



THE DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT  
CASPER FIELD OFFICE



**DECISION RECORD AND FINDING OF NO SIGNIFICANT IMPACT**

**Howell Petroleum Corporation  
Salt Creek Fieldwide Expansion of the CO<sub>2</sub> Enhanced Oil Recovery Project  
EA # WY-060-EA7-067  
Natrona County, Wyoming**

**I. Introduction**

This document records the decision made by the Bureau of Land Management (BLM) for managing public land surface and federal mineral estate in the Howell Petroleum Corporation (HPC) remaining Salt Creek Fieldwide Expansion (SCFEX) of its ongoing carbon dioxide (CO<sub>2</sub>) enhanced oil recovery (EOR) Project within Salt Creek Oil Field, which is located in northern Natrona County, Wyoming. The first two phases of the EOR in this field (Phases I and II) have been completed and Phases III through V are under construction, with associated increases in oil recovery rates reported. Under the SCFEX, Howell intends to continue its injection of CO<sub>2</sub> into the Wall Creek 2 (WC2) formation in an effort to further increase oil recovery, and to implement injection into the Wall Creek 1 (WC1), Sundance 2, Sundance 3, Lakota, and Tensleep formations. The Enhanced Oil Recovery Project (EORP) for full field development at Salt Creek Oil Field using (CO<sub>2</sub>) flood, and the “Salt Creek Environmental Assessment, CO<sub>2</sub> Enhanced Oil Recovery Project” (SCEA) (EA No. WY-060-04-001) were approved on December 3, 2003.

The proposed action is approved as described in the “*Salt Creek Fieldwide Expansion Environmental Assessment*” (EA No. WY-060-EA07-067) prepared for the SCFEX. The “Salt Creek Field, Natrona County, Wyoming, CO<sub>2</sub> Phase Plans of Development” (PHPODs) will continue to be submitted by Phases as development continues, and will be reviewed and approved as appropriate. Each PHPOD will provides individual Phase project details for planned development as well as actual disturbance from the prior approved phase(s) development, and when approved will be added as an addendum to the Base POD prepared for the Salt Creek CO<sub>2</sub> EORP and submitted to the BLM in November 2004. The Base POD includes the Master Surface Use Plan (MSUP- Exhibit 5.3.2) and the Applicant Proposed Mitigation Measures (APEPM-Exhibit 8.1.1). The MSUP is also included in the SCFEX EA Appendix B. The Master Drilling Well Plan and Master Well Reactivation Plan were approved for the Salt Creek Field on October 8, 2002 by the BLM Casper Field Office (CFO), and are also included in the Base POD.

This decision does not grant final approval for the project components in the PHPODs. Before any permit is issued authorizing an action on public lands (i.e. Application for Permit to Drill, Sundry Notice and report on Wells, or Right-of-Way) the final location for each well site, access road, pipeline, header, production unit, utility line, or other facility, the CFO shall make a site-specific evaluation specifically through a documentation of NEPA adequacy (DNA), Energy Act Section 390 Categorical Exclusion or an environmental assessment (EA) which may be required to conduct the site-specific evaluation.

Necessary permits and authorizations from the Bureau of Land Management will be issued pursuant to the Mineral Leasing Act of 1920, as amended, and the Federal Land Policy and Management Act of 1976, as amended, and will be subject to the appropriate and applicable rules and regulations including those found in 43 CFR 2800 and 43 CFR 3000, and the terms and conditions described below. All activities associated with federal oil and gas development, operation and production, and abandonment would be conducted in compliance with all applicable Federal, State and County laws, regulations, and stipulations.

This decision is based on the SCFEX EA and applies only to the public land surface and federal mineral estate subject to administration by the BLM. Policies for development and land use decisions within the project area are contained in the Final Platte River Resource Area (PRRA) Resource Management Plan (RMP) and Record of Decision (ROD) (BLM 1985). The SCFEX EA is available for public review at the BLM Casper Field Office at 2987 Prospector Drive, Casper, Wyoming, 82604.

