

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-4**

**Prepared by Susan Lucas Kamat, Staff Manager
WIPP Oversight Section
406 N Guadalupe Street
Carlsbad, NM 88220
(505) 845-5933
susan.lucaskamat@state.nm.us**

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 fourth quarter of calendar year 2013 (October to December, 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

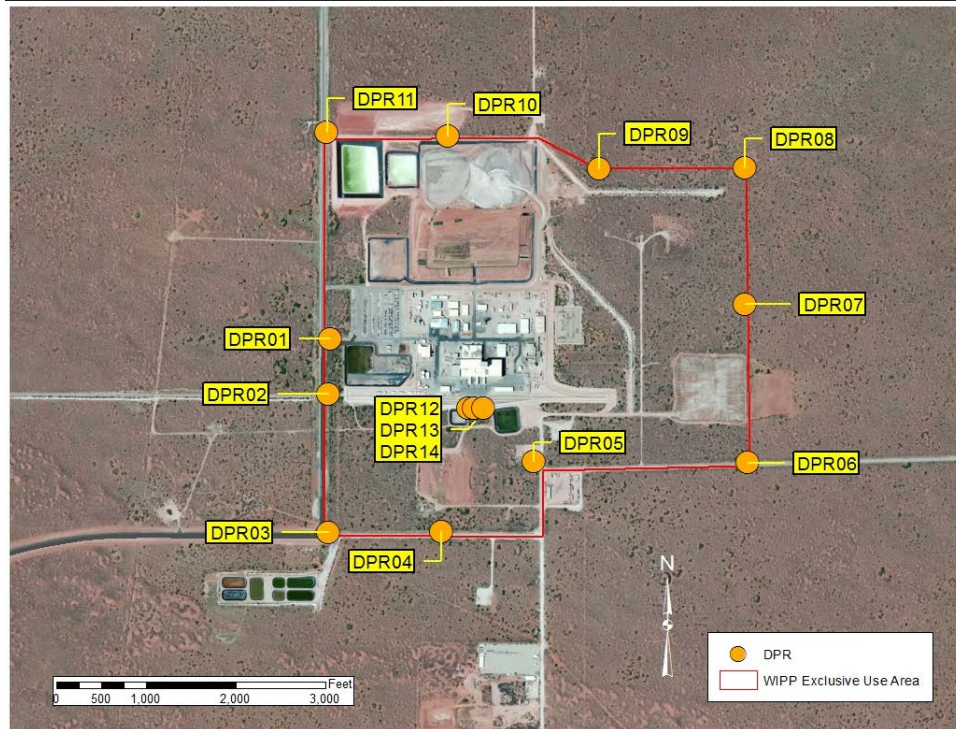


Figure 1. Location of DPR monitors maintained by the DOE Oversight Bureau at the WIPP.

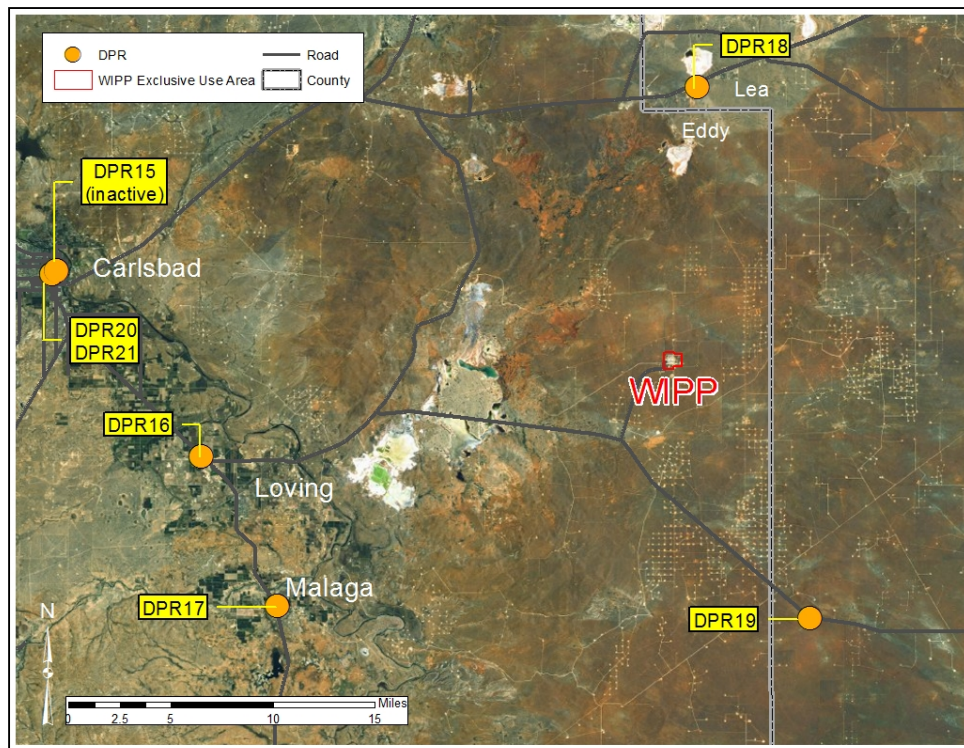


Figure 2. Location of DPR monitors maintained by the DOE Oversight Bureau in the area surrounding WIPP.

