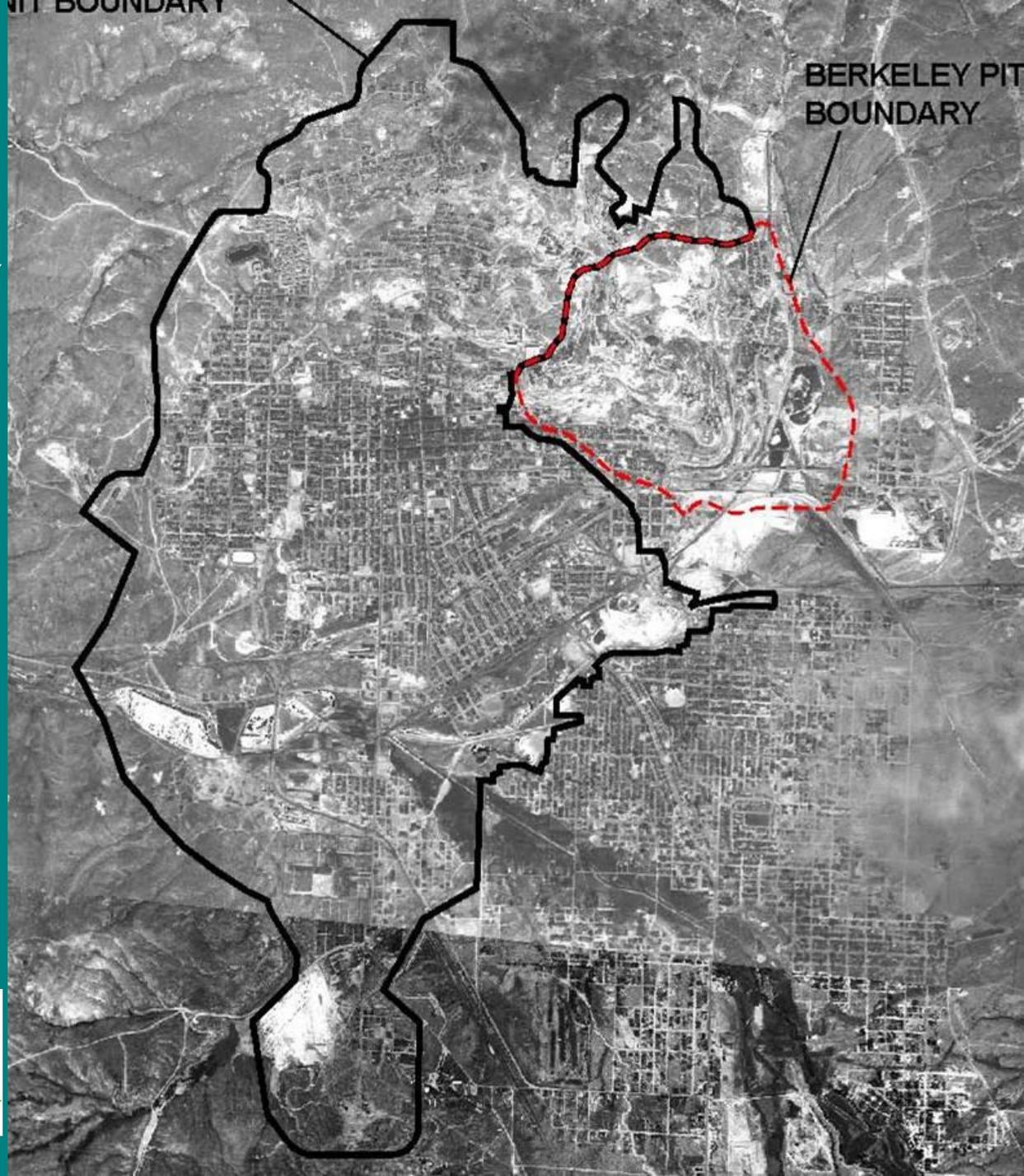


MANAGING WATER QUALITY SILVER BOW CREEK

2011 UPDATE



REMEDY
MUST PROTECT

HUMAN HEALTH
AND

ENVIRONMENT

A scenic view of Silver Bow Creek. The foreground is dominated by tall, green grasses and reeds. A small stream flows through the center, surrounded by dense green foliage. In the background, there are rolling hills and mountains under a clear sky. A power line tower is visible in the distance.

WATER QUALITY STANDARDS

YARDSTICK
OF PROTECTION

SILVER BOW CREEK

ROD Points of Compliance

GROVE GULCH

SS-4

SS-5

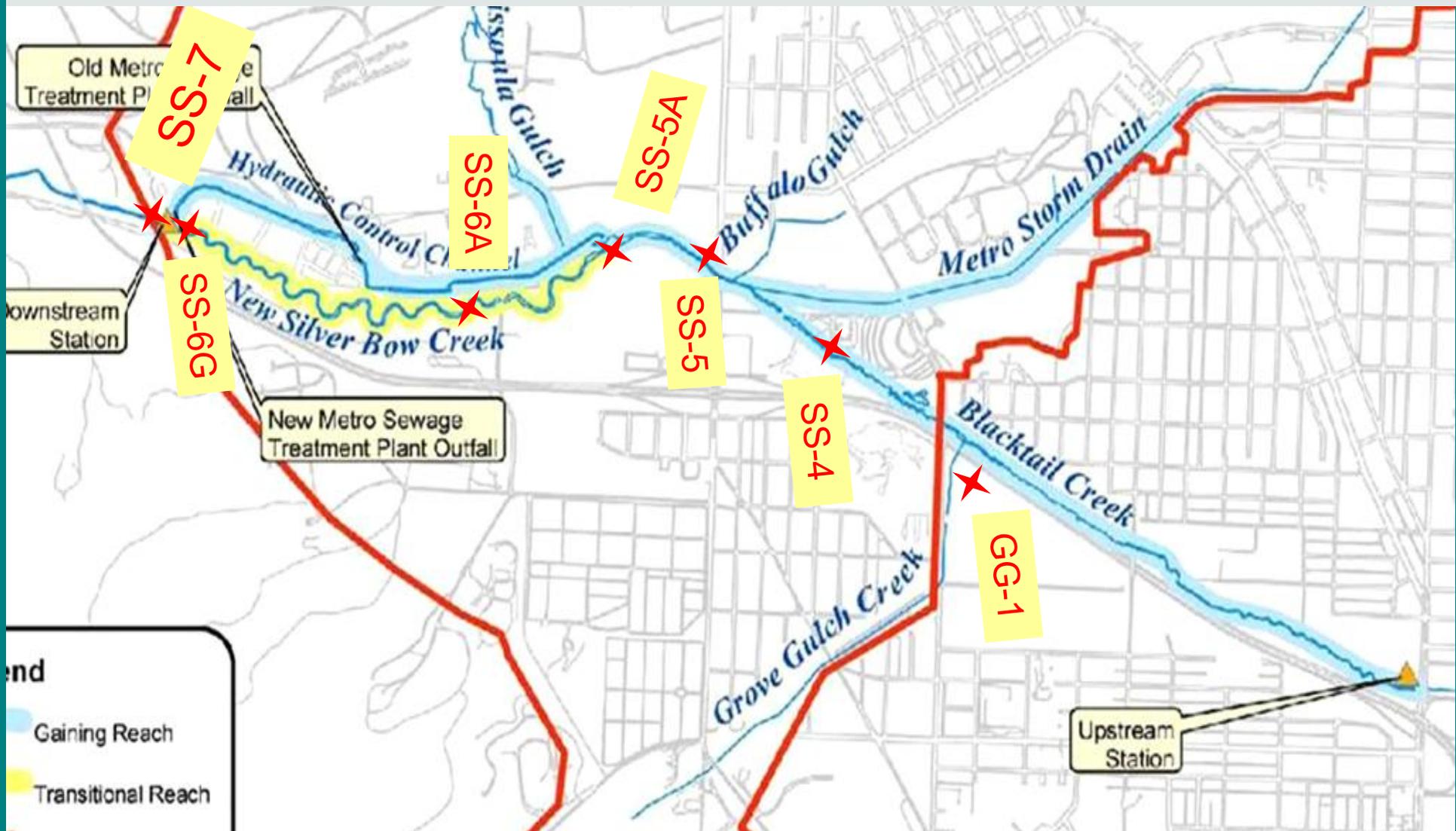
SS-5A

SS-6A

SS-6G

SS-07

ROD MUST MEET STANDARDS AT THESE STATIONS



HARDNESS BASED STANDARD Cd Cu Zn

$$\text{STANDARD} = \exp\{m_A [\ln(\text{hardness})] + b_A\}$$

MONITOR 2 FRACTIONS

DISSOLVED = metal ions

TOTAL RECOVERABLE =
ions + suspended sediment

FEDERAL STANDARD

DISSOLVED FRACTION

(Direct Effect on Aquatic Life)

