

APPENDIX DATA

ATTACHMENT A: DELAWARE BASIN DRILLING SURVEILLANCE DATA

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1 **DATA-A-1.0 DELAWARE BASIN DRILLING SURVEILLANCE PROGRAM**

2 *The Delaware Basin Drilling Surveillance Program (DBDSP) is designed to monitor drilling*
3 *activities in the vicinity of the Waste Isolation Pilot Plant (WIPP). The Environmental*
4 *Protection Agency (EPA) requires the Department of Energy (DOE) to demonstrate the*
5 *expected performance of the disposal system using a probabilistic risk assessment or*
6 *performance assessment (PA). The PA must show that the expected repository performance*
7 *will not release radioactive material above limits set by the EPA's standard and must consider*
8 *inadvertent drilling into the repository horizon at some future time. The EPA regulations also*
9 *state that current drilling practice, which is monitored by the DBDSP, should be assumed for*
10 *future inadvertent intrusions.*

11 *The DOE continues to provide surveillance of the drilling activity in the Delaware Basin in*
12 *accordance with the criteria established in 40 CFR § 194.33. This activity will continue until*
13 *the DOE and the EPA mutually agree that no benefit can be gained from continued*
14 *surveillance. The results of the ongoing surveillance activity will be used to determine if a*
15 *significant change has occurred which would be detrimental to the performance of the*
16 *disposal system.*

17 **DATA-A-2.0 QUALITY ASSURANCE**

18 *Because the DBDSP collects information only, the program's Quality Assurance (QA) process*
19 *is not required to comply with Nuclear Quality Assurance (NQA) standards. Information*
20 *collected from the various agencies and commercial sources is on an "as is" basis. However,*
21 *QA is maintained by ensuring that the information collected is verified between the various*
22 *sources for accuracy, to the extent possible. Also, any discrepancies noted are verified against*
23 *the extant records at the state offices. As each well is completed, a copy of the drilling report*
24 *is made from the records submitted to state offices in New Mexico and kept on file by the*
25 *DBDSP. Before changes are made to any of the records in the databases, a paper copy is used*
26 *to verify the change being made.*

27 **DATA-A-3.0 COLLECTION TIME PERIOD**

28 *The DBDSP collects the drilling-related information to be used for future PA calculations.*
29 *The information collected during the first recertification monitoring period (July 1995*
30 *through September 2002) was added to the existing information maintained by the DBDSP.*
31 *The information is collected weekly from Internet sites provided by the New Mexico Oil*
32 *Conservation Division (OCD) for the entire state and from a commercial source for*
33 *Southeastern New Mexico and Texas Railroad Commission, Oil and Gas Division, District 8.*
34 *This information is then reviewed to determine which wells are within the Delaware Basin and*
35 *need to be added to the databases. Other sources of information include the Bureau of Land*
36 *Management (BLM) and the New Mexico Institute of Mining and Technology. The drilling-*
37 *related activities monitored during the first recertification period by the DBDSP include:*

- 38 • *Drilling-related parameters/data, such as drilling rate, drill bit diameter, drill collar*
39 *diameter and length, surface casing diameter, drill pipe diameter, speed of drill string*

1 *rotation, penetration rate through the Salado Formation, type and characteristics (e.g.,*
2 *density, viscosity, etc.) of drilling mud, quantity of drilling fluid used, and occurrences*
3 *of air drilling;*

- 4 • *Castile brine-related parameters/data, such as number of encounters of pressurized*
5 *brine within the Castile Formation, Castile brine reservoir pressure and volume, and*
6 *shortest and longest time until well shut-in occurs after a pressure encounter;*
- 7 • *Borehole plug-related parameters/data, such as pattern of plugs, plug materials and*
8 *lengths; total number, location, and depth of abandoned boreholes; and type of steel*
9 *alloy in the well casing;*
- 10 • *Enhanced recovery data, including occurrences of fluid injection (water flood) within*
11 *the nine-township area, carbon dioxide (CO₂) miscible flooding, salt water disposal*
12 *within the nine-township area, and volume (barrels) of fluid injected near WIPP within*
13 *the nine-township area;*
- 14 • *Gas storage data, including occurrences of gas storage (cavern and/or reservoir) near*
15 *WIPP;*
- 16 • *Solution mining data, including occurrences of solution mining within the Delaware*
17 *Basin;*
- 18 • *Potash mining data, including changes in existing leases within the nine-township*
19 *area; and*
- 20 • *Seismic data including history of relevant events, e.g., earthquake (natural or human*
21 *induced) activity, relation of epicenters with geologic structures, geologic setting, etc.*

22 ***DATA-A-4.0 COMPLIANCE MONITORING PARAMETERS***

23 *Two of the ten parameters monitored by the DBDSP are the drilling rate and the probability of*
24 *encountering a Castile brine reservoir. Both parameters will continue to be monitored during*
25 *postclosure.*

26 *Performance assessment is required by regulation to consider disturbed case scenarios that*
27 *include intrusions into the repository by inadvertent and intermittent drilling for resources.*
28 *The probability of these intrusions was based on a future drilling rate of 46.8 boreholes as*
29 *used in the Compliance Certification Application (CCA) per square kilometer per 10,000*
30 *years. This rate is based on consideration of the past record of drilling events in the Delaware*
31 *Basin.*

32 *Two different types of boreholes are considered: those that penetrate a pressurized brine*
33 *reservoir in the underlying the Castile Formation and those that do not. While the presence of*
34 *pressurized brine under the repository is speculative, it cannot be completely ruled out based*
35 *on available information. The primary consequence of contacting pressurized brine is the*
36 *introduction of an additional source of brine beyond that which is assumed to be released into*

1 *the repository from the Salado. The human intrusion scenario models are based on extensive*
 2 *field data sets collected by the DOE.*

3 *The basis for the drilling rate to be used in PA for this Compliance Recertification Application*
 4 *(CRA) is shown in Table DATA-A-1. The drilling rate is calculated using wells that are deeper*
 5 *than 655 m (2,150 ft) below the surface since a well drilled to that depth would breach the*
 6 *repository horizon.*

7 **Table DATA-A-1. Wells in the Delaware Basin Deeper Than 655 m (2,150 ft)**

8 **Data collected from 1903 through September 2002**

<i>Well Type</i>	<i>Texas</i>	<i>New Mexico</i>	<i>Totals</i>
<i>Core Hole</i>	<i>5</i>	<i>0</i>	<i>5</i>
<i>Dry Hole</i>	<i>2,173</i>	<i>841</i>	<i>3,014</i>
<i>Gas Well</i>	<i>832</i>	<i>611</i>	<i>1,443</i>
<i>Injection Well</i>	<i>248</i>	<i>71</i>	<i>319</i>
<i>Junked and Abandoned Well</i>	<i>56</i>	<i>15</i>	<i>71</i>
<i>Oil Well</i>	<i>3,821</i>	<i>1,805</i>	<i>5,626</i>
<i>Oil and Gas Well</i>	<i>92</i>	<i>5</i>	<i>97</i>
<i>Plugged Gas Well</i>	<i>176</i>	<i>127</i>	<i>303</i>
<i>Plugged Injection Well</i>	<i>0</i>	<i>20</i>	<i>20</i>
<i>Plugged Oil Well</i>	<i>508</i>	<i>278</i>	<i>786</i>
<i>Plugged Oil and Gas Well</i>	<i>36</i>	<i>0</i>	<i>36</i>
<i>Plugged Brine Well</i>	<i>0</i>	<i>1</i>	<i>1</i>
<i>Plugged Salt Water Disposal Well</i>	<i>0</i>	<i>7</i>	<i>7</i>
<i>Drilling or Waiting on Paperwork</i>	<i>20</i>	<i>8</i>	<i>28</i>
<i>Brine Well</i>	<i>5</i>	<i>0</i>	<i>5</i>
<i>Salt Water Disposal Well</i>	<i>5</i>	<i>103</i>	<i>108</i>
<i>Service Well</i>	<i>101</i>	<i>3</i>	<i>104</i>
<i>Stratigraphic Test Hole</i>	<i>43</i>	<i>2</i>	<i>45</i>
<i>Sulfur Core Hole</i>	<i>85</i>	<i>0</i>	<i>85</i>
<i>Potash Core Hole</i>	<i>0</i>	<i>19</i>	<i>19</i>
<i>WIPP Core Hole</i>	<i>0</i>	<i>11</i>	<i>11</i>
<i>Other (Mine Shafts, Gnome Project Wells)</i>	<i>0</i>	<i>6</i>	<i>6</i>
Totals	8,206	3,933	12,139

9 *The drilling rate is calculated as follows: number of deep holes (12,139) × 10,000 years/*
 10 *Delaware Basin surface area (23,102.1 km² [8921.7 mi²])/100 years. The drilling rate is 52.5*
 11 *boreholes per square kilometer over 10,000 years. This is an increase from the 46.8 boreholes*
 12 *per square kilometer reported in the CCA. This number is anticipated to rise for quite a few*
 13 *years before it begins to drop. This is because of the 100-year time frame used for drilling*
 14 *results. As new wells are added to the count, wells older than 100 years are dropped. It will be*
 15 *2011 before any wells are dropped from the count while a number of new wells are expected to*
 16 *be added due to increased oil and gas activity, thus driving up the count.*

1 *Castile brine encounters are shown in Table DATA-A-2. The table shows the original*
 2 *encounters used in the CCA and the new brine encounters that occurred from July 1995*
 3 *through September 2002.*

