

**CONFIDENTIAL**

SEP 27 1993

Release Date \_\_\_\_\_

SUNCOR MELANGE #32-23  
SW NE 23-2N-1W, MARICOPA CO. 877



## WELL COMPLETION OR RECOMPLETION REPORT AND WELL LOG

DESIGNATE TYPE OF COMPLETION:

New Well  Work-Over  Deepen  Plug Back  Same Reservoir  Different Reservoir  Oil  Gas  Dry

### DESCRIPTION OF WELL AND LEASE

Operator <b>ARROWHEAD OIL &amp; GAS LTD.</b>		Address <b>475 17TH ST., STE. 820, DENVER, CO 80202</b>			
Federal, State or Indian Lease Number or name of lessor if free lease <b>SUNCOR - MELANGE</b>		Well Number <b>32-23</b>	Field & Reservoir <b>WILDCAT</b>		
Location <b>1962' FNL - 1954' FEL</b>		County <b>MARICOPA</b>			
Sec. TWP-Range or Block & Survey <b>SEC. 23-T2N-R1W</b>					
Date spudded <b>9/1/92</b>	Date total depth reached <b>9/24/92</b>	Date completed, ready to produce <b>N/A</b>	Elevation (DF, RKB, RT or Gr.) <b>RKB1048</b> feet	Elevation of casing hd. flange <b>1032</b> feet	
Total depth <b>6650</b>	P.B.T.D. <b>N/A</b>	Single, dual or triple completion? <b>DRY</b>		If this is a dual or triple completion, furnish separate report for each completion.	
Producing interval (s) for this completion <b>N/A</b>		Rotary tools used (interval) <b>SURFACE TO 6650</b>		Cable tools used (interval)	
Was this well directionally drilled? <b>NO</b>	Was directional survey made? <b>NO</b>	Was copy of directional survey filed? <b>NO</b>		Date filed	
Type of electrical or other logs run (check logs filed with the commission) <b>DLL, BHC SONIC, CNL/GR (ALL TO BE FILED DIRECTLY BY SCHLUMBERGER)</b>					Date filed

### CASING RECORD

Casing (report all strings set in well - conductor, surface, intermediate, producing, etc.)

Purpose	Size hole drilled	Size casing set	Weight (lb./ft.)	Depth set	Sacks cement	Amt. pulled
<b>SURFACE</b>	<b>13 1/2</b>	<b>9 5/8</b>	<b>36</b>	<b>2493</b>	<b>625</b>	<b>NONE</b>

### TUBING RECORD

### LINER RECORD

Size	Depth set	Packer set at	Size	Top	Bottom	Sacks cement	Screen (ft)
in.	ft.	ft.	in.	ft.	ft.		
<b>N/A</b>							

### PERFORATION RECORD

### ACID, SHOT, FRACTURE, CEMENT SQUEEZE RECORD

Number per ft.	Size & type	Depth Interval	Am't. & kind of material used	Depth Interval

### INITIAL PRODUCTION

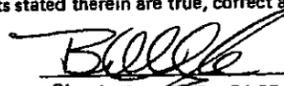
Date of first production <b>DRY</b>		Producing method (indicate if flowing, gas lift or pumping—if pumping, show size & type of pump:)				
Date of test	Hrs. tested	Choke size	Oil prod. during test bbls.	Gas prod. during test MCF	Water prod. during test bbls.	Oil gravity *API (Corr)
Tubing pressure	Casing pressure	Cal'ed rate of Production per 24 hrs.	Oil bbls.	Gas MCF	Water bbls.	Gas-oil ratio

Disposition of gas (state whether vented, used for fuel or sold):

CERTIFICATE: I, the undersigned, under the penalty of perjury, state that I am the CONSULTANT of the ARROWHEAD OIL & GAS LTD. (company), and that I am authorized by said company to make this report; and that this report was prepared under my supervision and direction and that the facts stated therein are true, correct and complete to the best of my knowledge.

11/05/92

Date

  
Signature **BILL CAGLE, CONSULTANT**

NOTE: WELL WAS PLUGGED AND ABANDONED, PRODUCTION CASING WAS NEVER RUN, NO ZONES WERE TESTED.

Permit No. **877**

**STATE OF ARIZONA**  
**OIL & GAS CONSERVATION COMMISSION**  
Well Completion or Recompletion Report and Well Log  
Form No. 4 File One Copy

**DETAIL OF FORMATIONS PENETRATED**

FORMATION	TOP	BOTTOM	DESCRIPTION*
LUKE SALT (MIOCENE)	2620	6650	

\* Show all important zones of porosity, detail of all cores, and all drill-stem tests, including depth interval tested, cushion used, time tool open, flowing and shut-in pressures, and recoveries.

**INSTRUCTIONS:**

Attach drillers log or other acceptable log of well.

This Well Completion or Recompletion report and well log shall be filed with the State of Arizona Oil & Gas Conservation Commission not later than thirty days after project completion.

Form No. 4

**PLUGGING RECORD**

Operator <b>ARROWHEAD OIL &amp; GAS LTD.</b>		Address <b>475 17TH ST., STE. 820, DENVER, CO 80202</b>	
Federal, State, or Indian Lease Number or lessor's name if fee lease. <b>SUNCOR-MELANGE</b>		Well No. <b>32-23</b>	Field & Reservoir <b>WILDCAT</b>
Location of Well <b>1962' FNL, 1954' FEL, SEC. 23-T2N-RLW</b>			Sec-Twp-Rge or Block & Survey <b>MARICOPA</b>
Application to drill this well was filed in name of <b>ARROWHEAD RESOURCES (USA) LTD</b>	Has this well ever produced oil or gas <b>NO</b>	Character of well at completion (initial production): Oil (bbls/day) _____ Gas (MCF/day) _____ Dry? <b>X</b>	
Date plugged: <b>9/27/92</b>	Total depth <b>6650'</b>	Amount well producing when plugged: Oil (bbls/day) _____ Gas (MCF/day) _____ Water (bbls/day) _____	
Name of each formation containing oil or gas. Indicate which formation open to wellbore at time of plugging	Fluid content of each formation	Depth interval of each formation	Size, kind & depth of plugs used. Indicate zones squeeze cemented, giving amount cement
<b>LUKE SALT</b>	<b>NONE</b>	<b>2620 - 6650</b>	<b>SEE REVERSE SIDE</b>

**CASING RECORD**

Size pipe	Put in well (ft.)	Pulled out (ft.)	Left in well (ft.)	Give depth and method of parting casing (shot, ripped, etc.)	Packers and shoes
<b>16"</b>	<b>66</b>	<b>0</b>	<b>66</b>		
<b>9 5/8</b>	<b>2493'</b>	<b>0</b>	<b>2493'</b>	<b>N/A</b>	<b>N/A</b>

Was well filled with heavy drilling mud, according to regulations? <b>YES</b>	Indicate deepest formation containing fresh water. <b>UNKNOWN - BEHIND SURFACE PIPE</b>
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**NAMES AND ADDRESSES OF ADJACENT LEASE OPERATORS OR OWNERS OF THE SURFACE**

Name	Address	Direction from this well:

In addition to other information required on this form, if this well was plugged back for use as a fresh water well, give all pertinent details of plugging operations to base of fresh water sand, perforated interval to fresh water sand, name and address of surface owner, and attach letter from surface owner authorizing completion of this well as a water well and agreeing to assume full liability for any subsequent plugging which might be required.

**N/A**

Use reverse side for additional detail.

CERTIFICATE: I, the undersigned, under the penalty of perjury, state that I am the CONSULTANT of the ARROWHEAD OIL & GAS LTD. (company) and that I am authorized by said company to make this report; and that this report was prepared under my supervision and direction and that the facts stated therein are true, correct and complete to the best of my knowledge.

10-13-92  
Date

*[Signature]*  
Signature



Permit No. **877**

Form No. 10

**STATE OF ARIZONA  
OIL & GAS CONSERVATION COMMISSION  
Plugging Record  
File One Copy**

PLUGS AS SET AND WITNESSED BY STEVE RAUZI:

PLUG #1: 5400' - 5200', 200', 83 ft<sup>3</sup>, 72 SX  
PLUG #2: 4550' - 4450', 100', 42 ft<sup>3</sup>, 37 SX  
PLUG #3: 3400' - 3000', 400', 167 ft<sup>3</sup>, 145 SX  
PLUG #4: 2650' - 2400', 250', 106 ft<sup>3</sup>, 92 SX  
PLUG #5: 1250' - 1100', 150', 65 ft<sup>3</sup>, 57 SX  
PLUG #6: 100' - 50', 50', 22 ft<sup>3</sup>, 19 SX

TOTAL CEMENT 485 ft<sup>3</sup> - 422 SX  
SEE ATTACHED PLUGGING PROGNOSIS FOR ADDITIONAL INFORMATION.

APPLICATION TO PLUG AND ABANDON

FIELD WILDCAT  
 OPERATOR ARROWHEAD OIL & GAS LTD. ADDRESS 475 17TH ST., STE. 820, DENVER, CO 80202  
 Federal, State or Indian Lease Number or Lessor's Name if Fee Lease SUNCOR-MELANGE WELL NO. 32-23  
 LOCATION 1962 FNL, 1954 FEL, SEC. 23-T2N-R1W  
MARICOPA COUNTY, ARIZONA  
 TYPE OF WELL DRY HOLE TOTAL DEPTH 6650  
(Oil, Gas or Dry Hole)  
 ALLOWABLE (If Assigned) N/A  
 LAST PRODUCTION TEST OIL \_\_\_\_\_ (Bbls.) WATER \_\_\_\_\_ (Bbls.)  
 GAS \_\_\_\_\_ (MCF) DATE OF TEST \_\_\_\_\_  
 PRODUCING HORIZON N/A PRODUCING FROM \_\_\_\_\_ TO \_\_\_\_\_

1. COMPLETE CASING RECORD.

16" CONDUCTOR SET @ 66' KB  
 9 5/8, 36#, K55, ST&C SET @ 2493' KB, CEMENTED TO SURFACE.



2. FULL DETAILS OF PROPOSED PLAN OF WORK.

WELL WILL BE PLUGGED WITH OPEN-ENDED DRILL PIPE AS FOLLOWS:

- PLUG #1: 5400' - 5200', 200', 83 ft.<sup>3</sup>, 72 SX
- PLUG #2: 4550' - 4450', 100', 42 ft.<sup>3</sup>, 37 SX
- PLUG #3: 3400' - 3000', 400', 167 ft.<sup>3</sup>, 145 SX
- PLUG #4: 2650' - 2400', 250', 106 ft.<sup>3</sup>, 92 SX
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- PLUG #6: 100' - 50', 50', 22 ft.<sup>3</sup>, 19 SX

TOTAL CEMENT 485 ft<sup>3</sup> - 422 SX

DATE COMMENCING OPERATIONS 9/26/92 - VERBAL APPROVAL OBTAINED 9/25/92 @ 8:30 PM  
 FROM STEVE RAUZI  
 NAME OF PERSON DOING WORK GREG ETHRIDGE ADDRESS N/A

Bill [Signature]  
 Signature  
 CONSULTANT  
 Title  
410 17TH ST., STE. 2420, DENVER, CO 80202  
 Address  
10/12/92  
 Date

Date Approved 10-15-92  
 STATE OF ARIZONA  
 OIL & GAS CONSERVATION COMMISSION  
 By: Sh. Rauzi

STATE OF ARIZONA  
 OIL & GAS CONSERVATION COMMISSION  
 Application to Plug and Abandon  
 File Two Copies  
 Form No. 9

Permit No. 877

**SUNDRY NOTICES AND REPORTS ON WELLS**

1. Name of Operator Arrowhead Resources (USA) Ltd.

2. OIL WELL  GAS WELL  OTHER  (Specify) \_\_\_\_\_

3. Well Name Suncor - Melange #32-23

Location 1961.97 Feet FNL and 1953.94 Feet FEL

Sec. 23 Twp. 2N Rge. 1W County Maricopa Arizona.

4. Federal, State or Indian Lease Number, or lease's name if fee lease \_\_\_\_\_

5. Field or Pool Name Wildcat

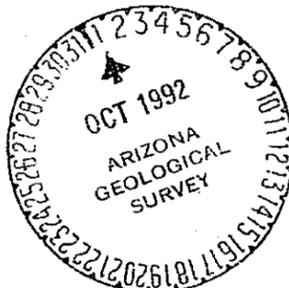
6. Check appropriate box to indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:		SUBSEQUENT REPORT OF:	
TEST WATER SHUT-OFF <input type="checkbox"/>	PULL OR ALTER CASING <input type="checkbox"/>	WATER SHUT-OFF <input type="checkbox"/>	MONTHLY PROGRESS <input type="checkbox"/>
FRACTURE TREAT <input type="checkbox"/>	DIRECTIONAL DRILL <input type="checkbox"/>	FRACTURE TREATMENT <input type="checkbox"/>	REPAIRING WELL <input type="checkbox"/>
SHOOT OR ACIDIZE <input type="checkbox"/>	PERFORATE CASING <input type="checkbox"/>	SHOOTING OR ACIDIZING <input type="checkbox"/>	ALTERING CASING <input type="checkbox"/>
REPAIR WELL <input type="checkbox"/>	CHANGE PLANS <input type="checkbox"/>		ABANDONMENT <input type="checkbox"/>
(OTHER) _____		(OTHER) <u>Weekly Progress Update</u>	<input checked="" type="checkbox"/>

(NOTE: Report results of multiple completion on Well Completion or Recommendation Report and Log form.)

7. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent data, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)

Weekly Update of wellsite activity, as requested by the APD is attached for the period 9/22 - 9/28/92.



8. I hereby certify that the foregoing is true and correct.

Signed [Signature] Title Consultant Date 9/28/92

Permit No. 00877

STATE OF ARIZONA  
OIL & GAS CONSERVATION COMMISSION  
Sundry Notices and Reports On Wells  
File-One Copy

Form No. 25

ARROWHEAD RESOURCES (USA) LTD.

DAILY DRILLING REPORT

SUNCOR - MELANGE #32-23  
SWNE SEC 23 T2N R1W  
MARICOPA COUNTY, ARIZONA



- 9/22/92: Drilling 8 3/4" hole at 5408' with 10.1 ppg salt mud.
- 9/23/92: Drilling 8 3/4" hole at 5856' with 10.2 ppg salt mud.
- 9/24/92: Drilling 8 3/4" hole at 6339' with 10.2 ppg salt mud.
- 9/25/92: Drilling 8 3/4" hole at 6650' with 10.2 ppg salt mud.  
Reached TD of 6650' 12:30 AM 9/24/92, condition hole TOH for logs.
- 9/26/92: Run DLL/CNL/GR and BHC sonic logs, loggers TD 6650',  
clean location, wait on Halliburton to pump cement.
- 9/27/92: GIH open ended with drill pipe, set cement plugs as  
follows:
- |         |               |        |
|---------|---------------|--------|
| Plug #1 | 5200' - 5400' | 72 SX  |
| Plug #2 | 4450' - 4550' | 37 SX  |
| Plug #3 | 3000' - 3400' | 145 SX |
| Plug #4 | 2400 - 2650'  | 92 SX  |
- Tag Plug #4 with drill pipe. Did not tag.
- 9/28/92: Reverse out Plug #4 to pit, re-pump Plug #4 and  
additional plugs as follows:
- |         |               |                |
|---------|---------------|----------------|
| Plug #4 | 2400' - 2650' | 92 SX (Replug) |
| Plug #5 | 1250' - 1100' | 57 SX          |
| Plug #6 | 100' - 50'    | 19 SX          |

Total cement used 422 SX, clean rig, cut off casing head and cut  
off 9 5/8" 4 1/2' below GL and install dry hole marker plate.

Note: FINAL REPORT. A separate sundry will be filed detailing the  
PXA operation. Your office will be notified once location is ready  
for inspection.

**MEMORANDUM TO FILE**

**DATE:** SEPTEMBER 28, 1992

**FROM:** STEVEN L. RAUZI *SLR*  
OIL AND GAS PROGRAM ADMINISTRATOR

**SUBJECT:** PLUG AND ABANDONMENT  
SUNCOR-MELANGE #32-23 WELL, STATE PERMIT #877

ARRIVED AT WELLSITE AT 8:30 P.M. REVIEWED AND APPROVED GREG ETHERIDGE'S PLUGGING PROGNOSIS DATED 9/25/92. PLAN CALLS FOR SIX CEMENT PLUGS: THREE IN THE SALT SECTION ACROSS SILT ZONES, A 250-FOOT PLUG ACROSS THE SHOE OF THE 9 5/8 INCH CASING (TO BE TAGGED), A PLUG ACROSS THE STAGE TOOL, AND A FIFTY-FOOT PLUG AT THE SURFACE.

RIG UP HALIBURTON 9/26/92 AND SET PLUGS 1 THROUGH 4 PER PLUGGING PROGNOSIS. PLUG 4 (ACROSS SHOE) IN PLACE AT NOON. WOC 8 HOURS, RIH NO TAG; WOC 4 HOURS, RIH NO TAG; WOC 6 HOURS, RIH NO TAG; REVERSE OUT PLUG 4 (IN PLACE BUT GREEN DUE TO SALT-SATURATED SLURRY). RESET PLUG 4 AND SET PLUGS 5 AND 6 ON 9/27/92. SURFACE PLUG IS FROM 90' UP TO SURFACE.

**MEMORANDUM TO FILE**

**DATE:** SEPTEMBER 28, 1992

**FROM:** STEVEN L. RAUZI *SLR*  
OIL AND GAS PROGRAM ADMINISTRATOR

**SUBJECT:** PLUG AND ABANDONMENT  
SUNCOR-MELANGE #32-23 WELL, STATE PERMIT #877

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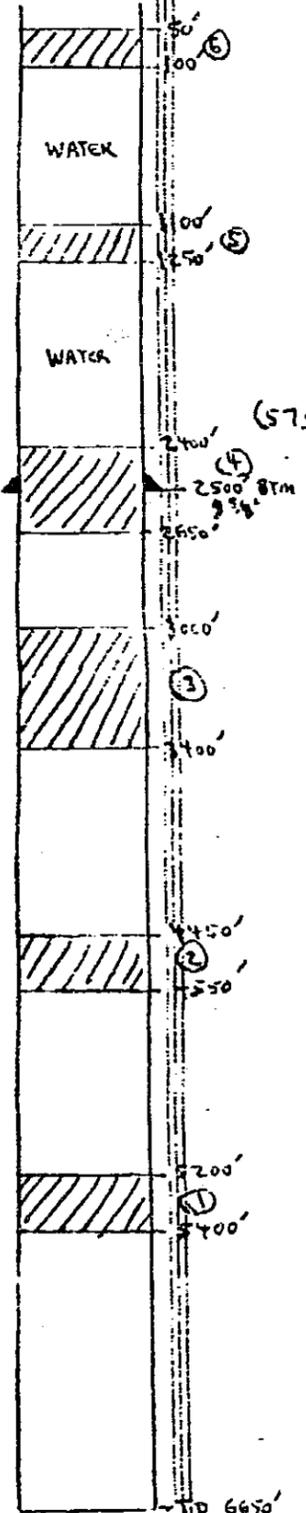
SEP-25-92 FRI 6:08

P. 81

9/25/92 (HWS)

ARROWHEAD OIL & GAS, L.T.D.  
 SUN COX - MELANGE # 32-23  
 SW/4 NE/4 SEC. 23 - T2N-R1W  
 MARICOPA COUNTY, ARIZONA

PLUGGING PROGNOSIS



JOINTS DP TO BTM.	PLUG NO.	INTERVAL	FEET	CENTENT		(FT <sup>3</sup> ) DISPLACEMENT
				FT <sup>3</sup>	SK	
(57 STDS. + 1)	172	① 5400' - 5200'	200'	83	72	395
		(PULL 9 STANDS)				
145 JTS.	②	4550' - 4450'	100'	42	37	335
		(PULL 12 STDS. + 1)				
108 JTS.	③	3400' - 3000'	400'	167	145	220
		(PULL 8 STANDS)				
84 JTS.	④	2650' - 2400'	250'	106	92	175
		(PULL 14 STANDS + 2)				
40 JTS.	⑤	1250' - 1100'	150'	65	57	80
		(PULL 12 STANDS + 1)				
3 JTS.	⑥	100' - 50'	50'	22	19	5
			1,150'	485 FT <sup>3</sup>	422	

CAPACITY:  
 9 5/8" C.C.: 0.4340 FT<sup>3</sup>/FT  
 8 3/4" W.C.: 0.4176 FT<sup>3</sup>/FT

4 1/2" DP  
 .0798 FT<sup>3</sup>/FT

**SUNDRY NOTICES AND REPORTS ON WELLS**

1. Name of Operator Arrowhead Resources (USA) Ltd.

2. OIL WELL  GAS WELL  OTHER  (Specify) \_\_\_\_\_

3. Well Name Suncor - Melange #32-23

Location 1961.97 Feet FNL and 1953.94 Feet FEL

Sec. 23 Twp. 2N Rge. 1W County Maricopa, Arizona.

4. Federal, State or Indian Lease Number, or lessor's name if fee lease \_\_\_\_\_

5. Field or Pool Name Wildcat

6. Check Appropriate Box to Indicate Nature of Notice, Report, or Other Data

<b>NOTICE OF INTENTION TO:</b>		<b>SUBSEQUENT REPORT OF:</b>	
TEST WATER SHUT-OFF <input type="checkbox"/>	PULL OR ALTER CASING <input type="checkbox"/>	WATER SHUT-OFF <input type="checkbox"/>	MONTHLY PROGRESS <input type="checkbox"/>
FRACTURE TREAT <input type="checkbox"/>	DIRECTIONAL DRILL <input type="checkbox"/>	FRACTURE TREATMENT <input type="checkbox"/>	REPAIRING WELL <input type="checkbox"/>
SHOOT OR ACIDIZE <input type="checkbox"/>	PERFORATE CASING <input type="checkbox"/>	SHOOTING OR ACIDIZING <input type="checkbox"/>	ALTERING CASING <input type="checkbox"/>
REPAIR WELL <input type="checkbox"/>	CHANGE PLANS <input type="checkbox"/>	(OTHER) <u>Change of Plans</u>	ABANDONMENT <input type="checkbox"/>
(OTHER) _____			<input checked="" type="checkbox"/>

(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)

7. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)

Verbal approval was obtained from Mr. Steven Rauzi by Greg Ethridge at 10:15 MST, Sept. 23, 1992 to extend the possible total depth of the Suncor - Melange 32-23 Well to 7500'. The original drilling permit #877 and dated 7/8/92 had an approved proposed depth of 6000'.



8. I hereby certify that the foregoing is true and correct.

Signed Bill Cagle Title Consultant Date 9/24/92

Permit No. 00877

**STATE OF ARIZONA**  
**OIL & GAS CONSERVATION COMMISSION**  
 Sundry Notices and Reports On Wells  
 Form No. 25 File One Copy

**SUNDRY NOTICES AND REPORTS ON WELLS**

1. Name of Operator Arrowhead Resources (USA) Ltd.  
 2. OIL WELL  GAS WELL  OTHER  (Specify) \_\_\_\_\_  
 3. Well Name Suncor - Melange #32-23  
 Location 1961.97 Feet FNL and 1953.94 Feet FEL  
 Sec. 23 Twp. 2N Rge. 1W County Maricopa Arizona.

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SHOOT OR ACIDIZE <input type="checkbox"/>	PERFORATE CASING <input type="checkbox"/>	SHOOTING OR ACIDIZING <input type="checkbox"/>	ALTERING CASING <input type="checkbox"/>
REPAIR WELL <input type="checkbox"/>	CHANGE PLANS <input type="checkbox"/>		ABANDONMENT <input type="checkbox"/>
(OTHER) _____		(OTHER) <u>Weekly Progress Update</u>	<input checked="" type="checkbox"/>

(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)

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Weekly Update of wellsite activity, as requested by the APD is attached for the period 9/12/92 - 9/21/92.



8. I hereby certify that the foregoing is true and correct.  
 Signed [Signature] Title Consultant Date 9/21/92

Permit No. 00877

STATE OF ARIZONA  
 OIL & GAS CONSERVATION COMMISSION  
 Sundry Notices and Reports On Wells  
 Form No. 25 File One Copy

ARROWHEAD RESOURCES (USA) LTD.

DAILY DRILLING REPORT

SUNCOR - MELANGE #32-23  
SWNE SEC 23 T2N R1W  
MARICOPA COUNTY, ARIZONA

- 9/12/92: Drilling 8 3/4" hole at 2653', salt up mud system,  
drilling luke salt.
- 9/13/92: Drilling 8 3/4" hole at 2857', deviation 2 1/4 Deg. at  
2849', TOH and pick up blade stabilizers, TIH mud WT 10.2 ppg.
- 9/14/92: Drilling 8 3/4" hole at 3156' with 10.2 ppg salt mud.
- 9/15/92: Drilling 8 3/4" hole at 3580' with 10.2 ppg salt mud.
- 9/16/92: Drilling 8 3/4" hole at 3940' with 10.2 ppg salt mud.
- 9/17/92: Drilling 8 3/4" hole at 4188' with 10.2 ppg salt mud.
- 9/18/92: Drilling 8 3/4" hole at 4449' with 10.2 ppg salt mud.
- 9/19/92: Drilling 8 3/4" hole at 4552' with 10.1 ppg salt mud.
- 9/20/92: Drilling 8 3/4" hole at 4835' with 10.1 ppg salt mud.
- 9/21/92. Drilling 8 3/4" hole at 5209' with 10.1 ppg salt mud.



ARROWHEAD RESOURCES (USA) LTD.

DAILY DRILLING REPORT

SUNCOR - MELANGE #32-23  
SWNE SEC 23 T2N R1W  
MARICOPA COUNTY, ARIZONA

9/12/92: Drilling 8 3/4" hole at 2653', salt up mud system,  
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9/21/92. Drilling 8 3/4" hole at 5209' with 10.1 ppg salt mud.



MEMORANDUM TO FILE

DATE: SEPTEMBER 14, 1992  
FROM: STEVEN L. RAUZI  
SUBJECT: WITNESS CIRCULATION OF CEMENT AND ROPE/CASING TEST  
SUNCOR-MELANGE #32-23 WELL, STATE PERMIT #877

I WITNESSED (WITH RICK TRAPP) THE CIRCULATION OF CEMENT ON THE 9 5/8 INCH SURFACE CASING ON TUESDAY, SEPTEMBER 8, 1992. ABOUT THREE OR FOUR BARRELS OF CEMENT WERE CIRCULATED ON THE FIRST STAGE. ABOUT 75 PERCENT EXCESS CEMENT WAS USED. NO SECOND STAGE PERFORMED.

LATE WEDNESDAY TO EARLY THURSDAY WE WITNESSED THE PRESSURE TEST OF THE ROPE. THE STACK HELD PRESSURE AT 500 PSI AND 1000 PSI BUT BLEED OFF ABOVE 3500 PSI. THE STACK WAS TIGHTENED BUT CONTINUED TO BLEED OFF AT 5000 PSI. THE PRESSURE SEEMED TO BE BLEEDING OFF THROUGH THE THREADS ON THE TEST PLUG. RETURNED TO ROOM AT 3:18 AM. THURSDAY MORNING WE TESTED THE ANNULAR PREVENTER TO 2500 PSI AND IT HELD. THE PIPE AND BLIND RAM PREVENTERS WERE TESTED TO 5000 PSI AND HELD. ONE VALVE ON THE MANIFOLD LEAKED ABOVE 3500 PSI BUT HELD AT 3500 PSI. ALL PRESSURE TESTS ON THE ROPE WERE HELD FOR A MINIMUM OF 15 MINUTES.

ON FRIDAY MORNING, SEPTEMBER 11, 1992, I WITNESSED THE MECHANICAL INTEGRITY TEST OF THE 9 5/8 INCH SURFACE CASING. THE CASING WAS TESTED TO 1500 PSI FOR 30 MINUTES AND HELD PRESSURE.

