

**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 2013 Q-1**

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**Final Report**

**9/29/2014**

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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 first quarter of calendar year 2013. 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 first quarter of calendar year 2013 (January to March, 2013). 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
DPR 01	Exclusive Use Area, Parking lot	Active
DPR 02	Exclusive Use Area, Railroad entrance	Active
DPR 03 to 11	Exclusive Use Area, Fence line	Active
DPR 12 to 14	Exclusive Use Area, Loading dock	Active
DPR 15	Carlsbad, NM - Canal St.	Discontinued CY2012 Q-2
DPR 16	Loving Weigh Station	Active
DPR 17	Malaga Volunteer Fire Department	Active
DPR 18	Hobbs Highway	Active
DPR 19	Southeast Control Tower	Active
DPR 20	Carlsbad, NM - Guadalupe St. (interior)	Active
DPR 21	Carlsbad, NM - Guadalupe St. (exterior)	Active

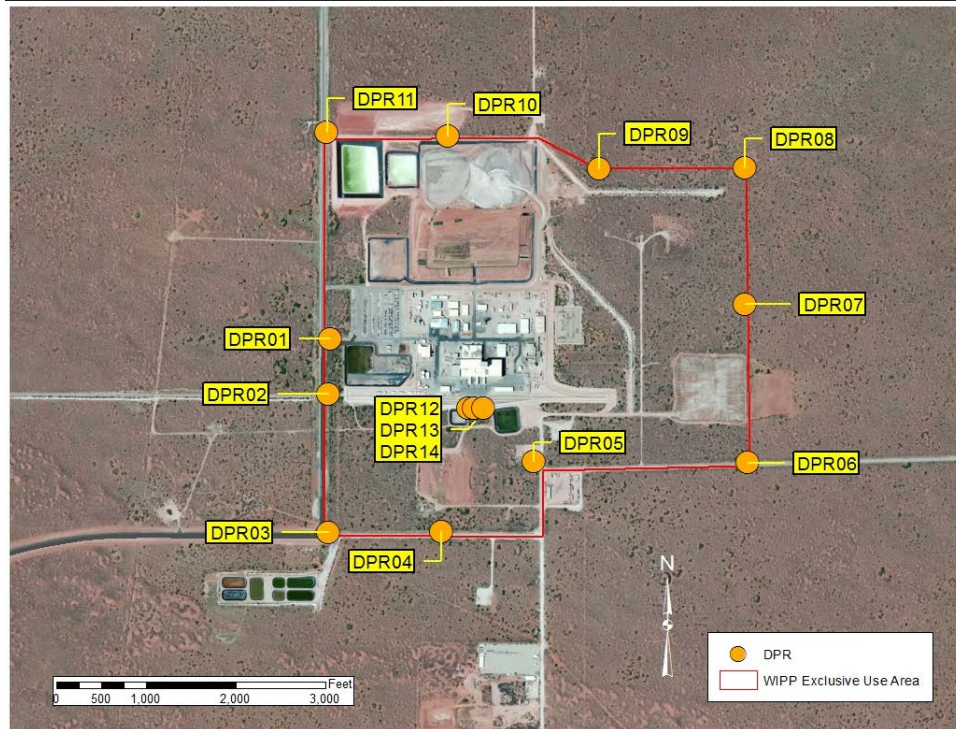


Figure 1. Location of DPR monitors maintained by the DOE Oversight Bureau at the WIPP.

