

0050



State of Utah
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

Michael O. Leavitt
Governor
Ted Stewart
Executive Director
James W. Carter
Division Director

355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203
801-538-5340
801-359-3940 (Fax)
801-538-5319 (TDD)

March 15, 1995

TO: Daron Haddock, Permit Supervisor

FROM: Steven M. Johnson, Reclamation Hydrologist *SMJ*

RE: Draft Review, Reclamation As-Built, Castle Gate Mine, Amax Coal Company,
ACT/007/004-94E, Working File, Carbon County, Utah

Folder # 2

SYNOPSIS

Amax Coal Company complete regrading of Sowbelly Canyon disturbance in September of 1994. After the completion as-builts were submitted to the Division to show some changes in the reclamation plan and the final configuration of the topography and channels.

ANALYSIS

RECLAMATION PLAN

HYDROLOGIC INFORMATION

Regulatory Reference: 30 CFR Sec. 784.14, 784.29, 817.41, 817.42, 817.43, 817.45, 817.49, 817.56, 817.57; R645-301-512, -301-513, -301-514, -301-515, -301-532, -301-533, -301-542, -301-723, -301-724, -301-725, -301-726, -301-728, -301-729, -301-731, -301-733, -301-742, -301-743, -301-750, -301-751, -301-760, -301-761.

Analysis:

Acid and toxic-forming materials.

The soil will be sampled for acid and toxic-forming material. Data from this sampling has not yet been received by the Division. The effect on the hydrologic balance will be addressed after this data is received.



Diversions.

As-builts diversions designs are presented in Table 3.2-20 and Table 3.2-21 and shown on Exhibits 3.2-13 and 14. The hand worked and computer generated design calculations are found in Appendix 3.2I. Appendix 3.2I is stamped and signed by a professional engineer. The summary of the channel designs (Table 3.2-20) shows that all evaluated channels were sized to allow the design flow depth and freeboard which range from 0.02-feet to 1.53-feet. Riprap ranges from 3-inches to 18-inches in diameter. The two berm diversions which route water away from SBRD-1 and into the sediment ponds are not included in the appendix calculation and summary table but they are not shown on the exhibits.

The freeboard on SBRD-1A, 1B, 1C, 1D, 9, and 10 all have less than 1.0-feet of freeboard. 1B, 1C, 1D, and 9 are less than 0.5-feet. Three of which are less than an 0.1-feet. These channels will be remeasured to see if they are as marginal as originally thought. Field measurements show that some areas are not adequate to convey the volume for the design storms.

The temporary road was originally designed to follow the Pond 017 diversion berm then go into the main channel up the canyon of Pond 016. This road has been redesigned to stop before it reaches the main channel but after it travels up the berm diversion bottom. The channel, though, has been used as a road during the reclamation work after channel construction was complete. This resulted in compaction of riprap in the channel bottom.

The berms, which route disturbed, flow into the sediment ponds are designed and shown in Appendix 3.2I and summarized on Table 3.2-20. These are not shown on either maps, Exhibits 3.2-13 and 14 as diversion but the contour show the approximate locations.

Many of the diversions were built with larger riprap on the edge. Field examination shows that water will likely be routed outside the riprap causing erosion to the channel banks. Riprap is also poorly graded, leaving large voids for water to flow through.

Stream buffer zones.

The main reclamation channel is part of an intermittent drainage. All reclamation activities within 100-feet of the main channel are within the buffer zone. The stream is protected from degradation by numerous sediment control measures addressed in the sediment control section of this document.

Sediment control measures.

Sediment is controlled by two ponds and alternate sediment control measures. Sediment pond as-builts are included in Exhibits 3.2-15 and 16 and in Appendix 3.2I. A summary of the constructed ponds inlet and outlet designs are included in Table 3.2-22. Exhibit 3.2-13

shows the areas treated by the sediment ponds. Areas not marked as treated by the sediment ponds are treated by alternate sediment control measures. An amendment approved in January 1995 provides detail into the alternate sediment control measures used in reclamation.

Sedimentation ponds.

Two sediment ponds were constructed in the reclaiming of Sowbelly Canyon. The as-builts for the ponds and the maps showing final grading, do not show identical elevations.

