

CHAPTER 2

PROPOSED ACTION AND ALTERNATIVES

2.0 PROPOSED ACTION

The PEDCO Proposed Action consists of drilling, completing, and operating 6 new productive coalbed methane (CBM) wells and related production and water disposal facilities in the Sun Dog Pod project area (SDPA) of the Atlantic Rim CBM project area (ARPA) (Figure 2-1). The proposal is a part of the Interim Drilling Plan associated with the Atlantic Rim environmental impact analysis in Carbon County, Wyoming.

The Atlantic Rim CBM Environmental Impact Statement (EIS) is scheduled to begin in late summer 2001, and is expected to take about 24 months to complete. During the interim period before the EIS is completed, the BLM, Rawlins Field Office (RFO) will allow, with compliance with criteria described in the Interim Drilling Policy (see Appendix A), the drilling of up to 200 exploratory wells. Currently, oil and gas operators have identified 9 areas or “pods” where these exploratory wells would be located, one of which is the SDPA. The Sun Dog pod is actually a portion of pod number six. The remaining portion of this pod is referred to as the Cow Creek pod, which will be developed by Double Eagle Petroleum and Mining Company. Because the Cow Creek pod will be operated by a different company, utilizing separate facilities, with plans to dispose of produced water by surface methods, a separate environmental analysis will be prepared.

The proposed CBM development is based on a Wyoming Oil and Gas Conservation Commission (WOGCC) approved 80-acre well spacing pattern. In addition to well sites, other facilities, such as access roads, gas gathering and water disposal pipelines, electrical utilities, and compressors, would be developed to facilitate natural gas (methane) production in the well fields. The interim project would develop over a 6 to 12 month period. The productive life of the project is estimated between 10 and 20 years.

Specific components of the Sun Dog CBM project are shown in the Master Surface Use and Master Drilling Plan (MSUP) (Appendix C), and summarized in the following sections of the PEDCO Plan of Operations.

2.1 PLAN OF OPERATIONS

2.1.1 Preconstruction Planning and Site Layout

PEDCO would follow the procedures outlined below to gain approval for proposed activities on BLM-administered lands within the SDPA. Development activities proposed on fee (private) surface would be approved by the WOGCC. The WOGCC permitting procedures require filing an APD with the WOGCC and obtaining a ROW from the surface owner.

- Prior to the start of construction activities, PEDCO would submit a Notice of Staking (NOS), APD, or ROW Application along with a preliminary MSUP to the BLM with a map showing the specific location of the proposed activity (e.g., individual drill sites, pipeline corridors, access roads, or other facilities). The application would include site-specific plans to describe the proposed development (i.e., drilling plans with casing/cementing program; surface use plans with road and drill pad construction details; and site specific reclamation

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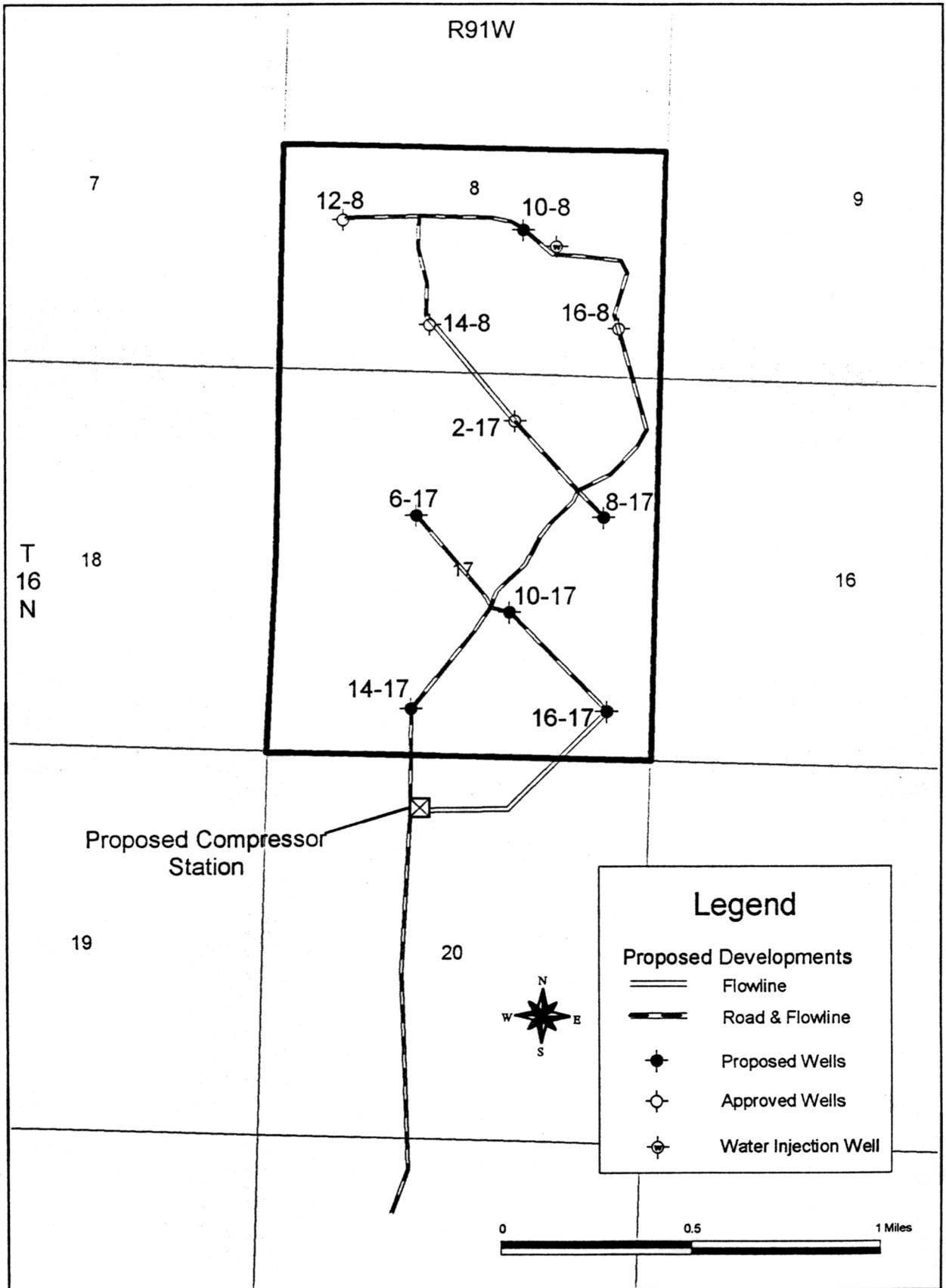


Figure 2-1. Proposed Developments for the Sun Dog Pod - Atlantic Rim Coalbed Methane Project.

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plans, etc.). Approval of all planned operations would be obtained in accordance with authority prescribed in Onshore Oil and Gas Order No. 1 (Approval of Operations on Onshore Federal and Indian Oil and Gas Leases).

- The proposed facility would be staked by the PEDCO and inspected by an interdisciplinary team (IDT) and/or an official from the BLM to ensure consistency with the approved RMP, the Interim Drilling Policy (see Appendix A), and oil and gas lease stipulations.
- More detailed construction plans, when required by the BLM for the proposed development, would be submitted to the BLM by PEDCO. The plans would address concerns that may exist concerning construction standards, required mitigation, etc. Negotiation of these plans between PEDCO and the BLM, if necessary to resolve differences, would be based on field inspection findings and would take place either during or after the BLM on-site inspection.
- PEDCO and/or its contractors would revise the MSUP and Drilling Plan as necessary per negotiations with the BLM. The BLM would complete a project-specific environmental analysis that incorporates agreed upon construction and mitigation standards. The BLM would then approve the specific proposal and attach the Conditions of Approval to the permit. PEDCO must then commence with the proposed activity within one year.

Following is a general discussion of proposed construction techniques to be used by PEDCO. More detailed plans can be reviewed in Appendix C1, Master Surface Use Plan. These construction techniques would be applicable to drill site, pipeline, and access road proposals within the SDPA, and may vary between the well sites.

2.1.2 Construction and Drilling Phase

2.1.2.1 Access Road Construction

The primary road access utilized by PEDCO to access the SDPA is Wyoming State Highway 789 (Figure 1-2). Access to the pod is provided by existing one-lane graveled and partially graveled BLM and Carbon County roads as described in Chapter 1 (Section 1.1.2, Location). Access to drill locations from the existing road network already in place would be provided by new and upgraded crowned, ditched, and surfaced roads.

PEDCO proposes to construct required new access roads across public lands in accordance with BLM Manual 9113 standards. Roads would be located to minimize disturbances and maximize transportation efficiency. Roads would be closed and reclaimed by PEDCO when they are no longer required for production operations, unless otherwise directed by the BLM.