Table DATA-A-2. Castile Brine Encounters

#	Location	Well Name	Spud Date	Status	Well Information
<i>Original CCA-related Castile Brine Encounters – 1896 Through June 1995</i>					
1	21S-31E-26	Federal #1	10/31/1979	P&A	Identified as encountering Castile Brine.
2	21S-31E-35	ERDA-6	06/13/1975	P&A	Identified as encountering Castile Brine.
3	21S-31E-35	Federal "FI" #1	09/25/1981	P&A	Identified as encountering Castile Brine.
4	21S-31E-36	Lost Tank "AIS" State #1	12/07/1991	Oil Well	Identified as encountering Castile Brine.
5	21S-31E-36	Lost Tank "AIS" State #4	11/19/1991	Oil Well	Identified as encountering Castile Brine.
6	21S-32E-31	Lost Tank SWD #1	11/12/1991	SWD	Identified as encountering Castile Brine.
7	22S-29E-09	Danford Permit #1	05/18/1937	P&A	Identified as encountering Castile Brine.
8	22S-31E-01	Unocal "AHU" Federal #1	04/02/1991	Oil Well	Identified as encountering Castile Brine.
9	22S-31E-01	Molly State #1	09/25/1991	Oil Well	Identified as encountering Castile Brine.
10	22S-31E-01	Molly State #3	10/20/1991	Oil Well	Identified as encountering Castile Brine.
11	22S-31E-02	State "2" #3	11/28/1991	Oil Well	Identified as encountering Castile Brine.
12	22S-31E-11	Martha "AIK" Federal #3	05/06/1991	Oil Well	Identified as encountering Castile Brine.
13	22S-31E-11	Martha "AIK" Federal #4	09/02/1991	Oil Well	Identified as encountering Castile Brine.
14	22S-31E-12	Federal "12" #8	03/28/1992	Oil Well	Identified as encountering Castile Brine.
15	22S-31E-13	Neff "13" Federal #5	02/04/1991	Oil Well	Identified as encountering Castile Brine.
16	22S-31E-17	WIPP-12	11/17/1978	Monitoring	Identified as encountering Castile Brine.
17	22S-32E-05	Bilbrey "5" Federal #1	11/26/1981	Oil Well	Identified as encountering Castile Brine.
18	22S-32E-15	Lechuza Federal #4	12/29/1992	Oil Well	Identified as encountering Castile Brine.
19	22S-32E-16	Kiwi "AKX" State #1	04/28/1992	Oil Well	Identified as encountering Castile Brine.
20	22S-32E-25	Covington "A" Federal #1	02/07/1975	Oil Well	Identified as encountering Castile Brine.
21	22S-32E-26	Culberson #1	12/15/1944	P&A	Identified as encountering Castile Brine.
22	22S-32E-34	Red Tank "34" Federal #1	09/23/1992	Oil Well	Identified as encountering Castile Brine.
23	22S-32E-36	Richardson State #1	07/20/1962	P&A	Identified as encountering Castile Brine.
24	22S-32E-36	Shell State #1	02/22/1964	Oil Well	Identified as encountering Castile Brine.
25	22S-33E-20	Cloyd Permit #1	09/07/1937	P&A	Identified as encountering Castile Brine.
26	22S-33E-20	Cloyd Permit #2	06/22/1938	P&A	Identified as encountering Castile Brine.
27	23S-30E-01	Hudson Federal #1	02/25/1974	SWD	Identified as encountering Castile Brine.
<i>New CRA-related Castile Brine Encounters – July 1995 Through September 2002</i>					
1	21S-31E-35	Lost Tank "35" State #4	09/11/2000	Oil Well	Estimated several hundred barrels per hour. Continued drilling.
2	21S-31E-35	Lost Tank "35" State #16	02/06/2002	Oil Well	At 2,705 ft, encountered 1,000 B/H. Shut-in to get room in reserve pit with pressure of 180 psi. Shut in next day with pressure at 100 psi and waterflow of 450 B/H. Two days later no water flow and full returns.
3	22S-31E-02	Graham "AKB" State #8	04/12/2002	Oil Well	Estimated 105 barrels per hour. Continued drilling.
4	23S-30E-01	James Ranch Unit #63	12/23/1999	Oil Well	Sulfur water encountered at 2,900 ft. 35 PPM was reported but quickly dissipated to 3 PPM in a matter of minutes. Continued drilling.
5	23S-30E-01	Hudson "I" Federal #7	01/06/2001	Oil Well	Estimated initial flow at 400 to 500 barrels per hour with a total volume of 600-800 barrels. Continued drilling.

4

1 *No official documentation of New Mexico state records exists for the five new Castile brine*
 2 *encounters. Four were reported by WIPP site personnel during discussions with area drillers,*
 3 *while the fifth was reported by one of the operators on the Annual Survey performed by the*
 4 *DBDSP. The Annual Survey is sent to regional area operators requesting information that is*
 5 *not available through other means.*

6 *All five wells were drilled in areas where Castile brine was previously encountered during the*
 7 *drilling process. Three wells were drilled in the vicinity of Well #ERDA-6 and the other two*
 8 *were southwest of the WIPP site. All were located in the nine-township area. During this time*
 9 *period, 345 wells were drilled in the nine-township area.*

10 **DATA-A-5.0 SUMMARY OF INFORMATION**

11 **DATA-A-5.1 Drilling-Related Parameters/Data**

12 *Tables DATA-A-3 through DATA-A-6 provide these drilling-related parameters/data: drill bit*
 13 *diameter, drill collar diameter and length, surface casing diameter, drill pipe diameter, speed*
 14 *of drill string rotation, penetration rate through the Salado, type and characteristics (density,*
 15 *viscosity, etc.) of drilling mud, quantity of drilling fluid used, and occurrences of air drilling.*

16 *Table DATA-A-3 lists drill bit sizes for the various wells drilled in the nine-township area*
 17 *during the recertification monitoring period. Currently, an 11" bit would be used to drill the*
 18 *same depth as the repository but in the CCA a 12 ¼" bit was modeled.*

19 **Table DATA-A-3. Nine-Township Area Bit Sizes**

20 **Three-String Hole**

<i>Bit Size</i>	<i>Surface Hole</i>	<i>Intermediate Hole</i>	<i>Production Hole</i>	<i>Totals</i>
<i>17 ½"</i>	<i>79</i>	<i>0</i>	<i>0</i>	<i>79</i>
<i>14 ¾"</i>	<i>25</i>	<i>0</i>	<i>0</i>	<i>25</i>
<i>14"</i>	<i>1</i>	<i>0</i>	<i>0</i>	<i>1</i>
<i>12 ¼"</i>	<i>0</i>	<i>16</i>	<i>0</i>	<i>16</i>
<i>11"</i>	<i>0</i>	<i>77</i>	<i>0</i>	<i>77</i>
<i>9 ⅞"</i>	<i>0</i>	<i>12</i>	<i>0</i>	<i>12</i>
<i>8 ⅞"</i>	<i>0</i>	<i>0</i>	<i>1</i>	<i>1</i>
<i>8 ¾"</i>	<i>0</i>	<i>0</i>	<i>3</i>	<i>3</i>
<i>7 ⅞"</i>	<i>0</i>	<i>0</i>	<i>89</i>	<i>89</i>
<i>6 ¾"</i>	<i>0</i>	<i>0</i>	<i>12</i>	<i>12</i>
Totals	105	105	105	315

Note: Bit size information was available on 114 holes out of 345 that were spudded in the nine-township area from July 1995 through September 2002. Of the 114 holes completed, 105 were drilled using a three-string setup.

21 **Two-String Hole**

<i>Bit Size</i>	<i>Surface Hole</i>	<i>Production Hole</i>	<i>Totals</i>
<i>12 ¼"</i>	<i>4</i>	<i>0</i>	<i>4</i>
<i>11"</i>	<i>5</i>	<i>0</i>	<i>5</i>
<i>7 ⅞"</i>	<i>0</i>	<i>9</i>	<i>9</i>
Totals	9	9	18

Note: Of the 114 holes with available bit size information, nine holes were completed using a two-string setup.

1 *Table DATA-A-4 lists the different casing sizes for wells drilled in the nine-township area*
 2 *during the recertification monitoring period. Information for casing sizes is acquired from*
 3 *commercial sources and thus is readily available while drill bit size is acquired from state*
 4 *records which are not available until several months after a well has been completed.*

5 **Table DATA-A-4. Nine-Township Area Casing Sizes**

6 **Three-String Hole**

<i>Casing Size</i>	<i>Surface Casing</i>	<i>Intermediate Casing</i>	<i>Production Casing</i>	<i>Totals</i>
<i>20"</i>	<i>1</i>	<i>0</i>	<i>0</i>	<i>1</i>
<i>13 3/8"</i>	<i>203</i>	<i>1</i>	<i>0</i>	<i>204</i>
<i>11 3/4"</i>	<i>44</i>	<i>0</i>	<i>0</i>	<i>44</i>
<i>10 3/4"</i>	<i>54</i>	<i>0</i>	<i>0</i>	<i>54</i>
<i>9 7/8"</i>	<i>0</i>	<i>1</i>	<i>0</i>	<i>1</i>
<i>9 5/8"</i>	<i>3</i>	<i>12</i>	<i>1</i>	<i>16</i>
<i>8 5/8"</i>	<i>0</i>	<i>236</i>	<i>0</i>	<i>236</i>
<i>7 7/8"</i>	<i>0</i>	<i>2</i>	<i>0</i>	<i>2</i>
<i>7 5/8"</i>	<i>0</i>	<i>50</i>	<i>1</i>	<i>51</i>
<i>7"</i>	<i>0</i>	<i>3</i>	<i>6</i>	<i>9</i>
<i>5 1/2"</i>	<i>0</i>	<i>0</i>	<i>235</i>	<i>235</i>
<i>4 1/2"</i>	<i>0</i>	<i>0</i>	<i>62</i>	<i>62</i>
<i>Totals</i>	<i>305</i>	<i>305</i>	<i>305</i>	<i>915</i>

Note: There were 345 wells drilled in the nine-township area from July 1995 through September 2002. Casing size information was available on 305 wells which used a three-string casing assembly to complete the well.

7 **Two-String Hole**

<i>Casing Size</i>	<i>Surface Casing</i>	<i>Production Casing</i>	<i>Totals</i>
<i>10 3/4"</i>	<i>1</i>	<i>0</i>	<i>1</i>
<i>9 5/8"</i>	<i>1</i>	<i>0</i>	<i>1</i>
<i>8 5/8"</i>	<i>17</i>	<i>0</i>	<i>17</i>
<i>7"</i>	<i>0</i>	<i>1</i>	<i>1</i>
<i>5 1/2"</i>	<i>0</i>	<i>18</i>	<i>18</i>
<i>Totals</i>	<i>19</i>	<i>19</i>	<i>38</i>

Note: There were 19 wells completed as a two-string assembly out of the 345 wells drilled in the nine-township area during the recertification monitoring period.

8 *Table DATA-A-5 lists these drilling related parameters: drill collar diameter and length, drill*
 9 *pipe diameter, speed of drill string rotation, penetration rate through the Salado, type and*
 10 *characteristics (density, viscosity, etc.) of drilling mud, and quantity of drilling fluid. This*
 11 *information was acquired from the annual surveys of area well operators performed each year*
 12 *during the recertification monitoring period.*

Table DATA-A-5. Nine-Township Drilling Survey Information

#	Well Name and No.	Drill Pipe	Rotation Speed	Penetration Rate	Mud Density	Mud Viscosity	Mud Yield	Collar Diameter	Collar Length	Number of Collars
1	Lucy "ALC" State #3	4 ½"	75-85 RPM	35.4 ft/HR	10 PPG	28 SEC/QT	No Report	S=8 1/16 I=7 ½ P=6 ½	No Report	S=25 I=27 P=27
2	Jacque "AQJ" State #5	4 ½"	75-90 RPM	60 ft/HR	10 PPG	28 SEC/QT	No Report	S=7 15/16 I=7 ½ P=6 ⅝	No Report	S=16 I=27 P=27
3	Graham "AKB" State #5	4 ½"	40-90 RPM	68.7 ft/HR	10 PPG	28 SEC/QT	No Report	S=7 11/16 I=8 P=6	No Report	S=18 I=33 P=33
4	Graham "AKB" State #8	4 ½"	50-80 RPM	68 ft/HR	9.9-10.2 PPG	28 SEC/QT	No Report	S=8 I=8 P=6	No Report	S=18 I=33 P=33
5	Flora "AKF" State #3	4 ½"	60-105 RPM	65 ft/HR	10 PPG	28 SEC/QT	No Report	S=7 ⅞ I=7 ⅞ P=6	No Report	S=18 I=33 P=33
6	Remuda Basin State #9	4 ½"	No Report	91.6 ft/HR	8.3 PPG	38 SEC/QT	No Report	S=8	S=30 ft	No Report
7	Remuda Basin State #10	4 ½"	No Report	105 ft/HR	8.7 PPG	29 SEC/QT	No Report	S=8	S=30 ft	No Report
8	Remuda Basin State #11A	4 ½"	No Report	37.9 ft/HR	8.3 PPG	38 SEC/QT	No Report	S=8	S=30 ft	No Report
9	Barclay Federal #15	4 ½"	110 RPM	No Report	10 PPG	29 SEC/QT	No Report	S=8 and 6 I=8 and 6 P=6	S=31 ft I=31 ft P=31 ft	S=14 I=14 P=26
10	Barclay Federal #10	4 ½"	110 RPM	No Report	10 PPG	29 SEC/QT	No Report	S=8 and 6 I=8 and 6 P=6	S=31 ft I=31 ft P=31 ft	S=14 I=14 P=26
11	Barclay Federal #21	4 ½"	115 RPM	28 ft/HR	8.6 PPG	33 SEC/QT	No Report	S=8 and 6 I=8 and 6 P=8 and 6	S=813 ft I=781 ft P=782 ft	No Report
12	Barclay Federal #18	4 ½"	120 RPM	28 ft/HR	8.6 PPG	33 SEC/QT	No Report	S=8 and 6 I=8 and 6 P=8 and 6	S=812 ft I=780 ft P=783 ft	No Report