Discharge structures.

The spillways from the sediment ponds are open, therefore, only one spillway is needed per pond. The open spillways are protected from erosion by riprap.

Findings:

Permanent diversions are required to provide adequate size to convey the 100-year, 6-hour storm event, and the design capacity of channels for temporary and permanent stream channel diversions will be at least equal to the capacity of the unmodified stream channel immediately upstream and downstream from the diversion (R645-301-742.322). The Division may specify additional design criteria for diversions to meet the requirements of R645-301-742.300 (R645-301-742.314). Typically the Division requires that 6-inches to a one foot of freeboard be built into permanent diversion. The original designs of these diversions was to include this freeboard. However, many of the diversion constructed in Sowbelly Gulch did not have this freeboard in their final construction. The freeboard on SBRD-1A, 1B, 1C, 1D, 9, and 10 all have less than 1.0-feet of freeboard. 1B, 1C, 1D, and 9 are less than 0.5-feet. Three of which are less than an 0.1-feet. Mr. Bill Hendrickson says the he "Thinks the measurement method was the problem, but the channels should work."

Field measurements made by the Division show that some areas are not adequate to convey the volume for the design storms. It appears that riprap was place on areas that were to shallow to begin. Then after the riprap was place the effective flow area was diminished even more. See the attached figures (Cross Sections and Rating Curves for SBRD-1C.) Areas where flow depth is not adequate will require reconstruction.

The riprapped channel in the area above the road has been damaged by vehicle traffic. The riprap is compacted into the channel bed and the channel has no roughness on the two side where the vehicles' wheels traveled. This reach of the channel should be well armored from erosion, but the compacted condition will make it difficult to establish vegetation. Furthermore, the smooth condition of the channel bottom has created a low frictional coefficient which will cause the water to gain much energy in this reach. The extra energy has not been accounted for in designing the riprap in the channel below the compacted area. The increased energy will increase

the potential for erosion in the lower reach.

Some culverts are not sized adequately as permanent diversion structures. These culverts must be removed or resized before phase II can be bond released.

The diversion berms that flow to Ponds 016 and 017 should be mapped better. No berms are shown on maps as diversions, though, the topography lines show their approximate locations. However, it is still unclear whether or not the berm will successfully route water into their respective pond. Especially the berm to Pond 016. It appears to breakdown right before the inlet, flowing into the main diversion. If this is the case, a large area is not being treated properly for sediment control. Snow melt in March 1995 showed that water would not be confined by these diversions; rather some water would flow out of the diversions, into the main untreated channel.

Many of the diversions were built with larger riprap on the edge which channellizes water and cause erosion along the ditch side. Riprap should be well graded across the diversion so that water can enter to proper flow paths. Riprap should be well graded to prevent water from undercutting the channel. A Division inspection in March 1995 showed that riprap is thin in many areas of the diversion. Often time the base material is shown though the riprap. The filter fabric in SBRD-1 is shown in some areas.

Alternate sediment control measure are not well delineated on the as-built maps. Each treatment in use should be shown in its location and the contributing area should be noted.

The sediment ponds and discharge structures are adequately sized as temporary structures. The inlets and outlets to the sediment ponds are adequately protected from erosion by riprap. The outlet of Pond 016 has a larger D50 riprap size than originally designed but the existing riprap should perform well because smaller rock was added to the large rock.