STATE STANDARD (DEQ-7)

TOTAL RECOVERABLE FRACTION

(Indirect Effect on Aquatic Life – Gut)

NUMERICALLY THE SAME



SURFACE WATER MANAGEMENT



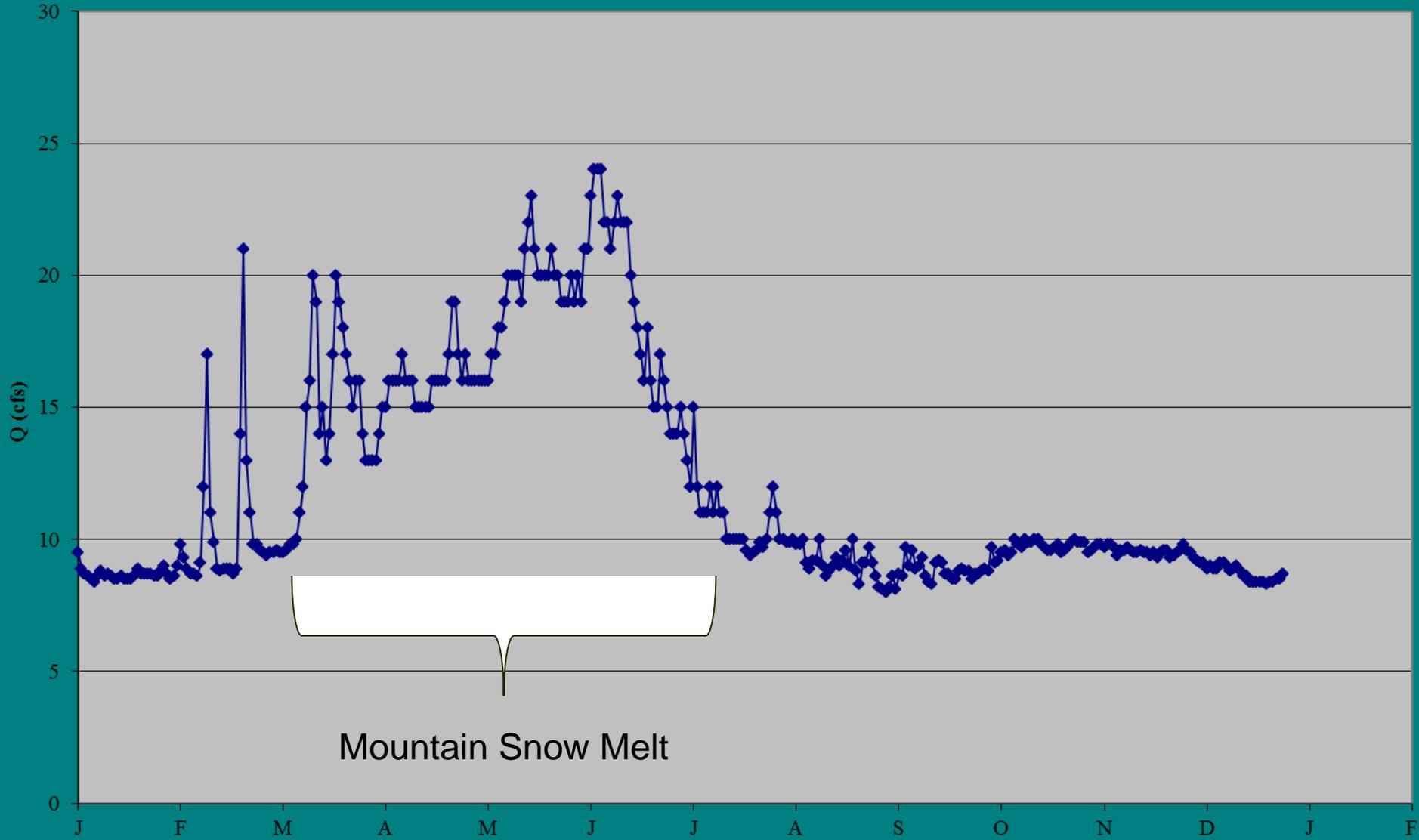
- BASEFLOW WATER QUALITY
CONTROL GROUND WATER
- STORMWATER QUALITY
BEST MANAGEMENT PRACTICES

BASEFLOW

Includes:

- **Low Flow** = July through February
Ground Water
- **High Flow** = April through June
Mountain Snow Melt

Blacktail Creek Avg Daily Mean Flow 1989-2005



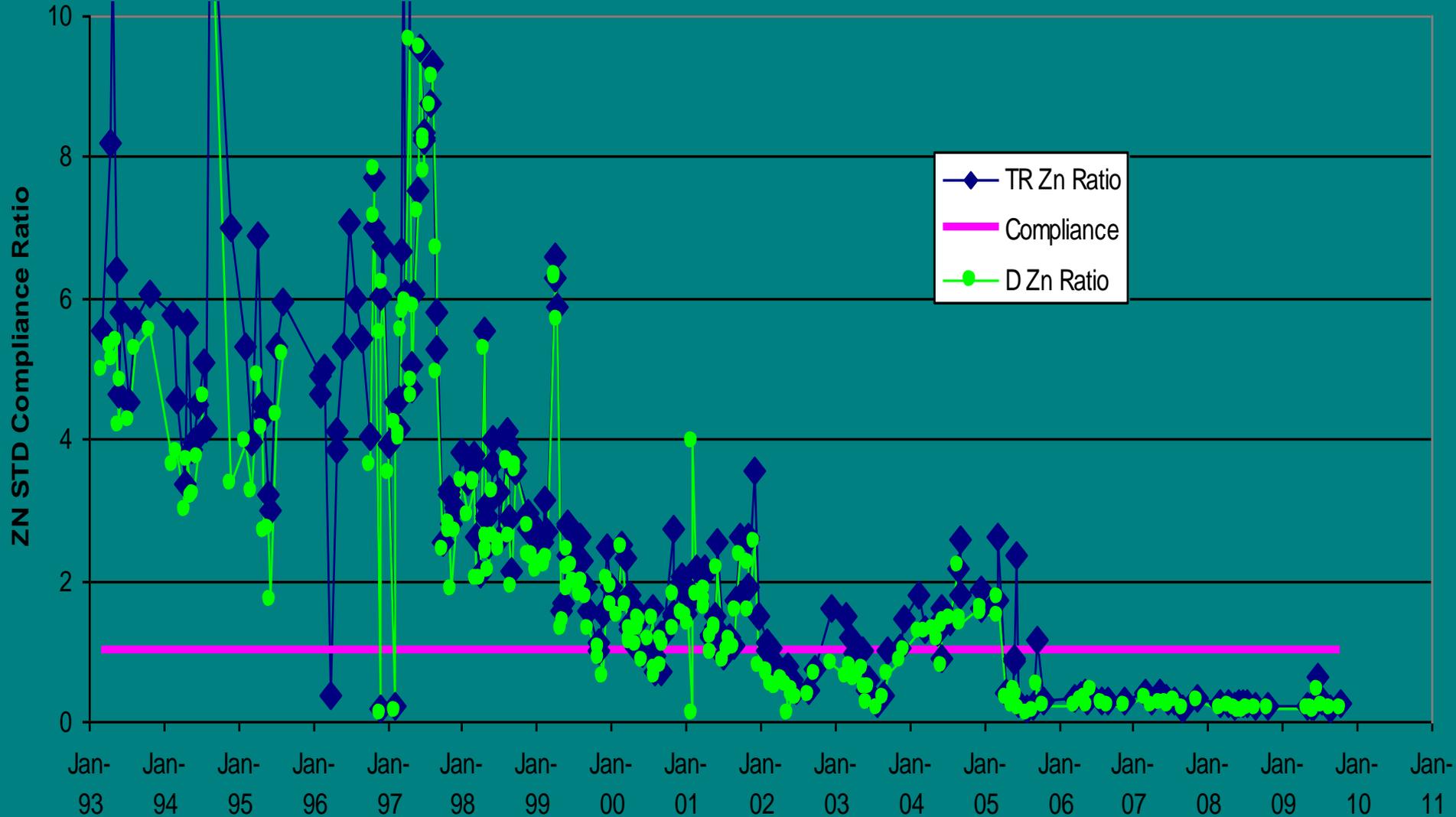
Surface Water - Base Flow

ROD REQUIRES

- Capture and Treat Contaminated Ground Water to Prevent Discharge to Silver Bow Creek
- Meet Chronic Standard in Stream as Measured at POCs

