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BURLINGTON RESOURCES

SAN JUAN DIVISION
June 17, 1997

Goes to well file

Certified - 358 636 553

New Mexico Oil Conservation Division
Attn. Denny Foust
1000 Rio Brazos Road
Aztec, NM 87410

RECEIVED
JUN 19 1997

**Re: Release - San Juan 30-6 Unit 112Y SWD
Unit Ltr. A, Sec. 26, Township 30N, Range 6W**

SAN JUAN DIST.
BUREAU

Dear Mr Foust:

As follow up to a recent produced water release from the above referenced facility, Burlington Resources is submitting the findings of the remediation investigation. This letter presents background information, describes the remediation investigation and concludes with a recommendation for remediation.

Background:

On March 26, 1997 100 barrels of produced water was released from the San Juan 30-6 Unit 112Y SWD (112Y SWD). The release resulted from a malfunction in a high level shut off switch. An earthen berm around the edge of the location burst under the pressure of the produced water allowing it to flow off the location and down into a steep canyon. A release report was completed and is enclosed (Enclosure 1).

The produced water flowed into a canyon to the North characterized by steep rocky walls scattered with Pinon and Juniper trees. The produced water flowed through an established drainage to the bottom of the canyon. Due to the steep canyon walls, precipitation run off velocities are high in the drainage. The high run off velocity naturally prevents vegetation from being established. A topographical map, which shows the location of the facility and the canyon can be found in Enclosure 2.

Site Investigation:

A Burlington Resources representative, Craig Bock, met on location with Bill Liese (BLM) and Denny Foust (NMOCD) March 27, 1997. It was agreed that Burlington Resources would take samples of the contaminated soils in the path of the off site flow. The steep canyon face was divided into three lifts. Lift 3 being the bottom of the canyon and Lift 1 being the first level downhill from the location pad. In addition to the contaminated soil samples, a corresponding background soil sample was taken on each Lift. Soil sample results are summarized in Enclosure 3.

In 1990 Buys and Associates (B&A) was contracted to research and develop a contingency plan for releases of Fruitland Coal produced water. The final Plan concluded that produced water releases to soil need to be remediated only if the soil's ability to support native vegetation is affected or it poses a danger to human health.

As stated in the contingency plan, reclamation procedures are dependent on the results of soil samples taken within one day of the release. Each soil sample is analyzed and compared to background samples taken and documented in the B&A Plan. In this case the reclamation procedures as outlined in Enclosure 4 were followed. Reclamation of a release should take place only if the soils are determined, through analysis, to be *Saline* or *Sodic*.

Saline soils contain excess soluble salts that can increase the osmotic pressure of root systems. Plants consequently dehydrate and die because the uptake of water is significantly diminished. Saline soils are defined in the Plan as having an Electroconductivity (EC) greater than 4 mmhos/cm.

Sodic soils contain excess sodium (relative to other cations) on exchangeable surfaces in the soil. These conditions cause clay particles in the soil to disperse and lower the permeability of soil to air and water. Sodic soils often have a high pH and an exchangeable sodium percentage (ESP) greater than 15.

Soil sample results, summarized in Enclosure 3, indicate the soils are neither Saline nor Sodic. In other words the soil is capable of supporting vegetation.

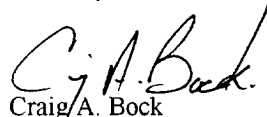
Recommendation:

Burlington Resources recommends that no action be taken to remediate the soils contacted by the produced water. Information gathered during the site investigation supports this conclusion. Following is a summary of the results:

- Soils contacted by the produced water are capable of supporting native vegetation.
- Natural factors at the site such as the steep canyon walls and high precipitation run off velocities may naturally prevent native vegetation from being established anyway.
- The steep canyon would cause the remediation activity to be extremely difficult and dangerous.
- A remediation action for produced water impacted soils would include flushing the soil with fresh water. This action will naturally take place because the produced water was released into an established drainage channel for precipitation. Any rain event will flush the soil with fresh water.

Please send written confirmation of your agreement to Burlington Resources Attn. Craig Bock. If further clarification of the information in this letter is needed, please contact Craig Bock at (505) 326-9537.

