

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-2**

**Prepared by Julia Marple, Environmental Scientist
WIPP Oversight Section
406 N Guadalupe Street
Carlsbad, NM 88220
(575) 885-9023**

Final Report

9/29/2014

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 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 second quarter of calendar year 2013 (April to June, 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
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

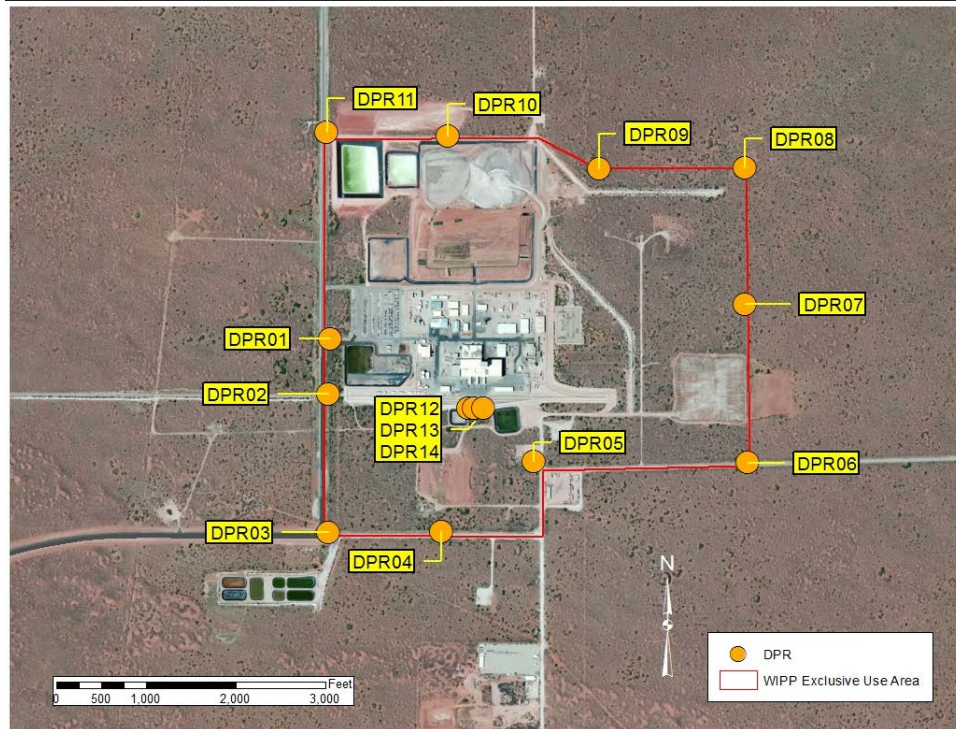


Figure 1. Location of DPR monitors maintained by the DOE Oversight Bureau at the WIPP.

