## Allen, Pam, NMENV

ENTERED

| | |
|---|---|
| **From:** | Maestas, Ricardo, NMENV |
| **Sent:** | Wednesday, August 13, 2014 10:20 AM |
| **To:** | Allen, Pam, NMENV |
| **Subject:** | FW: For the WIPP webpage - NMED sampling locations narrative and maps; ambient air results |
| **Attachments:** | 20140221 to 0311 NMED WIPP Ambient Air.pdf; Draft-Map-narrative-3-7-14.pdf; WIPP-2014-Closeup-Draft-3-13-14.pdf; WIPP-2014-Regional-Draft-3-13-14.pdf |

Email and att.

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**From:** Kliphuis, Trais, NMENV
**Sent:** Monday, April 21, 2014 10:51 AM
**To:** Maestas, Ricardo, NMENV; Smith, Coleman, NMENV
**Subject:** FW: For the WIPP webpage - NMED sampling locations narrative and maps; ambient air results

Comments?

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**From:** LucasKamat, Susan, NMENV
**Sent:** Friday, April 18, 2014 12:20 PM
**To:** Skibitski, Thomas, NMENV; Kliphuis, Trais, NMENV; Turner, Jill, NMENV
**Cc:** Flynn, Ryan, NMENV; Kendall, Jeff, NMENV; Tongate, Butch, NMENV; Schwender, Erika, NMENV; Blaine, Tom, NMENV; Kieling, John, NMENV; triayin@fiu.edu
**Subject:** For the WIPP webpage - NMED smapling locatiosn narrative and maps; ambient air results

Attached are the draft maps and narrative of sampling locations at WIPP.
Also attached the WIPP ambient air results. DOE OB has incorporated the comments and corrections we received so far.

If there are no further comments, these documents are ready to be posted on the WIPP Rad Release Response webpage.

Regards,
Susan

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## AMBIENT AIR MONITORING RESULTS AT THE WASTE ISOLATION PILOT PLANT (WIPP) AND THE VICINITY CARLSBAD, NEW MEXICO

| **Example table of results** | pCi/sample | | | | | Bq/sample | | | |
|---|---|---|---|---|---|---|---|---|---|
| Analyte | Result | ±1 s TPU | **±2 s TPU** | MDA | Lab Flag | Result | ±1 s TPU | ±2 s TPU | MDA |
| Gross alpha and beta activity | | | | | | | | | |
| Gross alpha | 1.6 | 1.6 | 3.2 | 0.55 | | 0.0592 | 0.0592 | 0.1184 | 0.02035 |
| Gross beta | 19 | 0.25 | **0.50** | 1.1 | | 0.703 | 0.00925 | 0.0185 | 0.0407 |
| Alpha and beta emitters | | | | | | | | | |
| Americium-241 | 0.0032 | 0.0085 | 0.0170 | 0.033 | U | 0.000118 | 0.000315 | 0.000629 | 0.001221 |
| Gamma emitters | | | | | | | | | |
| Bismuth-214 | 8.3 | 2.3 | 4.6 | 7 | J | 0.3071 | 0.0851 | 0.1702 | 0.259 |
| Lead-214 | 4.3 | 1.6 | 3.2 | 5.1 | UJ | 0.1591 | 0.0592 | 0.1184 | 0.1887 |

**How to interpret the table**

**TPU** is the **total propagated uncertainty**. The values of experimental measurements have uncertainties due to measurement limitations (e.g., instrument precision, chemical separation, etc.). These uncertainties propagate with the combination of variables in the function. The **uncertainty** is usually defined by the absolute error $\Delta x$. In measurements of radioactivity, TPU is an expression of the confidence that the actual value lies within a plus or minus range. **"1 TPU"** is plus or minus one standard deviation. This means that the true value of the measurement (the result) is within the range of plus or minus the TPU of the result with a certainty or confidence of about **68.3%**. The confidence that the actual measurement lies within the range of **2 TPU** (plus or minus 2 standard deviations) is about **95.5%**. Three standard deviations provides about 99.7% confidence that the actual measured value lies within the calculated range of possible values. The result is given for the sample analyzed.

There is a 95.5% probability that the actual measurement for gross beta in the chart above exists within the range of 19.5 to 18.5 pico Curies per sample (pCi/Sample). In other words, we can say with 95.5% confidence that the actual measurement of beta activity is between 18.5 and 19.5 pCi/sample, or about 19 pCi.

The **MDA** is the **minimum detectable activity** (or concentration) defined as the smallest concentration of radioactivity in a sample that can be detected with a 5% probability of erroneously detecting radioactivity, when in fact none was present (Type I error) and also, a 5% probability of not detecting radioactivity, when in fact it is present (Type II error). Often used interchangeably with **Minimum Detectable Concentration (MDC)**, since the difference between the two terms is only one of units. The MDC is the minimum detectable activity measured in concentration units.

The **Lab Flag** is a qualifier to the result. A **"U" flag** means the material was analyzed for, but was not detected above the **MDA** (or MDC). A U flag may be interpreted as a non-detection. A **"J" flag** means the associated numerical value is an estimated quantity. A J flag may be interpreted to mean the material was detected but is too small to quantify. Multiple flags may be used at borderline measurements.

The Becquerel (Bq) is the International System of Units (SI) derived unit of radioactivity and is defined as the activity of a quantity of radioactive material in which one nucleus decays per second.

| | |
|---|---|
| 1 Becquerel (Bq) equals | 2.70E-11 Curies (Ci) |
| 1 pico curies (pCi) equals | 0.037 Becquerel (Bq) |
| 1 pico curies (pCi) equals | one trillionth of a curie |

DOE Oversight Bureau
New Mexico Environment Department

## AMBIENT AIR MONITORING RESULTS AT THE WASTE ISOLATION PILOT PLANT (WIPP) AND THE VICINITY CARLSBAD, NEW MEXICO

### *WPL01 WIPP Salt Shaft*

### February 21, 2014 to February 28, 2014

| | pCi/sample | | | | | Bq/sample | | | |
|---|---|---|---|---|---|---|---|---|---|
| Analyte | Result | ±1 s TPU | ±2 s TPU | MDA | Lab Flag | Result | ±1 s TPU | ±2 s TPU | MDA |
| Gross alpha and beta activity | | | | | | | | | |
| Gross alpha | 1.6 | 0.25 | 0.5 | 0.55 | | 0.0592 | 0.00925 | 0.0185 | 0.02035 |
| Gross beta | 19 | 1.6 | 3.20 | 1.1 | | 0.703 | 0.0592 | 0.1184 | 0.0407 |
| Alpha and beta emitters | | | | | | | | | |
| Americium-241 | 0.0032 | 0.0085 | 0.0170 | 0.033 | U | 0.0001184 | 0.000315 | 0.000629 | 0.001221 |
| Plutonium-238 | 0.0052 | 0.0063 | 0.0126 | 0.019 | U | 0.0001924 | 0.000233 | 0.0004662 | 0.000703 |
| Plutonium-239/240 | 0.0077 | 0.0069 | 0.0138 | 0.024 | U | 0.0002849 | 0.000255 | 0.0005106 | 0.000888 |
| Strontium-90 | 0.084 | 0.13 | 0.26 | 0.58 | U | 0.003108 | 0.00481 | 0.00962 | 0.02146 |
| Gamma emitters | | | | | | | | | |
| Actinium-228 | 6.3 | 4.2 | 8.4 | 14 | U | 0.2331 | 0.1554 | 0.3108 | 0.518 |
| Americium-241 | -4.1 | 4.3 | 8.6 | 15 | U | -0.1517 | 0.1591 | 0.3182 | 0.555 |
| Beryllium-7 | 94 | 11 | 22 | 23 | | 3.478 | 0.407 | 0.814 | 0.851 |
| Bismuth-212 | 2.0 | 14 | 28 | 49 | U | 0.074 | 0.518 | 1.036 | 1.813 |
| Bismuth-214 | 8.3 | 2.3 | 4.6 | 7.0 | J | 0.3071 | 0.0851 | 0.1702 | 0.259 |
| Cesium-134 | -2.4 | 1.1 | 2.2 | 3.9 | U | -0.0888 | 0.0407 | 0.0814 | 0.1443 |
| Cesium-137 | 0.15 | 1.0 | 2.0 | 3.6 | U | 0.00555 | 0.037 | 0.074 | 0.1332 |
| Cobalt-60 | 0.081 | 1.4 | 2.8 | 4.8 | U | 0.002997 | 0.0518 | 0.1036 | 0.1776 |
| Iodine-131 | -0.54 | 1.0 | 2.0 | 3.5 | U | -0.01998 | 0.037 | 0.074 | 0.1295 |
| Lead-212 | 4.7 | 1.2 | 2.4 | 3.5 | | 0.1739 | 0.0444 | 0.0888 | 0.1295 |
| Lead-214 | 4.3 | 1.6 | 3.2 | 5.1 | UJ | 0.1591 | 0.0592 | 0.1184 | 0.1887 |
| Potassium-40 | 93 | 19 | 38 | 50 | | 3.441 | 0.703 | 1.406 | 1.85 |
| Protactinium-234m | -51 | 180 | 360 | 640 | U | -1.887 | 6.66 | 13.32 | 23.68 |
| Sodium-22 | 0.61 | 1.1 | 2.2 | 3.9 | U | 0.02257 | 0.0407 | 0.0814 | 0.1443 |
| Thallium-208 | 2.6 | 1.1 | 2.2 | 3.4 | U | 0.0962 | 0.0407 | 0.0814 | 0.1258 |
| Thorium-234 | 77 | 11 | 22 | 28 | | 2.849 | 0.407 | 0.814 | 1.036 |

