

**DOE Oversight Bureau, New Mexico Environment Department**

**Direct Penetrating Radiation Monitoring at  
the Waste Isolation Pilot Plant**

**Conducted by the  
New Mexico Environment Department DOE Oversight Bureau  
for Calendar Year 2012 Q-4**

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**Final Report**

**8/29/2014**

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The purpose of this communication is to transmit direct penetrating radiation (DPR) dose levels collected at the Waste Isolation Pilot Plant during the fourth quarter of calendar year 2012. The data measurements were obtained using the E-PERM® electret ionization chamber system from Rad Elec Inc.



## **Introduction**

The purpose of this communication is to transmit direct penetrating radiation (DPR) dose levels, recorded at New Mexico Environment Department (NMED) Department of Energy (DOE) Oversight Bureau monitoring sites, collected during the fourth quarter of calendar year 2012 (October to December, 2012). The Bureau maintains fourteen (14) sites located in the Exclusive Use Area at the Waste Isolation Pilot Plant (WIPP), and six (6) sites at other locations in the WIPP region (Table 1, Figure 2 and Figure 3).

Table 1. Location and operational details of direct penetrating radiation monitoring stations located inside the WIPP Exclusive Use Area and in the WIPP vicinity.

Location	Location Description	Operational History
WIPP 1	Exclusive Use Area, Parking lot	Active
WIPP 2	Exclusive Use Area, Railroad entrance	Active
WIPP 3 to 11	Exclusive Use Area, Fence line	Active
WIPP 12 to 14	Exclusive Use Area, Loading dock	Active
WIPP 15	Carlsbad, NM - Canal St.	Discontinued CY2012 Q-2
WIPP 16	Loving Weigh Station	Active
WIPP 17	Malaga Volunteer Fire Department	Active
WIPP 18	Hobbs Highway	Active
WIPP 19	Southeast Control Tower	Active
WIPP 20	Carlsbad, NM - Guadalupe St. (interior)	Active
WIPP 21	Carlsbad, NM - Guadalupe St. (exterior)	Active

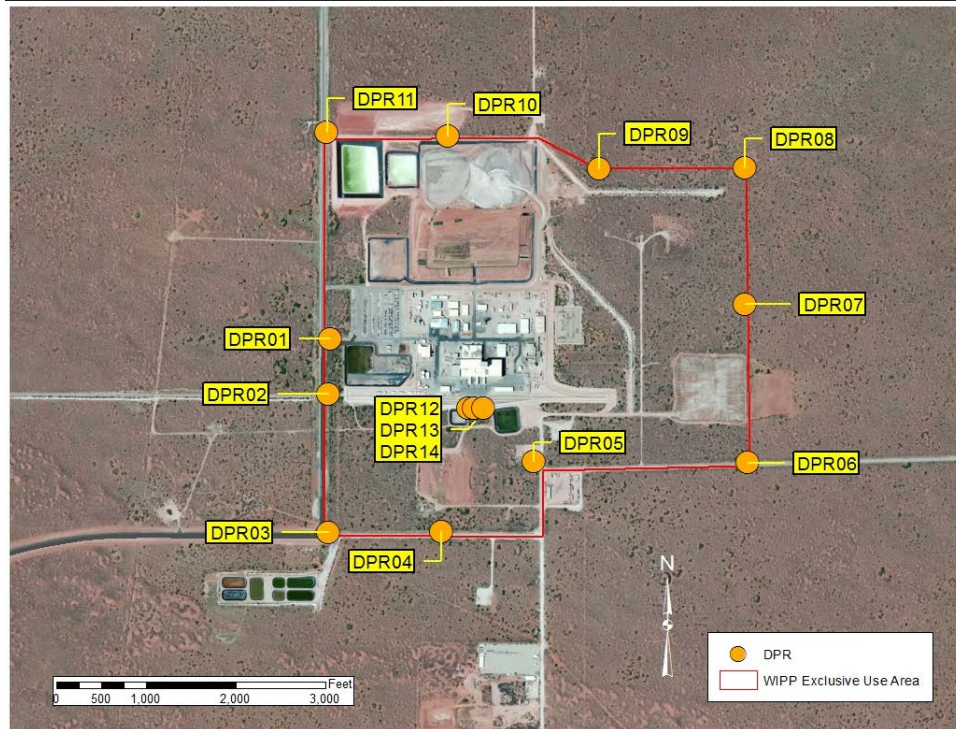


Figure 1. Location of DPR monitors maintained by the DOE Oversight Bureau at the WIPP.