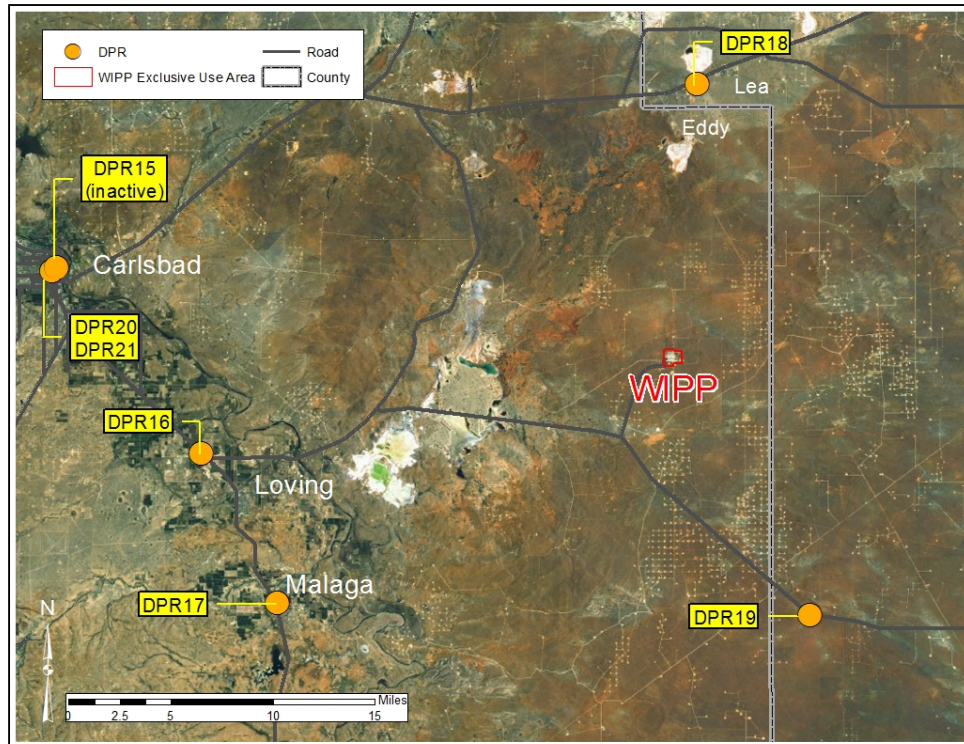


Figure 2. Location of DPR monitors maintained by the DOE Oversight Bureau in the area surrounding WIPP.

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 20.7 mrad at the WIPP Waste Handling Building (WHB) Loading Dock West (DPR12), to a maximum average quarterly dose of 29.7 mrad at WIPP Northeast Fence Corner (DPR08). The largest measurement in the vicinity of WIPP was 32.5 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 CY2013 Q-2

WIPP Parking Lot Entrance DPR01				
Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFC 139	4/1/13 12:16	7/8/13 3:04 PM	39	22.4
SGJ 022	4/1/13 12:16	7/8/13 3:04 PM	45	23.7
SGJ 058	4/1/13 12:16	7/8/13 3:04 PM	45	23.8
Average Quarterly Dose in mRad:				23.3
WIPP Railroad Track Entrance DPR02				
Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SGI 957	4/1/13 13:46	7/8/13 2:29 PM	40	21.1
SGI 982	4/1/13 13:46	7/8/13 2:29 PM	38	20.0
SGI 991	4/1/13 13:46	7/8/13 2:29 PM	46	24.3
Average Quarterly Dose in mRad:				21.8
WIPP Southwest Corner Fence DPR03				
Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFK 330	4/1/13 14:17	7/9/13 7:28 AM	49	26.0
SFK 351	4/1/13 14:17	7/9/13 7:28 AM	53	28.5
SFK 458	4/1/13 14:17	7/9/13 7:28 AM	52	28.0
Average Quarterly Dose in mRad:				27.5
WIPP South Fence Center DPR04				
Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFK 527	4/1/13 14:26	7/9/13 7:22 AM	45	25.1
SFK 569	4/1/13 14:26	7/9/13 7:22 AM	44	24.8
SGI 976	4/1/13 14:26	7/9/13 7:22 AM	48	25.2
Average Quarterly Dose in mRad:				25.0
WIPP Near SE Corner of Fence DPR05				
Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFC 087	4/1/13 13:53	7/9/13 12:31 PM	39	22.9
SGJ 044	4/1/13 13:53	7/9/13 12:31 PM	42	21.9
SGJ 109	4/1/13 13:53	7/9/13 12:31 PM	42	21.9
Average Quarterly Dose in mRad:				22.3
WIPP Far SE Corner of Fence DPR06				
Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFK 477	4/1/13 2:32 PM	7/8/13 2:42 PM	43	24.2
SFK 478	4/1/13 2:32 PM	7/8/13 2:42 PM	36	19.5
SFK 512	4/1/13 2:32 PM	7/8/13 2:42 PM	38	20.6
Average Quarterly Dose in mRad:				21.4

WIPP East Fence Mid DPR07

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFK 481	4/5/13 6:27 AM	7/9/13 12:39 PM	56	30.9
SFK 500	4/5/13 6:27 AM	7/9/13 12:39 PM	44	24.0
SFK 533	4/5/13 6:27 AM	7/9/13 12:39 PM	47	25.8
Average Quarterly Dose in mRad:				26.9

