D R I L L I N G P R O G N O S I S

WELL: **McELMO DOME YB #5** FIELD: McELMO DOME

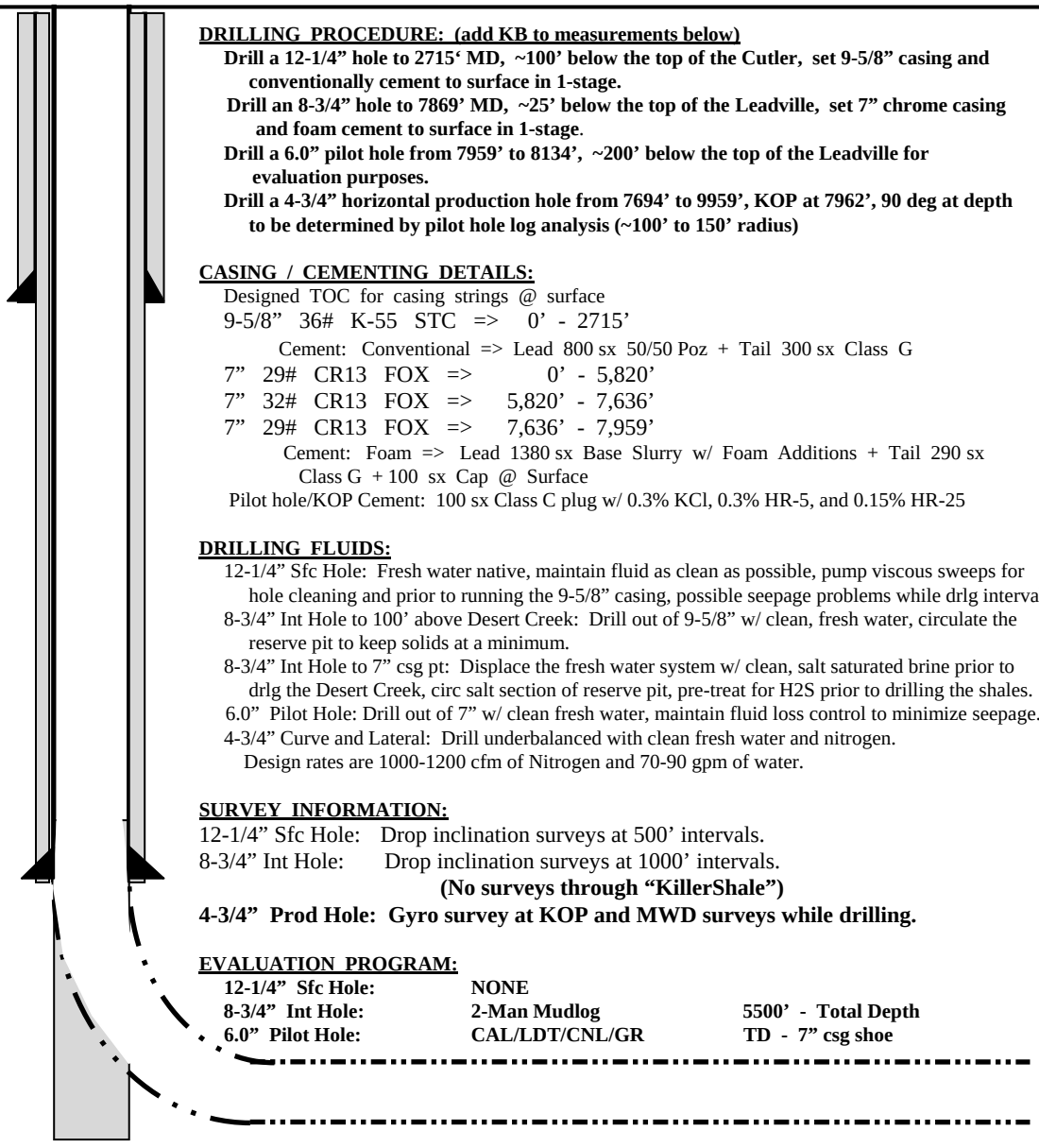
LOCATION: SHL: 1824' FSL & 258' FWL, Section 24, T37N R18W NMPM
BHL: Horizontal Well, 57' FSL & 2026' FWL, 135 deg azimuth from SHL (2500' max lateral extension)
MONTEZUMA CO, COLORADO

OBJECTIVE: LEADVILLE ELEVATION: GL =6636' EST.

