

Young, John, NMENV

From: Danny Katzman [katzman@lanl.gov]
Sent: Monday, November 05, 2007 2:05 PM
To: Young, John, NMENV
Cc: Cobrain, Dave, NMENV; mvaneeck@lanl.gov
Subject: PRB stuff *Permeable Reactive Barrier*

Attachments: PRB Appendix A-design drawings2.pdf; PRB Appendix B-photos2.pdf



PRB Appendix PRB Appendix
design drawings-photos2.pdf (5)

Hi john- See attachments. I don't have as-builts, but we understand that the final was the same as the design. I find the photos to also be very useful.

And, as a reminder to last week's discussion, we are interested in completing the project by removing the reactive media and leaving the structure in place. Benefits of leaving the structure in place include safety, minimizing generation of materials that will require handling and waste management, significant reduction of that physical scale of the excavation in the canyon (meaning that we'll have to peel back quite a bit of in-place alluvium for safety purposes once the stabilizing affect of the frame is removed), helps address potential for encountering problems associated with real-time saturation and all the implications of that (including waste implications), and the frame is left in place in the event that someone decides to re-install reactive media at some date in the future.

We'll commit to a demonstration using water levels that the hydrology will be unaffected.

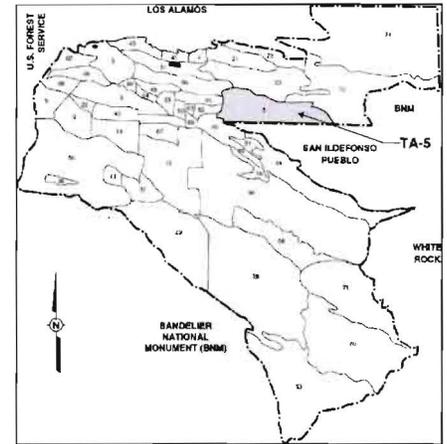
Let me know if you have any other questions.
d

Danny Katzman
Water Stewardship Program Manager
LANL Environmental Programs
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This inbound email has been scanned by the MessageLabs Email Security System.



Appendix A
Design Drawings



LOCATION PLAN
NOT TO SCALE

MULTIPLE PERMEABLE REACTIVE BARRIER MORTANDAD CANYON

DRAWING INDEX

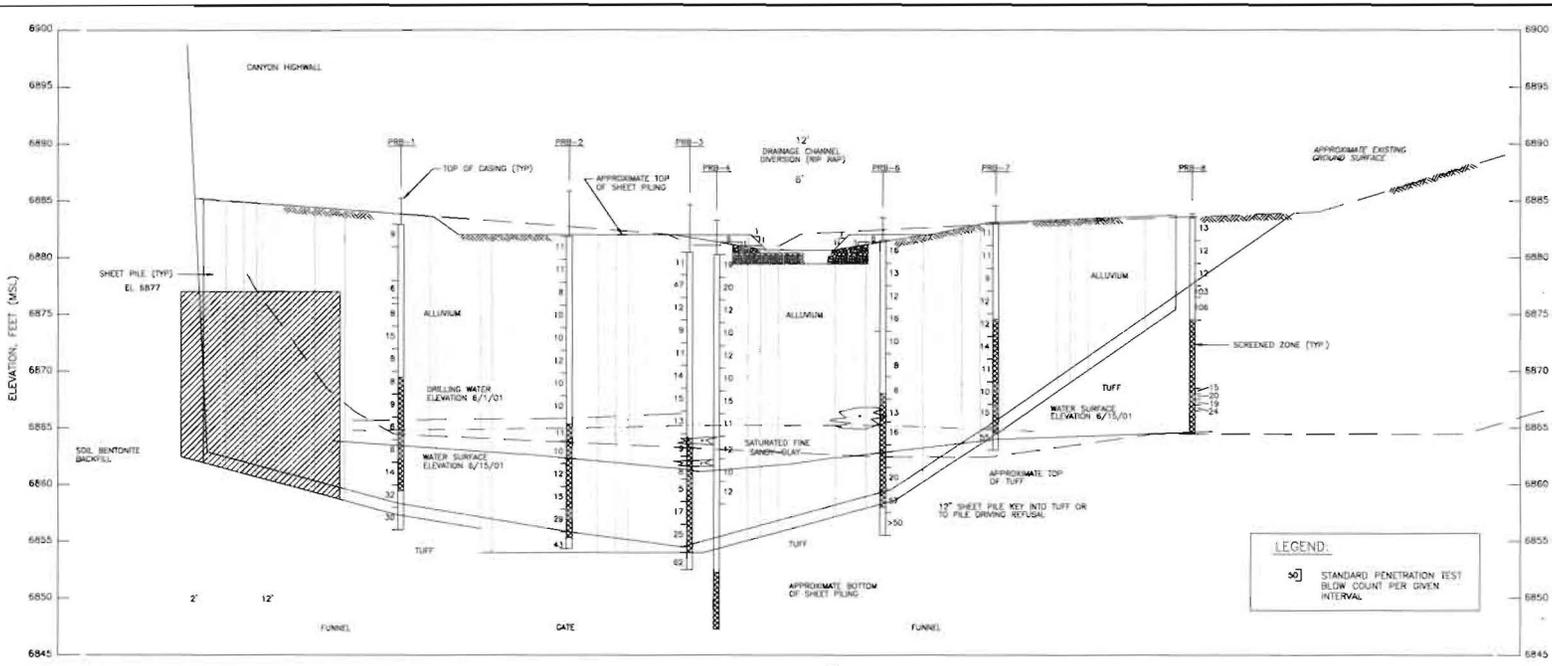
SHEET NUMBER	DISCIPLINE SHEET NUMBER	DRAWING TITLE
1	T1	TITLE SHEET
2	C1	SITE PLAN
3	C2	PROFILE, GATE CROSS SECTION AND SAMPLING/MONITORING PLAN
4	C3	GATE AND FUNNEL - PLAN AND SECTIONS
5	C4	GATE AND FUNNEL - DETAILS



	MULTIPLE PERMEABLE REACTIVE BARRIER MORTANDAD CANYON TITLE SHEET		TA- 5
	LOS ALAMOS		LOS ALAMOS NATIONAL LABORATORY LOS ALAMOS, NEW MEXICO 87545
DESIGNED: P. INDEKAL 9/30/02 DRAWN: J. STONMATTER 8/30/02 PROJECT ID: 826732	CHECKED: T. CHAM 5/30/02 SUBMITTED: S. BEN BARRI 8/30/02 DRAWING NO: 826732-D4	APPROVED: J. KACELBA 8/30/02 SHEET NO: 1 OF 5	REVISION NO: 0

NO.	DATE	DMN	DES	CHKD	APP	REVISIONS
1	8/30/02	ZC	JG	EA	SDB	AS-BUILTS - CHANGES ON SHEET 5
2	8/30/02	ZC	JG	EA	SDB	AS-BUILTS

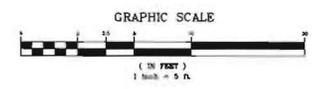
Q:\V1 Drawings - CAD Files\Los Alamos\826732\826732-D4.dwg
 8/30/02 12:42pm
 Plotted by administrator



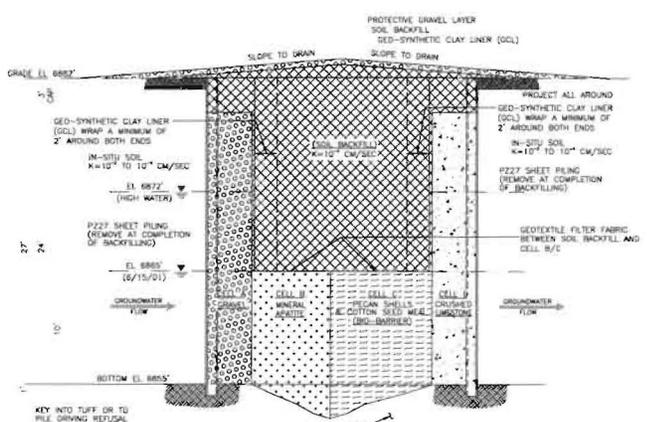
- CLAY PLUG AND SOIL BACKFILL NOTES:**
- CLAY PLUG (SOIL-BENTONITE BACKFILL) AT THE CANYON WALL
 - THE SOIL-BENTONITE BACKFILL MATERIAL FOR THE CLAY PLUG SHALL BE MIXTURES OF OFF-SITE BORROW SOIL AND BENTONITE. BORROW SOIL SHALL BE CLEAN AND FREE OF ROOTS, DEBRIS, BRUSH, SOIL AND ORGANIC AND FROZEN MATERIALS. THE BORROW SOIL SHALL BE CERTIFIED TO BE SUITABLE FOR EARTHWORK CONSTRUCTION, BACKFILL AND COMPACTION. A RANGE OF SIX TO TEN PERCENT (6 TO 10%) BENTONITE BY WEIGHT SHALL BE MIXED THOROUGHLY WITH THE SOIL PRIOR TO PLACEMENT AND COMPACTION.
 - THE MATERIAL PASSING THE NO. 200 SIEVE SHALL HAVE A LIQUID LIMIT GREATER THAN 30 AND A PLASTICITY INDEX GREATER THAN 10. THE BACKFILL MATERIAL SHALL CONFORM TO THE FOLLOWING GRADATION REQUIREMENTS OR APPROVED EQUAL.