## AMBIENT AIR MONITORING RESULTS AT THE WASTE ISOLATION PILOT PLANT (WIPP) AND THE VICINITY CARLSBAD, NEW MEXICO

### *WPL02 Far Field*

### February 21, 2014 to February 28, 2014

| | pCi/sample | | | | | Bq/sample | | | |
|---|---|---|---|---|---|---|---|---|---|
| Analyte | Result | ±1 s TPU | ±2 s TPU | MDA | Lab Flag | Result | ±1 s TPU | ±2 s TPU | MDA |
| Gross alpha and beta activity | | | | | | | | | |
| Gross alpha | 2.1 | 0.28 | 0.56 | 0.54 | | 0.0777 | 0.01036 | 0.02072 | 0.01998 |
| Gross beta | 26 | 2.1 | 4.20 | 1.1 | | 0.962 | 0.0777 | 0.1554 | 0.0407 |
| Alpha and beta emitters | | | | | | | | | |
| Americium-241 | 0.0045 | 0.0091 | 0.0182 | 0.035 | U | 0.0001665 | 0.000337 | 0.0006734 | 0.001295 |
| Plutonium-238 | 0.015 | 0.0075 | 0.0150 | 0.0082 | | 0.000555 | 0.000278 | 0.000555 | 0.0003034 |
| Plutonium-239/240 | 0.0060 | 0.0074 | 0.0148 | 0.028 | U | 0.000222 | 0.000274 | 0.0005476 | 0.001036 |
| Strontium-90 | -0.062 | 0.13 | 0.26 | 0.56 | U | -0.002294 | 0.00481 | 0.00962 | 0.02072 |
| Gamma emitters | | | | | | | | | |
| Actinium-228 | 5.9 | 3.1 | 6.2 | 10 | U | 0.2183 | 0.1147 | 0.2294 | 0.37 |
| Americium-241 | -5.5 | 9.3 | 18.6 | 32 | U | -0.2035 | 0.3441 | 0.6882 | 1.184 |
| Beryllium-7 | 130 | 11 | 22 | 20 | | 4.81 | 0.407 | 0.814 | 0.74 |
| Bismuth-212 | 11 | 10 | 20 | 35 | U | 0.407 | 0.37 | 0.74 | 1.295 |
| Bismuth-214 | 5.8 | 1.7 | 3.4 | 5.1 | J | 0.2146 | 0.0629 | 0.1258 | 0.1887 |
| Cesium-134 | 0.42 | 0.76 | 1.52 | 2.6 | U | 0.01554 | 0.02812 | 0.05624 | 0.0962 |
| Cesium-137 | 0.05 | 0.76 | 1.52 | 2.6 | U | 0.00185 | 0.02812 | 0.05624 | 0.0962 |
| Cobalt-60 | 0.14 | 0.89 | 1.78 | 3.1 | U | 0.00518 | 0.03293 | 0.06586 | 0.1147 |
| Iodine-131 | -0.13 | 0.8 | 1.6 | 2.8 | U | -0.00481 | 0.0296 | 0.0592 | 0.1036 |
| Lead-212 | -0.19 | 1.5 | 3.0 | 5.2 | U | -0.00703 | 0.0555 | 0.111 | 0.1924 |
| Lead-214 | 2.2 | 1.3 | 2.6 | 4.2 | UJ | 0.0814 | 0.0481 | 0.0962 | 0.1554 |
| Potassium-40 | -28 | 20 | 40 | 70 | U | -1.036 | 0.74 | 1.48 | 2.59 |
| Protactinium-234m | 47 | 120 | 240 | 420 | U | 1.739 | 4.44 | 8.88 | 15.54 |
| Sodium-22 | 0.31 | 0.81 | 1.62 | 2.8 | U | 0.01147 | 0.02997 | 0.05994 | 0.1036 |
| Thallium-208 | 2.4 | 0.73 | 1.46 | 2.3 | | 0.0888 | 0.02701 | 0.05402 | 0.0851 |
| Thorium-234 | 22 | 16 | 32 | 53 | U | 0.814 | 0.592 | 1.184 | 1.961 |

## AMBIENT AIR MONITORING RESULTS AT THE WASTE ISOLATION PILOT PLANT (WIPP) AND THE VICINITY
## CARLSBAD, NEW MEXICO

### *WPL03 Met Tower*

**February 21, 2014 to February 28, 2014**

| | pCi/sample | | | | | Bq/sample | | | |
|---|---|---|---|---|---|---|---|---|---|
| Analyte | Result | ±1 s TPU | ±2 s TPU | MDA | Lab Flag | Result | ±1 s TPU | ±2 s TPU | MDA |
| Gross alpha and beta activity | | | | | | | | | |
| Gross alpha | 2.0 | 0.26 | 0.52 | 0.49 | | 0.074 | 0.00962 | 0.01924 | 0.01813 |
| Gross beta | 22 | 1.8 | 3.60 | 1.1 | | 0.814 | 0.0666 | 0.1332 | 0.0407 |
| Alpha and beta emitters | | | | | | | | | |
| Americium-241 | -0.00040 | 0.0084 | 0.0168 | 0.034 | U | -0.0000148 | 0.000311 | 0.0006216 | 0.001258 |
| Plutonium-238 | 0 | 0.0056 | 0.0112 | 0.017 | U | 0 | 0.000207 | 0.0004144 | 0.000629 |
| Plutonium-239/240 | 0.0092 | 0.0057 | 0.0114 | 0.0062 | | 0.0003404 | 0.000211 | 0.0004218 | 0.0002294 |
| Strontium-90 | -0.098 | 0.14 | 0.28 | 0.62 | U | -0.003626 | 0.00518 | 0.01036 | 0.02294 |
| Gamma emitters | | | | | | | | | |
| Actinium-228 | 8.0 | 6.3 | 12.6 | 21 | U | 0.296 | 0.2331 | 0.4662 | 0.777 |
| Americium-241 | 0.050 | 0.97 | 1.94 | 3.3 | U | 0.00185 | 0.03589 | 0.07178 | 0.1221 |
| Beryllium-7 | 140 | 13 | 26 | 24 | | 5.18 | 0.481 | 0.962 | 0.888 |
| Bismuth-212 | 15 | 21 | 42 | 71 | U | 0.555 | 0.777 | 1.554 | 2.627 |
| Bismuth-214 | 3.9 | 2.3 | 4.6 | 7.4 | UJ | 0.1443 | 0.0851 | 0.1702 | 0.2738 |
| Cesium-134 | 1.1 | 1.0 | 2.0 | 3.4 | U | 0.0407 | 0.037 | 0.074 | 0.1258 |
| Cesium-137 | 0.98 | 0.93 | 1.86 | 3.1 | U | 0.03626 | 0.03441 | 0.06882 | 0.1147 |
| Cobalt-60 | -1.7 | 1.1 | 2.2 | 4.2 | U | -0.0629 | 0.0407 | 0.0814 | 0.1554 |
| Iodine-131 | -0.62 | 0.99 | 1.98 | 3.5 | U | -0.02294 | 0.03663 | 0.07326 | 0.1295 |
| Lead-212 | 0.71 | 1.8 | 3.6 | 5.9 | U | 0.02627 | 0.0666 | 0.1332 | 0.2183 |
| Lead-214 | 1.9 | 2.5 | 5.0 | 8.4 | UJ | 0.0703 | 0.0925 | 0.185 | 0.3108 |
| Potassium-40 | -24 | 22 | 44 | 76 | U | -0.888 | 0.814 | 1.628 | 2.812 |
| Protactinium-234m | -110 | 160 | 320 | 590 | U | -4.07 | 5.92 | 11.84 | 21.83 |
| Sodium-22 | -1.2 | 1.1 | 2.2 | 4.1 | U | -0.0444 | 0.0407 | 0.0814 | 0.1517 |
| Thallium-208 | 0.82 | 1.6 | 3.2 | 5.5 | U | 0.03034 | 0.0592 | 0.1184 | 0.2035 |
| Thorium-234 | 5.9 | 11 | 22 | 38 | U | 0.2183 | 0.407 | 0.814 | 1.406 |

**AMBIENT AIR MONITORING RESULTS AT THE WASTE ISOLATION PILOT PLANT (WIPP) AND THE VICINITY**
**CARLSBAD, NEW MEXICO**

***WPL03 Met Tower (laboratory duplicate)***

**February 21, 2014 to February 28, 2014**

| | pCi/sample | | | | | Bq/sample | | | |
|---|---|---|---|---|---|---|---|---|---|
| Analyte | Result | ±1 s TPU | ±2 s TPU | MDA | Lab Flag | Result | ±1 s TPU | ±2 s TPU | MDA |
| Gamma emitters | | | | | | | | | |
| Actinium-228 | -0.25 | 8.9 | 17.8 | 32 | U | -0.00925 | 0.3293 | 0.6586 | 1.184 |
| Americium-241 | 2.4 | 2.0 | 4.0 | 6.8 | U | 0.0888 | 0.074 | 0.148 | 0.2516 |
| Beryllium-7 | 130 | 21 | 42 | 46 | | 4.81 | 0.777 | 1.554 | 1.702 |
| Bismuth-212 | -29 | 38 | 76 | 140 | U | -1.073 | 1.406 | 2.812 | 5.18 |
| Bismuth-214 | -3.4 | 5.4 | 10.8 | 19 | UJ | -0.1258 | 0.1998 | 0.3996 | 0.703 |
| Cesium-134 | -0.41 | 2.0 | 4.0 | 7.1 | U | -0.01517 | 0.074 | 0.148 | 0.2627 |
| Cesium-137 | 1.8 | 2.1 | 4.2 | 7.2 | U | 0.0666 | 0.0777 | 0.1554 | 0.2664 |
| Cobalt-60 | -2.6 | 2.5 | 5.0 | 10 | U | -0.0962 | 0.0925 | 0.185 | 0.37 |
| Iodine-131 | 1.1 | 2.4 | 4.8 | 8.3 | U | 0.0407 | 0.0888 | 0.1776 | 0.3071 |
| Lead-212 | 0.34 | 2.2 | 4.4 | 7.8 | U | 0.01258 | 0.0814 | 0.1628 | 0.2886 |
| Lead-214 | 3.6 | 4.6 | 9.2 | 15 | UJ | 0.1332 | 0.1702 | 0.3404 | 0.555 |
| Potassium-40 | 5.5 | 34 | 68 | 120 | U | 0.2035 | 1.258 | 2.516 | 4.44 |
| Protactinium-234m | 110 | 320 | 640 | 1200 | U | 4.07 | 11.84 | 23.68 | 44.4 |
| Sodium-22 | -3.4 | 2.4 | 4.8 | 9.9 | U | -0.1258 | 0.0888 | 0.1776 | 0.3663 |
| Thallium-208 | 0.6 | 2.4 | 4.8 | 8.3 | U | 0.0222 | 0.0888 | 0.1776 | 0.3071 |
| Thorium-234 | 15 | 18 | 36 | 62 | U | 0.555 | 0.666 | 1.332 | 2.294 |

