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**Geotechnical Engineering Report
Final Report
Cave Buttes Piezometer Installation
PCN 050.42.35
FCD Contract No. 2001 C049
Assignment No. 1
R.A.M. Project No. G08200**



**Geotechnical Engineering Report
Final Report
Cave Buttes Piezometer Installation
PCN 050.42.35
FCD Contract No. 2001 C049
Assignment No. 1
R.A.M. Project No. G08200**

For:
Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009



By:
Ricker-Atkinson-McBee & Associates, Inc.
2105 South Hardy Drive, Suite 13
Tempe, Arizona 85282



R·A·M

RICKER • ATKINSON • MCBEE & ASSOCIATES, INC.

Geotechnical Engineering • Construction Materials Testing

Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009

December 20, 2002

Attention: Michael D. Greenslade, P.E.
Larry K. Lambert, P.E.

Subject: Final Report
Cave Buttes Piezometer Installation
PCN 050-42.35
FCD Contract No. 2001 C049
Assignment No. 1

R.A.M. Project No. G08200

In accordance with our scope of work for the Assignment No. 1 this letter transmits the results of the assignment which includes:

1. Initial field review.
2. Installation and logging of the Piezometer work.
3. Final Report.

If you have any questions, please do not hesitate to call.

Respectfully submitted,

RICKER, ATKINSON, MCBEE & ASSOCIATES, INC.



By: Kenneth L. Ricker, P.E.

/ces

Copies to: Addressee (6)

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REPORT



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INTRODUCTION

The City of Phoenix wastewater treatment facility located northeast of Cave Buttes Dam will be discharging excess treated effluent into a tributary wash to Cave Creek. The discharge will amount to about 760 acre-feet per year and will occur upstream of the old Cave Creek multi-arch concrete dam and the Cave Buttes Dam.

The Flood Control District of Maricopa County (DISTRICT) has an interest in monitoring the impact of the discharge to the Cave Buttes Dam. As part of the monitoring program, nine piezometer wells will be installed. We installed five of these piezometers for DISTRICT under this work assignment with the remainder to be installed at a later date by the City of Phoenix, or through a future work assignment of this contract.

WORK ASSIGNMENT

This work assignment includes an initial site review by R.A.M. (Ken Ricker) with DISTRICT personnel (Michael Greenslade, Robert Stevens and George Beckwith) and the City of Phoenix consultant, Hydro Systems, Inc. (Gary Small and Tomas Goode). The purpose of the site review was to select piezometer well locations and to become familiar with the site and site access. The initial 5 piezometer well locations (CC1 to CC4 and CB4) were marked in the field and recorded on photo mosaic of the site. Following the site selection of the initial 5 sites, the 4 remaining sites were visually reviewed by R.A.M. and DISTRICT personnel.

Subsequent to the field phase of the work the DISTRICT (Robert Stevens) applied for and obtained the ADWR well permits with variances (copies attached). Mr. Stevens also provided all necessary environmental clearances.

The field work was started on October 28, 2002. The final depths of the test borings and the depths of the porous stones were determined during discussions during installation with R.A.M. and DISTRICT personnel. The drilled locations for CC1 to CC4 and CB4 and the proposed locations for CB1 to CB3 and CB5 are shown on the attached plan. A detailed description of

each days work is attached along with a digital photo log. Enclosed is a CD containing all the digital photos.

Each piezometer consisted of a 24 inch long porous stone with an outside diameter of 1.5 inches attached to a 1 inch diameter flush jointed PVC (SCH80) which extended to the surface. The details of each piezometer well are presented on the attached "Piezometer Logs".

The piezometer bore holes were drilled by Layne Christensen Co. who also provide the piezometer materials and installation. The bore holes were drilled with a Schramn T-685 reverse circulated, top drive rotary drill rig equipment with a down hole hammer/casing advancer and 8-5/8 inch O.D. steel casing. The drill rod was double wall and the drill fluid was compressed air. Once the bore hole was drilled to the desired depth the drill rod/down hole hammer was removed leaving a cased hole. The steel casing was withdrawn during piezometer well installation.

The bore hole drilling and piezometer installation were logged and supervised by a senior field technician from our firm. The boring log for each bore hole is attached.

RECOMMENDATIONS

Until the City of Phoenix begins discharging into the wash, we recommend that the piezometers be read every three months. During the period of discharge or during storm events which result in flows in Cave Creek and/or in the wash near CC4, we recommend the piezometers be read as soon as possible after the start of the event and every week thereafter for at least four weeks or until readings stabilize and until the readings show no water after four consecutive readings.

**EXHIBIT A
SITE PLAN**

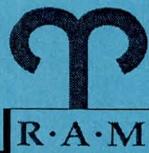




EXHIBIT A



Not to scale.

Legend

-  Locations of Installed Piezometers
-  Approximate Locations of Proposed Piezometer

**APPENDIX A
PIEZOMETER LOGS**



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APPENDIX B
TEST BORING LOGS
And
LEGEND



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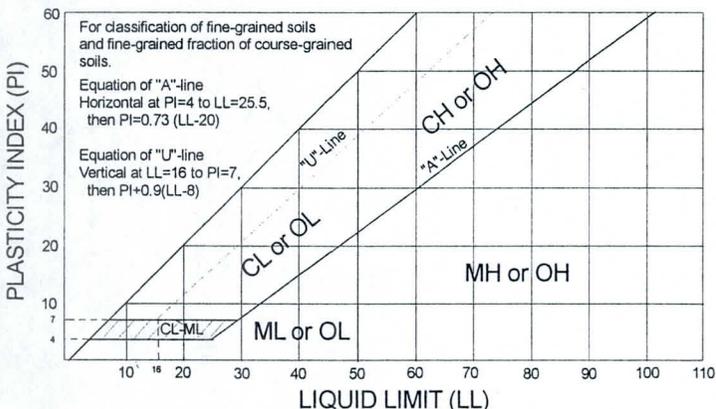
LEGEND

ASTM Designation: D2487-83

(Based on Unified Soil Classification System)

CLASSIFICATION OF SOILS

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests				Soil Classification		
				Group Symbol	Name	
COARSE-GRAINED SOILS More than 50% retained on No. 200 Sieve	Gravels More than 50% coarse fraction retained on No. 4 Sieve	Clean Gravels Less than 5% fines	$Cu \geq 4$ and $1 \leq Cc \leq 3$	GW	Well graded gravel	
			$Cu < 4$ and/or $1 > Cc > 3$	GP	Poorly graded gravel	
		Gravels with Fines More than 12% fines	Fines classify as ML or MH	GM	Silty gravel	
		Fines classify as CL or CH	GC	Clayey gravel		
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands Less than 5% fines	$Cu \geq 6$ and $1 \leq Cc \leq 3$	SW	Well-graded sand	
			$Cu < 6$ and/or $1 > Cc > 3$	SP	Poorly graded sand	
Sands with Fines More than 12% fines		Fines classify as ML or MH	SM	Silty sand		
		Fines classify as CL or CH	SC	Clayey sand		
FINE-GRAINED SOILS 50% or more passes the No. 200 Sieve		Silt and Clays Liquid limit less than 50	Inorganic	$Pl > 7$ and plots on or above "A" line	CL	Lean clay
				$Pl < 4$ or plots below "A" line	ML	Silt
	Organic		$\frac{\text{Liquid Limit} - \text{oven dried}}{\text{Liquid limit} - \text{not dried}} < 0.75$	OL	Organic clay Organic silt	
	Silt and Clays Liquid limit 50 or more	Inorganic	Pl plots on or above "A" line	CH	Fat clay	
			Pl plots below "A" line	MH	Elastic silt Organic clay	
		Organic	$\frac{\text{Liquid limit} - \text{oven dried}}{\text{Liquid limit} - \text{not dried}} < 0.75$	OH	Organic silt	
HIGHLY ORGANIC SOILS	Primarily organic matter, dark in color, and organic odor			PT	Peat	



TEST BORING LOG DEFINITIONS

Blows per foot using 140 pound hammer with 30 inch free-fall.

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
	C	N/R					

C = Continuous Penetration Resistance (2 inch diameter rod)
 N = Standard Penetration Resistance (ASTM D1586)
 R = Penetration Resistance (3 inch diameter ring line sampler)

U.S. STANDARD SERIES SIEVE

GRAIN SIZES

CLEAR SQUARE SIEVE OPENINGS

SILTS & CLAYS DISTINGUISHED ON BASIS OF PLASTICITY	SAND			GRAVEL		COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	COARSE		
	200	40	10	4	3/4"	3"	12"

MOISTURE CONDITION (INCREASING MOISTURE →)

DRY SLIGHTLY DAMP DAMP MOIST (Plastic Limit) VERY MOIST WET (SATURATED) (Liquid Limit)

CONSISTENCY CORRELATION

RELATIVE DENSITY CORRELATION

CLAYS & SILTS		BLOWS/FOOT*	SANDS & GRAVELS		BLOWS/FOOT*
VERY SOFT	0-2	0-2	VERY LOOSE	0-4	0-4
SOFT	2-4	2-4	LOOSE	4-10	4-10
FIRM	4-8	4-8	MEDIUM DENSE	10-30	10-30
STIFF	8-16	8-16	DENSE	30-50	30-50
VERY STIFF	16-32	16-32	VERY DENSE	OVER 50	OVER 50
HARD	OVER 32	OVER 32			

*Number of blows of 140 lb hammer falling 30" to drive a 2" O.D. (1-3/8" I.D.) split-spoon sampler (ASTM D1586).

RICKER, ATKINSON, MCBEE & ASSOCIATES, INC.
GEOTECHNICAL SERVICES
BORING LOG

BORING NO. CC1 DATE: 10-29-02 BY: DM
 PROJECT NO. G08200 SHEET NO. 1 OF 3
 PROJECT NAME: Cave Buttes Piezometer GROUND ELEV. 1609.8'
Installation W.T. ELEV. None Encountered
 LOCATION: N991524.2;E660778.3 DRILLER: Layne Christensen Company
 DRILL EQUIPMENT: Schramm T-685 Drill ADWR REGISTRATION NO.: 55-595012
Using 8 5/8" OD Pipe FILE NO.: A (4-3) 3 BBA

DEPTH IN FEET	BLOWS PER FOOT			DRY DENSITY (pcf)	WATER CONTENT %	UNIFIED CLASS- IFICATION	VISUAL CLASSIFICATION AND REMARKS
	CONTINUOUS PENETRATION RESISTANCE	3" RING SAMPLER	SPT				
5						CL/SC	Sandy Clay/Clayey Sand, Trace Gravel; brown, nearly dry, stiff, medium dense, medium to high plasticity.
10						SM/GM	Silty Sand and Gravel, Some Cobbles, Occasional Boulders; brown, nearly dry, dense, no to low plasticity fines.
15						SM	Silty Sand; brown, nearly dry, medium dense, no to low plasticity fines.
20						SP/GP	Sand and Gravel, Some Cobbles, Boulders and Silt; brown, nearly dry, dense.
25							Increase cobble and boulder content below 25 feet.
30							
							This boring log represents the conditions encountered on the date of drilling at this particular location. No other warranty is expressed or implied to the actual conditions which may exist within the vicinity of this boring location.

RICKER, ATKINSON, MCBEE & ASSOCIATES, INC.
GEOTECHNICAL SERVICES
BORING LOG

BORING NO. CC1 **DATE:** 10-29-02 **BY:** DM
PROJECT NO. G08200 **SHEET NO.** 2 **OF** 3
PROJECT NAME: Cave Buttes Piezometer **GROUND ELEV.** 1609.8'
Installation **W.T. ELEV.** None Encountered
LOCATION: N991524.2;E660778.3 **DRILLER:** Layne Christensen Company
DRILL EQUIPMENT: Schramm T-685 Drill **ADWR REGISTRATION NO.:** 55-595012
Using 8 5/8" OD Pipe **FILE NO.:** A (4-3) 3 BBA

DEPTH IN FEET	BLOWS PER FOOT			DRY DENSITY (pcf)	WATER CONTENT %	UNIFIED CLASS- IFICATION	VISUAL CLASSIFICATION AND REMARKS
	CONTINUOUS PENETRATION RESISTANCE	3" RING SAMPLER	SPT				
						SP/GP	Sand and Gravel, With Cobbles, Boulders and Silt; - continued
35						SP/GC	Sand, Gravel and Cobbles, With Boulders, Some Clay; brown, nearly dry, dense to very dense, low to medium plasticity fines.
40							
45						SC	Clayey Sand, Trace to Some Gravel, Occasional Cobbles; brown, slightly damp, dense, medium plasticity fines.
50							
55						SC/GC	Increase in gravel below 54 feet.
60							

This boring log represents the conditions encountered on the date of drilling at this particular location. No other warranty is expressed or implied to the actual conditions which may exist within the vicinity of this boring location.

RICKER, ATKINSON, MCBEE & ASSOCIATES, INC.
GEOTECHNICAL SERVICES
BORING LOG

BORING NO. CC2 DATE: 10-31-02 BY: DM
 PROJECT NO. G08200 SHEET NO. 1 OF 1
 PROJECT NAME: Cave Buttes Piezometer GROUND ELEV. 1600.2'
Installation W.T. ELEV. None Encountered
 LOCATION: N991699.9;E660196.9 DRILLER: Layne Christensen Company
 DRILL EQUIPMENT: Schramm T-685 Drill ADWR REGISTRATION NO.: 55-595006
Using 8 5/8" OD Pipe FILE NO.: A (4-3) 3 BBB

DEPTH IN FEET	BLOWS PER FOOT			DRY DENSITY (pcf)	WATER CONTENT %	UNIFIED CLASS- IFICATION	VISUAL CLASSIFICATION AND REMARKS
	CONTINUOUS PENETRATION RESISTANCE	3" RING SAMPLER	SPT				
5						SC/GC	Clayey Sand and Gravel, Some Cobbles; brown, nearly dry, medium dense, medium to low plasticity fines.
10						SP/SM	Sand, With Silt; brown, slightly damp, medium dense, non-plastic fines.
15						SP/GP	Sand, Gravel and Cobbles, Occassional Boulders; brown, nearly dry, dense.
20						CL	Sandy Clay; brown, moist, red brown, very stiff, high plasticity.
25						Bedrock	Sand, Gravel, and Cobbles in a Heavily Cemeted Matrix; brown, nearly dry, very hard (tuffaceous agglomerate).
30							Stopped at 23 feet (10-31-02). Set porous stone tip at 22.5 feet and completed piezometer.
							<small>This boring log represents the conditions encountered on the date of drilling at this particular location. No other warranty is expressed or implied to the actual conditions which may exist within the vicinity of this boring location.</small>

RICKER, ATKINSON, MCBEE & ASSOCIATES, INC.
GEOTECHNICAL SERVICES
BORING LOG

BORING NO. CC3 DATE: 10-31-02 BY: DM
 PROJECT NO. G08200 SHEET NO. 1 OF 1
 PROJECT NAME: Cave Buttes Piezometer GROUND ELEV. 1598.2'
Installation W.T. ELEV. None Encountered
 LOCATION: N991792.0;E659910.0 DRILLER: Layne Christensen Company
 DRILL EQUIPMENT: Schramm T-685 Drill ADWR REGISTRATION NO.: 55-595004
Using 8 5/8" OD Pipe FILE NO.: A (5-3) 33 DDD

DEPTH IN FEET	BLOWS PER FOOT			DRY DENSITY (pcf)	WATER CONTENT %	UNIFIED CLASS- IFICATION	VISUAL CLASSIFICATION AND REMARKS
	CONTINUOUS PENETRATION RESISTANCE	3" RING SAMPLER	SPT				
						SM	Silty Sand, Trace Gravel, Occasional Boulders; brown, nearly dry, medium dense, no to low plasticity fines.
5						SC	Clayey Sand, Trace Gravel; brown, damp, low to medium dense, medium plasticity fines.
10							
15						SC/GC	Clayey Sand and Gravel; brown, moist, dense, medium plasticity fines.
20						Bedrock	Sand, Gravel and Cobbles in a Heavily Cemented Matrix; light brown, nearly dry, hard to very hard with depth (tuffaceous agglomerate).
25							Stopped at 21 feet. (10-31-02) Pulled back casing to 18 feet, nine inches and backfilled bore hole 21 feet to 18 feet, nine inches with sand. Set porous stone at 18.7 feet and completed piezometer. First attempt to set piezometer was unsuccessful. Second attempt was completed (11-1-02).
30							

This boring log represents the conditions encountered on the date of drilling at this particular location. No other warranty is expressed or implied to the actual conditions which may exist within the vicinity of this boring location.

RICKER, ATKINSON, MCBEE & ASSOCIATES, INC.
GEOTECHNICAL SERVICES
BORING LOG

BORING NO. CC4 **DATE:** 10-28-02 **BY:** KLR
PROJECT NO. G08200 **SHEET NO.** 1 **OF** 1
PROJECT NAME: Cave Buttes Piezometer **GROUND ELEV.** 1656.9'
Installation **W.T. ELEV.** None Encountered
LOCATION: N997990.8;E664964.3 **DRILLER:** Layne Christensen Company
DRILL EQUIPMENT: Schramm T-685 Drill **ADWR REGISTRATION NO.:** 55-595005
Using 8 5/8" OD Pipe **FILE NO.:** A (5-3) 27 DDA

DEPTH IN FEET	BLOWS PER FOOT			DRY DENSITY (pcf)	WATER CONTENT %	UNIFIED CLASS- IFICATION	VISUAL CLASSIFICATION AND REMARKS
	CONTINUOUS PENETRATION RESISTANCE	3" RING SAMPLER	SPT				
5						SM	Silty Sand, Some Gravel, Trace Clay, Occasional Cobbles; brown, nearly dry, medium dense, low plasticity fines. Thin cobbly layer 0 to 1 feet.
10						SP/GM	Sand, Gravel and Cobbles, Some Boulders, Trace to Some Silt; brown, nearly dry, dense to very dense, no to low plasticity fines. Occasional thin silty sand and sand layers 13 to 16 feet.
15							
20							
25						CL/SC	Sandy Clay/Clayey Sand, Trace Gravel, Occasional Cobbles; brown, damp, stiff, medium plasticity.
30							Stopped at 28.5 feet. (10-28-02) (10-29-02) Set porous stone at 28 feet and completed piezometer. <small>This boring log represents the conditions encountered on the date of drilling at this particular location. No other warranty is expressed or implied to the actual conditions which may exist within the vicinity of this boring location.</small>

RICKER, ATKINSON, MCBEE & ASSOCIATES, INC.
GEOTECHNICAL SERVICES
BORING LOG

BORING NO. CB4 DATE: 11-1-02 BY: DM
 PROJECT NO. G08200 SHEET NO. 1 OF 2
 PROJECT NAME: Cave Buttes Piezometer GROUND ELEV. 1583.1'
Installation W.T. ELEV. None Encountered
 LOCATION: N991352.5;E660088.1 DRILLER: Layne Christensen Company
 DRILL EQUIPMENT: Schramm T-685 Drill ADWR REGISTRATION NO.: 55-595010
Using 8 5/8" OD Pipe FILE NO.: A (4-3) 3 BBC

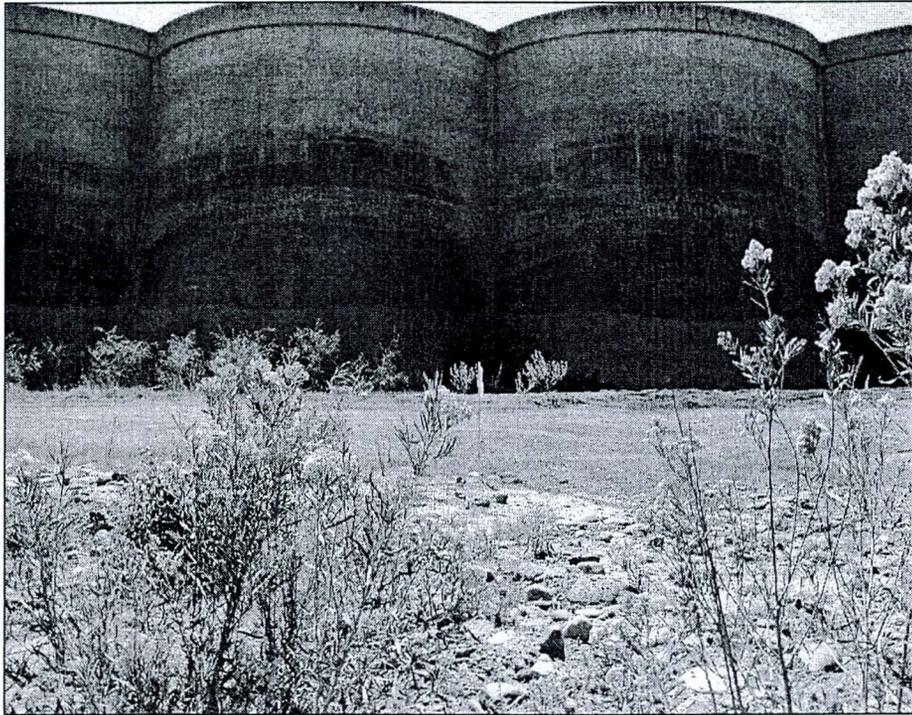
DEPTH IN FEET	BLOWS PER FOOT			DRY DENSITY (pcf)	WATER CONTENT %	UNIFIED CLASS- IFICATION	VISUAL CLASSIFICATION AND REMARKS
	CONTINUOUS PENETRATION RESISTANCE	3" RING SAMPLER	SPT				
5						SP/GM	Sand, Gravel and Cobbles, Trace to Some Silt, Some Boulders; brown, nearly dry, dense to very dense, no to low plasticity fines.
10							Clayey Sand, Some Gravel and Cobbles; brown, moist, dense, medium plasticity fines.
15							Clayey Sand, Some Gravel and Cobbles; brown, moist, dense, medium plasticity fines.
20							Clayey Sand, Some Gravel and Cobbles; brown, moist, dense, medium plasticity fines.
25							Clayey Sand, Some Gravel and Cobbles; brown, moist, dense, medium plasticity fines.
30							Clayey Sand, Some Gravel and Cobbles; brown, moist, dense, medium plasticity fines.