QUADCO TESTERS OF FARMINGTON PERFORMED ALL PRESSURE TESTS.

**MEMORANDUM TO FILE**

**DATE:** SEPTEMBER 14, 1992

**FROM:** STEVEN L. RAUZI <sup>SLR</sup>

**SUBJECT:** WITNESS CIRCULATION OF CEMENT AND BOPE/CASING TEST  
SUNCOR-MELANGE #32-23 WELL, STATE PERMIT #877

I WITNESSED (WITH RICK TRAPP) THE CIRCULATION OF CEMENT ON THE 9 5/8 INCH SURFACE CASING ON TUESDAY, SEPTEMBER 8, 1992. ABOUT THREE OR FOUR BARRELS OF CEMENT WERE CIRCULATED ON THE FIRST STAGE. ABOUT 75 PERCENT EXCESS CEMENT WAS USED. NO SECOND STAGE PERFORMED.

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ON FRIDAY MORNING, SEPTEMBER 11, 1992, I WITNESSED THE MECHANICAL INTEGRITY TEST OF THE 9 5/8 INCH SURFACE CASING. THE CASING WAS TESTED TO 1500 PSI FOR 30 MINUTES AND HELD PRESSURE.

QUADCO TESTERS OF FARMINGTON PERFORMED ALL PRESSURE TESTS.

**SUNDRY NOTICES AND REPORTS ON WELLS**

1. Name of Operator Arrowhead Resources (USA) Ltd.

2. OIL WELL  GAS WELL  OTHER  (Specify) \_\_\_\_\_

3. Well Name Suncor - Melange #32-23

Location 1961.97 Feet FNL and 1953.94 Feet FEL

Sec. 23 Twp. 2N Rge. 1W County Maricopa Arizona.

4. Federal, State or Indian Lease Number, or lessor's name if fee lease \_\_\_\_\_

5. Field or Pool Name Wildcat

6. Check Appropriate Box to Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:		SUBSEQUENT REPORT OF:	
TEST WATER SHUT-OFF <input type="checkbox"/>	PULL OR ALTER CASING <input type="checkbox"/>	WATER SHUT-OFF <input type="checkbox"/>	MONTHLY PROGRESS <input type="checkbox"/>
FRACTURE TREAT <input type="checkbox"/>	DIRECTIONAL DRILL <input type="checkbox"/>	FRACTURE TREATMENT <input type="checkbox"/>	REPAIRING WELL <input type="checkbox"/>
SHOOT OR ACIDIZE <input type="checkbox"/>	PERFORATE CASING <input type="checkbox"/>	SHOOTING OR ACIDIZING <input type="checkbox"/>	ALTERING CASING <input type="checkbox"/>
REPAIR WELL <input type="checkbox"/>	CHANGE PLANS <input type="checkbox"/>		ABANDONMENT <input type="checkbox"/>
(OTHER) _____		(OTHER) <u>Weekly Progress Update</u>	<input checked="" type="checkbox"/>

(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)

7. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)

Weekly Update of wellsite activity, as requested by the APD is attached for the period 8/18/92 - 9/11/92



8. I hereby certify that the foregoing is true and correct.

Signed [Signature] Title Consultant Date 9/14/92

Permit No. 00877

STATE OF ARIZONA  
OIL & GAS CONSERVATION COMMISSION  
Sundry Notices and Reports On Wells  
File One Copy

Form No. 25

ARROWHEAD RESOURCES (USA) LTD.

DAILY DRILLING REPORT

SUNCOR - MELANGE #32-23  
SWNE SEC 23 T2N R1W  
MARICOPA COUNTY, ARIZONA

8/18/92 - 9/1/92: Building location, MIRU Grace #174, installed 60' of 16" conductor pipe, 12' above ground, 48' below ground level.

9/2/92: Spud well with Big Rig 2:30 PM local time 9/1/92.

9/3/92: Drilling 13 1/2" hole at 985' with 8.9 ppg mud.

9/4/92: Drilling 13 1/2" hole at 1649' with 8.9 ppg mud.

9/5/92: Drilling 13 1/2" hole at 2040' with 9.0 ppg mud.

9/6/92: Drilling 13 1/2" hole at 2249' with 9.0 ppg mud.

9/7/92: Drilling 13 1/2" hole at 2390' with 9.2 ppg mud.

9/8/92: Drilled to 2500', start running casing.

9/9/92: Finish running 62 JTS (2489.38') 9 5/8, 36# K55 ST&C new casing with float collar and DV stage tool at 1228' KB. Mix and pump cement 25 BBL fresh water, 5 BBL super flush, 5 BBL fresh water, 425 SX "lite" cement mixed at 12.5 ppg, 150 SX neat class "G" mixed at 15.8 ppg. Had 100% returns, cement to surface on first stage, displacing 12 BBL cement to pit. Plug down at 3:00 PM

9/8/92. Float held ok. WOC 8 hrs., prepare casing for wellhead.

9/10/92: Nippling up and testing BOP to 5000 psi.

9/11/92: Drilling out DV tool, pumped 50 SX class "G" cement through "DV" tool and closed ports when plug bumped to 800 psi, WOC 8 hrs.



**SUNDRY NOTICES AND REPORTS ON WELLS**

1. Name of Operator Arrowhead Resources (USA) Ltd.  
 2. OIL WELL  GAS WELL  OTHER  (Specify) \_\_\_\_\_  
 3. Well Name Suncor - Melange #32-23  
 Location 1961.97 Feet FNL and 1953.94 Feet FEL  
 Sec. 23 Twp. 2N Rge. 1W County Maricopa, Arizona.  
 4. Federal, State or Indian Lease Number, or lessor's name if fee lease \_\_\_\_\_  
 5. Field or Pool Name Wildcat

6. Check Appropriate Box to Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:		SUBSEQUENT REPORT OF:	
TEST WATER SHUT-OFF <input type="checkbox"/>	PULL OR ALTER CASING <input type="checkbox"/>	WATER SHUT-OFF <input type="checkbox"/>	MONTHLY PROGRESS <input type="checkbox"/>
FRACTURE TREAT <input type="checkbox"/>	DIRECTIONAL DRILL <input type="checkbox"/>	FRACTURE TREATMENT <input type="checkbox"/>	REPAIRING WELL <input type="checkbox"/>
SHOOT OR ACIDIZE <input type="checkbox"/>	PERFORATE CASING <input type="checkbox"/>	SHOOTING OR ACIDIZING <input type="checkbox"/>	ALTERING CASING <input type="checkbox"/>
REPAIR WELL <input type="checkbox"/>	CHANGE PLANS <input type="checkbox"/>	(OTHER) _____	ABANDONMENT <input type="checkbox"/>
(OTHER) _____	<input checked="" type="checkbox"/>	(OTHER) _____	<input type="checkbox"/>

(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)

7. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)

As a followup to my telephone conversation with Mr. Steven Rauzi, please note that Grace Drilling Rig #174 will drill the above referenced well. Anticipated spud date is 8/30/92. Notification will be provided 48 hours before drilling operations commence per permit condition.



8. I hereby certify that the foregoing is true and correct.  
 Signed Bill Cagle Title Consultant Date 8/26/92  
 Bill Cagle

Permit No. 00877

**STATE OF ARIZONA**  
**OIL & GAS CONSERVATION COMMISSION**  
 Sundry Notices and Reports On Wells  
 Form No. 25 File One Copy



# PERMIT TO DRILL

This constitutes the permission and authority from the  
OIL AND GAS CONSERVATION COMMISSION,  
STATE OF ARIZONA,

To: ARROWHEAD OIL AND GAS, LTD.  
(OPERATOR)

to drill a well to be known as

SUNCOR-MELANGE #32-23  
(WELL NAME)

located 1961.97 FEET FNL AND 1953.94 FEET FEL

Section 23 Township 2N Range 1w, MARICOPA County, Arizona.

The WEST 1/2 OF NE 1/4 IF OIL; ALL OF SECTION 23 IF GAS of said  
Section, Township and Range is dedicated to this well.

Said well is to be drilled substantially as outlined in the attached Application and must be drilled  
in full compliance with all applicable laws, statutes, rules and regulations of the State of Arizona.

Issued this 8 day of JULY, 1992.

OIL AND GAS CONSERVATION COMMISSION

By Steven L. Ramin  
EXECUTIVE DIRECTOR  
OIL & GAS PROGRAM ADMINISTRATOR

PERMIT 00877

RECEIPT NO. 3027

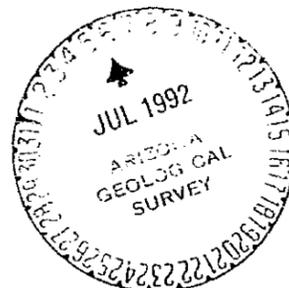
A.P.I. NO. 02-013-20025

State of Arizona  
Oil & Gas Conservation Commission  
Permit to Drill

FORM NO. 27

DRILLING PROGNOSIS

OPERATOR: Arrowhead Resources (USA) Ltd.  
WELL: Gila #1-23  
LOCATION: SW NE Section 23-T2N-R1W  
Maricopa County, Arizona  
ELEVATIONS: 1033' Ground  
1045' KB (Est.)



FORMATIONS

<u>INTERVAL</u>	<u>DESCRIPTION</u>
Surface-2500'	Upper Miocene Interbedded Sands, Gravels & Shales.
2500'-3200'	Miocene Salt
3200'-5500' TD	Lower Miocene Interbedded Silts, Sands, & Black Shales. (TD @ Top of 2nd Salt)

HOLE SIZE, CASING & CEMENTING PROGRAM

<u>INTERVAL</u>	<u>HOLE SIZE</u>	<u>CASING</u>	<u>CEMENT</u>
Surface 0-2500'	13 1/2"	9 5/8", 36#, K55, ST&C	Staged w/collar @ 1200' <u>First Stage:</u> 520 SX Lite Cement @ 13.8 ppg & 150 SX Neat Class "G" @ 15.8 ppg (75% Excess)
Surface			<u>Second Stage:</u> 500 SX Lite Cement @ 13.8 ppg (50% Excess)
Salt 2500-3200'	8 3/4"	(5 1/2", 17#, N80)	(Cemented w/remainder of Production String)

Drilling Prognosis  
Gila #1-23  
Page two

<u>INTERVAL</u>	<u>HOLE SIZE</u>	<u>CASING</u>	<u>CEMENT</u>
Miocene Sediments (Production) 3200'-TD @ 5500'	7 7/8"	5 1/2", 17#, N80, LT&C	Staged w/collar @ 4,000' <u>First Stage:</u> 260 SX Class "G" @ 15.8 ppg (15% Excess) <u>Second Stage:</u> 300 SX Class "G" @ 15.8 ppg (20% Excess w/TOC @ 2300' in 9 5/8" CSG.)

CASING ACCESSORIES

SURFACE CASING:

9 5/8" Float Shoe  
9 5/8" Float Collar w/Latch Down Receptacle  
6 Centralizers, 1 Stop Ring (4 @ Bottom, & 1  
either side of DV Tool)  
DV Tool @ 1200'

PRODUCTION CASING:

5 1/2" Float Shoe  
5 1/2" Float Collar w/Latch-Down Receptacle  
1 Centralizer & Stop Ring  
20 Turbulators

LOGGING PROGRAM:

FDC - CNL - GR - CALIPER (TD to 2500')  
DLL - GR (TD to Base of Salt)  
BHC Sonic - GR (TD to Base of Salt)

CORES:

None

DRILL STEM TESTS:

One or more possible in Miocene Sediments  
contingent upon hole conditions.

SAMPLES:

2500' (Base of Surface Casing) to TD @  
5500'-----10' Intervals

MUD LOGGING UNIT:

Self-manned unit in place @ 2500' (Top of  
Salt). Unit to contain H<sub>2</sub>S Detection equipment.

SPECIAL EQUIPMENT:

1) Pre-mix tank to pre-hydrate gel for salt-  
based mud below surface casing to TD (2500'-  
5500'). 2) Wear bushing mounted in 9 5/8"  
casing head when drilling below bottom of  
9 5/8" CSG.

Drilling Prognosis  
 Gila #1-23  
 Page Three

MUD PROGRAM:

<u>INTERVAL</u>	<u>MUD WT.</u>	<u>VISCOSITY</u>	<u>WATER LOSS</u>	<u>TYPE</u>
0-2500'	8.8-10.5	30-45	NC	Fresh Water Gel Allowed to weight-up naturally w/ solids & fines to prevent sands & gravels from sloughing.
2500-5500	9.8-10.3	34-38 (45-50 for Logs & DST)	8-10	Salt Saturated Gel (Gel to be pre-hydrated in separate pre-mix tank)

NOTE: Use Nitrates as Tracer for DST's  
 (100 ppm by time tools run)

DEVIATION SPECIFICATIONS:

<u>INTERVAL</u>	<u>MAX. DEV.</u>	<u>MAX. RATE OF CHANGE/100'</u>	<u>FREQUENCY OF SURVEYS</u>
0-2500'	2 Deg.	-	200'
2500-5500'	3 Deg.	1 Deg./100'	300' (Or as deemed necessary in dipping sediments below salt; 3200-5500)

MINIMUM BOP & PRESSURE CONTROL EQUIPMENT:

<u>INTERVAL</u>	<u>SURFACE EQUIPMENT</u>	<u>REMARKS</u>
0-2500'	None	
2500-5500'	Double ram BOP'w/blind rams & pipe rams for 4 1/2" drill pipe; & annular BOP above. (All rated for 3,000 psi)	Pressure test to 1,500 psi for 30 min. prior to drilling out 9 5/8" CSG.

Drilling Prognosis  
Gila #1-23  
Page four

NOTE: 1) Below surface casing setting depth, rig will have the following installed and/or available at all times (rated to at least 3,000 psig):

- 2 ea. Kelly Cocks (1 upper, 1 lower)
- 1 ea. Drill pipe stabbing valve, on rig floor, & in open position.
- 1 ea. Choke manifold w/isolating valve between BOP's & manifold.

2) Operational check of BOP's & choke manifold required once every 24 hours & to be recorded on daily "tour" reports.

GILA 1-23  
ARROWHEAD RESOURCES (USA) LTD.

CEMENT PROGRAM

SURFACE: 9 5/8" 36# in 13 1/2" hole  
(.4887 Ft<sup>3</sup>/Ft)(2500') = 1221.75 Ft<sup>3</sup>  
(1222 Ft<sup>3</sup>)(1.75 Excess) = 2,139 Ft<sup>3</sup>  
Stage Collar @ 1200'

FIRST STAGE (1300')(0.4887 Ft<sup>3</sup>/Ft)(1.75) = 1,112 Ft<sup>3</sup>  
(150 SX Neat)(1.18 Ft<sup>3</sup>/SK) = (177 Ft<sup>3</sup>)  
935 Ft<sup>3</sup> Lite Cement  
(935 Ft<sup>3</sup>)/(1.80 Ft<sup>3</sup>/SK) = 519 SX

FIRST STAGE: 50 BBL. Fresh water followed by 520 SX HOWCO Lite  
containing 2% CaCl & 1/4#/SK cello flakes; followed  
by 150 SX neat cement containing 2% CaCl & 1/4#/SK  
cello flakes. Bump plug to 1,000 psi. Open DV tool,  
circ. cement to pit, close in, & circulate w/mud tank  
volume 2 hrs.

SECOND STAGE (1200')(0.4887 Ft<sup>3</sup>/Ft)(1.50) = 880 Ft<sup>3</sup>  
(880 Ft<sup>3</sup>)/(1.80 Ft<sup>3</sup>/SK) = 489 SX

SECOND STAGE: 30 BBL. Fresh water followed by 500 SX HOWCO Lite  
containing 2% CaCl & 1/4#/SK cello flakes, bump  
plug to 1,000 psi; SI 12 hours WOC (state  
requirement)

PRODUCTION  
STRING: 5 1/2" 17# in 7 7/8" hole (8 3/4" hole thru  
salt) Cement 2300' (200' inside 9 5/8") to  
TD @ 5500'  
Stage collar at 4,000'

FIRST STAGE (1500')(0.1733 Ft<sup>3</sup>/Ft)(1.15) = 299 Ft<sup>3</sup>  
(299 Ft<sup>3</sup>)/(1.18 Ft<sup>3</sup>/SK) = 253 SX

FIRST STAGE: 20 BBL. Fresh water, 10 BBL. mud flush, 10 BBL. Fresh  
Wtr., & 260 SX Class "G" neat cement containing  
fluid loss & 1/4#/SK cello flakes. Bump plug w/  
1,000 psi. Open DV Tool, circ. excess cement to  
pit, close in, & circulate w/mud tank volume 2 hr.

SECOND STAGE (1700')(0.1733 Ft<sup>3</sup>/Ft)(1.20) = 354 Ft<sup>3</sup>  
(354 Ft<sup>3</sup>)/(1.18 Ft<sup>3</sup>/SK) = 300 SX

SECOND STAGE: 30 BBL. Fresh water, 10 BBL. mud flush, 20 BBL.  
fresh water, & 300 SX Class "G" neat cement contain-  
ing fluid loss & 1/4#/SK cello flakes.

**APPLICATION FOR PERMIT TO DRILL OR RE-ENTER**

APPLICATION TO DRILL

RE-ENTER OLD WELL

Arrowhead Resources (U.S.A.) Ltd., doing business in Arizona as Arrowhead Oil and Gas Ltd.  
NAME OF COMPANY OR OPERATOR

475 17th Street, Suite 820 Denver Colorado 80202  
Address City State

To be determined  
Drilling Contractor

Address

**DESCRIPTION OF WELL AND LEASE**

Federal, State or Indian Lease Number, or if fee lease, name of lessor	Well number	Elevation (ground)
<u>SunCor Development Company</u>	<u>32-23</u>	<u>1031.87'</u>

Nearest distance from proposed location to property or lease line:	Distance from proposed location to nearest drilling, completed or applied--for well on the same lease:
<u>652</u> feet	<u>N/A</u> feet

Number of acres in lease:	Number of wells on lease, including this well, completed in or drilling to this reservoir:
<u>638.884</u>	<u>N/A</u>

If lease, purchased with one or more wells drilled, from whom purchased:	Name	Address
<u>N/A</u>		

Well location (give footage from section lines)	Section--township--range or block and survey	Dedication (Comply with Rule 105)
<u>1962 fml, 1954 fel</u>	<u>23-2N-1W, SW/4NE/4</u>	<u>Oil Well - W/2NE/4</u> <u>Gas Well - All of 23</u>

Field and reservoir (if wildcat, so state)	County
<u>Wildcat</u>	<u>Maricopa</u>

Distance in miles, and direction from nearest town or post office  
1 1/2 miles Northeast of Litchfield Park

Proposed depth:	Rotary or cable tools	Approx. date work will start
<u>6000 feet</u>	<u>Rotary</u>	<u>8-20-92</u>

Bond Status <u>approved 6/29/92 SLR</u>	Organization Report	Filing Fee of \$25.00
Amount <u>\$5,000.00</u>	On file Or attached <input checked="" type="checkbox"/>	Attached <input checked="" type="checkbox"/>

Remarks:  
Well name will be SunCor-Melange #32-23

CERTIFICATE: I, the undersigned, under the penalty of perjury, state that I am the Attorney-in-Fact of the Arrowhead Resources (U.S.A.) Ltd. (company), and that I am authorized by said company to make this report; and that this report was prepared under my supervision and direction and that the facts stated therein are true, correct and complete to the best of my knowledge.

[Signature]  
Signature Douglas G. Liller

June 24, 1992  
Date

Permit Number: 877  
Approval Date: 7-8-92  
Approved By: Steven L. Rainz

Notice: Before sending in this form be sure that you have given all information requested. Much unnecessary correspondence will thus be avoided.

**STATE OF ARIZONA**  
**OIL & GAS CONSERVATION COMMISSION**  
Application to Drill or Re-enter  
File Two Copies

Form No. 3

JUN 05 '92 12:11

CADDIS RESOURCES

398 P02

- Operator shall outline the dedicated acreage for both oil and gas wells on the plat. open outline = oil  
red outline = gas
- A registered professional engineer or land surveyor registered in the State of Arizona or approved by the Commission shall show on the plat the location of the well and certify this information in the space provided.
- ALL DISTANCES SHOWN ON THE PLAT MUST BE FROM THE OUTER BOUNDARIES OF THE SECTION.
- Is the Operator the only owner in the dedicated acreage outlined on the plat below? YES \_\_\_\_\_ NO X
- If the answer to question four is "no," have the interests of all the owners been consolidated by communitization agreement or otherwise? YES X NO \_\_\_\_\_. If answer is "yes," Type of Consolidation various agreements between the parties
- If the answer to question four is "no," list all the owners and their respective interests below:

Owner Operator 51.85% SDC Nevada, Inc. 33.15%	Land Description Township 2 North, Range 1 West G&SRM
Dusty Mac Resources, Inc. 15%	Section 23

**CERTIFICATION**

I hereby certify that the information above is true and complete to the best of my knowledge and belief.

LARRY E. SULLIVAN  
Name

SURVEY MANAGER  
Position

COE & VAN LEO  
Company

6/9/92  
Date

I hereby certify that the well location shown on the plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my knowledge and belief.

Date Surveyed 5/10/92  
Registered Professional Engineer and/or Land Surveyor

R.L.S. 22782  
Certificate No.

**PROPOSED CASING PROGRAM**

Size of Casing	Weight	Grade & Type	Top	Bottom	Cementing Depths	Sacks Cement	Type
9 5/8	36#/ft.	K 5 5	surface	2500'	2500'--surface	1170	Lite & Class G
5 1/2	17#/ft.	N 8 0	surface	5500'	2300'--5500'	560	Class G

**MEMORANDUM TO FILE**

DATE: JUNE 25, 1992

FROM: STEVEN L. RAUZI <sup>SLR</sup>

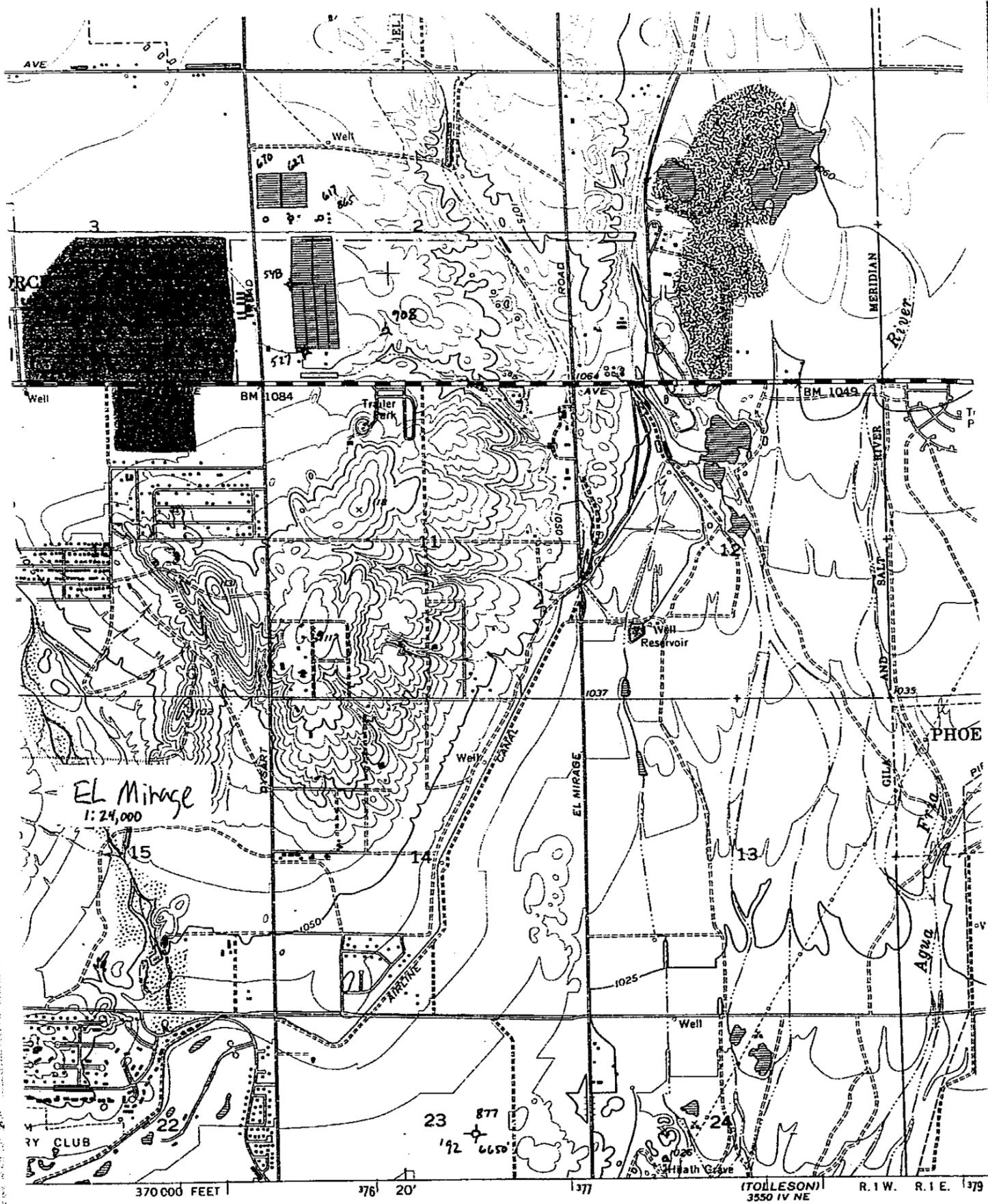
SUBJECT: FRESH-WATER AQUIFERS IN VICINITY OF SEC. 23, T. 2 N., R. 1 W.

I CONTACTED RICHARD L. HERTHER, ARIZONA DEPARTMENT OF WATER RESOURCES, PHOENIX, AND DISCUSSED WATER WELLS AND STATIC WATER LEVELS IN THIS AREA:

1. STATIC LEVEL IN NW SE SECTION 23 WAS 179.5 FEET ON 11/22/91.
2. STATIC LEVEL IN SW SE SECTION 23 WAS 186.1 FEET ON 11/22/91.
3. LITCHFIELD PARK SERVICE WELL IN S 1/2 OF SECTION IS 800 FEET DEEP.
4. A WELL IN THE W 1/2 OF SECTION IS ESTIMATED TO BE 400 FEET DEEP.

\*\*\*\*\*

THEREFORE, SURFACE CASING SET AT 2500 FEET AND CEMENTED BACK TO THE SURFACE WILL BE SUFFICIENT TO PROTECT ALL KNOWN AND REASONABLY ESTIMATED FRESH-WATER AQUIFERS IN THIS AREA.



