365.7	4.3	862.4	0.9	182.8
Personal Vehicles	4	200	2	0.9	0.19	7.3	1464.1	1.6	310.4	3.7	732.0	0.8	155.2
30 Ton Crane Truck	1	200	3	2.9	0.61	8.6	1724.8	1.8	365.7	4.3	862.4	0.9	182.8
										13.7	*2731.3*	*2.9*	*579.0*
Roads and Landing Work													
1 Ton Crew Cab 4X4	2	13	3	0.9	0.19	5.5	71.4	1.2	15.1	2.7	35.7	0.6	7.6
Water Trucks	2	13	40	2.9	0.61	230.0	2989.6	48.8	633.8	11.5	149.5	2.4	31.7
Lowboy Trk/Trlr	1	6	3	2.9	0.61	8.6	51.7	1.8	11.0	4.3	25.9	0.9	5.5
Personal Vehicles	5	13	2	0.9	0.19	9.2	119.0	1.9	25.2	4.6	59.5	1.0	12.6
										23.1	*270.5*	*4.9*	*57.3*
LST Steel Haul													
1 Ton Crew Cab Flat Bed, 4X4	2	45	3	0.9	0.19	5.5	247.1	1.2	52.4	2.7	123.5	0.6	26.2
40' Flat Bed Truck & Trailer	1	45	3	2.9	0.61	8.6	388.1	1.8	82.3	4.3	194.0	0.9	41.1
Personal Vehicles	4	45	2	0.9	0.19	7.3	329.4	1.6	69.8	3.7	164.7	0.8	34.9
										10.7	*482.3*	*2.3*	*102.2*
LST Retrofit													
3/4 Ton Pick-up Truck, 4X4	3	45	3	0.9	0.19	8.2	370.6	1.7	78.6	4.1	185.3	0.9	39.3
1 Ton Crew Cab Flat Bed, 4X4	2	45	3	0.9	0.19	5.5	247.1	1.2	52.4	2.7	123.5	0.6	26.2
Personal Vehicles	14	45	2	0.9	0.19	25.6	1152.9	5.4	244.4	12.8	576.5	2.7	122.2
30 Ton Crane Truck	2	45	3	2.9	0.61	17.2	776.2	3.7	164.5	8.6	388.1	1.8	82.3
80 Ton Rough Terrain Crane	1	45	3	2.9	0.61	8.6	388.1	1.8	82.3	4.3	194.0	0.9	41.1
80ft. Hydraulic Man-lift	1	45	3	2.9	0.61	8.6	388.1	1.8	82.3	4.3	194.0	0.9	41.1
Compressor Trailer	2	45	3	2.9	0.61	17.2	776.2	3.7	164.5	8.6	388.1	1.8	82.3
										45.5	*2049.5*	*9.7*	*434.5*
Remove/Install OPGW													
1 Ton Crew Cab Flat Bed, 4X4	2	72	3	0.9	0.19	5.5	395.3	1.2	83.8	2.7	197.6	0.6	41.9
Wire Truck & Trailer	0	0	3	2.9	0.61	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dump Truck (Trash)	1	72	3	2.9	0.61	8.6	620.9	1.8	131.6	4.3	310.5	0.9	65.8
3/4 Ton Pick-up Truck, 4X4	4	72	3	0.9	0.19	11.0	790.6	2.3	167.6	5.5	395.3	1.2	83.8
Pole Truck & Trailer	0	0	3	2.9	0.61	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Static Truck	0	0	3	2.9	0.61	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel, Helicopter Support Truck	1	24	3	2.9	0.61	8.6	207.0	1.8	43.9	4.3	103.5	0.9	21.9
Low Boy Truck & Trailer	0	0	3	2.9	0.61	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Personal Vehicles	15	0	2	0.9	0.19	27.5	0.0	5.8	0.0	13.7	0.0	2.9	0.0
80ft. Hydraulic Man-lift	1	36	3	2.9	0.61	8.6	310.5	1.8	65.8	4.3	155.2	0.9	32.9
										34.9	*1162.1*	*7.4*	*246.4*
Restoration													
1 Ton Crew Cab 4X4	2	25	3	0.9	0.19	5.5	137.3	1.2	29.1	2.7	68.6	0.6	14.5
Water Truck	1	25	40	2.9	0.61	115.0	2874.7	24.4	609.4	5.7	143.7	1.2	30.5
Lowboy Truck/Trailer	1	25	3	2.9	0.61	8.6	215.6	1.8	45.7	4.3	107.8	0.9	22.9
Personal Vehicles	7	25	2	0.9	0.19	12.8	320.3	2.7	67.9	6.4	160.1	1.4	33.9
										19.2	*480.3*	*4.1*	*101.8*
									Total		7176		1521

Eldorado-Ivanpah 500kV Construction
Helicopter Emission Factors

Emissions lbs/hour					
ROG	CO	NOX	SOX	PM	CO2
1.400	9.994	12.794	0.957	1.595	2831.000

***Assumed a helicopter with 2 GE T58-S engines, used Table 5-7 in "Procedures for Emission Inventory Preparation, Volume IV: Mobile Sources, EPA420-R-92-009, December 1992"
***Assumed 50% power usage for entire period of operation, 14.77 lb/min fuel flow (886 lbs/hr)
***Assumed all of the helicopter emissions were released within the mixing layer

CO2 from: Energy Information Administration, Documentation for Emissions of Greenhouse Gases in the United States 2005, DOE/EIA-0638 (2005), October 2007, Tables 6-1, 6-2, 6-4, and 6-5.
http://www.eia.doe.gov/oiaf/1605/excel/Fuel%20Emission%20Factors.xls

21.09	lb/gal	Jet fuel CO2 emission factor
6.5	lb/gal	assumed density of jet fuel
134.2424242	gal/hr	
2831.172727	lbs/hr	CO2 emission rate

Eldorado-Ivanpah 33kV Loop Construction
Emission Summary

Activity Emissions	Emissions (lbs)						
	CO	NOx	ROG	SOx	PM10	PM2.5	CO2
Combustion Related Emissions							
On-Road Vehicles	43	5	5	0.06	0.5	0.4	5698
Off-Road Vehicles and Equipment	54	198	19	0.23	7	6	20884
Fugitive Dust Emissions							
Paved Roads	-	-	-	-	52	9	-
Unpaved Roads	-	-	-	-	153	32	-
Construction Activities	-	-	-	-	2	1	-
Total Activity Emissions (tons)	0.05	0.10	0.012	0.00014	0.11	0.02	13.29
Total California Activity Emissions (tons)	0.05	0.10	0.012	0.00014	0.11	0.02	13.29
Construction Days	8	8	8	8	8	8	8
Average Daily Emissions (lbs)	12	25	2.9	0.036	27	6.1	3323

Eldorado-Ivanpah 33kV Loop Construction
Workforce Estimate

Work Activity						Activity Production	
Primary Equipment Description	**Estimated Horse-Power**	**Probable Fuel Type**	**Primary Equipment Quantity**	**Estimated Workforce**	**Estimated Schedule (Days)**	**Estimated Average Duration of Use (Hrs/Day)**	**Estimated Production Per Day**
Trenching, Structure Excavation (1)				4	8		
1-ton crew cab	300	Diesel	1			2	
Backhoe front loader	300	Diesel	1			8	
Overhead Line (2)				4	3		
1- ton crew cab, 4X4	300	Diesel	1	5	3	2	
55-foot double-bucket truck	350	Diesel	1		3	7	
50-foot digger derrick	350	Diesel	1		3	4	
Underground Cable Pulling (3)				4	2		
1-ton crew cab, 4X4	300	Diesel	1		2	2	
Router placer truck	350	Diesel	1		2	6	
Hydraulic rewind puller	300	Diesel	1		2	6	
Underground Cable Makeup (4)				8	60	10	
1-ton crew cab, 4X4	300	Diesel	1		4	2	
55-foot double-bucket truck	350	Diesel	1		4	4	
1. Trenching and Conduit Installation = one 4-man crew							
2. Overhead Line Work = one 4-man crew							
3. Underground Cable Pulling = one 4-man crew							
4. Underground Cable Makeup							

Eldorado-Ivanpah 33kV Loop Construction

On Site Equipment Exhaust Emissions

From SCAQMD offroad emission factors file name "offroadEF_07_25.xls" 2010

Description	Number	Hours per Day	Days of Activity	2010 Emission Factor (lbs/hr)						Emissions (lbs/day)						Total Activity Emissions (lbs)					
				ROG	CO	NOX	SOX	PM	CO2	ROG	CO	NOX	SOX	PM	CO2	ROG	CO	NOX	SOX	PM	CO2
Backhoe	1	8	8	0.142	0.404	1.549	0.002	0.052	172	1.1	3.2	12.4	0.0	0.4	1374	9	26	99	0.12	3	10991
55 ft double bucket truck	1	7	3	0.124	0.346	1.237	0.001	0.047	112	0.9	2.4	8.7	0.0	0.3	785	3	7	26	0.03	1.0	2355
50 ft digger	1	4	3	0.124	0.346	1.237	0.001	0.047	112	0.5	1.4	4.9	0.0	0.2	449	1	4	15	0.02	0.6	1346
Router placer truck	1	6	2	0.124	0.346	1.237	0.001	0.047	112	0.7	2.1	7.4	0.0	0.3	673	1	4	15	0.02	0.6	1346
Hydraulic puller	1	6	2	0.171	0.607	1.982	0.002	0.068	254	1.0	3.6	11.9	0.0	0.4	1525	2	7	24	0.03	0.8	3051
55 ft double bucket truck	1	4	4	0.124	0.346	1.237	0.001	0.047	112	0.5	1.4	4.9	0.0	0.2	449	2	6	20	0.02	0.8	1795
															TOTAL	**19**	**54**	**198**	**0.23**	**7.0**	**20884**

Eldorado-Ivanpah 33kV Loop Construction
Exhaust, Tire and Brake Emissions

From SCAQMD file "onroadEF07_26.xls"
Used 2010 Table

	Vehicles <8500 lbs (lbs/mile)	Vehicles >8500 lbs (lbs/mile)	Vehicles >33000 lbs (lbs/mile)
CO	0.00826	0.01844	0.01195
NOx	0.00092	0.02062	0.03822
ROG	0.00091	0.00259	0.00304
SOx	0.00001	0.00003	0.00004
PM10	0.00009	0.00075	0.00183
PM2.5	0.00005	0.00064	0.00160
CO2	1.09568	2.732222	4.21121

				Emission Factor (lb/VMT)							Emissions (lbs/day)							Activity Emissions (lbs)						
Activity	Number	Days	VMT/day	CO	NOx	ROG	SOx	PM10	PM2.5	CO2	CO	NOx	ROG	SOx	PM10	PM2.5	CO2	CO	NOx	ROG	SOx	PM10	PM2.5	CO2
Personal Vehicles	4	8	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	1.65	0.18	0.18	0.00	0.02	0.01	219	13.22	1.47	1.46	0.017	0.14	0.09	1753
Personal Vehicles	5	3	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	2.07	0.23	0.23	0.00	0.02	0.01	274	6.20	0.69	0.69	0.008	0.07	0.04	822
Personal Vehicles	4	2	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	1.65	0.18	0.18	0.00	0.02	0.01	219	3.31	0.37	0.37	0.004	0.03	0.02	438
Personal Vehicles	8	4	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	3.31	0.37	0.37	0.00	0.03	0.02	438	13.22	1.47	1.46	0.017	0.14	0.09	1753
1 Ton Crew Cab 4X4	1	8	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	0.41	0.05	0.05	0.00	0.00	0.00	55	3.31	0.37	0.37	0.004	0.03	0.02	438
1 Ton Crew Cab 4X4	1	3	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	0.41	0.05	0.05	0.00	0.00	0.00	55	1.24	0.14	0.14	0.002	0.01	0.01	164
1 Ton Crew Cab 4X4	1	2	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	0.41	0.05	0.05	0.00	0.00	0.00	55	0.83	0.09	0.09	0.001	0.01	0.01	110
1 Ton Crew Cab 4X4	1	4	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	0.41	0.05	0.05	0.00	0.00	0.00	55	1.65	0.18	0.18	0.002	0.02	0.01	219
																	TOTAL	**43**	**4.8**	**4.8**	**0.056**	**0.45**	**0.28**	**5698**