Drainage crossings on the access routes within the project area would either be low water crossings or crossings using culverts. Low water crossings would be utilized in shallow channel crossings. Crossings of larger channels within the project area would consist of excavating an area approximately four feet deep under the travelway and filling it with rock and gravel to the level of the drainage bottom. Channel banks on either side of such crossings would be cut down to reduce grade where necessary. Culverts would be installed on smaller, steeper channel crossings. Topsoil would be saved before channel crossing construction occurs. Also, the total area to be disturbed would be flagged on the ground before construction begins.

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2.1.2.2 Well Pad Design and Construction

All of the proposed CBM wells would be drilled on lands administered by the BLM. A graded well pad would be constructed at the well sites. Drilling operations on flat terrain would disturb an area approximately 200 feet by 200 feet at each well site.

Two temporary mud pits would be constructed adjacent to each other within the well pad location. A small overflow trench would be excavated at each well and reclaimed after completion operations. Topsoil would be removed and stockpiled prior to excavating the pit as required by BLM. PEDCO estimates the reserve pits would be open from 2 to 8 weeks to allow for evaporation of pit fluids. During this time, the pits would be fenced on all sides to prohibit wildlife and livestock from falling into the pit.

Where drilling on steeper slopes is necessary, the use of cut and fill construction techniques would be utilized. The use of cut and fill construction techniques to level work areas would be limited to areas where the land surface is too steep to allow the drill rig to set up over natural terrain. Drilling operations would be confined within a 200 feet by 200 feet well site area that is leveled and cleared of vegetation. (See Figure 2-2 for a typical CBM drill site layout). In areas where limited cuts and fills are necessary, vegetation may be disturbed or removed.

In the event drilling is non-productive, all disturbed areas, including the well site and new access road, would be reclaimed to the approximate landform that existed prior to construction. Reclamation and site stabilization techniques would be applied as specified in the MSUP.

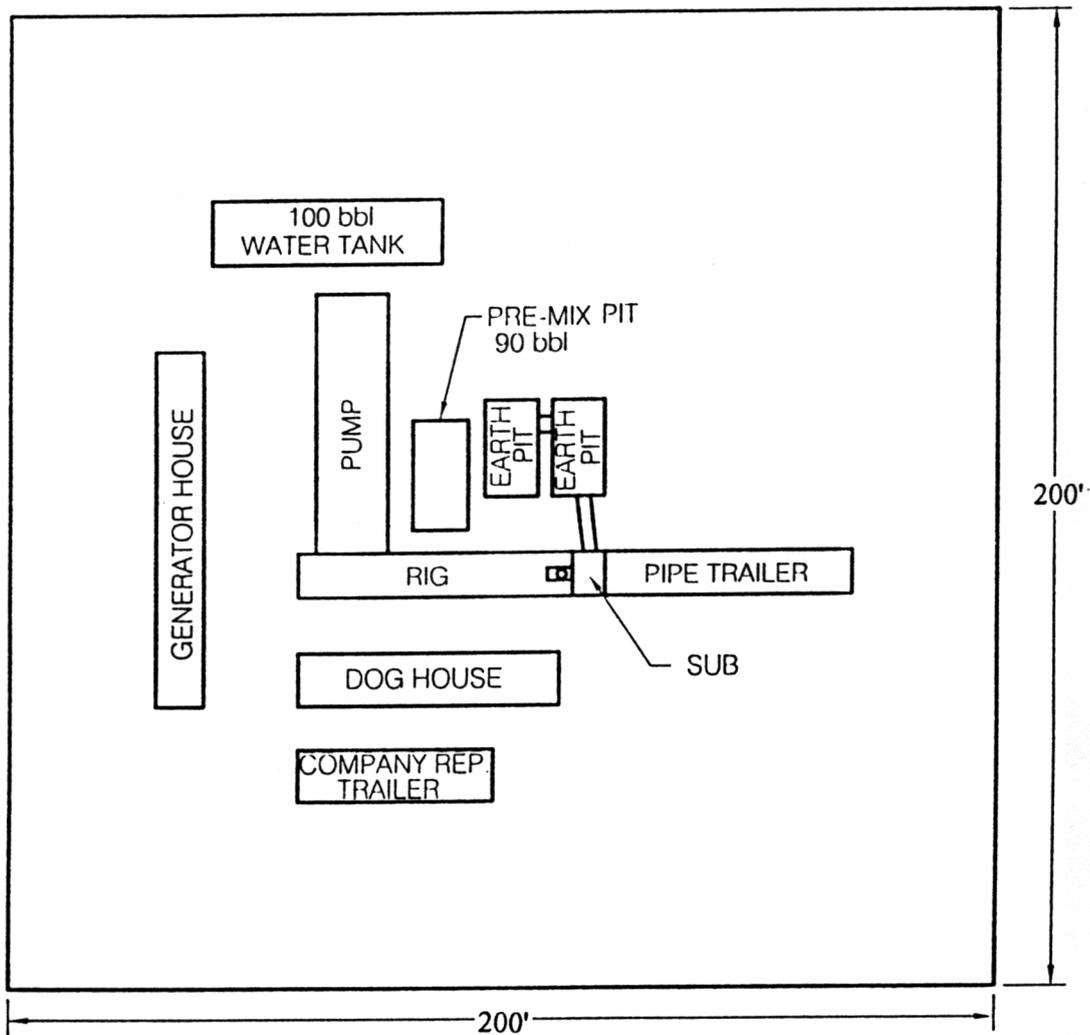
If drilling is productive, all access roads to the well site would remain in place for well servicing activities (i.e., maintenance, improvements, etc.). Partial reclamation would be completed on segments of the well pad and access road ROW no longer needed.

2.1.2.3 Drilling and Completion Operations

Drilling of the CBM and injection well would utilize a truck-mounted drilling rig. Additional equipment and materials needed for drilling operations would be trucked to the well site. Water for use in drilling the initial well in each pod would be obtained from a local source near the project area. Water for drilling the remaining wells would be obtained from water produced from the initial well. Approximately 600 barrels of water would be needed for drilling each well. Actual water volume used in drilling operations would be dependent upon the depth of the well and any losses that might occur during drilling. The proposed project would require approximately 84,000 gallons (or 0.26 acre-feet) of water per well for cement preparation, well stimulation, and dust control. Drilling water will come from existing PEDCO CBM wells completed in Almond Formation coal seams. Drilling mud usually is native mud and bentonite. As hole conditions dictate, small amounts of polymer additives and/or potassium chloride salts may be added for hole cleaning and clay stabilization.

Depending on the depth of the coal seam, each producing well would be drilled to a depth of 350 feet to 1,200 feet or deeper, and would have steel casing cemented from the top of the coal seam to the surface. The well control system would be designed to meet the conditions likely to be

TYPICAL DRILL SITE LAYOUT



NOT TO SCALE

Figure 2-2. Typical CBM Drill Site Layout - Sun Dog Pod.

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encountered in the hole and would be in conformance with BLM and State of Wyoming requirements. A completed CBM well bore is shown on Figure 2-3.

The drilling and completion operation for a CBM well normally requires approximately 10 to 15 people at a time, including personnel for logging and cementing activities. Each well would be drilled within a period of 7 to 10 days. A well completion program may be initiated to stimulate production of gas and to determine gas and water production characteristics in preparation for production of gas from a drilled, cased, and cemented well. A mobile completion rig similar to the drill rig may be transported to the well site and used to complete a well. Completion operations are expected to average 2 to 5 days per well. Upon receiving applicable permits, methane gas may be vented and water temporarily discharged into the reserved for a very short period of time during testing to determine whether wells would be produced. Once determined to be productive, wells would be shut-in until pipelines and other production facilities are constructed.

Drilling of the injection wells would be accomplished with the equipment and personnel used to drill the CBM wells. Depth of the injection wells is expected to range from 3,000 to 5,000 feet. Drilling and completion of each of the injection wells is expected to take approximately 7 to 14 days. Installation of surface equipment, holding tanks and pumping equipment would take approximately 14 days. A schematic of a typical injection well is shown on Figure 2-4.

2.1.3 Production Operations

2.1.3.1 Well Production Facilities

Wellhead facilities would be installed if the CBM wells are productive. A weatherproof covering would be placed over the wellhead facilities. At this time, no additional facility would be constructed at the well site for gas-water separation facilities. A downhole pump would be utilized to produce water from the uncased open hole or perforated interval. Methane gas would flow to the surface using the space between the production casing and the water tubing. The long-term surface disturbance at each productive well location where cut and fill construction techniques are utilized would encompass approximately 0.005 acre. Well site production facilities typically would be fenced or otherwise removed from existing uses. A typical CBM production wellsite is shown on Figure 2-5.

Pipeline trenches for well gathering lines are expected to disturb portions of 30-foot wide corridors temporarily and to be reclaimed as soon as practical after construction is completed. Trenches would be constructed along the access roads wherever possible. Separate gathering lines would be buried in the trenches and would transport methane gas to production pod facilities and produced water to injection wells.

