

EIGHT POINT DRILLING PLAN

Attached to Application For Permit To Drill: Form 3160-3:
Operator: Bonneville Fuels Corporation

Avalon 1 Federal #2

Unorthodox Surface Location: 2686' FSL & 1999' FEL, Lot 31

Orthodox Bottom Hole Location: 1900' FSL & 1800' FEL, Lot 34

Section 1, T.21S., R.26E. N.M.P.M.

Eddy County, New Mexico

1. ESTIMATED TOPS: IMPORTANT GEOLOGIC MARKERS

ALL DEPTHS REF. Est. KB @ 17' above GL:

Permian:	True Vertical Depth:	Measured Depth:
	Surface	Surface
Yates Fm.:		
Seven Rivers:	130'	130'
Capitan Reef Fm.:	740'	740'
Goat Seep Reef Fm.:	2180'	2204'
Delaware Fm.:	2285'	2329'
Cherry Canyon Mbr.:	2285'	2329'
San Andres Dolomite Mbr.:	3083'	3313'
Brushy Canyon Mbr.:	3740'	4029'
T.D. in Brushy Canyon Mbr.:	3820'	4113'

2. ESTIMATED DEPTHS OF ANTICIPATED WATER, OIL, GAS OR MINERALS:

	Formation	True Vertical Depth:	Measured Depth:
	OR Sand:		
Fresh Water:	Capitan Reef:	130' to 450'	130' to 450'
Oil and Gas Targets:			
	Delaware Fm.:	2285'	2329'
	Cherry Canyon Mbr.:	2285'	2329'
	EPF Sand #1:	3113'	3349'
	EPF Sand #2:	3303'	3566'
	EPF Sand #3:	3640'	3926'
	Brushy Canyon Mbr.:	3740'	4029'

Projected Maximum Total Depth @ 4113' MD (3840' TVD) in the Brushy Canyon Mbr. Of the Delaware Fm.

3. MINIMUM SPECS FOR PRESSURE CONTROL:

- a. A diagram of the Surface Blowout Preventer Stack and Wellhead Equipment is presented in Exhibit #1. The wellhead equipment for the production hole (12-1/4" @ 2,300' MD: 2261' TVD) is altered only by the replacement of the 13-5/8" 3000 psi WP starting head with a 9" 3000 psi WP starting head for the drilling of the 7-7/8" production hole. A diagram of the Choke Manifold is presented in Exhibit #2. All BOP and Choke Manifold equipment will be rated to 3000 psi Working Pressure (WP) minimum (min).
- b. Surface Casing Wellhead Equipment will consist of:
 - i. A 13-5/8" slip-on weld-on 3000 psi WP(min) braiden head w/ 2: 2" SE outlets with 2:2" SE XXHVY nipples and 2:2" SE FO 3000 psi WP(min) ball valves. This braiden head will be welded-on & nipples-up after the 600' MD (600' TVD) of 13-3/8" Surface Casing is set and cemented. This starting head will be removed after the 8-5/8" protective casing has been set and successfully cemented to surface.
 - ii. All wellhead and BOP equipment and the 13-3/8" Surface Casing will be pressure tested to 1000 psi with the rig pumps prior to drilling out.
- c. Protective Casing Wellhead Equipment will consist of:
 - i. A 9" slip-on weld-on 3000 psi WP(min) braiden head w/ 2: 2" SE outlets with 2: 2" SE XXHVY Nipples and 2: 2" SE FO 3000 psi WP(min) ball valves. This braden head will be welded onto the 8-5/8" Protective Casing as soon as the 13-5/8" Braden head has been cut-off the 13-3/8" surface casing and ONLY after the 8-5/8" protective casing at 2300' MD (2261' TVD) has been set and successfully cemented to surface.
 - ii. All wellhead and BOP equipment and the 8-5/8" Protective Casing will be pressure tested to 2500 psi prior to drilling-out the 7-7/8" Production Hole.