## **2. Proposed Action and Alternatives**

### **2.1 Proposed Action**

This EA analyzes the proposed Fieldwide Expansion (FEX), encompassing approximately 17,645 acres of tertiary EOR development using CO<sub>2</sub> injection. CO<sub>2</sub> EOR involves the alternating injection of CO<sub>2</sub> and water into the reservoir rock to displace liquid hydrocarbons towards production wells where it is withdrawn and further processed. CO<sub>2</sub> produced with the oil would be separated and recycled to the CO<sub>2</sub> injection system for re-injection. The proposed project would be similar to existing waterflood activities; therefore, many of the existing facilities and infrastructure would be used as part of the Proposed Action. Anticipated facilities would include injection and production wells, injection and production pipelines, production test and treating facilities, injection manifold headers, replacement or modification of three existing lease automatic custody transfer (LACT) tank batteries, construction of one new LACT, five additional recycle compression stations, and associated electrical lines. Existing wells would be utilized to the extent possible to limit the number of new wells.

The use of CO<sub>2</sub> is being successfully implemented within Salt Creek Oil Field and has resulted in approximately 5,000 BOPD of production attributable to EOR to date. As shown in Figure 2.1, in the SCFLEX EA an overview of reservoir modeling results for Salt Creek Oil Field suggests that CO<sub>2</sub> EOR expansion could ultimately increase daily production rates in excess of 27,000 BOPD and increase ultimate oil recovery from the entire field by as much as 150 MMBO, extending the life of the field 30 to 40 years.

The Proposed Action for SCFEX of the CO<sub>2</sub> flood would maximize the use of existing wellbores, both active and abandoned, thereby minimizing the disturbance of additional surface area. The plan would require approximately 1314 injection wells, 1324 production wells, and 133 monitor wells for a total of 2771 wells. The number of wells includes up to 480 new wells which may be required to replace existing wells or to optimize pattern efficiency. Table 2-1 below provides a conceptual summary of wells proposed for use in the field and a schematic representing a potential expansion scenario is shown in Figure 2.2 in the SCFEX EA. Howell plans to equip all injection, production, and monitoring wells similarly to those described in the Phases III/IV EA (BLM 2006a).

**Table 2-1 Summary of Salt Creek Well Utilization by Formation**

		WELL COUNTS			
Reservoir		# Injectors	# Producers	# Observation	Total Well Count
Wall Creek 2		668	668	66	1,402
Wall Creek 1		543	543	54	1,140
Lakota		57	57	5	119
Sundance		41	41	4	86
Tensleep		5	15	4	24
<b>Total</b>		1,314	1,324	133	2,771

**Existing Wells** - Many of the existing wells in Salt Creek Oil Field would require additional cement behind the casing to adequately contain the CO<sub>2</sub> within the target formation and isolate the other horizons. Each wellbore, active and abandoned, that penetrates the target formation would be evaluated for zonal isolation by previously run or new cement bond logs. Remedial well work would be conducted utilizing the processes and procedures approved and implemented for the Phases II through V areas.

Existing wells not to be used as either production or injection wells would either be equipped to serve as monitoring wells or be shut in. The shut in wells would be used for emergency backup in the case of the unlikely event of a catastrophic failure of an active well.

**New Wells** - Howell's plan to complete the fieldwide pattern expansion includes the drilling of up to 480 new wells. Depending on the target formation, each well would be drilled to an approximate depth of between 900 and 8500 feet from the surface, and would be permitted and constructed according to plans approved in previous EAs for Phases I-V.

**Abandoned Wells** - Howell plans to re-enter and reactivate approximately 1250 previously abandoned wellbores in the project area. Howell also anticipates having to re-plug approximately 1050 existing abandoned wells. The work procedures for re-entry would follow plans and procedures approved and implemented for the Phases II through V areas.