EL Mirage  
1:24,000

370000 FEET

376 20'

377

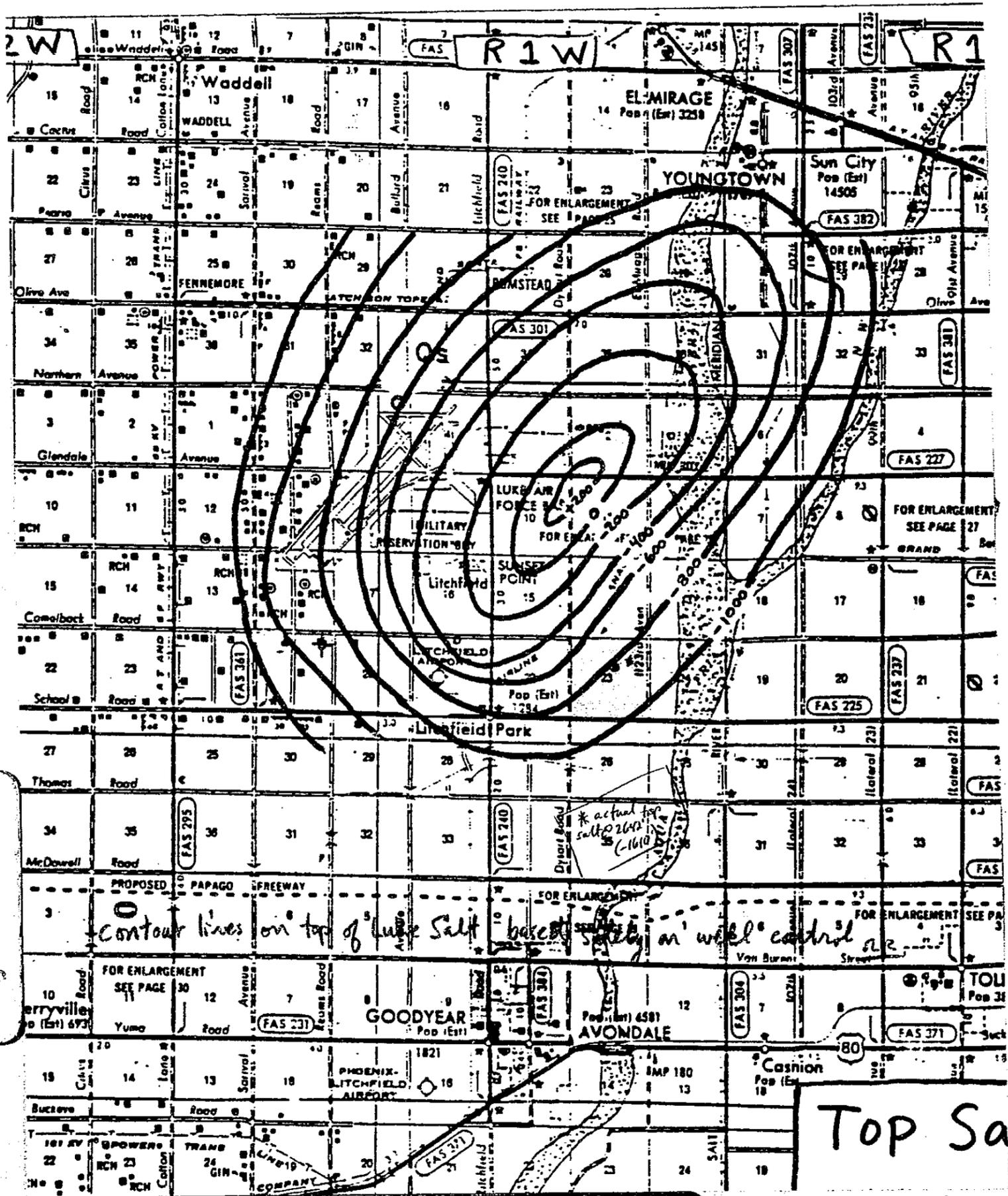
(TOLLESON)  
3550 IV NE

R.1W. R.1E. 379

Survey

SCALE 1:24000





contour lines on top of Luke Salt based on well control

\* actual top salt 2640 (-1610)

TOP Sa



SECURITIES SAFEKEEPING  
1700 WEST WASHINGTON ST. - PHOENIX, ARIZONA 85007

DATE: 06/25/92

STATE AGENCY NO. \_\_\_\_\_

STATE AGENCY ARIZONA GEOLOGICAL SURVEY (OIL & GAS)

State Treasurer's Use Only

COMPANY ARROWHEAD OIL & GAS LTD. ✓  
475 17TH STREET, SUITE 820  
DENVER, CO

DOMESTIC FOREIGN

DEPOSIT

C.D. NO.: 2609737 ✓

BANK: VALLEY NATIONAL BANK OF ARIZONA ✓

MATURITY DATE: 12/21/92 ✓

INTEREST RATE: 3.40 % ✓

AMOUNT \$ 5,000.00 ✓

C.D. ASSIGNMENT MUST BE ATTACHED UNLESS C.D. IS PAYABLE TO STATE TREASURER ✓

RELEASE

C.D. NO.:

BANK:

MATURITY DATE:

INTEREST RATE: %

AMOUNT \$

STATE TREASURER VALIDATION NO. \_\_\_\_\_

RECEIVED THE ABOVE RELEASE

STATE AGENCY AUTHORIZATION

BY \_\_\_\_\_

Authorized Signature

Date

BY Steven L. Rario

Authorized Signature

STATE TREASURER AUTHORIZATION

BY Katherine Valentin

Authorized Signature

FOR BANK USE ONLY

BANK AUTHORIZATION

Checked by \_\_\_\_\_

Verified by \_\_\_\_\_

BY \_\_\_\_\_

Authorized Signature

STATE'S DEPOSITORY BANK

RECEIVED  
STATE TREASURER  
JUN 29 10 48 AM '92

**ASSIGNMENT TO ARIZONA STATE TREASURER  
SECURITY IN LIEU OF CASH DEPOSIT FOR COMPLIANCE WITH  
SECTION 35-155 ARIZONA REVISED STATUTES**

Arrowhead Resources (U.S.A.) Ltd., doing business in Arizona as Arrowhead Oil and Gas Ltd.  
 NAME 475 17th Street, Suite 820 Denver  
 STREET ADDRESS Denver Colorado (303) 294-0400 CITY  
 COUNTY STATE TELEPHONE NUMBER

hereinafter referred to as ASSIGNOR, does hereby assign and transfer to the Treasurer of the State of Arizona, hereinafter referred to as the TREASURER, all right, title and interest of any kind whatsoever, owned or held by Assignor in the principal, but not in the interest hereinafter accruing after the date of this assignment in the insured account of ASSIGNOR so long as such funds remain on deposit in the

Valley National Bank  
FINANCIAL INSTITUTION

whose address is 4398 N. Campbell Ave. Tucson, AZ 85718 Pima  
 STREET ADDRESS CITY COUNTY

Arizona, as evidenced by an account in the amount of FIVE THOUSAND DOLLARS AND NO CENTS  
 dollars (\$ 5,000.00 ) identified by account number 8161-3043 / 2609737 which account is insured by the  
 Federal Deposit Insurance Corporation or the Federal Savings and Loan Insurance Corporation. This assignment is given as security for  
 compliance with ARS 27-501 to 539 and with the Rules of the Oil and Gas Conservation  
 Commission.

Dated this 19th day of June, 1992, at Denver, CO ARIZONA  
Arrowhead Resources (U.S.A.) Ltd., doing business in Arizona  
as Arrowhead Oil and Gas Ltd.

IMPORTANT - SIGNATURE OF ASSIGNOR  
 This Assignment shall be signed by the  
 Individual Himself BY: [Signature] Attorney-in-Fact  
 SIGNATURE OF ASSIGNOR

**FIRST ENDORSEMENT - RECEIPT FOR NOTICE OF ASSIGNMENT**

Receipt is hereby acknowledged to the Treasurer of the State of Arizona, hereinafter referred to as the TREASURER, of written notice of the assignment to said Treasurer of the above-identified account. We have noted our records to show the interest of the Treasurer in said account as shown in and by the assignment above. We have retained a copy of this document. We hereby certify that we have not received any notice of lien, encumbrance, hold, claim or other obligation against the above-identified account prior to its assignment to the Treasurer. We further hereby waive any current and future right of set-off against such account. We agree to make payment as required by the Rules and Regulations of the Treasurer adopted in accordance with applicable laws and the law applicable to this institution.

Dated this 22 day of June, 1992, at Tucson, Arizona  
Valley National Bank  
 NAME OF FINANCIAL INSTITUTION

BY [Signature] Customer Service Manager  
 SIGNATURE OF OFFICER OF FINANCIAL INSTITUTION TITLE

Subscribed and sworn before me this 23 day of June, 1992 [Signature]

NOTARY PUBLIC SIGNATURE  
 My Commission Expires July 31, 1994  
 COMMISSION EXPIRES

**SECOND ENDORSEMENT - RECEIPT FOR SECURITY AND DIRECTION TO PAY EARNINGS**

Receipt is acknowledged of the assignment above and the account identified in the assignment above. The financial institution named in the assignment above is hereby authorized and directed to pay any earnings credited after the date of this assignment on the above-identified account of the above-named assignor.

Dated this 29th day of June, 1992, at Phoenix, Arizona.

ARIZONA STATE TREASURER  
 Treasurer or Authorized Representative  
 By: [Signature]  
 (Prepare in duplicate. Please Type all Information)

Attach Original Assignment to Certificates of Deposit and File with State.

RECEIVED  
 JUN 29 10 48 AM '92  
 CLERK

**Valley National Bank of Arizona**

**Certificate of Deposit  
NON TRANSFERABLE**

**2609737**

BRANCH River Campbell

BRANCH NO. T-159 DATE 6-22-92

THIS CERTIFIES THAT THERE HAS BEEN DEPOSITED IN THIS BANK

**5,000 AND 00 CTS**

PAY TO

Arizona State Treasurer

ACCOUNT NO.  
8161-3043

\$ 5,000.00

(UPON SURRENDER OF THIS CERTIFICATE PROPERLY ENDORSED)  
Deposited by Arrowhead Oil & Gas Ltd..

THIS CERTIFICATE MATURES IN 182 Days FROM ISSUE DATE ON  
December 21, 1992 INTEREST IS TO BE PAID Maturity  
AT THE RATE OF 03.40 % PER ANNUM ON AN ACTUAL NUMBER OF DAYS PER YEAR BASIS  
FIRST INTEREST PAYMENT DUE 12-21-92

SINGLE MATURITY - INTEREST CEASES AT MATURITY  
 AUTOMATICALLY RENEWABLE - THE CERTIFICATE WILL AUTOMATICALLY RENEW EVERY 182 Days

UNLESS REDEEMED WITHIN 10 CALENDAR DAYS (ONE BUSINESS DAY FOR MATURITIES OF 31 DAYS OR LESS) AFTER ANY MATURITY. THE BANK RETAINS THE RIGHT TO REDEEM THIS CERTIFICATE OR CHANGE THE INTEREST RATE AND OTHER TERMS AS OF ANY MATURITY.

*Judith A. Reynolds*  
AUTHORIZED SIGNATURE

**ORGANIZATION REPORT**

Full Name of the Company, Organization, or Individual

Arrowhead Resources (U.S.A.) Ltd., doing business in Arizona as Arrowhead Oil and Gas Ltd.

Post Office Address (Box or Street Address) Oil

475 17th St., Suite 820, Denver, Colorado 80202

Plan of Organization (State whether organization is a corporation, joint stock association, firm or partnership, or individual)

Corporation

Purpose of Organization (State type of business in which engaged)

Oil & Gas Exploration

If a reorganization, give name and address of previous organization.

If a foreign corporation, give (1) State where incorporated	(2) Name and post office address of state agent	(3) Date of permit to do business in state
South Dakota	C. Liller, Jr. 26022 Primo Cr. Rio Verde, Arizona 85255	June 3, 1992
Principal Officers or Partners (if partnership) NAME	TITLE	POST OFFICE ADDRESS
George H. Laycraft	President	601 W. Cordova, Suite 100 Vancouver, B.C. V6B 1G1
Richard L. Coglon	Secretary	Same

DIRECTORS NAME	POST OFFICE ADDRESS
George H. Laycraft	601 W. Cordova, Suite 100
	Vancouver, B.C. V6B 1G1

CERTIFICATE: I, the undersigned, under the penalty of perjury, state that I am the Attorney-In-Fact of the Arrowhead Resources (U.S.A.) Ltd. (company), and that I am authorized by said company to make this report; and that this report was prepared under my supervision and direction and that the facts stated therein are true, correct and complete to the best of my knowledge.

Signature *Douglas G. Liller*  
 Douglas G. Liller, Attorney-In-Fact  
 Date June 24, 1992

STATE OF ARIZONA  
 OIL & GAS CONSERVATION COMMISSION  
 Organization Report  
 File One Copy  
 Form No. 1

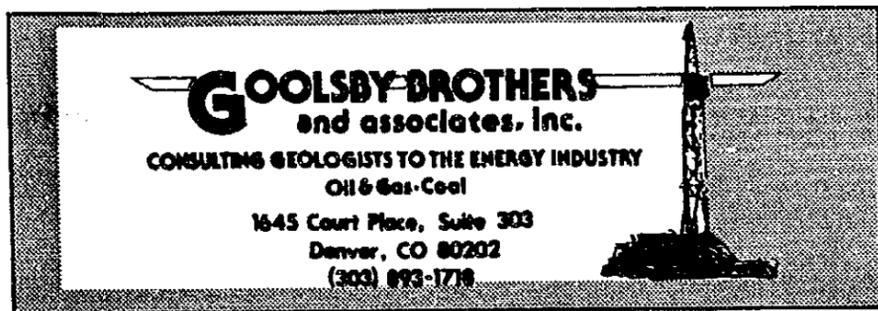
ARROWHEAD RESOURCES (USA) LTD.

1101

Filing Fee - Application for Permit to Drill or Re-Enter  
Suncor Melange #32-23 Well  
Maricopa County, Arizona

Gila Salt Dome

*receipt # 3027*



OCT 13 1992

GEOLOGICAL WELLSITE REPORT

PIN 877

ARROWHEAD OIL & GAS, LTD.

Sun Cor-Melange #32-23  
SW NE Section 23, T2N, R1W  
Maricopa County, New Mexico

**CONFIDENTIAL**

Release Date SEP 27 1993

Mathew D. Goolsby  
Consulting Geologist

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### SUMMARY

The Sun Cor-Melange #32-23 was spudded for Arrowhead Oil & Gas on September 1, 1992. Grace Drilling's rig #174 reached a total depth of 6650 feet on September 25, 1992.

As a seismic prospect, the Sun Cor-Melange #32-23 was designed to test updip truncations of Miocene clastics along the southern margin of the Luke Salt dome. Free oil shows and recoveries suggested oil generation and migration in the prospect area. Seismic interpretation also indicated good lateral and vertical closure, with salt providing the seal. There seemed to remain only finding reservoir quality rock within the Miocene clastic truncation.

The Luke Salt was encountered at 2620 feet (-1572'), with the section comprised of interbedded salt and clastics from that depth to 4500 feet. Several apparent source rocks were encountered from 3600 to 3900 feet in the form of black, carbonaceous and petroliferous shales. However, there was a lack of reservoir rock in the section. The interval's lithology consisted of mostly red shales, siltstones and minor clay-filled and silty sandstones.

From 4500 feet to total depth the lithology was 99% salt with scattered siltstone. Seismic data indicated that this was the main section of the Luke Salt below the clastic pinchout. Drilling was terminated at 6650 feet, and the well subsequently plugged and abandoned.

In conclusion, it should be noted that the prospect appeared to be in place both structurally and also in terms of source rock. The lack of reservoir rock constituted the missing part of the equation. Future work may lead to other drill sites around the Luke Salt complex.

WELL DATA

OPERATOR: Arrowhead Oil & Gas, Ltd.  
WELL NAME: Sun Cor-Melange #32-23  
LOCATION: 1962' FNL, 1954' FEL  
(SW NE) Section 23, T2N, R1W  
Maricopa County, New Mexico  
*Arizona*  
FIELD: Wildcat  
ELEVATION: 1032' GL, 1048' KB  
SPUD DATE: 9/1/92  
DATE TD REACHED: 9/25/92  
CONTRACTOR: Grace Drilling, Rig #174  
DRILLING SUPERVISION: Greg Ethridge  
HOLE SIZE: 13 1/2" to 2500', 8 3/4" to TD  
SURFACE CASING: 62 Joints 9 5/8" set @ 2493' KB (2 stage cement, 625 sacks).  
MUD COMPANY: Dynamic Drilling Fluids  
ENGINEER: Don West  
PROGRAM: Salt-Starch  
WELLSITE GEOLOGY: Mathew D. Goolsby; Goolsby Brothers & Associates, Inc.  
DRILLSTEM TESTS: None  
CORES: None  
LOGGING COMPANY: Schlumberger (Long Beach, CA)  
ENGINEER: Steve Rice  
PROGRAM: DLL, BHC SONIC, CNL/GR  
TOTAL DEPTH: 6650' Driller, 6650' Logger  
BOTTOM HOLE FORMATION: Luke Salt (Miocene)  
SAMPLE PROGRAM: 20' intervals to 2100', then 10' and 30' intervals to TD.  
WELL STATUS: Plugged and Abandoned.

DAILY CHRONOLOGY

<u>DATE</u>	<u>6 AM DEPTH</u>	<u>ROTATING HOURS, PREVIOUS DAY</u>
9/2/92	327'	12
9/3/92	985'	19 1/4
9/4/92	1649'	18 1/2
9/5/92	2040'	20 1/2
9/6/92	2249'	17 1/4
9/7/92	2390'	12 1/2
9/8/92	2500'	9 3/4
9/9/92	2500'	0 (9 5/8" Surface Casing)
9/10/92	2500'	0 (Nipple Up)
9/11/92	2500'	0
9/12/92	2653'	6 3/4
9/13/92	2857'	15 1/2
9/14/92	3156'	20
9/15/92	3580'	21 1/2
9/16/92	3940'	21 1/2
9/17/92	4188'	16 3/4
9/18/92	4449'	20
9/19/92	4552'	16 1/2
9/20/92	4835'	16
9/21/92	5209'	21 3/4
9/22/92	5408'	17
9/23/92	5858'	21 1/4
9/24/92	6339'	21
9/25/92	6650' (TD)	16

BIT RECORD

<u>#</u>	<u>MAKE</u>	<u>TYPE</u>	<u>SIZE</u>	<u>DEPTH OUT</u>	<u>FOOTAGE</u>	<u>HOURS RUN</u>	<u>REMARKS</u>
1	HTC	R1	13 1/2	1080	1014	34 3/4	
2	SEC	S3SJ	13 1/2	2059	979	37	
3	OSC	3AJ	13 1/2	2249	190	15 3/4	
4	HTC	X-11	13 1/2	2500	251	22 1/4	
5	STC	FDT	8 3/4	2500			Drill Surface Casing
5	STC	FDT	8 3/4	2857	357	22 1/4	
6	HTC	J11H	8 3/4	4188	1331	79 3/4	
7	HTC	J22	8 3/4	4557	369	37 1/2	
8	HTC	J1	8 3/4	5337	780	50	
9	HTC	J2	8 3/4	6650	1313	63 3/4	

MUD RECORD

<u>DEPTH</u>	<u>WT</u>	<u>VIS</u>	<u>PV</u>	<u>YP</u>	<u>GELS</u>	<u>Ph</u>	<u>WL</u>	<u>CHLOR</u>	<u>SOLIDS %</u>
327	8.7	50	12	16	3/8	9.0	8.8	300	2.8
985	8.9	40	6	30	8/10	8.5	16.6	300	4.4
1649	8.9	40	8	10	4/8	9.5	14.4	200	4.0
2040	9.0	45	10	17	5/15	9.0	13.8	300	6.0
2249	9.0	40	12	20	4/14	9.5	13.0	250	6.0
2390	9.2	45	13	22	6/26	9.5	11.6	350	7.0
2653	10.2	36	4	6	0/3	9.0	25	171k	10.0
2857	10.2	36	5	8	0/4	9.0	16.0	186k	11.0
3156	10.2	36	6	8	0/3	9.0	15.2	180k	11.0
3580	10.2	36	8	4	2/10	9.0	15.6	179k	12.0
3940	10.2	34	6	3	2/8	8.8	16.0	181k	13.0
4188	10.2	35	6	4	2/8	9.0	14.0	178K	11.0
4449	10.2	35	6	5	3/8	9.0	14.6	182K	11.0
4552	10.1	38	10	5	2/8	9.0	14.4	181k	11.0
4835	10.2	37	11	4	3/12	8.5	15.0	182k	12.0
5209	10.1	33	7	3	1/5	8.5	16.0	182k	13.0
5408	10.2	34	6	4	1/5	8.5	16.0	182k	12.0
5858	10.2	34	6	4	1/7	8.5	15.2	185k	12.0
6339	10.2	37	8	4	1/8	8.5	14.0	185k	12.0

DEVIATION SURVEYS

<u>DEPTH</u>	<u>DRIFT</u>	<u>DEPTH</u>	<u>DRIFT</u>
171	1/2°	232	1/2°
327	1°	388	3/4°
451	1/2°	514	1/2°
609	3/4°	704	3/4°
827	0°	922	1/4°
1080	1/2°	1175	3/4°
1301	1/2°	1428	1/2°
1554	3/4°	1713	1 1/2°
1806	1°	1868	1°
1932	1°	2059	1°
2120	1°	2183	3/4°
2255	1/4°	2422	2°
2475	1 3/4°	2566	1°
2660	2°	2723	2°
2786	1 3/4°	2849	2 1/4°
2924	1 1/2°	2984	1°
3046	2°	3140	1 3/4°
3235	1°	3329	1/2°
3424	1°	3551	1/2°
3709	1°	3835	1°
3961	3/4°	4088	3/4°
4188	1°	4307	2°
4370	1 1/2°	4431	1 1/2°
4494	1°	4557	1/2°
4658	1/2°	4785	1 1/4°
4848	1 1/4°	4911	1°
5006	1°	5124	1 1/4°
5228	1 1/4°	5324	1 3/4°
5418	1 1/4°	5483	1 3/4°
5568	1 1/4°	5692	1 1/4°
5818	2°	5942	2°
6068	2 1/2°	6181	2 1/4°
6318	3°	6443	3°

FORMATION TOPS

Measured from a KB elevation of 1048 feet.

FORMATION  
 Luke Salt  
 Total Depth

LOG TOP  
 2620  
 6650

SUBSEA  
 -1572  
 ----

SAMPLE DESCRIPTIONS

(Depth Caught)

- (400) "GRAVEL" CONGLOMERATE COMPRISED OF QTZ, FELDSPARS & COARSE SANDS
- (420) AA W/ 30% SLTST PALE ORNG, SDY, V BRIT
- (440) 50% SLTST V PALE ORNG, V SDY, HVY BLK MIN SPECKS, BRIT W/ 50% CONGL, QTZIC
- (460) 80% SLTST AA, INC SDY & GRDG TO SLTY SS
- (480) SLTST V PALE ORNG, V SDY, BRIT, HVY MIN
- (500) SS LT ORNG, LVF/ CG, SLI CONLOMIC, V P SRTD, HVY MIN GRAINS, CLY FLD, TITE, NO SHOWS
- (520) SLTST V LT ORNG, ABNT CLY MTRX & ALSO SDY
- (540) SLTST AA
- (560) SLTST V LT ORNG, SLI SDY, SHLY, ERTHY
- (580) SLTST, V FINE BLK MIN SPECKS
- (600) SLTST V LT ORNG, SDY, SHLY, BRIT
- (620) SLTST AA W/ INC ORNG CLY, WASHES THRU SAMPLE
- (640) SLTST LT ORNG, SLI SDY W/ ORNG "GUMBO" CLY WASHING THRU SAMPLE ... "POTTER'S" CLY
- (660) SAME
- (680) CLY, ORNG, GUMBO, WASHES THRU SMPLE W/ SCAT SD GRAINS
- (700) CLY WASHING THRU SAMPLE, CLY IS A STICKY GUMBO, LT ORNG

-- SAMPLE QUALITY V POOR, GUMBO CLY WASHES THRU SCREENS --

- (720) CLY, ORNG, GUMBO, WASHES THRU SAMPLE
- (740) SAME
- (760) GUMBO CLY WASHING THRU SAMPLE W/ INC SLT & SD
- (780) GUMBO CLY, ORNG W/ MNR SLT & SS
- (800) CLY, LT ORNG, SLTY, GUMBO
- (820) CLY AA, BCMG ORNG/ BRN, GUMBO, TR ANHYDRITE
- (840) MOSTLY LT ORNG/ BRN CLY W/ SCAT ANHY, WH/ CLR
- (860) CLY LT ORNG, BRN, SLTY & SDY, GUMBO, WASHES THRU SAMPLE W/ SCAT ANHY
- (880) SAME
- (900) CLY LT ORNG/ BRN, SLI SLTY, SCAT ANHY, GUMBO
- (920) MOSTLY CLY WASHING THRU SAMPLE W/ SLT, SCAT ANHY, CLR
- (940) CLY LT ORNGE/ BRN, SLTY, INC FREE ANHY
- (960) CLY LT ORNG, SLTY, TR SD, SCAT ANHY CLR, MOSTLY CLY WASHES THRU LEAVING POOR SAMPLE
- (980) NO SAMPLE

NOTE: SAMPLE QUALITY REMAINS V POOR. DRILLING IN GUMBO CLY WHICH WASHES THRU SAMPLE SCREEN, LEAVING MOSTLY NONREPRESENTATIVE CAVINGS!