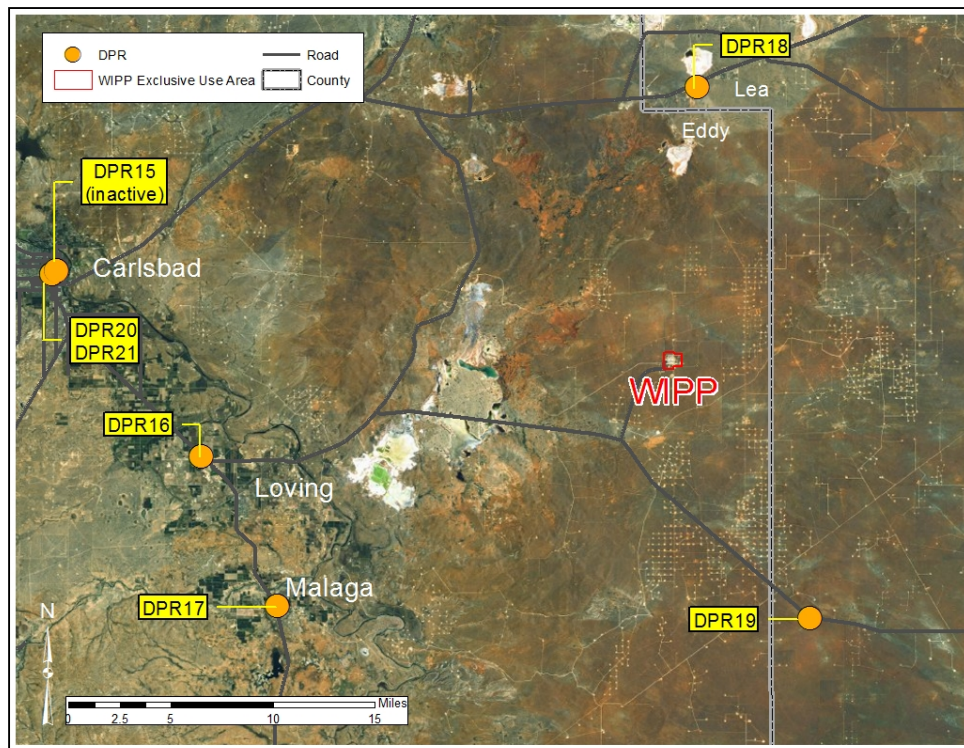


Figure 2. Location of DPR monitors maintained by the DOE Oversight Bureau in the area surrounding WIPP.

The quarterly dose rates have been normalized to reflect an actual quarter of 91.25 days.

### **Results**

DPR results at the WIPP ranged from a minimum average quarterly dose of 23.6 mrad at the Far Southeast Fence Corner (WIPP 06), to a maximum average quarterly dose of 30.3 mrad at WIPP East Fence Mid (WIPP 07). The highest average quarterly dose at any location was 34.0 mrad, measured at the Loving Weigh Station (WIPP 16).

Table 2 shows the individual results from each electret and the normalized average quarterly dose in mrad at each location.

Figure 3 shows the average dose calculations from monitors located in the WIPP Exclusive Use Area by quarter.

