RECLAMATION Managing Water in the West

Brantley and Avalon Reservoirs Resource Management Plan Amendment FINAL BIOLOGICAL ASSESSMENT



U.S. Department of the Interior Bureau of Reclamation Albuquerque Area Office Albuquerque, New Mexico



January 2011

Mission Statements

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian Tribes and our commitments to island communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

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PROJECT BACKGROUND

The U.S. Department of the Interior, Bureau of Reclamation (Reclamation) has prepared this Biological Assessment (BA), as well as subsequent Environmental Assessment (EA) and Resource Management Plan Amendment (RMPA) documents, to address future Federal leasable (e.g., geothermal, oil, gas) minerals development on Reclamation-administered lands in Eddy County, New Mexico (Figure 1). The lands encumbered by the BA, EA, and RMPA are part of Reclamation's Carlsbad Project, which is authorized under the Reclamation Act of June 17, 1902, and the Brantley Project Acts of 1972 (P. L. 92-514) and 1980 (P. L. 96-375).

The Minerals Leasing Act of 1920, as amended, provides the Secretary of the Interior with authority to issue leases on lands where the mineral rights are held by the Federal government. This authority has been delegated to the U.S. Department of the Interior, Bureau of Land Management (BLM), a Cooperating Agency for preparation of the BA, EA, and RMPA documents. The RMPA will amend Reclamation's 2003 Resource Management Plan for Brantley and Avalon Reservoirs (Reclamation 2003) and only affects those lands identified as containing existing *Unleased Federal Minerals*, as well as any future unleased (e.g., expired leases) mineral estate. The EA, however, is not the final review upon which approval of proposed mineral-leasing actions on Reclamation lands in Eddy County will be based. All future site-specific actions will receive further environmental analysis that will be tiered from the BA, EA, and RMPA documents, as appropriate.

The oil and gas development industry is a significant part of the State of New Mexico's economy, including Eddy County, and represents a major land use activity within the State. With the Project Area located above the Permian Basin, which is a rich resource for oil and gas reserves, increased interest has been expressed in exploration and production of these resources within the Project Area in recent years.

PROJECT LOCATION

Brantley and Avalon Reservoirs are located on the Pecos River, approximately 15 miles and 5 miles, respectively, upstream from the City of Carlsbad, New Mexico (Project Area). The Project Area includes Brantley Dam and Reservoir, Avalon Dam and Reservoir, the historic McMillan Dam (now breached) and the McMillan Dam Tender's Quarters, the original McMillan Reservoir area, and the section of the Pecos River between the two reservoirs, along with the lands subject to water inundation and a surrounding buffer of land at elevations higher than maximum reservoir storage (Figure 2). The Project Area is surrounded by a mosaic of mostly BLM, State of New Mexico, and private lands. At Brantley Reservoir, the Project Area boundary encompasses almost 45,000 acres of land that were acquired by Reclamation through fee purchase, condemnation, or withdrawal from public domain. At Avalon Reservoir the Project Area includes approximately 4,000 acres of land that were acquired using similar methods. Within the Project Area boundary are approximately 5,600 acres of lands that were transferred to the Carlsbad Irrigation District (CID) in 2001.





Figure 1. Brantley and Avalon Reservoirs Resource Management Plan Amendment (RMPA) Project Area Location Map.







Bureau of Reclamation Albuquerque Area Office The two reservoirs are managed primarily for agricultural irrigation, but they also provide secondary flood-control, recreation, and fish and wildlife habitat benefits. Brantley Lake State Park, located on the east and west sides of Brantley Reservoir, is managed by the New Mexico State Parks Division and serves approximately 95,000 visitors annually by providing recreational activities such as camping, picnicking, boating, fishing, and swimming. Eddy County is responsible for managing lands surrounding Champion Cove at Brantley Reservoir for primitive recreational uses with no specific recreational facilities provided. The New Mexico Department of Game and Fish manages the remaining lands around Brantley Reservoir as a Wildlife Management Area, which provides hunting and fishing opportunities and improved habitat for fish and wildlife. The Seven Rivers Wildlife Management Area, located on the northwest side of Brantley Reservoir, is also managed by the New Mexico Department of Game and Fish. The lands surrounding Avalon Reservoir are managed by the CID, although there are no specific recreational facilities provided.

PROPOSED FEDERAL ACTION

Mineral leasing on Reclamation lands is administered by the BLM under provisions of Title 43, Subpart 3100 of the Code of Federal Regulations (CFR). Leasable minerals (i.e., geothermal, oil, and gas) are under discretionary authority, meaning that they are open to development through application and permitting by the BLM with concurrence by Reclamation. Except for those minerals and conditions meeting the provisions of Section 10 of the Reclamation Projects Act of 1939, leases for mineral and geothermal resources on all land acquired or withdrawn by Reclamation are issued by the BLM per an Interagency Agreement between Reclamation and BLM dated December 1982. Under this agreement the BLM will, in all issues involving mineral and geothermal leases, request that Reclamation determine whether leasing is permissible and, if so, provide any stipulations required to protect the interests of the United States. Reclamation's Existing Oil and Gas Leasing Stipulations for the Project Area are presented in Appendix A.

In further consideration of oil and gas activities on Federal lands, Section 365 of the Energy Policy Act of 2005 was signed by President George W. Bush on August 8, 2005, and a Memorandum of Understanding (MOU) was executed to improve the efficiency of processing oil- and gas-use authorizations on Federal lands. The Energy Policy Act and MOU require the Secretary of the Interior and various Federal agencies to work together to further the objectives of Section 365 of the Energy Policy Act, with specific emphasis on developing measures to aid in the streamlining and coordinating of Federal permit processing for onshore oil and gas operations on Federal lands. In compliance with that requirement and to consider cumulative impacts, Reclamation must amend the existing RMP (Reclamation 2003) to appropriately evaluate future oil and gas leasing and development activities within the Project Area in order to comply with existing guidelines and laws. The proposed RMPA would affect only those lands currently identified as containing *Unleased Federal Minerals*, or about 16 percent of the Project Area, as well as any lands within the Project Area that in the future will contain Unleased Federal Minerals (e.g., expired leases).



NEED FOR THE ACTION

Reclamation, in its 2003 RMP, evaluated the conditions for existing mineral leasing and development within the Project Area, developed additional oil and gas leasing stipulations, and recommended that such stipulations adopted (Reclamation 2003). These recommended oil and gas leasing stipulations were consistent with the BLM's existing mineral leasing stipulations at the time. However, Reclamation did not evaluate the cumulative impacts of reasonably foreseeable future mineral leasing and development on Project Area resources in its 2003 RMP. The RMPA and the subsequent environmental review are needed to further evaluate recommended oil and gas leasing stipulations to ensure full consideration of requirements necessary to appropriately protect Project Area resources and to implement the preferred alternative.

PURPOSE FOR THE ACTION

In recent years the BLM has experienced a tremendous increase in interest from oil and gas development companies for new lease nominations throughout Eddy County, including the Project Area. At present the BLM is deferring new lease nominations for oil and gas development within the Project Area until the RMPA is completed. However, site-specific applications are being considered on a case-by-case basis. Applications for oil and gas drilling activities on existing lease areas are reviewed on the ground and approved if negative effects to natural and cultural resources can be mitigated. Since Reclamation's 2003 RMP did not evaluate the cumulative impacts of reasonably foreseeable future mineral leasing and development of Project Area resources, the purpose of the RMPA is to develop appropriate guidance that will allow Reclamation and BLM to make informed decisions about oil and gas leasing and development on Reclamation-administered lands in order to comply with existing guidelines and laws.

The result of this planning process will be an RMPA that identifies the lands within the Project Area that will be subject to the proposed stipulations and made available for oil and gas development through leasing and what requirements or stipulations are needed to manage those lands and protect other resource values. This includes all Federal mineral estates within the Project Area and future leases on lands conveyed to the CID in 2001. Stipulations that will be attached to future Federal mineral leases and future CID leases may include, but are not limited to, controlled surface use, timing limitations, or no surface occupancy (NSO). The RMPA document also will identify the circumstances necessary for granting waivers, exceptions, or modifications to leasing stipulations.

The EA, which is prepared to meet current requirements of the Federal mineral program, is not the final review upon which approval of all proposed actions on Reclamation lands in Eddy County will be based. Rather, the RMPA will identify lands within Reclamation's jurisdiction that are available for leasing and how those Federal minerals might be developed and managed for oil and gas activities. Decisions on all subsequent site-specific actions will be tiered from the EA document. That is, additional compliance with all applicable laws and regulations, such as NEPA, Section 106



of the National Historic Preservation Act, the Clean Water Act, and the Endangered Species Act, will occur on site specific lease/drilling proposals. However, the scope of the site-specific approval process will be streamlined and facilitated by the planning and programmatic evaluation of impacts in the RMPA and EA documents.

DESCRIPTION OF THE PROPOSED ACTION

Of the 49,493 acres of land within the Project Area, only 43,745 acres (88 percent) will be subject to the Proposed Action mineral lease stipulations. These lands comprise four minerals categories identified in Table 1 and shown on Figure 3. Federal Minerals Leased Lands, which account for 25,242 acres (51 percent) of the Project Area, include Federally owned minerals that are currently leased and subject to the lease stipulations in place at the time those minerals were leased. Federal Minerals Unleased Lands comprise 9,361 acres (19 percent) of the Project Area, while Reclamation Minerals Subordinate Lands involve private minerals that cannot be leased by the United States, Reclamation acquired and retains the right to restrict the development of the mineral estate to conform to Reclamations.

MINERALS CATEGORY	AREA IN ACRES		
Federal Minerals (Reclamation) Leased Lands	25,242 (51%)		
Federal Minerals (Reclamation) Unleased Lands	9,361 (19%)		
Reclamation Flowage Easement Lands (non-Federal lands)	3,349 (7%)		
Reclamation Minerals Subordinate Lands (Federal lands)	3,553 (7%)		
Carlsbad Irrigation District Lands	5,589 (11%)		
Private (non-Federal) Minerals	2,085 (4%)		
Non-Reclamation Lands	314 (1%)		
Total Area	49,493 (100%)		

 Table 1.
 Leased and Unleased, Federal and Private Minerals within the Project Area.

The fourth category involves CID Lands. In 2001, the United States conveyed the surface and mineral estate of 5,589 acres (11 percent) of Project Area land to the CID. The lands conveyed to CID are subject to management consistent with the management by Reclamation on adjacent lands, including the rights and obligations related to the mineral estate. The CID mineral estate is considered private and subject to the laws and regulations of the State of New Mexico. However, the CID mineral estate can only be leased in compliance with the stipulations in place by Reclamation for the leasing of Federal minerals at the time of lease issuance. Currently, the majority of the CID mineral estate is leased and subject to the stipulations in place at the time those minerals were leased.





Figure 3. Brantley and Avalon Reservoirs Resource Management Plan Amendment (RMPA) Project Area Minerals Categories Map.

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There are 2,085 acres (4 percent) of Reclamation lands within the Project Area that contain Private (non-Federal) Minerals that are not subject to Federal stipulations but are subject to the surface use stipulations as permitted by Reclamation. Reclamation also obtained flowage easements on 3,349 acres (7 percent) of non-Federal land that are also not subject to Federal stipulations (Reclamation Flowage Easement Lands). And there are 314 acres (<1 percent) of private lands that are not subject to the jurisdiction of the United States.

Federal mineral leasing and development may occur on lands where the surface is managed by Federal, State, or Native American agencies, or private individuals. For minerals development on Federal (Reclamation) lands within the Project Area, management objectives are defined in terms of the availability of land for leasing (i.e., closed or open to minerals leasing) and the management of lands that are open to leasing (i.e., with standard terms and conditions or with special leasing stipulations). Federal mineral lands and lands subject to Federal mineral leasing stipulations account for 88 percent of the Project Area. All Federal mineral lands and lands subject to Federal mineral leasing.

Lands open for minerals leasing may be open with no specific development restrictions defined in the original RMP or in the RMPA. However, these areas are subject to the *Standard Lease Terms and Conditions* as defined on the lease form. Or, lands open for leasing may be managed with constraints in the form of *Special Lease Stipulations*, which are provisions that modify the standard lease rights and conditions included in a lease when environmental and planning analyses have demonstrated that additional and more stringent environmental protection is needed. The three types of special lease stipulations defined for the Project Area are (1) *no surface occupancy (NSO)*, (2) *no storage facilities*, and (3) *surface occupancy on a case-by-case basis*. A stipulation of NSO does not allow the surface of a given area to be occupied. A stipulation of no storage facilities does not allow storage facilities within a given area. A stipulation of surface occupancy on a case-by-case basis allows for a site-specific evaluation of proposed activities to determine the appropriateness of surface occupancy and storage facilities. Under certain conditions, Reclamation may grant waivers, exceptions, or modifications to lease stipulations.

The Proposed Action modifies the existing mineral leasing management situation in the Project Area to respond to legislative policies, regulatory requirements, and/or *Reclamation Manual* directives and standards. In doing so, the major issues addressed include minimizing soil erosion, protecting Reclamation facilities, protecting cultural resources, protecting wildlife and special status species, protecting visual resources, and protecting water quality. The Proposed Action also responds to concerns expressed by CID regarding the estimated 100-year sedimentation rate for Brantley Reservoir. Under the Proposed Action, the maximum water surface elevation at Brantley Reservoir would be revised from 3,271 feet elevation to 3,263 feet elevation, and a NSO special lease stipulation would be applied below that elevation. In December 2010, the current water surface elevation was approximately 3,253 feet, meaning that over a 100-year time frame the water surface could rise approximately 10 feet.



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Although Brantley Dam was first filled in 1988, the original 100-year sediment deposition estimate for Brantley Reservoir was completed in the 1950s based on limited water and suspended sediment data. New estimates were made by Reclamation using a longer-period of flow and sediment gage records, which incorporate regulation of flood peaks since the 1950s, reduction of tributary sediment sources to the Pecos River, and the amount of sediment being trapped in upstream reservoirs (Reclamation 2008). Additionally, a no storage facilities special lease stipulation would be applied to areas within 660 horizontal feet of the 100-year floodplain elevation and below at both Brantley and Avalon Reservoirs.

The specific special lease stipulations applied to meet the management objectives of the Proposed Action are summarized below and shown in Figure 4. These special lease stipulations would replace and/or supplement the General Surface Use and Occupancy Requirements found in Appendix A, Section A-1.