### **Facility Plan**

The surface facilities required for the implementation of SCFEX would be similar to those installed under Phases I through V and would include as much of the existing waterflood

facilities as possible. The primary differences from waterflood operations would be the use of materials that are compatible with CO<sub>2</sub> production and can withstand higher working pressures. Figure 2.2 (SCFEX) shows the layout of a typical section. This figure illustrates a conceptual flow line and injection line layout for areas where multiple target reservoirs are overlaid, as well as locations for production test and treating facilities and injection manifold headers. Under SCFEX, the existing system would be extended to accommodate additional EOR wells with new manifolds, flowlines, and pipeline sections. Most of the current gathering and injection systems for existing waterflood activities would be replaced by the new system.

The proposed routing of injection and production lines reflects the use of existing corridors, Rights-of-Way (ROWs), and linear features (e.g., roads). As part of the Proposed Action, Howell would continue to install production and injection lines within the same corridor and follow existing ROWs to the extent practical. Additionally, as with all other phases of the development, Howell would use a Construction Supervisor to ensure that construction and development practices adhere to BLM's guidelines and regulations, such as Right-of-Way (ROW) placement. Howell has either employed contract labor and/or dedicated company personnel to fulfill the role of Construction Supervisor, whose main focus, on behalf of the Project Manager, is to provide on-site company representation and administer the selected installation contractor. This oversight would ensure:

- The scope of work is completed as per the original design, costs, specifications, and applicable permits.
- The work is conducted per Howell's safety and environmental guidelines, regulatory permit requirements, and the Salt Creek MSUP.
- Necessary departures from the original scope are approved and properly documented.

Howell's proposed SCFEX includes the continued utilization of existing roads and the replacement or modification of the LACT 11, LACT 20 in the Salt Creek light Oil Unit (SCLOU), and the Salt creek South Unit (SCSU) A Battery production facilities as well as construction of a new LACT. It is not anticipated that the produced water discharge volumes at any LACT would be significantly altered by the new process; therefore, additional discharge points would not be required. Future produced water quality is expected to be generally consistent to that currently being produced and would be subject to existing permit discharge limits and conditions established by the Wyoming Department of Environmental Quality (WDEQ) under the established Wyoming Pollution Discharge Elimination System (WYPDES) program. Howell is committed to continuing to meet the requirements of its existing discharge permits per WDEQ requirements and procedures and to implement necessary actions to ensure continued compliance.

**Production System** – This proposed expansion would include the installation of approximately 113 additional production/test manifold stations that would receive wellhead production volumes and separate the liquid and gas for transport to their respective gathering systems. The Phase V EA details this processing system (BLM 2006c).

**Injection System** – The water-alternating-gas (WAG) injection process would continue to be used for SCFEX. The WAG process involves alternating injection wells between water and gas injection on either a time or volume basis. Cycles could be as rapid as weekly or as long-term as annually, depending on the particular oil reservoir being flooded.

The injection system design for SCFEX follows the same basic approach as with previous Salt Creek development phases, including the use of centralized injection flow control at the manifold stations. Approximately 112 new injection manifolds to distribute CO<sub>2</sub> and water to individual wells would be added under this proposed expansion. The Phase V EA details this injection distribution system (BLM 2006c).

**Gas System** – As with Phases I through V, produced CO<sub>2</sub> gas for SCFEX would be collected and recycled back to the high-compression gas injection system for re-injection. The required recycle and flash gas compression and dehydration of produced gas would be supported by existing and new facilities. The Phase V EA details this gas gathering system (BLM 2006c). Future RCS stations would be located adjacent to new or existing production batteries in order to have ready access to power supply and fluid for cooling compressed CO<sub>2</sub>.

### **Access Roads**

New access roads would be necessary for 480 new drill wells under the Proposed Action and maintenance access to new power lines. Howell would continue an ongoing program conducted in cooperation with BLM to identify and reclaim unused, redundant, and/or unnecessary roads throughout the life of the Project.

### **Production Batteries**

To accommodate this expansion, Howell would retrofit existing batteries and/or construct new production batteries. Each production battery would be designed to process volumes sufficient to support surrounding phase development. The process design would be similar to the existing batteries as detailed in the Base POD and Phase V EA (Howell 2004, BLM 2006c). Retrofitted batteries would be completed within the confines of existing surface disturbance while a new battery would occupy approximately 500'x 500' with a total long term disturbance of about 5.7 acres. Howell would acquire all required regulatory construction permits as stipulated by Wyoming DEQ.