RECOMMENDATION

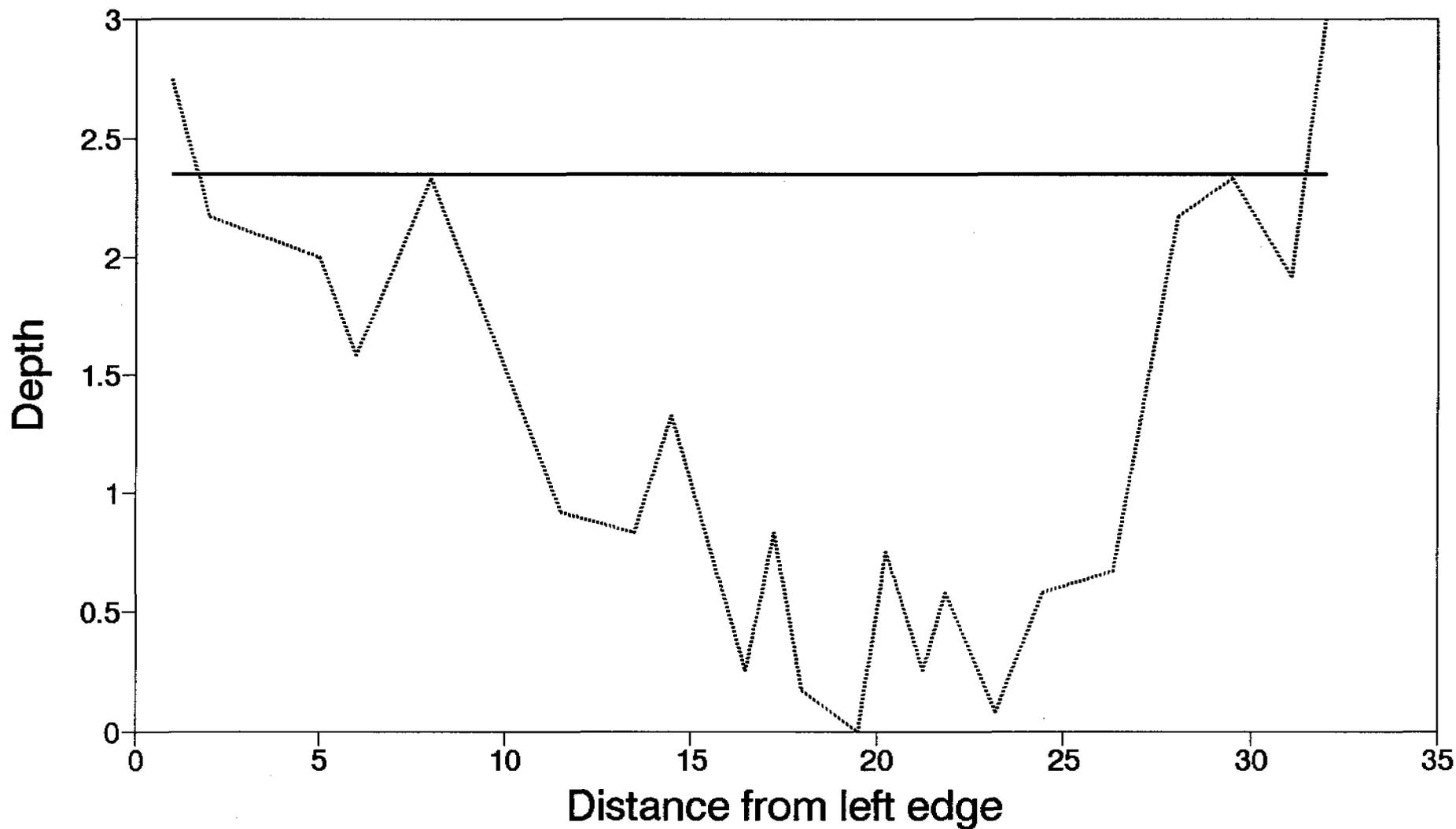
The reclamation construction at Sowbelly Canyon is not adequate to continue with phase I bond release protocol. The following hydrologic deficiencies must be addressed before phase I release can be considered.

1. All diversions must included, at minimum, 6-inches of freeboard above the size requirements which pass the design (100-year, 24-hour) storm event. Areas that do not have adequate flow depth to contain the 100-year, 24-hour storm runoff will need to be modified or reconstructed to the original design size.

2. SBRD-1D should be repaired from damage caused by vehicle traffic during reclamation activities. The channel below the compacted area must be protected from the increase energy caused by the compacted riprap.
3. The berm diversions which feed the two ponds must be shown on maps as diversion. The maps should show sufficient contours to determine whether flow will reach it intended pond.
4. The berm diversions must be repaired and modified to ensure flow will reach it proper destination.
5. Riprap in the reclamation channels must meet the quantity and gradation standards set in the originally approved MRP designs.
6. Alternate sediment control measures must be shown on appropriate maps. A brief description of the measure and the area that reports to each measure should be shown.
7. Sediment pond maps and the reclamation as-built maps must be made to reflect the actual elevations. These elevations should be the same on all maps.