- No surface occupancy within 2,640 horizontal feet of dam embankments, appurtenant structures, and tunnels at Brantley Dam or Avalon Dam Sites.
- No surface occupancy within 660 horizontal feet of maximum water surface at Brantley Reservoir (elevation 3,263 feet) or Avalon Reservoir (elevation 3,190 feet).
- Surface occupancy on a case-by-case basis for wells proposed within 2,640 horizontal feet and 5,280 horizontal feet of Brantley Dam site.
- No storage facilities within 660 horizontal feet of the 100-year floodplain at Brantley Reservoir (elevation 3,283 feet) or Avalon Reservoir (elevation 3,200 feet).
- Surface occupancy on a case-by-case basis within 300 horizontal feet of all publicly maintained (e.g., State of New Mexico, Eddy County) designated roads and highways for construction of access roads and pipelines. No wells permitted within these areas.
- Surface occupancy on a case-by-case basis within 660 horizontal feet of normal high water line of streams, rivers, and arroyos for construction of roads and pipelines. Construction of access roads and pipelines will be restricted in high-value riparian and sensitive areas along streams, rivers, and arroyos. No wells permitted within these areas.
- No surface occupancy within 300 horizontal feet of all areas leased for recreational purposes (e.g., Brantley Lake State Park and Champion Cove).
- Surface occupancy on case-by-case basis within 500 horizontal feet of any improvements either owned, permitted, leased, or otherwise authorized by Reclamation within the leased areas for construction of access roads and pipelines. No wells permitted within these areas.





Figure 4. Proposed Action Alternative Special Lease Stipulations Map.

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- No surface occupancy within 200 horizontal feet of all designated, improved, and permitted trails.
- Surface occupancy on a case-by-case basis within 200 horizontal feet of established crops for the construction of access roads and pipelines. No wells permitted within these areas.
- Surface occupancy on a case-by-case basis within 200 horizontal feet of, and including, slopes steeper than 2:1 for the construction of access roads and pipelines. No wells permitted within these areas.
- Surface occupancy on a case-by-case basis within established right-of-ways of human-made canals, laterals, aqueducts, pipelines, or drainages for the construction of access roads and pipelines. No wells permitted within these areas.
- No surface occupancy within Critical or Occupied Habitat for threatened and endangered species, and access may be restricted seasonally in other important wildlife areas.
- Surface occupancy on a case-by-case basis for the construction of wells, pipelines, roads, overhead electric distribution lines, and any other surface disturbance with the Carlsbad Irrigation District National Historic Landmark.

The amount of land open to leasing with a special lease stipulation of NSO would decrease to 19,155 acres, or 39 percent, of the Project Area under the Proposed Action. The amount of land open to leasing with a special lease stipulation of no storage facilities would decrease to 6,486 acres, or 13 percent of the Project Area. The amount of land designated for surface occupancy on a case-by-case basis (but with no wells allowed) would increase to 13,527 acres or 27 percent of the Project Area. The amount of land that could be leased with standard lease terms and conditions would decrease to 10,324 acres, or 21 percent of the Project Area. The Proposed Action consolidates the requirements and objectives at this programmatic level, which would clarify the leasing process for industry, Reclamation, and BLM, and would streamline the NEPA process for site-specific actions. Impacts on resources of concern are not anticipated to be significant under the Proposed Action, with implementation of the conditions of approval and other requirements. The amount of land closed to surface occupancy in the Proposed Action would likely limit the spatial area in which to explore for and develop fluid minerals in certain locales. This could reduce the opportunity and/or increase the cost for oil and gas development activities in the Project Area.

REASONABLE FORESEEABLE MINERALS DEVELOPMENT

This section provides a summary of the exploration history, current lease status, and the 20-year projections for reasonable foreseeable development (RFD) in the Project Area. The RFD is a projection of the Federal minerals actions and activities, including development, that are likely to



occur in the Project Area over the life of the RMPA (i.e., 20 years). Attention is focused on projecting Federal minerals leasing, exploration, development, production, and abandonment activities likely to occur on land managed by the Federal government within the Project Area. This projection includes the number, density, and type of wells likely to be drilled and the surface use requirements to project the amount of surface disturbance.

EXPLORATION HISTORY

Well data for the Project Area, obtained from the BLM, indicates that the first well was drilled in 1926 and the oldest active well dates back to approximately 1938. To date, 330 wells have been drilled in the Project Area. A summary of current well information is provided in Table 2. Of the 330 wells, 188 (57 percent) are in operation, 3 (1 percent) are suspended, 10 (3 percent) are temporarily abandoned, and 25 (8 percent) are permanently abandoned. There are also approximately 104 wells (31 percent) within the Project Area that are dry, junked, service, or location only.

WELL TYPE AND STATUS	NUMBER		
Active Gas Well	141		
Active Oil Well	47		
Dry Well	61		
Dry Hole with Show of Gas	16		
Dry Hole with Show of Oil	19		
Suspended Oil Well	3		
Temporarily Abandoned Well	10		
Permanently Abandoned Well	25		
Junked Well	3		
Service Well	3		
Location Only	2		
Total Wells	330		

 Table 2.
 Status of Oil and Gas Wells in the Project Area (2009).

DEVELOPMENT PROJECTIONS

Using the past 83 years of data to determine the average rate of drilling, approximately 4.0 wells per year were drilled within the Project Area. Given a planning period of 20 years, one might project that 80 wells would be drilled within the Project Area during that time. Another scenario might be



to assume that the next 20 years would be similar to the most active 10-year period for the Project Area, which was the decade from 1973 to 1982 with 77 wells drilled (or 7.7 wells per year). Conversely, another scenario might be to assume that the next 20 years would be similar to the least active 10-year period for the Project Area, which was the decade from 1987 to 1996 with 25 wells drilled (or 2.5 wells per year). Therefore, the potential RFD could range from 50 to 150 wells drilled on Reclamation lands over the 20-year planning period. The RFD does not imply any drilling restrictions or limitations; it is simply a forecast of anticipated activity based on history. The actual number of wells drilled would vary from year to year.

SURFACE DISTURBANCES ASSUMPTIONS

The assumptions for surface disturbance from access roads, drill pads, pipelines, power lines, and seismic activity were derived from Appendix 7 of the Special Status Species Proposed Resource Management Plan Amendment/Final EIS (BLM 2007). The following surface disturbance assumptions were used to estimate impacts associated with oil and gas exploration and development drilling activities within the Project Area:

- Stabilization of surface disturbance is expected to occur within 3 years.
- Access Roads: 14-foot-wide travel way, 1.5 acres of initial disturbance per access road (0.75 acre of disturbance stabilized per access road) per well.
- Drill Pads: 1.4 acres of disturbance per average well pad (i.e., 250 feet by 250 feet), 1.0 acre stabilized per abandoned well.
- Pipelines: 1.6 acres of initial disturbance per producing well (i.e., 30-foot right-of-way width), 0.75 acre stabilized per producing well, 0.5 acre stabilized per abandoned producing well.
- Power Lines: 0.5 acre of initial disturbance per producing well, 0.25 acre stabilized per well.
- Geophysical Lines: 1.0 acre of disturbance per mile of geophysical line. Reclamation of disturbance is expected to occur within 3 to 5 years.

An average of 5.0 acres per well was used to determine initial (i.e., short-term) surface disturbance in Chapter 4 discussions of the EA. This is a total acreage value and includes initial surface disturbance from roads, pipeline, power lines, and other activities associated with exploration and development of oil and gas resources. An average of 2.5 acres per well was used to determine stabilized (i.e., long-term) surface disturbance of active wells in Chapter 4 discussions of the EA.



DEVELOPMENT ESTIMATES

The RFD history indicates that approximately two to eight wells have been drilled per year and that up to two wells per year have been plugged and abandoned, on average, in the Project Area. Direct impacts included surface disturbances of approximately 10 to 40 acres, of which approximately 5 to 20 acres would have been reclaimed and stabilized by the end of 3 years. Successful reclamation and stabilization of the plugged and abandoned wells would have totaled approximately 3 acres per year.

Over the next 20 years the RFD projects that between 40 and 150 wells would likely be drilled in the Project Area, and up to 40 wells would likely be plugged and abandoned. During that period approximately 200 to 750 acres of surface area would be disturbed, while approximately 100 to 375 acres would be reclaimed and stabilized within three years of the initial disturbance. Approximately 60 acres would be reclaimed and stabilized from plugged and abandoned wells over the next 20-year planning period.

Table 3 provides a more accurate summary of the estimated number of wells drilled within the Project Area for each alternative over the next 20 years, including the amount of area disturbed by these activities. The estimated number of wells drilled per year over the next 20 years was determined by evaluating potential well locations based on proposed drilling restrictions (e.g., NSO areas, well spacing) for each of the three alternatives. Because of the relatively small geographic extent of the Project Area and over 85 years of oil and gas development history, the remaining area available for new wells will limit the number of wells that could be developed in the future compared with the past.

ALTERNATIVE	ESTIMATED NUMBER OF WELLS DRILLED PER YEAR	ESTIMATED NUMBER OF ACRES DIRECTLY IMPACTED PER YEAR	ESTIMATED NUMBER OF WELLS DRILLED OVER 20 YEARS	ESTIMATED NUMBER OF ACRES DIRECTLY IMPACTED OVER 20 YEARS	ESTIMATED NUMBER OF ACRES RECLAIMED AND STABILIZED OVER 20 YEARS (INCLUDES ABANDONED WELLS)
Alternative A	2 to 3	10 to 15 (4 to 6 hectares)	40 to 60	200 to 300 (81 to 121 hectares)	160 to 210 (65 to 85 hectares)
Alternative B	1 to 2	5 to 10 (2 to 4 hectares)	20 to 40	100 to 200 (41 to 81 hectares)	110 to 160 (45 to 65 hectares)
Alternative C	3 to 4	15 to 20 (6 to 8 hectares)	60 to 80	300 to 400 (121 to 162 hectares)	210 to 260 (85 to 105 hectares)

Table 3.Summary of Surface Disturbance from Oil and Gas Development
by Alternative.



SPECIES INFORMATION

Reclamation's 2003 RMP EA evaluated all Federal and State listed species for Eddy County that potentially occur within the Project Area. Species that were known or suspected to occur within or near the Project Area were evaluated in detail in the 2003 EA, while the other species were determined to have a low potential of occurrence. Those determined to have a low potential for occurrence were identified as such because their habitat is lacking, they occur only temporarily or infrequently, or they have been extirpated from the State of New Mexico. The potential for species to occur in the Project Area was based on site visits, habitat assessment, and detailed literature review (Reclamation 2003).

Since that time, two species have been added to the Federal and State lists as candidate species for Eddy County. These include the lesser prairie-chicken (*Tympanuchus pallidicinctus*) and the sand dune lizard (*Sceloporus arenicolus*). Neither of these species have been recorded in the Project Area, and no suitable habitat occurs in or near the Project Area. Therefore these species would not be affected by the Proposed Action.

INTERIOR LEAST TERN (Sterna antillarum)

Least terns measure 8.3 - 9.4 inches long with a 20-inch wingspread. Sexes are alike, characterized by a black-capped crown, white forehead, grayish back and dorsal wing surfaces, snowy white undersurfaces, legs of various orange and yellow colors depending on sex, and a black-tipped bill whose color varies depending on sex. Immature birds have darker plumage than adults, a dark bill, and dark eye stripe on their white foreheads.

During the breeding season, the least tern's range is usually restricted to a reach of river near sandbars where nests are located. Ranges can vary considerably in size, especially for re-nesting birds who usually find sites away from the original nesting site. Terns are considered piscivorous and usually feed in shallow waters of rivers, streams, and lakes.

Nesting areas usually consist of sparsely vegetated sand and gravel bars in wide unobstructed river channels, or salt flats along lake shorelines. Nesting sites are usually located at higher elevations away from the water's edge because nesting starts when river flows are high and small amounts of sand are exposed (USFWS 1990).

The breeding population of least terns (*Sterna antillarum*) in New Mexico declined from about 60 birds in the early 1960s to three poorly producing nesting pairs annually from 1987 to 1990. Least terns were first recorded in New Mexico nesting at Bitter Lake National Wildlife Refuge in 1949 (USFWS 1990, 2006), and least terns have continuously nested on or adjacent to refuge lands annually since then. Population counts over the period have been variable, ranging as high as 60 birds in 1961, but typically number 20 to 30 individuals during a breeding season.



For several years during the 1980s, the breeding colony was on a vegetation free area of the Roswell Test Facility adjacent to the refuge. The colony then shifted back to barren alkali flats on the refuge following the growth of vegetation at the off-refuge site. A 1997 survey of potential nesting habitat on BLM lands by the New Mexico Natural Heritage Program located two nests at the Grace Well flats just north of the refuge.

On June 9, 2004, five pairs of least terns were first observed in a backwater area of Brantley Reservoir on the Pecos River in Eddy County. It is unknown whether interior least terns had used areas around Brantley Reservoir for nesting in years prior to 2004. In 2004 a total of at least 14 adults were observed, with an estimated seven nests on the lakeshore. Six juvenile least terns were observed near the nesting area in late August. The nesting area used by least terns in 2004 spanned approximately 28 acres (USFWS 2006).

In 2006 least terns were first detected within the Project Area when a single adult was detected in mid-May. The number of least terns observed within the Project Area increased to 20 adults by late May. During summer 2006, two least tern nests were found on the west shore of Brantley Reservoir with three eggs in each nest (Figure 5). The nests found in 2006 were thought to have failed because of rapidly fluctuating lake levels (Doster 2006).

During 2007 the least tern population seemed to peak at five adults in late May and courtship behavior was observed. No nests were found during 2007 Project Area surveys (Doster 2007).

During the 2008 breeding season, a total of six least tern eggs were found in five nests along the western shoreline of Brantley Reservoir, northeast of Champion Cove (see Figure 5). All nests were located well within the reservoir pool at an approximate elevation of 3,241 feet. All eggs and nests were inundated once irrigation releases from upstream sources were initiated. In total, 30 adult least terns were documented within the Project Area during the 2008 breeding season (Doster 2009).