Table DATA-A-5. CRA Nine-Township Drilling Survey Information — Continued

#	Well Name and No.	Drill Pipe	Rotation Speed	Penetration Rate	Mud Density	Mud Viscosity	Mud Yield	Collar Diameter	Collar Length	Number of Collars
13	Barclay Federal #20	4 ½"	115 RPM	28 ft/HR	8.6 PPG	33 SEC/QT	No Report	S=8 and 6 I=8 and 6 P=8 and 6	S=813 ft I=780 ft P=782 ft	No Report
14	Barclay Federal #27		120 RPM	20 ft/HR	8.6 PPG	33 SEC/QT	No Report	S=8 and 6 I=8 and 6 P=8 and 6	S=810 ft I=785 ft P=780 ft	No Report
15	Barclay Federal #28	4 ½"	115 RPM	28 ft/HR	No Report	33 SEC/QT	No Report	S=8 and 6 I=8 and 6 P=8 and 6	S=812 ft I=784 ft P=782 ft	No Report
16	Barclay State #7	4 ½"	120 RPM	28 ft/HR	8.6 PPG	33 SEC/QT	No Report	S=8 and 6 I=8 and 6 P=8 and 6	S=810 ft I=781 ft P=780 ft	No Report
17	Barclay State #9	4 ½"	115 RPM		8.6 PPG	33 SEC/QT	No Report	S=8 and 6 I=8 and 6 P=8 and 6	S=815 ft I=785 ft P=786 ft	No Report
18	Barclay Federal #8	4 ½"	110 RPM	No Report	10 PPG	29 SEC/QT	No Report	S=8 and 6 I=8 and 6 P=6	S=31 ft I=31 ft P=31 ft	S=13 I=27 P=26
19	Barclay Federal #11	4 ½"	115 RPM	28 ft/HR	8.6 PPG	33 SEC/QT	No Report	S=8 and 6 I=8 and 6 P=8 and 6	S=810 ft I=780 ft P=784 ft	No Report
20	Barclay Federal #13	4 ½"	110 RPM	No Report	10 PPG	29 SEC/QT	No Report	S=8 and 6 I=8 and 6 P=6	S=31 ft I=31 ft P=31 ft	S=13 I=27 P=26
21	Barclay Federal #17	4 ½"	110 RPM	No Report	10 PPG	29 SEC/QT	No Report	S=8 and 6 I=8 and 6 P=6	S=31 ft I=31 ft P=31 ft	S=13 I=27 P=26
22	Barclay Federal #19	4 ½"	110 RPM	No Report	10 PPG	29 SEC/QT	No Report	S=8 and 6 I=8 and 6 P=6	S=31 ft I=31 ft P=31 ft	S=13 I=27 P=26
23	Barclay Federal #25	4 ½"	118 RPM	29 ft/HR	8.6 PPG	33 SEC/QT	No Report	S=8 and 6 I=8 and 6 P=8 and 6	S=815 ft I=784 ft P=782 ft	No Report

Note: Under the columns for Collars, the "S" indicates surface string, the "I" indicates intermediate string, and the "P" indicates production string. Also, under the Collar Diameter the production string on some wells indicates 8- and 6-in. collars. This is obviously an error since the hole diameter for that portion of the well is 7 ½ inches.

1 *Table DATA-A-6 lists the known instances of air drilling that have occurred in the New*
 2 *Mexico portion of the Delaware Basin since hydrocarbon drilling has been performed.*
 3 *During the 100 years of drilling used for the CCA, there were 15 suspected cases where air*
 4 *may have been used to drill some portion of a well. During the recertification monitoring*
 5 *period, there was one proven incidence of air drilling, although not through the salt section,*
 6 *which occurred near the airport in Carlsbad 40.23 km (25 mi) west of the WIPP site.*

7 **Table DATA-A-6. Air-Drilled Wells**

#	Location	Well Name and No.	Spud Date	Status	Well Information
<i>Wells Drilled Prior to Submittal of the CCA With Some Portion Drilled by Air</i>					
1	21S-28E-33	Richardson & Bass #1	07/27/1961	P&A	<i>Air drilled through the salt. Between 2,545 and 2,685 encountered water and changed from air to mud based drilling.</i>
2	21S-32E-26	Lincoln Federal Unit #1	04/01/1991	P&A	<i>Lost circulation at 1290. Hole was dry drilled to 1,792. Supposedly air drilled from 2,984 to 4,725.</i>
3	23S-26E-17	Exxon "17" Federal #1	08/01/1989	Gas Well	<i>Air drilled through the salt from 575 to 2,707.</i>
4	23S-28E-11	CP Pardue #1	10/28/1958	P&A	<i>Air drilled through the salt from 390 to 2,620.</i>
5	23S-28E-11	Amoco Federal #1	08/04/1979	Oil Well	<i>Air drilled from 475 to 9,700.</i>
6	23S-28E-11	Amoco Federal #3	02/28/1980	Oil Well	<i>Air drilled from 6271 to 9,692.</i>
7	23S-28E-23	South Culebra Bluff Unit #3	01/21/1979	Oil Well	<i>Air drilled from 6345 to 8,000.</i>
8	23S-28E-23	South Culebra Bluff Unit #4	08/09/1979	Oil Well	<i>Air drilled from 450 to 9,802.</i>
9	24S-31E-03	Lilly "ALY" Federal #2	05/01/1994	Oil Well	<i>Air drilled conductor hole to 40.</i>
10	24S-31E-03	Lilly "ALY" Federal #4	05/16/1994	Oil Well	<i>Air drilled conductor hole to 40.</i>
11	24S-34E-04	Antelope Ridge Unit #2	09/13/1962	Gas Well	<i>Attempted to drill with gas. Had to convert to water at 1,035. Tried again several times at different depths.</i>
12	24S-34E-09	Federal "9" Com #1	12/3/1963	Gas Well	<i>Hit water while gas drilling at 4,865.</i>
13	24S-34E-13	Federal Johnson #1	06/23/1958	P&A	<i>Proposed to drill with air but no information in the records indicate air drilling.</i>
14	26S-32E-20	Russell Federal #1	03/16/1966	Oil Well	<i>Drilled with air to 1,330.</i>
15	26S-32E-36	North El Mar Unit #44	02/19/1959	Oil Well	<i>Proposed to drill with air but no information in the records indicate air drilling.</i>
<i>Wells Drilled After Supplemental Information Provided to the Docket</i>					
1	22S-26E-28	Sheep Draw "28" Federal #13	07/01/1997	Oil Well	<i>Air drilled the first 358 ft.</i>

Note: The research on "air drilling" is a continuous effort since every new well drilled is checked to determine if any portion of the well was drilled by air. A copy of all completion reports are on file for all wells completed within the New Mexico portion of the Delaware Basin.

8 **DATA-A-5.2 Borehole Plug-Related Parameters/Data**

9 *Borehole plug-related parameters/data including pattern of plugs; plug materials and lengths;*
 10 *total number, location, and depth of abandoned boreholes; and type of well casing steel alloy*
 11 *are shown in Table DATA-A-7.*

Table DATA-A-7. Plugged Wells in the Nine-Township Area of the Delaware Basin – July 1995 Through September 2002

#	Location	Well Name and No.	Plug Date	R-111-P	Depth	No. Plugs	Plug Length	No. Sacks	Cement	Steel Alloy
1	21S-30E-33	Kaleidoscope "AKO" #1	03/13/1996	Yes	7,340	5	35 ft 50ft 100 ft 227 ft 264 ft	35 ft 10 Sacks 25 Sacks 25 Sacks 80 Sacks	Class C	S=J-55 I=J-55 P=J-55
2	21S-30E-34	Julia "AJL" Federal #4	03/19/1996	Yes	7,455	6	35 ft 100 ft 100 ft 185 ft No Report 50 ft	35 ft 25 Sacks 25 Sacks 25 Sacks 65 Sacks 5 Sacks	Class C	S=J-55 I=J-55 P=J-55
3	21S-32E-22	Bilbrey North "22" Federal #1	07/29/1998	Yes	15,020	5	330 ft 180 ft 150 ft 2,150 ft 50 ft	35 Sacks 180 ft 150 ft 750 Sacks 5 Sacks	No Report	S=J-55 I=N-80 P=P-110
4	21S-32E-31	Luke Federal #2	04/26/1998	Yes	8,585	4	No Report 100 ft 424 ft 50 ft	6 Sacks 11 Sacks 362 Sacks 50 Sacks	Class C	S=H-40 I=K-55 P=K-55
5	21S-32E-35	Anderson #1	07/27/1995	No	8,763	5	40 ft No Report 297 ft 197 ft 50 ft	40 ft 15 Sacks 70 Sacks 50 Sacks 10 Sacks	Class C	S=K-55 I=J-55 P=J-55
6	22S-32E-14	Prohibition Federal #5	05/24/1996	No	8,914	6	No Report 192 ft 336 ft 154 ft 125 ft 60 ft	25 Sacks 20 Sacks 50 Sacks 40 Sacks 65 Sacks 40 Sacks	Unknown Unknown Unknown Class C Class C Class C	S=J-55 I=J-55 P=J-55/N-80
7	22S-32E-22	Cercion Federal #8	03/25/1998	No	8,900	6	200 ft 100 ft 100 ft 100 ft 100 ft 20 ft	70 Sacks 50 Sacks 100 Sacks 35 Sacks 35 Sacks 20 Sacks	Class H Class H Class C Class C Class C Class C	No Report

**Table DATA-A-7. Plugged Wells in the Nine-Township Area of the Delaware Basin – July 1995 Through September 2002 –
Continued**

