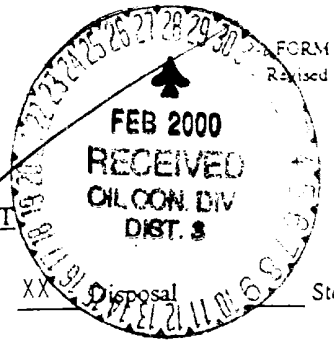
STATE OF NEW MEXICO
ENERGY, MINERALS and NATURAL
RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION
PO BOX 2088
SANTA FE, NM 87504-2088

FORM C-108
Revised 7-1-81



APPLICATION FOR AUTHORIZATION TO INJECT

I. PURPOSE: _____ Secondary Recovery _____ Pressure Maintenance XX Disposal _____ Storage
Application qualifies for administrative approval? __Yes __No

II. OPERATOR: Dugan Production Corp.

ADDRESS: P.O. Box 420, Farmington, NM 87499

CONTACT PARTY: John Alexander PHONE: 505/325-1821

III. WELL DATA: Complete the data required on the reverse side of this form for each well processed for injection. Additional sheets may be attached if necessary.

IV. Is this an expansion of an existing project: __ Yes X No
If yes, give the Division order number authorizing the project _____

V. Attach a map that identifies all wells and leases within two miles of any proposed injection well with a one-half mile radius circle drawn around each proposed injection well. This circle identifies the well's area of review.

VI. Attach a tabulation of data on all wells of public record within the area of review which penetrate the proposed injection zone. Such data shall include a description of each well's type, construction, date drilled, location, depth, record of completion, and a schematic of any plugged well illustrating all plugging detail.

VII. Attach data on the proposed operation, including:

1. Proposed average and maximum daily rate and volume of fluids to be injected;
2. Whether the system is open or closed;
3. Proposed average and maximum injection pressure;
4. Sources and an appropriate analysis of injection fluid and compatibility with the receiving formation if other than reinjected produced water; and
5. If injection is for disposal purposes into a zone not productive of oil or gas at or within one mile of the proposed well, attach a chemical analysis of the disposal zone formation water (may be measured or inferred from existing literature, studies, nearby wells, etc.).

*VIII. Attach appropriate geological data on the injection zone including appropriate lithologic detail, geological name, thickness and depth. Give the geologic name, and depth to bottom of all underground sources of drinking water (aquifers containing waters with total dissolved solids concentrations of 10,000 mg/1 or less) overlying the proposed injection zone as well as any such sources known to be immediately underlying the injection interval.

IX. Describe the proposed stimulation program, if any.

* X. Attach appropriate logging and test data on the well. (If well logs have been filed with the Division, they need not be resubmitted.)

* XI. Attach a chemical analysis of fresh water from two or more fresh water wells (if available and producing) within one mile of any injection or disposal well showing location of wells and dates samples were taken.

XII. Applicants for disposal wells must make an affirmative statement that they have examined available geologic and engineering data and find no evidence of open faults or any other hydrologic connection between the disposal zone and any underground source of drinking water.

XIII. Applicants must complete the "Proof of Notice" section on the reverse side of this form.

XIV. Certification: I hereby certify that the information submitted with this application is true and correct to the best of my knowledge and belief.

NAME: John Alexander TITLE: Vice-President

SIGNATURE: John Alexander DATE: 2/21/2000

* If the information required under Sections VI, VIII, X, and XI above has been previously submitted, it need not be resubmitted. Please show the date and circumstance of the earlier submittal. _____

DISTRIBUTION: Original and one copy to Santa Fe with one copy to the appropriate District Office

dugan production corp.

February 25, 2000

Ms. Lori Wrotenbery, Director
New Mexico Oil Conservation Division
2040 S. Pacheco
Santa Fe, NM 87505

Re: Application for Class II Produced Water Disposal Well, West Bisti Unit No. 153, San Juan County, N.M.

Dear Ms. Wrotenbery:

Dugan Production Corporation, P.O. Box 420, Farmington, N.M. 87401 (505-325-1821) makes application for produced water disposal into the Mesaverde Formation at its West Bisti Unit No. 153 well. The subject well is located: 1990' fsl & 1960' fwl, Section 35 - Township 26N - Range 13W, San Juan County, N.M. Surface is owned by the Navajo Nation through the Navajo Indian Irrigation Project. Minerals are owned by the federal government under the jurisdiction of the Bureau of Land Management.

This proposal is for the conversion of an existing Class II Enhanced Recovery Water Injection well in the Gallup formation to a Class II Salt Water Disposal well in the Mesaverde formation. The Gallup Unit was formed by action of the New Mexico Oil Conservation Division (NMOCD). All approvals for existing water injection wells in the unit have come from the NMOCD and Bureau of Land Management (BLM).

Sections and attachments to this application are numbered as those set forth in OCD Form C-108.

The WBU 153 was drilled by British-American Oil on 3/28/1957. Surface casing was 9-5/8" set at 214' and cement to the surface. The long string was 5-1/2" 14 lb./ft. casing set at 5049'. It was cemented with 100 sacks of cement containing 3% bentonite gel. A temperature survey was run after cementing and the cement top was found at 4,450'. The Gallup formation was perforated from 4,908-4,924 and 4,970-4,990. The well was a Gallup production well until 10/2/1960. At that time, it was converted to water injection service. An injection packer and plastic coated tubing was run. The producing perforations were used as the injection interval. Injection service continued until 3/14/1984 when it was discovered that a casing leak had developed. Chevron, then the operator of the unit, set a cast iron bridge plug at 4,850' and placed 40' of cement on top of that plug. Holes were found in the casing from 2,814' to 3,617', which is across the Mesaverde formation. The casing was found competent above and below the holes. Chevron decided to temporarily abandon the well. Abandonment mud was spotted from the Gallup cement plug to 3,800'. One hundred seventy five (175) sacks of cement was pumped down the casing and into the casing holes. While conducting this operation, fluid was returned to the surface between the 5-1/2 production casing and the 9-5/8" surface casing. This indicated that no cement or obstructions existed in the annulus. The cement was tagged with tubing at 2,673'. The 5-1/2" casing was pressure tested above the cement plug and held 700 psi with no leaks. The well remained abandoned until Dugan Production Corp. purchased the unit from Chevron in October 1989.

Dugan Production Corp. decided to re-enter the WBU 153 after a mechanical integrity test failed on 5/24/1999. The plan was to repair the casing leak and return the well to Gallup injection service. The existing

cement plug was found at 2,747'. A hole was discovered at 2,739'. The casing above this point held 1,000 psi. Two hundred and sixty (260) cubic feet of Class B cement was pumped into the hole. While pumping the cement, fluid returns to the surface were obtained between the production and surface casing. This indicated that the original remedial cement job, done by Chevron, had not lifted cement above the casing holes. If all the 260 cubic foot cement job went into the annulus, the cement top would be at 1,250'. The cement was drilled out to the original cement depth of 2,747'. The casing was pressure tested at 1,500 psi and held with no leaks. The old cement plug was drilled to 2,820', where no more cement was found. The casing was pressure tested and did not hold. The drill string was run in the hole to a depth of 3,210'. An obstruction was encountered at this point. Two days were spent attempting to drill past the obstruction, with no success. Dugan decided to swab test the Mesaverde water at the point of the casing holes and apply to convert this well to salt water disposal service into the existing casing holes.