WIPP NE Corner of Fence DPR08

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFC 049	4/4/13 6:16	7/12/13 4:27 PM	52	28.2
SFC 084	4/4/13 6:16	7/12/13 4:27 PM	58	31.9
SFC 103	4/4/13 6:16	7/12/13 4:27 PM	53	29.0
Average Quarterly Dose in mRad:				29.7

WIPP North Fence NE DPR09

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFC 074	4/4/13 6:13 AM	7/12/13 4:46 PM	47	25.7
SFC 097	4/4/13 6:13 AM	7/12/13 4:46 PM	48	26.6
SFC 204	4/4/13 6:13 AM	7/12/13 4:46 PM	57	31.5
Average Quarterly Dose in mRad:				27.9

WIPP North Fence Salt Pile DPR10

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFC 147	4/4/13 6:10 AM	7/8/13 2:17 PM	48	27.0
SFC 550	4/4/13 6:10 AM	7/8/13 2:17 PM	45	25.1
SFC 581	4/4/13 6:10 AM	7/8/13 2:17 PM	47	26.1
Average Quarterly Dose in mRad:				26.1

WIPP NW Corner of Fence DPR11

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SGI 986	4/1/13 2:08 PM	7/8/13 3:40 PM	48	25.5
SGJ 042	4/1/13 2:08 PM	7/8/13 3:40 PM	44	23.5
SGJ 083	4/1/13 2:08 PM	7/8/13 3:40 PM	46	24.4
Average Quarterly Dose in mRad:				24.4

WIPP Loading Dock WHB (West) DPR12

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFK 344	4/5/13 10:54 AM	7/9/13 12:42 PM	34	18.7
SFK 441	4/5/13 10:54 AM	7/9/13 12:42 PM	36	19.8
SFK 580	4/5/13 10:54 AM	7/9/13 12:42 PM	42	23.7
Average Quarterly Dose in mRad:				20.7

WIPP Loading Dock WHB (Center) DPR13

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFC 094	4/5/13 11:49 AM	7/9/13 12:36 PM	47	26.7
SGI 997	4/5/13 11:49 AM	7/9/13 12:36 PM	47	25.1
SGJ 041	4/5/13 11:49 AM	7/9/13 12:36 PM	45	24.2
Average Quarterly Dose in mRad:				25.3

WIPP Loading Dock WHB (East) DPR14

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFK 473	4/5/13 11:25 AM	7/9/13 12:27 PM	41	23.0
SFK 574	4/5/13 11:25 AM	7/9/13 12:27 PM	39	21.9
SFK 578	4/5/13 11:25 AM	7/9/13 12:27 PM	40	22.4
Average Quarterly Dose in mRad:				22.4

Loving Weigh Station DPR16

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFK 488	4/2/13 9:57 AM	7/8/13 3:16 PM	59	31.5
SFK 526	4/2/13 9:57 AM	7/8/13 3:16 PM	58	31.0
SFK 539	4/2/13 9:57 AM	7/8/13 3:16 PM	65	34.9
Average Quarterly Dose in mRad:				32.5

Malaga VFD DPR17

Malaga VFD DPR17				Quarterly Dose
Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Normalized
SFK 519	4/2/13 9:48 AM	7/8/13 2:55 PM	54	28.3
SFK 525	4/2/13 9:48 AM	7/8/13 2:55 PM	51	26.6
SFK 559	*Canister was wet inside. Disregard SFK 559 in dose calculation.			
Average Quarterly Dose in mRad:				27.4

Hobbs Hwy/ North Access Rd DPR18

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFK 354	4/5/13 10:37 AM	7/8/13 2:39 PM	55	31.1
SFK 406	4/5/13 10:37 AM	7/8/13 2:39 PM	54	30.2
SFK 502	4/5/13 10:37 AM	7/8/13 2:39 PM	56	31.4
Average Quarterly Dose in mRad:				30.9

Southeast Control DPR19

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SGI 958	4/5/13 10:30 AM	7/8/13 3:20 PM	47	25.4
SGJ 103	4/5/13 10:30 AM	7/8/13 3:20 PM	41	22.1
SGJ 104	4/5/13 10:30 AM	7/8/13 3:20 PM	46	24.9
Average Quarterly Dose in mRad:				24.1