3. MINIMUM SPECS FOR PRESSURE CONTROL (CONTINUED):

- d. The BOP Equipment, nipples-up on the 13-5/8" 3000 psi starting head for the 12-1/4" Intermediate Hole & the 9" 3000 psi starting head for the 7-7/8" production hole will be as follows:
 - i. A 13-5/8" Nom. 3000 psi WP(min) mud cross with a 2" 3000 psi WP(min) FO FE kill-side inlet and a 4" 3000 psi WP(min) FO FE choke-side outlet. A 9" x 13-5/8" 3000 psi DSA Flange will be inserted between the mud cross and the 9" starting head for the drilling of the 7-7/8" production hole.
 - ii. A 13-5/8" Nom. 3000 psi WP(min) double gate (or dual equivalent single gate) hydraulic ram-type preventer with Pipe Rams over Blind Rams. Pipe rams are anticipated to be 4-1/2".
 - iii. A 13-5/8" Nom. 5000 psi WP(min) hydraulic annular preventer.
 - iv. An 13-5/8" Nom. rotating head with fill-up and flow-line connections. The flow-line will tie-in to a gas buster.
 - v. A choke manifold consisting of an inside 4" 3000 psi WP(min) FO FE master gate valve run in the CLOSED position (at the wellhead) with an outside mounted 4" 3000 psi WP(min) Hydraulic FO FE Master Valve run in the OPEN position, a 4"(min nom) x 3,000 psi WP(min) FE welded choke line between the master valves and the choke manifold - consisting of a 2 x 4" and 2 x 2" 3000 psi WP(min) FE cross with a 4" 3000 psi WP(min) FO FE gate valve immediately upstream, and a 4" 3000 psi WP(min) ball/gate valve immediately downstream, of the manifold cross. Between the downstream 4" 3000 psi WP(min) FO FE ball/gate valve and the manifold cross will be a 4" x 4" x 2" 3000 psi WP(min) FO FE tee with a 2" 3000 psi WP(min) FO FE ball/gate valve with a 2" 3000 psi WP(min) Gauge Assembly for monitoring pressure at the choke manifold. The choke manifold will have 2: 2" 3000 psi FO FE ball/gate valves between the manifold cross and the 2: 2" FO FE 3000 psi(min) adjustable chokes (a total of 4: 3" 3000 psi ball/gate valves - 2 on each wing). One of these adjustable chokes will be hydraulically operated. Provision will be made to tie in DST surface lines to the choke manifold thru an optional 2" 3000 psi WP(min) FO FE tee above the 2" 3000 psi WP(min) ball/gate valve down stream of the choke manifold cross. The 4" blooey line downstream of the choke manifold will be staked down and targeted in the flare pit. The 2: 2" lines downstream of the chokes will be appropriately staked down to return mud to the mud tanks via a gas buster, fluids to a test tank, and gas to a flare pit.

3. MINIMUM SPECS FOR PRESSURE CONTROL (CONTINUED):

d. The BOP Equipment (Continued):

- vi. A gas buster will be installed to de-gas fluid returns during drilling/well control operations and to return de-gassed fluid to the mud pits and to convey gas to a flare pit.
- vii. A 3000 psi WP(min) FO safety valve and a 3000 psi WP(min) dart valve, with drill pipe threads and subs to meet other drill string threads, will be kept on the drill floor after the 13-3/8" surface casing is set. A 3000 psi(min) WP Upper Kelly valve and a 3000 psi WP(min) Lower Kelly valve will be kept on the kelly throughout drilling operations. All valves, and the wrenches to operate these valves, will be maintained on the floor in good order throughout drilling operations.
- viii. An accumulator with sufficient capacity to operate the BOPE against a 2000 psi well pressure(min) will be used to operate the BOP system. It shall contain the fluid capacity calculated to open and close the Hydraulic inside master valve, pipe rams, and annular preventer 1 time each, and then to close the pipe rams and annular preventer 1 additional time(min) and retain accumulator pressure at 200 psig over the pre-charge pressure **OR THE MINIMUM CAPACITY OF WORKING FLUID REQUIRED BY ON-SHORE ORDER NO. 2** - whichever is the lesser. The accumulator working pressure shall be 1,500 psi(minimum) with a pre-charge pressure between 900 - 1,200 psi(minimum). A Nitrogen bottle system shall provide independent (reserve) power to operate the system in the event rig motors must be shut down.
- ix. The kill-side manifold will consist of 2:2" 3000 psi WP(min) FO FE master valves with an outside 2" 3000 psi(min) FO FE check valve. The inside valve will be kept in the closed position. The outside 2" master valve will be kept in the open position. The kill line will be connected to the stand-pipe by a 2" 3000 psi WP(min) welded or co-flexip type kill line. **THE KILL LINE WILL IN NO CASE BE USED FOR THE FILL-UP LINE.**

3. MINIMUM SPECS FOR PRESSURE CONTROL (CONTINUED):

- e. BOPE Stack Testing Procedures and Operational Test Frequency:
NOTE: ALL pressure tests and operational/function tests and drills will be recorded/described on the IADC tour sheets.

