## Section 3

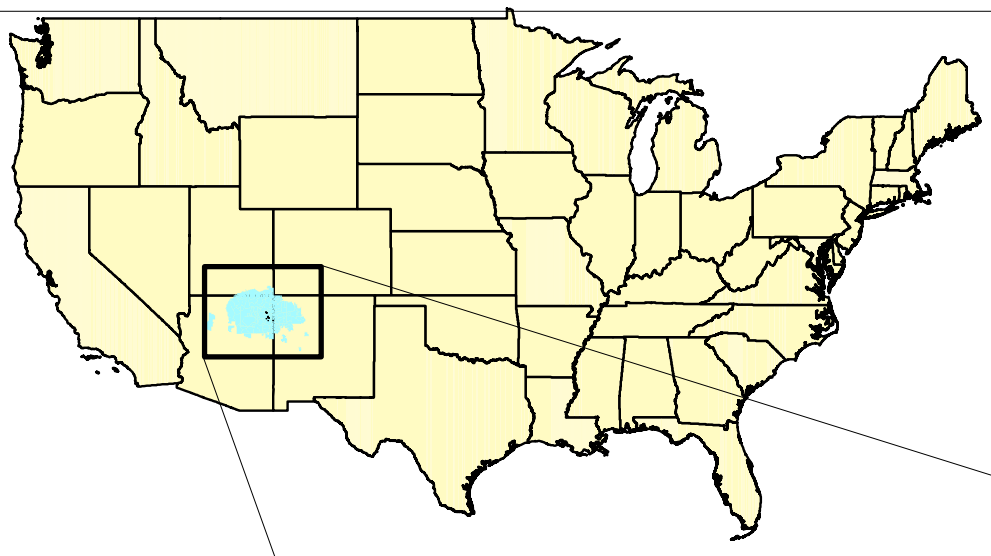
# CAMERON/TUBA CITY AREA

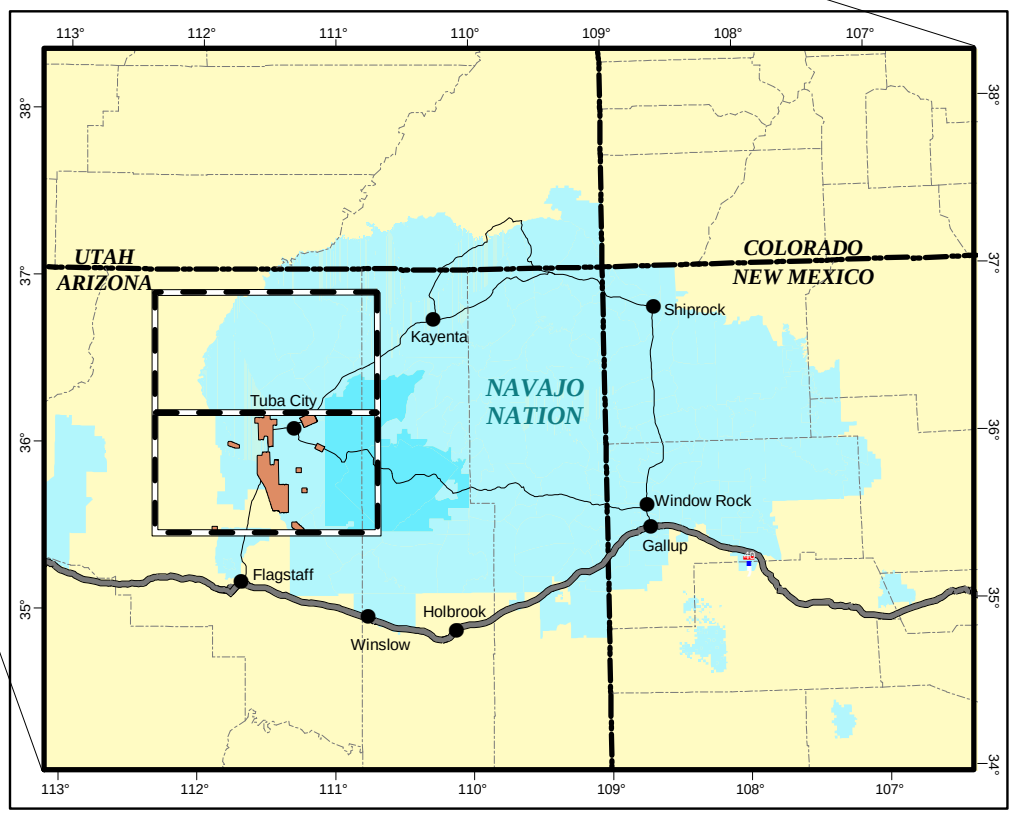
*United States Environmental Protection Agency*

**ABANDONED URANIUM MINES PROJECT**

# Cameron/Tuba City Area

# OVERVIEW MAP





Rabbit Brush Well

Shonto Well (3A-144)

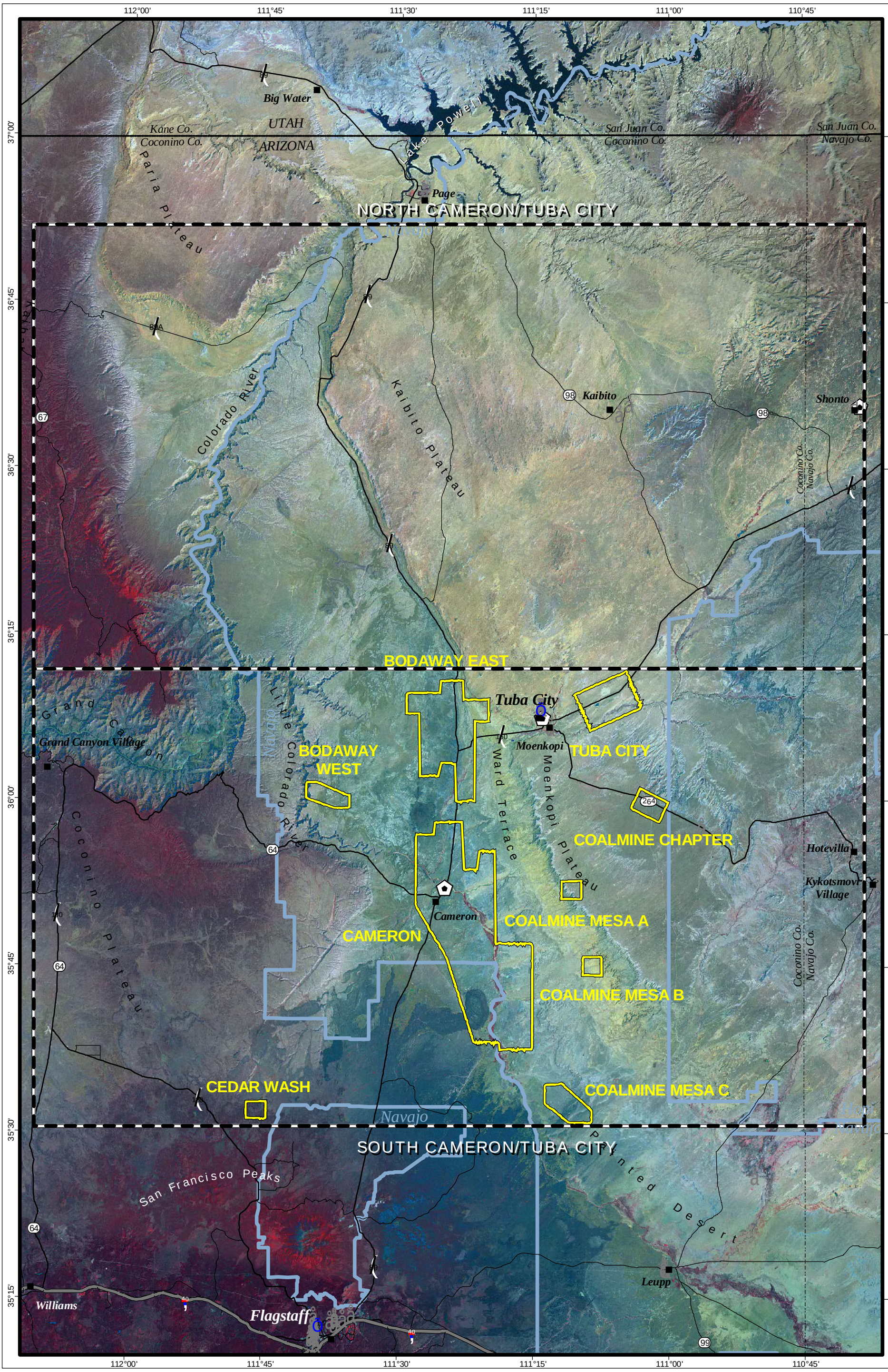
Goldtooth Spring

Tank 3A-149

The Cameron/Tuba City study area is located Iin northeastern Arizona on the western edge of the Navajo Nation. Some of the physiography of the area is shown above in photos taken by Glynn Alsup (USACE).

The overview map shown on the facing page provides the map extent boundary for the Cameron/Tuba City area maps presented in Section 3. Nine aerial radiation surveys were flown in the Cameron/Tuba City area: Bodaway East, Bodaway West, Cameron, Cedar Wash, Coalmine Chapter, Coalmine Mesa A, Coalmine Mesa B, Coalmine Mesa C, and Tuba City.

Water samples from 51 sites were collected in the Cameron/Tuba City area.




**MAP FEATURES**

- Map Extent Boundary
- Aerial Survey Boundary

# 4

## OVERVIEW MAP

10 0 10 Miles

10 0 10 Kilometers

Scale 1:600,000

*U.S. Environmental Protection Agency*

**ABANDONED URANIUM MINES PROJECT**

## Cameron/Tuba City Area

**ABANDONED URANIUM MINES PROJECT**

## SOUTH CAMERON/TUBA CITY AREA

# AERIAL RADIATION CONTOURS - GROSS COUNT

### Aerial Radiation Contours

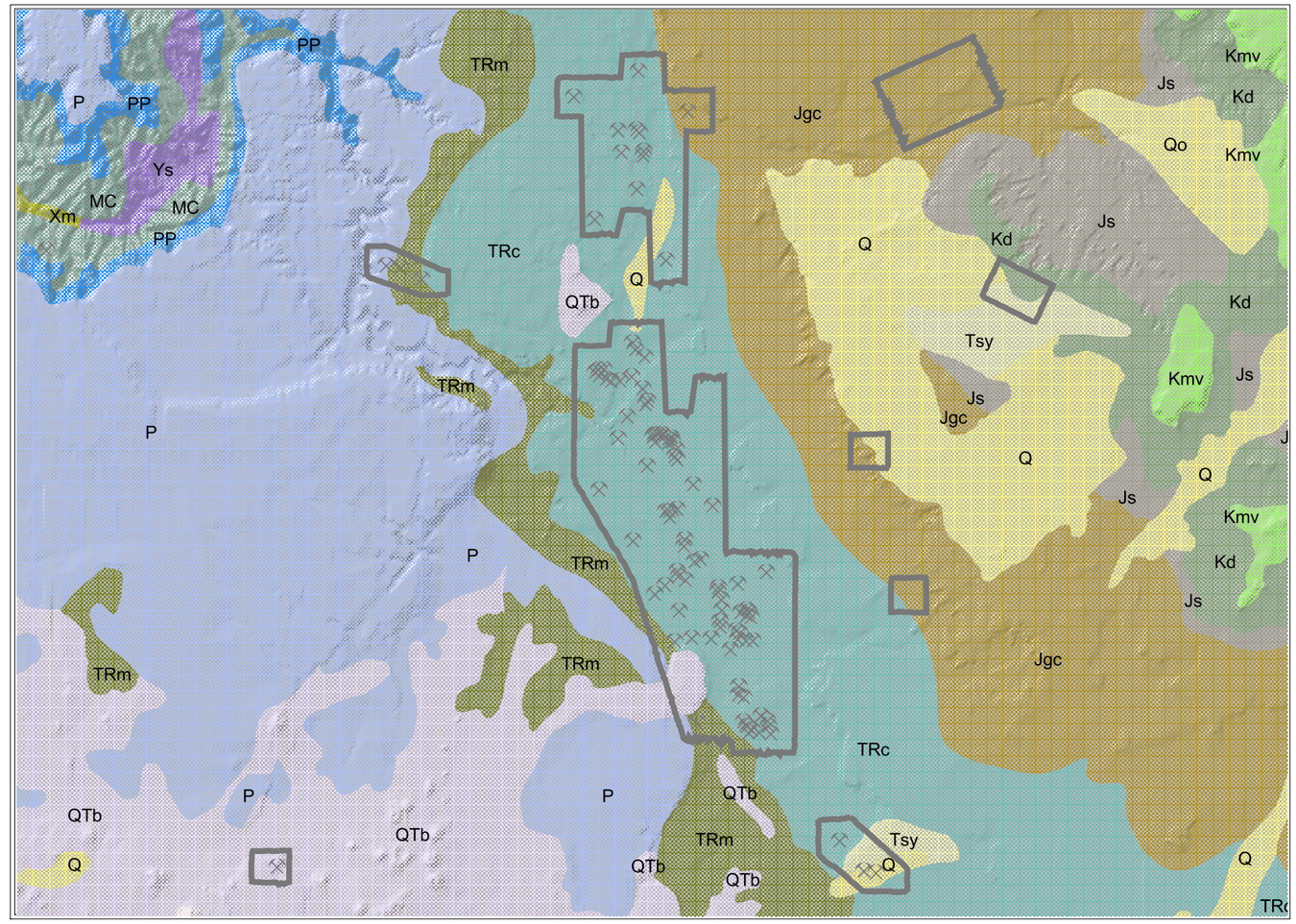
Derived terrestrial exposure rate at 1 meter above ground level. Does not include cosmic contribution (units: excess micro-R/hour)

- 9
- 12
- 16
- 24

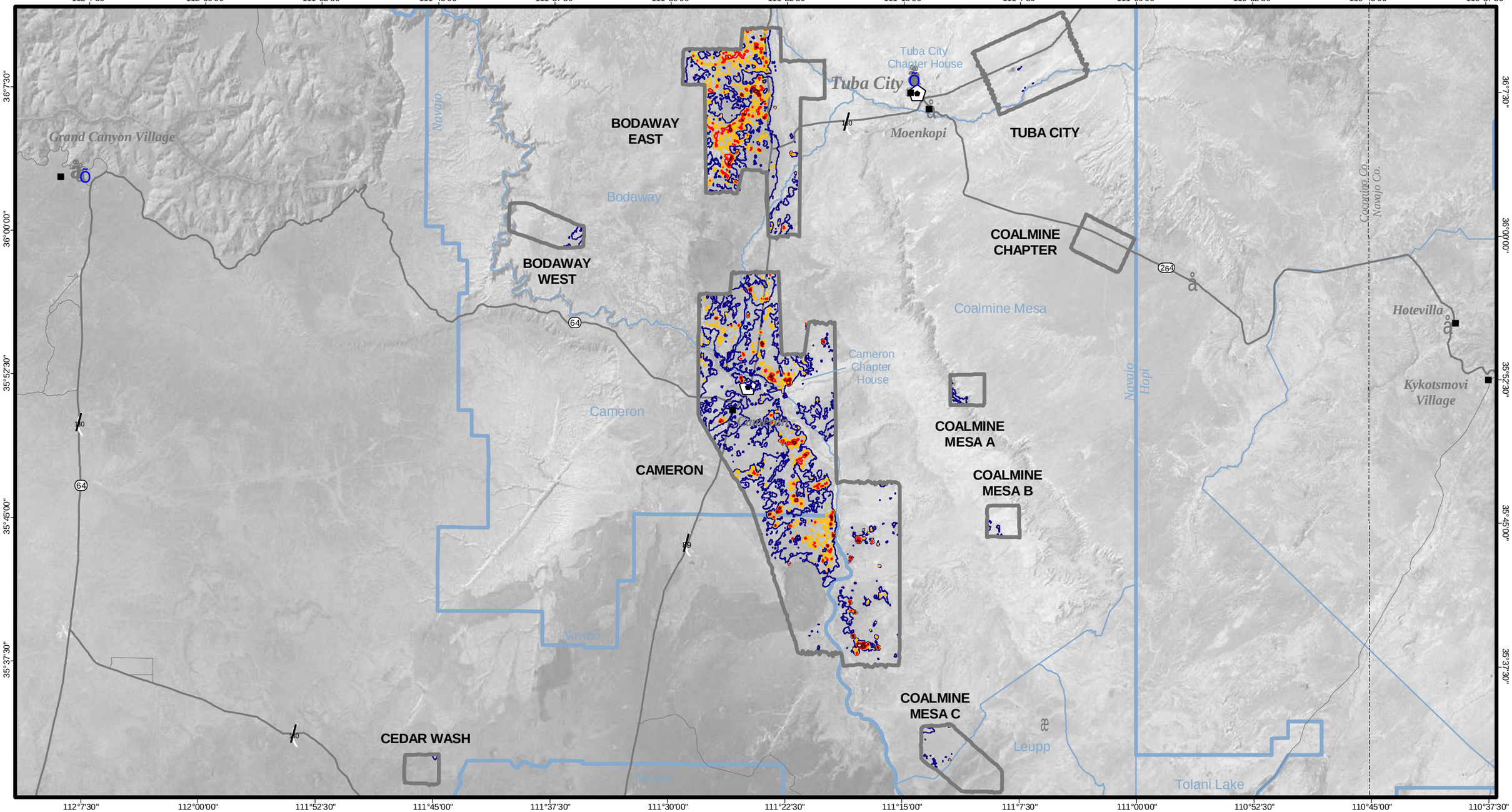
Aerial radiation contour values were compiled by Thane Hendricks, Department of Energy - Remote Sensing Laboratory. Units are in micro-Roentgens per hour. Derived from the total observed gamma spectrum. At the survey altitude of 150 feet, the footprint of the detection system is a circle approximately 300 feet in diameter. The data shown on this map are averages over this footprint at ground level.

**Geological Units (Age and Unit Description)**

- Q Quaternary Alluvium and Colluvium
- QTb Quaternary to Tertiary Basaltic Rocks
- Tsy Early Tertiary Sedimentary Rocks
- Kmv Cretaceous Mesa Verde Group
- Js Jurassic San Rafael Group
- Jgc Jurassic Glen Canyon Group
- TRc Triassic Chinle Formation
- TRm Triassic Moenkopi Formation
- P Permian Sedimentary Rocks
- PP Permian to Pennsylvanian Sedimentary Rocks
- MC Mississippian, Devonian, Cambrian Sedimentary Rocks
- Xm Early Proterozic Metamorphic Rocks




Sources: Aerial survey boundaries are from the Department of Energy, Remote Sensing Laboratory, Las Vegas, Nevada. Geological information from the Geologic Map of Arizona, GIS database (Richard and Kneale, 1997). Uranium mine locations shown above are approximate and were compiled from various sources by Thane Hendricks, Department of Energy, Remote Sensing Laboratory.




