SWMU 15 - Precipitator Dust Burial Area

Table of Contents

List of Tables

List of Figures

List of Appendices

5.5.15 SWMU 15 – Precipitator Dust Burial Area

The location of Solid Waste Management Unit (SWMU) 15 is shown on Figure 5.5.15-1a and SWMU 15 monitoring stations and sample locations are provided on Figure 5.5.15-1b. SWMU 15, the Precipitator Dust Burial Area, is located north of the Coarse Slag Pile (SWMU 12) and west of the Buried Precipitator Dust Pans Area (SWMU16), and on both the east and west sides of the pond water return channel. The larger portion of SWMU 15 is located east of the channel. A small portion of SWMU 15 is located on the west side of the pond water return channel. Nearby groundwater monitoring wells include: MW-06-21, located to the northwest and MW-06-22; MW-97-7, located to the north; MW-01-4 and MW-01-5, located to the east; and MW-01-1, located to the southeast. Dust from the electrostatic precipitators, which were used to clean the furnace off-gas, was generated until early 1985 when the precipitators were shut down and removed from service. The precipitator dust that was generated during normal high temperature conditions did not contain elemental phosphorus and was sold as a product. Precipitator dust that was generated during start-ups and other lower temperature conditions may have contained elemental phosphorus. The dust that contained elemental phosphorus was buried on-site in the two areas shown on Figure 5.5.15-1b. According to Plant records, the burial areas (listed as Disposal Site No. 2 and No. 3 on the Engineering Drawings in Appendix 5.5.11-A), are approximately 310 feet by 290 feet (No. 2) and approximately 90 feet by 120 feet (No. 3). The burial areas were capped with a multi-layer system, illustrated in cross-section in Appendix 5.5.11-A as "No. 2, 3 4 Waste Burial Sites", and consisting of the following layers (from bottom to top):

1) 2 feet of graded and rolled clay fill
2) Graded granular slag layer
3) Synthetic membrane (BURKE #3200, 20 mil-EPO (Polyolefin))
4) 2 feet granulated slag
5) 2 feet clay fill – contoured for drainage

The multi-layer cap protects the buried material and minimizes infiltration of precipitation through the precipitator dust. Groundwater quality across the site is discussed in Section 5.3. It is noted that the effects of the Precipitator Dust Burial Area related to groundwater cannot be segregated from Tailing Basin (SWMU 1) impacts because this area was impacted by the process water released from the SWMU 1 during Plant operations.

5.5.15.1 Precipitator Dust Characteristics

Two samples of precipitator dust were collected on September 5, 1980 and were analyzed using the extraction procedure toxicity method (EPTOX). The analytical data are summarized in Table 5.5.15-

1. None of the metals exceeded the EPTOX regulatory level. These results indicate that the precipitator dust was not hazardous due to leachable metals. As noted above, the precipitator dust buried in SWMU 15 contains varying amounts of elemental phosphorus.

5.5.15.2 SWMU 15 Geophysical Investigation

A geophysical investigation associated with SWMU 16, Buried Precipitator Dust Pans Area, was extended across the SWMU 15 area. The purpose of the geophysical investigation was to evaluate whether precipitator dust pans were buried in the area north of the coarse slag pile, which included the SWMU 15 area. A total field magnetometer (Mag) survey and an electromagnetic (EM) survey were conducted on July 13, 2010. Complete details of the investigation and results are discussed in Section 5.5.16.

The geophysical investigation identified four anomalies as potential buried precipitator dust pans that are located within the mapped boundary of SWMU 15 (*see* Figure 5.5.15-2). Predicted depths of the four major anomalies are between 1.1 to 1.7 meters or deeper. All other anomalies were determined to be either non-ferrous or too small to be a response from a metallic object the size of a precipitator pan. The anomalies are located within the capped area of SWMU 15.

5.5.15.3 SWMU 15 Phosphine Gas Investigation and Results

This section summarizes the investigation and results of phosphine gas monitoring conducted at SWMU 15 during July 2010 and October 2012. The results of the July 2010 phosphine monitoring are summarized in the Technical Memorandum for the SWMU 15 Precipitator Dust Pan Area Phosphine Monitoring Report (Appendix 5.5.15-A), submitted to the EPA on August 17, 2010. This appendix also provides the weather conditions recorded at the Butte airport during this monitoring event.

The phosphine monitoring program for the precipitator dust burial area consisted of ambient air screening, grid-based screening, and installation of two semi-permanent monitoring points at locations that had consistent higher phosphine concentrations during the initial monitoring phase. The semi-permanent monitoring points were monitored on July 15, 17, 19, 2010. These locations were also monitored on October 18, 2012, and weather conditions recorded at the Butte airport during the monitoring event are provided in Appendix 5.5.15-B.

5.5.15.3.1 Breathing Zone and Ground Surface

Twenty-six stations were established on a grid spacing of approximately 90 feet as shown on Figure 5.5.15-1b. Four locations (PDBA-15 through PDBA-18) were located on the coarse slag pile and

therefore, were not installed. An additional seven locations (PDBA-1A through PDBA-7A) were monitored within the lined areas of the SWMU. At each station, the breathing zone (approximately 5-feet above ground surface) and ground surface (approximately 1/2- to 1-inch above ground) were monitored for phosphine gas. The results of the breathing zone and ground surface monitoring are summarized in Table 5.5.15-2. Phosphine was not detected in the breathing zone or at the ground surface at any of the twenty-two grid-based stations or at any of the seven locations within the lined areas during July 2010 monitoring event.

Phosphine was not detected in the breathing zone or at the ground surface at the semi-permanent monitoring locations during the October 2012 monitoring event.

5.5.15.3.2 Soil Gas

A soil gas probe was installed at each of the 22 grid stations located outside the coarse slag pile. The locations on the capped burial areas were not probed so as not to penetrate the synthetic liner. Twenty-seven probes were driven to the depths shown in Table 5.5.15-2 by Geoprobe equipment at twenty-two locations. Five stations within the precipitator dust burial area were monitored at two discrete depth intervals. At each station, the expendable steel point was disengaged from the post-run tubing (PRT) expendable point holder attached to the bottom of the drive rods by inserting center rods fitted with a post-run "point popper" tool to hold the expendable point in place while pulling up on the drive rod. At each monitoring station, new Teflon tubing was attached to the PRT adaptor's barbed end and secured with a short length of electrical tape to prevent the PRT adaptor from spinning in the Teflon tubing as it was threaded into the PRT expendable point holder. The short length of electrical tape was applied to the outside of the Teflon tubing and PRT adaptor and did not come into contact with the soil gas sample. Prior to extracting the soil gas sample for field screening, a thick bentonite slurry was placed around the drive rods as a surface seal. The soil gas was extracted from the ground at a rate of approximately 0.75 liters per minute by a pump (manufactured by SKC, Inc.) and conveyed to the phosphine monitor (PAC III). The soil gas was contained in a tedlar bag after passing over the phosphine monitor. The system setup was the same as that used at SWMU 11, the Crude Phosphorus Burial Area, and described in Section 5.5.11.1.2.

The pump was not able to extract soil gas at a few locations around the precipitator dust burial areas due to the characteristics of the silty clay soils. At these locations, the probe was pulled up a few inches and another attempt was made to extract soil gas. The depth of each point is identified in Table 5.5.15-2. Upon completion of soil gas field screening, the drive rods were removed and the resulting borehole was sealed with bentonite.

The results of the soil gas monitoring program are summarized in Table 5.5.15-2, and are depicted on Figure 5.5.15-3. None of the phosphine concentrations exceeded the measuring range of the monitoring system [i.e., 20 parts per million by volume (ppmv)]. Therefore, soil gas monitoring using an instrument with a higher measuring range was not required.

The soil gas concentrations recorded for stations installed around the precipitator dust burial area fell into one of three categories:

- Not detected[1] (i.e., $\leq$ 0.02 ppmv) – 7 of 27 probes
- Trace concentration (i.e., > 0.02 and $\leq$ 0.05 ppmv) – 5 of 27 probes
- Above reference area concentration[2] (> 0.05 ppmv) – 15 of 27 probes.

Four stations in the precipitator dust burial area were monitored at two discrete intervals [1.5 feet and 6 feet below ground surface (bgs)]. The concentrations at the discrete intervals are presented in the following table as well as Table 5.5.15-2:

Station ID	PH3 concentration [ppmv]	
	(1.5 ft bgs)	(6 ft bgs)
PDBA-10	0.18	0.03
PDBA-12	0.11	0.10
PDBA-21	0.07	0.03
PDBA-23	0.46	0.07

Relatively consistent phosphine concentrations were recorded at both depths monitored at one station (PDBA-12). The other three stations had distinctly lower phosphine concentrations at the 6 foot monitoring probe than at the 1.5 foot probe.

Station PDBA-1 was monitored at 1.5 feet and 8 feet bgs due to approximately 6 feet of coarse slag fill present at the station.

[1] Detection limit based on instrument literature.

[2] *See* Section 5.5.11 for a discussion of the reference area phosphine monitoring program.

Station ID	PH3 concentration [ppmv]	
	(1.5 ft bgs)	(8 ft bgs)
PDBA-1	ND	0.02

The non-detect (ND) concentration for station PDBA-1 (1.5 ft) is representative of phosphine concentrations present in the coarse slag fill at that location indicating that the slag layer is not accumulating phosphine. Based on the estimated 6 feet of coarse slag fill, the station PDBA-1 (8 ft) is likely more representative of the 1.5 foot interval below the original cover surface at this location.

The reproducibility of a higher phosphine concentration was also evaluated. A second soil gas probe was installed approximately 2 feet away from the initial probe at station PDBA-5. The resulting data presented below shows a relatively consistent phosphine concentration.

Station ID	Depth	PH3 concentration [ppmv]	
		Initial	Replicate
PDBA-5	1.5 ft	0.81	0.89

Because of the relatively consistent higher phosphine concentrations at this location, a semi-permanent soil gas monitoring point was installed on July 15, 2010 at PDBA-5 station for additional monitoring. Station PDBA-13 was also selected for the installation of a semi-permanent soil gas monitoring location (also installed on July 15, 2010) because this location had the highest phosphine concentration (0.45 ppmv) at the east area (Table 5.5.15-2).

The semi-permanent points were installed using Geoprobe equipment and consisted of a six-inch long stainless steel screen, new Teflon tubing, glass bead filter pack, a glass bead and bentonite mixture for grouting the annular space, and a 4-inch diameter PVC pipe for surface protection. First, the 4-inch diameter PVC surface protection pipe was pushed approximately 10 inches into the ground with the Geoprobe machine. An expendable steel point fitted with female threads was then driven through the center of the PVC pipe to the design depth of 20-inches bgs using Geoprobe 1.25-inch drive rods. The expendable point was disengaged from the soil gas expendable point holder attached to the bottom of the drive rods by inserting center rods to hold the expendable point in place while pulling up on the drive rod. New Teflon tubing was attached to a barbed fitting on the top of the six inch long stainless steel screen and lowered into the drive rods. Male threads on the bottom of the screen were then engaged into the female threads in the expendable point by rotating the tubing and screen assembly in a counter clockwise direction. A premeasured volume of very fine glass beads

(used as the screen filter pack material) were funneled into the drive rods as they were retracted. Upon completion of the glass bead packing of the 14 – 20 inch bgs screened interval, powdered bentonite mixed with glass beads (to enhance flow through the drive rods) was funneled into the drive rods to seal the annular space as the rods were retracted to the surface. The exposed end of the Teflon tubing was then sealed from the atmosphere with a vinyl cap and the excess tubing was coiled and placed inside the 4-inch PVC pipe. The PVC protector pipe sticks up above the ground surface approximately 2 feet and is covered with an overlapping slip cap.

The semi-permanent points were monitored on July 15, 17 and 19, 2010, and again on October 18, 2012. The monitoring results are summarized below:

Semi-permanent Soil Gas Monitoring Station ID	PH3 concentration [ppmv]				
	7/15/2010	7/15/2010	7/17/2010	7/19/2010	10/18/2012
PDBA-5 (14 – 20 inches bgs)	0.11 – 0.12 (10 minutes after installation)	0.35 (4.5 hours after installation)	ND	ND	ND
PDBA-13 (14 – 20 inches bgs)	3.0 (1 hour after installation)	4.3 (4.5 hours after installation)	ND	ND	ND

ND – not detected at the literature-based, instrument detection limit of 0.02 ppmv.

Initial monitoring of the semi-permanent points the day of construction resulted in lower observed concentrations compared to the initial concentrations measured at PDBA-5 (1.5 ft bgs). Phosphine concentrations an order of magnitude higher than the initial concentration measured at PDBA-13 (1.5 ft bgs) were recorded the day of construction. However, the concentrations displayed by the PAC III slowly climbed over 10 to 20 minutes of pumping. In addition to the slow rise in concentrations, the PAC III monitor was slow (30 to 40 minutes) to return to zero once pumping ceased and the monitor was disconnected from the sampling train. Comparatively, PAC III monitors calibrated with 5 ppmv phosphine span gas generally stabilize around the 5 ppmv concentration in 2 to 5 minutes and generally return to zero within 1 to 2 minutes of being disconnected from the span gas.

No phosphine was detected in either PDBA-5 or PDBA-13 during the subsequent monitoring events conducted two and four days after the semi-permanent points were constructed in 2010. No phosphine was detected in either PDBA-5 or PDBA-13 during the follow-up monitoring event in October 2012. The PAC III monitor was calibrated at least daily during this soil gas monitoring program.

Soil gas monitoring points PDBA-5 and PDBA-13 remain in place. Annual soil gas monitoring will be conducted at these two locations concurrent with future groundwater monitoring events. The Long Term Groundwater Monitoring Plan will be developed in 2013.