Enumerated below are the pertinent points concerning the construction of the proposed project:

1. Injection will be into the Mesaverde Formation from 2747' – 3875'. Since the original cement top is 4450' (by temperature survey), it is also likely that the Lewis shale from 3875' to 4450' will be exposed to injection pressure. We do not anticipate this to create any problems or losses of injection, since the Lewis Shale is not productive in this area. These plugs will prevent injected fluids at the WBU 153 from entering any zones above the Mesaverde. The exact injection interval can not be determined because of the lack of knowledge of where the 175 sack cement squeeze, done by Chevron, was placed. Since Dugan found no cement above the Mesaverde holes, it can be safely assumed that the cement was placed somewhere in the Mesaverde and should prevent movement of injected water below the intended injection interval.

2. The only possible USDW in the area is the Ojo Alamo. This formation either does not exist at this well, or is behind the surface casing and protected by cement. There is no possibility that injected fluid will contaminate this acquirer.

3. The casing above the holes at 2747' has been pressure tested. The remedial cementing done by Dugan should have lifted cement above the Mesaverde to prevent casing leaks that could cause injection of fluids into formations above the injection interval. Frequent monitoring of the casing pressure will also mitigate the possibility of a casing failure.

4. This is an existing water injection well. All of the lines and facilities are in place. Minimum surface disturbance will be required. The Navajo Irrigation Project plans to be farming in this area. Any lessening of surface disturbance will benefit their operations

Our request is that we be allowed to dispose of produced water into the Mesaverde formation through holes existing in the casing of the WBU 153. Since the casing is cemented above these holes and the interval below the holes is either cemented or is incapable of taking injected water, all injected water will be confined to the Mesaverde.

Sincerely,

John Alexander

John Alexander
Vice President

Attachment III – Well Data
Dugan Production Corp.
West Bisti Unit No. 153: 1990' fsl & 1960' fwl, Section 35 - Township 26N - Range 13W, San Juan County, N.M.
Conversion to Mesaverde SWD

Well History:

Drilled by British-American Oil on 3/28/1957.

Surface casing: 9-5/8" set at 214'. Cement to the surface determined by circulation.

Long string : 5-1/2" 14 lb./ft. casing set at 5049'. Cemented with 100 sacks of cement containing 3% bentonite gel. A temperature survey was run after cementing and the cement top was found at 4,450'.

The Gallup formation was perforated from 4,908-4,924 and 4,970-4,990. The well was a Gallup production well until 10/2/1960. At that time, it was converted to water injection service.

An injection packer and plastic coated tubing was run. The producing perforations were used as the injection interval. Injection service continued until 3/14/1984 when it was discovered that a casing leak had developed. Chevron, then the operator of the unit, set a cast iron bridge plug at 4,850' and placed 40' of cement on top of that plug. Holes were found in the casing from 2,814' to 3,617', which is across the Mesaverde formation. The casing was found competent above and below the holes. Chevron decided to temporarily abandon the well. Abandonment mud was spotted from the Gallup cement plug to 3,800'. One hundred seventy five (175) sacks of cement was pumped down the casing and into the casing holes. While conducting this operation, fluid was returned to the surface between the 5-1/2 production casing and the 9-5/8" surface casing. This indicated that no cement or obstructions existed in the annulus. The cement was tagged with tubing at 2,673'. The 5-1/2" casing was pressure tested above the cement plug and held 700 psi with no leaks. Dugan Production Corp. decided to re-enter the WBU 153 after a mechanical integrity test failed on 5/24/1999. The plan was to repair the casing leak and return the well to Gallup injection service. The existing cement plug was found at 2,747'. A hole was discovered at 2,739'. The casing above this point held 1,000 psi. Two hundred and sixty (260) cubic feet of Class B cement was pumped into the hole. While pumping the cement, fluid returns to the surface were obtained between the production and surface casing. This indicated that the original remedial cement job, done by Chevron, had not lifted cement above the casing holes. If all the 260 cubic foot cement job went into the annulus, the cement top would be at 1,250'. The cement was drilled out to the original cement depth of 2,747'. The casing was pressure tested at 1,500 psi and held with no leaks. The old cement plug was drilled to 2,820', where no more cement was found. The casing was pressure tested and did not hold. The drill string was run in the hole to a depth of 3,210'. An obstruction was encountered at this point. Two days were spent attempting to drill past the obstruction, with no success. Dugan decided to swab test the Mesaverde water at the point of the casing holes and apply to convert this well to salt water disposal service into the existing casing holes.

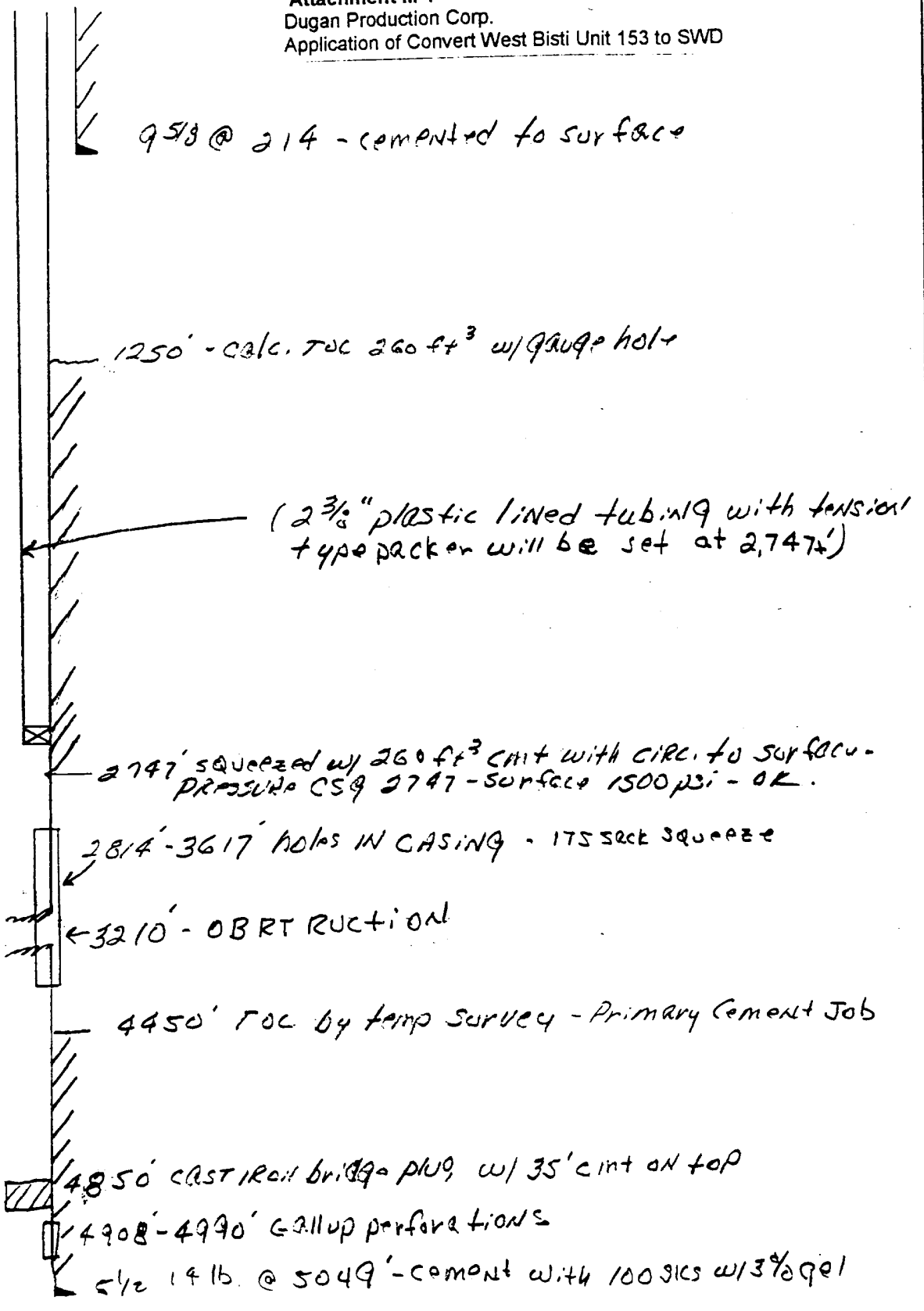
After conversion to injection:

2-3/8" plastic lined tubing set in Baker AD-1 tension packer set at 2747'.