### **Disturbance Estimates**

Operations that would result in surface disturbance would include the re-working of existing wells on previously disturbed sites and construction of drilling pads for new wells, new flow lines and injection lines, limited new access roads, and production facilities. Surface disturbance would be either short-term (during construction and site reclamation) or long-term (during or beyond the life of the project).

New construction would be sited to incorporate existing facilities, to parallel existing lines and roads, and to build on previously disturbed areas as much as possible. The SCFEX would require 1137.3 acres for new disturbance that would be reclaimed in the short term and 222.8 acres of new disturbance that would result in long-term surface disturbance (see Table 2-2).

**Table 2-2 Salt Creek Fieldwide Expansion Surface Disturbance Summary**

Category	QUANTITIES AND ASSUMPTIONS	Qty	Length	Width	SHORT-TERM (ST) (acres)			LONG-TERM (LT) (acres)		
					EXISTING	NEW	TOTAL	EXISTING	NEW	TOTAL
Wells	2291 existing 125 x 125 LT	2291	125	125	0.0	0.0	0.0	821.8	0.0	821.8
	440 new WC1/WC2 250 x 250 ST, 125 x 125 LT	440	250	250	0.0	473.5	473.5	0.0	157.8	157.8
	40 new SD3/LAK/TP 450 x 250 ST, 125 x 125 LT	40	450	250	0.0	89.0	89.0	0.0	14.3	14.3
Headers*	225 headers	225	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Flowlines	Lines to 2771 wells 1500 x 20 ST	2771	1500	20	1908.4	0.0	1908.4	0.0	0.0	0.0
Trunklines	Lines to 225 headers 2650 x 65 ST	225	1300	65	436.5	0.0	436.5	0.0	0.0	0.0
Access	Access to 225 headers 150 x 30 LT	225	150	30	0.0	0.0	0.0	23.2	0.0	23.2
Access	Access to 480 new wells 150 x 20 LT	480	150	20	0.0	0.0	0.0	0.0	33.1	33.1
Power	Lines to 225 headers and 40 new wells 600 x 20 ST, 600 x 3 x 3 / 100 LT	265	600	20	0.0	72.7	72.7	0.0	0.3	0.3
Facilities	3 existing LACTS and one new LACT; 5 new compression stations 750 x 750 ST, 500 x 500 LT	3	750	750	0.0	21.5	21.5	17.2	0.0	17.2
		6	750	750	0.0	43.0	43.0	0.0	34.4	34.4
Temporary Use Areas	20 areas averaging 1000 x 1000 ST	20	1000	1000	0.0	459.1	459.1	0.0	0.0	0.0
<b>TOTAL</b>					<b>2,344.9</b>	<b>1,158.8</b>	<b>3,503.7</b>	<b>862.2</b>	<b>240.0</b>	<b>1,102.2</b>

Total Acres 4,605.9  
Less Existing Disturbance 3,207.1  
Total New Disturbance 1,398.8  
Acres in Project Area 17,645.0

Avg Dist. acres/well 1.7  
Avg LTD acres/well 0.4

\* - Header disturbance included in flowline and trunkline disturbance

## **Non-unitized Tracts**

Operations to expand EOR in Salt Creek may encompass a number of tracts which are not part of the SCLOU, as well as the adjacent SCSU. During current waterflood operations, lease allocation has been managed by separately metering fluids which are produced or injected in the various leases, then commingling with SCLOU fluids. Future expansion proposes to continue metering of each lease separately. Other options are also being considered and each Plan of Development would address allocation among non-unitized tracts.