SCREEN SIZE	PERCENT PASSING BY DRY WEIGHT
3-INCH	100 %
NO. 4	40 TO 80 %
NO. 200	20 TO 60 %
 - BACKFILL SHALL BE PLACED IN LOOSE LIFTS OF 8 TO 12 INCHES THICK AND COMPACTED UNTIL NON-MOVEMENT OF THE BACKFILL BENEATH A HAND-OPERATED TAMPER IS OBSERVED DURING THE COMPACTION OPERATION.
 - SOIL BACKFILL INSIDE GATE/CELL
 - THE SOIL BACKFILL INSIDE THE GATE/CELL SHALL BE A "CLEAN" FILL, FREE OF ROOTS, DEBRIS, BRUSH, SOIL, ORGANIC, AND FROZEN MATERIALS. THE SOIL BACKFILL MATERIALS SHALL BE SUITABLE FOR EARTHWORK CONSTRUCTION, BACKFILL AND COMPACTION.
 - THE SOIL BACKFILL MATERIAL SHALL CONFORM TO THE FOLLOWING GRADATION REQUIREMENTS OR APPROVED EQUAL.

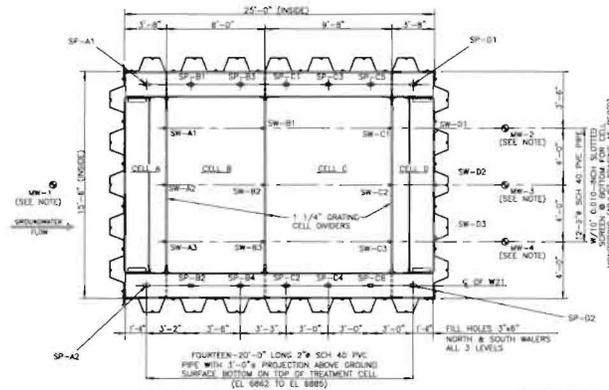
SCREEN SIZE	PERCENT PASSING BY DRY WEIGHT
3-INCH	100 %
NO. 4	40 TO 80 %
NO. 200	20 TO 60 %
 - THE SOIL BACKFILL FILL SHALL BE PLACED IN LOOSE LIFTS 8 TO 12 INCHES THICK AND COMPACTED UNTIL NON-MOVEMENT OF THE BACKFILL BENEATH A HAND OPERATED TAMPER IS OBSERVED DURING THE COMPACTION OPERATION.



PROFILE A-C1



GATE CROSS SECTION
NOT TO SCALE



SAMPLING/MONITORING PLAN
NOT TO SCALE

NOTE: MONITORING WELLS SHALL BE SCREENED CONTINUOUSLY THROUGH THE ALLUVIUM WITH 0.010 INCH SLOT AND COMPLETED PER LINE (ER-SOP-05-01 "WELL CONSTRUCTION")

LEGEND:

- SW-A1 to SW-D4: SAMPLING WELLS
- SP-A1 to SP-D4: SAMPLING POINTS
- MW-1 to MW-4: MONITORING WELL

12" x 12" SCH. 40 PVC PIPE WITH 0.010-INCH SLOTTED FILTER (SEE NOTE) MONITORING POINT (SEE NOTE)

FOURTEEN-20'-0" LONG 2" SCH. 40 PVC PIPE WITH 1'-0" PROJECTION ABOVE GROUND SURFACE BOTTOM ON TOP OF TREATMENT CELL (EL. 6942 TO EL. 6955)

FILL HOLES 3" x 8" NORTH & SOUTH WALLS ALL 3 LEVELS



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Shaw Environmental, Inc.

MULTIPLE PERMEABLE REACTIVE BARRIER MORTANDAD CANYON

PROFILE, GATE CROSS SECTION AND SAMPLING/MONITORING PLAN

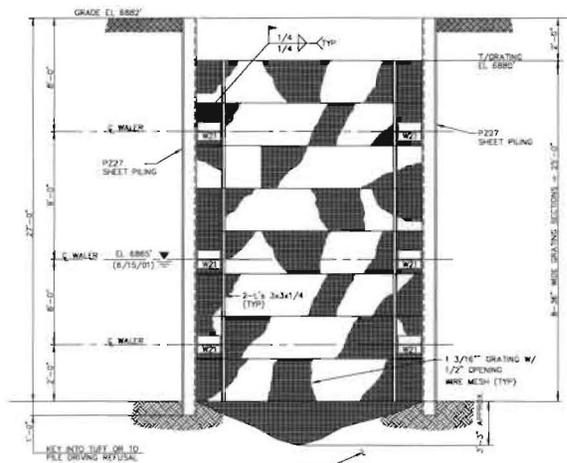
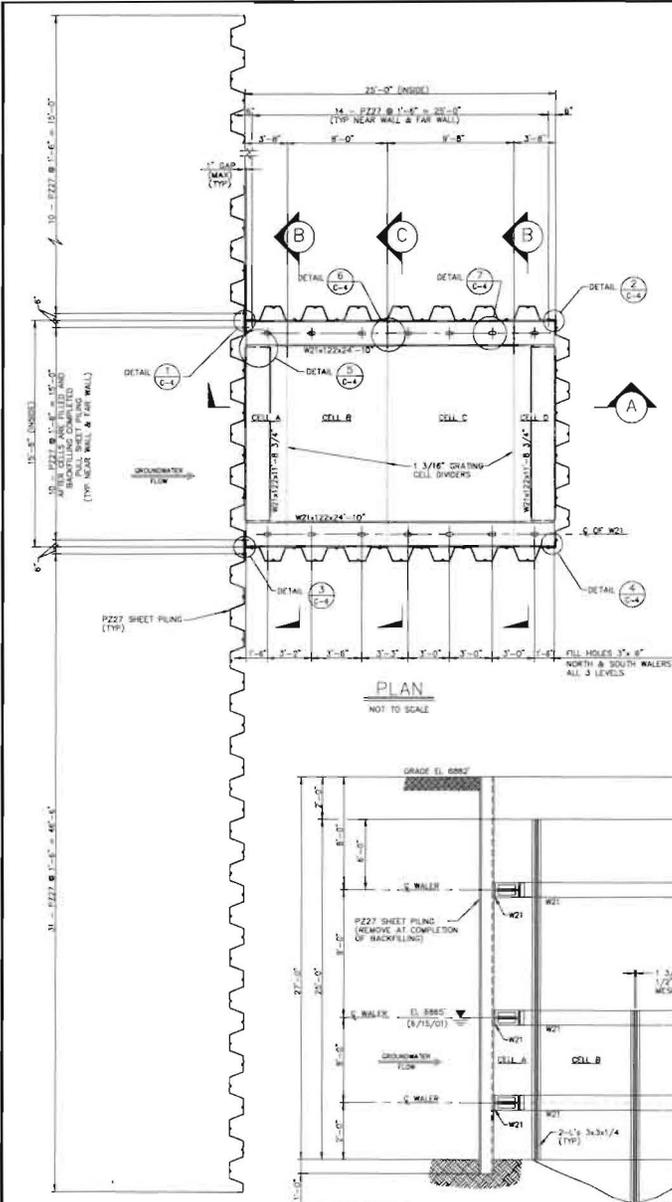
LOS ALAMOS

LOS ALAMOS NATIONAL LABORATORY
LOS ALAMOS, NEW MEXICO 87545

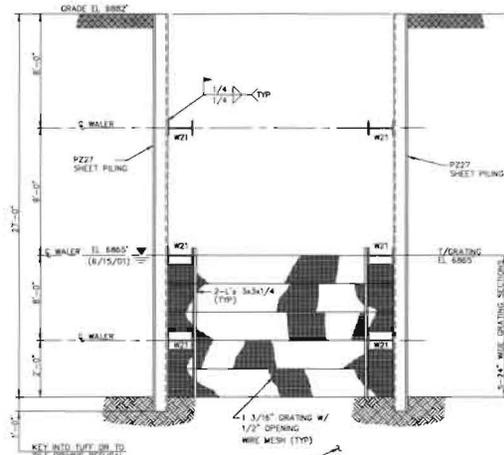
TA-5

DESIGNED	P. INGERSALL	8/30/02	CHECKED	R. E. CHAN	8/30/02	APPROVED	J. KAGITCIBASI	8/30/02
DRAWN	A. SMITH	8/30/02	SUBMITTED	S. DEB BARRIS	8/30/02	SHEET NO.	3	REVISION NO.
PROJECT ID	826732		DRAWING NO.	826732-D1		C2	OF	5
								0