5.5.15.4 Conclusions

The results of the phosphine monitoring program indicate that phosphine gas is not being released to the atmosphere, as discussed below:

- Phosphine is not detected in the air at a height of approximately 5 feet (typical breathing zone height).
- Phosphine is not detected in the air at the ground surface (1/2-inch to 1-inch above ground surface).
- Phosphine was not detected (or detected at reference area concentrations) in soil gas at 12 of 27 probes.
- Phosphine is present in the soil gas at some locations in the precipitator dust burial area, but the concentrations are very low, and do not result in detectable concentrations above the ground surface. The phosphine concentrations detected in the soil gas below grade are generally two orders of magnitude below the concentration considered immediately dangerous to life and health (IDLH) at 50 ppmv, and below the short-term exposure level (STEL) at 1.0 ppmv in all but one below grade location.
- The screening level phosphine monitoring program demonstrates that phosphine is not being released to the atmosphere at detectable concentrations. Low concentrations of phosphine may be present in the soil gas in the immediate area, but these below grade concentrations are not consequential to above grade inhalation exposure. Phosphine concentrations are orders of magnitude below IDLH conditions and generally below the occupational short-term exposure levels. As such, there is sufficient information to conduct risk assessments for this SWMU.
- The geophysical investigation identified four anomalies as potential buried precipitator dust pans that are located within the capped area of SWMU 15. Predicted depths of the four major anomalies are between 1.1 to 1.7 meters or deeper. All other anomalies were determined to be either non-ferrous or too small to be a response from a metallic object the size of a precipitator pan. The buried precipitator dust pans may contain precipitator dust that

contains elemental phosphorus (i.e., the same material that is buried in SWMU 15) and as such, does not represent a different material. Therefore, there is no need for further evaluation of the anomalies identified in SWMU 15.

- This SWMU contains buried elemental phosphorus. A health and safety plan is required during any intrusive activities in this SWMU and includes phosphine monitoring and appropriate safeguards for worker protection.

There is sufficient information to conduct the risk assessment for this SWMU. The risk assessment will identify which parameters, if any, are present at concentrations that warrant corrective measures. The dataset would be reviewed at that time and additional sampling may be necessary to inform the corrective measures study or later during the corrective measures design phase.

Tables

Table 5.5.15-1

Precipitator Dust Data - EPTOX Metals
SWMU 15
Rhodia Silver Bow Plant

Station ID		Precip Dust		Precip Dust	
Sample Date		9/5/1980		9/5/1980	
Sample ID		Idaho Precip. D		MT Precip. Dust	
Lab Name		Ford		Ford	
Lab ID	EPTOX Regulatory	80-002476		80-002477	
Report	Level	Material Charac		Material Charac	
Arsenic, EPTOX	5.0 mg/l	0.017	mg/l	0.022	mg/l
Barium, EPTOX	100.0 mg/l	2.36	mg/l	1.145	mg/l
Cadmium, EPTOX	1.0 mg/l	0.275	mg/l	0.31	mg/l
Chromium, EPTOX	5.0 mg/l	0.15	mg/l	0.12	mg/l
Lead, EPTOX	5.0 mg/l	0.011	mg/l	0.02	mg/l
Mercury, EPTOX	0.2 mg/l	0.004	mg/l	0.005	mg/l
Selenium, EPTOX	1.0 mg/l	0.009	mg/l	0.005	mg/l
Silver, EPTOX	5.0 mg/l	0.024	mg/l	0.015	mg/l

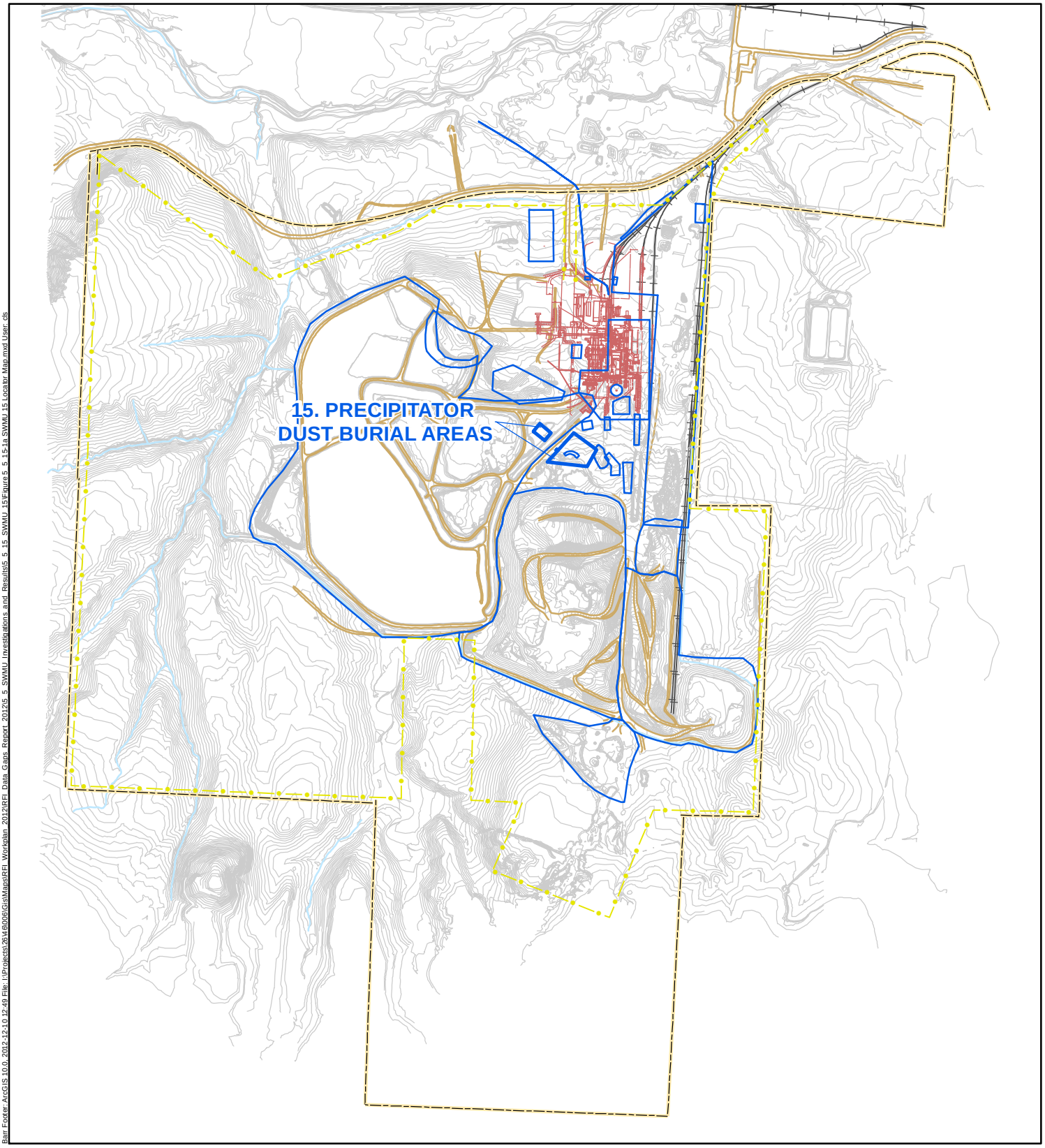
Table 5.5.15-2

Phosphine Gas Monitoring Data
SWMU 15
Rhodia Silver Bow Plant

	Breathing Zone	Ground Surface	Soil Gas	
StationID	PH3 [ppmv]	PH3 [ppmv]	Depth	PH3 [ppmv]
July 2010 SWMU 15 Monitoring Locations - (See Figure 5.5.15-1)				
PDBA-1	ND	ND	1.5 ft	ND
			8 ft	0.02
PDBA-1A	ND	ND	Liner	
PDBA-2	ND	ND	1.5 ft	0.08
PDBA-2A	ND	ND	Liner	
PDBA-3	ND	ND	1.5 ft	0.03
PDBA-3A	ND	ND	Liner	
PDBA-4	ND	ND	1.5 ft	0.22
PDBA-4A	ND	ND	Liner	
PDBA-5	ND	ND	1.5 ft	0.81
			1.5 ft	0.89
PDBA-5A	ND	ND	Liner	
PDBA-6	ND	ND	1.2 ft	ND
PDBA-6A	ND	ND	Liner	
PDBA-7	ND	ND	1.5 ft	0.02
PDBA-7A	ND	ND	Liner	
PDBA-8	ND	ND	1.5 ft	0.34
PDBA-9	ND	ND	1.5 ft	0.05
PDBA-10	ND	ND	1.5 ft	0.18
			6 ft	0.03
PDBA-11	ND	ND	1.5 ft	0.07
PDBA-12	ND	ND	1.5 ft	0.11
			6 ft	0.10
PDBA-13	ND	ND	1.5 ft	0.45
PDBA-14	ND	ND	1.5 ft	0.26
PDBA-15	Slag Pile			
PDBA-16	Slag Pile			
PDBA-17	Slag Pile			
PDBA-18	Slag Pile			
PDBA-19	ND	ND	1.5 ft	0.04
PDBA-20	ND	ND	1.5 ft	ND
PDBA-21	ND	ND	1.5 ft	0.07
			6 ft	0.03
PDBA-22	ND	ND	1.5 ft	0.07
PDBA-23	ND	ND	1.5 ft	0.46
			6 ft	0.07
PDBA-24	ND	ND	1.5 ft	0.02
PDBA-25	ND	ND	1.5 ft	0.15
PDBA-26	ND	ND	1 ft	0.02
October 2009 Reference Stations - (See Figure 5.5.11-2)				
REF-1	ND	ND	1.5 ft	0.05
REF-2	ND	ND	1.5 ft	ND
REF-3	ND	ND	1.5 ft	0.02
REF-4	ND	ND	1.5 ft	ND
REF-5	ND	ND	4 ft	ND
REF-6	ND	ND	1.5 ft	ND
October 2012 SWMU 15 Semi-Permanent Monitoring Stations (See Figure 5.5.15-3)				
PDBA-5	ND	ND	1.2-1.7 ft	ND
PDBA-13	ND	ND	1.2-1.7 ft	ND

ND - not detected at detection limit of 0.02 ppmv (based on sensor literature).
Reference area concentration = 0.05 ppmv (maximum)

Figures



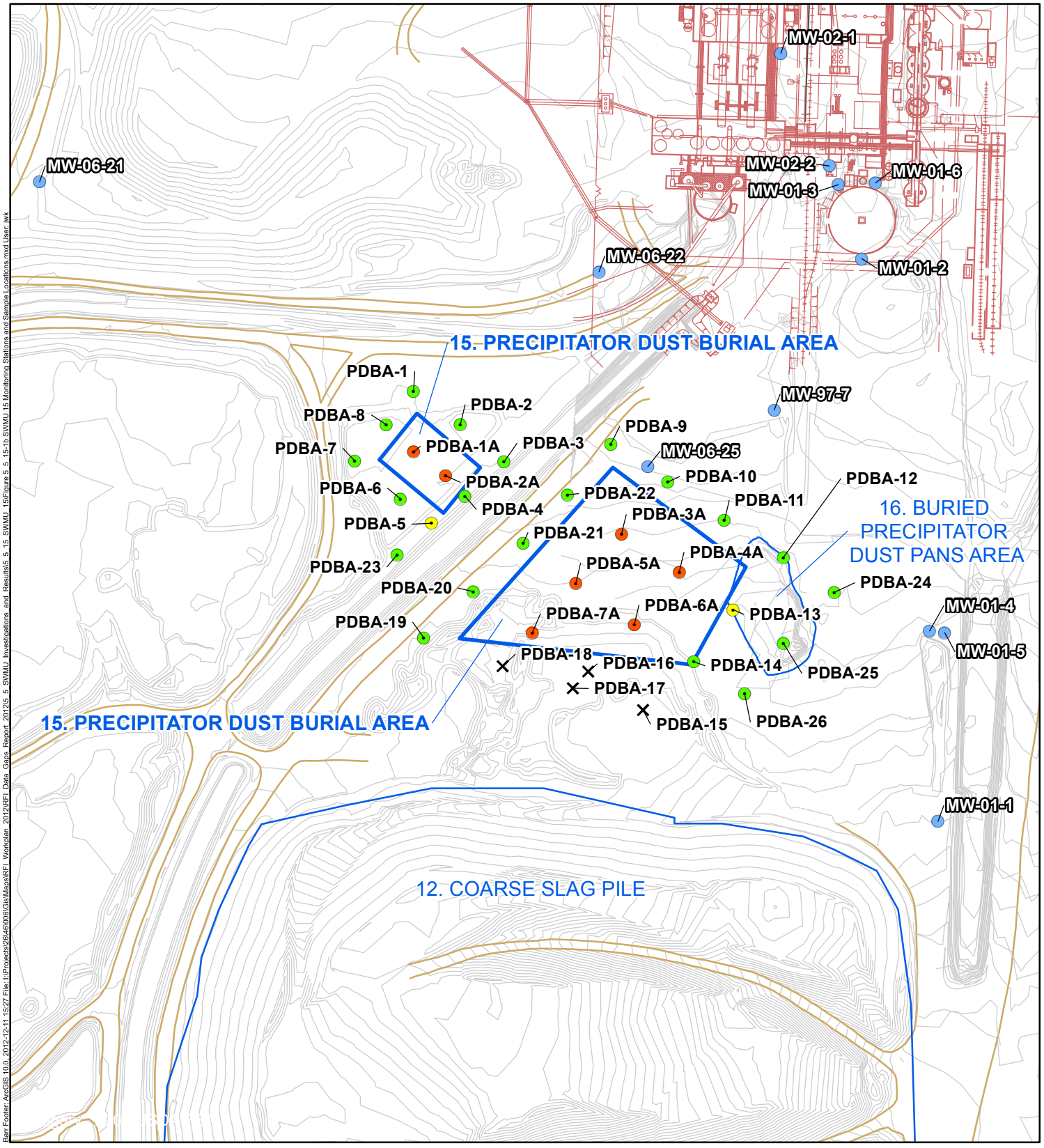
SWMU 15
Other SWMUs
Elevation Contour
Drainage
Railroad
Road
Former Plant Structures
Property Boundary
Fence Line

N

Feet
1,000 0 1,000

Figure 5.5.15-1a

SWMU 15 LOCATION
Rhodia Silver Bow Plant
Montana



Breathing Zone and Ground Surface Location (Liner Present)

Breathing Zone, Ground Surface, Soil Gas, and Semi-Permanent Soil Gas Monitoring Station