- i. Stack Test for the 12-1/4" Intermediate Hole: Use Rig Pumps: ALL of the pressure side BOP Equipment specified in Part d. above will be nipped-up on the 13-3/8" surface casing and each component will be hydraulically tested for ten(10) minutes(min) to 1000 psi and five(5) minutes(min) to 300 psi prior to drilling out cement. The 13-3/8" casing will then be tested against the Pipe Rams or Blind Rams to 1,000 psi for thirty(30) minutes(min). After the float collar is drilled out of the intermediate casing, and prior to drilling out the shoe, the intermediate casing will again be pressure tested to 1,000 psi for ten(10) minutes(min) against the Pipe Rams.
- ii. Operational checks while drilling the 12-1/4" intermediate hole: Pipe rams will be operationally checked each 24 hour period, and the Blind rams operationally checked each time that pipe is pulled from the hole. BOP drills will be run and recorded for each tour at least once every seven(7) days.
- iii. Stack Test for the 7-7/8" Production Hole: 3rd Party Test: The 8-5/8" casing, Blind Rams and all choke manifold lines and valves to the chokes and panic line, all kill side valves and the kill line will be nipped-up on the casing spool and each component will be hydraulically tested for ten(10) minutes(min) to 3,000 psi and five(5) minutes(min) to 300 psi. The Upper and Lower Kelly Valves will be hydraulically tested on the kelly for ten(10) minutes(min) each to 3,000 psi and for five(5) minutes(min) to 300 psi. All of the drill collars and at least 1,000' of drill pipe will then be run in the hole and then the Pipe Rams and the 8-5/8" casing will then be tested to 3,000 psi for thirty(30) minutes(min). After the float collar is drilled out of the intermediate casing, and prior to drilling out the shoe, the intermediate casing and the Annular Preventer will again be pressure tested to 1,500 psi for ten(10) minutes(min) prior to drilling out the shoe.
- iv. Operational checks while drilling the 7-7/8" Production Hole: Pipe rams will be checked each day. Blind rams will be checked each time that the drill string is pulled from the hole. A packer will be installed and the surface BOP equipment will be pressure tested every 30 operating days after the initial stack pressure test. BOP drills will be run and recorded for each tour at least once every seven(7) days.

3. MINIMUM SPECS FOR PRESSURE CONTROL (CONTINUED):

f. Tripping procedures for well control:

i. For the 12-1/4" intermediate hole:

A mud weight of 8.4 PPG to 9.5 PPG is anticipated at a depth of 2,300' MD (2,261' TVD). The well will be drilled by a triple-derrick rig (92' avg. length per stand). The well will be monitored each 5 stands to insure that the BHA is not swabbing the well in. The well will be filled after each 20 stands of drill pipe, 3 stands of 7" drill collars, and as each stand of large outside diameter drill collars (8" O.D. or larger) are pulled from the hole. Pits will be monitored in order to insure that the well is taking fluid on trips if the well will stand full of fluid. **In the event that the bit is plugged on a trip the well will be filled after each 7 stands of drill pipe are pulled from the well and as each stand of drill collars are pulled from the well. Swabbing will be checked each 3 stands.**

NOTE: If returns are lost completely while drilling this interval (AS IS LIKELY) then 25 Bbl. of mud containing at least 10 PPB of Lost Circulation Material will be pumped in the well each 30 minutes(min) on trips out of the hole.

ii. For the 7-7/8" production hole:

The anticipated maximum bottom-hole formation pressures are 1,500 psig @ 3,349' MD (TOP of EPF Sand #1 in Cherry Canyon Member of Delaware Fm. @ 3,113' TVD). The anticipated mud weight in this Production Hole Interval is 10.0 to 10.2 PPG. A mud weight sufficient to provide a 100 psig overbalance against the pay sands in the Delaware Fm. will be maintained in the well. The well will be drilled by a triple-derrick rig (92' avg. length per stand). The well will be monitored each 2 stands on trips to insure that the BHA is not swabbing the well in. The well will be filled after each 9 stands of drill pipe and as each stand of drill collars are pulled from the hole. Pits will be monitored in order to insure that the well is taking fluid on the trip. **In the event that the bit is plugged on a trip then the well will be filled after each 2 stands of drill pipe are pulled from the well and as each stand of drill collars are pulled from the well. Swabbing will be checked each stand.**

g. Procedures for running production casing:

Prior to running production casing the hole will be filled. The blind rams will be closed and the well will be monitored for flow while a set 5-1/2" casing rams will be installed in the BOP to replace the pipe rams. Casing will then be run and cemented. The BOPE will remain nipped up UNTIL the well is cemented.

4. CASING AND CEMENTING PROGRAM:

a. The Proposed Casing Program:

- i. OPTIONAL Conductor Casing: Pre-Set: Surface to 40' (MD=TVD):
20" O.D. 94# H-40 PE Casing.
- ii. Surface Casing: Surface to 600' (MD=TVD).
13-3/8" O.D. 54.5#/ft. J-55 8rd. ST&C.
- iii. Intermediate Casing: Surface to 2300' MD (2261' TVD).
8-5/8" O.D. 32#/ft. J-55 8rd. LT&C: 7.875" Special Drift.
- iv. Production Casing: Surface to TD @ 4,113' MD (3820' TVD).
5-1/2" O.D. 15.5#/ft. J-55 8rd. LT&C.

b. The Proposed Cementing Program:

- i. OPTIONAL Conductor Casing: Grouted:
Est. 70 F. @ 8.34 PPG water to 40':
Grout w/ Redi-Mix to Surface: Est. 4 Yds. of Redi-Mix.
- ii. 13-3/8" 54.5# Surface Casing: Single Stage:
Est. 75 F. @ 9.5 PPG mud @ 600'.
Circ. Cement to Surface:
Top Jobs if needed to bring cement to Surface.
Lead Slurry: Est. Surface to 410'.
100 % excess over calculated open-hole volume: Est. @
290 sx. Lite (65% Class 'C' + 35% Pozzalan + 6% Gel)
w/ 5#/sx. Gilsonite + 0.25#/sx. cello-flakes
+ 2% CaCl₂:
1.99 cu.ft./sx. @ 12.4 PPG.
Tail Slurry: Est. 410' to 600'.
100 % excess over calculated open-hole volume: Est. @
250 sx. Class 'C' w/ 2% CaCl₂ + 0.25#/sx. cello-flakes:
Additives: 1.33 cu.ft./sx. @ 14.8 PPG.

4. CASING AND CEMENTING PROGRAM (Continued):

- iii. 8-5/8" 32# Intermediate Casing: Single Stage:
Est. 87 F. @ 8.6 to 12.5 PPG mud @ 2,300' MD (2261' TVD).
Circ. Cement to Surface:
Top jobs if needed to bring cement to Surface.
Lead Slurry: Est. Surface to 1,800'.
100 % excess over calculated open-hole volume: Est. @
520 sx. Interfill 'C' (50% Class 'C'+50% Pozzalan+10% Gel)
w/ 10#/sx. Gilsonite + 0.5#/sx. cello-flakes:
2.47 cu.ft./sx. @ 11.9 PPG.
Tail Slurry: Est. 1,800' to 2,300' MD.
100 % excess over calculated volume: Est. @
340 sx. Class 'C' w/ 2% CaCl₂ + 0.25 #/sx. cellophane:
1.33 cu.ft./sx. @ 14.8 PPG.
- iv. 5-1/2" Production Casing: Single Stage:
ALL VOLUMES TO BE BASED ON CALIPER LOG VOLUMES.
Est. 105 F. @ 10.0 to 10.2 PPG mud @ 4,113'.
Est. 4,113' to 1000':
30 % excess over calculated open-hole volume: Est. @
440 sx. Super 'C' cement consisting of 70% Class 'C'
+ 17% Pozzalan + 13% Silica Flour
w/ 2#/sx. KCl + Additives.
1.33 cu.ft./sx. @ 14.2 PPG.