At the conclusion of the project, roads, culverts, cattleguards, pipelines, stock watering facilities, or other structures could be left in place for any beneficial use as designated by the BLM. Water wells and produced water would be available to the BLM, with appropriations, diversion, and storage rights already properly filed with the Wyoming State Engineer's Office (SEO). All federally-owned surfaces that contain disturbed areas or facilities that are no longer needed would be reclaimed.

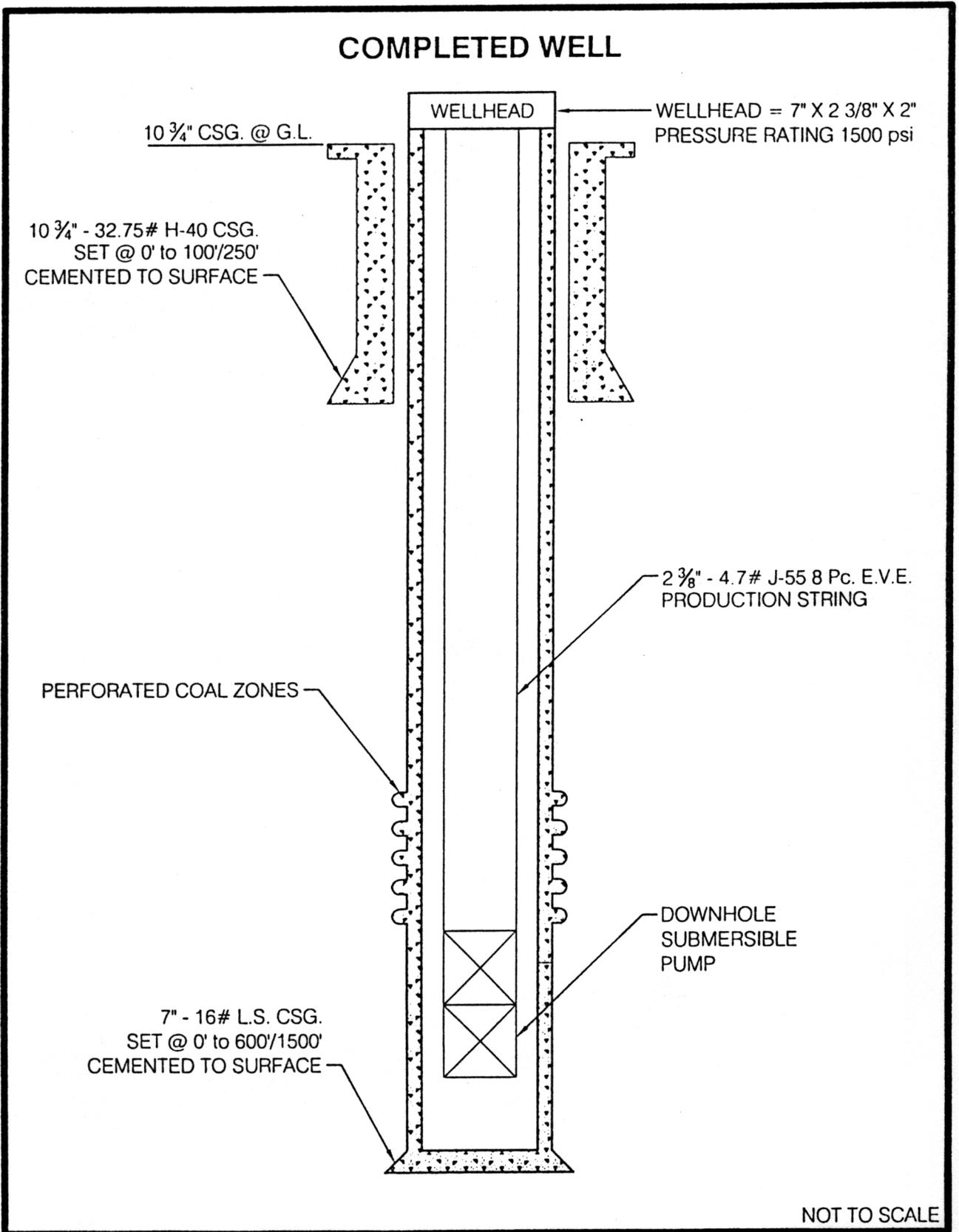


Figure 2-3. Typical Completed CBM Well Bore.

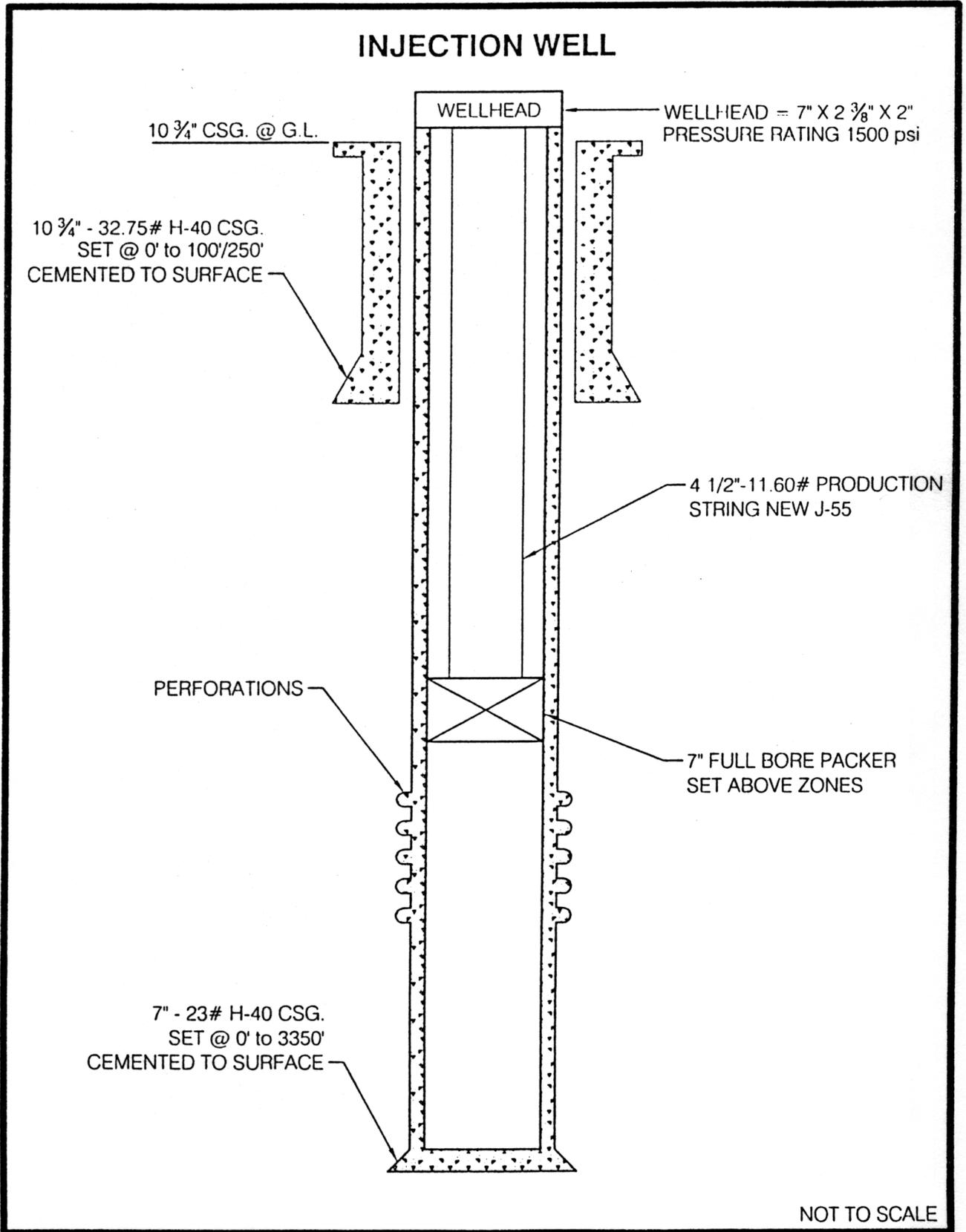
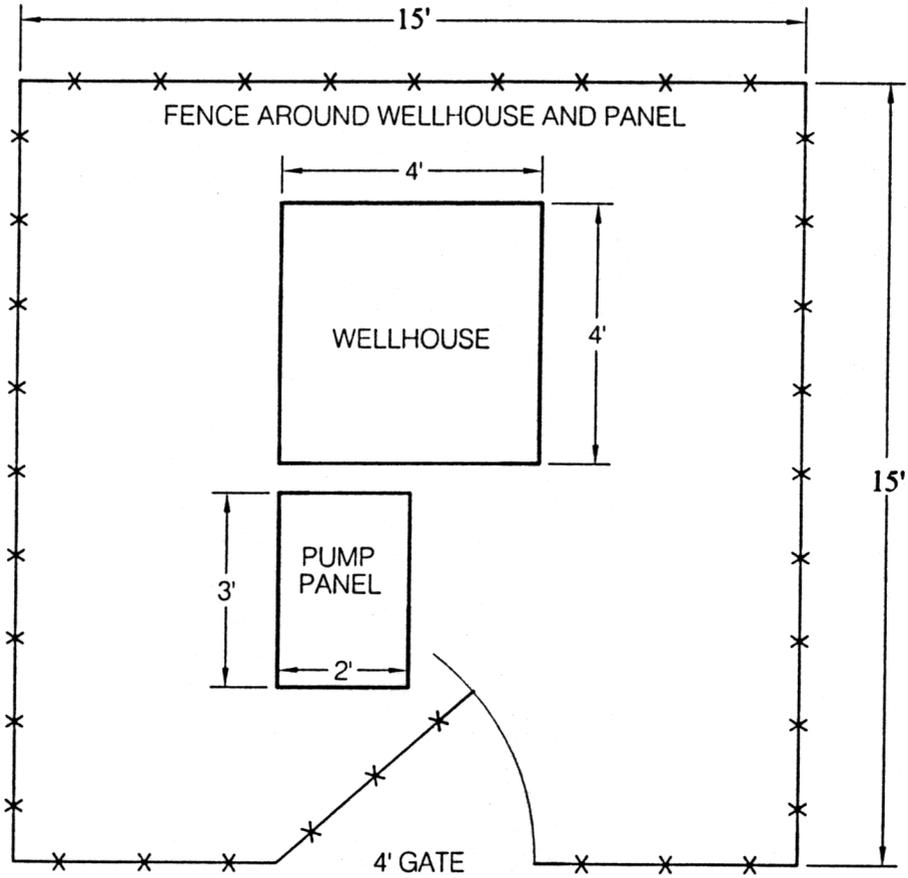