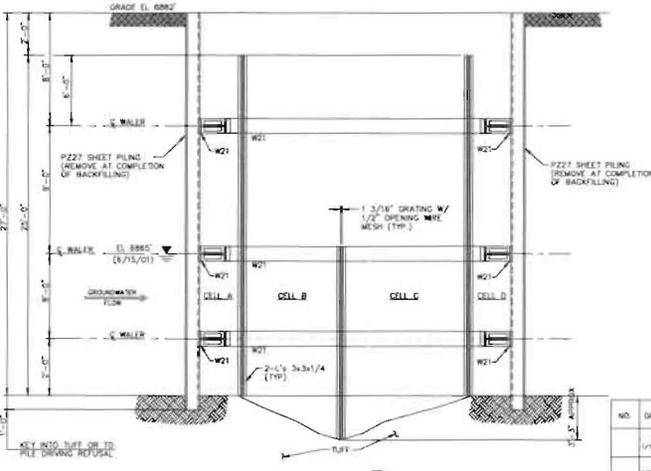
NO.	DATE	BY	CHKD	APP	REVISIONS	
1	8/30/02	ZC	JG	EA	SOB	AS-BUILTS - CHANGES ON SHEET 5
2	8/30/02	ZC	JG	EA	SOB	AS-BUILTS



SECTION (B)
NOT TO SCALE
(TYP 2 PLACES)



SECTION (C)
NOT TO SCALE



SECTION (A)
NOT TO SCALE

GENERAL NOTES

- FABRICATE AND ERECT ALL WORK IN ACCORDANCE WITH AMERICAN INSTITUTE OF STEEL CONSTRUCTION, INC. (AISC) SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS - ALLOWABLE STRESS DESIGN AND PLASTIC DESIGN, AND THE CODE OF STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES.
- PERFORM ALL WELDING IN ACCORDANCE WITH AMERICAN WELDING SOCIETY (AWS) D11.1, STRUCTURAL WELDING CODE-STEEL.
- STRUCTURAL STEEL: ASTM A36
- WELDING ELECTRODES: AWS A5.1 OR A5.5 E70XX
- SHEET PILING: P2-27 ASTM A328 DR EQUAL
- SHEET PILING JOINTS SHALL BE COATED WITH ANOKA ULTRA SEAL A-50 WATERSTOP
- GRATING SHALL BE RECTANGULAR WELDED STEEL GRATING, NON-REVERSIBLE TYPE V, WITH 1-1/4" x 3/16" BEARING BARS ON 1 3/16" CENTERS AND CROSSBARS ON 4 INCH CENTERS W/ 1/2" OPENING WIRE MESH, 1/16" WIRE, OVER GRATING.
- REACTIVE CELL (GATE) MATERIAL DESCRIPTION:
CELL A - FILTERATION GRAVEL (LAWN ROCK)
CELL B - MINERAL APATITE (PHOSPHATE PEBBLE)
CELL C - BIO-BARRIER (FICHA SHELLS & COTTON SEEDS)
CELL D - DRUSHED LIMESTONE

STEEL SHEET PILE CONSTRUCTION FOR THE GATE/CELL

- THE STEEL SHEET PILE SHALL BE DRIVEN AT THE LOCATION AS SHOWN ON THIS DRAWING, PROVIDED THAT IF HAS SUFFICIENT WORKSPACE FOR THE INSTALLATION OF REACTOR CELL. AN ALTERNATIVE LOCATION MAY BE USED TO INCREASE WORKSPACE AS NEEDED.
- STEEL SHEET PILING FOR TEMPORARY SHEET PILING SHALL BE NEW OR LIKE-NEW CONFORMING TO THE REQUIREMENTS OF ASTM A328. THE PILING SECTION SHALL BE P2-27 OR EQUAL. SHEETING EXHIBITING VARIATIONS BEYOND TOLERANCE LIMITS WILL BE CONSIDERED COUNTERED AND SHALL NOT BE USED IN THE WORK.
- ALL SHEETING SHALL BE TIGHT AND CONTINUOUS, AND DRIVEN VERTICALLY IN PLACE BY MEANS OF STEAM, VIBRATORY, OR PNEUMATIC HAMMERS, TO THE DEPTH AS SHOWN ON THIS DRAWING. ALL SHEETING SHALL BE CONSTRUCTED IN ACCORDANCE WITH USGS MODERN PRACTICE WITH EACH PILE INSTALLED VERTICALLY AND PROPERLY INTERLOCKED WITH ADJACENT PILES FOR ITS ENTIRE LENGTH. VERTICAL ALIGNMENT OF EACH PILE OR PILE GROUP SHALL BE MAINTAINED WITHIN TWO (2) PERCENT OF ITS LENGTH DRIVEN BELOW GRADE.
- THE CONTRACTOR SHALL RECORD THE PENETRATION INTO EXISTING GROUND OF EVERY DRIVEN SHEETING, SINGLE OR GROUP OF SHEETING IF MULTIPLE SHEETS ARE DRIVEN AT ONE TIME. THE RECORDS SHALL INCLUDE DRIVING EQUIPMENT, VIBRATORY PRESSURE AND FREQUENCY APPLIED, THE RATE OF PENETRATION, LOCATION OF THE SHEETING, ELEVATION OF EXISTING GRADE, ACTUAL DEPTH OF PENETRATION, AND OTHER PERTINENT DATA. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DOCUMENTING THE INSTALLATION OF THE WALLS.
- UPON COMPLETION OF REACTOR CELL, THE CONTRACTOR SHALL REMOVE THE UPSTREAM AND DOWNSTREAM SHEET PILES OF CELL TO ALLOW THE GROUNDWATER FLOW THROUGH.
- SHEET PILE INTERLOCK JOINT SEAL APPLICATIONS:
 - THE SHEET PILE SHALL BE PLACED ON A LEVEL FIRM GROUND WITH THE INTERLOCK FACED UP. A STRIP OF TAPE ON BOTH OPEN ENDS WILL BE REQUIRED TO PREVENT A-50 FROM RUNNING OUT.
 - A LAYER OF A-50 (ANOKA ULTRA SEAL) IS POURED DIRECTLY INTO THE INTERLOCK AND ALLOWED TO CURE.
 - A PAINTBRUSH CAN BE USED TO APPLY A-50 UNIFORMLY IN 3 TO 4 MM THICK ALONG THE ENTIRE LENGTH OF THE INTERLOCK.
 - AFTER POURING, ALL SHEET PILE SHALL BE COVERED WITH PLASTIC SHEET OR BE PLACED INDOOR DURING THE CURING PROCESS TO PREVENT PREMATURE EXPANSION OF THE HYDROPHILIC COMPONENT.
 - AFTER CURING, THE SHEET PILE CAN BE JOINTED AND PAIRED PRIOR TO INSTALLATION ON THE SAME DAY.

[Signature]
7/3/02
Professional Engineer
State of New Mexico
1988



MULTIPLE PERMEABLE REACTIVE BARRIER MORTANDAD CANYON

DATE AND FUNNEL PLAN AND SECTIONS

NO.	DATE	BY	DES	CHKD	APP	REVISIONS
1/18/02	ZC	JG	EA	SDB	AS-BUILTS - CHANGES ON SHEET 5	
4/14/04	ZC	JG	EA	SDB	AS-BUILTS	

Shaw Environmental, Inc.

DESIGNED: F. INGLETTI 8/30/02
DRAWN: J. SCHMATTER 8/30/02
PROJECT ID: 826732

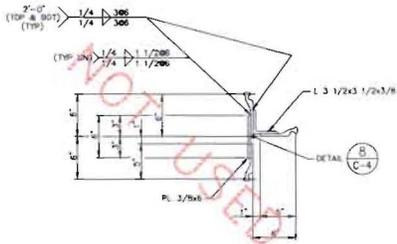
LOS ALAMOS

CHECKED: W. T. CHAN 8/30/02
SUBMITTED: S. DEN BARR 8/30/02
DRAWING NO: 826732-D3

TA-5

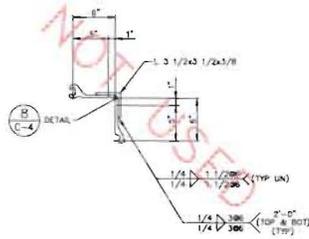
LOS ALAMOS NATIONAL LABORATORY
LOS ALAMOS, NEW MEXICO 87545

APPROVED: J. KASUBA 8/30/02
SHEET NO: 4 OF 5
REVISION NO: 0



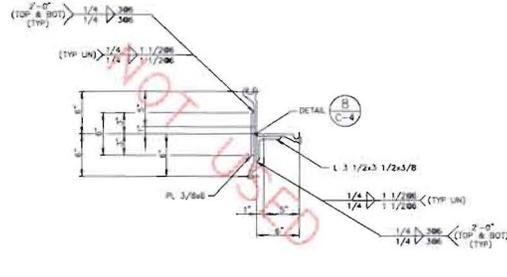
DETAIL 1
SCALE: 1 1/2" = 1'-0"