Eldorado-Ivanpah 33kV Loop Construction
On site fugitive dust during active construction activities

Distrubed acreage from Proj Discription Table 3-13

Assumes uncontrolled fugitive dust emission factor of 10 lbs/acre/day for PM10
Assumes PM2.5 is 50% of PM10 for fugitive dust
Assumes 50% controls from watering twice per day

Project Feature	Site Quantity	Disturbed Acreage Calculation (L x W)	Acres Disturbed During Construction	Assumed Days of Activity	Assumed Active Construction Activity (acres/day)	PM10 (lbs/day)	PM2.5 (lbs/day)	Total Activity PM10 (lbs)	Total Activity PM2.5 (lbs)
Underground Trench	1	2600 x 1.5	0.09	8	0.01125	0.05625	0.028125	0.45	0.225
Underground Manhole	2	10 x 15	0.01	1	0.01	0.05	0.025	0.05	0.025
Work area manholes	2	40 x 60	0.12	1	0.12	0.6	0.3	0.6	0.3
Work area pulling	3	40 x 60	0.12	2	0.06	0.3	0.15	0.6	0.3
Total Active Construction Area			0.34					1.7	0.85

Eldorado-Ivanpah 33kV Loop Construction

Unpaved Road Fugitive Dust Emissions

Unpaved Road Fugitive Dust Emissions
From SCAQMD CEQA AQ Handbook
Table A9-9-D

E=V*F
V= vehicle miles travelled on unpaved roads
F=2.1*(G/12)*(H/30)*((J/3)^.7)*((I/4)^.5)*((365-K)/365)
G= surface silt
H= mean vehicle speed
I= number of wheels
J=vehicle wt
K= days of precip per year at least 0.01 in

0.212 PM2.5 fraction of PM10 from SCAQMD Table A - Updated CEIDARS Table with PM2.5 Fractions

Light Vehicles Factor
G= 11 Assumed
H= 15 Assumed
I= 4 wheels
J= 3 tons
k= 18 precip days

0.9 F PM10 (lbs/VMT)
0.19 F PM2.5 (lbs/VMT)

Heavy Vehicles Factor
G= 11 Assumed
H= 15 Assumed
I= 10 wheels
J= 8 tons
k= 18 precip days

2.9 F PM10 (lbs/VMT)
0.61 F PM2.5 (lbs/VMT)

Assumed 50% control for watering
Assumed 95% control of the water truck emissions

						Uncontrolled Emissions				Controlled Emissions (50%)			
			Max	F PM10	F PM2.5	PM10		PM2.5		PM10		PM2.5	
Activity	Number	Days	VMT/day	(lbs/VMT)	(lbs/VMT)	(lbs/day)	lbs activity	(lbs/day)	lbs activity	(lbs/day)	lbs activity	(lbs/day)	lbs activity
Personal Vehicles	4	8	2	0.9	0.19	7.3	58.6	1.6	12.4	3.7	29.3	0.8	6.2
Personal Vehicles	5	3	2	0.9	0.19	9.2	27.5	1.9	5.8	4.6	13.7	1.0	2.9
Personal Vehicles	4	2	2	0.9	0.19	7.3	14.6	1.6	3.1	3.7	7.3	0.8	1.6
Personal Vehicles	8	4	2	0.9	0.19	14.6	58.6	3.1	12.4	7.3	29.3	1.6	6.2
1 Ton Crew Cab 4X4	1	8	3	2.9	0.61	8.6	69.0	1.8	14.6	4.3	34.5	0.9	7.3
1 Ton Crew Cab 4X4	1	3	3	2.9	0.61	8.6	25.9	1.8	5.5	4.3	12.9	0.9	2.7
1 Ton Crew Cab 4X4	1	2	3	2.9	0.61	8.6	17.2	1.8	3.7	4.3	8.6	0.9	1.8
1 Ton Crew Cab 4X4	1	4	3	2.9	0.61	8.6	34.5	1.8	7.3	4.3	17.2	0.9	3.7
									Total		153		32

Eldorado-Ivanpah 33kV Loop Construction
Paved Road Fugitive Dust Emissions

Light Weight Vehicles on paved road fugitive dust
From SCAQMD CEQA AQ Handbook
Table A9-9-B

E=VxG (PM10 with street cleaning)

V= vehicle miles travelled
G=EF from table A9-9-9-B1

G(PM10 lb/VMT)	Road Type
0.018	Local Streets
0.013	Collector Streets
0.0064	Major Streets/Highways
0.00065	Freeways

Assumed Mix of Roads
0.10 Local Streets (assumed 10%)
0.10 Collector Streets (assumed 10%)
0.10 Major Streets/Highways (10%)
0.70 Freeways (assumed 70%)

Composite light vehicle Emission Factor
0.0042 PM10 per VMT

0.169 PM2.5 fraction of PM10 from SCAQMD Table A - Updated CEIDARS Table with PM2.5 Fractions

0.00071 PM2.5 per VMT

Heavy Vehicles on paved road fugitive dust
Use SCAQMD CEQA Table A9-9-C
E=VxF (PM10 without street cleaning)
V= vehicle miles travelled
G from table A9-9-C1
F=0.77*((G*0.35)^0.3) lbs/VMT

Assume 60 percent reduction for street sweeping per Table A9-9

Road Type	G(PM10 oz/sq yd)	F(PM10 lb/VMT)	F with sweeping
Local Streets	0.04	0.213958	0.085583
Collector Streets	0.03	0.196267	0.078507
Major Streets/Highwa	0.012	0.149096	0.059638
Freeways	0.00065	0.062171	0.024868

Assumed Mix of Roads
0.10 Local Streets (assumed 10%)
0.10 Collector Streets (assumed 10%)
0.10 Major Streets/Highways (10%)
0.70 Freeways (assumed 70%)

Composite heavy vehicle Emission Factor
0.040 PM10 per VMT

0.169 PM2.5 fraction of PM10 from SCAQMD Table A - Updated CEIDARS Table with PM2.5 Fractions

0.0067 PM2.5 per VMT

						Emissions Assuming Street Cleaning			
				F PM10	F PM2.5	PM10		PM2.5	
Activity	Number	Days	VMT/day	(lbs/VMT)	(lbs/VMT)	(lbs/day)	lbs activity	(lbs/day)	lbs activity
Personal Vehicles	4	8	50	0.0042	0.00071	0.8	6.7	0.1	1.1
Personal Vehicles	5	3	50	0.0042	0.00071	1.0	3.1	0.2	0.5
Personal Vehicles	4	2	50	0.0042	0.00071	0.8	1.7	0.1	0.3
Personal Vehicles	8	4	50	0.0042	0.00071	1.7	6.7	0.3	1.1
1 Ton Crew Cab 4X4	1	8	50	0.0398	0.00672	2.0	15.9	0.3	2.7
1 Ton Crew Cab 4X4	1	3	50	0.0398	0.00672	2.0	6.0	0.3	1.0
1 Ton Crew Cab 4X4	1	2	50	0.0398	0.00672	2.0	4.0	0.3	0.7
1 Ton Crew Cab 4X4	1	4	50	0.0398	0.00672	2.0	8.0	0.3	1.3
					Total		**52.1**		**8.8**

Eldorado-Ivanpah Telecommunications System Construction
Emission Summary

Activity Emissions	Emissions (lbs)						
	CO	NOx	ROG	SOx	PM10	PM2.5	CO2
Combustion Related Emissions							
On-Road Vehicles	1868	864	226	3	39	33	257814
Off-Road Vehicles and Equipment	1380	5204	484	6	180	153	563837
Fugitive Dust Emissions							
Paved Roads	-	-	-	-	3541	598	-
Unpaved Roads	-	-	-	-	6258	1624	-
Construction Activities	-	-	-	-	292	146	-
Total Activity Emissions (tons)	1.6	3.0	0.36	0.0044	5.2	1.3	410.8
Total California Activity Emissions (tons)	0.32	0.61	0.071	0.0009	1.0	0.26	82.2
Construction Days	300	300	300	300	300	300	300
Average Daily Emissions (lbs)	11	20	2.4	0.030	34	8.5	2739

Eldorado-Ivanpah Telecommunications System Construction

On Site Equipment Exhaust Emissions From SCAQMD offroad emission factors file name "offroadEF_07_25.xls" 2010

Description	Number	Hours per Day	Days of Activity	2010 Emission Factor (lbs/hr)						Emissions (lbs/day)						Total Activity Emissions (lbs)					
				ROG	CO	NOX	SOX	PM	CO2	ROG	CO	NOX	SOX	PM	CO2	ROG	CO	NOX	SOX	PM	CO2
Splicing lab vehicle	1	6	30	0.124	0.346	1.237	0.001	0.047	112	0.7	2.1	7.4	0.0	0.3	673	22	62	223	0	8	20189
Telsa Cable truck	1	8	5	0.124	0.346	1.237	0.001	0.047	112	1.0	2.8	9.9	0.0	0.4	897	5	14	49	0	2	4486
Splicing van	1	8	5	0.124	0.346	1.237	0.001	0.047	112	1.0	2.8	9.9	0.0	0.4	897	5	14	49	0	2	4486
Backhoe	1	8	66	0.142	0.404	1.549	0.002	0.052	172	1.1	3.2	12.4	0.0	0.4	1374	75	213	818	1	28	90677
Telsa Cable truck	1	6	8	0.124	0.346	1.237	0.001	0.047	112	0.7	2.1	7.4	0.0	0.3	673	6	17	59	0	2	5384
Splicing van	1	8	4	0.124	0.346	1.237	0.001	0.047	112	1.0	2.8	9.9	0.0	0.4	897	4	11	40	0	2	3589
Backhoe	1	8	119	0.142	0.404	1.549	0.002	0.052	172	1.1	3.2	12.4	0.0	0.4	1374	135	384	1475	2	50	163494
Telsa Cable truck	2	8	7	0.124	0.346	1.237	0.001	0.047	112	2.0	5.5	19.8	0.0	0.8	1795	14	39	139	0	5	12562
Telsa Cable truck	2	8	4	0.124	0.346	1.237	0.001	0.047	112	2.0	5.5	19.8	0.0	0.8	1795	8	22	79	0	3	7178
Telsa Cable truck	1	8	9	0.124	0.346	1.237	0.001	0.047	112	1.0	2.8	9.9	0.0	0.4	897	9	25	89	0	3	8075
Splicing van	1	8	4	0.124	0.346	1.237	0.001	0.047	112	1.0	2.8	9.9	0.0	0.4	897	4	11	40	0	2	3589
Backhoe	1	8	132	0.142	0.404	1.549	0.002	0.052	172	1.1	3.2	12.4	0.0	0.4	1374	150	426	1636	2	55	181354
Telsa Cable truck	1	8	5	0.124	0.346	1.237	0.001	0.047	112	1.0	2.8	9.9	0.0	0.4	897	5	14	49	0	2	4486
Splicing van	1	8	2	0.124	0.346	1.237	0.001	0.047	112	1.0	2.8	9.9	0.0	0.4	897	2	6	20	0	1	1795
Crane	1	4	8	0.124	0.346	1.237	0.001	0.047	112	0.5	1.4	4.9	0.0	0.2	449	4	11	40	0	2	3589
Drill rig	1	6	7	0.149	0.557	1.705	0.003	0.061	311	0.9	3.3	10.2	0.0	0.4	1868	6	23	72	0	3	13075
Concrete pump	1	6	2	0.248	0.743	2.388	0.003	0.088	260	1.5	4.5	14.3	0.0	0.5	1561	3	9	29	0	1	3121
Fork Lift	1	4	10	0.142	0.404	1.549	0.002	0.052	172	0.6	1.6	6.2	0.0	0.2	687	6	16	62	0	2	6869
Backhoe	1	6	10	0.142	0.404	1.549	0.002	0.052	172	0.9	2.4	9.3	0.0	0.3	1030	9	24	93	0	3	10304
Telsa Cable truck	1	8	1	0.124	0.346	1.237	0.001	0.047	112	1.0	2.8	9.9	0.0	0.4	897	1	3	10	0	0	897
Splicing van	1	8	1	0.124	0.346	1.237	0.001	0.047	112	1.0	2.8	9.9	0.0	0.4	897	1	3	10	0	0	897
Backhoe	1	8	10	0.142	0.404	1.549	0.002	0.052	172	1.1	3.2	12.4	0.0	0.4	1374	11	32	124	0	4	13739
															TOTAL	**484**	**1380**	**5204**	**6**	**180**	**563837**

