Section 3.3 Hydrology

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3.3 Hydrology

The following paragraphs discuss the hydrology of Silver Bow Creek in the vicinity of the Silver Bow Site, Beaver Pond Area (and other groundwater-fed surface expressions) and Sheep Gulch upstream and downstream of the Silver Bow Site under higher (i.e. spring) flow conditions and lower (i.e. fall) flow conditions. The hydrologic setting and stream base flows were also discussed in detail in Section 2.2.2, Hydrology and Stream Base Flows, of the CCRA (Barr, 2006a). For the purpose of this section, discussion is based on data collected in 2008 supplemented with regional hydrology information for Silver Bow Creek. The 2008 data set is the most comprehensive set collected, in particular for on-site flows, and is the first stream gauging by Rhodia of Silver Bow Creek after its reconstruction.

3.3.1 Surface Water Flow Investigation

Surface-water features near the Silver Bow Site consist of a small ephemeral stream called Sheep Gulch and a series of four ponds including the one commonly referred to as the beaver pond. The beaver pond area is located between the tailing basin and the north property line of the site. Sheep Gulch runs northward along the western portion of the Silver Bow Site and into Silver Bow Creek.

Hydrologic field work was completed in accordance with the Phase 1 RFI Work Plan (Barr, 2009). Stream flow measurements were collected and the stream flow rates were calculated in accordance with the SOP included in the Field Sampling Plan and as described below. The surface water flow investigation was designed to provide a description of the physical properties of the surface waters around on the Silver Bow Site and the receiving waters of Silver Bow Creek.

3.3.1.1 Stream Gauging

Stream gauging was conducted at the Silver Bow Site during a spring 2008 event (May 19, 2008 through May 24, 2008) and a fall 2008 event (September 16, 2008 through September 21, 2008). Stream flow measurement locations are shown on Figure 3.3-1. The field data, estimated flow values, staff gauge readings (where applicable), a graphical presentation of station flow vs. depth (where applicable) and photographs of each surface water location for the spring and fall 2008 events are provided in Appendix 3.3-A.

During both events, stream gauging was conducted at locations SW-1, SW-3 through SW-6, SW-8, SW-10, SW-11, SW-13 through 17, and SW-20. At SW-10, SW-5, and SW-11, stream gauging was conducted at the outlet of each pond. No water was present at SW-2, SW-9, SW-18, and SW-19 during either event.

Staff gauges were installed and surveyed during the spring 2008 field event in three of the four ponds (SW-10, SW-11, and SW-12). The staff gauge previously installed in the fourth pond (SW-5) was resurveyed along with the staff gauge in Sheep Gulch (SW-6). Surveyed elevations for these staff gauges and water elevations read from the gauges are included in Table 3.3-1.

Locations SW-3 and SW-4 had previously installed stream flow measuring structures, but these structures are no longer suitable for providing accurate flow data. Flow was measured at these locations with a handheld current meter during the spring and fall 2008 field events.

3.3.1.2 Stream Gauging Methods

Stream gauging was performed in accordance with the SOPs for the Determination of Flow Rate in an Open Channel Using a Handheld Current Meter, included in the Field Sampling Plan of the Final RFI Work Plan (Barr, 2009). Stream velocity was measured at a series of points across the stream channel with a Marsh-McBirney electromagnetic type handheld current meter mounted on a wading rod at 60% of the water depth from the top and averaged over 40 second intervals. The spacing between points varied with the total width of the stream channel, from 0.1 ft for narrow channels to 2 ft for wider channels. Water depth was measured at each point using the same wading rod used to hold the current meter.

The water depth and flow velocity at each point were used to represent the average depth and velocity in the segment of stream extending half the distance to the next point, and half the distance to the previous point. The dimensions of a segment are the width, which is the sum of half the distance to the previous point and half the distance to the next point, and the height, which is the depth of water at the point of the velocity measurement. Multiplying the width, by the height of the segment gave an estimate of the cross-sectional area of the segment, which was multiplied by the measured velocity to give an average flow for the segment. Summing the flow from each segment in a cross-section yielded an estimate of the total flow of water through the channel at the location.

The flow rates were calculated using point velocities, section widths and section depths (i.e. mid-point method). Accuracy of flow measurements is affected by variations in stream channel conditions, less than optimal stream gauging conditions, field techniques ("human error") and the utilized equipment, which can introduce errors. However, with selection of appropriate stream gauging locations and careful measurements, measured flow will likely be within 15% of actual flow (Montana Department of Environmental Quality, MDEQ, 1995). Therefore, the data provided in Appendix 3.3-A is presented with an accuracy of ± 15% of the measured value.

3.3.2 Silver Bow Creek Hydrology

3.3.2.1 Silver Bow Creek Regional Hydrology

The Silver Bow Site is in the Upper Silver Bow Basin, a watershed bounded by mountainous divides. Silver Bow Creek is the primary stream in the vicinity of the Silver Bow Site, and is the regional discharge zone for groundwater and surface water. Silver Bow Creek flows from east to west through the reach north of the Silver Bow Site. Silver Bow Creek is located approximately 1,000 to 1,500 feet north of German Gulch Road, and about 1,500 feet north of the Tailings/Slag area and the production facilities in the Plant area.

Silver Bow Creek was used as a conduit for mining, smelting, industrial and municipal wastes for over 100 years (MDEQ, 1995). It has been designated as a federal Superfund site from about 5 miles upstream of the Silver Bow Site, to near Warm Springs ponds, approximately 12 miles downstream of the Silver Bow Site because of the presence of mine tailings from upstream sources. The site is called the Streamside Tailings Operable Unit (SSTOU) of the Silver Bow Creek/Butte Area Superfund Site. Rhodia is not a potentially responsible party to this Superfund site. The 23-mile reach from Butte to Warm Springs ponds was reconstructed as part of the Superfund site remedy.

Two United States Geological Survey (USGS) stream gauging stations on Silver Bow Creek bracket the Site upstream and downstream. The closest stream flow gauging station (number 12323250) is located at 45º 59' 49" N latitude and 112º 33' 43" W longitude, approximately seven miles upstream of the site. The station is located in Butte, Montana, as shown on Figure 3.3-2, below the confluence of Blacktail Creek and Silver Bow Creek. The drainage area to the station is approximately 103 square miles. Base flow was estimated for a 19-year period of record for the station (10/1/83 to 9/30/03) based on the methodology of White and Sloto (1990). The harmonic mean of base flow (largely the groundwater contribution to stream flow) was 18 cubic feet per second (cfs). The minimum and maximum total flows recorded at the gauging station were 8 cfs and 258 cfs, respectively (USGS, 2004a), while the minimum and maximum base flows were calculated to be 8 cfs and 100 cfs respectively.

The next downstream flow gauging station (number 12323600) is located at 46º 06' 28" N latitude and 112º 48' 17" W longitude, approximately 12 miles downstream of the site. The station is located in Opportunity, Montana, as shown on Figure 3.3-3. The drainage area for the station is approximately 363 square miles. Base flow was estimated for a 14-year period for the station (10/1/88 to 9/30/03) using the same methodology as for gauging station number 12323250. The harmonic mean of base flow was 32 cfs. The minimum and maximum total flows recorded at the

gauging station were 11 cfs and 1,300 cfs, respectively (USGS, 2004b), while the minimum and maximum base flows were 11 cfs and 300 cfs, respectively.

In the 19 miles between the two gauging stations, Silver Bow Creek gains approximately 14 cfs of base flow. The minimum base flow increases by 3 cfs and the maximum increases by 200 cfs. By linear interpolation, the average base flow in the vicinity of the Silver Bow Site would be approximately 23 cfs.

3.3.2.2 2008 Observations

During both the spring and fall 2008 stream gauging events, stream flow measurements were collected at five locations along Silver Bow Creek (SW-14, SW-15, SW-16, SW-17, and Sheep Gulch station SW-13), as shown on Figure 3.3-1. Flow measurements obtained at stations SW-14 and SW-15 were collected upstream and downstream of the Silver Bow Site, respectively. The flow measurements collected at stations SW-16 and SW-17 were adjacent to the Silver Bow Site. Measurements at SW-16 were collected in the main channel of Silver Bow Creek just upstream from location SW-17. Measurements at SW-17 were collected in the outflow of a constructed wetland created by the SSTOU remedy that enters Silver Bow Creek. Surface water flow from Sheep Gulch (SW-13) enters another constructed wetland that discharges to Silver Bow Creek upstream from station SW-15. Sheep Gulch was contributing 2 to 4 percent of the flow in Silver Bow Creek during these two monitoring events, as calculated from the observations presented in the table below.

Station	Silver Bow Creek Flowrate (cfs)	
	Spring 2008 (May 15, 2008)	Fall 2008 (Sep 20, 2008)
SW-14	33 ± 5	18 ± 3
SW-16	33 ± 5	20 ± 3
SW-17 (flow into Silver Bow Creek)	0.6 ± 0.1	0.6 ± 0.1
SW-13 (flow into Silver Bow Creek)	0.6 ± 0.1	0.8 ± 0.1
SW-15	32 ± 5	23 ± 3
	Steady	Steady to Slightly Gaining

The measured flow rates are steady to slightly increasing between the upstream (SW-14) and downstream (SW-15) stations along Silver Bow Creek. The slight increase and decrease in May 15, 2008 flow rates between SW-14 and SW-15 is not significant given the accuracy of the measurement procedures, but Silver Bow Creek is generally gaining base flow as it passes through the area. The measured flows of 33 cfs, about 10 cfs higher than the estimated base flow, suggest a modest runoff

contribution from the watershed, and the stream could be both gaining and losing in this reach. The slight increase in the September 20, 2008 flow rates between SW-14 and SW-15 indicates that Silver Bow Creek was gaining flow, and it reached the estimated base flow of 23 cfs for this segment.

Figure 3.3-3 presents spring 2008 Silver Bow Creek main channel calculated flow data and real time provisional flow data obtained from the USGS website (USGS, 2008) for the gauging station located below Blacktail Creek (45º 59' 49" N latitude and 112º 33' 43" W longitude) on Silver Bow Creek (Butte Gauging Station) and at Opportunity (46º 06' 28" N latitude and 112º 48' 17" W longitude) (Opportunity Gauging Station). The USGS gauging stations are shown on Figure 3.3-2. The data on Figure 3.3-3 shows the measured flows near the Silver Bow Site (SW-14, SW-15 and SW-16) to be fairly consistent with USGS data from the Butte Gauging Station. The contribution of flow from Brown's Creek and other Silver Bow Creek tributaries, and the spring season when base flows are augmented by runoff, likely account for the much higher flows in the USGS data from the Opportunity Gauging Station.

Figure 3.3-4 presents fall 2008 Silver Bow Creek main channel calculated flow data and daily mean flow data for the Butte and Opportunity Gauging Stations. Daily mean flow provisional data was obtained from the USGS website (USGS, 2008) for the Butte Gauging Station and the Opportunity Gauging Station, upstream and downstream, respectively, of the site. The USGS gauging stations are shown on Figure 3.3-2.

The data on Figure 3.3-4 show the measured flows near the Silver Bow Site (SW-14, SW-15 and SW-16) to be fairly consistent with USGS data from the Butte Gauging Station and the Opportunity Gauging Station. Measured flow for the downstream surface water sampling station SW-15 (23 ± 3 cfs) was higher than the mean flow for September 16-17, 2008 reported for the Opportunity Gauging Station located 12 miles further downstream. However, the calculated data is within the range of daily mean flow between the Butte and Opportunity Gauging Stations when considering data accuracy of ± 15%. Alternatively, these data appear to suggest that for this date, Silver Bow Creek gains flow (i.e. gaining stream) as it approaches and passes the Silver Bow Site and loses flow as it progresses towards the Opportunity Gauging Station (i.e. losing stream). This condition is entirely plausible, given that Silver Bow Creek was flowing at less than normal base flow at both the Butte and Opportunity Gauging Stations, and there is clearly groundwater discharge in the Ramsay Flats area west of Interstate 15.

3.3.2.3 2012 Staff Gauge Installation

Five staff gauges (SG-12-1 through SG-12-5) were installed in Silver Bow Creek and the ponds to the south of Silver Bow Creek as described in the October 2012 RFI Work Plan (Barr, 2012). The staff gauges were surveyed after installation and the locations are shown on Figure 3.3-5. In addition to these new staff gauges along Silver Bow Creek, the staff gauge located at SW-1 south of the tailing basin in Sheep Gulch was replaced. Surveyed staff gauge elevations and surface water elevation readings collected in November 2012 from the above mentioned staff gauges are included in Table 3.3-2. The 2012 surface water elevation data was evaluated and presented in conjunction with the groundwater elevation data presented in Section 3.2. As noted in Section 3.2, these surveyed elevations are accurate to the nearest 0.1 foot. It is anticipated that a survey accurate to 0.01 foot will be completed in 2013; this survey will also include the replaced staff gauge SW-1. Table 3.3-2 also includes surface water elevations measured in November 2012 at SW-6, SW-10, SW-11, and SW-12.

3.3.3 Beaver Pond Hydrology

The water flow from station (SW-5) and the three adjacent surface water expressions SW-10, SW-11 and SW-12 (collectively the Beaver Pond Area) were evaluated in the spring and fall on May 20–21, 2008 and September 17–21, 2008 respectively. The station SW-5 had an existing staff gauge. Additional staff gauges were installed at surface water locations SW-10, SW-11 and SW-12 on May 24, 2008.

During the spring and fall 2008 events, surface water flow between Beaver Pond Area groundwater-fed surface water features was observed. The surface water flow was observed to begin at SW-10 then flow to SW-5, SW-12, SW-11 and Sheep Gulch, respectively.

Flow measurements were collected with the portable flow meter from channels between SW-10 and SW-5 (Beaver Pond); SW-5 and SW-12; and SW-11 and Sheep Gulch. Flow measurements in the channel between SW-12 and SW-11 were not feasible due to the obstructions (e.g. tree trunks, branches and sticks) present in the channel. Where applicable, the field data, estimated flow values, staff gauge readings, a graphical presentation of station flow vs. depth and photographs for the spring and fall 2008 events are provided in Appendix 3.3-A. Flow measurement data and calculated flow values should be considered to have an accuracy of ± 15%.

Station	Beaver Pond Area Flowrate (cfs)	
	Spring 2008 (May 20-21, 2008)	Fall 2008 (Sep 17-21, 2008)
SW-10	0.05 ± 0.008	0.05 ± 0.008
SW-5	0.44 ± 0.07	0.33 ± 0.05
SW-11	0.38 ± 0.07	0.27 ± 0.05
	Gaining	Gaining

Although the Beaver Pond Area surface water locations receive groundwater, it appears SW-5 receives the most groundwater influence based on the flow data collected at the outlet locations of SW-10 and SW-11. The measured flows indicate a net gain of water is occurring at SW-5. The measured flow at SW-11's outlet is similar to SW-5's outlet which appears to indicate little net gain or loss between SW-5's outlet and Sheep Gulch.

3.3.4 Sheep Gulch Hydrology

Sheep Gulch serves as the discharge conduit for the Renewable Energy Corporation (REC) Plant located south of the Silver Bow Site. Monthly average discharge rate from the REC Plant for May and September 2008 was 1.25 cfs and 1.23 cfs respectively (http://www.epa-echo.gov/echo/).

During the spring and fall 2008 events, surface water flow between SW-20 (where the REC Plant discharge enters Rhodia property) and SW-13 (where Sheep Gulch flow enters Silver Bow Creek) was monitored at multiple locations at the Silver Bow Site. From SW-20, the surface water flows to SW-8, SW-1, SW-3, SW-4, SW-6, SW-13 and Silver Bow Creek, respectively, as shown on Figure 3.3-1.

The surface water flow originating from the REC Plant was observed to enter Rhodia property approximately 80 feet south of SW-20. At this location, REC Plant discharge water travels within a small marsh, approximately 60 feet wide. At SW-20, surface water flow is primarily in a slot-shaped, narrow channel.

Station	Sheep Gulch Flowrate (cfs)	
	Spring 2008 (May 20-21, 2008)	Fall 2008 (Sep 17-21, 2008)
REC Discharge (1)	1.25	1.23
SW-20	0.39 ± 0.06	1.1 ± 0.2
SW-8	0.28 ± 0.04	0.7 ± 0.1
SW-1	0.18 ± 0.03	0.7 ± 0.1

Station	Sheep Gulch Flowrate (cfs)	
	Spring 2008 (May 20-21, 2008)	Fall 2008 (Sep 17-21, 2008)
SW-3	0.19 ± 0.03	1.0 ± 0.1
SW-4	0.28 ± 0.04	0.9 ± 0.1
SW-11 (Beaver Pond Area flow to Sheep Gulch)	0.38 ± 0.06	0.27 ± 0.04
SW-6	0.7 ± 0.1	1.2 ± 0.2
SW-13	0.6 ± 0.1	0.8 ± 0.1

(1) Source: http://www.epa-echo.gov/echo/

May 2008 Data

Based on the reported REC discharge rate and measured flow rate for SW-20, Sheep Gulch appears to be losing flow as it travels toward the Silver Bow Site and continues to lose flow as it travels between SW-20 and SW-1. Flow values between SW-4 and SW-6 indicate Sheep Gulch is gaining in the vicinity of the Beaver Pond Area. The flow rate is steady to losing as Sheep Gulch continues further downstream to SW-13 and Silver Bow Creek. It is typical for tributaries to lose flow to groundwater as they approach their confluence.

September 2008 Data

The measured flow rates for the September 2008 measurements show a similar losing trend between the REC discharge and SW-1. Flow values for SW-4 and SW-6 indicate Sheep Gulch is gaining in the vicinity of the beaver ponds. The flow values indicate that Sheep Gulch is losing flow as it continues further downstream to SW-13. In addition, a downward vertical gradient was observed in the water elevations measured in the nested piezometers (P-06-3/P-06-4) located in this area.

3.3.5 Hydrology Summary

The surface water features associated with the Silver Bow Site include Sheep Gulch, groundwater fed ponds and wetlands (a.k.a. "Beaver Pond Area"), and Silver Bow Creek. The REC Plant water discharge contributes the bulk of the surface water flow to Sheep Gulch upstream of the Silver Bow Site. The average discharge rates reported by REC compared to the measured flow rate at the upstream boundary of the Silver Bow Site (SW-20) demonstrate that Sheep Gulch is a losing stream in this area. Sheep Gulch continues to lose flow as it travels north toward SW-8/SW-1. Sheep Gulch generally gains flow as it travels around the tailing basin (i.e., SW-1 to SW-4).

The Beaver Pond Area and associated wetlands contribute flow to Sheep Gulch. In spring 2008, the Beaver Pond Area flow more than doubled the Sheep Gulch flow measured from upstream of the Beaver Pond Area (SW-4) to the next downstream location (SW-6). In fall 2008, the Beaver Pond

Area flow was about 1/3 of the flow measured at SW-6. In 2008, Sheep Gulch was a steady to slightly losing stream as it traveled north toward Silver Bow Creek.

Silver Bow Creek is a steady to slightly gaining stream as it flows past the Silver Bow Site. Even with the REC Plant discharge, Sheep Gulch contributes less than 5% of the water flow of Silver Bow Creek through this area.

3.3.6 References

Barr Engineering Co. 2006a. Current Conditions/Release Assessment Report Corrective Action Order on Consent Docket No. RCRA-08-2004-0001., Rhodia Silver Bow Plant, Butte, Montana, February 2006.

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United States Geological Survey. 2004a. Home Page. http://nwis.waterdata.usgs.gov/nwis/nwisman/?site_no=12323250&agency_cd=USGS

United States Geological Survey. 2004b. Home Page. http://nwis.waterdata.usgs.gov/nwis/nwisman/?site_no=12323600&agency_cd=USGS

White, K.E. and R.A. Sloto. 1990. Base-Flow-Frequency Characteristics of Selected Pennsylvania Streams. U.S. Geological Survey Water-Resources Investigations Report 90-4160.