NOTE:
THREE-WAY PREFABRICATED
CORNER USED AT ALL CORNER
LOCATIONS (SEE DETAIL 8 BELOW)



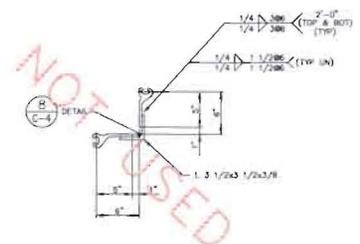
DETAIL 2
SCALE: 1 1/2" = 1'-0"

NOTE:
THREE-WAY PREFABRICATED
CORNER USED AT ALL CORNER
LOCATIONS (SEE DETAIL 8 BELOW)



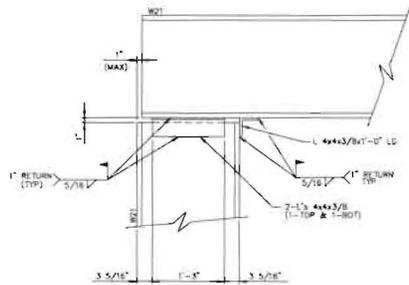
DETAIL 3
SCALE: 1 1/2" = 1'-0"

NOTE:
THREE-WAY PREFABRICATED
CORNER USED AT ALL CORNER
LOCATIONS (SEE DETAIL 8 BELOW)

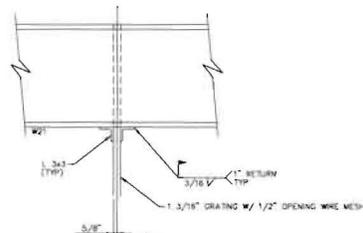


DETAIL 4
SCALE: 1 1/2" = 1'-0"

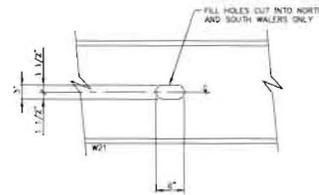
NOTE:
THREE-WAY PREFABRICATED
CORNER USED AT ALL CORNER
LOCATIONS (SEE DETAIL 8 BELOW)



DETAIL 5
SCALE: 1" = 1'-0"



DETAIL 6
SCALE: 1" = 1'-0"



DETAIL 7
SCALE: 1" = 1'-0"

"JOKER" PILE CONNECTOR



DETAIL 8
NOT TO SCALE



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**MULTIPLE PERMEABLE REACTIVE
BARRIER MORTANDAD CANYON**
GATE AND FLANGE DETAILS

TA- 5

NO.	DATE	BY	DES.	CHKD.	APP.	REVISIONS
1	9/30/02	ZC	JG	EA	SDB	AS-BUILTS - CHANGES ON SHEET 5
2	9/30/02	ZC	JG	EA	SDB	AS-BUILTS

DESIGNED	F. NEARDEL	9/30/02	CHECKED	W.T. DIAM	9/30/02	APPROVED	J. ALZUBA	9/30/02
DRAWN	J. ZIRIOWITZ	9/30/02	SUBMITTED	S. DEN MARKS	9/30/02	SHEET NO.	5	REVISION NO.
PROJECT ID	826732	DRAWING NO.	826732-D5	C4	5	0		

Appendix B

Photographs



View to north of PRB site prior to installation.



View to south of PRB site prior to installation.



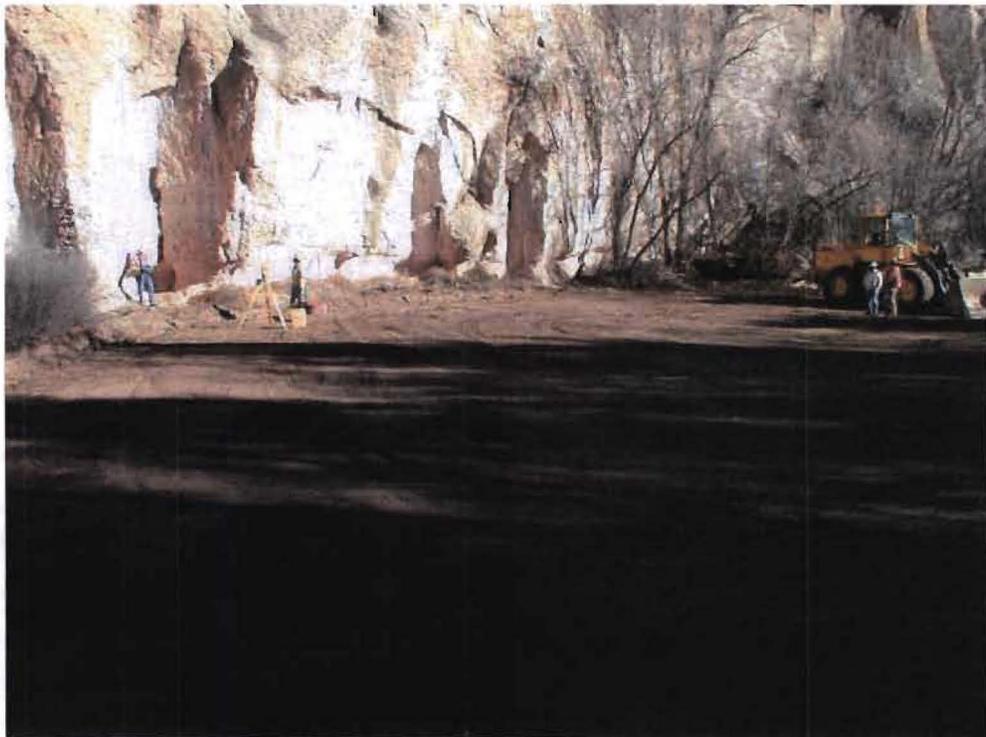
View looking west of PRB site prior to installation.



View to north of test wells installed during Phase I hydrogeologic and geotechnical investigation.



Leveling site prior to installation.



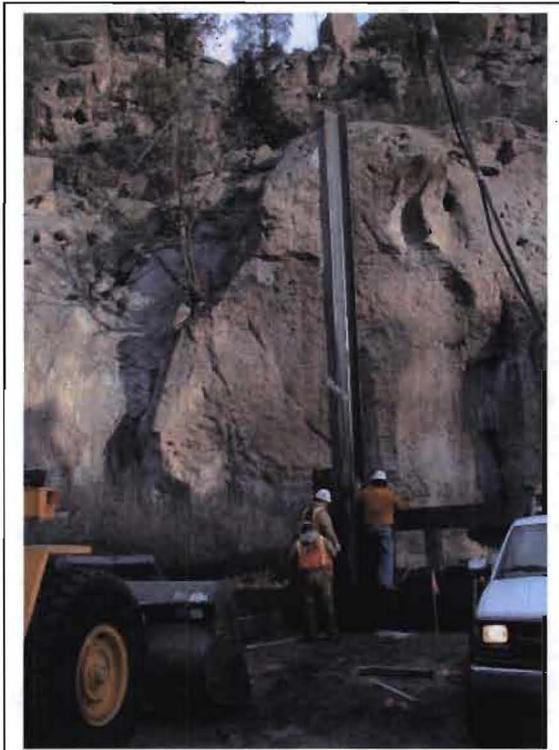
Leveling site prior to installation.



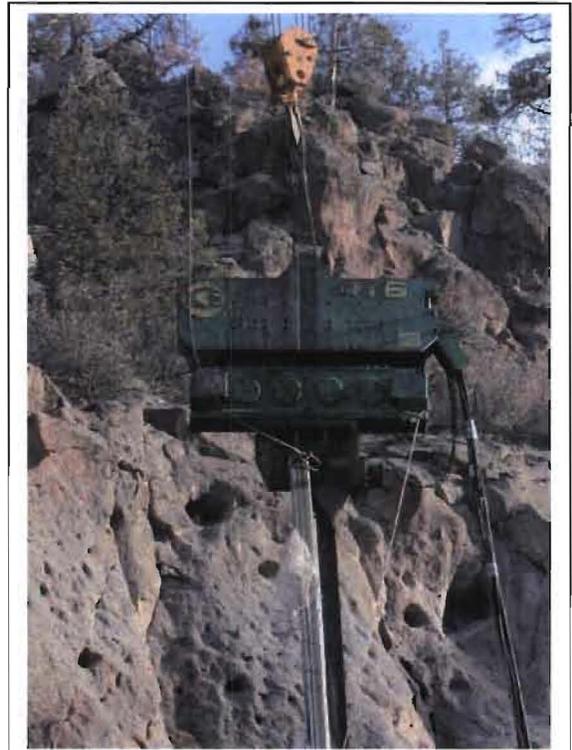
Leveling site prior to installation.