5. PROPOSED DRILLING FLUIDS:

The reserve pit will be constructed in two segments & will be fully lined with a minimum 12 mil thickness plastic liner to protect the surface environment and fresh water resources.

- a. 26" Conductor Hole: Surface to 40': Auger dry.
- b. 17-1/2" Surface Hole: Surface to 600': Fresh Water Spud Mud:
Additives: Gel, Lime & LCM as needed to maintain
circulation.
POSSIBLE COMPLETE LOSS OF RETURNS FROM 130' TO TOTAL DEPTH
OF SURFACE HOLE WITH DRY DRILLING AND LCM SWEEPS TO KEEP
HOLE OPEN. Est. 8.6 to 9.0 PPG @ VIS 40 to 120 sec./qt.

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5. PROPOSED DRILLING FLUIDS (Continued):

- c. 12-1/4" Intermediate Hole: Circulate fresh water in reserve pit.
600' to 2,300' MD: Native Mud: Fresh Water & Native Solids:
Additives: Possible Gel sweeps & LCM as needed to maintain
circulation and clean the hole, with field
crude oil to reduce shale sloughing/swelling.
POSSIBLE COMPLETE LOSS OF RETURNS FROM 1,300' TO TOTAL DEPTH
OF INTERMEDIATE HOLE WITH DRY DRILLING AND LCM SWEEPS TO
KEEP HOLE OPEN. Est. 8.4 to 10.5 PPG @ VIS 30 to 34 sec./qt.
- d. 7-7/8" Production Hole: Brine Mud:
2,300' to T.D.: Brine Mud @ 10.0-10.2 PPG:
Additives: Salt Gel, Starch & Polymers with Salt f/ weight
control and LCM as needed to maintain
circulation.
Est. 10.0-10.2 PPG @ VIS 38-55 sec/qt & 8-10 cc Water Loss.

6. LOGGING, TESTING, AND CORING PROGRAM:

- a. The logging program will consist of:
 - i. DLL/SFL - GR/SP (Induction Logs):
T.D. to Intermediate Casing.
GR to Surface.
 - ii. LDT/CNL - ML/PE/GR/CAL (Density/Neutron Porosity Logs):
T.D. to Intermediate Casing.
 - iii. Possible MRIL & Mechanical Rock Properties Logs to assist in
frac design.
- b. No conventional cores are planned.
- c. Drill stem tests are planned for the following formations IF
SAMPLE/GAS/OIL shows are sufficient to merit testing:
Cherry Canyon Fm.: 2329' MD to TD.
- d. 10' samples (wet) will be analyzed on-site by a geologist from
the base of the 8-5/8" Intermediate Casing @ 2,300' MD to est.
well T.D. @ 4,313' MD. The on-site geologist will assess oil and
gas shows and recommend DST points and Total Depth of the well on
the basis of his sample analysis.

7. **ABNORMAL CONDITIONS - PRESSURE - TEMPERATURE - POTENTIAL HAZARDS:**

a. 17-1/2" Surface Hole to 600':

Normal pressures (fresh water gradient or less) and temperatures (70 F. to 75 F.) are anticipated for this hole segment.

A COMPLETE LOSS OF RETURNS IS POSSIBLE FROM 130' TO T.D.

b. 12-1/4" Intermediate Hole from 600' to 2,300':

Fresh water gradient (8.34 ppg.: 0.433 psi./ft.) to brine gradient (salt water gradient @ 10.0 ppg.: 0.52 psi./ft.) pressures are anticipated.

Normal temperatures (75 F. to 95 F.) are anticipated.

No H₂S is anticipated in this hole interval.