T 11-31-11 WEST BISTI UNIT # 153 | INJECTION WELL

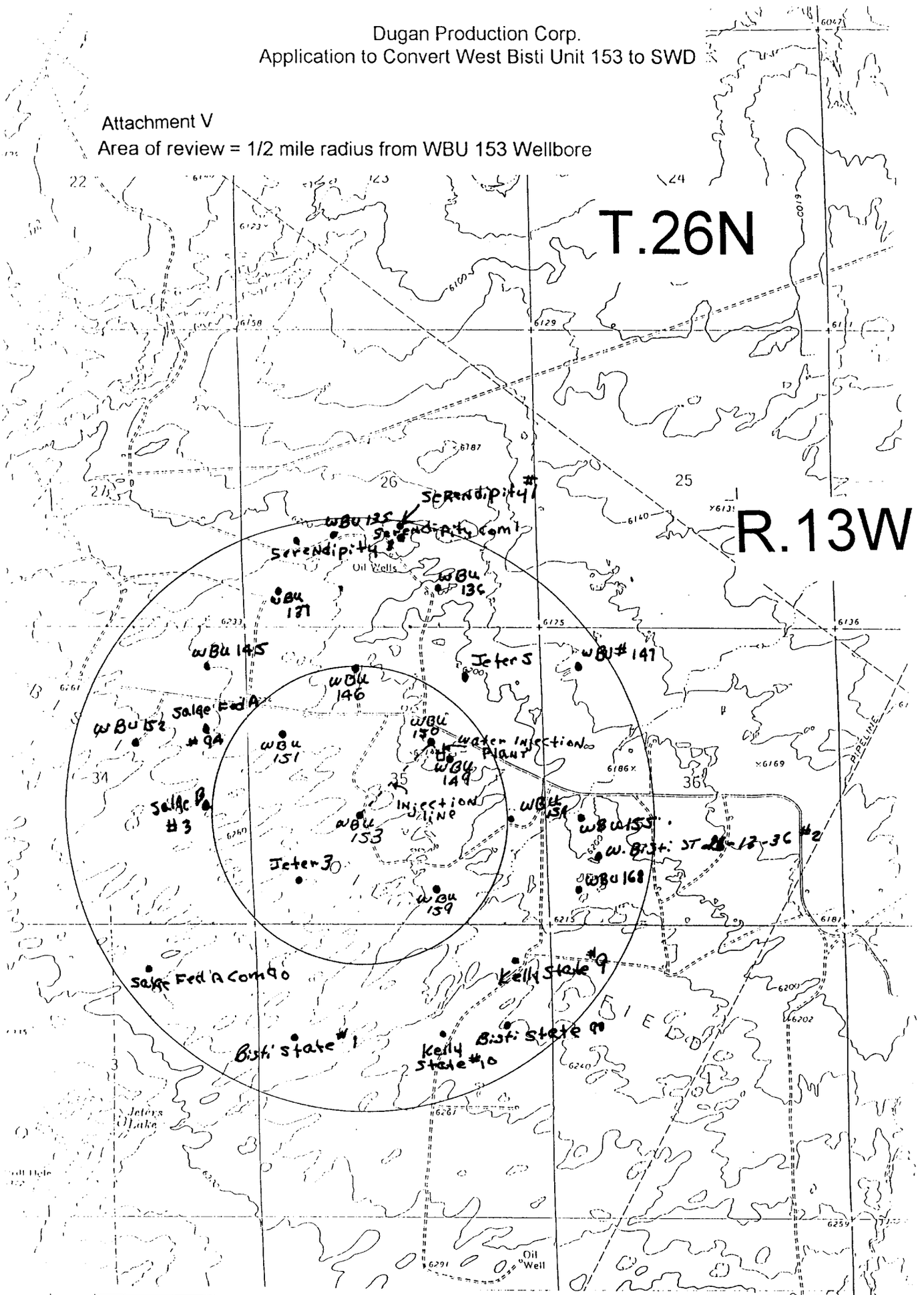
DUGAN Production Corp.
Application to Convert west Bisti UNIT #153 to Mesquardo SWD

Attachment III-1
Dugan Production Corp.
Application of Convert West Bisti Unit 153 to SWD



Dugan Production Corp.
Application to Convert West Bisti Unit 153 to SWD

Attachment V
Area of review = 1/2 mile radius from WBU 153 Wellbore



Well	No.	Formaiton	S.	T.	R.	U.	N/S	E/W
WEST BISTI UNIT	146	BISTI LOWER GALLUP	35	26N	13W	C	660/N	1980/W
WEST BISTI UNIT	151	BISTI LOWER GALLUP	35	26N	13W	E	1880/N	660/W
WEST BISTI UNIT	149	WATER WELL	35	26N	13W	G	2310/N	1650/E
WEST BISTI UNIT	150	BISTI LOWER GALLUP	35	26N	13W	G	1980/N	1980/E
WEST BISTI UNIT	153	BISTI LOWER GALLUP	35	26N	13W	K	1990/S	1960/W
WEST BISTI UNIT	159	BISTI LOWER GALLUP	35	26N	13W	O	660/S	1980/E
JETER	3	BASIN FRUITLAND COAL	35	26N	13W	M	790/S	790/W

Dugan Production Corp. - Wells within one mile radius of WBU 153 **Attachment V**

Those wells within the 1/2 mile area of review are shaded.

