



AMERADA HESS CORPORATION

FRESH WATER SAMPLING POINTS

NORTH MONUMENT GRAYBURG/ SAN ANDRES UNIT

Lea County, New Mexico

1 I MILES

P O. BOX 1468 DNAHANS, TEXAS 79756 1 943-3234 OR 563-1040	Martin Water Lado	ratories, inc.	MI	709 W. INDIANA DLAND. TEXAS 7970 PHONE 683-4521
	RESULT OF WATE	R ANALYSES		
		LABORATORY NO.	990227	<u></u>
o:Mr. Eric Haas		SAMPLE RECEIVED	9-27-9	0
P. O. Drawer "D", Monumer	nt, NM 88200	RESULTS REPORTE	D10-1-9	0
OMPANY <u>Amerada Hess Corpora</u>	ation LEAS	SE		
IELD OR POOL	0c • p 27p	······		
ECTION 18 BLOCK SURVEY	95 & K-STE COUNTY _	Lea	STATE NM	
DURCE OF SAMPLE AND DATE TAKEN	; 			
NO. 1 Raw water - taken fi	rom Windmill #1.			
NO. 2				
NO. 3				
NO. 4				
EMARKS:				
CHI	EMICAL AND PHYSICA	L PROPERTIES	,	
	NO. 1	NO. 2	NO. 3	NO. 4
Specific Gravity at 60° F.	1.0015			
pH When Sampled			<u> </u>	
pH When Received	7.17		ļ	
Bicarbonate as HCO3	239			
Supersaturation as CaCO3				
Undersaturation as CaCO3			L	
Total Hardness as CaCO3	246			
Calcium as Ca				
Magnesium as Mg	10			
Magnesium as Mg Sodium and/or Potassium	40			
Magnesium as Mg Sodium and/or Potassium Sulfate as SO4	40			
Magnesium as Mg Sodium and/or Potassium Sulfate as SO4 Chloride as Cl	40 62 52			
Magnesium as Mg Sodium and/or Potassium Sulfate as SO4 Chloride as Cl Iron as Fe	40 62 52 0.08			
Magnesium as Mg Sodium and/or Potassium Sulfate as SO4 Chloride as Cl Iron as Fe Barium as Ba	40 62 52 0.08			
Magnesium as Mg Sodium and/or Potassium Sulfate as SO4 Chloride as Cl Iron as Fe Barium as Ba Turbidity, Electric	40 62 52 0.08			
Magnesium as Mg Sodium and/or Potassium Sulfate as SO4 Chloride as Cl Iron as Fe Barium as Ba Turbidity, Electric Color as Pt	40 62 52 0.08			
Magnesium as Mg Sodium and/or Potassium Sulfate as SO4 Chloride as Cl Iron as Fe Barium as Ba Turbidity, Electric Color as Pt Total Solids, Calculated Temeseure %E	40 62 52 0.08 485			
Magnesium as Mg Sodium and/or Potassium Sulfate as SO4 Chloride as Cl Iron as Fe Barium as Ba Turbidity. Electric Color as Pt Total Solids. Calculated Temperature °F. Carbon Dioxide. Calculated	40 62 52 0.08 485			
Magnesium as Mg Sodium and/or Potassium Sulfate as SO4 Chloride as Cl Iron as Fe Barium as Ba Turbidity, Electric Color as Pt Total Solids, Calculated Temperature °F. Carbon Dioxide, Calculated Dissolved Oxygen	40 62 52 0.08 485			
Magnesium as Mg Sodium and/or Potassium Sulfate as SO4 Chloride as Cl Iron as Fe Barium as Ba Turbidity, Electric Color as Pt Total Solids, Calculated Temperature °F. Carbon Dioxide, Calculated Dissolved Oxygen, Hydrogen Sulfide	40 62 52 0.08 485			
Magnesium as Mg Sodium and/or Potassium Sulfate as SO4 Chloride as C1 Iron as Fe Barium as Ba Turbidity, Electric Color as Pt Total Solids, Calculated Temperature °F. Carbon Dioxide, Calculated Dissolved Oxygen, Hydrogen Sulfide Resistivity, ohms/m at 77° F	40 62 52 0.08 485 0.0 17 20			
Magnesium as Mg Sodium and/or Potassium Sulfate as SO4 Chloride as Cl Iron as Fe Barium as Ba Turbidity, Electric Color as Pt Total Solids, Calculated Temperature °F. Carbon Dioxide, Calculated Dissolved Oxygen, Hydrogen Sulfide Resistivity, ohms/m at 77° F.	40 62 52 0.08 485 0.0 17.20			
Magnesium as Mg Sodium and/or Potassium Sulfate as SO4 Chloride as Cl Iron as Fe Barium as Ba Turbidity, Electric Color as Pt Total Solids, Calculated Temperature °F. Carbon Dioxide, Calculated Dissolved Oxygen, Hydrogen Sulfide Resistivity, ohms/m at 77° F. Suspended Oil Eiltrable Solids as mg/1	40 62 52 0.08 485 0.0 17.20			
Magnesium as Mg Sodium and/or Potassium Sulfate as SO4 Chloride as Cl Iron as Fe Barium as Ba Turbidity, Electric Color as Pt Total Solids, Calculated Temperature °F. Carbon Dioxide, Calculated Dissolved Oxygen. Hydrogen Sulfide Resistivity, ohms/m at 77° F. Suspended Oil Filtrable Solids as mg/i Volume Filtared, mi	40 62 52 0.08 485 0.0 17.20			
Magnesium as Mg Sodium and/or Potassium Sulfate as SO4 Chloride as Cl Iron as Fe Barium as Ba Turbidity. Electric Color as Pt Total Solids. Calculated Temperature °F. Carbon Dioxide, Calculated Dissolved Oxygen. Hydrogen Sulfide Resistivity. ohms/m at 77° F. Suspended Oil Filtrable Solids as mg/i Volume Filtered, mi	40 62 52 0.08 485 485 0.0 17.20			

