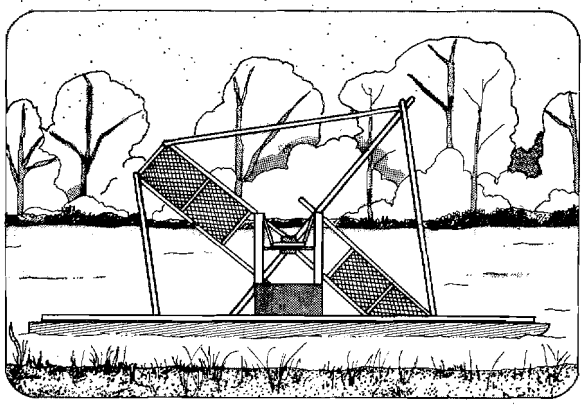
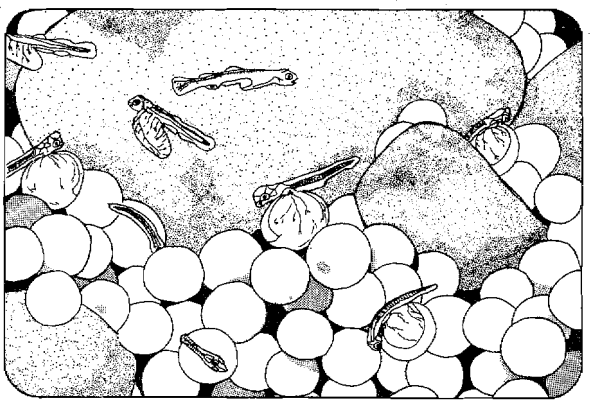
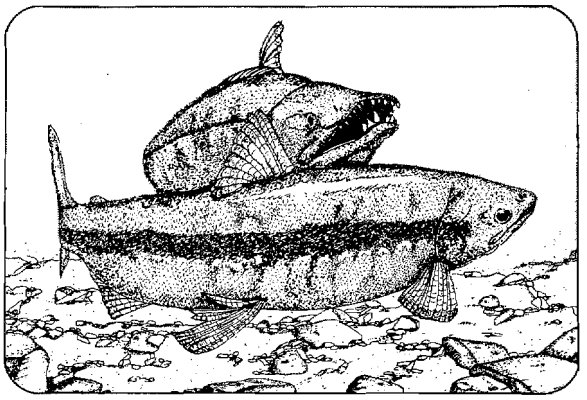
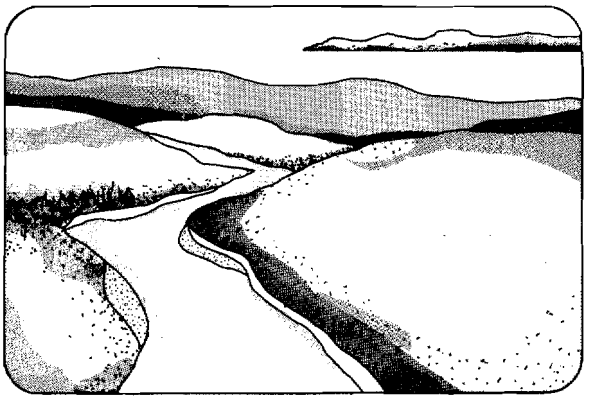
I. Queral









TASK 36 SUPPORT TECHNICAL REPORT

HYDROLOGICAL INVESTIGATIONS AT SELECTED LOWER SUSITNA RIVER STUDY SITES

by: Tim Quane, Pat Morrow, and Isaac Queral
Aquatic Habitat and Instream Flow Project

ALASKA DEPARTMENT OF FISH AND GAME
SUSITNA HYDRO AQUATIC STUDIES REPORT SERIES

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1.0 OBJECTIVES OF STUDY

The primary objective of this study was to provide hydraulic support to the Task 36 lower river Instream Flow Incremental Methodology (IFIM) rearing habitat modelling study. Correspondingly, the specific objectives of the study were: 1) to evaluate the response of stage and streamflow at Task 36 study sites to changes in mainstem discharge, 2) to describe the general characteristics of each Task 36 study site, 3) to describe the initial and controlling breaching discharges for each Task 36 study site, and 4) to describe the backwater conditions present within each Task 36 study site as a function of mainstem discharge.

The information presented in this study will then be used by Task 36 personnel to quantify, via an IFIM habitat modelling approach, changes in rearing habitat as a function of changes in discharge.

