Appendix A
Supporting Documentation

Appendix A1
Fence Inspection Reports

CH2MHILL

FENCING INSPECTION CHECKLIST

Location: Smith Lake, Thoreau, NM

Date: 03/20/2013

Description: Ruby #1, Adit Fencing

Time: 1025

Weather: 44°, sunny, breezy

This checklist is designed for Yes or NA (Not Applicable) answers to indicate a satisfactory condition. A No response needs corrective attention; details are in the comment column.

RUBY MINES*	Yes or NA	NO	Comments
Proper Warning Signage	Y		
Stakes in Working Order (Good Condition)	Y		
Stakes Firmly Installed in Ground	Y		
Barbed Wire in Working Order (Good Condition)	Y		No barbed wire, field fencing.
Barbed Wire Installed and Connected to Stakes Properly and Securely	Y		No barbed wire, field fencing.
Free of Vandalism	Y		
Free of Signs of Human Entry	Y		
Fence Properly Labeled with Location Identification	Y		
Fencing and Signage Free of Cosmetic Damage	Y		
Structurally Sound	Y		
Additional Comments	Y		Small animal tracks noted outside of fencing. Possible small animal's burrow located within fencing (see photos).
Conducted by:	**Jim Crew (CH2M HILL), Stanley Edison (Navajo EPA)**		

*See Attached Photos of Ruby #1 Adit Fencing

PHOTO 1: Approaching Ruby Mine #1 Adit and fencing, facing east.

PHOTO 2: Ruby Mine #1 Adit fencing and warning signage, facing south. Small burrow visible next to stake.

PHOTO 3: Ruby Mine #1 Adit opening and fencing, facing east. Note field fencing and no barbed wire.

PHOTO 4: Ruby Mine #1 Adit warning signage and fencing. Facing south.

PHOTO 5: Ruby Mine #1 Adit opening and fencing. Facing south.

PHOTO 6: Ruby Mine #1 Adit. Small burrow inside of fencing. Photo taken from above.

PHOTO 7: Ruby Mine #1 Adit opening and fencing. Facing east.

CH2MHILL

FENCING INSPECTION CHECKLIST

Location: Smith Lake, Thoreau, NM

Date: 03/20/2013

Description: Ruby #1, Vent Fencing

Time: 1130

Weather: 50°, sunny, breezy

This checklist is designed for Yes or NA (Not Applicable) answers to indicate a satisfactory condition. A No response needs corrective attention; details are in the comment column.

RUBY MINES*	Yes or NA	NO	Comments
Proper Warning Signage	Y		
Stakes in Working Order (Good Condition)	Y		
Stakes Firmly Installed in Ground	Y		
Barbed Wire in Working Order (Good Condition)	Y		
Barbed Wire Installed and Connected to Stakes Properly and Securely	Y		
Free of Vandalism	Y		
Free of Signs of Human Entry	Y		
Fence Properly Labeled with Location Identification		N	Wooden Stake Should be Labeled as Ruby 001
Fencing and Signage Free of Cosmetic Damage	Y		
Structurally Sound	Y		
Additional Comments	Y		Deceased deer in vent. No signs of damage to fencing.
Conducted by:	**Jim Crew (CH2M HILL), Stanley Edison (Navajo EPA)**		

*See Attached Photos of Ruby #1 Vent Fencing

PHOTO 1: Approaching Ruby Mine #1 Vent and fencing, facing southeast.

PHOTO 2: Ruby Mine #1 Vent fencing and warning signage, facing south.

PHOTO 3: Ruby Mine #1 Vent opening and fencing, facing south. Stake should be labeled Ruby 001.

PHOTO 4: Ruby Mine #1 Vent taken from above. Note dead deer inside of vent.

PHOTO 5: Ruby Mine #1 Vent fencing and warning signage, facing northeast.

PHOTO 6: Ruby Mine #1 Vent fencing and warning signage, facing northeast.

PHOTO 7: Ruby Mine #1 Vent opening. Note dead deer inside of vent. Photo taken from above.

FENCING INSPECTION CHECKLIST

Location: Smith Lake, Thoreau, NM

Date: 08/12/2013

Description: Ruby #001, Adit Fencing

Time: 10:45

Weather: Sunny, 85°F

This checklist is designed for "Yes" or "NA" (Not Applicable) answers to indicate a satisfactory condition. A "No" response needs corrective attention and details in the comment column.

RUBY MINES*	Yes or NA	NO	Comments
Proper Warning Signage	Y		
Stakes in Working Order (Good Condition)	Y		
Stakes Firmly Installed in Ground	Y		
Fencing Wire in Working Order (Good Condition)	Y		HMOSP re-stretched some fencing*
Fencing Wire Installed and Connected to Stakes Properly and Securely	Y		
Free of Vandalism	Y		
Free of Signs of Human Entry	Y		
Fence Properly Labeled with Location Identification	Y		
Fencing and signs free of Cosmetic Damage	Y		
Structurally Sound	Y		
Additional Comments	Y		
Conducted by:	**Jennifer Laggan (CH2M HILL), Stanley Edison (Navajo EPA)**		

See Below Photos of Ruby #001 Adit Fencing

PHOTO 1: View from south of adit.

PHOTO 2: View from the southwest of adit fencing, showing portion of fence to be re-stretched.

PHOTO 3: View of adit from the southwest

PHOTO 4: View of the adit from the southwest showing fencing to be re-stretched.

PHOTO 5: View of animal burrow south of adit (within fencing).

FENCING INSPECTION CHECKLIST

Location: Smith Lake, Thoreau, NM

Date: 08/12/2013

Description: Ruby #002, Vent Fencing

Time: 11:30

Weather: Sunny, 85°F

This checklist is designed for "Yes" or "NA" (Not Applicable) answers to indicate a satisfactory condition. A "No" response needs corrective attention and details in the comment column.

RUBY MINES*	Yes or NA	NO	Comments
Proper Warning Signage	Y		
Stakes in Working Order (Good Condition)	Y		
Stakes Firmly Installed in Ground	Y		
Fencing Wire in Working Order (Good Condition)	Y		
Fencing Wire Installed and Connected to Stakes Properly and Securely	Y		
Free of Vandalism	Y		
Free of Signs of Human Entry	Y		
Fence Properly Labeled with Location Identification	Y		
Fencing and signs free of Cosmetic Damage	Y		
Structurally Sound	Y		
Additional Comments	Y		Water noted in vent.
Conducted by:	**Jennifer Laggan (CH2M HILL), Stanley Edison (Navajo EPA)**		

See Below Photos of Ruby #002 Vent Fencing

PHOTO 1: View of fence from the west around Ruby-002 vent.

PHOTO 2: View of the northern portion of the fence around Ruby 002.

PHOTO 3: View of water within the Ruby 002.

FENCING INSPECTION CHECKLIST

Location: Smith Lake, Thoreau, NM

Date: 08/12/2013

Description: Ruby #003, Sinkhole Shaft Entrance

Time: 13:08

Weather: Sunny, 85°F

This checklist is designed for "Yes" or "NA" (Not Applicable) answers to indicate a satisfactory condition. A "No" response needs corrective attention and details in the comment column.

RUBY MINES*	Yes or NA	NO	Comments
Proper Warning Signage	Y		
Stakes in Working Order (Good Condition)	Y		
Stakes Firmly Installed in Ground	Y		
Fencing Wire in Working Order (Good Condition)	Y		
Fencing Wire Installed and Connected to Stakes Properly and Securely	Y		
Free of Vandalism	Y		
Free of Signs of Human Entry	Y		
Fence Properly Labeled with Location Identification	Y		
Fencing and signs free of Cosmetic Damage	Y		
Structurally Sound	Y		
Additional Comments	Y		
Conducted by:	**Jennifer Laggan (CH2M HILL), Stanley Edison (Navajo EPA)**		

See Below Photos of Ruby #003 shaft entrance sinkhole fencing

PHOTO 1: View from the southwest of the fence around Ruby 3 shaft entrance sink hole.

PHOTO 2: View from the southwest of Ruby 3 fencing.

PHOTO 3: View of the opening that is apparent in the Ruby 3 former shaft entrance.

PHOTO 4: View from the west of the Ruby 3 fencing.

FENCING INSPECTION CHECKLIST

Location: Smith Lake, Thoreau, NM

Date: 08/12/2013

Description: Ruby #004, Vent Fencing

Time: 14:00

Weather: Sunny, 85°F

This checklist is designed for Yes or NA (Not Applicable) answers to indicate a satisfactory condition. A "No" response needs corrective attention and details in the comment column.

RUBY MINES*	Yes or NA	NO	Comments
Proper Warning Signage	Y		
Stakes in Working Order (Good Condition)	Y		
Stakes Firmly Installed in Ground	Y		
Fencing Wire in Working Order (Good Condition)	Y		
Fencing Wire Installed and Connected to Stakes Properly and Securely	Y		
Free of Vandalism	Y		
Free of Signs of Human Entry	Y		
Fence Properly Labeled with Location Identification	Y		
Fencing and signs free of Cosmetic Damage	Y		
Structurally Sound	Y		
Additional Comments	Y		
Conducted by:	**Jennifer Laggan (CH2M HILL), Stanley Edison (Navajo EPA)**		

See Below Photos of Ruby #004 Vent Fencing

PHOTO 1: View facing south of the Ruby 004 vent fencing.

PHOTO 2: View facing south of the Ruby 004 vent fencing.

PHOTO 3: View of the exposed vent at Ruby 004.

FENCING INSPECTION CHECKLIST

Location: Smith Lake, Thoreau, NM

Date: 08/12/2013

Description: Ruby #016, Vent Fencing

Time: 13:55

Weather: Sunny, 85°F

This checklist is designed for "Yes" or "NA" (Not Applicable) answers to indicate a satisfactory condition. A "No" response needs corrective attention and details in the comment column.

RUBY MINES*	Yes or NA	NO	Comments
Proper Warning Signage	Y		
Stakes in Working Order (Good Condition)	Y		
Stakes Firmly Installed in Ground	Y		
Fencing Wire in Working Order (Good Condition)	Y		
Fencing Wire Installed and Connected to Stakes Properly and Securely	Y		
Free of Vandalism	Y		
Free of Signs of Human Entry	Y		
Fence Properly Labeled with Location Identification	Y		
Fencing and signs free of Cosmetic Damage	Y		
Structurally Sound	Y		
Additional Comments	Y		
Conducted by:	**Jennifer Laggan (CH2M HILL), Stanley Edison (Navajo EPA)**		

See Below Photos of Ruby #016 Vent Fencing

PHOTO 1: View facing northeast of fencing around Ruby 016.

PHOTO 2: View facing north of the Ruby 016 fencing.

PHOTO 3: View facing northeast of Ruby 016 vent fencing.

PHOTO 4: View of the fenced in area, showing the prospective mine feature at Ruby 016.

FENCING INSPECTION CHECKLIST

Location: Smith Lake, Thoreau, NM

Date: 08/12/2013

Description: Ruby #017, Vent Fencing

Time: 14:45

Weather: Sunny, 85 °F

This checklist is designed for "Yes" or "NA" (Not Applicable) answers to indicate a satisfactory condition. A "No" response needs corrective attention and details in the comment column.

RUBY MINES*	Yes or NA	NO	Comments
Proper Warning Signage	Y		
Stakes in Working Order (Good Condition)	Y		
Stakes Firmly Installed in Ground	Y		
Fencing Wire in Working Order (Good Condition)	Y		
Fencing Wire Installed and Connected to Stakes Properly and Securely	Y		
Free of Vandalism	Y		
Free of Signs of Human Entry	Y		
Fence Properly Labeled with Location Identification	Y		
Fencing and signs free of Cosmetic Damage	Y		
Structurally Sound	Y		
Additional Comments	Y		
Conducted by:	**Jennifer Laggan (CH2M HILL), Stanley Edison (Navajo EPA)**		

See Below Photos of Ruby #017 Vent Fencing

PHOTO 1: View of the fencing around the Ruby 017 Feature.

PHOTO 2: View of the fence around the Ruby 017 feature.

PHOTO 3: View of the metal grate on top of the Ruby 017 feature.

FENCING INSPECTION CHECKLIST

Location: Smith Lake, Thoreau, NM

Date: 08/12/2013

Description: Ruby #018, Vent Fencing

Time: 10:25

Weather: Sunny, 85°F

This checklist is designed for "Yes" or "NA" (Not Applicable) answers to indicate a satisfactory condition. A "No" response needs corrective attention and details in the comment column.

RUBY MINES*	Yes or NA	NO	Comments
Proper Warning Signage	Y		
Stakes in Working Order (Good Condition)	Y		
Stakes Firmly Installed in Ground	Y		
Fencing Wire in Working Order (Good Condition)	Y		
Fencing Wire Installed and Connected to Stakes Properly and Securely	Y		
Free of Vandalism	Y		
Free of Signs of Human Entry	Y		
Fence Properly Labeled with Location Identification	Y		
Fencing and signs free of Cosmetic Damage	Y		
Structurally Sound	Y		
Additional Comments	Y		
Conducted by:	**Jennifer Laggan (CH2M HILL), Stanley Edison (Navajo EPA)**		

See Below Photos of Ruby #018 Vent Fencing

PHOTO 1: View to the west of the fencing around the trash pit

PHOTO 2: View to the west of the fencing around the trash pit.

PHOTO 3: View to the west of the fence and trash pit.

CH2MHILL

FENCING INSPECTION CHECKLIST

Location: RUBY-001

Date: 12/23/2013

Description: Ruby Mine No. 1 Adit

Time: 12:30 pm

Weather: sunny, approximately 35 degrees F, breezy

This checklist is designed for "Yes" or "NA" (Not Applicable) answers to indicate a satisfactory condition. A "No" response needs corrective attention and details in the comment column.

RUBY MINES*	Yes or NA	NO	Comments
Proper Warning Signage	YES		
Stakes in Working Order (Good Condition)	YES		
Stakes Firmly Installed in Ground	YES		
Fencing Wire in Working Order (Good Condition)	YES		
Fencing Wire Installed and Connected to Stakes Properly and Securely	YES		
Free of Vandalism	YES		
Free of Signs of Human Entry	YES		
Fence Properly Labeled with Location Identification	YES		
Fencing and signs free of Cosmetic Damage		NO	Minor warping of fence wire due to tree limb fall. Minor repairs may be required if additional damage occurs.
Structurally Sound	YES		
Additional Comments			May schedule minor repairs if additional tree limbs fall on fencing.
Conducted by:	**Ben Moayyad (CH2M HILL), Stanley Edison (Navajo EPA)**		

Photo #s

Ruby01-02-Dec2013, Ruby01-04-Dec2013

Ruby01-02-Dec2013: Ruby Mine No.1 showing minor fence damage and adit opening.

Ruby01-04-Dec2013: Ruby Mine No.1 showing intact fence and sign.

CH2MHILL

FENCING INSPECTION CHECKLIST

Location: RUBY-002

Date: 12/23/2013

Description: Ruby Mine Vent (near continental divide)

Time: 11:55 am

Weather: sunny, approximately 30 degrees F, breezy

This checklist is designed for "Yes" or "NA" (Not Applicable) answers to indicate a satisfactory condition. A "No" response needs corrective attention and details in the comment column.

RUBY MINES*	Yes or NA	NO	Comments
Proper Warning Signage	YES		
Stakes in Working Order (Good Condition)	YES		
Stakes Firmly Installed in Ground	YES		
Fencing Wire in Working Order (Good Condition)	YES		
Fencing Wire Installed and Connected to Stakes Properly and Securely	YES		
Free of Vandalism	YES		
Free of Signs of Human Entry	YES		
Fence Properly Labeled with Location Identification	YES		
Fencing and signs free of Cosmetic Damage	YES		
Structurally Sound	YES		
Additional Comments			Water in bottom of vent with evidence of snow melt drainage on west side.
Conducted by:	**Ben Moayyad (CH2M HILL), Stanley Edison (Navajo EPA)**		

Photo #s

Ruby02-01-Dec2013, Ruby02-03-Dec2013, Ruby02-04-Dec2013

Ruby02-01-Dec2013: Vent on top of hill southwest of Ruby Mine No. 1 showing intact fence, depression, and signs.

Ruby02-03-Dec2013: Vent on top of hill southwest of Ruby Mine No. 1 showing drainage on west side and water at the bottom of vent opening.

Ruby02-04-Dec2013: Vent on top of hill southwest of Ruby Mine No. 1 showing intact fence and signs.

CH2MHILL

FENCING INSPECTION CHECKLIST

Location: RUBY-003

Date: 12/23/2013

Description: Ruby No. 3 Adit

Time: 2:00 pm

Weather: sunny, approximately 35 degrees F, breezy

This checklist is designed for "Yes" or "NA" (Not Applicable) answers to indicate a satisfactory condition. A "No" response needs corrective attention and details in the comment column.

RUBY MINES*	Yes or NA	NO	Comments
Proper Warning Signage	YES		
Stakes in Working Order (Good Condition)	YES		
Stakes Firmly Installed in Ground	YES		
Fencing Wire in Working Order (Good Condition)	YES		
Fencing Wire Installed and Connected to Stakes Properly and Securely	YES		
Free of Vandalism	YES		
Free of Signs of Human Entry	YES		
Fence Properly Labeled with Location Identification	YES		
Fencing and signs free of Cosmetic Damage	YES		
Structurally Sound	YES		
Additional Comments			No notable subsidence since last inspection.
Conducted by:	**Ben Moayyad (CH2M HILL), Stanley Edison (Navajo EPA)**		

Photo #s

Ruby03-02-Dec2013, Ruby03-03-Dec2013

Ruby03-02-Dec2013: Ruby Mine No. 3 showing intact fencing and signs.

Ruby03-03-Dec2013: Ruby Mine No. 3 showing fencing and signs.

CH2MHILL

FENCING INSPECTION CHECKLIST

Location: RUBY-004

Date: 12/23/2013

Description: Ruby Mine Vent (Section 27)

Time: 4:15 pm

This checklist is designed for "Yes" or "NA" (Not Applicable) answers to indicate a satisfactory condition. A "No" response needs corrective attention and details in the comment column.

Weather: poor light, approximately 30 degrees F, breezy

RUBY MINES*	Yes or NA	NO	Comments
Proper Warning Signage	NA		
Stakes in Working Order (Good Condition)	NA		
Stakes Firmly Installed in Ground	NA		
Fencing Wire in Working Order (Good Condition)	NA		
Fencing Wire Installed and Connected to Stakes Properly and Securely	NA		
Free of Vandalism	NA		
Free of Signs of Human Entry	NA		
Fence Properly Labeled with Location Identification	NA		
Fencing and signs free of Cosmetic Damage	NA		
Structurally Sound	NA		
Additional Comments			Poor light at end of day, and melting snow on roads make access to site unsafe.
Conducted by:	**Ben Moayyad (CH2M HILL), Stanley Edison (Navajo EPA)**		

Photo #s

No Inspection performed at this location do to access and safety issues.

CH2MHILL

FENCING INSPECTION CHECKLIST

Location: RUBY-016

Date: 12/23/2013

Description: Ruby Mine Prospect (Section 27)

Time: 4:15 pm

This checklist is designed for "Yes" or "NA" (Not Applicable) answers to indicate a satisfactory condition. A "No" response needs corrective attention and details in the comment column.

Weather: poor light, approximately 30 degrees F, breezy

RUBY MINES*	Yes or NA	NO	Comments
Proper Warning Signage	NA		
Stakes in Working Order (Good Condition)	NA		
Stakes Firmly Installed in Ground	NA		
Fencing Wire in Working Order (Good Condition)	NA		
Fencing Wire Installed and Connected to Stakes Properly and Securely	NA		
Free of Vandalism	NA		
Free of Signs of Human Entry	NA		
Fence Properly Labeled with Location Identification	NA		
Fencing and signs free of Cosmetic Damage	NA		
Structurally Sound	NA		
Additional Comments			Poor light at end of day, and melting snow on roads make access to site unsafe.
Conducted by:	**Ben Moayyad (CH2M HILL), Stanley Edison (Navajo EPA)**		

Photo #s

No inspection performed at this location do to access and safety issues.

CH2MHILL

FENCING INSPECTION CHECKLIST

Location: RUBY-017

Date: 12/23/2013

Description: Shaft (Section 25)

Time: 2:20 pm

Weather: sunny, approximately 35 degrees F, breezy

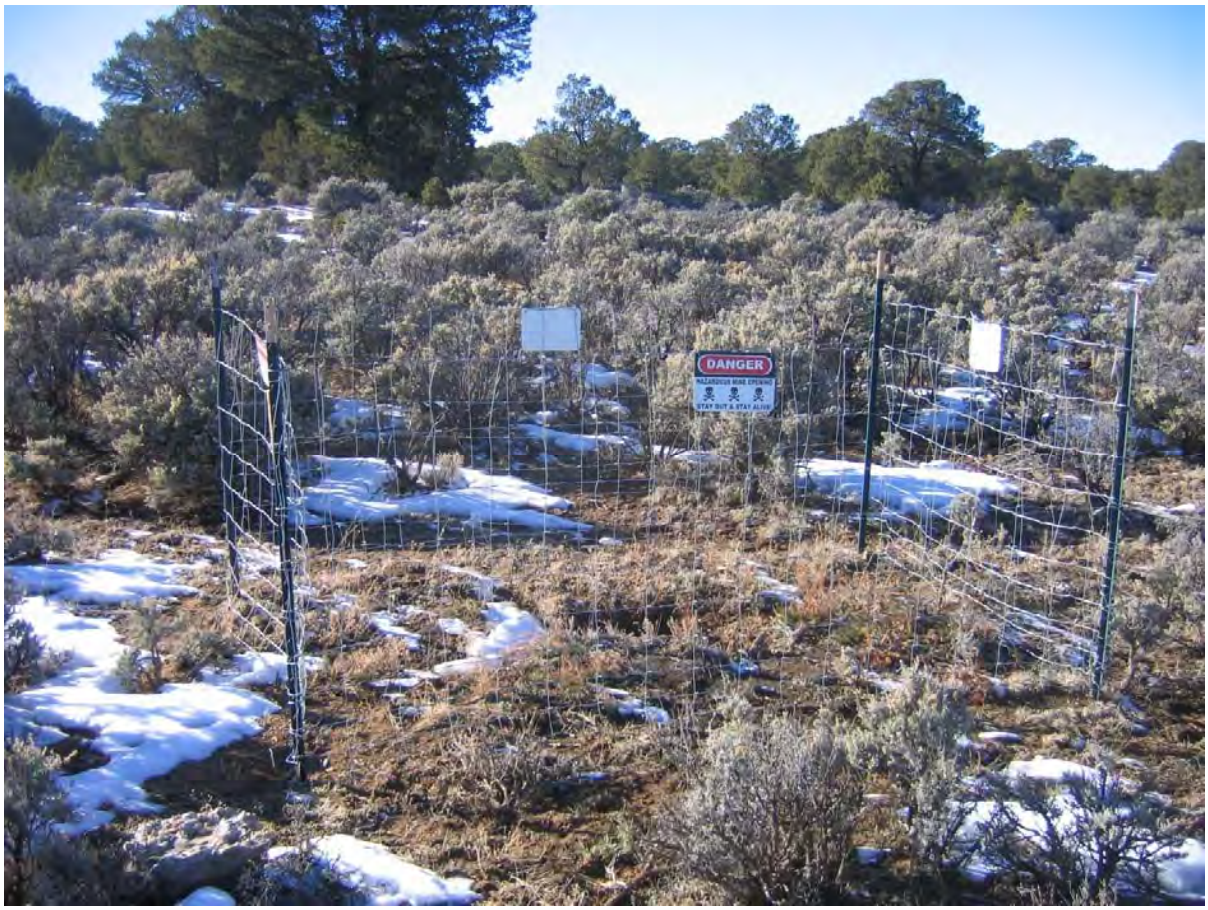
This checklist is designed for "Yes" or "NA" (Not Applicable) answers to indicate a satisfactory condition. A "No" response needs corrective attention and details in the comment column.

RUBY MINES*	Yes or NA	NO	Comments
Proper Warning Signage	YES		
Stakes in Working Order (Good Condition)	YES		
Stakes Firmly Installed in Ground	YES		
Fencing Wire in Working Order (Good Condition)	YES		
Fencing Wire Installed and Connected to Stakes Properly and Securely	YES		
Free of Vandalism	YES		
Free of Signs of Human Entry	YES		
Fence Properly Labeled with Location Identification	YES		
Fencing and signs free of Cosmetic Damage	YES		
Structurally Sound	YES		
Additional Comments			
Conducted by:	**Ben Moayyad (CH2M HILL), Stanley Edison (Navajo EPA)**		

Photo #s

Ruby17-01-Dec2013, Ruby17-03-Dec2013

Ruby17-01-Dec2013: Shaft southwest of Ruby Mine No. 3 showing intact fencing and signs.



Ruby17-02-Dec2013: Shaft southwest of Ruby Mine No. 3 showing intact fencing and signs.

FENCING INSPECTION CHECKLIST

Location: RUBY-018

Date: 12/23/2013

Description: Trash Pit/Potential Ruby Mine vent (Section 21)

Time: 11:35 am

Weather: sunny, approximately 30 degrees F, breezy

This checklist is designed for "Yes" or "NA" (Not Applicable) answers to indicate a satisfactory condition. A "No" response needs corrective attention and details in the comment column.

RUBY MINES*	Yes or NA	NO	Comments
Proper Warning Signage	YES		
Stakes in Working Order (Good Condition)	YES		
Stakes Firmly Installed in Ground	YES		
Fencing Wire in Working Order (Good Condition)	YES		
Fencing Wire Installed and Connected to Stakes Properly and Securely	YES		
Free of Vandalism	YES		
Free of Signs of Human Entry	YES		
Fence Properly Labeled with Location Identification	YES		
Fencing and signs free of Cosmetic Damage	YES		
Structurally Sound	YES		
Additional Comments			Some trash located outside of fenced area.
Conducted by:	**Ben Moayyad (CH2M HILL), Stanley Edison (Navajo EPA)**		

Photo #s

Ruby18-02-Dec2013, Ruby18-03-Dec2013

Ruby18-02-Dec2013: Trash Pit southwest of Ruby Mine No. 1 showing intact fencing, signs, and debris.

Ruby18-03-Dec2013: Trash Pit southwest of Ruby Mine No. 1 showing intact fencing, signs, and debris.

CH2MHILL

FENCING INSPECTION CHECKLIST

Location: RUBY-020

Date: 12/23/2013

Description: Prospect (Section 25)

Time: 2:30 pm

Weather: sunny, approximately 35 degrees F, breezy

This checklist is designed for "Yes" or "NA" (Not Applicable) answers to indicate a satisfactory condition. A "No" response needs corrective attention and details in the comment column.

RUBY MINES*	Yes or NA	NO	Comments
Proper Warning Signage	YES		
Stakes in Working Order (Good Condition)	YES		
Stakes Firmly Installed in Ground	YES		
Fencing Wire in Working Order (Good Condition)	YES		
Fencing Wire Installed and Connected to Stakes Properly and Securely	YES		
Free of Vandalism	YES		
Free of Signs of Human Entry	YES		
Fence Properly Labeled with Location Identification	YES		
Fencing and signs free of Cosmetic Damage	YES		
Structurally Sound	YES		
Additional Comments			Fencing was installed on 12/23/13 surrounding the depression. The small soil and rock debris piles were not entirely fenced.
Conducted by:	**Ben Moayyad (CH2M HILL), Stanley Edison (Navajo EPA)**		

Photo #s

Photos collected **prior to fencing**:

Ruby20-01-Dec2013, Ruby20-02-Dec2013, Ruby20-04-Dec2013,

Photos collected **subsequent to fencing**:

Ruby20-06-Dec2013, Ruby20-08-Dec2013, Ruby20-09-Dec2013

Ruby20-01-Dec2013: Prospect southwest of Ruby Mine No. 1 site conditions prior to fencing. The feature identifier is indicated on the stake, a small depression is partially filled with snow and small mounds of excavation debris are located adjacent to the depression.

Ruby20-02-Dec2013: Prospect southwest of Ruby Mine No. 1 site conditions prior to fencing.

Ruby20-04-Dec2013: Prospect southwest of Ruby Mine No. 1 showing mounds of excavated material.

Ruby20-06-Dec2013: Prospect southwest of Ruby Mine No. 1 showing fencing, depression, and signs.

Ruby20-08-Dec2013: Prospect southwest of Ruby Mine No. 1 showing fencing and signs.

Ruby20-09-Dec2013: Prospect southwest of Ruby Mine No. 1 showing fencing, signs, and depression.

CH2MHILL

FENCING INSPECTION CHECKLIST

Location: RUBY-001

Date: 02/25/2014

Description: Ruby Mine No. 1 Adit

Time: 3:45 pm

Weather: sunny, approximately 60 degrees F

This checklist is designed for "Yes" or "NA" (Not Applicable) answers to indicate a satisfactory condition. A "No" response needs corrective attention and details in the comment column.

RUBY MINES*	Yes or NA	NO	Comments
Proper Warning Signage	YES		
Stakes in Working Order (Good Condition)	YES		
Stakes Firmly Installed in Ground	YES		
Fencing Wire in Working Order (Good Condition)	YES		
Fencing Wire Installed and Connected to Stakes Properly and Securely	YES		
Free of Vandalism		No	Fence was folded over and tied together on southeast side. Repaired.
Free of Signs of Human Entry	YES		
Fence Properly Labeled with Location Identification	YES		
Fencing and signs free of Cosmetic Damage	YES		
Structurally Sound	YES		
Additional Comments			
Conducted by:	**Jen Laggan (CH2M HILL), Stanley Edison (Navajo EPA)**		

Photo #s

Ruby-001_1, Ruby-001_4, Ruby-001_5, Ruby-001_6

Ruby-001_1: Ruby Mine No.1 showing intact fencing and signs.

Ruby-001_4: Ruby Mine No.1 showing open adit.

Ruby-001_5: Ruby Mine No.1 showing folded fencing.

Ruby-001_6: Ruby Mine No.1 showing fencing after repair.

CH2MHILL

FENCING INSPECTION CHECKLIST

Location: RUBY-002

Date: 02/25/2014

Description: Ruby Mine Vent (near continental divide)

Time: 4:05 pm

Weather: sunny, approximately 60 degrees F

This checklist is designed for "Yes" or "NA" (Not Applicable) answers to indicate a satisfactory condition. A "No" response needs corrective attention and details in the comment column.

RUBY MINES*	Yes or NA	NO	Comments
Proper Warning Signage	YES		
Stakes in Working Order (Good Condition)	YES		
Stakes Firmly Installed in Ground	YES		
Fencing Wire in Working Order (Good Condition)	YES		
Fencing Wire Installed and Connected to Stakes Properly and Securely	YES		
Free of Vandalism	YES		
Free of Signs of Human Entry	YES		
Fence Properly Labeled with Location Identification	YES		
Fencing and signs free of Cosmetic Damage	YES		
Structurally Sound	YES		
Additional Comments			Water to 16 inches below the metal conduit.
Conducted by:	**Jen Laggan (CH2M HILL), Stanley Edison (Navajo EPA)**		

Photo #s

Ruby-002_1, Ruby-002_2, Ruby-002_3

Ruby-002_1: Ruby Mine No. 2 showing intact fencing and signs.

Ruby-002_2: Ruby Mine No. 2 showing intact fencing and signs.

Ruby-002_3: Water to 16 inches below the metal conduit.

CH2MHILL

FENCING INSPECTION CHECKLIST

Location: RUBY-003

Date: 02/25/2014

Description: Ruby No. 3 Adit

Time: 1:33 pm

Weather: sunny, approximately 60 degrees F

This checklist is designed for "Yes" or "NA" (Not Applicable) answers to indicate a satisfactory condition. A "No" response needs corrective attention and details in the comment column.

RUBY MINES*	Yes or NA	NO	Comments
Proper Warning Signage	YES		
Stakes in Working Order (Good Condition)	YES		
Stakes Firmly Installed in Ground	YES		
Fencing Wire in Working Order (Good Condition)	YES		
Fencing Wire Installed and Connected to Stakes Properly and Securely	YES		
Free of Vandalism	YES		
Free of Signs of Human Entry	YES		
Fence Properly Labeled with Location Identification	YES		
Fencing and signs free of Cosmetic Damage	YES		
Structurally Sound	YES		
Additional Comments			Opening appears to have gotten bigger since last inspection.
Conducted by:	**Jen Laggan (CH2M HILL), Stanley Edison (Navajo EPA)**		

Photo #s

Ruby-003_1, Ruby-003_2, Ruby-003_3

Ruby-003_1: Ruby Mine No. 3 showing intact fencing and signs.

Ruby-003_3: Ruby Mine No. 3 showing the larger opening.

FENCING INSPECTION CHECKLIST

Location: RUBY-004

Date: 02/25/2014

Description: Ruby Mine Vent (Section 27)

Time: 2:41 pm

Weather: sunny, approximately 60 degrees F

This checklist is designed for "Yes" or "NA" (Not Applicable) answers to indicate a satisfactory condition. A "No" response needs corrective attention and details in the comment column.

RUBY MINES*	Yes or NA	NO	Comments
Proper Warning Signage	YES		
Stakes in Working Order (Good Condition)	YES		
Stakes Firmly Installed in Ground	YES		
Fencing Wire in Working Order (Good Condition)	YES		
Fencing Wire Installed and Connected to Stakes Properly and Securely	YES		
Free of Vandalism	YES		
Free of Signs of Human Entry	YES		
Fence Properly Labeled with Location Identification	YES		
Fencing and signs free of Cosmetic Damage	YES		
Structurally Sound	YES		
Additional Comments			
Conducted by:	**Jen Laggan (CH2M HILL), Stanley Edison (Navajo EPA)**		

Photo #s

Ruby-004_1, Ruby-004_2, Ruby-004_3

Ruby-004_1: Ruby Mine Vent (Section 27) showing intact fencing and signs.

Ruby-004_2: Ruby Mine Vent (Section 27) showing intact fencing and signs.

Ruby-004_3: Ruby Mine Vent (Section 27) showing opening.

CH2MHILL

FENCING INSPECTION CHECKLIST

Location: RUBY-016

Date: 02/25/2014

Description: Ruby Mine Prospect (Section 27)

Time: 2:35 pm

Weather: sunny, approximately 60 degrees F

This checklist is designed for "Yes" or "NA" (Not Applicable) answers to indicate a satisfactory condition. A "No" response needs corrective attention and details in the comment column.

RUBY MINES*	Yes or NA	NO	Comments
Proper Warning Signage	YES		
Stakes in Working Order (Good Condition)	YES		
Stakes Firmly Installed in Ground	YES		
Fencing Wire in Working Order (Good Condition)	YES		
Fencing Wire Installed and Connected to Stakes Properly and Securely	YES		
Free of Vandalism	YES		
Free of Signs of Human Entry	YES		
Fence Properly Labeled with Location Identification	YES		
Fencing and signs free of Cosmetic Damage	YES		
Structurally Sound	YES		
Additional Comments			
Conducted by:	**Jen Laggan (CH2M HILL), Stanley Edison (Navajo EPA)**		

Photo #s

Ruby-016_1, Ruby-016_2

Ruby-016_1: Ruby Mine Prospect (Section 27) showing intact fencing and signs.

Ruby-016_2: Ruby Mine Prospect (Section 27) showing intact fencing and signs.

FENCING INSPECTION CHECKLIST

Location: RUBY-017

Date: 02/25/2014

Description: Shaft (Section 25)

Time: 1:55 pm

Weather: sunny, approximately 60 degrees F

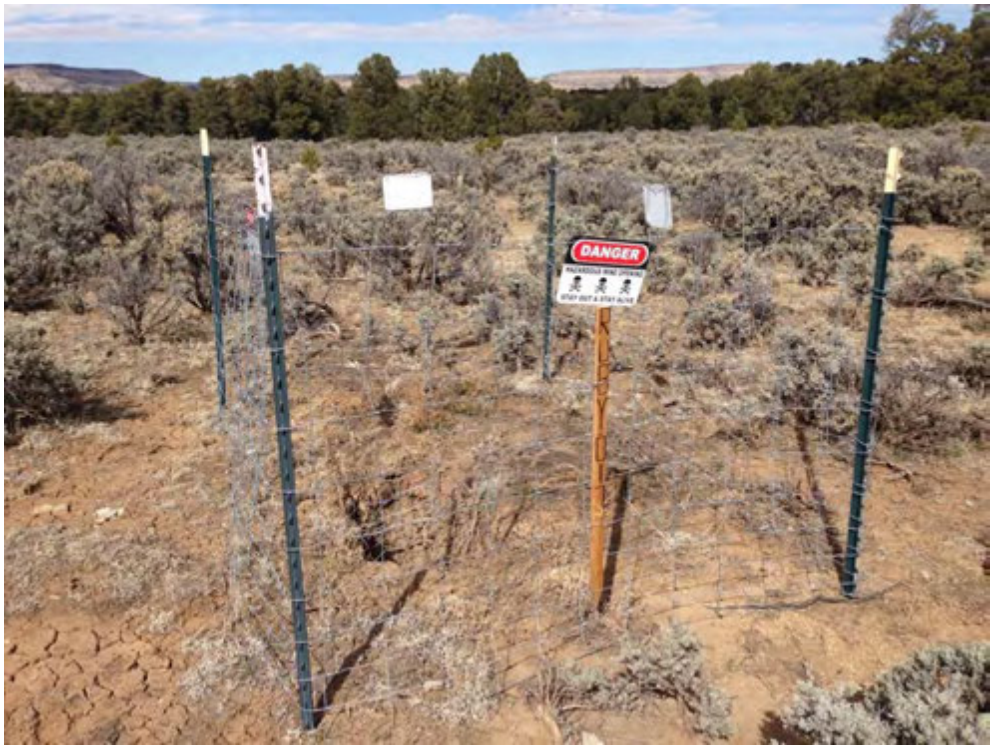
This checklist is designed for "Yes" or "NA" (Not Applicable) answers to indicate a satisfactory condition. A "No" response needs corrective attention and details in the comment column.

RUBY MINES*	Yes or NA	NO	Comments
Proper Warning Signage	YES		
Stakes in Working Order (Good Condition)	YES		
Stakes Firmly Installed in Ground	YES		
Fencing Wire in Working Order (Good Condition)	YES		
Fencing Wire Installed and Connected to Stakes Properly and Securely	YES		
Free of Vandalism	YES		
Free of Signs of Human Entry	YES		
Fence Properly Labeled with Location Identification	YES		
Fencing and signs free of Cosmetic Damage	YES		
Structurally Sound	YES		
Additional Comments			
Conducted by:	**Jen Laggan (CH2M HILL), Stanley Edison (Navajo EPA)**		

Photo #s

Ruby017_1, Ruby017_2

Ruby017_1: Shaft southwest of Ruby Mine No. 3 showing intact fencing and signs.



Ruby017_2: Shaft southwest of Ruby Mine No. 3 showing intact fencing and signs.

FENCING INSPECTION CHECKLIST

Location: RUBY-018

Date: 02/25/2014

Description: Trash Pit/Potential Ruby Mine vent (Section 21)

Time: 9:20 am

Weather: sunny, approximately 60 degrees F

This checklist is designed for "Yes" or "NA" (Not Applicable) answers to indicate a satisfactory condition. A "No" response needs corrective attention and details in the comment column.

RUBY MINES*	Yes or NA	NO	Comments
Proper Warning Signage	YES		
Stakes in Working Order (Good Condition)	YES		
Stakes Firmly Installed in Ground	YES		
Fencing Wire in Working Order (Good Condition)	YES		
Fencing Wire Installed and Connected to Stakes Properly and Securely	YES		
Free of Vandalism	YES		
Free of Signs of Human Entry	YES		
Fence Properly Labeled with Location Identification	YES		
Fencing and signs free of Cosmetic Damage	YES		
Structurally Sound	YES		
Additional Comments			Items appear to have subsided into hole.
Conducted by:	**Jen Laggan (CH2M HILL), Stanley Edison (Navajo EPA)**		

Photo #s

Ruby-018_1, Ruby-018_3, Ruby-018_4, Ruby-018_5

Ruby018_1: Trash Pit southwest of Ruby Mine No. 1 showing intact fencing, signs, and debris.

Ruby018_3: Trash Pit southwest of Ruby Mine No. 1 showing debris strewn to the west of the trash pit.

Ruby018_4: Trash Pit southwest of Ruby Mine No. 1 showing intact fencing, signs, and debris.

Ruby018_5: Trash Pit southwest of Ruby Mine No. 1 showing intact fencing, signs, and debris.

FENCING INSPECTION CHECKLIST

Location: RUBY-020

Date: 02/25/2014

Description: Prospect (Section 25)

Time: 1:50 pm

Weather: sunny, approximately 60 degrees F

This checklist is designed for "Yes" or "NA" (Not Applicable) answers to indicate a satisfactory condition. A "No" response needs corrective attention and details in the comment column.

RUBY MINES*	Yes or NA	NO	Comments
Proper Warning Signage	YES		
Stakes in Working Order (Good Condition)	YES		
Stakes Firmly Installed in Ground	YES		
Fencing Wire in Working Order (Good Condition)	YES		
Fencing Wire Installed and Connected to Stakes Properly and Securely	YES		
Free of Vandalism	YES		
Free of Signs of Human Entry	YES		
Fence Properly Labeled with Location Identification	YES		
Fencing and signs free of Cosmetic Damage	YES		
Structurally Sound	YES		
Additional Comments			
Conducted by:	**Jen Laggan (CH2M HILL), Stanley Edison (Navajo EPA)**		

Photo #s

Ruby020_1, Ruby020_2

Ruby020_1: Prospect southwest of Ruby Mine No. 1 showing intact fencing and signs.

Ruby020_2: Prospect southwest of Ruby Mine No. 1 showing intact fencing and signs.

PHOTO 4: Close up view of trash contained in pit.

Appendix A2
Cultural Resource Assessment Reports and Compliance Forms

WESTERN NUCLEAR, INC.
2801 Youngfield, Suite 340
Golden, Colorado 80401
(303) 274-1767 Fax: (303) 274-1762

September 25, 2013

Mr. Mark Ripperda
U.S. Environmental Protection Agency, Mail Code SFD-6-2
75 Hawthorne St.
San Francisco, CA 94105

Re: Ruby Mines Site
U.S. EPA Region 9, CERCLA Docket No. 2013-07
Cultural Resources Survey Report

Dear Mr. Ripperda:

In accordance with the revised schedule approved by EPA, Western Nuclear, Inc. (WNI) submits the cultural resources survey report in accordance with Appendix A, Scope of Work, attached to the Ruby Mines Site, Administrative Settlement Agreement and Order on Consent, CERCLA Docket No. 2013-07. The cultural resources survey was completed by Dinétahdóó Cultural Resources Management (Dinétahdóó) under a subcontract to CH2M HILL. Dinétahdóó will submit the report to the Navajo Nation Historic Preservation Department's Cultural Resources Compliance Section in Window Rock, Arizona for review. We will send EPA the approval letter once it has been received.

If you have any questions regarding the cultural resources survey report, please contact me at your convenience.

Sincerely,

Stuart M. Brown

Cc: Stan Curry – Gallagher & Kennedy
Stanley Edison – Navajo Nation Environmental Protection Agency

A Cultural Resources Inventory of the Ruby Mines Site in the Smith Lake Chapter, McKinley County, New Mexico

Report prepared by
Clifford Werito, Rena Martin,
Tonia Clark, and Clarina Clark

DCRM 2013-40

NNHPD Permit No. B13487

September 25, 2013

Submitted by
Rena Martin, Anthropologist/Archaeologist
Dinétahdóó Cultural Resources Management, LLC
P.O. Box 2012
Farmington, New Mexico 87499

Submitted to
Ronald Maldonado, Program Manager
Navajo Nation Historic Preservation Department
Cultural Resources Compliance Section
P.O. Box 4950
Window Rock, Arizona 86515

Prepared for
Jennifer Perry Laggan, Project Manager
CH2M HILL Engineers, Inc.
9191 South Jamaica Street
Englewood, Colorado 80112-5946

Abstract

This report is submitted to the Navajo Nation Historic Preservation Department's Cultural Resources Compliance Section, Window Rock, Arizona, and the U.S. Environmental Protection Agency (USEPA) for review as part of the cultural resources clearance process. The report details the results of the cultural resources inventory conducted in conjunction with the project titled *A Cultural Resources Inventory of the Ruby Mines Site in Smith Lake Chapter, McKinley County, New Mexico.* Ms. Jennifer Perry Laggan, project manager, CH2M HILL Engineers, Inc., requested the cultural resources survey to meet requirements established in an Administrative Settlement Agreement and Order on Consent (ASAOC) for Removal Site Evaluation and Interim Removal Action (CERCLA Docket No. 2013-07) between Western Nuclear Inc. (WNI) and the USEPA. The ASAOC scope of work has three phases: (1) fencing and closing adits, vents, and other mine features and installing warning signs; (2) performing gamma scanning on historical mine features and implementing a background study; and (3) evaluating the lateral and vertical extent of contamination in surface and subsurface soils and sediments in historical mine areas.

This project will involve the closure of adits, vents, and other mine features, and the completion of gamma scanning and soil/sediment sampling. Closure activities will involve the use of vehicles and heavy equipment along the former haul roads and in the former mine areas in order to backfill the adits, vents, and other mine features. The project area is in the Eastern Navajo Agency in the southern section of the Navajo checkerboard area. The project area is in Township 15 North, Range 12 and 13 West, NMPM. The project areas can be found on the Hosta Butte, N. Mex. 1963 and Thoreau, N. Mex. 1963 (photorevised 1980) USGS 7.5-minute quadrangle maps. The total area surveyed in conjunction with this project is 102.30 acres (46.31 hectares). Eight (8) isolated occurrences (IOs) and three (3) archaeological sites (NM-Q-26-19 [LA 15257], NM Q-26-20, and NM-Q-39-212) were encountered during the project. No traditional cultural places (TCPs) were identified, but a location of concern to a local family (Jishchaa' 1, a roadside marker) was documented. Archaeological clearance is recommended for the proposed undertaking provided that treatments prescribed in the report are followed.

Contents

List of Figures

List of Tables

Acronyms and Abbreviations

AIRFA	American Indian Religious Freedom Act
ASAOC	Administrative Settlement Agreement and Order on Consent
ARPA	Archaeological Resources Protection Act of 1979
CFR	Code of Federal Regulations
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DCRM	Dinétahdóó Cultural Resources Management
GPS	global positioning system
IUS	in-use site
IOs	isolated occurrences
N50	Navajo Route 50
NAGPRA	Native American Graves Protection and Repatriation Act
NHPA	National Historic Preservation Act
NMPM	New Mexico Principal Meridian
NNCRPA	Navajo Nation Cultural Resources Protection Act
NNHPD	Navajo Nation Historic Preservation Department
NRHP	National Register of Historic Places
NTUA	Navajo Tribal Utility Authority
TCPs	traditional cultural places
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UTM	Universal Transverse Mercator
WNI	Western Nuclear Incorporated

Introduction

Between August 21 and 29, 2013, Rena Martin, Clifford Werito, Clarina Clark, and Tonia Clark, archaeologists with Dinétahdóó Cultural Resources Management LLC (DCRM), conducted cultural resources inventories of the Ruby Mines, including former haul roads, adits, capped waste rock piles and surface water drainages associated with Ruby Mines Nos. 1 and 3; seven vents; , and two background sample locations. One previously recorded site and two newly identified archaeological sites were identified and evaluated, along with eight isolated occurrences (IOs). This cultural resources inventory was completed under Navajo Nation Cultural Resources Inventory Permit Number B13487.

Description of Undertaking

WNI proposes to complete the following three phases of work as required by the ASAOC: (1) closing adits, vents, and other mine features and installing warning signs; (2) performing gamma scanning on mine features and implementing a background study; and (3) evaluating the lateral and vertical extent of contamination in surface and subsurface soils and sediments in historical mine areas. The project area includes the previously reclaimed (i.e., capped) waste rock piles at Ruby Mines Nos. 1 and 3, two adits, six vents, former haul roads, two drainages, and two locations where background samples will be collected (Background Areas Nos. 1 and 2). The undertaking will require ground disturbance using heavy equipment to close former mine features and conduct gamma scanning and soil/sediment sampling.

The area of effect as staked by CH2M HILL totals approximately 46.31 acres (18.74 hectares). The dimensions of the individual areas are provided in Table 1.

Table 1. Dimensions of Proposed Area of Effect/Undertaking

Project Location	Dimensions	Area (acres/hectares)
Ruby Mine No. 1 capped waste rock	Polygon with six sides: 250, 400, 500, 400, 400, and 400 ft long, respectively (77.44, 121.92, 152.40, 121.92, 121.92, and 121.92 m)	7.33/2.97
RUBY-001	Radius of 50 ft (15.24 m)	0.18/0.07
RUBY-018	Radius of 50 ft (15.24 m)	0.18/0.07
RUBY-002	Radius of 50 ft (15.24 m)	0.18/0.07
Ruby Mine No. 1 former haul road	30 × 10,476 ft (9.14 × 3,193.08 m)	7.21/2.92
Ruby Mine No. 1 drainage	30 × 3,305 ft (9.14 × 1,007.36 m)	2.28/0.92
Ruby Mine No. 3 capped waste rock	Polygon with nine sides: 300, 375, 300, 110, 300, 600, 500, 400, and 1,150 ft long, respectively (91.44, 114.30, 91.44, 33.52, 91.44, 182.88, 152.40, and 121.92 m)	14.36/5.81
RUBY-003	Radius of 50 ft (15.24 m)	0.18/0.07
RUBY-017	Radius of 50 ft (15.24 m)	0.18/0.07
RUBY-016	Radius of 50 ft (15.24 m)	0.18/0.07

Project Location	Dimensions	Area (acres/hectares)
RUBY-004	Radius of 50 ft (15.24 m)	0.18/0.07
RUBY-020	Radius of 50 ft (15.24 m)	0.18/0.07
Ruby Mine No. 3 former haul road	30 × 12,566 ft (9.14 × 3,830.11 m)	8.65/3.50
Ruby Mine No. 3 drainage	30 × 1,783 ft (9.14 × 543.45 m)	1.23/0.56
Proposed Background Area No. 1	188 × 462 ft (57.30 × 140.81 m)	1.99/0.80
Proposed Background Area No. 2	Quadrangle with unequal sides: 521, 142, 351, and 283 ft, respectively (158.80, 43.28, 109.98, and 862.58 m)	1.82/0.73
Total Area (acres/hectares)		**46.31/18.74**

Location

The Ruby Mines Site is in the Eastern Navajo Agency, in the area known as the "checkerboard" (Figures 1 through 3), in Smith Lake Chapter, on Navajo Tribal Trust Lands. Table 2 provides the locations, land status, and corresponding USGS map names. Table 3 provides Universal Transverse Mercator (UTM) coordinates and legal descriptions.

Table 2. Project Locations, Land Status, and USGS Quadrangle Map Names

Project Location	Land Status	USGS 7.5-Minute Quadrangle
Ruby Mine No. 1 capped waste rock	Tribal Trust	Hosta Butte, N. Mex. 1963
RUBY-001		
RUBY-018, RUBY-002		
Ruby Mine No. 1 former haul road		
Ruby Mine No. 1 drainage		
Ruby Mine No. 3 covered waste pile		
RUBY-003		
RUBY-017, RUBY-016, RUBY-004, RUBY-020		
Ruby Mine No. 3 former haul road		
BOL to Bend 9		
Bend 10 through EOL		Thoreau, N. Mex. 1963 (PR 1980)
Ruby Mine No. 3 drainage		Hosta Butte, N. Mex. 1963
Proposed Background Area No. 1		
Proposed Background Area No. 2		

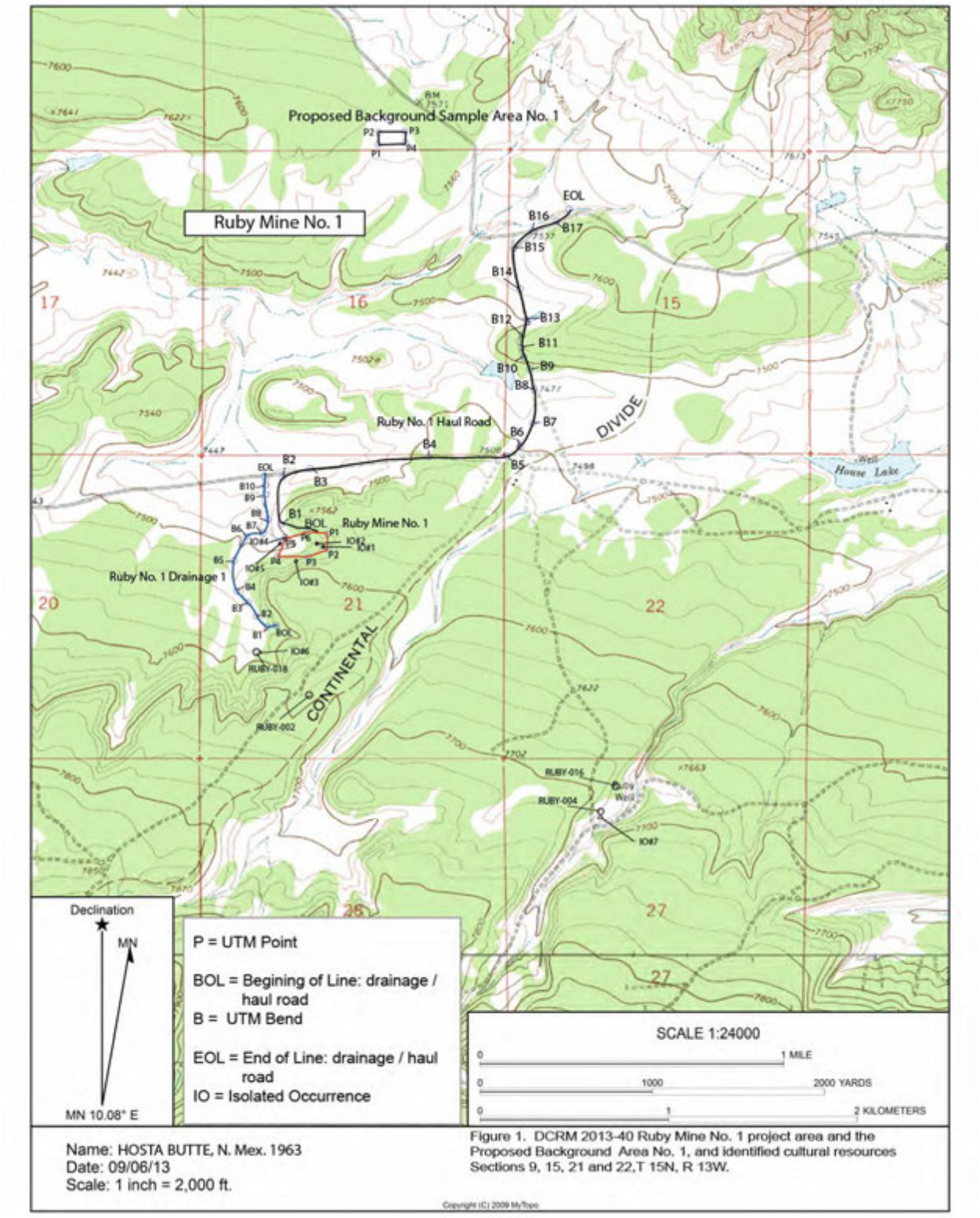


Figure 1. DCRM 2013-40 Ruby Mine No. 1 and Associated Project Locations, Hosta Butte, N. Mex. 1963 USGS 7.5-Minute Quadrangle, Sections 15 and 21, T 15N, R 13W

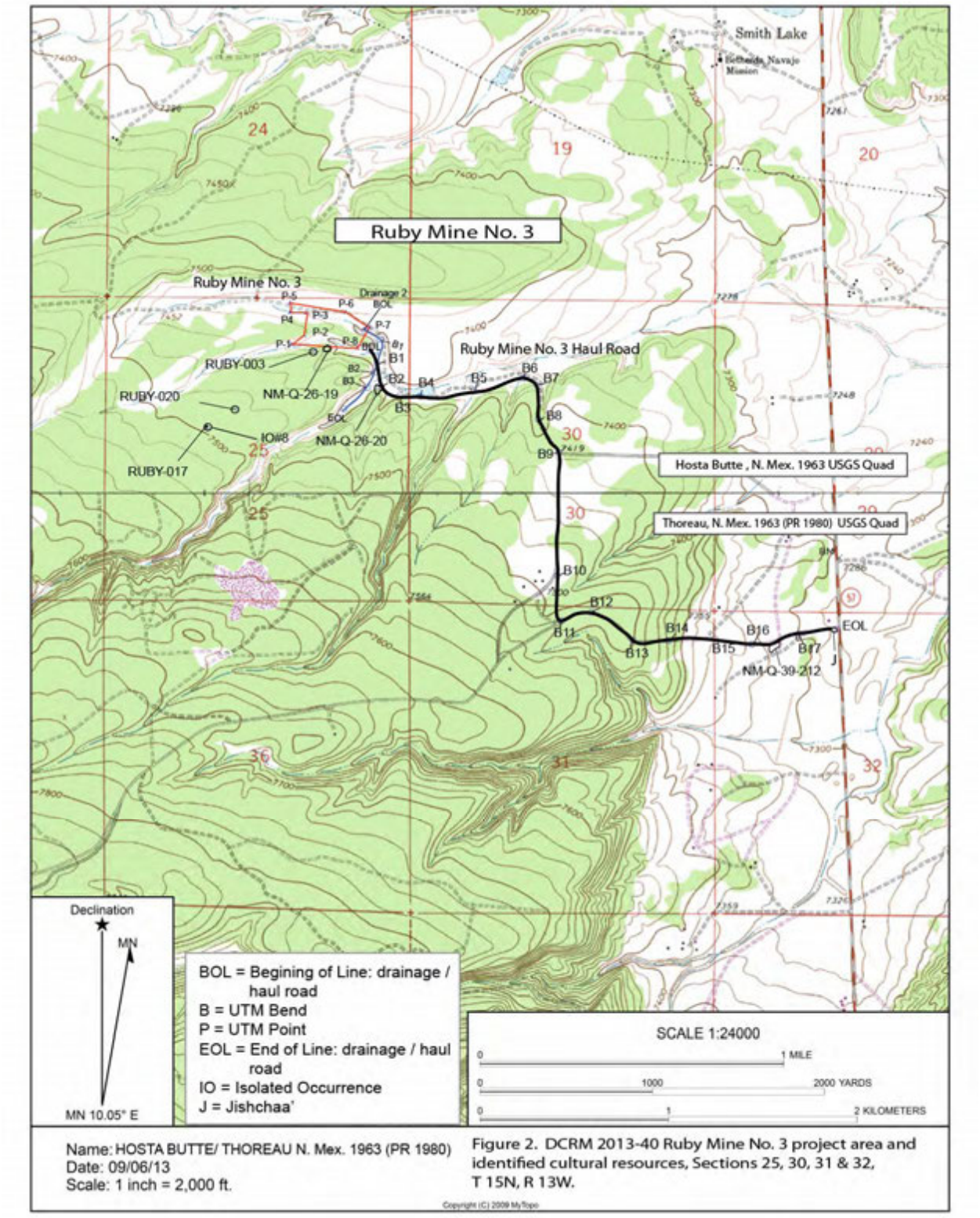


Figure 2. DCRM 2013-40 Ruby Mine No. 3 and Associated Project and Site Locations, Hosta Butte, N. Mex. 1963 and Thoreau, N. Mex. 1963 (PR 1980) USGS 7.5-Minute Quadrangle, Section 25, T 15N, R 13W, and Sections 30 and 31, T 15N, R 12W

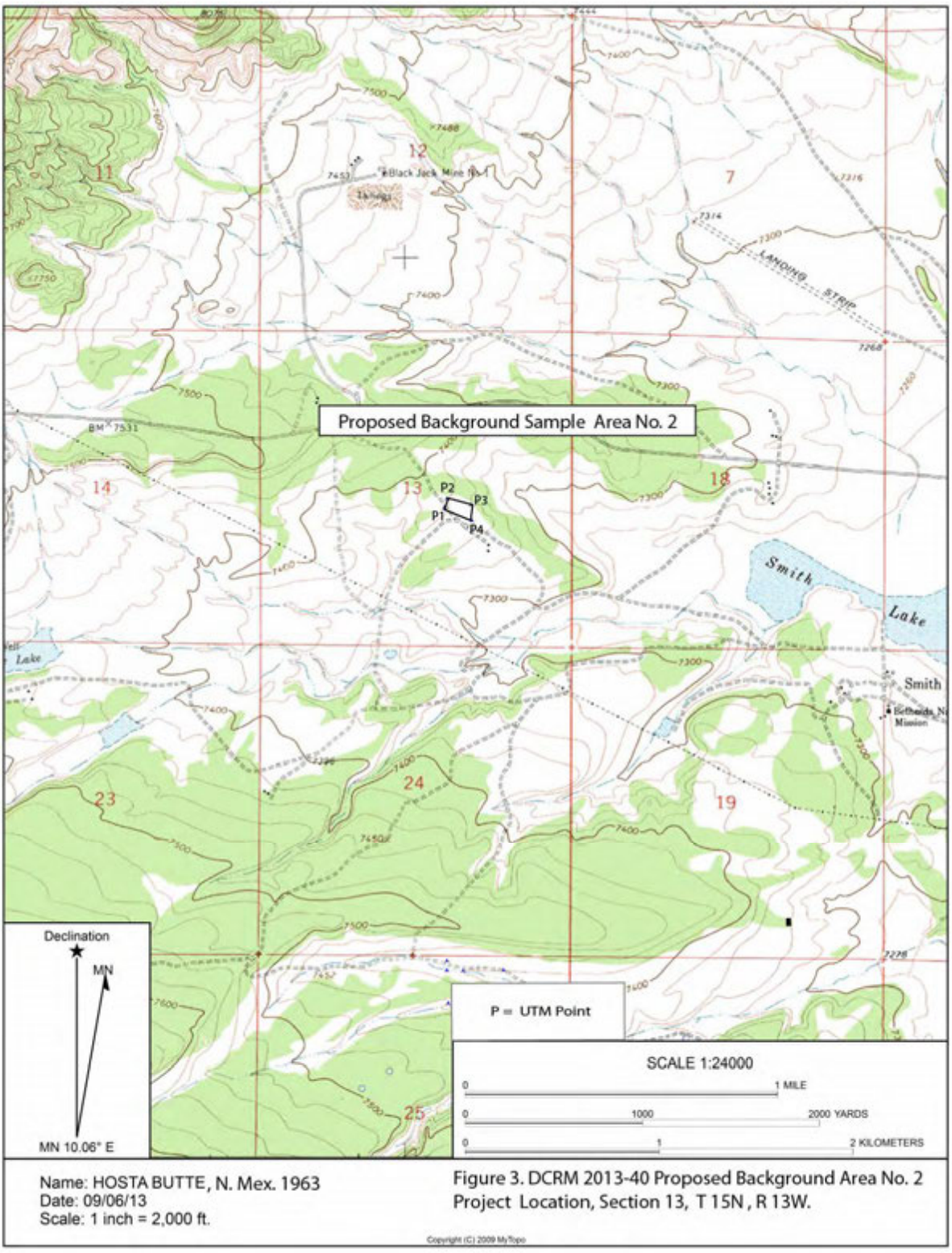


Figure 3. DCRM 2013-40 Proposed Background Area No 2 Project Location, Hosta Butte, N Mex. 1963 USGS 7.5-Minute Quadrangle, Section 13, T 15N, R 13W

Table 3. Project Locations, UTM Coordinates (Zone 13, NAD 83), and Legal Descriptions

Location	Northing	Easting	Quarter Section			Section	Township	Range
Ruby Mine No. 1								
P1	3934276	0751962	NE	SE	NW	21	15N	13W
P2	3934194	0751971	NE	SE	NW			
P3	3934149	0751865	NW	SE	NW			
P4	3934150	0751701	NW	SE	NW			
P5	3934256	0751739	SW	NE	NW			
P6	3934277	0751852	SW	NE	NW			
RUBY-001	3934135	0757870	NW	SE	NW			
RUBY-018	3933642	0751603	SE	NW	SW			
RUBY-002	3933416	0751891	NW	SE	SW			
Ruby Mine No. 1 former haul road								
BOL	3934294	0751908	SW	NE	NW	21	15N	13W
B1	3934319	0751716	SW	NE	NW			
B2	3934569	0751716	NW	NE	NW			
B3	3934620	0751862	NW	NE	NW			
B4	3934700	0752490	NE	NE	NE			
B5	3934713	0752905	NW	NW	NW	22		
B6	3934769	0752975	SW	SW	SW	15		
B7	3934892	0753038	SW	SW	SW			
B8	3935068	0753039	NW	SW	SW			
B9	3935178	0753013	SW	NW	SW			
B10	3935239	0752981	SW	NW	SW			
B11	3935291	0752967	SW	NW	SW			
B12	3935357	0752967	NW	NW	SW			
B13	3935438	0752988	NW	NW	SW			
B14	3935602	0752949	SW	SW	NW			
B15	3935813	0752909	NW	SW	NW			
B16	3935910	0753007	NW	SW	NW			
B17	3935963	0753133	SE	NW	NW			
EOL	3936027	0753196	SE	SW	SW			
Ruby Mine No. 1 drainage								
BOL	3933784	0751704	NW	NE	SW	21	15N	13W
B1	3933777	0751655	NE	NW	SW			
B2	3933830	0751897	NE	NW	SW			
B3	3933903	0751552	SE	SW	NW			
B4	3933960	0751490	W½	SW	NW			
B5	3934121	0751470	NW	SW	NW			
B6	3934250	0751533	NE	SW	NW	21	15N	13W
B7	3934268	0751620	NE	SW	NW			
B8	3934343	0751646	SE	NW	NW			
B9	3934477	0751628	SE	SW	NW			
B10	3934524	0751625	NE	NW	NW			
EOL	3934569	0751620	NE	NW	NW			

Location	Northing	Easting	Quarter Section			Section	Township	Range
Ruby Mine No. 3								
P1	3932978	0757141	SW	NW	NE	25	15N	13W
P2	3933026	0757205	SE	NW	NE			
P3	3933135	0757213	SE	NW	NE			
P4	3933146	0757129	NW	NW	NE			
P5	3933196	0757127	NW	NW	NE			
P6	3933155	0757423	NW	NE	NE			
P7	3933078	0757551	NE	NE	NE			
P8	3932967	0757489	SW	NE	NE			
RUBY-003	3932943	0757254	SE	NW	NE			
RUBY-017	3932532	0756708	NW	NE	SW			
RUBY-016	3932986	0753535	NE	NE	NW	27		
RUBY-004	3932851	0753455	SW	NE	NW	27		
RUBY-020	3932626	0756848	E½	SE	NW	25		
Ruby Mine No. 3 former haul road								
BOL	3932966	0757551	SW	NE	NE	25	15N	13W
B1	3932892	0757597	SE	NE	NE			
B2	3932769	0757622	NE	SE	NE			
B3	3932726	0757722	NE	SE	NE	30		12W
B4	3932725	0757831	NW	SW	NW			
B5	3932762	0758119	NE	SW	NW			
B6	3932835	0758376	NW	SE	NW			
B7	932798	0758465	NE	SE	NW			
B8	3932621	0758465	SE	SW	NW			
B9	3932449	0758578	NE	NE	SW			
B10	3931799	0758588	SE	SE	SW			
B11	3931560	0758619	NE	NE	NW	31		
B12	3931609	0758776	NW	NW	NE			
B13	3931468	0758999	NW	NW	NE			
B14	3931469	0759187	NW	NE	NE			
B15	3931489	0759432	NW	NW	NW	32		
B16	3931466	0759632	NW	NW	NW			
B17	3931524	0759877	NW	NE	NW			
EOL	3931466	0759632	NE	NE	NW			
Ruby Mine No. 3 drainage								
BOL	3933063	0757526	NW	NE	NE	25	15N	13W
B1	3933018	0757612	SE	NE	NE			
B2	3932843	0757583	SE	NE	NE			
B3	3932763	0757549	NW	SE	NE			
EOL	3932647	0577429	NW	SE	NE			
Proposed Background Area 1								
P1	3936343	0752175	SW	SW	SE	9	15N	13W
P2	3936406	0752175	SW	SW	SE			

Location	Northing	Easting	Quarter Section			Section	Township	Range
P3	3936416	0752312	SE	SW	SE			
P4	3936356	0752316	SE	SW	SE			
Proposed Background Area 2								
P1	3935526	0757046	NW	NW	SE	13	15N	13W
P2	3935574	0757059	NW	NW	SE			
P3	3935544	0757186	NE	NW	SE			
P4	3935465	0757192	NE	NW	SE			

KEY: BOL = Beginning of Line, B = Bend, P = Point, EOL = End of Line

Environmental and Cultural Setting

The project area is on the periphery of the Hosta Butte and Mount Powell ranges on the continental divide, between the southern end of the Hosta Butte range and the northern slopes of Mount Powell. The area is characterized by mesas with numerous ridges that slope into wide drainages and shallow ponds, including Smith Lake. The soil is fine- to coarse-grained alluvial, fluvial, and aeolian sand and silt. Sandstone outcrops are common. Vegetation in and near the project area is diverse, consisting of ponderosa pine, pinyon, juniper, gambel oak, sagebrush, snakeweed, cheat grass, Russian thistle, grama grass, galleta grass, prickly pear and barrel cacti, wolfberry, western wheatgrass, globemallow, and Indian rice grass. Smith Lake is approximately 7,890 ft above sea level.

The former mine areas are on ridge slopes with small and medium-sized unnamed drainages leading off the ridges. The former haul roads near the former mines are bladed and graveled; further from the mines, most of the roads are maintained and are used by local residents and for school buses. The graveled roads wind through groups of homesteads until they connect with paved roads. Ruby Mine No. 1 is on the northern slope of a ridge in a pinyon/juniper forest and has a northwestern exposure. At least three homesteads are visible from this former mine area. Ruby Mine No. 3 is also on the northern slope of a ridge in a pinyon/juniper forest, but it is not as exposed as Ruby Mine No. 1. The locations are within 5 miles of Smith Lake.

The Navajo name for Smith Lake is Tsin nabas si'a, translated as Rounded Wood (tree) Hill. Smith Lake Chapter is in the southeastern part of the Eastern Navajo Agency. There is currently no major development of any type to create employment for the community. State Highway 371 offers some development possibilities. Most residents commute elsewhere for employment. Although Smith Lake Chapter does not have good grazing land, livestock raising still provides subsistence for many of the local families, including traditional elders (LSR Innovations 2004).

Existing Data Review

Prior to field work, a records check was conducted at the Navajo Nation Historic Preservation Department (NNHPD) in Window Rock, Arizona. The records indicate that twenty-two (22) previous surveys have been conducted within a 300-ft (91-m) radius of the project areas. The previous studies include NPS-NAV-80385, HPD-06-1032, HPD-95-654, HPD-88-010, HPD-03-900, HPD-06-535, HPD-88-328, HPD-95-634, HPD-99-365, HPD-03-1257, HPD-80-61, HPD-07-1115, HPD-06-1144, HPD-04-1313, HPD-07-999, HPD-07-663, HPD-07-662, HPD-07-749, HPD-002-143, HPD-95-447, HPD-01-873, and HPD-05-749. No significant archaeological sites

were identified within 300 ft of the project areas. The largest of these projects is a waterline extension project (Paul 1995) listed as HPD-98-634.

The New Mexico Cultural Resources Information System was also checked for previously recorded sites within a 1-mile radius. Twelve previously recorded sites were found in the database: LA10801, Anasazi Ceramic Scatter; LA12100, Recent Unknown Navajo; LA 12101, Recent Unknown Navajo; LA 15248, Recent Unknown Navajo; LA 15249, Recent Unknown Navajo; LA 15250, Multicomponent: Anasazi Lithic/Ceramic Scatter and Unknown Navajo; LA 15251, Recent Navajo; LA 15252, Multicomponent: Anasazi Ceramic Scatter, Unknown Navajo, and Unknown Historic; LA 15253, Recent Unknown Navajo; LA 15255, Anasazi (PII-III) Ceramic Scatter; LA 15254, Multicomponent: Anasazi Ceramic Scatter and Recent Unknown Navajo; and LA 15256, Anasazi (PII-III).

The Sacred Places files in the NNHPD's Traditional Culture Program were researched to determine whether any previously identified sacred places are within 1 mile (1.609 km) of the project area. The records check indicated that one previously recorded sacred place (TCP No. 896) is within 1 mile of the Former Haul Road No. 2 project area: Naazla' (Bands). A thorough investigation by DCRM archaeologists determined that the proposed project will have no effect on the documented property. Mr. Tony Joe of the NNHPD's Traditional Culture Program was informed of the TCP location.

A review of Van Valkenburgh (1974) indicates that the closest sacred place near the project is Hosta Butte ('Ak'iih Nást'áni, or Mountain Sitting on Top of Another Mountain), approximately 5 miles (8.04 km) north of the project area.

Field Methods

Between August 21 and 29, 2013, Rena Martin, Clifford Werito, Clarina Clark, and Tonia Clark, archaeologists with DCRM, conducted the cultural resources inventory of the project area. Project location maps were supplied by Jennifer Perry Laggan, CH2M HILL project manager. The archaeological surveys were conducted with Ms. Laggan, who was accompanied by Darlene Jenkins from the Navajo Nation Environmental Protection Agency during most of the fieldwork. The three archaeological sites were recorded as soon as they were identified. The sites were measured and mapped with a hand-held global positioning system (GPS) unit. Notes were taken on the artifact types, site setting, and each site's relation to the undertaking.

At each vent and adit location a 100-ft-diameter area was inventoried by the archaeologists; there was no additional survey for a buffer zone. The surveyors spiraled out from the center point and were spaced no more than 10 m apart. The capped waste rock was staked in advance of the archaeological fieldwork. The irregular areas were surveyed by walking north–south transects spaced 15 m apart within the staked areas plus a buffer zone 50 ft wide. The drainage area inventories were completed by following the natural drainage routes, with two transects spaced 15 m apart; this method was also used for the former haul roads currently used by residents. A 30-m-wide corridor was inventoried for the former haul roads and drainages. Buffer zones of 35 m were added to either side of the linear routes. Fences run along most of the former haul roads. The location of each survey area was recorded using a handheld GPS unit. The total area

surveyed was approximately 102.30 acres (41.40 hectares). The surveyed areas and dimensions are provided in Table 4.

Table 4. Dimensions of Surveyed Areas

Project Location	**Dimensions**	**Area Surveyed (acres/hectares)**
Ruby Mine No. 1 capped waste rock plus 50-ft-wide buffer zone	Polygon with six sides	10.08/4.07
RUBY-001	50 ft (15.24 m) radius	0.18/0.07
RUBY-018	50 ft (15.24 m) radius	0.18/0.07
RUBY-002	50 ft (15.24 m) radius	0.18/0.07
Ruby Mine No. 1 former haul road	100 × 10,476 ft (30.48 × 3,193.08 m)	24.04/973
Ruby Mine No. 1 drainage	100 × 3,305 ft (30.48 × 1,007.36 m)	7.59/3.07
Ruby Mine No. 3 capped waste rock plus 50-ft-wide buffer zone	Polygon with nine sides	18.68/7.55
RUBY-003	50 ft(15.24 m) radius	0.18/0.07
RUBY-017	50 ft (15.24 m) radius	0.18/0.07
RUBY-016	50 ft (15.24 m) radius	0.18/0.07
RUBY-004	50 ft (15.24 m) radius	0.18/0.07
RUBY-020	50 ft (15.24 m) radius	0.18/0.07
Ruby Mine No. 3 former haul road	100 × 12,566 ft (30.48 × 3,830.11 m)	28.84/11.67
Ruby Mine No. 3 drainage	100 × 1,783 ft (30.48 × 543.45 m)	4.09/1.66
Proposed Background Area 1	288 × 562 ft (57.30 × 140.81 m)	3.72/1.50
Proposed Background Area 2	Quadrangle with unequal sides: 700, 240, 430, and 420 ft, respectively (213.36, 74.98, 131.06, and128.01 m)	3.82/1.54
Total Surveyed Area (acres/hectares)		**102.30/41.40**

Some ethnographic interviews were completed at the Smith Lake Senior Center, but most of the interviews took place at residences after the archaeological fieldwork was completed. Interviews were conducted with people living within sight of the project area, according to NNHPD's guidelines. Interviews were held with 22 individuals in Navajo or English. Notes taken in Navajo were transcribed into English at the office.

Cultural Resources Findings

One newly documented archaeological site, two previously identified archaeological sites, and eight IOs were identified within the project area. The archaeological sites, IOs, and in-use sites (IUS) are discussed below.

Archaeological Sites

Site: NM-Q-26-19 (LA 15257) (Figure 4)
USGS Map Reference: Hosta Butte, N.Mex., 1963
Legal Location: NE, NW, NE, SEC. 25, T15N, R13W
UTM (NAD 83): Zone 12, N3932967, E0757335
Land Status: Navajo Tribal Trust
State: New Mexico County: McKinley Agency: Eastern Navajo Chapter: Smith Lake
Site Type: Multicomponent: C1: Anasazi (PII-III) Habitation and Artifact Scatter
C2: Historic Artifact Scatter
Site Size: 39 × 29 m
Site Setting: The site is on the eastern edge of a ridge and on the ridge slope, and spills into a drainage along the eastern base of the ridge.
Site Description: NM-Q-26-19 is a multicomponent site with an Anasazi habitation (C1) and an unknown historic component (C2). The Anasazi site was previously recorded as LA 15257, but very limited information on that initial recording was found.

The Anasazi component (C1) contains the remains of a roomblock (Feature 1); the masonry structure is built on a sandstone ledge, and what remains is a rubble area with an L-shaped sandstone wall alignment. The alignment is approximately 50 by 50 cm and is at least five courses high of flat sandstone. The feature is less than 1 m in diameter. No artifacts were found, and the feature does not extend below the surface because it is built directly on bedrock.

Feature 2 is a 1-m-diameter cluster of sandstone that may be the remains of a storage feature; no ash or burnt sandstone blocks were found. The feature may be prehistoric or historic.

Feature 3 is the remains of a shelter that appears to have been built under a sandstone ledge. A sandstone wall alignment partially concealed by the rubble is about 1.5 by 1 m. The blocks are eroding off the slope of the ridge. No artifacts or ashy deposits were observed. It is unknown whether this feature is prehistoric or historic.

Feature 4 is a 1.5-m-diameter cluster of sandstone blocks eroding off the slope of the ridge. No wall alignment was observed, and no artifacts were found. It is not known whether this feature is prehistoric or historic.

Feature 5 is a 15-by-12-m midden that is eroding off the slope of the ridge. The midden contains ceramic and lithic artifacts, sandstone debris, and some soil discoloring from ash. The southern edge of the feature has been flooded by the drainage.

At least 60 Cibola-style ceramic artifacts were counted in the midden area and across the site. The most common types were Gallup Black-on-white and corrugated. Fewer than 20 quartzite secondary flakes and debris were observed across the site. No ground stone was found. The historic artifacts consisted of five fragments of aqua glass and a whole whiskey bottle along with more recent trash, including smashed aluminum soda cans.

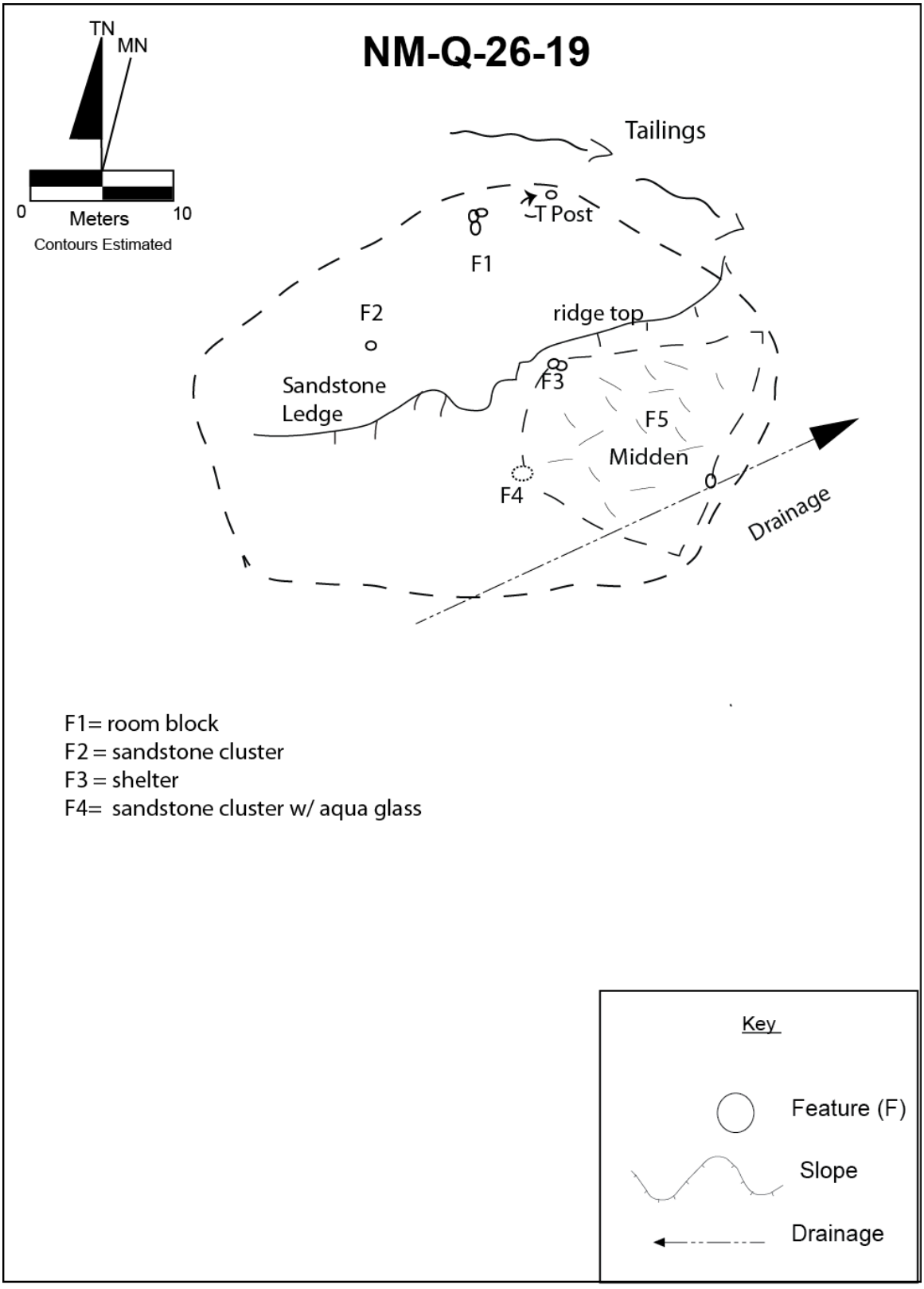


Figure 4. Revised Site Map of NM-Q-26-19 (LA 15257) (DCRM 2013-40)

There are not enough historic artifacts to determine whether the historic component is Navajo. The historic component may be associated with the former mine or miners.

A prehistoric grave could be present on the ridge slope, but a historic grave is unlikely.

Site: NM-Q-26-20 (Figure 5)
USGS Map Reference: Hosta Butte, N.Mex., 1963
Legal Location: NE, SE, NE, SEC. 25, T15N, R13W
UTM (NAD 83): Zone 12, N3932732, E0757595
Land Status: Navajo Tribal Trust
State: New Mexico County: McKinley Agency: Eastern Navajo Chapter: Smith Lake
Site Type: Anasazi (PII-III) Habitation and Artifact Scatter
Site Size: 29 × 26 m
Site Setting: This site is located on the northern tip of a ridge that was cut by a haul road for the former uranium mine.
Site Description: Site NM-Q-26-20 consists of a rubble mound and a scatter of artifacts. Feature 1 is a rubble mound with no visible walls; the sandstone cluster is 8 by 3 m. The mound appears to be more than 40 cm deep and consists of shaped and unshaped sandstone blocks. No artifacts were observed in the feature.

More than 1,500 artifacts were scattered evenly across the site; several ceramic sherds are eroding off the ridge onto the former haul road that is slated for testing. The ceramics include Gallup Black-on-white, Puerco Black-on-white, Chaco corrugated, and other white ware. Lithic artifacts include secondary flakes of reddish quartzite, brown silicified wood, and gray and white cherts. The ceramic artifacts outnumber the lithics by 5 to 1.

Subsurface deposits appear to be present near the roomblock. The site area has sandstone outcrops and sandy deposits that contain artifacts. No ashy soil deposits are visible on the surface. One or more graves may be present in the sandy areas.

Site: NM-Q-39-212 (Figure 6)
USGS Map Reference: Thoreau, N.Mex., 1963
Legal Location: NE, NW, NW, SEC. 32, T15N, R12W
UTM (NAD 83): Zone 12, N3931458, E0759745
Land Status: Navajo Tribal Trust
State: New Mexico County: McKinley Agency: Eastern Navajo Chapter: Smith Lake
Site Type: Anasazi PII-III, Habitation and Artifact Scatter
Site Size: 80 × 32 m
Site Setting: This site is located on the southern edge of Navajo Route 50 (N50) in a flat area with an open view. This portion of N50 was used as a haul road for the uranium mine.

Site Description: This site consists of a rubble mound (Feature 1) and a large midden (Feature 2) that has been exposed by blading. Feature 1 is roughly 20 by 7 m. The rubble mound appears to have more than 50 cm of subsurface deposits with more than 40 cm of surface rubble. No wall alignments or artifacts were observed. Feature 2 is a midden that was exposed by heavy equipment. An old scar from a drainage trench associated with N50 has exposed a heavy concentration of ceramic artifacts, rubble, and lithic artifacts. The majority of the artifacts are Cibola style, including an abundance of Chaco series black-on-whites, Gallup Black-on-whites, and Chaco corrugated.

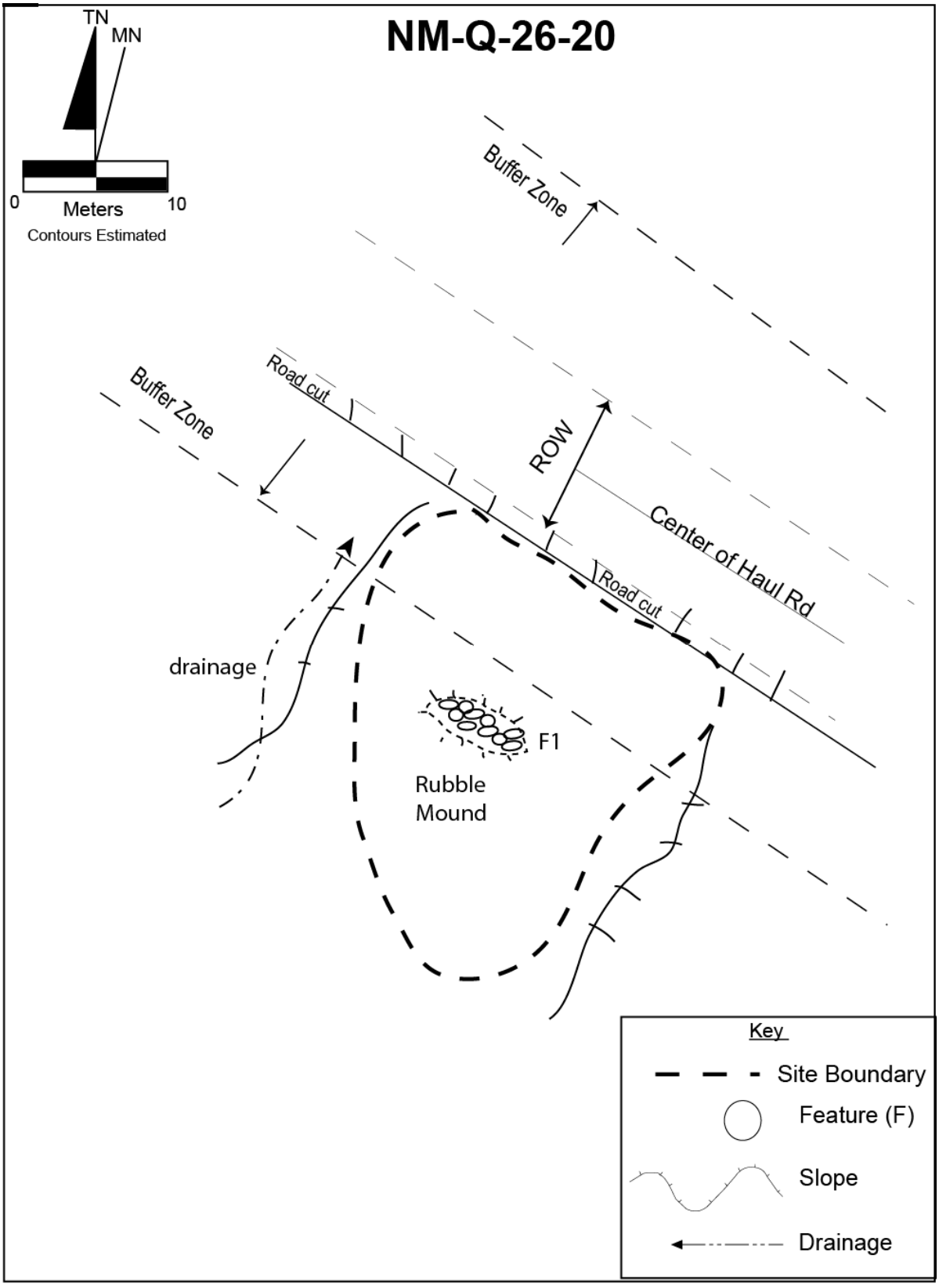


Figure 5. Site Map of NM-W-26-20 (DCRM 2013-40)

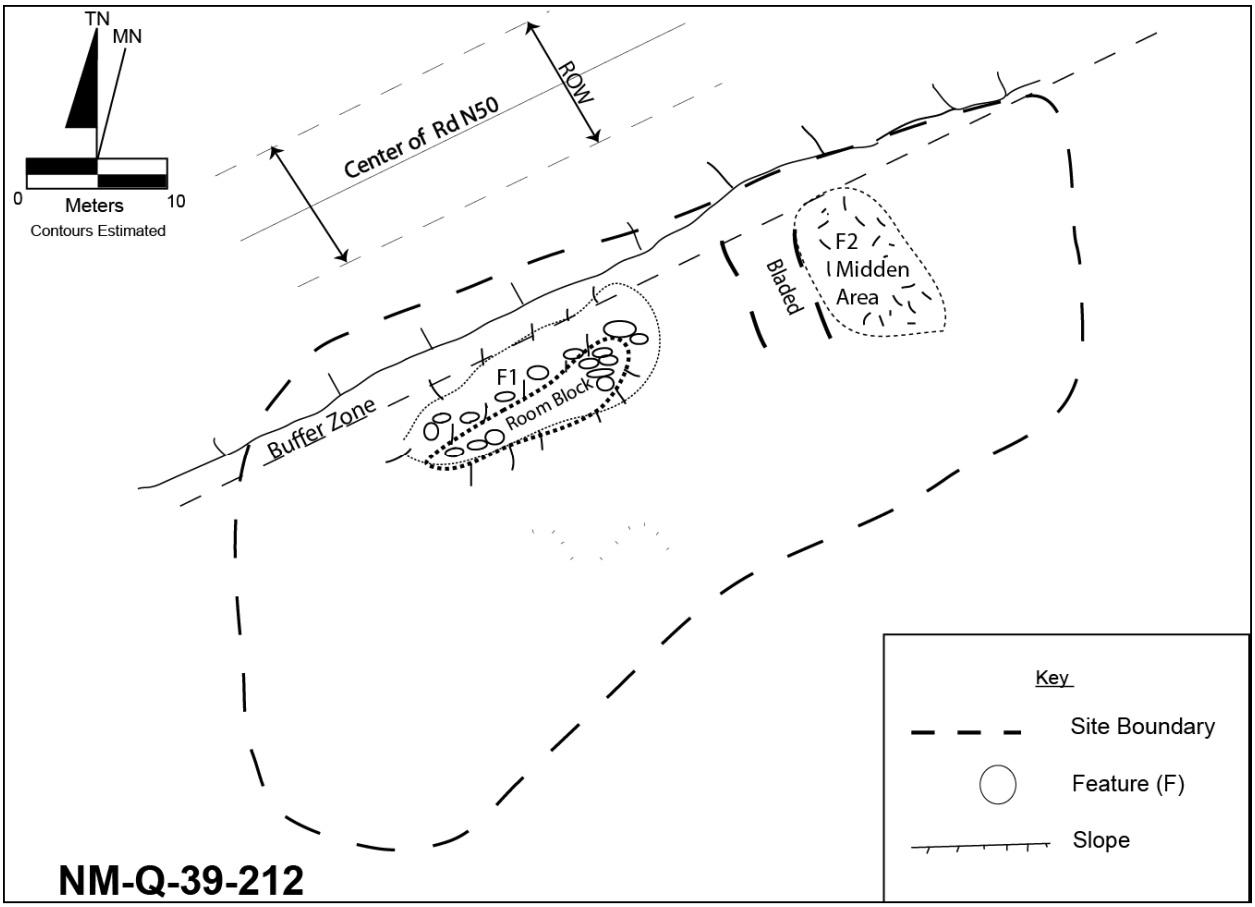


Figure 6. Site Map of NM-Q-39-212 (DCRM 2013-40)

The eastern portion of the site may have additional buried features. Some 50-plus ceramic artifacts and a few lithic artifacts are spread across the site outside the feature boundaries in areas that have been impacted by the road and erosion. The midden appears to contain thousands of ceramic artifacts. Observed were rim sherds, at least two handles, and a large number of body sherds. Lithic material types include brown and gray silicified wood, reddish and brown fine-grained quartzite, and white and golden chert.

The site is adjacent to N50, a well-used community road maintained by the BIA. Aside from the blading, the site appears to be in fairly good condition. This site, as well as others in the immediate area, was reported by a local elder who lives within sight of the road; thus, it is possible the site is visited for traditional reasons. A grave could be present in the subsurface deposits.

Isolated Occurrences

Eight isolated occurrences were identified during the survey (Table 5).

Table 5. Isolated Occurrences Identified in the Ruby Mines Nos. 1 and 3 Project Area

Designation	Description	UTM Coordinates (Zone 12, NAD 83)
IO1	Concrete pad, remains of warehouse, 16 × 32 m	3934202N, 0751951E
IO2	1 coffee can	3934209N, 0751893E
IO3	1 coffee can	3934129N, 0751805E
IO4	1 shovel handle	3934253N, 0751739E
IO5	1 gate hinge	3934210N, 0751701E
IO6	Recent trash dumping area	3933642N, 0751603E
IO7	6 Cibola sherds, sand temper	3932829N, 0753458E
IO8	2 sanitary seal food cans	3932532N, 0756708E

Traditional Cultural Properties

During the survey, the project archaeologists interviewed 22 individuals who live near the project area or at the Smith Lake Senior Center to request information on any sacred places, burials, or TCPs that may be affected by the project. No TCPs were identified within the area of effect; however, one roadside marker at the place where a family member died (Jishchaa' 1) was identified. The family wants the memorial left in place but is willing to have clean-up activities completed in and around the memorial.

Oral History Findings

The ethnographic interviews with local miners yielded information related to memories of accidents, miners, and some information on the mine facilities (see Appendix B). The interviewers' notes are summarized below.

Mr. Elmer Johnson said he worked with the Western Nuclear Mine (Ruby Mine No. 1) between 1981 and 1982. He stated that he mainly worked on the surface, in the office, and performed duties such as electrical work. He stated that Navajos, Mexicans, and white people worked in Ruby Mine No. 1. He said he thought about 75% of the workers were Navajos. His coworkers were mostly young, but ranged between approximately 20 and 51 years old. He said the buildings included a metal warehouse and an office trailer, which were dismantled when the mines were closed. He described the mine tunnel as 10 ft tall and wide enough for a dump truck, with a roof supported with ties and chain-link fence. The lights ran all the way down the tunnel. There were ponds in the tunnel but no one drank from them. The workers wore badges and their clothing was inspected for radiation exposure. Their clothes were washed down at the end of the work shift. The workers were not told what the ore was used for. Mr. Johnson did not know how many times per day the trucks hauled out the rocks. Since he worked mostly on the surface, he did not know much about the activities in the tunnel.

Mr. Stanley Saunders, a former miner, and his son, Mr. Shane Saunders, talked with Ms. Jennifer Laggan about the locations of the mine vents near Ruby Mine No. 3. He said that before the job with Western Nuclear, he worked at the former Gulf Mine in Mariano Lake. At that mine he worked on the surface, where he untangled wires that hoisted up equipment and ore from the mine, but his work for Western Nuclear at Ruby Mine No. 3 was different. The mine entrance

was an incline with a walk-in and truck entries. The tunnels were approximately as high as the shade house under which the interview took place (about 8 ft). There were about 100 workers who worked day, swing, and graveyard shifts, 24-7. Most of the workers were Navajos, but there were also Mexicans and Anglo workers, Mr. Stanley Saunders said. The loads of ore were taken to San Mateo, near Grants. He was told there was a mill and was told the ore was used for guns. The surface of the mine had a number of buildings, including portables and trailers. The Navajo Tribal Utility Authority (NTUA) brought in the utilities, but as soon as the mine closed the utilities were pulled out.

Describing the former mine, Mr. Stanley Saunders said:

> In the mine, there were steel beams for support. There was a main tunnel that ran from about here to the road [about 1,000 ft], with shorter tunnels leading off the main tunnel. The tunnels had metal and lumber support beams, and lights ran the entire length of the tunnels. Fresh air was piped in through these tarp vent bag/pipes. [He showed us a tarp vent bag/pipe covering his own equipment in his shed; it looked like an ordinary brown tarp but was sewn into an extra-large tube.] The bad air was piped out to the surface through vent holes. I had brothers that worked then too. One brother and I were asked to pile and fill in one area with dirt using heavy equipment. We bladed top dirt together and piled it high, not knowing what it was for. We even worked at night. There were lights at night, lights like a carnival. Next was the mine. While some dynamited and blasted into the ground over on the other side, others hauled the debris away. This was when some of us became truck drivers. My brother and I hauled dirt using the loaders; this dirt was to cover up the waste in the end. When the mine closed, the dirt we piled was used to cover debris/waste.

Mr. Stanley Saunders stated that haul road construction began for Ruby Mine No. 3 when an Anglo came by to ask for help building it. He explained there were no bladed roads in the area; all the roads were two-track. He and his brothers were hired to help with construction of the roads, moving dirt near the mine entrance. Meanwhile, the workers drilled holes in the ground and they tested. About 12 years passed from the start of the work on the road to the closing of the mine, he said.

Another former miner, Mr. Leo Robertson, said, “I worked at Ruby Mines Nos. 1 and 3 between 1979 and 1982, after leaving high school. I worked under and on the surface of the mine as a truck driver. I hauled raw material and dirt from the mine. The mine [Ruby Mine No. 1] had electric lights and the tunnels were well vented. The ceilings were reinforced with wire mesh and 6 by 6 beams. The tunnels were 10 to 15 ft wide and 12 to 15 ft high.” He mentioned that his cousin [referred to as his brother in Navajo], Mr. John Thompson, also worked at Ruby Mine No. 1 as a truck driver. He said approximately 20 Navajos worked as laborers. Fifteen or more workers were white men and they were all operators or foremen. Mr. Robertson worked in Ruby Mine No. 1 from 1982 until it closed [unsure about the date]. He explained there were big loaders and heavy equipment operations, and that the truck route to the mine was an incline of half a mile to where the trucks come out. There were 30 underground workers handling day, swing, and graveyard shifts. There were Navajo, Mexican, and Anglo workers.

Mr. Robertson and his mother (who was also present at the interview) laughed as he told a story about a coyote who visited the mine often and was even chased out when found at the end of the tunnels. There are also stories about a billy goat who visited Ruby Mine No. 1, scaring the workers.

Evaluation of Significance

Identified cultural resources are evaluated for significance under certain federal statutes for the preservation and management of these resources. This process is intended to document that cultural resources are not inadvertently destroyed by the proposed undertaking, and that local communities are involved in decision-making. Although the Navajo Nation has enacted the Navajo Nation Cultural Resources Protection Act (NNCRPA), it has not instituted regulations, nor is there a process to evaluate resources under this act.

The National Historic Preservation Act

Under the Section 106 process of the National Historic Preservation Act (NHPA; 36 Code of Federal Regulations [CFR] 60.4), cultural resources may be eligible for nomination to the National Register of Historic Places if they are more than 50 years old and "possess integrity of location, design, setting, material, workmanship, feeling, and association." One or more of the following criteria (a through d) must be applicable:

a. Are associated with events that have made a significant contribution to the broad patterns of our history; or
b. Are associated with the lives of a person significant in our past; or
c. Embody the distinctive characteristics of a type, period, or method of construction, or represent the work of a master, or possess high artistic value, or represent a significant and distinguishable entity whose components may lack individual distinction; or
d. Have yielded, or may be likely to yield, information important in prehistory or history.

As defined in 36 CFR 60.4, cemeteries, birthplaces, or graves of historical figures; properties owned by religious institutions or used for religious purposes; structures that have been moved from their original locations; reconstructed historical buildings; properties primarily commemorative in nature; and properties that have achieved significance within the past 50 years are not ordinarily considered eligible for the National Register. However, such properties may qualify if they are integral parts of National Register districts that do meet the eligibility criteria.

Archaeological Resources Protection Act

The Archaeological Resources Protection Act of 1979 (ARPA; 43 CFR Part 7) has two fundamental purposes:

- To protect irreplaceable archaeological resources on public lands and Indian lands from unauthorized excavation, removal, damage, alteration, or defacement; and
- To increase communication and exchange of information among governmental authorities, the professional archaeological community, and private individuals having collections of archaeological resources and data that were obtained prior to enactment of the Act.

To be considered an archaeological resource and thus merit protection, a resource must be both more than 100 years old and of archaeological interest.

American Indian Religious Freedom Act
The American Indian Religious Freedom Act (AIRFA [P.L. 95-341]) affirms that American Indians have the right to believe, express, and exercise their traditional religions and have access to sites, use and possession of sacred objects, and freedom of worship through ceremonies and rites. Any site or place (prehistoric or historic) that has religious, ceremonial, or sacred aspects or components needs to be dealt with in light of this law. Anasazi sites related to Navajo cultural traditions qualify for protection, as do all Navajo ceremonial sites, unmarked traditional places, and residential structures whose owners/users want them protected for religious or cultural reasons.

Native American Graves Protection and Repatriation Act
The Native American Graves Protection and Repatriation Act (NAGPRA [P.L. 101-601]) protects Native American graves; establishes procedures and legal standards for repatriation of human remains, funeral objects, sacred objects, and objects of cultural patrimony, including those from archaeological contexts; and gives the United States district court's jurisdiction over any action brought by any person alleging a violation of the act. The act also recognizes certain tribal, Native Hawaiian, and individual rights regarding burial sites on federal and Indian lands, and it sets forth procedures for intentional excavation and inadvertent discoveries of these items.

Navajo Nation law and policy also protects cultural resources on lands under Navajo Nation government jurisdiction. The **Navajo Nation Cultural Resources Protection Act of 1988** (NTC CMY-19-88) is modeled on the federal laws, which require consideration of the effects of an undertaking on significant cultural resources. It also authorizes the NNHPD to create and maintain a "Navajo Nation Register of Cultural Properties and Cultural Landmarks." The register is to include "buildings, districts, objects, places, sites, and structures significant in Navajo Nation history, architecture, archaeology, engineering, and culture" on Navajo lands. The register and its criteria for eligibility have yet to be established.

The **Navajo Nation Policy for the Protection of Jishcháá'** covers all human remains, associated funerary items, and unassociated funerary items on land under Navajo Nation jurisdiction. It emphasizes non-disturbance as the required treatment of these items unless disturbance is unavoidable. It sets forth procedures for intentional excavation and inadvertent discovery of these items.

Archaeological Sites

Recommendations for evaluation of significance are provided in Table 6.

Table 6. NRHP Eligibility and AIRFA and NAGPRA Status of the Archaeological Sites Identified within the Area of Effect

Resource Number	Description	Evaluation	
NM-Q-26-19 and LA 15257 (within area of effect and buffer zone)	Multicomponent: C1 Anasazi Habitation and Artifact Scatter C2 Unknown historic	NRHP	C1: Eligible 1. Meets 50-year guideline 2. Retains integrity of location, setting, materials, workmanship 3. Meets criterion d C2: Not eligible
		ARPA	C1: Eligible 1. Meets 100-year guideline 2. Is of archaeological interest C2: Not eligible
		AIRFA	Does not merit consideration
		NAGPRA	May merit protection (C1 only)
NM-Q-26-20 (within area of effect and buffer zone)	Anasazi Habitation and Artifact Scatter	NRHP	Eligible 1. 50-year guideline met 2. Retains integrity of location, setting, materials, workmanship, and association 3. Meets criterion d
		ARPA	Eligible 1. Meets 100-year guideline 2. Is of archaeological interest
		AIRFA	Does not merit consideration
		NAGPRA	May merit protection
NM-Q-39-212 (within area of effect and buffer zone)	Anasazi Habitation and Artifact Scatter	NRHP	Eligible 1. 50-year guideline met 2. Retains integrity of location, setting, materials, and association 3. Meets criterion d
		ARPA	Eligible 1. Meets 100-year guideline 2. Is of archaeological interest
		AIRFA	May merit consideration
		NAGPRA	May merit protection

Isolated Occurrences

The eight IOs do not appear to be associated with any nearby sites. In the absence of subsurface exploration or other evidence that the artifacts are associated with a nearby site, the IOs are not eligible for protection under the NHPA, ARPA, NAGPRA, or AIRFA. The IOs do not meet

eligibility requirements under criteria a through d since their research potential has been exhausted through recordation. Some of the IOs appear to meet the 100-year age requirement under ARPA, but do not appear to be of archaeological interest. The IOs are not materials that are usually considered for protection under AIRFA or NAGPRA.

Traditional Cultural Properties

The current undertaking will not affect any sacred places in or near the project area.

Recommendations

Archaeological clearance for the proposed undertaking is recommended provided that the following stipulations are met: (1) construction and traffic must be restricted to the areas slated for remediation; (2) the boundaries of sites NM-Q-26-19 (LA 15257), NM-Q-26-20, NM Q-39-212, and Jishchaa' 1 must be fenced before any construction activities begin; (3) an archaeologist should monitor any construction within 50 ft of the sites and Jishchaa' 1; and (4) in the event of any discovery of cultural materials and/or human remains, all work must stop within 50 ft of their location and the discovery must be reported immediately to NNHPD and other appropriate entities.

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Appendix A

Site Survey and Management Forms

NAVAJO NATION HISTORIC PRESERVATION DEPARTMENT
Site Survey and Management Form

SITE NO.: NM-Q-26-19 FIELD OR OTHER NO.: LA15257, Field 1
PROJECT NO. & NAME: DCRM 2013-40--A Cultural Resources Inventory of the Ruby Mines, Associated Adits and Vents, Former Haul Roads, Drainages, and Sample Areas in the Smith Lake Chapter, McKinley County, New Mexico.
RECORDING ORGANIZATION: Dinétahdoo CRM
DATE RECORDED: 8/28/13 RECORDED BY: Rena Martin, Clifford Werito, Clarina Clark & Tonia Clark
USGS 7.5' MAP REFERENCE: Hosta Butte, N. Mex., 1963
LEGALS (☒ NMPM / ☐ AZPM): Township: 15☒ N / ☐ S, Range: 13☐ E / ☒ W;
Sec.: 25 ; NE 1/4, NW 1/4, NE 1/4 (☐ Unplatted)
UTM COORDINATES (NAD 83): Zone: 12: 3932967 N, 0757335 E
STATE: NM, COUNTY: McKinley, CHAPTER: Smith Lake, AGENCY: Eastern Navajo
LAND STATUS: Navajo Nation Trust
GROUND VISIBILITY: 98 % Kind and extent of cover: Vegtation
TOPOGRAPHY: The site is on the eastern edge of a ridge, the ridge slope,and spills into a drainage along the eastern base of the ridge.
NEAREST DRAINAGE: Within site boundaries
ELEVATION (FT/M): 7455 ft / 2272 SLOPE AND DIRECTION: >5 ° NE
SEDIMENT TYPE: Sandstone outcrop with coarse- and fine-grained alluvial sand OTHER: sandstone bedrock
VEGETATION PRESENT: Pinyon/juniper, blue gramma, wolfberry, globemallow, prickly pear, and ring muhly
CULTURAL AFFILIATION: (C1) Anasazi and (C2) Unknown Historic
SITE TYPE: (C1) Habitation and Artifact Scatter and (C2) Unknown Historic
CURRENTLY IN-USE: ☐ Yes, ☒ No Comments:
PERIOD(S) OF OCCUPATION/CONSTRUCTION/USE (date if known): (C1) PII to PIII (900-1300 AD); (C2) early 1920s-to 1960s?
How Dated: Ceramic and artifact types
DIMENSIONS OF SITE (L × W): 39× 29 mTOTAL AREA (sq. m.): 1,131 sq m
ARCHITECTURE PRESENT: ☒ Yes, ☐ No Describe: L-shaped sandstone wall remnant and other sandstone features
TYPES OF ARTIFACTS OBSERVED and QUANTITY OF EACH TYPE (give approximate numbers if not counted): (C1) 60+ Gallup Black-on-white and 15+ sand temper corrugated sherds and <20 fine-grained reddish quartzite flakes, (C2) aqua bottle fragments and liquor bottles
COLLECTION MADE? ☐ Yes, ☒ No Of What? Method of Collection:
PHOTOS: ☐ Yes, ☒ No Photo ID:
PHYSICAL SITE DESCRIPTION: NM-Q-26-19 is a multi-component site with an Anasazi habitation and an unknown historic component. The Anasazi component contains the remains of a roomblock (Feature 1); the masonry structure is built on a sandstone ledge, and what remains is a rubble area with an L-shaped sandstone wall alignment. The alignment measures approximately 50 by 50cm and is at least five courses high of flat sandstone. The feature is less than 1 m in diameter. No artifacts were found, and the feature does not extend below the surface because it is built directly on bedrock.

Feature 2 is a 1-m-diameter cluster of sandstone that maybe the remains of a storage feature; no ash or burnt sandstone blocks were found. The feature may be prehistoric or historic.

Feature 3 is the remains of a shelter that appears to have been built under a sandstone ledge. A sandstone wall alignment partially concealed by the rubble measures about 1.5 by 1 m. The blocks are eroding off the slope of the ridge. No artifacts or ashy deposits were observed. It is unknown if this feature is prehistoric or historic.

Feature 4 is a 1.5-m-diameter cluster of sandstone blocks eroding off the slope of the ridge. No wall alignment was observed, and no artifacts were found. Again, it is not known if this feature is prehistoric or historic.

Feature 5 is a 15 by 12 m midden that is eroding off the slope of the ridge. The midden contains ceramic and lithic artifacts, sandstone debris, and some soil discoloring from ash. The southern edge of the feature has been flooded by the drainage.

At least 60 Cibola style ceramic artifacts were counted in the midden area and across the site. The most common types were Gallup Black-on-white and corrugated. Fewer than 20 quartzite secondary flakes and debris were observed across the site. No ground stone was found. The historic artifacts consisted of 5 fragments of aqua glass and a whole whiskey bottle along with more recent trash, including smashed aluminum soda cans.

There are not enough historic artifacts to determine if the historic component was Navajo. The historic component may be associated with the former mine or miners.

ETHNOGRAPHIC DATA (if any): None available from local land users.

CONDITION OF SITE: Fair CAUSES OF DISTURBANCE: Weathering/Erosion

LOCATION OF SITE RELATIVE TO PROJECT AREA and AREA OF POTENTIAL EFFECT: The site is located along the southern edge of the area slated for reclamation.

EXTENT OF INVESTIGATIONS TO DATE: The Anasazi site was previously recorded as LA 15257, but very limited information was found.

RESEARCH POTENTIAL/CULTURAL IMPORTANCE OF SITE: Component 1 may provide data on local Anasazi habitation sites; settlement patterns and resource exploitation; ceramic technology; lithic reduction; architectural technology and possibly subsistence patterns. Component 2 may provide data on temporary historic land use.

MANAGEMENT RECOMMENDATIONS: Fencing and monitoring

SITE ASSESSMENT UNDER 36 CFR 60.4 (National Register of Historic Places)

Component 1

REGISTER ELIGIBLE: ☒ Yes, ☐ No, ☐ Potentially

Comments: none

INTEGRITY: location ☒, design ☐, setting ☒, materials ☒, workmanship ☒, feeling ☐, association ☐, unknown ☐, none ☐

CRITERIA: a ☐, b ☐, c ☐, d ☒, unknown ☐, none ☐

EXCLUSIONS: none

Component 2

REGISTER ELIGIBLE: ☐ Yes, ☒ No, ☐ Potentially

Comments: none

INTEGRITY: location ☒, design ☐, setting ☒, materials ☒, workmanship ☐, feeling ☐, association ☐, unknown ☐, none ☐

CRITERIA: a ☐, b ☐, c ☐, d ☐, unknown ☐, none ☒

EXCLUSIONS: none

SITE ASSESSMENT UNDER 36 CFR 7.3 (Archaeological Resources Protection Act):

Component 1

Eligible for Protection? ☒ Yes, ☐ No

Meets 100-Year Guideline? ☒ Yes, ☐ No

Of Archaeological Interest? ☒ Yes, ☐ No

Comments:

Component 2

Eligible for Protection? ☐ Yes, ☒ No

Meets 100-Year Guideline? ☐ Yes, ☒ No

Of Archaeological Interest? ☐ Yes, ☒ No

Comments:

SITE ASSESSMENT UNDER P.L. 95-341 (American Indian Religious Freedom Act):

Component 1

Merit Consideration? ☐ Yes, ☒ No, ☐ N/A
Comments:

Component 2
Merit Consideration? ☐ Yes, ☒ No, ☐ N/A
Comments:

SITE ASSESSMENT UNDER NAVAJO NATION JISHCHAA' POLICY/NAGPRA:

Component 1
Eligible for Protection? ☐ Yes, ☐ No, ☒ Possibly (explain below)
Comments: A grave could be present on the ridge slope.

Component 2
Eligible for Protection? ☐ Yes, ☒ No, ☐ Possibly (explain below)
Comments: It is very unlikely that a historic grave could be present on this site.

HOW CAN THE SITE BE REACHED (Provide a narrative description & refer to attached USGS quad map):
The site is not very accessible due to the locked fences. See attached map for local two-track roads.
PROVIDE A SITE MAP (Including site designation, site boundary, north arrow, scale, recognizable features, landmarks, and relationship to project area).
OTHER COMMENTS:

NAVAJO NATION HISTORIC PRESERVATION DEPARTMENT
Site Survey and Management Form

SITE NO.: NM-Q-26-20 FIELD OR OTHER NO.: LA 15252?, Field 2
PROJECT NO. & NAME: DCRM 2013-40: A Cultural Resources Inventory of the Ruby Mines, Associated Adits and Vents, Former Haul Roads, Drainages, and Sample Areas in the Smith Lake Chapter, McKinley County, New Mexico.
RECORDING ORGANIZATION: Dinétahdoo CRM
DATE RECORDED: 8/28/13 RECORDED BY: Rena Martin, Clifford Werito, Clarina Clark & Tonia Clark
USGS 7.5' MAP REFERENCE: Hosta Butte, N. Mex., 1963
LEGALS (☒ NMPM / ☐ AZPM): Township: 15☒ N / ☐ S, Range: 13☐ E / ☒ W;
Sec.: 25 ; NE 1/4, SE 1/4, NE 1/4 (☐Unplatted)
UTM COORDINATES (NAD 83): Zone: 12: 3932733N, 0757595E
STATE: NM, COUNTY: McKinley, CHAPTER: Smith Lake, AGENCY: Eastern Navajo
LAND STATUS: Navajo Nation Trust
GROUND VISIBILITY: 98 % Kind and extent of cover: Vegetation
TOPOGRAPHY: This site is located on the northern tip of a ridge that has been cut by a haul road for the former uranium mine.
NEAREST DRAINAGE: An unnamed drainage is located at the western foot of the ridge.
ELEVATION (FT/M): 7424 ft / 2262 m SLOPE AND DIRECTION: >5 ° NE
SEDIMENT TYPE: Sandstone outcrop with coarse- and fine-grained alluvial sandOTHER: sandstone bedrock
VEGETATION PRESENT: Pinyon/juniper, sage, muhly grass, globemallow, snakeweed, rabbitbrush, blue grama grass, and Russian thistle
CULTURAL AFFILIATION: Anasazi
SITE TYPE: Habitation and Artifact Scatter
CURRENTLY IN-USE: ☐ Yes, ☒ No Comments:
PERIOD(S) OF OCCUPATION/CONSTRUCTION/USE (date if known): PII to PIII (900-1300 AD)
How Dated: Ceramic typology and artifact types
DIMENSIONS OF SITE (L × W): 29x26 m TOTAL AREA (sq. m.): 754 sq m.
ARCHITECTURE PRESENT: ☒ Yes, ☐ No Describe: Rubble mound
TYPES OF ARTIFACTS OBSERVED and QUANTITY OF EACH TYPE (give approximate numbers if not counted): 100+ Gallup Black-on-white and 20+ sand temper corrugated sherdsand <30 lithic artifacts
COLLECTION MADE? ☐ Yes, ☒ No Of What? Method of Collection:
PHOTOS: ☐ Yes, ☒ No Photo ID:
PHYSICAL SITE DESCRIPTION: Site NM-Q-26-20 consists of a rubble mound and a scatter of artifacts. Feature 1 is a rubble mound with no visible walls; the sandstone cluster measures 8 x 3 m. The mound appears to have more than 40cm of depth and consists of shaped and unshaped sandstone blocks. No artifacts were observed in the feature.

More than 1500 artifacts were scattered evenly across the site, with several ceramic sherdseroding off the ridge onto the haul road slated for testing. The ceramicsinclude Gallup Black-on-white, Puerco Black-on-white, Chaco corrugated, and other white ware. Lithic artifacts include secondary flakes of reddish quartzite, brown silicified wood, and gray and white cherts. The ceramic artifacts outnumber the lithics by 5 to 1.

Subsurface deposits appear to be present near the roomblock. The site area has sandstone outcropsand sandy deposits that contain artifacts. No ashy soil deposits are visible on the surface.

ETHNOGRAPHIC DATA (if any): None available
CONDITION OF SITE:Good CAUSES OF DISTURBANCE: Weathering/erosion
LOCATION OF SITE RELATIVE TO PROJECT AREA and AREA OF POTENTIAL EFFECT: The site is located above the former uranium haul road that is slated for testing and reclamation.
EXTENT OF INVESTIGATIONS TO DATE: This recording.

RESEARCH POTENTIAL/CULTURAL IMPORTANCE OF SITE: The site may provide data on local Anasazi habitation sites; settlement patterns and resource exploitation; ceramic technology; lithic reduction; architectural technology and subsistence patterns.
MANAGEMENT RECOMMENDATIONS: Fencing and monitoring
SITE ASSESSMENT UNDER 36 CFR 60.4 (National Register of Historic Places)

REGISTER ELIGIBLE: ☒ Yes, ☐ No, ☐ Potentially
Comments: The site is relatively intact and may contain subsurface deposits.
INTEGRITY: location ☒, design ☐, setting ☒, materials ☒, workmanship ☒, feeling ☐, association ☒, unknown ☐, none ☐
CRITERIA: a ☐, b ☐, c ☐, d ☒, unknown ☐, none ☐
EXCLUSIONS: none

SITE ASSESSMENT UNDER 36 CFR 7.3 (Archaeological Resources Protection Act):

Eligible for Protection? ☒ Yes, ☐ No
Meets 100-Year Guideline? ☒ Yes, ☐ No
Of Archaeological Interest? ☒ Yes, ☐ No
Comments:

SITE ASSESSMENT UNDER P.L. 95-341 (American Indian Religious Freedom Act):

Merit Consideration? ☐ Yes, ☒ No, ☐ N/A
Comments: There are no visible remains of traditional activities.

SITE ASSESSMENT UNDER NAVAJO NATION JISHCHAA' POLICY/NAGPRA:

Eligible for Protection? ☐ Yes, ☐ No, ☒ Possibly (explain below)
Comments: It is possible that a grave could be present in the sandy areas.

HOW CAN THE SITE BE REACHED (Provide a narrative description & refer to attached USGS quad map): The site is accessible by the former haul road and local roads. See attached map for local two track roads.
PROVIDE A SITE MAP (Including site designation, site boundary, north arrow, scale, recognizable features, landmarks, and relationship to project area).
OTHER COMMENTS:

NAVAJO NATION HISTORIC PRESERVATION DEPARTMENT
Site Survey and Management Form

SITE NO.: NM-Q-39-212 FIELD OR OTHER NO.: Field 3
PROJECT NO. & NAME: DCRM 2013-40: A Cultural Resources Inventory of the Ruby Mines, Associated Adits and Vents, Former Haul Roads, Drainages, and Sample Areas in the Smith Lake Chapter, McKinley County, New Mexico.
RECORDING ORGANIZATION: Dinétahdoo CRM
DATE RECORDED: 8/28/13 RECORDED BY: Rena Martin, Clifford Werito, Clarina Clark & Tonia Clark
USGS 7.5' MAP REFERENCE: Hosta Butte, N. Mex., 1963
LEGALS (☒ NMPM / ☐ AZPM): Township: 15☒ N / ☐ S, Range: 12☐ E / ☒ W;
Sec.: 25 ; NE 1/4, NW 1/4, NW 1/4 (☐Unplatted)
UTM COORDINATES (NAD 83): Zone: 12: 3931457N, 0759745E
STATE: NM, COUNTY: McKinley, CHAPTER: Smith Lake, AGENCY: Eastern Navajo
LAND STATUS: Navajo Nation Trust
GROUND VISIBILITY: 95% Kind and extent of cover: Vegetation
TOPOGRAPHY: This site is located on the southern edge of Navajo Route 50 (N50) in a flat area with an open view.This portion of N50 was used as a haul road for the uranium mine.
NEAREST DRAINAGE: Unnamed drainages that flow north toward Smith Lake.
ELEVATION (FT/M): 7309ft /2227 m SLOPE AND DIRECTION: >5 ° NE
SEDIMENT TYPE: Sandy loam OTHER: sandstone bedrock at a distance
VEGETATION PRESENT: Snakeweed, rabbitbrush, blue grama grass, Russian thistle, and globemallow.
CULTURAL AFFILIATION: Anasazi
SITE TYPE: Habitation and Artifact Scatter
CURRENTLY IN-USE: ☐ Yes, ☒ No Comments:
PERIOD(S) OF OCCUPATION/CONSTRUCTION/USE (date if known): PII to PIII (900-1300 AD)
How Dated: Ceramic and artifact types
DIMENSIONS OF SITE (L × W): 80 × 32 m TOTAL AREA (sq. m.): 2,560 sq m.
ARCHITECTURE PRESENT: ☒ Yes, ☐ No Describe: Rubble mound
TYPES OF ARTIFACTS OBSERVED and QUANTITY OF EACH TYPE (give approximate numbers if not counted): 350+ Cibola style ceramic artifacts and 40+ lithic artifacts
COLLECTION MADE? ☐ Yes, ☒ No Of What? Method of Collection:
PHOTOS: ☐ Yes, ☒ No Photo ID:
PHYSICAL SITE DESCRIPTION: This site consists of a rubble mound (Feature 1) and a large midden (Feature 2) that has been exposed by blading. Feature 1 measures roughly 20 x 7 m. The rubble mound appears to have > 50cm of subsurface deposits with >40cm of surface rubble. No wall alignments or artifacts were observed. Feature 2 is a midden that was exposed by heavy equipment. An old scar from a drainage trench associated with N50 has exposed a heavy concentration of ceramic artifacts, rubble, and lithic artifacts. The majority of the artifacts are Cibola style, including an abundance of Chaco Black-on-whites, Gallup Black-on-whites, and Chaco corrugated.

The eastern portion of the site may have additional buried features. Some 50+ ceramic artifacts and a few lithic artifacts are spread across the site outside the feature boundaries in areas that have been impacted by the road and erosion. The midden appears to contain 1000s of ceramic artifacts. Observed were rim sherds, at least two handles, and a large number of body sherds. Lithic material types include brown and gray silicified wood, reddish and brown fine-grained quartzite, and white and golden chert.

The site is located adjacent to N50, a well-used community road maintained by the BIA. Aside from the blading, the site appears to be in fairly good condition.
ETHNOGRAPHIC DATA (if any): A local elder knows of this site, as well as others, but he did not furnish any information on its possible use.
CONDITION OF SITE: Good CAUSES OF DISTURBANCE: Weathering/erosion

Dinétahdóó
Cultural Resources Management, LLC

P.O. Box 2012 • Farmington, New Mexico 87499 • Phone: (505) 960-9478 • Fax: (505) 960-9749
E-Mail: dinetahdoo@yahoo.com

December 6, 2013

Ms. Jennifer Perry Lagan, Project Manager
CH2M HILL Engineers, Inc.,
9191 South Jamaica Street
Englewood, Colorado
80112-5946

RE: Final Report: DCRM 2013-40, A Cultural Resources Inventory of the Ruby Mines Site in Smith Lake Chapter, McKinley County, New Mexico. Addendum 1: Inventory of 13.08 acres of additional land parcels for Ruby Mine Site.

Dear Ms. Laggan,

Enclosed is a copy of Dinétahdóó Cultural Resources Management's survey report DCRM 2013-40 concerning the cultural resources inventory of 13.08 acres of additional land parcels in McKinley County, New Mexico.

During the field survey, twelve isolated occurrences were documented. Archaeological clearance has been recommended with no stipulations as no significant cultural resources were encountered.

This report has been submitted to the Navajo Nation Historic Preservation Department (NNHPD)-Cultural Resource Compliance Section in Window Rock, Arizona for compliance review. You will hear directly from their office once a determination of effect has been made.

Please call me if you have any questions regarding this project. I can be contacted at (505) 960-9478.

Sincerely,

Jeremy Begay
Senior Archaeologist

Chrono 2013-149
Project files

CULTURAL RESOURCES INVENTORY REPORT DOCUMENTATION PAGE (HPD Oct/05)

1. HPD REPORT NO:	2. (FOR HPD USE ONLY)	3. RECIPIENT'S ACCESSION NO.
4. TITLE OF REPORT: A Cultural Resources Inventory of the Ruby Mines Site in Smith Lake Chapter, McKinley County, New Mexico. Addendum 1: Inventory of 13.08 acres of additional land parcels for Ruby Mine Site. Author (s): Matthew Martin		**5. FIELDWORK DATES:** November 4, 2013 **6. REPORT DATE:** December 6, 2013
7. CONSULTANT'S NAME AND ADDRESS: **Gen. Charge:** Mrs. Rena Martin **Org. Name:** Dinétahdóó CRM **Org. Address:** P.O. Box 2012 Farmington, NM 87499 **Phone:** (505) 960-9478 or (505) 960-9749		**8. PERMIT NO.:** B13660 **9. CONSULTANT'S REPORT NO.:** DCRM 2013-40
10. SPONSOR'S NAME AND ADDRESS: **Ind. Responsible:** Ms. Jennifer Perry Laggan, Project Manager **Org. Name:** CH2M HILL Engineers, Inc., **Org. Address:** 9191 South Jamaica Street Englewood, Colorado 80112-5946 **Phone:** (928) 729-6124		**11. SPONSOR'S PROJECT NO.:** Work Order No. **12. AREA OF EFFECT:** 6 ac (2.42 ha) **AREA SURVEYED:** 13.08 ac (5.29 ha)

13. LOCATION (MAP ATTACHED)

a. **Chapter:** Smith Lake
b. **Agency:** Eastern
c. **County:** McKinley
d. **State:** New Mexico
e. **Land Status:** Tribal Trust
f. **UTM:** See Table 1
g. **Legal Description:** See Table 1
h. **USGS 7.5' Maps:** See Table 1

14. REPORT /X/ OR SUMMARY (REPORT ATTACHED) / / OR PRELIMINARY REPORT / /

a. **Description of Undertaking**: See Supplemental Sheet
b. **Area of Environmental & Cultural Setting**: See Supplemental Sheet
c. **Existing Data Review**: See Supplemental Sheet
d. **Field Methods**: See Supplemental Sheet

15. CULTURAL RESOURCE FINDINGS:

a. **Location/Identification of Each Resource:** See Supplemental Sheet
b. **Evaluation of Significance of Each Resource:** See Supplemental Sheet

16. MANAGEMENT SUMMARY (RECOMMENDATION): Archaeological clearance is recommended for the proposed undertaking since no significant cultural resources were encountered during the survey.

17. CERTIFICATION:

SIGNATURE: Rena Martin **Date:** 12/6/13
General Charge Name: Rena Martin, Anthropologist

SIGNATURE: [signature] **Date:** DEC. 06, 2013
Direct Charge Name: Matthew Martin, Archaeologist

13. LOCATION:

Table 1. UTM Coordinates, Legal Descriptions, and USGS Maps for the Proposed Cultural Resources Inventory of the Ruby Mines Site in Smith Lake Chapter, McKinley County, New Mexico: Addendum 1.

Designation	UTM Coordinates: Zone 12 (NAD 83)		Legal Description						USGS Map Name (7.5' Quadrangle)
	Northing	Easting	¼	¼	¼	Sec.	T	R	
Colluvial Background Area (2-acre parcel)									Hosta Butte, N. Mex. 1963
NW Corner	3933998	0757477	NW	NE	SE	24	15N	13W	
NE Corner	3933999	0757572	NE	NE	SE	24	15N	13W	
SE Corner	3933902	0757575	NE	NE	SE	24	15N	13W	
SW Corner	3933901	0757479	NW	NE	SE	24	15N	13W	
Dakota Shale Background Area (2-acre parcel)									
NW Corner	3933553	0757038	NW	SW	SE	24	15N	13W	
NE Corner	3933553	0757126	NW	SW	SE	24	15N	13W	
SE Corner	3933456	0757126	NW	SW	SE	24	15N	13W	
SW Corner	3933457	0757038	NW	SW	SE	24	15N	13W	
Exploratory Boring Screening Area near Ruby Mine No. 1 (1-acre parcel)									
NW Corner	3933486	0751984	NE	SW	SE	21	15N	13W	
NE Corner	3933469	0752067	NE	SW	SE	21	15N	13W	
SE Corner	3933397	0752048	NE	SW	SE	21	15N	13W	
SW Corner	3933412	0751971	NE	SW	SE	21	15N	13W	
Exploratory Boring Screening Area near Ruby Mine No. 3 (1-acre parcel)									
NW Corner	3932762	0756591	NW	SE	NW	25	15N	13W	
NE Corner	3932751	0756658	NW	SE	NW	25	15N	13W	
SE Corner	3932667	0756646	NW	SE	NW	25	15N	13W	
SW Corner	3932678	0756576	NW	SE	NW	25	15N	13W	

14. REPORT:

a. Description of Undertaking: The report details the results of the cultural resources inventory conducted in conjunction with the project titled *A Cultural Resources Inventory of the Ruby Mines Site in Smith Lake Chapter, McKinley County, New Mexico.* Ms. Jennifer Perry Lagan, project manager, CH2M HILL Engineers, Inc., requested the cultural resources inventory to meet requirements established in an Administrative Settlement Agreement and Order on Consent (ASAOC) for Removal Site Evaluation and Interim Removal Action (CERCLA Docket No. 2013-07) between Western Nuclear Inc. (WNI) and the USEPA. WNI proposes to complete the following three phases of work as required by the ASAOC: (1) closing adits, vents, and other mine features and installing warning signs; (2) performing gamma scanning on mine features and implementing a background study; (3) evaluating the lateral and vertical extent of contamination in surface to subsurface soils and sediments in historical mine areas. The undertaking will require ground disturbance using heavy equipment to construct, close, and cover mine area features. With, *A Cultural Resources Inventory of the Ruby Mines Site in Smith Lake Chapter, McKinley County, New Mexico, Addendum 1: Inventory of 13.08 acres of additional land parcels for Ruby Mine Site.*, the proposed undertaking will include an addition of four parcels of land. Two parcels having (2) acres each and two parcels having (1) acre each of land needed for the above stated three phase of work. The area of effect was staked by CH2M HILL which totaled 6 acres (2.42 hectares).

b. Area of Environmental & Cultural Setting: The project area is on the periphery of the Hosta Butte and Mount Powell ranges on the continental divide, between the southern end of the Hosta Butte range and the northern slopes of Mount Powell. The area is characterized by mesas with numerous ridges that slope into wide drainages and shallow ponds, including Smith Lake. The soil is fine-to coarse-grained alluvial, fluvial, and Aeolian sand and silt. Sandstone outcrops are common among the mesa tops and are exposed in all drainages. Vegetation within the project area is diverse, consisting of ponderosa pine, pinyon, juniper, gambel oak, sagebrush, snakeweed, cheat grass, Russian thistle, grama grass, galleta grass, prickly pear cacti, barrel cacti, wolfberry, western wheatgrass, globemallow, and Indian rice grass. Smith Lake is approximately 7,890 feet above sea level.

The Navajo name for Smith Lake is Tsin nabas si'a, translated as Rounded Wood (tree) Hill. Smith Lake Chapter is in the southeastern part of the Eastern Navajo Agency. There is currently no major development of any type to create employment for the community. State Highway 371 offers some development possibilities. Most residents commute elsewhere for employment. Although, Smith Lake Chapter does not have good grazing land, livestock raising still provides subsistence for many of the local families, including traditional elders (LSR Innovations: 2004).

c. Existing Data Review: Prior to fieldwork, a records check was conducted at the Navajo Nation Historic Preservation Department's (NNHPD) Office, Located in Window Rock, Arizona. The records search indicated there were no previously inventoried sites that were recorded within 300 feet of the proposed project areas.

The Sacred Places files in the NNHPD's Traditional Culture Program files were researched to determine whether any previously identified sacred places are within 1 mile of the project area. Archaeologist's concluded that no TCP's were located within a 1 mile radius of the proposed project areas.

A check of Van Valkenburgh (1974) indicates that the closest sacred place near the project area is Hosta Butte ('Ak'iih Nast'ani, or Mountain Sitting on Top of Another Mountain), located approximately 5 miles (8.32 km) northeast of the project area.

d. Field Methods: On November 4, 2013, Matthew Martin and Jeffrey Begay, archaeologists with Dinetahdoo Cultural Resources Management, conducted the cultural resources inventory of the four proposed parcels of land. The project area was staked prior to the archaeological survey by Mr. Ben Moayyad of CH2M HILL Engineers, Inc. The project area was inventoried by walking parallel transects with two archaeologists spaced no more than 10 m apart. A total of 13.08 acres (5.29 ha) was inventoried in conjunction with the project. This included 6 acres (2.42 ha) for the area of affect and an additional 7.08 acres for the extended 50 foot buffer zones on all four sides of each project area.

In accordance with NNHPD guidelines, an effort to obtain information regarding local traditional cultural properties (TCPs) and unmarked burials in the area must be made. The project archaeologists Matthew Martin and Jeffrey Begay were unsuccessful in interviewing the nearest in-use site resident. The nearest in-use site belongs to an aunt of Edmund Henry. Edmund Henry is the current allotment owner for the project area and had no information pertaining to TCPs and stated that his aunt does not stay in the nearest home anymore. As a result, no traditional cultural properties or burials were to be found in or around the immediate project area. Additionally, a larger scale ethnographic survey was conducted with, *A Cultural Resources Inventory of the Ruby Mines Site in Smith Lake Chapter, McKinley County, New Mexico.*

15. CULTURAL RESOURCES FINDING:

a. Location/Identification of Each Resource: During the course of the inventory (12) isolated occurrences were identified within the project areas. A description of the identified isolated occurrences as well as their UTM coordinates can be found below in table 2.

Table 2. List of identified isolated occurrences for the Proposed Cultural Resources Inventory of the Ruby Mines Site in Smith Lake Chapter, McKinley County, New Mexico: Addendum 1.**Designation**	**Description**	**UTM Coordinates (Zone 12, NAD 83)**
IO9	1 Grey ware sherd	3933495N, 0757075E
IO10	2 Grey ware sherds	3933574N, 0757043E
IO11	6 Gray ware sherds 3 corrugated sherds	3933584N, 0757014E
IO12	1 Chaco Black-on-white sherd	3934009N, 0757478E
IO13	4 Grey ware 1 white ware sherd	3934008N, 0757522E
IO14	1 Chaco Black-on-white sherd	3933958N, 0757499E
IO15	1 Zuni spotted chert projectile point	3933897N, 0757560E
IO16	1 Black-on-white sherd	3933908N, 0757537E
IO17	1 Grey ware sherd	3933409N, 0752035E
IO18	5 Grey ware sherds	3933442N, 0751956E
IO19	1 Grey ware sherd	3932658N, 0756578E
IO20	1 Grey ware sherd	3932800N, 0756605E

b. Evaluation of Significance of Each Cultural Resource:

Table 3. Evaluation of Significance and Eligibility concerning NRHP, ARPA, AIRFA, and NAGPRA

Cultural Resource	**Description**	**Evaluation**	
Isolated Occurrences (#1-12)	28 Ceramic pottery sherds and 1 projectile point	NRHP	Not Eligible 1. 50-year guideline met 2. Lack aspects of integrity 3. Does not meet criteria a, b, c, d
		ARPA	Not Eligible 1. 100-year guideline met 2. Research potential is exhausted
		AIRFA	Does not merit consideration
		AIRFA	Does not merit consideration

References Cited:

LSR Innovations
2004 Chapter Images: 2004 Edition; edited by LSR Innovations for the Division of Community

Development, Window Rock, Arizona.

Van Valkenburgh, Richard F.
1974 Navajo Sacred Places. *In Navajo Indians III*, edited by C. Kluckhohn, pp. 9-99. Garland Publishing, New York.

Figure 1: Map showing project areas: Note* Maps are not to scale for the draft.