Eldorado-Ivanpah Telecommunications System Construction
Exhaust, Tire and Brake Emissions

From SCAQMD file "onroadEF07_26.xls"
Used 2010 Table

	Vehicles <8500 lbs (lbs/mile)	Vehicles >8500 lbs (lbs/mile)	Vehicles >33000 lbs (lbs/mile)
CO	0.00826	0.01844	0.01195
NOx	0.00092	0.02062	0.03822
ROG	0.00091	0.00259	0.00304
SOx	0.00001	0.00003	0.00004
PM10	0.00009	0.00075	0.00183
PM2.5	0.00005	0.00064	0.00160
CO2	1.0957	2.7322	4.2112

				Emission Factor (lb/VMT)							Emissions (lbs/day)							Activity Emissions (lbs)						
Activity	Number	Days	VMT/day	CO	NOx	ROG	SOx	PM10	PM2.5	CO2	CO	NOx	ROG	SOx	PM10	PM2.5	CO2	CO	NOx	ROG	SOx	PM10	PM2.5	CO2
Personal Vehicles	3	30	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	1.24	0.14	0.14	0.00	0.01	0.01	164	37.18	4.13	4.11	0.05	0.39	0.25	4931
Personal Vehicles	4	5	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	1.65	0.18	0.18	0.00	0.02	0.01	219	8.26	0.92	0.91	0.01	0.09	0.05	1096
Personal Vehicles	4	66	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	1.65	0.18	0.18	0.00	0.02	0.01	219	109.07	12.12	12.06	0.14	1.15	0.72	14463
Personal Vehicles	4	8	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	1.65	0.18	0.18	0.00	0.02	0.01	219	13.22	1.47	1.46	0.02	0.14	0.09	1753
Personal Vehicles	4	119	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	1.65	0.18	0.18	0.00	0.02	0.01	219	196.65	21.85	21.75	0.26	2.07	1.30	26077
Personal Vehicles	4	7	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	1.65	0.18	0.18	0.00	0.02	0.01	219	11.57	1.29	1.28	0.02	0.12	0.08	1534
Personal Vehicles	4	4	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	1.65	0.18	0.18	0.00	0.02	0.01	219	6.61	0.73	0.73	0.01	0.07	0.04	877
Personal Vehicles	4	9	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	1.65	0.18	0.18	0.00	0.02	0.01	219	14.87	1.65	1.65	0.02	0.16	0.10	1972
Personal Vehicles	4	132	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	1.65	0.18	0.18	0.00	0.02	0.01	219	218.14	24.24	24.13	0.28	2.30	1.45	28926
Personal Vehicles	4	8	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	1.65	0.18	0.18	0.00	0.02	0.01	219	13.22	1.47	1.46	0.02	0.14	0.09	1753
Personal Vehicles	4	5	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	1.65	0.18	0.18	0.00	0.02	0.01	219	8.26	0.92	0.91	0.01	0.09	0.05	1096
Personal Vehicles	8	68	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	3.31	0.37	0.37	0.00	0.03	0.02	438	224.75	24.97	24.86	0.29	2.37	1.49	29803
Personal Vehicles	4	1	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	1.65	0.18	0.18	0.00	0.02	0.01	219	1.65	0.18	0.18	0.00	0.02	0.01	219
Half Ton Pickup	1	30	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	0.83	0.09	0.09	0.00	0.01	0.01	110	24.79	2.75	2.74	0.03	0.26	0.16	3287
Half Ton Pickup	1	5	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	0.83	0.09	0.09	0.00	0.01	0.01	110	4.13	0.46	0.46	0.01	0.04	0.03	548
Half Ton Pickup	1	66	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	0.83	0.09	0.09	0.00	0.01	0.01	110	54.53	6.06	6.03	0.07	0.57	0.36	7232
Half Ton Pickup	1	8	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	0.83	0.09	0.09	0.00	0.01	0.01	110	6.61	0.73	0.73	0.01	0.07	0.04	877
Half Ton Pickup	1	119	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	0.83	0.09	0.09	0.00	0.01	0.01	110	98.33	10.93	10.88	0.13	1.04	0.65	13039
Half Ton Pickup	1	7	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	0.83	0.09	0.09	0.00	0.01	0.01	110	5.78	0.64	0.64	0.01	0.06	0.04	767
Half Ton Pickup	1	4	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	0.83	0.09	0.09	0.00	0.01	0.01	110	3.31	0.37	0.37	0.00	0.03	0.02	438
Half Ton Pickup	1	9	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	0.83	0.09	0.09	0.00	0.01	0.01	110	7.44	0.83	0.82	0.01	0.08	0.05	986
Half Ton Pickup	1	132	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	0.83	0.09	0.09	0.00	0.01	0.01	110	109.07	12.12	12.06	0.14	1.15	0.72	14463
Half Ton Pickup	1	8	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	0.83	0.09	0.09	0.00	0.01	0.01	110	6.61	0.73	0.73	0.01	0.07	0.04	877
Half Ton Pickup	1	5	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	0.83	0.09	0.09	0.00	0.01	0.01	110	4.13	0.46	0.46	0.01	0.04	0.03	548
Half Ton Pickup	1	1	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	0.83	0.09	0.09	0.00	0.01	0.01	110	0.83	0.09	0.09	0.00	0.01	0.01	110
Half Ton Pickup	1	10	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	0.83	0.09	0.09	0.00	0.01	0.01	110	8.26	0.92	0.91	0.01	0.09	0.05	1096
1 Ton crew cab	1	15	50	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	0.41	0.05	0.05	0.00	0.00	0.00	55	6.20	0.69	0.69	0.01	0.07	0.04	822
Dump Truck	1	66	100	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	1.84	2.06	0.26	0.00	0.08	0.06	273	121.69	136.12	17.09	0.18	4.96	4.24	18033
Dump Truck	1	119	100	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	1.84	2.06	0.26	0.00	0.08	0.06	273	219.41	245.43	30.82	0.32	8.94	7.64	32513
Dump Truck	1	132	100	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	1.84	2.06	0.26	0.00	0.08	0.06	273	243.38	272.24	34.18	0.36	9.92	8.48	36065
Dump Truck	1	7	100	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	1.84	2.06	0.26	0.00	0.08	0.06	273	12.91	14.44	1.81	0.02	0.53	0.45	1913
Dump Truck	1	10	100	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	1.84	2.06	0.26	0.00	0.08	0.06	273	18.44	20.62	2.59	0.03	0.75	0.64	2732
Flat bed truck	1	3	50	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	0.92	1.03	0.13	0.00	0.04	0.03	137	2.77	3.09	0.39	0.00	0.11	0.10	410
2 ton truck	1	15	100	0.00826	0.00092	0.00091	0.00001	0.00009	0.00005	1.09568	0.83	0.09	0.09	0.00	0.01	0.01	110	12.39	1.38	1.37	0.02	0.13	0.08	1644
Concrete truck	1	2	100	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	1.84	2.06	0.26	0.00	0.08	0.06	273	3.69	4.12	0.52	0.01	0.15	0.13	546
Bucket Truck	2	8	100	0.01844	0.02062	0.00259	0.00003	0.00075	0.00064	2.73222	3.69	4.12	0.52	0.01	0.15	0.13	546	29.50	33.00	4.14	0.04	1.20	1.03	4372
																	TOTAL	**1868**	**864**	**226**	**3**	**39**	**31**	**257814**

Eldorado-Ivanpah Telecommunications System Construction
On site fugitive dust during active construction activities

Distrubed acreage from Proj Discription Table 3-16,17 and 18

Assumes uncontrolled fugitive dust emission factor of 10 lbs/acre/day for PM10
Assumes PM2.5 is 50% of PM10 for fugitive dust
Assumes 50% controls from watering twice per day
Assumes two times daily average acerage is actively disturbed

Project Feature	Acres Disturbed During Construction	Assumed Days of Activity	Assumed Active Construction Activity (acres/day)	PM10 (lbs/day)	PM2.5 (lbs/day)	Total Activity PM10 (lbs)	Total Activity PM2.5 (lbs)
Path 1	0.16	30	0.01	0.05	0.03	1.6	0.8
Path 2 Sec 1	27.8	200	0.28	1.39	0.70	278.0	139.0
Path 2 Sec 2	1.21	71	0.03	0.17	0.09	12.1	6.1
Total Active Construction Area	29.17					291.7	145.9

Eldorado-Ivanpah Telecommunications System Construction
Unpaved Road Fugitive Dust Emissions

Unpaved Road Fugitive Dust Emissions
From SCAQMD CEQA AQ Handbook
Table A9-9-D

E=V*F
V= vehicle miles travelled on unpaved roads
F=2.1*(G/12)*(H/30)*((J/3)^.7)*((I/4)^.5)*((365-K)/365)
G= surface silt
H= mean vehicle speed
I= number of wheels
J=vehicle wt
K= days of precip per year at least 0.01 in

0.212 PM2.5 fraction of PM10 from SCAQMD Table A - Updated CEIDARS Table with PM2.5 Fractions

Light Vehicles Factor
G= 11 Assumed
H= 15 Assumed
I= 4 wheels
J= 3 tons
k= 18 precip days

0.9 F PM10 (lbs/VMT)
0.19 F PM2.5 (lbs/VMT)

Heavy Vehicles Factor
G= 11 Assumed
H= 15 Assumed
I= 10 wheels
J= 8 tons
k= 18 precip days

2.9 F PM10 (lbs/VMT)
0.61 F PM2.5 (lbs/VMT)

Assumed 50% control for watering
Assumed 95% control of the water truck emissions