Figure 2-4. Schematic of a Typical Injection Well Bore.

TYPICAL CBM WELLSITE



NOT TO SCALE

Figure 2-5. Schematic of a Typical CBM Production Wellsite.

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2.1.3.2 Power Generation

Electricity would be used to power pumps during well development and to initiate and maintain production. Both natural gas-fired and diesel engine-powered generators would be used on a temporary basis at individual wells until electrical distribution lines are constructed. Either electrical motors or natural gas-fired reciprocating or microturbine engines would power either a booster or blower units. Future compressors are anticipated to be natural gas-fired or electrical units.

2.1.3.3 Pipelines

Three types of pipelines would be constructed as part of the proposed project:

1. Gas-gathering pipeline systems (low pressure, from wellhead to pod building, and from pod building through trunkline to the compressor station).
2. Produced water-gathering pipeline systems.
3. Gas-delivery pipelines (high pressure, from compressor station to existing transmission pipelines).

Reclamation of pipeline corridors would occur as soon as practical after pipeline construction is completed.

2.1.3.3.1 Gas-Gathering Pipeline Systems

As part of the transportation corridor system linking the wells and ancillary facilities, gas-gathering pipelines and produced water-gathering pipelines would be constructed, placed together in the same trench/ditch, when practical, and buried. Construction and installation of pipelines would occur immediately after well drilling. Access roads typically would follow the pipeline right-of-way, except in a limited number of cases where topography dictates or as required by the BLM. Separate gathering lines would transport methane gas to production pod facilities and produced water away from wells to injection wells.

Pod gathering lines, averaging 1.3 miles long in length, are expected to disturb portions of 30-foot wide corridors, and would transport gas from each compression station to a trunkline.

Gas-delivery pipelines connecting compressor stations with existing transmission pipelines are expected to be located along existing roads. Disturbance related to these delivery lines is expected to be confined to areas not wider than 50 feet, located within rights-of-way to be established. Production must be established before potential pipeline locations can be identified for site-specific environmental analysis. The proposed gas-delivery line for the SDPA is shown on Figure 2-1.

Development would be constrained by the gas production from the coal seam(s) and by the pipeline capacity available to transport compressed gas to markets. Currently, the pipeline capacity within the project area is 12-60 MMCFD, depending on the pipeline connecting locations.

Long-term CBM well water production data within the project area are not available. Indications from short-term tests on recently drilled CBM wells are that discharge rates would be highly variable, with the maximum value occurring at the onset of production and declining throughout the project life. Due to the difference in coal depth and thickness, comparison with water production rates in the Powder River Basin may not be valid. Until long-term testing can be conducted, an

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average life-of-project (LOP) discharge rate of 8 gpm was assumed for this analysis. This rate is based on knowledge of hydrology and geology of the area and minimal production rate data. Long-term average water production would not be expected to exceed an estimated of 0.04 ac-ft/day/well (11,500 gallons/day/well). Analyses from existing wells in the project area indicate that the TDS concentrations of produced water would range from approximately 400 mg/l to 2000 mg/l. CBM produced water is typically of the sodium-bicarbonate type.

2.1.3.3.2 Produced Water-Gathering System and Injection Facilities

Produced water from individual wells would be collected and injected at disposal wells located in each pod. Prior to drilling the injection wells, a permit will be submitted to and received from the SEO and WDEQ/WQD.

The number of injection wells would be dependent upon the ability of the host aquifer to accept water and the amount of water produced by each CBM well. Produced water-gathering pipelines would be constructed along the well access road wherever feasible, from the wellhead to injection well locations. The water lines would be placed together in the same trench/ditch as gas gathering lines wherever practical, and buried. A typical water disposal facility is shown on Figure 2-6.

Transfer pumping stations would be utilized during production operations to transfer produced water from the CBM well(s) to the disposal well. The transfer pumping stations are needed in those areas where elevation differences require supplemental pumping to transfer the produced water. If transfer pumping stations are required, they would be identified in the MSUP for each Pod. The pumping station would consist of a 400 barrel water tank and a small centrifugal water pump. The pumping station would be confined to a 120 foot by 120 foot area. An approximate 3-foot berm would be constructed around the perimeter of the pumping station area to contain any potential spills. A small pump house would be constructed immediately outside of the bermed area to house the centrifugal pump. A typical water transfer facility is shown on Figure 2-7.

2.1.3.3.3 Gas-Delivery Pipelines and Compression

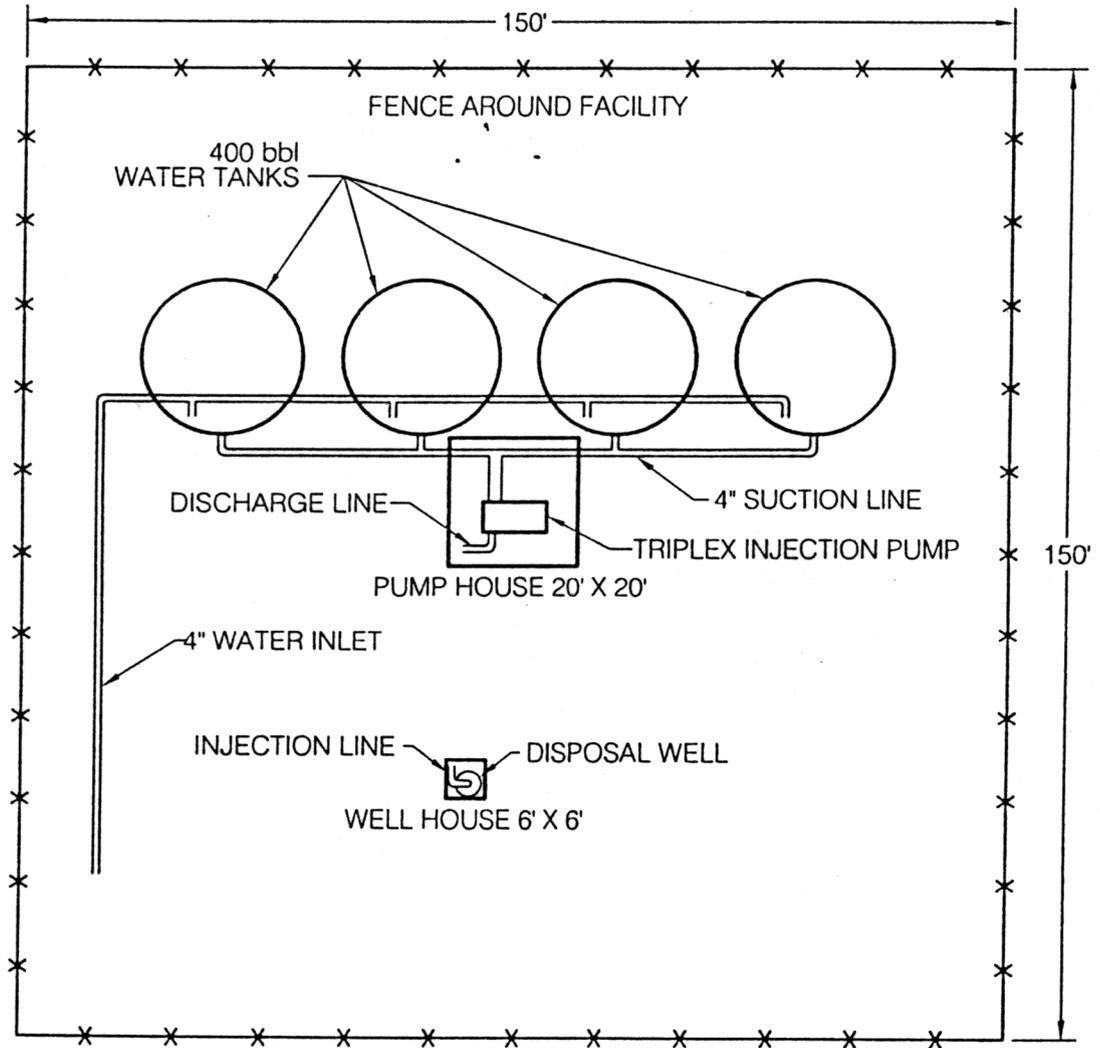
Produced natural gas (methane) under wellhead pressure would move through the low pressure gas gathering system to a compressor station. Typical gathering system line pressure is less than 100 pounds per square inch (psi). Gas arriving at the compressor station would be compressed from line pressure to facilitate transport and introduction of the gas into an existing transmission pipeline.