### **2.2 No Action Alternative**

The “No Action” alternative would involve continued waterflood operations throughout Salt Creek Oil Field and continued CO<sub>2</sub> EOR in the existing Phases I through V areas. Currently, about 7,500 BOPD is being produced, with about 5,000 BOPD attributed to CO<sub>2</sub> injection activities. An estimated 50 MMBO remains to be recovered under the No Action Alternative for the entire field, as compared to an estimated 150 MMBO recoverable by CO<sub>2</sub> EOR for the entire Salt Creek Oil Field. Assuming stability of current oil prices, Salt Creek Oil Field would likely be shut within the next 10 to 20 years under the No Action Alternative.

### **2.3 Alternatives Considered but Eliminated from Detailed Analysis**

EOR techniques have long been utilized by the oil industry to increase hydrocarbon yields from oil and gas bearing structures. To date, various types of waterflood procedures have been used and is the current EOR approach employed throughout Salt Creek Oil Field. In the last 20 years, the use of CO<sub>2</sub> as an EOR agent has become increasingly popular because, under certain conditions, it is much more effective at recovering additional trapped oils than waterflooding.

Implementation of Phases I/II by Howell has demonstrated that CO<sub>2</sub> flooding of the WC2 formation within Salt Creek Oil Field substantially increases recovery of remaining oil reserves. These evaluations, however, did not identify alternative EOR techniques that would be economically viable and effective within this field. Additionally, Howell considered the use of horizontal wells to reduce the number of wells used in the EOR project. Due to high permeability of the WC2 formation, horizontal wells would not develop sufficient sweep efficiency, resulting in poor recovery of oil. Therefore, this option is not technically sound for use in the WC2 formation and thereby also not an environmentally viable project alternative.

## **3. Decision**

The decision to approve the Fieldwide Expansion of the Salt Creek Field Enhanced Oil Recovery Project is based on the impact analysis made in the *Salt Creek Fieldwide Expansion Environmental Assessment* (EA No. WY-060-EA07-067). The analysis recognizes that the SCFEX proposed action is an important and necessary phase of the EORP at Salt Creek Field which has the potential to recover an additional 150 MMBO from the subsurface that might otherwise remain in place, and that the proposed action will not incur undue or unnecessary environmental impacts to the environment caused by the proposed SCFEX and associated activities. The approval of the proposed action is subject to the following administrative

requirements, and the conductance of all construction, installation, operations, maintenance, reclamation, and abandonment activities associated with the SCFEX, in accordance with the guidelines presented in the Salt Creek Field Master Surface Use Plan, the Applicant Proposed Environmental Protection Measures, the mitigation measures developed in the SCFEX EA, and any additional mitigation measures included in this document. These guidelines and mitigation measures are included in Section 7 of this Decision Record.

This decision record does not grant final approval for the project components in the PHPODs. Approval of the Proposed Action and individual project actions are conditioned upon and subject to the following pre-authorization administrative requirements:

- *Before any permit is issued authorizing an action on public lands (i.e. Application for Permit to Drill, Sundry Notice and report on Wells, or Right-of-Way) the final location for each well site, access road, pipeline, header, production unit, utility line, or other facility, the CFO shall make a site-specific evaluation specifically through a documentation of NEPA adequacy (DNA), Energy Act Section 390 Categorical Exclusion (CX) or an environmental assessment (EA) that may be required to conduct the site-specific evaluation.*

#### **4. Approved Project Components**

The proposed SCFEX will include the components discussed in Section 2.1 and those included in the Salt Creek Field Wide Expansion Summary Table 2-2 of this document.

Any modification or development beyond the specified levels outlined in this decision would require further NEPA analysis of the SCFEX.

#### **5. Finding of No Significant Impact (FONSI)**

Based on the analysis of the potential environmental impacts contained in the SCFEX EA, I have determined that the impacts are not expected to be significant and an environmental impact statement (EIS) is not needed.

#### **6. Rationale for the Decision**

The rationale to approve the SCFEX is based on careful consideration of the following factors:

- The decision to authorize the SCFEX of the EORP is in conformance with the planning objective in the PRRA RMP that states “*Oil and gas exploration and development will be authorized in accordance with the lease provisions. Lease constraints and development will be subject to land use decisions described in the Planning Decisions section of the RMP Record of Decision*”
- The decision to approve the SCFEX is based on the impact analysis made in the SCFEX EA as part of the EORP approved by the SCEA. The analysis shows that there will be no undue or unnecessary environmental impacts to the environment caused by construction, drilling, well reactivation, operation, maintenance, reclamation or abandonment associated with all phases of the project.