						Uncontrolled Emissions				Controlled Emissions (50%)			
			Max	F PM10	F PM2.5	PM10		PM2.5		PM10		PM2.5	
Activity	Number	Days	VMT/day	(lbs/VMT)	(lbs/VMT)	(lbs/day)	lbs activity	(lbs/day)	lbs activity	(lbs/day)	lbs activity	(lbs/day)	lbs activity
Personal Vehicles	3	30	2	0.9	0.19	5.5	164.7	1.2	34.9	2.7	82.4	0.6	17.5
Personal Vehicles	4	5	2	0.9	0.19	7.3	36.6	1.6	7.8	3.7	18.3	0.8	3.9
Personal Vehicles	4	66	2	0.9	0.19	7.3	483.1	1.6	102.4	3.7	241.6	0.8	51.2
Personal Vehicles	4	8	2	0.9	0.19	7.3	58.6	1.6	12.4	3.7	29.3	0.8	6.2
Personal Vehicles	4	119	2	0.9	0.19	7.3	871.1	1.6	184.7	3.7	435.6	0.8	92.3
Personal Vehicles	4	7	2	0.9	0.19	7.3	51.2	1.6	10.9	3.7	25.6	0.8	5.4
Personal Vehicles	4	4	2	0.9	0.19	7.3	29.3	1.6	6.2	3.7	14.6	0.8	3.1
Personal Vehicles	4	9	2	0.9	0.19	7.3	65.9	1.6	14.0	3.7	32.9	0.8	7.0
Personal Vehicles	4	132	2	0.9	0.19	7.3	966.3	1.6	204.9	3.7	483.1	0.8	102.4
Personal Vehicles	4	8	2	0.9	0.19	7.3	58.6	1.6	12.4	3.7	29.3	0.8	6.2
Personal Vehicles	4	5	2	0.9	0.19	7.3	36.6	1.6	7.8	3.7	18.3	0.8	3.9
Personal Vehicles	8	68	2	0.9	0.19	14.6	995.6	3.1	211.1	7.3	497.8	1.6	105.5
Personal Vehicles	4	1	2	0.9	0.19	7.3	7.3	1.6	1.6	3.7	3.7	0.8	0.8
						0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Half Ton Pickup	1	30	3	2	0.9	6.0	180.0	2.7	82.4	3.0	90.0	1.4	41.2
Half Ton Pickup	1	5	3	2	0.9	6.0	30.0	2.7	13.7	3.0	15.0	1.4	6.9
Half Ton Pickup	1	66	3	2	0.9	6.0	396.0	2.7	181.2	3.0	198.0	1.4	90.6
Half Ton Pickup	1	8	3	2	0.9	6.0	48.0	2.7	22.0	3.0	24.0	1.4	11.0
Half Ton Pickup	1	119	3	2	0.9	6.0	714.0	2.7	326.7	3.0	357.0	1.4	163.3
Half Ton Pickup	1	7	3	2	0.9	6.0	42.0	2.7	19.2	3.0	21.0	1.4	9.6
Half Ton Pickup	1	4	3	2	0.9	6.0	24.0	2.7	11.0	3.0	12.0	1.4	5.5
Half Ton Pickup	1	9	3	2	0.9	6.0	54.0	2.7	24.7	3.0	27.0	1.4	12.4
Half Ton Pickup	1	132	3	2	0.9	6.0	792.0	2.7	362.4	3.0	396.0	1.4	181.2
Half Ton Pickup	1	8	3	2	0.9	6.0	48.0	2.7	22.0	3.0	24.0	1.4	11.0
Half Ton Pickup	1	5	3	2	0.9	6.0	30.0	2.7	13.7	3.0	15.0	1.4	6.9
Half Ton Pickup	1	1	3	2	0.9	6.0	6.0	2.7	2.7	3.0	3.0	1.4	1.4
Half Ton Pickup	1	10	3	2	0.9	6.0	60.0	2.7	27.5	3.0	30.0	1.4	13.7
1 Ton crew cab	1	15	3	2.9	0.61	8.6	129.4	1.8	27.4	4.3	64.7	0.9	13.7
Dump Truck	1	66	3	2.9	0.61	8.6	569.2	1.8	120.7	4.3	284.6	0.9	60.3
Dump Truck	1	119	3	2.9	0.61	8.6	1026.3	1.8	217.6	4.3	513.1	0.9	108.8
Dump Truck	1	132	3	2.9	0.61	8.6	1138.4	1.8	241.3	4.3	569.2	0.9	120.7
Dump Truck	1	7	3	2.9	0.61	8.6	60.4	1.8	12.8	4.3	30.2	0.9	6.4
Dump Truck	1	10	3	2.9	0.61	8.6	86.2	1.8	18.3	4.3	43.1	0.9	9.1
Flat bed truck	1	3	3	2.9	0.61	8.6	25.9	1.8	5.5	4.3	12.9	0.9	2.7
2 ton truck	1	15	3	2.9	0.61	8.6	129.4	1.8	27.4	4.3	64.7	0.9	13.7
Concrete truck	1	2	3	2.9	0.61	8.6	17.2	1.8	3.7	4.3	8.6	0.9	1.8
Bucket Truck	2	8	3	2.9	0.61	17.2	138.0	3.7	29.3	8.6	69.0	1.8	14.6
Splicing lab vehicle	1	30	3	2.9	0.61	8.6	258.7	1.8	54.8	4.3	129.4	0.9	27.4
Telsa Cable truck	1	5	3	2.9	0.61	8.6	43.1	1.8	9.1	4.3	21.6	0.9	4.6
Splicing van	1	5	3	2.9	0.61	8.6	43.1	1.8	9.1	4.3	21.6	0.9	4.6
Backhoe	1	66	2	2.9	0.61	5.7	379.5	1.2	80.4	2.9	189.7	0.6	40.2
Telsa Cable truck	1	8	3	2.9	0.61	8.6	69.0	1.8	14.6	4.3	34.5	0.9	7.3
Splicing van	1	4	3	2.9	0.61	8.6	34.5	1.8	7.3	4.3	17.2	0.9	3.7
Backhoe	1	119	2	2.9	0.61	5.7	684.2	1.2	145.0	2.9	342.1	0.6	72.5
Telsa Cable truck	2	7	3	2.9	0.61	17.2	120.7	3.7	25.6	8.6	60.4	1.8	12.8
Telsa Cable truck	2	4	3	2.9	0.61	17.2	69.0	3.7	14.6	8.6	34.5	1.8	7.3
Telsa Cable truck	1	9	3	2.9	0.61	8.6	77.6	1.8	16.5	4.3	38.8	0.9	8.2
Splicing van	1	4	3	2.9	0.61	8.6	34.5	1.8	7.3	4.3	17.2	0.9	3.7
Backhoe	1	132	2	2.9	0.61	5.7	758.9	1.2	160.9	2.9	379.5	0.6	80.4
Telsa Cable truck	1	5	3	2.9	0.61	8.6	43.1	1.8	9.1	4.3	21.6	0.9	4.6
Splicing van	1	2	3	2.9	0.61	8.6	17.2	1.8	3.7	4.3	8.6	0.9	1.8
Crane	1	8	2	2.9	0.61	5.7	46.0	1.2	9.8	2.9	23.0	0.6	4.9
Drill rig	1	7	3	2.9	0.61	8.6	60.4	1.8	12.8	4.3	30.2	0.9	6.4
Concrete pump	1	2	3	2.9	0.61	8.6	17.2	1.8	3.7	4.3	8.6	0.9	1.8
Fork Lift	1	10	2	2.9	0.61	5.7	57.5	1.2	12.2	2.9	28.7	0.6	6.1
Backhoe	1	10	2	2.9	0.61	5.7	57.5	1.2	12.2	2.9	28.7	0.6	6.1
Telsa Cable truck	1	1	3	2.9	0.61	8.6	8.6	1.8	1.8	4.3	4.3	0.9	0.9
Splicing van	1	1	3	2.9	0.61	8.6	8.6	1.8	1.8	4.3	4.3	0.9	0.9
Backhoe	1	10	2	2.9	0.61	5.7	57.5	1.2	12.2	2.9	28.7	0.6	6.1
									Total		**6258**		**1624**

Eldorado-Ivanpah Telecommunications System Construction
Paved Road Fugitive Dust Emissions

Light Weight Vehicles on paved road fugitive dust
From SCAQMD CEQA AQ Handbook
Table A9-9-B

E=VxG (PM10 with street cleaning)

V= vehicle miles travelled
G=EF from table A9-9-9-B1

G(PM10 lb/VMT)	Road Type
0.018	Local Streets
0.013	Collector Streets
0.0064	Major Streets/Highways
0.00065	Freeways

Assumed Mix of Roads
0.10 Local Streets (assumed 10%)
0.10 Collector Streets (assumed 10%)
0.10 Major Streets/Highways (10%)
0.70 Freeways (assumed 70%)

Composite light vehicle Emission Factor
0.0042 PM10 per VMT

0.169 PM2.5 fraction of PM10 from SCAQMD Table A - Updated CEIDARS Table with PM2.5 Fractions

0.00071 PM2.5 per VMT

Heavy Vehicles on paved road fugitive dust
Use SCAQMD CEQA Table A9-9-C
E=VxF (PM10 without street cleaning)
V= vehicle miles travelled
G from table A9-9-C1
F=0.77*((G*0.35)^0.3) lbs/VMT

Assume 60 percent reduction for street sweeping per Table A9-9

Road Type	G(PM10 oz/sq yd)	F(PM10 lb/VMT)	F with sweeping
Local Streets	0.04	0.213958	0.085583
Collector Streets	0.03	0.196267	0.078507
Major Streets/Highwa	0.012	0.149096	0.059638
Freeways	0.00065	0.062171	0.024868

Assumed Mix of Roads
0.10 Local Streets (assumed 10%)
0.10 Collector Streets (assumed 10%)
0.10 Major Streets/Highways (10%)
0.70 Freeways (assumed 70%)

Composite heavy vehicle Emission Factor
0.040 PM10 per VMT

0.169 PM2.5 fraction of PM10 from SCAQMD Table A - Updated CEIDARS Table with PM2.5 Fractions

0.0067 PM2.5 per VMT

						Emissions Assuming Street Cleaning			
				F PM10	F PM2.5	PM10		PM2.5	
Activity	Number	Days	VMT/day	(lbs/VMT)	(lbs/VMT)	(lbs/day)	lbs activity	(lbs/day)	lbs activity
Personal Vehicles	3	30	50	0.0042	0.00071	0.6	18.9	0.1	3.2
Personal Vehicles	4	5	50	0.0042	0.00071	0.8	4.2	0.1	0.7
Personal Vehicles	4	66	50	0.0042	0.00071	0.8	55.4	0.1	9.4
Personal Vehicles	4	8	50	0.0042	0.00071	0.8	6.7	0.1	1.1
Personal Vehicles	4	119	50	0.0042	0.00071	0.8	99.8	0.1	16.9
Personal Vehicles	4	7	50	0.0042	0.00071	0.8	5.9	0.1	1.0
Personal Vehicles	4	4	50	0.0042	0.00071	0.8	3.4	0.1	0.6
Personal Vehicles	4	9	50	0.0042	0.00071	0.8	7.6	0.1	1.3
Personal Vehicles	4	132	50	0.0042	0.00071	0.8	110.7	0.1	18.7
Personal Vehicles	4	8	50	0.0042	0.00071	0.8	6.7	0.1	1.1
Personal Vehicles	4	5	50	0.0042	0.00071	0.8	4.2	0.1	0.7
Personal Vehicles	8	68	50	0.0042	0.00071	1.7	114.1	0.3	19.3
Personal Vehicles	4	1	50	0.0042	0.00071	0.8	0.8	0.1	0.1
Half Ton Pickup	1	30	100	0.0398	0.00672	4.0	119.3	0.7	20.2
Half Ton Pickup	1	5	100	0.0398	0.00672	4.0	19.9	0.7	3.4
Half Ton Pickup	1	66	100	0.0398	0.00672	4.0	262.6	0.7	44.4
Half Ton Pickup	1	8	100	0.0398	0.00672	4.0	31.8	0.7	5.4
Half Ton Pickup	1	119	100	0.0398	0.00672	4.0	473.4	0.7	80.0
Half Ton Pickup	1	7	100	0.0398	0.00672	4.0	27.8	0.7	4.7
Half Ton Pickup	1	4	100	0.0398	0.00672	4.0	15.9	0.7	2.7
Half Ton Pickup	1	9	100	0.0398	0.00672	4.0	35.8	0.7	6.1
Half Ton Pickup	1	132	100	0.0398	0.00672	4.0	525.1	0.7	88.7
Half Ton Pickup	1	8	100	0.0398	0.00672	4.0	31.8	0.7	5.4
Half Ton Pickup	1	5	100	0.0398	0.00672	4.0	19.9	0.7	3.4
Half Ton Pickup	1	1	100	0.0398	0.00672	4.0	4.0	0.7	0.7
Half Ton Pickup	1	10	100	0.0398	0.00672	4.0	39.8	0.7	6.7
1 Ton crew cab	1	15	50	0.0398	0.00672	2.0	29.8	0.3	5.0
Dump Truck	1	66	100	0.0398	0.00672	4.0	262.6	0.7	44.4
Dump Truck	1	119	100	0.0398	0.00672	4.0	473.4	0.7	80.0
Dump Truck	1	132	100	0.0398	0.00672	4.0	525.1	0.7	88.7
Dump Truck	1	7	100	0.0398	0.00672	4.0	27.8	0.7	4.7
Dump Truck	1	10	100	0.0398	0.00672	4.0	39.8	0.7	6.7
Flat bed truck	1	3	50	0.0398	0.00672	2.0	6.0	0.3	1.0
2 ton truck	1	15	100	0.0398	0.00672	4.0	59.7	0.7	10.1
Concrete truck	1	2	100	0.0398	0.00672	4.0	8.0	0.7	1.3
Bucket Truck	2	8	100	0.0398	0.00672	8.0	63.6	1.3	10.8
					Total		**3541.3**		**598.5**