Tables

Table 3.3-1
2008 Staff Gauge Survey Elevations and Water Elevations
Rhodia Silver Bow Plant

Staff Gauge Station ID	Location Coordinates		Staff Gauge Elevation (at 0')	Surface Water Elevation	
	X	Y		Spring 2008	Fall 2008
SW-6	369240.53	5094974.26	5296.62	5309.85	5310.02
SW-10	369333.20	5094849.25	5311.73	5312.61	5312.6
SW-11	369258.27	5094894.41	5310.45	5311.46	5311.49
SW-12	369278.40	5094908.98	5310.56	5311.54	5311.54

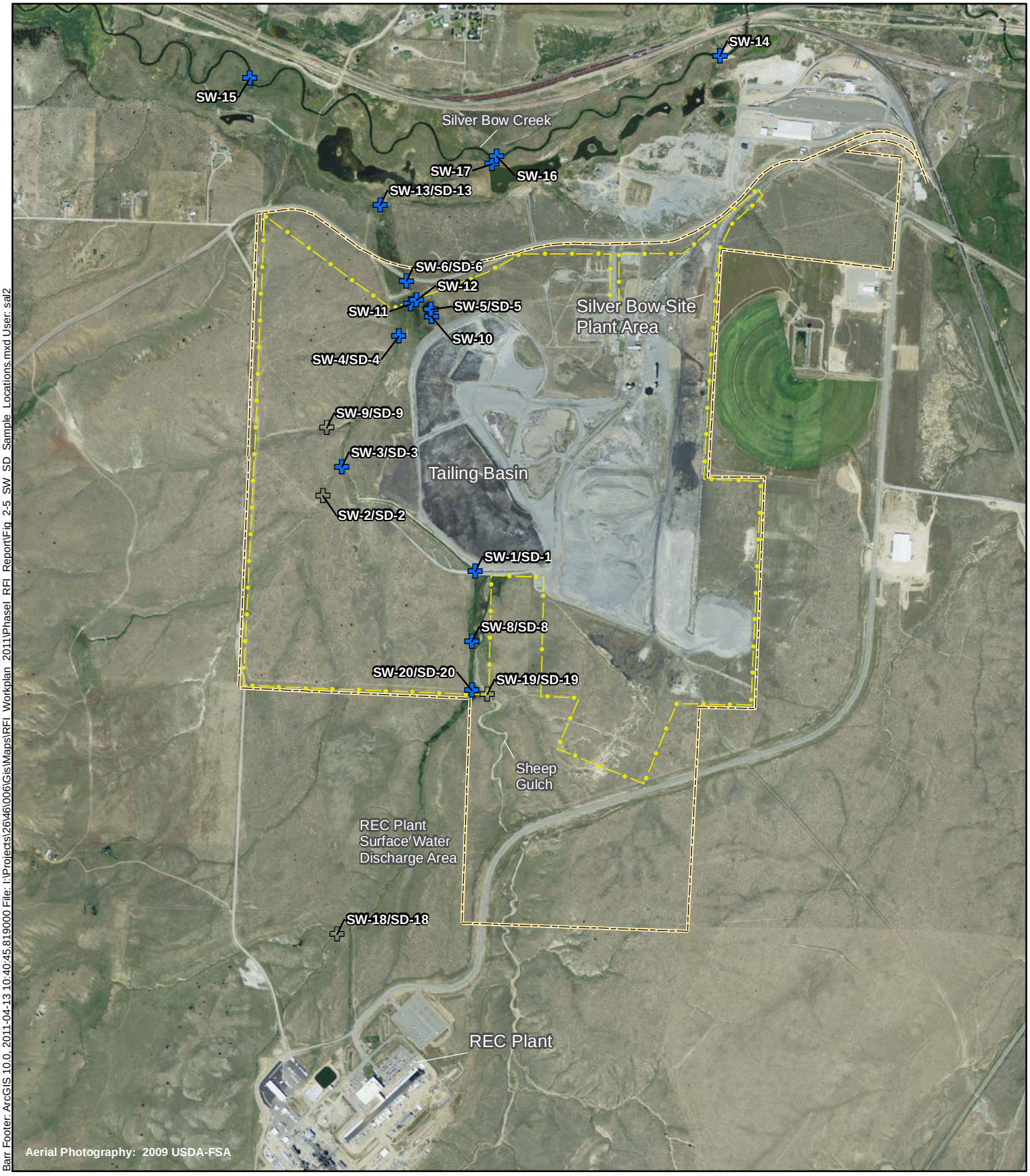
Elevations in Feet Mean Sea Level. Coordinates in UTM Zone 12N.
Staff gauge elevation calculated from surveyed elevation at top of staff gauge.

Table 3.3-2
2012 Staff Gauge Survey Elevations and Water Elevations
Rhodia Silver Bow Plant

Staff Gauge Station ID	Location Coordinates		Staff Gauge Elevation (at 0')	Surface Water Elevation 11/9/2012
	X	Y		
SG-12-1	370319.92	5095796.81	5305.5	5306.0
SG-12-2	369537.98	5095419.94	5297.7	5298.8
SG-12-3	368665.32	5095698.09	5289.7	5290.4
SG-12-4	369232.79	5095305.83	5295.7	5296.6
SG-12-5	369531.42	5095327.00	5299.8	5301.8
SW-6	369240.53	5094974.26	5296.6	5310.12
SW-10	369333.20	5094849.25	5311.7	5312.64
SW-11	369258.27	5094894.41	5310.5	5311.53
SW-12	369278.40	5094908.98	5310.6	5311.47

Elevations in Feet Mean Sea Level. Coordinates in UTM Zone 12N.
Staff gauge elevation calculated from surveyed surface water elevation at time of reading.

Figures



Barr Footer: ArcGIS 10.0, 2011-04-13 10:40:45.819000 File: I:\Projects\26\46\006\Gis\Maps\RFI Workplan 2011\Phase1 RFI Report\Fig 2-5 SW SD Sample Locations.mxd User: sal2

SW-10 — Surface water sample and stage and flow data collected Spring and Fall 2008.

SW-1/SD-1 — Surface water sample and stage and flow data collected Spring and Fall 2008. Sediment sample collected Fall 2008.

SW18/SD-18 — Surface water sample station dry (no surface water sample collected). Sediment sample collected Fall 2008.

Property Boundary

Fence Line

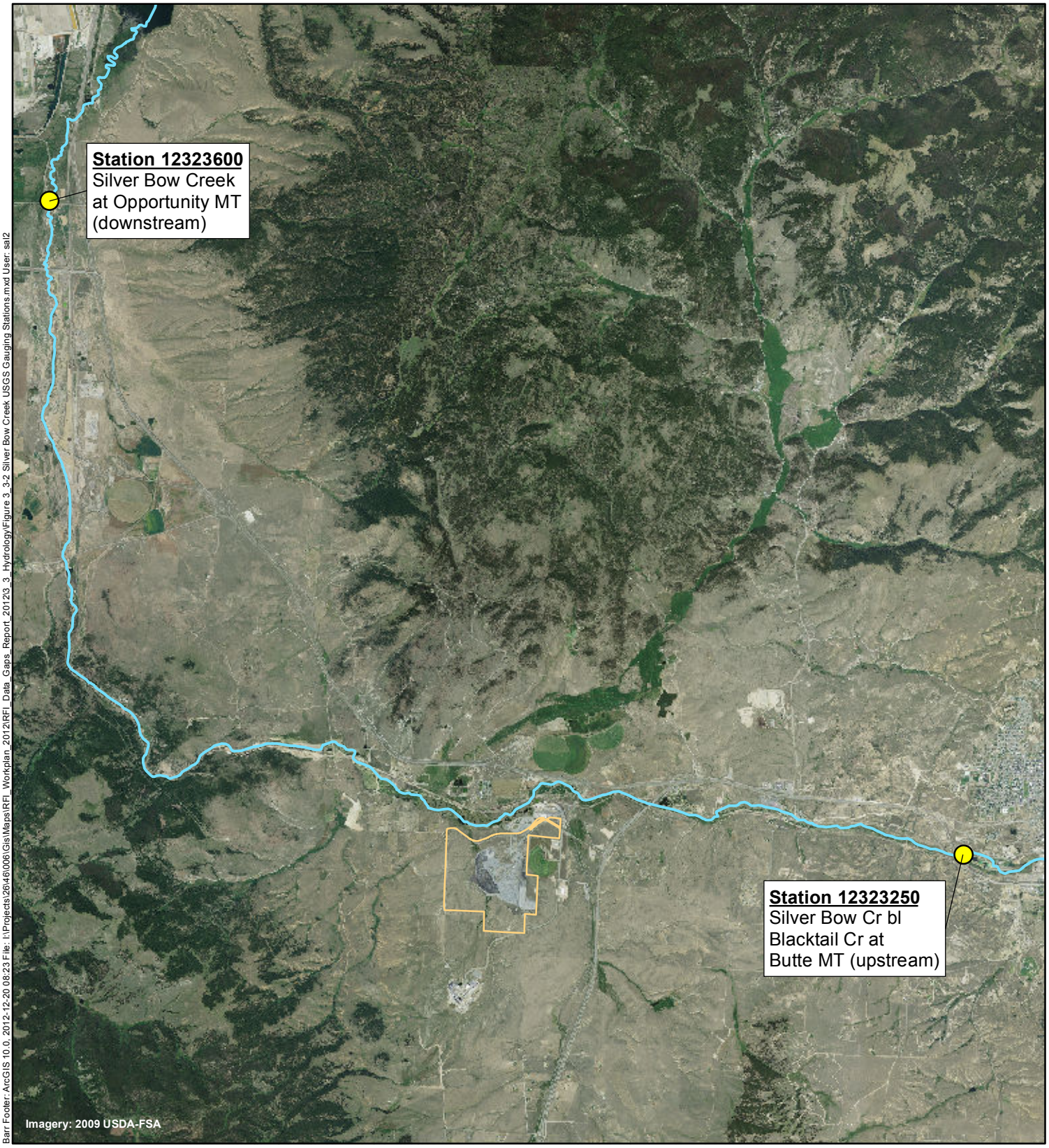
N

Feet

1,500 0 1,500

Figure 3.3-1

SURFACE WATER AND SEDIMENT SAMPLE LOCATIONS
Rhodia Silver Bow Plant
Montana



Barr Footer: ArcGIS 10.0, 2012-12-20 08:23 File: I:\Projects\26461006\Gis\Maps\RFI_Workplan_2012\RFI_Data_Gaps_Report_20123_3_Hydrology\Figure 3_3-2 Silver Bow Creek USGS Gauging Stations.mxd User: sal2

USGS Gauging Station

Silver Bow Creek

Rhodia Property Boundary

N

Feet

7,000 0 7,000

Figure 3.3-2

SILVER BOW CREEK
USGS GAUGING STATIONS
Rhodia Silver Bow Plant
Montana

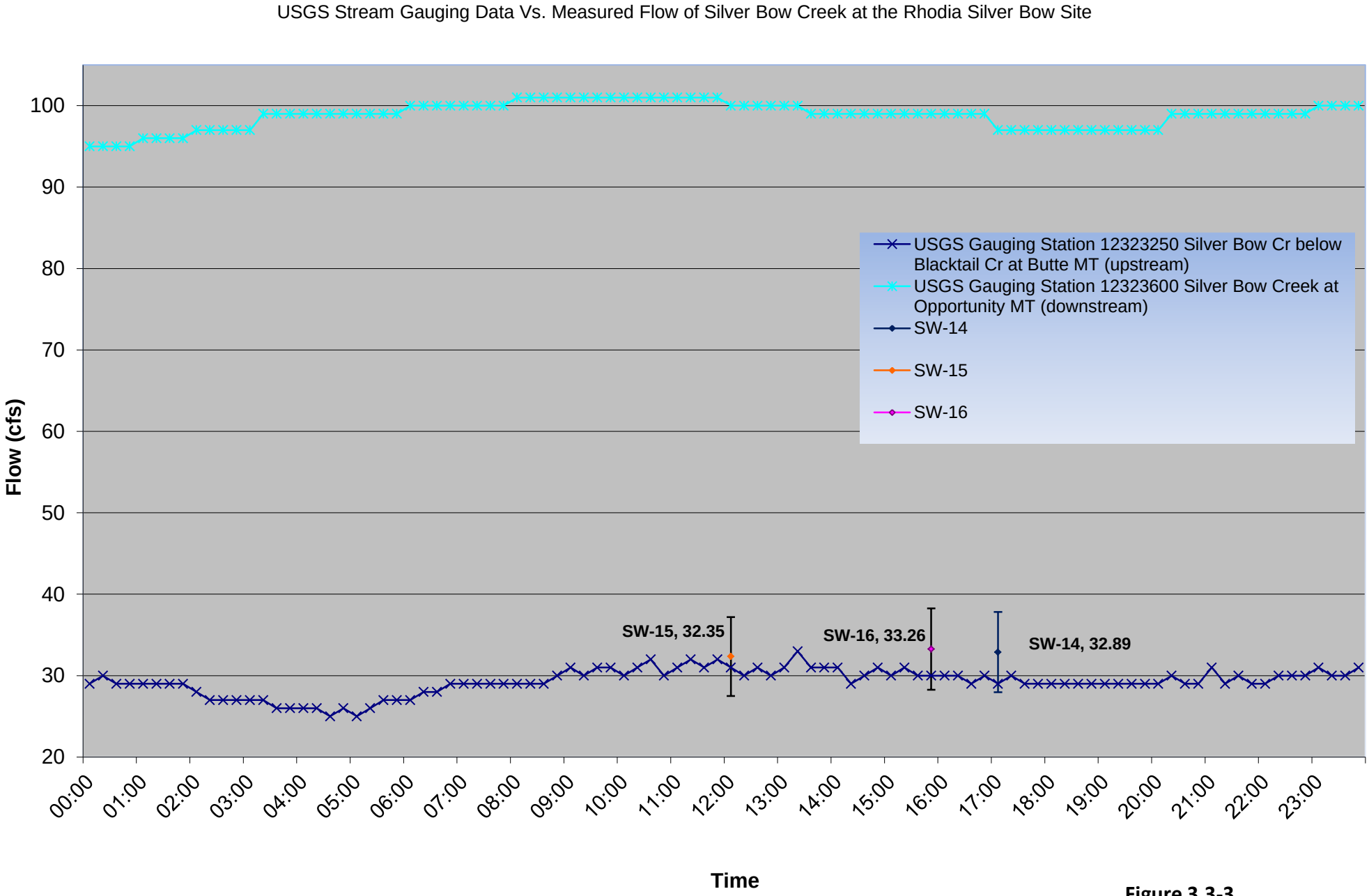


Figure 3.3-3
May 19, 2008 Silver Bow Creek Flow Data

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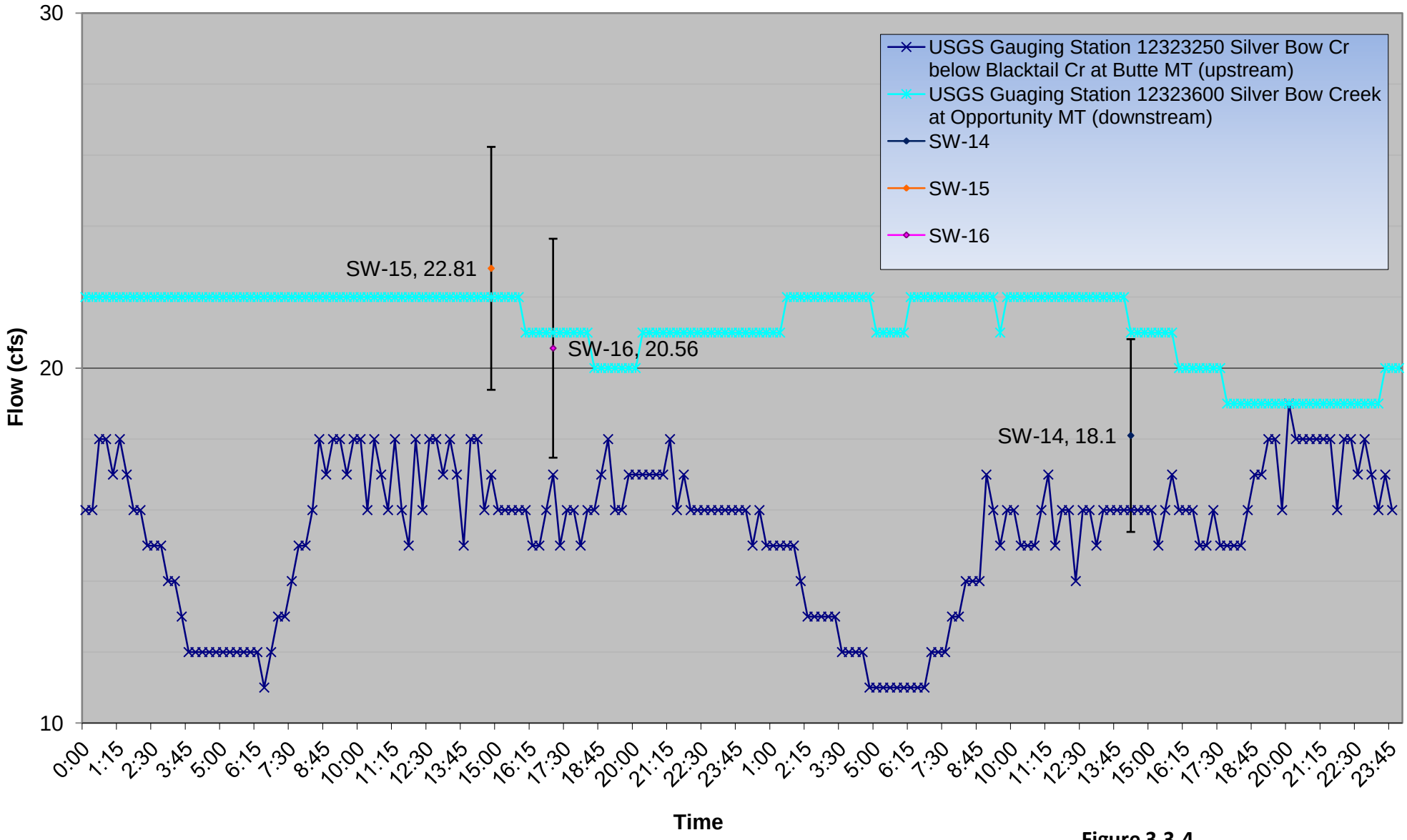

Figure 3.3-4
September 16 and 17, 2008 Silver Bow Creek Flow Data

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Staff Gauge

Property Boundary

Fence Line

Figure 3.3-5

SILVER BOW CREEK
STAFF GAUGE LOCATIONS
Rhodia Silver Bow Plant
Montana

N

Feet

750 0 750

Appendices

Appendix 3.3-A

Spring and Fall 2008 Stream Gauging Data

Appendix 3.3-A

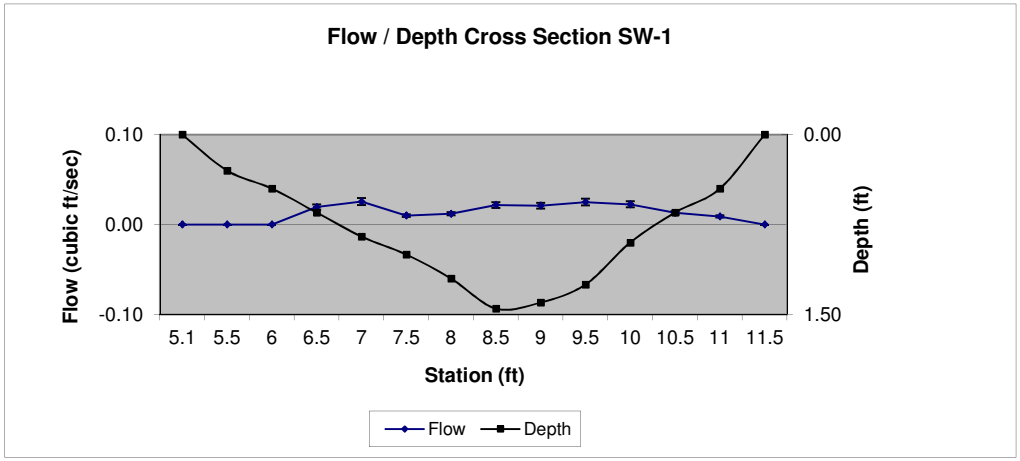
Spring and Fall 2008 Stream Gauging Data

Site: Rhodia Silver Bow Site
Project Number: 26/46-006-SW08
Date: 5/22/2008
Time: 17:05

Appendix 3.3-A - Spring and Fall 2008 Stream Gauging Data

Stream Width (ft): 6.4
Staff Gage (ft): 0.00 Steel post present, staff gauge missing.
Location of Measurement: SW-1 (Flow measurements collected on north side of 5 ft diameter culvert.)
Method of Measurement: six-tenths-depth

Station Distance from Initial Point (ft)	Notes	Depth (ft)	Velocity (ft/s)	Width (ft)	Area (sq ft)	Flow (cu ft/s)	% of Flow in Subsection
5.1	REW	0.00	0.00	0.20	0.00	0.00	0%
5.5		0.30	0.00	0.45	0.14	0.00	0%
6		0.45	0.00	0.50	0.23	0.00	0%
6.5		0.65	0.06	0.50	0.33	0.02	11%
7		0.85	0.06	0.50	0.43	0.03	14%
7.5		1.00	0.02	0.50	0.50	0.01	6%
8		1.20	0.02	0.50	0.60	0.01	7%
8.5		1.45	0.03	0.50	0.73	0.02	12%
9		1.40	0.03	0.50	0.70	0.02	12%
9.5		1.25	0.04	0.50	0.63	0.03	14%
10		0.90	0.05	0.50	0.45	0.02	13%
10.5		0.65	0.04	0.50	0.33	0.01	7%
11		0.45	0.02	1.00	0.45	0.01	5%
11.5	LEW	0.00	0.00	0.25	0.00	0.00	0%
			Estimated Flow: Cubic Feet/Sec			**0.18**	100%



Site: Rhodia Silver Bow Site

Project Number: 26/46-006-SW08

Date: 5/22/2008

Time: 11:46

Appendix 3.3-A - Spring and Fall 2008 Stream Gauging Data

Stream Width (ft): 0.0

V notch wier (ft): 0.00 No flow present

Location of Measurement: SW-2 (No flow present. Previous flow event has eroded soil from around wier and thus rendering it ineffective.)