Sincerely,



Craig A. Bock
Environmental Representative

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OIL CON. DIV.
DIST. 3

Enclosure 1: Release Report
Enclosure 2: Topographical Map
Enclosure 3: Sample Results Summary
Enclosure 4: Reclamation Procedures

cc. Bill Liese - BLM Farmington
Keith Baker - BR
Keith Boedecker - BR

Enclosure I

District I - (505) 393-6161
 P.O. Box 1940
 Hobbs, NM 88241-1980
 District II - (505) 748-1283
 811 South First
 Artesia, NM 88210
 District III - (505) 334-6178
 1000 Rio Brazos Road
 Aztec, NM 87410
 District IV - (505) 827-7131

State of New Mexico
 Energy Minerals and Natural Resources Department
 Oil Conservation Division
 2040 South Pacheco Street
 Santa Fe, New Mexico 87505
 (505) 827-7131
 Certified P 358 636 543

Form C- 141
 Originated 2/13/97

Submit 2 copies to
 Appropriate District
 Office in accordance
 with Rule 116

Release Notification and Corrective Action

OPERATOR

☒ Initial Report ☐ Final Report

Name Burlington Resources	Contact Craig A. Bock
Address P.O. Box 4289	Telephone No. (505) 326-9537
Facility Name San Juan 30-6 Unit #112Y	Facility Type Salt Water Disposal

Surface Owner Burlington Resources	Mineral Owner Burlington Resources	Lease No. N/A
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LOCATION OF RELEASE

Unit Letter A	Section 26	Township 30N	Range 6W	Feet from the North/South Line	Feet from the East/West Line	County Rio Arriba
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NATURE OF RELEASE

Type of Release Produced Water	Volume of Release 100 BBLs	Volume Recovered 0
Source of Release Holding tank run over	Date and Hour of Occurrence 3-26-97, 12:00 pm	Date and Hour of Discovery 3-26-97, 12:00 pm
Was Immediate Notice Given? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not Required	If YES, To Whom? Denny Foust	
By Whom? Craig A. Bock	Date and Hour 3-26-97, 1:06 pm	
Was a Watercourse Reached? <input type="checkbox"/> Yes <input type="checkbox"/> No	If YES, Volume Impacting the Watercourse.	

If a Watercourse was Impacted, Describe Fully.*

Describe Cause of Problem and Remedial Action Taken.*

Holding tank ran over due to high level shut-off malfunction.

Describe Area Affected and Cleanup Action Taken.*

Fluid ran over the location and broke through the berm. Fluid left the location and flowed down a cliff into an unnamed wash. Fluid soaked into the soil. Remediation is to be determined.

Describe General Conditions Prevailing (Temperature, Precipitation, etc.).*

55 degrees F

I hereby certify that the information given above is true and complete to the best of my knowledge and belief.
 Signature:

Printed Name: Craig A. Bock

Title: Environmental Rep.

Date: 4-14-97 Phone: 326-9537

OIL CONSERVATION DIVISION

Approved by
 District Supervisor:

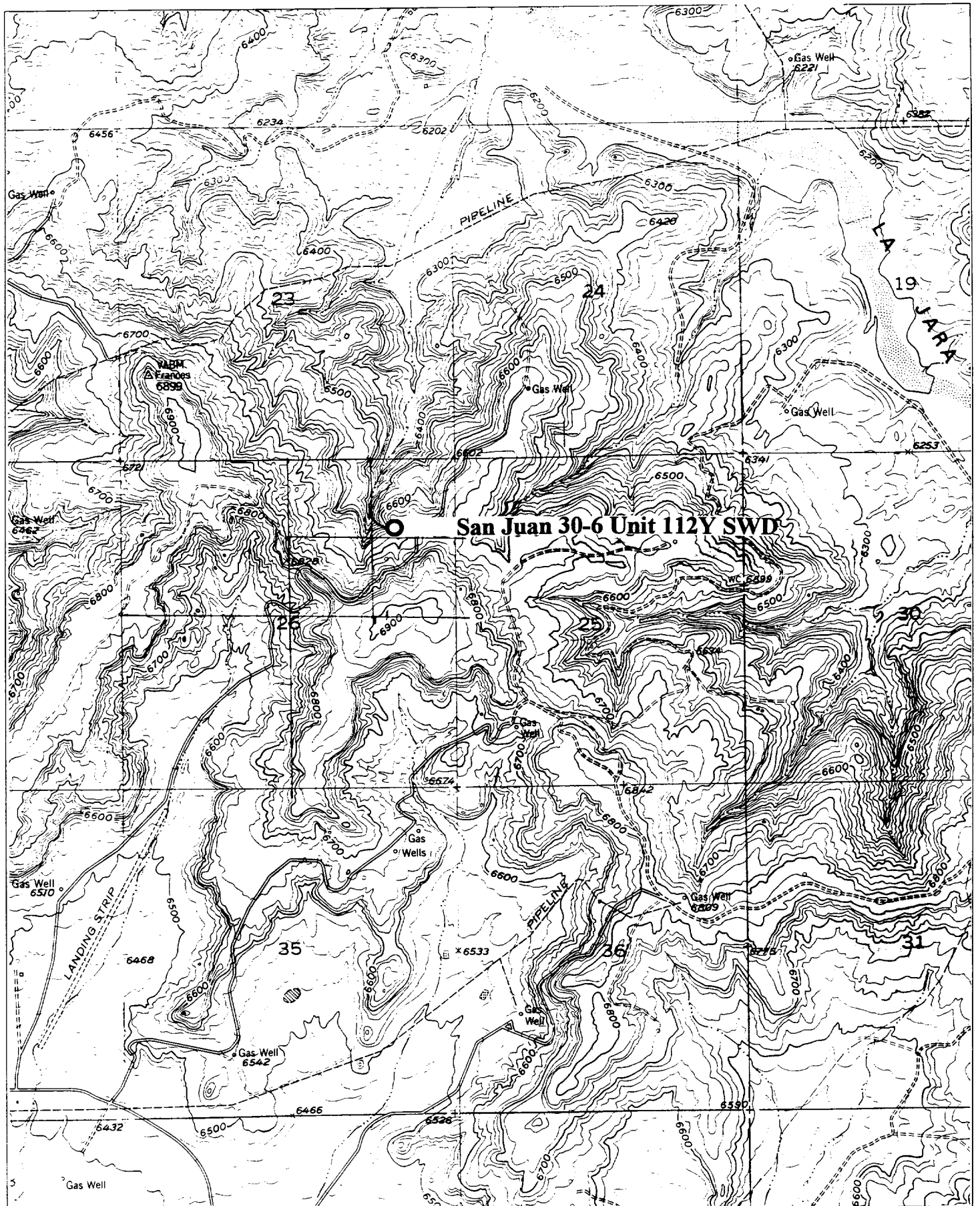
Approval Date:

Expiration Date:

Conditions of Approval:

Attached ☐

* Attach Additional Sheets If Necessary



Date:	6/17/97	Enclosure 2 San Juan 30-6 Unit 112Y SWD		<i>BURLINGTON RESOURCES</i> <i>San Juan Division</i>
Originated By:	CAB			
USGS 7.5 Minute Series		USGS Quadrangle Name	Gomez Ranch N. Mex	

Enclosure 3

30-6 Unit 112Y SWD Release

Soil Sample Results

Est. Release Volume: 100 hbbls
Discovery Date: 2/26/97

Sample No.	Electro-Conductivity		SAR	Na (mmolc/L)	Ca (mmolc/L)	Mg (mmolc/L)	ESP (%)	CEC (meq/100g)	ES (meq/100g)
	pH	(mmhos/cm)							
112YB1	8.10	0.151	0.30	0.30	2.60	0.40	0.00	29.50	0.00
112YB2	7.20	0.242	0.60	0.70	2.10	0.30	0.00	20.00	0.00
112YB3	7.40	0.161	0.40	0.60	3.30	0.40	0.00	33.90	0.00
Average	7.57	0.185	0.43	0.53	2.67	0.37	0.00	27.80	0.00
112YL1	8.80	0.666	9.10	12.10	2.70	0.80	1.10	25.00	28.00
112YL2	9.50	1.720	14.40	16.70	2.30	0.40	1.70	38.20	66.00
112YL3	8.00	0.987	3.40	11.20	17.80	4.50	0.40	37.10	13.00
Average	8.77	1.124	8.97	13.33	7.60	1.90	1.07	33.43	35.67
Background Soil Ranges									
Taken from Buys and Associates' FRUITLAND COAL RECLAMATION PROCEDURES Report, 1990.									
Vessilla Soil	7.9 - 8.97	0.158 - 0.282	0.05 - 0.37	1.4 - 8	25 - 62	2.05 - 6.33	0.08 - 0.3	10.10 - 26.9	0.01 - 0.07
Orlie Soil	7.9 - 8.45	0.168 - 0.267	0.19 - 1.45	3.9 - 27	15 - 36	3.51 - 10.3	0.3 - 1.14	14.7 - 18.8	0.04 - 0.21

112Y B1 - Background soil sample Level 1.