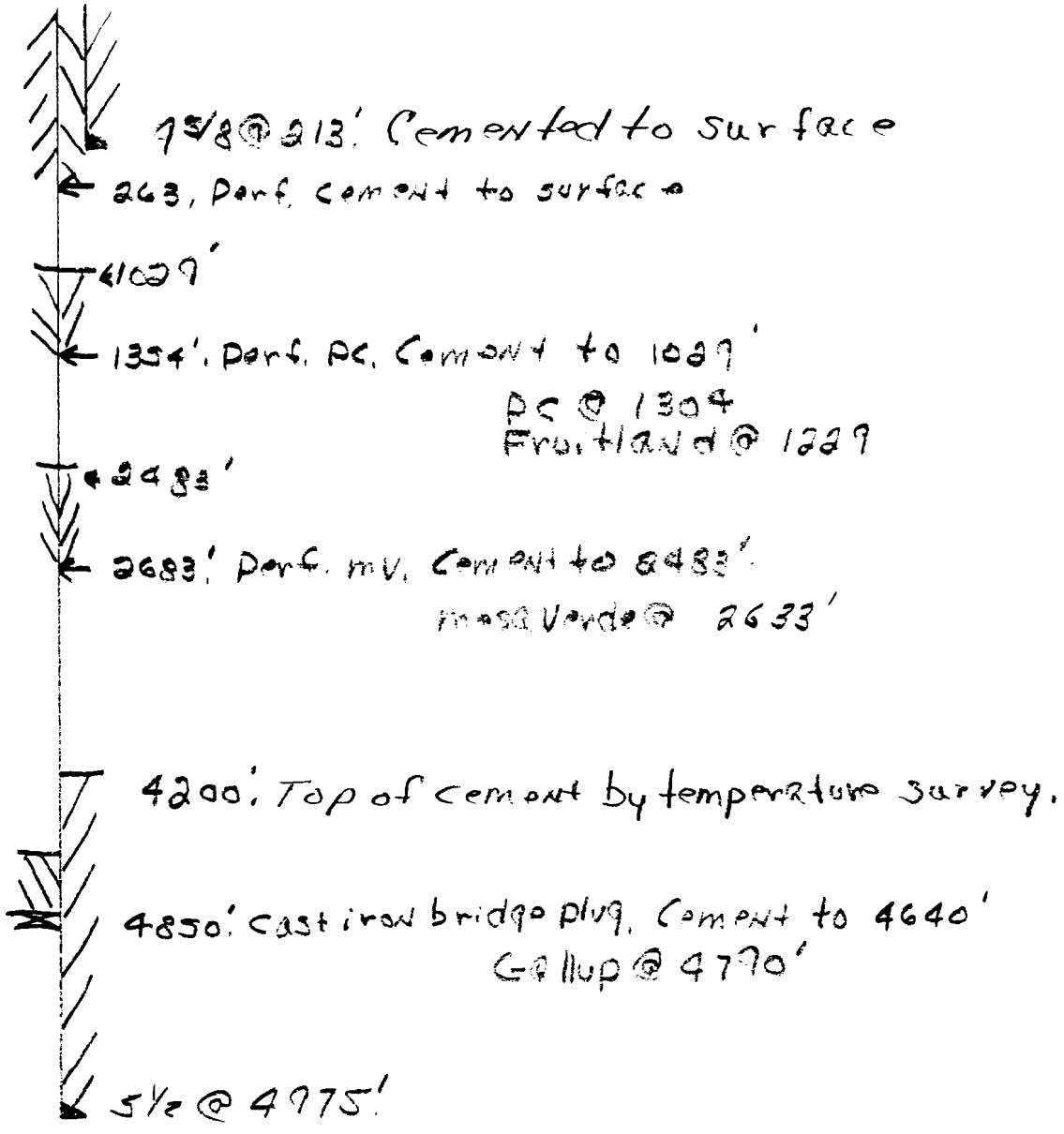
OPERATOR	WELL_NAME	WELL_NO	POOL	SEC	TWN	RGE	UL	FTAGE_NS	FTAGE_EW	TD	STATUS
DUGAN PRODUCTION CORP	BISTI STATE	1	BISTI LOWER GALLUP	02	25N	13W	E	1980/N	660/W	5050	ZA
DUGAN PRODUCTION CORP	BISTI STATE	1	BASIN FRUITLAND COAL	02	25N	13W	E	1980/N	660/W	5050	CO
EL PASO NAT GAS PROD CO	KELLY STATE	9	BISTI LOWER GALLUP	02	25N	13W	A	660/N	660/E	4978	PA
EL PASO NAT GAS PROD CO	KELLY STATE	10	BISTI LOWER GALLUP	02	25N	13W	G	1986/N	1980/E	5010	PA
DUGAN PRODUCTION CORP	BISTI STATE	90	BASIN FRUITLAND COAL	02	25N	13W	H	1980/N	790/E	1320	CO
DUGAN PRODUCTION CORP	SALGE FEDERAL A COM	90	BASIN FRUITLAND COAL	03	25N	13W	B	790/N	1850/E	1370	CO
MERRION O&G CORP	SERENDIPITY	1	BISTI LOWER GALLUP	26	26N	13W	J	1650/S	2310/E	5120	ZA
DUGAN PRODUCTION CORP	WEST BISTI UNIT	135	BISTI LOWER GALLUP	26	26N	13W	K	1650/S	1650/W	5078	CO
DUGAN PRODUCTION CORP	WEST BISTI UNIT	137	BISTI LOWER GALLUP	26	26N	13W	M	660/S	660/W	5108	CO
DUGAN PRODUCTION CORP	WEST BISTI UNIT	136	BISTI LOWER GALLUP	26	26N	13W	O	660/S	1978/E	5165	TA
MERRION O&G CORP	SERENDIPITY COM	1	BASIN FRUITLAND COAL	26	26N	13W	J	1650/S	2310/E	5120	CO
MERRION O&G CORP	SERENDIPITY	3	BASIN FRUITLAND COAL	26	26N	13W	L	1500/S	900/W	1385	CO
BRITISH-AMER OIL PROD CO	SALGE B	3	WC D3;GALLUP	34	26N	13W	I	2090/S	715/E	5075	PA
DUGAN PRODUCTION CORP	WEST BISTI UNIT	145	BISTI LOWER GALLUP	34	26N	13W	A	660/N	660/E	5120	PA
DUGAN PRODUCTION CORP	WEST BISTI UNIT	152	BISTI LOWER GALLUP	34	26N	13W	G	1980/N	1980/E	5082	SI
DUGAN PRODUCTION CORP	SALGE FEDERAL A	94	BASIN FRUITLAND COAL	34	26N	13W	H	1800/N	790/E	1370	CO
DUGAN PRODUCTION CORP	WEST BISTI UNIT	146	BISTI LOWER GALLUP	35	26N	13W	C	660/N	1980/W	5077	PA
DUGAN PRODUCTION CORP	WEST BISTI UNIT	151	BISTI LOWER GALLUP	35	26N	13W	E	1880/N	660/W	5055	PA
DUGAN PRODUCTION CORP	WEST BISTI UNIT	149	WATER WELL	35	26N	13W	G	2310/N	1650/E		PA
DUGAN PRODUCTION CORP	WEST BISTI UNIT	150	BISTI LOWER GALLUP	35	26N	13W	G	1980/N	1980/E	5075	PA
DUGAN PRODUCTION CORP	WEST BISTI UNIT	154	BISTI LOWER GALLUP	35	26N	13W	I	1980/S	660/E	5000	PA
DUGAN PRODUCTION CORP	WEST BISTI UNIT	153	BISTI LOWER GALLUP	35	26N	13W	K	1990/S	1960/W	5050	TA
DUGAN PRODUCTION CORP	WEST BISTI UNIT	159	BISTI LOWER GALLUP	35	26N	13W	O	660/S	1980/E	4975	PA
DUGAN PRODUCTION CORP	JETER	3	BASIN FRUITLAND COAL	35	26N	13W	M	790/S	790/W	1320	CO
DUGAN PRODUCTION CORP	JETER	5	BASIN FRUITLAND COAL	35	26N	13W	A	990/N	1300/E	1360	CO
CHEVRON USA INC	WEST BISTI UNIT	168	BISTI LOWER GALLUP	36	26N	13W	M	660/S	660/W	4886	PA
DUGAN PRODUCTION CORP	WEST BISTI UNIT	147	BISTI LOWER GALLUP	36	26N	13W	D	660/N	660/W	5051	PA
DUGAN PRODUCTION CORP	WEST BISTI UNIT	148	BISTI LOWER GALLUP	36	26N	13W	F	1980/N	1980/W	5075	CO
DUGAN PRODUCTION CORP	WEST BISTI UNIT	155	BISTI LOWER GALLUP	36	26N	13W	L	1980/S	660/W	5005	CO
DUGAN PRODUCTION CORP	WEST BISTI UNIT	158	BISTI LOWER GALLUP	36	26N	13W	N	660/S	1980/W	5050	CO
SG INTEREST I LTD	W BISTI ST 26-13-36	2	BASIN FRUITLAND COAL	36	26N	13W	M	1192/S	819/W	1380	CO