See facing page for legend

# 4

## AERIAL RADIATION CONTOURS GROSS COUNT

5 0 5 Miles

5 0 5 10 Kilometers

1:350,000

*U.S. Environmental Protection Agency*

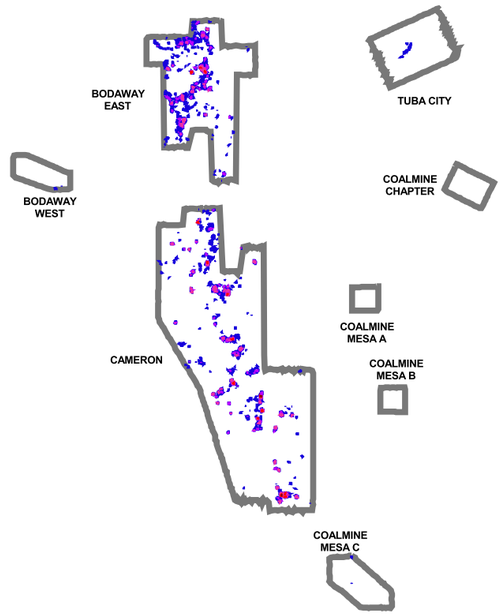
**ABANDONED URANIUM MINES PROJECT**

## South Cameron/Tuba City Area

**ABANDONED URANIUM MINES PROJECT**

## SOUTH CAMERON/TUBA CITY AREA

# AERIAL RADIATION CONTOURS - BISMUTH 214




| Aerial Radiation Contours | Derived contour-level Bismuth 214 photo-peak (excess counts per second) | Estimated exposure rate from excess Bismuth 214 (excess micro-R/hour) |
|---|---|---|
| | 80 | 3.5 |
| | 170 | 7.4 |
| | 250 | 10.9 |
| | 800 | 34.9 |
| | 1200 | 52.4 |

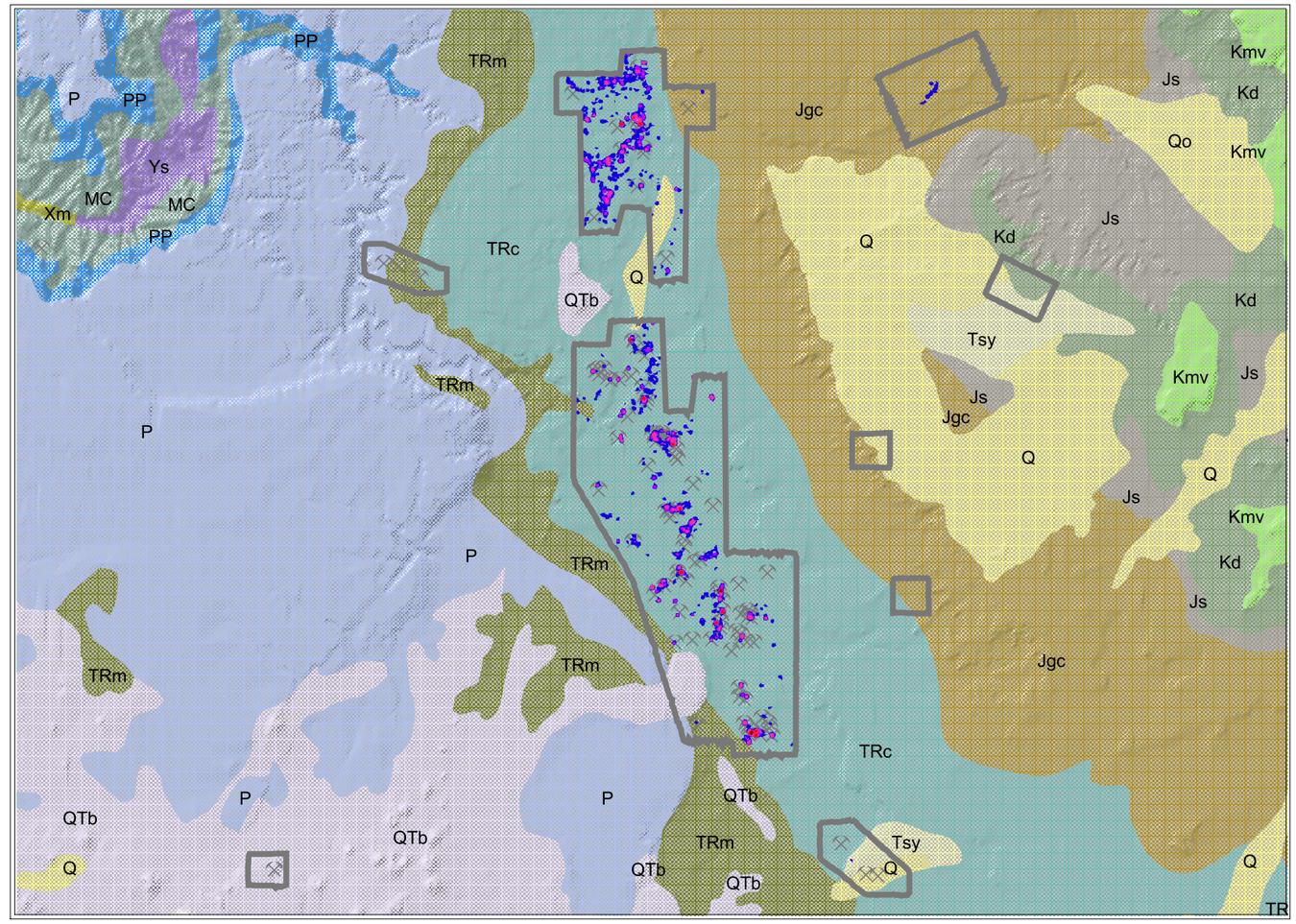
Aerial radiation contours are indicative of uranium concentrations higher than the regional levels.

Units are in micro-Roentgens per hour. The Bismuth 214 photo peak is at 1760 KeV. At the survey altitude of 150 feet above ground level, the footprint of the detection system is a circle approximately 300 feet in diameter. The data shown are averages over this footprint at ground level.

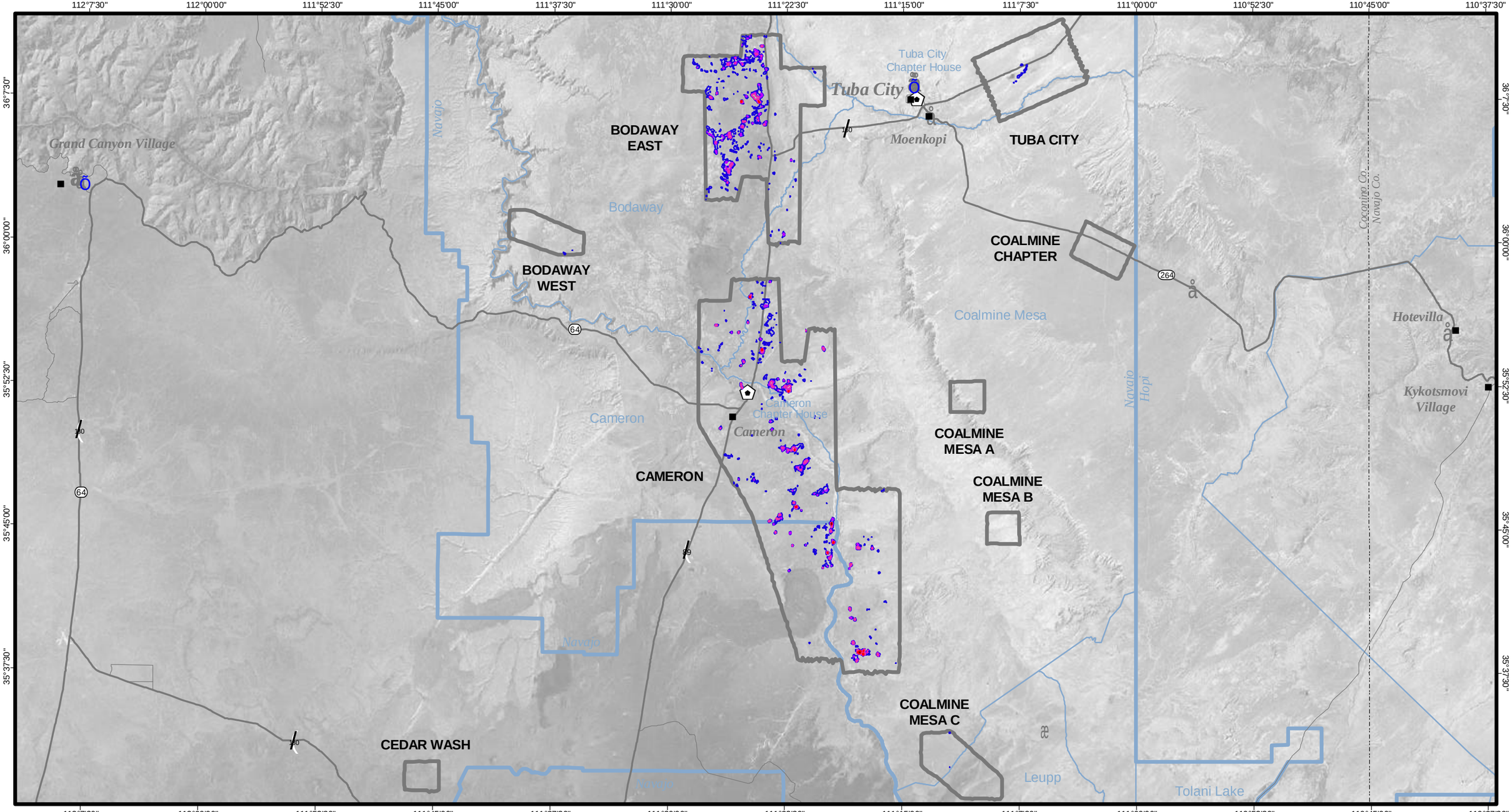
Derived and estimated values were compiled by Thane Hendricks, Department of Energy, Remote Sensing Laboratory, Las Vegas.

**Geological Units (Age and Unit Description)**

- Q — Quaternary Alluvium and Colluvium
- QTb — Quaternary to Tertiary Basaltic Rocks
- Tsy — Early Tertiary Sedimentary Rocks
- Kmv — Cretaceous Mesa Verde Group
- Js — Jurassic San Rafael Group
- Jgc — Jurassic Glen Canyon Group
- TRc — Triassic Chinle Formation
- TRm — Triassic Moenkopi Formation
- P — Permian Sedimentary Rocks
- PP — Permian to Pennsylvanian Sedimentary Rocks
- MC — Mississippian, Devonian, Cambrian Sedimentary Rocks
- Xm — Early Proterozic Metamorphic Rocks




Sources: Aerial survey boundaries are from the Department of Energy, Remote Sensing Laboratory, Las Vegas, Nevada. Geological information from the Geologic Map of Arizona, GIS database (Richard and Kneale, 1997). Uranium mine locations shown above are approximate and were compiled from various sources by Thane Hendricks, Department of Energy, Remote Sensing Laboratory.




**MAP FEATURES**

Aerial Survey Boundary

# 4

## AERIAL RADIATION CONTOURS
## BISMUTH 214

5 0 5 Miles

5 0 5 10 Kilometers

1:350,000

*U.S. Environmental Protection Agency*

**ABANDONED URANIUM MINES PROJECT**

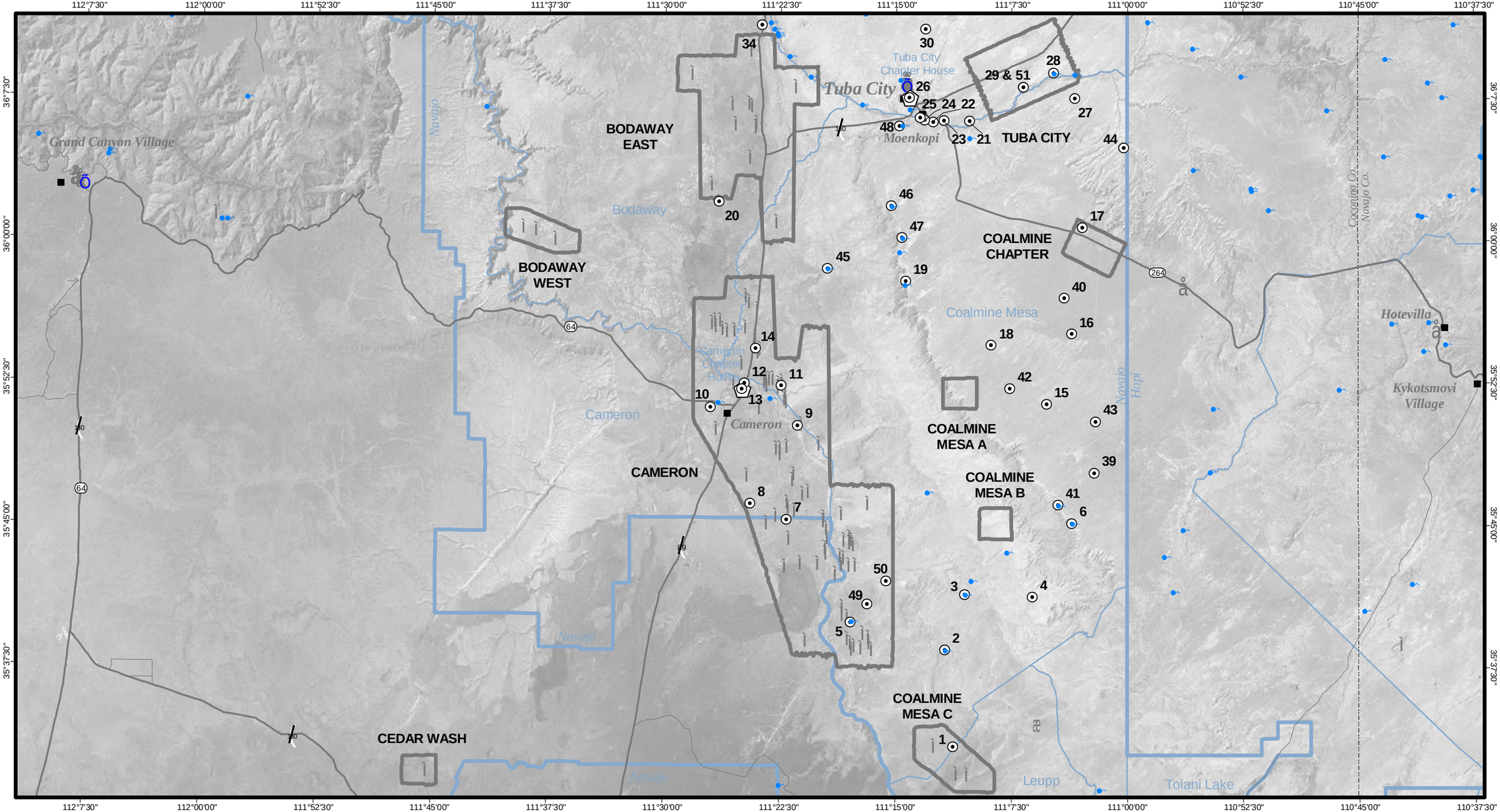
## South Cameron/Tuba City Area

# WATER SAMPLE INFORMATION

| Map ID[1] | Sample ID | Field Type | Sample Name | Longitude (DMS) (W) | Latitude (DSM) (N) | Elevation (ft) | Sample Date | Sample Time |
|---|---|---|---|---|---|---|---|---|
| 1 | CT980724CAS001 | Spring | Dry Spring Well | 111 11 16.100 | 35 33 20.4047 | 4626 | 24-Jul-98 | 11:50 AM |
| 2 | CT980729CMS004 | Spring | Badger Spring | 111 11 46.958 | 35 38 26.7611 | 4669 | 29-Jul-98 | 2:23 PM |
| 3 | CT980729CMS005 | Spring | Tse To Baah Naali Spring | 111 10 30.578 | 35 41 21.0048 | 4472 | 29-Jul-98 | 4:50 PM |
| 4 | CT980729CMS003 | Spring | Tohachi Spring | 111 6 8.23381 | 35 41 14.0106 | 4616 | 29-Jul-98 | 12:45 PM |
| 5 | CT980727CAS002 | Spring | Yellow Spring | 111 17 53.783 | 35 39 53.4894 | 4393 | 27-Jul-98 | 10:04 AM |
| 6 | CT980729CMS002 | Spring | Willow Spring | 111 3 34.8563 | 35 45 6.63598 | 5259 | 29-Jul-98 | 10:25 AM |
| 7 | CT980727CAW005 | Well | Shallow Well | 111 22 3.0996 | 35 45 18.3480 | 4242 | 27-Jul-98 | 2:19 PM |
| 8 | CT980727CAW004 | Wind Mill | Tank 3K-331 | 111 24 24.948 | 35 46 8.28541 | 4324 | 27-Jul-98 | 1:20 PM |
| 9 | CT980722CAW001 | Wind Mill | Tank 3T-538 | 111 21 21.106 | 35 50 15.4547 | 4078 | 22-Jul-98 | 1:33 PM |
| 10 | CT980724CAW003 | Wind Mill | Tank 3T-527 | 111 26 59.392 | 35 51 13.4334 | 4354 | 24-Jul-98 | 2:10 PM |
| 11 | CT980722CAM002 | Mine | Open Pit Mine | 111 22 24.600 | 35 52 20.8937 | 4068 | 22-Jul-98 | 11:34 AM |
| 12 | CT980724CAW002 | Well | Cameron Trading Post | 111 24 48.804 | 35 52 27.9545 | 4157 | 24-Jul-98 | 1:29 PM |
| 13 | CT990415CAW006 | Well | Cameron Chapter House | 111 24 58.047 | 35 52 10.5240 | 4213 | 15-Apr-99 | 1:57 PM |
| 14 | CT980722CAM003 | Mine | Open Pit Mine | 111 24 4.0187 | 35 54 18.9744 | 4104 | 22-Jul-99 | 11:35 AM |
| 15 | CT980728CMW005 | Wind Mill | Tank 3A-151 | 111 5 12.3522 | 35 51 24.1361 | 5358 | 28-Jul-98 | 3:05 PM |
| 16 | CT980810CMW006 | Wind Mill | Tank 3T-540 | 111 3 35.8643 | 35 55 4.78138 | 5860 | 10-Aug-98 | 11:49 PM |
| 17 | CT980728CMW003 | Wind Mill | Tank 3K-312 | 111 2 55.2288 | 36 0 41.35139 | 5755 | 28-Jul-98 | 12:54 PM |
| 18 | CT980728CMW004 | Wind Mill | Goldtooth Well | 111 8 48.6437 | 35 54 29.8847 | 5299 | 28-Jul-98 | 2:07 PM |
| 19 | CT980810CMS006 | Spring | Goldtooth Spring (Rock Spring) | 111 14 22.089 | 35 57 52.9931 | 5144 | 10-Aug-98 | 10:26 AM |
| 20 | CT980811TCW001 | Well | Shadow Mountain Well | 111 26 29.119 | 36 2 1.742999 | 4455 | 11-Aug-98 | 3:08 PM |
| 21 | CT980813HOS001 | Spring | Little Dog Spring | 111 13 10.606 | 36 6 22.19760 | 4649 | 13-Aug-98 | 10:57 AM |
| 22 | CT980813HOS003 | Spring | Wisemen Spring | 111 12 34.868 | 36 6 17.09881 | 4577 | 13-Aug-98 | 1:16 PM |
| 23 | CT980813HOS002 | Spring | Gaging Station Spring | 111 11 55.221 | 36 6 20.24578 | 4626 | 13-Aug-98 | 11:57 AM |
| 24 | CT980813HOW001 | Spring | Lower Moenkopi Well | 111 13 10.596 | 36 6 22.21199 | 4570 | 13-Aug-98 | 2:38 PM |
| 25 | CT980813HOS004 | Spring | Yellowjacket Spring | 111 13 25.737 | 36 6 30.68640 | 4642 | 13-Aug-98 | 3:19 PM |
| 26 | CT990415TCW006 | Well | Tuba City Chapter House | 111 14 8.5193 | 36 7 32.77739 | 4833 | 15-Apr-99 | 12:35 PM |
| 27 | CT980728CMW001 | Wind Mill | Tank 3T-541 | 111 3 23.9082 | 36 7 29.27038 | 5108 | 28-Jul-98 | 10:57 AM |
| 28 | CT980811TCS001 | Spring | Lechee Spring | 111 4 46.2713 | 36 8 51.53341 | 4787 | 11-Aug-98 | 10:34 AM |
| 29 | CT980811TCS002 | Spring | Shonto Well (3A-144) | 111 6 43.5750 | 36 8 4.637400 | 4695 | 11-Aug-98 | 11:49 AM |
| 30 | CT980812TCW004 | Well | Rabbit Brush Well | 111 13 4.9493 | 36 11 8.62861 | 5121 | 12-Aug-98 | 12:52 PM |
| 34 | CT980804BGS001 | Spring | Hidden Spring | 111 23 42.337 | 36 11 21.9011 | 4734 | 04-Aug-98 | 5:54 PM |
| 39 | CT000107CMW007 | Wind Mill | Tank 3T-547 | 111 2 7.21258 | 35 47 46.8959 | 5410 | 07-Jan-00 | 12:03 PM |
| 40 | CT000107CMW008 | Wind Mill | Tank 3A-149 | 111 4 4.45439 | 35 56 58.6344 | 5820 | 07-Jan-00 | 2:52 PM |
| 41 | CT000119CMS008 | Spring | Gold Spring | 111 4 28.4861 | 35 46 4.19761 | 5260 | 19-Jan-00 | 1:34 PM |
| 42 | CT000119CMW010 | Wind Mill | 3-T-504 | 111 7 36.6149 | 35 52 13.7646 | 5397 | 19-Jan-00 | 3:25 PM |
| 43 | CT000119CMW011 | Wind Mill | 3-K-328 | 111 2 2.33339 | 35 50 29.2373 | 5693 | 19-Jan-00 | 4:46 PM |
| 44 | CT000120CMS008 | Spring | Al Hasteen Nez Spring | 111 0 13.9859 | 36 4 54.38881 | 5030 | 20-Jan-00 | 11:30 AM |
| 45 | CT000120CMS009 | Spring | Fivemile Wash Spring | 111 19 24.759 | 35 58 31.9068 | 4418 | 20-Jan-00 | 4:00 PM |
| 46 | CT000124CMS010 | Spring | Toh Nee Di Kishi | 111 15 18.163 | 36 1 50.06820 | 4969 | 24-Jan-00 | 1:30 PM |
| 47 | CT000125CMS011 | Spring | Tohnalea | 111 14 36.334 | 36 0 10.31461 | 4968 | 25-Jan-00 | 1:00 PM |
| 48 | CT000125CMS012 | Spring | Harry Goldtooth Spring | 111 14 47.780 | 36 6 1.505987 | 4610 | 25-Jan-00 | 5:00 PM |
| 49 | CT991130CAS003 | Spring | Balokai Spring | 111 16 48.436 | 35 40 51.3041 | 4532 | 30-Nov-99 | 3:23 PM |
| 50 | CT991130CAW007 | Well | Paddock Well | 111 15 36.882 | 35 42 3.66299 | 4240 | 30-Nov-99 | 4:21 PM |
| 51 | Shonto Well -DOE | Well | Shonto Well -DOE | 111 6 43.5750 | 36 8 4.637400 | NA | 17-Aug-99 | NA |

1. Water sample information for MAP IDs 31, 32, 33, 35, 36, 37, and 38 are found on the following data page (3.10) for North Cameron/Tuba City.