Breathing Zone, Ground Surface, and Soil Gas Location

Soil Gas Location on Slag Pile and Soil Gas Probe Not Installed

Monitoring Well

SWMU 15

Other SWMUs

Elevation Contour

Drainage

Railroad

Road

Former Plant Structures

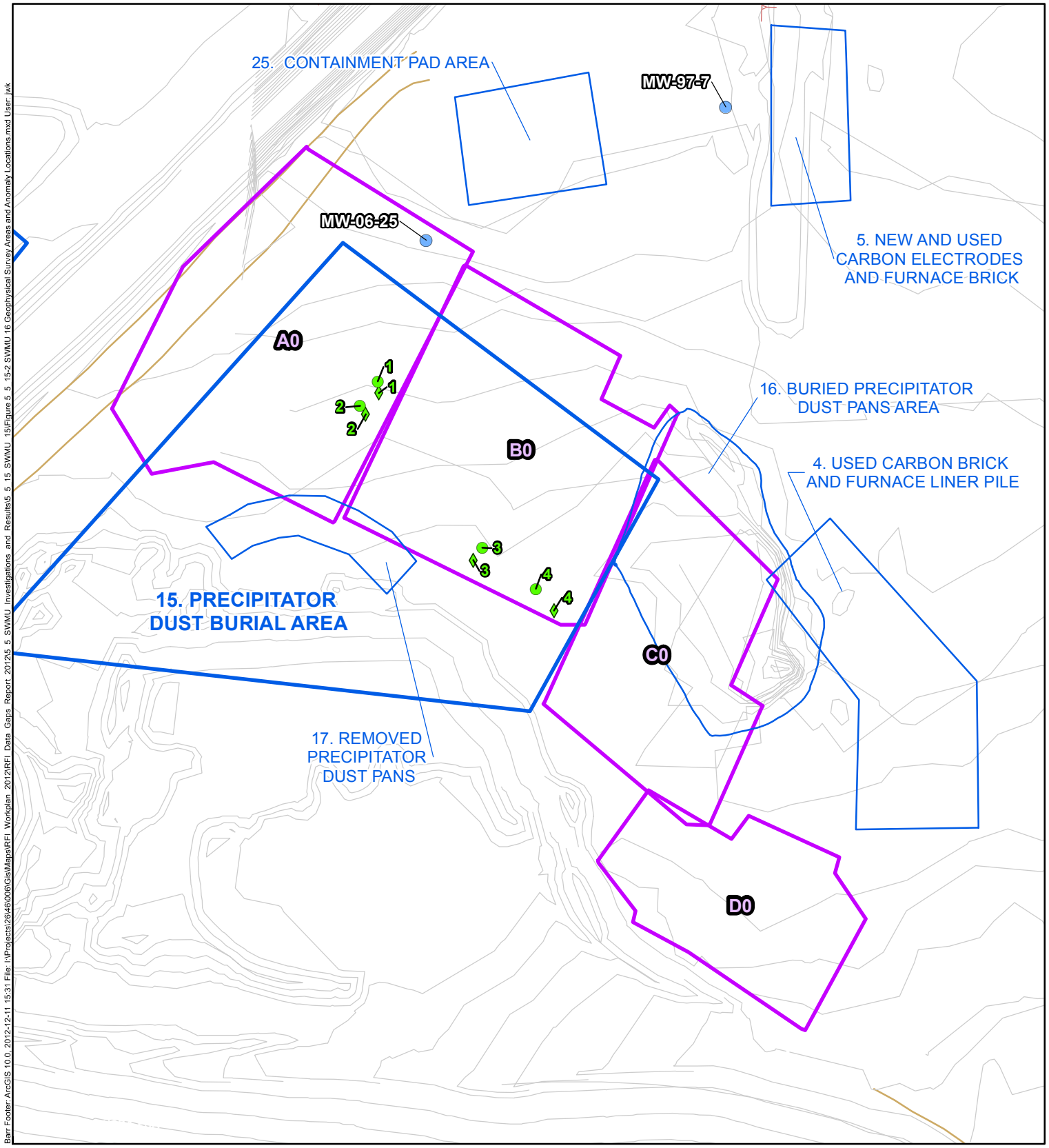
N

Feet

200 0 200

Figure 5.5.15-1b

SWMU 15
MONITORING STATIONS
AND SAMPLE LOCATIONS
Rhodia Silver Bow Plant
Montana



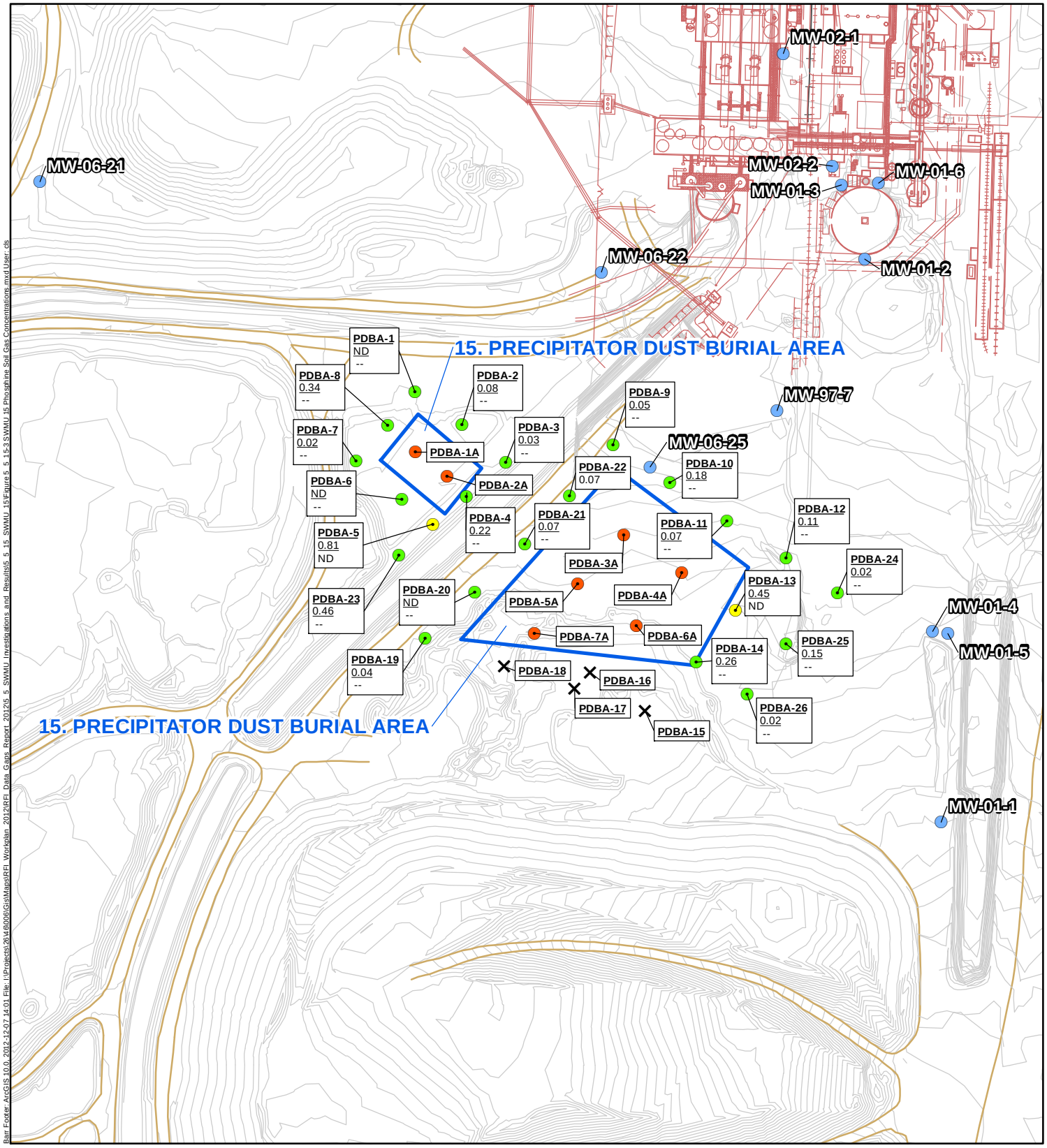
Electromagnetic Anomaly Location
Magnetic Anomaly Location
Monitoring Well
SWMU 15
Other SWMUs
Geolex Geophysical Survey Area
Elevation Contour
Drainage
Railroad
Road
Former Plant Structures

N

Feet
75 0 75

Figure 5.5.15-2

SWMU 15
GEOPHYSICAL SURVEY AREAS AND ANOMALY LOCATIONS
Rhodia Silver Bow Plant
Montana



Breathing Zone and Ground Surface Location (Liner Present)

Breathing Zone, Ground Surface, Soil Gas, and Semi-Permanent Soil Gas Monitoring Station

Breathing Zone, Ground Surface, and Soil Gas Location

Soil Gas Location on Slag Pile and Soil Gas Probe Not Installed

0.04 2010 Measured Phosphine Soil Gas Concentration (ppmv)

ND 2012 Measured Phosphine Soil Gas Concentration (ppmv)

ND Not Detected at the Instrument Detection Limit

-- No Data Collected

Monitoring Well

Solid Waste Management Unit

Elevation Contour

Drainage

Railroad

Road

Former Plant Structures

N

Feet

200 0 200

Figure 5.5.15-3

SWMU 15 PHOSPHINE GAS CONCENTRATION
Rhodia Silver Bow Plant
Montana

Where data was collected from sampled location at multiple depths, only shallow data is provided on figure.

Breathing zone and ground surface soil monitoring was non-detect at all monitored locations.

Appendices

Appendix 5.5.15-A

Technical Memorandum, SWMU 15 – Precipitator Dust Pan Area – Phosphine Monitoring Report

Memorandum

To: Sara Sparks (U.S. EPA) & Rebecca Holmes (Mt DEQ)
From: Kevin McGilp/Tom Mattison
Subject: SWMU 15 - Precipitator Dust Burial Area - Phosphine Monitoring Report
Date: August 17, 2010
Project: 26/46-0006.16 PHOS 100
c: Dan Bersanti, Cam Balentine, Ken Kastner, Cathy Laughner

This technical memorandum summarizes the results of the phosphine monitoring conducted at SWMU #15 – Precipitator Dust Burial Areas between July 13 and 19, 2010. The plan for phosphine monitoring was provided in the June 22, 2010 Technical Memorandum, Crude Phosphorus Burial Area – Phosphine Monitoring Report. The same techniques as outlined in the Crude Phosphorus Burial Area – Phosphine Monitoring Work Plan (Appendix N of the Phase 1 RFI Work Plan dated March 25, 2009) were used at the Precipitator Dust Burial Areas.

Dust from the electrostatic precipitators, which were used to clean the furnace off-gas, was generated until early 1985 when the precipitators were shut down and removed from service. The precipitator dust that was generated during normal high temperature conditions did not contain elemental phosphorus and was sold as a product. Precipitator dust that was generated during start-ups and other lower temperature conditions could have contained elemental phosphorus. The dust was buried onsite at 2 locations as shown on Figure 1. According to Plant records, the west burial area is approximately 90 feet by 120 feet, and the east burial area is approximately 310 feet by 290 feet. The burial areas were closed in the late 1970s and capped with a multi-layer system consisting of the following layers (from bottom to top)::

1) 2 feet of graded and rolled clay fill
2) Graded granular slag layer
3) Synthetic membrane (BURKE #3200, 20 mil-EPO (Polyolefin))
4) 2 feet granulated slag
5) 2 feet clay fill – contoured for drainage
6) Coarse slag

The phosphine monitoring program for the precipitator dust burial area consisted of ambient air screening, and grid-based screening. First, the phosphine concentration in the breathing zone was monitored while walking across the capped precipitator dust burial areas. Twenty six stations were

established on a grid spacing of approximately 90 feet as shown on Figure 2. Four locations (PDBA-15 through PDBA-18) were located on the coarse slag pile and therefore were not installed. Five stations in the precipitator dust burial area were monitored at two discrete depth intervals for a total of 27 monitored soil gas stations.

At each station, the breathing zone (approximately 5-feet above ground surface) and ground surface (approximately 1/2- to 1-inch above ground) were monitored for phosphine and the results recorded. A soil gas probe was installed at each location that was not located on a capped burial area so as not to penetrate the synthetic liner. The soil gas probe was driven to depth (either 1.5 or 6 feet unless otherwise noted) by Geoprobe equipment. An expendable steel point was disengaged from the post-run tubing (PRT) expendable point holder attached to the bottom of the drive rods by inserting center rods fitted with a post-run "point popper" tool to hold the expendable point in place while pulling up on the drive rod. At each monitoring station, new Teflon tubing was attached to the PRT adaptor's barbed end and secured with a short length of electrical tape to prevent the PRT adaptor from spinning in the Teflon tubing as it was threaded into the PRT expendable point holder. The short length of electrical tape was applied to the outside of the Teflon tubing and PRT adaptor and did not come into contact with the soil gas sample. Prior to extracting the soil gas sample for field screening, a thick bentonite slurry was placed around the drive rods as a surface seal. The soil gas was extracted from the ground at a rate of approximately 0.75 liters per minute by a SKC pump and conveyed to the phosphine monitor (PAC III). The soil gas was contained in a tedlar bag after passing over the phosphine monitor.

The pump was not able to extract soil gas at a few locations around the precipitator dust burial areas due to the characteristics of the silty clay soils. At these locations, the probe was pulled up a few inches and another attempt was made to extract soil gas. The depth of each point is identified in the station identifier (Table 1). Upon completion of soil gas field screening, the drive rods were removed and the resulting borehole was permanently sealed with bentonite.

Semi-permanent screened soil gas monitoring points were installed at station 5 and 13 (Figure 2) at the precipitator dust burial area for additional monitoring. The semi-permanent points were installed by Geoprobe equipment and consisted of a six-inch long stainless steel screen, new Teflon tubing, glass bead filter pack, a glass bead and bentonite mixture for grouting of the annular space, and a 4-inch diameter

PVC pipe for surface protection. First, the 4-inch diameter PVC surface protection pipe was pushed approximately 10 inches into the ground with the Geoprobe machine. A expendable steel point fitted with female threads was then driven through the center of the PVC pipe to the design depth of 20-inches below ground surface using Geoprobe 1.25" drive rods. The expendable point was disengaged from the soil gas expendable point holder attached to the bottom of the drive rods by inserting center rods to hold the expendable point in place while pulling up on the drive rod. New Teflon tubing was attached to a barbed fitting on the top of the six inch long stainless steel screen and lowered into the drive rods. Male threads on the bottom of the screen were then engaged into the female threads in the expendable point by rotating the tubing and screen assembly in a counter clockwise direction. A premeasured volume of very fine glass beads (used as the screen filter pack material) were funneled into the drive rods as they were retracted. Upon completion of the glass bead packing of the 14 – 20 inch bgs screened interval, powdered bentonite mixed with glass beads (to enhance flow through the drive rods) were funneled into the drive rods to seal the annular space as the rods are retracted to the surface. The exposed end of the Teflon tubing was then sealed from the atmosphere with a vinyl cap and the excess tubing was coiled and placed inside the 4-inch PVC pipe. The PVC protector pipe sticks up above the ground surface approximately 2 feet and is covered with an overlapping slip cap.