Table 2. Direct Penetrating Radiation Quarterly Dose Rates for CY2012 Q-4

<b>WIPP Parking Lot Entrance WIPP 1</b>				
Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFC 139	10/1/12 12:12	1/2/13 12:38 PM	44	24.6
SFC 145	10/1/12 12:12	1/2/13 12:38 PM	43	24.8
SFC 207	10/1/12 12:12	1/2/13 12:38 PM	46	26.6
<b>Average Quarterly Dose in mRad:</b>				<b>25.3</b>
<b>WIPP Railroad Track Entrance WIPP 2</b>				
Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFC 057	10/1/12 12:40	1/2/13 12:55 PM	44	25.7
SFC 065	10/1/12 12:40	1/2/13 12:55 PM	44	25.5
SFC 082	10/1/12 12:40	1/2/13 12:55 PM	42	24.7
<b>Average Quarterly Dose in mRad:</b>				<b>25.3</b>
<b>WIPP Southwest Corner Fence WIPP 3</b>				
Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFK 330	10/1/12 12:30	1/2/13 12:44 PM	51	26.9
SFK 351	10/1/12 12:30	1/2/13 12:44 PM	56	29.8
SFK 458	10/1/12 12:30	1/2/13 12:44 PM	54	28.8
<b>Average Quarterly Dose in mRad:</b>				<b>28.5</b>
<b>WIPP South Fence Center WIPP 4</b>				
Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFK 487	10/3/12 12:19	1/2/13 12:48 PM	49	27.8
SFK 527	10/3/12 12:19	1/2/13 12:48 PM	51	28.7
SFK 569	10/3/12 12:19	1/2/13 12:48 PM	49	27.7
<b>Average Quarterly Dose in mRad:</b>				<b>28.1</b>
<b>WIPP Near SE Corner of Fence WIPP 5</b>				
Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFC 087	9/28/12 10:20	1/8/13 11:16 AM	50	26.4
SFC 114	9/28/12 10:20	1/8/13 11:16 AM	50	26.6
SFC 159	9/28/12 10:20	1/8/13 11:16 AM	52	27.7
<b>Average Quarterly Dose in mRad:</b>				<b>26.9</b>
<b>WIPP Far SE Corner of Fence WIPP 6</b>				
Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFK 477	Anomalous high voltage drop. Not included in dose calculation.			
SFK 478	9/28/12 10:15	1/8/13 11:21 AM	48	23.6
SFK 512	9/28/12 10:15	1/8/13 11:21 AM	48	23.6
<b>Average Quarterly Dose in mRad:</b>				<b>23.6</b>



**WIPP East Fence Mid WIPP 7**

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFK 481	10/3/12 6:15 AM	1/2/13 4:10 PM	54	29.6
SFK 500	10/3/12 6:15 AM	1/2/13 4:10 PM	60	32.8
SFK 533	10/3/12 6:15 AM	1/2/13 4:10 PM	52	28.5
<b>Average Quarterly Dose in mRad:</b>				<b>30.3</b>

**WIPP NE Corner of Fence WIPP 8**

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFC 049	10/2/12 6:38	1/8/13 6:30 AM	52	27.3
SFC 084	10/2/12 6:38	1/8/13 6:30 AM	59	31.2
SFC 103	10/2/12 6:38	1/8/13 6:30 AM	53	28.0
<b>Average Quarterly Dose in mRad:</b>				<b>28.8</b>

**WIPP North Fence NE WIPP 9**

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFC 074	10/2/12 6:35 AM	1/8/13 11:30 AM	52	27.4
SFC 097	10/2/12 6:35 AM	1/8/13 11:30 AM	54	28.8
SFC 204	10/2/12 6:35 AM	1/8/13 11:30 AM	57	30.2
<b>Average Quarterly Dose in mRad:</b>				<b>28.8</b>

**WIPP North Fence Salt Pile WIPP 10**

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFC 147	10/2/12 6:41 AM	1/8/13 6:34 AM	54	28.5
SFC 550	10/2/12 6:41 AM	1/8/13 6:34 AM	62	32.6
SFC 581	10/2/12 6:41 AM	1/8/13 6:34 AM	55	28.8
<b>Average Quarterly Dose in mRad:</b>				<b>30.0</b>