This boring log represents the conditions encountered on the date of drilling at this particular location. No other warranty is expressed or implied to the actual conditions which may exist within the vicinity of this boring location.

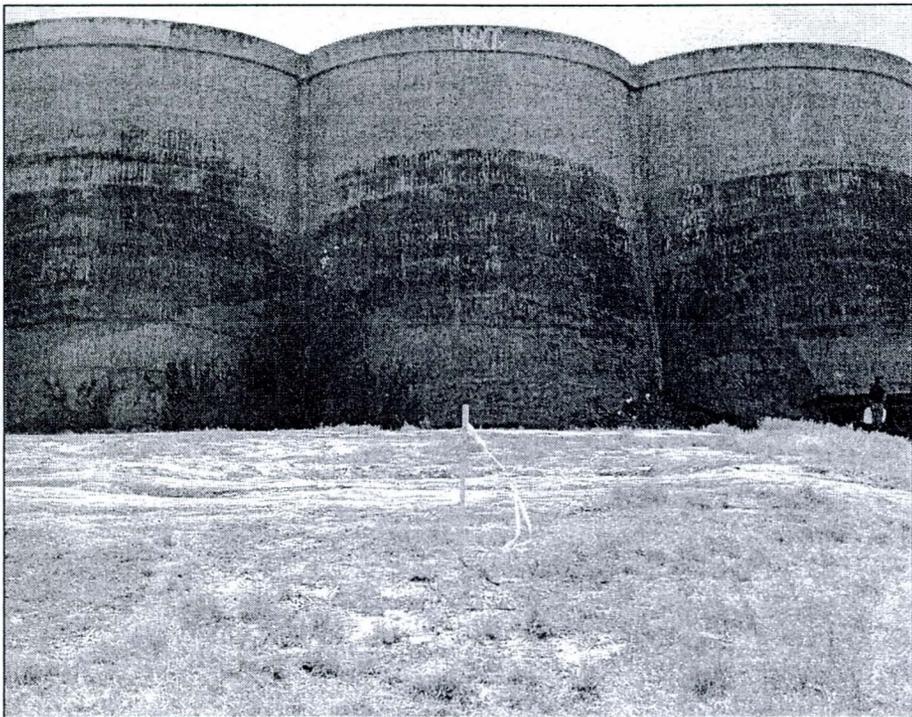
APPENDIX C
DIGITAL PHOTO LOGS



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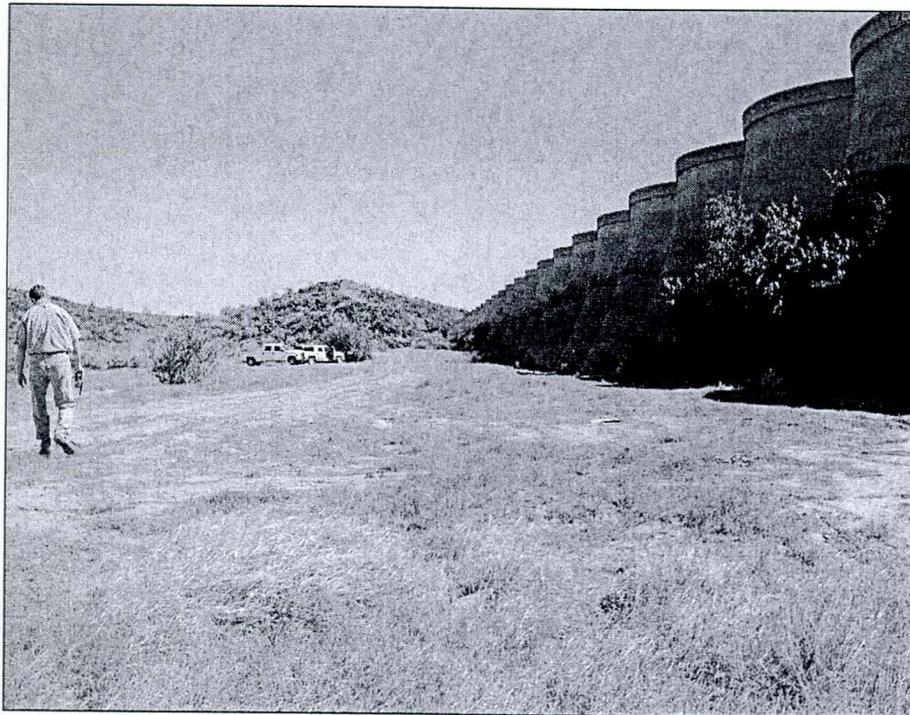
CC2