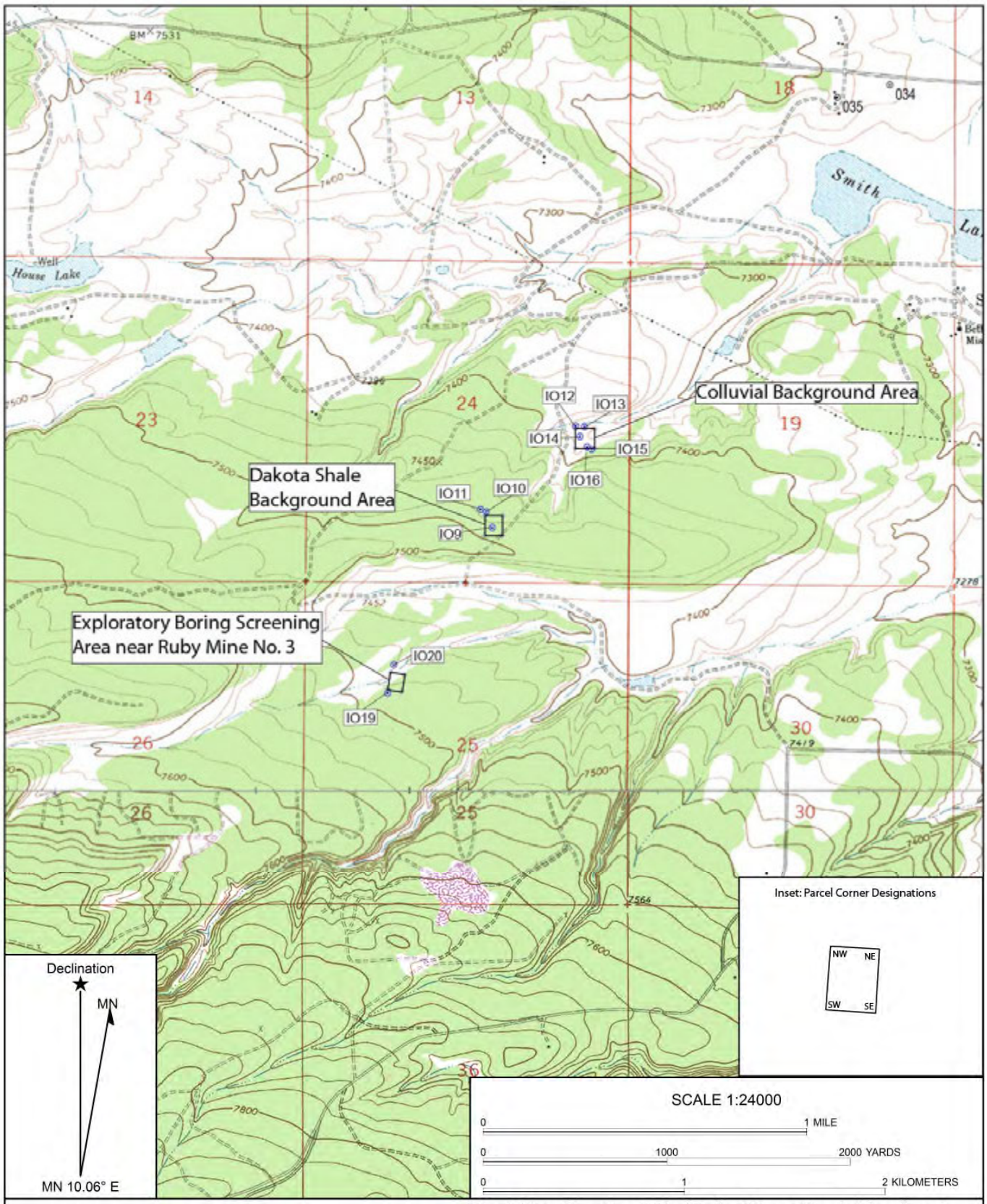
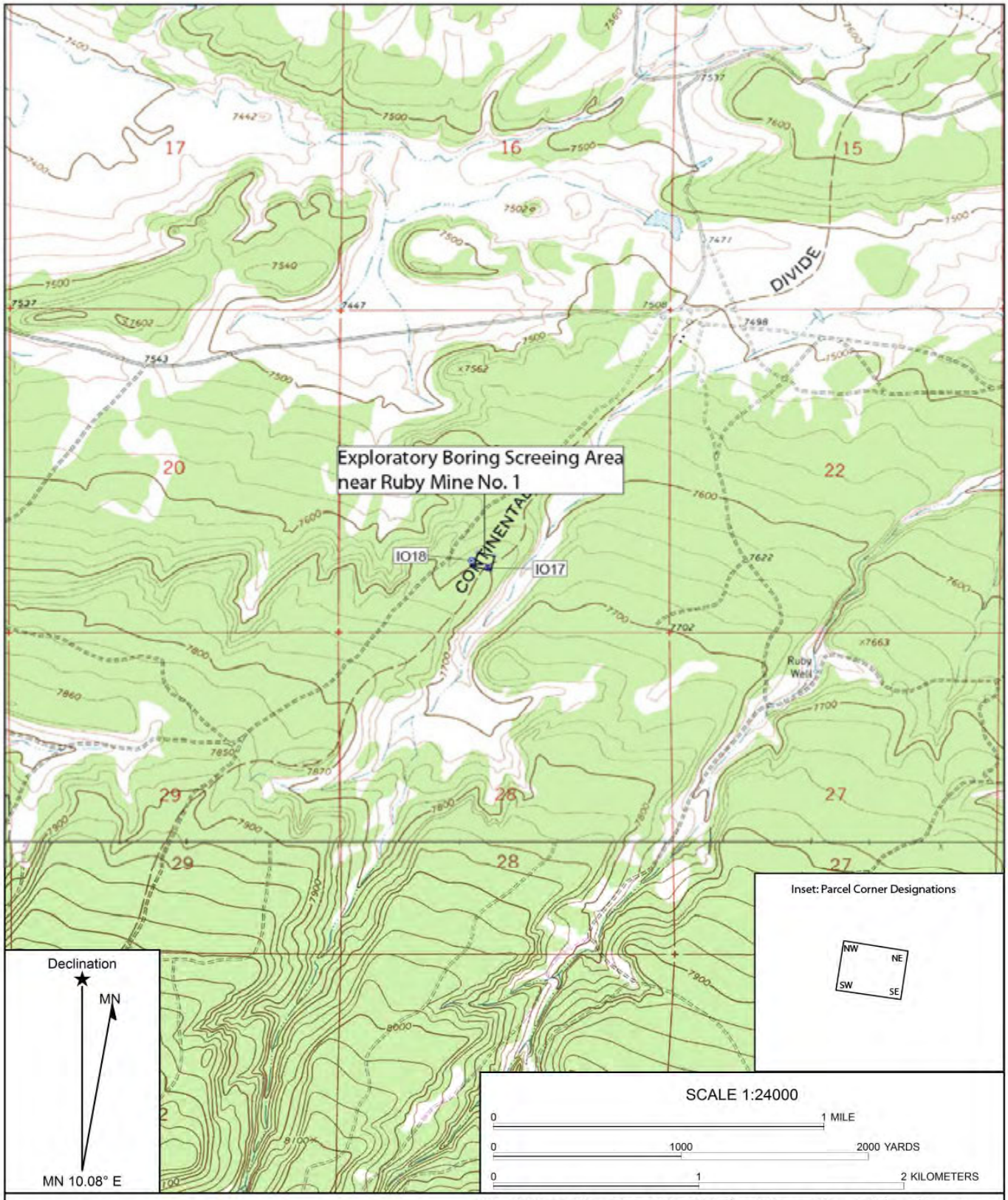


Fig. 1 Map Showing CRI of Ruby Mines Site. Addendum 1: survey parcels and identified cultural resources. (DCRM 2013-40)

Figure 2: Map showing project areas: Note* Maps are not to scale for the draft.



THE NAVAJO NATION
HISTORIC PRESERVATION DEPARTMENT
PO Box 4950, Window Rock, Arizona 86515
TEL: (928) 871-7198 / 7147 FAX: (928) 871-7886

CULTURAL RESOURCE COMPLIANCE FORM

ROUTE COPIES TO:	NNHPD NO.: HPD-13-794
☑ DCRM	OTHER PROJECT NO.: DCRM 2013-40

PROJECT TITLE: A Cultural Resources Inventory of the Ruby Mines, Associated Adits and Vents, Former Haul Roads, Drainages, and Sample Areas in the Smith Lake Chapter, McKinley County, New Mexico

LEAD AGENCY: BIA/NR

SPONSOR: Jennifer Perry Laggan, CH2M HILL Engineers, Inc., 9191 South Jamaica Street, Englewood, Colorado 80112-5946

PROJECT DESCRIPTION: WNI proposes to complete the following three phases of work as required by the ASAOC: (1) closing adits, vents and other mine features and installing warning signs; (2) performing gamma scanning on mine features and implementing a background study; and (3) evaluating the lateral and vertical extent of contamination surface and subsurface soils and sediments in historical mine areas. The project area includes the previously reclaimed (i.e., capped) waste rock pile at Ruby Mines Nos. 1 and 3, two adits, six vents, former haul roads, two drainages and two locations where background samples will be collected (Background Areas Nos. 1 and 2). The area of effect is 46.31-acres. Ground disturbance will be intensive and extensive with the use of heavy equipment.

LAND STATUS: Navajo Tribal Trust
CHAPTER: Smith Lake
LOCATIONS: **T.** 15 **N, R.** 13 **W – Sec.** 9, 13, 15, 21, 22, 25, 27
T. 15 **N, R.** 12 **W – Sec.** 30, 31, 32
Hosta Butte & Thoreau Quadrangles, McKinley County, New Mexico NMPM

PROJECT ARCHAEOLOGIST: Clifford Werito, Rena Martin, Tonia Clark & Clarina Clark
NAVAJO ANTIQUITIES PERMIT NO.: B13487

DATE INSPECTED: 08/21/13 – 08/29/13
DATE OF REPORT: 09/25/2013
TOTAL ACREAGE INSPECTED: 102.30 - ac

METHOD OF INVESTIGATION: Class III pedestrian inventory with transects spaced 15 m apart.

LIST OF CULTURAL RESOURCES FOUND:
(3) Sites (NM-Q-26-19, NM-Q-26-20, NM-Q-39-212)
(8) Isolated Occurrences (IO)
(1) Memorial Marker

LIST OF ELIGIBLE PROPERTIES:
(3) Sites (NM-Q-26-19, NM-Q-26-20, NM-Q-39-212)

LIST OF NON-ELIGIBLE PROPERTIES:
(8) IO
(1) Memorial Marker

LIST OF ARCHAEOLOGICAL RESOURCES:
(3) Sites (NM-Q-26-19, NM-Q-26-20, NM-Q-39-212)

EFFECT/CONDITIONS OF COMPLIANCE: No Historic Properties affected with the following conditions:

Sites NM-Q-26-19, NM-Q-26-20, NM-Q-39-212:

1. Site boundaries will be temporarily fenced under the direction of a qualified archaeologist prior to ground disturbing activities.
2. Sites will be avoided by all construction &/or remediation activities by a minimum of 50-ft. from site boundaries.

Memorial Marker:
Marker will be temporarily fenced & avoided by all construction activities by a minimum of 50-ft.

HPD-13-794 / DCRM 2013-40
Page 2, continued

In the event of a discovery ["*discovery*" means any previously unidentified or incorrectly identified cultural resources including but not limited to archaeological deposits, human remains, or locations reportedly associated with Native American religious/traditional beliefs or practices], all operations in the immediate vicinity of the discovery must cease, and the Navajo Nation Historic Preservation Department must be notified at (928) 871-7147.

FORM PREPARED BY: Tamara Billie
FINALIZED: November 19, 2013

Notification to Proceed Recommended ☑ Yes ☐ No

Conditions: ☑ Yes ☐ No

11-21-13

The Navajo Nation Historic Preservation Office — Date

Navajo Region Approval ☑ Yes ☐ No

12/5/13

BIA – Navajo Regional Office — Date

TLM 12.3.13

THE NAVAJO NATION
HISTORIC PRESERVATION DEPARTMENT
PO Box 4950, Window Rock, Arizona 86515
TEL: (928) 871-7198 / 7147 FAX: (928) 871-7886

CULTURAL RESOURCE COMPLIANCE FORM

ROUTE COPIES TO:	NNHPD NO.: HPD-13-794.1
☑ DCRM	OTHER PROJECT NO.: DCRM 2013-40

PROJECT TITLE: A Cultural Resources Inventory of the Ruby Mine Site in Smith Lake Chapter, McKinley County, New Mexico. Addendum 1: Inventory of 13. 08 Acres of Additional Land Parcels for Ruby Mine Site

LEAD AGENCY: BIA/NR

SPONSOR: Jennifer Perry Laggan, CH2M HILL Engineers, Inc., 9191 South Jamaica Street, Englewood, Colorado 80112-5946

PROJECT DESCRIPTION: WNI proposes to complete the following three phases of work as required by the ASAOC: (1) closing adits, vents and other mine features and installing warning signs; (2) performing gamma scanning on mine features and implementing a background study; and (3) evaluating the lateral and vertical extent of contamination surface and subsurface soils and sediments in historical mine areas. This undertaking will include an additional four parcels of land. Two parcels (2-acres each), and another two parcels (1-acre each) are slated for one or more of the above stated phases of work. The area of effect is 6.0-acres. Ground disturbance will be intensive and extensive with the use of heavy equipment.

LAND STATUS: Navajo Tribal Trust
CHAPTER: Smith Lake
LOCATIONS: T. 15 N, R. 13 W – Sec. 21, 24, 25; Hosta Butte Quadrangle, McKinley County, New Mexico NMPM

PROJECT ARCHAEOLOGIST: Matthew Martin
NAVAJO ANTIQUITIES PERMIT NO.: B13660

DATE INSPECTED: 11/04/2013
DATE OF REPORT: 12/06/13
TOTAL ACREAGE INSPECTED: 13.08 - ac

METHOD OF INVESTIGATION: Class III pedestrian inventory with transects spaced 15 m apart.

LIST OF CULTURAL RESOURCES FOUND: (12) Isolated Occurrences (IO)
LIST OF ELIGIBLE PROPERTIES: None
LIST OF NON-ELIGIBLE PROPERTIES: (12) IO
LIST OF ARCHAEOLOGICAL RESOURCES: None

EFFECT/CONDITIONS OF COMPLIANCE: No Historic Properties affected.

In the event of a discovery ["*discovery*" means any previously unidentified or incorrectly identified cultural resources including but not limited to archaeological deposits, human remains, or locations reportedly associated with Native American religious/traditional beliefs or practices], all operations in the immediate vicinity of the discovery must cease, and the Navajo Nation Historic Preservation Department must be notified at (928) 871-7147.

FORM PREPARED BY: Tamara Billie
FINALIZED: December 26, 2013

Notification to Proceed Recommended ☑ Yes ☐ No
Conditions: ☐ Yes ☑ No

12-31-13
The Navajo Nation Historic Preservation Office — Date

Navajo Region Approval ☑ Yes ☐ No

Acting
BIA – Navajo Regional Office — Date 1/24/14

TCM 1-22-14

Appendix A3
NNHP Biolgical Submittal

CH2M HILL
9193 S. Jamaica St.
Englewood, CO 80122

Tel 720.286.0836

March 24, 2014

Pamela Kyselka
Navajo Natural Heritage Program
POB 1480
Window Rock, AZ 86515

Subject: Biological resource report, Western Nuclear Inc. Ruby Mines,

Dear Ms. Kyselka:

CH2M HILL, Inc. (CH2M HILL) is submitting this request for a Biological Resource Compliance Form (BRCF) from the Navajo Natural Heritage Program (NNHP) for proposed remedial work on the Ruby Mines in McKinley County, Arizona (Attachment 1). The project location is approximately one to five miles west south-west of Smith Lake, located adjacent to SR-371. The proposed work plan was submitted to the NNHP for biological resource review. A report that identified the results of NNHP's resource review was prepared by NNHP and sent to Liz Dodge (CH2M HILL) on 20 February 2014 (Attachment 2). The NNHP identified golden eagle (*Aquila chrysaetos*), peregrine falcon (*Falco peregrinus*), and Heil's milkvetch (*Astragalus heilii*) as the only three protected species potentially occurring in the project vicinity. No known species were identified in that report (Attachment 2). Note that the submittal to NNHP included the point locations for work, but did not include the background sites (Attachment 1); however, the biological review report indicates that a 3-mile buffer was used, and the background sites are all within this review area (Attachment 2).

Proposed Work Activities

Activities are planned at the Ruby Mines site as described in the United States Environmental Protection Agency (USEPA) Administrative Settlement Agreement and Order on Consent (AOC) signed July 15, 2013.

Phase I activities involve closure of mine features that are open to the surface for safety and to restore the ground surface. Access and transport of materials and equipment will be on existing dirt-track roads. Dump trucks will bring clean backfill to the RUBY-001 surface adit location; from there it and other materials and equipment will be transported to other surface features by pick-up trucks or all-terrain vehicles (ATVs). The surface mine features will be closed by backfilling with native soils and in some cases placement of polyurethane foam plugs (Attachment 3). At the RUBY-001 feature, a backhoe and possibly a grader will be needed to place backfill and close the opening.

Phase 2 activities involve pedestrian gamma screening surveys and shallow soil sampling at various locations which would all occur within the project area (Attachment 3). At the background study areas (Mancos Shale, Dakota Sandstone, colluvial background) and selected other mine areas (capped waste rock, exploratory borehole areas), shallow soil samples will be collected by hand to 6 inches below grade.

Site Vegetative Description

The Ruby Mines project location is in piñon-juniper habitat that has evidence of disturbance from historical mining activities, exploratory testing, and power distribution lines (Attachment 3). There are ephemeral washes crossing portions of the project area, and some grasslands where piñon-juniper areas have been cleared or along the washes.

Species Demographic Background Information

Golden eagles are known to nest in McKinley County on cliff faces and prominent trees near rocky outcrops or rim rock ledges, and typically hunt in grasslands for small mammals and reptiles, or feed on carrion. While the species can be observed from piñon-juniper habitats, they rarely will perch in these areas.

Peregrine falcons are associated with large cliff faces or sometimes urban skyscrapers for nesting and perching habitat, and commonly feed on passerines which they hunt and strike while in the air. They are not associated with piñon-juniper habitats.

Heil's milk vetch is known to occur in only one location in Arizona, approximately 10 miles to the east north-east in the vicinity of Borrego Pass. The species is an endemic that is associated with "rim rock ledges" in the Mesa Verde Group, in piñon-juniper woodlands (New Mexico Rare Plants, *Astragalus heilii*). The species is found at approximately 7,200' elevation, and flowers mid may through June (NNHP, Species account for *Astragalus heilii*).

Ruby Mines Habitat Suitability for Protected Resources

The Ruby Mines proposed work area and surrounding 3 mile buffer do not contain any rock faces or ledges that would be suitable for nesting habitat for golden eagles or peregrine falcon, or hunting/foraging habitat for golden eagle. Liz Dodge (CH2M HILL) spoke with Chad Smith (NNHP, 25 February 2014) about the potential for golden eagle or peregrine falcon presence, and he indicated that the nearest known golden eagle and peregrine falcon nesting locations are approximately three miles south of the Ruby Mine work locations. Additionally, the nesting cliffs are facing away from the Ruby Mines. The Navajo Nation Golden and Bald Eagle Nest Protection Regulations (2008) maximum buffer is 0.75 miles away from work activities that are classified as "Loud," so all work will be outside of the nest buffer distance for any cliff-nesting eagles.

The Ruby Mines proposed work location is located in piñon-juniper habitat well away from rim rock ledges. The geologic formations where work is proposed are in Cretaceous units that are older than the Mesa Verde group (or formation) where the Heil's milkvetch is known to occur, or far younger in the colluvium. Additionally, the site elevation is at least 200' higher than the locations where Heil's milkvetch has been found. In a conversation with Andrea Hazelton (NNHP botanist, 10 March 2014), she indicated that the site habitat did not appear to be suitable for Heil's milkvetch, so no field surveys would be requested.

Conclusion

Based on a review of suitable habitat for the three species that potentially could occur in the work areas, it is highly unlikely that Heil's milkvetch is present, or that golden eagles or peregrine falcons would nest within the protective buffer for such work activities. Based on the lack of anticipated deleterious effects on any protected resources, and verbal consultations with Chad Smith and

Andrea Hazelton, we conclude that a Biological Resource Compliance Form is not needed for the proposed activities and we will proceed unless we hear otherwise from the Navajo Natural Heritage Program.

Thank you for your review of this request. If you have any questions regarding this report, don't hesitate to contact me by phone (720.286.0836) or email (deron.lawrence@ch2m.com).

Sincerely,

CH2M HILL

Deron Lawrence
Senior Ecologist

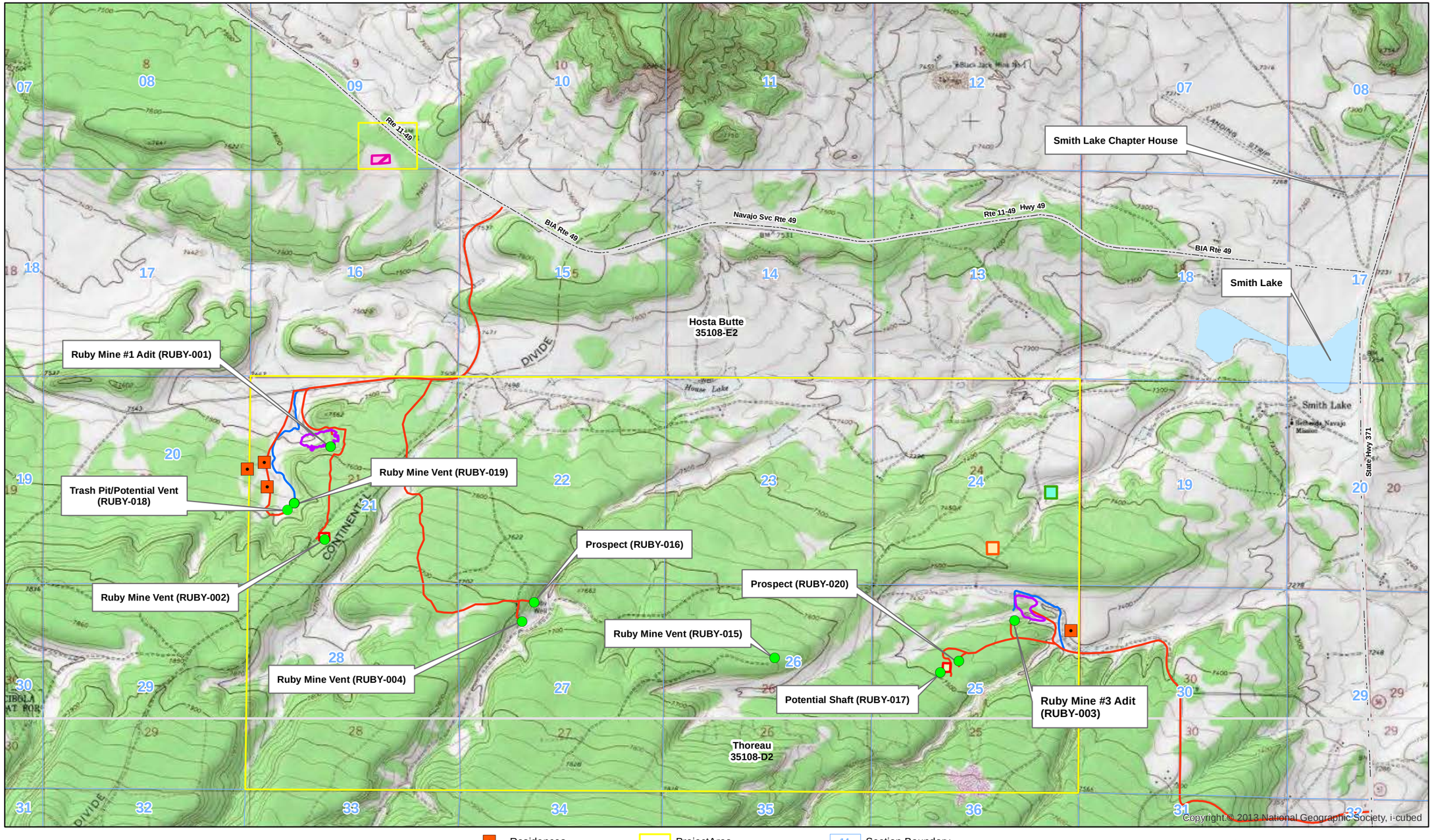
Attachments:

1: Topographic map of proposed work areas

2: Letter from NNHP to Liz Dodge, 20 February 2014

3: Aerial map of proposed work areas

c: Copies: Stuart Brown/Freeport-McMoRan Copper & Gold
Liz Dodge/CH2M HILL



Residences
Associated Mine Features
Major Roads
Drainage Channel
Haul Road
ProjectArea
Mancos Shale Background
Dakota Sandstone Background
Colluvial Backround
14 Section Boundary
Exploratory Borings Screening Areas
Capped Waste Rock Pile
US Geologic Survey Quadrangle

N
0 0.5 1 Miles

Attachment 1. Topographic Map
Ruby Mines Phase 2 Project Area

CH2MHILL

NNHP
Navajo Natural Heritage Program

PO Box 1480
Window Rock, AZ
86515

P 928.871.6472
F 928.871.7603

http://nnhp.nndfw.org

14ch2m101

20-February-2014

Liz Dodge
Program Manager
CH2M HILL
155 Grand Ave Suite 100
Oakland, CA 94612

SUBJECT: Ruby Mines Phase I Work Plan Adit and Vent Closure

Liz Dodge,

NNHP has performed an analysis of your project in comparison to known biological resources of the Navajo Nation and has included the findings in this letter. The letter is composed of seven parts. The sections as they appear in the letter are:

1. **Known Species** – a list of all species within relative proximity to the project
2. **Potential Species** – a list of potential species based on project proximity to respective suitable habitat
3. **Quadrangles** – an exhaustive list of quads containing the project
4. **Project Summary** – a categorized list of biological resources within relative proximity to the project grouped by individual project site(s) or quads
5. **Conditional Criteria Notes** – additional details concerning various species, habitat, etc.
6. **Personnel Contacts** – a list of employee contacts
7. **Resources** – identifies sources for further information

Known Species lists "species of concern" known to occur within proximity to the project area. Planning for avoidance of these species is expected. If no species are displayed then based upon the records of the Navajo Nation Department of Fish and Wildlife (NNDFW) there are no "species of concern" within proximity to the project. Refer to the Navajo Endangered Species List (NESL) Species Accounts for recommended avoidance measures, biology, and distribution of NESL species on the Navajo Nation (http://nnhp.nndfw.org/sp_account.htm).

Potential Species lists species that are potentially within proximity to the project area and need to be evaluated for presence/absence. If no species are found within the Known or Potential Species lists, the project is not expected to affect any federally listed species, nor significantly impact any tribally listed species or other species of concern. Potential for species has been determined primarily on habitat characteristics and species range information. A thorough habitat analysis, and if necessary, species specific surveys, are required to determine the potential for each species.

Species of concern include protected, candidate, and other rare or otherwise sensitive species, including certain native species and species of economic or cultural significance. For legally protected species, the following tribal and federal statuses are indicated: NESL, federal Endangered Species Act (ESA), Migratory Bird Treaty Act (MBTA), and Eagle Protection Act (EPA). No legal protection is afforded species with only

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ESA candidate, NESL group 4 status, and species listed on the Sensitive Species List. Please be aware of these species during surveys and inform the NNDFW of observations. Reported observations of these species and documenting them in project planning and management is important for conservation and may contribute to ensuring they will not be up listed in the future.

In any and all correspondence with NNDFW or NNHP concerning this project please cite the Data Request Code associated with this document. It can be found in this report on the top right corner of the every page. Additionally please cite this code in any biological evaluation documents returned to our office.

1. Known Species *(NESL=Navajo Endangered Species List, FE=Federally Endangered, FT=Federally Threatened, FC=Federal Candidate)*

Species

None

2. Potential Species

Species

AQCH = Aquila chrysaetos / Golden Eagle NESL G3
ASHE = Astragalus heilii / Heil's Milk-vetch NESL G4
FAPE = Falco peregrinus / Peregrine Falcon NESL G4

3. Quadrangles (7.5 Minute)

Quadrangles

Hosta Butte (35108-E2) / NM

4. Project Summary *(EO1 Mile/EO 3 Miles=elements occuring within 1 & 3 miles., MSO=mexican spotted owl PACs, POTS=potential species, RCP=Biological Areas)*

SITE	EO1MI	EO3MI	QUAD	MSO	POTS	AREAS
RUBY-001	None	None	Hosta Butte (35108-E2) / NM	None	ASHE, FAPE, AQCH	Area 3
RUBY-003	None	None	Hosta Butte (35108-E2) / NM	None	ASHE, FAPE, AQCH	Area 3
RUBY-016	None	None	Hosta Butte (35108-E2) / NM	None	ASHE, FAPE, AQCH	Area 3
RUBY-017	None	None	Hosta Butte (35108-E2) / NM	None	ASHE, FAPE, AQCH	Area 3
RUBY-018	None	None	Hosta Butte (35108-E2) / NM	None	ASHE, FAPE, AQCH	Area 3
RUBY-020	None	None	Hosta Butte (35108-E2) / NM	None	ASHE, FAPE, AQCH	Area 3
RUBY-004	None	None	Hosta Butte (35108-E2) / NM	None	ASHE, FAPE, AQCH	Area 3

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5. Conditional Criteria Notes *(Recent revisions made please read thoroughly. For certain species, and/or circumstances, please read and comply)*

A. **Biological Resource Land Use Clearance Policies and Procedures (RCP)** - The purpose of the RCP is to assist the Navajo Nation government and chapters ensure compliance with federal and Navajo laws which protect, wildlife resources, including plants, and their habitat resulting in an expedited land use clearance process. After years of research and study, the NNDFW has identified and mapped wildlife habitat and sensitive areas that cover the entire Navajo Nation.
The following is a brief summary of six (6) wildlife areas:
1. ***Highly Sensitive Area*** – recommended no development with few exceptions.
2. ***Moderately Sensitive Area*** – moderate restrictions on development to avoid sensitive species/habitats.
3. ***Less Sensitive Area*** – fewest restrictions on development.
4. ***Community Development Area*** – areas in and around towns with few or no restrictions on development.
5. ***Biological Preserve*** – no development unless compatible with the purpose of this area.
6. ***Recreation Area*** – no development unless compatible with the purpose of this area.
None - outside the boundaries of the Navajo Nation
This is not intended to be a full description of the RCP please refer to the our website for additional information at http://www.nndfw.org/clup.htm.

B. **Raptors** – If raptors are known to occur within 1 mile of project location: Contact Chad Smith at 871-7070 regarding your evaluation of potential impacts and mitigation.
o **Golden and Bald Eagles**- If Golden or Bald Eagle are known to occur within 1 mile of the project, decision makers need to ensure that they are not in violation of the Golden and Bald Eagle Nest Protection Regulations found at http://nnhp.nndfw.org/docs_reps/gben.pdf.
o **Ferruginous Hawks** – Refer to "Navajo Nation Department of Fish and Wildlife's Ferruginous Hawk Management Guidelines for Nest Protection" http://nnhp.nndfw.org/docs_reps.htm for relevant information on avoiding impacts to Ferruginous Hawks within 1 mile of project location.
o **Mexican Spotted Owl** - Please refer to the Navajo Nation Mexican Spotted Owl Management Plan http://nnhp.nndfw.org/docs_reps.htm for relevant information on proper project planning near/within spotted owl protected activity centers and habitat.

C. **Surveys** – Biological surveys need to be conducted during the appropriate season to ensure they are complete and accurate please refer to NN Species Accounts http://nnhp.nndfw.org/sp_account.htm. Surveyors on the Navajo Nation must be permitted by the Director, NNDFW. Contact Jeff Cole at (928) 871-7068 for permitting procedures. Questions pertaining to surveys should be directed to the NNDFW Zoologist (Chad Smith) for animals at 871-7070, and Botanist (Andrea Hazelton) for plants at (928)523-3221. Questions regarding biological evaluation should be directed to Jeff Cole at 871-7068.

D. **Oil/Gas Lease Sales** – Any settling or evaporation pits that could hold contaminants should be lined and covered. Covering pits, with a net or other material, will deter waterfowl and other migratory bird use. Lining pits will protect ground water quality.

E. **Power line Projects** – These projects need to ensure that they do not violate the regulations set forth in the Navajo Nation Raptor Electrocution Prevention Regulations found at http://nnhp.nndfw.org/docs_reps/repr.pdf.

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F. **Guy Wires** – Does the project design include guy wires for structural support? If so, and if bird species may occur in relatively high concentrations in the project area, then guy wires should be equipped with highly visual markers to reduce the potential mortality due to bird-guy wire collisions. Examples of visual markers include aviation balls and bird flight diverters. Birds can be expected to occur in relatively high concentrations along migration routes (e.g., rivers, ridges or other distinctive linear topographic features) or where important habitat for breeding, feeding, roosting, etc. occurs. The U.S. Fish and Wildlife Service recommends marking guy wires with at least one marker per 100 meters of wire.

G. **San Juan River** – On 21 March 1994 (Federal Register, Vol. 59, No. 54), the U.S. Fish and Wildlife Service designated portions of the San Juan River (SJR) as critical habitat for Ptychocheilus lucius (Colorado pikeminnow) and Xyrauchen texanus (Razorback sucker). Colorado pikeminnow critical habitat includes the SJR and its 100-year floodplain from the State Route 371 Bridge in T29N, R13W, sec. 17 (New Mexico Meridian) to Neskahai Canyon in the San Juan arm of Lake Powell in T41S, R11E, sec. 26 (Salt Lake Meridian) up to the full pool elevation. Razorback sucker critical habitat includes the SJR and its 100-year floodplain from the Hogback Diversion in T29N, R16W, sec. 9 (New Mexico Meridian) to the full pool elevation at the mouth of Neskahai Canyon on the San Juan arm of Lake Powell in T41S, R11E, sec. 26 (Salt Lake Meridian). All actions carried out, funded or authorized by a federal agency which may alter the constituent elements of critical habitat must undergo section 7 consultation under the Endangered Species Act of 1973, as amended. Constituent elements are those physical and biological attributes essential to a species conservation and include, but are not limited to, water, physical habitat, and biological environment as required for each particular life stage of a species.

H. **Little Colorado River** - On 21 March 1994 (Federal Register, Vol. 59, No. 54) the U.S. Fish and Wildlife Service designated Critical Habitat along portions of the Colorado and Little Colorado Rivers (LCR) for Gila cypha (humpback chub). Within or adjacent to the Navajo Nation this critical habitat includes the LCR and its 100-year floodplain from river mile 8 in T32N R6E, sec. 12 (Salt and Gila River Meridian) to its confluence with the Colorado River in T32N R5E sec. 1 (S&GRM) and the Colorado River and 100-year floodplain from Nautuloid Canyon (River Mile 34) T36N R5E sec. 35 (S&GRM) to its confluence with the LCR. All actions carried out, funded or authorized by a federal agency which may alter the constituent elements of Critical Habitat must undergo section 7 consultation under the Endangered Species Act of 1973, as amended. Constituent elements are those physical and biological attributes essential to a species conservation and include, but are not limited to, water, physical habitat, and biological environment as required for each particular life stage of a species.

I. **Wetlands** – In Arizona and New Mexico, potential impacts to wetlands should also be evaluated. The U.S. Fish & Wildlife Service's National Wetlands Inventory (NWI) maps should be examined to determine whether areas classified as wetlands are located close enough to the project site(s) to be impacted. In cases where the maps are inconclusive (e.g., due to their small scale), field surveys must be completed. For field surveys, wetlands identification and delineation methodology contained in the "Corps of Engineers Wetlands Delineation Manual" (Technical Report Y-87-1) should be used. When wetlands are present, potential impacts must be addressed in an environmental assessment and the Army Corps of Engineers, Phoenix office, must be contacted. NWI maps are available for examination at the Navajo Natural Heritage Program (NNHP) office, or may be purchased through the U.S. Geological Survey (order forms are available through the NNHP). The NNHP has complete coverage of the Navajo Nation, excluding Utah, at 1:100,000 scale; and coverage at 1:24,000 scale in the southwestern portion of the Navajo Nation. In Utah, the U.S. Fish & Wildlife Service's National Wetlands Inventory maps are not yet available for the Utah portion of the Navajo Nation, therefore, field surveys should be completed to determine whether wetlands are located close enough to the project site(s) to be impacted. For field surveys, wetlands identification and delineation methodology contained in the "Corps of Engineers Wetlands Delineation Manual" (Technical Report Y-87-1) should be used. When wetlands are present, potential impacts must be addressed in an environmental assessment and the Army Corps of Engineers, Phoenix office, must be contacted. For more information contact the Navajo Environmental Protection Agency's Water Quality Program.

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J. **Life Length of Data Request** – The information in this report was identified by the NNHP and NNDFW's biologists and computerized database, and is based on data available at the time of this response. If project planning takes more than two (02) years from the date of this response, verification of the information provided herein is necessary. It should not be regarded as the final statement on the occurrence of any species, nor should it substitute for on-site surveys. Also, because the NNDFW information is continually updated, any given information response is only wholly appropriate for its respective request.

K. **Ground Water Pumping** - Projects involving the ground water pumping for mining operations, agricultural projects or commercial wells (including municipal wells) will have to provide an analysis on the effects to surface water and address potential impacts on all aquatic and/or wetlands species listed below. NESL Species potentially impacted by ground water pumping: Carex specuicola (Navajo Sedge), Cirsium rydbergii (Rydberg's Thistle), Primula specuicola (Cave Primrose), Platanthera zothecina (Alcove Bog Orchid), Puccinellia parishii (Parish Alkali Grass), Zigadenus vaginatus (Alcove Death Camas), Perityle specuicola (Alcove Rock Daisy), Symphyotrichum welshii (Welsh's American-aster), Coccyzus americanus (Yellow-billed Cuckoo), Empidonax traillii extimus (Southwestern Willow Flycatcher), Rana pipiens (Northern Leopard Frog), Gila cypha (Humpback Chub), Gila robusta (Roundtail Chub), Ptychocheilus lucius (Colorado Pikeminnow), Xyrauchen texanus (Razorback Sucker), Cinclus mexicanus (American Dipper), Speyeria nokomis (Western Seep Fritillary), Aechmophorus clarkia (Clark's Grebe), Ceryle alcyon (Belted Kingfisher), Dendroica petechia (Yellow Warbler), Porzana carolina (Sora), Catostomus discobolus (Bluehead Sucker), Cottus bairdi (Mottled Sculpin), Oxyloma kanabense (Kanab Ambersnail)

14ch2m101

6. Personnel Contacts

Wildlife Manager
Sam Diswood
928.871.7062
sdiswood@nndfw.org

Zoologist
Chad Smith
928.871.7070
csmith@nndfw.org

Botanist
Andrea Hazelton
928.523.3221
ahazelton@nndfw.org

Environmental Reviewer
Pamela Kyselka
928.871.7065
pkyselka@nndfw.org

GIS Supervisor
Dexter D Prall
928.871.6489
prall@nndfw.org

Wildlife Tech
Sonja Detsoi
928.871.6472
sdetsoi@nndfw.org

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7. Resources

National Environmental Policy Act

Navajo Endangered Species List:
http://nnhp.nndfw.org/endangered.htm

Species Accounts:
http://nnhp.nndfw.org/sp_account.htm

Biological Investigation Permit Application
http://nnhp.nndfw.org/study_permit.htm

Navajo Nation Sensitive Species List
http://nnhp.nndfw.org/study_permit.htm

Various Species Management and/or Document and Reports
http://nnhp.nndfw.org/docs_reps.htm

Consultant List
(Coming Soon)

If you have any questions I may be reached at (928) 871-6472.

Sonja Detsoi, Wildlife Tech.
Natural Heritage Program
Department of Fish and Wildlife

xc: file/chrono

INVOICE

Navajo Nation
Department of Fish & Wildlife
Natural Heritage Program
P.O. Box 1480
Window Rock, AZ 86515
Phone # 928-871-6472
Fax # 928-871-7603
Web Site www.navajofishandwildlife.org

BILL TO

Liz Dodge, Program Manager
CH2M Hill
155 Grand Ave. Suite 100
Oakland, CA 94612

INVOICE #	DATE
14ch2m101	6/26/2014

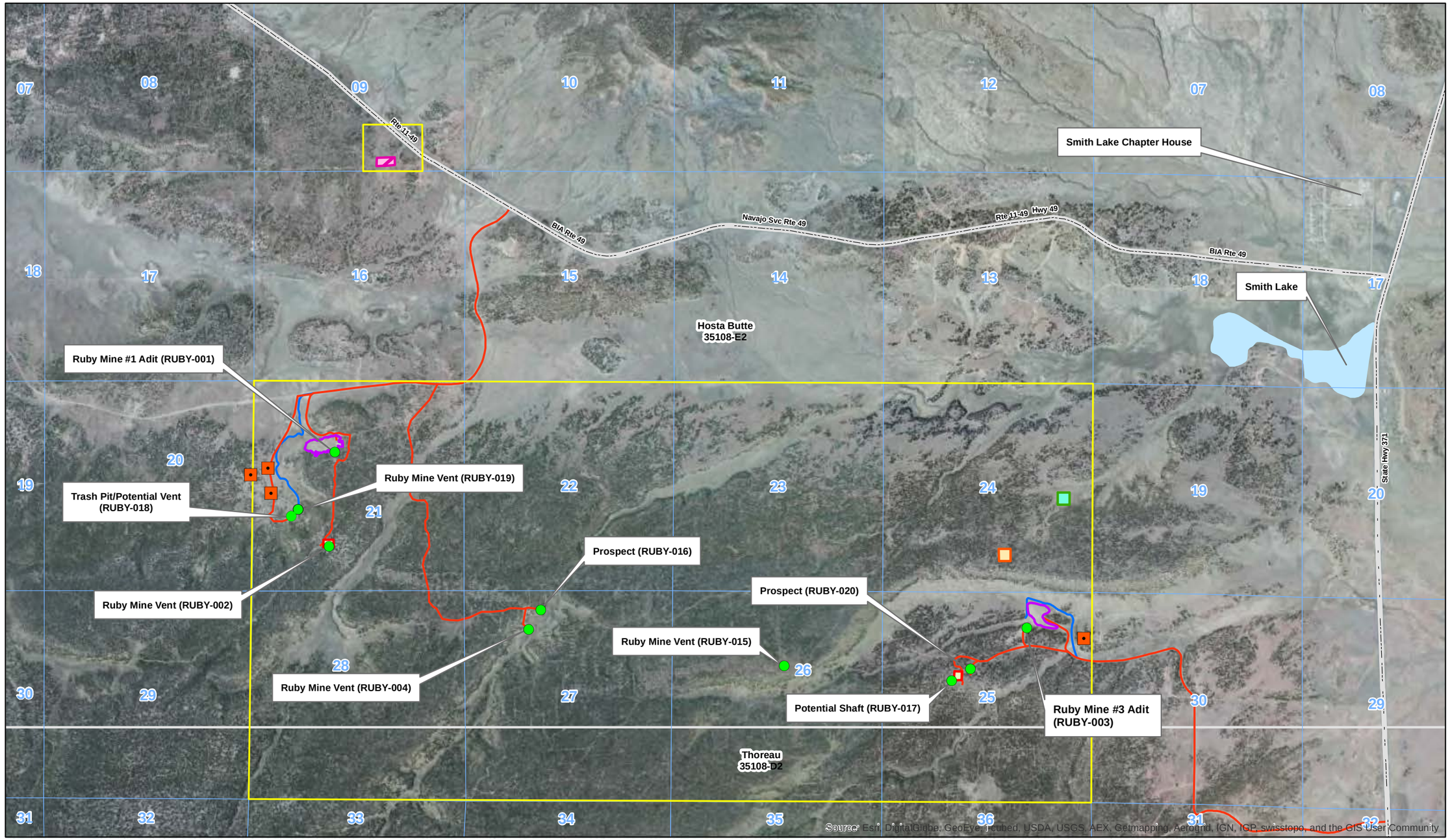
ITEM	DESCRIPTION	QTY	RATE	AMOUNT
01	Base Fee - Navajo Endangered Species List (NESL) Information for Ruby Mines Phase 1 Work Plan Adit and Vent Closure. Please make money order or cashier's/company check payable to NAVAJO NATION. Thank you.	1	65.00	65.00
			TOTAL	$65.00

NAVAJO NATION
Department of Fish & Wildlife
Navajo Natural Heritage Program
P.O. Box 1480
Window Rock, AZ 86515

ALBUQUERQUE NM 870
27 JUN 2014 PM 3 L

Liz Dodge, Program Manager
CH2H Hill
155 Grand Ave. Suite 100
Oakland, CA 94612

9461237212 5



Residences
Associated Mine Features
Major Roads
Drainage Channel
Haul Road
ProjectArea
Mancos Shale Background
Dakota Sandstone Background
Colluvial Backround
Section Boundary
Exploratory Borings Screening Areas
Capped Waste Rock Pile
US Geologic Survey Quadrangle

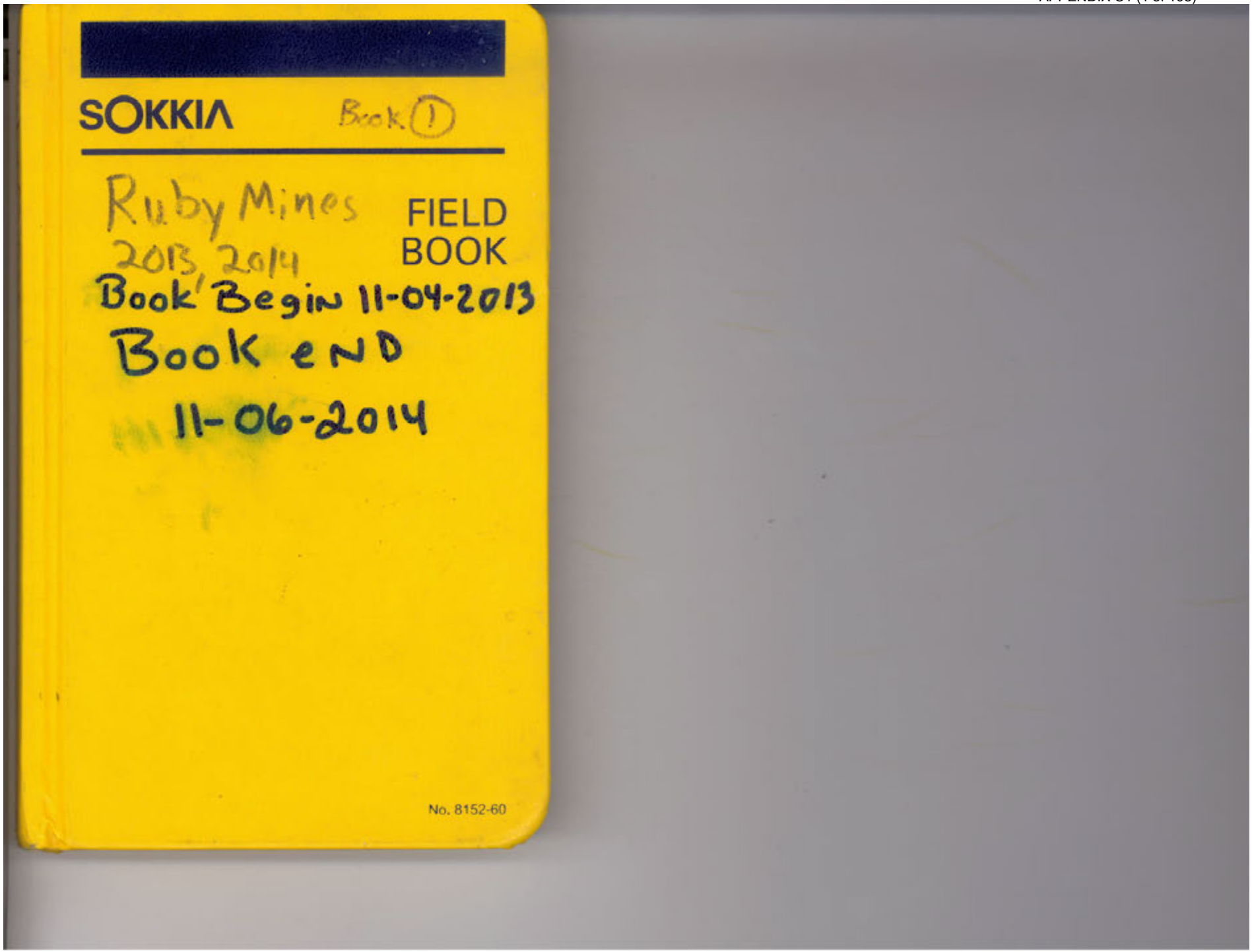
N
0 0.5 1 Miles

Attachment 3. Aerial Map
Ruby Mines Phase 2 Project Area

CH2MHILL

Appendix C
Field Documentation

Appendix C1
Field Notes


SOKKIA
Book (1)
Ruby Mines
2013, 2014
FIELD
BOOK
Book Begin 11-04-2013
Book end
11-06-2014
No. 8152-60

Ruby Mine - Freeport McMoRan 11/4/13
Phase 2 Prep

Cultural Survey - Background Areas

06:50 Mobe to Gallup from Albuquerque
0920 @ Gallup & review paperwork
0930 Meet Stanley Edison/NN EPA & Drive to Smith Lake Chapter House
1015 on site, check in at chapter house & Meet Dinétahdoo team Matthew Martin & Jeff Begay
Do Safety tailgate & Sign HSP
10:30 Mobe to North of Ruby #3 mine & begin Cultural Resource ~~Study~~ Survey @ Dakota Background site.
Flag area by Trimble GPS.
11:20 Move to Flag next area by GPS while Dinetahdoo continues Survey @ Dakota (Ben flags Colluvium)
12:30 Finish Survey @ Dakota:
* no sites found, few incidentals were flagged
* no changes made to Boundaries

Dinétahdoó
Matthew Martin
Jeff Begay
CH2M Hill
Ben Moayyad
NNEPA
Stanley Edison

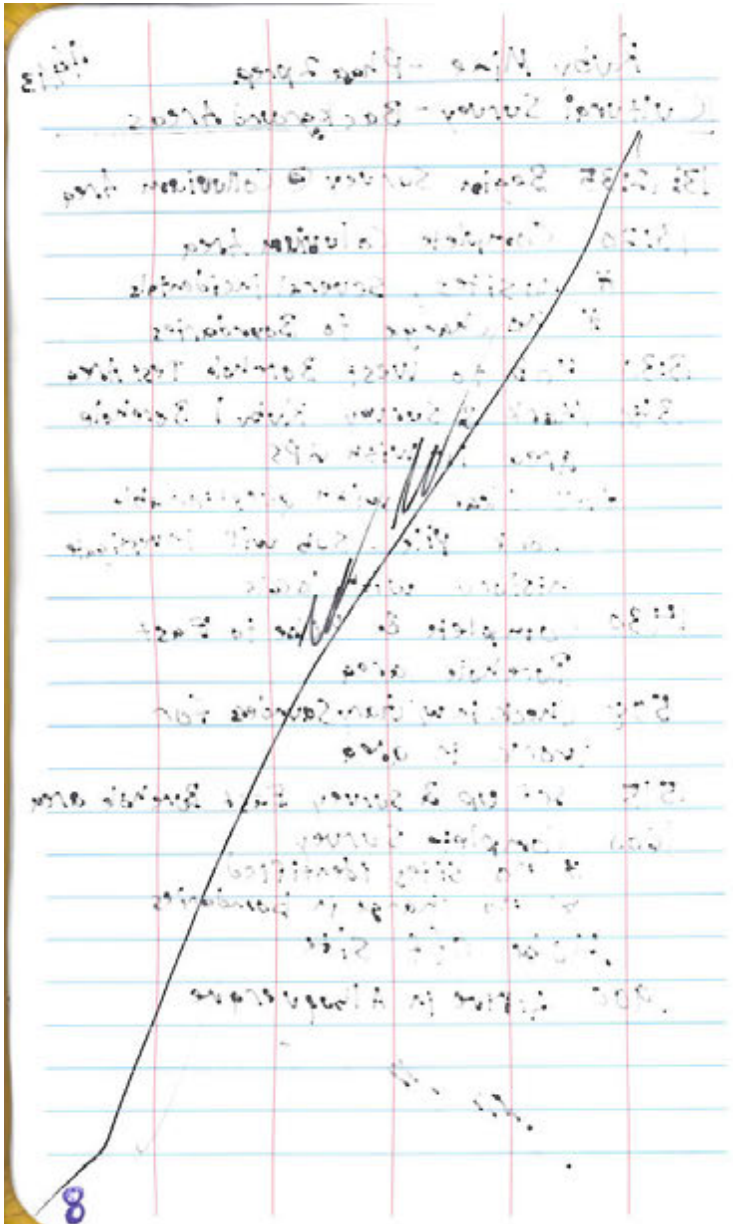
6

Ruby Mine - Phase 2 prep. 11/4/13

Cultural Survey - Background Areas

12:35 Begin Survey @ Colluvium Area
13:20 Complete Colluvium Area
* no sites, several incidentals
* no change to Boundaries
13:30 Mob to west Borehole Test Area
1340 Mark & Survey Ruby 1 Borehole area ~~in~~ with GPS
* All Clear with questionable rock pile. Sub will investigate history with locals
1430 Complete & Mobe to East Borehole area
1508 Check in w/ Gary Saunders for work in area
1515 Set up & survey East Borehole area
1600 Complete Survey
* no sites identified
* no change in boundaries
Mobe off site
1900 Arrive in Albuquerque

7



Gallup/Thoreau NM 12/23/13

Ruby Mines Freeport McMoRan

Phase I

Fencing / Fill Sediments / Fence inspection

0515 Depart Albuquerque NM & Mobe to site

Conditions Dark, 9-20°F lt wind

0730 Arrive in Gallup, exit 26 PTSP - driving, Get hot drink & make 1st call to suppliers of Fill

0750 Meet Ed Warren @ Bonaguidi Construction & Recieve 4 samples from each of their pits:

1. Gallup Northside Pit
2. Gallup East ~~X~~ Pit
3. T&R Pit
4. Shumacher Pit (Thoreau)

One full gallon bag each should be barely enough sample no time to log and photo - ~~foot~~ drop in cooler

0805 Call from Mike McConnel about meeting @ Denny's @ I40 Exit 26 to go to McConnel Pit

CH2MHill

Ben Moayyad

8

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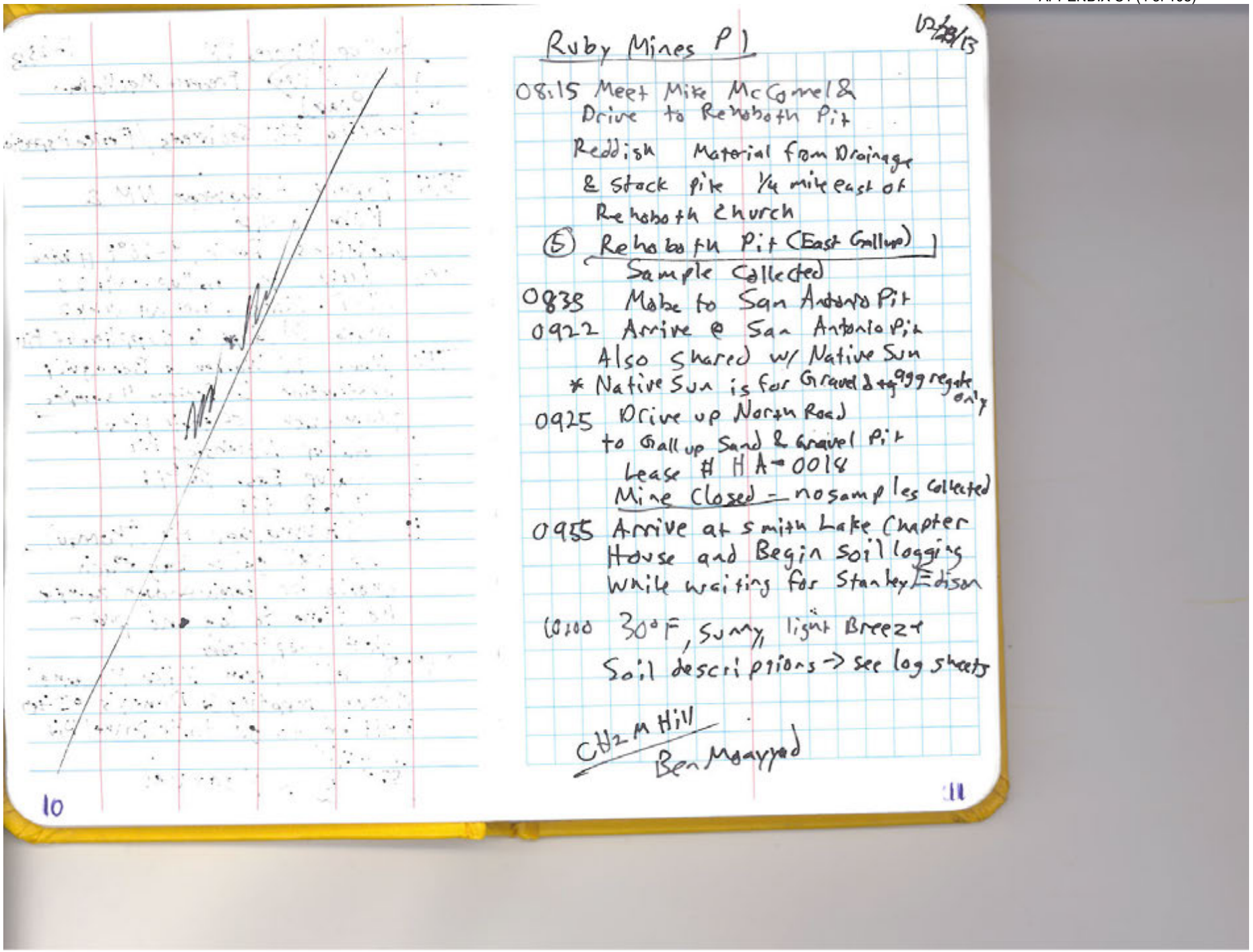


Ruby Mines P1 — 12/28/15

08:15 Meet Mike McConnel & Drive to Rehoboth Pit

Reddish Material from Drainage & stock pile ¼ mile east of Rehoboth Church

(5) Rehoboth Pit (East Gallup) — Sample Collected

0838 Make to San Antonio Pit

0922 Arrive @ San Antonio Pit
Also shared w/ Native Sun
* Native Sun is for Gravel & Aggregate only

0925 Drive up North Road to Gallup Sand & Gravel Pit
Lease # HA-0018
Mine Closed - no samples collected

0955 Arrive at Smith Lake Chapter House and Begin Soil logging while waiting for Stanley Edison

10:00 30°F, Sunny, light Breeze

Soil descriptions -> see log sheets

CH2M Hill
Ben Moayyad

10

11

12/23/13

Ruby Mine Phase I
Freeport McMoRan [Fence Inspection]

1035 Meet Stanley Edison,
Check in @ Chapter house
Local Resident reports possible additional vent/hole/depression due East of Residents @ Ruby 001
Stanley will investigate

1100 Borrow post driver from Chapter House

1135 Ruby ~~~~ 018 Fence inspection
photos# 1-4, Good Condition
Same dumping North of Fence

1140 Ruby 019 ~~Fence~~ inspection
photos# 5-6, no fence, Pad ok
Meets stake

1155 Ruby 002 Vent Fence inspection
Frozen water at bottom of hole
Small drainage Evident
Photos 7-10

1200 Hike back to Ruby 001 ~~~~ adit

CH2M Hill / Ben Moayyad [signature]
NNEPA / Stanley Edison
NN / Edmon Henry

Rubp Mine Phase1 12/23/13
Freeport Mc MoRan Fence Inspection

1200 Continued ...
Access Agreements:
- Mr Henry takes forms for Ester & daughters
- No residents at home in Mine 1 Area
- Mr Henry to visit for consent

12:30 Ruby 001 Adit Fence Inspection Good Condition, snow, Photos 11-16
1300 Meet Ester & 1 Daughter at Chapter House. Mr Henry & Stanley discuss Mine work & She (Ester) takes forms
Lunch at Chapter House
1400 Move to Ruby 003
Ruby 003 Fence Inspection good no additional subsidence noted Photos 17-21
1420 Ruby 017 Fence Inspection good Photos 22-24
1430 Move Back to Ruby 020 & Fence
1550 Complete Fencing & Signage

CH2MHill B. Morgan
NN EPA S. Edson

14
15

Ruby Mine Phase I 12/23/13

Fence Inspection

1600 Attempt to inspect Ruby 004, 016 and 015
→ Road conditions very poor & loosing light.

1615 Decide not to proceed with final inspections due to unsafe conditions.
Call in to PM for approval

1625 Begin drive to Albuquerque Off site & complete

16
14

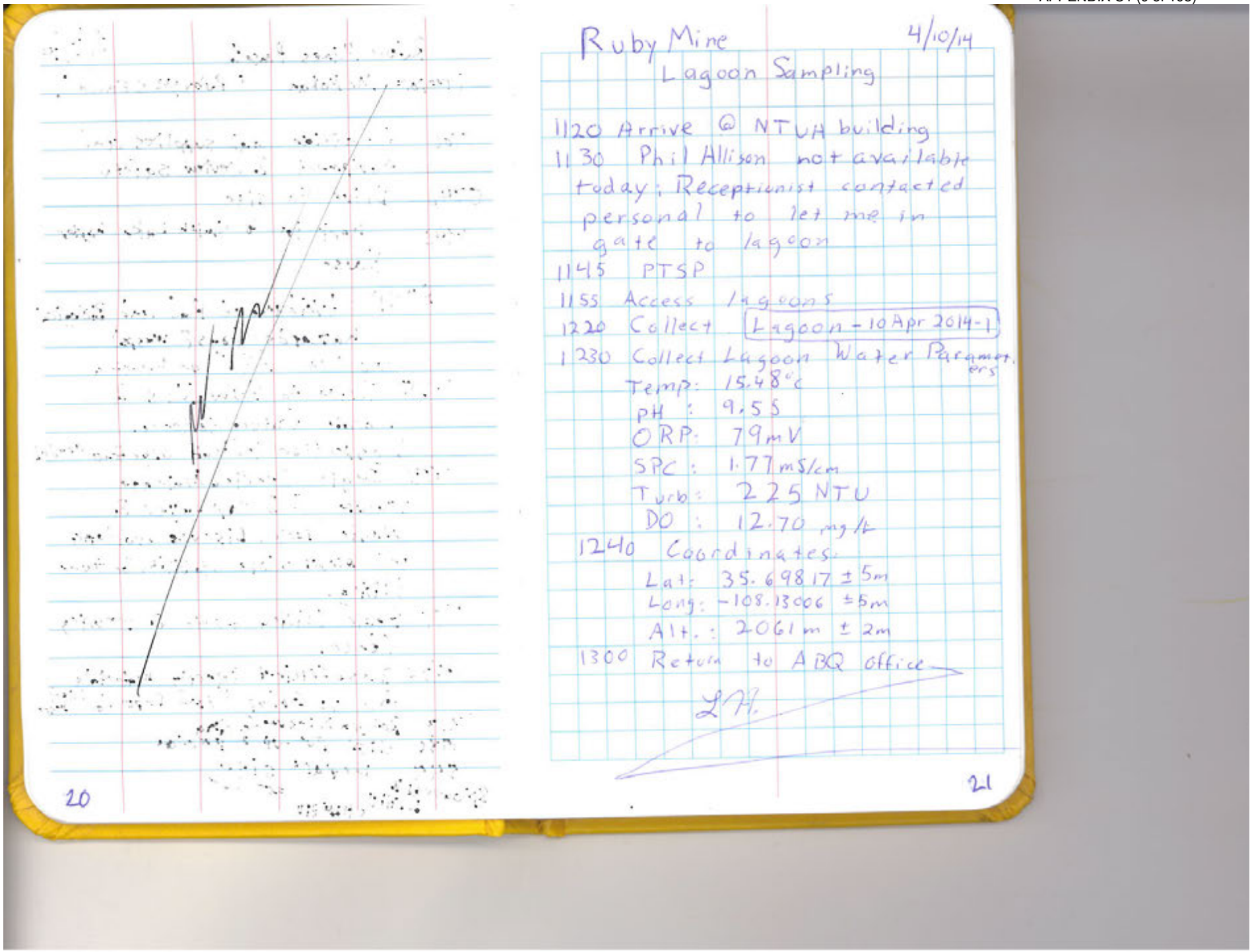
17

Ruby Mines Phase 1 3/7/14

Freeport McMoRan [Ruby No 3 Fence]

0700 At office, load supplies and equipment & review safety
0740 Drive to site
0940 Check in @ Smith Lake Chapter House
PTSP - Avoidance of Rad and Biological hazards (dogs & wasps)
Go Over AHA on Fencing
10:25 Drive to Ruby No 3 & Locate feature to fence.
Inspection indicate large fence needed
10:35 Begin Fencing drainage feature, ID cap layer & Waste rock. Discuss avoidance and proper slope stability for truck driving.
1100 Begin driving posts & securing fence.
12:30 Insufficient Fencing materials. Go to Gallup Home Depot for more
13:30 Return & resume fencing
1530 Sign put-up & photos
1545 Depart site

B Moayyad & L. Hill
CH/JA Hill



Ruby Mine 4/10/14

Lagoon Sampling

1120 Arrive @ NTUH building

1130 Phil Allison not available today; Receptionist contacted personal to let me in gate to lagoon

1145 PTSP

1155 Access lagoons

1220 Collect Lagoon - 10 Apr 2014-1

1230 Collect Lagoon Water Paramet. ers

Temp: 15.48°C

pH : 9.55

ORP: 79 mV

SPC : 1.77 mS/cm

Turb: 225 NTU

DO : 12.70 mg/L

1240 Coordinates:

Lat: 35.69817 ± 5m

Long: -108.13006 ± 5m

Alt.: 2061 m ± 2m

1300 Return to ABQ office

LH

20

21

22

Rumy Mines Photo log

4/26/14	#1	Erosion Fence @ RM3
	#2	"
	#3	Snow Fence @ RM3
	#4	"
	#5	"
	#6	Cultural Site Map
	#7	"

23

Ruby Mines 4/28/14

Freeport Mc MoRan | Fencing & Prep

0715 At ABQ ~40°F, cloudy
Bear Moayyad & Luke Hill load trucks and mobilize to site

1000 At Smith Lake Chapter House
→ Chapter House is closed, wait for Cultural Resources Sub Dinetahdoo
→ Perform PTSP daily – subject is weather
Mark coods. in Garmin C10187 GPS

10:25 Call Rena Martin @ Dinetahdoo
no staff mobilized in error.
2 archeologists mobilized to site
Drive to Ruby No 3 & mark GPS

1040-to 12:30 Install orange snow fence and survey ~~tree~~ fence-out with Dinetahdoo on site
Dinetahdoo staff approve set-up
↳ Mathew Martin & Jeremy Begay

1240 photograph fence & Cultural Resource file map → see photo log.

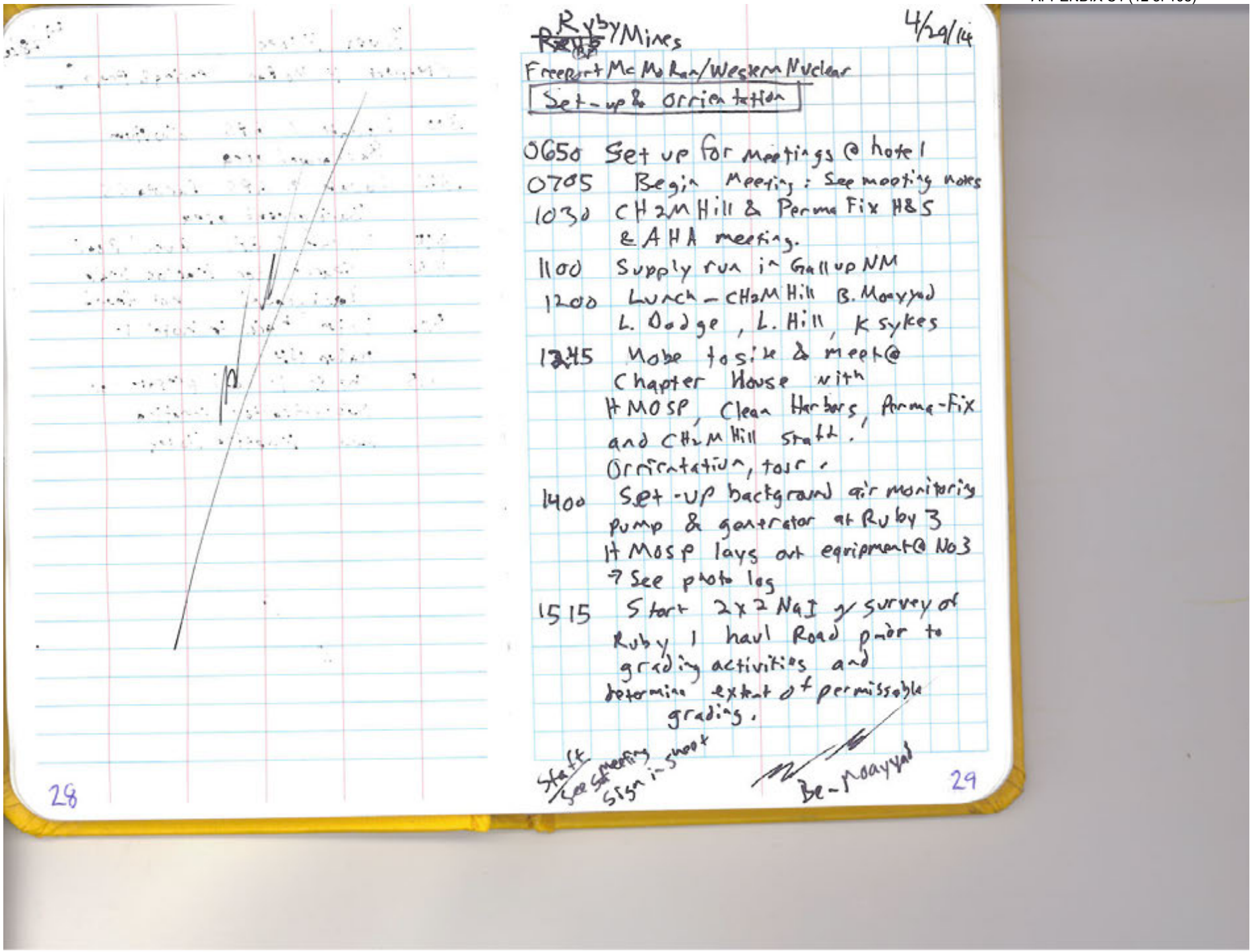
1250 Dinetahdoo on site 2 hours & depart

CH2MHill
B. Moayyad
L. Hill

Dinetahdoo
M. Martin
J. Begay

24

25



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Ruby Mines 4/29/14

Freeport McMoRan/Western Nuclear

Set-up & Orientation

0650 Set up for meetings @ hotel

0705 Begin Meeting: See meeting notes

1030 CH2M Hill & Perma Fix H&S & AHA meeting.

1100 Supply run in Gallup NM

1200 Lunch - CH2M Hill B. Moayyad L. Dodge, L. Hill, K Sykes

1245 Mobe to site & meet @ Chapter House with HMOSP, Clean Harbors, Perma-Fix and CH2M Hill staff. Orientation, tour.

1400 Set-up background air monitoring pump & generator at Ruby 3 HMOSP lays out equipment @ No3 → See photo log

1515 Start 2x2 NaI γ survey of Ruby 1 haul Road prior to grading activities and determine extent of permissable grading.

Staff / See sheet for sign in sheet

B. Moayyad

29

Ruby Mines 4/29/14

Freeport McMoRan/Western Nuclear

Background Air & prelim γ survey

1520 L Hill & B Moayyad do meter checks
Ludlum #3 Exposure meters
Ground @ ~~Sta~~ Chapter house = ~~0.1-0.3~~
0.01 to 0.03 mR/hr = hands = Boots

1535 Elevated NaI cpm readings along Ruby I haul road. Determine that grading area be minimized
→ See photo log.

1615 Kyra Sykes, Jen Loggen, & Stuart Brown/Freeport on site to determine grading options

1630 Perma-Fix clears H Mosp excavator 450 E Empire Backhoe/skip loader for mine closure work

1700 Delimit & communicate area of Haul Road to Ruby I for grading to opperator

1730 Move to Ruby 3 to pick up Air Sample & equipment

1800 Drop crew 2 & Equipment & head back to hotel Offsite

4/30/14

Ruby Mines
Freeport McMoRan / Western Nuclear
Crew 2 - Gamma Survey

0605 Depart hotel in Gallup NM
0700 Clean Harbors at Ruby 1 area
~~Lake~~ at Ruby No 018 to empty
and haul trash from mine feature
Meet at Smith Lake Chapter House
for ~~safety~~ brief w/ HMOSP,
~~clean Harbors~~ Perma-Fix, regulators
client and CH2M Hill
0715 PTSP - Wind, hydration & ~~comm~~
Communication
Perform Equipment daily check:
Ludlum Model 3 Pin # 04992
Background @ chapter House parking lot (gravel)
0.02 mR/hr = hands

0750 Crew 1 goes to Mancos Shale
Background area & Crew 2 goes
to Ruby 3 Exploratory borehole
area

CH2M Hill
for B Moayyad

Perma-Fix
M. Schrifer

32

33

Ruby Mines 4/30/14

Freeport McMoRan/Western Nuclear

Exploratory Boreholes at Ruby 3

0755 Download coordinates for Exploratory Borehole areas

0800 Need to verify calibration log for rental Ludlum meter for Luke Hill-Crew 1, only box SN on cal log - need to document pair.

0825 Move to Ruby 3 area and prep for transect survey

0925 locate corners of Ruby 3 Exploratory Boreholes by Garmin GPS and initiate survey

0940 J. Laggan/CH2M PM & M. Ripeda/EPA R9 arrive. They review borehole maps provided by S. Brown/Freeport and adjust area to cover ore body

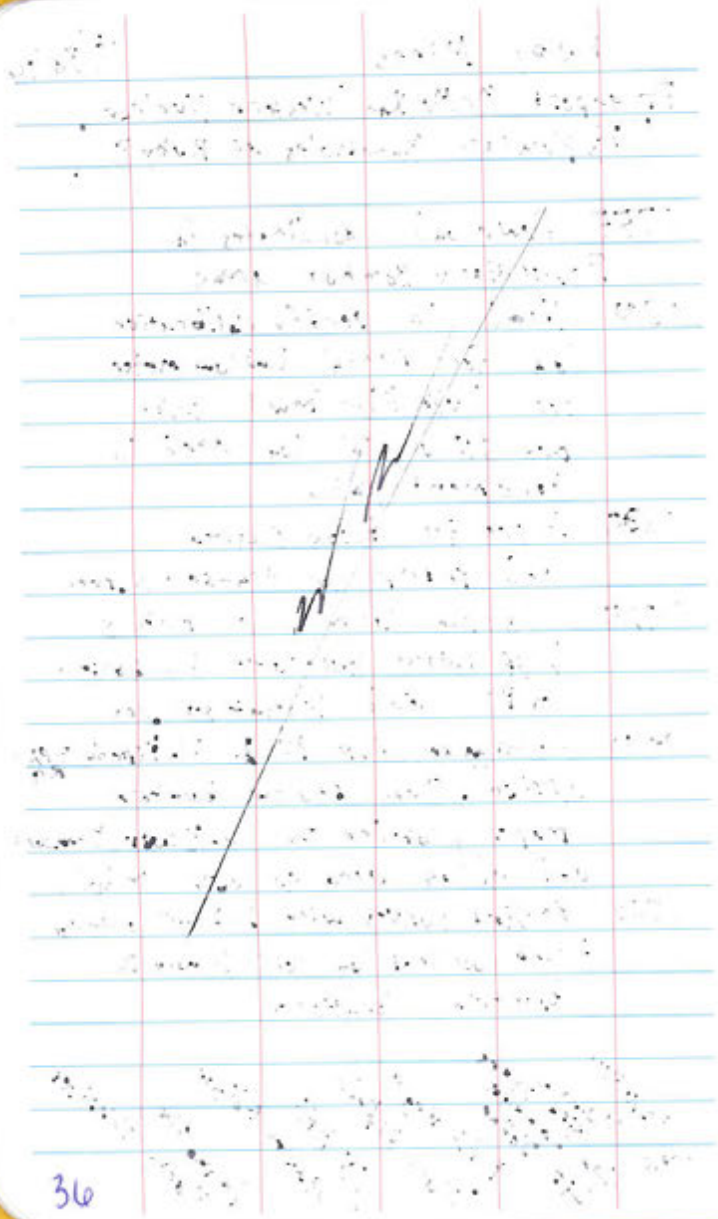
1000 Restart survey with 2x2 NaI detector → see coordinate log for corners & borehole locations

CH2M Hill / Ben Moayyad / Kira Sykes / Jen Laggan / Liz Dodge

EPA Reg 9 / Mark Ripeda

NN EPA / Stanley Edison

Perma Fix / Marty Schriver



Ruby Mines 4/30/04

Freeport Mc MoRan Western Nuclear

Ruby 3 Exploratory Boreholes

1005 QC Check SE corner = initial (See GPS log)
1 minute static = 10,000 cpm
GPS boreholes by tag # (See GPS log)

10:30 Liz Dodge wonders away, begin search at 1040 or 10:45

10:50 Liz Dodge found have a safety review for working in remote locations → order satelite phones
come up with search procedure:
① Begin search asap after worker is misplaced
② Person last stays in ~~the~~ place try phone, yell, wear traffic vest
③ Search party scans area in line of sight transects call in/out

~~1150~~ 1158 BF QC check 1 min read at ~~24,374~~ 9,992
for mid-point
Hot Spot @ 24,374
See GPS log for locations

1300 Check in with HSM J. Hillgaerdner for changes on HSP get verbal OK & change in HSP

Bmontyard

36

37

Ruby Mines 4/30/14

Freeport McMoRan / Western Nuclear

Exploratory Borehole Survey @ Ruby 1 & 3

~~1330~~ 1300 Continue gamma Survey at Ruby 3 Borehole area as adjusted. See photo log & GPS Log

1330 Complete ~~1~~ Survey @ Ruby 3 Boreholes & prep for Ruby 1 Boreholes area

1340 Screen out of ~~the~~ Ruby 3 Borehole area @ 0.03 mR/hr on hands and boots

Move to Ruby 1 Exploratory Borehole area

1440 At Ruby 1 Exploratory Borehole area to West of Ruby 002

Search for Borehole markers

Adjust Area to upland are ~200 ft West of original area (See GPS log) based on density of borings locations

1525 Initial Ruby 1 Borehole Survey

QC Check 1min static = 6,203 w/ 2X2 NaI detector

1600 Mobe out for Day w/ 10% complete

16:30 Off Site

CH2M Hill / B Mocykyad, J. Lassgan, L Dowse, K Sykes

EPA Reg 9 / M. Ripka

NN EPA / S. Edison

Freeport / S. Brown

Perma-Fix / M Schriver

Ruby Mines 5/1/14

Freeport McMoRan / Western Nuclear

Crew 2 Exploratory Boreholes & Ruby 1 area

0615 Mobilize to site from hotel in Gallup, NM
~40°F, sunny, no wind

0700 All crews meet @ chapter house
(Clean Harbors offsite now)
PTSP - Safety topics for May 1
"Stand-up for Safety" = Biologicals, lifting, driving
One person identified w/ Bee allergies
All HOSP is aware and knows where his epi-pin is located.

0730 Source checks and Background Checks for CH2M Hill meters
Source check 5,000 mR/hr = good
Source check for L. Hill rented meter fails (Pegs meter at max)
⇒ order new meter & plan to return old one

0800 Mobe to Exploratory Borehole Area

0845 On site and resume Survey at marked locations from previous day
Prep GPS units; Starting Frisk ok @ 0.04 mR/hr

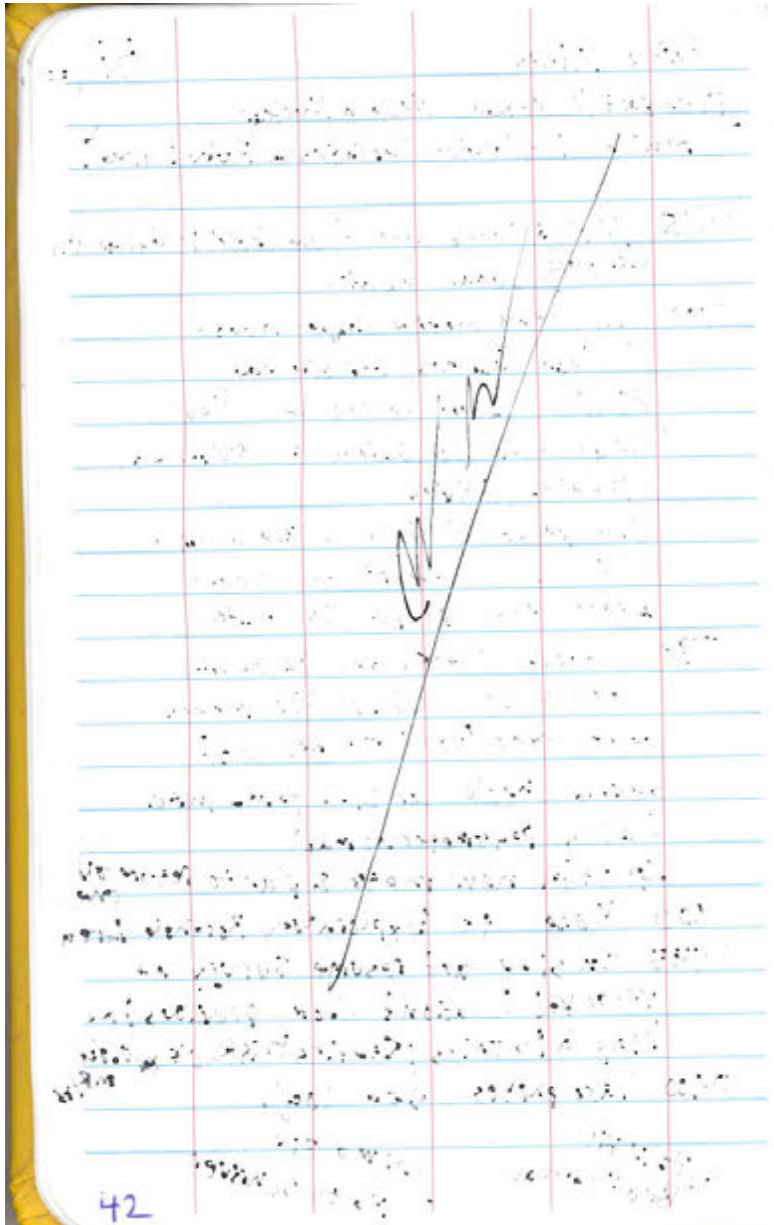
0900 Take photos (see log)

CH2M Hill
Ben Moayyad

Perma Fix
Marty Schriver

40

41



42

Ruby Mines 5/1/14

Freeport McMoRan / Western Nuclear

Crew 2 Exploratory Boreholes at Ruby 1 Area

0900 continued - Photos & GPS of borehole locations. See GPS log & photo log.

0930 Difficulty lining up survey pathways due to diagonal area devised 4/30 to cover boreholes and because of dense tree/shrub cover

0940 QC Check mid point @ 8,159 cpm (See GPS Log)

1030 Call to meet @ Ruby 3 drainage Progress slows due to obstructions ne hot spots, Reads 5,000 – 8,000 cpm

1100 continue with photos & GPS while Permafix does survey

1202 Check in @ Ruby No 001 closure Foam Pour Begins/ Exposure reads 10-15 uR/hr (See map)

1205 Drive to Ruby 3 Adit, Check in and collect photos (see Photo log) See exposure reads table

CH2MHill B Moayyad

PermaFix M. Schriver

43

44

Ruby Mines 5/1/14

Freeport McMoRan / Western Nuclear

Crew 2 - Exploratory Boreholes at Ruby 1

1235 Meet for discussion on coverage for Ruby 3. Walk drainages with CH2MHill Team, EPA & PermaFix

~~1300~~ 1330 Resolve plan for area coverage and proceed with gamma scan

1330 ~~H~~ MOS Crew Finishes Foam at Ruby No ~~3~~ 3

Take photos (see photo log)

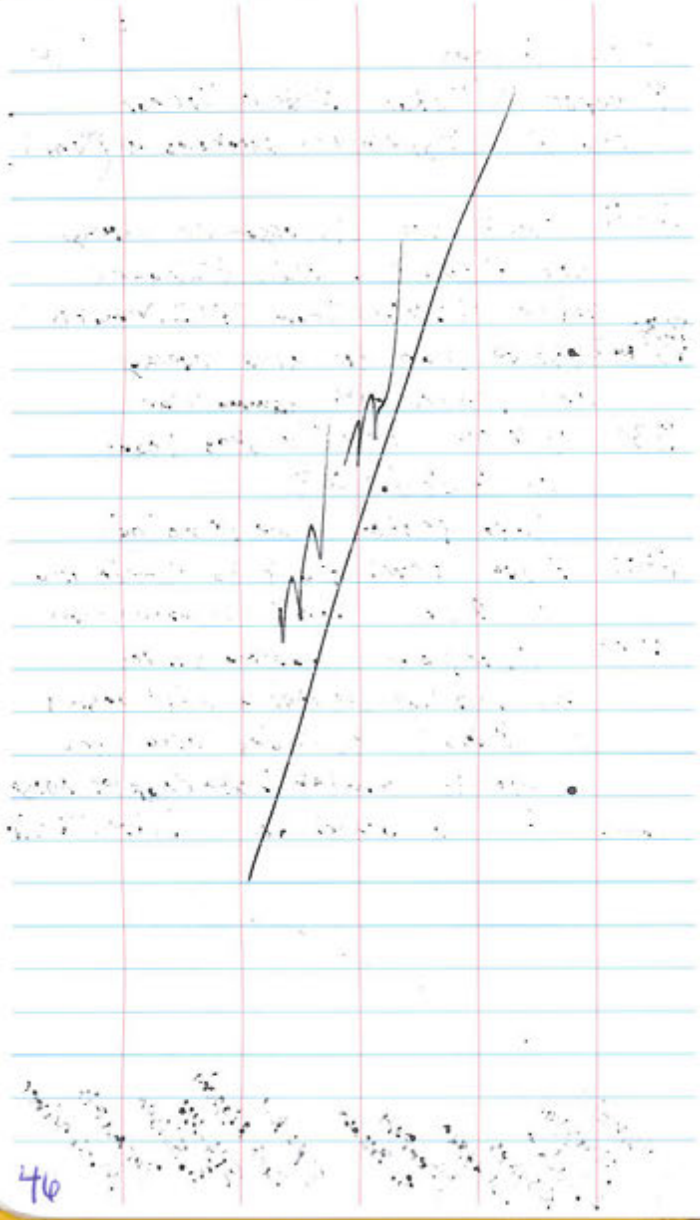
1400 Move Crew 2 back to Borehole area at Ruby 1 ~~at~~ to resume survey

1530 Complete gamma survey by 2x2 NaI detector @ 6 ft transects at Ruby 1 Boreholes area and drive to Smith Lake chapter house

1600 All accounted for - Drive off site

CH2MHill B. Moayyad L. Dodge K. Sikes J. Lagser Freeport S. Bodan EPA R9 Mark Ripperda EPA-NN S. Edison PermaFix M. Schriver

45



Ruby Mines 5/2/14

Freeport McMoRan/Western Nuclear

Ruby 1 area gamma scan

0615 Mobilize to site. Sunny ~40°F

0700 On Site, Safety meeting about driving - speeds & buses

0750 · Ludlum Model 3 ~~did~~ daily checks
Pine 04992 SN 177941
Source Check good @ 5,000 cpm
Ground = hands = feet = 0.03 mR/hr

0805 Mobilize to Ruby 1 area for survey on drainage and haul roads

0820 Initial QC Check
1 minute static at haul road
is ~~37,378~~ 37392 cpm (See GPS log)
See also photo log

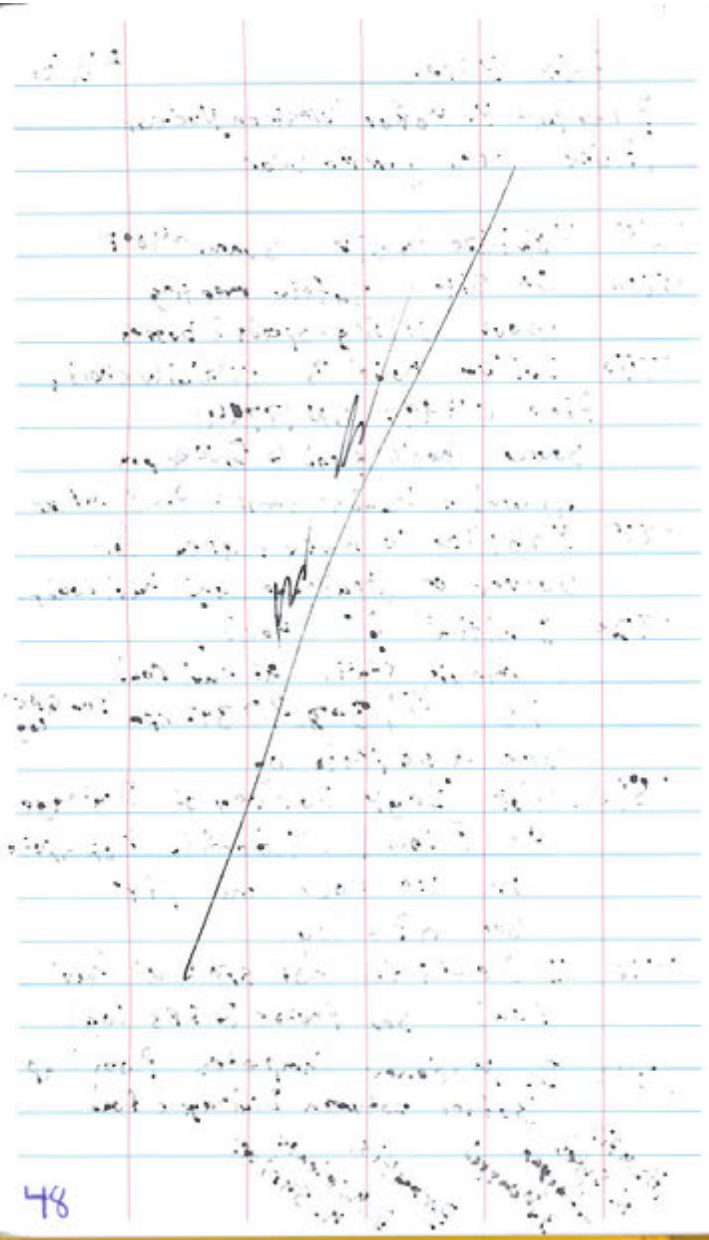
0830 · ~~Hot~~ Begin Survey of Drainage at Ruby 1. Identify hot spots on ore rock and pipe
(See GPS log)

0920 Identify hot spot at haul road (See Photos & GPS log)

10:40 D. Mcelaney Completes Ruby 1 Cap Buffer between Drainage & Road

Hazmat Bill
K. Sykes
J. Lagman
B. Mowrey

Permafix
D Mcelaney
M. Shriver



Ruby Mines 5/2/14

Freeport McMoRan/Western Nuclear

Ruby 1 Area Gamma Scan

10:40 continued:.

D Mceleney moves to Cap perimeter between top of Cap & drainage = Ruby 1 Cap A

M Schriver identifies ~~high~~ elevated γ reads in areas of waste rock piles and erosional features North of haul road, near Cap.

11:10 M. Schriver Completes Ruby 1 Buffer B. D Mceleney moves to scan residents in Ruby 1 area

11:20 M. Schriver rest room break then lunch

1150 M. Schriver/B Moayyad back on site and resume survey of Ruby 1 Cap @ 6 ft transects with Ludlum 2221 with NaI 2x3 probe

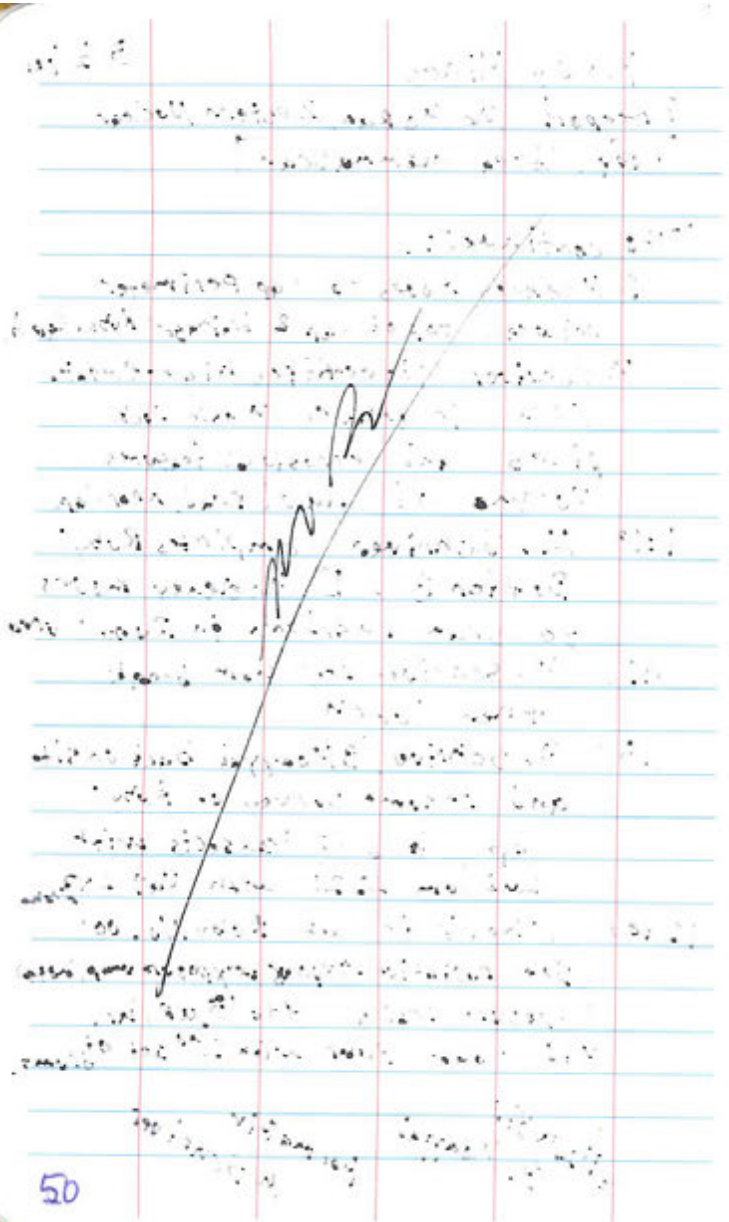
12:00 Check in at Ruby No. 001 (See radiation ~~exposure~~ exposure map/notes) Exposure reads 9 to 15 μR/hr. Mid. foam pour with 2nd set of drums.

C Hill/B. Moayyad

PermaFix/M Schriver

48

49



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Ruby Mines 5/2/14

Freeport Mc Mo Ran

Ruby 1 Area Gamma Scan

Sunny ~70°F, light breeze.

12:30 Collect GPS & Flag Ruby 1 Cap A
Entry frisk of hands & Boots @
0.04 mR/hr.

1300 D Mceleney Completes Ruby 1 residents
and last of closed features by
Ruby No. 009

1400 J Laggan & K Sykes depart site.
D Mceleney takes water/snack break

1420 Prep for Ruby 1 Cap Buffer C
Flag out 100 ft buffer between
drainage & road on North side of Cap
and begin M. Scniver on N Survey
@ 6 ft transects

1440 Try to bound Ruby 1 Buffer B to
13,000 cpm investigation limit
or end at stego @ SS ridge face
(See photos)

1500 HMOSP Mobe off Ruby No 001

1520 Perma Fix Mobe off. Check in at Ruby 3

1620 Meet @ Chapter house -
1639 all staff [illegible] & depart

51

Ruby Mines 5/3/14

Freeport McMoRan / Western Nuclear

Ruby 01 CAP area Gamma Survey

0700 On Site. Clear, sunny ~40°F
Safety Meeting - Complacency, rushing

0720 Daily checks on Ludlum Model 3

B Moayyad Pin 04992	L Hill Pin 04130
source check good @ 5,000 cpm	OK @ 4,000 cpm
Ground check at 0.02 mR/hr	Ground = 0.03 mR/hr
hands/feet ↓	hands/feet ↓

0745 Move to Ruby ~~CAP~~ 1 area and resume 2x2 NaI γ walk over survey
→ cover all flat areas ~~and to~~ roughly 500 ft buffer, but not delimited to background
→ Bound area by SS bluff to N and add boundary line at greater distance (not 6 ft transects)

0930 QC Check at buffer with 1 minute static @ 13,239 (see GPS log)

Check in with other crews:
Ruby No 003 → Foam to 8 ft bgs
Ruby No 018 → Foam to 2 ft bgs

CH2M Hill Ben Moayyad
Per-Ma-Fix M. Schriver

Ruby Mines 5/3/14

Freeport McMoRan / Western Nuclear

[Ruby 1 area Gamma Survey]

10:00 Borrow clean fill for 018 from east of Ruby 01 (Behind concrete pad) field screen @ 15-16 kcpm to ~~be~~ be used as base fill under final cover.

Soil in area of 18 @ 12-25 kcpm

will use 6" to 1 ft of base fill ~~for~~ then cap with clean import to reduce site disturbance @ 18

~~18~~ 10:45 Begin Western Cap Margin at Ruby 1 Cap 13 by M. Schriver

1055 Check in @ 001 Adit (see photos)

1110 Check in @ 018 good progress (See photos)

1130 Return to gamma survey @ Ruby 01 higher reads @ SW end of cap

1145 Ruby 018 → 2nd load base fill screen to 15-16kcpm

3rd load base fill 15-16.2 kcpm

6 ft transect survey continues at Ruby 1 cap

1210 GPS points of cap edge

Check in @ 001 - exposure @ 10-15 µR/hr

C. Hamilton / B Moayyad

Perma-Fix / M Schriver

Ruby Mines 5/3/14

Freeport McMoRan / Weston Nuclear

[Ruby 1 Area Gamma Survey]

1400 Continue to expand buffer area to south due to elevated readings

1500 flag stop point & frisk out hands & ~~boots~~ @ 0.01 mR/hr boots @ 0.02 mR/hr

1515 Meet at ~~Check house~~ haul road to discuss plan for ~~Saturday~~ Sunday

-> check in @ Ruby 018
- 6 loads base fill (c 3 skid loader buckets) Screen 14 to 12.5 Kcpm
- HMOSP Needs 2 more loads then 2-4 clean fill loads to complete

Sunday 5/4/14

Fluke Hill

* Drive Cap. 001
* Drive Haul Road 001
  - Need Buffer at & Drainage C
  - Staff issues @ Perma Fix

J. Robinson off site

58

5/5/14 5/6/14 BM

Ruby Mines

Freeport McMoRan / Western Nuclear

Ruby 1 Area Gamma Scan

Dark, ~50°F

05:00 Depart Albuquerque NM city Center & move to site

0650 On Site: B Moayyad & M. Schriver are crew 2 for walk over survey

0700 PTSP & meeting. Discuss wind, and hydration. HMOSP will be at Ruby No 001 3018 then HMOSP crew 2 will move to No. 002

0730 Ludlum Model 3 Daily Check

PIN04992 Source check @ 5,000cpm

Pin 0 4130 Source check @ 4200cpm

Ground = hands = feet = 0.02 mR/hr.

0820 At Ruby 1 and begin surveys off tracks of Ruby 1 Gap Buffer E of the Sonoma Hills area.

Weather: 1+ breeze, 50°F, Sunny

Start QC ~~static~~ 1-min static

Read @ Buffer E = 13,978 (See GPS log)

See photos of Buffer E area

C Hamm / B Moayyad

Penny Fix / M. Schriver

59

Ruby Mines 5/5/14

Freeport McMoRan/Western Nuclear

Ruby 1 area Gamma Survey

0850 Move over and begin Survey @ 6-ft transects at East Buffer area @ Ruby 01 Cap Buffer F
QC started 1 min Static @ 25,754 cpm
See GPS Log

0900 Walk perimeter of East Buffer on South side and flag an area to 100 ft buffer
Reading in this area are 15-20 kcpm
∴ Extend at 20 ft transects to 200 ft due to steep terrain & dense tree cover

0900 → Check in @ 18 ⇒ complete

1000 Continue East Buffer F survey

1100 winds 15-35 mph. Sunny, ~65 °F
M Shriver covers 70% of Buffer F
Elevated reads on pad & adjacent trees

1130 Unable to delimit to 13,00 cpm w 200 ft buffer. will discuss with PM

1140 Frisk out & depart for lunch & Rest Room break

CH2M Hill / B Moayyad

PermaFix / M Scriver

Ruby Mines 5/5/14

Freeport Mc MoRan / Western Nuclear

Ruby 1 Area Buffer & Drainage Survey

1225 Return to site & resume survey along Buffer F

1320 check in at Ruby No 001:
- Complete Foam & begin backfill upon local barrier.
- ⇒ Screen buckets, 1st 15-16.5 kcpm, 2nd 16-17.5 kcpm, 3rd

1345 Continue gamma walkover in Buffer 1 Ruby No 001 Backfill buckets 3-8 Screens < 17.5 kcpm

1425 More gamma walkover to west down gradient end @ 20 ft transects to 250 ft and 6 ft transects to 100 ft
- ⇒ Check in @ Ruby 001 ⇒ good progress but slow & will finish tomorrow.

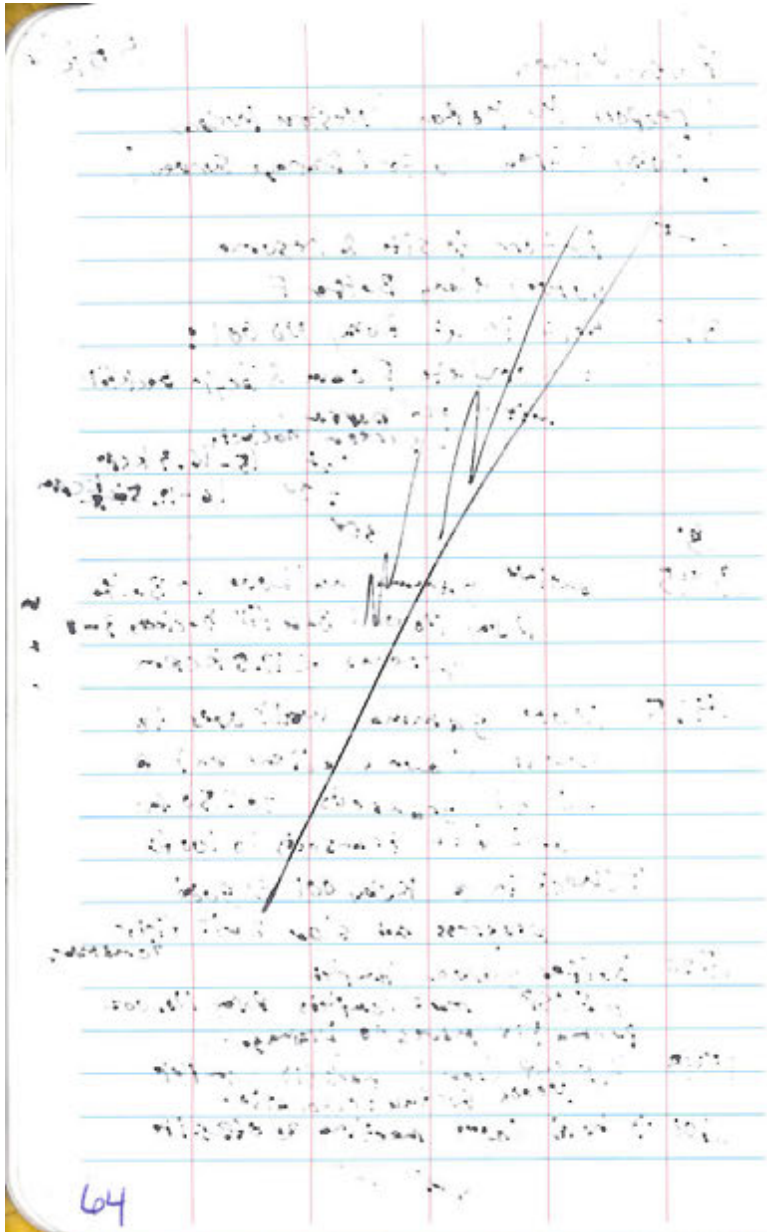
1520 Buffer Survey Complete
H MOSP Crew 2 completes Ruby No. 002 Perma Fix moves to Drainage C

1548 H MOSP Crew 1 backfill Complete
- → Needs surface restoration.

1600 → head Court meeting & offsite

62

63



Ruby Mines 5/6/14

Freepoint McMo Ran / Western Nuclear

Ruby 3 area Gamma survey

0700 All crews on site
PTSP - discuss rain, lightning
road condition & visitors

0730 Partly cloudy ~40°F, light breeze
Daily check on Ludlum Model 3

BM Pin #04992	LH Pin # 04130
0.03 mR/hr grand	0.03 mR/hr grand
0.02 mR/hr feet	0.03 mR/hr hands/feet
Source 5,000 - 4850 cpm	4,900 cpm source

0800 Drive to Ruby 3 Gate - Locked out
Residents broke & removed CH2M Hill lock
Call PM → she will try to resolve with Stanley Saunders
* Appears CH2M / Permafix did not daisy chain properly
* Need to make Apologies & discuss to all staff

0900 55°F, windy (20 mph+), ptly cloudy
PM J. Laggan spoke w/ resident Stanley Saunders opens gate
BMcGrath & M Schriver enter to resume begin survey @ Ruby 3 Cap area

CH2M Hill / Ben McGrath

Permafix / M. Schriver

64

65

Ruby Mines 5/6/14

Freeport McMoRan/Western Nuclear

Ruby 3 Area Gamma Survey

0930 Begin Truck SUV mounted Survey of Ruby 3 Cap Buffer ~~4~~ (North side)
QC check = 12,056 cpm (see GPS log)
See also photo log of Buffer 4

0950 Ride with M Schriver to monitor meter & delineate to 13,000 cpm investigation level.
SUV mounted with 2 of Ludlum 2221 meters with 2x2 NaI probes @ 4ft spacing
* May need to process data different from walk/drive to account for excess data density
Extend Buffer to 150 to 175 ft from Cap to north & farther to East

1080 Get out to flag area while M Schriver continues survey
Flag apsticles for driving

1100 ~~Grid~~ Ride for East side of Buffer to ensure area is delineated
→ ~~high Reads~~ Elevated Reads (14-17 kcpm) at sandstone bluff
→ Natural variability, no waste rock or disturbed ground

66

67

Ruby Mines 5/6/14

Free port McMoRan/Western Nuclear

Ruby 3 Area Gamma Survey

12:20 Complete North Buffer Area with good coverage & delimit to 13 kcpm
→ except to East bluff
→ areat drainage area to be walked.

1225 Head out for lunch & restroom break

1300 Back on site and Set up for Ruby 3 Buffer B1 for driving survey

1312 Start driving transect after walking to check for safe driving conditions

1345 M. Rippeda/EPA Reg 9 on site Gets in SUV for driving survey
→ Generally appearing, but thinks the transects should be farther apart. (too dense)

1430 Complete driving Buffer B1
M. Rippeda departs & Finds Gate locked (unable to depart Ruby 3)

1500 M Rippeda & J. Laggan meet & search for way to exit

1520 M Schriver moves to drive Ruby 3 Cap Pond West of Cap & North of adit
elevated readings 15-28 kcpm found.

CH2MHill Ben Mooryan J. Laggan

PermaFix M Schriver

EPA R9 M. Rippeda

68

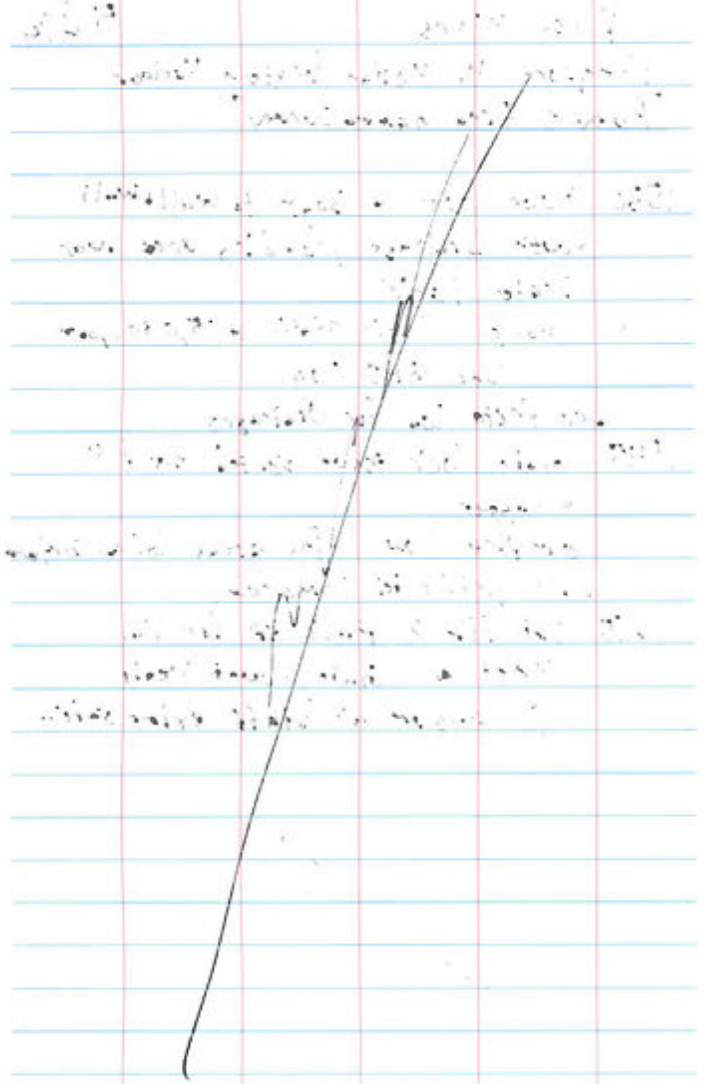
69

Ruby Mines 5/6/14
Freeport Mc MoRan/Western Nuclear
Ruby 3 Area Gamma Survey

1530 Move over & begin to walk/walk
South Drainage ponding area near
water tank
QC Check -1 min static @ 15,030 cpm
See GPS log
See Photo log for drainages
1545 Gate lock issue sorted by PM
J Lagger
Complete low-lying areas today before
rain (predicted tomorrow)
1615 Cut tie & pack up for day
Meet @ Gate, Count heads
& ensure all staff exiting safely

70

71



5/7/14

Ruby Mines

~~Freeport McMoRan / Western Nuclear~~

Ruby 1 Area Gamma Survey & closure

0700 All on site, HMOSP safety officer Allen Bret on site for audit.
PTSP - Storms & Driving
Discuss progress HMOSP will demobilize today

0720 Source Check Ludlum Model 3s
Pine 04190 ⇒ 4,000 cpm OK
hands = ground = 0.01 mR/hr
Pine 01992 ⇒ 5,500 cpm good
hands = ground = 0.02 mR/hr

0745 CH2M/PermaFix go to Ruby 1 area for step-outs

0830 Call from J. Robinson (Jiangsu) Complaining about Pay & Safety concerns (not valid) Try to appease.

0835 M. Scriver & D. Mcelaney finish columnated run at Ruby 1 haul road from cap to larger road

0900 Begin Haul Road Buffers
Marty → Ruby 1 Haul Road to East @ 20 ft transects

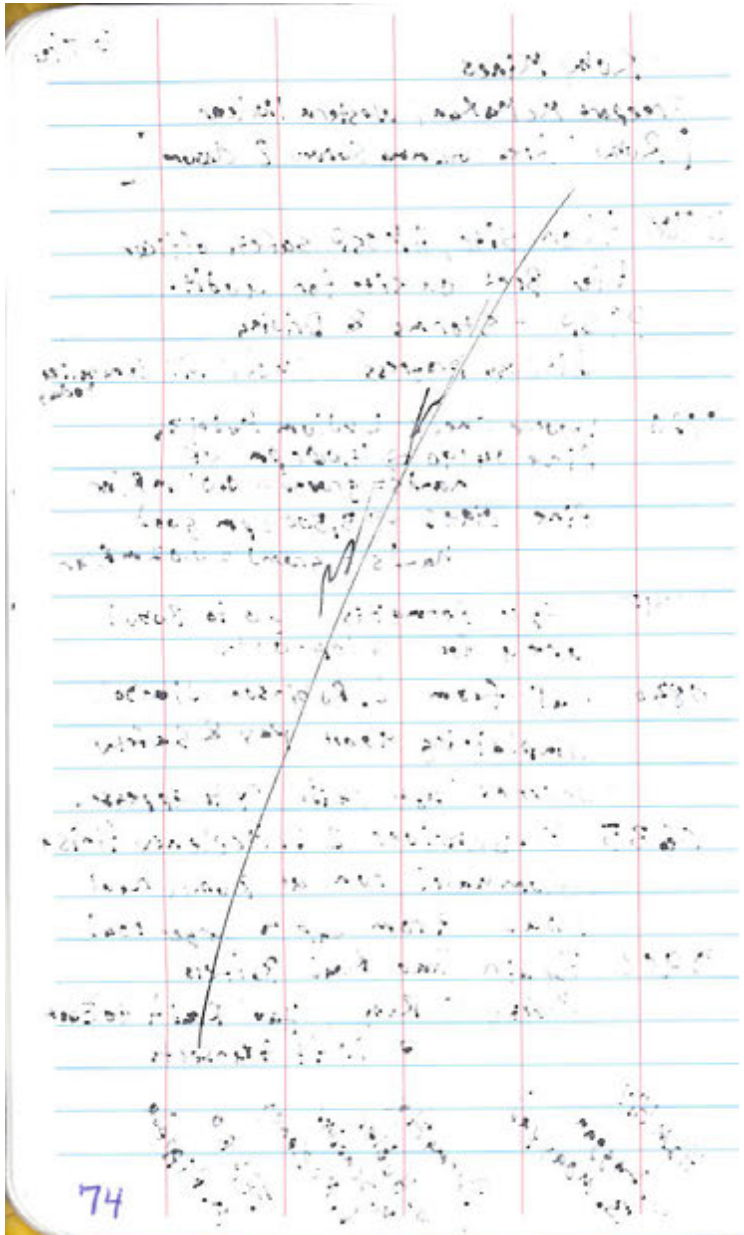
CH2M Hill / J. Lagan B. Moayyad

PermaFix / J. Hubler M. Scriver D. Mcelaney

EPA R9 / M. Pippola

72

73



74

Ruby Mines 5/7/14

Freeport McMoRan / Western Nuclear

Ruby 1 Area ~~Step outs~~

0900 Continued ..

D McKenney Ruby 1 Haul Road B

to west of Road between drainage C and Road all the way to Main Road at 20 ft transects & ties into Buffer G

1000 Complete ~~Closure/at~~ Survey at :

- Ruby 1a step out survey
- 001 Adit survey
- Loop & bound Ruby 1 to East & North
- Between drainage & haul road
- Buffer of Haul Road East (as marked)

1020 Walk by large haul Road hot spot near ~~B-FA-44 road~~ bus stop.

→ delimit to 13,000 cpm

→ possible high Radon waste ling backfill

Frisk out shaft & Excavator CAT 450E (Empire)

→ good for departure of excavator

1100 Move to Ruby 3 area

75

Ruby Mines 5/7/14

Freeport McMoRan / Western Nuclear

Ruby 3 Area Gamma Survey - Buffers & Drainage

1100 Cloudy wind 10-25 mph, ~50°F
Perma Fix & CH2M to Ruby 3 area
→ J Loggan/J Hubler to Ruby 01S to find A Williams & survey closed features
→ B Moayyad / D McElaney / M Scriver survey Cap @ Ruby 3 (Drive)

1204 Begins to sprinkle rain. Prepare plan for heavy rain.

1220 NN EPA arrives

1300 no rain Begin walk of Ruby
<u>Drainage A</u> head @ Ponding @ 11K at 19,000 cpm

1315 Readings drop to 13,000 cpm near Cap → 15-16 Kcpm with peaks @ 20 Kcpm East of Cap

1340 Start Ruby 3 Cap <u>Buffer C</u> to cover SS ridge between Cap row & Ponds to East
Bound North by drainage & South by haul road.

CH2M Hill / Ben Moayyad
Perma Fix / M. Scriver, D. McElaney
Navajo EPA / Darlene Jenkins, Stanley Edison

Ruby Mines 5/7/14

Freeport Mc MoRan / Western Nuclear

Ruby 3 Area Survey

1415 NN EPA departs Ruby 3 and returns keys for Smith Lake Chapter House Fenced yard (used by HMOSP)

J. Leggen & J Hubber Cover

- Resident @ Ruby 3
- Closed Features 17 & 20
- Delineate South Drainage to 13,00 cpm investigation level

1500 Wind picks up to 40-60 mph with intermittent light rain

Decide to end day due to weather

1520 Gather crews / count heads

Depart for day

Ruby Mines 5/8/14

Freeport McMoRan / Western Nuclear

Ruby 3 Buffer Area Gamma Survey

0700 Meet at Chapter House
Pretask Safety Plan - discuss hydration and walking on uneven ground also communication
Ludlum Model 3 Daily Check
PIMe 04190 ⇒ ~~Source~~ Source Check @ 5,300 cpm
⇒ Ground = boots = 0.02 mR/hr
Pine 04992 ⇒ Source Check @ 4,900 cpm
⇒ Ground = boots = 0.01 mR/hr

0725 Move to Ruby 3 Cap to survey Buffer Areas
~~Marty~~ M Schriver: Ruby 3 Cap perimeter
D Mceleney: Ruby 3 Cap Buffer C (SS Bluff)
A. Williams: South Cap & Drainage

0830 D. Mceleney Buffer C @ 15-30 K cpm

0900 M Schriver Begins Buffer D in drainage above Dam between SS bluffs

C Hzmbill / B Moayyad / J Laggar
EPA R.9 / M. Ripperda
Perma Fix / M. Schriver / A. Williams / J. Huber / D. Mceleney

82

Ruby Mines 5/8/14

Freeport McMoRan /Western Nuclear

Ruby 3 Buffer Gamma Survey

0930 QC Check at Buffer D
1-minute static @ 12,927 → See GPS Log

1000 NN EPA Arrives on Site

1030 M Schriver Completes 6 ft transect At Ruby 3 Adit area & attempts to delineate to 13,000cpm

1100 D Mcelenay Completes Buffer C

1130 Lunch Break – Begins to Snow

1145 Move into vehicles to wait out heavy snow

1200 J Laggan /J Hubler begin Soil Sampling for Correlation Samples @ Ruby 3

1240 Snow Continues but light & not sticking on ground
All crews resume Gamma Survey to west of Cap (East Complete)

1345 Complete Buffers @ West to 13,000cpm & move over to Ruby 1 for Samples

C Hamill / B Mooyyad / J Laggan / Perma Fix / J Hubler / M Schriver / A. Williams / D. Mcelenay / EPA Reg 8 / M Rippanda / NNEPA / S. Elijah / D Jenkins

83

Ruby Mines 5/8/14

Freeport McMo Ron/Western Nuclear

Ruby 1 Soil Samples & Road Step-out

1420 Drive to Ruby 1, pick up posts for signs
Measure Soil sample jars with
Ludlum 2221 at Church "background"
location EPA R9/M Rigged offsite

1440 Begin step-out survey of haul Road
East Side → delimit to 13,000 cpm
Begin Correlation Samples @ Ruby 3

1530 J Leggan ~~& M Rigg~~ offsite

1615 NN EPA offsite
Perma Fix Completes Correlation Samples
B Mowyad installs signs @ Ruby 1

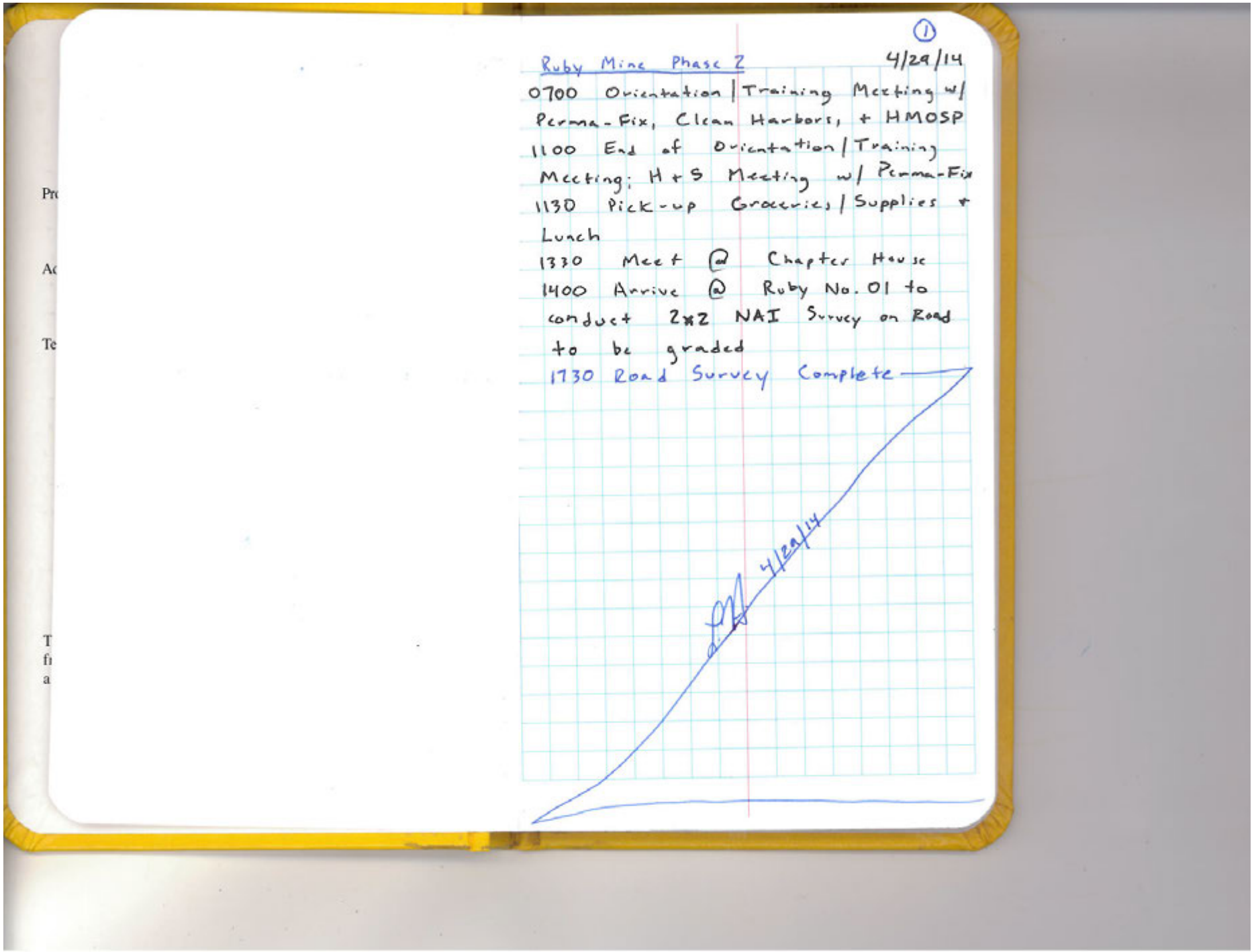
1700 Install Signs @ Ruby 3
& Perma Fix gathers equipment
and takes jar "background" reads

1800 Work Complete Jars handed
over to CH2M Hill
all staff accounted for & offsite
→ Ground Rny snow sublimated by ≈ 1630

84

85


SOKKIA
Book (2)
Ruby Mines
2014
FIELD
BOOK
No. 8152-60



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Ruby Mine Phase 2 — 4/29/14

0700 Orientation / Training Meeting w/ Perma-Fix, Clean Harbors, + HMOSP

1100 End of Orientation / Training Meeting; H + S Meeting w/ Perma-Fix

1130 Pick-up Groceries / Supplies + Lunch

1330 Meet @ Chapter House

1400 Arrive @ Ruby No. 01 to conduct 2x2 NAI Survey on Road to be graded

1730 Road Survey Complete

4/29/14

(2)

Ruby Mine Phase 2 4/30/14

0700 Arrive @ Smith Lake Chapter House; H+S Meeting

0730 Ludlum Model 3 Daily Check: Pine Environmental, #20177; Serial No. 292147; Calibration Date: 17-Dec.2013 Ex. Due Date: 17-Dec. 2014

0845 Gate is Locked to Dakota Background Area; Heading to Ruby No. 001 to drop off equipment to Perma-Fix

0920 Arrive @ Mancos Shale Background Area

1100 RMMB-C56 (In-Situ) 11121 CPM

1102 RMMB-K56 (In-Situ) 10993 CPM

1105 RMMB-F49 (In-Situ) 11099 CPM

1108 RMMB-CN72 (In-Situ) 11157 CPM

1110 RMMB-AN71 (In-Situ) 11491 CPM

1112 RMMB-R70 (In-Situ) 11335 CPM

1115 RMMB-L70 (In-Situ) 11307 CPM

1220 Lunch

1230 Heading to Chapter House to pick up Perma-Fix equipment

1245 Deliver perma-Fix equipment to Ruby No. 001

1330 Arrive back at Mancos Shale Background Area

(3)

Ruby Mine Phase 2 4/30/14

1346 RMMB-A09 (In-Situ) 10232 cpm

1350 RMMB-A19 (In-Situ) 10778 cpm

1351 RMMB-E15 (In-Situ) 10976 cpm

1352 RMMB-I23 (In-Situ) 10703 cpm

1353 RMMB-I28 (In-Situ) 10927 cpm

1354 RMMB-L26 (In-Situ) 10684 cpm

1355 RMMB-L32 (In-Situ) 10658 cpm

1356 RMMB-Q30 (In-Situ) 11018 cpm

1357 RMMB-T43 (In-Situ) 11056 cpm

1359 RMMB-W52 (In-Situ) 10831 cpm

1411 RMMB-EN63 (In-Situ) 11102 cpm

1413 RMMB-HN65 (In-Situ) 11183 cpm

1416 RMMB-GN55 (In-Situ) 10725 cpm

1419 RMMB-FN46 (In-Situ) 10935 cpm

1422 RMMB-DN38 (In-Situ) 11040 cpm

1426 RMMB-AN19 (In-Situ) 10956 cpm

1434 RMMB-Q10 (In-Situ) 11406 cpm

1435 RMMB-W05 (In-Situ) 11177 cpm

1440 Continue Collecting Soil Samples

1605 Leaving Mancos Background Area for the day; Headed to Chapter House

1645 Leaving Site for the day

LM 4/30/14

(4)

Ruby Mine Phase 2 5/1/14

0640 Arrive @ Smith Lake Chapter House

0700 H+S Meeting; Weather: Clear Skies, 40's - 50's; Personal/Subs: CH2M Hill, Perma-Fix, + HMOPS

0730 Ludlum Model 3 Daily Check: Pine Environmental, #20177; Serial No.: 292147; Calibration Date: 17-Dec. 2013, Ex. Due Date: 17-Dec. 2014; Hands Check: 0.1 x 0.3 = 0.03 Feet Check: 0.1 x 0.3 = 0.03 mR/hour; Source Check: 5000 cpm Jason (Perma-Fix) → Hands Check: 0.1 x 0.3 = 0.03 Feet Check: 0.1 x 0.3 = 0.03 mR/min

0830 Taking Daren (w/ Perma-Fix) to Ruby Mine No. 003

0850 Heading to Mancos Shale Background Area

0910 Arrive @ Mancos Shale Background Area

0945 Collect RMMB-HN65 for 901.1

0950 Collect RMMB-FN46 for 901.1

0955 Collect RMMB-GN55 for 901.1 + 6020/7470A

1000 Collect RMMB-EN63 for 901.1 + 6020/7470A

1005 Collect RMMB-Q10 for 901.1 + 6020/7470A

(5)

Ruby Mine Phase 2 5/1/14

1010 Collect RMMB-AN17 for 901.1 + 6020/7470A

1015 Collect RMMB-W05 for 901.1 + 6020/7470A

1052 Exit Scan from Mancos Shale Background Area:

Meter Model: 3A

Serial No: 232186

Probe Model: 44-9

Serial No: PR173575

Cali. Due Date: 4/22/15

Background: ~ 60 cpm

Scan Hands + Feet: ~ 50-60 cpm

1115 Lunch

1204 Arrive @ Colluvium Background Area

1230 RMCB-J12 (In-Situ) 11241 cpm

1231 RMCB-L10 (In-Situ) 10942 cpm

1233 RMCB-P10 (In-Situ) 11159 cpm

1234 RMCB-X18 (In-Situ) 11329 cpm

1236 RMCB-DN22 (In-Situ) 11587 cpm

1237 RMCB-FN34 (In-Situ) 11827 cpm

1240 RMCB-EN34 (In-Situ) 12067 cpm

1242 RMCB-X24 (In-Situ) 11628 cpm

1244 RMCB-038 (In-Situ) 11039 cpm

(6)

Ruby Mine Phase 2 5/1/14

1245 RMCB-L45 (In-Situ) 11214 cpm
1320 Collect RMCB-J12
1325 Collect RMCB-L10 •
1330 Collect RMCB-P10 •
1335 Collect RMCB-X18
1340 Collect RMCB-X24 •
1345 Collect RMCB-DN33 •
1350 Collect RMCB-EN34 • + MS/MSD
Collect RMCB-END34 @ "1700"
1355 Collect RMCB-FN34
1400 Collect RMCB-038
Collect RMCB-OD38 @ "1730"
1410 Collect RMCB-L45
1510 Exit Scan from Colluvium Background Area using same Model 3A: Hands + Feet: ~ 50-60 cpm
1515 Heading to Chapter House
1615 ~~Off~~ Leaving the Chapter House

YM. 5/1/14

(7)

Ruby Mine Phase 2 5/2/14

0630 Arrive @ Smith Lake Chapter House
0700 H+S Meeting; Weather: 50-60s, Clear Skies
0730 Hands/Feet Check w/ Meter Model 3A, Serial No.: 232186, Probe Model: 44-9, Serial No.: PR193575, Calibration Due Date: 4/22/15; Hands + Feet: 0.1 x 0.3 = 0.03 mR/hour
0800 Heading to Colluvium Background Area
0825 Arrive @ Colluvium Background Area
0840 RMCB-DN44 (In-Situ) 11089 cpm
0841 RMCB-KN49 (In-Situ) 11066 cpm
0843 RMCB-Z46 (In-Situ) 11053 cpm
0846 RMCB-P54 (In-Situ) 10509 cpm
0848 RMCB-R59 (In-Situ) 10573 cpm
0850 RMCB-N52 (In-Situ) 10508 cpm
0852 RMCB-H45 (In-Situ) 11364 cpm
0854 RMCB-F57 (In-Situ) 10504 cpm
0858 RMCB-ON49 (In-Situ) 11174 cpm
0900 RMCB-A14 (In-Situ) 10907 cpm
0915 RMCB-A02 (In-Situ) 11267 cpm
0940 Begin Collecting Soil Samples

YM.

(8)

Ruby Mine Phase 2 5/2/14

1015 Collect RMCB-A02 for Rad-226
1020 Collect RMCB-A14 for Rad-226 + Metals
1025 Collect RMCB-H45 for Rad-226 + Metals
1030 Collect RMCB-N52 for Rad-226 + Metals
1035 Collect RMCB-P54 for Rad-226
1040 Collect RMCB-F57 for Rad-226
1045 Collect RMCB-R59 for Rad-226 + Metals
1050 Collect RMCB-Z46 for Rad-226
1055 Collect RMCB-DN44 for Rad-226
1100 Collect RMCB-KN49 for Rad-226 + Metals
1105 Collect RMCB-ON49 for Rad-226
1110 RMCB-EU38 (In-Situ) 11736 cpm
1112 RMCB-~~GU38~~ GUZ6 (In-Situ) 11338 cpm
1113 RMCB-YN15 (In-Situ) 11135 cpm
1116 RMCB-RN06 (In-Situ) 11212 cpm
1130 Collect RMCB-RN06 for Rad-226 + Metals
1135 Collect RMCB-YN15 for Rad-226
1140 Collect RMCB-EU38 for Rad-226 + Metals
1145 Collect RMCB-GU26 for Rad-226 +
Collect RMCB-GUDZ6 for Rad-226 @ "1700"
1220 Exit Scan from Colluvium Background Area using same Model 3A: Hands/Feet: 50-60 cpm; Heading to Dakota Background Area

P.M.

(9)

Ruby Mine Phase 2 5/2/14

1300 RMDB-I10 (In-Situ) 9310 cpm
1303 RMDB-R16 (In-Situ) 7241 cpm
1305 RMDB-V20 (In-Situ) 8777 cpm
1315 RMDB-H40 (In-Situ) 9396 cpm
1318 RMDB-C44 (In-Situ) 9066 cpm
1325 RMDB-050 (In-Situ) 9175 cpm
1400 ~~RM+~~ Collect RMDB-I10 for Rad-226 +
Collect RMDB-ID10 for Rad-226 @ "1730"
1405 Collect RMDB-H40 for Rad-226 + Metals
1410 Collect RMDB-050 for Rad-226 + Metals
1415 Collect RMDB-V20 for Rad-226
1420 Collect RMDB-C44 for Rad-226 + Metals
1425 Collect RMDB-R16 for Rad-226
1515 Exit Scan From Dakota Background Area: Hands/Feet: 50-60 cpm
1520 Heading to Chapter House
1615 Off Site for the day

P.M.

(10)

Ruby Mine Phase 2 — 5/3/14

0640 Arrive @ Smith Lake Chapter House

0700 H+S Meeting; Weather: 60-70s, Clear Skies

0730 ~~Hands/Feet Check w/ Meter Model 3A, Serial No.: 232186, Probe Model: 44-9, Serial No.: PR143575, Calibration Due Date: 4/22/15, Hands + Feet:~~

Ludlum Model 3 Survey Meter, Serial No.: 294605, Probe Serial No.: PR260884
Calibration Date: March 24, 2014;
Calibration Due Date: March 24, 2015;
Hands/Feet Check: 0.1 x 0.3 = 0.03 mR/hr
Source Check: 3000 cpm

0820 Arrive @ Dakota Background Area

0830 RMDB-BN03 (In-Situ) 9811 cpm
0833 RMDB-UN18 (In-Situ) 9956 cpm
0835 RMDB-VN27 (In-Situ) 9693 cpm
0855 RMDB-AU44 (In-Situ) 9594 cpm
0900 RMDB-EU24 (In-Situ) 10077 cpm
0910 RMDB-TN46 (In-Situ) 9180 cpm
0915 RMDB-XN59 (In-Situ) 9586 cpm
0920 RMDB-SN52 (In-Situ) 9893 cpm
0925 RMDB-MN51 (In-Situ) 9454 cpm
0930 RMDB-LN40 (In-Situ) 9468 cpm
0935 RMDB-GN36 (In-Situ) 9789 cpm

(11)

Ruby Mine Phase 2 — 5/3/14

0940 RMDB-CN44 (In-Situ) 9710 cpm
0945 RMDB-HN56 (In-Situ) 9671 cpm
0950 RMDB-CN53 (In-Situ) 9453 cpm
1000 RMDB-AN55 (In-Situ) 9753 cpm
1005 RMDB-DN28 (In-Situ) 9236 cpm
1010 RMDB-R53 (In-Situ) 9501 cpm
1015 RMDB-FG4 (In-Situ) 8690 cpm
1020 RMDB-BG0 (In-Situ) 8783 cpm
1100 Collect RMDB-VN27 for Rad-226+Metals
1105 Collect RMDB-AU44 for Rad-226+Metals
1110 Collect RMDB-TN46 for Rad-226+Metals
1115 Collect RMDB-CN53 for Rad-226
1120 Collect RMDB-EU24 for Rad-226 +
Collect RMDB-EUD24 for Rad-226 @ "1700"
1125 Collect RMDB-SN52 for Rad-226
1130 Collect RMDB-BN03 for Rad-226
1135 Collect RMDB-BG0 for Rad-226
1140 Collect RMDB-UN18 for Rad-226
1145 Collect RMDB-XN59 for Rad-226
1150 Collect RMDB-HN56 for Rad-226+Metals (MS/MSD); Collect RMDB-HND56 for Rad-226+Metals @ "1730"
1155 Collect RMDB-R53 for Rad-226+Metals
1200 Collect RMDB-FG4 For Rad-226
1205 Collect RMDB-MN51 for Rad-226+Metals

(12)

Ruby Mine Phase 2 5/3/14

1210 Collect RMDB-CN44 for Rad-226 + Metals
1215 Collect RMDB-LN40 for Rad-226
1220 Collect RMDB-GN36 for Rad-226
1225 Collect RMDB-DN28 for Rad-226 + Metals
1230 Collect RMDB-AN55 for Rad-226 + Metals
1400 Exit Scan from Dakota Background Area: Hands/Feet: 50-60 cpm
1455 Arrive @ Ruby Mine No. 1
1600 Leaving Site for the day

(13)

Ruby Mine Phase 2 5/4/14

0730 Arrive @ Ruby Mine No. 1
0830 H+S Meeting; Weather: 70's, Clear Skies
0840 Ludlum Model 3 Survey Meter, Serial No: 294605, Probe Serial No.: PR 260884, Calibration Date: March 24, 2014, Calibration Due Date: March 24, 2015; Hands + Feet Check: 50-60 cpm Source Check: 3000 cpm
0845 CH2M HILL Staff: Luke Hill/ABQ
Perma-Fix Personal:
Jason - Haul Road to Highway
Andy - Haul Road Survey
Marty - Haul Road to Highway
Jim - Haul Road Survey
0900 Begin Haul Road to Highway Survey
1115 Haul Road to Highway Survey Complete
1130 Begin Ruby Mine 1 Cap Survey
1233 Ruby Mine No. 1 Cap Survey Complete
1250 Begin Haul Road to Highway Survey @ Ruby Mine No. 3
1410 Haul Road to Highway Survey @ Ruby Mine No. 3 Complete to Locked Gate
1430 Leaving Site for the day

(14)

Ruby Mine Phase 2 5/5/14

0650 Arrive @ Smith Lake ~~Chapter H.~~ Chapter House

0700 H + S Meeting; Weather: 60s - 70s, Clear Skies

0730 Ludlum Model 3 Survey Meter, Serial No. ~~PR260884~~ 294605, Probe Serial No. PR260884; Calibration Date: March 24, 2014, Calibration Due Date: March 24, 2015; Source Check: 3000 cpm Hands/Feet Check: 50-60 cpm

0820 Arrive @ Trash Pit (Ruby Mine 018); Jason (Perma-Fix) setting up air monitoring @ Trash Pit; Ben Trappe (HMOSP) wearing air monitor

0920 Fill Dirt placement @ Trash Pit complete; Jason (Perma-Fix) begins Gamma Survey of Trash Pit (Ruby Mine No. 018)

0940 Hands/Feet Check: ~~50-60 cpm~~ 0.1 x 0.3 = 0.03 ~~mR/hour~~

0950 Picking up equipment @ Ruby Mine No. 1

1040 Arrive @ Ruby Mine No. 002

1215 Ruby Mine No. 021 Boring Closure Complete

1520 Ruby Mine No. 002 Closure Complete; Hands/Feet Check: 0.1 x 0.3 = 0.03 mR/hr.

(15)

Ruby Mine Phase 2 5/6/14

0630 Arrive @ Smith Lake Chapter House

0700 H + S Meeting; Weather: 70s, Partly Cloudy

0730 Ludlum Model 3 Survey Meter, Serial No. 294605, Probe Serial No. PR260884, Calibration Date: March 24, 2014; Calibration Due Date: March 24, 2015; Source Check: 5000 cpm Hands/Feet Check: 0.1 x 0.5 = 0.05 mR/hr

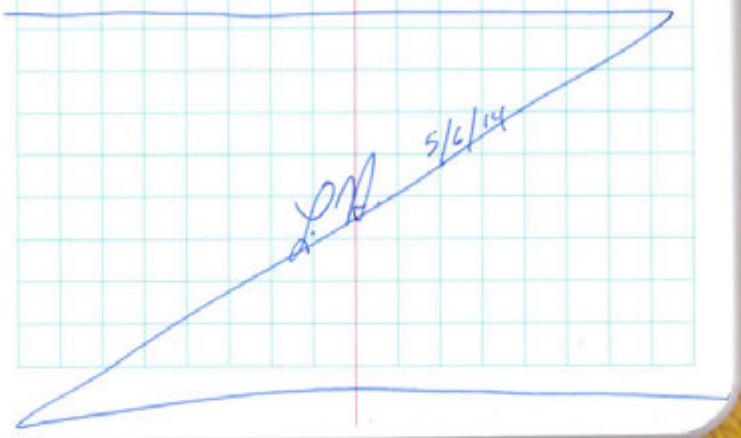
0800 Arrive @ Ruby Mine No. ~~001~~ 004 to pick up equipment

0945 Arrive @ Ruby Mine No. 004 + begin Closure

1510 Ruby Mine No. 004 Closure Complete

1600 Arrive @ Chapter House

1640 Leaving the site for the day



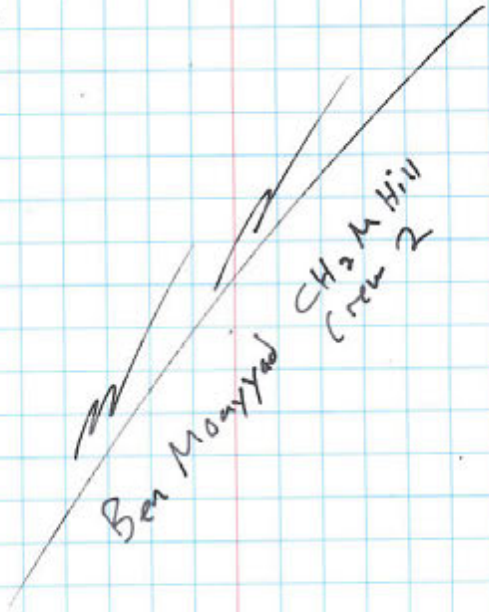
Phase 1 & 2

April / May 2014

~~Eav~~ Event

Completed

Field 4/29 to 5/8/2014



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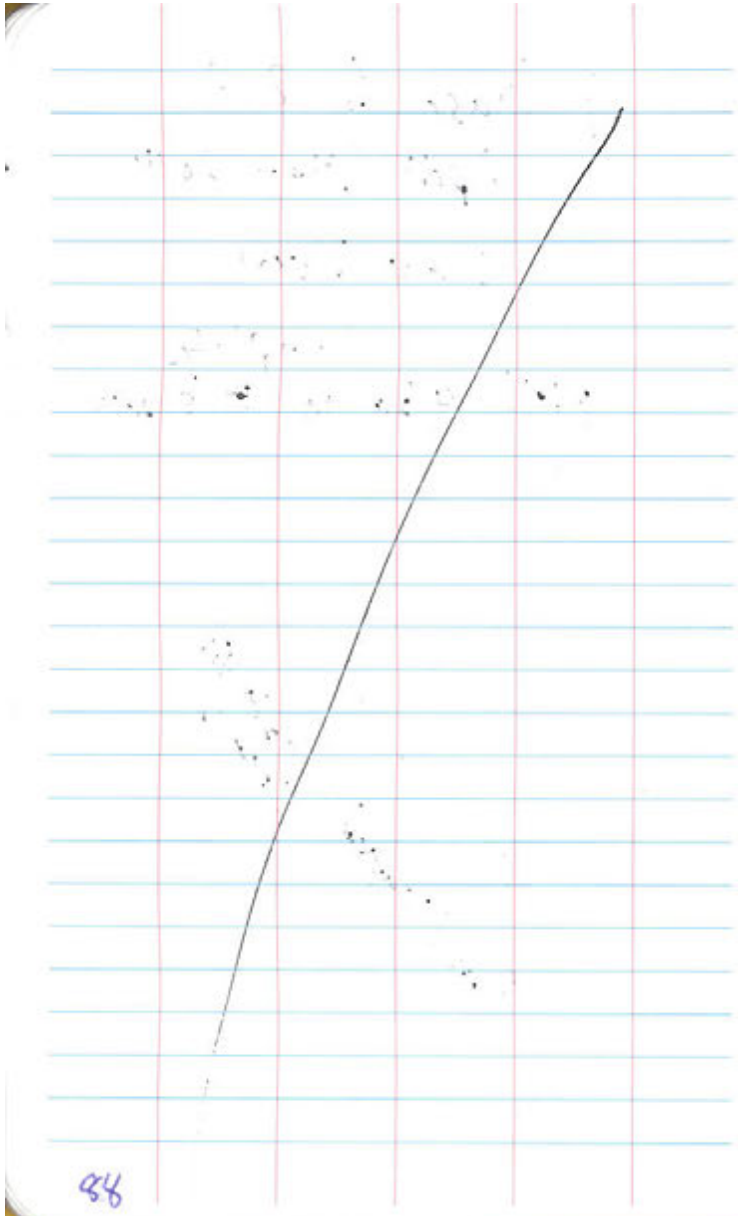
87



Ruby Mines Phase 3 Sept 30, 2014

(Utility Location / Mark Borings)

0600 B Moayyad Departs Albuquerque to meet Utility Location Subcontractor On Point in Thoreau NM

0735 Arrive at site get coffee and water and go through paperwork before sub. arrives at meeting point.

Cool ~ 50°F, calm wind, Sunny

0805 On Point on Site Safety Brief - Rad & Bio & Hydration

0845 Checking Chapter House

0908 Move to Ruby 3 area and find gate locked out of EH2M Santa Hike in & Begin Survey

10:00 Cleared 10 points by EM / metal detector, no linestr trace, no GPR warranted

11:00 Lunch break @ trucks, cleared 25 points by same method

11:30 Hike back in & clear all remaining areas of Ruby 3 - See logs

EH2M Hill / B. Moayyad

On Point / Jose Betancourt

84

89

Ruby Mines Phase 3 Sept 3d 2014

Utility Location/Mark Bringer

70°F, Sunny

1300 CGM Line identified on West - SW of RUBY-003 along Road marked pink in white Paint & Flagging
Not active

1330 Mob off Ruby 3 area
Attempt to Contact Stanley Saunders about locked gate Field Crew has no success at his house.

1400 Mobe to Colluvium & Dakota
Colluvium Downhole Log
N 1,643,032.108 E 2,625,507.244
Elev 7378.213

1500 Dakota Downhole Log
N 1,641,629.269/E 2,624,514.6
Elev. 7,474.670

Cleared Large area
May Need to mow
* Difficult Roads for Rig *
Very Rocky for hand auger

1530 Move to Ruby 1 area

CH2M Hill Ben Moayyed. On Point Jose Betancourt

Ruby Mines Phase 3 9/30/14

Utility Locate & Mark Borings

75°F, Sunny

1600 Find Mancos Shale off Thompson's Corral & West

Stake Mancos Borehole Log @ N 1,651,937.8
E 2,604,029.3

(Leave) large area to be able to maneuver need to check w Phase 2 Maps

1645 Paperwork & go over work for next day
Check in W/ Stanley Edison NN

1700 to dinner & off site

92

93

Ruby Mines Phase 3 10/01/14

[Utility Locate & Mark Borings]

0700 Mobe to site B. Moayyad

0745 on site 40°F, sunny, no wind
Wait for On Point, don PPE
& sunscreen, start paperwork
Go through Stand-up for
safety presentation & VTSP

0805 check in @ Chapter house
& move to Vent 2 area
to clear - no utilities → modify before at RUBY on

0925 Stanly Edison (NNEPA arrives
Go back to the Smith
Lake Chapter House to pick up

0945 Meet & pick up S Edison &
Move to Vent 4 area

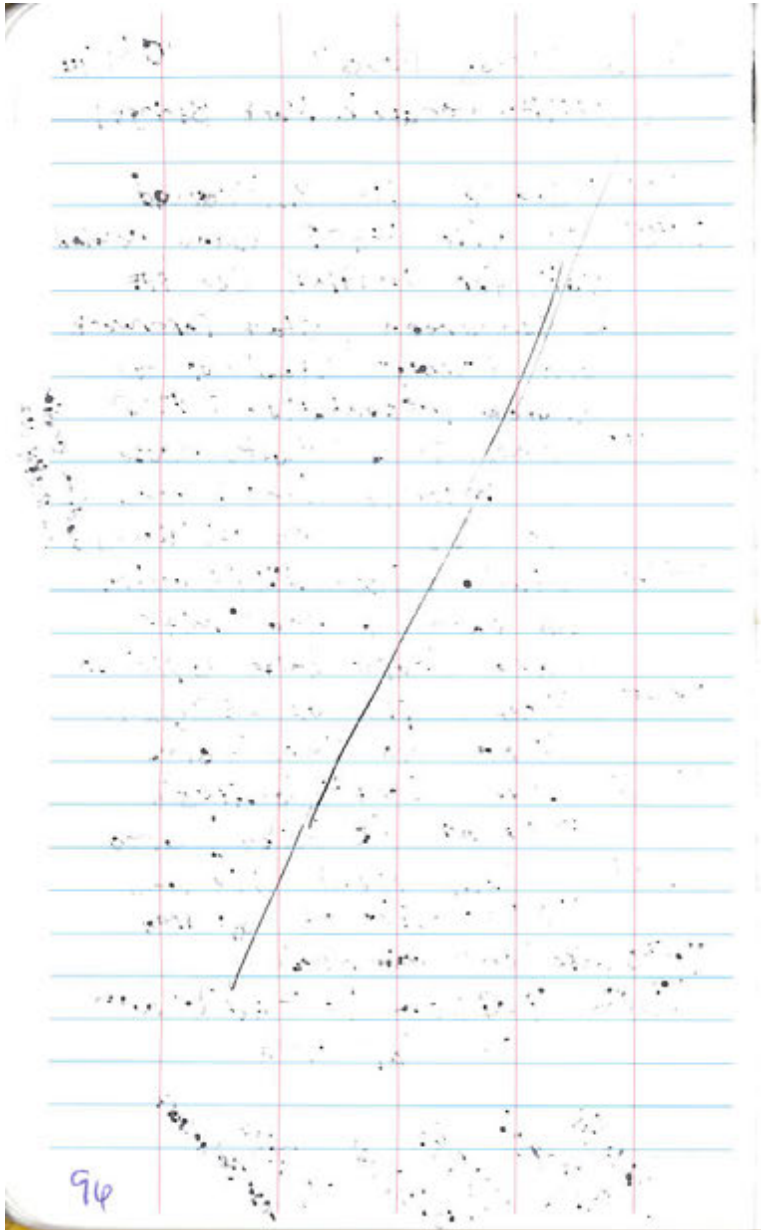
10:30 Clear Vent 4 locations &
mob out to Ruby 1 area

1205 Clear West side and
North side of Cap area

1230 Take lunch/water break

1305 Resume in East & South
of Cap area

CHM Hill / B. Moayyad
NNEPA / S. Edison
On Point / Jose Betancourt



Ruby Mines Phase 3 10/1/14

Utility Locate & Mark Borings

1445 Complete Ruby 1 area
Utility Locate
3 Correlation Samples not on GPS
and 2 others w/ wrong ID
1450 Use Work Plan Figure to Mark
Move over to Ruby Vent 14
Clear & Mark RUBY-014
locations and add 1 @ RUBY-015
in case it is needed for
Correlation Sampling
1500 Stanley ~~Eddis~~ Edison talks
to Marie Charley about
work ~~Area~~ week. Collect Point Coords
1540 Move over to Ruby 3 area
Check gate and find
CH2M Hill lock is still
locked out
1600 Go to Stanley Saunder's
house and check in
- not at home, check leave
message & card w/ Daughter
1630 Drop Stanley @ Charter House
1645 Depart for ~~home~~ ABQ

96

97

10/6/14

Ruby Mines Phase 3

Background Downhole log - Team 1

Weather: 35-75°F, lt breeze, Sunny

0700 B Moayyad Meets Drillers at hotel in Gallup NM & escorts to meeting location @ Smith Lake Charter House

0750 On site with CH2M Hill (call sign Stuff) National Drilling (3 crew men), and PermaFix (2 crew). Check in at Charter House and review SOW and go through safety and radiation training (See Signatures on JHAs, HSPs)

1000 Split in teams and mobilize to Ruby 1 area (1/ survey & background)

Team 1 goes to Mancos Shale Background Collect Core (Compress to 42") from 0-5 feet as marked. See log

1150 Move to COLUM-01 & Collect by hand auger @ marker location bag core @ 1 ft intervals

1300 Move to PAKOTA-01 & Collect by hand auger @ 5 ft w/ old marker Refusal @ 6" w/ 3 attempts

CH2M: B. Moayyad, K. Sykes

PermaFix: Jason Hubler

National: Jessie Gonzales, Gregory Gutierrez

98

99

100

Ruby Mines Phase 3 10/6/14
(Ruby 3 γ Scan

weather: 75°F, sunny, lt breeze

1400 Mobilize off Dakota to Ruby 3 area

~~1450~~ T

1445 Drillers get flat & await tooling to change tire on drill rig trailer

1500 Move out to Ruby 3 area an initial γ walk-over survey. Clean up trash at site & identify

* waste rock buried in work area between former buildings and dewatering area

1700 ~~Fin~~ Continue survey and await team 2

1710 Frisk out < bkgd or [illegible] & ~ 20 µR/hr

1730 Team 2 arrives and meet to discuss tomorrow's plan

1735 All depart. All staff 9 hours on site

101

RM Phase 3 Photo log p1 10/6/14

Ben M. Phone Camera 10/6/14

(1)(2) 10:00 JHA log by National

(3)(4) 10:15 Mancos Shale Background during drilling facing SE

(5) Colluvium Core

(6) Dakota Core

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(1) RM03-DWTR01 soil core 10-7

(3)(4) RM03-DWTR02 Soil Core - Black Spot

(5)(6) RM03-DWTR03 Soil Core - Waste rock

Ben M. Phone Camera 10/8/14

(1) RM03-CWR004 Bottom Core

Ruby Mines Phase 3 10/8/14

Ruby 3 Dewatering Drilling

weather: Dark then mostly sunny, 35°- light breeze

06:00 B Manyyad Depart Gallup to pick up T Charley in ~~Gallup~~ BM Grants NM

07:00 Arrive in Grants @ Walmart checkin & Tommy on his way

0815 Meet T Charley & Drillers and move to site

0900 PTSP & Move over to Ruby 3

model 19: SN193606 Cal due 21 Jan15

uR meter source check ok

PID, zero Cal Multirae 3000 C10250?