Compression of the gas at a field compressor station would increase the pressure to an estimated 700 to 1,450 psi. One existing field compressor station ultimately is expected to contain up to three 1,340-HP engines. The compressor station would have a pad size of 200 feet by 200 feet and would result in approximately 0.9 acre of site disturbance. All compressors are expected to be housed within structures. Approximately 1.75 miles of all-weather road would need to be constructed to the SDPA compressor station. A typical compressor station and meter facility is shown on Figure 2-8.

2.1.4 Ancillary Facilities

All wells, pipelines, and associated ancillary production facilities would be operated in a safe manner by PEDCO as set forth by standard industry operating procedures. Routine maintenance

TYPICAL WATER DISPOSAL FACILITY



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Figure 2-6. Typical Water Disposal Facility.

TYPICAL WATER TRANSFER FACILITY

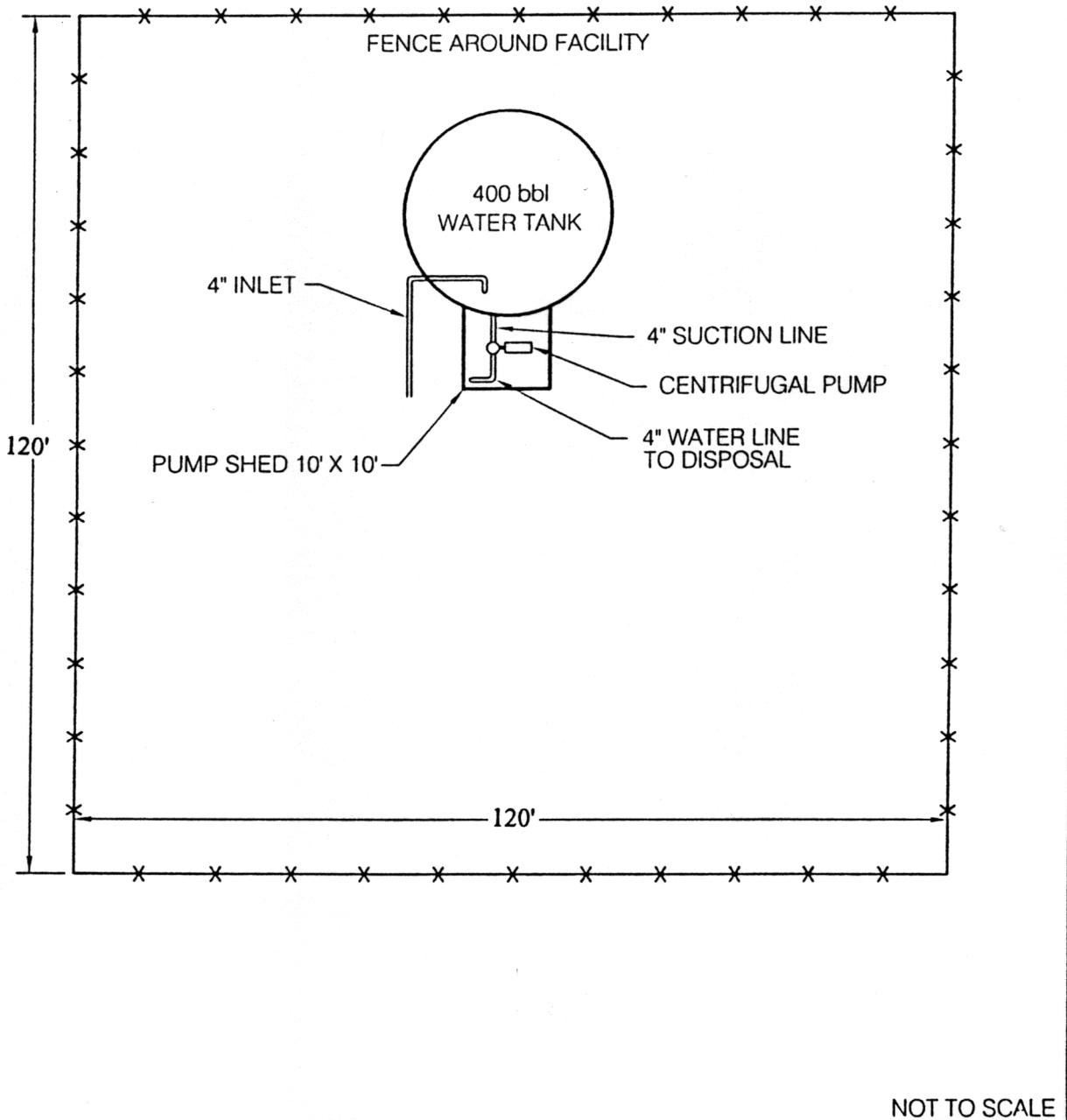
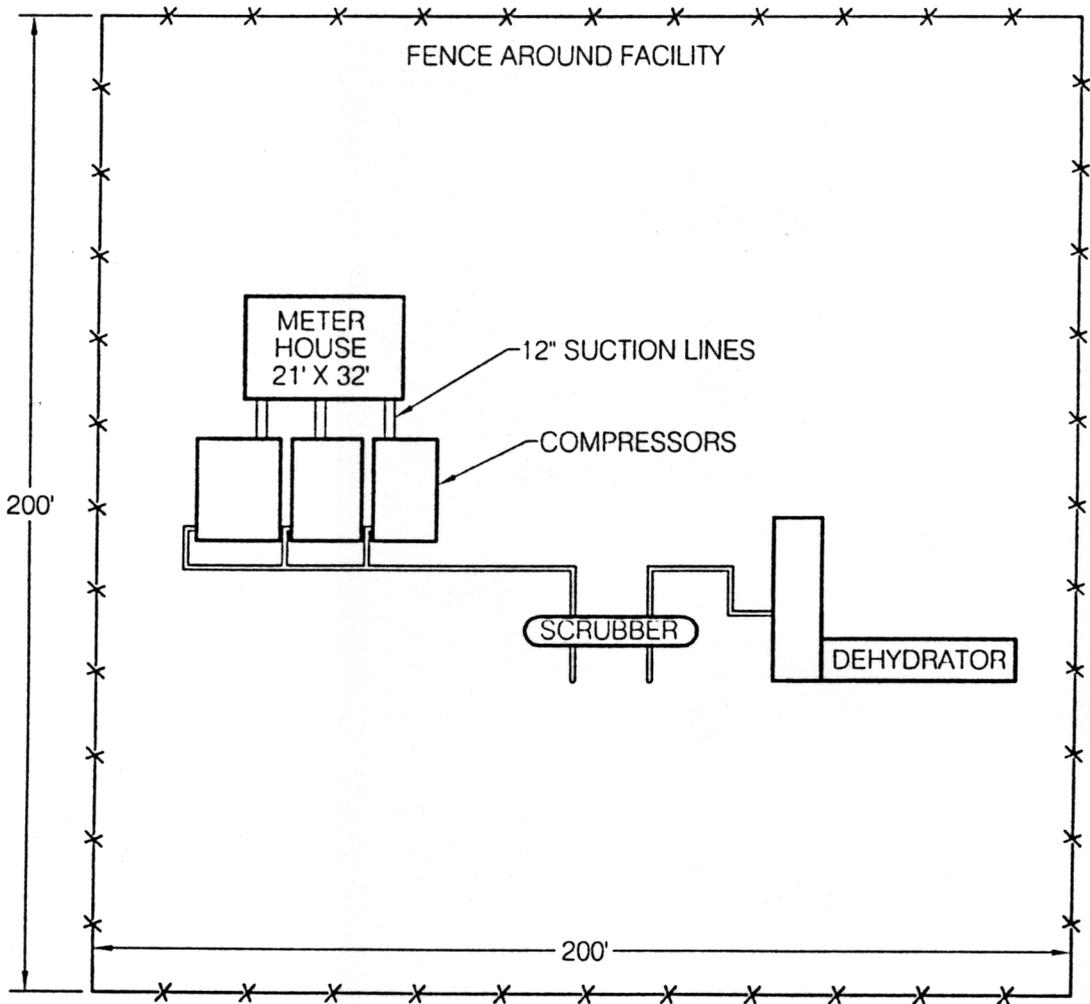


Figure 2-7. Typical Water Transfer Facility.