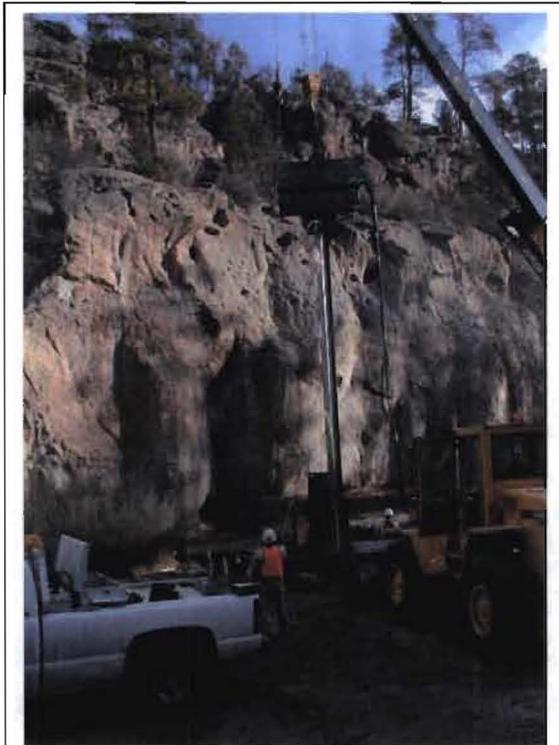
Setting gate template.



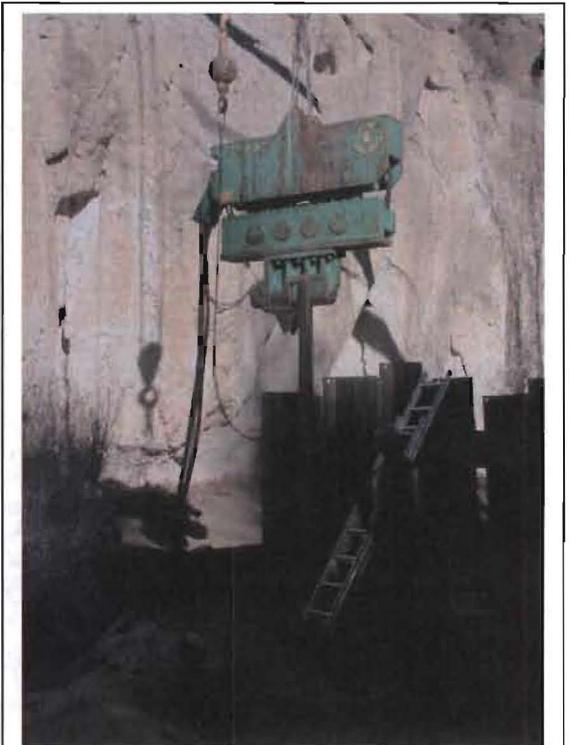
Positioning of first sheet pile.



Vibro hammer driving pile.



Driving first sheet pile.



Driving sheet pile.



Gate sheetpiling driven to approx 20 feet below grade.



Driving sheetpiles to refusal.



Gate sheetpiling.



Several gate sheetpiles driven to refusal.



Sheetpiling with tape over water seal.



Excavating bentonite key.



Installing first waler at 9 feet below grade.



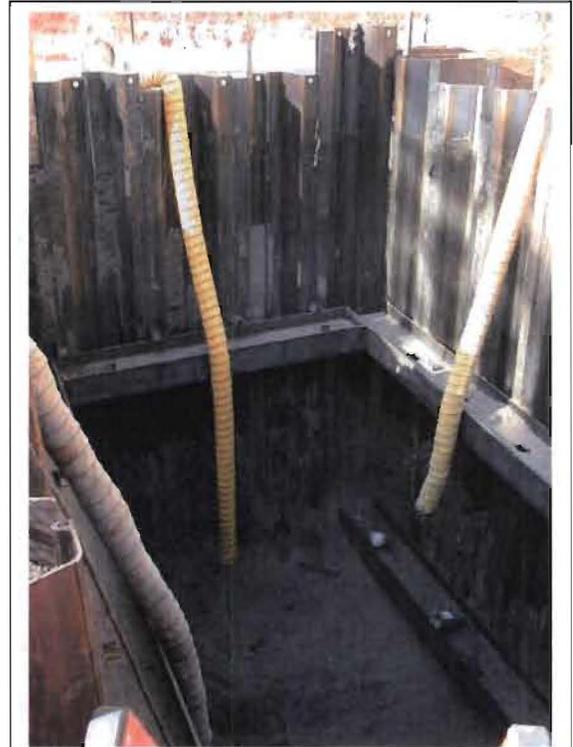
Placement of eastern waler at 9 feet.



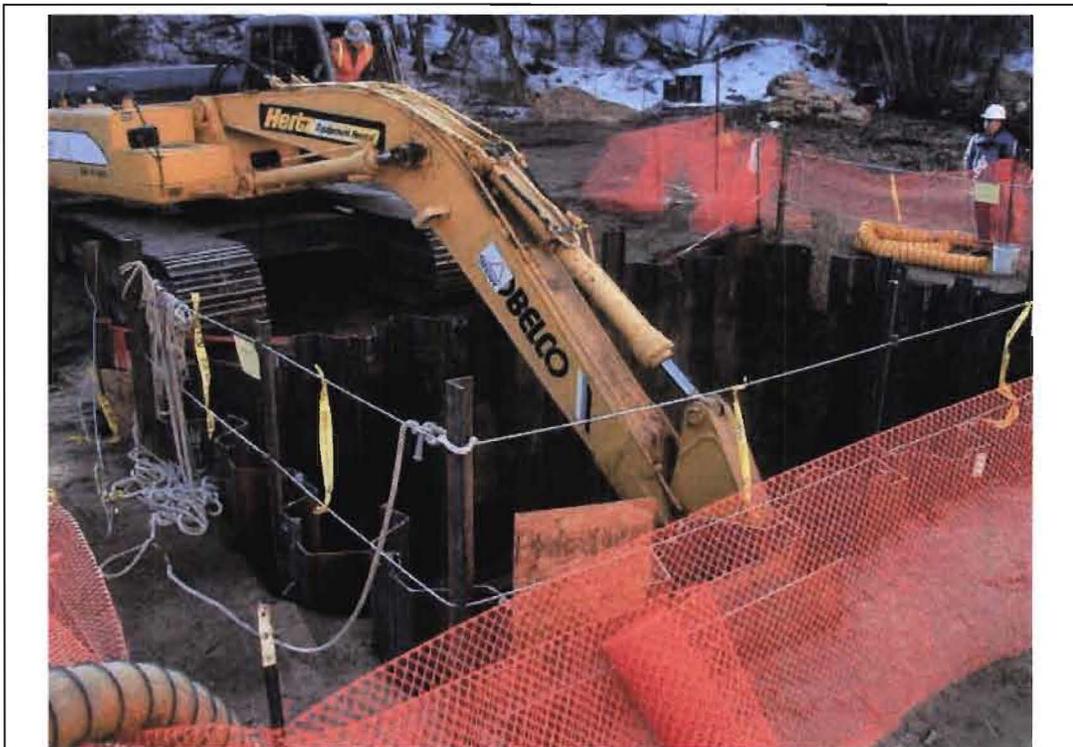
Installation of first waler complete.



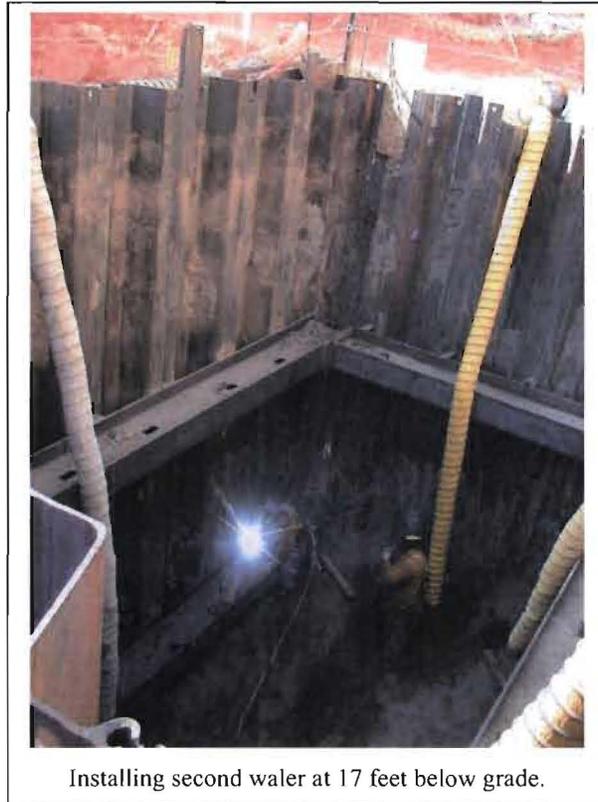
Excavating to 18 feet below grade.



