Appendix A

Borehole Logs

					BOR	EHOLE LOG NAT01-0548
	ECT _				ATER	BIT SIZE(S) (IN)
	NAT					DRILLING METHOD AUGER/ROTARY
	NUMB					SAMPLING METHOD
			r) <u>5889</u>			WATER LEVEL (FT BTOC) 8.05 on 06/17/1986
			11062	97.08		LOGGED BYDupuy, J.
HOLE	DEPTI	1 (FT)	23.00	21- 00	0144/4000	REMARKS
DATE	DRILL	ED	5/09/1980	o to Ut	6/11/1986	
DEPTH (FT BGL)	ELEV. (FT NGVD)	BLOW COUNTS	SAMPLE ID.	EXTENT	GRAPHIC LOG	LITHOLOGIC DESCRIPTION
	5290— 5290— 5285— 5280— 5275— 5270—	0	15			10-13 ft. SANDY GRAVEL (GW-SW), with some cobbles and clay, becomes mostly gravel at depth. 13-19 ft. GRAVEL (GW), some sand with cobbles, river alluvium. 19-23 ft. BRUSHY BASIN MEMBER OF MORRISON FORMATION: SILTSTONE; bedrock with some mudstone, reddish-brown in color.
Fr.	QC	tec	-er	_ = U	J.S. DEPA GRAND JL	ARTMENT OF ENERGY UNCTION OFFICE, COLORADO PAGE 1 OF 1 08/03/2001

	MONITORIN	G WELL C	OMPLET	TION LOG NAT01-DM1
PROJECT UMTRA LOCATION _, CO SITE NATURITA WELL NUMBER [NORTH COOR EAST COORD HOLE DEPTH WELL DEPTH	. (FT) <u>11083</u> (FT) 8.00	973.91 DATE DRILLED 07/06/1999 381.41 SURFACE ELEV. (FT NGVD) 5307.58 TOP OF CASING (FT) 5310.81 MEAS. PT. ELEV. (FT) 5310.81
	WELL INSTALLAT		RVAL (FT)	SLOT SIZE (IN) 0.020
SURFACE CASING: BLANK CASING: WELL SCREEN: SUMP/END CAP: SURFACE SEAL: GROUT: SEAL: UPPER PACK: LOWER PACK:		-3.23 2.67 7.67 0.0 0.5	to 2.67 to 7.67 to 8.0 to 0.5 to 2.0	
DEPTH (FT BGL) ELEV. (FT NGVD) BLOW COUNTS	E D.	L DIAGRAM	GRAPHIC 6 LOG	LITHOLOGIC DESCRIPTION
5305		Bentonite Pellets PVC Sch 40 10-20 Silica Sand 0.020" Slotted PVC		
-10				Total Depth 8.0 ft.
mactec	ers U.S. D	EPARTME IND JUNCTION	ENT OF E	ENERGY PAGE 1 OF 1 08/10/2001

PROJECT UMTRA LOCATION , CO SITE NATURITA . WELL NUMBER .	E	ORTH COORD. (FT) 58939 AST COORD. (FT) 1106194 IOLE DEPTH (FT) 14.50 VELL DEPTH (FT) 14.50	1.84 DATE DRILLED 10/18/1998 8.83 SURFACE ELEV. (FT NGVD) 5287.99 TOP OF CASING (FT) 5289.68 MEAS. PT. ELEV. (FT) 5289.68 SLOT SIZE (IN) 0.030
SURFACE CASING: BLANK CASING: WELL SCREEN: SUMP/END CAP: SURFACE SEAL:	WELL INSTALLATION 2 in. PVC Sch 40 2 in. Slotted PVC 2 in. PVC Sch 40	ON INTERVAL (FT) -1.69 to 9.17 9.17 to 14.17 14.17 to 14.5	BIT SIZE(S) (IN) 9.0 DRILLING METHOD AUGER SAMPLING METHOD DATE DEVELOPED WATER LEVEL (FT BGS)
GROUT: SEAL: UPPER PACK:	Bentonite Chips	0.0 to 6.0	LOGGED BY Holmes REMARKS
POMENTH (FT BGL) ELEV. ELEV. BLOW COUNTS	O-20 Silica Sand WELL WELL	6.0 to 14.5 DIAGRAM DIAGRAM DIAGRAM	LITHOLOGIC DESCRIPTION
- 5285- - 5280- - 5280- - 5275-		Bentonite Chips PVC Sch 40 10-20 Silica Sand PVC Sch PVC Sch	Total Depth 14.0 ft

LOCATION SITE NAT	, CO URITA	GROUN		ATER	NORTH EAST C	OORD.	(FT) _ FT)	1100 18.00)	SUR TOP	E DRILLED FACE ELEV OF CASING	(FT NGVD (FT) 528) <u>5287.33</u> 9.42
WELL NUME	WELL NUMBER <u>MAU02-1</u> WELL INSTA				WELL DEPTH (FT) <u>16.83</u> _ATION INTERVAL (FT)						S. PT. ELEV T SIZE (IN)	'. (FT) <u>52</u> 0.030	89.42
SURFACE CASING: BLANK CASING: WELL SCREEN: SUMP/END CAP: SURFACE SEAL: GROUT: SEAL: UPPER PACK: LOWER PACK:		0.5 in. 0.5 in.	PVC S Slotte PVC S nt nite Ch	Sch 80 d PVC Sch 80 lips	-2.09 15.82 16.32 0.0 11.67		to 16.83 to 0.5		32 S. 33 D. W. L(BIT SIZE(S) (IN) 9.0 DRILLING METHOD AUGER SAMPLING METHOD DATE DEVELOPED WATER LEVEL (FT BGS) LOGGED BY Holmes REMARKS Cluster of 3 casings: MAU02-1 casing and screen depths provided; MAU02-2 casing is from to 10.5 ft. and screened to 11.0 ft.; MAU02-3 casing i			casing is from 0
DEPTH (FT BGL) ELEV. (FT NGVD)	BLOW	SAMPLE ID.	EXTENT	WEL	L DIAGR	RAM	GRAPHIC LOG			om 0 to 8.9	Ift. and scre	ened to 9.41	
5285- - -5- -5- 10- - 15- - 						Bentonite Chips Bentonite Chip			0-18 ft.	ALLUVIUM	Total Dep	ıth 18.0 ft.	
	_										- 0		

PROJ	TION _	, co	GROUN	ID W	ATER	EAS	TH COOR! T COORD. E DEPTH ((FT)	58937 10636 3.00	8.48 S	ATE DRILLED 10/18/1998 URFACE ELEV. (FT NGVD) _ OP OF CASING (FT) 5289.40	5287.33 0
	NUMB	ER N	MAU02-2				L DEPTH			M	EAS. PT. ELEV. (FT)5289.4	
			WELL	_ ins	TALLA	ION	INTE	ERVAL (F	T)		LOT SIZE (IN) 0.030 IT SIZE(S) (IN) 9.0	
SLAN VELL	ACE CASI K CASI . SCREE	NG: En:	0.5 in.	Slotte	Sch 80 ed PVC		-2.07 10.5	to	10.5 11.0	SAMPLIN	METHOD AUGER G METHOD VELOPED	
SURF	/END C ACE SE		Cemer		Sch 80		11.0 0.0		11.17 0.5	WATER L	EVEL (FT BGS) BY Holmes	
SROL SEAL	:		Benton	ite C	hips		9.75	to	10.0	REMARK	S Cluster of 3 casings: MAU	
	R PACK ER PAC		10-20	Silica	Sand		10.0	to	18.0	to 15.82 ft	n depths provided; MAU02-1 cas and screened to 16.32 ft.; MAU	
- <u>`</u>	.Q	_S	<u>Ö</u>	E				ဋ		from 0 to 8	8.91 ft. and screened to 9.41 ft.	
DEPTH (FT BGL)	ELEV. (FT NGVD)	BLOW	SAMPLE	EXTENT	WEI	L DIA	GRAM	GRAPHIC		LITI	HOLOGIC DESCRIPTION	
	-		**				- Cement		0-18	Bft. ALLUVIL	JM .	•
-)) D	:			
-	5285—							, O. (3			
_] -					-	Bentonite Pellets	° (∑ °				
5 –] -							ο. Ο Ο (·:			
J	_							o. (j.o				
-	_						#2	p 0				
_	5280-						PVC Sch 80	o. V. V.	<u>3</u> ∶			
_	_					-	10-20 Silica Sand	ο. 0				
10-	-					-	Bentonite Chips	, O. (j			
-	-						0.03" — Slotted PVC	. B.				
-	-					8	PVC	0 c	3			
	5275—							° () °				
-	-							0.0	<u>:</u>			
15-	-							, O. (
-	ļ .) .p. N				
	5270-							. O .	3			
	3270_							• : (\ ; •	:		Total Depth 18.0 ft.	
											τοιαι Deptit 10,0 tt.	

JRFACE CASING: LANK CASING:	IAU02-3 WELL INSTALLAT	HOLE DEPTH (WELL DEPTH (FT) <u>18</u>	.00	TOP OF CASING (FT) 5289.40		
JRFACE CASING: LANK CASING:	WELL INSTALLAT	· ·		i8	MEAS, PT. ELEV. (FT) 5289,40		
ANK CASING:		ION INTE	RVAL (F		SLOT SIZE (IN) 0.030 BIT SIZE(S) (IN) 9.0		
ELL SCREEN: JMP/END CAP: JRFACE SEAL: ROUT: EAL:	0.5 in. PVC Sch 80 0.5 in. Slotted PVC 0.5 in. PVC Sch 80 Cement	-2.07 8.91 9.41 0.0	to 9 to 9 to 0	.41 SAMP .58 DATE .5 WATE	SAMPLING METHOD DATE DEVELOPED WATER LEVEL (FT BGS) LOGGED BY Holmes REMARKS Cluster of 3 casings: MAU02-3 casing and screen depths provided; MAU02-1 casing is from to 15.82 ft. and screened to 16.32 ft.; MAU02-2 casing		
PPER PACK: OWER PACK:	10-20 Silica Sand	6.5		and so			
(FT BGL) ELEV (FT NGVD) BLOW COUNTS	SAMPLE ID. EXTENT AREA THE SAMPLE ID.	L DIAGRAM	GRAPHIC LOG	from 0	O to 10.5 ft. and screened to 11.0 ft. LITHOLOGIC DESCRIPTION		
5285—		#3 PVC Sch 80 0.03" Slotted PVC 10-20 Silica Sand		0-18 ft. ALL	Total Depth 18.0 ft.		

URFACE CASING: ILANK CASING: 2 in. VELL SCREEN: 2 in. UMP/END CAP: 2 in. URFACE SEAL: BROUT: EAL: Ben UPPER PACK:	PVC Sch 40 Slotted PVC PVC Sch 40 tonite Chips	-2.35 2.17 9.17 0.5 1.5 LL DIAGRAM Bentonite Chips	to 2 to 9 to 9 to 1	.17 DRILI .17 SAMI .5 DATE WATI	SLOT SIZE (IN) 0.030 BIT SIZE(S) (IN) 10.0 LING METHOD AUGER PLING METHOD E DEVELOPED ER LEVEL (FT BGS) GED BY Holmes ARKS LITHOLOGIC DESCRIPTION
	EXTENT	Bentonite		0-9.5 ft. ALI	LITHOLOGIC DESCRIPTION
5280			,	0-9.5 ft. ALI	
5 - 5275		PVC Sch 40 10-20 Silica Sand 0.03" Slotted PVC			Total Depth 9.5 ft.

										LOG NAT01-MAU04
PROJE:	CT U		GROUN	ID WA		NORTH COORD.				DATE DRILLED 10/19/1998 SURFACE ELEV. (FT NGVD) 5278.76
SITE WELL	NATUR NUMBE		IAU04			HOLE DEPTH (10.50		TOP OF CASING (FT) 5280.56 MEAS. PT. ELEV. (FT) 5280.56
		· ·		INST	ALLAT		(FT) <u>10.50</u> ERVAL (FT)			SLOT SIZE (IN) 0.030
SURFACE CASING: BLANK CASING: WELL SCREEN: SUMP/END CAP: SURFACE SEAL: GROUT: SEAL:		G: N: .P:				-1.8 3.17 10.17	to to to	3.17 10.1 10.5	17 SAM 5 DATE WAT LOG	BIT SIZE(S) (IN) _ 9.0 LLING METHOD _AUGER IPLING METHOD _ E DEVELOPED
UPPER	PACK:		10-20 5		-	0.0 2.5	to to	2.5		ARKS
	····	T		Silica S	allu	2.5	ī	\neg)	
DEPTH (FT BGL)	(FT NGVD)	COUNTS	SAMPLE ID	EXTENT	WEL	L DIAGRAM	GRAPHIC			LITHOLOGIC DESCRIPTION
-5-	5275—					PVC Sch 40 10-20 Silica Sand 0.03" Slotted PVC			0-10.5 ft. A	Total Depth 10.5 ft.
m	xch	EC	er:	5 U		DEPARTM AND JUNCTION				

			MON	IITC	RIN					ION LOG NAT01-MAU05			
	CT L		GROUN	ID W	ATER	NORTI	H COORI COORD.	O. (FT)	5894 11063	07.28 DATE DRILLED 10/18/1998 34.48 SURFACE ELEV. (FT NGVD) 5286.95			
SITE	NATU	IRITA				HOLE	DEPTH (FT)	9.00	TOP OF CASING (FT) 5289.20			
VELL	NUMBI	ER _ N	IAU05			WELL DEPTH (FT) 9.00 TION INTERVAL (FT)				MEAS. PT. ELEV. (FT) 5289.20 SLOT SIZE (IN) 0.030			
:IIRF/	CE CA	SING	WELL	. INS	TALLA	FION	INTE	ERVAL	(FT)	BIT SIZE(S) (IN) 9.0			
BLAN	CASI	NG:	2 in. P				-2.25		8.17	DRILLING METHOD AUGER SAMPLING METHOD			
	SCREE END C.		2 in. Slotted PVC 2 in. PVC Sch 40			8.17 8.67		to to	8.67 9.0	DATE DEVELOPED			
	CE SE	AL:								WATER LEVEL (FT BGS)			
GROUT: SEAL:			Bentonite Chips			0.0		to	8.0	LOGGED BY Holmes REMARKS			
	R PACK R PACI		10-20 Silica Sand			8.0		to	9.0				
	<u>a</u>	တ	<u></u>		<u> </u>			O					
DEPTH (FT BGL)	₹ 5 1	BLOW	PLE	EXTENT	WE	LL DIAG	RAM	GRAPHIC	}	LITHOLOGIC DESCRIPTION			
ᄪᆫ	ELEV. (FT NGVD)	ᄪᅙ	SAMPLE ID	MA	T]		&-	'				
		+						ø. V.	Ç o	9 ft. ALLUVIUM			
								• 0					
1) ::	3				
	5285							о O.	\odot				
1	5265							$ \cdot $					
	_							0					
								0					
	_					—	Bentonite						
		ļ					Chips	0	1				
- 5 —	4							o.					
-	4				4		PVC Sch 80	. 0					
								0.0	٥				
4	5280-							3	3				
								. O:					
_	-						0.03"	• 🗘	•				
						•	Slotted PVC	0. 1					
4	-				· 1 - F	/	10-20 Silica		-	Totał Depth 9.0 ft.			
.							Sand			·			
10													
	ا												
.]	5275—									·			
1													

	MONITORIN	G WELL C	OMPL	ETION LOG NAT01-MAU06
PROJECT UMTRA LOCATION , CO SITE NATURITA WELL NUMBER N	GROUND WATER MAU06	NORTH COORD EAST COORD. HOLE DEPTH (WELL DEPTH)	(FT) 11 FT) 8.8	1106557.81 SURFACE ELEV. (FT NGVD) 5284.16 TOP OF CASING (FT) 5286.60
SURFACE CASING: BLANK CASING: WELL SCREEN: SUMP/END CAP: SURFACE SEAL: GROUT: SEAL: UPPER PACK: LOWER PACK:	WELL INSTALLAT 2 in. PVC Sch 40 2 in. Slotted PVC 2 in. PVC Sch 40 Cement Bentonite Pellets 10-20 Silica Sand	-2.44 3.5 8.5 0.0 0.67 2.16	to 8 to 8 to 0 to 2	SLOT SIZE (IN) 0 020
DEPTH (FT BGL) ELEV. (FT NGVD) BLOW COUNTS	SAMPLE ID. EXTENT MACHINE	LL DIAGRAM	GRAPHIC LOG	LITHOLOGIC DESCRIPTION
5280— — 5 — — 5 — — 5275— — 10—		PVC Sch 40 10-20 Silica Sand 0.020" Slotted PVC		O-8.83 ft. ALLUVIUM Total Depth 8.83 ft.
mactec	ers U.S.	DEPARTM RAND JUNCTION		OF ENERGY PAGE 1 OF 1 08/02/2001

	MONITORING	3 WELL C	OMPLE	TION LOG NAT01-MAU07
PROJECT UMTRA LOCATION , CO SITE NATURITA WELL NUMBER _ N		NORTH COORD EAST COORD. HOLE DEPTH (WELL DEPTH ((FT) <u>110</u> FT) <u>8.25</u>	06502.56 SURFACE ELEV. (FT NGVD) 5278.11 TOP OF CASING (FT) 5280.88 MEAS. PT. ELEV. (FT) 5280.88
CUDEACE CASINO	WELL INSTALLAT	ION INTE	RVAL (FT)	SLOT SIZE (IN) 0.020 BIT SIZE(S) (IN) 4.0
SURFACE CASING: BLANK CASING: WELL SCREEN: SUMP/END CAP: SURFACE SEAL: GROUT: SEAL: UPPER PACK:	2 in. PVC Sch 40 2 in. Slotted PVC 2 in. PVC Sch 40 Cement Bentonite Pellets	-2.77 2.92 7.92 0.0 0.5	to 2.9 to 7.9 to 8.2 to 0.5 to 2.0 to 8.2	SAMPLING METHOD DATE DEVELOPED WATER LEVEL (FT BGS) LOGGED BY Holmes/Rowland REMARKS
LOWER PACK:	10-20 Silica Sand	2.0		
DEPTH (FT BGL) ELEV. (FT NGVD) BLOW COUNTS	ᄪᆝᅜᅩᆝ	L DIAGRAM	GRAPHIC LOG	LITHOLOGIC DESCRIPTION
		PVC Sch 40 10-20 Silica Sand 0.020" Slotted PVC		0-2.5 ft. SILTY SAND (SM). 2.5-5 ft. GRAVEL (GW), some cobbles. 5-5.5 ft. SAND (SP) 5.5-6.17 ft. GRAVEL (GW), some small cobbles. 6.17-8 ft. BOULDERS and GRAVEL.
5270-			••••	8-8.25 ft. SAND (SW), some silt with large boulder@8.25 ft. Total Depth 8.25 ft.
-10-				
mactec	ers U.S.	DEPARTM AND JUNCTION		F ENERGY PAGE 1 OF 1 08/02/2001

	MONITORIN	G WELL C	OMPL	ETION L	OG NAT01-MAU08
	GROUND WATER				DATE DRILLED07/01/1999
LOCATION, CO_ SITE NATURITA		EAST COORD. HOLE DEPTH (.50	SURFACE ELEV. (FT NGVD) 5288.27 TOP OF CASING (FT) 5291.19
	MAU08	WELL DEPTH			MEAS. PT. ELEV. (FT) 5291.19
SURFACE CASING:	WELL INSTALLA	TION INTE	ERVAL (F	•	SLOT SIZE (IN) 0.020 BIT SIZE(S) (IN) 4.0
BLANK CASING:	2 in. PVC Sch 40	-2.92			LING METHOD HAMMER CASING ADVANCE
WELL SCREEN: SUMP/END CAP:	2 in. Slotted PVC 2 in. PVC Sch 40	6.17 11.17			PLING METHOD
SURFACE SEAL:	Cement	0.0			ER LEVEL (FT BGS)
GROUT:	D 1 11 01 1			_	GED BY Holmes/Rowland
SEAL: UPPER PACK:	Bentonite Chips	1.5	to 5	5.5 REM.	ARKS
LOWER PACK:	10-20 Silica Sand	5.5	to 1	1.5	
DEPTH (FT BGL) ELEV. (FT NGVD) BLOW COUNTS	SAMPLE ID. EXTENT	LL DIAGRAM	GRAPHIC LOG		LITHOLOGIC DESCRIPTION
5285- 5 5 10		Bentonite Chips PVC Sch 40 10-20 Silica Sand 0 020" Slotted PVC		7.5-8.5 ft. S	ERAVEL (GW), some cobbles. EAND (SP), some clay. GRAVEL (GW), some small cobbles with sand. T. BRUSHY BASIN MEMBER OF MORRISON N: SHALE, bedrock
					Total Depth 11.5 ft.
mactec	ers U.S.	DEPARTM AND JUNCTION			

PROJECT LOCATION	, co	GROUN	ID WATE	_ 1	NORTH COOR	. (FT)	110	6284.10	SURFACE ELEV. (FT NGVD) 5292.84
SITE <u>NATI</u> WELL NUMB		IAT01-1			HOLE DEPTH WELL DEPTH				TOP OF CASING (FT) 5295.46 MEAS. PT. ELEV. (FT) 5295.46
		WELL	. INSTAL	_ATI	ON INT	ERVAL	. (FT)		SLOT SIZE (IN) 0.030 BIT SIZE(S) (IN) 14.0
SURFACE CA BLANK CASI WELL SCRE SUMP/END C SURFACE SI	NG: EN: AP:	0.5 in.	PVC Sch Slotted P\ PVC Sch	/C	-2.62 17.0 17.5	to	17. 17. 17.	5 SAM	LLING METHOD AUGER MPLING METHOD TE DEVELOPED TER LEVEL (FT BGS)
GROUT: SEAL:		Benton	ite Chips		0.0	to	12.	LOG	GGED BY Holmes MARKS Cluster of 2 casings: NAT01-1 casing
UPPER PACH LOWER PAC	OWER PACK:		Silica San	d	12.0	to	18.		screen depths provided; NATO1-2 casing is from 0 116 and screened to 12.66 ft.
			EXTENT	VELL	. DIAGRAM	GRAPHIC	3		LITHOLOGIC DESCRIPTION
5290— 5290— 5285— 5285— 5280— 5280— 5275—					#1 PVC Sch 80 0.03" Slotted PVC 10-20 Silica Sand				Total Depth 18.0 ft.