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 19.8 mrad at the WIPP Waste Handling Building (WHB) Loading Dock East (DPR14), to a maximum average quarterly dose of 24.7 mrad at the Northeast Fence Corner (DPR08). The largest measurement in the vicinity of WIPP was 32.4 mrad, measured at NMED Carlsbad Guadalupe Street Office – Interior location (DPR20).

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-4

Parking Lot Entrance DPR01				
Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFC 139	10/7/2013 11:46	1/9/2014 8:10	41	21.9
SGJ 022	10/7/2013 11:46	1/9/2014 8:10	44	21.2
SGJ 058	10/7/2013 11:46	1/9/2014 8:10	45	21.7
Average Quarterly Dose in mRad:				21.6
Railroad Track Entrance DPR02				
Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFK 428	10/7/2013 12:16	1/9/2014 8:24	50	25.0
SFK 437	10/7/2013 12:16	1/9/2014 8:24	47	23.6
SFK 438	10/7/2013 12:16	1/9/2014 8:24	47	23.1
Average Quarterly Dose in mRad:				23.9
SW Fence Corner DPR03				
Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFK 330	10/7/2013 11:24	1/9/2014 9:15	48	23.6
SFK 351	10/7/2013 11:24	1/9/2014 9:15	46	22.9
SFK 458	10/7/2013 11:24	1/9/2014 9:15	48	24.0
Average Quarterly Dose in mRad:				23.5
South Fence Center DPR04				
Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFK 527	10/7/2013 11:52	1/9/2014 16:23	40	20.7
SFK 569	10/7/2013 11:52	1/9/2014 16:23	40	21.0
SGI 976	10/7/2013 11:52	1/9/2014 16:23	43	20.7
Average Quarterly Dose in mRad:				20.8
Near SE Corner of Fence DPR05				
Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SGJ 044	10/10/2013 6:35	1/9/2014 4:26	42	20.8
SGJ 109	10/10/2013 6:35	1/9/2014 4:26	48	23.9
SHC 688	10/10/2013 6:35	1/9/2014 4:26	52	25.6
Average Quarterly Dose in mRad:				23.4
Far SE Corner of Fence DPR06				
Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFK 477	10/7/2013 11:56	1/9/2014 14:36	39	20.2
SFK 478	10/7/2013 11:56	1/9/2014 14:36	43	21.2
SFK 512	10/7/2013 11:56	1/9/2014 14:36	39	19.2
Average Quarterly Dose in mRad:				20.2

East Fence Mid DPR07

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFK 481	10/8/2013 6:28	1/9/2014 16:39	46	23.0
SFK 500	10/8/2013 6:28	1/9/2014 16:39	59	29.5
SFK 533	10/8/2013 6:28	1/9/2014 16:39	39	19.3
Average Quarterly Dose in mRad:				23.9

NE Corner DPR8

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFC 049	11/4/2013 5:54	1/9/2014 16:48	32	22.3
SFC 084	11/4/2013 5:54	1/9/2014 16:48	15	10.2
SFC 103	11/4/2013 5:54	1/9/2014 16:48	58	41.7
Average Quarterly Dose in mRad:				24.7

NW Corner DPR11

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SHC 666	10/11/2013 6:25	1/9/2014 8:43	47	23.8
SHC 678	10/11/2013 6:25	1/9/2014 8:43	39	19.5
SHC 780	10/11/2013 6:25	1/9/2014 8:43	47	23.6
Average Quarterly Dose in mRad:				22.3

Loading Dock WHB (West) DPR12

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFK 344	10/8/2013 11:51	1/9/2014 8:18	40	20.3
SFK 441	10/8/2013 11:51	1/9/2014 8:18	39	20.1
SFK 580	10/8/2013 11:51	1/9/2014 8:18	53	27.8
Average Quarterly Dose in mRad:				22.7

Loading Dock WHB (Center) DPR13

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFC 094	10/8/2013 11:44	1/9/2014 8:30	43	22.6
SGI 997	10/8/2013 11:44	1/9/2014 8:30	43	20.9
SGJ 041	10/8/2013 11:44	1/9/2014 8:30	44	21.6
Average Quarterly Dose in mRad:				21.7

Loading Dock WHB (East) DPR14

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFK 473	10/8/2013 11:39	1/9/2014 8:36	40	20.7
SFK 574	10/8/2013 11:39	1/9/2014 8:36	38	19.6
SFK 578	10/8/2013 11:39	1/9/2014 8:36	37	19.1
Average Quarterly Dose in mRad:				19.8

Loving Weigh Station DPR16

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFK 488	10/9/2013 13:20	1/9/2014 17:01	56	28.2
SFK 526	10/9/2013 13:20	1/9/2014 17:01	55	27.6
SFK 539	10/9/2013 13:20	1/9/2014 17:01	58	29.3
Average Quarterly Dose in mRad:				28.4