A COMPLETE LOSS OF RETURNS IS POSSIBLE FROM 1100' TO T.D.

b. 7-7/8" Production Hole from 2,300' MD (2285' TVD) to 4113' MD TD:

i. **Well/Pressure Control Considerations:**

FORMATION TARGET:	TVD:	EST. BHP:	GRADIENT:	RATING:
	Feet:	PSIG	PSI/FT	

Delaware Fm.:

Cherry Canyon Mbr.:	3113'	1500	0.682	Abnormal
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Brushy Canyon Mbr.:	3640'	1580	0.433	Normal
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KICKS AND WELL CONTROL HAZARDS ARE COMMON IN THIS AREA:

AN ADEQUATE SUPPLY OF BRINE WATER, SALTS & SALT-WATER GEL, AND/OR BARITE WILL BE MAINTAINED ON LOCATION AT ALL TIMES, THROUGHOUT DRILLING OPERATIONS BELOW THE SURFACE CASING SHOE @ 600', TO RAISE THE MUD WEIGHT OF THE HOLE & STEEL PIT CIRCULATING SYSTEM A MINIMUM OF 2 PPG. A PVT system with a gas buster and rotating head will be installed immediately after the surface casing is set (prior to drilling out the surface casing shoe @ 600'). This equipment will permit the safe handling of minor gas volumes at the surface and the monitoring of well flow and trip volumes while the well is being drilled.

ii. **Normal temperatures (95 F. to 105 F.) are anticipated.**

iii. **H₂S (Hydrogen Sulfide) Gas Hazards:**

Potential H₂S is anticipated in the Delaware Fm. from 2,300' MD to 4113' MD TD. An H₂S Safety Plan is prepared as Exhibit #3 and will be posted at the well-site. An H₂S monitoring system will be rigged-up and functional after the Surface Casing is set at 600', and PRIOR TO DRILLING OUT OF THE SURFACE CASING SHOE. ALL RIG-SITE AND SUPERVISORY PERSONNEL WILL BE TRAINED AND CERTIFIED TO WORK IN AN H₂S ENVIRONMENT PRIOR TO ENTRY ONTO THIS JOB SITE.

8. ANTICIPATED STARTING DATE AND DURATION OF OPERATIONS:

Location construction may be commenced in April after BLM APD and BOR ROW approvals are received. After NMOCD approval of the Unorthodox Location request (with NMOCD and BLM APD approval), and as soon as a rig is available to drill this well economically, this well will be spud and drilled to a projected T.D. @ 4,313' MD or +100'. Anticipated spud date is May 15, 2000. Est. 20 drilling days. Est. 10 completion days and 15 days constructing site facilities. Est. 1st production on or after July 1, 2000.

a. The surface location of the proposed site and access road for the Avalon 1 Federal #2 wellsite is owned by the Federal Government of the United States of America. The permitted surface uses of these lands is controlled and administered by the Bureau of Reclamation with the assistance of the Bureau of Land Management. In conjunction with the Application for a Permit to Drill BFC will be seeking a Right-of-Way for the use of the drill-site, access road, and potential Pipeline Right-of-Way from the Bureau of Reclamation.

A copy of this Right-of-Way request is attached for your information. No site construction activity may commence prior to receiving AND fully executing this grant of Right-of-Way.

b. The minerals targeted by this well are oil and gas pays in the Delaware Fm. The planned pro-ration unit for the well is the 164.66 acres encompassed by Lots 33, 34, 39 & 40 in Section 1, T.21S., R.26E., Eddy County, New Mexico (Federal Lease NM 13624). The well is Unorthodox in terms of Surface Location and Bottom-Hole Location by virtue of the Rules of the New Mexico Oil Conservation Division. In conjunction with the Application for a Permit to Drill BFC will be seeking Administrative Approval of its requested directional drilling plan and Unorthodox Surface Location.

A copy of the Request for Administrative Approval of this Unorthodox Location is attached for your information. No actual drilling operations will commence until this Unorthodox Location and Drilling Plan is FULLY approved by the NMOCD.


9. DIRECTIONAL WELL PLAN SCHEMATIC AND PROFILE:

A copy of the proposed directional plan along with a wellbore profile is attached as Exhibit #4 for your information.

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CERTIFICATION:

I hereby certify that I, or persons under my direct supervision, have inspected the proposed drill site and access routes; that I am familiar with the conditions which currently exist; that the statements made in this plan are, to the best of my knowledge, true and correct; and that the work associated with operations proposed herein will be performed by Bonneville Fuels Corporation and its contractors and subcontractors in conformity with this plan and the terms & conditions under which it is approved. This statement is subject to the provisions of 18 U.S.C. 1001 for the filing of a false statement.

Date: 3/5/2000 Signature: 
Robert A. Schwering, P.E.
Operations Manager: SE New Mexico
Bonneville Fuels Corporation