TYPICAL COMPRESSOR STATION & METER FACILITY



NOT TO SCALE

Figure 2-8. Typical Compressor Station and Meter Facility.

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of producing wells would be necessary to maximize performance and detect potential difficulties with gas production operations. Each well location would be visited about every other day to ensure operations are proceeding in an efficient and safe manner. The visits would include checking separators, gauges, valves, fittings, and on-site storage of produced water and condensates. Routine on-site equipment maintenance would also be performed as necessary. Additionally, all roads and well locations would be regularly inspected and maintained to minimize erosion and assure safe operating conditions.

2.1.5 Traffic Estimates and Work Force Loading Schedule

Estimated traffic requirements for drilling, completion, and field development operations are shown in Table 2-1. The TRIP TYPE column lists the various service and supply vehicles that would travel two and from the well sites and production facilities. The ROUND TRIP FREQUENCY column lists the number of trips both external (i.e., to/from the pods), and internal (within the pod). The figures provided in Table 2-1 should be considered general estimates. Drilling and production activity levels may vary over time in response to weather and other factors.

2.1.6 Site Restoration and Abandonment

PEDCO proposes to completely reclaim all disturbed areas not needed for production activities. Reclamation would generally include: (1) complete cleanup of the disturbed areas (drill sites, access roads, etc.), (2) restoration of the disturbed areas to the ground contour that existed prior to construction, (3) replacement of topsoil over all disturbed areas, (4) ripping of disturbed areas to a depth of 12 to 18 inches, and (5) seeding of reclaimed areas with a BLM approved, certified weed free, seed mixture.

2.1.7 Summary of Estimated Disturbances

Table 2-2 summarizes the estimated disturbances that would result with implementation of the Sun Dog project.

2.1.8 Project-Wide Mitigation Measures and Procedures

PEDCO proposes to implement the following mitigation measures, procedures, and BLM require management practices on public lands to avoid or mitigate resource or other land use impacts. These mitigation measures and procedures would be applied on privately owned surface unless alternate actions are specifically required by the involved private surface owners. An exception to a mitigation measure and/or design feature may be approved on public land on a case-by-case basis when deemed appropriate by the BLM. An exception would be approved only after a thorough, site-specific analysis determined that the resource or land use for which the measure was put in place is not present or would not be significantly impacted.

2.1.8.1 Preconstruction Planning and Design Measures

1. PEDCO and the BLM would make onsite inspections of each proposed and staked facility site (e.g., well sites), new access road, access road reconstruction, and pipeline alignment projects so that site-specific recommendations and mitigation measures can be developed.

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Table 2-1. Traffic Estimates

TRIP TYPE	ROUND TRIP FREQUENCY	
	External (to/from pod)	Internal (within pod)
Drilling (2 rigs, 2 crews/rig)		
Rig supervisor	4/day	same
Rig crews	4/day	same
Engineers ^a	2/week	1/day/rig
Mechanics	4/week	same
Supply delivery ^b	1/week	2-4/day
Water truck ^c	1/month	2 round trips/day
Fuel trucks	2 round trips/well	same
Mud trucks ^d	1/week	2/day
Rig move ^e	8 trucks/well	8 trucks/well
Drill bit/tool delivery	1 every 2 weeks	same
Completion		
Smeal rig/crew	1/day	same
Cement crew	2 trips/well	same
Consultant	1/day	same
Well loggers	3 trips/well	same
Gathering systems	8/day	same
Power systems	2/day	same
Compressor stations	2/day	same
Other field development	3/day	same
Testing and operations	2/day	same
Notes:		
^a Engineers travel to pod weekly and stay in a trailer in the pod during the week.		
^b Current plans are to establish a central supply area within a pod and deliver supplies on a weekly basis.		
^c Water trucks would deliver water to rigs from a location within the pod.		
^d Current plans are to establish a central mud location within a pod and deliver mud on a weekly basis.		
^e It would require 4 trucks to move each rig to a pod. Upon completion of drilling in a pod, each rig would move to the next pod.		

2. New road construction and maintenance of existing roads in the SDPA and ARPA would be accomplished in accordance with BLM Manual 9113 standards unless private landowners or the State of Wyoming specify otherwise.

3. Prior to construction, PEDCO would submit a Master Surface Use Plan (MSUP) for each pod. This plan would contain individual APD's for each drill site and Sundry Notices and/or ROW applications for pipeline and access roads. APD's submitted by PEDCO would show the layout of the drill pad over the existing topography, dimensions of the pad, volumes and cross sections of the cut and fill (when required), location and dimensions of reserve pit(s), and access road egress and ingress. The MSUP would include itemization of project administration, time frame, and responsible parties.

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Table 2-2. Disturbance Estimates - Sun Dog Pod.

PEDCO - Sun Dog Pod				
Facility	Development Phase			Operations
	Length (feet)	Width (feet)	Acres	Acres
New Roads (includes gas and water ROW's)	11,949	40	11.0	11.0
Gas Lines (to sales line)	3,700	30	2.5	0
Drill Pads (6)	200	200	5.5	0.03
Compressor Station (1)	200	200	0.9	0.9
Pumping Stations (4)	120	120	1.3	1.3
Total Disturbance			21.2	13.2

4. PEDCO would slope-stake construction activities when required by the BLM (e.g., steep and/or unstable slopes) and receive approval from the BLM prior to start of construction.
5. BLM would require the road to be crowned and ditched with a .03 to .05 ft crown, and the topsoil would be pulled back down on the cut slope so there is no berm left at the top of the cut slope.
6. BLM would require that culverts be a minimum of 12" of fill or ½ the pipe diameter, which ever is greater. The inlet and outlet will be set flush with existing ground and lined up in the center of the draw. The bottom of the pipe will be bedded on good material before backfilling. Backfill with unfrozen material and no rocks larger that two inches in diameter. Care would be exercised to thoroughly compact the backfill under the haunches of the conduit. The backfill would be brought up evenly in 6" layers on both sides of the conduit.
7. Additional culverts would be placed in the existing access road as needed or directed by BLM.
8. BLM would require surfacing of the access road prior to moving the drilling equipment/rig onto the pad, with an appropriate grade of gravel to a depth of 4".
9. BLM would require that access roads be maintained in a safe and usable condition. A regular maintenance program would include, but is not limited to, blading, ditching, culvert installation, and surfacing.
10. If snow removal is required outside new and existing roadways, BLM would require that snow removal equipment be equipped with shoes to keep the blade off the ground surface. If the surface of the ground is uneven, the BLM would require special precautions be taken to ensure that equipment blades do no destroy vegetation.
11. BLM would require wind ditches be constructed, as necessary, to divert water from road ditches.

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2.1.8.2 Resource-Specific Requirements

PEDCO proposes to implement the following resource-specific mitigation measures, procedures, and BLM management requirements on public lands.

2.1.8.2.1 Range Resources and Other Land Uses

Mitigation requirements listed under Soils, Vegetation and Wetlands, and Wildlife of this EA also apply to Range Resources and Other Land Uses.

1. PEDCO would coordinate with the affected livestock operators to ensure that livestock control structures remain functional during drilling and production operations.

2.1.8.2.2 Air Quality

1. All BLM conducted or authorized activities must comply with applicable local, state, tribal and Federal air quality regulations and standards. PEDCO would adhere to all applicable ambient air quality standards, permit requirements (including preconstruction, testing, and operating permits), motorized equipment and other regulations, as required by the State of Wyoming, Department of Environmental Quality, Air Quality Division (WDEQ-AQD).
2. PEDCO would not allow burning garbage or refuse at well locations or other facilities. Any other open burning would be conducted under the permitting provisions of Section 13 of the Wyoming Air Quality Standards and Regulations.
3. On Federal land, PEDCO would initiate immediate abatement of fugitive dust (by application of water, chemical dust suppressants, or other measures) when air quality, soil loss, or safety concerns are identified by the BLM or the WDEQ-AQD. These concerns include, but are not limited to, potential exceedances of applicable air quality standards. The BLM would approve the control measure, location, and application rates. If watering is the approved control measure, the operator must obtain the water from state-approved source(s).

2.1.8.2.3 Transportation

1. Existing roads would be used as collectors and local roads whenever possible. Standards for road design would be consistent with BLM Road Standards Manual Section 9113.
2. Roads not required for routine operation and maintenance of producing wells and ancillary facilities would be permanently blocked, reclaimed, and revegetated.
3. Areas with important resource values, steep slopes and fragile soils should be avoided where possible in planning for new roads.
4. Permits are required from Carbon County for any road access to or across a county road or for any pipeline crossing of a county road. These permits should be acquired prior to construction of additional roads. All roads on public lands which are not required for operation and maintenance of field production should be permanently blocked, re-contoured and reseeded. Roads on private lands should be treated similarly depending on the desires of the land owner.