In 2006 approximately 84 acres of least tern nesting and brood-rearing habitat was created along the western shoreline of Brantley Reservoir (see Figure 5). These created habitat areas were not used by least terns during the 2008 breeding season. At the time when most least terns arrive at the Project Area, water levels in Brantley Reservoir were very low, leaving the created habitat sites more than 0.25 mile from the water's edge. As a result, the created habitat areas were much less attractive to terns that prefer to nest close to the water's edge (Doster 2009).

SOUTHWESTERN WILLOW FLYCATCHER (E. t. adastus)

The willow flycatcher is a widely distributed summer resident of much of the United States and southern Canada (Brown 1988). Currently, four subspecies of willow flycatcher are recognized in North America and distinguished by subtle differences in color, morphology, and breeding range (Phillips 1948, Aldrich 1953, Unitt 1987, Browning 1993). One subspecies breeds east of the Rocky





Figure 5. Species Occurrence Map for the Least Tern and Gypsum Wild-Buckwheat within the Project Area.



Mountains, *E. t. traillii*. Three breed west of the Rocky Mountains, *E. t. brewateri*, *E. t. adastus*, and *E. t. extimus* (Unitt 1987). Browning (1993) recognizes a fifth subspecies (*E. t. campestris*) that is said to occur in the central portion of the United States.

Historically, the willow flycatcher was widespread across the southwestern United States, breeding in riparian habitats ranging from sea level to approximately 7,000 feet in Arizona, southern California, New Mexico, southern Nevada, southern Utah, southwestern Colorado, west Texas, and extreme northwest Mexico (Phillips 1948, USFWS 1995, McKernan and Braden 2001). This species has been documented at a total of 109 sites on 43 drainages throughout the southwestern United States. The majority of the population occurs in Arizona, California, and New Mexico, accounting for 92 percent of all breeding territories (Marshall 2000).

In New Mexico southwestern willow flycatcher breeding territories have been documented on the upper, middle, and lower Rio Grande; the Rio Chama; the Zuni River; and the middle and lower Gila River (Marshall 2000). To date, no southwestern willow flycatchers have been documented within the Project Area along the Pecos River between Brantley and Avalon Reservoirs (Doster 2008, pers. comm.).

GYPSUM WILD-BUCKWHEAT (Eriogonum gypsophilum)

Only three populations of the gypsum wild-buckwheat are known to exist in the world, all in Eddy County, New Mexico. One of these populations is found on both Reclamation and BLM lands in the lower Seven Rivers Hills area, immediately west of US-285 on the west side of the Project Area (see Figure 5). On Reclamation lands the species occurs within the Mixed Desert Scrub habitat on the Seven Rivers Hills escarpment where approximately 50 individuals have been observed. An adjacent 540-acre parcel of BLM land is designated as a Special Management Area (SMA) to protect the species and its habitat (Reclamation 2003). Critical habitat was designated for the species on the adjacent SMA lands in 1981. Typically, the plant is found on gypsum soils, most frequently on materials that have eroded from nearby gypsum outcrops. On the Seven Rivers Hills SMA, the terrain is mostly a complex of bare, steep slopes and deep, eroded arroyos (BLM 1986).

PECOS BLUNTNOSE SHINER (Notropis simus pecosensis)

Distribution and Abundance

The shiner (*Notropis simus pecosensis*) is a cyprinid species endemic to the Pecos River in New Mexico and Texas. The abundance and distribution of the shiner has declined since the mid 1900s largely because of habitat alterations to the Rio Grande and Pecos Rivers resulting from water diversions and the construction of impoundments (Hatch et al. 1985; USFWS 1987). Although there was some confusion regarding taxonomic status of the species, Chernoff et al. (1982) determined that two subspecies existed. The Rio Grande subspecies, now considered extinct, occurred from El



Paso, Texas, north to the Chama River in New Mexico. The Pecos form historically occurred from the town of Santa Rosa to an area north of Carlsbad (USFWS 1987, Bestgen and Platania 1990).

Declines in the abundance of the shiner were reported by Brooks et al. (1991). Their review of historic collections and comparisons with fish surveys conducted in the Pecos River from 1986 to 1990 also provided evidence of the reduction in the range of this species. Shiners were captured sporadically from Sumner Dam downstream to the Brantley Reservoir inflow. As noted, the species historically occurred throughout the Pecos River in both New Mexico and Texas, but their range is now restricted to a 225-mile section of the river between these two reservoirs (Hatch et al. 1985, Brooks et al. 1991). Hatch et al. (1985) warn that their distribution in this river section is tenuous because of periodic dewatering of many habitats for irrigation demands. A narrower range was reported by Brooks et al. 1995, indicating that collections during 1990 occurred only from approximately 4.8 miles south of Fort Sumner downstream to an area near the Rio Felix confluence. There is also evidence that adult or breeding Pecos bluntnose shiner tend to be more common upstream of the Highway 70 bridge near Roswell. Downstream of the Rio Hondo confluence near Roswell, samples have included mostly eggs, larvae, and young bluntnose shiner (Brooks et al. 1991). Recent fish community monitoring surveys between the confluence of Willow Creek and the Bitter Lake National Wildlife Refuge indicate that Pecos bluntnose shiner catch rates have increased since 2005 because of more favorable hydrologic conditions. Results of these surveys indicate higher catch rates of Pecos Bluntnose shiner in the upper reaches of the section sampled than at lower reaches. Catch rates in lower reaches, including the Brantley Reservoir inflow, increased seasonally because of upstream reproduction (Davenport 2008).

Several factors have contributed to the imperiled status of the Pecos bluntnose shiner, but the most significant appears to be seasonal dewatering of substantial reaches of its historic habitat (Propst 1999, Davenport 2008). Other factors that have contributed to the decline of the Pecos bluntnose shiner locally include contaminants, non-native predators, and channel modification (NMDGF 2006). Non-native fish species include the plains minnow (*Hybognathus placitus*) and the Arkansas River shiner (*Notropis girardi*) (Sublette et al. 1990), which now comprise a large portion of the shiner guild and may result in increased inter-specific competition with Pecos bluntnose shiner.

The Pecos bluntnose shiner was listed by the NMDGF as a State threatened species in 1976. In 1987 the USFWS listed this species as Federally threatened and designated critical habitat (USFWS 1987). Critical habitat for the species was designated in two sections of the Pecos River. The first section extends from approximately 10 miles downstream of Ft. Sumner and approximately 64 miles further downstream. The second section starts near Hagerman and extends 37 miles to the Highway 82 bridge, near Artesia. The designated critical area for this species does not extend into the Project Area. Brantley Dam is located approximately 15 miles below the critical area boundary and does not affect the designated critical habitat (USFWS 1987). However, this species reportedly occurs seasonally in the headwaters of Brantley Reservoir because of the displacement of young fish from upstream habitats during flood events (USFWS 1992).



Within the designated critical habitat sections of the Pecos River, the channel is typically wide, sandy, and unstable. The shifting bed structure is a common attribute of suitable habitat for the Pecos bluntnose shiner, where the channel spreads out and becomes braided. This stretch of river is hydrologically characterized as a losing reach, where surface water is lost to seepage and evaporation. Under some conditions water losses in this portion of the river can be as high as 50 percent before the water reaches Acme. Downstream from Acme, the river is a gaining reach and is characterized by a narrowing and deepening channel, which decreases its value as shiner habitat.

Life History and Ecology

The shiner is a relatively large shiner. Adults reach up to 3.5 inches (USFWS 1987). Hatch et al. (1985) reported sizes of three age classes with the age-2 fish ranging from 2.3 to 2.8 inches in total length. In the wild, shiners may survive 3 years, but most in a population are age-1 or less (USFWS 1992).

The shiner is a pelagic broadcast spawner. Spawning begins in early summer and ends in October (Sublette et al. 1990). Elevated flow (e.g., from spring runoff, storm events) is an environmental cue to initiate spawning (Platania 1995). Females release their nonadhesive, semi-buoyant eggs in the water column and males immediately fertilize them (Platania 1998). Life-history studies of this species have suggested that fertilized eggs hatch relatively quickly, within 24 to 48 hours, and their dispersal is more closely related to increased flow than to absolute water volume (Platania 1995). In the protolarvae stage, shiners drift with the current and in 4 to 8 days move into protected, low-velocity habitats. Larvae and juveniles tend to be most common in slow-velocity shoreline habitats and small embayments and backwaters (Propst 1999). Platania (1995) suggested that this life-history strategy allows larvae to gain refuge from high flows at a very early stage. Backwaters, characterized by warm and relatively nutrient- rich waters, allow larvae to reach their maximum growth rate.

The shiner is a drift feeder (Hoagstrom 2002), positioning itself in relatively calm water next to currents within the water column. Adult bluntnose shiners are mainly insectivorous, while young likely feed on zooplankton and small aquatic insects (Propst 1999). Hatch et al. (1985) found that the species occupies most major habitats within the river, but is most common in the main channel, in low-velocity water, 6.5 - 16.1 inches deep, over a sandy substrate. More specifically, habitat use and availability studies conducted by Kehmeier et al. (2004) have indicated that shiners commonly select low to moderate velocity plunge habitats and avoid higher-velocity runs and flats. Their study also indicated that plunge habitats selected by this species did not change significantly as a result of variations in discharge, while runs and flats increased significantly with discharge.

Permanent river flows are considered critical for the conservation of the shiner (USFWS 1992). Valdez et al. (2003) and Kehmeier et al. (2004) reported that habitats more often used by Pecos bluntnose shiners were available in similar quantities despite substantial variations in discharge (i.e., 3-80 cubic feet per second) during their studies. These authors suggested that flexible management



of the Pecos River based on water availability may be more appropriate than managing to provide minimum flows for the conservation of the shiner. It has been hypothesized that predation pressure on Pecos bluntnose shiner and other prey species would increase in isolated pools during extended zero-flow periods (Larson and Propst 2000). Further, Hatch et al. (1985) have suggested that stream desiccation could be considered the main reason for the decline of the species in the Pecos River.

ANALYSIS OF THE EFFECTS OF THE ACTION

INTERIOR LEAST TERN (Sterna antillarum)

Direct effects of oil and gas development and surface use activities including the removal of vegetation, soil exposure, and increased soil susceptibility to erosion all have the potential of having detrimental effects on the least tern's prey base and can potentially lead to indirect impacts that include increased runoff, erosion, off-site sedimentation, increased salt loading and water quality impairments to surface waters. Actions that have the potential of negatively impacting the least tern include any action that would reduce the abundance of fish in the reservoir because least terns are known as a piscivorous species. In addition, soil disturbances can potentially lead to changes in channel morphology from road and pipeline crossings, as well as to the contamination of surface waters by produced water. Activities that could cause these direct or indirect impacts include the use of existing trails and roads, and the construction and operation of well sites, access roads, gas pipelines, and associated facilities. The extent of these potential impacts to water resources, and thus to habitat used by the least tern's prey base, would depend on the proximity of the disturbance to the drainage channel, the slope of the disturbed areas, the size of the area disturbed, the duration and timing of construction activities, and the implementation of mitigation measures.

Potential for Contamination of Adjacent Waters

One of the greatest concerns of oil and gas exploration activities within the Project Area is the potential for introduction of contaminants into aquatic systems, which would impact aquatic species that serve as the least tern's prey base. Leaks and breaks on lines that cross ravines and the Pecos River would likely have the greatest impacts to aquatic species. The standard lease agreement (see Appendix A) has many stipulations designed to contain all drilling fluids and waste byproducts produced in the drilling process on site and to prevent escape of any fluids from the site. However, accidental spills that may enter an adjacent waterway have the potential to affect aquatic resources.

The inclusion of a 660-horizontal-foot buffer of surface occupancy on a case-by-case basis from the normal high-water line of all streams, rivers, and arroyos (with no wells permitted) is a valuable step in preventing or minimizing the potential of contamination of these waterways and any subsequent impacts on aquatic species. These buffer areas provide an extra measure of protection against extremely high-water runoff that could inundate structures that are located at or below this elevation level and also provide an opportunity for the lessee to recapture or contain escaped materials before



they reach the water. Consequently, the potential pollution of waterways and impacts to aquatic species that serve as the least tern's prey base are unlikely.

Impacts of Proposed Spacing and Density of Well Sites

Contaminants associated with the oil and gas well drilling and production process have the potential to enter the Pecos River. Drilling fluids, engine oils, produced natural gas liquids, oil and/or oil products could be potentially transported into the Pecos River during a flood event or through the ground water if any spill events are not properly cleaned up. This type of contamination could result in a direct loss of fish and increase the chronic bioaccumulation of heavy metals in fish species, which are eaten by piscivorous avian species including the least tern. The accumulation of contaminants including heavy metals and pesticides, etc. is known to have a negative effect on the reproductive success of many avian species (Thompson et al. 1997). However, in addition to stipulations that reduce potential impacts to water resources and aquatic biota, oil and gas wells and storage facilities would include safety measures to ensure operations that minimize the potential for habitat pollution in the form of oil leaks or spills. Such measures would include the replacement of worn or out-of-date materials and equipment, construction of spill-containment structures, removal of contaminated materials, and protection of well sites (see Appendix A).

Under the Proposed Action, efforts to prevent or minimize impacts to resources (e.g., soil erosion, water quality, and special status species) within the Project Area include oil and gas special lease stipulations that restrict Surface Occupancy. The total area of NSO under the Proposed Action amounts to 19,155 acres. Well data provided by the BLM indicated that a total of 330 wells have been drilled within the Project Area. Of these, 112 wells (of which 38 are active) are located at or below the estimated 100-year floodplain (elevation 3,283 feet).

Special lease stipulations under the Proposed Action would preclude Surface Occupancy within the maximum conservation pool elevation of the reservoir. These stipulations would prevent the development of oil and gas wells within potential Project Area least tern habitat. Other special lease stipulations that would minimize potential negative effects of well drilling and production on the least tern include surface occupancy on a case-by-case basis within 660 horizontal feet of the normal high waterline of streams, rivers, and arroyos (with no wells permitted), and NSO within Critical or Occupied habitat for threatened and endangered species. Further, access would be restricted seasonally in other important wildlife areas as needed.