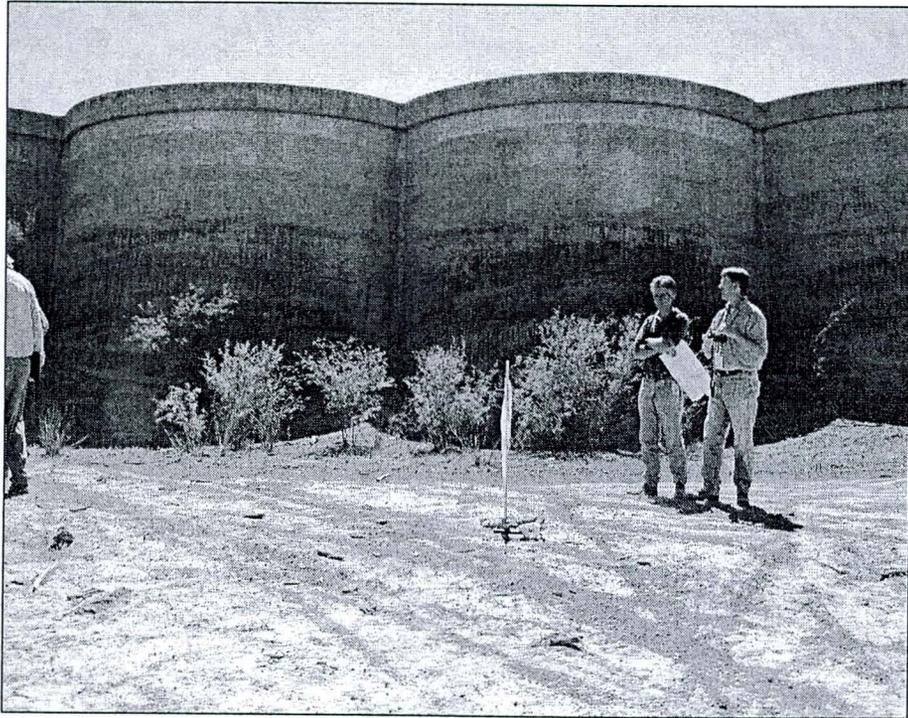
CC3



CC3



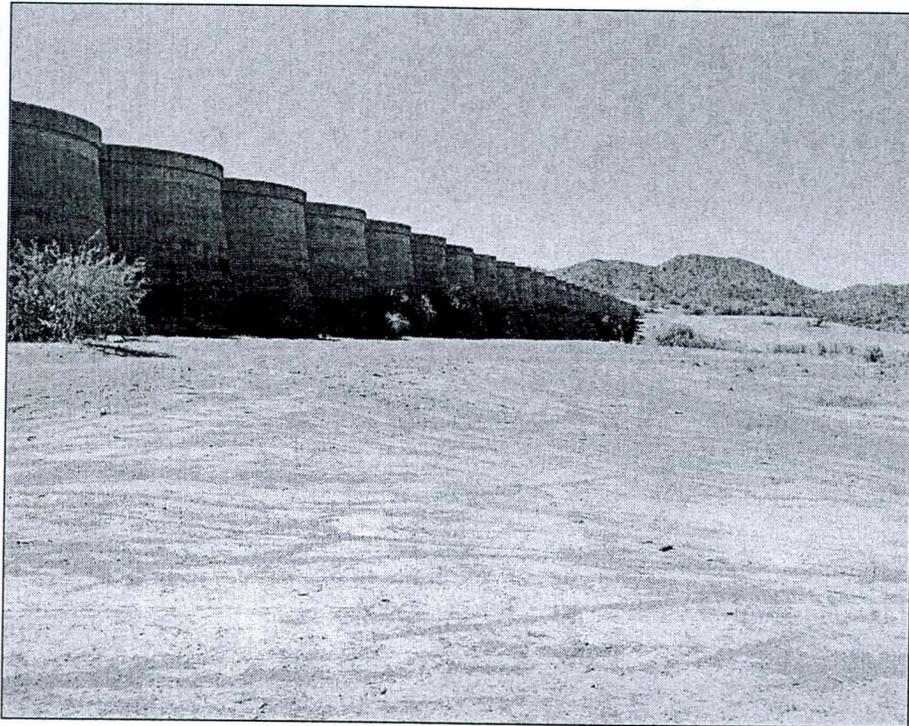
CC3 to CC2



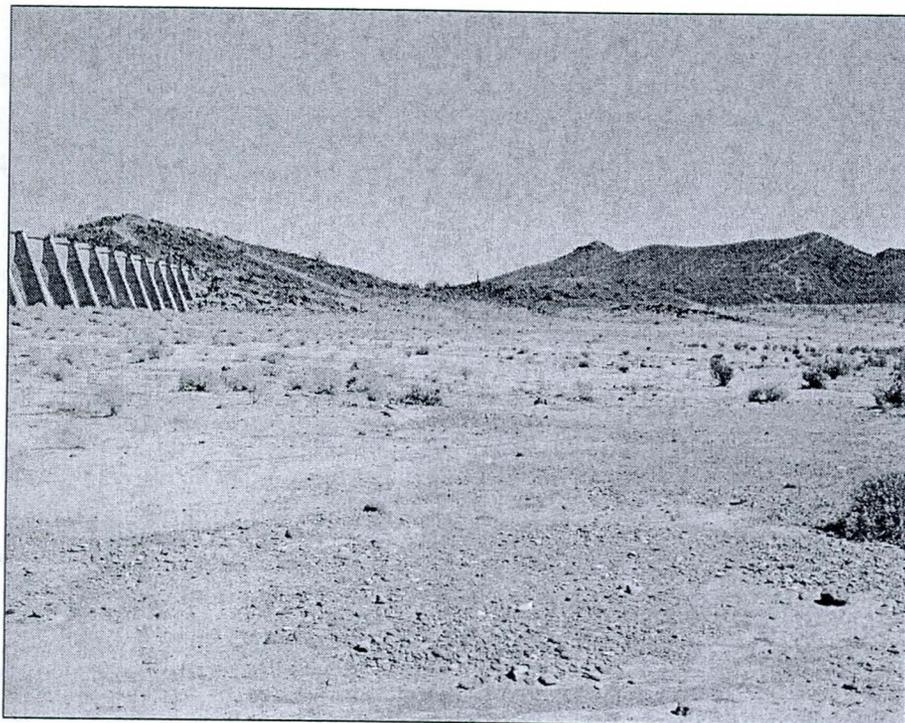
CC1



CC1 East



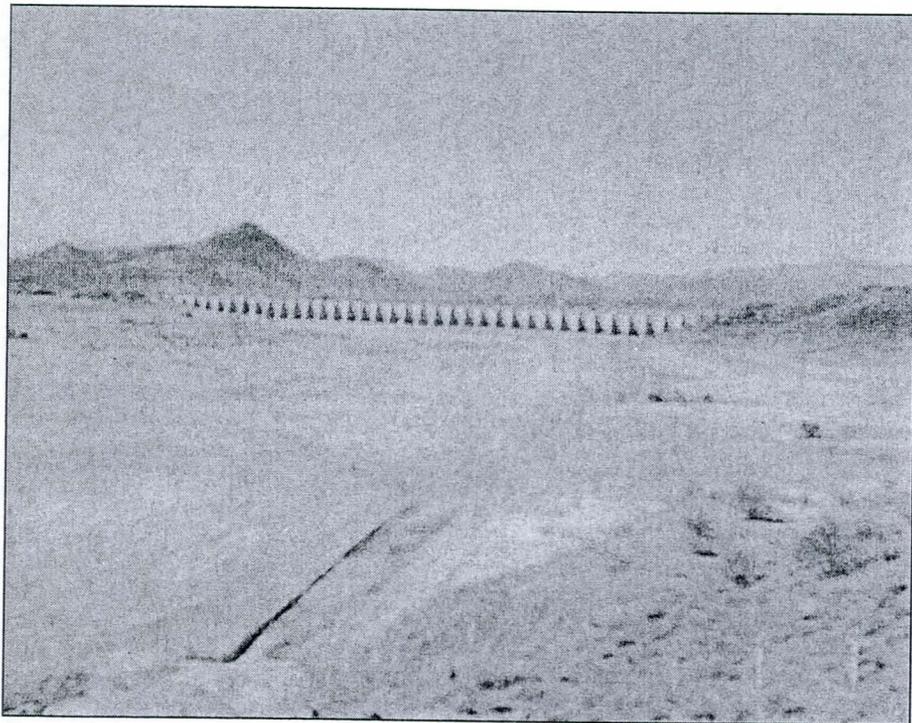
CC1 West



CB4



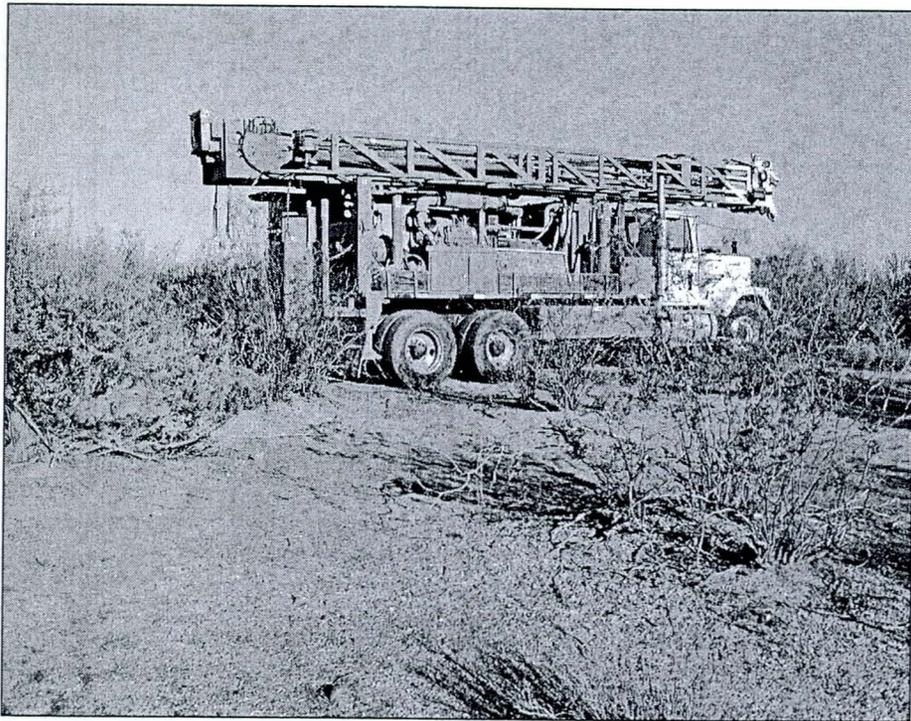
CB4 East



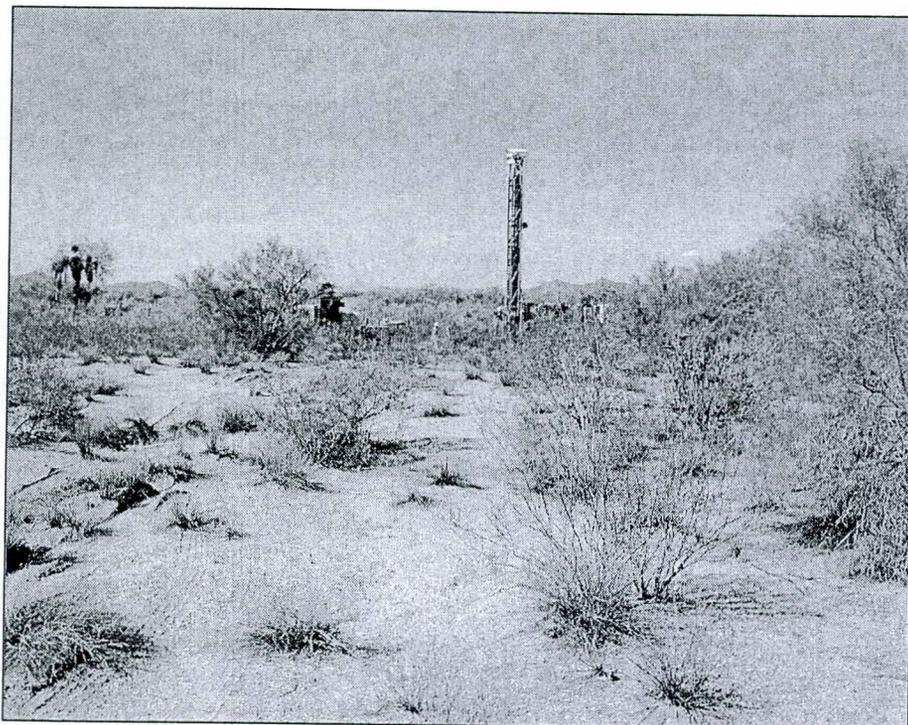
CBD - Looking North



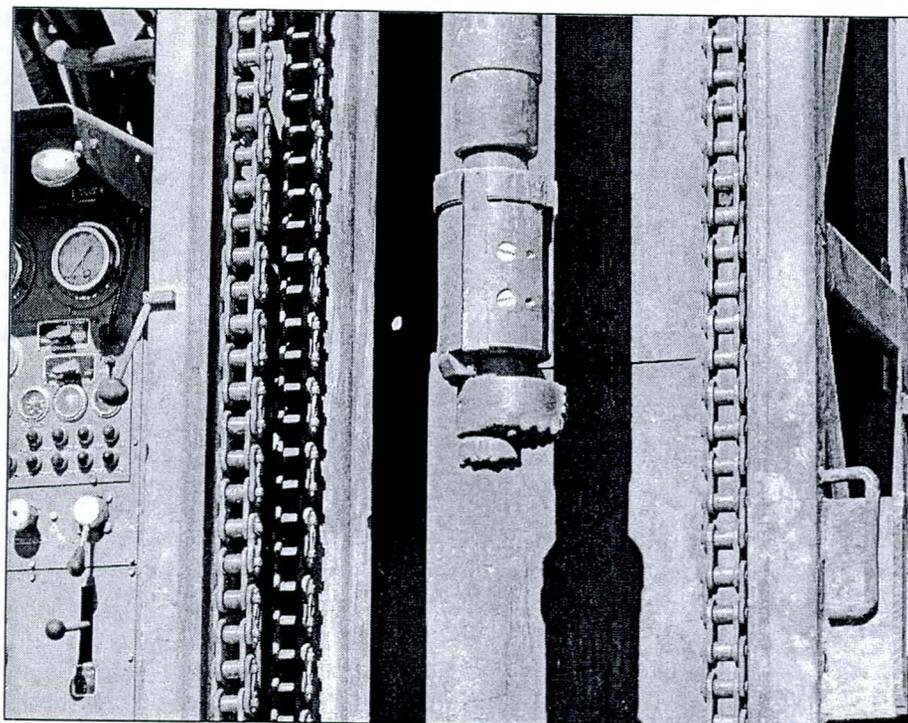
CC4



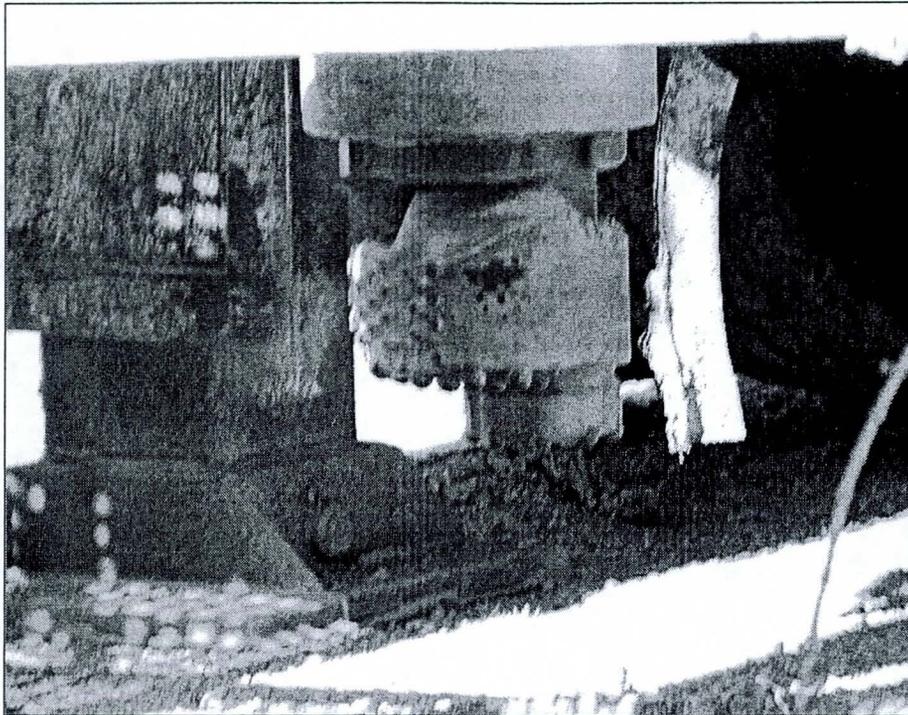
CC4



CC4



Down-Hole Hammer



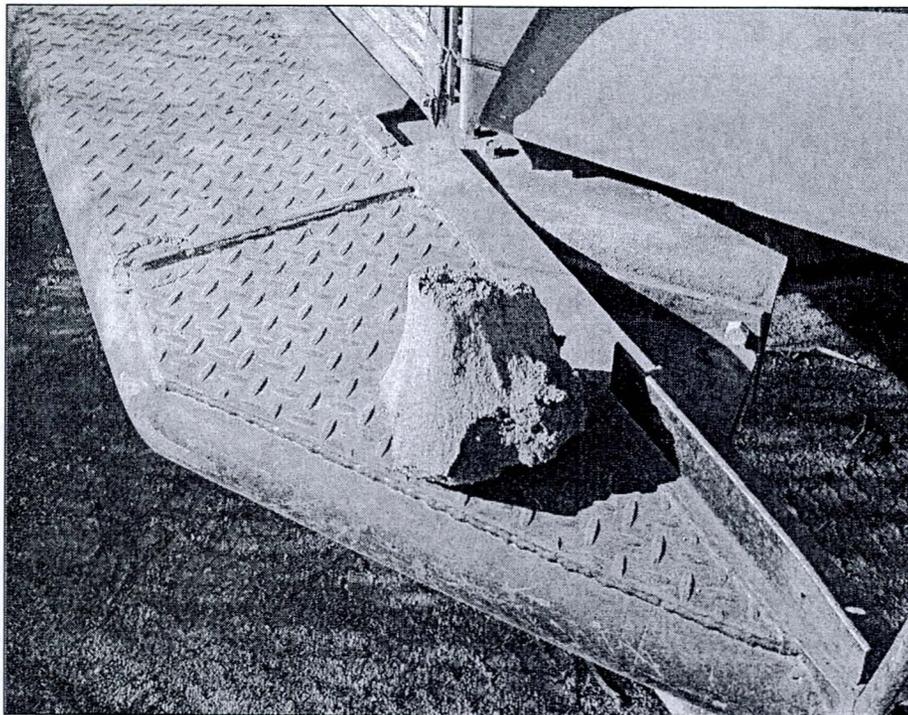
Down-Hole Hammer



CC4



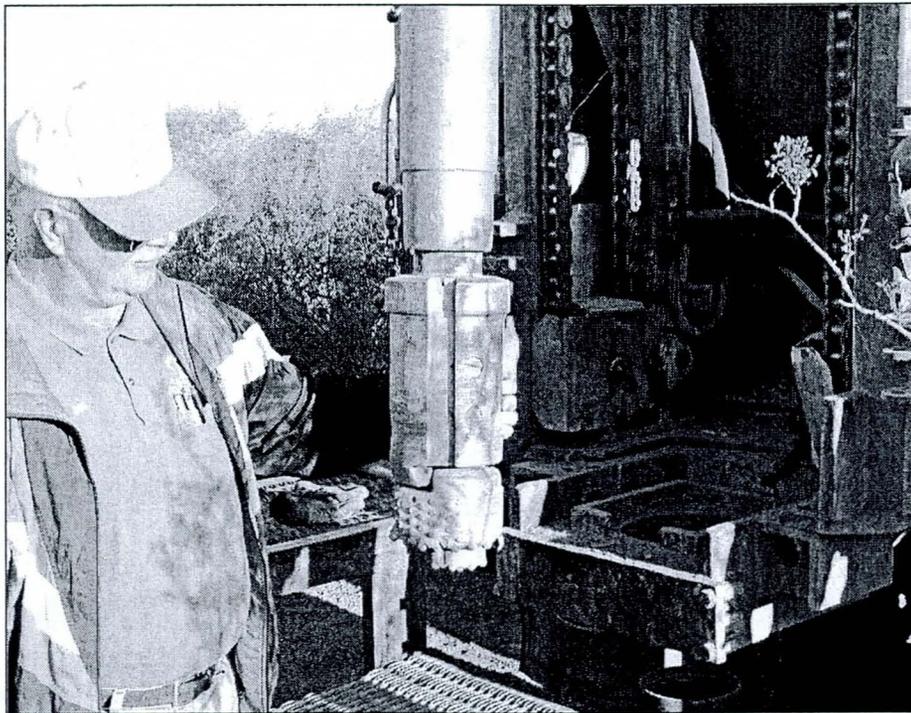
CC4 Drilling



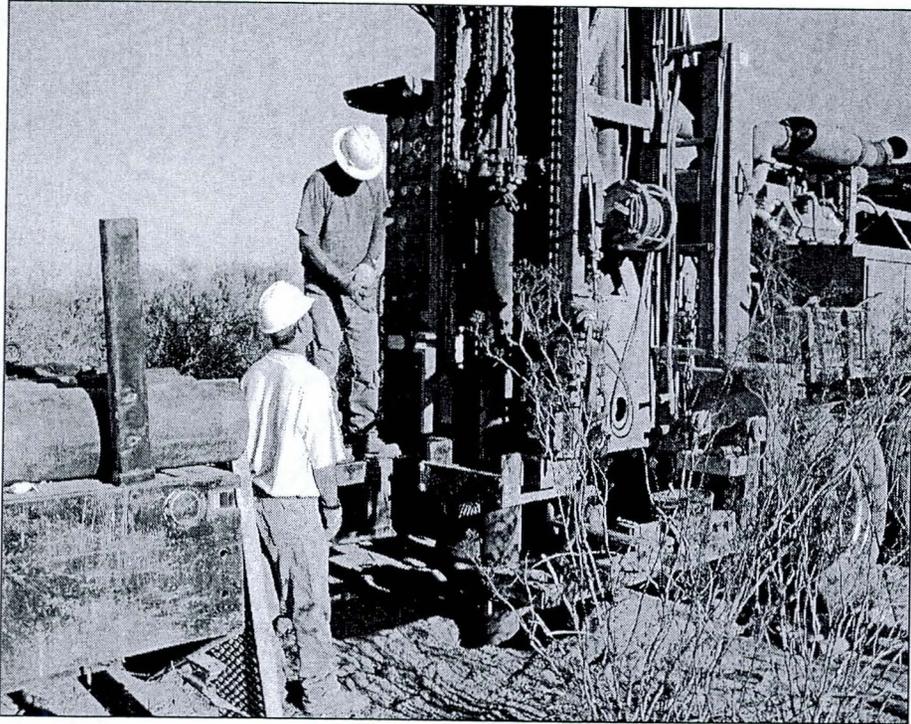
CC4 Clay



CC4 Porous Stone



Down-Hole Hammer



CC4 Measuring



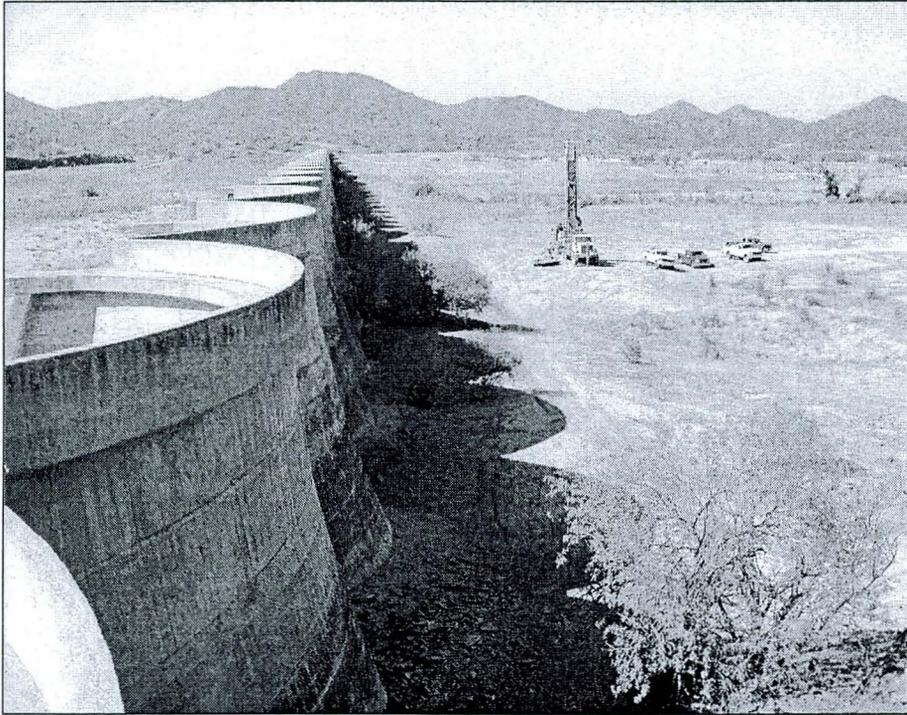
Mix Bentonite



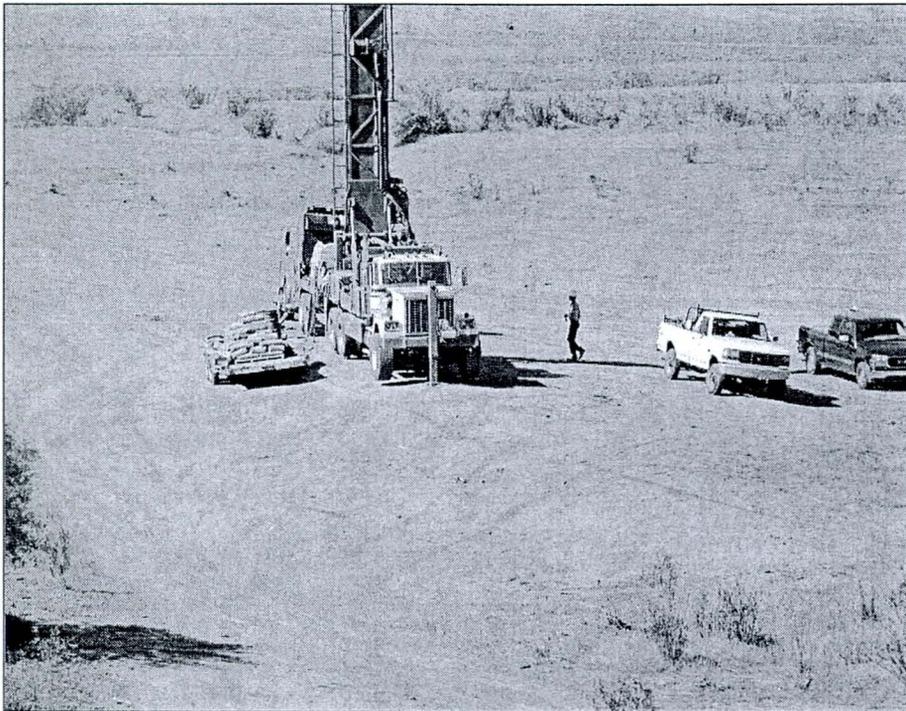
Mix Cement/Bentonite



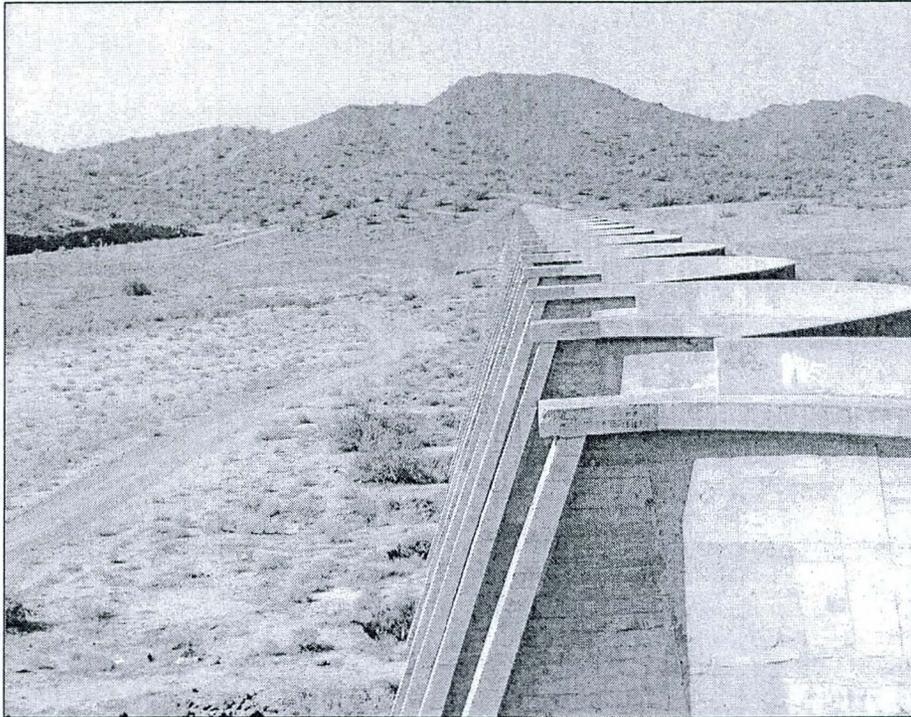
Pumping Cement/Bentonite



Looking West at CC1



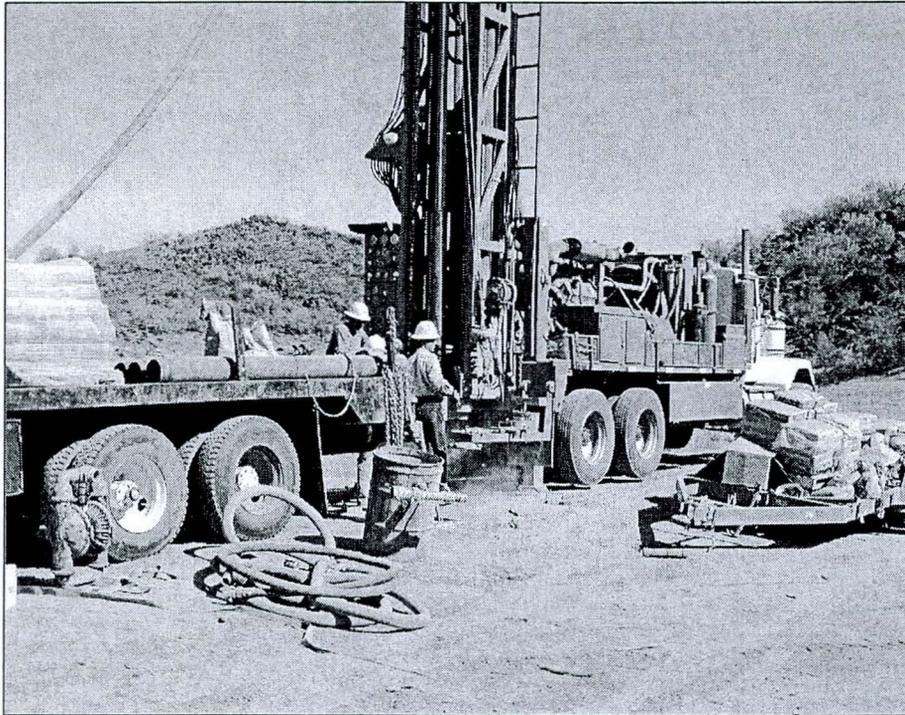
CC1



Looking West Downstream



CC1 - Drilling



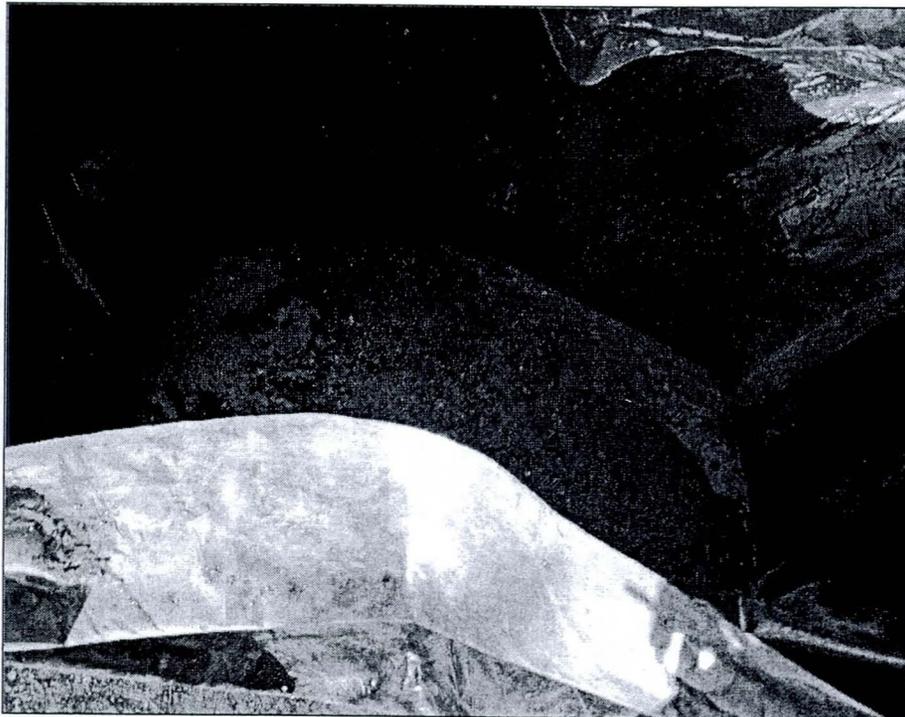
CC1



CC4



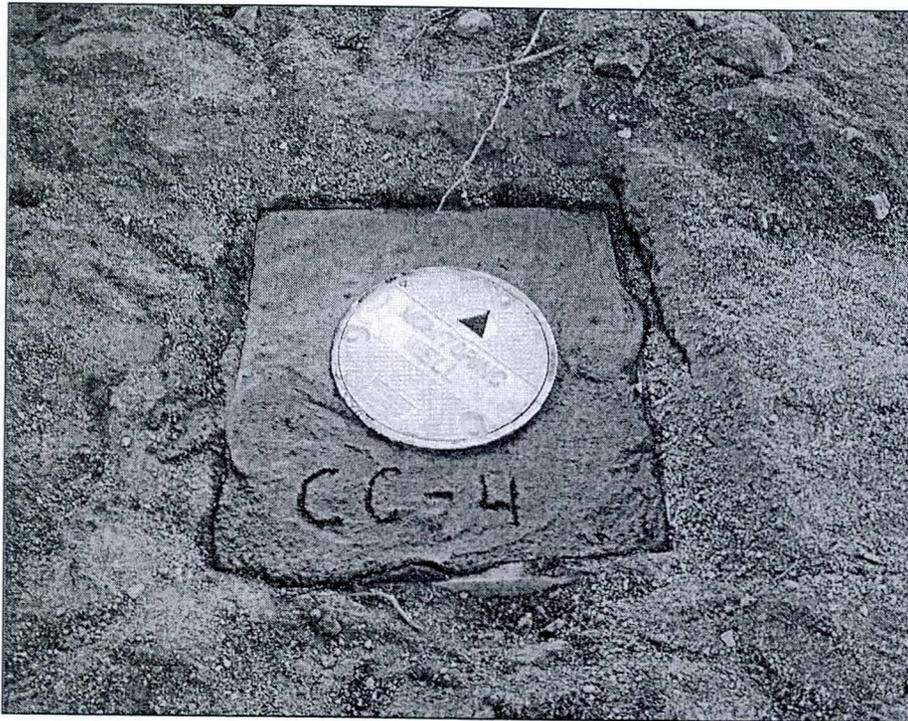
Mixing Concrete



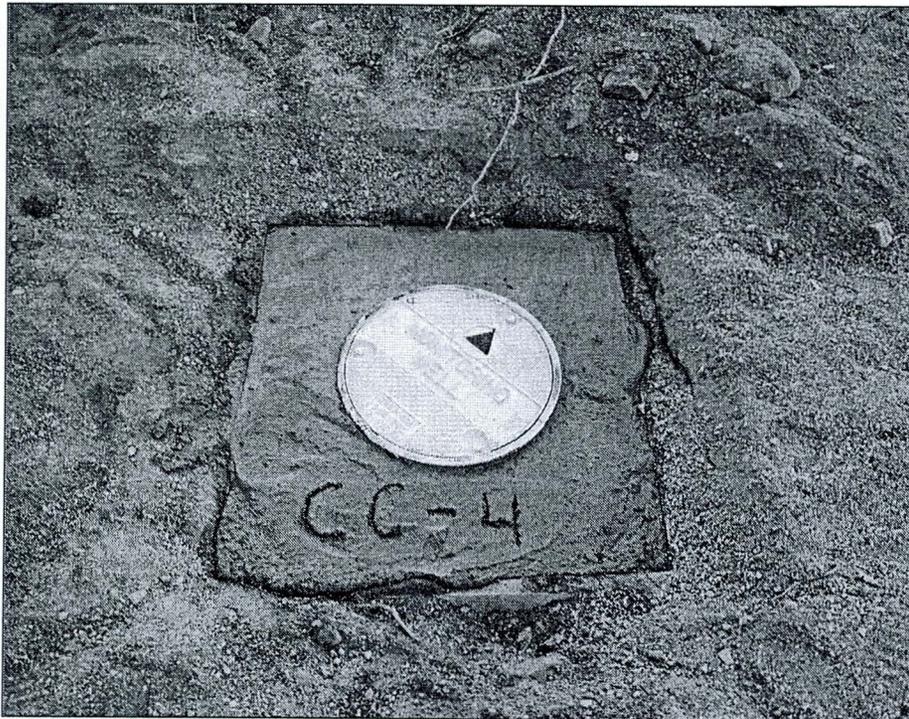
Mixed Concrete



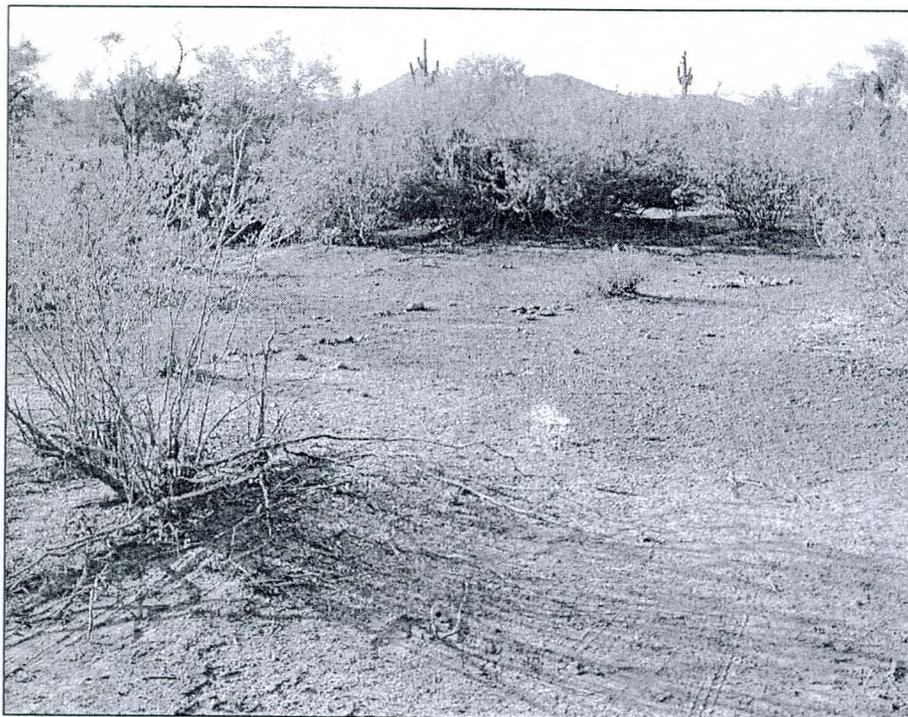
Placing Concrete Around Vault



CC4



CC4



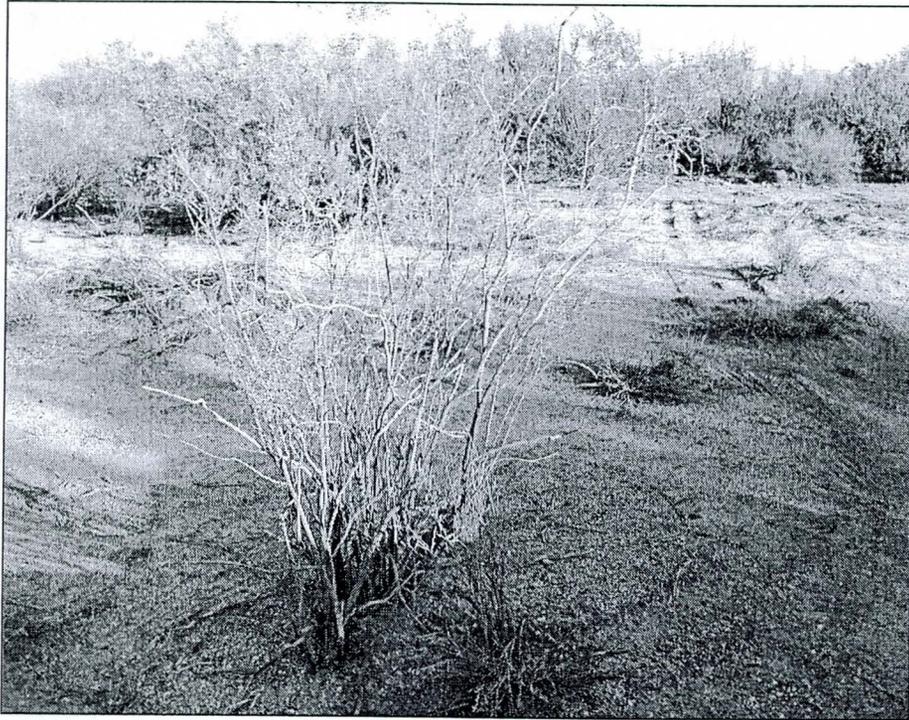
CC4 - After



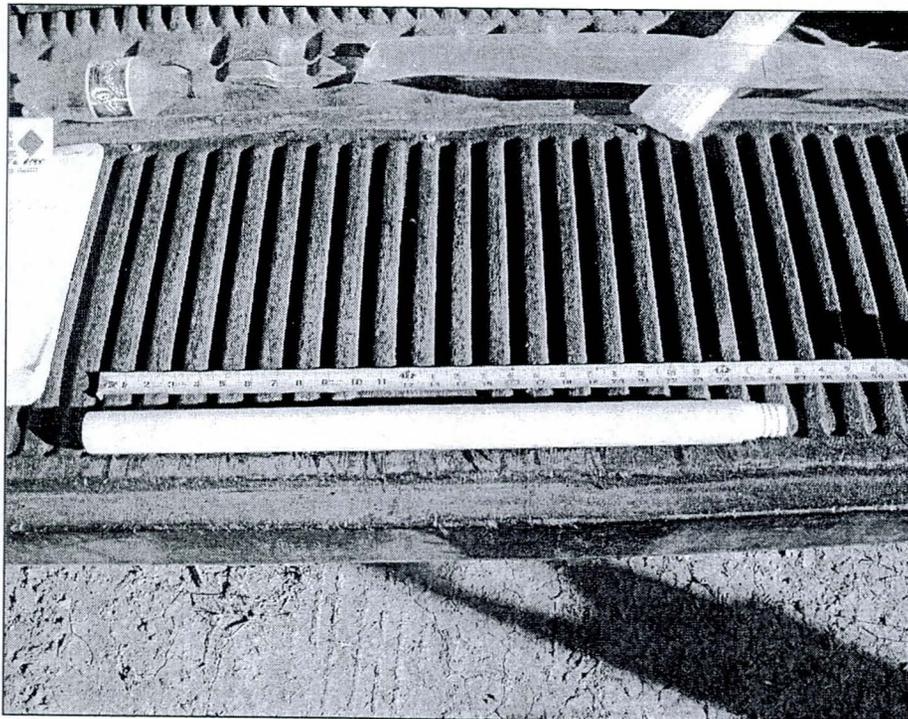
CC4 - After



CC4 - After



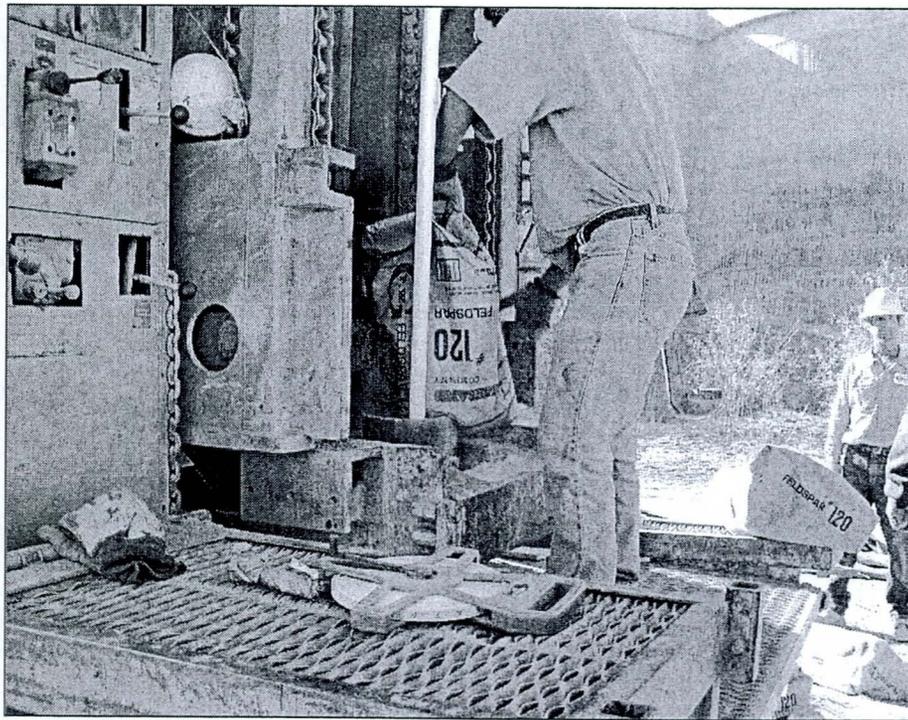
CC4 - After



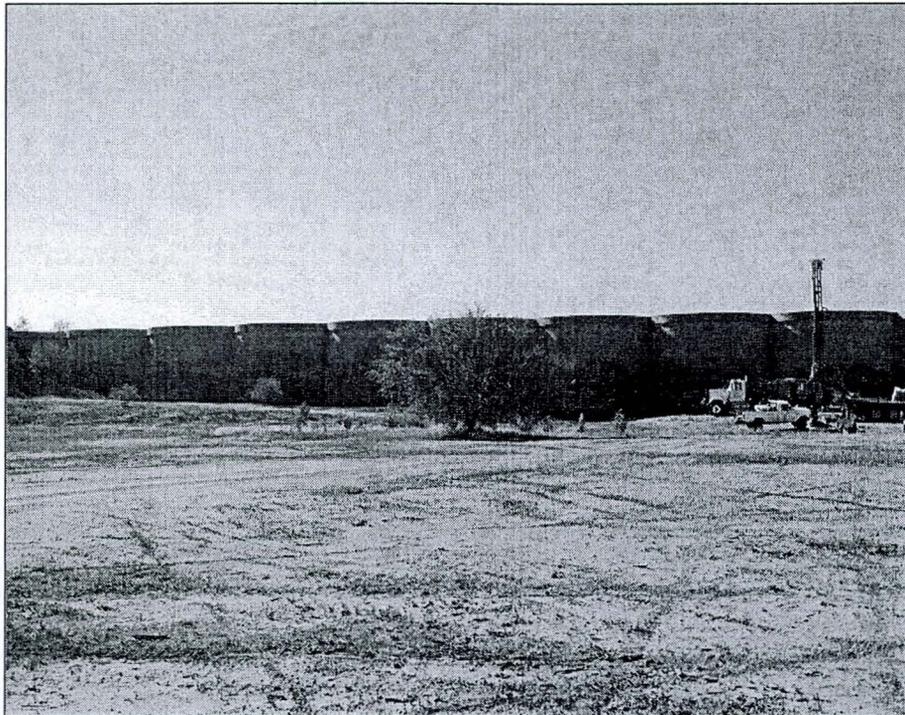
CC1 - Porous Stone



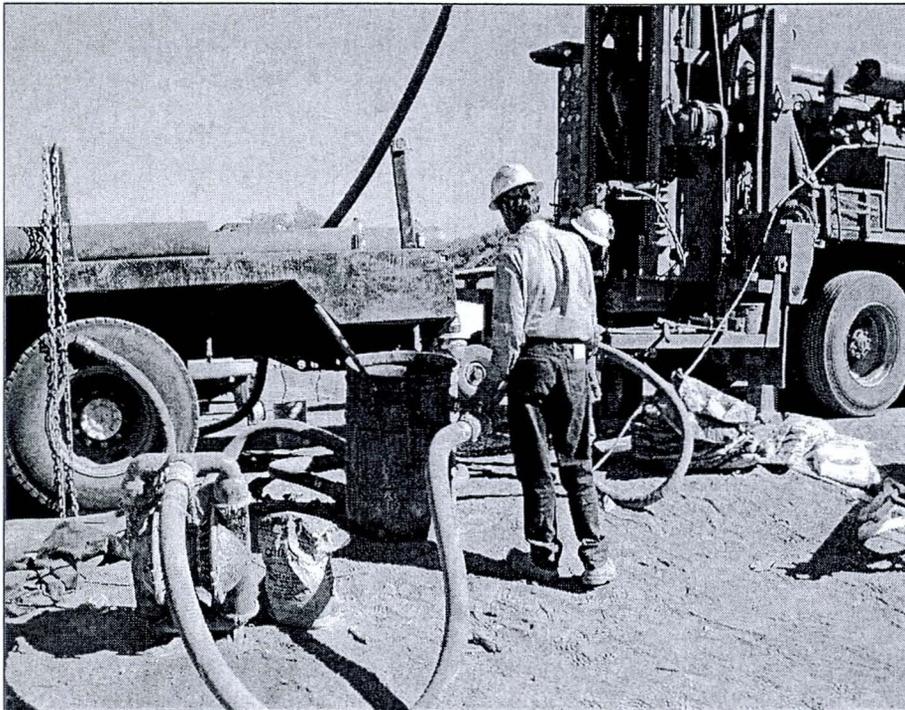
CC1



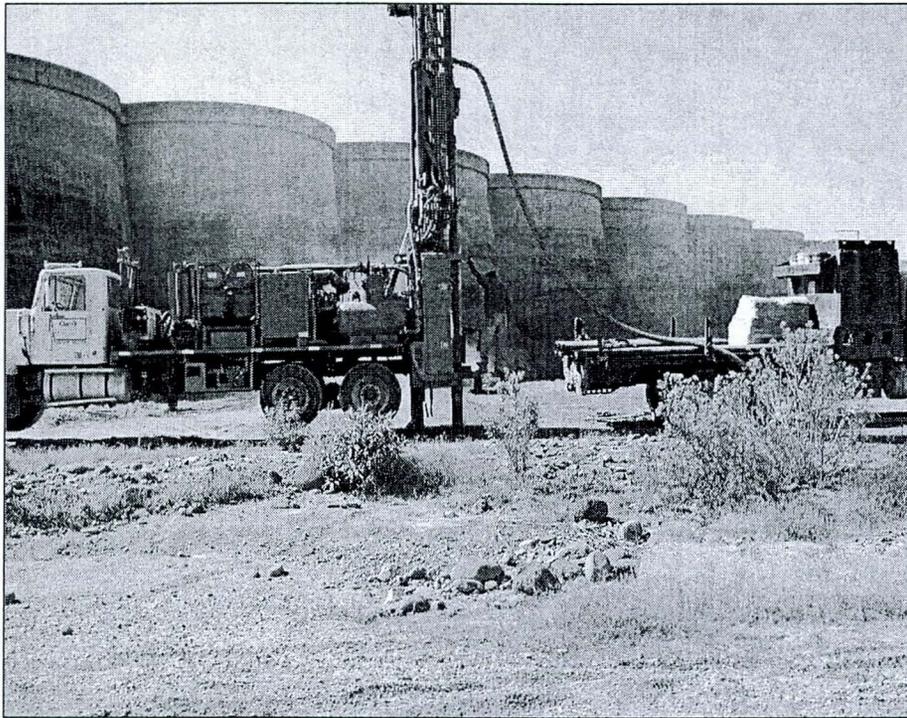
CC1 - Set Piezometer



CC1



Mix Cement/Bentonite