**WIPP NW Corner of Fence WIPP 11**

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFC 002	10/1/12 12:34 PM	1/8/13 6:23 AM	45	25.4
SFC 022	10/1/12 12:34 PM	1/8/13 6:23 AM	45	25.2
SFC 054	10/1/12 12:34 PM	1/8/13 6:23 AM	43	24.1
<b>Average Quarterly Dose in mRad:</b>				<b>24.9</b>

**WIPP Loading Dock WHB (West) WIPP 12**

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFK 344	10/3/12 12:12 PM	1/8/13 11:32 AM	48	24.7
SFK 441	10/3/12 12:12 PM	1/8/13 11:32 AM	46	23.6
SFK 580	10/3/12 12:12 PM	1/8/13 11:32 AM	53	27.7
<b>Average Quarterly Dose in mRad:</b>				<b>25.3</b>

**WIPP Loading Dock WHB (Center) WIPP 13**

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFC 039	10/3/12 12:26 PM	1/8/13 11:43 AM	45	25.6
SFC 053	10/3/12 12:26 PM	1/8/13 11:43 AM	47	26.1
SFC 062	10/3/12 12:26 PM	1/8/13 11:43 AM	46	25.9
<b>Average Quarterly Dose in mRad:</b>				<b>25.9</b>

**WIPP Loading Dock WHB (East) WIPP 14**

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFK 473	10/3/12 12:23 PM	1/8/13 11:52 AM	52	27.0
SFK 574	10/3/12 12:23 PM	1/8/13 11:52 AM	49	25.5
SFK 578	10/3/12 12:23 PM	1/8/13 11:52 AM	48	24.9
<b>Average Quarterly Dose in mRad:</b>				<b>25.8</b>

**Loving Weigh Station WIPP 16**

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFK 488	9/27/12 2:27 PM	1/3/13 12:09 PM	66	33.8
SFK 526	9/27/12 2:27 PM	1/3/13 12:09 PM	66	33.8
SFK 539	9/27/12 2:27 PM	1/3/13 12:09 PM	67	34.4
<b>Average Quarterly Dose in mRad:</b>				<b>34.0</b>

**Malaga VFD WIPP 17**

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFK 519	9/27/12 2:22 PM	1/7/13 11:26 AM	70	33.8
SFK 525	9/27/12 2:22 PM	1/7/13 11:26 AM	65	31.3
SFK 559	9/27/12 2:22 PM	1/7/13 11:26 AM	73	35.5
<b>Average Quarterly Dose in mRad:</b>				<b>33.5</b>

**Hobbs Hwy/ North Access Rd WIPP 18**

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFK 354	9/28/12 6:33 AM	1/2/13 4:14 PM	63	33.0
SFK 406	9/28/12 6:33 AM	1/2/13 4:14 PM	65	33.8
SFK 502	9/28/12 6:33 AM	1/2/13 4:14 PM	62	32.3
<b>Average Quarterly Dose in mRad:</b>				<b>33.0</b>

**Southeast Control WIPP 19**

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFB 963	9/28/12 10:29 AM	1/8/13 11:12 AM	54	29.7
SFB 999	9/28/12 10:29 AM	1/8/13 11:12 AM	49	26.7
SFC 010	9/28/12 10:29 AM	1/8/13 11:12 AM	53	28.8
<b>Average Quarterly Dose in mRad:</b>				<b>28.4</b>

### Guadalupe Office Inside WIPP 20

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFK 364	9/27/12 4:54 PM	1/2/13 11:08 AM	60	31.2
SFK 514	9/27/12 4:54 PM	1/2/13 11:08 AM	66	34.4
SFK 542	9/27/12 4:54 PM	1/2/13 11:08 AM	57	29.5
<b>Average Quarterly Dose in mRad:</b>				<b>31.7</b>

### Guadalupe Office Outside WIPP 21

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFK 450	9/27/12 4:27 PM	1/7/13 11:17 AM	61	29.9
SFK 466	9/27/12 4:27 PM	1/7/13 11:17 AM	66	32.3
SFK 486	9/27/12 4:27 PM	1/7/13 11:17 AM	63	30.8
<b>Average Quarterly Dose in mRad:</b>				<b>31.0</b>