Impacts of Anticipated Leasing Quantity

The 20-year projection for reasonable foreseeable development (RFD) includes the drilling of 60 to 80 wells on Reclamation lands within the Project Area. As described above, activities associated with well exploration and production that may affect the least tern include the development and use of access roads, drill pads, and pipelines. Under the Proposed Action, it is anticipated that up to 400



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acres of surface area will be directly impacted over a 20 year period. Impacts to least terns could occur during the breeding season as a result of well construction in suitable or potentially suitable breeding habitat. However, limits on the spatial area and locales where oil and gas exploration and development can occur under the Proposed Action, coupled with other constraints placed by special lease stipulations, will provide adequate protection for the least tern and its habitat.

SOUTHWESTERN WILLOW FLYCATCHER (E. t. adastus)

Given the limited amount of suitable flycatcher habitat within the Project Area, negative impacts to flycatchers are not anticipated. However, removal of woody riparian vegetation, including salt cedar, for development of oil and gas leases, recreational access, etc. would further restrict the distribution of the species should they be found within the Project Area.

Potential for Contamination of Adjacent Waters

Although one of the greatest concerns of oil and gas exploration within the Project Area is the potential for introduction of contaminants into aquatic systems, such problems are not likely to have a negative impact upon the flycatcher since the amount of potentially suitable habitat within the Project Area is very limited and no flycatchers have been found to date (R. Doster 2008, pers. comm.). Leaks and breaks on lines that cross ravines and the Pecos River would have the greatest impacts to aquatic species. The standard lease agreement (see Appendix A) has many stipulations designed to contain all drilling fluids and waste byproducts produced in the drilling process on site and to prevent escape of any fluids from the site. However, accidental spills that may enter an adjacent waterway have the potential to affect riparian and aquatic resources.

The inclusion of a 660-horizontal-foot buffer of surface occupancy on a case-by-case basis from the normal high-water line of all streams, rivers, and arroyos (with no wells permitted) is a valuable step in preventing or minimizing the potential of contamination of these waterways and any subsequent impacts on aquatic or riparian species. These buffer areas provide an extra measure of protection against extremely high-water runoff that could inundate structures that are located at or below this elevation level. Buffer areas also provide opportunities for the lessee to recapture or contain escaped materials before they reach the water, which prevents and minimizes the potential pollution of waterways and impacts to riparian species that serve as the flycatcher's habitat.

Impacts of Proposed Spacing and Density of Well Sites

Under the Proposed Action, efforts to prevent or minimize impacts to resources (e.g., soil erosion, water quality, and special status species) within the Project Area include oil and gas special lease stipulations that restrict surface occupancy. The total area of NSO under the Proposed Action amounts to 19,155 acres. Well data provided by the BLM indicated that a total of 330 wells have



been drilled within the Project Area. Of these, 112 wells (of which 38 are active) are located at or below the estimated 100-year floodplain (elevation 3,283 feet).

Although special lease stipulations under the Proposed Action would be applied at elevations below the revised maximum conservation pool elevation, oil and gas development would be permitted in portions of the Project Area that may serve as potentially suitable habitat. Other special lease stipulations that would minimize potential negative effects of well drilling and production on the flycatcher include NSO within Critical or Occupied habitat for threatened and endangered species. Further, access would be restricted seasonally in other important wildlife areas as needed.

Overall, while the Proposed Action would allow for minerals leasing and development, limits on the spatial area and locales where oil and gas exploration and development can occur, coupled with other constraints placed by special lease stipulations, would provide adequate protection for southwestern willow flycatchers that may eventually occur within the Project Area. The inclusion of a 660-horizontal-foot buffer of surface occupancy on a case-by-case basis from the normal highwater line of all streams, rivers, and arroyos (with no wells permitted) is a valuable step in preventing or minimizing potential impacts on aquatic or riparian species.

Impacts of Anticipated Leasing Quantity

The 20-year projection for reasonable foreseeable development (RFD) includes the drilling of 60 to 80 wells on Reclamation lands within the Project Area. As described above, activities associated with well exploration and production that may affect the flycatcher include the development and use of access roads, drill pads, and pipelines. Under the Proposed Action, it is anticipated that up to 400 acres of surface area will be directly impacted over a 20-year period. Under the Proposed Action, potential impacts of oil and gas exploration and development on the flycatcher or its potentially suitable habitat could occur. However, limits on the spatial area and locales where oil and gas exploration and development con occur under the Proposed Action, coupled with other constraints placed by special lease stipulations, would provide adequate protection for the flycatcher and its habitat.

GYPSUM WILD-BUCKWHEAT (Eriogonum gypsophilum)

Direct negative impacts to the gypsum wild-buckwheat could include development of mineral, oil, and gas leases in areas where the species is either known to exist or could potentially be found. These areas include habitat described above where the soils consist primarily of gypsum that eroded from nearby outcroppings. Other activities including recreation would also have negative effects on the species by compacting the soils, destroying live plants, etc.



Potential for Contamination of Adjacent Waters

Because gypsum wild-buckwheat can be found only in steep upland areas away from waterways that could be contaminated by discharge from oil and gas exploration, it is unlikely that the species would be negatively impacted by such discharges.

Impacts of Proposed Spacing and Density of Well Sites

Under the Proposed Action, efforts to prevent or minimize impacts to resources (e.g., soil erosion, water quality, and special status species) within the Project Area include oil and gas special lease stipulations that restrict surface occupancy. The total area of NSO under the Proposed Action amounts to 19,155 acres. Well data provided by the BLM indicated that a total of 330 wells have been drilled within the Project Area. Of these, 112 wells (of which 38 are active) are located within the estimated 100-year floodplain (elevation 3,283 feet).

Special lease stipulations under the Proposed Action would preclude surface occupancy within Critical or Occupied habitat for threatened and endangered species. This stipulation would prevent the development of potential gypsum wild-buckwheat habitat within the Project Area. Known buckwheat populations also occur within an adjacent BLM designated Special Management Area, which was designated Critical habitat in 1981 and provides the species additional protection.

Overall, while the Proposed Action would allow for minerals leasing and development, limits on the spatial area and locales where oil and gas exploration and development can occur under this alternative coupled with other constraints placed by special lease stipulations, will provide adequate protection for gypsum wild-buckwheat populations known to occur within the Project Area.

Impacts of Anticipated Leasing Quantity

The 20-year projection for reasonable foreseeable development (RFD) includes the drilling of 60 to 80 wells on Reclamation lands within the Project Area. As described above, activities associated with well exploration and production that may affect the gypsum wild-buckwheat include the development and use of access roads, drill pads, and pipelines. Under the Proposed Action, it is anticipated that up to 400 acres of surface area will be directly impacted over a 20-year period. However, NSO stipulations for Critical or Occupied habitat set under the Proposed Action would minimize future potential impacts of oil and gas exploration and development on known populations of the gypsum wild-buckwheat.



PECOS BLUNTNOSE SHINER (Notropis simus pecosensis)

Actions that have the potential to impact the Pecos bluntnose shiner include new mineral developments and the development of roads. From a broad scale perspective, extractive resource uses such as oil and gas developments that occur throughout New Mexico can influence ecosystem function, resilience and sustainability (NMDGF 2006). Pollution of freshwaters by oil and oil products in localized areas is known to be harmful and can cause mortality to aquatic organisms including invertebrates and fish (Mason 2002).

Direct effects of oil and gas development and surface use activities include the removal of vegetation, soil exposure, and increased soil susceptibility to erosion. In turn, these effects can lead to indirect impacts that include increased runoff, erosion, off-site sedimentation, increased salt loading and water quality impairments to surface waters. Soil disturbances can also lead to changes in channel morphology due to road and pipeline crossings, as well as to the contamination of surface waters by produced water. Activities that could cause these direct or indirect impacts include the use of existing trails and roads, and the construction and operation of well sites, access roads, gas pipelines, and facilities (BLM 2007). As noted in BLM (2007) the extent of these potential impacts to water resources, and thus to habitat potentially used by the bluntnose shiner, would depend on the proximity of the disturbance to the drainage channel, the slope of the disturbed areas, the size of the area disturbed, the duration and timing of construction activities, and the implementation of mitigation measures.

Oil, oil products, or other chemicals accidentally spilled could contaminate ground and surface waters and could impact habitats used by the bluntnose shiner. Road construction can be deleterious to fish and other aquatic life forms as it can potentially alter the hydrology of watersheds. Roads increase surface runoff, sedimentation and debris avalanches, destroy riparian vegetation and often require in-stream structures, such as culverts and bridges, which remove aquatic habitat and/or function as barriers to fish movement (Furniss et al. 1991).

Potential for Contamination of Adjacent Waters

One of the greatest potential concerns of oil and gas exploration activities within the Project Area is the potential for introduction of materials into the adjacent waters and the subsequent impact of pollution to aquatic species. Leaks and breaks on lines that cross ravines and the Pecos River would likely have the greatest impacts to aquatic species. The standard lease stipulations (see Appendix A) include many requirements designed to contain all drilling fluids and waste byproducts produced in the drilling process on site and to prevent escape of any fluids from the site. However, as noted above, accidental spills that may enter an adjacent waterway have the potential to affect aquatic resources.



A feature of the landscape capable of buffering and enhancing the protection of water quality and aquatic life is dense vegetation in the riparian zone. Riparian areas act as filters that reduce the concentration of contaminants that enter the watershed and move toward the waterway. However, streambanks along the Pecos River have been highly modified and native riparian vegetation is virtually non-existent. Much of the landscape along the Pecos River and its tributaries is comprised of sparse vegetation and groundcover that may slow down the movement of contaminants toward the water is very limited. While riparian vegetation has not been recognized to be critical for the survival of the bluntnose shiner (USFWS 1987), the scarcity or lack of a functional riparian buffer would allow accidental spills to enter waterways and affect the aquatic life in adjacent areas. As described below, the extent of this potential impact would vary with the type and density of vegetation cover in the vicinity of disturbed areas.

The most abundant vegetation community in the Project Area is the mixed desert shrubland. This community consists primarily of creosote bush and whitethorn acacia (*Acacia constricta*). These species tend to grow in a sparse patchwork and offer little opportunity to restrict flow of liquids. Bunch grasses are often common in this community as well and can even contribute higher areal coverage than the shrubs. When abundant, these bunch grasses can be very effective as a buffer for preventing contaminants from reaching the riparian zone. Forbs are diverse in this community but make up a very small proportion of the total cover.

A second form of cover in the riparian zone adjacent to sites that could potentially be leased under the proposed stipulations is mesquite shrubland. This vegetation community type is identified as having mesquite as the dominant shrub and generally occurs in drainages where the mesquite grows tall and in dense stands. Only one small area of currently unleased land (in the northwest section of the Project Area) is located adjacent to a riparian zone dominated by mesquite shrubland.

More common than mesquite shrubland, but less so than mixed desert shrubland is limestone/gypsum hills shrubland in the riparian zone. The potential oil and gas lease sites that are located directly adjacent to these riparian areas include several large sections that are currently leased by BLM in the northeast portion of the Project Area. Any activities in this area would have the greatest potential to impact the Pecos bluntnose shiner because this species is only known to occur upstream of Brantley reservoir within the Project Area (USFWS 1987). This vegetation community is characterized as sparsely vegetated with a diverse community of sparsely spaced shrubs. Individually, the low-growing shrubs may provide some measure of protection against movement of contaminants down gradient, toward the Pecos River, but the spacing of these plants makes for an ineffective natural buffer. Further, this vegetation community is located in an area with steep terrain, which could exacerbate contaminants would reach the river more quickly and be increasingly difficult to recapture and/or contain in the riparian zone.



The Pecos River also flows through large areas of tamarisk shrubland and Kochia upstream of Brantley Reservoir. Both of these plant community types provide more protection as a vegetation buffer along the waterway than the vegetation community types described above. However, the areas where these communities are located are within the maximum water surface elevation of Brantley reservoir and NSO is designated in areas adjacent to these vegetation communities under the Proposed Action. Consequently, the potential pollution of waterways and impacts to the bluntnose shiners that may occur in this area are unlikely.

Impacts of Proposed Spacing and Density of Well Sites

Contaminants associated with the oil and gas well drilling and production process have the potential to enter the Pecos River. Drilling fluids, engine oils, produced natural gas liquids, oil and/or oil products could be potentially transported into the Pecos River during a flood event or through the ground water if any spill events are not properly cleaned up. This type of contamination could result in a direct loss of fish, reduced habitat quality, and/or increased chronic bioaccumulation of heavy metals in fish species. However, in addition to stipulations that reduce potential impacts to water resources and aquatic biota, oil and gas wells and storage facilities would include safety measures to ensure operations that minimize the potential for habitat pollution in the form of oil leaks or spills. Such measures would include the replacement of worn or out-of-date materials and equipment, construction of spill-containment structures, removal of contaminated materials, and protection of well sites (see Appendix A).

Under the Proposed Action, efforts to prevent or minimize impacts to resources (e.g., soil erosion, water quality, and special status species) within the Project Area include oil and gas special lease stipulations that restrict surface occupancy. The total area of NSO under the Proposed Action amounts to 19,155 acres. Well data provided by the BLM indicated that a total of 330 wells have been drilled within the Project Area. Of these, 112 wells (of which 38 are active) are located at or below the 100-year floodplain (elevation 3,283 feet). Only one active well is located in the vicinity of the northern portion of the reservoir near the inflow of the Pecos River. Currently, no active wells occur within a mile of the Pecos River channel five miles upstream of its inflow into Brantley Reservoir (see Figure 4).

The Project Area is located below the lower Critical habitat boundary for the bluntnose shiner. The limited number of active wells in the vicinity of the northern portion of the reservoir or near its headwaters coupled with the proposed special lease stipulations would reduce the possibility of contamination of the reservoir and potential negative effects on displaced young bluntnose shiner that may occur seasonally in the headwaters of Brantley Reservoir. Other special lease stipulations that would minimize potential negative effects of well drilling and production on the bluntnose shiner include NSO within Critical or Occupied habitat for threatened and endangered species. Further, access would be restricted seasonally in other important wildlife areas as needed.



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Overall, while the Proposed Action would allow for minerals leasing and development, limits on the spatial area and locales where oil and gas exploration and development can occur under this alternative coupled with other constraints placed by special lease stipulations, are likely to provide adequate protection for bluntnose shiner that may occur seasonally in the inflow area of Brantley Reservoir. While there is a limited number of active wells in the vicinity of the inflow area of Brantley Reservoir, the Proposed Action could allow for the development of a larger area, thus increasing the potential for contamination of aquatic resources and impact bluntnose shiner that may occur in this area.