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5. The Proponent would be responsible for preventive and corrective maintenance of roads in the project area throughout the duration of the project. This may include blading, cleaning ditches and drainage facilities, dust abatement, noxious weed control, or other requirements as directed by the BLM or the Carbon County Road and Bridge Department.
6. Except in emergency situations, access would be limited to drier conditions to prevent severe rutting of the road surface. Culverts would be installed where needed to allow drainage in all draws and natural drainage areas. Low water crossings would be utilized where applicable. Onsite reviews would be conducted with BLM personnel for approval of proposed access prior to any construction.

2.1.8.2.4 Minerals/Paleontology

Mitigation measures presented in the Soils and Water Resources sections of this EA would avoid or minimize many of the potential impacts to the surface mineral resources. Protection of subsurface mineral resources from adverse impacts would be provided by the BLM and WDEQ casing and cementing policy.

Potential scientifically significant paleontological resources within the Lewis Shale, the only geologic formation of concern which underlies the SDPA would be protected through the following mitigation measures:

1. If recommended by the BLM, each proposed facility located in areas with known and potential vertebrate paleontological resource significance) would be surveyed by a BLM-approved paleontologist prior to surface disturbance (USDI-BLM 1987, 1990).
2. Discovery Contingency. Contingency should be made for the accidental discovery of significant fossils by project personnel. If fossils are discovered by construction personnel during implementation of the project the BLM would be notified immediately. If the fossils could be adversely affected by construction, construction activities would be redirected until a qualified paleontologist has determined the importance of the uncovered fossils and the extent of the fossiliferous deposits and made and implemented recommendations regarding further mitigation.
3. Field Survey. No specific data currently exists on deposits of high and undetermined paleontologic potential in SDPA. For that reason field survey for paleontologic resources would be conducted on a case by case basis, as directed by the BLM, in areas in which surface exposures of the Browns Park, Green River, and Wasatch formations crop out. Field survey may result in the identification of additional mitigation measures to lessen adverse impacts to fossil resources. This mitigation may include collection of additional data and fossil material, obtaining representative samples of fossil material, by monitoring excavation; or by avoidance. In some cases no action beyond that conducted during the field survey may be necessary.

A report would be submitted to the BLM following the completion of each field survey. That report will detail the results of the survey, including a list of fossils collected, if any were, and may include recommendations for, or detail the results of additional mitigation. If significant fossils are collected, the report must document the curation of specimens along with associated geologic records into the collections of an acceptable museum repository.

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2.1.8.2.5 Soils

1. Reduce the area of disturbance to the absolute minimum necessary for construction and production operations while providing for the safety of the operation.
2. Where feasible, locate pipelines immediately adjacent to roads to avoid creating separate areas of disturbance and in order to reduce the total area of disturbance.
3. Avoid using frozen or saturated soils as construction material.
4. Minimize construction activities in areas of steep slopes.
5. Design cutslopes in a manner that would allow retention of topsoil, surface treatment such as mulch, and subsequent revegetation.
6. Selectively strip and salvage topsoil or the best suitable medium for plant growth from all disturbed areas to a minimum depth of 6 inches on all well pads.
7. Where possible, minimize disturbance to vegetated cuts and fills on existing roads that are improved.
8. Install runoff and erosion control measures such as water bars, berms, and interceptor ditches if needed.
9. Install culverts for ephemeral and intermittent drainage crossings. Design all drainage crossing structures to carry the 25- to 50-year discharge event, or as otherwise directed by the BLM.
10. Implement minor routing variations during access road layout to avoid steep slopes adjacent to ephemeral or intermittent drainage channels. Maintain a 100-foot wide buffer strip of natural vegetation where possible (not including wetland vegetation) between all construction activities and ephemeral and intermittent drainage channels.
11. Include adequate drainage control devices and measures in the road design (e.g., road berms and drainage ditches, diversion ditches, cross drains, culverts, out-sloping, and energy dissipators) at sufficient intervals and intensities to adequately control and direct surface runoff above, below, and within the road environment to avoid erosive concentrated flows. In conjunction with surface runoff or drainage control measures, use erosion control devices and measures such as temporary barriers, ditch blocks, erosion stops, mattes, mulches, and vegetative covers. Implement a revegetation program as soon as possible to re-establish the soil protection afforded by a vegetal cover.
12. Upon completion of construction activities, restore topography to near pre-existing contours at the well sites, along access roads and pipelines, and other facilities sites; replace up to 6 inches of topsoil or suitable plant growth material over all disturbed surfaces; apply fertilizer as required; seed; and mulch.

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2.1.8.2.6 Water Resources

Other mitigation measures listed in the Soils, and Vegetation and Wetlands sections of this EA would also apply to Water Resources.

1. Limit construction of drainage crossings to no-flow periods or low-flow periods.
2. Minimize the area of disturbance within perennial, ephemeral and intermittent drainage channel environments.
3. Prohibit construction of well sites, access roads, and pipelines within 500 feet of surface water and/or riparian areas. Possible exceptions to this would be granted by the BLM based on an environmental analysis and site-specific mitigation plans.
4. Design channel crossings to minimize changes in channel geometry and subsequent changes in flow hydraulics.
5. Maintain vegetation barriers occurring between construction activities and ephemeral and intermittent channels.
6. Design and construct interception ditches, sediment traps/silt fences, water bars, silt fences and revegetation and soil stabilization measures if needed.
7. Construct channel crossings by pipelines such that the pipe is buried a minimum of four feet below the channel bottom.
8. Regrade disturbed channel beds to the original geometric configuration and the same or very similar bed material replaced.
9. Case wells during drilling, and case and cement all wells in accordance with Onshore Order No. 2 to protect all high quality water aquifers. High quality water aquifers are aquifers with known water quality of 10,000 TDS or less. Include well casing and welding of sufficient integrity to contain all fluids under high pressure during drilling and well completion. Further, wells would adhere to the appropriate BLM cementing policy.
10. Construct the reserve pits in cut rather than fill materials or compact and stabilize fill. Inspect the subsoil material of the pit to be constructed in order to assess soil stability and permeability and whether reinforcement and/or lining are required. If lining is required, line the reserve pit with a reinforced synthetic liner at least 12 mils in thickness and a bursting strength of 175 x 175 pounds per inch (ASTMD 75179). Consideration should be given to use of closed or semi-closed drilling systems in situations where a liner may be required.
11. Maintain two feet of freeboard on all reserve pits to ensure the reserve pits are not in danger of overflowing. Shut down drilling operations until the problem is corrected if leakage is found outside the pit.
12. Extract hydrostatic test water used in conjunction with pipeline testing and all water used during construction activities from sources with sufficient quantities and through appropriation permits approved by the State of Wyoming.

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13. Discharge hydrostatic test water in a controlled manner onto an energy dissipator. The water is to be discharged onto undisturbed land that has vegetative cover, if possible, or into an established drainage channel. Prior to discharge, treat or filter the water to reduce pollutant levels or to settle out suspended particles if necessary. If discharged into an established drainage channel, the rate of discharge would not exceed the capacity of the channel to safely convey the increased flow. Coordinate all discharge of test water with the Wyoming SEO and the BLM.
14. Discharge all concentrated water flows within access road ROW's onto or through an energy dissipator structure (e.g., riprapped aprons and discharge points) and discharge into undisturbed vegetation.
15. Develop and implement a pollution prevention plan (PPP) for storm water runoff at drill sites as required per WDEQ storm water National Pollution Discharge Elimination System (NPDES) permit requirements. The WDEQ requires operators to obtain a field permit for fields of 20 wells or more.
16. Exercise stringent precautions against pipeline breaks and other potential accidental discharges of toxic chemicals into adjacent streams. If liquid petroleum products are stored on site in sufficient quantities (per criteria contained in 40 CFR Part 112), a Spill Prevention Control and Countermeasures (SPCC) plan would be developed in accordance with 40 CFR Part 112, dated December 1973.
17. Coordinate all crossings or encroachments of waters of the U.S. with the U.S. Army Corps of Engineers (COE).
18. Any changes in the produced water disposal method or location must have written approval from the BLM before the changes take place.

2.1.8.2.7 Fisheries

1. No fisheries mitigation is needed beyond that indicated under Water Resources and Special Status Species Fish.

2.1.8.2.8 Vegetation and Wetlands

Other mitigation measures under Soils and Water Resources of this EA would also apply to vegetation and wetlands.

1. File noxious weed monitoring forms with the BLM and implement, if necessary, a weed control and eradication program.
2. Evaluate all project facility sites for occurrence and distribution of waters of the U.S., special aquatic sites, and jurisdictional wetlands. All project facilities would be located out of these sensitive areas. If complete avoidance is not possible, minimize impacts through modification and minor relocations. Coordinate activities that involve dredge or fill into wetlands with the COE.
3. On BLM lands, an approved Pesticide Use Proposal would be obtained before the application of herbicides or other pesticides for the control of noxious weeds.