## AMBIENT AIR MONITORING RESULTS AT THE WASTE ISOLATION PILOT PLANT (WIPP) AND THE VICINITY CARLSBAD, NEW MEXICO

### *Filter Blank*

### February 21, 2014 to February 28, 2014

| | pCi/sample | | | | | Bq/sample | | | |
|---|---|---|---|---|---|---|---|---|---|
| Analyte | Result | ±1 s TPU | ±2 s TPU | MDA | Lab Flag | Result | ±1 s TPU | ±2 s TPU | MDA |
| Gross alpha and beta activity | | | | | | | | | |
| Gross alpha | -0.05 | 0.17 | 0.34 | 0.58 | U | -0.00185 | 0.00629 | 0.01258 | 0.02146 |
| Gross beta | -0.48 | 0.34 | 0.68 | 1.1 | U | -0.01776 | 0.01258 | 0.02516 | 0.0407 |
| Alpha and beta emitters | | | | | | | | | |
| Americium-241 | -0.0023 | 0.0083 | 0.0166 | 0.035 | U | -0.0000851 | 0.000307 | 0.0006142 | 0.001295 |
| Plutonium-238 | 0.013 | 0.0081 | 0.0162 | 0.024 | U | 0.000481 | 0.0003 | 0.0005994 | 0.000888 |
| Plutonium-239/240 | 0 | 0.0080 | 0.0160 | 0.035 | U | 0 | 0.000296 | 0.000592 | 0.001295 |
| Strontium-90 | 0.19 | 0.14 | 0.28 | 0.60 | U | 0.00703 | 0.00518 | 0.01036 | 0.0222 |
| Gamma emitters | | | | | | | | | |
| Actinium-228 | 2.6 | 5.2 | 10.4 | 17 | U | 0.0962 | 0.1924 | 0.3848 | 0.629 |
| Americium-241 | 24 | 15 | 30 | 48 | U | 0.888 | 0.555 | 1.11 | 1.776 |
| Beryllium-7 | -3.0 | 6.1 | 12.2 | 21 | U | -0.111 | 0.2257 | 0.4514 | 0.777 |
| Bismuth-212 | -8.8 | 11 | 22 | 40 | U | -0.3256 | 0.407 | 0.814 | 1.48 |
| Bismuth-214 | 5.4 | 2.1 | 4.2 | 6.8 | UJ | 0.1998 | 0.0777 | 0.1554 | 0.2516 |
| Cesium-134 | -0.89 | 0.98 | 1.96 | 3.4 | U | -0.03293 | 0.03626 | 0.07252 | 0.1258 |
| Cesium-137 | 0.22 | 0.89 | 1.78 | 3.0 | U | 0.00814 | 0.03293 | 0.06586 | 0.111 |
| Cobalt-60 | 1.2 | 1.0 | 2.0 | 3.3 | U | 0.0444 | 0.037 | 0.074 | 0.1221 |
| Iodine-131 | -0.91 | 0.94 | 1.88 | 3.3 | U | -0.03367 | 0.03478 | 0.06956 | 0.1221 |
| Lead-212 | -0.29 | 2.0 | 4.0 | 6.6 | U | -0.01073 | 0.074 | 0.148 | 0.2442 |
| Lead-214 | 2.1 | 2.4 | 4.8 | 8.1 | UJ | 0.0777 | 0.0888 | 0.1776 | 0.2997 |
| Potassium-40 | 14 | 20 | 40 | 67 | U | 0.518 | 0.74 | 1.48 | 2.479 |
| Protactinium-234m | -28 | 180 | 360 | 640 | U | -1.036 | 6.66 | 13.32 | 23.68 |
| Sodium-22 | 0.97 | 0.86 | 1.72 | 2.9 | U | 0.03589 | 0.03182 | 0.06364 | 0.1073 |
| Thallium-208 | 2.0 | 1.4 | 2.8 | 4.7 | U | 0.074 | 0.0518 | 0.1036 | 0.1739 |
| Thorium-234 | 17 | 21 | 42 | 68 | U | 0.629 | 0.777 | 1.554 | 2.516 |

## AMBIENT AIR MONITORING RESULTS AT THE WASTE ISOLATION PILOT PLANT (WIPP) AND THE VICINITY CARLSBAD, NEW MEXICO

### *Laboratory Method Blank*

### February 21, 2014 to February 28, 2014

| | pCi/sample | | | | | Bq/sample | | | |
|---|---|---|---|---|---|---|---|---|---|
| Analyte | Result | ±1 s TPU | ±2 s TPU | MDA | Lab Flag | Result | ±1 s TPU | ±2 s TPU | MDA |
| Gross alpha and beta activity | | | | | | | | | |
| Gross alpha | 0.82 | 0.18 | 0.36 | 0.5 | | 0.03034 | 0.00666 | 0.01332 | 0.0185 |
| Gross beta | 1.2 | 0.34 | 0.68 | 1.0 | | 0.0444 | 0.01258 | 0.02516 | 0.037 |
| Alpha and beta emitters | | | | | | | | | |
| Americium-241 | 0.0026 | 0.0069 | 0.0138 | 0.027 | U | 0.0000962 | 0.000255 | 0.0005106 | 0.000999 |
| Plutonium-238 | 0.0045 | 0.0056 | 0.0112 | 0.0061 | U | 0.0001665 | 0.000207 | 0.0004144 | 0.0002257 |
| Plutonium-239/240 | 0.0068 | 0.0056 | 0.0112 | 0.017 | U | 0.0002516 | 0.000207 | 0.0004144 | 0.000629 |
| Strontium-90 | -0.070 | 0.12 | 0.2400 | 0.55 | U | -0.00259 | 0.00444 | 0.00888 | 0.02035 |
| Gamma emitters | | | | | | | | | |
| Actinium-228 | -4.9 | 6.9 | 13.8 | 24 | U | -0.1813 | 0.2553 | 0.5106 | 0.888 |
| Americium-241 | -0.38 | 1.1 | 2.20 | 3.9 | U | -0.01406 | 0.0407 | 0.0814 | 0.1443 |
| Beryllium-7 | -8.2 | 6.5 | 13.0 | 24 | U | -0.3034 | 0.2405 | 0.481 | 0.888 |
| Bismuth-212 | -14 | 27 | 54 | 92 | U | -0.518 | 0.999 | 1.998 | 3.404 |
| Bismuth-214 | 3.5 | 2.3 | 4.6 | 7.7 | UJ | 0.1295 | 0.0851 | 0.1702 | 0.2849 |
| Cesium-134 | 0.85 | 1.0 | 2.0 | 3.5 | U | 0.03145 | 0.037 | 0.074 | 0.1295 |
| Cesium-137 | 0.38 | 1.0 | 2.0 | 3.5 | U | 0.01406 | 0.037 | 0.074 | 0.1295 |
| Cobalt-60 | -0.65 | 1.4 | 2.8 | 5.0 | U | -0.02405 | 0.0518 | 0.1036 | 0.185 |
| Iodine-131 | 0.11 | 0.81 | 1.62 | 2.8 | U | 0.00407 | 0.02997 | 0.05994 | 0.1036 |
| Lead-212 | 1.1 | 2.0 | 4.0 | 6.5 | U | 0.0407 | 0.074 | 0.148 | 0.2405 |
| Lead-214 | 7.0 | 2.0 | 4.0 | 6.1 | J | 0.259 | 0.074 | 0.148 | 0.2257 |
| Potassium-40 | -8.5 | 24 | 48 | 85 | U | -0.3145 | 0.888 | 1.776 | 3.145 |
| Protactinium-234 | 250 | 180 | 360 | 600 | U | 9.25 | 6.66 | 13.32 | 22.2 |
| Sodium-22 | -1.0 | 1.3 | 2.6 | 4.9 | U | -0.037 | 0.0481 | 0.0962 | 0.1813 |
| Thallium-208 | -1.9 | 1.7 | 3.4 | 6.0 | U | -0.0703 | 0.0629 | 0.1258 | 0.222 |
| Thorium-234 | 16 | 11 | 22 | 38 | U | 0.592 | 0.407 | 0.814 | 1.406 |

## AMBIENT AIR MONITORING RESULTS AT THE WASTE ISOLATION PILOT PLANT (WIPP) AND THE VICINITY CARLSBAD, NEW MEXICO

### *WPL01 WIPP Salt Shaft*

**February 28, 2014 to March 11, 2014**

| | pCi/sample | | | | | Bq/sample | | | |
|---|---|---|---|---|---|---|---|---|---|
| Analyte | Result | ±1 s TPU | ±2 s TPU | MDA | Lab Flag | Result | ±1 s TPU | ±2 s TPU | MDA |
| Gross alpha and beta activity | | | | | | | | | |
| Gross alpha | 3.2 | 0.34 | 0.68 | 0.47 | | 0.1184 | 0.01258 | 0.02516 | 0.01739 |
| Gross beta | 32 | 2.6 | 5.2 | 0.93 | | 1.184 | 0.0962 | 0.1924 | 0.03441 |
| Alpha and beta emitters | | | | | | | | | |
| Americium-241 | 0.0040 | 0.0092 | 0.0184 | 0.034 | U | 0.000148 | 0.00034 | 0.0006808 | 0.001258 |
| Plutonium-238 | -0.0057 | 0.0069 | 0.0138 | 0.030 | U | -0.0002109 | 0.000255 | 0.0005106 | 0.00111 |
| Plutonium-239/240 | 0 | 0.0069 | 0.0138 | 0.030 | U | 0 | 0.000255 | 0.0005106 | 0.00111 |
| Strontium-90 | 0.18 | 0.14 | 0.28 | 0.57 | U | 0.00666 | 0.00518 | 0.01036 | 0.02109 |
| Gamma emitters | | | | | | | | | |
| Actinium-228 | -8.0 | 10.0 | 20 | 40 | U | -0.296 | 0.37 | 0.74 | 1.48 |
| Americium-241 | 63 | 39 | 78 | 130 | U | 2.331 | 1.443 | 2.886 | 4.81 |
| Beryllium-7 | 150 | 25 | 50 | 55 | | 5.55 | 0.925 | 1.85 | 2.035 |
| Bismuth-212 | -8.9 | 30 | 60 | 110 | U | -0.3293 | 1.11 | 2.22 | 4.07 |
| Bismuth-214 | 5.0 | 4.8 | 9.6 | 16 | UJ | 0.185 | 0.1776 | 0.3552 | 0.592 |
| Cesium-134 | -1.9 | 2.6 | 5.2 | 9.6 | U | -0.0703 | 0.0962 | 0.1924 | 0.3552 |
| Cesium-137 | -1.7 | 2.5 | 5.0 | 9.6 | U | -0.0629 | 0.0925 | 0.185 | 0.3552 |
| Cobalt-60 | -1.1 | 2.2 | 4.4 | 9.3 | U | -0.0407 | 0.0814 | 0.1628 | 0.3441 |
| Iodine-131 | -2.9 | 2.6 | 5.2 | 10 | U | -0.1073 | 0.0962 | 0.1924 | 0.37 |
| Lead-212 | 2.3 | 3.2 | 6.4 | 11 | U | 0.0851 | 0.1184 | 0.2368 | 0.407 |
| Lead-214 | -5.0 | 4.6 | 9.2 | 17 | UJ | -0.185 | 0.1702 | 0.3404 | 0.629 |
| Potassium-40 | -20 | 29 | 58 | 120 | U | -0.74 | 1.073 | 2.146 | 4.44 |
| Protactinium-234m | -150 | 340 | 680 | 1400 | U | -5.55 | 12.58 | 25.16 | 51.8 |
| Sodium-22 | 2.2 | 1.9 | 3.8 | 6.5 | U | 0.0814 | 0.0703 | 0.1406 | 0.2405 |
| Thallium-208 | -0.57 | 2.5 | 5.0 | 9.2 | U | -0.02109 | 0.0925 | 0.185 | 0.3404 |
| Thorium-234 | -46 | 33 | 66 | 120 | U | -1.702 | 1.221 | 2.442 | 4.44 |