NA = Not Available




**MAP FEATURES**

- Water Sample Site
- Spring (GNIS) used in project planning
- Mine or Mineral occurrence (MRDS and MILS) used in project planning

# 4

## WATER SAMPLE LOCATIONS

5 0 5 Miles

5 0 5 10 Kilometers

1:350,000

*U.S. Environmental Protection Agency*

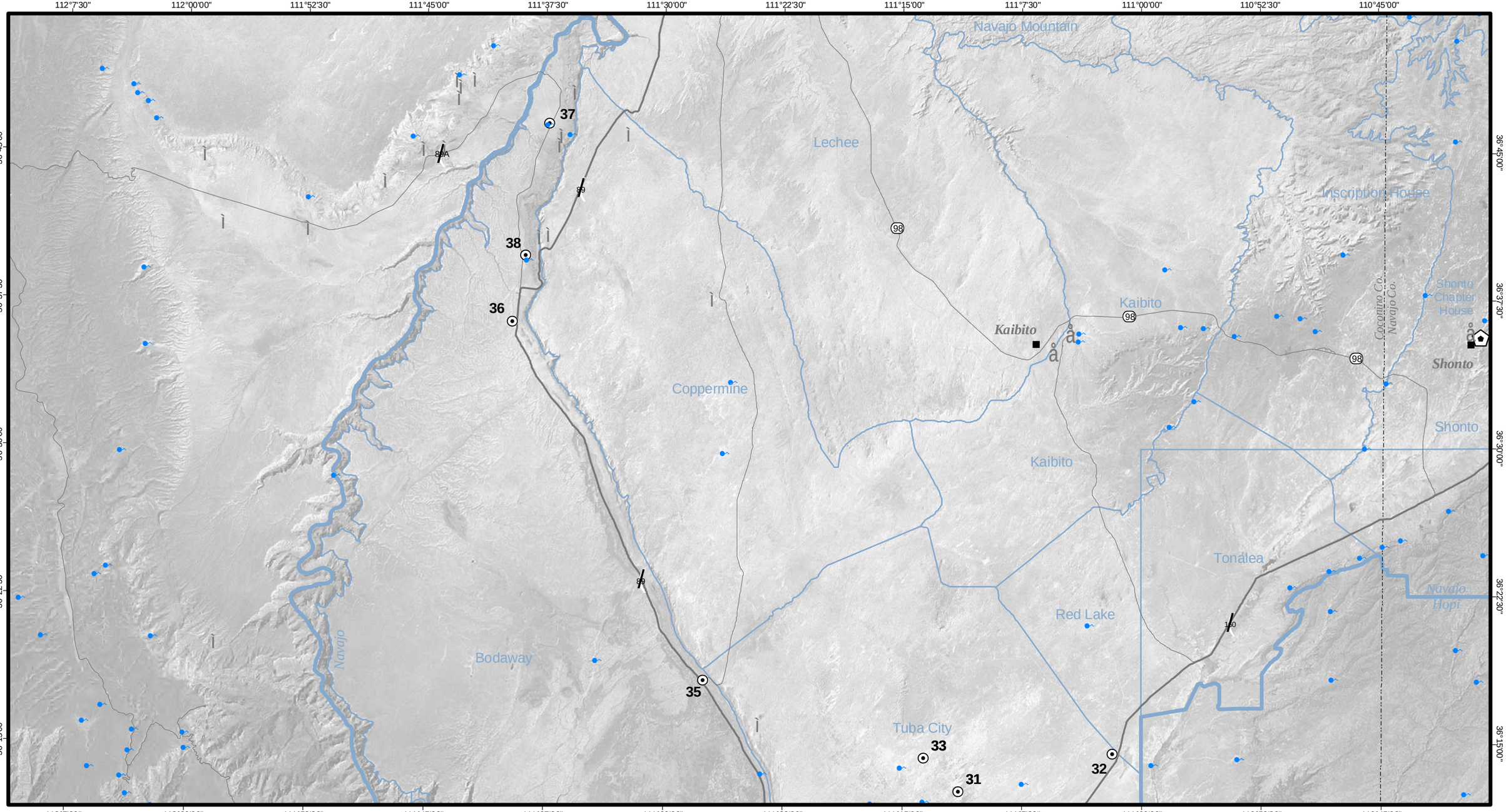
**ABANDONED URANIUM MINES PROJECT**

## South Cameron/Tuba City Area

# WATER SAMPLE INFORMATION

| Map ID[1] | Sample ID | Field Type | Sample Name | Longitude (DMS) (W) | Latitude (DSM) (N) | Elevation (ft) | Sample Date | Sample Time |
|---|---|---|---|---|---|---|---|---|
| 31 | CT980812TCW003 | Wind Mill | Navajo John Well | 111 11 29.109 | 36 12 37.4069 | 5157 | 12-Aug-98 | 12:02 PM |
| 32 | CT980812TCW002 | Wind Mill | Tank-Middle Mesa (1T-518) | 111 1 48.5777 | 36 14 30.1602 | 5541 | 12-Aug-98 | 11:16 AM |
| 33 | CT980812TCW005 | Wind Mill | Standing Rock Well | 111 13 39.565 | 36 14 18.7032 | 5207 | 12-Aug-98 | 1:51 PM |
| 35 | CT980804BGW001 | Well | Bodaway Gap Chapter House | 111 27 30.440 | 36 18 13.6475 | 5207 | 04-Aug-98 | 3:36 PM |
| 36 | CT980805BGW004 | Wind Mill | Tanner Wash Windmill | 111 39 35.153 | 36 36 22.4453 | 5059 | 05-Aug-98 | 11:44 AM |
| 37 | CT980805BGS002 | Spring | Navajo Spring | 111 37 17.996 | 36 46 27.9954 | 3894 | 05-Aug-98 | 12:51 PM |
| 38 | CT980805BGS003 | Spring | Toh De Koinsh Spring | 111 38 45.435 | 36 39 44.4876 | 4869 | 05-Aug-98 | 3:08 PM |

1. Water sample information for MAP IDs 1-30, 34, and 39-51 are found on the previous data page (3.08) for South Cameron/Tuba City.




**MAP FEATURES**

- Water Sample Site
- Spring (GNIS) used in project planning
- Mine or Mineral occurrence (MRDS and MILS) used in project planning

# 4

## WATER SAMPLE LOCATIONS

5 0 5 Miles

5 0 5 10 Kilometers

1:350,000

*U.S. Environmental Protection Agency*

**ABANDONED URANIUM MINES PROJECT**

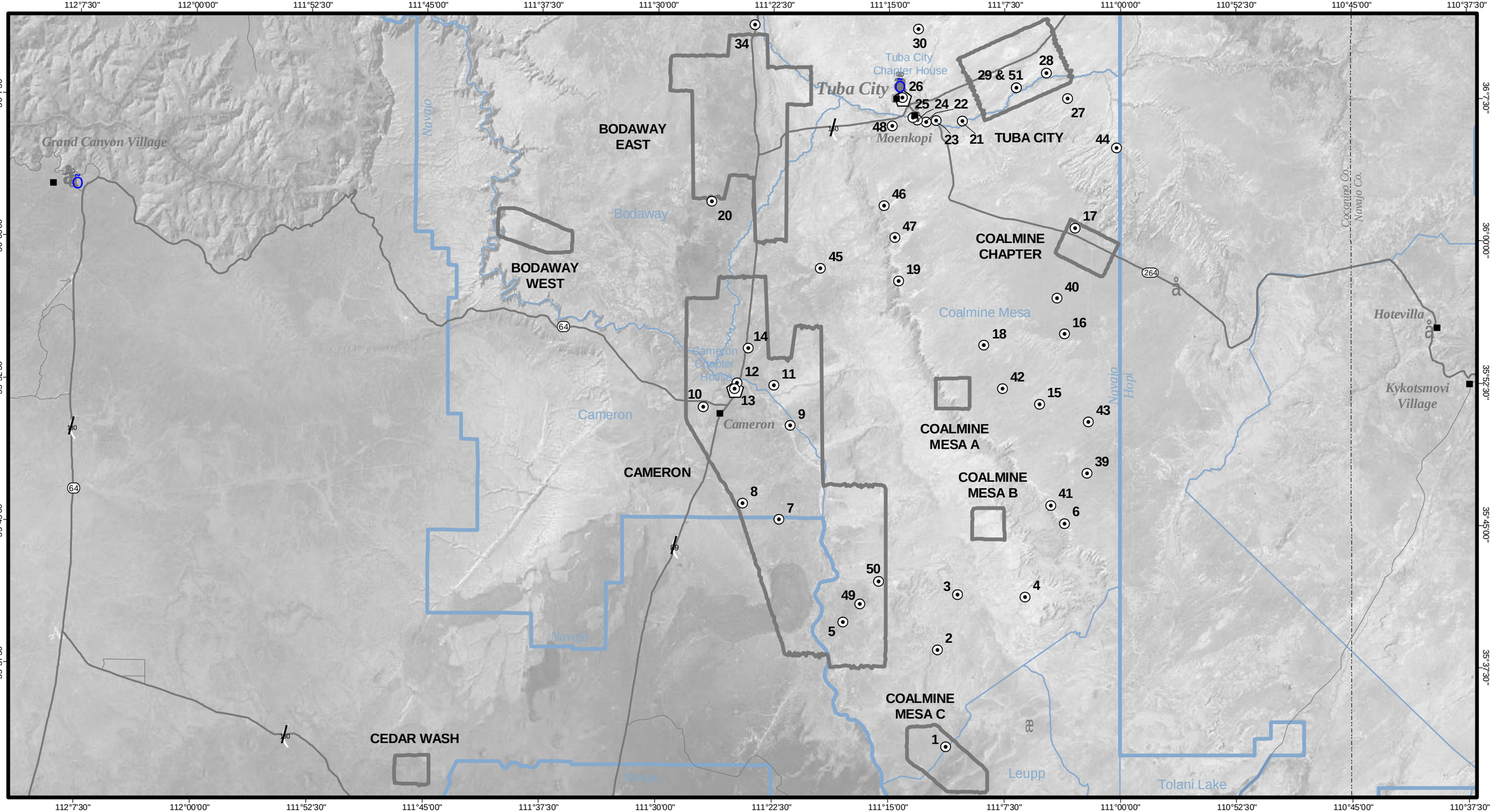
## North Cameron/Tuba City Area

# WATER SAMPLE ANALYSIS FOR STABLE METALS

| Map ID[9] | Sample ID | Sample Name | Al | Sb[2] | As[2,4] | Ba | Be[2,4] | Cd[2,4] | Cr[2,5] | Cu[2] | Fe[2] | Pb | Mn[2] | Hg[2] | Ni[2] | Se[2] | Ag[2] | Th[2,5] | V[2] | Zn[2] | ILCRsta[1,7] | HI[3,7] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Primary MCLs in Micrograms per Liter (µg/L)[7] | 1000 | 6 | 50 | 1000 | 4 | 5 | 100 | 1300 | 300 | 15 | 50 | 2 | None | 50 | 100 | 2 | None | 5000 | | |
| | | PRG Limits in Micrograms per Liter (µg/L)[8] | 37000 | 15 | 0.045 | 2600 | 73 | 18 | 180 | 1400 | 11000 | 4 | 1700 | 11 | 730 | 189 | 180 | 2.6 | 260 | 11000 | | |
| 1 | CT980724CAS001 | Dry Spring Well | 107.0 | 0 | 3.7 | 75.4 | 0 | 0 | 0 | 0 | 0 | 0 | 0.7 | 0 | 0 | 0 | 0 | 0 | 21.6 | 7.9 | 8.22E-05 | 0.45 |
| 2 | CT980729CMS004 | Badger Spring | 161.0 | 0 | 51.1 | 57.4 | 0 | 0 | 0 | 4.7 | 90.3 | 0 | 2.1 | 0.019 | 0 | 0 | 0 | 2.9 | 409.0 | 40.1 | 1.14E-03 | 7.38 |
| 3 | CT980729CMS005 | Tse To Baah Naali Spring | 868.0 | 0 | 31.9 | 55.1 | 0 | 0 | 0 | 2.3 | 344.0 | 0 | 5.2 | 0.025 | 0 | 6.2 | 0 | 5.7 | 209.0 | 10.3 | 7.09E-04 | 6.01 |
| 4 | CT980729CMS003 | Tohachi Spring | 63.0 | 0 | 54.8 | 23.0 | 0 | 0 | 0 | 3.3 | 0 | 4.0 | 0.6 | 0 | 0 | 12.5 | 0 | 0 | 256.0 | 158.0 | 1.22E-03 | 6.06 |
| 5 | CT980727CAS002 | Yellow Spring | 52.2 | 0 | 6.2 | 32.2 | 0 | 0 | 0 | 124 | 951.0 | 4.4 | 54.2 | 0 | 0 | 0 | 0 | 3.3 | 30.3 | 112.0 | 1.38E-04 | 2.18 |
| 6 | CT980729CMS002 | Willow Spring | 61.9 | 0 | 0 | 45.2 | 0.1 | 0 | 0 | 36.6 | 2,080.0 | 4.9 | 10.8 | 0 | 0 | 0 | 0 | 0 | 29.1 | 158.0 | 0.00E+00 | 0.37 |
| 7 | CT980727CAW005 | Shallow Well | 61900.0 | 0 | 6.6 | 773.0 | 3.7 | 2.4 | 27.0 | 91.4 | 37,100.0 | 51.3 | 1360.0 | 0.130 | 31.9 | 21.6 | 0 | 0 | 103.0 | 871.0 | 1.47E-04 | 7.80 |
| 8 | CT980727CAW004 | Tank 3K-331 | 63.5 | 0 | 0 | 28.6 | 0 | 0 | 0 | 5.9 | 275.0 | 0 | 25.4 | 0 | 0 | 0 | 0 | 0 | 0 | 1,610.0 | 0.00E+00 | 0.20 |
| 9 | CT980722CAW001 | Tank 3T-538 | 116.0 | 0 | 0 | 30.5 | 0 | 0 | 0 | 0.0 | 315.0 | 0 | 11.0 | 0 | 0 | 0 | 0 | 0 | 0 | 85.1 | 0.00E+00 | 0.06 |
| 10 | CT980724CAW003 | Tank 3T-527 | 35.2 | 0 | 0 | 26.1 | 0 | 0 | 0 | 8.7 | 267.0 | 0 | 2.7 | 0 | 0 | 3.7 | 0 | 0 | 4.8 | 151.0 | 0.00E+00 | 0.09 |
| 11 | CT980722CAM002 | Open Pit Mine | 82500.0 | 0 | 29.8 | 1,150.0 | 5 | 0.9 | 14.4 | 89.0 | 26400.0 | 38.0 | 709 | 0.16 | 17.4 | 3.8 | 0 | 0 | 125.0 | 88.3 | 6.62E-04 | 9.02 |
| 12 | CT980724CAW002 | Cameron Trading Post | 88.8 | 0 | 3.3 | 16.8 | 0 | 0 | 0 | 14.6 | 55.4 | 0 | 24.9 | 0.009 | 0 | 0 | 0 | 0 | 0 | 8.3 | 7.33E-05 | 0.34 |
| 13 | CT990415CAW006 | Cameron Chapter House | 0 | 0 | 3.5 | 30.7 | 0 | 0 | 0 | 0 | 50.3 | 1.1 | 65.2 | 0 | 0 | 0 | 0 | 0 | 0 | 964.0 | 7.78E-05 | 0.46 |
| 14 | CT980722CAM003 | Open Pit Mine | 463000.0 | 4.3 | 145.0 | 7,690.0 | 42.5 | 6.4 | 44.8 | 468.0 | 139000.0 | 343.0 | 4140.0 | 0.44 | 82.5 | 3.6 | 0 | 0 | 322.0 | 444.0 | 3.22E-03 | 47.03 |
| 15 | CT980728CMW00 | Tank 3A-151 | 44.7 | 0 | 0 | 1.7 | 0 | 0 | 0 | 9.8 | 636.0 | 0 | 12.6 | 0 | 0 | 0 | 0 | 0 | 0 | 122 | 0.00E+00 | 0.09 |
| 16 | CT980810CMW00 | Tank 3T-540 | 49.1 | 0 | 0 | 38.8 | 0 | 0 | 0 | 0 | 54.0 | 0 | 107.0 | 0.022 | 0 | 0 | 0 | 0 | 0 | 965.0 | 0.00E+00 | 0.17 |
| 17 | CT980728CMW00 | Tank 3K-312 | 43.8 | 0 | 0 | 49.7 | 0 | 0 | 0 | 1.9 | 56.8 | 0 | 15.0 | 0 | 0 | 0 | 0 | 0 | 0 | 110.0 | 0.00E+00 | 0.05 |
| 18 | CT980728CMW00 | Goldtooth Well | 46.5 | 0 | 0 | 8.8 | 0 | 0 | 0 | 13.7 | 1,440.0 | 0 | 11.0 | 0.008 | 0 | 0 | 0 | 3.1 | 0 | 149.0 | 0.00E+00 | 1.36 |
| 19 | CT980810CMS006 | Goldtooth Spring (Rock Spring) | 118.0 | 0 | 3.9 | 121.0 | 0 | 0 | 0 | 3.4 | 74.6 | 0 | 189.0 | 0.16 | 0 | 0 | 0 | 0 | 36.3 | 35.5 | 8.67E-05 | 0.67 |
| 20 | CT980811TCW001 | Shadow Mountain Well | 94.6 | 0 | 6.6 | 72.6 | 0 | 0 | 0 | 8.0 | 674.0 | 0 | 18.3 | 0.16 | 0 | 0 | 0 | 3.3 | 9.2 | 36.1 | 1.47E-04 | 2.02 |
| 21 | CT980813HOS001 | Little Dog Spring | 531.0 | 0 | 2.8 | 91.3 | 0 | 0 | 0 | 2.7 | 230.0 | 0 | 21.8 | 0.19 | 0 | 0 | 0 | 0 | 3.4 | 4.4 | 6.22E-05 | 0.35 |
| 22 | CT980813HOS003 | Wisemen Spring | 521.0 | 0 | 0 | 26.3 | 0 | 0 | 0 | 0 | 257.0 | 0 | 13.3 | 0.18 | 0 | 0 | 0 | 0 | 7.7 | 3.9 | 0.00E+00 | 0.09 |
| 23 | CT980813HOS002 | Gaging Station Spring | 118.0 | 0 | 0 | 99.5 | 0 | 0 | 0 | 0 | 40.3 | 0 | 8.2 | 0.17 | 0 | 0 | 0 | 0 | 6.6 | 7.6 | 0.00E+00 | 0.08 |
| 24 | CT980813HOW001 | Lower Moenkopi Well | 53.0 | 0 | 3.8 | 55.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.12 | 0 | 0 | 0 | 0 | 6.6 | 84.5 | 8.44E-05 | 0.40 |
| 25 | CT980813HOS004 | Yellowjacket Spring | 335.0 | 0 | 3.4 | 95.2 | 0 | 0 | 0 | 2.1 | 141.0 | 0 | 31.7 | 0 | 0 | 3.4 | 0 | 4.8 | 29.3 | 7.3 | 7.56E-05 | 2.37 |
| 26 | CT990415TCW006 | Tuba City Chapter House | 40.9 | 3.8 | 2.6 | 46.6 | 0 | 0 | 0 | 11.8 | 21.8 | 0 | 0.0 | 0 | 0 | 0 | 0 | 3.2 | 9.4 | 12.1 | 5.78E-05 | 1.79 |
| 27 | CT980728CMW00 | Tank 3T-541 | 55.8 | 0 | 7.3 | 16.2 | 0 | 0 | 0 | 3.8 | 76.1 | 0 | 3.9 | 0 | 0 | 0 | 0 | 0 | 67.7 | 79.5 | 1.62E-04 | 0.95 |
| 28 | CT980811TCS001 | Lechee Spring | 68.8 | 0 | 0 | 60.3 | 0 | 0 | 0 | 3.8 | 76.7 | 0 | 0.7 | 0.22 | 0 | 8.2 | 0 | 3.0 | 9.0 | 100 | 0.00E+00 | 1.28 |
| 29 | CT980811TCS002 | Shonto Well (3A-144) | 19100.0 | 0 | 30.8 | 365.0 | 0.7 | 1.1 | 18.7 | 87.1 | 20,200.0 | 81.8 | 500.0 | 0.39 | 13.5 | 5.4 | 0 | 0 | 73.2 | 2,110.0 | 6.84E-04 | 6.35 |
| 30 | CT980812TCW004 | Rabbit Brush Well | 50.7 | 0 | 5.2 | 76.4 | 0 | 0 | 0 | 3.9 | 208.0 | 0 | 2.5 | 0.22 | 0 | 0 | 0 | 0 | 20.6 | 96.4 | 1.16E-04 | 0.62 |
| 34 | CT980804BGS001 | Hidden Spring | 90.9 | 0 | 10.3 | 53.2 | 0.1 | 0 | 10.6 | 9.3 | 0 | 0 | 0.4 | 0.031 | 0 | 11.5 | 0 | 6.9 | 234.0 | 11.8 | 2.29E-04 | 4.65 |
| 39 | CT000107CMW00 | Tank 3T-547 | 0 | 0 | 0 | 0.6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.00E+00 | 0 |
| 40 | CT000107CMW00 | Tank 3A-149 | 0 | 0 | 1.2 | 23.4 | 0 | 1.1 | 0 | 3.9 | 571.0 | 1.2 | 2.2 | 0 | 0 | 0 | 0 | 0 | 0 | 278.0 | 2.67E-05 | 0.26 |
| 41 | CT000119CMS008 | Gold Spring | 1540.0 | 0 | 0.5 | 34.4 | 0 | 0 | 0 | 0 | 942.0 | 2.1 | 129.0 | 0 | 0 | 1.3 | 0 | 0 | 5.9 | 13.4 | 1.20E-05 | 0.30 |
| 42 | CT000119CMW01 | 3-T-504 | 0 | 0 | 0.6 | 1.2 | 0 | 0 | 0 | 31.1 | 1,650.0 | 1.3 | 42.4 | 0 | 0 | 0 | 0 | 0 | 0 | 182.0 | 1.31E-05 | 0.27 |
| 43 | CT000119CMW01 | 3-K-328 | 31.0 | 0 | 0 | 32.2 | 0 | 0 | 0 | 0 | 238.0 | 0.7 | 12.9 | 0 | 0 | 1.6 | 0 | 0 | 0 | 229 | 0.00E+00 | 0.07 |
| 44 | CT000120CMS008 | Al Hasteen Nez Spring | 311.0 | 0 | 1.3 | 21.8 | 0 | 0.2 | 0 | 0 | 253.0 | 2.4 | 234.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.89E-05 | 0.31 |
| 45 | CT000120CMS009 | Fivemile Wash Spring | 479.0 | 0 | 8.9 | 207.0 | 0 | 0.1 | 0 | 0 | 227.0 | 0 | 32.8 | 0 | 0 | 9.8 | 0 | 0 | 19.0 | 0 | 1.97E-04 | 1.07 |
| 46 | CT000124CMS010 | Toh Nee Di Kishi | 237.0 | 0 | 5.4 | 13.4 | 0 | 0 | 0 | 0 | 184.0 | 0 | 4.8 | 0 | 0 | 5.7 | 0 | 0 | 8.4 | 0 | 1.20E-04 | 0.58 |
| 47 | CT000125CMS011 | Tohnalea | 18100.0 | 0 | 8.5 | 159.0 | 0 | 0.2 | 6.2 | 17.5 | 11300.0 | 11.5 | 411 | 0.016 | 7.0 | 2.1 | 0 | 0 | 35.7 | 55.7 | 1.88E-04 | 2.81 |
| 48 | CT000125CMS012 | Harry Goldtooth Spring | 19000.0 | 0 | 6.8 | 143.0 | 0 | 0.1 | 5.8 | 3.5 | 11,300.0 | 2.9 | 239.0 | 0 | 6.8 | 15.1 | 0 | 0 | 43.2 | 29.2 | 1.52E-04 | 2.66 |
| 49 | CT991130CAS003 | Balokai Spring | 0 | 0 | 9.0 | 18.5 | 0 | 0 | 0 | 0 | 0 | 0 | 2.0 | 0 | 0 | 3.2 | 0 | 0 | 43.2 | 4.4 | 2.01E-04 | 1.01 |
| 50 | CT991130CAW007 | Paddock Well | 56.0 | 0 | 25.3 | 71.6 | 0 | 0.1 | 4.6 | 15.4 | 73.0 | 1.7 | 1.1 | 0 | 0 | 8.5 | 0 | 0 | 173.0 | 33.4 | 5.62E-04 | 3.09 |
| 51 | Shonto Well -DOE | Shonto Well - DOE | 0 | 0 | 4.9 | 79.3 | 0 | 0 | 0 | 0 | 30.8 | 0 | 0 | 0 | 0 | 3.7 | NA | 0 | NA | 17.8 | 1.09E-04 | 0.50 |