- (1000) CLY, GUMBO, ORNG BRN, SCAT ANHY
- (1020) CLY, AA, OCC V LT GRN/ GY, GUMBO
- (1040) GUMBO, AA
- (1060) CLY LT ORNG BRN, GUMBO, SLI SLTY, MOST WASHES OUT, V SFT W/ OCC ANHY WH/ CLR
- (1080) CLY AA W/ SLI INC ANHY, MOST CLR & COARSEXLN

- (1100) CLY ORNG/ BRN, SLI SLTY, SFT, WASHES THRU
- (1120) CLY ORNG/ BRN, GUMBO, SLI SLTY, MNR ANHY
- (1140) SAME
- (1160) CLY ORNG/ BRN, GUMBO, W/ INC ANHY, CLR, COARSEXLN
- (1180) GUMBO SH AA W/ 15% ANHY CLR, CXLN
- (1200) CLY LT BRN/ ORNG, GUMMY, SFT
- NOTE: STILL DRILLING PRED GUMBO CLY, WHICH WASHES THRU  
SAMPLE SCREENS...SAMPLE QUALITY POOR
- (1220) CLY ORNG/ BRN, GUMMY, SLI SLTY & SDY W/ MNR ANHY
- (1240) GUMMY CLY AA W/ 5% SS CLR, VF/ MG, P SRTD, ABNT MIN  
DEBRIS, EST 14% Ø, NO SHOWS
- (1260) CLY ORNG/ BRN, GUMMY, SLTY, SDY, MOST WASHES THRU
- (1280) GUMMY CLY, AA
- (1300) CLY LT ORNG, GUMMY, SLTY, WASHES THRU
- (1320) CLY AA W/ INC SDY & FREQ UNCONSL MED GR SD
- (1340) SS CLR/ LT GY, VF/ CG, P SRTD, SB ANG, CONGLOMIC, MIN  
DEBRIS, EST 15% Ø, NSFOC
- (1360) DECR SS W/ CLY LT ORNG, GUMMY, WASHES THRU & 10% ANHY  
MLKY WH, CXLN
- (1380) 50% SS LT GY, VF/ MG, P SRTD, EST 14% Ø, FREQ CLY MATRIX W/  
GUMMY CLY AA & 10% ANHY AA
- (1400) 70% CLY LT ORNG, GUMMY/ V SDY, SFT, SOME GRDG TO CLY  
FLD SS; ANHY AA

NOTE: SAMPLE QUALITY IMPROVING, DRILLING INC ANHY & SS, LESS  
"GUMBO" CLY

- (1420) SLTST LT ORNG, SLI SDY & ABNT CLY, SFT W/ 30% ANHY, WH, VFXL
- (1440) SLTST AA W/ 50% ANHY, WH, MIC/ FXL, MASS
- (1460) 60% ANHY, WH/ MLKY, FIB/ MASS W/ SLTST LT ORNG, SLI SDY
- (1480) SAME W/ TR SS LT GY, VF/ FG, SB RD/ SB ANG, MIN GR, EST 15% Ø, NSFOC, FREQ UNCONSL SS IN SMPL. NOTE: THIS CORRESPONDS TO THE DRLG BRK 1463-1466
- (1500) 50% ANHY AA W/ SLTST ORNG, V SDY W/ VF SD, SFT; STILL SOME GUMBO CLY WASHING THRU
- (1520) 75% ANHY, MLKY WH, INC MIXCL W/ SLTST AA
- (1540) 50% ANHY W/ SLTST ORNG, SHLY/ SDY, V BRIT
- (1560) 80% ANHY MLKY WH, MIC/ VFXL W/ 20% SLTST & CLY
- (1580) 70% ANHY AA; 30% SLTST ORNG, V SDY, SOME SHLY
- (1600) 75% ANHY, MLKY WH, MICXL W/ SLTST, AA
- (1620) 80% ANHY; SLTST ORNG, V SDY, SHLY
- (1640) ANHY & SLTST AA
- (1660) 75% ANHY, MLKY WH, MICXL W/ SLTST ORNG, SHLY/ SDY, V BRIT
- (1680) 35% SLTST ORNG, SDY/ SHLY, BRIT W/ ANHY
- (1700) 70% SLTST ORNG, SLI SDY, INC SHLY, ANHYDRIC
- (1720) 60% ANHY MLK WH, MIC/ VFXL W/ SLTST ORNG, SHLY, SFT
- (1740) SAME
- (1760) 50% SLTST ORNG, SLI SDY, SHLY W/ 50% ANHY
- (1780) INC SLTST, BCMG V SHLY & GRDG TO SLTY SH, GUMMY

- (1800) MOSTLY CLY, V GUMMY, SLTY, WASHES THRU, POOR SAMPLE
- (1820) 60% CLY ORNG, V GUMMY, V SLTY W/ 40% ANHY MLK WH,  
MICKL
- (1840) SAME
- (1860) 75% CLY, ORNG, GUMMY, V SLTY, WASHES THRU; ANHY AA
- (1880) AA W/ 10% SS OFF WH, VF/ MG, SB RD, EST 14% Ø, BRIT, NSFOC
- (1900) PRED CLY ORNG, SLI SLTY, GUMBO, WASHES THRU SMPL
- (1920) CLY AA, WASHING THRU LEAVING V POOR SMPL
- (1940) CLY RED/ ORNG, V GUMMY, V SFT, LIKE "POTTERS CLAY"
- (1960) CLY AA W/ 5% ANHY, MLK WH, VFXL
- (1980) CLY ORNG, GUMMY, SCAT SLTY, V SFT & WASHES OUT SMPL
- (2000) CLY ORNG/ RED ORNG, SLTY, V SFT & V GUMMY
- (2020) CLY LT ORNG/ RED ORNG, V SLTY, SLI SDY, GUMMY & WASHES  
OUT SAMPLE
- (2040) CLY ORNG/ RED, SLI SLTY, GUMMY
- (2060) CLY AA, V GUMMY W/ 15% ANHY MLKY WH, MIC/ VFXL
- (2080) PRED SLTST LT ORNG/ RED ORNG, SLI SDY, ANHYDRIC, SOME  
LMY, BCMG FIRM
- (2100) SLTST AA, SOME V SDY, SLI MICA  
START 10' SAMPLES @ 2100'
- (2110) SLTST RED ORNG, SLI/ V SDY, SLI LMY, FIRM
- (2120) AA W/ 15% ANHY, WH/ LT GY
- (2130) SLTST RED ORNG/ BRN, AA
- (2140) SLTST V LT ORNG/ RED ORNG, ANHYDRIC, SLI SDY

- (2150) SLTST AA
- (2160) SLTST RED ORNG, SHLY, ANHYDRIC, FIRM
- (2170) SLTST AA, TR GRDG TO SLTY SS, NSFOC
- (2180) SLTST LT ORNG/ RED ORNG, SDY/ SHLY, ANHYDRIC
- (2190) SLTST, INC RED ORNG
- (2200) SLTST AA
- (2210) 70% ANHY, WH/ TRNSLCNT, FIRM W/ SLTST LT ORNG, SDY, FIRM
- (2220) 70% ANHY WH/ TRNSLCNT, MIXCL, DNS, V FIRM
- (2230) ANHY AA, TR CLR CHT W/ SLTST, RED ORNG, ANHYDRIC
- (2240) ANHY WH/ CLR, CRYPTOXL, V FIRM W/ 25% SLTST
- (2250) ANHY WH/ GY, TRNSLCNT, CRYPTOXL, V FIRM W/ 50% RED ORNG SLTST
- (2260) 50% ANHY AA W/ SLTST RED ORNG, SDY/ SHLY
- (2270) NO SAMPLE
- (2280) PRED ANHY MLKY WH, CRYPTOXLN & DNS, HD; 35% SLTST
- (2290) SAME
- (2300) 90% ANHY WH/ OFF WH, CRYPTOXL & DNS, V FIRM
- (2310) ANHY, AA
- (2320) ANHY LT BRN/ WH, CRYPTOXL/ MICXL, FIRM W/ MNR SLTST LT BRN, ANHYDRIC, FIRM
- (2330) SH LT ORNG/ LT GRN, SLTY, V ANHYDRIC, SOME GUMMY W/ ANHY GRN, MICXL, FIRM
- (2340) SH LT ORNG/ RED BRN, GRN, ANHYDRIC, SOME V SLTY W/ 10% GRN ANHY

- (2350) SH AA, INC ANHY
- (2360) SH VARICOL ORNG TO GRN, ANHYDRIC, SLTY W/ 10% ANHY GRN, MICXL
- (2370) SH PRED TURQSE GRN, (CLY ST), V ANHYDRIC W/ FREQ ANHY, GRN, MICXL/ DNS, V FIRM
- (2380) INC ANHY LT/ DK GRN, MICXL, V FIRM W/ MNR GRN SH
- (2390) 70% ANHY, VARICOL WH/ BRN/ GRN, MICXL, DRTY & GRDS TO 30% V ANHYDRIC SH
- (2400) SH LT/ RED ORNG, SLTY/ SLI SDY, ANHYDRIC, FIRM W/ 10% ANHY AA
- (2410) NO SAMPLE
- (2420) SH AA, SOME GRDG TO SLTST
- (2430) SH LT ORNG/ RED BRN, V SLTY, ANHYDRIC, FIRM, SM GRDS TO SLTST
- (2440) SH LT BRN/ RED BRN, SLTY, ANHYDRIC W/ 20% ANHY TAN/ WH, MICXL, V FIRM
- (2450) 70% ANHY CRM, MICXL, V FIRM W/ SLTST, AA
- (2460) 90% SLTST LT/ M BRN, SHLY/ SDY, ANHYDRIC, V FIRM
- (2470) SLTST AA, SLI INC SDY
- (2480) SLTST ORNG BRN, SLI SDY, ANHYDRIC
- (2490) SLTST AA W/ 5% ANHY
- (2500) 50% ANHY CRM/ YEL TAN, MIC/ VFXL, FIRM W/ SLTST ORNG/ BRN, ANHYDRIC

NOTE: CHLORIDES HAVE RISEN FROM 400 TO 1050 PPM, PROBABLE SALT IN THIS SECTION!

START LAGGED SAMPLES @ 2500, LAG = 25 MINUTES

(Depth Caught) Lagged Depth

- (2520) 2505 SLTST LT ORNG, SDY, SHLY, V BRIT, ANHYDRIC W/ GUMBO SH WASHING THRU
- (2530) 2516 SLTST AA W/ INC CLY
- (2540) 2526 SLTST V LT ORNG, INC ANHYDRIC, SLI SDY, BRIT
- (2550) 2536 SLTST PALE ORNG/ WH, V ANHYDRIC, W/ ANHYDRIC SH, BRIT
- NOTE: NO CUTTINGS RETURNED 2550 TO 2653. MUD CHECK INDICATES ANHYDRITE 2550 TO 2620, GOING INTO SOLUTION. DRILLING BREAK @ 2620 INDICATES SALT AS CHLORIDES JUMPED TO 15K PPM. SHUT DOWN @ 2653 TO SALT SATURATE THE MUD.
- (2660) 2653 SALT WH/ CLR YEL
- (2670) 2661 SALT AA W/ MNR SLTST, RED ORNG, BRIT
- (2680) 2669 SALT CLR/ MLKY WH, BRIT
- (2690) 2681 SALT CLR W/ MNR SH RED BRN, SLTY, BRIT
- (2700) 2691 SALT & 5% SH, AA
- (2710) 2702 SALT CLR/ YEL W/ CLY RED/ GRN/ V DK GY, SFT  
CARBIDE LAG @ 2722 = 27 MINUTES
- (2720) 2711 SALT AA W/ FINE BLK ORGANICS
- (2730) 2722 SALT WH/ CLR W/ 20% SH GY & 10% UNCONSL SS, VFG
- (2740) 2733 SALT & SH, AA
- (2750) 2742 SALT W/ 30% GY V FINE CLY & UNCONSL SS
- (2760) 2752 SALT W/ UNCONSL SLT & SS, VFG, VARIOUS AMTS GY CLY ALSO
- (2770) 2763 SALT W/ MNR SLTST & SS, UNCONSL

NOTE: DRILLING SALT W/ SLT & SS IN SUSPENSION, ALL SAMPLE UNCONSOLIDATED; MOST SALT WASHING OUT

(2780) 2773 SALT W/ MNR AMTS GY SH & SLTST  
(2790) 2782 SAME  
(2800) 2793 SALT W/ MNR UNCONSL SS & SLT; UNCONSL SS IS VFG & ANG  
(2810) 2803 SALT W/ MNR SLTST LT ORNG, SDY, BRIT, PRED UNCONSL  
(2820) 2813 60% SLTST LT ORNG, SLI SHLY, CONSL, BRIT, SLI SDY  
(2830) 2821 SLTST LT ORNG, SLI SDY, SHLY, SFT W/ CORNSTARCH CONTAMINATION  
(2840) 2832 SLTST AA  
(2850) 2842 SLTST LT RED ORNG, OCC SDY, SHLY, V BRIT W/ CONTAMINATION  
(2860) 2852 NO SAMPLE  
(2870) 2861 SLTST LT RED ORNG, BRIT, SLI SALTY  
(2880) 2871 20% SALT W/ SLTST LT ORNG/ LT GY, SALTY, BRIT  
(2890) 2880 80% SALT, CLR W/ MNR SLTST  
(2900) 2890 SALT CLR/ MLKY WH  
(2910) 2901 90% SALT CLR/ OFF WH (POSS ADDED SALT) W/ 10% SLTST LT GY/ RED ORNG, BRIT, SALTY  
(2920) 2912 SALT & SLTST, AA  
(2930) 2920 60% CORNSTARCH W/ SLTST LT ORNG, SHLY, FLKY, V BRIT  
(2940) 2930 INC SLTST, BCMG V LT GY/ LT ORNG W/ 10% SS LT GY, SLTY/ VFG, P SRTD, ABNT CLY MIN & CLY FL, POSS SALT FLD I.P., EST 10% Ø, NO VIS PERM, NSFOC  
(2950) 2940 PRED AA, SLTST LT GY/ LT ORNG, SLI SDY W/ 5% SS AA

(2960) 2952 ANHY LT BLU GRN, MIC/ VFXL, SLI SLTY, SLI SALTY W/ 25%  
SALT WH/ PALE BLU GRN, SLI SLTY, V SFT, FXL

(2970) 2960 SALT & ANHY AA W/ INC SLTST LT GY, SALTY, SLI SDY, BRIT

(2980) 2970 SLTST LT GY/ RED ORNG, BRIT, OCC SDY W/ 20% SALT CLR, VF/  
MXL

(2990) 2980 INC SALT CLR, F/ MXL W/ SLTST AA

(3000) 2990 20% SALT W/ 10% SS TAN/ LT ORNG, LVFG, SLTY, CLY FLD, TITE,  
NSFOC, SFT, SOME GRDS TO SDY SLTST

(3010) 2997 INC SLTST LT ORNG, SLI SDY, SHLY, BRIT, SOME LT GY W/ 15%  
CLR SALT

(3020) 3010 40% SALT CLR, F/ MEDXL; 25% ANHY LT BLU GRN, SHLY & SLTY,  
VFXL

(3030) 3016 40% SLTST LT ORNG, V SDY & GRDS TO SLTY SS, PROB HALITE  
FLD (LOOKS "ETCHED"), SHLY & TITE, NSFOC W/ 50% SALT

(3040) 3026 85% SALT CLR/ LT ORNG, V COARSE W/ MNR SLTST

(3050) 3035 NO SAMPLE

(3060) 3048 99% SALT, CXL, CLR

(3070) 3061 30% SALT PALE ORNG/ CLR, FXL W/ SLTST LT GY/ ORNG, BRIT

(3080) 3072 SALT CLR, CXL W/ 10% SLTST

(3090) 3079 SLI INC SLTST LT ORNG, FLKY

(3100) 3092 99% SALT, CLR, CXL

(3110) 3101 SLTST TAN/ GY/ ORNG, SLI SDY, BRIT W/ 20% SALT

(3120) 3111 SLTST, AA

(3130) 3120 SLTST ORNG/ TAN, GY, SLI SDY, BRIT W/ 10% SALT

(3140) 3127 SLTST LT GY/ LT ORNG, SLI SDY, BRIT W/ 20% SALT

- (3150) 3135 SLTST AA, INC LT ORNG, V SDY, V BRIT
- (3160) 3146 SLTST LT ORNG/ LT GY, SDY W/ SOME SS CLR/ WH, VF/ FG, SLTY, HALITE FLD I.P., EST 15% Ø, NO SHOWS
- (3170) 3158 SLTST & GRDG TO SLTY SS AA
- (3180) 3163 NO SAMPLE
- (3190) 3169 5% SS CLR/ WH, VF/ FG, P SRTD, SB ANG, HALITE FLD I.P., EST +15% Ø, NO SHOWS, UNCONSL I.P.; SLTST AA
- (3200) 3180 INC SLTST LT GY, SDY, BRIT, SALTY W/ DECR SS, AA
- (3210) 3190 SLTST LT ORNG, SHLY, BRIT, SDY W/ 10% SS AA
- (3220) 3204 PRED SLTST LT GY, SHLY, SLI SDY W/ DECR SS
- (3230) 3215 SLTST, AA
- (3240) 3222 SLTST LT GY, OCC ORNG, SLI SDY, BRIT W/ MNR SALT & SS
- (3250) 3233 90% SLTST LT GY, SLI S & P, SDY
- (3260) 3246 90% SLTST AA W/ 10% SS WH/ CLR, VF/ FG, P SRTD, SALTY, EST +15% Ø, NO SHOWS
- (3270) 3255 SLTST GY, SLI SDY, BRIT
- (3280) 3266 SLTST, AA
- (3290) 3272 SLTST GY, SLI SDY, BRIT, SLI SHLY
- (3300) 3282 SLTST LT GY/ GY GRN, SLI SDY, FIRM/ BRIT W/ MNR SS
- (3310) 3293 SLTST AA, PRED LT GY
- (3320) 3303 SLTST LT GY/ LT GRN, SHLY/ SDY, V BRIT
- (3330) 3315 SAME W/ 5% SS CLR, VF/ MG, P SRTD, ANG, PROB HALITE FLD & TITE, LOOKS ETCHED, NO SHOWS
- (3340) 3332 SLTST AA W/ 30% SALT CLR, BRIT

(3350) 3336 75% SALT CLR, CXL W/ SLTST  
(3360) 3344 SALT W/ INC SLTST, LT BRN/ LT ORNG, SDY, SHLY/ SALTY  
(3370) 3354 90% SALT, CLR, CXL  
(3380) 3361 90% SALT, AA  
(3390) 3372 95% SALT CLR, CXL  
(3400) 3384 95% SALT, AA  
(3410) 3391 50% SLTST LT ORNG/ GY, SLI SDY, SHLY, BRIT  
(3420) 3403 SLTST GY/ ORNG W/ 35% SALT LT ORNG/ CLR, SHLY & SLTY  
(3430) 3415 SALT CLR/ MLKY, CXL  
(3440) 3426 SALT, AA  
(3450) 3436 SALT CLR, CXL  
(3460) 3446 SALT, AA  
(3470) 3455 SALT LT ORNG/ CLR, FXL, SLTY W/ 40% SLTST LT ORNG, SALTY,  
SHLY  
(3480) 3469 SALT AA, SLI INC SLTST, GY/ ORNG, SHLY, BRIT  
(3490) 3479 INC SLTST LT BRN/ ORNG/ GY, SHLY, SLI SDY W/ 20% SALT  
(3500) 3486 50% SALT CLR/ WH, CXL W/ SCAT SAND CLUMPS & SLTST INC  
BRN, SHLY, V BRIT  
(3510) 3498 70% SALT CLR, CXL W/ SLTST ORNG/ BRN, AA  
(3520) 3510 95% SALT AA; 5% SLTST ORNG/ BRN, SDY  
(3530) 3516 95% SALT, CXL  
(3540) 3528 90% SALT W/ SLTST ORNG/ GY, SHLY, SFT, TR GRN SH  
(3550) 3538 95% SALT, CLR, CXL

(3560) 3549 90% SALT W/ SH GRN, SB WXY, V SALTY & SLTST, AA  
(3570) 3558 SALT W/ 40% SH GRN/ YEL GRN, SB WXY, ANHYDRIC & SALTY,  
FIRM  
(3580) 3569 10% GRN SH W/ SALT CLR, CXL  
(3590) 3578 SALT W/ 5% SH GRN, V SLTY, BRIT  
(3600) 3586 99% SALT, CLR, CXL  
(3610) 3596 SALT, AA  
(3620) 3601 SALT CLR, CXL  
(3630) 3609 SAME  
(3640) 3615 SALT CLR, CXL  
(3650) 3632 SALT AA W/ 1% SH BLK, FIRM, CARB; NOTE: BACKGROUND GAS  
INCREASED FR/ 1/2 TO 2 UNITS, WITH 30% C2, POSSIBLE SOURCE  
ROCK.  
(3660) 3645 SALT CLR, CXL W/ 5% SH, BLK, CARB, FIRM  
(3670) 3656 99% SALT, CLR, CXL W/ TR SH, AA  
(3680) 3667 99% SALT, CLR, CXL  
(3690) 3675 SAME  
(3700) 3684 SALT, CLR, CXL  
(3710) 3696 SALT, CLR, CXL  
(3720) 3708 SALT AA W/ 5% SH, BLK, CARB, FIRM  
(3730) 3720 SALT CLR, CXL  
(3740) 3732 SALT, AA  
(3750) 3737 SALT AA W/ 5% SH GREEN, SALTY, SOME SLTY  
(3760) 3746 SALT, CLR, CXL W/ SH AA; ALSO 2% SH BLK, CARB, V SLTY

- (3770) 3758 SALT, CLR, CXL
- (3780) 3772 NO SAMPLE
- (3790) 3776 SALT W/ 3% SH GRN/ DK GY, SLTY, FLKY
- (3800) 3783 TRASHY LOOKING SAMPLE W/ SH GRN/ BLK, CARB WHEN BLK, SM GRN & WXY & SLTST ORNG/ OCC BRN, SHLY, BRIT; SMPLE LOOKS LIKE CAVINGS?
- (3810) 3796 SH VARICOL GRN/ RED BRN/ BLK, WXY/ SLTY, OCC CARB W/ MNR SLTST; 20% SALT
- (3820) 3804 AA W/ 5% SS CLUMPS, VF/ MG, HALITE FLD, ETCHED, P SRTD, V BRIT, PROB NO Ø?, NSFOC W/ 20% SALT
- (3830) 3820 SH BLK, SLI CARB, FIRM W/ SLTST RED BRN, SLI & V SDY, FIRM
- (3840) 3828 AA W/ INC SH BLK, CARB, FIRM, WK YEL CRUSH CUTS; 25% SALT, CXL, CLR
- (3850) 3838 SLTST LT ORNG/ RED BRN, SHLY/ SDY W/ 20% BLK SH; 20% SALT
- (3860) 3848 40% SH BLK, FIRM, PETROLIF, NO DRY FLOR, FAIR YEL CRUSH CUTS
- (3870) 3857 30% SH, BLK, AA W/ SLTST RED BRN, SHLY, OCC SDY
- (3880) 3866 SLTST RED BRN/ RED ORNG, SHLY, BRIT W/ 25% BLK SH AA
- (3890) 3879 SLTST AA, BCMG SDY W/ 30% SALT CLR, CXL & 20% BLK SH
- (3900) 3890 60% SH BLK, FIRM, PETROLIF, GOOD YEL CRUSH CUTS W/ SLTST & SALT CLR, CXL
- (3910) 3900 30% SALT CLR, CXL W/ SLTST RED ORNG, SDY & SHLY, BRIT; SCAT SD CLUMPS
- (3920) 3910 SLTST AA W/ 30% SALT CLR, CXL
- (3930) 3918 95% SALT CLR, CXL W/ 5% BLK SH
- (3940) 3926 99% SALT CLR, CXL

(3950) 3939 SALT AA

(3960) 3949 99% SALT, CLR, CXL

(3970) 3958 SAME

(3980) 3968 99% SALT, CLR, CXL

(3990) 3980 99% SALT

(4000) 3988 SALT, CLR, CXL

(4010) 3998 90% SALT W/ SLTST RED/ BRN/ GY, SHLY, V SFT

(4020) 4012 85% SALT W/ 15% SLTST GY/ OCC BRN, V SHLY & V SFT

(4030) 4020 99% SALT CLR

(4040) 4028 NO SAMPLE, WORK ON SHAKER

(4050) 4038 INC SLTST RED ORNG, OCC GY, V SHLY SDY

(4060) 4045 SLTST AA & TR SS GRN/ TAN BRN, LVFG, SLTY, SFT, EST 14% Ø,  
SOME CLY FLD & TITE, NSFOC

(4070) 4052 PRED SLTST RED ORNG, SHLY/ SDY, BRIT W/ TR SS AA

-- DRILLING BREAK 4060-4068, CIRCULATE SAMPLES @ 4076 --

(15") 4060 SDY SLTST AA

(30") 4070 SLTST W/ 50% CLR SALT

(45") 4076 10% SS ORNG/ TAN, LVFG, SLTY, SFT, CLY FLD, TITE, NSFOC W/  
SLTST RED BRN, SDY/ SHLY

(4090) LAT SLTST RED BRN/ BRN, V SDY, SHLY, BRIT

(4100) 4080 SLTST RED BRN, SHLY, SDY, SOME GRDG TO SHLY SS; SCAT  
CLUMPS CLR ANHY

(4110) 4095 SLTST RED ORNG/ LT BRN AA W/ 10% SH RED ORNG, SB PLTY,  
BRIT

- (4120) 4105 SLTST AA, SOME V SHLY
- (4130) 4115 SLTST GY, V SHLY, BRIT
- (4140) 4125 SLTST AA, GRDS TO SLTY SH
- (4150) 4136 SLTST RED BRN, INC SDY, BRIT
- (4160) 4147 SLTST RED ORNG, SDY, SHLY W/ 10% SH RED ORNG, BLKY
- (4170) 4159 INC SH BRICK RED, FIRM, BLKY W/ 50% SLTST AA
- (4180) 4172 SH ORNG/ BRICK RED, SLI SLTY, BLKY, FIRM
- - BIT TRIP @ 4187' - -
- (4200) LAT 50% SH BRICK RED, BLKY, SLTY W/ 50% SLTST BRICK RED, SHLY, TR SDY
- (4210) 4194 SH & SLTST AA
- (4220) 4206 SH BRICK RED, INC SLTY W/ 50% SLTST BRICK RED, SHLY/ SDY
- (4230) 4214 SH BRICK RED, NON/ V SLTY, FIRM W/ 40% SLTST BRICK RED, MOD SDY
- (4240) 4224 SAME
- (4250) 4237 SH BRICK RED, BLKY, SLI SLTY, GRDS TO 30% SLTST
- (4260) 4247 PRED SH, AA; 20% SLTST BRICK RED, SHLY
- (4270) 4258 SLTST BRICK RED/ ORNG, SHLY/ SDY, OCC GRDS TO SLTY SS; SH BRICK RED, SLI SLTY
- (4280) 4268 SLTST AA W/ MNR SS RED ORNG, SLTY/ VFG, SHLY, TITE, NSFOC W/ 25% SH BRICK RED, SLTY
- NOTE: LEAD BIRD SHOT (#6 & 7 1/2) IN THESE SAMPLES WERE PROBABLY STIRRED UP OFF BOTTOM OF PITS, DOVE SEASON LAST WEEK, RIG PEPPERED SEVERAL TIMES.
- (4290) 4280 SLTST BRICK RED, SHLY/ SDY W/ MNR ANHY WH/ LT CRM, MICXL; ABNT "TRASH"

- (4300) 4286 PRED SLTST LT ORNG/ BRICK RED, SHLY
- (4310) 4293 SLTST ORNG/ BRICK RED, SLI SDY, SHLY, FIRM
- (4320) 4301 SLTST BRICK RED, V SDY & GRDG TO SS TAN/ BRICK RED, LVFG, SLTY, P SRTD, CLY FLD, TITE, FLKY, V SFT, NSFOC
- (4330) 4323 SDY SLTST AA W/ 25% SH BRICK RED, SLTY & MNR SH LT/ M GY, WXY/ SLI SLTY
- (4340) 4331 35% SH BRICK RED, ANHYDRIC?, SLI SLTY W/ SLTST & SLTY SS, AA
- (4350) 4342 50% SH BRICK RED, OCC RED BRN, SLI/ NON SLTY, FIRM W/ SLTST AA
- (4360) 4354 SLTST BRN/ BRICK RED, SLI/ V SDY, BRIT W/ 40% SH
- (4370) 4363 SLTST BRICK RED, INC SHLY, BRIT W/ SH BRICK RED, SLTY
- (4380) 4370 SLTST & SH W/ MNR ANHY, CRM/ MLK WH, MICXL
- (4390) 4377 SLTST TAN/ BRICK RED, SHLY, SLI SDY W/ 20% SH
- (4400) 4386 SLTST W/ INC SH & SOME LT GY
- (4410) 4396 SLTST TAN/ BRICK RED, INC SDY, BRIT W/ MNR SH
- (4420) 4404 SLTST AA W/ 30% SH RED ORNG/ BRICK RED, SLI SLTY
- (4430) 4416 SLTST TAN/ BRICK RED, V SDY, MNR AMT GRDS TO SLTY SS, TITE, NO SHOWS
- (4440) 4428 SLTST AA, SOME SDY
- (4450) 4441 INC SH BRICK RED, SMOOTH/ SLTY
- (4460) 4453 SH BRN/ BRICK RED, BLKY, SLI SLTY
- (4470) 4462 SH BRICK RED, SLI SLTY W/ 50% SLTST BRICK RED, SHLY, TR GRDS TO SLTY SS
- (4480) 4474 (LAT) FREQ TRIP CAVINGS W/ SLTST AA & SH BRICK RED, SLTY

(4490) 4483 SLTST TAN/ RED BRN, FREQ V SDY, BRIT W/ 35% SH AA

(4500) 4495 SH RED BRN/ BRICK RED/ GY, SMOOTH/ V SLTY W/ 50% SLTST, RED BRN, SDY

(4510) 4505 SLTST TAN/ RED BRN, V SDY, FREQ GRDS TO SS, V SLTY; 20% SH RED BRN/ BRICK RED

(4520) 4512 30% SLTST AA W/ SALT CLR, CXL

(4530) 4525 70% SALT CLR, CXL W/ SLTST RED BRN, SHLY/ SDY

(4540) 4533 99% SALT CLR, CXL

(4550) 4544 99% SALT

(4560) 4551 99% SALT, CLR, CXL

(4570) 4556 SALT AA

(4580) 4565 99% SALT, CLR, CXL

(4590) 4572 100% SALT, AA

(4600) 4577 25% SLTST RED ORNG, SDY, SHLY W/ 75% SALT, CLR, CXL

SAMPLES 4600 TO 5220, 100% SALT, CLR, PRED CXL

(5210) 5193 100% SALT, CLR, CXL

(5220) 5208 SALT, AA

(5230) 5219 SALT AA W/ 5% SLTST ORNG RED, SHLY, BRIT

(5240) 5230 10% SLTST LT ORNG/ RED BRN, SHLY, SLI SDY

(5250) 5240 SLTST BRICK RED/ RED ORNG, SDY, BRIT W/ 1% SH BLK, CARB, SFT, NSFOC

(5260) 5250 SLTST RED ORNG, SLI/ V SDY, BRIT; 2% BLK SH, AA

(5270) 5262 SLTST RED ORNG, SDY, MNR AMTS GRDG TO SLTY SS, TITE, SHLY, BRIT, NSFOC; ABNT CAVINGS & "TRASH", INCLUDING SCALE, LCM, PAINT SHAVINGS

(5280) 5271 SAME

(5290) 5282 SLTST RED ORNG, SDY W/ 5% SLTST GREEN, SDY, SALTY, BRIT

(5300) 5292 SLTST GREEN/ RED ORNG, SLI/ V SDY, SALTY MATRIX, BRIT,  
SOME GRDS TO SLTY GREEN SS, NO VIS Ø, NO SHOW; 20% SALT  
CLR CXL

-- CARBIDE LAG @ 5292 = 60 MINUTES --

(5310) 5301 90% SALT CLR, CXL

(5320) 5308 95% SALT

(5330) 5321 SALT CLR, CXL

-- 5340 TO 5570, SAMPLE 100% SALT, CLR, CXL, BRIT --

(5580) 5554 80% SALT W/ SLTST RED ORNG, SHLY, SALTY

(5590) 5575 90% SALT W/ 10% SLTST, AA

(5600) 5580 15% SLTST LT RED ORNG, SLI SHLY, SALTY W/ 85% SALT

(5610) 5585 50% SLTST TAN/ RED ORNG, SHLY, BRIT W/ SALT, AA

(5620) 5590 30% SLTST, 70% SALT CLR, CXL

(5630) 5600 60% SLTST LT GY/ RED ORNG, SHLY/ SLI SDY W/ 40% SALT

(5640) 5610 99% SALT, CLR, CXL

-- SAMPLES 5650 TO 6650 (TD), 100% SALT CLR, CXL --

ARIZONA GEOLOGICAL SURVEY 416 W. CONGRESS, SUITE 100, TUCSON, AZ 85701

**FAX**

Date: 6-28-01  
Number of pages including cover sheet: 5

To: Mathew Garlick

Phone:

Fax phone: 623-935-1020

CC:

From: Steve Rauzi

Arizona Geological Survey

416 W. Congress. Suite 100

Tucson, AZ 85701

Phone: (520) 770-3500

Fax phone: (520) 770-3505

REMARKS:  Urgent  For your review  Reply ASAP  Please comment

I've attached the

- ① app to p+a
- ② plugging record (2 sides), and
- ③ daily activity 9-22-92 to 9-28-92

for the SunLot-Melange # 32-23 hole. Note  
9 5/8" casing cut off 4 1/2' below ground level.