ATTACHMENT VI - WELL DATA OF WELLS IN AREA OF REVIEW
Dugan Production Corp
Application to Dispose of Water in the Mesaverde Formation
West Bisti Unit No. 153

Well	Footage	Sec	Twn.	Rng	Status	Date Drilled	Depth	Surface Casing	Production Casing	Plugging Information
West Bisti Unit 146	660' fnl & 1980' fwl	35	26N	13W	Producer - Plugged	12/14/1956	5081	9-5/8' @ 213. Cemented to surface.	5-1/2 @ 5077. Cement with 100 sks. w/3% gel. Top of cement at 4470', by temperature survey.	Cement plugs set as follows: Formation / Depth / Length of Cement plug Gallup 4838' Cast Iron Bridge Plug @ 4900'. Cement 4900' - 4590'. Mesaverde 2283' Perforate @ 2333'. Cement 2133' - 2333' Pictured Cliffs 1267' Fruitland 1219' Perforate @ 1326. Cement 1019' - 1326 Ojo Alamo 240' Perforate @ 290'. Cement 290' to surface.
West Bisti Unit 151	1880' fnl & 660' fwl	35	26N	13W	Injection - Plugged	4/18/1957	5054	9-5/8' @ 213. Cemented to surface.	5-1/2 @ 5054. Cement with 100 sks. w/3% gel. Top of cement at 4400', by temperature survey.	Cement plugs set as follows: Formation / Depth / Length of Cement plug Gallup 4834' Cast iron Bridge Plug @ 4874. Cement 4874' - 465 Mesaverde 2550' Perforate @ 2600'. Cement 2625' - 2155' Pictured Cliffs 1291' Fruitland 1202' Perforate @ 1341. Cement 761' - 1341 Ojo Alamo behind surf. csg. Perforate @ 290'. Cement 290' to surface.
West Bisti Unit 150	1980' fnl & 1980' fel	35	26N	13W	Injection - Plugged	8/1/1956	5075	9-5/8' @ 214. Cemented to surface.	5-1/2 @ 5054. Cement with 125 sks. w/3% gel. Top of cement at 4305', by temperature survey.	Cement plugs set as follows: Formation / Depth / Length of Cement plug Gallup 4730' Cast iron Bridge Plug @ 4850. Cement 4850' - 467 Mesaverde 1980' Perforate @ 2030'. Cement 2230' - 1880' Pictured Cliffs 1250' Fruitland 990' Perforate @ 1300. Cement 890' - 1300 Ojo Alamo behind surf. csg. Perforate @ 264'. Cement 264' to surface.
West Bisti Unit 149	2310' fnl & 1650' fel	35	26N	13W	Water Source Well - Plugged	7/9/1959	2540	none	9-5/8 @ 2540. Cemented with 100 sks. 50/50 Pozmix. Top of cement 1600', by temperature survey.	Cement plugs set as follows: Formation / Depth / Length of Cement plug Mesaverde 2304' Previously plug with cast iron bridge plug @ 1984, with cement on top from 1984 to 1914'. Pictured Cliffs 1320' Fruitland 1136' Perforate @ 1370. Cement 936' - 1370 Ojo Alamo not present . Perforate @ 100'. Cement 100' to surface.
West Bisti Unit 159	660' fsl & 1980' fel	35	26N	13W	Producer - Plugged	6/29/1959	4975	9-5/8' @ 213. Cemented to surface.	5-1/2 @ 4975. Cement with 150 sks. 50/50 Poz w/ 2% gel. Top of cement at 4200', by temperature survey.	Cement plugs set as follows: Formation / Depth / Length of Cement plug Gallup 4790' Cast iron Bridge Plug @ 4850. Cement 4850' - 464 Mesaverde 2633' Perforate @ 2683'. Cement 2483' - 2695' Pictured Cliffs 1304' Fruitland 1229' Perforate @ 1354. Cement 1029' - 1354' Ojo Alamo behind surf. csg. Perforate @ 263'. Cement 263' to surface.

WESTBISTI UNIT NO. 159
660' FSL & 1980' FEL
35-26N-13W

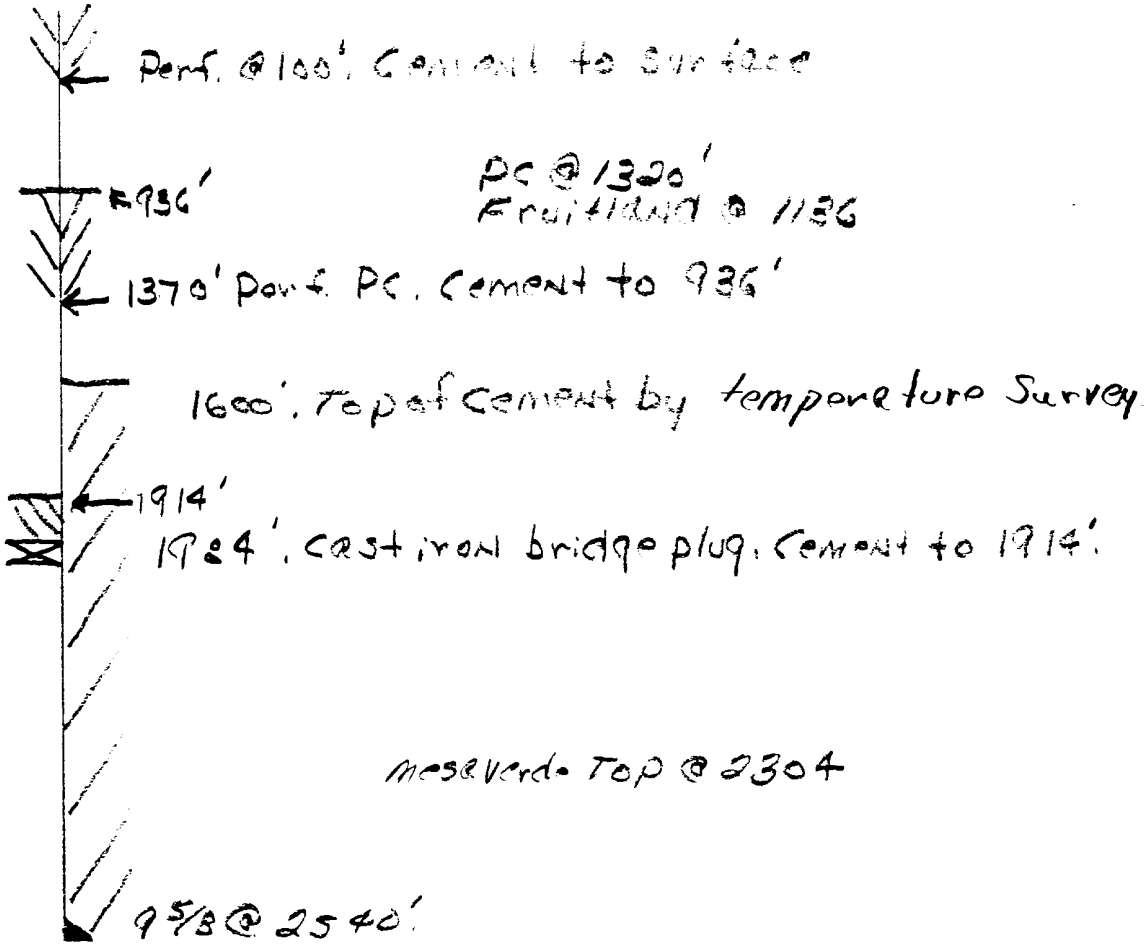
Gallup Formation Production Well
PLUGGING SCHEMATIC