A FOCUSED EFFORT WILL BE EXPECTED BY ALL PARTIES TO ELIMINATE ANY / ALL ACCIDENTS DURING THE EXECUTION OF THIS DRILLING PROJECT. H2S IS ANTICIPATED WHILE DRILLING THE KILLER SHALES.

GEOLOGY / FORMATION TOPS

FORMATION	TVD	SS
ENTRADA	1060'	+5576'
CHINLE	1890'	+4746'
SHINARUMP	2550'	+4086'
CUTLER	2615'	+4021'
9-5/8" SFC CSG	**2715'**	
U. HERMOSA	4560'	+2076'
PARADOX	5615'	+1021'
DESERT CREEK	5925'	+711'
PARADOX SALT	6020'	+616'
KILLER SHALES	**6509'**	**+127'**
BASE SALT	7436'	-800'
L.HERMOSA	7550'	-914'
MOLAS	7834'	-1198'
LEADVILLE	**7934'**	**-1298'**
7" PROD CSG	**7959'**	
BASE OF LEADVILLE		**8134'**



WELL PROGRAM

DRILLING PROCEDURE: (add KB to measurements below)

Drill a 12-1/4" hole to 2715' MD, ~100' below the top of the Cutler, set 9-5/8" casing and conventionally cement to surface in 1-stage.

Drill an 8-3/4" hole to 7869' MD, ~25' below the top of the Leadville, set 7" chrome casing and foam cement to surface in 1-stage.

Drill a 6.0" pilot hole from 7959' to 8134', ~200' below the top of the Leadville for evaluation purposes.

Drill a 4-3/4" horizontal production hole from 7694' to 9959', KOP at 7962', 90 deg at depth to be determined by pilot hole log analysis (~100' to 150' radius)

CASING / CEMENTING DETAILS:

Designed TOC for casing strings @ surface

9-5/8" 36# K-55 STC => 0' - 2715'

Cement: Conventional => Lead 800 sx 50/50 Poz + Tail 300 sx Class G

7" 29# CR13 FOX => 0' - 5,820'

7" 32# CR13 FOX => 5,820' - 7,636'

7" 29# CR13 FOX => 7,636' - 7,959'

Cement: Foam => Lead 1380 sx Base Slurry w/ Foam Additions + Tail 290 sx Class G + 100 sx Cap @ Surface

Pilot hole/KOP Cement: 100 sx Class C plug w/ 0.3% KCl, 0.3% HR-5, and 0.15% HR-25

DRILLING FLUIDS:

12-1/4" Sfc Hole: Fresh water native, maintain fluid as clean as possible, pump viscous sweeps for hole cleaning and prior to running the 9-5/8" casing, possible seepage problems while drlg interval

8-3/4" Int Hole to 100' above Desert Creek: Drill out of 9-5/8" w/ clean, fresh water, circulate the reserve pit to keep solids at a minimum.

8-3/4" Int Hole to 7" csg pt: Displace the fresh water system w/ clean, salt saturated brine prior to drlg the Desert Creek, circ salt section of reserve pit, pre-treat for H2S prior to drilling the shales.

6.0" Pilot Hole: Drill out of 7" w/ clean fresh water, maintain fluid loss control to minimize seepage.

4-3/4" Curve and Lateral: Drill underbalanced with clean fresh water and nitrogen.
Design rates are 1000-1200 cfm of Nitrogen and 70-90 gpm of water.

SURVEY INFORMATION:

12-1/4" Sfc Hole: Drop inclination surveys at 500' intervals.

8-3/4" Int Hole: Drop inclination surveys at 1000' intervals.
(No surveys through "KillerShale")

4-3/4" Prod Hole: Gyro survey at KOP and MWD surveys while drilling.