Malaga VFD DPR17

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFK 519	10/9/2013 13:15	1/9/2014 17:07	50	24.6
SFK 525	10/9/2013 13:15	1/9/2014 17:07	51	25.0
SFK 559	10/9/2013 13:15	1/9/2014 17:07	56	28.0
Average Quarterly Dose in mRad:				25.8

Hobbs Hwy / North Access Rd DPR18

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFK 354	10/10/2013 6:28	1/9/2014 17:11	92	47.7
SFK 406	10/10/2013 6:28	1/9/2014 17:11	36	18.3
SFK 502	10/10/2013 6:28	1/9/2014 17:11	9	4.3
Average Quarterly Dose in mRad:				23.4

Southeast Control DPR19

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SGI 958	10/8/2013 12:03	11/18/1901 0:00	47	24.0
SGJ 103	10/8/2013 12:03	11/8/1901 0:00	46	23.6
SGJ 104	10/8/2013 12:03	11/22/1901 0:00	50	25.6
Average Quarterly Dose in mRad:				24.4

NMED Guadalupe Office Interior DPR20

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFK 364	10/8/2013 12:08	12/25/1900 0:00	49	28.4
SFK 514	10/8/2013 12:08	12/3/1900 0:00	53	31.1
SFK 542	10/8/2013 12:08	1/16/1901 0:00	47	27.0
Average Quarterly Dose in mRad:				28.8

NMED Guadalupe Office Exterior DPR21

Electret ID	Start Date and Time	Finish Date and Time	Voltage Drop	Quarterly Dose Normalized
SFK 450	10/9/2013 15:09	1/22/1901 0:00	56	29.2
SFK 466	10/9/2013 15:09	2/17/1901 0:00	48	24.7
SFK 486	10/9/2013 15:09	3/3/1901 0:00	44	22.5
Average Quarterly Dose in mRad:				25.5

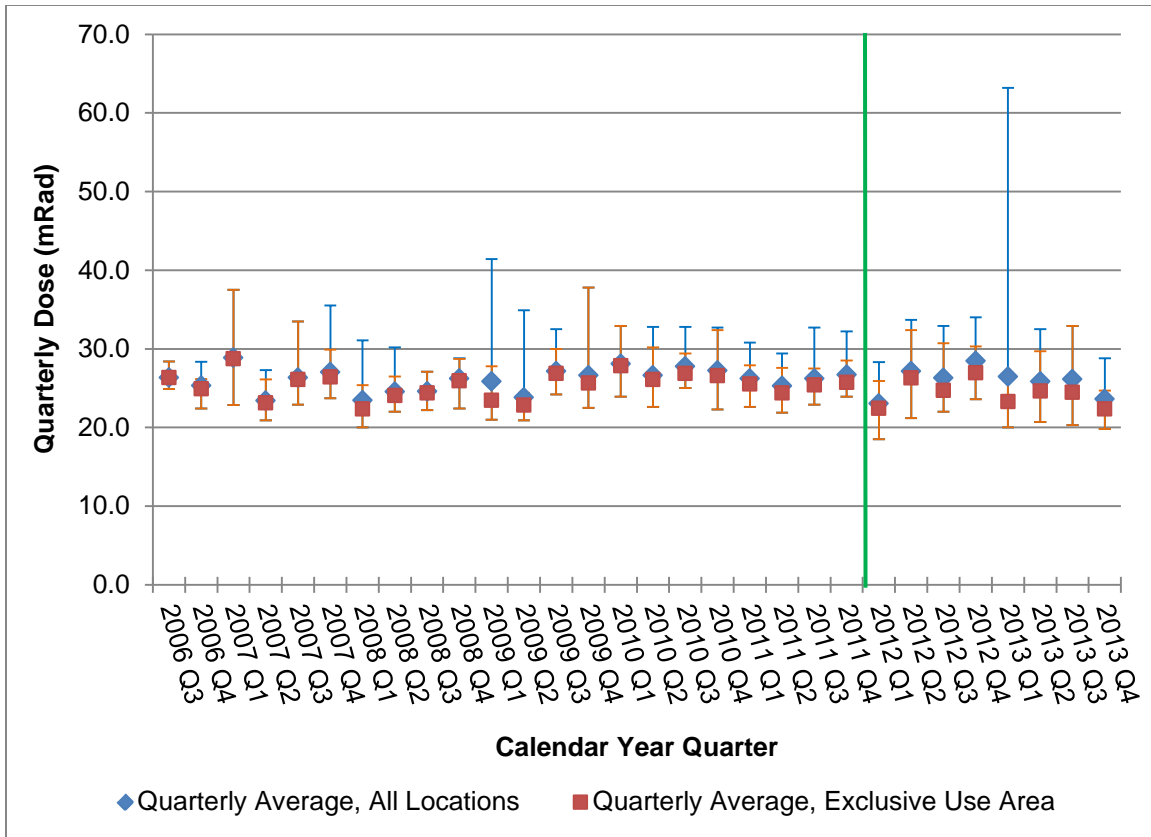


Figure 3. Average DPR Results for all locations and for the WIPP Exclusive Use Area by Quarter. The error bars represent maximum and minimum results for the quarter. The green line denotes the implementation of 2012 program changes, most significantly, the application of temperature and pressure correction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