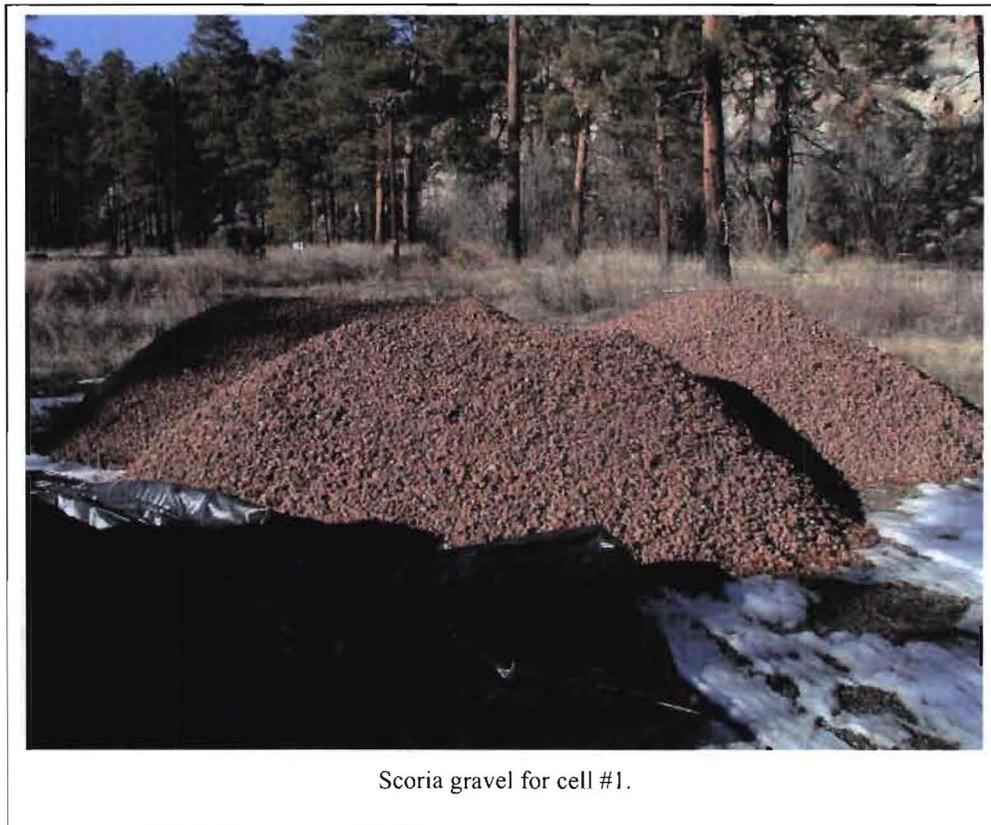
Excavation ventilation equipment.



Excavating prior to emplacement of second waler at 18 feet below grade.



Installing second waler at 17 feet below grade.



Scoria gravel for cell #1.



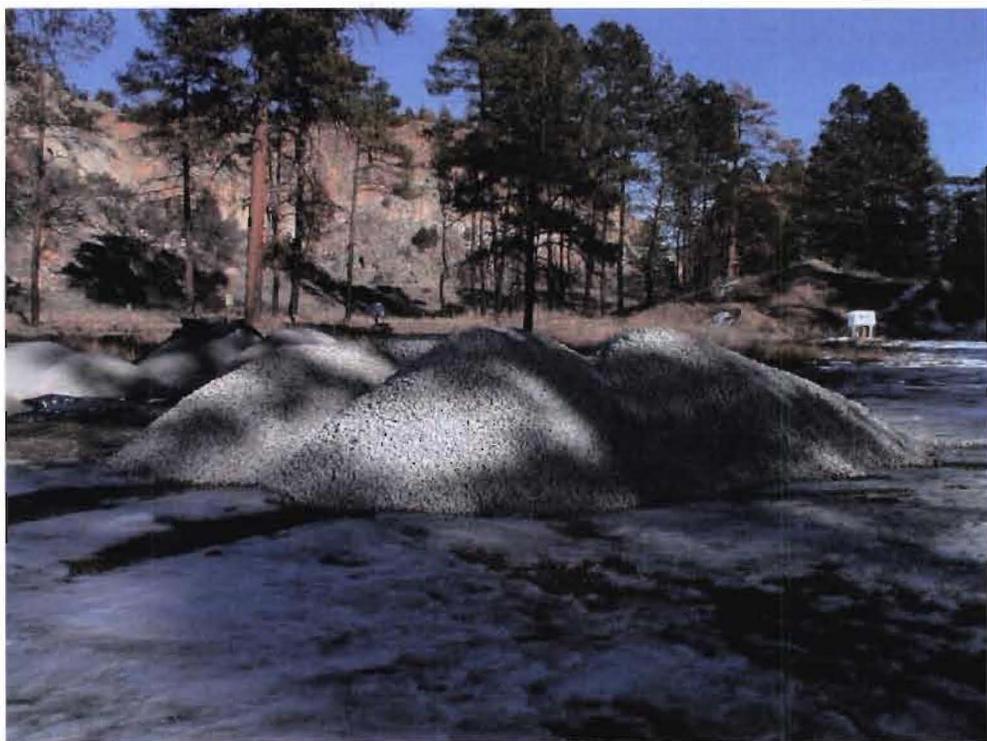
Mineral apatite for cell #2.



Cotton seed meal for cell #3.



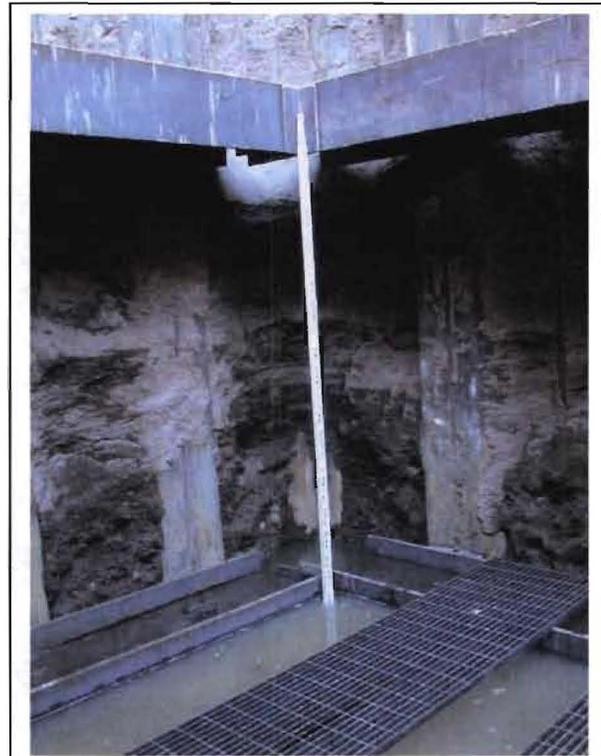
Pecan shells for cell #3.



Limestone gravel for cell #4.



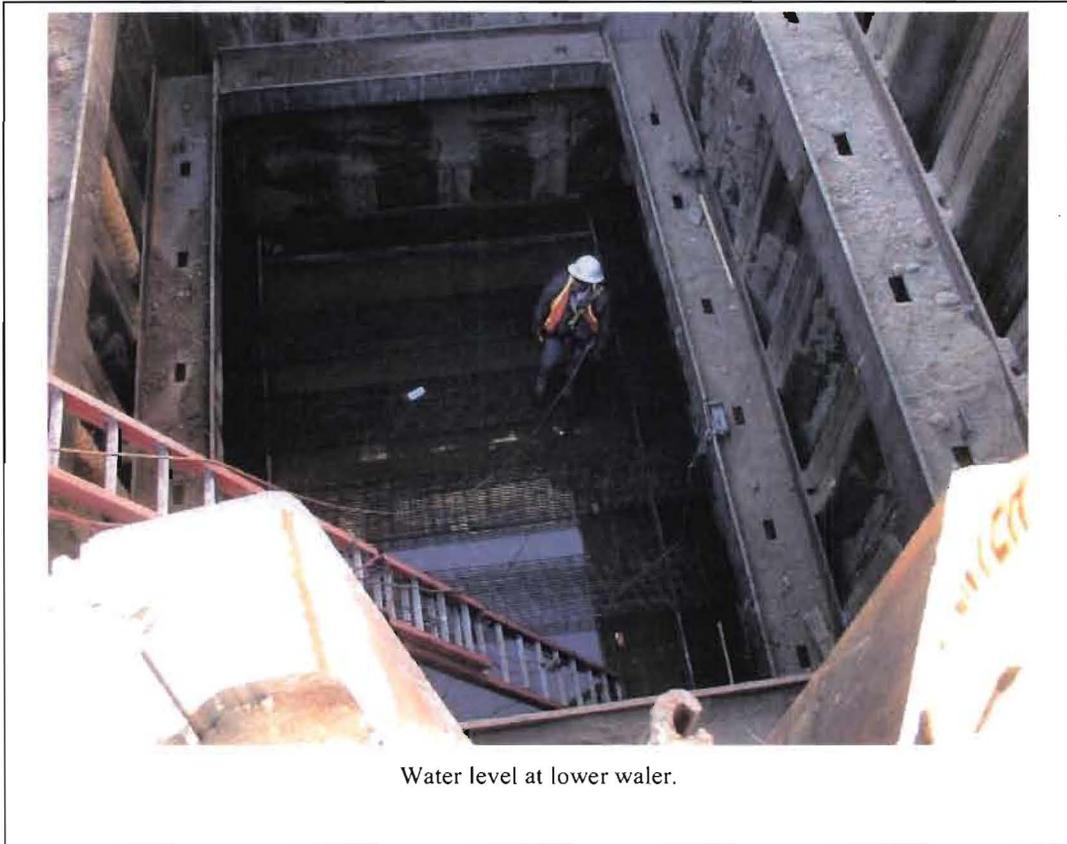
1st and 2nd walers at NE corner.