Cross Section

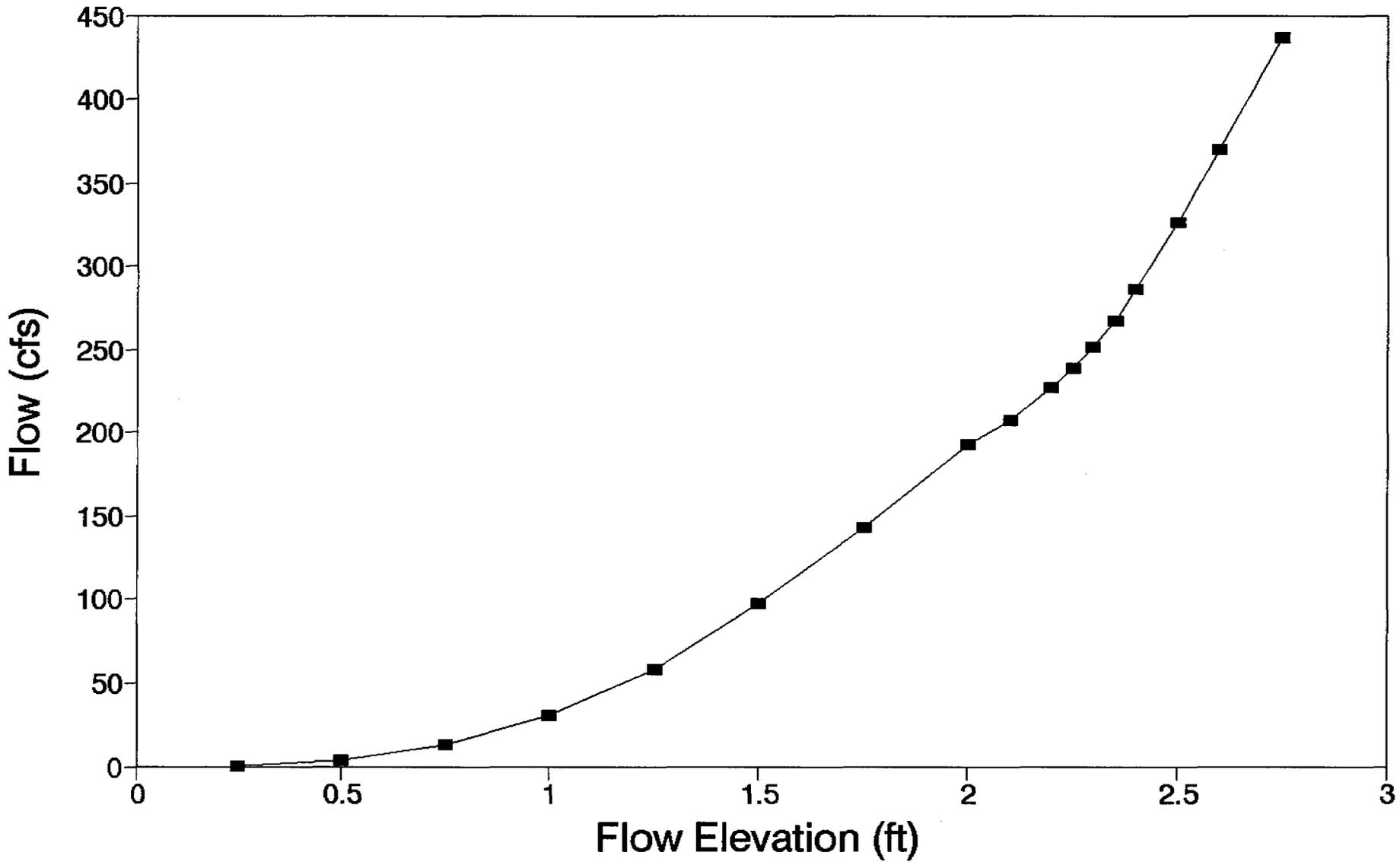
Sowbelley Reclamation, Sbrd-1A ~ 0+15



..... Channel Bottom — Water Level