Isobutylene Cal check 99.8ppm

10:00 RM03- DWTR01

Surf. Collimated 4745 / Uncollimated 15,978

standard suite, NO DUP, NO MSD5

	BM	uR/h
10:44 RM03 - DWTR01 -00	(0.5)	16
10:46 RM03 - DWTR01 -01	(1.5)	14
10:48 RM03 - DWTR01 -05	(5.5)	16

C Atsidie? B Manyyad K Sykes T Charley Jason Ponder? -00 -01 -05 National Jessie O George G

Ruby Mines Phase 3 10/5/14

[Ruby 3 | Ops Dewater/Drainage Samples]

Weather partly cloudy

1145 RM-DWTR02
N 1640165.9
E 2,624692.7

1140 Collect Sample RM03-DWTR02-00
Jar Count 15 μR/hr 15 μR/hr
Ra 226 and Total metals 15 μR/hr

1145 Collect Sample RM03-DWTR02-01
Jar Count 17 μR/hr
Ra 226 and Metals

1235 RM-DWTR03
N 1,640097.4
E 2,624866.5

1400 Finish collecting samples @ Dewatering area and Move north to Drainage

1527 (1527 to walk)

1527 RM03-DRAI01
N 1,640567.2
E 2,624861.4

15:55 RM03-DRAIN03
N 1634943.7
E 2,625695.1

Jessie D.
George G.

Ruby Mines Phase 3

10-7-14
[illegible]

Time	Sample ID	
15:30	RMØ3-DRNØ1-ØØ	14-18
15:35	RMØ3-DRNØ1-Ø1	15 18
15:40	RMØ3-DRNØ1-Ø5	15 18
10-7-14 16:15 43	RMØ3-DRNØ2-ØØ	18 18
16:50	RMØ3-DRNØ2-Ø1	17 18
16:55	RMØ3-DRNØ2-Ø5	18 18
16:15	RMØ3-DRNØ3-ØØ	18
16:20	RMØ3-DRNØ3MS-ØØ	18
16:20	RMØ3-DRNØ3MSD-ØØ	18
16:25	RMØ3-DRNØ3-Ø1	18
16:35	RMØ3-DRNØ3D-Ø1	18
16:30	RMØ3-DRNØ3-Ø5	18

RMØ3-DRNØ3
16:55 N 1,634,943.7
E 2,625,695.1
(SPN83)

17:00 RMØ3-DRNØ2
N 1,639929.5
E 2625481.3

1730 Meet@ ed of Day 2 [illegible]
offsite

Ruby Mines Phase 3 10/8/14

Ruby 3 Cap drilling Team

Weather: Cloudy – 40-50°F still air

0615 Meet Survey Crew & Mob to site from Gallup NM

0715 On site P.T.S.P – lightning roads

Set up @ RM03-CWRP04

Calibrate MultiRae 3000 # C102547

Fresh air OK Span Cal Isobutylene Read 100.C

Ludlum Model 19 EAG # 19866 Bat. Check Good

Source check 100 μR/hr good

RM03-CAP04-00

Collect Sample RM03-~~CWRP04~~-00 for Ra^{226} & Metals

Exposure rate @ 14 μR/hr

8:20 RM03-CWRP04

N 1,640009.3

E 2,635442.1

0940 Collect RM03-~~CWRP04~~ ROCK 04-03 in wash rock

exposure rate @ 18 μR/hr

Duplicate RM03-~~CWRP04~~ ROCK 03 - 03 @ 0910

10:00 RM03-~~CWRP~~ ROCK P04-08 in wash rock

Exposure @ 17 μR/hr

10:10 RM03-~~CWRP04-14~~ SOIL 04-14 in clean material

Exposure @ 15 μR/hr

all 10-8-14 KS

CH2M Hill / Ben Maynard / Tommy Charley

Perma-Fix / Jason Hooker

Navajo Nation / Jessie Acrelas / George Gutierrez

Ruby Mines Phase 3 10/8/14

Ruby 3 Cap Drilling Regan!

Overcast, lt breez ~60°F, ~~lt~~ in

10:15 move to RMØ3-CWRPØ5 - Sample RMØ3-CAPØ5-00 + MS&MSD w/ 12 ul Rad'

Coordinates, ~~Ht~~ 60L

N 1,640,072.0 E 2,625,111.3

Surface Collimated 8,078; Uncollimated 24,347

no ~~refusal~~ recovery (rock) @ 5-10; step over 1 ft. and start hole @ 1 ft. east

1045 Drill rig has no ~~ref~~ recovery at 5-10 in 1st hole or step-over

Re tool to Macro Core bit after finding stripped threads on point

1100 process samples and Continue

1220 Complete sampling, finish log and 15 min Lunch

1330 Move to Work area and set up on RMO3-WRKØ1

Collect Samples @ specified depth. no elevated γ reads

Intermittent Rain

Ruby Mines Phase 3 10/8/14

Sample Log

Time	Sample ID	µR/hr
8:20	RM03 - CAP04 - 00	14
9:40	RM03 - Rock04 - 03	18-19 (2 10-8-14)
9:10	RM03 - Rock04D - 03	17
10:00	RM03 - Rock04 - 08	17
~~10:10~~	~~RM03 - Rock04 -~~	
10:10	RM03 - SOIL04 - 14	15
10:15	RM03 - CAP05 - 00	14
10:15	RM03 - CAP05 MS - 00	14
10:15	RM03 - CAP05 MSD - 00	14
11:25	RM03 - Rock05 - 02	90
11:24	RM03 - Rock05 - 05	12
12:15	RM03 - Rock05 - 10	13
12:20	RM03 - ~~Rock05~~ SOIL05 - 15	15
13:33	RM03 - WRK01 - 00 N 1,639,540.2 E 2,624,860.4	15
1338	RM03 - WRK01 - 01	15
1345	RM03 - WRK01 - 05	14
1410	RM03 - WRK02 - 00	16
14:30	RM03 - WRK02D - 01	15
14:20	RM03 - WRK02 - 01	15
14:20	RM03 - WRK02 - 05	13

KS 10-8-14

114

115

Ruby Mines Phase 3 10/8/14

Ruby 3 Work Area Drilling Team

Overcast, light breeze

1409 Mobilize to RM03-WRK02
N 1,639,858.7 E 2,624,674.3

1410 Collect Surface sample then all other depths as planned

1435 Mobilize to RM03WRK04 and begin drilling in Travertine hit refusal @ 4.4 ft

1510 RM03-WRK04
N 1639,746.3 E 2624,531.9

1537 RM03-WRK03
N 1,639,773.5 E 2624,702.2
Drill to 5 ft & refusal in Cemented soils Remob & move back to Cap area

Time	Sample Log ID	µR/hr
1440	RM03-WRK04-00	35
1445	RM03-WRK04-01	12
	RM03-WRK04-01 MS/MSD	12
1450	RM03-WRK04-04	15
1540	RM03-WRK03-00	15
1550	RM03-WRK03-01	16
1555	RM03-WRK03-05	14

116

117

Ruby Mines Phase 3 10/8/19

Ruby 3 Cap Drilling - Team 1

weather: intermittent light rain, light breeze ~50°F

1615 Move back to Cap area North end

1625 RM03-CWRP01
N 1,640,524.6 E 2624916.7
and begin drilling on waste Cap

Sample Log

Time	ID	mR/hr	µR/h
1625	RM03-CAP01-00		13
1650	RM03-Rock01-05		15
1655	RM03-SOIL01-06		13
1655	RM03-SOIL01-06 MS/MSD		

1700 Clean up & Motor out

118

119

Ruby Mines Phase 3 10/9/14

Ruby 3 Cap Drilling

weather, Cloudy ~85°F, no wind
heavy rain 10am to 11

0700 On Site PTSP, Mud weather
exclusion zone, calibrate Meters

Landtec Model 12 SN190635
Bat. check ok, Source check ok

PID C102547 MultiRae 3000
100 ppm isobutylene 100.1
-ok KAN2464041

0740 Move out

0811 RM03-CWRP06
N 1640196.7 E 2624584.1
Drill at Staked locations
Native @ 12 ft, sample @ 13' had
elevated reads, take 18 ft sample
for clean bottom

0930 RM03-CWRP07 next hole
N 1640278.8 E 2625124.4
Drill at marked location

1020 - make off due to heavy
rain. Move all vehicles
not 4X4 to gravel to Clubhouse

C Hall, B Moayyad, T Chorley, PermaFix J Huther, National Jessie Ordaz, George Gutierrez

122

Ruby Mines, phase 3 10/9/14

Ruby 3 drilling

~~intermittent rain~~ on/off rain, lt. breeze, ~60°F

1045 Set up to log & sample core from RM03-CWRP02 at parking area. drilling stopped

1154 RMØ3-CWRPØ2
N 1640433.2 E 2625[illegible]4.4

1240 RMØ3-CWRPØ3
N 1640349.5 E 2625362.8

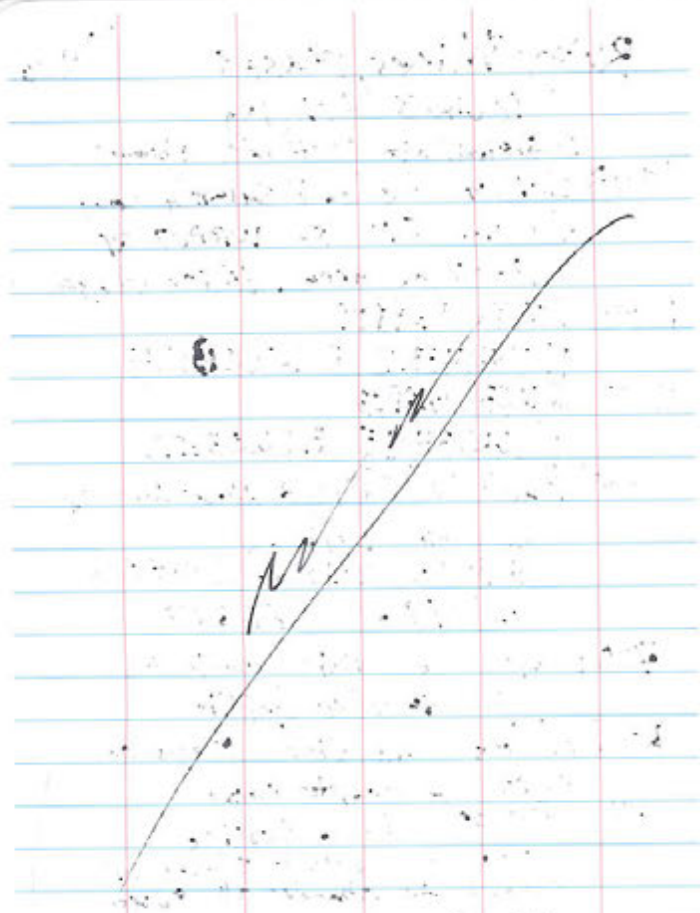
1200 Back to drilling @ waste rock cap
Complete borings RM03-CWRPØ2 & CWRP03 and ARG01 & ARG02

1305 Begins to rain again hard & stop drilling

1500 Drillers go find keys on truck @ chapter house

1600 Decon rig & tooling & get all cones & stakes up
Check to abandon the cover properly

123



Ruby Mines Phase 3 10/9/14

Ruby 3 Cap Drilling

Sample Log

Time	ID	µR/hr
0824	RMØ3-CWRPØ6-C-ØØ	15
0830	RMØ3-CWRPØ6D-CØØ	15
0850	RMØ3-CWRPØ6-R-05	19
0855	RMØ3-CWRPØ6-R-10	17
0920	RMØ3-CWRPØC-S-13	16
0925	RMØ3-CWRPØ6-S-18	15
0940	RMØ3-CWRPØ7-C-ØØ	13
1045	RMØ3-CWRPØ7-R-05	17
1050	RMØ3-CWRPØ7-S-6.5	13
1100	RMØ3-CWRPØ7-S-10	13
1200	RMØ3-CWRPØ2-C-ØØ	15
1230	RMØ3-CWRPØ2-R-05	15
1240	RMØ3-CWRPØ2-R-10	14
1320	RMØ3-CWRPØ2-S-13.5	13
1255	RMØ3-CWRPØ3-C-ØØ	12
1300	RMØ3-CWRPØ3D-C-ØØ	13
1355	RMØ3-CWRPØ3-R-Ø5	13
1400	RMØ3-CWRPØ3-S-10	13

124

125

Ruby Mines phase 3 10/10/14

~~Ruby & Drilling~~

Weather: Cloudy, ~40°F, still air

0700 Load up & Move to Smith Lake Charter House

0800 On site @ Charter House

Calibrate PID 210549 MultiRae3000

zero cal ok PID read = 99.9

0830 Talk to Stanley Saunders ~~Stanley Saunders~~ & check roads

No access to site

0900 Move off drillers & formalFix

CH2M Hill back to motel to pack & ship all remaining samples

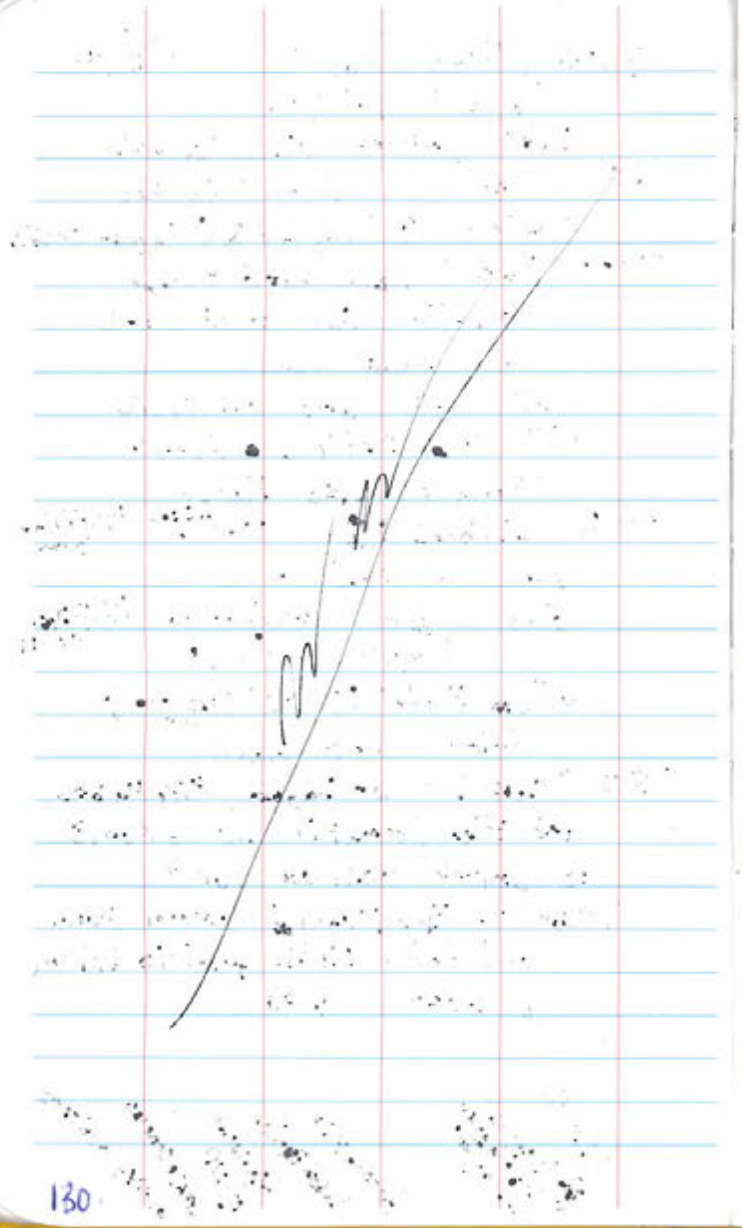
1235 Ship samples & meet to plan future activities

126

127

Ruby Mines Phase 3 10/11/14
Ruby 1 Drilling
Dark, ~40°F, still, Fog @ site
0600 Mobe to Ruby 1 to check
Roads: B Moayyad & J Laggan onsite
0700 Ruby 1 roads good except
1/8 mile soft sand stretch
on main road
Call all teams out to site
will meet Drillers @ Ruby 3
Others @ Chapter House
0715 Calibrate PID C102547 MultiRae 3000
Span Cal read @ 100.0
Gas = 100 ppm isobutylene lot KAN-246-100-11
Expires on 7/2015
Ludlum Model 19 SN 143606
Battery Check Good
0808 Team 2 - Jen Laggan, Mike Marable,
and Elen/PermaFix go to Ruby 3
to complete walk-over survey
Team 1 - Ben Moayyad, Tommey Charley
and Andre Ritchie guiding Drillers
to Ruby 1 area

CH2M Hill
B Moayyad
J Laggan
PermaFix
Jason Hebler
Navajo EWP
Jessie Charles
George Gutierrez



Ruby Mines phase 3 10/1/14

Ruby 1 Drilling

Fog breaking up, Sunny – 45°F

09:30 Drillers make it to Bus Stop at North edge of Ruby 1 area

Park Support truck, fuel rig and prepare to move up to mine

J. Hunter, A Ritzie T Charley prepare working and core screening areas at top of haul road & screen areas by 1/4 reads

945 PTSP Communication & Driving More to step-out/Drainage area at north

1000 Start Drilling @ RM01-STEP02 then to RM01-HR01. then to RM01-STEP05 RM01-DRN01

1147 RM01-STEP05
N 1644937.0 E 2607268

1200 Move off & Stop for Lunch

See Sample log

1243 RM01-STEP03
N 1,644,816.9 E 2,607,599.9

130

131

~~RM01 Ruby Mines Phase 3~~ 10/11/14

Ruby 1 Drilling

Sample log

Time	~~ID~~	ft/hr	
10:50	RM01-STEP02-05	28	
1058	RM01-STEP020-05	28	
1100	RM01-STEP02-01	16	
1103	RM01-STEP02-05	12	
1055	RM01-HR07-00	44	
1115	RM01-HR07-01	16	
1120	RM01-HR07-05	9	
1122	RM01-STEP05-00	36	
1140	RM01-STEP05-01	16	
1145	RM01-STEP05 05	15	
1155	RM01-DRNA1-01	~~16~~	
1200	RM01-DRNA1-05	~~15~~	
1142	RM01-DRNA1 00	14	
	~~RM01-DRNA1~~		
236	RM01-STEP03-00	17	
1305	RM01-STEP03-01	15	
1315	RM01-STEP03-05	15	
1300	RM01-WRK02-00	17	+MS/MSD
1320	RM01-WRK02-01	17	
1325	RM01-WRK02-5.5	15	

132

133

Ruby Mines, Phase 3 10/11/14

Ruby 1 Drilling

light wind, ~65°F, ptly cloudy

12:20 Resume work after 15-min lunch and start @ RM01-STEP03 then to ~~Rtm~~ RM01-WRK02 + RM-WRK01, -WRK03

1400 Drill rig won't start looks like fuel filter is clogged pull filter & head out to [illegible] to get replacement

Continue processing core & samples

Team 2 - 1/[illegible] - SU eq to Sample @ RUBY-019 and Jon & Elen ~~sample~~ resample RM03-DWTR02 Ra-226 Sample

1500 Wait for drillers - they need fuel filter from Grants

1615 Complete hand auger @ RUBY09 & resample @ DWTR02

1645 GPS WRK

RM01-WRK01	RM01-WRK02
N 1,644,776.4	N 1,644,729.5
E 2,607, ~~505.~~ 456.0	E 2,607,505.9

1700 Rig back up & running set up at WRK 03 & Re[illegible]

Ruby Mines phase B (Ruby 1 Drilling) 10/11/14

Sample Log

Time	ID	uR/hr
13:20	RMØ1-WRKØ1-ØØ	15
1355	RM-Ø1WRKØ1-Ø1	16
1400	RMØ1-WRKØ1-Ø5	17
1440	RMØ3-DUTRØ2-ØØ	
	U 23,634	
	C 7,212.	

replicate, same count

Ruby Mines Phase 3 10/12/14

Ruby 1 Drilling

Weather: 40° light breeze, windy, Sunny

0700 - Teams 1 & 2 on site, safety talk

Calibrate MiniRae 3000 C102547
100 PPM ISOBUTYLENE Lot# KAN-24-100-11
Reading 100.0 PPM
Ludlum Model 12 SN 193606
Battery Good, Source Check ✓

0730 Move to Cap area low # zone and set up.

0735 Begin Drilling @ ~~RM01~~ RM01-WRK03 then ~~WR~~ -SIEP04, WRK04, CWRP04

0845 Drilled to 15 ft hit native Soil and found no waste rock will add 1 more hole
Move to RM01-CWRP05 then -CWRP07

1000 Jason H, Jen L, Tommy C go to hand auger at vent 2

Chad Hill, B Macy, J Leggett, T Crowley, K Ricky, Parma Fix, Ellen Jakub, J Hutter, National, Jessie Oroley, George Gutierrez

Ruby Mines Phase 3 10/12/14

Ruby 1 Drilling

Weather: 40° light breeze, windy, Sunny

0700 – Teams 1 & 2 on site, saftey talk

Calibrate MiniRae 3000 C102547

100 PPM ISOBUTYLENE Lot# KAN-~~24~~-100-11

Reading 100.0 ppm

Ludlum Model 12 SN 193606

Batery Good, Source Check ✓

0730 Move to Cap area low # zone and set up.

0735 Begin Drilling @
~~RM~~ RM01-WRK03 then
~~WR~~ -STEP04, WRK04, CWRP04

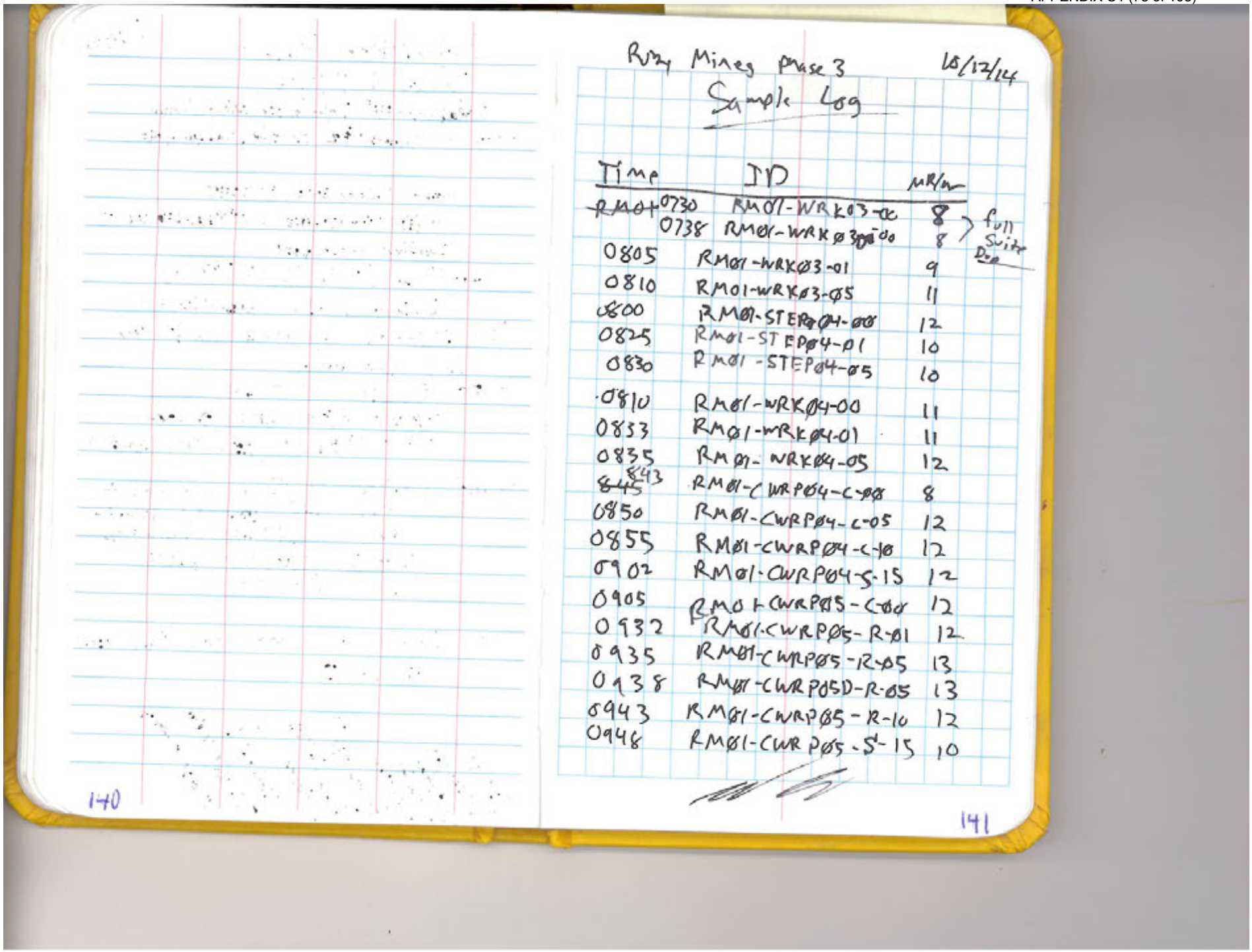
0845 Drilled to 15 ft hit native Soil and found no waste rock will add 1 more hole
Move to RM01-CWRP05 then -CWRP07

1000 Jason H, Jen C, Tommy C go to hand auger at vent 2

Chem Hill — B Morrow, J Leggett, T Charley, + Ricky

Pernа Fix — Ellen Jakub, J. Hosker

National — Jessie Orteles, George Gutierrez



Run Mines phase 3 10/17/14

Sample Log

Time	ID	mR/hr	
~~RM01~~ 0730	RM01-WRK03-00	8	> full Swipe Box
0738	RM01-WRK03-00	8	
0805	RM01-WRK03-01	9	
0810	RM01-WRK03-05	11	
0800	RM01-STEP04-00	12	
0825	RM01-STEP04-01	10	
0830	RM01-STEP04-05	10	
0810	RM01-WRK04-00	11	
0853	RM01-WRK04-01	11	
0835	RM01-WRK04-05	12	
8~~45~~ 843	RM01-CWRP04-C-00	8	
0850	RM01-CWRP04-C-05	12	
0855	RM01-CWRP04-C-10	12	
0902	RM01-CWRP04-S-15	12	
0905	RM01-CWRP05-C-00	12	
0932	RM01-CWRP05-R-01	12	
0935	RM01-CWRP05-R-05	13	
0938	RM01-CWRP05D-R-05	13	
0943	RM01-CWRP05-R-10	12	
0948	RM01-CWRP05-S-15	10	

140

141

RW by Mikes Phase 3 10/12/14

Sample Log

Time	ID	MR/hr
0945	RMØ1 - CWRPØ7 - C - ØØ	11
10:30	11 - CWRPØ7 - R - 05	10
10:40	11 - CWRPØ7 - R - 10	12
10:50	11 - CWRPØ7 - R - 15	12
1100	11 - CWRPØ7 - R - 20	11
1110	11 - CWRPØ7 - R - 25	11
1145	11 - CWRPØ7 - S - ~~315~~ 26.5	9
1150	11 - CWRPØ7 - S - 31.5	9
1112	RMØ1 - CWRPØ3 - C - ØØ	13
1140	" " - CWRPØ3 - R - 05	12
1200	11 CWRPØ7b - S 31.5	9
1330	RM - CWRPØ3 - R - ~~10~~	12
1335	RM - CWRPØ3 - R - 15	10
1341	RM - CWRPØ3 - S - 16.5	10
1147	RMØ2 - VENTØ2 - ØØ	8
1158	RMØ2 - VENTØ2 - Ø1	12
1200	RMØ2 - VENTØ3 - ØØ	12
1205	RMØ2 - VENTØ3 - Ø1	8
1124	RMØ2 VENTØ1 - ØØ	8
1135	RMØ2 VENTØ1 - Ø1	7
13:20	RMØ1 - AGR01	7

142

143

Ruby Mines, Phase 3 10/17/14

Ruby 1 Drilling

Winds 15-90mph, Cloudy, 60°-70°F

1100 Drillers ~~for~~ first out, Change PPE & set up @ RM01-CWRP03

1140 Rig ~~to~~ cuts off @ 10 ft on RM01-CWRP03 - no electric will try to jump start & check battery. Unable to start Continue to work on rig

1200 Fix rig -

1300 RM01-AGR01 N1644761.307

Uncollimated 17,093 E2,604,929.670

Collimated 4628

1330 Complet RM01-CWRP03 Move down hill & locate low ~~/~~ spot for processing ~~for~~ sample core

1600 Drill RM01-STEP01 and RM01-URNC1

1645 Drillers Move off Samplers Continue to process Core

1710 Move off site

Ruby Mines, Phase 3 10/12/14

Sample Log

Time	ID	MR/hr
1335	RMØ1-CWRPØ8-C-ØØ	11
1418	RMØ1-CWRPØ8-R-Ø5	12
1425	RMØ1-CWRPØ8-R-1Ø	10
1435	RMØ1-CWRPØ8-R-15	9
1440	RMØ1-CWRPØ8-S-18.5	9
1510	RMØ1-CWRPØ1-C-ØØ	20
1605	RMØ1-CWRPØ1-R-Ø5	12
1610	RMØ1-CWRPØ1 AR D-R-Ø5	12
1545	RMØ1-ARGØ2	20
~~1610~~ 1614	RMØ1-STEPØ1-ØØ	12
1620	" STEPØ1-Ø1	14
1630	" STEPØ1-05	9
1615	" DRNC1-ØØ	16
1635	" DRNC1-Ø1	8
1640	" DRNC1-05	10

146

147

148

Ruby Mines Phase 3 10/13/14

Ruby 1 Drilling

Weather: Sunny ~40-65°F, no wind

730 All staff on site
Calibrate MiniRae 3000
100 PPM ISOBUTYLENE Lot# KAN-240-100-1(
Reading 100.1 PPM
0800 PTSP, rushing, ~~[illegible]~~ grade, radiation
0815 Andre collects VOC Samples, Team 1 starts drilling @ RM01-AURP06, ARNB1
905 RM01-HR01
~~9:05~~ N 1,644,987.4 E 2,606,802.4
910 RM~~01~~-HR02
N 1,645,214.1 E 2,606,708.2
915 RM~~01~~-HR03
~~N 1,64[illegible]~~ E 2,606,760.2
N 1,645,757.1
1030 Decon drill rig, tools, Collect Equipment blank & start drilling on Haul Road
RM01-HR01 - HR02 & HR03
1300 Decon & site restoration
1330 Off site

Chazz Hill, B Maynard, A. Ritchie, J. Leggett, T Charley, Ramon Fitz, J Kaber, J Sakolo, Nathaniel, Jessie Granados, George Gutierrez

149

Ruby Mines Phase 3 10/13/14

~~Ruby Mines~~

Sample Log

EB & VOCs collected in AM

Time	ID	mR/hr	MK/hr
~~0435~~ 0810	RM01-CWRP06-00		7
0815	" -CWRP06-R05		11
0820	" -CWRP06D-R05		10
0830	" -CWRP06-S-6.5		8
~~0835~~ 840	" CWRP06D-S-11.5		7
~~0840~~ 835	" CWRP06-S-11.5		7
0846	RM01-DRNB1-00		12
0930	" DRNB1-01		10
0935	" DRNB1-05		9
0935	RM01-HR01-00		7
10:36	" HR01-01		8
1040	HR01-05		7
0946	RM01-HR02-00		~~40~~
1050	" -HR02-01		11
1055	" -HR02-05		7
0955	RM01-HR03-00 MS/MSD		~~29~~
1150	" HR03-01		7
1155	" HR03-05		7
1200	" HR03-05		6

150

151

Ruby Mines Phase 3 11/4/14
LiDAR @ Ruby 1 Cap

Weather: clear, lt breaze, 30-50°F

0500 B Monyyad Mob to site from ABQ office
0700 Pick up T Charley @ Gallup
0800 Meet J. Bitsuick at chapter house and check in to Navajo Nation to inform them of work on site
0815 Mobe to Ruby 1 waste rock cap area and do safety tailgate - radiation awareness
0920 Begin scanning @ Ruby 1
1100 Scan at 3 locations on North edge of Cap
1200 Check gate access at Ruby 3 (gallup)
Continue Scan @ 2 location on West of Ruby 1 cap
1400 Continue Scan w/ 3 locations on top of Cap
1600 Conclude scan @ Ruby 1, Pack up equipment
1625 Depart sight

CH2MHill
Jason Bitsuick
B. Monyyad
Tommy Charley

152

153

154

Ruby Mines Phase 3 11/5/14

LiDAR at Ruby 3 cap

Weather: sunny, calm wind 30-60°F

0530 Andre Ritchie leaves ABQ office.

0730 A. Ritchie arrives at Smith Lake Chapter House of Navajo Nation.

0750 Tommy Charley and Jason Bittick arrive at Chapter House.

0810 Sign-in at Chapter House to inform them of our work at mine.

0815 Move to Ruby3.

0850 Arrive at Ruby3, Conduct H+S meeting. Topics included:

- Slip, trip, and fall hazards
- Radiation exposure
- PPE (safety glasses, reflective vest, steel toe boots)

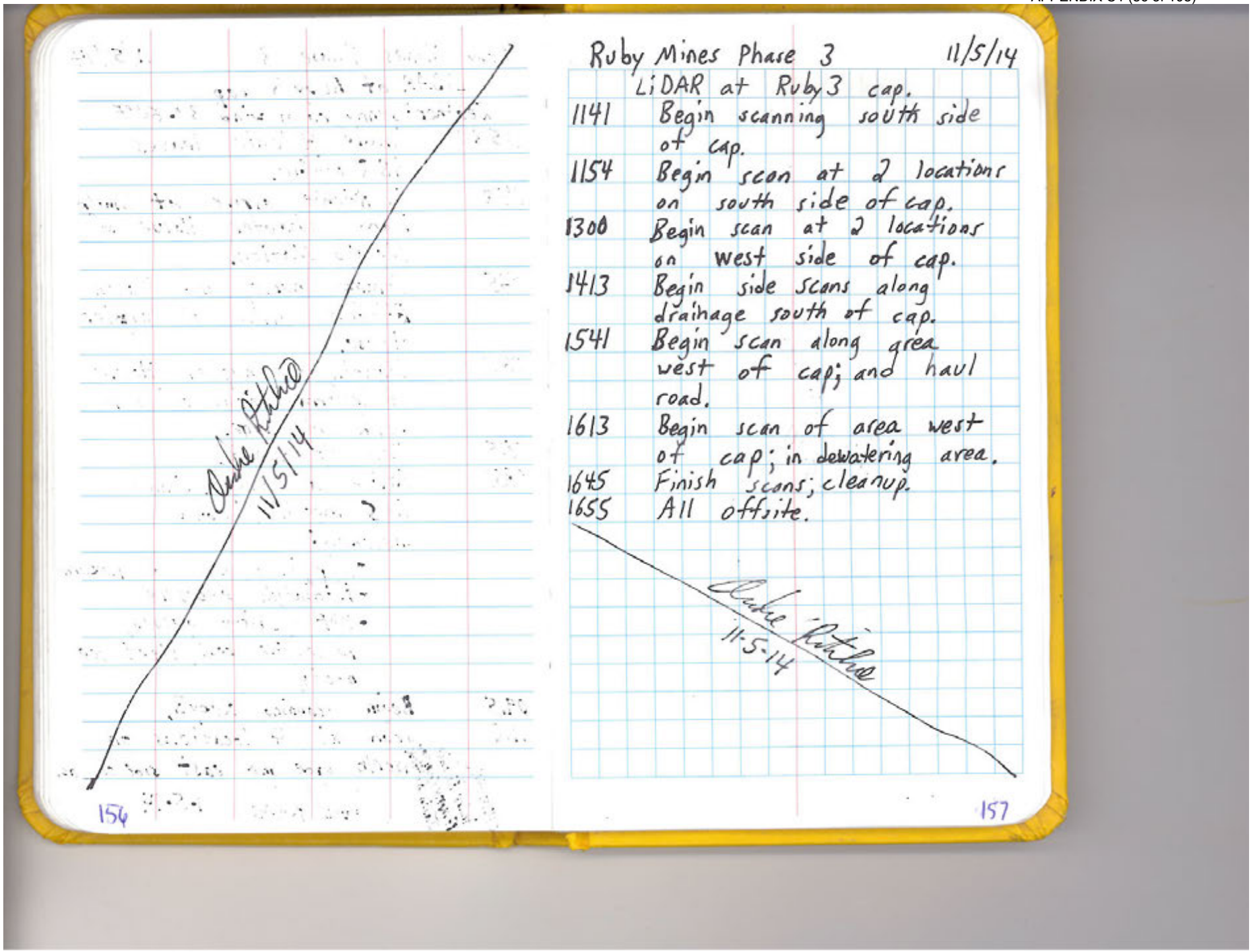
0915 Begin scanning Ruby3.

1112 Scan at 4 locations on north side and east side of cap.

CHRIS HILL
Andre Ritchie
Tommy Charley
Jason Bittick

Andre Ritchie 11-5-14

155



Ruby Mines Phase 3 11/5/14

LiDAR at Ruby 3 cap.

1141 Begin scanning south side of cap.

1154 Begin scan at 2 locations on south side of cap.

1300 Begin scan at 2 locations on west side of cap.

1413 Begin side scans along drainage south of cap.

1541 Begin scan along area west of cap; and haul road.

1613 Begin scan of area west of cap; in dewatering area.

1645 Finish scans; cleanup.

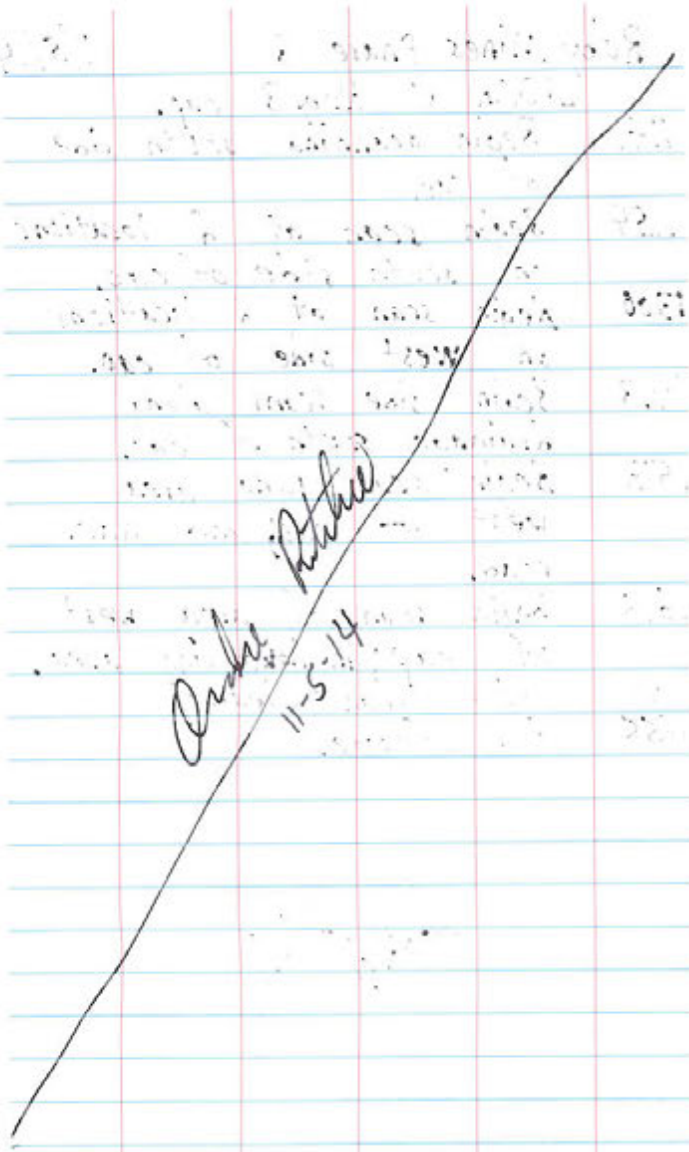
1655 All offsite.

Clarke Ritchie 11-5-14

Clarke Ritchie 11/5/14

154

157



158

Ruby Mines Phase 3 11/6/14

LiDAR at Ruby 3 cap.

0755 Andre Ritchie, Tommy Charley, and Jason Bittick arrive at Smith Lake Chapter House.

0800 Health and safety meeting. Topics included:
- Slip, trip, and fall hazards
- Uneven ground
- Manual lifting

0810 Chapter House not open yet; depart for Ruby 3.

0824 Arrive at Ruby 3. AR

0846 Begin scans at ~~3~~ 2 locations on north side of cap.

0957 Begin scan at 1 location on east side of cap.

1041 Begin scan at additional location on east side of cap.

1124 Finish scans; cleanup.

1209 All offsite.

1245 Drop Tommy in Gallup.

1300 Drive to ABQ.

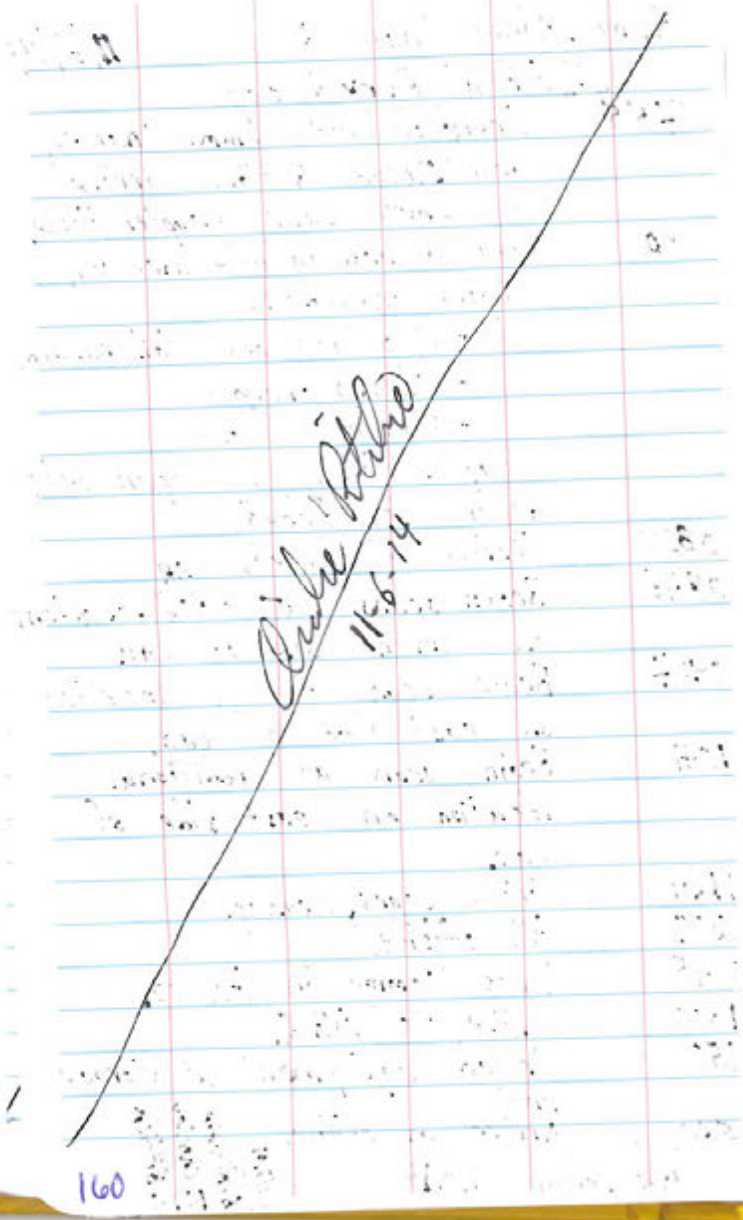
1500 Unload equipment at storage unit.

1530 Arrive at office.

Andre Ritchie 11/6/14

CH2M { A. Ritchie, T. Charley, J. Bittick

159



INDEX OF
CURVE AND REDUCTION TABLES

Weather: sunny, 70°F, 5-10mph breeze (16)

Ruby Mines Phase 3 10/6/14

0715 Leave Hotel for site.
0805 Arrive at Chapter House.
0815 Conduct H+S / site orientation.
- Topics included site hazards: slip, trip, and fall; radiological; biological; poor communications
0930 Calibrate PID: MiniRAE 3000
- CH2M HILL #: C102724
- SN: 592-907773
- Cal. gas: isobutylene, 100 ppm
- lot #: 955641; exp: 6/2016
- Ashtead Technology
- zero cal. = 0.0 ppm; span cal. = 98.5 ppm
1000 Move to Ruby 1 with Ellen (Permafix), and Mike, Jen, and Andre from CH2M HILL.
1005 Delineate parking area; area at background; 5-10 uR/hr.
1030 Ellen prepares for gamma walkover survey at Step Out North of Ruby1 and Adit South of Ruby1.
1035 Begin gamma walkover in area at step Out North of Ruby 1.

Andie Ritchie 10-6-14

Smith Lake Chapter of Navajo Nation (17)

Ruby Mines Phase 3 10/6/14

1153 Finish gamma walkover in area at Step Out North of Ruby1. Define extent >13,000 cpm.
1159 Frisk hands and feet for all at 100-200 cpm using Ludlum M-3, SN 187367 with 44-9 SN PR 194676 (15.9% eff.)
- cal. date: 10/3/14
- cal. due: 10/3/15
1200 Lunch break.
1220 Begin gamma walkover in area of Adit South of Ruby1.
1310 Mike takes over for Ellen doing gamma walkover. Ellen takes rest.
1334 Finish gamma walkover in area of Adit South of Ruby1. Define extent >13,000 cpm.
1442 Arrive at RUBY-004.
1545 Collect [RM04-VENT03-00] from 0 to 0.5' bgs. Also collect field duplicate from same location.

Andie Ritchie 10-6-14

(18)

Ruby Mines Phase 3 10-6-14

1600 Collect RM04-VENT03D-00 (field duplicate).

1630 Collect RM04-VENT03-02 from 2 to 2.5' bgs.

1700 All samples from RM04-VENT03 include:
- Ra-226 (901.1) in 1 9-oz glass jar (unpreserved).
- As, Mo, Se, U, +V (6020) and Hg (7470A) in 1 4-oz glass jar (unpreserved).

for depths 0-0.5' bgs and 2-2.5' bgs, including field duplicate from 0-0.5' bgs. 2" diameter, 6" long closed bucket hand auger used to collect all RM04-VENT03 samples.

1730 Frisk hands and feet in parking area. All at 100-200 cpm.

1800 All staff offsite.

1830 Arrive at hotel. AR

Staff: Ellen (Permafix), Jen L. (CH2M HILL), Mike M. (CH2M HILL), Andre R. (CH2M HILL)

Andre Ritchie 10-6-14

(19)

Ruby Mines Phase 3 10-6-14

1830 All samples were placed immediately in a cooler with ice. Site exposure hour summary:

CH2M HILL
- Jen Laggan = 10 hours
- Mike Marable = 10 hours
- Andre Ritchie = 10 hours

Permafix
- Ellen Jakub = 10 hours

1835 On-contact readings on all samples collected today:
- RM04-VENT03-00
  - 4-oz. = 12,582 cpm
  - AR q-8-oz. = 13,664 cpm
- RM04-VENT03D-00
  - 4-oz. = 12,909 cpm
  - AR q-8-oz. = 13,911 cpm
- RM04-VENT03-02
  - 4-oz. = 11,327 cpm
  - AR q-8-oz. = 11,301 cpm

Readings made with Ludlum M-2221, SN 262318 with 2x2 NaI scintillation detector 44-10, SN PR240330
- cal. date: 10/3/14
- cal. due: 10/3/15

Andre Ritchie 10-6-14

(20)

Ruby Mines Phase 3 10-6-14

1840 Ludlum M-2221 with 44-10 also used for gamma walkover survey, and collimated and uncollimated surface readings and soil boring readings at sample locations.

1845 Exposure rate (uR/hr) readings made with Bicron microrem, SN X10 E049A
- cal. date: 10/3/14
- cal. due: 10/3/15

1850 All rad. detectors checked with Cesium check source (Cs137), # 99-0295.

Andie Ritchie 10-6-14

Weather: partly cloudy, 70°F, light wind

(21)

Ruby Mines Phase 3 10-7-14

0710 Leave hotel. Travel to site.

0807 Arrive at Ruby 3. Mark (USEPA) onsite.

0810 Calibrate PID, MiniRAE 3000. Same calibration standards as 10-6-14.
- Fresh air (zero cal.) = 0.0 ppm
- Span cal. = 100.4 ppm

0815 Health and safety meeting. Topics included:
- Road conditions
- Uneven ground
- Field team communication
- Dust mitigation

0900 Jen, Mike, and Andre (CH2M HILL), Ellen (Permafix), and Mark Ripperda (USEPA R9) head to RUBY-004. Other H+S participants:
- Kira (CH2M HILL), and
- Jason (Permafix)

0915 Arrive at RUBY-004.

0940 Ellen begins gamma scan at RM04-VENT02.

1020 Collect [RM04-VENT02-00] from 0 to 0.5' bgs.

1030 Collect [RM04-VENT02-01] from 1 to 1.5' bgs.

Andie Ritchie 10-7-14

Smith Lake Chapter of Navajo Nation (22)

Ruby Mines Phase 3 10-7-14

1045 Collect RM04-VENT01-00 from 0 to 0.5' bgs.
1050 Collect RM04-VENT01-01 from 1 to 1.5' bgs.
1130 Leave RUBY-004. Frisk all at 100-200 cpm.
1150 Arrive at Ruby 3.
1200 Lunch.
1230 Prepare equipment to collect correlation samples.
1255 Move to Ruby 3 cap area. Will collect correlation samples at dewatering area.
1330 Collect in-situ 1-min static count 6-inches above ground surface at RM-COR39
- uncollimated = 18,845 cpm
1335 Ellen begins scanning surface around correlation samples in dewatering area.
1350 Mark Ripperda offsite.
1355 File name for dewatering area: Ruby3-COR for correlation sample points in Permafix datalogger.
1413 Collect RM-COR30-00 from 0 to 0.5' bgs.

Andie Ritchie 10-7-14

(23)

Ruby Mines Phase 3 10-7-14

1433 Collect RM-COR25-00 from 0 to 0.5' bgs.
1445 Collect RM-COR39-00 from 0 to 0.5' bgs.
1516 Collect RM-COR32-00 from 0 to 0.5' bgs.
1525 Collect RM-COR31-00 from 0 to 0.5' bgs.
1610 Collect RM-COR27-00 from 0 to 0.5' bgs
1612 Collect RM-COR40-00 from 0 to 0.5' bgs
1615 Mike (CH2M HILL) offsite.
1654 Collect RM-COR28-00 from 0 to 0.5' bgs.
1700 All correlation samples (COR) collected today include:
- Ra-226 (901.1) in 1 9-oz glass jar (unpreserved).
RM04 samples collected today for same analyses for RM04 samples collected on 10-6-14.

Staff: Ellen J. (Permafix), Jen L. (CH2M HILL), Mike M. (CH2M HILL), Andie R. (CH2M HILL)

Andie Ritchie 10-7-14

Ruby Mines Phase 3 (24) 10-7-14

1705 On-contact readings on all samples collected today:

- RM04-VENT02-00
  - 4-oz. = 10,523 cpm; 9 μrem/hr
  - 9-oz. = 10,738 cpm; 9 μrem/hr
- RM04-VENT02-01
  - 4-oz. = 10,515 cpm; 9 μrem/hr
  - 9-oz. = 10,627 cpm; 9 μrem/hr
- RM04-VENT01-00
  - 4-oz. = 10,706 cpm; 9 μrem/hr
  - 9-oz. = 10,407 cpm; 9 μrem/hr
- RM04-VENT01-01
  - 4-oz. = 10,320 cpm; 9 μrem/hr
  - 9-oz. = 10,259 cpm; 10 μrem/hr
- RM-COR30-00
  - 9-oz. = 11,157 cpm; 6 μrem/hr
- RM-COR25-00
  - 9-oz. = 11,625 cpm; 11 μrem/hr
- RM-COR39-00
  - 9-oz. = 10,682 cpm; 9 μrem/hr
- RM-COR32-00
  - 9-oz. = 11,735 cpm; 11 μrem/hr
- RM-COR31-00
  - 9-oz. = 11,914 cpm; 11 μrem/hr
- RM-COR24-00
  - 9-oz. = 12,319 cpm; 6 μrem/hr

Andre' Ritchie 10-7-14

Ruby Mines Phase 3 (25) 10-7-14

1705 cont.

- RM-COR40-00
  - 9-oz. = 11,173 cpm; 7 μrem/hr
- RM-COR28-00
  - 9-oz. = 10,129 cpm; 8 μrem/hr

On-contact exposure rate also recorded on samples collected on 10-6-14:

- RM04-VENT03-00
  - 4-oz. = 9 μrem/hr
  - 9-oz. = 9 μrem/hr
- RM04-VENT03D-00
  - 4-oz. = 9 μrem/hr
  - 9-oz. = 10 μrem/hr
- RM04-VENT03-02
  - 4-oz. = 10 μrem/hr
  - 9-oz. = 10 μrem/hr

All readings made on-contact with sample jars.

1710 All correlation samples collected with stainless steel hand trowel. All RM04-VENT samples collected with 2" diameter hand auger, with 6" long, closed bucket hand auger.

Andre' Ritchie 10-7-14

(26)

Ruby Mines Phase 3 10-7-14

1715 Hand auger and hand trowel decontaminated between sampling locations with dry brushing, followed by distilled water rinse, and hand-drying with paper towel.

1720 All frisk hands and feet at 100-200 cpm.

1730 All offsite, Site exposure hour summary for 10-7-14:

CH2M HILL
- Jen Laggan = 9.5 hours
- Mike Marable = 8 hours
- Andre Ritchie = 9.5 hours

Permafix = Ellen Jakub = 9.5 hours

USEPA - Mark Ripperda = 6 hours

1815 Arrive at hotel.

Andre Ritchie 10-7-14

Weather: cloudy, 70°F, sprinkles, light breeze

(27)

Ruby Mines Phase 3 10-8-14

0615 Leave hotel.

0700 Arrive at gate to Ruby 3.

0705 Calibrate PID, MiniRAE 3000. Same calibration standards as 10-7-14.
- zero cal. = 0.0 ppm
- span cal. = 100.1 ppm

0715 All field team members onsite.
- CH2M HILL:
  - Andre Ritchie
  - Mike Marable
  - Jen Laggan
  - Ben Moayyad
  - Tommy Charley
  - Jason Bittick
  - Bobby Wildrick
  - Kira Sykes
- Permafix:
  - Ellen Jakub
  - Jason Hubler
- National
  - Jesse
  - George

0720 Health + safety meeting. Topics: weather, driving hazards, communication.

Andre Ritchie 10-8-14

Smith Lake Chapter of Navajo Nation (28)

Ruby Mines Phase 3 10-8-14

0805 Collect equipment blank from hand auger used to sample RUBY-004. Sample ID: RM04-EB01. Samples:
- Ra-226 (903) in 1-L poly (HNO_3).
- As, Mo, Se, U, + V (6020) and Hg (7470A) in 500-mL poly (HNO_3).

EB collected by pouring BDH water (cat. #: BDH1168-5GL lot #: 111413B) over + through closed bucket of auger.

0810 All head to Ruby3 area.

0815 Ellen (Permafix) begins gamma walkover transects at Ruby3 ~~ste~~ AR work area.

0855 Collect RM-COR38-00 from 0 to 0.5' bgs.

0904 Collect RM-COR37-00 from 0 to 0.5' bgs.

0911 Collect RM-COR24-00 from 0 to 0.5' bgs.

0918 Collect RM-COR36-00 from 0 to 0.5' bgs.

Andre Ritchie 10-8-14

(29)

Ruby Mines Phase 3 10-8-14

0925 Collect RM-COR35-00 from 0 to 0.5' bgs.

0935 Collect RM-COR34-00 from 0 to 0.5' bgs.

0943 Collect RM-COR33-00 from 0 to 0.5' bgs.

0954 Collect RM-COR29-00 from 0 to 0.5' bgs.

1030 Move to Ruby3 cap area.

1047 Collect RM-COR26-00 from 0 to 0.5' bgs.

1058 Back at Ruby3 parking area.

1115 Begin gamma walkover survey of work area west of Ruby3 cap area.

1330 Finish walkover survey. All frisk hands and feet at 100-200 cpm, Mark (EPA) onsite.

1350 Move to Ruby1.

1410 Arrive at Ruby1 area.

1420 Collect RM-COR44-00 from 0 to 0.5' bgs.

1435 Collect RM-COR41-00 from 0 to 0.5' bgs.

Staff: Ellen J. (Permafix), Jon L, Mike M, Andre R. (CHEMHILL)

Andre Ritchie 10-8-14

(30)

Ruby Mines Phase 3 10-8-14

1443 Collect RM-COR42-00 from 0 to 0.5' bgs,

1451 Collect RM-COR19-00 from 0 to 0.5' bgs,

1500 Collect RM-COR43-00 from 0 to 0.5' bgs,

1514 Collect RM-COR21-00 from 0 to 0.5' bgs,

1518 Collect RM-COR18-00 from 0 to 0.5' bgs,

1535 Collect RM-COR47-00 from 0 to 0.5' bgs,

1545 Collect RM-COR23-00 from 0 to 0.5' bgs,

1555 Collect RM-COR46-00 from 0 to 0.5' bgs,

1600 Collect RM-COR22-00 from 0 to 0.5' bgs,

1615 Collect RM-COR45-00 from 0 to 0.5' bgs,

1620 Collect RM-COR20-00 from 0 to 0.5' bgs,

1625 All COR (correlation) samples collected today include:
- Ra-226 (901.1) in 1 9-oz. glass jar (unpreserved)

Andre Ritchie 10-8-14

(31)

Ruby Mines Phase 3 10-8-14

1630 On-contact readings on all samples collected today:
- RM-COR38-00
  - 9-oz. = 10,242 cpm; 7 urem/hr
- RM-COR37-00
  - 9-oz. = 10,207 cpm; 8 urem/hr
- RM-COR24-00
  - 9-oz. = 10,011 cpm; 6 urem/hr
- RM-COR36-00
  - 9-oz. = 10,159 cpm; 7 urem/hr
- RM-COR35-00
  - 9-oz. = 10,191 cpm; 6 urem/hr
- RM-COR34-00
  - 9-oz. = 10,459 cpm; 6 urem/hr
- RM-COR33-00
  - 9-oz. = 10,196 cpm; 9 urem/hr
- RM-COR29-00
  - 9-oz. = 10,559 cpm; 6 urem/hr
- RM-COR26-00
  - 9-oz. = 11,071 cpm; 7 urem/hr
- RM-COR44-00
  - 9-oz. = 8,252 cpm; 8 urem/hr
- RM-COR41-00
  - 9-oz. = 8,566 cpm; 8 urem/hr

Andre Ritchie 10-8-14

Ruby Mines Phase 3 10-8-14

1630 cont. -RM-COR42-00
-9-oz.=8,677 cpm; 8 urem/hr
-RM-COR19-00
-9-oz.=8,824 cpm; 8 urem/hr
-RM-COR43-00
-9-oz.=8,813 cpm; 9 urem/hr
-RM-COR21-00
-9-oz.=8,400 cpm; 7 urem/hr
-RM-COR18-00
-9-oz.=8,417 cpm; 8 urem/hr
-RM-COR47-00
-9-oz.=8,259 cpm; 8 urem/hr
-RM-COR23-00
-9-oz.=8,319 cpm; 6 urem/hr
-RM-COR46-00
-9-oz.=8,309 cpm; 8 urem/hr
-RM-COR22-00
-9-oz.=8,012 cpm; 7 urem/hr
-RM-COR45-00
-9-oz.=8,366 cpm; 8 urem/hr
-RM-COR20-00
-9-oz.=8,838 cpm; 7 urem/hr

All readings made on-contact with sample jars,

Andre Ritchie 10-8-14

Ruby Mines Phase 3 10-8-14

1640 Cleanup and pack samples
1645 All COR samples collected with stainless steel hand trowel. Decontaminated between sampling locations with dry brushing, followed by distilled water rinse, and hand-drying with paper towel.
1715 All frisk hands and feet at 100-200 cpm. Head to meet other team at entrance road to Ruby 3.
1730 All offsite. Site exposure hour summary for 10-8-14:

CH2M HILL
- Jen Laggan = 10.5 hours
- Mike Marable = 10.5 hours
- Andre Ritchie = 10.5 hours

Permatix
- Ellen Jakub = 10.5 hours

US EPA R9
- Mark Ripperda = ?
Arrived at 1330, but departure was not observed by Team 2.

1815 Arrive at hotel.

Andre Ritchie
10-8-14

Weather: cloudy, 65°F, showers, light wind (34)

Ruby Mines Phase 3 10-9-14

0615 Leave hotel.
0658 Arrive at Ruby 3.
0700 Calibrate PID, Mini RAE 3000. Same calibration standards as 10-8-14.
- zero cal. = 0.0 ppm
- span cal. = 100.1 ppm

0710 Health and safety meeting. Participants include:
- CH2M HILL:
  - Andre Ritchie
  - Mike Marable
  - Tommy Charley
  - Kira Sykes
  - Jen Laggan
  - Ben Moayyad
- Permafix:
  - Ellen Jakub
  - Jason Hubler
- National
  - Jesse
  - George

Topics include weather conditions, uneven ground, dust mitigation, radiation.

Andre Ritchie 10-9-14

Smith Lake chapter of Navajo Nation (35)

Ruby Mines Phase 3 10-9-14

0818 Collect RM03-WRK01-00 from 0 to 0.5' bgs.
0848 Collect RM03-WRK02-00 from 0 to 0.5' bgs.
0915 Collect RM03-WRK04-00 from 0 to 0.5' bgs.
0930 Collect RM03-WRK03-00 from 0 to 0.5' bgs.
1000 Head to Ruby3 cap to help drill rig.
1005 Chased off cap by heavy thunder storm.
1010 Regroup at Ruby3 parking area.
1045 Heavy rain has forced AR ~~none~~ non-4WD vehicles to leave Ruby3. Kira, Mike, Ellen, and Jesse offsite.
1050 Work area samples collected today from Ruby3 for VOCs (8260B) in 3 40-mL VOAs (2 preserved with sodium bisulfate, 1 preserved with methanol); SVOCs (8270C), PCB (8082), and TPH (8015M) in 1 9-oz. glass jar (unpreserved); and

Andre Ritchie 10-9-14

Ruby Mines Phase 3 10-9-14

1050 cont, perchlorate (6860) in 1 4-oz. jar (unpreserved; and explosives (8330B) in 1 4-oz. jar (unpreserved).

1055 Work area samples collected with disposable plastic scoop (dedicated scoop for each sample location), placed in gallon plastic bag to homogenize, and then distributed to sample containers. VOAs filled using Terra Core sampler.

1122 Mark (USEPA) onsite.

1130 Drillers mobilize back to cap area.

1145 Prepare and pack samples for shipment.

1400 Mark offsite.

1530 Jen and Andre offsite with 4 coolers to drop at Fed Ex. Frisk out at 100-200 cpm.

1615 Arrive at Fed Ex. Wait for driver.

1630 Fed Ex driver arrives.

Andre Ritchie 10-9-14

Ruby Mines Phase 3 10-9-14

1700 Andre and Jen arrive at hotel.

Andre Ritchie 10-9-14

Weather: cloudy, 60°F, sprinkles, light wind (38)

Ruby Mines Phase 3 10-10-14

0800 Arrive at Smith Lake Chapter House,

0805 Calibrate PID, MiniRAE 3000. Some calibration standards as 10-9-14,
- zero cal. = 0.0 ppm
- span cal. = 100.0 ppm

0810 Health and safety meeting. Discuss hazards: poor road conditions, track mud into field vehicles, fog. Attendants:
- CH2M HILL:
  - Andre Ritchie
  - Mike Marable
  - Bobby Wildrick
  - Jason Bittick
  - Jen Laggan
  - Ben Moayyad
  - Kira Sykes
  - Tommy Charley
- Permafix:
  - Ellen Jakub
  - Jason Hubler
- National:
  - ~~Jorge~~ AR George
  - Jesse

Andre' Ritchie 10-10-14

Smith Lake Chapter of Navajo Nation (39)

Ruby Mines Phase 3 10-10-14

0810 cont. - Freeport McMoRan:
- Stu

0900 Rain on 10-9-14 has made roads to Ruby1 and Ruby3 impassable, Local residents have also requested we not drive on unpaved roads. Team 1 (drill rig team) heads back to Gallup for the day, Team 2 (Andre, Jen, Ellen, and Jason Hubler) head to Ruby1 former Haul Road near BIA Route 49 to get 3 shallow samples, Stu offsite,

0923 Collect RM01-HR06-00 from 0 to 0.5' bgs,

0928 Collect RM01-HR04-00 from 0 to 0.5' bgs,

0935 Collect RM01-HR05-00 from 0 to 0.5' bgs,

0955 All frisk out at 100-200 cpm,

1000 Leave Ruby1 haul road,

1015 Arrive at Smith Lake Chapter House,

Staff { Permafix / Ellen J., Jason H. / CH2M / Jen L., Andre R.

Andre' Ritchie 10-10-14

Ruby Mines Phase 3 (40) 10-10-14

1020 All leave Chapter House.

1100 Arrive at hotel. Help pack and prepare samples for shipment.

1245 Andre and Tommy head to FedEx drop off location with 4 coolers.

1300 Drop off coolers at FedEx.

1315 Summary of exposure hours for 10-9-14 and 10-10-14:

- 10-9-14:
  - CH2M HILL - Jen Laggan = 8.5 hours
  - CH2M HILL - Mike Marable = 8.5 hours
  - CH2M HILL - Andre Ritchie = 8.5 hours
  - Permafix - Ellen Jakub = 8.5 hours
  - USEPA R9 - Mark Ripperda = 2.5 hours
- 10-10-14:
  - CH2M HILL - Jen Laggan = 3 hours
  - CH2M HILL - Mike Marable = 1 hour
  - CH2M HILL - Andre Ritchie = 2 hours
  - Permafix - Ellen Jakub = 2 hours
  - Permafix - Jason Hubler = 2 hours
  - Freeport McMoRan - Stu = 1 hours

1320 All samples collected today for Ra-226 (1 9-oz. glass jar, unpreserved) and metals (1 4-oz. glass jar, unpreserved)

Andre Ritchie 10-10-14

Ruby Mines Phase 3 (41) 10-10-14

1320 cont. See 10-6-14 notes for analyses and methods.

1330 On-contact readings on all samples collected today:

- RM01-HR06-00
  - 4-oz. = 12,956 cpm; 15 urem/hr
  - 9-oz. = 13,073 cpm; 13 urem/hr
- RM01-HR04-00
  - 4-oz. = 10,446 cpm; 12 urem/hr
  - 9-oz. = 10,694 cpm; 12 urem/hr
- RM01-HR05-00
  - 4-oz. = 17,277 cpm; 15 urem/hr
  - 9-oz. = 19,609 cpm; 15 urem/hr

Andre Ritchie 10-10-14

Weather: foggy, 60°F, light wind

Ruby Mines Phase 3 (42) 10-11-14

0710 Leave hotel.
0750 Arrive at Smith Lake Chapter House.
0800 Calibrate PID, MiniRAE 3000. Same calibration standards as 10-10-14.
- zero cal. = 0.0 ppm
- span cal. = 100.2 ppm
0810 Andre, Tommy, and Jason head to Ruby1 to gamma scan boring locations for today.
0945 Ben, Jen, Mike, Ellen, and drillers (Jesse and George) arrive at Ruby1. Drillers had to drive rig on tracks up muddy road.
1015 Begin drilling at RM01-STEP02.
1030 Collect equipment blank off drill pipe. Sample ID: RM01-EB02.
1055 Collect RM01-HR07-00 from 0 to 0.5' bgs.
1115 Collect RM01-HR07-01 from 1 to 1.5' bgs.

Andre Ritchie 10-11-14

Weather: sunny, 75°F, light breeze

Ruby Mines Phase 3 (43) 10-11-14

1120 Collect RM01-HR07-05 from 4.5 to 5' bgs.
1142 Collect RM01-DRNA1-00 from 0 to 0.5' bgs.
1155 Collect RM01-DRNA1-01 from 1 to 1.5' bgs.
1200 Collect RM01-DRNA1-05 from 4.5 to 5' bgs.
1300 Collect RM01-WRK02-00 from 0 to 0.5' bgs. MS/MSD for metals.
1320 Collect RM01-WRK02-01 from 1 to 1.5' bgs.
1325 Collect RM01-WRK02-5.5 from 5.5 to 6' bgs.
1400 Andre and Jason head to RUBY-19 vent. Drill rig has stopped.
1510 Collect RM19-VENT03-00 from 0 to 0.5' bgs.
1515 Collect RM19-VENT03-01 from 1 to 1.5' bgs.
1519 Collect RM19-VENT01-00 from 0 to 0.5' bgs.
1523 Collect RM19-VENT01-01 from 0 to 1.5' bgs.

AR 1

Andre Ritchie 10-11-14

staff: ERM: J. Lagan, M. Murable, B. Maynard, A. Ritchie, T. Charley; Permatrix: E. Jakub, J. Hubler; National: George, Jesse

Smith Lake Chapter of Navajo Nation (44)
Ruby Mines Phase 3 10-11-14

1525 Collect RM19-VENT02-00 from 0 to 0.5' bgs.
1530 Collect RM19-VENT02-01 from 1 to 1.5' bgs.
1600 Head back to Ruby1.
1630 Drillers left Ruby1 at 1330 to get part for rig, as rig stopped working. Drillers are back onsite with part, and repair rig.
1645 Cleanup.
1700 All offsite.
1745 Arrive at hotel.

Andre Ritchie 10-11-14

Weather: sunny, 70°F, strong wind (45)
Ruby Mines Phase 3 10-12-14

0615 Leave hotel.
0700 Arrive at Ruby1.
0705 Calibrate PID, MiniRAE 3000, Same calibration standards as 10-11-14.
- zero cal. = 0.0 ppm
- span cal. = 100.1 ppm
0710 Health and safety. Discuss hazards:
- wind
- blowing dust
- maintain focus
0730 On-contact readings for all samples collected on 10-11-14:
- RM01-HR07-00 = 44 urem/hr
- RM01-HR07-01 = 16 urem/hr
- RM01-HR07-05 = 9 urem/hr
- RM01-DRNA1-00 = 14 urem/hr
- RM01-DRNA1-01 = 16 urem/hr
- RM01-DRNA1-05 = 15 urem/hr
- RM01-WRK02-00 = 17 urem/hr
- RM01-WRK02-01 = 17 urem/hr
- RM01-WRK02-5.5 = 15 urem/hr
- RM19-VENT03-00 = 16 urem/hr
- RM19-VENT03-01 = 15 urem/hr
- RM19-VENT01-00 = 16 urem/hr
- RM19-VENT01-01 = 15 urem/hr

Andre Ritchie 10-12-14

Smith Lake Chapter of Navajo Nation (46)

Ruby Mines Phase 3 10-12-14

0730 cont. -RM19-VENT02-00 = 15 urem/hr
-RM19-VENT02-01 = 15 urem/hr
All samples on 10-12-14 collected for Ra-226 and metals. See 10-6-14 notes for analyses and methods.

0800 Collect RM01-STEP04-00 from 0 to 0.5' bgs. 12 uR/hr.

0825 Collect RM01-STEP04-01 from 1 to 1.5' bgs. 10 uR/hr.

0830 Collect RM01-STEP04-05 from 4.5 to 5' bgs. 10 uR/hr.

0843 Collect RM01-CWRP04-C-00 from 0 to 0.5' bgs. 8 uR/hr.

0850 Collect RM01-CWRP04-R-05 from 4.5 to 5' bgs. 12 uR/hr.

0855 Collect RM01-CWRP04-R-10 from 9.5 to 10' bgs. 12 uR/hr.

0902 Collect RM01-CWRP04-S-15 from 14.5 to 15' bgs. 12 uR/hr.

0945 Collect RM01-CWRP07-C-00 from 0 to 0.5' bgs. 11 uR/hr.

1030 Collect RM01-CWRP07-R-05 from 4.5 to 5' bgs. 10 uR/hr.

1040 Collect RM01-CWRP07-R-10 from 9.5 to 10' bgs. 12 uR/hr.

Andre Ruthe 10-12-14

(47)

Ruby Mines Phase 3 10-12-14

1050 Collect RM01-CWRP07-R-15 from 14.5 to 15' bgs. 12 uR/hr.

1100 Collect RM01-CWRP07-R-20 from 19.5 to 20' bgs. 11 uR/hr.

1110 Collect RM01-CWRP07-R-25 from 24.5 to 25' bgs. 11 uR/hr.

1145 Collect RM01-CWRP07-S-26.5 from 26.5 to 27' bgs. 9 uR/hr.

AR

1150 Collect RM01-CWRP07-S-31.5 from 31.5 to 32' bgs. 9 uR/hr.

1147 RUB4-002 vent samples are collected using 2" diameter hand auger with Jen, Tommy, and Jason. Collect RM02-VENT02-00 from 0 to 0.5' bgs. 8 urem/hr.

1158 Collect RM02-VENT02-01 from 1 to 1.5' bgs. 12 urem/hr.

1124 Collect RM02-VENT01-00 from 0 to 0.5' bgs. 8 urem/hr.

1135 Collect RM02-VENT01-01 from 1 to 1.5' bgs. 7 urem/hr.

1200 Collect RM02-VENT03-00 from 0 to 0.5' bgs. 12 urem/hr.

1205 Collect RM02-VENT03-01 from 1 to 1.5' bgs. 8 urem/hr.

Andre Ruthe 10-12-14

(48)

Ruby Mines Phase 3 10-12-14

1335 Collect RM01-CWRP08-C-00 from 0 to 0.5' bgs, 11 urem/hr.

1418 Collect RM01-CWRP08-R-05 from 4.5 to 5' bgs, 12 urem/hr.

1425 Collect RM01-CWRP08-R-10 from 9.5 to 10' bgs, 10 urem/hr.

1435 Collect RM01-CWRP08-R-15 from 14.5 to 15' bgs, 9 urem/hr.

1440 Collect RM01-CWRP08-S-18.5 from 18.5 to 19' bgs, 9 urem/hr.

1510 Collect RM01-CWRP01-C-00 from 0 to 0.5' bgs, 20 urem/hr.

1605 Collect RM01-CWRP01-R-05 from 4.5 to 5' bgs. Duplicate collected at 1610 with ID RM01-CWRP01D-R-05, 12 urem/hr.

1629 Collect RM01-CWRP01-R-10 from 9.5 to 10' bgs, 11 urem/hr.

1635 Collect RM01-CWRP01-R-15 from 14.5 to 15' bgs, including MS/MSD for metals analyses. 10 urem/hr.

1640 Collect RM01-CWRP01-R-20 from 19.5 to 20' bgs, 11 urem/hr.

1645 Collect RM01-CWRP01-S-22.5 from 22.5 to 23' bgs, 7 urem/hr.

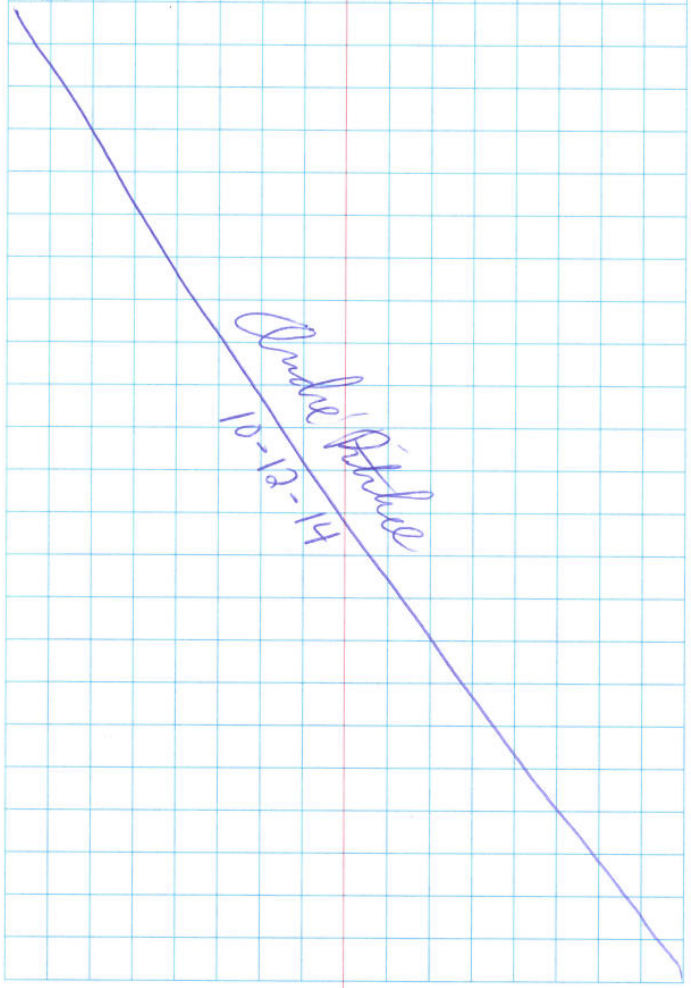
Andie Ritchie 10-12-14

(49)

Ruby Mines Phase 3 10-12-14

1710 All offsite from Ruby 1

1750 Arrive at hotel.



Weather: Sunny, 60 °F, light wind (50)

Ruby Mines Phase 3 10-13-14

0730 Arrive at Ruby 1.

0735 Health and safety meeting. Hazard items include:
- Cold temperatures
- Unstable slopes and footing on cap
- Maintain focus

0745 Calibrate PID, MiniRAE 3000. Same calibration standards as 10-12-14.
- zero cal. = 0.0 ppm
- span cal. = 100.0 ppm

0832 Collect RM01-WRK01-00 from 0 to 0.5' bgs for VOCs.

0834 Collect RM01-WRK02-00 from 0 to 0.5' bgs for VOCs.

0836 Collect RM01-WRK03-00 from 0 to 0.5' bgs for VOCs.

0838 Collect RM01-WRK04-00 from 0 to 0.5' bgs for VOCs,

0840 VOC samples collected using TerraCores in 3 VOAs, 40-mL each (2 preserved with sodium bisulfate, 1 preserved with methanol).

Andre Ritchie 10-13-14

Smith Lake Chapter of Navajo Nation (51)

Ruby Mines Phase 3 10-13-14

0842 VOCs analyzed by 8260B.

0925 Collect equipment blank from stainless steel hand trowel, Sample ID: RM01-EB03. Samples include:
- Ra-226 (903) in 1-L poly (preserved with HNO_3).
- As, Mo, Se, U, + V (6020) and Hg (7470A) in 500-mL poly (preserved with HNO_3).

EB collected using same method and water as described on 10-8-14.

1000 Ben and Tommy collect EB from drill pipe, Sample ID: RM01-EB04. Same analyses and methods as RM01-EB03.

1030 Andre, Tommy, Jen, and Ellen leave Ruby 1 and head to hotel to begin packing samples.

1100 Arrive at hotel.

Andre Ritchie 10-13-14

Staff: CH2M HILL / J. Loggen / M. Motable / B. Moayyad / T. Charley / A. Ritchie / Permafix / J. Hubler / E. Jakub / National / Jesse George

(52)

Ruby Mines Phase 3 10-13-14

1640 Andre, Jason, Ellen, and Ben head to FedEx with samples.

1700 Samples relinquished to FedEx.

Andre Pettee
10-13-14

Projects (continued).

YELLOW POLE & SCAN TARGET = 7.1 [illegible]

BLACK POLE & SCAN TARGET = 7.[illegible]

RUBY 3

GATE COMBO : 7829

Printed in China

NM ~~RUBY~~ BK-1/1

GALLUP NM.
RUBY MINES 1 & 3

PRIMARY CONTROL
FOR LIDAR SCAN

B. WILDRICK

REF FRAME : NSRS
ELLIPSOID : NGS NAD83/2011
EPOCH 2010.000
VERT DATUM : NAVD88
GEOID MODEL : GEOID-12A

SPCS : NM WEST ZONE

Appendix C2
Sampling and Boring Logs

CH2MHILL

PROJECT NUMBER	SAMPLE GRID	SHEET 1 OF 2
461446.01.RM.02.SI.NM	Ruby 1 Correlation Samples	

MULTIPLE SOIL SAMPLE LOG

PROJECT : Ruby Mines Phase 2 GENERAL LOCATION : Ruby 1 Cap Area ELEVATION : 7470 - 7550 ft amsl

CONTRACTOR : PermaFix NAME OF CONTRACTOR : Jason Hubler

DRILLING METHOD/EQUIPMENT: surface scrape (hand trowel)

DATE : 5/8/14 LOGGER : Ben Moayyad

SAMPLE ID: **RM01-8MAY14-01** GPS Latitude: 35.51850014 GPS Longitude: -108.22207001

DATE/TIME: 5/8/14 14:53 SAMPLE JAR READING: 11,776 cpm

QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
	0 - 4 in			ML	Sandy Silt (ML) Reddish brown (2.5 YR 5/4), dry soft, minor gravel, approximately 35% well graded sand.	In-situ **uncollumnated** 2x2 NaI 1-min reading: **38,876** cpm In-situ **collumnated** 2x2 NaI 1-min reading: **11,774** cpm

SAMPLE ID: **RM01-8MAY14-02** GPS Latitude: 35.51840851 GPS Longitude: -108.22216530

DATE/TIME: 5/8/14 15:00 SAMPLE JAR READING: 14,687 cpm

QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
	0 - 4 in			ML	Sandy Silt (ML) Reddish brown (2.5 YR 5/4), dry soft, minor gravel, approximately 35% well graded sand.	In-situ **uncollumnated** 2x2 NaI 1-min reading: **79,193** cpm In-situ **collumnated** 2x2 NaI 1-min reading: **35,235** cpm

SAMPLE ID: **RM01-8MAY14-03** GPS Latitude: 35.51981760 GPS Longitude: -108.22445546

DATE/TIME: 5/8/14 15:15 SAMPLE JAR READING: 9,558 cpm

QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
	0 - 4 in			ML	Sandy Silt (ML) Light reddish brown (5 YR 5/4), dry, soft, no gravel, approximately 30% fine sand.	In-situ **uncollumnated** 2x2 NaI 1-min reading: **19,947** cpm In-situ **collumnated** 2x2 NaI 1-min reading: **5,787** cpm

SAMPLE ID: **RM01-8MAY14-04** GPS Latitude: 35.52043764 GPS Longitude: -108.22247815

DATE/TIME: 5/8/14 16:05 SAMPLE JAR READING: 9,304 cpm

QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
	0 - 4 in			ML	Sandy Silt (ML) Reddish brown (5 YR 5/4), dry, soft, no gravel, approximately 30% fine sand.	In-situ **uncollumnated** 2x2 NaI 1-min reading: **34,094** cpm In-situ **collumnated** 2x2 NaI 1-min reading: **10,226** cpm

CH2MHILL

PROJECT NUMBER	SAMPLE GRID	SHEET 2 OF 2
461446.01.RM.02.SI.NM	Ruby 1 Correlation Samples	

MULTIPLE SOIL SAMPLE LOG

SAMPLE ID: **RM01-8MAY14-05** GPS Latitude: 35.52055685 GPS Longitude: -108.22243918
DATE/TIME: 5/8/14 16:10 SAMPLE JAR READING: 43,536 cpm
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
	0 - 4 in			**ML**	Sandy Silt (ML) Reddish brown (2.5 YR 5/4), dry soft, minor gravel, approximately 35% well graded sand.	In-situ **uncollumnated** 2x2 NaI 1-min reading **122,269** cpm In-situ **collumnated** 2x2 NaI 1-min reading: **91,084** cpm

SAMPLE ID: **RM01-8MAY14-06** GPS Latitude: 35.52241962 GPS Longitude: -108.22419465
DATE/TIME: 5/8/14 16:16 SAMPLE JAR READING: 10,331 cpm
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
	0 - 4 in			**ML**	Sandy Silt (ML) Light reddish brown (5 YR 5/4), dry, soft, no gravel, approximately 35% well graded sand.	In-situ **uncollumnated** 2x2 NaI 1-min reading **26,512** cpm In-situ **collumnated** 2x2 NaI 1-min reading: **8,423** cpm

SAMPLE ID: **RM01-8MAY14-07** GPS Latitude: 35.52244212 GPS Longitude: -108.22406770
DATE/TIME: 5/8/14 16:22 SAMPLE JAR READING: 40,655 cpm
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
	0 - 4 in			**ML**	Sandy Silt (ML) Reddish brown (2.5 YR 5/4), dry soft, minor gravel, approximately 35% well graded sand.	In-situ **uncollumnated** 2x2 NaI 1-min reading **268,857** cpm In-situ **collumnated** 2x2 NaI 1-min reading: **112,974** cpm

SAMPLE ID: **RM01-8MAY14-08** GPS Latitude: 35.52270914 GPS Longitude: -108.22508486
DATE/TIME: 5/8/14 16:30 SAMPLE JAR READING: 10,708 cpm
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
	0 - 4 in			**SM**	Silty Sand (SM) Reddish grey (5 YR 5/2), dry loose, with 30% to 35% fines.	In-situ **uncollumnated** 2x2 NaI 1-min reading **13,094** cpm In-situ **collumnated** 2x2 NaI 1-min reading: **3,889** cpm

CH2MHILL

PROJECT NUMBER	SAMPLE GRID	SHEET 1 OF 3
461446.01.RM.02.SI.NM	Ruby 3 Correlation Samples	

MULTIPLE SOIL SAMPLE LOG

PROJECT : Ruby Mines Phase 2 GENERAL LOCATION : Ruby 1 Cap Area ELEVATION : 7410 - 7450 ft amsl

CONTRACTOR : PermaFix NAME OF CONTRACTOR : Jason Hubler

DRILLING METHOD/EQUIPMENT: surface scrape (hand trowel)

DATE : 5/8/14 LOGGER : Ben Moayyad

SAMPLE ID: **RM03-8MAY14-01** GPS Latitude: 35.50635022 GPS Longitude: -108.16471863

DATE/TIME: 5/8/14 10:49 SAMPLE JAR READING: 8,508 cpm

QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
	0 - 4 in			ML	Sandy Silt (ML) Reddish grey (5 YR 5/2), dry soft, approximately 30% fine sand, no plasticity.	In-situ **uncollumnated** 2x2 NaI 1-min reading: **12,877** cpm In-situ **collumnated** 2x2 NaI 1-min reading: **3,804** cpm

SAMPLE ID: **RM03-8MAY14-02** GPS Latitude: 35.50672218 GPS Longitude: -108.16373767

DATE/TIME: 5/8/14 10:06 SAMPLE JAR READING: 8,260 cpm

QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
	0 - 4 in			ML	Silt with sand (ML) Light brown (7.5 YR 6/4), dry soft, 15% to 25% fine sand.	In-situ **uncollumnated** 2x2 NaI 1-min reading: **23,023** cpm In-situ **collumnated** 2x2 NaI 1-min reading: **7,488** cpm

SAMPLE ID: **RM03-8MAY14-03** GPS Latitude: 35.50716808 GPS Longitude: -108.16394602

DATE/TIME: 5/8/14 13:20 SAMPLE JAR READING: 8,394 cpm

QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
	0 - 4 in			ML	Silt (ML) Brown (5 YR 5/4), damp, soft, trace fine sand and minor clay, slow dilatency, low plasticity.	In-situ **uncollumnated** 2x2 NaI 1-min reading: **17,167** cpm In-situ **collumnated** 2x2 NaI 1-min reading: **5,116** cpm

SAMPLE ID: **RM03-8MAY14-04** GPS Latitude: 35.50642812 GPS Longitude: -108.16454219

DATE/TIME: 5/8/14 14:53 SAMPLE JAR READING: 11,301 cpm

QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
	0 - 4 in			ML	Sandy Silt (ML) Reddish grey (5 YR 5/2), dry soft, approximately 30% fine sand, no plasticity.	In-situ **uncollumnated** 2x2 NaI 1-min reading: **38,876** cpm In-situ **collumnated** 2x2 NaI 1-min reading: **11,774** cpm

CH2MHILL

PROJECT NUMBER	SAMPLE GRID	SHEET 2 OF 3
461446.01.RM.02.SI.NM	Ruby 3 Correlation Samples	

MULTIPLE SOIL SAMPLE LOG

SAMPLE ID: **RM03-8MAY14-05** GPS Latitude: 35.50857301 GPS Longitude: -108.16235703
DATE/TIME: 5/8/14 11:06 SAMPLE JAR READING: 7,956 cpm
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
	0 - 4 in			**ML**	Silt with sand (ML) Light brown (7.5 YR 6/4), dry soft, 15% to 25% fine sand.	In-situ **uncollumnated** 2x2 NaI 1-min reading **30,597** cpm In-situ **collumnated** 2x2 NaI 1-min reading: **10,838** cpm

SAMPLE ID: **RM03-8MAY14-06** GPS Latitude: 35.50777363 GPS Longitude: -108.16155890
DATE/TIME: 5/8/14 16:16 SAMPLE JAR READING: 9,320 cpm
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
	0 - 4 in			**ML**	Silt with sand (ML) Brown (7.5 YR 5/4), dry soft, 15% to 25% fine sand.	In-situ **uncollumnated** 2x2 NaI 1-min reading **47,897** cpm In-situ **collumnated** 2x2 NaI 1-min reading: **18,852** cpm

SAMPLE ID: **RM03-8MAY14-07** GPS Latitude: 35.50651105 GPS Longitude: -108.16404193
DATE/TIME: 5/8/14 10:21 SAMPLE JAR READING: 28,208 cpm
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
	0 - 4 in			**SM**	Silty Sand (SM) Pinkish grey (7.5 YR 6/2), dry medium dense, well graded sand with minor gravel and 15% to 25% silt.	In-situ **uncollumnated** 2x2 NaI 1-min reading **109,898** cpm In-situ **collumnated** 2x2 NaI 1-min reading: **41,707** cpm

SAMPLE ID: **RM03-8MAY14-08** GPS Latitude: 35.50620053 GPS Longitude: -108.16369818
DATE/TIME: 5/8/14 12:10 SAMPLE JAR READING: 16,798 cpm
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
	0 - 4 in			**SM**	Silty Sand (SM) Reddish brown (5 YR 5/3), dry loose, fine to medium sand with 15% to 20% silt.	In-situ **uncollumnated** 2x2 NaI 1-min reading **171,019** cpm In-situ **collumnated** 2x2 NaI 1-min reading: **89,326** cpm

CH2MHILL

PROJECT NUMBER	SAMPLE GRID	SHEET 3 OF 3
461446.01.RM.02.SI.NM	Ruby 3 Correlation Samples	

MULTIPLE SOIL SAMPLE LOG

SAMPLE ID: **RM03-8MAY14-09** GPS Latitude: 35.50735611 GPS Longitude: -108.16247746

DATE/TIME: 5/8/14 12:24 SAMPLE JAR READING: 44,070 cpm

QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
	0 - 4 in			**SM**	Silty Sand (SM) Dark grey (5 YR 4/1), and reddish brown (5YR 5/4), damp to dry, loose, fine to medium sand, approximately 35% fines. Sample collected from cap material at Ruby 3	In-situ **uncollumnated** 2x2 NaI 1-min reading **Meter Max > 1million cpm** In-situ **collumnated** 2x2 NaI 1-min reading: **313,782** cpm

CH2MHILL

PROJECT NUMBER	SAMPLE GRID	SHEET 1 OF 7
461446.01.RM.02.SI.NM	Colluvium Background	

MULTIPLE SOIL SAMPLE LOG

PROJECT : Ruby Mines Phase 2 GENERAL LOCATION : Mancos Shale Background Area ELEVATION : 7405 - 7455 ft amsl
CONTRACTOR : PermaFix NAME OF CONTRACTOR : Jason Hubler
DRILLING METHOD/EQUIPMENT: surface scrape (hand trowel)
DATE : 5/1/14 LOGGER : Luke Hill

SAMPLE ID: **RMCB-J12** GPS Latitude: 35.515474 GPS Longitude: -108.21737
DATE/TIME: 5/1/14 13:20 SAMPLE GAMMA READING: 8300 cpm
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft) SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
0 - 6 in			ML	Silt (ML) Yellow (10YR 7/8), dry, soft, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **11,241** cpm

SAMPLE ID: **RMCB-L10** GPS Latitude: 35.515502 GPS Longitude: -108.160641
DATE/TIME: 5/1/14 13:25 SAMPLE GAMMA READING: 8600
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft) SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
0 - 6 in			ML	Silt (ML) Yellow (10YR 7/8), dry, soft, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **10,942** cpm

SAMPLE ID: **RMCB-P10** GPS Latitude: 35.5155575 GPS Longitude: -108.1606407
DATE/TIME: 5/1/14 13:30 SAMPLE GAMMA READING: 8200
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft) SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
0 - 6 in			ML	Silt (ML) Yellow (10YR 7/8), dry, soft, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **11,159** cpm

SAMPLE ID: **RMCB-A14** GPS Latitude: 35.515348 GPS Longitude: -108.160575
DATE/TIME: 5/2/14 10:20 SAMPLE GAMMA READING: 8800
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft) SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
0 - 6 in			ML	Silt (ML) Yellow (10YR 7/8), dry, soft, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **10,907** cpm

CH2MHILL

PROJECT NUMBER	SAMPLE GRID	SHEET 2 OF 7
461446.01.RM.02.SI.NM	Colluvium Background	

MULTIPLE SOIL SAMPLE LOG

PROJECT : Ruby Mines Phase 2 GENERAL LOCATION : Mancos Shale Background Area ELEVATION : 7405 - 7455 ft amsl
CONTRACTOR : PermaFix NAME OF CONTRACTOR : Jason Hubler
DRILLING METHOD/EQUIPMENT: surface scrape (hand trowel)
DATE : 5/2/14 LOGGER : Luke Hill

SAMPLE ID: **RMCB-H45** GPS Latitude: 35.515348 GPS Longitude: -108.160575
DATE/TIME: 5/1/14 10:25 SAMPLE GAMMA READING: 8800
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft) SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
0 - 6 in			**ML**	Silt (ML) Yellow (10YR 7/8), dry, soft, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **11,364** cpm

SAMPLE ID: **RMCB-F57** GPS Latitude: 35.515418 GPS Longitude: -108.159865
DATE/TIME: 5/2/14 10:40 SAMPLE GAMMA READING: 8600
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft) SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
0 - 6 in			**ML**	Silt (ML) Yellow (10YR 7/8), dry, soft, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **10,504** cpm

SAMPLE ID: **RMCB-N52** GPS Latitude: 35.51553 GPS Longitude: -108.159948
DATE/TIME: 5/2/14 10:30 SAMPLE GAMMA READING: 8100
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft) SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
0 - 6 in			**ML**	Silt (ML) Yellow (10YR 7/8), dry, soft, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **10,508** cpm

SAMPLE ID: **RMCB-P54** GPS Latitude: 35.5155575 GPS Longitude: -108.1599147
DATE/TIME: 5/2/14 10:35 SAMPLE GAMMA READING: 8800
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft) SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
0 - 6 in			**ML**	Silt (ML) Yellow (10YR 7/8), dry, soft, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **10,509** cpm

CH2MHILL

PROJECT NUMBER	SAMPLE GRID	SHEET 3 OF 7
461446.01.RM.02.SI.NM	Colluvium Background	

MULTIPLE SOIL SAMPLE LOG

PROJECT : Ruby Mines Phase 2 GENERAL LOCATION : Mancos Shale Background Area ELEVATION : 7405 - 7455 ft amsl
CONTRACTOR : PermaFix NAME OF CONTRACTOR : Jason Hubler
DRILLING METHOD/EQUIPMENT: surface scrape (hand trowel)
DATE : 5/2/14 LOGGER : Luke Hill

SAMPLE ID: **RMCB-R59** GPS Latitude: 35.5155854 GPS Longitude: -108.1598322
DATE/TIME: 5/2/14 10:45 SAMPLE GAMMA READING: 8500
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft) SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
0 - 6 in			**ML**	Silt (ML) Yellow (10YR 7/8), dry, soft, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **10,509** cpm

SAMPLE ID: **RMCB-Z46** GPS Latitude: 35.5156972 GPS Longitude: -108.1600467
DATE/TIME: 5/2/14 10:50 SAMPLE GAMMA READING: 8400
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft) SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
0 - 6 in			**ML**	Silt (ML) Yellow (10YR 7/8), dry, soft, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **11,053** cpm

SAMPLE ID: **RMCB-DN44** GPS Latitude: 35.5157531 GPS Longitude: -108.1600797
DATE/TIME: 5/2/14 10:50 SAMPLE GAMMA READING: 8500
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft) SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
0 - 6 in			**ML**	Silt (ML) Yellow (10YR 7/8), dry, soft, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **11,089** cpm

SAMPLE ID: **RMCB-X18** GPS Latitude: 35.5156693 GPS Longitude: -108.1605087
DATE/TIME: 5/1/14 13:35 SAMPLE GAMMA READING: 8700
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft) SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
0 - 6 in			**ML**	Silt (ML) Yellow (10YR 7/8), dry, soft, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **11,329** cpm

CH2MHILL

PROJECT NUMBER	SAMPLE GRID	SHEET 4 OF 7
461446.01.RM.02.SI.NM	Colluvium Background	

MULTIPLE SOIL SAMPLE LOG

PROJECT : Ruby Mines Phase 2 GENERAL LOCATION : Mancos Shale Background Area ELEVATION : 7405 - 7455 ft amsl
CONTRACTOR : PermaFix NAME OF CONTRACTOR : Jason Hubler
DRILLING METHOD/EQUIPMENT: surface scrape (hand trowel)
DATE : 5/2/14 LOGGER : Luke Hill

SAMPLE ID: **RMCB-X24** GPS Latitude: 35.5156693 GPS Longitude: -108.1604097
DATE/TIME: 5/1/14 13:40 SAMPLE GAMMA READING: 8500
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft) SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
0 - 6 in			**ML**	Silt (ML) Yellow (10YR 7/8), dry, soft, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **11,628** cpm

SAMPLE ID: **RMCB-DN33** GPS Latitude: 35.5157531 GPS Longitude: -108.1602612
DATE/TIME: 5/1/14 13:45 SAMPLE GAMMA READING: 8400
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft) SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
0 - 6 in			**ML**	Silt (ML) Yellow (10YR 7/8), dry, soft, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **11,587** cpm

SAMPLE ID: **RMCB-EN34** GPS Latitude: 35.5157671 GPS Longitude: -108.1602447
DATE/TIME: 5/1/14 13:50 SAMPLE GAMMA READING: 8600
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft) SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
0 - 6 in			**ML**	Silt (ML) Yellow (10YR 7/8), dry, soft, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **12,067** cpm

SAMPLE ID: **RMCB-FN34** GPS Latitude: 35.5157811 GPS Longitude: -108.1602447
DATE/TIME: 5/1/14 13:55 SAMPLE GAMMA READING: 8900
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft) SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
0 - 6 in			**ML**	Silt (ML) Yellow (10YR 7/8), dry, soft, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **11,827** cpm

CH2MHILL

PROJECT NUMBER	SAMPLE GRID	SHEET 5 OF 7
461446.01.RM.02.SI.NM	Colluvium Background	

MULTIPLE SOIL SAMPLE LOG

PROJECT : Ruby Mines Phase 2 GENERAL LOCATION : Mancos Shale Background Area ELEVATION : 7405 - 7455 ft amsl
CONTRACTOR : PermaFix NAME OF CONTRACTOR : Jason Hubler
DRILLING METHOD/EQUIPMENT: surface scrape (hand trowel)
DATE : 5/2/14 LOGGER : Luke Hill

SAMPLE ID: **RMCB-O38** GPS Latitude: 35.515544 GPS Longitude: -108.160179
DATE/TIME: 5/1/14 14:00 SAMPLE GAMMA READING: 8400
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft) SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
0 - 6 in			**ML**	Silt (ML) Yellow (10YR 7/8), dry, soft, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **11,039** cpm

SAMPLE ID: **RMCB-L45** GPS Latitude: 35.515502 GPS Longitude: -108.160063
DATE/TIME: 5/1/14 14:10 SAMPLE GAMMA READING: 8100
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft) SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
0 - 6 in			**ML**	Silt (ML) Yellow (10YR 7/8), dry, soft, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **11,214** cpm

SAMPLE ID: **RMCB-A02** GPS Latitude: 35.515348 GPS Longitude: -108.160773
DATE/TIME: 5/2/14 10:15 SAMPLE GAMMA READING: 9100
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft) SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
0 - 6 in			**ML**	Silt (ML) Yellow (10YR 7/8), dry, soft, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **11,267** cpm

SAMPLE ID: **RMCB-KN49** GPS Latitude: 34.515851 GPS Longitude: -108.1599972
DATE/TIME: 5/1/14 11:00 SAMPLE GAMMA READING: 8700
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft) SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
0 - 6 in			**ML**	Silt (ML) Yellow (10YR 7/8), dry, soft, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **11,066** cpm

CH2MHILL

PROJECT NUMBER	SAMPLE GRID	SHEET 6 OF 7
461446.01.RM.02.SI.NM	Colluvium Background	

MULTIPLE SOIL SAMPLE LOG

PROJECT : Ruby Mines Phase 2 GENERAL LOCATION : Mancos Shale Background Area ELEVATION : 7405 - 7455 ft amsl
CONTRACTOR : PermaFix NAME OF CONTRACTOR : Jason Hubler
DRILLING METHOD/EQUIPMENT: surface scrape (hand trowel)
DATE : 5/2/14 LOGGER : Luke Hill

SAMPLE ID: **RMCB-ON49** GPS Latitude: 35.5159069 GPS Longitude: -108.1599972
DATE/TIME: 5/1/14 11:05 SAMPLE GAMMA READING: 8500
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft) SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
0 - 6 in			**ML**	Silt (ML) Yellow (10YR 7/8), dry, soft, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **11,174** cpm

SAMPLE ID: **RMCB-EU38** GPS Latitude: 35.5161305 GPS Longitude: -108.1601787
DATE/TIME: 5/2/14 11:40 SAMPLE GAMMA READING: 8600
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft) SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
0 - 6 in			**ML**	Silt (ML) Yellow (10YR 7/8), dry, soft, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **11,736** cpm

SAMPLE ID: **RMCB-GU26** GPS Latitude: 35.5161585 GPS Longitude: -108.1603767
DATE/TIME: 5/2/14 11:45 SAMPLE GAMMA READING: 8700
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft) SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
0 - 6 in			**ML**	Silt (ML) Yellow (10YR 7/8), dry, soft, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **11,338** cpm

SAMPLE ID: **RMCB-YN15** GPS Latitude: 35.5160466 GPS Longitude: -108.1601787
DATE/TIME: 5/2/14 13:35 SAMPLE GAMMA READING: 8500
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft) SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
0 - 6 in			**ML**	Silt (ML) Yellow (10YR 7/8), dry, soft, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **11,135** cpm

CH2MHILL

PROJECT NUMBER	SAMPLE GRID	SHEET 7 OF 7
461446.01.RM.02.SI.NM	Colluvium Background	

MULTIPLE SOIL SAMPLE LOG

PROJECT : Ruby Mines Phase 2 GENERAL LOCATION : Mancos Shale Background Area ELEVATION : 7405 - 7455 ft amsl
CONTRACTOR : PermaFix NAME OF CONTRACTOR : Jason Hubler
DRILLING METHOD/EQUIPMENT: surface scrape (hand trowel)
DATE : 5/2/14 LOGGER : Luke Hill

SAMPLE ID: **RMCB-RN06** GPS Latitude: 35.5159488 GPS Longitude: -108.1607067
DATE/TIME: 5/2/14 11:30 SAMPLE GAMMA READING: 8500
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
	0 - 6 in			**ML**	Silt (ML) Yellow (10YR 7/8), dry, soft, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **11,212** cpm

CH2MHILL

PROJECT NUMBER	SAMPLE GRID	SHEET 1 OF 7
461446.01.RM.02.SI.NM	Dakota Sandstone Background	

MULTIPLE SOIL SAMPLE LOG

PROJECT : Ruby Mines Phase 2 GENERAL LOCATION : Dakota Sandstone Background Area ELEVATION : 7490 - 7515 ft amsl
CONTRACTOR : PermaFix NAME OF CONTRACTOR : Jason Hubler
DRILLING METHOD/EQUIPMENT: surface scrape (hand trowel)
DATE : 5/3/14 LOGGER : Luke Hill

SAMPLE ID: **RMDB-VN27** GPS Latitude: 35.51212 GPS Longitude: -108.165354
DATE/TIME: 5/3/14 11:00 SAMPLE GAMMA READING: 6000 cpm
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
	0 - 6 in			**ML**	Silt with Sand (ML) Light yellowish brown (10YR 6/4), soft, dry, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **9693** cpm

SAMPLE ID: **RMDB-AN55** GPS Latitude: 35.51182 GPS EASTING: -108.164892
DATE/TIME: 5/3/14 12:30 SAMPLE GAMMA READING: 6400 cpm
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
	0 - 6 in			**ML**	Silt with Sand (ML) Light yellowish brown (10YR 6/4), soft, dry, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **9753** cpm

SAMPLE ID: **RMDB-DN28** GPS Latitude: 35.51186 GPS EASTING: -108.165337
DATE/TIME: 5/3/14 12:25 SAMPLE GAMMA READING: 6000 cpm
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
	0 - 6 in				Silt with Sand (ML) Light yellowish brown (10YR 6/4), soft, dry, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **9236** cpm

SAMPLE ID: **RMDB-GN36** GPS Latitude: 35.51191 GPS EASTING: -108.165205
DATE/TIME: 5/3/14 12:20 SAMPLE GAMMA READING: 5900 cpm
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
	0 - 6 in				Silt with Sand (ML) Light yellowish brown (10YR 6/4), soft, dry, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **9789** cpm

CH2MHILL

PROJECT NUMBER	SAMPLE GRID	SHEET 2 OF 7
461446.01.RM.02.SI.NM	Dakota Sandstone Background	

MULTIPLE SOIL SAMPLE LOG

PROJECT : Ruby Mines Phase 2 GENERAL LOCATION : Dakota Sandstone Background Area ELEVATION : 7490 - 7515 ft amsl
CONTRACTOR : PermaFix NAME OF CONTRACTOR : Jason Hubler
DRILLING METHOD/EQUIPMENT: surface scrape (hand trowel)
DATE : 5/3/14 LOGGER : Luke Hill

SAMPLE ID: **RMDB-LN40** GPS Latitude: 35.51198 GPS Longitude: -108.165139
DATE/TIME: 5/3/14 12:15 SAMPLE GAMMA READING: 6100 cpm
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
0	0 - 6 in			**ML**	Silt with Sand (ML) Light yellowish brown (10YR 6/4), soft, dry, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **9468** cpm

SAMPLE ID: **RMDB-CN44** GPS Latitude: 35.51185 GPS Longitude: -108.165073
DATE/TIME: 5/3/14 12:10 SAMPLE GAMMA READING: 6400 cpm
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
0	0 - 6 in			**ML**	Silt with Sand (ML) Light yellowish brown (10YR 6/4), soft, dry, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **9710** cpm

SAMPLE ID: **RMDB-MN51** GPS Latitude: 35.51199 GPS Longitude: -108.164958
DATE/TIME: 5/3/14 12:05 SAMPLE GAMMA READING: 6300 cpm
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
0	0 - 6 in			**ML**	Silt with Sand (ML) Light yellowish brown (10YR 6/4), soft, dry, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **9454** cpm

SAMPLE ID: **RMDB-F64** GPS Latitude: 35.51153 GPS Longitude: -108.16479
DATE/TIME: 5/3/14 12:00 SAMPLE GAMMA READING: 6100 cpm
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
0	0 - 6 in			**ML**	Silt with Sand (ML) Light yellowish brown (10YR 6/4), soft, dry, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **8690** cpm

CH2MHILL

PROJECT NUMBER	SAMPLE GRID	SHEET 3 OF 7
461446.01.RM.02.SI.NM	Dakota Sandstone Background	

MULTIPLE SOIL SAMPLE LOG

PROJECT : Ruby Mines Phase 2 GENERAL LOCATION : Dakota Sandstone Background Area ELEVATION : 7490 - 7515 ft amsl
CONTRACTOR : PermaFix NAME OF CONTRACTOR : Jason Hubler
DRILLING METHOD/EQUIPMENT: surface scrape (hand trowel)
DATE : 5/3/14 LOGGER : Luke Hill

SAMPLE ID: **RMDB-R53** GPS Latitude: 35.5117 GPS Longitude: -108.164925
DATE/TIME: 5/3/14 11:55 SAMPLE GAMMA READING: 6300 cpm
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
	0 - 6 in			**ML**	Silt with Sand (ML) Light yellowish brown (10YR 6/4), soft, dry, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **9501** cpm

SAMPLE ID: **RMDB-HN56** GPS Latitude: 35.51192 GPS Longitude: -108.164875
DATE/TIME: 5/3/14 11:50 SAMPLE GAMMA READING: 5900 cpm
QA/QC SAMPLE ID: **RMDB-HND56** QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
	0 - 6 in			**ML**	Silt with Sand (ML) Light yellowish brown (10YR 6/4), soft, dry, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **9671**cpm

SAMPLE ID: **RMDB-XN59** GPS Latitude: 35.51214 GPS Longitude: -108.164826
DATE/TIME: 5/3/14 11:45 SAMPLE GAMMA READING: 5800 cpm
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
	0 - 6 in			**ML**	Silt with Sand (ML) Light yellowish brown (10YR 6/4), soft, dry, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **9586** cpm

SAMPLE ID: **RMDB-UN18** GPS Latitude: 35.5121 GPS Longitude: -108.165502
DATE/TIME: 5/3/14 11:40 SAMPLE GAMMA READING: 6000 cpm
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
	0 - 6 in			**ML**	Silt with Sand (ML) Light yellowish brown (10YR 6/4), soft, dry, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **9956** cpm

CH2MHILL

PROJECT NUMBER	SAMPLE GRID	SHEET 4 OF 7
461446.01.RM.02.SI.NM	Dakota Sandstone Background	

MULTIPLE SOIL SAMPLE LOG

PROJECT : Ruby Mines Phase 2 GENERAL LOCATION : Dakota Sandstone Background Area ELEVATION : 7490 - 7515 ft amsl
CONTRACTOR : PermaFix NAME OF CONTRACTOR : Jason Hubler
DRILLING METHOD/EQUIPMENT: surface scrape (hand trowel)
DATE : 5/3/14 LOGGER : Luke Hill

SAMPLE ID: **RMDB-B60** GPS Latitude: 35.51147 GPS Longitude: -108.16481
DATE/TIME: 5/3/14 11:35 SAMPLE GAMMA READING: 5800 cpm
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
	0 - 6 in			**ML**	Silt with Sand (ML) Light yellowish brown (10YR 6/4), soft, dry, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **8783** cpm

SAMPLE ID: **RMDB-BN03** GPS Latitude: 35.51184 GPS Longitude: -108.165750
DATE/TIME: 5/3/14 11:30 SAMPLE GAMMA READING: 6500 cpm
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
	0 - 6 in			**ML**	Silt with Sand (ML) Light yellowish brown (10YR 6/4), soft, dry, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **9811** cpm

SAMPLE ID: **RMDB-SN52** GPS Latitude: 35.51207 GPS Longitude: -108.164941
DATE/TIME: 5/3/14 11:25 SAMPLE GAMMA READING: 6200 cpm
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
	0 - 6 in			**ML**	Silt with Sand (ML) Light yellowish brown (10YR 6/4), soft, dry, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **9893** cpm

SAMPLE ID: **RMDB-EU24** GPS Latitude: 35.51224 GPS Longitude: -108.165403
DATE/TIME: 5/3/14 11:20 SAMPLE GAMMA READING: 6400 cpm
QA/QC SAMPLE ID: **RMDB-EUD24** QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
	0 - 6 in			**ML**	Silt with Sand (ML) Light yellowish brown (10YR 6/4), soft, dry, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **10077** cpm

CH2MHILL

PROJECT NUMBER	SAMPLE GRID	SHEET 5 OF 7
461446.01.RM.02.SI.NM	Dakota Sandstone Background	

MULTIPLE SOIL SAMPLE LOG

PROJECT : Ruby Mines Phase 2 GENERAL LOCATION : Dakota Sandstone Background Area ELEVATION : 7490 - 7515 ft amsl
CONTRACTOR : PermaFix NAME OF CONTRACTOR : Jason Hubler
DRILLING METHOD/EQUIPMENT: surface scrape (hand trowel)
DATE : 5/2/14 & 5/3/14 LOGGER : Luke Hill

SAMPLE ID: **RMDB-CN53** GPS Latitude: 35.51185 GPS Longitude: -108.164925
DATE/TIME: 5/3/14 11:15 SAMPLE GAMMA READING: 6000 cpm
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
	0 - 6 in			**ML**	Silt with Sand (ML) Light yellowish brown (10YR 6/4), soft, dry, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **9453** cpm

SAMPLE ID: **RMDB-C44** GPS Latitude: 35.51149 GPS Longitude: -108.16507
DATE/TIME: 5/2/14 14:20 SAMPLE GAMMA READING: 6900 cpm
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
	0 - 6 in				Silt with Sand (ML) Light yellowish brown (10YR 6/4), soft, dry, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **9066** cpm

SAMPLE ID: **RMDB-R16** GPS Latitude: 35.5117 GPS Longitude: -108.165535
DATE/TIME: 5/2/14 14:25 SAMPLE GAMMA READING: 6800 cpm
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
	0 - 6 in				Silt with Sand (ML) Light yellowish brown (10YR 6/4), soft, dry, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **7241** cpm

SAMPLE ID: **RMDB-TN46** GPS Latitude: 35.51209 GPS Longitude: -108.165040
DATE/TIME: 5/3/14 11:10 SAMPLE GAMMA READING: 5900 cpm
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
	0 - 6 in				Silt with Sand (ML) Light yellowish brown (10YR 6/4), soft, dry, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **9180** cpm

CH2MHILL

PROJECT NUMBER	SAMPLE GRID	SHEET 6 OF 7
461446.01.RM.02.SI.NM	Dakota Sandstone Background	

MULTIPLE SOIL SAMPLE LOG

PROJECT : Ruby Mines Phase 2 GENERAL LOCATION : Dakota Sandstone Background Area ELEVATION : 7490 - 7515 ft amsl
CONTRACTOR : PermaFix NAME OF CONTRACTOR : Jason Hubler
DRILLING METHOD/EQUIPMENT: surface scrape (hand trowel)
DATE : 5/2/14 & 5/3/14 LOGGER : Luke Hill

SAMPLE ID: **RMDB-AU44** GPS Latitude: 35.51219 GPS Longitude: -108.165073
DATE/TIME: 5/3/14 11:05 SAMPLE GAMMA READING: 5900 cpm
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
	0 - 6 in			**ML**	Silt with Sand (ML) Light yellowish brown (10YR 6/4), soft, dry, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **9594** cpm

SAMPLE ID: **RMDB-I10** GPS Latitude: 35.51157 GPS Longitude: -108.165634
DATE/TIME: 5/2/14 14:00 SAMPLE GAMMA READING: 6300 cpm
QA/QC SAMPLE ID: **RMDB-ID10** QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
	0 - 6 in			**ML**	Silt with Sand (ML) Light yellowish brown (10YR 6/4), soft, dry, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **9310** cpm

SAMPLE ID: **RMDB-H40** GPS Latitude: 35.51156 GPS Longitude: -108.165139
DATE/TIME: 5/2/14 14:05 SAMPLE GAMMA READING: 6300 cpm
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
	0 - 6 in				Silt with Sand (ML) Light yellowish brown (10YR 6/4), soft, dry, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **9396** cpm

SAMPLE ID: **RMDB-O50** GPS Latitude: 35.51165 GPS Longitude: -108.164974
DATE/TIME: 5/2/14 14:10 SAMPLE GAMMA READING: 6600 cpm
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
	0 - 6 in				Silt with Sand (ML) Light yellowish brown (10YR 6/4), soft, dry, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **9175** cpm

CH2MHILL

PROJECT NUMBER	SAMPLE GRID	SHEET 7 OF 7
461446.01.RM.02.SI.NM	Dakota Sandstone Background	

MULTIPLE SOIL SAMPLE LOG

PROJECT : Ruby Mines Phase 2 GENERAL LOCATION : Dakota Sandstone Background Are ELEVATION : 7490 - 7515 ft amsl
CONTRACTOR : PermaFix NAME OF CONTRACTOR : Jason Hubler
DRILLING METHOD/EQUIPMENT: surface scrape (hand trowel)
DATE : 5/2/14 LOGGER : Luke Hill

SAMPLE ID: **RMDB-V20** GPS Latitude: 35.51175 GPS Longitude: -108.165469
DATE/TIME: 5/2/14 14:15 SAMPLE GAMMA READING: 6200 cpm
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
	0 - 6 in			**ML**	Silt with Sand (ML) Light yellowish brown (10YR 6/4), soft, dry, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **8777** cpm

CH2MHILL

PROJECT NUMBER	SAMPLE GRID	SHEET 1 OF 7
461446.01.RM.02.SI.NM	Mancos Shale Background	

MULTIPLE SOIL SAMPLE LOG

PROJECT : Ruby Mines Phase 2 GENERAL LOCATION : Mancos Shale Background Area ELEVATION : 7575 - 7590 ft amsl
CONTRACTOR : PermaFix NAME OF CONTRACTOR : Jason Hubler
DRILLING METHOD/EQUIPMENT: surface scrape (hand trowel)
DATE : 4/30/14 LOGGER : Luke Hill

SAMPLE ID: **RMMB-C56** GPS Latitude: 35.53877 GPS Longitude: -108.21737
DATE/TIME: 4/30/14 11:50 SAMPLE GAMMA READING: 8150 cpm
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft) SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
0 - 6 in			**ML**	Silt (ML) Yellowish red (5YR 5/8), dry, soft, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **11,121** cpm

SAMPLE ID: **RMMB-A19** GPS Latitude: 35.53870 GPS Longitude: -108.21813
DATE/TIME: 4/30/14 15:35 SAMPLE GAMMA READING: 8300
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft) SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
0 - 6 in			**ML**	Silt (ML) Yellowish red (5YR 5/8), dry, soft, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **10,778** cpm

SAMPLE ID: **RMMB-E15** GPS Latitude: 35.53876 GPS Longitude: -108.2182
DATE/TIME: 4/30/14 15:32 SAMPLE GAMMA READING: 8000
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft) SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
0 - 6 in			**ML**	Silt (ML) Yellowish red (5YR 5/8), dry, soft, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **10,976** cpm

SAMPLE ID: **RMMB-I23** GPS Latitude: 35.53884 GPS Longitude: -108.21804
DATE/TIME: 4/30/14 15:42 SAMPLE GAMMA READING: 8200
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft) SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
0 - 6 in			**ML**	Silt (ML) Yellowish red (5YR 5/8), dry, soft, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **10,703** cpm

CH2MHILL

PROJECT NUMBER	SAMPLE GRID	SHEET 2 OF 7
461446.01.RM.02.SI.NM	Mancos Shale Background	

MULTIPLE SOIL SAMPLE LOG

PROJECT : Ruby Mines Phase 2 GENERAL LOCATION : Mancos Shale Background Area ELEVATION : 7575 - 7590 ft amsl
CONTRACTOR : PermaFix NAME OF CONTRACTOR : Jason Hubler
DRILLING METHOD/EQUIPMENT: surface scrape (hand trowel)
DATE : 4/30/14 LOGGER : Luke Hill

SAMPLE ID: **RMMB-I28** GPS Latitude: 35.53884 GPS Longitude: -108.21794
DATE/TIME: 4/30/14 15:36 SAMPLE GAMMA READING: 8100
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft) SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
0 - 6 in			**ML**	Silt (ML) Yellowish red (5YR 5/8), dry, soft, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **10,927** cpm

SAMPLE ID: **RMMB-L26** GPS Latitude: 35.53889 GPS Longitude: -108.21797
DATE/TIME: 4/30/14 15:40 SAMPLE GAMMA READING: 8000
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft) SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
0 - 6 in			**ML**	Silt (ML) Yellowish red (5YR 5/8), dry, soft, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **10,684** cpm

SAMPLE ID: **RMMB-L32** GPS Latitude: 35.5389 GPS Longitude: -108.21785
DATE/TIME: 4/30/14 15:50 SAMPLE GAMMA READING: 7700
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft) SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
0 - 6 in			**ML**	Silt (ML) Yellowish red (5YR 5/8), dry, soft, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **10,658** cpm

SAMPLE ID: **RMMB-Q10** GPS Latitude: 35.53896 GPS Longitude: -108.2183
DATE/TIME: 4/30/14 10:05 SAMPLE GAMMA READING: 8500
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft) SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
0 - 6 in			**ML**	Silt (ML) Yellowish red (5YR 5/8), dry, soft, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **11,406** cpm

CH2MHILL

PROJECT NUMBER	SAMPLE GRID	SHEET 3 OF 7
461446.01.RM.02.SI.NM	Mancos Shale Background	

MULTIPLE SOIL SAMPLE LOG

PROJECT : Ruby Mines Phase 2 GENERAL LOCATION : Mancos Shale Background Area ELEVATION : 7575 - 7590 ft amsl
CONTRACTOR : PermaFix NAME OF CONTRACTOR : Jason Hubler
DRILLING METHOD/EQUIPMENT: surface scrape (hand trowel)
DATE : 4/30/14 LOGGER : Luke Hill

SAMPLE ID: **RMMB-Q30** GPS Latitude: 35.53898 GPS Longitude: -108.21789
DATE/TIME: 4/30/14 15:45 SAMPLE GAMMA READING: 8800
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft) SAMPLE INTERVAL (ft)	RECOVERY (ft) #/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
0 - 6 in		**ML**	Silt (ML) Yellowish red (5YR 5/8), dry, soft, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **11,018** cpm

SAMPLE ID: **RMMB-W05** GPS Latitude: 35.53905 GPS Longitude: -108.2184
DATE/TIME: 4/30/14 10:15 SAMPLE GAMMA READING: 8300
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft) SAMPLE INTERVAL (ft)	RECOVERY (ft) #/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
0 - 6 in		**ML**	Silt (ML) Yellowish red (5YR 5/8), dry, soft, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **11,177** cpm

SAMPLE ID: **RMMB-T43** GPS Latitude: 35.53904 GPS Longitude: -108.21762
DATE/TIME: 4/30/14 15:55 SAMPLE GAMMA READING: 8200
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft) SAMPLE INTERVAL (ft)	RECOVERY (ft) #/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
0 - 6 in		**ML**	Silt (ML) Yellowish red (5YR 5/8), dry, soft, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **11,056** cpm

SAMPLE ID: **RMMB-AN17** GPS Latitude: 35.53913 GPS Longitude: -108.21815
DATE/TIME: 4/30/14 10:10 SAMPLE GAMMA READING: 7900
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft) SAMPLE INTERVAL (ft)	RECOVERY (ft) #/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
0 - 6 in		**ML**	Silt (ML) Yellowish red (5YR 5/8), dry, soft, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **10,956** cpm

CH2MHILL

PROJECT NUMBER	SAMPLE GRID	SHEET 4 OF 7
461446.01.RM.02.SI.NM	Mancos Shale Background	

MULTIPLE SOIL SAMPLE LOG

PROJECT : Ruby Mines Phase 2 GENERAL LOCATION : Mancos Shale Background Area ELEVATION : 7575 - 7590 ft amsl
CONTRACTOR : PermaFix NAME OF CONTRACTOR : Jason Hubler
DRILLING METHOD/EQUIPMENT: surface scrape (hand trowel)
DATE : 4/30/14 LOGGER : Luke Hill

SAMPLE ID: **RMMB-W52** GPS Latitude: 35.53910 GPS Longitude: -108.21743
DATE/TIME: 4/30/14 15:58 SAMPLE GAMMA READING: 8200
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
	0 - 6 in			ML	Silt (ML) Yellowish red (5YR 5/8), dry, soft, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **10,831** cpm

SAMPLE ID: **RMMB-HN65** GPS Latitude: 35.53930 GPS Longitude: -108.21716
DATE/TIME: 4/30/14 9:45 SAMPLE GAMMA READING: 8300
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
	0 - 6 in			ML	Silt (ML) Yellowish red (5YR 5/8), dry, soft, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **11,183** cpm

SAMPLE ID: **RMMB-F49** GPS Latitude: 35.53881 GPS Longitude: -108.21751
DATE/TIME: 4/30/14 11:45 SAMPLE GAMMA READING: 8054
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
	0 - 6 in			ML	Silt (ML) Yellowish red (5YR 5/8), dry, soft, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **11,099** cpm

SAMPLE ID: **RMMB-L70** GPS Latitude: 35.53894 GPS Longitude: -108.21707
DATE/TIME: 4/30/14 12:00 SAMPLE GAMMA READING: 8018
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
	0 - 6 in			ML	Silt (ML) Yellowish red (5YR 5/8), dry, soft, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **11,307** cpm

CH2MHILL

PROJECT NUMBER	SAMPLE GRID	SHEET 5 OF 7
461446.01.RM.02.SI.NM	Mancos Shale Background	

MULTIPLE SOIL SAMPLE LOG

PROJECT : Ruby Mines Phase 2 GENERAL LOCATION : Mancos Shale Background Area ELEVATION : 7575 - 7590 ft amsl
CONTRACTOR : PermaFix NAME OF CONTRACTOR : Jason Hubler
DRILLING METHOD/EQUIPMENT: surface scrape (hand trowel)
DATE : 4/30/14 LOGGER : Luke Hill

SAMPLE ID: **RMMB-CN72** GPS Latitude: 35.53922 GPS Longitude: -108.21702
DATE/TIME: 4/30/14 12:15 SAMPLE GAMMA READING: 7933
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
	0 - 6 in			ML	Silt (ML) Yellowish red (5YR 5/8), dry, soft, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **11,157** cpm

SAMPLE ID: **RMMB-K56** GPS Latitude: 35.5389 GPS Longitude: -108.21736
DATE/TIME: 4/30/14 11:55 SAMPLE GAMMA READING: 8094
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
	0 - 6 in			ML	Silt (ML) Yellowish red (5YR 5/8), dry, soft, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **10,993** cpm

SAMPLE ID: **RMMB-AN71** GPS Latitude: 35.53919 GPS Longitude: -108.21704
DATE/TIME: 4/30/14 12:10 SAMPLE GAMMA READING: 8343
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
	0 - 6 in			ML	Silt (ML) Yellowish red (5YR 5/8), dry, soft, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **11,491** cpm

SAMPLE ID: **RMMB-R70** GPS Latitude: 35.53904 GPS Longitude: -108.21707
DATE/TIME: 4/30/14 12:05 SAMPLE GAMMA READING: 8156
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
	0 - 6 in			ML	Silt (ML) Yellowish red (5YR 5/8), dry, soft, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **11,335** cpm

CH2MHILL

PROJECT NUMBER	SAMPLE GRID	SHEET 6 OF 7
461446.01.RM.02.SI.NM	Mancos Shale Background	

MULTIPLE SOIL SAMPLE LOG

PROJECT : Ruby Mines Phase 2 GENERAL LOCATION : Mancos Shale Background Area ELEVATION : 7575 - 7590 ft amsl
CONTRACTOR : PermaFix NAME OF CONTRACTOR : Jason Hubler
DRILLING METHOD/EQUIPMENT: surface scrape (hand trowel)
DATE : 4/30/14 LOGGER : Luke Hill

SAMPLE ID: **RMMB-AO9** GPS Latitude: 35.53869 GPS Longitude: -108.21833
DATE/TIME: 4/30/14 15:30 SAMPLE GAMMA READING: 8000
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft) SAMPLE INTERVAL (ft)	RECOVERY (ft) #/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
0 - 6 in		ML	Silt (ML) Yellowish red (5YR 5/8), dry, soft, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **10,232** cpm

SAMPLE ID: **RMMB-DN38** GPS Latitude: 35.53920 GPS Longitude: -108.21772
DATE/TIME: 4/30/14 16:00 SAMPLE GAMMA READING: 7800
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft) SAMPLE INTERVAL (ft)	RECOVERY (ft) #/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
0 - 6 in		ML	Silt (ML) Yellowish red (5YR 5/8), dry, soft, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **11,040** cpm

SAMPLE ID: **RMMB-FN46** GPS Latitude: 35.53924 GPS Longitude: -108.21755
DATE/TIME: 4/30/14 09:50 SAMPLE GAMMA READING: 8100
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft) SAMPLE INTERVAL (ft)	RECOVERY (ft) #/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
0 - 6 in		ML	Silt (ML) Yellowish red (5YR 5/8), dry, soft, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **10,935** cpm

SAMPLE ID: **RMMB-EN63** GPS Latitude: 35.53924 GPS Longitude: -108.2172
DATE/TIME: 4/30/14 10:00 SAMPLE GAMMA READING: 8300
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft) SAMPLE INTERVAL (ft)	RECOVERY (ft) #/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
0 - 6 in		ML	Silt (ML) Yellowish red (5YR 5/8), dry, soft, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **11,102** cpm

CH2MHILL

PROJECT NUMBER	SAMPLE GRID	SHEET 7 OF 7
461446.01.RM.02.SI.NM	Mancos Shale Background	

MULTIPLE SOIL SAMPLE LOG

PROJECT : Ruby Mines Phase 2 GENERAL LOCATION : Mancos Shale Background Area ELEVATION : 7575 - 7590 ft amsl
CONTRACTOR : PermaFix NAME OF CONTRACTOR : Jason Hubler
DRILLING METHOD/EQUIPMENT: surface scrape (hand trowel)
DATE : 4/30/14 LOGGER : Luke Hill

SAMPLE ID: **RMMB-GN55** GPS Latitude: 35.53927 GPS Latitude: -108.21737
DATE/TIME: 4/30/14 09:55 SAMPLE GAMMA READING: 8300
QA/QC SAMPLE ID: - - QA/QC SAMPLE TYPE: - -

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: RADIOLOGICAL MEASUREMENT/NOTE DEBRIS ENCOUNTERED, PID RESULTS, SAMPLE COLLECTION (date, time, sample ID)
	0 - 6 in			**ML**	Silt (ML) Yellowish red (5YR 5/8), dry, soft, non-plastic, noncohesive	In-situ 2x2 NaI 1-min reading: **10,725** cpm

CH2MHILL

PROJECT NUMBER	SAMPLE GRID
461446	Background Locations SHEET 1 OF 1

MULTIPLE SOIL SAMPLE LOG

PROJECT : Ruby Mines | GENERAL LOCATION : Ruby Mines Background locatior | ELEVATION (TBM or MSL) :

CONTRACTOR : National EWP | NAME OF DRILLER : Jessie Ornelas

SAMPLE METHOD/EQUIPMENT: Geoprobe 7730DT | BORING DIAMETER : 2.25-inches

DATE : 10/6/14 | LOGGER : Ben Moayyad

LOCATION ID: **MANCOS-01** GPS NORTHING: 1,651,818.20 GPS EASTING: 2,608,951.40

SAMPLE TIME: SAMPLE GAMMA READING: see below

QA/QC SAMPLE ID: none QA/QC SAMPLE TYPE: none

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	GM[A]	Downhole[B]	MEASUREMENTS Core measurements on contact with gamma radiation detecto Collimated[C]	Uncollimated[D]
								3,641	10,878 surface[C]
1	0 - 5	3.5		SM	Silty Sand Brown (7.5YR 5/4), loose, fine sand ~35% silty fines.	90 - 100	3,156	2,300 - 2,800	7,000 - 7,500
2						100 - 120	4,211	2,400 - 3,000	6,800 - 7,400
3						110 - 120	4,411	2,400 - 2,800	7,300 - 7,900
4						110 - 170	3,040	2,300 - 3,000	7,300 - 7,900
5						110 - 150	3,473	2,500 - 3,000	7,500 - 8,100

NOTES: **A**: Core measurements with Gieger-Mueler Pancake probe Ludlum 44-9 with Ludlum 12 scaler

B: Borehole measurements with 1x1-inch NaI scintillating detector, Ludlum Model 44-2 with Ludlum 2221 Model scaler.