to the best of his knowledge and belief.

Form No. 3

On Tuck 11 ٨ By

Ronnie D. Tucker, B.S.

RESULT OF WATER ANALYSES LABORATORY NO. 990228 SAMPLE RECEIVED 9-27-90 F. O. Drawer "D", Monument, NM 88265 RESULTS REPORTED 10-1-90 COMPANY Amerada Hess Corporation Lease FIELD OR POOL SURVEY F-195 & R-37E_COUNTY Lea STATE MM SOURCE OF SAMPLE AND DATE TAKEN: NO. 1 NO. 1 NO. 4 CHEMICAL AND PHYSICAL PROPERTIES Source of SAMPLE AND DATE TAKEN: NO. 1 NO. 2 NO. 1 NO. 1 NO. 1 NO. 1 NO. 1 NO. 1	MONAHANS, TEXAS 79756 PH 943-3234 OR 563-1040			м	DLAND TEXA
Mr. Eric Haas LABORATORY NO902220 P. O. Drawer "D", MONUMENT, NM 88265 SAMPLE RECEIVED 9-27-90 P. O. Drawer "D", MONUMENT, NM 88265 RESULTS REPORTED. 10-1-90 COMPANY Amerada Hess Corporation LEASE		RESULT OF WA	IER ANALYSES	00000	0
TO: TO: SAMPLE RECEIVED 72/190 P. O. Draver "D", Monument, XM 88265 RESULTS REPORTED 10-1-90 P. O. Draver "D", Monument, XM 88265 RESULTS REPORTED 10-1-90 FIELD OR POOL	- Mr Fric Haas		LABORATORY NO.	<u>99022</u>	90
Amerada Hess Corporation LEASE PIEL D OR POOL	P. O. Drawer "D", Monum	ent. NM 88265	SAMPLE RECEIVED		90
COMPANY Amerada Hess Corporation LEASE FIEL DOR POOL SURVEY T-19S & R-37Ecounty Lea STATE NM SOURCE OF SAMPLE AND DATE TAKEN: NO. 1 Raw water - taken from Windmill #2. NO. 3 NO. 3 NO. 3 NO. 1 NO. 1 NO. 2 NO. 3 NO. 1 NO. 2 NO. 3 NO. 4			RESULTS REPORTE	D10-1-	<u> </u>
FIELD OR POOL	COMPANY Amerada Hess Co	rporation L	EASE		
SECTION 32 BLOCK SURVEY F195 & R-3/PCOUNTY Lea STATE M SOURCE OF SAMPLE AND DATE TAKEN: NO. 1 Raw water - taken from Windmill #2. NO. 3	FIELD OR POOL				
SOURCE OF SAMPLE AND DATE TAKEN: NO. 1 Raw water - taken from Windmill #2. NO. 2 NO. 3 REMARKS: CHEMICAL AND PHYSICAL PROPERTIES CHEMICAL AND PHYSICAL PROPERTIES NO. 3 NO. 3 NO. Social region as CACO3 NO. Subsersturation as CACO3 (2000) Chemical and Patassum 140 Suffere as SO4 (2000) Chemical and Chemical (2000) Barum as Ba Turbicity. Electric Calor as Pt Catebon Dioxide. Calculated Dissolved Gorgen. Hydrogen Suffide Carbon Dioxide. Calculated Dissolved Gorgen. Hydrogen Suffide Fiftrable Solids as mg/1 Volume Filtemed. nl Nitrate, as N 1,4 Mitrate, as N 1,4 Mitrate, as Ma Reserved As Hittigrams Per Liter Additional Desumentations And Reserves The undersigned certifies the above to be true and	SECTION 32 BLOCK SURV	EY T-195 & R-3/ECOUNT	Lea	STATENM	
NO. 1 Raw water - taken from Windmill #2. NO. 2	SOURCE OF SAMPLE AND DATE T	AKEN			
NO. 2 NO. 4 REMARKS: CHEMICAL AND PHYSICAL PROPERTIES NO. 1 NO. 2 NO. 3 NO. 3 Specific Gravity at 60° F. 1.0024 NO. 1 NO. 3 NO. 1 pH Who Sampled 1.0024 NO. 1 NO. 3 NO. 1 pH Who Received 7.23 Image: Colspan="2">Colspan="2"Colspa="2"Col	NO. 1 Raw water - take	<u>en from Windmill #2</u>	•		
NO. 3 NO. 4 REMARKS: CHEMICAL AND PHYSICAL PROPERTIES NO. 1 NO. 2 NO. 3 NO. Specific Gravity at 60° F. 1.0024 Image: Colspan="2">Image: Chemical properties pH When Sampled Image: Colspan="2">Image: Chemical properties pH When Sacaused 7.23 Image: Colspan="2">Image: Colspan="2" Image: Colspan="2">Image: Colspan="2" Image: Colspan= 2: Total Solids. Colculated Image: Colspan="2" Image: Colspan= 2: Total Solids. Colculated Image: Colspan="2" Image: Colspan= 2: Total Solids. Colculated <td< td=""><td>NO. 2</td><td></td><td></td><td></td><td></td></td<>	NO. 2				
NO. 4	NO. 3				•
NO. 1 NO. 2 NO. 3 NO. 3 Specific Gravity at 60° F. 1.0024 NO. 3					