- The SCFEX is an integral part of the EORP which has the potential to recover an additional 150 MMBO from Salt Creek Field that would otherwise remain trapped in the subsurface. Positive economic impacts will be realized from the additional tax revenues to the local, state, and federal government, and from the extended production life of Salt Creek Field.
- The reasonably foreseeable development for SCFEX is predictable and the identified cumulative impacts are accurate and representative if the guidelines and measures presented in the Salt Creek Field Master Surface Use Plan (MSUP) the Base POD Applicant Proposed Environmental Protection Measures (APEPM), the mitigation measures developed in the SCFEX EA, and any additional mitigation measures listed in Section 7 below are successfully implemented.
- Due to the development and implementation of a comprehensive CO<sub>2</sub> Seep Containment Plan, public health and safety will not be affected by the proposed action.

## **7. Environmental Protection Mitigation Measures**

The approval of the proposed action is subject to the conductance of all construction, installation, operations, maintenance, reclamation, and abandonment activities associated with the all phases in accordance with the environmental protection guidelines and mitigation measures presented in the Salt Creek Field MSUP, the Base POD APCEPM, the SCFEX EA, and other mitigation measures listed below:

### **Resource Protection**

- (1) The Applicant Committed Environmental Protection Measures and the Master Surface Use Plan in the Salt Creek CO<sub>2</sub> EOR Base POD shall apply to all project components for Phase unless superseded by direction of the BLM Authorized Officer (AO) or by the following environmental protection mitigation and monitoring measures:
- (2) Individual components of all phases shall use to the greatest extent possible existing well pads, access roads, facilities, and power lines to minimize areas of disturbance.
- (3) Pipelines shall be installed within the same corridor and/or follow existing right-of-ways and linear features, e. g. roads, whenever possible. HPC shall have a Construction Supervisor to ensure that pipeline construction is completed per the original design and specifications in the approved permit.
- (4) If pipeline crossings of streams will be done by boring underneath the stream, boring pits shall be located far enough back from the channel to prevent bank instability.
- (5) Where pipeline crossings of perennial or intermittent streams will be trenched, stream banks should be re-stabilized using appropriate proven stabilization practices such as placing large angular rock (greater than 2 feet in one dimension) or wire enclosed riprap structures. Riprap should be placed from the channel bottom to the top of the normal high water line on the bank. Double-ditching techniques should be used to separate the top one-foot of stream bottom substrate from deep soil layers and the substrate layers should be replaced in the same order that they are removed. Another option would be to use a type of matting such as Turf Reinforcement Mats over the disturbed area.
- (6) For pipeline crossings of streams, riparian canopy or stabilizing vegetation should not be

removed if possible. Crushing or shearing streamside woody vegetation is preferable to complete removal and any such vegetation that is removed should be re-established as soon as possible following completion of the crossing.

- (7) Riparian areas and floodplains should not be used as staging or refueling areas and all chemicals, solvents, and fuels should be kept at least 150 feet away from any streams or riparian areas.
- (8) HPC shall continue to monitor water volumes and quality of produced water discharged from LACTs into salt Creek as per the established WYPDES monitoring program.
- (9) HPC shall continue to monitor groundwater for operational purposes under the routine Oilfields Water Analysis (ROWA) and annual groundwater monitoring program for the Salt Creek oil Field Sewage Lagoon (as required by WDEQ Permit # 94-372).
- (10) Post-construction monitoring on a regular basis would be undertaken by HPC to ensure that surface reclamation is undertaken in a timely manner and that applicable erosion control measures are effective, including re-vegetation. The following revised seed mixture shall be substituted for future reclamation activities in the Salt Creek Oil Field, replacing the species re-vegetation guideline included in the Applicant Committed Environmental Protection Measures (ACEPM).