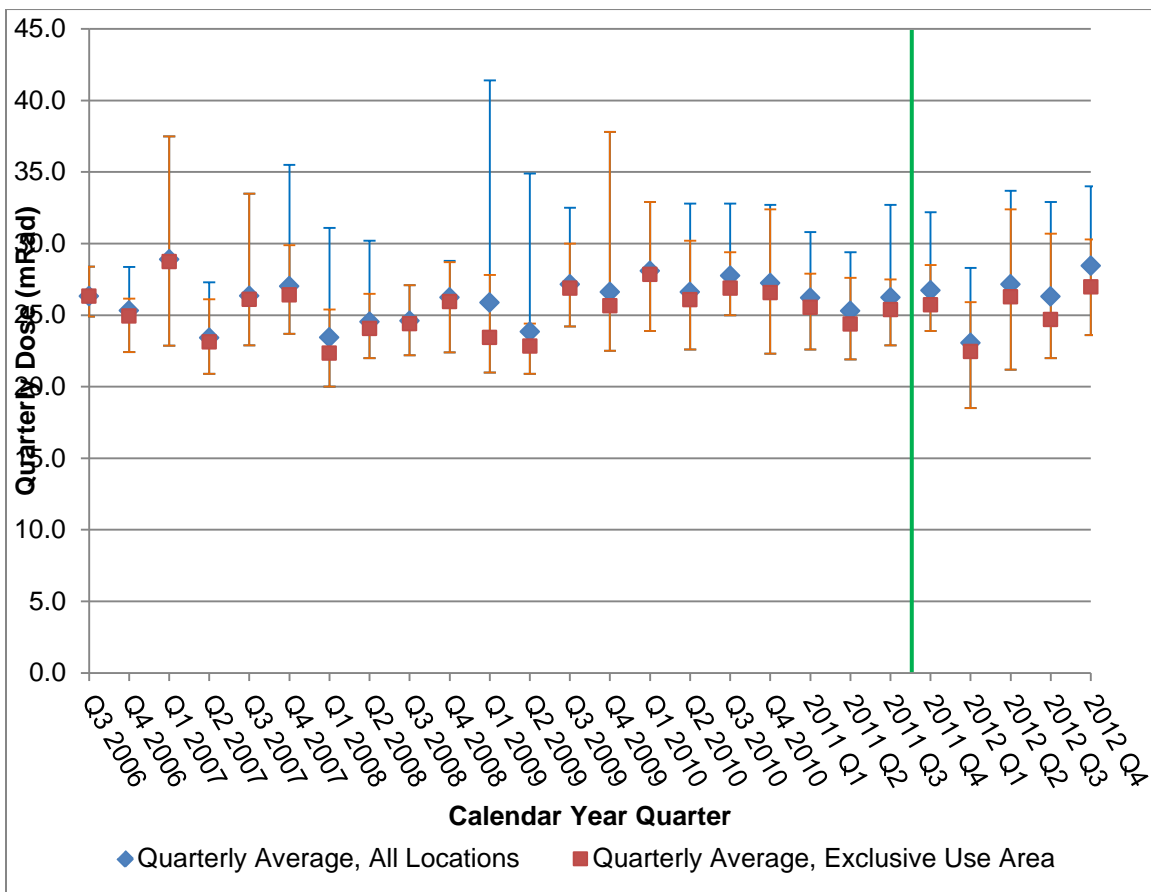


Figure 3. Average DPR Results for all locations and for the WIPP Exclusive Use Area by Quarter. The error bars represent maximum and minimum results for the quarter. The green line denotes the implementation of 2012 program changes, most significantly, the application of temperature and pressure correction factors and correcting for the inherent discharge of electrets.



**Conclusions**

These calculated doses from DPR are comparable with past results obtained by the Bureau and do not show a trend of increased gamma radiation exposure at the WIPP.