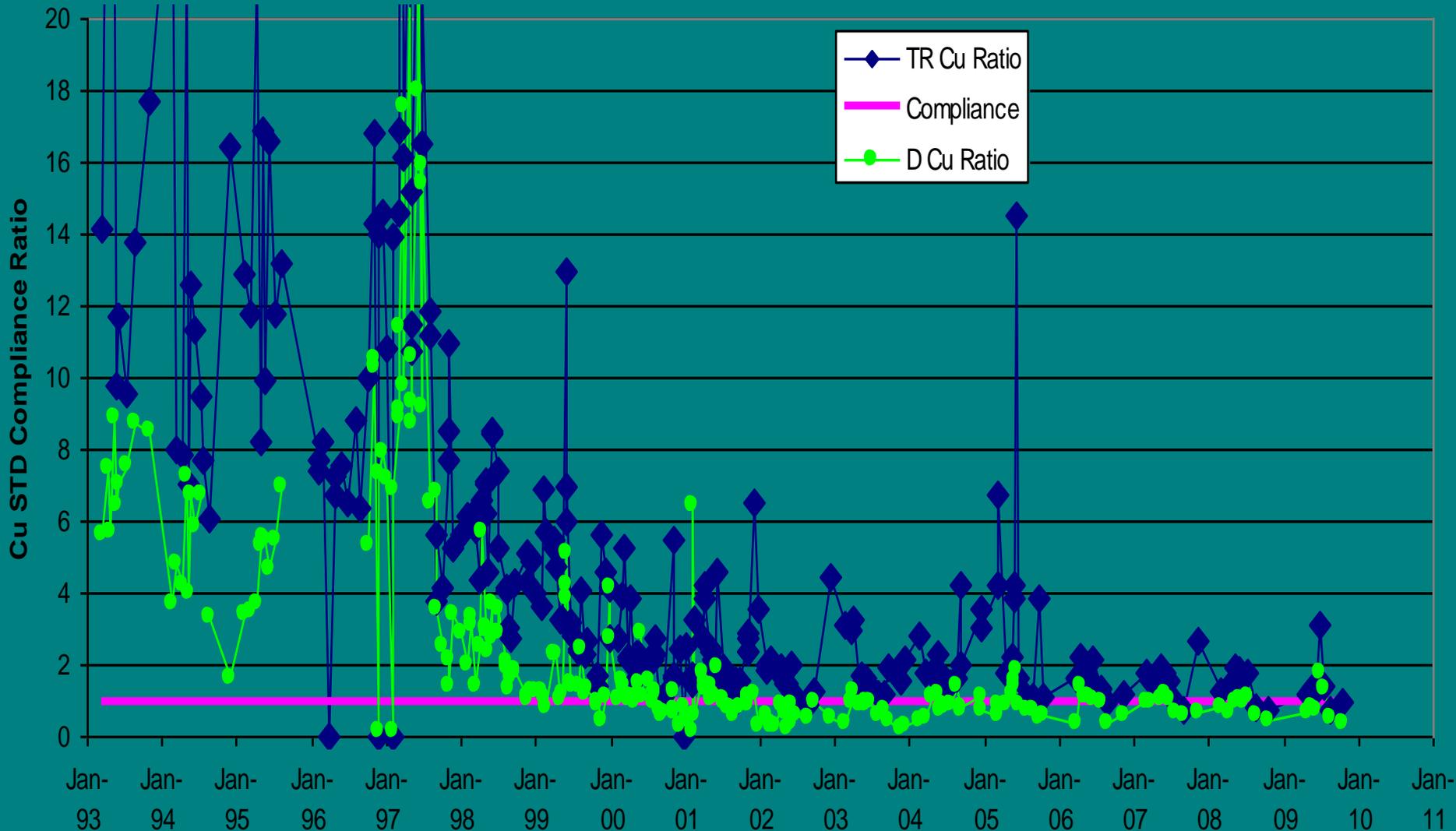
USGS STATION SS-07

COMPLIANCE WITH ZINC STANDARDS - SILVER BOW CREEK



USGS STATION SS-07

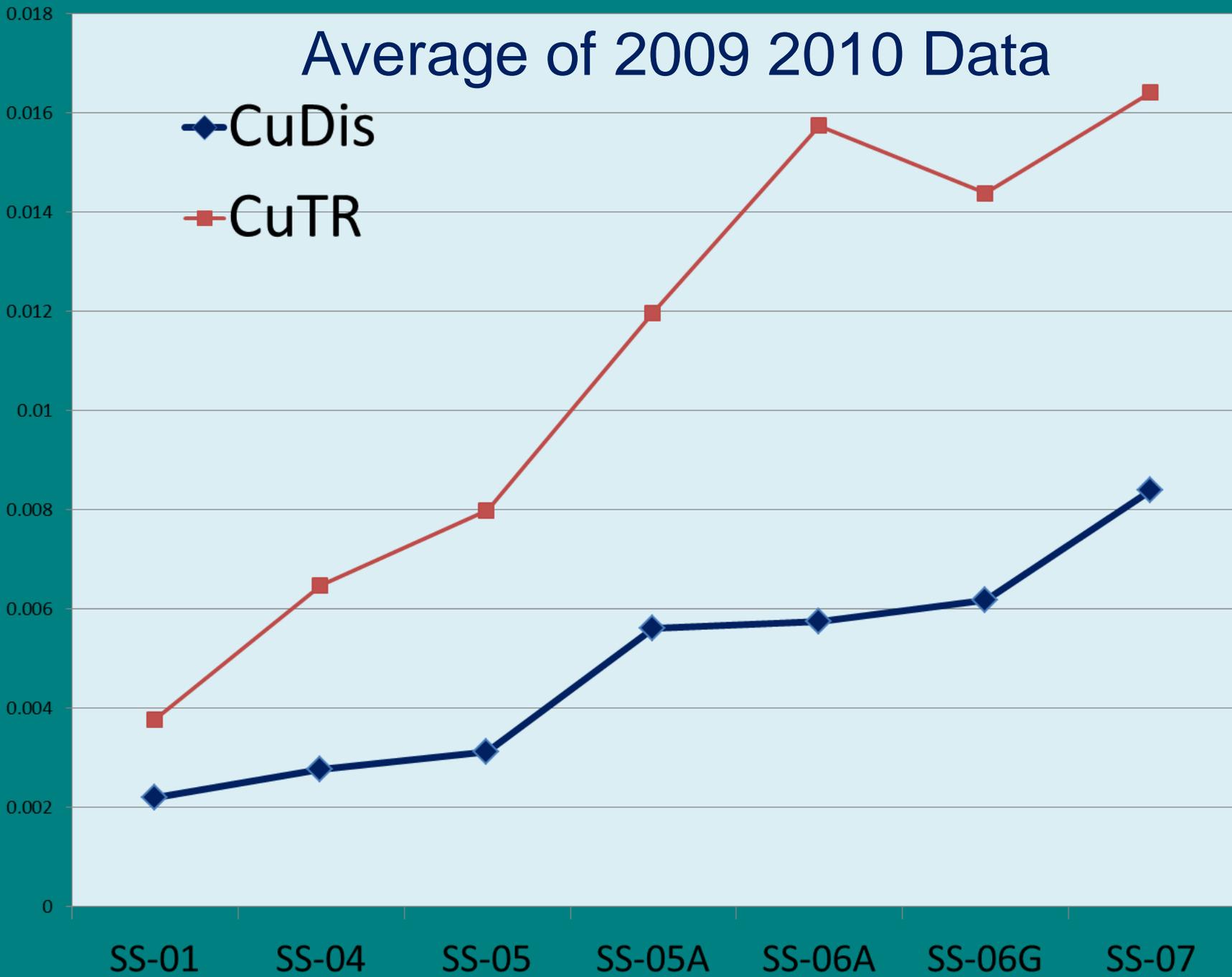
COMPLIANCE WITH COPPER STANDARD - SILVER BOW CREEK