URFACE CASING: LANK CASING: 0. /ELL SCREEN: 0. UMP/END CAP: 0. URFACE SEAL: ROUT: EAL: B PPER PACK: 10	NELL INSTALLA 5 in. PVC Sch 80 5 in. Slotted PVC 5 in. PVC Sch 80 entonite Chips 0-20 Silica Sand	-2.45 12.16	to 12.66	DRILLIN SAMPL SAMPL WATER LOGGE REMAR and scre 17 and s	TOP OF CASING (FT) 5295.29 MEAS. PT. ELEV. (FT) 5295.29 SLOT SIZE (IN) 0.030 BIT SIZE(S) (IN) 14.0 NG METHOD AUGER ING METHOD EVELOPED R LEVEL (FT BGS) ED BY Holmes EKS Cluster of 2 casings: NAT01-2 casing been depths provided; NAT01-1 casing is from 0 to screened to 17.5 ft.
URFACE CASING: LANK CASING: O. VELL SCREEN: O. UMP/END CAP: O. URFACE SEAL: ROUT: EAL: PPER PACK: OWER PACK: O	5 in. PVC Sch 80 5 in. Slotted PVC 5 in. PVC Sch 80 entonite Chips 0-20 Silica Sand	-2.45 12.16 12.66 0.0 12.0	to 12.6 to 12.6 to 12.6 to 12.6 to 12.6 to 18.6	DRILLIN SO SAMPL SO DATE D WATER LOGGE REMAR and scre 17 and s	SLOT SIZE (IN) 0.030 BIT SIZE(S) (IN) 14.0 NG METHOD AUGER ING METHOD DEVELOPED R LEVEL (FT BGS) ED BY Holmes EKS Cluster of 2 casings: NAT01-2 casing been depths provided; NAT01-1 casing is from 0 to screened to 17.5 ft.
LANK CASING: (ELL SCREEN: UMP/END CAP: URFACE SEAL: ROUT: EAL: BOUND AND AND AND AND AND AND AND AND AND A	5 in. Slotted PVC 5 in. PVC Sch 80 entonite Chips 0-20 Silica Sand	12.16 12.66 0.0 12.0	to 12.6 to 12.6 to 18.0 TO 18.	SAMPL	ING METHOD DEVELOPED R LEVEL (FT BGS) ED BY Holmes RKS Cluster of 2 casings: NAT01-2 casing ten depths provided; NAT01-1 casing is from 0 tescreened to 17.5 ft.
PPER PACK: OWER PACK: OWER PACK: (LT NGVD) BLOW COUNTS	0-20 Silica Sand	12.0	to 18.0 CRAPHIC LOG LOG	and scre 17 and s	een depths provided; NAT01-1 casing is from 0 to screened to 17.5 ft.
	SAMPLE ID.	L DIAGRAM		LI	
5200			٠.٠.٠	0-18 ft. ALLUV	
5285-		#2 Bentonite Chips PVC Sch 80 0.03" Slotted PVC 10-20 Silica Sand			Total Depth 18.0 ft.

LOCA	CT L TION NATU	, co	GROUN	D W	ATER	EAST	H COORD. COORD.	(FT) _	58808 110682 11.75	34.64 27.76	SURFA	CE ELEV.	10/16/1998 (FT NGVD) (FT) 529	5291.98
WELL	NUMBE	R N	AT02				DEPTH (MEAS.	PT. ELEV.	(FT) 529	4.09
			WELL	INS?	TALLA	TION	INTE	RVAL	(FT)			SIZE (IN) ZE(S) (IN)		
BLANI WELL SUMP SURF GROU SEAL: UPPE		NG: :N: AP: AL:	2 in. PV 2 in. Sk 2 in. PV Cement Bentoni	otted /C So t ite Ch	PVC th 40 nips		-2.11 6.42 11.42 0.0 0.75	to to to to	6.42 11.42 11.75 0.75 3.75	SAM DATI WAT LOG	LING MET PLING ME E DEVELO	THOD AU THOD DPED (FT BGS) Holmes		
DEPTH (FT BGL)	ELEV. (FT NGVD)	BLOW	SAMPLE ID.	EXTENT	WE	LL DIAG	GRAM	GRAPHIC			LITHOLO	OGIC DESC	RIPTION	
- 5	5290-						Bentonite Chips 10-20 Silica Sand PVC Sch 40 0.03" Slotted PVC '		<u> </u>					
-	5280—											Total Dept	h 11.75 ft.	

1 - 1

ELL NUMBER	NAT03		EAST COORD. HOLE DEPTH (WELL DEPTH ((FT) <u>1</u> FT) 11	106419 1.58	.18 SUR TOP	E DRILLED FACE ELEV. OF CASING S. PT. ELEV.	(FT NGVD) (FT)5293	5291.27 .05
		TALLAT	ION INTE			SLO'	T SIZE (IN) SIZE(S) (IN)	0.030	
URFACE CASING: LANK CASING: /ELL SCREEN: UMP/END CAP: URFACE SEAL: ROUT:	2 in. PVC Sc 2 in. Slotted 2 in. PVC Sc	PVC	-1.78 6.25 11.25	to	6.25 11.25 11.58	DRILLING MI SAMPLING M DATE DEVEL WATER LEV	METHOD _OPED EL (FT BGS)		
EAL: PPER PACK:	Bentonite Ch	nips	0.0	to s	5.58	LOGGED BY REMARKS			
OWER PACK:	10-20 Silica	Sand	5.58	to	11.58				
(FT BGL) ELEV. (FT NGVD) BLOW COUNTS	SAMPLE ID.	WEL	L DIAGRAM	GRAPHIC LOG		LITHO	LOGIC DESC	RIPTION	
5290-			PVC Sch 40 10-20 Silica Sand 0.03" Slotted PVC				Total Depth	n 11.58 ft.	

			GROU	ND W	ATER		H COORI				DATE DRILLED	10/17/199	
LOCA [.] SITE	_	, CO					COORD. DEPTH (7.00		SURFACE ELEV. TOP OF CASING		
	NUMB		NAT04-1				DEPTH (MEAS. PT. ELEV		
			14/51	INC						·	SLOT SIZE (IN)	0.030	
SURFA	ACE CA	SING.	VVEL	L INS	TALLA	ION	INTE	RVAL (-1)		BIT SIZE(S) (IN)	9.0	
	K CASI		0.5 in.	PVC	Sch 40		-2.16	to	12.0		ING METHOD AL	JGER	
	SCREE				ed PVC		12.0	to	12.5		LING METHOD		· · · · · · · · · · · · · · · · · · ·
	/END C. ACE SE		0.5 in.	PVC	Sch 40		12.5	to	12.6		DEVELOPED R LEVEL (FT BGS	١	
GROU		·~-·									ED BY Holmes	,	
SEAL:			Bentor	nite P	ellets		11.16	to	11.5	REMA	RKS Cluster of	3 casings: N	AT04-1 casing
	R PACK		10.20	Ciliaa	Cand		11.5	to	17.0		reen depths provide		
LOWE	R PACI	Λ:	10-20	Silica	Sano		11.5	lo .	17.0	3.07 11	t, and screened to 10 to 8.17 ft, and scre		
1	وَ	_ છ	₫	_				ပ္		nom c	10 6.17 It. and scre	eneu to o.or	IL.
DEPTH (FT BGL)	F 전	8E		EXTENT	WEI	L DIAG	RAM	₹8			LITHOLOGIC DESC	CRIPTION	
밀	ELEV. (FT NGVD)	BLOW COUNTS	SAMPLE ID	EX	[]		GRAPHIC LOG				-,,,,	
			Ŋ								D BI D A		
								0	اب)-14 ft. ALLU	JVIUM		
-	-												
								5 . Q					
						-	Bentonite Pellets	7 · O · 5	3				
4	5290-												
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								$\rho \rightarrow 0$					
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	5285												
	0200						Bentonite		:				
_	-					_	Chips	00					
-10-						-	+1 PVC Sch	o · ○ · · (ij				
						-	40	. B.					
_	-						Bentonite Chips)					
_	_						0.03"	O t					
						+- -	Slotted PVC	0					
_	5280-							, O					
-	_							٥٠٠٠	<u>:</u>	1Δ-17 ft RDI	USHY BASIN MEMBE	R OF MORP	SON FORMATION
							10-20			SHALE	COLIT DAOIN MEMBE	IN OF WICKE	CONT CINIVATION
-15						1	Silica Sand		▤				
_													
	-				- Accessorated						Total Dep	th 17.0 ft.	
4	5275												
┪	-												
1						1							

					ON LOG NAT01-NAT04-2
PROJECT UMTRA	GROUND WATER	NORTH COORI			
SITE NATURITA	IAT04-2	HOLE DEPTH ((FT) <u>1</u>	7.00	TOP OF CASING (FT) 5295.28 MEAS. PT. ELEV. (FT) 5295.28
	WELL INSTALLAT		ERVAL (SLOT SIZE (IN) 0.030 BIT SIZE(S) (IN) 9.0
SURFACE CASING: BLANK CASING: WELL SCREEN: SUMP/END CAP: SURFACE SEAL: GROUT:	0.5 in. PVC Sch 40 0.5 in. Slotted PVC 0.5 in. PVC Sch 40	-2.2 9.67 10.17	to to	9.67 10.17 10.34	DRILLING METHOD AUGER
SEAL: UPPER PACK:	Bentonite Chips	9.16	to	8.83	REMARKS Cluster of 3 casings: NAT04-2 casing
LOWER PACK:	10-20 Silica Sand	8.83	to	17.0	and screen depths provided; NAT04-1 casing is from 0 to 12 ft. and screened to 12.5 ft.; NAT04-3 casing is from 0
DEPTH (FT BGL) ELEV. (FT NGVD) BLOW COUNTS	SAMPLE ID. EXTENT	L DIAGRAM	GRAPHIC LOG		to 8.17 ft. and screened to 8.67 ft. LITHOLOGIC DESCRIPTION
- 5290- - 5		#2 PVC Sch 40 Bentonite Chips 0.03" Slotted PVC 10-20 Silica Sand			4 ft. ALLUVIUM 17 ft. BRUSHY BASIN MEMBER OF MORRISON FORMATION; ALE Total Depth 17.0 ft.
mactec	ers U.S. I	DEPARTM AND JUNCTION			

PROJ	ECT _		GROUN	ID W	VATER		H COORD					DRILLED _ ACE ELEV.	10/17/1998	
	NATI						DEPTH (17.00	/10./3		OF CASING (
NELL	NUMB	ER N	IAT04-3			WELL	. DEPTH	(FT) _8	3.84		_	S. PT. ELEV.	` '	5.28
			WELL	. INS	STALLAT	ION	INT	ERVAL ((FT)			r size (IN) Size(S) (IN)		
	ACE CASI		0.5 in.	PVC	Sch 40		-2.2	to	8.17	DRIL	LING ME	THOD AU	GER	
VELL	SCRE	EN:			ed PVC		8.17	to	8.67			ETHOD		
	/END C ACE SE		0.5 in.	PVC	Sch 40		8.67	to	8.84		E DEVEL	EL (FT BGS)		
SROL		-AL.										Holmes		
EAL			Benton	ite C	Chips		0.0	to	5.0					T04-3 casing
	R PACE R PAC		10-20	Silica	Sand		5.0	to	17.0					casing is from 0 casing is from 0
				1	1			T		12 11.		screened to		casing is non o
Ŧ Ĵ	ELEV. (FT NGVD)	BLOW	Ö	þ				GRAPHIC LOG						
DEPTH (FT BGL)	NG.FJ	95	SAMPLE ID	EXTENT	WEL	L DIAC	SRAM	\$\frac{1}{2} \frac{1}{2} \fr			LITHO	LOGIC DESC	RIPTION	
<u> </u>	FT (F	~ 8	SAN	ũ	TT			9						
			· · · · · · · · · · · · · · · · · · ·					, U.	তা	-14 ft. ALI	UVIUM			
_	_							.0.(3.0						
								3						
-	-					_	Bentonite	0.1						
-	5290-						Pellets	·						
_														
	_							0.0						
- 5	-					*	- #3	o .	\odot					
_	_						PVC Sch	0.0°						
							40	p 0						
_	-							. O.						
-	5285-					-	0.03" - Stotted	0 (
_						- \	PVC 10-20)						
	-					`	\ Silica							
10-	-						Sand	0						
_	_							(°. U.						
						*		.p∵0						
-	-							o. 🗘 :	\odot					
-	5280-							· ():						
_								20						
	-									4-17 ft. BF SHALE	RUSHY B	ASIN MEMBER	OF MORRIS	SON FORMATION
-15	-													
_	-													
-	1 ⁻	1										Total Dept	h 17.0 ft.	
-	5275-	-												
_]						,							
_	-]												

ROJECT <u>UMTRA</u> OCATION <u>, CO</u> ITE NATURITA /ELL NUMBER N	GROUND W	E	NORTH COORI EAST COORD. HOLE DEPTH (WELL DEPTH ((FT) <u>1</u> FT) <u>14</u>	106235.48 .00	DATE DRILLED SURFACE ELEV. (TOP OF CASING (F MEAS. PT. ELEV. (FT NGVD) <u>5292.33</u> FT) <u>5294.42</u>
	WELL INS			RVAL (F		SLOT SIZE (IN) BIT SIZE(S) (IN)	0.030
URFACE CASING: LANK CASING: /ELL SCREEN: UMP/END CAP: URFACE SEAL: ROUT: EAL: PPER PACK:	2 in. PVC Si 2 in. Slotted 2 in. PVC Si Bentonite Ci	PVC ch 40	-2.09 8.67 13.67	to 8 to 1 to 1	3.67 DR 3.67 SA 4.0 DA W/	RILLING METHOD AUG MPLING METHOD MPLING METHOD METER DEVELOPED ATER LEVEL (FT BGS) DEGED BY Holmes	ER
OWER PACK:	10-20 Silica	Sand	5.0	to 1	4.0		
(FT BGL) ELEV. (FT NGVD) BLOW COUNTS	SAMPLE ID. EXTENT	WELL	DIAGRAM	GRAPHIC LOG		LITHOLOGIC DESCR	IPTION
5290-			■ Bentonite Chips PVC Sch 40 10-20 Silica Sand 0.03" Slotted PVC			Total Depth	

PROJECT LOCATION SITE N	N VATŪ	, CO RITA	GROUN	ID W	ATER	EAST HOLE	TH COORI COORD. DEPTH (L DEPTH	(FT)	110662 2.50	DATE DRILLED 10/19/1998 SURFACE ELEV. (FT NGVD) 5293.5 TOP OF CASING (FT) 5296.41 MEAS. PT. ELEV. (FT) 5296.41 SLOT SIZE (IN) 0.030
SURFAC BLANK O WELL SO SUMP/EN SURFAC GROUT: SEAL: UPPER P LOWER!	CASING CA	NG: :N: AP: AL: :	0.5 in. 0.5 in.	PVC Slotte PVC nite C	•		-2.84 11.66 12.16 0.0 5.0	to to	11.66 12.16 12.33 5.0	BIT SIZE(S) (IN) 9.0 DRILLING METHOD AUGER SAMPLING METHOD DATE DEVELOPED WATER LEVEL (FT BGS) LOGGED BY Holmes REMARKS Cluster of 3 casings: NAT06-1 cases and screen depths provided; NAT06-2 casing is figure of 9.25 ft.; NAT06-3 casing
(FT BGL)	(FT NGVD)	BLOW	SAMPLE ID.	EXTENT	WE	LL DIA	GRAM	GRAPHIC LOG		0 to 5.41 ft. and screened to 5.91 ft. LITHOLOGIC DESCRIPTION
- 5 - 5	290						Bentonite Chips #1 PVC Sch 80 10-20 Silica Sand 0.03" Slotted PVC		٩٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠	7. Total Depth 12.5 ft.

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PROJE		MTRA	GROUN			NORTH COOR	D. (FT)	58	7901.18	OG NAT01-NAT06-2 DATE DRILLED
LOCA SITE	NATUI	, CO RITA				HOLE DEPTH	. (FT) (FT)	110 12.5		SURFACE ELEV. (FT NGVD) 5293.57 TOP OF CASING (FT) 5296.41
	NUMBE		IAT06-2			WELL DEPTH	(FT)			MEAS. PT. ELEV. (FT) 5296.41
SURF	ACE CAS	SING:	WELL	_ INS	TALLAT	ION INTI	ERVAL	(FT)		SLOT SIZE (IN) 0.030 BIT SIZE(S) (IN) 9.0
WELL SUMP SURF	K CASIN SCREEI /END CA ACE SEA	N: .P:	0.5 in.	Slotte	Sch 80 ed PVC Sch 80	-2.84 9.25 9.75	to to to	9.2 9.7 9.9	5 SAMI 2 DATE WAT	LING METHOD AUGER PLING METHOD E DEVELOPED ER LEVEL (FT BGS)
GROU SEAL: UPPER			Benton	ite Cl	hips	0.0	to	5.0	REMA	GED BY Holmes ARKS Cluster of 3 casings: NAT06-2 casing creen depths provided; NAT06-1 casing is from 0 to
LOWE	R PACK	:	10-20	Silica	Sand	5.0	to	12.	⁵ 11.66	ift, and screened to 12.16 ft., NATO6-3 casing is 1011 0 to 0.00 to 5.41 ft. and screened to 5.91 ft.
DEPTH (FT BGL)	ELEV. (FT NGVD)	BLOW	SAMPLE ID.	EXTENT	WEL	L DIAGRAM	GRAPHIC		Hom	LITHOLOGIC DESCRIPTION
- 5	5285					#2 #2 PVC Sch 80 0 03" Slotted PVC 10-20 Silica Sand			0-12.5 ft. Āl	Total Depth 12.5 ft.
m	act	ec	-er	. .		DEPARTM AND JUNCTION				GY PAGE 1 OF 1 08/02/2001

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			GROUN	ID W	ATER	NORTH	COORD			901.18 321.36	DATE DRILLED _ SURFACE ELEV.	10/19/1998	5293.57
SITE		, CO JRITA					DEPTH (12.50	021.30	TOP OF CASING		
	NUMB		NAT06-3			WELL (DEPTH (MEAS. PT. ELEV.	(FT) 5296	5.41
SUIDE	ACE CA	VEINIC:	WELL	. INS	TALLAT	ION	INTE	RVAL	(FT)		SLOT SIZE (IN) BIT SIZE(S) (IN)		,
	K CASI		0.5 in.	PVC	Sch 80		-2.84	to	5.41		LLING METHOD AU	GER	
	SCREE				ed PVC		5.41	to	5.91		MPLING METHOD		
	/END C ACE SE		0.5 in.	PVC	Sch 80		5.91	to	6.08		TE DEVELOPED TER LEVEL (FT BGS)		
ROU		ML.									GED BY Holmes		
SEAL			Benton	ite C	hips		0.0	to	5.0		MARKS Cluster of 3	casings: NA	T06-3 casing
	RPACK			_							screen depths provided		
.OWE	R PAC	K:	10-20	Silica	Sand		5.0	to	12.5	11.0	66 ft. and screened to 1		
- ¬	ெ	ွတ	<u>⊡</u>	_				U		trom	n 0 to 9.25 ft. and scree	ned to 9.75 r	
DEPTH (FT BGL)	ELEV. (FT NGVD)	BLOW	SAMPLE ID	EXTENT	WEI	L DIAGE	> A N #	GRAPHIC	!		LITHOLOGIC DESC	RIPTION	
		<u> </u>	Ā	X	VVL		VOIN!	§	1		EITHOLOGIO BLOO	IXII TIOI	
_=	Ē.	٥	ŝ	_									
								o 💛 .	ه بن	-12.5 ft. /	ALLUVIUM		
							#3	.o. ():					
							#2)	3:5				
							Bentonite	O					
-							Chips	0. 🔨	٠				
	-			:			PVC Sch	(<u>()</u>					
-				1			80	0(5∷				
	5290-			1				. 0	Ö				
-													
	-							. 0	∷a				
- 5 —						6		.o∵.(3 ∵:				
	_						0.03" Slotted	, O					
-							PVC	. (\	9				
	_						10-20						
-				1			Silica Sand	o					
	_							ø [⊙]	\bigcirc				
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	5285)					
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	-				1752000	222					Total Dept	h 12.5 ft	
-	1										rotal Dept	111	
	5280-												
-	1												
	l -			1				1	1				

PROJI LOCA SITE	TION _ NATU	JMTRA , CO JRITA	GROUN	I ORII	R_ i	NORTH COORI EAST COORD. HOLE DEPTH (D. (FT) (FT) <u>1</u> (FT) 1:	588381. 106551. 3.00	.24 SURFACE ELEV. (FT NGVD) 5290.51 TOP OF CASING (FT) 5292.64	
WELL	NUMBI	ERN	IAT07-1			WELL DEPTH			MEAS. PT. ELEV. (FT) 5292.64 SLOT SIZE (IN) 0.030	_
BLAN WELL SUMP	ACE CA K CASII SCREE /END C ACE SE IT:	NG: EN: AP:	0.5 in. l 0.5 in. l	. INSTAL PVC Sch Siotted P' PVC Sch	80 /C	-2.13 11.83	to	11.83 12.33 12.5	BIT SIZE(S) (IN) 9.0 DRILLING METHOD AUGER SAMPLING METHOD DATE DEVELOPED WATER LEVEL (FT BGS) LOGGED BY Holmes	
SEAL:	: R PACK	:	Benton	ite Chips		0.0	to	6.0	REMARKS Cluster of 3 casings: NAT07-1 casing and screen depths provided; NAT07-2 casing is from 0	1 to
LOWE	R PACI	≺ :	10-20 5	Silica San	d	6.0	to	13.0	10.08 ft. and screened to 10.58 ft.; NAT07-3 casing is	
DEPTH (FT BGL)	ELEV. (FT NGVD)	BLOW	SAMPLE ID.	EXTENT	VELL	. DIAGRAM	GRAPHIC LOG		from 0 to 8.00 ft. and screened to 8.50 ft. LITHOLOGIC DESCRIPTION	
- 5	5285—			CHILL		#1 PVC Sch 80 10-20 Silica Sand 0.03" Slotted PVC			Total Depth 13.0 ft.	
m	عدا	ec	-er:	3 U.S		EPARTM ND JUNCTION				1

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PROJECT MITTRA GROUND WATER LOCATION CAST COORD. (FT.) 588884 47 LOCATION CAST COORD. (FT.) 108851 24 LOCATION CAST COORD. (FT.) 13.00 LOCAT COORD. (FT.)		MONITORING	WELL CO	OMPLE	TION L	OG NAT01-NAT07-2
WELL INSTALLATION	LOCATION , CO SITE NATURITA		EAST COORD. HOLE DEPTH ((FT) 11 (FT) 13.	06551.24 00	SURFACE ELEV. (FT NGVD) 5290.51 TOP OF CASING (FT) 5292.53
BLANK CASING: WELL SCREEN: 5 is in Slotted PVC 10.08 to 10.58 SAMPLING METHOD					-	SLOT SIZE (IN) 0.030
UPPER PACK: LOWER PACK: 10-20 Silica Sand 6.0 to 13.0 and screen depths provided; NAT07-1 casing is from 0 to 13.0 in	BLANK CASING: WELL SCREEN: SUMP/END CAP: SURFACE SEAL: GROUT:	0.5 in. Slotted PVC 0.5 in. PVC Sch 80	10.08 10.58 `	to 10	0.58 SAM 0.75 DAT WA	MPLING METHOD TE DEVELOPED TER LEVEL (FT BGS) GGED BY Holmes
TOTAL STATE OF THE PROPERTY OF	UPPER PACK:	•			and	screen depths provided; NAT07-1 casing is from 0 to
Sentonite Chips - 5 - 5285 - #2 - 10 - 5280 -	DEPTH (FT BGL) ELEV. (FT NGVD) BLOW COUNTS	SAMPLE ID.	L DIAGRAM	GRAPHIC LOG		n 0 to 8.00 ft. and screened to 8.50 ft.
TICETEC-ETS U.S. DEPARTMENT OF ENERGY PAGE 1 OF 1 08/02/2001		U.S.	#2 PVC Sch 80 10-20 Silica Sand 0.03" Slotted PVC			Total Depth 13.0 ft.