C/D: Measurements with 2x2 NaI scintillating detector Ludlum Model 44-10 on contact with core and 6-inches above ground surface. Collimated Uncollimated

LOCATION ID: **COLLUV-01** GPS NORTHING: 1,643,234.30 GPS EASTING: 2,625,688.50

SAMPLE TIME: SAMPLE GAMMA READING: see below

QA/QC SAMPLE ID: none QA/QC SAMPLE TYPE: none

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	GM[A]	Downhole[B]	MEASUREMENTS Core measurements on contact with gamma radiation detecto Collimated[C]	Uncollimated[D]
							3,016	3,473	10,653 surface[C]
1	0 - 5	5		ML	Sandy Silt Reddish brown (2.5YR 5/4), soft, ~30% fine sand.	80 - 110	4,427	3,200 - 3,600	9,900 - 10,400
2						80 - 110	4,449	2,900 - 3,200	9,600 - 10,300
3						80 - 110	4,038	3,200 - 3,500	9,800 - 10,300
4						80 - 110	3,770	2,900 - 3,100	10,400 - 11,100
5						80 - 110	3,915	2,900 - 3,200	10,400 - 11,100

NOTES: **A**: Core measurements with Gieger-Mueler Pancake probe Ludlum 44-9 with Ludlum 12 scaler

B: Borehole measurements with 1x1-inch NaI scintillating detector, Ludlum Model 44-2 with Ludlum 2221 Model scaler.

C/D: Measurements with 2x2 NaI scintillating detector Ludlum Model 44-10 on contact with core and 6-inches above ground surface. Collimated Uncollimated

LOCATION ID: **DAKOTA-01** GPS NORTHING: 1,641,678.40 GPS EASTING: 2,624,283.80

SAMPLE TIME: SAMPLE GAMMA READING: see below

QA/QC SAMPLE ID: none QA/QC SAMPLE TYPE: none

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	GM[A]	Downhole[B]	MEASUREMENTS Core measurements on contact with gamma radiation detecto Collimated[C]	Uncollimated[D]
							2,019	2,580	7,993 surface[C]
1	0 - 0.5	0.5		ML	Sandy Silt	60 - 100	2,307	2,600 - 2,900	7,300 - 7,600
2				Bedrock	Reddish brown (2.5YR 5/4), soft, ~35% fine quartz sand. Sandstone bedrock refusal at 6 inches across most of the area				
3									
4									
5									

NOTES: **A**: Core measurements with Gieger-Mueler Pancake probe Ludlum 44-9 with Ludlum 12 scaler

B: Borehole measurements with 1x1-inch NaI scintillating detector, Ludlum Model 44-2 with Ludlum 2221 Model scaler.

C/D: Measurements with 2x2 NaI scintillating detector Ludlum Model 44-10 on contact with core and 6-inches above ground surface. Collimated Uncollimated

CH2MHILL

PROJECT NUMBER	BORING NUMBER	
461446	RM01-CWRP01	SHEET 1 OF 2

DRILLING LOG

PROJECT : Ruby Mines	LOCATION : Ruby Mines No. 1	ELEVATION (TBM or MSL) :	
DRILLING CONTRACTOR :	National EWP	NAME OF DRILLER:	Jesse Ornelas
DRILLING METHOD/EQUIPMENT:	Direct Push (Geoprobe 7730 DT)	SIZE/TYPE OF BIT:	2.25-inch Macrocore
GPS COORDINATES (SYSTEM):	1,644,546.3 N 2,606,829.0 E NAD 83 NM West, Ft	TOTAL DEPTH :	25 ft bgs
	START : 10/12/2014 END : 10/12/2014	LOGGER :	A.Ritchie

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft) / RECOVERY (ft) / #/TYPE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: SAMPLE COLLECTION	GM[1]	2X2[2]
			Surface counts (cpm)[3]:	27,214	uncollimated
				9,124	collimated
				RADIATION MEASUREMENTS	
	SM	Sitty sand (SM) dark yellowish brown (10 YR 3/4), moist, loose, 60% fine sand, 40% silt. **Cap 0 to 1 feet.**	Collect RM01-CWRP01-C-00 at 15:00 at 20 µR/hr	100 - 200	13,600 - 13,800
1	SP	Poorly graded sand (SP) light yellowish brown (10 YR 6/4), dry, loose, 100% fine sand. **Waste Rock 1 to 21.5 feet**		140-180	13,800-14,300
2	SP	same as above, except reddish brown (2.5 YR 5/4) 100% fine to medium sand of felsic mineralogy.		140-180	14,400-15,100
3	SP	Poorly graded sand with Silt (SP-SM), yellowish brown (10 YR 5/6), dry, loose, 90% fine sand, 10% silt,		100-200	14,700-15,100
4				180-220	16,000-16,800
5	SP	same as above, except @ reddish brown (5YR 4/4)	collect RMO1-CWRP01-R-05 @16:05 and RMO1-CWRP01D-R-05 16:10 at 12 µR/hr	120-180	14,200-15,000
6	SP	same as above, except yellowish brown (10 YR 5/6),		180-220	15,000-16,000
7	CL	Lean Clay with Sand (CL), greenish gray (GLEY1 5/10 Y), 80% clay, 20% moist, soft 20% fine sand. CL lense only 6.5-6.7 ft.			
	SP	Poorly graded sand (SP) yellowish brown (10 YR 5/6), dry, loose, 100% fine sand.		200-320	16,400-17,500
8	SP			240-280	17,000-17,800
9					
10	SP	zone of sand stone fragments, light greenish gray (GLEY1 7/10 Y) same as 6.7 to 9.5'	Collect RMO1-CWRP01-R-10 @ 16:29 11 µR/hr	140-160	14,100-14,500
11	CL	Lean Clay with Sand (CL), greenish gray (GLEY1 5/10 Y), 80% clay, 20% moist, soft 20% fine sand. CL lense same as 6.5-6.7 ft.		160-200	14,400-15,000
12	SP	Poorly graded sand (SP) yellowish brown (10 YR 5/6), dry, loose, 100% fine sand.			

Note 1 Radiation measurements of core collected with Ludlum Model 12 scaler and Ludlum 44-09 pancake probe in counts per minute (cpm)
Note 2 Gamma radiation measurements of core collected with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).
Note 3 Gamma radiation measurements on surface with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).

CH2MHILL

PROJECT NUMBER	BORING NUMBER	
461446	RM01-CWRP01	SHEET 2 OF 2

DRILLING LOG

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SAMPLE COLLECTION	RADIATION MEASUREMENTS GM[1]	RADIATION MEASUREMENTS 2X2[2]
						160-180	15,500-16,800
13			SP	see previous page; cont,		200-240	16,200-16,600
14					Collect RMO1-CWRP01-R-15 @ 16:35 including MS/MSD for metals, 10 µR/hr	180-200	15,000-16,100
15						100-140	15,800-16,000
16			SP	as above		180-240	15.800-16.800
17						200-240	15.900-16.200
18						200-240	16,100-16,400
19						220-240	16,400-17,000
20					Collect RM01-CWRPO1-R-20 @ 16:40 11 µR/hr	300-380	16,200-17,100
			ML	Sandy Silt (ML) light greenish gray (gley 1 7/10 Y) 60% silt, 40% fine sand, dry, soft.			
21			SP	Poorly Graded Sand (SP), brown (7.5 YR 5/4), 100% fine to medium sand of felsic minerals, dry, loose.		200-300	16,200-17,100
			CL	Lean Clay (CL) brown (10 YR 5/3), 100% clay, moist, very hard			
22				**Native soil at 21.5 ft to total depth**		110-160	13,700-14,600
23					Collect RM01-CWRP01-S-22.5 @ 16:45 7 µR/hr	100-140	13,400-13,700
24						100-120	13,200-13,400
25				End of boring	Backfill with cutting and cap with hydrated bentonite.		

Note 1 Radiation measurements of core collected with Ludlum Model 12 scaler and Ludlum 44-09 pancake probe in counts per minute (cpm)
Note 2 Gamma radiation measurements of core collected with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).

CH2MHILL

PROJECT NUMBER	BORING NUMBER		
461446	RM01-CWRP02	SHEET 1	OF 1

DRILLING LOG

PROJECT : Ruby Mines	LOCATION : Ruby Mines No. 1	ELEVATION (TBM or MSL) :	
DRILLING CONTRACTOR :	National EWP	NAME OF DRILLER:	Jesse Ornelas
DRILLING METHOD/EQUIPMENT:	Direct Push (Geoprobe 7730 DT)	SIZE/TYPE OF BIT :	2.25-inch Macrocore
GPS COORDINATES (SYSTEM):	1,644,521.3 N 2,607,009.0 E NAD 83 NM West, Ft	TOTAL DEPTH :	25 ft bgs
	START : 10/12/2014 END : 10/12/2014	LOGGER :	B. Moayyad

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: SAMPLE COLLECTION	Surface counts (cpm)[3]: 25,779 uncollimated / 8,558 collimated RADIATION MEASUREMENTS GM[1]	2X2[2]
0			SM	Silty Sand (SM) Yellowish Red (5YR 5/4), damp, loose, fine sand. **Cap 0.1 to 0.8 feet.**	RM01-CWRP02-C-00 @ 14:20 @ 9 µR/hr	90-160	16,900-17,600
						100-120	18,360-18,990
2			SP	Poorly Graded Sand (SP) pink to grey (7.5 YR 7/3 to 7/1), dry, loose, fine mineralized sand with cemented sections and black and rusty spots		110-170	17,960-18,215
		4'		**Waste Rock 0.8 to 20.2 feet**	RM01-CWRP02-R-05 @ 15:10 @ 9 µR/hr	170-195	18,025-18,210
4						180-190	17,580-18,200
						100-120	21,310-21,320
6						180-210	19,800-21,300
		3'				220-280	19,790-19,970
8						190-250	19,440-19,810
			SP	SP as above with trace gravel		120-150	18,880-
10					RM01-CWRP02-R-15 @ 15:10 @ 9 µR/hr	140-180	19,340-20,090
					RM01-CWRP02-R-15 @ 15:12	160-180	20,240-20,610
12		3'				180-210	20,380-
						160-200	20,430-
14						140-180	19,460-19,790
						120-150	19,520-20,830
16						150-180	20,910-20-980
		3'				150-200	21,780-30,462
18						200-800	26,462-32,180
						150-190	19,821-29,280
20						90-100	19,230-20,120
			CL	Lean Clay With Sand (CL)		90-110	18,970-19,120
		3'		Brown (7.5 YR 6/3), moist, low plasticity, silty, 10 - 20% fine sand.	RMO1-CWRP02-S-21 @ 15:25 @ 9 µR/hr		
22				**Native Soil 20.2 feet to total depth**		90-110	18,850-19,235
						90-110	19,050-19,280
24						100-110	18,170-18,340
				End of boring at 25 feet	Backfill with cutting and cap with hydrated bentonite.		

Note 1 Radiation measurements of core collected with Ludlum Model 12 scaler and Ludlum 44-09 pancake probe in counts per minute (cpm)
Note 2 Gamma radiation measurements of core collected with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).
Note 3 Gamma radiation measurements on surface with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).

CH2MHILL

PROJECT NUMBER	BORING NUMBER	
461446	RM01-CWRP03	SHEET 1 OF 2

DRILLING LOG

PROJECT : Ruby Mines	LOCATION : Ruby Mines No. 1	ELEVATION (TBM or MSL) :	
DRILLING CONTRACTOR :	National EWP	NAME OF DRILLER:	Jesse Ornelas
DRILLING METHOD/EQUIPMENT:	Direct Push (Geoprobe 7730 DT)	SIZE/TYPE OF BIT :	2.25-inch Macrocore
GPS COORDINATES (SYSTEM):	N 1,644,507.017 2,607,009.0 E NAD 83 NM West, Ft	TOTAL DEPTH :	20 ft bgs
	START : 10/12/2014 END : 10/12/2014	LOGGER :	B. Moayyad

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: Surface counts (cpm)[3]: 25,028 uncollimated; 7,469 collimated	RADIATION MEASUREMENTS GM[1]	RADIATION MEASUREMENTS 2X2[2]
					SAMPLE COLLECTION		
0		4.0'	SM	Silty Sand (SM) yellowish red (5 YR 5/6), dry, loose, fine sand, with 30% red silty fines. **Cap 0 to 2 feet.**	RM01-CWRP03-C-00 11:12 @ 13 µR/hr	60-100	18,700-19,200
1						100-140	18,600-18,900
2			GC	Clayey Gravel (GC) Grey (7.5 YR 5/1) dry, loose, gravel and cobbles, with grey stiff plastic fines. **Waste Rock 2 to 15.5 feet.**		120-140	18,200-18,800
3						140-160	17,600-18,200
4			SM	Silty Sand with Gravel (SM) moltled grey, dark grey and brown (7.5 YR 5/1, 4/1, & 5/4), dry, loose, 10-30% fine mineralized sand. PID= 0.0		120-140	16,700-17,200
5					RM01-CWRP03-R-05 @ 11:40 @ 12 µR/hr	100-120	17,000-17,400
6		2.0'	SM	as above		120-140	16,000-16,400
7	no recovery					No readings	
8	no recovery			Cobble blocks core barel - no recovery. Drills like sand with gravel and cobbles as above.		No readings	
9	no recovery					No readings	
10							
11		2.5'	SM	as above to 15.5 ft	RM01-CWRP03-R-10 @ 13:30 @ 12 MR/hr	180-240	17,300-17,700
						60-220	17,500-17,900
12						120-160	16,600-16,900

Note 1 Radiation measurements of core collected with Ludlum Model 12 scaler and Ludlum 44-09 pancake probe in counts per minute (cpm)
Note 2 Gamma radiation measurements of core collected with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).
Note 3 Gamma radiation measurements on surface with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).

CH2MHILL

PROJECT NUMBER	BORING NUMBER
461446	RM01-CWRP3 SHEET 2 OF 2

DRILLING LOG

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SAMPLE COLLECTION	RADIATION MEASUREMENTS GM[1]	RADIATION MEASUREMENTS 2X2[2]
13		2.5'	SM	as above		140-160	16,600-16,800
14						80-120	16,300-16,600
15					RM01-CWRP03-R-15 @ 13:35 @ 10 µR/hr	80-120	19,800-21,500
16			CL	Lean Clay With Sand (CL) brown (7.5 YR 5/4), moist, stift, 15-20% fine sand, roots, and minor carbonate nodules. **Native Soil 15.5 feet to total depth**		80-100	18,400-19,100
17					RM01-CWRP03-S-16.5 @ 13:41 @ 10 µR/hr	80-100	17,500-18,100
18			CL	as above		60-80	16,800-18,100
19						80-100	16,100-17,000
20				End of boring	Backfill with cutting and cap with hydrated bentonite.		
21							
22							
23							
24							
25							

Note 1 Radiation measurements of core collected with Ludlum Model 12 scaler and Ludlum 44-09 pancake probe in counts per minute (cpm)
Note 2 Gamma radiation measurements of core collected with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).

CH2MHILL

PROJECT NUMBER	BORING NUMBER	
461446	RM01-CWRP04	SHEET 1 OF 1

DRILLING LOG

PROJECT : Ruby Mines	LOCATION : Ruby Mines No. 1	ELEVATION (TBM or MSL) :	
DRILLING CONTRACTOR :	National EWP	NAME OF DRILLER:	Jesse Ornelas
DRILLING METHOD/EQUIPMENT:	Direct Push (Geoprobe 7730 DT)	SIZE/TYPE OF BIT :	2.25-inch Macrocore
GPS COORDINATES (SYSTEM):	N 1,644,669.454 E 2,607,370.624 NAD 83 NM West, Ft	TOTAL DEPTH :	15 ft bgs
	START : 10/12/2014 END : 10/12/2014	LOGGER :	A. Ritchie

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: SAMPLE COLLECTION	GM[1]	2X2[2]
					Surface counts (cpm)[3]:	21,887 uncollimated	
						6,514 collimated	
						RADIATION MEASUREMENTS	
			SM	Sandy silt (ML) darkyellowish brown (10 YR 4/6), moist, hard, 60% silt, 40% fine sand. **Cap 0 to 1 feet.**	collcet RM01-CWRP04-C-00 @ 08:43 8 µR/hr	60-80	13,700-13,900
2			SP	Poorly graded (SP) very pale brown (10 YR 7/4), dry, loose, some mineralized zones at 1 - 1.5 feet. **Waste Rock 2 to 11 feet.**		80-100	13,400-13,800
		4'				60-80	13,400-13,600
4						60-80	12,900-13,400
					collect RM01-CWRP04-C-05 @ 08:50 @12 µR/hr	80-100	12,900-13,200
6			SP	same as above with mineralized zones at 7.5 feet.		80-100	13,200-13,700
		4'				80-100	12,600-12,900
8						80-110	12,600-12,800
						80-100	12,600-12,800
10					collect RM01-CWRP04-C-10 @ 08:55 12 µR/hr	80-100	12,500-12,700
				Lean Clay With Sand (CL) dark brown (10 YR 3/3), moist, very hard, 80%		80-100	13,200-13,400
12		4'	CL	lean clay, 20% fine sand. **Native Soil 11 feet to total depth**		80-100	13.000-13.200
						80-100	13,000-13,200
14						80-100	13,000-13,200
						80-100	12,700-13,000
16				End of boring	Backfill with cutting and cap with hydrated bentonite.		
18							
20							
22							
24							

Note 1 Radiation measurements of core collected with Ludlum Model 12 scaler and Ludlum 44-09 pancake probe in counts per minute (cpm)
Note 2 Gamma radiation measurements of core collected with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).
Note 3 Gamma radiation measurements on surface with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).

CH2MHILL

PROJECT NUMBER	BORING NUMBER	
461446	RM01-CWRP05	SHEET 1 OF 1

DRILLING LOG

PROJECT : Ruby Mines	LOCATION : Ruby Mines No. 1	ELEVATION (TBM or MSL) :	
DRILLING CONTRACTOR :	National EWP	NAME OF DRILLER:	Jesse Ornelas
DRILLING METHOD/EQUIPMENT:	Direct Push (Geoprobe 7730 DT)	SIZE/TYPE OF BIT :	2.25-inch Macrocore
GPS COORDINATES (SYSTEM):	N 1,644,781.629 E 2,607,280.078 NAD 83 NM West, Ft	TOTAL DEPTH :	15 ft bgs
	START : 10/12/2014 END : 10/12/2014	LOGGER :	B. Moayyad

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SAMPLE COLLECTION	GM[1]	2X2[2]
				SOIL DESCRIPTION	**Surface counts (cpm)[3]:**	19,328 uncollimated 5,765 collimated	
						RADIATION MEASUREMENTS	
					COMMENTS		
			SM	Silty Sand (SM) yellowish red (5 YR 4/6), moist, loose, quartz sand with 30% fines. ~30 fine	RM01-CWRP05-C-00 @ 9:05 @ 12 µR/hr	60-100	15,800-16,200
		2'		**Cap 0 to 1 feet.**	RM01-CWRP05-R-01 @ 9:32 12 µR/hr	100-140	16,500-16,700
2			SP	Poorly Graded Sand with Gravel (SP)			
				grey (7.5 YR 5/1) dry, loose,		60-120	17,000-17,500
				mineralized fine to medium sand			
				cemented fragments at 3.5 ft		100-120	16,800-17,300
		2'		brown (7.5 YR 5/3) at 4-9 ft			
4				**Waste Rock 1.0 to 12.5 feet.**			
						80-100	16,200-16,400
					RM01-CWRP05-R-05 @ 9:35 @ 13 µR/hr	60-100	19.600-20.100
6					RM01-CWRP05D-R-05 @ 9:38 @13 µR/hr		
						100-120	19,100-19,500
		2.7'					
						120-160	18,500-18,900
			SP	as above, but no gravel and mottled grey and brown			
8				from 9 to 12.5 feet.			
						140-160	17,600-17,900
						120-140	16,100-17,100
10					RM01-CWRP05-R-10 @		
					9:43 @ 12 µR/hr	140-160	22,100-22,600
					w/MS/MSD on metals		
						140-160	20,100-20,600
12		4'					
						160-200	19,000-19,600
			CL	Sandy Lean Clay (CL)			
				brown (10 YR 4/3), moist, stiff, low plasticity, 20-30%		80-100	18,100-19,000
				fine sand.			
14				**Native Soil 12.5 feet to total depth**			
						60-100	17,400-17,800
16							
18							
20							
22							
24							

Note 1 Radiation measurements of core collected with Ludlum Model 12 scaler and Ludlum 44-09 pancake probe in counts per minute (cpm)
Note 2 Gamma radiation measurements of core collected with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).
Note 3 Gamma radiation measurements on surface with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).

CH2MHILL

PROJECT NUMBER	BORING NUMBER	
461446	RM01-CWRP06	SHEET 1 OF 1

DRILLING LOG

PROJECT : Ruby Mines	LOCATION : Ruby Mines No. 1	ELEVATION (TBM or MSL) :	
DRILLING CONTRACTOR :	National EWP	NAME OF DRILLER:	Jesse Ornelas
DRILLING METHOD/EQUIPMENT:	Direct Push (Geoprobe 7730 DT)	SIZE/TYPE OF BIT :	2.25-inch Macrocore
GPS COORDINATES (SYSTEM):	N 1,644,721.4 E 2,607,005.6 NAD 83 NM West, Ft	TOTAL DEPTH :	15 ft bgs
	START : 10/13/2014 END: 10/13/2014	LOGGER :	B. Moayyad

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: SAMPLE COLLECTION	GM[1]	2X2[2]
					Surface counts (cpm)[3]:	29,301 uncollimated	
						9,149 collimated	
						RADIATION MEASUREMENTS	
			SM	Silty Sand (SM) yellowish red (5 YR 4/6), moist, loose, quartz sand with 30% fines. **Cap 0 to 1 feet.**	RM01-CWRP06-C-00 @ 08:10 7 µR/hr	60-80	12,900-13,200
2		2.5'	SP	Poorly Graded Sand (SP) light brown (7.5 YR 6/3) with gray and black molteling, fine mineralized sand. **Waste Rock 1.0 to 6.5 feet.**		60-80	13,500-13,800
						80-140	15,000-15,200
4						120-160	14,900-15,000
					RM01-CWRP06-R-05 @ 8:15 11 µR/hr	100-140	15,700-16,000
6		4'			RM01-CWRP06D-R-05 @ 8:20 10 µR/hr	120-140	14,200-14,800
					RM01-CWRP06-S-6.5 @ 8:30 8 µR/hr	100-120	13,200-13,800
8			CL	Sandy Lean Clay (CL), brown (7.5 YR 5/4), dry, 25-30 % fine sand, low plasticity silty, carbernate modules. **Native Soil 6.5 feet to total depth**	RM01-CWRP06-S-11.5 @ 8:35 7 µR/hr	120-140	13,000-13,200
						110-130	13,100-13,600
10						100-120	14,100-14,400
						100-140	14,600-15,000
12		4'		@	RM01-CWRP06D-S-11.5 8:40 7 µR/hr	80-120	13,100-13,400
						80-100	14,100-14,300
14			CL	Lean Clay (CL) brown (7.5 YR 5/4), dry, trace fine sand, low to moderate plasticity		60-80	14,000-14,100
						60-80	13,600-14,100
16							
18							
20							
22							
24							

Note 1 Radiation measurements of core collected with Ludlum Model 12 scaler and Ludlum 44-09 pancake probe in counts per minute (cpm)
Note 2 Gamma radiation measurements of core collected with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).
Note 3 Gamma radiation measurements on surface with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).

CH2MHILL

PROJECT NUMBER	BORING NUMBER
461446	RM01-CWRP07 SHEET 1 OF 2

DRILLING LOG

PROJECT : Ruby Mines | LOCATION : Ruby Mines No. 1 | ELEVATION (TBM or MSL) :

DRILLING CONTRACTOR : National EWP | NAME OF DRILLER: Jesse Ornelas

DRILLING METHOD/EQUIPMENT: Direct Push (Geoprobe 7730 DT) | SIZE/TYPE OF BIT : 2.25-inch Macrocore

GPS COORDINATES (SYSTEM): N 1,644,637.803 N, E 2,607,160.985 (NAD 83, NM West, Ft) | TOTAL DEPTH OF BORING 35' bgs

START : 10/12/2014 END : 10/12/2014 | LOGGER : A.Ritchie

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: Surface counts (cpm)[3]: 39,423 uncollimated; 14,130 collimated	RADIATION MEASUREMENTS GM[1]	RADIATION MEASUREMENTS 2X2[2]
			SM	Silty Sand (SM) dark yellowish brown (10 YR 3/6), moist, loose, fine sand with 40% silt. **Cap 0 to 0.5 feet.**	collect RM01-CWRP07-C-00 from 0 to 0.5' @ 09:45, 11 µR/hr	60-100	15,200-15,900
			SP	Poorly Graded Sand (SP) light gray (10 YR 7/2), dry, loose, fine to medium felsic sand, trace fine to coarse gravel.		60-100	15,200-15,500
2		3'				100-120	14,700-15,000
				Waste Rock 1.0 to 25.5 feet.		100-140	14,900-15,100
4			SP	light reddish brown (5 YR 6/4) from 2.5 to 3 feet.		100-160	15,000-15,500
					collect RM01-CWRP07-R-05 @ 10:30, 10 µR/hr	80-120	15,600-15,900
6		3'				100-140	15,400-16,100
						100-140	15,200-16,000
			SP	gravel lense at 7.5 to 8 feet.			
8						100-120	15,300-15,500
						100-120	15,900-16,200
10					collect RM01-CWRP07-R-10		
			SP	light reddish brown (5 YR 6/4) from 10.5 to 11.5 feet.	@ 10:40, 12 µR/ hr	80-100	16,000-16,200
						100-140	15,900-16,200
12		4'				120-140	15,900-16,200
						120-200	16,300-16,500
14			SP	Poorly Graded Sand (SP) light light yellowish brown (10 YR 6/4), dry, loose, fine to medium felsic sand, trace fine to coarse gravel.		160-180	15,900-16,200
					collect RM01-CWRP07-R-15 @ 10:50, 12 µR/hr	60-100	16,600-16,800
16						120-160	16,400-16,800
						160-180	17,100-17,200
18		4'				140-180	17,100-17,300
						120-160	17,100-17,300
20					collect RM01-CWRP07-R-20		
			SP	light reddish grey (5 YR 6/2) from 20 to 25 feet.	@ 11:00, 11 µR/hr	140-160	16,500-16,800
						120-160	16,900-17,300
22		4'				120-160	16,800-17,300
						140-220	16,800-17,900
24						140-220	16,800-17,900

Note 1 Radiation measurements of core collected with Ludlum Model 12 scaler and Ludlum 44-09 pancake probe in counts per minute (cpm)
Note 2 Gamma radiation measurements of core collected with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).
Note 3 Gamma radiation measurements on surface with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).

CH2MHILL

PROJECT NUMBER	BORING NUMBER
461446	RM01-CWRP07 SHEET 2 OF 2

DRILLING LOG

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: SAMPLE COLLECTION	GM[1]	2X2[2]
26			CL	Lean Clay (CL) dark brown (10 YR 3/3), moist, very hard, medium plasticity, 10%, fine sand. **Native Soil 25.5 feet to total depth**		120-160	15,300-15,700
		4'				100-140	15,300-15,700
					collect RM01-CWRP07-R-26.5 @ 11:45 9 µR/hr	80-120	15,000-15,300
28			CL	Lean Clay With Sand (CL) dark brown (10 YR 3/3), moist, firm, 20% fine sand, low plasticity.		120-140	15,300-16,000
						120-160	15,900-16,500
30			CL	Sandy Lean Clay (CL) dark yellowish brown (10 YR 3/6), moist, firm, 40% fine sand, low plasticity.		60-80	16,100-16,400
		4'				80-100	15,500-16,100
32					collect RM01-CWRP07-R-31.5 @ 11:50 9 µR/hr	80-120	15,600-15,900
						100-140	15,400-15,800
34						100-120	15,000-15,500
36				End of boring	Backfill with cutting and cap with hydrated bentonite.		
38							
40							
42							
44							
46							
48							
50							

Note 1 Radiation measurements of core collected with Ludlum Model 12 scaler and Ludlum 44-09 pancake probe in counts per minute (cpm)
Note 2 Gamma radiation measurements of core collected with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).

CH2MHILL

PROJECT NUMBER	BORING NUMBER	
461446	RM01-CWRP08	SHEET 1 OF 1

DRILLING LOG

PROJECT : Ruby Mines	LOCATION : Ruby Mines No. 1	ELEVATION (TBM or MSL) :	
DRILLING CONTRACTOR :	National EWP	NAME OF DRILLER:	Jesse Ornelas
DRILLING METHOD/EQUIPMENT:	Direct Push (Geoprobe 7730 DT)	SIZE/TYPE OF BIT :	2.25-inch Macrocore
GPS COORDINATES (SYSTEM):	N 1,644,637.8 E 2,607,191.6 NAD 83 NM West, Ft	TOTAL DEPTH :	20 ft bgs
	START : 10/12/2014 END: 10/12/2014	LOGGER :	A.Ritchie

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: SAMPLE COLLECTION	GM[1]	2X2[2]
					Surface counts (cpm)[3]:	18,098	uncollimated
						5,523	collimated
						RADIATION MEASUREMENTS	
			ML	Sandy Silt (ML) dark yellowish brown (10 YR 3/6), moist, very hard to hard silt with loose sand, 40% fine sand. **Cap 0 to 2.0 feet.**	Collect RM01-CWRP08-C-00 @ 13:35 11 µR/hr	80-100	12,400-13,000
						80-120	13,300-14,000
2		2.5'	SM	Silty Sand (SM) light greenish grey (GLEY 1 7/10 Y), dry, dense, 60% fine felsic sand, 40% silt. **Waste Rock 2.0 to 17.5 feet.** mineralization at 3 to 4.5 feet.		300-1,200	17,000-35,000
						200-400	17,000-27,000
4						100-160	14,300-16,000
			SM	as above with 20% silt and trace fine to coarse gravel.	Collect RM01-CWRP08-R-05 @ 14:18 12 µR/hr	100-140	12,600-12,900
6		4'				120-160	13,400-13,600
						100-140	13,400-13,600
8			SM	as above with 20% silt and mineralization.		60-80	13,100-13,400
						60-100	13,000-13,300
10			SP	Poorly Graded Sand (SP) light yellowish brown (2.5 Y 6/3), dry, loose, fine sand.	Collect RM01-CWRP08-R-10 @ 14:25 10 µR/hr	100-140	13,700-14,000
						80-100	13,400-13,700
12		4'				80-100	12,900-13,400
			SP	same as above, except (2.5 Y 5/6) light olive brown		80-100	13,200-13,400
14						60-100	13,200-13,500
			SP	pale brown (10 YR 6/3)		60-100	13,700-14,200
			SP	olive brown (2.5 Y 4/4)			
16			SP	light yellowish brown (2.5 Y 6/3),		60-80	13,100-13,600
						60-80	13,100-13,300
18		5'	CL	Lean Clay with Sand (CL) dark yellowish brown (10 YR 3/6), moist, hard, low plasticity, 20%, fine sand. **Native Soil 17.5 feet to total depth** black at 17.5 feet with PID = 0.0 ppm	Collect RM01-CWRP08-S-18.5 @ 14:40 9 µR/hr	60-80	13,100-13,300
						60-80	13,600-13,800
20				End of boring	Backfill with cutting and cap with hydrated bentonite.		
22							
24							

Note 1 Radiation measurements of core collected with Ludlum Model 12 scaler and Ludlum 44-09 pancake probe in counts per minute (cpm)
Note 2 Gamma radiation measurements of core collected with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).
Note 3 Gamma radiation measurements on surface with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).

CH2MHILL

PROJECT NUMBER	BORING NUMBER
461446	RM01-DRNA1 SHEET 1 OF 1

DRILLING LOG

PROJECT : Ruby Mines	LOCATION : Ruby Mines No. 1	ELEVATION (TBM or MSL) :	
DRILLING CONTRACTOR :	National EWP	NAME OF DRILLER:	Jesse Ornelas
DRILLING METHOD/EQUIPMENT:	Direct Push (Geoprobe 7730 DT)	SIZE/TYPE OF BIT :	2.25-inch Macrocore
GPS COORDINATES (SYSTEM):	N 1,644,855.027 E 2,607,411.426 NAD 83 NM West, Ft	TOTAL DEPTH :	5 ft bgs
	START : 10/11/2014 END : 10/11/2014	LOGGER :	A.Ritchie

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: SAMPLE COLLECTION	GM[1]	2X2[2]
				Surface counts (cpm)[3]:		30,924 uncollimated	
						8,365 collimated	
						RADIATION MEASUREMENTS	
1		4 ft	ML	Sandy Silt (ML), dark yellowish brown (10 YR 3/6), moist, loose, 60% silt, 40% fine to coarse mafic sand with trace fine to coarse gravel	Collect RM01-DRNA1-00 @ 11:55 11 µR/hr	80-120	10,900-11,300
			CL	Lean Clay with Sand (CL) dark yellowish brown (10 YR 4/ moist, firm, 20% fine to coarse sand.			
2			SP-SM	Poorly graded sand with Silt (SP-SM), yellowish brown (10 YR 5/8), dry, loose, 90% fine sand, 10% silt.	Collect RM01-DRNA1-01 @ 11:55 16 µR/hr	80-110	10,700-10,800
3						60-100	10,600-10,800
4			SP-SM	same as above, except light yellowish brown (10 YR 6/4), trace coorse sand to fine gravel of CaCo3		80-100	10,600-10,800
5			ML	Sandy Silt (ML) grey (10YR6/1), dry, very hard, 40% fine sand.	Collect RM01-DRNA1-05 @ 12:00 15 µR/hr	80-100	10,700-10,900
6				End of boring	Backfill with cutting and cap with hydrated bentonite.		
7							
8							
9							
10							
11							
12							

Note 1 Radiation measurements of core collected with Ludlum Model 12 scaler and Ludlum 44-09 pancake probe in counts per minute (cpm)
Note 2 Gamma radiation measurements of core collected with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).
Note 3 Gamma radiation measurements on surface with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).

CH2MHILL

PROJECT NUMBER	BORING NUMBER	
461446	RM01-DRNB1	SHEET 1 OF 1

DRILLING LOG

PROJECT : Ruby Mines	LOCATION : Ruby Mines No. 1	ELEVATION (TBM or MSL) :	
DRILLING CONTRACTOR :	National EWP	NAME OF DRILLER:	Jesse Ornelas
DRILLING METHOD/EQUIPMENT:	Direct Push (Geoprobe 7730 DT)	SIZE/TYPE OF BIT :	2.25-inch Macrocore
GPS COORDINATES (SYSTEM):	N 1,644,788.36 E 2,607,101.22 NAD 83 NM West, Ft	TOTAL DEPTH :	5 ft bgs
	START : 10/13/2014 END : 10/13/2014	LOGGER :	B. Moayyad

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SAMPLE COLLECTION	COMMENTS: Surface counts (cpm)[3]: Not Measured uncollimated / Not Measured collimated / RADIATION MEASUREMENTS GM[1]	2X2[2]
0			SM	Silty Sand (SM) brown (7.5 YR 4/4), moist, soft nonplastic, approximately 25% silty fines.	RM01-DRNB1-00 @ 8:46 @ 12 µR/hr	80-100	13,700-14,000
1					RM01-DRNB1-01 @ 9:30 @ 10 µR/hr	80-120	13,500-13,800
2		4.2 ft				80-100	13,600-13,800
3			ML	Sandy Silt (ML) Brown (7.5 YR 4/4), moist, soft, nonplastic, approximately 30% fine sand. No waste rock identified.		80-120	13,800-13,900
4						80-100	14,600-15,200
5					RM01-DRNB1-05 @ 9:35 @ 9 µR/hr		
6				End of boring Backfill with native soil.			
7							
8							
9							
10							
11							
12							

Note 1 Radiation measurements of core collected with Ludlum Model 12 scaler and Ludlum 44-09 pancake probe in counts per minute (cpm)
Note 2 Gamma radiation measurements of core collected with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).
Note 3 Gamma radiation measurements on surface with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).

CH2MHILL

PROJECT NUMBER	BORING NUMBER	
461446	RM01-DRNC1	SHEET 1 OF 1

DRILLING LOG

PROJECT : Ruby Mines	LOCATION : Ruby Mines No. 1	ELEVATION (TBM or MSL) :	
DRILLING CONTRACTOR :	National EWP	NAME OF DRILLER:	Jesse Ornelas
DRILLING METHOD/EQUIPMENT:	Direct Push (Geoprobe 7730 DT)	SIZE/TYPE OF BIT :	2.25-inch Macrocore
GPS COORDINATES (SYSTEM):	N 1,644,744.3 E 2,606,969.7 NAD 83 NM West, Ft	TOTAL DEPTH :	5 ft bgs
	START : 10/12/2014 END : 10/12/2014	LOGGER :	B. Moayyad

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft) / RECOVERY (ft)	#/TYPE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: Surface counts (cpm)[3]: 18,214 uncollimated; 5,775 collimated. RADIATION MEASUREMENTS. SAMPLE COLLECTION	GM[1]	2X2[2]
1		SM	Silty Sand (SM) reddish brown (5 YR 5/6), damp, loose, fine quartz sand with red silty fines. No waste rock identified. @	RM01-DRNC1-00 @ 16:15 @ 10 µR/hr	100-120	RM01-DRNC1D @ 16:17 10 µR/hr 13,700-14,000
2	4.2 ft	CL	Lean Clay With Sand (CL) brown (7.5 YR 4/3), dry, stiff, low pasticity, ~15-20% fine sand.	RM01-DRNC1-01 16:35 @ 8 µR/hr	60-90	13,500-13,800
3					60-90	13,600-13,800
4					60-90	13,800-13,900
5				RM01-DRNC1-05 @ 16:40 @10 µR/hr	60-90	13,600-13,800
6			End of boring Backfill with native soil.			
7						
8						
9						
10						
11						
12						

Note 1 Radiation measurements of core collected with Ludlum Model 12 scaler and Ludlum 44-09 pancake probe in counts per minute (cpm)
Note 2 Gamma radiation measurements of core collected with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).
Note 3 Gamma radiation measurements on surface with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).

CH2MHILL

PROJECT NUMBER	BORING NUMBER	
461446	RM01-HR01	SHEET 1 OF 1

DRILLING LOG

PROJECT : Ruby Mines | LOCATION : Ruby Mines No. 1 | ELEVATION (TBM or MSL) :

DRILLING CONTRACTOR : National EWP | NAME OF DRILLER: Jesse Ornelas

DRILLING METHOD/EQUIPMENT: Direct Push (Geoprobe 7730 DT) | SIZE/TYPE OF BIT : 2.25-inch Macrocore

GPS COORDINATES (SYSTEM): N 1,644,987.4 E 2,60 ,802.4 NAD 83 NM West, Ft | TOTAL DEPTH : 5 ft bgs

START : 10/13/2014 END : 10/13/2014 | LOGGER : B. Moayyad

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: Surface counts (cpm)[3]: 25,600 uncollimated; 9,665 collimated	RADIATION MEASUREMENTS GM[1]	RADIATION MEASUREMENTS 2X2[2]
					SAMPLE COLLECTION		
0			SM	Silty Sand(SM) strong brown (7.5 YR 4/6) moist, loose, fine sand with ~25% silty fines **Waste rock 0-2 inches**	RM01-HR01-00 @ 09:35 @ 7 µR/hr RM01-HR01-01 @ 10:36 @ 8 µR/hr	100-140 100-120	9,200-9,400 9,100-9,500
2		4.0'	ML	Silt With Sand (ML) brown (7.5 YR 5/3), dry, medium dense, non-plastic, blocky, 10-20% fine sand.		80-100	8,700-9,000
3						60-80	8,800-9,000
4						60-100	8,800-9,100
5					RM01-HR-05 @ 10:40 @ 7 µR/hr		
				End of boring Backfill with native soil.			
6							
7							
8							
9							
10							
11							
12							

Note 1 Radiation measurements of core collected with Ludlum Model 12 scaler and Ludlum 44-09 pancake probe in counts per minute (cpm)
Note 2 Gamma radiation measurements of core collected with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).
Note 3 Gamma radiation measurements on surface with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).

CH2MHILL

PROJECT NUMBER	BORING NUMBER	
461446	RM01-HR02	SHEET 1 OF 1

DRILLING LOG

PROJECT : Ruby Mines	LOCATION : Ruby Mines No. 1	ELEVATION (TBM or MSL) :	
DRILLING CONTRACTOR :	National EWP	NAME OF DRILLER:	Jesse Ornelas
DRILLING METHOD/EQUIPMENT:	Direct Push (Geoprobe 7730 DT)	SIZE/TYPE OF BIT :	2.25-inch Macrocore
GPS COORDINATES (SYSTEM):	N 1,645,214.1 E 2,606,703.2 NAD 83 NM West, Ft	TOTAL DEPTH :	5 ft bgs
	START : 10/13/2014 END : 10/13/2014	LOGGER :	B. Moayyad

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SAMPLE COLLECTION	COMMENTS: Surface counts (cpm)[3]: 67,130 uncollimated; 40,753 collimated; RADIATION MEASUREMENTS GM[1]	2X2[2]
1			SM	Silty Sand (SM) strong brown (7.5 YR 4/6), damp, loose, fine quartz sand. Black wast rock interspersed 0 - 1 feet bgs.	RM01-HR02-00 @ 9:46 @ 40 µR/hr	24,000-31,000	21,600-22,900
2		3.8'	SM	Silty Sand (SM) light brown (7.5 YR 6/3), dry, loose, fine quarts sand with approximately 35% silty fines.	RM01-HR02-01 @ 10:50 @ 11 MR/hr	11,000-21,100	16,800-19,000
3						80-120	10,500-11,100
4						80-100	10,400-10,600
5						80-100	10,200-10,400
					RM01-HR02-05 @ 10:55 @ 7 µR/hr		
6				End of boring Backfill with native soil.			
7							
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9							
10							
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12							

Note 1 Radiation measurements of core collected with Ludlum Model 12 scaler and Ludlum 44-09 pancake probe in counts per minute (cpm)
Note 2 Gamma radiation measurements of core collected with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).
Note 3 Gamma radiation measurements on surface with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).

CH2MHILL

PROJECT NUMBER	BORING NUMBER	
461446	RM01-HR03	SHEET 1 OF 1

DRILLING LOG

PROJECT : Ruby Mines	LOCATION : Ruby Mines No. 1	ELEVATION (TBM or MSL) :	
DRILLING CONTRACTOR :	National EWP	NAME OF DRILLER:	Jesse Ornelas
DRILLING METHOD/EQUIPMENT:	Direct Push (Geoprobe 7730 DT)	SIZE/TYPE OF BIT :	2.25-inch Macrocore
GPS COORDINATES (SYSTEM):	N 1,645,759.6 E 2,606,765.5 NAD 83 NM West, Ft	TOTAL DEPTH :	5 ft bgs
	START : 10/13/2014 END : 10/13/2014	LOGGER :	B. Moayyad

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: SAMPLE COLLECTION	Surface counts (cpm)[3]: 77,079 uncollimated / 37,264 collimated — RADIATION MEASUREMENTS GM[1]	2X2[2]
			SC	Clalyey Sand(SC)	RM01-HR03-00 @		
				Black and brown moltled, loose, dry	9:55 @ 9 µR/hr	240-450	11,000-13,600
				sandy black waste rock with	+ MS,MSD metals		
				clay native soil mixed			
1			CL	Lean Clay with Sand (CL)	RM01-HR03-01 @		
				brown (7.5 YR 5/3), dry, stift, low plasticity, silty.	11:55 @ 7 µR/hr		
				Native soil with no waste rock.			
					RM01-HR03D-01 @	100-140	9,600-10,300
					11:55 @ 7 µR/hr		
2		4.0'					
						80-120	9,100-9,500
3							
						100-120	9,400-9,700
4							
			CL	CL as above			
						100-120	10,300-10,600
5					RM01-HR03-05 @		
					12:00 @ 6 µR/hr		
				End of boring Backfill with native soil.			
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7							
8							
9							
10							
11							
12							

Note 1 Radiation measurements of core collected with Ludlum Model 12 scaler and Ludlum 44-09 pancake probe in counts per minute (cpm)
Note 2 Gamma radiation measurements of core collected with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).
Note 3 Gamma radiation measurements on surface with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).

CH2MHILL

PROJECT NUMBER	SAMPLE GRID	
461446	Haul Road RUBY-001	SHEET 1 OF 1

MULTIPLE SOIL SAMPLE LOG

PROJECT : Ruby Mines	GENERAL LOCATION : Haul road just south of BIA 49	ELEVATION (TBM or MSL) :	TBM
CONTRACTOR : none		NAME OF DRILLER :	none
SAMPLE METHOD/EQUIPMENT:	Disposable plastic scoop	BORING DIAMETER :	2-inches
DATE : 10/10/2014		LOGGER :	Andre Ritchie

LOCATION ID: **RM01-HR04-00** GPS NORTHING: 1,650,268.8 GPS EASTING: 2,611,570.6
SAMPLE TIME: 9:28 SAMPLE GAMMA READING: 10,694 cpm on contact with jars
QA/QC SAMPLE ID: none QA/QC SAMPLE TYPE none

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	MEASUREMENTS: Core measurements on contact with gamma radiation detector*
0.5	0 - 0.5	0.5		SM	Silty Sand (SM) Dark yellowish brown (10Y 4/6), moist, loose. 60% fine to medium felsic sand, 40% silt.	1-minute in-situ uncollimated static count: 30,157 cpm 1-minute in-situ collimated static count: 13,126 cpm

NOTES: * Ludlum model 44-10 2x2-inch NaI scintillating detector with Ludlum Model 2221 scaler

LOCATION ID: **RM01-HR05-00** GPS NORTHING: 1,650,284.1 GPS EASTING: 2,611,593.1
SAMPLE TIME: 9:35 SAMPLE GAMMA READING: 19,609 cpm on contact with jars
QA/QC SAMPLE ID: none QA/QC SAMPLE TYPE none

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	MEASUREMENTS: Core measurements on contact with gamma radiation detector*
1 1.5	1 - 1.5	0.5		CL	Lean Clay with Sand (CL) dark yellowish brown (10YR 3/4), moist, soft, 20% fine sand, medium plasticity.	1-minute uncollimated static count on bag: 89,648 cpm 1-minute in-situ collimated static count: 33,068 cpm

NOTES: * Ludlum model 44-10 2x2-inch NaI scintillating detector with Ludlum Model 2221 scaler

LOCATION ID: **RM01-HR06-00** GPS NORTHING: 1,650,303.0 GPS EASTING: 2,611,622.7
SAMPLE TIME: 9:23 SAMPLE GAMMA READING: 13,073 cpm on contact with jars
QA/QC SAMPLE ID: none QA/QC SAMPLE TYPE none

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	MEASUREMENTS: Core measurements on contact with gamma radiation detector*
O 0.5	0-0.5	0.5		SM	Silty Sand (SM) Dark brown (10Y 3/3), moist, loose, 80% fine to medium felsic sand, 20% silt.	1-minute in-situ uncollimated static count: 50,010 cpm 1-minute in-situ collimated static count: 19,402 cpm

NOTES: * Ludlum model 44-10 2x2-inch NaI scintillating detector with Ludlum Model 2221 scaler

CH2MHILL

PROJECT NUMBER	BORING NUMBER	
461446	RM01-HR07	SHEET 1 OF 1

DRILLING LOG

PROJECT : Ruby Mines	LOCATION : Ruby Mines No. 1	ELEVATION (TBM or MSL) :	
DRILLING CONTRACTOR :	National EWP	NAME OF DRILLER:	Jesse Ornelas
DRILLING METHOD/EQUIPMENT:	Direct Push (Geoprobe 7730 DT)	SIZE/TYPE OF BIT :	2.25-inch Macrocore
GPS COORDINATES (SYSTEM):	N 1644877.218 E 2,607,057.524 NAD 83 NM West, Ft	TOTAL DEPTH :	5 ft bgs
	START : 10/11/2014 END : 10/11/2014	LOGGER :	A.Ritchie

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: Surface counts (cpm)[3]: 176,269 uncollimated; 72,600 collimated	RADIATION MEASUREMENTS GM[1]	RADIATION MEASUREMENTS 2X2[2]
					SAMPLE COLLECTION		
0			SM	Silty Sand (SM), dark yellowish brown (10 YR 3/6), moist, loose, 60% fine to coarse felsic sand, 40% silt.	RM01-HR07-00 @ 10:55 @ 44 µR/hr	140-200	13,400-14,000
1			SP-SM	Poorly Graded Sand with Silt (SP-SM), yellowish brown (10 YR 5/6), dry, loose, fine sand, 10% silt.	RM01-HR07-01 @ 11:15 @ 16 µR/hr	80-110	11,500-12,000
2		4.0'					
			SP-SM	same as above, except pale brown (10 YR 6/3)		110-160	11,200-11,500
3			SW-SM	Well Graded Sand with Silt (SW-SM), yellowish brown (10 YR 5/4), dry, loose, 90% fine to coarse sand with CaCO3 cement, 10% silt.		100-120	10,900-11,100
4			CL	Lean Clay (CL) brown (10 YR 4/3), dry, very hard, low plasticity.		60-100	10,800-11,000
5					RM01-HR07-05 @ 11:20 @ 9 µR/hr		
				End of boring Backfill with native soil.			
6							
7							
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10							
11							
12							

Note 1 Radiation measurements of core collected with Ludlum Model 12 scaler and Ludlum 44-09 pancake probe in counts per minute (cpm)
Note 2 Gamma radiation measurements of core collected with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).
Note 3 Gamma radiation measurements on surface with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).

CH2MHILL

PROJECT NUMBER	BORING NUMBER		
461446	RM01-STEP01	SHEET 1	OF 1

DRILLING LOG

PROJECT : Ruby Mines	LOCATION : Ruby Mines No. 1	ELEVATION (TBM or MSL) :	
DRILLING CONTRACTOR :	National EWP	NAME OF DRILLER:	Jesse Ornelas
DRILLING METHOD/EQUIPMENT:	Direct Push (Geoprobe 7730 DT)	SIZE/TYPE OF BIT :	2.25-inch Macrocore
GPS COORDINATES (SYSTEM):	N 1,644,681.4 E 2,606,733.9 NAD 83 NM West, Ft	TOTAL DEPTH :	5 ft bgs
	START : 10/12/2014 END : 10/12/2014	LOGGER :	B. Moayyad

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: Surface counts (cpm)[3]: 24,593 uncollimated; 8,403 collimated. RADIATION MEASUREMENTS. SAMPLE COLLECTION	GM[1]	2X2[2]
0			SM	Silty Sand (SM) reddish brown (5 YR 5/4), dry, loose, fine quarts sand, with red silty fines to 1.2 ft	RM01-STEP01-00 16:14 @ 12 µR/hr	90-110	11,970-12,150
1					RM01-STEP01-01 16:20 @ 14 µR/hr		
2		4.0'	CL	Sand Lean Clay (CL) brown (7.5 YR 5/4), dry, stiff, low plasticity, silty, trace fine sand. No waste rock identified.		90-110	11,860-12,100
3						90-110	12,000-12,030
4						90-110	11,950-12,300
5						90-110	11,970-12,200
6				End of boring Backfill with native soil.	RM01-STEP01-05 @ 16:30 @ 9 µR/hr		
7							
8							
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10							
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12							

Note 1 Radiation measurements of core collected with Ludlum Model 12 scaler and Ludlum 44-09 pancake probe in counts per minute (cpm)
Note 2 Gamma radiation measurements of core collected with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).
Note 3 Gamma radiation measurements on surface with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).

CH2MHILL

PROJECT NUMBER	BORING NUMBER	
461446	RM01-STEP02	SHEET 1 OF 1

DRILLING LOG

PROJECT : Ruby Mines	LOCATION : Ruby Mines No. 1	ELEVATION (TBM or MSL) :	
DRILLING CONTRACTOR :	National EWP	NAME OF DRILLER:	Jesse Ornelas
DRILLING METHOD/EQUIPMENT:	Direct Push (Geoprobe 7730 DT)	SIZE/TYPE OF BIT :	2.25-inch Macrocore
GPS COORDINATES (SYSTEM):	N 1,645,048.112 E 2,607,229.083 NAD 83 NM West, Ft	TOTAL DEPTH :	5 ft bgs
	START : 10/11/2014 END : 10/11/2014	LOGGER :	B. Moayyad

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SAMPLE COLLECTION	COMMENTS: Surface counts (cpm)[3]: 97,827 uncollimated; 40,360 collimated. RADIATION MEASUREMENTS GM[1]	RADIATION MEASUREMENTS 2X2[2]
1			SM @	Silty Sand (SM) strong brown (7.5 YR 5/8), dry, loose, fine quartz sand with with 35-40% silty fines. Wet gray gravel waste rock at surface up to 2 inches bgs.	RM01-STEP02-00 @ 10:50 @ 28 µR/hr RM01-STEP02D 10:58 @ 28 µR/hr	100-220	15,000-16,500
2		4.0'	SM	as above.	RM01-STEP02-01 @ 11:00 @ 16 µR/hr	100-120	13,100-14,100
3						80-100	12,800-13,100
4						60-80	12,300-12,800
5						60-80	12,100-12,300
5				End of boring Backfill with native soil.	RMO1-STEPO2-05 @ 11:03 @ 12 Mµ/hr		
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12							

Note 1 Radiation measurements of core collected with Ludlum Model 12 scaler and Ludlum 44-09 pancake probe in counts per minute (cpm)
Note 2 Gamma radiation measurements of core collected with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).
Note 3 Gamma radiation measurements on surface with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).

CH2MHILL

PROJECT NUMBER	BORING NUMBER		
461446	RM01-STEP03	SHEET 1	OF 1

DRILLING LOG

PROJECT : Ruby Mines	LOCATION : Ruby Mines No. 1	ELEVATION (TBM or MSL) :	
DRILLING CONTRACTOR :	National EWP	NAME OF DRILLER:	Jesse Ornelas
DRILLING METHOD/EQUIPMENT:	Direct Push (Geoprobe 7730 DT)	SIZE/TYPE OF BIT:	2.25-inch Macrocore
GPS COORDINATES (SYSTEM):	N 1,644,810.9 E 2,607,599.9 NAD 83 NM West, Ft	TOTAL DEPTH :	5 ft bgs
	START : 10/11/2014 END : 10/11/2014	LOGGER :	B. Moayyad

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SAMPLE COLLECTION	COMMENTS: Surface counts (cpm)[3]: 59,471 uncollimated; 21,694 collimated. RADIATION MEASUREMENTS GM[1]	2X2[2]
1		4.0'	SM	Sandy Silt (ML) brown (7.5 YR 4/4) dry, stiff, with approximately 35% fine quartz sand. fine quartz sand No waste rock identified.	RM01-STEP03-00 @ 12:36 @ 17 MμR/hr	100-120	13,200-13,700
2					RM01-STEP03-01 @ 13:05 @ 15 μR/hr	100-100	12,400-13,100
3						100-100	12,400-12,100
4			SM	as above.		60-80	12,500-12,300
5						80-100	12,500-12,100
6				End of boring Backfill with native soil.	RM01-STEP03-05 @ 13:15 @ 15 μR/hr		
7							
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10							
11							
12							

Note 1 Radiation measurements of core collected with Ludlum Model 12 scaler and Ludlum 44-09 pancake probe in counts per minute (cpm)
Note 2 Gamma radiation measurements of core collected with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).
Note 3 Gamma radiation measurements on surface with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).

CH2MHILL

PROJECT NUMBER	BORING NUMBER		
461446	RM01-STEP04	SHEET 1	OF 1

DRILLING LOG

PROJECT : Ruby Mines	LOCATION : Ruby Mines No. 1	ELEVATION (TBM or MSL) :	
DRILLING CONTRACTOR :	National EWP	NAME OF DRILLER:	Jesse Ornelas
DRILLING METHOD/EQUIPMENT:	Direct Push (Geoprobe 7730 DT)	SIZE/TYPE OF BIT :	2.25-inch Macrocore
GPS COORDINATES (SYSTEM):	N 1,644,608.95 E 2,607,548.46 NAD 83 NM West, Ft	TOTAL DEPTH :	5 ft bgs
	START : 10/12/2014 END : 10/12/2014	LOGGER :	B. Moayyad

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: SAMPLE COLLECTION	GM[1]	2X2[2]
					Surface counts (cpm)[3]:	134,792 uncollimated	
						57,437 collimated	
						RADIATION MEASUREMENTS	
0			SM	Silty Sand (SM), dark yellowish brown (10 YR 4/6), 60% fine sand, 40% silt, moist, loose	collect RM01-STEP04-00 @ 08:00	350-450	16,800-18,500
				Waste rock interspersed 0 to 1 feet bgs.	12 NµR/hr		
1			SM	Silty Sand (SM), brown (7.5 YR 5/4), dry, loose, 80% fine to medium sand, 10% silt, trace fine to coarse gravel (gley 2 7/5 PB; light bluish gray)	collect RM01-STEP4-01 @ 08:25	120-180	14,200-15,000
					10 µR/hr		
2		4.0'	SM	Silty Sand (SM) dark yellowish brown (10 YR 4/4), dry, loose. 60% fine sand, 40% silt.		100-120	13,100-13,800
3						80-110	12,900-13,400
4			ML	Sandy Silt (ML) dark yellowish brown (10 YR 4/4), dry, hard, 60% silt, 40% fine sand.	Collect RM01-STEP04-05 @ 08:30	80-110	12,900-13,300
5					10 µR/hr		
				End of boring Backfill with native soil.			
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Note 1 Radiation measurements of core collected with Ludlum Model 12 scaler and Ludlum 44-09 pancake probe in counts per minute (cpm)
Note 2 Gamma radiation measurements of core collected with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).
Note 3 Gamma radiation measurements on surface with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).

CH2MHILL

PROJECT NUMBER	BORING NUMBER		
461446	RM01-STEP05	SHEET 1	OF 1

DRILLING LOG

PROJECT : Ruby Mines	LOCATION : Ruby Mines No. 1	ELEVATION (TBM or MSL) :	
DRILLING CONTRACTOR :	National EWP	NAME OF DRILLER:	Jesse Ornelas
DRILLING METHOD/EQUIPMENT:	Direct Push (Geoprobe 7730 DT)	SIZE/TYPE OF BIT :	2.25-inch Macrocore
GPS COORDINATES (SYSTEM):	N 1,644,937.0, E 2,607,226.8 NAD 83 NM West, Ft	TOTAL DEPTH :	5 ft bgs
	START : 10/11/2014 END : 10/11/2014	LOGGER :	B. Moayyad

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SAMPLE COLLECTION	COMMENTS: Surface counts (cpm)[3]: 102,246 uncollimated / 73,119 collimated; RADIATION MEASUREMENTS GM[1]	2X2[2]
1			CL	Sandy Lean Clay (CL), light brown (7.5 YR 6/4), dry, stiff 25-35% fine sand, silty with carbonate lenses	RM01-STEP05-00 @ 11:22 @ 36 µR/hr	1,000-1,600	16,700-17,000
				Note: Dark Grey (7.5 YR 3/1) Sandy Waste Rock at 0-8" and discolored soil (dark gray) to 14"	RM01-STEP05-01 @ 11:40 @ 16 µR/hr		
2		4.0'				140-300	13,200-16,300
3						80-140	12,100-13.000
4						60-80	11,200-11,500
5						60-80	11,400-11,700
				End of boring Backfill with native soil.	RM01-STEP05-05 @ 11:45 @15 µR/hr		
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Note 1 Radiation measurements of core collected with Ludlum Model 12 scaler and Ludlum 44-09 pancake probe in counts per minute (cpm)
Note 2 Gamma radiation measurements of core collected with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).
Note 3 Gamma radiation measurements on surface with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).

CH2MHILL

PROJECT NUMBER	BORING NUMBER		
461446	RM01-WRK01	SHEET 1	OF 1

DRILLING LOG

PROJECT : Ruby Mines	LOCATION : Ruby Mines No. 1	ELEVATION (TBM or MSL) :	
DRILLING CONTRACTOR :	National EWP	NAME OF DRILLER:	Jesse Ornelas
DRILLING METHOD/EQUIPMENT:	Direct Push (Geoprobe 7730 DT)	SIZE/TYPE OF BIT :	2.25-inch Macrocore
GPS COORDINATES (SYSTEM):	N 1,644,776.4 E 2,606,456.0 NAD 83 NM West, Ft	TOTAL DEPTH :	5 ft bgs
	START : 10/11/2014 END : 10/11/2014	LOGGER :	B. Moayyad

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SAMPLE COLLECTION	COMMENTS: Surface counts (cpm)[3]: 26,190 uncollimated; 8,284 collimated. RADIATION MEASUREMENTS GM[1]	RADIATION MEASUREMENTS 2X2[2]
0			SM	Silty Sand with Gravel (SM) brown (7.5 YR 5/4), dry, loose, fine to medium. **Waste rock (gray gravel and sand) interspersed 0 to 1.5 feet bgs.**	RM01-WRK01-00 @ 13:20 @ 15 µR/hr	60-140	13,100-14,300
1					RM01-WRK01-01 @ 13:55 @ 16 µR/hr		
			CL	Lean Clay with Sand (CL) strong brown (7.5 YR 4/6), with dark grey staining, dry, stiff, low plasticity. PID = 0.0		140-180	13,500-14,800
2		4.5'					
			CL	as above with no staining or waste rock to total depth		140-180	12,400-12,700
3							
						120-140	12,000-12,300
4							
						100-120	12,000-12,100
5					RM01-WRKO1-05 @ 14:00 @ 13 µR/hr		
				End of boring Backfill with native soil.			
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Note 1 Radiation measurements of core collected with Ludlum Model 12 scaler and Ludlum 44-09 pancake probe in counts per minute (cpm)
Note 2 Gamma radiation measurements of core collected with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).
Note 3 Gamma radiation measurements on surface with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).

CH2MHILL

PROJECT NUMBER	BORING NUMBER	
461446	RM01-WRK02	SHEET 1 OF 1

DRILLING LOG

PROJECT : Ruby Mines	LOCATION : Ruby Mines No. 1	ELEVATION (TBM or MSL) :	
DRILLING CONTRACTOR :	National EWP	NAME OF DRILLER:	Jesse Ornelas
DRILLING METHOD/EQUIPMENT:	Direct Push (Geoprobe 7730 DT)	SIZE/TYPE OF BIT :	2.25-inch Macrocore
GPS COORDINATES (SYSTEM):	N 1,644,729.629 E 2,607,505.972 NAD 83 NM West, Ft	TOTAL DEPTH :	10 ft bgs
	START : 10/11/2014 END : 10/11/2014	LOGGER :	A.Ritchie

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: SAMPLE COLLECTION	Surface counts (cpm)[3]: 42,278 uncollimated; 14,159 collimated. RADIATION MEASUREMENTS GM[1]	RADIATION MEASUREMENTS 2X2[2]
0			ML	Sandy Silt (ML) dark yellowish brown (10 YR 4/6), moist, loose, 60% silt, 40% fine sand. No waste rock identified.	Collect RM01-WRK02-00 from 0 to 0.5' bgs @ 13:00 17 µR/hr on contact	80-110	12,200-12,400
1			SM	Silty Sand (SM), yellowish brown (10 YR 5/6), dry, loose, 80% fine sand, 20% silt.	Collect RM01-WRK02-01 from 1 to 1.5' bgs @ 13:20 17 µR/hr on contact	100-120	11,500-11,800
2		4.0'				80-110	11,200-11,500
3				Zone of CaCo3 cementing from 3.5 to 4' bgs		80-120	11,000-11,500
4			SM	same as 1 to 3.5' bgs, except brown (7.5 YR 4/4), and trace medium sand of felsic composition		140-200	11,300-11,600
5			ML	Sandy Silt (ML), pale brown (10 YR 6/3), dry, very hard, 60% silt, 40% fine sand.	Collect RM01-WRK02-5.5 from 5.5 to 6' bgs @ 13:25 15 µR/hr on contact	80-120	11,200-11,500
6						80-120	10,700-11,100
7		4.0'	ML	Zone of CaCo3 cementing from 6.5 to 8' bgs		80-110	10,200-10,400
8			SM	SM, continued from sheet 1		80-100	10,400-11,000
9				Lean Clay (CL), dark gray (10 YR 4/1), 100% clay, dry, very hard	No sample collected	80-100	10,800-11,100
10				End of boring Backfill with native soil and hydrated bentonite chips			
11							
12							

Note 1 Radiation measurements of core collected with Ludlum Model 12 scaler and Ludlum 44-09 pancake probe in counts per minute (cpm)
Note 2 Gamma radiation measurements of core collected with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).
Note 3 Gamma radiation measurements on surface with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).

CH2MHILL

PROJECT NUMBER	BORING NUMBER	
461446	RM01-WRK03	SHEET 1 OF 1

DRILLING LOG

PROJECT : Ruby Mines	LOCATION : Ruby Mines No. 1	ELEVATION (TBM or MSL) :	
DRILLING CONTRACTOR :	National EWP	NAME OF DRILLER:	Jesse Ornelas
DRILLING METHOD/EQUIPMENT:	Direct Push (Geoprobe 7730 DT)	SIZE/TYPE OF BIT :	2.25-inch Macrocore
GPS COORDINATES (SYSTEM):	N 1,644,691.2 E 2,607,455.1 NAD 83 NM West, Ft	TOTAL DEPTH :	5 ft bgs
	START : 10/12/2014 END : 10/12/2014	LOGGER :	B. Moayyad

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SOIL DESCRIPTION / SAMPLE COLLECTION	COMMENTS: RADIATION MEASUREMENTS GM[1]	2X2[2]
					Surface counts (cpm)[3]:	30,130 uncollimated	
						9,360 collimated	
0			SM	Silty Sand (SM) yellowish red (5 YR 5/8), fine quartz sand with approximately 30% silty fines.	RM01-WRK03 @ 07:30 @ 8 µ/hr		
					RM01-WRK03D-00 @ 07:38 @ 8 µ/hr	60-80	18,900-19,500
1				@	RM01-WRK03-01 08:05 @ 8 µ/hr		
			SM	Silty Sand With Gravel (SM) gray (7.5 YR 6/1), well graded sand with approximately 30% gravel and 25% rock powder from 1.5-2.2 ft	PID= 0.0	80-220	19,600-22,600
2		4.0'		**Waste Rock 1.5-2.2 ft and lenses at 2.6 ft bgs**			
				@	RM01-WRK03-05 08:10 @ 11 MR/hr	140-220	18,900-20,800
3			CL	Lean Clay (CL) Brown (7.5 YR 5/4), moist, stiff, low plasticity			
				Black organic staining at 3.3 ft. PID = 0.0	PID= 0.00 3.3 ft in organic lense		
				Native Soil		80-120	16,000-17,000
4							
						80-110	15,500-16,100
5				End of boring Backfill with native soil.			
6							
7							
8							
9							
10							
11							
12							

Note 1 Radiation measurements of core collected with Ludlum Model 12 scaler and Ludlum 44-09 pancake probe in counts per minute (cpm)
Note 2 Gamma radiation measurements of core collected with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).
Note 3 Gamma radiation measurements on surface with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).

CH2MHILL

PROJECT NUMBER	BORING NUMBER	
461446	RM01-WRK04	SHEET 1 OF 1

DRILLING LOG

PROJECT : Ruby Mines	LOCATION : Ruby Mines No. 1	ELEVATION (TBM or MSL) :	
DRILLING CONTRACTOR :	National EWP	NAME OF DRILLER:	Jesse Ornelas
DRILLING METHOD/EQUIPMENT:	Direct Push (Geoprobe 7730 DT)	SIZE/TYPE OF BIT :	2.25-inch Macrocore
GPS COORDINATES (SYSTEM):	N 1,644,600.0 E 2,607,468.8 NAD 83 NM West, Ft	TOTAL DEPTH :	5 ft bgs
	START : 10/12/2014 END : 10/12/2014	LOGGER :	B. Moayyad

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SAMPLE COLLECTION	COMMENTS: Surface counts (cpm)[3]: 17,374 uncollimated; 4,890 collimated. RADIATION MEASUREMENTS GM[1]	2X2[2]
0			SM	Silty Sand (SM) yellowish red (5 YR 5/6), wet, loose, fine quartz sand, with approximately 20% fines. **Cap fill material 0-1 feet bgs**	RM01-WRK04-00 8:10 @ 11 µR/hr	100-140	18,600-19,00
1			GW	Well Graded Gravel (GW) gray (5 YR 5/1) dry, dense, gravel, cobble, and rock powder. **Waste Rock 1-1.9 feet bgs**	RM01-WRK04-01 8:33 @ 11 µR/hr	100-140	18,300-19,000
2		4.0'	CL	Sandy Lean Clay (CL) Brown (7.5 YR 5/3), damp, stiff, low plasticity, with approximately 40% fine sand. Native soil with no staining to total depth	PID=0.0	80-120	16,700-18,200
3						80-100	16,000-18,200
4						60-100	14,400-15,400
5				@	RM01-WRK04-05 8:38 @ 12 µR/hr		
				End of boring Backfill with native soil.			
6							
7							
8							
9							
10							
11							
12							

Note 1 Radiation measurements of core collected with Ludlum Model 12 scaler and Ludlum 44-09 pancake probe in counts per minute (cpm)
Note 2 Gamma radiation measurements of core collected with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).
Note 3 Gamma radiation measurements on surface with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).

CH2MHILL

PROJECT NUMBER	BORING NUMBER
461446	RM03-CWRP01 SHEET 1 OF 1

DRILLING LOG

PROJECT : Ruby Mines	LOCATION : Ruby Mines No. 3	ELEVATION (TBM or MSL) :	
DRILLING CONTRACTOR :	National EWP	NAME OF DRILLER:	Jesse Ornelas
DRILLING METHOD/EQUIPMENT:	Direct Push (Geoprobe 7730 DT)	SIZE/TYPE OF BIT :	2.25-inch Macrocore
GPS COORDINATES (SYSTEM):	1,640,522.926N 2,624,916.676 E NAD 83 NM West, Ft	TOTAL DEPTH :	25 ft bgs
	START : 10/8/2014 END : 10/08/2014	LOGGER :	B. Moayyad

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: Surface counts (cpm)[3]: 15,909 uncollimated; 5,297 collimated	RADIATION MEASUREMENTS GM[1]	RADIATION MEASUREMENTS 2X2[2]
					SAMPLE COLLECTION		
0			ML	Silt with Sand (ML) reddish brown (5 YR 5/4), dry, soft, approximately 15% fine sand **Cap 0 to 1 feet.**	Collect RM03-CWRP01-C-00 at 16:25 at 13 µR/hr	100-110	10,600 - 11,100
1			GM & SM	Silty Gravel and Sand (GM & SM) gray (5 YR 6/1), dry, dense, 35-45% sand, 35-45% gravel, 30% crushed rock powder. **Waste Rock 1 to 5.5 feet**		110-180	10,300 - 10,600
2		4'				110-160	10,500 - 11,700
3						110-160	10,900 - 11,600
4						100-120	10,900 - 11,200
5					collect RM03-CWRP01-R-05 @16:50 at 15 µR/hr	80-110	12,000 - 12,200
6		3.6'	CL	Lean clay with sand (CL) red (2.5 YR 5/6), dry, stiff, 10-15ft% fine sand, plastic. @ **Native Soil at 5.5 to 10**	and RM03-CWRP01-S-06 16:55 at 13 µR/hr with MS/MSD	80-100	11,600 - 11,800
7						80-100	11,100 - 11,500
8			CL	Lean clay (CL) brown (7.5 YR 4/4), dry, stiff, no sand, plastic		80-100	10,900 - 11,200
9					**no samples at 10 feet in clean native soil**	80-100	10,800 - 11,000
10				End of boring	Backfill with cutting and cap with hydrated bentonite.		
11							
12							

Note 1 Radiation measurements of core collected with Ludlum Model 12 scaler and Ludlum 44-09 pancake probe in counts per minute (cpm)
Note 2 Gamma radiation measurements of core collected with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).
Note 3 Gamma radiation measurements on surface with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).

CH2MHILL

PROJECT NUMBER	BORING NUMBER
461446	RM03-CWRP02 SHEET 1 OF 1

DRILLING LOG

PROJECT : Ruby Mines	LOCATION : Ruby Mines No. 3	ELEVATION (TBM or MSL) :	
DRILLING CONTRACTOR :	National EWP	NAME OF DRILLER:	Jesse Ornelas
DRILLING METHOD/EQUIPMENT:	Direct Push (Geoprobe 7730 DT)	SIZE/TYPE OF BIT :	2.25-inch Macrocore
GPS COORDINATES (SYSTEM):	1,640,434.2 N 2,625,119.5 E NAD 83 NM West, Ft	TOTAL DEPTH :	20 ft bgs
	START : 10/9/2014 END : 10/9/2014	LOGGER :	B. Moayyad

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SOIL DESCRIPTION	COMMENTS Surface counts (cpm)[3]: 18,141 uncollimated, 5,935 collimated RADIATION MEASUREMENTS SAMPLE COLLECTION	GM[1]	2X2[2]
			SC	Clayey sand (CL) brown (7.5 YR 5/4), wet, loose, 35-40% plastic fines, fine sand.		RM03-CWRP02-C-00 @ 12:00 @ 15 µR/hr	60-80	11,400-11,700
				Cap 0 to 1 feet bgs			80-120	11,000-11,300
2			SM	Silty Sand With Gravel (SM) grey to pale brown (7.5 YR 5/1 to 7/2), dry, dense, crushed mineralized rock with ~30% rock powder.			100-140	10,500-10,800
		3.5'		**Waste Rock 1 to 12.5 feet**			120-160	10,800-11,000
4							100-140	10,800-11,300
						RM03-CWRP02-R-05 @ 12:30 @ 15 µR/hr	100-140	11,500-12,000
6							120-160	11,400-11,800
							120-160	11,100-11,400
8		3.5'	SM	as above			120-160	11,000-11,400
							120-160	11,400-12,000
10						RM03-CWRP02-R-10 @ 12:40 @ 14 µR/hr	100-140	10,900-11,200
				cobbles at 11 feet				
			SM	Silty Sand (SM) dark grey (7.5 YR 4/1), black fines and gray well graded sand with gravel.			120-160	11,000-12,300
12		3'					200-400	11,000-11,300
			CL	Sandy Lean Clay (CL) Red (2.5 YR 5/3) dry, stiff, plastic, with approximately 25% fine sand.		RM03-CWRP02-S-13.5 @ 13:20 @ 13 µR/hr	80-100	14,300-14,900
14				**Native Soil 12.5 feet to total depth**			80-100	12,000-13,400
			ML	Silt With Sand (ML) light brown (7.5 YR 7/3), non plastic, ~30% fine quartz sand and carbonate cementation			80-100	10,900-11,300
16							80-100	12,100-12,600
							80-100	10,600-10,800
18		3'					80-100	9,900-10,300
							80-100	10,000-10,400
20				End of boring at 20 feet		Backfill with cutting and cap with hydrated bentonite.		
22								
24								

Note 1 Radiation measurements of core collected with Ludlum Model 12 scaler and Ludlum 44-09 pancake probe in counts per minute (cpm)
Note 2 Gamma radiation measurements of core collected with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).
Note 3 Gamma radiation measurements on surface with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).

CH2MHILL

PROJECT NUMBER	BORING NUMBER	
461446	RM03-CWRP03	SHEET 1 OF 1

DRILLING LOG

PROJECT : Ruby Mines	LOCATION : Ruby Mines No. 3	ELEVATION (TBM or MSL) :	
DRILLING CONTRACTOR :	National EWP	NAME OF DRILLER:	Jesse Ornelas
DRILLING METHOD/EQUIPMENT:	Direct Push (Geoprobe 7730 DT)	SIZE/TYPE OF BIT :	2.25-inch Macrocore
GPS COORDINATES (SYSTEM):	1,640,356.8 N 2,625,360.3 E NAD 83 NM West, Ft	TOTAL DEPTH :	12.5 ft bgs
	START : 10/9/2014 END : 10/9/2014	LOGGER :	B. Moayyad

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: SAMPLE COLLECTION	Surface counts (cpm)[3]: 19,634 uncollimated, 7,124 collimated — RADIATION MEASUREMENTS GM[1]	2X2[2]
1		4.0'	ML	Sandy Silt (ML) yellowish brown (7.5 YR 5/6), wet, soft, with 30% fine sand. **Cap 0 to 1 feet.**	RM03-CWRP03-C-00 @ 12:55 @ 12 µR/hr; RM03-CWRP03-C-00 @ 13:00 @ 13 µR/hr	60-100	18,700-19,200
2			SM	Silty Sand with Gravel (SM) grey to white (7.5 YR 5/1 to 9/1), dry, dense, crushed rock with 10-20% gravel and cobbles, 50% sand, 35% powder. **Waste Rock 1 to approximately 12 feet.**		100-140	18,600-18,900
3						120-140	18,200-18,800
4						140-160	17,600-18,200
5			SM	as above		120-140	16,700-17,200
6	no recovery	0			RM03-CWRP03-R-05 @ 13:55 @ 13 µR/hr	100-120	17,000-17,400
7	no recovery		SM?	drills like sand, assume cobble blocks core barrel		120-140	16,000-16,400
8						No readings	
9		2'	SM	as above		No readings	
10			CL	Sandy Lean Clay (CL) yellowish brown (7 YR 5/8) damp, stiff, 30% fine sand. **Initially assumed to be native, but SP below is characteristic of waste rock.**	RM03-CWRP03-S-10 14:00 @ 13µR/hr	180-240	17,300-17,700
11		2.5'	SP	Poorly Graded Sand (SP) grey (7.5 YR 5/1) dry, dense, cemented or mineralized fine quartz sand.		60-220	17,500-17,900
12			CL	Refusal at 12 feet in cemented clay	**Presumed native soil at 12 feet bgs.** Backfill with cutting and cap with hydrated bentonite.		

Note 1 Radiation measurements of core collected with Ludlum Model 12 scaler and Ludlum 44-09 pancake probe in counts per minute (cpm)
Note 2 Gamma radiation measurements of core collected with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).
Note 3 Gamma radiation measurements on surface with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).

CH2MHILL

PROJECT NUMBER	BORING NUMBER	
461446	RM03-CWRP04	SHEET 1 OF 1

DRILLING LOG

PROJECT : Ruby Mines	LOCATION : Ruby Mines No. 3	ELEVATION (TBM or MSL) :	
DRILLING CONTRACTOR :	National EWP	NAME OF DRILLER:	Jesse Ornelas
DRILLING METHOD/EQUIPMENT:	Direct Push (Geoprobe 7730 DT)	SIZE/TYPE OF BIT :	2.25-inch Macrocore
GPS COORDINATES (SYSTEM):	N 1,640,009.3 E 2,625,442.1 NAD 83 NM West, Ft	TOTAL DEPTH :	15 ft bgs
	START : 10/8/2014 END : 10/8/2014	LOGGER :	B. Moayyad

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: Surface counts (cpm)[3]: 31,942 uncollimated; 10,925 collimated SAMPLE COLLECTION	RADIATION MEASUREMENTS GM[1]	RADIATION MEASUREMENTS 2X2[2]
			ML	Sandy Silt (ML) light reddish brown (7.5 YR 6/4), dry, to soft, 30% fine sand.	collcet RM03-CWRP04-C-00 @ 08:26 14 µR/hr		
				Cap 0 to 0.5 feet.		100-200	12,200-13,200
2			SM	Silty Sand With Gravel (SM) brown to grey (7.5 YR 5/4 to6/1) dry, dense to loose, 35-50% sand, 25-40% grey mineralized gravel		110-180	12,200-12,800
		4'		**Waste Rock 0.5 to 12 feet.**	collect RM03-CWRP04-R-03 08:40 17 µR/hr Duplicate at 9:10	110-180	11,900-12,300
4						120-200	11,500-12,800
						160-200	11,200-12,200
6			SM	same as above but brown (7.5 YR 4/3) moist, less gravel (10-25%) and ~30% fines		80-110	13,100-13,600
		4'				100-160	12,800-13,700
8					collect RM03-CWRP04-R-08 @ 10:00 15 µR/hr	140-180	12,900-13,800
			SM	same as above		140-180	12,400-13,200
10						160-210	13,100-13,800
			GW 11'-12'	Well Graded Gravel (GW) light grey (7.5 YR 7/1), dry, dense, mineralized cobbles, gravel, and rock powder		120-180	12,600-14,100
12		4'	ML	Silt with sand (ML) reddish yellow (7.5 YR 6/6), dry, dense, and approximately 20% fine sand		140-180	13,900-14,300
				Native Soil 12 feet to total depth		80-120	12,100-12,600
14					collect RM03-CWRP04-S-14 @ 10:10 13 µR/hr	80-100	11,800-12,400
						80-110	12,200-13,400
16				End of boring at 15 feet	Backfill with cutting and cap with hydrated bentonite.		
18							
20							
22							
24							

Note 1 Radiation measurements of core collected with Ludlum Model 12 scaler and Ludlum 44-09 pancake probe in counts per minute (cpm)
Note 2 Gamma radiation measurements of core collected with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).
Note 3 Gamma radiation measurements on surface with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).

CH2MHILL

PROJECT NUMBER	BORING NUMBER	
461446	RM03-CWRP05	SHEET 1 OF 1

DRILLING LOG

PROJECT : Ruby Mines	LOCATION : Ruby Mines No. 3	ELEVATION (TBM or MSL) :	
DRILLING CONTRACTOR :	National EWP	NAME OF DRILLER:	Jesse Ornelas
DRILLING METHOD/EQUIPMENT:	Direct Push (Geoprobe 7730 DT)	SIZE/TYPE OF BIT :	2.25-inch Macrocore
GPS COORDINATES (SYSTEM):	N 1,640,072.0 E 2,625,111.3 NAD 83 NM West, Ft	TOTAL DEPTH :	25 ft bgs
	START : 10/8/2014 END : 10/8/2014	LOGGER :	B. Moayyad

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: SAMPLE COLLECTION	RADIATION MEASUREMENTS GM[1]	RADIATION MEASUREMENTS 2X2[2]
					Surface counts (cpm)[3]:	24,347 uncollimated	8,078 collimated
			ML	Sandy Silt (ML) Reddish yellow (7.5 YR 6/6), dry, loose, non-plastic, approximately 30% fine sand **Cap 0 to 1 feet.**	RM03-CWRP05-C-00 @ 10:15 + MS/MSD 13µR/hr	60-80	10,900-11,300
					RM03-CWRP05-R-01 @ 11:24 Hold, 90 µR/hr	100-160	10,900-11,200
2		4'	SM	Silty Sand With Gravel (SM) white (7.5 YR 8/1), dry, loose, well graded, mineralized sand and gravel, with rock powder.		120-180	10,400-11,000
				Black high radiation zone at 2 to 3 feet. **Waste Rock 1 to 20.5 feet.**		110-160	9,500-10,100
4						80-120	9,400-9,800
					RM03-CWRP05-R-05 @ 11:25 @ 12 µR/hr	80-120	10,500-10,800
6			SM	same as above			
						100-140	10,200-10,500
		4.5'	SC	Clayey Sand (SC) dark grey (7.5 YR 4/1) damp, dense fine quartz sand with black organic fines, and minor waste rock gravel fragments	PID= 0.0	80-110	10,100-10,400
8						80-110	9,800-10,200
						80-110	9,600-10,000
10					RM03-CWRP05-R-10 @ 12:15 @ 13 µR/hr	80-110	10,800-11,200
			SC SM	Clayey Sand and Silty Sand (SC&SM) gray (7.5 YR 5/1), damp, dense, fine quartz sand with dark fines	PID= 0.0	80-110	10,600-10,900
12		4'	SM	Lense of yellowish red silty sand		60-100	10,100-10,400
			SP	Poorly Graded Fine Sand (SP)		60-100	9,700-9,900
				light gray (10 YR 7/1), dry, dense, partially cemented dark bedding striations at 13 to 14 feet.			
14				Originally logged as native sands, mineralization in sand is consistent with crushed waste rock and bedding may have resulted from wet deposition.		60-80	9,700-9,900
						60-80	9,000-10,400
16						60-80	10,300-10,700
		4.5'	SP	as above with brown and gray banding PID=0.0		80-110	10,100-10,500
18						80-110	10,000-10,300
						80-110	10,200-10,500
20						80-100	10,400-10,800
			CL	Sandy Lean Clay (CL) Strong brown (7.5 YR 5/6), moist, stiff, plastic, with approximately 35% fine sand.		80-110	10,400-10,800
22		5'		**Native Soil 20.5 feet to total depth**	no samples in native clay		
						60-100	10,500-10,700
						60-80	10,000-10,400
24			CL	as above		60-100	10,000-10,300
				End of boring	Backfill with cutting and cap with hydrated bentonite.		

Note 1 Radiation measurements of core collected with Ludlum Model 12 scaler and Ludlum 44-09 pancake probe in counts per minute (cpm)
Note 2 Gamma radiation measurements of core collected with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).
Note 3 Gamma radiation measurements on surface with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).

CH2MHILL

PROJECT NUMBER	BORING NUMBER		
461446	RM03-CWRP06	SHEET 1	OF 1

DRILLING LOG

PROJECT : Ruby Mines	LOCATION : Ruby Mines No. 3	ELEVATION (TBM or MSL) :	
DRILLING CONTRACTOR :	National EWP	NAME OF DRILLER:	Jesse Ornelas
DRILLING METHOD/EQUIPMENT:	Direct Push (Geoprobe 7730 DT)	SIZE/TYPE OF BIT :	2.25-inch Macrocore
GPS COORDINATES (SYSTEM):	N 1,640,196.7 E 2,624,984.1 NAD 83 NM West, Ft	TOTAL DEPTH :	20 ft bgs
	START : 10/9/2014 END : 10/9/2014	LOGGER :	B. Moayyad

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SAMPLE COLLECTION	COMMENTS: RADIATION MEASUREMENTS GM[1]	2X2[2]
			SM	Silty Sand (ML) light reddish brown (5 YR 7/4), wet, sticky, with 55% fine sand, and 45% silt and clay. **Cap 0 to 1 feet.**	RM03-CWRP06-C-00 @ 08:24 @ 15 µR/hr	Surface counts (cpm)[3]: 31,320 uncollimated 10,834 collimated	
					duplicate	120-180	12,100-12,600
			GM	Silty Gravel With Cobbles (GM) light gray (7.5 YR 4/1), dry, dense, mineralized gravel, and sand, with cobbles. **Waste Rock 1.0 to 17 feet.**	08:30 @ 15 µR/hr	160-200	12,500-13,200
2		2.5'				100-140	13,200-13,600
						110-160-	13,300-13,700
4						120-180	13,600-13,800
					RM03-CWRP06-R-05 @ 8:50:00 AM @ 19 µR/hr		
6		0		no recovery due to cobbles			
			CL				
8						120-180	12,300-13,00
		2'	GM	as above to 12 ft		120-160	12,900-13,200
10					RM03-CWRP06-R-10 @ 08:55 @ 17 µR/hr	100-140	12,100-12,400
						120-160	11,700-12,300
12		4'					
			SW-SM	Well Graded Sand With Silt (SW-SM) light gray (10 YR 7/2), damp, medium dense, fine to coarse quartz sand, with 10-15% silty fines. Originally logged at native sand due to intact bedding.		100-160	12,800-13,200
					RM03-CWRP06-S-13 @ 9:20 @ 16 µR/hr	120-160	12,700-13,000
14						100-140	12,600-12,800
						100-140	12,400-12,700
16						100-140	11,900-12,400
			CL	Lean Clay (CL) dark brown (7.5 YR 3/4), moist, stiff, plastic, no sand.		80-100	11,700-12,000
18				Gray at 17-17.8 feet (7.5YR 5/1), dark brown below. **Native Soil 17 feet to total depth**	RM03-CWRP06-S-18 @ 9:25 @ 15 µR/hr	80-100	12,300-12,600
						80-100	12,700-12,900
20							
22							
24							

Note 1 Radiation measurements of core collected with Ludlum Model 12 scaler and Ludlum 44-09 pancake probe in counts per minute (cpm)
Note 2 Gamma radiation measurements of core collected with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).
Note 3 Gamma radiation measurements on surface with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).

CH2MHILL

PROJECT NUMBER	BORING NUMBER
461446	RM03-CWRP07 SHEET 1 OF 1

DRILLING LOG

PROJECT : Ruby Mines | LOCATION : Ruby Mines No. 3 | ELEVATION (TBM or MSL) :

DRILLING CONTRACTOR : National EWP | NAME OF DRILLER: Jesse Ornelas

DRILLING METHOD/EQUIPMENT: Direct Push (Geoprobe 7730 DT) | SIZE/TYPE OF BIT : 2.25-inch Macrocore

GPS COORDINATES (SYSTEM): N 1,640,278.8 E 2,625,124.4 (NAD 83, NM West, Ft) | TOTAL DEPTH OF BORING 20 ft bgs

START : 10/9/2014 END : 10/9/2014 | LOGGER : B. Moayyad

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SAMPLE COLLECTION	RADIATION MEASUREMENTS GM[1]	RADIATION MEASUREMENTS 2X2[2]
					Surface counts (cpm)[3]:	14,380 uncollimated	6,044 collimated
			ML	Silty Sandy Silt (ML) light brown (7.5 YR 7/4), wet, soft **Cap 0 to 1.5 feet.**	RM03-CWRP07-C-00 @ 09:40 @ 13 µR/hr	60-80	13,000-13,300
2		4.8'	SM	Silty Sand With Gravel (SM) gray (7.5 YR 5/1), damp, dense, 10-35% gravel, fine to coarse sand, and rock powder **Waste Rock 1.5 to 15 feet.**		100-180	13,200-13,600
						100-180	12,900-13,200
						200-1,000	13,800-15,300
4						300-400	16,000-17,000
					RM03-CWRP07-R-05 @ 10:45 @ 17 µR/hr	120-160	11,300-11,500
6		4.8'	SP	Poorly Graded Sand (SP) light gray (7.5 YR 7/1) damp, dense, fine mineralized sand.		140-180	11,200-11,500
					RM03-CWRP07-S-6.5 @ 10:50 @ 13 µR/hr	140-180	11,700-12,100
8						100-120	10,400-10,600
						80-100	10,500-10,800
10					RM03-CWRP07-S-10 @ 11:00 @ 13 µR/hr		
						no readings in sough	
12		3.2'	SP?	appears to be sough of fine sand from above drills like sand			
14						no readings in sough	
16			CL	Lean Clay (CL) brown (7.5 YR 4/4), dry, stiff, plastic, trace fine sand. **Native Soil 15 feet to total depth**		60-100	11,300-12,000
					no samples in clay	80-110	11,100-12,000
18		4'				80-100	11,400-11,800
						80-110	11,800-12,100
20						80-110	11,400-11,900
22							
24							

Note 1 Radiation measurements of core collected with Ludlum Model 12 scaler and Ludlum 44-09 pancake probe in counts per minute (cpm)
Note 2 Gamma radiation measurements of core collected with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).
Note 3 Gamma radiation measurements on surface with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).

CH2MHILL

PROJECT NUMBER	BORING NUMBER
461446	RM03-DRN01 SHEET 1 OF 1

DRILLING LOG

PROJECT : Ruby Mines	LOCATION : Ruby Mines No. 3	ELEVATION (TBM or MSL) :	
DRILLING CONTRACTOR :	National EWP	NAME OF DRILLER:	Jesse Ornelas
DRILLING METHOD/EQUIPMENT:	Direct Push (Geoprobe 7730 DT)	SIZE/TYPE OF BIT :	2.25-inch Macrocore
GPS COORDINATES (SYSTEM):	N 1,640,567.2 E 2,624,857.4 NAD 83 NM West, Ft	TOTAL DEPTH :	5 ft bgs
	START : 10/7/2014 END : 10/7/2014	LOGGER :	B. Moayyad

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: SAMPLE COLLECTION	RADIATION MEASUREMENTS GM[1]	RADIATION MEASUREMENTS 2X2[2]
				Surface counts (cpm)[3]:	13,376 uncollimated 4,182 collimated		
0			SM	Silty Sand (SM) light brown (7.5 YR 6/4), dry, dense, fine quartz sand with 25-35% silt and clay No waste rock identified..	RM03-DRN01-00 @ 15:30 @ 14 µR/hr	80-100	10,800-11,300
1					RM03-DRN01-01 @ 15:35 @ 15 µR/hr		
						80-110	9,700-11,100
2		4.8'					
						80-100	8,500-9,200
3				rusty striction @ 3 ft			
						60-80	9,000-9,700
4			SM	as above, but very dense			
						60-80	8,500-9,100
5					RM03-DRN01-05 @ 15:40 15 µR/hr		
				End of boring at refusal			
6							
7							
8							
9							
10							
11							
12							

Note 1 Radiation measurements of core collected with Ludlum Model 12 scaler and Ludlum 44-09 pancake probe in counts per minute (cpm)
Note 2 Gamma radiation measurements of core collected with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).
Note 3 Gamma radiation measurements on surface with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).

CH2MHILL

PROJECT NUMBER	BORING NUMBER	
461446	RM03-DRN02	SHEET 1 OF 1

DRILLING LOG

PROJECT : Ruby Mines	LOCATION : Ruby Mines No. 3	ELEVATION (TBM or MSL) :	
DRILLING CONTRACTOR :	National EWP	NAME OF DRILLER:	Jesse Ornelas
DRILLING METHOD/EQUIPMENT:	Direct Push (Geoprobe 7730 DT)	SIZE/TYPE OF BIT :	2.25-inch Macrocore
GPS COORDINATES (SYSTEM):	N 1,639,928.79 E 2,624,514.18 NAD 83 NM West, Ft	TOTAL DEPTH :	5 ft bgs
	START : 10/7/2014 END : 10/7/2014	LOGGER :	B. Moayyad

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SAMPLE COLLECTION	COMMENTS: RADIATION MEASUREMENTS GM[1]	2X2[2]
					Surface counts (cpm)[3]:	19,784 uncollimated	5,626 collimated
0			SC	Sandy Lean Clay (SC) Brown (7.5 YR 5/4), dry, loose, approximately 30% fine sand	RM03-DRN02-00 @ 16:43		
				No waste rock identified		60-80	10,900-11,800
1			SW	Well Graded Sand (SW) Light brown (7.5 YR 6/4), dry, loose, fine to coarse lithic cand.	RM03-DRN02-01 @ 16:50		
2			ML	Sandy Silt (ML) pale brown (7.5 YR 7/4), dry, firm, trace fine sand		80-100	10,500-11,200
		4.2 ft				80-100	8,900-9,400
3							
4			ML	as above, no gravel or waste rock		80-100	9,100-10,400
5					RM03-DRN02-05 @ 16:50	80-100	10,700-11,300
				End of boring Backfill with native soil.			
6							
7							
8							
9							
10							
11							
12							

Note 1 Radiation measurements of core collected with Ludlum Model 12 scaler and Ludlum 44-09 pancake probe in counts per minute (cpm)
Note 2 Gamma radiation measurements of core collected with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).
Note 3 Gamma radiation measurements on surface with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).

CH2MHILL

PROJECT NUMBER	BORING NUMBER	
461446	RM03-DRN03	SHEET 1 OF 1

DRILLING LOG

PROJECT : Ruby Mines	LOCATION : Ruby Mines No. 3	ELEVATION (TBM or MSL) :	
DRILLING CONTRACTOR :	National EWP	NAME OF DRILLER:	Jesse Ornelas
DRILLING METHOD/EQUIPMENT:	Direct Push (Geoprobe 7730 DT)	SIZE/TYPE OF BIT :	2.25-inch Macrocore
GPS COORDINATES (SYSTEM):	N 1,634,943.7 E 2,625,695.1 NAD 83 NM West, Ft	TOTAL DEPTH :	5 ft bgs
	START : 10/7/2014 END : 10/7/2014	LOGGER :	B. Moayyad

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: SAMPLE COLLECTION	RADIATION MEASUREMENTS GM[1]	RADIATION MEASUREMENTS 2X2[2]
					Surface counts (cpm)[3]:	16,378 uncollimated	5,635 collimated
0		4.8'	CL	Sandy Lean Clay (CL) Brown (7.5 YR 5/4), moist, soft, 25-40% fine sand, no gravel. No waste rock identified. PID = 0.0	RM03-DRN03-00 @ 16:15 and MS/MSD at 16:20	60-80	12,500-13,200
1					RM03-DRN03-01 @ 16:25		
2				@	RM03-DRN03D-01 16:35	80-110	10,500-11,200
3						100-120	10,200-11,600
4			CL	as above		80-110	9,700-10,400
5					RM03-DRN03-05 @ 16:30	80-110	10,600-11,300
6				End of boring Backfill with native soil.			
7							
8							
9							
10							
11							
12							

Note 1 Radiation measurements of core collected with Ludlum Model 12 scaler and Ludlum 44-09 pancake probe in counts per minute (cpm)
Note 2 Gamma radiation measurements of core collected with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).
Note 3 Gamma radiation measurements on surface with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).

CH2MHILL

PROJECT NUMBER	BORING NUMBER	
461446	RM03-DWRT01	SHEET 1 OF 1

DRILLING LOG

PROJECT : Ruby Mines	LOCATION : Ruby Mines No. 3	ELEVATION (TBM or MSL) :	
DRILLING CONTRACTOR :	National EWP	NAME OF DRILLER:	Jesse Ornelas
DRILLING METHOD/EQUIPMENT:	Direct Push (Geoprobe 7730 DT)	SIZE/TYPE OF BIT :	2.25-inch Macrocore
GPS COORDINATES (SYSTEM):	N 1,640,105.9 E 2,624,642.7 NAD 83 NM West, Ft	TOTAL DEPTH :	10 ft bgs
	START : 10/7/2014 END : 10/7/2014	LOGGER :	B. Moayyad

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft) / RECOVERY (ft) / #/TYPE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: SAMPLE COLLECTION	Surface counts (cpm)[3]: 15,978 uncollimated / 4,745 collimated — RADIATION MEASUREMENTS GM[1]	2X2[2]
1	CL	Lean Clay With Sand (CL) Reddish brown (5 YR 4/3), moist, soft, with approximately 20% fine sand	RM03-DWTR01-00 @ 10:44 for metals & Ra-226	80-100	11,100-11,600
			RM03-DWTR01-01 @ 10:46 for metals & Ra-226		
2	2.5'			80-100	11,700-12,500
3		lense of grey gravelly sand at 2.8 feet **Waste rock with distict radioactive signature**		150-200	13,200-14,500
				100-110	11,200-12,000
4	CL	Lean Clay (CL) dark reddish gray (5YR 4/2) wet, soft, medium plasticity, no sand.			
				80-100	11,000-
5			RM03-DWTR01-05 @ 10:48 for metals & Ra-226		
				100-110	11,600-12,10(
6	CL	Sandy Lean Clay (CL) reddish brown (5YR 5/3), moist soft, with approximately 30% fine sand			
				100-110	11,600-12,200
7	4'				
				100-110	13,000-13,000
8					
				100-110	12,800-13,200
9	SC	Clayey Sand (CL) light brown (7.5 YR 6/3), medium dense, moist, fine to medium quartz sand.	no samples in SC		
				80-100	12,500-13,200
10		End of boring Backfill with native soil.			
11					
12					

Note 1 Radiation measurements of core collected with Ludlum Model 12 scaler and Ludlum 44-09 pancake probe in counts per minute (cpm)
Note 2 Gamma radiation measurements of core collected with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).
Note 3 Gamma radiation measurements on surface with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).

CH2MHILL

PROJECT NUMBER	BORING NUMBER	
461446	RM03-DWTR02	SHEET 1 OF 1

DRILLING LOG

PROJECT : Ruby Mines	LOCATION : Ruby Mines No. 3	ELEVATION (TBM or MSL) :	
DRILLING CONTRACTOR :	National EWP	NAME OF DRILLER:	Jesse Ornelas
DRILLING METHOD/EQUIPMENT:	Direct Push (Geoprobe 7730 DT)	SIZE/TYPE OF BIT :	2.25-inch Macrocore
GPS COORDINATES (SYSTEM):	N 1,640,093.4 E 2,624,826.5 NAD 83 NM West, Ft	TOTAL DEPTH :	10 ft bgs
	START : 10/7/2014 END : 10/7/2014	LOGGER :	B. Moayyad

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: SAMPLE COLLECTION	RADIATION MEASUREMENTS GM[1]	RADIATION MEASUREMENTS 2X2[2]
					Surface counts (cpm)[3]:	24,524 uncollimated	8,178 collimated
0			SM	Silty Sand (SM) Brown (7.5 YR 4/3), damp, loose, fine quartz sand.	RM03-DWTR02-00 @ 11:40 Ra-226/Metals 15 µR/hr	80-100	13,200-13,700
1				@ grey cemeted dense lense at @ 1 ft	RM03-DWTR02-01 11:45 Ra-226/Metals 17 µR/hr		
			CL	Sandy Lean Clay (CL) Brown (5 YR 5/4), damp, firm, with interspersed **crushed grey waste rock**		100-160	13,200-14,200
2		4'					
						180-220	13,900-14,500
3			SC	Clayey Sand (SC) pinkish grey (7.5 YR 6/2), damp, loose, ~30% clay fines, fine quartz sand			
						180-210	14,100-15,600
4				**Black zone at 4 feet with radioactive signature**			
						200-300	15,300-16,400
5					RM03-DWTR02-05 13:20 HOLD		
			CH	Fat Clay (CH) gray (10 YR 6/1) moist, soft, highly plastic, trace fine sand		160-180	14,800-16,20(
6							
					RM03-DWTR02-6.5 @ 13:20 Ra-226/Metals 16 µR/hr	180-240	13,900-14,200
7		5'	SP	lense light gray SP fine quartz sand (10 YR 7/2) at 7-7.3 ft			
			CH	Fat Clay as above		160-200	11,600-13,000
8			ML	Sandy silt (ML) Brown (7.5 YR 5/3), damp, stiff, with approximately 25-30% fine sand	No samples in ML		
						100-140	10,500-11,700
9							
						100-120	11,500-12,300
10				End of boring Backfill with native soil.			
11							
12							

Note 1 Radiation measurements of core collected with Ludlum Model 12 scaler and Ludlum 44-09 pancake probe in counts per minute (cpm)
Note 2 Gamma radiation measurements of core collected with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).
Note 3 Gamma radiation measurements on surface with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).

CH2MHILL

PROJECT NUMBER	BORING NUMBER
461446	RM03-DWTR03 SHEET 1 OF 1

DRILLING LOG

PROJECT : Ruby Mines	LOCATION : Ruby Mines No. 3	ELEVATION (TBM or MSL) :	
DRILLING CONTRACTOR :	National EWP	NAME OF DRILLER:	Jesse Ornelas
DRILLING METHOD/EQUIPMENT:	Direct Push (Geoprobe 7730 DT)	SIZE/TYPE OF BIT :	2.25-inch Macrocore
GPS COORDINATES (SYSTEM):	N 1,640,097.4 E 2,624,871.5 NAD 83 NM West, Ft	TOTAL DEPTH :	15 ft bgs
	START : 10/7/2014 END : 10/7/2014	LOGGER :	B. Moayyad

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: SAMPLE COLLECTION	RADIATION MEASUREMENTS GM[1]	RADIATION MEASUREMENTS 2X2[2]
					Surface counts (cpm)[3]:	41,483 uncollimated	
						14,453 collimated	
2		5'	SM	Silty Sand (SM) Pinkish grey (7.5 YR 6/2), damp, loose, quartz sand with 20-30% silty fine **Waste rock (gray gravel and sand) 1 to 5 feet**	RM03-DWTR03-00 @ 13:43		
					Duplicate @ 13:45	100-120	14,200-15,800
					RM03-DWTR03-01 @ 13:55		
					16 µR/hr	150-220	13,800-14,400
						200-220	13,800-14,400
4			SM	as above with 15-30% fines **Black rock chip presumably waste rock** with high radioactive signatrue.		1,000-2,000	13,800-15,900
						150-200	13,900-16,200
						250-300	12,700-14,00(
6		5'	CL	Lean Clay (CL) Pinkish grey (7.5 YR 6/2), moist, plastic, no sand	RM03-DWTR03-05 @ 14:05 Hold] 17µR/hr		
						120-160	12,300-13,000
			SW	Well Graded Sand (SW), pinkish grey (7.5 YR 6/2), dry, loose, fine to coarse quartz and lithic sand with trace fines		140-180	12,400-13,400
8				lenses of SP fine at 7 ft lenses of light brown SM at 7.5 ft			
			CL	Lean Clay (CL) gray (7.5 YR 6/1), wet, soft, plastic, Black Organic lense with higher reads and trace sand at 8.2 ft		160-210	12,500-13,800
					PID = 0.0		
						120-160	12,800-13,600
10			SW	Well-Graded Sand (SW) pink (7.5 YR 7/3), dry, dense, fine-coarse quartz sand minor fines			
		5'	CL	Lean Clay (CL) brown (7.5 YR 5/4), moist, plastic, trace fine sand		80-100	13,000-
					PID = 0.0		
						80-110	12,400-12,900
12			SM	Silty Sand (SM) reddish brown (5 YR 5/4) damp, dense, fine quartz sand with silty fines		80-110	12,600-13,100
						100-120	12,700-13,500
14			CL	Lean Clay (CL) brown (7.5 YR 5/4), moist, plastic, trace fine sand			
					RM03-DWTR03-10 @ 14:10 17µR/hr	80-110	13,000-13,500
16				End of boring Backfill with native soil.			
18							
20					PID= 0.0 RM03-DWTR03-10 @ 14:10 17 µR/hr		
22							
24							

Note 1 Radiation measurements of core collected with Ludlum Model 12 scaler and Ludlum 44-09 pancake probe in counts per minute (cpm)
Note 2 Gamma radiation measurements of core collected with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).
Note 3 Gamma radiation measurements on surface with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).

CH2MHILL

PROJECT NUMBER	BORING NUMBER	
461446	RM03-WRK01	SHEET 1 OF 1

DRILLING LOG

PROJECT : Ruby Mines	LOCATION : Ruby Mines No. 3	ELEVATION (TBM or MSL) :	
DRILLING CONTRACTOR :	National EWP	NAME OF DRILLER:	Jesse Ornelas
DRILLING METHOD/EQUIPMENT:	Direct Push (Geoprobe 7730 DT)	SIZE/TYPE OF BIT :	2.25-inch Macrocore
GPS COORDINATES (SYSTEM):	N 1,639,940.2 E 2,624,860.4 (NAD 83 NM West, Ft	TOTAL DEPTH :	5 ft bgs
	START : 10/8/2014 END : 10/8/2014	LOGGER :	B. Moayyad

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SOIL DESCRIPTION / SAMPLE COLLECTION	COMMENTS: RADIATION MEASUREMENTS GM[1]	2X2[2]
					Surface counts (cpm)[3]:	15,295 uncollimated	4,815 collimated
0			ML	Silty With Sand (ML)	RM03-WRK01-00 @ 13:33		
				Reddish yellow (7.5 YR 6/6) dry, loose,	15 µR/hr		
				approximately 20% fine quartz sand, non-plastic.		60-80	10,000-10,200
1				No waste rock identified	RM03-WRK01-01 @ 13:38		
						100-120	10,200-10,600
2		3.4'					
						80-110	10,500-10,800
3							
			ML	as above		80-110	10,100-10,300
4							
						80-110	9,800-10,100
5					RM03-WRKO1-05 @ 13:45		
				End of boring Backfill with native soil.			
6							
7							
8							
9							
10							
11							
12							

Note 1 Radiation measurements of core collected with Ludlum Model 12 scaler and Ludlum 44-09 pancake probe in counts per minute (cpm)
Note 2 Gamma radiation measurements of core collected with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).
Note 3 Gamma radiation measurements on surface with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).

CH2MHILL

PROJECT NUMBER	BORING NUMBER
461446	RM03-WRK02 SHEET 1 OF 1

DRILLING LOG

PROJECT : Ruby Mines	LOCATION : Ruby Mines No. 3	ELEVATION (TBM or MSL) :	
DRILLING CONTRACTOR :	National EWP	NAME OF DRILLER:	Jesse Ornelas
DRILLING METHOD/EQUIPMENT:	Direct Push (Geoprobe 7730 DT)	SIZE/TYPE OF BIT :	2.25-inch Macrocore
GPS COORDINATES (SYSTEM):	N 1,639,864.73 E 2,624,665.23 NAD 83 NM West, Ft	TOTAL DEPTH :	5 ft bgs
	START : 10/8/2014 END : 10/8/2014	LOGGER :	B. Moayyad

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS Surface counts (cpm)[3]: 14,067 uncollimated, 4,247 collimated SAMPLE COLLECTION	RADIATION MEASUREMENTS GM[1]	2X2[2]
0			ML	Sandy Silt (SM) strong brown (7.5 YR 5/6) damp, soft, fine lithic sand.	RM03-WRK02-00 @ 14:10 16 µR/hr	60-80	10,200-10,400
1					RM03-WRK02-01 @ 14:20 15 MR/hr Duplicate-WRK02D-01 @ 14:30 15 µR/hr	60-80	9,900-10,000
2		4.5'	SM	Silty Sand (SM) reddish yellow (7.5 YR 7/6), dry, dense fine sand with 30-35% silty fines and silty fines caliche layers at 2.8 and 3.4 ft		80-100	9,800-10,000
3						80-100	9,800-10,200
4			SM	as above		80-110	9,800-10,100
5					RM03-WRK02-05 @ 14:30 13 µR/hr		
6				End of boring Backfill with native soil.			
7							
8							
9							
10							
11							
12							

Note 1 Radiation measurements of core collected with Ludlum Model 12 scaler and Ludlum 44-09 pancake probe in counts per minute (cpm)
Note 2 Gamma radiation measurements of core collected with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).
Note 3 Gamma radiation measurements on surface with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).

CH2MHILL

PROJECT NUMBER	BORING NUMBER	
461446	RM03-WRK03	SHEET 1 OF 1

DRILLING LOG

PROJECT : Ruby Mines	LOCATION : Ruby Mines No. 3	ELEVATION (TBM or MSL) :	
DRILLING CONTRACTOR :	National EWP	NAME OF DRILLER:	Jesse Ornelas
DRILLING METHOD/EQUIPMENT:	Direct Push (Geoprobe 7730 DT)	SIZE/TYPE OF BIT :	2.25-inch Macrocore
GPS COORDINATES (SYSTEM):	1,639,773.5 N 2,624,702.2 E NAD 83 NM West, Ft	TOTAL DEPTH :	5 ft bgs
	START : 10/8/2014 END : 10/8/2014	LOGGER :	B. Moayyad

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SAMPLE COLLECTION	RADIATION MEASUREMENTS GM[1]	RADIATION MEASUREMENTS 2X2[2]
					Surface counts (cpm)[3]:	24,140 uncollimated	8,430 collimated
0			ML	Sandy Silt (ML) light reddish brown (5 YR 6/4), dry, stiff, with approximaterly 30% fine sand	RM03-WRK03-OO 15:40 at 15 μR/ hr	60-80	10,800-11,500
1				@	RM03-WRK03-01 15:50 at 16 μR/hr		
			ML	Silt (ML) reddish brown to yellowish red (5 YR 5/4 to 5/8) dry, stiff, trace fine sand with rusty and carbonate cementation.		60-100	10,800-11,200
2		4.0'					
						60-80	11,200-11,500
3							
						80-100	10,800-11,000
4							
			ML	ML as above but pink (5 YR 8/4) with abandant carbonate	RM03-WRK03-05 @ 15:55 at 14 μR/hr	80-110	11,100-11,300
5				End of boring Backfill with native soil.			
6							
7							
8							
9							
10							
11							
12							

Note 1 Radiation measurements of core collected with Ludlum Model 12 scaler and Ludlum 44-09 pancake probe in counts per minute (cpm)
Note 2 Gamma radiation measurements of core collected with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).
Note 3 Gamma radiation measurements on surface with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).

CH2MHILL

PROJECT NUMBER	BORING NUMBER	
461446	RM03-WRK04	SHEET 1 OF 1

DRILLING LOG

PROJECT : Ruby Mines	LOCATION : Ruby Mines No. 3	ELEVATION (TBM or MSL) :	
DRILLING CONTRACTOR :	National EWP	NAME OF DRILLER:	Jesse Ornelas
DRILLING METHOD/EQUIPMENT:	Direct Push (Geoprobe 7730 DT)	SIZE/TYPE OF BIT :	2.25-inch Macrocore
GPS COORDINATES (SYSTEM):	1,639,750.4 N 2,622,535.4 E NAD 83 NM West, Ft	TOTAL DEPTH :	5 ft bgs
	START : 10/8/2014 END : 10/8/2014	LOGGER :	B. Moayyad

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: SAMPLE COLLECTION	RADIATION MEASUREMENTS GM[1]	RADIATION MEASUREMENTS 2X2[2]
					Surface counts (cpm)[3]:	104,266 uncollimated	
						40,982 collimated	
0			ML @	Silty With Sand (ML)	RM03-WRK04-00		
				reddish yellowish (7.5 YR 7/6), stiff	14:40 at 35 µR/hr		
				dry, with ~20% fine sand			
1				@ome carbonate cementation	RM03-WRK04-01		
				at 2.5 and 4 ft, roots @ 1ft	14:45 w/MS/MSD on metals	220-380	12,400-15,100
					12 µR/hr		
2		4.4'				120-160	13,200-14,100
3						100-120	13,600-13,900
4			ML	as above but very dense with caliche	RM03-WRK04-04 @ 14:50	80-100	12,100-12,400
				Refusal at 4.4 ft Backfill with native soil.		80-110	11,800-12,200
5							
6							
7							
8							
9							
10							
11							
12							

Note 1 Radiation measurements of core collected with Ludlum Model 12 scaler and Ludlum 44-09 pancake probe in counts per minute (cpm)
Note 2 Gamma radiation measurements of core collected with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).
Note 3 Gamma radiation measurements on surface with Ludlum Model 2221 scaler and Ludlum 44-10 2x2 inch sodium iodide detector (cpm).

CH2MHILL

PROJECT NUMBER	SAMPLE GRID	
461446	RUBY-002	SHEET 1 OF 2

MULTIPLE SOIL SAMPLE LOG

PROJECT : Ruby Mines | GENERAL LOCATION : Vent RUBY-002 | ELEVATION (TBM or MSL) :
CONTRACTOR : none | NAME OF DRILLER : none
SAMPLE METHOD/EQUIPMENT: Hand Auger | BORING DIAMETER : 2-inches
DATE : 10/12/2014 | LOGGER : Andre Ritchie

LOCATION ID: **RM02-VENT01-00** GPS NORTHING: 1,642,097.5 GPS EASTING: 2,607,271.7
SAMPLE TIME: 11:24 SAMPLE GAMMA READING: 14,185 cpm on contact with jars
QA/QC SAMPLE ID: none QA/QC SAMPLE TYPE: none

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	MEASUREMENTS: Core measurements on contact with gamma radiation detector*
0	0 - 0.5	0.5		ML	Silt with Sand (ML) brown (7.5 YR 4/3), moist, soft to hard, 80% silt, 20% fine sand.	1-minute in-situ uncollimated static count: 9,167 cpm 1-minute in-situ collimated static count: 3,164 cpm
0.5						

NOTES: * Ludlum model 44-10 2x2-inch NaI scintillating detector with Ludlum Model 2221 scaler

LOCATION ID: **RM02-VENT01-01** GPS NORTHING: 1,642,097.5 GPS EASTING: 2,607,271.7
SAMPLE TIME: 11:35 SAMPLE GAMMA READING: 14,107 cpm on contact with jars
QA/QC SAMPLE ID: none QA/QC SAMPLE TYPE: none

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	MEASUREMENTS: Core measurements on contact with gamma radiation detector*
1	1 -1.5	0.5		ML	Silt with Sand (ML) brown (7.5 YR 4/4), moist, soft to hard, 80% silt, 20% fine sand.	
1.5						

NOTES: * Ludlum model 44-10 2x2-inch NaI scintillating detector with Ludlum Model 2221 scaler

LOCATION ID: **RM02-VENT02-00** GPS NORTHING: 1,642,072.3 GPS EASTING: 2,607,269.2
SAMPLE TIME: 11:47 SAMPLE GAMMA READING: 14,066 cpm on contact with jars
QA/QC SAMPLE ID: none QA/QC SAMPLE TYPE: none

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	MEASUREMENTS: Core measurements on contact with gamma radiation detector*
0	0 - 0.5	0.5		ML	Sandy Silt (ML) very dark brown (7.5 YR 2.5/2), moist, soft, 60% silt, 40% fine sand.	1-minute in-situ uncollimated static count: 30,995 cpm 1-minute in-situ collimated static count: 12,495 cpm
0.5						

NOTES: * Ludlum model 44-10 2x2-inch NaI scintillating detector with Ludlum Model 2221 scaler

CH2MHILL

PROJECT NUMBER	SAMPLE GRID
461446	RUBY-002 SHEET 2 OF 2

MULTIPLE SOIL SAMPLE LOG

PROJECT : Ruby Mines | GENERAL LOCATION : Vent RUBY-002 | ELEVATION (TBM or MSL) :
CONTRACTOR : none | NAME OF DRILLER : none
SAMPLE METHOD/EQUIPMENT: Hand Auger | BORING DIAMETER : 2-inches
DATE : 10/12/2014 | LOGGER : Andre Ritchie

LOCATION ID: **RM02-VENT02-01** GPS NORTHING: 1,642,072.3 GPS EASTING: 2,607,269.2
SAMPLE TIME: 11:58 SAMPLE GAMMA READING: 14,079 cpm on contact with jars
QA/QC SAMPLE ID: none QA/QC SAMPLE TYPE: none

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	MEASUREMENTS: Core measurements on contact with gamma radiation detector*
1	1 -1.5	0.5		SM	Silty Sand (SM), brown (7.5 YR 4/4), moist, loose, fine to coarse sand and gravel of felsic minerology 40% silt.	
1.5						

NOTES: * Ludlum model 44-10 2x2-inch NaI scintillating detector with Ludlum Model 2221 scaler

LOCATION ID: **RM02-VENT03-00** GPS NORTHING: 1,642,067.3 GPS EASTING: 2,607,268.8
SAMPLE TIME: 12:00 SAMPLE GAMMA READING: 16,564 cpm on contact with jars
QA/QC SAMPLE ID: none QA/QC SAMPLE TYPE: none

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	MEASUREMENTS: Core measurements on contact with gamma radiation detector*
0	0 - 0.5	0.5		ML	Sandy Silt (ML), dark yellowish brown (10 YR 3/4), moist, soft, 40% fine sand, 60% silt.	1-minute in-situ uncollimated static count: 113,882 cpm 1-minute in-situ collimated static count: 47,869 cpm
0.5						

NOTES: * Ludlum model 44-10 2x2-inch NaI scintillating detector with Ludlum Model 2221 scaler

LOCATION ID: **RM02-VENT03-01** GPS NORTHING: 1,642,067.3 GPS EASTING: 2,607,268.8
SAMPLE TIME: 12:05 SAMPLE GAMMA READING: 14,066 cpm on contact with jars
QA/QC SAMPLE ID: none QA/QC SAMPLE TYPE: none

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	MEASUREMENTS: Core measurements on contact with gamma radiation detector*
1	1 -1.5	0.5		ML	Sandy Silt (ML), dark yellowish brown (10 YR 3/4), moist, soft, 40% fine sand, 60% silt.	1-minute uncollimated static count on bag: 13,457 cpm
1.5						

NOTES: * Ludlum model 44-10 2x2-inch NaI scintillating detector with Ludlum Model 2221 scaler

CH2MHILL

PROJECT NUMBER	SAMPLE GRID
461446	RUBY-004 SHEET 1 OF 2

MULTIPLE SOIL SAMPLE LOG

PROJECT : Ruby Mines	GENERAL LOCATION : Vent RUBY-004	ELEVATION (TBM or MSL) :	TBM
CONTRACTOR : none		NAME OF DRILLER :	none
SAMPLE METHOD/EQUIPMENT: Hand Auger		BORING DIAMETER :	2-inches
DATE : 10/6/2014		LOGGER :	Andre Ritchie

LOCATION ID: **RM04-VENT01-00** GPS NORTHING: 1,639,976.1 GPS EASTING: 2,612,299.1
SAMPLE TIME: 10:45 SAMPLE GAMMA READING: 10,706 cpm on contact with jars
QA/QC SAMPLE ID: none QA/QC SAMPLE TYPE none

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	MEASUREMENTS
					SOIL DESCRIPTION	Core measurements on contact with gamma radiation detector*
0.5	0 - 0.5	0.5		SM	Silty Sand (SM) Light olive brown (2.5Y 5/6), 60% fine sand, 40% silt, trace fine gravel. 70% felsic minera 30% mafic minerals, dry, loose.	1-minute in-situ uncollimated static count: 13,279 cpm 1-minute in-situ collimated static count: 4,256 cpm

NOTES: * Ludlum model 44-10 2x2-inch NaI scintillating detector with Ludlum Model 2221 scaler

LOCATION ID: **RM04-VENT01-01** GPS NORTHING: 1,639,976.1 GPS EASTING: 2,612,299.1
SAMPLE TIME: 10:50 SAMPLE GAMMA READING: 10,320 cpm on contact with jars
QA/QC SAMPLE ID: none QA/QC SAMPLE TYPE none

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	MEASUREMENTS
					SOIL DESCRIPTION	Core measurements on contact with gamma radiation detector*
1 1.5	1 - 1.5	0.5		ML	Sandy Silt (ML) yellowish brown (10YR 5/6) 60% silt, 40% fine sand, dry, loose, felsic mineralogy	1-minute uncollimated static count on bag: 11,081 cpm

NOTES: * Ludlum model 44-10 2x2-inch NaI scintillating detector with Ludlum Model 2221 scaler

LOCATION ID: **RM04-VENT02-00** GPS NORTHING: 1,639,998.9 GPS EASTING: 2,612,317.5
SAMPLE TIME: 10:20 SAMPLE GAMMA READING: 10,738 cpm on contact with jars
QA/QC SAMPLE ID: none QA/QC SAMPLE TYPE none

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	MEASUREMENTS
					SOIL DESCRIPTION	Core measurements on contact with gamma radiation detector*
O 0.5	0-0.5	0.5		SM	Sitty Sand (SM) yellowish brown (10YR 5/4) 60% Fine sand, 40% silt, dry, loose, felsic mineralogy	1-minute in-situ uncollimated static count: 23,252 cpm 1-minute in-situ collimated static count: 8,397 cpm

CH2MHILL

PROJECT NUMBER	SAMPLE GRID
461446	RUBY-004 SHEET 2 OF 2

MULTIPLE SOIL SAMPLE LOG

PROJECT : Ruby Mines | GENERAL LOCATION : Vent RUBY-004 | ELEVATION (TBM or MSL) :
CONTRACTOR : none | NAME OF DRILLER : none
SAMPLE METHOD/EQUIPMENT: Hand Auger | BORING DIAMETER : 2-inches
DATE : 10/6/2014 | LOGGER : Andre Ritchie

LOCATION ID: RM04-VENT02-01 GPS NORTHING: 1,639,998.9 GPS EASTING: 2,612,317.5
SAMPLE TIME: 10:30 SAMPLE GAMMA READING: 10,515 cpm on contact with jars
QA/QC SAMPLE ID: none QA/QC SAMPLE TYPE none

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	MEASUREMENTS
					SOIL DESCRIPTION	Core measurements on contact with gamma radiation detector*
1	1 -1.5	0.5		ML	Sandy Silt (ML) dark yellowish brown (10 YR 4/4), dry, loose, 60% silt, 40% fine sand, trace fine gravel; felsic mineralogy	1-minute uncollimated static count on bag: 11,117 cpm
1.5						

NOTES: * Ludlum model 44-10 2x2-inch NaI scintillating detector with Ludlum Model 2221 scaler

LOCATION ID: RM04-VENT03-00 GPS NORTHING: 1,639,992.7 GPS EASTING: 2,612,354.9
SAMPLE TIME: 0:00 SAMPLE GAMMA READING: 12,582 cpm
QA/QC SAMPLE ID: RMO4-VENT03D-00@1600 QA/QC SAMPLE TYPE field duplicate; 12909

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	MEASUREMENTS
					SOIL DESCRIPTION	Core measurements on contact with gamma radiation detector*
0	0 - 0.5	0.5		SP	Poorly Graded Sand (SP), light olive brown (2.5 YR 5/4), dry, loose fine to coarse sand with felsic minerals, trace fine gravel with mafic minerals	1-minute in-situ uncollimated static count: 97,183 cpm 1-minute in-situ collimated static count: 43,463 cpm
0.5						

NOTES: * Ludlum model 44-10 2x2-inch NaI scintillating detector with Ludlum Model 2221 scaler

LOCATION ID: RM04-VENT03-02 GPS NORTHING: 1,639,992.7 GPS EASTING: 2,612,354.9
SAMPLE TIME: 16:30 SAMPLE GAMMA READING: 11,327 cpm
QA/QC SAMPLE ID: none QA/QC SAMPLE TYPE none

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	MEASUREMENTS
					SOIL DESCRIPTION	Core measurements on contact with gamma radiation detector*
2	2-2.5	0.5			Sitty Sand (SM) light olive brown (2.5 Y 5/3), dry, loose, 70% Fine sand, 30% silt, felsic minerals	1-minute in-situ uncollimated static count: 11,327 cpm
2.5						

NOTES: * Ludlum model 44-10 2x2-inch NaI scintillating detector with Ludlum Model 2221 scaler

CH2MHILL

PROJECT NUMBER	SAMPLE GRID
461446	RUBY-019 SHEET 1 OF 2

MULTIPLE SOIL SAMPLE LOG

PROJECT : Ruby Mines	GENERAL LOCATION : Vent RUBY-019	ELEVATION (TBM or MSL) :
CONTRACTOR : none		NAME OF DRILLER : none
SAMPLE METHOD/EQUIPMENT: Hand Auger		BORING DIAMETER : 2-inches
DATE : 10/11/2014		LOGGER : Andre Ritchie

LOCATION ID: **RM19-VENT01-00** GPS NORTHING: 1,643,045.1 GPS EASTING: 2,606,491.5
SAMPLE TIME: 15:19 SAMPLE GAMMA READING: 13,000 cpm on contact with jars
QA/QC SAMPLE ID: none QA/QC SAMPLE TYPE: none

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	MEASUREMENTS
0	0 - 0.5	0.5		SM	Silty Sand (SM) yellowish brown (10 YR 5/6), moist, loose, 60% fine sand, 40% silt.	1-minute in-situ uncollimated static count: 12,716 cpm 1-minute in-situ collimated static count: 3,889 cpm
0.5						

NOTES: * Ludlum model 44-10 2x2-inch NaI scintillating detector with Ludlum Model 2221 scaler

LOCATION ID: **RM19-VENT01-01** GPS NORTHING: 1,643,045.1 GPS EASTING: 2,606,491.5
SAMPLE TIME: 15:23 SAMPLE GAMMA READING: 13,000 cpm
QA/QC SAMPLE ID: none QA/QC SAMPLE TYPE: none

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	MEASUREMENTS
1	1 -1.5	0.5		SM	Silty Sand (SM) yellowish brown (10 YR 5/6), moist, loose, 60% fine sand, 40% silt.	
1.5						

NOTES: * Ludlum model 44-10 2x2-inch NaI scintillating detector with Ludlum Model 2221 scaler

LOCATION ID: **RM04-VENT02-00** GPS NORTHING: 1,643,014.8 GPS EASTING: 2,606,508.7
SAMPLE TIME: 15:25 SAMPLE GAMMA READING: 13,000 cpm
QA/QC SAMPLE ID: none QA/QC SAMPLE TYPE: none

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	MEASUREMENTS
0	0 - 0.5	0.5			Sitty Sand (SM), brown (7.5 YR 4/4), moist, loose, medium, feldspar sand, with 20% silt,.	1-minute in-situ uncollimated static count: 77,944 cpm 1-minute in-situ collimated static count: 31,787 cpm
0.5						

NOTES: * Ludlum model 44-10 2x2-inch NaI scintillating detector with Ludlum Model 2221 scaler

CH2MHILL	PROJECT NUMBER 461446	SAMPLE GRID RUBY-019 SHEET 2 OF 2
	MULTIPLE SOIL SAMPLE LOG	

PROJECT : Ruby Mines | GENERAL LOCATION : Vent RUBY-019 | ELEVATION (TBM or MSL) :
CONTRACTOR : none | NAME OF DRILLER : none
SAMPLE METHOD/EQUIPMENT: Hand Auger | BORING DIAMETER : 2-inches
DATE : 10/11/2014 | LOGGER : Andre Ritchie

LOCATION ID: **RM04-VENT02-01** GPS NORTHING: 1,643,014.8 GPS EASTING: 2,606,508.7
SAMPLE TIME: 15:30 SAMPLE GAMMA READING: 13,000 cpm
QA/QC SAMPLE ID: none QA/QC SAMPLE TYPE: none

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	MEASUREMENTS
					SOIL DESCRIPTION	Core measurements on contact with gamma radiation detector*
1	1 -1.5	0.5		ML	Sandy Silt (ML) brownish yellow (10 YR 6/6), dry, very hard, 60% silt, 40% fine sand.	
1.5						

NOTES: * Ludlum model 44-10 2x2-inch NaI scintillating detector with Ludlum Model 2221 scaler

LOCATION ID: **RM04-VENT03-00** GPS NORTHING: 1,642,973.3 GPS EASTING: 2,606,506.1
SAMPLE TIME: 15:10 SAMPLE GAMMA READING: 13,000 cpm
QA/QC SAMPLE ID: none QA/QC SAMPLE TYPE: none

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	MEASUREMENTS
					SOIL DESCRIPTION	Core measurements on contact with gamma radiation detector*
0	0 - 0.5	0.5		SM	Sitty Sand (SM), dark yellowish brown (10 YR 3/6), moist, loose, 60% fine sand, with 40% silt,.	1-minute in-situ uncollimated static count: 33,329 cpm 1-minute in-situ collimated static count: 12,254 cpm
0.5						

NOTES: * Ludlum model 44-10 2x2-inch NaI scintillating detector with Ludlum Model 2221 scaler

LOCATION ID: **RM04-VENT03-01** GPS NORTHING: 1,642,973.3 GPS EASTING: 2,606,506.1
SAMPLE TIME: 15:15 SAMPLE GAMMA READING: 13,000 cpm
QA/QC SAMPLE ID: none QA/QC SAMPLE TYPE: none

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	MEASUREMENTS
					SOIL DESCRIPTION	Core measurements on contact with gamma radiation detector*
1	1 -1.5	0.5		ML	Sandy Silt (ML) very pale brown (10 YR 7/4), dry, very hard, 60% silt, 40% fine sand.	
1.5						

NOTES: * Ludlum model 44-10 2x2-inch NaI scintillating detector with Ludlum Model 2221 scaler

CH2MHILL

PROJECT NUMBER	BORING NUMBER	
461446	Correlation	SHEET 1 OF 10

MULTIPLE SOIL SAMPLE LOG

PROJECT : Ruby Mines	GENERAL LOCATION : Ruby Mines No. 3	ELEVATION (TBM or MSL) :
CONTRACTOR : none		NAME OF DRILLER : none
SAMPLE METHOD/EQUIPMENT: Hand trowel		BORING DIAMETER : 2-inches
		LOGGER : Andre Ritchie

LOCATION ID: **RM-COR18-00** GPS NORTHING: 1,644,702.71 GPS EASTING: 2,607,563.72
SAMPLE TIME: 10/8/2014 15:18 SAMPLE GAMMA READING: 8,417 cpm on contact ; 8 μR/hr on contact
QA/QC SAMPLE ID: none QA/QC SAMPLE TYPE: none

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	MEASUREMENTS
					SOIL DESCRIPTION	Core measurements on contact with gamma radiation detector*
0	0	0.5		SM	Silty Sand (SM) yellowish brown (10 YR 5/6), dry, loose, 60% fine sand, 40% silt, trace medium to coars sand of felsic minerals.	in-situ uncollimated 1-min. static count, 6-inches above ground (2x2 NaI)= 20,411 cpm
0.5	0.5					in-situ collimated 1-min (same method as above) 5,990 cpm

NOTES: * Ludlum model 44-10 2x2-inch NaI scintillating detector with Ludlum Model 2221 scaler

LOCATION ID: **RM-COR19-00** GPS NORTHING: 1,644,957.74 GPS EASTING: 2,607,105.35
SAMPLE TIME: 10/8/2014 14:51 SAMPLE GAMMA READING: 8,824 cpm on contact ; 8 μR/hr on contact
QA/QC SAMPLE ID: none QA/QC SAMPLE TYPE: none

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	MEASUREMENTS
					SOIL DESCRIPTION	Core measurements on contact with gamma radiation detector*
0	0	0.5		SM	Silty Sand (SM) brown (10 YR 4/3), dry, loose, 70% fine to coarse felsic sand, 10% fine gravel, 20% silt.	in-situ uncollimated 1-min. static count, 6-inches above ground (2x2 NaI)= 16,546 cpm
0.5	0.5					in-situ collimated 1-min (same method as above) 5,052 cpm

NOTES: * Ludlum model 44-10 2x2-inch NaI scintillating detector with Ludlum Model 2221 scaler

LOCATION ID: **RM-COR20-00** GPS NORTHING: 1,644,761.30 GPS EASTING: 2,606,929.67
SAMPLE TIME: 10/8/2014 1/0/00 SAMPLE GAMMA READING: 8,838 cpm on contact ; 7 μR/hr on contact
QA/QC SAMPLE ID: QA/QC SAMPLE TYPE:

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	MEASUREMENTS
					SOIL DESCRIPTION	Core measurements on contact with gamma radiation detector*
0	0	0.5		SM	Silty Sand (SM), dark yellowish brown (7.5 YR 4/4), 60% fine sand, 40% silt, dry, loose.	in-situ uncollimated 1-min. static count, 6-inches above ground (2x2 NaI)= 18,114 cpm
0.5	0.5					in-situ collimated 1-min (same method as above) 5,439 cpm

NOTES: * Ludlum model 44-10 2x2-inch NaI scintillating detector with Ludlum Model 2221 scaler

CH2MHILL

PROJECT NUMBER	BORING NUMBER		
461446	Correlation	SHEET 2	OF 10

MULTIPLE SOIL SAMPLE LOG

PROJECT : Ruby Mines	GENERAL LOCATION : Ruby Mines No. 3	ELEVATION (TBM or MSL) :	
CONTRACTOR : none		NAME OF DRILLER :	none
SAMPLE METHOD/EQUIPMENT:	Hand trowel	BORING DIAMETER :	2-inches
		LOGGER :	Andre Ritchie

LOCATION ID: **RM-COR21-00** GPS NORTHING: 1,644,884.65 GPS EASTING: 2,607,480.78
SAMPLE TIME: 10/8/2014 15:14 SAMPLE GAMMA READING: 8,400 cpm on contact ; 7 μR/hr on contact
QA/QC SAMPLE ID: none QA/QC SAMPLE TYPE: none

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	MEASUREMENTS
					SOIL DESCRIPTION	Core measurements on contact with gamma radiation detector*
0	0	0.5		SM	Silty Sand (SM) strong brown (7.5 YR 4/6), dry, loose, 60% fine sand, 40% silt, trace medium sand to fine gravel, felsic minerals.	in-situ uncollimated 1-min. static count, 6-inches above ground (2x2 NaI)= 17,964 cpm in-situ collimated 1-min (same method as above) 5,074 cpm
0.5	0.5					

NOTES: * Ludlum model 44-10 2x2-inch NaI scintillating detector with Ludlum Model 2221 scaler

LOCATION ID: **RM-COR22-00** GPS NORTHING: 1,644,380.56 GPS EASTING: 2,606,950.63
SAMPLE TIME: 10/8/2014 16:00 SAMPLE GAMMA READING: 8,012 cpm on contact ; 7 μR/hr on contact
QA/QC SAMPLE ID: QA/QC SAMPLE TYPE:

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	MEASUREMENTS
					SOIL DESCRIPTION	Core measurements on contact with gamma radiation detector*
0	0	0.5		SM	Silty Sand (SM), dark yellowish brown (10 YR 4/2), dry, loose, 60% fine to coarse mafic sand, 40% silt.	in-situ uncollimated 1-min. static count, 6-inches above ground (2x2 NaI)= 16,809 cpm in-situ collimated 1-min (same method as above) 5,116 cpm
0.5	0.5					

NOTES: * Ludlum model 44-10 2x2-inch NaI scintillating detector with Ludlum Model 2221 scaler

LOCATION ID: **RM-COR23-00** GPS NORTHING: 1,644,476.71 GPS EASTING: 2,607,498.05
SAMPLE TIME: 10/8/2014 15:45 SAMPLE GAMMA READING: 8,319 cpm on contact ; 6 μR/hr on contact
QA/QC SAMPLE ID: none QA/QC SAMPLE TYPE: none

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	MEASUREMENTS
					SOIL DESCRIPTION	Core measurements on contact with gamma radiation detector*
0	0	0.5		SM	Silty Sand (SM) dark yellowish brown (10 YR 4/6), dry, loose, 60% fine to coarse felsic sand, 40% silt.	in-situ uncollimated 1-min. static count, 6-inches above ground (2x2 NaI)= 20,456 cpm in-situ collimated 1-min (same method as above) 6,117 cpm
0.5	0.5					

NOTES: * Ludlum model 44-10 2x2-inch NaI scintillating detector with Ludlum Model 2221 scaler

CH2MHILL	PROJECT NUMBER 461446	BORING NUMBER Correlation SHEET 3 OF 10
	MULTIPLE SOIL SAMPLE LOG	

PROJECT : Ruby Mines	GENERAL LOCATION : Ruby Mines No. 3	ELEVATION (TBM or MSL) :
CONTRACTOR : none		NAME OF DRILLER : none
SAMPLE METHOD/EQUIPMENT: Hand trowel		BORING DIAMETER : 2-inches
		LOGGER : Andre Ritchie

LOCATION ID: **RM-COR24-00** GPS NORTHING: 1,639,915.70 GPS EASTING: 2,624,754.59
SAMPLE TIME: 10/8/2014 9:11 SAMPLE GAMMA READING: 10,011 cpm on contact ; 6µR/hr on contact
QA/QC SAMPLE ID: none QA/QC SAMPLE TYPE: none

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	MEASUREMENTS
					SOIL DESCRIPTION	Core measurements on contact with gamma radiation detector*
0 0.5	0 0.5	0.5		SM	Silty Sand (SM) dark yellowish brown (10 YR 4/6) 70% fine sand, 30% silt, trace medium to coarse sand of felsic minerals, dry, loose	in-situ uncollimated 1-min. static count 6-inches above ground (2x2 NaI)= 15,050 cpm in-situ collimated 1-min (same method as above) 4,467 cpm

NOTES: * Ludlum model 44-10 2x2-inch NaI scintillating detector with Ludlum Model 2221 scaler

LOCATION ID: **RM-COR25-00** GPS NORTHING: 1,640,139.21 GPS EASTING: 2,624,746.07
SAMPLE TIME: 10/7/2014 14:33 SAMPLE GAMMA READING: 11,625 cpm on contact ; 11 Nrem/hr on contact
QA/QC SAMPLE ID: QA/QC SAMPLE TYPE:

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	MEASUREMENTS
					SOIL DESCRIPTION	Core measurements on contact with gamma radiation detector*
0 0.5	0 0.5	0.5		ML	Sandy Silt (ML), brown (7.5 YR 4/2), moist, loose, 40% fine sand, trace coorse sand with mafic minerals,	in-situ uncoolimated 1-min static count, 6-inches above ground (2x2 NaI)= 17,355 cpm -in-situ collimated same as above 5,326 cpm

NOTES: * Ludlum model 44-10 2x2-inch NaI scintillating detector with Ludlum Model 2221 scaler

LOCATION ID: **RM-COR26-00** GPS NORTHING: 1,640,520.10 GPS EASTING: 2,625,047.16
SAMPLE TIME: 10/8/2014 10:47 SAMPLE GAMMA READING: 11,071 cpm on contact ; 7 µR/hr on contact
QA/QC SAMPLE ID: none QA/QC SAMPLE TYPE: none

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	MEASUREMENTS
					SOIL DESCRIPTION	Core measurements on contact with gamma radiation detector*
0 0.5	0 0.5	0.5		SM	Silty Sand (SM) yellowish brown (10 YR 5/6), dry, loose, 70% fine sand, 30% silt, trace medium to coarse sand, felsic	in-situ uncollimated 1-min. static count, 6-inches above ground (2x2 NaI)= 15,753 cpm in-situ collimated 1-min (same method as above) 5,081 cpm

NOTES: * Ludlum model 44-10 2x2-inch NaI scintillating detector with Ludlum Model 2221 scaler

CH2MHILL

PROJECT NUMBER	BORING NUMBER	
461446	Correlation	SHEET 4 OF 10

MULTIPLE SOIL SAMPLE LOG

PROJECT : Ruby Mines | GENERAL LOCATION : Ruby Mines No. 3 | ELEVATION (TBM or MSL) :
CONTRACTOR : none | NAME OF DRILLER : none
SAMPLE METHOD/EQUIPMENT: Hand trowel | BORING DIAMETER : 2-inches
LOGGER : Andre Ritchie

LOCATION ID: **RM-COR27-00** GPS NORTHING: 1,639,910.88 GPS EASTING: 2,625,645.34
SAMPLE TIME: 10/7/2014 14:45 SAMPLE GAMMA READING: 12,319 cpm on contact ; 6 µR/hr on contact
QA/QC SAMPLE ID: none QA/QC SAMPLE TYPE none