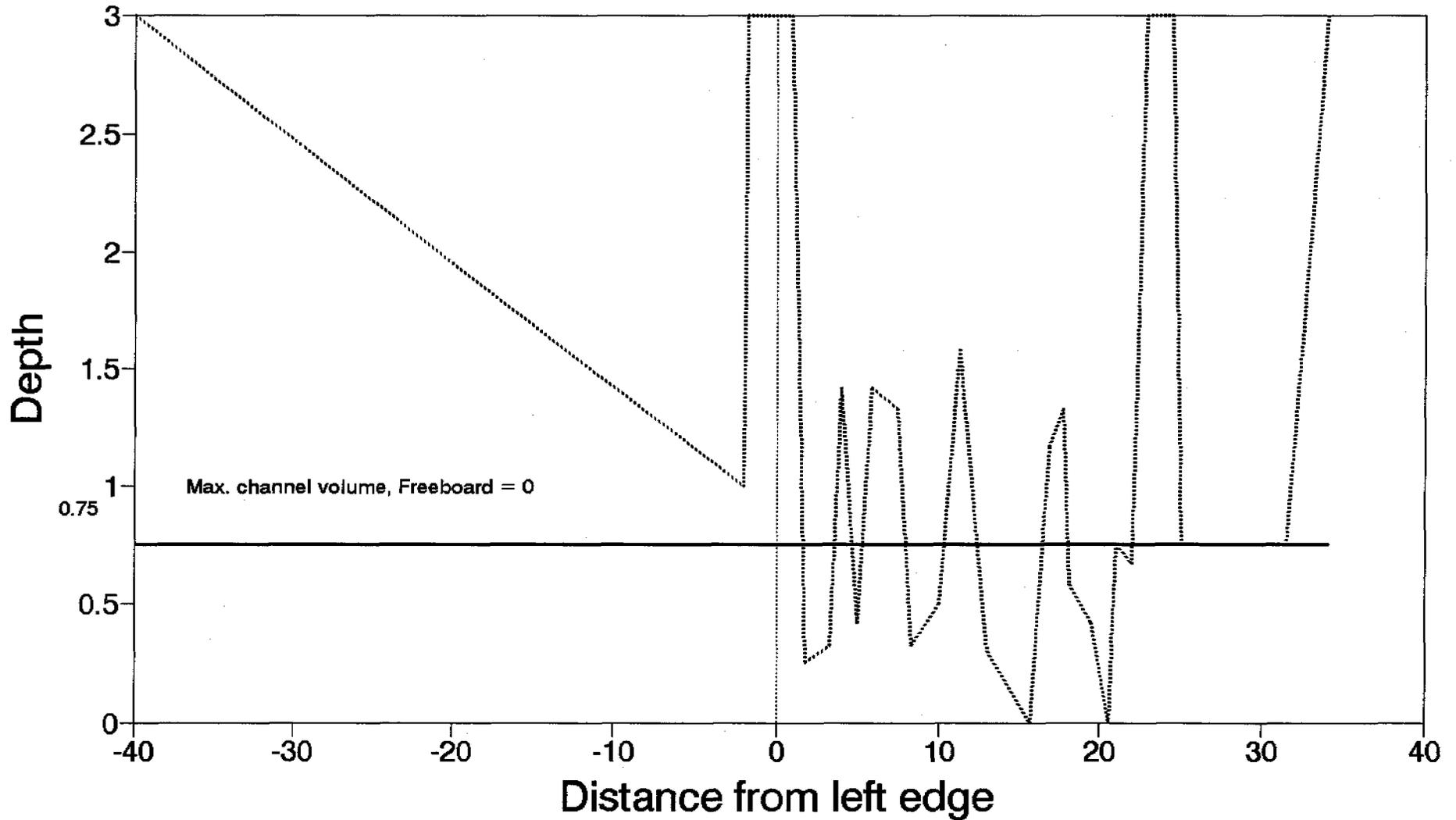
Rating Curve

Sowbelley Reclamation, Sbrd-1A ~ 0+15



Cross Section

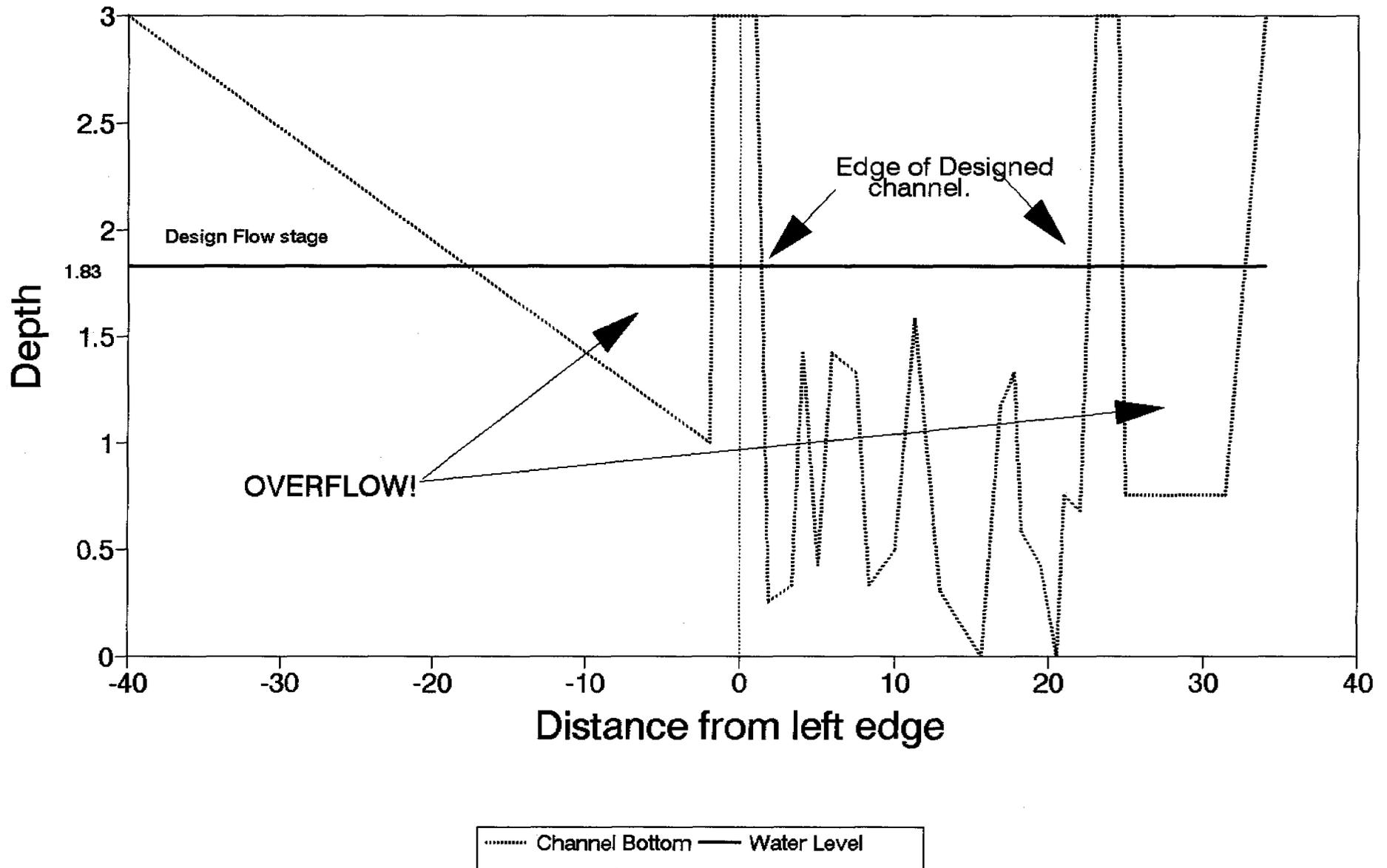