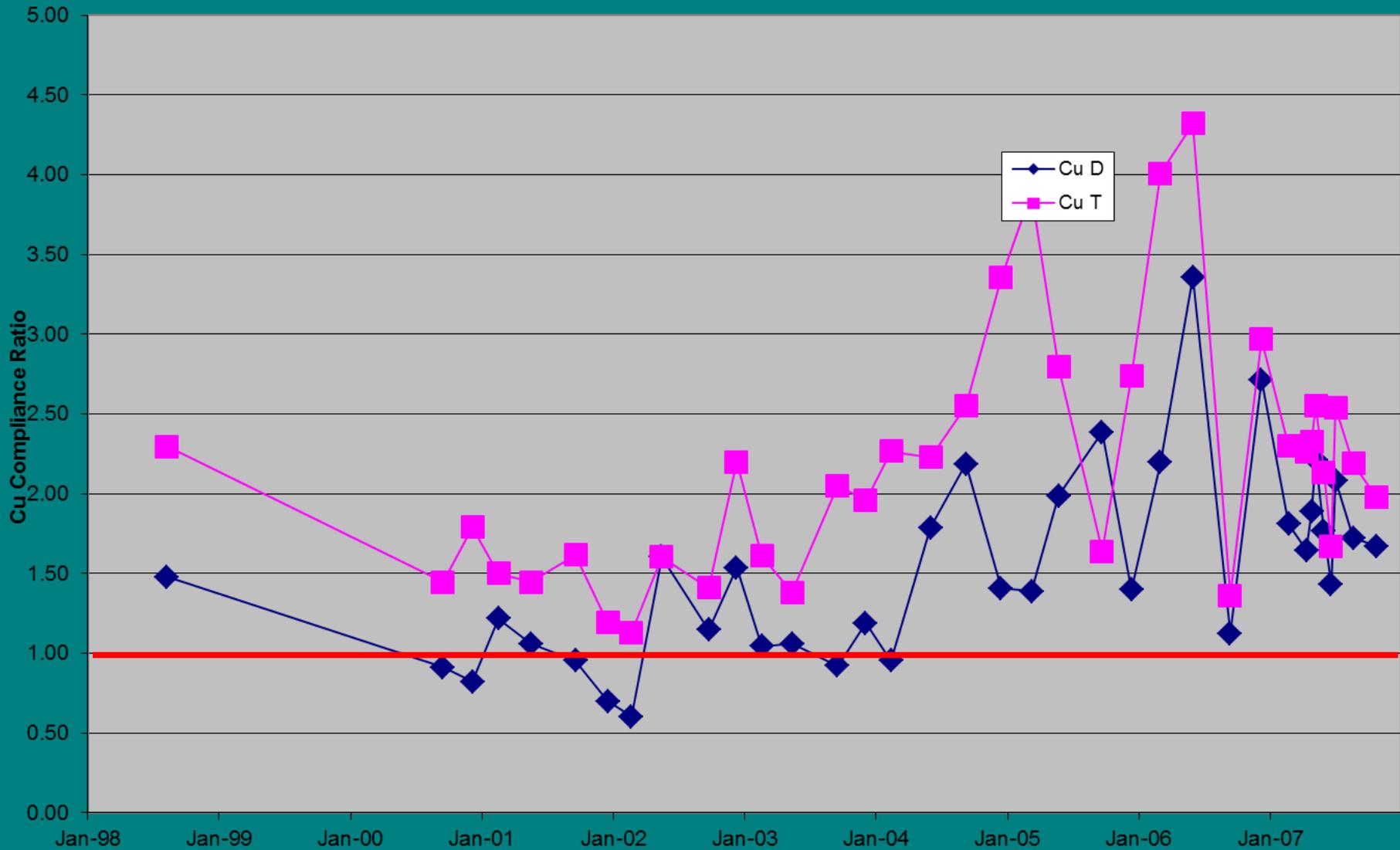
Average of 2009 2010 Data

◆ CuDis

■ CuTR



Copper Metro Sewer Discharge



BIGGEST REMAINING PROBLEM

RAIN AND SNOW-MELT RUNOFF





7 30 '98

Surface Water – Storm Flows

- ROD REQUIRES – Best Management Practices (BMP) Program to Address Contaminated Storm Water Runoff –
15 Years
- ROD REQUIRES – If BMPs Don't Achieve Acute Standards in Silver Bow Creek - Capture and Treat Contaminated Runoff

STORMWATER BMP PROGRAM ITERATIVE PROCESS

MONITORING

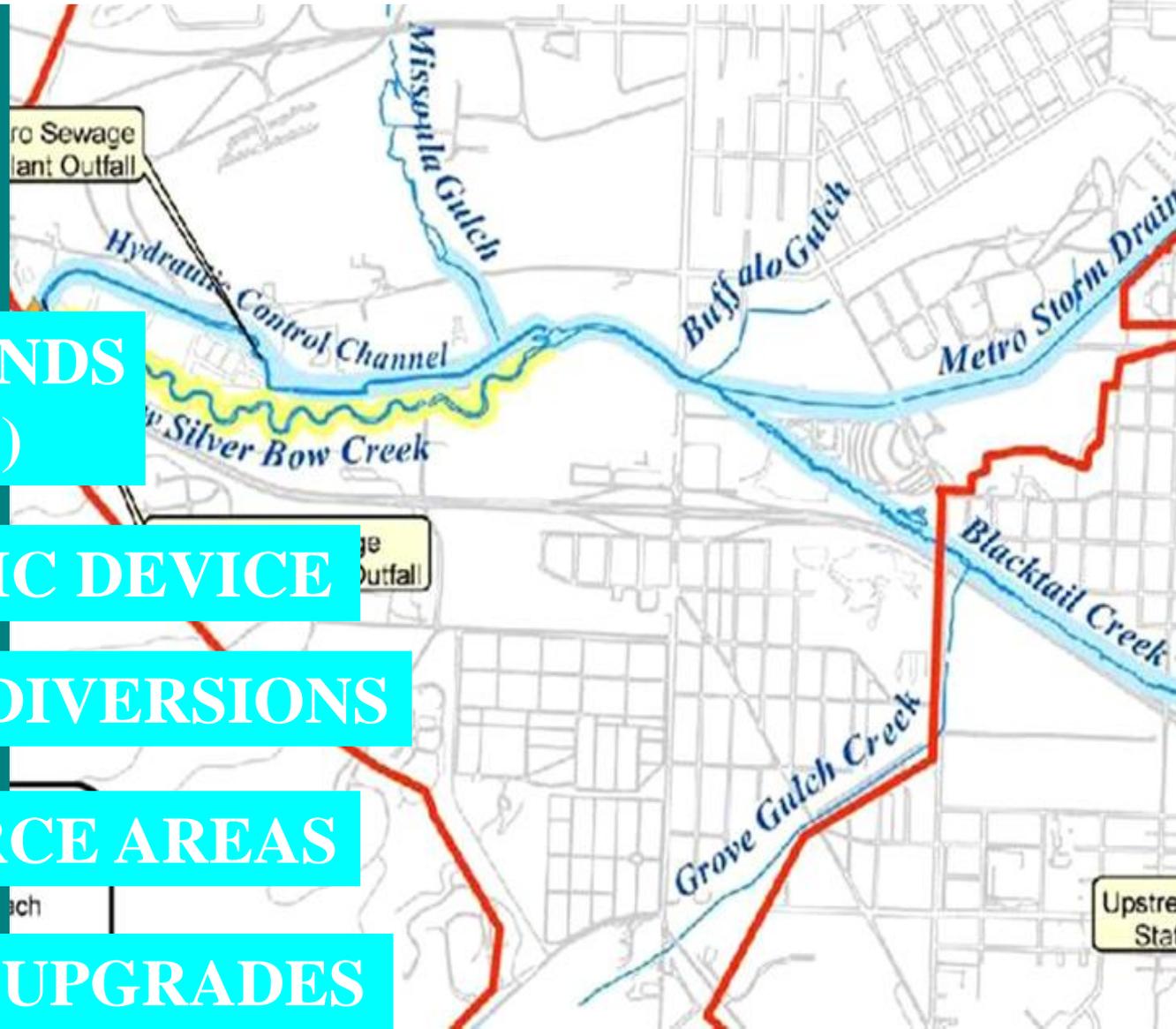
RETENTION PONDS
(CATCH BASINS)

HYDRODYNAMIC DEVICE

ROUTING AND DIVERSIONS

RECLAIM SOURCE AREAS

STORM SEWER UPGRADES



Storm Water BMPs To Date

- Cap Wastes
- Diversions to Berkeley Pit
- Missoula Gulch – storm water retention basins
- MSD Channel Reconstruction