## AMBIENT AIR MONITORING RESULTS AT THE WASTE ISOLATION PILOT PLANT (WIPP) AND THE VICINITY CARLSBAD, NEW MEXICO

### *WPL02 Far Field*

### February 28, 2014 to March 11, 2014

| | pCi/sample | | | | | Bq/sample | | | |
|---|---|---|---|---|---|---|---|---|---|
| Analyte | Result | ±1 s TPU | ±2 s TPU | MDA | Lab Flag | Result | ±1 s TPU | ±2 s TPU | MDA |
| Gross alpha and beta activity | | | | | | | | | |
| Gross alpha | 2.7 | 0.31 | 0.62 | 0.53 | | 0.0999 | 0.01147 | 0.02294 | 0.01961 |
| Gross beta | 29 | 2.4 | 4.8 | 0.92 | | 1.073 | 0.0888 | 0.1776 | 0.03404 |
| Alpha and beta emitters | | | | | | | | | |
| Americium-241 | -0.0047 | 0.0062 | 0.0124 | 0.028 | U | -0.0001739 | 0.000229 | 0.0004588 | 0.001036 |
| Plutonium-238 | 0.0070 | 0.0058 | 0.0116 | 0.017 | U | 0.000259 | 0.000215 | 0.0004292 | 0.000629 |
| Plutonium-239/240 | 0.0070 | 0.0071 | 0.0142 | 0.025 | U | 0.000259 | 0.000263 | 0.0005254 | 0.000925 |
| Strontium-90 | 0.0065 | 0.10 | 0.20 | 0.42 | U | 0.0002405 | 0.0037 | 0.0074 | 0.01554 |
| Gamma emitters | | | | | | | | | |
| Actinium-228 | 21 | 9.6 | 19.2 | 30 | U | 0.777 | 0.3552 | 0.7104 | 1.11 |
| Americium-241 | 18 | 8.6 | 17.2 | 27 | U | 0.666 | 0.3182 | 0.6364 | 0.999 |
| Beryllium-7 | 180 | 27 | 54 | 61 | | 6.66 | 0.999 | 1.998 | 2.257 |
| Bismuth-212 | 30 | 29 | 58 | 100 | U | 1.11 | 1.073 | 2.146 | 3.7 |
| Bismuth-214 | 4.1 | 5.3 | 10.6 | 18 | UJ | 0.1517 | 0.1961 | 0.3922 | 0.666 |
| Cesium-134 | 0.48 | 2.3 | 4.6 | 8.2 | U | 0.01776 | 0.0851 | 0.1702 | 0.3034 |
| Cesium-137 | -1.4 | 2.3 | 4.6 | 8.5 | U | -0.0518 | 0.0851 | 0.1702 | 0.3145 |
| Cobalt-60 | 4.7 | 3.0 | 6.0 | 9.8 | U | 0.1739 | 0.111 | 0.222 | 0.3626 |
| Iodine-131 | -0.84 | 2.5 | 5.0 | 9.1 | U | -0.03108 | 0.0925 | 0.185 | 0.3367 |
| Lead-212 | 0.80 | 2.8 | 5.6 | 9.7 | U | 0.0296 | 0.1036 | 0.2072 | 0.3589 |
| Lead-214 | 1.5 | 4.1 | 8.2 | 14 | UJ | 0.0555 | 0.1517 | 0.3034 | 0.518 |
| Potassium-40 | -42 | 45 | 90 | 170 | U | -1.554 | 1.665 | 3.33 | 6.29 |
| Protactinium-234m | -460 | 510 | 1020 | 2000 | U | -17.02 | 18.87 | 37.74 | 74 |
| Sodium-22 | -1.8 | 2.6 | 5.2 | 10 | U | -0.0666 | 0.0962 | 0.1924 | 0.37 |
| Thallium-208 | -1.2 | 2.4 | 4.8 | 8.9 | U | -0.0444 | 0.0888 | 0.1776 | 0.3293 |
| Thorium-234 | -23 | 27 | 54 | 95 | U | -0.851 | 0.999 | 1.998 | 3.515 |

**AMBIENT AIR MONITORING RESULTS AT THE WASTE ISOLATION PILOT PLANT (WIPP) AND THE VICINITY CARLSBAD, NEW MEXICO**

***WPL02 Far Field (laboratory duplicate)***

**February 28, 2014 to March 11, 2014**

| | pCi/sample | | | | | Bq/sample | | | |
|---|---|---|---|---|---|---|---|---|---|
| Analyte | Result | ±1 s TPU | ±2 s TPU | MDA | Lab Flag | Result | ±1 s TPU | ±2 s TPU | MDA |
| Gamma emitters | | | | | | | | | |
| Actinium-228 | -19 | 13 | 26 | 54 | U | -0.703 | 0.481 | 0.962 | 1.998 |
| Americium-241 | -17 | 17 | 34 | 63 | U | -0.629 | 0.629 | 1.258 | 2.331 |
| Beryllium-7 | 110 | 23 | 46 | 53 | | 4.07 | 0.851 | 1.702 | 1.961 |
| Bismuth-212 | 68 | 46 | 92 | 150 | U | 2.516 | 1.702 | 3.404 | 5.55 |
| Bismuth-214 | -3.4 | 7.4 | 14.8 | 27 | UJ | -0.1258 | 0.2738 | 0.5476 | 0.999 |
| Cesium-134 | -4.1 | 3.5 | 7.0 | 13 | U | -0.1517 | 0.1295 | 0.259 | 0.481 |
| Cesium-137 | 0.87 | 2.7 | 5.4 | 9.7 | U | 0.03219 | 0.0999 | 0.1998 | 0.3589 |
| Cobalt-60 | 2.4 | 4.3 | 8.6 | 15 | U | 0.0888 | 0.1591 | 0.3182 | 0.555 |
| Iodine-131 | -6.1 | 3.4 | 6.8 | 13 | U | -0.2257 | 0.1258 | 0.2516 | 0.481 |
| Lead-212 | 1.0 | 4.2 | 8.4 | 14 | U | 0.037 | 0.1554 | 0.3108 | 0.518 |
| Lead-214 | -4.0 | 5.5 | 11 | 20 | UJ | -0.148 | 0.2035 | 0.407 | 0.74 |
| Potassium-40 | 65 | 47 | 94 | 160 | U | 2.405 | 1.739 | 3.478 | 5.92 |
| Protactinium-234m | -63 | 470 | 940 | 1800 | U | -2.331 | 17.39 | 34.78 | 66.6 |
| Sodium-22 | 3.3 | 3.6 | 7.2 | 13 | U | 0.1221 | 0.1332 | 0.2664 | 0.481 |
| Thallium-208 | 3.2 | 3.3 | 6.6 | 11 | U | 0.1184 | 0.1221 | 0.2442 | 0.407 |
| Thorium-234 | -40 | 33 | 66 | 120 | U | -1.48 | 1.221 | 2.442 | 4.44 |

## AMBIENT AIR MONITORING RESULTS AT THE WASTE ISOLATION PILOT PLANT (WIPP) AND THE VICINITY CARLSBAD, NEW MEXICO

### *WPL03 Met Tower*

### February 28, 2014 to March 11, 2014

| | pCi/sample | | | | | Bq/sample | | | |
|---|---|---|---|---|---|---|---|---|---|
| Analyte | Result | ±1 s TPU | ±2 s TPU | MDA | Lab Flag | Result | ±1 s TPU | ±2 s TPU | MDA |
| Gross alpha and beta activity | | | | | | | | | |
| Gross alpha | 3.0 | 0.32 | 0.64 | 0.48 | | 0.111 | 0.01184 | 0.02368 | 0.01776 |
| Gross beta | 27 | 2.2 | 4.4 | 0.93 | | 0.999 | 0.0814 | 0.1628 | 0.03441 |
| Alpha and beta emitters | | | | | | | | | |
| Americium-241 | 0.0071 | 0.0083 | 0.0166 | 0.030 | U | 0.0002627 | 0.000307 | 0.0006142 | 0.00111 |
| Plutonium-238 | 0.027 | 0.011 | 0.022 | 0.024 | | 0.000999 | 0.000407 | 0.000814 | 0.000888 |
| Plutonium-239/240 | 0.030 | 0.012 | 0.024 | 0.031 | U | 0.00111 | 0.000444 | 0.000888 | 0.001147 |
| Strontium-90 | -0.46 | 0.18 | 0.36 | 0.71 | U | -0.01702 | 0.00666 | 0.01332 | 0.02627 |
| Gamma emitters | | | | | | | | | |
| Actinium-228 | -1.9 | 15 | 30 | 55 | U | -0.0703 | 0.555 | 1.11 | 2.035 |
| Americium-241 | -24 | 17 | 34 | 64 | U | -0.888 | 0.629 | 1.258 | 2.368 |
| Beryllium-7 | 170 | 32 | 64 | 78 | | 6.29 | 1.184 | 2.368 | 2.886 |
| Bismuth-212 | -19 | 44 | 88 | 170 | U | -0.703 | 1.628 | 3.256 | 6.29 |
| Bismuth-214 | 4.3 | 7.4 | 14.8 | 26 | UJ | 0.1591 | 0.2738 | 0.5476 | 0.962 |
| Cesium-134 | -2.7 | 3.2 | 6.4 | 12 | U | -0.0999 | 0.1184 | 0.2368 | 0.444 |
| Cesium-137 | 0.87 | 2.6 | 5.2 | 9.5 | U | 0.03219 | 0.0962 | 0.1924 | 0.3515 |
| Cobalt-60 | -4.5 | 3.9 | 7.8 | 16 | U | -0.1665 | 0.1443 | 0.2886 | 0.592 |
| Iodine-131 | 2.7 | 3.8 | 7.6 | 13 | U | 0.0999 | 0.1406 | 0.2812 | 0.481 |
| Lead-212 | -1.0 | 4.0 | 8.0 | 14 | U | -0.037 | 0.148 | 0.296 | 0.518 |
| Lead-214 | 2.5 | 5.9 | 11.8 | 20 | UJ | 0.0925 | 0.2183 | 0.4366 | 0.74 |
| Potassium-40 | 26 | 46 | 92 | 160 | U | 0.962 | 1.702 | 3.404 | 5.92 |
| Protactinium-234m | 570 | 540 | 1080 | 1900 | U | 21.09 | 19.98 | 39.96 | 70.3 |
| Sodium-22 | -3.5 | 4.0 | 8.0 | 16 | U | -0.1295 | 0.148 | 0.296 | 0.592 |
| Thallium-208 | -4.9 | 3.4 | 6.8 | 13 | U | -0.1813 | 0.1258 | 0.2516 | 0.481 |
| Thorium-234 | 18 | 30 | 60 | 100 | U | 0.666 | 1.11 | 2.22 | 3.7 |