2.0 METHODS

2.1 Site Selection

The Task 36 study sites are presented in Table 1 and Figure 1. These sites were selected by Task 36 study personnel to meet the specific study objectives of Task 36. Refer to the Task 36 summary report for the criteria used to select these study sites.

Table 1. Task 36 study sites supported by the Physical Description Support Program.

Study Site	River Mile
Island Side Channel	63.2
Mainstem West Bank Side Channel	74.4
Circular Side Channel	75.3
Sauna Side Channel	79.8
Sunset Side Channel	86.9
Trapper Creek Side Channel	91.6

2.2 Field Data Collection

Stage, discharge, and channel geometry data were collected at each study site to evaluate the effect that mainstem discharge has on stage, streamflow, and backwater. Specific methods used in the field collection of these data are described below:

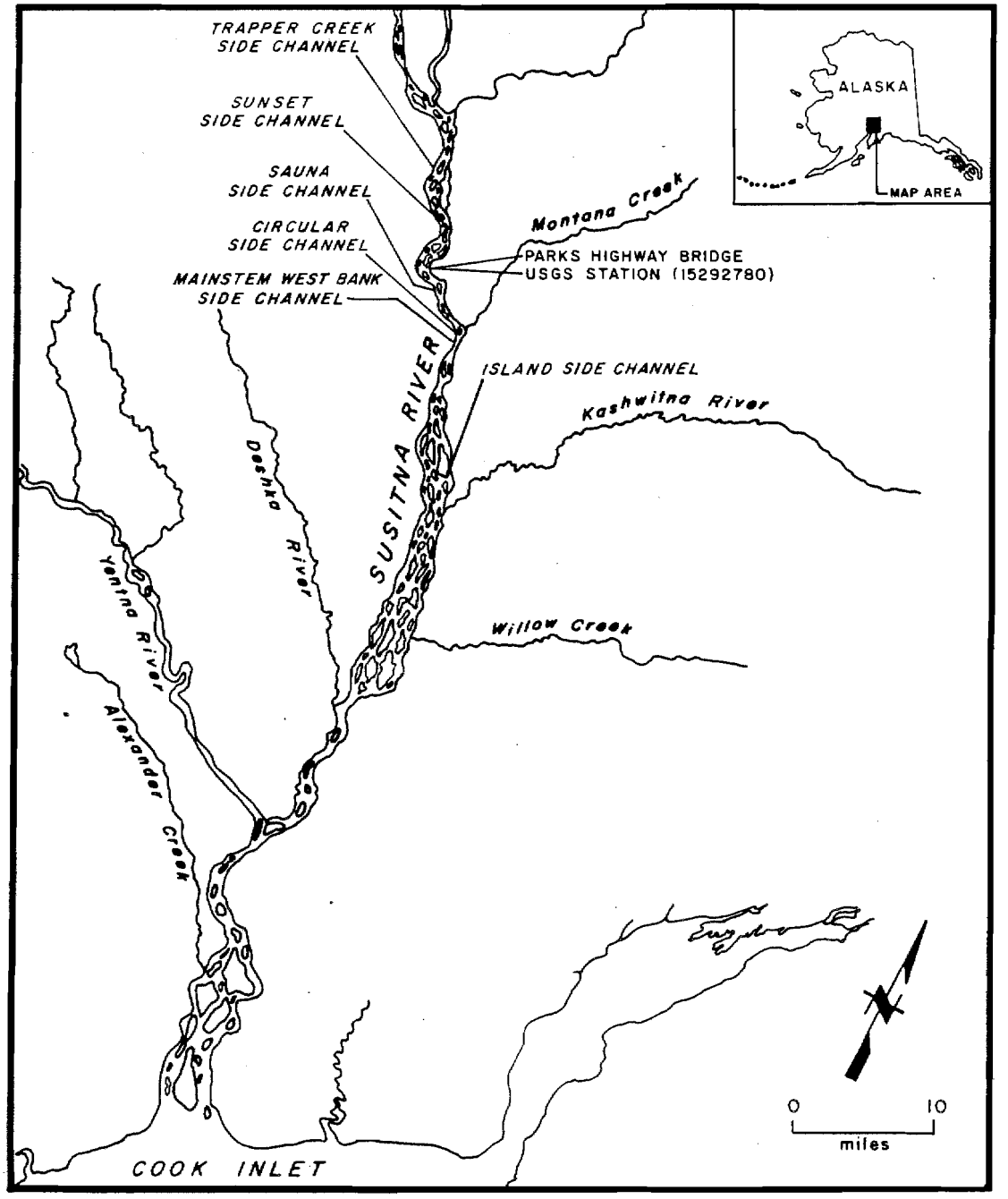


Figure 1. Task 36 study site locations.