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4. Disturbed areas would be seeded and stabilized in accordance with BLM-approved reclamation guidelines.

2.1.8.2.9 Wildlife

1. During reclamation, establish a variety of forage species that are useful to resident herbivores.
2. Prohibit unnecessary off-site activities of operational personnel in the vicinity of the drill sites. Inform all project employees of applicable wildlife laws and penalties associated with unlawful take and harassment.
3. Limit construction activities per BLM authorizations within big game crucial winter range from November 15 to April 30.
4. Complete a raptor survey of the ARPA prior to construction to ensure that well sites are located away from potential conflict areas.
5. Survey and clear well sites within one mile of raptor nests identified in the raptor survey prior to the commencement of drilling and construction during the raptor nesting period (February 1 through July 31).
6. When an `active' raptor nest is within 0.75 to one mile (depending on species and line of sight) of a proposed well site, restrict construction during the critical nesting season for that species.
7. Do not perform construction activities within 0.25 mile of existing sage grouse leks at any time.
8. Provide for sage grouse lek protection during the breeding, egg-laying and incubation period (March 1 - June 30) by restricting construction activities within a two-mile radius of active sage grouse leks. Exceptions may be granted if the activity would occur in unsuitable nesting habitat.
9. To eliminate any hazard to migratory birds or other wildlife, BLM would require netting (maximum 2 inch mesh) be installed over any pits identified as containing oil or toxic substances.

2.1.8.2.10 Special Status Species

Special Status Plants

1. Employ site-specific recommendations developed by the BLM IDT for staked facilities.
2. Minimize impacts due to clearing and soil handling.
3. Monitor and control noxious weeds.
4. Comply with Section 404(b)(1) guidelines of the federal Clean Water Act (CWA).
5. Perform clearance surveys for plant species of concern.

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Special Status Animals

1. Implement measures discussed in Chapter 4 in compliance with the Endangered Species Act (ESA).
2. Prior to production of waters associated with CBM production in the SDPA, the proponent agrees to collect water data to determine if water from the Mesaverde Formation is connected to surface waters associated with the Colorado River System. Results of this analysis will be submitted to USFWS and BLM. If data indicates that there is a connectivity between the waters produced concurrent with CBM production and the Colorado River Basin system, and that the project will result in depletions, formal consultation will be initiated with USFWS.

2.1.8.2.11 Visual Resources

1. Utilize existing topography to screen roads, pipeline corridors, drill rigs, well heads, and production facilities from view.
2. Paint well and central facilities site structures with flat colors (e.g., Carlsbad Canyon or Desert Brown) that blend with the adjacent surrounding undisturbed terrain, except for structures that require safety coloration in accordance with Occupational Safety and Health Administration (OSHA) requirements.

2.1.8.2.12 Noise

1. Muffle and maintain all motorized equipment according to manufacturers' specifications.
2. In any area of operations (drill site, compressor site, etc.) where noise levels may exceed federal OSHA and MSHA safe limits, PEDCO would provide and require the use of proper personnel protective equipment by employees.

2.1.8.2.13 Recreation

Measures under Wildlife, Transportation, Soils, Health and Safety, and Water Resources of the EA apply to Recreation.

1. Minimize conflicts between project vehicles and equipment and recreation traffic by posting appropriate warning signs, implementing operator safety training, and requiring project vehicles to adhere to low speed limits.

2.1.8.2.14 Socioeconomics

1. Implement hiring policies that would encourage the use of local or regional workers who would not have to relocate to the area.
2. Coordinate project activities with ranching operations to minimize conflicts involving livestock movement or other ranch operations. This would include scheduling of project activities to minimize potential disturbance of large-scale livestock movements. Establish effective and frequent communication with affected ranchers to monitor and correct problems and coordinate scheduling.

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3. PEDCO and its subcontractors would obtain Carbon County sales and use tax licenses for purchases made in conjunction with the project so that project-related sales and use tax revenues would be distributed to Carbon County.

2.1.8.2.15 Cultural Resources

1. If a site is considered eligible for, or is already on the National Register of Historic Places (NRHP), avoidance is the preferred method for mitigating adverse effects to that property.
2. Mitigation of adverse effects to cultural/historical properties that cannot be avoided would be accomplished by the preparation of a cultural resources mitigation plan.
3. If cultural resources are discovered at any time during construction, all construction activities would halt and the BLM Authorized Officer (AO) would be immediately notified. Work would not resume until a Notice to Proceed is issued by the BLM AO.

2.1.8.2.16 Health and Safety

Measures listed under Air Quality and Water Quality also apply to Health and Safety.

1. Sanitation facilities installed on the drill sites and any resident camp site locations would be approved by the WDEQ.
2. To minimize undue exposure to hazardous situations, require measures that would preclude the public from entering hazardous areas and place warning signs alerting the public of truck traffic.
3. Haul all garbage and rubbish from the drill site to a State-approved sanitary landfill for disposal. Collect and store any garbage or refuse materials on location prior to transport in containers approved by the BLM.
4. During construction and upon commencement of production operations, PEDCO would have a chemical or hazardous substance inventory for all such items that may be at the site. PEDCO would institute a Hazard Communication Program for its employees and would require subcontractor programs in accordance with OSHA 29 CFR 1910.1200. These programs are designed to educate and protect the employees and subcontractors with respect to any chemicals or hazardous substances that may be present in the work place. It would be required that as every chemical or hazardous material is brought on location, a Material Safety Data Sheet (MSDS) would accompany that material and would become part of the file kept at the field office as required by 29 CFR 1910.1200. All employees would receive the proper training in storage, handling, and disposal of hazardous substances.
5. Spill Prevention Control and Countermeasure Plans would be written and implemented as necessary in accordance with 40 CFR Part 112 to prevent discharge into navigable waters of the United States.

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6. Chemical and hazardous materials would be inventoried and reported in accordance with the Superfund Amendments and Reauthorization Act (SARA) Title III. 40 CFR Part 335, if quantities exceeding 10,000 pounds or the threshold planning quantity (TPQ) are to be produced or stored in association with the Proposed Action. The appropriate Section 311 and 312 forms would be submitted at the required times to the State and County Emergency Management Coordinators and the local fire departments.
7. Any hazardous wastes, as defined by the Resource Conservation and Recovery Act (RCRA), would be transported and/or disposed of in accordance with all applicable federal, state, and local regulations.

2.2 ALTERNATIVE A - NO ACTION

Section 1502.14(d) of the NEPA requires that the alternatives analysis "include the alternative of no action". "No Action" implies that on-going natural gas production activities would be allowed to continue by the BLM in the SDPA, but the proposed field development program (Proposed Action) would be disallowed. Approved disturbances (initially 19.0 ac; LOP 14.5 ac) associated with the recently approved four CBM wells, one injection well, and associated facilities will be considered under the No Action Alternative. Additional APD's and ROW actions would be considered by the BLM for federal land on a case-by-case basis consistent with the scope of existing environmental analysis. Transport of natural gas products would be allowed from those wells within the SDPA that are currently productive. Additional gas development could occur on private lands within the project area under APD's approved by the WOGCC.

The U.S. Department of the Interior's (USDI) authority to implement a "No Action" alternative is limited because the public lands have already been leased. An explanation of this limitation and the discretion the USDI has in this regard follows.

- An oil and gas lease grants the lessee the "right and privilege to drill for, mine, extract, remove and dispose of all oil and gas deposits" in the leased lands, subject to the terms and conditions incorporated in the lease (Form 3110-2). Because the Secretary of the Interior has the authority and responsibility to protect the environment within federal oil and gas leases, restrictions are imposed on the lease terms.
- Leases within the SDPA contain various stipulations concerning surface disturbance, surface occupancy and limited surface use. In addition, the lease stipulations provide that the USDI may impose "such reasonable conditions, not inconsistent with the purposes for which [the] lease is issued, as the [BLM] may require to protect the surface of the leased lands and the environment." None of the stipulations, however, would empower the Secretary of the Interior to deny all drilling activity because of environmental concerns.
- Provisions in leases that expressly provide Secretarial authority to deny or restrict APD development in whole or in part would depend on an opinion provided by the U.S. Fish and Wildlife Service (FWS) regarding impacts to endangered or threatened species or habitats of plants or animals that are listed or proposed for listing (e.g., bald eagle). If the FWS concludes that the Proposed Action and alternatives would likely jeopardize the continued existence of any endangered or threatened plant or animal species, then the APD(s) and Atlantic Rim development may be denied in whole or in part.

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2.3 ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL

The proposed action was developed around measures provided in the Interim Drilling Policy - Development Authorized Concurrent with EIS Preparation for the Atlantic Rim Coalbed Methane Project. Authorizations provided in the interim drilling policy limit the selection of other alternatives. As a result, no other alternatives to the proposed action were considered.