## AMBIENT AIR MONITORING RESULTS AT THE WASTE ISOLATION PILOT PLANT (WIPP) AND THE VICINITY
## CARLSBAD, NEW MEXICO

### *WPL10 Carlsbad (Guadalupe St.)*
### February 28, 2014 to March 11, 2014

| | pCi/sample | | | | | Bq/sample | | | |
|---|---|---|---|---|---|---|---|---|---|
| Analyte | Result | ±1 s TPU | ±2 s TPU | MDA | Lab Flag | Result | ±1 s TPU | ±2 s TPU | MDA |
| Gross alpha and beta activity | | | | | | | | | |
| Gross alpha | 2.6 | 0.30 | 0.60 | 0.51 | | 0.0962 | 0.0111 | 0.0222 | 0.01887 |
| Gross beta | 24 | 1.9 | 3.8 | 0.87 | | 0.888 | 0.0703 | 0.1406 | 0.03219 |
| Alpha and beta emitters | | | | | | | | | |
| Americium-241 | -0.0025 | 0.0066 | 0.0132 | 0.028 | U | -0.0000925 | 0.000244 | 0.0004884 | 0.001036 |
| Plutonium-238 | 0.016 | 0.0068 | 0.0136 | 0.0074 | | 0.000592 | 0.000252 | 0.0005032 | 0.0002738 |
| Plutonium-239/240 | 0.022 | 0.0079 | 0.0158 | 0.0074 | | 0.000814 | 0.000292 | 0.0005846 | 0.0002738 |
| Strontium-90 | -0.10 | 0.18 | 0.36 | 0.73 | U | -0.0037 | 0.00666 | 0.01332 | 0.02701 |
| Gamma emitters | | | | | | | | | |
| Actinium-228 | -2.1 | 10 | 20 | 39 | U | -0.0777 | 0.37 | 0.74 | 1.443 |
| Americium-241 | 12 | 28 | 56 | 96 | U | 0.444 | 1.036 | 2.072 | 3.552 |
| Beryllium-7 | 160 | 28 | 56 | 65 | | 5.92 | 1.036 | 2.072 | 2.405 |
| Bismuth-212 | 77 | 33 | 66 | 100 | U | 2.849 | 1.221 | 2.442 | 3.7 |
| Bismuth-214 | -2.6 | 6.0 | 12 | 22 | UJ | -0.0962 | 0.222 | 0.444 | 0.814 |
| Cesium-134 | -0.63 | 2.5 | 5.0 | 9.2 | U | -0.02331 | 0.0925 | 0.185 | 0.3404 |
| Cesium-137 | -1.2 | 2.4 | 4.8 | 9.2 | U | -0.0444 | 0.0888 | 0.1776 | 0.3404 |
| Cobalt-60 | -3.7 | 2.8 | 5.6 | 12 | U | -0.1369 | 0.1036 | 0.2072 | 0.444 |
| Iodine-131 | 3.5 | 3.4 | 6.8 | 11 | U | 0.1295 | 0.1258 | 0.2516 | 0.407 |
| Lead-212 | -7.3 | 3.6 | 7.2 | 14 | U | -0.2701 | 0.1332 | 0.2664 | 0.518 |
| Lead-214 | 6.5 | 4.4 | 8.8 | 15 | UJ | 0.2405 | 0.1628 | 0.3256 | 0.555 |
| Potassium-40 | -49 | 39 | 78 | 160 | U | -1.813 | 1.443 | 2.886 | 5.92 |
| Protactinium-234m | -170 | 410 | 820 | 1600 | U | -6.29 | 15.17 | 30.34 | 59.2 |
| Sodium-22 | -1.3 | 2.4 | 4.8 | 10 | U | -0.0481 | 0.0888 | 0.1776 | 0.37 |
| Thallium-208 | 3.9 | 2.8 | 5.6 | 9.3 | U | 0.1443 | 0.1036 | 0.2072 | 0.3441 |
| Thorium-234 | -36 | 28 | 56 | 100 | U | -1.332 | 1.036 | 2.072 | 3.7 |

## AMBIENT AIR MONITORING RESULTS AT THE WASTE ISOLATION PILOT PLANT (WIPP) AND THE VICINITY CARLSBAD, NEW MEXICO

### *WPL11 Carlsbad Mobile Solar*

**February 28, 2014 to March 11, 2014**

| | pCi/sample | | | | | Bq/sample | | | |
|---|---|---|---|---|---|---|---|---|---|
| Analyte | Result | ±1 s TPU | ±2 s TPU | MDA | Lab Flag | Result | ±1 s TPU | ±2 s TPU | MDA |
| Gross alpha and beta activity | | | | | | | | | |
| Gross alpha | 0.50 | 0.23 | 0.46 | 0.75 | U | 0.0185 | 0.00851 | 0.01702 | 0.02775 |
| Gross beta | 7.3 | 0.69 | 1.38 | 1.0 | | 0.2701 | 0.02553 | 0.05106 | 0.037 |
| Alpha and beta emitters | | | | | | | | | |
| Americium-241 | -0.010 | 0.0080 | 0.016 | 0.037 | U | -0.00037 | 0.000296 | 0.000592 | 0.001369 |
| Plutonium-238 | 0.0068 | 0.0055 | 0.011 | 0.017 | U | 0.0002516 | 0.000204 | 0.000407 | 0.000629 |
| Plutonium-239/240 | 0.009 | 0.0064 | 0.0128 | 0.021 | U | 0.000333 | 0.000237 | 0.0004736 | 0.000777 |
| Strontium-90 | 0.12 | 0.10 | 0.20 | 0.41 | U | 0.00444 | 0.0037 | 0.0074 | 0.01517 |
| Gamma emitters | | | | | | | | | |
| Actinium-228 | 12 | 9.9 | 19.8 | 33 | U | 0.444 | 0.3663 | 0.7326 | 1.221 |
| Americium-241 | 3.9 | 12 | 24 | 42 | U | 0.1443 | 0.444 | 0.888 | 1.554 |
| Beryllium-7 | 51 | 19 | 38 | 60 | U | 1.887 | 0.703 | 1.406 | 2.22 |
| Bismuth-212 | 39 | 32 | 64 | 100 | U | 1.443 | 1.184 | 2.368 | 3.7 |
| Bismuth-214 | 17 | 5.1 | 10.2 | 16 | J | 0.629 | 0.1887 | 0.3774 | 0.592 |
| Cesium-134 | -6.6 | 2.4 | 4.8 | 8.5 | U | -0.2442 | 0.0888 | 0.1776 | 0.3145 |
| Cesium-137 | 3.3 | 2.2 | 4.4 | 7.2 | U | 0.1221 | 0.0814 | 0.1628 | 0.2664 |
| Cobalt-60 | -5.6 | 2.9 | 5.8 | 11 | U | -0.2072 | 0.1073 | 0.2146 | 0.407 |
| Iodine-131 | -4.6 | 3.1 | 6.2 | 11 | U | -0.1702 | 0.1147 | 0.2294 | 0.407 |
| Lead-212 | 12 | 3.4 | 6.8 | 10 | | 0.444 | 0.1258 | 0.2516 | 0.37 |
| Lead-214 | 21 | 4.4 | 8.8 | 13 | J | 0.777 | 0.1628 | 0.3256 | 0.481 |
| Potassium-40 | 170 | 34 | 68 | 94 | | 6.29 | 1.258 | 2.516 | 3.478 |
| Protactinium-234m | 980 | 410 | 820 | 1300 | U | 36.26 | 15.17 | 30.34 | 48.1 |
| Sodium-22 | -0.68 | 2.7 | 5.4 | 9.4 | U | -0.02516 | 0.0999 | 0.1998 | 0.3478 |
| Thallium-208 | 8.6 | 2.5 | 5.0 | 7.8 | | 0.3182 | 0.0925 | 0.185 | 0.2886 |
| Thorium-234 | 150 | 32 | 64 | 96 | | 5.55 | 1.184 | 2.368 | 3.552 |

**AMBIENT AIR MONITORING RESULTS AT THE WASTE ISOLATION PILOT PLANT (WIPP) AND THE VICINITY**
**CARLSBAD, NEW MEXICO**

***WPL11 Carlsbad Mobile Solar (laboratory duplicate)***

**February 28, 2014 to March 11, 2014**

| | pCi/sample | | | | | Bq/sample | | | |
|---|---|---|---|---|---|---|---|---|---|
| Analyte | Result | ±1 s TPU | ±2 s TPU | MDA | Lab Flag | Result | ±1 s TPU | ±2 s TPU | MDA |
| Gamma emitters | | | | | | | | | |
| Actinium-228 | 3.7 | 11 | 22 | 38 | U | 0.1369 | 0.407 | 0.814 | 1.406 |
| Americium-241 | -0.46 | 11 | 22 | 40 | U | -0.01702 | 0.407 | 0.814 | 1.48 |
| Beryllium-7 | 50 | 18 | 36 | 54 | U | 1.85 | 0.666 | 1.332 | 1.998 |
| Bismuth-212 | -16 | 35 | 70 | 120 | U | -0.592 | 1.295 | 2.59 | 4.44 |
| Bismuth-214 | 2.5 | 7.1 | 14.2 | 24 | UJ | 0.0925 | 0.2627 | 0.5254 | 0.888 |
| Cesium-134 | 0 | 2.2 | 4.4 | 7.8 | U | 0 | 0.0814 | 0.1628 | 0.2886 |
| Cesium-137 | -1.5 | 2.4 | 4.8 | 8.4 | U | -0.0555 | 0.0888 | 0.1776 | 0.3108 |
| Cobalt-60 | -1.6 | 2.7 | 5.4 | 9.8 | U | -0.0592 | 0.0999 | 0.1998 | 0.3626 |
| Iodine-131 | -7.5 | 3.7 | 7.4 | 13 | U | -0.2775 | 0.1369 | 0.2738 | 0.481 |
| Lead-212 | -2.7 | 4.7 | 9.4 | 16 | U | -0.0999 | 0.1739 | 0.3478 | 0.592 |
| Lead-214 | -3.3 | 5.4 | 10.8 | 19 | UJ | -0.1221 | 0.1998 | 0.3996 | 0.703 |
| Potassium-40 | -36 | 43 | 86 | 150 | U | -1.332 | 1.591 | 3.182 | 5.55 |
| Protactinium-234m | -270 | 390 | 780 | 1400 | U | -9.99 | 14.43 | 28.86 | 51.8 |
| Sodium-22 | -5.2 | 2.4 | 4.8 | 9.4 | U | -0.1924 | 0.0888 | 0.1776 | 0.3478 |
| Thallium-208 | -4.5 | 3.1 | 6.2 | 11 | U | -0.1665 | 0.1147 | 0.2294 | 0.407 |
| Thorium-234 | -20 | 43 | 86 | 150 | U | -0.74 | 1.591 | 3.182 | 5.55 |