2.2.1 Stage

Stage (water surface elevations) data were obtained from staff gage measurements and surveyed water surface elevations. The specific procedures for obtaining stage data are presented in the ADF&G procedures manual (ADF&G 1984). Water surface elevations (WSEL) were determined from staff gage observations and are relative to the temporary bench mark (TBM) established for each study site. Because each TBM was assigned an elevation of 100.00 (feet), the resultant water surface elevations are relative to 100.00 feet and are not "true water surface elevations" tied into project datum.

2.2.2 Streamflow

Streamflow measurements were collected from streamflow stations located within each of the study sites. These streamflow stations were located on selected IFIM habitat modelling transects. Standard USGS streamflow techniques employing either Price AA or Pygmy flow meters were used to obtain the streamflow (discharge) measurements. In order to develop rating curves, stage measurements were also obtained at the time of each streamflow measurement. Specific procedures utilized in obtaining discharge measurements are described in the ADF&G procedures manual (ADF&G 1984).

2.2.3 Channel Geometry

Thalweg and cross section profiles were determined at each Task 36 study site.

2.2.3.1 Thalweg Profile

Thalweg profiles were determined for each of the Task 36 study sites. These thalweg profiles represent the "best" determination of the channel thalweg by the visual assessment of field crews. Surveying for the development of the thalweg profile began at either the mouth of the side channel or the first hydraulic control downstream of the study site after which the survey continued upstream to the first hydraulic control above the study site or to the head of the side channel. Thalweg data were collected using the standard surveying techniques of differential leveling with significant morphological features selected as thalweg points (i.e., riffles, pools). At each of the thalweg points (or stations), the streambed elevation, water surface elevation, and distance between thalweg points was determined. All thalweg elevations are relative to the assigned elevation of the TBM established at each study site (100.00 ft).

When applicable, cross section profile data were also used to develop the thalweg profiles. The lowest elevation obtained from a cross section profile was compared to the thalweg elevation obtained at the cross section. When a difference in elevation occurred between the

thalweg and cross section profile, the elevation from the cross section was used. The greatest difference in elevation detected was 0.3 ft.

Specific procedures for the collection of thalweg survey data are presented in the ADF&G procedures manual (ADF&G 1984).

2.2.3.2 Cross Section Profile

Cross sectional profiles were determined for each staff gage location within every Task 36 study site using the standard surveying techniques of differential leveling. Streambed elevations, water surface elevations, and horizontal distances from bank headpins were obtained for each cross sectional profile. Specific survey techniques and procedures used in the collection of cross sectional data are presented in the ADF&G Procedures Manual (ADF&G, 1984).

2.3 Data Analysis

2.3.1 Stage and Streamflow

Water surface elevation (WSEL) data obtained at each staff gage location were plotted against corresponding mean daily Susitna River discharge as determined by the United States Geological Survey (USGS) from their Sunshine gaging station (USGS 15292780). Due to the distance of the Island Side Channel study site from the Sunshine gaging station, mainstem discharge values for the plot for the site were determined from a time lag analysis provided by E.W. Trihey & Associates (see Attachment A).

For each plot, a least squares regression equation was calculated when sufficient data were available. At several gage sites, more than one function was evident on a plot as illustrated by a change in the slope of the line drawn between the data points. For these cases, separate regression equations were calculated for each function. These regression equations enable estimates of water surface elevation to be determined from the range of USGS mainstem discharge values included in the plots.

Water surface elevations (WSEL) obtained from staff gages located at each streamflow measurement station were also plotted against the corresponding measured study site streamflow data (Q_{sc}). Several of the plots have more than one function as illustrated by a change in the slope of the line drawn between the data points. Under these cases, a least squares equation is included for each function when sufficient data was available. These regression equations enable an estimate of streamflow from observed water surface elevation data.

Plots of measured streamflow (Q_{sc}) versus mean daily mainstem discharge (Q_{ms}) at the USGS Sunshine gaging station (USGS 15292780) were also developed. These plots include a least squares regression equation for each function. These equations enable site streamflow to be estimated from mean, daily mainstem discharge values (USGS 15292780).