CHEMICAL AND PHYSICAL PROPERTIES NO. 1 NO. 2 NO. 3 NO. Specific Gravity at 60° F. 1.0024					
NO. 1 NO. 2 NO. 3 NO. 3 Specific Gravity at 60° F. 1.0024		CHEMICAL AND PHYSI			
Specific Gravity at 60° F. 1.0024 Intersection of the second of the		NO.	1 NO. 2	NO. 3	NO
pH When Received 7.23 Bicarbonate as HCO3 405 Supersturation as CAC03 140 Undersaturation as CAC03 143 Total Hardness as CaC03 143 Magnesium as Mg 28 Solution as Ca 143 Magnesium as Mg 28 Solution and/or Potsasium 140 Suffere as SO4 107 Chloride as C1 236 Iron as Fe 0.08 Barrum as Ba 1 Total Solids. Calculated 1,059 Trail Solids. Calculated 1,059 Temperature "F. Carbon Dioxide, Calculated Dissolved Oxygen. 0.0 Hydrogen Sulfide 0.0 Suspended Oil Filtrable Solids as mg/1 Volume Filtrable Solids as mg/1 1.4 Nitrate, as N 1.4 Nitrate, as N 1.4	Specific Gravity at 60° F.	1.0024			<u></u>
pH When Received 7.23 Bicarbonate as HCO3 405 Supersaturation as CaCO3	pH When Sampled			†	
Bicarbonate as HCOg 405 Superasturation as CaCO3	pH When Received	7.	23		1
Supersaturation as CaCO3 Image: Supersaturation as CaCO3 Undersaturation as CaCO3 472 Calcium as Ca 143 Calcium as Mg 28 Sodium and/or Potassium 140 Sulfare as SO4 107 Chloride as Cl 236 Iron as Fe 0.08 Barium as Ba Image: Sulfare as SO4 Turbidity, Electric Image: Sulfare as Pt Total Solids, Calculated 1,059 Temperature *F. Image: Sulfare as 77* F. Garges Sulfare 0.0 Hydrogen Sulfare 0.0 Hydrogen Sulfare 0.0 Results Reported As Milligrams Per Liter Additional Determentations And Remerks The undersigned certifies the above to be true and	Bicarbonate as HCO3	405			
Undersaturation as CaC03 472 Total Hardness as CaC03 472 Calcium as Ca 143 Sedium and/or Potassium 140 Sulfate as S04 107 Chloride as Cl 236 Iron as Fe 0.08 Barium as Ba 1 Turbidity, Electric 1 Colors Pt 1 Total Solids, Calculated 1,059 Temperature "F: 1 Carbon Dioxide, Calculated 0.0 Dissolved Oxygen, 1 Hydrogen Sulfide 0.0 Filtrable Solids as mg/1 1 Volume Filtered, mi 1.4 Nittrate, as N 1.4 Nittrate, as N 1.4	Supersaturation as CaCO3				
Total Hardness as CaC03 4/2 Calcium as Ca 143 Magnesium as Mg 28 Sodium and/or Potassium 140 Sulfate as SQ 107 Chloride as Cl 236 Iron as Fe 0.08 Barium as Ba 1 Turbidity. Electric 1 Color as Pt 1 Total Solids. Calculated 1,059 Temperature "F: 1 Carbon Dioxide. Calculated 0.0 Dissolved Oxygen. 1 Hydrogen Sulfide 0.0 Resistivity. ohma/m at 77" F. 6.95 Suspended Oil 1.4 Filtrable Solids as mg/t 1.4 Volume Filtered. ml 1.4 Nitrate, as N 1.4 Nature Reported As Milligrams Per Liter Additional Determinations And Remerks The undersigned certifies the above to be true and	Undersaturation as CaCO3				
Childram as Ca 143 Magnesium as Mg 28 Sodium and/or Potassium 140 Sulfare as SQ4 107 Chloride as C1 236 Iron as Fe 0.08 Barium as Ba 1 Turbidity, Electric 1 Color as Pt 1 Total Solids. Calculated 1,059 Temperature *F. 1 Carbon Dioxide. Calculated 1 Dissolved Oxygen. 1 Hydrogen Sulfide 0.0 Resistivity, ohma/m at 77* F. 6.95 Suspended Oil 1.4 Fitrable Solids as mg/t 1.4 Volume Filtered, ml 1.4 Nitrate, as N 1.4 Results Reported As Milligrame Per Liter Additional Determinations And Remerks The undersigned certifies the above to be true and	Total Hardness as CaCO3	4/2			<u> </u>