Eldorado-Ivanpah System Construction
Total Emissions from All Activities

Location	Construction Activity	Total Activity Emissions (tons)							
		CO	NOx	ROG	SOx	PM10	PM2.5	CO2	CH4
California	Ivanpah Sub	3.8	10	1.1	0.01	4.0	1.0	1,052	0.074
	220 kV	4.5	8.1	0.96	0.04	8.0	1.9	1,103	-
	115 kV	0.28	0.44	0.06	0.0006	2.6	0.56	60	-
	33 Loop	0.05	0.10	0.01	0.0001	0.11	0.02	13	-
	Telecomm	0.32	0.61	0.07	0.0009	0.95	0.21	82	-
	Total	**9.0**	**19**	**2.2**	**0.05**	**16**	**3.7**	**2,310**	**0.074**
	1st 12-month Period	***5.7***	***12***	***1.4***	***0.03***	***10***	***2.4***	***1,459***	***0.047***
	2nd 12-month Period	***3.3***	***7.1***	***0.8***	***0.02***	***5.8***	***1.4***	***851***	***0.027***
Nevada	220 kV	18	32	3.8	0.16	32	7.8	4,411	-
	Telecomm	1.3	2.4	0.28	0.004	3.8	0.83	329	-
	500 kV	2.5	4.3	0.51	0.05	4.7	1.1	611	-
	Total	**22**	**39**	**4.6**	**0.22**	**41**	**10**	**5,351**	**-**
	1st 12-month Period	***14***	***25***	***2.9***	***0.14***	***26***	***6.1***	***3,379***	***-***
	2nd 12-month Period	***8.0***	***14***	***1.7***	***0.08***	***15***	***3.6***	***1,971***	***-***
TOTAL	Ivanpah Sub	3.8	10.0	1.1	0.01	4.0	1.0	1,052	0.074
	220 kV	22	40	4.8	0.20	40	9.7	5,513	-
	115 kV	0.28	0.44	0.06	0.001	2.6	0.56	60	-
	33 Loop	0.05	0.10	0.01	0.0001	0.11	0.02	13	-
	Telecomm	1.6	3.0	0.36	0.004	4.7	1.0	411	-
	500 kV	2.5	4.3	0.51	0.05	4.7	1.1	611	-
	Total	**31**	**58**	**6.8**	**0.27**	**56**	**13**	**7,660**	**0.074**
	1st 12-month Period	**19**	**37**	**4.3**	**0.17**	**36**	**8.5**	**4,838**	**0.047**
	2nd 12-month Period	**11**	**21**	**2.5**	**0.10**	**21**	**5.0**	**2,822**	**0.027**

Eldorado-Ivanpah System Construction
Average Daily Emissions from All Activities

Construction Activity	Average Daily Activity Emissions (lb/day)							
	CO	NOx	ROG	SOx	PM10	PM2.5	CO2	CH4
Ivanpah Sub	47	122	14	0.14	50	13	13,144	0.92
220 kV	77	138	16	0.69	137	33	18,816	-
115 kV	17	26	3.3	0.036	153	33	3,502	-
33 Loop	12	25	2.9	0.036	27	6.1	3323	
Telecomm	11	20	2.4	0.030	34	8.5	2,739	
500 kV	25	43	5.1	0.51	47	11	6,115	

Eldorado-Ivanpah System Construction
Regulated Greenhouse Gas Emissions from All Activities

Construction Combustion Related		
CO_2 project total	7662	tpy
CO_2 project total	6949	metric tpy
Amortized proj total construction	232	metric tpy/30 yrs CO_2
Operational SF_6 Leakage		
SF_6 Installed capacity	1620	lbs (estimated)
Annual Leakage rate	1	% (estimated)
Annual emissions	16	lbs
Annual emissions	387180	lbs CO_2 eq
Annual emissions	176	metric tpy/30 yrs CO_2
Operational Vehicle Exhaust		
Vehicle Exhaust (see note)	110	lbs CO_2 eq/day
Annual emissions	39992	lbs CO_2 eq
Annual emissions	18	metric tons
Total Annual 30 yr Amortized	**425**	**metric tpy/30 yrs CO_2**

Note:
Assumed 100 vmt per day of light duty pickup truck (CO_2=1.0957 lb/vmt) for routine inspection of substation and transmission lines

Appendix E
Scoping Summary Report

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Southern California Edison
Eldorado–Ivanpah Transmission Project
Scoping Summary Report

October 14, 2009

Prepared for the

United States Bureau of Land Management

and the

California Public Utilities Commission

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ABBREVIATIONS AND ACRONYMS

Abbreviation/Acronym	Item
BCCE	Boulder City Conservation Easement
BLM	Bureau of Land Management
CCDOA	Clark County Department of Aviation
CCR	California Code of Regulations
CDB	Center for Biological Diversity
CDCA	California Desert Conservation Area
CDFG	California Department of Fish and Game
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CPUC	California Public Utilities Commission
DWMA	Desert Wildlife Management Area
E & E	Ecology and Environment, Inc.
EIR	Environmental Impact Report (Draft EIR) (under CEQA)
EIS	Environmental Impact Statement (Draft EIS) (under NEPA)
EITP	Eldorado-Ivanpah Transmission Project
EPA	Environmental Protection Agency
kV	kilovolt
MSHCP	Multiple Species Habitat Conservation Plan
NEPA	National Environmental Policy Act
NOI	Notice of Intent
NOP	Notice of Preparation
ROW	rights-of way
SCE	Southern California Edison
SNSA	Southern Nevada Supplemental Airport

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1 INTRODUCTION

1.1 Purpose of Scoping Report

This Scoping Report summarizes the public scoping effort conducted for the proposed Eldorado–Ivanpah Transmission Project (EITP). On May 28, 2009 Southern California Edison (SCE), the project applicant, filed an application with the California Public Utilities Commission (CPUC) for a Certificate of Public Convenience and Necessity and an application with the U.S. Bureau of Land Management (BLM) for right-of-way (ROW) authorization and special use permits for approval to construct the proposed project. As part of the project approval process and in compliance with the requirements of the California Environment Quality Act (CEQA) and the National Environmental Policy Act (NEPA), the CPUC and the BLM, as CEQA and NEPA lead agencies, will prepare a joint Environmental Impact Report (EIR) and Environmental Impact Statement (EIS), via their third-party consultant, Ecology and Environment, Inc. (E & E). The EIR/EIS will evaluate the potential environmental impacts associated with the proposed project and will identify mitigation measures to reduce these impacts, where possible. The public scoping period allows the public and regulatory agencies an opportunity to comment on the scope of the environmental document and to identify issues that should be addressed in the document. This report documents the issues and concerns expressed during the public scoping meetings and the written comments received from the public, community organizations, and governmental agencies during the public scoping period, which ended on August 26, 2009.

The CPUC and the BLM will use the comments received during the scoping period to:

- Present environmental impacts of the proposed project and alternatives;
- Encourage public participation;
- Determine the range of issues and alternatives to be addressed in the EIR/EIS;
- Identify ways to avoid or reduce environmental impacts; and
- Inform BLM and CPUC decision-making processes.

1.2 Project Description

The EITP is located in San Bernardino County, California, and Clark County, Nevada. SCE filed an electronic application on May 28, 2009, for a permit to upgrade a single-circuit 115 kilovolt (kV) transmission line with a double-circuit 230 kV transmission line and construct a new substation and associated telecommunications and transmission lines (CPUC application number A.09-05-027). The proposed project would run approximately 35 miles from the Eldorado Substation in Nevada to SCE's proposed Ivanpah Substation in California (Figure 1). The project would include upgrades to the Eldorado Substation and installation of approximately 35 miles of redundant overhead, underground, or microwave path telecommunication routes.

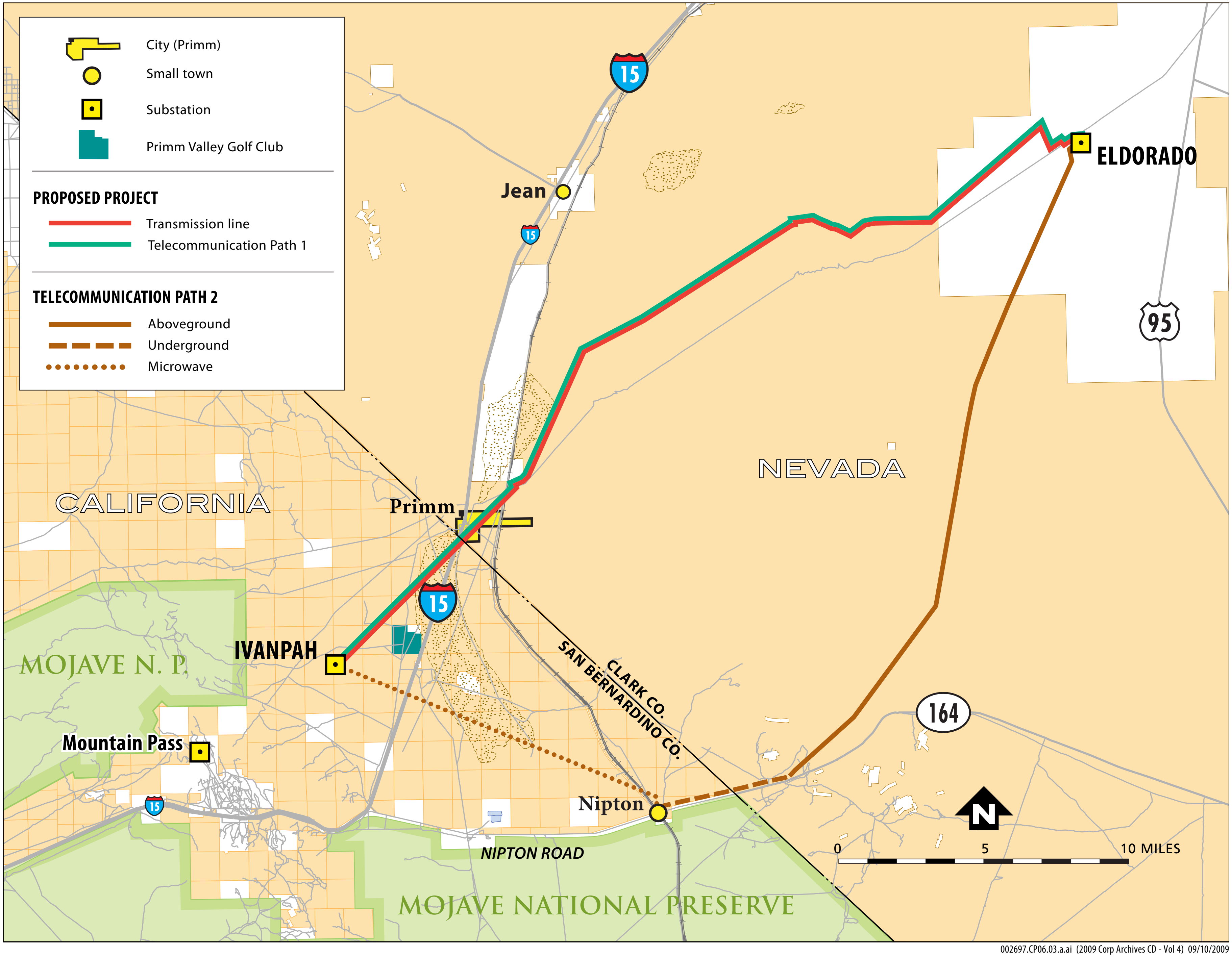

Figure 1 **PROPOSED PROJECT**

2 SCOPING PERIOD AND MEETINGS

2.1 NEPA & CEQA Requirements for Scoping

The lead agencies have agreed to cooperate in preparation of a joint EIR/EIS document that satisfies the needs of both NEPA and CEQA. Once developed, the EIR/EIS will provide full disclosure of the environmental effects of the proposed project and will be a tool used to plan actions and make decisions regarding the project. In addition, it will provide a means of informing stakeholders of reasonable alternatives that would avoid or minimize adverse impacts on the environment or enhance its quality.