## AMBIENT AIR MONITORING RESULTS AT THE WASTE ISOLATION PILOT PLANT (WIPP) AND THE VICINITY CARLSBAD, NEW MEXICO

### *Filter Blank*

### February 28, 2014 to March 11, 2014

| | pCi/sample | | | | | Bq/sample | | | |
|---|---|---|---|---|---|---|---|---|---|
| Analyte | Result | ±1 s TPU | ±2 s TPU | MDA | Lab Flag | Result | ±1 s TPU | ±2 s TPU | MDA |
| Gross alpha and beta activity | | | | | | | | | |
| Gross alpha | -0.53 | 0.16 | 0.32 | 0.60 | U | -0.01961 | 0.00592 | 0.01184 | 0.0222 |
| Gross beta | 0.23 | 0.28 | 0.56 | 0.92 | U | 0.00851 | 0.01036 | 0.02072 | 0.03404 |
| Alpha and beta emitters | | | | | | | | | |
| Americium-241 | -0.0045 | 0.0063 | 0.0126 | 0.028 | U | -0.0001665 | 0.000233 | 0.0004662 | 0.001036 |
| Plutonium-238 | 0.0023 | 0.0069 | 0.0138 | 0.028 | U | 0.0000851 | 0.000255 | 0.0005106 | 0.001036 |
| Plutonium-239/240 | 0.011 | 0.0057 | 0.0114 | 0.0062 | | 0.000407 | 0.000211 | 0.0004218 | 0.0002294 |
| Strontium-90 | 0.33 | 0.16 | 0.32 | 0.60 | U | 0.01221 | 0.00592 | 0.01184 | 0.0222 |
| Gamma emitters | | | | | | | | | |
| Actinium-228 | -15 | 11 | 22 | 46 | U | -0.555 | 0.407 | 0.814 | 1.702 |
| Americium-241 | -13 | 27 | 54 | 99 | U | -0.481 | 0.999 | 1.998 | 3.663 |
| Beryllium-7 | 5.9 | 21 | 42 | 76 | U | 0.2183 | 0.777 | 1.554 | 2.812 |
| Bismuth-212 | 20 | 42 | 84 | 150 | U | 0.74 | 1.554 | 3.108 | 5.55 |
| Bismuth-214 | -5.2 | 6.4 | 12.8 | 24 | UJ | -0.1924 | 0.2368 | 0.4736 | 0.888 |
| Cesium-134 | -1.1 | 2.6 | 5.2 | 9.8 | U | -0.0407 | 0.0962 | 0.1924 | 0.3626 |
| Cesium-137 | -0.46 | 2.2 | 4.4 | 8.6 | U | -0.01702 | 0.0814 | 0.1628 | 0.3182 |
| Cobalt-60 | -2.5 | 2.2 | 4.4 | 11 | U | -0.0925 | 0.0814 | 0.1628 | 0.407 |
| Iodine-131 | -2.4 | 3.6 | 7.2 | 13 | U | -0.0888 | 0.1332 | 0.2664 | 0.481 |
| Lead-212 | 1.1 | 3.8 | 7.6 | 13 | U | 0.0407 | 0.1406 | 0.2812 | 0.481 |
| Lead-214 | -4.7 | 5.6 | 11.2 | 21 | UJ | -0.1739 | 0.2072 | 0.4144 | 0.777 |
| Potassium-40 | -33 | 48 | 96 | 180 | U | -1.221 | 1.776 | 3.552 | 6.66 |
| Protactinium-234m | -97 | 440 | 880 | 1800 | U | -3.589 | 16.28 | 32.56 | 66.6 |
| Sodium-22 | 2.7 | 3.2 | 6.4 | 11 | U | 0.0999 | 0.1184 | 0.2368 | 0.407 |
| Thallium-208 | -1.8 | 3.1 | 6.2 | 12 | U | -0.0666 | 0.1147 | 0.2294 | 0.444 |
| Thorium-234 | 2.6 | 29 | 58 | 100 | U | 0.0962 | 1.073 | 2.146 | 3.7 |

## AMBIENT AIR MONITORING RESULTS AT THE WASTE ISOLATION PILOT PLANT (WIPP) AND THE VICINITY CARLSBAD, NEW MEXICO

### *Laboratory Method Blank*

**February 28, 2014 to March 11, 2014**

| | pCi/sample | | | | | Bq/sample | | | |
|---|---|---|---|---|---|---|---|---|---|
| Analyte | Result | ±1 s TPU | ±2 s TPU | MDA | Lab Flag | Result | ±1 s TPU | ±2 s TPU | MDA |
| Gross alpha and beta activity | | | | | | | | | |
| Gross alpha | 0.055 | 0.14 | 0.28 | 0.47 | U | 0.002035 | 0.00518 | 0.01036 | 0.01739 |
| Gross beta | 0.66 | 0.25 | 0.50 | 0.79 | U | 0.02442 | 0.00925 | 0.0185 | 0.02923 |
| Alpha and beta emitters | | | | | | | | | |
| Americium-241 | -0.0015 | 0.0055 | 0.011 | 0.024 | U | -0.0000555 | 0.000204 | 0.000407 | 0.000888 |
| Plutonium-238 | 0.0082 | 0.0051 | 0.0102 | 0.0056 | | 0.0003034 | 0.000189 | 0.0003774 | 0.0002072 |
| Plutonium-239/240 | 0.0082 | 0.0051 | 0.0102 | 0.0056 | | 0.0003034 | 0.000189 | 0.0003774 | 0.0002072 |
| Strontium-90 | 0.10 | 0.088 | 0.176 | 0.35 | U | 0.0037 | 0.003256 | 0.006512 | 0.01295 |
| Gamma emitters | | | | | | | | | |
| Actinium-228 | 2.3 | 8.8 | 17.6 | 31 | U | 0.0851 | 0.3256 | 0.6512 | 1.147 |
| Americium-241 | 50 | 31 | 62 | 100 | U | 1.85 | 1.147 | 2.294 | 3.7 |
| Beryllium-7 | -9.8 | 12 | 24 | 46 | U | -0.3626 | 0.444 | 0.888 | 1.702 |
| Bismuth-212 | 52 | 27 | 54 | 85 | U | 1.924 | 0.999 | 1.998 | 3.145 |
| Bismuth-214 | 2.1 | 5 | 10 | 17 | UJ | 0.0777 | 0.185 | 0.37 | 0.629 |
| Cesium-134 | -3.2 | 2.2 | 4.4 | 8.1 | U | -0.1184 | 0.0814 | 0.1628 | 0.2997 |
| Cesium-137 | -0.087 | 1.9 | 3.8 | 6.8 | U | -0.003219 | 0.0703 | 0.1406 | 0.2516 |
| Cobalt-60 | -2.6 | 1.6 | 3.2 | 7.2 | U | -0.0962 | 0.0592 | 0.1184 | 0.2664 |
| Iodine-131 | -0.45 | 1.2 | 2.4 | 4.5 | U | -0.01665 | 0.0444 | 0.0888 | 0.1665 |
| Lead-212 | 1.7 | 2.8 | 5.6 | 9.7 | U | 0.0629 | 0.1036 | 0.2072 | 0.3589 |
| Lead-214 | -1.5 | 3.4 | 6.8 | 12 | UJ | -0.0555 | 0.1258 | 0.2516 | 0.444 |
| Potassium-40 | -6.0 | 27 | 54 | 100 | U | -0.222 | 0.999 | 1.998 | 3.7 |
| Protactinium-234m | 34 | 360 | 720 | 1300 | U | 1.258 | 13.32 | 26.64 | 48.1 |
| Sodium-22 | -1.8 | 1.6 | 3.2 | 7.0 | U | -0.0666 | 0.0592 | 0.1184 | 0.259 |
| Thallium-208 | -1.6 | 2.1 | 4.2 | 7.7 | U | -0.0592 | 0.0777 | 0.1554 | 0.2849 |
| Thorium-234 | 48 | 23 | 46 | 72 | U | 1.776 | 0.851 | 1.702 | 2.664 |

## AMBIENT AIR MONITORING RESULTS AT THE WASTE ISOLATION PILOT PLANT (WIPP) AND THE VICINITY CARLSBAD, NEW MEXICO

### *Laboratory Method Blank (laboratory duplicate)*

**February 28, 2014 to March 11, 2014**

| | pCi/sample | | | | | Bq/sample | | | |
|---|---|---|---|---|---|---|---|---|---|
| Analyte | Result | ±1 s TPU | ±2 s TPU | MDA | Lab Flag | Result | ±1 s TPU | ±2 s TPU | MDA |
| Gamma emitters | | | | | | | | | |
| Actinium-228 | -5.1 | 9.8 | 19.6 | 34 | U | -0.1887 | 0.3626 | 0.7252 | 1.258 |
| Americium-241 | 14 | 11 | 22 | 35 | U | 0.518 | 0.407 | 0.814 | 1.295 |
| Beryllium-7 | 0.42 | 13 | 26 | 45 | U | 0.01554 | 0.481 | 0.962 | 1.665 |
| Bismuth-212 | -25 | 29 | 58 | 100 | U | -0.925 | 1.073 | 2.146 | 3.7 |
| Bismuth-214 | 12 | 4.4 | 8.8 | 14 | UJ | 0.444 | 0.1628 | 0.3256 | 0.518 |
| Cesium-134 | 0.88 | 2.0 | 4.0 | 6.7 | U | 0.03256 | 0.074 | 0.148 | 0.2479 |
| Cesium-137 | -2 | 2.0 | 4.0 | 7.3 | U | -0.074 | 0.074 | 0.148 | 0.2701 |
| Cobalt-60 | -0.90 | 2.2 | 4.4 | 7.8 | U | -0.0333 | 0.0814 | 0.1628 | 0.2886 |
| Iodine-131 | -1.8 | 1.9 | 3.8 | 6.7 | U | -0.0666 | 0.0703 | 0.1406 | 0.2479 |
| Lead-212 | 1.4 | 4.1 | 8.2 | 14 | U | 0.0518 | 0.1517 | 0.3034 | 0.518 |
| Lead-214 | -3.7 | 6.1 | 12.2 | 21 | UJ | -0.1369 | 0.2257 | 0.4514 | 0.777 |
| Potassium-40 | -0.18 | 39 | 78 | 130 | U | -0.00666 | 1.443 | 2.886 | 4.81 |
| Protactinium-234m | 580 | 330 | 660 | 1100 | U | 21.46 | 12.21 | 24.42 | 40.7 |
| Sodium-22 | -0.19 | 1.9 | 3.8 | 6.9 | U | -0.00703 | 0.0703 | 0.1406 | 0.2553 |
| Thallium-208 | 2.0 | 3.0 | 6.0 | 10 | U | 0.074 | 0.111 | 0.222 | 0.37 |
| Thorium-234 | -12 | 38 | 76 | 130 | U | -0.444 | 1.406 | 2.812 | 4.81 |

The New Mexico Environment Department (NMED) Department of Energy (DOE) Oversight Bureau conducts oversight and monitoring activities at the Waste Isolation Pilot Plant (WIPP). Monitoring programs include both joint and independent evaluations of impacts to the environment and public health. Environmental sampling and analysis include particulates in air, soils and sediments, vegetation, and surface and ground water.