Method of Measurement: NA

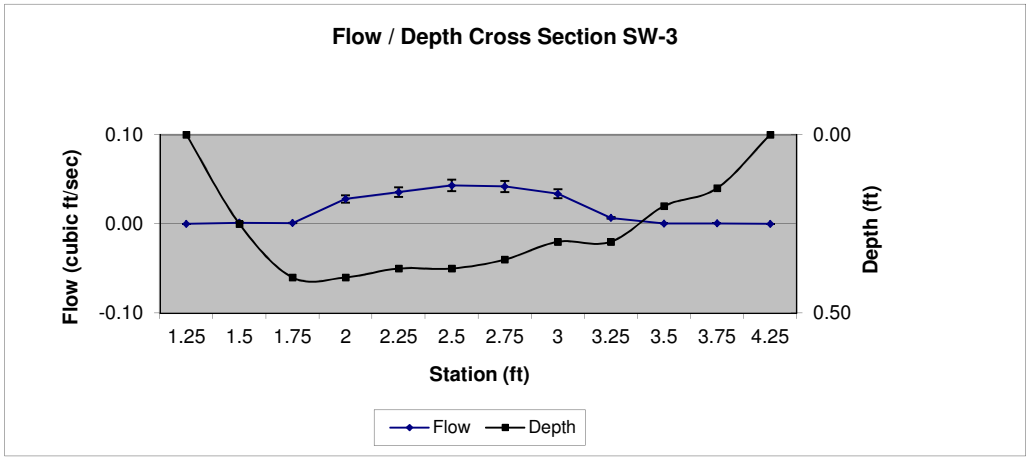
Station Distance from Initial Point (ft)	Notes	Depth (ft)	Velocity (ft/s)	Width (ft)	Area (sq ft)	Flow (cu ft/s)	% of Flow in Subsection
		0.00	0.00	0.00	0.00	0.00	NA
		0.00	0.00	0.00	0.00	0.00	NA
		0.00	0.00	0.00	0.00	0.00	NA
				Estimated Flow: Cubic Feet/Sec		**0.00**	NA

Site: Rhodia Silver Bow Site
Project Number: 26/46-006-SW08
Date: 5/22/2008
Time: 11:10

Appendix 3.3-A - Spring and Fall 2008 Stream Gauging Data

Stream Width (ft): 3.0
Staff Gage (ft): 0.00 water has bypassed flume
Location of Measurement: SW-3 (Flow has bypassed flume. Flow measurements collected on west side of flume in new channel.)
Method of Measurement: six-tenths-depth

Station Distance from Initial Point (ft)	Notes	Depth (ft)	Velocity (ft/s)	Width (ft)	Area (sq ft)	Flow (cu ft/s)	% of Flow in Subsection
1.25	REW	0.00	0.00	0.13	0.00	0.00	0%
1.5		0.25	0.02	0.25	0.06	0.00	1%
1.75		0.40	0.01	0.25	0.10	0.00	1%
2		0.40	0.28	0.25	0.10	0.03	15%
2.25		0.38	0.38	0.25	0.09	0.04	19%
2.5		0.38	0.46	0.25	0.09	0.04	22%
2.75		0.35	0.48	0.25	0.09	0.04	22%
3		0.30	0.45	0.25	0.08	0.03	18%
3.25		0.30	0.09	0.25	0.08	0.01	4%
3.5		0.20	0.01	0.25	0.05	0.00	0%
3.75		0.15	0.01	0.38	0.06	0.00	0%
4.25	LEW	0.00	0.00	0.25	0.00	0.00	0%
			Estimated Flow: Cubic Feet/Sec			**0.19**	100%

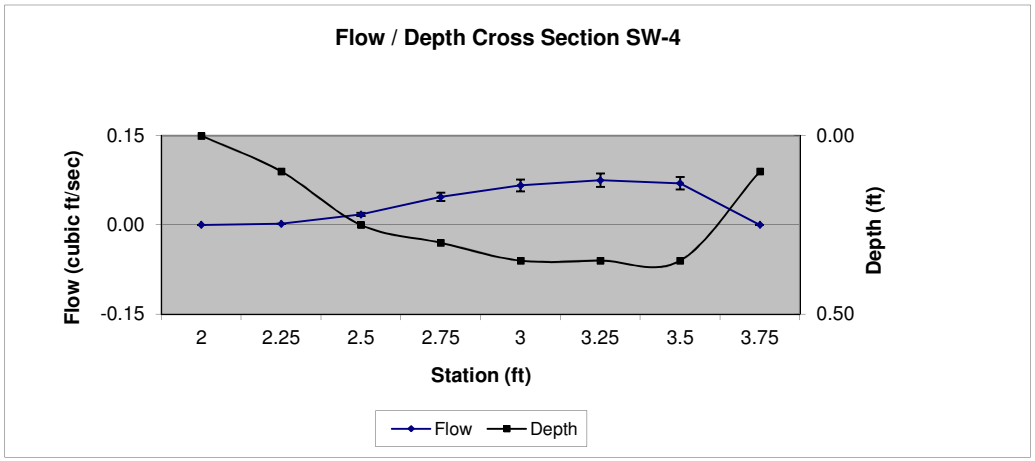


Site: Rhodia Silver Bow Site
Project Number: 26/46-006-SW08
Date: 5/21/2008
Time: 18:30

Appendix 3.3-A - Spring and Fall 2008 Stream Gauging Data

Stream Width (ft): 1.8
Staff Gage (ft): 0.16 Flume unlevel
Location of Measurement: SW-4 Flume is unlevel and stream has partially bypassed flume mouth. (flow measurements collected 7 feet south of flume mouth.)
Method of Measurement: six-tenths-depth

Station Distance from Initial Point (ft)	Notes	Depth (ft)	Velocity (ft/s)	Width (ft)	Area (sq ft)	Flow (cu ft/s)	% of Flow in Subsection
2	LEW	0.00	0.00	0.13	0.00	0.00	0%
2.25		0.10	0.08	0.25	0.03	0.00	1%
2.5		0.25	0.28	0.25	0.06	0.02	6%
2.75		0.30	0.63	0.25	0.08	0.05	17%
3		0.35	0.76	0.25	0.09	0.07	24%
3.25		0.35	0.86	0.25	0.09	0.08	27%
3.5		0.35	0.80	0.25	0.09	0.07	25%
3.75	REW	0.10	0.00	0.13	0.01	0.00	0%
			Estimated Flow: Cubic Feet/Sec			**0.28**	100%

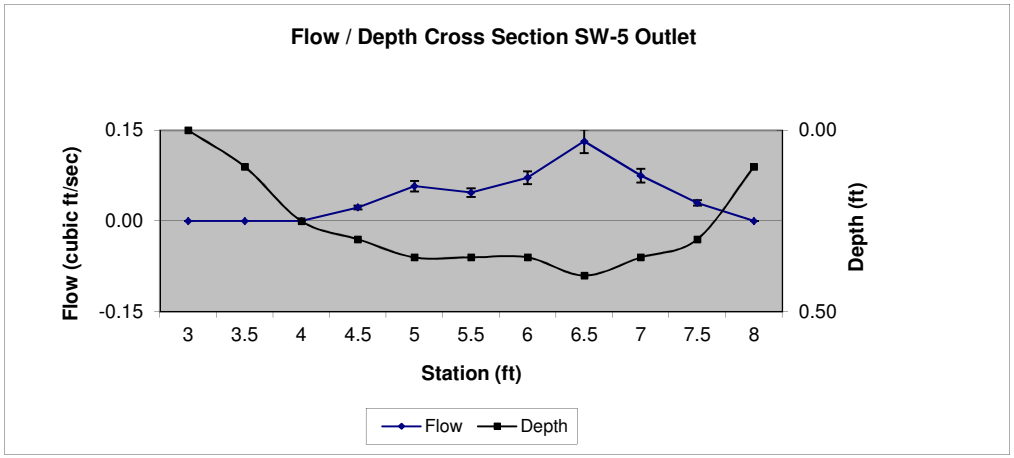


Appendix 3.3-A - Spring and Fall 2008 Stream Gauging Data

Site: Rhodia Silver Bow Site
Project Number: 26/46-006-SW08
Date: 5/21/2008
Time: 15:37

Stream Width (ft): 5.0
Staff Gage (ft): 5.27 read pm of 5/20/2008
Location of Measurement: SW-5 (flow measurements collected at the outlet approximately 90 feet north of SW-5 staff gauge.)
Method of Measurement: six-tenths-depth

Station Distance from Initial Point (ft)	Notes	Depth (ft)	Velocity (ft/s)	Width (ft)	Area (sq ft)	Flow (cu ft/s)	% of Flow in Subsection
3	LEW	0.00	0.00	0.25	0.00	0.00	0%
3.5		0.10	0.00	0.50	0.05	0.00	0%
4		0.25	0.00	0.50	0.13	0.00	0%
4.5		0.30	0.15	0.50	0.15	0.02	5%
5		0.35	0.33	0.50	0.18	0.06	13%
5.5		0.35	0.27	0.50	0.18	0.05	11%
6		0.35	0.41	0.50	0.18	0.07	16%
6.5		0.40	0.66	0.50	0.20	0.13	30%
7		0.35	0.43	0.50	0.18	0.08	17%
7.5		0.30	0.20	0.50	0.15	0.03	7%
8	REW	0.10	0.00	0.25	0.03	0.00	0%
			Estimated Flow: Cubic Feet/Sec			**0.44**	100%

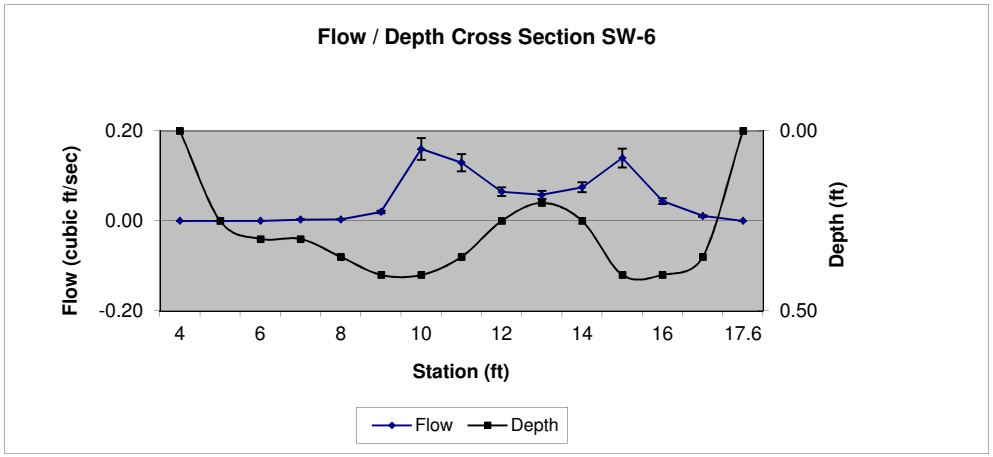


Site: Rhodia Silver Bow Site
Project Number: 26/46-006-SW08
Date: 5/20/2008
Time: 16:40

Stream Width (ft): 13.6
Staff Gage (ft): 13.23
Location of Measurement: SW-6 (22.5 feet south of staff gauge.)
Method of Measurement: six-tenths-depth

Appendix 3.3-A - Spring and Fall 2008 Stream Gauging Data

Station Distance from Initial Point (ft)	Notes	Depth (ft)	Velocity (ft/s)	Width (ft)	Area (sq ft)	Flow (cu ft/s)	% of Flow in Subsection
4	LEW	0.00	0.00	0.50	0.00	0.00	0%
5		0.25	0.00	1.00	0.25	0.00	0%
6		0.30	0.00	1.00	0.30	0.00	0%
7		0.30	0.01	1.00	0.30	0.00	0%
8		0.35	0.01	1.00	0.35	0.00	0%
9		0.40	0.05	1.00	0.40	0.02	3%
10		0.40	0.40	1.00	0.40	0.16	23%
11		0.35	0.37	1.00	0.35	0.13	18%
12		0.25	0.26	1.00	0.25	0.07	9%
13		0.20	0.29	1.00	0.20	0.06	8%
14		0.25	0.30	1.00	0.25	0.08	11%
15		0.40	0.35	1.00	0.40	0.14	20%
16		0.40	0.11	1.00	0.40	0.04	6%
17		0.35	0.04	0.80	0.28	0.01	2%
17.6	REW	0.00	0.00	0.30	0.00	0.00	0%
			Estimated Flow: Cubic Feet/Sec			**0.71**	100%

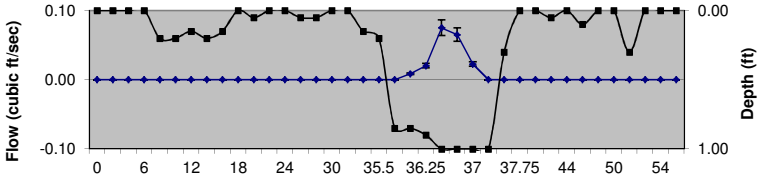


Site: Rhodia Silver Bow Site
Project Number: 26/46-006-SW08
Date: 5/22/2008
Time: 17:05

Appendix 3.3-A - Spring and Fall 2008 Stream Gauging Data

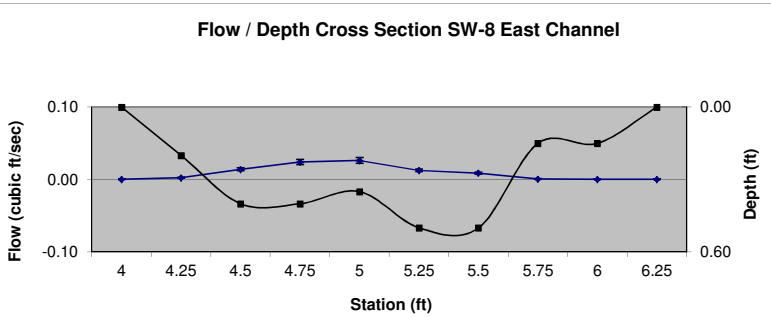
Stream Width (ft): 56.0 and 2.3
Staff Gage (ft): NA
Location of Measurement: SW-8 (Location is currently very wide with areas of stagnant water and 2 distinct channels.)
Method of Measurement: six-tenths-depth

West Channel Station Distance from Initial Point (ft)	Notes	Depth (ft)	Velocity (ft/s)	Width (ft)	Area (sq ft)	Flow (cu ft/s)	% of Flow in Subsection
0	REW	0.00	0.00	1.00	0.00	0.00	0%
2		0.00	0.00	2.00	0.00	0.00	0%
4		0.00	0.00	2.00	0.00	0.00	0%
6		0.00	0.00	2.00	0.00	0.00	0%
8		0.20	0.00	2.00	0.40	0.00	0%
10		0.20	0.00	2.00	0.40	0.00	0%
12		0.15	0.00	2.00	0.30	0.00	0%
14		0.20	0.00	2.00	0.40	0.00	0%
16		0.15	0.00	2.00	0.30	0.00	0%
18		0.00	0.00	2.00	0.00	0.00	0%
20		0.05	0.00	2.00	0.10	0.00	0%
22		0.00	0.00	2.00	0.00	0.00	0%
24		0.00	0.00	2.00	0.00	0.00	0%
26		0.05	0.00	2.00	0.10	0.00	0%
28		0.05	0.00	2.00	0.10	0.00	0%
30		0.00	0.00	2.00	0.00	0.00	0%
32		0.00	0.00	2.00	0.00	0.00	0%
34		0.15	0.00	1.75	0.26	0.00	0%
35.5	edge of channel	0.20	0.00	0.88	0.18	0.00	0%
35.75		0.85	0.00	0.25	0.21	0.00	0%
36		0.85	0.04	0.25	0.21	0.01	4%
36.25		0.90	0.09	0.25	0.23	0.02	11%
36.5		1.00	0.30	0.25	0.25	0.08	39%
36.75		1.00	0.26	0.25	0.25	0.07	34%
37		1.00	0.09	0.25	0.25	0.02	12%
37.25		1.00	0.00	0.25	0.25	0.00	0%
37.5	edge of channel	0.30	0.00	0.25	0.08	0.00	0%
37.75		0.00	0.00	1.25	0.00	0.00	0%
40		0.00	0.00	2.13	0.00	0.00	0%
42		0.05	0.00	2.00	0.10	0.00	0%
44		0.00	0.00	2.00	0.00	0.00	0%
46		0.10	0.00	2.00	0.20	0.00	0%
48		0.00	0.00	2.00	0.00	0.00	0%
50		0.00	0.00	1.50	0.00	0.00	0%
51		0.30	0.00	1.00	0.30	0.00	0%
52		0.00	0.00	1.50	0.00	0.00	0%
54		0.00	0.00	2.00	0.00	0.00	0%
56	LEW	0.00	0.00	1.00	0.00	0.00	0%
				Flow: Cubic Feet/Sec		**0.19**	100%



Approximately 86 feet of dry land between channels

East Channel Station Distance from Initial Point (ft)	Notes	Depth (ft)	Velocity (ft/s)	Width (ft)	Area (sq ft)	Flow (cu ft/s)	% of Flow in Subsection
4	REW	0.00	0.00	0.13	0.00	0.00	0%
4.25		0.20	0.05	0.25	0.05	0.00	1%
4.5		0.40	0.14	0.25	0.10	0.01	7%
4.75		0.40	0.24	0.25	0.10	0.02	13%
5		0.35	0.30	0.25	0.09	0.03	14%
5.25		0.50	0.10	0.25	0.13	0.01	7%
5.5		0.50	0.07	0.25	0.13	0.01	5%
5.75		0.15	0.02	0.25	0.04	0.00	0%
6		0.15	0.00	0.25	0.04	0.00	0%
6.25	LEW	0.00	0.00	0.13	0.00	0.00	0%
			Estimated Flow: Cubic Feet/Sec			**0.09**	46%