Scoping is a means of gathering input for the EIR/EIS early in the EIR/EIS development process. Scoping is required by NEPA pursuant to the Council on Environmental Quality 1979 regulations (40 Code of Federal Regulations [CFR] 1501.7) and by CEQA for projects of "statewide, regional or area-wide significance" per §21083 of the California Public Resources Code. This process ensures that significant public issues, alternatives, and impacts are addressed in environmental documents, and determines the scope and degree to which these issues and impacts will be analyzed.

Notice of Intent (NOI). The scoping period for NEPA began on July 27, 2009, with publication of the NOI in the *Federal Register*.

Notice of Preparation (NOP). The NOP for CEQA was provided to the California State Clearinghouse for release on July 23, 2009. The NOP was mailed to 118 residents and nongovernmental organizations to inform the public of the proposed project and provide notice for the public scoping meetings (Appendix B).

The NOI and NOP were published to notify interested parties of the BLM and the CPUC's intent to prepare an EIR/EIS. The scoping period for the NOI and NOP ended on August 26, 2009.

The following interested parties may participate in scoping: federal, state, regional, and city agencies; affected tribes and communities; businesses; and interested groups and individuals.

2.2 Scoping Meetings

When public scoping is conducted, NEPA requires that public meetings be conducted in accordance with statutory requirements and other criteria (e.g., consideration of the interest in or environmental controversy of the proposed project) (40 CFR 1506.6(c)). CEQA recommends that public scoping be combined to the extent possible with consultation with responsible agencies, as required under 14 California Code of Regulations (CCR) 15802. Consultation is conducted with agencies that will be involved in the environmental review process locally, as well as state and federal agencies and tribal governments, as appropriate.

The BLM and the CPUC conducted joint public scoping meetings along the proposed route in Nipton, California, on Tuesday, July 28, 2009, and Las Vegas, Nevada, on Wednesday, July 29, 2009.

An open house was held for one hour prior to each meeting so that participants could review displays, maps, and literature, as well as meet members of the EIR/EIS project team, agency staff, and project personnel. To encourage public comment, repositories were provided to receive written comments. Several informational sheets about the proposed project and extra copies of the NOI/NOP were made available to the public at each venue.

Each scoping meeting began with presentations by the BLM and the CPUC describing their roles as lead agencies under the NEPA/CEQA processes, followed by an overview of the technical aspects of the proposed project. This included a detailed presentation of the current route, accompanied by a justification for the project need. Lastly, the environmental consulting firm preparing the EIR/EIS for BLM and the CPUC described their role as third-party consultant, described opportunities for public involvement, and provided an overview of the environmental issues already identified to be addressed.

Each meeting concluded with a public comment period where the agencies invited the public to make verbal comments on the project. A court reporter was available to record comments. In addition to having the opportunity to provide oral comments on the project, participants were also given the opportunity at the meetings to provide written comments or to take a comment form to fill out and mail in at a later date. Attendees of the meetings were encouraged to take additional comment forms with them to distribute. Nine persons attended the two scoping meetings and open houses in Nipton and Las Vegas.

No verbal comments were received during these scoping meetings; however, the BLM and the CPUC received electronic letters from elected officials, agencies, organizations, and private citizens, by the August 26, 2009, deadline (Appendix G).

2.3 Other Scoping Activities

Other scoping activities included:

- An interagency pre-scoping meeting was held on July 1, 2009. Invitees included the Federal Aviation Administration, Western Pacific Region, Airports Division; Mojave National Preserve; United States Fish and Wildlife Service; California Department of Fish and Game; California Department of Transportation; Nevada Division of Environmental Protection, Bureau of Waste Management; Nevada Division of Wildlife, Southern Region; Nevada Public Utilities Commission; San Bernardino County Planning Department; Clark County Department of Aviation; Clark County Department of Planning; Clark County Desert Conservation Program; Boulder City, Nevada, Community Development; and the Town of Laughlin, Nevada, Manager's Office. The agencies were briefed on the proposed project so they could determine their roles in the environmental document, provide better feedback in their scoping comments, and identify key issues early in the scoping process. Minutes from this agency Scoping Meeting and comments from the agencies are included as an appendix to this report (Appendix G).

- Contact with Native American tribes that may have an interest in the proposed project was initiated in accordance with 40 CFR 1501.7, which requires that scoping must be conducted both internally with appropriate BLM staff and include tribes. The following tribes were given notice of the project as the first step in the consultation process: Chemehuevi Indian Tribe, Colorado River Indian Tribes, Fort Mohave Indian Reservation, Las Vegas Paiute Tribe, Moapa Band of Paiute Indians, Pahrump Paiute Tribe, and Timbisha Shoshone Tribe.

2.4 Repositories for Public Documents for the Project

Copies of the draft and final EIR/EIS will be placed in local repositories to accommodate public review. Documents produced during the course of the environmental review process will be available for public review at the Las Vegas BLM Field Office and at the Las Vegas Library located at 833 Las Vegas Boulevard North in Las Vegas, Nevada.

A CPUC website dedicated to the proposed project exists at http://www.cpuc.ca.gov/Environment/info/ene/ivanpah/ivanpah.html and will serve as an additional repository. Project information will also be posted on the BLM website at: http://www.blm.gov/ca/st/en/fo/needles.html.

3 SUMMARY OF PUBLIC AND AGENCY COMMENTS

This section summarizes the comments received during scoping and identifies the scoping issues to be addressed in the EIR/EIS. Elected officials, agencies, and organizations submitted comments. No comments were received from private citizens. Because the purpose of this scoping summary report is to convey public comments, the comments reflect the views of the author and may contain factual errors.

The following governmental agencies provided comments: Clark County Department of Aviation, Clark County Desert Conservation Program, Mojave Desert Air Quality Management District, Nevada Department of Wildlife, Federal Aviation Administration (FAA), California Department of Transportation (Caltrans), National Park Service, and California Department of Fish and Game (CDFG). In addition, the United Stated Environmental Protection Agency (EPA) and the Clark County Department of Air Quality and Environmental Management each provided a letter stating receipt of the NOI; however, the letter did not include any formal comments.

The following non-governmental organizations provided comments: Sierra Club, San Gregorio Chapter, and the Center for Biological Diversity. To date, no comments have been received from public officials, individuals, or tribes.

Four primary areas of concern were identified during the public scoping process. These issues were: (1) impacts of the project on several biological resources, most prominently, Desert Tortoise; (2) compatibility of the project with regional land uses such as the planned Southern Nevada Supplemental Airport (SNSA); (3) compatibility of the project with other existing rights-of-way (ROW) designations; and (4) cumulative impacts.

In accordance with 40 CFR 1503.4, which requires that all substantive comments must be considered to the extent feasible prior to project decisions, comments received during the scoping period were categorized by issue and included in this document. Tables 1 and 2 identify key issue comments and organize them into two categories, not resource-specific and resource-specific. Comments that were not specific to any of the environmental resource areas include procedural and general issues related to project development (Table 1). Resource-specific comments are those that address specific environmental resource areas (e.g. Air quality and Biological Resources) (Table 2). For more information, including copies of each comment received to date, please refer to Appendix G.

Table 1 Summary of General Procedural Comments Received

Issue Category	Issue Characterization	Commenter
ALTERNATIVES		
Alternatives	0009-4: BLM should formulate "meaningful alternatives that could avoid many of the impacts of the [cumulative projects] and where impacts remain that cannot be avoided though alternatives, provide for comprehensive minimization and mitigation measures that will ensure that impacts to [the Northeastern Mojave Recovery Unit] are appropriately mitigated. Ultimately, BLM must ensure that the approval of these linked projects does not impair the recovery of the desert tortoise populations…"	Lisa T. Belenky, Center for Biological Diversity, 8/20/09.

Table 1 Summary of General Procedural Comments Received

Issue Category	Issue Characterization	Commenter
	0009-5: A range of alternatives should be developed and analyzed according to CEQA guidelines, possibly including alternative sites—including those that may require changes in land use designations—as well as alternatives that may be less profitable than the proposed project.	Lisa T. Belenky, Center for Biological Diversity, 8/20/09.
	0009-6: A range of alternatives should be developed and analyzed according to NEPA guidelines, with an "emphasis on what is 'reasonable' rather than on whether the proponent or applicant likes or is itself capable of carrying out a particular alternative."	Lisa T. Belenky, Center for Biological Diversity, 8/20/09.
	0009-7: The BLM should avoid impacts to wildlife from conflicting land uses and impacts to sensitive plant species pursuant to the BLM's California Desert Conservation Area plan (CDCA Plan 28 and 37, respectively). "Avoidance can best be accomplished through alternative project siting and/or project design." Most important are alternative sites that may avoid impacts to desert tortoises, critical habitat, DWMAs, and other essential desert tortoise habitat.	Lisa T. Belenky, Center for Biological Diversity, 8/20/09.
	0009-11: "…the EIR/EIS should explore a more robust range of alternatives providing at least one alternative that does not impact any [desert tortoise] critical habitat."	Lisa T. Belenky, Center for Biological Diversity, 8/20/09.
	0009-16: If the project as proposed may affect riparian areas or Unusual Plant Assemblages, "alternatives must be explored that would avoid all impacts."	Lisa T. Belenky, Center for Biological Diversity, 8/20/09.
CUMULATIVE IMPACTS		
Cumulative	0006-10: In addition to lighting that may be required by the FAA for EITP structures near the proposed SNSA, "there are several existing transmission lines near the project area that may need to be lighted when the SNSA becomes operational. To that end, BLM should consider both the direct and the potential cumulative effects of any required lighting of the new EITP lines."	Teresa R. Motley, AICP, Clark County Department of Aviation, 8/24/09.
	0006-12: The Ivanpah to Eldorado Transmission Project in Relation to Other Energy Projects Map contains mistakes regarding land status in Clark County. For example: - "The map depicts BLM solar project leases inside the [SNSA] Site. [That site] was patented to Clark County in 2004. Clark County did not take title subject to any existing leases, and BLM has no legal authority, since the land was transferred, to accept any leases on the now private property." - "The map also depicts several categories of land northwest of Jean as 'BLM wind project leases (authorized).' CCDOA is aware of at least one lease (the proposed Table Mountain Wind Co. project) that has not yet received a Record of Decision from BLM." - "In addition, the map depicts a series of solar project leases throughout the South County, many of which overlap the Airport Environs Overlay District. BLM should amend the map to include the perimeter of the Overlay District and to clarify that none of these solar leases are yet authorized."	Teresa R. Motley, AICP, Clark County Department of Aviation, 8/24/09.