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	MEASUREMENTS: Core measurements on contact with gamma radiation detector*
0	0	0.5			Silty Sand (SM) brown (7.5 YR 5/3), 80% fine to medium sand, 20% silt, trace coarse sand; sand has mafic mineralogy, dry, loose	in-situ uncollimated 1-min. static count 6-inches above ground (2x2 NaI)= 13,996 cpm in-situ collimated 1-min static (same method) 3,505 cpm
0.5	0.5					

NOTES: * Ludlum model 44-10 2x2-inch NaI scintillating detector with Ludlum Model 2221 scaler

LOCATION ID: **RM-COR28-00** GPS NORTHING: 1,640,161.99 GPS EASTING: 2,625,422.06
SAMPLE TIME: 10/7/2014 16:54 SAMPLE GAMMA READING: 10,129 cpm on contact ; 8 µR/hr on contact
QA/QC SAMPLE ID: QA/QC SAMPLE TYPE:

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	MEASUREMENTS: Core measurements on contact with gamma radiation detector*
0	0	0.5		SM	Silty Sand (SM). brown (7.5 YR 4/4), 60% fine sand, 40% silt, dry, loose	in-situ uncollimated 1-min. static count, 6-inches above ground (2x2 NaI)= 17,957 cpm in-situ collimated 1-min (same method as above) 4,808 cpm
0.5	0.5					

NOTES: * Ludlum model 44-10 2x2-inch NaI scintillating detector with Ludlum Model 2221 scaler

CH2MHILL

PROJECT NUMBER	BORING NUMBER		
461446	Correlation	SHEET 5	OF 10

MULTIPLE SOIL SAMPLE LOG

PROJECT : Ruby Mines	GENERAL LOCATION : Ruby Mines No. 3	ELEVATION (TBM or MSL) :
CONTRACTOR : none		NAME OF DRILLER : none
SAMPLE METHOD/EQUIPMENT: Hand trowel		BORING DIAMETER : 2-inches
		LOGGER : Andre Ritchie

LOCATION ID: **RM-COR30-00** GPS NORTHING: 1,640,129.99 GPS EASTING: 2,624,715.10
SAMPLE TIME: 10/7/2014 10:30 SAMPLE GAMMA READING: 11,152 cpm on contact ; 6 Nrem/hr on contact
QA/QC SAMPLE ID: none QA/QC SAMPLE TYPE: none

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	MEASUREMENTS: Core measurements on contact with gamma radiation detector*
0	0	0.5		CL	Lean Clay with Sand (CL), brown (7.5 YR 4/2), moist, firm, medium plasticity, 20% fine sand.	in-situ uncollimated 1-min. static count, 6-inches above ground (2x2 NaI)= 15,436 cpm
0.5	0.5					-in-situ collimated (same as) 4,839 cpm

NOTES: * Ludlum model 44-10 2x2-inch NaI scintillating detector with Ludlum Model 2221 scaler

LOCATION ID: **RM-COR31-00** GPS NORTHING: 1,640,086.80 GPS EASTING: 2,624,781.43
SAMPLE TIME: 10/7/2014 15:25 SAMPLE GAMMA READING: 11,914 cpm on contact ; 11 µR/hr on contact
QA/QC SAMPLE ID: QA/QC SAMPLE TYPE:

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	MEASUREMENTS: Core measurements on contact with gamma radiation detector*
0	0	0.5		SM	Silty Sand (SM) brown (7.5 YR 4/3), moist, loose, sand, 40% silt.	in-situ uncollimated 1-min. static count, 6-inches above ground (2x2 NaI)= 17,341 cpm
0.5	0.5					in-situ collimated (same method as above) 4,884 cpm

NOTES: * Ludlum model 44-10 2x2-inch NaI scintillating detector with Ludlum Model 2221 scaler

LOCATION ID: **RM-COR32-00** GPS NORTHING: 1,640,081.01 GPS EASTING: 2,624,811.25
SAMPLE TIME: 10/7/2014 15:16 SAMPLE GAMMA READING: 11,735 cpm on contact; 11 µr/hr on contact
QA/QC SAMPLE ID: none QA/QC SAMPLE TYPE: none

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	MEASUREMENTS: Core measurements on contact with gamma radiation detector*
0	0	0.5		ML	Sandy Silt (ML) brown (7.5 YR 4/2), moist, soft. 40% fine sand.	in-situ uncollimated 1-min. static count, 6-inches above ground (2x2 NaI)= 19,368 cpm
0.5	0.5					in-situ collimated 1-min (same method as above) 5,633 cpm

NOTES: * Ludlum model 44-10 2x2-inch NaI scintillating detector with Ludlum Model 2221 scaler

CH2MHILL

PROJECT NUMBER	BORING NUMBER	
461446	Correlation	SHEET 6 OF 10

MULTIPLE SOIL SAMPLE LOG

PROJECT : Ruby Mines | GENERAL LOCATION : Ruby Mines No. 3 | ELEVATION (TBM or MSL) :
CONTRACTOR : none | NAME OF DRILLER : none
SAMPLE METHOD/EQUIPMENT: Hand trowel | BORING DIAMETER : 2-inches
LOGGER : Andre Ritchie

LOCATION ID: **RM-COR33-00** GPS NORTHING: 1,639,998.25 GPS EASTING: 2,624,874.65
SAMPLE TIME: 10/8/2014 9:43 SAMPLE GAMMA READING: 10,196 cpm on contact ; 9 μR/hr on contact
QA/QC SAMPLE ID: none QA/QC SAMPLE TYPE: none

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	MEASUREMENTS
					SOIL DESCRIPTION	Core measurements on contact with gamma radiation detector*
0	0	0.5		SM	Silty Sand (SM) brown (7.5 YR 4/4), dry, loose, 60% fine sand, 40% silt, trace medium to coarse sand, felsic minerals.	in-situ uncollimated 1-min. static count, 6-inches above ground (2x2 NaI)= 20,175 cpm
0.5	0.5					in-situ collimated 1-min (same method as above) 6,084 cpm

NOTES: * Ludlum model 44-10 2x2-inch NaI scintillating detector with Ludlum Model 2221 scaler

LOCATION ID: **RM-COR34-00** GPS NORTHING: 1,639,984.95 GPS EASTING: 2,624,800.70
SAMPLE TIME: 10/8/2014 9:35 SAMPLE GAMMA READING: 10,459 cpm on contact ; 6 μR /hr on contact
QA/QC SAMPLE ID: none QA/QC SAMPLE TYPE: none

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	MEASUREMENTS
					SOIL DESCRIPTION	Core measurements on contact with gamma radiation detector*
0	0	0.5		SM	Silty Sand (SM), yellowish brown (10 YR 5/6), 70% fine sand, 30% silt, trace medium to coarse sand of felsic minerals, dry, loose	in-situ uncollimated 1-min. static count 6-inches above ground (2x2 NaI)= 17,119 cpm
0.5	0.5					in-situ collimated 1-min (same method as above) 4,937 cpm

NOTES: * Ludlum model 44-10 2x2-inch NaI scintillating detector with Ludlum Model 2221 scaler

LOCATION ID: **RM-COR35-00** GPS NORTHING: 1,639,938.59 GPS EASTING: 2,624,712.12
SAMPLE TIME: 10/8/2014 9:25 SAMPLE GAMMA READING: 10,191 cpm on contact ; 6 μR /hr on contact
QA/QC SAMPLE ID: QA/QC SAMPLE TYPE:

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	MEASUREMENTS
					SOIL DESCRIPTION	Core measurements on contact with gamma radiation detector*
0	0	0.5		SM	Silty Sand (SM), dark yellowish brown (10 YR 4/6), 70% fine sand, 30% silt, trace medium to coarse sand of felsic minerals, dry, loose	in-situ uncollimated 1-min. static count, 6-inches above ground (2x2 NaI)= 15,485 cpm
0.5	0.5					in-situ collimated 1-min (same method as above) 4,998 cpm

NOTES: * Ludlum model 44-10 2x2-inch NaI scintillating detector with Ludlum Model 2221 scaler

CH2MHILL

PROJECT NUMBER	BORING NUMBER		
461446	Correlation	SHEET 7	OF 10

MULTIPLE SOIL SAMPLE LOG

PROJECT : Ruby Mines	GENERAL LOCATION : Ruby Mines No. 1	ELEVATION (TBM or MSL) :
CONTRACTOR : none		NAME OF DRILLER : none
SAMPLE METHOD/EQUIPMENT: Hand trowel		BORING DIAMETER : 2-inches
		LOGGER : Andre Ritchie

LOCATION ID: **RM-COR36-00** GPS NORTHING: 1,639,848.20 GPS EASTING: 2,624,783.28
SAMPLE TIME: 10/8/2014 9:18 SAMPLE GAMMA READING: 10,159 cpm on contact ; 7 μR/hr on contact
QA/QC SAMPLE ID: none QA/QC SAMPLE TYPE: none

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	MEASUREMENTS: Core measurements on contact with gamma radiation detector*
0	0	0.5		SM	Silty Sand (SM) dark yellowish brown (10 YR 4/6), 70% fine sand, 30% silt, trace medium to coarse sand of felsic minerals, dry, loose	in-situ uncollimated 1-min. static count, 6-inches above ground (2x2 NaI)= 20,280 cpm
0.5	0.5					in-situ collimated 1-min (same method as above) 6,344 cpm

NOTES: * Ludlum model 44-10 2x2-inch NaI scintillating detector with Ludlum Model 2221 scaler

LOCATION ID: **RM-COR37-00** GPS NORTHING: 1,639,681.02 GPS EASTING: 2,624,811.40
SAMPLE TIME: 10/8/2014 9:04 SAMPLE GAMMA READING: 10,207 cpm on contact ; 8 μR/hr on contact
QA/QC SAMPLE ID: QA/QC SAMPLE TYPE:

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	MEASUREMENTS: Core measurements on contact with gamma radiation detector*
0	0	0.5		SM	Silty Sand (SM) strong brown (7.5 YR 4/6), 70% fine sand, 30% silt, trace medium to coarse sand of felsic minerals dry, loose	in-situ uncollimated 1-min. static count, 6-inches above ground (2x2 NaI)= 16,561 cpm
0.5	0.5					in-situ collimated 1-min (same method as above) 5,087 cpm

NOTES: * Ludlum model 44-10 2x2-inch NaI scintillating detector with Ludlum Model 2221 scaler

LOCATION ID: **RM-COR38-00** GPS NORTHING: 1,639,758.88 GPS EASTING: 2,624,585.27
SAMPLE TIME: 10/8/2014 8:55 SAMPLE GAMMA READING: 10,242 cpm on contact ; 7 μR /hr on contact
QA/QC SAMPLE ID: none QA/QC SAMPLE TYPE: none

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	MEASUREMENTS: Core measurements on contact with gamma radiation detector*
0	0	0.5		SM	Silty Sand (SM) brown (7.5 YR 4/4), 70% fine sand, 30%, silt, trace medium to coarse sand, dry, loose, felsic mineralogy	in-situ uncollimated 1-min. static count, 6-inches above ground (2x2 NaI)= 18,409 cpm
0.5	0.5					in-situ collimated 1-min (same method as above) 5,955 cpm

NOTES: * Ludlum model 44-10 2x2-inch NaI scintillating detector with Ludlum Model 2221 scaler

CH2MHILL

PROJECT NUMBER	BORING NUMBER	
461446	Correlation	SHEET 8 OF 10

MULTIPLE SOIL SAMPLE LOG

PROJECT : Ruby Mines	GENERAL LOCATION : Ruby Mines No. 1	ELEVATION (TBM or MSL) :
CONTRACTOR : none		NAME OF DRILLER : none
SAMPLE METHOD/EQUIPMENT: Hand trowel		BORING DIAMETER : 2-inches
		LOGGER : Andre Ritchie

LOCATION ID: **RM-COR39-00** GPS NORTHING: 1,640,113.32 GPS EASTING: 2,624,770.44
SAMPLE TIME: 10/7/2014 14:45 SAMPLE GAMMA READING: 10,682 cpm on contact; 9 Nrem/hr on contact
QA/QC SAMPLE ID: none QA/QC SAMPLE TYPE: none

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	MEASUREMENTS
					SOIL DESCRIPTION	Core measurements on contact with gamma radiation detector*
0 0.5	0 0.5	0.5	ML		Sandy Silt (ML) brown (7.5 YR 4/2), moist, loose, 40% fine sand.	in-situ uncollimated 1-min. static count, 6-inches above ground (2x2 NaI)= 18,845 cpm in-situ collimated 1-min (same method as above) 5,761 cpm

NOTES: * Ludlum model 44-10 2x2-inch NaI scintillating detector with Ludlum Model 2221 scaler

LOCATION ID: **RM-COR40-00** GPS NORTHING: 1,639,834.88 GPS EASTING: 2,625,919.47
SAMPLE TIME: 10/7/2014 16:12 SAMPLE GAMMA READING: 11,173 cpm on contact ; 7 µR/hr on contact
QA/QC SAMPLE ID: none QA/QC SAMPLE TYPE: none

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	MEASUREMENTS
					SOIL DESCRIPTION	Core measurements on contact with gamma radiation detector*
0 0.5	0 0.5	0.5		ML	Sandy Silt (ML) brown (7.5 YR 5/3), moist, soft, 40% fine sand	in-situ uncollimated 1-min. static count, 6-inches above ground (2x2 NaI)= 14,482 cpm in-situ collimated 1-min (same method as above) 4,310 cpm

NOTES: * Ludlum model 44-10 2x2-inch NaI scintillating detector with Ludlum Model 2221 scaler

LOCATION ID: **RM-COR41-00** GPS NORTHING: 1,645,009.38 GPS EASTING: 2,607,170.49
SAMPLE TIME: 10/8/2014 14:35 SAMPLE GAMMA READING: 21,636 cpm on contact ; 8 µR/hr on contact
QA/QC SAMPLE ID: QA/QC SAMPLE TYPE:

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	MEASUREMENTS
					SOIL DESCRIPTION	Core measurements on contact with gamma radiation detector*
0 0.5	0 0.5	0.5		SM	Silty Sand (SM), yellowish brown (10 YR 5/6), dry, loose, 60% fine sand, 40% silt, medium to coarse sand, felsic minerals.	in-situ uncollimated 1-min. static count, 6-inches above ground (2x2 NaI)= 21,636 cpm in-situ collimated 1-min (same method as above) 6,839 cpm

NOTES: * Ludlum model 44-10 2x2-inch NaI scintillating detector with Ludlum Model 2221 scaler

CH2MHILL

PROJECT NUMBER	BORING NUMBER	
461446	Correlation	SHEET 9 OF 10

MULTIPLE SOIL SAMPLE LOG

PROJECT : Ruby Mines	GENERAL LOCATION : Ruby Mines No. 1	ELEVATION (TBM or MSL) :
CONTRACTOR : none		NAME OF DRILLER : none
SAMPLE METHOD/EQUIPMENT: Hand trowel		BORING DIAMETER : 2-inches
		LOGGER : Andre Ritchie

LOCATION ID: **RM-COR42-00** GPS NORTHING: 1,644,985.07 GPS EASTING: 2,607,159.55
SAMPLE TIME: 10/8/2014 14:43 SAMPLE GAMMA READING: 8,677 cpm on contact ; 8 μR/hr on contact
QA/QC SAMPLE ID: none QA/QC SAMPLE TYPE: none

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	MEASUREMENTS
					SOIL DESCRIPTION	Core measurements on contact with gamma radiation detector*
0 0.5	0 0.5	0.5		SM	Silty Sand (SM) yellowish brown (10 YR 5/6), dry, loose, 60% fine sand, 40% silt, medium to coarse sand, felsic minerals.	in-situ uncollimated 1-min. static count, 6-inches above ground (2x2 NaI)= 24,359 cpm in-situ collimated 1-min (same method as above) 7,575 cpm

NOTES: * Ludlum model 44-10 2x2-inch NaI scintillating detector with Ludlum Model 2221 scaler

LOCATION ID: **RM-COR43-00** GPS NORTHING: 1,644,933.67 GPS EASTING: 2,607,165.28
SAMPLE TIME: 10/8/2014 15:00 SAMPLE GAMMA READING: 8,813 cpm on contact ; 9 μR/hr on contact
QA/QC SAMPLE ID: QA/QC SAMPLE TYPE:

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	MEASUREMENTS
					SOIL DESCRIPTION	Core measurements on contact with gamma radiation detector*
0 0.5	0 0.5	0.5		SM	Silty Sand (SM), dark yellowish brown (10 YR 4/4), dry, loose, 70% fine to medium felsic sand, 30% silt.	in-situ uncollimated 1-min. static count, 6-inches above ground (2x2 NaI)= 19,182 cpm in-situ collimated 1-min (same method as above) 5,721 cpm

NOTES: * Ludlum model 44-10 2x2-inch NaI scintillating detector with Ludlum Model 2221 scaler

LOCATION ID: **RM-COR44-00** GPS NORTHING: 1,645,750.25 GPS EASTING: 2,606,570.33
SAMPLE TIME: 10/8/2014 14:20 SAMPLE GAMMA READING: 8,252 cpm on contact ; 8 μR/hr on contact
QA/QC SAMPLE ID: none QA/QC SAMPLE TYPE: none

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	MEASUREMENTS
					SOIL DESCRIPTION	Core measurements on contact with gamma radiation detector*
0 0.5	0 0.5	0.5		SM	Silty Sand (SM) dark yellowish brown (10 YR 4/4), dry, loose, 70% fine sand, 30% silt.	in-situ uncollimated 1-min. static count, 6-inches above ground (2x2 NaI)= 13,437 cpm in-situ collimated 1-min (same method as above) 4,292 cpm

NOTES: * Ludlum model 44-10 2x2-inch NaI scintillating detector with Ludlum Model 2221 scaler

CH2MHILL

PROJECT NUMBER	BORING NUMBER	
461446	Correlation	SHEET 10 OF 10

MULTIPLE SOIL SAMPLE LOG

PROJECT : Ruby Mines | GENERAL LOCATION : Ruby Mines No. 1 | ELEVATION (TBM or MSL) :
CONTRACTOR : none | NAME OF DRILLER : none
SAMPLE METHOD/EQUIPMENT: Hand trowel | BORING DIAMETER : 2-inches
LOGGER : Andre Ritchie

LOCATION ID: **RM-COR45-00** GPS NORTHING: 1,644,723.46 GPS EASTING: 2,606,781.80
SAMPLE TIME: 10/8/2014 16:15 SAMPLE GAMMA READING: 8,366 cpm on contact ; 8 μR/hr on contact
QA/QC SAMPLE ID: none QA/QC SAMPLE TYPE: none

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	MEASUREMENTS: Core measurements on contact with gamma radiation detector*
0 0.5	0 0.5	0.5		ML	Sandy Silt (ML) strong brown (7.5 YR 4/6), moist, loose, 60% silt, 40% fine sand.	in-situ uncollimated 1-min. static count, 6-inches above ground (2x2 NaI)= 20,154 cpm in-situ collimated 1-min (same method as above) 5,935 cpm

NOTES: * Ludlum model 44-10 2x2-inch NaI scintillating detector with Ludlum Model 2221 scaler

LOCATION ID: **RM-COR46-00** GPS NORTHING: 1,644,421.97 GPS EASTING: 2,607,270.24
SAMPLE TIME: 10/8/2014 15:55 SAMPLE GAMMA READING: 8,309 cpm on contact ; 8 μR/hr on contact
QA/QC SAMPLE ID: none QA/QC SAMPLE TYPE: none

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	MEASUREMENTS: Core measurements on contact with gamma radiation detector*
0 0.5	0 0.5	0.5		SM	Silty Sand (SM) yellowish brown (10 YR 5/6), dry, loose, 60% fine to coarse felsic sand, 40% silt.	in-situ uncollimated 1-min. static count, 6-inches above ground (2x2 NaI)= 20,369 cpm in-situ collimated 1-min (same method as above) 6,292 cpm

NOTES: * Ludlum model 44-10 2x2-inch NaI scintillating detector with Ludlum Model 2221 scaler

LOCATION ID: **RM-COR47-00** GPS NORTHING: 1,644,534.86 GPS EASTING: 2,607,511.90
SAMPLE TIME: 10/8/2014 15:35 SAMPLE GAMMA READING: 8,259 cpm on contact ; 8 μR/hr on contact
QA/QC SAMPLE ID: QA/QC SAMPLE TYPE:

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL (ft)	RECOVERY (ft)	#/TYPE	USCS CODE	SOIL DESCRIPTION	MEASUREMENTS: Core measurements on contact with gamma radiation detector*
0 0.5	0 0.5	0.5		SM	Silty Sand (SM), brown (10 YR 4/4), dry, loose, 60% fine flesic sand, 40% silt, trace medium to coarse sand.	in-situ uncollimated 1-min. static count, 6-inches above ground (2x2 NaI)= 18,008 cpm in-situ collimated 1-min (same method as above) 5,171 cpm

NOTES: * Ludlum model 44-10 2x2-inch NaI scintillating detector with Ludlum Model 2221 scaler

Appendix C3
Photographic Log

Photo 1: Mancos Shale Background Reference Area (Facing North)

Photo 2: Colluvium Background Reference Area (Facing North)

Photo 3: Dakota Background Reference Area (Facing Southwest)

Photo 4: Dakota Background Reference Area (Facing Northeast)

Photo 5: RUBY-001 Adit Closed

Photo 6: RUBY-002 Vent Closed

Photo 7: RUBY-003 Adit Closed (Facing North)

Photo 8: RUBY-004 Vent Closed (Facing Northeast)

Photo 9: RUBY-016 Prospect Closed (Facing Northwest)

Photo 10: RUBY-017 Shaft Closed

Photo 11: RUBY-018 Vent Closed (Facing West)

Photo 12: RUBY-020 Prospect Closed

Photo 13: RUBY-021 Shaft Closed (Facing Northwest)

Photo 14: RUBY-001 Drainages (West of Waste Rock Cap, Facing North)

Photo 15: Settling Pond and Drainage East of Ruby Mine No. 3 Waste Rock Cap

Photo 16: Ruby Mine No. 1 Waste Cap Rock Radiological Survey (Facing Northwest)

Photo 17: Radiological Survey using Vehicle Attachment

Photo 18: Correlation Soil Sampling - Static In-Situ Measurement

Photo 19: Background Soil Sampling - Performing Static Measurements for Soil Samples

Photo 20: Warning Signs Posted around Capped Waste Rock Piles (Ruby Mines No. 3 Facing Southeast)

Photo 21: Marking of Soil Borings during Utility Clearance (Boring RM03-DRAIN03 Facing South)

Photo 22: Marking of Approximate Location of Surface Samples (Correlation Sample RM-COR40 Facing North)

Photo 23: Direct Push Drill Rig Staging (Facing Northwest)

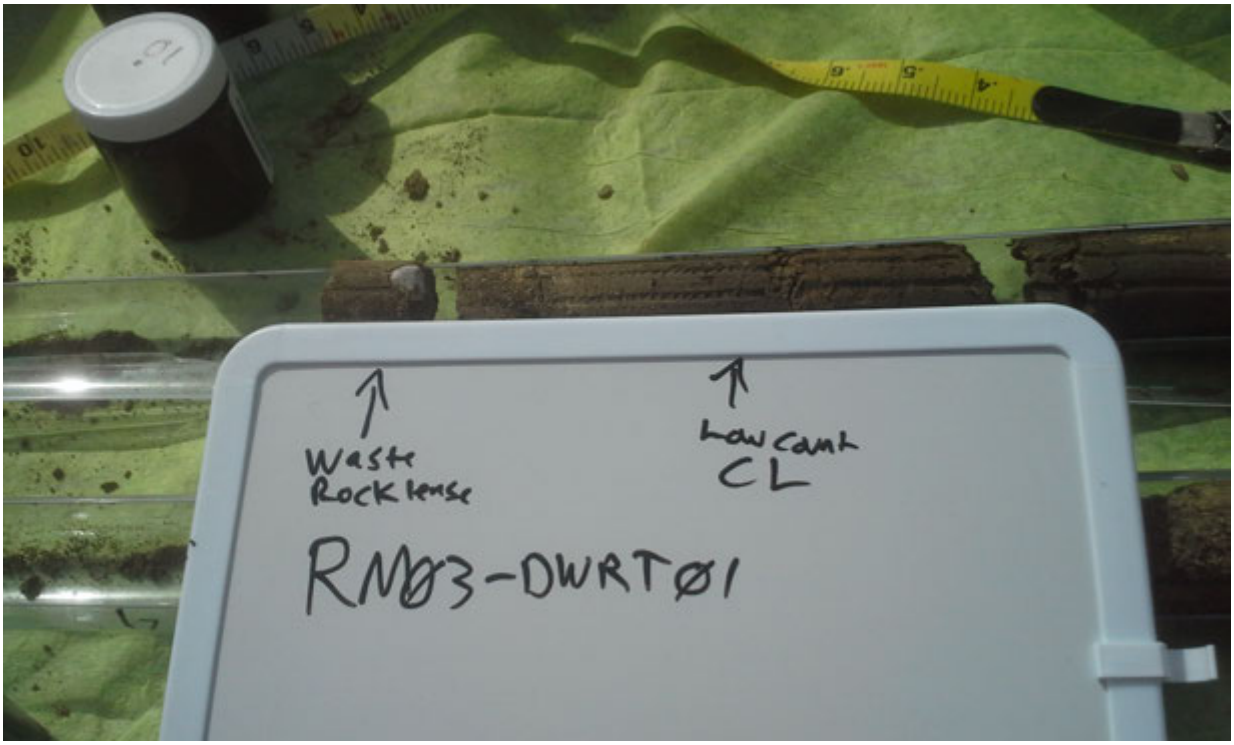

Photo 24: Soil Core Screening Indicating Waste Rock near Surface (Left Side is Up in Dewatering Area Core)

Photo 25: Soil Core Screening Indicating Subsurface Waste Rock (Boring RM03-DWTR02 Core)

Photo 26: Soil Core Screening Indicating Transition from Waste Rock to Native Soil (Boring RM03-CWRP04 with Bottom at Left)

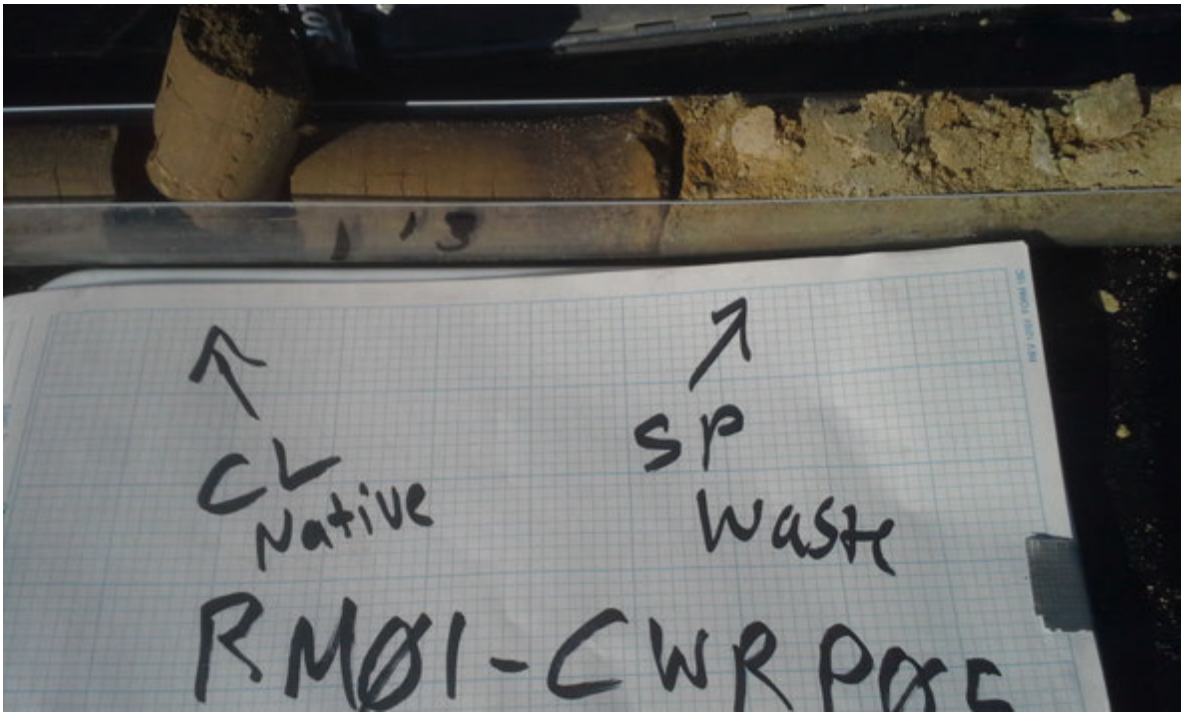

Photo 27: Soil Core Screening Indicating Transition from Waste Rock to Native Soil (Boring RM01-CWRP05 with Bottom at Left)

Appendix C4
Instrument Certification and Calibration

INSTRUMENT SOURCE CHECK FORM

Project Number: 144023			Project Name: Ruby Mines	

CHECK SOURCES

METER	MODEL	2221	CALIBRATION	RADIONUCLIDE	Cs-137
	SERIAL #	184010	**DUE DATE: 4/22/15**	ID	Cs-137-2
DETECTOR	MODEL	44-10	CALIBRATION	RADIONUCLIDE	N/A
	SERIAL #	PR242324	**DUE DATE: 4/22/15**	ID	N/A

DATE/TIME OF CHECK	BATT. (S/U)	HIGH VOLTAGE (S/U)	(FAST/SLOW) RESPONSE	1- MIN. BKGD. READING	SOURCE CHECK GROSS	SOURCE CHECK NET	PASS / FAIL	TECH INITIALS	DATA REVIEW TECH INITALS
4/29/14	S	S	Fast	7,801	515,154	507,353	Pass	JMH	
4/30/14	S	S	Fast	7,736	521,521	513,785	Pass	JMH	
5/1/14	S	S	Fast	7,819	535,336	527,517	Pass	JMH	
5/2/14	S	S	Fast	7,599	527,838	520,239	Pass	JMH	
5/3/14	S	S	Fast	7,670	525,899	518,229	Pass	JMH	
5/4/14	S	S	Fast	7,993	538,701	530,708	Pass	JMH	
5/5/14	S	S	Fast	7,951	511,977	504,026	Pass	JMH	
5/6/14	S	S	Fast	8,053	524,453	516,400	Pass	JMH	
5/7/14	S	S	Fast	8,322	518,752	510,430	Pass	JMH	
5/8/14	S	S	Fast	7,124	528,648	521,524	Pass	JMH	

Cs-137 Check Source: AVG +/- 20 % Net Source Response Limits are: 423,376 cpm to 635,065 cpm

Data Reviewed By: _____ Date Reviewed: _____

INSTRUMENT SOURCE CHECK FORM

Project Number: 144023			Project Name: Ruby Mines	

CHECK SOURCES

METER	MODEL	2221	CALIBRATION	RADIONUCLIDE	Cs-137
	SERIAL #	172029	**4/23/2015**	ID	Cs-137-2
DETECTOR	MODEL	44-10	CALIBRATION	RADIONUCLIDE	N/A
	SERIAL #	245188	**DUE DATE: 4/23/15**	ID	N/A

DATE/TIME OF CHECK	BATT. (S/U)	HIGH VOLTAGE (S/U)	(FAST/SLOW) RESPONSE	1- MIN. BKGD. READING	SOURCE CHECK GROSS	SOURCE CHECK NET	PASS / FAIL	TECH INITIALS	DATA REVIEW TECH INITALS
4/29/14	S	S	Fast	9,669	598,592	588,923	Pass	JMH	
4/30/14	S	S	Fast	9,179	585,593	576,414	Pass	JMH	
5/1/14	S	S	Fast	9,677	571,161	561,484	Pass	JMH	
5/2/14	S	S	Fast	8,863	575,075	566,212	Pass	JMH	
5/3/14	S	S	Fast	8,854	570,353	561,499	Pass	JMH	
5/4/14	S	S	Fast	9,698	580,664	570,966	Pass	JMH	
5/5/14	S	S	Fast	8,445	558,496	550,051	Pass	JMH	
5/6/14	S	S	Fast	8,105	570,950	562,845	Pass	JMH	
5/7/14	S	S	Fast	8,656	581,598	572,942	Pass	JMH	
5/8/14	S	S	Fast	8,137	574,546	566,409	Pass	JMH	

Cs-137 Check Source: AVG +/- 20 % Net Source Response Limits are: 449,176 cpm to 673,764 cpm

Data Reviewed By: _____ Date Reviewed: _____

INSTRUMENT SOURCE CHECK FORM

Project Number: 144023			Project Name: Ruby Mines	

CHECK SOURCES

METER	MODEL	2221	CALIBRATION	RADIONUCLIDE	Cs-137
	SERIAL #	172018	**DUE DATE: 4/23/15**	ID	Cs-137-2
DETECTOR	MODEL	44-10	CALIBRATION	RADIONUCLIDE	N/A
	SERIAL #	276599	**DUE DATE: 4/23/15**	ID	N/A

DATE/TIME OF CHECK	BATT. (S/U)	HIGH VOLTAGE (S/U)	(FAST/SLOW) RESPONSE	1- MIN. BKGD. READING	SOURCE CHECK GROSS	SOURCE CHECK NET	PASS / FAIL	TECH INITIALS	DATA REVIEW TECH INITALS
4/29/14	S	S	Fast	7,982	527,054	519,072	Pass	JMH	
4/30/14	S	S	Fast	7,705	523,167	515,462	Pass	JMH	
5/1/14	S	S	Fast	8,352	526,026	517,674	Pass	JMH	
5/2/14	S	S	Fast	7,354	524,435	517,081	Pass	JMH	
5/3/14	S	S	Fast	7,220	524,671	517,451	Pass	JMH	
5/4/14	S	S	Fast	8,466	520,539	512,073	Pass	JMH	
5/5/14	S	S	Fast	7,994	544,381	536,387	Pass	JMH	
5/6/14	S	S	Fast	7,463	521,185	513,722	Pass	JMH	
5/7/14	S	S	Fast	7,592	529,027	521,435	Pass	JMH	
5/8/14	S	S	Fast	7,137	514,741	507,604	Pass	JMH	

Cs-137 Check Source: AVG +/- 20 % Net Source Response Limits are: 409,683 cpm to 614,524 cpm

Data Reviewed By: _____ Date Reviewed: _____

INSTRUMENT SOURCE CHECK FORM

Project Number: 144023			Project Name: Ruby Mines	

CHECK SOURCES

METER	MODEL	2221	CALIBRATION	RADIONUCLIDE	Cs-137
	SERIAL #	262345	**DUE DATE: 4/23/15**	ID	Cs-137-2
DETECTOR	MODEL	44-10	CALIBRATION	RADIONUCLIDE	N/A
	SERIAL #	288455	**DUE DATE: 4/23/15**	ID	N/A

DATE/TIME OF CHECK	BATT. (S/U)	HIGH VOLTAGE (S/U)	(FAST/SLOW) RESPONSE	1- MIN. BKGD. READING	SOURCE CHECK GROSS	SOURCE CHECK NET	PASS / FAIL	TECH INITIALS	DATA REVIEW TECH INITALS
4/29/14	S	S	Fast	NA	NA	NA	NA	JMH	
4/30/14	S	S	Fast	NA	NA	NA	NA	JMH	
5/1/14	S	S	Fast	8,182	566,355	558,173	Pass	JMH	
5/2/14	S	S	Fast	7,685	582,151	574,466	Pass	JMH	
5/3/14	S	S	Fast	8,194	572,105	563,911	Pass	JMH	
5/4/14	S	S	Fast	8,985	588,079	579,094	Pass	JMH	
5/5/14	S	S	Fast	9,587	596,515	586,928	Pass	JMH	
5/6/14	S	S	Fast	8,095	556,544	548,449	Pass	JMH	
5/7/14	S	S	Fast	8,226	573,656	565,430	Pass	JMH	
5/8/14	S	S	Fast	8,348	581,492	573,144	Pass	JMH	

Cs-137 Check Source: AVG +/- 20 % Net Source Response Limits are: 464,152 cpm to 696,229 cpm

Data Reviewed By: _____ Date Reviewed: _____

INSTRUMENT SOURCE CHECK FORM

Project Number: 144023			Project Name: Ruby Mines	

CHECK SOURCES

METER	MODEL	Bicron	CALIBRATION	RADIONUCLIDE	Cs-137
	SERIAL #	C665J	**DUE DATE: 3/18/15**	ID	Cs-137-2
DETECTOR	MODEL	NA	CALIBRATION	RADIONUCLIDE	N/A
	SERIAL #	NA	**NA**	ID	N/A

DATE/TIME OF CHECK	BATT. (S/U)	HIGH VOLTAGE (S/U)	(FAST/SLOW) RESPONSE	1- MIN. BKGD. READING	SOURCE CHECK GROSS	SOURCE CHECK NET	PASS / FAIL	TECH INITIALS	DATA REVIEW TECH INITALS
4/29/14	S	S	Slow	NA	NA	NA	Pass	JMH	
4/30/14	S	S	Slow	11	1100	1089	Pass	JMH	
5/1/14	S	S	Slow	10	1000	990	Pass	JMH	
5/2/14	S	S	Slow	11	1050	1039	Pass	JMH	
5/3/14	S	S	Slow	12	1000	988	Pass	JMH	
5/4/14	S	S	Slow	11	1000	989	Pass	JMH	
5/5/14	S	S	Slow	11	1000	989	Pass	JMH	
5/6/14	S	S	Slow	11	1000	989	Pass	JMH	
5/7/14	S	S	Slow	10	1000	990	Pass	JMH	
5/8/14	S	S	Slow	NA	NA	NA	Pass	JMH	

Cs-137 Check Source: AVG +/- 20 % Net Source Response Limits are: 871 µrem/hr to 1,307 µrem/hr

Data Reviewed By: _____ Date Reviewed: _____

INSTRUMENT SOURCE CHECK FORM

Project Number: 144023			Project Name: Ruby Mines	

CHECK SOURCES

METER	MODEL		Bicron		CALIBRATION		RADIONUCLIDE		Cs-137
	SERIAL #		09010		**DUE DATE: 3/18/15**		ID		Cs-137-2
DETECTOR	MODEL		NA		CALIBRATION		RADIONUCLIDE		N/A
	SERIAL #		NA		**NA**		ID		N/A
DATE/TIME OF CHECK	BATT. (S/U)	HIGH VOLTAGE (S/U)	(FAST/SLOW) RESPONSE	1- MIN. BKGD. READING	SOURCE CHECK GROSS	SOURCE CHECK NET	PASS / FAIL	TECH INITIALS	DATA REVIEW TECH INITALS
4/29/14	S	S	Slow	NA	NA	NA	Pass	JMH	
4/30/14	S	S	Slow	11	1050	1039	Pass	JMH	
5/1/14	S	S	Slow	10	1000	990	Pass	JMH	
5/2/14	S	S	Slow	15	1000	985	Pass	JMH	
5/3/14	S	S	Slow	11	1000	989	Pass	JMH	
5/4/14	S	S	Slow	11	1000	989	Pass	JMH	
5/5/14	S	S	Slow	11	1000	989	Pass	JMH	
5/6/14	S	S	Slow	10	1000	990	Pass	JMH	
5/7/14	S	S	Slow	10	1000	990	Pass	JMH	
5/8/14	S	S	Slow	NA	NA	NA	Pass	JMH	

Cs-137 Check Source: AVG +/- 20 % Net Source Response Limits are: 832 µrem/hr to 1,248 µrem/hr

Data Reviewed By: _____ Date Reviewed: _____

INSTRUMENT SOURCE CHECK FORM

Project Number: 144023			Project Name: Ruby Mines	

CHECK SOURCES

METER	MODEL	3	CALIBRATION	RADIONUCLIDE	Cs-137
	SERIAL #	144023	**DUE DATE: 4/22/15**	ID	Cs-137-2
DETECTOR	MODEL	44-9	CALIBRATION	RADIONUCLIDE	N/A
	SERIAL #	153297	**DUE DATE: 4/22/15**	ID	N/A

DATE/TIME OF CHECK	BATT. (S/U)	HIGH VOLTAGE (S/U)	(FAST/SLOW) RESPONSE	1- MIN. BKGD. READING	SOURCE CHECK GROSS	SOURCE CHECK NET	PASS/ FAIL	TECH INITIALS	DATA REVIEW TECH INITALS
4/29/14	S	S	Slow	58	5,438	5,380	Pass	JMH	
4/30/14	S	S	Slow	66	5,302	5,236	Pass	JMH	
5/1/14	S	S	Slow	65	5,169	5,104	Pass	JMH	
5/2/14	S	S	Slow	61	5,249	5,188	Pass	JMH	
5/3/14	S	S	Slow	48	5,237	5,189	Pass	JMH	
5/4/14	S	S	Slow	62	5,304	5,242	Pass	JMH	
5/5/14	S	S	Slow	43	5,187	5,144	Pass	JMH	
5/6/14	S	S	Slow	53	5,024	4,971	Pass	JMH	
5/7/14	S	S	Slow	58	5,327	5,269	Pass	JMH	
5/8/14	S	S	Slow	61	5,320	5,259	Pass	JMH	

Cs-137 Check Source: AVG +/- 20 % Net Source Response Limits are: 4,043 cpm to 6,065 cpm

Data Reviewed By: _____ Date Reviewed: _____

INSTRUMENT SOURCE CHECK FORM

Project Number: 144023			Project Name: Ruby Mines	

CHECK SOURCES

METER	MODEL	3	CALIBRATION	RADIONUCLIDE	Cs-137
	SERIAL #	111520	**DUE DATE: 4/24/15**	ID	Cs-137-2
DETECTOR	MODEL	44-9	CALIBRATION	RADIONUCLIDE	N/A
	SERIAL #	226310	**DUE DATE: 4/24/15**	ID	N/A

DATE/TIME OF CHECK	BATT. (S/U)	HIGH VOLTAGE (S/U)	(FAST/SLOW) RESPONSE	1- MIN. BKGD. READING	SOURCE CHECK GROSS	SOURCE CHECK NET	PASS/ FAIL	TECH INITIALS	DATA REVIEW TECH INITALS
4/29/14	S	S	Slow	NA	NA	NA	Pass	JMH	
4/30/14	S	S	Slow	70	4600	4530	Pass	JMH	
5/1/14	S	S	Slow	60	4600	4540	Pass	JMH	
5/2/14	S	S	Slow	50	4700	4650	Pass	JMH	
5/3/14	S	S	Slow	60	4600	4540	Pass	JMH	
5/4/14	S	S	Slow	60	4700	4640	Pass	JMH	
5/5/14	S	S	Slow	60	4600	4540	Pass	JMH	
5/6/14	S	S	Slow	60	4600	4540	Pass	JMH	
5/7/14	S	S	Slow	60	4600	4540	Pass	JMH	
5/8/14	S	S	Slow	NA	NA	NA	Pass	JMH	

Cs-137 Check Source: AVG +/- 20 % Net Source Response Limits are: 3,632 cpm to 5,448 cpm

Data Reviewed By: _____ Date Reviewed: _____

INSTRUMENT SOURCE CHECK FORM

Project Number: 144023			Project Name: Ruby Mines	

CHECK SOURCES

METER	MODEL	3	CALIBRATION	RADIONUCLIDE	Cs-137
	SERIAL #	232186	**DUE DATE: 4/22/15**	ID	Cs-137-2
DETECTOR	MODEL	44-9	CALIBRATION	RADIONUCLIDE	N/A
	SERIAL #	193575	**DUE DATE: 4/22/15**	ID	N/A

DATE/TIME OF CHECK	BATT. (S/U)	HIGH VOLTAGE (S/U)	(FAST/SLOW) RESPONSE	1- MIN. BKGD. READING	SOURCE CHECK GROSS	SOURCE CHECK NET	PASS/ FAIL	TECH INITIALS	DATA REVIEW TECH INITALS
4/29/14	S	S	Slow	NA	NA	NA	Pass	JMH	
4/30/14	S	S	Slow	50	4600	4550	Pass	JMH	
5/1/14	S	S	Slow	50	4600	4550	Pass	JMH	
5/2/14	S	S	Slow	50	4600	4550	Pass	JMH	
5/3/14	S	S	Slow	60	4600	4540	Pass	JMH	
5/4/14	S	S	Slow	50	4600	4550	Pass	JMH	
5/5/14	S	S	Slow	60	4600	4540	Pass	JMH	
5/6/14	S	S	Slow	60	4600	4540	Pass	JMH	
5/7/14	S	S	Slow	60	4600	4540	Pass	JMH	
5/8/14	S	S	Slow	60	4600	4540	Pass	JMH	

Cs-137 Check Source: AVG +/- 20 % Net Source Response Limits are: 3,640 cpm to 5,460 cpm

Data Reviewed By: _____ Date Reviewed: _____

INSTRUMENT SOURCE CHECK FORM

Project Number: 144023			Project Name: Ruby Mines	

CHECK SOURCES

METER	MODEL	2221	CALIBRATION	RADIONUCLIDE	Cs-137
	SERIAL #	262318	**DUE DATE: 10/3/2015**	ID	99-0295
DETECTOR	MODEL	44-10	CALIBRATION	RADIONUCLIDE	N/A
	SERIAL #	PR240330	**DUE DATE: 10/3/2015**	ID	N/A

DATE/TIME OF CHECK	BATT. (S/U)	HIGH VOLTAGE (S/U)	(FAST/SLOW) RESPONSE	1- MIN. BKGD. READING	SOURCE CHECK GROSS	SOURCE CHECK NET	PASS / FAIL	TECH INITIALS	DATA REVIEW TECH INITALS
10/6/14	S	S	Fast	6,405	8,870	2,465	PASS	JMH	
10/7/14	S	S	Fast	6,317	8,832	2,515	PASS	JMH	
10/8/14	S	S	Fast	7,061	9,321	2,260	PASS	JMH	
10/9/14	S	S	Fast	6,080	8,671	2,591	PASS	JMH	
10/10/14	S	S	Fast	6,232	8,973	2,741	PASS	JMH	
10/11/14	S	S	Fast	6,504	9,053	2,549	PASS	JMH	
10/12/14	S	S	Fast	6,926	9,521	2,595	PASS	JMH	
10/13/14	S	S	Fast	6,125	9,407	3,282	PASS	JMH	

Cs-137 Check Source: AVG +/- 20 % Net Source Response Limits are: 2,194 cpm to 3,291 cpm

Data Reviewed By: James Rose Date Reviewed: 11/7/2014

INSTRUMENT SOURCE CHECK FORM

Project Number: 144023			Project Name: Ruby Mines	

CHECK SOURCES

METER	MODEL	2221	CALIBRATION	RADIONUCLIDE	Cs-137
	SERIAL #	172035	**DUE DATE: 10/3/2015**	ID	99-0295
DETECTOR	MODEL	44-10	CALIBRATION	RADIONUCLIDE	
	SERIAL #	PR199125	**DUE DATE: 10/3/2015**	ID	

DATE/TIME OF CHECK	BATT. (S/U)	HIGH VOLTAGE (S/U)	(FAST/SLOW) RESPONSE	1- MIN. BKGD. READING	SOURCE CHECK GROSS	SOURCE CHECK NET	PASS / FAIL	TECH INITIALS	DATA REVIEW TECH INITALS
10/6/14	S	S	Fast	6,182	8,469	2,287	PASS	JMH	
10/7/14	S	S	Fast	6,129	8,361	2,232	PASS	JMH	
10/8/14	S	S	Fast	6,104	8,950	2,846	PASS	JMH	
10/9/14	S	S	Fast	5,693	7,915	2,222	PASS	JMH	
10/10/14	S	S	Fast	5,716	8,086	2,370	PASS	JMH	
10/11/14	S	S	Fast	5,834	8,281	2,447	PASS	JMH	
10/12/14	S	S	Fast	6,060	8,366	2,306	PASS	JMH	
10/13/14	S	S	Fast	6,102	8,871	2,769	PASS	JMH	

Cs-137 Check Source: AVG +/- 20 % Net Source Response Limits are: 1,958 cpm to 2,937 cpm

INSTRUMENT SOURCE CHECK FORM

Project Number: 144023			Project Name: Ruby Mines	

CHECK SOURCES

METER	MODEL	2221	CALIBRATION	RADIONUCLIDE	Cs-137
	SERIAL #	172038	**DUE DATE: 10/3/2015**	ID	99-0295
DETECTOR	MODEL	44-2	CALIBRATION	RADIONUCLIDE	
	SERIAL #	PR273892	**DUE DATE: 10/3/2015**	ID	

DATE/TIME OF CHECK	BATT. (S/U)	HIGH VOLTAGE (S/U)	(FAST/SLOW) RESPONSE	1- MIN. BKGD. READING	SOURCE CHECK GROSS	SOURCE CHECK NET	PASS / FAIL	TECH INITIALS	DATA REVIEW TECH INITALS
10/6/14	S	S	Fast	1,590	2,407	817	Pass	JMH	
10/7/14	S	S	Fast	1,595	2,343	748	Pass	JMH	
10/8/14	S	S	Fast	1,464	2,412	948	Pass	JMH	

Cs-137 Check Source: AVG +/- 20 % Net Source Response Limits are: 648 cpm to 971 cpm

INSTRUMENT SOURCE CHECK FORM

Project Number: 144023			Project Name: Ruby Mines	

CHECK SOURCES

METER	MODEL	12	CALIBRATION	RADIONUCLIDE	Cs-137
	SERIAL #	186763	**DUE DATE: 10/3/2015**	ID	99-0295
DETECTOR	MODEL	44-9	CALIBRATION	RADIONUCLIDE	N/A
	SERIAL #	PR151024	**DUE DATE: 10/3/2015**	ID	N/A

DATE/TIME OF CHECK	BATT. (S/U)	HIGH VOLTAGE (S/U)	(FAST/SLOW) RESPONSE	1- MIN. BKGD. READING	SOURCE CHECK GROSS	SOURCE CHECK NET	PASS / FAIL	TECH INITIALS	DATA REVIEW TECH INITALS
10/6/14	S	S	Slow	57	171	NA	NA	JMH	
10/7/14	S	S	Slow	47	155	NA	NA	JMH	
10/8/14	S	S	Slow	59	176	117	Pass	JMH	
10/9/14	S	S	Slow	48	134	86	Pass	JMH	
10/10/14	S	S	Slow	41	130	89	Pass	JMH	
10/11/14	S	S	Slow	65	149	84	Pass	JMH	
10/12/14	S	S	Slow	54	153	99	Pass	JMH	
10/13/14	S	S	Slow	55	164	109	Pass	JMH	

Cs-137 Check Source: AVG +/- 20 % Net Source Response Limits are: 80 cpm to 120 cpm

INSTRUMENT SOURCE CHECK FORM

Project Number: 144023			Project Name: Ruby Mines	

CHECK SOURCES

METER	MODEL	3	CALIBRATION	RADIONUCLIDE	Cs-137
	SERIAL #	187367	**DUE DATE: 10/3/2015**	ID	99-0295
DETECTOR	MODEL	44-9	CALIBRATION	RADIONUCLIDE	
	SERIAL #	PR194676	**DUE DATE: 10/3/2015**	ID	

DATE/TIME OF CHECK	BATT. (S/U)	HIGH VOLTAGE (S/U)	(FAST/SLOW) RESPONSE	1- MIN. BKGD. READING	SOURCE CHECK GROSS	SOURCE CHECK NET	PASS / FAIL	TECH INITIALS	DATA REVIEW TECH INITALS
10/6/14	S	S	Slow	49	174	125	Pass	JMH	
10/7/14	S	S	Slow	65	157	92	Pass	JMH	
10/8/14	S	S	Slow	51	170	119	Pass	JMH	
10/9/14	S	S	Slow	55	166	111	Pass	JMH	
10/10/14	S	S	Slow	56	153	97	Pass	JMH	
10/11/14	S	S	Slow	51	153	102	Pass	JMH	
10/12/14	S	S	Slow	57	186	129	Pass	JMH	
10/13/14	S	S	Slow	58	190	132	Pass	JMH	

Cs-137 Check Source: AVG +/- 20 % Net Source Response Limits are: 90 cpm to 135 cpm

INSTRUMENT SOURCE CHECK FORM

Project Number: 144023			Project Name: Ruby Mines	

CHECK SOURCES

METER	MODEL	Bicron	CALIBRATION	RADIONUCLIDE	Cs-137
	SERIAL #	E049A	**DUE DATE: 10/3/2015**	ID	Cs137-99-0295
DETECTOR	MODEL	NA	CALIBRATION	RADIONUCLIDE	N/A
	SERIAL #	NA	**NA**	ID	N/A

DATE/TIME OF CHECK	BATT. (S/U)	HIGH VOLTAGE (S/U)	(FAST/SLOW) RESPONSE	1- MIN. BKGD. READING	SOURCE CHECK GROSS	SOURCE CHECK NET	PASS / FAIL	TECH INITIALS	DATA REVIEW TECH INITALS
10/6/14	S	S	Slow	10	260	NA	Pass	JMH	
10/7/14	S	S	Slow	10	250	240	Pass	JMH	
10/8/14	S	S	Slow	10	250	240	Pass	JMH	
10/9/14	S	S	Slow	11	240	229	Pass	JMH	
10/10/14	S	S	Slow	11	250	239	Pass	JMH	
10/11/14	S	S	Slow	10	250	240	Pass	JMH	
10/12/14	S	S	Slow	11	250	239	Pass	JMH	
10/13/14	S	S	Slow	10	240	230	Pass	JMH	

Cs-137 Check Source: AVG +/- 20 % Net Source Response Limits are: 871 µrem/hr to 1,307 µrem/hr

INSTRUMENT SOURCE CHECK FORM

Project Number: 144023			Project Name: Ruby Mines	

CHECK SOURCES

METER	MODEL	Bicron	CALIBRATION	RADIONUCLIDE	Cs-137
	SERIAL #	2014	**DUE DATE: 10/3/15**	ID	Cs137-99-0295
DETECTOR	MODEL	NA	CALIBRATION	RADIONUCLIDE	N/A
	SERIAL #	NA	**NA**	ID	N/A

DATE/TIME OF CHECK	BATT. (S/U)	HIGH VOLTAGE (S/U)	(FAST/SLOW) RESPONSE	1- MIN. BKGD. READING	SOURCE CHECK GROSS	SOURCE CHECK NET	PASS / FAIL	TECH INITIALS	DATA REVIEW TECH INITALS
10/6/14	S	S	Slow	10	240	230	Pass	JMH	
10/7/14	S	S	Slow	11	250	239	Pass	JMH	
10/8/14	S	S	Slow	10	240	230	Pass	JMH	
10/9/14	S	S	Slow	10	240	230	Pass	JMH	
10/10/14	S	S	Slow	11	240	229	Pass	JMH	
10/11/14	S	S	Slow	11	240	229	Pass	JMH	
10/12/14	S	S	Slow	11	250	239	Pass	JMH	
10/13/14	S	S	Slow	10	240	230	Pass	JMH	

Cs-137 Check Source: AVG +/- 20 % Net Source Response Limits are: 192 µrem/hr to 288 µrem/hr

Perma-Fix Environmental Services
2800 Solway Rd.
Knoxville, TN 37931

Form HPM-2-1-1
Performance Check Values

Project Number:	144023	Project Name:	Ruby Mines
Instrument Model:	2221	Technician:	J Hubler
Instrument S/N:	184010	Date:	4/29/2014
Calibration Due:	4/22/2015	Detector Model:	44-10
Radiation Detected:	Gamma	Detector S/N:	PR242324
Source Isotope & S/N:	Cs137-	Detector Type:	NaI
Bkg Count Rate:	7968		

Data Point	Gross Count	Net Count	Data Point	Gross Count	Net Count
1	532,789	524,821	11	533,291	525,323
2	534,234	526,266	12	538,001	530,033
3	534,821	526,853	13	541,144	533,176
4	533,371	525,403	14	540,213	532,245
5	533,470	525,502	15	541,318	533,350
6	533,958	525,990	16	541,837	533,869
7	533,484	525,516	17	543,180	535,212
8	533,691	525,723	18	543,274	535,306
9	533,897	525,929	19	542,549	534,581
10	533,162	525,194	20	542,091	534,123

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Average Net Count:		529,221
Standard Deviation of Net Count (Scalers):		4,171
20% of Net Count (Ratemeters):		105,844
Average minus 2 X standard deviation (Scalers):		520,879
Average plus 2 X standard deviation (Scalers):		537,562
Average minus 20% (Ratemeters):		423,376
Average plus 20% (Ratemeters):		635,065

Formulas

Where: n = number of counts (20)

$\bar{x}$ = average of counts

x_i = each count result

$$StdDev = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n-1}}$$

Comments:

Prepared By: 

Date: 4/29/2014

Perma-Fix Environmental Services
2800 Solway Rd.
Knoxville, TN 37931

Form HPM-2-1-1
Performance Check Values

Project Number:	144023	Project Name:	Ruby Mines
Instrument Model:	2221	Technician:	J Hubler
Instrument S/N:	172029	Date:	4/29/2014
Calibration Due:	4/23/2015	Detector Model:	44-10
Radiation Detected:	Gamma	Detector S/N:	245188
Source Isotope & S/N:	Cs137-	Detector Type:	NaI
Bkg Count Rate:	10817.2		

Data Point	Gross Count	Net Count	Data Point	Gross Count	Net Count
1	582,821	572,004	11	571,336	560,519
2	583,734	572,917	12	571,184	560,367
3	584,435	573,618	13	569,690	558,873
4	570,305	559,488	14	569,857	559,040
5	570,677	559,860	15	570,172	559,355
6	569,747	558,930	16	570,210	559,393
7	569,362	558,545	17	569,612	558,795
8	571,679	560,862	18	569,823	559,006
9	571,627	560,810	19	568,839	558,022
10	570,894	560,077	20	569,740	558,923

Average Net Count:		561,470
Standard Deviation of Net Count (Scalers):		4,968
20% of Net Count (Ratemeters):		112,294
Average minus 2 X standard deviation (Scalers):		551,533
Average plus 2 X standard deviation (Scalers):		571,407
Average minus 20% (Ratemeters):		449,176
Average plus 20% (Ratemeters):		673,764

Formulas

Where: n = number of counts (20)

$\overline{x}$ = average of counts

x_i = each count result

$$StdDev = \sqrt{\frac{\sum_{i=1}^{n} (x_i - \bar{x})^2}{n-1}}$$

Comments:

Prepared By: James Rose

Date: 4/29/2014

Perma-Fix Environmental Services
2800 Solway Rd.
Knoxville, TN 37931

Form HPM-2-1-1
Performance Check Values

Project Number:	144023	Project Name:	Ruby Mines
Instrument Model:	2221	Technician:	J Hubler
Instrument S/N:	172018	Date:	4/29/2014
Calibration Due:	4/23/2015	Detector Model:	44-10
Radiation Detected:	Gamma	Detector S/N:	276599
Source Isotope & S/N:	Cs137-	Detector Type:	NaI
Bkg Count Rate:	8550		

Data Point	Gross Count	Net Count	Data Point	Gross Count	Net Count
1	519,426	510,876	11	519,416	510,866
2	519,993	511,443	12	521,315	512,765
3	520,032	511,482	13	521,576	513,026
4	519,963	511,413	14	522,101	513,551
5	520,345	511,795	15	521,618	513,068
6	520,183	511,633	16	520,659	512,109
7	519,997	511,447	17	521,160	512,610
8	519,667	511,117	18	521,537	512,987
9	520,549	511,999	19	521,292	512,742
10	520,668	512,118	20	521,576	513,026

Average Net Count:		512,104
Standard Deviation of Net Count (Scalers):		817
20% of Net Count (Ratemeters):		102,421
Average minus 2 X standard deviation (Scalers):		510,470
Average plus 2 X standard deviation (Scalers):		513,737
Average minus 20% (Ratemeters):		409,683
Average plus 20% (Ratemeters):		614,524

Formulas

Where: n = number of counts (20)

$\bar{x}$ = average of counts

x_i = each count result

$$StdDev = \sqrt{\frac{\sum_{i=1}^{n} (x_i - \bar{x})^2}{n-1}}$$

Comments:

Prepared By: 

Date: 4/29/2014

Perma-Fix Environmental Services
2800 Solway Rd.
Knoxville, TN 37931

Form HPM-2-1-1
Performance Check Values

Project Number:	144023	Project Name:	Ruby Mines
Instrument Model:	2221	Technician:	J. Hubler
Instrument S/N:	262345	Date:	4/30/2014
Calibration Due:	4/23/2015	Detector Model:	44-10
Radiation Detected:	Gamma	Detector S/N:	PR288455
Source Isotope & S/N:	Cs137-	Detector Type:	NaI
Bkg Count Rate:	6796		

Data Point	Gross Count	Net Count	Data Point	Gross Count	Net Count
1	587,009	580,213	11	586,848	580,052
2	586,295	579,499	12	587,757	580,961
3	587,478	580,682	13	588,829	582,033
4	586,267	579,471	14	587,260	580,464
5	586,720	579,924	15	586,755	579,959
6	587,764	580,968	16	586,077	579,281
7	587,394	580,598	17	586,257	579,461
8	587,035	580,239	18	587,092	580,296
9	586,449	579,653	19	587,297	580,501
10	586,848	580,052	20	586,298	579,502

Average Net Count:		580,190
Standard Deviation of Net Count (Scalers):		668
20% of Net Count (Ratemeters):		116,038
Average minus 2 X standard deviation (Scalers):		578,855
Average plus 2 X standard deviation (Scalers):		581,526
Average minus 20% (Ratemeters):		464,152
Average plus 20% (Ratemeters):		696,229

Formulas

Where: n = number of counts (20)

$\bar{x}$ = average of counts

x_i = each count result

$$StdDev = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n-1}}$$

Comments:

Prepared By: 

Date: 4/30/2014

Perma-Fix Environmental Services
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Knoxville, TN 37931

Form HPM-2-1-1
Performance Check Values

Project Number:	144023	Project Name:	Ruby Mines
Instrument Model:	Bicron	Technician:	J Hubler
Instrument S/N:	C665J	Date:	4/29/2014
Calibration Due:	3/18/2015	Detector Model:	NA
Radiation Detected:	Gamma	Detector S/N:	NA
Source Isotope & S/N:	Cs137-	Detector Type:	MicroRem
Bkg Count Rate (µrem/hr):	11		

Data Point	Gross µrem/hr	Net Count	Data Point	Gross µrem/hr	Net Count
1	1,100	1,089	11	1,100	1,089
2	1,100	1,089	12	1,100	1,089
3	1,100	1,089	13	1,100	1,089
4	1,100	1,089	14	1,100	1,089
5	1,100	1,089	15	1,100	1,089
6	1,100	1,089	16	1,100	1,089
7	1,100	1,089	17	1,100	1,089
8	1,100	1,089	18	1,100	1,089
9	1,100	1,089	19	1,100	1,089
10	1,100	1,089	20	1,100	1,089

Average Net Count:		1,089
Standard Deviation of Net Count (Scalers):		0
20% of Net Count (Ratemeters):		218
Average minus 2 X standard deviation (Scalers):		1,089
Average plus 2 X standard deviation (Scalers):		1,089
Average minus 20% (Ratemeters):		871
Average plus 20% (Ratemeters):		1,307

Formulas

Where: n = number of counts (20)

$\bar{x}$ = average of counts

x_i = each count result

$$StdDev = \sqrt{\frac{\sum_{i=1}^{n} (x_i - \bar{x})^2}{n-1}}$$

Comments:

Prepared By: 

Date: 4/29/2014

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Form HPM-2-1-1
Performance Check Values

Project Number:	144023	Project Name:	Ruby Mines
Instrument Model:	Bicron	Technician:	J Hubler
Instrument S/N:	09010	Date:	4/29/2014
Calibration Due:	3/18/2015	Detector Model:	NA
Radiation Detected:	Gamma	Detector S/N:	NA
Source Isotope & S/N:	Cs137-	Detector Type:	MicroRem
Bkg Count Rate (µrem/hr):	10		

Data Point	Gross µrem/hr	Net Count	Data Point	Gross µrem/hr	Net Count
1	1,050	1,040	11	1,050	1,040
2	1,050	1,040	12	1,050	1,040
3	1,050	1,040	13	1,050	1,040
4	1,050	1,040	14	1,050	1,040
5	1,050	1,040	15	1,050	1,040
6	1,050	1,040	16	1,050	1,040
7	1,050	1,040	17	1,050	1,040
8	1,050	1,040	18	1,050	1,040
9	1,050	1,040	19	1,050	1,040
10	1,050	1,040	20	1,050	1,040

Average Net Count:		1,040
Standard Deviation of Net Count (Scalers):		0
20% of Net Count (Ratemeters):		208
Average minus 2 X standard deviation (Scalers):		1,040
Average plus 2 X standard deviation (Scalers):		1,040
Average minus 20% (Ratemeters):		832
Average plus 20% (Ratemeters):		1,248

Formulas

Where: n = number of counts (20)

$\bar{x}$ = average of counts

x_i = each count result

$$StdDev = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n-1}}$$

Comments:

Prepared By: 

Date: 4/29/2014

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Knoxville, TN 37931

Form HPM-2-1-1
Performance Check Values

Project Number:	144023	Project Name:	Ruby Mines
Instrument Model:	3	Technician:	J Hubler
Instrument S/N:	187583	Date:	4/29/2014
Calibration Due:	4/22/2015	Detector Model:	44-9
Radiation Detected:	Beta/Gamma	Detector S/N:	153297
Source Isotope & S/N:	Cs137-	Detector Type:	GM
Bkg Count Rate:	58.2		

Data Point	Gross Count	Net Count	Data Point	Gross Count	Net Count
1	5,087	5,029	11	5,123	5,065
2	5,225	5,167	12	5,117	5,059
3	5,127	5,069	13	5,006	4,948
4	5,068	5,010	14	5,119	5,061
5	5,200	5,142	15	5,049	4,991
6	5,214	5,156	16	4,975	4,917
7	5,141	5,083	17	5,047	4,989
8	5,160	5,102	18	4,935	4,877
9	5,203	5,145	19	5,066	5,008
10	5,272	5,214	20	5,105	5,047

Average Net Count:		5,054
Standard Deviation of Net Count (Scalers):		87
20% of Net Count (Ratemeters):		1,011
Average minus 2 X standard deviation (Scalers):		4,880
Average plus 2 X standard deviation (Scalers):		5,227
Average minus 20% (Ratemeters):		4,043
Average plus 20% (Ratemeters):		6,065

Formulas

Where: n = number of counts (20)

$\bar{x}$ = average of counts

x_i = each count result

$$StdDev = \sqrt{\frac{\sum_{i=1}^{n} (x_i - \bar{x})^2}{n-1}}$$

Comments:

Prepared By: 

Date: 4/29/2014

Perma-Fix Environmental Services
2800 Solway Rd.
Knoxville, TN 37931

Form HPM-2-1-1
Performance Check Values

Project Number:	144023	Project Name:	Ruby Mines
Instrument Model:	3	Technician:	J Hubler
Instrument S/N:	111520	Date:	4/29/2014
Calibration Due:	4/24/2015	Detector Model:	44-9
Radiation Detected:	Beta/Gamma	Detector S/N:	226310
Source Isotope & S/N:	Cs137-	Detector Type:	GM
Bkg Count Rate:	60		

Data Point	Gross Count	Net Count	Data Point	Gross Count	Net Count
1	4,600	4,540	11	4,600	4,540
2	4,600	4,540	12	4,600	4,540
3	4,600	4,540	13	4,600	4,540
4	4,600	4,540	14	4,600	4,540
5	4,600	4,540	15	4,600	4,540
6	4,600	4,540	16	4,600	4,540
7	4,600	4,540	17	4,600	4,540
8	4,600	4,540	18	4,600	4,540
9	4,600	4,540	19	4,600	4,540
10	4,600	4,540	20	4,600	4,540

Average Net Count:		4,540
Standard Deviation of Net Count (Scalers):		0
20% of Net Count (Ratemeters):		908
Average minus 2 X standard deviation (Scalers):		4,540
Average plus 2 X standard deviation (Scalers):		4,540
Average minus 20% (Ratemeters):		3,632
Average plus 20% (Ratemeters):		5,448

Formulas

Where: n = number of counts (20)

$\bar{x}$ = average of counts

x_i = each count result

$$StdDev = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n-1}}$$

Comments:

Prepared By:	Date: 4/29/2014

Perma-Fix Environmental Services
2800 Solway Rd.
Knoxville, TN 37931

Form HPM-2-1-1
Performance Check Values

Project Number:	144023	Project Name:	Ruby Mines
Instrument Model:	3	Technician:	J Hubler
Instrument S/N:	232186	Date:	4/29/2014
Calibration Due:	4/22/2015	Detector Model:	44-9
Radiation Detected:	Beta/Gamma	Detector S/N:	193575
Source Isotope & S/N:	Cs137-	Detector Type:	GM
Bkg Count Rate:	50		

Data Point	Gross Count	Net Count	Data Point	Gross Count	Net Count
1	4,600	4,550	11	4,600	4,550
2	4,600	4,550	12	4,600	4,550
3	4,600	4,550	13	4,600	4,550
4	4,600	4,550	14	4,600	4,550
5	4,600	4,550	15	4,600	4,550
6	4,600	4,550	16	4,600	4,550
7	4,600	4,550	17	4,600	4,550
8	4,600	4,550	18	4,600	4,550
9	4,600	4,550	19	4,600	4,550
10	4,600	4,550	20	4,600	4,550

Average Net Count:		4,550
Standard Deviation of Net Count (Scalers):		0
20% of Net Count (Ratemeters):		910
Average minus 2 X standard deviation (Scalers):		4,550
Average plus 2 X standard deviation (Scalers):		4,550
Average minus 20% (Ratemeters):		3,640
Average plus 20% (Ratemeters):		5,460

Formulas

Where: n = number of counts (20)

$\overline{x}$ = average of counts

x_i = each count result

$$StdDev = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n-1}}$$

Comments:

Prepared By: 

Date: 4/29/2014

Perma-Fix Environmental Services
2800 Solway Rd.
Knoxville, TN 37931

Form HPM-2-1-1
Performance Check Values

Project Number:	144023	Project Name:	Ruby Mines
Instrument Model:	2221	Technician:	J Hubler
Instrument S/N:	262318	Date:	10/5/2014
Calibration Due:	10/3/2015	Detector Model:	44-10
Radiation Detected:	Gamma	Detector S/N:	PR240330
Source Isotope & S/N:	Cs137-99-0295	Detector Type:	NaI
Bkg Count Rate:	5998		

Data Point	Gross Count	Net Count	Data Point	Gross Count	Net Count
1	8,697	2,699	11	8,740	2,742
2	8,573	2,575	12	8,867	2,869
3	8,892	2,894	13	8,769	2,771
4	9,012	3,014	14	8,733	2,735
5	8,476	2,478	15	8,509	2,511
6	8,909	2,911	16	8,700	2,702
7	8,824	2,826	17	8,717	2,719
8	8,528	2,530	18	8,804	2,806
9	8,632	2,634	19	8,738	2,740
10	8,937	2,939	20	8,758	2,760

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Average Net Count:		2,742
Standard Deviation of Net Count (Scalers):		146
20% of Net Count (Ratemeters):		548
Average minus 2 X standard deviation (Scalers):		2,450
Average plus 2 X standard deviation (Scalers):		3,034
Average minus 20% (Ratemeters):		2,194
Average plus 20% (Ratemeters):		3,291

Formulas

Where: n = number of counts (20)

$\bar{x}$ = average of counts

x_i = each count result

$$StdDev = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n-1}}$$

Comments:

Prepared By: 

Date: 10/5/2014

Perma-Fix Environmental Services
2800 Solway Rd.
Knoxville, TN 37931

Form HPM-2-1-1
Performance Check Values

Project Number:	144023	Project Name:	Ruby Mines
Instrument Model:	2221	Technician:	J Hubler
Instrument S/N:	172035	Date:	10/5/2014
Calibration Due:	10/3/2015	Detector Model:	44-10
Radiation Detected:	Gamma	Detector S/N:	PR199125
Source Isotope & S/N:	Cs137-99-0295	Detector Type:	NaI
Bkg Count Rate:	5833.1		

Data Point	Gross Count	Net Count	Data Point	Gross Count	Net Count
1	8,231	2,398	11	8,423	2,590
2	8,266	2,433	12	8,101	2,268
3	8,378	2,545	13	8,268	2,435
4	8,372	2,539	14	8,315	2,482
5	8,250	2,417	15	8,352	2,519
6	8,249	2,416	16	8,453	2,620
7	8,312	2,479	17	8,460	2,627
8	8,215	2,382	18	8,164	2,331
9	8,056	2,223	19	8,417	2,584
10	7,983	2,150	20	8,342	2,509

Average Net Count:		2,447
Standard Deviation of Net Count (Scalers):		131
20% of Net Count (Ratemeters):		489
Average minus 2 X standard deviation (Scalers):		2,186
Average plus 2 X standard deviation (Scalers):		2,708
Average minus 20% (Ratemeters):		1,958
Average plus 20% (Ratemeters):		2,937

Formulas

Where: n = number of counts (20)

$\overline{x}$ = average of counts

x_i = each count result

$$StdDev = \sqrt{\frac{\sum_{i=1}^{n} (x_i - \bar{x})^2}{n-1}}$$

Comments:

Prepared By: 

Date: 10/5/2014

Perma-Fix Environmental Services
2800 Solway Rd.
Knoxville, TN 37931

Form HPM-2-1-1
Performance Check Values

Project Number:	144023	Project Name:	Ruby Mines
Instrument Model:	2221	Technician:	J Hubler
Instrument S/N:	172038	Date:	10/5/2014
Calibration Due:	10/3/2015	Detector Model:	44-2
Radiation Detected:	Gamma	Detector S/N:	273892
Source Isotope & S/N:	Cs137-99-0295	Detector Type:	NaI
Bkg Count Rate:	1320.5		

Data Point	Gross Count	Net Count	Data Point	Gross Count	Net Count
1	2,164	844	11	2,109	789
2	2,120	800	12	2,098	778
3	2,125	805	13	2,172	852
4	2,140	820	14	2,064	744
5	2,052	732	15	2,097	777
6	2,116	796	16	2,107	787
7	2,128	808	17	2,157	837
8	2,091	771	18	2,208	888
9	2,193	873	19	2,139	819
10	2,148	828	20	2,172	852

Average Net Count:		810
Standard Deviation of Net Count (Scalers):		41
20% of Net Count (Ratemeters):		162
Average minus 2 X standard deviation (Scalers):		728
Average plus 2 X standard deviation (Scalers):		891
Average minus 20% (Ratemeters):		648
Average plus 20% (Ratemeters):		971

Formulas

Where: n = number of counts (20)

$\bar{x}$ = average of counts

x_i = each count result

$$StdDev = \sqrt{\frac{\sum_{i=1}^{n} (x_i - \bar{x})^2}{n-1}}$$

Comments:

Prepared By: 

Date: 10/5/2014

Perma-Fix Environmental Services
2800 Solway Rd.
Knoxville, TN 37931

Form HPM-2-1-1
Performance Check Values

Project Number:	144023	Project Name:	Ruby Mines
Instrument Model:	Bicron	Technician:	J Hubler
Instrument S/N:	E049A	Date:	10/5/2014
Calibration Due:	10/3/2015	Detector Model:	NA
Radiation Detected:	Gamma	Detector S/N:	NA
Source Isotope & S/N:	Cs137-99-0295	Detector Type:	MicroRem
Bkg Count Rate (µrem/hr):	11		

Data Point	Gross µrem/hr	Net Count	Data Point	Gross µrem/hr	Net Count
1	240	229	11	240	229
2	240	229	12	250	239
3	240	229	13	240	229
4	250	239	14	240	229
5	250	239	15	240	229
6	240	229	16	250	239
7	240	229	17	250	239
8	240	229	18	250	239
9	240	229	19	240	229
10	250	239	20	240	229

Average Net Count:		233
Standard Deviation of Net Count (Scalers):		5
20% of Net Count (Ratemeters):		47
Average minus 2 X standard deviation (Scalers):		223
Average plus 2 X standard deviation (Scalers):		242
Average minus 20% (Ratemeters):		186
Average plus 20% (Ratemeters):		279

Formulas

$\bar{x}$ = average of counts

x_i = each count result

n = number of counts (20)

$$StdDev = \sqrt{\frac{\sum_{i=1}^{n} (x_i - \bar{x})^2}{n-1}}$$

Comments:

Prepared By: 

Date: 10/5/2014

Perma-Fix Environmental Services
2800 Solway Rd.
Knoxville, TN 37931

Form HPM-2-1-1
Performance Check Values

Project Number:	144023	Project Name:	Ruby Mines
Instrument Model:	Bicron	Technician:	J Hubler
Instrument S/N:	2014	Date:	10/5/2014
Calibration Due:	10/3/2015	Detector Model:	NA
Radiation Detected:	Gamma	Detector S/N:	NA
Source Isotope & S/N:	Cs137-99-0295	Detector Type:	MicroRem
Bkg Count Rate (µrem/hr):	10		

Data Point	Gross µrem/hr	Net Count	Data Point	Gross µrem/hr	Net Count
1	250	240	11	250	240
2	250	240	12	250	240
3	250	240	13	260	250
4	250	240	14	250	240
5	260	250	15	250	240
6	250	240	16	240	230
7	250	240	17	250	240
8	250	240	18	250	240
9	240	230	19	250	240
10	250	240	20	250	240

Average Net Count:		240
Standard Deviation of Net Count (Scalers):		5
20% of Net Count (Ratemeters):		48
Average minus 2 X standard deviation (Scalers):		231
Average plus 2 X standard deviation (Scalers):		249
Average minus 20% (Ratemeters):		192
Average plus 20% (Ratemeters):		288

Formulas

$\bar{x}$ e: n = number of counts (20)

= average of counts

x_i = each count result

$$StdDev = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n-1}}$$

Comments:

Prepared By: 

Date: 10/5/2014

Perma-Fix Environmental Services
2800 Solway Rd.
Knoxville, TN 37931

Form HPM-2-1-1
Performance Check Values

Project Number:	144023	Project Name:	Ruby Mines
Instrument Model:	3	Technician:	J Hubler
Instrument S/N:	187367	Date:	10/5/2014
Calibration Due:	10/3/2015	Detector Model:	44-9
Radiation Detected:	Beta/Gamma	Detector S/N:	PR194676
Source Isotope & S/N:	Cs137-99-0295	Detector Type:	GM
Bkg Count Rate:	56.4		

Data Point	Gross Count	Net Count	Data Point	Gross Count	Net Count
1	164	108	11	156	100
2	158	102	12	179	123
3	180	124	13	185	129
4	174	118	14	166	110
5	184	128	15	165	109
6	159	103	16	162	106
7	190	134	17	161	105
8	155	99	18	168	112
9	158	102	19	185	129
10	149	93	20	178	122

Average Net Count:		112
Standard Deviation of Net Count (Scalers):		12
20% of Net Count (Ratemeters):		22
Average minus 2 X standard deviation (Scalers):		88
Average plus 2 X standard deviation (Scalers):		137
Average minus 20% (Ratemeters):		90
Average plus 20% (Ratemeters):		135

Formulas

Where: n = number of counts (20)

$\bar{x}$ = average of counts

x_i = each count result

$$StdDev = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n-1}}$$

Comments:

Prepared By: 

Date: 10/5/2014

Perma-Fix Environmental Services
2800 Solway Rd.
Knoxville, TN 37931

Form HPM-2-1-1
Performance Check Values

Project Number:	144023	Project Name:	Ruby Mines
Instrument Model:	12	Technician:	J Hubler
Instrument S/N:	186763	Date:	10/5/2014
Calibration Due:	10/3/2015	Detector Model:	44-9
Radiation Detected:	Beta/Gamma	Detector S/N:	PR151024
Source Isotope & S/N:	Cs137-99-0295	Detector Type:	GM
Bkg Count Rate:	55.8		

Data Point	Gross Count	Net Count	Data Point	Gross Count	Net Count
1	156	100	11	148	92
2	161	105	12	182	126
3	147	91	13	152	96
4	140	84	14	158	102
5	149	93	15	177	121
6	160	104	16	154	98
7	143	87	17	151	95
8	150	94	18	153	97
9	155	99	19	174	118
10	157	101	20	155	99

Average Net Count:		100
Standard Deviation of Net Count (Scalers):		11
20% of Net Count (Ratemeters):		20
Average minus 2 X standard deviation (Scalers):		79
Average plus 2 X standard deviation (Scalers):		122
Average minus 20% (Ratemeters):		80
Average plus 20% (Ratemeters):		120

Formulas

$\bar{x}$ e: n = number of counts (20)

= average of counts

x_i = each count result

$$StdDev = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n-1}}$$

Comments:

Prepared By: 

Date: 10/5/2014

Safety and Ecology Corporation SEC PROCEDURE # SEC-IS-403 Rev 3

2800 Solway Road, Knoxville, TN 37931

Calibration Certificate

4/29/2014

Calibration Certificate for 2221,Serial # 262345, Bar Code # ,Property # SEC-6973

Date: 04/29/14 **Date Last Cal. Expires:** 02/14/15 **Technician:** Jeffrey Knight

Location: 9999, **Reason For Calibration:** Other (See Comments)

EQUIPMENT USED DURING CALIBRATION

MODEL: 500-2 **SERIAL #:** 153622 **CAL DUE:** 06/13/14

MODEL: **SERIAL #:** **CAL DUE:**

AS FOUND DATA

Geotropism: SAT **AS FOUND Instrument Condition:** SAT **AS LEFT Instrument Condition:** SAT

HIGH VOLTAGE (+/- 10% tolerance)	AS FOUND HV	AS LEFT HV
500 V:	505 V	508 V
1000 V:	993 V	1000 V
1500 V:	1485 V	1495 V

☐ New Batteries?

Threshold ratio: 100=10mV

AF THRESHOLD: 9.7 mV **AL THRESHOLD:** 10.0 mV

AF Mechanical Zero: 0 **AL Mechanical Zero:** 0

AF HV Reading: 983 V **AL HV Reading:** 1000 V

RATE METER

SCALE	RATE CPM	AS FOUND	% ERROR	AS LEFT	% ERROR
x.1 or x1	100	100	0.00%	AF	0.00%
	250	250	0.00%	AF	0.00%
	400	400	0.00%	AF	0.00%
x1 or x10	1000	1000	0.00%	AF	0.00%
	2500	2500	0.00%	AF	0.00%
	4000	4000	0.00%	AF	0.00%
x10 or x100	10K	10	0.00%	AF	0.00%
	25K	25	0.00%	AF	0.00%
	40K	40	0.00%	AF	0.00%
x100 or x1000	100K	100	0.00%	AF	0.00%
	250K	250	0.00%	AF	0.00%
	400K	400	0.00%	AF	0.00%

☑ Is the As Found Data Within 20% of the Set Point?

DIGITAL SCALER

AF 250: 250 **% ERR:** 0.00% **AL 250:** AF **% ERR:** 0.00%

AF 2500: 2501 **% ERR:** 0.04% **AL 2500:** AF **% ERR:** 0.04%

AF 25K: 25.01 K **% ERR:** 0.04% **AL 25K:** AF K **% ERR:** 0.04%

AF 250K: 249.9 K **% ERR:** 0.04% **AL 250K:** AF K **% ERR:** 0.04%

☑ Is the As Found Data Within 20% of the Set Point?

LOG SCALE

AF 200: 200 **% ERR:** 0.00% **AL 200:** AF **% ERR:** 0.00%

AF 2000: 2000 **% ERR:** 0.00% **AL 2000:** AF **% ERR:** 0.00%

AF 20K: 20 K **% ERR:** 0.00% **AL 20K:** AF K **% ERR:** 0.00%

AF 200K: 200 K **% ERR:** 0.00% **AL 200K:** AF K **% ERR:** 0.00%

☑ Is the As Found Data Within 20% of the Set Point?

REPRODUCIBILITY

x.1 or x1 Scale:	250	250	250
x1 or x10 Scale:	2500	2500	2500
x10 or x100 Scale:	25 K	25 K	25 K
x100 or x1000 Scale:	250 K	250 K	250 K

☑ Are the Individual Counts Within 10% of the Average?

Audio Response: SAT

Audio Divide: SAT

Push Buttons: SAT

Lamp: SAT

Scaler/Digital: SAT

☑ Fast / Slow Response Function Properly?

Comments: **Married as a set with:** **Model:** 44-10 **Serial #:** PR288455 **Bar Code #:**

Meter married to probe #PR288455.

☑ Does Instrument Meet Final Acceptance Criteria? ☑ Calibration Sticker Attached?

Date Instrument is Due For Next Calibration: 04/29/15

Performed by: _____ **Reviewed by:** _____ **Date:** 4/29/14

Printed Name: Jeffrey Knight

Safety and Ecology Corporation SEC PROCEDURE # SEC-IS-415 Rev 3
2800 Solway Road, Knoxville, TN 37931
Page 1 of 1
Calibration Certificate *4/29/2014*

Calibration Certificate for 44-10,Serial # PR288455, Bar Code # ,Property # SEC-7212

Date: 04/29/14 **Date Last Cal. Expires:** 01/09/13 **Technician:** Jeffrey Knight
Location: 9999, **Reason For Calibration:** Other (See Comments)

EQUIPMENT USED DURING CALIBRATION

MODEL: 2221 **SERIAL #:** 262345 **CAL DUE:** 04/29/15
MODEL: **SERIAL #:** **CAL DUE:**

NIST TRACEABLE SOURCES USED

SOURCE	ISOTOPE	ACTIVITY	2π	ASSAY DATE
99CS250-0288	Cs-137	6.655 uCi		12/26/2012

Efficiency from Last Calibration: 0.57 % **HV From Last Calibration:** 1025 V **Calibration Threshold:** 10 mV

AS FOUND DATA

AS FOUND Instrument Condition: SAT
HV: 1025 V
Center: 101033
Background: 4024
Probe Efficiency: Cs-137 **0.66%**

1 MINUTE COUNTS (CPM)

AS LEFT DATA after repair of HV adjust

AS LEFT Instrument Condition: SAT
HV: 1000 V
Center: 101860
Background: 3989
Probe Efficiency: Cs-137 **0.66%**

"AF" in the AL Efficiency fields means to refer to the AF Efficiencies in the AS FOUND DATA Section

☐ **Is the As Found Efficiency Within 20% of the efficiency from the last cal.?**

Reproducibility: **Isotope:**Cs-137 101303 101509 101342 **Average:** 101385 ☑ **Are the individual counts within 10% of the average?**

* If As Found Efficiency (even after repair) is within 10% of the last calibration and uniformity is <10%, the technician may N/A the Plateau Data and proceed to Comments. Geometry = Nal probes are 4 1/2" from source. All other probes are in contact with surface unless otherwise specified.

PLATEAU AND SET POINT DATA (CPM)

High Voltage	Source Response	Background
900	99809	4085
950	101609	4041
1000	103119	4087
1050	101728	3953

HV	CENTER	Background	Efficiency	
1000 V	101860	3989	Cs-137	0.66%

Comments: **Married as a set with:** **Model:** 2221 **Serial #:** 262345 **Bar Code #:**
Probe married to meter #262345.

☑ **Does Instrument Meet Final Acceptance Criteria?** ☑ **Calibration Sticker Attached?**

Date Instrument is Due For Next Calibration: 04/29/15

Performed by: _____ **Reviewed by:** _____ **Date:** 4/29/14
Printed Name: Jeffrey Knight

Safety and Ecology Corporation SEC PROCEDURE # SEC-IS-403 Rev 3

2800 Solway Road, Knoxville, TN 37931

Calibration Certificate

4/23/2014

Calibration Certificate for 2221,Serial # 172029, Bar Code # ,Property # SEC-5533

Date: 04/23/14 **Date Last Cal. Expires:** 04/03/15 **Technician:** Jeffrey Knight

Location: 9999, **Reason For Calibration:** Other (See Comments)

EQUIPMENT USED DURING CALIBRATION

MODEL: 500-2 **SERIAL #:** 153622 **CAL DUE:** 06/13/14

MODEL: **SERIAL #:** **CAL DUE:**

AS FOUND DATA **Geotropism:** SAT **AS FOUND Instrument Condition:** SAT **AS LEFT Instrument Condition:** SAT

HIGH VOLTAGE (+/- 10% tolerance)	AS FOUND HV	AS LEFT HV
500 V:	505 V	AF V
1000 V:	1000 V	AF V
1500 V:	1496 V	AF V

☐ New Batteries? **Threshold ratio: 100=10mV**

AF THRESHOLD: 9.8 mV **AL THRESHOLD:** 10.0 mV

AF Mechanical Zero: 0 **AL Mechanical Zero:** 0

AF HV Reading: 1040 V **AL HV Reading:** 1200 V

RATE METER

SCALE	RATE CPM	AS FOUND	% ERROR	AS LEFT	% ERROR
x.1 or x1	100	100	0.00%	AF	0.00%
	250	250	0.00%	AF	0.00%
	400	400	0.00%	AF	0.00%
x1 or x10	1000	1000	0.00%	AF	0.00%
	2500	2500	0.00%	AF	0.00%
	4000	4000	0.00%	AF	0.00%
x10 or x100	10K	10	0.00%	AF	0.00%
	25K	25	0.00%	AF	0.00%
	40K	40	0.00%	AF	0.00%
x100 or x1000	100K	100	0.00%	AF	0.00%
	250K	250	0.00%	AF	0.00%
	400K	400	0.00%	AF	0.00%

☑ Is the As Found Data Within 20% of the Set Point?

DIGITAL SCALER

AF 250:	250	% ERR:	0.00%	AL 250:	AF	% ERR:	0.00%
AF 2500:	2502	% ERR:	0.08%	AL 2500:	AF	% ERR:	0.08%
AF 25K:	25.2 K	% ERR:	0.80%	AL 25K:	AF K	% ERR:	0.80%
AF 250K:	250.2 K	% ERR:	0.08%	AL 250K:	AF K	% ERR:	0.08%

☑ Is the As Found Data Within 20% of the Set Point?

LOG SCALE

AF 200:	200	% ERR:	0.00%	AL 200:	AF	% ERR:	0.00%
AF 2000:	2000	% ERR:	0.00%	AL 2000:	AF	% ERR:	0.00%
AF 20K:	20 K	% ERR:	0.00%	AL 20K:	AF K	% ERR:	0.00%
AF 200K:	200 K	% ERR:	0.00%	AL 200K:	AF K	% ERR:	0.00%

☑ Is the As Found Data Within 20% of the Set Point?

REPRODUCIBILITY

x.1 or x1 Scale:	250	250	250
x1 or x10 Scale:	2500	2500	2500
x10 or x100 Scale:	25 K	25 K	25 K
x100 or x1000 Scale:	250 K	250 K	250 K

☑ Are the Individual Counts Within 10% of the Average?

Audio Response: SAT

Audio Divide: SAT

Push Buttons: SAT

Lamp: SAT

Scaler/Digital: SAT

☑ Fast / Slow Response Function Properly?

Comments: **Married as a set with:** **Model:** 44-10 **Serial #:** PR245188 **Bar Code #:**

Meter married to 44-10 probe #PR245188.

☑ Does Instrument Meet Final Acceptance Criteria? ☑ Calibration Sticker Attached?

Date Instrument is Due For Next Calibration: 04/23/15

Performed by: _____ **Reviewed by:** _____ **Date:** 4/24/14

Printed Name: Jeffrey Knight

Safety and Ecology Corporation SEC PROCEDURE # SEC-IS-415 Rev 3
2800 Solway Road, Knoxville, TN 37931
Page 1 of 1
Calibration Certificate
4/23/2014

Calibration Certificate for 44-10,Serial # PR245188, Bar Code # ,Property # SEC-6343

Date: 04/23/14 **Date Last Cal. Expires:** 04/23/15 **Technician:** Jeffrey Knight
Location: 9999, **Reason For Calibration:** Other (See Comments)

EQUIPMENT USED DURING CALIBRATION

MODEL: 2221 **SERIAL #:** 172029 **CAL DUE:** 04/23/15
MODEL: **SERIAL #:** **CAL DUE:**

NIST TRACEABLE SOURCES USED

SOURCE	ISOTOPE	ACTIVITY	2π	ASSAY DATE
99CS250-0288	Cs-137	6.655 uCi		12/26/2012

Efficiency from Last Calibration: 0.63 % **HV From Last Calibration:** 1200 V **Calibration Threshold:** 10 mV

AS FOUND DATA

AS FOUND Instrument Condition: SAT
HV: 1200 V
Center: 100212
Background: 4007
Probe Efficiency: Cs-137 **0.65%**

1 MINUTE COUNTS (CPM)

AS LEFT DATA after repair of HV adjust

AS LEFT Instrument Condition: SAT
HV: AF V
Center:
Background:
Probe Efficiency: Cs-137

"AF" in the AL Efficiency fields means to refer to the AF Efficiencies in the AS FOUND DATA Section

☑ **Is the As Found Efficiency Within 20% of the efficiency from the last cal.?**

Reproducibility: **Isotope:** Cs-137 99324 10033 99333 **Average:** 69563 ☑ **Are the individual counts within 10% of the average?**

* If As Found Efficiency (even after repair) is within 10% of the last calibration and uniformity is <10%, the technician may N/A the Plateau Data and proceed to Comments. Geometry = Nal probes are 4 1/2" from source. All other probes are in contact with surface unless otherwise specified.

PLATEAU AND SET POINT DATA (CPM)

High Voltage	Source Response	Background	HV	CENTER	Background	Efficiency
N/A			V			Cs-137

Comments: **Married as a set with:** **Model:** 2221 **Serial #:** 172029 **Bar Code #:**
Probe married to 2221 #172029.

☑ **Does Instrument Meet Final Acceptance Criteria?** ☑ **Calibration Sticker Attached?**

Date Instrument is Due For Next Calibration: 04/23/15

Performed by: _____ **Reviewed by:** _____ **Date:** 4/24/14
Printed Name: Jeffrey Knight

Safety and Ecology Corporation SEC PROCEDURE # SEC-IS-403 Rev 3

2800 Solway Road, Knoxville, TN 37931

Calibration Certificate

4/24/2014

Calibration Certificate for 2221,Serial # 184010, Bar Code # ,Property # SEC-5167

Date: 04/22/14 **Date Last Cal. Expires:** 04/22/15 **Technician:** Jeffrey Knight

Location: 9999, **Reason For Calibration:** Other (See Comments)

EQUIPMENT USED DURING CALIBRATION

MODEL: 500-2 **SERIAL #:** 153622 **CAL DUE:** 06/13/14

MODEL: **SERIAL #:** **CAL DUE:**

AS FOUND DATA **Geotropism:** SAT **AS FOUND Instrument Condition:** SAT **AS LEFT Instrument Condition:** SAT

HIGH VOLTAGE (+/- 10% tolerance)	AS FOUND HV	AS LEFT HV
500 V:	510 V	507 V
1000 V:	1003 V	1000 V
1500 V:	1497 V	1493 V

☐ New Batteries? **Threshold ratio: 100=10mV**

AF THRESHOLD: 10 mV **AL THRESHOLD:** 10 mV

AF Mechanical Zero: 0 **AL Mechanical Zero:** 0

AF HV Reading: 900 V **AL HV Reading:** 1000 V

RATE METER

SCALE	RATE CPM	AS FOUND	% ERROR	AS LEFT	% ERROR
x.1 or x1	100	100	0.00%	AF	0.00%
	250	250	0.00%	AF	0.00%
	400	400	0.00%	AF	0.00%
x1 or x10	1000	1000	0.00%	AF	0.00%
	2500	2500	0.00%	AF	0.00%
	4000	4000	0.00%	AF	0.00%
x10 or x100	10K	10	0.00%	AF	0.00%
	25K	25	0.00%	AF	0.00%
	40K	40	0.00%	AF	0.00%
x100 or x1000	100K	100	0.00%	AF	0.00%
	250K	250	0.00%	AF	0.00%
	400K	400	0.00%	AF	0.00%

☑ Is the As Found Data Within 20% of the Set Point?

DIGITAL SCALER

AF 250: 250 **% ERR:** 0.00% **AL 250:** AF **% ERR:** 0.00%

AF 2500: 2502 **% ERR:** 0.08% **AL 2500:** AF **% ERR:** 0.08%

AF 25K: 25.01 K **% ERR:** 0.04% **AL 25K:** AF K **% ERR:** 0.04%

AF 250K: 250.1 K **% ERR:** 0.04% **AL 250K:** AF K **% ERR:** 0.04%

☑ Is the As Found Data Within 20% of the Set Point?

LOG SCALE

AF 200: 200 **% ERR:** 0.00% **AL 200:** AF **% ERR:** 0.00%

AF 2000: 2000 **% ERR:** 0.00% **AL 2000:** AF **% ERR:** 0.00%

AF 20K: 20 K **% ERR:** 0.00% **AL 20K:** AF K **% ERR:** 0.00%

AF 200K: 200 K **% ERR:** 0.00% **AL 200K:** AF K **% ERR:** 0.00%

☑ Is the As Found Data Within 20% of the Set Point?

REPRODUCIBILITY

x.1 or x1 Scale:	250	250	250
x1 or x10 Scale:	2500	2500	2500
x10 or x100 Scale:	25 K	25 K	25 K
x100 or x1000 Scale:	250 K	250 K	250 K

☑ Are the Individual Counts Within 10% of the Average?

Audio Response: SAT

Audio Divide: SAT

Push Buttons: SAT

Lamp: SAT

Scaler/Digital: SAT

☑ Fast / Slow Response Function Properly?

Comments: **Married as a set with:** **Model:** 44-10 **Serial #:** PR242324 **Bar Code #:**

Meter married to 44-10 probe #PR242324

☑ Does Instrument Meet Final Acceptance Criteria? ☑ Calibration Sticker Attached?

Date Instrument is Due For Next Calibration: **04/22/15**

Performed by: _____ **Reviewed by:** _____ **Date:** 4/24/14

Printed Name: Jeffrey Knight

Safety and Ecology Corporation SEC PROCEDURE # SEC-IS-415 Rev 3

2800 Solway Road, Knoxville, TN 37931

Page 1 of 1

Calibration Certificate

4/22/2014

Calibration Certificate for 44-10,Serial # PR242324, Bar Code # ,Property # SEC-6314

Date: 04/22/14 **Date Last Cal. Expires:** 02/01/12 **Technician:** Jeffrey Knight

Location: 9999, **Reason For Calibration:** Due for Calibration

EQUIPMENT USED DURING CALIBRATION

MODEL: 2221 **SERIAL #:** 184010 **CAL DUE:** 04/22/15

MODEL: **SERIAL #:** **CAL DUE:**

NIST TRACEABLE SOURCES USED

SOURCE	ISOTOPE	ACTIVITY	2π	ASSAY DATE
99CS250-0288	Cs-137	6.655 uCi		12/26/2012

Efficiency from Last Calibration: 0.48 % **HV From Last Calibration:** 975 V **Calibration Threshold:** 10 mV

AS FOUND DATA

AS FOUND Instrument Condition: SAT

HV: V

Center: 0

Background: 0

Probe Efficiency: Cs-137 **0.00%**

1 MINUTE COUNTS (CPM)

AS LEFT DATA after repair of HV adjust

AS LEFT Instrument Condition: SAT

HV: 1000 V

Center: 93570

Background: 3933

Probe Efficiency: Cs-137 **0.61%**

"AF" in the AL Efficiency fields means to refer to the AF Efficiencies in the AS FOUND DATA Section

☐ **Is the As Found Efficiency Within 20% of the efficiency from the last cal.?**

Reproducibility: **Isotope:** Cs-137 93895 93684 93431 **Average:** 93670 ☑ **Are the individual counts within 10% of the average?**

* If As Found Efficiency (even after repair) is within 10% of the last calibration and uniformity is <10%, the technician may N/A the Plateau Data and proceed to Comments. Geometry = NaI probes are 4 1/2" from source. All other probes are in contact with surface unless otherwise specified.

PLATEAU AND SET POINT DATA (CPM)

High Voltage	Source Response	Background
975	94042	3915
1000	94495	3980
1050	97414	4139
1100	97147	4166

HV	CENTER	Background	Efficiency
1000 V	93570	3933	Cs-137 **0.61%**

Comments: **Married as a set with:** **Model:** 2221 **Serial #:** 184010 **Bar Code #:**

Probe married to 2221 #184010.

☑ **Does Instrument Meet Final Acceptance Criteria?** ☑ **Calibration Sticker Attached?**

Date Instrument is Due For Next Calibration: 04/22/15

Performed by: _____ **Reviewed by:** _____ **Date:** 4/24/14

Printed Name: Jeffrey Knight

Safety and Ecology Corporation SEC PROCEDURE # SEC-IS-403 Rev 3

2800 Solway Road, Knoxville, TN 37931

Calibration Certificate

4/23/2014

Calibration Certificate for 2221,Serial # 172018, Bar Code # ,Property # SEC-6644

Date: 04/23/14 **Date Last Cal. Expires:** 04/03/15 **Technician:** Jeffrey Knight

Location: 9999, **Reason For Calibration:** Repair

EQUIPMENT USED DURING CALIBRATION

MODEL: 500-2 **SERIAL #:** 153622 **CAL DUE:** 06/13/14

MODEL: **SERIAL #:** **CAL DUE:**

AS FOUND DATA **Geotropism:** SAT **AS FOUND Instrument Condition:** UNSAT **AS LEFT Instrument Condition:** SAT

HIGH VOLTAGE (+/- 10% tolerance)	AS FOUND HV	AS LEFT HV
500 V:	509 V	AF V
1000 V:	1002 V	AF V
1500 V:	1500 V	AF V

☐ New Batteries?

Threshold ratio: 100=10mV

AF THRESHOLD: 9.7 mV **AL THRESHOLD:** 10.0 mV

AF Mechanical Zero: 0 **AL Mechanical Zero:** 0

AF HV Reading: 992 V **AL HV Reading:** 1150 V

RATE METER

SCALE	RATE CPM	AS FOUND	% ERROR	AS LEFT	% ERROR
x.1 or x1	100	100	0.00%	AF	0.00%
	250	250	0.00%	AF	0.00%
	400	400	0.00%	AF	0.00%
x1 or x10	1000	1000	0.00%	AF	0.00%
	2500	2500	0.00%	AF	0.00%
	4000	4000	0.00%	AF	0.00%
x10 or x100	10K	10	0.00%	AF	0.00%
	25K	25	0.00%	AF	0.00%
	40K	40	0.00%	AF	0.00%
x100 or x1000	100K	100	0.00%	AF	0.00%
	250K	250	0.00%	AF	0.00%
	400K	400	0.00%	AF	0.00%

☑ Is the As Found Data Within 20% of the Set Point?

DIGITAL SCALER

AF 250: 250 **% ERR:** 0.00% **AL 250:** AF **% ERR:** 0.00%

AF 2500: 2502 **% ERR:** 0.08% **AL 2500:** AF **% ERR:** 0.08%

AF 25K: 25.01 K **% ERR:** 0.04% **AL 25K:** AF K **% ERR:** 0.04%

AF 250K: 250.1 K **% ERR:** 0.04% **AL 250K:** AF K **% ERR:** 0.04%

☑ Is the As Found Data Within 20% of the Set Point?

LOG SCALE

AF 200: 200 **% ERR:** 0.00% **AL 200:** AF **% ERR:** 0.00%

AF 2000: 2000 **% ERR:** 0.00% **AL 2000:** AF **% ERR:** 0.00%

AF 20K: 20 K **% ERR:** 0.00% **AL 20K:** AF K **% ERR:** 0.00%

AF 200K: 200 K **% ERR:** 0.00% **AL 200K:** AF K **% ERR:** 0.00%

☑ Is the As Found Data Within 20% of the Set Point?

REPRODUCIBILITY

x.1 or x1 Scale:	250	250	250
x1 or x10 Scale:	2500	2500	2500
x10 or x100 Scale:	25 K	25 K	25 K
x100 or x1000 Scale:	250 K	250 K	250 K

Audio Response: SAT

Audio Divide: SAT

Push Buttons: SAT

Lamp: SAT

Scaler/Digital: SAT

☑ Are the Individual Counts Within 10% of the Average?

☑ Fast / Slow Response Function Properly?

Comments: **Married as a set with:** **Model:** 44-10 **Serial #:** PR276599 **Bar Code #:**

AF: Damaged switch - replaced switch and cleaned circuit boards.

☑ Does Instrument Meet Final Acceptance Criteria? ☑ Calibration Sticker Attached?

Date Instrument is Due For Next Calibration: 04/23/15

Performed by: _____ **Reviewed by:** _____ **Date:** 4/24/14

Printed Name: Jeffrey Knight

Safety and Ecology Corporation SEC PROCEDURE # SEC-IS-415 Rev 3
2800 Solway Road, Knoxville, TN 37931 Page 1 of 1
Calibration Certificate 4/23/2014

Calibration Certificate for 44-10,Serial # PR276599, Bar Code # ,Property # SEC-6848

Date: 04/23/14 **Date Last Cal. Expires:** 07/02/14 **Technician:** Jeffrey Knight
Location: 9999, **Reason For Calibration:** Other (See Comments)

EQUIPMENT USED DURING CALIBRATION

MODEL: 2221 **SERIAL #:** 172018 **CAL DUE:** 04/23/15
MODEL: **SERIAL #:** **CAL DUE:**

NIST TRACEABLE SOURCES USED

SOURCE	ISOTOPE	ACTIVITY	2π	ASSAY DATE
99CS250-0288	Cs-137	6.655 uCi		12/26/2012

Efficiency from Last Calibration: 0.60 % **HV From Last Calibration:** 1150 V **Calibration Threshold:** 10 mV

AS FOUND DATA

AS FOUND Instrument Condition: SAT
HV: 1150 V
Center: 94025
Background: 3763
Probe Efficiency: Cs-137 0.61%

1 MINUTE COUNTS (CPM)

AS LEFT DATA after repair of HV adjust

AS LEFT Instrument Condition: SAT
HV: AF V
Center:
Background:
Probe Efficiency: Cs-137

"AF" in the AL Efficiency fields means to refer to the AF Efficiencies in the AS FOUND DATA Section

☑ **Is the As Found Efficiency Within 20% of the efficiency from the last cal.?**

Reproducibility: **Isotope:** Cs-137 93696 92812 95063 **Average:** 93857 ☑ **Are the individual counts within 10% of the average?**

* If As Found Efficiency (even after repair) is within 10% of the last calibration and uniformity is <10%, the technician may N/A the Plateau Data and proceed to Comments. Geometry = NaI probes are 4 1/2" from source. All other probes are in contact with surface unless otherwise specified.

PLATEAU AND SET POINT DATA (CPM)

High Voltage	Source Response	Background	HV	CENTER	Background	Efficiency
N/A			V			Cs-137

Comments: **Married as a set with:** **Model:** 2221 **Serial #:** 172018 **Bar Code #:**
Probe married to 2221 #172018.

☑ **Does Instrument Meet Final Acceptance Criteria?** ☑ **Calibration Sticker Attached?**

Date Instrument is Due For Next Calibration: 04/23/15

Performed by: _____ **Reviewed by:** _____ **Date:** 4/24/14
Printed Name: Jeffrey Knight

Calibration Certificate

ThermoFisher SCIENTIFIC

The world leader in serving science

Thermo Eberline LLC
312 Miami St.
W.Columbia, S.C. 29170
USA

Report Number	Calibration Date
00120539-C665J	18-Mar-14
Manufacturer	**As Found Condition**
Thermo Scientific	Out of Tolerance
Instrument	**PO Number**
Micro Rem AO	N/A
Serial Number	**PO Rev# / Rel#**
C665J	N/A

Calibration Standards used have calibration traceable to N.I.S.T.
Refer to back of the page for Certificate of Test & Calibration & Conformance

Test Equipment	Calibration Standards
FLUKE 8010A S/N CP75332 Cal Due 14-Nov-14 FLUKE 80K-40 S/N HVP-019 Cal Due 03-May-14	MP2 S/N 739 Cal Due 23-May-14 Cs-137 10 mCi S/N 733 Cal Due 28-Feb-15 Cs-137 10 Ci S/N 375 Cal Due 28-Feb-15

Instrument Calibration Procedure	Probe Calibration Procedure
IWI024 Rev 17 Sept 13D	N/A

Environmental Conditions		
Temperature: 21 °C	Relative Humidity: 33 %	Barometric Pressure: 29.82 in Hg

Preliminaries					
5 VDC +/- .5 VDC	☑	-4.5 VDC +/- .25 VDC	☑	1 VDC +/- .5 VDC	☑
Mechanical Zero	☑	Geotropism	☑		

Calibration Data

Range	Calibration Point	Tolerance (µRem/h)	In Tolerance	As Found (µRem/h)	As Left (µRem/h)
X.1	1600 CPM	14.4 - 17.6	Yes	N/A	16
X.1	400 CPM	3.6 - 4.4	No	5	4
X1	16K CPM	Pulser Ref = 160		N/A	160
X1	4K CPM	36 - 44	Yes	N/A	40
X1	.16 mR/h	144 - 176	No	135	160
X10	1.6 mR/h	1440 - 1760	Yes	N/A	1600
X10	.4 mR/h	360 - 440	Yes	N/A	400
X100	16 mR/h	14400 - 17600	No	18000	16000
X100	4 mR/h	3600 - 4400	Yes	N/A	4000
X1000	160 mR/h	144000 - 176000	Yes	N/A	160000
X1000	40 mR/h	36000 - 44000	No	30000	40000

Paul Green
Electronic Technician

Calibration Certificate

ThermoFisher SCIENTIFIC

The world leader in serving science

Thermo Eberline LLC
312 Miami St.
W.Columbia, S.C. 29170
USA

Report Number	Calibration Date
00120540-9010	18-Mar-14
Manufacturer	**As Found Condition**
Thermo Scientific	Out of Tolerance
Instrument	**PO Number**
Micro Rem AO	N/A
Serial Number	**PO Rev# / Rel#**
9010	N/A

Calibration Standards used have calibration traceable to N.I.S.T.
Refer to back of the page for Certificate of Test & Calibration & Conformance

Test Equipment	Calibration Standards
FLUKE 8010A S/N CP75332 Cal Due 14-Nov-14 FLUKE 80K-40 S/N HVP-019 Cal Due 03-May-14	MP2 S/N 739 Cal Due 23-May-14 Cs-137 10 mCi S/N 733 Cal Due 28-Feb-15 Cs-137 10 Ci S/N 375 Cal Due 28-Feb-15

Instrument Calibration Procedure	Probe Calibration Procedure
IWI024 Rev 17 Sept 13D	N/A

Environmental Conditions		
Temperature: 21 °C	Relative Humidity: 33 %	Barometric Pressure: 29.82 in Hg

Preliminaries					
5 VDC +/- .5 VDC	☑	-4.5 VDC +/- .25 VDC	☑	1 VDC +/- .5 VDC	☑
Mechanical Zero	☑	Geotropism	☑		

Calibration Data

Range	Calibration Point	Tolerance (µRem/h)	In Tolerance	As Found (µRem/h)	As Left (µRem/h)
X.1	1600 CPM	14.4 - 17.6	Yes	N/A	16
X.1	400 CPM	3.6 - 4.4	Yes	N/A	4
X1	16K CPM	Pulser Ref = 160		N/A	160
X1	4K CPM	36 - 44	Yes	N/A	40
X1	.16 mR/h	144 - 176	Yes	N/A	160
X10	1.6 mR/h	1440 - 1760	Yes	N/A	1600
X10	.4 mR/h	360 - 440	Yes	N/A	400
X100	16 mR/h	14400 - 17600	No	19000	16000
X100	4 mR/h	3600 - 4400	No	4500	4000
X1000	160 mR/h	144000 - 176000	Yes	N/A	160000
X1000	40 mR/h	36000 - 44000	Yes	N/A	40000

Paul Green
Electronic Technician

30-Mar-14
C5

Safety and Ecology Corporation
2800 Solway Road, Knoxville, TN 37931
Calibration Certificate

SEC PROCEDURE # SEC-IS-405 Rev 2

4/22/2014

Calibration Certificate for 3,Serial # 111520, Bar Code # ,Property # SEC-5654

Date: 04/22/14 **Date Last Cal. Expires:** 09/24/14 **Technician:** Jeffrey Knight

Location: 9999, **Reason For Calibration:** Due for Calibration

EQUIPMENT USED DURING CALIBRATION

MODEL: 500-2	**SERIAL #:** 153622	**CAL DUE:** 06/13/14
MODEL:	**SERIAL #:**	**CAL DUE:**

AS FOUND DATA

Geotropism: SAT **AS FOUND Instrument Condition:** SAT **AS LEFT Instrument Condition:** SAT

HIGH VOLTAGE (+/- 10% tolerance)	AS FOUND HV	AS LEFT HV
500 V:	N/A	N/A
1000 V:	N/A	N/A
1500 V:	N/A	N/A

HV Range 400-1500V: N/A

☐ New Batteries? **Battery Check:** SAT **Alarm:** N/A

AS FOUND Mechanical Zero: 0 **AS LEFT Mechanical Zero:** 0

AS FOUND THRESHOLD: 33.2 mV **AS LEFT THRESHOLD:** 33.2 mV

AS FOUND HV Reading: 902 V **AS LEFT HV Reading:** 900 V

RATE METER

SCALE	RATE CPM	AS FOUND	% ERROR	AS LEFT	% ERROR
x.1 or x1	130	130	0.00%	AF	0.00%
	330	330	0.00%	AF	0.00%
	530	520	1.88%	AF	1.88%
x1 or x10	1300	1300	0.00%	AF	0.00%
	3300	3300	0.00%	AF	0.00%
	5300	5300	0.00%	AF	0.00%
x10 or x100	13K	13	0.00%	AF	0.00%
	33K	33	0.00%	AF	0.00%
	53K	53	0.00%	AF	0.00%
x100 or x1000	130K	130	0.00%	AF	0.00%
	330K	330	0.00%	AF	0.00%
	530K	530	0.00%	AF	0.00%

☑ Is the As Found Data Within 20% of the Set Point?

DIGITAL SCALER

AF 250:	N/A	**% ERR:** 0.00%	**AL 250:**	N/A	**% ERR:** 0.00%
AF 2500:	N/A	**% ERR:** 0.00%	**AL 2500:**	N/A	**% ERR:** 0.00%
AF 25K:	N/A K	**% ERR:** 0.00%	**AL 25K:**	N/A K	**% ERR:** 0.00%
AF 100K:	N/A K	**% ERR:** 0.00%	**AL 100K:**	N/A K	**% ERR:** 0.00%

☐ Is the As Found Data Within 20% of the Set Point?

REPRODUCIBILITY

x.1 or x1 Scale:	250	250	250
x1 or x10 Scale:	2500	2500	2500
x10 or x100 Scale:	25 K	25 K	25 K
x100 or x1000 Scale:	250 K	250 K	250 K

☑ Are the Individual Counts Within 10% of the Average?

☑ Fast / Slow Response Switch Functions Properly?

Audio Response: SAT **Audio Divide:** N/A

Push Buttons: SAT **Lamp:** N/A

Scaler/Digital: N/A

Comments **Married as a set with:** **Model:** 44-9 **Serial #:** PR226310 **Bar Code #:**

☑ Does Instrument Meet Final Acceptance Criteria? ☑ Calibration Sticker Attached?

Date Instrument is Due For Next Calibration: 04/22/15

Performed by: _____ **Reviewed by:** _____ **Date:** 4/24/14

Printed Name: Jeffrey Knight

Safety and Ecology Corporation SEC PROCEDURE # SEC-IS-407 Rev 2

2800 Solway Road, Knoxville, TN 37931

Calibration Certificate

4/22/2014

Calibration Certificate for 44-9,Serial # PR226310, Bar Code # ,Property # SEC-5986

Date: 04/22/14 **Date Last Cal. Expires:** 09/24/14 **Technician:** Jeffrey Knight

Location: 9999, **Reason For Calibration:** Due for Calibration

EQUIPMENT USED DURING CALIBRATION

MODEL: 3 **SERIAL #** 111520 **CAL DUE:** 04/22/15

MODEL: **SERIAL #** **CAL DUE:**

NIST TRACEABLE SOURCES USED

SOURCE	ISOTOPE	ACTIVITY	2π	ASSAY DATE
5744-06	Sr-90	18100 dpm	12,700 cpm	12/27/2012
5746-06	Tc-99	31900 dpm	20,000 cpm	12/27/2012

Geometry = in contact with surface unless otherwise specified.

PREVIOUS Tc-99 EFFICIENCY: 13.03 % **Calibration Voltage:** 900 V **Calibration Threshold:** 33.2 mV

AS FOUND Instrument Condition: SAT

AS LEFT Instrument Condition: SAT

AS FOUND DATA

1 MINUTE COUNTS (CPM)

				AVERAGE
AF Background:	36			
Tc-99 Count:	4000	4000	4000	4000.0
Sr-90 Count:	3800			

Efficiencies

Tc-99 EFF: 12.43% Sr-90 EFF: 20.80%

AS LEFT DATA

1 MINUTE COUNTS (CPM)

				AVERAGE
AL Background:	AF			
Tc-99 Count:	AF	AF	AF	
Sr-90 Count:	AF			

Efficiencies

Tc-99 EFF: AF Sr-90 EFF: AF

"AF" in the AL Efficiency fields means to refer to the AF Efficiencies in the AS FOUND DATA Section

- [x] Is the AS FOUND efficiency within 20% of efficiency from last calibration?
- [x] Reproducibility: Are the individual counts within 10% of the average?
- [x] Does the probe meet final acceptance criteria?
- [x] Calibration sticker attached?

Comments: Married as a set with: Model: 3 Serial #: 111520 Bar Code #:

Date Instrument is Due For Next Calibration: 04/22/15

Performed by: _____ Reviewed by: _____ Date: 4/24/14

Printed Name: Jeffrey Knight

Safety and Ecology Corporation
2800 Solway Road, Knoxville, TN 37931
Calibration Certificate

SEC PROCEDURE # SEC-IS-405 Rev 2

4/22/2014

Calibration Certificate for 3,Serial # 187583, Bar Code # ,Property # SEC-5126

Date: 04/22/14 Date Last Cal. Expires: 09/13/14 Technician: Jeffrey Knight

Location: 9999, Reason For Calibration: Due for Calibration

EQUIPMENT USED DURING CALIBRATION

MODEL: 500-2 SERIAL #: 153622 CAL DUE: 06/13/14

MODEL: SERIAL #: CAL DUE:

AS FOUND DATA

Geotropism: SAT AS FOUND Instrument Condition: SAT AS LEFT Instrument Condition: SAT

HIGH VOLTAGE (+/- 10% tolerance)	AS FOUND HV	AS LEFT HV
500 V:	N/A	N/A
1000 V:	N/A	N/A
1500 V:	N/A	N/A

HV Range 400-1500V: SAT

☐ New Batteries? Battery Check: SAT Alarm: N/A

AS FOUND Mechanical Zero: 0 AS LEFT Mechanical Zero: 0

AS FOUND THRESHOLD: 36.5 mV AS LEFT THRESHOLD: 36.5 mV

AS FOUND HV Reading: 900 V AS LEFT HV Reading: 900 V

RATE METER

SCALE	RATE CPM	AS FOUND	% ERROR	AS LEFT	% ERROR
x.1 or x1	100	100	0.00%	AF	0.00%
	250	250	0.00%	AF	0.00%
	400	400	0.00%	AF	0.00%
x1 or x10	1000	1000	0.00%	AF	0.00%
	2500	2500	0.00%	AF	0.00%
	4000	4000	0.00%	AF	0.00%
x10 or x100	10K	10	0.00%	AF	0.00%
	25K	25	0.00%	AF	0.00%
	40K	40	0.00%	AF	0.00%
x100 or x1000	100K	100	0.00%	AF	0.00%
	250K	250	0.00%	AF	0.00%
	400K	400	0.00%	AF	0.00%

☑ Is the As Found Data Within 20% of the Set Point?

DIGITAL SCALER

AF 250: 250 % ERR: 0.00% AL 250: AF % ERR: 0.00%

AF 2500: 2502 % ERR: 0.08% AL 2500: AF % ERR: 0.08%

AF 25K: 25.02 K % ERR: 0.08% AL 25K: AF K % ERR: 0.08%

AF 100K: 99.9 K % ERR: 0.10% AL 100K: AF K % ERR: 0.10%

☑ Is the As Found Data Within 20% of the Set Point?

REPRODUCIBILITY

x.1 or x1 Scale:	250	250	250
x1 or x10 Scale:	2500	2500	2500
x10 or x100 Scale:	25 K	25 K	25 K
x100 or x1000 Scale:	250 K	250 K	250 K

☑ Are the Individual Counts Within 10% of the Average?

☑ Fast / Slow Response Switch Functions Properly?

Audio Response: SAT Audio Divide: N/A

Push Buttons: SAT Lamp: N/A

Scaler/Digital: SAT

Comments Married as a set with: Model: 44-9 Serial #: PR153297 Bar Code #:

☑ Does Instrument Meet Final Acceptance Criteria? ☑ Calibration Sticker Attached?

Date Instrument is Due For Next Calibration: 04/22/15

Performed by: _____ Reviewed by: _____ Date: 4/24/14

Printed Name: Jeffrey Knight

Safety and Ecology Corporation SEC PROCEDURE # SEC-IS-407 Rev 2

2800 Solway Road, Knoxville, TN 37931

Calibration Certificate

4/22/2014

Calibration Certificate for 44-9,Serial # PR153297, Bar Code # ,Property # SEC-5773

Date: 04/22/14 **Date Last Cal. Expires:** 09/13/14 **Technician:** Jeffrey Knight

Location: 9999, **Reason For Calibration:** Due for Calibration

EQUIPMENT USED DURING CALIBRATION

MODEL: 3 **SERIAL #** 187583 **CAL DUE:** 04/22/15

MODEL: **SERIAL #** **CAL DUE:**

NIST TRACEABLE SOURCES USED

SOURCE	ISOTOPE	ACTIVITY	2π	ASSAY DATE
5746-06	Tc-99	31900 dpm	20,000 cpm	12/27/2012
5744-06	Sr-90	18100 dpm	12,700 cpm	12/27/2012

Geometry = in contact with surface unless otherwise specified.

PREVIOUS Tc-99 EFFICIENCY: 12.19 % **Calibration Voltage:** 900 V **Calibration Threshold:** 36.5 mV

AS FOUND Instrument Condition: SAT

AS FOUND DATA

1 MINUTE COUNTS (CPM)

				AVERAGE
AF Background:	0			
Tc-99 Count:	0	0	0	0.0
Sr-90 Count:	0			

Efficiencies

Tc-99 EFF: 0.00% Sr-90 EFF: 0.00%

AS LEFT Instrument Condition: SAT

AS LEFT DATA

1 MINUTE COUNTS (CPM)

				AVERAGE
AL Background:	37			
Tc-99 Count:	4107	3977	4096	4060.0
Sr-90 Count:	3848			

Efficiencies

Tc-99 EFF: 12.61% Sr-90 EFF: 21.06%

"AF" in the AL Efficiency fields means to refer to the AF Efficiencies in the AS FOUND DATA Section

- ☐ Is the AS FOUND efficiency within 20% of efficiency from last calibration?
- ☑ Reproducibility: Are the individual counts within 10% of the average?
- ☑ Does the probe meet final acceptance criteria?
- ☑ Calibration sticker attached?

Comments: Married as a set with: **Model:** 3 **Serial #:** 187583 **Bar Code #:**

af: No response - replaced GMT.

Date Instrument is Due For Next Calibration: 04/22/15

Performed by: _____ **Reviewed by:** _____ **Date:** 4/24/14

Printed Name: Jeffrey Knight

Safety and Ecology Corporation
2800 Solway Road, Knoxville, TN 37931

SEC PROCEDURE # SEC-IS-405 Rev 2

Calibration Certificate

4/22/2014

Calibration Certificate for 3A,Serial # 232186, Bar Code # ,Property # SEC-6351

Date: 04/22/14 **Date Last Cal. Expires:** 02/08/12 **Technician:** Jeffrey Knight

Location: 9999, **Reason For Calibration:** Due for Calibration

EQUIPMENT USED DURING CALIBRATION

MODEL: 500-2 **SERIAL #:** 153622 **CAL DUE:** 06/13/14

MODEL: **SERIAL #:** **CAL DUE:**

AS FOUND DATA

Geotropism: SAT **AS FOUND Instrument Condition:** SAT **AS LEFT Instrument Condition:** SAT

HIGH VOLTAGE (+/- 10% tolerance)	AS FOUND HV	AS LEFT HV
500 V:	N/A	N/A
1000 V:	N/A	N/A
1500 V:	N/A	N/A

HV Range 400-1500V: SAT

☐ New Batteries? **Battery Check:** SAT **Alarm:** SAT

AS FOUND Mechanical Zero: 0 **AS LEFT Mechanical Zero:** 0

AS FOUND THRESHOLD: 31.1 mV **AS LEFT THRESHOLD:** 31.1 mV

AS FOUND HV Reading: 902 V **AS LEFT HV Reading:** 900 V

RATE METER

SCALE	RATE CPM	AS FOUND	% ERROR	AS LEFT	% ERROR
x.1 or x1	100	100	0.00%	AF	0.00%
	250	250	0.00%	AF	0.00%
	400	395	1.25%	AF	1.25%
x1 or x10	1000	1000	0.00%	AF	0.00%
	2500	2500	0.00%	AF	0.00%
	4000	3950	1.25%	AF	1.25%
x10 or x100	10K	10	0.00%	AF	0.00%
	25K	25	0.00%	AF	0.00%
	40K	40	0.00%	AF	0.00%
x100 or x1000	100K	100	0.00%	AF	0.00%
	250K	250	0.00%	AF	0.00%
	400K	400	0.00%	AF	0.00%

☑ Is the As Found Data Within 20% of the Set Point?

DIGITAL SCALER

AF 250:	N/A	**% ERR:** 0.00%	**AL 250:**	N/A	**% ERR:** 0.00%
AF 2500:	N/A	**% ERR:** 0.00%	**AL 2500:**	N/A	**% ERR:** 0.00%
AF 25K:	N/A K	**% ERR:** 0.00%	**AL 25K:**	N/A K	**% ERR:** 0.00%
AF 100K:	N/A K	**% ERR:** 0.00%	**AL 100K:**	N/A K	**% ERR:** 0.00%

☐ Is the As Found Data Within 20% of the Set Point?

REPRODUCIBILITY

x.1 or x1 Scale:	250	250	250
x1 or x10 Scale:	2500	2500	2500
x10 or x100 Scale:	25 K	25 K	25 K
x100 or x1000 Scale:	250 K	250 K	250 K

☑ Are the Individual Counts Within 10% of the Average?

☑ Fast / Slow Response Switch Functions Properly?

Audio Response: SAT **Audio Divide:** N/A

Push Buttons: SAT **Lamp:** SAT

Scaler/Digital: N/A

Comments **Married as a set with:** **Model:** 44-9 **Serial #:** PR193575 **Bar Code #:**

☑ Does Instrument Meet Final Acceptance Criteria? ☑ Calibration Sticker Attached?

Date Instrument is Due For Next Calibration: 04/22/15

Performed by: _____ **Reviewed by:** _____ **Date:** 4/24/14

Printed Name: Jeffrey Knight

Safety and Ecology Corporation SEC PROCEDURE # SEC-IS-407 Rev 2
2800 Solway Road, Knoxville, TN 37931

Calibration Certificate

Calibration Certificate for 44-9,Serial # PR193575, Bar Code # ,Property # SEC-6058

Date: 04/22/14 **Date Last Cal. Expires:** 12/21/12 **Technician:** Jeffrey Knight

Location: 9999, **Reason For Calibration:** Due and Repair

EQUIPMENT USED DURING CALIBRATION

MODEL: 3A **SERIAL #** 232186 **CAL DUE:** 04/22/15

MODEL: **SERIAL #** **CAL DUE:**

NIST TRACEABLE SOURCES USED

SOURCE	ISOTOPE	ACTIVITY	2π	ASSAY DATE
5746-06	Tc-99	31900 dpm	20,000 cpm	12/27/2012
5744-06	Sr-90	18100 dpm	12,700 cpm	12/27/2012

Geometry = in contact with surface unless otherwise specified.

PREVIOUS Tc-99 EFFICIENCY: 13.96 % **Calibration Voltage:** 900 V **Calibration Threshold:** 31.1 mV

AS FOUND Instrument Condition: UNSAT

AS FOUND DATA

1 MINUTE COUNTS (CPM)

				AVERAGE
AF Background:	0			
Tc-99 Count:	0	0	0	0.0
Sr-90 Count:	0			

Efficiencies

Tc-99 EFF: 0.00% **Sr-90 EFF:** 0.00%

AS LEFT Instrument Condition: SAT

AS LEFT DATA

1 MINUTE COUNTS (CPM)

				AVERAGE
AL Background:	47			
Tc-99 Count:	4300	4300	4300	4300.0
Sr-90 Count:	3800			

Efficiencies

Tc-99 EFF: 13.33% **Sr-90 EFF:** 20.73%

"AF" in the AL Efficiency fields means to refer to the AF Efficiencies in the AS FOUND DATA Section

- ☐ Is the AS FOUND efficiency within 20% of efficiency from last calibration?
- ☑ Reproducibility: Are the individual counts within 10% of the average?
- ☑ Does the probe meet final acceptance criteria?
- ☑ Calibration sticker attached?

Comments: Married as a set with: **Model:** 3A **Serial #:** 232186 **Bar Code #:**

AF: Broken GMT - Replaced.

Date Instrument is Due For Next Calibration: 04/22/15

Performed by: _____ **Reviewed by:** _____ **Date:** 4/24/14

Printed Name: Jeffrey Knight

Safety and Ecology Corporation SEC PROCEDURE SEC-IS-409 Rev 3
2800 Solway Road
Knoxville, TN 37931

Calibration Certificate

Calibration Certificate for LV-1,Serial # 003692, Bar Code # ,Property # SEC-7208

Date: 04/17/14 **Date Last Cal. Expires:** 11/26/14 **Technician:** Jeffrey Knight

Location: 9999, **Reason For Calibration:** Other (See Comments)

EQUIPMENT USED DURING CALIBRATION

MODEL: D-812 **SERIAL #:** 3259 **CAL. DUE:** 10/08/14

MODEL: **SERIAL #:** **CAL DUE:**

AS FOUND DATA **AF Physical Condition** SAT **AS LEFT DATA**

As Found Instrument Flow Indication: 60 **LPM** **As Left Instrument Flow Indication:** 60 **LPM**

As Found Calibrator Flow Indication: 60 **LPM** **As Left Calibrator Flow Indication:** 60 **LPM**

Unit of Measure: (•) **LPM** ( ) **CFM**

Reproducibility 60 **LPM** 60 **LPM** 60 **LPM** **Average:** 60.00 **LPM**

☑ **Are the Individual Counts Within 10% of the Average?**

CALIBRATION DATA	TARGET VALUE	AIR SAMPLER READING	CALIBRATOR READING	ERROR %
	30.00 LPM	30.00 LPM	30.20 LPM	0.67% LPM
	50.00 LPM	50.00 LPM	50.20 LPM	0.40% LPM
	80.00 LPM	80.00 LPM	80.20 LPM	0.25% LPM

Air Sampler Setting 60.00 ☑ **Is Error Within 10%?**

Reproducibility 60 **LPM** 60 **LPM** 60 **LPM** **Average:** 60.00 **LPM**

☑ **Are the Individual Counts Within 10% of the Average?**

Air Sampler rotometer reading: ( ) Use Manufacturers Indication (•) Use Corrected Marking ( ) N/A

Comments: **Married as a set with:** **Model** **Bar Code #:**
Calibrated for new customer.

☑ **Does Instrument Meet Final Acceptance Criteria?** ☑ **Calibration Sticker Attached?**

Date Instrument is Due For Next Calibration: 04/17/15

Performed by: _____ **Reviewed by:** _____ **Date:** 4/24/14

Printed Name: Jeffrey Knight

Safety and Ecology Corporation SEC PROCEDURE SEC-IS-409 Rev 3
2800 Solway Road
Knoxville, TN 37931

Calibration Certificate

Calibration Certificate for LV-1,Serial # 003691, Bar Code # ,Property # SEC-7143

Date: 04/17/14 **Date Last Cal. Expires:** 09/09/14 **Technician:** Jeffrey Knight

Location: 9999, **Reason For Calibration:** Other (See Comments)

EQUIPMENT USED DURING CALIBRATION

MODEL: D-812 **SERIAL #:** 3259 **CAL. DUE:** 10/08/14

MODEL: **SERIAL #:** **CAL DUE:**

AS FOUND DATA **AF Physical Condition** SAT **AS LEFT DATA**

As Found Instrument Flow Indication: 60 **LPM** **As Left Instrument Flow Indication:** 60 **LPM**

As Found Calibrator Flow Indication: 63 **LPM** **As Left Calibrator Flow Indication:** 60 **LPM**

Unit of Measure: (•) **LPM** ( ) **CFM**

Reproducibility 60 **LPM** 60 **LPM** 60 **LPM** **Average:** 60.00 **LPM**

☑ **Are the Individual Counts Within 10% of the Average?**

CALIBRATION DATA	TARGET VALUE	AIR SAMPLER READING	CALIBRATOR READING	ERROR %
	30.00 LPM	30.00 LPM	30.00 LPM	0.00% LPM
	50.00 LPM	50.00 LPM	50.00 LPM	0.00% LPM
	70.00 LPM	70.00 LPM	70.00 LPM	0.00% LPM

Air Sampler Setting 60.00 ☑ **Is Error Within 10%?**

Reproducibility 60 **LPM** 60 **LPM** 60 **LPM** **Average:** 60.00 **LPM**

☑ **Are the Individual Counts Within 10% of the Average?**

Air Sampler rotometer reading: ( ) Use Manufacturers Indication (•) Use Corrected Marking ( ) N/A

Comments: **Married as a set with:** **Model** **Bar Code #:**

Calibrated for new customer.

☑ **Does Instrument Meet Final Acceptance Criteria?** ☑ **Calibration Sticker Attached?**

Date Instrument is Due For Next Calibration: **04/17/15**

Performed by: _____ **Reviewed by:** _____ **Date:** 4/24/14

Printed Name: Jeffrey Knight

Calibration Certificate

ThermoFisher SCIENTIFIC

The world leader in serving science

Thermo Eberline LLC
312 Miami St.
W.Columbia, S.C. 29170
USA

Report Number	Calibration Date
00120541-9027	18-Mar-14
Manufacturer	**As Found Condition**
Thermo Scientific	Out of Tolerance
Instrument	**PO Number**
Micro Rem AO	N/A
Serial Number	**PO Rev# / Rel#**
9027	N/A

Calibration Standards used have calibration traceable to N.I.S.T.
Refer to back of the page for Certificate of Test & Calibration & Conformance

Test Equipment	Calibration Standards
FLUKE 8010A S/N CP75332 Cal Due 14-Nov-14 FLUKE 80K-40 S/N HVP-019 Cal Due 03-May-14	MP2 S/N 739 Cal Due 23-May-14 Cs-137 10 mCi S/N 733 Cal Due 28-Feb-15 Cs-137 10 Ci S/N 375 Cal Due 28-Feb-15

Instrument Calibration Procedure	Probe Calibration Procedure
IWI024 Rev 17 Sept 13D	N/A

Environmental Conditions		
Temperature: 21 °C	Relative Humidity: 33 %	Barometric Pressure: 29.82 in Hg

Preliminaries					
5 VDC +/- .5 VDC	☑	-4.5 VDC +/- .25 VDC	☑	1 VDC +/- .5 VDC	☑
Mechanical Zero	☑	Geotropism	☑		

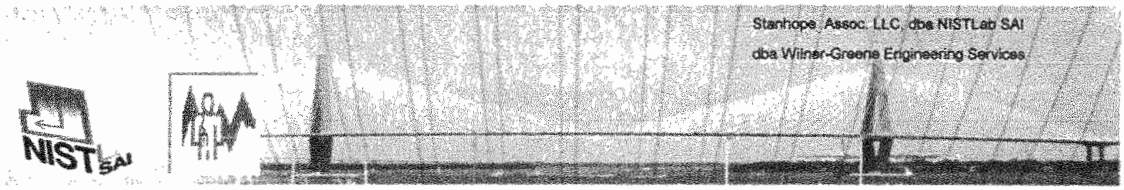
Calibration Data

Range	Calibration Point	Tolerance (µRem/h)	In Tolerance	As Found (µRem/h)	As Left (µRem/h)
X.1	1600 CPM	14.4 - 17.6	Yes	N/A	16
X.1	400 CPM	3.6 - 4.4	Yes	N/A	4
X1	16K CPM	Pulser Ref = 160		N/A	160
X1	4K CPM	36 - 44	Yes	N/A	40
X1	.16 mR/h	144 - 176	No	135	160
X10	1.6 mR/h	1440 - 1760	Yes	N/A	1600
X10	.4 mR/h	360 - 440	Yes	N/A	400
X100	16 mR/h	14400 - 17600	No	19000	16000
X100	4 mR/h	3600 - 4400	Yes	N/A	4000
X1000	160 mR/h	144000 - 176000	Yes	N/A	160000
X1000	40 mR/h	36000 - 44000	Yes	N/A	40000

Paul Green
Electronic Technician

20 May-14

QC 5



CERTIFICATE OF CALIBRATION

Certificate Number 20141174 - 66853 Page 1

Issued To: PERMA-FIX / SEC
10512 LEXINGTON DRIVE
SUITE 200
KNOXVILLE, TN 37932

Date Received: 2/12/2014
Date Issued: 2/15/2014
Valid Until: Feb 2015

Equipment: Manufacturer: BIOS
Model Number: DEFENDER 510
SerialNumber: 121038
Control #

Test Conditions :

Temperature	20.2	C
Humidity:	48.7	%
Barometric Pressure:	1021.4	mBar

As Found:
FULLY FUNCTIONAL AND IN TOLERANCE.

As Returned:
FULLY FUNCTIONAL AND WITHIN TOLERANCE.

Special Conditions:
NONE

Work Performed:
CALIBRATED PER CALIBRATION PROCEDURE FC-002.

CALIBRATED TO: +/- 3.0% AS REFERENCED TO PRIMARY BUBBLE FLOW CELL @ 0.3% UNCERTAINTY AT AMBIENT C

Device, Description, Report Number, Date Due

Reference Standards:

1011, AF-PVM100, PRECISION MICROMANOMETER, 7390238, 5/17/2014

1013, SKC 311-500, 500 ML LAB BURRETTE, caltec96675, 3/13/2023

1030, GILIAN IHCP 300HL, MAGNEHELIC GUAGE, 20132496-65054, 9/28/2014

1037, 4146, MASS FLOW METER, 20131963-61885, 4/25/2013

2061, GILAIR PLUS, GILAIR PLUS HIGH PERFORMANCE SAMPLING PUMP., 091-1009-01RB, 5/23/2014

5045, 811-9911-03, BGI PRIMECAL PRECISION AIR FLOW CALIBRATOR, 20132573-65168, 10/12/2014

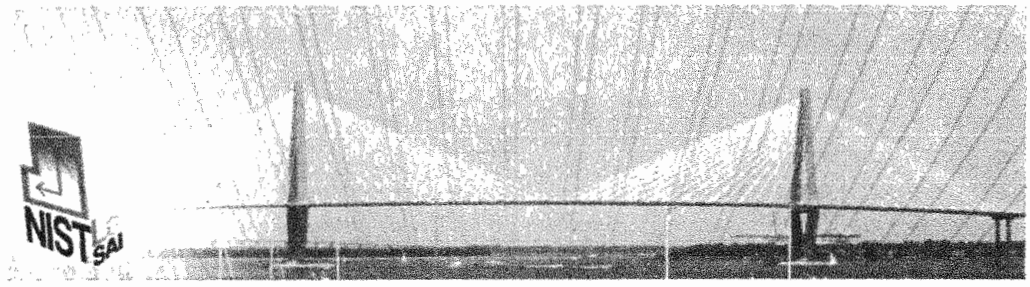
Measurement Uncertainty: AIR FLOW RATE +/- 0.3%

Calibrated and Reviewed by 2/15/2014

Authorized Signature: Brian Stanhope

This report certifies that all calibration equipment used in the test is traceable to the National Institue of Standards (NIST) , and applies only to the unit identified under "Equipment" above. This report must not be reproduced except in it's entirety without express written approval.

3575 Maybank HWY, D-327 • Johns Island, SC 29455 • USA • (800) 238-7550 • Fax (800) 238-7550
Website: www.nistlab.com Email: bstanhope@nistlab.com



Calibration Report

Certificate # 20141174-66853 Page

Model: Defender 510 **Date:** 2/15/2014
Serial # 121038

Test Results As Received / Returned

Reference Cell cc/min	Cell Under test cc/min	Relative Difference cc/min	Percent Difference
1054.2	1047.7	-6.5	-0.62%
1045.9	1045.6	-0.2	-0.02%
1050.8	1046.5	-4.3	-0.41%
MEAN	**MEAN**	**PERCENT DIFF. OF AVERAGE**	
1050.3	1046.6	-0.35%	
2533.6	2532.2	-1.4	-0.05%
2536.0	2534.5	-1.5	-0.06%
2542.6	2531.2	-11.4	-0.45%
MEAN	**MEAN**	**PERCENT DIFF. OF AVERAGE**	
2537.4	2532.6	-0.19%	
4965.3	4946.6	-18.7	-0.38%
4963.5	4952.0	-11.5	-0.23%
4964.2	4947.0	-17.2	-0.35%
MEAN	**MEAN**	**PERCENT DIFF. OF AVERAGE**	
4964.3	4948.6	-0.32%	

This report is valid only as an attachment to the Calibration Certificate number indicated above.