Appendix 3.3-A - Spring and Fall 2008 Stream Gauging Data

Site: Rhodia Silver Bow Site
Project Number: 26/46-006-SW08
Date: 5/22/2008
Time: 11:35

Stream Width (ft): 0.0
Staff Gage (ft): NA
Location of Measurement: SW-9 (No flow present.)
Method of Measurement: NA

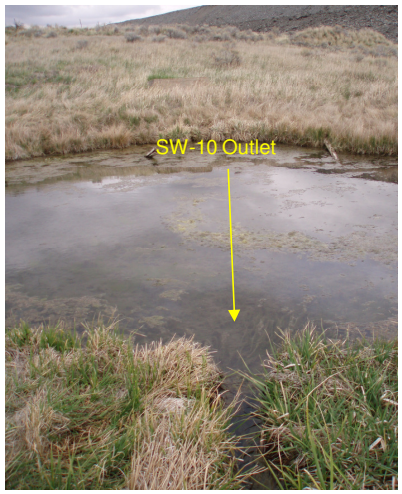
Station Distance from Initial Point (ft)	Notes	Depth (ft)	Velocity (ft/s)	Width (ft)	Area (sq ft)	Flow (cu ft/s)	% of Flow in Subsection
		0.00	0.00	0.00	0.00	0.00	NA
		0.00	0.00	0.00	0.00	0.00	NA
		0.00	0.00	0.00	0.00	0.00	NA
				Estimated Flow: Cubic Feet/Sec		**0.00**	NA

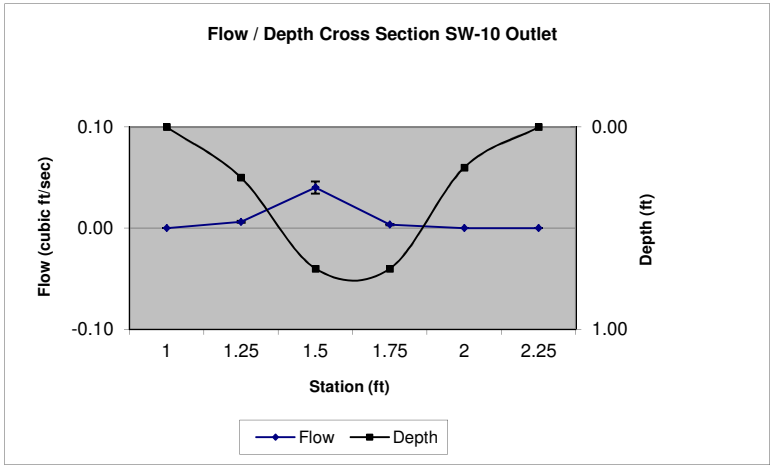
Appendix 3.3-A - Spring and Fall 2008 Stream Gauging Data

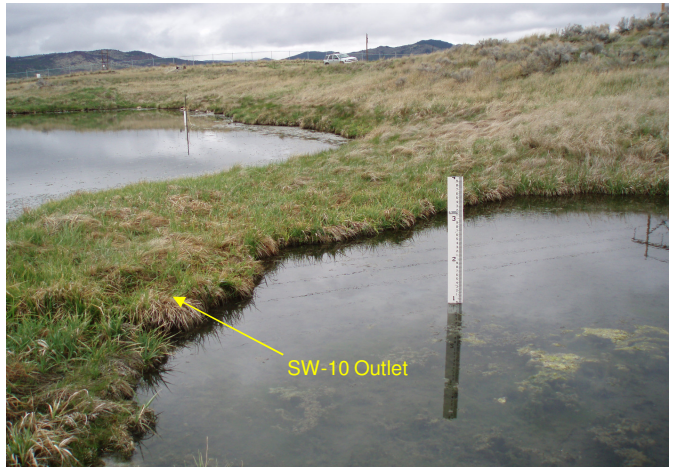
Site: Rhodia Silver Bow Site
Project Number: 26/46-006-SW08
Date: 5/21/2008
Time: 10:20

Stream Width (ft): 1.3
Staff Gage (ft): 0.88 Measured 12:10 on 5/24/08
Location of Measurement: SW-10 Outlet
Method of Measurement: six-tenths-depth

Station Distance from Initial Point (ft)	Notes	Depth (ft)	Velocity (ft/s)	Width (ft)	Area (sq ft)	Flow (cu ft/s)	% of Flow in Subsection
1	REW	0.00	0.00	0.13	0.00	0.00	0%
1.25		0.25	0.10	0.25	0.06	0.01	13%
1.5		0.70	0.23	0.25	0.18	0.04	81%
1.75		0.70	0.02	0.25	0.18	0.00	7%
2		0.20	0.00	0.25	0.05	0.00	0%
2.25	LEW	0.00	0.00	0.13	0.00	0.00	0%
			Estimated Flow: Cubic Feet/Sec			**0.05**	100%





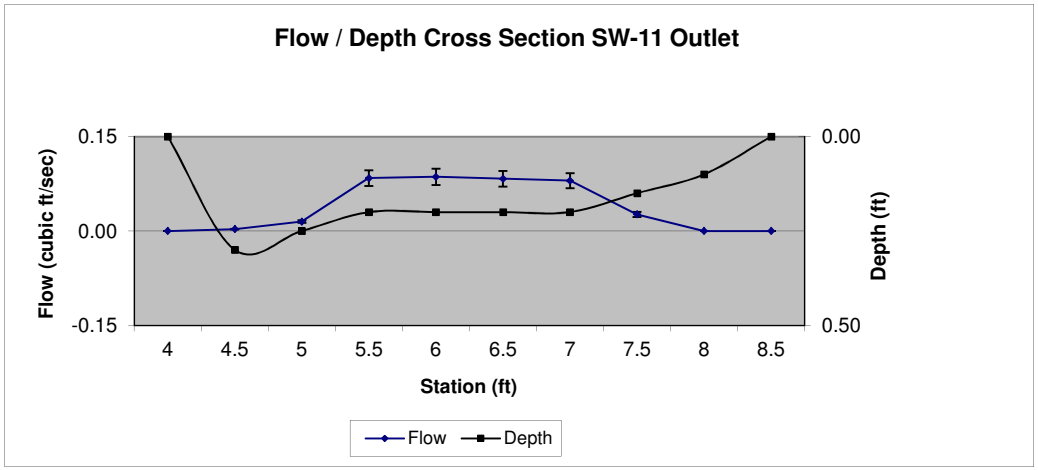


Site: Rhodia Silver Bow Site
Project Number: 26/46-006-SW08
Date: 5/21/2008
Time: 16:09

Appendix 3.3-A - Spring and Fall 2008 Stream Gauging Data

Stream Width (ft): 4.5
Staff Gage (ft): 1.01 Measured 12:05 on 5/24/08
Location of Measurement: SW-11 Outlet (approximately 80 feet north of SW-11 sample location.)
Method of Measurement: six-tenths-depth

Station Distance from Initial Point (ft)	Notes	Depth (ft)	Velocity (ft/s)	Width (ft)	Area (sq ft)	Flow (cu ft/s)	% of Flow in Subsection
4	LEW	0.00	0.00	0.25	0.00	0.00	0%
4.5		0.30	0.02	0.50	0.15	0.00	1%
5		0.25	0.12	0.50	0.13	0.02	4%
5.5		0.20	0.84	0.50	0.10	0.08	22%
6		0.20	0.86	0.50	0.10	0.09	23%
6.5		0.20	0.83	0.50	0.10	0.08	22%
7		0.20	0.80	0.50	0.10	0.08	21%
7.5		0.15	0.35	0.50	0.08	0.03	7%
8		0.10	0.00	0.50	0.05	0.00	0%
8.5	REW	0.00	0.00	0.25	0.00	0.00	0%
			Estimated Flow: Cubic Feet/Sec			**0.38**	100%

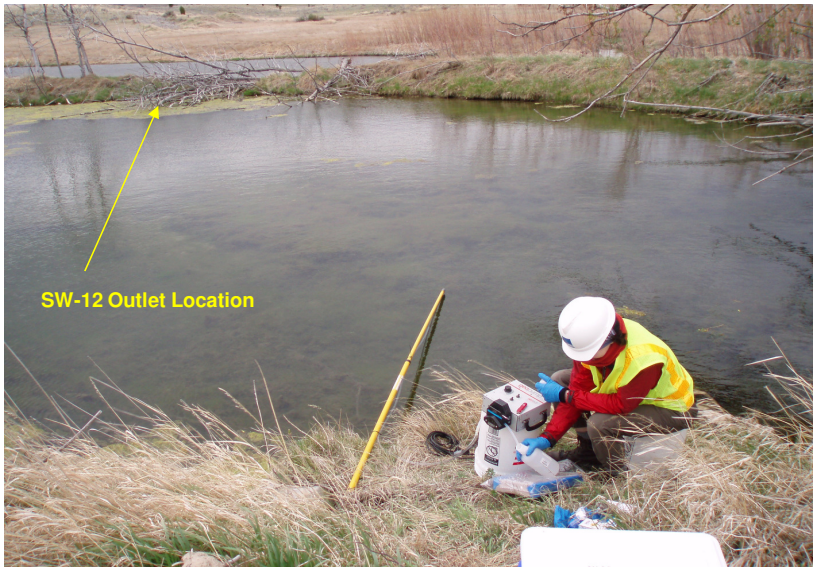


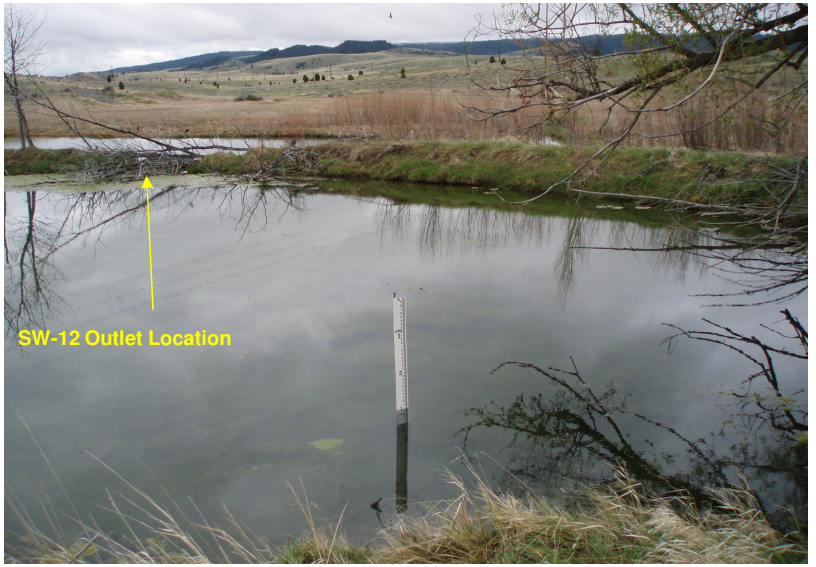
Site: Rhodia Silver Bow Site
Project Number: 26/46-006-SW08
Date: 5/24/2008
Time: 12:00

Appendix 3.3-A - Spring and Fall 2008 Stream Gauging Data

Stream Width (ft): 0.0
Staff Gage (ft): 0.98
Location of Measurement: SW-12 Outlet flow not measured. No unobstructed location to collect flow measurements present.
Method of Measurement: NA

Station Distance from Initial Point (ft)	Notes	Depth (ft)	Velocity (ft/s)	Width (ft)	Area (sq ft)	Flow (cu ft/s)	% of Flow in Subsection
		0.00	0.00	0.00	0.00	0.00	NA
		0.00	0.00	0.00	0.00	0.00	NA
		0.00	0.00	0.00	0.00	0.00	NA
				Estimated Flow: Cubic Feet/Sec		**0.00**	NA



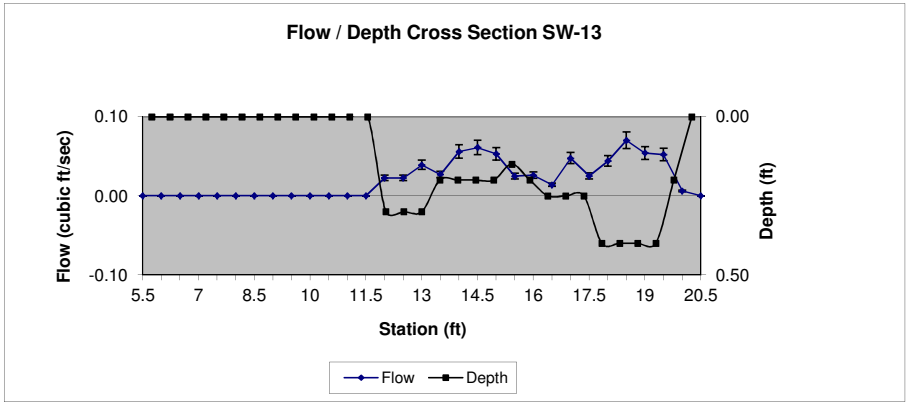


Site: Rhodia Silver Bow Site
Project Number: 26/46-006-SW08
Date: 5/20/2008
Time: 12:45

Appendix 3.3-A - Spring and Fall 2008 Stream Gauging Data

Stream Width (ft): 15.0
Staff Gage (ft): NA
Location of Measurement: SW-13
Method of Measurement: six-tenths-depth

Station Distance from Initial Point (ft)	Notes	Depth (ft)	Velocity (ft/s)	Width (ft)	Area (sq ft)	Flow (cu ft/s)	% of Flow in Subsection
5.5	stagnant	0.00	0.00	0.25	0.00	0.00	0%
6	water,	0.00	0.00	0.50	0.00	0.00	0%
6.5	vegetation	0.00	0.00	0.50	0.00	0.00	0%
7	and mud to	0.00	0.00	0.50	0.00	0.00	0%
7.5	station 11	0.00	0.00	0.50	0.00	0.00	0%
8		0.00	0.00	0.50	0.00	0.00	0%
8.5		0.00	0.00	0.50	0.00	0.00	0%
9		0.00	0.00	0.50	0.00	0.00	0%
9.5		0.00	0.00	0.50	0.00	0.00	0%
10		0.00	0.00	0.50	0.00	0.00	0%
10.5		0.00	0.00	0.50	0.00	0.00	0%
11		0.00	0.00	0.50	0.00	0.00	0%
11.5	LEW	0.00	0.00	0.50	0.00	0.00	0%
12		0.30	0.15	0.50	0.15	0.02	3%
12.5		0.30	0.15	0.50	0.15	0.02	3%
13		0.3	0.26	0.50	0.15	0.04	6%
13.5		0.2	0.27	0.50	0.10	0.03	4%
14		0.2	0.56	0.50	0.10	0.06	9%
14.5		0.2	0.61	0.50	0.10	0.06	9%
15		0.2	0.53	0.50	0.10	0.05	8%
15.5		0.15	0.33	0.50	0.08	0.02	4%
16		0.2	0.26	0.50	0.10	0.03	4%
16.5		0.25	0.11	0.50	0.13	0.01	2%
17		0.25	0.38	0.50	0.13	0.05	7%
17.5		0.25	0.2	0.50	0.13	0.03	4%
18		0.4	0.22	0.50	0.20	0.04	7%
18.5		0.4	0.35	0.50	0.20	0.07	11%
19		0.4	0.27	0.50	0.20	0.05	8%
19.5		0.4	0.26	0.50	0.20	0.05	8%
20		0.2	0.06	0.50	0.10	0.01	1%
20.5	REW	0	0	0.25	0.00	0.00	0%
			Estimated Flow: Cubic Feet/Sec			**0.64**	100%



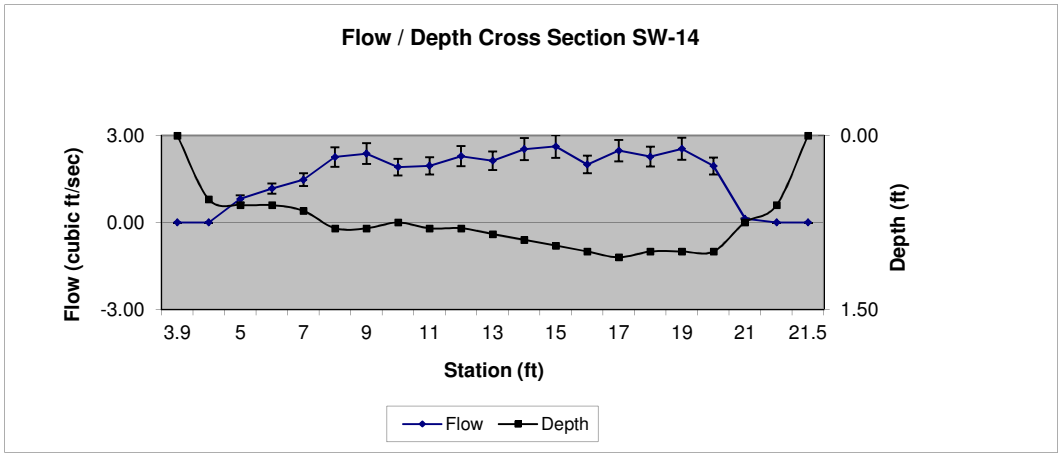
P:\Mpls\26 MT\46\2646006\WorkFiles\RFI\RFI Report 2012\Section 3.3 Hydrology\Appendix\Appdx 3.3-A Spring and Fall 2008 Stream Gauging Data\original format\May 2008 Flow Measurement

Site: Rhodia Silver Bow Site
Project Number: 26/46-006-SW08
Date: 5/19/2008
Time: 17:05

Stream Width (ft): 17.6
Staff Gage (ft): NA
Location of Measurement: SW-14
Method of Measurement: six-tenths-depth

Appendix 3.3-A - Spring and Fall 2008 Stream Gauging Data

Station Distance from Initial Point (ft)	Notes	Depth (ft)	Velocity (ft/s)	Width (ft)	Area (sq ft)	Flow (cu ft/s)	% of Flow in Subsection
3.9	LEW	0.00	0.00	0.05	0.00	0.00	0%
4		0.55	0.01	0.55	0.30	0.00	0%
5		0.60	1.35	1.00	0.60	0.81	2%
6		0.60	1.95	1.00	0.60	1.17	4%
7		0.65	2.27	1.00	0.65	1.48	4%
8		0.80	2.82	1.00	0.80	2.26	7%
9		0.80	2.97	1.00	0.80	2.38	7%
10		0.75	2.55	1.00	0.75	1.91	6%
11		0.80	2.44	1.00	0.80	1.95	6%
12		0.80	2.86	1.00	0.80	2.29	7%
13		0.85	2.51	1.00	0.85	2.13	6%
14		0.90	2.81	1.00	0.90	2.53	8%
15		0.95	2.76	1.00	0.95	2.62	8%
16		1.00	2.00	1.00	1.00	2.00	6%
17		1.05	2.36	1.00	1.05	2.48	8%
18		1.00	2.27	1.00	1.00	2.27	7%
19		1.00	2.54	1.00	1.00	2.54	8%
20		1.00	1.95	1.00	1.00	1.95	6%
21		0.75	0.24	0.70	0.52	0.13	0%
21.4		0.60	0.00	0.25	0.15	0.00	0%
21.5	REW	0.00	0.00	0.05	0.00	0.00	0%
			Estimated Flow: Cubic Feet/Sec			**32.89**	100%



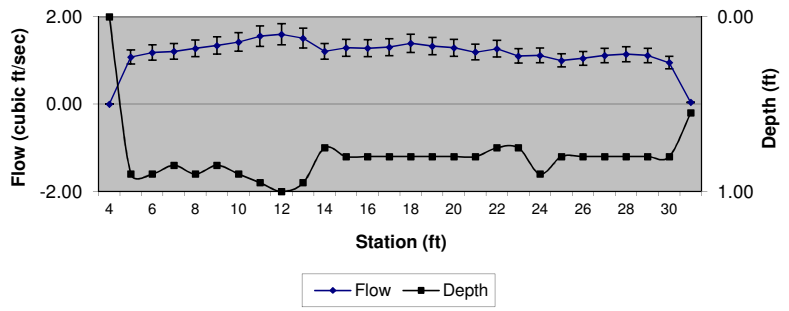
P:\Mpls\26 MT\46\2646006\WorkFiles\RFI\RFI Report 2012\Section 3.3 Hydrology\Appendix\Appdx 3.3-A Spring and Fall 2008 Stream Gauging Data\original format\May 2008 Flow Measurement