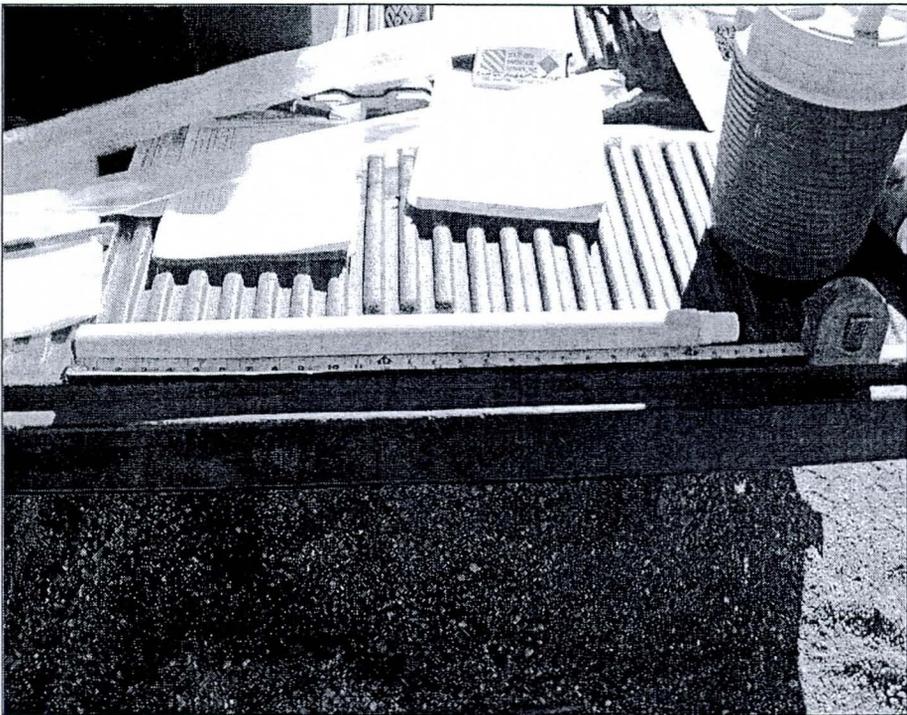
CC2



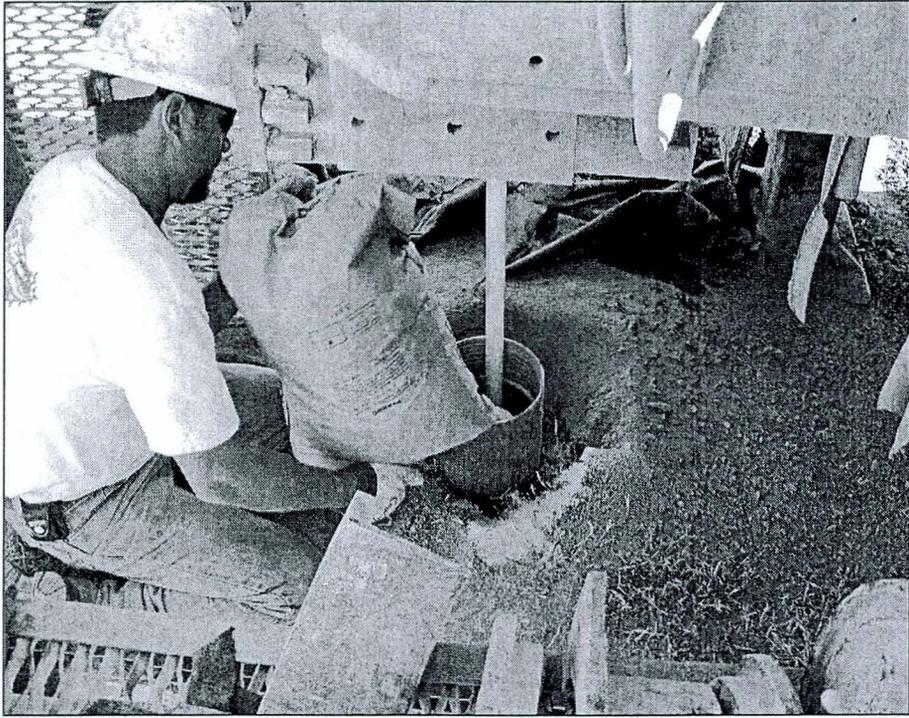
CC1



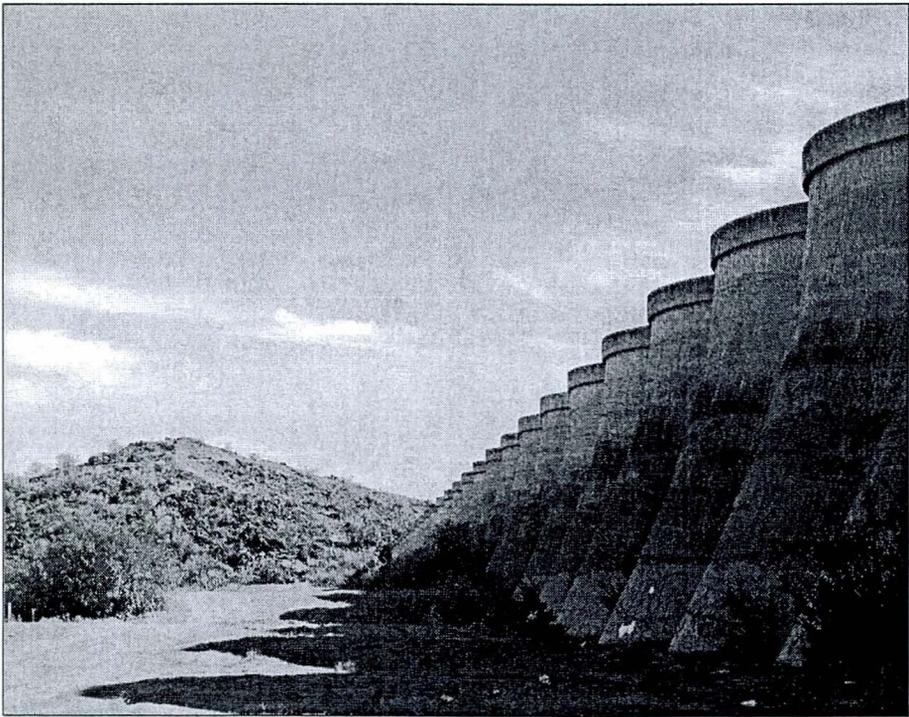
CC1



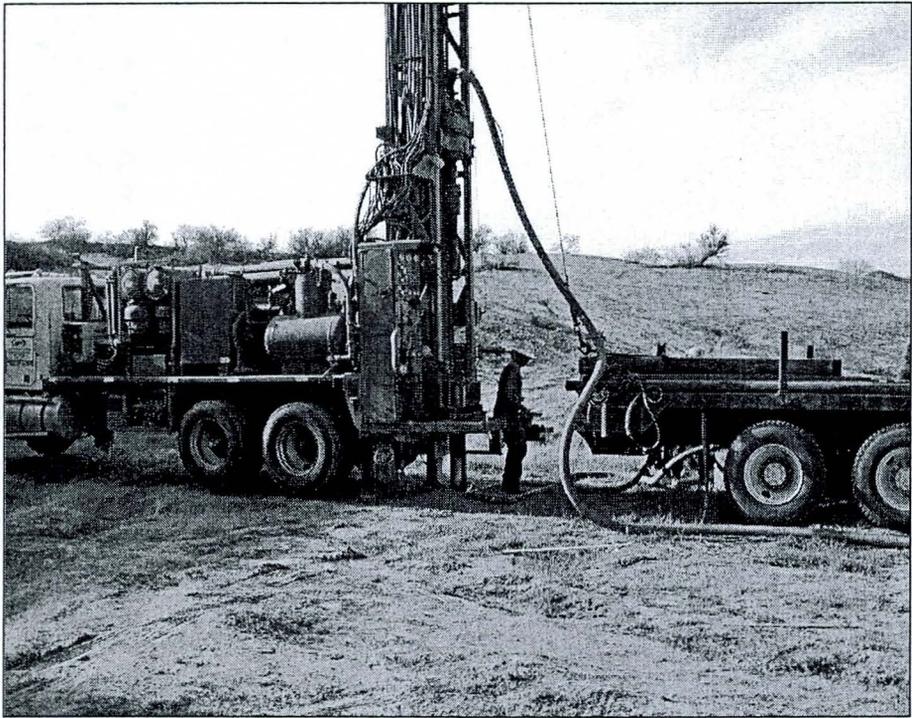
CC2 - Porous Stone



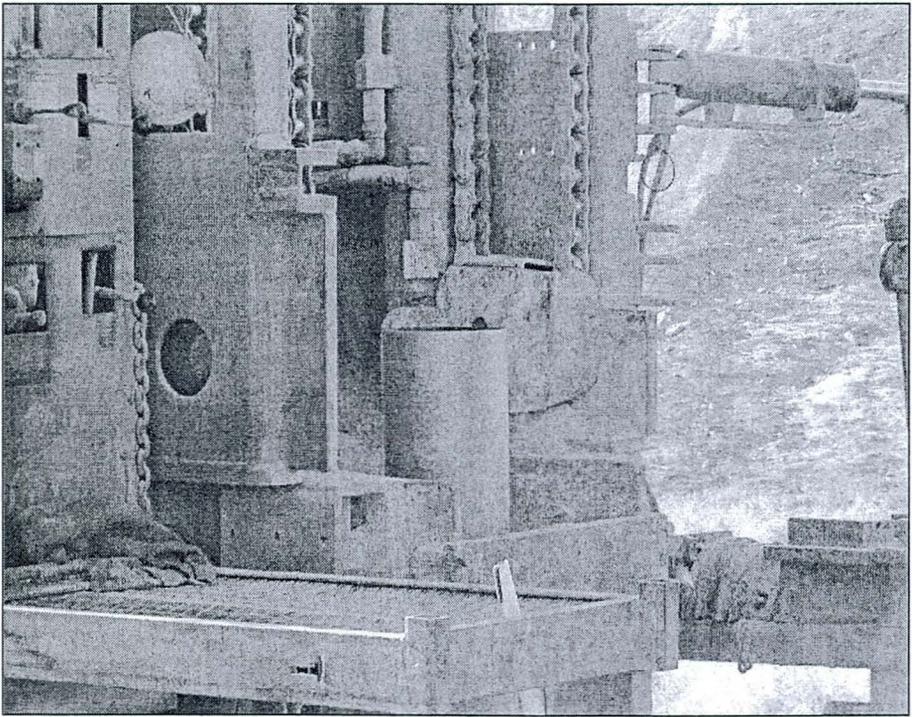
CC2 - Placing Sand



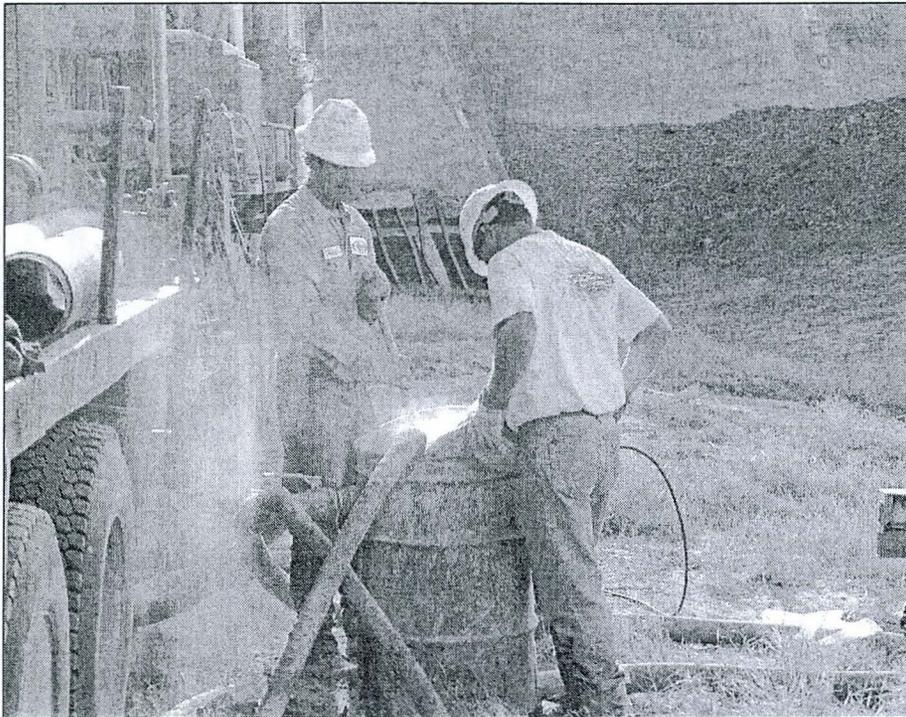
CC2 - East



CC3



CC3



CC3



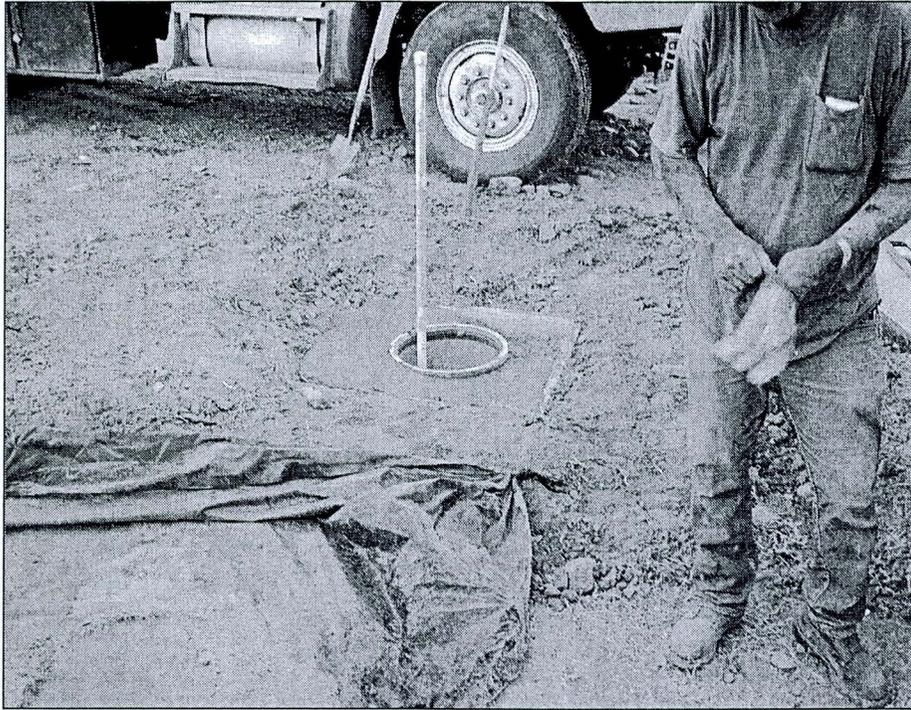
CC3



CC2



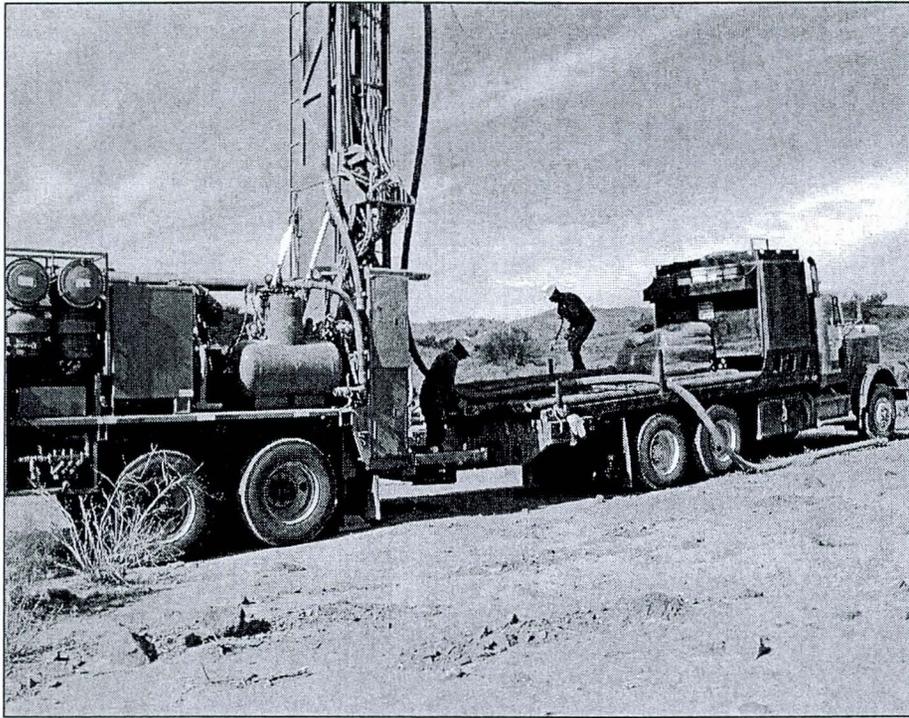
CC2



CC2



CC2



CB4



CB4



CB4 - Porous Stone



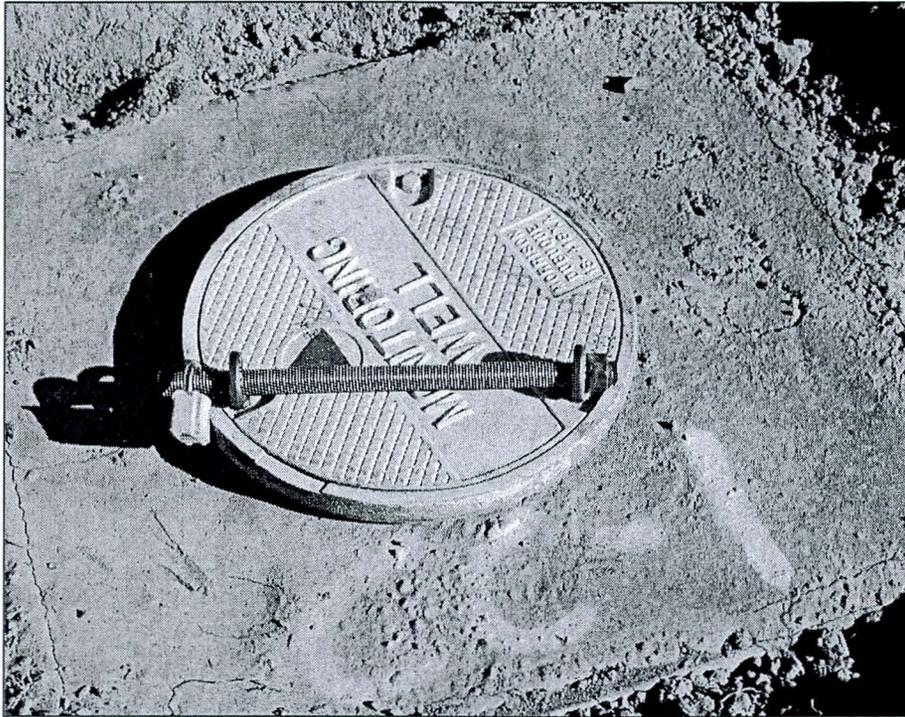
CC3



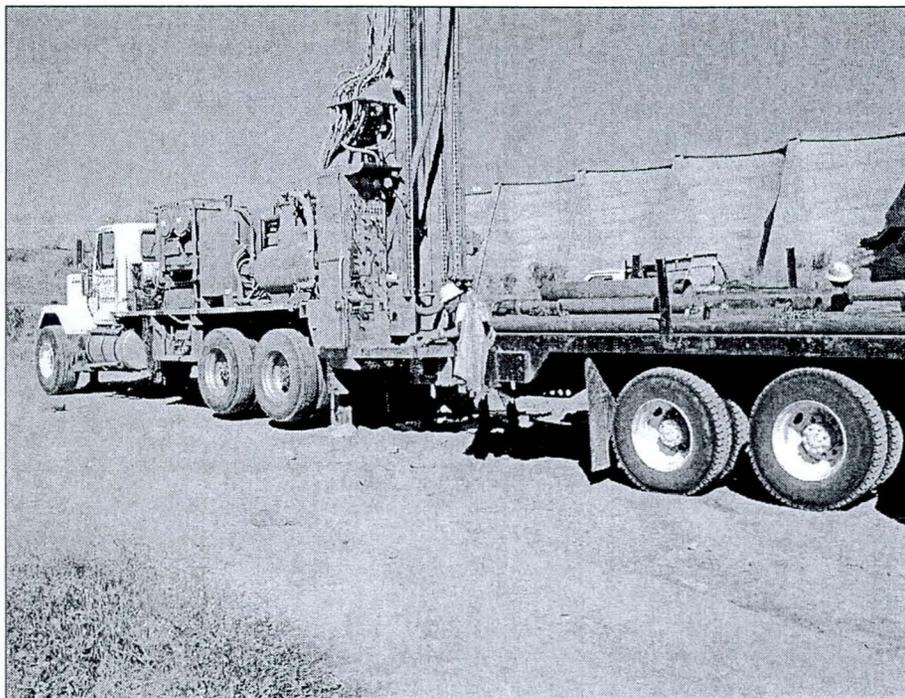
CC3



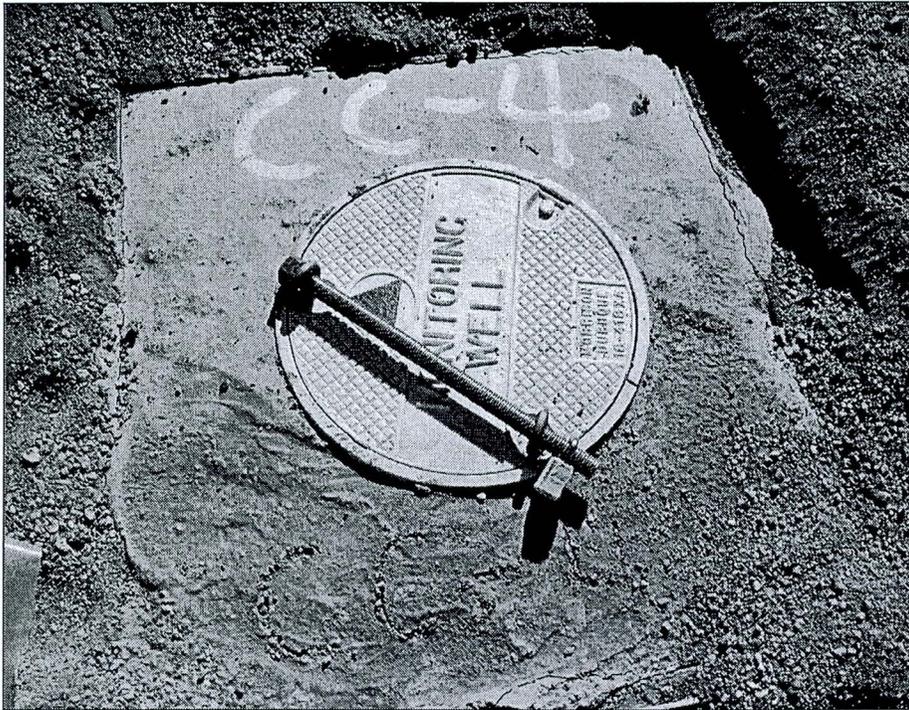
CC2 - With Lock Bar



CC1 – With Lock Bar



CB4



CC4 – With Lock Bar



CC4 – With Plastic Over



CC3 – With Lock Bar



CC4 – With Lock Bar



CC4 – With Lock Bar

APPENDIX D
DAILY FIELD REPORTS



R·A·M

DAILY FIELD REPORT

Project: Cave Creek Dam Piezometer Installation
Project No.: G08200
Date: 10-28-02
By: Ken Ricker

Arrived at initial meeting site at 6:35am for 7:00am meeting. Mike Greenslade (FCD) and Tomas Goode (HSI) both arrived before 7:00am. Layne Drill rig and pickup truck finally arrived at 7:30am. Took all parties to site of CC4 where rig was set up on CC4 by 8:30. However, the pipe truck and piezometer supplies had been left in Layne's yard since the helper did not show up. Crew left to get rest of the equipment at 8:30am. Mike & I then checked out access to CC1, CC2 and CC3 since some rain had occurred over weekend. Bob Stevens (FCD) met us there. Left site at about 9:30 to return to office to await news from Layne that equipment was on its way. Left for site about 12:00 