Impacts of Anticipated Leasing Quantity

The 20-year projection for reasonable foreseeable development (RFD) includes the drilling of 60 to 80 wells on Reclamation lands within the Project Area. As described above, activities associated with well exploration and production that may affect bluntnose shiner include the development and use of access roads, drill pads, and pipelines. Under the Proposed Action, it is anticipated that up to 400 acres of surface area will be directly impacted over a 20 year period. However, special lease stipulations set under the Proposed Action are likely to minimize future potential impacts of oil and gas exploration and development on bluntnose shiner and its Critical or Occupied habitat.

EFFECTS DETERMINATION

INTERIOR LEAST TERN (Sterna antillarum)

The potential impacts to the least tern resulting from the Proposed Action are described above. With implementation of proposed special lease stipulations, the Proposed Action **"may affect, is not likely to adversely affect"** the least tern. The Proposed Action would not lead to the destruction or adverse modification of its habitat.

SOUTHWESTERN WILLOW FLYCATCHER (E. t. adastus)

To date, no southwestern willow flycatchers have been documented within the Project Area along the Pecos River between Brantley and Avalon Reservoirs (Doster 2008, pers.comm.). As such, the Proposed Action will have **"no affect"** on the southwestern willow flycatcher.

GYPSUM WILD-BUCKWHEAT (Eriogonum gypsophilum)

Currently, known populations of the gypsum wild-buckwheat are protected by both the BLM and Reclamation. Special lease stipulations under the Proposed Action would preclude surface occupancy within Critical or Occupied habitat for threatened and endangered species. This stipulation would prevent the development of potential gypsum wild-buckwheat habitat within the



Project Area. With implementation of proposed special lease stipulations, the Proposed Action "**may affect, is not likely to adversely affect**" the gypsum wild-buckwheat and will not destroy or adversely modify its Critical habitat.

PECOS BLUNTNOSE SHINER (Notropis simus pecosensis)

The Project Area is located below the lower Critical habitat area boundary designated for the Pecos bluntnose shiner. Brantley Dam is located approximately 15 miles below the Critical habitat boundary and does not affect the designated Critical habitat (USFWS 1987). The potential impacts from the Proposed Action to this species are discussed above under the analysis of the effects of the action. With implementation of proposed special lease stipulations, the Proposed Action **"may affect, is not likely to adversely affect"** Pecos bluntnose shiner and will not destroy or adversely modify its Critical habitat.


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APPENDIX A: EXISTING OIL AND GAS LEASING STIPULATIONS

APPENDIX A: EXISTING OIL AND GAS LEASING STIPULATIONS

APPENDIX A-1: GENERAL SURFACE USE AND OCCUPANCY REQUIREMENTS

This appendix describes practices intended to be applied, when needed, to minimize surface disturbance.

The intent of the Surface Use and Occupancy Requirements is to best manage mechanical surface disturbance and other effects on specified natural resources. Mechanical surface disturbance is created by the use of such things as tools and machinery. Circumstances for waivers of the requirements have been included so that they will not be applied needlessly. Exceptions to the requirements will be considered in emergency situations involving human health and safety and the protection of the environment.

The basis for the "200 meter rule" used in the Surface Use and Occupancy Requirements is 43 CFR 3101.1-2, which states that, at a minimum, mitigation measures are deemed consistent with oil and gas lease rights if they do not require "...relocation of proposed operations by more than 200 meters..." The intent of the actions described in this Appendix is to comply with the regulations and allow the relocation of proposed activities to mitigate impacts, but by no more than 200 meters, without undertaking additional NEPA analysis. The opportunity exists through the NEPA process to design mitigation of impacts that would require relocation greater than 200 meters. The "200 meter rule" simply allows relocation of an activity, such as during on-site meetings prior to APD approval, without the need for detailed NEPA analysis.

The Surface Use and Occupancy Requirements identify minimum use standards for activities around certain natural and man-made features to ensure protection of those features.

- Wildlife Habitat Projects: Surface disturbance will not be allowed within 200 meters of existing or planned wildlife habitat improvement projects. Large-scale vegetation manipulation projects such as prescribed burns will be excepted. This requirement will be considered for waiver with appropriate off-site mitigation, as determined by the Authorized Officer.
- **Endangered Species:** Surface disturbance will not be allowed within 200 meters of critical endangered species habitat.
- **Raptor Nests and Heronries:** Surface disturbance will not be allowed within 200 meters of active heronries or by delaying activity for up to 120 days, or a combination of both. Raptor



nests on special, natural habitat features, such as trees, large brush, cliff faces and escarpments, will be protected by not allowing surface disturbance within 200 meters of nests or by delaying activity for up to 90 days, or a combination of both. Exceptions to this requirement for raptor nests will be considered if the nests expected to be disturbed are inactive, the proposed activity is or short duration (e.g. habitat enhancement projects, fences, pipelines), and will not result in continuing activity in proximity to the nest.

- **Slopes or Fragile Soils:** Surface disturbance will not be allowed on slopes over 30 percent. Exceptions will be considered for projects designed to enhance or protect renewable natural resources, or if a plan of operations and development which provides for adequate mitigation of impacts was approved by the Authorized Officer. Occupancy or use of fragile soils will be considered on a case-by-case basis.
- Streams, Rivers, and Floodplains: Surface disturbance will not be allowed within 200 meters of the outer edge of the 100-year floodplain (As Defined by the Federal Emergency Management Agency FEMA), to protect the integrity of the floodplain. On a case-by-case basis, an exception to this requirement may be considered based on one or more of the criteria listed below. The first three criteria would not be applied in areas of identified critical or occupied habitat for federally listed threatened or endangered species.
 - Additional development in areas with existing developments that have shown no adverse impacts to the riparian areas as determined by the Authorized Officer, following a case-by-case review at the time of permitting.
 - Suitable off-site mitigation if habitat loss has been identified.
 - An approved plan of operations ensures the protection of water or soil resources, or both.
 - Installation of habitat, rangeland or recreation projects designed to enhance or protect renewable natural resources.
- Playas and Alkali Lakes: Surface disturbance will not be allowed within 200 meters of playas or alkali lakes. Waiver of this requirement will be considered on a case-by-case basis for projects designed to enhance or protect renewable natural resources. An exception for oil and gas development will be considered if playa lake loss was mitigated by the protection and development of another playa exhibiting the potential for improvement. Mitigation could include: installing fencing; developing a supplemental water supply; planting trees and shrubs for shelter belts; conducting playa basin excavation; constructing erosion control structures or cross dikes; or by improving the habitat in another area.



- **Springs, Seeps, and Tanks:** Surface disturbance will not be allowed within 200 meters of the source of a spring or seep, or within downstream riparian areas created by flows from the source or resulting from riparian area management. Surface disturbance will not be allowed within 200 meters of earthen tanks or the adjacent riparian areas created as a result of the presence of tanks. Exceptions to this requirement will be considered for the installation of habitat or rangeland projects designed to enhance the spring or seep, or downstream flows.
- **Caves and Karst:** Surface disturbance will not be allowed within 200 meters of known cave entrances, passages or aspects of significant caves, or significant karst features. Waiver of this requirement will be considered for projects that enhance or protect renewable natural resource values, when the proposed activity is of a short duration, or when an approved plan of operations ensures the protection of the cave and karst resources. Also see Appendix A-3 for cave and karst drilling practices.
- **Visual Resource Management:** Painting of oil field equipment and structures to minimize visual impacts will be conducted according to the requirements of Notice to Lessees (NTL) 87-1, New Mexico. Low profile facilities also may be required, when needed, to reduce the contrast of a project with the dominant color, line, texture, and form of the surrounding landscape. Other surface facilities or equipment approved by the BOR, such as large-scale range improvements or pipelines, will be painted, when needed, to conform with the requirements of visual resource management to minimize visual impacts. Paint colors will be selected from the ten standard environmental colors approved by the Rocky Mountain Coordinating Committee. The selected paint color will match as closely as possible the predominant soil or vegetation color of the area.
- **Recreation Areas:** Facilities must be located so that they are not visible from designated recreation areas such as campgrounds, picnic areas, boat launch ramps, etc.
- **Spacing Requirements:** The lease or portion of a lease for an area within and below the full conservation pool elevation may be issued for the sole purpose of assisting the orderly development of the Federal mineral estate. This lease will only be used to maintain state well-spacing requirements on the lands noted above. With the exception of providing access, determined on a case-by-case basis, this lease does not grant surface occupancy.

The specific stipulations listed below are designed to protect the dams, water conveyance facilities, and the water quality in the Project Area.

1. Permittee agrees to provide written notice to the Bureau of Reclamation (BOR) 15 days prior to any and all intended surface activities in connection with exploration, drilling, or any other activity associated with, or leading to, oil and gas, geothermal or other leasable mineral



production including seismic activity on any lands which the BOR has jurisdiction as the surface agency.

- 2. Permittee agrees to no surface occupancy within 800 horizontal meters (~1/2 mile) from the Brantley or Avalon Dam sites. Drilling proposed within 800 to 1600 meters (~ 1/2 to ~ 1 mile) of either dam will be considered on a case-by-case basis after review of the geology of the proposed site. This stipulation is to ensure the integrity of the structures.
- 3a. Permittee agrees to no surface occupancy within 200 horizontal meters (~ 1/8 mile) or below the full conservation pool elevation (Brantley full pool elevation is 3,271 feet AMS) and no storage facilities below the maximum flood zone elevation at Brantley Reservoir (Brantley maximum flood surface elevation is 3286 feet above sea level). This stipulation is to reduce the possibility of contamination (pollution) affecting the reservoir waters.
- 3b. Permittee agrees to no surface occupancy within 200 horizontal meters (~ 1/8 mile) of the maximum conservation pool elevation (Avalon maximum conservation pool surface elevation is 3190 feet) and no storage facilities below 3,200 feet at Avalon Reservoir.
- 4. Permittee agrees to no surface occupancy within 200 horizontal meters (~ 1/8 mile) of the centerline of any constructed or proposed BOR tunnel, canal, aqueduct, pipeline, lateral, drain, transmission line, telephone line, roadway, building, or other permanent structures or facilities under the administration, jurisdiction, or ownership of the BOR. BOR operation and maintenance roads will not be used for access without prior approval of the BOR.
- 5. Permittee agrees to no surface occupancy within 200 horizontal meters (approximately 1/8 mile) of any improved campground, boat ramp, or other permanent recreation facility.
- 6. Permittee agrees to locate production facilities so they are not visible from the reservoir or public recreation facilities (campgrounds, etc.).
- 7. Permittee agrees to no surface occupancy within the boundaries of Brantley Lake State Park or other designated public recreation areas.

APPENDIX A-2: GENERAL CONDITIONS OF APPROVAL

This appendix describes standard conditions of approval. When appropriate, conditions of approval may be selected from this list and attached to use authorizations. A check-list or other suitable means may be used to identify applicable conditions of approval. The emphasis is primarily on oil and gas operations and rights-of-way, but these conditions may be applied to other activities, as well.



General Conditions

1. Reclamation does, through the duly authorized officer executing this Permit, hereby consent to Permittee's request to enter onto lands of the United States for the purpose of; establishing, constructing, placing, operating and maintaining an oil and gas well head and appurtenant facilities approved ______ by the State of New Mexico's Energy, Minerals and Natural Resources Department (______) and constructing, improving and maintaining an access road to that site, subject to the terms and conditions herein written:

said lands located in the XX (XX) of Section XX and the XX of the XX (XX) of Section XX of Township XX South, Range XX East, New Mexico Principal Meridian in Eddy County, New Mexico. The area is shown in the attached "Exhibit A," and made a part hereof.

- 2. This permission given herein will neither constitute nor be construed as any surrender of the jurisdiction and supervision of the United States over the lands described herein.
- 3. The Permittee hereby agrees to indemnify and hold harmless the United States, their employees, agents, and assigns from any loss or damage and from any liability on account of personal injury, property damage, or claims for personal injury or death arising out the Permittee's activities under this Permit.
- 4. The Permittee will comply with all applicable Federal laws and regulations existing or hereafter enacted or promulgated. In any event, the Permittee will comply with the Toxic Substances Control Act of 1976, as amended (15 U.S.C. 2601, et. seq.) with regard to any toxic substances that are used, generated by or stored on United States lands or on facilities authorized by this permit. (Re: 40 CFR, Part 702-799 and particularly provisions on polychlorinated biphenyls, 40 CFR, Part 761.1 761.193.) Additionally, any release of toxic substances (leaks, spills, etc.) in excess of the reportable quantity established by 40 CFR, Part 117 will be reported as required by the Comprehensive Environmental Response, Compensation and Liability Act, Section 102b. A copy of any report required or requested by any Federal agency or State government as a result of the reportable release or spill of toxic substances will be furnished to Reclamation concurrent with the filing of the reports to the involved Federal agency or State government.
- 5. The Permittee agrees to indemnify and hold harmless the United States against any liability arising from the release of any hazardous substance or hazardous waste (as these terms are defined in the Comprehensive Environmental Response, Compensation and Liability Act of 1980, 42 U.S.C. 9601 et seq. or the Resource Conservation and Recovery Act, 42 U.S.C. 6901, et seq.) on United States lands unless the release is wholly unrelated to the Permittee's



activities on United States lands. This agreement applies without regard to whether a release is caused by the Permittee, its agent or unrelated third parties.

- 6. If, during any phase of the construction, operation, maintenance, or termination of the facilities authorized by this permit, any oil or other pollutant should be discharged, impacting United States lands, the control and removal, disposal, and cleaning up of such oil or other pollutant, wherever found will be the responsibility of the Permittee, regardless of fault. Upon failure of the Permittee to control, repair all damages to United States lands resulting therefrom, Reclamation may take such measures as deemed necessary to control and clean up the discharge and restore the area, including, where appropriate, the aquatic environment and fish and wildlife habitats, at the full expense of the Permittee. Such action by Reclamation will not relieve the Permittee of any liability or responsibility.
- 7. The Permittee will comply with all applicable water, ground, and air pollution laws and regulations of the United States, the State of New Mexico and local authorities. In addition the Permittee will comply with the following hazardous materials restrictions:
 - A. The Permittee will comply with all applicable Federal, State, and local laws and regulations, and Reclamation policies and instructions, existing or hereafter enacted or promulgated, concerning any hazardous material that will be used, produced, transported, stored or disposed of on or in lands, waters or facilities owned by the United States or administered by Reclamation.
 - B. "Hazardous material" means any substance, pollutant or contaminant listed as hazardous under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, 42 U.S.C. 9601, et seq., and the regulations promulgated pursuant to that Act.
 - C. The Permittee may not allow contamination of lands, waters or facilities owned by the United States or administered by Reclamation by hazardous materials, thermal pollution, refuse, garbage, sewage effluent, industrial waste, petroleum products, mine tailings, mineral salts, pesticides (including, but not limited to, the misuse of pesticides), pesticide containers or any other pollutants.
 - D. The Permittee will report to Reclamation, within 24 hours of its occurrence, any events which may or does result in pollution or contamination adversely affecting lands, water or facilities owned by the United States or administered by Reclamation.