#	Location	Well Name and No.	Plug Date	R-111-P	Depth	No. Plugs	Plug Length	No. Sacks	Cement	Steel Alloy
8	23S-32E-09	Aracanga Federal #2	02/04/1998	No	8,985	4	No Report 100 ft 100 ft 430 ft	35 Sacks 25 Sacks 25 Sacks 112 Sacks	No Report	S=H-40 I=J-55 P=J-55
9	23S-32E-12	Pronghorn Federal "12" #1	02/18/1999	No	9,200	7	50 ft 100 ft 100 ft 150 ft 100 ft 100 ft 50 ft	50 ft 50 Sacks 40 Sacks 60 Sacks 35 Sacks 35 Sacks 15 Sacks	Class H Class C Class C Class C Class C Class C Class C	No Report
10	23S-32E-15	Codorniz Federal #2	12/31/1996	No	9,039	5	100 ft 100 ft 100 ft 100 ft 60 ft	50 Sacks 50 Sacks 50 Sacks 50 Sacks 20 Sacks	Class H	S=H-40 I=J-55/S-80 P=K-55
11	23S-32E-18	Sand "18" Federal #2	05/24/1996	No	8,800	4	200 ft 265 ft 141 ft 75 ft	55 Sacks 180 Sacks 45 Sacks 57 Sacks	Class H	S=WC-40 I=WC-50 P=K-55/L-80
12	23S-32E-24	Red Deer "24" Federal #1	05/27/1997	No	9,101	4	216 ft 115 ft 180 ft 730 ft	50 Sacks 25 Sacks 35 Sacks 140 Sacks	Class C	S=K-55 I=K-55
13	23S-32E-35	Red Ruby "35" Federal #1	08/17/1997	No	9,100	6	202 ft 101 ft 125 ft 110 ft 110 ft 15 ft	60 Sacks 45 Sacks 70 Sacks 30 Sacks 30 Sacks 15 Sacks	No Report	S=J-55 I=NS-80

Note: Under the column for Steel Alloy the "S" indicates surface casing, the "I" indicates intermediate casing, and the "P" indicates production casing. The plugging regulations in New Mexico have not changed since the 1996 CCA.

1 ***DATA-A-5.3 Enhanced Recovery Data***

2 *Enhanced recovery data, including occurrences of fluid injection (water flood) within the*
3 *nine-township area; CO₂ miscible flooding; salt water disposal within the nine-township area;*
4 *and volume (barrels) of fluid injected near WIPP within the nine-township area are shown in*
5 *the following Figure DATA-A-1 and Table DATA-A-8.*

6 ***DATA-A-5.3.1 CO₂ Flooding***

7 *There are no secondary or tertiary recovery projects in the vicinity of the WIPP site utilizing*
8 *carbon dioxide flooding as a means to recover oil. The nearest operation of this type is located*
9 *40.23 km (25 mi) to the south in Loving County, Texas.*

10 *There are no CO₂ pipelines to any of the oil fields in the New Mexico portion of the Delaware*
11 *Basin where secondary recovery is ongoing. The one field near the WIPP site (El Mar) where*
12 *secondary recovery is ongoing is located approximately 40.23 km (25 mi) from the CO₂*
13 *flooding operation in Loving County, Texas.*

14 ***DATA-A-5.4 Gas Storage Data***

15 *Gas storage data including occurrences of gas storage (cavern and/or reservoir) near WIPP*
16 *are shown in Table DATA-A-9.*

17 *A common underground gas storage facility is a cavern solution mined from the salt*
18 *formations underlying the surface. They are made by dissolving the salt with fresh water and*
19 *then pumping the brine to the surface, leaving a cavity that can be used for storage of*
20 *hydrocarbons while a depleted reservoir storage system utilizes a reservoir from which most or*
21 *all economically recoverable hydrocarbons have been produced.*

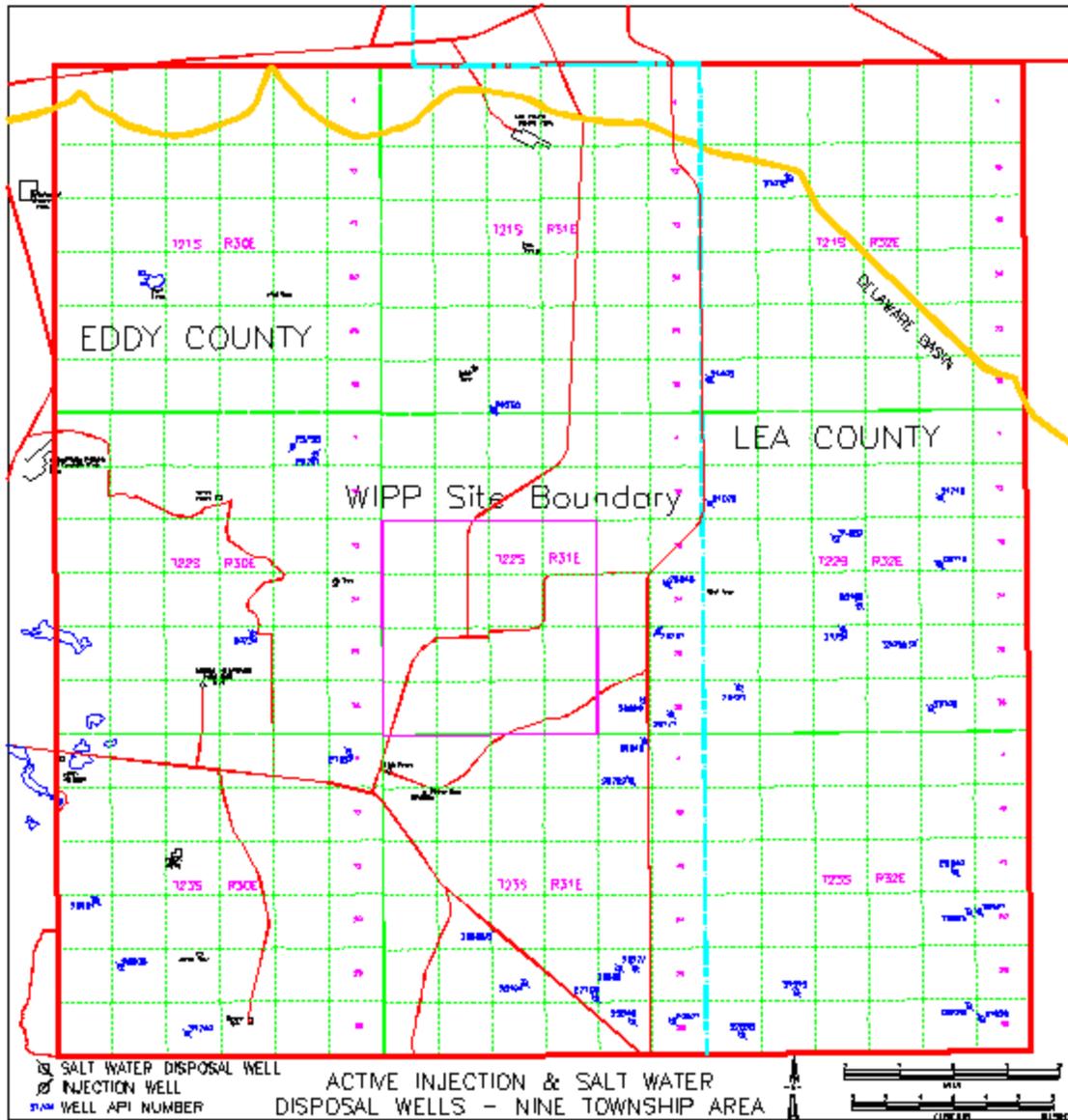
22 *In 1992, there were six gas storage facilities permitted in the state of New Mexico. Five were*
23 *located in Southeast New Mexico, with one being inside the boundaries of the Delaware Basin*
24 *and of interest to the WIPP site. The Washington Ranch Storage Project, located in the*
25 *Delaware Basin about 79.03 km (46 mi) to the southwest of the WIPP site, is a multiwell*
26 *system in a depleted gas reservoir, storing produced natural gas at a depth of approximately*
27 *1981.2 to 2133.6 m (6,500 to 7,000 ft). It is still in operation at this time, although at a much*
28 *reduced level than in 1992.*

29 *Of the five facilities located in southeast New Mexico, only three are cavern-type facilities*
30 *solution mined from the salt. All three store liquefied petroleum gas and are between 53.1 and*
31 *56.33 km (33 and 35 mi) from the WIPP site. The two that store produced natural gas do so in*
32 *a depleted gas reservoir with the nearest facility located 32.19 km (20 mi) from the WIPP site,*
33 *leaving the Washington Ranch Storage Project the furthest from the site at 79.03 km (46 mi).*

34 *At this time, there are no known underground gas storage facilities in the Texas portion of the*
35 *Delaware Basin.*

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Figure DATA-A-1. Active Injection and Salt Water Disposal Wells

Table DATA-A-8. Nine-Township Injection and Salt Water Disposal (SWD) Well Information