Vegression as rig 20 Sodium and/or Potassium 140 Sulfare as SQ4 107 Chloride as C1 236 Iron as Fe 0.08 Barium as Ba 0.08 Turbidity, Electric 0.08 Color as Pt 0.09 Total Solids. Calculated 1,059 Temperature "F. 0.0 Carbon Dioxide. Calculated 1,059 Dissolved Oxygen. 0.0 Hydrogen Sulfide 0.0 Results Reported As Milligrams Per Liter 0.0 Results Reported As Milligrams Per Liter					ļ
Sulfare as SO4 107 Chloride as Cl 236 Iron as Fe 0.08 Barium as Ba 0.08 Turbidity, Electric 107 Color as Pt 100 Total Solids. Calculated 1,059 Temperature *F. 100 Carbon Dioxide. Calculated 1,059 Dissolved Oxygen. 100 Hydrogen Sulfide 0.0 Resistivity, ohme/m at 77* F. 6.95 Suspended Oli 1.4 Nitrate, as N 1.4 Results Reported As Milligrams Per Liter	Sodium and/or Potassium			<u></u>	
Chloride as Cl 236 Iron as Fe 0.08 Barum as Ba 0.08 Turbidity. Electric 1 Color as Pt 1 Total Solids. Calculated 1,059 Temperature "F. 1 Carbon Dioxide. Calculated 1 Dissolved Oxygen. 1 Hydrogen Sulfide 0.0 Resistivity. ohma/m at 77° F. 6.95 Suspended Oll 1.4 Nitrate, as N 1.4 Results Reported As Mittigrams Per Liter	Sulfate as SQ4				<u> </u>
Iron as Fe 0.08 Barium as Ba	Chloride as Cl	236			
Barium as Ba	Iron as Fe	0.0)8		
Turbidity, Electric	Barium as Ba				
Color as Pt 1,059 1 Total Solids. Calculated 1,059 1 Temperature *F. 1 1 Carbon Dioxide. Calculated 1 1 Dissolved Oxygen. 1 1 Hydrogen Sulfide 0.0 1 Resistivity. ohms/m at 77° F. 6.95 1 Suspended Oil 1 1 Filtrable Solids as mg/1 1 1 Volume Filtered. ml 1.4 1 Nitrate, as N 1.4 1 Results Reported As Milligrams Per Liter	Turbidity, Electric				
Total Solids. Calculated 1,059 Temperature *F.	Color as Pt				
Temperature "F. Carbon Dioxide. Calculated Dissolved Oxygen.	Total Solids, Calculated	1,059			
Carbon Disxidal Calculates Image: Calculates Dissolved Oxygen. Image: Calculates Hydrogen Sulfide 0.0 Resistivity, ohms/m at 77° F. 6.95 Suspended Oll Image: Calculates Filtrable Solids as mg/t Image: Calculates Volume Filtered, mi Image: Calculates Nitrate, as N 1.4 Results Reported As Milligrams Per Liter Additional Determinations And Remerks The undersigned certifies the above to be true and	Temperature "F.				
Hydrogen Sulfide 0.0 Resistivity. ohms/m at 77° F. 6.95 Suspended Oil	Dissolved Orveen				
Resistivity. ohms/m at 77° F. 6.95 Suspended Oil	Hydrosen Sulfide	0.0			
Suspended Oil	Resistivity, ohms/m at 77° F.	6.9	5		
Filtrable Solids as mg/1 Image: Constraint of the solid of the	Suspended Oil				
Volume Filtered, ml Nitrate, as N 1.4 Results Reported As Milligrams Per Liter Additional Determinations And Remerks The undersigned certifies the above to be true and	Filtrable Solids as mg/1				
Nitrate, as N 1.4 Results Reported As Milligrams Per Liter Additional Determinations And Remarks The undersigned certifies the above to be true and	Volume Filtered, ml				
Results Reported As Milligrams Per Liter Additional Determinations And Remarks The undersigned certifies the above to be true and	Nitrate, as N	1.4			
Results Reported As Milligrams Per Liter Additional Determinations And Remarks The undersigned certifies the above to be true and					
Results Reported As Milligrams Per Liter Additional Determinations And Remarks The undersigned certifies the above to be true and				1	
Additional Determinations And Remarks The undersigned certifies the above to be true and		Results Reported As Mil	ligrams Per Liter		
	Additional Determinations And Remerks	The undersigned	certifies the abo	ove to be tru	e and
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			4	. // /	
	form No. 3		1 11.0	1 9	