noon to meet crew. Arrived 12:30 where they were setting up. Started drilling at 2:06. Mike present during drilling. CC4 drilled 0 to 28.5' by 4:05. Near end of drilling Tomas returned. Drilling somewhat disorganized. Returned to office at 5:00pm.

DAILY FIELD REPORT

Project: Cave Creek Dam Piezometer Installation

Project No.: G08200

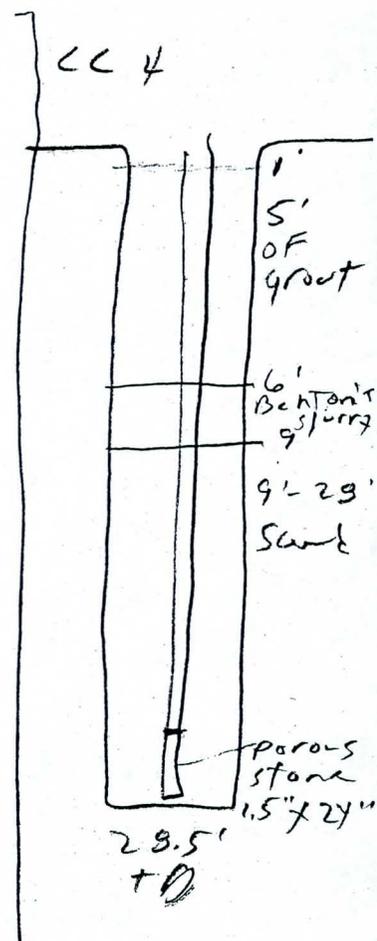
Date: 10-29-02

By: Dustin Miller

Arrived at CC4 7:00am. Pulled rods until 8:00. Set porous stone at 28'. Added 5 bags of sand (100#). Sand was placed from 28.5' to 9'. 12 gallons of bentonite slurry approximately 3' was mixed and placed on the sand. 1 bag of bentonite was used. Mixed ½ bag of bentonite and 2, 50# bags of Portland, approximately 55 gallons and placed from 6' to near surface. Pulled off hole at 11:00am.

Moved and set up on hole CC1 from 11:00 to 12:00pm. Started to drill at 12:00pm. Drilled to a total depth of 64' and ran out of casing at 3:00pm. Cleaned up the site till 3:30pm.

Went back to Boring CC4 to complete vault and clean up site from 3:30 to 5:00pm. Used 4/2" x 6" x 4' forms and 6 bags of premix. Done for the day.

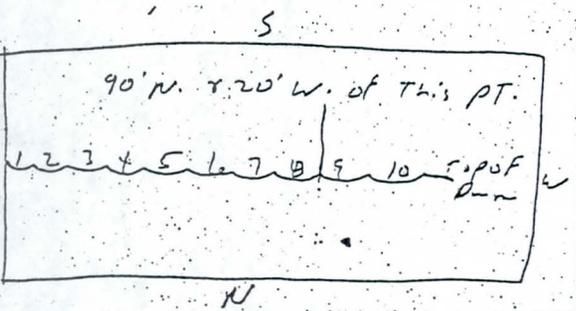
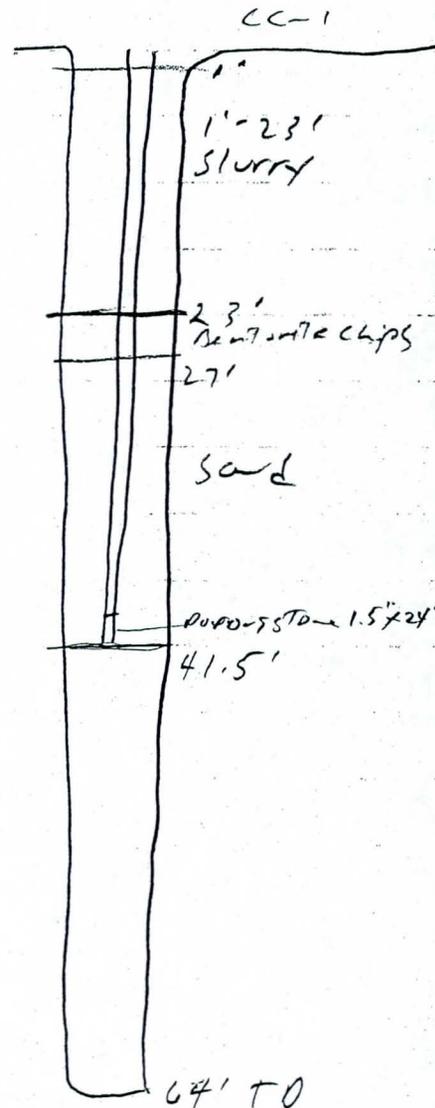


DAILY FIELD REPORT

Project: Cave Creek Dam Piezometer Installation
Project No.: G08200
Date: 10-30-02
By: Dustin Miller

Arrived at 6:15am. Called about what to do about Boring CC1 and was told to backfill hole to 42' with cuttings and silica sand and set well. Went to Boring CC4 and cleaned up core spill, racked out and covered up. Brought water truck back to CC1 at 7:30am. Measured hole CC4 26.8' top of PVC, 27.3 top of vault.