7-21-99

Jerry Ellsworth called

Reported slug of oil or some type of HC contamination in wtr well  
located B(2-1)656b - 2 wells near each other

Adamsian wtr system. DEQ, County Health smelled oil in tank  
recommended shut down or advise customers drink bottled wtr.

Not turbine oil - vegetable oil is used

No gas stations or other source of contamination nearby  
Water water in that area ~ 90°

Perfs 700-1200', wtr table @ 300'

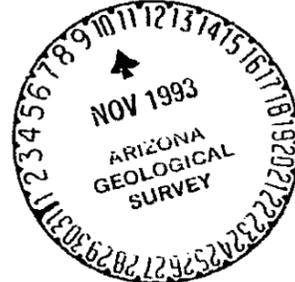
SLR / 7-21-99



*Rauzi*  
**CITY OF AVONDALE**

INCORPORATED 1946

525 NORTH CENTRAL AVENUE • AVONDALE, ARIZONA 85323 • PHONE: 932-2400



**MAYOR**  
RAYMOND W. BEDOYA

**VICE MAYOR**  
THOMAS F. MORALES, JR.

**COUNCIL MEMBERS**  
LON MONTGOMERY  
EARL D. COOPER  
HENRY BELTRAN  
DALE MOXON  
ALBERT CARROLL, JR.

**CITY MANAGER**  
CARLOS V. PALMA

**CITY CLERK**  
LINDA M. TYLER

**CITY ATTORNEY**  
FRANK L. ROSS

October 26, 1993

*file 877*

Arizona Geological Survey  
845 N. Park Avenue, Suite 100  
Tucson, Arizona 85719-4816

Attn: Laurie Colton

Enclosed is a check in the amount of \$ 10.57 to purchase a copy of Open File Report No. 86-14 and a copy of the Mud Log for the Suncor Melange Well 32-23.

Please mail these copies to the attention of Mr. Jim Mitchell, Public Works Department, at the above address.

If you have any questions regarding this request, please contact me at (602) 932-1909.

Thank you,

*Rose Loza*

Rose Loza



AVONDALE  
A Bicentennial  
Community



Fife Symington  
Governor

State of Arizona  
**Arizona Geological Survey**

845 North Park Avenue, #100  
Tucson, Arizona 85719  
(602) 882-4795



Larry D. Fellows  
Director and State Geologist

September 3, 1993

Certified Mail

Ms. Debbie S. Liller  
Arrowhead Resources (U.S.A.) Ltd.  
475 17th Street, Suite 820  
Denver, Colorado 80202

Re: Valley National Bank of Arizona C.D. No. 2609737

Dear Ms. Liller:

Our records show that the Arrowhead Suncor-Melange #32-23 well, permit 877, has been plugged and abandoned in accordance with the rules of the Oil and Gas Conservation Commission and that the location has been restored to the satisfaction of the Commission. Therefore, the above referenced certificate of deposit is hereby released into your custody.

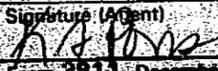
You will need to present the securities release endorsed by the State Treasurer in order to redeem the certificate.

Please let me know if I may be of further assistance.

Sincerely,

Steven L. Rauzi  
Oil & Gas Program Administrator

Enclosure

<b>SENDER:</b> • Complete items 1 and/or 2 for additional services. • Complete items 3, and 4a & b. • Print your name and address on the reverse of this form so that we can return this card to you. • Attach this form to the front of the mailpiece, or on the back if space does not permit. • Write "Return Receipt Requested" on the mailpiece below the article number. • The Return Receipt will show to whom the article was delivered and the date delivered.		I also wish to receive the following services (for an extra fee): 1. <input type="checkbox"/> Addressee's Address 2. <input type="checkbox"/> Restricted Delivery Consult postmaster for fee.	
3. Article Addressed to: Debbie Liller Arrowhead Resources USA 475 17th ST STE 800 Denver, CO 80202		4a. Article Number P242659662	
5. Signature (Addressee)  6. Signature (Agent) 		4b. Service Type <input checked="" type="checkbox"/> Registered <input type="checkbox"/> Insured <input type="checkbox"/> Certified <input type="checkbox"/> COD <input type="checkbox"/> Express Mail <input type="checkbox"/> Return Receipt for Merchandise	
		7. Date of Delivery SEP 07 1993	
		8. Addressee's Address (Only if requested and fee is paid)  	
PS Form 3811, December 1991		DOMESTIC RETURN RECEIPT	

If your RETURN ADDRESS completed on the reverse

Thank you for using Return Receipt Service.

**SECURITIES SAFEKEEPING**  
 1700 WEST WASHINGTON ST. - PHOENIX, ARIZONA 85007

DATE: 8/27/93

STATE AGENCY NO. \_\_\_\_\_

STATE AGENCY OIL AND GAS CONSERVATION COMMISSION

State Treasurer's Use Only

COMPANY ARROWHEAD OIL & GAS, LTD. ✓

475 17TH STREET, SUITE 820

DENVER CO 80202

DOMESTIC FOREIGN

**DEPOSIT**

C.D. NO.:

BANK:

MATURITY DATE:

INTEREST RATE: %

AMOUNT \$

C.D. ASSIGNMENT MUST BE ATTACHED UNLESS C.D. IS PAYABLE TO STATE TREASURER

**RELEASE**

C.D. NO.: 2609737 ✓

BANK: VALLEY NATIONAL BANK OF ARIZONA ✓

MATURITY DATE: 12/21/92 ✓

INTEREST RATE: 3.4% ✓

AMOUNT \$ 5,000.00 ✓

STATE TREASURER VALIDATION NO. \_\_\_\_\_

RECEIVED  
STATE TREASURER  
SEP 1 2 50 PM '93

RECEIVED THE ABOVE RELEASE		STATE AGENCY AUTHORIZATION	
BY <u>Stern L. Rainz</u> 8/27/93 Authorized Signature Date		BY <u>Stern L. Rainz</u> Authorized Signature	
FOR BANK USE ONLY		STATE TREASURER AUTHORIZATION	
		BY <u>Katherine Valentin</u> Authorized Signature	
Checked by _____	Verified by _____	BANK AUTHORIZATION	
		BY _____ Authorized Signature	
		STATE'S DEPOSITORY BANK	



Fife Symington  
Governor

State of Arizona  
**Arizona Geological Survey**

845 North Park Avenue, #100  
Tucson, Arizona 85719  
(602) 882-4795



Larry D. Fellows  
Director and State Geologist

August 27, 1993

877

Ms. Katherine L. Valentin  
State Treasurer's Office  
1700 West Washington  
Phoenix, Arizona 85007

Re: Valley National Bank of Arizona C.D. No. 2609737

Dear Katherine:

I have enclosed a securities safekeeping release for the referenced certificate of deposit. The maturity date and current interest rate are blank.

The certificate is made payable to the Arizona State Treasurer. Will the Treasurer need to endorse the certificate to allow Arrowhead Oil & Gas Ltd. to obtain their funds?

Sincerely,

Steven L. Rauzi  
Oil & Gas Program Administrator

Enclosures

*Return yellow copy with  
signature of State Treasurer  
so that C.D. can be  
cashed by ARROWHEAD.  
Pink copy for our file  
KV/SER 8/27/93*

**MEMORANDUM TO FILE**

**DATE:** August 26, 1993

**FROM:** Steven L. Rauzi *SLR*  
Oil and Gas Program Administrator

**SUBJECT:** Field check restoration of well location  
ARROWHEAD RESOURCES SUNCOR-MELANGE #32-23, PERMIT 877

On Friday, August 20, 1993, Pam Lott and I inspected the final restoration of the referenced well location. The mud pits were reclaimed, all debris was removed, and the location was restored to its original level state. On Thursday, August 26, 1993, I called SunCor and they were also satisfied with the final restoration of the well location.

The bond on this well may therefore be released.

**ARROWHEAD RESOURCES (U.S.A.) LTD.**

475 17TH STREET, SUITE 820

DENVER, COLORADO 80202

(303) 294-0400  
FAX (303) 294-0724

August 12, 1993

Mr. Steve Rauzi  
Oil & Gas Program Administrator  
Arizona Geological Survey  
845 North Park Avenue, Suite 100  
Tucson, Arizona 85719

877

Re: Arrowhead Resources (USA) Ltd.  
Doing Business as Arrowhead Oil and Gas Ltd.  
SunCor-Melange #32-23, Sec. 23, T. 2N., R. 1 W.  
Maricopa County, Arizona

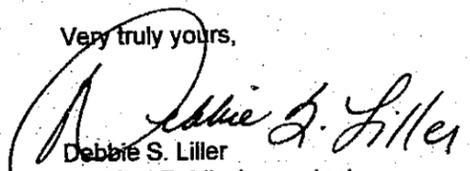
Dear Mr. Rauzi,

Arrowhead Resources (USA) Ltd. has completed site clean up and restoration of the above referenced well location.

After your satisfactory inspection of the site, please have the \$5,000.00 bond posted with the Treasurer of the State of Arizona released.

Thank you for your assistance in this matter.

Very truly yours,

  
Debbie S. Liller  
Certified Public Accountant



**MEMORANDUM TO FILE**

**DATE:** April 30, 1993

**FROM:** Steven L. Rauzi *SLR*  
Oil and Gas Program Administrator

**SUBJECT:** Restoration of location,  
SUNCOR-MELANGE #32-23 WELL, STATE PERMIT #877

Called Mr. Warren Downs this morning to check on the current condition of the location. He indicated that Arrowhead had planned to let the reserve pits evaporate and have the location restored by the end of this month. However, the heavy rains in January and February prevented evaporation of the pit.

Called Mr. Bill Cagle, Cagle Consultants, and he referred me to Mr. John Luken, Arrowhead Oil and Gas. Mr. Luken indicated that Wheeler Construction has been hired to restore the location and that he would be notifying me in about a week or two for final inspection of the location.

## Bonus Bids Top \$1,000,000 at Wyoming BLM Lease Sale

**T**HE DECEMBER 1 oil and gas lease sale held by the Wyoming State Office of the Bureau of Land Management in Cheyenne drew high bids totaling \$1,029,888 for 161 parcels covering 102,248 acres, an average of \$10.07 per acre.

On the day of the sale, the BLM offered 425 parcels totaling 366,880.09 acres. The sale offering was described in PI 10-27-92.

*(Utah, continued from Page 1)*

Creek interval (PI 11-25-92). Total measured depth is 9080 ft; true vertical depth is 8110 ft.

Working interest holders in the 10-1 Kane Springs-Federal discovery include Coastal with 48.1 percent, Columbia Gas 16.9 percent, Enserch Exploration Partners Ltd 18.2 percent and Exxon Corp with 16.9 percent.

Meanwhile, Columbia Gas has filed a Notice of Staking for a stepout a little more than half a mile south of the 27-1 Kane Springs-Federal. The Kane Springs 25-19-34-1 is to be drilled in nw ne 34-25s-19e.

Columbia Gas also has plans to drill the Kane Springs 26-20-18-1 from a surface location 1300 ft from the south line and 1200 ft from the east line (se se) 18-26s-20e. The latter venture is in the section north of the company's second horizontal discovery in the program, the 19-1A Kane Springs-Federal in se 19-26s-20e. That Cane Creek producer flowed at a calculated rate of 1,158 bbls of oil per day through an 11/64-inch choke (PI 11-19-91).

The sale's high per-acre bid of \$280 was made for Parcel WY-9212-352, a 58.16-acre lease covering acreage in the bed of the Green River in 17-26n-112w, Lincoln County, about 21 miles southwest of Big Piney. It's within three quarters of a mile east of several Enron Oil & Gas Co.-operated Frontier gas producers in the Big Piney/Stead Canyon area.

Half a mile east of the lease, Arrowhead Resources (USA) Ltd late last year completed the 1 Spur Canyon, ne nw 16-26n-112w, as a Frontier gas/condensate producer. In its first 11 months on line (October 1991 through August 1992), the 7650-ft well produced a total of 177,499,000 cu ft of gas and 632 bbls of

condensate. In August, it produced an average of 521,000 cu ft of gas and one bbl of condensate per day.

Parcel WY-9212-068 drew the sale's highest overall bid of \$121,410, or about \$95 per acre. The Powder River Basin lease comprises 1,280 acres in sections 22, 23, 26 and 27-51n-69w, Campbell County, about 12 miles northwest of Moorcroft and within one and a half miles of four Minnelusa oil pools—Wheat Draw to the east-southeast, Simpson Ranch to the north, Stewart to the south, and North Garner Lake to the west.

More comprehensive sale results will be published in an upcoming edition of PI.

## Winslow Schedules Wildcat West of Nebraska's Gurley Field

**D**ENVER-BASED WINSLOW Resources Inc, with Gear Drilling under contract, will evaluate the D and J sands at a 4700-ft Denver Julesburg Basin wildcat staked 10 miles north of Sidney in the Nebraska Panhandle.

The 1 Gurley, sw sw 4-15n-49w, Cheyenne County, is a mile northwest of Rush Creek field, a D sand pool with cumulative production of about 386,000 bbls of oil and 1.2 million bbls of water. A little more than two miles east of the new location, Gurley field has produced more than 2.8 million bbls of oil, 284 million cu ft of gas and 3.9 million bbls of water from the D and J sands since its discovery in 1949.

The new wildcat offsets a 4671-ft dry hole completed by Plains Exploration and Dunn & Boring in 1953 at the 1 Hill, also in sw sw 4-15n-49w. Log tops at that well include D sand at 4508 ft and J sand at 4654 ft, measured from a Kelly bushing elevation of 4260 ft. A drillstem test of D sand between 4528 and 4557 ft recovered 210 ft of highly oil cut mud and 270 ft of salty water. A test of a deeper interval from 4634 to 4647 ft yielded 15 ft of oil. Plains also drillstem tested the interval 4646-56 ft, recovering 110 ft of mud cut oil, 36 ft of oil cut mud and 10 ft of salt water.

**CAGLE CONSULTING, INC.**

410 17TH STREET  
SUITE 2420  
DENVER, CO 80202  
(303) 595-3341

November 6, 1992

Steven L. Rauzi  
Arizona Geological Survey  
845 North Park Avenue, Suite 100  
Tucson, Arizona 85719

Re: SunCor - Melange #32-23  
Well Completion or Recompletion Report and Well Log  
SWNE Sec 23 T2N R1W  
Maricopa County, Arizona

Dear Mr. Rauzi:

Please find attached our completed Well Completion or Recompletion Report and Well Log for the above reference well.

If you should have any additional questions, please contact me at the above phone number.

Sincerely,



Bill Cagle  
Consultant

Enc.

cc: Debbie Liller  
Harold Laycraft  
Operation File

NOV 12 1992  
AZ OIL & GAS  
CONSERVATION COMMISSION

NOV 12 1992  
AZ OIL & GAS  
CONSERVATION COMMISSION

NOV 12 1992



Fife Symington  
Governor

State of Arizona  
**Arizona Geological Survey**

845 North Park Avenue, #100  
Tucson, Arizona 85719  
(602) 882-4795



Larry D. Fellows  
Director and State Geologist

October 15, 1992

Mr. Bill Cagle  
Cagle Consulting, Inc.  
410 17th Street, Suite 2420  
Denver, Colorado 80202

Re: **Arrowhead Oil and Gas, Ltd., SunCor-Melange #32-23 well,**  
Sec. 23, T. 2 N., R. 1 W., Maricopa Co., Arizona, State Permit #877

Dear Mr. Cagle:

I acknowledge receipt of your Application to Plug and Abandon and Plugging Record for the referenced well. Enclosed is a copy of the approved Application to Plug and Abandon.

I will need a completed Completion Report, Form 4; a copy of each wireline log; and the samples (I have received the strip log) for this well. The Completion Report is required even though the well was completed as a dry hole. The logs and samples will be kept in the confidential file until September 27, 1993.

Sincerely,

Steven L. Rauzi  
Oil & Gas Program Administrator

Enclosure

*Called Bill Cagle 10/28/92 to request (1) completion Rpt (2) E-logs (3) samples* <sup>scr</sup>

**CAGLE CONSULTING, INC.**

410 17TH STREET  
SUITE 2420  
DENVER, CO 80202  
(303) 595-3341

October 13, 1992

Steven L. Rauzi  
Arizona Geological Survey  
845 North Park Avenue, Suite 100  
Tucson, Arizona 85719



Re: SunCor - Melange #32-23  
Application to Plug and Abandon - Plugging Record  
SWNE Sec 23 T2N R1W  
Maricopa County, Arizona

Dear Mr. Rauzi:

Please find attached our completed Application to Plug and Abandon and Plugging Record for the above reference well.

If you should have any additional questions, please contact me at the above phone number.

Sincerely,

*Bill Cagle*  
Bill Cagle  
Consultant

Enc.

cc: Debbie Liller  
Harold Laycraft  
Operation File

# EXPLORATION WELL TESTS SALT NEAR PHOENIX

877  
Steven L. Rauzi  
Arizona Geological Survey

In September 1992, Arrowhead Oil and Gas, Ltd., drilled the SunCor-Melange #32-23 well about 20 miles west of Phoenix to test the oil and natural gas potential of a deeply buried deposit of salt near Luke Air Force Base. (Large deposits of subsurface salt and anhydrite are present at several localities in Arizona [Peirce, 1981].) The Luke salt is at least Miocene in age; it is overlain by basalt that has been dated at about 10.5 million years (Eberly and Stanley, 1978). Near the well, the top of the salt deposit lies between 2,500 and 2,600 feet below the surface. The well was drilled to a total depth of 6,650 feet and was completed as a dry hole on September 27, 1992.

The well was drilled in an agricultural and suburban area, which is underlain by a freshwater aquifer that is a primary source of drinking water for nearby communities. Special attention was given to ensure that ground water would not be contaminated during the drilling process. The aquifer in this area is between 400 and 600 feet below the surface, and several water wells produce from it within 0.5 mile of the SunCor-Melange #32-23 well. (The Arizona Geological Survey [AZGS] routinely contacts the Arizona Department of Water Resources for information on the location of water wells and the depth of ground water within 0.5 mile of a proposed exploration well.) The lessor of the oil and gas rights, SunCor Development Corporation, through Litchfield Park Service Company, operates some of these water wells and was therefore especially interested in preventing ground-water contamination.

The procedures used to protect ground water during drilling are based on experience and technology developed over years of drilling in different environments throughout the world. They are employed in both the petroleum and the water-well drilling industries. The most basic method of preventing contamination is zonal isolation, sealing off access to all zones so that salt water, oil, and natural gas, if encountered during drilling, cannot mix with ground water. This is accomplished by circulating a viscous mixture of water and clay called drilling mud in the wellbore (the hole made by the drill bit) to prevent contamination while the well is being drilled. A special pipe called casing is then installed and cemented in the wellbore to prevent contamination after drilling has been completed.

## DRILLING

The SunCor-Melange #32-23 well was drilled in two steps: (1) using a freshwater-based drilling mud to a depth just above the salt (about 2,500 feet), where casing was installed and cemented; and (2) using a saltwater-based drilling mud before penetrating the salt to prevent the salt from dissolving, as it would have done if a freshwater-based drilling mud had been used.

As the wellbore is drilled deeper, new joints of drill pipe are added to the drill string (Figure 1). The drill bit is at

the bottom of the drill string, which is rotated at the surface. To improve cutting performance, weight is added to the drill string by placing heavy, thick-walled pipe called drill collars just above the bit.

Drilling mud is used to cool the drill bit, lubricate the drill pipe, bring cuttings back to the surface, and prevent contamination of the formations being drilled. It accomplishes the last function by forming a thin, impermeable seal of clay particles on the walls of the wellbore. Drilling mud also prevents the hole from caving in and keeps exposed formation fluids from flowing by exerting hydrostatic pressure against its walls.

To ensure these results, an operator must constantly keep the wellbore full of drilling mud during drilling operations. The drilling mud is pumped through the drill pipe to the drill bit at the bottom of the wellbore, after which the mud returns to the surface with the cuttings through the annular space between the drill pipe and the walls of the wellbore.

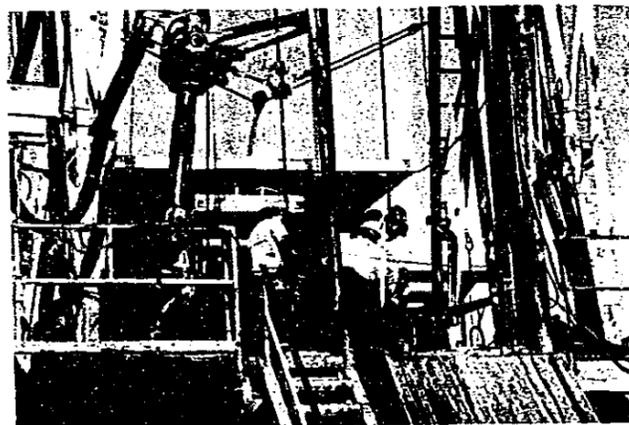


Figure 1. Roughnecks (workers on a drilling rig) connecting another stand to the drill string, which is being lowered into the wellbore. A stand consists of three joints of drill pipe and is approximately 90 feet in length.

At the surface, the mud is routed across a vibrating screen to remove cuttings, sand, and silt that can interfere with the formation of the impermeable clay seal in the wellbore. The mud is then recycled through the drill pipe.

## CASING

The final steps in preventing ground-water contamination in wells are installing casing in the wellbore and cementing it in place (Figure 2). Cementing the casing along its length to isolate each formation penetrated in a well protects ground water, petroleum, and other natural resources by preventing fluid movement between formations. If fluids cannot move from one zone to another, they cannot contaminate each other.

The bottom or shoe of the casing is set in a hard, impermeable formation to provide a strong anchor and seal. In addition, centralizers are installed on the casing in several places to keep it in the center of the wellbore and to allow cement to surround it completely. This casing is then cemented throughout its entire length by pumping the cement slurry down the inside of the casing until all of the slurry exits the bottom and fills the annular space between the casing and the walls of the wellbore. The cement slurry thus extends from the bottom of the wellbore to the land

surface. Special rubber plugs are commonly added in front of and behind the cement slurry to prevent it from mixing with the mud it displaces and with the mud used to move it into place, respectively. Fresh water is also typically pumped into the wellbore before the cement slurry is added to clean the viscous drilling mud off the wellbore walls. This cleaning helps establish a more effective cement bond between the casing and the formations along the wellbore walls. The cement prevents fluid movement between formations and supports the weight of the casing.

Once the cement sets, the well is essentially a pipeline from the bottom of the hole to the surface. The wellbore casing is similar to a pipeline that transports natural gas or drinking water into a home, except that the wellbore casing is cemented vertically in place, whereas natural gas and water lines are uncemented and horizontal. Just as a natural gas pipeline confines the gas and prevents it from leaking and contaminating surrounding soil, the wellbore casing confines the fluids traveling within it and prevents them from leaking and contaminating the formations and freshwater aquifers through which it extends.

After drilling to a depth of 2,500 feet, the operator of the SunCor-Melange #32-23 well installed casing in the wellbore. The casing shoe was set just above the salt and just below several beds of hard anhydrite, which provided a strong, impermeable seal (Figure 2). The cemented casing shoe was pressure tested to 1,500 pounds per square inch (psi) and held this pressure for 30 minutes. This proved that the casing had sufficient mechanical integrity to contain the saltwater-based drilling mud and to withstand any unexpectedly high pressures that may have been encountered as the drill bit drilled into the salt. AZGS staff geologists Steve Rauzi and Rick Trapp were present during the cementing process to ensure that the cement was circulated back to the surface and, thus, that the process was properly completed. An AZGS representative witnesses this process on all oil, natural gas, helium, and geothermal wells drilled in Arizona.

The 1,900 feet of cemented casing between the top of the salt and the base of the freshwater aquifer effectively prevented the saltwater-based drilling mud from contaminating the aquifer and would have prevented oil or natural gas contamination had these resources been found and produced. If production had been feasible, the operator would have added another string of casing, called the production string, from the surface to the bottom of the oil or natural gas zone to provide additional protection for both the oil or natural gas and the ground water. No oil or natural gas was discovered, however.

#### PLUGGING AND ABANDONMENT

If no oil or natural gas is discovered in commercial amounts in an exploration well, the well is plugged and

abandoned. Information gained while drilling the well is used to plan the plugging operation, which must follow specific regulations that require cement plugs to be placed across certain intervals in the well. In open (uncased) holes, cement plugs are placed across all freshwater zones, any zone containing fluid with a potential to migrate, and any zone containing potentially valuable natural resources. In cased holes, cement plugs are placed across all open perforations, as well as the casing shoe.

The cement plugs are placed by lowering drill pipe to the bottom of the lowest zone to be plugged. The calculated volume of cement is pumped to that zone. The drill pipe is then pulled up to the bottom of the next zone to be plugged. This process is repeated until all of the zones are plugged. The intervals between the cement plugs are filled with a heavy, viscous mud.