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Website: www.nistlab.com Email: bstanhope@nistlab.com

Safety and Ecology Corporation SEC PROCEDURE SEC-IS-410 Rev 3
2800 Solway Road
Knoxville, TN 37931

Calibration Certificate

Calibration Certificate for GilAir5,Serial # 15193, Bar Code # ,Property # SEC-5968

Date: 04/24/14 **Date Last Cal. Expires:** **Technician:** Sabrina Hall

Location: 144023, **Reason For Calibration:** Due for Calibration

EQUIPMENT USED DURING CALIBRATION

MODEL: Defender 51 **SERIAL #:** 121038 **CAL. DUE:** 02/15/15

MODEL: **SERIAL #:** **CAL DUE:**

AS FOUND DATA **AF Physical Condition** SAT **AS LEFT DATA**

As Found Instrument Flow Indication: 3 **LPM** **As Left Instrument Flow Indication:** 3 **LPM**

As Found Calibrator Flow Indication: 2.7 **LPM** **As Left Calibrator Flow Indication:** 3 **LPM**

Unit of Measure: (•) **LPM** ( ) **CFM**

Reproducibility 3.02 **LPM** 3 **LPM** 3.01 **LPM** **Average:** 3.01 **LPM**

[x] **Are the Individual Counts Within 10% of the Average?**

CALIBRATION DATA	TARGET VALUE	AIR SAMPLER READING	CALIBRATOR READING	ERROR %
	2.00 LPM	2.00 LPM	1.99 LPM	0.50% LPM
	3.00 LPM	3.00 LPM	3.01 LPM	0.33% LPM
	4.00 LPM	4.00 LPM	4.02 LPM	0.50% LPM

Air Sampler Setting 3.00 [ ] **Is Error Within 10%?**

Reproducibility 3.02 **LPM** 3 **LPM** 3.01 **LPM** **Average:** 3.01 **LPM**

[x] **Are the Individual Counts Within 10% of the Average?**

Air Sampler rotometer reading: ( ) Use Manufacturers Indication (•) Use Corrected Marking ( ) N/A

Comments: **Married as a set with:** **Model** **Bar Code #:**

[x] **Does Instrument Meet Final Acceptance Criteria?** [x] **Calibration Sticker Attached?**

Date Instrument is Due For Next Calibration: 04/24/15

Performed by: Sabrina Hall **Reviewed by:** [signature] **Date:** 4/24/14

Printed Name: Sabrina Hall

Safety and Ecology Corporation SEC PROCEDURE SEC-IS-410 Rev 3
2800 Solway Road
Knoxville, TN 37931

Calibration Certificate

Calibration Certificate for GilAir5,Serial # 20080601019, Bar Code # ,Property # SEC-6684

Date: 04/24/14 **Date Last Cal. Expires:** **Technician:** Sabrina Hall

Location: 9999, **Reason For Calibration:** Due for Calibration

EQUIPMENT USED DURING CALIBRATION

MODEL: Defender 51 **SERIAL #:** 121038 **CAL. DUE:** 02/15/15

MODEL: **SERIAL #:** **CAL DUE:**

AS FOUND DATA **AF Physical Condition** SAT **AS LEFT DATA**

As Found Instrument Flow Indication: 3 **LPM** **As Left Instrument Flow Indication:** 3 **LPM**

As Found Calibrator Flow Indication: 2.85 **LPM** **As Left Calibrator Flow Indication:** 3 **LPM**

Unit of Measure: (•) **LPM** ( ) **CFM**

Reproducibility 3.02 **LPM** 3.01 **LPM** 3 **LPM** **Average:** 3.01 **LPM**

☑ **Are the Individual Counts Within 10% of the Average?**

CALIBRATION DATA	TARGET VALUE	AIR SAMPLER READING	CALIBRATOR READING	ERROR %
	2.00 LPM	2.00 LPM	2.01 LPM	0.50% LPM
	3.00 LPM	3.00 LPM	3.00 LPM	0.00% LPM
	4.00 LPM	4.00 LPM	4.00 LPM	0.00% LPM

Air Sampler Setting 3.00 ☐ **Is Error Within 10%?**

Reproducibility 3.02 **LPM** 3.01 **LPM** 3 **LPM** **Average:** 3.01 **LPM**

☑ **Are the Individual Counts Within 10% of the Average?**

Air Sampler rotometer reading: ( ) Use Manufacturers Indication (•) Use Corrected Marking ( ) N/A

Comments: **Married as a set with:** **Model** **Bar Code #:**

☑ **Does Instrument Meet Final Acceptance Criteria?** ☑ **Calibration Sticker Attached?**

Date Instrument is Due For Next Calibration: 04/24/15

Performed by: Sabrina Hall **Reviewed by:** [signature] **Date:** 4/24/14

Printed Name: Sabrina Hall

Safety and Ecology Corporation SEC PROCEDURE SEC-IS-410 Rev 3
2800 Solway Road
Knoxville, TN 37931

Calibration Certificate

Calibration Certificate for GilAir5,Serial # 20071004010, Bar Code # ,Property # SEC-6501

Date: 04/24/14 **Date Last Cal. Expires:** 10/11/13 **Technician:** Sabrina Hall

Location: 9999, **Reason For Calibration:** Due for Calibration

EQUIPMENT USED DURING CALIBRATION

MODEL: Defender 51 **SERIAL #:** 121038 **CAL. DUE:** 02/15/15

MODEL: **SERIAL #:** **CAL DUE:**

AS FOUND DATA **AF Physical Condition** SAT **AS LEFT DATA**

As Found Instrument Flow Indication: 3 **LPM** **As Left Instrument Flow Indication:** 3 **LPM**

As Found Calibrator Flow Indication: 2.63 **LPM** **As Left Calibrator Flow Indication:** 3 **LPM**

Unit of Measure: (•) **LPM** ( ) **CFM**

Reproducibility 3.01 **LPM** 2.99 **LPM** 3 **LPM** **Average:** 3.00 **LPM**

☑ **Are the Individual Counts Within 10% of the Average?**

CALIBRATION DATA	TARGET VALUE	AIR SAMPLER READING	CALIBRATOR READING	ERROR %
	2.00 **LPM**	2.00 **LPM**	2.00 **LPM**	0.00% **LPM**
	3.00 **LPM**	3.00 **LPM**	3.00 **LPM**	0.00% **LPM**
	4.00 **LPM**	4.00 **LPM**	4.01 **LPM**	0.25% **LPM**

Air Sampler Setting ☐ **Is Error Within 10%?**

Reproducibility 3.01 **LPM** 2.99 **LPM** 3 **LPM** **Average:** 3.00 **LPM**

☑ **Are the Individual Counts Within 10% of the Average?**

Air Sampler rotometer reading: ( ) Use Manufacturers Indication (•) Use Corrected Marking ( ) N/A

Comments: **Married as a set with:** **Model** **Bar Code #:**

☑ **Does Instrument Meet Final Acceptance Criteria?** ☑ **Calibration Sticker Attached?**

Date Instrument is Due For Next Calibration: 04/24/15

Performed by: Sabrina Hall **Reviewed by:** [signature] **Date:** 4/24/14

Printed Name: Sabrina Hall

Safety and Ecology Corporation SEC PROCEDURE SEC-IS-410 Rev 3
2800 Solway Road
Knoxville, TN 37931

Calibration Certificate

Calibration Certificate for GilAir5,Serial # 15187, Bar Code # ,Property # SEC-5017

Date: 04/24/14 **Date Last Cal. Expires:** 05/05/13 **Technician:** Sabrina Hall

Location: 9999, **Reason For Calibration:** Due for Calibration

EQUIPMENT USED DURING CALIBRATION

MODEL: Defender 51 **SERIAL #:** 121038 **CAL. DUE:** 02/15/15

MODEL: **SERIAL #:** **CAL DUE:**

AS FOUND DATA **AF Physical Condition** SAT **AS LEFT DATA**

As Found Instrument Flow Indication: 3 LPM **As Left Instrument Flow Indication:** 3 LPM

As Found Calibrator Flow Indication: 2.65 LPM **As Left Calibrator Flow Indication:** 3 LPM

Unit of Measure: (•) LPM ( ) CFM

Reproducibility	3.01 LPM	3.02 LPM	3 LPM	**Average:**	3.01 LPM

☑ **Are the Individual Counts Within 10% of the Average?**

CALIBRATION DATA	TARGET VALUE	AIR SAMPLER READING	CALIBRATOR READING	ERROR %
	2.00 LPM	2.00 LPM	2.02 LPM	1.00% LPM
	3.00 LPM	3.00 LPM	3.01 LPM	0.33% LPM
	4.00 LPM	4.00 LPM	4.00 LPM	0.00% LPM

Air Sampler Setting 3.00 ☐ **Is Error Within 10%?**

Reproducibility	3.01 LPM	3.02 LPM	3 LPM	**Average:**	3.01 LPM

☑ **Are the Individual Counts Within 10% of the Average?**

Air Sampler rotometer reading: ( ) Use Manufacturers Indication (•) Use Corrected Marking ( ) N/A

Comments: **Married as a set with:** **Model** **Bar Code #:**

☑ **Does Instrument Meet Final Acceptance Criteria?** ☑ **Calibration Sticker Attached?**

Date Instrument is Due For Next Calibration: 04/24/15

Performed by: Sabrina Hall **Reviewed by:** [signature] **Date:** 4/24/14

Printed Name: Sabrina Hall

Safety and Ecology Corporation
2800 Solway Road
Knoxville, TN 37931

SEC PROCEDURE SEC-IS-410 Rev 3

Calibration Certificate

Calibration Certificate for GilAir5,Serial # 20071004009, Bar Code # ,Property # SEC-6500

Date: 04/24/14 **Date Last Cal. Expires:** 04/01/15 **Technician:** Sabrina Hall

Location: 9999, **Reason For Calibration:** Short Cycled

EQUIPMENT USED DURING CALIBRATION

MODEL: Defender 51 **SERIAL #:** 121038 **CAL. DUE:** 02/15/15

MODEL: **SERIAL #:** **CAL DUE:**

AS FOUND DATA **AF Physical Condition** SAT **AS LEFT DATA**

As Found Instrument Flow Indication: 3 **LPM** **As Left Instrument Flow Indication:** 3 **LPM**

As Found Calibrator Flow Indication: 2.69 **LPM** **As Left Calibrator Flow Indication:** 3.01 **LPM**

Unit of Measure: (•) **LPM** ( ) **CFM**

Reproducibility 3.01 **LPM** 3.03 **LPM** 3.01 **LPM** **Average:** 3.02 **LPM**

☑ **Are the Individual Counts Within 10% of the Average?**

CALIBRATION DATA	TARGET VALUE	AIR SAMPLER READING	CALIBRATOR READING	ERROR %
	2.00 LPM	2.00 LPM	1.99 LPM	0.50% LPM
	3.00 LPM	3.00 LPM	2.01 LPM	33.00% LPM
	4.00 LPM	4.00 LPM	4.00 LPM	0.00% LPM

Air Sampler Setting 3.00 ☐ **Is Error Within 10%?**

Reproducibility 3.01 **LPM** 3.03 **LPM** 3.01 **LPM** **Average:** 3.02 **LPM**

☑ **Are the Individual Counts Within 10% of the Average?**

Air Sampler rotometer reading: ( ) Use Manufacturers Indication (•) Use Corrected Marking ( ) N/A

Comments: **Married as a set with:** **Model** **Bar Code #:**

☑ **Does Instrument Meet Final Acceptance Criteria?** ☑ **Calibration Sticker Attached?**

Date Instrument is Due For Next Calibration: 04/24/15

Performed by: Sabrina Hall **Reviewed by:** [signature] **Date:** 4/24/14

Printed Name: Sabrina Hall

Safety and Ecology Corporation SEC PROCEDURE # SEC-IS-403 Rev 3

2800 Solway Road, Knoxville, TN 37931

Calibration Certificate

4/22/2014

Calibration Certificate for 2221,Serial # 172013, Bar Code # ,Property # SEC-5063

Date: 04/22/14 **Date Last Cal. Expires:** 01/09/15 **Technician:** Jeffrey Knight

Location: 9999, **Reason For Calibration:** Other (See Comments)

EQUIPMENT USED DURING CALIBRATION

MODEL: 500-2 **SERIAL #:** 153622 **CAL DUE:** 06/13/14

MODEL: **SERIAL #:** **CAL DUE:**

AS FOUND DATA **Geotropism:** SAT **AS FOUND Instrument Condition:** SAT **AS LEFT Instrument Condition:** SAT

HIGH VOLTAGE (+/- 10% tolerance)	AS FOUND HV	AS LEFT HV
500 V:	506 V	AF V
1000 V:	999 V	AF V
1500 V:	1491 V	AF V

☐ New Batteries? **Threshold ratio: 100=10mV**

AF THRESHOLD: 11.3 mV **AL THRESHOLD:** 10.0 mV

AF Mechanical Zero: 0 **AL Mechanical Zero:** 0

AF HV Reading: 800 V **AL HV Reading:** 1200 V

RATE METER

SCALE	RATE CPM	AS FOUND	% ERROR	AS LEFT	% ERROR
x.1 or x1	100	100	0.00%	AF	0.00%
	250	250	0.00%	AF	0.00%
	400	400	0.00%	AF	0.00%
x1 or x10	1000	1000	0.00%	AF	0.00%
	2500	2500	0.00%	AF	0.00%
	4000	4000	0.00%	AF	0.00%
x10 or x100	10K	10	0.00%	AF	0.00%
	25K	25	0.00%	AF	0.00%
	40K	40	0.00%	AF	0.00%
x100 or x1000	100K	100	0.00%	AF	0.00%
	250K	250	0.00%	AF	0.00%
	400K	400	0.00%	AF	0.00%

☑ Is the As Found Data Within 20% of the Set Point?

DIGITAL SCALER

AF 250: 250 **% ERR:** 0.00% **AL 250:** AF **% ERR:** 0.00%

AF 2500: 2502 **% ERR:** 0.08% **AL 2500:** AF **% ERR:** 0.08%

AF 25K: 25.02 K **% ERR:** 0.08% **AL 25K:** AF K **% ERR:** 0.08%

AF 250K: 250.2 K **% ERR:** 0.08% **AL 250K:** AF K **% ERR:** 0.08%

☑ Is the As Found Data Within 20% of the Set Point?

LOG SCALE

AF 200: 200 **% ERR:** 0.00% **AL 200:** AF **% ERR:** 0.00%

AF 2000: 2200 **% ERR:** 10.00% **AL 2000:** AF **% ERR:** 10.00%

AF 20K: 20 K **% ERR:** 0.00% **AL 20K:** AF K **% ERR:** 0.00%

AF 200K: 200 K **% ERR:** 0.00% **AL 200K:** AF K **% ERR:** 0.00%

☑ Is the As Found Data Within 20% of the Set Point?

REPRODUCIBILITY

x.1 or x1 Scale:	250	250	250
x1 or x10 Scale:	2500	2500	2500
x10 or x100 Scale:	25 K	25 K	25 K
x100 or x1000 Scale:	250 K	250 K	250 K

Audio Response: SAT

Audio Divide: SAT

Push Buttons: SAT

Lamp: SAT

Scaler/Digital: SAT

☑ Are the Individual Counts Within 10% of the Average?

☑ Fast / Slow Response Function Properly?

Comments: **Married as a set with:** **Model:** 44-10 **Serial #:** PR242839 **Bar Code #:**

Meter married to 44-10 probe using 10' cable.

☑ Does Instrument Meet Final Acceptance Criteria? ☑ Calibration Sticker Attached?

Date Instrument is Due For Next Calibration: 04/22/15

Performed by: _____ **Reviewed by:** _____ **Date:** 4/24/14

Printed Name: Jeffrey Knight

Safety and Ecology Corporation SEC PROCEDURE # SEC-IS-415 Rev 3
2800 Solway Road, Knoxville, TN 37931
Calibration Certificate
Page 1 of 1
4/22/2014

Calibration Certificate for 44-10,Serial # PR242839, Bar Code # ,Property # SEC-6308

Date: 04/22/14 **Date Last Cal. Expires:** 01/08/15 **Technician:** Jeffrey Knight
Location: 9999, **Reason For Calibration:** Other (See Comments)

EQUIPMENT USED DURING CALIBRATION

MODEL: 2221 **SERIAL #:** 172013 **CAL DUE:** 04/22/15
MODEL: **SERIAL #:** **CAL DUE:**

NIST TRACEABLE SOURCES USED

SOURCE	ISOTOPE	ACTIVITY	2π	ASSAY DATE
99CS250-0288	Cs-137	6.655 uCi		12/26/2012

Efficiency from Last Calibration: 0.60 % **HV From Last Calibration:** 1100 V **Calibration Threshold:** 10 mV

AS FOUND DATA

AS FOUND Instrument Condition: SAT
HV: V
Center: 0
Background: 0
Probe Efficiency: Cs-137 **0.00%**

1 MINUTE COUNTS (CPM)

AS LEFT DATA after repair of HV adjust

AS LEFT Instrument Condition: SAT
HV: AF V
Center:
Background:
Probe Efficiency: Cs-137

"AF" in the AL Efficiency fields means to refer to the AF Efficiencies in the AS FOUND DATA Section

☐ Is the As Found Efficiency Within 20% of the efficiency from the last cal.?

Reproducibility: **Isotope:** Cs-137 94596 94947 94385 **Average:** 94643 ☑ Are the individual counts within 10% of the average?

* If As Found Efficiency (even after repair) is within 10% of the last calibration and uniformity is <10%, the technician may N/A the Plateau Data and proceed to Comments. Geometry = NaI probes are 4 1/2" from source. All other probes are in contact with surface unless otherwise specified.

PLATEAU AND SET POINT DATA (CPM)

High Voltage	Source Response	Background
1100	87130	2491
1150	90683	2915
1200	93801	3287

HV	CENTER	Background	Efficiency	
1200 V	93801	3287	Cs-137	0.61%

Comments: **Married as a set with:** **Model:** 2221 **Serial #:** 172013 **Bar Code #:**
Probe married to 2221 using 10' cable.

☑ Does Instrument Meet Final Acceptance Criteria? ☑ Calibration Sticker Attached?

Date Instrument is Due For Next Calibration: 04/22/15

Performed by: _____ **Reviewed by:** _____ **Date:** 4/24/14
Printed Name: Jeffrey Knight

Safety and Ecology Corporation SEC PROCEDURE # SEC-IS-405 Rev 2
2800 Solway Road, Knoxville, TN 37931 Page 1 of 1
Calibration Certificate 4/22/2014

Calibration Certificate for 3,Serial # 112928, Bar Code # ,Property # SEC-5665

Date: 04/22/14 **Date Last Cal. Expires:** 03/19/14 **Technician:** Jeffrey Knight
Location: 9999, **Reason For Calibration:** Due for Calibration

EQUIPMENT USED DURING CALIBRATION

MODEL: 500-2 **SERIAL #:** 153622 **CAL DUE:** 06/13/14
MODEL: **SERIAL #:** **CAL DUE:**

AS FOUND DATA

Geotropism: SAT **AS FOUND Instrument Condition:** SAT **AS LEFT Instrument Condition:** SAT

HIGH VOLTAGE (+/- 10% tolerance)	AS FOUND HV	AS LEFT HV
500 V:	N/A	N/A
1000 V:	N/A	N/A
1500 V:	N/A	N/A

HV Range 400-1500V: SAT

☐ New Batteries? **Battery Check:** SAT **Alarm:** N/A
AS FOUND Mechanical Zero: 0 **AS LEFT Mechanical Zero:** 0
AS FOUND THRESHOLD: 31.5 mV **AS LEFT THRESHOLD:** 31.5 mV
AS FOUND HV Reading: 900 V **AS LEFT HV Reading:** 900 V

RATE METER

SCALE	RATE CPM	AS FOUND	% ERROR	AS LEFT	% ERROR
x.1 or x1	130	130	0.00%	AF	0.00%
	330	330	0.00%	AF	0.00%
	530	525	0.94%	AF	0.94%
x1 or x10	1300	1300	0.00%	AF	0.00%
	3300	3300	0.00%	AF	0.00%
	5300	5250	0.94%	AF	0.94%
x10 or x100	13K	13	0.00%	AF	0.00%
	33K	33	0.00%	AF	0.00%
	53K	52	1.88%	AF	1.88%
x100 or x1000	130K	130	0.00%	AF	0.00%
	330K	330	0.00%	AF	0.00%
	530K	525	0.94%	AF	0.94%

☑ Is the As Found Data Within 20% of the Set Point?

DIGITAL SCALER

AF 250: N/A **% ERR:** 0.00% **AL 250:** N/A **% ERR:** 0.00%
AF 2500: N/A **% ERR:** 0.00% **AL 2500:** N/A **% ERR:** 0.00%
AF 25K: N/A K **% ERR:** 0.00% **AL 25K:** N/A K **% ERR:** 0.00%
AF 100K: N/A K **% ERR:** 0.00% **AL 100K:** N/A K **% ERR:** 0.00%

☐ Is the As Found Data Within 20% of the Set Point?

REPRODUCIBILITY

x.1 or x1 Scale:	250	250	250
x1 or x10 Scale:	2500	2500	2500
x10 or x100 Scale:	25 K	25 K	25 K
x100 or x1000 Scale:	250 K	250 K	250 K

☑ Are the Individual Counts Within 10% of the Average?
☑ Fast / Slow Response Switch Functions Properly?
Audio Response: SAT **Audio Divide:** N/A
Push Buttons: SAT **Lamp:** N/A
Scaler/Digital: N/A

Comments **Married as a set with:** **Model:** 44-9 **Serial #:** PR194691 **Bar Code #:**

☑ Does Instrument Meet Final Acceptance Criteria? ☑ Calibration Sticker Attached?
Date Instrument is Due For Next Calibration: 04/22/15

Performed by: _____ **Reviewed by:** _____ **Date:** 4/24/14
Printed Name: Jeffrey Knight

Safety and Ecology Corporation
2800 Solway Road, Knoxville, TN 37931

SEC PROCEDURE # SEC-IS-407 Rev 2

4/22/2014

Calibration Certificate

Calibration Certificate for 44-9,Serial # PR194691, Bar Code # ,Property # SEC-5190

Date: 04/22/14 **Date Last Cal. Expires:** 03/19/14 **Technician:** Jeffrey Knight

Location: 9999, **Reason For Calibration:** Due for Calibration

EQUIPMENT USED DURING CALIBRATION

MODEL: 3 **SERIAL #** 112928 **CAL DUE:** 04/22/15

MODEL: **SERIAL #** **CAL DUE:**

NIST TRACEABLE SOURCES USED

SOURCE	ISOTOPE	ACTIVITY	2π	ASSAY DATE
5746-06	Tc-99	31900 dpm	20,000 cpm	12/27/2012
5744-06	Sr-90	18100 dpm	12,700 cpm	12/27/2012

Geometry = in contact with surface unless otherwise specified.

PREVIOUS Tc-99 EFFICIENCY: 12.56 % **Calibration Voltage:** 900 V **Calibration Threshold:** 31.5 mV

AS FOUND Instrument Condition: UNSAT

AS FOUND DATA

1 MINUTE COUNTS (CPM)

				AVERAGE
AF Background:	44			
Tc-99 Count:	4400	4400	4400	4400.0
Sr-90 Count:	4000			

Efficiencies

Tc-99 EFF: 13.66% **Sr-90 EFF:** 21.86%

AS LEFT Instrument Condition: SAT

AS LEFT DATA

1 MINUTE COUNTS (CPM)

				AVERAGE
AL Background:	AF			
Tc-99 Count:	AF	AF	AF	
Sr-90 Count:	AF			

Efficiencies

Tc-99 EFF: AF **Sr-90 EFF:** AF

"AF" in the AL Efficiency fields means to refer to the AF Efficiencies in the AS FOUND DATA Section

- [x] **Is the AS FOUND efficiency within 20% of efficiency from last calibration?**
- [x] **Reproducibility: Are the individual counts within 10% of the average?**
- [x] **Does the probe meet final acceptance criteria?**
- [x] **Calibration sticker attached?**

Comments: **Married as a set with:** **Model:** 3 **Serial #:** 112928 **Bar Code #:**

AF: Dirty GMT - cleaned GMT, and screen.

Date Instrument is Due For Next Calibration: 04/22/15

Performed by: _____ **Reviewed by:** _____ **Date:** 4/24/14

Printed Name: Jeffrey Knight

SEC/Perma-Fix Instrument Services
Calibration Data Sheet

Form 90
Rev. C

Customer Name: SEC/Perma-Fix
Plant Name: M&EC
Address: -
-
-
Contact Person: -
-

Instrument Manufacturer: Arrow-Tech
Model Number: 138
Range: 200 mR/hr
Max. drift per 24 hours: 4 mR/hr
Acceptable Range
Minimum: 144 mR/hr
Maximum: 176 mR/hr

N.I.S.T. Source(s)

Material	Serial No.	Activity	Due
Cs137	KR-4097	130 mCi	6/5/2014
Cs137	0300-GY	400 Ci	6/5/2014
-	-	-	-

Calibration Data

Dosimeter S/N	Drift Test Start	Total Hours Test Time	Dosimeter Reading	Drift Per 24 Hours	Percent Drift	Drift Test Pass?	Exposure Delivered	Dosimeter Reading	Percent Error	Exposure Pass?	Final Result
138	9/20/13 8:20						160 mR/hr	158	-1.25%	TRUE	
063502	END	73.0833333	1	0.33	0.16%	TRUE	160 mR/hr	155	-3.13%	TRUE	Pass
	9/23/13 9:25						160 mR/hr	161	0.63%	TRUE	
138	9/20/13 8:22						160 mR/hr	161	0.63%	TRUE	
035892	END	73.0666667	0	0.00	0.00%	TRUE	160 mR/hr	160	0.00%	TRUE	Pass
	9/23/13 9:26						160 mR/hr	158	-1.25%	TRUE	
138	9/20/13 8:23						160 mR/hr	150	-6.25%	TRUE	
063519	END	73.05	0	0.00	0.00%	TRUE	160 mR/hr	157.5	-1.56%	TRUE	Pass
	9/23/13 9:26						160 mR/hr	151	-5.63%	TRUE	
138	9/20/13 8:25						160 mR/hr	160	0.00%	TRUE	
033517	END	73.0333333	1	0.33	0.16%	TRUE	160 mR/hr	159	-0.63%	TRUE	Pass
	9/23/13 9:27						160 mR/hr	163	1.88%	TRUE	
138	9/20/13 8:26						160 mR/hr	152.5	-4.69%	TRUE	
063505	END	73.0166667	0	0.00	0.00%	TRUE	160 mR/hr	149	-6.88%	TRUE	Pass
	9/23/13 9:27						160 mR/hr	149	-6.88%	TRUE	

Comments/Remarks:

Dosimeters must 2 of 3 exposure tests and drift test to meet acceptance criteria.
Calibration performed per procedure number 90.

Calibrated by: _____
David Moyer
Date Calibrated: 9/23/2013
Calibration Due: 9/23/2014

Reviewed by: _____
Review Date: 9-23-13

Safety and Ecology Corporation SEC PROCEDURE # ICAL Rev 0
2800 Solway Road Knoxville, TN 37931 *Page 1 of 1*
Calibration Certificate *10/3/2014*

Calibration Certificate for MICRO REM,Serial # E049A, Bar Code # ,Property # SEC-6040

Date: 10/03/14 Date Last Cal. Expires: 09/17/14 Technician: Thomas Thompson
Location: 143241, Reason For Calibration: Due for Calibration

EQUIPMENT USED DURING CALIBRATION

MODEL	MP-2	SERIAL #:	314	CAL DUE:	09/08/15
MODEL	87 V	SERIAL #:	92560066	CAL DUE:	02/22/15
MODEL		SERIAL #:		CAL DUE:	

NIST TRACEABLE SOURCES USED	SOURCE	ISOTOPE	ACTIVITY	ASSAY DATE
	KR-4097	Cs-137	76.839 mCi	6/11/2014
	0300-GY	Cs-137	236.457 Ci	6/11/2014

AS FOUND DATA

Physical Cond SAT Geotropism: SAT Bat. Check SAT Speaker Check SAT

		As Found	As Left
High Voltage	High Voltage Indicated in OK Band	OK	OK
	+5 Volt Power Supply (4.5 to 5.5V)	5.155	5.155
	-5 Volt Power Supply (-3.74 to -5.06 V)	-4.37	-4.37

CALIBRATION DATA

HV AL

Scale	Exposure Rate uR/HR	Exposure Rate (MR/HR)	Instrument Reading As Found	Instrument Reading As Left	Percent Error As Found	Percent Error As Left
0.1	5	(Pulsed = TO)	6	5	20.00	0.00
	10	(Pulsed = TO)	11.7	10	17.00	0.00
	15	(Pulsed = TO)	17.8	15	18.67	0.00
1	50	(.05)	60	50	20.00	0.00
	100	(.1)	120	100	20.00	0.00
	150	(.15)	180	150	20.00	0.00
10	500	(0.5)	520	520	4.00	4.00
	1000	(1.0)	1050	1050	5.00	5.00
	1500	(1.5)	1500	1500	0.00	0.00
100	5000	(5)	4800	4800	-4.00	-4.00
	10000	(10)	9500	9500	-5.00	-5.00
	15000	(15)	15500	15500	3.33	3.33
1000	50000	(50)	50000	50000	0.00	0.00
	100000	(100)	100000	100000	0.00	0.00
	150000	(150)	160000	160000	6.67	6.67

Precision

Scale	Exposure Rate		As Found	Mean Value	% Dev
X1000	100000	(100)	100000.00		0.00
			100000.00	100000.00	0.00
			100000.00		0.00

Comments:

☑ Does Instrument Meet Final Acceptance Criteria? ☑ Calibration Sticker Attached? Next Calibration Due Date: 10/03/15

Performed by: _____ Reviewed by: _____ Date: 10/3/14

Printed Name: Thomas Thompson

Safety and Ecology Corporation SEC PROCEDURE # ICAL Rev 0
2800 Solway Road Knoxville, TN 37931 *Page 1 of 1*
Calibration Certificate *10/3/2014*

Calibration Certificate for MICRO REM,Serial # 2014, Bar Code # ,Property # SEC-6591

Date: 10/03/14 Date Last Cal. Expires: 12/02/14 Technician: Thomas Thompson

Location: 999999, Reason For Calibration: Due for Calibration

EQUIPMENT USED DURING CALIBRATION

MODEL	MP-2	SERIAL #:	314	CAL DUE:	09/08/15
MODEL	87 V	SERIAL #:	92560066	CAL DUE:	02/22/15
MODEL		SERIAL #:		CAL DUE:	

NIST TRACEABLE SOURCES USED	SOURCE	ISOTOPE	ACTIVITY	ASSAY DATE
	KR-4097	Cs-137	76.839 mCi	6/11/2014
	0300-GY	Cs-137	236.457 Ci	6/11/2014

AS FOUND DATA

Physical Cond SAT Geotropism: SAT Bat. Check SAT Speaker Check N/A

		As Found	As Left
High Voltage	High Voltage Indicated in OK Band	OK	OK
	+5 Volt Power Supply (4.5 to 5.5V)	5.12	5.12
	-5 Volt Power Supply (-3.74 to -5.06 V)	-4.33	-4.33

CALIBRATION DATA

HV AL

Scale	Exposure Rate uR/HR	Exposure Rate (MR/HR)	Instrument Reading As Found	Instrument Reading As Left	Percent Error As Found	Percent Error As Left
0.1	5	(Pulsed = TO)	4.7	4.7	-6.00	-6.00
	10	(Pulsed = TO)	9.8	9.8	-2.00	-2.00
	15	(Pulsed = TO)	15	15	0.00	0.00
1	50	(.05)	51	51	2.00	2.00
	100	(.1)	106	106	6.00	6.00
	150	(.15)	152	152	1.33	1.33
10	500	(0.5)	540	500	8.00	0.00
	1000	(1.0)	1100	1000	10.00	0.00
	1500	(1.5)	1600	1500	6.67	0.00
100	5000	(5)	4900	4900	-2.00	-2.00
	10000	(10)	10000	10000	0.00	0.00
	15000	(15)	15800	15800	5.33	5.33
1000	50000	(50)	50000	50000	0.00	0.00
	100000	(100)	95000	95000	-5.00	-5.00
	150000	(150)	151000	151000	0.67	0.67

Precision

Scale	Exposure Rate		As Found	Mean Value	% Dev
X1000	100000	(100)	95000.00		0.00
			95000.00	95000.00	0.00
			95000.00		0.00

Comments:

☑ Does Instrument Meet Final Acceptance Criteria? ☑ Calibration Sticker Attached? Next Calibration Due Date: 10/03/15

Performed by: _____ Reviewed by: _____ Date: 10/3/14

Printed Name: Thomas Thompson

Safety and Ecology Corporation
2800 Solway Road, Knoxville, TN 37931
Calibration Certificate

SEC PROCEDURE # SEC-IS-403 Rev 3

10/3/2014

Calibration Certificate for 2221,Serial # 172038, Bar Code # ,Property # SEC-5435

Date: 10/03/14 **Date Last Cal. Expires:** 06/19/13 **Technician:** Carl Hall

Location: 999999, **Reason For Calibration:** Due for Calibration

EQUIPMENT USED DURING CALIBRATION

MODEL: 500-2 **SERIAL #:** 132896 **CAL DUE:** 12/26/14

MODEL: **SERIAL #:** **CAL DUE:**

AS FOUND DATA

Geotropism: SAT **AS FOUND Instrument Condition:** SAT **AS LEFT Instrument Condition:** SAT

HIGH VOLTAGE (+/- 10% tolerance)	AS FOUND HV	AS LEFT HV
500 V:	497 V	AF V
1000 V:	1000 V	AF V
1500 V:	1502 V	AF V

☐ New Batteries?
Threshold ratio: 100=10mV
AF THRESHOLD: 10.0 mV
AL THRESHOLD: 10.0 mV

AF Mechanical Zero: 0
AL Mechanical Zero: 0
AF HV Reading: 750 V
AL HV Reading: 750 V

RATE METER

SCALE	RATE CPM	AS FOUND	% ERROR	AS LEFT	% ERROR
x.1 or x1	100	100	0.00%	AF	0.00%
	250	250	0.00%	AF	0.00%
	400	400	0.00%	AF	0.00%
x1 or x10	1000	1000	0.00%	AF	0.00%
	2500	2500	0.00%	AF	0.00%
	4000	4000	0.00%	AF	0.00%
10 or x100	10K	10	0.00%	AF	0.00%
	25K	25	0.00%	AF	0.00%
	40K	40	0.00%	AF	0.00%
x100 or x1000	100K	100	0.00%	AF	0.00%
	250K	250	0.00%	AF	0.00%
	400K	400	0.00%	AF	0.00%

☑ Is the As Found Data Within 20% of the Set Point?

DIGITAL SCALER

AF 250: 250 **% ERR:** 0.00% **AL 250:** AF **% ERR:** 0.00%
AF 2500: 2503 **% ERR:** 0.12% **AL 2500:** AF **% ERR:** 0.12%
AF 25K: 25.03 K **% ERR:** 0.12% **AL 25K:** AF K **% ERR:** 0.12%
AF 250K: 250.3 K **% ERR:** 0.12% **AL 250K:** AF K **% ERR:** 0.12%

☑ Is the As Found Data Within 20% of the Set Point?

LOG SCALE

AF 200: 200 **% ERR:** 0.00% **AL 200:** AF **% ERR:** 0.00%
AF 2000: 2000 **% ERR:** 0.00% **AL 2000:** AF **% ERR:** 0.00%
AF 20K: 20 K **% ERR:** 0.00% **AL 20K:** AF K **% ERR:** 0.00%
AF 200K: 200 K **% ERR:** 0.00% **AL 200K:** AF K **% ERR:** 0.00%

☑ Is the As Found Data Within 20% of the Set Point?

REPRODUCIBILITY

x.1 or x1 Scale:	250	250	250
x1 or x10 Scale:	2500	2500	2500
x10 or x100 Scale:	25 K	25 K	25 K
x100 or x1000 Scale:	250 K	250 K	250 K

☑ Are the Individual Counts Within 10% of the Average?

Audio Response: SAT
Audio Divide: SAT
Push Buttons: SAT
Lamp: SAT
Scaler/Digital: SAT

☑ Fast / Slow Response Function Properly?

Comments: **Married as a set with:** **Model:** 44-2 **Serial #:** PR273892 **Bar Code #:**

☑ Does Instrument Meet Final Acceptance Criteria? ☑ Calibration Sticker Attached?

Date Instrument is Due For Next Calibration: 10/03/15

Performed by: _____ **Reviewed by:** _____ **Date:** 10-3-14

Printed Name: Carl Hall

Safety and Ecology Corporation SEC PROCEDURE # SEC-IS-415 Rev 3

2800 Solway Road, Knoxville, TN 37931

Calibration Certificate

10/3/2014

Calibration Certificate for 44-2,Serial # PR273892, Bar Code # ,Property # SEC-6738

Date: 10/03/14 **Date Last Cal. Expires:** 10/07/14 **Technician:** Carl Hall

Location: 999999, **Reason For Calibration:** Due for Calibration

EQUIPMENT USED DURING CALIBRATION

MODEL: 2221 **SERIAL #:** 172038 **CAL DUE:** 10/03/15

MODEL: **SERIAL #:** **CAL DUE:**

NIST TRACEABLE SOURCES USED

SOURCE	ISOTOPE	ACTIVITY	2π	ASSAY DATE
99CS250-0288	Cs-137	6.655 uCi		12/26/2012

Efficiency from Last Calibration: 0.15 % **HV From Last Calibration:** 700 V **Calibration Threshold:** 10 mV

1 MINUTE COUNTS (CPM)

AS FOUND DATA

AS FOUND Instrument Condition: SAT

HV: 700 V

Center: 22196

Background: 763

Probe Efficiency: Cs-137 **0.15%**

AS LEFT DATA after repair of HV adjust

AS LEFT Instrument Condition: SAT

HV: 750 V

Center: 22234

Background: 782

Probe Efficiency: Cs-137 **0.15%**

"AF" in the AL Efficiency fields means to refer to the AF Efficiencies in the AS FOUND DATA Section

☑ **Is the As Found Efficiency Within 20% of the efficiency from the last cal.?**

Reproducibility: **Isotope:** Cs-137 22387 22196 22264 **Average:** 22282 ☑ **Are the individual counts within 10% of the average?**

* If As Found Efficiency (even after repair) is within 10% of the last calibration and uniformity is <10%, the technician may N/A the Plateau Data and proceed to Comments. Geometry = NaI probes are 4 1/2" from source. All other probes are in contact with surface unless otherwise specified.

PLATEAU AND SET POINT DATA (CPM)

High Voltage	Source Response	Background
600	20187	760
650	21115	798
700	22196	763
750	22234	782
800	22901	815
850	25763	871
900	30492	993

HV	CENTER	Background	Efficiency	
750 V	22234	782	Cs-137	0.15%

Comments: **Married as a set with:** **Model:** 2221 **Serial #:** 172038 **Bar Code #:**

Calibrated for use with a 15' cable.

☑ **Does Instrument Meet Final Acceptance Criteria?** ☑ **Calibration Sticker Attached?**

Date Instrument is Due For Next Calibration: 10/03/15

Performed by: _____ **Reviewed by:** _____ **Date:** 10-3-14

Printed Name: Carl Hall

Safety and Ecology Corporation SEC PROCEDURE # SEC-IS-405 Rev 2

2800 Solway Road, Knoxville, TN 37931 Page 1 of 1

Calibration Certificate

10/3/2014

Calibration Certificate for 3,Serial # 187367, Bar Code # ,Property # SEC-5667

Date: 10/03/14 **Date Last Cal. Expires:** 02/07/15 **Technician:** Carl Hall

Location: 999999, **Reason For Calibration:** Due for Calibration

EQUIPMENT USED DURING CALIBRATION

MODEL: 500-2 **SERIAL #:** 132896 **CAL DUE:** 12/26/14

MODEL: **SERIAL #:** **CAL DUE:**

AS FOUND DATA **Geotropism:** SAT **AS FOUND Instrument Condition:** SAT **AS LEFT Instrument Condition:** SAT

HIGH VOLTAGE (+/- 10% tolerance)	AS FOUND HV	AS LEFT HV
500 V:	N/A	N/A
1000 V:	N/A	N/A
1500 V:	N/A	N/A

HV Range 400-1500V: SAT

☐ New Batteries? **Battery Check:** SAT **Alarm:** N/A

AS FOUND Mechanical Zero: 0 **AS LEFT Mechanical Zero:** 0

AS FOUND THRESHOLD: 40.4 mV **AS LEFT THRESHOLD:** 40.4 mV

AS FOUND HV Reading: 900 V **AS LEFT HV Reading:** 900 V

RATE METER

SCALE	RATE CPM	AS FOUND	% ERROR	AS LEFT	% ERROR
x.1 or x1	100	100	0.00%	AF	0.00%
	250	250	0.00%	AF	0.00%
	400	400	0.00%	AF	0.00%
x1 or x10	1000	1000	0.00%	AF	0.00%
	2500	2500	0.00%	AF	0.00%
	4000	4000	0.00%	AF	0.00%
x10 or x100	10K	10	0.00%	AF	0.00%
	25K	25	0.00%	AF	0.00%
	40K	40	0.00%	AF	0.00%
x100 or x1000	100K	100	0.00%	AF	0.00%
	250K	250	0.00%	AF	0.00%
	400K	400	0.00%	AF	0.00%

☑ Is the As Found Data Within 20% of the Set Point?

DIGITAL SCALER

AF 250:	250	**% ERR:** 0.00%	**AL 250:**	AF	**% ERR:** 0.00%
AF 2500:	2504	**% ERR:** 0.16%	**AL 2500:**	AF	**% ERR:** 0.16%
AF 25K:	25.04 K	**% ERR:** 0.16%	**AL 25K:**	AF K	**% ERR:** 0.16%
AF 100K:	100.2 K	**% ERR:** 0.20%	**AL 100K:**	AF K	**% ERR:** 0.20%

☑ Is the As Found Data Within 20% of the Set Point?

REPRODUCIBILITY

x.1 or x1 Scale:	250	250	250
x1 or x10 Scale:	2500	2500	2500
x10 or x100 Scale:	25 K	25 K	25 K
x100 or x1000 Scale:	250 K	250 K	250 K

☑ Are the Individual Counts Within 10% of the Average?

☑ Fast / Slow Response Switch Functions Properly?

Audio Response: SAT **Audio Divide:** N/A

Push Buttons: SAT **Lamp:** N/A

Scaler/Digital: SAT

Comments **Married as a set with:** **Model:** 44-9 **Serial #:** PR194676 **Bar Code #:**

☑ Does Instrument Meet Final Acceptance Criteria? ☑ Calibration Sticker Attached?

Date Instrument is Due For Next Calibration: 10/03/15

Performed by: _____ **Reviewed by:** _____ **Date:** 10-3-14

Printed Name: Carl Hall

Safety and Ecology Corporation SEC PROCEDURE # SEC-IS-407 Rev 2

2800 Solway Road, Knoxville, TN 37931

Calibration Certificate

10/3/2014

Calibration Certificate for 44-9,Serial # PR194676, Bar Code # ,Property # SEC-5440

Date: 10/03/14 **Date Last Cal. Expires:** 04/15/14 **Technician:** Carl Hall

Location: 999999, **Reason For Calibration:** Due for Calibration

EQUIPMENT USED DURING CALIBRATION

MODEL: 3 **SERIAL #** 187367 **CAL DUE:** 10/03/15

MODEL: **SERIAL #** **CAL DUE:**

NIST TRACEABLE SOURCES USED

SOURCE	ISOTOPE	ACTIVITY	2π	ASSAY DATE
5744-06	Sr-90	18100 dpm	12,700 cpm	12/27/2012
5746-06	Tc-99	31900 dpm	20,000 cpm	12/27/2012

Geometry = in contact with surface unless otherwise specified.

PREVIOUS Tc-99 EFFICIENCY: 14.12 % **Calibration Voltage:** 900 V **Calibration Threshold:** 40.4 mV

AS FOUND Instrument Condition: SAT

AS FOUND DATA

1 MINUTE COUNTS (CPM)

				AVERAGE
AF Background:	34			
Tc-99 Count:	5092	5170	5084	5115.3
Sr-90 Count:	4592			

Efficiencies

Tc-99 EFF: 15.93% Sr-90 EFF: 25.18%

AS LEFT Instrument Condition: SAT

AS LEFT DATA

1 MINUTE COUNTS (CPM)

				AVERAGE
AL Background:	34			
Tc-99 Count:	5092	5170	5084	5115.3
Sr-90 Count:	4592			

Efficiencies

Tc-99 EFF: 15.93% Sr-90 EFF: 25.18%

"AF" in the AL Efficiency fields means to refer to the AF Efficiencies in the AS FOUND DATA Section

- [x] Is the AS FOUND efficiency within 20% of efficiency from last calibration?
- [x] Reproducibility: Are the individual counts within 10% of the average?
- [x] Does the probe meet final acceptance criteria?
- [x] Calibration sticker attached?

Comments: Married as a set with: **Model:** 3 **Serial #:** 187367 **Bar Code #:**

Date Instrument is Due For Next Calibration: 10/03/15

Performed by: _____ **Reviewed by:** _____ **Date:** 10-3-14

Printed Name: Carl Hall

Safety and Ecology Corporation
2800 Solway Road, Knoxville, TN 37931

SEC PROCEDURE # SEC-IS-404 Rev 2

Calibration Certificate

10/3/2014

Calibration Certificate for 12,Serial # 186763, Bar Code # ,Property # SEC-5640

Date: 10/03/14 **Date Last Cal. Expires:** 09/10/15 **Technician:** Carl Hall

Location: 999999, **Reason For Calibration:** Due for Calibration

EQUIPMENT USED DURING CALIBRATION

MODEL: 500-2 **SERIAL #:** 132896 **CAL DUE:** 12/26/14

MODEL: **SERIAL #:** **CAL DUE:**

AS FOUND DATA **Geotropism:** SAT **AS FOUND Instrument Condition:** SAT **AS LEFT Instrument Condition:** SAT

HIGH VOLTAGE (+/- 10% tolerance)	AS FOUND HV	AS LEFT HV
500 V:	505	AF
1000 V:	997	AF
1500 V:	1485	AF

HV Range 400-1500V: N/A

☐ New Batteries? **Battery Check:** SAT **Alarm:** N/A

AS FOUND Mechanical Zero: 0 **AS LEFT Mechanical Zero:** 0

AS FOUND THRESHOLD: 35.0 mV **AS LEFT THRESHOLD:** 35.0 mV

AS FOUND HV Reading: 900 V **AS LEFT HV Reading:** 900 V

RATE METER

SCALE	RATE CPM	AS FOUND	% ERROR	AS LEFT	% ERROR
x.1 or x1	100	100	0.00%	AF	0.00%
	250	250	0.00%	AF	0.00%
	400	400	0.00%	AF	0.00%
x1 or x10	1000	1000	0.00%	AF	0.00%
	2500	2500	0.00%	AF	0.00%
	4000	4000	0.00%	AF	0.00%
x10 or x100	10K	10	0.00%	AF	0.00%
	25K	25	0.00%	AF	0.00%
	40K	40	0.00%	AF	0.00%
x100 or x1000	100K	100	0.00%	AF	0.00%
	250K	250	0.00%	AF	0.00%
	400K	400	0.00%	AF	0.00%

☑ Is the As Found Data Within 20% of the Set Point?

DIGITAL SCALER

AF 250:	250	**% ERR:** 0.00%	**AL 250:**	AF	**% ERR:** 0.00%
AF 2500:	2503	**% ERR:** 0.12%	**AL 2500:**	AF	**% ERR:** 0.12%
AF 25K:	25.03 K	**% ERR:** 0.12%	**AL 25K:**	AF K	**% ERR:** 0.12%
AF 100K:	100.1 K	**% ERR:** 0.10%	**AL 100K:**	AF K	**% ERR:** 0.10%

☑ Is the As Found Data Within 20% of the Set Point?

REPRODUCIBILITY

x.1 or x1 Scale:	250	250	250
x1 or x10 Scale:	2500	2500	2500
x10 or x100 Scale:	25 K	25 K	25 K
x100 or x1000 Scale:	250 K	250 K	250 K

☑ Are the Individual Counts Within 10% of the Average?

☑ Fast / Slow Response Switch Functions Properly?

Audio Response: SAT **Audio Divide:** N/A

Push Buttons: SAT **Lamp:** N/A

Scaler/Digital: SAT

Comments **Married as a set with:** **Model:** 44-9 **Serial #:** PR151024 **Bar Code #:**

☑ Does Instrument Meet Final Acceptance Criteria? ☑ Calibration Sticker Attached?

Date Instrument is Due For Next Calibration: 10/03/15

Performed by: _____ **Reviewed by:** _____ **Date:** 10-3-14

Printed Name: Carl Hall

Safety and Ecology Corporation SEC PROCEDURE # SEC-IS-407 Rev 2

2800 Solway Road, Knoxville, TN 37931

Calibration Certificate

10/3/2014

Calibration Certificate for 44-9,Serial # PR151024, Bar Code # ,Property # SEC-5617

Date: 10/03/14 **Date Last Cal. Expires:** 09/10/15 **Technician:** Carl Hall

Location: 999999, **Reason For Calibration:** Due for Calibration

EQUIPMENT USED DURING CALIBRATION

MODEL: 12 **SERIAL #** 186763 **CAL DUE:** 10/03/15

MODEL: **SERIAL #** **CAL DUE:**

NIST TRACEABLE SOURCES USED

SOURCE	ISOTOPE	ACTIVITY	2π	ASSAY DATE
5744-06	Sr-90	18100 dpm	12,700 cpm	12/27/2012
5746-06	Tc-99	31900 dpm	20,000 cpm	12/27/2012

Geometry = in contact with surface unless otherwise specified.

PREVIOUS Tc-99 EFFICIENCY: 12.62 % **Calibration Voltage:** 900 V **Calibration Threshold:** 35 mV

AS FOUND Instrument Condition: SAT

AS FOUND DATA

1 MINUTE COUNTS (CPM)

				AVERAGE
AF Background:	27			
Tc-99 Count:	4161	4226	4294	4227.0
Sr-90 Count:	4045			

Efficiencies

Tc-99 EFF: 13.17% Sr-90 EFF: 22.20%

AS LEFT Instrument Condition: SAT

AS LEFT DATA

1 MINUTE COUNTS (CPM)

				AVERAGE
AL Background:	27			
Tc-99 Count:	4161	4226	4294	4227.0
Sr-90 Count:	4045			

Efficiencies

Tc-99 EFF: 13.17% Sr-90 EFF: 22.20%

"AF" in the AL Efficiency fields means to refer to the AF Efficiencies in the AS FOUND DATA Section

- [x] Is the AS FOUND efficiency within 20% of efficiency from last calibration?
- [x] Reproducibility: Are the individual counts within 10% of the average?
- [x] Does the probe meet final acceptance criteria?
- [x] Calibration sticker attached?

Comments: Married as a set with: **Model:** 12 **Serial #:** 186763 **Bar Code #:**

Date Instrument is Due For Next Calibration: 10/03/15

Performed by: _____ **Reviewed by:** _____ **Date** 10-3-14

Printed Name: Carl Hall

Safety and Ecology Corporation SEC PROCEDURE # SEC-IS-403 Rev 3

2800 Solway Road, Knoxville, TN 37931

Calibration Certificate

10/3/2014

Calibration Certificate for 2221,Serial # 262318, Bar Code # ,Property # SEC-6971

Date: 10/03/14 **Date Last Cal. Expires:** 10/14/14 **Technician:** Carl Hall

Location: 999999, **Reason For Calibration:** Due for Calibration

EQUIPMENT USED DURING CALIBRATION

MODEL: 500-2 **SERIAL #:** 132896 **CAL DUE:** 12/26/14

MODEL: **SERIAL #:** **CAL DUE:**

AS FOUND DATA **Geotropism:** SAT **AS FOUND Instrument Condition:** SAT **AS LEFT Instrument Condition:** SAT

HIGH VOLTAGE (+/- 10% tolerance)	AS FOUND HV	AS LEFT HV
500 V:	492 V	AF V
1000 V:	995 V	AF V
1500 V:	1503 V	AF V

☐ New Batteries? Threshold ratio: 100=10mV

AF THRESHOLD: 10.0 mV AL THRESHOLD: 10.0 mV

AF Mechanical Zero: 0 AL Mechanical Zero: 0

AF HV Reading: 1050 V AL HV Reading: 1050 V

RATE METER

SCALE	RATE CPM	AS FOUND	% ERROR	AS LEFT	% ERROR
x.1 or x1	100	100	0.00%	AF	0.00%
	250	250	0.00%	AF	0.00%
	400	400	0.00%	AF	0.00%
x1 or x10	1000	1000	0.00%	AF	0.00%
	2500	2500	0.00%	AF	0.00%
	4000	4000	0.00%	AF	0.00%
.10 or x100	10K	10	0.00%	AF	0.00%
	25K	25	0.00%	AF	0.00%
	40K	40	0.00%	AF	0.00%
x100 or x1000	100K	100	0.00%	AF	0.00%
	250K	250	0.00%	AF	0.00%
	400K	400	0.00%	AF	0.00%

☑ Is the As Found Data Within 20% of the Set Point?

DIGITAL SCALER

AF 250: 250 % ERR: 0.00% AL 250: AF % ERR: 0.00%

AF 2500: 2503 % ERR: 0.12% AL 2500: AF % ERR: 0.12%

AF 25K: 25.03 K % ERR: 0.12% AL 25K: AF K % ERR: 0.12%

AF 250K: 250.3 K % ERR: 0.12% AL 250K: AF K % ERR: 0.12%

☑ Is the As Found Data Within 20% of the Set Point?

LOG SCALE

AF 200: 200 % ERR: 0.00% AL 200: AF % ERR: 0.00%

AF 2000: 2000 % ERR: 0.00% AL 2000: AF % ERR: 0.00%

AF 20K: 20 K % ERR: 0.00% AL 20K: AF K% ERR: 0.00%

AF 200K: 200 K % ERR: 0.00% AL 200K: AF K% ERR: 0.00%

☑ Is the As Found Data Within 20% of the Set Point?

REPRODUCIBILITY

x.1 or x1 Scale:	250	250	250
x1 or x10 Scale:	2500	2500	2500
x10 or x100 Scale:	25 K	25 K	25 K
x100 or x1000 Scale:	250 K	250 K	250 K

☑ Are the Individual Counts Within 10% of the Average?

Audio Response: SAT

Audio Divide: SAT

Push Buttons: SAT

Lamp: SAT

Scaler/Digital: SAT

☑ Fast / Slow Response Function Properly?

Comments: Married as a set with: Model: 44-10 Serial #: PR240330 Bar Code #:

☑ Does Instrument Meet Final Acceptance Criteria? ☑ Calibration Sticker Attached?

Date Instrument is Due For Next Calibration: 10/03/15

Performed by: _____ Reviewed by: _____ Date: 10-3-14

Printed Name: Carl Hall

Safety and Ecology Corporation SEC PROCEDURE # SEC-IS-415 Rev 3
2800 Solway Road, Knoxville, TN 37931 *Page 1 of 1*
Calibration Certificate *10/3/2014*

Calibration Certificate for 44-10,Serial # PR240330, Bar Code # ,Property # SEC-6225

Date: 10/03/14 **Date Last Cal. Expires:** 10/14/14 **Technician:** Carl Hall
Location: 999999, **Reason For Calibration:** Due for Calibration

EQUIPMENT USED DURING CALIBRATION

MODEL: 2221 **SERIAL #:** 262318 **CAL DUE:** 10/03/15
MODEL: **SERIAL #:** **CAL DUE:**

NIST TRACEABLE SOURCES USED

SOURCE	ISOTOPE	ACTIVITY	2π	ASSAY DATE
99CS250-0288	Cs-137	6.655 uCi		12/26/2012

Efficiency from Last Calibration: 0.66 % **HV From Last Calibration:** 1050 V **Calibration Threshold:** 10 mV

AS FOUND DATA

AS FOUND Instrument Condition: SAT
HV: 1050 V
Center: 101602
Background: 3865
Probe Efficiency: Cs-137 **0.66%**

1 MINUTE COUNTS (CPM)

AS LEFT DATA after repair of HV adjust

AS LEFT Instrument Condition: SAT
HV: 1050 V
Center:
Background:
Probe Efficiency: Cs-137

"AF" in the AL Efficiency fields means to refer to the AF Efficiencies in the AS FOUND DATA Section

☑ **Is the As Found Efficiency Within 20% of the efficiency from the last cal.?**

Reproducibility: **Isotope:** Cs-137 101567 101589 101648 **Average:** 101601 ☑ **Are the individual counts within 10% of the average?**

* If As Found Efficiency (even after repair) is within 10% of the last calibration and uniformity is <10%, the technician may N/A the Plateau Data and proceed to Comments. Geometry = NaI probes are 4 1/2" from source. All other probes are in contact with surface unless otherwise specified.

PLATEAU AND SET POINT DATA (CPM)

High Voltage	Source Response	Background	HV	CENTER	Background	Efficiency
N/A			V			Cs-137

Comments: **Married as a set with:** **Model:** 2221 **Serial #:** 262318 **Bar Code #:**

☑ **Does Instrument Meet Final Acceptance Criteria?** ☑ **Calibration Sticker Attached?**

Date Instrument is Due For Next Calibration: 10/03/15

Performed by: _____ **Reviewed by:** _____ **Date:** 10-3-14

Printed Name: Carl Hall

Safety and Ecology Corporation SEC PROCEDURE # SEC-IS-403 Rev 3

2800 Solway Road, Knoxville, TN 37931

Calibration Certificate

10/3/2014

Calibration Certificate for 2221,Serial # 172035, Bar Code # ,Property # SEC-5232

Date: 10/03/14 **Date Last Cal. Expires:** 04/03/15 **Technician:** Carl Hall

Location: 143241, **Reason For Calibration:** Due for Calibration

EQUIPMENT USED DURING CALIBRATION

MODEL: 500-2 **SERIAL #:** 132896 **CAL DUE:** 12/26/14

MODEL: **SERIAL #:** **CAL DUE:**

AS FOUND DATA **Geotropism:** SAT **AS FOUND Instrument Condition:** SAT **AS LEFT Instrument Condition:** SAT

HIGH VOLTAGE (+/- 10% tolerance)	AS FOUND HV	AS LEFT HV
500 V:	497 V	AF V
1000 V:	1000 V	AF V
1500 V:	1503 V	AF V

☐ New Batteries? Threshold ratio: 100=10mV

AF THRESHOLD: 10.0 mV AL THRESHOLD: 10.0 mV

AF Mechanical Zero: 0 AL Mechanical Zero: 0

AF HV Reading: 1200 V AL HV Reading: 1200 V

RATE METER

SCALE	RATE CPM	AS FOUND	% ERROR	AS LEFT	% ERROR
x.1 or x1	100	100	0.00%	AF	0.00%
	250	250	0.00%	AF	0.00%
	400	400	0.00%	AF	0.00%
x1 or x10	1000	1000	0.00%	AF	0.00%
	2500	2500	0.00%	AF	0.00%
	4000	4000	0.00%	AF	0.00%
x10 or x100	10K	10	0.00%	AF	0.00%
	25K	25	0.00%	AF	0.00%
	40K	40	0.00%	AF	0.00%
x100 or x1000	100K	100	0.00%	AF	0.00%
	250K	250	0.00%	AF	0.00%
	400K	400	0.00%	AF	0.00%

☑ Is the As Found Data Within 20% of the Set Point?

DIGITAL SCALER

AF 250:	250	% ERR:	0.00%	AL 250:	AF	% ERR:	0.00%
AF 2500:	2503	% ERR:	0.12%	AL 2500:	AF	% ERR:	0.12%
AF 25K:	25.03 K	% ERR:	0.12%	AL 25K:	AF K	% ERR:	0.12%
AF 250K:	250.3 K	% ERR:	0.12%	AL 250K:	AF K	% ERR:	0.12%

☑ Is the As Found Data Within 20% of the Set Point?

LOG SCALE

AF 200:	200	% ERR:	0.00%	AL 200:	AF	% ERR:	0.00%
AF 2000:	2000	% ERR:	0.00%	AL 2000:	AF	% ERR:	0.00%
AF 20K:	20 K	% ERR:	0.00%	AL 20K:	AF K	% ERR:	0.00%
AF 200K:	200 K	% ERR:	0.00%	AL 200K:	AF K	% ERR:	0.00%

☑ Is the As Found Data Within 20% of the Set Point?

REPRODUCIBILITY

x.1 or x1 Scale:	250	250	250
x1 or x10 Scale:	2500	2500	2500
x10 or x100 Scale:	25 K	25 K	25 K
x100 or x1000 Scale:	250 K	250 K	250 K

☑ Are the Individual Counts Within 10% of the Average?

Audio Response: SAT

Audio Divide: SAT

Push Buttons: SAT

Lamp: SAT

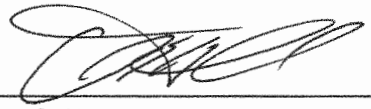
Scaler/Digital: SAT

☑ Fast / Slow Response Function Properly?

Comments: Married as a set with: **Model:** 44-10 **Serial #:** PR199125 **Bar Code #:**

☑ Does Instrument Meet Final Acceptance Criteria? ☑ Calibration Sticker Attached?

Date Instrument is Due For Next Calibration: 10/03/15

Performed by:  Reviewed by:  Date: 10-3-14

Printed Name: Carl Hall

Safety and Ecology Corporation SEC PROCEDURE # SEC-IS-415 Rev 3

2800 Solway Road, Knoxville, TN 37931

Calibration Certificate

10/3/2014

Calibration Certificate for 44-10,Serial # PR199125, Bar Code # ,Property # SEC-5291

Date: 10/03/14 **Date Last Cal. Expires:** 02/04/12 **Technician:** Carl Hall

Location: 999999, **Reason For Calibration:** Due for Calibration

EQUIPMENT USED DURING CALIBRATION

MODEL: 2221 **SERIAL #:** 172035 **CAL DUE:** 10/03/15

MODEL: **SERIAL #:** **CAL DUE:**

NIST TRACEABLE SOURCES USED

SOURCE	ISOTOPE	ACTIVITY	2π	ASSAY DATE
99CS250-0288	Cs-137	6.655 uCi		12/26/2012

Efficiency from Last Calibration: 0.54 % **HV From Last Calibration:** 1000 V **Calibration Threshold:** 10 mV

AS FOUND DATA

AS FOUND Instrument Condition: SAT

HV: 1000 V

Center: 97458

Background: 3211

Probe Efficiency: Cs-137 **0.64%**

1 MINUTE COUNTS (CPM)

AS LEFT DATA after repair of HV adjust

AS LEFT Instrument Condition: SAT

HV: 1200 V

Center: 100795

Background: 4237

Probe Efficiency: Cs-137 **0.65%**

"AF" in the AL Efficiency fields means to refer to the AF Efficiencies in the AS FOUND DATA Section

☑ **Is the As Found Efficiency Within 20% of the efficiency from the last cal.?**

Reproducibility: **Isotope:** Cs-137 101002 100723 100869 **Average:** 100865 ☑ **Are the individual counts within 10% of the average?**

* If As Found Efficiency (even after repair) is within 10% of the last calibration and uniformity is <10%, the technician may N/A the Plateau Data and proceed to Comments. Geometry = NaI probes are 4 1/2" from source. All other probes are in contact with surface unless otherwise specified.

PLATEAU AND SET POINT DATA (CPM)

High Voltage	Source Response	Background
1000	97458	3211
1100	98862	3768
1200	100795	4237

HV V **CENTER** **Background** **Efficiency**

Cs-137

Comments: **Married as a set with:** **Model:** 2221 **Serial #:** 172035 **Bar Code #:**

Increased high voltage setpoint to increase detection sensitivity.

☑ **Does Instrument Meet Final Acceptance Criteria?** ☑ **Calibration Sticker Attached?**

Date Instrument is Due For Next Calibration: 10/03/15

Performed by: _____ **Reviewed by:** _____ **Date:** 10-3-14

Printed Name: Carl Hall

Safety and Ecology Corporation SEC PROCEDURE SEC-IS-410 Rev 3

2800 Solway Road

Knoxville, TN 37931

Calibration Certificate

Calibration Certificate for GilAir5,Serial # 20071004006, Bar Code # ,Property # SEC-6497

Date: 10/03/14 **Date Last Cal. Expires:** **Technician:** Sabrina Hall

Location: 999999, **Reason For Calibration:** #Error

EQUIPMENT USED DURING CALIBRATION

MODEL: DC-Lite (MH) **SERIAL #:** 5036 **CAL. DUE:** 04/17/15

MODEL: **SERIAL #:** **CAL DUE:**

AS FOUND DATA **AF Physical Condition** SAT **AS LEFT DATA**

As Found Instrument Flow Indication: 3 **LPM** **As Left Instrument Flow Indication:** 3 **LPM**

As Found Calibrator Flow Indication: 3 **LPM** **As Left Calibrator Flow Indication:** 3 **LPM**

Unit of Measure: (•) **LPM** ( ) **CFM**

Reproducibility 3 **LPM** 3.01 **LPM** 3 **LPM** **Average:** 3.00 **LPM**

☑ **Are the Individual Counts Within 10% of the Average?**

CALIBRATION DATA	**TARGET VALUE**	**AIR SAMPLER READING**	**CALIBRATOR READING**	**ERROR %**
	2.00 **LPM**	2.00 **LPM**	2.01 **LPM**	0.50% **LPM**
	3.00 **LPM**	3.00 **LPM**	3.00 **LPM**	0.00% **LPM**
	4.00 **LPM**	4.00 **LPM**	4.02 **LPM**	0.50% **LPM**

Air Sampler Setting 3.00 ☑ **Is Error Within 10%?**

Reproducibility 3 **LPM** 3.01 **LPM** 3 **LPM** **Average:** 3.00 **LPM**

☑ **Are the Individual Counts Within 10% of the Average?**

Air Sampler rotometer reading: (•) Use Manufacturers Indication ( ) Use Corrected Marking ( ) N/A

Comments: **Married as a set with:** **Model** **Bar Code #:**

☑ **Does Instrument Meet Final Acceptance Criteria?** ☑ **Calibration Sticker Attached?**

Date Instrument is Due For Next Calibration: 10/03/15

Performed by: Sabrina Hall **Reviewed by:** [signature] **Date:** 10/3/14

Printed Name: Sabrina Hall

Safety and Ecology Corporation SEC PROCEDURE SEC-IS-410 Rev 3

2800 Solway Road

Knoxville, TN 37931

Calibration Certificate

Calibration Certificate for GilAir5,Serial # 20080601022, Bar Code # ,Property # SEC-6687

Date: 10/03/14 **Date Last Cal. Expires:** 08/13/15 **Technician:** Sabrina Hall

Location: 999999, **Reason For Calibration:** Short Cycled

EQUIPMENT USED DURING CALIBRATION

MODEL: DC-Lite (MH) **SERIAL #:** 5036 **CAL. DUE:** 04/17/15

MODEL: **SERIAL #:** **CAL DUE:**

AS FOUND DATA **AF Physical Condition** SAT **AS LEFT DATA**

As Found Instrument Flow Indication: 3 **LPM** **As Left Instrument Flow Indication:** 3 **LPM**

As Found Calibrator Flow Indication: 3 **LPM** **As Left Calibrator Flow Indication:** 3.01 **LPM**

Unit of Measure: (•) **LPM** ( ) **CFM**

Reproducibility 3 **LPM** 3.02 **LPM** 3.01 **LPM** **Average:** 3.01 **LPM**

☑ **Are the Individual Counts Within 10% of the Average?**

CALIBRATION DATA	TARGET VALUE	AIR SAMPLER READING	CALIBRATOR READING	ERROR %
	2.00 LPM	2.00 LPM	2.02 LPM	1.00% LPM
	3.00 LPM	3.00 LPM	3.01 LPM	0.33% LPM
	4.00 LPM	4.00 LPM	4.03 LPM	0.75% LPM

Air Sampler Setting 3.00 ☐ **Is Error Within 10%?**

Reproducibility 3 **LPM** 3.02 **LPM** 3.01 **LPM** **Average:** 3.01 **LPM**

☑ **Are the Individual Counts Within 10% of the Average?**

Air Sampler rotometer reading: (•) Use Manufacturers Indication ( ) Use Corrected Marking ( ) N/A

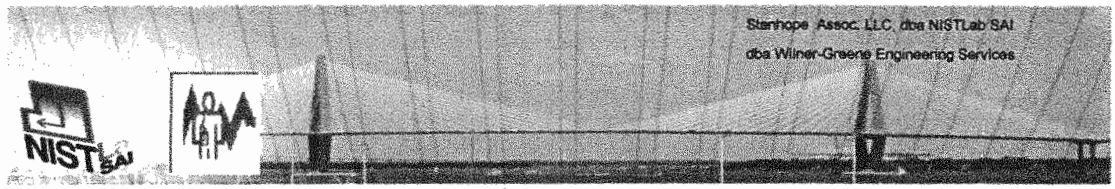
Comments: **Married as a set with:** **Model** **Bar Code #:**

☑ **Does Instrument Meet Final Acceptance Criteria?** ☑ **Calibration Sticker Attached?**

Date Instrument is Due For Next Calibration: 10/03/15

Performed by: Sabrina Hall **Reviewed by:** [signature] **Date:** 10/3/14

Printed Name: Sabrina Hall



CERTIFICATE OF CALIBRATION

Certificate Number: 20142427 - 69853 Page 1

Issued To: PERMA-FIX / SEC
10512 LEXINGTON DRIVE
SUITE 200
KNOXVILLE, TN 37932

Date Received: 8/11/2014
Date Issued: 8/17/2014
Valid Until: Aug 2015

Equipment: Manufacturer: BIOS
Model Number: DEFENDER 510
SerialNumber: 115671
Control #:

Test Conditions :
Temperature: 20.2 C
Humidity: 48.7 %
Barometric Pressure: 1021.4 mBar

As Found:
FULLY FUNCTIONAL AND IN TOLERANCE.

As Returned:
FULLY FUNCTIONAL AND WITHIN TOLERANCE.

Special Conditions:
NONE

Work Performed:
CALIBRATED PER CALIBRATION PROCEDURE FC-002.

CALIBRATED TO: +/- 3.0% AS REFERENCED TO PRIMARY BUBBLE FLOW CELL @ 0.3% UNCERTAINTY AT AMBIENT C

Device, Description, Report Number, Date Due

Reference Standards:

1011, AF-PVM100, PRECISION MICROMANOMETER, 8776372, 6/18/2015

1013, SKC 311-500, 500 ML LAB BURRETTE, caltec96675, 3/13/2023

1030, GILIAN IHCP 300HL, MAGNEHELIC GUAGE, 20132496-65054, 9/28/2014

1037, 4146, MASS FLOW METER, 20141631-68649, 6/2/2015

5045, 811-9911-03, BGI PRIMECAL PRECISION AIR FLOW CALIBRATOR, 20132573-65168, 10/12/2014

Measurement Uncertainty: AIR FLOW RATE +/- 0.3%

Calibrated and Reviewed by 8/17/2014

Authorized Signature: Brian Stanhope

This report certifies that all calibration equipment used in the test is traceable to the National Institue of Standards (NIST) , and applies only to the unit identified under "Equipment" above. This report must not be reproduced except in it's entirety without express written approval.

3575 Maybank HWY, D-327 • Johns Island, SC 29455 • USA • (800) 238-7550 • Fax (800) 238-7550
Website: www.nistlab.com Email: bstanhope@nistlab.com

WASTE MANAGEMENT

Butterfield Station Landfill

Original

40404 S. 99th Ave.
Mobile, AZ, 85239
Ph: 602-606-1008

Ticket# 708957

Customer Name CleanHarborsEnv Clean Harbors
Ticket Date 05/05/2014
Payment Type Credit Account
Manual Ticket#
Hauling Ticket#
Route
State Waste Code
Manifest 105920
Destination
PO W140455694 14000739 44
Profile 440022AZ (HOUSE TRASH AND DEBRIS)
Generator 160-WESTERNNUCLEAR WESTERN NUCLEAR

Carrier CleanHarbors
Vehicle# 40266
Container
Driver
Check#
Billing # 0000020
Gen EPA ID
Grid

Volume

	Time	Scale	Operator	Inbound		
In	05/05/2014 09:20:45	Inbound	sculwell		Gross	29600 lb
Out	05/05/2014 09:47:21	Outbound	sculwell		Tare	28160 lb
					Net	1440 lb
					Tons	0.72

Comments

	Product	LD%	Qty	UOM	Rate	Tax	Amount	Origin
1	SpwasteSolidOth-To	100	0.72	Tons				NM
2	EVF-P6-Environment	100		%				NM
3	ADE-ADEQ Fee	100	0.72	Tons				NM

"This is to certify that the following described merchandise was weighted and counted or measured by a public or deputy weighmaster, an when properly signed and sealed, shall be primafacie evidence of the accuracy of the weight shown prescribed by law"

"I certify that the waste I delivered to this facility on this date does not contain any regulated hazardous, toxic, radioactive waste or substances, or other non-allowable wastes. I also agree to remove any non-allowable wastes I bring to this facility, or pay all costs for proper removal of such wastes, upon request from this facility."

DRIVER: PLEASE SIGN HERE

Total Tax

Total Ticket

WMFL-Butter

WASTE MANAGEMENT

Butterfield Station Landfill

Original

40404 S. 99th Ave.
Mobile, AZ, 85239
Ph: 602-606-1000

Ticket# 708957

Customer Name	CleanHarborsEnv Clean Harbors	Carrier	CleanHarbors		
Ticket Date	05/05/2014	Vehicle#	40266	Volume	
Payment Type	Credit Account	Container			
Manual Ticket#		Driver			
Hauling Ticket#		Check#			
Route		Billing #	0000020		
State Waste Code		Gen EPA ID			
Manifest	105920				
Destination		Grid			
PO	W140455694				
Profile	440022AZ (HOUSE TRASH AND DEBRIS)				
Generator	160-WESTERNNUCLEAR WESTERN NUCLEAR				

	Time	Scale	Operator	Inbound		
In	05/05/2014 09:20:45	Inbound	sculwell		Gross	29600 lb
Out	05/05/2014 09:47:21	Outbound	sculwell		Tare	28160 lb
					Net	1440 lb
					Tons	0.72

Comments

	Product	LD%	Qty	UOM	Rate	Tax	Amount	Origin
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"I certify that the waste I delivered to this facility on this date does not contain any regulated hazardous, toxic, radioactive waste or substances, or other non-allowable wastes. I also agree to remove any non-allowable wastes I bring to this facility, or pay all costs for proper removal of such wastes, upon request from this facility."

DRIVER: PLEASE SIGN HERE

Total Tax

Total Ticket

403WMFL-Butter

4/02/66 PO W1404555694

WASTE MANAGEMENT

PLEASE CALL LANDFILL 24 HRS IN ADVANCE WITH SHIPPING NOTICE.

NON - HAZARDOUS WASTE MANIFEST

FOR OFFICE USE ONLY
Customer Acct. No. _____
Ticket No. _____

GENERATOR

DINEFCHHP 20135 WM-105920

Name WESTERN NUCLEAR INC
Generating Location - SAINE -
Address RUBY MINE #11
SMITH LAKE, NM
Phone No. (720) 286-0513
I.D. No. _____

PROFILE APPROVAL NO.	WASTE DESCRIPTION	QUANTITY	UNITS
440222AZ	HOUSEHOLD TRASH + DEBRIS		

UNIT
D - DRUM
B - BAG
C - CARTON
T - TONS
Y - YARDS
O - OTHER

I hereby certify that the above listed material(s), is (are) not a hazardous waste as defined by 40CFR Part 261: That each waste has been properly described, classified and packaged, and is in proper condition for transportation according to applicable regulation.

BILL D _____ 5/1/14 _____
AUTHORIZED AGENT'S NAME (PRINT) DATE SIGNATURE

CONTRACTOR

Name CLEAN HARBORS
Phone No. (480) 345-2777
Address 4041 W EARHART WAY CHANDLER AZ 85226

I hereby certify that the above listed material(s), is (are) not a hazardous waste as defined by 40CFR Part 261or any applicable state law: That each waste has been properly described, classified and packaged, and is in proper condition for transportation according to applicable regulation.

JOSE RODRIGUEZ 05/05/14 _____
AUTHORIZED AGENT'S NAME (PRINT) DATE SIGNATURE

TRANSPORTER

Name CLEAN HARBORS
Phone No. (480) 345-2777
Address 4041 W EARHART WAY
CHANDLER AZ 85226
Driver's Name _____
Vehicle's No. _____

I hereby certify that the above listed material(s), is (are) not a hazardous waste as defined by 40CFR Part 261or any applicable state law: That each waste has been properly described, classified and packaged, and is in proper condition for transportation according to applicable regulation.

05/05/14 _____ 05/05/14 _____
SHIPMENT DATE DRIVER'S SIGNATURE DELIVERY DATE DRIVER'S SIGNATURE

DISPOSAL FACILITY

- [X] BUTTERFIELD STATION FACILITY • 40404 South 99th Avenue • Mobile, Arizona 85139 • (602) 256-0638
- [ ] NORTHWEST REGIONAL LANDFILL • 19401 West Deer Valley Road • Surprise, Arizona 85387 • (623) 584-8065
- [ ] PAINTED DESERT LANDFILL • 9001 North Porter Avenue • Joseph City, Arizona 86032 • (928) 288-3605
- [ ] GRAY WOLF LANDFILL • 23355 East Highway 169 • Mile Post 11 • Dewey, Arizona 86327 • (928) 925-6249
- [ ] LONE CACTUS LANDFILL • 21402 North 7th Street • Phoenix, Arizona 85024 • (623) 581-0939
- [ ] IRONWOOD LANDFILL • 12720 East Highway 287 • Florence, Arizona 85232 • (520) 868-8778
- [ ] _____

I Hereby certify that the above material has been accepted and that information presented on this document are true and accurate.

_____ 5/5/14 _____
NAME (PRINT) DATE SIGNATURE

ORIGINAL – WHITE DISPOSAL FACILITY – YELLOW TRANSPORTER – PINK GENERATOR – GOLDENROD

Appendix E
Statistical Documentation

Goodness-of-Fit Test and Summary Statistics for Arsenic Background Samples

Colluvium

General Statistics

Total Number of Observations	12	Number of Distinct Observations	11
Minimum	5.6	First Quartile	7.275
Second Largest	9.7	Median	8.25
Maximum	10	Third Quartile	9.2
Mean	8.042	SD	1.538
Coefficient of Variation	0.191	Skewness	-0.581
Mean of logged Data	2.066	SD of logged Data	0.206

Critical Values for Background Comparison Values

Tolerance Factor K (For UTL)	2.736	d2max (for USL)	2.285

Normal GOF Test

Shapiro Wilk Test Statistic	0.9	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.859	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.182	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.256	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage **12.25**

Dakota

General Statistics

Total Number of Observations	12	Number of Distinct Observations	11
Minimum	3.2	First Quartile	3.775
Second Largest	5	Median	3.95
Maximum	6	Third Quartile	4.675
Mean	4.2	SD	0.8
Coefficient of Variation	0.19	Skewness	1.009
Mean of logged Data	1.42	SD of logged Data	0.182

Critical Values for Background Comparison Values

Tolerance Factor K (For UTL)	2.736	d2max (for USL)	2.285

Normal GOF Test

Shapiro Wilk Test Statistic	0.921	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.859	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.182	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.256	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage **6.389**

Mancos

General Statistics

Total Number of Observations	11	Number of Distinct Observations	11
Minimum	3.6	First Quartile	3.85
Second Largest	4.9	Median	4.3
Maximum	5.5	Third Quartile	4.7
Mean	4.327	SD	0.593
Coefficient of Variation	0.137	Skewness	0.609
Mean of logged Data	1.457	SD of logged Data	0.134

Critical Values for Background Comparison Values

Tolerance Factor K (For UTL)	2.815	d2max (for USL)	2.234

Normal GOF Test

Shapiro Wilk Test Statistic	0.943	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.85	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.164	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.267	Data appear Normal at 5% Significance Level	

Data appear Approximate Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage **5.998**

Goodness-of-Fit Test and Summary Statistics for Mercury Background Samples

Colluvium

General Statistics

Total Number of Observations	12	Number of Distinct Observations	7
Minimum	0.014	First Quartile	0.015
Second Largest	0.019	Median	0.0175
Maximum	0.02	Third Quartile	0.0183
Mean	0.017	SD	0.00195
Coefficient of Variation	0.115	Skewness	-0.0877
Mean of logged Data	-4.081	SD of logged Data	0.116

Critical Values for Background Comparison Values

Tolerance Factor K (For UTL)	2.736	d2max (for USL)	2.285

Normal GOF Test

Shapiro Wilk Test Statistic	0.928	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.859	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.196	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.256	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage **0.0223**

Dakota

General Statistics

Total Number of Observations	12	Number of Distinct Observations	7
Minimum	0.013	First Quartile	0.0165
Second Largest	0.021	Median	0.018
Maximum	0.031	Third Quartile	0.02
Mean	0.0184	SD	0.00472
Coefficient of Variation	0.256	Skewness	1.717
Mean of logged Data	-4.021	SD of logged Data	0.232

Critical Values for Background Comparison Values

Tolerance Factor K (For UTL)	2.736	d2max (for USL)	2.285

Normal GOF Test

Shapiro Wilk Test Statistic	0.83	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.859	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.209	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.256	Data appear Normal at 5% Significance Level	

Data appear Approximate Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage **0.0313**

Mancos

General Statistics

Total Number of Observations	12	Number of Distinct Observations	5
Minimum	0.018	First Quartile	0.02
Second Largest	0.025	Median	0.02
Maximum	0.03	Third Quartile	0.022
Mean	0.0213	SD	0.00333
Coefficient of Variation	0.157	Skewness	1.894
Mean of logged Data	-3.861	SD of logged Data	0.143

Critical Values for Background Comparison Values

Tolerance Factor K (For UTL)	2.736	d2max (for USL)	2.285

Data Not Lognormal at 5% Significance Level

Data Not Normal at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Nonparametric Upper Limits for Background Comparison Values

Order of Statistic, r	12	95% UTL with 95% Coverage	**0.0311**

Goodness-of-Fit Test and Summary Statistics for Molybdenum Background Samples

Colluvium

General Statistics

Total Number of Observations	12	Number of Distinct Observations	10
Minimum	0.37	First Quartile	0.5
Second Largest	0.62	Median	0.535
Maximum	0.71	Third Quartile	0.56
Mean	0.532	SD	0.0879
Coefficient of Variation	0.165	Skewness	0.167
Mean of logged Data	-0.645	SD of logged Data	0.169

Critical Values for Background Comparison Values

Tolerance Factor K (For UTL)	2.736	d2max (for USL)	2.285

Normal GOF Test

Shapiro Wilk Test Statistic	0.975	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.859	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.167	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.256	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage **0.772**

Dakota

General Statistics

Total Number of Observations	12	Number of Distinct Observations	8
Minimum	0.28	First Quartile	0.35
Second Largest	0.42	Median	0.37
Maximum	0.45	Third Quartile	0.393
Mean	0.372	SD	0.0428
Coefficient of Variation	0.115	Skewness	-0.263
Mean of logged Data	-0.996	SD of logged Data	0.119

Critical Values for Background Comparison Values

Tolerance Factor K (For UTL)	2.736	d2max (for USL)	2.285

Normal GOF Test

Shapiro Wilk Test Statistic	0.942	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.859	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.223	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.256	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage **0.489**

Mancos

General Statistics

Total Number of Observations	12	Number of Distinct Observations	11
Minimum	0.39	First Quartile	0.51
Second Largest	0.71	Median	0.6
Maximum	0.74	Third Quartile	0.643
Mean	0.583	SD	0.104
Coefficient of Variation	0.179	Skewness	-0.263
Mean of logged Data	-0.556	SD of logged Data	0.188

Critical Values for Background Comparison Values

Tolerance Factor K (For UTL)	2.736	d2max (for USL)	2.285

Normal GOF Test

Shapiro Wilk Test Statistic	0.977	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.859	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.112	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.256	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage **0.868**

Goodness-of-Fit Test and Summary Statistics for Selenium Background Samples

Colluvium

General Statistics

Total Number of Observations	12	Number of Distinct Observations	8
Minimum	0.85	First Quartile	0.985
Second Largest	1.3	Median	1.05
Maximum	1.4	Third Quartile	1.125
Mean	1.077	SD	0.16
Coefficient of Variation	0.148	Skewness	0.754
Mean of logged Data	0.0642	SD of logged Data	0.144

Critical Values for Background Comparison Values

Tolerance Factor K (For UTL)	2.736	d2max (for USL)	2.285

Normal GOF Test

Shapiro Wilk Test Statistic	0.939	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.859	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.192	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.256	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage **1.514**

Dakota

General Statistics

Total Number of Observations	12	Number of Distinct Observations	11
Minimum	0.52	First Quartile	0.66
Second Largest	0.85	Median	0.71
Maximum	0.99	Third Quartile	0.758
Mean	0.72	SD	0.121
Coefficient of Variation	0.169	Skewness	0.7
Mean of logged Data	-0.341	SD of logged Data	0.166

Critical Values for Background Comparison Values

Tolerance Factor K (For UTL)	2.736	d2max (for USL)	2.285

Normal GOF Test

Shapiro Wilk Test Statistic	0.964	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.859	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.152	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.256	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage **1.052**

Mancos

General Statistics

Total Number of Observations	12	Number of Distinct Observations	11
Minimum	0.65	First Quartile	0.788
Second Largest	1.1	Median	0.87
Maximum	1.2	Third Quartile	1.018
Mean	0.894	SD	0.175
Coefficient of Variation	0.196	Skewness	0.327
Mean of logged Data	-0.129	SD of logged Data	0.196

Critical Values for Background Comparison Values

Tolerance Factor K (For UTL)	2.736	d2max (for USL)	2.285

Normal GOF Test

Shapiro Wilk Test Statistic	0.951	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.859	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.13	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.256	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage **1.373**

Goodness-of-Fit Test and Summary Statistics for Uranium Background Samples

Colluvium

General Statistics

Total Number of Observations	12	Number of Distinct Observations	11
Minimum	0.48	First Quartile	0.605
Second Largest	0.74	Median	0.63
Maximum	0.82	Third Quartile	0.673
Mean	0.639	SD	0.0858
Coefficient of Variation	0.134	Skewness	0.407
Mean of logged Data	-0.456	SD of logged Data	0.134

Critical Values for Background Comparison Values

Tolerance Factor K (For UTL)	2.736	d2max (for USL)	2.285

Normal GOF Test

Shapiro Wilk Test Statistic	0.959	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.859	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.163	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.256	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage **0.874**

Dakota

General Statistics

Total Number of Observations	12	Number of Distinct Observations	9
Minimum	0.38	First Quartile	0.44
Second Largest	0.56	Median	0.48
Maximum	0.58	Third Quartile	0.54
Mean	0.486	SD	0.0622
Coefficient of Variation	0.128	Skewness	-0.112
Mean of logged Data	-0.73	SD of logged Data	0.13

Critical Values for Background Comparison Values

Tolerance Factor K (For UTL)	2.736	d2max (for USL)	2.285

Normal GOF Test

Shapiro Wilk Test Statistic	0.97	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.859	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.142	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.256	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage **0.656**

Mancos

General Statistics

Total Number of Observations	12	Number of Distinct Observations	10
Minimum	0.4	First Quartile	0.508
Second Largest	0.76	Median	0.52
Maximum	0.86	Third Quartile	0.628
Mean	0.578	SD	0.129
Coefficient of Variation	0.224	Skewness	1.043
Mean of logged Data	-0.569	SD of logged Data	0.212

Critical Values for Background Comparison Values

Tolerance Factor K (For UTL)	2.736	d2max (for USL)	2.285

Normal GOF Test

Shapiro Wilk Test Statistic	0.9	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.859	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.257	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.256	Data Not Normal at 5% Significance Level	

Data appear Approximate Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage **0.932**

Goodness-of-Fit Test and Summary Statistics for Vanadium Background Samples

Colluvium

General Statistics

Total Number of Observations	12	Number of Distinct Observations	5
Minimum	12	First Quartile	12
Second Largest	15	Median	13.5
Maximum	16	Third Quartile	14
Mean	13.33	SD	1.371
Coefficient of Variation	0.103	Skewness	0.546
Mean of logged Data	2.586	SD of logged Data	0.101

Critical Values for Background Comparison Values

Tolerance Factor K (For UTL)	2.736	d2max (for USL)	2.285

Normal GOF Test

Shapiro Wilk Test Statistic	0.849	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.859	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.251	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.256	Data appear Normal at 5% Significance Level	

Data appear Approximate Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage **17.08**

Dakota

General Statistics

Total Number of Observations	12	Number of Distinct Observations	6
Minimum	12	First Quartile	13.75
Second Largest	16	Median	15
Maximum	19	Third Quartile	16
Mean	14.92	SD	1.832
Coefficient of Variation	0.123	Skewness	0.572
Mean of logged Data	2.696	SD of logged Data	0.121

Critical Values for Background Comparison Values

Tolerance Factor K (For UTL)	2.736	d2max (for USL)	2.285

Normal GOF Test

Shapiro Wilk Test Statistic	0.927	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.859	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.194	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.256	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage **19.93**

Mancos

General Statistics

Total Number of Observations	12	Number of Distinct Observations	5
Minimum	16	First Quartile	17
Second Largest	21	Median	18
Maximum	21	Third Quartile	20
Mean	18.58	SD	1.73
Coefficient of Variation	0.0931	Skewness	0.148
Mean of logged Data	2.918	SD of logged Data	0.093

Critical Values for Background Comparison Values

Tolerance Factor K (For UTL)	2.736	d2max (for USL)	2.285

Normal GOF Test

Shapiro Wilk Test Statistic	0.896	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.859	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.215	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.256	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage **23.32**

Goodness-of-Fit Test and Summary Statistics for Radium-226 Background Samples

Colluvium

General Statistics

Total Number of Observations	25	Number of Distinct Observations	23
Minimum	0.83	First Quartile	1.12
Second Largest	1.48	Median	1.25
Maximum	1.56	Third Quartile	1.32
Mean	1.221	SD	0.186
Coefficient of Variation	0.152	Skewness	-0.381
Mean of logged Data	0.188	SD of logged Data	0.16

Critical Values for Background Comparison Values

Tolerance Factor K (For UTL)	2.292	d2max (for USL)	2.663

Normal GOF Test

Shapiro Wilk Test Statistic	0.972	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.918	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.101	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.177	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage **1.647**

Dakota

General Statistics

Total Number of Observations	25	Number of Distinct Observations	22
Minimum	0.63	First Quartile	0.83
Second Largest	1.29	Median	0.95
Maximum	1.29	Third Quartile	1.17
Mean	0.987	SD	0.199
Coefficient of Variation	0.201	Skewness	0.0535
Mean of logged Data	-0.0333	SD of logged Data	0.206

Critical Values for Background Comparison Values

Tolerance Factor K (For UTL)	2.292	d2max (for USL)	2.663

Normal GOF Test

Shapiro Wilk Test Statistic	0.942	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.918	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.145	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.177	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage **1.442**

Mancos

General Statistics

Total Number of Observations	25	Number of Distinct Observations	21
Minimum	0.85	First Quartile	1.15
Second Largest	1.7	Median	1.3
Maximum	1.71	Third Quartile	1.45
Mean	1.301	SD	0.237
Coefficient of Variation	0.182	Skewness	-0.0142
Mean of logged Data	0.247	SD of logged Data	0.189

Critical Values for Background Comparison Values

Tolerance Factor K (For UTL)	2.292	d2max (for USL)	2.663

Normal GOF Test

Shapiro Wilk Test Statistic	0.973	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.918	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.0917	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.177	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage **1.845**

Outlier Evaluation for Arsenic

FULL ARSENIC DATA SET (mg/kg)

AsCount	Colluvium	Dakota	Mancos
1	5.60	3.20	3.60
2	5.70	3.30	3.70
3	6.00	3.70	3.80
4	7.70	3.80	3.90
5	8.10	3.80	4.00
6	8.10	3.90	4.30
7	8.40	4.00	4.50
8	8.60	4.20	4.60
9	9.10	4.60	4.80
10	9.50	4.90	4.90
11	9.70	5.00	5.50
12	10.00	6.00	6.90

Notes

Red = Dixon's Test Outliers at 5% significance

No outliers for Dixon's Test at 1% significance

Variable	NumObs	# Missing	Minimum	Maximum	Mean	SD
Colluvium	12	0	5.6	10	8.042	1.538
Dakota	12	0	3.2	6.0	4.2	0.80
Mancos	12	0	3.6	6.9	4.542	0.934

Variable	SEM	MAD/0.675	Skewness	Kurtosis	CV
Colluvium	0.444	1.557	-0.581	-0.9	0.191
Dakota	0.231	0.667	1.009	0.95	0.19
Mancos	0.27	0.741	1.579	2.944	0.206

ADJUSTED ARSENIC DATA SET (mg/kg)

AsCount	Colluvium	Dakota	Mancos
1	5.60	3.20	3.60
2	5.70	3.30	3.70
3	6.00	3.70	3.80
4	7.70	3.80	3.90
5	8.10	3.80	4.00
6	8.10	3.90	4.30
7	8.40	4.00	4.50
8	8.60	4.20	4.60
9	9.10	4.60	4.80
10	9.50	4.90	4.90
11	9.70	5.00	5.50
12	10.00	6.00	- -

Notes - - Removed mathematical outlier

No outliers for second itteration of Dixon's test

Variable	NumObs	# Missing	Minimum	Maximum	Mean	SD
Colluvium	12	0	5.6	10	8.042	1.538
Dakota	12	0	3.2	6.0	4.2	0.80
Mancos	12	0	3.6	5.5	4.33	0.593

Variable	SEM	MAD/0.675	Skewness	Kurtosis	CV
Colluvium	0.444	1.557	-0.581	-0.9	0.191
Dakota	0.231	0.667	1.009	0.95	0.19
Mancos	0.179	0.741	0.609	-0.306	0.137

	%Change in Mean
Mancos	4.85%

Outlier Evaluation for Arsenic

Step 1

Run Dixon test on full data set.

Results indicate only one point is mathematical outlier at 5% significance.

Step 2

Remove mathematical Dixon test on adjusted data set.

Results indicate no mathematical outliers at 5% significance.

Step 3

Plot histogram and review data for appropriate use.

Full data set is considered to be appropriate for use in calculation of background values

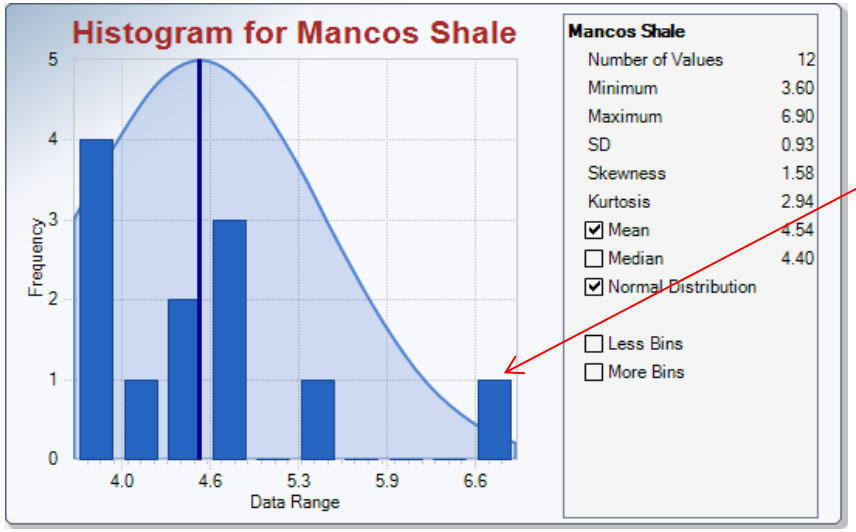
Statistical Justification:

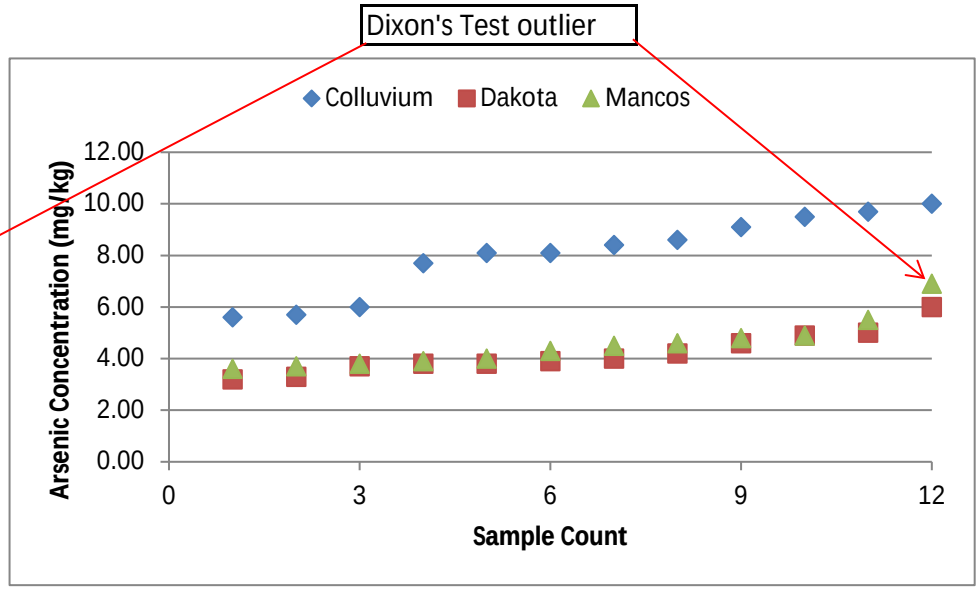
1 Mathematical outlier value plots within range of values of other background samples
2 Change in mean value by removal of data is small (<5%)
3 Full range of values is within 3 standard deviations
4 Range of values becomes very narrow without inclusion of the mathematical outlier

Step 4

Review highest sample locations to search for "hot samples"

Highest Colluvium	RMCB-DN33	Highest Dakota	RMDB-R53
	RMCB-END34		RMDB-DN28
	RMCB-X24		RMDB-TN46
Highest Mancos	RMMB-EN63		
	RMMB-AN17		
	RMMB-LD32		





FULL ARSENIC DATA SET (mg/kg)

Outlier Tests for Selected Uncensored Variables

Pro UCL V5.0 Outlier Output File

User Selected Options	
Date/Time of Computation	7/7/2014 9:05
From File	WorkSheet.xls
Full Precision	OFF

Dixon's Outlier Test for Colluvium

Number of Observations = 12
10% critical value: 0.49
5% critical value: 0.546
1% critical value: 0.642

1. Observation Value 10 is a Potential Outlier (Upper Tail)?
Test Statistic: 0.116
For 10% significance level, 10 is not an outlier.
For 5% significance level, 10 is not an outlier.
For 1% significance level, 10 is not an outlier.

2. Observation Value 5.6 is a Potential Outlier (Lower Tail)?
Test Statistic: 0.098
For 10% significance level, 5.6 is not an outlier.
For 5% significance level, 5.6 is not an outlier.
For 1% significance level, 5.6 is not an outlier.

Dixon's Outlier Test for Dakota

Number of Observations = 12
10% critical value: 0.49
5% critical value: 0.546
1% critical value: 0.642

1. Observation Value 6 is a Potential Outlier (Upper Tail)?
Test Statistic: 0.407
For 10% significance level, 6 is not an outlier.
For 5% significance level, 6 is not an outlier.
For 1% significance level, 6 is not an outlier.

2. Observation Value 3.2 is a Potential Outlier (Lower Tail)?
Test Statistic: 0.278
For 10% significance level, 3.2 is not an outlier.
For 5% significance level, 3.2 is not an outlier.
For 1% significance level, 3.2 is not an outlier.

Dixon's Outlier Test for Mancos

Number of Observations = 12
10% critical value: 0.49
5% critical value: 0.546
1% critical value: 0.642

1. Observation Value 6.9 is a Potential Outlier (Upper Tail)?
Test Statistic: 0.625
For 10% significance level, 6.9 is an outlier.
For 5% significance level, 6.9 is an outlier.
For 1% significance level, 6.9 is not an outlier.

2. Observation Value 3.6 is a Potential Outlier (Lower Tail)?
Test Statistic: 0.105
For 10% significance level, 3.6 is not an outlier.
For 5% significance level, 3.6 is not an outlier.
For 1% significance level, 3.6 is not an outlier.

ADJUSTED ARSENIC DATA SET (mg/kg)

Outlier Tests for Selected Uncensored Variables

Pro UCL V5.0 Outlier Output File

User Selected Options	
Date/Time of Computation	7/7/2014 9:10
From File	WorkSheet.xls
Full Precision	OFF

Dixon's Outlier Test for Colluvium

Number of Observations = 12
10% critical value: 0.49
5% critical value: 0.546
1% critical value: 0.642

1. Observation Value 10 is a Potential Outlier (Upper Tail)?
Test Statistic: 0.116
For 10% significance level, 10 is not an outlier.
For 5% significance level, 10 is not an outlier.
For 1% significance level, 10 is not an outlier.

2. Observation Value 5.6 is a Potential Outlier (Lower Tail)?
Test Statistic: 0.098
For 10% significance level, 5.6 is not an outlier.
For 5% significance level, 5.6 is not an outlier.
For 1% significance level, 5.6 is not an outlier.

Dixon's Outlier Test for Dakota

Number of Observations = 12
10% critical value: 0.49
5% critical value: 0.546
1% critical value: 0.642

1. Observation Value 6 is a Potential Outlier (Upper Tail)?
Test Statistic: 0.407
For 10% significance level, 6 is not an outlier.
For 5% significance level, 6 is not an outlier.
For 1% significance level, 6 is not an outlier.

2. Observation Value 3.2 is a Potential Outlier (Lower Tail)?
Test Statistic: 0.278
For 10% significance level, 3.2 is not an outlier.
For 5% significance level, 3.2 is not an outlier.
For 1% significance level, 3.2 is not an outlier.

Dixon's Outlier Test for Mancos

Number of Observations = 11
10% critical value: 0.517
5% critical value: 0.576
1% critical value: 0.679

1. Observation Value 5.5 is a Potential Outlier (Upper Tail)?
Test Statistic: 0.389
For 10% significance level, 5.5 is not an outlier.
For 5% significance level, 5.5 is not an outlier.
For 1% significance level, 5.5 is not an outlier.

2. Observation Value 3.6 is a Potential Outlier (Lower Tail)?
Test Statistic: 0.154
For 10% significance level, 3.6 is not an outlier.
For 5% significance level, 3.6 is not an outlier.
For 1% significance level, 3.6 is not an outlier.

Outlier Evaluation for Mercury

FULL MERCURY DATA SET (mg/kg)

HgCount	Colluvium	Dakota	Mancos
1	0.014	0.013	0.018
2	0.015	0.013	0.018
3	0.015	0.015	0.020
4	0.015	0.017	0.020
5	0.016	0.017	0.020
6	0.017	0.018	0.020
7	0.018	0.018	0.020
8	0.018	0.018	0.020
9	0.018	0.020	0.022
10	0.019	0.02	0.022
11	0.019	0.021	0.025
12	0.020	0.031	0.030

Notes

Red = Dixon's Test Outliers at 5% significance

No outliers for Dixon's Test at 1% significance

Variable	NumObs	# Missing	Minimum	Maximum	Mean	SD
Colluvium	12	0	0.014	0.02	0.017	0.001954
Dakota	12	0	0.013	0.031	0.018417	0.004719
Mancos	12	0	0.018	0.03	0.02125	0.003334

Variable	SEM	MAD/0.675	Skewness	Kurtosis	CV
Colluvium	5.64E-04	0.00222	-0.0877	-1.374	0.115
Dakota	0.00136	0.00297	1.717	4.547	0.256
Mancos	9.62E-04	0.00148	1.894	4.002	0.157

ADJUSTED MERCURY DATA SET (mg/kg)

HgCount	Colluvium	Dakota	Mancos
1	0.014	0.013	0.018
2	0.015	0.013	0.018
3	0.015	0.015	0.020
4	0.015	0.017	0.020
5	0.016	0.017	0.020
6	0.017	0.018	0.020
7	0.018	0.018	0.020
8	0.018	0.018	0.020
9	0.018	0.020	0.022
10	0.019	0.02	0.022
11	0.019	0.021	0.025
12	0.020	--	--

Notes -- Removed mathematical outlier

No outliers for second itteration of Dixon's test

Variable	NumObs	# Missing	Minimum	Maximum	Mean	SD
Colluvium	12	0	0.014	0.02	0.017	0.001954
Dakota	11	0	0.013	0.021	0.01727	0.002687
Mancos	11	0	0.018	0.025	0.02045	0.001968

Variable	SEM	MAD/0.675	Skewness	Kurtosis	CV
Colluvium	5.64E-04	0.00222	-0.0877	-1.374	0.115
Dakota	8.10E-04	0.00297	-0.468	-0.656	0.156
Mancos	5.93E-04	0	1.141	2.081	0.0962

	%Change in Mean
Dakota	6.43%
Mancos	3.84%

Outlier Evaluation for Mercury

Step 1

Run Dixon test on full data set.

Results indicate two points are mathematical outliers at 5% significance.

Step 2

Remove mathematical Dixon test on adjusted data set.

Results indicate no mathematical outliers at 5% significance.

Step 3

Plot histogram and review data for appropriate use.

Step 4

Review highest sample locations to search for "hot samples"

Highest Colluvium	RMCB-DN33	Highest Dakota	RMMB-W05
	RMCB-R59		RMMB-EN63
	RMCB-X24		RMMB-E15
Highest Mancos	RMDB-DN28		
	RMDB-C44		
	RMDB-AN55		

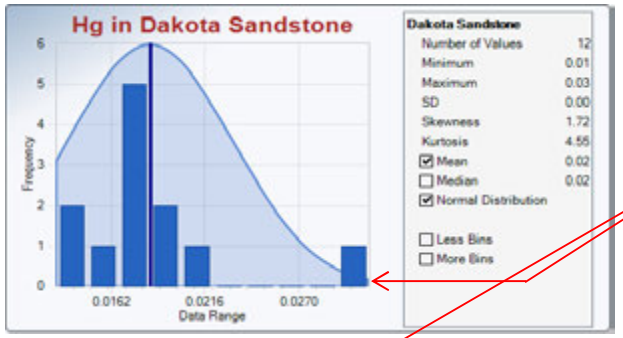
Full data set for is considered to be appropriate

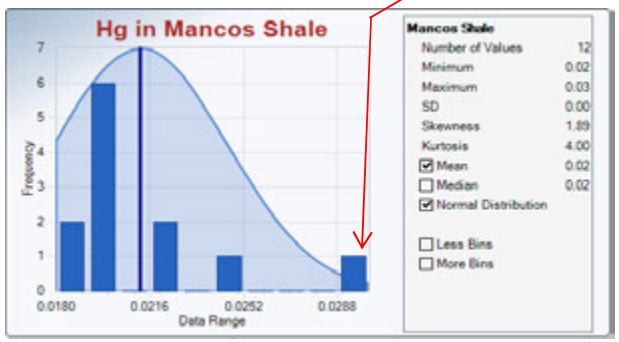
Justification:

1 No mathematical outliers according to Dixon's Tests

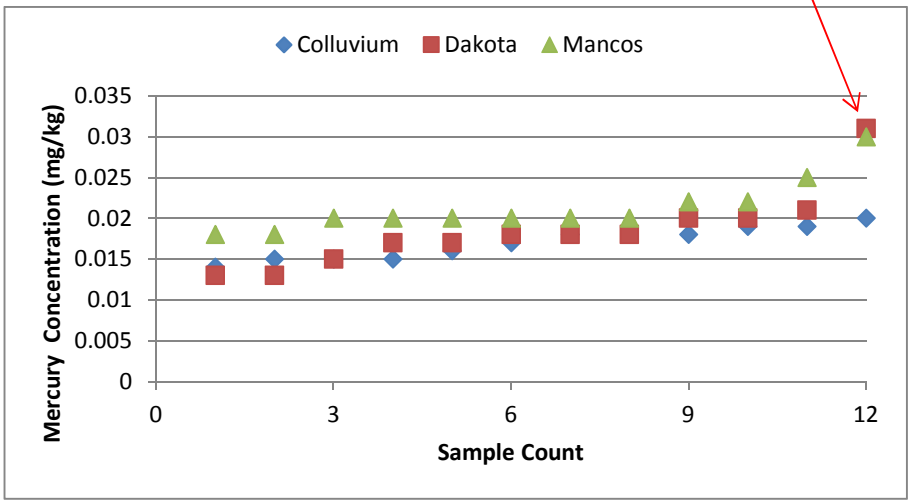
2 Removal of mazimum values will creat unnecessarily narrow range of detection values (from 18 to 8 ug/kg)

3 Maximum sample concentrations agree in different areas and do not correlate well with high detections of other analytes.





Dixon's Test outlier



FULL MERCURY DATA SET (mg/kg)

Outlier Tests for Selected Uncensored Variables

Pro UCL V5.0 Outlier Output File

User Selected Options	
Date/Time of Computation	7/7/2014 11:47
From File	WorkSheet_a.xls
Full Precision	OFF

Dixon's Outlier Test for Colluvium

Number of Observations = 12
10% critical value: 0.49
5% critical value: 0.546
1% critical value: 0.642

1. Observation Value 0.02 is a Potential Outlier (Upper Tail)?
Test Statistic: 0.200
For 10% significance level, 0.02 is not an outlier.
For 5% significance level, 0.02 is not an outlier.
For 1% significance level, 0.02 is not an outlier.

2. Observation Value 0.014 is a Potential Outlier (Lower Tail)?
Test Statistic: 0.200
For 10% significance level, 0.014 is not an outlier.
For 5% significance level, 0.014 is not an outlier.
For 1% significance level, 0.014 is not an outlier.

Dixon's Outlier Test for Dakota

Number of Observations = 12
10% critical value: 0.49
5% critical value: 0.546
1% critical value: 0.642

1. Observation Value 0.031 is a Potential Outlier (Upper Tail)?
Test Statistic: 0.611
For 10% significance level, 0.031 is an outlier.
For 5% significance level, 0.031 is an outlier.
For 1% significance level, 0.031 is not an outlier.

2. Observation Value 0.013 is a Potential Outlier (Lower Tail)?
Test Statistic: 0.250
For 10% significance level, 0.013 is not an outlier.
For 5% significance level, 0.013 is not an outlier.
For 1% significance level, 0.013 is not an outlier.

Dixon's Outlier Test for Mancos

Number of Observations = 12
10% critical value: 0.49
5% critical value: 0.546
1% critical value: 0.642

1. Observation Value 0.03 is a Potential Outlier (Upper Tail)?
Test Statistic: 0.667
For 10% significance level, 0.03 is an outlier.
For 5% significance level, 0.03 is an outlier.
For 1% significance level, 0.03 is an outlier.

2. Observation Value 0.018 is a Potential Outlier (Lower Tail)?
Test Statistic: 0.286
For 10% significance level, 0.018 is not an outlier.
For 5% significance level, 0.018 is not an outlier.
For 1% significance level, 0.018 is not an outlier.

ADJUSTED MERCURY DATA SET (mg/kg)

Outlier Tests for Selected Uncensored Variables

Pro UCL V5.0 Outlier Output File

User Selected Options	
Date/Time of Computation	7/7/2014 12:17
From File	WorkSheet.xls
Full Precision	OFF

Dixon's Outlier Test for Colluvium

Number of Observations = 12
10% critical value: 0.49
5% critical value: 0.546
1% critical value: 0.642

1. Observation Value 0.02 is a Potential Outlier (Upper Tail)?
Test Statistic: 0.200
For 10% significance level, 0.02 is not an outlier.
For 5% significance level, 0.02 is not an outlier.
For 1% significance level, 0.02 is not an outlier.

2. Observation Value 0.014 is a Potential Outlier (Lower Tail)?
Test Statistic: 0.200
For 10% significance level, 0.014 is not an outlier.
For 5% significance level, 0.014 is not an outlier.
For 1% significance level, 0.014 is not an outlier.

Dixon's Outlier Test for Dakota

Number of Observations = 11
10% critical value: 0.517
5% critical value: 0.576
1% critical value: 0.679

1. Observation Value 0.021 is a Potential Outlier (Upper Tail)?
Test Statistic: 0.125
For 10% significance level, 0.021 is not an outlier.
For 5% significance level, 0.021 is not an outlier.
For 1% significance level, 0.021 is not an outlier.

2. Observation Value 0.013 is a Potential Outlier (Lower Tail)?
Test Statistic: 0.286
For 10% significance level, 0.013 is not an outlier.
For 5% significance level, 0.013 is not an outlier.
For 1% significance level, 0.013 is not an outlier.

Dixon's Outlier Test for Mancos

Number of Observations = 11
10% critical value: 0.517
5% critical value: 0.576
1% critical value: 0.679

1. Observation Value 0.025 is a Potential Outlier (Upper Tail)?
Test Statistic: 0.429
For 10% significance level, 0.025 is not an outlier.
For 5% significance level, 0.025 is not an outlier.
For 1% significance level, 0.025 is not an outlier.

2. Observation Value 0.018 is a Potential Outlier (Lower Tail)?
Test Statistic: 0.500
For 10% significance level, 0.018 is not an outlier.
For 5% significance level, 0.018 is not an outlier.
For 1% significance level, 0.018 is not an outlier.

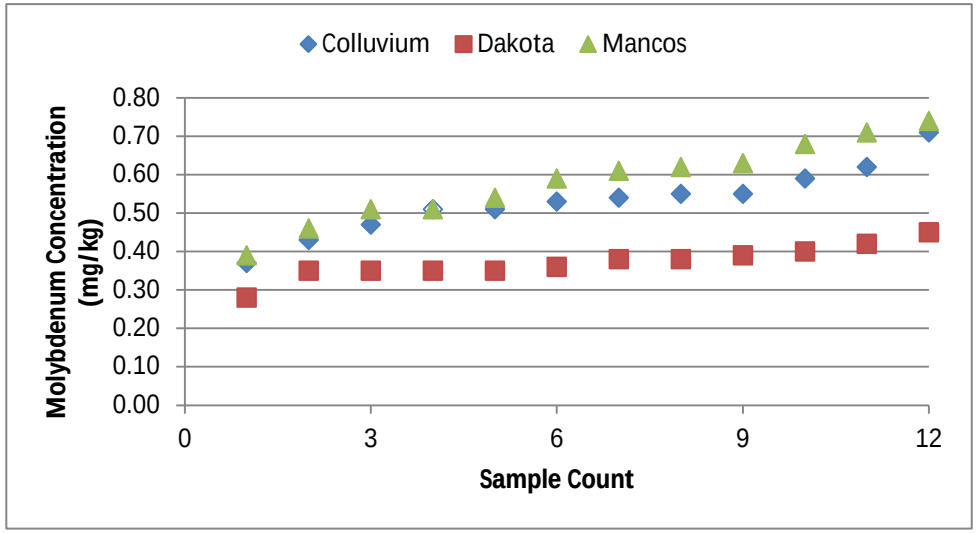
Outlier Evaluation for Molybdenum

FULL MOLYBDENUM DATA SET (mg/kg)

MoCount	Colluvium	Dakota	Mancos
1	0.37	0.28	0.39
2	0.43	0.35	0.46
3	0.47	0.35	0.51
4	0.51	0.35	0.51
5	0.51	0.35	0.54
6	0.53	0.36	0.59
7	0.54	0.38	0.61
8	0.55	0.38	0.62
9	0.55	0.39	0.63
10	0.59	0.40	0.68
11	0.62	0.42	0.71
12	0.71	0.45	0.74

Variable	NumObs	# Missing	Minimum	Maximum	Mean	SD
Colluvium	12	0	0.37	0.71	0.532	0.0879
Dakota	12	0	0.28	0.45	0.372	0.0428
Mancos	12	0	0.39	0.74	0.583	0.104

Variable	SEM	MAD/0.675	Skewness	Kurtosis	CV
Colluvium	0.0254	0.0593	0.167	0.955	0.165
Dakota	0.0124	0.0297	-0.263	1.376	0.115
Mancos	0.0301	0.126	-0.263	-0.511	0.179



Notes

No outliers for Dixon's Test at 5% significance

Step 1

Run Dixon test on full data set.

Results indicate only no data is mathematical outlier at 5% significance.

Step 2

Plot histogram and review data for appropriate use.

Step 3

Review highest sample locations to search for "hot samples"

Highest Colluvium	RMCB-X24	Highest Dakota	RMDB-DN28	Highest Mancos	RMMB-E15
	RMCB-DN33		RMDB-TN46		RMMB-W05
	RMCB-EN34		RMDB-HND56		RMMB-AN17

Full data set is considered to be appropriate for use in calculation of background values

Justification:

1 No mathematical outliers according to Dixon's Tests

FULL MOLYBDENUM DATA SET (mg/kg)

Outlier Tests for Selected Uncensored Variables

Pro UCL V5.0 Outlier Output File

User Selected Options	
Date/Time of Computation	7/7/2014 11:50
From File	WorkSheet_a.xls
Full Precision	OFF

Dixon's Outlier Test for Colluvium

Number of Observations = 12
10% critical value: 0.49
5% critical value: 0.546
1% critical value: 0.642

1. Observation Value 0.71 is a Potential Outlier (Upper Tail)?
Test Statistic: 0.429
For 10% significance level, 0.71 is not an outlier.
For 5% significance level, 0.71 is not an outlier.
For 1% significance level, 0.71 is not an outlier.

2. Observation Value 0.37 is a Potential Outlier (Lower Tail)?
Test Statistic: 0.400
For 10% significance level, 0.37 is not an outlier.
For 5% significance level, 0.37 is not an outlier.
For 1% significance level, 0.37 is not an outlier.

Dixon's Outlier Test for Dakota

Number of Observations = 12
10% critical value: 0.49
5% critical value: 0.546
1% critical value: 0.642

1. Observation Value 0.45 is a Potential Outlier (Upper Tail)?
Test Statistic: 0.500
For 10% significance level, 0.45 is an outlier.
For 5% significance level, 0.45 is not an outlier.
For 1% significance level, 0.45 is not an outlier.

2. Observation Value 0.28 is a Potential Outlier (Lower Tail)?
Test Statistic: 0.500
For 10% significance level, 0.28 is an outlier.
For 5% significance level, 0.28 is not an outlier.
For 1% significance level, 0.28 is not an outlier.

Dixon's Outlier Test for Mancos

Number of Observations = 12
10% critical value: 0.49
5% critical value: 0.546
1% critical value: 0.642

1. Observation Value 0.74 is a Potential Outlier (Upper Tail)?
Test Statistic: 0.214
For 10% significance level, 0.74 is not an outlier.
For 5% significance level, 0.74 is not an outlier.
For 1% significance level, 0.74 is not an outlier.

2. Observation Value 0.39 is a Potential Outlier (Lower Tail)?
Test Statistic: 0.375
For 10% significance level, 0.39 is not an outlier.
For 5% significance level, 0.39 is not an outlier.
For 1% significance level, 0.39 is not an outlier.

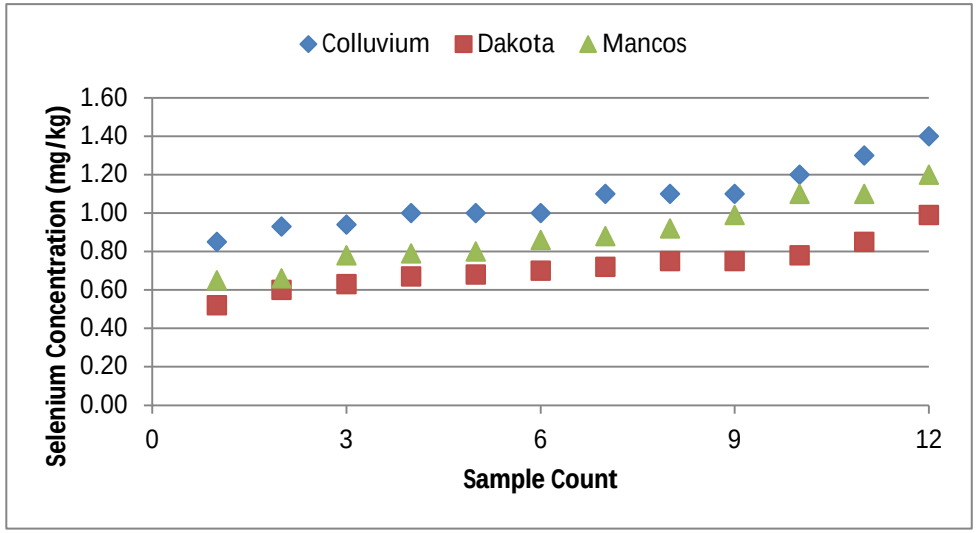
Outlier Evaluation for Selenium

FULL SELENIUM DATA SET (mg/kg)

SeCount	Colluvium	Dakota	Mancos
1	0.85	0.52	0.65
2	0.93	0.60	0.66
3	0.94	0.63	0.78
4	1.0	0.67	0.79
5	1.0	0.68	0.80
6	1.0	0.70	0.86
7	1.1	0.72	0.88
8	1.1	0.75	0.92
9	1.1	0.75	0.99
10	1.2	0.78	1.1
11	1.3	0.85	1.1
12	1.4	0.99	1.2

Variable	NumObs	# Missing	Minimum	Maximum	Mean	SD
Colluvium	12	0	0.85	1.4	1.077	0.16
Dakota	12	0	0.52	0.99	0.72	0.121
Mancos	12	0	0.65	1.2	0.894	0.175

Variable	SEM	MAD/0.675	Skewness	Kurtosis	CV
Colluvium	0.0461	0.119	0.754	0.137	0.148
Dakota	0.0351	0.0815	0.7	1.4	0.169
Mancos	0.0505	0.156	0.327	-0.778	0.196



Notes

No outliers for Dixon's Test at 5% significance

Step 1

Run Dixon test on full data set.

Results indicate only no data is mathematical outlier at 5% significance.

Step 2

Plot histogram and review data for appropriate use.

Step 3

Review highest sample locations to search for "hot samples"

Highest Colluvium	RMCB-DN33	Highest Dakota	RMDB-R53	Highest Mancos	RMDB-C44
	RMCB-EN34		RMDB-H40		RMDB-CN44
	RMCB-A14		RMDB-DN28		RMDB-AU44

Full data set is considered to be appropriate for use in calculation of background values

Justification:

1 No mathematical outliers according to Dixon's Tests

FULL SELENIUM DATA SET (mg/kg)

Outlier Tests for Selected Uncensored Variables

Pro UCL V5.0 Outlier Output File

User Selected Options	
Date/Time of Computation	6/10/2014 14:36
From File	WorkSheet_a.xls
Full Precision	OFF

Dixon's Outlier Test for Colluvium

Number of Observations = 12
10% critical value: 0.49
5% critical value: 0.546
1% critical value: 0.642

1. Observation Value 1.4 is a Potential Outlier (Upper Tail)?
Test Statistic: 0.426
For 10% significance level, 1.4 is not an outlier.
For 5% significance level, 1.4 is not an outlier.
For 1% significance level, 1.4 is not an outlier.

2. Observation Value 0.85 is a Potential Outlier (Lower Tail)?
Test Statistic: 0.200
For 10% significance level, 0.85 is not an outlier.
For 5% significance level, 0.85 is not an outlier.
For 1% significance level, 0.85 is not an outlier.

Dixon's Outlier Test for Dakota

Number of Observations = 12
10% critical value: 0.49
5% critical value: 0.546
1% critical value: 0.642

1. Observation Value 0.99 is a Potential Outlier (Upper Tail)?
Test Statistic: 0.538
For 10% significance level, 0.99 is an outlier.
For 5% significance level, 0.99 is not an outlier.
For 1% significance level, 0.99 is not an outlier.

2. Observation Value 0.52 is a Potential Outlier (Lower Tail)?
Test Statistic: 0.333
For 10% significance level, 0.52 is not an outlier.
For 5% significance level, 0.52 is not an outlier.
For 1% significance level, 0.52 is not an outlier.

Dixon's Outlier Test for Mancos

Number of Observations = 12
10% critical value: 0.49
5% critical value: 0.546
1% critical value: 0.642

1. Observation Value 1.2 is a Potential Outlier (Upper Tail)?
Test Statistic: 0.185
For 10% significance level, 1.2 is not an outlier.
For 5% significance level, 1.2 is not an outlier.
For 1% significance level, 1.2 is not an outlier.

2. Observation Value 0.65 is a Potential Outlier (Lower Tail)?
Test Statistic: 0.289
For 10% significance level, 0.65 is not an outlier.
For 5% significance level, 0.65 is not an outlier.
For 1% significance level, 0.65 is not an outlier.

Outlier Evaluation for Uranium

FULL URANIUM DATA SET (mg/kg)

Ucount	Colluvium	Dakota	Mancos
1	0.48	0.38	0.4
2	0.56	0.41	0.48
3	0.59	0.44	0.5
4	0.61	0.44	0.51
5	0.62	0.47	0.51
6	0.63	0.47	0.52
7	0.63	0.49	0.52
8	0.64	0.51	0.61
9	0.67	0.54	0.62
10	0.68	0.54	0.65
11	0.74	0.56	0.76
12	0.82	0.58	0.86

Notes

Red = Dixon's Test Outliers at 5% significance

No outliers for Dixon's Test at 1% significance

Variable	NumObs	# Missing	Minimum	Maximum	Mean	SD
Colluvium	12	0	0.48	0.82	0.639	0.0858
Dakota	12	0	0.38	0.58	0.486	0.0622
Mancos	12	0	0.4	0.86	0.578	0.129

Variable	SEM	MAD/0.675	Skewness	Kurtosis	CV
Colluvium	0.0248	0.0593	0.407	1.399	0.134
Dakota	0.0179	0.0741	-0.112	-0.929	0.128
Mancos	0.0373	0.0964	1.043	0.825	0.224

ADJUSTED URANIUM DATA SET (mg/kg)

Ucount	Colluvium	Dakota	Mancos
1	0.48	0.38	0.4
2	0.56	0.41	0.48
3	0.59	0.44	0.5
4	0.61	0.44	0.51
5	0.62	0.47	0.51
6	0.63	0.47	0.52
7	0.63	0.49	0.52
8	0.64	0.51	0.61
9	0.67	0.54	0.62
10	0.68	0.54	0.65
11	0.74	0.56	0.76
12	0.82	0.58	- -

Notes - - Removed mathematical outlier

No outliers for second itteration of Dixon's test

Variable	NumObs	# Missing	Minimum	Maximum	Mean	SD
Colluvium	12	0	0.48	0.82	0.639	0.0858
Dakota	12	0	0.38	0.58	0.486	0.0622
Mancos	11	0	0.4	0.76	0.553	0.0987

Variable	SEM	MAD/0.675	Skewness	Kurtosis	CV
Colluvium	0.0248	0.0593	0.407	1.399	0.134
Dakota	0.0179	0.0741	-0.112	-0.929	0.128
Mancos	0.0298	0.0593	0.762	0.77	0.179

	%Change in Mean
Mancos	4.42%

Outlier Evaluation for Uranium

Step 1

Run Dixon test on full data set.

Results indicate only one point is mathematical outlier at 5% significance.

Step 2

Remove mathematical Dixon test on adjusted data set.

Results indicate no mathematical outliers at 5% significance.

Step 3

Plot histogram and review data for appropriate use.

Full data set is considered to be appropriate for use in calculation of background values

Justification:

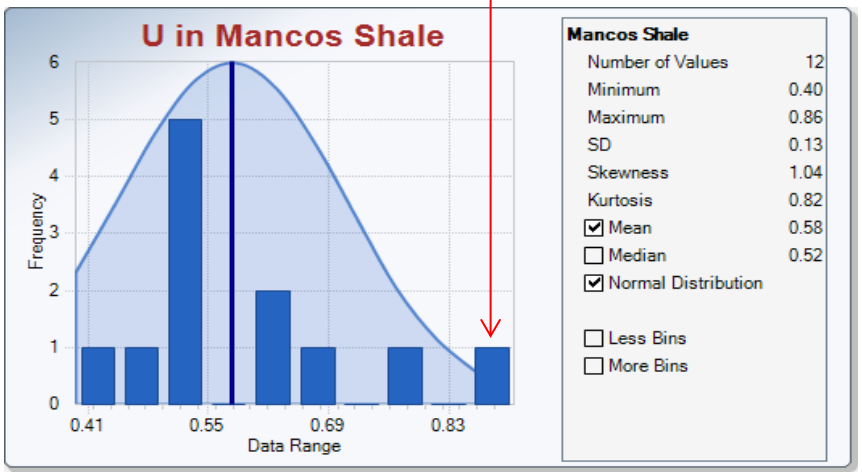
1 Mathematical outlier value plots near range of values of other background samples
2 Change in mean value by removal of data is small (<5%)
3 Full range of values is within 3 standard deviations

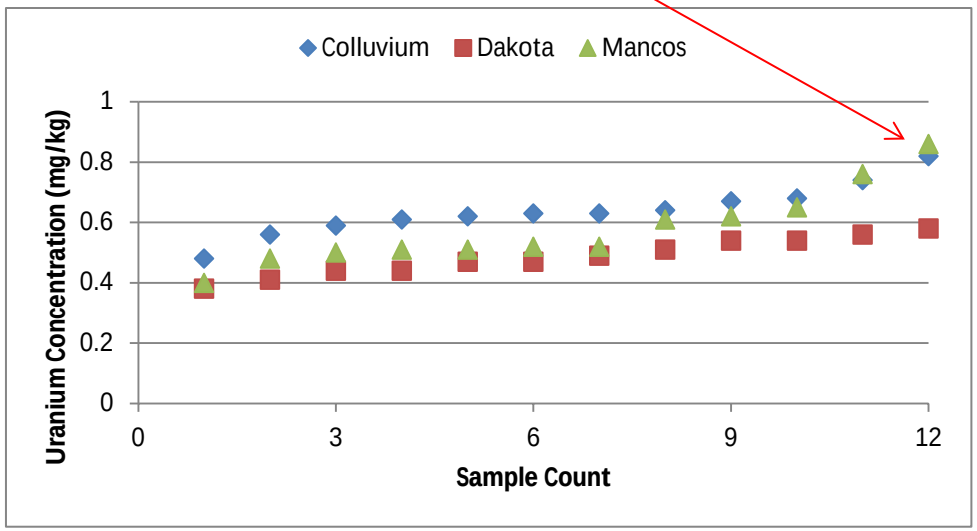
Step 4

Review highest sample locations to search for "hot samples"

Highest Colluvium	RMCB-X24	Highest Dakota	RMDB-DN28
	RMCB-END34		RMDB-TN46
	RMCB-DN33		RMDB-C44
Highest Mancos	RMMB-EN63		
	RMMB-W05		
	RMMB-R70		

Dixon's Test outlier





FULL URANIUM DATA SET (mg/kg)

Outlier Tests for Selected Uncensored Variables

Pro UCL V5.0 Outlier Output File

User Selected Options	
Date/Time of Computation	7/7/2014 11:59
From File	WorkSheet_a.xls
Full Precision	OFF

Dixon's Outlier Test for Colluvium

Number of Observations = 12
10% critical value: 0.49
5% critical value: 0.546
1% critical value: 0.642

1. Observation Value 0.82 is a Potential Outlier (Upper Tail)?
Test Statistic: 0.538
For 10% significance level, 0.82 is an outlier.
For 5% significance level, 0.82 is not an outlier.
For 1% significance level, 0.82 is not an outlier.

2. Observation Value 0.48 is a Potential Outlier (Lower Tail)?
Test Statistic: 0.423
For 10% significance level, 0.48 is not an outlier.
For 5% significance level, 0.48 is not an outlier.
For 1% significance level, 0.48 is not an outlier.

Dixon's Outlier Test for Dakota

Number of Observations = 12
10% critical value: 0.49
5% critical value: 0.546
1% critical value: 0.642

1. Observation Value 0.58 is a Potential Outlier (Upper Tail)?
Test Statistic: 0.235
For 10% significance level, 0.58 is not an outlier.
For 5% significance level, 0.58 is not an outlier.
For 1% significance level, 0.58 is not an outlier.

2. Observation Value 0.38 is a Potential Outlier (Lower Tail)?
Test Statistic: 0.333
For 10% significance level, 0.38 is not an outlier.
For 5% significance level, 0.38 is not an outlier.
For 1% significance level, 0.38 is not an outlier.

Dixon's Outlier Test for Mancos

Number of Observations = 12
10% critical value: 0.49
5% critical value: 0.546
1% critical value: 0.642

1. Observation Value 0.86 is a Potential Outlier (Upper Tail)?
Test Statistic: 0.553
For 10% significance level, 0.86 is an outlier.
For 5% significance level, 0.86 is an outlier.
For 1% significance level, 0.86 is not an outlier.

2. Observation Value 0.4 is a Potential Outlier (Lower Tail)?
Test Statistic: 0.278
For 10% significance level, 0.4 is not an outlier.
For 5% significance level, 0.4 is not an outlier.
For 1% significance level, 0.4 is not an outlier.

ADJUSTED URANIUM DATA SET (mg/kg)

Outlier Tests for Selected Uncensored Variables

Pro UCL V5.0 Outlier Output File

User Selected Options	
Date/Time of Computation	7/7/2014 12:11
From File	WorkSheet.xls
Full Precision	OFF

Dixon's Outlier Test for Colluvium

Number of Observations = 12
10% critical value: 0.49
5% critical value: 0.546
1% critical value: 0.642

1. Observation Value 0.82 is a Potential Outlier (Upper Tail)?
Test Statistic: 0.538
For 10% significance level, 0.82 is an outlier.
For 5% significance level, 0.82 is not an outlier.
For 1% significance level, 0.82 is not an outlier.

2. Observation Value 0.48 is a Potential Outlier (Lower Tail)?
Test Statistic: 0.423
For 10% significance level, 0.48 is not an outlier.
For 5% significance level, 0.48 is not an outlier.
For 1% significance level, 0.48 is not an outlier.

Dixon's Outlier Test for Dakota

Number of Observations = 12
10% critical value: 0.49
5% critical value: 0.546
1% critical value: 0.642

1. Observation Value 0.58 is a Potential Outlier (Upper Tail)?
Test Statistic: 0.235
For 10% significance level, 0.58 is not an outlier.
For 5% significance level, 0.58 is not an outlier.
For 1% significance level, 0.58 is not an outlier.

2. Observation Value 0.38 is a Potential Outlier (Lower Tail)?
Test Statistic: 0.333
For 10% significance level, 0.38 is not an outlier.
For 5% significance level, 0.38 is not an outlier.
For 1% significance level, 0.38 is not an outlier.

Dixon's Outlier Test for Mancos

Number of Observations = 11
10% critical value: 0.517
5% critical value: 0.576
1% critical value: 0.679

1. Observation Value 0.76 is a Potential Outlier (Upper Tail)?
Test Statistic: 0.500
For 10% significance level, 0.76 is not an outlier.
For 5% significance level, 0.76 is not an outlier.
For 1% significance level, 0.76 is not an outlier.

2. Observation Value 0.4 is a Potential Outlier (Lower Tail)?
Test Statistic: 0.400
For 10% significance level, 0.4 is not an outlier.
For 5% significance level, 0.4 is not an outlier.
For 1% significance level, 0.4 is not an outlier.

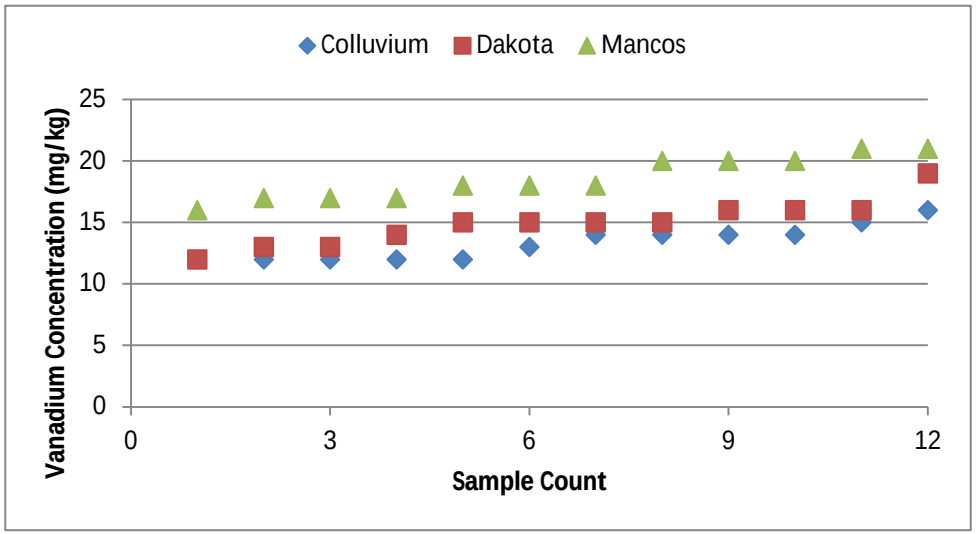
Outlier Evaluation for Vanadium

FULL VANADIUM DATA SET (mg/kg)

Vcount	Colluvium	Dakota	Mancos
1	12	12	16
2	12	13	17
3	12	13	17
4	12	14	17
5	12	15	18
6	13	15	18
7	14	15	18
8	14	15	20
9	14	16	20
10	14	16	20
11	15	16	21
12	16	19	21

Variable	NumObs	# Missing	Minimum	Maximum	Mean	SD
Colluvium	12	0	12	16	13.33	1.371
Dakota	12	0	12	19	14.92	1.832
Mancos	12	0	16	21	18.58	1.73

Variable	SEM	MAD/0.675	Skewness	Kurtosis	CV
Colluvium	0.396	2.224	0.546	-0.69	0.103
Dakota	0.529	1.483	0.572	1.314	0.123
Mancos	0.499	2.224	0.148	-1.499	0.0931



Notes

No outliers for Dixon's Test at 5% significance

Step 1

Run Dixon test on full data set.

Results indicate only no data is mathematical outlier at 5% significance.

Step 2

Plot histogram and review data for appropriate use.

Step 3

Review highest sample locations to search for "hot samples"

Highest Colluvium	RMCB-DN33	Highest Dakota	RMDB-TN46	Highest Mancos	RMMB-AN17
	RMCB-END34		RMDB-DN28		RMMB-CN72
	RMCB-N52		RMDB-H40		RMMB-E15

Full data set is considered to be appropriate for use in calculation of background values

Justification:

1 No mathematical outliers according to Dixon's Tests

FULL VANADIUM DATA SET (mg/kg)

Outlier Tests for Selected Uncensored Variables

Pro UCL V5.0 Outlier Output File

User Selected Options	
Date/Time of Computation	7/7/2014 12:06
From File	WorkSheet_a.xls
Full Precision	OFF

Dixon's Outlier Test for Colluvium

Number of Observations = 12
10% critical value: 0.49
5% critical value: 0.546
1% critical value: 0.642

1. Observation Value 16 is a Potential Outlier (Upper Tail)?
Test Statistic: 0.500
For 10% significance level, 16 is an outlier.
For 5% significance level, 16 is not an outlier.
For 1% significance level, 16 is not an outlier.

2. Observation Value 12 is a Potential Outlier (Lower Tail)?
Test Statistic: 0.000
For 10% significance level, 12 is not an outlier.
For 5% significance level, 12 is not an outlier.
For 1% significance level, 12 is not an outlier.

Dixon's Outlier Test for Dakota

Number of Observations = 12
10% critical value: 0.49
5% critical value: 0.546
1% critical value: 0.642

1. Observation Value 19 is a Potential Outlier (Upper Tail)?
Test Statistic: 0.500
For 10% significance level, 19 is an outlier.
For 5% significance level, 19 is not an outlier.
For 1% significance level, 19 is not an outlier.

2. Observation Value 12 is a Potential Outlier (Lower Tail)?
Test Statistic: 0.250
For 10% significance level, 12 is not an outlier.
For 5% significance level, 12 is not an outlier.
For 1% significance level, 12 is not an outlier.

Dixon's Outlier Test for Mancos

Number of Observations = 12
10% critical value: 0.49
5% critical value: 0.546
1% critical value: 0.642

1. Observation Value 21 is a Potential Outlier (Upper Tail)?
Test Statistic: 0.250
For 10% significance level, 21 is not an outlier.
For 5% significance level, 21 is not an outlier.
For 1% significance level, 21 is not an outlier.

2. Observation Value 16 is a Potential Outlier (Lower Tail)?
Test Statistic: 0.200
For 10% significance level, 16 is not an outlier.
For 5% significance level, 16 is not an outlier.
For 1% significance level, 16 is not an outlier.