RECLAIM



MISSOULA GULCH RETENTION BASINS

MODEL BMP



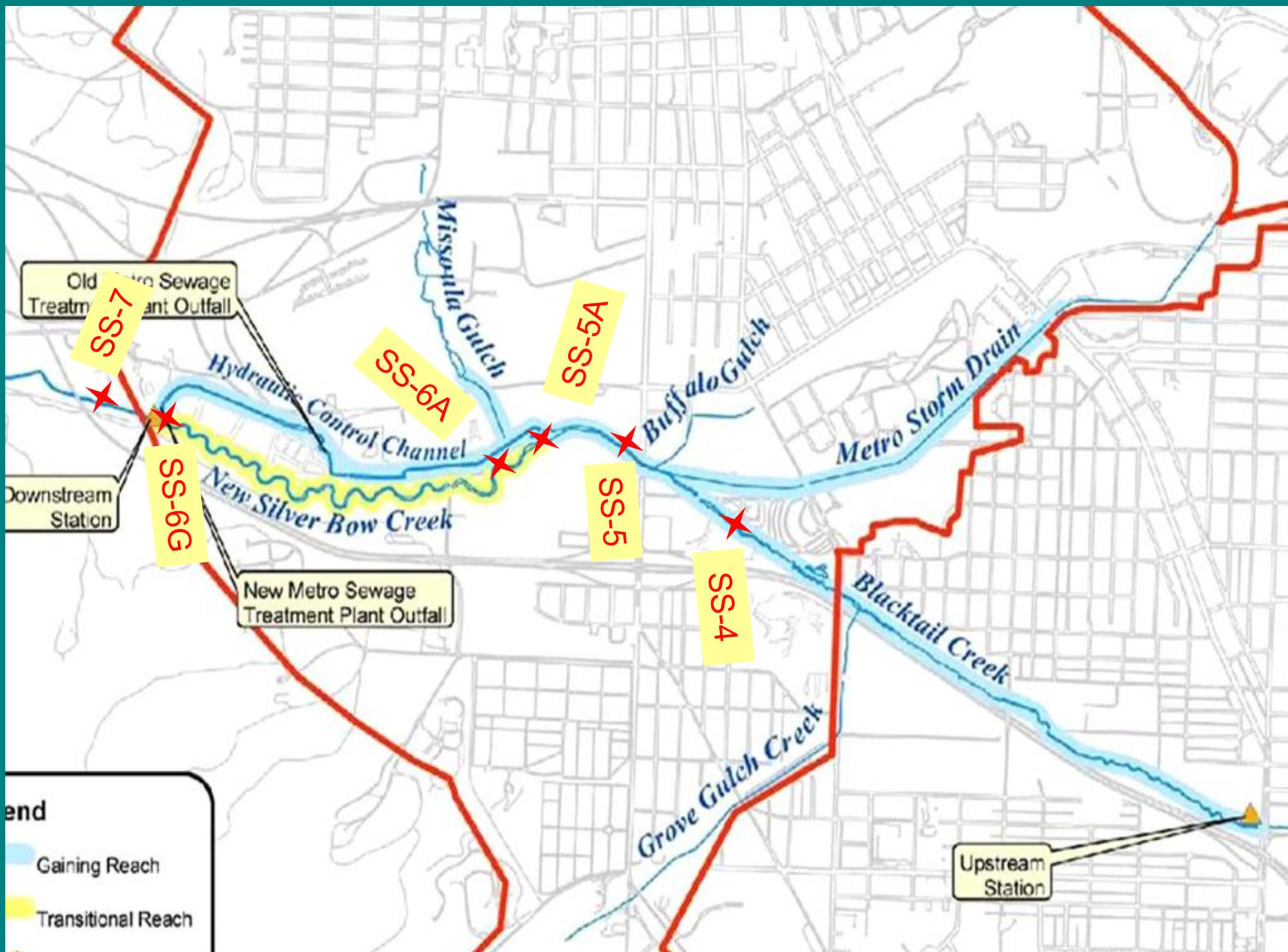
-  Drainage Area Boundary
-  Area Not Analyzed
-  Source Area
-  Study Area Boundary

Note: Grove Gulch is not included in this version of the report and the rail yard was not analyzed because stormwater is contained onsite.

Sources: Reha 2005 NAF, image courtesy of MT Natural Resource Information System (NRIS) (nris.mt.gov)

Source area boundaries provided by Butte-Silver Bow County (Updated June 2009)