Sowbelley Reclamation, Sbrd-1C ~ 5+00



..... Channel Bottom — Water Level

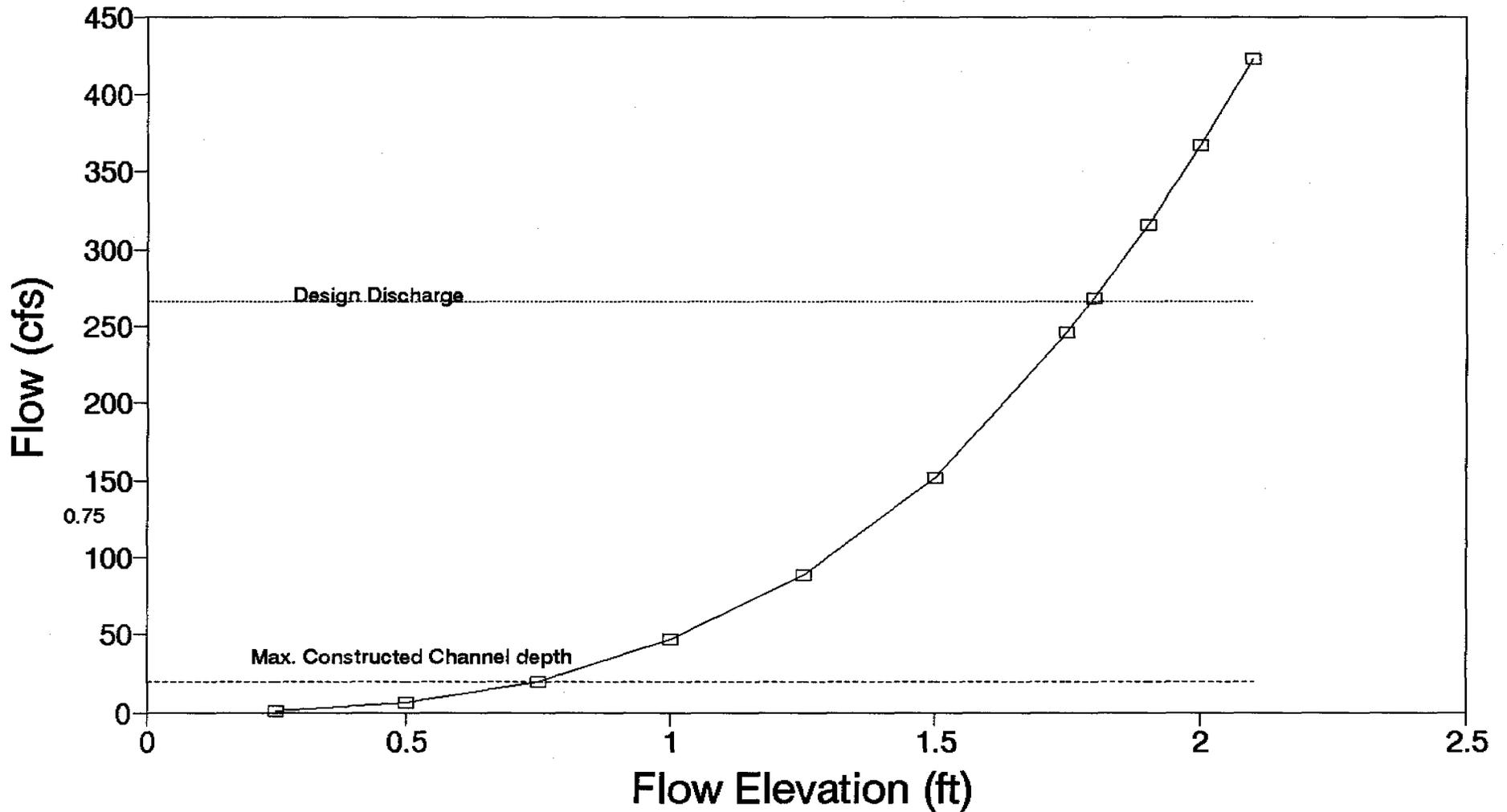
Cross Section

Sowbelley Reclamation, Sbrd-1C ~ 5+00



Rating Curve

Sowbelley Reclamation, Sbrd-1C ~ 5+00



□ Channel Bottom Water Level