EVALUATION PROGRAM:

12-1/4" Sfc Hole:	**NONE**	
8-3/4" Int Hole:	**2-Man Mudlog**	**5500' - Total Depth**
6.0" Pilot Hole:	**CAL/LDT/CNL/GR**	**TD - 7" csg shoe**

OBJECTIVES:

1) **Focused effort by all parties to eliminate all accidents during the drilling operation**
2) **Drill, evaluate, and case the YB #5 in less than 26 days at a cost of $3,500,000 or less.**
3) **Successfully run the 7" chrome production casing / tubing to 25' inside the Leadville.**
4) **Isolate the 7" 13-Chrome to surface with a high quality cement.**
5) **Drill the 4-3/4" lateral production hole underbalanced w/ minimal fluid loss to the formation.**

D R I L L I N G P R O G N O S I S
2006 CO2 WELL DRILLING PROGRAM
WELL: YB #5

PROSPECT INFORMATION

The McElmo Dome YB #5 will be the first of three wells to be drilled during the 2006-2007 drilling program at McElmo Dome. The wellplan calls for the 9-5/8" X 7" casing program (tubingless openhole completion) that has been used successfully since being implemented in 1996. The 2006-07 three well program will be only the second "Grassroots" horizontal well program to drilled at McElmo.

WELL OBJECTIVE

The main objectives for the drilling operation on the McElmo Dome YB #5 are:

1. Maintain a focused effort by everyone on location to eliminate all accidents.
2. Drill, evaluate, case and complete (horizontal leg of 2000') the well in less than 26 days at a cost of $3,500,000.
3. Run a full string of 7" 13-Chrome production casing to 20' below the top of the Leadville formation.
4. Isolate the 7" 13-Chrome to surface with a high quality cement.
5. Drill the 4-3/4" horizontal production hole with minimal fluid loss / damage to the formation. The lateral will not be drilled under-balanced it will be drilled using managed pressure drilling techniques. The drawbacks drilling under-balanced and bringing CO2 to surface are noise, corriosion, and CO2 emissions to the environment and the sensitivity of the national monument. Therefore, under-balanced is only a contingency.

H2S POTENTIAL

H2S is expected to be circulated to the surface during the drilling of the Killer Shales located within the Paradox Salt interval located at 6168'- 7561'. The H2S contingency plan that was used in the previous programs has been updated and revised and will be in force. All the necessary precautions, drills, and training will be done to protect personnel on location. H2S monitors and safety equipment will be on location and operational prior to drilling the section and remain until rig release.

POTENTIAL PROBLEMS

The main problems for the YB #5 are the typical problems expected while drilling in the McElmo Dome are:

1. **Lost Circulation in the 12-1/4" Surface Hole:** Lost circulation can be expected at any depth while drilling the surface hole. Maintain a clean fresh water system, circulating the reserve pit, while drilling this hole section. Pump LCM pills as required to control the losses. No losses in surface hole were encountered on offsets.

2. **Gas Kick from the Desert Creek @ 5845':** Gas kicks have been encountered while drilling the Desert Creek formation. A planned mud weight schedule will be utilized to help minimize the chance of kicks in this section.

3. **Gas and H2S from the Killer Shales:** Geopressured shales from the P4 on down will contain varying amounts of gas and associated H2S. Circulate the salt water portion of the reserve pit to remove excess gas. Pre-treat the mud using Baroid H2S scavenger for H2S contamination.

4. **Stuck Pipe in the Killer Shales:** The Killer Shale is a high pressure, low volume shale which "flows" into the well causing stuck pipe. An attached list of recommendations for drilling the Killer Shale, titled "Paradox Salt Drilling Procedure", is located in the mud section of this program. The recommendations have proven to be very successful in recent drilling programs and are strongly recommended they be followed. Educate the drillers prior to drilling the killer shale and discuss in detail the procedure for drilling the shale.

5. **Lost Circulation in the Lower Hermosa:** Lost circulation problems have been encountered during the production casing cement job in the Lower Hermosa. The fracture gradient is estimated at 12 ppg. The problem has been successfully eliminated with single stage foam cementing.

6. **Pilot Hole Cementing Pipe:** The pilot hole cement plug should not be over 100 sks. If the first plug does not fill into the casing, spot a second plug which does not exceed 50 sks. Over-displacement is reservoir-dependent.