Old Metro Sewage Treatment Plant Outfall

SS-7

Downstream Station

SS-6G

New Metro Sewage Treatment Plant Outfall

SS-6A

SS-5A

SS-5

SS-4

Upstream Station

Legend
Gaining Reach
Transitional Reach

Missoula Gulch

Hydraulic Control Channel

New Silver Bow Creek

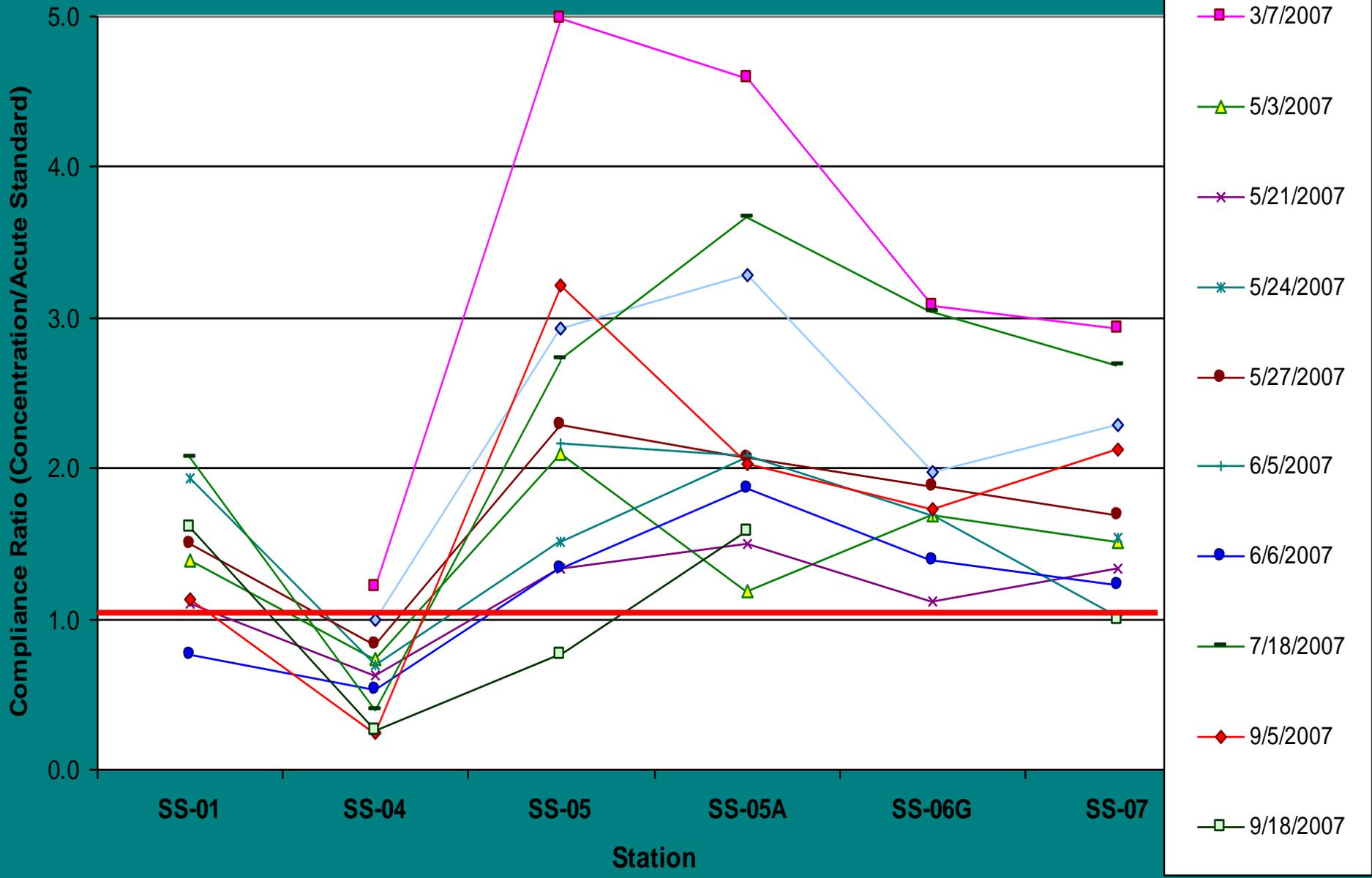
Grove Gulch Creek

Buffalo Gulch

Metro Storm Drain

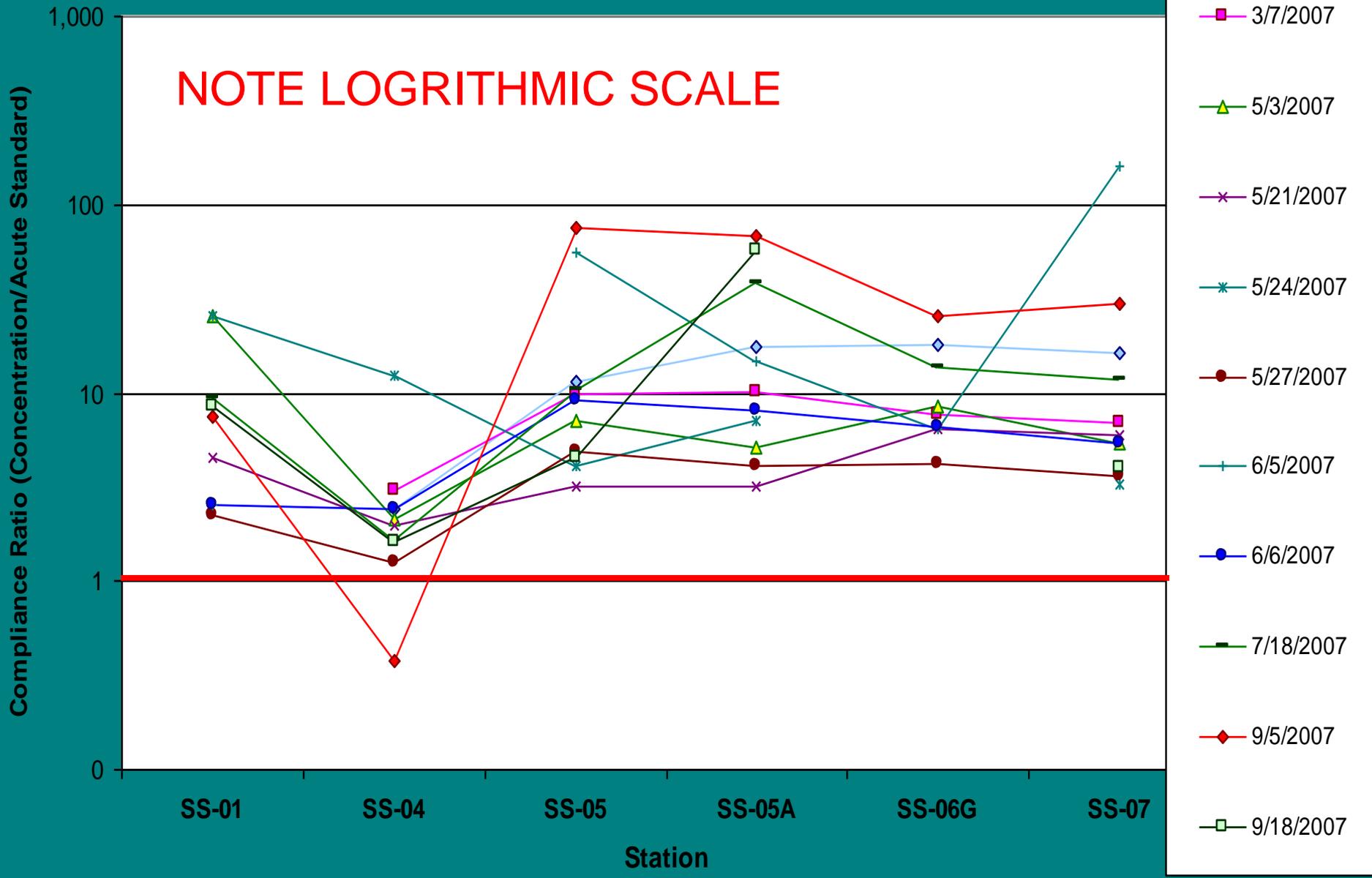
Blacktail Creek

2007 Wet Weather Dissolved Copper Compliance Ratio - by Event

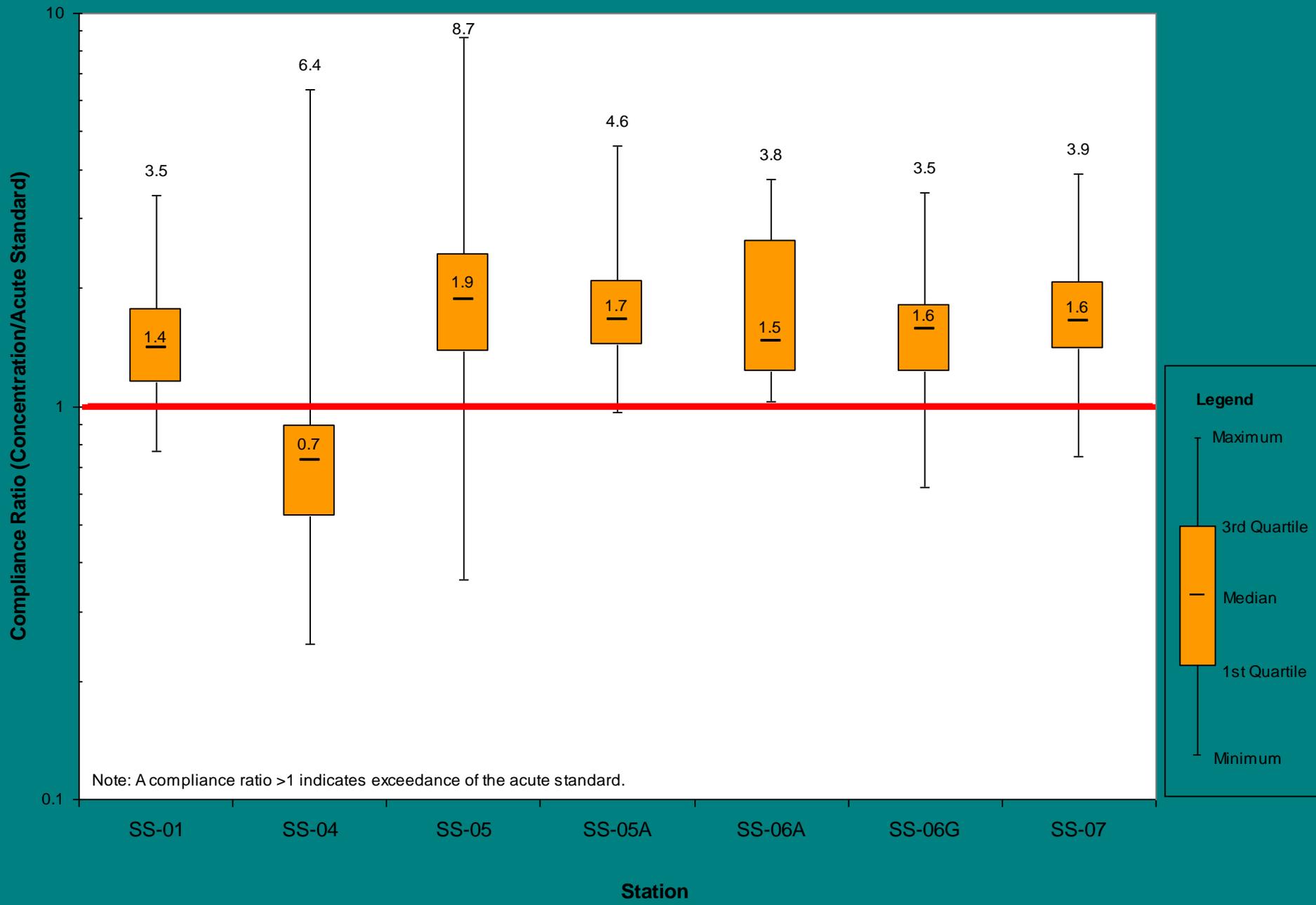