Weather Conditions

Weather conditions were obtained from the weather underground website (www.wunderground.com) for the Butte airport. The hourly observations are provided in Attachment A, and the daily conditions are summarized below:

Condition	7/13/2010	7/14/2010	7/15/2010	7/17/2010	7/19/2010
Mean Temperature	56 °F	56 °F	62 °F	65 °F	60 °F
Average Humidity	31 %	49 %	50 %	45 %	40 %
Precipitation	0.00 in	0.00 in	0.00 in	0.00 in	0.00 in
Barometric Pressure	29.78 in Hg	30.10 in Hg	30.10 in Hg	29.96 in Hg	29.95 in Hg
Wind Speed	13 mph (NW)	5 mph (NNW)	5 mph (SW)	6 mph (NNW)	5 mph (ESE)

Phosphine Monitoring Reference Stations

During the 2009 crude phosphorus burial area phosphine monitoring program, six soil gas probes were installed in areas where elemental phosphorus was not managed to evaluate the sensitivity of the monitoring equipment. Three soil gas probes were installed in the raw materials area (near station RM-2-7) and three soil probes were installed in the natural area located south of the coarse slag pile. Stable phosphine concentrations were reported in 2 of the 6 reference stations at a concentration as high as 0.05 ppmv. Additional discussion is provided in the June 22, 2010 technical memorandum prepared for the Crude Phosphorus Burial Area. The phosphine reference values developed during the 2009 monitoring event are presented in Table 1 and are used in this report for comparative purposes.

Phosphine Monitoring Results

The phosphine monitoring results for the precipitator dust burial areas are summarized in Table 1, and are depicted on Figure 3. Phosphine was not detected during the initial walk across the precipitator dust burial areas. In addition, phosphine was not detected in the breathing zone or at the ground surface at any of the 22 installed grid-based stations. The detection limit is 0.02 ppmv based on the sensor literature. None of the phosphine concentrations exceeded the measuring range of the monitoring system. Therefore, soil gas monitoring using an instrument with a higher measuring range is not required.

The soil gas concentrations recorded for stations installed around the precipitator dust burial area fell into one of three categories:

- Not detected[1] (i.e., $\leq$ 0.02 ppmv) – 7 of 27 stations
- Trace concentration (i.e., $\leq$ 0.05 ppmv) – 5 of 27 stations
- Above reference area concentration (> 0.05 ppmv) – 15 of 27 stations.

Four stations in the precipitator dust burial area were monitored at two discrete intervals (1.5 feet and 6 feet bgs). The concentrations at the discrete intervals are presented in the following Table:

[1] Detection limit based on instrument literature.

Station ID	PH3 concentration [ppmv]	
	(1.5 ft)	(6 ft)
PDBA-10	0.18	0.03
PDBA-12	0.11	0.10
PDBA-21	0.07	0.03
PDBA-23	0.46	0.07

Relatively consistent phosphine concentrations were recorded at both depths monitored at one station (PDBA-12). All other stations had lower phosphine concentrations at the 6 foot monitoring interval.

Station PDBA-1 was monitored at 1.5 feet and 8 feet bgs due to approximately 6 feet of coarse slag fill present at the station.

Station ID	PH3 concentration [ppmv]	
	(1.5 ft)	(8 ft)
PDBA-1	ND	0.02

The non-detect (ND) concentration for station PDBA-1 (1.5 ft) is representative of phosphine concentrations present in the coarse slag fill at that location. Based on the estimated 6 feet of coarse slag fill, the station (PDBA-1 (8 ft) is likely more representative of the 1.5 foot interval below the original cover surface at this location.

The reproducibility of a higher phosphine concentration was also evaluated. A second soil gas probe was installed approximately 2 feet from the initial probe at station PDBA-5. The resulting data presented below shows a relatively consistent phosphine concentration.

Station ID	PH3 concentration [ppmv]	
	Initial	Replicate
PDBA-5 (1.5 ft)	0.81	0.89

Because of the relatively consistent higher phosphine concentration, a semi-permanent soil gas monitoring point was installed on July 15, 2010 at PDBA-5 station for additional monitoring. Station PDBA-13 was also selected for the installation of a semi-permanent soil gas monitoring location (also installed on July 15, 2010) due to this location having the highest phosphine concentration (0.45 ppmv) at the east area (Table 1). The resulting data for the additional monitoring conducted at stations PDBA-5 and PDBA-13 are summarized in the following table:

Semi-permanent Soil Gas Monitoring Station ID	PH3 concentration [ppmv]			
	7/15/2010	7/15/2010	7/17/2010	7/19/2010
PDBA-5 (14 – 20 inches)	0.11 – 0.12 (10 minutes after installation)	0.35 (4.5 hours after installation)	ND	ND
PDBA-13 (14 – 20 inches)	3.0 (1 hour after installation)	4.3 (4.5 hours after installation)	ND	ND

Initial monitoring of the semi-permanent points the day of construction resulted in lower observed concentrations compared to the initial concentrations measured at PDBA-5 (1.5 ft). Phosphine concentrations an order of magnitude higher than the initial concentration measured at PDBA-13 (1.5 ft) were recorded the day of construction. However, the concentrations displayed by the PAC III slowly climbed over 10 to 20 minutes of pumping. In addition to the slow rise in concentrations, the PAC III monitor was slow (30 to 40 minutes) to return to zero once pumping ceased and the monitor was disconnected from the sampling train. Comparatively, PAC III monitors calibrated with 5 ppmv phosphine span gas generally stabilize around the 5 ppmv concentration in 2 to 5 minutes and generally return to zero within 1 to 2 minutes of being disconnected from the span gas.

No phosphine was detected in either PDBA-5 or PDBA-13 during the monitoring events conducted two and four days after the semi-permanent points were constructed.

Conclusions

The following conclusions were developed based on the results of the July 2010 phosphine monitoring program conducted at SWMU #15 – Precipitator Dust Burial Area:

- Phosphine is not detected in the air at a height of approximately 5 feet (typical breathing zone height).

- Phosphine is not detected in the air at the ground surface (1/2-inch to 1-inch above ground surface).

- Phosphine was not detected (or detected at reference area concentrations) in 12 of 27 stations.

- Phosphine may be present in the soil gas at the precipitator dust burial area, but the concentrations are very low, and do not result in detectable concentrations above the ground surface. The phosphine concentrations detected in the soil gas are generally two orders of magnitude below the concentration considered immediately dangerous to life or health (IDLH) at 50 ppmv.

- The stations with the higher phosphine concentrations were at a depth of 1.5 feet below ground surface.

- Phosphine was not detected in the semi-permanent soil gas monitoring points installed at stations PDBA-5 and PDBA-13 after the day of construction.

- Typical phosphine concentrations detected in the soil gas were below the occupational short-term exposure level (STEL) of 1.0 ppmv (STEL). The initial phosphine concentration at the semi-permanent point at PDBA-13 was not found during follow-up monitoring conducted 2 and 4 days after installation.

The screening level phosphine monitoring program demonstrates that phosphine is not being released to the atmosphere at detectable concentrations. Low concentrations of phosphine may be present in the soil gas in the immediate area, but the concentrations are not consequential (i.e., orders of magnitude below IDLH conditions and generally below the occupational short-term exposure levels).

Table 1

Air and Soil Gas Quality Data - Phosphine
SWMU 15 - Precipitator Dust Burial Area
Rhodia Silver Bow Plant

	Breathing Zone	Ground Surface	Soil Gas	
StationID	PH3 [ppmv]	PH3 [ppmv]	SampleID	PH3 [ppmv]
PDBA-1	ND	ND	PDBA-1 (1.5 ft)	ND
			PDBA-1 (8 ft)	0.02
PDBA-1A	ND	ND	Liner	
PDBA-2	ND	ND	PDBA-2 (1.5 ft)	0.08
PDBA-2A	ND	ND	Liner	
PDBA-3	ND	ND	PDBA-3 (1.5 ft)	0.03
PDBA-3A	ND	ND	Liner	
PDBA-4	ND	ND	PDBA-4 (1.5 ft)	0.22
PDBA-4A	ND	ND	Liner	
PDBA-5	ND	ND	PDBA-5 (1.5 ft)	0.81
			PDBA-5 (1.5 ft)	0.89
PDBA-5A	ND	ND	Liner	
PDBA-6	ND	ND	PDBA-6 (1.2 ft)	ND
PDBA-6A	ND	ND	Liner	
PDBA-7	ND	ND	PDBA-7 (1.5 ft)	0.02
PDBA-7A	ND	ND	Liner	
PDBA-8	ND	ND	PDBA-8 (1.5 ft)	0.34
PDBA-9	ND	ND	PDBA-9 (1.5 ft)	0.05
PDBA-10	ND	ND	PDBA-10(1.5 ft)	0.18
			PDBA-10(6 ft)	0.03
PDBA-11	ND	ND	PDBA-11(1.5 ft)	0.07
PDBA-12	ND	ND	PDBA-12(1.5 ft)	0.11
			PDBA-12(6 ft)	0.10
PDBA-13	ND	ND	PDBA-13(1.5 ft)	0.45
PDBA-14	ND	ND	PDBA-14(1.5 ft)	0.26
PDBA-15	Slag Pile			
PDBA-16	Slag Pile			
PDBA-17	Slag Pile			
PDBA-18	Slag Pile			
PDBA-19	ND	ND	PDBA-19(1.5 ft)	0.04
PDBA-20	ND	ND	PDBA-20(1.5 ft)	ND
PDBA-21	ND	ND	PDBA-21(1.5 ft)	0.07
			PDBA-21(6 ft)	0.03
PDBA-22	ND	ND	PDBA-22(1.5 ft)	0.07
PDBA-23	ND	ND	PDBA-23(1.5 ft)	0.46
			PDBA-23(6 ft)	0.07
PDBA-24	ND	ND	PDBA-24(1.5 ft)	0.02
PDBA-25	ND	ND	PDBA-25(1.5 ft)	0.15
PDBA-26	ND	ND	PDBA-26(1 ft)	0.02
October 2009 Reference Stations - (See Figure 1)				
REF-1	ND	ND	REF-1 (1.5 ft)	0.05
REF-2	ND	ND	REF-2 (1.5 ft)	ND
REF-3	ND	ND	REF-3 (1.5 ft)	0.02
REF-4	ND	ND	REF-4 (1.5 ft)	ND
REF-5	ND	ND	REF-5 (4 ft)	ND
REF-6	ND	ND	REF-6 (1.5 ft)	ND

ND - not detected at detection limit of 0.02 ppmv (based on sensor literature).
Reference area concentration = 0.05 ppmv (maximum)

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Imagery: FSA 2006

- Breathing Zone and Ground Surface Monitoring Station
- Breathing Zone, Ground Surface and Soil Gas Monitoring Station
- Monitoring Well
- Production Well
- Capped Area

N

Feet

200 0 200 400 600 800

Meters

50 0 50 100 150 200 250

Figure 1

PRECIPITATOR DUST AND PAN BUILDING, CRUDE PHOSPHORUS BURIAL AREA, AND REFERENCE STATION LOCATIONS
Rhodia Silver Bow Plant
Montana

Barr Footer: Date: 7/30/2010 12:21:47 PM File: I:\Projects\2 6\46\006\Gis\Maps\RFI_Workplan_2010\Grid_Over_Precipitator_Dust_Burial_Areas.mxd User: bal

- Breathing Zone and Ground Surface Location
- Breathing Zone, Ground Surface, Soil Gas, and Semi-permanent Soil Gas Monitoring Location
- Breathing Zone, Ground Surface, and Soil Gas Location
- Soil Gas Location on Slag Pile and Not Installed
- Existing Wells
- Solid Waste Management Units and Areas of Concern

N

Feet
100 0 100 200 300 400

Meters
25 0 25 50 75 100 125

DRAFT

Figure 2

GRID OVER PRECIPITATOR DUST BURIAL AREAS
Rhodia Silver Bow Plant
Montana

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Breathing Zone and Ground Surface Location

Breathing Zone, Ground Surface, Soil Gas, and Semi-permanent Soil Gas Monitoring Location

Breathing Zone, Ground Surface, and Soil Gas Location

Soil Gas Location on Slag Pile and Not Installed

Existing Wells

Solid Waste Management Units and Areas of Concern

N

Feet

100 0 100 200 300 400

Meters

25 0 25 50 75 100 125

DRAFT

Figure 3

GRID OVER PRECIPITATOR DUST BURIAL AREAS MONITORING STATIONS
Rhodia Silver Bow Plant
Montana