<i>No.</i>	<i>Location</i>	<i>Well Name and No.</i>	<i>Well Status</i>	<i>Injection Zone</i>	<i>1st Inj</i>	<i>Latest Inj</i>	<i>Inj Press</i>	<i>Cumulative Barrels</i>
<i>Wells Completed Prior to the Initial Certification</i>								
<i>1</i>	<i>21S-32E-08</i>	<i>Union "AJS" Federal #1</i>	<i>Salt Water Disposal</i>	<i>4826-5978</i>	<i>1991</i>	<i>June-2002</i>	<i>700 psi</i>	<i>4,784,288 Barrels</i>
<i>2</i>	<i>21S-32E-31</i>	<i>Lost Tank SWD #1</i>	<i>Salt Water Disposal</i>	<i>4618-6012</i>	<i>1992</i>	<i>June-2002</i>	<i>20 psi</i>	<i>157,463 Barrels</i>
<i>3</i>	<i>22S-30E-02</i>	<i>James "A" #3</i>	<i>Injection</i>	<i>7200-7264</i>	<i>1993</i>	<i>June-2002</i>	<i>855 psi</i>	<i>6,376,961 Barrels</i>
<i>4</i>	<i>22S-30E-02</i>	<i>James "A" #12</i>	<i>Injection</i>	<i>5600-7400</i>	<i>1991</i>	<i>June-2002</i>	<i>776 psi</i>	<i>6,758,551 Barrels</i>
<i>5</i>	<i>22S-30E-27</i>	<i>RH Legg Federal #1</i>	<i>Salt Water Disposal</i>	<i>3820-3915</i>	<i>1981</i>	<i>June-2002</i>	<i>760 psi</i>	<i>1,947,467 Barrels</i>
<i>6</i>	<i>22S-31E-24</i>	<i>Getty "24" Federal #5</i>	<i>Salt Water Disposal</i>	<i>4519-5110</i>	<i>1991</i>	<i>June-2002</i>	<i>No Report</i>	<i>4,694,840 Barrels</i>
<i>7</i>	<i>22S-31E-25</i>	<i>Neff Federal #3</i>	<i>Injection</i>	<i>7050-7068</i>	<i>1995</i>	<i>June-2002</i>	<i>600 psi</i>	<i>3,069,445 Barrels</i>
<i>8</i>	<i>22S-31E-35</i>	<i>David Ross "AIT" Federal #1</i>	<i>Salt Water Disposal</i>	<i>4500-5670</i>	<i>1991</i>	<i>June-2002</i>	<i>700 psi</i>	<i>7,791,690 Barrels</i>
<i>9</i>	<i>22S-32E-07</i>	<i>Flamenco Federal #1</i>	<i>Salt Water Disposal</i>	<i>4676-5814</i>	<i>1991</i>	<i>June-2002</i>	<i>300 psi</i>	<i>5,014,465 Barrels</i>
<i>10</i>	<i>22S-32E-11</i>	<i>Prohibition Federal #2</i>	<i>Salt Water Disposal</i>	<i>5200-8706</i>	<i>1994</i>	<i>June-2002</i>	<i>450 psi</i>	<i>915,747 Barrels</i>
<i>11</i>	<i>22S-32E-14</i>	<i>Red Tank "BT" Federal #2</i>	<i>Salt Water Disposal</i>	<i>4900-6080</i>	<i>1994</i>	<i>May-2002</i>	<i>No Report</i>	<i>2,564,127 Barrels</i>
<i>12</i>	<i>22S-32E-16</i>	<i>Kiwi "AKX" State #8</i>	<i>Salt Water Disposal</i>	<i>5240-8710</i>	<i>1995</i>	<i>June-2002</i>	<i>700 psi</i>	<i>4,750,431 Barrels</i>
<i>13</i>	<i>22S-32E-21</i>	<i>Gilmore Federal #1</i>	<i>Salt Water Disposal</i>	<i>4755-5110</i>	<i>1992</i>	<i>June-2002</i>	<i>550 psi</i>	<i>1,847,930 Barrels</i>
<i>14</i>	<i>22S-32E-28</i>	<i>Red Tank "28" Federal #3</i>	<i>Salt Water Disposal</i>	<i>4690-5800</i>	<i>1993</i>	<i>June-2002</i>	<i>300 psi</i>	<i>397,081 Barrels</i>
<i>15</i>	<i>22S-32E-31</i>	<i>Proximity "31" Federal #4</i>	<i>Salt Water Disposal</i>	<i>4662-5915</i>	<i>1993</i>	<i>June-2002</i>	<i>550 psi</i>	<i>2,976,033 Barrels</i>
<i>16</i>	<i>22S-32E-35</i>	<i>Red Tank "35" Federal #3</i>	<i>Salt Water Disposal</i>	<i>4950-6252</i>	<i>1995</i>	<i>June-2002</i>	<i>400 psi</i>	<i>2,025,597 Barrels</i>
<i>17</i>	<i>23S-30E-29</i>	<i>Charger "29" Federal #1</i>	<i>Salt Water Disposal</i>	<i>5479-7220</i>	<i>1996</i>	<i>June-2002</i>	<i>375 psi</i>	<i>1,587,535 Barrels</i>
<i>18</i>	<i>23S-31E-26</i>	<i>Todd Federal "26" #2</i>	<i>Salt Water Disposal</i>	<i>4460-5134</i>	<i>1992</i>	<i>June-2002</i>	<i>900 psi</i>	<i>3,231,147 Barrels</i>
<i>19</i>	<i>23S-31E-26</i>	<i>Todd Federal "26" #3</i>	<i>Salt Water Disposal</i>	<i>4390-6048</i>	<i>1971</i>	<i>June-2002</i>	<i>900 psi</i>	<i>4,460,450 Barrels</i>
<i>20</i>	<i>23S-31E-28</i>	<i>Sand Dunes "28" Federal #1</i>	<i>Salt Water Disposal</i>	<i>4295-5570</i>	<i>1993</i>	<i>June-2002</i>	<i>440 psi</i>	<i>2,944,921 Barrels</i>
<i>21</i>	<i>23S-31E-35</i>	<i>Cal-Mon #5</i>	<i>Salt Water Disposal</i>	<i>4484-5780</i>	<i>1993</i>	<i>June-2002</i>	<i>732 psi</i>	<i>2,347,175 Barrels</i>
<i>22</i>	<i>23S-31E-36</i>	<i>Todd "36" State #1</i>	<i>Salt Water Disposal</i>	<i>5980-6560</i>	<i>1994</i>	<i>June-2002</i>	<i>700 psi</i>	<i>6,836,860 Barrels</i>
<i>23</i>	<i>23S-32E-14</i>	<i>Cuervo Federal #1</i>	<i>Salt Water Disposal</i>	<i>5496-6014</i>	<i>1991</i>	<i>June-2002</i>	<i>550 psi</i>	<i>1,071,613 Barrels</i>
<i>24</i>	<i>23S-32E-29</i>	<i>James Federal #1</i>	<i>Salt Water Disposal</i>	<i>4844-4944</i>	<i>1992</i>	<i>June-2002</i>	<i>650 psi</i>	<i>2,882,040 Barrels</i>
<i>25</i>	<i>23S-32E-31</i>	<i>SDE "31" Federal #9</i>	<i>Salt Water Disposal</i>	<i>5150-5700</i>	<i>1996</i>	<i>June-2002</i>	<i>No Report</i>	<i>629,554 Barrels</i>
<i>26</i>	<i>23S-32E-35</i>	<i>James Federal #1A</i>	<i>Salt Water Disposal</i>	<i>5062-5100</i>	<i>1969</i>	<i>March-2002</i>	<i>850 psi</i>	<i>142,681 Barrels</i>
<i>27</i>	<i>23S-32E-36</i>	<i>Triste Draw "36" State #1</i>	<i>Salt Water Disposal</i>	<i>5364-6138</i>	<i>1995</i>	<i>May-2002</i>	<i>No Report</i>	<i>1,035,920 Barrels</i>

Table DATA-A-8. Nine-Township Injection and Salt Water Disposal (SWD) Well Information — Continued

<i>No.</i>	<i>Location</i>	<i>Well Name and No.</i>	<i>Well Status</i>	<i>Injection Zone</i>	<i>1st Inj</i>	<i>Latest Inj</i>	<i>Inj Press</i>	<i>Cumulative Barrels</i>
<i>Wells Completed Since the Initial Certification</i>								
28	21S-31E-33	Lost Tank "33" Federal #2	Salt Water Disposal	4166-5160	1998	June-2002	360 psi	1,383,513 Barrels
29	22S-31E-36	Medano State Commercial #1	Salt Water Disposal	4500-5700	1998	Sept-2001	950 psi	2,500,628 Barrels
30	22S-32E-27	Prize Federal #4	Injection	6831-8388	1998	April-1999	No Report	No Report
31	23S-30E-01	Hudson Federal #1	Salt Water Disposal	4040-4825	2001	June-2002	800 psi	561,873 Barrels
32	23S-30E-19	Remuda Basin "19" Federal #2	Salt Water Disposal	3402-4609	1997	No Report	No Report	No Report
33	23S-30E-33	Poker Lake Unit #170	Salt Water Disposal	4546-6760	2002	No Report	No Report	No Report
34	23S-31E-02	Conoco State AA-2 #1	Salt Water Disposal	4489-5670	1997	Sept-2001	1010 psi	3,726,488 Barrels
35	23S-31E-02	Barclay State #4	Salt Water Disposal	4500-5850	1998	Sept-2001	1030 psi	2,908,070 Barrels
36	23S-31E-20	Pure Gold "B" Federal #20	Injection	7740-7774	2001	Dec-2001	No Report	244,642 Barrels
37	23S-31E-27	Todd "27" Federal	Salt Water Disposal	4694-5284	1998	No Report	No Report	No Report
38	23S-32E-23	Diamondtail "23" Federal #2	Salt Water Disposal	5954-6064	?	May-2001	420 psi	911,167 Barrels
39	23S-32E-24	Diamondtail "24" Federal #1	Salt Water Disposal	5925-6042	?	June-2002	No Report	732,490 Barrels

Note: Information collected from OCD offices in Artesia and Hobbs. Also, Cumulative Barrels information is collected from the New Mexico Oil & Gas Engineering Committee, Inc. and is valid through June 2002.

Table DATA-A-9. Underground Gas Storage Facilities in the Vicinity of the WIPP Site

<i>Facility/Operator</i>	<i>Type of Facility</i>	<i>Location</i>	<i>Delaware Basin</i>	<i>Capacity</i>	<i>Material Stored</i>
<i>Washington Ranch Storage Project El Paso Natural Gas Company</i>	<i>Multiwell system utilizing a depleted gas reservoir found at a depth of 6,500 to 7,000 ft.</i>	<i>25S-24E 26S-24E Eddy County</i>	<i>Yes</i>	<i>67,253 MMCF</i>	<i>Produced Natural Gas</i>
<i>Loco Hills Arrow Gas Company</i>	<i>Three-well system interconnected by a cavity in the salt section at a depth of 500 to 600 ft.</i>	<i>17S-29E-22 Eddy County</i>	<i>No</i>	<i>235,000 to 238,000 barrels</i>	<i>Liquified Petroleum Gas</i>
<i>LPG Storage Well No. 1 Warren Petroleum Company</i>	<i>One-well storage facility in the salt section at a depth of 1,892 ft.</i>	<i>20S-36E-01 Lea County</i>	<i>No</i>	<i>168,000 barrels</i>	<i>Liquified Petroleum Gas</i>
<i>LPG Storage Well No. 2 Warren Petroleum Company</i>	<i>One-well storage facility in the salt section at a depth of 1,469 ft.</i>	<i>19S-36E-36 Lea County</i>	<i>No</i>	<i>245,000 barrels</i>	<i>Liquified Petroleum Gas</i>
<i>Grama Ridge Morrow Unit Llano, Inc.</i>	<i>Four-well storage facility (two injectors, two withdrawal wells) in a portion of the Grama Ridge Gas Pool at a depth of 12,700 to 13,200 ft.</i>	<i>21S-34E-34 22S-34E-03 Lea County</i>	<i>No</i>	<i>13,000 MMCF</i>	<i>Produced Natural Gas</i>

1 *DATA-A-5.5 Solution Mining*

2 *This section discusses occurrences of solution mining within the Delaware Basin. The*
3 *discussion addresses the following four categories:*

- 4 • *Potash solution mining,*
- 5 • *Sulfur solution mining,*
- 6 • *Brine wells, and*
- 7 • *Naturally occurring radioactive materials (NORM) facilities.*

8 *DATA-A-5.5.1 Potash Solution Mining*

9 *No solution mining for potash has occurred at any of the mines located within the Delaware*
10 *Basin in the vicinity of the WIPP site. The DOE is not aware of any plans being considered by*
11 *any mining companies to use potash solution mining in the Delaware Basin. However, this*
12 *process has occurred outside the Delaware Basin in the Carlsbad Mining District, which*
13 *comprises all of the potash mines in the area. Potash can be found in the Mcnutt*

14 *The first solution mining attempt was in the late 1960s. Conoco Minerals installed a pilot*
15 *scale in-situ solution mine on the AMAX lease in 19S-30E-12. This solution cavity was*
16 *mapped in 1974 from the surface using radar. The cavern created was 213.36 m (700 ft) in*
17 *diameter and approximately 3.04 m (10 ft) high. There were four boreholes drilled to create*
18 *this cavity — one injection well and three withdrawal wells. This project was designed to test*
19 *solution mining of potassium minerals, but the potash ore zone was deemed too thin to make*
20 *this method economically viable. This occurred approximately 22 miles north of the WIPP*
21 *Site.*