In the SunCor-Melange #32-23 well, several cement plugs were placed in the open hole below the casing shoe. Another cement plug was placed 150 feet below the casing shoe up to 100 feet within the casing. Finally, a cement plug was placed inside the casing from a depth of 90 feet up to the ground surface.

#### CONCLUSION

Even though the SunCor-Melange #32-23 well was completed as a dry hole, it provided valuable information on the subsurface geology of Arizona. Each new well, whether completed as a producer or a dry hole, enhances the understanding of Arizona's geologic

history. The better geologists understand this history, the better they can explore for, develop, and manage Arizona's natural resources. These resources include not only oil and natural gas, but also ground water.

The subsurface information obtained on all wells drilled for oil, natural gas, helium, and geothermal resources is maintained at the AZGS. This information includes drilling and production data, sample descriptions, drill cuttings and cores, electric and porosity logs, and formation tops. For any oil or gas exploration well drilled in unproven territory, the subsurface data are kept confidential for 1 year after the well is completed. The well operator has exclusive use of these data during this time. After the period expires, however, these data become public information and may be reviewed at the AZGS office by any individual or group during regular working hours.

#### REFERENCES

- Eberly, L.D., and Stanley, T.B., 1978, Cenozoic stratigraphy and geologic history of southwestern Arizona: Geological Society of America Bulletin, v. 89, p. 921-940.  
 Peirce, H.W., 1981, Major Arizona salt deposits: Arizona Bureau of Geology and Mineral Technology Fieldnotes, v. 11, no. 4, p. 1-4. [Available for \$1.00 from the Arizona Geological Survey.]

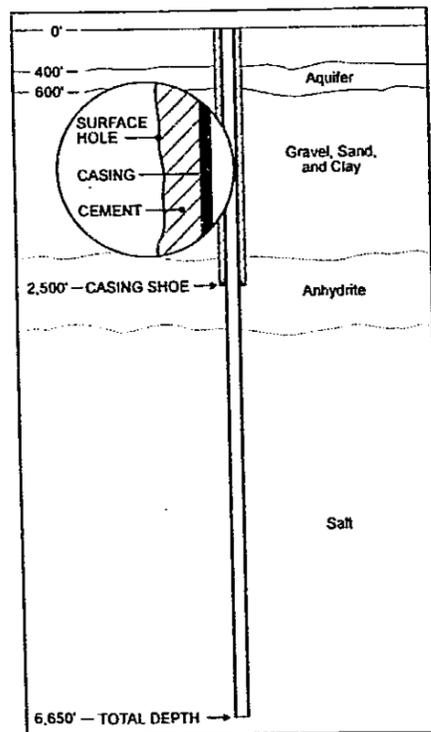


Figure 2. Construction schematic of SunCor-Melange #32-23 well near Phoenix.

Lisa Hastings (DEQ) 10-6-92 (207-4425)

Called to inquire about the Suncor-Melange well. She indicated that Arundale was jealous of their water supply and reviewed a call she received from them in which they expressed concern about OGCC rules and our issuance of the permit. These concerns sounded similar to those expressed in their letter to Larry dated 9-21-92. I informed her of that letter and Larry's reply inviting them to the next OGCC mtg. I provided her with the Commission's Statutory authority and rules in the A.A.C. (ARS 27-501 + 27-676). The main points of concern were apparently 1) no public hearing before permit was issued 2) being left out of loop 3) our cavalier approach to issuing permit, and 4) that water wells near the Suncor 1-19 drilled in 1988 had to be abandoned because of brine contamination and damage. She thanked me for the information on the situation and I thanked her for her offer to provide contacts with local governments and government associations as necessary in the future. SLR

10-7-92

I called J. Watten Downs, Manager of Farms and Administration for Suncor Development Co. to inquire about the reported contamination of water wells from the Suncor 1-19. He indicated that this was not true and that he would like to respond to that particular matter. I gave him Lisa's phone number. [Rick Trapp and I drove to the old location of the Suncor 1-19 well while we were at the SW 32-23 well for the cementing and noted that a water well was in full operation in the NE quarter of Section 19] SLR

The Suncor 1-19 was converted to a water well on 8-22-88



SUNCOR  
DEVELOPMENT  
COMPANY

September 30, 1992

Bill Bates, Public Works Director  
City of Avondale  
525 N. Central Avenue  
Avondale, AZ 85323

RE: SUNCOR -- MELANGE WELL NO. 32-23

Dear Bill:

We have received your letter dated September 21, 1992. The purpose of this letter is to clarify SunCor's involvement in the above-referenced project. As you are probably aware, Arrowhead Resources ceased drilling on September 24. From our perspective, the drilling was conducted with the highest degree of professional responsibility and the exploration was completed without incident.

It is important to note that several years of preparation and planning took place prior to commencing drilling operations on our property. As the largest land owner and holder of the service rights (CC&N) for this area, SunCor spent an inordinate amount of time and effort to ensure that both the surface and subsurface environment was protected. We decided very early on in the process (which started in 1986) that we would not agree to lease land if our concerns could not be alleviated.

The parties involved in this well -- Melange, Arrowhead Resources, Kachina Oil & Gas, and Caddis Resources; brought many years of professional and practical experience to the table. They not only exceeded our expectations, but also went to great expense to take safety precautions not otherwise required by law or contract. Arrowhead and its related companies spent in excess of \$500,000 on this project to ensure that the right people were in charge and the best equipment was in place to do the job correctly and safely. This project could have been drilled at half the expense if Arrowhead did not concern themselves with environmental safety issues. In addition, Arrowhead obtained costly insurance policies with limitations in the millions of dollars.

For the record, Warren Downs manages our farm operations and is not an authority on geotechnical issues. Consequently, your reference to his statement was apparently misquoted and does not support your argument. Also for the record, because of the temporary nature of the drilling operations it was not necessary to obtain permits from Maricopa County and all requirements of the County were satisfied.

Bill Bates

-2-

September 30, 1992

Finally, your attack on the Arizona Geological Survey Department is unfounded and misleading. Mr. Rauzi at AGS verified that all necessary precautions were in place before drilling commenced and continued to follow up on site during operations. It is our understanding that the AGS did an admirable job in protecting State and local interest. Better communications may be in order, but additional legislation would be unnecessary.

Sincerely,

*Steve Gervais*

Steven Gervais  
Vice President  
General Counsel

SG/jeh

cc: Raymond W. Bedoya, Mayor, City of Avondale  
Perry Hubbard, Mayor, City of Litchfield Park

bc: Geoff Appleyard  
Warren Downs  
John Ogden  
Bob Denny, Arizona State Senate  
Greg Eldridge  
Larry Fellows/Steven Rauzi  
Harold Laycraft, Arrowhead Resources  
Rita Pearson, Office of the Governor  
Gary Stewart, Melange



Fife Symington  
Governor

State of Arizona  
**Arizona Geological Survey**

845 North Park Avenue, #100  
Tucson, Arizona 85719  
(602) 882-4795



Larry D. Fellows  
Director and State Geologist

September 30, 1992

Mr. Bill Bates  
Public Works Director  
City of Avondale  
525 North Central Avenue  
Avondale, AZ 85323

*file 877*

Dear Mr. Bates:

I received your letter of September 21, in which you informed me about your objections to the drilling of the SunCor-Melange No. 32-23 oil well and expressed displeasure with the regulatory procedures followed. The Arizona Geological Survey administers and enforces the policies and procedures established by the Arizona Oil and Gas Conservation Commission to regulate the drilling and production of oil, gas, geothermal, and helium resources. The Commission consists of five members appointed by the Governor. I encourage you to attend the next meeting of the Commission to express your concerns. The meeting will be held October 23, 1992, at 10:00 a.m. in room 500 in the State Capitol, West Wing, 1700 West Washington, Phoenix.

Current rules and regulations, which have been in effect for many years, do not require that a public hearing be held before a permit to drill for oil, gas, geothermal, or helium is issued. Drilling an exploratory well is a temporary event that, with current technology and expertise, is accomplished with minimal impact and, for most wells drilled in Arizona, is completed within a month. Likewise, there is no requirement for a public hearing prior to the drilling of water wells.

One of the primary reasons for regulating the drilling and production of oil, gas, geothermal, and helium resources is to protect ground water. When we receive an application for a permit to drill, we routinely check with the Arizona Department of Water Resources to determine the locations and depths of water wells present within a one-half-mile radius of the proposed drilling location. This information is necessary to determine whether the amount of surface casing proposed by the operator is adequate to protect the ground water. We were informed that the deepest water well within a half-mile radius of the SunCor-Melange well is 800 feet. The operator proposed to set casing from the surface to the top of the salt, which was estimated to be at a depth of approximately 2500 feet. This depth has absolutely nothing to do with protecting the structural integrity of the casing from splitting due to "geodetic" forces. You are totally misinformed when you suggest that this portion of our program was established "to protect the pipe over that of our natural resources." Setting 2500 feet of casing to protect ground water in an area where the deepest water well is 800 feet is far in excess of what we would have required of the operator.

At the time the permit to drill was issued, we were informed that negotiations were in progress between the operator and the Grace Drilling Company. Grace, the largest land drilling contractor in the nation, currently has 182 drilling rigs operating worldwide. The operator was expecting to spend a large amount of money, perhaps as much as a half-million dollars or more, to drill the well and was trying to locate an experienced driller with the type of equipment that would be required.

Drilling has been going on routinely for many years and a tremendous amount of expertise, experience, and technology have been developed. In terms of making a profit, or even recovering the initial investment, it is, indeed, a risky venture. The bond required, \$5,000, was determined by the Commission years ago and has been reviewed several times since. That amount is considered to be adequate to plug a well but not too high to discourage a company from drilling. To suggest requiring a bond equivalent to cover, at a minimum, 125% of the cost for engineering and construction of a well is not realistic. Following that guideline, a bond of at least \$625,000 would have been required for this well, based on an estimated engineering and construction cost of a half-million dollars.

It seems unnecessary and unrealistic to me to suggest that monitoring wells should be installed as part of the well construction process. Drilling mud forms a thin seal on the rock in the well bore that prevents contamination of the ground water through an uncased hole. Properly cemented casing is emplaced to protect the ground water from contamination immediately thereafter.

The Arizona Geological Survey takes its responsibility for regulating oil and gas drilling very seriously. This includes the permitting process as well as verifying whether the well is constructed and completed properly. Mr. Steven Rauzi and Mr. Richard Trapp were both present September 8-11, when the casing was set and cemented, and Mr. Rauzi was present when the well was plugged and abandoned September 27. It is not necessary for an inspector to continuously stand on the derrick floor to verify that proper procedures are being followed.

Drilling an oil well is an expensive venture. Once the rig is on location, the operator is concerned that the drilling proceed as expeditiously as possible. The operator is paying for the rig time regardless of whether drilling is in progress. Your suggestion that Arrowhead's interest in getting the drilling accomplished in as short a time span as possible so they could maximize the partnership's profits at the expense of their neighbors is, at best, based on misinformation.

SunCor and Arrowhead cooperated fully with us at all stages of the process, consistently showed concern for protecting the ground water and the environment, in general, and hired a highly qualified drilling contractor, which constructed a well that far exceeded minimum requirements to protect the ground water.

I hope you are able to attend the Commission meeting October 23. In the meantime if you have any questions or would like clarification, please give me a call.

Very truly yours,

*Larry D. Fellows*

Larry D. Fellows  
Director and State Geologist

cc: Jan C. Wilt, Chairman, Arizona Oil and Gas Conservation Commission  
J. Dale Nations, James E. Warne, Jr., Barbara H. Murphy, and Zed Veale, members of the  
Arizona Oil and Gas Conservation Commission  
Joe Lane, Special Assistant, Office of the Governor  
Rita Pearson, Executive Assistant, Environment/Natural Resources, Office of the Governor  
Greg Wallace, Arizona Department of Water Resources  
Bob Denny, Arizona State Senate, District 15  
Kyle Hindman, Arizona House of Representatives, District 15  
Bob Williams, Arizona House of Representatives, District 15  
Raymond W. Bedoya, Mayor, City of Avondale  
Carlos Palma, City Manager, City of Avondale  
Perry Hubbard, Mayor, City of Litchfield Park  
Bob Musselwhite, City Manager, City of Litchfield Park  
John Ogden, President, SunCor Development Company  
Harold Laycraft, President, Arrowhead Resources Ltd.

**CAGLE CONSULTING, INC.**

410 17TH STREET  
SUITE 2420  
DENVER, CO 80202  
(303) 595-3341

September 28, 1992

Steven L. Rauzi  
Arizona Geological Survey  
845 North Park Avenue, Suite 100  
Tucson, Arizona 85719

Re: SunCor - Melange #32-23  
Wellsite Activity Report  
SWNE Sec 23 T2N R1W  
Maricopa County, Arizona



Dear Mr. Rauzi:

Please find attached a Sundry providing your office a weekly update of wellsite activity as required by the APD for the period 9/22/92 to 9/28/92.

If you should have any additional questions, please contact me at the above phone number.

Sincerely,

*Bill Cagle*  
Bill Cagle  
Consultant

Enc.

cc: Debbie Liller  
Harold Laycraft  
Operation File

**CAGLE CONSULTING, INC.**

410 17TH STREET  
SUITE 2420  
DENVER, CO 80202  
(303) 595-3341

September 24, 1992

Steven L. Rauzi  
Arizona Geological Survey  
845 North Park Avenue, Suite 100  
Tucson, Arizona 85719

Re: SunCor - Melange #32-23  
Change of Plans - Sundry  
SWNE Sec 23 T2N R1W  
Maricopa County, Arizona



Dear Mr. Rauzi:

Please find attached a Sundry to document verbal approval received to extend the proposed depth of the Suncor-Melange 32-23 well to 7500'.

If you should have any additional questions, please contact me at the above phone number.

Sincerely,

*Bill Cagle*  
Bill Cagle  
Consultant

Enc.

cc: Debbie Liller  
Harold Laycraft  
Operation File



Fife Symington  
Governor

State of Arizona  
**Arizona Geological Survey**

845 North Park Avenue, #100  
Tucson, Arizona 85719  
(602) 882-4795



Larry D. Fellows  
Director and State Geologist

September 23, 1992

Mr. Bill Cagle  
Cagle Consulting, Inc.  
410 17th Street, Suite 2420  
Denver, Colorado 80202

Re: **Arrowhead Oil and Gas, Ltd., SunCor-Melange #32-23 well,  
Sec. 23, T. 2 N., R. 1 W., Maricopa Co., Arizona, State Permit #877**

Dear Mr. Cagle:

This letter will verify my verbal authorization to Mr. Greg Etheridge this morning to revise the proposed total depth on the above referenced well from 6,000 feet to 7,500 feet.

Sincerely,

A handwritten signature in cursive script that reads "Steven L. Rauzi".

Steven L. Rauzi  
Oil & Gas Program Administrator

**MEMORANDUM TO FILE**

**DATE:** SEPTEMBER 23, 1992

**FROM:** STEVEN L. RAUZI <sup>SLR</sup>  
OIL AND GAS PROGRAM ADMINISTRATOR

**SUBJECT:** AUTHORIZE REVISED PROPOSED TOTAL DEPTH TO 7500 FEET  
SUNCOR-MELANGE #32-23 WELL, STATE PERMIT #877

GREG ETHERIDGE CALLED AT 10:15 A.M. THIS MORNING TO REQUEST REVISING THE PROPOSED TOTAL DEPTH ON THIS WELL FROM 6000 FEET TO 7500 FEET. HE INDICATED THAT THEY WERE DRILLING AT 5970 FEET AND POINTED OUT THE LACK OF DEVIATION OF HOLE; THAT THEY ARE CURRENTLY DRILLING SALT AND ARE PROBABLY IN THE MAIN BODY OF SALT; THAT THE SURFACE CASING IS IN GOOD SHAPE (USING RUBBERS ON DRILL PIPE); AND THAT THEY WOULD PROBABLY TD BETWEEN 6500 FEET AND 7000 FEET.



# CITY OF AVONDALE

INCORPORATED 1946

525 NORTH CENTRAL AVENUE • AVONDALE, ARIZONA 85323 • PHONE: 932-2400

September 21, 1992

MAYOR  
RAYMOND W. BEDOYA  
VICE MAYOR  
THOMAS F. MORALES, JR.

COUNCIL MEMBERS  
LON MONTGOMERY

EARL D. COOPER  
HENRY BELTRAN  
DALE MOXON

ALBERT CARROLL, JR.

CITY MANAGER  
CARLOS V. PALMA

CITY CLERK  
LINDA M. TYLER

CITY ATTORNEY  
FRANK L. ROSS

Arizona Geological Survey  
845 North Park Avenue, #100  
Tucson, Arizona 85719

Attn: Larry D. Fellows, Director and State Geologist

Project: SunCor-Melange Well No. 32-23

Dear Mr. Fellows,

The City of Avondale wishes to express objection to the construction of the wildcat well known as SunCor-Melange No. 32-23. We are displeased with the Arizona Geological Survey (AGS) for issuance of a Permit to Drill without giving the City the opportunity to appear and be heard from at a public hearing. We are concerned about the environmental impact this exploratory well may have on our municipal water supplies.

We feel that the review process employed by the AGS was totally inadequate. To begin with the Application For Permit to Drill Or Re-enter submitted by Arrowhead Resources Ltd. appeared to be incomplete or lacking pertinent information. In the first place, the driller for the proposed 6,000 feet deep well was not known. It seems obvious that the success of a venture of this magnitude would be dependant upon the qualifications of a competent qualified driller to be approved by AGS. Secondly, the Survey map does not depict the impact the wildcat well has on encroaching City property. The City's strip annexation area was not included on the map.

Of greater concern to us is the omission of our primary municipal wells. We have two wells located within 3000 feet of the oil well, one of them being located in section 23. We are dismayed that AGS' research of Arizona Department of Water Resources's records did not acknowledge existence of these wells. Our expressed concern is that these wells provide water for our City's municipal needs from the last good aquifer remaining available to the City. It is imperative for us to insure adequate and complete protection of the water resources available to the city. Yet, AGS's permitting process denied us the opportunity to express these eminent concerns. AGS's rules and regulations must be changed to afford us this capability.



AVONDALE  
A Bicentennial  
Community

This well is in the fringe of Avondale's active and progressive development area. We are concerned not only about aquifer protection issues, but also air and noise pollution issues as well. Yet AGS's permitting policies did not provide a platform for the City to express our concerns. It appears that AGS needs to exercise common sense to revise their policies to account for regional and neighboring community needs.

For AGS to allow foreign limited partnership companies to operate such a risky venture in our neighborhoods under the "protection" of a \$5,000 bond is ridiculous. The acceptance by AGS of this pittance amount for assurance of compliance with oil and gas rules and regulations is unfathomable. In case of an environmental accident, it should not be the responsibility of the local communities to bear the cost of a potential cleanup, letting the foreign companies skate away virtually unscathed. A bonding amount should be provided to cover, at a minimum, 125% of the cost for engineering and construction of the well.

Talking with Mr. Stephen Rauzi of AGS, we were under the impression that the casing will be a minimum of 2500 feet or to the top of the salt dome if it should be lower. According to Mr. Warren Downs, Manager Farm and Administration for SunCor, the casing was stopped at 2500 feet to protect the structural integrity of the casing from splitting due to geodetic forces. It is a sad commentary that a program could be established to protect the pipe over that of our natural resources. It would appear that if a stronger pipe were required it should be installed.

AGS must be responsible to provide for continuous inspections to insure that the project is being constructed in accordance with the plans, and not just a few critical operations. Cementing procedures are extremely important, but so are the other features of construction, such as verifying actual length of casing being provided, construction practices employed, or dealing with potential hazards that may arise due to construction.

Monitoring of surrounding aquifers needs to be an integral component of the construction program. The last time ADWR took well samples in this area was four years ago. Monitoring wells should be installed as part of the construction process. Water sampling should be completed before, during and after well construction to determine if any deterioration of water supplies is occurring and if clean-up operations are needed.

It is evident that drilling was to continue posthaste regardless of regional concerns. It is unfortunate that the developers did not exhibit the wisdom of approaching the City to obtain project approval. But their lack of regional concern is even more evident in their lack of responsibility to approach Maricopa County Planning Department to obtain all the necessary permits and

approvals. The only interest they expressed is the ability to get the drilling accomplished in as short a time span as possible. Which emphasizes Arrowhead's concern for maximizing the partnership's profits at the expense of their neighbors.

In conclusion, AGS must adopt new rules and regulations to incorporate, and not ignore, the concerns and needs of surrounding communities impacted by drilling endeavors. The permitting review process must be advanced to include regional goals and concepts other than that solely of the wildcatter.

Sincerely,

  
Bill Bates  
Public Works Director

Copies:

Carlos Palma, City Manager, City of Avondale  
Raymond W. Bedoya, Mayor, City of Avondale  
Bob Musselwhite, City Manager,  
City of Litchfield Park  
John Ogden, President, SunCor Development Company  
Harold Laycraft, President, Arrowhead Resources Ltd.  
Senator Bob Denny  
Representative Kyle Hindman  
Rita Pearson, Governor's Office

suncor23.001

**CAGLE CONSULTING, INC.**

410 17TH STREET  
SUITE 2420  
DENVER, CO 80202  
(303) 595-3341

September 21, 1992

Steven L. Rauzi  
Arizona Geological Survey  
845 North Park Avenue, Suite 100  
Tucson, Arizona 85719

Re: SunCor - Melange #32-23  
Wellsite Activity Report  
SWNE Sec 23 T2N R1W  
Maricopa County, Arizona



Dear Mr. Rauzi:

Please find attached a Sundry providing your office a weekly update of wellsite activity as required by the APD for the period 9/12/92 to 9/21/92.

If you should have any additional questions, please contact me at the above phone number.

Sincerely,

*Bill Cagle*  
Bill Cagle  
Consultant

Enc.

cc: Debbie Liller  
Harold Laycraft  
Operation File

## MUNGER OILOGRAM

CALIFORNIA CONTRACT RIGS  
(Rated Depth with 4-1/2" drill pipe)

SEPTEMBER 18, 1992

BLUE SKY DRLG. CO. (Rio Vista) 707 374-5014  
 #1 (Solano County) 11500'  
 #2 (Rio Vista) 9000'  
 #3 (Rio Vista) 12000'

CALPAC DRLG. CO., INC. (Camarillo)  
 805 987-8721  
 #7 (Seal Beach) 10000'  
 #9 (Huntington Beach) 7000'  
 (Labor) THUIS (RD) Wilmington  
 (Labor) THUIS (RD) Wilmington  
 (Labor) THUIS (RD) Wilmington

CARDINAL DRLG (Billings, MT) 406 248-7324  
 #2 Skippy Oil Eureka Co, NV 5000-10500'  
 #4 (Eureka Co, NV) 3000-8500'  
 #12 Trail Intn Nye Co, NV 6500'  
 #40 (White Pine Co., NV) 14000'

CLEVELAND DRLG (Bakersfield) 805 589-9700  
 #1 (Elk Hills) 18000'  
 #2 (Elk Hills) 6000'  
 #3 (Bakersfield) 16000'  
 #4 ARCO Midway Sunset 10000'  
 #5 UOHPR (RD) Elk Hills 18000'  
 #6 Chevron Asphalto 18000'  
 #7 (Buttonwillow) 10000'  
 #9 (Bakersfield) 18000'

DUAL DRLG. CO. (Dallas) 214 373-6200  
 #44 Chevron (Pt. Arguello) 25000'  
 #45 Chevron (Pt. Arguello) 25000'

GARY DRLG. CO. (Bakersfield) 805 589-0111  
 #1 Shell (RD) Belridge-South 5000'  
 #3 (Bakersfield) 8000'  
 #4 Santa Fe (RW) Midway Sunset 4500'  
 #5 (Bakersfield) 2000'  
 #6 (Bakersfield) 6000'  
 #7 (Bakersfield) 2500'  
 #8 Santa Fe (RW) Belridge-South 4500'  
 #9 Texaco Midway Sunset 4500'  
 #10 Crutcher-Tufts Belridge-North 5500'  
 #11 McFarland Fresno County 7000'  
 #12 (Bakersfield) 4500'  
 #13 Oxy Kern Front 4000'  
 #14 No. Valley (RD) Contra Costa Co 8000'  
 #15 (Bakersfield) 8000'

GRACE DRILLING CO. (Golden, CO) 303 234-1444  
 #90 Santa Fe Geo The Geysers 20000'  
 #162 (Fresno County) 12500'  
 #164 (Washoe Co., NV) 7500'  
 #165 (Colusa County) 8500'  
 #166 (The Geysers) 18000'  
 #167 Sta Rosa Geo The Geysers 16000'  
 #168 (Maricopa) 14500'  
 #170 Samedan Newhall 25000'  
 #268 (Salton Sea) 20000'

GRACE DRILLING CO. (Casper, WY) 307-472-4097  
 #173 (Nye Co. NV) 12500'  
 #174 Arrowhead Oil Mariposa Co, AZ 10000'  
 #183 (Washington) 15000'

JIM GRAHAM INC. (Rio Vista) 707 374-6200  
 #5 Chevron (RW) Solano County 6000'

PAUL GRAHAM DRILLING & SERVICE CO.  
 (Rio Vista) 707 374-5123  
 #2 (Glenn County) 8000'  
 #3 D.E. Craggs (comp) Glenn County 5000'  
 #4 Vern Jones Madera County 8000'  
 #5 Capitol Oil Yolo County 11000'

HELMERICH & PAYNE INTERNATIONAL DRLG. CO.  
 (Ventura) 805 653-6662  
 #103 (Hueso) 20000'  
 #104 (Platform Trena) 16000'

HEXADYNE DRLG. (Woodland) 916-666-3200  
 #1 Northern Energy (comp) Colusa Co 9500'  
 #2 Mahama & Waagank Solano County 11500'  
 #3 (Solano County) 12500'  
 #4 (Sacramento Co) 12000'  
 #6 (Woodland) 6000'

HYLTON DRLG CO. (Bakersfield) 805 589-2062  
 #1 (Belridge-South) 4000'  
 #4 (Bakersfield) 3500'  
 #5 (Bakersfield) 5000'  
 #7 Texaco Kern River 4000'  
 #8 (Bakersfield) 5500'  
 #9 Chevron Cymric 5000'

# Wildcatters encouraged by west Valley oil project

### Expect to know in days whether drill site is good

By Guy Webster  
The Arizona Republic

Oil prospectors near Litchfield Park said Tuesday that they are encouraged by their first 3,600 feet of drilling, and that they expect to know within a few days whether they've got an oil well or a dry hole.

A contract crew working round-the-clock for the three Canadian firms investing in the project has been sinking the test well about 250 feet per day. The goal is 6,000 feet or so.

The drilling rig rises 130 feet above a surrounding cotton field on land owned by Phoenix-based Suncor Development Co. at Dy-sart and Indian School roads.

Suncor, sister company to the Arizona Public Service Co. under the Pinnacle West Capital Corp. holding firm, has leased the mineral rights to the wildcatters in return for a share of oil income if the project pans out.

A pulse of excitement passed

— See WILDCATTERS, page E5



Photos by John Samora/The Arizona Republic  
Greg Ethridge, a drilling engineer at the 130-foot oil rig near Litchfield Park, is part of a crew that has been working round-the-clock to sink a test well. Coarse salt (left photo) has been coming up the pipe lately as the drilling rig bores through a thick underground layer of salt deposits, beneath which may lie a reserve of oil.

# Wildcatters encouraged

— WILDCATTERS, from page E1

through the 10 or so men at the site Tuesday morning as, over the roar of generators and motors, the news was shouted from person to person, "There's C2 on the hot wire."

The hot wire is a monitoring system to identify any gas coming out of the hole, explained Greg Ethridge, drilling engineer. Ethane gas is called C2 because it has two carbon atoms per molecule. Until the ethane showed up, the only organic-gas traces had been methane, its one-carbon cousin.