CC1 pulled drill rods and bit out of hole. Pulled casing up to 42'. At 9:00am began to backfill hole from 65' to 42' with 6, 100# bags of silica sand and some cuttings. Set porous stone at 41.5'. Added 6, 100# bags of #120 silica sand up to 27'. Added 2, 50# bags of Enviro plug Bentonite chips, 130 gallons of Portland Bentonite grout, 23' to 1' (6 bags of Portland, 1 bag Bentonite). Done by 11:00am.



11:00 to 11:30am moved to Hole CC2. Started drilling at 11:30. Drilled until rig broke at 2:00pm. Tried to and did fix rig from 2:00 to 4:00pm but stopped drilling for the day. 4:00pm moved back to CC1 to complete the vault from 4:00 to 5:00pm.

DAILY FIELD REPORT

Project: Cave Creek Dam Piezometer Installation
Project No.: G08200
Date: 10-31-02
By: Dustin Miller

Arrived at 6:45am. Drillers support truck/pipe truck had been shot up with a 22 caliber 6-8 hole in hood and cab of truck and had broken drivers side window. Made calls and checked engine till around 8:00am.

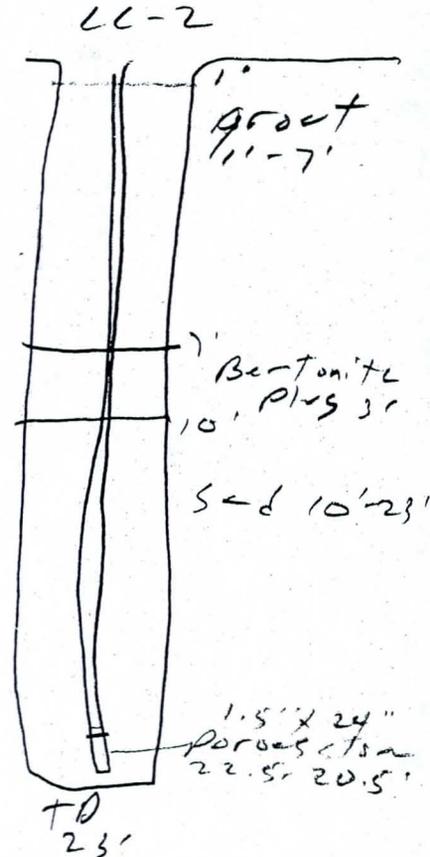
8:00am set up to continue drilling on CC2. I took pictures of vault and measured well on CC1 - top of PVC 40.8' - top of vault 41.3'.

Drilled on CC2 from 8:00 to 11:00am. Had to get water to complete well from 11:00 to 12:00. Set well from 12:00 to 1:30 at 22.5'.

Used 4, 100# bags of #120 silica sand, 2, 50# bags of Bentonite chips, 55 gallons of grout, 1/2 bag Bentonite and 2 bags of Portland cement.

1:00 moved to Boring CC3. Set up and drilled to 2:30. Drilled to 21', backfilled hole to 18'-9" and set well at 18'-9". Used 3, 100# bags of silica sand and brought up to 9'. Added 2, 50# bags of Bentonite chips up to 6'. Added 6' of grout, 55 gallons, 1/2 bag of Bentonite, 2 bags of Portland. At 3:45pm pulled casing and entire well stuck in casing. Pulled out porous stone and all. Need to drill out and reset well in the morning.

Moved back to CC2 and finished install of vault. 4:30 to 6:00pm measured CC2 - 21.5' top of PVC - 21.75' top of vault.



DAILY FIELD REPORT

Project: Cave Creek Dam Piezometer Installation

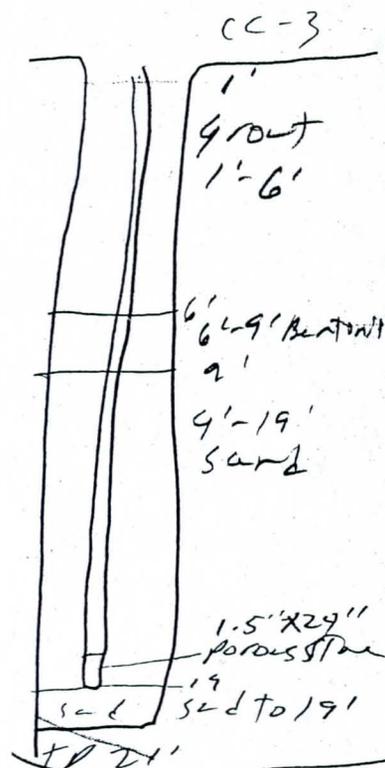
Project No.: G08200

Date: 11-1-02

By: Dustin Miller

7:00 to 8:00am drillout sand pack in CC3. 8:00 to 10:00am reset well at 19'. Drilled hole back to 21'. Added 2' of sand and set well at 19'. Used 3 1/2, 100# bags, brought up to 9', added 2, 50# bags Bentonite chips to bring up to 6'. Added 5' or 55 gallons of grout (1/2 bag of Bentonite powder and 2 bags of Portland). Stopped at 10:00.

10:00 to 11:00 moved to CB4. Drilled from 11:00 to 2:00pm. Drilled to 44', backfilled to 18' with cuttings and 6, 100# bags of silica sand. Tried to set well at 18'. Porous stone slipped off PVC insert and fell to bottom of hole. Fished porous stone out of hole undamaged by adding a gallon of water to bottom of hole to calm dust, pushed insert into porous stone and gently pulled up hole. Reattached porous stone to PVC and gently lowered back into hole, put 3 bags of sand on top of stone, pulled casing up and entire well came up with the wet silica in bottom of hole. Stopped at 4:00. Moved back to CC3 to finish vault from 4:00 to 6:00pm.



DAILY FIELD REPORT

Project: Cave Creek Dam Piezometer Installation

Project No.: G08200

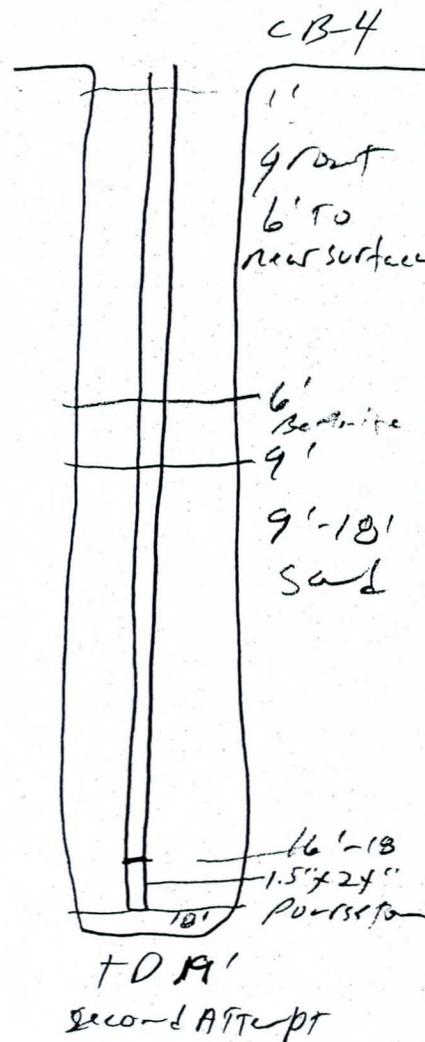
Date: 11-2-02

By: Dustin Miller

7:00 set up to redrill CB4, 4' SE of original CB4. Drilled from 7:00 to 10:00. Drilled down to 19', added 1' of sand to bottom of hole and set well at 18'. Added 3, 100# bags of silica sand up to 9', added 2 bags of Bentonite chips up to 5.5'. Added 50 gallons of grout (1/2 bag of Bentonite and 2 bags of Portland) and finished vault at 12:00pm.

Moved over to CC3 and measured hole - 18.55' top of PVC - 18.9' top of vault.

Came back to CB4 and measured hole - 17.5' to top of PVC - 17.86' top of vault.



APPENDIX E
ADWR WELL PERMITS



ARIZONA DEPARTMENT OF WATER RESOURCES

500 North 3rd Street, Phoenix, Arizona 85004

Telephone (602) 417-2470

Fax (602) 417-2422

October 18, 2002



JANE DEE HULL
Governor

JOSEPH C. SMITH
Director

FLOOD CONTROL DISTRICT OF MARICOPA CTY
2801 W DURANGO AVE
PHOENIX, AZ 85009

Registration No. 55-595012
File No. A(4-3) 3 BBA

Dear Well Owner:

Enclosed for your records is an annotated copy of the Notice of Intention to Drill a well. This is returned to you as evidence of compliance with A.R.S. §45-596. A drilling card has been mailed to your designated driller. Prior to drilling he must have it in his possession.

Since this well is being drilled as a Monitor well, or for Cathodic Protection, Grounding, Geotechnical or Piezometer purposes, our standard driller report form is also being furnished to the driller. He is required to complete it and return it to the Department within 30 days after the completion of the well. A Completion Report form is being furnished for monitor wells where pump installation is authorized. This must be completed within thirty days of installation as required by A.R.S. §45-600.

A Change of Well Information form is enclosed for your future use. If you deem it necessary to change the location of the proposed well, please notify the Department on the enclosed form. A properly amended drilling card will then be issued and must be in possession of the driller before drilling begins. During the drilling of a new well, if it is determined that it must be abandoned, then a Well Abandonment Completion Report must be submitted per R12-15-816.F.

Per A.R.S. §45-593, the person to whom a well is registered shall notify this Department of a change of ownership of the well and/or information pertaining to the physical characteristics of the well, in order to keep the well registration file current and accurate.

Sincerely,

A handwritten signature in cursive script, appearing to read "Sylvia Valdez".

Sylvia Valdez
Water Resource Technician
Groundwater Management Support Section

Enclosures



Arizona Department of Water Resources
Groundwater Management Support Section
P.O. Box 458 • Phoenix, Arizona 85001-0458
(602) 417-2470 • (800) 352-8488
www.water.az.gov

CC1

\$10 FEE

Notice of Intent to
Drill, Deepen, or Modify a
Monitor / Piezometer / Environmental Well

- ❖ Review instructions prior to completing form
 - ❖ You **must** include with your Notice:
 - > \$10 check or money order for the processing fee
 - > Well construction diagram, labeling all specifications listed in Section 6.
 - ❖ Authority for fee: A.R.S. § 45-113(B), A.A.C. R12-15-151(B)(4)(a)
- ** PLEASE PRINT CLEARLY ****

AMA WNA <i>PNX</i>	B SB <i>do</i>
RECEIVED DATE <i>10/9/02</i>	WS <i>07</i>
ISSUED DATE <i>10/21/02</i>	WQARF CERCLA

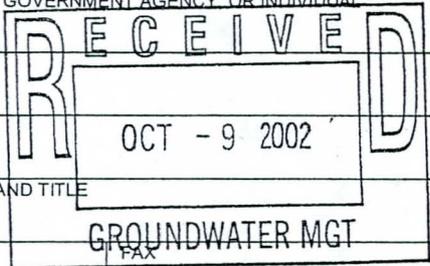
FILE NUMBER: <i>74-313100</i>
WELL REGISTRATION NUMBER <i>55-595012</i>

SECTION 1. REGISTRY INFORMATION

Well Type	Proposed Action	Location of Well
CHECK ONE <input type="checkbox"/> Monitor <input checked="" type="checkbox"/> Piezometer <input type="checkbox"/> Vadose Zone <input type="checkbox"/> Air Sparging <input type="checkbox"/> Soil Vapor Extraction <input type="checkbox"/> Other (please specify):	CHECK ONE <input checked="" type="checkbox"/> Drill New Well <input type="checkbox"/> Deepen <input type="checkbox"/> Modify If Deepening or Modifying: WELL REGISTRATION NUMBER <i>55 -</i>	WELL LOCATION ADDRESS (IF ANY) <i>COUE BUTTES DAM.</i> TOWNSHIP (N/S) RANGE (E/W) SECTION 160 ACRE 40 ACRE 10 ACRE <i>4N 3E 3, NW 1/4 NW 1/4 NE 1/4</i> COUNTY ASSESSOR'S PARCEL ID NUMBER BOOK <i>212</i> MAP <i>16</i> PARCEL <i>018</i> COUNTY WHERE WELL IS LOCATED <i>MARICOPA COUNTY</i>

SECTION 2. OWNER INFORMATION

Well Owner	Landowner (if different from Well Owner)
FULL NAME OF COMPANY, ORGANIZATION, OR INDIVIDUAL <i>FLOOD CONTROL DISTRICT OF MARICOPA COUNTY</i>	FULL NAME OF COMPANY, GOVERNMENT AGENCY, OR INDIVIDUAL
MAILING ADDRESS <i>2801 WEST DURANGO AVENUE PHOENIX, AZ 85009-6399</i>	MAILING ADDRESS
CITY / STATE / ZIP CODE <i>PHOENIX, AZ 85009-6399</i>	CITY / STATE / ZIP CODE
CONTACT PERSON NAME AND TITLE <i>BOB STEVENS, ENV. PLAN</i>	CONTACT PERSON NAME AND TITLE
TELEPHONE NUMBER <i>602 506-4073</i>	TELEPHONE NUMBER
FAX <i>506-8561</i>	FAX



SECTION 3. DRILLING AUTHORIZATION

Drilling Firm	Consultant (if applicable)
NAME <i>Layne Christensen SPECIAL REQUIREMENTS</i>	CONSULTING FIRM <i>JOHAN + Mc BEE + ASS, INC</i>
DWR LICENSE NUMBER <i>(No.) 7</i>	CONTACT PERSON NAME <i>Ken Rickman</i>
ROC LICENSE CATEGORY <i>C-53 + A-4</i>	TELEPHONE NUMBER <i>(480) 921-8100</i>
TELEPHONE NUMBER <i>(480) 895-9336</i>	FAX <i>(480) 921-4031</i>
FAX <i>480-895-8698</i>	E-MAIL ADDRESS

SECTION 4.

Questions	Yes	No	Explanation:
1. Are all annular spaces between the casing(s) and the borehole for the placement of grout at least 2 inches?	X		2-inch annular spaces are special standards required for wells located in and near groundwater contamination sites (such as CERCLA, WQARF, DOD, LUST).
2. Is the screened or perforated interval of casing greater than 100 feet in length?		X	100-foot maximum screen intervals are a special standard for wells located in and near groundwater contamination sites (such as CERCLA, WQARF, DOD, LUST).
3. Are you requesting a variance to use thermoplastic casing in lieu of steel casing in the surface seal?	X		The wells must be constructed in a vault as defined in A.A.C. R12-15-801(27).
4. Is there another well name or identification number associated with this well?	X		IF YES, PLEASE STATE <i>CC1</i>
5. Have construction plans been coordinated with the Arizona Department of Environmental Quality?		X	IF YES, PLEASE STATE AGENCY CONTACT & PHONE NUMBER
6. For monitor wells, is dedicated pump equipment to be installed?		X	IF YES, PLEASE STATE DESIGN PUMP CAPACITY Gallons per Minute
7. Will the well registration number be stamped on the vault cover or on the upper part of the casing?	X		IF NO, WHERE WILL THE REGISTRATION NUMBER BE PLACED?

Notice of Intent to Drill, Deepen, or Modify a Monitor / Piezometer / Environmental Well

WELL REGISTRATION NUMBER
55 -

SECTION 5. WELL CONSTRUCTION DETAILS

Drill Method CHECK ONE		Method of Well Development CHECK ONE		Grout Emplacement Method CHECK ONE	
<input type="checkbox"/> Air Rotary <input type="checkbox"/> Bored or Augered <input type="checkbox"/> Cable Tool <input type="checkbox"/> Dual Rotary <input type="checkbox"/> Mud Rotary <input type="checkbox"/> Reverse Circulation <input type="checkbox"/> Driven <input type="checkbox"/> Jetted <input checked="" type="checkbox"/> Air Percussion / Odex Tubing <input type="checkbox"/> Other (please specify):		<input checked="" type="checkbox"/> Airlift <input type="checkbox"/> Bail <input type="checkbox"/> Surge Block <input type="checkbox"/> Surge Pump <input type="checkbox"/> Other (please specify):		<input type="checkbox"/> Gravity <input type="checkbox"/> Pressure Grout <input checked="" type="checkbox"/> Tremie <input type="checkbox"/> Other (please specify):	
		Method of Sealing at Reduction Points CHECK ONE		Surface or Conductor Casing CHECK ONE	
		<input type="checkbox"/> None <input type="checkbox"/> Welded <input type="checkbox"/> Swedged <input type="checkbox"/> Packed <input type="checkbox"/> Other (please specify):		<input checked="" type="checkbox"/> Flush Mount in a vault <input type="checkbox"/> Extend above grade	

RECEIVED
 OCT - 9 2002

SECTION 6. PROPOSED WELL CONSTRUCTION PLAN (attach additional page if needed) DATE CONSTRUCTION TO BEGIN
 Attach a well construction diagram labeling all specifications below. GROUNDWATER MGT
10/8/02

Borehole			Casing													
DEPTH FROM SURFACE		BOREHOLE DIAMETER (inches)	DEPTH FROM SURFACE		OUTER DIAMETER (inches)	MATERIAL TYPE (X)				PERFORATION TYPE (X)					SLOT SIZE IF ANY (inches)	
FROM (feet)	TO (feet)		FROM (feet)	TO (feet)		STEEL	PVC	ABS	IF OTHER TYPE DESCRIBE	BLANK OR NONE	WIRE WRAP	SHUTTER SCREEN	MULTI KNIFE	SLOTTED		IF OTHER TYPE DESCRIBE
0	25	10	-	23.	2		X			X						
			23.	25	2			poly ethylene								Porous Tip

DEPTH FROM SURFACE		ANNULAR MATERIAL TYPE (X)							FILTER PACK			
FROM (feet)	TO (feet)	NONE	CONCRETE	NEAT CEMENT OR CEMENT GROUT	CEMENT-BENTONITE GROUT	BENTONITE			IF OTHER TYPE OF ANNULAR MATERIAL, DESCRIBE	SAND	GRAVEL	SIZE
						GROUT	CHIPS	PELLETS				
10	25											X
7	10							X				
0	7	X										

IF THIS WELL HAS NESTED CASINGS, SPECIFY NUMBER OF CASING STRINGS	EXPECTED DEPTH TO WATER 25 Feet Below Ground Surface
---	--

I state that this notice is filed in compliance with A.R.S. § 45-596 and is complete and correct to the best of my knowledge and belief.

TYPE OR PRINT NAME AND TITLE Richard G. Perreault II, Acting P3M Div. Mgr	SIGNATURE OF WELL OWNER OR LANDOWNER <i>[Signature]</i>	DATE 10/8/02
--	--	-----------------

ARIZONA DEPARTMENT OF WATER RESOURCES

Hydrology Division

500 North Third Street, Phoenix, Arizona 85004

Telephone 602 417-2448

Fax 602 417-2425

October 15, 2002



JANE DEE HULL
Governor

JOSEPH C. SMITH
Director

Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009-6399

ATTN: Richard Perreault

**RE: Variances for Construction of Nine Piezometer Wells
Registration Numbers 55-595004 through 55-595012**

Dear Mr. Perreault:

The Arizona Department of Water Resources received your request dated October 9, 2002 for construction variances for nine piezometer wells to be located in Maricopa County. The purpose of these wells will be to evaluate groundwater altitudes.

The Arizona Department of Water Resources approves this request for the following variances:

- Thermoplastic casings with watertight caps may be used in lieu of steel (R12-15-811.B.1).
- The length of the surface seals may be reduced to between 7 and 17 feet below ground surface to monitor the shallow water table (R12-15-811.B.1).

The following *special requirements* are conditions for these variances (R12-15-821.):

- The casings shall comply with ASTM Standard Guide D5092, Section 6.5.
- The wells shall be constructed per the "Variance Granted" Notice of Intention to Drill.
- The wells shall be abandoned per A.A.C. R12-15-816.

If you have any questions, please contact Bruce Hammett of my staff at 602-417-2400 extension 7301.

Sincerely,

A handwritten signature in black ink, appearing to read "Frank Corkhill".

Frank Corkhill
Technical Support Section Supervisor

ARIZONA DEPARTMENT OF WATER RESOURCES

500 North 3rd Street, Phoenix, Arizona 85004

Telephone (602) 417-2470

Fax (602) 417-2422



JANE DEE HULL

Governor

JOSEPH C. SMITH

Director

October 18, 2002

FLOOD CONTROL DISTRICT OF MARICOPA CTY
2801 W DURANGO AVE
PHOENIX, AZ 85009

Registration No. 55-595006

File No. A(4-3) 3 BBB

Dear Well Owner:

Enclosed for your records is an annotated copy of the Notice of Intention to Drill a well. This is returned to you as evidence of compliance with A.R.S. §45-596. A drilling card has been mailed to your designated driller. Prior to drilling he must have it in his possession.

Since this well is being drilled as a Monitor well, or for Cathodic Protection, Grounding, Geotechnical or Piezometer purposes, our standard driller report form is also being furnished to the driller. He is required to complete it and return it to the Department within 30 days after the completion of the well. A Completion Report form is being furnished for monitor wells where pump installation is authorized. This must be completed within thirty days of installation as required by A.R.S. §45-600.

A Change of Well Information form is enclosed for your future use. If you deem it necessary to change the location of the proposed well, please notify the Department on the enclosed form. A properly amended drilling card will then be issued and must be in possession of the driller before drilling begins. During the drilling of a new well, if it is determined that it must be abandoned, then a Well Abandonment Completion Report must be submitted per R12-15-816.F.