Site: Rhodia Silver Bow Site
Project Number: 26/46-006-SW08
Date: 5/19/2008
Time: 11:55

Stream Width (ft): 26.8
Staff Gage (ft): NA
Location of Measurement: SW-15
Method of Measurement: six-tenths-depth

Appendix 3.3-A - Spring and Fall 2008 Stream Gauging Data

Station Distance from Initial Point (ft)	Notes	Depth (ft)	Velocity (ft/s)	Width (ft)	Area (sq ft)	Flow (cu ft/s)	% of Flow in Subsection
4	LEW	0.00	0	0.50	0.00	0.00	0%
5		0.90	1.2	1.00	0.90	1.08	3%
6		0.90	1.31	1.00	0.90	1.18	4%
7		0.85	1.42	1.00	0.85	1.21	4%
8		0.90	1.42	1.00	0.90	1.28	4%
9		0.85	1.58	1.00	0.85	1.34	4%
10		0.90	1.58	1.00	0.90	1.42	4%
11		0.95	1.64	1.00	0.95	1.56	5%
12		1.00	1.6	1.00	1.00	1.60	5%
13		0.95	1.59	1.00	0.95	1.51	5%
14		0.75	1.61	1.00	0.75	1.21	4%
15		0.80	1.61	1.00	0.80	1.29	4%
16		0.80	1.6	1.00	0.80	1.28	4%
17		0.80	1.63	1.00	0.80	1.30	4%
18		0.80	1.74	1.00	0.80	1.39	4%
19		0.80	1.66	1.00	0.80	1.33	4%
20		0.80	1.61	1.00	0.80	1.29	4%
21		0.80	1.49	1.00	0.80	1.19	4%
22		0.75	1.69	1.00	0.75	1.27	4%
23		0.75	1.47	1.00	0.75	1.10	3%
24		0.90	1.24	1.00	0.90	1.12	3%
25		0.80	1.25	1.00	0.80	1.00	3%
26		0.80	1.31	1.00	0.80	1.05	3%
27		0.80	1.39	1.00	0.80	1.11	3%
28		0.80	1.43	1.00	0.80	1.14	4%
29		0.80	1.39	1.00	0.80	1.11	3%
30		0.80	1.32	0.90	0.72	0.95	3%
30.8	REW	0.55	0.18	0.40	0.22	0.04	0%
			Estimated Flow: Cubic Feet/Sec			**32.35**	100%

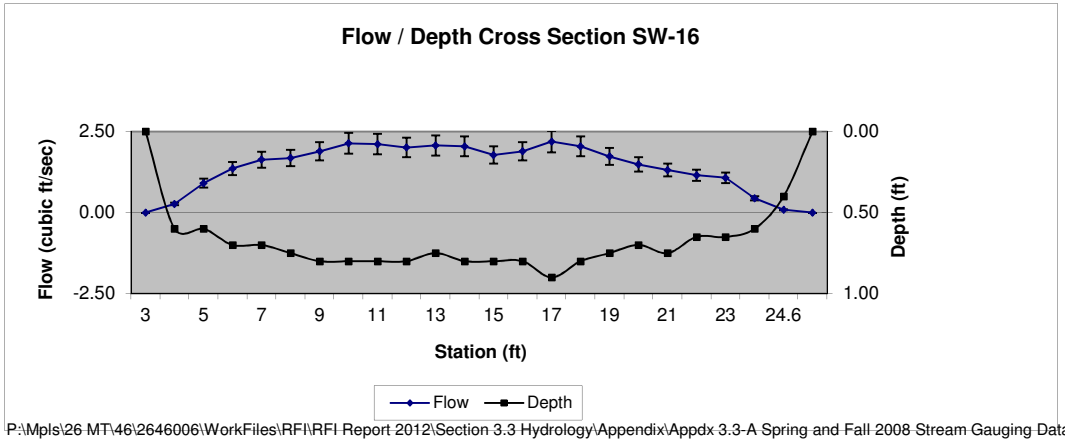


Site: Rhodia Silver Bow Site
Project Number: 26/46-006-SW08
Date: 5/19/2008
Time: 15:40

Stream Width (ft): 22.0
Staff Gage (ft): NA
Location of Measurement: SW-16
Method of Measurement: six-tenths-depth

Appendix 3.3-A - Spring and Fall 2008 Stream Gauging Data

Station Distance from Initial Point (ft)	Notes	Depth (ft)	Velocity (ft/s)	Width (ft)	Area (sq ft)	Flow (cu ft/s)	% of Flow in Subsection
3	LEW	0.00	0	0.50	0.00	0.00	0%
4		0.60	0.44	1.00	0.60	0.26	1%
5		0.60	1.51	1.00	0.60	0.91	3%
6		0.70	1.94	1.00	0.70	1.36	4%
7		0.70	2.33	1.00	0.70	1.63	5%
8		0.75	2.24	1.00	0.75	1.68	5%
9		0.80	2.36	1.00	0.80	1.89	6%
10		0.80	2.67	1.00	0.80	2.14	6%
11		0.80	2.64	1.00	0.80	2.11	6%
12		0.80	2.51	1.00	0.80	2.01	6%
13		0.75	2.76	1.00	0.75	2.07	6%
14		0.80	2.55	1.00	0.80	2.04	6%
15		0.80	2.22	1.00	0.80	1.78	5%
16		0.80	2.36	1.00	0.80	1.89	6%
17		0.90	2.43	1.00	0.90	2.19	7%
18		0.8	2.55	1.00	0.80	2.04	6%
19		0.75	2.31	1.00	0.75	1.73	5%
20		0.7	2.12	1.00	0.70	1.48	4%
21		0.75	1.75	1.00	0.75	1.31	4%
22		0.65	1.77	1.00	0.65	1.15	3%
23		0.65	1.65	1.00	0.65	1.07	3%
24		0.6	0.92	0.80	0.48	0.44	1%
24.6		0.4	0.43	0.50	0.20	0.09	0%
25	REW	0	0	0.20	0.00	0.00	0%
			Estimated Flow: Cubic Feet/Sec			**33.26**	100%

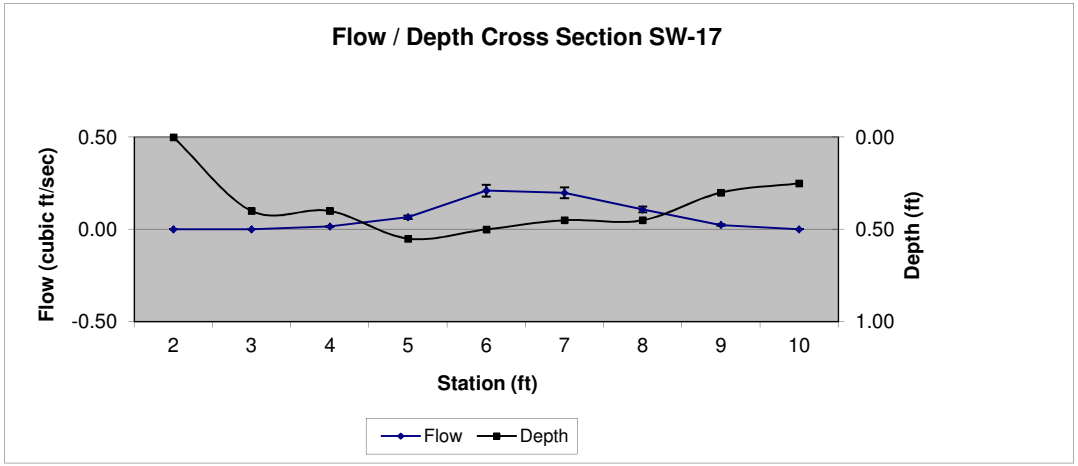


Site: Rhodia Silver Bow Site
Project Number: 26/46-006-SW08
Date: 5/19/2008
Time: 14:25

Appendix 3.3-A - Spring and Fall 2008 Stream Gauging Data

Stream Width (ft): 8.0
Staff Gage (ft): NA
Location of Measurement: SW-17
Method of Measurement: six-tenths-depth

Station Distance from Initial Point (ft)	Notes	Depth (ft)	Velocity (ft/s)	Width (ft)	Area (sq ft)	Flow (cu ft/s)	% of Flow in Subsection
2	REW	0.00	0	0.50	0.00	0.00	0%
3		0.40	0	1.00	0.40	0.00	0%
4		0.40	0.04	1.00	0.40	0.02	3%
5		0.55	0.12	1.00	0.55	0.07	11%
6		0.50	0.42	1.00	0.50	0.21	34%
7		0.45	0.44	1.00	0.45	0.20	32%
8		0.45	0.24	1.00	0.45	0.11	17%
9		0.30	0.08	1.00	0.30	0.02	4%
10	LEW	0.25	0	0.50	0.13	0.00	0%
			Estimated Flow: Cubic Feet/Sec			**0.62**	100%



Appendix 3.3-A - Spring and Fall 2008 Stream Gauging Data

Site: Rhodia Silver Bow Site
Project Number: 26/46-006-SW08
Date: 5/23/2008
Time: 10:45

Stream Width (ft): 0.0
Staff Gage (ft): NA
Location of Measurement: SW-18 (Up gradient of REC Plant discharge. No flow present.)
Method of Measurement: NA

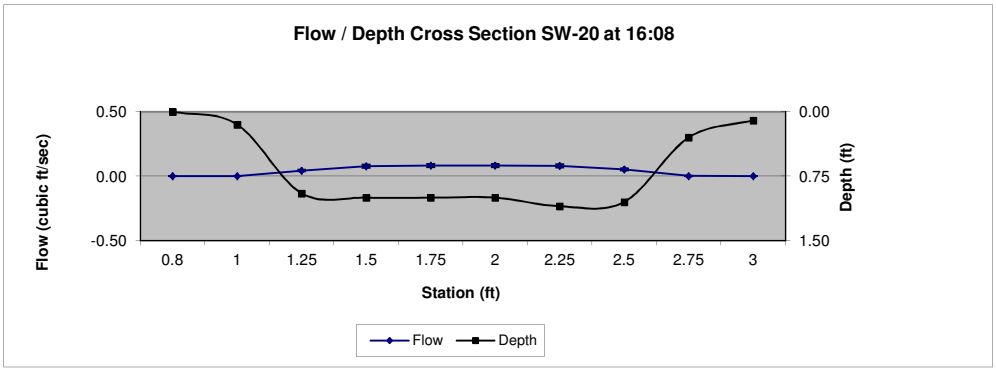
Station Distance from Initial Point (ft)	Notes	Depth (ft)	Velocity (ft/s)	Width (ft)	Area (sq ft)	Flow (cu ft/s)	% of Flow in Subsection
		0.00	0.00	0.00	0.00	0.00	NA
		0.00	0.00	0.00	0.00	0.00	NA
		0.00	0.00	0.00	0.00	0.00	NA
				Estimated Flow: Cubic Feet/Sec		**0.00**	NA

Site: Rhodia Silver Bow Site
Project Number: 26/46-006-SW08
Date: 5/23/2008
Time: 16:08 / 16:20

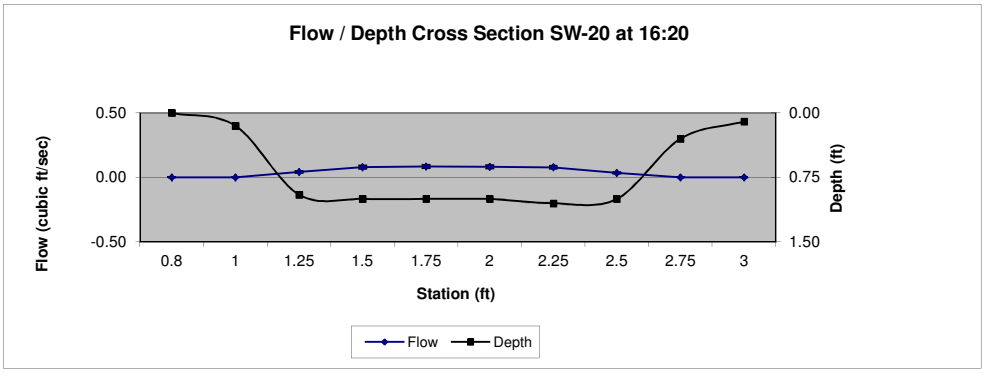
Appendix 3.3-A - Spring and Fall 2008 Stream Gauging Data

Stream Width (ft): 2.2
Staff Gage (ft): NA
Location of Measurement: SW-20 Field replicate measurements collected 4 hours after collecting initial water sample and flow data. Water level appeared higher and therefore measurements were collected twice.
Method of Measurement: six-tenths-depth

16:08 Measurement Station Distance from Initial Point (ft)	Notes	Depth (ft)	Velocity (ft/s)	Width (ft)	Area (sq ft)	Flow (cu ft/s)	% of Flow in Subsection
0.8	REW	0.00	0	0.13	0.00	0.00	0%
1		0.15	0	0.25	0.04	0.00	0%
1.25		0.95	0.18	0.25	0.24	0.04	10%
1.5		1.00	0.31	0.25	0.25	0.08	18%
1.75		1.00	0.33	0.25	0.25	0.08	20%
2		1.00	0.33	0.25	0.25	0.08	20%
2.25		1.10	0.29	0.25	0.28	0.08	19%
2.5		1.05	0.20	0.25	0.26	0.05	13%
2.75		0.30	0.02	0.25	0.08	0.00	0%
3	LEW	0.1	0	0.13	0.01	0.00	0%
				Flow: Cubic Feet/Sec		**0.42**	100%



16:20 Measurement Station Distance from Initial Point (ft)	Notes	Depth (ft)	Velocity (ft/s)	Width (ft)	Area (sq ft)	Flow (cu ft/s)	% of Flow in Subsection
0.8	REW	0.00	0	0.13	0.00	0.00	0%
1		0.15	0	0.25	0.04	0.00	0%
1.25		0.95	0.18	0.25	0.24	0.04	10%
1.5		1.00	0.32	0.25	0.25	0.08	19%
1.75		1.00	0.34	0.25	0.25	0.09	20%
2		1.00	0.33	0.25	0.25	0.08	20%
2.25		1.05	0.30	0.25	0.26	0.08	19%
2.5		1.00	0.14	0.25	0.25	0.04	8%
2.75		0.30	0.01	0.25	0.08	0.00	0%
3	LEW	0.1	0	0.13	0.01	0.00	0%
				Estimated Flow: Cubic Feet/Sec		**0.40**	97%

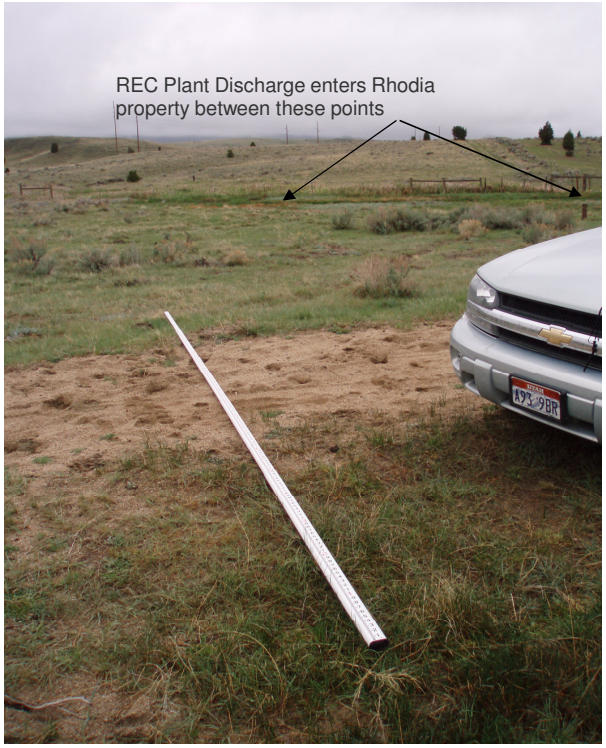


Site: Rhodia Silver Bow Site
Project Number: 26/46-006-SW08
Date: 5/23/2008
Time: 12:40

Appendix 3.3-A - Spring and Fall 2008 Stream Gauging Data

Stream Width (ft): 0.0
Staff Gage (ft): NA
Location of Measurement: SW-19 (In Sheep Gulch up gradient of where ASiMi discharge joins. No flow present.)
Method of Measurement: NA

Station Distance from Initial Point (ft)	Notes	Depth (ft)	Velocity (ft/s)	Width (ft)	Area (sq ft)	Flow (cu ft/s)	% of Flow in Subsection
		0.00	0.00	0.00	0.00	0.00	NA
		0.00	0.00	0.00	0.00	0.00	NA
		0.00	0.00	0.00	0.00	0.00	NA
				Estimated Flow: Cubic Feet/Sec		**0.00**	NA

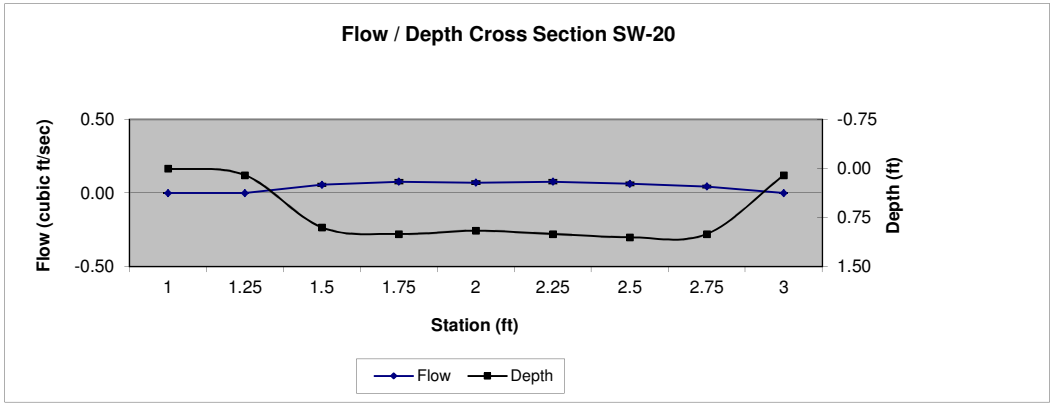


Site: Rhodia Silver Bow Site
Project Number: 26/46-006-SW08
Date: 5/23/2008
Time: 12:08

Appendix 3.3-A - Spring and Fall 2008 Stream Gauging Data

Stream Width (ft): 2.0
Staff Gage (ft): NA
Location of Measurement: SW-20 (flow measurements collected approximately 80 north of where REC Plant enters Rhodia property)
Method of Measurement: six-tenths-depth

Station Distance from Initial Point (ft)	Notes	Depth (ft)	Velocity (ft/s)	Width (ft)	Area (sq ft)	Flow (cu ft/s)	% of Flow in Subsection
1	REW	0.00	0	0.13	0.00	0.00	0%
1.25		0.10	0	0.25	0.03	0.00	0%
1.5		0.90	0.25	0.25	0.23	0.06	14%
1.75		1.00	0.31	0.25	0.25	0.08	20%
2		0.95	0.3	0.25	0.24	0.07	18%
2.25		1.00	0.31	0.25	0.25	0.08	20%
2.5		1.05	0.24	0.25	0.26	0.06	16%
2.75		1.00	0.18	0.25	0.25	0.05	12%
3	LEW	0.1	0	0.13	0.01	0.00	0%
			Estimated Flow: Cubic Feet/Sec			**0.39**	100%