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	MONITORING	WELL CO	OMPLE	TION LOG NA	T01-NAT07-3	
LOCATION, CO SITE NATURITA	GROUND WATER	NORTH COORD EAST COORD. HOLE DEPTH ((FT) 110 FT) 13.0	6551.24 SURFAC 0 TOP OF	ORILLED 10/19/1998 CE ELEV. (FT NGVD) CASING (FT) 5292 PT. ELEV. (FT) 529	5290.51 2.34
SURFACE CASING: BLANK CASING:	WELL INSTALLAT		to 8.0	SLOT S BIT SIZE	IZE (IN) 0.030 E(S) (IN) 9.0	
WELL SCREEN: SUMP/END CAP: SURFACE SEAL:	0.5 in. Slotted PVC 0.5 in. PVC Sch 80	8.0 8.5	to 8.6	SAMPLING MET 7 DATE DEVELOR WATER LEVEL	THODPED(FT BGS)	
GROUT: SEAL: UPPER PACK: LOWER PACK:	Bentonite Chips 10-20 Silica Sand	0.0 6.0	to 6.0	REMARKS _ C	Holmes Cluster of 3 casings: NAns provided; NAT07-1 eened to 12.33 ft; NAT	casing is from 0 to
DEPTH (FT BGL) ELEV. (FT NGVD) BLOW COUNTS	SAMPLE ID. EXTENT Tan Tan Tan Tan Tan Tan Tan T	L DIAGRAM	GRAPHIC LOG	from 0 to 10.08 f	ft. and screened to 10.5	
5290- 		#3 PVC Sch 80 0 03" Slotted PVC 10-20 Silica Sand		0-13 ft. ALLUVIUM	Total Depth 13.0 ft.	
mactec	ers U.S. I	DEPARTM AND JUNCTION		F ENERGY OLORADO	PAGE 1 OF 1	08/02/2001

_			MON	IIT	ORIN	g w	ELL C	OMF	PLE	ETIC)N L	.OG	NΑ	T0	1-N	AT0	8		
LOCAT	TION TONT	, CO JRITA	GROUN	ID W	ATER	EAST HOLE	NORTH COORD. (FT)5882 EAST COORD. (FT)11062 HOLE DEPTH (FT)12.00 WELL DEPTH (FT)11.67			06422. 00	22.26 SURFACE ELEV. (FT NGVD) TOP OF CASING (FT) 5292.7					529 2.73	91.13		
**	HOMB			INS	ΤΔΙΙΔΊ		INTE					SL	OT SI	ZE (IN)	0.03	0		
BLANK WELL SUMP/ SURFA GROU' SEAL:	CASII SCREE END C ACE SE T:	EN: AP: :AL:	4 in. P\ 4 in. SI	√C S otted √C S	ch 40 PVC ch 40		-1.6 6.3 11.3	to to	6.3 11	3 1.3 1.67	DATE WATE LOGG	LING I PLING DEVI ER LE GED E	METH MET ELOF VEL	HOD HOD ED (FT E	AU BGS)	12.0 GER			
LOWE	R PACI	K:	10-20	Silica	Sand		3.0	to	12	2.0	•								
DEPTH (FT BGL)	ELEV. (FT NGVD)	BLOW	SAMPLE ID.	EXTENT	WEI	L DIA	GRAM	GRAPHIC				LITH	OLO(SIC [DESC	RIPTIC	ON		
- 5	5290 — 5285 — 5280 —						Bentonite Chips PVC Sch 40 10-20 Sillica Sand 0.03" Slotted PVC			0-121	t. ALL	UVIUN	1	Tota	I Den	th 12.0	fi		
				<u>L</u>								01/	l	ıota	г Бер	ui 12.0	11.		·
m	عد	tec	-er	5	U.S.	DEF RAND J	PARTN	IENT OFFIC	DE, G	COLO	NER RADO	KGY		PAC	3E	1 OF	1	08/	02/2001

PROJECT UMTRA GROUND WATER LOCATION CO	
WELL INSTALLATION INTERVAL (FT) SURFACE CASING: BLANK CASING: 2 in. PVC Sch 40 WELL SCREEN: 2 in. Slotted PVC 5.67 to 10.67 SUMP/END CAP: 2 in. PVC Sch 40 10.67 to 11.0 DATE DEVELOPED WATER LEVEL (FT BG LOGGED BY Holmes REMARKS UPPER PACK: LOWER PACK: 10-20 Silica Sand 3.0 to 11.0 WELL INSTALLATION INTERVAL (FT) BIT SIZE (IN) BAMPLING METHOD A SAMPLING METHO	5 (FT) 5293.11
BLANK CASING: 2 in. PVC Sch 40 WELL SCREEN: 2 in. Slotted PVC SUMP/END CAP: 2 in. PVC Sch 40 SUMP/END CAP: 2 in. PVC Sch 40 SURFACE SEAL: GROUT: SEAL: Bentonite Chips UPPER PACK: LOWER PACK: 10-20 Silica Sand WELL DIAGRAM WELL DIAGRAM DRILLING METHOD ASAMPLING METHOD DATE DEVELOPED WATER LEVEL (FT BG LOGGED BY Holmes REMARKS WELL DIAGRAM DHOPE DO -11 ft. ALLUVIUM DO -11 ft. ALLUVIUM DO -11 ft. ALLUVIUM	0.030
SEAL: Bentonite Chips 0.0 to 3.0 REMARKS UPPER PACK: 10-20 Silica Sand 3.0 to 11.0 HUNGARY PACK: 10-20 Silica Sand 3.0 to 11.0 WELL DIAGRAM WELL DIAGRAM O-11 ft. ALLUVIUM S290- S290- Bentonite Bentonite	.)
LOWER PACK: 10-20 Silica Sand 3.0 to 11.0 HERD OF THE PACK: 10-20 Silica Sand 3.0 to 11.0 WELL DIAGRAM WELL DIAGRAM Septonite Septonite	
O-11 ft. ALLUVIUM	
O-11 ft. ALLUVIUM	CRIPTION
PVC Sch 40	oth 11.0 1
TOCTEC-ETS U.S. DEPARTMENT OF ENERGY GRAND JUNCTION OFFICE, COLORADO PAGE	1 OF 1 08/02/2001

		MO	NITO	RING	3 WELL C	OMP	'LE	HON L	.OG NAT01-	NAT10			
PROJECT LOCATIO SITE N WELL NU	N CO) 4	ND WA	TER	NORTH COORD EAST COORD. HOLE DEPTH (WELL DEPTH ((FT)	1106 12.00	419.25	0.13 DATE DRILLED 10/20/1998 0.25 SURFACE ELEV. (FT NGVD) 5291.93 TOP OF CASING (FT) 5294.21 MEAS. PT. ELEV. (FT) 5294.21				
SURFACE BLANK C WELL SC SUMP/EN	ASING: REEN: D CAP:	G: 2 in. F 2 in. S	L INST	h 40 PVC	-2.28 6.83 11.83	to to	(FT) 6.83 11.8 12.0	3 SAMF DATE	SLOT SIZE (IN) BIT SIZE(S) (IN) LING METHOD A PLING METHOD DEVELOPED	9.0 UGER			
SURFACE GROUT: SEAL: UPPER PA	ACK:		nite Chi		0.0	to	5.0	LOGO REMA	ER LEVEL (FT BG: SED BY Holmes ARKS				
LOWER F		10-20	Silica S	Sand	5.0	to	12.0						
DEPTH (FT BGL) ELEV.	(FT NGVD) BLOW	SAMPLE ID.	EXTENT	WEL	L DIAGRAM	GRAPHIC LOG			LITHOLOGIC DES	CRIPTION			
- 52 - 52 - 10	85-				PVC Sch 40 10-20 Silica Sand 0.03" Slotted PVC			-12 ft. ALL		pth 12.0 ft.			
		c-er		J.S. I	DEPARTM	ENT	OF	ENER	GY DAGE	1 OF 1	08/02/2001		

SITE NATURITA WELL DEPTH (FT) 14.00 TOP OF CASING (FT) 5298.49	LOCATION 🗍	, CO	GROUND W	ATER	NORTH COORD	(FT)	110694	8.06	DATE DRILLED SURFACE ELEV.	(FT NGVD)	5296.19
SURFACE CASING: BLANK CASING: BLANK CASING: BLANK CASING: VELL SCREEN: 2 in. PVC Sch 40 2.3 to 8.67 10 13.67 SAMPLING METHOD AUGER AMPLING METHOD DATE DEVELOPED WATER LEVEL (FT BGS) LOGGED BY Holmes REMARKS DEPER PACK: LOWER PACK: LOWER PACK: LOWER PACK: LOWER PACK: LOWER PACK: LOWER PACK: DO 20 Silica Sand DO 10 6.0 LITHOLOGIC DESCRIPTION DO 10 6.0 LITHOLOGIC DESCRIPTION DO 10 6.0 REMARKS PVC Sch AU 10.20 DO 14 ft. ALLUVIUM DO 10 6.0 DO 15 6.0 DO 16 6.0 DO 16 6.0 DO 16 6.0 DO 16 6.0 DO 17 DO 18 DO 1			AT11		WELL DEPTH (FT) _	14.00		MEAS. PT. ELEV.	(FT) 529	8.49 8.49
BLANK CASING: WELL SCREEN: 2 in. PVC Sch 40	CUBEAGE C:	CINO	WELL INS	TALLAT	TION INTE	RVAL	(FT)		SLOT SIZE (IN) BIT SIZE(S) (IN)	0.030 10.0	
SEAL: Dentonite Chips 10-20 Silica Sand	BLANK CASI WELL SCREE SUMP/END C SURFACE SE	NG: :N: AP:	2 in. Slotted	PVC	8.67	to	13.67	SAMPL DATE D WATER	ING METHOD DEVELOPED R LEVEL (FT BGS)		
LOWER PACK: 10-20 Silica Sand 6.0 to 14.0 Had a little part of the same of th		:	Bentonite Ch	nips	0.0	to	6.0	REMAR	KS		
5295— Bentonite Chips PVC Sch 40 10-20 Silica Sand 0.03" Slotted			10-20 Silica	Sand	6.0	to	14.0				
5295— Bentonite Chips PVC Sch 40 PVC Sch 40 10-20 Silica Sand Sand Solved S	DEPTH (FT BGL) ELEV. (FT NGVD)	BLOW	SAMPLE ID. EXTENT	WEI	LL DIAGRAM	GRAPHIC		LI	ITHOLOGIC DESC	RIPTION	
	5290				PVC Sch 40 10-20 Silica Sand 0.03" Slotted						
Total Depth 14.0 ft.									Total Depti	n 14.0 ft.	

PROJECT LOCAT SITE WELL N	ION NATŪ	, CO RITA		N Di	/ATER	EAST HOLE	H COORD. COORD. DEPTH ((FT) _ FT) _	110618 18.00		DATE DRILLED 10/21/1998 SURFACE ELEV. (FT NGVD) 5294 TOP OF CASING (FT) 5296.35 MEAS. PT. ELEV. (FT) 5296.35
			WELI	. INS	TALLA	TION	INTE	RVAL	(FT)		SLOT SIZE (IN) 0.030 BIT SIZE(S) (IN) 9.0
SURFA BLANK WELL S SUMP/E SURFA	CASIN SCREE END CA CE SEA	IG: N: AP:	0.5 in.	Slott	Sch 80 ed PVC Sch 80		-1.85 13.91 14.41	to	13.91 14.41 14.58	SAMF DATE WATE	LING METHOD AUGER PLING METHOD EDEVELOPED ER LEVEL (FT BGS)
GROUT SEAL:			Bentor	ite C	hips		10.66	to	11.0	REMA	GED BY Holmes ARKS Cluster of 2 casings: NAT12-1
UPPER LOWER			10-20	Silica	Sand		11.0	to	18.0		creen depths provided; NAT12-2 casing is ft. and screened to 10.16 ft.
DEPTH (FT BGL)	ELEV. (FT NGVD)	BLOW	SAMPLE ID.	EXTENT	WEL	L DIAC	SRAM	GRAPHIC			LITHOLOGIC DESCRIPTION
- 15-	5290						Bentonite Chips #1 PVC Sch 80 Bentonite Chips 0.03" Slotted PVC 10-20 Silica Sand				BRUSHY BASIN MEMBER OF MORRISON N; SHALE Total Depth 18.0 ft.

PROJECT UMTRA	MONITORING GROUND WATER	NORTH COOR	D. (FT) _	588608.43	LOG NAT01-NAT12-2 DATE DRILLED
LOCATION, CO SITE NATURITA		EAST COORD. HOLE DEPTH (<u>106183,99</u> 3.00	SURFACE ELEV. (FT NGVD) 5294.50 TOP OF CASING (FT) 5296.35
WELL NUMBERN	IAT12-2	WELL DEPTH	(FT) 10	.33	MEAS. PT. ELEV. (FT) 5296.35 SLOT SIZE (IN) 0.030
SURFACE CASING:	WELL INSTALLAT	TION INTE	ERVAL (F	Т)	BIT SIZE(S) (IN) 9.0
BLANK CASING: WELL SCREEN: SUMP/END CAP: SURFACE SEAL: GROUT:	0.5 in. PVC Sch 80 0.5 in. Slotted PVC 0.5 in. PVC Sch 80	-1.85 9.66 10.16	to 1	10.16 SA 10.33 DA WA	MPLING METHOD AUGER MPLING METHOD TE DEVELOPED ATER LEVEL (FT BGS) DIGGED BY Holmes
SEAL: UPPER PACK:	Bentonite Chips	0.0	to 8		MARKS Cluster of 2 casings: NAT12-2 casing
LOWER PACK:	10-20 Silica Sand	8.0	to 1		<u>d screen depths provided; NAT12-1 casing is from 0 to 91 ft.</u>
DEPTH (FT BGL) ELEV. (FT NGVD) BLOW COUNTS	SAMPLE ID. EXTENT	L DIAGRAM	GRAPHIC LOG		LITHOLOGIC DESCRIPTION
5290— 5290— 5285— 10— 5280— 15— 5275—		#2		17.5-18.0 FORMAT	Ift. BRUSHY BASIN MEMBER OF MORRISON ION; SHALE Total Depth 18.0 ft.
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PROJE LOCA SITE WELL	TION _	, CO JRITA	GROUN	ID W	ATER	EAST HOLE	COORD.	D. (FT) <u>5</u> (FT) <u>11</u> (FT) <u>12</u> . (FT) <u>12</u> .	06943. 50	
BLANI WELL SUMP SURF GROU SEAL: UPPER		NG: EN: AP: EAL:	0.5 in. 0.5 in.	PVC Slotte PVC it ite G		FION	-2.75 11.83 12.33 0.0 1.58	to 1: to 1: to 1 to 5	1.83 2.33 2.5 58 08	SLOT SIZE (IN) 0.030 BIT SIZE(S) (IN) 4.0 DRILLING METHOD HAMMER CASING ADVANCE SAMPLING METHOD DATE DEVELOPED WATER LEVEL (FT BGS) LOGGED BY Holmes/Rowland REMARKS Cluster of 3 casings. NAT13-1 casing and screen depths provided; NAT13-2 casing is from 0 to 9.75 and screened to 10.25 ft.; NAT13-3 casing is from 0 to 10.25 ft.;
DEPTH (FT BGL)	ELEV. (FT NGVD)	BLOW	SAMPLE ID.	EXTENT	WEI	L DIAC	GRAM	GRAPHIC LOG		to 7.75 and screened to 8.25 ft. LITHOLOGIC DESCRIPTION
- 5 -	5295— - 						Bentonite Grout		5-6 ft	t. SAND (SW), moist.
-10-	5290— — — — — — —				TITE)		- #1 PVC Sch 80 10-20 - Silica Sand			ft. SANDY GRAVEL (GW-SW), sand with gravel cobbles and
-							0.03" - Slotted PVC			2.5 ft. BRUSHY BASIN MEMBER OF MORRISON MATION: SHALE; very hard drilling. Total Depth 12.5 ft.

RROLECT MATEA GROUND WATER SEAT COORD. (FT) 1106943.70 SUFFACE ELEV. (FT NGVD) 5296.24				MONI	ITORIN	G WE	LL C	OMPLI	ETIC	N LOG	NAT01-NAT13-2	
WELL INSTALLATION	LOCA SITE	TION NATI	, CO JRITA		ID WATER	EAST HOLE	COORD.	(FT) <u>1</u> (FT) <u>12</u>	106943 .50	3.70 SL TO	JRFACE ELEV. (FT NGVD) OP OF CASING (FT) 5298.	93
SEALE	SURF	ACE CA	ASING:	WELL		TION	INT	ERVAL (F	T)	SL Bl	OT SIZE (IN) 0.030 T SIZE(S) (IN) 4.0	
LOWER PACK: 10-20 Silica Sand 5.08 to 12.5 iii.83 and screened to 12.33 ft. NAT13-3 casing is for 11.83 and screened to 12.33 ft. NAT13-3 casing is for 12.5 iii.83 and screened to 12.33 ft. NAT13-3 casing is for 12.5 iii.83 and screened to 12.33 ft. NAT13-3 casing is for 12.5 iii.83 and screened to 12.33 ft. NAT13-3 casing is for 12.30 ft. NAT13-3 casing is for 12.30 ft. NAT13-3 casing is for 12.30 ft. NAT13-3 casing is for 13.30 ft. NAT13-3	WELL SUMP SURF, GROU SEAL	. SCREI /END C ACE SE IT:	EN: :AP: EAL:	0.5 in. 0.5 in. Cemen	Slotted PVC PVC Sch 80 it		9.75 10.25 0.0	to 1 i to 1 to 1	0.25 0.42 .58	SAMPLING DATE DEV WATER LE LOGGED I	G METHOD /ELOPED EVEL (FT BGS) BY Holmes/Rowland	
HEND AND BOTH THE PROPERTY OF				10-20 8	Silica Sand		5.08	to 1	2.5	11.83 and	screened to 12.33 ft.; NAT13-	
Bentonite Grout 5-6 ft. SAND (SW), moist. 5-90- #2 PVC Sch 80 10-20 Silica Sand O 0.33* Slotted PVC 12-12.5 ft. BRUSHY BASIN MEMBER OF MORRISON FORMATION: SHALE; very hard drilling.	DEPTH (FT BGL)	ELEV. (FT NGVD)	BLOW	SAMPLE ID.	EXTENT	ELL DIAG	GRAM	GRAPHIC LOG				
12-12.5 ft. BRUSHY BASIN MEMBER OF MORRISON FORMATION: SHALE; very hard drilling.		5290					Bentonite Grout #2 PVC Sch 80 10-20 Silica Sand 0.03" Slotted		5-61	f. SAND (SW	'), moist.	ravel cobbles and
MOSTES U.S. DEPARTMENT OF ENERGY GRAND JUNCTION OFFICE, COLORADO PAGE 1 OF 1 08/02/20	-						A D.T.		FOR	MATION: SH	ALE; very hard drilling. Total Depth 12.5 ft.	ISON