2007 Wet Weather Total Recoverable Copper Compliance Ratio - by Event

NOTE LOGRITHMIC SCALE

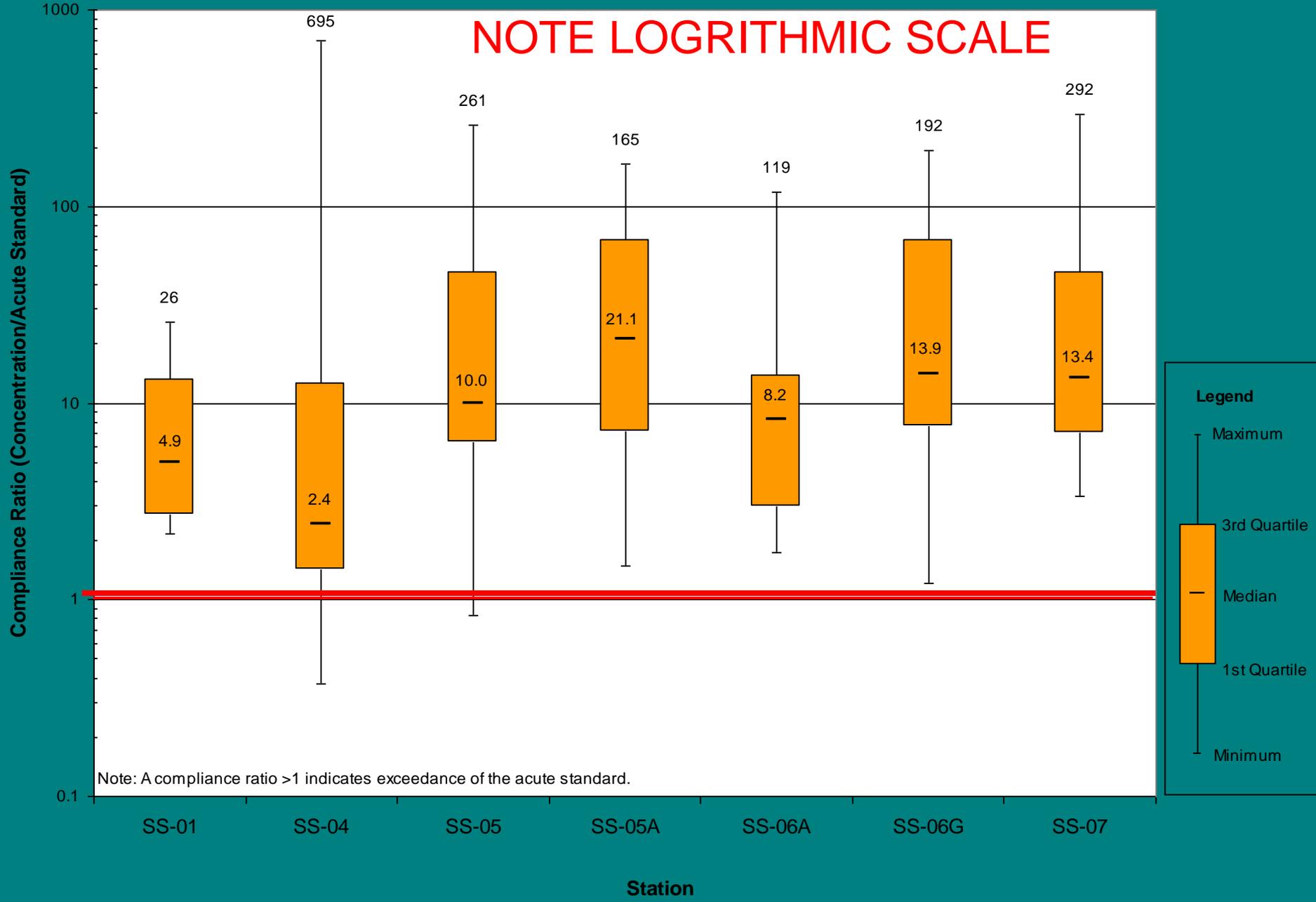


Storm Water In-Stream Dissolved Copper Data Summary - Post 2005



Storm Water In-Stream Total Recoverable Copper Data Summary - Post 2005

NOTE LOGRITHMIC SCALE



Butte, Mt

BUFFALO

MSD

Image © 2011 GeoEye

2472 ft

Imagery Date: 8/17/2010

45°59'56.14" N 112°31'30.81" W elev 5475 ft

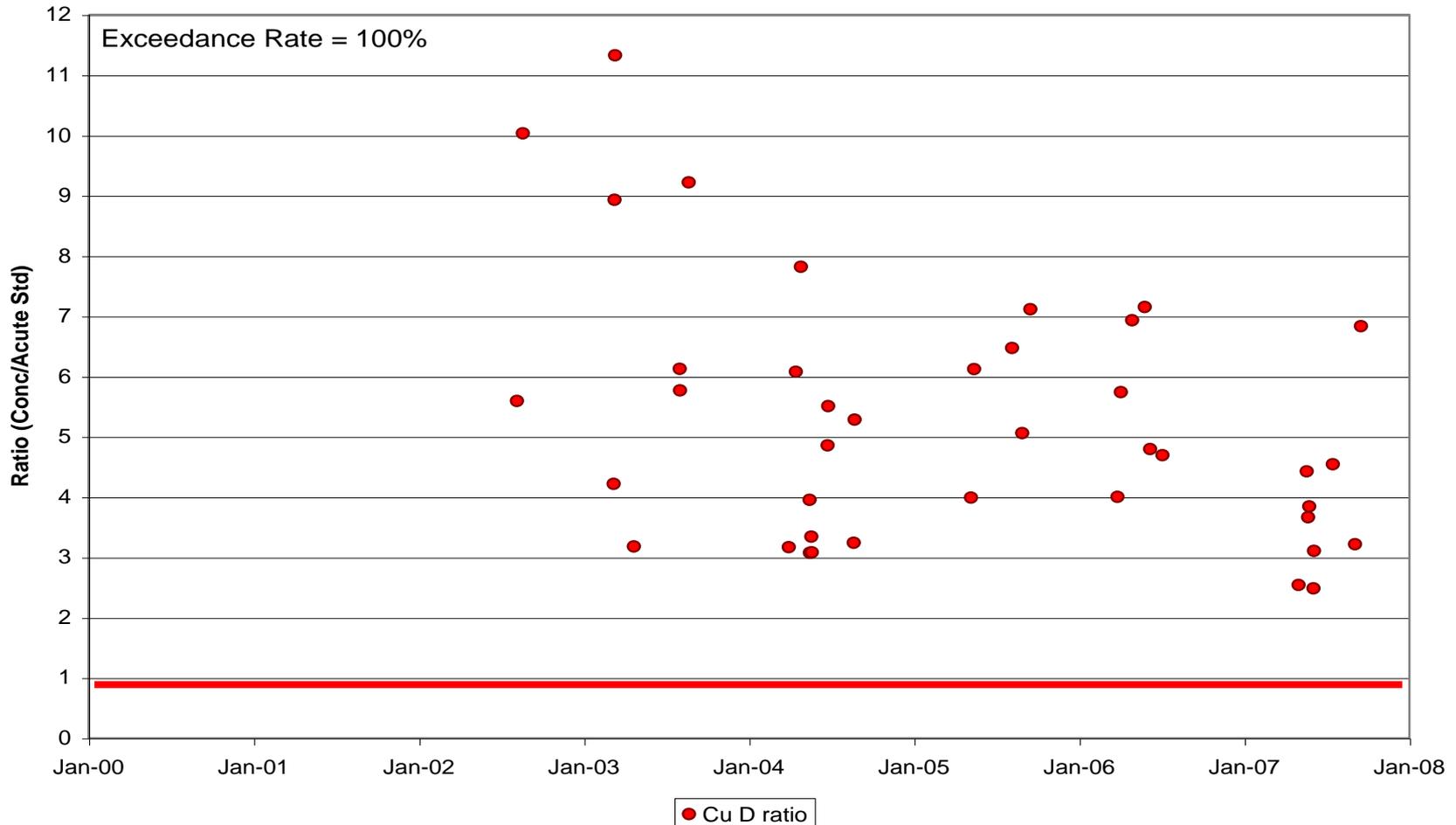


Buffalo Gulch

- Storm Sewer Network
 - Direct to Silver Bow Creek
- No Retention Basin
- Diversion Only Upper-Most Drainage