2.3.2 Initial Breaching and Controlling Discharges

The breaching phenomenon has been partitioned into two discharge events; an initial breaching discharge and controlling breaching discharge events.

2.3.2.1 Initial Breaching Discharges

The mainstem discharge at Sunshine (USGS 15292780) required to initially overtop the head portions of each Task 36 study site is referred to as the "initial breaching discharge". This discharge was determined by field observations and aerial photographs and is referenced to mean daily discharges as recorded at Sunshine.

2.3.2.2 Controlling Breaching Discharge

As progressively higher levels of mainstem discharge overtop the head portion of the study site the hydraulic conditions of the site become governed by mainstem discharge. The mainstem discharge at which the hydraulics become governed by mainstem discharge is referred to as the controlling breaching discharge.

To determine the controlling breaching discharge of each study site, the WSEL vs Q_{ms} plots were evaluated to identify changes in the relationship between stage and mainstem discharge from base flow conditions (unbreached condition) to the controlled breached condition. The base

flow or unbreached condition is generally characterized in these plots as having minimal change in stage (WSEL) over a relatively large range of mainstem discharge whereas the controlled breached condition is generally characterized by larger changes in stage (WSEL) over corresponding increases in mainstem discharges. The initial point where stage begins to increase in proportion to corresponding increases in mainstem discharge is the controlling discharge.

Stage data is not always available at the point that the hydraulic condition is initially controlled by mainstem discharge. Therefore, a combined interpretation of stage data from each staff gage location in the study site, as well as a knowledge of the initial breaching discharge, are used to arrive at controlling breaching discharges.

2.3.3 Backwater

A generic analysis of backwater was performed for each study site utilizing available stage and channel geometry data. For the purposes of this report, a backwater area is defined as a water surface having the same or very similar water surface elevation between two or more points of measurement. Backwater was not strictly evaluated on the basis of water velocity.

To determine backwater conditions, a table of the 1984 stage data for each study site was formatted to allow comparisons of water surface elevations over corresponding mainstem discharges for each of the staff

gage locations in the study site. The thalweg profile for the study site was also used to estimate the linear extent of the backwater at each study site.

2.3.4 Channel Geometry

Channel geometry data collected in support of Task 36 included both thalweg and cross sectional profile data.

2.3.4.1 Thalweg Profile

Thalweg profiles consist of a series of streambed and water surface elevations determined for the deepest part of the stream channel, at the time of the survey, traversing the length of the study site. Water surface elevations were determined by adding the water depth at the thalweg point to the elevation surveyed for the thalweg point. Water was not always present at the time of the thalweg survey, and therefore may be absent from the thalweg profile. When available, streamflow were measured on the same date as the thalweg survey. In some instances, streamflow measurements could not be obtained due to low flow conditions and the flow was estimated. In either case, base flows are indicated on the thalweg profile.

Streambed gradients were determined for each thalweg by dividing the difference between the thalweg elevation of the downstream portion of the thalweg profile and the thalweg elevation of the upstream portion, by the distance between these two points.

Thalweg profiles are used in hydraulic simulation modeling of Task 36 study sites to determine the point of zero flow (PZF) for each transect selected for the model and to evaluate backwater effects.

2.3.4.2 Cross Section Profile

Cross section profiles consist of a series of elevations perpendicular to the stream channel, beginning from the left bank (looking upstream) and continuing to the right bank, including all major changes in channel topography. As such, cross section data collected in this study were graphed as streambed elevations versus horizontal distance.

Cross sectional profiles are used to support modelling studies and to assist in determining the hydraulic conditions governing the study site. They were also used to assist in determination of the lowest channel elevation in developing thalweg profiles.

3.0 RESULTS

The results of these studies are presented below by study site. For each study site a general description is presented along with a discussion of the hydraulic and channel geometry conditions that were observed at the study site during the 1984 open water field season (May - October, 1984).

3.1 Island Side Channel (RM 63.2)

3.1.1 Site Description

Island Side Channel is located on the east bank of the main channel of the Susitna River at river mile (RM) 63.2 (Figure 2). This side channel is located downstream of a braided, vegetated floodplain and is not directly connected to the main channel Susitna River. It is approximately 0.7 miles in length with both the mouth and head portions adjoining side channel networks. Breaching flows in this side channel result from overtopping of the head by an adjoining larger side channel. Prior to breaching, side channel flow is greatly reduced with a series of pools remaining.