	MONITORING			ETION LOG NAT01-NAT13-3
LOCATION, CO SITE NATURITA	GROUND WATER AT13-3	NORTH COORI EAST COORD. HOLE DEPTH (WELL DEPTH	(FT) 11 (FT) 12	106943.70 SURFACE ELEV. (FT NGVD) 5296.24 50 TOP OF CASING (FT) 5298.99
SURFACE CASING:	WELL INSTALLAT		ERVAL (FT	SLOT SIZE (IN) 0.030 BIT SIZE(S) (IN) 4.0
BLANK CASING: WELL SCREEN: SUMP/END CAP: SURFACE SEAL: GROUT: SEAL: UPPER PACK: LOWER PACK:	0.5 in. PVC Sch 80 0.5 in. Slotted PVC 0.5 in. PVC Sch 80 Cement Bentonite Grout 10-20 Silica Sand	-2.75 7.75 8.25 0.0 1.58	to 8. to 8. to 1. to 5.	DRILLING METHOD HAMMER CASING ADVANCE SAMPLING METHOD DATE DEVELOPED WATER LEVEL (FT BGS) LOGGED BY Holmes/Rowland REMARKS Cluster of 3 casings. NAT13-3 casing and screen depths provided; NAT13-1 casing is from 0 to 11.83 and screened to 12.33 ft.; NAT13-2 casing is from
DEPTH (FT BGL) ELEV. (FT NGVD) BLOW COUNTS	SAMPLE ID. EXTENT	LL DIAGRAM	GRAPHIC LOG	0 to 9.75 and screened to 10.25 ft. LITHOLOGIC DESCRIPTION
5295— 5290— 5290— 5285— 5285—		Bentonite Grout #3 PVC Sch 80 10-20 Silica Sand 0 03" Slotted PVC		5-6 ft. SAND (SW), moist. 6-12 ft. SANDY GRAVEL (GW-SW), sand with gravel cobbles and boulders. 12-12.5 ft. BRUSHY BASIN MEMBER OF MORRISON FORMATION: SHALE; very hard drilling. Total Depth 12.5 ft.
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			MON	ITC	RING	WE	LL C	OMPL	ETI	TION LOG NAT01-NAT14-1
PROJI	CT TION	UMTRA	GROU	<u>N</u> DW	ATER			D. (FT) 1		
SITE	<u>NATŪ</u>	JRITA				HOLE	DEPTH ((FT) 11	.66	TOP OF CASING (FT) 5299.32
WELL	NUMB	⊭κ <u></u>	NAT14-1					(FT) <u>11</u>		MEAS. PT. ELEV. (FT) 5299.32 SLOT SIZE (IN) 0.030
SURF	ACE CA	ASING:	WEL	LINS	TALLA	TION	INTE	ERVAL (F	T)	BIT SIZE(S) (IN) 4.0
	K CASI				Sch 80		-3.1		11.0	
	SCREE END C				ed PVC Sch 80		11.0 11.5		11.5 11.66	
SURF.	ACE SE	EAL:	Cemer Bentor		irout		0.0 1.5		1.5 3.0	WATER LEVEL (FT BGS) LOGGED BY Holmes/Rowland
SEAL	:		Dento	inte O	iiout		1.5	10 (J.O	REMARKS Cluster of 3 casings. NAT14-1 casing
	R PACK		10-20	Silica	Sand		6.0	to	11.66	and screen depths provided; NAT14-2 casing is from 0 to
 				T					T	9.75 ft. and screened to 10.25 ft.; NAT14-3 casing is from 0 to 7.75 ft. and screened to 8.25 ft.
DEPTH (FT BGL)	ELEV. (FT NGVD)	BLOW	SAMPLE ID	EXTENT	WE	LL DIAG	GRAM	GRAPHIC LOG		LITHOLOGIC DESCRIPTION
	_								• 0-	0-3.5 ft. SILTY SAND (SM)
							Cement			
	5295—								•	
<u> </u>									•	
							Bentonite		3 9	3.5-4 ft. GRAVEL (GW), cobbles.
} -							Grout	1		4-9.5 ft. SANDY GRAVEL (GW-SW), sand with gravel.
										Control of the state of the sta
5	_								3	
<u> </u>	5290-								3	
<u> </u>	4								3	
<u> </u>	_						#1			
							PVC Sch			
r -	-						80			
L ₁₀							10-20		9.5	9.5-11 ft. GRAVEL (GW), gravel with cobbles.
<u></u> 10−	+						Silica Sand			
							0.03"			
	5285					-	Slotted PVC			11-11.66 ft. BRUSHY BASIN MEMBER OF MORRISON FORMATION: SHALE; very hard drilling.
. −					otoomii B	۲	,		1	Total Depth 11.66 ft.
<u> </u>										
m		lec	-er	5						ENERGY PAGE 1 OF 1 08/02/2001

PROJ	ECT _!		GROUN	N QV	ATER		COORD.	D. (FT) _ !	58756 10693	
SITE	NATU	IRITA	IAT440			HOLE	DEPTH (FT) 11	66	· · · · · · · · · · · · · · · · · · ·
WELL	. NUMBI	ERN	IAT14-2		TALLA		DEPTH	RVAL (F		SLOT SIZE (IN) 0.030
	ACE CA					ION				BIT SIZE(S) (IN) 4.0 DRILLING METHOD HAMMER CASING ADVANCE
	K CASII . SCREE				Sch 80 ed PVC		-3.09 9.75	to 1	.75 0.25	SAMPLING METHOD THANKER CASING ABVANCE
	END C				Sch 80		10.25 0.0		0.42 .5	DATE DEVELOPED
GROU	ACE SE IT:	AL.	Cemer Bentor		rout		1.5		.0	LOGGED BY Holmes/Rowland
SEAL:	: R PACK	•								REMARKS Cluster of 3 casings. NAT14-2 casing and screen depths provided; NAT14-1 casing is from 0
	R PAC		10-20	Silica	Sand		6.0	to 1	1.66	11 ft. and screened to 11.5 ft.; NAT14-1 casing is from
$\overline{}$	ଚ	(0	o.	Τ.				0		to 7.75 ft. and screened to 8.25 ft.
DEPTH (FT BGL)	ELEV. (FT NGVD)	BLOW	SAMPLE ID	EXTENT	WFI	I DIA	GRAM	GRAPHIC LOG		LITHOLOGIC DESCRIPTION
HF.	크	B [25 B	AM.	\frac{\Z}{2}	(, , , ,]		GRA U	ļ	
						8			0-3.	.5 ft. SILTY SAND (SM)
							- Cement	•]	
-	5295—	İ				N	Comon		1	
						22				
-										
-	-									
						<	_ Bentonite Grout		3.5-	-4 ft. GRAVEL (GW), cobbles.
-	_							700	4-9.	.5 ft. SANDY GRAVEL (GW-SW), sand with gravel.
_										
- 5 —	-							1000		
	5290-									
							- #2			
-	-						π4			
_		Ì					_ PVC Sch			
	-						80			
_							10-20 Silica			
							Sand			44.8. CDA)/EL /C)AA. gravel with salt-la-
-10							0.03" - Slotted		9.5-	-11 ft. GRAVEL (GW), gravel with cobbles.
	-						PVC			
_									111	11.66 ft. BRUSHY BASIN MEMBER OF MORRISON
	5285-									RMATION: SHALE; very hard drilling.
_]									Total Depth 11.66 ft.

	MONITORING				DG NAT01-NAT14-3
LOCATIONCO SITE NATURITA	GROUND WATER	NORTH COORD EAST COORD HOLE DEPTH WELL DEPTH	. (FT) <u>11</u> (FT) <u>11.</u>	06939.85 66	DATE DRILLED 06/30/1999 SURFACE ELEV. (FT NGVD) 5296.22 TOP OF CASING (FT) 5299.31 MEAS. PT. ELEV. (FT) 5299.31
SURFACE CASING: BLANK CASING: WELL SCREEN: SUMP/END CAP: SURFACE SEAL: GROUT: SEAL: UPPER PACK: LOWER PACK:	WELL INSTALLAT 0.5 in. PVC Sch 80 0.5 in. Slotted PVC 0.5 in. PVC Sch 80 Cement Bentonite Grout 10-20 Silica Sand	-3.09 7.75 8.25 0.0 1.5	to 8. to 8. to 1. to 6.	75 DRILL 25 SAMF 42 DATE 5 WATE 0 LOGG REMA and so 11.66 11 ft.:	SLOT SIZE (IN) 0.030 BIT SIZE(S) (IN) 4.0 LING METHOD HAMMER CASING ADVANCE PLING METHOD EDEVELOPED ER LEVEL (FT BGS) GED BY Holmes/Rowland ARKS Cluster of 3 casings. NAT14-3 casing creen depths provided; NAT14-1 casing is from 0 to and screened to 11.5 ft; NAT14-2 casing is from 0
DEPTH (FT BGL) ELEV. (FT NGVD) BLOW COUNTS	SAMPLE ID. EXTENT	LL DIAGRAM	GRAPHIC LOG		5 ft. and screened to 10.25 ft. LITHOLOGIC DESCRIPTION
5295— 5295— 5290— 5290— 5285— 5285—		Bentonite Grout #3 PVC Sch 80 0.03" Slotted PVC 10-20 Silica Sand		3.5-4 ft. GR/ 4-9.5 ft. SAN 9.5-11 ft. GF	AVEL (GW), cobbles. IDY GRAVEL (GW-SW), sand with gravel. RAVEL (GW), gravel with cobbles. BRUSHY BASIN MEMBER OF MORRISON N: SHALE; very hard drilling. Total Depth 11.66 ft.
mactec		DEPARTM AND JUNCTION			GY PAGE 1 OF 1 08/02/2001

			GROUN	ID W	ATER	NORT	H COORE). (FT)	58	8305.94	DATE DRILLED 07/01/1999
LOCA SITE	TION _ NATI	, CO JRITA					COORD.		14.5		SURFACE ELEV. (FT NGVD) _5292.57 TOP OF CASING (FT) 5294.93
	NUMB		IAT15-1				DEPTH (,	14.50		MEAS. PT. ELEV. (FT) 5294.93
			WELL	. INS	TALLAT	ION	INTE	RVAL	(FT)		SLOT SIZE (IN) 0.030 BIT SIZE(S) (IN) 4.0
	ACE CASI	ASING: NG:	0.5 in	PVC	Sch 80		-2.36	to	13.	83 DRIL	LLING METHOD HAMMER CASING ADVANCE
	SCRE		0.5 in.	Slotte	ed PVC		13.83	to	14.	33 SAM	MPLING METHOD
	END C ACE SE		0.5 in. Cemen		Sch 80		14.33 0.0	to to	14. 2.5		TE DEVELOPED
GROU		AL.	Cernen	11.			0.0	10	2.0		GGED BY Holmes/Rowland
SEAL:		. .	Benton	ite P	ellets		2.5	to	8.0		MARKS Cluster of 3 casings. NAT15-1 casing
	R PACK		10-20	Silica	Sand		8.0	to	14.		screen depths provided; NAT15-2 casing is from 0 to 33 ft and screened to 12.5 ft.; and NAT15-3 casing is
											9.83 and screened to 10.5 ft.
도()	ELEV. (FT NGVD)	BLOW	SAMPLE ID	둗				GRAPHIC	,		
DEPTH (FT BGL)	NG		Δ₽.	EXTENT	WEL	L DIA	SRAM	 ≥			LITHOLOGIC DESCRIPTION
⊐ F	FE (FE	"당	SA	ω				ট			
				ļ —	NAN	Ŋ	<u> </u>	o 🔍	\odot	0-5 ft. GRA	AVELLY SAND (SW-GW), 70% sand.
	7							\mathcal{O} .0.			
						-	- Cement). 	3		
						X		· O	\mathbf{C}		
	5290-								•		
_	3290								\vdots		
	_							0.	ا (
-								0	Ÿ		
	_										
- 5 —							Bentonite		Ď	5-6.5 ft. B	BOULDERS AND COBBLES.
	_						Pellets		9		
-								3			
	-					ł		<u>،</u> ن	V	6.5-8.5 ft.	GRAVELLY SAND (SW-GW).
-								. O	٥٠٠		
	5285-							3			
-	_							· O		0.5.40.5.6	DOLUBERO AND CORR FO
_								7	8	8.5-13.5 II.	BOULDERS AND COBBLES.
	_							20	2		
-10-								H	B		
	-			İ					J.		
-				-		-	- #1	32	Į.		
	-						10-20	X	S		
-							SilicaSand	O	16		
	5280-	1					PVC Sch	W	3		
_							80		K		
_	_	1					0.03" - Slotted				ft. BRUSHY BASIN MEMBER OF MORRISON ION: SHALE; very hard drilling.
	_]					PVC				
	l -			1	ŀ	- 1		1	1		Total Depth 14.5 ft.

	MONITORING V	WELL CO	OMPLE:	TION LOG NAT01-NAT15-2
LOCATION _, CO SITE NATURITA	E. H	ORTH COORD AST COORD. OLE DEPTH (/ELL DEPTH ((FT) <u>110</u> FT) <u>14.5</u>	06235.04 SURFACE ELEV. (FT NGVD) 5292.57 TOP OF CASING (FT) 5294.96
SURFACE CASING: BLANK CASING: WELL SCREEN: SUMP/END CAP: SURFACE SEAL:	WELL INSTALLATIO 0.5 in. PVC Sch 80 0.5 in. Slotted PVC 0.5 in. PVC Sch 80 Cement	-2.39 11.83 12.33 0.0	to 12.	.83 DRILLING METHOD HAMMER CASING ADVANCE .33 SAMPLING METHOD .5 DATE DEVELOPED
GROUT: SEAL: UPPER PACK:	Bentonite Pellets	2.5	to 8.0	LOGGED BY Holmes/Rowland REMARKS Cluster of 3 casings. NAT15-2 casing and screen depths provided; NAT15-1 casing is from 0 to
LOWER PACK:	10-20 Silica Sand	8.0	to 14.	13.83 ft. and screened to 14.33 ft.; and NAT15-3 casing
DEPTH (FT BGL) ELEV. (FT NGVD) BLOW COUNTS	SAMPLE ID. EXTENT	DIAGRAM	GRAPHIC LOG	is 0 to 9.83 ft. and screened to 10.5 ft. LITHOLOGIC DESCRIPTION
5290-		Cement ■ Bentonite		0-5 ft. GRAVELLY SAND (SW-GW), 70% sand.
5285		Pellets		5-6.5 ft. BOULDERS AND COBBLES. 6.5-8.5 ft. GRAVELLY SAND (SW-GW). 8.5-13.5 ft. BOULDERS AND COBBLES.
- 10 		#2 10-20 Silica Sand PVC Sch 80 0.03" Slotted PVC		13.5-14.5 ft. BRUSHY BASIN MEMBER OF MORRISON FORMATION: SHALE; very hard drilling.
				· · · · · · · · · · · · · · · · · · ·
mactec	U.S. DI	EPARTM ID JUNCTION		Total Depth 14.5 ft. F ENERGY COLORADO PAGE 1 OF 1 08/02/2001

			GROUN	ID W	ATER	NORT	TH COOR	D. (FT)	_58	88305.94	DATE DRILLED 07/01/1999
LOCA							COORD.				SURFACE ELEV. (FT NGVD) 529
SITE		JRITA	IAT15-3			HOLE	E DEPTH (L DEPTH ((FI)	10.5	0	TOP OF CASING (FT)5294.95 MEAS. PT. ELEV. (FT)5294.95
44ELL	NUMB	<u> </u>	IA 1 13-3			VVCL					SLOT SIZE (IN) 0.030
			WELL	_ INS	TALLA	TION	INTE	ERVAL	(FT)		BIT SIZE(S) (IN) 4.0
		ASING:	0.5:-		C-F 90		-2.38	to	9.8	n DRII	LLING METHOD HAMMER CASING AL
	CASI SCREI				Sch 80 ed PVC		9.83	to	10.		IPLING METHOD
	END C				Sch 80		10.33		10.		E DEVELOPED
SURFA	ACE SE	EAL:	Cemer	nt			0.0	to	2.5		TER LEVEL (FT BGS)
GROU							2.5	4.			GGED BY Holmes/Rowland
SEAL:	RPACH	۲.	Benton	lite P	ellets		2.5	to	8.0		MARKS Cluster of 3 casings. NAT15-3
LOWE			10-20	Silica	Sand		8.0	to	14.		screen depths provided; NAT15-1 casing 33 ft. and screened to 14.33 ft.; and NAT1
-				Τ	-			1		15.0	to 11.83 ft. and screened to 12.5 ft.
	. 0	<u>_</u> &	≘	<u>_</u>				ပ္		15.0	is a second to the fit
DEPTH (FT BGL)	ELEV. (FT NGVD)	BLOW	SAMPLE ID	EXTENT	WE	LL DIA	GRAM	GRAPHIC			LITHOLOGIC DESCRIPTION
뭐다	H T	찍었	₩	X]		X			
	<u> </u>		ഗ്					<u> </u>			
						N		о V	Ÿ	0-5 ft. GRA	AVELLY SAND (SW-GW), 70% sand.
_	7					Ø		·• : (2):			
					NN	N ◄	- Cement	D 0			
	-					×		O			
					BBB	N		0			
	5290—							(o. C)			
								00	;:: <u>]</u>		
	-							.0	Ö		
								\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	5		
	_)	∴á		
− 5 −							Bentonite			5-6.5 ft. B	OULDERS AND COBBLES.
	-						Pellets	17	4		
	_							. O.	Ü	6.5-8.5 ft.	GRAVELLY SAND (SW-GW).
]						0.00	3.		
	5285-							J	∷∤		
							– #3	ο . C			
	-								[·]	8.5-13.5 ft.	BOULDERS AND COBBLES.
						-	PVC Sch	13	v		
	_						0.03"	B			
-10-						- -	Slotted	H	8		
	_						PVC 10-20	X			
						₩	- Silica				
	_						Sand		V		
<u> </u>								B			
	5000							H	9		
	5280-							X			
7											
	-										ft. BRUSHY BASIN MEMBER OF MORRISON ON: SHALE; very hard drilling.
- 1										ONWATE	Ort. Of ICEE, very hard draining.
. 1	-	1			1	٦					Total Depth 14.5 ft.

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			MON	ITO	RING	WE	LL C	OMPL	E.	TIO	N LOG NAT01-NAT16-1
	CT _		GROUN	ND W	ATER		H COORI				
SITE	NATU	JŔITA				HOLE	DEPTH (FT)	12.3	3	TOP OF CASING (FT) 5295.82
WELL	NUMB	ER	IAT16-1				. DEPTH				MEAS. PT. ELEV. (FT) 5295.82 SLOT SIZE (IN) 0.030
SURE	ACE CA	SING	WELL	_ INS	TALLAT	ION	INTE	ERVAL ((FT)		BIT SIZE(S) (IN) 4.0
BLANI WELL SUMP	CASII SCREE END C ACE SE	NG: EN: AP:	0.5 in.	Slotte PVC	Sch 80 ed PVC Sch 80		-2.68 11.66 12.16 0.0		11. 12. 12. 1.5	.16 .33	DRILLING METHOD HAMMER CASING ADVANCE SAMPLING METHOD DATE DEVELOPED WATER LEVEL (FT BGS) LOGGED BY Holmes/Rowland
SEAL:	RPACK	٠.	Benton	ite P	ellets		1.5	to	5.5		REMARKS Cluster of 3 casings. NAT16-1 casing
	R PAC		10-20	Silica	Sand		5.5	to	12.		and screen depths provided; NAT16-2 casing is from 0 to 9.83 ft. and screened to 10.33 ft.; and NAT16-3 casing is from 0 to 7.83 ft. and screened to 8.33 ft.
DEPTH (FT BGL)	ELEV. (FT NGVD)	BLOW	SAMPLE ID.	EXTENT	WEL	L DIAC	SRAM	GRAPHIC LOG			LITHOLOGIC DESCRIPTION
_	-		1301111			₹	- Cement			0-3.5	5 ft. SILTY SAND (SM).
- 5 -	- 5290 -				2000		Bentonite Pellets			3.5-6.	6.5 ft. GRAVEL (GW), some cobbles.
						[.]			٠	65-6	6.83 ft. BOULDERS.
 	5285 				CELLE		10-20 - Silica Sand - #1			6.83-	6.63 ft. SANDY GRAVEL (GW-SW), some cobbles.
							PVC Sch	\$0		10.5-	-10.83 ft. BOULDERS.
- 1	-						80			10.83 cobbl	3-12.25 ft. SANDY GRAVEL (GW-SW), sand, gravel and bles.
	-					-	0.03" Slotted PVC			12.25	E 12 22 6 PRI ICHY PACINI MEMPER OF MORRISON
	5280—									FORM	5-12.33 ft. BRUSHY BASIN MEMBER OF MORRISON RMATION: SHALE; very hard drilling. Total Depth 12.33 ft.
m	محا	lec	-er				ARTM				NERGY PAGE 1 OF 1 08/02/2001