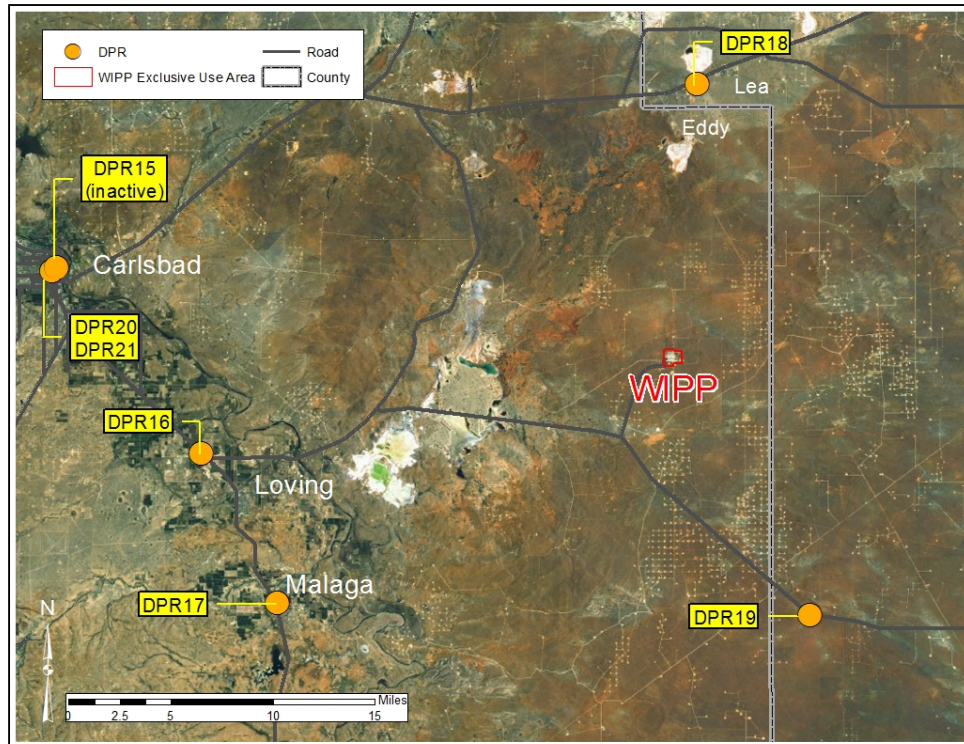


Figure 2. Location of DPR monitors maintained by the DOE Oversight Bureau in the area surrounding WIPP.

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 20.0 mrad at the WIPP Railroad Track Entrance (DPR02), to a maximum average quarterly dose of 26.1 mrad at WIPP North-northeast Fence (DPR09). The largest measurement in the vicinity of WIPP was 30.6 mrad, measured at the Loving Weigh Station (DPR16). The highest average quarterly dose at any location was 63.2 mrad, measured at the NMED Carlsbad Guadalupe Street Office – Interior location. These results are double the usual amount.

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 CY2013 Q-1

<b>WIPP Parking Lot Entrance DPR01</b>				
Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFC 139	1/2/13 12:38	4/1/13 12:16 PM	40	23.6
SFC 145	1/2/13 12:38	4/1/13 12:16 PM	38	23.2
SFC 207	1/2/13 12:38	4/1/13 12:16 PM	42	25.8
<b>Average Quarterly Dose in mRad:</b>				<b>24.2</b>
<b>WIPP Railroad Track Entrance DRPR02</b>				
Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFC 057	1/2/13 12:55	4/1/13 1:46 PM	32	19.8
SFC 065	1/2/13 12:55	4/1/13 1:46 PM	33	20.3
SFC 082	1/2/13 12:55	4/1/13 1:46 PM	32	19.9
<b>Average Quarterly Dose in mRad:</b>				<b>20.0</b>
<b>WIPP Southwest Corner Fence DPR03</b>				
Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFK 330	1/2/13 12:44	4/1/13 2:17 PM	39	21.5
SFK 351	1/2/13 12:44	4/1/13 2:17 PM	40	22.3
SFK 458	1/2/13 12:44	4/1/13 2:17 PM	43	24.1
<b>Average Quarterly Dose in mRad:</b>				<b>22.6</b>
<b>WIPP South Fence Center DPR04</b>				
Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFK 487	1/2/13 12:48	4/1/13 2:26 PM	37	22.9
SFK 527	1/2/13 12:48	4/1/13 2:26 PM	40	23.1
SFK 569	1/2/13 12:48	4/1/13 2:26 PM	41	23.9
<b>Average Quarterly Dose in mRad:</b>				<b>23.3</b>
<b>WIPP Near SE Corner of Fence DPR05</b>				
Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFC 087	1/8/13 11:16	4/1/13 1:53 PM	36	23.6
SFC 114	1/8/13 11:16	4/1/13 1:53 PM	35	23.2
SFC 159	1/8/13 11:16	4/1/13 1:53 PM	36	23.9
<b>Average Quarterly Dose in mRad:</b>				<b>23.6</b>
<b>WIPP Far SE Corner of Fence DPR06</b>				
Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFK 477	1/8/13 11:21 AM	4/1/13 2:32 PM	38	23.8
SFK 478	1/8/13 11:21 AM	4/1/13 2:32 PM	32	19.3
SFK 512	1/8/13 11:21 AM	4/1/13 2:32 PM	38	23.0
<b>Average Quarterly Dose in mRad:</b>				<b>22.0</b>