GENERAL DRILLING PROCEDURE

14" conductor pipe will be set at ~80' prior to moving in the drilling rig. It is necessary to rig up a 13-3/8" 3M annular preventer with diverter to drill the surface hole.

A 12-1/4" hole will be drilled from surface to _____', located approximately 100' below the top of the Cutler. A full string of 9-5/8" surface casing will be run to 3225' with cement circulated to surface. The 9-5/8" surface casing will protect the groundwater in the area and isolate the Shinarump formation. After the casing is run and cemented, screw on the 9-5/8" X 11" 3M casing head housing and nipple-up the 11" 5M BOP. Wait on cement 12 hours and pressure test the casing to 1500 psi and the BOP's to their rating prior to drilling out.

An 8-3/4" hole will be drilled out from the surface casing point to the 7" production casing point at 7694', located 25' into the Leadville formation. The casing point will be picked by the mud-logger. No wireline logs will be run at casing point. A full string of 7" 13-Chrome casing will be run and set 25' into the Leadville. The 7" casing will be cemented back to surface in one stage with foam cement.

A 6.0" pilot hole will be drilled out from the 7" production casing to 200' below the Leadville. The pilot hole will be logged from TD to the 7" casing shoe. The pilot hole will be cemented and KOP dressed off 3' below the casing shoe.

A 6.0" horizontal hole will be drilled out from the KOP to TD. The build rate and target elevation of the lateral will be determined from pilot log analysis, usually ~100 to 150 ft below the top of the Leadville. A string of 2-7/8" drill pipe will be picked up and the 4-3/4" hole will be drilled with clean fresh water and nitrogen.

SURVEY DETAIL

Normal well deviation is not a concern. Inclination surveys should be taken at 500' intervals from spud to the 9-5/8" casing point and at ~1000' intervals from below the 9-5/8" casing point to the top of the Paradox Salt. Do not drop surveys while drilling below the Paradox Salt. Surveys can be taken inside the 2-7/8" drillstring after the 7" casing is run. A gyro survey will be run at KOP and MWD surveys will be taken while drilling the horizontal section.

BHA INFORMATION

CASING DETAIL			CASING RATING / DESIGN FACTORS		
SIZE	**INTERVAL**	**DESCRIPTION**	**COLLAPSE**	**BURST**	**TENSION**
9-5/8"	**0' -3225'**	**36# K-55 STC**	**2020 / 1.6**	**3520 / 1.8**	**423 / 4.9**
7"	**0' - 5771'**	**29# CR13 FOX**	**7020 / 2.3**	**8160 / 2.9**	**676 / 7.3**
7"	**5771' - 7451'**	**32# CR13 FOX**	**8600 / 1.2**	**9060 / 3.1**	**692 / 10**
7"	**7451' - 7694'**	**29# CR13 FOX**	**7020 / 1.8**	**8160 / 2.4**	**676 / 10**

All of the 32# CR13 casing will be coated with Rytwrap (ICO in Odessa) prior to arriving on location.

DESIGN ASSUMPTIONS:

9-5/8" Surface	Tension:	Buoyed weight in 8.4 ppg fresh water, DF = 1.6
	Collapse:	Full evacuation w/ 9.0 ppg on outside, DF = 1.0
	Burst:	2000 psi shut in pressure at the surface, DF = 1.33
7" Production	Tension:	Buoyed weight in 10.0 ppg brine
	Collapse:	Full evacuation in 10.0 ppg brine for 29#, 1.0 psi/ft for 32#
	Burst:	2500 psi shut in pressure at the surface with 10.0 ppg inside and 9.0 ppg outside

PRODUCTION CASING HANDLING, RUNNING AND MAKEUP

The well integrity is dependent on the casing being handled and run correctly. 7” 13CR requires special handling and is to be handled and run according to the procedures specified in the attachment to this prognosis. A copy of the FOX Thread Technical Specifications for the 29# and 32# are also attached.