During the 1984 open water field season, the study site selected for Island Side Channel was approximately 750 feet in length and was located in the lower portion of the side channel (Figure 3). Stage was monitored at eight locations in the side channel with streamflow being

Figure 2. Overview of Island Side Channel (RM 63.2).

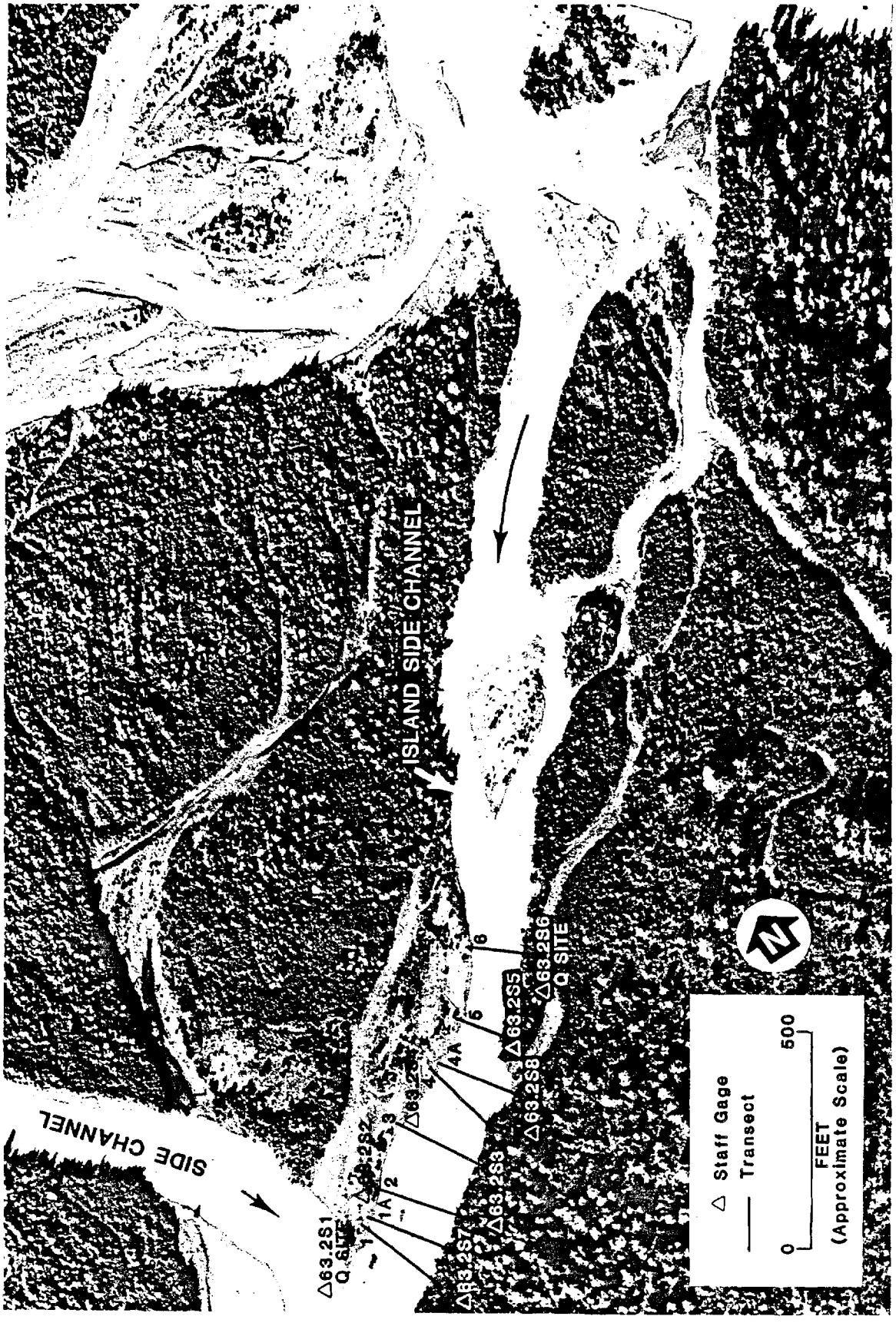


Figure 3. Location of Island Side Channel study site (RM 63.2).

measured at two of these stage monitoring stations. Cross section survey data were obtained at each stage monitoring station (staff gage site). Survey data for the development of a thalweg profile were collected for that portion of the side channel beginning at the confluence of the adjoining side channel and terminating at the first hydraulic control above the study site.