22 *The second potash solution mining endeavor is still in the initial phases and solution mining*
23 *activities have not yet commenced. In May 1997, Mississippi Chemical filed a notice of intent*
24 *to proceed with solution mining of potash in the Clayton Basin just to the north of the*
25 *Delaware Basin. The next step in the process is for a detailed plan to be submitted to the*
26 *Bureau of Land Management (BLM) for further evaluation. This plan was not submitted*
27 *until March 2002. BLM approved the test plan in May 2002 for the pilot project. After the*
28 *pilot phase is completed, an Environmental Impact Statement will be required before work can*
29 *proceed. Currently, Mississippi Chemical has put the plan on hold due to a lack of funding.*
30 *Talks with the BLM have indicated that the plan is still of a proprietary nature and the BLM*
31 *will not allow anyone to review the plan without approval from Mississippi Chemical.*
32 *However, BLM personnel did indicate that the facility would be located at the old Eddy Potash*
33 *mine, which is located outside of the Delaware Basin and north-northwest of the WIPP site*
34 *approximately 30.68 km (19 mi). The proposed plan is to pump water down the shaft into a*
35 *section of the mine that has been previously mined out, circulating the water around pillars*
36 *until it becomes saturated with potash, and then pumping the saturated fluid to the surface*
37 *where it would be dumped into a two- to three-acre evaporation pond. The residue would then*

1 *be refined. This information was acquired in a phone conversation with BLM personnel on*
 2 *3/13/02.*

3 ***DATA-A-5.5.2 Sulfur Solution Mining***

4 *Solution mining for sulfur has occurred in the Delaware Basin. Currently, there are no active*
 5 *sulfur solution mining projects within the Delaware Basin. Past activity was at the sulfur*
 6 *mine located west of Orla, Texas, in Culberson County. This facility utilized a number of*
 7 *Class III injection wells to remove sulfur from underground mineral deposits. This mine was*
 8 *closed in June 1999.*

9 ***DATA-A-5.5.3 Brine Wells***

10 *Brine wells are classified as Class II injection wells. In the Delaware Basin, the process*
 11 *involves injecting fresh water through the wells into a salt formation to create a saturated*
 12 *brine solution, which is then extracted and utilized as a drilling agent when drilling a new*
 13 *well. These wells are tracked by the DBDSP on a continuing basis. Supplemental*
 14 *information provided to the EPA in 1997 showed 11 brine wells in the Delaware Basin.*
 15 *Further research showed there to be 15 brine wells. Four of these are plugged and abandoned*
 16 *with 11 being active (see Table DATA-A-10). One new well has been permitted in the*
 17 *Delaware Basin since submittal of the initial certification application (Quito West Unit #207).*
 18 *One well has yet to be verified and is not listed in the table below. Records indicate it has been*
 19 *permitted, but there are no records to indicate whether it was drilled. If records are found to*
 20 *verify when the well was drilled, it will be added to the databases maintained by the DBDSP*
 21 *and classified as a brine well.*

22 ***Table DATA-A-10. Delaware Basin Brine Well Status***

<i>County</i>	<i>Location</i>	<i>API No.</i>	<i>Well Name and No.</i>	<i>Operator</i>	<i>Status</i>
<i>Eddy</i>	<i>22S-26E-36</i>	<i>3001521842</i>	<i>City of Carlsbad #WS-1</i>	<i>Key Energy Services</i>	<i>Brine Well</i>
<i>Eddy</i>	<i>22S-27E-03</i>	<i>3001520331</i>	<i>Tracy #3</i>	<i>Ray Westall</i>	<i>Plugged Brine Well</i>
<i>Eddy</i>	<i>22S-27E-17</i>	<i>3001522574</i>	<i>Eugenie #WS-1</i>	<i>I & W Inc</i>	<i>Brine Well</i>
<i>Eddy</i>	<i>22S-27E-17</i>	<i>3001523031</i>	<i>Eugenie #WS-2</i>	<i>I & W Inc</i>	<i>Plugged Brine Well</i>
<i>Loving</i>	<i>Blk 29-03</i>	<i>4230110142</i>	<i>Lineberry Brine Station #1</i>	<i>Chance Properties</i>	<i>Brine Well</i>
<i>Loving</i>	<i>Blk 01-82</i>	<i>4230130680</i>	<i>Chapman Ford #BR1</i>	<i>Herricks & Son Co.</i>	<i>Plugged Brine Well</i>
<i>Loving</i>	<i>Blk 33-80</i>	<i>4230180318</i>	<i>Mentone Brine Station #1D</i>	<i>Basic Energy Services</i>	<i>Brine Well</i>
<i>Loving</i>	<i>Blk 29-28</i>	<i>4230180319</i>	<i>East Mentone Brine Station #1</i>	<i>Permian Brine Sales, Inc.</i>	<i>Plugged Brine Well</i>
<i>Loving</i>	<i>Blk 01-83</i>	<i>4230180320</i>	<i>North Mentone #1</i>	<i>Chance Properties</i>	<i>Brine Well</i>
<i>Reeves</i>	<i>Blk 56-30</i>	<i>4238900408</i>	<i>Orla Brine Station #1D</i>	<i>Mesquite SWD Inc.</i>	<i>Brine Well</i>
<i>Reeves</i>	<i>Blk 04-08</i>	<i>4238920100</i>	<i>North Pecos Brine Station #WD-1</i>	<i>Chance Properties</i>	<i>Brine Well</i>
<i>Reeves</i>	<i>Blk 07-21</i>	<i>4238980476</i>	<i>Coyanosa Brine Station #1</i>	<i>Chance Properties</i>	<i>Brine Well</i>
<i>Ward</i>	<i>Blk 17-20</i>	<i>4247531742</i>	<i>Pyote Brine Station #WD-1</i>	<i>Chance Properties</i>	<i>Brine Well</i>
<i>Ward</i>	<i>Blk 01-13</i>	<i>4247534514</i>	<i>Quito West Unit #207</i>	<i>Seaboard Oil Co.</i>	<i>Brine Well</i>
<i>Ward</i>	<i>Blk 34-174</i>	<i>4247582265</i>	<i>Barstow Brine Station #1</i>	<i>Chance Properties</i>	<i>Brine Well</i>

1 ***DATA-A-5.5.4 Naturally Occurring Radioactive Materials Facilities***

2 ***NORM facilities are considered because they may be created in salt formations by solution***
3 ***mining to dispose of NORM wastes. According to conversations with the NORM Director for***
4 ***the Texas Railroad Commission, there are four permitted NORM sites in the state of Texas.***
5 ***Three are located in the Permian Basin but well outside of the Delaware Basin. The Andrews***
6 ***facility, approximately 96.56 km (60 mi) east of the WIPP Site, is operated by Lotus LLC and***
7 ***will eventually have a capacity of 570,000 barrels. Another facility is located near Fort***
8 ***Stockton by NES Permian and will have a capacity of 1,000,000 barrels. The third facility is***
9 ***also operated by NES Permian near Big Spring and is considerably smaller. All of these***
10 ***facilities are located in salt formations and were solution mined to facilitate the reinjection of***
11 ***NORM wastes by the oil companies. This information is tracked by the DBDSP. There is no***
12 ***requirement to track NORM facilities outside of the Delaware Basin, but the DBDSP does so***
13 ***for possible future impacts to activities within the Delaware Basin.***

14 ***DATA-A-5.6 Potash Mining Data***

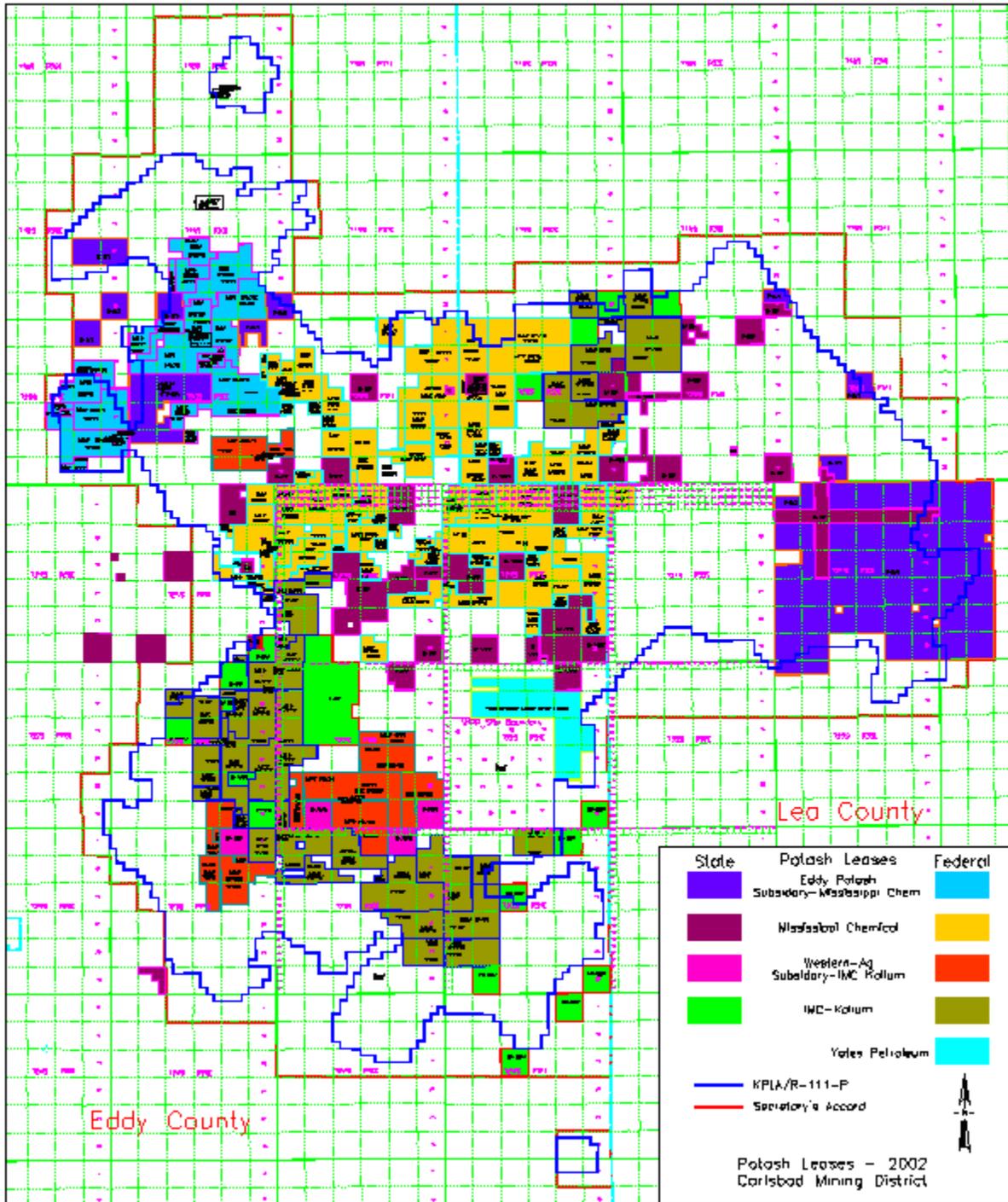
15 ***Potash mining data include a map of current potash leases (Figure DATA-A-2) and changes***
16 ***in existing leases within the nine-township area (see Table DATA-A-11). A full-sized copy of***
17 ***Figure DATA-A-2 can be found in a pocket at the end of this volume.***