NMED Guadalupe Office Interior DPR20

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFK 364	4/2/13 1:28 PM	7/8/13 2:48 PM	54	29.2
SFK 514	4/2/13 1:28 PM	7/8/13 2:48 PM	60	32.6
SFK 542	4/2/13 1:28 PM	7/8/13 2:48 PM	53	28.5
Average Quarterly Dose in mRad:				30.1

NMED Guadalupe Office Exterior DPR21

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFK 450	4/2/13 1:55 PM	7/8/13 3:09 PM	53	28.8
SFK 466	4/2/13 1:55 PM	7/8/13 3:09 PM	48	25.9
SFK 486	4/2/13 1:55 PM	7/8/13 3:09 PM	50	26.9
Average Quarterly Dose in mRad:				27.2

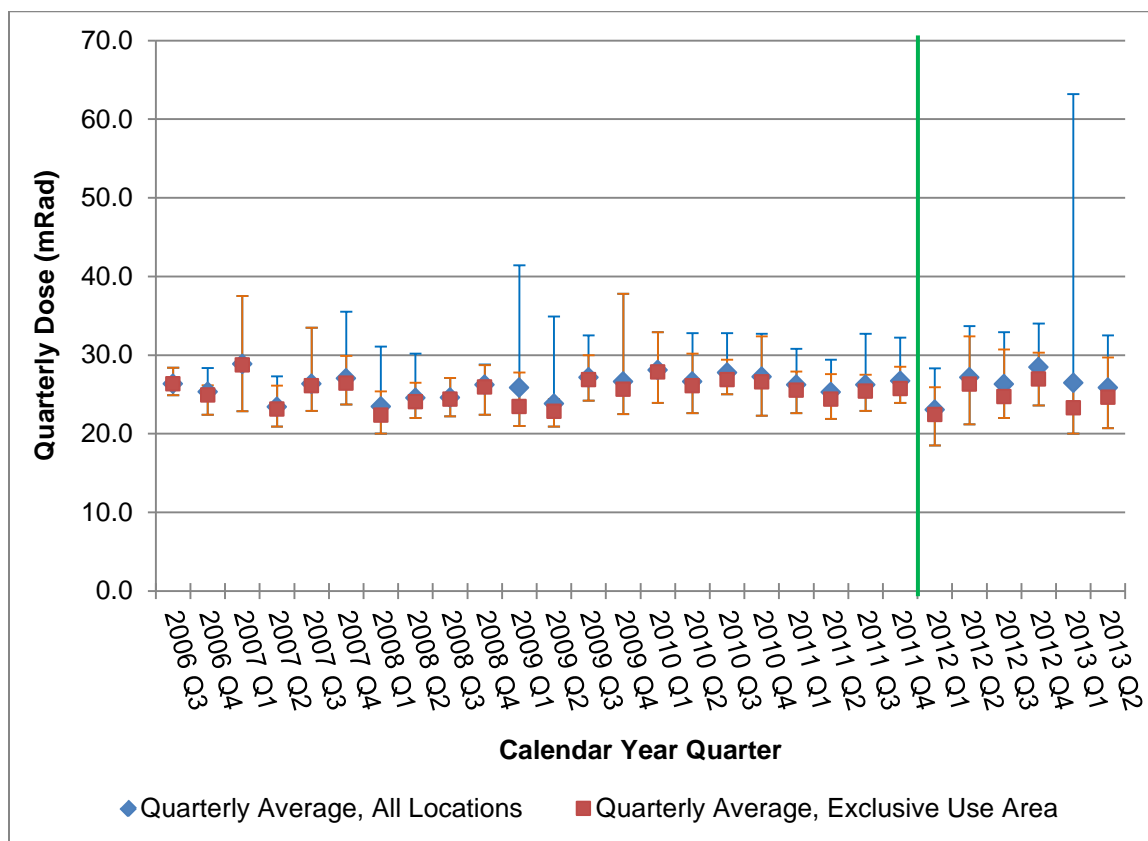


Figure 3. Average DPR Results for all locations and for the WIPP Exclusive Use Area by Quarter. The error bars represent maximum and minimum results for the quarter. The green line denotes the implementation of 2012 program changes, most significantly, the application of temperature and pressure correction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