CEMENTING PROCEDURE (see attached program for details)

9-5/8" SURFACE CASING => 1-stage

Use API 8-3/4" drift on location

Shoe Type:	Regular Guide Shoe
Collar Type:	Regular Float collar, 40' above shoe
Centralizers:	18 required => Place centralizers on shoe joint, and every 4th joint to surface
Flag Joints:	None Required
Other Equipment:	Stop clamp, thread lock the bottom 2 joints of casing + all float equipment, top and bottom plugs
Reciprocate:	Not required, limit of 264,000 lbs based on 36# K-55 STC w/ a 1.6 SF
Preflush:	50 bbls => Fresh water @ 10 bbls / min
Lead CMT Slurry:	800 sks => Light Premium + 2% CaCl2 + 1/4 pps Flocele + .2% Versaset
Specifications:	11.9 ppg / 2.14 ft3 / sk / 12.07 gal / sk
Tail CMT Slurry:	300 sks => Premium Cement + 1% CaCl2 + 1/4 pps Flocele
Specifications:	15.6 ppg / 1.19 ft3 / sk / 5.22 gal / sk
Displacement:	~217 bbls => Fresh Water @ 8 - 10 bbls / min
Volume Based:	All volumes listed are estimates only, for calculations use 12-1/4" X 9-5/8" annulus + 100% excess + shoe joints + ~100 sks circulated @ surface, attempt to circulate cement to surface, excess volume is based on experience.
Pressure Limits:	2000 psi while pumping or bumping plug due to collapse rating of the 9-5/8" 36# K-55 STC w/ a 1.0 SF
Test Required:	Lab test w/ field water, want a 2 hr minimum @ 105° BHST
Temperature Survey:	Required if cement does not circulate at surface, call Barry Portman @ (713) 369-9208 for details
Wellhead:	Install section "A" assembly
Special Note:	1. Report the volume of cement circulated to the surface. 2. WOC for a minimum of 12 hours prior to drilling out. 3. NU 3M - 11 - BOP and test to rating. 4. Test the casing to 1500 psi. 5. Cement Co. => Send copy of pressure charts, job log and summary to: Kinder Morgan, Attn: Barry Portman, 500 Dallas, Suite 1000, Houston, TX 77002.

CEMENTING PROCEDURE (see cementing program for details)

7" PRODUCTION CASING => Single stage foam

Shoe Type:	Differential Fill Float Shoe
Collar Type:	Differential Fill Float Collar, 80' above shoe
Centralizers:	65 required => 10' above shoe and every other joint
Flag Joints:	Cross overs from 29# to 32# will serve as flag joints
Other Equipment:	Thread lock the bottom 3 joints of casing + all float equipment.
Reciprocate:	If required, limit @ 100,000 lbs
Preflush:	20 bbls => Fresh water @ 10 bbls / min 30 bbls => Mud flush 20 bbls => Fresh water
Lead Slurry:	1380 sks => See recommendation
Specifications:	13.0 ppg / 1.47 ft3 / sk / 6.89 gal / sk
Tail Slurry:	290 sks => See recommendation
Specifications:	13.5 ppg / 1.32 ft3 / sk / 5.94 gal / sk
Cement Cap Slurry:	100 sks => See recommendation
Specifications:	15.0 ppg / 1.30 ft3 / sk / 6.04 gal / sk
Displacement:	~295 bbls freshwater @ 8 - 10 bbls / min
Volume Based:	Use 13" hole diameter to calculate cement volume
Test Required:	Lab test w/ field water, 3.25 hr minimum @ 200° BHST Lab test w/ field water, 3.50 hr minimum @ 170° BHST
Temperature Survey:	Possible survey if severe lost circulation occurs
Wellhead:	Install section "B" assembly
Special Note:	1. Circulate 3 annular volumes prior to cementing @ maximum rate possible. 2. Displace cement at the maximum rate possible. 3. Report volumes of cement circulated. 4. Report any circulation problems on the morning report. 5. Cement Co. => Send copy of pressure charts, job log and summary to: Kinder Morgan, Attn: Barry Portman, 500 Dallas, Suite 1000, Houston, TX 77002.

MUD PROGRAM (see Baroid Mud program for details)

The "standard" mud program and procedures used during the previous drilling programs at McElmo Dome will be employed during the drilling operation on the YB #5.