	5295.75 5295.75
WELL INSTALLATION INTERVAL (FT)	
SURFACE CASING: BLANK CASING: WELL SCREEN: 0.5 in. PVC Sch 80 0.5 in. PVC Sch 80 10.33 to 10.33 SMPLING METHOD SURFACE SEAL: GROUT: SEAL: Bentonite Pellets 1.5 to 5.5 REMARKS Cluster of 3 casings and screen depths provided; NAT1 11.66 ft. and screened to 12.16 ft. WELL DIAGRAM WELL DIAGRAM WELL INSTALLATION INTERVAL (FT) BIT SIZE(S) (IN) 4.0 ADAIL DEVELOPED LHAMMER (CASING: DATE DEVELOPED LOGGED BY Holmes/Rowland LOGGED BY Holmes/Rowland Sereen depths provided; NAT1 11.66 ft. and screened to 12.16 ft. STORM OT 0.7.83 ft. and screened to 12.16 ft. STORM OT 0.83 ft. and screened to 12.16 ft. STORM OT 0.83 ft. and screened to 12.16 ft. SEAL:	ASING ADVANCE
BLANK CASING: 0.5 in. PVC Sch 80 -2.61 to 9.83 DRILLING METHOD HAMMER (WELL SCREEN 0.5 in. Slotted PVC 9.83 to 10.33 SUMP/END CAP: 0.5 in. PVC Sch 80 10.33 to 10.5 SUMP/END CAP: 0.5 in. PVC Sch 80 10.33 to 10.5 SUMP/END CAP: 0.5 in. PVC Sch 80 10.33 to 10.5 SUMP/END CAP: 0.5 in. PVC Sch 80 10.33 to 10.5 SUMP/END CAP: 0.5 in. PVC Sch 80 10.33 to 10.5 SUMP/END CAP: 0.5 in. PVC Sch 80 10.33 to 10.5 SUMP/END CAP: 0.5 in. PVC Sch 80 10.33 to 10.5 SEAL: Bentonite Pellets 1.5 to 5.5 Seath: LOGGED BY Holmes/Rowland REMARKS Cluster of 3 casings and screened to 12.16 ft.; is from 0 to 7.83 ft. and screened to 12.16 ft.; is from 0 to 7.83 ft. and screened to SUMP/END CAP: 10.20 SUMP/EN	ASING ADVANCE
SUMP/END CAP: SURFACE SEAL: Gement 0.5 in. PVC Sch 80 10.33 to 10.5 WATER LEVEL (FT BGS) LOGGED BY Holmes/Rowland SEAL: Bentonite Pellets 1.5 to 5.5 REMARKS Cluster of 3 casings and screen depths provided; NAT1 11.66 ft. and screened to 12.16 ft.; is from 0 to 7.83 ft. and screened to LITHOLOGIC DESCRIPTION WELL DIAGRAM WELL DIAGRAM Bentonite Pellets 3.5-6.5 ft. GRAVEL (GW), some cobbles.	
SURFACE SEAL: Greent 0.0 to 1.5 WATER LEVEL (FT BGS) Holmes/Rowland SEAL: Bentonite Pellets 1.5 to 5.5 Remarks Cluster of 3 casings and screen depths provided; NAT1 11.66 ft. and screened to 12.16 ft.; is from 0 to 7.83 ft. and screened to 12.16 ft.; is from 0 to 7.83 ft. and screened to 12.16 ft.; is from 0 to 7.83 ft. and screened to 12.16 ft.; is from 0 to 7.83 ft. SILTY SAND (SM). September 1.5 to 5.5 to 12.33 WELL DIAGRAM DEPTH 1.66 ft. and screened to 12.16 ft.; is from 0 to 7.83 ft. and screened to 12.16 ft.; is from 0 to 7.83 ft. SILTY SAND (SM). September 2.5290 Bentonite Pellets 2.5290 Bentonite Pellets 3.5-6.5 ft. GRAVEL (GW), some cobbles.	
Bentonite Pellets 1.5 to 5.5 REMARKS Cluster of 3 casings and screen depths provided; NAT1 1.66 ft. and screened to 12.16 ft.; is from 0 to 7.83 ft. and screened to 12.16 ft.; is from	
UPPER PACK: LOWER PACK: 10-20 Silica Sand 5.5 to 12.33 and screen depths provided; NAT1 11.66 ft. and screened to 12.16 ft.; is from 0 to 7.83 ft. and screened to 12.16 ft.; is from 0 to 7.83 ft. and screened to 12.16 ft.; is from 0 to 7.83 ft. SILTY SAND (SM). WELL DIAGRAM Bentonite Pellets 3.5-6.5 ft. GRAVEL (GW), some cobbles. 10-20 Silica Sand 6.5-6.83 ft. BOULDERS. 6.83-10.5 ft. SANDY GRAVEL (GW-SW), some cobbles.	NAT16-2 casing
WELL DIAGRAM WELL DIAGRAM STATE OF THE STA	5-1 casing is from 0
WELL DIAGRAM WELL DIAGRAM WELL DIAGRAM DHOD O-3.5 ft. SILTY SAND (SM). DHOD O-3.5 ft. SILTY SAND (SM). DHOD O-3.5 ft. SILTY SAND (SM).	
Bentonite Pellets 3.5-6.5 ft. SILTY SAND (SM). 3.5-6.5 ft. GRAVEL (GW), some cobbles. 10-20 Silica Sand 6.5-6.83 ft. BOULDERS. 6.83-10.5 ft. SANDY GRAVEL (GW-SW), s	0.00 1
5290- Bentonite Pellets 3.5-6.5 ft. GRAVEL (GW), some cobbles. 10-20 Silica Sand 6.5-6.83 ft. BOULDERS. 6.83-10.5 ft. SANDY GRAVEL (GW-SW), s	l
Bentonite Pellets 3.5-6.5 ft. GRAVEL (GW), some cobbles. 10-20 Silica Sand 6.83-10.5 ft. SANDY GRAVEL (GW-SW), s	
Bentonite Pellets 3.5-6.5 ft. GRAVEL (GW), some cobbles. 10-20 Silica Sand 6.83-10.5 ft. SANDY GRAVEL (GW-SW), s	
Bentonite Pellets 3.5-6.5 ft. GRAVEL (GW), some cobbles. 10-20 Silica Sand 6.5-6.83 ft. BOULDERS. 6.83-10.5 ft. SANDY GRAVEL (GW-SW), s	
Bentonite Pellets 3.5-6.5 ft. GRAVEL (GW), some cobbles. 10-20 Silica Sand 6.5-6.83 ft. BOULDERS. 6.83-10.5 ft. SANDY GRAVEL (GW-SW), s	
Bentonite Pellets 3.5-6.5 ft. GRAVEL (GW), some cobbles. 10-20 Silica Sand 6.5-6.83 ft. BOULDERS. 6.83-10.5 ft. SANDY GRAVEL (GW-SW), s	
Bentonite Pellets 3.5-6.5 ft. GRAVEL (GW), some cobbles. 10-20 Silica Sand 6.5-6.83 ft. BOULDERS. 6.83-10.5 ft. SANDY GRAVEL (GW-SW), s	
10-20 6.5-6.83 ft. BOULDERS. Silica Sand Sand	
10-20 6.5-6.83 ft. BOULDERS. Silica Sand 6.83-10.5 ft. SANDY GRAVEL (GW-SW), s	
10-20 6.5-6.83 ft. BOULDERS. Silica Sand Sand	
- Silica Sand 6.83-10.5 ft. SANDY GRAVEL (GW-SW), s	
- Silica Sand 6.83-10.5 ft. SANDY GRAVEL (GW-SW), s	
Sand	
	me cobbles.
-1 #/ Wind +	
PVC Sch 80	
0.03"	
-10	
10.5-10.83 ft. BOULDERS. 10.83-12.25 ft. SANDY GRAVEL (GW-SW)	sand, gravel and
cobbles.	
12.25-12.33 ft. BRUSHY BASIN MEMBER C	E MODDISON
FORMATION: SHALE; very hard drilling.	A MORRISON
7 5280 - Total Depth 12.33 f	
4 1	

	MONITORING	WELL CO	MPLE	TION LO	OG NAT01-NAT16-3			
LOCATION,CO SITE NATURITA	E	NORTH COORD EAST COORD. HOLE DEPTH (WELL DEPTH ((FT) <u>11</u> FT) <u>12.</u>	06706.27 33	DATE DRILLED 07/02/1999 SURFACE ELEV. (FT NGVD) 5293.14 TOP OF CASING (FT) 5295.75 MEAS. PT. ELEV. (FT) 5295.75			
SURFACE CASING:	WELL INSTALLATION	· ·	RVAL (FT		SLOT SIZE (IN) 0.030 BIT SIZE(S) (IN) 4.0			
BLANK CASING: WELL SCREEN: SUMP/END CAP: SURFACE SEAL: GROUT:	0.5 in. PVC Sch 80 0.5 in. Slotted PVC 0.5 in. PVC Sch 80 Cement	-2.61 7.83 8.33 0.0		 33 SAMF 5 DATE 5 WATE 	LING METHOD HAMMER CASING ADVANCE PLING METHOD DEVELOPED ER LEVEL (FT BGS) SED BY Holmes/Rowland			
SEAL: UPPER PACK: LOWER PACK:	Bentonite Pellets 10-20 Silica Sand	1.5 5.5	to 5.	5 REMA	REMARKS Cluster of 3 casings. NAT16-3 casing and screen depths provided; NAT16-1 casing is from 0			
	. 1	5.5		11.00	ft. and screened to 12.33 ft.; and NAT16-2 casing n 0 to 9.83 ft. and screened to 10.33 ft.			
DEPTH (FT BGL) ELEV. (FT NGVD) BLOW COUNTS	SAMPLE ID EXTENT THE STANDARD STANDAR	. DIAGRAM	GRAPHIC LOG		LITHOLOGIC DESCRIPTION			
		Cement		0-3.5 ft. SIL	TY SAND (SM).			
5290-		Bentonite Pellets		3.5-6.5 ft. G	RAVEL (GW), some cobbles.			
				6.5-6.83 ft. E	BOULDERS.			
5285— —10—	1000	PVC Sch 80 0.03" Slotted PVC 10-20 Silica Sand		6.83-10.5 ft.	SANDY GRAVEL (GW-SW), some cobbles. BOULDERS.			
F				10.83-12.25 cobbles.	ft. SANDY GRAVEL (GW-SW), sand, gravel and			
5280-					ft. BRUSHY BASIN MEMBER OF MORRISON N: SHALE; very hard drilling. Total Depth 12.33 ft.			
mactec	ers U.S. D	EPARTM ND JUNCTION						

	MONITORING	WELL CO	OMPLE	TION LO	OG NAT01-NAT17-1
LOCATION _,CO SITE NATURITA	A GROUND WATER NAT17-1	NORTH COORD EAST COORD. HOLE DEPTH (WELL DEPTH	(FT) 110 FT) 11.3	07135.98 33	DATE DRILLED 07/02/1999 SURFACE ELEV. (FT NGVD) 5298.41 TOP OF CASING (FT) 5300.74 MEAS. PT. ELEV. (FT) 5300.74
_	WELL INSTALLA	TION INTE	RVAL (FT)	SLOT SIZE (IN) 0.030 BIT SIZE(S) (IN) 4.0
SURFACE CASING: BLANK CASING: WELL SCREEN: SUMP/END CAP: SURFACE SEAL: GROUT: SEAL: UPPER PACK: LOWER PACK:	0.5 in. PVC Sch 80 0.5 in. Slotted PVC 0.5 in. PVC Sch 80 Cement Bentonite Chips 10-20 Silica Sand	-2.33 10.66 11.16 0.0 1.16 5.16	to 11 to 11 to 1. to 5.	.16 SAMF .33 DATE 16 WATE LOGG 16 REMA	LING METHOD HAMMER CASING ADVANCE PLING METHOD EDEVELOPED ER LEVEL (FT BGS) GED BY Holmes/Rowland ARKS Cluster of 3 casings: NAT17-1 casing creen depths provided; NAT17-2 casing is from 0 to t. and screened to 9.17 ft.; and NAT17-3 casing is
DEPTH (FT BGL) ELEV. (FT NGVD) BLOW COUNTS	SAMPLE ID. EXTENT A Page 199	LL DIAGRAM	GRAPHIC LOG		I to 6.67 ft. and screened to 7.17 ft. LITHOLOGIC DESCRIPTION
5295-		Bentonite Chips 10-20 Silica Sand #1		3-4 ft. GRAV 4-4.5 ft. SIL 4.5-6 ft. SIL 6-8 ft. SILT	TY SAND (SM) (ML)
		0.03" Slotted PVC		11-11.33 ft. FORMATION	BRUSHY BASIN MEMBER OF MORRISON N: SHALE Total Depth 11.33 ft.
macted	:-ers U.S.	DEPARTN RAND JUNCTION			GY PAGE 1 OF 1 08/02/2001

	MONITORING	WELL CO	OMPLE	TION LC	OG NAT01-NAT17-2
LOCATION , CO SITE NATURITA	A GROUND WATER NAT17-2	NORTH COORI EAST COORD. HOLE DEPTH (WELL DEPTH	(FT) <u>11</u> (FT) <u>11.</u>	07135.98· 33	DATE DRILLED 07/02/1999 SURFACE ELEV. (FT NGVD) 5298.41 TOP OF CASING (FT) 5300.74 MEAS. PT. ELEV. (FT) 5300.74
SURFACE CASING	WELL INSTALLAT		(F1) <u>9.1</u> ERVAL (F1	T)	SLOT SIZE (IN) 0.030 BIT SIZE(S) (IN) 4.0
BLANK CASING: WELL SCREEN: SUMP/END CAP: SURFACE SEAL: GROUT:	0.5 in. PVC Sch 80 0.5 in. Slotted PVC 0.5 in. PVC Sch 80 Cement	-2.33 8.67 9.17 0.0	to 9 to 9 to 1	.17 SAMP .34 DATE .16 WATE LOGG	LING METHOD HAMMER CASING ADVANCE PLING METHOD DEVELOPED ER LEVEL (FT BGS) SED BY Holmes/Rowland
SEAL: UPPER PACK: LOWER PACK:	Bentonite Chips 10-20 Silica Sand	1.16 5.16		and so	RKS Cluster of 3 casings: NAT17-2 casing creen depths provided; NAT17-1 casing is from 0 to ft. and screened to 11.16 ft.; and NAT17-3 casing
DEPTH (FT BGL) ELEV. (FT NGVD) BLOW COUNTS	SAMPLE ID.	L DIAGRAM	GRAPHIC LOG	is fron	n 0 to 6.67 ft. and screened to 7.17 ft. LITHOLOGIC DESCRIPTION
5295		Bentonite Chips 10-20 Silica Sand #2 PVC Sch 80 0 03"		3-4 ft. GRAV 4-4.5 ft. SILT 4.5-6 ft. SILT 6-8 ft. SILT (TY SAND (SM) (ML) DULDERS
macted	U.S.	Slotted PVC DEPARTM AND JUNCTION		11-11.33 ft. I FORMATION	Total Depth 11.33 ft.

	MONITORING	WELL CO	OMPLE"	TION L	OG NAT01-NAT17-3
LOCATION _, CO SITE NATURITA		NORTH COORD EAST COORD. HOLE DEPTH (WELL DEPTH	(FT) <u>110</u> FT) <u>11.3</u>	7135.98 ⁻	DATE DRILLED 07/02/1999 SURFACE ELEV. (FT NGVD) 5298.41 TOP OF CASING (FT) 5300.74 MEAS. PT. ELEV. (FT) 5300.74 SLOT SIZE (IN) 0.030
SURFACE CASING BLANK CASING: WELL SCREEN: SUMP/END CAP: SURFACE SEAL: GROUT: SEAL: UPPER PACK: LOWER PACK:	WELL INSTALLATE 0.5 in. PVC Sch 80 0.5 in. Slotted PVC 0.5 in. PVC Sch 80 Cement Bentonite Chips 10-20 Silica Sand	-2.33 6.67 7.17 0.0 1.16 5.16	to 6.6 to 7.1 to 7.3 to 1.1 to 5.1 to 11.	7 DRIL 7 SAM 4 DAT 6 WAT LOG 6 REM 33 10.6	BIT SIZE(S) (IN) 4.0 LING METHOD HAMMER CASING ADVANCE IPLING METHOD IE DEVELOPED IER LEVEL (FT BGS) IGED BY Holmes/Rowland IARKS Cluster of 3 casings: NAT17-3 casing screen depths provided; NAT17-1 casing is from 0 to 6 ft. and screened to 11.16 ft.; and NAT17-2 casing om 0 to 8.67 ft. and screened to 9.17 ft.
DEPTH (FT BGL) ELEV. (FT NGVD) BLOW COUNTS	SAMPLE ID.	LL DIAGRAM	GRAPHIC LOG	15 110	LITHOLOGIC DESCRIPTION
5295-		Bentonite Chips #3 PVC Sch 80 0.03" Slotted PVC 10-20 Silica Sand		3-4 ft. GR/ 4-4.5 ft. SI 4.5-6 ft. SI 6-8 ft. SIL ⁻¹ 8-8.66 ft. E	LTY SAND (SM)
macte		DEPARTM	IENT O	FORMATION	BRUSHY BASIN MEMBER OF MORRISON DN: SHALE Total Depth 11.33 ft. RGY PAGE 1 OF 1 08/02/2001

	MONITORING	WELLO)MDI =	TION	 _OG NAT01-NAT18-1
	GROUND WATER	NORTH COORD	D. (FT) _5	587229.97 107140.96	DATE DRILLED 07/02/1999 SURFACE ELEV. (FT NGVD) 5298.51
	IAT18-1	HOLE DEPTH	(FT) <u>11.</u> (FT) <u>11.</u>	33	TOP OF CASING (FT) 5301.19 MEAS. PT. ELEV. (FT) 5301.19
SURFACE CASING:	WELL INSTALLAT	ION INTE	ERVAL (FT	Γ)	SLOT SIZE (IN) 0.030 BIT SIZE(S) (IN) 4.0
BLANK CASING: WELL SCREEN: SUMP/END CAP: SURFACE SEAL: GROUT: SEAL: UPPER PACK: LOWER PACK:	0.5 in. PVC Sch 80 0.5 in. Slotted PVC 0.5 in. PVC Sch 80 Cement Bentonite Pellets 10-20 Silica Sand	-2.68 10.66 11.16 0.0 1.67	to 12 to 13 to 1. to 5.	1.16 SAI 1.33 DA' 67 WA LOX 0 REI	LLING METHOD HAMMER CASING ADVANCE MPLING METHOD TE DEVELOPED TER LEVEL (FT BGS) GGED BY Holmes/Rowland MARKS Cluster of 3 casings: NAT18-1 casing screen depths provided; NAT18-2 casing is from 0 to
		5.0	Ţ	1.33 8.67	7 ft. and screened to 9.17 ft.; and NAT18-3 casing is 0 to 6.67 ft. and screened to 7.17 ft.
DEPTH (FT BGL) ELEV. (FT NGVD) BLOW COUNTS	SAMPLE ID EXTENT	L DIAGRAM	GRAPHIC LOG		LITHOLOGIC DESCRIPTION
		Cement			.TY SAND (SM).
5295-	\$30000 \$30000 \$30000	Bentonite Pellets		4-5.5 ft. S	
	ETT.11	10-20		5.5-9 ft. G	RAVEL (GW), some cobbles.
5290-		Sand			
		#1		0.44.4. = -	N.H.S.F.D.O.
			04	9-11 ft. BC	DULDERS, some cobbles.
-10-		PVC Sch 80 . 0.03"	3		
		Slotted PVC		11-11.3 ft. FORMATION	BRUSHY BASIN MEMBER OF MORRISON DN: SHALE Total Depth 11.33 ft.
mactec	ers U.S. D	DEPARTM AND JUNCTION	ENT O	F ENER	RGY PAGE 1 OF 1 08/02/2001

					OG NAT01-NAT18-2
PROJECT <u>UMTR/</u> LOCATION , CO	A GROUND WATER	NORTH COORD.	D. (FT) <u>5</u> (FT) <u>11</u>	07140.96	DATE DRILLED 07/02/1999 SURFACE ELEV. (FT NGVD) 5298.51
SITE NATURITA WELL NUMBER	NAT18-2	HOLE DEPTH (TOP OF CASING (FT) 5301.19 MEAS. PT. ELEV. (FT) 5301.19
WELL WOMBER	WELL INSTALLA		RVAL (FT		SLOT SIZE (IN) 0.030
SURFACE CASING: BLANK CASING: WELL SCREEN: SUMP/END CAP: SURFACE SEAL: GROUT:		-2.68 8.67	to 8. to 9. to 9.	67 DRIL 17 SAM 34 DATI 67 WAT LOG	BIT SIZE(S) (IN)
SEAL: UPPER PACK:				and s	ARKS Cluster of 3 casings: NAT18-2 casing screen depths provided; NAT18-1 casing is from 0 to
LOWER PACK:	10-20 Silica Sand	5.0	to 1		6 ft. and screened to 11.16 ft.; and NAT18-3 casing m 0 to 6.67 ft. and screened to 7.17 ft.
DEPTH (FT BGL) ELEV. (FT NGVD) BLOW COUNTS	SAMPLE ID. EXTENT ARE ARE ARE ARE ARE ARE ARE AR	LL DIAGRAM	GRAPHIC LOG		LITHOLOGIC DESCRIPTION
-		⋖ — Cement		0-3 ft. SIL	TY SAND (SM).
5295-	SSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSS	Bentonite Pellets		3-4 ft. GRA 4-5.5 ft. Sil	LVEL (GW), some cobbles. T (ML).
5290-		10-20 Silica Sand #2 PVC Sch 80 0.03"		5.5-9 ft. GF	RAVEL (GW), some cobbles.
-10-	<u> </u>	- Slotted PVC			BRUSHY BASIN MEMBER OF MORRISON ON: SHALE Total Depth 11.33 ft.
macted	-ers U.S.	DEPARTN RAND JUNCTION	TENT C N OFFICE,) F ENEF COLORADO	RGY PAGE 1 OF 1 08/02/2001

	MONITORING	WELL CO	MPLE	ETION LOG NAT01-NAT18-3
LOCATIONCO SITE NATURITA	E H NAT18-3 V	NORTH COORD EAST COORD. HOLE DEPTH (WELL DEPTH ((FT) <u>110</u> FT) <u>11.3</u> (FT) <u>7.34</u>	33 TOP OF CASING (FT) 5301.19 4 MEAS. PT. ELEV. (FT) 5301.19 SLOT SIZE (IN) 0.030
SURFACE CASING: BLANK CASING: WELL SCREEN: SUMP/END CAP: SURFACE SEAL: GROUT: SEAL: UPPER PACK: LOWER PACK:	WELL INSTALLATION 0.5 in. PVC Sch 80 0.5 in. Slotted PVC 0.5 in. PVC Sch 80 Cement Bentonite Pellets 10-20 Silica Sand	-2.68 6.67 7.17 0.0 1.67	to 7. to 7. to 1.0 to 5.0	BIT SIZE(S) (IN) 4.0 67 DRILLING METHOD HAMMER CASING ADVANCE 1.17 SAMPLING METHOD 34 DATE DEVELOPED 67 WATER LEVEL (FT BGS) LOGGED BY Holmes/Rowland
DEPTH (FT BGL) ELEV. (FT NGVD) BLOW COUNTS	SAMPLE ID. EXTENT	DIAGRAM	GRAPHIC LOG	from 0 to 8.67 ft. and screened to 9.17 ft. LITHOLOGIC DESCRIPTION
5295- - 5		#3 PVC Sch 80 0.03° Slotted PVC 10.20 Silica Sand		0-3 ft. SILTY SAND (SM). 3-4 ft. GRAVEL (GW), some cobbles. 4-5.5 ft. SILT (ML). 5.5-9 ft. GRAVEL (GW), some cobbles. 9-11 ft. BOULDERS, some cobbles.
				FORMATION: SHALE Total Depth 11.33 ft.
mactec		EPARTM ND JUNCTION		PAGE 1 OF 1 08/02/2001

	ECT L		GROUN	D W	ATER	NOR1	TH COORD	D. (FT) (FT)	58722 110714	24.44 DATE DRILLED 07/02/1999 5.63 SURFACE ELEV. (FT NGVD) 5298.67
SITE	NATŪ	IRITA	IAT19			HOLE	E DEPTH (L DEPTH :	FT) <u>1</u>	1.33	TOP OF CASING (FT)5301.36
VELL	. NUNBI	=K!				TION		(C')! ERVAL (I		SLOT SIZE (IN) 0.020
SLAN VELL SUMP SURF SROU SEAL JPPEI		NG: EN: AP: (AL:	2 in. P	VC Solution	ch 40 PVC ch 40 ellets	TION	-2.69 6.0 11.0 0.0 1.33	to to to to	6.0 11.0 11.33 1.33 5.0	BIT SIZE(S) (IN) 4.0 DRILLING METHOD HAMMER CASING ADVANCE SAMPLING METHOD DATE DEVELOPED WATER LEVEL (FT BGS) LOGGED BY Holmes/Rowland REMARKS
(FT BGL)	ELEV. (FT NGVD)	BLOW	SAMPLE ID.	EXTENT	WE	LL DIA	GRAM	GRAPHIC LOG		LITHOLOGIC DESCRIPTION
 -							— Cement		0-3	ft. SILTY SAND (SM).
5 —	5295— -					▼	_ Bentonite Pellets			ft. GRAVEL (GW), some cobbles. ft. SILT (ML).
-	_						_ PVC Sch 40			
-	-						10-20 — Silica Sand			
-10	5290—						0.020" — Slotted PVC		8-1	1 ft. GRAVEL (GW), some cobbles.
-				:						-11.33 ft. BRUSHY BASIN MEMBER OF MORRISON RMATION: SHALE Total Depth 11.33 ft.