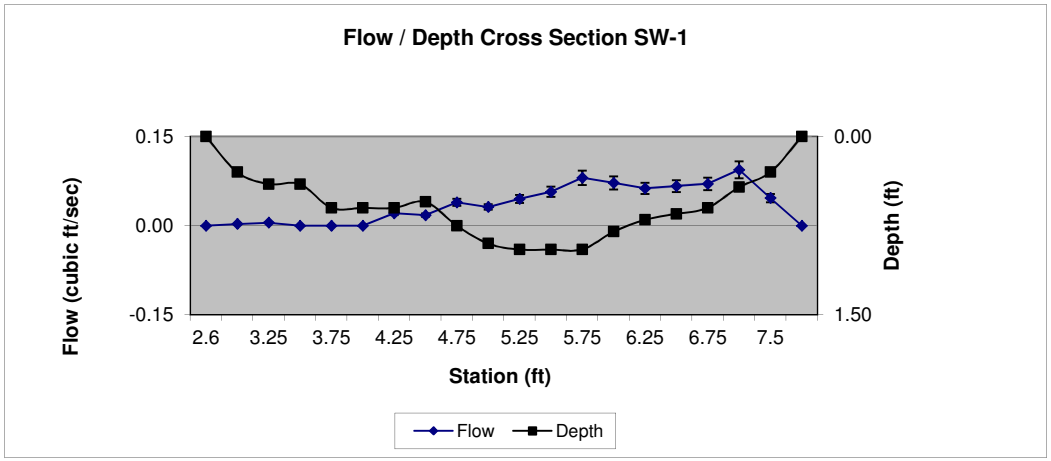


Site: Rhodia Silver Bow Site
Project Number: 26/46-006-SW08
Date: 9/20/2008
Time: 13:15

Appendix 3.3-A - Spring and Fall 2008 Stream Gauging Data

Stream Width (ft): 5.4
Staff Gage (ft): 0.00 Steel post present, staff gauge missing.
Location of Measurement: SW-1 (Flow measurements collected on north side of 5 ft diameter culvert.)
Method of Measurement: six-tenths-depth

Station Distance from Initial Point (ft)	Notes	Depth (ft)	Velocity (ft/s)	Width (ft)	Area (sq ft)	Flow (cu ft/s)	% of Flow in Subsection
2.6	REW	0.00	0.00	0.20	0.00	0.00	0%
3		0.30	0.03	0.33	0.10	0.00	0%
3.25		0.40	0.05	0.25	0.10	0.01	1%
3.5		0.40	0.00	0.25	0.10	0.00	0%
3.75		0.60	0.00	0.25	0.15	0.00	0%
4		0.60	0.00	0.25	0.15	0.00	0%
4.25		0.60	0.14	0.25	0.15	0.02	3%
4.5		0.55	0.13	0.25	0.14	0.02	3%
4.75		0.75	0.21	0.25	0.19	0.04	6%
5		0.90	0.14	0.25	0.23	0.03	4%
5.25		0.95	0.19	0.25	0.24	0.05	6%
5.5		0.95	0.24	0.25	0.24	0.06	8%
5.75		0.95	0.34	0.25	0.24	0.08	11%
6		0.80	0.36	0.25	0.20	0.07	10%
6.25		0.70	0.36	0.25	0.18	0.06	9%
6.5		0.65	0.41	0.25	0.16	0.07	9%
6.75		0.60	0.47	0.25	0.15	0.07	10%
7		0.425	0.59	0.38	0.16	0.09	13%
7.5		0.30	0.31	0.50	0.15	0.05	7%
8	LEW	0.00	0.00	0.25	0.00	0.00	0%
				Flow: Cubic Feet/Sec		**0.71**	100%



Site: Rhodia Silver Bow Site
Project Number: 26/46-006-SW08
Date: 9/20/2008
Time: 11:10

Appendix 3.3-A - Spring and Fall 2008 Stream Gauging Data

Stream Width (ft): 0.0
V notch wier (ft): 0.00 No flow present
Location of Measurement: SW-2 (No flow present. Previous flow event has eroded soil from around wier and thus rendering it ineffective.)
Method of Measurement: NA

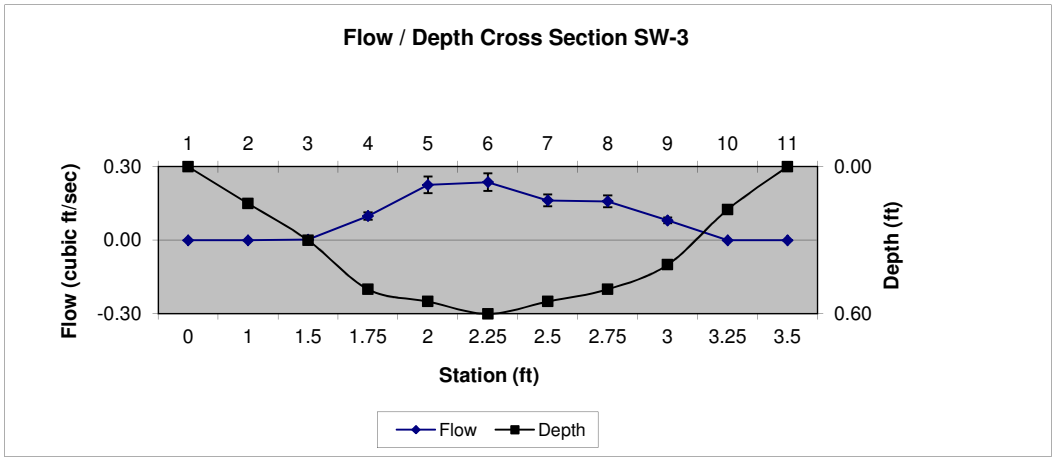
Station Distance from Initial Point (ft)	Notes	Depth (ft)	Velocity (ft/s)	Width (ft)	Area (sq ft)	Flow (cu ft/s)	% of Flow in Subsection
		0.00	0.00	0.00	0.00	0.00	NA
		0.00	0.00	0.00	0.00	0.00	NA
		0.00	0.00	0.00	0.00	0.00	NA
				Flow: Cubic Feet/Sec		**0.00**	NA

Site: Rhodia Silver Bow Site
Project Number: 26/46-006-SW08
Date: 9/19/2008
Time: 17:17

Appendix 3.3-A - Spring and Fall 2008 Stream Gauging Data

Stream Width (ft): 3.5
Staff Gage (ft): 0.00 water has bypassed flume
Location of Measurement: SW-3 (Flow has bypassed flume. Flow measurements collected on west side of flume in new channel.)
Method of Measurement: six-tenths-depth

Station Distance from Initial Point (ft)	Notes	Depth (ft)	Velocity (ft/s)	Width (ft)	Area (sq ft)	Flow (cu ft/s)	% of Flow in Subsection
0	REW	0.00	0.00	0.50	0.00	0.00	0%
1		0.15	0.00	0.75	0.11	0.00	0%
1.5		0.30	0.02	0.38	0.11	0.00	0%
1.75		0.50	0.79	0.25	0.13	0.10	10%
2		0.55	1.64	0.25	0.14	0.23	23%
2.25		0.60	1.58	0.25	0.15	0.24	25%
2.5		0.55	1.18	0.25	0.14	0.16	17%
2.75		0.50	1.27	0.25	0.13	0.16	16%
3		0.40	0.81	0.25	0.10	0.08	8%
3.25		0.175	0.00	0.25	0.04	0.00	0%
3.5	LEW	0.00	0.00	0.13	0.00	0.00	0%
				Flow: Cubic Feet/Sec		**0.97**	100%

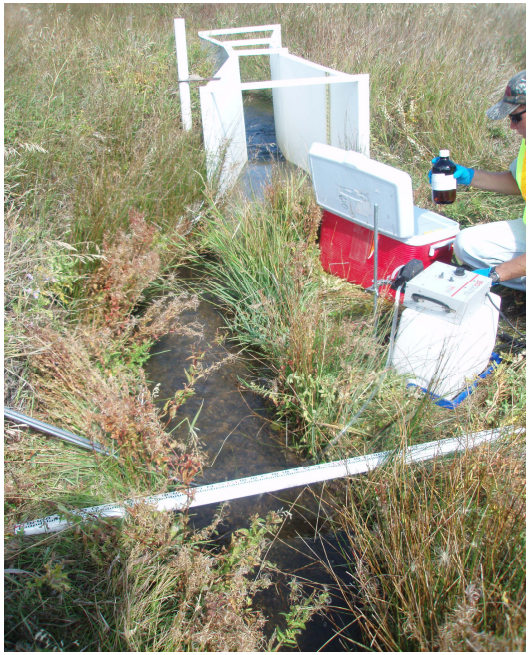


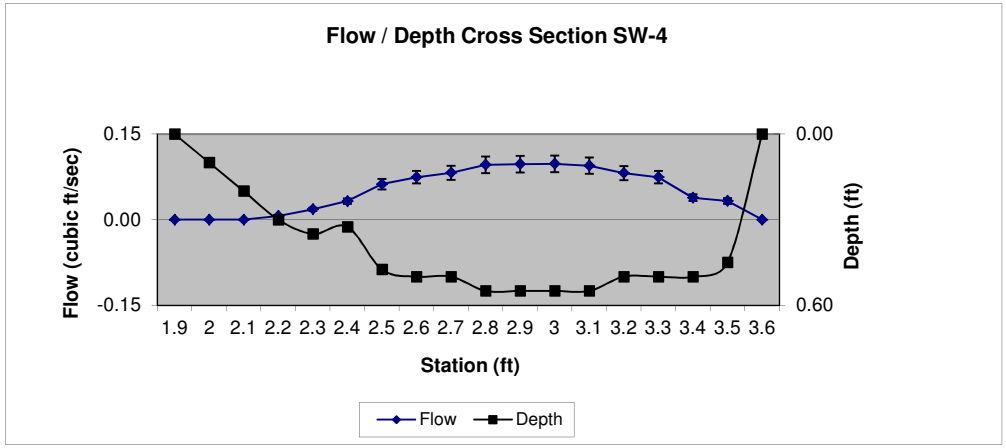
Site: Rhodia Silver Bow Site
Project Number: 26/46-006-SW08
Date: 9/19/2008
Time: 14:41

Appendix 3.3-A - Spring and Fall 2008 Stream Gauging Data

Stream Width (ft): 1.7
Staff Gage (ft): 0.34 Flume unlevel
Location of Measurement: SW-4 Flume is unlevel and stream has partially bypassed flume mouth. (flow measurements collected 7 feet south of flume mouth.)
Method of Measurement: six-tenths-depth

Station Distance from Initial Point (ft)	Notes	Depth (ft)	Velocity (ft/s)	Width (ft)	Area (sq ft)	Flow (cu ft/s)	% of Flow in Subsection
1.9	REW	0.00	0.00	0.05	0.00	0.00	0%
2		0.10	0.00	0.10	0.01	0.00	0%
2.1		0.20	0.00	0.10	0.02	0.00	0%
2.2		0.30	0.22	0.10	0.03	0.01	1%
2.3		0.35	0.52	0.10	0.03	0.02	2%
2.4		0.325	1.00	0.10	0.03	0.03	4%
2.5		0.475	1.31	0.10	0.05	0.06	7%
2.6		0.50	1.49	0.10	0.05	0.07	8%
2.7		0.50	1.64	0.10	0.05	0.08	9%
2.8		0.55	1.75	0.10	0.05	0.10	11%
2.9		0.55	1.77	0.10	0.06	0.10	11%
3		0.55	1.78	0.10	0.06	0.10	11%
3.1		0.55	1.72	0.10	0.06	0.09	11%
3.2		0.50	1.63	0.10	0.05	0.08	9%
3.3		0.50	1.49	0.10	0.05	0.07	8%
3.4		0.50	0.77	0.10	0.05	0.04	4%
3.5		0.45	0.73	0.10	0.05	0.03	4%
3.6	LEW	0.00	0.00	0.05	0.00	0.00	0%
				Flow: Cubic Feet/Sec		**0.89**	100%



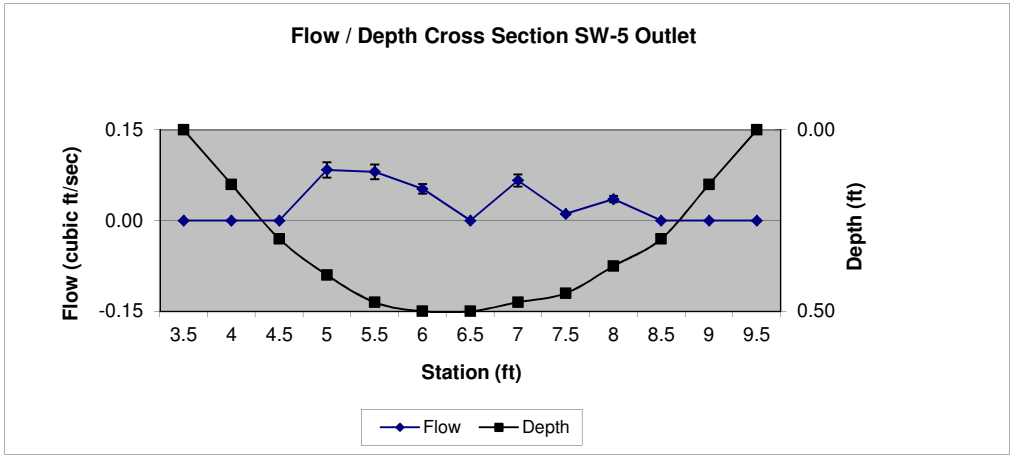


Site: Rhodia Silver Bow Site
Project Number: 26/46-006-SW08
Date: 9/19/2008
Time: 15:10

Appendix 3.3-A - Spring and Fall 2008 Stream Gauging Data

Stream Width (ft): 6.0
Staff Gage (ft): 5.35
Location of Measurement: SW-5 (flow measurements collected at the outlet approximately 90 feet north of SW-5 staff gauge.)
Method of Measurement: six-tenths-depth

Station Distance from Initial Point (ft)	Notes	Depth (ft)	Velocity (ft/s)	Width (ft)	Area (sq ft)	Flow (cu ft/s)	% of Flow in Subsection
3.5	REW	0.00	0.00	0.25	0.00	0.00	0%
4		0.15	0.00	0.50	0.08	0.00	0%
4.5		0.30	0.00	0.50	0.15	0.00	0%
5		0.40	0.42	0.50	0.20	0.08	25%
5.5		0.475	0.34	0.50	0.24	0.08	24%
6		0.50	0.21	0.50	0.25	0.05	16%
6.5		0.50	0.00	0.50	0.25	0.00	0%
7		0.475	0.28	0.50	0.24	0.07	20%
7.5		0.45	0.05	0.50	0.23	0.01	3%
8		0.375	0.19	0.50	0.19	0.04	11%
8.5		0.30	0.00	0.50	0.15	0.00	0%
9		0.15	0.00	0.50	0.08	0.00	0%
9.5	LEW	0.00	0.00	0.75	0.00	0.00	0%
				Flow: Cubic Feet/Sec		**0.33**	100%

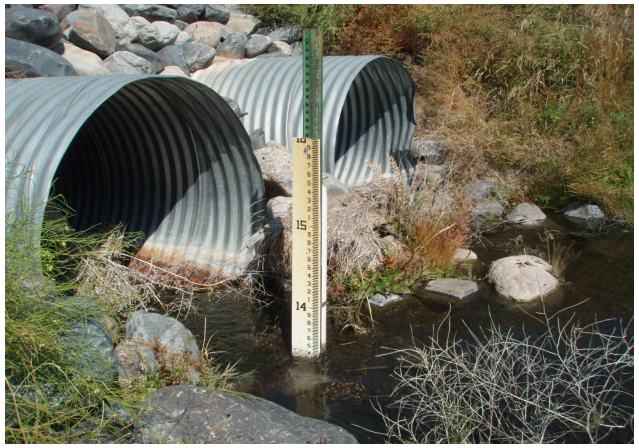


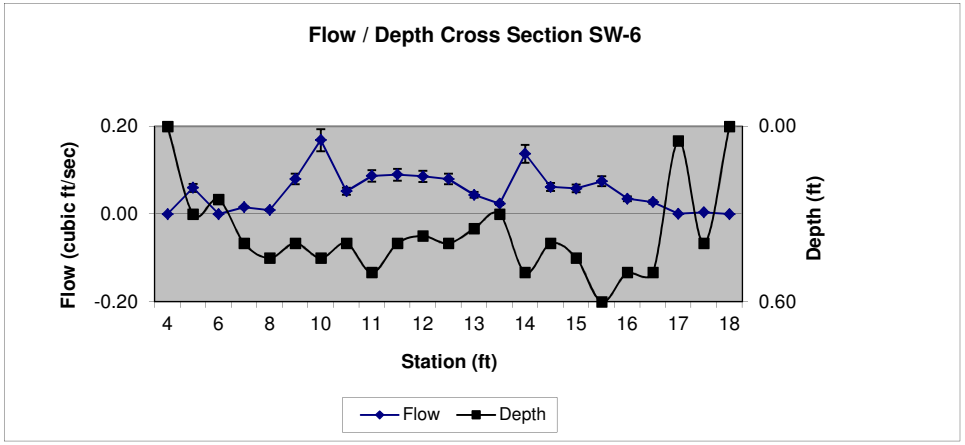
Appendix 3.3-A - Spring and Fall 2008 Stream Gauging Data

Site: Rhodia Silver Bow Site
Project Number: 26/46-006-SW08
Date: 9/18/2008
Time: 14:17

Stream Width (ft): 14.0
Staff Gage (ft): 13.40
Location of Measurement: SW-6 (22.5 feet south of staff gauge.)
Method of Measurement: six-tenths-depth

Station Distance from Initial Point (ft)	Notes	Depth (ft)	Velocity (ft/s)	Width (ft)	Area (sq ft)	Flow (cu ft/s)	% of Flow in Subsection
4	REW	0.00	0.00	0.50	0.00	0.00	0%
5		0.30	0.20	1.00	0.30	0.06	5%
6		0.25	0.00	1.00	0.25	0.00	0%
7		0.40	0.04	1.00	0.40	0.02	1%
8		0.45	0.02	1.00	0.45	0.01	1%
9		0.40	0.20	1.00	0.40	0.08	7%
10		0.45	0.50	0.75	0.34	0.17	14%
10.5		0.40	0.26	0.50	0.20	0.05	4%
11		0.50	0.35	0.50	0.25	0.09	7%
11.5		0.40	0.45	0.50	0.20	0.09	8%
12		0.38	0.46	0.50	0.19	0.09	7%
12.5		0.40	0.40	0.50	0.20	0.08	7%
13		0.35	0.25	0.50	0.18	0.04	4%
13.5		0.30	0.16	0.50	0.15	0.02	2%
14		0.50	0.55	0.50	0.25	0.14	11%
14.5		0.40	0.31	0.50	0.20	0.06	5%
15		0.45	0.26	0.50	0.23	0.06	5%
15.5		0.60	0.25	0.50	0.30	0.08	6%
16		0.50	0.14	0.50	0.25	0.04	3%
16.5		0.50	0.11	0.50	0.25	0.03	2%
17		0.05	0.03	0.50	0.03	0.00	0%
17.5		0.40	0.02	0.50	0.20	0.00	0%
18	LEW	0.00	0.00	0.25	0.00	0.00	0%
				Flow: Cubic Feet/Sec		**1.20**	100%