Buffalo Gulch Dissolved Copper

BUFFALO GULCH MOUTH Dissolved Copper Compliance With Acute Std Ratio

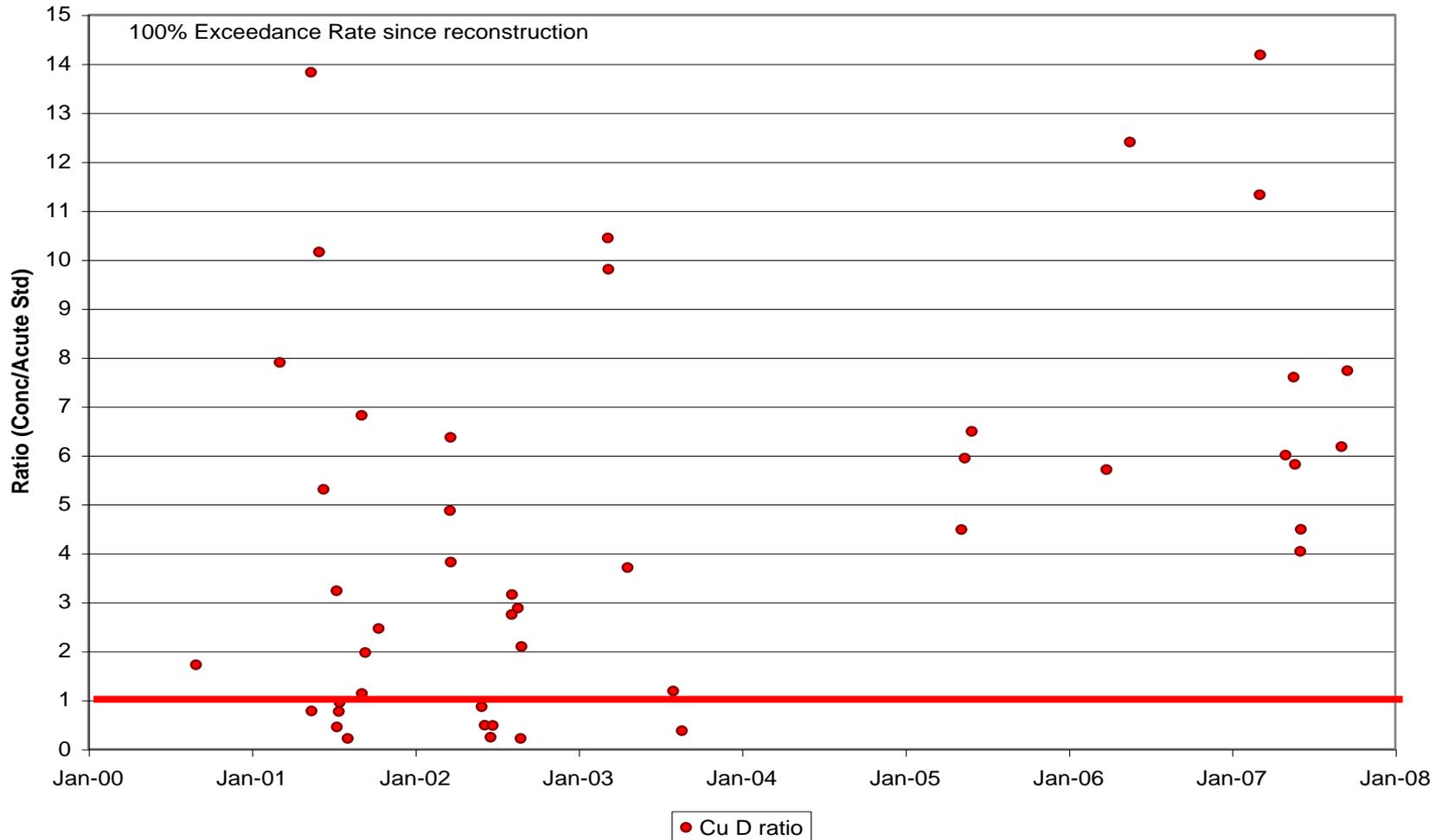


Metro Storm Drain

- Channel Reconstructed 2003-2005
- Storm Sewer Network To MSD
 - Direct to Silver Bow Creek
- No Retention Basin
- Diversions To Pit Upper Anaconda Road

MSD Dissolved Copper

METRO STORM DRAIN Dissolved Copper Compliance With Acute Std Ratio



BUFFALO STORM FLOW

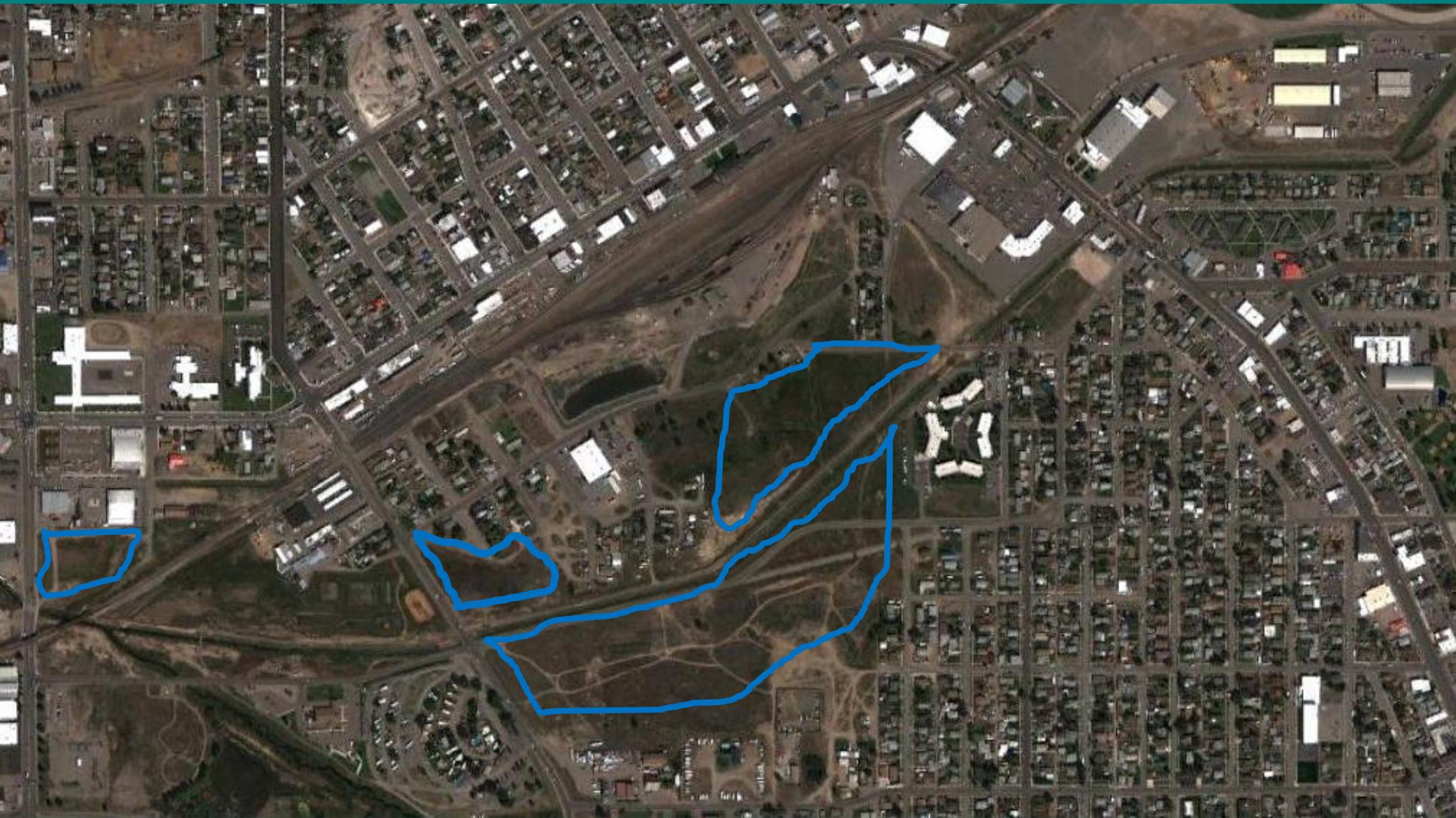
Sharp Peak Short Duration

MSD STORM FLOW

Broad Peak Long Duration

BMP Program – Next Steps

- MAJOR FOCUS
 - Buffalo Gulch
 - Metro Storm Drain
- Hydrodynamic Devices
- Upgrade Storm Sewers
- Divert From Silver Bow Creek
- Retention Basins



UNDEVELOPED AREAS

IT COULD LOOK LIKE THIS



REMEDY
MUST PROTECT

HUMAN HEALTH
AND

ENVIRONMENT

ROD SECTION 15

Coordination With Natural Resource Damage Restoration Actions

The EPA will work with the Trustee in the design and implementation of the remedial action to coordinate the implementation of the Selected Remedy with restoration actions to avoid duplication of effort and unnecessary costs and to maximize benefits to the area, where feasible and practical, and where coordination will not result in substantial delays to remedy implementation.

In Perpetuity

is a long time

CFWEP



CLARK FORK
WATERSHED
EDUCATION PROGRAM