18 ***DATA-A-5.7 Seismic Data***

19 ***Seismic data include a history of relevant events, e.g., earthquake (natural or human induced)***
20 ***activity, relation of epicenters with geologic structures, geologic setting, etc. This information***
21 ***is provided in Figure DATA-A-3 and Table DATA-A-12. A full-sized copy of Figure DATA-***
22 ***A-3 can be found in a pocket at the end of this volume.***

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Figure DATA-A-2. Current Potash Leases

Table DATA-A-11. Potash Leases in the Vicinity of the WIPP Site

<i>Company</i>	<i>1995</i>	<i>2002</i>	<i>Federal Leases</i>	<i>Acreage</i>	<i>Lease Eff. Date</i>	<i>State Leases</i>	<i>Acreage</i>	<i>Lease Eff. Date</i>
<i>Horizon Corp</i>	<i>Yes</i>	<i>No</i>	<i>Cancelled</i>			<i>Cancelled</i>		
<i>Eddy Potash (Subsidiary of Mississippi Chemical)</i>	<i>Yes</i>	<i>Yes</i>	<i>NMLC-044752</i>	<i>240.00</i>	<i>09/01/1956</i>	<i>M-873</i>	<i>37,850.28</i>	<i>Unknown</i>
			<i>NMLC-046729A</i>	<i>2,558.76</i>	<i>01/18/1933</i>			
			<i>NMLC-046729C</i>	<i>2,279.95</i>	<i>01/18/1933</i>			
			<i>NMLC-046729D</i>	<i>1,840.00</i>	<i>01/18/1933</i>			
			<i>NMLC-050063B</i>	<i>2,560.00</i>	<i>040/1/1939</i>			
			<i>NMLC-050063F</i>	<i>2,358.36</i>	<i>04/01/1939</i>			
			<i>NMLC-065081-01</i>	<i>480.00</i>	<i>12/06/1950</i>			
			<i>NMLC-065566-01</i>	<i>720.00</i>	<i>09/28/1951</i>			
			<i>NMLC-066026-01</i>	<i>200.00</i>	<i>09/01/1955</i>			
			<i>NMLC-070141-01</i>	<i>438.91</i>	<i>01/01/1959</i>			
			<i>NMNM-023623-01</i>	<i>400.00</i>	<i>02/01/1962</i>			
			<i>NMNM-036791</i>	<i>1,840.00</i>	<i>10/01/1957</i>			
			<i>NMNM-050249A</i>	<i>880.00</i>	<i>09/01/1963</i>			
			<i>NMNM-088285</i>	<i>120.00</i>	<i>080/1/1960</i>			
			<i>NMNM-0121810-01</i>	<i>640.00</i>	<i>01/01/1965</i>			
			<i>NMNM-0135065</i>	<i>200.00</i>	<i>06/01/1961</i>			
			<i>NMNM-0220116</i>	<i>800.00</i>	<i>12/01/1961</i>			
			<i>NMNM-13933</i>	<i>80.00</i>	<i>10/01/1971</i>			
			<i>NMNM-12763</i>	<i>160.00</i>	<i>06/01/1971</i>			
<i>Western-Ag Minerals (Subsidiary of IMC Kalium)</i>	<i>Yes</i>	<i>Yes</i>	<i>NMLC-048730A</i>	<i>2,560.00</i>	<i>08/21/1952</i>	<i>MP-001</i>	<i>642.97</i>	<i>Unknown</i>
			<i>NMLC-048730B</i>	<i>2,556.40</i>	<i>08/21/1952</i>	<i>M-2618</i>	<i>1,951.18</i>	<i>Unknown</i>
			<i>NMLC-062188</i>	<i>2,520.00</i>	<i>12/01/1959</i>			
			<i>NMLC-063241A</i>	<i>1,600.00</i>	<i>11/30/1949</i>			
			<i>NMNM-0349889-01</i>	<i>1,400.00</i>	<i>11/01/1967</i>			
			<i>NMNM-1225</i>	<i>480.00</i>	<i>06/20/1932</i>			
			<i>NMNM-10544</i>	<i>240.09</i>	<i>11/01/1969</i>			
			<i>NMNM-10545</i>	<i>800.00</i>	<i>11/01/1969</i>			
			<i>NMNM-46370</i>	<i>640.00</i>	<i>02/01/1982</i>			
			<i>NMNM-84935</i>	<i>160.03</i>	<i>04/01/1991</i>			
			<i>NMNM-86720</i>	<i>640.00</i>	<i>03/01/1993</i>			
<i>Harroun</i>	<i>Yes</i>	<i>No</i>	<i>Cancelled</i>			<i>None</i>		
<i>National Potash Company</i>	<i>Yes</i>	<i>No</i>	<i>Owned by Mississippi</i>			<i>None</i>		
<i>New Mexico Potash</i>	<i>Yes</i>	<i>No</i>	<i>Owned by Mississippi</i>			<i>Mississippi</i>		
<i>IMC Global/Noranda</i>	<i>Yes</i>	<i>No</i>	<i>Owned by IMC Kalium</i>			<i>IMC Kalium</i>		

Table DATA-A-11. Potash Leases in the Vicinity of the WIPP Site — Continued

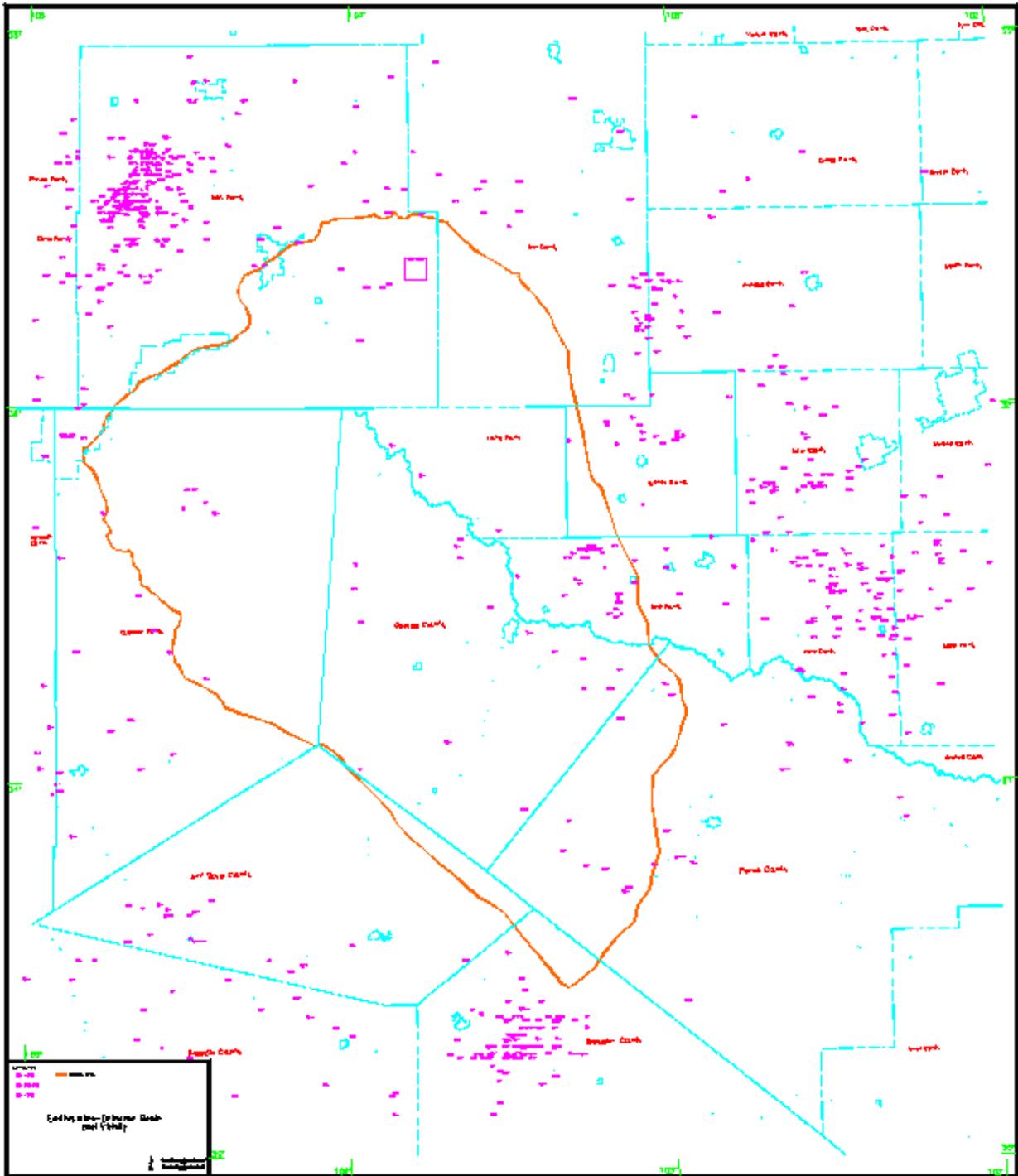
<i>Company</i>	<i>1995</i>	<i>2002</i>	<i>Federal Leases</i>	<i>Acreage</i>	<i>Lease Eff. Date</i>	<i>State Leases</i>	<i>Acreage</i>	<i>Lease Eff. Date</i>
<i>Yates Petroleum/Pogo Producing Co</i>	<i>Yes</i>	<i>Yes</i>		<i>5,184.72</i>	<i>1992</i>	<i>None</i>		
<i>IMC Kalium</i>	<i>Yes</i>	<i>Yes</i>	<i>NMLC-044311A</i>	<i>2,550.33</i>	<i>10/26/1938</i>	<i>M-13947</i>	<i>637.05</i>	<i>Unknown</i>
			<i>NMLC-044311B</i>	<i>2,560.00</i>	<i>10/26/1938</i>	<i>M-1753</i>	<i>921.33</i>	<i>Unknown</i>
			<i>NMLC-044311C</i>	<i>2,563.28</i>	<i>10/26/1938</i>	<i>M-651</i>	<i>5,734.52</i>	<i>Unknown</i>
			<i>NMLC-044312A</i>	<i>302.37</i>	<i>11/15/1946</i>	<i>MP-0024</i>	<i>4,472.90</i>	<i>Unknown</i>
			<i>NMLC-044312B</i>	<i>40.00</i>	<i>11/15/1946</i>	<i>Unknown</i>	<i>2,517.63</i>	<i>Unknown</i>
			<i>NMLC-044312C</i>	<i>1,400.29</i>	<i>11/15/1946</i>			
			<i>NMLC-065209</i>	<i>1,920.00</i>	<i>11/01/1949</i>			
			<i>NMLC-065484-01</i>	<i>1,331.76</i>	<i>01/5/1953</i>			
			<i>NMNM-02160-01</i>	<i>798.78</i>	<i>11/01/1956</i>			
			<i>NMNM-07755-01</i>	<i>665.65</i>	<i>06/01/1957</i>			
			<i>NMNM-09118A</i>	<i>1,766.71</i>	<i>07/02/1951</i>			
			<i>NMNM-09118C</i>	<i>1,400.60</i>	<i>07/02/1951</i>			
			<i>NMNM-045326-01</i>	<i>640.00</i>	<i>05/01/1958</i>			
			<i>NMNM-0329208-01</i>	<i>1,287.00</i>	<i>03/01/1967</i>			
			<i>NMNM-0359157-01</i>	<i>960.20</i>	<i>11/01/1967</i>			
			<i>NMNM-0359158-01</i>	<i>2,520.00</i>	<i>11/01/1967</i>			
			<i>NMNM-0359159-01</i>	<i>1,160.00</i>	<i>02/01/1968</i>			
			<i>NMNM-0384584-01</i>	<i>957.69</i>	<i>11/01/1967</i>			
			<i>NMNM-6829</i>	<i>2,211.12</i>	<i>11/01/1967</i>			
			<i>NMNM-6830</i>	<i>960.00</i>	<i>11/01/1967</i>			
			<i>NMNM-36861</i>	<i>320.00</i>	<i>01/01/1981</i>			
			<i>NMNM-69499</i>	<i>1,926.40</i>	<i>03/01/1967</i>			
			<i>NMNM-68500</i>	<i>640.00</i>	<i>03/01/1967</i>			
			<i>NMNM-013298A</i>	<i>2,564.33</i>	<i>02/24/1953</i>			
			<i>NMNM-013298B</i>	<i>640.00</i>	<i>02/24/1953</i>			
			<i>NMNM-013298C</i>	<i>2,360.00</i>	<i>02/24/1953</i>			
			<i>NMNM-013299</i>	<i>1,277.80</i>	<i>02/24/1953</i>			
			<i>NMNM-26309</i>	<i>1,438.80</i>	<i>02/24/1953</i>			