**WIPP East Fence Mid DPR07**

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFB 985	1/2/13 11:18 AM	4/5/13 10:45 AM	42	24.4
SFC 063	1/2/13 11:18 AM	4/5/13 10:45 AM	47	27.5
SFC 210	1/2/13 11:18 AM	4/5/13 10:45 AM	40	22.7
Average Quarterly Dose in mRad:				24.9

**WIPP NE Corner of Fence DPR08**

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFK 431	1/7/13 10:55	4/4/13 3:04 PM	45	26.2
SFK 510	1/7/13 10:55	4/4/13 3:04 PM	45	26.0
SFK 533	1/7/13 10:55	4/4/13 3:04 PM	45	25.8
Average Quarterly Dose in mRad:				26.0

**WIPP North Fence NE DPR09**

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SGJ 046	1/7/13 11:02 AM	4/4/13 3:01 PM	48	27.0
SGJ 055	1/7/13 11:02 AM	4/4/13 3:01 PM	45	25.3
SGJ 061	1/7/13 11:02 AM	4/4/13 3:01 PM	46	25.9
Average Quarterly Dose in mRad:				26.1

**WIPP North Fence Salt Pile DPR10**

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFK 428	1/7/13 11:10 AM	4/4/13 2:58 PM	41	23.9
SFK 437	1/7/13 11:10 AM	4/4/13 2:58 PM	40	23.4
SFK 438	1/7/13 11:10 AM	4/4/13 2:58 PM	39	22.4
Average Quarterly Dose in mRad:				23.3

**WIPP NW Corner of Fence DPR11**

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SGJ 042	1/8/13 6:23 AM	4/1/13 2:08 PM	37	22.0
SFC 022	1/8/13 6:23 AM	4/1/13 2:08 PM	35	23.5
SFC 054	1/8/13 6:23 AM	4/1/13 2:08 PM	40	26.9
Average Quarterly Dose in mRad:				24.2

**WIPP Loading Dock WHB (West) DPR12**

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFK 344	1/8/13 11:32 AM	4/5/13 10:54 AM	32	18.5
SFK 441	1/8/13 11:32 AM	4/5/13 10:54 AM	34	19.6
SFK 580	1/8/13 11:32 AM	4/5/13 10:54 AM	39	23.0
Average Quarterly Dose in mRad:				20.4

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

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFC 094	1/8/13 11:43 AM	4/5/13 11:49 AM	42	24.8
SFC 053	1/8/13 11:43 AM	4/5/13 11:49 AM	36	22.9
SGJ 041	1/8/13 11:43 AM	4/5/13 11:49 AM	44	24.8
Average Quarterly Dose in mRad:				<b>24.1</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	1/8/13 11:52 AM	4/5/13 11:25 AM	38	22.3
SFK 574	1/8/13 11:52 AM	4/5/13 11:25 AM	35	20.5
SFK 578	1/8/13 11:52 AM	4/5/13 11:25 AM	37	21.7
Average Quarterly Dose in mRad:				<b>21.5</b>

**Loving Weigh Station WIPP 16**

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFC 075	1/3/13 6:29 AM	4/2/13 1:43 PM	54	32.1
SFC 195	1/3/13 6:29 AM	4/2/13 1:43 PM	51	29.0
SFC 212	1/3/13 6:29 AM	4/2/13 1:43 PM	53	30.5
Average Quarterly Dose in mRad:				<b>30.6</b>

**Malaga VFD WIPP 17**

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFK 380	1/7/13 9:06 AM	4/2/13 1:50 PM	46	26.3
SFK 524	1/7/13 9:06 AM	4/2/13 1:50 PM	47	26.9
SFK 543	1/7/13 9:06 AM	4/2/13 1:50 PM	54	31.1
Average Quarterly Dose in mRad:				<b>28.1</b>

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

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFC 092	1/2/13 11:57 AM	4/5/13 4:42 PM	46	26.6
SFC 182	1/2/13 11:57 AM	4/5/13 4:42 PM	44	25.0
SFC 183	1/2/13 11:57 AM	4/5/13 4:42 PM	47	27.3
Average Quarterly Dose in mRad:				<b>26.3</b>

**Southeast Control WIPP 19**

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFK 410	1/7/13 4:01 PM	4/5/13 4:47 PM	46	26.7
SFK 443	1/7/13 4:01 PM	4/5/13 4:47 PM	46	26.7
SFK 562	1/7/13 4:01 PM	4/5/13 4:47 PM	43	24.6
Average Quarterly Dose in mRad:				<b>26.0</b>