P O BOX 1468	Martin Water Lat	boratories, Inc.		709 W INDIA
MONAHANS, TEXAS 79756 PH 943-3234 OR 563-1040			м	IDLAND. TEXAS 3.
	RESULT OF WAT	ER ANALYSES		
		LABORATORY NO.	99022	9
TO: Mr. Eric Haas		_ SAMPLE RECEIVED	9-27-	90
P. O. Drawer "D", Monumer	<u>nt, NM 88265</u>	_ RESULTS REPORTE	ID10-1-	90
COMPANY Amerada Hess Lor	DOTATION LE	ASE		
FIELD OR POOL	T-20C & D-27F		ND4	
SECTION BLOCK SURVE	Y 1-205 & K-STECOUNTY			
SOURCE OF SAMPLE AND DATE TA	KEN:			
NO.1 <u>Raw water - take</u>	<u>n from Windmill #3.</u>			
NO. 2				
NO. 3				
NO. 4				
	CHEMICAL AND PHYSIC			
	NO. 1	NO. 2	NO. 1	
Specific Gravity at 60° F.	1.0022			<u> </u>
pH When Sampled			†	
pH When Received	7.3	8	1	<u> </u>
Bicarbonate as HCO3	393		†	
Supersaturation as CaCO3				<u> </u>
Undersaturation as CaCO3			<u></u>	<u> </u>
Total Hardness as CaCO3	398			<u> </u>
Calcium as Ca	121			·····
Magnesium as Mg	23			
Sodium and/or Potassium	170			
Suifate as SO4	150			
Chloride as Cl	206			
Iron as Fe	0.32	2		
Barium as Ba				
Turbidity, Electric				
Color as Pt				
Total Solids, Calculated	1,063			
Temperature °F.				
Carbon Dioxide, Calculated				
Dissolved Oxygen.				
Hydrogen Sulfide				
Resistivity, ohms/m at 77° F.	/.05	<u>}</u>		
Suspended Oil				
Filtrable Solids as mg/1				
Volume Filtered, mi				
Nitrate, as N				
	Beguine Bearmed As Mill	ierome Des Linn		
Additional Descriptions And Provide	The understand on	rer Litter	a to be to	
Additional Determinations And humans	s knowledge and bel	iof	e to be true	and
Correct to the best of his	b knowledge and bei			
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		F.	16	
- Jana 190. J		By A Uthere	11019	2
		Ronnie	D. Tucker.	B.S.