Table DATA-A-11. Potash Leases in the Vicinity of the WIPP Site — Continued

<i>Company</i>	<i>1995</i>	<i>2002</i>	<i>Federal Leases</i>	<i>Acreage</i>	<i>Lease Eff. Date</i>	<i>State Leases</i>	<i>Acreage</i>	<i>Lease Eff. Date</i>
<i>Mississippi Potash</i>	<i>Yes</i>	<i>Yes</i>	<i>NMLC-036092A</i>	<i>2,436.85</i>	<i>11/21/1929</i>	<i>M-651</i>	<i>19,973.52</i>	<i>Unknown</i>
			<i>NMLC-036092B</i>	<i>2,025.59</i>	<i>11/21/1929</i>	<i>M-19262</i>	<i>1,512.52</i>	<i>Unknown</i>
			<i>NMLC-036092C</i>	<i>2,559.15</i>	<i>11/21/1929</i>	<i>M-14957</i>	<i>2,632.51</i>	<i>Unknown</i>
			<i>NMLC-043636A</i>	<i>1,044.03</i>	<i>06/20/1932</i>	<i>M-15171</i>	<i>121.13</i>	<i>Unknown</i>
			<i>NMLC-043636B</i>	<i>2,311.66</i>	<i>06/20/1932</i>	<i>M-19393</i>	<i>1,084.16</i>	<i>Unknown</i>
			<i>NMLC-043636C</i>	<i>920.00</i>	<i>06/20/1932</i>	<i>M-4510</i>	<i>2,270.97</i>	<i>Unknown</i>
			<i>NMLC-061847-01</i>	<i>1,115.24</i>	<i>07/01/1951</i>			
			<i>NMLC-065693-01</i>	<i>560.00</i>	<i>02/01/1958</i>			
			<i>NMLC-065275-01</i>	<i>2,550.56</i>	<i>01/09/1952</i>			
			<i>NMLC-068397</i>	<i>1,920.00</i>	<i>01/09/1952</i>			
			<i>NMLC-065286-01</i>	<i>2,553.87</i>	<i>01/09/1952</i>			
			<i>NMLC-071868-01</i>	<i>1,938.24</i>	<i>09/01/1955</i>			
			<i>NMNM-06101-01</i>	<i>1,040.00</i>	<i>02/01/1958</i>			
			<i>NMNM-03468</i>	<i>160.00</i>	<i>07/01/1958</i>			
			<i>NMNM-07005</i>	<i>636.28</i>	<i>01/02/1952</i>			
			<i>NMNM-016540-01</i>	<i>120.00</i>	<i>04/04/1960</i>			
			<i>NMNM-033696</i>	<i>960.00</i>	<i>03/01/1958</i>			
			<i>NMNM-063880</i>	<i>120.00</i>	<i>07/01/1959</i>			
			<i>NMNM-070607</i>	<i>551.70</i>	<i>02/01/1960</i>			
			<i>NMNM-0184149</i>	<i>80.00</i>	<i>01/01/1955</i>			
			<i>NMNM-0184150</i>	<i>240.00</i>	<i>11/30/1949</i>			
			<i>NMNM-13932</i>	<i>640.00</i>	<i>11/01/1974</i>			
			<i>NMNM-24522</i>	<i>800.00</i>	<i>03/01/1982</i>			
			<i>NMNM-25232</i>	<i>640.00</i>	<i>07/06/1951</i>			
			<i>NMNM-25233</i>	<i>640.00</i>	<i>01/02/1952</i>			
			<i>NMNM-25234</i>	<i>80.00</i>	<i>11/30/1949</i>			
			<i>NMNM-28916</i>	<i>880.00</i>	<i>08/01/1963</i>			
			<i>NMNM-011776</i>	<i>2,559.06</i>	<i>01/09/1952</i>			
			<i>NMNM-011777</i>	<i>1,117.64</i>	<i>01/09/1952</i>			
			<i>NMNM-40071</i>	<i>2,080.00</i>	<i>05/01/1980</i>			
			<i>NMNM-06859-01</i>	<i>2,554.24</i>	<i>10/26/1953</i>			
			<i>NMNM-014742-01</i>	<i>640.00</i>	<i>08/01/1963</i>			
<i>NMNM-033696A</i>	<i>1,240.62</i>	<i>03/01/1958</i>						
<i>NMNM-035383</i>	<i>2,400.00</i>	<i>01/01/1958</i>						
<i>NMNM-045410</i>	<i>2,438.30</i>	<i>06/01/1958</i>						
<i>NMNM-057287-01</i>	<i>560.00</i>	<i>01/01/1964</i>						

Table DATA-A-11. Potash Leases in the Vicinity of the WIPP Site — Concluded

<i>Company</i>	<i>1995</i>	<i>2002</i>	<i>Federal Leases</i>	<i>Acreage</i>	<i>Lease Eff. Date</i>	<i>State Leases</i>	<i>Acreage</i>	<i>Lease Eff. Date</i>
<i>Mississippi Potash (continued)</i>	<i>Yes</i>	<i>Yes</i>	<i>NMNM-015064A</i>	<i>1,599.76</i>	<i>10/26/1953</i>			
			<i>NMNM-015064B</i>	<i>1,280.00</i>	<i>10/26/1953</i>			
			<i>NMNM-015064C</i>	<i>1,049.40</i>	<i>10/25/1953</i>			
			<i>NMNM-0292684-01</i>	<i>1,720.00</i>	<i>12/01/1966</i>			
			<i>NMNM-0554862</i>	<i>480.00</i>	<i>02/24/1953</i>			
			<i>NMNM-0554863</i>	<i>200.00</i>	<i>02/24/1953</i>			
			<i>NMNM-0554864</i>	<i>1,250.04</i>	<i>02/24/1953</i>			
			<i>NMNM-18417</i>	<i>160.00</i>	<i>01/09/1952</i>			
			<i>NMNM-28915</i>	<i>117.94</i>	<i>06/01/1958</i>			
			<i>NMNM-40362</i>	<i>280.00</i>	<i>12/01/1980</i>			
			<i>NMNM-41639</i>	<i>120.00</i>	<i>07/01/1981</i>			
			<i>NMNM-47021</i>	<i>1,104.26</i>	<i>07/01/1982</i>			
			<i>NMNM-54619</i>	<i>565.88</i>	<i>03/01/1983</i>			
			<i>NMNM-80707</i>	<i>2,520.00</i>	<i>08/01/1963</i>			



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Figure DATA-A-3. Seismic Activity in the Delaware Basin

1

Table DATA-A-12. Earthquake Events in the Delaware Basin

<i>County</i>	<i>No. of Events</i>	<i>Earliest Event</i>	<i>Latest Event</i>	<i>Smallest Magnitude</i>	<i>Largest Magnitude</i>
<i>Culberson</i>	<i>6</i>	<i>12/30/1997</i>	<i>08/04/2002</i>	<i>1</i>	<i>1.9</i>
<i>Eddy</i>	<i>5</i>	<i>04/24/1983</i>	<i>12/03/1998</i>	<i>1.1</i>	<i>3.5</i>
<i>Loving</i>	<i>3</i>	<i>02/04/1976</i>	<i>04/28/1997</i>	<i>1.1</i>	<i>1.3</i>
<i>Pecos</i>	<i>10</i>	<i>04/03/1977</i>	<i>12/22/1998</i>	<i>1</i>	<i>2.2</i>
<i>Reeves</i>	<i>16</i>	<i>08/03/1975</i>	<i>05/25/2002</i>	<i>1</i>	<i>2.5</i>
<i>Ward</i>	<i>26</i>	<i>09/24/1971</i>	<i>08/18/1984</i>	<i>0.8</i>	<i>3</i>
<i>Winkler</i>	<i>1</i>	<i>04/30/1976</i>	<i>04/30/1976</i>	<i>1.5</i>	<i>1.5</i>
<i>Totals</i>	<i>67</i>	<i>09/24/1971</i>	<i>08/04/2002</i>	<i>0.8</i>	<i>3.5</i>

Key:

Magnitude

- Less than 2* *Very seldom ever felt*
- 2.0 to 3.4* *Barely felt*
- 3.5 to 4.2* *Felt as a rumble*
- 4.3 to 4.9* *Shakes furniture; can break dishes*
- 5.0 to 5.9* *Dislodges heavy objects; cracks walls*
- 6.0 to 6.9* *Considerable damage to buildings*
- 7.0 to 7.3* *Major damage to buildings; breaks underground pipe*
- 7.4 to 7.9* *Great damage; destroys masonry and frame buildings*
- Above 8.0* *Complete destruction; ground moves in waves*

Note: Three of the five earthquake events in Eddy County can be directly attributed to mining activities. The other two remain unexplained. Most of the seismic events recorded in the vicinity of the Delaware Basin can be attributed to oil and gas activities—such as the number of events that continue to occur in the Dagger Draw or Cass Ranch area of Central Eddy County—where a large number of oil and gas activities are being conducted.

The table includes only reported data.

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