3.1.2 Stage/Discharge Relationship

Measurements of water surface elevations obtained at each stage monitoring station located in Island Side Channel along with the mean daily mainstem discharges at Sunshine (USGS 15292780) corresponding to the date of the stage measurements are presented in Attachment Table B-1. Plots of these water surface elevations versus mainstem discharges are presented in Attachment Figures E-1 to E-8.

Measurements of streamflow were obtained at two stage monitoring stations located on modelling transects 1 and 6. These measurements of streamflow and the corresponding water surface elevations and mainstem discharges (USGS 15292780) are presented in Attachment Table B-1. Plots of these streamflows versus water surface elevations developed as rating curves are presented in Figures 4 and 5. In addition, the streamflow data was plotted against mean daily mainstem discharge as rating curves (Figures _____ and _____).

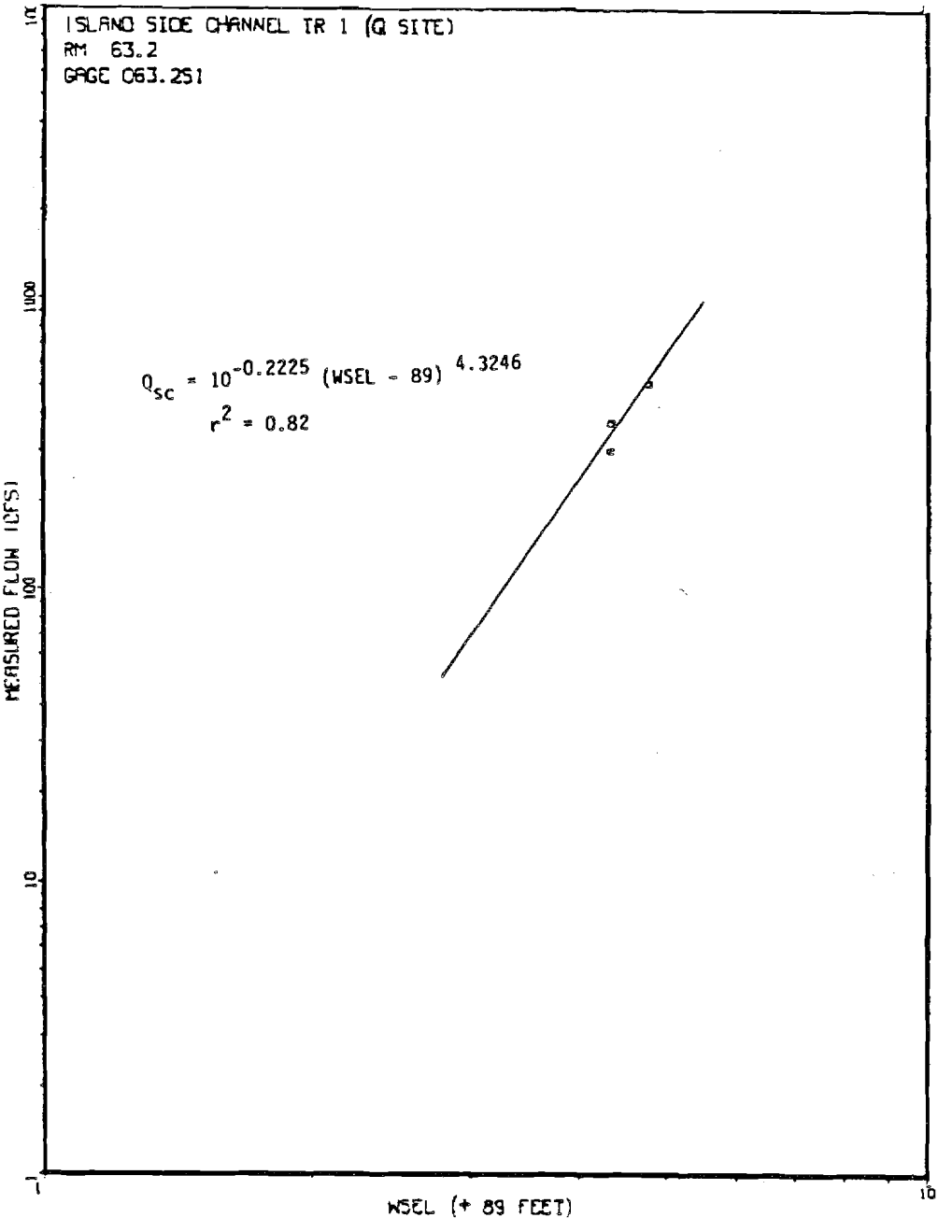


Figure 4. Island Side Channel streamflow vs WSEL at transect 1 (Q Site).