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P O BOX 1468 Onahans, TEXAS 79756	WIGHTIN WOLCH LOUDIN	101163, 111L.	MI	709 W INDIANA Dland texas 79701
943-3234 OR 563-1040	RESULT OF WATER	ANALYSES		PHONE 683-4521
	1		99023	0
- Mr. Eric Haas			9-27-	.90
P. O. Drawer "D", Monumen	t, NM 88265		10-1-	.90
<u> </u>				
OMPANY Amerada Hess Corp	oration LEASE			
IELD OR POOL	T 10C % D 27E			
ECTION BLOCK SURVEY .	1-195 & R-3/ COUNTY	s1	TATE	
SURCE OF SAMPLE AND DATE TAKE	[N:			
NO. 1 Raw water - taken	ITOM WINDMILL #4.			
NO. 2	• · · · · · · · · · · · · · · · · · · ·		<u> </u>	
NO. 3				·
NO. 4				
EMARKS:				
C	HEMICAL AND PHYSICAL	PROPERTIES		
·	NO. 1	NO. 2	NO. 3	NO. 4
Specific Gravity at 60° F.	- 1.0017	+		<u> </u>
pH When Sampled	7 76	++		
Bicethonate as HCO2	256	++		<u>├</u>
Supersaturation as CaCO3		++		
Undersaturation as CaCO3				
Total Hardness as CaCO3	364			
Calcium as Ca	123			
Magnesium as Mg	14			
Sodium and/or Potassium	82			
Sulfate as SO4	82			
Chloride as Cl	175	╺╉┙╼╍╼╺╡		
Iron as Fe	0.04	- {		
Barium as Bs				
Color as Pt				
Total Solida, Calculated	732	++		
Temperature °F.				
Carbon Dioxide, Calculated				
Dissolved Oxygen.				
Hydrogen Sulfide	0.0			
Resistivity, ohms/m at 77° F.	9.83			
Suspended Oil				
Filtrable Solids as mg/1				
Nitrate as N	2.5	++		
Altiace, as n		++		
	Results Reported As Milligra	ms Per Liter		
Additional Determinations And Remarks	The undersigned ce	rtifies the abo	ove to be tr	ue and
correct to the best of hi	s knowledge and beli	ef.		
		<u> </u>		
		$\frac{2}{\nu_{i}}$		

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NORTH MONUMENT GRAYBURG/SAN ANDRES UNIT ATTACHMENT XII TO FORM C108 APPLICATION FOR AUTHORIZATION TO INJECT WATER

PROPOSED NORTH MONUMENT GRAYBURG/SAN ANDRES UNIT LEA COUNTY, NEW MEXICO

Amerada Hess Corporation has examined available geological and engineering data and finds no evidence of open faults or any other hydrologic connection between the injection zone and any underground source of drinking water.