1. ILCR = Incremental Lifetime Cancer Risk with Respect to Stable Metals.
2. The values of "0" represent a result of either "not detected" at the detection limit of the laboratory method or a negative count; in both cases the result can be considered "0".
3. The evaluation of Beta is in two steps. The initial screening level is 50 pCi/L. If the measured level of Beta exceeds the 50 pCi/L, further evaluation is merited. Beta-emitting radionuclides would be screened.
4. The values of "0" in the Pb210 column represent analytical results that measured less than the Minimum Detectable Activity (MDA).
5. Definition of final calculations and ranking is described and published in Appendix A.1 *Summary of the Characterization of Risk Leading to Exposure Reduction*.
6. When comparing these PRG's with the U.S. EPA's PRG list, the calculated PRG used for U238 is less than the EPA's PRG for U238D (D meaning that its decay daughters are included in the risk calculations).
7. MCL – Maximum Contaminant Levels are the maximum permissible level of a contaminant in water delivered to users of a public water system.
8. PRG – Preliminary Remediation Goals are tools for evaluating and cleaning up contaminated sites. They are risk-based concentrations derived from standardized equations, combining exposure information assumptions and EPA toxicity data.
9. Water sample information for MAP IDs 31, 32, 33, 35, 36, 37, and 38 are found on the following data page (3.14) for North Cameron/Tuba City.

Al = Aluminum  Sb = Antimony  As = Arsenic  Ba = Barium  Be = Beryllium  Cd = Cadmium  Cr = Chromium  Cu = Copper  Fe = Iron  Pb = Lead  Mn = Manganese  Hg = Mercury  Ni = Nickel  Se = Selenium  Ag = Silver  Th = Thallium  V = Vanadium  Zn = Zinc  HI = Hazard Index  NA = Not Available




**MAP FEATURES**

⊙ Water Sample Site - Stable Metals

# 4

## WATER SAMPLE ANALYSIS FOR STABLE METALS

5 0 5 Miles

5 0 5 10 Kilometers

1:350,000

*U.S. Environmental Protection Agency*

**ABANDONED URANIUM MINES PROJECT**

## South Cameron/Tuba City Area

# WATER SAMPLE ANALYSIS FOR STABLE METALS

| Map ID[9] | Sample ID | Sample Name | Al | Sb[2] | As[2,4] | Ba | Be[2,4] | Cd[2,4] | Cr[2,5] | Cu[2] | Fe[2] | Pb | Mn[2] | Hg[2] | Ni[2] | Se[2] | Ag[2] | Th[2,5] | V[2] | Zn[2] | ILCRsta[1,7] | HI[3,7] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Primary MCLs in Micrograms per Liter (µg/L) | 1000 | 6 | 50 | 1000 | 4 | 5 | 100 | 1300 | 300 | 15 | 50 | 2 | None | 50 | 100 | 2 | None | 5000 | | |
| | | PRG Limits in Micrograms per Liter (µg/L) | 37000 | 15 | 0.045 | 2600 | 73 | 18 | 180 | 1400 | 11000 | 4 | 1700 | 11 | 730 | 189 | 180 | 2.6 | 260 | 11000 | | |
| 31 | CT980812TCW003 | Navajo John Well | 168.0 | 0 | 2.7 | 98.6 | 0 | 0 | 0 | 11.4 | 55.2 | 0 | 3.1 | 0 | 0 | 4.2 | 0 | 5.4 | 10.3 | 18.7 | 6.00E-05 | 2.44 |
| 32 | CT980812TCW002 | Tank-Middle Mesa (1T-518) | 60.0 | 0 | 2.7 | 71.7 | 0 | 0 | 0 | 4.9 | 53.2 | 0 | 5.0 | 0.014 | 0 | 0 | 0 | 0 | 7.5 | 157.0 | 6.00E-05 | 0.33 |
| 33 | CT980812TCW005 | Standing Rock Well | 47.5 | 0 | 4.1 | 209.0 | 0 | 0 | 0 | 64.5 | 209.0 | 2.6 | 50.3 | 0.036 | 0 | 0 | 0 | 0 | 10.4 | 167.0 | 9.11E-05 | 0.61 |
| 35 | CT980804BGW001 | Bodaway Gap Chapter House | 71.5 | 0 | 4.6 | 41.3 | 0 | 0 | 0 | 14.7 | 160.0 | 0 | 1.1 | 0.020 | 0 | 0 | 0 | 3.0 | 5.8 | 21.0 | 1.02E-04 | 1.64 |
| 36 | CT980805BGW004 | Tanner Wash Windmill | 126.0 | 0 | 0 | 13.4 | 0 | 0 | 0 | 8.2 | 56.0 | 0 | 4.0 | 0.019 | 0 | 23.6 | 0 | 0 | 0 | 101.0 | 0.00E+00 | 0.16 |
| 37 | CT980805BGS002 | Navajo Spring | 70.2 | 0 | 7.6 | 258.0 | 0 | 0 | 0 | 0 | 28.1 | 0 | 1.0 | 0.022 | 0 | 0 | 0 | 0 | 7.2 | 45.6 | 1.69E-04 | 0.83 |
| 38 | CT980805BGS003 | Toh De Koinsh Spring | 183.0 | 0 | 0 | 10.4 | 0 | 0 | 0 | 0 | 75.1 | 0 | 9.7 | 0.028 | 0 | 35.7 | 0 | 3.3 | 0 | 9.7 | 0.00E+00 | 1.48 |

1. ILCR = Incremental Lifetime Cancer Risk with Respect to Stable Metals.

2. The values of "0" represent a result of either "not detected" at the detection limit of the laboratory method or a negative count; in both cases the result can be considered "0".

3. The evaluation of Beta is in two steps. The initial screening level is 50 pCi/L. If the measured level of Beta exceeds the 50 pCi/L, further evaluation is merited. Beta-emitting radionuclides would be screened.

4. The values of "0" in the Pb210 column represent analytical results that measured less than the Minimum Detectable Activity (MDA).

5. Definition of final calculations and ranking is described and published in Appendix A.1 *Summary of the Characterization of Risk Leading to Exposure Reduction.*

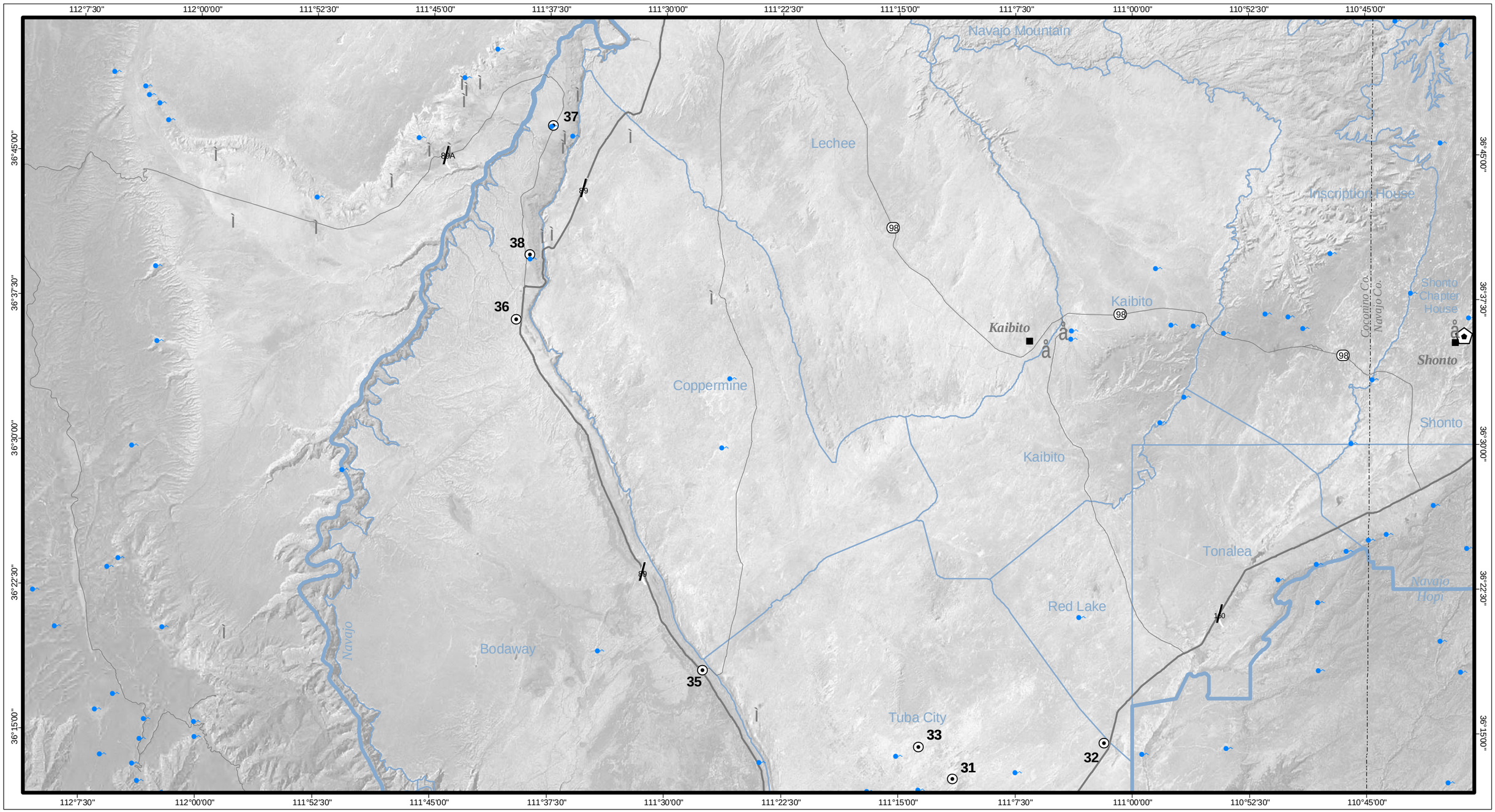
6. When comparing these PRG's with the U.S. EPA's PRG list, the calculated PRG used for U238 is less than the EPA's PRG for U238D (D meaning that its decay daughters are included in the risk calculations).

7. MCL – Maximum Contaminant Levels are the maximum permissible level of a contaminant in water delivered to users of a public water system.

8. PRG – Preliminary Remediation Goals are tools for evaluating and cleaning up contaminated sites. They are risk-based concentrations derived from standardized equations, combining exposure information assumptions and EPA toxicity data.

9. Water sample information for MAP IDs 1-30, 34, and 39-51 are found on the preceding data page (3.12) for South Cameron/Tuba City.

Al = Aluminum Sb = Antimony As = Arsenic Ba = Barium Be = Beryllium Cd = Cadmium Cr = Chromium Cu = Copper Fe = Iron Pb = Lead Mn = Manganese Hg = Mercury Ni = Nickel Se = Selenium Ag = Silver Th = Thallium V = Vanadium Zn = Zinc HI = Hazard Index