Per A.R.S. §45-593, the person to whom a well is registered shall notify this Department of a change of ownership of the well and/or information pertaining to the physical characteristics of the well, in order to keep the well registration file current and accurate.

Sincerely,

A handwritten signature in blue ink, appearing to read "S. Valdez".

Sylvia Valdez
Water Resource Technician
Groundwater Management Support Section

Enclosures



Arizona Department of Water Resources
Groundwater Management Support Section
P.O. Box 458 • Phoenix, Arizona 85001-0458
(602) 417-2470 • (800) 352-8488
www.water.az.gov

CC 2

\$10 FEE

Notice of Intent to
Drill, Deepen, or Modify a
Monitor / Piezometer / Environmental Well

- Review instructions prior to completing form
- You must include with your Notice:
 - \$10 check or money order for the processing fee
 - Well construction diagram, labeling all specifications listed in Section 6.
- Authority for fee: A.R.S. § 45-113(B), A.A.C. R12-15-151(B)(4)(a)

RECEIVED	DATE	WS	WB
10/21/02	10/21/02	07	06
ISSUED	DATE	WQARF	CERCLA
10/21/02			

FILE NUMBER
A(4-3)3 bbb
WELL REGISTRATION NUMBER
55 - 595006

** PLEASE PRINT CLEARLY **

SECTION 1. REGISTRY INFORMATION

Well Type	Proposed Action	Location of Well
CHECK ONE	CHECK ONE	WELL LOCATION ADDRESS (IF ANY)
<input type="checkbox"/> Monitor	<input checked="" type="checkbox"/> Drill New Well	COBE BUTTES DAM
<input checked="" type="checkbox"/> Piezometer	<input type="checkbox"/> Deepen	TOWNSHIP (N/S) RANGE (E/W) SECTION 160 ACRE 40 ACRE 10 ACRE
<input type="checkbox"/> Vadose Zone	<input type="checkbox"/> Modify	4N 3E 3, NW 1/4 NW 1/4 NW 1/4
<input type="checkbox"/> Air Sparging	If Deepening or Modifying:	COUNTY ASSESSOR'S PARCEL ID NUMBER
<input type="checkbox"/> Soil Vapor Extraction	WELL REGISTRATION NUMBER	BOOK 212 MAP 16 PARCEL 018
<input type="checkbox"/> Other (please specify):	55 -	COUNTY WHERE WELL IS LOCATED
		MARICOPA COUNTY

SECTION 2. OWNER INFORMATION

Well Owner	Landowner (if different from Well Owner)
FULL NAME OF COMPANY, ORGANIZATION, OR INDIVIDUAL	FULL NAME OF COMPANY, GOVERNMENT AGENCY, OR INDIVIDUAL
FLOOD CONTROL DISTRICT OF MARICOPA	
MAILING ADDRESS	MAILING ADDRESS
2801 WEST DURANGO AVENUE	
CITY / STATE / ZIP CODE	CITY / STATE / ZIP CODE
PHOENIX, AZ 85009-6399	
CONTACT PERSON NAME AND TITLE	CONTACT PERSON NAME AND TITLE
BOB STEVENS, ENV. PLAN	VARIANCE GRANTED GROUNDWATER MGT
TELEPHONE NUMBER	TELEPHONE NUMBER
602 506-4073	
FAX	FAX
506-8561	

SECTION 3. DRILLING AUTHORIZATION

Drilling Firm	Consultant (if applicable)
NAME	CONSULTING FIRM
Layne Christensen	Ricker Atkinson + McBe + Assoc., Inc.
DWR LICENSE NUMBER	CONTACT PERSON NAME
60.7	Ken Ricker
ROC LICENSE CATEGORY	TELEPHONE NUMBER
C-5.3 + A-4	(480) 921-5100
TELEPHONE NUMBER	FAX
(480) 895-9336	(800) 921-4081
FAX	E-MAIL ADDRESS
480-895-8698	

SECTION 4.

Questions	Yes	No	Explanation:
1. Are all annular spaces between the casing(s) and the borehole for the placement of grout at least 2 inches?	X		2-inch annular spaces are special standards required for wells located in and near groundwater contamination sites (such as CERCLA, WQARF, DOD, LUST).
2. Is the screened or perforated interval of casing greater than 100 feet in length?		X	100-foot maximum screen intervals are a special standard for wells located in and near groundwater contamination sites (such as CERCLA, WQARF, DOD, LUST).
3. Are you requesting a variance to use thermoplastic casing in lieu of steel casing in the surface seal?	X		The wells must be constructed in a vault as defined in A.A.C. R12-15-801(27).
4. Is there another well name or identification number associated with this well?	X		IF YES, PLEASE STATE CC 2
5. Have construction plans been coordinated with the Arizona Department of Environmental Quality?		X	IF YES, PLEASE STATE AGENCY CONTACT & PHONE NUMBER
6. For monitor wells, is dedicated pump equipment to be installed?		X	IF YES, PLEASE STATE DESIGN PUMP CAPACITY Gallons per Minute
7. Will the well registration number be stamped on the vault cover or on the upper part of the casing?	X		IF NO, WHERE WILL THE REGISTRATION NUMBER BE PLACED?

SECTION 5. WELL CONSTRUCTION DETAILS

<p>Drill Method</p> <p>CHECK ONE</p> <p><input type="checkbox"/> Air Rotary</p> <p><input type="checkbox"/> Bored or Augered</p> <p><input type="checkbox"/> Cable Tool</p> <p><input type="checkbox"/> Dual Rotary</p> <p><input type="checkbox"/> Mud Rotary</p> <p><input type="checkbox"/> Reverse Circulation</p> <p><input type="checkbox"/> Driven</p> <p><input type="checkbox"/> Jetted</p> <p><input checked="" type="checkbox"/> Air Percussion / Odex Tubing</p> <p><input type="checkbox"/> Other (please specify):</p>	<p>Method of Well Development</p> <p>CHECK ONE</p> <p><input checked="" type="checkbox"/> Airlift</p> <p><input type="checkbox"/> Bail</p> <p><input type="checkbox"/> Surge Block</p> <p><input type="checkbox"/> Surge Pump</p> <p><input type="checkbox"/> Other (please specify):</p>	<p>Grout Emplacement Method</p> <p>CHECK ONE</p> <p><input type="checkbox"/> Gravity</p> <p><input type="checkbox"/> Pressure Grout</p> <p><input checked="" type="checkbox"/> Tremie</p> <p><input type="checkbox"/> Other (please specify):</p>
<p>Method of Sealing at Reduction Points</p> <p>CHECK ONE</p> <p><input type="checkbox"/> None</p> <p><input type="checkbox"/> Welded</p> <p><input type="checkbox"/> Swedged</p> <p><input type="checkbox"/> Packed</p> <p><input type="checkbox"/> Other (please specify):</p>		<p>Surface or Conductor Casing</p> <p>CHECK ONE</p> <p><input checked="" type="checkbox"/> Flush Mount in a vault</p> <p><input type="checkbox"/> Extend 1' above grade</p>

SECTION 6. PROPOSED WELL CONSTRUCTION PLAN (attach additional page if needed) DATE CONSTRUCTION TO BEGIN
10-20-02

Attach a well construction diagram labeling all specifications below.

Borehole			Casing												
DEPTH FROM SURFACE		BOREHOLE DIAMETER (inches)	DEPTH FROM SURFACE		OUTER DIAMETER (inches)	MATERIAL TYPE (X)				PERFORATION TYPE (X)				SLOT SIZE IF ANY (inches)	
FROM (feet)	TO (feet)		FROM (feet)	TO (feet)		STEEL	PVC	ABS	OTHER TYPE, DESCRIBE	BLANK	WIRE WRAP	SHUTTER GREEN	MILLS KNIFE		SIFTED
0	40	10	0	37	2		X								
			38	40	2			polyethylene						Perms TIP	

SPECIAL REQUIREMENTS

DEPTH FROM SURFACE		ANNULAR MATERIAL TYPE (X)							FILTER PACK			
FROM (feet)	TO (feet)	NONE	CONCRETE	NEAT CEMENT OR CEMENT GROUT	CEMENT-BENTONITE GROUT	BENTONITE GROUT	CHIPS	PELLETS	IF OTHER TYPE OF ANNULAR MATERIAL, DESCRIBE	SAND	GRAVEL	SIZE
25	40											
22	25							X				
0	22			X								

IF THIS WELL HAS NESTED CASINGS, SPECIFY NUMBER OF CASING STRINGS	EXPECTED DEPTH TO WATER 25' Feet Below Ground Surface
---	---

I state that this notice is filed in compliance with A.R.S. § 45-596 and is complete and correct to the best of my knowledge and belief.

TYPE OR PRINT NAME AND TITLE	SIGNATURE OF WELL OWNER OR LANDOWNER <i>[Signature]</i>
	DATE 10/8/02

ARIZONA DEPARTMENT OF WATER RESOURCES

Hydrology Division

500 North Third Street, Phoenix, Arizona 85004

Telephone 602 417-2448

Fax 602 417-2425

October 15, 2002



JANE DEE HULL
Governor

JOSEPH C. SMITH
Director

Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009-6399

ATTN: Richard Perreault

**RE: Variances for Construction of Nine Piezometer Wells
Registration Numbers 55-595004 through 55-595012**

Dear Mr. Perreault:

The Arizona Department of Water Resources received your request dated October 9, 2002 for construction variances for nine piezometer wells to be located in Maricopa County. The purpose of these wells will be to evaluate groundwater altitudes.

The Arizona Department of Water Resources approves this request for the following variances:

- Thermoplastic casings with watertight caps may be used in lieu of steel (R12-15-811.B.1).
- The length of the surface seals may be reduced to between 7 and 17 feet below ground surface to monitor the shallow water table (R12-15-811.B.1.).

The following *special requirements* are conditions for these variances (R12-15-821.):

- The casings shall comply with ASTM Standard Guide D5092, Section 6.5.
- The wells shall be constructed per the "Variance Granted" Notice of Intention to Drill.
- The wells shall be abandoned per A.A.C. R12-15-816.

If you have any questions, please contact Bruce Hammett of my staff at 602-417-2400 extension 7301.

Sincerely,

A handwritten signature in black ink, appearing to read "Frank Corkhill".

Frank Corkhill
Technical Support Section Supervisor

ARIZONA DEPARTMENT OF WATER RESOURCES

500 North 3rd Street, Phoenix, Arizona 85004

Telephone (602) 417-2470

Fax (602) 417-2422



JANE DEE HULL
Governor

JOSEPH C. SMITH
Director

October 18, 2002

FLOOD CONTROL DISTRICT RECEIVED	
OCT 23 '02	
ICM & GM	FINANCE
IPID	ILANDS
IADMIN	IC&M
I REG	✓ P & PM
IENG	FILE
I CONTRACTS	
ROUTING	

RBS

FLOOD CONTROL DISTRICT OF MARICOPA CTY
2801 W DURANGO AVE
PHOENIX, AZ 85009

Registration No. 55-595004

File No. A(5-3) 33 DDD

Dear Well Owner:

Enclosed for your records is an annotated copy of the Notice of Intention to Drill a well. This is returned to you as evidence of compliance with A.R.S. §45-596. A drilling card has been mailed to your designated driller. Prior to drilling he must have it in his possession.

Since this well is being drilled as a Monitor well, or for Cathodic Protection, Grounding, Geotechnical or Piezometer purposes, our standard driller report form is also being furnished to the driller. He is required to complete it and return it to the Department within 30 days after the completion of the well. A Completion Report form is being furnished for monitor wells where pump installation is authorized. This must be completed within thirty days of installation as required by A.R.S. §45-600.

A Change of Well Information form is enclosed for your future use. If you deem it necessary to change the location of the proposed well, please notify the Department on the enclosed form. A properly amended drilling card will then be issued and must be in possession of the driller before drilling begins. During the drilling of a new well, if it is determined that it must be abandoned, then a Well Abandonment Completion Report must be submitted per R12-15-816.F.

Per A.R.S. §45-593, the person to whom a well is registered shall notify this Department of a change of ownership of the well and/or information pertaining to the physical characteristics of the well, in order to keep the well registration file current and accurate.

Sincerely,

Sylvia Valdez
Water Resource Technician
Groundwater Management Support Section

Enclosures



Arizona Department of Water Resources
Groundwater Management Support Section
P.O. Box 458 • Phoenix, Arizona 85001-0458
(602) 417-2470 • (800) 352-8488
www.water.az.gov

Notice of Intent to
Drill, Deepen, or Modify a
Monitor / Piezometer / Environmental Well

- ❖ Review instructions prior to completing form
- ❖ You must include with your Notice:
 - \$10 check or money order for the processing fee
 - Well construction diagram, labeling all specifications listed in Section 6.

❖ Authority for fee: A.R.S. § 45-113(B), A.A.C. R12-15-151(B)(4)(a)

** PLEASE PRINT CLEARLY **

AMM / INA PWX	B 06	SB 06
RECEIVED 10/9/02	DATE 10/21/02	WS 07
ISSUED 10/21/02	DATE 10/21/02	WQARF CERCLA

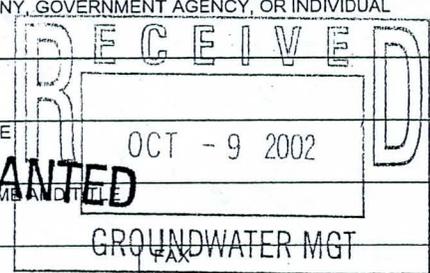
FILE NUMBER A(53)33 ddd
WELL REGISTRATION NUMBER 55-595004

SECTION 1. REGISTRY INFORMATION

Well Type CHECK ONE <input type="checkbox"/> Monitor <input checked="" type="checkbox"/> Piezometer <input type="checkbox"/> Vadose Zone <input type="checkbox"/> Air Sparging <input type="checkbox"/> Soil Vapor Extraction <input type="checkbox"/> Other (please specify):	Proposed Action CHECK ONE <input checked="" type="checkbox"/> Drill New Well <input type="checkbox"/> Deepen <input type="checkbox"/> Modify If Deepening or Modifying: WELL REGISTRATION NUMBER 55 -	Location of Well WELL LOCATION ADDRESS (IF ANY) CLODE BUTTES DAM, TOWNSHIP (N/S) RANGE (E/W) SECTION 160 ACRE 40 ACRE 10 ACRE 5N 3E 33 SE ¼ SE ¼ SE ¼ COUNTY ASSESSOR'S PARCEL ID NUMBER BOOK 212 MAP 16 PARCEL 020 COUNTY WHERE WELL IS LOCATED MARICOPA COUNTY
--	---	---

SECTION 2. OWNER INFORMATION

Well Owner FULL NAME OF COMPANY, ORGANIZATION, OR INDIVIDUAL FLOOD CONTROL DISTRICT OF MARICOPA MAILING ADDRESS 2801 WEST DURANGO AVENUE CITY / STATE / ZIP CODE PHOENIX, AZ 85009-6399 CONTACT PERSON NAME AND TITLE BOB STEVENS, ENV. PLAN TELEPHONE NUMBER 602 506-4073 FAX 506-8561	Landowner (if different from Well Owner) FULL NAME OF COMPANY, GOVERNMENT AGENCY, OR INDIVIDUAL MAILING ADDRESS CITY / STATE / ZIP CODE CONTACT PERSON NAME AND TITLE TELEPHONE NUMBER FAX
--	---



SECTION 3. DRILLING AUTHORIZATION

Drilling Firm NAME Layne Christensen DWR LICENSE NUMBER No. 7 TELEPHONE NUMBER (480) 895-9336	Consultant (if applicable) CONSULTING FIRM Ricker, Atkinson + McBee + Assoc, Inc CONTACT PERSON NAME TELEPHONE NUMBER 480 921-8100 FAX 480-921-4081 E-MAIL ADDRESS
--	---

SPECIAL REQUIREMENTS

SECTION 4.

Questions	Yes	No	Explanation:
1. Are all annular spaces between the casing(s) and the borehole for the placement of grout at least 2 inches?	X		2-inch annular spaces are special standards required for wells located in and near groundwater contamination sites (such as CERCLA, WQARF, DOD, LUST).
2. Is the screened or perforated interval of casing greater than 100 feet in length?		X	100-foot maximum screen intervals are a special standard for wells located in and near groundwater contamination sites (such as CERCLA, WQARF, DOD, LUST).
3. Are you requesting a variance to use thermoplastic casing in lieu of steel casing in the surface seal?	X		The wells must be constructed in a vault as defined in A.A.C. R12-15-801(27).
4. Is there another well name or identification number associated with this well?	X		IF YES, PLEASE STATE CC 3
5. Have construction plans been coordinated with the Arizona Department of Environmental Quality?		X	IF YES, PLEASE STATE AGENCY CONTACT & PHONE NUMBER
6. For monitor wells, is dedicated pump equipment to be installed?		X	IF YES, PLEASE STATE DESIGN PUMP CAPACITY Gallons per Minute
7. Will the well registration number be stamped on the vault cover or on the upper part of the casing?	X		IF NO, WHERE WILL THE REGISTRATION NUMBER BE PLACED?

SECTION 5. WELL CONSTRUCTION DETAILS		
Drill Method CHECK ONE <input type="checkbox"/> Air Rotary <input type="checkbox"/> Bored or Augered <input type="checkbox"/> Cable Tool <input type="checkbox"/> Dual Rotary <input type="checkbox"/> Mud Rotary <input type="checkbox"/> Reverse Circulation <input type="checkbox"/> Driven <input type="checkbox"/> Jetted <input checked="" type="checkbox"/> Air Percussion / Odex Tubing <input type="checkbox"/> Other (please specify):	Method of Well Development CHECK ONE <input checked="" type="checkbox"/> Airlift <input type="checkbox"/> Bail <input type="checkbox"/> Surge Block <input type="checkbox"/> Surge Pump <input type="checkbox"/> Other (please specify):	Grout Emplacement Method CHECK ONE <input type="checkbox"/> Gravity <input type="checkbox"/> Pressure Grout <input checked="" type="checkbox"/> Tremie <input type="checkbox"/> Other (please specify):
Method of Sealing at Reduction Points CHECK ONE <input type="checkbox"/> None <input type="checkbox"/> Welded <input type="checkbox"/> Swedged <input type="checkbox"/> Packed <input type="checkbox"/> Other (please specify):		Surface or Conductor Casing CHECK ONE <input checked="" type="checkbox"/> Flush Mount in a vault <input type="checkbox"/> Extend 1' above grade

SECTION 6. PROPOSED WELL CONSTRUCTION PLAN (attach additional page if needed)	DATE CONSTRUCTION TO BEGIN
Attach a well construction diagram labeling all specifications below.	10-20-02

Borehole			Casing														
DEPTH FROM SURFACE		BOREHOLE DIAMETER (inches)	DEPTH FROM SURFACE		OUTER DIAMETER (inches)	MATERIAL TYPE (X)				PERFORATION TYPE (X)				SLOT SIZE IF ANY (inches)			
FROM (feet)	TO (feet)		FROM (feet)	TO (feet)		STEEL	PVC	ABS	IF OTHER TYPE, DESCRIBE	BLANK OR NON-	WIRE WRAP	SHUTTER SCREEN	MILLS KNIFE		SLOTTED	IF OTHER TYPE, DESCRIBE	
0	25'	10	0	23	2		X										
			23	25'	2												

VARIANCE GRANTED

polyethylene

porous TIP

SPECIAL REQUIREMENTS

DEPTH FROM SURFACE		ANNULAR MATERIAL TYPE (X)								FILTER PACK		
FROM (feet)	TO (feet)	NONE	CONCRETE	NEAT CEMENT OR CEMENT GROUT	CEMENT-BENTONITE GROUT	BENTONITE GROUT	CHIPS	PELLETS	IF OTHER TYPE OF ANNULAR MATERIAL, DESCRIBE	SAND	GRAVEL	SIZE
10	25											
7	10							X				
0	7				X							

RECEIVED
OCT - 9 2002
GROUNDWATER MGT

IF THIS WELL HAS NESTED CASINGS, SPECIFY NUMBER OF CASING STRINGS	EXPECTED DEPTH TO WATER 25'	Feet Below Ground Surface
---	--------------------------------	---------------------------

I state that this notice is filed in compliance with A.R.S. § 45-596 and is complete and correct to the best of my knowledge and belief.

TYPE OR PRINT NAME AND TITLE	SIGNATURE OF WELL OWNER OR LANDOWNER	DATE
	<i>[Signature]</i>	10/8/02

ARIZONA DEPARTMENT OF WATER RESOURCES

Hydrology Division

500 North Third Street, Phoenix, Arizona 85004

Telephone 602 417-2448

Fax 602 417-2425

October 15, 2002



JANE DEE HULL
Governor

JOSEPH C. SMITH
Director

Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009-6399

ATTN: Richard Perreault

**RE: Variances for Construction of Nine Piezometer Wells
Registration Numbers 55-595004 through 55-595012**

Dear Mr. Perreault:

The Arizona Department of Water Resources received your request dated October 9, 2002 for construction variances for nine piezometer wells to be located in Maricopa County. The purpose of these wells will be to evaluate groundwater altitudes.

The Arizona Department of Water Resources approves this request for the following variances:

- Thermoplastic casings with watertight caps may be used in lieu of steel (R12-15-811.B.1).
- The length of the surface seals may be reduced to between 7 and 17 feet below ground surface to monitor the shallow water table (R12-15-811.B.1.).

The following *special requirements* are conditions for these variances (R12-15-821.):

- The casings shall comply with ASTM Standard Guide D5092, Section 6.5.
- The wells shall be constructed per the "Variance Granted" Notice of Intention to Drill.
- The wells shall be abandoned per A.A.C. R12-15-816.

If you have any questions, please contact Bruce Hammett of my staff at 602-417-2400 extension 7301.