112Y B2 - Background soil sample Level 2.

112Y B3 - Background soil sample Level 3.

112YL1 - Impacted area soil sample Level 1.

112YL2 - Impacted area soil sample Level 2.

112YL3 - Impacted area soil sample Level 3.

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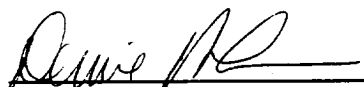
General Water Quality
Burlington Resources, Inc.

Project ID: 112 Y Release
Sample ID: 112 Y B1
Laboratory ID: 6574
Sample Matrix: Soil

Date Reported: 04/21/97
Date Sampled: 03/27/97
Time Sampled: 11:00
Date Received: 03/27/97

Parameter	Analytical Result	Units
General		
Lab pH.....	8.1	s.u.
Conductivity.....	151	µmhos/cm
Sodium Absorption Ratio (SAR)	0.3	
Sodium	0.3	mmolc/L
Calcium	2.6	mmolc/L
Magnesium	0.4	mmolc/L
Exchangeable Sodium Percentage (ESP)	0.0	
Cation Exchange Capacity	29.5	meq/100 g soil
Exchangeable Sodium	0.0	meq/100 g soil

Reference Western States Program; Ver. 4.00 (1/15/97)
Method S-1.60: Saturation Paste Extract, Ca, Mg, Na, and SAR
Method S - 0017: Saturated Soil Paste


Review

General Water Quality
Burlington Resources, Inc.

Project ID: 112 Y Release
Sample ID: 112 Y L1
Laboratory ID: 6573
Sample Matrix: Soil

Date Reported: 04/21/97
Date Sampled: 03/27/97
Time Sampled: 11:00
Date Received: 03/27/97

Parameter	Analytical Result	Units
General		
Lab pH.....	8.8	s.u.
Conductivity.....	666	µmhos/cm
Sodium Absorption Ratio (SAR)	9.1	
Sodium	12.1	mmolc/L
Calcium	2.7	mmolc/L
Magnesium	0.8	mmolc/L
Exchangeable Sodium Percentage (ESP)	1.1	%
Cation Exchange Capacity	25	meq/100 g soil
Exchangeable Sodium	28	meq/100 g soil

Reference Western States Program; Ver. 4.00 (1/15/97)
Method S-1.60: Saturation Paste Extract, Ca, Mg, Na, and SAR
Method S - 0017: Saturated Soil Paste


Review

General Water Quality
Burlington Resources, Inc.

Project ID: 112 Y Release
Sample ID: 112 Y B2
Laboratory ID: 6576
Sample Matrix: Soil

Date Reported: 04/21/97
Date Sampled: 03/27/97
Time Sampled: 11:00
Date Received: 03/27/97

Parameter	Analytical Result	Units
General		
Lab pH.....	7.2	s.u.
Conductivity.....	242	µmhos/cm
Sodium Absorption Ratio (SAR)		
Sodium	0.6	
Calcium	0.7	mmolc/L
Magnesium	2.1	mmolc/L
	0.3	mmolc/L
Exchangeable Sodium Percentage (ESP)		
	0.0	
Cation Exchange Capacity		
	20.0	meq/100 g soil
Exchangeable Sodium	0.0	meq/100 g soil

Reference Western States Program; Ver. 4.00 (1/15/97)
Method S-1.60: Saturation Paste Extract, Ca, Mg, Na, and SAR
Method S - 0017: Saturated Soil Paste



Review

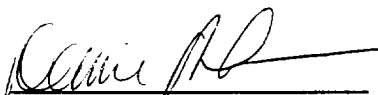
General Water Quality
Burlington Resources, Inc.

Project ID: 112 Y Release
Sample ID: 112 Y L2
Laboratory ID: 6575
Sample Matrix: Soil

Date Reported: 04/21/97
Date Sampled: 03/27/97
Time Sampled: 11:00
Date Received: 03/27/97

Parameter	Analytical Result	Units
General		
Lab pH.....	9.5	s.u.
Conductivity.....	1,720	µmhos/cm
Sodium Absorption Ratio (SAR)		
Sodium	16.7	mmolc/L
Calcium	2.3	mmolc/L
Magnesium	0.4	mmolc/L
Exchangeable Sodium Percentage (ESP)		
	1.7	
Cation Exchange Capacity		
Exchangeable Sodium	38.2	meq/100 g soil
	66	meq/100 g soil

Reference Western States Program; Ver. 4.00 (1/15/97)
Method S-1.60: Saturation Paste Extract, Ca, Mg, Na, and SAR
Method S - 0017: Saturated Soil Paste



Review

General Water Quality

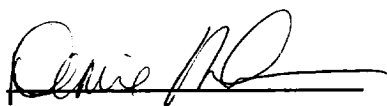
Burlington Resources, Inc.