Surface - 3225' (9-5/8" Casing Point):

Hole Size:	12-1/4"
Mud Type:	Fresh water

Spud the 12-1/4" surface hole with fresh water and circulate the fresh water section of the reserve pit. Maintain the fluid as clean as possible to help prevent lost circulation. Use paper to control any seepage and pump LCM sweeps if lost circulation becomes a problem. Pump viscous sweeps if tight connections are encountered and prior to running the 9-5/8" casing.

2881' - 5800' (100' above the Desert Creek):

Hole Size: 8-3/4"
Mud Type: Fresh water
Problems: Seepage, hole cleaning

Drill out of the 9-5/8" casing with clean fresh water. Circulate the reserve pit to keep solids to a minimum. Sweep the hole as required for hole cleaning and / or lost circulation problems. Use paper to control any seepage problems.

5800' - 7694' (25' into the Leadville / 7" Casing Point) and Pilot Hole (7694 - 7869):

Hole Size: 8-3/4"
Mud Type: Salt saturated brine
pH: 11+, as required to control H2S
Problems: H2S, killer Shale gas influx, hole cleaning

Displace the fresh water system with salt saturated brine 100' above the Desert Creek formation. Circulate through the salt water section of the reserve pit to maintain a clean fluid and to assist in breaking out any entrained gas. Pretreat mud for H2S prior to drilling the P4 Shale.

Follow the attached guidelines for drilling the Killer Shale, titled "Paradox Salt Drilling Procedure", which is located at the back of this prognosis. The recommendations have proven to be very successful in recent drilling programs.

EVALUATION PROGRAM

Call out Mud Logger at 5500' MD.

MUDLOG: 2-man mudlogging unit w/ FID 5500' => TD

Approval: _____

OFFSET INFORMATION

The following wells are recent offsets from previous programs.

YA#5
HF#3
MC#8

SAND CANYON #9 Spud 5/31/96 – Rig release 6/25/96

9-5/8 set at 2955' – 730sks lead and 290sks tail – circulated 100sks – bumped plug 1100psi
Bit trip @ 5797' – loggers had 74ppm H2S – monitors showed nothing
6375' sloughing shale – had to control drill
6615' couldn't make connection due to sloughing shale – 100ppm H2S
Top of Leadville @ 7694'
Run casing – wash 5' to bottom

HA #3 Spud 7/1/96 – Rig release 7/23/96

9-5/8 set at 2875 – 800sks lead and 300sks tail – circulated 150sks – bumped plug with 1400psi
Plugged bit @ 199' – plugged with 4 pieces of gravel
1000' – 1100' – Hole started seeping – mix LCM and haul water
At TD – short trip to collars – had to wash 60' to bottom
5774' – Bit trip – LD shock sub – PU jars
7026' – Short trip – POOH to 6000' – Hit bridge GIH @ 6660' – LD DP and wash to bottom – Circ BU (60ppm H2S – mudlogger)
Top Leadville @ 8222' – Short trip – 15' of hard fill – circ and condition hole – several bridges on short trip
Run casing – wash 15' to bottom

HA #2 Spud 7/27/96 – Rig release 8/17/96

9-5/8 set at 2872' - 800sks lead and 300sks tail – circulated 150sks – bumped plug with 1325psi
Surface hole taking 1-2bpm – 3 trucks hauling to reserve – healed up at ~2700'
5200' – Hole seeping – make bit trip
6678' – Shale #5 - sticky hole – hit jars 3 times to get loose
6817' – Shale #7 – 10ppm H2S
7916' – Heavy salt deposits on DP
Top of Leadville @ 8205' – 20 stand short trip – 240' fill – pump sweep – spot 90bbl pill on bottom
Well kicking gas while LDDP
Run casing – circ BU – 80ppm H2S

YF #2 Spud 8/22/96 – Rig release 9/21/96

9-5/8 set at 2965' - 800sks lead and 300sks tail
Lost returns @ 190' – Pump LCM pill
1011' – Trip for bit
Survey @ 1531' – lost 70bbls while surveying – circ while building volume
Tight spot @ 2378' – Hole still seeping – mixing 4sks LCM/hr
Pump sweep and spot pill on bottom at TD
5800' – Bit trip – LD shock sub – PU jars – Switch to brine
6060' – Mix H2S Scavenger
6772' - Trace of H2S in Shale #7
7087' – 20ppm H2S – added scavenger
7618'-7621' – 5-10ppm H2S
7896' – Bit trip – had to wash salt off pipe – several salt bridges in casing – wash and ream 200' to bottom
TD @ 8262' – circ 100bbl sweep – short trip – tight in first 10 stands @8080' – spot 100bbl pill on bottom
Run 7" casing – circ at 2100' – wash 3jts to bottom – fill and bridge