	MONITORING	WELL C	OMPL	ETION LOG NAT01-NAT20
LOCATION _ CO SITE NATURITA		NORTH COORD EAST COORD. HOLE DEPTH (WELL DEPTH ((FT) <u>11</u> FT) <u>10.</u>	07776.56 SURFACE ELEV. (FT NGVD) 5306.28 50 TOP OF CASING (FT) 5309.29 60 MEAS. PT. ELEV. (FT) 5309.29
SURFACE CASING:	WELL INSTALLATI	ION INTE	RVAL (FT	SLOT SIZE (IN) 0.020 BIT SIZE(S) (IN) 4.0
BLANK CASING: WELL SCREEN: SUMP/END CAP: SURFACE SEAL: GROUT:	2 in. PVC Sch 40 2 in. Slotted PVC 2 in. PVC Sch 40 Cement	-3.01 5.17 10.17 0.0	to 10	
SEAL: UPPER PACK:	Bentonite Pellets	2.0	to 5.	
LOWER PACK:	10-20 Silica Sand	5.0	to 10	2.5
DEPTH (FT BGL) ELEV. (FT NGVD) BLOW COUNTS	SAMPLE ID. EXTENT THE STENT THE STENT EXTENT	L DIAGRAM	GRAPHIC LOG	LITHOLOGIC DESCRIPTION
5305—		Cement		0-1.5 ft. SANDY GRAVEL (GW-SW).
		Bentonite Pellets PVC Sch 40		1.5-7.5 ft. COBBLES; with a boulder from 7.0 ft. to 7.5 ft.
5300		10-20 Silica Sand		
		Slotted PVC		7.5-8.5 ft. GRAVEL (GW), some cobbles. 8.5-10.5 ft. BRUSHY BASIN MEMBER OF MORRISON FORMATION: SHALE; weathered bedrock from 8.5 to 10.0 ft. Lost
-10-				piece of metal from steel casing downhole (strip 1/2" x 4").
5295				Total Depth 10.5 ft.
mactec	ers U.S. E	DEPARTM AND JUNCTION		F ENERGY PAGE 1 OF 1 08/02/2001

.

										ETION LOG NAT01-NAT21-1
PROJE	ECT TION		GROUN	AD N	/ATER_	NOR1	TH COORI). (FT) (FT)) <u>5</u> 11	586313.05 DATE DRILLED <u>07/03/1999</u> 107772.43 SURFACE ELEV. (FT NGVD) <u>5306.29</u>
SITE	-	JRITA				HOLE	DEPTH (FT)	10.	
WELL	NUMB	ER 1	NAT21-1				L DEPTH			.00 MEAS. PT. ELEV. (FT) 5309.07
			WELI	L INS	TALLA	ION	INTE	RVAL	. (FT	SLOT SIZE (IN) 0.030 BIT SIZE(S) (IN) 4.0
SURF	ACE CA	ASING:							•	DELL'ING METHOD LIAMMED CACING ADVANCE
	K CASI				Sch 80 ed PVC		-2.78 9.33	to to		9.83 SAMPLING METHOD HAMMER CASING ADVANCE
	. SCREI /END C				Sch 80		9.83	to		0.0 DATE DEVELOPED
	ACE SE		Cemer				0.0	to	1.	.5 WATER LEVEL (FT BGS)
GROU									_	LOGGED BY Holmes/Rowland
SEAL	: R PACH	۲۰	Bentor	nite P	ellets		1.5	to	3.	REMARKS Cluster of 3 casings: NAT21-1 casing
	R PAC		10-20	Silica	Sand		3.5	to	10	0.0 and screen depths provided; NAT21-2 casing is from 0 7.33 ft. and screened to 7.83 ft.; and NAT21-3 casing is
				T	T			1	-	from 0 to 5.33 ft. and screened to 5.83 ft.
DEPTH (FT BGL)	ELEV. (FT NGVD)	BLOW	SAMPLE ID	EXTENT	WEL	L DIA	GRAM	GRAPHIC	50.	LITHOLOGIC DESCRIPTION
<u> </u>	(FT	<u>■</u> 8	SAM	ă			····	R.		
	-					_	Cement			0-1 ft. ELASTIC SILT (MH), some clay.
-	5305—									1-8.5 ft. SANDY GRAVEL (GW-SW), small gravel with large
	5505					Y				grained sand. Gravel increases to cobble size with depth and san decreases.
-										3
	_					4	Bentonite Pellets			e.
_							relieus		\mathbf{H}	
	-									
-	_									
- 5 —										3
										r.
_										
	5300-					:	10-20	Ft		
							SilicaSand		O,	
_							•		. i.	.1
						 	#1			
	}									1
	_					_	_ PVC Sch	A.		C S 40 0 B DDI ICUIV PACIN MEMBER OF MODDICON
_							80			8.5-10.0 ft. BRUSHY BASIN MEMBER OF MORRISON FORMATION: SHALE; weathered bedrock.
_	-						0.03"			
					E	1	SlottedPVC			
-10—	_				processed E	-				Total Donth 10.0.9
										Total Depth 10.0 ft.
-	1									
	5295									
_	1			1	1	1				

		MONITORING	WELL CO	OMPLE	TION LOG NAT01-NAT21-2
PROJECT LOCATIO SITE N WELL NU	N , CO IATURITA	GROUND WATER NAT21-2 WELL INSTALLA	NORTH COORI EAST COORD. HOLE DEPTH (WELL DEPTH	(FT) <u>11</u> (FT) <u>10.</u>	TOP OF CASING (FT) 5309.07 D MEAS. PT. ELEV. (FT) 5309.07 SLOT SIZE (IN) 0.030
SURFACE BLANK O WELL SO SUMP/EN SURFACE GROUT: SEAL: UPPER P. LOWER F	CREEN: ID CAP: E SEAL: ACK:	0.5 in. PVC Sch 80 0.5 in. Slotted PVC 0.5 in. PVC Sch 80 Cement Bentonite Pellets 10-20 Silica Sand	-2.78 7.33	to 7. to 7. to 8. to 1.	DRILLING METHOD HAMMER CASING ADVANCE SAMPLING METHOD DATE DEVELOPED WATER LEVEL (FT BGS) LOGGED BY Holmes/Rowland
DEPTH (FT BGL) ELEV.	(FT NGVD) BLOW COUNTS	SAMPLE ID. EXTENT	LL DIAGRAM	GRAPHIC LOG	from 0 to 5.33 ft. and screened to 5.83 ft. LITHOLOGIC DESCRIPTION
5 —	- - - - - - -		Cement Bentonite Pellets 10-20 Silica Sand #2 PVC Sch 80 0.03" Slotted PVC		0-1 ft. ELASTIC SILT (MH), some clay. 1-8.5 ft. SANDY GRAVEL (GW-SW), small gravel with large grained sand. Gravel increases to cobble size with depth and sand decreases.
10	- - :95				8.5-10.0 ft. BRUSHY BASIN MEMBER OF MORRISON FORMATION: SHALE; weathered bedrock. Total Depth 10.0 ft.
ma	ctec		DEPARTM RAND JUNCTION		F ENERGY PAGE 1 OF 1 08/02/2001

LOCAT	ION _	, co	GROUN	DW	ATER	EAST	H COORD	(FT) _	110	07772.43 SURFACE ELEV. (FT NGVD) 5306.29
SITE WELL!			IAT21-3		-		DEPTH (. ,	10.0 6.00	0 MEAS. PT. ELEV. (FT) 5309.07
				. INS	TALLAT	ION	INTE	ERVAL	(FT)	SLOT SIZE (IN) 0.030 BIT SIZE(S) (IN) 4.0
SURFA BLANK WELL: SUMP/E SURFA GROUT SEAL: UPPER	CASII SCREE END C. CE SE	NG: EN: AP: AL:	0.5 in.	Slotte PVC t	Sch 80		-2.78 5.33 5.83 0.0	to to to to	5.3 5.8 6.0 1.5	83 SAMPLING METHOD
LOWER			10-20	Silica	Sand		3.5	to	10	9.33 ft. and screened to 9.83 ft.; and NAT21-2 casin from 0 to 7.33 ft. and screened to 7.83 ft.
DEPTH (FT BGL)	ELEV. (FT NGVD)	BLOW	SAMPLE ID.	EXTENT	WEL	L DIA	GRAM	GRAPHIC	}	LITHOLOGIC DESCRIPTION
	-					-	Cement			0-1 ft. ELASTIC SILT (MH), some clay. 1-8.5 ft. SANDY GRAVEL (GW-SW), small gravel with large
- 5 -	5300				(31117)		Bentonite Pellets #3 PVC Sch 80 0.03" Slotted PVC 10-20 Silica Sand			
	_									8.5-10.0 ft. BRUSHY BASIN MEMBER OF MORRISON FORMATION: SHALE; weathered bedrock.
-10-	5295									Total Depth 10.0 ft.

			MON	ITORING	WE	LL C	OMPLI	ETION	LOG NAT01-NAT22-1
PROJECT LOCATION SITE WELL N	ION NATU	, CO JRITA	GROUN	ID WATER	EAST HOLE	COORD.	(FT) 1	586318.78 107768.24 .00 .00	
SURFA				INSTALLA			ERVAL (F		SLOT SIZE (IN) 0.030 BIT SIZE(S) (IN) 4.0
BLANK WELL S SUMP/E SURFAG GROUT SEAL: UPPER	CASII SCREE END C CE SE	NG: EN: AP: :AL:	0.5 in. 3 0.5 in. 3 Cemen	PVC Sch 80 Slotted PVC PVC Sch 80 It		-2.76 9.33 9.83 0.0	to 9 to 1 to 1	0.83 SA 0.0 DA 1.5 W LC 3.5 RE	ATER LEVEL (FT BGS) DGGED BY Holmes/Rowland EMARKS Cluster of 3 casings: NAT22-1 casing
LOWER	PACI		10-20 8	Silica Sand		3.5	to 1	$0.0 \frac{7}{7}$	d screen depths provided; NAT22-2 casing is from 0 to 33 ft. and screened to 7.83 ft.; and NAT22.3 casing is
DEPTH (FT BGL)	ELEV. (FT NGVD)	BLOW	SAMPLE ID.	EXTENT ME	LL DIAG	SRAM	GRAPHIC LOG		om 0 to 5.33 ff, and screened to 5.83 ft. LITHOLOGIC DESCRIPTION
	5305—					Cement			LTY SAND (SM). Light tan in color. GRAVEL (GW), samll gravel and small cobbles. Light tan
	-					Bentonite Pellets		3-8 ft. G	SHALE, some small size gravel. Light tan in color. RAVEL (GW), gravel increases in size with depth. Color to dark brown.
	5300-			CIII		10-20 Silica Sand #1 PVC Sch 80		SHALE;	BRUSHY BASIN MEMBER OF MORRISON FORMATION: weathered bedrock with large cobbles the first few inches.
-10-	-					0.03" Slotted PVC		Daik gra	y in color. Total Depth 10.0 ft.
	5295-	ec	-er:	U.S.				OF ENE	

	, CO RITA	GROUN	W DI	ATER	EAST HOLE	TH COORD COORD. DEPTH (DEPTH ((FT)	110776 0.00		DATE DRILLED 07/04/1999 SURFACE ELEV. (FT NGVD) 5306.29 TOP OF CASING (FT) 5309.05 MEAS. PT. ELEV. (FT) 5309.05 SLOT SIZE (IN) 0.030
SURFACE CAS BLANK CASIN WELL SCREE SUMP/END CA SURFACE SEA GROUT: SEAL: UPPER PACK: LOWER PACK	G: N: NP: AL:	0.5 in. 0.5 in. 0.5 in. Cemen Benton	PVC Slotte PVC it	d PVC Sch 80 ellets	TION	-2.76 7.33 7.83 0.0 1.5	to to to	7.33 7.83 8.0 1.5 3.5	SAMP DATE WATE LOGG REMA and so 9.33 ft	BIT SIZE(S) (IN) 4.0 LING METHOD HAMMER CASING ADVANCE LING METHOD DEVELOPED ER LEVEL (FT BGS) EED BY Holmes/Rowland IRKS Cluster of 3 casings: NAT22-2 casing creen depths provided; NAT22-1 casing is from 0 to and screened to 9.83 ft.; and NAT22.3 casing is to 5.33 ft. and screened to 5.83 ft.
DEPTH (FT BGL) ELEV (FT NGVD)	BLOW	SAMPLE ID.	EXTENT	WE	LL DIA	GRAM	GRAPHIC LOG			LITHOLOGIC DESCRIPTION
5305						- Cement Bentonite Pellets 10-20 Silica Sand #2 PVC Sch 80 0.03" Slotted PVC		2.5 in c	.5 ft. GR/ color. -3 ft. SH/ ft. GRAN anges to d	AVEL (GW), samil gravel and small cobbles. Light tan ALE, some small size gravel. Light tan in color. ALE, some small size gravel. Light tan in c

PROJECT UMTRA LOCATION , CO SITE NATURITA	GROUND WATER IAT22-3	NORTH COORD EAST COORD. HOLE DEPTH (WELL DEPTH	D. (FT) <u>1</u> (FT) <u>1</u>	586318.78 107768.24 0.00	DATE DRILLED 07/04/1999 SURFACE ELEV. (FT NGVD) 5306.29 TOP OF CASING (FT) 5309.05 MEAS. PT. ELEV. (FT) 5309.05
SURFACE CASING: BLANK CASING: WELL SCREEN: SUMP/END CAP: SURFACE SEAL: GROUT: SEAL: UPPER PACK: LOWER PACK:	WELL INSTALLAT 0.5 in. PVC Sch 80 0.5 in. Slotted PVC 0.5 in. PVC Sch 80 Cement Bentonite Pellets 10-20 Silica Sand	-2.76 5.33 5.83 0.0 1.5	to sto to to	5.33 DRILL 5.83 SAMP 6.0 DATE 1.5 WATE LOGG 3.5 REMA	SLOT SIZE (IN) 0.030 BIT SIZE(S) (IN) 4.0 LING METHOD HAMMER CASING ADVANCE PLING METHOD DEVELOPED ER LEVEL (FT BGS) BED BY Holmes/Rowland ARKS Cluster of 3 casings: NAT22-2 casing preen depths provided; NAT22-1 casing is from 0 to a casing streen depths provided; NAT22-1 casing is streen depths provided; NAT22-2 casing is and screened to 9.83 ft.; and NAT22-2 casing is
DEPTH (FT BGL) ELEV. (FT NGVD) BLOW COUNTS	SAMPLE ID. EXTENT Tag	L DIAGRAM	GRAPHIC LOG		to 7.33 ft. and screened to 7.83 ft. LITHOLOGIC DESCRIPTION
5305-		Bentonite Pellets #3 PVC Sch 80 0 03" Slotted PVC 10-20 Silica Sand		1-2.5 ft. GR/in color. 2.5-3 ft. SH/A 3-8 ft. GRAN changes to d	SHY BASIN MEMBER OF MORRISON FORMATION: thered bedrock with large cobbles the first few inches.
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LOCA SITE	NOIT. JTAN	, CO JRITA	GROUN	ID W	ATER	NORTH COOR EAST COORD HOLE DEPTH WELL DEPTH	. (FT)	110629 0.00	290.35 SURFACE ELEV. (FT NGVD) 5287.81 TOP OF CASING (FT) 5290.19
WELL	. NUMB	EK!	NAT23						SLOT SIZE (IN) 0.020
BLAN WELL SUMP SURF. GROU SEAL UPPEI		NG: EN: AP: EAL:	2 in. P\ 2 in. SI	/C S otted /C S t	ch 40 PVC ch 40 ellets	-2.38 4.67 9.67 0.0 1.0	to to to	4.67 9.67 10.0 1.0 4.0	SAMPLING METHOD DATE DEVELOPED WATER LEVEL (FT BGS) LOGGED BY Holmes/Rowland REMARKS
DEPTH (FT BGL)	ELEV. (FT NGVD)	BLOW	SAMPLE ID.	EXTENT	WE	LL DIAGRAM	GRAPHIC LOG		LITHOLOGIC DESCRIPTION
 	5285					Bentonite Pellets PVC Sch 40 10-20		3.5	-3.5 ft. SILTY SAND (SM), light tan in color. -5.7 ft. SANDY GRAVEL (GW-SW), fine sand with some sitt. ight tan in color.
- 5 -	5280-					Silica Sand 0.020" Slotted PVC		6 bro	-8.5 ft. SANDY GRAVEL (GP-SP), coarse grained sand. Da prown in color. 5-10 ft. BRUSHY BASIN MEMBER OF MORRISON FORMA BHALE; weathered bedrock. Dark brown in color.
10 <i>-</i>									Total Depth 10.0 ft.

								LOG NAT01-NAT24	
PROJE	ECT TION	UMTRA CO	GROUN	ID WATER	NORTH COORD.				
SITE	<u>NAT</u>	JRITA			HOLE DEPTH	(FT) 9.	50	TOP OF CASING (FT) 5292.34	
WELL	NUMB	ER _N	AT24		WELL DEPTH	(FT) <u>9.</u>	50	MEAS. PT. ELEV. (FT) 5292.34	
			WELL	.INSTALLA	TION INTE	ERVAL (F	T)	SLOT SIZE (IN) 0.020 BIT SIZE(S) (IN) 4.0	
SURFACE CASING: BLANK CASING: WELL SCREEN: SUMP/END CAP: SURFACE SEAL: GROUT:		2 in. PVC Sch 40 2 in. Slotted PVC 2 in. PVC Sch 40 Cement		-2.53 4.7 9.17 0.0	to 9	9.17 SA 9.5 DA 1.0 W	HAMMER CASING ADVANCE MPLING METHOD MTE DEVELOPED ATER LEVEL (FT BGS) MGGED BY Holmes/Rowland		
SEAL:			Benton	ite Pellets	1.0	to 3		MARKS	
UPPER PACK: LOWER PACK:		10-20 Silica Sand		3.0	to 9	9.5			
DEPTH (FT BGL)	ELEV. (FT NGVD)	BLOW COUNTS	SAMPLE ID.	EXTENT	LL DIAGRAM	GRAPHIC LOG		LITHOLOGIC DESCRIPTION	
_	_				Cement		0-5.75 ft.	SILTY SAND (SM), dark brown in color.	
_	_				Bentonite Pellets				
- 5 —	5285				PVC Sch 40 10-20 Silica				
-	_				Sand 0.020"		5.75-8 ft.	GRAVEL (GW), some cobbles.	
-	-				Slotted PVC		9054	PRINCIPLE OF MORRISON FORMATION	
-	_							BRUSHY BASIN MEMBER OF MORRISON FORMATION veathered bedrock.	
-10-	5280							Total Depth 9.5 ft.	
m	محا	lec	-er:	U.S.	DEPARTM AND JUNCTION				

PRO I	CT	IMITOA	GROUN	יעי עו	ATER	NOP:	TH COORI	O (FT)	589005	59 DA	TE DRILLED (7/05/1999	
	_	, CO	GIVOOI	٧٧ ت	MILK		COORD.				RFACE ELEV. (I		
	NATĪ						DEPTH (OF CASING (F		
NELL	NUMB	ER N	IAT25			WEL	L DEPTH	(FT) 15	.50		AS. PT. ELEV. (F		6.55
			WELL	_ INS	TALLA	TION	INTE	ERVAL (F	T)		OT SIZE (IN) SIZE(S) (IN)		<u> </u>
	ACE CA		a : =				0.47	4. 4	0.47		IETHOD HAMI		NG ADVANCE
	K CASI SCREE		2 in. P\ 2 in. SI				-2.47 10.17		10.17 15.17	SAMPLING		WEI (07 (01	NO NEW MICE
	END C		2 in. 5				15.17		15.5	DATE DEVE			
	ACE SE		Cemer		·		0.0		2.0		/EL (FT BGS)		
GROU	T:									LOGGED B	Y Holmes/Rov	vland	
SEAL:		_	Benton	ite P	ellets		2.0	to 6	3.0	REMARKS			
	R PACK		10-20	Silica	Sand		6.0	to 1	15.5				
_	<u> </u>	m	<u>Ö</u>	Ι. Ι				0					
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DEPTH (FT BGL)	۳ž	BLOW COUNTS	SAMPLE	EXTENT	VVE	LL DIA	GKAM	GRAPHIC LOG		LITHC	LOGIC DESCRI	FHON	
ᄪ	ELEV. (FT NGVD)	~ ŭ	SA	Ш				ত					
							_		0-5 ft	. SILTY SAND	(SM), dark bown.		
╡	4						 Cement 		7				
						X							
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4	_								:				
							Bentonite		1				
4	5290-						Pellets		-				
- 5 —									-			* *	
~ <u> </u>	7								5-7 ft	. ELASTIC SIL	T (MH), light brow	wn in color.	
4	4												
٦	+					. :			- 7-15	ft. SAND (SW), fine to medium (grained, ligh	nt brown in color.
_	ا_						_ PVC Sch		•				
							40		•				
-	5285					· [-]			:				
									•				
-10-	+								:				
							10-20 – Silica		:				
						. [Sand						
\dashv	4						0.020"	:::::::::::::::::::::::::::::::::::::	:				
	-					-	 Slotted 	::::::: :::::::::::::::::::::::::::::	:				
٦	7						PVC		:				
_	5280-												
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-15—	4					: :					Y BASIN MEMBER		RISON
J									FOR	MATION: SHA	E; light brown in o		
1	7]			Total Depth	15.5 II.	
4	4												
4	-							1					
4	5275-												
İ	3213												
				لبل	L			L	.1				

OCATION, CO ITENATURITA	GROUND WATER	EAST COORD. HOLE DEPTH ((FT) 110 FT) 16.0	06014.15 SURFACE ELEV. (FT NGVD) 5297.90 TOP OF CASING (FT) 5300.21
VELL NUMBER _ N	IAT26	WELL DEPTH (SLOT SIZE (IN) 0.020
URFACE CASING: LANK CASING: /ELL SCREEN: UMP/END CAP: URFACE SEAL: ROUT: EAL: PPER PACK: OWER PACK:	WELL INSTALLA 2 in. PVC Sch 40 2 in. Slotted PVC 2 in. PVC Sch 40 Cement Bentonite Pellets 10-20 Silica Sand	-2.31 10.67 15.67 0.0 2.0	to 15	DRILLING METHOD HAMMER CASING ADVANCE SAMPLING METHOD DATE DEVELOPED WATER LEVEL (FT BGS) LOGGED BY Holmes/Rowland REMARKS
(FT BGL) ELEV. (FT NGVD) BLOW COUNTS	SAMPLE ID. EXTENT A	LL DIAGRAM	GRAPHIC LOG	LITHOLOGIC DESCRIPTION
5295-		Bentonite Pellets PVC Sch 40 10-20 Silica Sand 0.020' Slotted PVC		0-4 ft. SANDY GRAVEL (GW-SW), dark brown. 4-15 ft. GRAVELLY SAND (SW-GW), coarse sand with small gravel, dark brown. 15-16 ft. BRUSHY BASIN MEMBER OF MORRISON FORMATION SHALE; dark brown weathered bedrock. Total Depth 16.0 ft.