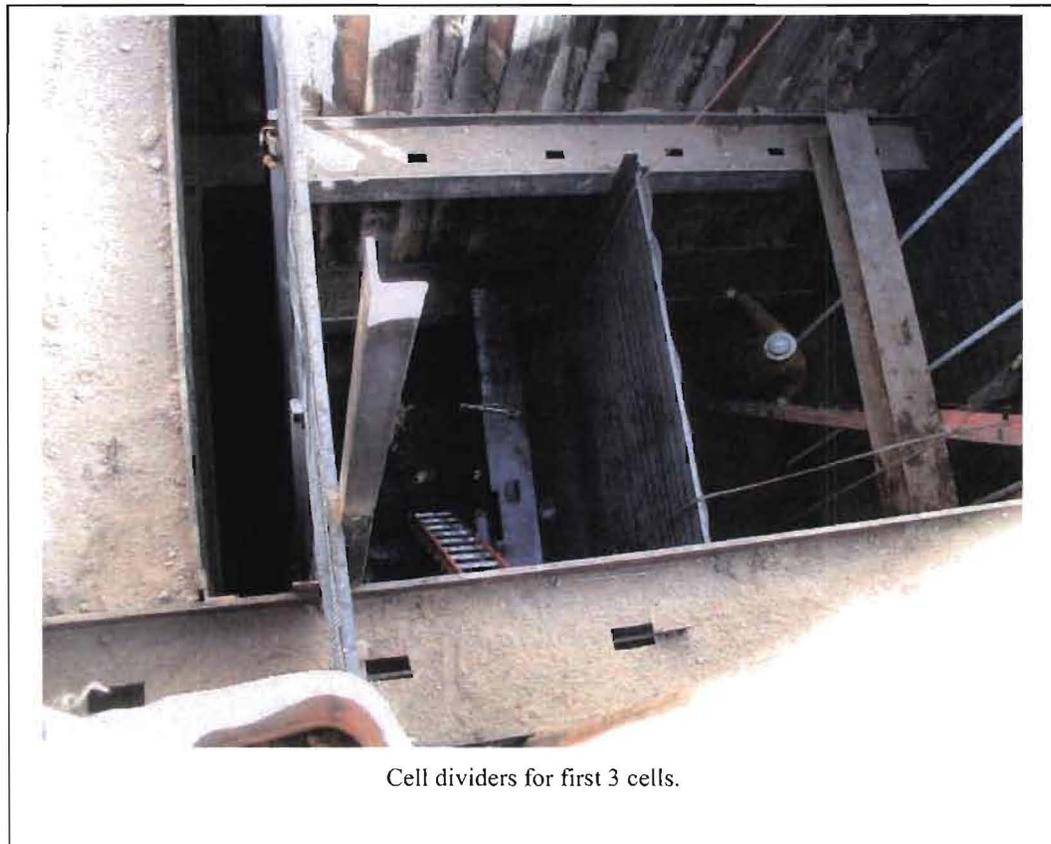
Elevations of 3rd and 2nd waler in NW corner.



Elevation of groundwater and water at NW corner of gate.



Water level at lower water.



Cell dividers for first 3 cells.



Monitoring ports in the first cell. (scoria).



Installation of apatite rock into second cell.



Installation of apatite rock into second cell.



Installation of apatite rock into second cell.



Leveling of apatite media in second cell.



Monitoring ports in the second cell (apatite).



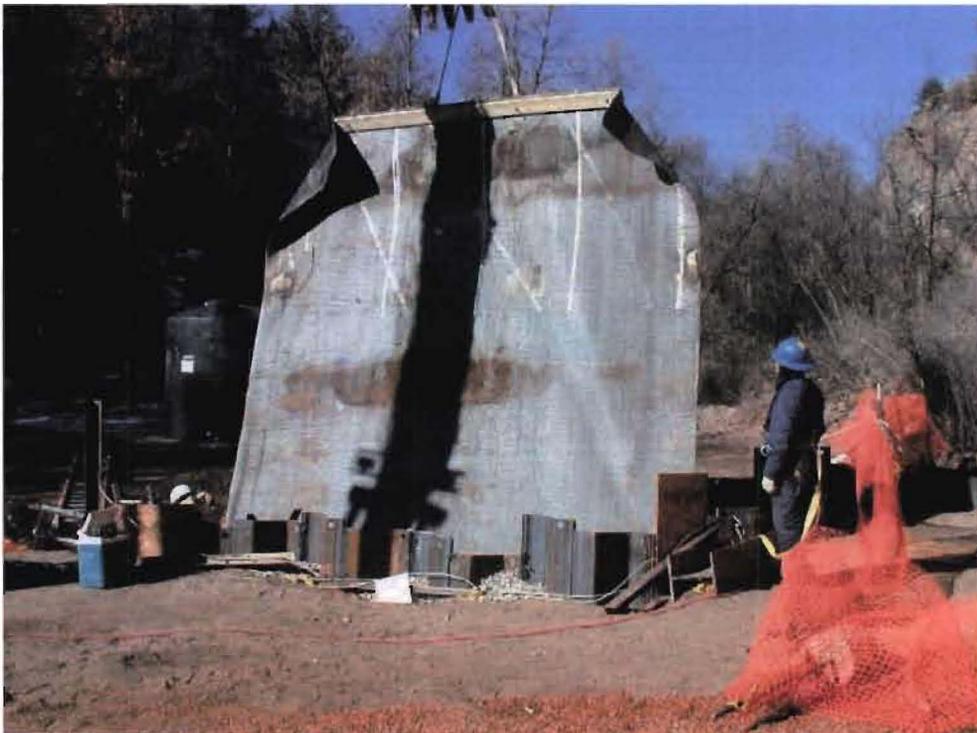
Placement of biobarrier media in the third cell.



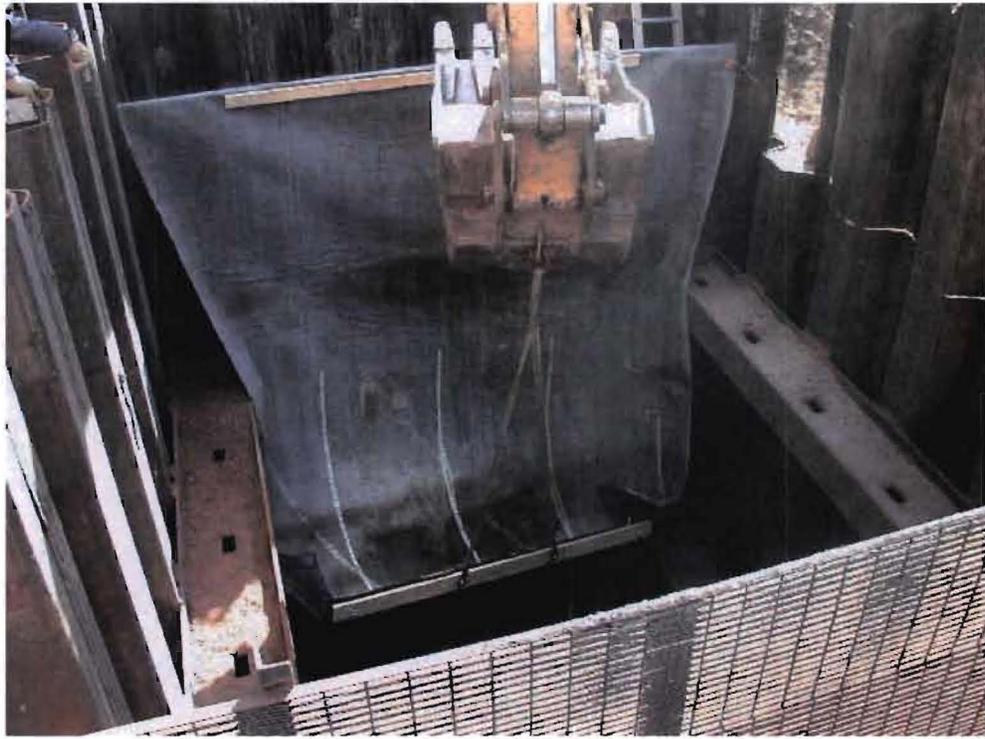
Installation of biobarrier material into third cell..