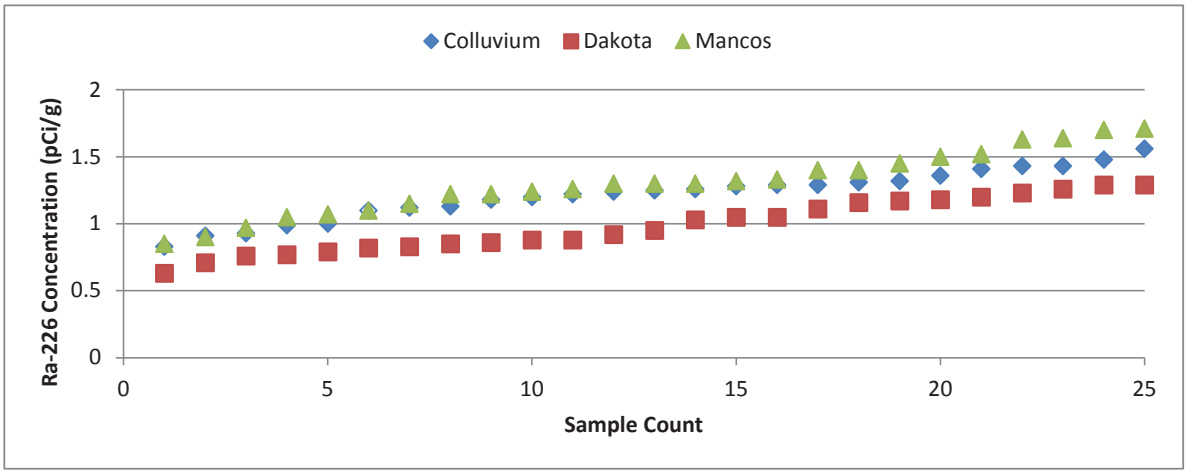
Outlier Evaluation for RadiumĞ 26

FULL Ra-226 DATA SET (ug/kg)

Ra226Count	Colluvium	Dakota	Mancos
1	0.83	0.63	0.85
2	0.91	0.71	0.9
3	0.93	0.76	0.97
4	0.99	0.77	1.05
5	1	0.79	1.07
6	1.1	0.82	1.1
7	1.12	0.83	1.15
8	1.13	0.85	1.22
9	1.18	0.86	1.22
10	1.2	0.88	1.24
11	1.22	0.88	1.26
12	1.24	0.92	1.3
13	1.25	0.95	1.3
14	1.26	1.03	1.3
15	1.28	1.05	1.32
16	1.29	1.05	1.33
17	1.29	1.11	1.4
18	1.31	1.16	1.4
19	1.32	1.17	1.45
20	1.36	1.18	1.5
21	1.41	1.2	1.52
22	1.43	1.23	1.63
23	1.43	1.26	1.64
24	1.48	1.29	1.7
25	1.56	1.29	1.71

Variable	NumObs	# Missing	Minimum	Maximum	Mean	SD
Colluvium	25	0	0.83	1.56	1.221	0.186
Dakota	25	0	0.63	1.29	0.987	0.199
Mancos	25	0	0.85	1.71	1.301	0.237

Variable	SEM	MAD/0.675	Skewness	Kurtosis	CV
Colluvium	0.0372	0.178	-0.381	-0.33	0.152
Dakota	0.0397	0.237	0.0535	-1.264	0.201
Mancos	0.0475	0.222	-0.0142	-0.529	0.182



Step 1

Run Rosner's test on full data set.

Results indicate only no data is mathematical outlier at 5% significance.

Step 2

Plot histogram and review data for appropriate use.

Full data set is considered to be appropriate for use in calculation of background values

Justification:

1 No mathematical outliers according to Rosner's Tests

Pro UCL V5.0 Outlier Output File **Outlier Tests for Selected Uncensored Variables**

User Selected Options	
Date/Time of Computation	6/10/2014 16:29
From File	WorkSheet_a.xls
Full Precision	OFF

Rosner's Outlier Test for Colluvium

Mean	1.221
Standard Deviation	0.186
Number of data	25
Number of suspected outliers	1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	1.221	0.182	0.83	24	2.145	2.82	3.14

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

Rosner's Outlier Test for Dakota

Mean	0.987
Standard Deviation	0.199
Number of data	25
Number of suspected outliers	1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	0.987	0.195	0.63	3	1.834	2.82	3.14

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

Rosner's Outlier Test for Mancos

Mean	1.301
Standard Deviation	0.237
Number of data	25
Number of suspected outliers	1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	1.301	0.233	0.85	18	1.94	2.82	3.14

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

Background Comparison Value for Arsenic

Arsenic data evaluated for outliers

One outlier detected in Mancos Shale data set

Arsenic data evaluated for normality

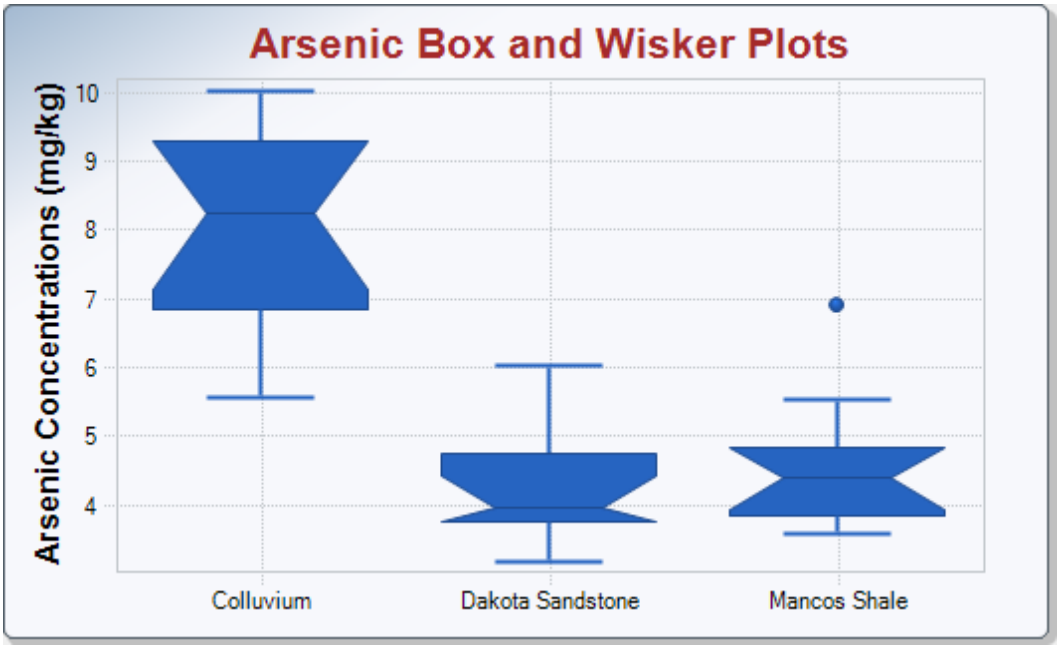
Colluvium and Dakota Sandstone soil data sets fit normal data distribution

Mancos Shale soil data set approximates normal distribution

Background threshold values calculated by UTL95-95 method

Soils	Arsenic Background Comparison Value (mg/kg)
Colluvium	12.25
Dakota Sandstone	6.389
Mancos Shale	5.998

mg/kg = milligrams per kilogram



Background Comparison Value for Mercury

Mercury data evaluated for outliers

One outlier detected in Dakota Sandstone and Mancos Shale data set

Mercury data evaluated for normality

Colluvium and Dakota Sandstone soil data set fit normal data distribution

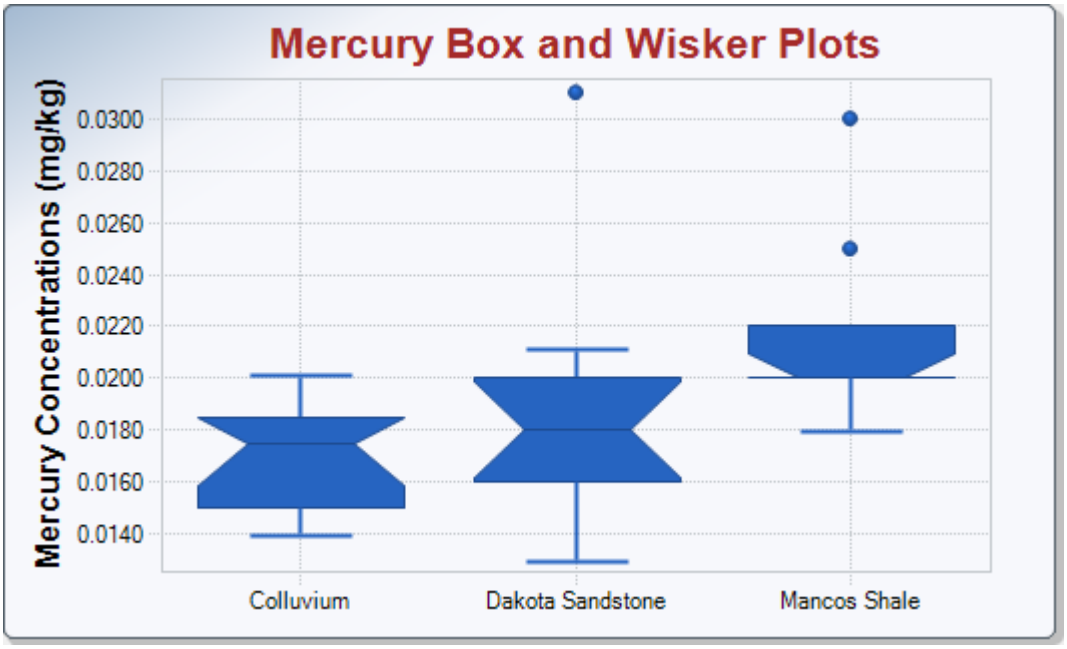
Dakota Sandstone soil data set approximates a normal data distribution

Mancos Shale soil data set do not fit any pattern and are modeled with nonparametric UTL95-95

Background threshold values calculated by UTL95-95

Soils	Mercury Background Comparison Value (mg/kg)
Colluvium	0.0223
Dakota Sandstone	0.0313
Mancos Shale	0.0311

mg/kg = micrograms per kilogram



Background Comparison Value for Molybdenum

Molybdenum data evaluated for outliers

No outliers detected

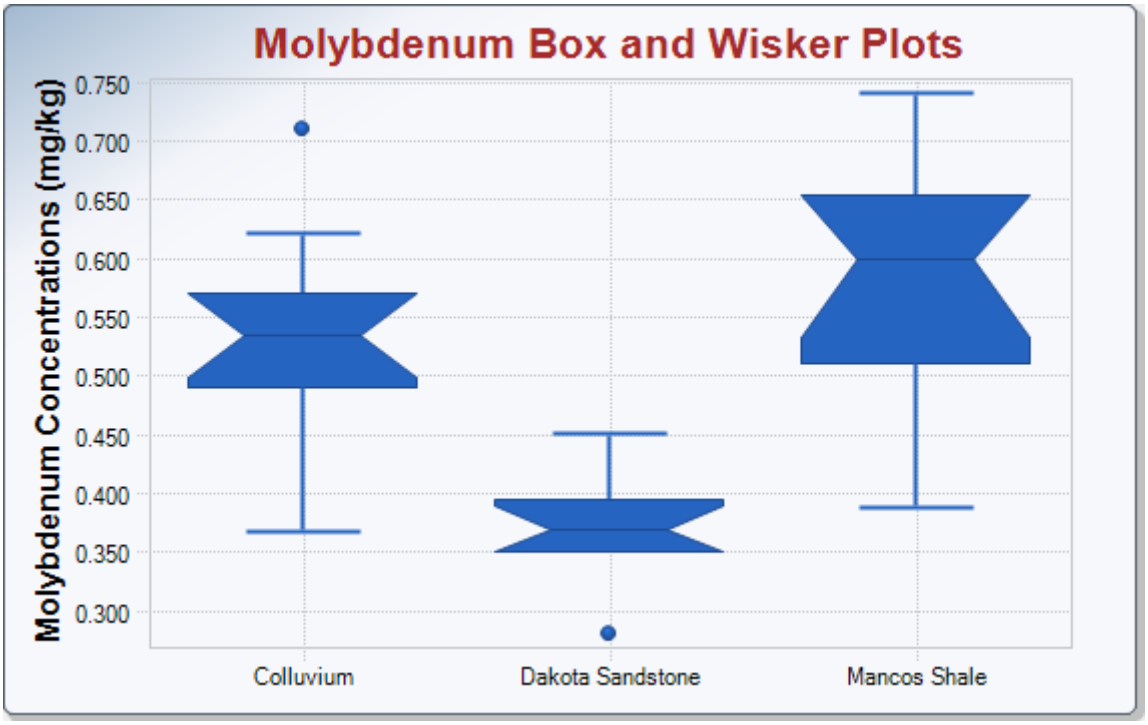
Molybdenum data evaluated for normality

All soil data sets fit normal data distribution

Background threshold values calculated by UTL95-95 method

Soils	Molybdenum Background Comparison Value (mg/kg)
Colluvium	0.772
Dakota Sandstone	0.489
Mancos Shale	0.868

mg/kg = micrograms per kilogram



Background Comparison Value for Selenium

Selenium data evaluated for outliers

No outliers detected

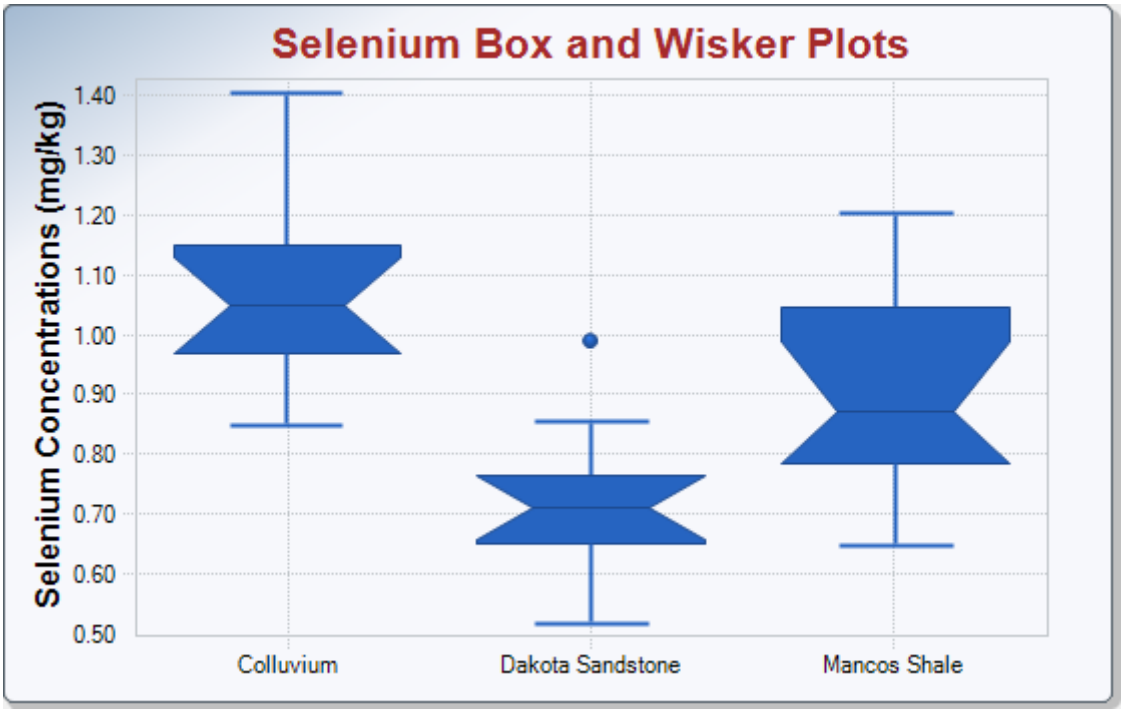
Selenium data evaluated for normality

All soil data sets fit normal data distribution

Background threshold values calculated by UTL95-95 method

Soils	Uranium Background Comparison Value (mg/kg)
Colluvium	1.514
Dakota Sandstone	1.052
Mancos Shale	1.373

mg/kg = micrograms per kilogram



Background Comparison Value for Uranium

Uranium data evaluated for outliers

One outlier detected in Mancos Shale data set

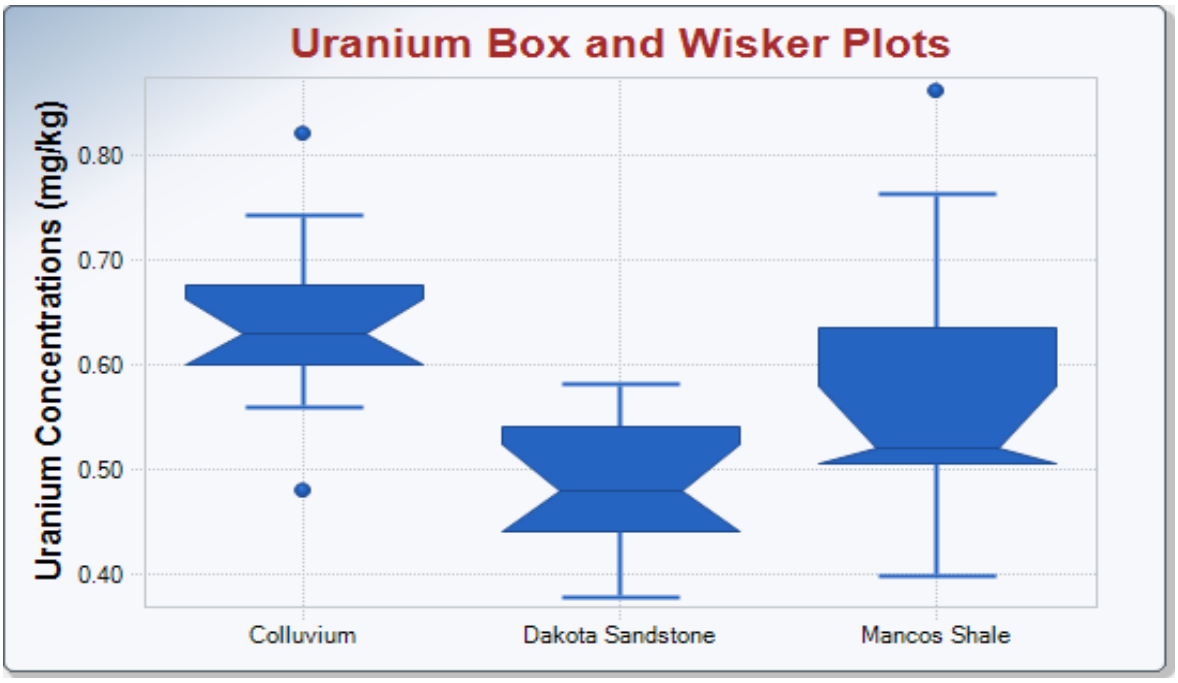
Uranium data evaluated for normality

All soil data sets fit normal data distribution

Background threshold values calculated by UTL95-95 method

Soils	Uranium Background Comparison Value (mg/kg)
Colluvium	0.874
Dakota Sandstone	0.656
Mancos Shale	0.932

mg/kg = micrograms per kilogram



Background Comparison Value for Vanadium

Vanadium data evaluated for outliers

No outliers detected

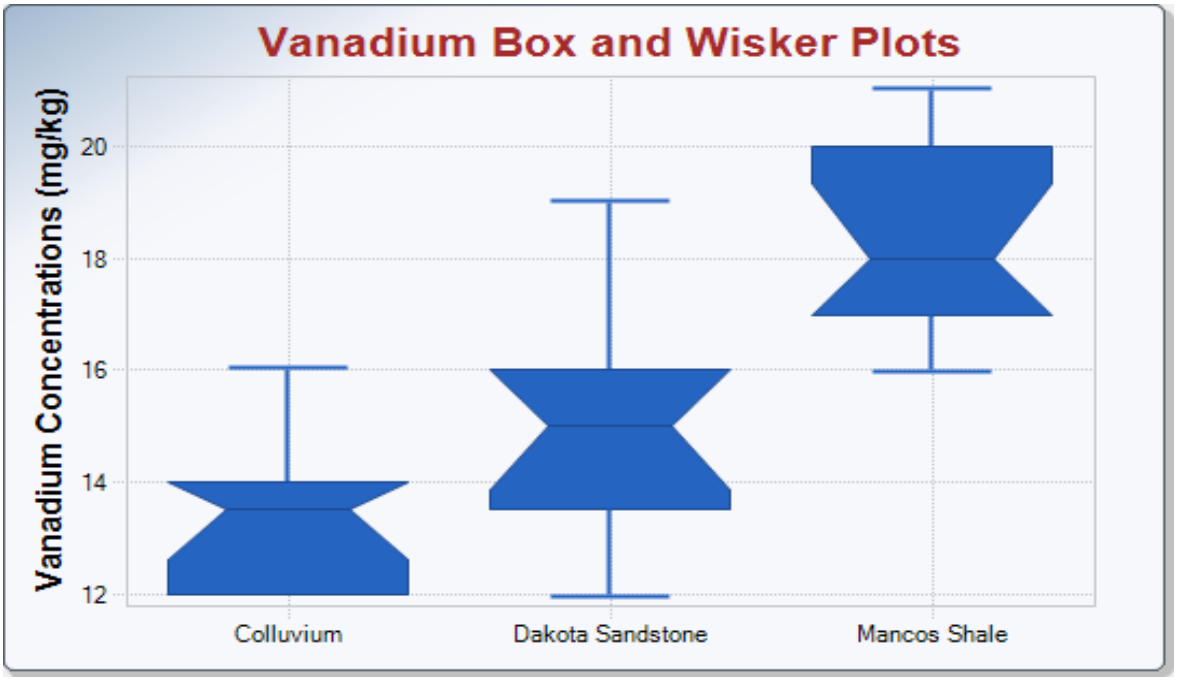
Vanadium data evaluated for normality

All soil data sets fit normal data distribution

Background threshold values calculated by UTL95-95 method

Soils	Vanadium Background Comparison Value (mg/kg)
Colluvium	17.08
Dakota Sandstone	19.93
Mancos Shale	23.32

mg/kg = micrograms per kilogram



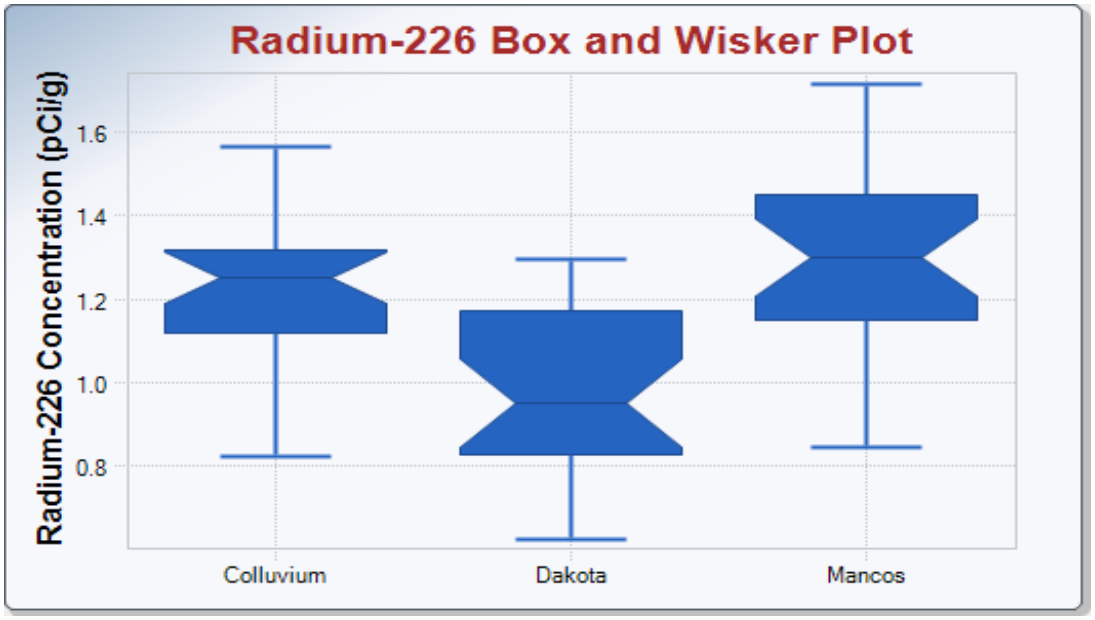
Background Comparison Value for Radium-226

Radium-226 data evaluated for outliers
No outliers detected
Radium-226 data evaluated for normality
All soil data sets fit normal data distribution

Background threshold values calculated by UTL95-95 method

Soils	Ra-226 BTV (pCi/g)
Colluvium	1.647
Dakota Sandstone	1.442
Mancos Shale	1.845

ug/kg = micrograms per kilogram



Appendix F
Evaluation of the Correlation Between Surface Gamma Radiation Survey Readings and Radium 226 Concentrations In Surface Soil At the Ruby Mines

APPENDIX F

Evaluation of the Correlation Between Surface Gamma Radiation Survey Readings and Radium-226 Concentrations In Surface Soil At the Ruby Mines.

Purpose and Objective

The purpose of this appendix is to document the radiological data assessment used to develop a correlation of radium-226 (Ra-226) measurements in surface soil with field gamma radiation survey results. It contains the methodology used to assess the data, the results of the assessment that were critical to developing the correlation, a discussion of uncertainties with the data, and the conclusion.

The purpose of the correlation was to estimate Ra-226 concentrations in surface soils in picocuries per gram (pCi/g) using the walkover gamma radiation survey data in counts per minute (cpm) in locations where soil samples were not collected.

The objective of the data analysis was to develop a correlation that was representative of a range of Ra-226 concentrations in surface soil that would likely be considered during remedy evaluations.

The relationship between the detector count rates in cpm and the surface soil Ra-226 concentrations in pCi/g generally follows a linear trend—as count rates increase, soil concentration of gamma-emitting radionuclides also increase. The correlation is meant to provide an estimate of Ra-226 concentrations in the absence of laboratory data and may not reflect the actual Ra-226 concentration at any given location.

Methodology

The following methodology was used to develop the correlation value used in the RSE report:

1. Collect the radiological data in the field and from the laboratory.
2. Develop a database, and group data for evaluation. Assign a geology and feature type to each soil sample location based on the location where it was collected.
3. Determine correlation value using ProUCL.
4. Identify the best correlation for project use.

Each of these steps is discussed in detail in the following subsections.

Collect the Data

- For each discrete soil sample location, the following data was collected from each surface soil sample:
- Static gamma-radiation survey result uncollimated (cpm)
- Static gamma-radiation survey result using collimator (cpm)
- Ra-226 concentration (pCi/g) based on laboratory analysis of a discrete surface soil sample
- As discussed in Section 4.5 of the RSE report, static radiation survey measurements were collected prior to soil sample collection. Static radiation survey measurements were collected at 6 inches above the ground for 1 minute, and locations were documented by global positioning system. Collimated (shielded) and uncollimated (unshielded) static radiation measurements were recorded with a Ludlum Model 44-10 2-inch-by-2-inch sodium iodide (NaI) scintillation detector. The soil samples were analyzed in a certified laboratory for Ra-226 using U.S. Environmental Protection Agency (USEPA) Method 901.1. A total of 98 surface soil samples were collected between 0 to 4 inches or between 0 to 6 inches below ground surface, with Ra-226 concentrations ranging from 1.1 pCi/g to 1,680 pCi/g[1].

[1] The sample depth was 0 to 4 inches during Phase 2, and was 0 to 6 inches during Phase 3.

Database Development

The static radiation measurements and laboratory data were combined into one master data set for evaluation of the correlation. Each sample location was assigned a geology and a feature type, which referred to the mine-related location where the sample was collected:

- Geology
  - Dakota Sandstone
  - Colluvium
  - Mancos Shale
- Feature Type
  - Capped Waste Rock Piles
  - Drainages
  - Former Haul Roads
  - Vents
  - Other Areas—for example: Work Areas, Step out Areas

This master data set is provided in Table 1. The geology and feature type assignments were done by the project radiological health physicist and reviewed and approved by the project geologist and project manager. When uncertainties existed, the project manager determined the assignment based on site knowledge.

Determine Correlation Value Using Statistical Methods

The relationship between the detector count rates in cpm and the surface soil Ra-226 concentrations in pCi/g generally follows a linear trend: as count rates increase, soil concentration of gamma-emitting radionuclides also increase. The objective of the data analysis was to develop a correlation value in cpm that was representative of a range of Ra-226 concentrations in surface soil given this linear trend. Different groups of the data set were evaluated to select the best correlation value based on professional judgment, USEPA requests, and knowledge of the site. For each group, the survey data using the collimated and uncollimated detector was compared to the surface soil Ra-226 concentration using an ordinary least squares linear regression model. Each group was evaluated using the USEPA statistical software application, ProUCL version 5.0.00 (USEPA, 2013). For each group, the radiation health physicist documented trends, observed variations in the data, and calculated a representative correlation value. Visual observation of the variations and R-squared values produced in the ProUCL output were noted.

The following groups were evaluated, and the results of the data assessment and ProUCL evaluations are provided in the corresponding tables.

- Ra-226 concentration
  - Table 2. Entire Data Set
  - Table 3. Less than 20 pCi/g
  - Table 4. Less than 50 pCi/g
  - Table 5. Greater than 50 pCi/g
  - Table 6. Less than 20 pCi/g (outliers excluded)
- Sampling locations
  - Table 7. Capped Waste Rock Piles
  - Table 8. Drainages
  - Table 9. Vents
  - Table 10. Former Haul Roads
  - Table 11. Other Areas

- Geology
  - Table 12. Colluvium
  - Table 13. Dakota Sandstone
  - Table 14. Mancos Shale

For each group, the following evaluation was performed, and the results are provided in the corresponding table.

- Performed linear regression analysis, which included a graphical representation of the linear regression and calculation of an R-squared value.
- Evaluated outliers, conducted goodness-of-fit tests, and applied 95 percent confidence and 95 percent prediction levels, as needed.
- Calculated the specific correlation value, if warranted.
- Performed additional data evaluations as needed.

The following information presents a brief discussion of the thought process and results of each group evaluated where it relates to developing the correlation value. It is not meant to be a thorough discussion of every piece of information in each table and how to interpret it.

Table 2, All Data: The results of the assessment of the entire data set were evaluated to develop a baseline correlation value for use in evaluating other correlations.

- The results of the linear regression for the uncollimated data set resulted in an R-squared value of 0.57. Therefore, the mean detector output was able to explain 57 percent of the observed variability in the mean Ra-226 concentration.
- Goodness-of-fit tests performed on uncollimated, collimated, and soil concentration data indicate that the data sets did not fit a known distribution.
- The correlation value for the group was calculated using the given regression line equation:

Y = m * X + b
Where,
Y = Ra-226 concentration (pCi/g)
m = slope from ProUCL
X = Correlation value (uncollimated measurement in cpm)
b = y intercept from ProUCL
For example, from Table 2 ProUCL output, if the Ra-226 concentration was 3 pCi/g, then the correlation value (**X**) would be as follows.
Y = m * **X** + b
Where,
Y = Ra-226 concentration (3 pCi/g)
m = slope from ProUCL (0.00568)
X = Correlation value (uncollimated measurement in cpm)
b = y intercept from ProUCL (-102)
Therefore, 3 = 0.00568 * **X** + -102
X = (3+102)/0.00568
X = 18,486 cpm

A measurement of 18,486 cpm correlates to a Ra-226 concentration of 3 pCi/g.

The graph for the uncollimated data shows that at lower concentrations, the data do not fit the predicted linear regression line and the slope appears different (visually looks flat with almost no slope). Data at higher

concentrations appear more scattered both above and below the regression line and several are located outside the 95 percent confidence interval (green) and prediction interval (red). Further, the y-intercept is at -120 pCi/g, an incorrect value because theoretically the Ra-226 concentration should be 0 pCi/g when the count rate is 0 cpm. Therefore, 18,486 cpm on an uncollimated detector correlates to a concentration of 3 pCi/g of Ra-226 in surface soil.

While the correlation value is greater than the mean of background, the statistical confidence is not optimal. Therefore, the data were separated into the lower concentration range (that is, less than 20 pCi/gm) to evaluate if the lower concentrations had better statistical confidence and a more reliable correlation value.

Table 3, less than 20 pCi/g:

- The R-squared value for the uncollimated data was 0.19 and for the collimated data was 0.13, which indicate poor representations of the scenario data set.
- The correlation value for the uncollimated data was determined to be more a predictor of background because the predicted count rate and corresponding Ra-226 concentration is similar to the background data set.
- Collimated data was also evaluated to determine if at low concentrations the elevated background at the site from the capped waste rock pile was affecting the data. No obvious elevated background issues were found when looking at samples along the capped waste rock pile (sample IDs with CWRP) compared to other locations.

The next step was to expand the range of concentrations up to 50 pCi/g to determine if a larger sample population and higher concentrations would result in a more reliable correlation.

Table 4, less than 50 pCi/g:

- The R-squared value for the uncollimated data was 0.21, and the collimated data was 0.19, which indicates a poor representation of the group data set.

Therefore, it was decided to evaluate the data at the higher concentration ranges to determine if any information would assist in determining a more reliable correlation value.

Table 5, greater than 50 pCi/g:

- The R-squared value for the uncollimated data was 0.33, and the collimated data was 0.45, which indicate poor representations of the group data set.
- Outlier tests were performed, and there were no outliers identified at a 5 percent significance level.

Next, the lower concentration range data set was revisited because it is anticipated that the goal to be used in remedial evaluations will be within this range. The data not within the 95 percent confidence and prediction levels were then revisited and removed from the data set, and a calculation was made to determine the effect on the correlation.

Table 6, less than 20 pCi/g using 95% confidence and prediction levels:

- The R-squared value for the uncollimated data was 0.86, and the collimated data was 0.79, which was significantly improved, as expected.
- A trend analysis was performed to compare the increase in Ra-226 concentrations with the increase in detector count rates. This analysis showed a general trend of increasing concentrations as expected.

The remaining evaluations presented in Tables 7 through 14 were performed to evaluate if there were any geological or mine-feature characteristics that would explain the results of earlier correlations.
No correlation values were calculated for these data sets because they are for evaluation purposes to evaluate if they should be removed from the correlation data set.

Table 7: Capped Waste Rock Piles:

- The R-squared value for the uncollimated data was 0.44, and the collimated data was 0.55.
- One outlier was identified in the data set. The R-squared values did not change significantly once the outlier was removed.

The Capped Waste Rock Pile evaluation was not helpful in improving the statistics because the surface samples were expected to be relatively clean (low Ra-226 concentrations) since they were collected from cover material. However, the count rate data was expected to be variable and high because they were influenced by the presence of a large waste rock pile (a large planar source).

Table 8: Drainages:

- The R-squared value for the uncollimated data was 0.85, and the collimated data was 0.89.
- The concentration of Ra-226 in soil followed a similar trend to the count rate data, meaning, that as the Ra-226 concentration increases, the count rate increases as well.

These results were expected for this uniform type of Ra-226 distribution. Some samples were collected immediately adjacent to a Capped Waste Rock Pile, and the count rates could have been influenced by the adjacent radiation field, but the collimated data show very similar properties to the uncollimated data.

Table 9: Vents:

- The R-squared value for the uncollimated data was 0.97, and the collimated data was 0.95.

The vents are not influenced by another radiological source (for example, Capped Waste Rock Pile) and have a good linear regression result. These results are similar to the drainages.

Table 10: Former Haul Roads:

- The R-squared value for the uncollimated data was 0.47, and the collimated data was 0.50.

This evaluation did not prove useful in determining how to improve the overall statistics for the correlation value or if any sample location was affecting results.

Table 11: Other Areas:

- The R-squared value for the uncollimated data was 0.61, and the collimated data was 0.76.

This evaluation did not prove useful in determining how to improve the overall statistics for the correlation value or if any sample location was affecting results.

Table 12: Colluvium:

- The R-squared value for the uncollimated data was 0.77, and the collimated data was 0.88.

Table 13: Dakota Sandstone:

- The R-squared value for the uncollimated data was 0.49, and the collimated data was 0.49.

Table 14: Mancos Shale:

- The R-squared value for the uncollimated data was 0.35, and the collimated data was 0.38.

The evaluations presented above show that no matter how the data set was grouped, the statistics for the correlation value could not be improved. There were no obvious trends or features that could be removed to provide for a more reliable outcome. Therefore, it was decided to select the lower concentration range data set (Table 6) to provide the correlation because the values are near the anticipated range of where a preliminary remediation goal would be established for remedial evaluations. The data outside the 95 percent confidence limit was then revisited and removed from the data set and calculation.

Uncertainties

Uncertainties in the data that could may affect the results of the correlation values include the following: the lack of uniform distribution of contaminants in the surface soil, influence of adjacent areas with elevated count rates (shine), uncertainty in laboratory results (for example, incomplete homogenization of composite samples, slight errors in sample weights, etc.), and uncertainty in results due to sampling (for example, inconsistencies in soil densities, sampling depths, slight differences in volumes of each sub-sample that make up the sample, laboratory requirements to avoid collecting larger rocks, etc.). The uncertainties are discussed in detail in the RSE report.

Conclusion

The correlation provided in Table 2 is acceptable for its intended use to determine lateral extent of Ra-226 concentrations. The evaluations presented in this appendix show that no matter how the data set was grouped, the statistics for the correlation value could not be improved. For the purpose of determining the extent of potential contamination above the Ra-226 PRG in the upcoming remedial evaluations, using the correlation value will provide a representative estimate of locations and quantities to consider.

References

U.S. Environmental Protection Agency (USEPA). 2013. ProUCL Software. Version 5.0.00. Site Characterization and Monitoring Technical Support Center. September 13.

Tables

Table 1. Master Spreadsheet of Data
Ruby Mines Removal Site Evaluation Report - Correlation Statistics

Sample ID – Depth to top of sample (ft)	cpm (uncollimated)	cpm (collimated)	Ra-226 (pCi/g)	Description for Grouping	Geology
RM01-8MAY14-01	38876	11774	143	Other Areas	Dakota Sandstone
RM01-8MAY14-02	79193	35235	299	Other Areas	Dakota Sandstone
RM01-8MAY14-03	19947	5787	5.73	Other Areas	Colluvium
RM01-8MAY14-04	34094	10226	17.3	Other Areas	Colluvium
RM01-8MAY14-05	122269	91084	1330	Other Areas	Colluvium
RM01-8MAY14-06	26512	8423	15.8	Former Haul Road	Colluvium
RM01-8MAY14-07	268857	112974	1440	Former Haul Road	Colluvium
RM01-8MAY14-08	13094	3889	2.77	Drainage	Colluvium
RM01-CWRP01-C-00	27214	9124	2.61	Capped Waste Rock Pile	Colluvium
RM01-CWRP02-C-00	25779	8558	8.6	Capped Waste Rock Pile	Colluvium
RM01-CWRP03-C-00	25028	7469	7.3	Capped Waste Rock Pile	Colluvium
RM01-CWRP04-C-00	21887	6514	7.1	Capped Waste Rock Pile	Colluvium
RM01-CWRP05-C-00	19328	5765	2.33	Capped Waste Rock Pile	Colluvium
RM01-CWRP06-C-00	29301	9149	3.62	Capped Waste Rock Pile	Colluvium
RM01-CWRP07-C-00	39423	14130	4.09	Capped Waste Rock Pile	Colluvium
RM01-CWRP08-C-00	18098	5523	6.74	Capped Waste Rock Pile	Colluvium
RM01-DRNA1-00	30924	8365	18.9	Drainage	Colluvium
RM01-DRNC1-00	18214	5775	10.1	Drainage	Colluvium
RM01-HR01-00	25600	9665	14.6	Former Haul Road	Colluvium
RM01-HR02-00	67130	40753	1680	Former Haul Road	Mancos Shale
RM01-HR03-00	77079	37264	218	Former Haul Road	Mancos Shale
RM01-HR04-00	30157	13126	28.6	Former Haul Road	Colluvium
RM01-HR05-00	89648	33068	412	Former Haul Road	Colluvium
RM01-HR06-00	50010	19402	129	Former Haul Road	Colluvium
RM01-HR07-00	176269	72600	1160	Former Haul Road	Colluvium
RM01-STEP01-00	24593	8403	21.3	Other Areas	Colluvium
RM01-STEP02-00	97827	40360	281	Other Areas	Mancos Shale
RM01-STEP03-00	59471	21694	122	Other Areas	Colluvium
RM01-STEP04-00	134792	57437	20.9	Other Areas	Colluvium
RM01-STEP05-00	102246	73119	846	Other Areas	Colluvium
RM01-WRK01-00	26190	8284	6.8	Other Areas	Colluvium
RM01-WRK02-00	42278	14159	39.9	Other Areas	Colluvium
RM01-WRK03-00	30130	9360	3.08	Other Areas	Colluvium
RM01-WRK04-00	17374	4890	2.99	Other Areas	Colluvium
RM02-VENT01-00	9167	3164	1.39	Vent	Dakota Sandstone
RM02-VENT02-00	30995	12495	5.69	Vent	Dakota Sandstone
RM02-VENT03-00	113882	47869	159	Vent	Dakota Sandstone
RM03-8MAY14-01	12877	3804	1.19	Other Areas	Mancos Shale
RM03-8MAY14-02	23023	7488	4.17	Other Areas	Mancos Shale
RM03-8MAY14-03	17167	5116	3.27	Drainage	Mancos Shale

Sample ID – Depth to top of sample (ft)	Top of Sample Interval (feet)	Background Reference Area
RM01-CWRP01-C-00	0	Colluvium
RM01-CWRP01-R-05	5	Colluvium
RM01-CWRP01-R-10	10	Colluvium
RM01-CWRP01-R-15	15	Colluvium
RM01-CWRP01-R-20	20	Colluvium
RM01-CWRP01-S-22.5	22.5	Colluvium
RM01-CWRP02-C-00	0	Colluvium
RM01-CWRP02-R-05	5	Colluvium
RM01-CWRP02-R-10	10	Colluvium
RM01-CWRP02-R-15	15	Colluvium
RM01-CWRP02-S-21	21	Colluvium
RM01-CWRP03-C-00	0	Mancos Shale
RM01-CWRP03-R-05	5	Mancos Shale
RM01-CWRP03-R-10	10	Mancos Shale
RM01-CWRP03-R-15	15	Mancos Shale
RM01-CWRP03-S-16.5	16.5	Mancos Shale
RM01-CWRP04-C-00	0	Colluvium
RM01-CWRP04-R-05	5	Colluvium
RM01-CWRP04-R-10	10	Colluvium
RM01-CWRP04-S-15	15	Colluvium
RM01-CWRP05-C-00	0	Colluvium
RM01-CWRP05-R-01	1	Colluvium
RM01-CWRP05-R-05	5	Colluvium
RM01-CWRP05-R-10	10	Colluvium
RM01-CWRP05-S-15	15	Colluvium
RM01-CWRP06-C-00	0	Colluvium
RM01-CWRP06-R-05	5	Colluvium
RM01-CWRP06-S-6.5	6.5	Colluvium
RM01-CWRP06-S-11.5	11.5	Colluvium
RM01-CWRP07-C-00	0	Colluvium
RM01-CWRP07-R-05	5	Colluvium
RM01-CWRP07-R-10	10	Colluvium
RM01-CWRP07-R-15	15	Colluvium
RM01-CWRP07-R-20	20	Colluvium
RM01-CWRP07-R-25	25	Colluvium
RM01-CWRP07-S-26.5	26.5	Colluvium
RM01-CWRP07-S-31.5	31.5	Colluvium
RM01-CWRP08-C-00	0	Colluvium
RM01-CWRP08-R-05	5	Colluvium

Background Sample ID	Background Reference Area
RMMB-A19	Mancos Shale
RMMB-AN17	Mancos Shale
RMMB-AN71	Mancos Shale
RMMB-C56	Mancos Shale
RMMB-CN72	Mancos Shale
RMMB-DN38	Mancos Shale
RMMB-E15	Mancos Shale
RMMB-EN63	Mancos Shale
RMMB-F49	Mancos Shale
RMMB-FN46	Mancos Shale
RMMB-GN55	Mancos Shale
RMMB-HN65	Mancos Shale
RMMB-I23	Mancos Shale
RMMB-I28	Mancos Shale
RMMB-K56	Mancos Shale
RMMB-L26	Mancos Shale
RMMB-L32	Mancos Shale
RMMB-L70	Mancos Shale
RMMB-Q10	Mancos Shale
RMMB-Q30	Mancos Shale
RMMB-R70	Mancos Shale
RMMB-T43	Mancos Shale
RMMB-W05	Mancos Shale
RMMB-W52	Mancos Shale
RMCB-A02	Colluvium
RMCB-A14	Colluvium
RMCB-DN33	Colluvium
RMCB-DN44	Colluvium
RMCB-EN34	Colluvium
RMCB-EU38	Colluvium
RMCB-F57	Colluvium
RMCB-FN34	Colluvium
RMCB-GU26	Colluvium
RMCB-H45	Colluvium
RMCB-J12	Colluvium
RMCB-KN49	Colluvium
RMCB-L10	Colluvium
RMCB-L45	Colluvium
RMCB-N52	Colluvium
RMCB-038	Colluvium

Table 1. Master Spreadsheet of Data

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Sample ID – Depth to top of sample (ft)	cpm (uncollimated)	cpm (collimated)	Ra-226 (pCi/g)	Description for Grouping	Geology
RM03-8MAY14-04	38876	11774	141	Other Areas	Mancos Shale
RM03-8MAY14-05	30597	10838	3.27	Other Areas	Colluvium
RM03-8MAY14-06	47897	18852	220	Capped Waste Rock Pile	Mancos Shale
RM03-8MAY14-07	109898	41707	1000	Other Areas	Mancos Shale
RM03-8MAY14-08	171019	89326	391	Former Haul Road	Mancos Shale
RM03-CWRP01-C-00	15909	5297	1.72	Capped Waste Rock Pile	Colluvium
RM03-CWRP02-C-00	18141	5935	1.61	Capped Waste Rock Pile	Mancos Shale
RM03-CWRP03-C-00	19634	7124	1.71	Capped Waste Rock Pile	Mancos Shale
RM03-CWRP04-C-00	31942	10925	1.62	Capped Waste Rock Pile	Colluvium
RM03-CWRP05-C-00	24347	8078	2.27	Capped Waste Rock Pile	Colluvium
RM03-CWRP06-C-00	31320	10834	2.04	Capped Waste Rock Pile	Mancos Shale
RM03-CWRP07-C-00	14380	6044	2.23	Capped Waste Rock Pile	Mancos Shale
RM03-DRN01-00	13376	4182	2.35	Drainage	Mancos Shale
RM03-DRN02-00	19784	5626	8.9	Drainage	Colluvium
RM03-DRN03-00	16378	5635	10.2	Drainage	Mancos Shale
RM03-DWTR01-00	15978	4745	2.58	Drainage	Mancos Shale
RM03-DWTR02-00	24524	8178	6.69	Drainage	Mancos Shale
RM03-DWTR03-00	41483	14453	50.7	Drainage	Mancos Shale
RM03-WRK01-00	15295	4815	2.7	Other Areas	Mancos Shale
RM03-WRK02-00	14067	4247	2.66	Other Areas	Mancos Shale
RM03-WRK03-00	24140	8430	20	Other Areas	Mancos Shale
RM03-WRK04-00	104266	40982	590	Other Areas	Mancos Shale
RM04-VENT01-00	13279	4256	1.1	Vent	Mancos Shale
RM04-VENT02-00	23252	8397	6.38	Vent	Mancos Shale
RM04-VENT03-00	97183	43463	111	Vent	Mancos Shale
RM19-VENT01-00	12716	3889	1.37	Vent	Colluvium
RM19-VENT02-00	77944	31787	107	Vent	Colluvium
RM19-VENT03-00	33329	12254	32.2	Vent	Colluvium
RM-COR18-00	20411	5990	4.14	Other Areas	Colluvium
RM-COR19-00	16546	5052	2.56	Other Areas	Colluvium
RM-COR20-00	18114	5439	7.7	Other Areas	Colluvium
RM-COR21-00	17964	5074	4.03	Other Areas	Colluvium
RM-COR22-00	16809	5116	1.49	Other Areas	Mancos Shale
RM-COR23-00	20456	6117	5.77	Other Areas	Mancos Shale
RM-COR24-00	15050	4467	1.54	Other Areas	Mancos Shale
RM-COR25-00	17355	5326	2.13	Drainage	Mancos Shale
RM-COR26-00	15753	5081	1.7	Capped Waste Rock Pile	Colluvium
RM-COR27-00	13996	3505	1.38	Drainage	Mancos Shale
RM-COR28-00	17957	4808	1.99	Other Areas	Mancos Shale

Sample ID – Depth to top of sample (ft)	Top of Sample Interval (feet)	Background Reference Area
RM01-CWRP08-R-10	10	Colluvium
RM01-CWRP08-R-15	15	Colluvium
RM01-CWRP08-S-18.5	18.5	Colluvium
RM01-DRNA1-00	0	Colluvium
RM01-DRNA1-01	1	Colluvium
RM01-DRNA1-05	5	Colluvium
RM01-DRNB1-00	0	Colluvium
RM01-DRNB1-01	1	Colluvium
RM01-DRNB1-05	5	Colluvium
RM01-DRNC1-00	0	Colluvium
RM01-DRNC1-01	1	Colluvium
RM01-DRNC1-05	5	Colluvium
RM01-HR01-00	0	Colluvium
RM01-HR01-01	1	Colluvium
RM01-HR01-05	5	Colluvium
RM01-HR02-00	0	Mancos Shale
RM01-HR02-01	1	Mancos Shale
RM01-HR02-05	5	Mancos Shale
RM01-HR03-00	0	Mancos Shale
RM01-HR03-01	1	Mancos Shale
RM01-HR03-05	5	Mancos Shale
RM01-HR04-00	0	Colluvium
RM01-HR05-00	0	Colluvium
RM01-HR06-00	0	Colluvium
RM01-HR07-00	0	Colluvium
RM01-HR07-01	1	Colluvium
RM01-HR07-05	5	Colluvium
RM01-STEP01-00	0	Colluvium
RM01-STEP01-01	1	Colluvium
RM01-STEP01-05	5	Colluvium
RM01-STEP02-00	0	Mancos Shale
RM01-STEP02-01	1	Mancos Shale
RM01-STEP02-05	5	Mancos Shale
RM01-STEP03-00	0	Colluvium
RM01-STEP03-01	1	Colluvium
RM01-STEP03-05	5	Colluvium
RM01-STEP04-00	0	Colluvium
RM01-STEP04-01	1	Colluvium
RM01-STEP04-05	5	Colluvium

Background Sample ID	Background Reference Area
RMCB-ON49	Colluvium
RMCB-P10	Colluvium
RMCB-P54	Colluvium
RMCB-R59	Colluvium
RMCB-RN06	Colluvium
RMCB-X18	Colluvium
RMCB-X24	Colluvium
RMCB-YN15	Colluvium
RMCB-Z46	Colluvium
RMDB-AN55	Dakota Sandstone
RMDB-AU44	Dakota Sandstone
RMDB-B60	Dakota Sandstone
RMDB-BN03	Dakota Sandstone
RMDB-C44	Dakota Sandstone
RMDB-CN44	Dakota Sandstone
RMDB-CN53	Dakota Sandstone
RMDB-DN28	Dakota Sandstone
RMDB-EU24	Dakota Sandstone
RMDB-F64	Dakota Sandstone
RMDB-GN36	Dakota Sandstone
RMDB-H40	Dakota Sandstone
RMDB-HN56	Dakota Sandstone
RMDB-I10	Dakota Sandstone
RMDB-ID10	Dakota Sandstone
RMDB-LN40	Dakota Sandstone
RMDB-MN51	Dakota Sandstone
RMDB-O50	Dakota Sandstone
RMDB-R16	Dakota Sandstone
RMDB-R53	Dakota Sandstone
RMDB-SN52	Dakota Sandstone
RMDB-TN46	Dakota Sandstone
RMDB-UN18	Dakota Sandstone
RMDB-V20	Dakota Sandstone
RMDB-VN27	Dakota Sandstone
RMDB-XN59	Dakota Sandstone

Table 1. Master Spreadsheet of Data

Ruby Mines Removal Site Evaluation Report - Correlation Statistics

Sample ID – Depth to top of sample (ft)	cpm (uncollimated)	cpm (collimated)	Ra-226 (pCi/g)	Description for Grouping	Geology
RM-COR29-00	18719	5456	3.34	Other Areas	Colluvium
RM-COR30-00	15436	4839	2.9	Drainage	Mancos Shale
RM-COR31-00	17341	4884	3.42	Drainage	Mancos Shale
RM-COR32-00	19368	5633	6.71	Drainage	Mancos Shale
RM-COR33-00	20175	6084	3.01	Other Areas	Colluvium
RM-COR34-00	17119	4937	1.95	Other Areas	Colluvium
RM-COR35-00	15485	4998	1.5	Other Areas	Mancos Shale
RM-COR36-00	20280	6344	6.23	Former Haul Road	Mancos Shale
RM-COR37-00	16561	5087	7.5	Other Areas	Mancos Shale
RM-COR38-00	18409	5955	8.8	Other Areas	Mancos Shale
RM-COR39-00	18845	5761	3.19	Drainage	Mancos Shale
RM-COR40-00	14482	4310	1.82	Former Haul Road	Mancos Shale
RM-COR41-00	21636	6839	9.3	Other Areas	Colluvium
RM-COR42-00	24359	7575	19.2	Other Areas	Colluvium
RM-COR43-00	19182	5721	1.7	Other Areas	Colluvium
RM-COR44-00	13437	4292	1.5	Other Areas	Colluvium
RM-COR45-00	20154	5935	7.9	Other Areas	Colluvium
RM-COR46-00	20369	6292	5.57	Other Areas	Mancos Shale
RM-COR47-00	18008	5171	3.38	Other Areas	Colluvium
Number samples:	96				

Sample ID – Depth to top of sample (ft)	Top of Sample Interval (feet)	Background Reference Area
RM01-STEP05-00	0	Colluvium
RM01-STEP05-01	1	Colluvium
RM01-STEP05-05	5	Colluvium
RM01-WRK01-00	0	Colluvium
RM01-WRK01-01	1	Colluvium
RM01-WRK01-05	5	Colluvium
RM01-WRK02-00	0	Colluvium
RM01-WRK02-01	1	Colluvium
RM01-WRK02-5.5	5.5	Colluvium
RM01-WRK03-00	0	Colluvium
RM01-WRK03-01	1	Colluvium
RM01-WRK03-05	5	Colluvium
RM01-WRK04-00	0	Colluvium
RM01-WRK04-01	1	Colluvium
RM01-WRK04-05	5	Colluvium
RM02-VENT01-00	0	Dakota Sandstone
RM02-VENT01-01	1	Dakota Sandstone
RM02-VENT02-00	0	Dakota Sandstone
RM02-VENT02-01	1	Dakota Sandstone
RM02-VENT03-00	0	Dakota Sandstone
RM02-VENT03-01	1	Dakota Sandstone
RM03-CWRP01-C-00	0	Colluvium
RM03-CWRP01-R-05	5	Colluvium
RM03-CWRP01-S-06	6	Colluvium
RM03-CWRP02-C-00	0	Mancos Shale
RM03-CWRP02-R-05	5	Mancos Shale
RM03-CWRP02-R-10	10	Mancos Shale
RM03-CWRP02-S-13.5	13.5	Mancos Shale
RM03-CWRP03-C-00	0	Mancos Shale
RM03-CWRP03-R-05	5	Mancos Shale
RM03-CWRP03-S-10	10	Mancos Shale
RM03-CWRP04-C-00	0	Colluvium
RM03-CWRP04-R-03	3	Colluvium
RM03-CWRP04-R-08	8	Colluvium
RM03-CWRP04-S-14	14	Colluvium
RM03-CWRP05-C-00	0	Colluvium
RM03-CWRP05-R-02	2	Colluvium
RM03-CWRP05-R-05	5	Colluvium
RM03-CWRP05-R-10	10	Colluvium
RM03-CWRP05-S-15	15	Colluvium
RM03-CWRP06-C-00	0	Mancos Shale
RM03-CWRP06-R-05	5	Mancos Shale
RM03-CWRP06-R-10	10	Mancos Shale

Mine Feature Designation	Feature Description	Predominant Geology
RUBY-001	Adit	Mancos Shale
Ruby Mine No. 1	Capped waste rock pile	Colluvium
	Drainages A, B, C	Colluvium
	Exploratory borehole area	Dakota Sandstone
	Former haul road to Wolf Canyon Road	Colluvium
	Former haul road at Wolf Canyon Road - isolated location near BIA Route 49	Colluvium
	Residences	Dakota Sandstone
	Step out area	Colluvium
	Work area	Colluvium
RUBY-002	Ruby Mine vent	Dakota Sandstone
RUBY-003	Adit	Mancos Shale
Ruby Mine No. 3	Capped waste rock pile	Mancos Shale
	Dewatering area	Mancos Shale
	Drainages	Colluvium
	Exploratory borehole area	Mancos Shale
	Former haul road to New Mexico Highway 371	Mancos Shale
	Residence	Mancos Shale
	Work Area	Mancos Shale
RUBY-004	Ruby Mine vent	Mancos Shale

Table 1. Master Spreadsheet of Data

Ruby Mines Removal Site Evaluation Report - Correlation Statistics

Sample ID – Depth to top of sample (ft)	Top of Sample Interval (feet)	Background Reference Area
RM03-CWRP06-S-13	13	Mancos Shale
RM03-CWRP06-S-18	18	Mancos Shale
RM03-CWRP07-C-00	0	Mancos Shale
RM03-CWRP07-R-05	5	Mancos Shale
RM03-CWRP07-S-6.5	6.5	Mancos Shale
RM03-CWRP07-S-10	10	Mancos Shale
RM03-DRN01-00	0	Mancos Shale
RM03-DRN01-01	1	Mancos Shale
RM03-DRN01-05	5	Mancos Shale
RM03-DRN02-00	0	Colluvium
RM03-DRN02-01	1	Colluvium
RM03-DRN02-05	5	Colluvium
RM03-DRN03-00	0	Mancos Shale
RM03-DRN03-01	1	Mancos Shale
RM03-DRN03-05	5	Mancos Shale
RM03-DWTR01-00	0	Mancos Shale
RM03-DWTR01-01	1	Mancos Shale
RM03-DWTR01-05	5	Mancos Shale
RM03-DWTR02-00	0	Mancos Shale
RM03-DWTR02-01	1	Mancos Shale
RM03-DWTR02-05	5	Mancos Shale
RM03-DWTR02-6.5	6.5	Mancos Shale
RM03-DWTR03-00	0	Mancos Shale
RM03-DWTR03-01	1	Mancos Shale
RM03-DWTR03-05	5	Mancos Shale
RM03-DWTR03-10	10	Mancos Shale
RM03-WRK01-00	0	Mancos Shale
RM03-WRK01-01	1	Mancos Shale
RM03-WRK01-05	5	Mancos Shale
RM03-WRK02-00	0	Mancos Shale
RM03-WRK02-01	1	Mancos Shale
RM03-WRK02-05	5	Mancos Shale
RM03-WRK03-00	0	Mancos Shale
RM03-WRK03-01	1	Mancos Shale
RM03-WRK03-05	5	Mancos Shale
RM03-WRK04-00	0	Mancos Shale
RM03-WRK04-01	1	Mancos Shale
RM03-WRK04-04	4	Mancos Shale
RM04-VENT01-00	0	Mancos Shale
RM04-VENT01-01	1	Mancos Shale
RM04-VENT02-00	0	Mancos Shale
RM04-VENT02-01	1	Mancos Shale
RM04-VENT03-00	0	Mancos Shale

Table 1. Master Spreadsheet of Data

Ruby Mines Removal Site Evaluation Report - Correlation Statistics

RM04-VENT03-02	2	Mancos Shale
RM19-VENT01-00	0	Colluvium
RM19-VENT01-01	1	Colluvium
RM19-VENT02-00	0	Colluvium
RM19-VENT02-01	1	Colluvium
RM19-VENT03-00	0	Colluvium
RM19-VENT03-01	1	Colluvium
RM01-8MAY14-01	0	Dakota Sandstone
RM01-8MAY14-02	0	Dakota Sandstone
RM01-8MAY14-03	0	Colluvium
RM01-8MAY14-04	0	Colluvium
RM01-8MAY14-05	0	Colluvium
RM01-8MAY14-06	0	Colluvium
RM01-8MAY14-07	0	Colluvium
RM01-8MAY14-08	0	Colluvium
RM03-8MAY14-01	0	Mancos Shale
RM03-8MAY14-02	0	Mancos Shale
RM03-8MAY14-03	0	Mancos Shale
RM03-8MAY14-04	0	Mancos Shale
RM03-8MAY14-05	0	Colluvium
RM03-8MAY14-06	0	Mancos Shale
RM03-8MAY14-07	0	Mancos Shale
RM03-8MAY14-08	0	Mancos Shale
RM03-8MAY14-09	0	Mancos Shale
RM-COR18-00	0	Colluvium
RM-COR19-00	0	Colluvium
RM-COR20-00	0	Colluvium
RM-COR21-00	0	Colluvium
RM-COR22-00	0	Mancos Shale
RM-COR23-00	0	Mancos Shale
RM-COR24-00	0	Mancos Shale
RM-COR25-00	0	Mancos Shale
RM-COR26-00	0	Colluvium
RM-COR27-00	0	Mancos Shale
RM-COR28-00	0	Mancos Shale
RM-COR29-00	0	Colluvium
RM-COR30-00	0	Mancos Shale
RM-COR31-00	0	Mancos Shale
RM-COR32-00	0	Mancos Shale
RM-COR33-00	0	Colluvium
RM-COR34-00	0	Colluvium
RM-COR35-00	0	Mancos Shale
RM-COR36-00	0	Mancos Shale

Table 1. Master Spreadsheet of Data

Ruby Mines Removal Site Evaluation Report - Correlation Statistics

RM-COR37-00	0	Mancos Shale
RM-COR38-00	0	Mancos Shale
RM-COR39-00	0	Mancos Shale
RM-COR40-00	0	Mancos Shale
RM-COR41-00	0	Colluvium
RM-COR42-00	0	Colluvium
RM-COR43-00	0	Colluvium
RM-COR44-00	0	Colluvium
RM-COR45-00	0	Colluvium
RM-COR46-00	0	Mancos Shale
RM-COR47-00	0	Colluvium

Table 2. Radium-226 Concentrations in pCi/g (ALL DATA)
Ruby Mines Removal Site Evaluation Report - Correlation Statistics

Sample ID – Depth to top of sample (ft)	cpm (uncollimated)	cpm (collimated)	Ra-226 (pCi/g)
RM01-HR02-00	67130	40753	1680
RM01-8MAY14-07	268857	112974	1440
RM01-8MAY14-05	122269	91084	1330
RM01-HR07-00	176269	72600	1160
RM03-8MAY14-07	109898	41707	1000
RM01-STEP05-00	102246	73119	846
RM03-WRK04-00	104266	40982	590
RM01-HR05-00	89648	33068	412
RM03-8MAY14-08	171019	89326	391
RM01-8MAY14-02	79193	35235	299
RM01-STEP02-00	97827	40360	281
RM03-8MAY14-06	47897	18852	220
RM01-HR03-00	77079	37264	218
RM02-VENT03-00	113882	47869	159
RM01-8MAY14-01	38876	11774	143
RM03-8MAY14-04	38876	11774	141
RM01-HR06-00	50010	19402	129
RM01-STEP03-00	59471	21694	122
RM04-VENT03-00	97183	43463	111
RM19-VENT02-00	77944	31787	107
RM03-DWTR03-00	41483	14453	50.7
RM01-WRK02-00	42278	14159	39.9
RM19-VENT03-00	33329	12254	32.2
RM01-HR04-00	30157	13126	28.6
RM01-STEP01-00	24593	8403	21.3
RM01-STEP04-00	134792	57437	20.9
RM03-WRK03-00	24140	8430	20
RM-COR42-00	24359	7575	19.2
RM01-DRNA1-00	30924	8365	18.9
RM01-8MAY14-04	34094	10226	17.3
RM01-8MAY14-06	26512	8423	15.8
RM01-HR01-00	25600	9665	14.6
RM03-DRN03-00	16378	5635	10.2
RM01-DRNC1-00	18214	5775	10.1
RM-COR41-00	21636	6839	9.3
RM03-DRN02-00	19784	5626	8.9
RM-COR38-00	18409	5955	8.8

Uncollimated

Ordinary Least Squares Linear Regression Output Sheet

User Selected Options	
Date/Time of Computation	4/20/2015 23:39
From File	CorrelationComparisonEPA_Ruby Mines_f.xls
Full Precision	OFF
Display Limits	FALSE
Display Regression Diagnostics	FALSE
Display Regression Tables	TRUE
Title For Y vs X Plots	UC < 50 pCi/g - uncollimated (All data)
Confidence Level for Regression Line	0.95
Display Confidence Band	FALSE
Display Prediction Band	FALSE

Dependent Variable (Y-Data)	Ra-226 (pCi/g)
Number Reported (Y values)	98
Independent Variable (x-data)	cpm (uncollimated)
Number Reported (x-values)	98

Regression Estimates and Inference Table

Parameter	Estimates	Std. Error	T-values	p-values
intercept	-102	28.37	-3.597	5.11E-04
cpm (uncollin	0.00568	5.03E-04	11.29	2.59E-19

OLS ANOVA Table

Source of Variation	SS	DOF	MS	F-Value	P-Value
Regression	5407608	1	5407608	127.5	0
Error	4071800	96	42415		
Total	9479409	97			

R Square	0.57
Adjusted R Square	0.566
Sqrt(MSE) = Scale	205.9

Table 2. Radium-226 Concentrations in pCi/g (ALL DATA)
Ruby Mines Removal Site Evaluation Report - Correlation Statistics

RM01-CWRP02-C-00	25779	8558	8.6
RM-COR45-00	20154	5935	7.9
RM-COR20-00	18114	5439	7.7
RM-COR37-00	16561	5087	7.5
RM01-CWRP03-C-00	25028	7469	7.3
RM01-CWRP04-C-00	21887	6514	7.1
RM01-WRK01-00	26190	8284	6.8
RM01-CWRP08-C-00	18098	5523	6.74
RM-COR32-00	19368	5633	6.71
RM03-DWTR02-00	24524	8178	6.69
RM04-VENT02-00	23252	8397	6.38
RM-COR36-00	20280	6344	6.23
RM-COR23-00	20456	6117	5.77
RM01-8MAY14-03	19947	5787	5.73
RM02-VENT02-00	30995	12495	5.69
RM-COR46-00	20369	6292	5.57
RM03-8MAY14-02	23023	7488	4.17
RM-COR18-00	20411	5990	4.14
RM01-CWRP07-C-00	39423	14130	4.09
RM-COR21-00	17964	5074	4.03
RM01-CWRP06-C-00	29301	9149	3.62
RM-COR31-00	17341	4884	3.42
RM-COR47-00	18008	5171	3.38
RM-COR29-00	18719	5456	3.34
RM03-8MAY14-03	17167	5116	3.27
RM03-8MAY14-05	30597	10838	3.27
RM-COR39-00	18845	5761	3.19
RM01-WRK03-00	30130	9360	3.08
RM-COR33-00	20175	6084	3.01
RM01-WRK04-00	17374	4890	2.99
RM-COR30-00	15436	4839	2.9
RM01-8MAY14-08	13094	3889	2.77
RM03-WRK01-00	15295	4815	2.7
RM03-WRK02-00	14067	4247	2.66
RM01-CWRP01-C-00	27214	9124	2.61
RM03-DWTR01-00	15978	4745	2.58
RM-COR19-00	16546	5052	2.56
RM03-DRN01-00	13376	4182	2.35
RM01-CWRP05-C-00	19328	5765	2.33
RM03-CWRP05-C-00	24347	8078	2.27
RM03-CWRP07-C-00	14380	6044	2.23
RM-COR25-00	17355	5326	2.13
RM03-CWRP06-C-00	31320	10834	2.04
RM-COR28-00	17957	4808	1.99
RM-COR34-00	17119	4937	1.95
RM-COR40-00	14482	4310	1.82
RM03-CWRP01-C-00	15909	5297	1.72
RM03-CWRP03-C-00	19634	7124	1.71
RM-COR26-00	15753	5081	1.7
RM-COR43-00	19182	5721	1.7
RM03-CWRP04-C-00	31942	10925	1.62
RM03-CWRP02-C-00	18141	5935	1.61
RM-COR24-00	15050	4467	1.54
RM-COR35-00	15485	4998	1.5
RM-COR44-00	13437	4292	1.5

Collimated

Ordinary Least Squares Linear Regression Output Sheet

User Selected Options					
Date/Time of Computation	4/20/2015 23:43				
From File	CorrelationComparisonEPA_Ruby Mines_f.xls				
Full Precision	OFF				
Display Limits	FALSE				
Display Regression Diagnostics	FALSE				
Display Regression Tables	TRUE				
Title For Y vs X Plots	UC < 50 pCi/g - collimated (All data)				
Confidence Level for Regression Line	0.95				
Display Confidence Band	FALSE				
Display Prediction Band	FALSE				
Dependent Variable (Y-Data)	Ra-226 (pCi/g)				
Number Reported (Y values)	98				
Independent Variable (x-data)	cpm (collimated)				
Number Reported (x-values)	98				

Regression Estimates and Inference Table

Parameter	Estimates	Std. Error	T-values	p-values
intercept	-70.75	23.44	-3.018	0.00326
cpm (collimat	0.0122	9.16E-04	13.32	1.50E-23

OLS ANOVA Table

Source of Variation	SS	DOF	MS	F-Value	P-Value
Regression	6152066	1	6152066	177.5	0
Error	3327343	96	34660		
Total	9479409	97			

R Square	0.649
Adjusted R Square	0.645
Sqrt(MSE) = Scale	186.2

Correlation Calculation

calculated y=mx+b (PRG = slope*CPM + intercept)

y	2.00	3.00	5.00	10.00
m	0.0056800	0.0056800	0.0056800	0.0056800
x	x	x	x	x
b	-102.00	-102.00	-102.00	-102.00
x (cpm) =	18,310	18,486	18,838	19,718

Table 2. Radium-226 Concentrations in pCi/g (ALL DATA)
Ruby Mines Removal Site Evaluation Report - Correlation Statistics

RM-COR22-00	16809	5116	1.49
RM02-VENT01-00	9167	3164	1.39
RM-COR27-00	13996	3505	1.38
RM19-VENT01-00	12716	3889	1.37
RM03-8MAY14-01	12877	3804	1.19
RM04-VENT01-00	13279	4256	1.1
number samples	**98**		1680

Goodness of fit test - Not any common distribution

Goodness-of-Fit Test Statistics for Uncensored Full Data Sets without Non-Detects

User Selected Options	
From File	ALL DATA.xls
Full Precision	OFF
Confidence Coefficient	0.95

cpm (uncollimated)		cpm (collimated)		Ra-226 (pCi/g)	
Raw Statistics		Raw Statistics		Raw Statistics	
Number of Valid Observations	99	Number of Valid Observations	98	Number of Valid Observations	98
Number of Distinct Observations	98	Number of Distinct Observations	94	Number of Distinct Observations	95
Minimum	98	Minimum	3164	Minimum	1.1
Maximum	268857	Maximum	112974	Maximum	1680
Mean of Raw Data	37947	Mean of Raw Data	15280	Mean of Raw Data	115.8
Standard Deviation of Raw Data	41525	Standard Deviation of Raw Data	20633	Standard Deviation of Raw Data	312.6
Khat	1.505	Khat	1.169	Khat	0.292
Theta hat	25222	Theta hat	13068	Theta hat	395.8
Kstar	1.466	Kstar	1.14	Kstar	0.29
Theta star	25891	Theta star	13400	Theta star	398.7
Mean of Log Transformed Data	10.18	Mean of Log Transformed Data	9.149	Mean of Log Transformed Data	2.384
Standard Deviation of Log Transformed Data	0.906	Standard Deviation of Log Transformed Data	0.857	Standard Deviation of Log Transformed Data	1.996
Normal GOF Test Results		Normal GOF Test Results		Normal GOF Test Results	
Correlation Coefficient R	0.779	Correlation Coefficient R	0.754	Correlation Coefficient R	0.64
Approximate Shapiro Wilk Test Statistic	0.631	Approximate Shapiro Wilk Test Statistic	0.58	Approximate Shapiro Wilk Test Statistic	0.426
Approximate Shapiro Wilk P Value	0	Approximate Shapiro Wilk P Value	0	Approximate Shapiro Wilk P Value	0
Lilliefors Test Statistic	0.295	Lilliefors Test Statistic	0.322	Lilliefors Test Statistic	0.382
Lilliefors Critical (0.05) Value	0.089	Lilliefors Critical (0.05) Value	0.0895	Lilliefors Critical (0.05) Value	0.0895
Data not Normal at (0.05) Significance Level		Data not Normal at (0.05) Significance Level		Data not Normal at (0.05) Significance Level	
Gamma GOF Test Results		Gamma GOF Test Results		Gamma GOF Test Results	
Correlation Coefficient R	0.938	Correlation Coefficient R	0.937	Correlation Coefficient R	0.956
A-D Test Statistic	7.327	A-D Test Statistic	9.835	A-D Test Statistic	11.87
A-D Critical (0.05) Value	0.77	A-D Critical (0.05) Value	0.779	A-D Critical (0.05) Value	0.871
K-S Test Statistic	0.208	K-S Test Statistic	0.241	K-S Test Statistic	0.294
K-S Critical(0.05) Value	0.0916	K-S Critical(0.05) Value	0.0928	K-S Critical(0.05) Value	0.0983
Data not Gamma Distributed at (0.05) Significance Level		Data not Gamma Distributed at (0.05) Significance Level		Data not Gamma Distributed at (0.05) Significance Level	
Lognormal GOF Test Results		Lognormal GOF Test Results		Lognormal GOF Test Results	
Correlation Coefficient R	0.864	Correlation Coefficient R	0.915	Correlation Coefficient R	0.927
Approximate Shapiro Wilk Test Statistic	0.797	Approximate Shapiro Wilk Test Statistic	0.823	Approximate Shapiro Wilk Test Statistic	0.838
Approximate Shapiro Wilk P Value	0	Approximate Shapiro Wilk P Value	0	Approximate Shapiro Wilk P Value	5.55E-16
Lilliefors Test Statistic	0.191	Lilliefors Test Statistic	0.187	Lilliefors Test Statistic	0.186
Lilliefors Critical (0.05) Value	0.089	Lilliefors Critical (0.05) Value	0.0895	Lilliefors Critical (0.05) Value	0.0895
Data not Lognormal at (0.05) Significance Level		Data not Lognormal at (0.05) Significance Level		Data not Lognormal at (0.05) Significance Level	

Table 2. Radium-226 Concentrations in pCi/g (ALL DATA) (Continued)
Ruby Mines Removal Site Evaluation Report - Correlation Statistics

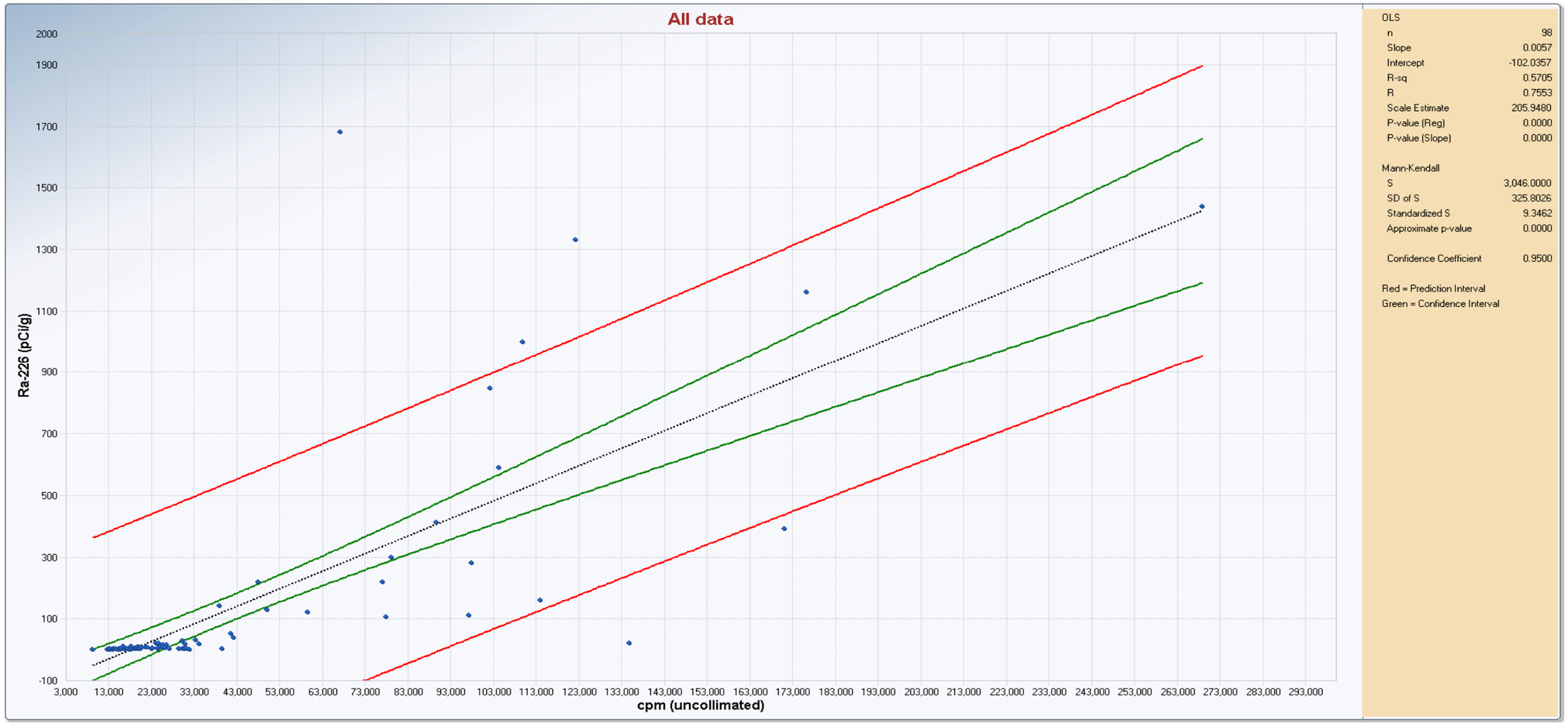


Table 2. Radium-226 Concentrations in pCi/g (ALL DATA) (Continued)
Ruby Mines Removal Site Evaluation Report - Correlation Statistics

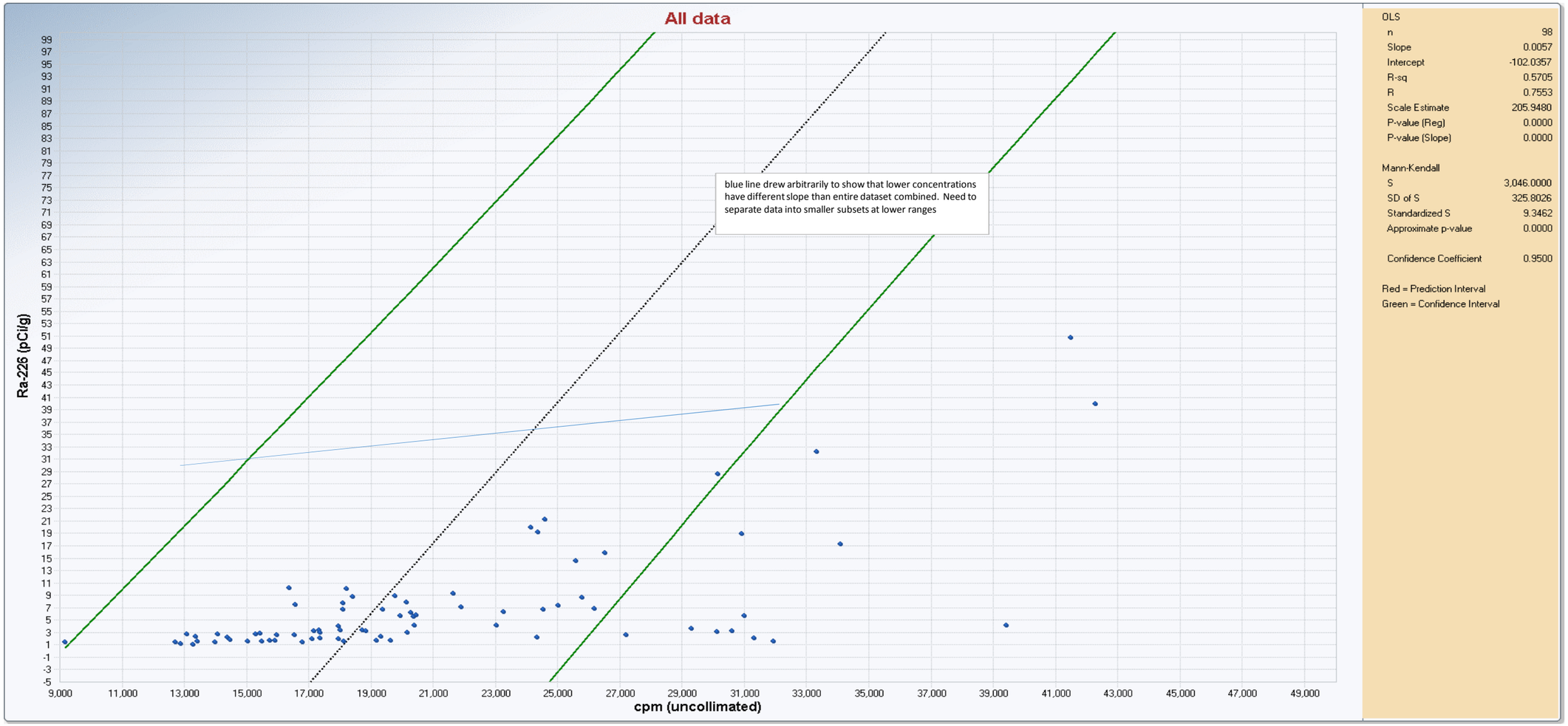


Table 3. Radium-226 Concentrations < 20 pCi/g (ALL DATA)
Ruby Mines Removal Site Evaluation Report - Correlation Statistics

Sample ID – Depth to top of sample (ft)	cpm (uncollimated)	cpm (collimated)	Ra-226 (pCi/g)
Number of Samples:	0		
RM02-VENT01-00	9167	3164	1.39
RM19-VENT01-00	12716	3889	1.37
RM03-8MAY14-01	12877	3804	1.19
RM01-8MAY14-08	13094	3889	2.77
RM04-VENT01-00	13279	4256	1.1
RM03-DRN01-00	13376	4182	2.35
RM-COR44-00	13437	4292	1.5
RM-COR27-00	13996	3505	1.38
RM03-WRK02-00	14067	4247	2.66
RM03-CWRP07-C-00	14380	6044	2.23
RM-COR40-00	14482	4310	1.82
RM-COR24-00	15050	4467	1.54
RM03-WRK01-00	15295	4815	2.7
RM-COR30-00	15436	4839	2.9
RM-COR35-00	15485	4998	1.5
RM-COR26-00	15753	5081	1.7
RM03-CWRP01-C-00	15909	5297	1.72
RM03-DWTR01-00	15978	4745	2.58
RM03-DRN03-00	16378	5635	10.2
RM-COR19-00	16546	5052	2.56
RM-COR37-00	16561	5087	7.5
RM-COR22-00	16809	5116	1.49
RM-COR34-00	17119	4937	1.95
RM03-8MAY14-03	17167	5116	3.27
RM-COR31-00	17341	4884	3.42
RM-COR25-00	17355	5326	2.13
RM01-WRK04-00	17374	4890	2.99
RM-COR28-00	17957	4808	1.99
RM-COR21-00	17964	5074	4.03
RM-COR47-00	18008	5171	3.38
RM01-CWRP08-C-00	18098	5523	6.74
RM-COR20-00	18114	5439	7.7
RM03-CWRP02-C-00	18141	5935	1.61
RM01-DRNC1-00	18214	5775	10.1
RM-COR38-00	18409	5955	8.8

Uncollimated

Ordinary Least Squares Linear Regression Output Sheet

User Selected Options	
Date/Time of Computation	4/20/2015 23:23
From File	CorrelationComparisonEPA_Ruby Mines_d.xls
Full Precision	OFF
Display Limits	FALSE
Display Regression Diagnostics	FALSE
Display Regression Tables	TRUE
Title For Y vs X Plots	UC < 20 pCi/g - uncollimated (All data)
Confidence Level for Regression Line	0.95
Display Confidence Band	FALSE
Display Prediction Band	FALSE
Dependent Variable (Y-Data)	Ra-226 (pCi/g)
Number Reported (Y values)	71
Independent Variable (x-data)	cpm (uncollimated)
Number Reported (x-values)	71

Regression Estimates and Inference Table

Parameter	Estimates	Std. Error	T-values	p-values
intercept	-1.348	1.616	-0.834	0.407
cpm (uncollimat	3.11E-04	7.67E-05	4.054	1.30E-04

OLS ANOVA Table

Source of Variation	SS	DOF	MS	F-Value	P-Value
Regression	240.2	1	240.2	16.44	0.0001
Error	1008	69	14.61		
Total	1248	70			

R Square	0.192
Adjusted R Square	0.181
Sqrt(MSE) = Scale	3.822

Table 3. Radium-226 Concentrations < 20 pCi/g (ALL DATA)

Ruby Mines Removal Site Evaluation Report - Correlation Statistics

RM-COR29-00	18719	5456	3.34
RM-COR39-00	18845	5761	3.19
RM-COR43-00	19182	5721	1.7
RM01-CWRP05-C-00	19328	5765	2.33
RM-COR32-00	19368	5633	6.71
RM03-CWRP03-C-00	19634	7124	1.71
RM03-DRN02-00	19784	5626	8.9
RM01-8MAY14-03	19947	5787	5.73
RM-COR45-00	20154	5935	7.9
RM-COR33-00	20175	6084	3.01
RM-COR36-00	20280	6344	6.23
RM-COR46-00	20369	6292	5.57
RM-COR18-00	20411	5990	4.14
RM-COR23-00	20456	6117	5.77
RM-COR41-00	21636	6839	9.3
RM01-CWRP04-C-00	21887	6514	7.1
RM03-8MAY14-02	23023	7488	4.17
RM04-VENT02-00	23252	8397	6.38
RM03-CWRP05-C-00	24347	8078	2.27
RM-COR42-00	24359	7575	19.2
RM03-DWTR02-00	24524	8178	6.69
RM01-CWRP03-C-00	25028	7469	7.3
RM01-HR01-00	25600	9665	14.6
RM01-CWRP02-C-00	25779	8558	8.6
RM01-WRK01-00	26190	8284	6.8
RM01-8MAY14-06	26512	8423	15.8
RM01-CWRP01-C-00	27214	9124	2.61
RM01-CWRP06-C-00	29301	9149	3.62
RM01-WRK03-00	30130	9360	3.08
RM03-8MAY14-05	30597	10838	3.27
RM01-DRNA1-00	30924	8365	18.9
RM02-VENT02-00	30995	12495	5.69
RM03-CWRP06-C-00	31320	10834	2.04
RM03-CWRP04-C-00	31942	10925	1.62
RM01-8MAY14-04	34094	10226	17.3
RM01-CWRP07-C-00	39423	14130	4.09

Collimated

Ordinary Least Squares Linear Regression Output Sheet

User Selected Options	
Date/Time of Computation	4/20/2015 23:26
From File	CorrelationComparisonEPA_Ruby Mines_d.xls
Full Precision	OFF
Display Limits	FALSE
Display Regression Diagnostics	FALSE
Display Regression Tables	TRUE
Title For Y vs X Plots	UC < 20 pCi/g - collimated (All data)
Confidence Level for Regression Line	0.95
Display Confidence Band	FALSE
Display Prediction Band	FALSE
Dependent Variable (Y-Data)	Ra-226 (pCi/g)
Number Reported (Y values)	71
Independent Variable (x-data)	cpm (collimated)
Number Reported (x-values)	71

Regression Estimates and Inference Table

Parameter	Estimates	Std. Error	T-values	p-values
intercept	0.601	1.454	0.414	0.681
cpm (collimated	6.79E-04	2.15E-04	3.156	0.00237

OLS ANOVA Table

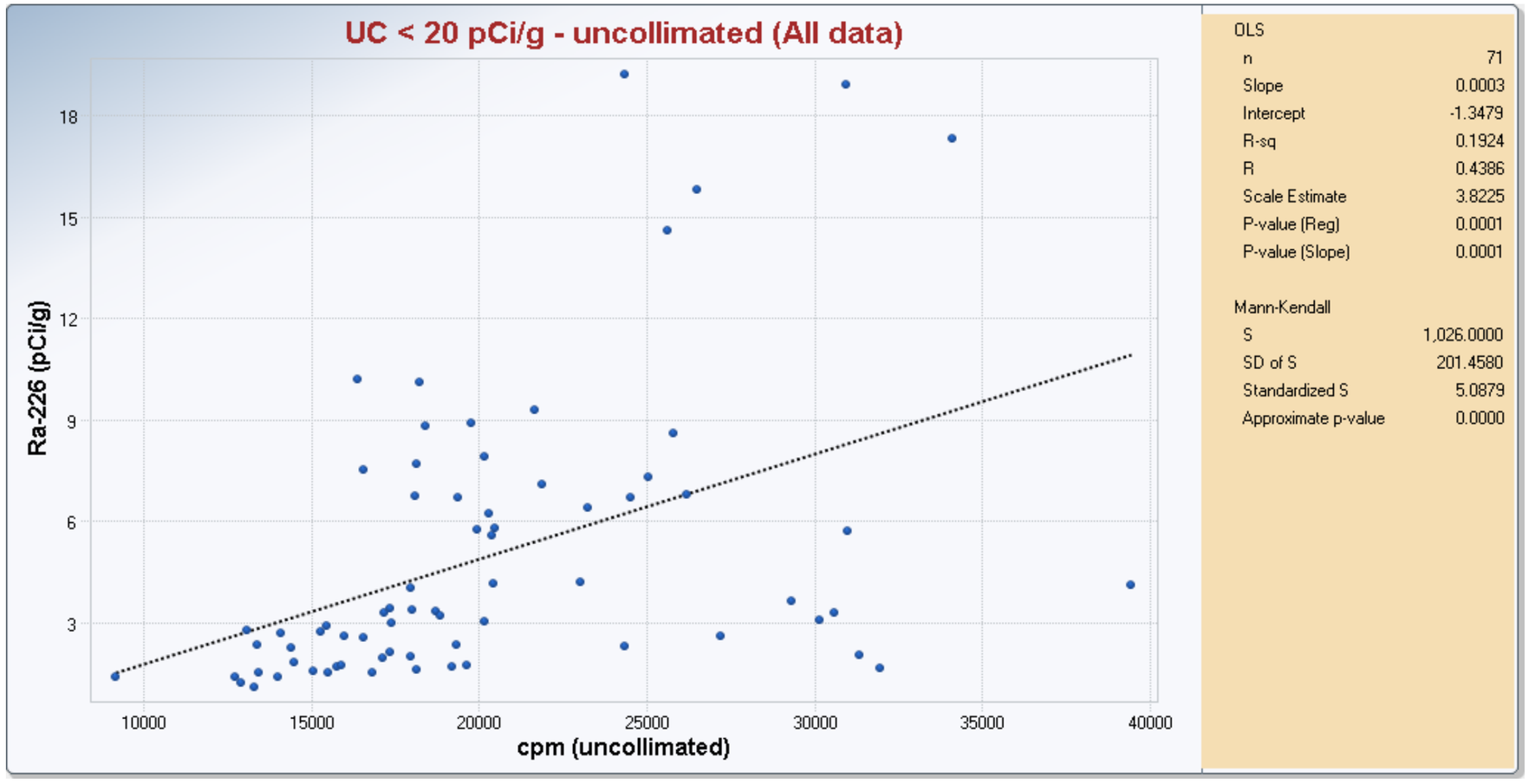
Source of Variation	SS	DOF	MS	F-Value	P-Value
Regression	157.5	1	157.5	9.963	0.0024
Error	1091	69	15.81		
Total	1248	70			

R Square	0.126
Adjusted R Square	0.114
Sqrt(MSE) = Scale	3.976

calculated y=mx+b (PRG = slope*CPM + intercept)

y	2.00	2.50	2.75	2.85	3.00
m	0.0003110	0.0003110	0.0003110	0.0003110	0.0003110
x	x	x	x	x	x
b	-1.348	-1.348	-1.348	-1.348	-1.348
x (correlation value)=	10,765	12,373	13,176	13,498	13,980
BACKGROUND VALUE (cpm)	13493	13493	13493	13493	13493

Table 3. Radium-226 Concentrations < 20 pCi/g (ALL DATA) (Continued)
Ruby Mines Removal Site Evaluation Report - Correlation Statistics



OLS	
n	71
Slope	0.0003
Intercept	-1.3479
R-sq	0.1924
R	0.4386
Scale Estimate	3.8225
P-value (Reg)	0.0001
P-value (Slope)	0.0001
Mann-Kendall	
S	1,026.0000
SD of S	201.4580
Standardized S	5.0879
Approximate p-value	0.0000

Table 3. Radium-226 Concentrations < 20 pCi/g (ALL DATA) (Continued)
Ruby Mines Removal Site Evaluation Report - Correlation Statistics

Graph used to remove data from final correlation. All data outside green 95% confidence interval

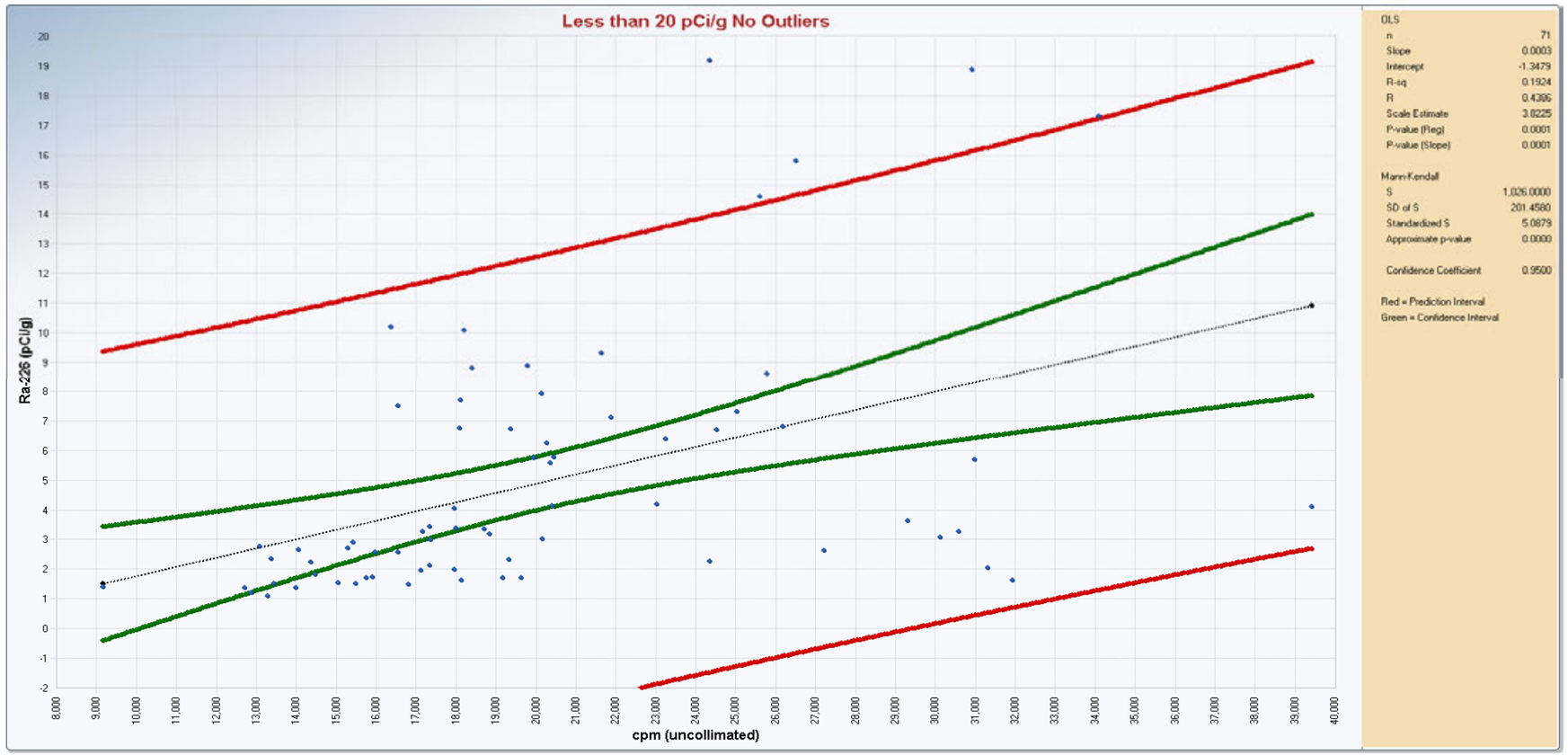
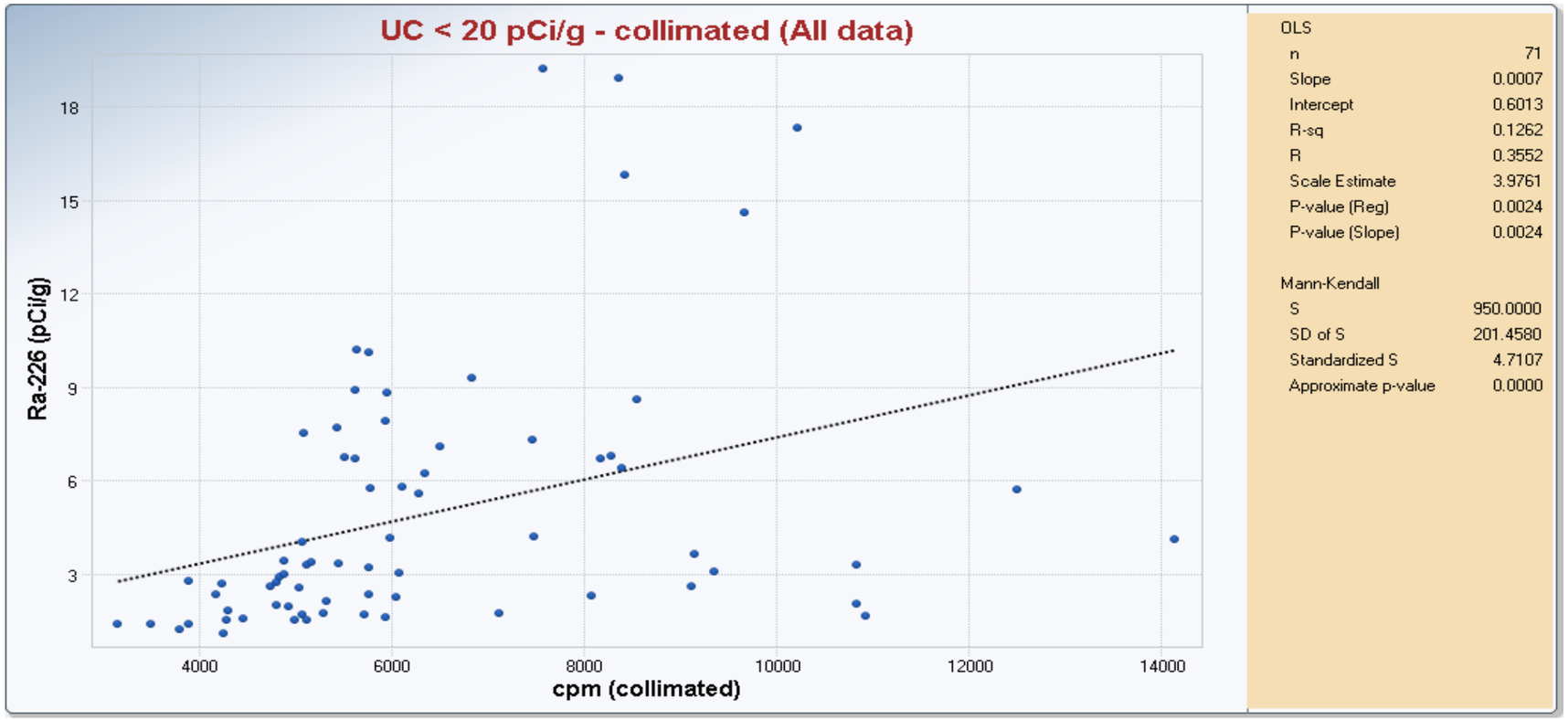


Table 3. Radium-226 Concentrations < 20 pCi/g (ALL DATA) (Continued)
Ruby Mines Removal Site Evaluation Report - Correlation Statistics



OLS	
n	71
Slope	0.0007
Intercept	0.6013
R-sq	0.1262
R	0.3552
Scale Estimate	3.9761
P-value (Reg)	0.0024
P-value (Slope)	0.0024

Mann-Kendall	
S	950.0000
SD of S	201.4580
Standardized S	4.7107
Approximate p-value	0.0000

Table 3. Radium-226 Concentrations < 20 pCi/g (ALL DATA) (Continued)
Ruby Mines Removal Site Evaluation Report - Correlation Statistics

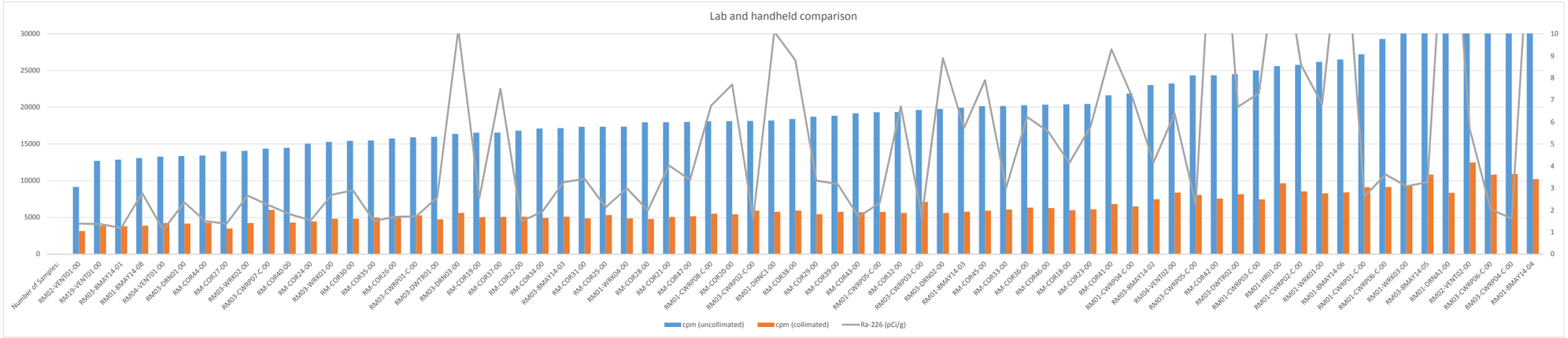


Table 4. Radium-226 Concentrations < 50 pCi/g (ALL DATA)
Ruby Mines Removal Site Evaluation Report - Correlation Statistics

Sample ID – Depth to top of sample (ft)	cpm (uncollimated)	cpm (collimated)	Ra-226 (pCi/g)
RM01-WRK02-00	42278	14159	39.9
RM19-VENT03-00	33329	12254	32.2
RM01-HR04-00	30157	13126	28.6
RM01-STEP01-00	24593	8403	21.3
RM01-STEP04-00	134792	57437	20.9
RM03-WRK03-00	24140	8430	20
RM-COR42-00	24359	7575	19.2
RM01-DRNA1-00	30924	8365	18.9
RM01-8MAY14-04	34094	10226	17.3
RM01-8MAY14-06	26512	8423	15.8
RM01-HR01-00	25600	9665	14.6
RM03-DRN03-00	16378	5635	10.2
RM01-DRNC1-00	18214	5775	10.1
RM-COR41-00	21636	6839	9.3
RM03-DRN02-00	19784	5626	8.9
RM-COR38-00	18409	5955	8.8
RM01-CWRP02-C-00	25779	8558	8.6
RM-COR45-00	20154	5935	7.9
RM-COR20-00	18114	5439	7.7
RM-COR37-00	16561	5087	7.5
RM01-CWRP03-C-00	25028	7469	7.3
RM01-CWRP04-C-00	21887	6514	7.1
RM01-WRK01-00	26190	8284	6.8
RM01-CWRP08-C-00	18098	5523	6.74
RM-COR32-00	19368	5633	6.71
RM03-DWTR02-00	24524	8178	6.69
RM04-VENT02-00	23252	8397	6.38
RM-COR36-00	20280	6344	6.23
RM-COR23-00	20456	6117	5.77
RM01-8MAY14-03	19947	5787	5.73
RM02-VENT02-00	30995	12495	5.69
RM-COR46-00	20369	6292	5.57
RM03-8MAY14-02	23023	7488	4.17
RM-COR18-00	20411	5990	4.14
RM01-CWRP07-C-00	39423	14130	4.09
RM-COR21-00	17964	5074	4.03
RM01-CWRP06-C-00	29301	9149	3.62
RM-COR31-00	17341	4884	3.42

Uncollimated

Ordinary Least Squares Linear Regression Output Sheet

User Selected Options	
Date/Time of Computation	4/20/2015 23:32
From File	CorrelationComparisonEPA_Ruby Mines_e.xls
Full Precision	OFF
Display Limits	FALSE
Display Regression Diagnostics	FALSE
Display Regression Tables	TRUE
Title For Y vs X Plots	UC < 50 pCi/g - uncollimated (All data)
Confidence Level for Regression Line	0.95
Display Confidence Band	FALSE
Display Prediction Band	FALSE
Dependent Variable (Y-Data)	Ra-226 (pCi/g)
Number Reported (Y values)	77
Independent Variable (x-data)	cpm (uncollimated)
Number Reported (x-values)	77

Regression Estimates and Inference Table

Parameter	Estimates	Std. Error	T-values	p-values
intercept	1.358	1.415	0.96	0.34
cpm (uncollim	2.37E-04	5.31E-05	4.468	2.75E-05

OLS ANOVA Table

Source of Variation	SS	DOF	MS	F-Value	P-Value
Regression	902.1	1	902.1	19.96	0
Error	3389	75	45.19		
Total	4.29E+03	76			

R Square	0.21
Adjusted R Square	0.2
Sqrt(MSE) = Scale	6.722

Table 4. Radium-226 Concentrations < 50 pCi/g (ALL DATA)

Ruby Mines Removal Site Evaluation Report - Correlation Statistics

RM-COR47-00	18008	5171	3.38
RM-COR29-00	18719	5456	3.34
RM03-8MAY14-03	17167	5116	3.27
RM03-8MAY14-05	30597	10838	3.27
RM-COR39-00	18845	5761	3.19
RM01-WRK03-00	30130	9360	3.08
RM-COR33-00	20175	6084	3.01
RM01-WRK04-00	17374	4890	2.99
RM-COR30-00	15436	4839	2.9
RM01-8MAY14-08	13094	3889	2.77
RM03-WRK01-00	15295	4815	2.7
RM03-WRK02-00	14067	4247	2.66
RM01-CWRP01-C-00	27214	9124	2.61
RM03-DWTR01-00	15978	4745	2.58
RM-COR19-00	16546	5052	2.56
RM03-DRN01-00	13376	4182	2.35
RM01-CWRP05-C-00	19328	5765	2.33
RM03-CWRP05-C-00	24347	8078	2.27
RM03-CWRP07-C-00	14380	6044	2.23
RM-COR25-00	17355	5326	2.13
RM03-CWRP06-C-00	31320	10834	2.04
RM-COR28-00	17957	4808	1.99
RM-COR34-00	17119	4937	1.95
RM-COR40-00	14482	4310	1.82
RM03-CWRP01-C-00	15909	5297	1.72
RM03-CWRP03-C-00	19634	7124	1.71
RM-COR26-00	15753	5081	1.7
RM-COR43-00	19182	5721	1.7
RM03-CWRP04-C-00	31942	10925	1.62
RM03-CWRP02-C-00	18141	5935	1.61
RM-COR24-00	15050	4467	1.54
RM-COR35-00	15485	4998	1.5
RM-COR44-00	13437	4292	1.5
RM-COR22-00	16809	5116	1.49
RM02-VENT01-00	9167	3164	1.39
RM-COR27-00	13996	3505	1.38
RM19-VENT01-00	12716	3889	1.37
RM03-8MAY14-01	12877	3804	1.19
RM04-VENT01-00	13279	4256	1.1

Collimated

Ordinary Least Squares Linear Regression Output Sheet

User Selected Options

Date/Time of Computation	4/20/2015 23:36
From File	CorrelationComparisonEPA_Ruby Mines_e.xls
Full Precision	OFF
Display Limits	FALSE
Display Regression Diagnostics	FALSE
Display Regression Tables	TRUE
Title For Y vs X Plots	UC < 50 pCi/g - collimated (All data)
Confidence Level for Regression Line	0.95
Display Confidence Band	FALSE
Display Prediction Band	FALSE

Dependent Variable (Y-Data)	Ra-226 (pCi/g)
Number Reported (Y values)	77
Independent Variable (x-data)	cpm (collimated)
Number Reported (x-values)	77

Regression Estimates and Inference Table

Parameter	Estimates	Std. Error	T-values	p-values
intercept	2.841	1.198	2.371	0.0203
cpm (collimat	5.20E-04	1.24E-04	4.195	7.40E-05

OLS ANOVA Table

Source of Variation	SS	DOF	MS	F-Value	P-Value
Regression	815.6	1	815.6	17.6	0.0001
Error	3476	75	46.34		
Total	4291	76			

R Square	0.19
Adjusted R Square	0.179
Sqrt(MSE) = Scale	6.808

Table 4. Radium-226 Concentrations < 50 pCi/g (ALL DATA)

Ruby Mines Removal Site Evaluation Report - Correlation Statistics

Number of samples 77

Correlation Calculation			
calculated y=mx+b (PRG = slope*CPM + intercept)			
y	2	3	10
m	0.0000531	0.0000531	0.0000531
x	x	x	x
b	1.35800	1.41500	0.96000
x=	12,093	29,855	170,277

Table 4. Radium-226 Concentrations < 50 pCi/g (ALL DATA) (Continued)
Ruby Mines Removal Site Evaluation Report - Correlation Statistics

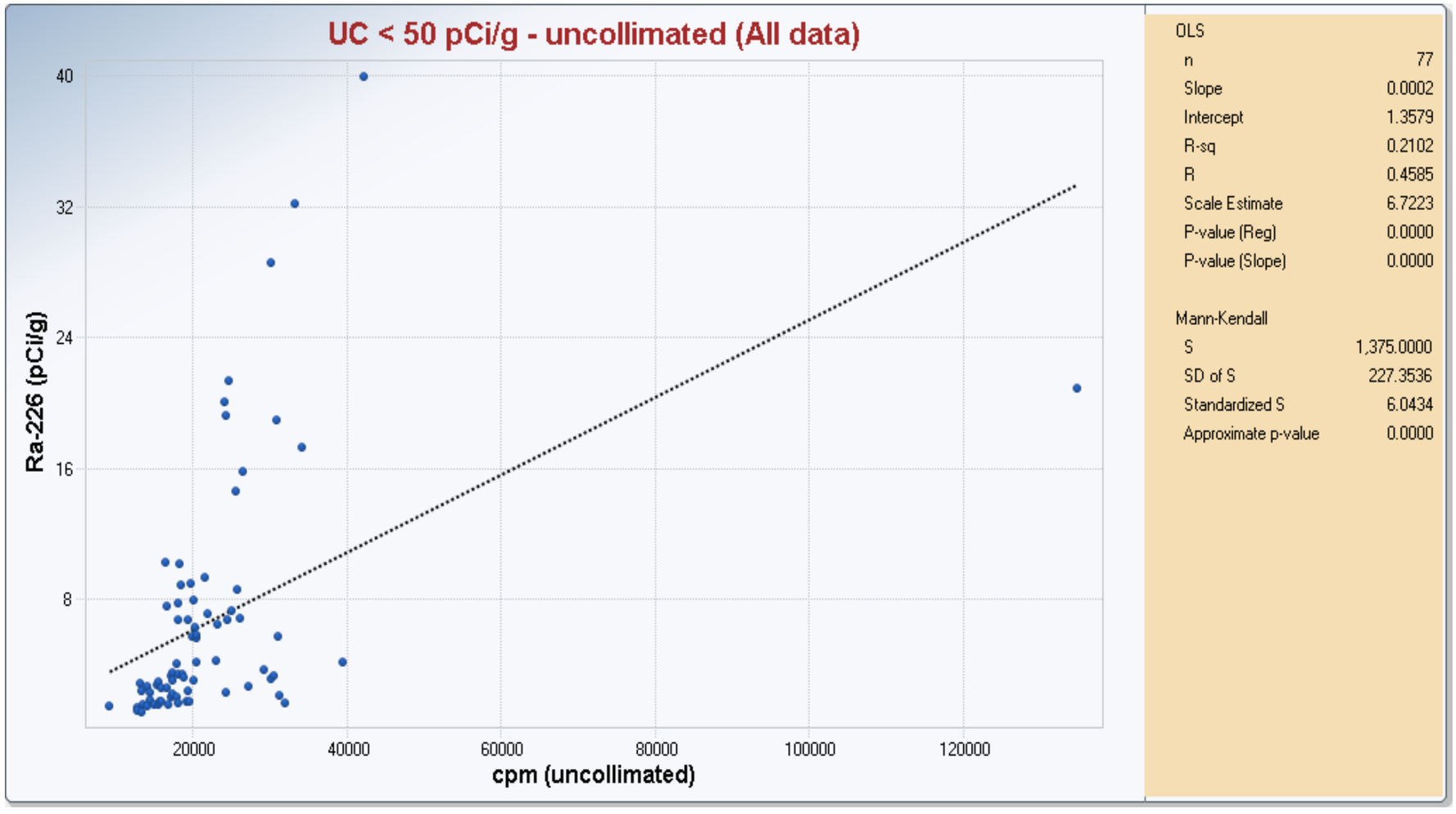


Table 4. Radium-226 Concentrations < 50 pCi/g (ALL DATA) (Continued)
Ruby Mines Removal Site Evaluation Report - Correlation Statistics

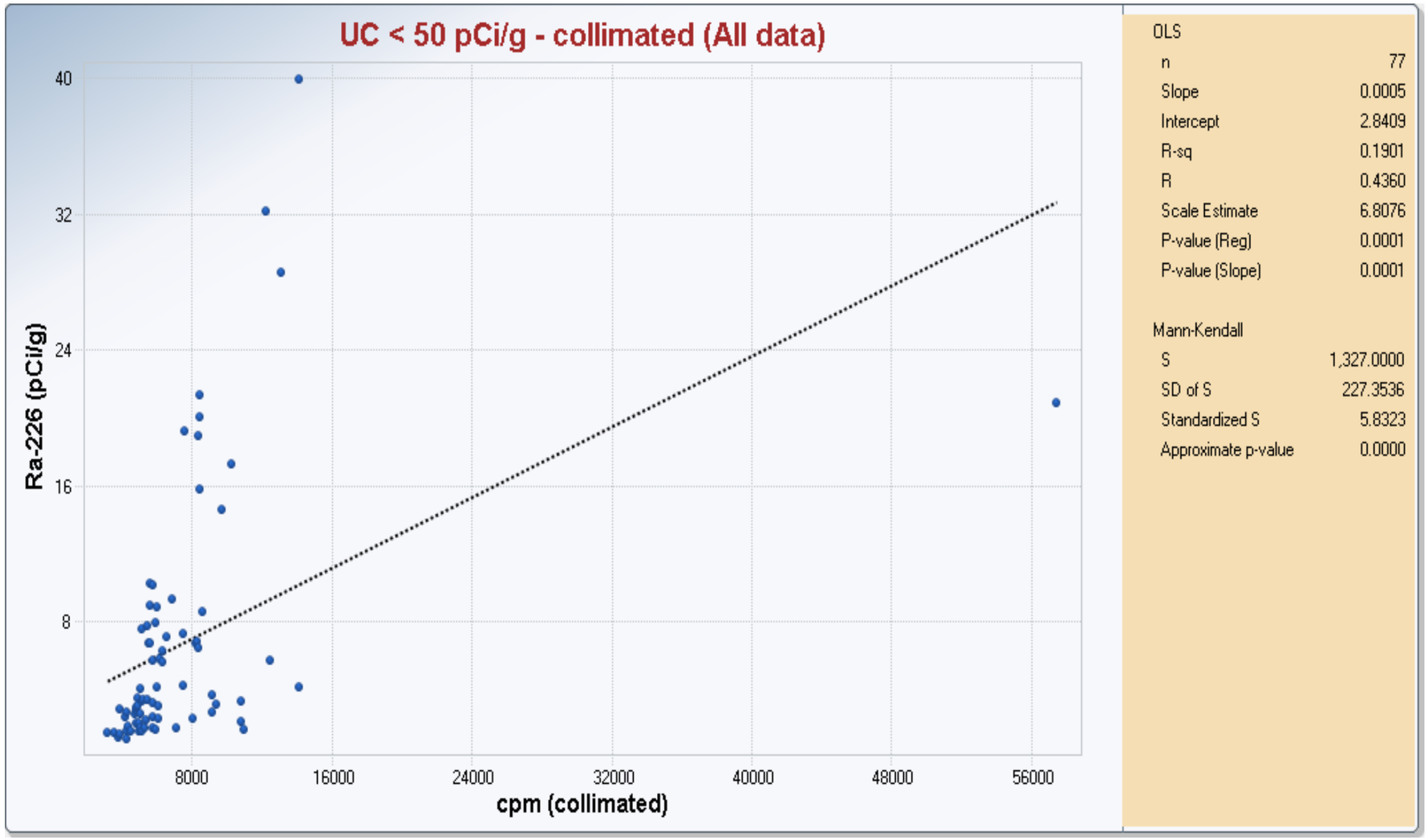


Table 5. Radium-226 Concentrations > 50 pCi/g
Ruby Mines Removal Site Evaluation Report - Correlation Statistics

Sample ID – Depth to top of sample (ft)	cpm (uncollimated)	cpm (collimated)	Ra-226 (pCi/g)
RM01-8MAY14-01	38876	11774	143
RM01-8MAY14-02	79193	35235	299
RM01-8MAY14-05	122269	91084	1330
RM01-8MAY14-07	268857	112974	1440
RM01-HR02-00	67130	40753	1680
RM01-HR03-00	77079	37264	218
RM01-HR05-00	89648	33068	412
RM01-HR06-00	50010	19402	129
RM01-HR07-00	176269	72600	1160
RM01-STEP02-00	97827	40360	281
RM01-STEP03-00	59471	21694	122
RM01-STEP05-00	102246	73119	846
RM02-VENT03-00	113882	47869	159
RM03-8MAY14-04	38876	11774	141
RM03-8MAY14-06	47897	18852	220
RM03-8MAY14-07	109898	41707	1000
RM03-8MAY14-08	171019	89326	391
RM03-DWTR03-00	41483	14453	50.7
RM03-WRK04-00	104266	40982	590
RM04-VENT03-00	97183	43463	111
RM19-VENT02-00	77944	31787	107

Uncollimated

Ordinary Least Squares Linear Regression Output Sheet

User Selected Options	
Date/Time of Computation	4/15/2015 12:39
From File	RM_CC_04152015_j.xls
Full Precision	OFF
Display Limits	FALSE
Display Regression Diagnostics	FALSE
Display Regression Tables	TRUE
Title For Y vs X Plots	[Ra-226] > 50 pCi/g - uncollimated
Confidence Level for Regression Line	0.95
Display Confidence Band	FALSE
Display Prediction Band	FALSE
Dependent Variable (Y-Data)	Ra-226 (pCi/g)
Number Reported (Y values)	21
Independent Variable (x-data)	cpm (uncollimated)
Number Reported (x-values)	21

Regression Estimates and Inference Table

Parameter	Estimates	Std. Error	T-values	p-values
intercept	-3.205	192.2	-0.0167	0.987
cpm (uncollimated)	0.00536	0.00174	3.087	0.00607

OLS ANOVA Table

Source of Variation	SS	DOF	MS	F-Value	P-Value
Regression	1736921	1	1736921	9.53	0.0061
Error	3462906	19	182258		
Total	5199827	20			

R Square	0.334
Adjusted R Square	0.299
Sqrt(MSE) = Scale	426.9

Table 5. Radium-226 Concentrations > 50 pCi/g
Ruby Mines Removal Site Evaluation Report - Correlation Statistics

Collimated

Ordinary Least Squares Linear Regression Output Sheet

User Selected Options	
Date/Time of Computation	4/15/2015 12:44
From File	RM_CC_04152015_j.xls
Full Precision	OFF
Display Limits	FALSE
Display Regression Diagnostics	FALSE
Display Regression Tables	TRUE
Title For Y vs X Plots	[Ra-226] > 50 pCi/g - collimated
Confidence Level for Regression Line	0.95
Display Confidence Band	FALSE
Display Prediction Band	FALSE
Dependent Variable (Y-Data)	Ra-226 (pCi/g)
Number Reported (Y values)	21
Independent Variable (x-data)	cpm (collimated)
Number Reported (x-values)	21

Regression Estimates and Inference Table

Parameter	Estimates	Std. Error	T-values	p-values
intercept	-23.23	160.5	-0.145	0.886
cpm (collimated)	0.0122	0.00308	3.951	8.56E-04

OLS ANOVA Table

Source of Variation	SS	DOF	MS	F-Value	P-Value
Regression	2345577	1	2345577	15.61	0.0009
Error	2854251	19	150224		
Total	5199827	20			

R Square	0.451
Adjusted R Square	0.422
Sqrt(MSE) = Scale	387.6

Table 5. Radium-226 Concentrations > 50 pCi/g
Ruby Mines Removal Site Evaluation Report - Correlation Statistics

Dixon's Outlier Test for cpm (uncollimated)	Dixon's Outlier Test for cpm (collimated)	Dixon's Outlier Test for Ra-226 (pCi/g)
Number of Observations = 21	Number of Observations = 21	Number of Observations = 21
10% critical value: 0.391	10% critical value: 0.391	10% critical value: 0.391
5% critical value: 0.44	5% critical value: 0.44	5% critical value: 0.44
1% critical value: 0.524	1% critical value: 0.524	1% critical value: 0.524
1. Observation Value 268857 is a Potential Outlier (Upper Tail)?	1. Observation Value 112974 is a Potential Outlier (Upper Tail)?	1. Observation Value 1680 is a Potential Outlier (Upper Tail)?
Test Statistic: 0.430	Test Statistic: 0.240	Test Statistic: 0.223
For 10% significance level, 268857 is an outlier.	For 10% significance level, 112974 is not an outlier.	For 10% significance level, 1680 is not an outlier.
For 5% significance level, 268857 is not an outlier.	For 5% significance level, 112974 is not an outlier.	For 5% significance level, 1680 is not an outlier.
For 1% significance level, 268857 is not an outlier.	For 1% significance level, 112974 is not an outlier.	For 1% significance level, 1680 is not an outlier.
2. Observation Value 38876 is a Potential Outlier (Lower Tail)?	2. Observation Value 11774 is a Potential Outlier (Lower Tail)?	2. Observation Value 50.7 is a Potential Outlier (Lower Tail)?
Test Statistic: 0.020	Test Statistic: 0.035	Test Statistic: 0.047
For 10% significance level, 38876 is not an outlier.	For 10% significance level, 11774 is not an outlier.	For 10% significance level, 50.7 is not an outlier.
For 5% significance level, 38876 is not an outlier.	For 5% significance level, 11774 is not an outlier.	For 5% significance level, 50.7 is not an outlier.
For 1% significance level, 38876 is not an outlier.	For 1% significance level, 11774 is not an outlier.	For 1% significance level, 50.7 is not an outlier.

Outlier Tests for Selected Uncensored Variables

User Selected Options		
Date/Time of Computation	4/20/2015 18:42	
From File		greater than 50 for outlier test 4_20_15.xls
Full Precision		OFF

Table 5. Radium-226 Concentrations > 50 pCi/g (Continued)
Ruby Mines Removal Site Evaluation Report - Correlation Statistics

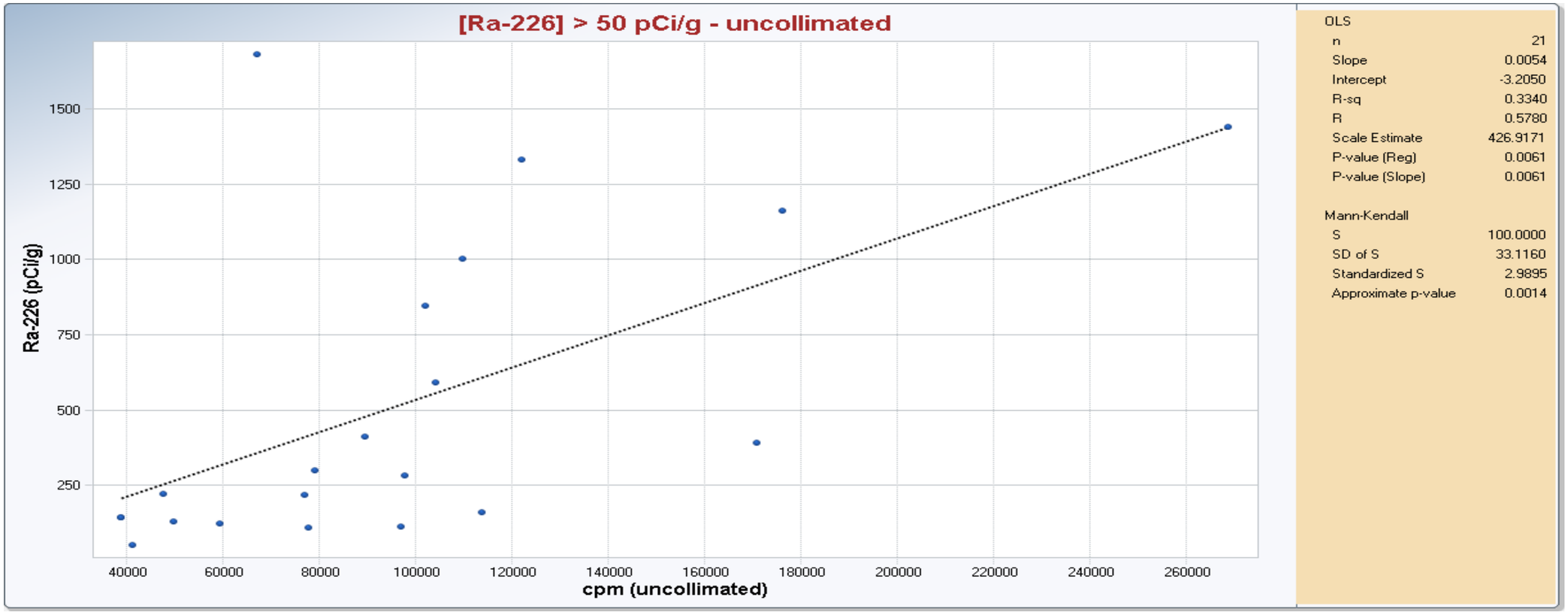


Table 5. Radium-226 Concentrations > 50 pCi/g (Continued)
Ruby Mines Removal Site Evaluation Report - Correlation Statistics

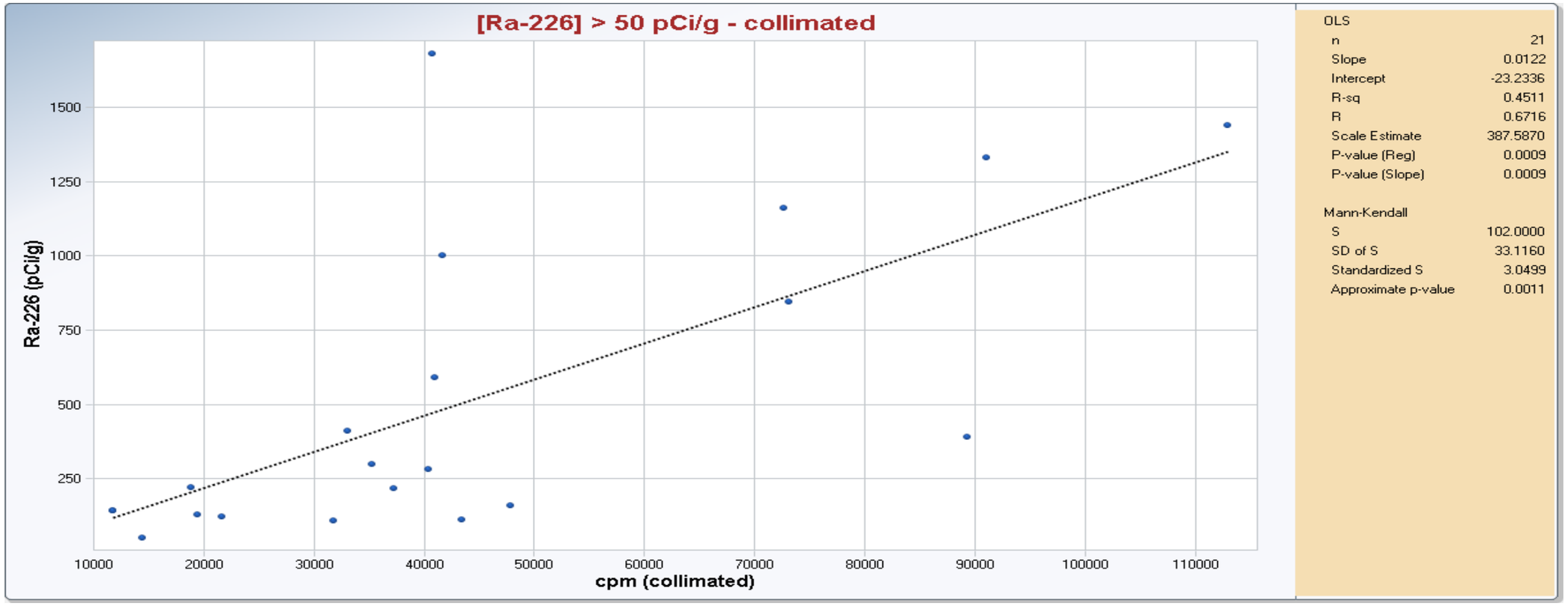


Table 6. Radium-226 Concentrations < 20 pCi/g - Outliers Excluded
Ruby Mines Removal Site Evaluation Report - Correlation Statistics

Sample ID – Depth to top of sample (ft)	cpm (uncollimated)	cpm (collimated)	Ra-226 (pCi/g)
RM04-VENT01-00	13279	4256	1.1
RM03-8MAY14-01	12877	3804	1.19
RM19-VENT01-00	12716	3889	1.37
RM-COR27-00	13996	3505	1.38
RM02-VENT01-00	9167	3164	1.39
RM-COR44-00	13437	4292	1.5
RM-COR24-00	15050	4467	1.54
RM-COR26-00	15753	5081	1.7
RM-COR40-00	14482	4310	1.82
RM03-CWRP07-C-00	14380	6044	2.23
RM03-DRN01-00	13376	4182	2.35
RM-COR19-00	16546	5052	2.56
RM03-DWTR01-00	15978	4745	2.58
RM03-WRK02-00	14067	4247	2.66
RM03-WRK01-00	15295	4815	2.7
RM01-8MAY14-08	13094	3889	2.77
RM-COR30-00	15436	4839	2.9
RM01-WRK04-00	17374	4890	2.99
RM-COR39-00	18845	5761	3.19
RM03-8MAY14-03	17167	5116	3.27
RM-COR29-00	18719	5456	3.34
RM-COR47-00	18008	5171	3.38
RM-COR31-00	17341	4884	3.42
RM-COR21-00	17964	5074	4.03
RM-COR18-00	20411	5990	4.14
RM-COR46-00	20369	6292	5.57
RM01-8MAY14-03	19947	5787	5.73
RM-COR23-00	20456	6117	5.77
RM-COR36-00	20280	6344	6.23
RM04-VENT02-00	23252	8397	6.38
RM03-DWTR02-00	24524	8178	6.69
RM01-WRK01-00	26190	8284	6.8
RM01-CWRP03-C-00	25028	7469	7.3

Note: Data excluded is outside the 95% confidence interval.

Uses Spreadsheet (1) to determine which values to be excluded.

Used in Report as best scenario for correlation

Uncollimated

Ordinary Least Squares Linear Regression Output Sheet

User Selected Options	
Date/Time of Computation	4/20/2015 22:49
From File	CorrelationComparisonEPA_Ruby Mines_c.xls
Full Precision	OFF
Display Limits	FALSE
Display Regression Diagnostics	FALSE
Display Regression Tables	TRUE
Title For Y vs X Plots	UC < 20 pCi/g - uncollimated (outliers excluded)
Confidence Level for Regression Line	0.95
Display Confidence Band	FALSE
Display Prediction Band	FALSE
Dependent Variable (Y-Data)	Ra-226 (pCi/g)
Number Reported (Y values)	33
Independent Variable (x-data)	cpm (uncollimated)
Number Reported (x-values)	33

Regression Estimates and Inference Table

Parameter	Estimates	Std. Error	T-values	p-values
intercept	-4.10E+00	5.60E-01	-7.316	3.11E-08
cpm (uncollimated	4.38E-04	3.19E-05	13.72	1.04E-14

OLS ANOVA Table

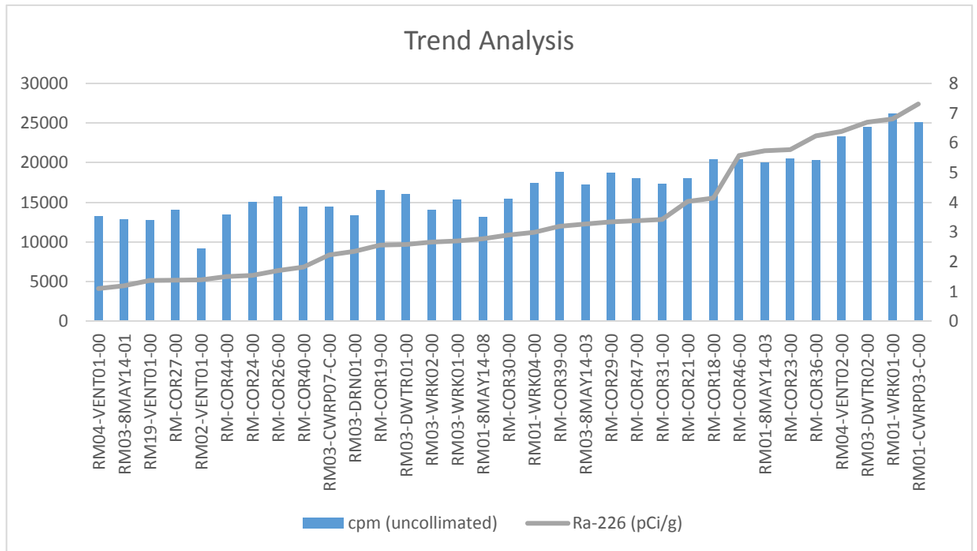
Source of Variation	SS	DOF	MS	F-Value	P-Value
Regression	96.01	1	96.01	188.2	0
Error	15.81	31	0.51		
Total	111.8	32			

R Square	0.859
Adjusted R Square	0.854
	0.714

Table 6. Radium-226 Concentrations < 20 pCi/g - Outliers Excluded
Ruby Mines Removal Site Evaluation Report - Correlation Statistics

Correlation Calculation
calculated y=mx+b (PRG = slope*CPM + intercept)
ex: 2 pCi/g=0.00031101*X + 1.3479
X = [2 - (-1.3479)]/0.00031101
X=13,931 CPM

y	2.00	3.00	10.00
m	0.0004375	0.0004375	0.0004375
x	x	x	x
b	-4.10	-4.10	-4.10
x=	13,931	16,216	32,216



Collimated
Ordinary Least Squares Linear Regression Output Sheet

User Selected Options	
Date/Time of Computation	4/20/2015 23:01
From File	CorrelationComparisonEPA_Ruby Mines_c.xls
Full Precision	OFF
Display Limits	
Display Regression Diagnostics	FALSE
Display Regression Tables	FALSE
Display Regression Tables	TRUE
Title For Y vs X Plots	UC < 20 pCi/g - collimated (outliers excluded)
Confidence Level for Regression Line	0.95
Display Confidence Band	FALSE
Display Prediction Band	FALSE

Dependent Variable (Y-Data)	Ra-226 (pCi/g)
Number Reported (Y values)	33
Independent Variable (x-data)	cpm (collimated)
Number Reported (x-values)	33

Regression Estimates and Inference Table

Parameter	Estimates	Std. Error	T-values	p-values
intercept	-3.152	0.626	-5.036	1.94E-05
cpm (collimated)	0.00124	1.15E-04	10.78	5.20E-12

OLS ANOVA Table

Source of Variation	SS	DOF	MS	F-Value	P-Value
Regression	88.26	1	88.26	116.2	0
Error	23.56	31	0.76		
Total	111.8	32			

R Square	0.789
Adjusted R Square	0.783
Sqrt(MSE) = Scale	0.872

Table 6. Radium-226 Concentrations < 20 pCi/g - Outliers Excluded (Continued)
Ruby Mines Removal Site Evaluation Report - Correlation Statistics

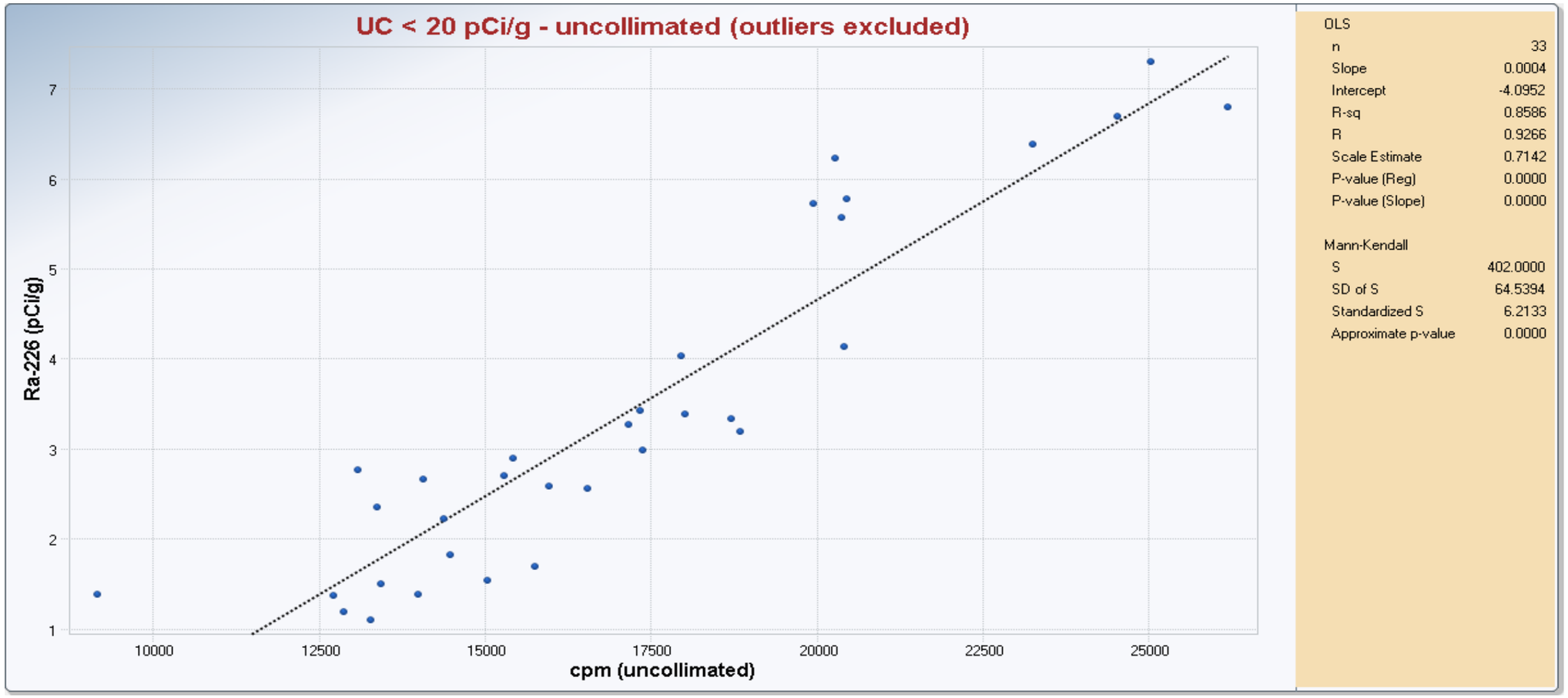


Table 6. Radium-226 Concentrations < 20 pCi/g - Outliers Excluded (Continued)

Ruby Mines Removal Site Evaluation Report - Correlation Statistics

Same dataset and graph as above but with a smaller scale so that the region of interest (2-5 pCi/g) is shown.