- E. Violation of any of the provisions of this Article will constitute grounds for immediate termination of this Permit and will make the Permittee liable for the cost of full and complete remediation and/or restoration of any Federal resources or facilities that are adversely affected as a result of violation.
- F. The Permittee agrees to include the provision contained in paragraphs (a) through (e) of this Article in any subcontract or third party contract it may enter into pursuant to this Permit.
- G. Reclamation agrees to provide information necessary for the Permittee, using reasonable diligence, to comply with the provision of this Article.
- 8. The holder shall be responsible for maintaining the site in a sanitary condition at all times; waste materials shall be disposed of promptly at an appropriate waste disposal site. "Waste" means all discarded matter including, but not limited to, human waste, trash, garbage, refuse, oil drums, petroleum products, ashes, and equipment.
- 9. The Permittee will minimize disturbance to existing fences and other improvements on United States lands. The Permittee is required to promptly repair improvements to at least their former condition. Functional use of these improvements will be maintained at all times. The Permittee will make a documented good-faith effort to contact the owner of any improvements prior to disturbing those facilities. When necessary to pass through a fence line, the fence will be braced on both sides of the passageway prior to cutting the fence.
- 10. This Permit is granted subject to the existing rights in favor of the public or third parties for highways, roads, railroads, telegraph, telephone and electrical transmission lines, canals, laterals, ditches, flumes, siphons, and pipelines on, over, and across said land.
- 11. This Permit is personal, revocable, and nontransferable and will become effective on the date hereinabove written and unless otherwise sooner terminated, will continue for ten (10) years so long as in the opinion of Reclamation it is considered expedient and not detrimental to the public interest, and will be revocable upon sixty (60) days written notice to the Permittee in accordance with Article 11. Upon such revocation or termination, the aforesaid structure or structures and all accessories will be removed without delay at the expense of the Permittee. The Permittee will leave the site(s) in a condition satisfactory to Reclamation and the Bureau of Land Management.



- 12. This Permit may be revoked by Reclamation upon sixty (60) days written notice to the Permittee if:
 - A. The Permittee's use of the land interferes with existing or proposed facilities; or
 - B. The land contained in the Permit is needed for any United States purpose; or
 - C. The United States disposes of its interest in the land contained in this Permit; or
 - D. The Permittee fails to comply with any other terms or conditions of this Permit and upon notification of the violation, Permittee fails to adequately cure the violation in a timely manner. Reclamation will have the final determination regarding the adequacy of the cure.
- 13. Reclamation has appraised the fair market value of the right-of-use fee in accordance with 43 CFR, Part 429.3. Said appraisal has established the fee for the right-of-use as \$______, and is due prior to the United States executing this Permit.
- 14. The Permittee will comply with Section 106 of the National Historic Preservation Act (P.L. 89-665, 80 Stat.915 [16 USC 470] as amended, the New Mexico Cultural Properties Act (NMSA 1978, 18-6-1 through 18-6-23), and the Prehistoric and Historic Sites Preservation Act (NMSA 18-8-1 through 18-8-8) and their implementing regulations for all registered cultural properties on Reclamation lands, specifically including all properties and lands within the Carlsbad Irrigation District National Historic Landmark. The New Mexico State Cultural Properties Act requires that survey work for archaeological sites be conducted prior to any development on State or Federal lands. The Permittee will get written authorization before any work is started within the Carlsbad Irrigation District National Historic Landmark. Any cultural resources discovered shall be immediately reported to the authorizing officer.

Pursuant to the Memorandum of Agreement with the Bureau of Reclamation, the Advisory Council on Historic Preservation and the New Mexico State Historic Preservation Officer, the Carlsbad Irrigation District will ensure compliance with the New Mexico Cultural Properties Act (NMSA 1978, 18-6-1 through 18-6-23), and the Prehistoric and Historic Sites Preservation Act (NMSA 18-8-1 through 18-8-8) and their implementing regulations for all registered cultural properties conveyed to the CID by the Bureau of Reclamation.

In the event cultural resources (including architecture, artifacts, and/or cultural debris of bone, shell, charcoal, or wood) are discovered during activities authorized herein, Permittee will immediately cease work in proximity of the discovery location and contact the Reclamation archaeologist immediately at (505) 462-3644, giving location and nature of the findings. The Permittee will exercise care so as not to disturb or damage the cultural materials discovered, and will provide such cooperation and assistance as may be necessary to preserve the findings for removal or other disposition by the Government.



Discovery of Human Remains: Any person who knows or has reason to know that he or she has inadvertently discovered possible human remains on Federal lands, must provide immediate telephone notification of the inadvertent discovery to the Reclamation archaeologist at (505) 462-3644.

If the discovery occurred in connection with an activity, including (but not limited to) construction, mining, logging, and agriculture, the person will cease the activity in the area of the discovery, make a reasonable effort to protect the items discovered, and wait for approval from the Reclamation archaeologist before resuming such activity. The requirement is prescribed under the Native American Graves Protection and Repatriation Act (Public Law 101-601; 104 Stat. 3042) of November 1990 and National Historic Preservation Act, Section 110(a)(2)(E)(iii) (Public Law 102-575, 106 Stat. 4753) of October 1992.

Destruction of Archaeological Resources: Any person who excavates, removes, damages, alters or defaces or attempts to excavate, remove, damage, or otherwise alter or deface any archaeological resource located on public lands or Indian land is subject to a maximum of five years in prison and \$250,000 fine, as prescribed under Sections 6 and 7 of the Archaeological Resources Protection Act of 1979 (Public Law 96-95, 93 Stat. 721), as amended.

- 15. No member of or delegate to Congress or the Resident Commissioner will be admitted to any share or part of this Permit or to any benefit to arise therefrom, but this restriction will not be construed to extend to this Permit if made with a corporation or company for its general benefit.
- 16. The Permittee warrants that no person or agency has been employed or retained to solicit or secure this Permit upon an agreement or understanding for a commission, percentage, brokerage, or contingent fee except bona fide employees and bona fide commercial agencies maintained by the Permittee for the purpose of securing business. For breach or violation of this warranty, Reclamation will have the right to revoke this Permit without liability or in its discretion to require the Permittee to pay the full amount of such commission, percentage, brokerage, or contingency fee to the United States.

Road Construction, Improvement, and Maintenance

17. The road will have a driving surface of 14 feet. The maximum grade is 10 percent unless agreed to by Reclamation in writing. If Reclamation does permit grades in excess of 10 percent for a distance of more than 300 feet, that segment will be designed by a professional engineer. Maximum width of surface disturbance from construction, improvement and maintenance activities will be 30 feet.



- 18. Crowning with materials on site and ditching on one side of the road of the uphill side will be required. The crown will have a grade of approximately 2 percent, i.e. 1 inch crown per 12 feet of width. If conditions dictate, ditching may be required for both sides of the road; if conditions permit, flat-bladed road may be considered.
- 19. Drainage control will be ensured over the entire road through the use of borrow ditches, outsloping, insloping, natural rolling topography, lead-off (turnout) ditches, culverts, and/or drainage dips. All lead-off ditches will be graded to a 3 percent maximum ditch slope. The spacing interval for lead-off ditches will be determined according to the following table, but may be amended depending upon existing soil types and centerline road slope in percentage.

SPACING INTERVAL FOR TURNOUT DITCHES

Spacing Interval
400 feet - 150 feet
250 feet - 125 feet
200 feet - 100 feet
150 feet - 75 feet

A typical lead-off ditch has a minimum depth of one foot below and a berm 6 inches above the natural surface elevation. The berm will be on the downslope side of the lead-off ditch. The ditch will tie into vegetation wherever possible.

Culvert pipes will be used for cross drainage dips where low water crossings are not feasible. The minimum culvert diameter must be 18 inches. Any culvert pipe installed will be of a sufficient diameter to pass the anticipated flow of water. Culvert location and diameters will be submitted to Reclamation by Permittee for Reclamation approval.

On road slopes exceeding 2 percent, drainage dips will drain water into an adjacent lead-off ditch. Drainage dip location and spacing will be determined by the following formula:

spacing interval = 400 ft / road slope percent + 100 ft.example 2% slope: 400/2 + 100 = 300 feet

20. The road or those portion identified by Reclamation may, as determined by Reclamation, be required to be surfaced with caliche, gravel, or other surfacing material which will be approved by Reclamation. When surfacing is required, surfacing material will be compacted to a minimum thickness of six inches with caliche material. The width of surfacing will be no less than the driving surface. Prior to using any mineral materials from any existing or proposed source, authorization must be obtained from Reclamation.



- 21. Where used, all Cattleguard grids and foundation design and construction will meet the American Association of State Highway and Transportation Officials (AASHTO) Load Rating H-20, although AASHTO U-80 rated grids will be required where heavy loads (Exceeding H-20 loading), are anticipated. Cattleguard grids will not be less than 8 feet in length nor less than 14 feet in width. A wire gate, 16 foot minimum width will be provided on one side unless otherwise requested by the surface user.
- 22. Permittee will maintain the road in a safe, usable condition. A maintenance program will include, but not limited to blading, ditching, culvert cleaning, drainage installation, cattle guard maintenance and surfacing.
- 23. Unless otherwise approved by the Authorized Officer, vehicle turnouts will be required. Turnouts will be located at 2000-foot intervals, or the turnouts will be intervisible, whichever is less.
- 24. Unless otherwise determined by Reclamation, the road will not be used as an access for the public. Reclamation withdrawn lands are established for project purposes and are not subject to the use by the general public. Permittee will be responsible to ensure that the public use is restricted from the withdrawn lands under management by Reclamation.
- 25. The area will be kept free of the following plant species: Malta starthistle, African rue, Scotch thistle, and Saltcedar.
- 26. Reclamation will be informed immediately if any subsurface drainage channels, cave passages, or voids are penetrated during construction and no further construction will be done at that point until clearance has been issued by Reclamation. Special restoration stipulations or a realignment may be required at such intersections, if any. Roads and pipelines will be routed around sinkholes and other karst features when practical. Turnout ditches and drainage leadoffs will not be constructed in such a manner as to increase or decrease the natural flow of water into or out of cave or karst features.

Road Rehabilitation

27. When the road is abandoned, it will be ripped at least sixteen inches deep, including all turnouts. The caliche may be reclaimed for re-use before ripping. The caliche will be removed and topsoil placed over the impacted area, and the surface disced before seeding. All culverts or other structures will be removed. All fill material will be replaced into the cut areas; borrow and lead-off ditches, drainage dips, or other erosion control earthwork will be filled or smoothed, and the abandoned road returned to the natural contours, as closely as possible. Traffic barriers will be installed at all vehicular access points to prevent further use



of the road. Water breaks at lest 8-inches high will be constructed as directed by Reclamation.

28. Permittee will reseed the entire area with the following mixture:

Seed	Rate (lbs. per acre PLS)
Alkali sacaton (Sporobolus airoides)	3 lbs. per acre
Sideoats grama (<i>Bouteloua curtipendula</i>)	5 lbs. per acre

Pounds of pure live seed (PLS): (Pounds of seed) * (percent of purity) * (percent of germination).

All disturbed areas are to be seeded with the seed mixture listed above. The seed and fertilizer are to be applied together by broadcasting with a seed spreader, than harrowed for seed coverage. Use of a seed drill is acceptable. Appropriate measures will be taken to insure that the seed/fertilizer mixture is evenly and uniformly planted. There will be no primary or secondary noxious weeds in the seed mixture. Seeds will be tested for viability and purity in accordance with State law(s) within nine months prior to purchase. Commercial seed will be either certified or registered and the seed mixture container will be tagged in accordance with State law(s). The seed will be available for inspection by Reclamation. The seeding will be repeated until a satisfactory stand is established as determined by Reclamation. Evaluation of growth will not be made before completion of the growing season after seeding.

- 29. Normally the best time for seeding is between June 15 and September 15. However, the Permittee may reseed immediately after completing surface abandonment procedures. In any event, Reclamation reserves the right to require reseeding at a specified time if the seed does not germinate after one complete growing season.
- 30. Permittee will contact Reclamation at 505.462.3599 at least three working days prior to the start of reseeding activities.

Drilling Surface Requirements: Standards

31. The approval of this action does not in any way grant or imply approval of any off-lease or off-unit action. It is the responsibility of the applicant to obtain any such approvals from the appropriate surface managing agency, including the Reclamation, and/or any private landowners.



- 32. Prior to commencing construction of the road, pad, or other associated developments, the operator shall provide the dirt contractor with a copy of the approved Surface Use Plan and the attached Conditions of Approval.
- 33. All topsoil and vegetation encountered during the construction of the drill site areas shall be stockpiled and made available for resurfacing of the disturbed areas after completion of the drilling operations. Topsoil on the (well name and number) is approximately (specify) inches in depth. A minimum of approximately (specify) Cubic yards of topsoil material shall be stockpiled on the (specify) edge / at the (specify) corner of the location for reclamation of the pad and pit area.
- 34. The Permittee shall post signs identifying the location permitted herein in accordance with the requirements contained in 43 CFR 3162.6. The following data is required on the well sign:

Operator's Name:	
Well Name and No.:	
Lease No.:	

Location: xx' fxl & xx' fxl - Sec. nn T nn S, R nn E NMPM

- 35. All vehicles and equipment associated with the drilling, completion, or production phases of this well shall be confined to the approved road, pad and other areas approved herein.
- 36. The drill pad and access road for this well must be surfaced with 6 inches on compacted caliche, gravel or other approved surfacing material. Caliche, gravel or other related materials from new or existing pits on Federal mineral estate shall not be taken without the approval of Reclamation and the Bureau of Land Management. Payment for Federal mineral materials to be used for construction is required prior to construction of the pad and road.
- 37. Reserve or mud pits shall not be constructed within the Project Area. The Permittee will use the Closed Loop System with no reserve pits. The entire well pad will be bermed to prevent oil, salt, and other contaminants from leaving the well pad. Topsoil shall not be used to construct any of the berms. The berms shall be maintained throughout the life of the well.
- 38. Stockpiling of topsoil is required. The topsoil shall be stockpiled in an appropriate location to prevent loss of soil due to water or wind erosion and not used for berming or erosion control. Any water erosion that may occur during the life of the well will be quickly



corrected and proper measures will be taken to prevent future erosion. The surface material for the road and well pad shall be removed before reclamation can begin.