Project ID: 112 Y Release
 Sample ID: 112 B3
 Laboratory ID: 6578
 Sample Matrix: Soil

Date Reported: 04/21/97
 Date Sampled: 03/27/97
 Time Sampled: 11:00
 Date Received: 03/27/97

Parameter	Analytical Result	Units
General		
Lab pH.....	7.4	s.u.
Conductivity.....	161	µmhos/cm
Sodium Absorption Ratio (SAR)		
Sodium	0.4	
Calcium	0.6	mmolc/L
Magnesium	3.3	mmolc/L
	0.4	mmolc/L
Exchangeable Sodium Percentage (ESP)	0.0	
Cation Exchange Capacity	33.9	meq/100 g soil
Exchangeable Sodium	0.0	meq/100 g soil

Reference Western States Program; Ver. 4.00 (1/15/97)
 Method S-1.60: Saturation Paste Extract, Ca, Mg, Na, and SAR
 Method S - 0017: Saturated Soil Paste


 Review




General Water Quality Burlington Resources, Inc.

Project ID: 112 Y Release
Sample ID: 112 Y L3
Laboratory ID: 6577
Sample Matrix: Soil

Date Reported: 04/21/97
Date Sampled: 03/27/97
Time Sampled: 11:00
Date Received: 03/27/97

Parameter	Analytical Result	Units
General		
Lab pH.....	8.0	s.u.
Conductivity.....	987	µmhos/cm
Sodium Absorption Ratio (SAR)		
Sodium	3.4	
Calcium	11.2	mmolc/L
Magnesium	17.8	mmolc/L
	4.5	mmolc/L
Exchangeable Sodium Percentage (ESP)		
	0.4	
Cation Exchange Capacity		
Exchangeable Sodium	37.1	meq/100 g soil
	13	meq/100 g soil

Reference Western States Program; Ver. 4.00 (1/15/97)
Method S-1.60: Saturation Paste Extract, Ca, Mg, Na, and SAR
Method S - 0017: Saturated Soil Paste


Review

Enclosure 4

Saltwater Release Reclamation Procedures

- Identify vendors of materials; stockpile materials where appropriate.
- Collect soil samples when threshold volume of 10 barrels is reached.
- Begin reclamation if soil is *Saline* or *Sodic*. None of the further action described below is required if soil is neither *Saline* nor *Sodic*.
- Additional spills of any volume at sites that did not previously require further action necessitate resampling.
- Identify soil present. Soils underlying wells and gathering systems are identified on the following maps:
 - Meridian San Juan 30-6: Plate 4-1
 - Meridian San Juan 31-6: Plate 4-2
 - Blackwood & Nichols La Jara, Simms Mesa, Middle Mesa and Pump Mesa: Plate 4-3
 - Meridian San Juan 32-9: Plate 4-4
 - Meridian Pump Canyon: Plate 4-5
 - Meridian Cedar Hill: Plate 4-6
 - Meridian Middle Mesa Plate: 4-7
 - ARCO Atlantic: Plate 4-8
 - ARCO Pump Canyon: Plate 4-9
- Apply gypsum amendments and native grass mulch or aged manure. Amendment rate is specified in Table 9-2. Apply native grass mulch at the rate of 2 to 2.5 tons per acre or aged manure at the rate of 10 to 29 tons per acre. Disk or manually apply amendments to 1 foot or bedrock, whichever is shallower.
- Promptly leach with water. Amounts are specified in Table 9-2. Impound water where practical.
- Seed area with salt-tolerant grasses and shrubs during the period of July 1 to September 15. Plant species are Alkali sacaton, Western wheatgrass, Fourwing saltbrush and Indian ricegrass. Used a seed mixture of 25% of each at a rate of 4.5 pounds PLS per acre. The methods of seeding should be the same as are required by the BLM for plugged and abandoned well sites. Desert or Inland saltgrass sprigs or sets may also be transplanted from other areas.

Taken from "FINAL REPORT RECLAMATION PROCEDURES FRUITLAND COAL WELLS"
Buys and Associates, Inc. Oct. 19, 1990.