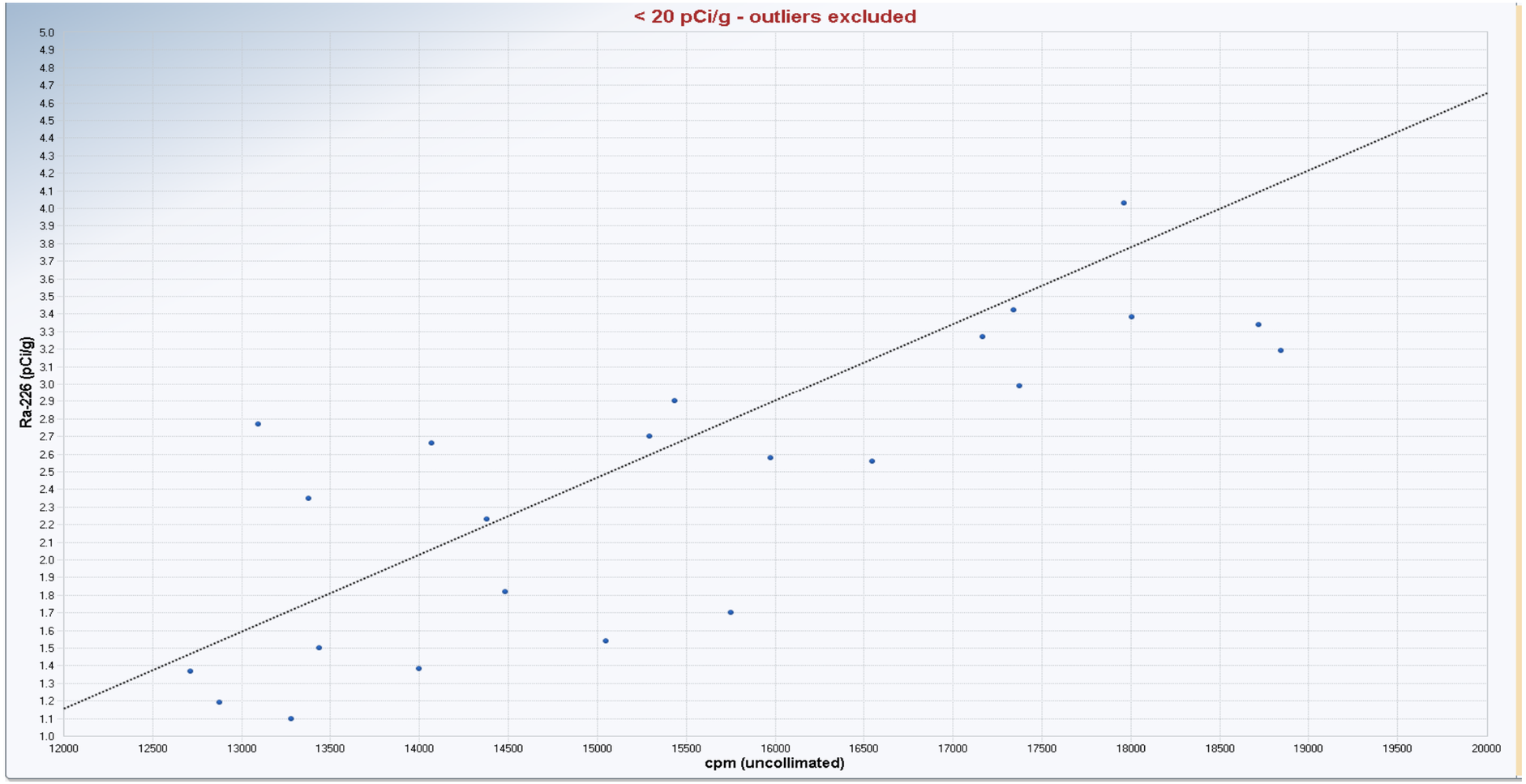


Table 6. Radium-226 Concentrations < 20 pCi/g - Outliers Excluded (Continued)

Ruby Mines Removal Site Evaluation Report - Correlation Statistics

Same data and graph but with the confidence intervals shown. Uncollimated. Used in report, but without intervals shown.

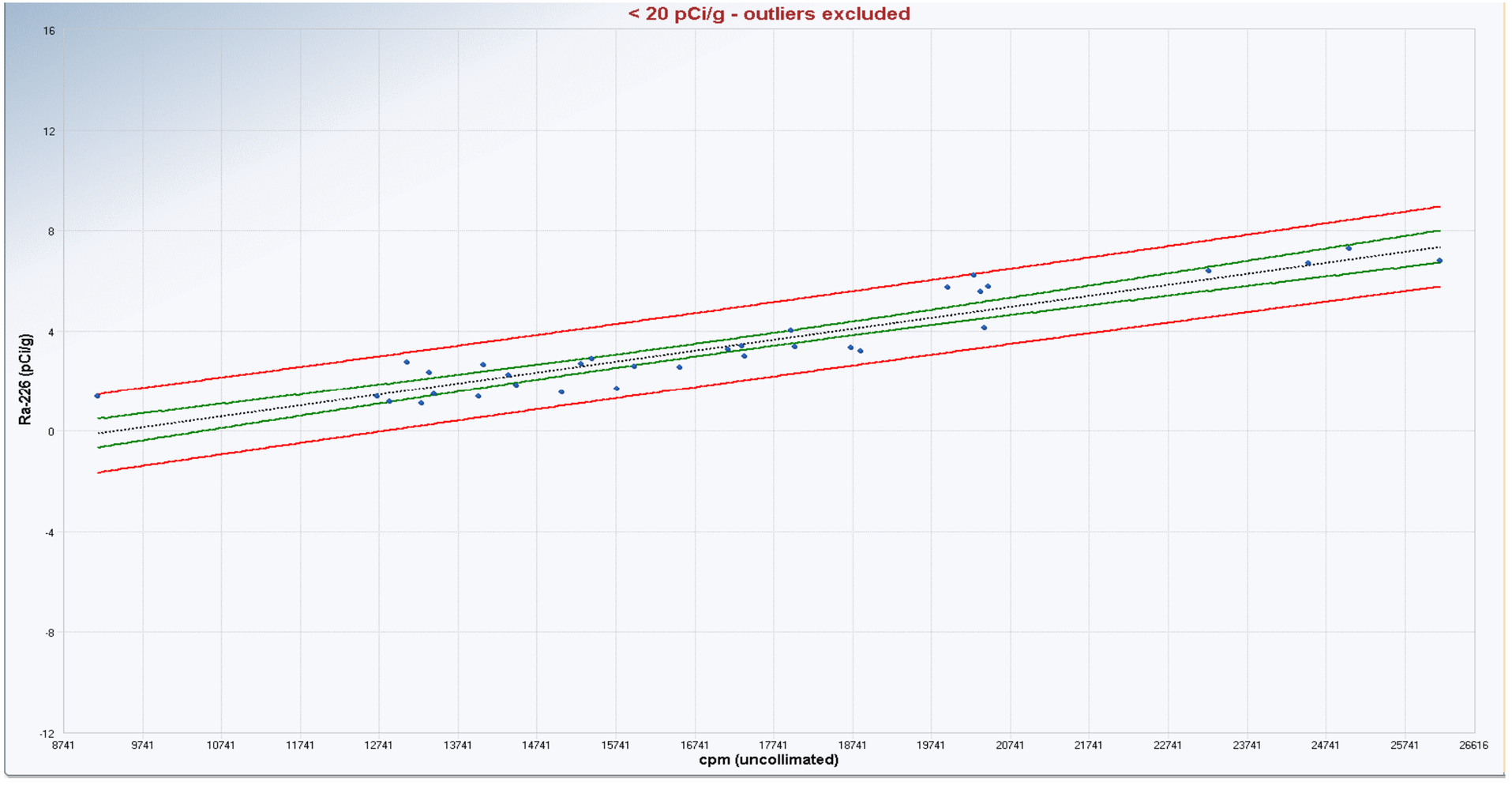
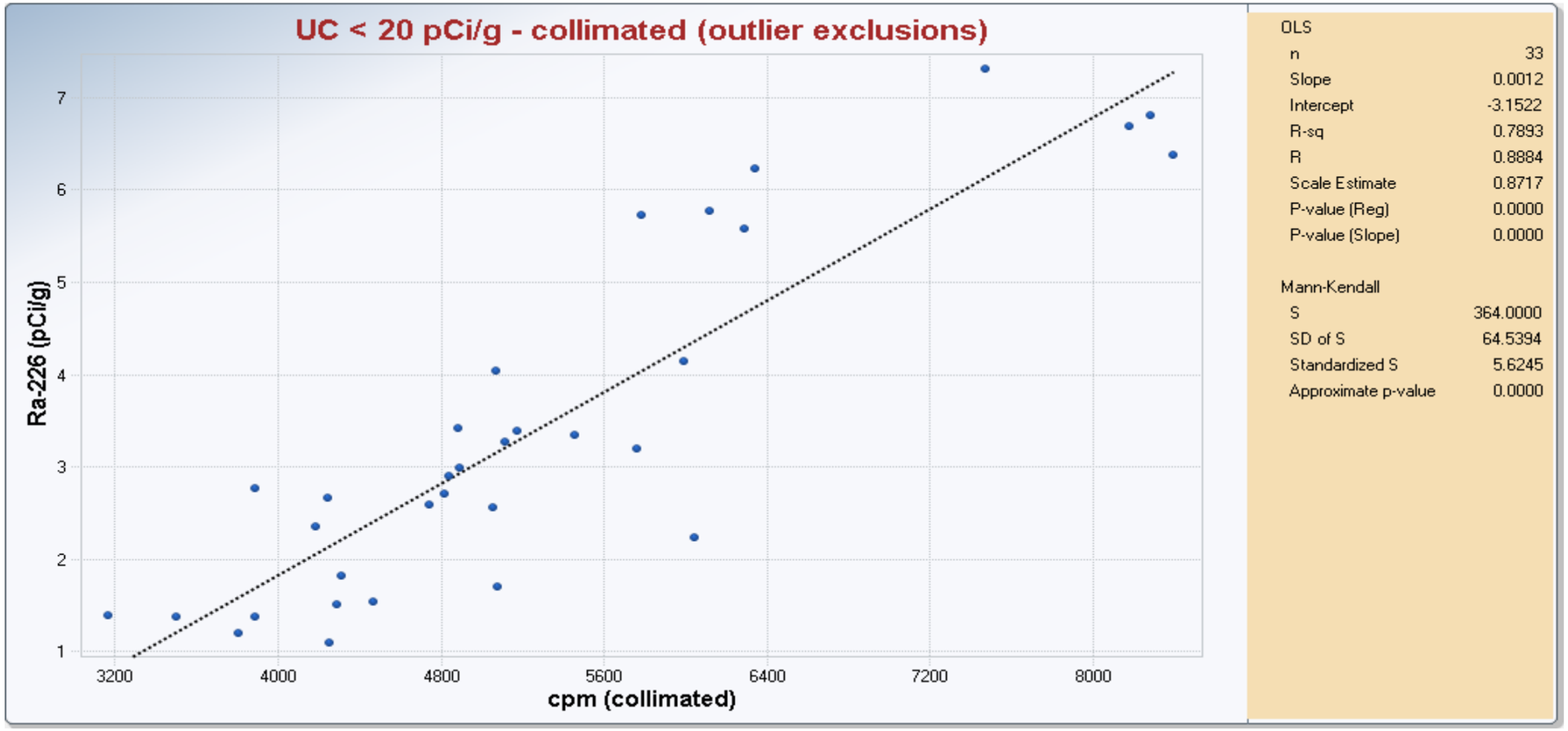


Table 6. Radium-226 Concentrations < 20 pCi/g - Outliers Excluded (Continued)
Ruby Mines Removal Site Evaluation Report - Correlation Statistics



OLS	
n	33
Slope	0.0012
Intercept	-3.1522
R-sq	0.7893
R	0.8884
Scale Estimate	0.8717
P-value (Reg)	0.0000
P-value (Slope)	0.0000

Mann-Kendall	
S	364.0000
SD of S	64.5394
Standardized S	5.6245
Approximate p-value	0.0000

Table 7. Capped Waste Rock Piles
Ruby Mine Removal Site Evaluation Report - Correlation Statistics

Sample ID - Depth to top of sample (ft)	cpm (uncollimated)	cpm (collimated)	Ra-226 (pCi/g)	Comments
RM03-8MAY14-06	47897	18852	220	outlier
RM01-CWRP02-C-00	25779	8558	8.6	
RM01-CWRP03-C-00	25028	7469	7.3	
RM01-CWRP04-C-00	21887	6514	7.1	
RM01-CWRP08-C-00	18098	5523	6.74	
RM01-CWRP07-C-00	39423	14130	4.09	
RM01-CWRP06-C-00	29301	9149	3.62	
RM01-CWRP01-C-00	27214	9124	2.61	
RM01-CWRP05-C-00	19328	5765	2.33	
RM03-CWRP05-C-00	24347	8078	2.27	
RM03-CWRP07-C-00	14380	6044	2.23	
RM03-CWRP06-C-00	31320	10834	2.04	
RM03-CWRP01-C-00	15909	5297	1.72	
RM03-CWRP03-C-00	19634	7124	1.71	
RM-COR26-00	15753	5081	1.7	
RM03-CWRP04-C-00	31942	10925	1.62	
RM03-CWRP02-C-00	18141	5935	1.61	

Outlier removed

Sample ID - Depth to top of sample (ft)	cpm (uncollimated)	cpm (collimated)	Ra-226 (pCi/g)	
RM01-CWRP02-C-00	25779	8558	8.6	**Comments**
RM01-CWRP03-C-00	25028	7469	7.3	
RM01-CWRP04-C-00	21887	6514	7.1	
RM01-CWRP08-C-00	18098	5523	6.74	
RM01-CWRP07-C-00	39423	14130	4.09	
RM01-CWRP06-C-00	29301	9149	3.62	
RM01-CWRP01-C-00	27214	9124	2.61	
RM01-CWRP05-C-00	19328	5765	2.33	
RM03-CWRP05-C-00	24347	8078	2.27	
RM03-CWRP07-C-00	14380	6044	2.23	
RM03-CWRP06-C-00	31320	10834	2.04	
RM03-CWRP01-C-00	15909	5297	1.72	
RM03-CWRP03-C-00	19634	7124	1.71	
RM-COR26-00	15753	5081	1.7	
RM03-CWRP04-C-00	31942	10925	1.62	
RM03-CWRP02-C-00	18141	5935	1.61	

Uncollimated

Ordinary Least Squares Linear Regression Output Sheet

User Selected Options	
Date/Time of Computation	4/15/2015 11:03
From File	RM_CC_04152015_b.xls
Full Precision	OFF
Display Limits	FALSE
Display Regression Diagnostics	FALSE
Display Regression Tables	TRUE
Title For Y vs X Plots	Cap - uncollimated
Confidence Level for Regression Line	0.95
Display Confidence Band	FALSE
Display Prediction Band	FALSE
Dependent Variable (Y-Data)	Ra-226 (pCi/g)
Number Reported (Y values)	17
Independent Variable (x-data)	cpm (uncollimated)
Number Reported (x-values)	17

Regression Estimates and Inference Table

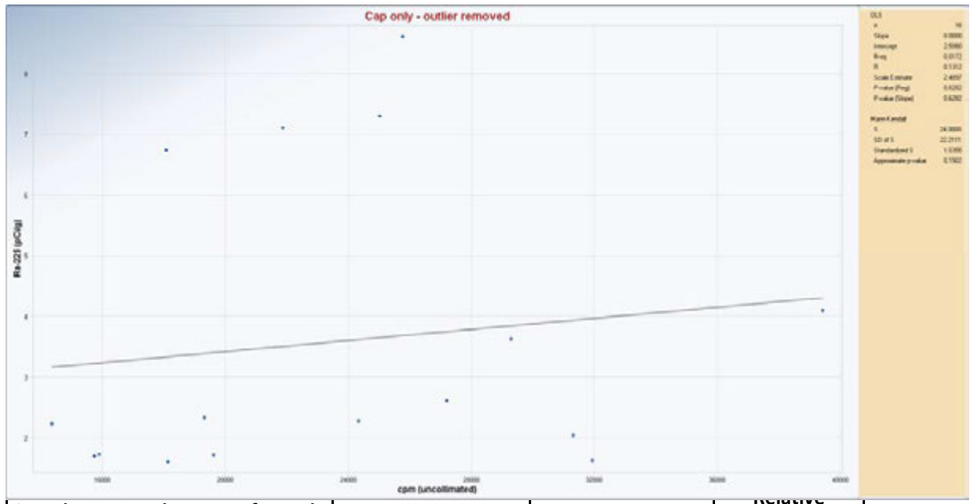
Parameter	Estimates	Std. Error	T-values	p-values
intercept	-80.28	30.06	-2.67	0.0175
cpm (uncollimated)	0.00386	0.00113	3.402	0.00394

OLS ANOVA Table

Source of Variation	SS	DOF	MS	F-Value	P-Value
Regression	19239	1	19239	11.57	0.0039
Error	24932	15	1662		
Total	44171	16			

R Square	0.436
Adjusted R Square	0.398
Sqrt(MSE) = Scale	40.77

Table 7. Capped Waste Rock Piles
Ruby Mine Removal Site Evaluation Report - Correlation Statistics



Sample ID - Depth to top of sample (ft)	cpm (uncollimated)	cpm (collimated)	Relative percent difference
RM01-CWRP02-C-00	25779	8558	100%
RM01-CWRP03-C-00	25028	7469	108%
RM01-CWRP04-C-00	21887	6514	108%
RM01-CWRP08-C-00	18098	5523	106%
RM01-CWRP07-C-00	39423	14130	94%
RM01-CWRP06-C-00	29301	9149	105%
RM01-CWRP01-C-00	27214	9124	100%
RM01-CWRP05-C-00	19328	5765	108%
RM03-CWRP05-C-00	24347	8078	100%
RM03-CWRP07-C-00	14380	6044	82%
RM03-CWRP06-C-00	31320	10834	97%
RM03-CWRP01-C-00	15909	5297	100%
RM03-CWRP03-C-00	19634	7124	94%
RM-COR26-00	15753	5081	102%
RM03-CWRP04-C-00	31942	10925	98%
RM03-CWRP02-C-00	18141	5935	101%

Collimated

Ordinary Least Squares Linear Regression Output Sheet

User Selected Options	
Date/Time of Computation	4/15/2015 11:37
From File	RM_CC_04152015_b.xls
Full Precision	OFF
Display Limits	FALSE
Display Regression Diagnostics	FALSE
Display Regression Tables	TRUE
Title For Y vs X Plots	Cap - collimated
Confidence Level for Regression Line	0.95
Display Confidence Band	FALSE
Display Prediction Band	FALSE
Dependent Variable (Y-Data)	Ra-226 (pCi/g)
Number Reported (Y values)	17
Independent Variable (x-data)	cpm (collimated)
Number Reported (x-values)	17

Regression Estimates and Inference Table

Parameter	Estimates	Std. Error	T-values	p-values
intercept	-74.85	23.27	-3.217	0.00576
cpm (collimated)	0.0107	0.00253	4.239	7.15E-04

OLS ANOVA Table

Source of Variation	SS	DOF	MS	F-Value	P-Value
Regression	24072	1	24072	17.97	0.0007
Error	20098	15	1340		
Total	44171	16			

R Square	0.545
Adjusted R Square	0.515
Sqrt(MSE) = Scale	36.6

Table 7. Capped Waste Rock Piles (Continued)
Ruby Mine Removal Site Evaluation Report - Correlation Statistics

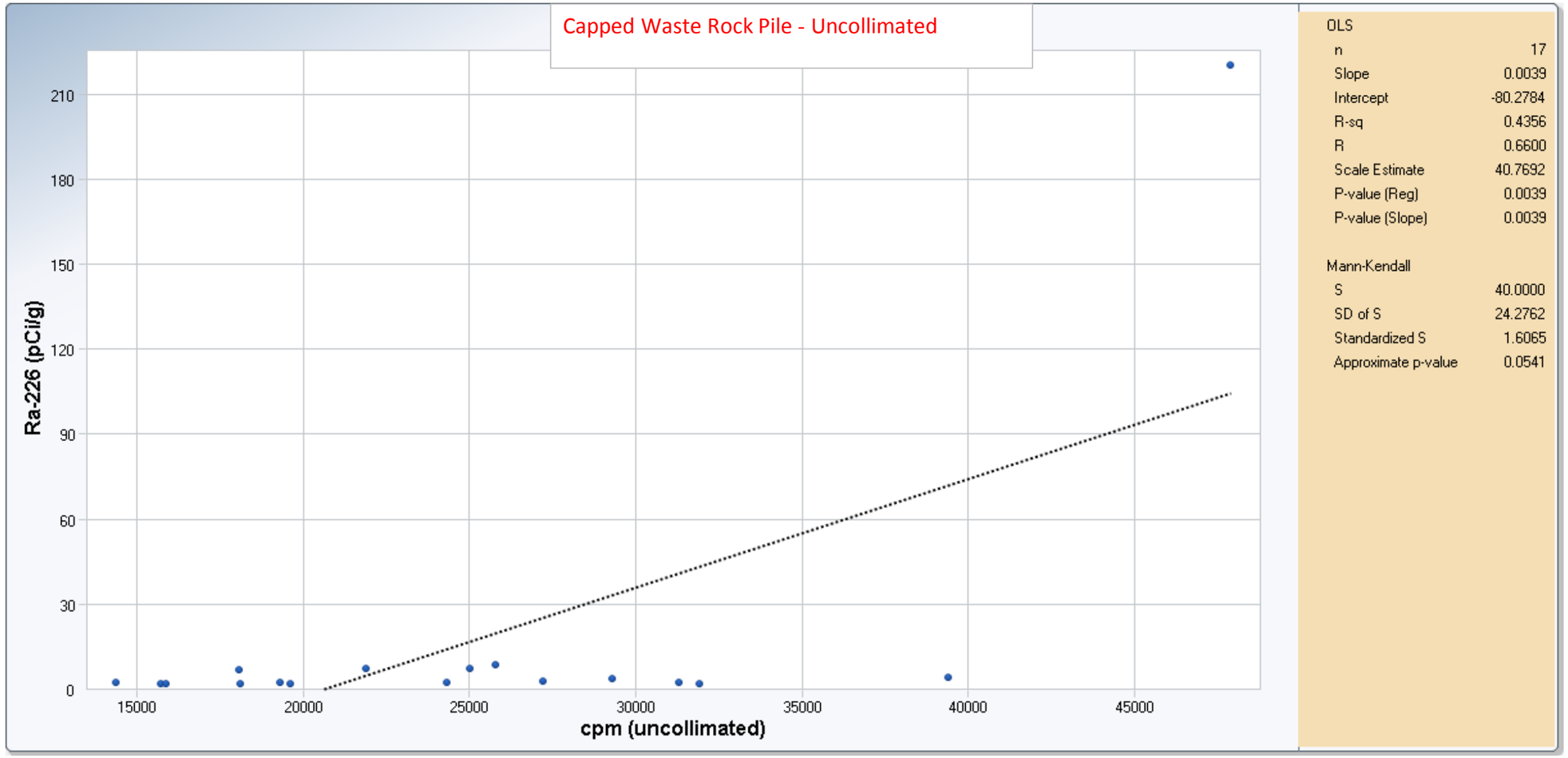


Table 7. Capped Waste Rock Piles (Continued)
Ruby Mine Removal Site Evaluation Report - Correlation Statistics

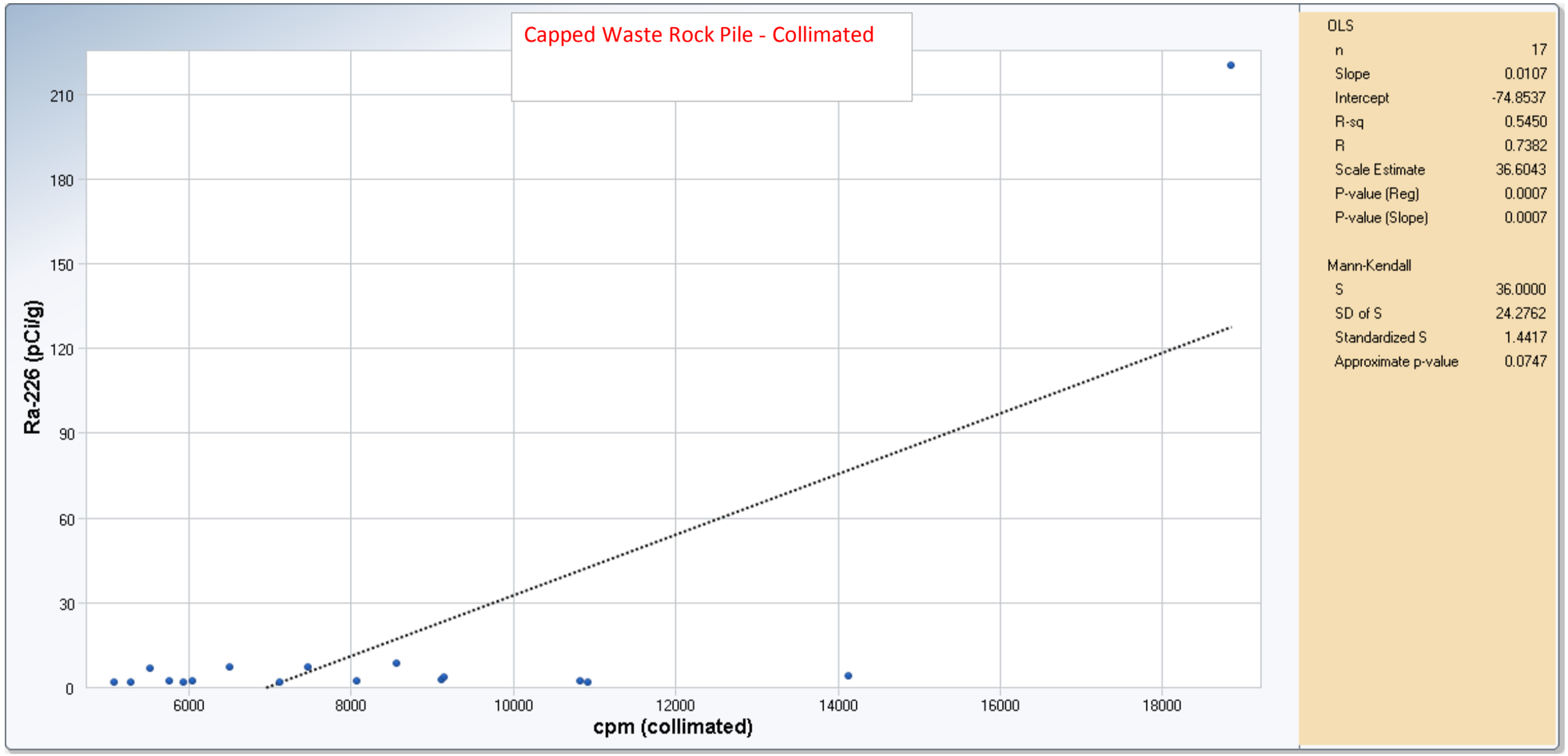
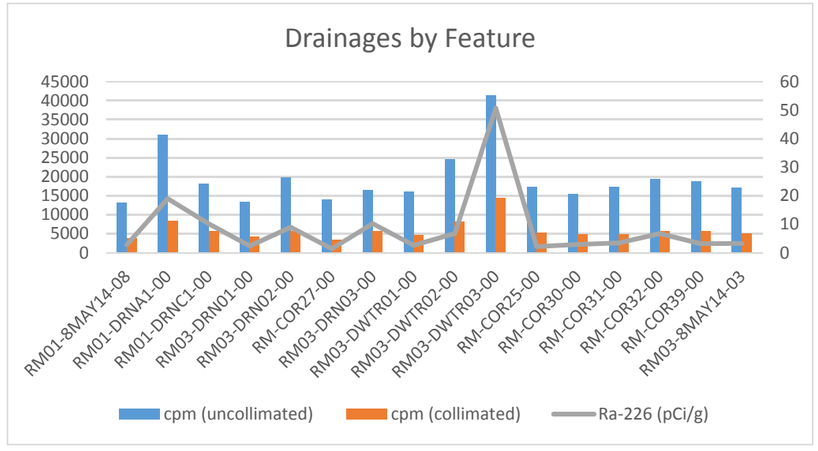


Table 8. Drainages
Ruby Mine Removal Site Evaluation Report - Correlation Statistics

Sample ID - Depth to top of sample (ft)	cpm (uncollimated)	cpm (collimated)	Ra-226 (pCi/g)
RM01-8MAY14-08	13094	3889	2.77
RM01-DRNA1-00	30924	8365	18.9
RM01-DRNC1-00	18214	5775	10.1
RM03-DRN01-00	13376	4182	2.35
RM03-DRN02-00	19784	5626	8.9
RM-COR27-00	13996	3505	1.38
RM03-DRN03-00	16378	5635	10.2
RM03-DWTR01-00	15978	4745	2.58
RM03-DWTR02-00	24524	8178	6.69
RM03-DWTR03-00	41483	14453	50.7
RM-COR25-00	17355	5326	2.13
RM-COR30-00	15436	4839	2.9
RM-COR31-00	17341	4884	3.42
RM-COR32-00	19368	5633	6.71
RM-COR39-00	18845	5761	3.19
RM03-8MAY14-03	17167	5116	3.27



Uncollimated

Ordinary Least Squares Linear Regression Output Sheet

User Selected Options					
Date/Time of Computation	4/15/2015 11:41				
From File	RM_CC_04152015_c.xls				
Full Precision	OFF				
Display Limits	FALSE				
Display Regression Diagnostics	FALSE				
Display Regression Tables	TRUE				
Title For Y vs X Plots	Drainages - uncollimated				
Confidence Level for Regression Line	0.95				
Display Confidence Band	FALSE				
Display Prediction Band	FALSE				
Dependent Variable (Y-Data)	Ra-226 (pCi/g)				
Number Reported (Y values)	16				
Independent Variable (x-data)	cpm (uncollimated)				
Number Reported (x-values)	16				
Regression Estimates and Inference Table					
Parameter	Estimates	Std. Error	T-values	p-values	
intercept	-21.41	3.588	-5.968	3.44E-05	
cpm (uncollimated)	0.00153	1.72E-04	8.87	4.04E-07	
OLS ANOVA Table					
Source of Variation	SS	DOF	MS	F-Value	P-Value
Regression	1877	1	1877	78.67	0
Error	334	14	23.86		
Total	2211	15			
R Square	0.849				
Adjusted R Square	0.838				
Sqrt(MSE) = Scale	4.884				

Table 8. Drainages
Ruby Mine Removal Site Evaluation Report - Correlation Statistics

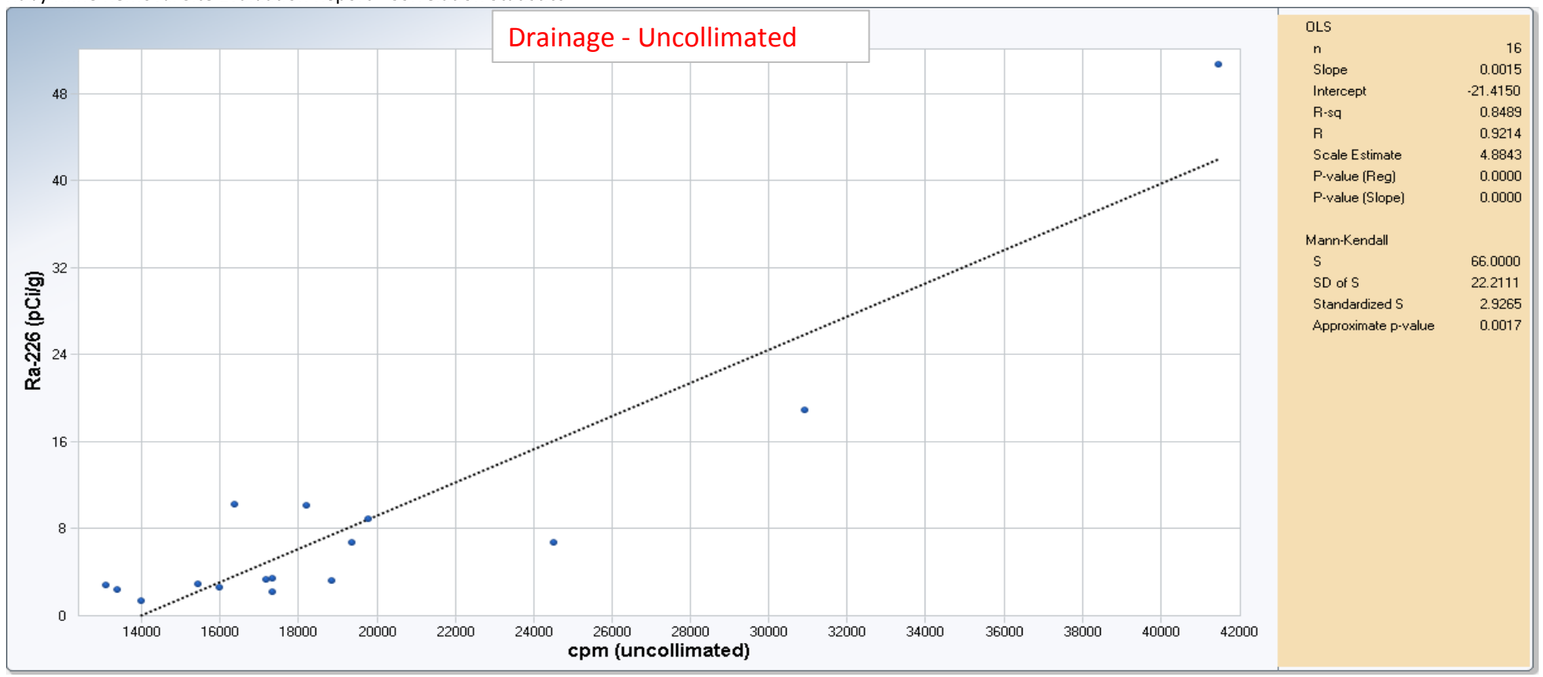
Collimated

Ordinary Least Squares Linear Regression Output Sheet

User Selected Options					
Date/Time of Computation	4/15/2015 11:45				
From File	RM_CC_04152015_c.xls				
Full Precision	OFF				
Display Limits	FALSE				
Display Regression Diagnostics	FALSE				
Display Regression Tables	TRUE				
Title For Y vs X Plots	Drainages - collimated				
Confidence Level for Regression Line	0.95				
Display Confidence Band	FALSE				
Display Prediction Band	FALSE				
Dependent Variable (Y-Data)	Ra-226 (pCi/g)				
Number Reported (Y values)	16				
Independent Variable (x-data)	cpm (collimated)				
Number Reported (x-values)	16				
Regression Estimates and Inference Table					
Parameter	Estimates	Std. Error	T-values	p-values	
intercept	-17.88	2.668	-6.702	1.01E-05	
cpm (collimated)	0.0044	4.10E-04	10.73	3.87E-08	
OLS ANOVA Table					
Source of Variation	SS	DOF	MS	F-Value	P-Value
Regression	1971	1	1971	115.2	0
Error	239.6	14	17.12		
Total	2211	15			
R Square	0.892				
Adjusted R Square	0.884				
Sqrt(MSE) = Scale	4.137				

Table 8. Drainages (Continued)

Ruby Mine Removal Site Evaluation Report - Correlation Statistics

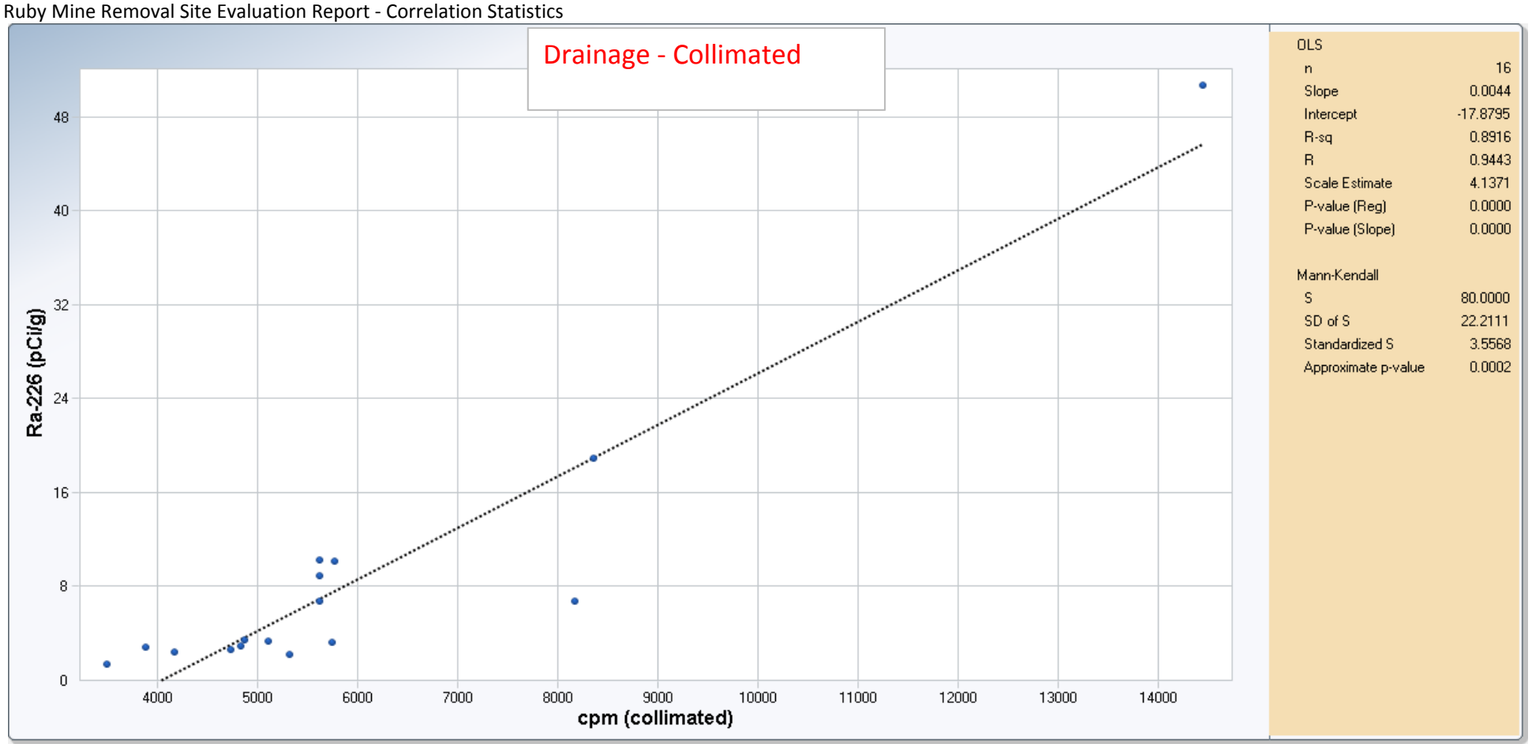


OLS	
n	16
Slope	0.0015
Intercept	-21.4150
R-sq	0.8489
R	0.9214
Scale Estimate	4.8843
P-value (Reg)	0.0000
P-value (Slope)	0.0000

Mann-Kendall	
S	66.0000
SD of S	22.2111
Standardized S	2.9265
Approximate p-value	0.0017

Table 8. Drainages (Continued)

Ruby Mine Removal Site Evaluation Report - Correlation Statistics



OLS	
n	16
Slope	0.0044
Intercept	-17.8795
R-sq	0.8916
R	0.9443
Scale Estimate	4.1371
P-value (Reg)	0.0000
P-value (Slope)	0.0000

Mann-Kendall	
S	80.0000
SD of S	22.2111
Standardized S	3.5568
Approximate p-value	0.0002

Table 9. Vents
Ruby Mine Removal Site Evaluation Report - Correlation Statistics

Sample ID - Depth to top of sample (ft)	cpm (uncollimated)	cpm (collimated)	Ra-226 (pCi/g)	geology
RM02-VENT01-00	9167	3164	1.39	Dakota Sandstone
RM02-VENT02-00	30995	12495	5.69	Dakota Sandstone
RM02-VENT03-00	113882	47869	159	Dakota Sandstone
RM04-VENT01-00	13279	4256	1.1	Mancos Shale
RM04-VENT02-00	23252	8397	6.38	Mancos Shale
RM04-VENT03-00	97183	43463	111	Mancos Shale
RM19-VENT01-00	12716	3889	1.37	Colluvium
RM19-VENT02-00	77944	31787	107	Colluvium
RM19-VENT03-00	33329	12254	32.2	Colluvium

Uncollimated

Ordinary Least Squares Linear Regression Output Sheet

User Selected Options	
Date/Time of Computation	4/15/2015 11:48
From File	RM_CC_04152015_d.xls
Full Precision	OFF
Display Limits	FALSE
Display Regression Diagnostics	FALSE
Display Regression Tables	TRUE
Title For Y vs X Plots	Vent - uncollimated
Confidence Level for Regression Line	0.95
Display Confidence Band	FALSE
Display Prediction Band	FALSE
Dependent Variable (Y-Data)	Ra-226 (pCi/g)
Number Reported (Y values)	9
Independent Variable (x-data)	cpm (uncollimated)
Number Reported (x-values)	9

Regression Estimates and Inference Table

Parameter	Estimates	Std. Error	T-values	p-values
intercept	-22.11	6.093	-3.628	0.00842
cpm (uncollimated)	0.00152	1.03E-04	14.72	1.60E-06

OLS ANOVA Table

Source of Variation	SS	DOF	MS	F-Value	P-Value
Regression	29143	1	29143	216.7	0
Error	941.2	7	134.5		
Total	30084	8			

R Square	0.969
Adjusted R Square	0.964
Sqrt(MSE) = Scale	11.6

Table 9. Vents
Ruby Mine Removal Site Evaluation Report - Correlation Statistics

Collimated

Ordinary Least Squares Linear Regression Output Sheet

User Selected Options	
Date/Time of Computation	4/15/2015 11:52
From File	RM_CC_04152015_d.xls
Full Precision	OFF
Display Limits	FALSE
Display Regression Diagnostics	FALSE
Display Regression Tables	TRUE
Title For Y vs X Plots	Vent - collimated
Confidence Level for Regression Line	0.95
Display Confidence Band	FALSE
Display Prediction Band	FALSE
Dependent Variable (Y-Data)	Ra-226 (pCi/g)
Number Reported (Y values)	9
Independent Variable (x-data)	cpm (collimated)
Number Reported (x-values)	9

Regression Estimates and Inference Table

Parameter	Estimates	Std. Error	T-values	p-values
intercept	-15.96	7.038	-2.268	0.0576
cpm (collimated)	0.00339	2.82E-04	12.04	6.21E-06

OLS ANOVA Table

Source of Variation	SS	DOF	MS	F-Value	P-Value
Regression	28699	1	28699	145	0
Error	1385	7	197.9		
Total	30084	8			

R Square	0.954
Adjusted R Square	0.947
Sqrt(MSE) = Scale	14.07

Table 9. Vents (Continued)

Ruby Mine Removal Site Evaluation Report - Correlation Statistics

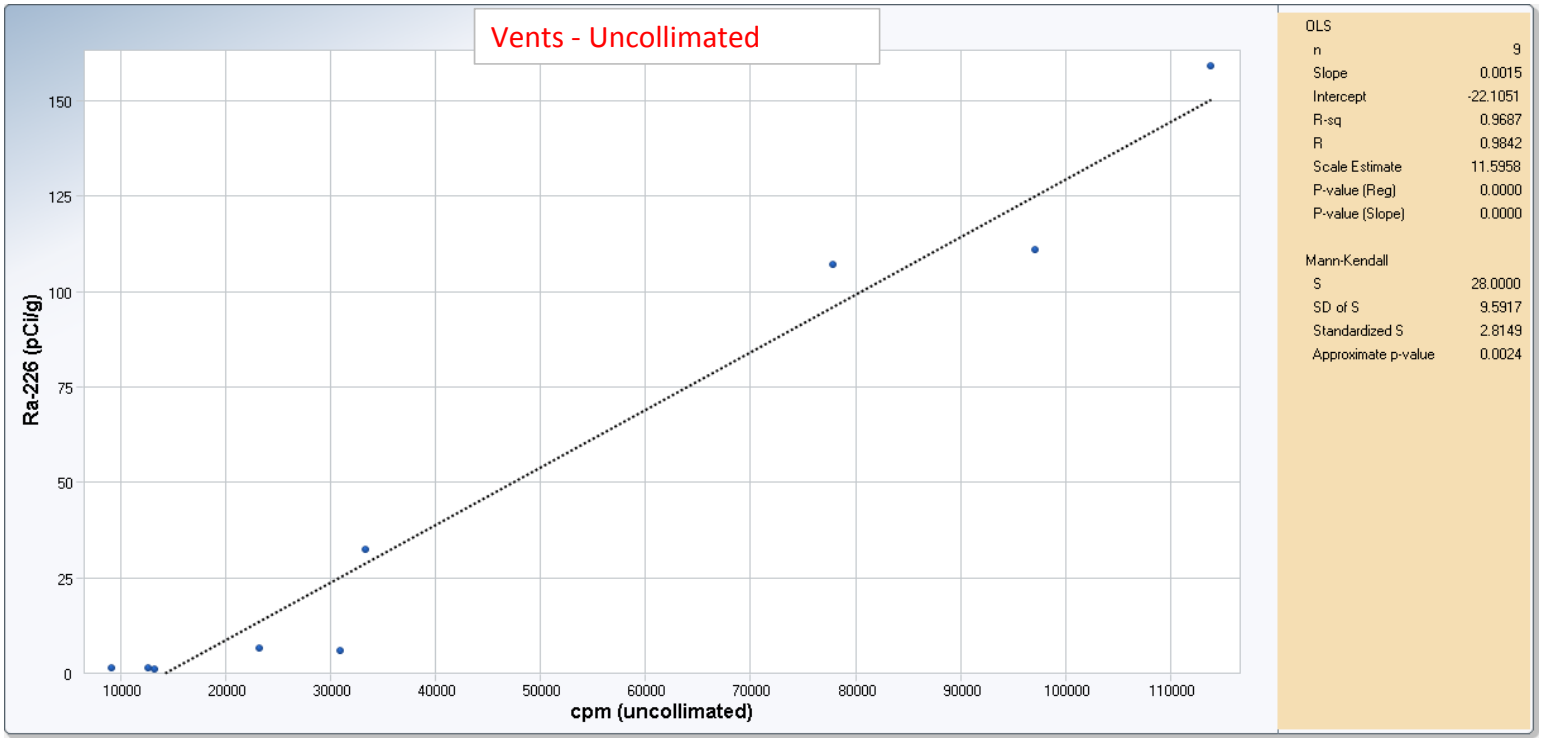


Table 9. Vents (Continued)

Ruby Mine Removal Site Evaluation Report - Correlation Statistics

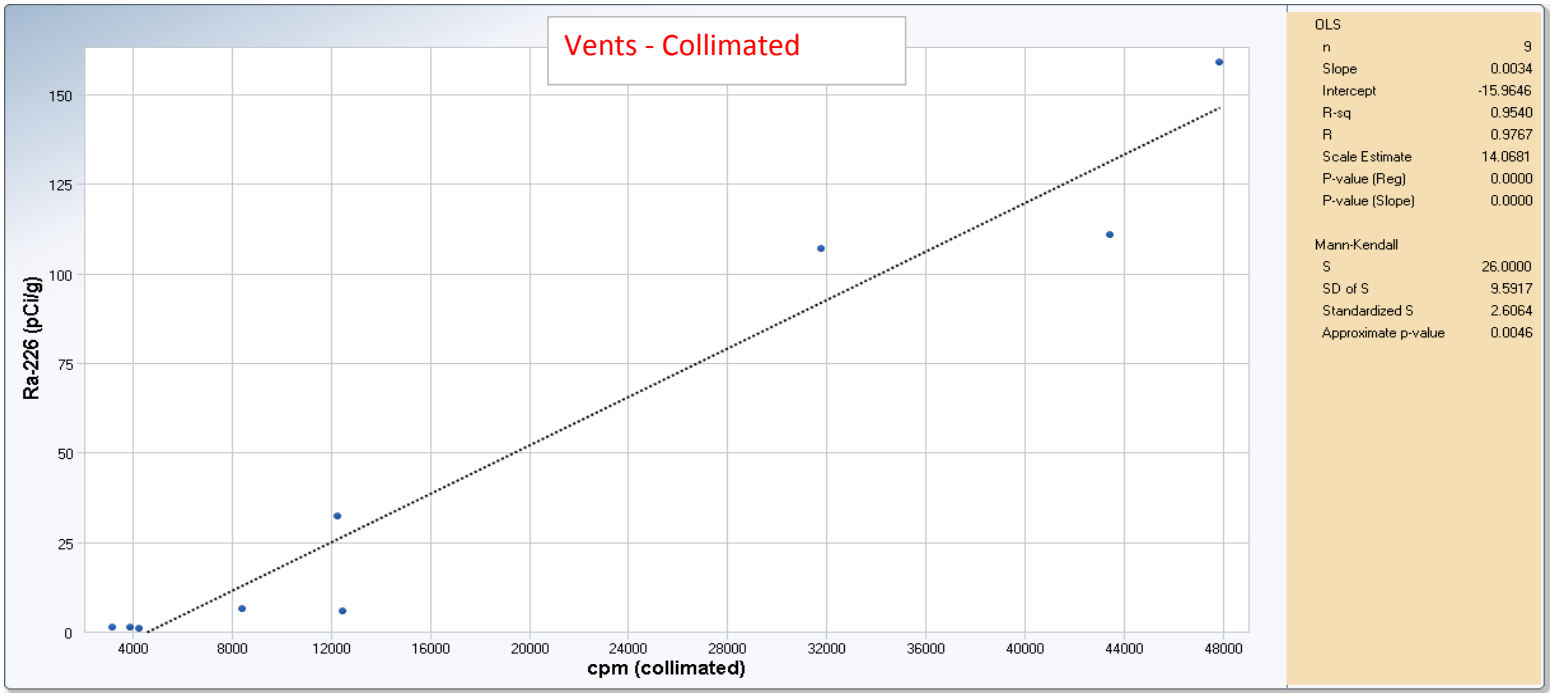


Table 10. Former Haul Roads
Ruby Mine Removal Site Evaluation Report - Correlation Statistics

Sample ID - Depth to top of sample (ft)	cpm (uncollimated)	cpm (collimated)	Ra-226 (pCi/g)
RM01-8MAY14-06	26512	8423	15.8
RM01-8MAY14-07	268857	112974	1440
RM01-HR01-00	25600	9665	14.6
RM01-HR02-00	67130	40753	1680
RM01-HR03-00	77079	37264	218
RM01-HR04-00	30157	13126	28.6
RM01-HR05-00	89648	33068	412
RM01-HR06-00	50010	19402	129
RM01-HR07-00	176269	72600	1160
RM03-8MAY14-08	171019	89326	391
RM-COR36-00	20280	6344	6.23
RM-COR40-00	14482	4310	1.82

Potential outliers from ProUCL

Removed 1680 outlier and the statistics improved to R-squared of 0.89.

Uncollimated

Ordinary Least Squares Linear Regression Output Sheet

User Selected Options					
Date/Time of Computation	4/15/2015 11:56				
From File	RM_CC_04152015_e.xls				
Full Precision	OFF				
Display Limits	FALSE				
Display Regression Diagnostics	FALSE				
Display Regression Tables	TRUE				
Title For Y vs X Plots	Former Haul Roads - uncollimated				
Confidence Level for Regression Line	0.95				
Display Confidence Band	FALSE				
Display Prediction Band	FALSE				
Dependent Variable (Y-Data)	Ra-226 (pCi/g)				
Number Reported (Y values)	12				
Independent Variable (x-data)	cpm (uncollimated)				
Number Reported (x-values)	12				
Regression Estimates and Inference Table					
Parameter	Estimates	Std. Error	T-values	p-values	
intercept	15.04	201.6	0.0746	0.942	
cpm (uncollimated)	0.00523	0.00177	2.96	0.0143	
OLS ANOVA Table					
Source of Variation	SS	DOF	MS	F-Value	P-Value
Regression	1920432	1	1920432	8.764	0.0143
Error	2191151	10	219115		
Total	4111583	11			
R Square	0.467				
Adjusted R Square	0.414				
Sqrt(MSE) = Scale	468.1				

Table 10. Former Haul Roads

Ruby Mine Removal Site Evaluation Report - Correlation Statistics

Collimated

Ordinary Least Squares Linear Regression Output Sheet

User Selected Options	
Date/Time of Computation	4/15/2015 12:05
From File	RM_CC_04152015_e.xls
Full Precision	OFF
Display Limits	FALSE
Display Regression Diagnosti	FALSE
Display Regression Tables	TRUE
Title For Y vs X Plots	Former Haul Roads - collimated
Confidence Level for Regress	0.95
Display Confidence Band	FALSE
Display Prediction Band	FALSE
Dependent Variable (Y-Data)	Ra-226 (pCi/g)
Number Reported (Y values)	12
Independent Variable (x-dat	cpm (collimated)
Number Reported (x-values)	12

Regression Estimates and Inference Table

Parameter	Estimates	Std. Error	T-values	p-values
intercept	12.77	193.7	0.0659	0.949
cpm (collimated)	0.0119	0.00382	3.131	0.0107

OLS ANOVA Table

Source of Variation	SS	DOF	MS	F-Value
Regression	2035407	1	2035407	9.804
Error	2076176	10	207618	
Total	4111583	11		

R Square	0.495
Adjusted R Square	0.445
Sqrt(MSE) = Scale	455.7

Outlier Tests for Selected Uncensored Variables

User Selected Options	
Date/Time of Computation	4/20/2015 18:30
From File	haul road outlier test 4_20_15.xls
Full Precision	OFF

Dixon's Outlier Test for cpm (uncollimated)

Number of Observations = 12
10% critical value: 0.49
5% critical value: 0.546
1% critical value: 0.642

1. Observation Value 268857 is a Potential Outlier (Upper Tail)?

Test Statistic: 0.394

For 10% significance level, 268857 is not an outlier.
For 5% significance level, 268857 is not an outlier.
For 1% significance level, 268857 is not an outlier.

2. Observation Value 14482 is a Potential Outlier (Lower Tail)?

Test Statistic: 0.069

For 10% significance level, 14482 is not an outlier.
For 5% significance level, 14482 is not an outlier.
For 1% significance level, 14482 is not an outlier.

Dixon's Outlier Test for cpm (collimated)

Number of Observations = 12
10% critical value: 0.49
5% critical value: 0.546
1% critical value: 0.642

1. Observation Value 112974 is a Potential Outlier (Upper Tail)?

Test Statistic: 0.379

For 10% significance level, 112974 is not an outlier.
For 5% significance level, 112974 is not an outlier.
For 1% significance level, 112974 is not an outlier.

2. Observation Value 4310 is a Potential Outlier (Lower Tail)?

Test Statistic: 0.048

For 10% significance level, 4310 is not an outlier.
For 5% significance level, 4310 is not an outlier.
For 1% significance level, 4310 is not an outlier.

Table 10. Former Haul Roads
Ruby Mine Removal Site Evaluation Report - Correlation Statistics

Dixon's Outlier Test for Ra-226 (pCi/g)

Number of Observations = 12
10% critical value: 0.49
5% critical value: 0.546
1% critical value: 0.642

1. Observation Value 1680 is a Potential Outlier (Upper Tail)?

Test Statistic: 0.311

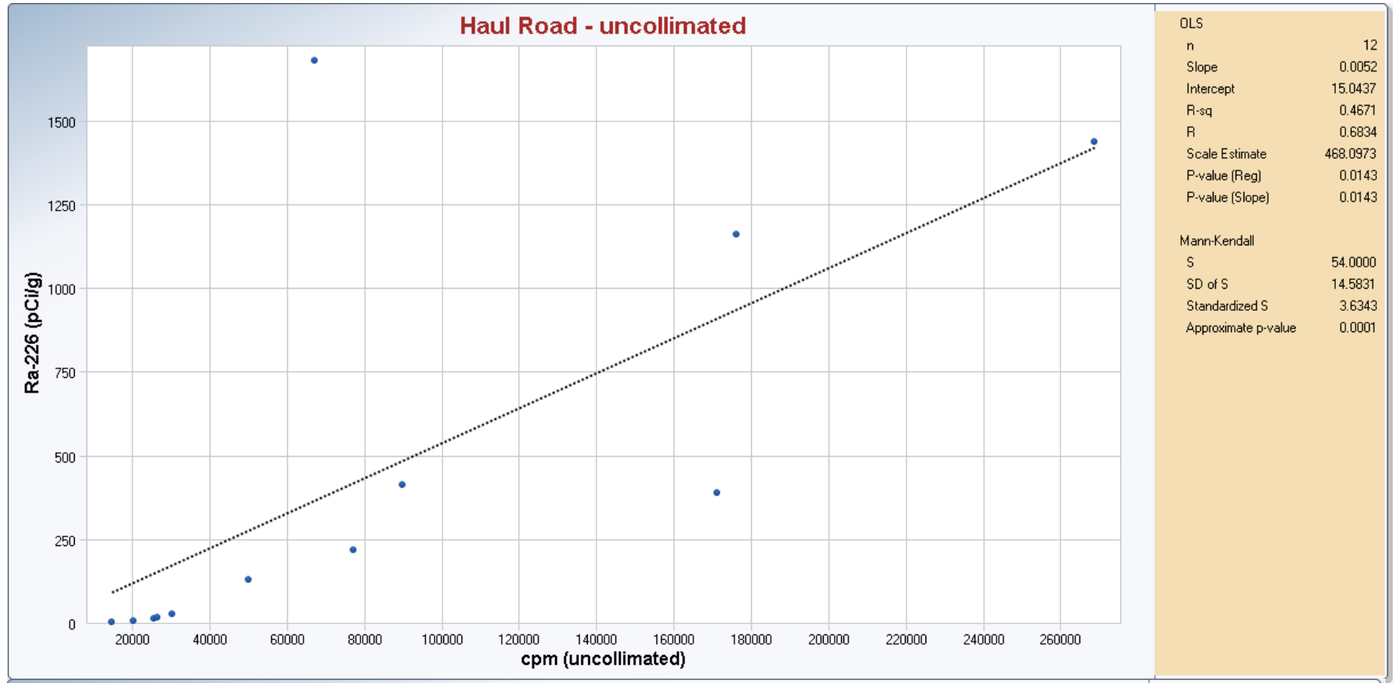
For 10% significance level, 1680 is not an outlier.
For 5% significance level, 1680 is not an outlier.
For 1% significance level, 1680 is not an outlier.

2. Observation Value 1.82 is a Potential Outlier (Lower Tail)?

Test Statistic: 0.009

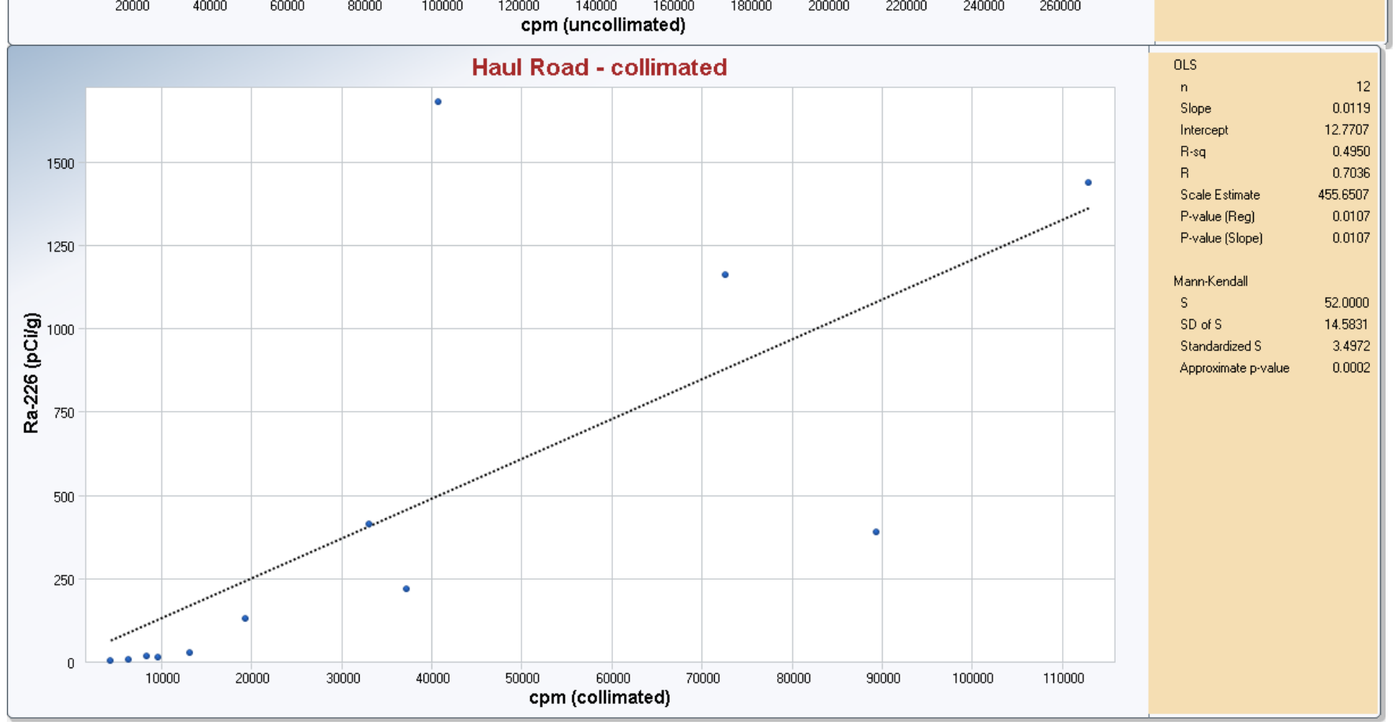
For 10% significance level, 1.82 is not an outlier.
For 5% significance level, 1.82 is not an outlier.
For 1% significance level, 1.82 is not an outlier.

Table 10. Former Haul Roads (Continued)
Ruby Mine Removal Site Evaluation Report - Correlation Statistics



OLS	
n	12
Slope	0.0052
Intercept	15.0437
R-sq	0.4671
R	0.6834
Scale Estimate	468.0973
P-value (Reg)	0.0143
P-value (Slope)	0.0143

Mann-Kendall	
S	54.0000
SD of S	14.5831
Standardized S	3.6343
Approximate p-value	0.0001



OLS	
n	12
Slope	0.0119
Intercept	12.7707
R-sq	0.4950
R	0.7036
Scale Estimate	455.6507
P-value (Reg)	0.0107
P-value (Slope)	0.0107

Mann-Kendall	
S	52.0000
SD of S	14.5831
Standardized S	3.4972
Approximate p-value	0.0002

Table 11. Other Areas
Ruby Mine Removal Site Evaluation Report - Correlation Statistics

Sample ID - Depth to top of sample (ft)	cpm (uncollimated)	cpm (collimated)	Ra-226 (pCi/g)
RM01-8MAY14-01	38876	11774	143
RM01-8MAY14-02	79193	35235	299
RM01-8MAY14-03	19947	5787	5.73
RM01-8MAY14-04	34094	10226	17.3
RM01-8MAY14-05	122269	91084	1330
RM01-STEP01-00	24593	8403	21.3
RM01-STEP02-00	97827	40360	281
RM01-STEP03-00	59471	21694	122
RM01-STEP04-00	134792	57437	20.9
RM01-STEP05-00	102246	73119	846
RM01-WRK01-00	26190	8284	6.8
RM01-WRK02-00	42278	14159	39.9
RM01-WRK03-00	30130	9360	3.08
RM01-WRK04-00	17374	4890	2.99
RM03-8MAY14-01	12877	3804	1.19
RM03-8MAY14-02	23023	7488	4.17
RM03-8MAY14-04	38876	11774	141
RM03-8MAY14-05	30597	10838	3.27
RM03-8MAY14-07	109898	41707	1000
RM03-WRK01-00	15295	4815	2.7
RM03-WRK02-00	14067	4247	2.66
RM03-WRK03-00	24140	8430	20
RM03-WRK04-00	104266	40982	590
RM-COR18-00	20411	5990	4.14
RM-COR19-00	16546	5052	2.56
RM-COR20-00	18114	5439	7.7
RM-COR21-00	17964	5074	4.03
RM-COR22-00	16809	5116	1.49
RM-COR23-00	20456	6117	5.77
RM-COR24-00	15050	4467	1.54
RM-COR28-00	17957	4808	1.99
RM-COR29-00	18719	5456	3.34
RM-COR33-00	20175	6084	3.01
RM-COR34-00	17119	4937	1.95
RM-COR35-00	15485	4998	1.5
RM-COR37-00	16561	5087	7.5
RM-COR38-00	18409	5955	8.8
RM-COR41-00	21636	6839	9.3
RM-COR42-00	24359	7575	19.2
RM-COR43-00	19182	5721	1.7
RM-COR44-00	13437	4292	1.5
RM-COR45-00	20154	5935	7.9
RM-COR46-00	20369	6292	5.57
RM-COR47-00	18008	5171	3.38

Uncollimated

Ordinary Least Squares Linear Regression Output Sheet

User Selected Options	
Date/Time of Computation	4/15/2015 12:08
From File	RM_CC_04152015_f.xls
Full Precision	OFF
Display Limits	FALSE
Display Regression Diagnostics	FALSE
Display Regression Tables	TRUE
Title For Y vs X Plots	Other Areas - uncollimated
Confidence Level for Regression Line	0.95
Display Confidence Band	FALSE
Display Prediction Band	FALSE
Dependent Variable (Y-Data)	Ra-226 (pCi/g)
Number Reported (Y values)	44
Independent Variable (x-data)	cpm (uncollimated)
Number Reported (x-values)	44

Regression Estimates and Inference Table

Parameter	Estimates	Std. Error	T-values	p-values
intercept	-129.2	40.23	-3.211	0.00254
cpm (uncollimated)	0.00673	8.25E-04	8.156	3.39E-10

OLS ANOVA Table

Source of Variation	SS	DOF	MS	F-Value	P-Value
Regression	2139579	1	2139579	66.52	0
Error	1350932	42	32165		
Total	3490512	43			

R Square	0.613
Adjusted R Square	0.604
Sqrt(MSE) = Scale	179.3

Notes: Evaluating if lower concentrations result in a trend

Table 11. Other Areas

Ruby Mine Removal Site Evaluation Report - Correlation Statistics

Sample ID - Depth to top of sample (ft)	cpm (uncollimated)	cpm (collimated)	Ra-226 (pCi/g)
RM03-8MAY14-01	12877	3804	1.19
RM-COR22-00	16809	5116	1.49
RM-COR35-00	15485	4998	1.5
RM-COR44-00	13437	4292	1.5
RM-COR24-00	15050	4467	1.54
RM-COR43-00	19182	5721	1.7
RM-COR34-00	17119	4937	1.95
RM-COR28-00	17957	4808	1.99
RM-COR19-00	16546	5052	2.56
RM03-WRK02-00	14067	4247	2.66
RM03-WRK01-00	15295	4815	2.7
RM01-WRK04-00	17374	4890	2.99
RM-COR33-00	20175	6084	3.01
RM01-WRK03-00	30130	9360	3.08
RM03-8MAY14-05	30597	10838	3.27
RM-COR29-00	18719	5456	3.34
RM-COR47-00	18008	5171	3.38
RM-COR21-00	17964	5074	4.03
RM-COR18-00	20411	5990	4.14
RM03-8MAY14-02	23023	7488	4.17
RM-COR46-00	20369	6292	5.57
RM01-8MAY14-03	19947	5787	5.73
RM-COR23-00	20456	6117	5.77
RM01-WRK01-00	26190	8284	6.8
RM-COR37-00	16561	5087	7.5
RM-COR20-00	18114	5439	7.7
RM-COR45-00	20154	5935	7.9
RM-COR38-00	18409	5955	8.8
RM-COR41-00	21636	6839	9.3
RM01-8MAY14-04	34094	10226	17.3
RM-COR42-00	24359	7575	19.2
RM03-WRK03-00	24140	8430	20
RM01-STEP04-00	134792	57437	20.9
RM01-STEP01-00	24593	8403	21.3

Sample ID - Depth to top of sample (ft)	cpm (uncollimated)	cpm (collimated)	Ra-226 (pCi/g)
RM03-8MAY14-01	12877	3804	1.19
RM-COR44-00	13437	4292	1.5
RM03-WRK02-00	14067	4247	2.66
RM-COR24-00	15050	4467	1.54
RM03-WRK01-00	15295	4815	2.7
RM-COR35-00	15485	4998	1.5
RM-COR19-00	16546	5052	2.56
RM-COR37-00	16561	5087	7.5
RM-COR22-00	16809	5116	1.49
RM-COR34-00	17119	4937	1.95
RM01-WRK04-00	17374	4890	2.99
RM-COR28-00	17957	4808	1.99

Collimated

Ordinary Least Squares Linear Regression Output Sheet

User Selected Options				
Date/Time of Computation	4/15/2015 12:12			
From File	RM_CC_04152015_f.xls			
Full Precision	OFF			
Display Limits	FALSE			
Display Regression Diagnostics	FALSE			
Display Regression Tables	TRUE			
Title For Y vs X Plots	Other Areas- collimated			
Confidence Level for Regression Line	0.95			
Display Confidence Band	FALSE			
Display Prediction Band	FALSE			
Dependent Variable (Y-Data)	Ra-226 (pCi/g)			
Number Reported (Y values)	44			
Independent Variable (x-data)	cpm (collimated)			
Number Reported (x-values)	44			
Regression Estimates and Inference Table				
Parameter	Estimates	Std. Error	T-values	p-values
intercept	-73.1	26.84	-2.723	0.00938
cpm (collimated)	0.0128	0.00111	11.49	1.52E-14
OLS ANOVA Table				
Source of Variation	SS	DOF	MS	F-Value	P-Value
Regression	2647955	1	2647955	132	0
Error	842556	42	20061		
Total	3490512	43			
R Square	0.759			
Adjusted R Square	0.753			
Sqrt(MSE) = Scale	141.6			

Table 11. Other Areas

Ruby Mine Removal Site Evaluation Report - Correlation Statistics

RM-COR21-00	17964	5074	4.03
RM-COR47-00	18008	5171	3.38
RM-COR20-00	18114	5439	7.7
RM-COR38-00	18409	5955	8.8
RM-COR29-00	18719	5456	3.34
RM-COR43-00	19182	5721	1.7
RM01-8MAY14-03	19947	5787	5.73
RM-COR45-00	20154	5935	7.9
RM-COR33-00	20175	6084	3.01
RM-COR46-00	20369	6292	5.57
RM-COR18-00	20411	5990	4.14
RM-COR23-00	20456	6117	5.77
RM-COR41-00	21636	6839	9.3
RM03-8MAY14-02	23023	7488	4.17
RM03-WRK03-00	24140	8430	20
RM-COR42-00	24359	7575	19.2
RM01-STEP01-00	24593	8403	21.3
RM01-WRK01-00	26190	8284	6.8
RM01-WRK03-00	30130	9360	3.08
RM03-8MAY14-05	30597	10838	3.27
RM01-8MAY14-04	34094	10226	17.3
RM01-STEP04-00	134792	57437	20.9

Table 11. Other Areas (Continued)

Ruby Mine Removal Site Evaluation Report - Correlation Statistics

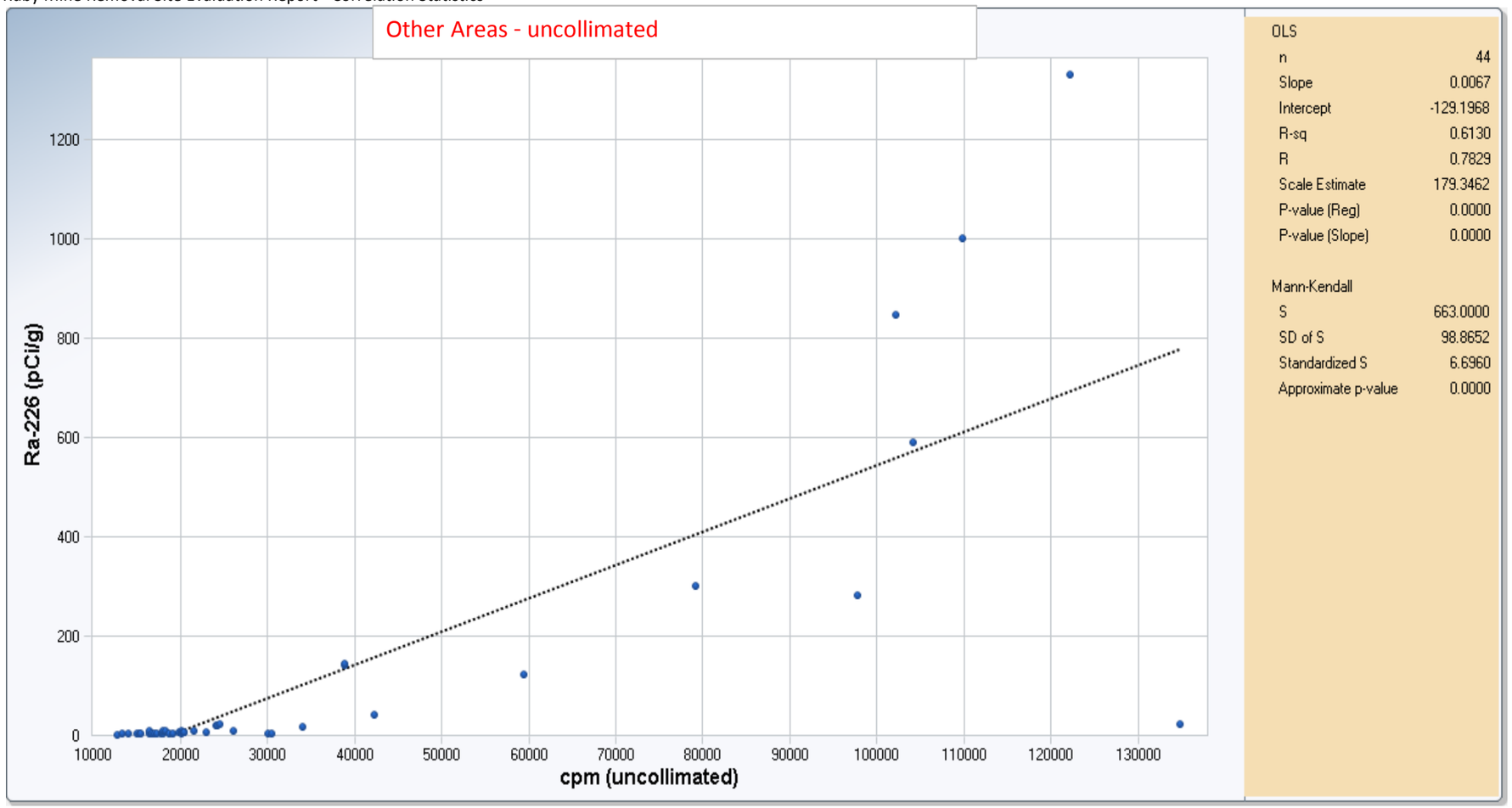


Table 11. Other Areas (Continued)

Ruby Mine Removal Site Evaluation Report - Correlation Statistics

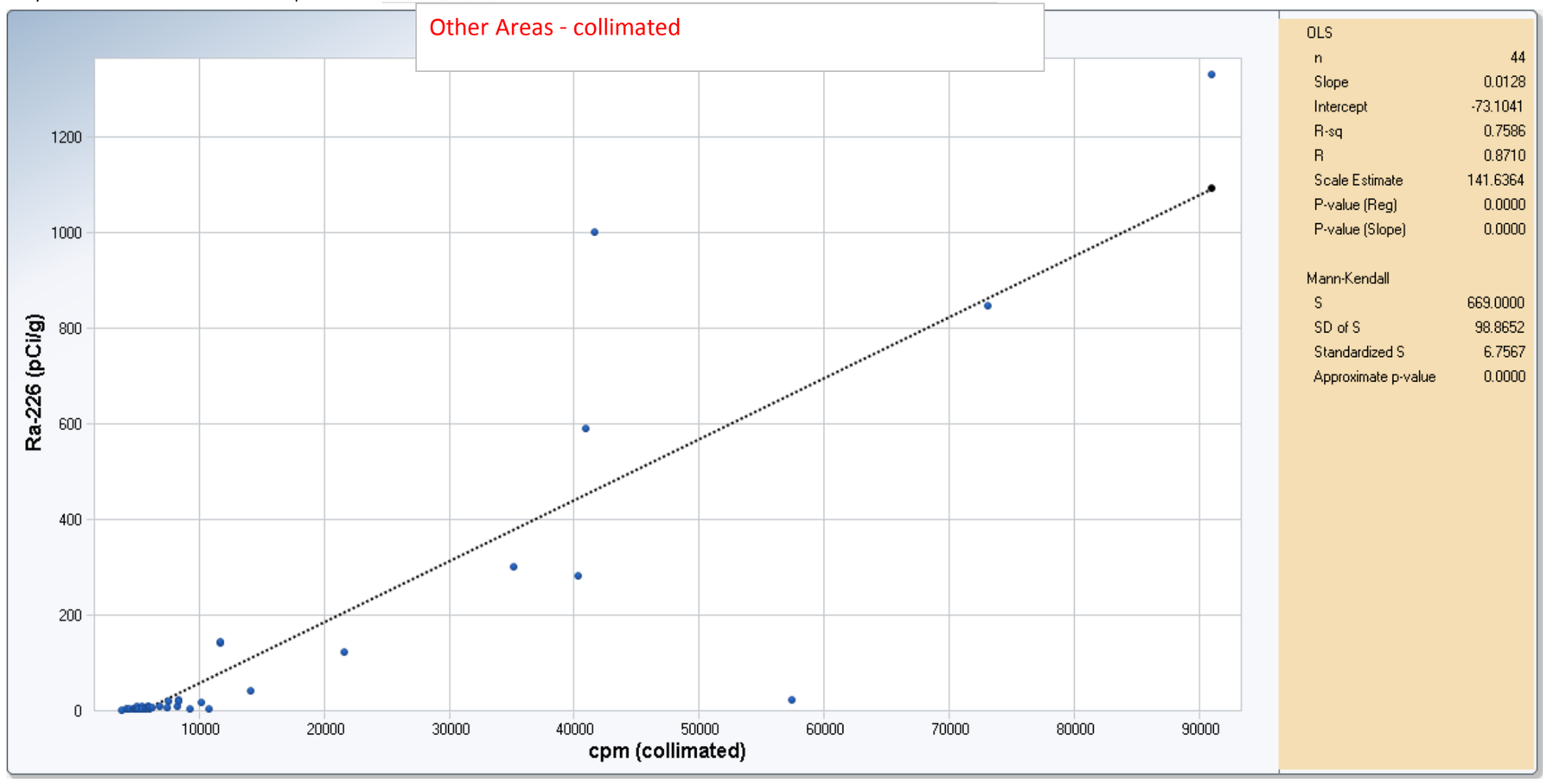


Table 11. Other Areas (Continued)

Ruby Mine Removal Site Evaluation Report - Correlation Statistics

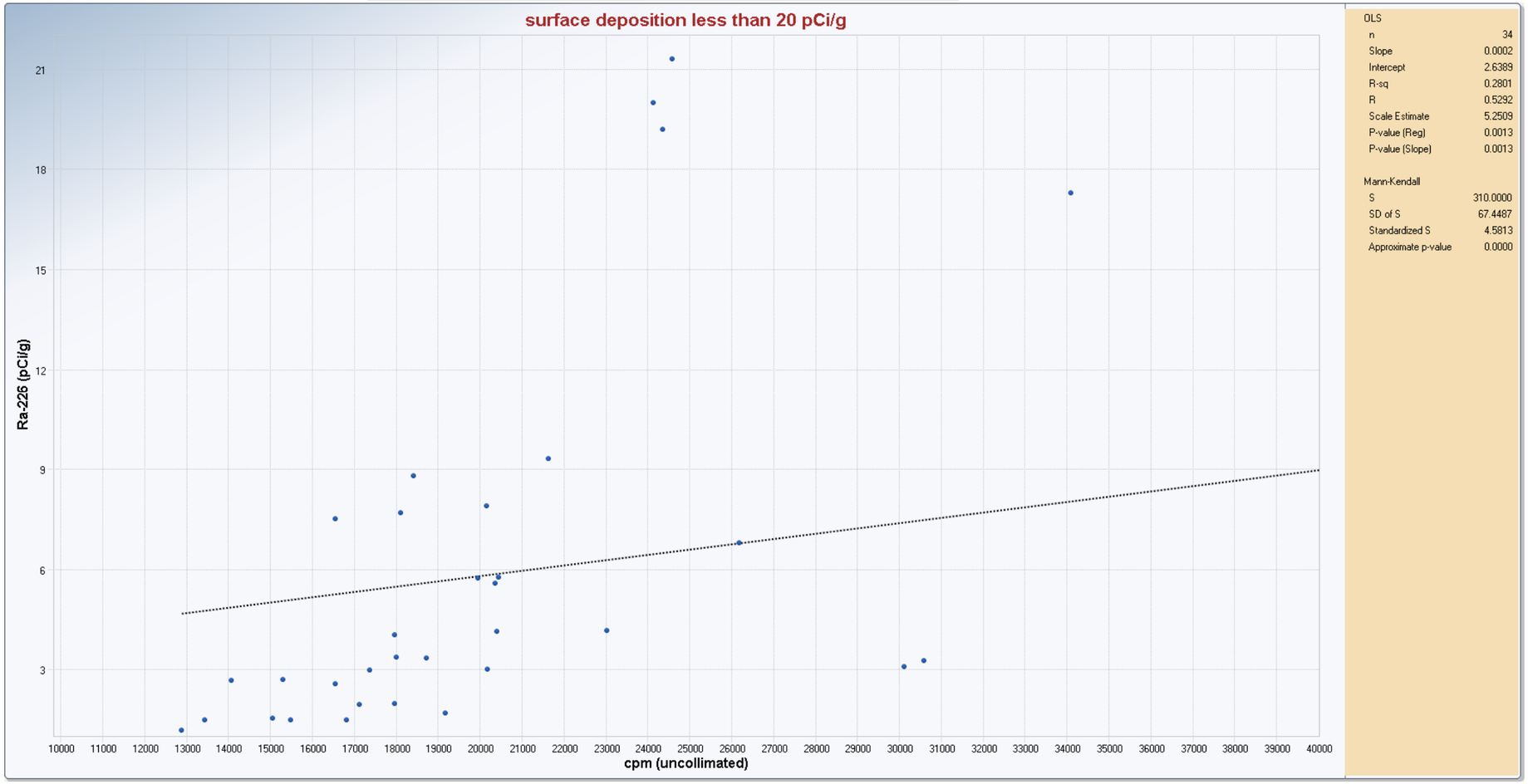


Table 12. Colluvium Geology
Ruby Mine Removal Site Evaluation Report - Correlation Statistics

Sample ID - Depth to top of sample (ft)	cpm (uncollimated)	cpm (collimated)	Ra-226 (pCi/g)
RM01-8MAY14-03	19947	5787	5.73
RM01-8MAY14-04	34094	10226	17.3
RM01-8MAY14-05	122269	91084	1330
RM01-8MAY14-06	26512	8423	15.8
RM01-8MAY14-07	268857	112974	1440
RM01-8MAY14-08	13094	3889	2.77
RM01-CWRP01-C-00	27214	9124	2.61
RM01-CWRP02-C-00	25779	8558	8.6
RM01-CWRP03-C-00	25028	7469	7.3
RM01-CWRP04-C-00	21887	6514	7.1
RM01-CWRP05-C-00	19328	5765	2.33
RM01-CWRP06-C-00	29301	9149	3.62
RM01-CWRP07-C-00	39423	14130	4.09
RM01-CWRP08-C-00	18098	5523	6.74
RM01-DRNA1-00	30924	8365	18.9
RM01-DRNC1-00	18214	5775	10.1
RM01-HR01-00	25600	9665	14.6
RM01-HR04-00	30157	13126	28.6
RM01-HR05-00	89648	33068	412
RM01-HR06-00	50010	19402	129
RM01-HR07-00	176269	72600	1160
RM01-STEP01-00	24593	8403	21.3
RM01-STEP03-00	59471	21694	122
RM01-STEP04-00	134792	57437	20.9
RM01-STEP05-00	102246	73119	846
RM01-WRK01-00	26190	8284	6.8
RM01-WRK02-00	42278	14159	39.9
RM01-WRK03-00	30130	9360	3.08
RM01-WRK04-00	17374	4890	2.99
RM03-8MAY14-05	30597	10838	3.27
RM03-CWRP01-C-00	15909	5297	1.72
RM03-CWRP04-C-00	31942	10925	1.62
RM03-CWRP05-C-00	24347	8078	2.27
RM03-DRN02-00	19784	5626	8.9
RM19-VENT01-00	12716	3889	1.37
RM19-VENT02-00	77944	31787	107
RM19-VENT03-00	33329	12254	32.2
RM-COR18-00	20411	5990	4.14
RM-COR19-00	16546	5052	2.56
RM-COR20-00	18114	5439	7.7

Uncollimated

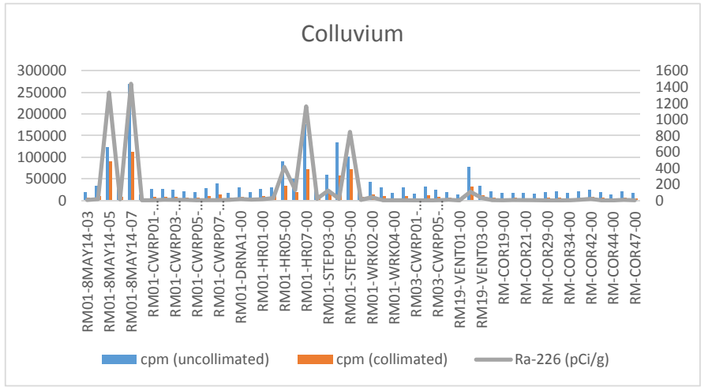
Ordinary Least Squares Linear Regression Output Sheet

User Selected Options					
Date/Time of Computation	4/15/2015 12:16				
From File	RM_CC_04152015_g.xls				
Full Precision	OFF				
Display Limits	FALSE				
Display Regression Diagnostics	FALSE				
Display Regression Tables	TRUE				
Title For Y vs X Plots	Colluvium - uncollimated				
Confidence Level for Regression Line	0.95				
Display Confidence Band	FALSE				
Display Prediction Band	FALSE				
Dependent Variable (Y-Data)	Ra-226 (pCi/g)				
Number Reported (Y values)	51				
Independent Variable (x-data)	cpm (uncollimated)				
Number Reported (x-values)	51				
Regression Estimates and Inference Table					
Parameter	Estimates	Std. Error	T-values	p-values	
intercept	-133.7	29.88	-4.474	4.58E-05	
cpm (uncollimated)	0.00619	4.87E-04	12.71	3.99E-17	
OLS ANOVA Table					
Source of Variation	SS	DOF	MS	F-Value	P-Value
Regression	4170537	1	4170537	161.5	0
Error	1265523	49	25827		
Total	5436060	50			
R Square	0.767				
Adjusted R Square	0.762				
Sqrt(MSE) = Scale	160.7				

Table 12. Colluvium Geology

Ruby Mine Removal Site Evaluation Report - Correlation Statistics

RM-COR21-00	17964	5074	4.03
RM-COR26-00	15753	5081	1.7
RM-COR29-00	18719	5456	3.34
RM-COR33-00	20175	6084	3.01
RM-COR34-00	17119	4937	1.95
RM-COR41-00	21636	6839	9.3
RM-COR42-00	24359	7575	19.2
RM-COR43-00	19182	5721	1.7
RM-COR44-00	13437	4292	1.5
RM-COR45-00	20154	5935	7.9
RM-COR47-00	18008	5171	3.38



Collimated

Ordinary Least Squares Linear Regression Output Sheet

User Selected Options	
Date/Time of Computation	4/15/2015 12:18
From File	RM_CC_04152015_g.xls
Full Precision	OFF
Display Limits	FALSE
Display Regression Diagnostics	FALSE
Display Regression Tables	TRUE
Title For Y vs X Plots	Colluvium - collimated
Confidence Level for Regression Line	0.95
Display Confidence Band	FALSE
Display Prediction Band	FALSE
Dependent Variable (Y-Data)	Ra-226 (pCi/g)
Number Reported (Y values)	51
Independent Variable (x-data)	cpm (collimated)
Number Reported (x-values)	51

Regression Estimates and Inference Table

Parameter	Estimates	Std. Error	T-values	p-values
intercept	-98.57	19.72	-4.999	7.75E-06
cpm (collimated)	0.0133	6.99E-04	18.97	3.21E-24

OLS ANOVA Table

Source of Variation	SS	DOF	MS	F-Value	P-Value
Regression	4784615	1	4784615	359.9	0
Error	651445	49	13295		
Total	5436060	50			

R Square	0.88
Adjusted R Square	0.878
Sqrt(MSE) = Scale	115.3

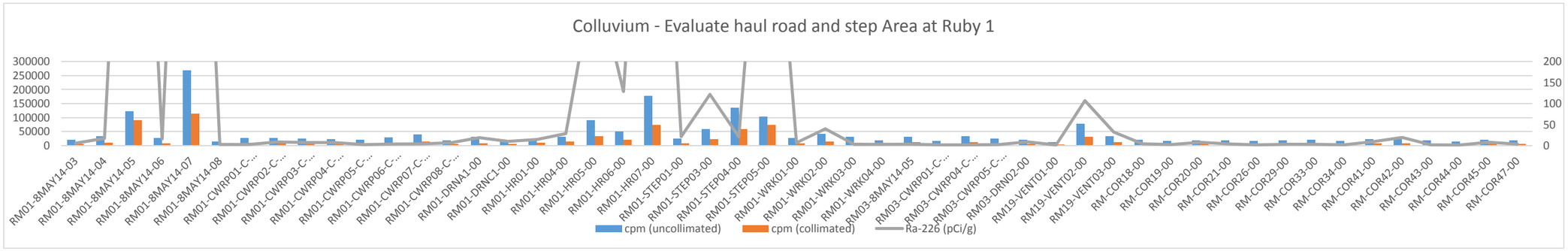


Table 12. Colluvium Geology (Continued)
Ruby Mine Removal Site Evaluation Report - Correlation Statistics

Sample ID - Depth to top of sample (ft)	cpm (uncollimated)	cpm (collimated)	Ra-226 (pCi/g)
RM01-8MAY14-03	19947	5787	5.73
RM01-8MAY14-04	34094	10226	17.3
RM01-8MAY14-05	122269	91084	1330
RM01-8MAY14-06	26512	8423	15.8
RM01-8MAY14-07	268857	112974	1440
RM01-8MAY14-08	13094	3889	2.77
RM01-CWRP01-C-00	27214	9124	2.61
RM01-CWRP02-C-00	25779	8558	8.6
RM01-CWRP03-C-00	25028	7469	7.3
RM01-CWRP04-C-00	21887	6514	7.1
RM01-CWRP05-C-00	19328	5765	2.33
RM01-CWRP06-C-00	29301	9149	3.62
RM01-CWRP07-C-00	39423	14130	4.09
RM01-CWRP08-C-00	18098	5523	6.74
RM01-DRNA1-00	30924	8365	18.9
RM01-DRNC1-00	18214	5775	10.1
RM01-HR01-00	25600	9665	14.6
RM01-HR04-00	30157	13126	28.6
RM01-HR05-00	89648	33068	412
RM01-HR06-00	50010	19402	129
RM01-HR07-00	176269	72600	1160
RM01-STEP01-00	24593	8403	21.3
RM01-STEP03-00	59471	21694	122
RM01-STEP04-00	134792	57437	20.9
RM01-STEP05-00	102246	73119	846
RM01-WRK01-00	26190	8284	6.8
RM01-WRK02-00	42278	14159	39.9
RM01-WRK03-00	30130	9360	3.08
RM01-WRK04-00	17374	4890	2.99
RM03-8MAY14-05	30597	10838	3.27
RM03-CWRP01-C-00	15909	5297	1.72
RM03-CWRP04-C-00	31942	10925	1.62
RM03-CWRP05-C-00	24347	8078	2.27
RM03-DRN02-00	19784	5626	8.9
RM19-VENT01-00	12716	3889	1.37
RM19-VENT02-00	77944	31787	107
RM19-VENT03-00	33329	12254	32.2
RM-COR18-00	20411	5990	4.14
RM-COR19-00	16546	5052	2.56
RM-COR20-00	18114	5439	7.7
RM-COR21-00	17964	5074	4.03
RM-COR26-00	15753	5081	1.7
RM-COR29-00	18719	5456	3.34
RM-COR33-00	20175	6084	3.01
RM-COR34-00	17119	4937	1.95
RM-COR41-00	21636	6839	9.3
RM-COR42-00	24359	7575	19.2
RM-COR43-00	19182	5721	1.7
RM-COR44-00	13437	4292	1.5
RM-COR45-00	20154	5935	7.9
RM-COR47-00	18008	5171	3.38

Uncollimated
Ordinary Least Squares Linear Regression Output Sheet

User Selected Options

Date/Time of Computation	4/15/2015 12:16
From File	RM_CC_04152015_g.xls
Full Precision	OFF
Display Limits	FALSE
Display Regression Diagnostics	FALSE
Display Regression Tables	TRUE
Title For Y vs X Plots	Colluvium - uncollimated
Confidence Level for Regression Line	0.95
Display Confidence Band	FALSE
Display Prediction Band	FALSE
Dependent Variable (Y-Data)	Ra-226 (pCi/g)
Number Reported (Y values)	51
Independent Variable (x-data)	cpm (uncollimated)
Number Reported (x-values)	51

Regression Estimates and Inference Table

Parameter	Estimates	Std. Error	T-values	p-values
intercept	-133.7	29.88	-4.474	4.58E-05
cpm (uncollimated)	0.00619	4.87E-04	12.71	3.99E-17

OLS ANOVA Table

Source of Variation	SS	DOF	MS	F-Value	P-Value
Regression	4170537	1	4170537	161.5	0
Error	1265523	49	25827		
Total	5436060	50			

R Square	0.767
Adjusted R Square	0.762
Sqrt(MSE) = Scale	160.7

Collimated
Ordinary Least Squares Linear Regression Output Sheet
User Selected Options

Date/Time of Computation	4/15/2015 12:18
From File	RM_CC_04152015_g.xls
Full Precision	OFF
Display Limits	FALSE
Display Regression Diagnostics	FALSE
Display Regression Tables	TRUE
Title For Y vs X Plots	Colluvium - collimated
Confidence Level for Regression Line	0.95
Display Confidence Band	FALSE
Display Prediction Band	FALSE
Dependent Variable (Y-Data)	Ra-226 (pCi/g)
Number Reported (Y values)	51
Independent Variable (x-data)	cpm (collimated)
Number Reported (x-values)	51

Regression Estimates and Inference Table

Parameter	Estimates	Std. Error	T-values	p-values
intercept	-98.57	19.72	-4.999	7.75E-06
cpm (collimated)	0.0133	6.99E-04	18.97	3.21E-24

OLS ANOVA Table

Source of Variation	SS	DOF	MS	F-Value	P-Value
Regression	4784615	1	4784615	359.9	0
Error	651445	49	13295		
Total	5436060	50			

R Square	0.88
Adjusted R Square	0.878
Sqrt(MSE) = Scale	115.3

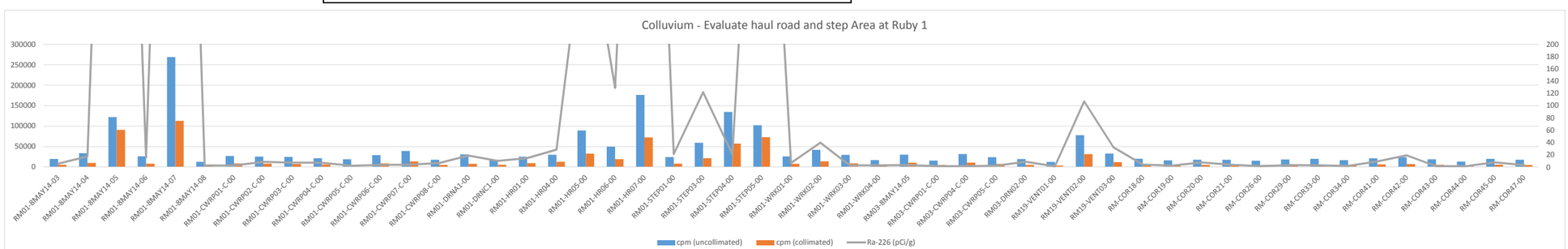


Table 12. Colluvium Geology (Continued)

Ruby Mine Removal Site Evaluation Report - Correlation Statistics

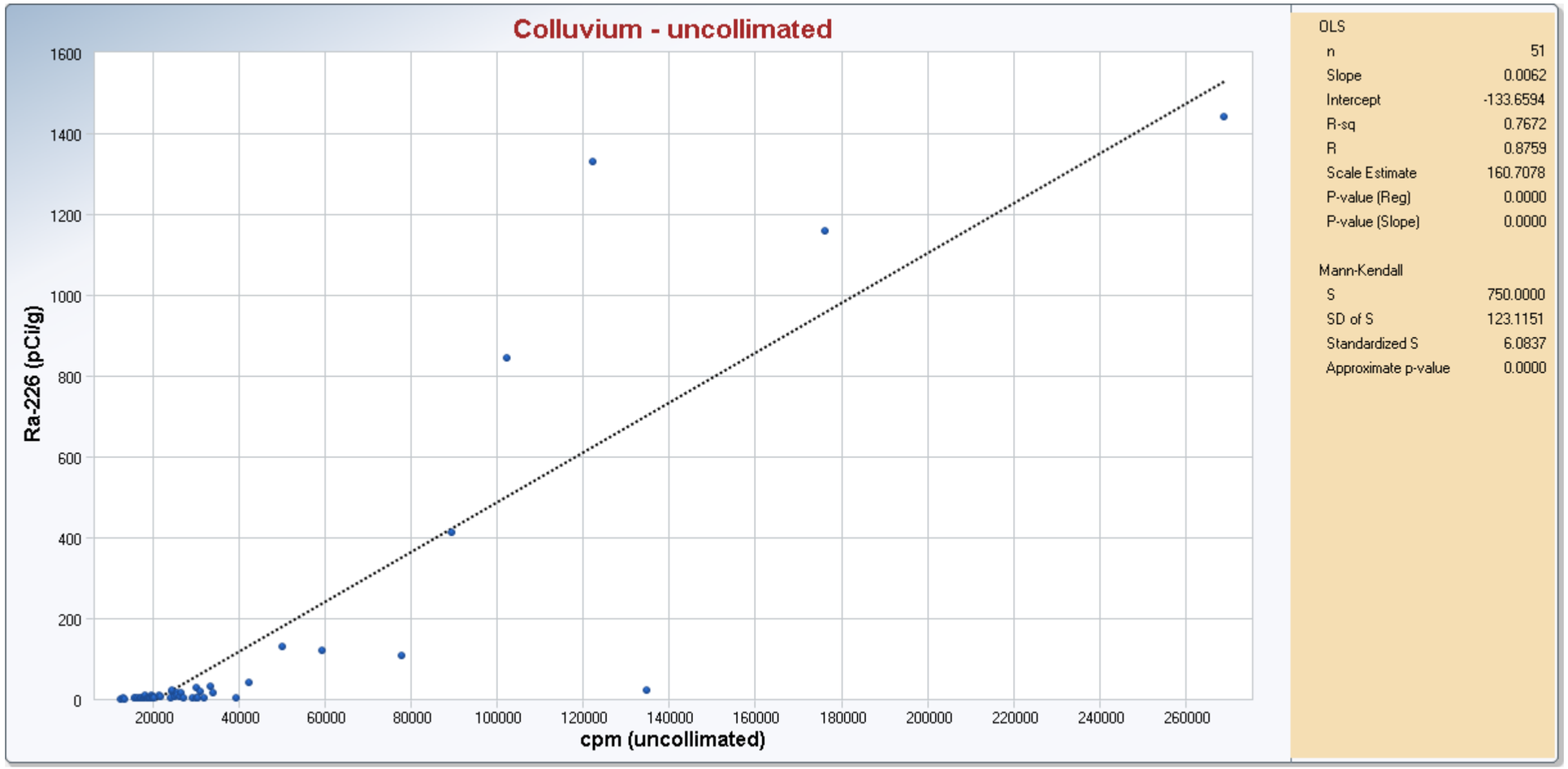


Table 12. Colluvium Geology (Continued)

Ruby Mine Removal Site Evaluation Report - Correlation Statistics

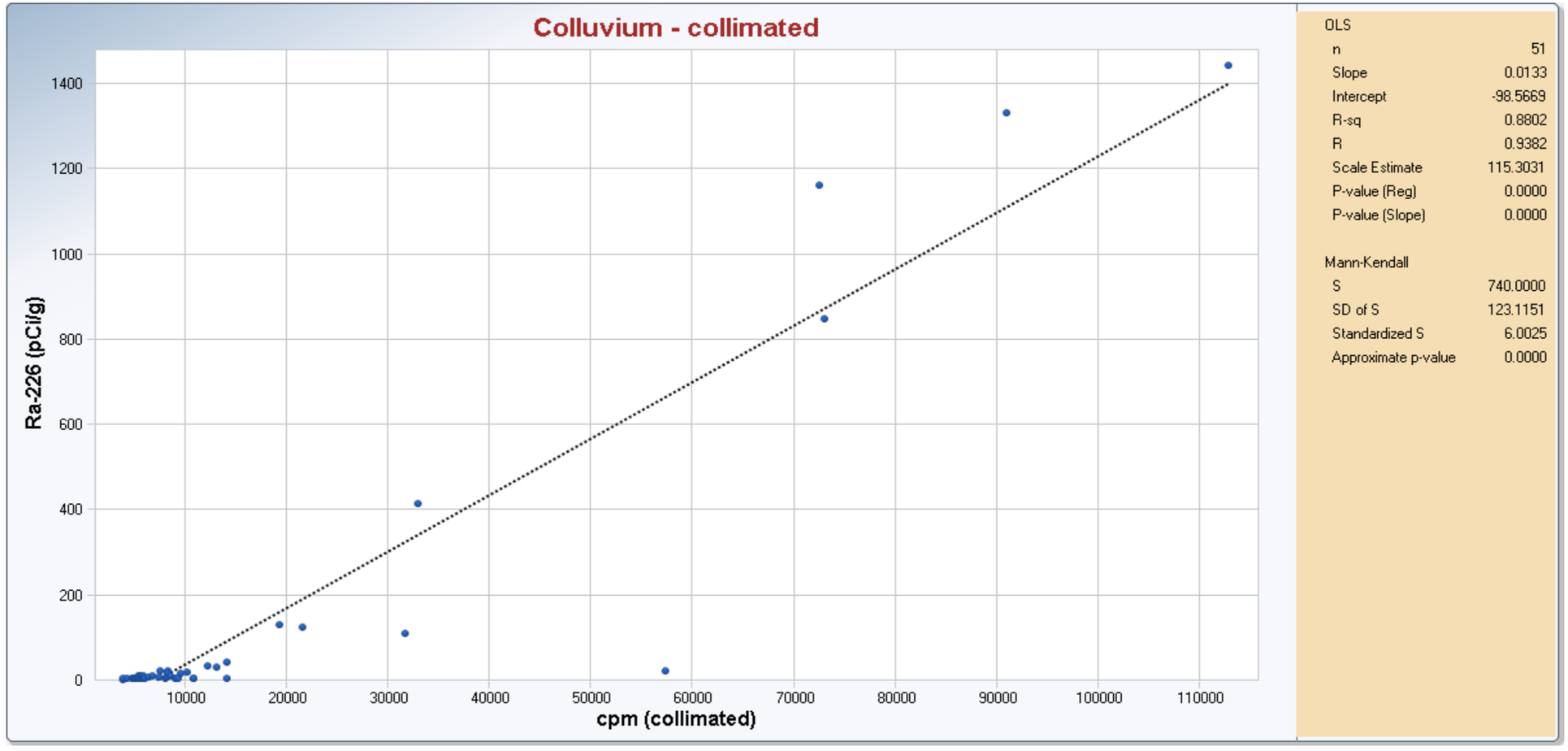
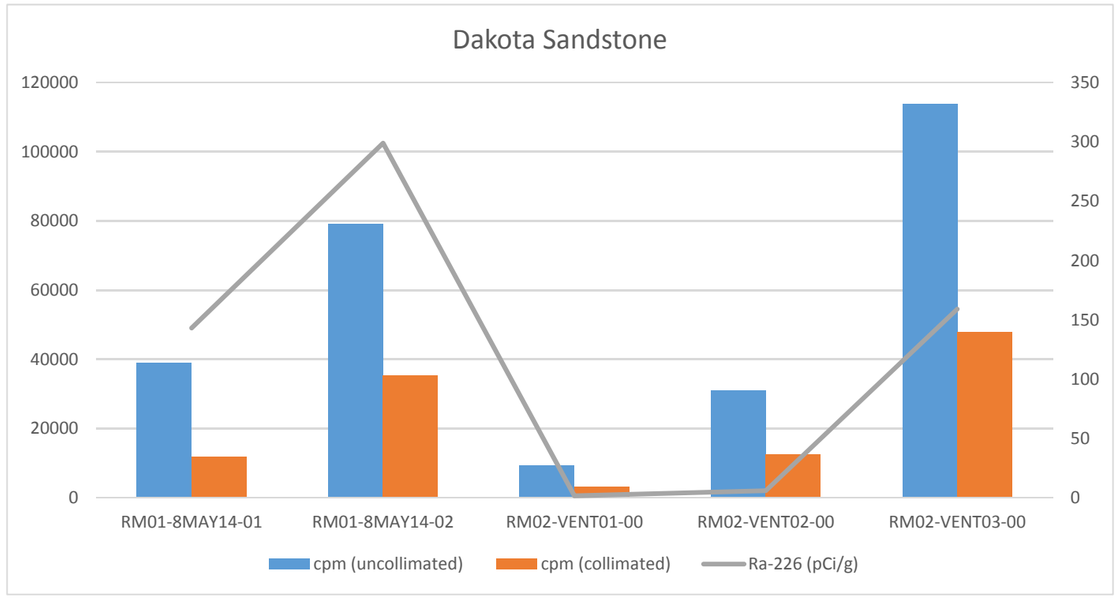


Table 13. Dakota Sandstone Geology
Ruby Mine Removal Site Evaluation Report - Correlation Statistics

Sample ID - Depth to top of sample (ft)	cpm (uncollimated)	cpm (collimated)	Ra-226 (pCi/g)	Description for Grouping	Geology
RM01-8MAY14-01	38876	11774	143	Other Areas	Dakota Sandstone
RM01-8MAY14-02	79193	35235	299	Other Areas	Dakota Sandstone
RM02-VENT01-00	9167	3164	1.39	Vent	Dakota Sandstone
RM02-VENT02-00	30995	12495	5.69	Vent	Dakota Sandstone
RM02-VENT03-00	113882	47869	159	Vent	Dakota Sandstone



Uncollimated

Ordinary Least Squares Linear Regression Output Sheet

User Selected Options	
Date/Time of Computation	4/15/2015 12:32
From File	RM_CC_04152015_i.xls
Full Precision	OFF
Display Limits	FALSE
Display Regression Diagnostics	FALSE
Display Regression Tables	TRUE
Title For Y vs X Plots	Dakota Sandstone - uncollimated
Confidence Level for Regression Line	0.95
Display Confidence Band	FALSE
Display Prediction Band	FALSE
Dependent Variable (Y-Data)	Ra-226 (pCi/g)
Number Reported (Y values)	5
Independent Variable (x-data)	cpm (uncollimated)
Number Reported (x-values)	5

Regression Estimates and Inference Table

Parameter	Estimates	Std. Error	T-values	p-values
intercept	9.143	80.77	0.113	0.917
cpm (uncollimated)	0.00207	0.00122	1.689	0.19

OLS ANOVA Table

Source of Variation	SS	DOF	MS	F-Value	P-Value
Regression	29845	1	29845	2.854	0.1897
Error	31368	3	10456		
Total	61213	4			

R Square	0.488
Adjusted R Square	0.317
Sqrt(MSE) = Scale	102.3

Table 13. Dakota Sandstone Geology
Ruby Mine Removal Site Evaluation Report - Correlation Statistics

Collimated					
Ordinary Least Squares Linear Regression Output Sheet					
User Selected Options					
Date/Time of Computation	4/15/2015 12:34				
From File	RM_CC_04152015_i.xls				
Full Precision	OFF				
Display Limits	FALSE				
Display Regression Diagnostics	FALSE				
Display Regression Tables	TRUE				
Title For Y vs X Plots	Dakota Sandstone - collimated				
Confidence Level for Regression Line	0.95				
Display Confidence Band	FALSE				
Display Prediction Band	FALSE				
	Ra-226 (pCi/g)				
Dependent Variable (Y-Data)	5				
Number Reported (Y values)	cpm (collimated)				
Independent Variable (x-data)	5				
Number Reported (x-values)					
Regression Estimates and Inference Table					
Parameter	Estimates	Std. Error	T-values	p-values	
intercept	19.13	75.74	0.253	0.817	
cpm (collimated)	0.00464	0.00273	1.696	0.188	
OLS ANOVA Table					
Source of Variation	SS	DOF	MS	F-Value	P-Value
Regression	29960	1	29960	2.876	0.1885
Error	31253	3	10418		
Total	61213	4			
R Square	0.489				
Adjusted R Square	0.319				
Sqrt(MSE) = Scale	102.1				

Table 13. Dakota Sandstone Geology (Continued)

Ruby Mine Removal Site Evaluation Report - Correlation Statistics

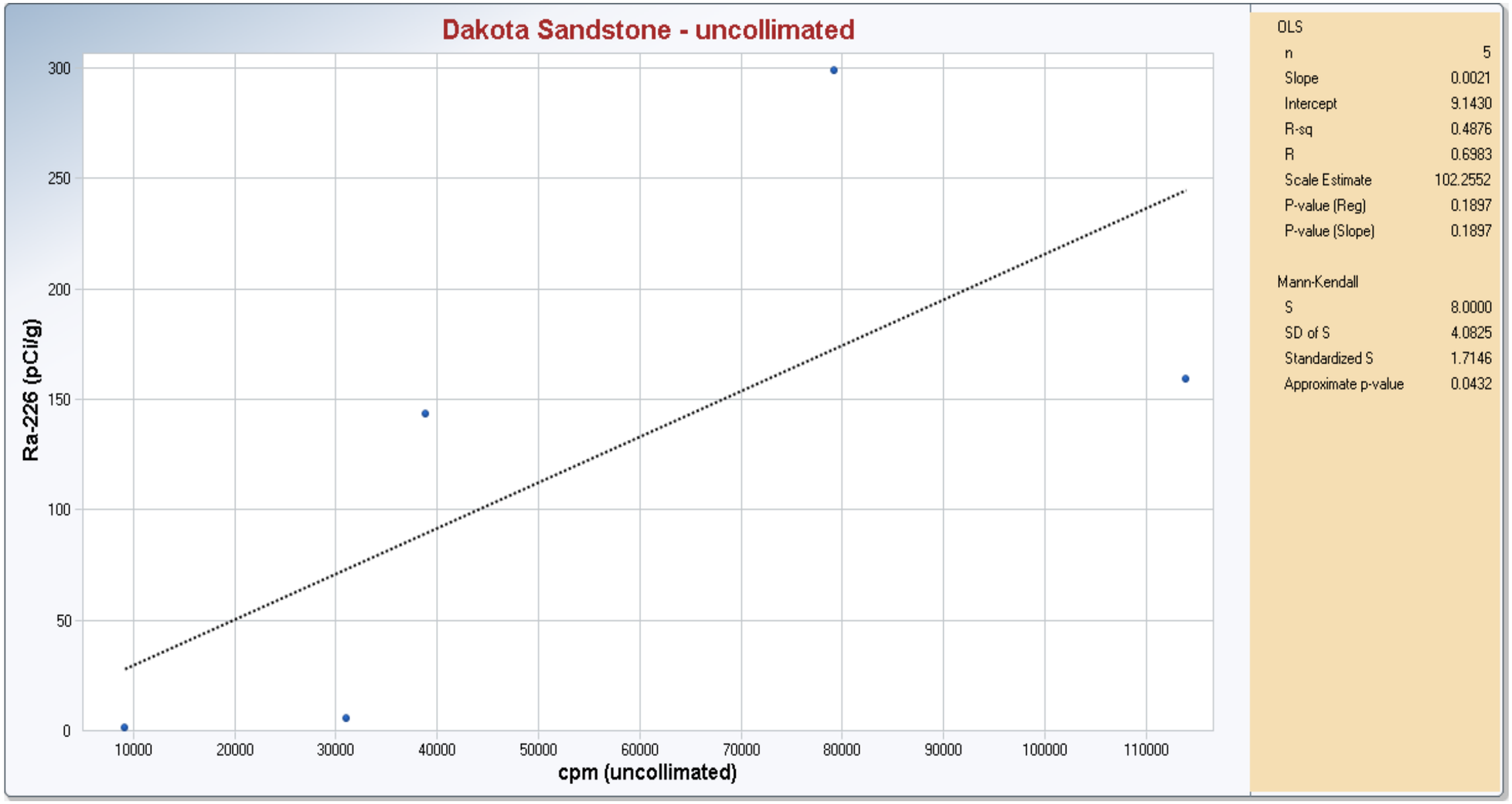


Table 13. Dakota Sandstone Geology (Continued)
Ruby Mine Removal Site Evaluation Report - Correlation Statistics

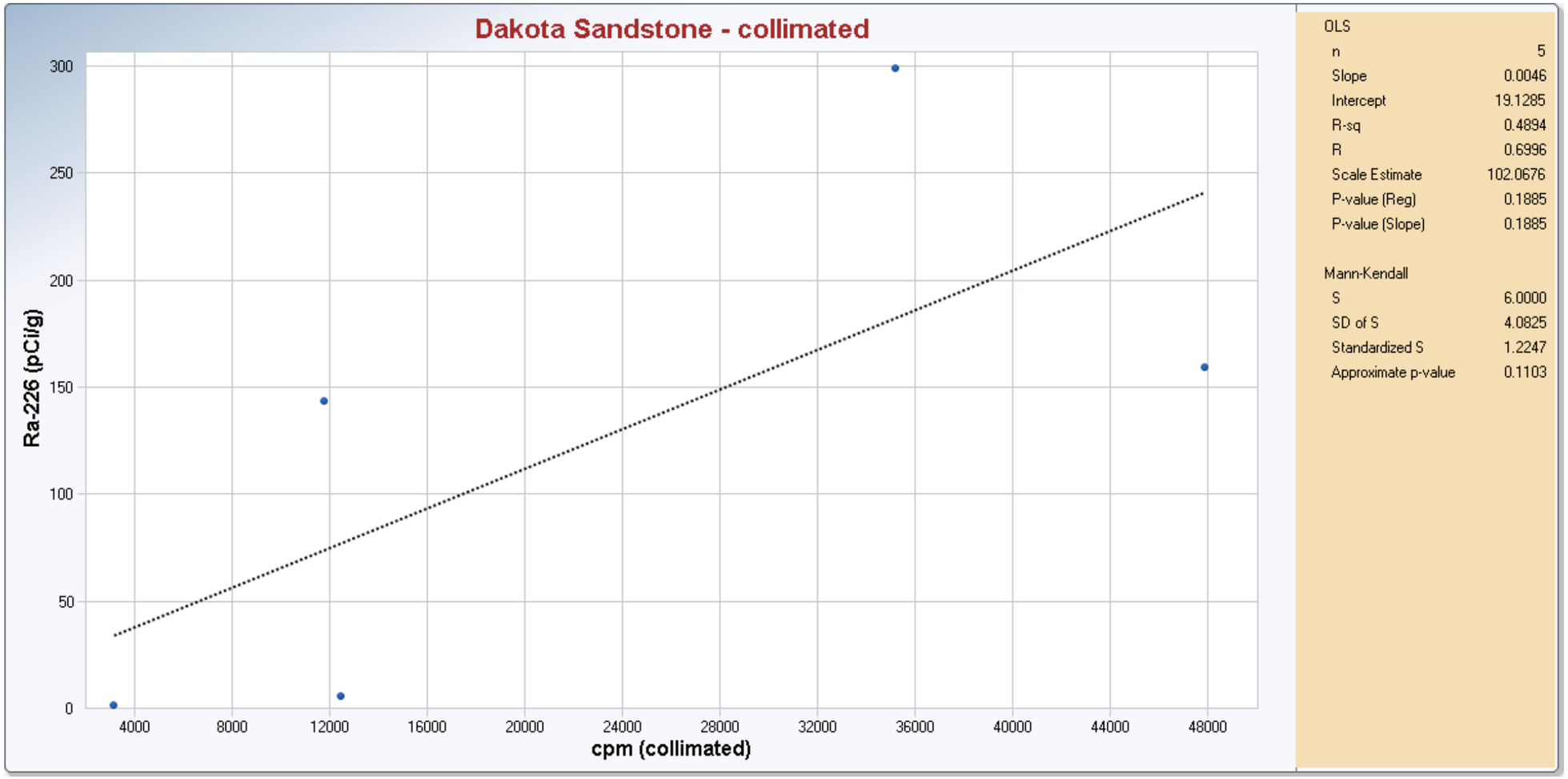


Table 14. Mancos Shale Geology
Ruby Mine Removal Site Evaluation Report - Correlation Statistics

Sample ID - Depth to top of sample (ft)	cpm (uncollimated)	cpm (collimated)	Ra-226 (pCi/g)
RM01-HR02-00	67130	40753	1680
RM01-HR03-00	77079	37264	218
RM01-STEP02-00	97827	40360	281
RM03-8MAY14-01	12877	3804	1.19
RM03-8MAY14-02	23023	7488	4.17
RM03-8MAY14-03	17167	5116	3.27
RM03-8MAY14-04	38876	11774	141
RM03-8MAY14-06	47897	18852	220
RM03-8MAY14-07	109898	41707	1000
RM03-8MAY14-08	171019	89326	391
RM03-CWRP02-C-00	18141	5935	1.61
RM03-CWRP03-C-00	19634	7124	1.71
RM03-CWRP06-C-00	31320	10834	2.04
RM03-CWRP07-C-00	14380	6044	2.23
RM03-DRN01-00	13376	4182	2.35
RM03-DRN03-00	16378	5635	10.2
RM03-DWTR01-00	15978	4745	2.58
RM03-DWTR02-00	24524	8178	6.69
RM03-DWTR03-00	41483	14453	50.7
RM03-WRK01-00	15295	4815	2.7
RM03-WRK02-00	14067	4247	2.66
RM03-WRK03-00	24140	8430	20
RM03-WRK04-00	104266	40982	590
RM04-VENT01-00	13279	4256	1.1
RM04-VENT02-00	23252	8397	6.38
RM04-VENT03-00	97183	43463	111
RM-COR22-00	16809	5116	1.49
RM-COR23-00	20456	6117	5.77
RM-COR24-00	15050	4467	1.54
RM-COR25-00	17355	5326	2.13
RM-COR27-00	13996	3505	1.38
RM-COR28-00	17957	4808	1.99
RM-COR30-00	15436	4839	2.9
RM-COR31-00	17341	4884	3.42
RM-COR32-00	19368	5633	6.71
RM-COR35-00	15485	4998	1.5
RM-COR36-00	20280	6344	6.23
RM-COR37-00	16561	5087	7.5
RM-COR38-00	18409	5955	8.8
RM-COR39-00	18845	5761	3.19
RM-COR40-00	14482	4310	1.82
RM-COR46-00	20369	6292	5.57

Evaluate 0-250 pCi/g to remove influence of the few high concentration data

Sample ID - Depth to top of sample (ft)	cpm (uncollimated)	cpm (collimated)	Ra-226 (pCi/g)
RM03-8MAY14-06	47897	18852	220
RM01-HR03-00	77079	37264	218
RM03-8MAY14-04	38876	11774	141
RM04-VENT03-00	97183	43463	111
RM03-DWTR03-00	41483	14453	50.7
RM03-WRK03-00	24140	8430	20
RM03-DRN03-00	16378	5635	10.2
RM-COR38-00	18409	5955	8.8
RM-COR37-00	16561	5087	7.5
RM-COR32-00	19368	5633	6.71
RM03-DWTR02-00	24524	8178	6.69
RM04-VENT02-00	23252	8397	6.38
RM-COR36-00	20280	6344	6.23
RM-COR23-00	20456	6117	5.77
RM-COR46-00	20369	6292	5.57
RM03-8MAY14-02	23023	7488	4.17
RM-COR31-00	17341	4884	3.42
RM03-8MAY14-03	17167	5116	3.27
RM-COR39-00	18845	5761	3.19
RM-COR30-00	15436	4839	2.9
RM03-WRK01-00	15295	4815	2.7
RM03-WRK02-00	14067	4247	2.66
RM03-DWTR01-00	15978	4745	2.58
RM03-DRN01-00	13376	4182	2.35
RM03-CWRP07-C-00	14380	6044	2.23
RM-COR25-00	17355	5326	2.13
RM03-CWRP06-C-00	31320	10834	2.04
RM-COR28-00	17957	4808	1.99
RM-COR40-00	14482	4310	1.82
RM03-CWRP03-C-00	19634	7124	1.71
RM03-CWRP02-C-00	18141	5935	1.61
RM-COR24-00	15050	4467	1.54
RM-COR35-00	15485	4998	1.5
RM-COR22-00	16809	5116	1.49
RM-COR27-00	13996	3505	1.38
RM03-8MAY14-01	12877	3804	1.19
RM04-VENT01-00	13279	4256	1.1

Uncollimated

Ordinary Least Squares Linear Regression Output Sheet

User Selected Options					
Date/Time of Computation	4/15/2015 12:23				
From File	RM_CC_04152015_h.xls				
Full Precision	OFF				
Display Limits	FALSE				
Display Regression Diagnostics	FALSE				
Display Regression Tables	TRUE				
Title For Y vs X Plots	Mancos Shale - uncollimated				
Confidence Level for Regression Line	0.95				
Display Confidence Band	FALSE				
Display Prediction Band	FALSE				
Dependent Variable (Y-Data)	Ra-226 (pCi/g)				
Number Reported (Y values)	42				
Independent Variable (x-data)	cpm (uncollimated)				
Number Reported (x-values)	42				
Regression Estimates and Inference Table					
Parameter	Estimates	Std. Error	T-values	p-values	
intercept	-66.1	55.18	-1.198	0.238	
cpm (uncollimated)	0.00532	0.00114	4.655	3.52E-05	
OLS ANOVA Table					
Source of Variation	SS	DOF	MS	F-Value	P-Value
Regression	1399342	1	1399342	21.67	0
Error	2582566	40	64564		
Total	3981908	41			
R Square	0.351				
Adjusted R Square	0.335				
Sqrt(MSE) = Scale	254.1				

Collimated

Ordinary Least Squares Linear Regression Output Sheet

User Selected Options	4/15/2015 12:28				
Date/Time of Computation	RM_CC_04152015_h.xls				
From File	OFF				
Full Precision					
Display Limits	FALSE				
Display Regression Diagnostics	FALSE				
Display Regression Tables	TRUE				
Title For Y vs X Plots	Mancos Shale - collimated				
Confidence Level for Regression Line	0.95				
Display Confidence Band	FALSE				
Display Prediction Band	FALSE				
Dependent Variable (Y-Data)	Ra-226 (pCi/g)				
Number Reported (Y values)	42				
Independent Variable (x-data)	cpm (collimated)				
Number Reported (x-values)	42				
Regression Estimates and Inference Table					
Parameter	Estimates	Std. Error	T-values	p-values	
intercept	-34.05	48.61	-0.7	0.488	
cpm (collimated)	0.0111	0.00224	4.966	1.32E-05	
OLS ANOVA Table					
Source of Variation	SS	DOF	MS	F-Value	P-Value
Regression	1518587	1	1518587	24.66	0
Error	2463321	40	61583		
Total	3981908	41			
R Square	0.381				
Adjusted R Square	0.366				
Sqrt(MSE) = Scale	248.2				
Regression Table					

Table 14. Mancos Shale Geology
Ruby Mine Removal Site Evaluation Report - Correlation Statistics

OUTLIER TESTS - Remove outliers

Sample ID - Depth to top of sample (ft)	cpm (uncollimated)	cpm (collimated)	Ra-226 (pCi/g)
RM01-HR03-00	77079	37264	218
RM01-STEP02-00	97827	40360	281
RM03-8MAY14-01	12877	3804	1.19
RM03-8MAY14-02	23023	7488	4.17
RM03-8MAY14-03	17167	5116	3.27
RM03-8MAY14-04	38876	11774	141
RM03-8MAY14-06	47897	18852	220
RM03-8MAY14-07	109898	41707	1000
RM03-CWRP02-C-00	18141	5935	1.61
RM03-CWRP03-C-00	19634	7124	1.71
RM03-CWRP06-C-00	31320	10834	2.04
RM03-CWRP07-C-00	14380	6044	2.23
RM03-DRN01-00	13376	4182	2.35
RM03-DRN03-00	16378	5635	10.2
RM03-DWTR01-00	15978	4745	2.58
RM03-DWTR02-00	24524	8178	6.69
RM03-DWTR03-00	41483	14453	50.7
RM03-WRK01-00	15295	4815	2.7
RM03-WRK02-00	14067	4247	2.66
RM03-WRK03-00	24140	8430	20
RM03-WRK04-00	104266	40982	590
RM04-VENT01-00	13279	4256	1.1
RM04-VENT02-00	23252	8397	6.38
RM04-VENT03-00	97183	43463	111
RM-COR22-00	16809	5116	1.49
RM-COR23-00	20456	6117	5.77
RM-COR24-00	15050	4467	1.54
RM-COR25-00	17355	5326	2.13
RM-COR27-00	13996	3505	1.38
RM-COR28-00	17957	4808	1.99
RM-COR30-00	15436	4839	2.9
RM-COR31-00	17341	4884	3.42
RM-COR32-00	19368	5633	6.71
RM-COR35-00	15485	4998	1.5
RM-COR36-00	20280	6344	6.23
RM-COR37-00	16561	5087	7.5
RM-COR38-00	18409	5955	8.8
RM-COR39-00	18845	5761	3.19
RM-COR40-00	14482	4310	1.82
RM-COR46-00	20369	6292	5.57

removed two outlier samples (3 results failed test for 2 samples)

Outlier Tests for Selected Uncensored Variables
User Selected Options
Date/Time of Computation 4/21/2015 12:30

From File mancos less than 250 pcig.xls
Full Precision OFF

Rosner's Outlier Test for cpm (uncollimated)

Mean 33993
Standard Deviation 34742
Number of data 42
Number of suspected outliers 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Cr va	Critical value (1%)
1	33993	34326	171019	10	3.992	3	3

For 5% Significance Level, there is 1 Potential Outlier
Potential outliers is: 171019

For 1% Significance Level, there is 1 Potential Outlier
Potential outliers is: 171019

Rosner's Outlier Test for cpm (collimated)

Mean 13372
Standard Deviation 17306
Number of data 42
Number of suspected outliers 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Cr va	Critical value (1%)
1	13372	17099	89326	10	4.442	3	3

For 5% Significance Level, there is 1 Potential Outlier
Potential outliers is: 89326

For 1% Significance Level, there is 1 Potential Outlier
Potential outliers is: 89326

Rosner's Outlier Test for Ra-226 (pCi/g)

Mean 114.7
Standard Deviation 311.6
Number of data 42
Number of suspected outliers 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Cr va	Critical value (1%)
1	114.7	307.9	1680	1	5.084	3	3

For 5% Significance Level, there is 1 Potential Outlier
Potential outliers is: 1680

For 1% Significance Level, there is 1 Potential Outlier
Potential outliers is: 1680

Table 14. Mancos Shale Geology (Continued)
Ruby Mine Removal Site Evaluation Report - Correlation Statistics

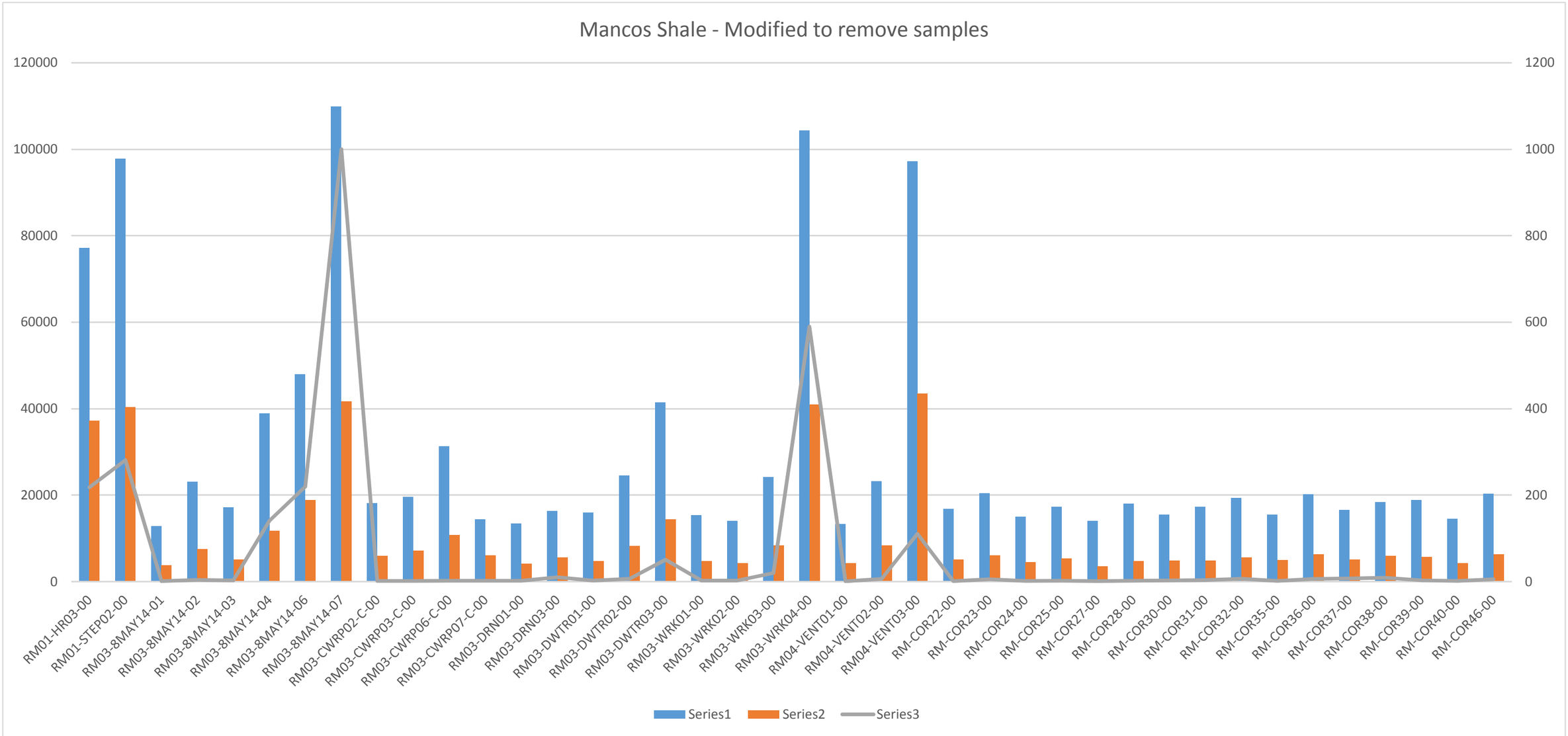


Table 14. Mancos Shale Geology (Continued)

Ruby Mine Removal Site Evaluation Report - Correlation Statistics

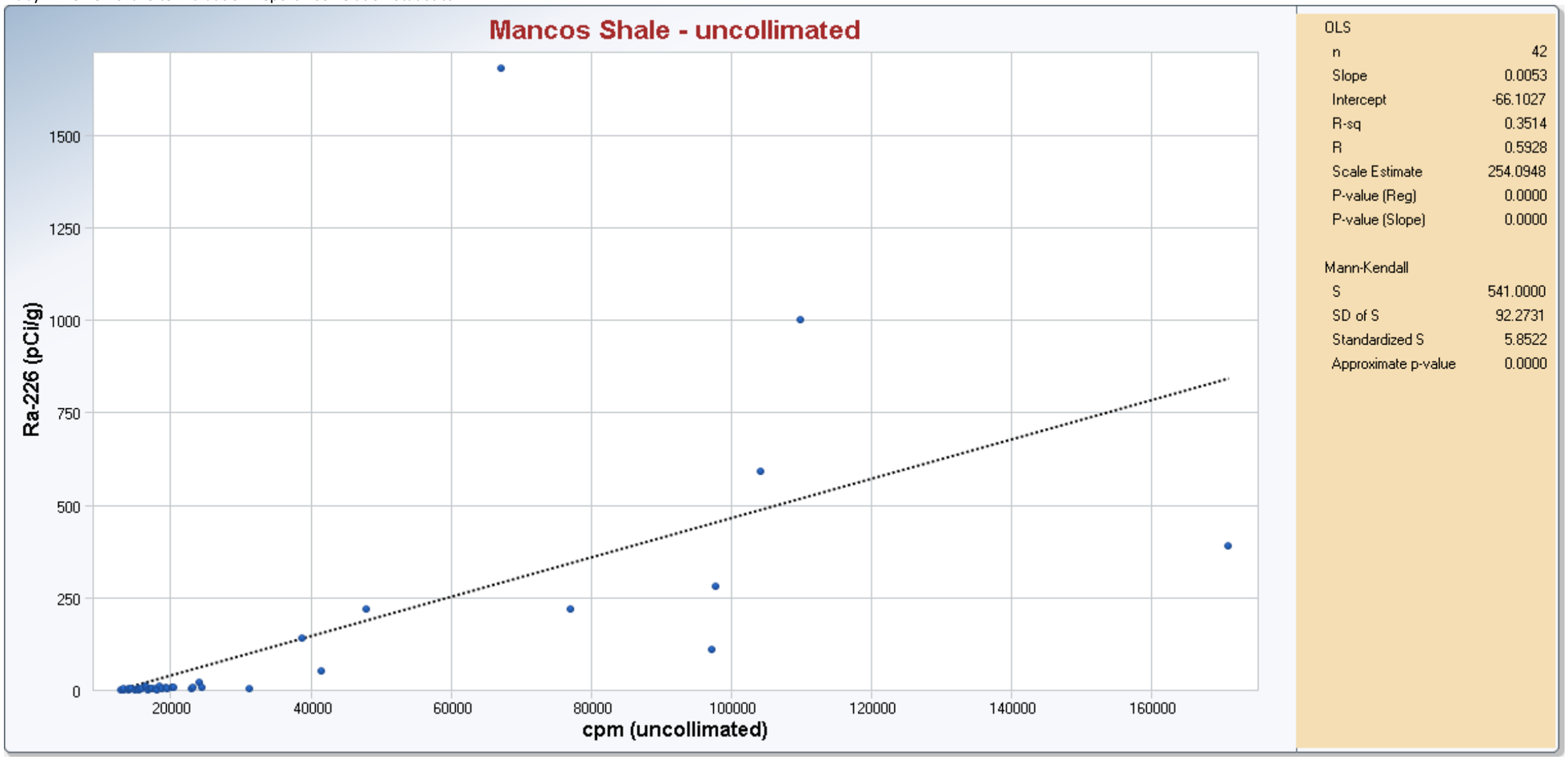


Table 14. Mancos Shale Geology (Continued)
Ruby Mine Removal Site Evaluation Report - Correlation Statistics

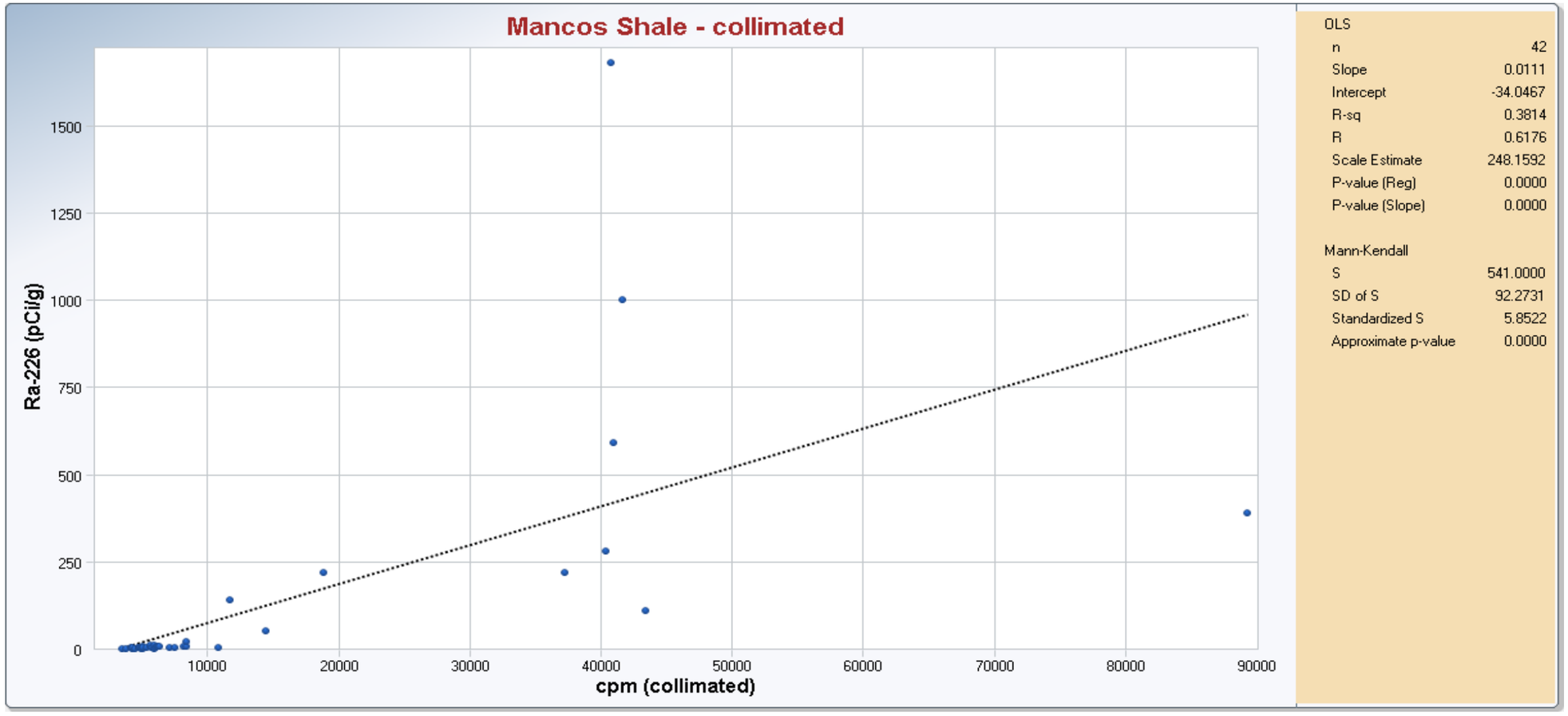


Table 14. Mancos Shale Geology (Continued)
Ruby Mine Removal Site Evaluation Report - Correlation Statistics

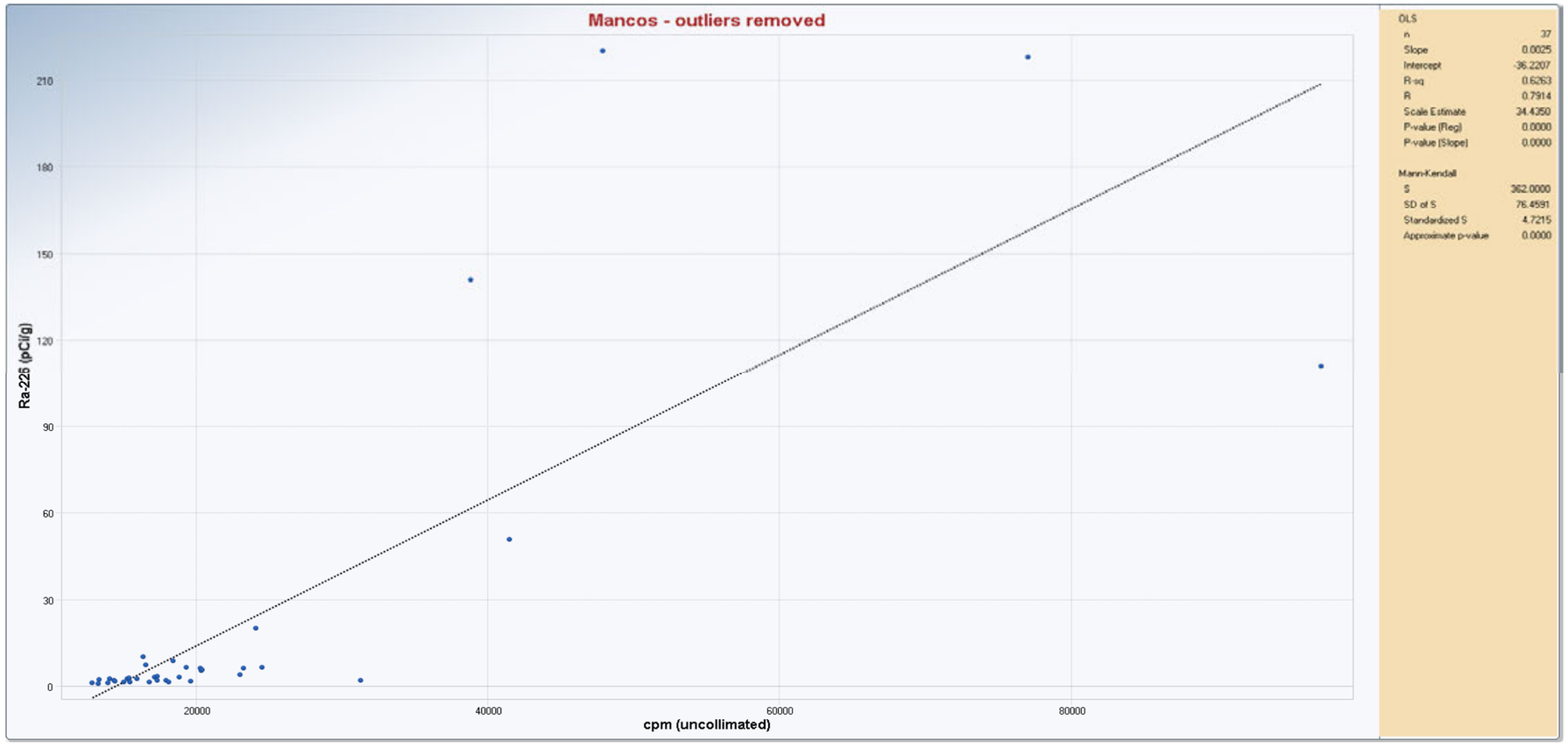


Table 14. Mancos Shale Geology (Continued)
Ruby Mine Removal Site Evaluation Report - Correlation Statistics