**Air Monitoring**

NMED's DOE Oversight Bureau continues to monitor the air at the WIPP and surrounding areas. Exhaust air filters are collected from Stations A and B and shipped to contract laboratories for analysis of gross alpha and beta, isotopic plutonium, isotopic uranium, americium, strontium, and gamma-emitting isotopes (like cesium). The Bureau also monitors ambient air at WIPP, at locations along the Jal Highway, and in Carlsbad. Ambient air filter samples are collected bi-weekly (every 14 days) and are analyzed for gross alpha and beta, isotopic plutonium, isotopic uranium, strontium, americium and gamma-emitting isotopes.

| Sample ID | Location | Media | Sampling history | Sampling Frequency |
|---|---|---|---|---|
| A1-1 | WIPP Station A Skid 1 | Exhaust Air | 2006-present | Daily |
| A2-1 | WIPP Station A Skid 2 | Exhaust Air | 2006-present | Daily |
| A3-1 | WIPP Station A Skid 3 | Exhaust Air | 2006-present | Daily |
| B1-1 | WIPP Station B Skid 1 | Exhaust Air | 2006-present | Weekly or Biweekly |
| WPL01 | WIPP Salt Shaft | Ambient Air | 2007-2013, 2014 | Biweekly |
| WPL02 | WIPP Far Field | Ambient Air | 2007-2013, 2014 | Biweekly |
| WPL03 | WIPP Met Tower | Ambient Air | 2007-2013, 2014 | Biweekly |
| WPL09 | Southeast Control | Ambient Air | 2011-2013, present | Biweekly |
| WPL10 | Carlsbad NMED Office Guadalupe St | Ambient Air | 2014-present | Biweekly |
| WPL11 | Mobile Solar | Ambient Air | 2014-present | Biweekly |

**Gamma Radiation Monitoring**

The Oversight Bureau continues to monitor gamma radiation (direct penetrating radiation) both on and off-site at WIPP on a quarterly basis.

| Sample ID | Location | Media | Sampling history | Sampling Frequency |
|---|---|---|---|---|
| DPR01 | WIPP Parking Lot | Gamma Radiation | 2006 - present | Quarterly |
| DPR02 | WIPP Railroad Entrance | Gamma Radiation | 2006 - present | Quarterly |
| DPR03 | WIPP Southw est Fence Corner | Gamma Radiation | 2006 - present | Quarterly |
| DPR04 | WIPP South Fence Center | Gamma Radiation | 2006 - present | Quarterly |
| DPR05 | WIPP Southeast Fence Corner | Gamma Radiation | 2006 - present | Quarterly |
| DPR06 | WIPP Far Southeast Fence Corner | Gamma Radiation | 2006 - present | Quarterly |
| DPR07 | WIPP East Fence Mid | Gamma Radiation | 2006 - present | Quarterly |
| DPR08 | WIPP Northeast Fence Corner | Gamma Radiation | 2006 - present | Quarterly |
| DPR09 | WIPP North Northeast Fence | Gamma Radiation | 2006 - present | Quarterly |
| DPR10 | WIPP North Fence Salt Pile | Gamma Radiation | 2006 - present | Quarterly |
| DPR11 | WIPP Northw est Fence Corner | Gamma Radiation | 2006 - present | Quarterly |
| DPR12 | WIPP Loading Dock West | Gamma Radiation | 2006 - present | Quarterly |
| DPR13 | WIPP Loading Dock Center | Gamma Radiation | 2006 - present | Quarterly |
| DPR14 | WIPP Loading Dock East | Gamma Radiation | 2006 - present | Quarterly |
| DPR16 | Loving Weight Station | Gamma Radiation | 2007-present | Quarterly |
| DPR17 | Malaga Volunteer Fire Dept. | Gamma Radiation | 2007-present | Quarterly |
| DPR18 | Hobbs Hiw ay - North Access Road | Gamma Radiation | 2008-present | Quarterly |
| DPR19 | Southeast Control | Gamma Radiation | 2011-present | Quarterly |
| DPR20 | Carlsbad NMED Office Guadalupe St Interior | Gamma Radiation | 2012-present | Quarterly |
| DPR21 | Carlsbad NMED Office Guadalupe St Exterior | Gamma Radiation | 2012-present | Quarterly |

**Soil and Vegetation Monitoring**

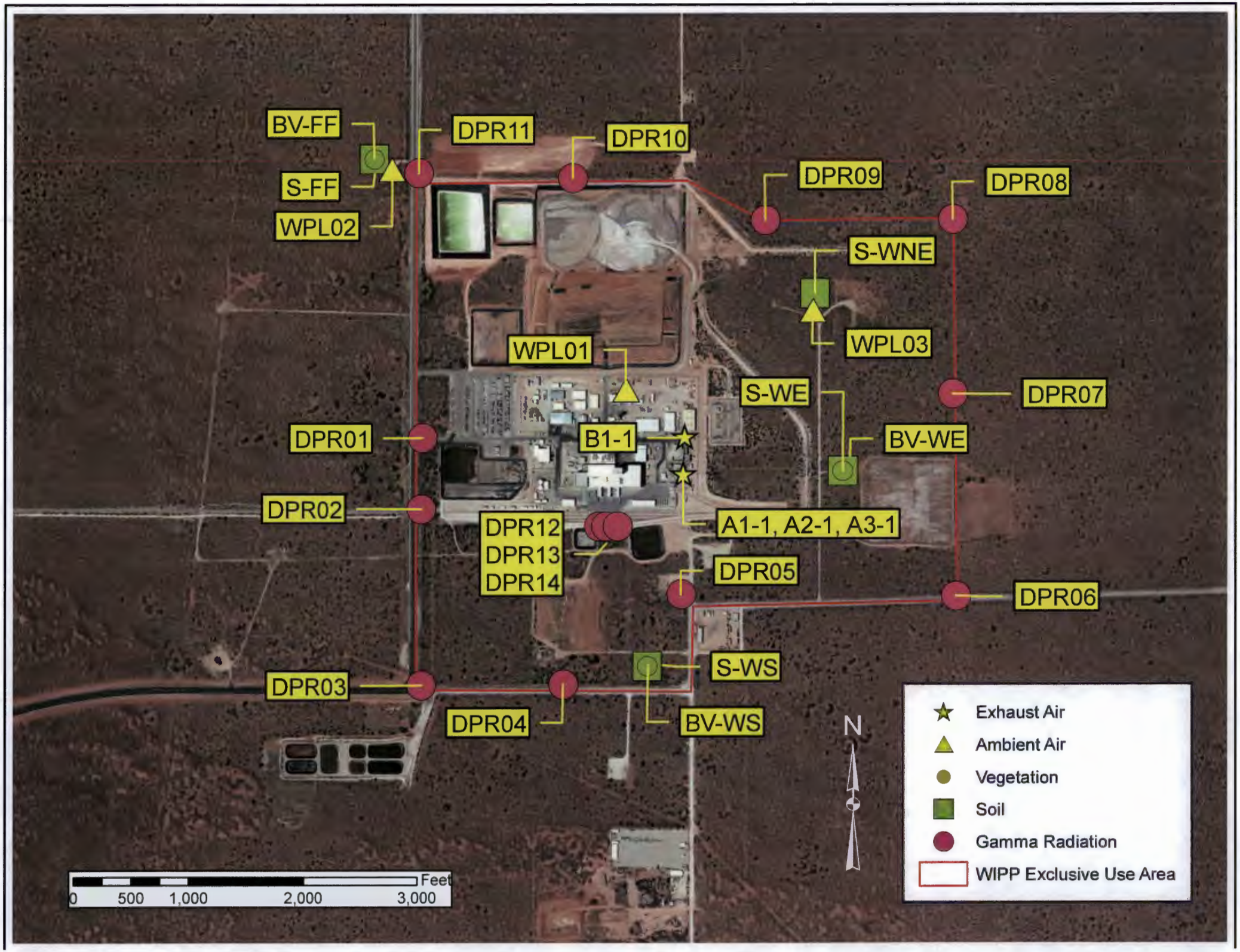
The Oversight Bureau conducts sampling and analysis of soil and vegetation in the vicinity of WIPP for radiological constituents. Soil, sediment and vegetation are analyzed for isotopic plutonium, isotopic uranium, americium, strontium and gamma-emitting isotopes.

| Sample ID | Location | Media | Sampling history | Sampling Frequency |
|---|---|---|---|---|
| BV-FF | Far Field | Vegetation | 2010, 2012 | Annual |
| BV-MR | Mills Ranch | Vegetation | 2010, 2011 | Annual |
| BV-Noy | Noya Tank | Vegetation | 2012 | Annual |
| BV-Pok | Poker Tank | Vegetation | 2012 | Annual |
| BV-SEC | South East Control | Vegetation | 2011 | Annual |
| BV-WE | WIPP East | Vegetation | 2010, 2011 | Annual |
| BV-WN | WIPP North | Vegetation | 2012 | Annual |
| BV-WS | WIPP South | Vegetation | 2010, 2011 | Annual |
| S-FF | Far Field | Soil | 2012 | Annual |
| S-Gnome | Gnome | Soil | NA | NA |
| S-MR | Mills Ranch | Soil | 2010, 2011 | Annual |
| S-SR | Smith Ranch | Soil | 2010, 2012 | Annual |
| S-WE | WIPP East | Soil | 2010, 2012 | Annual |
| S-WN | WIPP North | Soil | 2011, 2012 | Annual |
| S-WNE | WIPP Northeast | Soil | 2011 | Annual |
| S-WS | WIPP South | Soil | 2010, 2011 | Annual |