**MAP FEATURES**

⦿ Water Sample Site - Stable Metals

# 4

## WATER SAMPLE ANALYSIS FOR STABLE METALS

5 0 5 Miles

5 0 5 10 Kilometers

1:350,000

*U.S. Environmental Protection Agency*

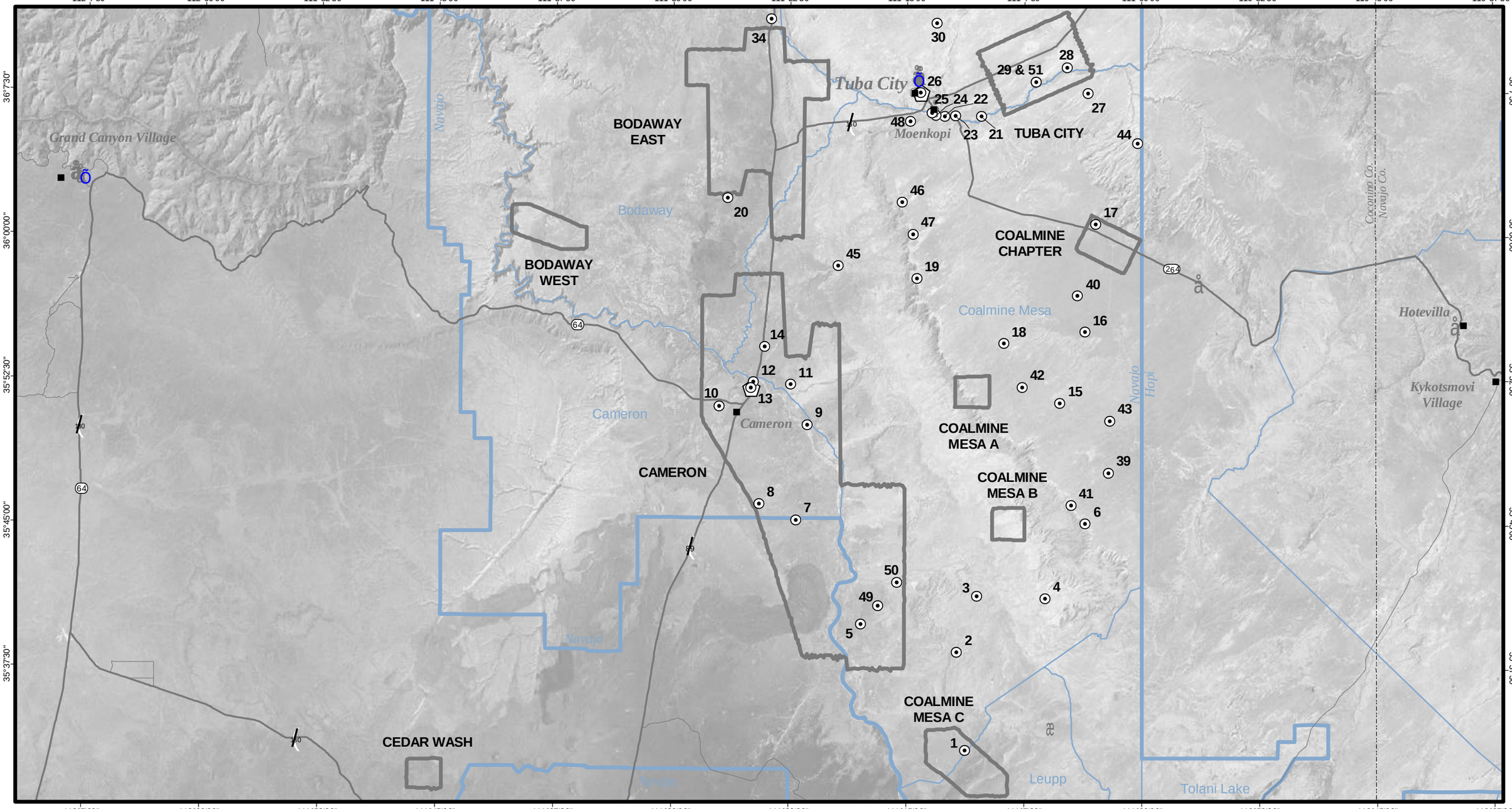
**ABANDONED URANIUM MINES PROJECT**

## North Cameron/Tuba City Area

# WATER SAMPLE ANALYSIS FOR RADIOACTIVE METALS

| Map ID[9] | Sample ID | Sample Name | Alpha[2] | Beta[2] | Lead210[4] | Radium226[2] | Radium228[2] | Thorium228[2] | Thorium230[2] | Thorium232[2] | Uranium234[2] | Uranium235[2] | Uranium238[2,6] | ILCRrad[1,5] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Primary MCLs in Pico-curies per Liter (pCi/L)[7] | 15 | 50 | None | 5 | 5 | None | None | None | 20 | 20 | 20 | |
| | | PRG Limits in Pico-curies per Liter (pCi/L)[8] | None | None | 0.047 | 0.16 | 0.19 | 0.21 | 1.3 | 1.5 | 1.1 | 1.1 | 0.71 | |
| 1 | CT980724CAS001 | Dry Spring Well | 10.40 | 7.33 | 0.67 | 0.067 | 0.308 | 0.005 | 0.023 | 0.007 | 6.11 | 0.129 | 4.99 | 2.89E-05 |
| 2 | CT980729CMS004 | Badger Spring | 21.50 | 9.85 | 0.58 | 0.051 | -0.029 | 0.004 | 0.000 | -0.002 | 12.00 | 1.200 | 8.86 | 2.48E-05 |
| 3 | CT980729CMS005 | Tse To Baah Naali Spring | 17.60 | 8.81 | 0.61 | 0.060 | 0.215 | 0.020 | 0.029 | 0.005 | 14.30 | 0.590 | 8.44 | 2.71E-05 |
| 4 | CT980729CMS003 | Tohachi Spring | 45.50 | 36.90 | 0.82 | 0.073 | 0.689 | 0.002 | 0.015 | 0.000 | 48.50 | 1.500 | 34.20 | 1.15E-04 |
| 5 | CT980727CAS002 | Yellow Spring | 6.10 | 8.11 | 1.03 | 0.362 | 0.756 | 0.002 | 0.019 | 0.000 | 4.79 | 0.303 | 3.26 | 3.74E-05 |
| 6 | CT980729CMS002 | Willow Spring | 11.00 | 12.80 | 0.69 | 0.078 | 0.672 | 0.011 | 0.000 | 0.010 | 4.10 | 0.184 | 4.25 | 1.40E-05 |
| 7 | CT980727CAW00 | Shallow Well | 0.00 | 0.00 | 4.96 | 0.406 | 1.630 | 0.000 | 0.000 | 0.000 | 0.00 | 0.000 | 0.00 | 1.17E-04 |
| 8 | CT980727CAW00 | Tank 3K-331 | -1.15 | 3.71 | 1.06 | 0.586 | 1.540 | 0.054 | 0.017 | -0.002 | 1.79 | -0.024 | 0.43 | 3.68E-05 |
| 9 | CT980722CAW00 | Tank 3T-538 | 5.80 | 4.45 | 0.28 | 0.166 | 0.311 | -0.015 | 0.005 | -0.001 | 1.66 | 0.000 | 0.98 | 5.56E-06 |
| 10 | CT980724CAW00 | Tank 3T-527 | 4.43 | 5.14 | 0.49 | 0.066 | 0.458 | 0.013 | 0.011 | 0.000 | 1.56 | 0.125 | 1.69 | 6.81E-06 |
| 11 | CT980722CAM002 | Open Pit Mine | 135.00 | 125.00 | 9.38 | 7.120 | 3.230 | 2.510 | 3.410 | 1.560 | 27.40 | 1.030 | 22.50 | 3.34E-04 |
| 12 | CT980724CAW00 | Cameron Trading Post | 1.78 | 6.11 | 0.39 | 0.049 | 0.567 | 0.004 | 0.004 | 0.000 | 1.65 | 0.060 | 1.08 | 6.39E-06 |
| 13 | CT990415CAW00 | Cameron Chapter House | 1.03 | 5.79 | 0.54 | 0.064 | 0.460 | 0.006 | 0.018 | 0.000 | 1.10 | 0.059 | 0.77 | 5.00E-06 |
| 14 | CT980722CAM003 | Open Pit Mine | 474.00 | 735.00 | 36.20 | 21.800 | 20.400 | 18.000 | 14.800 | 14.700 | 30.10 | 1.180 | 25.80 | 1.19E-03 |
| 15 | CT980728CMW00 | Tank 3A-151 | 0.31 | 1.14 | -0.04 | 0.581 | 2.480 | 0.048 | 0.018 | 0.000 | 0.22 | 0.000 | 0.00 | 1.71E-05 |
| 16 | CT980810CMW00 | Tank 3T-540 | 0.44 | 2.86 | 0.30 | 0.220 | 0.742 | -0.002 | 0.008 | 0.000 | 0.01 | -0.004 | 0.00 | 5.29E-06 |
| 17 | CT980728CMW00 | Tank 3K-312 | 0.65 | 5.95 | 0.29 | 0.121 | 0.813 | 0.000 | 0.004 | 0.002 | 0.07 | 0.044 | 0.00 | 5.15E-06 |
| 18 | CT980728CMW00 | Goldtooth Well | 3.68 | 4.02 | 0.09 | 0.288 | 0.546 | -0.002 | 0.016 | 0.017 | 0.99 | -0.018 | 1.46 | 7.66E-06 |
| 19 | CT980810CMS006 | Goldtooth Spring (Rock Spring) | 6.78 | 4.78 | 1.71 | 0.096 | 0.362 | 0.000 | 0.008 | 0.011 | 1.39 | 0.034 | 1.35 | 4.21E-05 |
| 20 | CT980811TCW001 | Shadow Mountain Well | 12.10 | 14.70 | 0.39 | 0.096 | 0.822 | 0.007 | 0.020 | 0.000 | 6.21 | 0.051 | 5.30 | 1.81E-05 |
| 21 | CT980813HOS001 | Little Dog Spring | 4.54 | 6.03 | 0.93 | 0.151 | 0.803 | -0.009 | 0.039 | 0.011 | 3.04 | -0.008 | 1.48 | 2.98E-05 |
| 22 | CT980813HOS003 | Wisemen Spring | 4.36 | 3.73 | 0.31 | 0.063 | 0.799 | -0.009 | 0.005 | 0.006 | 2.46 | -0.010 | 0.96 | 8.19E-06 |
| 23 | CT980813HOS002 | Gaging Station Spring | 3.34 | 3.95 | 0.36 | 0.179 | 0.460 | 0.059 | 0.012 | 0.000 | 1.38 | 0.111 | 0.84 | 6.36E-06 |
| 24 | CT980813HOW00 | Lower Moenkopi Well | 3.20 | 2.26 | 0.38 | 0.100 | 0.572 | 0.000 | 0.016 | -0.001 | 2.52 | 0.000 | 1.01 | 7.36E-06 |
| 25 | CT980813HOS004 | Yellowjacket Spring | 4.30 | 4.09 | 0.56 | 0.141 | 0.722 | 0.024 | 0.021 | 0.000 | 2.87 | 0.239 | 1.08 | 9.16E-06 |
| 26 | CT990415TCW006 | Tuba City Chapter House | 0.96 | 1.96 | 0.18 | 0.056 | 0.501 | -0.002 | 0.000 | 0.003 | 0.85 | 0.035 | 0.12 | 3.96E-06 |
| 27 | CT980728CMW00 | Tank 3T-541 | 1.25 | 3.09 | 0.50 | 0.044 | 1.160 | 0.006 | 0.031 | 0.000 | 0.55 | 0.039 | 0.09 | 7.09E-06 |
| 28 | CT980811TCS001 | Lechee Spring | -0.48 | 2.74 | 0.44 | 0.097 | 0.268 | 0.019 | 0.015 | 0.000 | 13.60 | 0.163 | 7.04 | 2.45E-05 |
| 29 | CT980811TCS002 | Shonto Well (3A-144) | 30.50 | 18.80 | 10.20 | 1.020 | 1.120 | 0.880 | 0.766 | 0.298 | 2.13 | 0.069 | 0.83 | 2.37E-04 |
| 30 | CT980812TCW004 | Rabbit Brush Well | 1.00 | 2.78 | 0.46 | 0.106 | 0.631 | 0.032 | 0.005 | -0.001 | 0.88 | 0.061 | 0.29 | 5.41E-06 |
| 34 | CT980804BGS001 | Hidden Spring | 6.52 | 2.40 | 0.22 | 0.039 | 0.190 | 0 | 0.021 | 0 | 4.60 | 0.023 | 2.91 | 9.56E-06 |
| 39 | CT000107CMW00 | Tank 3T-547 | 0.50 | 3.30 | -0.50 | 0.200 | -0.800 | 0.300 | 0.400 | 0.300 | 1.40 | 0.000 | 0.20 | 4.74E-06 |
| 40 | CT000107CMW00 | Tank 3A-149 | -0.20 | 2.90 | 0.00 | 0.000 | -0.600 | 0.200 | 0.200 | 0.200 | 0.40 | 0.200 | 0.20 | 2.07E-06 |
| 41 | CT000119CMS008 | Gold Spring | 2.10 | 10.50 | 0.20 | 0.000 | 0.500 | 0.300 | 0.500 | 0.200 | 1.70 | 0.000 | 1.80 | 8.66E-06 |
| 42 | CT000119CMW01 | 3-T-504 | 1.80 | 3.20 | 0.50 | 0.100 | 2.100 | 0.300 | 0.200 | 0.200 | 1.00 | 0.000 | 0.10 | 1.44E-05 |
| 43 | CT000119CMW01 | 3-K-328 | 1.40 | 8.40 | 3.40 | 0.600 | 0.700 | 0.300 | 0.300 | 0.300 | 1.80 | 0.400 | 1.60 | 1.35E-05 |
| 44 | CT000120CMS008 | Al Hasteen Nez Spring | 1.30 | 40.60 | 1.70 | 0.100 | 1.600 | 0.300 | 0.300 | 0.300 | 0.60 | 0.200 | 0.30 | 1.21E-05 |
| 45 | CT000120CMS009 | Fivemile Wash Spring | 16.70 | 45.70 | -1.10 | 0.200 | 3.600 | 0.400 | 1.300 | 0.400 | 17.70 | 0.400 | 10.30 | 5.43E-05 |
| 46 | CT000124CMS010 | Toh Nee Di Kishi | 4.90 | 5.40 | 2.90 | 0.100 | -0.600 | 0.300 | 0.300 | 0.300 | 7.90 | 0.400 | 4.90 | 1.69E-05 |
| 47 | CT000125CMS011 | Tohnalea | 1.80 | 29.60 | 6.60 | 0.500 | 0.900 | 0.400 | 1.100 | 0.400 | 2.10 | 0.000 | 1.40 | 1.48E-05 |
| 48 | CT000125CMS012 | Harry Goldtooth Spring | 11.30 | 23.40 | -0.80 | 0.200 | 0.700 | 0.200 | 0.200 | 0.200 | 10.30 | 0.200 | 8.30 | 2.74E-05 |
| 49 | CT991130CAS003 | Balokai Spring | 8.10 | -7.00 | -1.70 | -0.100 | 0.000 | 0.200 | 0.200 | 0.200 | 8.60 | 0.400 | 6.50 | 1.86E-05 |
| 50 | CT991130CAW00 | Paddock Well | 22.00 | 13.10 | -4.20 | 0.100 | -1.900 | 0.200 | 0.200 | 0.200 | 26.20 | 1.500 | 18.70 | 5.34E-05 |
| 51 | Shonto Well -DOE | Shonto Well - DOE | 8.56 | 6.89 | NA | 0.140 | 0.820 | NA | NA | NA | 1.30 | 0.040 | 1.30 | NA |

1. ILCR = Incremental Lifetime Cancer Risk with Respect to Radioactive Metals.
2. The values of "0" represent a result of either "not detected" at the detection limit of the laboratory method or a negative count. In both cases, the result can be considered "0".
3. The evaluation of Beta is in two steps. The initial screen level is 50pCi/l. If the measured level of Beta exceeds the 50 pCi/L, a further evaluation is merited. The Beta-emitting radionuclides would be screened.
4. The values of "0" in the Lead210 column represent analytical results that measured less than the Method Detection Activity (MDA).
5. Definition of final calculations and ranking is described and published in Appendix A.1 *Summary of the Characterization of Risk Leading to Exposure Reduction.*
6. When comparing these PRG's with the U.S. EPA's PRG list, the calculated PRG used for Uranium238 is less than the EPA's PRG for Uranium238D (D meaning that its decay daughters are included in the risk calculations).
7. MCL – Maximum Contaminant Levels are the maximum permissible level of a contaminant in water delivered to users of a public water system.
8. PRG – Preliminary Remediation Goals are tools for evaluating and cleaning up contaminated sites. They are risk-based concentrations derived from standardized equations, combining exposure information assumptions and EPA toxicity data.
9. Water sample information for MAP IDs 31, 32, 33, 35, 36, 37, and 38 are found on the following data page (3.18) for North Cameron/Tuba City.
10. NA = Not Available




**MAP FEATURES**

⊙ Water Sample Site - Radioactive Metals

# 4

# WATER SAMPLE ANALYSIS FOR RADIOACTIVE METALS

5 0 5 Miles

5 0 5 10 Kilometers

1:350,000

*U.S. Environmental Protection Agency*

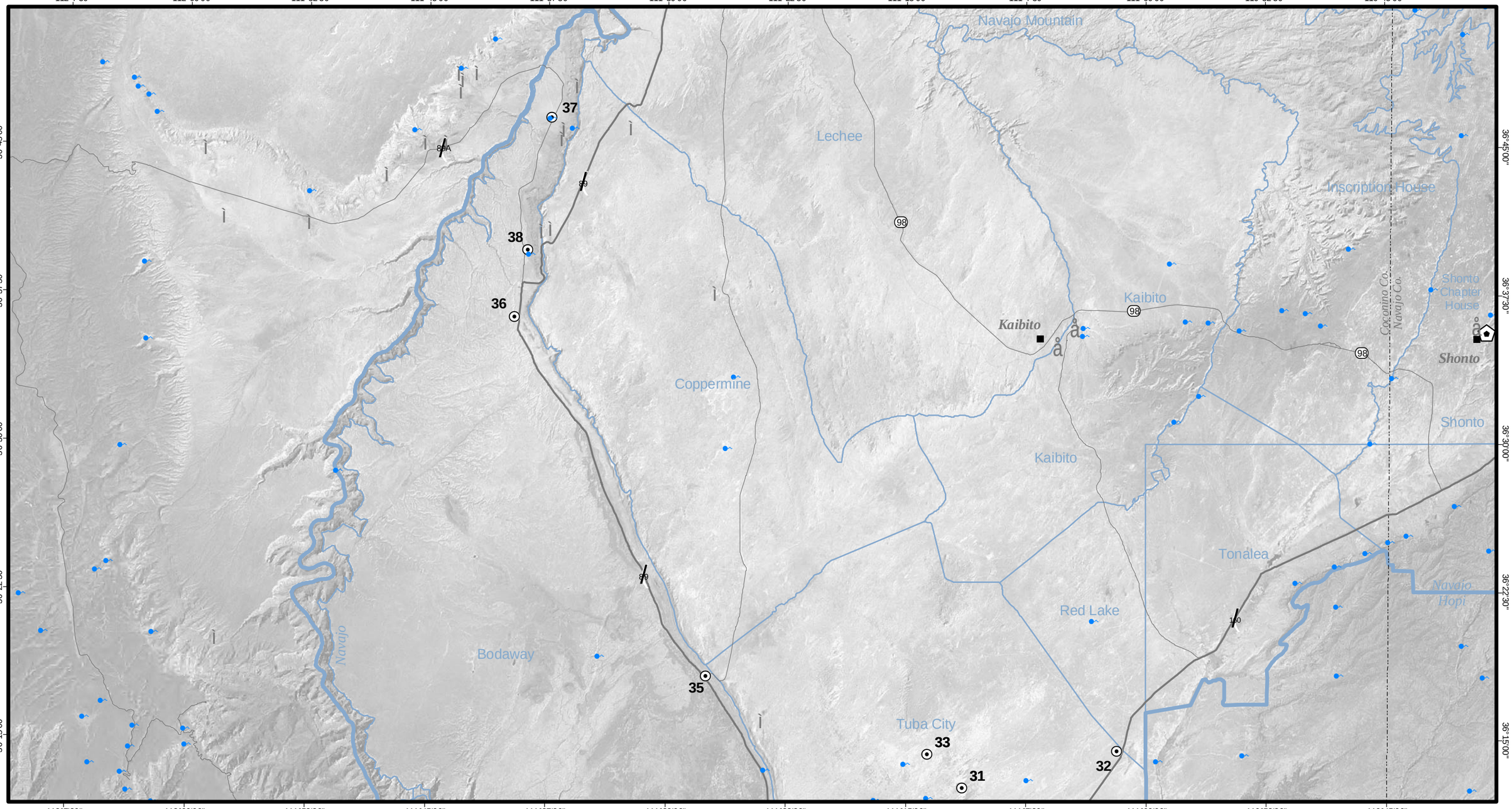
**ABANDONED URANIUM MINES PROJECT**

## South Cameron/Tuba City Area

# WATER SAMPLE ANALYSIS FOR RADIOACTIVE METALS

| Map ID[9] | Sample ID | Sample Name | Alpha[2] | Beta[2] | Lead210[4] | Radium226[2] | Radium228[2] | Thorium228[2] | Thorium230[2] | Thorium232[2] | Uranium234[2] | Uranium235[2] | Uranium238[2,6] | ILCRrad[1,5] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Primary MCLs in Pico-curies per Liter (pCi/L)[7] | 15 | 50 | None | 5 | 5 | None | None | None | 20 | 20 | 20 | |
| | | PRG Limits in Pico-curies per Liter (pCi/L)[8] | None | None | 0.047 | 0.16 | 0.19 | 0.21 | 1.3 | 1.5 | 1.1 | 1.1 | 0.71 | |
| 31 | CT980812TCW003 | Navajo John Well | 15.00 | 5.58 | 0.41 | 0.115 | 0.471 | -0.016 | 0.012 | 0.006 | 9.62 | 0.044 | 3.10 | 1.64E-05 |
| 32 | CT980812TCW002 | Tank-Middle Mesa (1T-518) | 2.20 | 2.46 | 0.53 | 0.107 | 0.475 | 0.014 | 0.013 | 0.000 | 1.21 | 0.000 | 0.21 | 4.64E-06 |
| 33 | CT980812TCW005 | Standing Rock Well | 1.62 | 39.30 | 0.25 | 0.227 | 1.490 | 0.018 | 0.005 | 0.000 | 0.04 | 0.000 | 0.11 | 9.53E-06 |
| 35 | CT980804BGW00 | Bodaway Gap Chapter House | 2.41 | 2.70 | 0.78 | 0.022 | 0.170 | 0.013 | 0.011 | 0.000 | 1.39 | -0.004 | 0.56 | 1.97E-05 |
| 36 | CT980805BGW00 | Tanner Wash Windmill | 10.40 | 13.30 | 0.43 | 0.134 | 0.237 | 0.005 | 0.011 | 0.000 | 7.80 | 0.293 | 5.51 | 1.72E-05 |
| 37 | CT980805BGS002 | Navajo Spring | 3.73 | 4.77 | 1.04 | 0.108 | 0.444 | 0.000 | 0.015 | -0.002 | 1.66 | -0.015 | 0.37 | 2.72E-05 |
| 38 | CT980805BGS003 | Toh De Koinsh Spring | 16.40 | 24.60 | 1.49 | 0.130 | 0.379 | 0.117 | 0.050 | 0.000 | 8.58 | 0.307 | 5.17 | 5.05E-05 |

1. ILCR = Incremental Lifetime Cancer Risk with Respect to Radioactive Metals.
2. The values of "0" represent a result of either "not detected" at the detection limit of the laboratory method or a negative count. In both cases, the result can be considered "0".
3. The evaluation of Beta is in two steps. The initial screen level is 50pCi/l. If the measured level of Beta exceeds the 50 pCi/L, a further evaluation is merited. The Beta-emitting radionuclides would be screened.
4. The values of "0" in the Lead210 column represent analytical results that measured less than the Method Detection Activity (MDA).
5. Definition of final calculations and ranking is fully described and published in Appendix A.1 *Summary of the Characterization of Risk Leading to Exposure Reduction.*
6. When comparing these PRG's with the U.S. EPA's PRG list, the calculated PRG used for Uranium238 is less than the EPA's PRG for Uranium238D (D meaning that its decay daughters are included in the risk calculations).
7. MCL – Maximum Contaminant Levels are the maximum permissible level of a contaminant in water delivered to users of a public water system.
8. PRG – Preliminary Remediation Goals are tools for evaluating and cleaning up contaminated sites. They are risk-based concentrations derived from standardized equations, combining exposure information assumptions and EPA toxicity data.
9. Water sample information for MAP IDs 1-30, 34, 39-51 are found on the preceding data page (3.16) for South Cameron/Tuba City.