### NMED Guadalupe Office Interior DPR20

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFK 364	1/2/13 11:08 AM	4/2/13 1:28 PM	109	62.7
SFK 514	1/2/13 11:08 AM	4/2/13 1:28 PM	116	66.8
SFK 542	1/2/13 11:08 AM	4/2/13 1:28 PM	105	60.2
Average Quarterly Dose in mRad:				63.2

### NMED Guadalupe Office Exterior DPR21

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFK 450	1/7/13 11:17 AM	4/2/13 1:55 PM	53	31.3
SFK 466	1/7/13 11:17 AM	4/2/13 1:55 PM	50	29.5
SFK 486	1/7/13 11:17 AM	4/2/13 1:55 PM	45	26.4
Average Quarterly Dose in mRad:				29.1

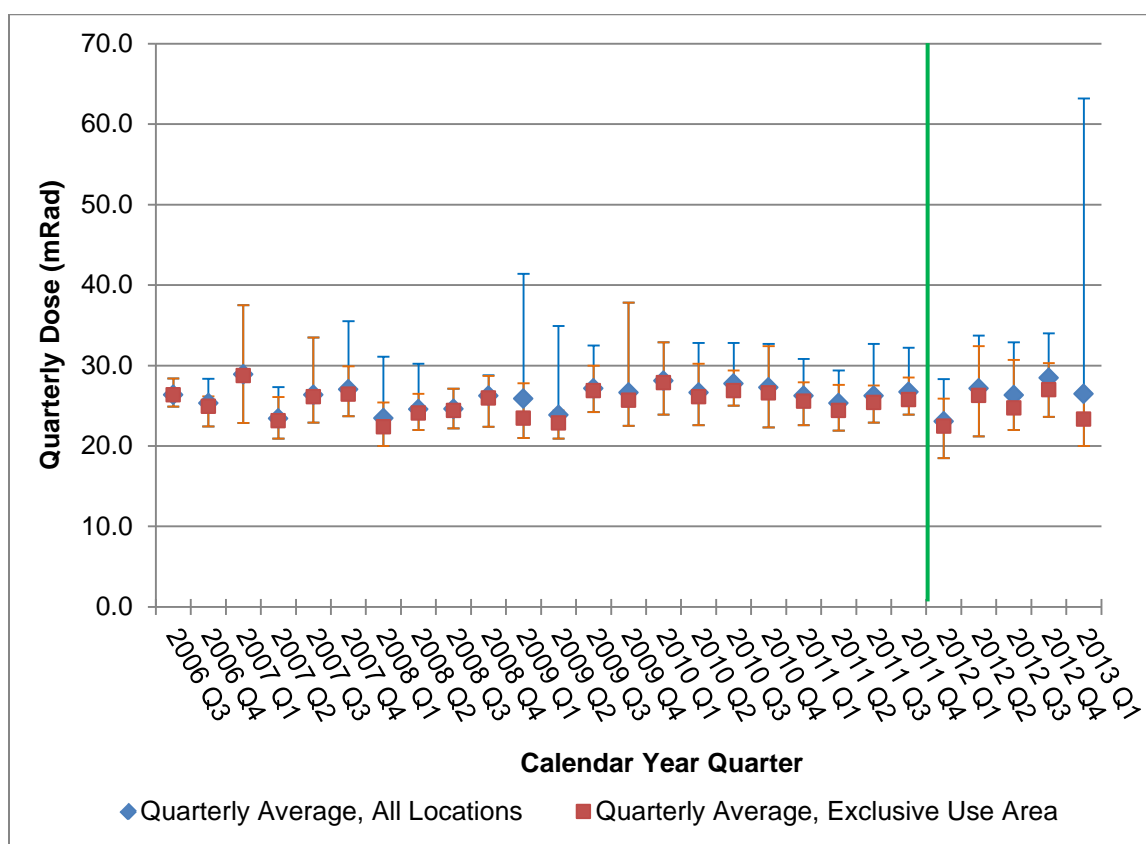


Figure 3. Average DPR Results for all locations and for the WIPP Exclusive Use Area by Quarter. The error bars represent maximum and minimum results for the quarter. The green line denotes the implementation of 2012 program changes, most significantly, the application of temperature and pressure correction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