	MONITORING	WELL CO	OMPLE	TION LO	S NAT01-NAT27-1
PROJECT UMTRA LOCATION , CO SITE NATURITA WELL NUMBER N	GROUND WATER	NORTH COORD EAST COORD HOLE DEPTH WELL DEPTH	(FT) <u>11</u> (FT) <u>7.3</u>	07200.51 3	DATE DRILLED 07/05/1999 SURFACE ELEV. (FT NGVD) 5294.56 TOP OF CASING (FT) 5297.53 MEAS. PT. ELEV. (FT) 5297.53
	WELL INSTALLAT		RVAL (F1		SLOT SIZE (IN) 0.030 BIT SIZE(S) (IN) 4.0
SURFACE CASING: BLANK CASING: WELL SCREEN: SUMP/END CAP: SURFACE SEAL: GROUT: SEAL:	0.5 in. PVC Sch 80 0.5 in. Slotted PVC 0.5 in. PVC Sch 80 Cement Bentonite Pellets	-2.97 6.66 7.16 0.0	6.66 to 7.16 SAMPLING METHOD 7.16 to 7.33 DATE DEVELOPED 0.0 to 1.0 WATER LEVEL (FT BG LOGGED BY Holmes		EVELOPED LEVEL (FT BGS) D BY Holmes/Rowland KS Cluster of 3 casings: NAT27-1 casing
UPPER PACK: LOWER PACK:	10-20 Silica Sand	2.33	to 7	.33 4.66 ft. a	en depths provided; NAT27-2 casing is from 0 to and screened to 5.16 ft.; and NAT27-3 casing is
DEPTH (FT BGL) ELEV. (FT NGVD) BLOW COUNTS	SAMPLE ID.	LL DIAGRAM	GRAPHIC LOG		THOLOGIC DESCRIPTION
5290-		Dement Bentonite Pellets 10-20 Silica Sand #1 PVC Sch 80 0.03" Slotted PVC		2.5-7 ft. GRAV brown in color.	SAND (SM), light brown in color. EL (GW), some cobbles with coarse sand, light HY BASIN MEMBER OF MORRISON FORMATION: Total Depth 7.33 ft.
5285- 10					
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	MONITORING	WELL CO	OMPLE	TION LO	OG NAT01-NAT27-2	
LOCATION , CO SITE NATURITA	A GROUND WATER NAT27-2	NORTH COOR EAST COORD. HOLE DEPTH WELL DEPTH	(FT) 11 (FT) 7.3	07200.51 3	DATE DRILLED 07/05/1999 SURFACE ELEV. (FT NGVD) 5294.56 TOP OF CASING (FT) 5297.50 MEAS. PT. ELEV. (FT) 5297.50	
SURFACE CASING:	WELL INSTALLAT		ERVAL (F1		SLOT SIZE (IN) 0.030 BIT SIZE(S) (IN) 4.0	
BLANK CASING: WELL SCREEN: SUMP/END CAP: SURFACE SEAL: GROUT: SEAL: UPPER PACK: LOWER PACK:	0.5 in. PVC Sch 80 0.5 in. Slotted PVC 0.5 in. PVC Sch 80 Cement Bentonite Pellets 10-20 Silica Sand	-2.94 4.66 5.16 0.0 1.0	to 5 to 5 to 1 to 2	.16 SAMP .33 DATE .0 WATE LOGG .33 REMA	HAMMER CASING ADVANCE AMPLING METHOD DATE DEVELOPED WATER LEVEL (FT BGS) OGGED BY Holmes/Rowland EMARKS Cluster of 3 casings: NAT27-2 casing and screen depths provided; NAT27-1 casing is from 0	
DEPTH (FT BGL) ELEV. (FT NGVD) BLOW COUNTS	SAMPLE ID.	LL DIAGRAM	GRAPHIC LOG	from C	t. and screened to 7.16 ft.; and NAT27-3 casing is 0 to 2.66 ft. and screened to 3.16 ft. LITHOLOGIC DESCRIPTION	
5290-		Bentonite Pellets #2 PVC Sch 80 0.03" Slotted PVC 10-20 Sliica Sand		2.5-7 ft. GR/ brown in cold	AVEL (GW), some cobbles with coarse sand, light or. USHY BASIN MEMBER OF MORRISON FORMATION:	
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PROJECT UMTR	A GROUND WATER	NORTH COORD	D. (FT) _	587776.30	OG NAT01-NAT27-3 DATE DRILLED 07/05/1999 SURFACE ELEV. (FT NGVD) 5294.56
SITE NATURITA WELL NUMBER	NAT27-3	HOLE DEPTH (TOP OF CASING (FT) 5297.51 5297.51
SURFACE CASING	WELL INSTALLA		RVAL (F	, , , , , , , , , , , , , , , , , , ,	SLOT SIZE (IN) 0.030 BIT SIZE(S) (IN) 4.0
BLANK CASING: WELL SCREEN: SUMP/END CAP: SURFACE SEAL: GROUT: SEAL: UPPER PACK:	0.5 in. PVC Sch 80 0.5 in. Slotted PVC 0.5 in. PVC Sch 80 Cement Bentonite Pellets	2.66 to 3. 3.16 to 3. 0.0 to 1.		2.66 DRILLING METHOD HAMMER CASING ADV. 3.16 SAMPLING METHOD 3.33 DATE DEVELOPED 1.0 WATER LEVEL (FT BGS) LOGGED BY Holmes/Rowland 2.33 REMARKS Cluster of 3 casings: NAT27-3 casing is	
LOWER PACK:	10-20 Silica Sand	2.33	to 7	6.66	ft. and screened to 7.16 ft.; and NAT27-2 casing is
DEPTH (FT BGL) ELEV. (FT NGVD) BLOW COUNTS	SAMPLE ID. EXTENT	LL DIAGRAM	GRAPHIC LOG	from	0 to 4.66 ft. and screened to 5.16 ft. LITHOLOGIC DESCRIPTION
5290-		Bentonite Pellets #3 PVC Sch 80 0.03" Slotted PVC 10-20 Silica Sand		2.5-7 ft. GF brown in co	Total Depth 7.33 ft.
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	MONITORING	WELL CO	OMPLE	TION LOG NAT01-NAT28-1
LOCATION , CO SITE NATURITA	GROUND WATER	NORTH COORD EAST COORD. HOLE DEPTH ((FT) 110 (FT) 7.33	07204.15 SURFACE ELEV. (FT NGVD) 5294.66 TOP OF CASING (FT) 5297.37
	WELL INSTALLAT		ERVAL (FT	SLOT SIZE (IN) 0.030
SURFACE CASING: BLANK CASING: WELL SCREEN: SUMP/END CAP: SURFACE SEAL: GROUT: SEAL: UPPER PACK: LOWER PACK:	0.5 in. PVC Sch 80 0.5 in. Slotted PVC 0.5 in. PVC Sch 80 Cement Bentonite Pellets 10-20 Silica Sand	-2.71 6.66 7.16 0.0 1.0	to 7.	DRILLING METHOD HAMMER CASING ADVANCE SAMPLING METHOD DATE DEVELOPED WATER LEVEL (FT BGS) LOGGED BY Holmes/Rowland REMARKS Cluster of 3 casings: NAT28-1 casing and screen depths provided: NAT28-2 casing is from 0 to
DEPTH (FT BGL) ELEV. (FT NGVD) BLOW COUNTS	SAMPLE ID. EXTENT	L DIAGRAM	GRAPHIC LOG	from 0 to 2.66 ft. and screened to 3.16 ft. LITHOLOGIC DESCRIPTION
5290-	77/XX)	Dement Bentonite Pellets 10-20 Silica Sand #1 PVC Sch 80 0.03" Slotted PVC		0-2.5 ft. SILTY SAND (SM). 2.5-7 ft. GRAVEL (GW), some cobbles. 7-7.33 ft. BRUSHY BASIN MEMBER OF MORRISON FORMATION: SHALE; bedrock Total Depth 7.33 ft.
-10 - 5285)FPARTM	FNT O	F ENERGY DAGE 4 OF 4 COMPANY
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	MONITORING	WELL CO	MPLE	TION LO	G NAT01-NAT28-2
LOCATION , CO SITE NATURITA	GROUND WATER	NORTH COORD EAST COORD. HOLE DEPTH (WELL DEPTH	(FT) 110 FT) 7.33	·	DATE DRILLED 07/06/1999 SURFACE ELEV. (FT NGVD) 5294.66 TOP OF CASING (FT) 5297.37 MEAS. PT. ELEV. (FT) 5297.37
SURFACE CASING: BLANK CASING: WELL SCREEN: SUMP/END CAP: SURFACE SEAL: GROUT: SEAL: UPPER PACK: LOWER PACK:	WELL INSTALLAT 0.5 in. PVC Sch 80 0.5 in. Slotted PVC 0.5 in. PVC Sch 80 Cement Bentonite Pellets 10-20 Silica Sand	-2.71 4.66 5.16 0.0 1.0	to 4.6 to 5.3 to 1.0 to 2.0 to 7.3	DRILL SAMP AND DATE WATE LOGG REMA and sc 6.66 ft	SLOT SIZE (IN) 0.030 BIT SIZE(S) (IN) 4.0 ING METHOD HAMMER CASING ADVANCE LING METHOD DEVELOPED R LEVEL (FT BGS) ED BY Holmes/Rowland RKS Cluster of 3 casings: NAT28-2 casing reen depths provided; NAT28-1 casing is from 0 to and screened to 7.16 ft.; and NAT28-3 casing is
DEPTH (FT BGL) ELEV. (FT NGVD) BLOW COUNTS	SAMPLE ID.	L DIAGRAM	GRAPHIC LOG		to 2.66 ft. and screened to 3.16 ft. LITHOLOGIC DESCRIPTION
5290-		PVC Sch 80 0.03" Slotted PVC 10-20 Silica Sand		2.5-7 ft. GRA	Total Depth 7.33 ft.
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			MON	ITO	RING	WE	11.00	OMPL		TION LOG NAT01-NAT28-3
PROJI	ECT		GROUN							
	TION -		GROUI	AD AA	AILK					87770.69 DATE DRILLED 07/06/1999 07204.15 SURFACE ELEV. (FT NGVD) 5294.66
SITE	NAT	JRITA				HOLE	DEPTH	(FT) 7.	33	TOP OF CASING (FT) 5297.36
WELL	NUMB	ER _1	NAT28-3			WELL	_ DEPTH	(FT) 3.	33_	MEAS. PT. ELEV. (FT)5297.36
			WELI	LINS	TALLA	ION	INT	ERVAL (F	T)	SLOT SIZE (IN) 0.030 BIT SIZE(S) (IN) 4.0
		ASING:						·	-	
	K CASI . SCREI				Sch 80 ed PVC		-2.7		2.66	
	/END C				Sch 80		2.66 3.16		3.16 3.33	
	ACE SE		Cemer		00,100		0.0		1.0 1.0	
GROU										LOGGED BY Holmes/Rowland
SEAL:		٠.	Bentor	ite P	ellets		1.0	to 2	2.0	- Classing - Classings. NATEO-1 Casing
	R PACE		10-20	Silica	Sand		2.0	+a -	7.33	and screen depths provided; NAT28-2 casing is from 0 to
	IN FAC	1	10-20	Silica	Sanu		2.0	to	7.33	4.00 it. and screened to 5.16 it.; and NA128-3 casing is
│ ┰╻│	. <u>Q</u>	\s	Ω̈́	_				U		from 0 to 2.66 ft. and screened to 3.16 ft.
DEPTH (FT BGL)	ELEV. (FT NGVD)	BLOW	SAMPLE ID	EXTENT	WEI	L DIAC	SRAM	GRAPHIC LOG		LITHOLOGIC DESCRIPTION
꿈눈	귀	필인	Ā	🔄			21/AIVI	₹Z		ETHOLOGIC DESCRIPTION
_ =	F)	0	Ś	"				9		
					344	N .			: []	0-2.5 ft. SILTY SAND (SM).
					2000	\	- Cement	<u></u>		
					7 7 7	8				
						_	Bentonite			
							Pellets + #3			
							PVC Sch			
	4					■	80		2	2.5-7 ft. GRAVEL (GW), some cobbles.
ŀ -						-	0.03" - Slotted		•	
					"		PVC		7	
	7					*	10-20 Silica			
İ				li			Sand			
	5290-								1	
- 5 -									•	
LJ	٦									
	4									
┝╶┤								• • • •	9	7-7.33 ft. BRUSHY BASIN MEMBER OF MORRISON FORMATION:
					18888	82			ځ ک	、SHALE; bedrock
L _	1									Total Depth 7.33 ft.
								1		
	4									
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	5005									
-10-	5285	İ								
'`										
	4									
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	MONITORIN	G WELL C	OMPL	ETION I	LOG NAT01-NAT29
PROJECT UMTRA LOCATION , CO SITE NATURITA WELL NUMBER N	GROUND WATER	NORTH COORI EAST COORD. HOLE DEPTH (WELL DEPTH	(FT) <u>110</u> (FT) <u>6.75</u>	07208.58 5	SURFACE ELEV. (FT NGVD)5294.80
SURFACE CASING: BLANK CASING: WELL SCREEN: SUMP/END CAP: SURFACE SEAL: GROUT: SEAL: UPPER PACK:	WELL INSTALLA 2 in. PVC Sch 40 2 in. Slotted PVC 2 in. PVC Sch 80 Cement Bentonite Pellets		to 1 to 6 to 6 to 1	7) 42 DRIL 42 SAM 75 DAT 25 WAT LOG	SLOT SIZE (IN) 0.020 BIT SIZE(S) (IN) 4.0 LING METHOD HAMMER CASING ADVANCE IPLING METHOD E DEVELOPED FER LEVEL (FT BGS) GED BY Holmes/Rowland ARKS
LOWER PACK:	10-20 Silica Sand	1.42	to 6.	75 —	
DEPTH (FT BGL) ELEV. (FT NGVD) BLOW COUNTS	SAMPLE ID. EXTENT	LL DIAGRAM	GRAPHIC LOG		LITHOLOGIC DESCRIPTION
5290		Cement Bentonite Pellets 10-20 Silica Sand 0.020" Slotted PVC PVC Sch 40		2.5-6.58 ft.	. BRUSHY BASIN MEMBER OF MORRISON IN: SHALE, bedrock. Total Depth 6.75 ft.
- 10- 5285- 					
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	MONITORING	WELL CO	OMPLE	TION LOG NAT01-NAT30-1
LOCATION _, CO SITE NATURITA	NAT30-1	NORTH COORD EAST COORD. HOLE DEPTH (WELL DEPTH	(FT) <u>11</u> (FT) <u>8.5</u> (07476.19 SURFACE ELEV. (FT NGVD) 5302.05 0 TOP OF CASING (FT) 5304.91 0 MEAS. PT. ELEV. (FT) 5304.91
SURFACE CASING: BLANK CASING: WELL SCREEN: SUMP/END CAP: SURFACE SEAL: GROUT:	WELL INSTALLATION O.5 in. PVC Sch 80 0.5 in. PVC Sch 80 Cement	-2.86 7.83 8.33 0.0		BIT SIZE(3) (III)
SEAL: UPPER PACK:	Bentonite Pellets	1.5 3.0	to 3.	O REMARKS Cluster of 3 casings: NAT30-1 casing and screen depths provided; NAT30-2 casing is from 0 to
LOWER PACK:	10-20 Silica Sand	3.0	to 8.	5.83 ft. and screened to 6.33 ft.; and NAT30-3 casing is from 0 to 3.83 ft. and screened to 4.33 ft.
DEPTH (FT BGL) ELEV. (FT NGVD) BLOW COUNTS	SAMPLE ID EXTENT	LL DIAGRAM	GRAPHIC LOG	LITHOLOGIC DESCRIPTION
5300 5		Bentonite Pellets 10-20 Silica Sand #1 PVC Sch 80 0.03" Slotted PVC		3-7 ft. GRAVEL (GW), some cobbles and dark brown in color. 7-8.5 ft. BRUSHY BASIN MEMBER OF MORRISON FORMATION: SHALE, weathered bedrock from 7.0 to 8.0 ft. Total Depth 8.5 ft.
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PROJECT LOCATION		GROUN	D WATER	NORTH COOR EAST COORD HOLE DEPTH	(FT) <u>11</u>	07476.19	DATE DRILLED 07/06/1999 SURFACE ELEV. (FT NGVD) 5302.05 TOP OF CASING (FT) 5304.87
VELL NU		NAT30-2		WELL DEPTH	(FT) 6.50)	MEAS. PT. ELEV. (FT) 5304.87
SURFACE			INSTALLA		ERVAL (FT	200	SLOT SIZE (IN) 0.030 BIT SIZE(S) (IN) 4.0 LING METHOD HAMMER CASING ADVANCE
BLANK CASING: WELL SCREEN: SUMP/END CAP: SURFACE SEAL: GROUT: SEAL: UPPER PACK: LOWER PACK:		0.5 in. 5	PVC Sch 80 Slotted PVC PVC Sch 80	-2.82 5.83 6.33 0.0		33 SAM 5 DAT 5 WA T	PLING METHOD E DEVELOPED ER LEVEL (FT BGS) GED BY Holmes/Rowland
			te Pellets	1.5	to 3.	0 REM. and s	ARKS Cluster of 3 casings: NAT30-2 casing creen depths provided; NAT30-1 casing is from 0
_OWER P	ACK:	10-20 S	Silica Sand	3.0	to 8.	7.03	ft. and screened to 8.33 ft.; and NAT30-3 casing is 0 to 3.83 ft. and screened to 4.33 ft.
(FT BGL)	BLOW COUNTS	SAMPLE ID.	EXTENT	LL DIAGRAM	GRAPHIC LOG	Į OIII	LITHOLOGIC DESCRIPTION
- 5			7///8///// 2////////////////////////////	Bentonite Pellets 10-20 Silica Sand #2 PVC Sch 80 0.03" Slotted PVC		3-7 ft. GRA	Y SAND (SM), light brown. WEL (GW), some cobbles and dark brown in color. RUSHY BASIN MEMBER OF MORRISON FORMATION athered bedrock from 7.0 to 8.0 ft.
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	MONITORING	WELL CO	OMPLE	TION LOG NAT01-NAT30-3
LOCATION CO SITE NATURITA	E	NORTH COORD EAST COORD. HOLE DEPTH (WELL DEPTH	(FT) 110 (FT) 8.50	77476.19 SURFACE ELEV. (FT NGVD) 5302.05 TOP OF CASING (FT) 5304.87
SURFACE CASING: BLANK CASING: WELL SCREEN: SUMP/END CAP: SURFACE SEAL: GROUT: SEAL: UPPER PACK: LOWER PACK:	WELL INSTALLATION 0.5 in. PVC Sch 80 0.5 in. Slotted PVC 0.5 in. PVC Sch 80 Cement Bentonite Pellets 10-20 Silica Sand	-2.82 3.83 4.33 0.0 1.5	to 3.8 to 4.3 to 4.5 to 1.5 to 3.0 to 8.5	DRILLING METHOD HAMMER CASING ADVANCE SAMPLING METHOD DATE DEVELOPED WATER LEVEL (FT BGS) LOGGED BY Holmes/Rowland REMARKS Cluster of 3 casings: NAT30-3 casing and screen depths provided: NAT30-1 casing is from 0 fc
DEPTH (FT BGL) ELEV. (FT NGVD) BLOW COUNTS	SAMPLE ID. EXTENT The state of the state o	DIAGRAM	GRAPHIC LOG	from 0 to 5.83 ft. and screened to 6.33 ft. LITHOLOGIC DESCRIPTION
5300 5 5295		Cement Bentonite Pellets #3 PVC Sch 80 0.03" Slotted PVC 10-20 Silica Sand		0-3 ft. SILTY SAND (SM), light brown. 3-7 ft. GRAVEL (GW), some cobbles and dark brown in color. 7-8.5 ft. BRUSHY BASIN MEMBER OF MORRISON FORMATION: SHALE, weathered bedrock from 7.0 to 8.0 ft.
- 10 5290-				
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Appendices B, C and D are provided on CD

Final Site Observational Work Plan for the Naturita, Colorado, UMTRA Project Site Appendices B, C, and D

Appendix E

USGS Distribution Coefficient Analysis

1.0 Introduction

1.1 Distribution Coefficient (K_d) Analysis

The K_d is a bulk parameter that has been used with some success to describe the retardation of contaminant movement in an aquifer system. Laboratory measurements to determine the K_d for selected analytes were performed on alluvial material to support computer-modeling efforts in characterizing subsurface contaminant transport at the Naturita site.

1.1.1 Method of Solution

Laboratory analyses of the K_d were performed according to American Society for Testing and Materials (ASTM) procedure D 4646–87 (ASTM 1987), with slight modifications as detailed below, for two site-related contaminants of potential concern (COPCs): uranium and vanadium. Essentially, the procedure involves placing a sample representative of a location (e.g., soil, sediments, cuttings, core) into a solution of simulated contaminated ground water with which the material is likely to come in contact. The simulated ground water solution was agitated for 96 hours (uranium) or 24 hours (vanadium) and then centrifuged. The supernatant solution was analyzed and compared to the contaminant concentrations of the original solution. The difference between the two is assumed to be adsorbed to the sample. The linear adsorption isotherm distribution coefficient is generally defined as

$$C_{\text{soil}} = K_d \times C_{\text{water}}$$
, which can be rearranged to $K_d = C_{\text{soil}}/C_{\text{water}}$,

or the ratio of the concentration of the contaminant in soil (or other material of interest) to the concentration of the contaminant in water at equilibrium. Therefore, the higher the K_d , the greater the retardation of contaminant movement in ground water.

The procedure requires analysis of only the solutions (and no actual soil samples) used in the experiments. Site samples collected from background areas or uncontaminated site samples are generally used, and all contaminant loss in the final solution is attributed to sample adsorption. However, for this study, uranium-contaminated alluvial samples were also collected, and uranium(VI) adsorption on these samples was determined by desorption in alkaline solutions and by uranium isotopic exchange in artificial ground water solution.

1.1.1.1 Sample Selection

A large sample of background alluvial material was collected by backhoe from the saturated zone of the aquifer at a location upgradient of the site on July 16 and 17, 1998. The sample was considered uncontaminated because concentrations of dissolved uranium at well 0547 (and decommissioned DOE wells nearby) were always very low, near the background uranium concentrations in the San Miguel River. The background sample of alluvium was screened in the field to remove cobbles larger than about 65 mm, and it was estimated visually that about 50 percent of the material scooped by the backhoe did not pass the 65-mm screen.