**MAP FEATURES**

⊙ Water Sample Site - Radioactive Metals

# 4

# WATER SAMPLE ANALYSIS FOR RADIOACTIVE METALS

5 0 5 Miles

5 0 5 10 Kilometers

1:350,000

*U.S. Environmental Protection Agency*

**ABANDONED URANIUM MINES PROJECT**

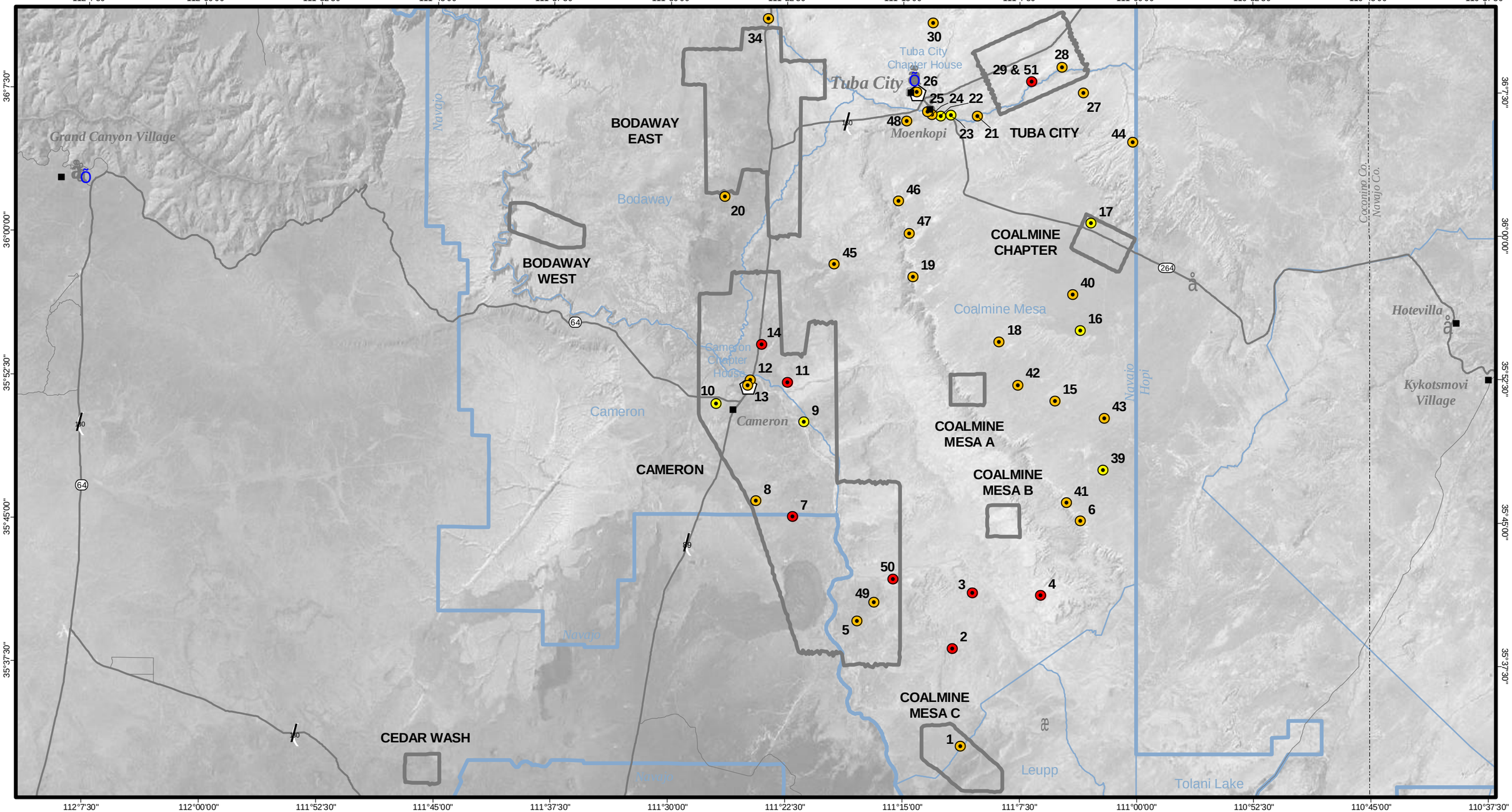
## North Cameron/Tuba City Area

# SUMMARY OF WATER QUALITY WITH RESPECT TO STABLE AND RADIOACTIVE METALS

| Map ID[9] | Sample ID | Sample Name | Total Cancer Risk | HI | Arsenic[5] | Lead[3] | Total U[2] | Water Quality with Respect to Stable and Radioactive Metals[4] | | | Risk Category | Risk Ranking[6] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Primary MCLs in Micrograms per Liter (µg/L)[7] | | | 50 | 15 | 30 | | | | | |
| | | PRG Limits in Micrograms per Liter (µg/L)[8] | | | 0.045 | 4 | None | Less Risk | Some Risk | More Risk | | |
| 1 | CT980724CAS001 | Dry Spring Well | 1.11E-004 | 0.45 | 3.7 | 0 | 11.10 | | ILCR | | SOME | 32 |
| 2 | CT980729CMS004 | Badger Spring | 1.16E-003 | 7.38 | 51.1 | 0 | 22.06 | | | ILCR | MORE | 44 |
| 3 | CT980729CMS005 | Tse To Baah Naali Spring | 7.36E-004 | 6.01 | 31.9 | 0 | 23.33 | | | ILCR | MORE | 43 |
| 4 | CT980729CMS003 | Tohachi Spring | 1.33E-003 | 6.06 | 54.8 | 4.0 | 84.20 | | | ILCR, Total U | MORE | 47 |
| 5 | CT980727CAS002 | Yellow Spring | 1.75E-004 | 2.18 | 6.2 | 4.4 | 8.05 | | ILCR, Lead, HI | | SOME | 38 |
| 6 | CT980729CMS002 | Willow Spring | 1.40E-005 | 0.37 | 0 | 4.9 | 8.35 | | ILCR, Lead | | SOME | 33 |
| 7 | CT980727CAW005 | Shallow Well | 2.63E-004 | 7.80 | 6.6 | 51.3 | 0.00 | | | Lead | MORE | 46 |
| 8 | CT980727CAW004 | Tank 3K-331 | 3.68E-005 | 0.20 | 0 | 0 | 2.22 | | ILCR | | SOME | 11 |
| 9 | CT980722CAW001 | Tank 3T-538 | 5.56E-006 | 0.06 | 0 | 0 | 2.64 | X | | | LESS | 5 |
| 10 | CT980724CAW003 | Tank 3T-527 | 6.81E-006 | 0.09 | 0 | 0 | 3.25 | X | | | LESS | 6 |
| 11 | CT980722CAM002 | Open Pit Mine | 9.96E-004 | 9.02 | 29.8 | 38.0 | 50.93 | | | ILCR, Lead, Total U | MORE | 48 |
| 12 | CT980724CAW002 | Cameron Trading Post | 7.97E-005 | 0.34 | 3.3 | 0 | 2.73 | | ILCR | | SOME | 16 |
| 13 | CT990415CAW006 | Cameron Chapter House | 8.28E-005 | 0.46 | 3.5 | 1.1 | 1.87 | | ILCR | | SOME | 22 |
| 14 | CT980722CAM003 | Open Pit Mine | 4.41E-003 | 47.03 | 145.0 | 343.0 | 57.08 | | | ILCR, HI, Lead, Total U | MORE | 50 |
| 15 | CT980728CMW005 | Tank 3A-151 | 1.71E-005 | 0.09 | 0 | 0 | 0.00 | | ILCR | | SOME | 8 |
| 16 | CT980810CMW006 | Tank 3T-540 | 5.29E-006 | 0.17 | 0 | 0 | 0.00 | X | | | LESS | 2 |
| 17 | CT980728CMW003 | Tank 3K-312 | 5.15E-006 | 0.05 | 0 | 0 | 0.00 | X | | | LESS | 1 |
| 18 | CT980728CMW004 | Goldtooth Well | 7.66E-006 | 1.36 | 0 | 0 | 2.45 | | HI | | SOME | 9 |
| 19 | CT980810CMS006 | Goldtooth Spring (Rock Spring) | 1.29E-004 | 0.67 | 3.9 | 0 | 2.74 | | ILCR | | SOME | 26 |
| 20 | CT980811TCW001 | Shadow Mountain Well | 1.65E-004 | 2.02 | 6.6 | 0 | 11.51 | | ILCR, HI | | SOME | 35 |
| 21 | CT980813HOS001 | Little Dog Spring | 9.21E-005 | 0.35 | 2.8 | 0 | 4.52 | | ILCR | | SOME | 25 |
| 22 | CT980813HOS003 | Wisemen Spring | 8.19E-006 | 0.09 | 0 | 0 | 3.42 | X | | | LESS | 7 |
| 23 | CT980813HOS002 | Gaging Station Spring | 6.36E-006 | 0.08 | 0 | 0 | 2.22 | X | | | LESS | 4 |
| 24 | CT980813HOW001 | Lower Moenkopi Well | 9.18E-005 | 0.40 | 3.8 | 0 | 3.53 | | ILCR | | SOME | 20 |
| 25 | CT980813HOS004 | Yellowjacket Spring | 8.47E-005 | 2.37 | 3.4 | 0 | 3.95 | | ILCR, HI | | SOME | 21 |
| 26 | CT990415TCW006 | Tuba City Chapter House | 6.17E-005 | 1.79 | 2.6 | 0 | 0.85 | | ILCR, HI | | SOME | 10 |
| 27 | CT980728CMW001 | Tank 3T-541 | 1.69E-004 | 0.95 | 7.3 | 0 | 0.55 | | ILCR | | SOME | 24 |
| 28 | CT980811TCS001 | Lechee Spring | 2.45E-005 | 1.35 | 0 | 0 | 20.64 | | ILCR, HI | | SOME | 37 |
| 29 | CT980811TCS002 | Shonto Well (3A-144) | 9.22E-004 | 6.35 | 30.8 | 82 | 2.96 | | | ILCR | MORE | 49 |
| 30 | CT980812TCW004 | Rabbit Brush Well | 1.21E-004 | 0.62 | 5.2 | 0 | 1.17 | | ILCR | | SOME | 17 |
| 34 | CT980804BGS001 | Hidden Spring | 9.56E-006 | 4.65 | 10.3 | 0 | 7.51 | | ILCR, HI | | SOME | 34 |
| 39 | CT000107CMW007 | Tank 3T-547 | 4.74E-006 | 0.00 | 0 | 0 | 1.60 | X | | | LESS | 3 |
| 40 | CT000107CMW008 | Tank 3A-149 | 2.87E-005 | 0.26 | 1.2 | 1.2 | 1.8 | | ILCR | | SOME | 13 |
| 41 | CT000119CMS008 | Gold Spring | 2.07E-005 | 0.30 | 0.5 | 2.1 | 3.50 | | ILCR | | SOME | 23 |
| 42 | CT000119CMW010 | 3-T-504 | 2.76E-005 | 0.27 | 0.6 | 1.3 | 1.10 | | ILCR | | SOME | 14 |
| 43 | CT000119CMW011 | 3-K-328 | 1.35E-005 | 0.07 | 0 | 0.7 | 3.80 | | ILCR | | SOME | 15 |
| 44 | CT000120CMS008 | Al Hasteen Nez Spring | 4.09E-005 | 0.31 | 1.3 | 2.4 | 1.10 | | ILCR | | SOME | 18 |
| 45 | CT000120CMS009 | Fivemile Wash Spring | 2.51E-004 | 1.07 | 8.9 | 0 | 28.40 | | ILCR, HI | | SOME | 42 |
| 46 | CT000124CMS010 | Toh Nee Di Kishi | 1.37E-004 | 0.58 | 5.4 | 0 | 13.20 | | ILCR | | SOME | 36 |
| 47 | CT000125CMS011 | Tohnalea | 2.03E-004 | 2.81 | 8.5 | 11.5 | 3.50 | | ILCR, Lead, HI | | SOME | 41 |
| 48 | CT000125CMS012 | Harry Goldtooth Spring | 1.79E-004 | 2.66 | 6.8 | 2.9 | 18.80 | | ILCR, HI | | SOME | 40 |
| 49 | CT991130CAS003 | Balokai Spring | 2.19E-004 | 1.01 | 9.0 | 0 | 15.10 | | ILCR, HI | | SOME | 39 |
| 50 | CT991130CAW007 | Paddock Well | 6.16E-004 | 3.09 | 25.3 | 1.7 | 46.40 | | | ILCR, Total U | MORE | 45 |
| 51 | Shonto Well -DOE | Shonto Well - DOE | NA | 0.50 | 4.9 | 0 | NA | | | | UNKNOWN | |

1. ILCR = Incremental Lifetime Cancer Risk with Respect to Stable Metals and Radioactive Metals.
2. The PRG's and MCL's for Alpha, Beta, and Uranium are in Pico-Curies per Liter (pCi/L).
3. The PRG's and MCL's for Lead and Arsenic are in Micrograms per Liter (µg/L).
4. Water Quality Levels:
   - Less Risk — Total Cancer Risk is less than or equal to 1E-05 and Hazard Index is less than or equal to 1 and Lead is less than 4 and Total Uranium is less than 30.
   - Some Risk — Total Cancer Risk is less than or equal to 6E-04 but greater than 1E-05 or Hazard Index is less than 10 but greater than 1 or Lead is less than 15 but greater than 4 and Total Uranium is less than 30.
   - More Risk — Total Cancer Risk is greater than 6E-04 or Hazard Index is greater than 10 or Lead is greater than 15 or Total Uranium is equal to or greater than 30.
5. Proposed EPA MCl is 30 pCi/L for the sum of the three Uranium isotopes.
6. Definition of final calculations and ranking is described and published in Appendix A.1 *Summary of the Characterization of Risk Leading to Exposure Reduction.*
7. MCL – Maximum Contaminant Levels are the maximum permissible level of a contaminant in water delivered to users of a public water system.
8. PRG – Preliminary Remediation Goals are tools for evaluating and cleaning up contaminated sites. They are risk-based concentrations derived from standardized equations, combining exposure information assumptions and EPA toxicity data.
9. Water sample information for MAP IDs 31, 32, 33, 35, 36, 37, and 38 are found on the following data page (3.22) for North Cameron/Tuba City.

NA = NOT AVAILABLE




- Less Risk
  Total Cancer Risk is less than or equal to 1E-05 and Hazard Index is less than or equal to 1 and Lead is less than 4 and U is less than 30.
- Some Risk
  Total Cancer Risk is less than or equal to 6E-04 but greater than 1E-05 or Hazard Index is less than 10 but greater than 1 or Lead is less than 15 but greater than 4 and U is less than 30.
- More Risk
  Total Cancer Risk is greater than 6E-04 or Hazard Index is greater than 10 or Lead is greater than 15 or U is equal to or greater than 30.

# 4

## SUMMARY OF WATER QUALITY ANALYSIS WITH RESPECT TO STABLE AND RADIOACTIVE METALS

5 0 5 Miles
5 0 5 10 Kilometers
1:350,000

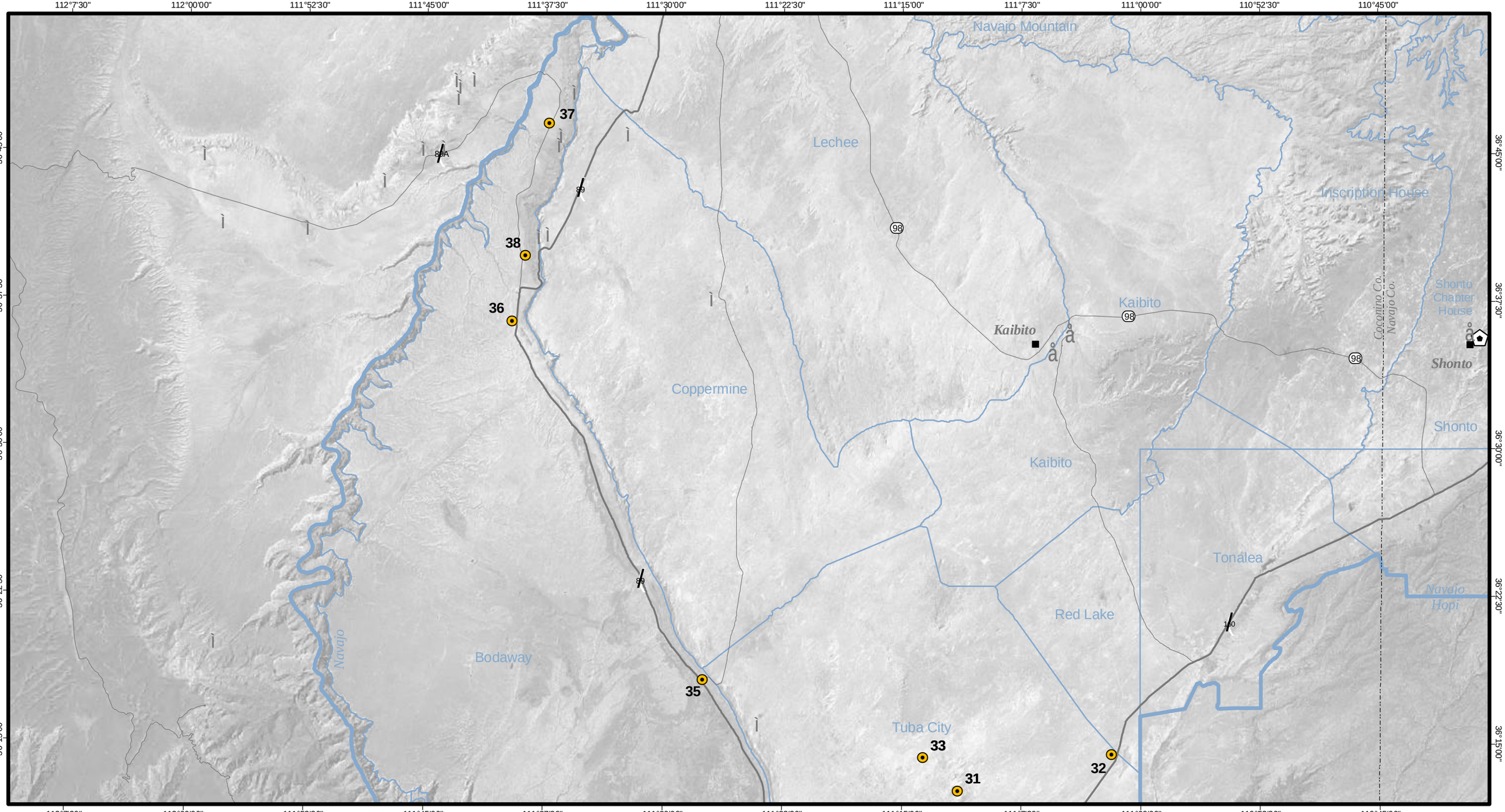
*U.S. Environmental Protection Agency*
**ABANDONED URANIUM MINES PROJECT**

## South Cameron/Tuba City Area

# SUMMARY OF WATER QUALITY WITH RESPECT TO STABLE AND RADIOACTIVE METALS

| Map ID[9] | Sample ID | Sample Name | Total Cancer Risk | HI | Arsenic[5] | Lead[3] | Total U[2] | Water Quality with Respect to Stable and Radioactive Metals[4] | | | Risk Category | Risk Ranking[6] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Primary MCLs in Micrograms per Liter (µg/L)[7] | | | 50 | 15 | 30 | | | | | |
| | | PRG Limits in Micrograms per Liter (µg/L)[8] | | | 0.045 | 4 | None | Less Risk | Some Risk | More Risk | | |
| 31 | CT980812TCW003 | Navajo John Well | 7.64E-005 | 2.44 | 2.7 | 0 | 12.72 | | ILCR, HI | | SOME | 30 |
| 32 | CT980812TCW002 | Tank-Middle Mesa (1T-518) | 6.46E-005 | 0.33 | 2.7 | 0 | 1.21 | | ILCR | | SOME | 12 |
| 33 | CT980812TCW005 | Standing Rock Well | 1.01E-004 | 0.61 | 4.1 | 2.6 | 0.00 | | ILCR | | SOME | 27 |
| 35 | CT980804BGW001 | Bodaway Gap Chapter House | 1.22E-004 | 1.64 | 4.6 | 0 | 1.95 | | ILCR, HI | | SOME | 19 |
| 36 | CT980805BGW004 | Tanner Wash Windmill | 1.72E-005 | 0.16 | 0.0 | 0 | 13.60 | | ILCR | | SOME | 29 |
| 37 | CT980805BGS002 | Navajo Spring | 1.96E-004 | 0.83 | 7.6 | 0 | 2.03 | | ILCR | | SOME | 28 |
| 38 | CT980805BGS003 | Toh De Koinsh Spring | 5.05E-005 | 1.48 | 0 | 0 | 14.06 | | ILCR, HI | | SOME | 31 |

1. ILCR = Incremental Lifetime Cancer Risk with Respect to Stable Metals and Radioactive Metals.
2. The PRG's and MCL's for Alpha, Beta, and Uranium are in Pico-Curies per Liter (pCi/L).
3. The PRG's and MCL's for Lead and Arsenic are in Micrograms per Liter (µg/L).
4. Water Quality Levels:
   - Less Risk — Total Cancer Risk is less than or equal to 1E-05 and Hazard Index is less than or equal to 1 and Lead is less than 4 and Total Uranium is less than 30.
   - Some Risk — Total Cancer Risk is less than or equal to 6E-04 but greater than 1E-05 or Hazard Index is less than 10 but greater than 1 or Lead is less than 15 but greater than 4 and Total Uranium is less than 30.
   - More Risk — Total Cancer Risk is greater than 6E-04 or Hazard Index is greater than 10 or Lead is greater than 15 or Total Uranium is equal to or greater than 30.
5. Proposed EPA MCI is 30 pCi/L for the sum of the three Uranium isotopes.
6. Definition of final calculations and ranking is described and published in Appendix A.1 *Summary of the Characterization of Risk Leading to Exposure Reduction.*
7. MCL – Maximum Contaminant Levels are the maximum permissible level of a contaminant in water delivered to users of a public water system.
8. PRG – Preliminary Remediation Goals are tools for evaluating and cleaning up contaminated sites. They are risk-based concentrations derived from standardized equations, combining exposure information assumptions and EPA toxicity data.
9. Water sample information for MAP IDs 1-30, 34, and 39-51 are found on the preceding data page (3.20) for South Cameron/Tuba City.




Less Risk
Total Cancer Risk is less than or equal to 1E-05 and Hazard Index is less than or equal to 1 and Lead is less than 4 and U is less than 30.

Some Risk
Total Cancer Risk is less than or equal to 6E-04 but greater than 1E-05 or Hazard Index is less than 10 but greater than 1 or Lead is less than 15 but greater than 4 and U is less than 30.

More Risk
Total Cancer Risk is greater than 6E-04 or Hazard Index is greater than 10 or Lead is greater than 15 or U is equal to or greater than 30.

