

**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-2**

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**Final Report**

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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 second 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 second quarter of calendar year 2012. The Bureau maintains fourteen (14) sites located in the Exclusive Use Area at the Waste Isolation Pilot Plant (WIPP) and six (6) at other locations in the WIPP region. Monitoring locations are shown in Figure 1.

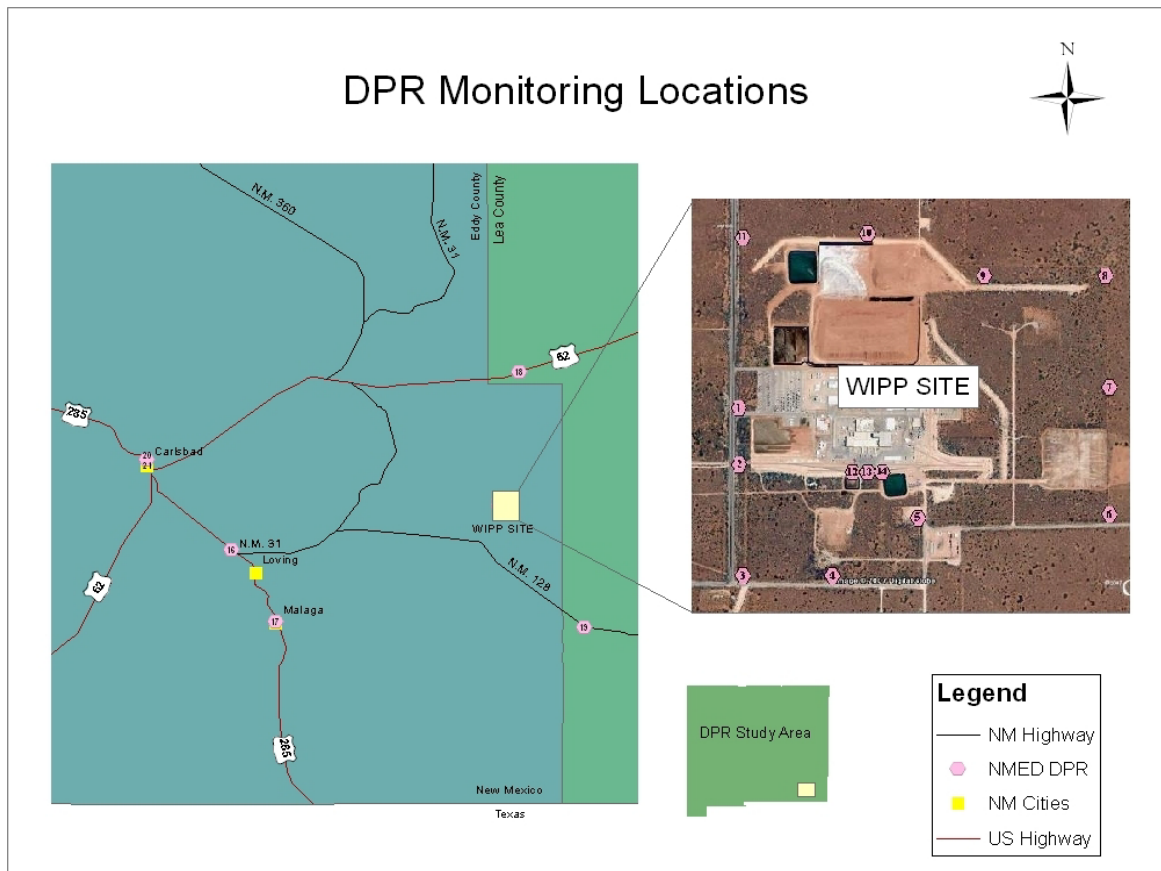


Figure 1. Location of DPR monitors maintained by the DOE Oversight Bureau.

The data were obtained using the E-PERM® electret ionization chamber system from Rad Elec Inc. The chambers are housed in aluminum canisters designed to block gamma radiation from radon.

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 21.2 mrad at WIPP Far SE Corner of Fence (WIPP 06), to a maximum average quarterly dose of 32.4 mrad at the Northeast Corner Fence (WIPP 08). The maximum average quarterly dose at any location was of 33.7 mrad at Loving Weigh Station (WIPP 16).

The DPR monitor at the former Bureau office on Canal Street in Carlsbad (WIPP 15) has been discontinued. Data will be available from two (2) monitors (one located inside and one located outside) at the new Bureau office on Guadalupe Street beginning next quarter.

Table 1 shows the individual results from each electret and the normalized average quarterly dose in mrad at each location.

Figure 2 shows the average dose calculations from monitors located in the WIPP Exclusive Use Area by quarter.