1.1.1.2 Preparation of the Sample of Background Alluvium

The sample was air dried at room temperature and sieved to separate the <3 mm fraction. Alluvial material totaling 190 kg passed a 3-mm screen and was mixed into a single composite

sample, representing 30 percent (by weight) of the material that had been sieved in the field through a 65-mm screen. The <3 mm sample represented approximately 15 percent of the total material sampled by backhoe in the field.

Synthetic solutions were prepared that simulated ground water at the Naturita site. Based on ground water analyses for several wells sampled in November 1998 and on preliminary batch experiments, a composition of synthetic ground water (AGW-3) was prepared for experiments equilibrated with air as follows (in mg/L): Na = 55.5, K = 2.5, Ca = 189, Mg = 36.8, SO₄ = 459, Cl = 171, C (inorganic) = 6.46, with pH adjusted to 7.9. The concentrations of C (inorganic) and Ca were expected to change somewhat during the batch experiments, because of the presence of calcite in the alluvial material. The AGW-3 solution equilibrated in the batch experiments with alluvial material and air without a significant change in pH (about 7.9) or alkalinity (37.5 mg/L as CaCO₃).

For uranium(VI), because of its tendency to form aqueous carbonate complexes, other synthetic solutions were prepared for experiments equilibrated with gas mixtures containing 0.5 percent $CO_2/99.5$ percent N_2 (AGW-7) and 2.0 percent $CO_2/98$ percent N_2 (AGW-5). The composition of AGW-7 was Na = 55.5, K = 2.5, Ca = 98.2, Mg = 36.8, $SO_4 = 368.5$, Cl = 8.2, and C (inorganic) = 30. This solution yielded a final pH of about 7.58 and an alkalinity of 152 mg/L as $CaCO_3$ after equilibration with the alluvial material and the gas mixture containing 0.5 percent CO_2 . This alkalinity corresponds to a C (inorganic) concentration of 36.5 mg/L.

The composition of AGW-5 was Na = 55.5, K = 2.5, Ca = 257, Mg = 36.8, $SO_4 = 459$, Cl = 193, and C (inorganic) = 40. This solution yielded a final pH of about 7.18 and an alkalinity of 202 mg/L as $CaCO_3$, after equilibration with the alluvial material and the gas mixture containing 2.0 percent CO_2 . This alkalinity corresponds to a C (inorganic) concentration of 48.4 mg/L. This latter solution was closer to the observed ground water pH and C (inorganic) concentrations observed in the alluvial aquifer than could be obtained by equilibrating experiments in the presence of air. Alkalinity in the alluvial aquifer ranges from 200 to 500 mg/L (as $CaCO_3$).

After equilibration of the synthetic solution with the alluvial material for 12 hours, either uranium or vanadium was then added from acidified nitrate stock solutions to study a range of target concentrations: 0.006 to 1.9 mg/L uranium or 1 to 16 mg/L vanadium.

1.1.1.3 Sample Analysis

The synthetic ground water solutions were analyzed to determine that the target concentrations were achieved by additions from the uranium(VI) and vanadium(V) stock solutions. These results are reported in Table 1.

Table 1. Laboratory Analytical Results for Synthetic Ground Water Solutions

Sample	Sample Description	Solution Volume (mL)	/2007/11		Analyzed Concentration (mg/L)	
ID	Description	Volume (mic)	U	V	U	V
AGW3-1	Synthetic ground water	30	0.0255	1.75	0.0267	1.73
AGW3-2	Synthetic ground water	30	0.241	5.25	0.0254	5.35
AGW3-3	Synthetic ground water	30	2.40	8.75	2.62	8.95

Aliquots of the synthetic ground water were first preequilibrated with each sample at a concentration of 25 g/L prior to use in the actual sample analyses, to preequilibrate the synthetic ground water with the sample surface. The preequilibrated synthetic ground water was filtered through a 0.45 micrometer (µm) filter prior to use in the sample analyses. For analysis with the ground water AGW-3, approximately 0.5 or 0.75 g of each sample was measured and placed in 50-milliliter (mL) polycarbonate centrifuge tubes with 20 or 30 mL of the filtered, preequilibrated synthetic ground water, resulting in sample suspension of 25 g/L. For analysis with the ground water AGW-7, approximately 3.75 g of each sample was measured and placed in 50-mL polycarbonate centrifuge tubes with 30 mL of the filtered, preequilibrated synthetic ground water, resulting in a sample suspension of 125 g/L. For analysis with the ground water AGW-5, approximately 7.5 g of each sample was measured and placed in 50 mL polycarbonate centrifuge tubes with 30 mL of the filtered, preequilibrated synthetic ground water, resulting in a sample suspension of 250 g/L.

Samples were rotated end over end at 14 revolutions per minute (rpm) for 24 hours, after which an aliquot of uranium(VI) or vanadium(V) stock solution was added to achieve the target contaminant concentration in the analysis. Samples were then rotated end-over-end at 14 rpm for 24 hours (V analysis) or 96 hours (U analysis). They were then centrifuged at 23,500 rpm for 30 minutes. The 5 mL aliquots of the resulting leachate samples were preserved with 50 µL concentrated HNO3 in glass scintillation vials for analysis of U(VI) or vanadium. Analytical results are reported in Tables 2 through 4. Blank centrifuge tubes (with no solid sample) were included for each analysis to check for adsorption onto container walls; no adsorption on the container walls was observed. U(VI) was analyzed by kinetic phosphoresence analysis (KPA), and vanadium was analyzed by inductively coupled plasma optical emission spectrometry (ICP-OES).

Table 2. Analytical Results for Sample Leachate Solutions Using the Uncontaminated Alluvial Deposit Sample and Synthetic Ground Water AGW−3 (equilibrated with the partial pressure of CO₂ in air)

Sample	Sample	Solution	Synthetic	Sample	Concenti	ration (mg/L)
ID	Description	Volume (mL)	Solution Type	Mass (g)	U	V
Ex6S7	Alluvium composite leachate	30	AGW-3	0.75	0.00635	
Ex6S8	Duplicate	30	AGW-3	0.75	0.00584	
Ex6S9	Alluvium composite leachate	30	AGW-3	0.75	0.0167	
Ex6S10	Duplicate	30	AGW-3	0.75	0.0180	
Ex6S11	Alluvium composite leachate	30	AGW-3	0.75	0.0530	
Ex6S12	Duplicate	30	AGW-3	0.75	0.0514	
Ex6S13	Alluvium composite leachate	30	AGW-3	0.75	0.196	
Ex6S14	Duplicate	30	AGW-3	0.75	0.192	
Ex6S15	Alluvium composite leachate	30	AGW-3	0.75	0.412	
Ex6S16	Duplicate	30	AGW-3	0.75	0.420	
Ex6S17	Alluvium composite leachate	30	AGW-3	0.75	2.24	
Ex6S18	Duplicate	30	AGW-3	0.75	2.13	
ExVS5	Alluvium composite leachate	20	AGW-3	0.5		1.16
ExVS6	Duplicate	20	AGW-3	0.5		1.17
ExVS8	Alluvium composite leachate	20	AGW-3	0.5		4.34
ExVS9	Duplicate	20	AGW-3	0.5		4.32
ExVS11	Alluvium composite leachate	20	AGW-3	0.5		7.75
ExVS12	Duplicate	20	AGW-3	0.5		7.83
ExVS14	Alluvium composite leachate	20	AGW-3	0.5		11.8
ExVS15	Duplicate	20	AGW-3	0.5		12.0
ExVS17	Alluvium composite leachate	20	AGW-3	0.5		16.2
ExVS18	Duplicate	20	AGW-3	0.5		16.1

Table 3. Analytical Results for Sample Leachate Solutions Using the Uncontaminated Alluvial Deposit Sample and Synthetic Ground Water AGW-7 (equilibrated with 0.5 percent CO₂)

Sample ID	Sample Description	Solution Volume (mL)	Synthetic Solution Type	Sample Mass (g)	Concentration (mg/L) U
Ex11S107	Alluvium composite leachate	30	AGW-7	3.75	0.0178
Ex11S108	Duplicate	30	AGW-7	3.75	0.0182
Ex11S109	Alluvium composite leachate	30	AGW-7	3.75	0.0305
Ex11S110	Duplicate	30	AGW-7	3.75	0.0304
Ex11S111	Alluvium composite leachate	30	AGW-7	3.75	0.0644
Ex11S112	Duplicate	30	AGW-7	3.75	0.0657
Ex11S113	Alluvium composite leachate	30	AGW-7	3.75	0.188
Ex11S114	Duplicate	30	AGW-7	3.75	0.200
Ex11S115	Alluvium composite leachate	30	AGW-7	3.75	0.589
Ex11S116	Duplicate	30	AGW-7	3.75	0.574
Ex11S117	Alluvium composite leachate	30	AGW-7	3.75	1.95
Ex11S118	Duplicate	30	AGW-7	3.75	1.96

Table 4. Analytical Results for Sample Leachate Solutions Using the Uncontaminated Alluvial Deposit Sample and Synthetic Ground Water AGW−5 (equilibrated with 2.0 percent CO₂)

Sample ID	Sample Description	Solution Volume (mL)	Synthetic Solution Type	Sample Mass (g)	Concentration (mg/L) U
Ex10S7	Alluvium composite leachate	30	AGW-5	7.5	0.0252
Ex10S8	Duplicate	30	AGW-5	7.5	0.0225
Ex10S9	Alluvium composite leachate	30	AGW-5	7.5	0.0308
Ex10S10	Duplicate	30	AGW-5	7.5	0.0307
Ex10S11	Alluvium composite leachate	30	AGW5	7.5	0.0566
Ex10S12	Duplicate	30	AGW-5	7.5	0.0621
Ex10S13	Alluvium composite leachate	30	AGW5	7.5	0.180
Ex10S14	Duplicate	30	AGW-5	7.5	0.187
Ex10S15	Alluvium composite leachate	30	AGW-5	7.5	0.529
Ex10S16	Duplicate	30	AGW-5	7.5	0.535
Ex10S17	Alluvium composite leachate	30	AGW-5	7.5	1.87
Ex10S18	Duplicate	30	AGW-5	7.5	1.83

1.1.1.4 K_d Calculation

K_ds are calculated using the analytical data summarized in Table 5 through Table 8 and the following equation:

$$K_d = \frac{(A-B)V}{(M_s)B}$$

where

A = total initial concentration (mg/L) of the COPCs in the synthetic ground water,

final concentration of the COPCs in the leachate after 96 hours (uranium) or 24 hours (vanadium) in contact with the sediment sample (mg/L),

V = volume of solution (mL),

M_s = mass of sediment sample (grams), and

 K_d = distribution coefficient (milliliters per gram [mL/g]).

Results of the calculations are presented in Table 5 through Table 7. The K_d values are consistent with R_d values in the ASTM procedure; this value only represents a true K_d if equilibrium conditions were attained during the test period.

Table 5. Measured K_d Values for the Uncontaminated Alluvial Deposit Sample and Synthetic Ground Water AGW-3 (equilibrated with the partial pressure of CO2 in air)

Sample Sample ID Description		Initial Concentration (mg/L)		Final Concentration (mg/L)		K _d (mL/g)	
		U	V	U	V	U	V
Ex6S7	Alluvium composite leachate	0.0108		0.00635		28.1	
Ex6S8	Duplicate	0.0107		0.00584		33.9	
Ex6S9	Alluvium composite leachate	0.0279		0.0167		27.1	İ
Ex6S10	Duplicate	0.0280		0.0180		22.5	-
Ex6S11	Alluvium composite leachate	0.0791		0.0530		19.8	
Ex6S12	Duplicate	0.0794		0.0514		21.9	
Ex6S13	Alluvium composite leachate	0.255		0.196		12.2	
Ex6S14	Duplicate	0.256		0.192		13.2	
Ex6S15	Alluvium composite leachate	0.533		0.412		11.7	
Ex6S16	Duplicate	0.534		0.420		10.8	
Ex6S17	Alluvium composite leachate	2.59		2.24		6.1	
Ex6S18	Duplicate	2.59		2.13		8.6	
ExVS5	Alluvium composite leachate		1.73		1.16	0.5	20.0
ExVS6	Duplicate		1.73		1.17		19.5
ExVS8	Alluvium composite leachate		5.35		4.34		9.3
ExVS9	Duplicate		5.35		4.32		9.5
ExVS11	Alluvium composite leachate		8.95		7.75		6.2
ExVS12	Duplicate		8.95	·	7.83		5.7
ExVS14	Alluvium composite leachate		13.3		11.8		5.2
ExVS15	Duplicate		13.3	 	12.0		4.5
ExVS17	Alluvium composite leachate		17.8		16.2		4.0
ExVS18	Duplicate		17.8		16.1		4.3

Table 6. Measured Uranium K_d Values for the Uncontaminated Alluvial Deposit Sample and Synthetic Ground Water AGW-7 (equilibrated with 0.5 percent CO_2)

Sample ID	Sample Description	Initial Concentration (mg/L)	Final Concentration (mg/L)	K _d (mL/g)
שו	Description	U	U	U
Ex11S107	Alluvium composite leachate	0.0304	0.0178	5.8
Ex11S108	Duplicate	0.0304	.0.0182	5.4
Ex11S109	Alluvium composite leachate	0.0466	0.0305	4.3
Ex11S110	Duplicate	0.0454	0.0304	4.2
Ex11S111	Alluvium composite leachate	0.0904	0.0644	3.5
Ex11S112	Duplicate	0.0940	0.0657	3.6
Ex11S113	Alluvium composite leachate	0.273	0.188	3.7
Ex11S114	Duplicate	0.274	0.200	3.0
Ex11S115	Alluvium composite leachate	0.756	0.589	2.3
Ex11S116	Duplicate	0.756	0.574	2.6
Ex11S117	Alluvium composite leachate	2.42	1.95	2.0
Ex11S118	Duplicate	2.40	1.96	1.8

Table 7. Measured Uranium K_d Values for the Uncontaminated Alluvial Deposit Sample and Synthetic Ground Water AGW−5 (equilibrated with 2.0 percent CO₂)

Sample ID	Sample Description	Initial Concentration (mg/L)	Final Concentration (mg/L)	K _d (mL/g)
i.b	Description	U	U	U
Ex10S7	Alluvium composite leachate	0.0430	0.0252	3.0
Ex10S8	Duplicate	0.0429	0.0225	3.8
Ex10S9	Alluvium composite leachate	0.0570	0.0308	3.6
Ex10S10	Duplicate	0.0570	0.0307	3.6
Ex10S11	Alluvium composite leachate	0.0974	0.0566	3.1
Ex10S12	Duplicate	0.0979	0.0621	2.5
Ex10S13	Alluvium composite leachate	0.283	0.180	2.4
Ex10S14	Duplicate	0.282	0.187	2.2
Ex10S15	Alluvium composite leachate	0.772	0.529	2.0
Ex10S16	Duplicate	0.777	0.535	1.9
Ex10S17	Alluvium composite leachate	2.55	1.87	1.5
Ex10S18	Duplicate	2.54	1.83	1.6

Measured K_d values obtained for the alluvial aquifer samples were adjusted on the basis of aquifer grain size analysis. It was found in collecting the uncontaminated alluvial material that only 15 percent of the aquifer material was in the <3 mm fraction and that most of the material was gravel to cobble size. Therefore, the measured K_d values for the alluvial aquifer, which were

performed on the <3 mm fraction, were adjusted by multiplying by 0.15. This assumes that the gravel- and cobble-sized materials are insignificant in terms of contaminant adsorption. The adjusted values are reported in Table 8 through Table 10.

Table 8. Results for K_d Values Adjusted for Grain-Size Distribution for the Uncontaminated Alluvial Deposit Sample and Synthetic Ground Water AGW-3 (equilibrated with the partial pressure of CO_2 in air)

Sample ID	Sample	K _d (mL/g)
	Description	U	V
Ex6S7	Alluvium composite leachate	4.2	
Ex6S8	Duplicate	5.1	
Ex6S9	Alluvium composite leachate	4.1	
Ex6S10	Duplicate	3.4	
Ex6S11	Alluvium composite leachate	3.0	
Ex6S12	Duplicate	3.3	
Ex6S13	Alluvium composite leachate	1.8	
Ex6S14	Duplicate	2.0	
Ex6S15	Alluvium composite leachate	1.8	
Ex6S16	Duplicate	1.6	
Ex6S17	Alluvium composite leachate	0.92	
Ex6S18	Duplicate	1.3	-
ExVS5	Alluvium composite leachate		3.0
ExVS6	Duplicate		2.9
ExVS8	Alluvium composite leachate		1.4
ExVS9	Duplicate		1.4
ExVS11	Alluvium composite leachate		0.93
ExVS12	Duplicate		0.86
ExVS14	Alluvium composite leachate		0.77
ExVS15	Duplicate		0.67
ExVS17	Alluvium composite leachate		0.59
ExVS18	Duplicate		0.64

Table 9. Results for K_d Values Adjusted for Grain-Size Distribution for the Uncontaminated Alluvial Deposit Sample and Synthetic Ground Water AGW-7 (equilibrated with 0.5 percent CO_2)

Sample ID	Sample Description	K _d (mL/g) U
Ex11S107	Alluvium composite leachate	0.87
Ex11S108	Duplicate	0.81
Ex11S109	Alluvium composite leachate	0.65
Ex11S110	Duplicate	0.63
Ex11S111	Alluvium composite leachate	0.52
Ex11S112	Duplicate	0.54
Ex11S113	Alluvium composite leachate	0.56
Ex11S114	Duplicate	0.45
Ex11S115	Alluvium composite leachate	0.35
Ex11S116	Duplicate	0.39
Ex11S117	Alluvium composite leachate	0.30
Ex11S118	Duplicate	0.27

Table 10. Results for K_d Values Adjusted for Grain-Size Distribution for the Uncontaminated Alluvial Deposit Sample and Synthetic Ground Water AGW–5 (equilibrated with 2.0 percent CO₂)

Sample ID	Sample Description	K₄ (mL/g) U
Ex10S7	Alluvium composite leachate	0.45
Ex10S8	Duplicate	0.58
Ex10S9	Alluvium composite leachate	0.54
Ex10S10	Duplicate	0.54
Ex10S11	Alluvium composite leachate	0.46
Ex10S12	Duplicate	0.37
Ex10S13	Alluvium composite leachate ·	0.36
Ex10S14	Duplicate	0.32
Ex10S15	Alluvium composite leachate	0.29
Ex10S16	Duplicate	0.28
Ex10S17	Alluvium composite leachate	0.23
Ex10S18	Duplicate	0.25

The data show that the K_d values are somewhat dependent on the concentration of the COPC, under otherwise constant chemical conditions (Figure 1 through Figure 3). In addition, the data show that the uranium K_d values are greatly decreased by increasing alkalinity (or partial pressure of carbon dioxide gas), due to the formation of weakly adsorbing, aqueous uranyl-carbonate complexes (Figure 4).

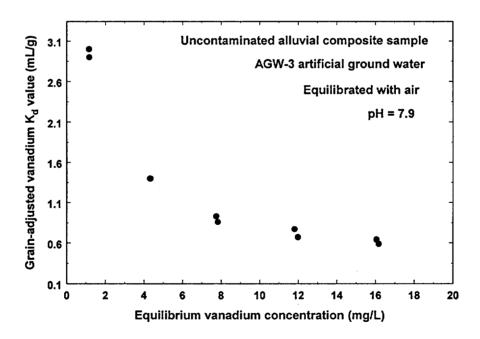


Figure 1. Grain-Adjusted K_d Values for Vanadium as a Function of Vanadium Concentration Vanadium Concentrations in the Alluvial Aquifer Vary from Below Detection to 7 mg/L

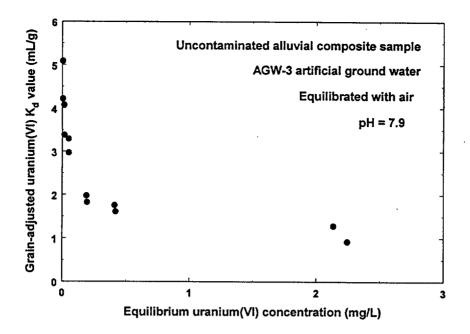


Figure 2. Grain-Adjusted K_d Values for Uranium as a Function of Uranium Concentration Uranium Concentrations in the Alluvial Aquifer Vary from 0.005 to 2.6 mg/L

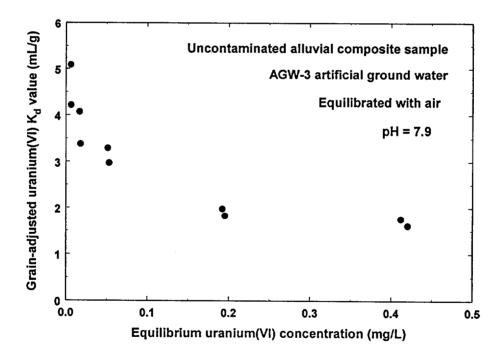


Figure 3. Grain-Adjusted K_d Values for Uranium as a Function of Uranium Concentration at Low Uranium Concentrations

Uranium Concentrations in the Alluvial Aquifer Vary from 0.005 to 2.6 mg/L

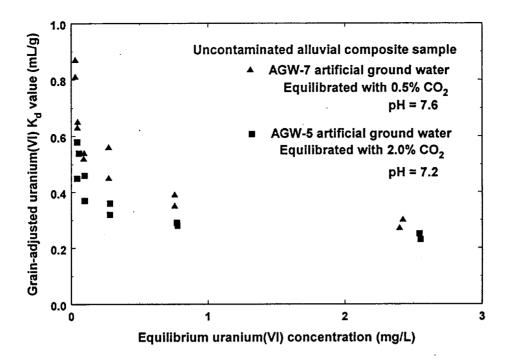


Figure 4. Grain-Adjusted K_d values for Uranium as a Function of Uranium Concentration in Waters

Equilibrated with 0.5 or 2 percent CO₂

Each System Reaches a Different Equilibrium pH Value Due to Equilibration with Carbonate Minerals in

the Alluvial Sediments. Partial Pressures of CO₂ in the Alluvial Aquifer Range from 1 to 10 percent CO₂

If left undisturbed, the trailing edge of the contaminant plume will probably leave the site with low uranium concentrations and an alkalinity closer to background conditions. This would be near the conditions represented by the sample analysis with 0.5 percent CO_2 , although alluvial ground water usually has a lower pH (7.0 to 7.2). Based on the range of K_d values indicated by the sample analysis, it is recommended that K_d values in the range of 1–3 mL/g be used for both uranium and vanadium in the contaminant transport modeling of alluvial ground water.

End of current text