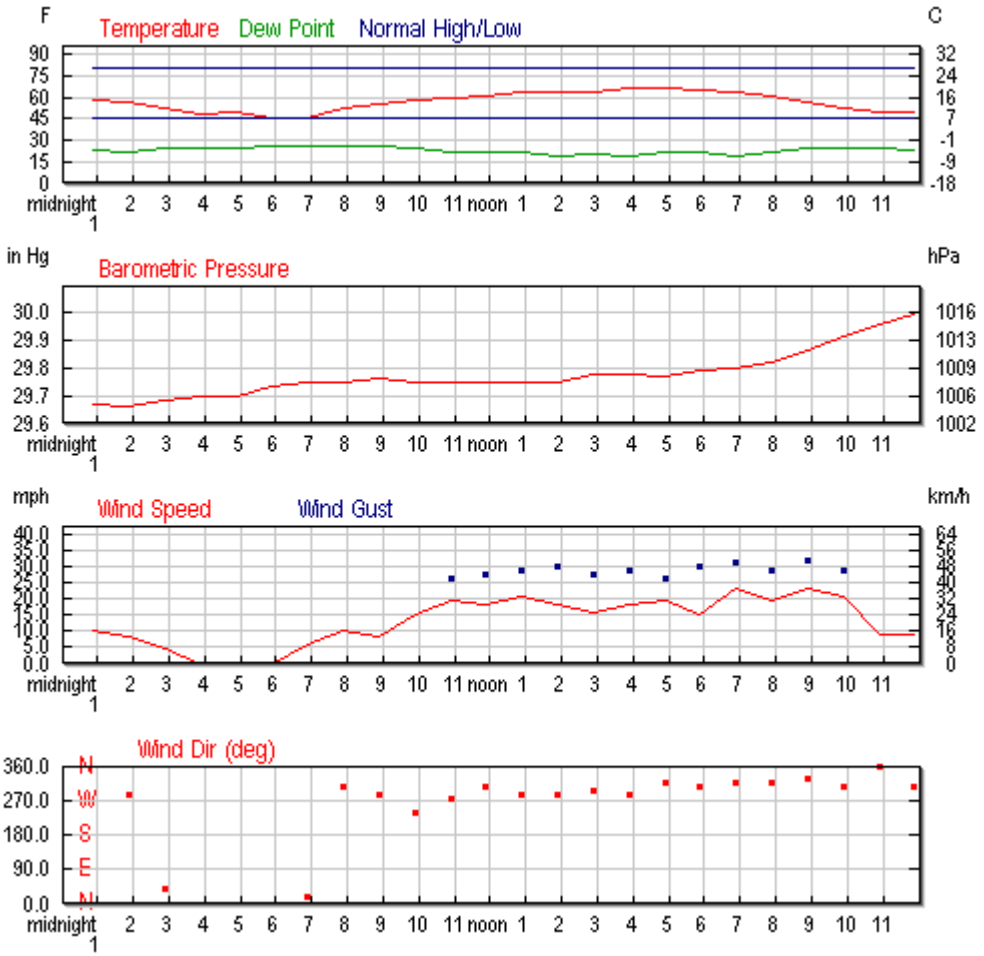
History for Butte, MT

Tuesday, July 13, 2010

Daily Summary

	Actual:	Average :	Record :
Temperature:			
Mean Temperature	**56** °F	**63** °F	
Max Temperature	**67** °F	**80** °F	**97** °F (2002)
Min Temperature	**44** °F	**46** °F	**36** °F (1965)
Degree Days:			
Heating Degree Days	9	4	
Month to date heating degree days	100	63	
Since 1 June heating degree days	442	341	
Since 1 July heating degree days	100	63	
Cooling Degree Days	0	2	
Month to date cooling degree days	0	20	
Year to date cooling degree days	8	29	
Since 1 June cooling degree days	8	29	
Growing Degree Days	6 (Base 50)		
Moisture:			
Dew Point	**23** °F		
Average Humidity	31		
Maximum Humidity	45		
Minimum Humidity	16		
Precipitation:			
Precipitation	**0.00** in	**0.05** in	**0.92** in (1937)
Month to date precipitation	0.52	0.68	
Year to date precipitation	9.93	7.62	
Sea Level Pressure:			
Sea Level Pressure	**29.78** in		
Wind:			
Wind Speed	**13** mph (NW)		
Max Wind Speed	**30** mph		
Max Gust Speed	**35** mph		
Visibility	**10** miles		
Events			

T = Trace of Precipitation, **MM** = Missing Value **Source:** NWS Daily Summary



Hourly Observations

Time (MDT):	Temp.:	Dew Point:	Humidity:	Sea Level Pressure:	Visibility:	Wind Dir:	Wind Speed:	Gust Speed:	Precip:	Events:	Conditions:
12:53 AM	**57.9** °F	**23.0** °F	26%	**29.67** in	**10.0** miles	WNW	**10.4** mph	-	N/A		Clear
1:53 AM	**57.0** °F	**21.0** °F	25%	**29.66** in	**10.0** miles	WNW	**8.1** mph	-	N/A		Clear
2:53 AM	**52.0** °F	**24.1** °F	34%	**29.68** in	**10.0** miles	NE	**4.6** mph	-	N/A		Clear
3:53 AM	**48.0** °F	**25.0** °F	41%	**29.70** in	**10.0** miles	Calm	Calm	-	N/A		Clear
4:53 AM	**48.9** °F	**24.1** °F	38%	**29.70** in	**10.0** miles	Calm	Calm	-	N/A		Clear
5:53 AM	**46.0** °F	**26.1** °F	46%	**29.73** in	**10.0** miles	Calm	Calm	-	N/A		Clear
6:53 AM	**46.0** °F	**26.1** °F	46%	**29.75** in	**10.0** miles	NNE	**5.8** mph	-	N/A		Clear
7:53 AM	**52.0** °F	**26.1** °F	37%	**29.75** in	**10.0** miles	NW	**10.4** mph	-	N/A		Clear
8:53 AM	**55.0** °F	**26.1** °F	33%	**29.76** in	**10.0** miles	WNW	**8.1** mph	-	N/A		Clear
9:53 AM	**57.9** °F	**24.1** °F	27%	**29.75** in	**10.0** miles	WSW	**15.0** mph	**24.2** mph	N/A		Clear
10:53 AM	**59.0** °F	**21.9** °F	24%	**29.75** in	**10.0** miles	West	**19.6** mph	**26.5** mph	N/A		Clear

11:53 AM	**61.0** °F	**21.9** °F	22%	**29.75** in	**10.0** miles	NW	**18.4** mph	**27.6** mph	N/A	Clear
12:53 PM	**63.0** °F	**21.9** °F	21%	**29.75** in	**10.0** miles	WNW	**20.7** mph	**28.8** mph	N/A	Clear
1:53 PM	**64.0** °F	**19.0** °F	18%	**29.75** in	**10.0** miles	WNW	**18.4** mph	**29.9** mph	N/A	Clear
2:53 PM	**64.0** °F	**19.9** °F	18%	**29.78** in	**10.0** miles	WNW	**16.1** mph	**27.6** mph	N/A	Clear
3:53 PM	**66.0** °F	**19.0** °F	17%	**29.78** in	**10.0** miles	WNW	**18.4** mph	**28.8** mph	N/A	Clear
4:53 PM	**66.0** °F	**21.0** °F	18%	**29.77** in	**10.0** miles	NW	**19.6** mph	**26.5** mph	N/A	Clear
5:53 PM	**64.9** °F	**21.0** °F	19%	**29.79** in	**10.0** miles	NW	**15.0** mph	**29.9** mph	N/A	Clear
6:53 PM	**63.0** °F	**19.0** °F	18%	**29.80** in	**10.0** miles	NW	**23.0** mph	**31.1** mph	N/A	Clear
7:53 PM	**61.0** °F	**21.0** °F	21%	**29.82** in	**10.0** miles	NW	**19.6** mph	**28.8** mph	N/A	Clear
8:53 PM	**55.9** °F	**24.1** °F	29%	**29.86** in	**10.0** miles	NNW	**23.0** mph	**32.2** mph	N/A	Clear
9:53 PM	**52.0** °F	**25.0** °F	35%	**29.91** in	**10.0** miles	NW	**20.7** mph	**28.8** mph	N/A	Clear
10:53 PM	**50.0** °F	**25.0** °F	38%	**29.96** in	**10.0** miles	North	**9.2** mph	-	N/A	Clear
11:53 PM	**48.9** °F	**23.0** °F	36%	**29.99** in	**10.0** miles	NW	**9.2** mph	**18.4** mph	N/A	Clear

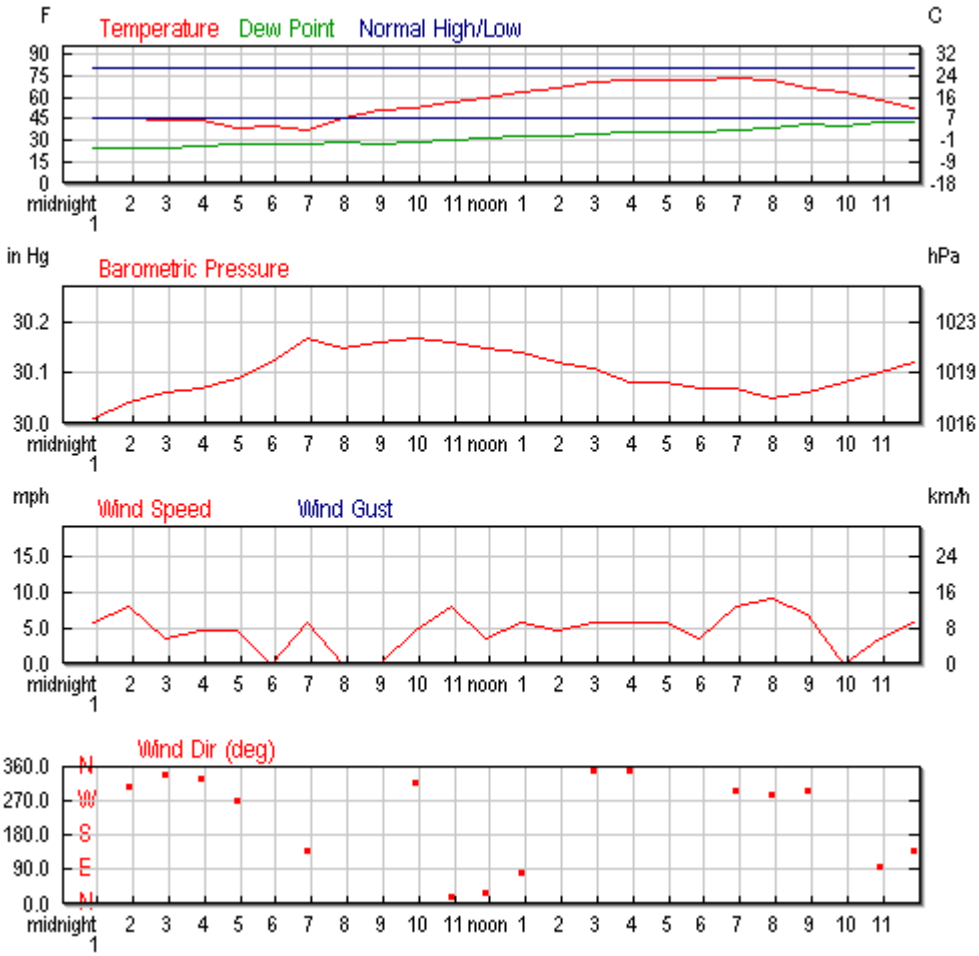
History for Butte, MT

Wednesday, July 14, 2010

Daily Summary

	Actual:	Average :	Record :
Temperature:			
Mean Temperature	**56** °F	**63** °F	
Max Temperature	**74** °F	**80** °F	**95** °F (2002)
Min Temperature	**37** °F	**46** °F	**34** °F (1943)
Degree Days:			
Heating Degree Days	9	4	
Month to date heating degree days	109	67	
Since 1 June heating degree days	451	345	
Since 1 July heating degree days	109	67	
Cooling Degree Days	0	2	
Month to date cooling degree days	0	22	
Year to date cooling degree days	8	31	
Since 1 June cooling degree days	8	31	
Growing Degree Days	5 (Base 50)		
Moisture:			
Dew Point	**32** °F		
Average Humidity	49		
Maximum Humidity	71		
Minimum Humidity	26		
Precipitation:			
Precipitation	**0.00** in	**0.05** in	**0.90** in (1918)
Month to date precipitation	0.52	0.73	
Year to date precipitation	9.93	7.67	
Sea Level Pressure:			
Sea Level Pressure	**30.10** in		
Wind:			
Wind Speed	**5** mph (NNW)		
Max Wind Speed	**13** mph		
Max Gust Speed	**17** mph		
Visibility	**10** miles		
Events			

T = Trace of Precipitation, **MM** = Missing Value **Source:** NWS Daily Summary



Hourly Observations

Time (MDT):	Temp.:	Dew Point:	Humidity:	Sea Level Pressure:	Visibility:	Wind Dir:	Wind Speed:	Gust Speed:	Precip:	Events:	Conditions:
12:53 AM	**46.0** °F	**24.1** °F	42%	**30.01** in	**10.0** miles	NW	**5.8** mph	-	N/A		Clear
1:53 AM	**46.0** °F	**25.0** °F	44%	**30.04** in	**10.0** miles	NW	**8.1** mph	-	N/A		Clear
2:53 AM	**44.1** °F	**25.0** °F	47%	**30.06** in	**10.0** miles	NNW	**3.5** mph	-	N/A		Clear
3:53 AM	**44.1** °F	**26.1** °F	49%	**30.07** in	**10.0** miles	NNW	**4.6** mph	-	N/A		Scattered Clouds
4:53 AM	**39.0** °F	**28.0** °F	65%	**30.09** in	**10.0** miles	West	**4.6** mph	-	N/A		Clear
5:53 AM	**39.9** °F	**27.0** °F	60%	**30.12** in	**10.0** miles	Calm	Calm	-	N/A		Clear
6:53 AM	**37.0** °F	**27.0** °F	67%	**30.17** in	**10.0** miles	SE	**5.8** mph	-	N/A		Clear
7:53 AM	**46.0** °F	**28.9** °F	51%	**30.15** in	**10.0** miles	Calm	Calm	-	N/A		Clear
8:53 AM	**51.1** °F	**28.0** °F	41%	**30.16** in	**10.0** miles	Calm	Calm	-	N/A		Clear
9:53 AM	**53.1** °F	**28.9** °F	40%	**30.17** in	**10.0** miles	NW	**4.6** mph	-	N/A		Clear
10:53 AM	**57.0** °F	**30.0** °F	36%	**30.16** in	**10.0** miles	NNE	**8.1** mph	-	N/A		Clear

11:53 AM	**60.1** °F	**30.9** °F	33%	**30.15** in	-	NNE	**3.5** mph	-	N/A	Clear
12:53 PM	**64.0** °F	**33.1** °F	31%	**30.14** in	-	East	**5.8** mph	-	N/A	Clear
1:53 PM	**66.9** °F	**33.1** °F	28%	**30.12** in	-	Variable	**4.6** mph	-	N/A	Clear
2:53 PM	**70.0** °F	**34.0** °F	27%	**30.11** in	**10.0** miles	North	**5.8** mph	-	N/A	Clear
3:53 PM	**72.0** °F	**35.1** °F	26%	**30.08** in	**10.0** miles	North	**5.8** mph	-	N/A	Clear
4:53 PM	**72.0** °F	**35.1** °F	26%	**30.08** in	**10.0** miles	Variable	**5.8** mph	-	N/A	Clear
5:53 PM	**72.0** °F	**36.0** °F	27%	**30.07** in	**10.0** miles	Variable	**3.5** mph	-	N/A	Clear
6:53 PM	**73.0** °F	**37.0** °F	27%	**30.07** in	**10.0** miles	WNW	**8.1** mph	-	N/A	Clear
7:53 PM	**72.0** °F	**37.9** °F	29%	**30.05** in	**10.0** miles	WNW	**9.2** mph	-	N/A	Clear
8:53 PM	**66.9** °F	**41.0** °F	39%	**30.06** in	**10.0** miles	WNW	**6.9** mph	-	N/A	Clear
9:53 PM	**64.0** °F	**39.9** °F	41%	**30.08** in	**10.0** miles	Calm	Calm	-	N/A	Clear
10:53 PM	**57.9** °F	**42.1** °F	56%	**30.10** in	**10.0** miles	East	**3.5** mph	-	N/A	Clear
11:53 PM	**52.0** °F	**42.1** °F	69%	**30.12** in	**10.0** miles	SE	**5.8** mph	-	N/A	Clear