**Table 1: Direct Penetrating Radiation Quarterly Dose Rates for CY 2012 Q-2****WIPP Parking Lot Entrance WIPP 1**

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFC 139	3/29/12 6:23 AM	6/29/12 5:55 AM	40	23.0
SFC 145	3/29/12 6:23 AM	6/29/12 5:55 AM	43	25.3
SFC 207	3/29/12 6:23 AM	6/29/12 5:55 AM	45	26.5
Average Quarterly Dose in mRad:				<b>25.0</b>

**WIPP Railroad Track Entrance WIPP 2**

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFC 057	3/29/12 6:18 AM	6/29/12 6:00 AM	40	23.8
SFC 065	3/29/12 6:18 AM	6/29/12 6:00 AM	35	20.7
SFC 082	3/29/12 6:18 AM	6/29/12 6:00 AM	40	23.9
Average Quarterly Dose in mRad:				<b>22.8</b>

**WIPP Southwest Corner Fence WIPP 3**

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFB 974	3/29/12 5:59 AM	6/29/12 11:58 AM	41	25.3
SFB 983	3/29/12 5:59 AM	6/29/12 11:58 AM	42	25.6
SFC 025	3/29/12 5:59 AM	6/29/12 11:58 AM	39	23.6
Average Quarterly Dose in mRad:				<b>24.9</b>

**WIPP South Fence Center WIPP 4**

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFK 487	3/28/12 6:52 PM	6/28/12 12:08 PM	55	31.5
SFK 527	3/28/12 6:52 PM	6/28/12 12:08 PM	51	29.0
SFK 569	3/28/12 6:52 PM	6/28/12 12:08 PM	53	30.3
Average Quarterly Dose in mRad:				<b>30.3</b>

**WIPP Near SE Corner of Fence WIPP 5**

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFC 087	3/29/12 6:09 AM	6/28/12 12:27 PM	41	24.2
SFC 114	3/29/12 6:09 AM	6/28/12 12:27 PM	44	26.2
SFC 159	3/29/12 6:09 AM	6/28/12 12:27 PM	43	25.6
Average Quarterly Dose in mRad:				<b>25.3</b>

**WIPP Far SE Corner of Fence WIPP 6**

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFK 477	3/30/12 6:25 AM	6/29/12 11:38 AM	43	24.2
SFK 478	3/30/12 6:25 AM	6/29/12 11:38 AM	36	20.1
SFK 512	3/30/12 6:25 AM	6/29/12 11:38 AM	35	19.5
Average Quarterly Dose in mRad:				<b>21.2</b>

**Table 1: Direct Penetrating Radiation Quarterly Dose Rates for CY 2012 Q-2****WIPP East Fence Mid WIPP 7**

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFK 481	3/28/12 6:00 PM	7/3/12 2:06 PM	58	30.8
SFK 500	3/28/12 6:00 PM	7/3/12 2:06 PM	50	26.4
SFK 533	3/28/12 6:00 PM	7/3/12 2:06 PM	53	28.1
Average Quarterly Dose in mRad:				<b>28.4</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	3/28/12 6:08 PM	7/3/12 2:15 PM	58	31.2
SFC 084	3/28/12 6:08 PM	7/3/12 2:15 PM	64	34.7
SFC 103	3/28/12 6:08 PM	7/3/12 2:15 PM	58	31.3
Average Quarterly Dose in mRad:				<b>32.4</b>

**WIPP North Fence NE WIPP 9**

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFC 074	3/28/12 6:18 PM	7/3/12 2:21 PM	47	25.3
SFC 097	3/28/12 6:18 PM	7/3/12 2:21 PM	55	30.0
SFC 204	3/28/12 6:18 PM	7/3/12 2:21 PM	52	28.2
Average Quarterly Dose in mRad:				<b>27.8</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	3/28/12 6:23 PM	7/3/12 2:26 PM	60	32.4
SFK 550	3/28/12 6:23 PM	7/3/12 2:26 PM	55	29.6
SFK 581	3/28/12 6:23 PM	7/3/12 2:26 PM	56	30.0
Average Quarterly Dose in mRad:				<b>30.7</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	3/29/12 6:02 AM	6/29/12 11:27 AM	37	22.1
SFC 022	3/29/12 6:02 AM	6/29/12 11:27 AM	39	23.2
SFC 054	3/29/12 6:02 AM	6/29/12 11:27 AM	37	22.0
Average Quarterly Dose in mRad:				<b>22.4</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	3/28/12 6:37 PM	6/29/12 12:08 PM	40	22.1
SFK 441	3/28/12 6:37 PM	6/29/12 12:08 PM	40	22.0
SFK 580	3/28/12 6:37 PM	6/29/12 12:08 PM	52	29.1
Average Quarterly Dose in mRad:				<b>24.4</b>

**Table 1: Direct Penetrating Radiation Quarterly Dose Rates for CY 2012 Q-2****WIPP Loading Dock WHB (Center) WIPP 13**

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFC 039	3/29/12 5:54 AM	6/29/12 11:31 AM	45	27.1
SFC 053	3/29/12 5:54 AM	6/29/12 11:31 AM	42	24.8
SFC 062	3/29/12 5:54 AM	6/29/12 11:31 AM	42	25.1
Average Quarterly Dose in mRad:				<b>25.7</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	3/29/12 12:43 PM	6/29/12 12:04 PM	49	27.6
SFK 574	3/29/12 12:43 PM	6/29/12 12:04 PM	46	25.9
SFK 578	3/29/12 12:43 PM	6/29/12 12:04 PM	47	26.5
Average Quarterly Dose in mRad:				<b>26.6</b>