Table 1 Summary of General Procedural Comments Received

Issue Category	Issue Characterization	Commenter
	0007-3: Conduct cumulative analysis to evaluate impacts on the Northeastern Mojave Recovery Unit from other renewable energy projects in the area. "The EIR/EIS will be inadequate if it fails to consider cumulative impacts [from both the project and related energy projects] on nearly 8,000 acres of desert tortoise habitat in the eastern Ivanpah Valley."	Sidney Silliman, Sierra Club-San Gorgonio Chapter, 8/21/09.
	0009-3: Cumulative impacts to biological resources, such as desert tortoise and its habitat should be analyzed for "the proposed solar projects and the proposed transmission line and substation."	Lisa T. Belenky, Center for Biological Diversity, 8/20/09.
	0010-5: Suggested addressing potential impacts to the white-margin beardtongue in the cumulative section, given the amount of development in the area.	Fred Edwards, BLM, Scoping Meeting, 7/01/09.
	0010-7: While the project would not require nighttime lighting and would use non-speculative materials, impacts to natural dark would have to be addressed in the cumulative impacts analysis.	Larry Whalen, National Park Service, Scoping Meeting, 7/01/09.
	0010-8: Wants to know if cumulative impacts due to land construction had been quantified.	Becky Jones, CDFG, Scoping Meeting, 7/01/09.
	0010-11: Acquire a list of Bolder City's Future Projects from Bolder City.	Sue Wainscott, Clark County Desert Conservation Program, Scoping Meeting, 7/01/09.
	0010-12: Some of the footprints for solar development in the area on the cumulative map were misplaced or incorrectly sized.	BLM Representatives, Scoping Meeting, 7/01/09
PURPOSE AND NEED		
Need for the Project	0009-1: Purpose and Need for the project is based upon need to service other projects which have not been approved. "…NEPA review cannot be 'used to rationalize or justify decisions already made.'"	Lisa T. Belenky, Center for Biological Diversity, 8/20/09.
REGULATORY GUIDELINES AND CONSISTENCY		
Regulatory Guidelines	0009-2: Because the purpose and need of the proposed project is dependent upon the approval of other projects, the BLM should halt the NEPA process for this project and coordinate this process with the approval process for all of the other projects (i.e., "connected actions"). The BLM should evaluate these projects together and "not treat this critical analysis as a cumulative impacts question alone."	Lisa T. Belenky, Center for Biological Diversity, 8/20/09.
GENERAL COMMENTS		
General	0003-6: "…information gathered from raptor surveys associated with the project [should] be shared with [Nevada Department of Wildlife] biological staff."	D. Bradford Hardenbrook, Nevada Department of Wildlife, 8/13/09.
	0005-3: Requests documentation describing "the formal designation and legal descriptions" of several corridors near the BCCE that appear to be reserved for ROW issuance with US Land Patent 27-95-0022. "Until such time as those documents are provided and the corridor issue is resolved, it is the County's position that the BCCE, and its terms and conditions, applies to any expansion of existing ROW or any additional ROW on the BCCE."	Sue Wainscott, Clark County Desert Conservation Program, 7/24/09.

Table 1 Summary of General Procedural Comments Received

Issue Category	Issue Characterization	Commenter
	0006-1: "CCDOA formally requests to be a cooperating agency for the EITP EIS" to ensure land use compatibility between the future SNSA and the EITP.	Teresa R. Motley, AICP, Clark County Department of Aviation, 8/24/09.
	0006-8: "CCDOA is prepared to assist the project applicant and/or BLM in determining any necessary measures to avoid any adverse effects to air navigation or to the SNSA."	Teresa R. Motley, AICP, Clark County Department of Aviation, 8/24/09.
	0008-1: Requests two CDs and one hard copy of the DEIS.	Ann McPherson, Environmental Protection Agency, 8/24/09.
	0010-2: Representatives from the Clark County Department of Aviation noted that they have been attending ongoing meetings with SCE regarding the project and had another meeting scheduled for the end of the month.	Clark County Department of Aviation, Scoping Meeting, 7/01/09
	0011-4: Review Boulder City Ordinances, Nevada State Cactus and Yucca laws and other local and state regulations for compliance.	Lee Bice, Clark County Desert Conservation Program, 8/28/09.

Table 2 Summary of all Comments Received, Organized by EIR/EIS Resource Area

Issue Category	Issue Characterization	Commenter
AESTHETICS		
	No comments.	
AGRICULTURE AND SOILS		
	No comments.	
AIR QUALITY		
Impacts on Air Quality	0004-1: Air quality impacts associated with construction should be evaluated.	Alan J. De Salvio, Mojave Desert Air Quality Management District, 7/30/09.
BIOLOGICAL RESOURCES		
Impacts on Migratory Birds	0003-4: "Measures to discourage roosting on powerlines should be adopted into the plan of development."	D. Bradford Hardenbrook, Nevada Department of Wildlife, 8/13/09
	0003-5: "…spacing of the terminals on the towers must be adequate to ameliorate collision threats involving large raptors like the Golden eagle and Red-Tailed hawk. Standard, raptor-friendly designs are outlined in 'Suggested Practice for Raptor Protection on Power Lines' (Avian Power Line Interaction Committee, 2006, 1996; APLIC and U.S. Fish & Wildlife Service 2005). These should be incorporated into the project design as a standard operating procedure."	D. Bradford Hardenbrook, Nevada Department of Wildlife, 8/13/09.
	0003-9: "Pre-construction surveys will be conducted for migratory birds such as Phainopepla to minimize potential impacts during the spring and summer months."	D. Bradford Hardenbrook, Nevada Department of Wildlife, 8/13/09.
	0009-14: "Consultations should be conducted with the Nevada Department of Wildlife [regarding the Wee Thump Joshua Tree Forest Important Bird Area] and should include consideration of mitigation measures such as seasonal work stoppages to protect the breeding activity [of bird species]."	Lisa T. Belenky, Center for Biological Diversity, 8/20/09.
Impacts on Vegetation	0005-5: According to NRS 527.100, it is unlawful to "cut, destroy, mutilate, remove, or possess any Christmas tree, cactus, yucca from any of the lands owned by or under the jurisdiction of the State of Nevada or its counties," including "all areas within the BCCE."	Sue Wainscott, Clark County Desert Conservation Program, 7/24/09.
	0009-8: The project route crosses White-margined penstemon (*Penstemon albomarginatus*) populations. "A pre-activity inventory should be conducted in areas of potential and known habitats, and the populations found or known clearly marked on the ground. Activities associated with tower construction or modification, line pulling and other potentially ground disturbing activities should be sited away from inventoried occupied sites whenever possible."	Lisa T. Belenky, Center for Biological Diversity, 8/20/09.

Table 2 Summary of all Comments Received, Organized by EIR/EIS Resource Area		
Issue Category	**Issue Characterization**	**Commenter**
	0009-9: Route crosses through Aven Nelson phacelia (*Phacelia anelsonii*) populations in one location. "A pre-activity inventory should be conducted in areas of potential and known habitats, and the populations found or known clearly marked on the ground. Activities associated with tower construction or modification, line pulling and other potentially ground disturbing activities should be sited away from inventoried occupied sites whenever possible."	Lisa T. Belenky, Center for Biological Diversity, 8/20/09.
	0009-15: "The EIS should identify and analyze impacts to all Unusual Plant Assemblages and riparian areas throughout the project area and these resources should be fully protected."	Lisa T. Belenky, Center for Biological Diversity, 8/20/09.
	0010-6: Rare plant surveys must follow BLM protocol.	Fred Edwards, BLM, Scoping Meeting, 7/01/09
	0011-13: The following plant species may be found in or near the BCCE: *Penstemon bicolor* ssp *roseus* & *bicolor*, *Acacia greggii*, *Prosopis glandulosa*, and *Lotus argyraeus* var *multicaulis* (scrub lotus).	Lee Bice, Clark County Desert Conservation Program, 8/28/09.
Impacts on Wildlife	0003-1: Concerned with potential for loss of bighorn sheep habitat due to installation of transmission line and upgrades or establishment of service roads.	D. Bradford Hardenbrook, Nevada Department of Wildlife, 8/13/09.
	0003-2: Concerned with "inadvertent hazing of animals out of the area which is a bighorn movement corridor and potential lambing grounds."	D. Bradford Hardenbrook, Nevada Department of Wildlife, 8/13/09.
	0003-3: Project proponent should "time installation of the transmission lines to avoid the [bighorn sheep] lambing season, utilizing the warmer summer months when bighorn sheep will be tied to water sources north of the project area."	D. Bradford Hardenbrook, Nevada Department of Wildlife, 8/13/09.
	0003-7: "The [Banded Gila Monster] is State of Nevada Protected and a species of conservation priority to the Department as well as a BLM Sensitive Species." Gila monster encounter protocols have been forwarded to E & E and are available online.	D. Bradford Hardenbrook, Nevada Department of Wildlife, 8/13/09.
	0003-8: "…prior to handling any live [desert tortoise] individuals, authorization must be obtained from the [Nevada Department of Wildlife] in addition to any Federal requirements."	D. Bradford Hardenbrook, Nevada Department of Wildlife, 8/13/09.
	0009-12: Impacts to Bighorn Sheep should be minimized. Project activities that cross the McCullough Range near critical watering guzzler should be conducted outside of periods where access is important. Also, construction should be timed so that it does not occur when sheep are crossing between ranges near the proposed telecommunications route Path 2 Section 1. The BLM and proponent should consult with the Nevada Department of Wildlife on how to best mitigate impacts on sheep, habitat, and lambing due to construction and helicopter use.	Lisa T. Belenky, Center for Biological Diversity, 8/20/09.
	0010-9: Will the project require a 2081 (California Incidental Take Permit)?	Becky Jones, CDFG, Scoping Meeting, 7/01/09.
	0011-10: The following reptile species may be found in or near the BCCE: *Gopherus agassizii*, *Heloderma suspectum*, *Sauromaulus obesus*, *Gambelia wislizenii*, *Crotaphytus insularis*, *Coleonyx variegatus*, *Phrynosoma platyrhinos*, *Dipsosaurus dorsalis*, *Crotalus mitchelli*, *Crotalus cerastes*, *Crotalus scutulatus*, *Rhinocheilus lecontei*, *Arizona elegans*,	Lee Bice, Clark County Desert Conservation Program, 8/28/09.