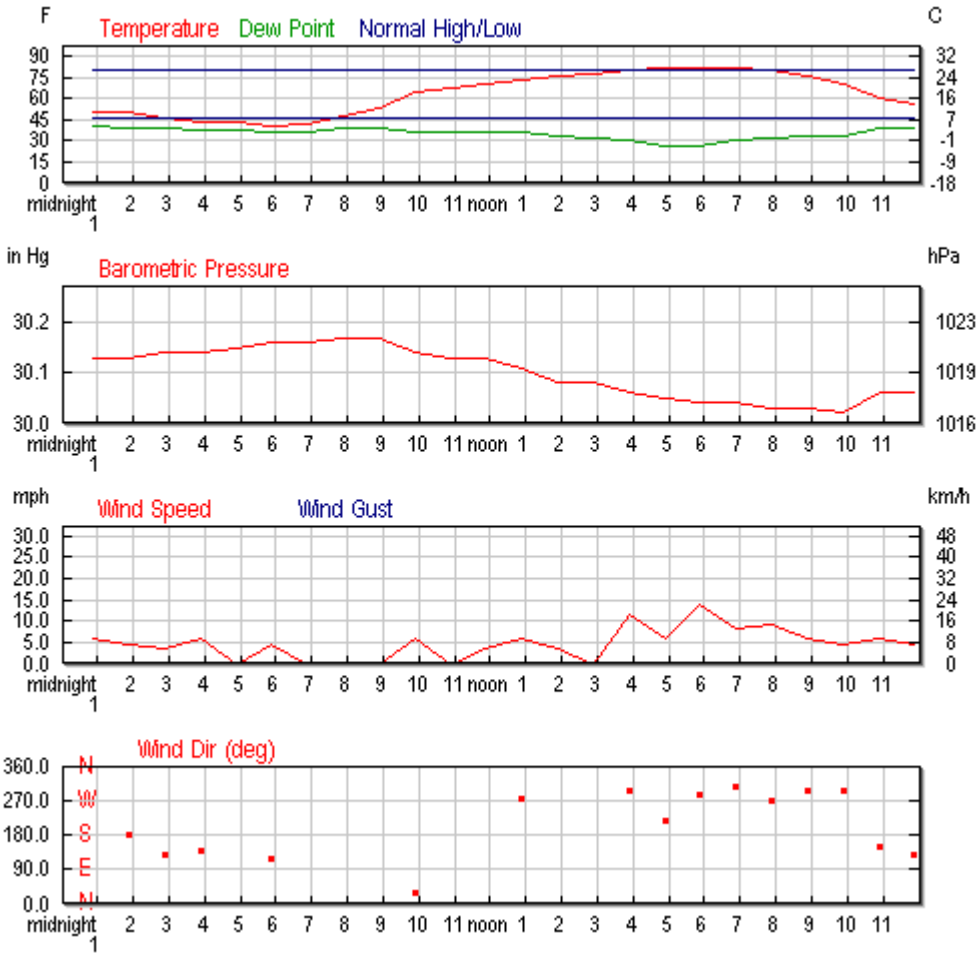
History for Butte, MT

Thursday, July 15, 2010

Daily Summary

	Actual:	Average :	Record :
Temperature:			
Mean Temperature	**62** °F	**63** °F	
Max Temperature	**83** °F	**80** °F	**95** °F (2007)
Min Temperature	**40** °F	**46** °F	**33** °F (1958)
Degree Days:			
Heating Degree Days	3	4	
Month to date heating degree days	112	71	
Since 1 June heating degree days	454	349	
Since 1 July heating degree days	112	71	
Cooling Degree Days	0	2	
Month to date cooling degree days	0	24	
Year to date cooling degree days	8	33	
Since 1 June cooling degree days	8	33	
Growing Degree Days	12 (Base 50)		
Moisture:			
Dew Point	**36** °F		
Average Humidity	50		
Maximum Humidity	86		
Minimum Humidity	13		
Precipitation:			
Precipitation	**0.00** in	**0.05** in	**0.62** in (1907)
Month to date precipitation	0.52	0.78	
Year to date precipitation	9.93	7.72	
Sea Level Pressure:			
Sea Level Pressure	**30.10** in		
Wind:			
Wind Speed	**5** mph (SW)		
Max Wind Speed	**15** mph		
Max Gust Speed	**22** mph		
Visibility	**10** miles		
Events			

T = Trace of Precipitation, **MM** = Missing Value **Source:** NWS Daily Summary



Hourly Observations

Time (MDT):	Temp.:	Dew Point:	Humidity:	Sea Level Pressure:	Visibility:	Wind Dir:	Wind Speed:	Gust Speed:	Precip:	Events:	Conditions:
12:53 AM	**50.0** °F	**41.0** °F	71%	**30.13** in	**10.0** miles	SSE	**5.8** mph	-	N/A		Clear
1:53 AM	**50.0** °F	**39.9** °F	68%	**30.13** in	**10.0** miles	South	**4.6** mph	-	N/A		Clear
2:53 AM	**46.0** °F	**39.0** °F	76%	**30.14** in	**10.0** miles	SE	**3.5** mph	-	N/A		Clear
3:53 AM	**44.1** °F	**37.9** °F	79%	**30.14** in	**10.0** miles	SE	**5.8** mph	-	N/A		Clear
4:53 AM	**43.0** °F	**37.9** °F	82%	**30.15** in	**10.0** miles	Calm	Calm	-	N/A		Clear
5:53 AM	**41.0** °F	**37.0** °F	86%	**30.16** in	**10.0** miles	ESE	**4.6** mph	-	N/A		Clear
6:53 AM	**42.1** °F	**37.0** °F	82%	**30.16** in	**10.0** miles	Calm	Calm	-	N/A		Clear
7:53 AM	**48.0** °F	**39.0** °F	71%	**30.17** in	**10.0** miles	Calm	Calm	-	N/A		Clear
8:53 AM	**54.0** °F	**39.9** °F	59%	**30.17** in	**10.0** miles	Calm	Calm	-	N/A		Clear
9:53 AM	**64.9** °F	**37.0** °F	36%	**30.14** in	**10.0** miles	NNE	**5.8** mph	-	N/A		Clear
10:53 AM	**68.0** °F	**37.0** °F	32%	**30.13** in	**10.0** miles	Calm	Calm	-	N/A		Clear

11:53 AM	**71.1** °F	**37.0** °F	29%	**30.13** in	**10.0** miles	Variable	**3.5** mph	-	N/A	Clear
12:53 PM	**73.0** °F	**37.0** °F	27%	**30.11** in	**10.0** miles	West	**5.8** mph	-	N/A	Clear
1:53 PM	**77.0** °F	**33.1** °F	20%	**30.08** in	**10.0** miles	Variable	**3.5** mph	-	N/A	Clear
2:53 PM	**78.1** °F	**32.0** °F	19%	**30.08** in	**10.0** miles	Calm	Calm	-	N/A	Clear
3:53 PM	**81.0** °F	**30.9** °F	16%	**30.06** in	**10.0** miles	WNW	**11.5** mph	-	N/A	Clear
4:53 PM	**82.0** °F	**27.0** °F	13%	**30.05** in	**10.0** miles	SW	**5.8** mph	-	N/A	Clear
5:53 PM	**82.0** °F	**27.0** °F	13%	**30.04** in	**10.0** miles	WNW	**13.8** mph	**21.9** mph	N/A	Clear
6:53 PM	**82.0** °F	**30.0** °F	15%	**30.04** in	**10.0** miles	NW	**8.1** mph	-	N/A	Clear
7:53 PM	**80.1** °F	**32.0** °F	17%	**30.03** in	**10.0** miles	West	**9.2** mph	-	N/A	Clear
8:53 PM	**75.9** °F	**34.0** °F	22%	**30.03** in	**10.0** miles	WNW	**5.8** mph	-	N/A	Clear
9:53 PM	**71.1** °F	**34.0** °F	26%	**30.02** in	**10.0** miles	WNW	**4.6** mph	-	N/A	Clear
10:53 PM	**60.1** °F	**39.0** °F	46%	**30.06** in	**10.0** miles	SSE	**5.8** mph	-	N/A	Clear
11:53 PM	**57.0** °F	**39.0** °F	51%	**30.06** in	**10.0** miles	SE	**4.6** mph	-	N/A	Clear

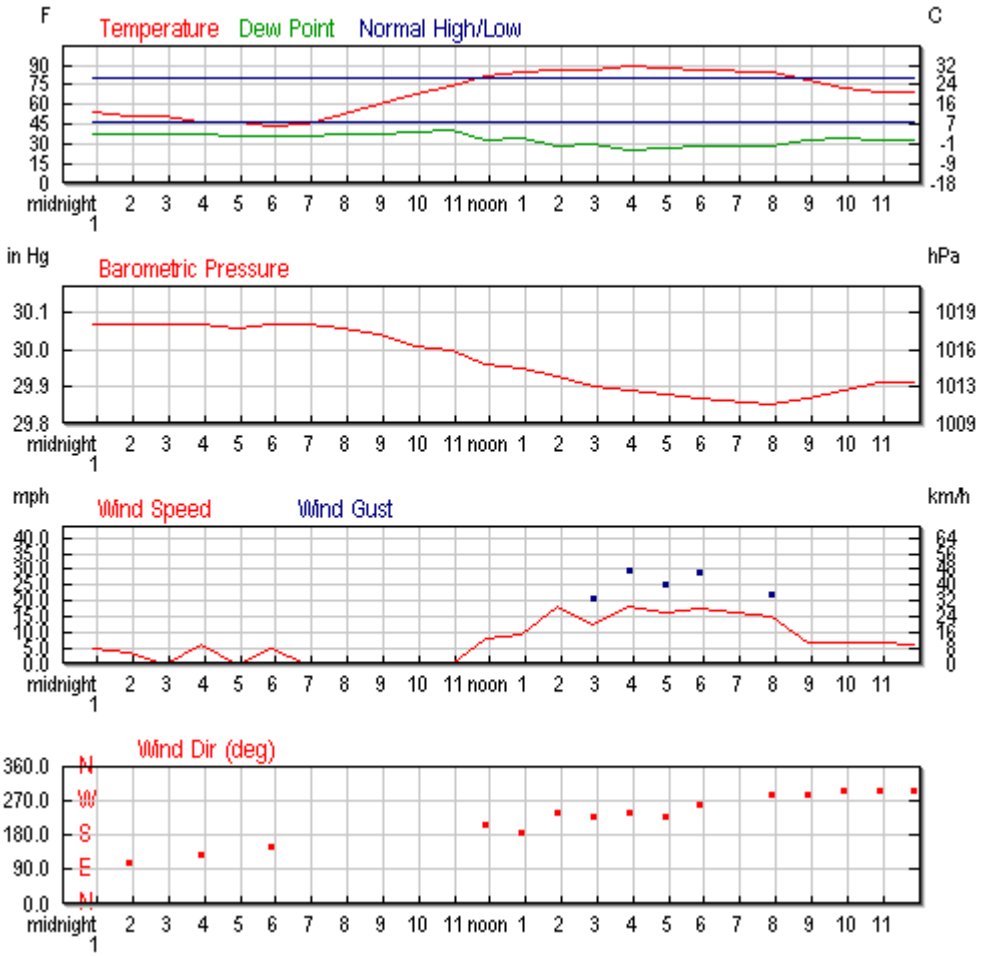
History for Butte, MT

Friday, July 16, 2010

Daily Summary

	Actual:	Average :	Record :
Temperature:			
Mean Temperature	**67** °F	**63** °F	
Max Temperature	**89** °F	**80** °F	**98** °F (1936)
Min Temperature	**44** °F	**46** °F	**30** °F (1943)
Degree Days:			
Heating Degree Days	0	4	
Month to date heating degree days	112	75	
Since 1 June heating degree days	454	353	
Since 1 July heating degree days	112	75	
Cooling Degree Days	2	2	
Month to date cooling degree days	2	26	
Year to date cooling degree days	10	35	
Since 1 June cooling degree days	10	35	
Growing Degree Days	16 (Base 50)		
Moisture:			
Dew Point	**34** °F		
Average Humidity	41		
Maximum Humidity	71		
Minimum Humidity	10		
Precipitation:			
Precipitation	**0.00** in	**0.05** in	**0.93** in (1894)
Month to date precipitation	0.52	0.83	
Year to date precipitation	9.93	7.77	
Sea Level Pressure:			
Sea Level Pressure	**29.97** in		
Wind:			
Wind Speed	**7** mph (SW)		
Max Wind Speed	**25** mph		
Max Gust Speed	**35** mph		
Visibility	**10** miles		
Events			