YE #2 Spud 9/25/96 – Rig release 10/16/96

9-5/8 set at 2965' – 800sks lead and 300sks tail
Lost returns at 1016'-1022' (approx 500bbls) – hole is constantly seeping fluid
1768' – Trip for bit
Short trip – SLM – 4' of fill – hole took 85bbls fluid on trip
Pump 2 – 100bbl LCM sweeps
POOH – LD 15jts DP and DC's
5690' – clean pits – displace w/ brine
5986' – Bit trip – LD shock sub – PU jars
6668' – Shale #5 sloughing – tight hole
6723' – H2S alarms – 170ppm
7475' – H2S alarms – 30ppm on monitor – 0ppm with Draeger tube
Short trip at TD – Salt build up on pipe – Pump 100bll sweep – spot 100bbl pill on bottom
7990' TD
Run casing – 100ppm H2S on BU

YA #4 Spud 4/29/01 – Rig release 5/24/01

9-5/8 set at 2869' – 800sks lead and 300sks tail
Lost partial returns at 1551'-1925' (approx 50-60 bbl/hr) – hole is constantly seeping fluid
Cement fell back to 80' – Pump 50 sk top job
Drill out with a straight hole motor to 5000'
5542' – clean pits – displace w/ brine
6016' – Install rotating head rubber
6528' – H2S alarms – 40-60 ppm – pipe stuck – parted pin on bit sub – attempt to fish – fishing attempts were unsuccessful – plug back and sidetrack @ 6252'
7351' – 15 stand short trip – wash and ream 100' to bottom
7895' – 20 stand short trip – tight at 7300' – wash and ream bridge – circulate BU – 156ppm H2S
7895' TD – Top of Leadville at 7875'

Run casing – No H2S on cement job – No cement to surface – good returns the entire job

YB #4 Spud 5/28/01 – Rig release 6/15/01

9-5/8 set at 2858' – 800sks lead and 300sks tail
Slight seepage (approx 20bbl/hr) constantly
Good returns – 100 bbl cement to surface – cement fell back 38' – Pump 75sk top job
Drill out with straight hole motor to 5896'
5896' – clean pits – displace w/ brine
6628' – 17 stand short trip
7153' – 20 stand short trip
7920' TD – Top of Leadville at 7898'
Run casing – 100ppm H2S on BU

TELEPHONE NUMBERS		**OFFICE #**	**CELL #**	**HOME #**
Houston Operations	Barry Portman	(713) 369-9128	(832) 588-2667	(281) 256-8264
Drilling Engineer Houston	Kelly McClure	(173)-369-8488	(713)-702-9803 Alt (281)-732-6007	
Drilling Director	Doug Frederick	(713)-369-	(281)-421-2333	
Reservoir Engineer	Jim Skurner	(713) 369-8722	(713) 254-2378	(713) 974-2038
Cement Float equipment	Halliburton	(505) 324-3500		
Mud	Baroid (Brian Nordquist) Leonard Morales		(713)-471-9594 (505)-486-3387	
Mudlog	Andy Choquette		505-793-5334	
Straight Hole Motors	Smith Services			
Casing Running Services	Weatherford			

Attachments:

1. Paradox Salt Drilling Procedure
2. FOX Thread Specifications
3. 13CR Handling Instructions
4. H2S Contingency Plan
5. BOP and Choke Manifold Diagram
6. Surface Use Program

ATTACHMENT #1

PARADOX SALT DRILLING PROCEDURE

ATTACHMENT #2

FOX THREAD SPECIFICATIONS

ATTACHMENT #3

13CR HANDLING INSTRUCTIONS

ATTACHMENT #4

H2S CONTINGENCY PLAN

ATTACHMENT #5

BOP AND CHOKE MANIFOLD DIAGRAM