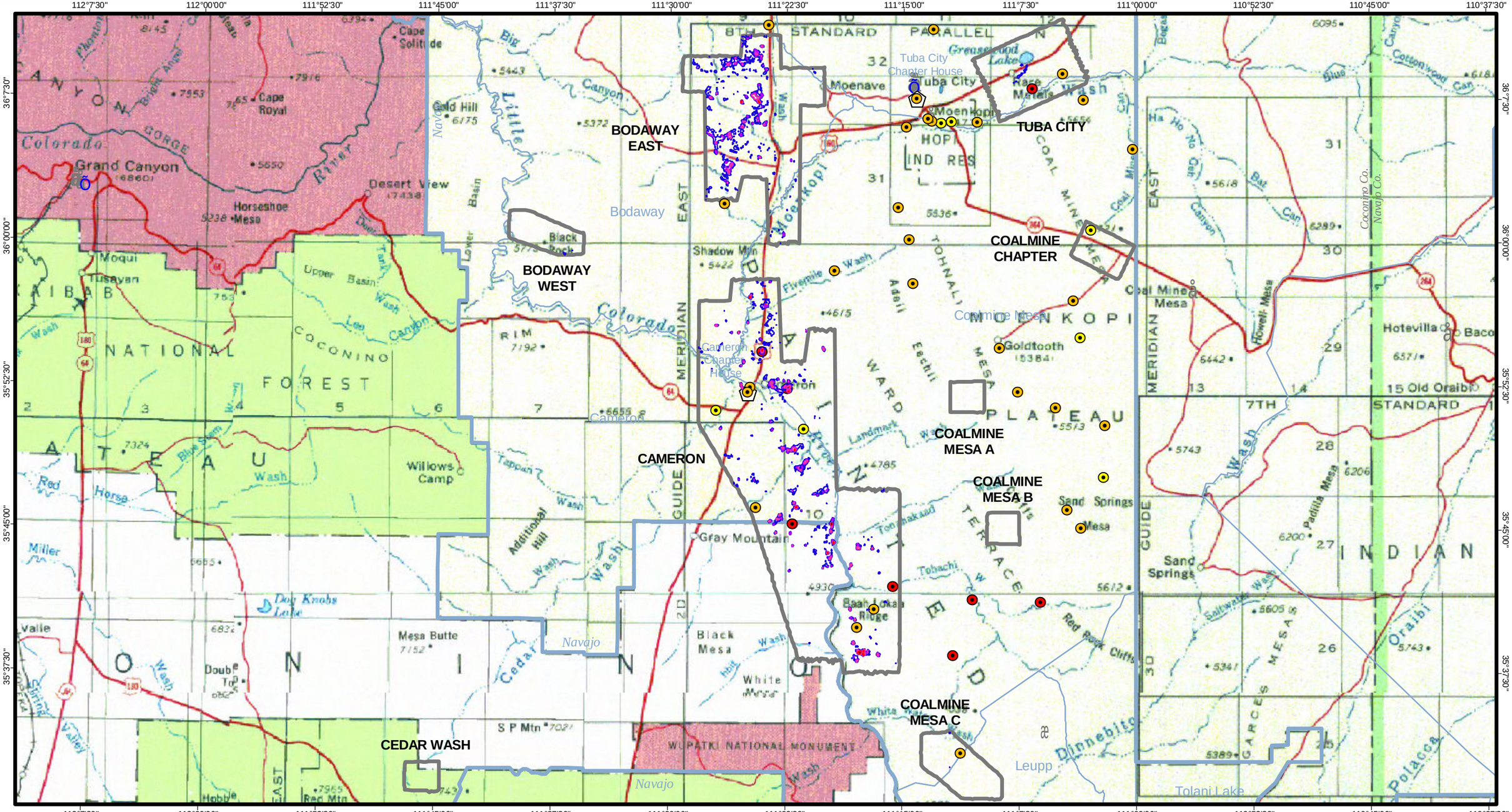
# 4

## SUMMARY OF WATER QUALITY ANALYSIS WITH RESPECT TO STABLE AND RADIOACTIVE METALS

5 0 5 Miles
5 0 5 10 Kilometers
1:350,000

*U.S. Environmental Protection Agency*
**ABANDONED URANIUM MINES PROJECT**

## North Cameron/Tuba City Area




| | Aerial Radiation Contours | Derived contour-level Bismuth 214 photo-peak (excess counts per second) | Estimated exposure rate from excess Bismuth 214 (excess micro-R/hour) |
|---|---|---|---|
| Less Risk | | 80 | 3.5 |
| Some Risk | | 170 | 7.4 |
| | | 250 | 10.9 |
| More Risk | | 800 | 34.9 |
| | | 1200 | 52.4 |

# 4

## SUMMARY OF WATER QUALITY ANALYSIS AND BISMUTH 214 CONTOURS

5 0 5 Miles

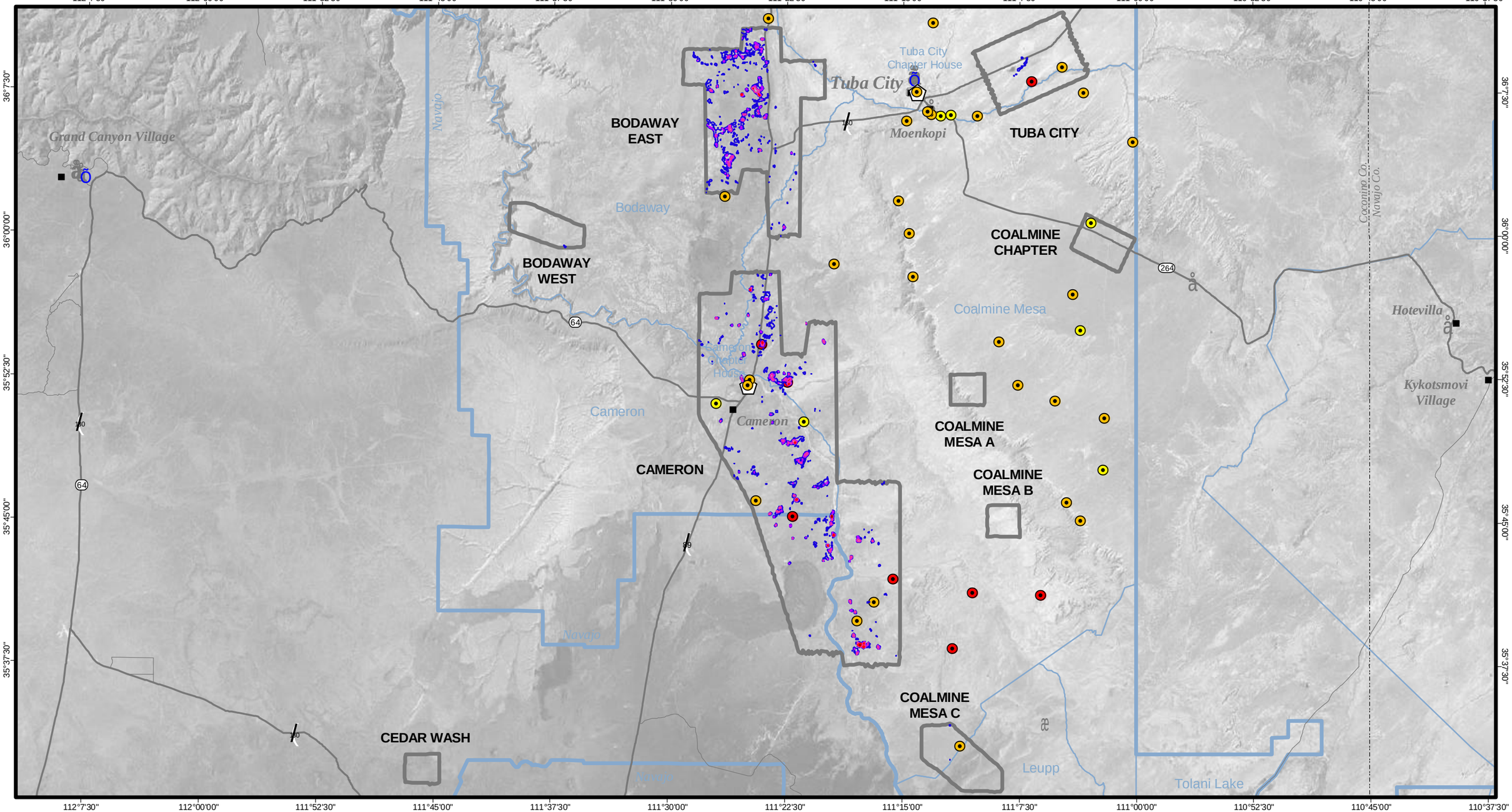
5 0 5 10 Kilometers

1:350,000

*U.S. Environmental Protection Agency*

**ABANDONED URANIUM MINES PROJECT**

## South Cameron/Tuba City Area




| | Aerial Radiation Contours | Derived contour-level Bismuth 214 photo-peak (excess counts per second) | Estimated exposure rate from excess Bismuth 214 (excess micro-R/hour) |
|---|---|---|---|
| Less Risk | | 80 | 3.5 |
| Some Risk | | 170 | 7.4 |
| | | 250 | 10.9 |
| More Risk | | 800 | 34.9 |
| | | 1200 | 52.4 |

# 4

## SUMMARY OF WATER QUALITY ANALYSIS AND BISMUTH 214 CONTOURS

5 0 5 Miles

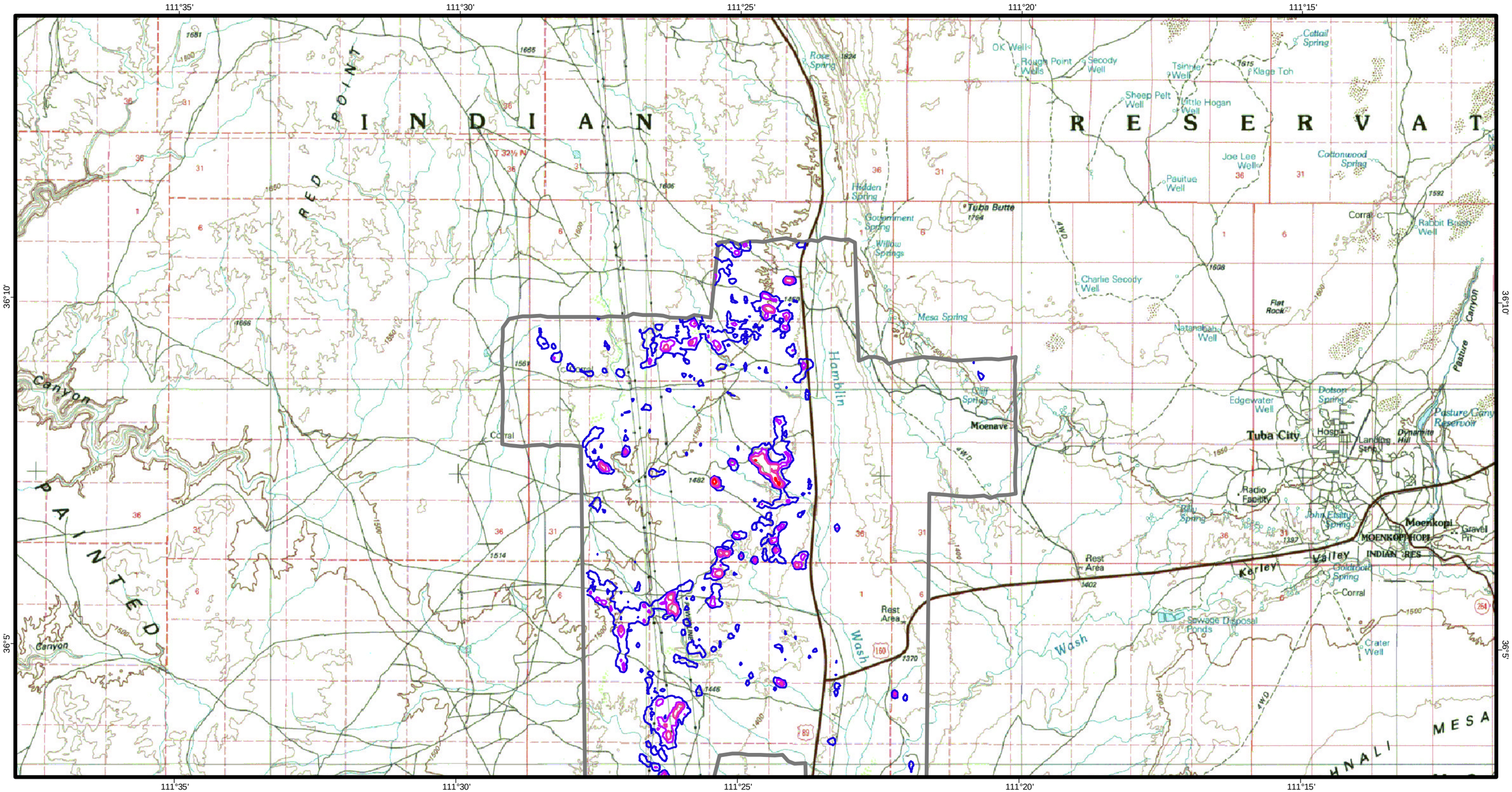
5 0 5 10 Kilometers

1:350,000

*U.S. Environmental Protection Agency*

**ABANDONED URANIUM MINES PROJECT**

**South Cameron/Tuba Area**




## NORTH - BODAWAY EAST

| Aerial Radiation Contours | Derived contour-level Bismuth 214 photo-peak (excess counts per second) | Estimated exposure rate from excess Bismuth 214 (excess micro-R/hour) |
|---|---|---|
| | 80 | 3.5 |
| | 170 | 7.4 |
| | 250 | 10.9 |
| | 800 | 34.9 |
| | 1200 | 52.4 |

# 4

## AERIAL RADIATION CONTOURS BISMUTH 214 NORTH-BODAWAY EAST

1 0 1 2 Miles

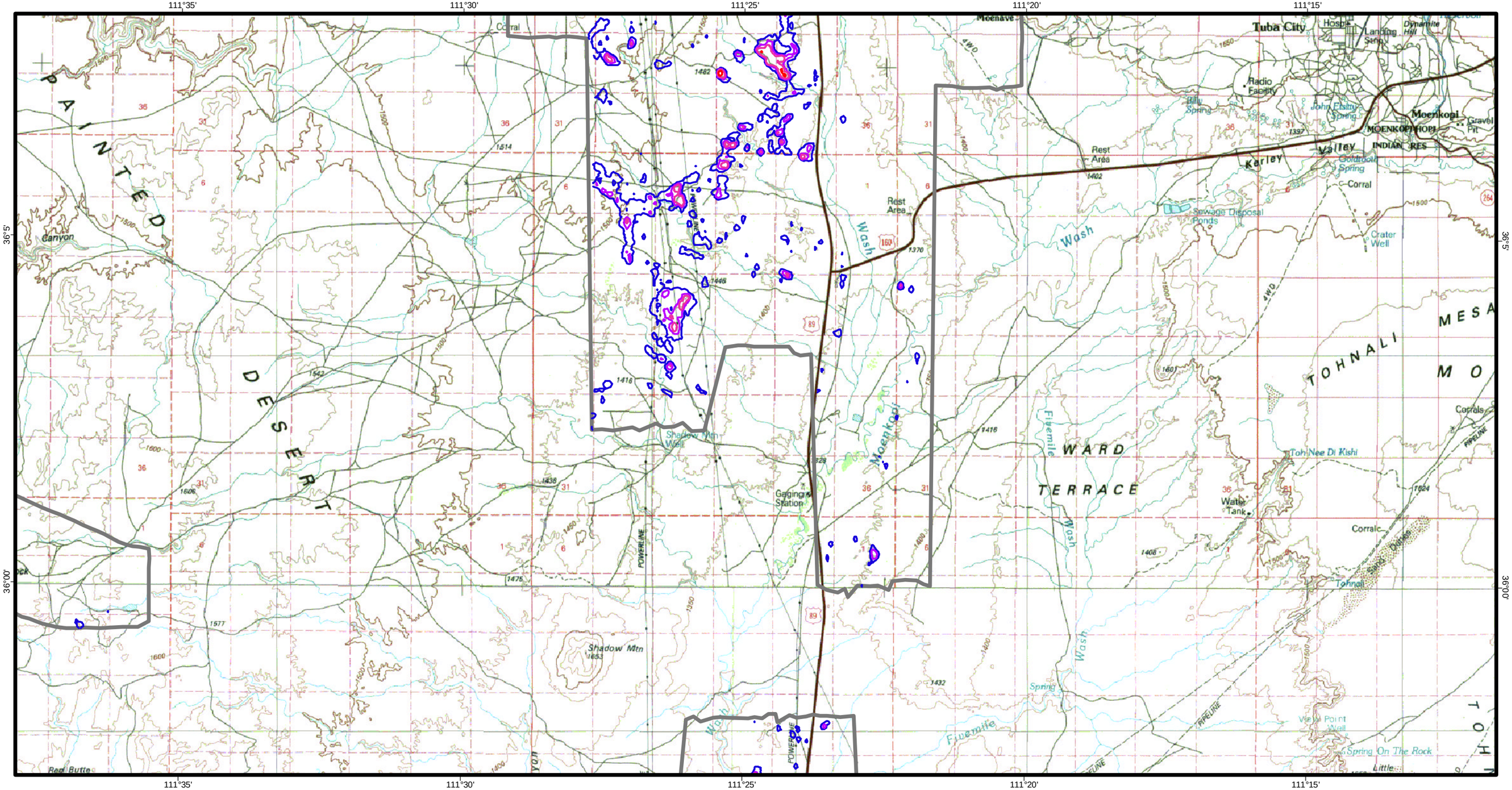
1 0 1 2 3 Kilometers

1:100,000

*U.S. Environmental Protection Agency*

**ABANDONED URANIUM MINES PROJECT**

**South Cameron/Tuba Area**




## SOUTH - BODAWAY EAST

| Aerial Radiation Contours | Derived contour-level Bismuth 214 photo-peak (excess counts per second) | Estimated exposure rate from excess Bismuth 214 (excess micro-R/hour) |
|---|---|---|
| | 80 | 3.5 |
| | 170 | 7.4 |
| | 250 | 10.9 |
| | 800 | 34.9 |
| | 1200 | 52.4 |

# 4

## AERIAL RADIATION CONTOURS BISMUTH 214 SOUTH-BODAWAY EAST

1 0 1 2 Miles

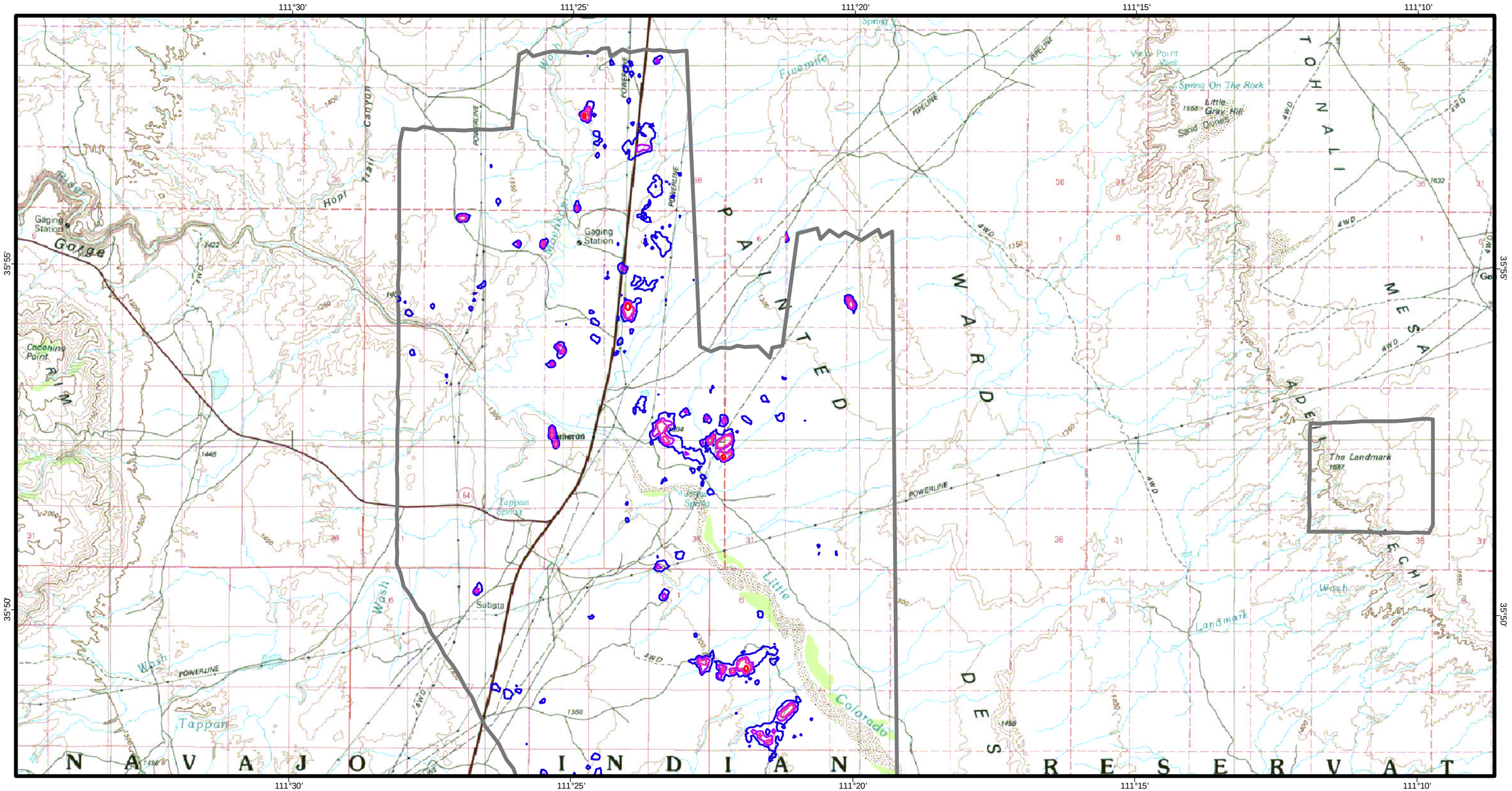
1 0 1 2 3 Kilometers

1:100,000

*U.S. Environmental Protection Agency*

**ABANDONED URANIUM MINES PROJECT**

**South Cameron/Tuba Area**




## NORTH - CAMERON

| Aerial Radiation Contours | Derived contour-level Bismuth 214 photo-peak (excess counts per second) | Estimated exposure rate from excess Bismuth 214 (excess micro-R/hour) |
|---|---|---|
| | 80 | 3.5 |
| | 170 | 7.4 |
| | 250 | 10.9 |
| | 800 | 34.9 |
| | 1200 | 52.4 |