T = Trace of Precipitation, **MM** = Missing Value **Source:** NWS Daily Summary



Hourly Observations

Time (MDT):	Temp.:	Dew Point:	Humidity:	Sea Level Pressure:	Visibility:	Wind Dir:	Wind Speed:	Gust Speed:	Precip:	Events:	Conditions:
12:53 AM	**55.0** °F	**37.9** °F	53%	**30.07** in	**10.0** miles	South	**4.6** mph	-	N/A		Clear
1:53 AM	**52.0** °F	**37.0** °F	57%	**30.07** in	**10.0** miles	ESE	**3.5** mph	-	N/A		Clear
2:53 AM	**51.1** °F	**37.0** °F	59%	**30.07** in	**10.0** miles	Calm	Calm	-	N/A		Clear
3:53 AM	**46.9** °F	**37.0** °F	68%	**30.07** in	**10.0** miles	SE	**5.8** mph	-	N/A		Clear
4:53 AM	**46.9** °F	**36.0** °F	66%	**30.06** in	**10.0** miles	Calm	Calm	-	N/A		Clear
5:53 AM	**44.1** °F	**36.0** °F	73%	**30.07** in	**10.0** miles	SSE	**4.6** mph	-	N/A		Clear
6:53 AM	**45.0** °F	**36.0** °F	71%	**30.07** in	**10.0** miles	Calm	Calm	-	N/A		Clear
7:53 AM	**53.1** °F	**37.9** °F	57%	**30.06** in	**10.0** miles	Calm	Calm	-	N/A		Clear
8:53 AM	**60.1** °F	**37.9** °F	44%	**30.04** in	**10.0** miles	Calm	Calm	-	N/A		Clear
9:53 AM	**68.0** °F	**39.0** °F	35%	**30.01** in	**10.0** miles	Calm	Calm	-	N/A		Clear
10:53 AM	**75.0** °F	**39.9** °F	28%	**30.00** in	**10.0** miles	Calm	Calm	-	N/A		Clear

11:53 AM	**82.0** °F	**33.1** °F	17%	**29.96** in	**10.0** miles	SSW	**8.1** mph	-	N/A	Clear
12:53 PM	**84.9** °F	**35.1** °F	17%	**29.95** in	**10.0** miles	South	**9.2** mph	-	N/A	Clear
1:53 PM	**86.0** °F	**28.9** °F	13%	**29.93** in	**10.0** miles	WSW	**18.4** mph	**33.4** mph	N/A	Clear
2:53 PM	**87.1** °F	**30.0** °F	13%	**29.90** in	**10.0** miles	SW	**12.7** mph	**20.7** mph	N/A	Clear
3:53 PM	**89.1** °F	**26.1** °F	10%	**29.89** in	**10.0** miles	WSW	**18.4** mph	**29.9** mph	N/A	Clear
4:53 PM	**88.0** °F	**27.0** °F	11%	**29.88** in	**10.0** miles	SW	**16.1** mph	**25.3** mph	N/A	Clear
5:53 PM	**87.1** °F	**28.0** °F	12%	**29.87** in	**10.0** miles	West	**17.3** mph	**28.8** mph	N/A	Clear
7:53 PM	**84.9** °F	**28.9** °F	13%	**29.85** in	**10.0** miles	WNW	**15.0** mph	**21.9** mph	N/A	Clear
8:53 PM	**79.0** °F	**33.1** °F	19%	**29.87** in	**10.0** miles	WNW	**6.9** mph	-	N/A	Clear
9:53 PM	**73.0** °F	**34.0** °F	24%	**29.89** in	**10.0** miles	WNW	**6.9** mph	-	N/A	Clear
10:53 PM	**70.0** °F	**33.1** °F	26%	**29.91** in	**10.0** miles	WNW	**6.9** mph	-	N/A	Clear
11:53 PM	**69.1** °F	**33.1** °F	26%	**29.91** in	**10.0** miles	WNW	**5.8** mph	-	N/A	Clear

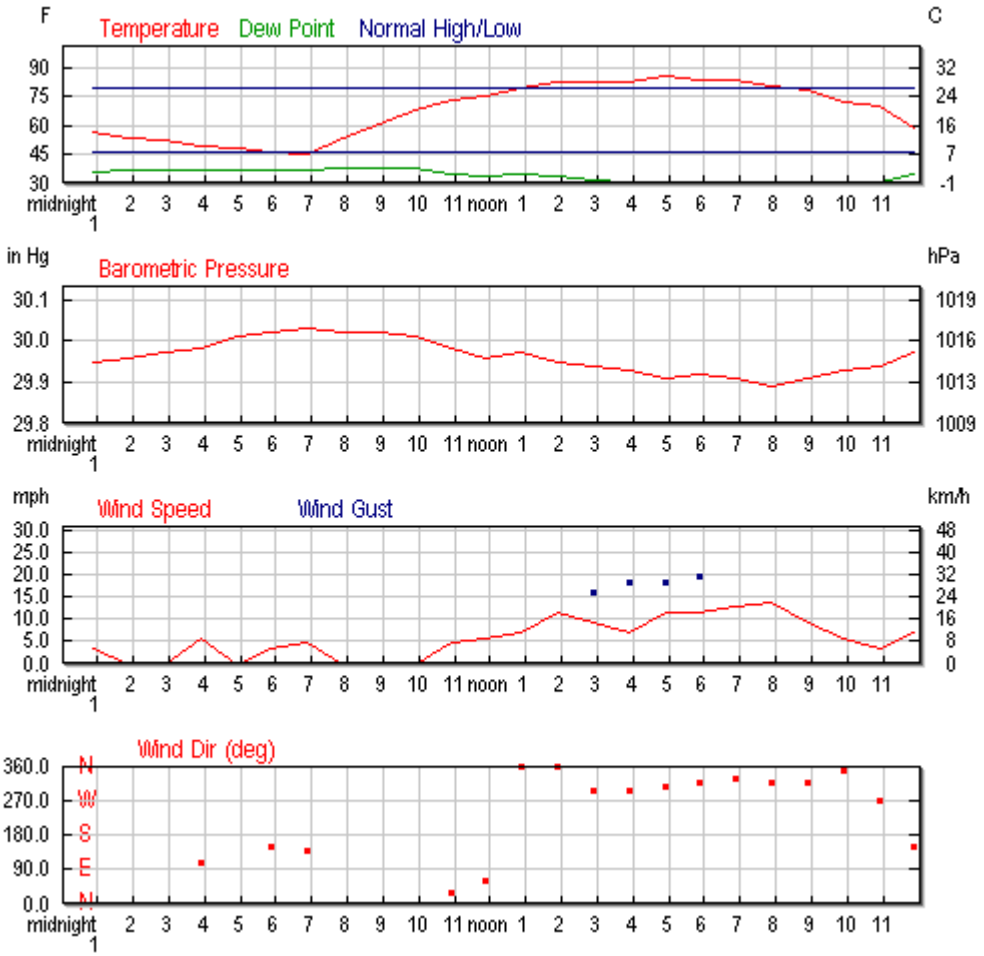
History for Butte, MT

Saturday, July 17, 2010

Daily Summary

	Actual:	Average :	Record :
Temperature:			
Mean Temperature	**65** °F	**63** °F	
Max Temperature	**86** °F	**80** °F	**96** °F (1998)
Min Temperature	**44** °F	**46** °F	**34** °F (1982)
Degree Days:			
Heating Degree Days	0	4	
Month to date heating degree days	112	79	
Since 1 June heating degree days	454	357	
Since 1 July heating degree days	112	79	
Cooling Degree Days	0	2	
Month to date cooling degree days	2	28	
Year to date cooling degree days	10	37	
Since 1 June cooling degree days	10	37	
Growing Degree Days	16 (Base 50)		
Moisture:			
Dew Point	**34** °F		
Average Humidity	45		
Maximum Humidity	76		
Minimum Humidity	13		
Precipitation:			
Precipitation	**0.00** in	**0.05** in	**1.14** in (1987)
Month to date precipitation	0.52	0.88	
Year to date precipitation	9.93	7.82	
Sea Level Pressure:			
Sea Level Pressure	**29.96** in		
Wind:			
Wind Speed	**6** mph (NNW)		
Max Wind Speed	**23** mph		
Max Gust Speed	**38** mph		
Visibility	**10** miles		
Events			

T = Trace of Precipitation, **MM** = Missing Value **Source:** NWS Daily Summary



Hourly Observations

Time (MDT):	Temp.:	Dew Point:	Humidity:	Sea Level Pressure:	Visibility:	Wind Dir:	Wind Speed:	Gust Speed:	Precip:	Events:	Conditions:
12:53 AM	**57.0** °F	**36.0** °F	45%	**29.95** in	**10.0** miles	SE	**3.5** mph	-	N/A		Clear
1:53 AM	**54.0** °F	**37.0** °F	53%	**29.96** in	**10.0** miles	Calm	Calm	-	N/A		Clear
2:53 AM	**52.0** °F	**37.0** °F	57%	**29.97** in	**10.0** miles	Calm	Calm	-	N/A		Clear
3:53 AM	**48.9** °F	**37.0** °F	64%	**29.98** in	**10.0** miles	ESE	**5.8** mph	-	N/A		Clear
4:53 AM	**48.0** °F	**37.0** °F	66%	**30.01** in	**10.0** miles	Calm	Calm	-	N/A		Clear
5:53 AM	**46.0** °F	**37.0** °F	71%	**30.02** in	**10.0** miles	SSE	**3.5** mph	-	N/A		Clear
6:53 AM	**45.0** °F	**37.0** °F	74%	**30.03** in	**10.0** miles	SE	**4.6** mph	-	N/A		Clear
7:53 AM	**54.0** °F	**37.9** °F	55%	**30.02** in	**10.0** miles	Calm	Calm	-	N/A		Clear
8:53 AM	**61.0** °F	**37.9** °F	42%	**30.02** in	**10.0** miles	Calm	Calm	-	N/A		Clear
9:53 AM	**68.0** °F	**37.9** °F	33%	**30.01** in	**10.0** miles	Calm	Calm	-	N/A		Clear
10:53 AM	**73.0** °F	**35.1** °F	25%	**29.98** in	**10.0** miles	NNE	**4.6** mph	-	N/A		Clear

11:53 AM	**75.9** °F	**34.0** °F	22%	**29.96** in	**10.0** miles	ENE	**5.8** mph	-	N/A	Clear
12:53 PM	**80.1** °F	**35.1** °F	20%	**29.97** in	**10.0** miles	North	**6.9** mph	-	N/A	Clear
1:53 PM	**82.9** °F	**34.0** °F	17%	**29.95** in	**10.0** miles	North	**11.5** mph	**17.3** mph	N/A	Clear
2:53 PM	**82.9** °F	**32.0** °F	16%	**29.94** in	**10.0** miles	WNW	**9.2** mph	**16.1** mph	N/A	Clear
3:53 PM	**82.9** °F	**30.9** °F	15%	**29.93** in	**10.0** miles	WNW	**6.9** mph	**18.4** mph	N/A	Partly Cloudy
4:53 PM	**86.0** °F	**30.9** °F	14%	**29.91** in	**10.0** miles	NW	**11.5** mph	**18.4** mph	N/A	Clear
5:53 PM	**84.0** °F	**30.0** °F	14%	**29.92** in	**10.0** miles	NW	**11.5** mph	**19.6** mph	N/A	Clear
6:53 PM	**84.0** °F	**30.9** °F	15%	**29.91** in	**10.0** miles	NNW	**12.7** mph	-	N/A	Clear
7:53 PM	**81.0** °F	**30.9** °F	16%	**29.89** in	**10.0** miles	NW	**13.8** mph	**20.7** mph	N/A	Clear
8:53 PM	**78.1** °F	**30.0** °F	17%	**29.91** in	**10.0** miles	NW	**9.2** mph	-	N/A	Clear
9:53 PM	**72.0** °F	**30.9** °F	22%	**29.93** in	**10.0** miles	North	**5.8** mph	-	N/A	Clear
10:53 PM	**70.0** °F	**30.9** °F	24%	**29.94** in	**10.0** miles	West	**3.5** mph	-	N/A	Clear
11:53 PM	**59.0** °F	**35.1** °F	41%	**29.97** in	**10.0** miles	SSE	**6.9** mph	-	N/A	Clear

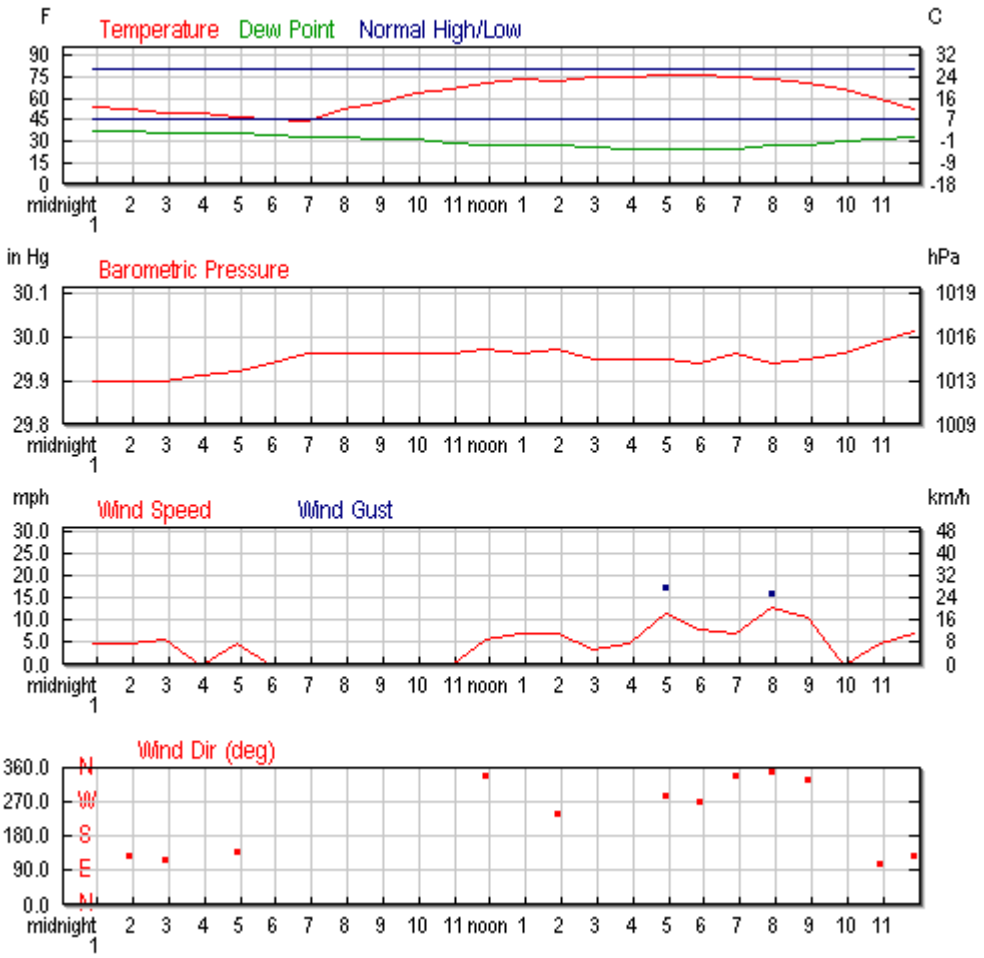
History for Butte, MT

Monday, July 19, 2010

Daily Summary

	Actual:	Average :	Record :
Temperature:			
Mean Temperature	**60** °F	**63** °F	
Max Temperature	**78** °F	**80** °F	**96** °F (1960)
Min Temperature	**42** °F	**46** °F	**34** °F (1962)
Degree Days:			
Heating Degree Days	5	4	
Month to date heating degree days	118	87	
Since 1 June heating degree days	460	365	
Since 1 July heating degree days	118	87	
Cooling Degree Days	0	2	
Month to date cooling degree days	2	32	
Year to date cooling degree days	10	41	
Since 1 June cooling degree days	10	41	
Growing Degree Days	10 (Base 50)		
Moisture:			
Dew Point	**30** °F		
Average Humidity	40		
Maximum Humidity	65		
Minimum Humidity	15		
Precipitation:			
Precipitation	**0.00** in	**0.04** in	**0.60** in (1969)
Month to date precipitation	0.52	0.97	
Year to date precipitation	9.93	7.91	
Sea Level Pressure:			
Sea Level Pressure	**29.95** in		
Wind:			
Wind Speed	**5** mph (ESE)		
Max Wind Speed	**16** mph		
Max Gust Speed	**22** mph		
Visibility	**10** miles		
Events			