"When you start getting C2, it suggests you're getting into heavier hydrocarbons, and hopefully, moving toward oil," said Harold Laycraft, leader of the three-company partnership putting up the money.

"It's far from definitive, but it is a good sign."

Laycraft is president of Arrowhead Resources Ltd. and International Dusty Mac Enterprises Ltd. The

venture's third partner is Sundance Resources Ltd. All three are based in Vancouver, British Columbia.

The companies have not disclosed how much they are spending on the Litchfield Park gamble. Steven L. Rauzi, oil- and gas-program commissioner for the Arizona Geological Survey, estimated that a project of this scope costs about \$500,000 for drilling and preparatory expenses.

An article that Rauzi wrote for an industry publication last year identified the Litchfield Park area as a potential source of oil trapped beneath a thick underground layer of salt deposits from an ancient lake.

Laycraft said about one of every eight wildcat wells in the United States makes a find that pays off.

"We think our chances of success here are higher than average, by a wide margin," he said.

The favorable indications, Laycraft said, include several nearby occurrences in past decades of oil seeping into surface or well water, traces of natural gas being found in a 4,000-

foot exploratory well drilled four miles away in 1988, and seismic-testing results consistent with a model of potential oil-bearing layers beneath an underground salt dome.

So far, the layers the drill has hit have matched the predictions, Ethridge said.

The crew from Dallas-based Grace Drilling Co. includes veterans of oil exploration in California, Wyoming, Oklahoma and other states.

Part of the work's appeal, said Gene Kramer, a Grace tool pusher from California, is the suspense of exploring the unknown. A tool pusher is a foreman who supervises drilling operations at an oil well.

Even if the project has the luck to find oil, don't drive out to look for a gusher.

The oil rig includes three systems to contain oil, if there is any, rather than allow the hazard and waste of a blowout, Ethridge explained.

"This isn't the movie *Giant*," he said. "If there were a blowout, I'd probably lose my job."

# Drinking water contamination feared Litchfield Park, Avondale worried about oil drilling

By Jeff Nelson  
THE PHOENIX GAZETTE

City officials in Avondale and Litchfield Park fear a Canadian oil mining operation under way near their cities could contaminate the communities' underground drinking water supply with oil and salt.

"It's (water) the lifeblood of our growing community," Litchfield Park Mayor Perry Hubbard said. "It's worth more than gold, and it's worth more than oil."

The drilling operation sits above a giant underground aquifer, located 400 to 600 feet below the surface, which is the sole source of drinking water for the 3,300 residents of Litchfield Park and the primary source for the 22,000 residents of Avondale.

"Our main concern at this point is to

make sure they do all they're supposed to do," said Bill Bates, Avondale's public works director.

A group of Canadian wildcatters is working around the clock in a cotton field just east of Litchfield Park in hopes of finding an oil field.

The venture is being financed by three Vancouver, British Columbia, companies — Arrowhead Resources Ltd., International Dusty Mac Enterprises Ltd. and Sundance Resources Ltd.

Crews are boring an exploratory well 5,500 to 6,000 feet deep on land owned by Phoenix-based SunCor Development Co. between Dysart and El Mirage, and Camelback and Indian School roads.

SunCor, a major land owner and developer in the West Valley, has leased the mineral rights to the investment group in exchange for royalties if any oil is found.

Robert Musselwhite, city manager of Litchfield Park, said he is concerned the drilling could allow nitrate-contaminated water, located in a less shallow water

table 200 feet below the surface, to mix with the drinking water supply.

Harold Laycraft, president of Arrowhead Resources and International Dusty Mac Enterprises, said modern oil wells are designed to protect the environment and water supplies.

The hole is lined with a special pressure-tested concrete designed to keep the various levels of water and soil from mixing with each other, Laycraft said. A steel pipe inside the concrete casing provides additional protection.

"The engineering with respect to concerns to aquifers is very well-established," Laycraft said. "It is so designed that it completely removes any chance of contamination."

Steven Rauzi, oil and gas commissioner for the Arizona Geological Survey, a state agency that oversees oil and gas mining, said he also believes the ground-water supply is safe.

"This well is just like any other well, it's just dug extra deep," Rauzi said.

See ■ WATER, Page C5



Dana Leonard / THE PHOENIX GAZETTE  
Oil drilling equipment shares a West Valley cotton and sunflower field.

Meanwhile, drilling continues. While crews haven't uncovered a major oil find, they have found lots of salt, Laycraft said.

Investors think this thick layer of salt — believed to have been produced by an ancient salt lake — conceals a huge oil deposit. Salt domes like the one near Litchfield Park have been associated with major oil finds in Texas and Louisiana.

Other indications of an oil deposit include the fact that traces of oil have been found in ground and surface water, Laycraft said. Also, seismic testing has revealed geological conditions common with other oil discoveries.

Arizona has 22 oil wells that produce 120,000 barrels annually, and six natural gas wells that produce 1.5 billion cubic feet of gas

"They're being extra cautious, and I think it's because of the concern."

SunCor President John Ogden said no one has a bigger interest in maintaining a clean water supply in the Litchfield Park area than his company.

A subsidiary of Pinnacle West Capital Corp., which owns Arizona Public Service Co., SunCor is a major home builder in the Litchfield Park area. In addition, the company owns Litchfield Park Service Co., the city's water provider.

"We wouldn't do it if we thought there would be a problem with the water quality," Ogden said.

Jerry Ellsworth, manager of Litchfield Park Service Co., said his company will monitor its wells for oil, salt and other contaminants.

**CAGLE CONSULTING, INC.**

410 17TH STREET  
SUITE 2420  
DENVER, CO 80202  
(303) 595-3341

September 14, 1992

Steven L. Rauzi  
Arizona Geological Survey  
845 North Park Avenue, Suite 100  
Tucson, Arizona 85719

Re: SunCor - Melange #32-23  
Wellsite Activity Report  
SWNE Sec 23 T2N R1W  
Maricopa County, Arizona



Dear Mr. Rauzi:

Please find attached a Sundry providing your office a weekly update of wellsite activity as required by the APD for the period 8/18/92 to 9/11/92. My plans are to mail this report out each Monday for the previous weeks activity. I apologize for the tardiness of this first report.

If you should have any additional questions, please contact me at the above phone number.

Sincerely,

  
Bill Cagle  
Consultant

Enc.

cc: Debbie Liller  
Harold Laycraft  
Operation File

9-9-92

Met with Robert R. Musselwhite (Litchfield Park City Manager), Perry Hubbard (Mayor), and State Senator Bob Denny at the Litchfield Park City offices this date. Senator Denny expressed concern that the state had no regulation of oil & gas drilling. Informed the group that there was and referred them to A.R.S. §§ 27-501 through 27-677 and A.A.C. Title 12, Chapter 7. Indicated that regulation of oil & gas wells became official in Arizona with the Conservation Act of 1951.

Also discussed the regulations covering the construction of oil & gas wells with emphasis on surface casing requirements. Diagrammed the drilling of a well-bore, running of casing, and cementing by the pump & plug (displacement) method to set a sheath of cement from the bottom of the casing to the surface. Noted that centralizers were used on every other joint coupling to get the pipe centered in the hole before being cemented.

Meeting lasted from 11:30am to 1:25pm.

See

# No gusher yet, but oil drillers are optimistic

by Dan Nowicki  
staff writer

A wildcat oil well operating on SunCor Development Co.-owned property near Litchfield Park hasn't struck crude yet, but seems to be making progress, according to officials familiar with the project.

"It's still drilling," said John Ogden, president of SunCor Development Co. "Last I heard it was still heading down. A lot of it depends on what kind of dirt and gravel that they run into down there."

The wildcat well, which began drilling Aug. 25, was built by a Canadian-led partnership of private oil-and-gas companies on the longshot hope that a oil deposit is located beneath an underground salt dome discovered in the area.

The site is located on unincorporated county land between Dysart and El Mirage roads and between Camelback and Indian School roads.

The partnership, which consists of Canadian-based Arrowhead Resources Ltd. and two sister companies, and Denver-based Melange Associates Inc., has leased 12,000 acres around the site from SunCor. Should the well find any natural resources, SunCor will get a share of the royalties.

Arrowhead President Harold Laycraft said the \$700,000 enterprise is "going very nicely."

"It is logging well," Laycraft said. "What we've encountered so far has coincided with our seismic information."

Seismic predictions, Laycraft said, are often wildly inaccurate.

As of Friday, the well had reached a depth of 1,649 feet. The project's targeted depth — where oil will be found if there is any — is between 5,500 and 6,000 feet.

Laycraft said the well should be finished drilling within two weeks.

Residents living around the site can rest assured that the well poses no environmental hazard, a state official said.

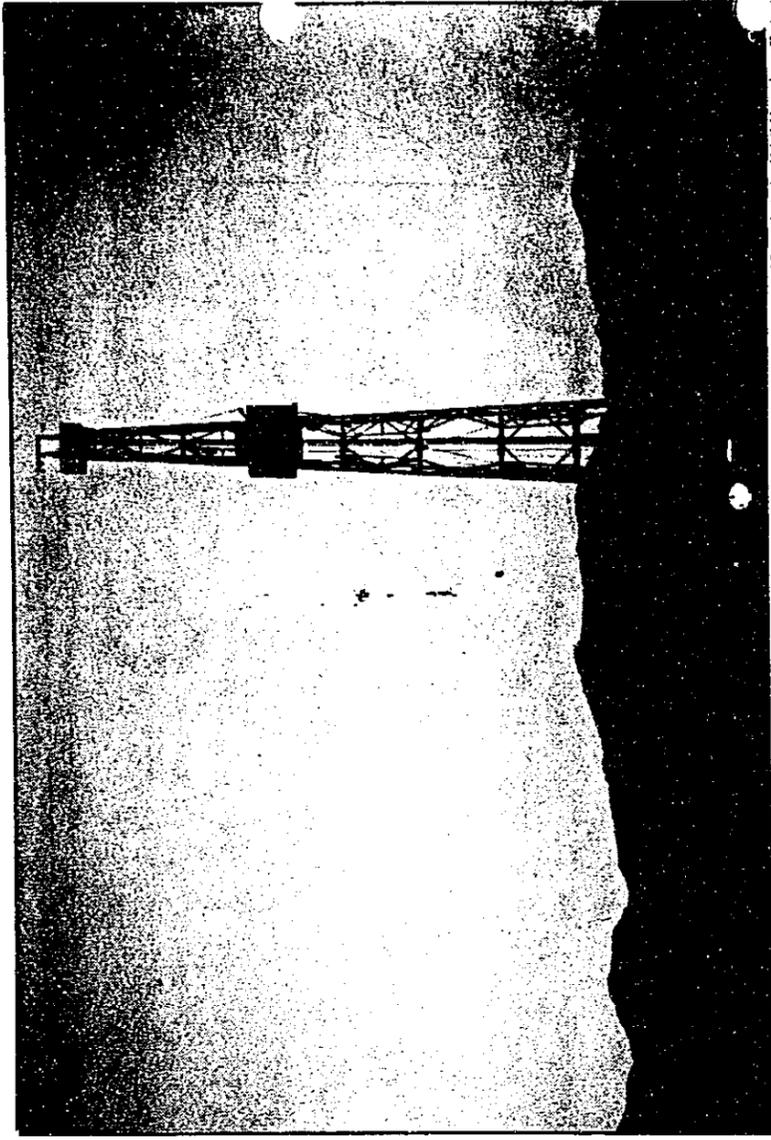
Steve Rauzi, oil and gas program administrator for the Arizona Geological Survey, said the chances of the oil well causing any environmental damage such as groundwater contamination or natural gas seepage are "slim to none."

"Basically, there's no difference between drilling a water well and an oil well," Rauzi said. "It's just a matter of drilling a hole in the ground."

The AGS provides staff and administrative support for the Arizona Oil and Gas Commission.

"We protect fresh water and natural resources," Rauzi said. "They're not supposed to let that stuff escape."

Rauzi said that piping precautions and guidelines are so strict that he "can't imagine" any leakage or



View photo by Kristi Humphrey Ryden

## China or bust

Towering high above the surrounding landscape near Dysart and Camelback roads is the derrick of

the new wildcat oil well which started drilling Aug. 25.

contamination. He also said that after the oil is removed, the commission requires that different fluids be pumped underground to replace it.

This would remove the threat of subsidence in the area, he said.

Rauzi said that the environmental concerns will be rendered moot if no oil is discovered, and he thinks the odds of the well actually striking it rich are very remote.

"It's like winning the lottery," Rauzi said. "That's what keeps these guys going."



Fife Symington  
Governor

State of Arizona  
**Arizona Geological Survey**

845 North Park Avenue, #100  
Tucson, Arizona 85719  
(602) 882-4795



Larry D. Fellows  
Director and State Geologist

**FAX TRANSMITTAL COVER SHEET**

DATE: 9-4-92

6 PAGES  
(including cover sheet)

**TO:**

NAME: Greg Wallace  
COMPANY: Department of Water Resources  
FAX NO: 256-0506 CITY: Phoenix

**FROM:**

Steven L. Rauzi, Oil & Gas Program

OUR FAX NO: (602) 628-5106

IF THERE ARE ANY QUESTIONS, RESPONSES, OR PROBLEMS WITH THIS TRANSMISSION, PLEASE CALL THE SENDER AT (602) 882-4795. THANK YOU.

**MESSAGE:**

Attowhead Oil & Gas Drilling  
Program for well in Sec 23, T2N-  
R1W.

Greg called Friday afternoon and indicated that the Litchfield Park people were in his office expressing concerns over the Sunlor well. He advised them that 2500' of surface casing would be sufficient to protect groundwater and that the possibility of damage would be if Attowhead did an acid-frac which could possibly shake some scale off of their water well. Greg's ~7 years experience in Oklahoma apparently helped An Equal Opportunity Employer alleviate their concerns because Greg indicated that he had talked them out of pursuing a temporary injunction on the well. I mailed a copy of the drilling program to Greg after faxing.



Fife Symington  
Governor

State of Arizona  
**Arizona Geological Survey**

845 North Park Avenue, #100  
Tucson, Arizona 85719  
(602) 882-4795



Larry D. Fellows  
Director and State Geologist

**FAX TRANSMITTAL COVER SHEET**

DATE: 9-3-92

4 <sup>\* 502</sup> PAGES  
(including cover sheet)

TO:

NAME: Batty Moody

COMPANY: State Land Dept.

FAX NO: 542-2590 CITY: Phoenix

FROM:

Steven L. Rauzi

OUR FAX NO: (602) 628-5106

IF THERE ARE ANY QUESTIONS, RESPONSES, OR PROBLEMS WITH THIS TRANSMISSION, PLEASE CALL THE SENDER AT (602) 882-4795. THANK YOU.

MESSAGE:

\* Application for Permit to drill (page 1 & 2)  
and my structural contour map drawn on  
the top of the Luke Salt - Barry has replaced  
Stephen Powers and noted that State lands existed  
in section 13 just northeast of this well. The State  
would welcome oil & gas development on their land.

An Equal Opportunity Employer

Phone 542-4628



Fife Symington  
Governor

State of Arizona  
**Arizona Geological Survey**

845 North Park Avenue, #100  
Tucson, Arizona 85719  
(602) 882-4795



Larry D. Fellows  
Director and State Geologist

FAX TRANSMITTAL COVER SHEET

DATE: 9-3-92

8 <sup>\*5/2</sup> PAGES  
(including cover sheet)

TO:

NAME: Larry Udall

COMPANY:

Mattinez & Curtis Law Offices (City of C. Cochfield Park)

FAX NO:

266-8290 CITY: Phoenix

FROM:

Steven L. Rauzi, Oil & Gas Program Administrator

OUR FAX NO: (602) 628-5106

IF THERE ARE ANY QUESTIONS, RESPONSES, OR PROBLEMS WITH THIS TRANSMISSION, PLEASE CALL THE SENDER AT (602) 882-4795. THANK YOU.

MESSAGE:

Hard copies to follow in mail

\*Includes page 6 and 7 of A.A.C. (R12-7-109, through R12-7-115);  
Memorandum on freshwater aquifers dated 6/25/92; Page 1 and  
2 of Application for permit to drill; Permit to drill; and  
cover letter

An Equal Opportunity Employer

\*\* Bill Engstrom, ADEQ, called and advised of his receiving call from Larry Udall expressing his concerns about the Suncor well. Advised him that I just spoken with him and that I had faxed and mailed information pertinent to his concerns. Went on to discuss the basics of the well and its construction.



Fife Symington  
Governor

State of Arizona  
**Arizona Geological Survey**

845 North Park Avenue, #100  
Tucson, Arizona 85719  
(602) 882-4795



Larry D. Fellows  
Director and State Geologist

September 3, 1992

Mr. Larry Udall  
2712 North 7th Street  
Phoenix, Arizona 85006

Dear Mr. Udall:

This letter is in response to your telephone call today concerning the oil exploration well being drilled in T. 2 N., R. 1 W., sec 23. Please note that a well drilled for oil is the same as a well drilled for water except that a well drilled for oil is normally drilled deeper and is regulated by a much stricter set of rules and requirements. As you can see from the enclosed rules on casing requirements, these rules are written to ensure the protection of natural resources including all fresh water aquifers. Along with the enclosed rules, I have enclosed a copy of Arrowhead Oil and Gas Ltd's application and their permit to drill.

Note that on the bottom of page 2 of the application, Arrowhead Oil and Gas Ltd's casing program calls for steel pipe (casing) to be set from the surface to a depth of 2,500 feet or wherever they penetrate salt. This casing will be cemented throughout its entire length to seal off and confine all waters to their respective strata as required in R12-7-109. As I mentioned on the phone, a representative of this office will be on site to witness the cementing operation and to make sure that cement is circulated to the surface.

Enclosed with the hard copy of this letter and attachments is (1) a memorandum of my discussion with the Department of Water Resources concerning the freshwater aquifers in the vicinity of this well and (2) the detailed drilling program for this well. Please note that the casing will be cemented in two stages as described on the last page of the drilling program, the first stage from the bottom of the casing to 1,200 feet and the second stage from 1,200 feet to the surface. The two stage cement job reduces the amount of pressure at the bottom of the hole that would otherwise result from a 2,500-foot column of cement.

Sincerely,

Steven L. Rauzi  
Oil & Gas Program Administrator

Enclosures

cc Larry D. Fellows

Edward Smith, New Jersey 9-3-92

Called to check on the veracity of Atronhead Oil & Gas (i.e. did they permit a well, is the play concept valid, etc.) Advised him that they have been issued a permit and that the well started drilling Tuesday afternoon.

Larry Udall, 9-3-92

Called to get information on the Suncot-Melange 32-23 well. See fax and cover letter this date.

Kurt Wilson, Phoenix 9-3-92

Called to get the exact location of the Suncot-Melange 32-23 well. Also inquired as to terms and conditions of the lease. Advised of the percentage ownership as stated on application but that oil & gas leases on private land was between the parties involved. ∴ can provide no information in that regard.

Nyal Niemuth, DMMR, 9-3-92

Requested general info on this play and on oil & gas in general. Sent OGS 7-22-91 test sheet & Oil & Gas Review by Nations et al 1978.

Barry Moody, State Land Dept 9-3-92

Ditto Nyal Niemuth



Fife Symington  
Governor

State of Arizona  
**Arizona Geological Survey**  
845 North Park Avenue, #100  
Tucson, Arizona 85719  
(602) 882-4795



Larry D. Fellows  
Director and State Geologist

**FAX TRANSMITTAL COVER SHEET**

DATE: 8-31-92

4 PAGES  
(including cover sheet)

**TO:**

NAME: Bob Brittain

COMPANY: Principal Planner, Dept. Planning & Dev., Maricopa Co.

FAX NO: 506-3601 CITY: Phoenix, 85003

**FROM:** Steven L. Rauzi, Oil & Gas Program Administrator

OUR FAX NO: (602) 628-5106

IF THERE ARE ANY QUESTIONS, RESPONSES, OR PROBLEMS WITH THIS TRANSMISSION, PLEASE CALL THE SENDER AT (602) 882-4795. THANK YOU.

MESSAGE: Enclosed are application to drill and permit to drill.

- \* Greg Etheridge called 8/31 and indicated that Maricopa Co. had issued them a stop-work permit because they did not obtain a Building permit or Zoning clearance from the County.
- \* Bob Brittain called 8/31 and inquired what statutory authority we had to issue a drilling permit. I quoted A.R.S. 27-501 following and 27-513 in particular, and faxed him the material indicated.
- \* Greg Etheridge called 9/1 and indicated that in a meeting @ 1:00 pm with the Maricopa County Planning & Development Department they had waived the need for a building permit, and rescinded the stop work notice. They indicated that Arrowhead was still in violation of the An Equal Opportunity Employer Zoning since the area was zoned for agriculture. The County was not sure what zoning was required to drill a well and basically determine that drilling was in variance from agriculture. However, since the drilling operation did not appear to be a flagrant violation they decided to waive the \$7-15 per day fine for the zoning violation.

SLR

# drilled to test mineral rights of agricultural landowners; not in variance of agriculture

Bob Brittain  
Principal Planner  
Maricopa Co. Dept. of Planning & Development  
301 W. Jefferson  
Phoenix, AZ 85003  
Phone 506-3988  
Fax 506-3601

## Work Under Way at Arizona Wildcat

**A**RROWHEAD RESOURCES (USA) Ltd has moved in Grace Drilling's Rig #174 to drill a remote exploratory test about a mile east of Litchfield in southwestern Arizona.

The Maricopa County wildcat, the 32-23 SunCor-Melange in sw ne 23-2n-1w, is projected to 6000 ft in volcanics (PI 7-13-92). The drillsite is about 275 miles southwest of production in northeastern Arizona and some 300 miles east-southeast of fields in Southern California's Los Angeles Basin.

Four miles west of the 32-23 SunCor-Melange, Bob James Exploration & Drilling in 1988 completed a 4000-ft dry hole at the 1-19 SunCor in ne ne 19-2n-1w. That wildcat was spudded in Quaternary fill and logged the top of a Miocene salt at 1716 ft.

## Union Pacific Spuds Morrow Test Near Hugo Colorado

**U**NION PACIFIC Resources Co, with Murfin Drilling's Rig #14 under contract, is drilling a Morrow test on the southeastern flank of the Denver Julesburg Basin two and a half miles north of Hugo, Colorado.

The 1 Follow 32-18, sw ne 18-10s-54w, Lincoln County, is five miles west-northwest of Hugo field, an abandoned Marmaton/Cherokee oil pool, and 14 miles northwest of the nearest current production from Morrow, at Clifford field. It's projected to 7800 ft in Morrow (PI 8-11-92).

Union Pacific late last year staked location for the 1 Follow 41-18 in ne ne 18-10s-54w, just northeast of the 1 Follow 32-18 venture. No activity has been reported at that site.

## Stepouts Staked from Two North Dakota Madison Pools

**D**ALLAS-BASED COUGAR Energy Development Inc and Denver independent Samuel Gary Jr & Associates Inc each has staked a new exploratory test in the western North Dakota portion of the Williston Basin.

Fifteen miles south west of Killdeer in western Dinn County, Cougar staked the 16-1 Cougar Energy-State in ne sw 16-143n-97w. The location is about a mile east-southeast of the one-well Crooked Creek field, an inactive Fryburg (Madison) producer. The 1-17 West Crooked Creek, sw ne 17-143n-97w, produced 84,918 bbls of oil, 77,183,000 cu ft of gas and about 868,000 bbls of water from Fryburg between 9697 and 9766 ft before being shut in.

Formation tops at the discovery well, measured from a Kelly bushing elevation of 2576 ft, include Charles at 8889 ft, Ratcliffe 9416, Midale 9476, Mission Canyon 9547, Fryburg 9698 and Duperow at 11,242 ft.

In eastern Mountrail County six miles north of the town of Plaza, Gary plans to drill the 35-5 Salter in sw nw 35-154n-88w. This new venture offsets to the northeast Texaco Exploration & Production Inc's apparently non-commercial Osloe field discovery, the 34-1 Paul Rau in ne se 34-154n-88w. Since its completion late last year, the shut-in discovery has produced only 618 bbls of 27° oil and 558 bbls of water. Production at the 7653-ft well is from Madison at 7323-38 ft.

## High Bids Average \$18.93/Acre at Weld County Colorado Sale

**T**HE AUGUST 26 oil and gas lease sale held by the Board of Weld County (Colorado) Commissioners in Greeley drew high bids totaling \$23,672.25 for five parcels comprising 1,250.20 acres, an average of \$18.93 per acre. The sale offering was comprised of 10 tracts covering 1,730.20 acres (PI 7-23-92). It was originally scheduled to be held August 19, but was postponed a week (PI 8-5-92).

Morrison, Colorado landman Randall Taylor made the sale's top per-acre bid of \$36.15 for Tract No. 2, a 160-acre lease covering n/2 ne, sw ne, and ne nw 34-5n-63w, Weld County, nearly 15 miles east-southeast of Greeley. The tract is within half a mile south of J sand gas production in Wattenberg field. Taylor also picked up Tract No. 3, 320 acres in n/2 14-4n-63w, for a per-acre bid of \$11.12.

Lomita Operating Co, Englewood, Colorado, acquired Tracts Nos. 8 and 9 for bids of \$20.00 per acre each. Tract No. 8 encompasses 320 acres in e/2 28-5n-61w; Tract No. 9 comprises 320 acres in s/2 34-5n-61w. They are in an area 12 miles northwest of Wiggins and 1-2 miles southwest and south of Northeast Riverside II field, a D sand oil and gas pool.

Denver-based Skaer Enterprises Inc was the successful bidder for Tract No. 7, which covers 130.20 acres in 3-7n-58w (in various blocks in Town of Raymer). Skaer paid \$11.75 per acre for the parcel.

**CAGLE CONSULTING, INC.**

410 17TH STREET  
SUITE 2420  
DENVER, CO 80202  
(303) 595-3341

August 27, 1992

Steven L. Rauzi  
Arizona Geological Survey  
845 North Park Avenue, Suite 100  
Tucson, Arizona 85719

Re: SunCor - Melange #32-23  
Informational Sundry  
SWNE Sec 23 T2N R1W  
Maricopa County, Arizona



Dear Mr. Rauzi:

Please find attached an informational Sundry identifying the drilling contractor as Grace Drilling Rig # 174.

If you should have any additional questions, please contact me at the above phone number.

Sincerely,

*Bill Cagle*  
Bill Cagle  
Consultant

Enc.

cc: Debbie Liller  
Harold Laycraft  
Operation File



Fife Symington  
Governor

State of Arizona  
**Arizona Geological Survey**  
845 North Park Avenue, #100  
Tucson, Arizona 85719  
(602) 882-4795



Larry D. Fellows  
Director and State Geologist

August 25, 1992

Mr. Jim Mitchell  
Environmental Specialist  
City of Avondale  
525 N. Central  
Avondale, Arizona 85323

Dear Mr. Mitchell:

This letter is in response to your telephone call today concerning the oil exploration well to be drilled in T. 2 N., R. 1 W., sec 23. Please note that a well drilled for oil is the same as a well drilled for water except that a well drilled for oil is normally drilled deeper and is regulated by a much stricter set of rules and requirements. As you can see from the enclosed rules on casing requirements, these rules are written to ensure the protection of natural resources including fresh water. Along with the enclosed rules, I have enclosed a copy of Arrowhead Oil and Gas Ltd's application and their permit to drill.

Note that on the bottom of page 2 of the application, Arrowhead Oil and Gas Ltd's casing program calls for steel pipe to be set from the surface to a depth of 2,500 feet or wherever they penetrate salt. This casing will be cemented throughout its entire length to seal off and confine all waters to their respective strata as required in R12-7-109. As I mentioned on the phone, a representative of this office will be on-site to witness the cementing operation and to make sure that cement is circulated to the surface.