# 4

## AERIAL RADIATION CONTOURS BISMUTH 214 NORTH-CAMERON

1 0 1 2 Miles

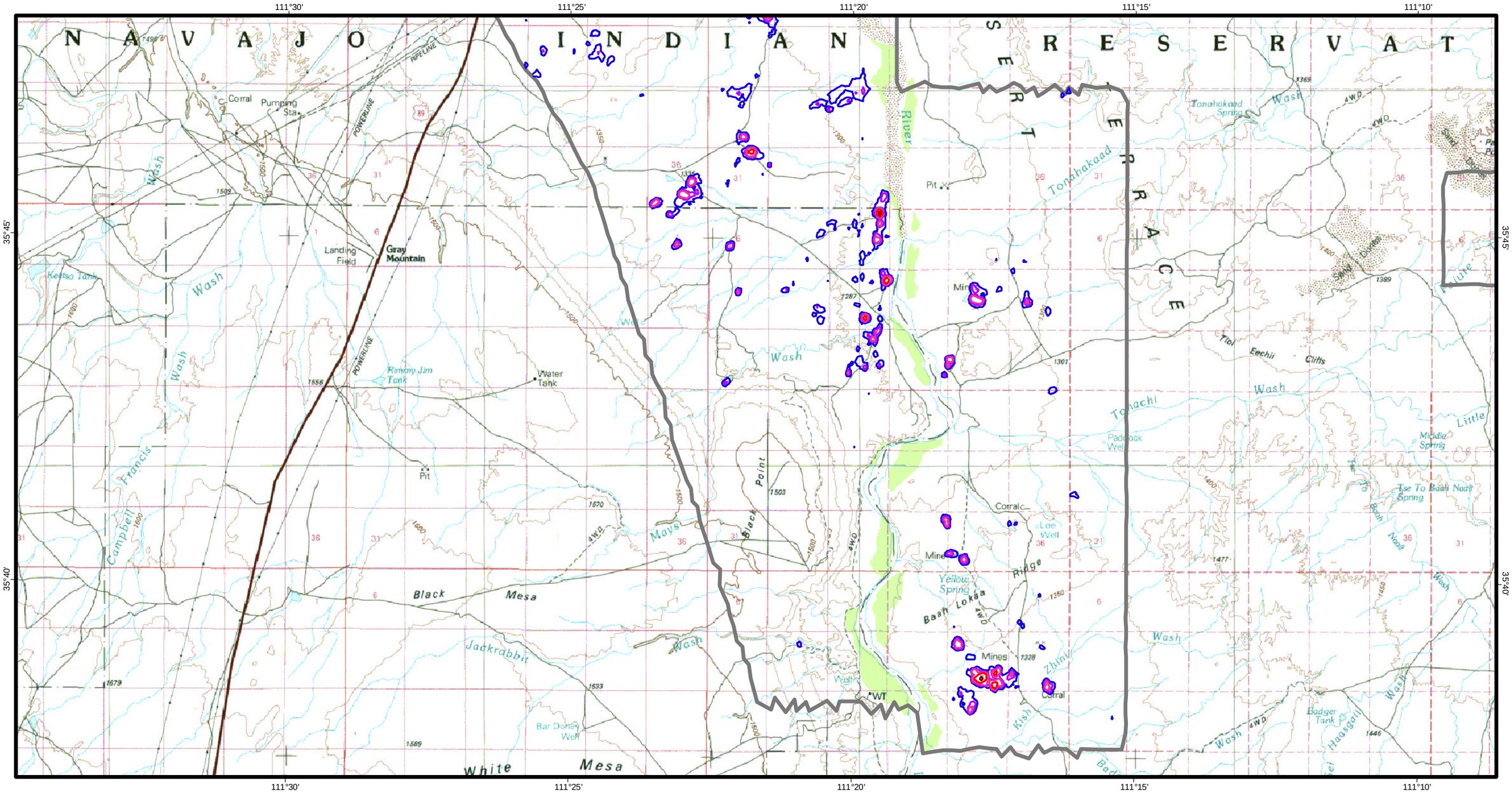
1 0 1 2 3 Kilometers

1:100,000

*U.S. Environmental Protection Agency*

**ABANDONED URANIUM MINES PROJECT**

**South Cameron/Tuba Area**




## SOUTH - CAMERON

| Aerial Radiation Contours | Derived contour-level Bismuth 214 photo-peak (excess counts per second) | Estimated exposure rate from excess Bismuth 214 (excess micro-R/hour) |
|---|---|---|
| | 80 | 3.5 |
| | 170 | 7.4 |
| | 250 | 10.9 |
| | 800 | 34.9 |
| | 1200 | 52.4 |

# 4

## AERIAL RADIATION CONTOURS BISMUTH 214 SOUTH-CAMERON

1 0 1 2 Miles

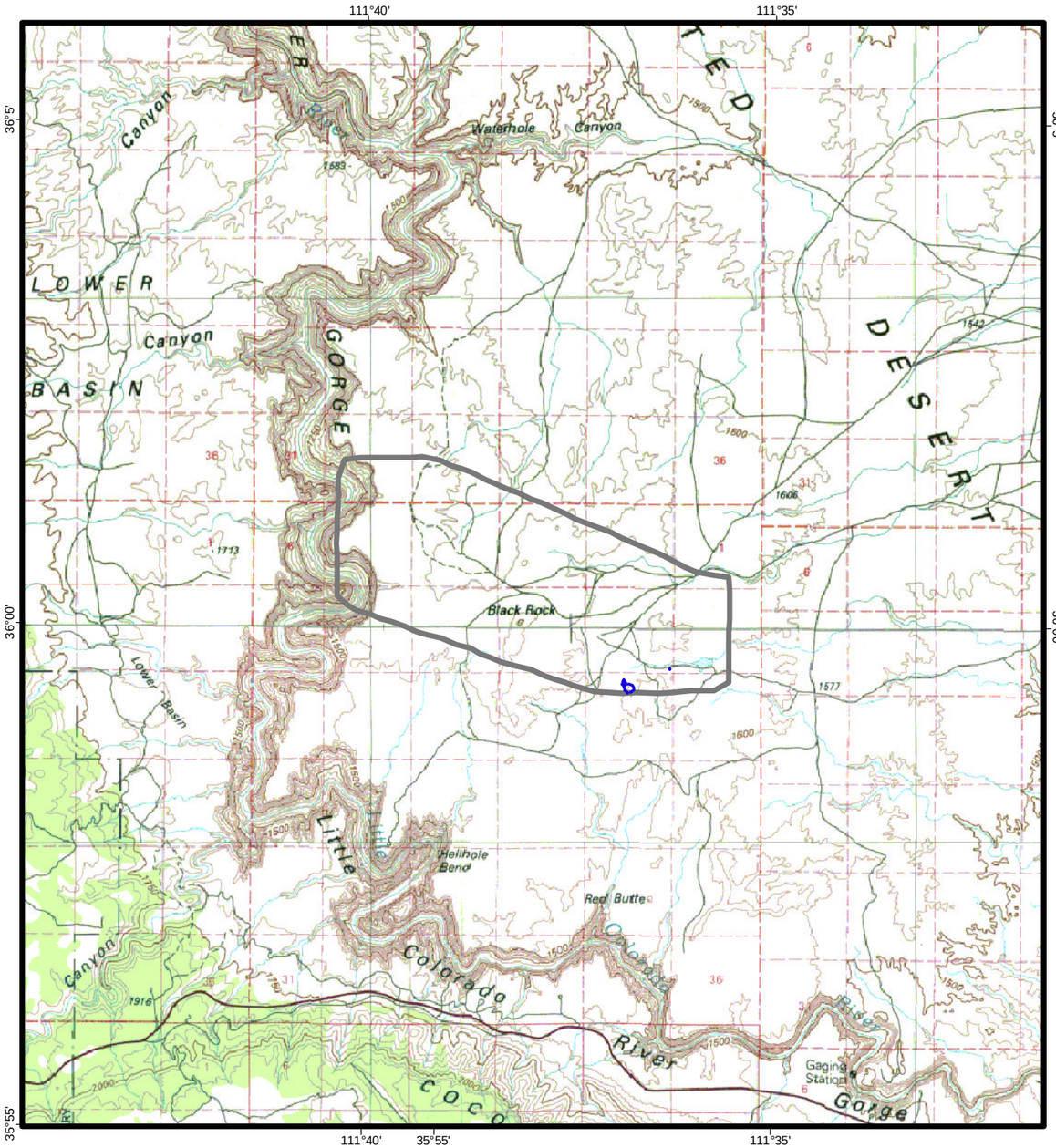
1 0 1 2 3 Kilometers

1:100,000

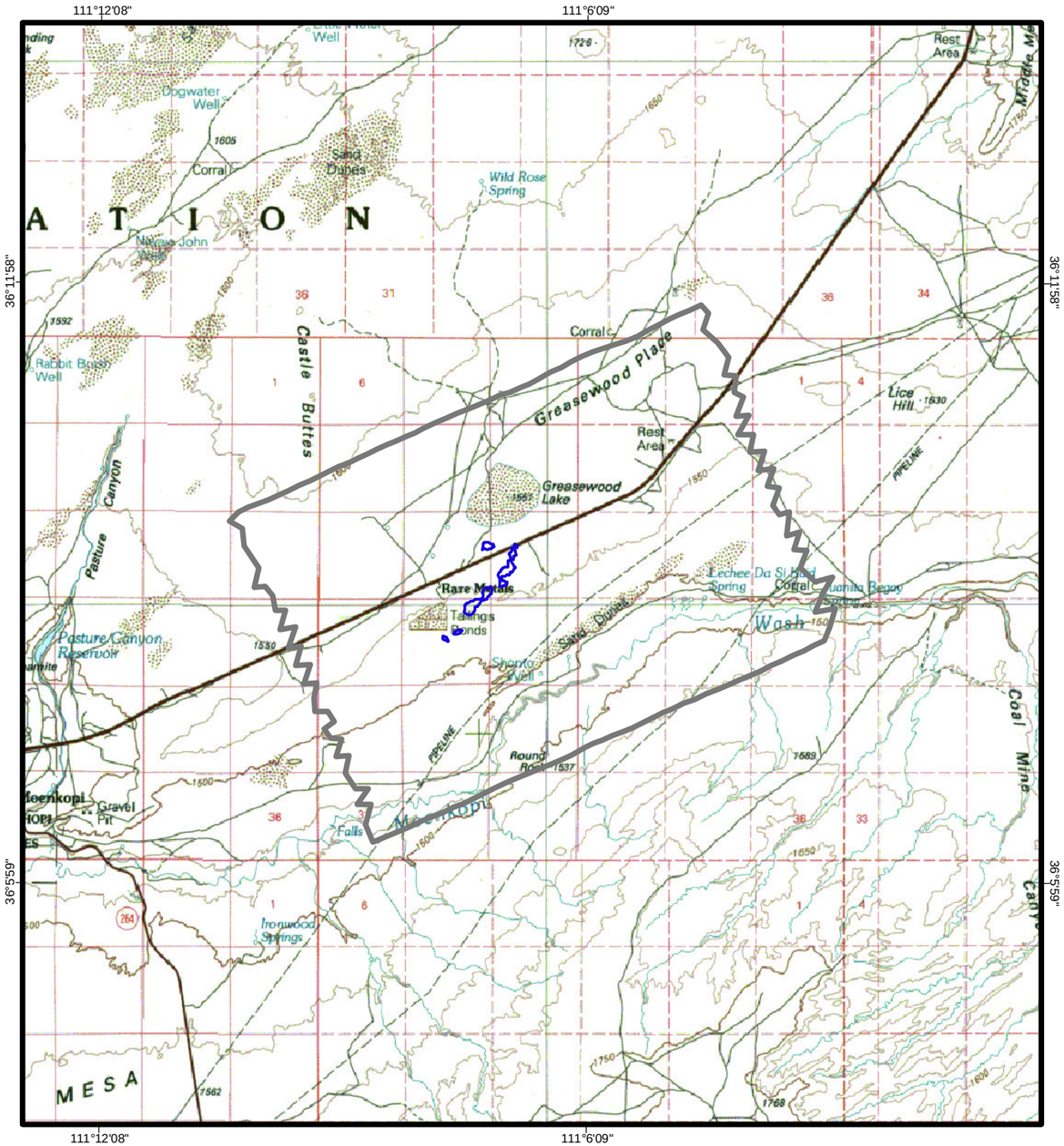
*U.S. Environmental Protection Agency*

**ABANDONED URANIUM MINES PROJECT**

**South Cameron/Tuba Area**




BODAWAY WEST




TUBA CITY

| Aerial Radiation Contours | Derived contour-level Bismuth 214 photo-peak (excess counts per second) | Estimated exposure rate from excess Bismuth 214 (excess micro-R/hour) |
|---|---|---|
| | 80 | 3.5 |
| | 170 | 7.4 |
| | 250 | 10.9 |
| | 800 | 34.9 |
| | 1200 | 52.4 |

# 4

## AERIAL RADIATION CONTOURS BISMUTH 214 BODAWAY WEST AND TUBA CITY

1 0 1 2 Miles

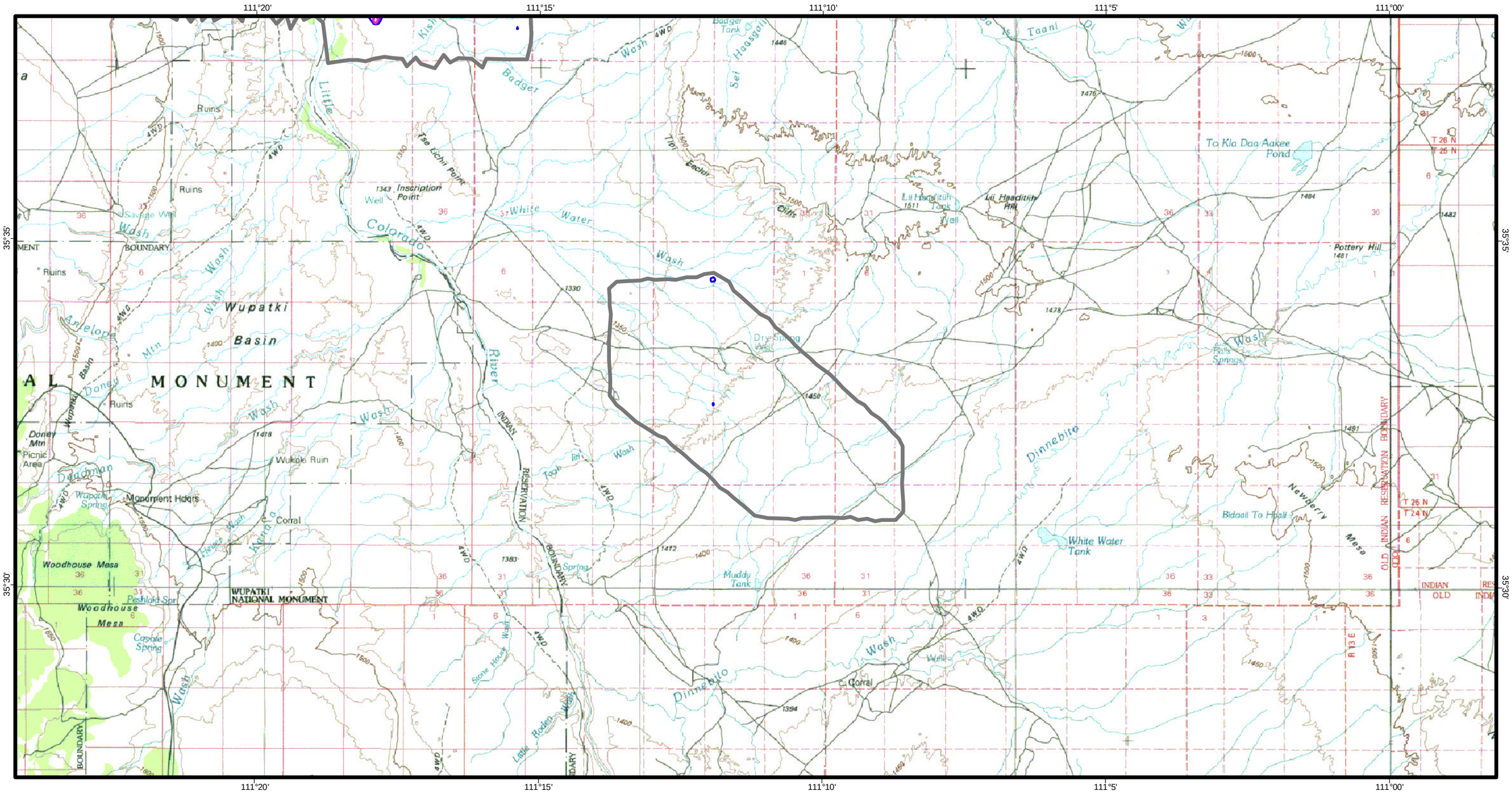
1 0 1 2 3 Kilometers

1:100,000

*U.S. Environmental Protection Agency*

**ABANDONED URANIUM MINES PROJECT**

**South Cameron/Tuba Area**




**COALMINE MESA C**

| Aerial Radiation Contours | Derived contour-level Bismuth 214 photo-peak (excess counts per second) | Estimated exposure rate from excess Bismuth 214 (excess micro-R/hour) |
|---|---|---|
| | 80 | 3.5 |
| | 170 | 7.4 |
| | 250 | 10.9 |
| | 800 | 34.9 |
| | 1200 | 52.4 |

# 4

## AERIAL RADIATION CONTOURS BISMUTH 214 COALMINE MESA C

1 0 1 2 Miles

1 0 1 2 3 Kilometers

1:100,000

*U.S. Environmental Protection Agency*

**ABANDONED URANIUM MINES PROJECT**

**South Cameron/Tuba Area**

Abandoned Uranium Mines
U.S. EPA/Navajo Nation EPA
Aerial Gamma Radiation Survey

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY • REGION 9 • SAN FRANCISCO, CALIFORNIA • MAY 1998

# U.S. EPA to Perform Helicopter Survey of Abandoned Uranium Mines

At the request of the Navajo Nation Environmental Protection Agency (NNEPA), the U.S. Environmental Protection Agency (USEPA) will be sending a team from their Region 9 office in San Francisco to perform an aerial gamma radiation survey of the Navajo Nation abandoned uranium mines. This survey will be performed by helicopter in May and June 1998.

The purpose of this survey is to measure naturally occurring radiation (gamma radiation) coming from abandoned uranium mining areas. Results of this survey will help determine if these sites pose a risk to people in the area and, if so, what measures should be taken to minimize that risk.

We would like residents of the area to know that the low-flying helicopter going back and forth during May and June is measuring radiation from the mines for this purpose.

## Keeping the Chapters Informed

USEPA will inform the Navajo Nation Chapters of the results of this survey and any follow-up actions that may be recommended.

## Who to Contact If You Have Questions or Concerns

USEPA and NNEPA will do their best to provide information to the Navajo Nation Chapters. We want to encourage you to get in touch with us if you have any questions or concerns regarding the abandoned uranium mines. USEPA has a TOLL-FREE phone number you may call at any time. Please leave your name and telephone number and we will call you back.

### The person to contact at US EPA:

**Vicki Rosen**
Community Involvement Coordinator
US EPA Region 9
75 Hawthorne St. (SFD-3)
San Francisco, CA 94105
(800) 231-3075 or
(415) 744-2187

### The Navajo Chapters to contact are:

**Dilkon Chapter**
(520) 657-3376
**Indian Wells Chapter**
(520) 654-3289
**Lower Greasewood Chapter**
(520) 654-3239
**Whitecone Chapter**
(520) 654-3340
**Teesto Chapter**
(520) 657-3352

### The person to contact at Navajo Nation EPA:

**Stanley Edison**
Navajo Superfund Program
43 Crest Rd.
St. Michaels, AZ 86511
(520) 871-6859