WEST BISTI UNIT NO. 149
2310' FNL & 1650' FEL
35-26N-13W

Mesaverde Water Source Well

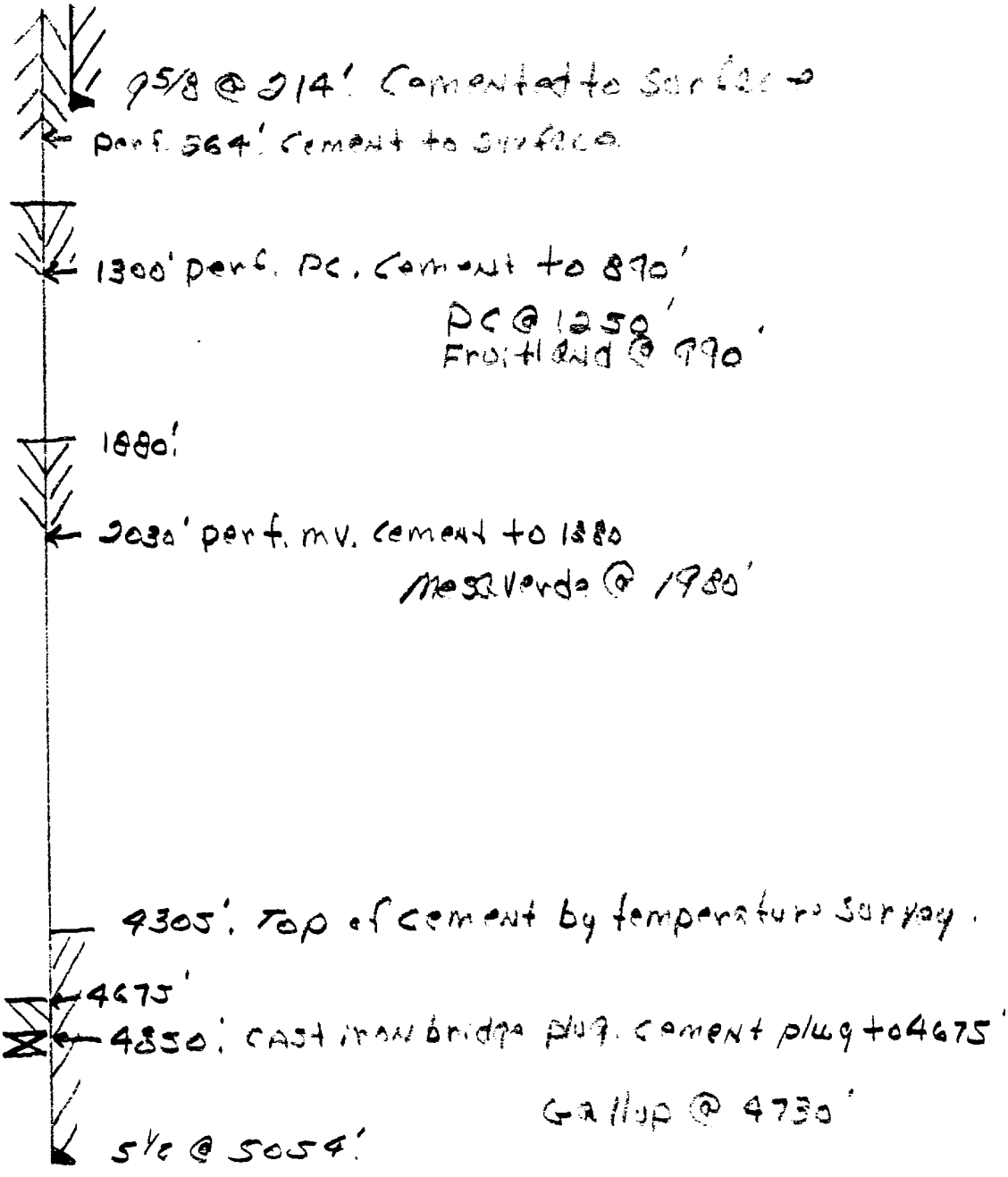
PLUGGING SCHEMATIC



WEST [illegible] UNIT NO. 150
1980' FNL & 1980' FEL
35-26N-13W

Gallup Formation Injection Well

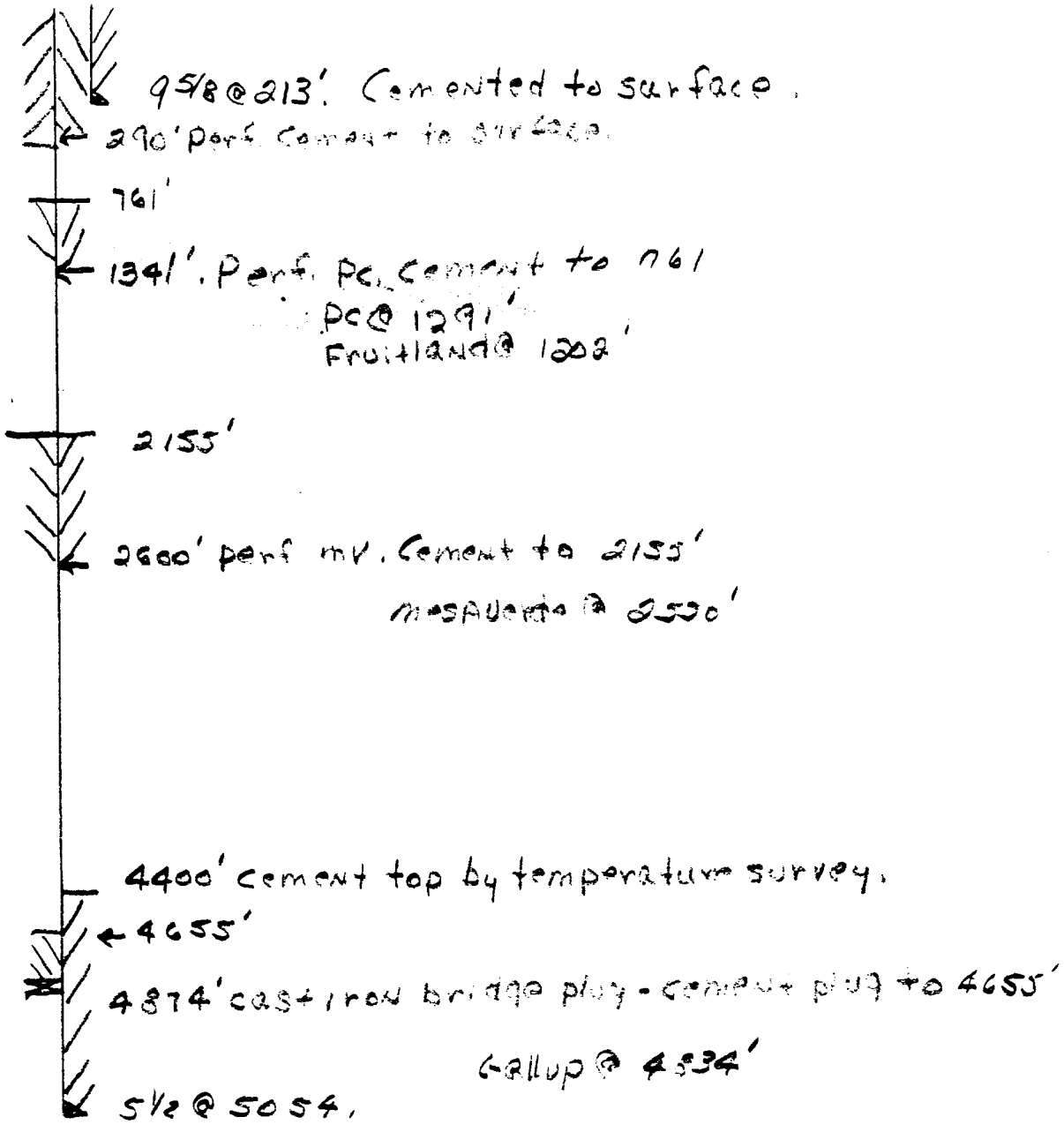
PLUGGING SCHEMATIC



West Bisti Unit No. 151
1880' FNL & 660' FWL
35-26N-13W

Gallup Formation Injection Well

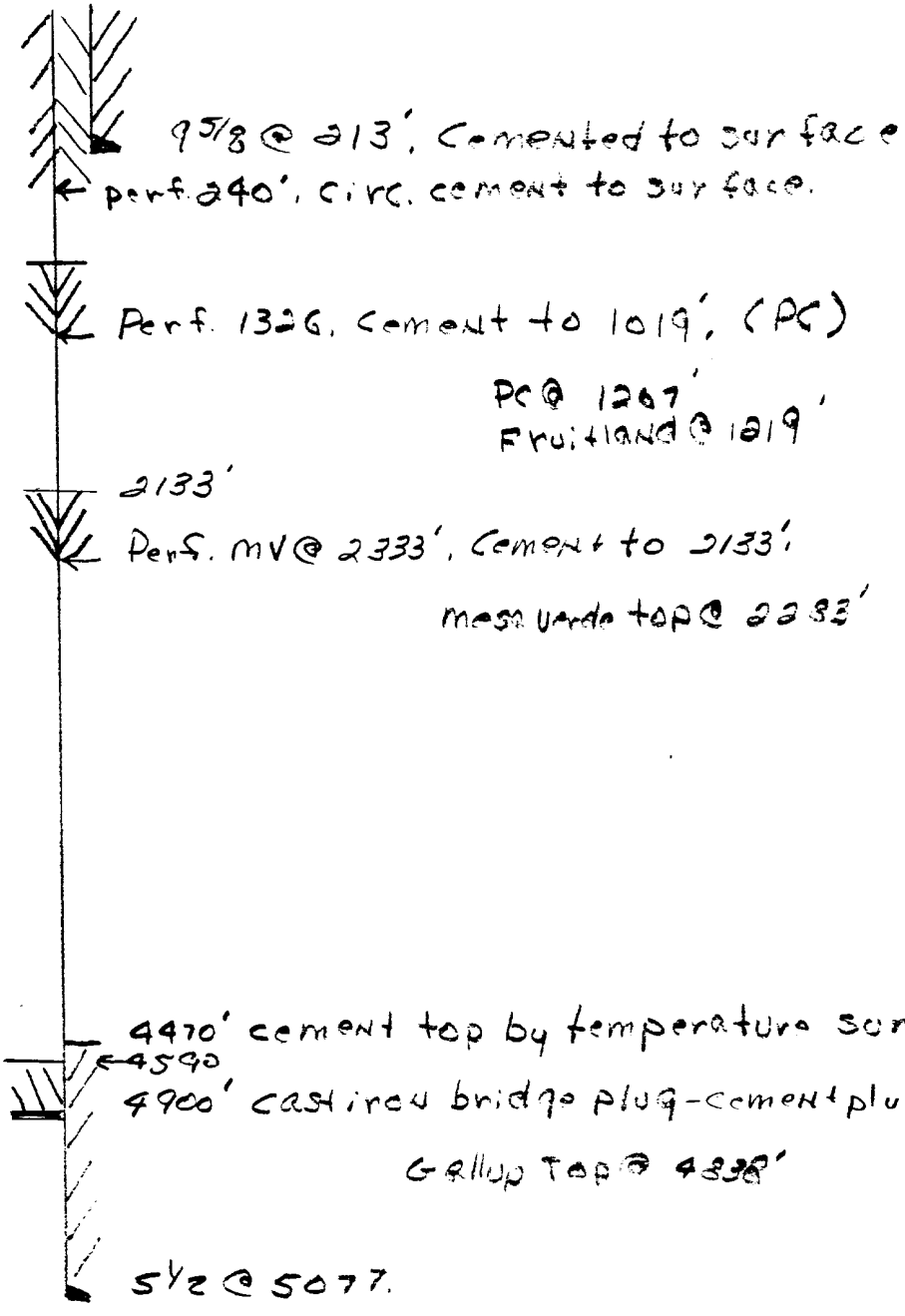
PLUGGING SCHEMATIC



West Bisti Unit #146
660' FNL & 1980' FWL
35 - 26N - 13W

Gallup Formation Producer Well

PLUGGING SCHEMATIC



Attachment VII
Dugan Production Corp.
Conversion of West Bisti Unit No. 153 to SWD

Operating Data – Analysis of Injected Water

Maximum Daily Volume: 700 barrels

Average Daily Volume: 500 barrels

System is closed.

Maximum Surface Injection Pressure: 550 psi

Average Surface Injection Pressure: 500 psi

Source of Injected Fluids: Basin Fruitland Coal and Gallup Formation wells in the area.

Analysis of Injected Fluids: To analyze the effect of injection into the Mesaverde from our water injection plant, a sample was collected from the water injection station. This analysis (Attachment VII-1) showed a TDS of 20,892 ppm. This represents the water quality that will be injected into the Mesaverde at the WBU 153 well. Injection of this water will not result in degradation of water within the Mesaverde. The injected water and Mesaverde water are compatible. An analysis of the Mesaverde water is included as Attachment VII-2. Also attached is an analysis of the WBU No. 131 water source well (Attachment VII-3). This well was used to supply water for the waterflood unit prior to the time when adequate produced water was available. It was used only as a water source well, so this analysis will be an accurate measure of Mesaverde water quality.

Attachment VIII

Injection Zone – Mesaverde
Formation Type: Sandstone
Depth: 2,010' – 3,875'
Thickness: 1,865'
Fracture Pressure: Unknown. Other Mesaverde wells in the San Juan Basin have been shown to have a fracture gradient of approximately 0.65 psi/ft. This would make the bottomhole fracture pressure here 1,913 psi at mid-formation depth.

There are no underground sources of drinking water below the Mesaverde. The Ojo Alamo lies close to the surface and is covered by surface casing in this well. No water samples have been taken in the area of the Ojo Alamo. It is assumed that in many areas the Ojo is an underground source of drinking water.

Attachment IX

No stimulation is planned.

Attachment X

A copy of the open hole log is enclosed as Attachment X-1.