Sincerely,

Steven L. Rauzi  
Oil & Gas Program Administrator

Enclosures

cc Larry D. Fellows

**PERMIT ISSUED TO DRILL OIL WELL NEAR LITCHFIELD PARK \***

A permit was issued by the Arizona Geological Survey on July 8 to Arrowhead Oil and Gas, Ltd. to drill an exploration well about 1 mile northeast of Litchfield Park. The well, the 32-23 Suncor-Melange is in T. 2 N., R. 1 W., sec. 23 and has a proposed total depth of 6,000 feet.

In accordance with Arizona Revised Statutes § 27-513, the Arizona Geological Survey issues a permit to drill when proper application for a permit is received and found to be in accordance with rules and law.

The operator of the well, Arrowhead Oil and Gas, Ltd. expects to prepare the location, move in the rig, and start drilling operations sometime during the last week of August. The operator is to notify the Arizona Geological Survey before the drilling operations begin. The operator of the well contacted us this morning, <sup>\*\*</sup> August 21, to report that the location was being prepared and that they hope to start drilling on August 29th.

Our records show that the only previous oil exploration well drilled in the vicinity of this well was the Bob James #1-19 Suncor well, which was drilled in T. 2 N., R. 1 W., sec 23 (4 miles west of this well) in the summer of 1988. The #1-19 well penetrated several thousand feet of salt with minor showings of organic material at several zones, but was plugged and abandoned that summer in compliance with the rules of the Oil and Gas Conservation Commission.

For additional information, contact the Arizona Geological Survey, 845 N. Park Avenue, Suite 100, Tucson, Arizona 85719, phone (602) 882-4795.

151

Steven L. Rauzi  
Oil and Gas Program Administrator  
August 21, 1992

\* Faxed to Joe Lane, Governor's Office Friday Morning 8/21/92

\*\* Matt Goolsbey, wellsite geologist, discuss sample interval, drill rates, & composite samples. They expect to drill ~600'/day minimum. ~2500'/day is 12min/kelley down. Arrowhead is building location and hope to spud well on Saturday 29<sup>th</sup>. One unpermitted load on its way. Permitted loads (weight) to follow.

AUG-20-'92 THU 14:14 ID: DEPT WATER RESOURCES TEL NO: 602 256 0506

#726 P01

**ARIZONA DEPARTMENT OF WATER RESOURCES**

15 South 15th Avenue, Phoenix, Arizona 85007  
Telephone (602) 542-1553  
Fax (602) 256-0506



FIFE SYMINGTON  
Governor

ELIZABETH ANN RIEKE  
Director

DATE:

AUGUST 20, 1992

TO:

STEVEN L. RAUZI

AZ GEOLOGICAL SURVEY

FROM:

BRAND HILL

2

PAGES TO FOLLOW

MESSAGE:

REGARD OIL WELL IN LITCHFIELD PARIC.

FOR YOUR RECORDS

TELEPHONE: (602) 542-1586 EXT.

TELEFAX TELEPHONE NUMBER: (602) 256-0506

**ARIZONA DEPARTMENT OF WATER RESOURCES**

15 South 15th Avenue, Phoenix, Arizona 85007  
Telephone (602) 542-1553  
Fax (602) 256-0506

August 20, 1992



FIPE SYMINGTON  
Governor

ELIZABETH ANN RIEKE  
Director

Mr. Robert R. Musselwhite  
City Manager  
City of Litchfield Park  
214 W. Indian School Road  
Litchfield Park, AZ 85340

Dear Mr. Musselwhite,

I am writing in response to your letter dated August 19, 1992, concerning the oil well to be drilled near Litchfield Park. According to Arizona Revised Statute §45-591.01, wells drilled for oil, gas, helium or geothermal purposes are not under the regulatory authority of the Department of Water Resources. The State agency that regulates these types of wells is the Arizona Geological Survey (AGS) in Tucson. I have forwarded a copy of your letter to Steven L. Rauzi, Oil and Gas Program Administrator for the Arizona Geological Survey.

Mr. Rauzi shared with me some pertinent information that may help you understand the potential impacts, if any, on your water supply wells. According to the AGS, the proposed wildcat oil well "Suncor-Melange #32-23" is to be drilled to a total depth of 6,000 feet below land surface. Steel casing is to be installed from land surface to a depth of 2,500 feet or wherever salt is encountered during drilling. The annular space between the steel casing and drilled borehole will be sealed with cement grout from land surface to the bottom of the steel casing. Installation of the cement grout seal will be monitored on-site by AGS staff. These construction specifications should help minimize any potential water quality impact on your water supply wells.

If you have any further questions, please do not hesitate to contact Mr. Rauzi at the Arizona Geological Survey (602-882-4795) or Greg Wallace, Chief Hydrologist at the Department of Water Resources (542-1586).

Sincerely,

A handwritten signature in black ink that reads "Bradley M. Hill".

Bradley M. Hill, P.G.  
Hydrologist

AUG-20-'92 THU 14:15 ID:DEPT WATER RESOURCES TEL NO:602 256 0506

#726 P03

8/19/82 16:35 002 935 5427

LITCHFIELD PARK

002

## City of Litchfield Park

### City Council

Derry D. Hubbard, Mayor  
Richard W. Vasiloff, Vice Mayor  
Lon T. Briggs  
J. Bart Mitchell  
Sandra J. Eagan  
Peter A. Spav  
Bert Van Wagner

August 19, 1992

Mr. Brad Hill, Hydrology  
Arizona Department of Water Resources  
15 S. 15th Avenue  
Phoenix, Arizona 85004

Reference: Water Well Protection

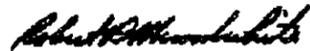
Dear Mr. Hill:

The attached article was taken from the Arizona Republic, August 17, 1992. I have had reports, from a very reliable source, that similar oil well drilling attempts made in 1950 resulted in the abandonment of several water wells due to resulting salt contamination. These wells were within a quarter mile of the drill site.

The City's existing water supply comes from the area described in this article. I request that you take necessary steps to avoid a potentially disastrous situation for us.

Sincerely,

City of Litchfield Park



Robert R. Musselwhite  
City Manager

RTH/CSS

Enclosure

cc Mayor Hubbard  
Litchfield Park City Council

Bill Cagle, Arrowhead Oil & Gas, July 9, 1992.

Called to check on status of permit application.  
indicated that they would set surf. csg. at top salt.  
would be using earthen reserve pit.  
\*advised him to get general use permit from DEQ. (for pit)  
indicated that Greg Etheridge would be at well-site.  
Would notify me as conditioned in my cover letter of

Bill Cagle August 5, 1992.

Contacted Roger Kennett <sup>207-4179</sup> w/ office w/ Quality @ DEQ who indicated  
that the general use permit for the drilling mud reserve pit does not  
require any paper work pursuant to A.A.C. R18-9-129(D). Arrow-  
head expects to build location on the 17<sup>th</sup>, MI RU on 19<sup>th</sup> & spud  
on the 24<sup>th</sup> of August. Have contract, yet unsigned, for  
Grace Drilling Rig # 174, which is currently stacked in Coconino Co.

Brad Hill August 20, 1992 (ADWR)

Received a fax from the City Manager of Litchfield  
Park expressing concerns of contamination of water wells  
from the proposed Arrowhead well. He will respond  
with referral to AZGS for further requests for information  
or concerns.

Monday, August 17, 1992

## Oil well to be sunk in Valley

### Canada wildcatters plan test on long shot

By Guy Webster  
The Arizona Republic

A Canadian company plans to drill for oil within a few weeks about 15 miles west of downtown Phoenix, citing an underground salt dome and other favorable indications, but acknowledging that the project is dicey.

International Dusty Mac Enterprises Ltd. of Vancouver, British Columbia, and partners will bore an exploratory well as deep as 6,000 feet on land owned by Suncor Development Co., Dusty Mac President Harold Laycraft said Friday. Drilling probably will begin by the end of August, he said.

The drilling site is between Dysart and El Mirage roads and between Camelback and Indian School roads, on the former Goodyear Farms near Litchfield Park, Suncor President John Ogden said.

Phoenix-based Suncor, a subsidiary of Pinnacle West Capital Corp., would receive royalties if any oil was produced, but Ogden emphasized that the initiative for the project came from Laycraft's group. Pinnacle West also owns Arizona Public Service Co., the state's largest electric utility.

"There are several indications that could be positive," Laycraft said. The thick, buried layer of salt in the area resembles salt domes associated with major oil finds in Texas, Louisiana and elsewhere, he said.

Also, traces of oil, though not in commercially recoverable amounts, have been found in earlier test wells northwest of the salt dome, he said. The theory behind the project is that oil from sedimentary layers under the salt layer may be trapped just below the impervious salt.

"A wildcat well always involves risk,

— See CANADIAN, page E6

E6 The Arizona Republic

## Canadian wildcatters to drill for oil on former farm in west Phoenix

— CANADIAN, from page E1

but if it were successful, it would be, potentially, a very large discovery," Laycraft said.

He declined to forecast the cost of the exploration project.

Steven L. Rauzi, oil- and gas-program commissioner for the Arizona Geological Survey, estimated that a project of the scope of Dusty Mac's would cost \$500,000 or more, mostly for the drilling. Other costs would cover preliminary seismic testing and mineral-rights leases.

Rauzi identified the Suncor area as a potential oil source in an article published last summer in *Oil & Gas Journal*, a trade publication.

"It's quite a risk, but there is a chance, and it has not really been tested yet," he said Friday.

Rauzi explained that the thick salt deposit appears to have been produced

by an ancient salt lake. Abundant life in that type of lake, such as brine shrimp and plankton, could have produced richly organic sediments. Those sediments, under thousands of feet of salt and other sediments, could have turned into oil held in place by the salt, Rauzi said.

Traces of oil that have been found in wells northwest of the salt deposit, in the Wittman and Beardsley areas, could have migrated from the area of the Suncor land, he said.

A 4,000-foot-deep well drilled in 1988 near the site of Dusty Mac's planned well hit lots of salt but no oil, according to Rauzi's 1991 article.

"The salt in the Suncor well may serve as a trapping mechanism to oil and gas below the salt," the article said.

Nyal Niemuth, resources specialist with the Arizona Department of Mines and Mineral Resources, said that the large salt deposit already is being used commercially for producing salt, and that propane and butane are stored in cavities created by excavating the salt.

Dusty Mac's partners in the project include Vancouver-based Arrowhead Resources Ltd. and Sundance Resources Ltd. They had AMH Group of Calgary, Alberta, make an independent evaluation of the site's potential, Laycraft said. The partners have acquired mineral-rights leases to more than 12,000 acres in the west Valley.

The AMH report said that chances of finding oil are low but that exploration costs also would be low. If oil was found, it could be "one of the largest onshore oil discoveries within the lower 48 states," it said.

Contributing to this article was Terry McDonnell of *The Arizona Republic*.

Rocky M.  
S.

## Horizontal Test Slated for Northwestern New Mexico Gallup Pool

**M**ERIDIAN OIL Inc has received a state drilling permit for a horizontal test of Gallup on the northwestern flank of the San Juan Basin six miles northwest of Fruitland, New Mexico.

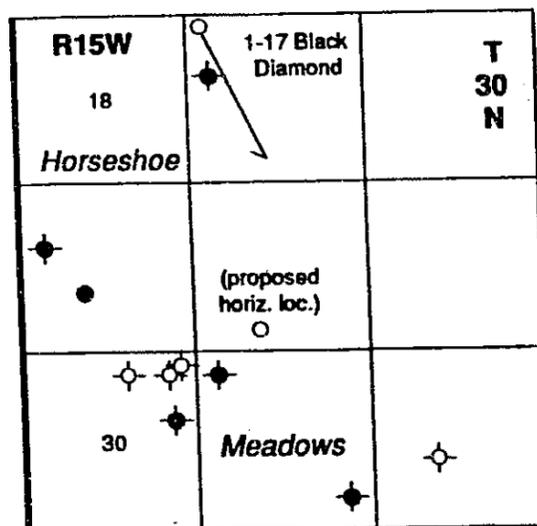
The 1-17 Black Diamond will be spudded from a surface location 150 ft from the north line and 205 ft from the west line (nw nw) of section 17-30n-15w, and drilled southeastward to a projected bottom-hole location 999 ft from the south line and 2310 ft from the west line (ne sw) of the same section. Meridian did not disclose the proposed true vertical or total measured depths.

The planned wellbore passes just east of an inactive Gallup producer completed in 1961 by Benson-Montin-Greer in the Horseshoe-Gallup pool. That 4270-ft well, the 1 Harrington in sw nw 17-30n-15w, produced 24,125 bbls of 39° oil with about 38 million cu ft of gas and 306 bbls of water from Gallup at 4130-40 ft before being shut in.

Log tops at the 1 Harrington, measured from a derrick floor elevation of 5374 ft, include Mesaverde at 965 ft,

Menefee 1590, Mancos 2800, Gallup 3790 and Sanostee at 4233 ft.

Meridian has filed an application with the New Mexico Oil Conservation Division for another horizontal test in



the Horseshoe-Gallup pool, with a surface location in se sw 20-30n-15w, nearly two miles south of the 1-17 Black Diamond site. A state permit has not yet been issued for that venture. Both Horseshoe-Gallup horizontal drilling requests, along with a third in the Basin-Dakota pool, were scheduled to be considered by the OCD at its June 11 hearing (PI 6-3-92).

## Remote Wildcat Scheduled in Southwestern Arizona

**A**RROWHEAD RESOURCES (USA) Ltd has staked a remote exploratory test in southwestern Arizona about a mile east of Litchfield Park in central Maricopa County.

The 32-23 SunCor-Melange, sw ne 23-2n-1w, is projected to 6000 ft in volcanics. It's approximately 275 miles southwest of production at fields on Navajo Indian lands in northeastern Arizona and some 300 miles east-southeast of fields in the Los Angeles Basin of southern California.

In 1988, Bob James Exploration & Drilling completed a 4000-ft dry hole at the 1-19 SunCor in ne ne 19-2n-1w, about four miles west of the Arrowhead wildcat. James' test was spudded in Quaternary fill, and logged a Miocene salt at 1716 ft. Little other information was released on that test, which was converted to a water well.

Arrowhead late last year completed a remote wildcat in Butte County, South Dakota, as a dry hole. The 13-4R Jeffrey, ne ne 13-8n-3e, was set up as a 3750-ft test to the Cambrian Deadwood and was drilled some 80 miles from the nearest production.

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Rocky Mountain Region Report (USPS 113-170). Price: \$1560 per year. "Northern Edition" Price: \$1320 per year. "Wyoming Edition" Price \$1320 per year. "Four Corners-Intermountain Edition" Price \$960 per year. "Southeastern Edition" Price \$960 per year. "Newsletter Edition" Price \$888 per year. Published by Petroleum Information Corporation, Monday through Friday except New Years Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and the day after, and Christmas Day and the day after, 4100 East Dry Creek Road, Littleton, CO 80122. Second class postage paid at Littleton, CO 80122 and additional mailing offices. Postmaster: Send address changes to: Rocky Mountain Region Report, P.O. Box 2612, Denver, CO 80201.

**PETROLEUM INFORMATION  
DAILY ACTIVITY REPORT  
SECTION II - 07/13/92**

**PAGE 2**

**FIRST REPORT SUMMARY**

INITIAL CLASS: WF = NEW FIELD WILDCAT; WD = DEEPER POOL WILDCAT; WS = SHALLOWER POOL WILDCAT; WP = NEW POOL WILDCAT; WO = WILDCAT OUTPOST; D = DEVELOPMENT.  
■ DENOTES NEW INFORMATION ADDED THIS WEEK. LDIR - LAST DATE INFORMATION REPORTED OR CONFIRMED.

**ARIZONA**

**MARICOPA COUNTY**

**ARROWHEAD RESOURCES**  
32-23 SUNCOR-MELANGE  
API 02-013-20025

23-2N-1W  
NE SW NE  
1982 FNL 1954 FEL  
IC 20137000192

WILDCAT; 6000 VOLCANCS. (FR 07/10/92DN) OPER ADD: 475 17TH ST  
STE 820, DENVER, CO, 80202 PHONE (303) 695-6608; EL: 1032 GP;  
LOCATION DATA: 192 MI S-SW PINTA DOME FLD(COCONINO) 1 1/2 MI NE  
LITCHFIELD, AZ;

WF

LOC;



Fife Symington  
Governor

State of Arizona  
**Arizona Geological Survey**

845 North Park Avenue, #100  
Tucson, Arizona 85719  
(602) 882-4795



Larry D. Fellows  
Director and State Geologist

July 8, 1992

Pamela A. Pontzer  
Arrowhead Oil and Gas Ltd.  
475 17th Street, Suite 820  
Denver, Colorado 80202

Re: SunCor-Melange #32-23, Sec. 23, T. 2 N., R. 1 W., Maricopa Co.,  
State Permit #877

Dear Ms. Pontzer:

Enclosed are (1) approved Application for Permit to Drill, (2) Permit to Drill #877, (3) filing fee receipt #3027, and (4) instructions for handling well samples.

Certain wellsite operations need to be witnessed by this office. Therefore, this Permit to Drill is issued on the condition that you *notify this office at least 48 hours* before you

- 1) Commence drilling operations;
- 2) Run and cement surface casing; and
- 3) Nipple up and test the BOPE prior to drilling out of the surface casing.

Forms enclosed include (1) Form 4; *Well Completion Report*, which is required within 30 days of completing the well; (2) Form 9, *Application to Plug and Abandon*, which requires approval before commencing any work to plug and abandon the well; (3) Form 10, *Plugging Record*, which is required after the well has been plugged; and (4) Form 25, *Sundry Notice*, to provide this office of weekly updates of wellsite activity. BLM forms may be substituted for Form 25.

I look forward to a successful completion of this well.

Sincerely,

Steven L. Rauzi  
Oil & Gas Program Administrator

Enclosures



Fife Symington  
Governor

State of Arizona  
**Arizona Geological Survey**  
845 North Park Avenue, #100  
Tucson, Arizona 85719  
(602) 882-4795



Larry D. Fellows  
Director and State Geologist

INSTRUCTIONS FOR HANDLING WELL SAMPLES

**Oil & Gas Conservation Commission, A.A.C. R12-7-121.C**

Two sets of samples of all cores and cuttings, at a maximum interval of ten feet, shall be furnished to the Commission within 30 days of the completion or abandonment of the well from which said samples were taken. All samples and cores for the Commission shall be handled as follows:

1. All samples shall be properly washed and dried.
2. An amount, the equivalent of two tablespoons, of each sample shall be placed in envelopes or other suitable wrapping and clearly identified as to the depth at which it was taken. Envelopes shall be packaged in boxes of sufficient size and shape to accommodate the envelopes.
3. Samples shall be properly packaged for transporting in a manner that will protect the individual samples; each individual pack of samples shall contain the identification of the well from which the samples originated, the complete location of the well, and the Commission's permit number.
4. Two sets of samples of all wells shall be shipped or mailed, charges prepaid, to:  
  
Oil and Gas Program Administrator  
Arizona Geological Survey  
845 North Park Avenue, Room 100  
Tucson, AZ 85719
5. Core samples may be furnished in chips and suitably packed as set forth in paragraphs 2 and 3 above. Core samples shall be shipped or mailed, charges prepaid, as indicated in paragraph 4 above.
6. Any Samples so requested which the operator desires to keep confidential shall be furnished to the Commission at its office within 30 days after completion or abandonment of the well from which taken.

Brian Jeanfreau, 7/2/92, called to inquire about Arrowhead Oil + gas and Sundance Energy and if they are drilling a well in Maticopa Co. He indicated that they were still in process of tying up land, which has delayed their spud date. (from Louisiana)  
\* Advised him that Arrowhead OG has applied for permit to drill. ~~SLR~~

Le Roy Graff, 7/9/92, called to inquire about International Dusty Mac + if they have applied for a drilling permit in Maticopa Co.  
\* Advised him that Arrowhead OG was issued a permit to drill. ~~SLR~~

Norm Cranceford, 7/9/92, from Alabama, called to inquire about Arrowhead OG applying for permit to Drill in Maticopa Co. Has invested in International Dusty Mac Enterprises Ltd. (DMACE on Nasdaq) They have invested 20% in the Luke Salt play with Arrowhead + have about 11,500 acres tied up. DMACS is a Canadian Co. with Silver holdings in Calif. Silver is down so they invested in this play.  
\* Advised him that Arrowhead OG has been issued Permit to Drill. ~~SLR~~



Fife Symington  
Governor

State of Arizona  
**Arizona Geological Survey**

845 North Park Avenue, #100  
Tucson, Arizona 85719  
(602) 882-4795



Larry D. Fellows  
Director and State Geologist

July 6, 1992

Randall Beard  
5436 South, 2000 West  
Rexburg, Idaho 83440

Re: SunCor-Melange #32-23 well, sec. 23, T. 2N., R. 1 W., Maricopa  
Co., State Permit #877

Dear Mr. Beard:

In reply to your letter of June 24, 1992, this letter will verify that Arrowhead Resources (U.S.A.) Ltd., has applied to this agency for a permit to drill the above referenced well. I expect to issue them a permit in the next few days.

Information on oil and gas leasing in the area can be obtained from

- 1) The State Land Department at 1616 W. Adams, Phoenix, AZ 85007, phone (602) 542-4631 with respect to any State lands in the area;
- 2) The Federal Bureau of Land Management at 3707 N. Seventh Street, Phoenix, AZ 85014, phone (602) 640-5534 with respect to any Federal lands in the area; and
- 3) The County recorder in the County in question with respect to any Private lands in the area.

Oil shows reported in some wells drilled in the general area would suggest the possibility of finding oil in the vicinity of the salt. However, for a more thorough analysis or recommendation I would recommend that you obtain the opinion of a consulting geologist.

Sincerely,

*Steven L. Rauzi*

Steven L. Rauzi  
Oil & Gas Program Administrator



Fife Symington  
Governor

State of Arizona  
**Arizona Geological Survey**

845 North Park Avenue, #100  
Tucson, Arizona 85719  
(602) 882-4795



Larry D. Fellows  
Director and State Geologist

July 6, 1992

Randall Beard  
5436 South, 2000 West  
Rexburg, Idaho 83440

Re: SunCor-Melange #32-23 well, sec. 23, T. 2N., R. 1 W., Maricopa  
Co., State Permit #877

Dear Mr. Beard:

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Sincerely,

Steven L. Rauzi  
Oil & Gas Program Administrator



STATE OF ARIZONA  
DEPARTMENT OF MINES AND MINERAL RESOURCES  
ARIZONA MINING AND MINERAL MUSEUM

Phone (602) 255-3791 1-800-446-4259 (IN ARIZONA ONLY)  
FAX (602) 255-3777 Tucson Field Office (602) 628-6340

July 1, 1992

Randall Beard  
5636 S. 2000 W.  
Rexburg, Idaho 83440



Dear Mr. Beard:

Your letter requesting information on oil and gas exploration has been referred to Steven L. Rauzi, Program Administrator, Arizona Oil and Gas Program Office at the Arizona Geological Survey.

Thank you for your interest in Arizona Mineral Resources.

Sincerely,

*Ken A. Phillips*  
Ken A. Phillips  
Chief Engineer

KAP:mc  
cc: Steven Rauzi



Randall Beard  
5436 S. 2000 W.  
Rexburg, Idaho 83440  
June 24, 1992  
H (208)356-4891  
W (208)526-6657



Arizona  
Department of Mines and Minerals  
1502 W. Washington Street  
Phoenix, AZ 85007

Dear Department Manager,

I am enquiring of your office with questions regarding oil and gas exploration in Arizona. If I am not addressing the correct department, or person, please direct this correspondence to the correct area. If this is not possible please inform me who I should contact.

Specifically, I am enquiring about the validity of claims which a company by the name of Arrowhead Resources, has made about drilling for oil in the Glendale Basin of Arizona. They call their project, the Gila Salt Dome Project. I have invested money in this company and am trying to verify the level of security in this investment, and the legitimacy of their claims. I would like to receive any information you can provide me regarding this project. Has there been a permit issued to drill, or will there be in the future? Does Arrowhead own land in the said area? Are the possibilities of finding oil reasonable in the area? Anything else you can tell me would be appreciated. Thank you for your cooperation.

Randall Beard

ARROWHEAD RESOURCES (U.S.A.) LTD.  
475 17TH STREET, SUITE 820  
DENVER, COLORADO 80202  
(303) 294-0400

July 2, 1992

Arizona Oil & Gas Conservation Commission  
845 North Park, #100  
Tucson, Arizona 85719

Attn: Mr. Steven L. Rauzi  
Oil & Gas Programs Administrator

RE: SunCor Melange #32-23 Well  
ADDITION TO APPLICATION FOR PERMIT TO DRILL  
1. Drilling Prognosis  
Township 2 North, Range 1 West  
Section 23: SW/4NE/4



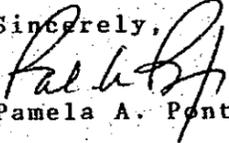
Dear Steve:

Pursuant to our phone conversation last week, please find enclosed a "Drilling Prognosis" regarding the SunCor Melange #32-23 Well. This report is to be attached to the Application for Permit to Drill submitted to you earlier.

As we discussed, Arrowhead would like all information pertaining to the SunCor Melange #32-23 Well to remain confidential.

Should you require any further information please let me know.

Sincerely,

  
Pamela A. Pontzer

Enclosure



Fife Symington  
Governor

State of Arizona  
**Arizona Geological Survey**  
845 North Park Avenue, #100  
Tucson, Arizona 85719  
(602) 882-4795



Larry D. Fellows  
Director and State Geologist

June 25, 1992

Katherine L. Valentin  
State Treasurer's Office  
1700 West Washington  
Phoenix, Arizona 85007

Re: Valley National Bank of Arizona C.D. No. 2609737

Dear Ms. Valentin:

Enclosed are (1) Valley National Bank of Arizona Certificate of Deposit No. 2609737, (2) Assignment to the Arizona State Treasurer form, in duplicate, and (3) Securities Safekeeping form.

Sincerely,

A handwritten signature in cursive script that reads "Steven L. Rauzi".

Steven L. Rauzi  
Oil & Gas Program Administrator

Enclosures

ARROWHEAD RESOURCES (U.S.A.) LTD.  
475 17TH STREET, STE. 820  
DENVER, COLORADO 80202  
(303) 294-0400

June 24, 1992

State of Arizona  
Oil & Gas Conservation Commission  
845 North Park, #100  
Tucson, Arizona 85719

Attn: Mr. Steven L. Rauzi  
Oil & Gas Programs Administrator

RE: SunCor Melange #32-23 Well  
1. Certificate of Deposit in Lieu of Bond  
2. Application for Permit to Drill  
Maricopa County, Arizona

Dear Steve:

Enclosed please find the following documentation:

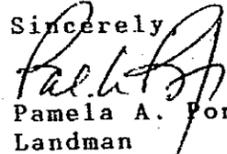
- 1A. "Assignment to Arizona State Treasurer Security in Lieu of Cash Deposit for Compliance with Section 35-155 Arizona Revised Statutes" - Two (2) originally executed copies for submittal to the Arizona State Treasurer
- 1B. Certificate of Deposit 2609737 in the Amount of \$5000.00 payable to the Arizona State Treasurer, deposited by Arrowhead Oil and Gas Ltd.
- 2A. "Application for Permit to Drill or Re-enter" and "Organization Report" - Two (2) originally executed copies.
- 2B. Arrowhead Check No. 1101 in the amount of \$25.00 to cover filing fees.

As you and I discussed, Arrowhead would like all information pertaining to the SunCor Melange #32-23 Well to remain confidential.

State of Arizona  
Oil & Gas Conservation Commission  
June 24, 1992  
Page 2

Your help has been invaluable Steve. Thank you for your time and patience. Should you require any further information, please let me know.

Sincerely

  
Pamela A. Pontzer  
Landman

PAP/dgl

Enclosures