<b>Species</b>	<b>Pounds per Acre (PLS)<sup>1</sup></b>
Western Wheatgrass	3.0
Green needle grass	2.0
Thickspike wheatgrass	2.0
Indian ricegrass	2.0
Sandberg bluegrass	0.5
Alkali sacaton	0.5
Prairie coneflower	0.5
White prairie clover	0.5
Yarrow	0.5
Blue flax	1.0
<b>TOTAL</b>	<b>12.50</b>

- (11) The Noxious Weed Management Plan for Salt Creek Field, included as Appendix A of the Phase V EA, shall be applied for surface-disturbing activities in all phases.

**Human Health & Safety Protection**

HPC shall continue to apply containment and monitoring measures for phase expansion of the Salt Creek CO2 EOR that have been successfully implemented for all phases. In the event that well remediation does not fully address future CO2 surface seepage in Phase V, HPC will implement the subsurface containment mitigation measures as outlined in Section 2.1.3 of the EA for the Salt Creek CO2 EOR Phase III/IV expansion:

- (1) Install shallow vertical wells (between 100 and 800 feet below ground surface) that would be completed in naturally fractured zones.
- (2) Install horizontal bores that would be drilled about 20-80 feet below a CO2 seep.

- (3) Install drains in or near natural draws, which appear to be the primary areas where CO<sub>2</sub> seeps surface.
- (4) For both the shallow vertical wells and horizontal bores, Howell would install pumps at the lowest available point to remove shale fluids displaced by the CO<sub>2</sub>. These fluids would be collected and processed, along with the CO<sub>2</sub> flood-produced fluids at a nearby LACT battery.
- (5) Liquids collected by drains in or near natural ravines would be removed by vacuum truck and transported to a nearby LACT battery for processing. CO<sub>2</sub> recovered during these procedures would be gathered into a low-pressure system and compressed by blowers into the main CO<sub>2</sub> recycle system.
- (6) HPC shall fence prominent CO<sub>2</sub> seeps to restrict human and animal access directly into the seep area.
- (7) HPC shall continue to investigate and evaluate new technology and will update the CO<sub>2</sub> Seep Containment Plan design, as necessary, and shall continue to communicate directly with the BLM and the towns of Midwest and Edgerton regarding any changes to the Plan.

### **Range Management Protection**

- (1) HPC shall coordinate with the grazing lessee to minimize grazing impacts from the implementation of all phases. Options to minimize grazing impacts shall include but not be limited to temporary fencing of reclaimed areas and providing alternate grazing pastures or supplemental livestock feed.
- (2) Whenever possible, construction activities shall be conducted when the construction area is not actively in use for grazing.
- (3) Fences shall be constructed to prevent conflict between grazing operations and oil field development activities.
- (4) Fences shall be constructed around production facility areas that present a risk to livestock or to prevent damage to the facility from livestock.

### **Wildlife Protection**

- (1) No drilling or surface disturbing activities shall occur within ½-mile of an occupied raptor nest from February 1<sup>st</sup> through July 31<sup>st</sup> without the consent of the AO.
- (2) New electric distribution lines shall be built in accordance to the Avian Power Line Interaction Committee's (APLIC) "Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006 (APLIC 2006)". WEB Site: [http://www.aplic.org/SuggestedPractices2006\(LR\).pdf](http://www.aplic.org/SuggestedPractices2006(LR).pdf)
- (3) Existing electric distribution lines and/or electric structures where future bird fatalities may be recorded shall be retrofitted according to the APLIC guidelines.
- (4) Existing de-energized electric distribution lines that are re-energized in the future shall also be retrofitted according to the APLIC guidelines.
- (5) Project development shall avoid active prairie dog colonies whenever possible. In the event project development can not avoid a prairie dog colony, the applicant shall advise the AO and get approval prior to proceeding with the action.

(S) Patrick J. Moore

8/27/2007

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Assistant Field Manager, Mineral and Lands  
Casper Field Office

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Date