**Loving Weigh Station WIPP 16**

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFK 488	3/28/12 11:47 AM	7/2/12 2:42 PM	63	33.3
SFK 526	3/28/12 11:47 AM	7/2/12 2:42 PM	64	33.9
SFK 539	3/28/12 11:47 AM	7/2/12 2:42 PM	64	33.8
Average Quarterly Dose in mRad:				<b>33.7</b>

**Malaga VFD WIPP 17**

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFB 962	3/28/12 11:42 AM	7/2/12 4:31 PM	53	30.7
SFB 969	3/28/12 11:42 AM	7/2/12 4:31 PM	50	29.0
SFC 185	3/28/12 11:42 AM	7/2/12 4:31 PM	47	27.3
Average Quarterly Dose in mRad:				<b>29.0</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	3/28/12 11:49 AM	6/29/12 3:30 PM	57	31.7
SFK 406	3/28/12 11:49 AM	6/29/12 3:30 PM	59	32.7
SFK 502	3/28/12 11:49 AM	6/29/12 3:30 PM	57	31.7
Average Quarterly Dose in mRad:				<b>32.0</b>

**Southeast Control WIPP 19**

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFB 963	3/28/12 11:21 AM	6/28/12 12:17 PM	45	27.6
SFB 999	3/28/12 11:21 AM	6/28/12 12:17 PM	39	23.8
SFC 010	3/28/12 11:21 AM	6/28/12 12:17 PM	45	27.3
Average Quarterly Dose in mRad:				<b>26.2</b>

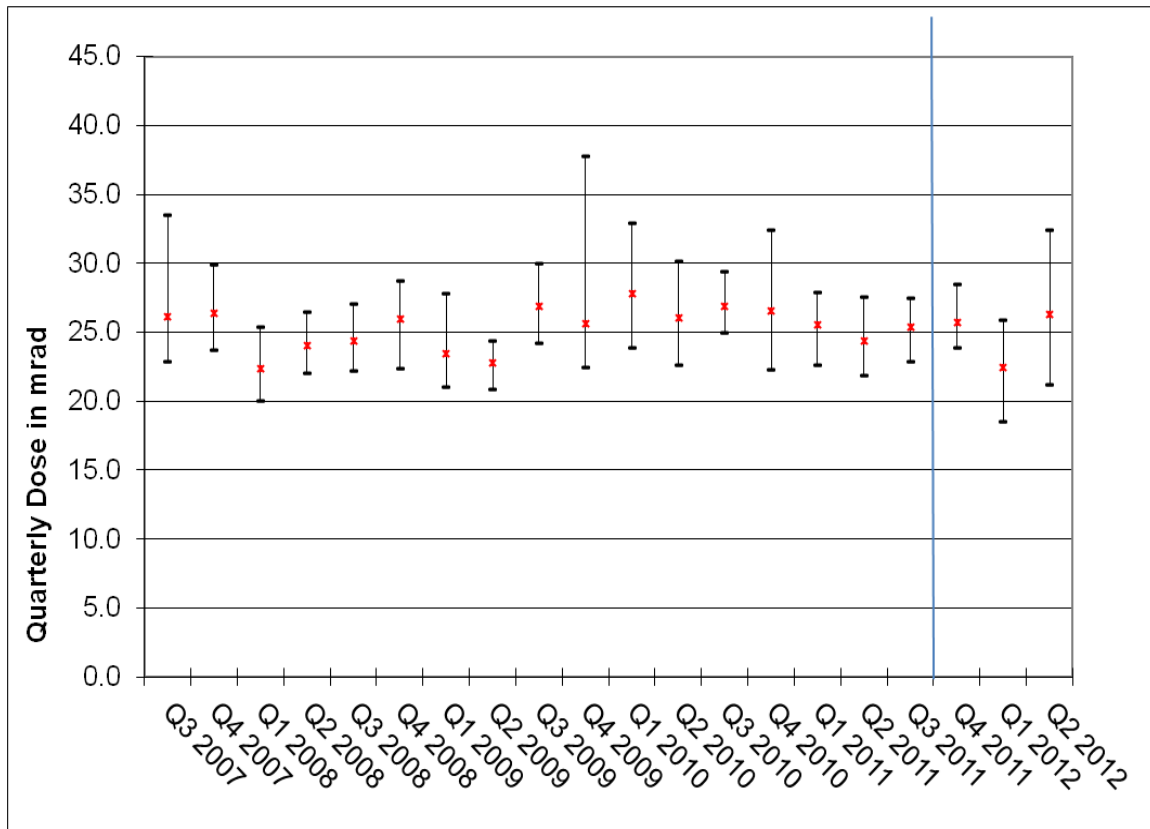


Figure 2. Average DPR Results in the WIPP Exclusive Use Area by Quarter  
The end marks of each bar represent minimum and maximum results for the quarter. The blue line denotes the implementation of 2012 program changes, most significantly, the application of temperature and pressure correction factors 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.