Sincerely,

Frank Corkhill
Technical Support Section Supervisor

ARIZONA DEPARTMENT OF WATER RESOURCES

500 North 3rd Street, Phoenix, Arizona 85004

Telephone (602) 417-2470

Fax (602) 417-2422

October 18, 2002



JANE DEE HULL
Governor

JOSEPH C. SMITH
Director

FLOOD CONTROL DISTRICT OF MARICOPA CTY
2801 W DURANGO AVE
PHOENIX, AZ 85009

Registration No. 55-595005

File No. A(5-3) 27 DDA

Dear Well Owner:

Enclosed for your records is an annotated copy of the Notice of Intention to Drill a well. This is returned to you as evidence of compliance with A.R.S. §45-596. A drilling card has been mailed to your designated driller. Prior to drilling he must have it in his possession.

Since this well is being drilled as a Monitor well, or for Cathodic Protection, Grounding, Geotechnical or Piezometer purposes, our standard driller report form is also being furnished to the driller. He is required to complete it and return it to the Department within 30 days after the completion of the well. A Completion Report form is being furnished for monitor wells where pump installation is authorized. This must be completed within thirty days of installation as required by A.R.S. §45-600.

A Change of Well Information form is enclosed for your future use. If you deem it necessary to change the location of the proposed well, please notify the Department on the enclosed form. A properly amended drilling card will then be issued and must be in possession of the driller before drilling begins. During the drilling of a new well, if it is determined that it must be abandoned, then a Well Abandonment Completion Report must be submitted per R12-15-816.F.

Per A.R.S. §45-593, the person to whom a well is registered shall notify this Department of a change of ownership of the well and/or information pertaining to the physical characteristics of the well, in order to keep the well registration file current and accurate.

Sincerely,

A handwritten signature in cursive script, appearing to read "S. Valdez".

Sylvia Valdez
Water Resource Technician
Groundwater Management Support Section

Enclosures

CC 4

\$10 FEE



Arizona Department of Water Resources
 Groundwater Management Support Section
 P.O. Box 458 • Phoenix, Arizona 85001-0458
 (602) 417-2470 • (800) 352-8488
 www.water.az.gov

Notice of Intent to
 Drill, Deepen, or Modify a
 Monitor / Piezometer / Environmental Well

- ❖ Review instructions prior to completing form
 - ❖ You must include with your Notice:
 - \$10 check or money order for the processing fee
 - Well construction diagram, labeling all specifications listed in Section 6.
 - ❖ Authority for fee: A.R.S. § 45-113(B), A.A.C. R12-15-151(B)(4)(a)
- ** PLEASE PRINT CLEARLY ****

AM / INA <i>PAX</i>	B <i>do</i>	SB <i>do</i>
RECEIVED <i>10/9/02</i>	DATE <i>10/21/02</i>	WS <i>07</i>
ISSUED	DATE	WQARF CERCLA

FILE NUMBER <i>25-3)27 add</i>
WELL REGISTRATION NUMBER <i>55-595005</i>

SECTION 1. REGISTRY INFORMATION

Well Type	Proposed Action	Location of Well
CHECK ONE	CHECK ONE	WELL LOCATION ADDRESS (IF ANY)
<input type="checkbox"/> Monitor	<input checked="" type="checkbox"/> Drill New Well	<i>CAOE BUTTES DAM</i>
<input checked="" type="checkbox"/> Piezometer	<input type="checkbox"/> Deepen	TOWNSHIP (NS) RANGE (EW) SECTION 160 ACRE 40 ACRE 10 ACRE
<input type="checkbox"/> Vadose Zone	<input type="checkbox"/> Modify	<i>5N 3E 27 SE 1/4 SE 1/4 NE 1/4</i>
<input type="checkbox"/> Air Sparging	If Deepening or Modifying:	COUNTY ASSESSOR'S PARCEL ID NUMBER
<input type="checkbox"/> Soil Vapor Extraction	WELL REGISTRATION NUMBER	BOOK <i>211</i> MAP <i>26</i> PARCEL <i>006</i>
<input type="checkbox"/> Other (please specify):	<i>55 -</i>	COUNTY WHERE WELL IS LOCATED
		<i>MARICOPA COUNTY</i>

SECTION 2. OWNER INFORMATION

Well Owner	Landowner (if different from Well Owner)
FULL NAME OF COMPANY, ORGANIZATION, OR INDIVIDUAL <i>FLOOD CONTROL DISTRICT OF MARICOPA</i>	FULL NAME OF COMPANY, GOVERNMENT AGENCY, OR INDIVIDUAL
MAILING ADDRESS <i>2801 WEST DURANGO AVENUE</i>	MAILING ADDRESS
CITY / STATE / ZIP CODE <i>PHOENIX, AZ 85009-6399</i>	CITY / STATE / ZIP CODE
CONTACT PERSON NAME AND TITLE <i>BOB STEVENS, ENV. PLAN</i>	CONTACT PERSON NAME AND TITLE <i>VARIANCE GRANTED</i>
TELEPHONE NUMBER <i>602 506-4073</i>	TELEPHONE NUMBER
FAX <i>506-8561</i>	FAX

SECTION 3. DRILLING AUTHORIZATION

Drilling Firm	Consultant (if applicable)
NAME <i>Layne Christensen</i>	CONSULTING FIRM <i>Ricker Atkinson + McBee + Assoc., Inc</i>
DWR LICENSE NUMBER <i>(No. 7)</i>	CONTACT PERSON NAME
ROC LICENSE CATEGORY <i>C-53-A-4</i>	TELEPHONE NUMBER <i>480 921-3100</i>
TELEPHONE NUMBER <i>(480) 895-9336</i>	FAX <i>480-921-4081</i>
FAX <i>480-895-8695</i>	E-MAIL ADDRESS

SECTION 4.

Questions	Yes	No	Explanation:
1. Are all annular spaces between the casing(s) and the borehole for the placement of grout at least 2 inches?	<i>X</i>		2-inch annular spaces are special standards required for wells located in and near groundwater contamination sites (such as CERCLA, WQARF, DOD, LUST).
2. Is the screened or perforated interval of casing greater than 100 feet in length?		<i>X</i>	100-foot maximum screen intervals are a special standard for wells located in and near groundwater contamination sites (such as CERCLA, WQARF, DOD, LUST).
3. Are you requesting a variance to use thermoplastic casing in lieu of steel casing in the surface seal?	<i>X</i>		The wells must be constructed in a vault as defined in A.A.C. R12-15-801(27).
4. Is there another well name or identification number associated with this well?	<i>X</i>		IF YES, PLEASE STATE <i>CC 4</i>
5. Have construction plans been coordinated with the Arizona Department of Environmental Quality?		<i>X</i>	IF YES, PLEASE STATE AGENCY CONTACT & PHONE NUMBER
6. For monitor wells, is dedicated pump equipment to be installed?		<i>X</i>	IF YES, PLEASE STATE DESIGN PUMP CAPACITY Gallons per Minute
7. Will the well registration number be stamped on the vault cover or on the upper part of the casing?	<i>X</i>		IF NO, WHERE WILL THE REGISTRATION NUMBER BE PLACED?

SECTION 5. WELL CONSTRUCTION DETAILS

Drill Method CHECK ONE <input type="checkbox"/> Air Rotary <input type="checkbox"/> Bored or Augered <input type="checkbox"/> Cable Tool <input type="checkbox"/> Dual Rotary <input type="checkbox"/> Mud Rotary <input type="checkbox"/> Reverse Circulation <input type="checkbox"/> Driven <input type="checkbox"/> Jetted <input checked="" type="checkbox"/> Air Percussion / Odex Tubing <input type="checkbox"/> Other (please specify):		Method of Well Development CHECK ONE <input checked="" type="checkbox"/> Airlift <input type="checkbox"/> Bail <input type="checkbox"/> Surge Block <input type="checkbox"/> Surge Pump <input type="checkbox"/> Other (please specify):		Grout Emplacement Method CHECK ONE <input type="checkbox"/> Gravity <input type="checkbox"/> Pressure Grout <input checked="" type="checkbox"/> Tremie <input type="checkbox"/> Other (please specify):	
		Method of Sealing at Reduction Points CHECK ONE <input type="checkbox"/> None <input type="checkbox"/> Welded <input type="checkbox"/> Swedged <input type="checkbox"/> Packed <input type="checkbox"/> Other (please specify):		Surface or Conductor Casing CHECK ONE <input checked="" type="checkbox"/> Flush Mount in a vault <input type="checkbox"/> Extend 1' above grade	

RECEIVED
DATE CONSTRUCTION TO BEGIN
OCT - 9 2002
10-2-02

SECTION 6. PROPOSED WELL CONSTRUCTION PLAN (attach additional page if needed)

Attach a well construction diagram labeling all specifications below.

Borehole			Casing										GROUNDWATER MGT			
DEPTH FROM SURFACE		BOREHOLE DIAMETER (inches)	DEPTH FROM SURFACE		OUTER DIAMETER (inches)	MATERIAL TYPE (X)				PERFORATION TYPE (X)						
FROM (feet)	TO (feet)		FROM (feet)	TO (feet)		STEEL	PVC	ABS	IF OTHER TYPE, DESCRIBE	BLANK OR NONE	WIRE WRAP	SHUTTER SCREEN	MILLS KNIFE	SLOTTED	IF OTHER TYPE, DESCRIBE	SLOT SIZE IF ANY (inches)
0	35	10	0	33	2	X										
			33	35	2											

VARIANCE GRANTED

poly ethylene

71P

Annular Material

DEPTH FROM SURFACE		ANNULAR MATERIAL TYPE (X)							FILTER/PACK		
FROM (feet)	TO (feet)	NONE	CONCRETE	NEAT CEMENT OR CEMENT GROUT	CEMENT-BENTONITE GROUT	BENTONITE			SAND	GRAVEL	SIZE
						GROUT	CHIPS	PELLETS			
20	35										
17	20							X			
0	17				X						

SPECIAL REQUIREMENTS

IF THIS WELL HAS NESTED CASINGS, SPECIFY NUMBER OF CASING STRINGS	EXPECTED DEPTH TO WATER 25' Feet Below Ground Surface
---	---

I state that this notice is filed in compliance with A.R.S. § 45-596 and is complete and correct to the best of my knowledge and belief.

TYPE OR PRINT NAME AND TITLE	SIGNATURE OF WELL OWNER OR LANDOWNER	DATE
	<i>[Signature]</i>	10/8/02

ARIZONA DEPARTMENT OF WATER RESOURCES

Hydrology Division

500 North Third Street, Phoenix, Arizona 85004

Telephone 602 417-2448

Fax 602 417-2425

October 15, 2002



JANE DEE HULL
Governor

JOSEPH C. SMITH
Director

Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009-6399

ATTN: Richard Perreault

**RE: Variances for Construction of Nine Piezometer Wells
Registration Numbers 55-595004 through 55-595012**

Dear Mr. Perreault:

The Arizona Department of Water Resources received your request dated October 9, 2002 for construction variances for nine piezometer wells to be located in Maricopa County. The purpose of these wells will be to evaluate groundwater altitudes.

The Arizona Department of Water Resources approves this request for the following variances:

- Thermoplastic casings with watertight caps may be used in lieu of steel (R12-15-811.B.1).
- The length of the surface seals may be reduced to between 7 and 17 feet below ground surface to monitor the shallow water table (R12-15-811.B.1.).

The following *special requirements* are conditions for these variances (R12-15-821.):

- The casings shall comply with ASTM Standard Guide D5092, Section 6.5.
- The wells shall be constructed per the "Variance Granted" Notice of Intention to Drill.
- The wells shall be abandoned per A.A.C. R12-15-816.

If you have any questions, please contact Bruce Hammett of my staff at 602-417-2400 extension 7301.

Sincerely,

Frank Corkhill
Technical Support Section Supervisor

ARIZONA DEPARTMENT OF WATER RESOURCES

500 North 3rd Street, Phoenix, Arizona 85004
Telephone (602) 417-2470
Fax (602) 417-2422



JANE DEE HULL
Governor

JOSEPH C. SMITH
Director

October 18, 2002

FLOOD CONTROL DISTRICT OF MARICOPA CTY
2801 W DURANGO AVE
PHOENIX, AZ 85009

Registration No. 55-595010
File No. A(4-3) 3 BBC

Dear Well Owner:

Enclosed for your records is an annotated copy of the Notice of Intention to Drill a well. This is returned to you as evidence of compliance with A.R.S. §45-596. A drilling card has been mailed to your designated driller. Prior to drilling he must have it in his possession.

Since this well is being drilled as a Monitor well, or for Cathodic Protection, Grounding, Geotechnical or Piezometer purposes, our standard driller report form is also being furnished to the driller. He is required to complete it and return it to the Department within 30 days after the completion of the well. A Completion Report form is being furnished for monitor wells where pump installation is authorized. This must be completed within thirty days of installation as required by A.R.S. §45-600.

A Change of Well Information form is enclosed for your future use. If you deem it necessary to change the location of the proposed well, please notify the Department on the enclosed form. A properly amended drilling card will then be issued and must be in possession of the driller before drilling begins. During the drilling of a new well, if it is determined that it must be abandoned, then a Well Abandonment Completion Report must be submitted per R12-15-816.F.

Per A.R.S. §45-593, the person to whom a well is registered shall notify this Department of a change of ownership of the well and/or information pertaining to the physical characteristics of the well, in order to keep the well registration file current and accurate.

Sincerely,

A handwritten signature in cursive script, appearing to read "Sylvia Valdez".

Sylvia Valdez
Water Resource Technician
Groundwater Management Support Section

Enclosures

CB4

\$10 FEE



Arizona Department of Water Resources
Groundwater Management Support Section
P.O. Box 458 • Phoenix, Arizona 85001-0458
(602) 417-2470 • (800) 352-8488
www.water.az.gov

Notice of Intent to Drill, Deepen, or Modify a Monitor / Piezometer / Environmental Well

- ❖ Review instructions prior to completing form
 - ❖ You must include with your Notice:
 - \$10 check or money order for the processing fee
 - Well construction diagram, labeling all specifications listed in Section 6.
 - ❖ Authority for fee: A.R.S. § 45-113(B), A.A.C. R12-15-151(B)(4)(a)
- ** PLEASE PRINT CLEARLY ****

AMA / INA <i>PNX</i>	B <i>do</i>	SP
RECEIVED <i>10/9/02</i>	DATE <i>10/9/02</i>	WS <i>07</i>
ISSUED <i>10/21/02</i>	DATE <i>10/21/02</i>	WQARF CERCLA

FILE NUMBER <i>9(4-3)3660</i>
WELL REGISTRATION NUMBER <i>55-595010</i>

SECTION 1. REGISTRY INFORMATION		
Well Type	Proposed Action	Location of Well
CHECK ONE	CHECK ONE	WELL LOCATION ADDRESS (IF ANY)
<input type="checkbox"/> Monitor	<input checked="" type="checkbox"/> Drill New Well	<i>LAOZ BUTTES DAM,</i>
<input checked="" type="checkbox"/> Piezometer	<input type="checkbox"/> Deepen	TOWNSHIP (N/S) RANGE (E/W) SECTION 160 ACRE 40 ACRE 10 ACRE
<input type="checkbox"/> Vadose Zone	<input type="checkbox"/> Modify	<i>4N 3E 3 NW ¼ NW ¼ SW ¼</i>
<input type="checkbox"/> Air Sparging	<i>If Deepening or Modifying:</i>	COUNTY ASSESSOR'S PARCEL ID NUMBER
<input type="checkbox"/> Soil Vapor Extraction	WELL REGISTRATION NUMBER	BOOK <i>212</i> MAP <i>16</i> PARCEL <i>018</i>
<input type="checkbox"/> Other (please specify):	<i>55 -</i>	COUNTY WHERE WELL IS LOCATED
		<i>MARICOPA COUNTY</i>

SECTION 2. OWNER INFORMATION		
Well Owner	Landowner (if different from Well Owner)	
FULL NAME OF COMPANY, ORGANIZATION, OR INDIVIDUAL	FULL NAME OF COMPANY, GOVERNMENT AGENCY, OR INDIVIDUAL	
<i>FLOOD CONTROL DISTRICT OF MARICOPA COUNTY</i>		
MAILING ADDRESS	MAILING ADDRESS	
<i>2801 WEST DURANGO AVENUE</i>		
CITY / STATE / ZIP CODE	CITY / STATE / ZIP CODE	
<i>PHOENIX, AZ 85009-6399</i>		
CONTACT PERSON NAME AND TITLE	CONTACT PERSON NAME AND TITLE	
<i>BOB STEVENS, ENV. PLANNING</i>		
TELEPHONE NUMBER	FAX	TELEPHONE NUMBER
<i>602 506-4073</i>	<i>506-8561</i>	

RECEIVED
OCT - 9 2002
GROUNDWATER MGT

VARIANCE GRANTED

SECTION 3. DRILLING AUTHORIZATION			
Drilling Firm	* Consultant (if applicable)		
NAME	CONSULTING FIRM		
<i>Layne Christensen</i>	<i>Ricker Atkinson & McBrye & Assoc., Inc.</i>		
DWR LICENSE NUMBER	ROC LICENSE CATEGORY	CONTACT PERSON NAME	
<i>No. 7</i>	<i>C-53-A-4</i>	<i>Ken Ricker</i>	
TELEPHONE NUMBER	FAX	TELEPHONE NUMBER	FAX
<i>(480) 295-9336</i>	<i>480-845-8898</i>	<i>480-921-4081</i>	
		E-MAIL ADDRESS	

SECTION 4.			
Questions	Yes	No	Explanation:
1. Are all annular spaces between the casing(s) and the borehole for the placement of grout at least 2 inches?	X		2-inch annular spaces are special standards required for wells located in and near groundwater contamination sites (such as CERCLA, WQARF, DOD, LUST).
2. Is the screened or perforated interval of casing greater than 100 feet in length?		X	100-foot maximum screen intervals are a special standard for wells located in and near groundwater contamination sites (such as CERCLA, WQARF, DOD, LUST).
3. Are you requesting a variance to use thermoplastic casing in lieu of steel casing in the surface seal?	X		The wells must be constructed in a vault as defined in A.A.C. R12-15-801(27).
4. Is there another well name or identification number associated with this well?	X		IF YES, PLEASE STATE <i>CB4</i>
5. Have construction plans been coordinated with the Arizona Department of Environmental Quality?		X	IF YES, PLEASE STATE AGENCY CONTACT & PHONE NUMBER
6. For monitor wells, is dedicated pump equipment to be installed?		X	IF YES, PLEASE STATE DESIGN PUMP CAPACITY Gallons per Minute
7. Will the well registration number be stamped on the vault cover or on the upper part of the casing?	X		IF NO, WHERE WILL THE REGISTRATION NUMBER BE PLACED?

SECTION 5. WELL CONSTRUCTION DETAILS		
Drill Method CHECK ONE <input type="checkbox"/> Air Rotary <input type="checkbox"/> Bored or Augered <input type="checkbox"/> Cable Tool <input type="checkbox"/> Dual Rotary <input type="checkbox"/> Mud Rotary <input type="checkbox"/> Reverse Circulation <input type="checkbox"/> Driven <input type="checkbox"/> Jetted <input checked="" type="checkbox"/> Air Percussion / Odex Tubing <input type="checkbox"/> Other (please specify):	Method of Well Development CHECK ONE <input checked="" type="checkbox"/> Air lift <input type="checkbox"/> Ball <input type="checkbox"/> Surge Block <input type="checkbox"/> Surge Pump <input type="checkbox"/> Other (please specify):	Grout Emplacement Method CHECK ONE <input type="checkbox"/> Gravity <input type="checkbox"/> Pressure Grout <input checked="" type="checkbox"/> Tremie <input type="checkbox"/> Other (please specify):
	Method of Sealing at Reduction Points CHECK ONE <input type="checkbox"/> None <input type="checkbox"/> Welded <input type="checkbox"/> Swedged <input type="checkbox"/> Packed <input type="checkbox"/> Other (please specify):	Surface or Conductor Casing CHECK ONE <input checked="" type="checkbox"/> Flush Mount in a vault <input type="checkbox"/> Extend 1' above grade

SECTION 6. PROPOSED WELL CONSTRUCTION PLAN (attach additional page if needed)	DATE CONSTRUCTION TO BEGIN
Attach a well construction diagram labeling all specifications below.	10-20-02

Borehole			Casing														
DEPTH FROM SURFACE		BOREHOLE DIAMETER (inches)	DEPTH FROM SURFACE		OUTER DIAMETER (inches)	MATERIAL TYPE (X)				PERFORATION TYPE (X)				SLOT SIZE IF ANY (inches)			
FROM (feet)	TO (feet)		FROM (feet)	TO (feet)		STEEL	PVC	PLBS	IF OTHER TYPE, DESCRIBE	BLANK OR NONE	WIRE WRAP	SLIPPER SCREEN	MILLS KNIFE		SLOTTED	IF OTHER TYPE, DESCRIBE	
0	35	10	0	33	2	X					X						
			33	35	2												

Annular Material												
DEPTH FROM SURFACE		ANNULAR MATERIAL TYPE (X)						FILTER PACK				
FROM (feet)	TO (feet)	NONE	CONCRETE	NEAT CEMENT OR CEMENT GROUT	CEMENT-BENTONITE GROUT	BENTONITE			SAND	GRAVEL	SIZE	
						GROUT	CHIPS	PELLETS				
20	35											
17	20							X				
0	17				X							

IF THIS WELL HAS NESTED CASINGS, SPECIFY NUMBER OF CASING STRINGS	EXPECTED DEPTH TO WATER 25' Feet Below Ground Surface
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I state that this notice is filed in compliance with A.R.S. § 45-596 and is complete and correct to the best of my knowledge and belief.

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Frank Corkhill
Technical Support Section Supervisor

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- Divider
- Exhibit A Site Plan

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