T = Trace of Precipitation, **MM** = Missing Value **Source:** NWS Daily Summary



Hourly Observations

Time (MDT):	Temp.:	Dew Point:	Humidity:	Sea Level Pressure:	Visibility:	Wind Dir:	Wind Speed:	Gust Speed:	Precip:	Events:	Conditions:
12:53 AM	**54.0** °F	**37.0** °F	53%	**29.90** in	**10.0** miles	SSE	**4.6** mph	-	N/A		Clear
1:53 AM	**52.0** °F	**37.0** °F	57%	**29.90** in	**10.0** miles	SE	**4.6** mph	-	N/A		Clear
2:53 AM	**50.0** °F	**36.0** °F	59%	**29.90** in	**10.0** miles	ESE	**5.8** mph	-	N/A		Clear
3:53 AM	**50.0** °F	**35.1** °F	57%	**29.91** in	**10.0** miles	Calm	Calm	-	N/A		Scattered Clouds
4:53 AM	**46.9** °F	**35.1** °F	63%	**29.92** in	**10.0** miles	SE	**4.6** mph	-	N/A		Clear
5:53 AM	**45.0** °F	**34.0** °F	65%	**29.94** in	**10.0** miles	Calm	Calm	-	N/A		Clear
6:53 AM	**44.1** °F	**33.1** °F	65%	**29.96** in	**10.0** miles	Calm	Calm	-	N/A		Clear
7:53 AM	**52.0** °F	**33.1** °F	49%	**29.96** in	**10.0** miles	Calm	Calm	-	N/A		Partly Cloudy
8:53 AM	**57.0** °F	**32.0** °F	39%	**29.96** in	**10.0** miles	Calm	Calm	-	N/A		Clear
9:53 AM	**63.0** °F	**32.0** °F	31%	**29.96** in	**10.0** miles	Calm	Calm	-	N/A		Clear

10:53 AM	**66.9** ℉	**28.9** ℉	24%	**29.96** in	**10.0** miles	Calm	Calm	-	N/A	Clear
11:53 AM	**71.1** ℉	**28.0** ℉	20%	**29.97** in	**10.0** miles	NNW	**5.8** mph	-	N/A	Clear
12:53 PM	**73.0** ℉	**27.0** ℉	18%	**29.96** in	**10.0** miles	Variable	**6.9** mph	-	N/A	Clear
1:53 PM	**72.0** ℉	**27.0** ℉	19%	**29.97** in	**10.0** miles	WSW	**6.9** mph	**18.4** mph	N/A	Clear
2:53 PM	**75.0** ℉	**26.1** ℉	16%	**29.95** in	**10.0** miles	Variable	**3.5** mph	-	N/A	Clear
3:53 PM	**75.0** ℉	**25.0** ℉	16%	**29.95** in	**10.0** miles	Variable	**4.6** mph	**17.3** mph	N/A	Clear
4:53 PM	**75.9** ℉	**25.0** ℉	15%	**29.95** in	**10.0** miles	WNW	**11.5** mph	**17.3** mph	N/A	Clear
5:53 PM	**75.9** ℉	**24.1** ℉	15%	**29.94** in	**10.0** miles	West	**8.1** mph	-	N/A	Clear
6:53 PM	**75.0** ℉	**24.1** ℉	15%	**29.96** in	**10.0** miles	NNW	**6.9** mph	**20.7** mph	N/A	Clear
7:53 PM	**73.9** ℉	**27.0** ℉	18%	**29.94** in	**10.0** miles	North	**12.7** mph	**16.1** mph	N/A	Clear
8:53 PM	**71.1** ℉	**28.0** ℉	20%	**29.95** in	**10.0** miles	NNW	**10.4** mph	-	N/A	Clear
9:53 PM	**66.0** ℉	**30.0** ℉	26%	**29.96** in	**10.0** miles	Calm	Calm	-	N/A	Clear
10:53 PM	**60.1** ℉	**32.0** ℉	35%	**29.99** in	**10.0** miles	ESE	**4.6** mph	-	N/A	Clear
11:53 PM	**53.1** ℉	**33.1** ℉	47%	**30.01** in	**10.0** miles	SE	**6.9** mph	-	N/A	Clear

Appendix 5.5.15-B

Weather Conditions for October 18, 2012 Phosphine Monitoring

History for Butte, MT

Thursday, October 18, 2012

Thursday, October 18, 2012

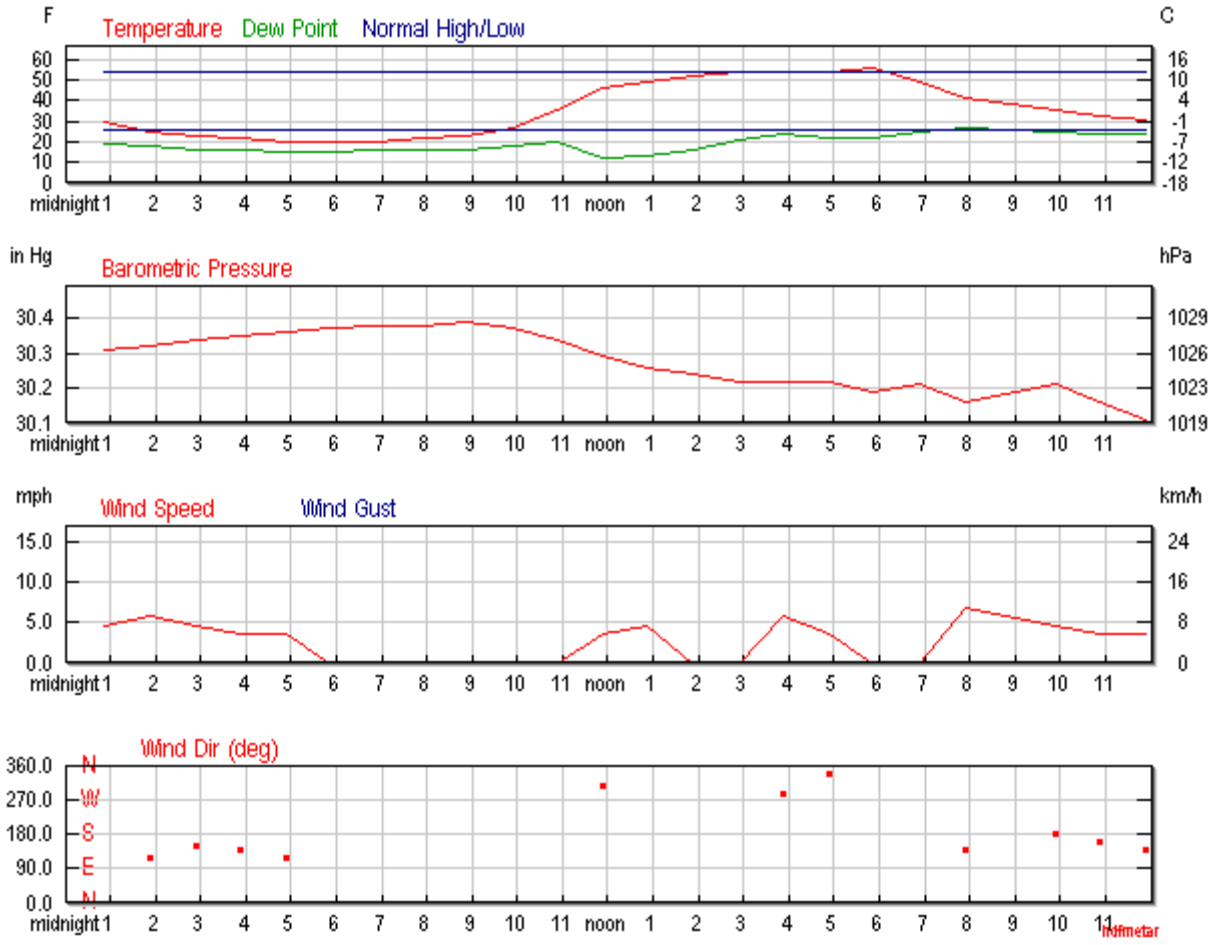
« Previous Day | October 18 2012 View | Next Day »

Daily | Weekly | Monthly | Custom

	Actual	Average	Record
Temperature			
Mean Temperature	**38** ℉	**40** ℉	
Max Temperature	**57** ℉	**54** ℉	**76** ℉ (2003)
Min Temperature	**18** ℉	**26** ℉	**5** ℉ (1938)
Degree Days			
Heating Degree Days	27	25	
Month to date heating degree days	409	395	
Since 1 July heating degree days	814	1016	
Cooling Degree Days	0	0	
Month to date cooling degree days	0	0	
Year to date cooling degree days	121	81	
Moisture			
Dew Point	**19** ℉		
Average Humidity	54		
Maximum Humidity	84		
Minimum Humidity	23		
Precipitation			
Precipitation	**0.00** in	**0.03** in	**0.28** in (1949)
Month to date precipitation	0.23	0.50	
Year to date precipitation	7.66	11.38	
Sea Level Pressure			
Sea Level Pressure	**30.28** in		
Wind			
Wind Speed	**2** mph (SSE)		
Max Wind Speed	**13** mph		
Max Gust Speed	**20** mph		
Visibility	**10** miles		
Events			

T = Trace of Precipitation, **MM** = Missing Value

Source: NWS Daily Summary



Certify This Report

Hourly Observations

Time (MDT)	**Temp.**	**Windchill**	**Dew Point**	**Humidity**	**Pressure**	**Visibility**	**Wind Dir**	**Wind Speed**	**Gust S**
12:53 AM	**30.0** °F	**25.2** °F	**19.0** °F	64%	**30.31** in	**10.0** mi	NW	**4.6** mph	-
1:53 AM	**25.0** °F	**18.1** °F	**18.0** °F	75%	**30.32** in	**10.0** mi	ESE	**5.8** mph	-
2:53 AM	**23.0** °F	**17.0** °F	**16.0** °F	74%	**30.34** in	**10.0** mi	SSE	**4.6** mph	-
3:53 AM	**21.9** °F	**17.2** °F	**16.0** °F	78%	**30.35** in	**10.0** mi	SE	**3.5** mph	-

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Time (MDT)	Temp.	Windchill	Dew Point	Humidity	Pressure	Visibility	Wind Dir	Wind Speed	Gust S
4:53 AM	**19.9** ℉	**14.9** ℉	**15.1** ℉	81%	**30.36** in	**10.0** mi	ESE	**3.5** mph	-
5:53 AM	**19.9** ℉	-	**15.1** ℉	81%	**30.37** in	**10.0** mi	Calm	Calm	-
6:53 AM	**19.9** ℉	-	**16.0** ℉	85%	**30.38** in	**10.0** mi	Calm	Calm	-
7:53 AM	**21.9** ℉	-	**16.0** ℉	78%	**30.38** in	**10.0** mi	Calm	Calm	-
8:53 AM	**23.0** ℉	-	**16.0** ℉	74%	**30.39** in	**10.0** mi	Calm	Calm	-
9:53 AM	**27.0** ℉	-	**18.0** ℉	69%	**30.37** in	**10.0** mi	Calm	Calm	-
10:53 AM	**35.1** ℉	-	**19.9** ℉	54%	**30.34** in	**10.0** mi	Calm	Calm	-
11:53 AM	**46.0** ℉	**44.8** ℉	**12.0** ℉	25%	**30.29** in	**10.0** mi	NW	**3.5** mph	-
12:53 PM	**48.9** ℉	-	**12.9** ℉	24%	**30.26** in	**10.0** mi	Variable	**4.6** mph	-
1:53 PM	**52.0** ℉	-	**16.0** ℉	24%	**30.24** in	**10.0** mi	Calm	Calm	-
2:53 PM	**54.0** ℉	-	**21.0** ℉	28%	**30.22** in	**10.0** mi	Calm	Calm	-
3:53 PM	**54.0** ℉	-	**24.1** ℉	31%	**30.22** in	**10.0** mi	WNW	**5.8** mph	-
4:53 PM	**54.0** ℉	-	**21.9** ℉	29%	**30.22** in	**10.0** mi	NNW	**3.5** mph	-
5:53 PM	**55.9** ℉	-	**21.9** ℉	27%	**30.19** in	**10.0** mi	Calm	Calm	-
6:53 PM	**48.9** ℉	-	**25.0** ℉	39%	**30.21** in	**10.0** mi	Calm	Calm	-
7:53 PM	**41.0** ℉	**36.4** ℉	**26.6** ℉	57%	**30.16** in	**10.0** mi	SE	**6.9** mph	-
9:53 PM	**35.1** ℉	**31.0** ℉	**25.0** ℉	67%	**30.21** in	**10.0** mi	South	**4.6** mph	-
10:53 PM	**32.0** ℉	**28.7** ℉	**24.1** ℉	73%	**30.16** in	**10.0** mi	SSE	**3.5** mph	-
11:53 PM	**30.9** ℉	**27.5** ℉	**24.1** ℉	76%	**30.11** in	**10.0** mi	SE	**3.5** mph	-

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