**Sediment Monitoring**

The Oversight Bureau conducts sampling and analysis of soil and vegetation in the vicinity of WIPP for radiological constituents. Soil, sediment and vegetation are analyzed for isotopic plutonium, isotopic uranium, americium, strontium and gamma-emitting isotopes.

| Sample ID | Location | Media | Sampling history | Sampling Frequency |
|---|---|---|---|---|
| SD-Hill | Hill Tank | Sediment | 2009, 2010, 2011, 2012 | Annual |
| SD-Indian | Indian Tank | Sediment | 2009, 2010, 2011, 2012 | Annual |
| SD-Lost | Lost Tank | Sediment | 2010, 2011, 2012 | Annual |
| SD-Noya | Noya Tank | Sediment | 2009, 2010, 2011, 2012 | Annual |
| SD-Pecos | Pecos River | Sediment | 2009 | Annual |
| SD-Pierce | Pierce Canyon | Sediment | 2010, 2011 | Annual |
| SD-Poker | Poker Tank | Sediment | 2009, 2010, 2011, 2012 | Annual |
| SD-Red | Red Tank | Sediment | 2009, 2010, 2011 | Annual |
| SD-Tut | Tut Tank | Sediment | 2012 | Annual |
| SD-UTH | Under the Hill Tank | Sediment | 2009, 2010, 2011 | Annual |


BV-FF
DPR11
DPR10
S-FF
WPL02
DPR09
DPR08
S-WNE
WPL03
WPL01
S-WE
DPR07
DPR01
B1-1
BV-WE
DPR02
A1-1, A2-1, A3-1
DPR12
DPR13
DPR14
DPR05
DPR06
S-WS
DPR03
DPR04
BV-WS
N
Exhaust Air
Ambient Air
Vegetation
Soil
Gamma Radiation
WIPP Exclusive Use Area
Feet
0
500
1,000
2,000
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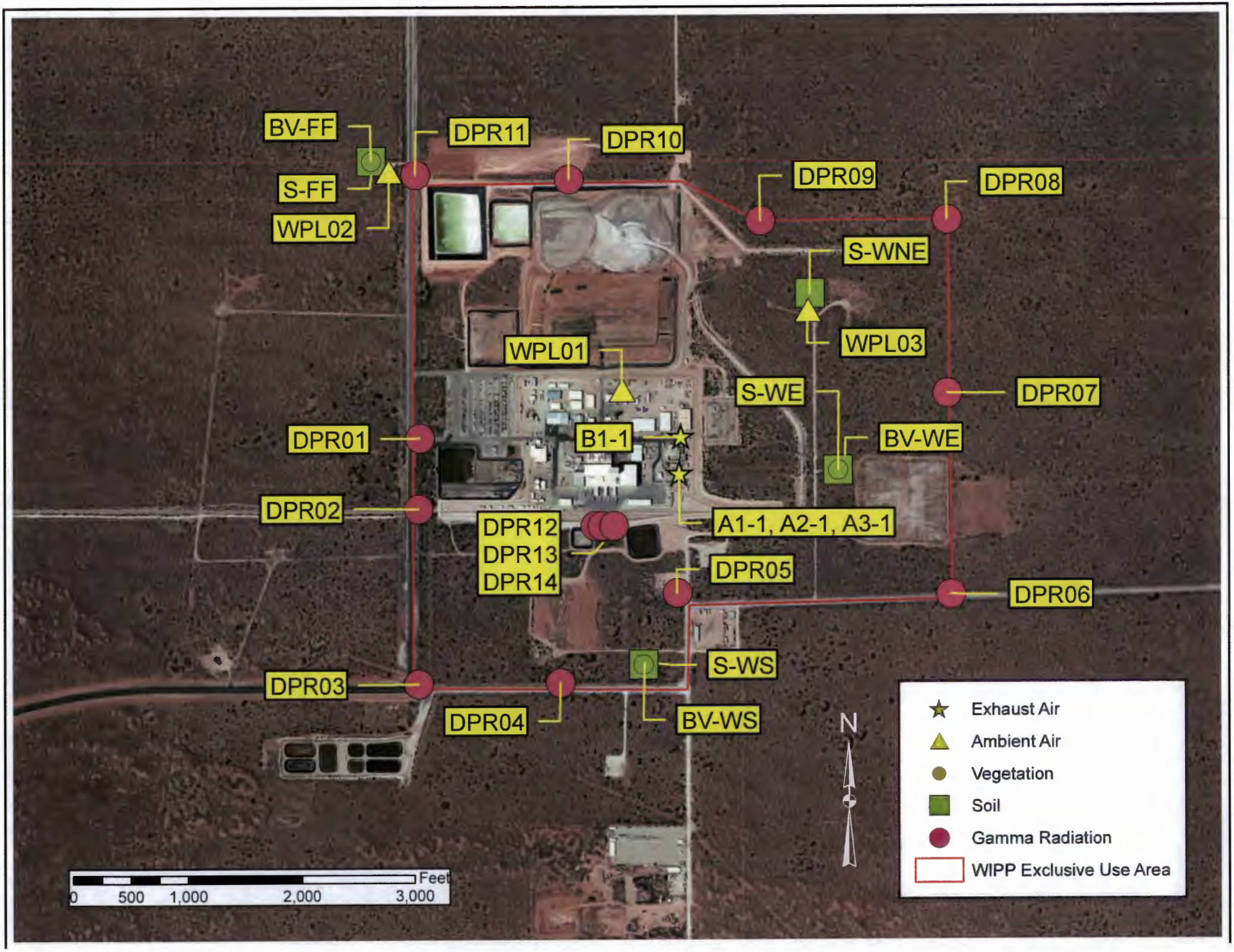
BV-FF
DPR11
DPR10
S-FF
WPL02
DPR09
DPR08
S-WNE
WPL03
WPL01
S-WE
DPR07
DPR01
B1-1
BV-WE
DPR02
A1-1, A2-1, A3-1
DPR12
DPR13
DPR14
DPR05
DPR06
S-WS
DPR03
DPR04
BV-WS
N
Exhaust Air
Ambient Air
Vegetation
Soil
Gamma Radiation
WIPP Exclusive Use Area
Feet
0
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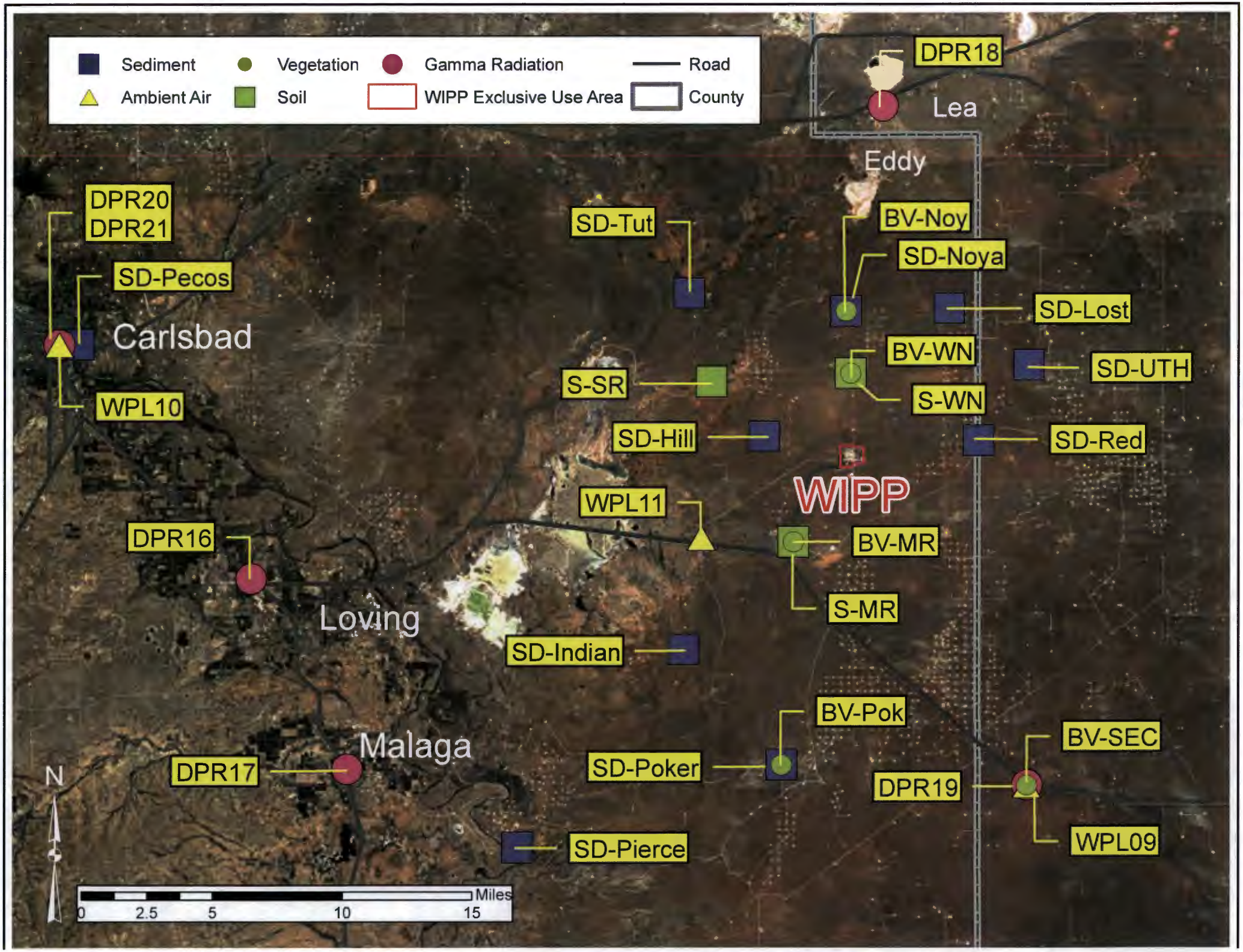
1,000
2,000
3,000


Sediment
Vegetation
Gamma Radiation
Road
Ambient Air
Soil
WIPP Exclusive Use Area
County
DPR18
Lea
Eddy
DPR20
DPR21
SD-Pecos
Carlsbad
WPL10
SD-Tut
BV-Noy
SD-Noya
SD-Lost
BV-WN
SD-UTH
S-SR
S-WN
SD-Hill
SD-Red
WIPP
WPL11
BV-MR
DPR16
S-MR
Loving
SD-Indian
BV-Pok
BV-SEC
Malaga
DPR17
SD-Poker
DPR19
WPL09
SD-Pierce
N
Miles
0
2.5
5
10
15