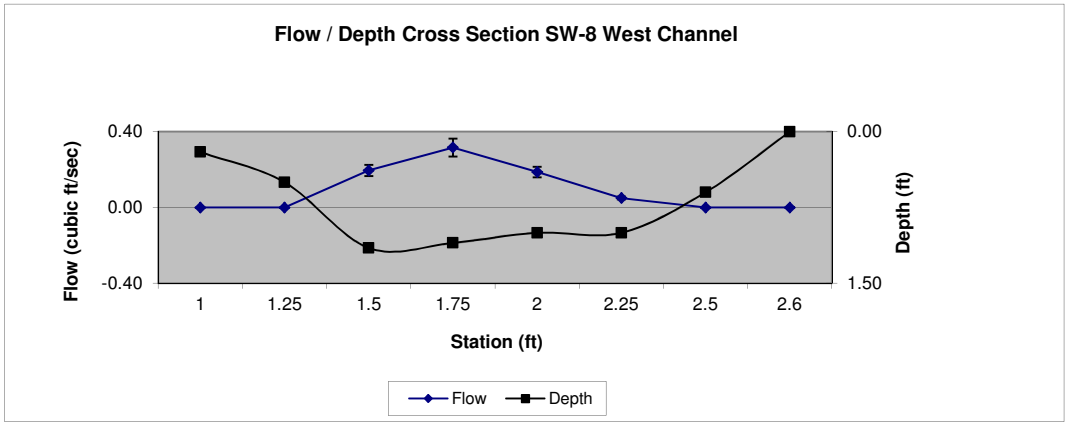


Site: Rhodia Silver Bow Site
Project Number: 26/46-006-SW08
Date: 9/20/2008
Time: 17:06

Appendix 3.3-A - Spring and Fall 2008 Stream Gauging Data

Stream Width (ft): 1.6 and 1.3
Staff Gage (ft): NA
Location of Measurement: SW-8 (Location is currently very wide with areas of stagnant water and 2 distinct channels.)
Method of Measurement: six-tenths-depth

West Channel Station Distance from Initial Point (ft)	Notes	Depth (ft)	Velocity (ft/s)	Width (ft)	Area (sq ft)	Flow (cu ft/s)	% of Flow in Subsection
1	REW	0.20	0.00	0.13	0.03	0.00	0%
1.25	30' of wet grass	0.50	0.00	0.25	0.13	0.00	0%
1.5	prior to	1.15	0.68	0.25	0.29	0.20	26%
1.75	edge of channel	1.10	1.15	0.25	0.28	0.32	42%
2		1.00	0.75	0.25	0.25	0.19	25%
2.25		1.00	0.20	0.25	0.25	0.05	7%
2.5		0.60	0.00	0.18	0.11	0.00	0%
2.6	LEW	0.00	0.00	0.05	0.00	0.00	0%
				Flow: Cubic Feet/Sec		**0.75**	100%



Approximately 55 feet of dry land between channels

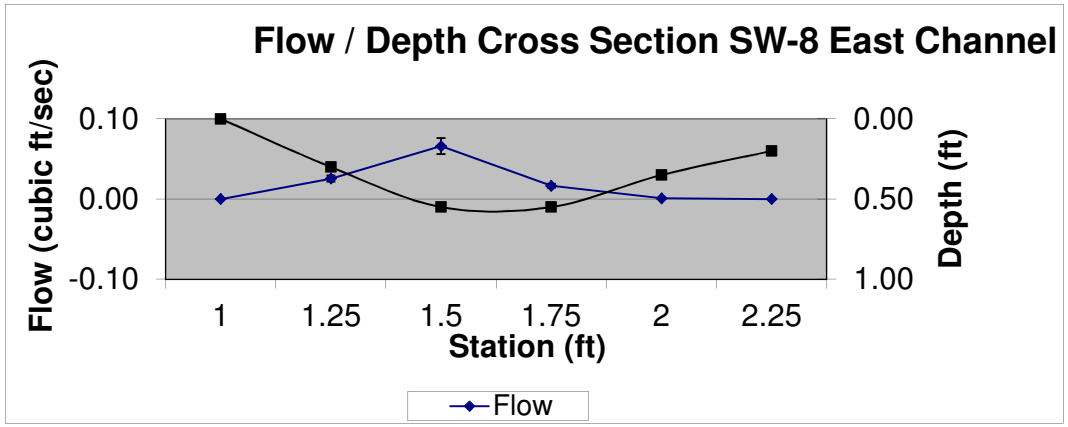
(SW-8 - East Channel continued on next page)

Site: Rhodia Silver Bow Plant
Project Number: 26/46-006-SW08
Date: 9/20/2008
Time: 17:06

Appendix 3.3-A - Spring and Fall 2008 Stream Gauging Data

Stream Width (ft): -1.0 and 0.0
Staff Gage (ft): NA
Location of Measurement: SW-8 (Location is currently very wide with areas of stagnant water and 2 distinct channels.)
Method of Measurement: six-tenths-depth

East Channel Station Distance from Initial Point (ft)	Notes	Depth (ft)	Velocity (ft/s)	Width (ft)	Area (sq ft)	Flow (cu ft/s)	% of Flow in Subsection
1	REW	0.00	0.00	0.13	0.00	0.00	0%
1.25		0.30	0.34	0.25	0.08	0.03	3%
1.5		0.55	0.48	0.25	0.14	0.07	9%
1.75		0.55	0.12	0.25	0.14	0.02	2%
2		0.35	0.01	0.25	0.09	0.00	0%
2.25	LEW	0.20	0.00	0.13	0.03	0.00	0%
				Flow: Cubic Feet/Sec		**0.11**	15%

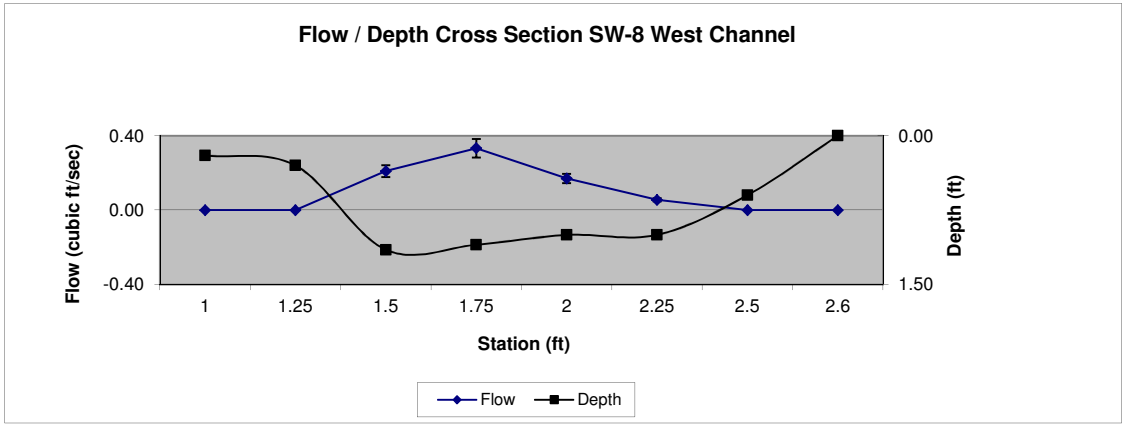


Site: Rhodia Silver Bow Site
Project Number: 26/46-006-SW08
Date: 9/20/2008
Time: 17:20

Appendix 3.3-A - Spring and Fall 2008 Stream Gauging Data

Stream Width (ft): 1.6
Staff Gage (ft): NA
Location of Measurement: SW-8 (Field replicate of west channel flow measurements)
Method of Measurement: six-tenths-depth

West Channel Station Distance from Initial Point (ft)	Notes	Depth (ft)	Velocity (ft/s)	Width (ft)	Area (sq ft)	Flow (cu ft/s)	% of Flow in Subsection
1	REW	0.20	0.00	0.13	0.03	0.00	0%
1.25	30' of wet grass	0.30	0.00	0.25	0.08	0.00	0%
1.5	prior to	1.15	0.73	0.25	0.29	0.21	27%
1.75	edge of channel	1.10	1.21	0.25	0.28	0.33	43%
2		1.00	0.68	0.25	0.25	0.17	22%
2.25		1.00	0.22	0.25	0.25	0.06	7%
2.5		0.60	0.00	0.18	0.11	0.00	0%
2.6	LEW	0.00	0.00	0.05	0.00	0.00	0%
				Flow: Cubic Feet/Sec		**0.77**	100%

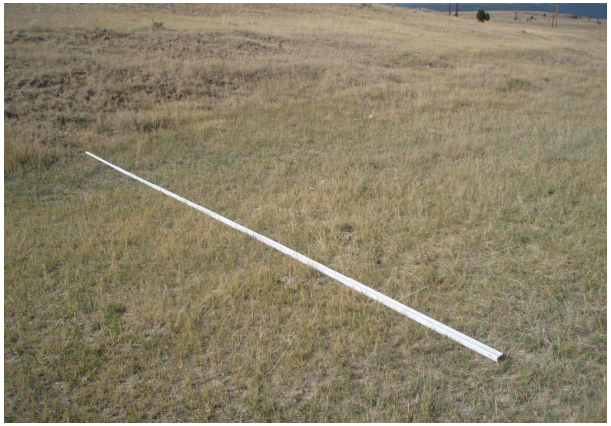


Site: Rhodia Silver Bow Site
Project Number: 26/46-006-SW08
Date: 9/20/2008
Time: 9:45

Stream Width (ft): 0.0
Staff Gage (ft): NA
Location of Measurement: SW-9 (No flow present.)
Method of Measurement: NA

Appendix 3.3-A - Spring and Fall 2008 Stream Gauging Data

Station Distance from Initial Point (ft)	Notes	Depth (ft)	Velocity (ft/s)	Width (ft)	Area (sq ft)	Flow (cu ft/s)	% of Flow in Subsection
		0.00	0.00	0.00	0.00	0.00	NA
		0.00	0.00	0.00	0.00	0.00	NA
		0.00	0.00	0.00	0.00	0.00	NA
				Flow: Cubic Feet/Sec		**0.00**	NA

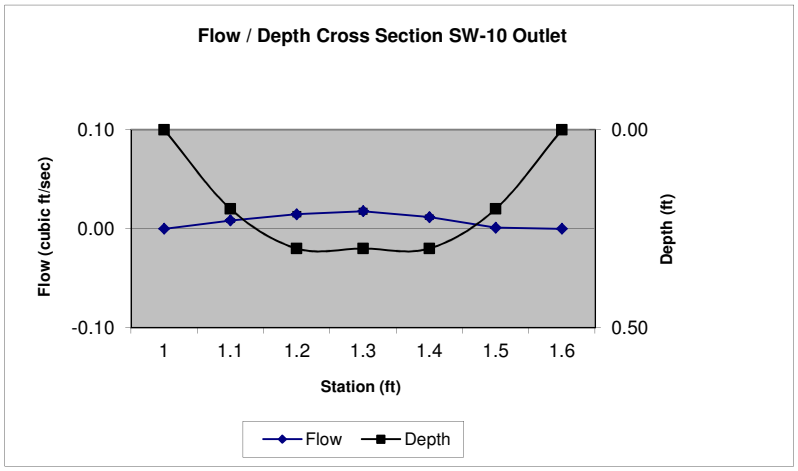


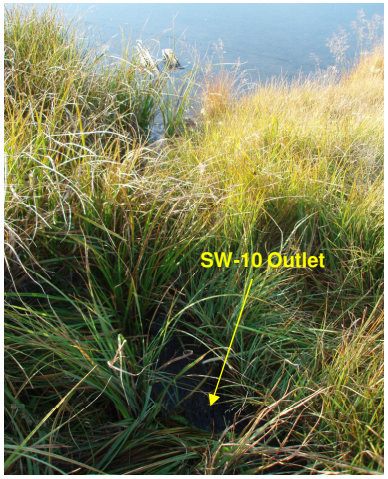
Site: Rhodia Silver Bow Site
Project Number: 26/46-006-SW08
Date: 9/18/2008
Time: 10:20

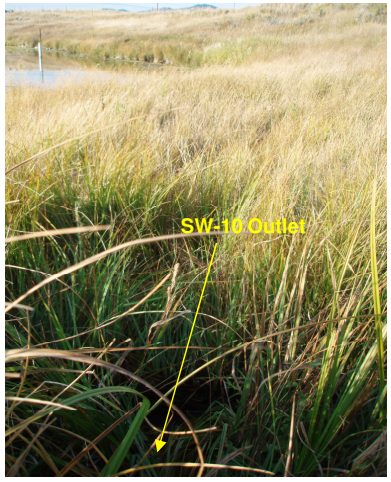
Appendix 3.3-A - Spring and Fall 2008 Stream Gauging Data

Stream Width (ft): 0.6
Staff Gage (ft): 0.87
Location of Measurement: SW-10 Outlet
Method of Measurement: six-tenths-depth

Station Distance from Initial Point (ft)	Notes	Depth (ft)	Velocity (ft/s)	Width (ft)	Area (sq ft)	Flow (cu ft/s)	% of Flow in Subsection
1	REW	0.00	0.00	0.05	0.00	0.00	0%
1.1		0.20	0.42	0.10	0.02	0.01	16%
1.2		0.30	0.49	0.10	0.03	0.01	27%
1.3		0.30	0.59	0.10	0.03	0.02	33%
1.4		0.30	0.39	0.10	0.03	0.01	22%
1.5		0.20	0.05	0.10	0.02	0.00	2%
1.6	LEW	0.00	0.00	0.05	0.00	0.00	0%
				Flow: Cubic Feet/Sec		**0.05**	100%





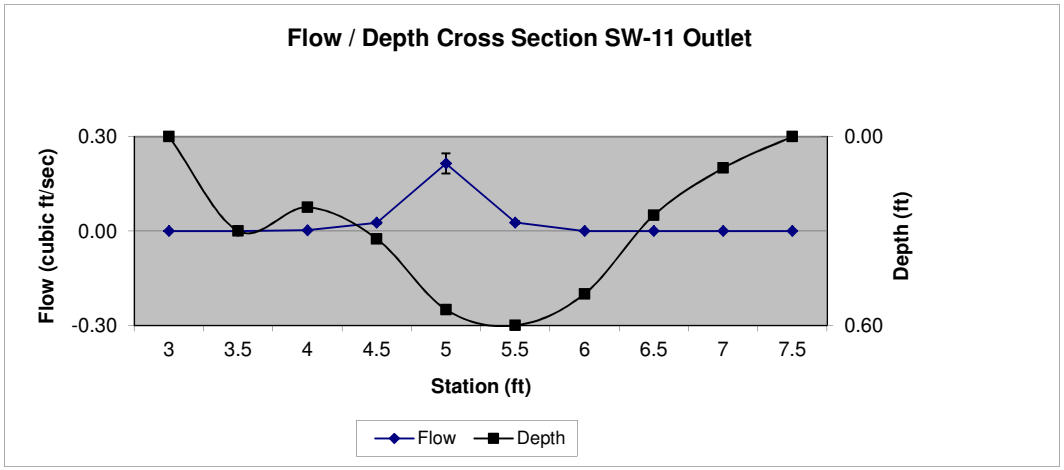


Site: Rhodia Silver Bow Site
Project Number: 26/46-006-SW08
Date: 9/19/2008
Time: 15:29

Appendix 3.3-A - Spring and Fall 2008 Stream Gauging Data

Stream Width (ft): 4.5
Staff Gage (ft): 1.04
Location of Measurement: SW-11 Outlet (approximately 80 feet north of SW-11 sample location.)
Method of Measurement: six-tenths-depth

Station Distance from Initial Point (ft)	Notes	Depth (ft)	Velocity (ft/s)	Width (ft)	Area (sq ft)	Flow (cu ft/s)	% of Flow in Subsection
3	REW	0.00	0.00	0.25	0.00	0.00	0%
3.5		0.30	0.00	0.50	0.15	0.00	0%
4		0.225	0.02	0.50	0.11	0.00	1%
4.5		0.325	0.16	0.50	0.16	0.03	10%
5		0.55	0.78	0.50	0.28	0.21	80%
5.5		0.60	0.09	0.50	0.30	0.03	10%
6		0.50	0.00	0.50	0.25	0.00	0%
6.5		0.25	0.00	0.50	0.13	0.00	0%
7		0.10	0.00	0.50	0.05	0.00	0%
7.5	LEW	0.00	0.00	0.25	0.00	0.00	0%
				Flow: Cubic Feet/Sec		**0.27**	100%

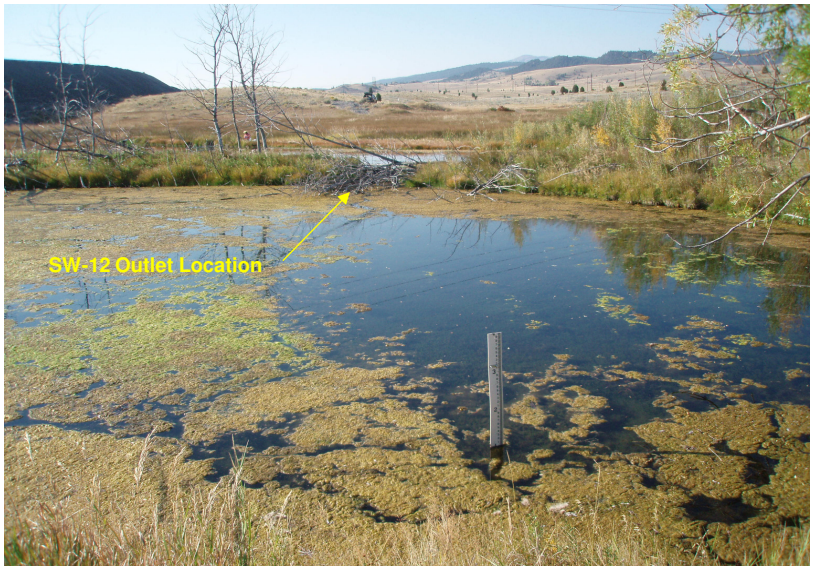


Site: Rhodia Silver Bow Site
Project Number: 26/46-006-SW08
Date: 9/19/2008
Time: 15:00

Appendix 3.3-A - Spring and Fall 2008 Stream Gauging Data

Stream Width (ft): 0.0
Staff Gage (ft): 0.98
Location of Measurement: SW-12 Outlet flow not measured. No unobstructed location to collect flow measurements present.
Method of Measurement: NA

Station Distance from Initial Point (ft)	Notes	Depth (ft)	Velocity (ft/s)	Width (ft)	Area (sq ft)	Flow (cu ft/s)	% of Flow in Subsection
		0.00	0.00	0.00	0.00	0.00	#DIV/0!
		0.00	0.00	0.00	0.00	0.00	#DIV/0!
		0.00	0.00	0.00	0.00	0.00	#DIV/0!
				Flow: Cubic Feet/Sec		**0.00**	#DIV/0!