- 39. Firewalls/Containment Dikes are to be constructed and maintained around all storage facilities/batteries. A 20-millimeter, permanent liner will be installed with a 4-ounce felt backing to prevent tears or punctures. Tank battery berms must be large enough to contain 1.5 times the capacity of the largest tank. Automatic shut-off check valves, or similar systems, will be installed to minimize the effects of catastrophic line failures used in production or drilling. Exhaust noise from pump jack engines must be muffled or otherwise controlled.
- 40. If during any drilling or construction activities any sinkholes or cave openings are discovered, all drilling or construction activities shall cease immediately and Reclamation will be notified. Within one working day, Reclamation will evaluate the situation and determine if construction can continue or provide mitigation measures to lessen damage to the karst environment. Reclamation will coordinate this activity with the Bureau of Land Management and a verbal recommendation to proceed or stop the operation will be issued.
- 41. All trash, junk and other waste material will be contained in trash cages or bins to prevent scattering and will be removed and deposited in an approved sanitary landfill. Waste burial on site is not permitted.
- 42. All above ground structures not subject to safety requirements shall be painted by the Permittee to blend with the natural color of the landscape. The paint used shall be a color which simulates "Standard Environmental Colors" designated by the Rocky Mountain Five-State Interagency Committee. The color selected for this project will be provided within thirty days following the execution of this permit.
- 43. All open-vent exhaust stacks associated with heater-treater, separator and dehydrator units shall be modified to prevent birds and bats from entering them and to the extent practical to discourage perching and nesting.

New production equipment installed on federal leases after November 1, 1993, will have the open-vent exhaust stacks constructed to prevent the entry of birds and bats and, to the extent practical, to discourage perching and nesting.

Buried Pipelines

44. The holder shall conduct all activities associated with the construction, operation, and termination of the pipeline within the authorized limits.



- The pipeline shall be buried with a minimum cover of ______ inches between the top of 45. the pipe and ground level.
- 46. Blading of all vegetation shall/shall not be allowed. Blading is defined as the complete removal of brush and ground vegetation. Clearing of brush species shall be allowed. Clearing is defined as the removal of brush while leaving ground vegetation (grasses, weeds, etc.) intact. Clearing is best accomplished by holding the blade 4 to 6 inches above the ground surface. In areas where blading and/or clearing is allowed, the maximum width of these operations shall not exceed feet.
- 47. The holder shall minimize disturbance to existing fences and other improvements on public lands. The holder is required to promptly repair impacted improvements to at least their former state. The holder shall contact the owner of any improvements prior to disturbing them. When necessary to pass through a fence line, the fence shall be braced on both sides of the passageway prior to cutting of the fence. No permanent gates shall be allowed unless approved by the Authorized Officer.
- 48. Vegetation, soil, and rocks left as a result of construction or maintenance activity shall be randomly scattered over the project area and shall not be left in rows, piles, or berms, unless otherwise approved by the Authorized Officer, except that an earthen berm shall be left over the ditch line to allow for settling back to grade.
- 49. The holder shall seed all surface disturbed by construction activities. Seeding shall be done according to the attached seeding requirements (Exhibit), using the attached seed mixture (as determined to meet Desired Plant Community objectives).
- 50. All above-ground structures not subject to safety requirements shall be painted by the holder to blend with the natural color of the landscape. The paint used shall be a color which simulates "Standard Environmental Colors" designated by the Rocky Mountain Five-State Interagency Committee. The color selected for this project is _____, Munsell Soil Color Chart Number _____.
- 51. The holder shall post signs designating the Reclamation serial number assigned to this authorization at the following locations: the points of origin and completion, or entry to and exit from public lands, of the pipeline and at all major road crossings. These signs shall be posted in a permanent, conspicuous manner, and shall be maintained in a legible condition for the term of the authorization.
- 52. The holder shall not use the pipeline route as a road for purposes other than routine maintenance as determined necessary by the Authorized Officer in consultation with the



holder. The holder shall take whatever steps are necessary to ensure that the pipeline route is not used as a roadway.

Surface Installed Pipeline

- 53. No surface pipeline will be placed within/below the 100-year floodplain at Brantley Reservoir (elevation 3,283 feet [1,000 meters]) or Avalon Reservoir (elevation 3,200 feet [975 meters]).
- 54. The holder shall be liable for damage or injury to the United States to the extent provided by 43 CFR Sec. 2803/2883. The holder shall be held to a standard of strict liability for damage or injury to the United States resulting from fire or soil movement (including landslides and slumps as well as wind and water caused movement of particles) caused or substantially aggravated by any of the following within the permit area:
 - A. Activities of the holder, including but not limited to, construction, operation, maintenance, and termination of the facility.
 - B. Activities of other parties including but not limited to:
 - 1. Land clearing.
 - 2. Earth-disturbing and earth-moving work.
 - 3. Blasting.
 - 4. Vandalism and sabotage.
 - C. Acts of God.

The maximum limitation for such strict liability damages shall not exceed one million dollars (\$1,000,000) for any one event and any liability in excess of such amount shall be determined by the ordinary rules of negligence of the jurisdiction of in which the damage or injury occurred.

This section shall not impose strict liability for damage or injury resulting primarily from the negligent acts of the United States.

- 55. The holder shall conduct all activities associated with the construction, operation, and termination of the pipeline within the authorized width of ______ feet.
- 56. No blading or clearing of any vegetation shall be allowed unless approved in writing by the Authorized Officer.



- 57. The holder shall install the pipeline on the surface in such a manner that will minimize suspension of the pipeline across low areas in the terrain. In hummocky or dune areas, the pipeline will be "snaked" around hummocks and dunes rather than suspended across these features.
- 58. The pipeline shall be buried a minimum of ______ inches under all roads, including "two-tracks" and trails. Burial shall continue for 20 feet on each side of each crossing. The condition of the road, upon completion of the construction, shall be returned to at least its former state, with no bumps, dips, or soft spots remaining in the road surface.
- 59. The holder shall minimize disturbance to existing fences and other improvements on public lands. The holder is required to promptly repair impacted improvements to at least their former state. The holder shall contact the owner of any improvements prior to disturbing them. When necessary to pass through a fence line, the fence shall be braced on both sides of the passageway prior to cutting of the fence. No permanent gates shall be allowed unless approved by the Authorized Officer.
- 60. All above-ground structures not subject to safety requirements shall be painted by the holder to blend with the natural color of the landscape. The paint used shall be a color which simulates "Standard Environmental Colors" designated by the Rocky Mountain five-State Interagency Committee. The color selected for this project is ______, Munsell Soil Color Chart Number _____.
- 61. The holder shall post signs designating the Reclamation serial number assigned to this pipeline at the following locations: the points of origin and completion, or entry to and exit from public lands, of the pipeline and at all major road crossings. These signs shall be posted in a permanent, conspicuous manner, and shall be maintained in a legible condition for the term of the authorization.
- 62. The holder shall not use the pipeline route as a road for purposes other than routine maintenance as determined necessary by the Authorized Officer in consultation with the holder. The holder shall take whatever steps are necessary to ensure that the pipeline route is not used as a roadway.

Overhead Electric Distribution Lines

- 63. The holder shall conduct all activities associated with the construction, operation, and termination of the power line within the authorized limits.
- 64. No blading or clearing of any vegetation will be allowed unless approved in writing by the Authorized Officer.



- 65. Power lines shall be constructed to standards outlined in "Suggested Practices for Raptor Protection on Power lines," Raptor Research Foundation, Inc., 1981, unless otherwise agreed to by the Authorized Officer in writing. The holder is responsible for demonstrating that power pole designs not meeting these standards are "raptor safe". Such proof shall be provided by a raptor expert approved by the Authorized Officer. The Reclamation reserves the right to require modifications or additions to power line structures constructed under this authorization, should they be necessary to ensure the safety of large perching birds. These modifications and/or additions shall be made by the holder without liability or expense to the United States.
- 66. The holder shall minimize disturbance to existing fences and other improvements on public lands. The holder is required to promptly repair impacted improvements to at least their former state. The holder shall contact the owner of any improvements prior to disturbing them. When necessary to pass through a fence line, the fence will be braced on both sides of the passageway prior to cutting of the fence. No permanent gates will be allowed unless approved by the Authorized Officer.
- 67. Construction holes left open overnight shall be covered. Covers shall be secured in place and shall be strong enough to prevent livestock or wildlife from falling through and into a hole.
- 68. The holder shall evenly spread the excess soil excavated from pole holes in the immediate vicinity of the pole structure.
- 69. The Reclamation serial number assigned to this authorization grant shall be posted in a permanent, conspicuous manner, and be maintained in a legible condition for the term of the authorization at all major road crossings and at all serviced facilities. Numbers will be at least two inches high and will be affixed to the pole nearest the road crossing and at the facilities served.
- 70. Upon cancellation, relinquishment, or expiration of this grant, the holder shall comply with those abandonment procedures prescribed in the grant or determined at the time of abandonment.
- 71. All surface structures (poles, lines, transformers, etc.) Shall be removed within ______ days of abandonment, relinquishment, or termination of use of the serviced facilities or within ______ days of abandonment, relinquishment, or termination of this authorization, whichever comes first. This will not apply where the power line extends to serve an active, adjoining facility or facilities.



Communication Sites

- 72. The authorization is conditioned upon the submission of a copy of an approved license and/or renewal license granted by the Federal Communication Commission (FCC) or the Interdepartmental Radio Advisory Committee (IRAC) for each electronic station installation authorized or future amendments of this authorization. A copy of the FCC or IRAC authorization shall be submitted with 90 days of issuance of this authorization or within 90 days following approval of an amendment to this authorization. Failure to submit the FCC or IRAC authorization copy within the time specified shall be grounds for termination of this authorization or cancellation of an amendment to this authorization. The Authorized Officer may grand an extension of up to 90 days, if requested in writing by the holder.
- 73. The holder and its sublessees shall at all times operate their radio-electronic equipment in such a manner as not to cause interference with radio-electronic operations of existing users in the vicinity. If such interference results from holder's or sublessee's operations, holder shall promptly, at its own expense, modify the equipment and operations, or shut down if necessary to eliminate or reduce the interference to the satisfaction of the FCC, IRAC, and/or the Authorized Officer.
- 74. The holder shall notify the Authorized Officer of any intent to locate additional users within or upon their existing facilities, not less than 45 days prior to occupancy of holder's facilities. Information that must included is:
 - A. Name, current address, and phone number of the third party user(s).
 - B. Expected date of occupancy.
 - C. A photo or sketch of the type of antennas to be installed, as well as any other planned physical changes to the exterior facilities operated by the holder. If the proposed use is not specified in the original authorization shall be required.
- 75. No less than 45 days prior to occupancy of the holder's facility, the holder shall notify existing users within a 1-mile radius that the holder intends to accommodate a new communication user in its facility. Existing users can then file any comments pertaining to potential frequency or electromagnetic problems with the Federal Communications Commission, 1919 M Street NW, Washington, DC 20554, with a copy to the Authorized Officer.
- 76. The holder shall be responsible for the actions and operations of any third party users associated with this facility. All such use shall be subject to the applicable terms, conditions, and stipulations of this authorization.



- 77. All above-ground structures not subject to safety requirements shall be painted by the holder to blend with the natural color of the landscape. The paint used shall be a color which simulates "Standard Environmental Colors" designated by the Rocky Mountain Five-State Interagency Committee. The color selected for this project is ______, Munsell Soil Color Chart Number _____.
- 78. The holder shall post signs designating the Reclamation serial number assigned to this facility at the points of entry to and exit from the site. These signs shall be posted in a permanent, conspicuous manner, and shall be maintained in a legible condition for the term of the authorization.
- 79. The holder agrees to share road maintenance costs with all present and future users of the access road. At such future time as a Users Association for this communication site is formed, the holder shall join the Users Association and remain a member in good standing. Within 30 days of the creation of such Users Association the holder shall provide the authorized officer with evidence of membership. Failure of the holder to join the Users Association and remain a member in good standing for termination of this authorization.

Mineral Material Sites (Gravel, Sand, Saleable Type Minerals)

- 80. All design, material, and construction, operation, maintenance, and termination practices shall be in accordance with safe and proven engineering practices, and include Storm Water Pollution Prevention Plans that address erosion and sediment control as well as other potential pollutants.
- 81. The holder shall conduct all activities associated with the construction, operation, and termination of the material pit within the authorized limits.
- 82. The holder shall minimize disturbance to existing fences and other improvements on public lands. The holder is required to promptly repair impacted improvements to at least their former state. The holder shall contact the owner of any improvements prior to disturbing them. When necessary to pass through a fence line, the fence shall be braced on both sides of the passageway prior to cutting of the fence. No permanent gates shall be allowed unless approved by the Authorized Officer.
- 83. The holder shall be responsible for the actions and operations of any third party users associated with this authorization. All such use shall be subject to the applicable terms, conditions, and stipulations of this authorization.