Attachment VII-1
Dugan Production Corp.
Application of Convert West Bisti Unit 153 to SWD

FW01W663

BJ SERVICES COMPANY

WATER ANALYSIS #FW01W663

FARMINGTON LAB

GENERAL INFORMATION			
OPERATOR:	DUGAN PRODUCTION	DEPTH:	
WELL:	WBU WTR INJ. PLANT	DATE SAMPLED:	09/27/99
FIELD:		DATE RECEIVED:	09/28/99
SUBMITTED BY:	J. ALEXANDER	COUNTY:	SAN JUAN STATE: NM
WORKED BY	:M. LOGAN	FORMATION:	
PHONE NUMBER:	327-6222		

SAMPLE DESCRIPTION

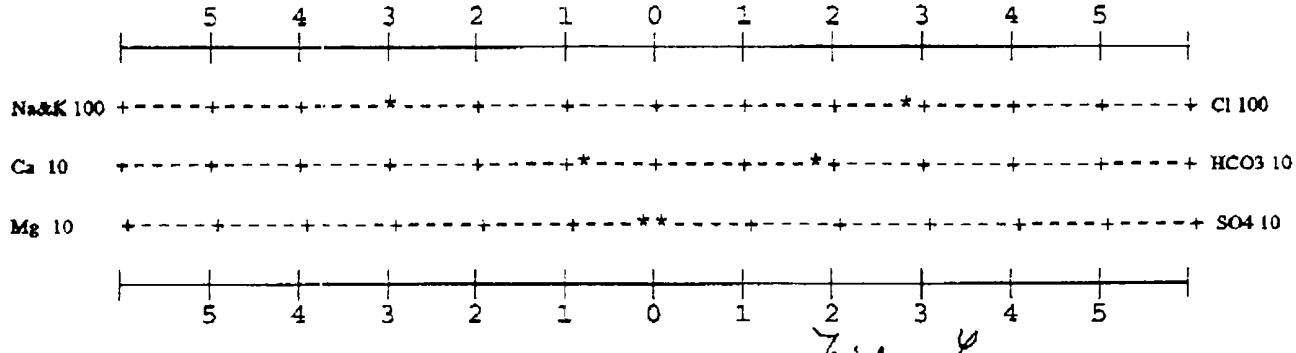
WBU WTR INJECTION PLANT
Sample date:9/27/99

PHYSICAL AND CHEMICAL DETERMINATIONS

SPECIFIC GRAVITY:	1.010 @ 66°F	PH:	7.43
RESISTIVITY (MEASURED):	0.440 ohms @ 66°F		
IRON (FE++) :	3 ppm	SULFATE:	0 ppm
CALCIUM:	167 ppm	TOTAL HARDNESS	515 ppm
MAGNESIUM:	24 ppm	BICARBONATE:	1,063 ppm
CHLORIDE:	10,180 ppm	SODIUM CHLORIDE(Calc)	16,745 ppm
SODIUM+POTASS:	9,134 ppm	TOT. DISSOLVED SOLIDS:	20,892 ppm
IODINE:		POTASSIUM: 23 ppm	

REMARKS

STIFF TYPE PLOT (IN MEQ/L)



ANALYST Mike Logan
M. LOGAN

Attachment VII-2
Dugan Production Corp.
Application of Convert West Bisti Unit 153 to SWD

FW01W655

BJ SERVICES COMPANY

WATER ANALYSIS #FW01W655

FARMINGTON LAB

GENERAL INFORMATION			
OPERATOR:	DUGAN PRODUCTION	DEPTH:	
WELL:	W. BISTI UNIT #153	DATE SAMPLED:	09/24/99
FIELD:		DATE RECEIVED:	09/24/99
SUBMITTED BY:	JONH ALEXANDER	COUNTY:	SAN JUAN STATE: NM
WORKED BY	:D. SHEPHERD	FORMATION:	MESAVERDE
PHONE NUMBER:			

SAMPLE DESCRIPTION

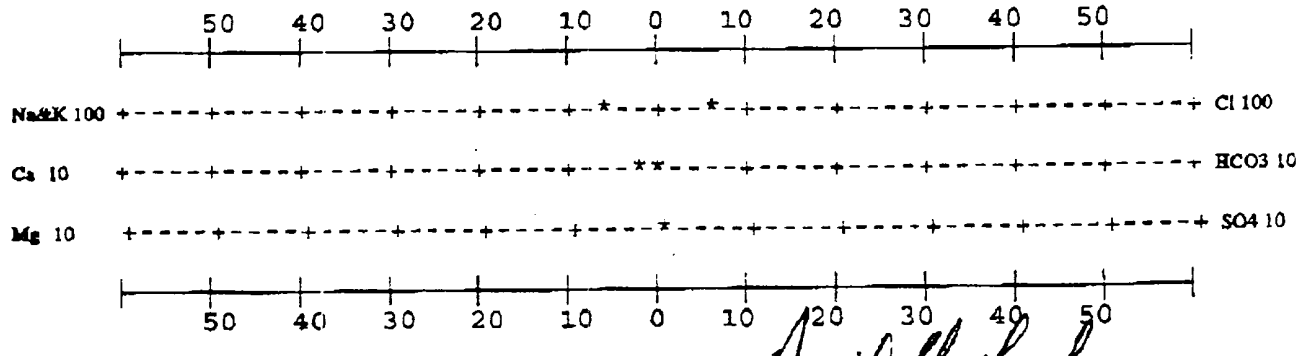
swab sample from Mesaverde

PHYSICAL AND CHEMICAL DETERMINATIONS

SPECIFIC GRAVITY:	1.020 @ 78°F	PH:	7.77
RESISTIVITY (MEASURED):	0.220 ohms @ 80°F		
IRON (FE++) :	0 ppm	SULFATE:	0 ppm
CALCIUM:	228 ppm	TOTAL HARDNESS	981 ppm
MAGNESIUM:	100 ppm	BICARBONATE:	155 ppm
CHLORIDE:	21,202 ppm	SODIUM CHLORIDE(Calc)	34,878 ppm
SODIUM+POTASS:	13,354 ppm	TOT. DISSOLVED SOLIDS:	35,693 ppm
H2S: NO TRACE		POTASSIUM (PPM):	37

REMARKS

STIFF TYPE PLOT (IN MEQ/L)



ANALYST David Shepherd
D. SHEPHERD

Attachment VII-3
Dugan Production Corp.
Application of Convert West Bisti Unit 153 to SWD

American Energy Services

Water Analysis Results Sheet

Operator:	Dugan Production Co.	Date:	12/17/1999
Well :	West Bisti #131	District:	Farmington
Formation:	Mesa verde	Requested by:	John Alexander
County:	San Juan	Technician:	Mike Brown
Depth:	N/A	Source:	Well (Swab Run)#4

PHYSICAL AND CHEMICAL DETERMINATION

SPECIFIC GRAVITY:	1	AT 75 Degrees F.			
pH:	8.72		SULFATES:	1290	ppm
			CALCIUM:	840.0	ppm
IRON:	0	ppm	BICARBONATES:	8418.0	ppm
			RESISTIVITY:		ohm/meter
H2S:	0	ppm	CHLORIDES:	6400.0	ppm
			SODIUM :	6010.6	ppm
			POTASSIUM:	11.0	ppm
MAGNESIUM:	510.3	ppm	TDS:	23479.86	ppm

CaCO3 Scale Tendency = Probable
CaSO4 Scale Tendency = Remote

REMARKS: Water Analysis: Sample appears to be formation water.