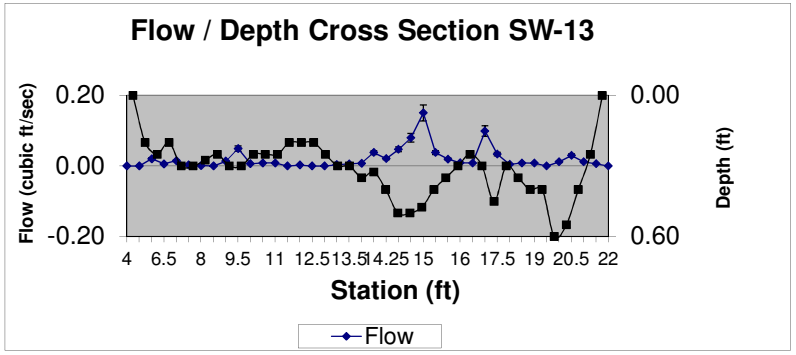


Site: Rhodia Silver Bow Site
Project Number: 26/46-006-SW08
Date: 9/17/2008
Time: 16:17

Stream Width (ft): 18.0
Staff Gage (ft): NA
Location of Measurement: SW-13
Method of Measurement: six-tenths-depth

Appendix 3.3-A - Spring and Fall 2008 Stream Gauging Data

Station Distance from Initial Point (ft)	Notes	Depth (ft)	Velocity (ft/s)	Width (ft)	Area (sq ft)	Flow (cu ft/s)	% of Flow in Subsection
4	REW	0.00	0.00	0.50	0.00	0.00	0%
5		0.2	0.00	1.00	0.20	0.00	0%
6		0.25	0.11	0.75	0.19	0.02	3%
6.5		0.2	0.06	0.50	0.10	0.01	1%
7		0.3	0.10	0.50	0.15	0.02	2%
7.5		0.3	0.02	0.50	0.15	0.00	0%
8		0.275	0.01	0.50	0.14	0.00	0%
8.5		0.25	0.00	0.50	0.13	0.00	0%
9		0.3	0.09	0.50	0.15	0.01	2%
9.5		0.3	0.33	0.50	0.15	0.05	6%
10		0.25	0.05	0.50	0.13	0.01	1%
10.5		0.25	0.07	0.50	0.13	0.01	1%
11		0.25	0.07	0.50	0.13	0.01	1%
11.5		0.2	0.00	0.50	0.10	0.00	0%
12		0.2	0.03	0.50	0.10	0.00	0%
12.5		0.2	0.00	0.50	0.10	0.00	0%
13		0.25	0.00	0.38	0.09	0.00	0%
13.25		0.3	0.05	0.25	0.08	0.00	0%
13.5		0.3	0.08	0.25	0.08	0.01	1%
13.75		0.35	0.09	0.25	0.09	0.01	1%
14		0.325	0.47	0.25	0.08	0.04	5%
14.25		0.4	0.21	0.25	0.10	0.02	3%
14.5		0.5	0.38	0.25	0.13	0.05	6%
14.75		0.5	0.64	0.25	0.13	0.08	10%
15		0.475	1.27	0.25	0.12	0.15	19%
15.25		0.4	0.38	0.25	0.10	0.04	5%
15.5		0.35	0.15	0.38	0.13	0.02	3%
16		0.3	0.06	0.50	0.15	0.01	1%
16.5		0.25	0.07	0.50	0.13	0.01	1%
17		0.3	0.66	0.50	0.15	0.10	13%
17.5		0.45	0.15	0.50	0.23	0.03	4%
18		0.3	0.03	0.50	0.15	0.00	1%
18.5		0.35	0.05	0.50	0.18	0.01	1%
19		0.4	0.04	0.50	0.20	0.01	1%
19.5		0.4	0.00	0.50	0.20	0.00	0%
20		0.6	0.04	0.50	0.30	0.01	2%
20.5		0.55	0.11	0.50	0.28	0.03	4%
21		0.4	0.06	0.50	0.20	0.01	2%
21.5		0.25	0.05	0.50	0.13	0.01	1%
22	LEW	0.00	0.00	0.25	0.00	0.00	0%
				Flow: Cubic Feet/Sec		**0.78**	100%

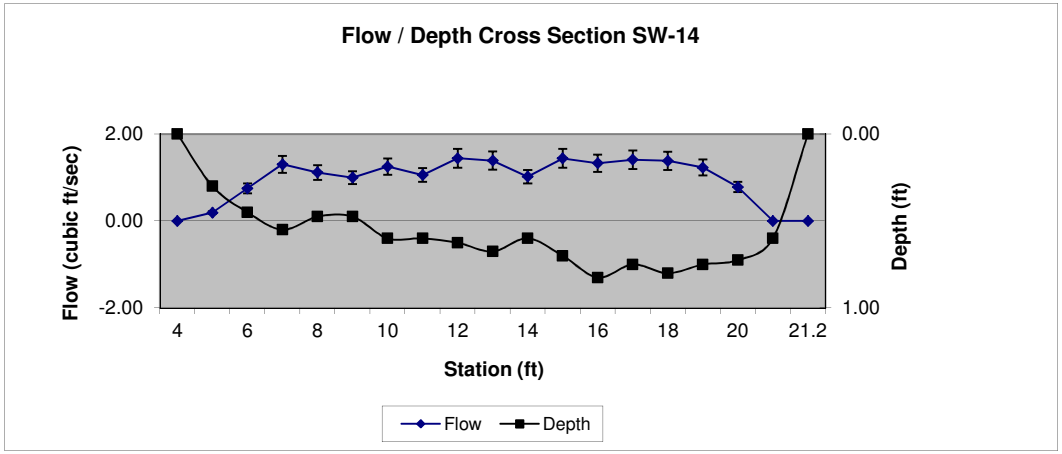


Site: Rhodia Silver Bow Site
Project Number: 26/46-006-SW08
Date: 9/17/2008
Time: 13:58

Stream Width (ft): 17.2
Staff Gage (ft): NA
Location of Measurement: SW-14
Method of Measurement: six-tenths-depth

Appendix 3.3-A - Spring and Fall 2008 Stream Gauging Data

Station Distance from Initial Point (ft)	Notes	Depth (ft)	Velocity (ft/s)	Width (ft)	Area (sq ft)	Flow (cu ft/s)	% of Flow in Subsection
4	REW	0.00	0.00	0.50	0.00	0.00	0%
5		0.30	0.64	1.00	0.30	0.19	1%
6		0.45	1.67	1.00	0.45	0.75	4%
7		0.55	2.37	1.00	0.55	1.30	7%
8		0.475	2.35	1.00	0.48	1.12	6%
9		0.475	2.10	1.00	0.48	1.00	6%
10		0.60	2.09	1.00	0.60	1.25	7%
11		0.60	1.76	1.00	0.60	1.06	6%
12		0.625	2.31	1.00	0.63	1.44	8%
13		0.675	2.06	1.00	0.68	1.39	8%
14		0.60	1.70	1.00	0.60	1.02	6%
15		0.70	2.06	1.00	0.70	1.44	8%
16		0.825	1.61	1.00	0.83	1.33	7%
17		0.75	1.88	1.00	0.75	1.41	8%
18		0.80	1.73	1.00	0.80	1.38	8%
19		0.75	1.64	1.00	0.75	1.23	7%
20		0.725	1.08	1.00	0.73	0.78	4%
21		0.60	0.00	0.60	0.36	0.00	0%
21.2	LEW	0.00	0.00	0.10	0.00	0.00	0%
				Flow: Cubic Feet/Sec		**18.10**	100%



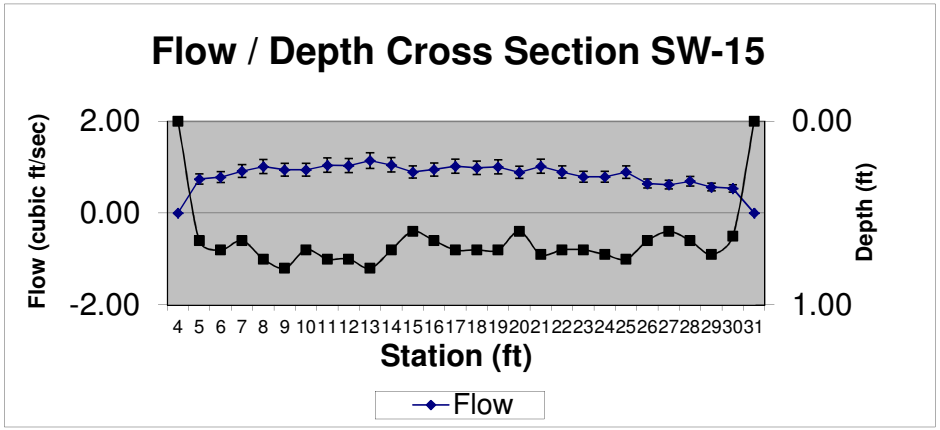
P:\Mpls\26 MT\46\2646006\WorkFiles\RFI\RFI Report 2012\Section 3.3 Hydrology\Appendix\Appdx 3.3-A Spring and Fall 2008 Stream Gauging Data\original format\September 2008 Flow Measurement

Site: Rhodia Silver Bow Site
Project Number: 26/46-006-SW08
Date: 9/16/2008
Time: 14:40

Stream Width (ft): 27.0
Staff Gage (ft): NA
Location of Measurement: SW-15
Method of Measurement: six-tenths-depth

Appendix 3.3-A - Spring and Fall 2008 Stream Gauging Data

Station Distance from Initial Point (ft)	Notes	Depth (ft)	Velocity (ft/s)	Width (ft)	Area (sq ft)	Flow (cu ft/s)	% of Flow in Subsection
4	REW	0.00	0	0.50	0.00	0.00	0%
5		0.65	1.14	1.00	0.65	0.74	3%
6		0.70	1.12	1.00	0.70	0.78	3%
7		0.65	1.41	1.00	0.65	0.92	4%
8		0.75	1.35	1.00	0.75	1.01	4%
9		0.80	1.18	1.00	0.80	0.94	4%
10		0.70	1.35	1.00	0.70	0.95	4%
11		0.75	1.39	1.00	0.75	1.04	5%
12		0.75	1.38	1.00	0.75	1.04	5%
13		0.80	1.43	1.00	0.80	1.14	5%
14		0.70	1.5	1.00	0.70	1.05	5%
15		0.60	1.49	1.00	0.60	0.89	4%
16		0.65	1.46	1.00	0.65	0.95	4%
17		0.70	1.46	1.00	0.70	1.02	4%
18		0.70	1.41	1.00	0.70	0.99	4%
19		0.70	1.44	1.00	0.70	1.01	4%
20		0.60	1.48	1.00	0.60	0.89	4%
21		0.725	1.41	1.00	0.73	1.02	4%
22		0.70	1.28	1.00	0.70	0.90	4%
23		0.70	1.13	1.00	0.70	0.79	3%
24		0.725	1.09	1.00	0.73	0.79	3%
25		0.75	1.19	1.00	0.75	0.89	4%
26		0.65	0.99	1.00	0.65	0.64	3%
27		0.60	1.03	1.00	0.60	0.62	3%
28		0.65	1.07	1.00	0.65	0.70	3%
29		0.725	0.78	1.00	0.73	0.57	2%
30		0.625	0.86	1.00	0.63	0.54	2%
31	LEW	0.00	0	0.50	0.00	0.00	0%
				Flow: Cubic Feet/Sec		**22.81**	100%

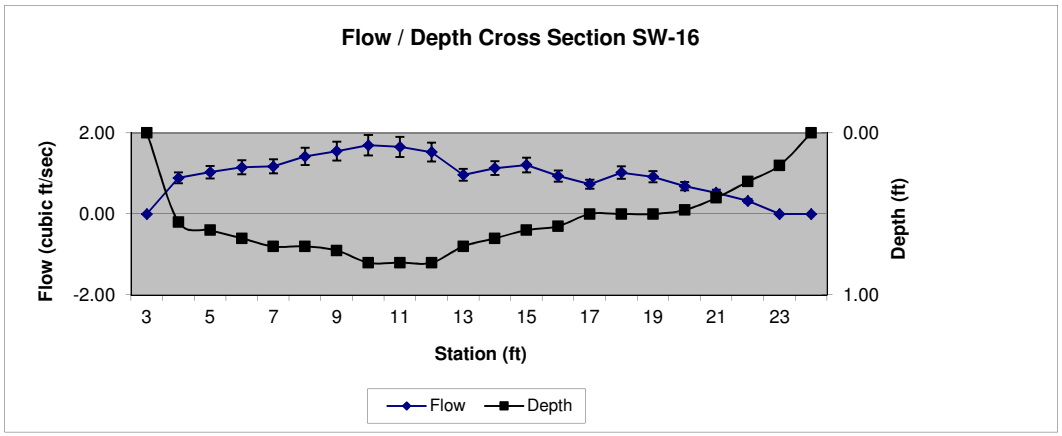


Appendix 3.3-A - Spring and Fall 2008 Stream Gauging Data

Site: Rhodia Silver Bow Site
Project Number: 26/46-006-SW08
Date: 9/16/2008
Time: 16:53

Stream Width (ft): 20.5
Staff Gage (ft): NA
Location of Measurement: SW-16
Method of Measurement: six-tenths-depth

Station Distance from Initial Point (ft)	Notes	Depth (ft)	Velocity (ft/s)	Width (ft)	Area (sq ft)	Flow (cu ft/s)	% of Flow in Subsection
3	REW	0.00	0	0.50	0.00	0.00	0%
4		0.55	1.62	1.00	0.55	0.89	4%
5		0.60	1.72	1.00	0.60	1.03	5%
6		0.65	1.77	1.00	0.65	1.15	6%
7		0.70	1.68	1.00	0.70	1.18	6%
8		0.70	2.03	1.00	0.70	1.42	7%
9		0.725	2.14	1.00	0.73	1.55	8%
10		0.80	2.12	1.00	0.80	1.70	8%
11		0.80	2.07	1.00	0.80	1.66	8%
12		0.80	1.91	1.00	0.80	1.53	7%
13		0.70	1.38	1.00	0.70	0.97	5%
14		0.65	1.74	1.00	0.65	1.13	6%
15		0.60	2.02	1.00	0.60	1.21	6%
16		0.575	1.63	1.00	0.58	0.94	5%
17		0.50	1.47	1.00	0.50	0.74	4%
18		0.5	2.04	1.00	0.50	1.02	5%
19		0.5	1.84	1.00	0.50	0.92	4%
20		0.475	1.44	1.00	0.48	0.68	3%
21		0.4	1.31	1.00	0.40	0.52	3%
22		0.3	1.08	1.00	0.30	0.32	2%
23		0.2	0	0.75	0.15	0.00	0%
23.5	LEW	0	0	0.25	0.00	0.00	0%
				Flow: Cubic Feet/Sec		**20.56**	100%

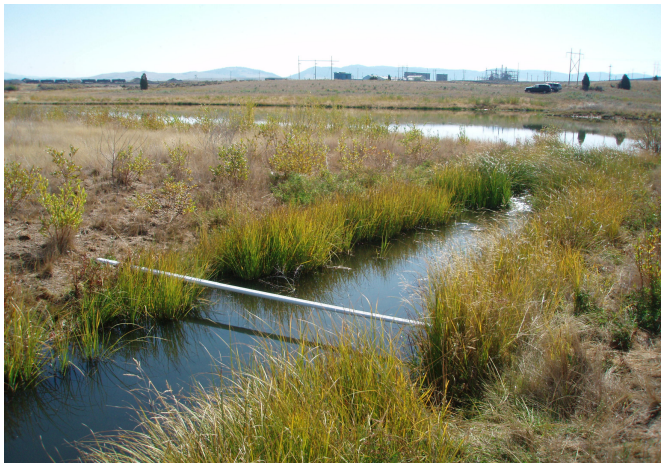


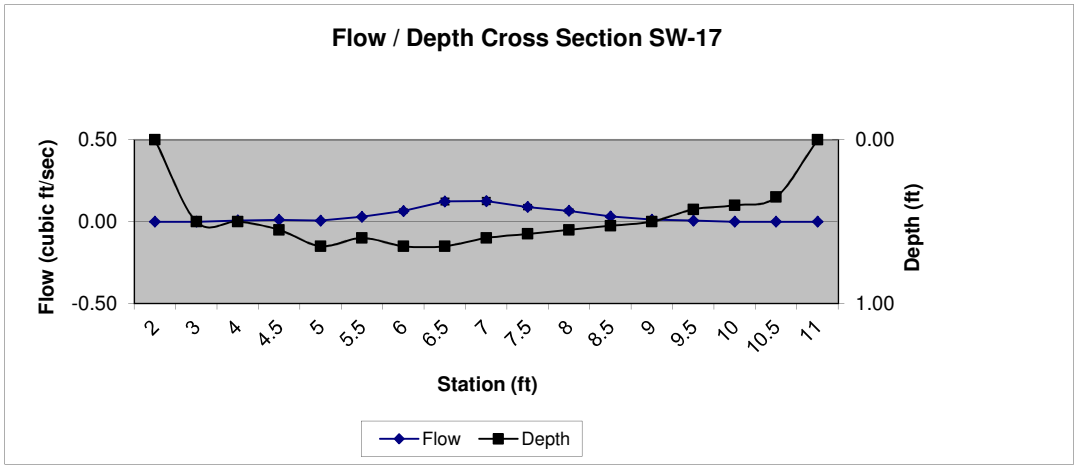
Appendix 3.3-A - Spring and Fall 2008 Stream Gauging Data

Site: Rhodia Silver Bow Site
Project Number: 26/46-006-SW08
Date: 9/17/2008
Time: 11:38

Stream Width (ft): 9.0
Staff Gage (ft): NA
Location of Measurement: SW-17
Method of Measurement: six-tenths-depth

Station Distance from Initial Point (ft)	Notes	Depth (ft)	Velocity (ft/s)	Width (ft)	Area (sq ft)	Flow (cu ft/s)	% of Flow in Subsection
2	REW	0.00	0	0.50	0.00	0.00	0%
3		0.50	0	1.00	0.50	0.00	0%
4		0.50	0.02	0.75	0.38	0.01	1%
4.5		0.55	0.04	0.50	0.28	0.01	2%
5		0.65	0.02	0.50	0.33	0.01	1%
5.5		0.60	0.1	0.50	0.30	0.03	5%
6		0.65	0.2	0.50	0.33	0.07	11%
6.5		0.65	0.38	0.50	0.33	0.12	21%
7		0.60	0.42	0.50	0.30	0.13	22%
7.5		0.575	0.31	0.50	0.29	0.09	16%
8		0.55	0.24	0.50	0.28	0.07	11%
8.5		0.525	0.12	0.50	0.26	0.03	5%
9		0.50	0.05	0.50	0.25	0.01	2%
9.5		0.425	0.03	0.50	0.21	0.01	1%
10		0.40	0	0.50	0.20	0.00	0%
10.5		0.35	0	0.50	0.18	0.00	0%
11	LEW	0	0	0.25	0.00	0.00	0%
				Flow: Cubic Feet/Sec		**0.58**	100%





Site: Rhodia Silver Bow Site
Project Number: 26/46-006-SW08
Date: 9/21/2008
Time: 14:20

Appendix 3.3-A - Spring and Fall 2008 Stream Gauging Data

Stream Width (ft): 0.0
Staff Gage (ft): NA
Location of Measurement: SW-18 (Up gradient of REC Plant discharge. No flow present.)
Method of Measurement: NA

Station Distance from Initial Point (ft)	Notes	Depth (ft)	Velocity (ft/s)	Width (ft)	Area (sq ft)	Flow (cu ft/s)	% of Flow in Subsection
		0.00	0.00	0.00	0.00	0.00	NA
		0.00	0.00	0.00	0.00	0.00	NA
		0.00	0.00	0.00	0.00	0.00	NA
				Flow: Cubic Feet/Sec		**0.00**	NA

Site: Rhodia Silver Bow Site
Project Number: 26/46-006-SW08
Date: 9/21/2008
Time: 13:35

Appendix 3.3-A - Spring and Fall 2008 Stream Gauging Data

Stream Width (ft): 0.0
Staff Gage (ft): NA
Location of Measurement: SW-19 (In Sheep Gulch up gradient of where REC Plant discharge joins. No flow present.)
Method of Measurement: NA

Station Distance from Initial Point (ft)	Notes	Depth (ft)	Velocity (ft/s)	Width (ft)	Area (sq ft)	Flow (cu ft/s)	% of Flow in Subsection
		0.00	0.00	0.00	0.00	0.00	NA
		0.00	0.00	0.00	0.00	0.00	NA
		0.00	0.00	0.00	0.00	0.00	NA
				Flow: Cubic Feet/Sec		**0.00**	NA

Site: Rhodia Silver Bow Site
Project Number: 26/46-006-SW08
Date: 9/21/2008
Time: 12:40

Appendix 3.3-A - Spring and Fall 2008 Stream Gauging Data

Stream Width (ft): 2.0
Staff Gage (ft): NA
Location of Measurement: SW-20 (flow measurements collected approximately 80 north of where REC Plant flow enters Rhodia property)
Method of Measurement: six-tenths-depth

Station Distance from Initial Point (ft)	Notes	Depth (ft)	Velocity (ft/s)	Width (ft)	Area (sq ft)	Flow (cu ft/s)	% of Flow in Subsection
1.75	REW	0.00	0	0.13	0.00	0.00	0%
2		0.20	0.36	0.25	0.05	0.02	2%
2.25		1.05	1.07	0.25	0.26	0.28	26%
2.5		1.00	1.08	0.25	0.25	0.27	25%
2.75		0.95	1.16	0.25	0.24	0.28	25%
3		1.00	0.87	0.25	0.25	0.22	20%
3.25		0.95	0.16	0.25	0.24	0.04	3%
3.5		0.20	0	0.25	0.05	0.00	0%
3.75	LEW	0	0	0.13	0.00	0.00	0%
				Flow: Cubic Feet/Sec		**1.10**	100%