- 84. The road proposed as part of this authorization shall be constructed and maintained in accordance with Reclamation road standards, including the New Mexico Roads Policy.
- 85. The holder shall seed all surface disturbed by construction activities. Seeding shall be done according to the attached seeding requirements (Exhibit ______), using the attached seed mixture (as determined by DPC).
- 86. Suitable topsoil material removed in conjunction with clearing and stripping shall be conserved in stockpiles (within the material site) (at the following staked locations: specify location). Topsoil shall be stripped to an average depth of (specify) inches. A total of (specify) cubic yards of topsoil shall be stockpiled.
- 87. Excess excavated, unsuitable, or slide material shall be disposed of as directed by the Authorized Officer.
- 88. No construction or routine maintenance activities shall be performed during periods when the soil is too wet to adequately support construction equipment. If such equipment creates ruts in excess of (designate) inches deep, the soil shall be deemed too wet to adequately support construction equipment.
- 89. Existing roads and trails on public lands that are blocked as the result of the material pit activities shall be rerouted or rebuilt as directed by the authorized officer.
- 90. The holder shall recontour the disturbed area and obliterate all earthwork by removing embankments, backfilling excavations, and grading to reestablish the approximate original contour of the land as determined by the Authorized Officer.
- 91. The holder shall uniformly spread topsoil over all unoccupied disturbed areas. Spreading shall not be done when the ground or topsoil is frozen or wet.
- 92. Reclamation will monitor construction on this material pit site. Notify the appropriate Reclamation Resource Area Office at least ______ working days prior to commencing excavation at ______.

Floodplain Development

93. If a threat of flooding by the Pecos River occurs during drilling operations, the ______ Resource Area Manager will issue a shut-in order. Toxic substances and, possibly, drilling equipment will be removed from the floodplain.



- 94. A drilling pad will be elevated at least _____ (inches, feet) and surfaced according to Condition of Approval 36.
- 95. All riparian habitat will be protected according to instructions provided by the Authorized Officer. Trees will not be cut down unless authorized.
- 96. No storage facilities will be allowed within 660 horizontal feet (200 horizontal meters) of the 100-year floodplain at Brantley or Avalon Reservoirs.
- 97. Pits containing oil, tank bottoms or other hydrocarbons, salt water, or any toxic substances will not be allowed in the floodplain.
- 98. Provision for containing salt water flow must be made prior to beginning drilling, without resorting to reserve pits constructed in the ground. Metal tanks or tank trucks must be in place to collect salt water. Salt water storage will not be allowed in the floodplain.
- 99. Production facilities will be located outside the floodplain.
- 100. Flow lines from the wellhead to production facilities will be buried, if soil conditions permit burial.
- 101. Special precautions will be taken to reduce damage from flooding:
 - A. The well will be equipped with a down-hole shut-in device, rated at working pressure of 1,500 psi; or
 - B. The wellhead will be buried below ground in a concrete cellar with a grate over it: or,
 - C. Three steel posts will be set in concrete. Horizontal steel cross bars will connect the posts. Heavy gauge chain link fencing will be welded or bolted to the post and cross bars. The V must point upstream or in the direction specified.
- 102. Chemical toilets will be used instead of latrines.

Drilling Rig Storage

103. The holder shall conduct all activities associated with the operation, and termination of the rig storage within the authorized limits. All activity will be limited to ______ (describe authorized area of activity) and the immediate perimeter ______ (describe distance; maximum of 20 feet).



- 104. If the storage of this rig should interfere with the producer's operations, the holder shall be required to remove it immediately.
- 105. Should the well be plugged and abandoned during the term of this permit, the permittee will be required either to remove the drilling rig within 30 days or assume all responsibility for restoration of the well pad and access road.
- 106. The Reclamation will be notified in writing within 30 days after removal of the drilling rig. Address correspondence to:

Bureau of Reclamation Carlsbad Project Office 620 East Greene Carlsbad, NM 88221-1356

Geophysical Exploration

- 107. All large, hummocky sand dunes encountered during geophysical operations shall be avoided by driving around the sand dunes.
- 108. Any large trees (e.g., soapberry, elm or large mesquite) encountered in the area of operations shall be avoided and shall not be disturbed.
- 109. Playas shall be avoided by using re-routes or skips.
- 110. Wildlife watering facilities shall be avoided by using re-routes or skips.
- 111. Archaeological sites shall be avoided by adhering to the re-routes flagged in the field, which are listed in the attachment to the NOI. Additional cultural resources protections provided in cultural report ______, which are listed in the attachment, shall be followed.
- 112. Any fence needing to be cut during operations to allow access shall be immediately repaired to a condition as good as or better than the condition in which the fence was found. No fence shall be removed.
- 113. Where appropriate, disturbed areas shall be rehabilitated as directed by the Authorized Officer. Rehabilitation techniques may include, but are not limited to: ripping, discing, or other seed bed preparation; reseeding; placement of erosion control devices; and berming, barricading, and/or signing geophysical routes where they cross roads.
- 114. Operations shall be suspended when, in the judgment of the Authorized Officer, they have the possibility of unduly harming the surface during periods of wet weather or drought.



APPENDIX A-3: PRACTICES FOR OIL AND GAS DRILLING AND OPERATIONS IN CAVE AND KARST AREAS

This appendix describes practices for detecting and avoiding significant caves and significant karst features with respect to oil and gas drilling, and for mitigating impacts to significant caves and karst when they cannot be avoided. These mitigations are predicated on the Reclamation's responsibilities for resource management and protection derived from the Federal Land Policy and Management Act, the Federal Cave Resources Protection Act, and the National Environmental Policy Act. The practices described here supersede those of the Draft "Interim Guide for Oil and Gas Drilling and Operations in Cave and Karst Areas" (February 1993).

Potential for Caves or Karst

A map of cave or karst potential will be maintained to provide the public with current information about the likelihood of the presence of cave or karst resources. The map will serve as an indicator of the potential for encountering caves or karst for which special practices could be required, following NEPA analysis, to mitigate drilling impacts. The primary use of the map is as a source of information for individuals or companies contemplating the leasing of federal minerals.

Three zones of cave or karst occurrence have been identified and categorized: high potential; medium potential; and low potential. Areas that contain known cave or karst features are in the high potential zone. Areas containing known soluble rock formations with the potential for cave or karst development are in the medium potential zone. These zones were identified using geological maps and existing information on caves and karst. All other lands fall into the low potential zone. These zones were identified using geologic maps and existing information on caves and karst. All other lands fall into the low potential zone. These zones may be increased or decreased in size as new information from drilling, cave exploration or other sources becomes available.

The cave or karst occurrence zones have been further divided into smaller geographic areas to provide an additional means of identification of a specific area. An estimate has been made for each of these areas as to the lowest likely depth at which caves might be expected. Again, this is simply a source of information for individuals or companies contemplating the leasing of Federal minerals. The lease notice "Potential Cave or Karst Occurrence Area" (Roswell 46), will be applied to leases when all or part of the lease is located in a high or medium potential cave or karst occurrence area. An example of the least notice is included below. The purpose of the lease notice, as with maps of cave or karst potential, is to provide information to the purchasers of federal oil and gas leases.



AREA NAME	DEPTH ^b	POTENTIAL ^b
Burton Flats	350	High

Table C3-1. Cave or Karst Occurrence Area	as, Brantley and Avalon Project Area.
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Because the identification of cave or karst potential zones is only informational, the mitigations described below will be applied, when and where appropriate, irrespective of any identified zone of cave or karst potential. However, the emphasis of management will be on caves presently designated significant or on those designated in the future as significant, and on significant karst features.

Lease Notice

Potential Cave or Karst Occurrence Area

All or portions of the lease are located in a potential cave or karst occurrence area. Within this area, caves or karst features such as sinkholes, passages, and large rooms may be encountered from the surface to a depth of as much as 2,500 feet, within surface areas ranging from a few acres to hundreds of acres. Due to the sensitive nature of the cave or karst systems of this area, special protective measures may be developed during environmental analyses and be required as part of approvals for drilling or other operations on this lease. These measures could include relocation of the proposed well; changes in drilling operations; special casing and cementing programs; modifications to surface facilities; or other reasonable measures to mitigate impacts to cave or karst values. These measures may be imposed in accordance with 43 CFR 3101.1-2; 43 CFR 3162.5-1; Onshore Oil and Gas Order No. 1; and Section 6 of the lease terms (Roswell 46 February 1991).

Mitigation of Drilling Impacts

The need to relocate drilling locations to avoid caves or karst, and any special drilling or production practices employed to mitigate impacts to caves or karst, will be determined during the NEPA analysis of APDs or other applications.

The practices described below will be applied where needed, and to the extent necessary, to ensure that the potential impacts of drilling oil or gas wells, or of constructing other facilities, in cave or karst areas would be minimized according to the following process:

- 1. Detect potential cave or karst resources and determine their significance.
- 2. Avoid cave or karst resources where possible.
- 3. Mitigate impacts to caves or karst that cannot be avoided.



The result of any detection efforts will be addressed in the NEPA analysis and appropriate mitigations will be developed, if needed as part of the analysis.

Depending on the results of detection, avoidance will be considered as a means of mitigating potential impacts. In most cases, avoidance will be accomplished by relocation of the proposed well location, which is often done in consultation with the operator at the time of a field examination. Moving a proposed location up to 200 meters is a commonly employed avoidance measure. The need to move a location more than 200 meters will be addressed in the NEPA analysis of an APD. If the construction of a pipeline, road, power line or other facility is proposed, rerouting or relocation will be required to accomplish avoidance.

The management of oil and gas operations in cave or karst areas, including approvals for drilling oil or gas wells, will be guided by procedures described below, Surface Use and Occupancy Requirements (Appendix A-1), and Conditions of Approval (Appendix A-2). These practices will be modified as new and cost effective technologies for cave and karst protection become available.

Detection Methods

The primary detection method will be the review of Reclamation or other records on the presence of caves or karst features in the area of interest, in conjunction with a field exam by a Reclamation employee or cave inventory contractor to determine the presence of unrecorded cave or karst features. Depending on the results of initial detection efforts and a determination of potential significance by the Reclamation, cave exploration could be employed to gain additional information. As various geophysical techniques are proven useful for cave detection and become generally available for use, they may be considered on a case-by-case basis as a means of locating unrecorded cave or karst features.

Surface Mitigation

Whether or not a proposed activity has been relocated to reduce potential impacts on caves or karst, surface mitigations will be applied, when needed to minimize the risk of impacts during construction, drilling or production. Appropriate surface mitigations will be developed during the NEPA analysis of a proposal and could include one or more of the following practices, most of which have long been employed to mitigate impacts.

Practices to minimize potential impacts from reserve pit spill or leakage:

• The use of a Closed Loop System or steel tanks.



Practices to minimize potential impacts from leaking tanks or pipelines:

- The construction of berms around storage tanks sufficient to contain spills, in accordance with Conditions of Approval (Appendix A-2);
- The installation of leak detection systems for pipelines or tanks;
- The use of permanent liners in storage tank areas;
- The use of differential pressure shut-off valves;
- The use of corrosion-inhibiting coatings and cathodic protection.

Practices to minimize the potential impacts of vented or escaping gases settling in caves:

- The flaring or venting of gas to protect human safety and to better disperse the gases and eliminate possible gas ignitions;
- The use of stock tank vapor recovery systems.

Subsurface Mitigation

Applicable and reasonable subsurface mitigations will be applied where the presence of caves or karst is obvious or expected, based on the results of detection efforts, and in lost circulation zones. The options could include, but are not limited to, the following practices:

Drilling

- Cable tool drilling techniques will be used when possible in areas where encounters of caves or karst are expected at depths not greater than 350 feet.
- Rotary drilling techniques in cave or karst areas will include the use of either fresh water mud, foam, or compressed air as a circulating medium in zones where caves or karst are expected. Below those zones, the operator may use whatever drilling fluid is appropriate.

Casing and Cementing

• All casing will meet or exceed National Association of Corrosion Engineers specifications pertaining to the geology of the location and be run according to American Petroleum Institute and Reclamation standards.



- A "cave protection" casing could be required in instances when a designated significant cave would be jeopardized. The cave-protection casing string would be set at least 100 feet below the deepest known cave-bearing zone as determined by drilling or other pertinent methods.
- Regardless of the type of drilling machinery used, if bit drops of four feet or more and circulation losses greater than 75 percent occur simultaneously while drilling in any cavebearing zone, drilling operations will immediately stop and the Reclamation will be notified by the Operator. The Reclamation will assess the consequences of the situation and work with the Operator on corrective actions to resolve the problem. If corrective actions fail, the well will be plugged.
- The casing will be cemented in place using one or a combination of any of the following methods that are environmentally sound, as determined by the Reclamation and the Operator:
 - 1. If a large void or severe lost circulation zone is encountered, isolation from above and below rather than complete cement coverage of these zones could be employed. This would be accomplished by using stage cementing equipment, external casing packers, cement baskets, and one-inch remedial cementing techniques.
 - 2. For a less severe lost circulation zone encountered while drilling, the operator would attempt to circulate cement to the surface using a single or multistage cementing job composed of a "lead" and "tail" slurry for each stage.
 - 3. Foam cementing techniques may be used.

Any corrective actions proposed to resolve problems related to bit drops or lost circulation will require Reclamation concurrence before implementation. A decision on how to proceed will be reached within 24 hours of notification.

Monitoring Drilling Operations

Where the presence of significant caves or significant karst features are obvious or expected based on the results of detection efforts, and in lost circulation zones, constant monitoring of drilling operations by the Reclamation could be required.

Monitoring Production Operations

On wells within one-half mile of significant caves, annual pressure tests will be performed by the Operator on all casing annuli. If the test results indicated a casing failure, remedial actions approved by the Reclamation will be undertaken to correct the problem.



Plugging and Abandonment

The BLM standards for plugging and abandonment in Onshore Oil and Gas Order No. 2 will be applied to protect or isolate all useable water zones, potentially productive zones, lost circulation zones, abnormally pressured zones, caves, and any prospectively valuable deposits of minerals. This includes any zones encountered during drilling that contain fluids with a potential to migrate.

Record Keeping

The Operator will track the customary drilling activities, including the rate of penetration, pump pressure, weight on bit, bit drops, percent of mud returns, and presence or absence of cuttings returning to the surface. As part of customary record keeping, each detectable void or sudden increase in the rate of penetration not attributable to a change in the formation type should be documented and evaluated as it is encountered.

The Reclamation may review data held by companies on wells drilled in cave or karst areas, to gain information about impacts to caves and karst. This information will be used to categorize lost-circulation zones on the basis of depth, relative volume, and severity, and to evaluate and compare the relative success or failure of different remedies attempted to combat lost-circulation problems while drilling and cementing casing in these zones. This information also will be used to update information about the occurrence of cave and karst features. Information concerning cave resources gathered during drilling will be submitted, as well, to be retained by Reclamation in accordance with the regulations implementing the Federal Cave Resources Protection Act.