Table 2 Summary of all Comments Received, Organized by EIR/EIS Resource Area

Issue Category	Issue Characterization	Commenter
	Phyllorhynchus decurtatus, and *Trimorphodon biscutatus*	
	0011-11: The following bee species may be found in or near the BCCE: *Perdita cracens* and *Perdita fallugiae*.	Lee Bice, Clark County Desert Conservation Program, 8/28/09.
	0011-12: The following bird species may be found in or near the BCCE: Phainopepla, LeConte's thrasher, crissal thrasher, gray vireo, loggerhead shrike, west-ern burrowing owl, cactus wren, and Scott's oriole.	Lee Bice, Clark County Desert Conservation Program, 8/28/09.
	0011-14: The following mammal species may be found in or near the BCCE: kit fox, several varieties of bats, desert kangaroo rat, and desert pocket mouse.	Lee Bice, Clark County Desert Conservation Program, 8/28/09.
Mojave National Preserve Impacts	0009-13: "All potential impacts to the [Mojave National Preserve] must be identified and fully considered."	Lisa T. Belenky, Center for Biological Diversity, 8/20/09.
Desert Tortoise Critical Habitat Impacts	0005-1: "Much of the BCCE meets the criteria for desert tortoise critical habitat, and should be analyzed as such in the biological and environmental analyses…"	Sue Wainscott, Clark County Desert Conservation Program, Scoping Meeting, 7/01/09.
	0007-1: "EIR/EIS must include a thorough and complete analysis of the project's effects on the Northeastern Mojave Desert Tortoise Recovery Unit and its associated eco-system, both in terms of direct and cumulative impacts."	Sidney Silliman, Sierra Club-San Gorgonio Chapter, 8/21/09.
	0007-2: "The project will impact the Piute-Eldorado Desert Wildlife Management Area (DWMA), critical habitat where the threatened desert tortoise is to be managed to achieve recovery by reducing eliminating human-caused impacts."	Sidney Silliman, Sierra Club-San Gorgonio Chapter, 8/21/09.
	0009-10: The Ivanpah Valley in California is the only location of a particular population of desert tortoise with a unique genotype. "All critical habitat and occupied desert tortoise habitat should be avoided…" In addition, the entire proposed route in Nevada falls within the Piute-Eldorado Desert Wildlife Management Area.	Lisa T. Belenky, Center for Biological Diversity, 8/20/09.
Clark County Multiple Species Habitat Conservation Plan (MSHCP) / Boulder City Conservation Easement (BCCE)	0001-1: The Eldorado substation is surrounded by the BCCE; therefore, the impacts of the project on the Clark County MSHCP mitigation areas, including the BCCE, must be included in the environmental assessment or the document will be deemed deficient.	Sue Wainscott, Clark County Desert Conservation Program, 6/12/09.
	0010-1: Advised CPUC/BLM to obtain a list of species covered under the MSHCP and their mitigation measures for with Boulder City.	Sue Wainscott, Clark County Desert Conservation Program, Scoping Meeting, 7/01/09.
	0011-3: "The application documents should indicate that the project as proposed will have an impact on our Habitat Conservation Plan via the impacts to … the [BCCE]. …Environmental Checklist Form (Appendix A) and the text of the document do not indicate or analyze these impacts."	Lee Bice, Clark County Desert Conservation Program, 8/28/09.
	0011-5: "Chapter 8, page A-8, needs to have the HCP box checked as having some impacts."	Lee Bice, Clark County Desert Conservation Program, 8/28/09.

Table 2 Summary of all Comments Received, Organized by EIR/EIS Resource Area		
Issue Category	**Issue Characterization**	**Commenter**
	0011-7: "Road story maps 11-14 and 74-78 are of particular interest to the DCP. These maps are located in one of the highest biodiversity areas within the [BCCE]. This area contains greater cactus densities; impacts and restoration activities may be higher in this area."	Lee Bice, Clark County Desert Conservation Program, 8/28/09.
	0011-9: "Consider general project impacts and restoration activities, especially and pull and tension sites. The impacts and restoration will be greater in sandier areas and in southwestern portion of the [BCCE]."	Lee Bice, Clark County Desert Conservation Program, 8/28/09.
CULTURAL RESOURCES		
National Historic Preservation Act Compliance	0006-11: BLM should ensure that its findings regarding properties eligible for listing in the National Register of Historic Properties are consistent with the SNSA EIS where the area of potential effect overlaps with the EITP EIS.	Teresa R. Motley, AICP, Clark County Department of Aviation, 8/24/09.
ENVIRONMENTAL JUSTICE		
	No comments.	
GEOLOGIC RESOURCES		
	0010-10: Will the project require a 1600 (lakebed and stream alteration) permit?	Becky Jones, CDFG, Scoping Meeting, 7/01/09.
GREENHOUSE GASES		
	No comments.	
HAZARDOUS MATERIALS		
	0010-3: Asked about the handling of the old poles—specifically where would they be disposed of and whether the existing roads would be able to handle the transportation of the waste materials.	Roddy Sheppard, Nevada Department of Wildlife, Scoping Meeting, 7/01/09.
LANDS AND REALTY		
Boulder City Conservation Easement (BCCE)	0005-2: "…if SCE seeks to go beyond the ROW within the BCCE, any proposed expansion of existing ROW or any additional ROW would be subordinate to the BCCE. […] any extension in time or expansion of allowable uses or areas for those ROW as well as any additional ROW [are] incompatible with the BCCE."	Sue Wainscott, Clark County Desert Conservation Program, 7/24/09.
	0005-4: Surface disturbances within the BCCE are restricted by Boulder City Ordinance #972, title 7, chapter 5 (7-5-8). "The City does reserve the right to issue permits for temporary surface disturbances, with the written concurrence of the County and the FWS."	Sue Wainscott, Clark County Desert Conservation Program, 7/24/09.
	0011-1: "No expansion of the current [SCE ROW] in space or uses could currently be granted without amendment to the [BCCE]."	Lee Bice, Clark County Desert Conservation Program, 8/28/09.
	0011-2: "No new [ROW] could currently be granted within the [BCCE] without amendment to the Easement."	Lee Bice, Clark County Desert Conservation Program, 8/28/09.
	0011-6: Define boundaries of the BCCE and SCE ROW limits more explicitly and incorporate into Roger Overstreet's road story maps. "Our staff and law enforcement personnel, who patrol the [BCCE] on a regular basis, will need to know what the limits of	Lee Bice, Clark County Desert Conservation Program, 8/28/09.

Table 2 Summary of all Comments Received, Organized by EIR/EIS Resource Area		
Issue Category	**Issue Characterization**	**Commenter**
	those ROWs are, prior to any ground disturbance within the [BCCE] area, so that we have a clear understanding of what activities are and are not allowable."	
Airport Environs Overlay District	0006-2: Because SCE-proposed ROW passes through the southern part of the Airport Environs Overlay District, the "BLM must examine whether the EITP is consistent with […] Public Law 107-282."	Teresa R. Motley, AICP, Clark County Department of Aviation, 8/24/09.
	0006-3: The BLM must evaluate whether project is compliant with Clark County Comprehensive Plan, Vol.1, the Clark County Airport Environs Report (2007), and the South County Land Use Plan (2009).	Teresa R. Motley, AICP, Clark County Department of Aviation, 8/24/09.
	0006-4: "BLM should coordinate the terms of any relevant land use authorization with Clark County…" to prevent potential future airspace compatibility.	Teresa R. Motley, AICP, Clark County Department of Aviation, 8/24/09.
Mojave National Preserve	0010-14: Will the telecommunications route be within an existing ROW or require new ROW and will it be undergrounded or installed along existing poles in the Mojave National Preserve?	Larry Whalen, National Park Service, Scoping Meeting, 7/01/09.
Additional Land Use Issues	0010-4: A permit would be required for the I-15 crossing but crossing would be allowed in that location. Raised the issue of consulting the Nevada Department of Transportation and potential railroad crossings.	Dan Kupulsky, Caltrans, Scoping Meeting, 7/01/09.
	0011-8: "Table 3.1 needs to be updated to reflect the acres of private (City of Boulder City) lands and substation lands affected by the project and alternatives."	Lee Bice, Clark County Desert Conservation Program, 08/28/09.
TRAFFIC AND TRANSPORATION		
	No comments	
NOISE AND VIBRATION		
	No comments	
RECREATION		
	No comments.	
SAFETY		
Southern Nevada Supplemental Airport (SNSA)	0006-5: "Because of the close proximity of the EITP to the proposed SNSA, […] some of the elements of the EITP (specifically, transmission towers and lines) may constitute obstructions or hazards, or may create adverse impacts on the safe and efficient use of navigable airspace."	Teresa R. Motley, AICP, Clark County Department of Aviation, 8/24/09.
	0006-6: "Part 77 of the Federal Aviation Regulations (Part 77) provides that any party proposing to construct an object or structure near a *proposed* public-use airport is required to notify the [FAA] before construction begins."	Teresa R. Motley, AICP, Clark County Department of Aviation, 8/24/09.
	0006-7: "CCDOA strongly recommends that the project applicant file a FAA Form 7460-1 (Notice of Proposed Construction or Alteration) for each discrete structure proposed to be located near the SNSA in order to obtain a formal FAA determination for each structure." FAA determinations will include "lighting and/or other mitigation requirements." The EITP cannot be determined compatible with the SNSA until this process is complete; therefore, the applicant must submit these forms ASAP.	Teresa R. Motley, AICP, Clark County Department of Aviation, 8/24/09.

Table 2 Summary of all Comments Received, Organized by EIR/EIS Resource Area		
Issue Category	**Issue Characterization**	**Commenter**
	0006-9: "FAA requires that structures near aviation facilities that are *obstructions* must be marked and/or lighted in accordance with FAA standards, and it is very likely that sections of the EITP near the SNSA will need to be lighted."	Teresa R. Motley, AICP, Clark County Department of Aviation, 8/24/09.
	0010-13: Regarding navigational aids and airplane flight paths, will the project look at electromagnetic interference and sound abatement zones?	Dave Kessler, FAA, Scoping Meeting, 7/01/09.
PUBLIC SERVICES		
	No comments.	
UTILITIES		
	No comments.	
SOCIAL AND ECONOMIC CONSIDERATIONS		
	No comments.	
ENERGY USE		
	No comments.	

Given the results of comments received, the following areas are considered the most sensitive for analysis in the EIR/EIS:

- Alternatives;
- Cumulative Impacts;
- Purpose and Need;
- Regulatory Guidelines and Consistency;
- Biological Resources;
- Cultural Resources;
- Lands and Realty; and
- Safety.

4 NEXT STEPS IN THE EIR/EIS PROCESS

The scoping period is not the only time in which interested parties can comment on the environmental document. A similar process will begin when the draft environmental document is released. In addition to providing new comments on the draft EIR/EIS analysis at that time, the public will be able to comment on the adequacy of how their scoping comments have been addressed in the environmental document. Table 3 presents the proposed project schedule for the EIR/EIS and identifies where in the process that agencies and the public will have the opportunity to provide additional input into the environmental review process.

Table 3 Next Steps in the EIR/EIS Process and Opportunities for Further Agency/Public Comments

Event/Document		Purpose of Event/Document	Approximate Date
Completed Events/Documents			
Notice of Preparation		The NOP was published to notify interested parties of the BLM and the CPUC's intent to prepare an EIR/EIS.	July 23, 2009
Notice of Intent		The NOI was published to notify interested parties of the BLM and the CPUC's intent to prepare an EIR/EIS.	July 27, 2009
Scoping Meetings		One agency scoping and two public scoping meetings were held to allow for comment on the scope of the EIR/EIS.	July 1 – 29, 2009
Scoping Summary Report		The Scoping Summary Report documents agency and public comments received during the scoping period and summarizes environmental concerns identified.	September 30, 2009
Upcoming Events/Documents			
Alternatives Screening Report		The Alternatives Screening Report documents alternatives identified for further evaluation in the EIR/EIS and describes the process used to determine those that will be further evaluated.	October 30, 2009
Draft EIR/EIS	Release of Draft EIR/EIS	The Draft EIR/EIS discusses impacts and mitigation for the project and alternatives.	Spring, 2010
	Public Review Period	The public review period for the Draft EIR/EIS will be a minimum of 45 days.	Spring, 2010
	Draft EIR/EIS Public Meetings	Public Meetings will be held to give interested parties the opportunity to comment on the Draft EIR/EIS.	Spring, 2010
Final EIR/EIS	Release of Final EIR/EIS	The Final EIR/EIS, including response to comments, will be issued by the BLM and the CPUC and will be filed with the EPA.	Summer, 2010
	Decision on the Project	The BLM issues the Record of Decision and begins the 45-day appeal period. The CPUC certifies the EIR/EIS and issues a Proposed Decision.	Fall, 2010
* Specific EIR/EIS event/document dates and updates can be found on the project website: http://www.cpuc.ca.gov/Environment/info/ene/ivanpah/ivanpah.html			

Appendix F
Programmatic Agreement with CA and NV SHPOs

(TBA for Publication of the FEIR/EIS)

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Appendix F – Programmatic Agreement

(TBA in the FEIR/EIS)

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