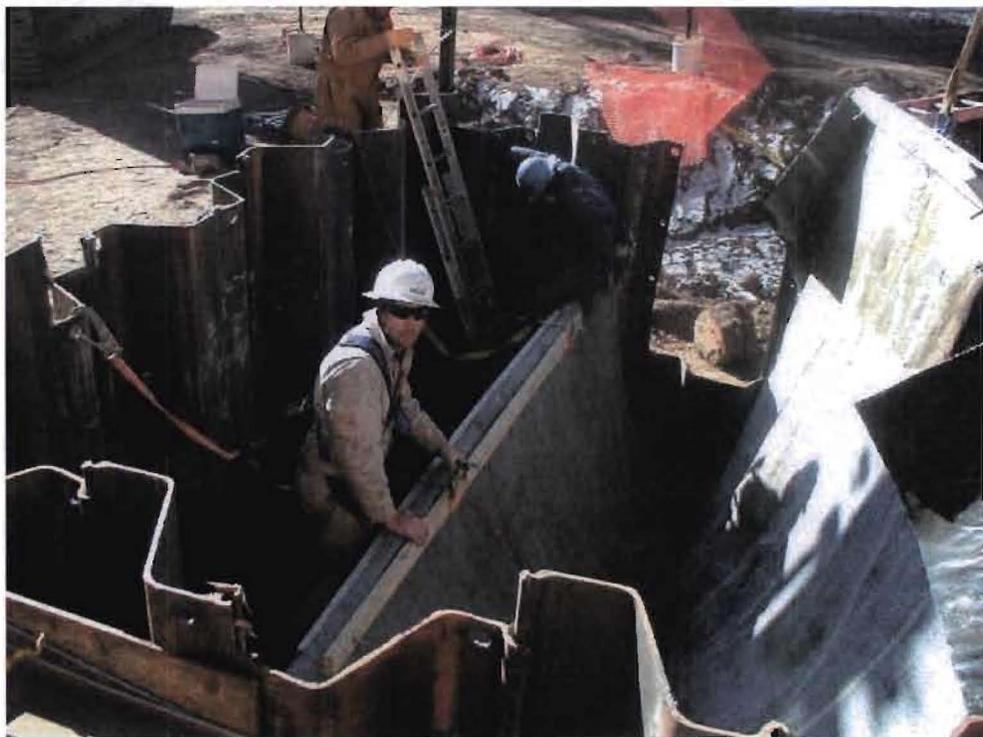
Installation of limestone gravel into fourth cell.



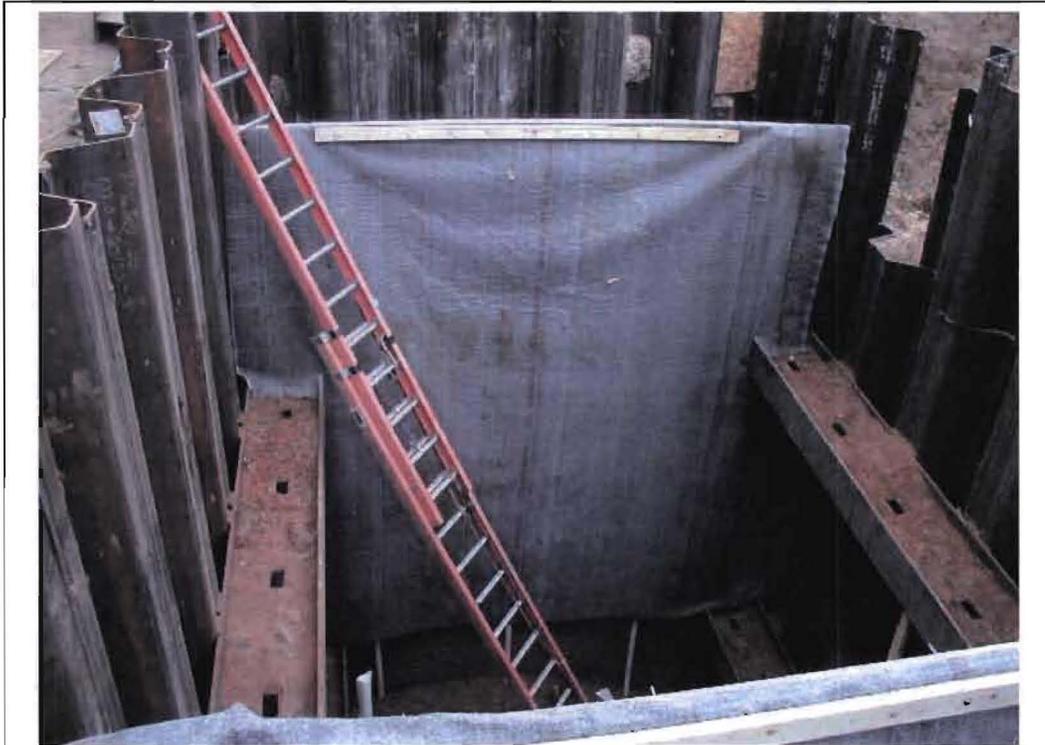
Installation of geosynthetic clay liner.



Installation of geosynthetic clay liner into cell divider.



Securing geosynthetic clay liner to cell divider.



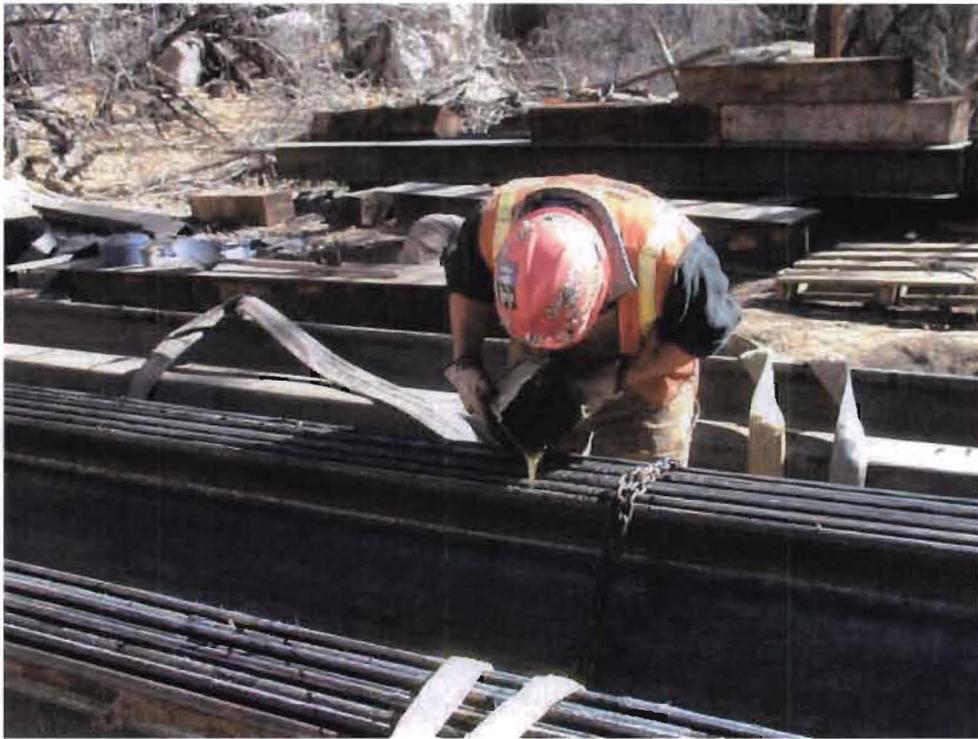
Geosynthetic clay liner installed onto grating between 3rd and 4th cells.



Cell one with lava rock (scoria) and geosynthetic clay liner, water sampling ports (right), and solid media sampling port (back).



Cell four with limestone gravel and geosynthetic clay liner, water sampling ports (right and left), and solid media sampling port (back).



Reapplying water sealant prior to placement in sheetpiling for funnel.



Northern funnel sheet piling prior to cut off; note sampling ports in background.



Northern funnel sheet piling after cut off; note sampling ports and surface water channel in background.



Southern funnel sheet piling after cut off; note PRB in background.



Notch in sheetpiling for stream channel on south side of PRB.



Stream channel on south side of PRB.



Final site restoration.



Final site restoration.



West view of drill rig in position at monitor well #1 (upgradient).



East view of channel bridge used for crossing drill rig.



Drill crew conducting fire prevention measures prior to drilling monitor well #1.



Drilling monitor well #1, the upgradient well.



Drilling monitor well #1, the upgradient well.



Drilling monitor well #2, the downgradient well.



Drilling monitor well #2, the downgradient well.



Drilling monitor well #3, 50 feet downgradient of the PRB.



Drilling monitor well #4, 100 feet downgradient of the PRB.



West view of site with completed monitor well #4 in forefront.



Northwest view of security fence surrounding PRB.



Southwest view of security fence surrounding PRB.



East view of the PRB.