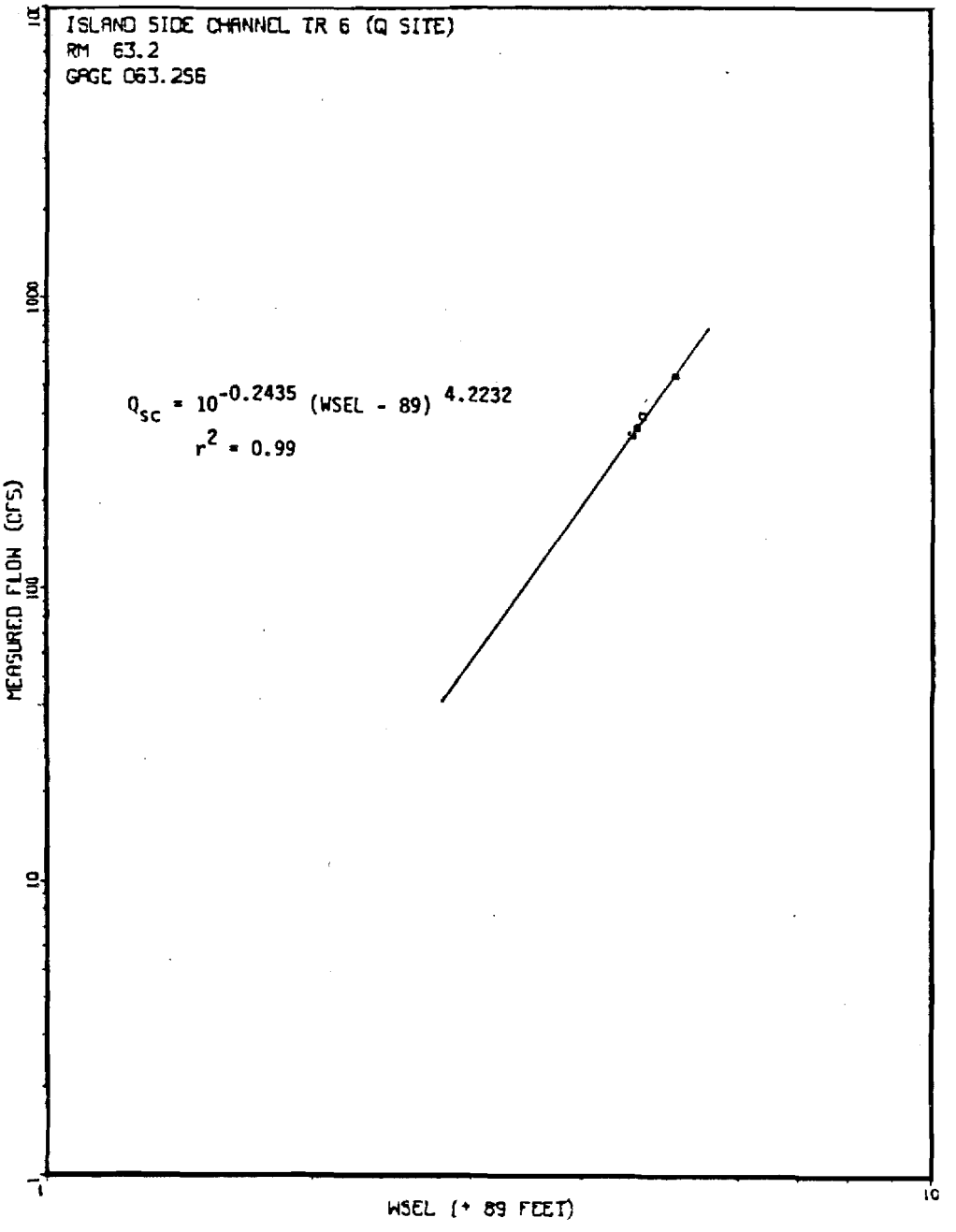
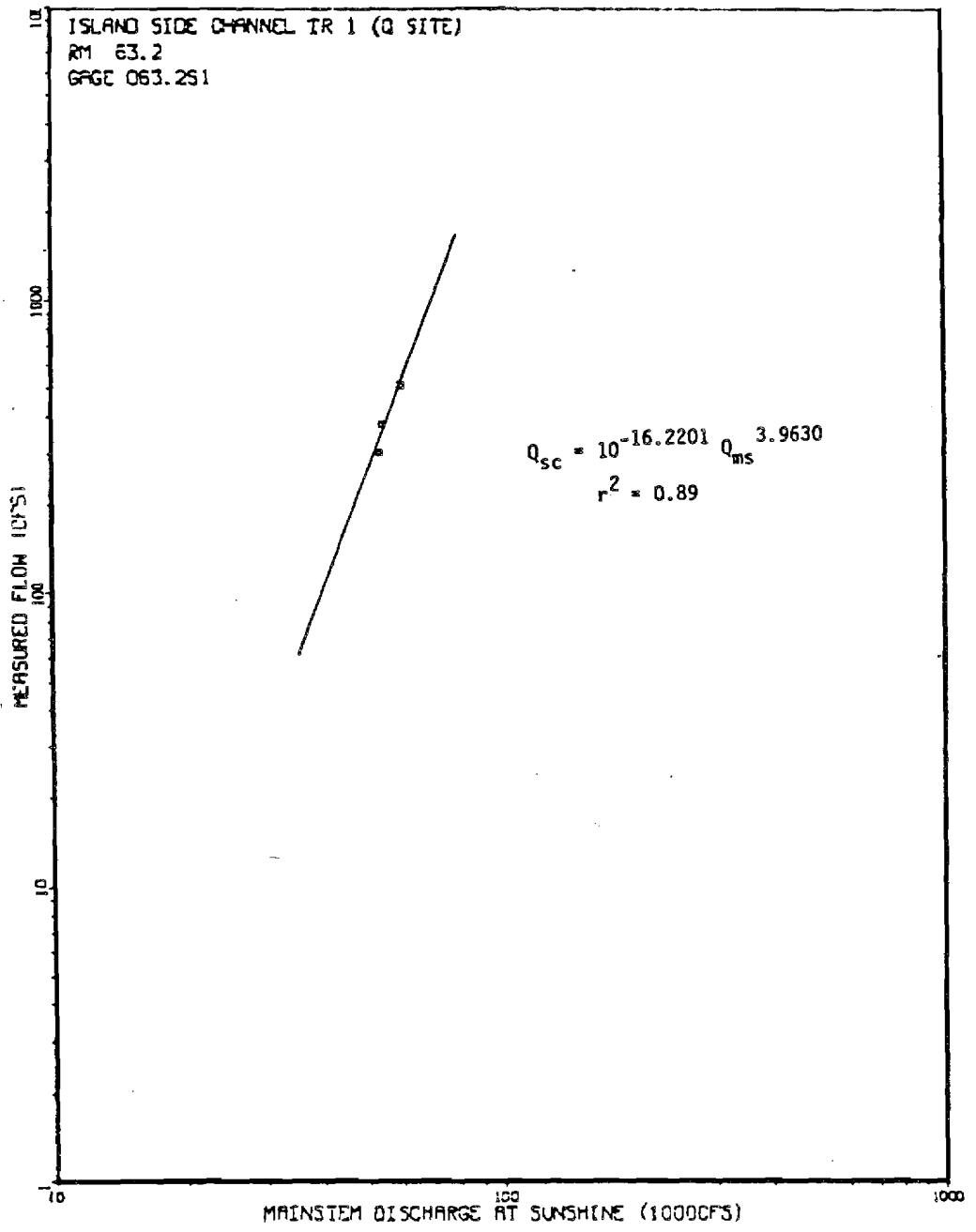


Figure 5. Island Side Channel streamflow vs WSEL at transect 6 (Q Site).


ISLAND SIDE CHANNEL TR 1 (Q SITE)
RM 63.2
GAGE 063.2S1
$Q_{sc} = 10^{-16.2201} Q_{ms}^{3.9630}$
$r^2 = 0.89$
MEASURED FLOW (CFS)
10
100
1000
10
100
1000
MAINSTEM DISCHARGE AT SUNSHINE (1000CFS)

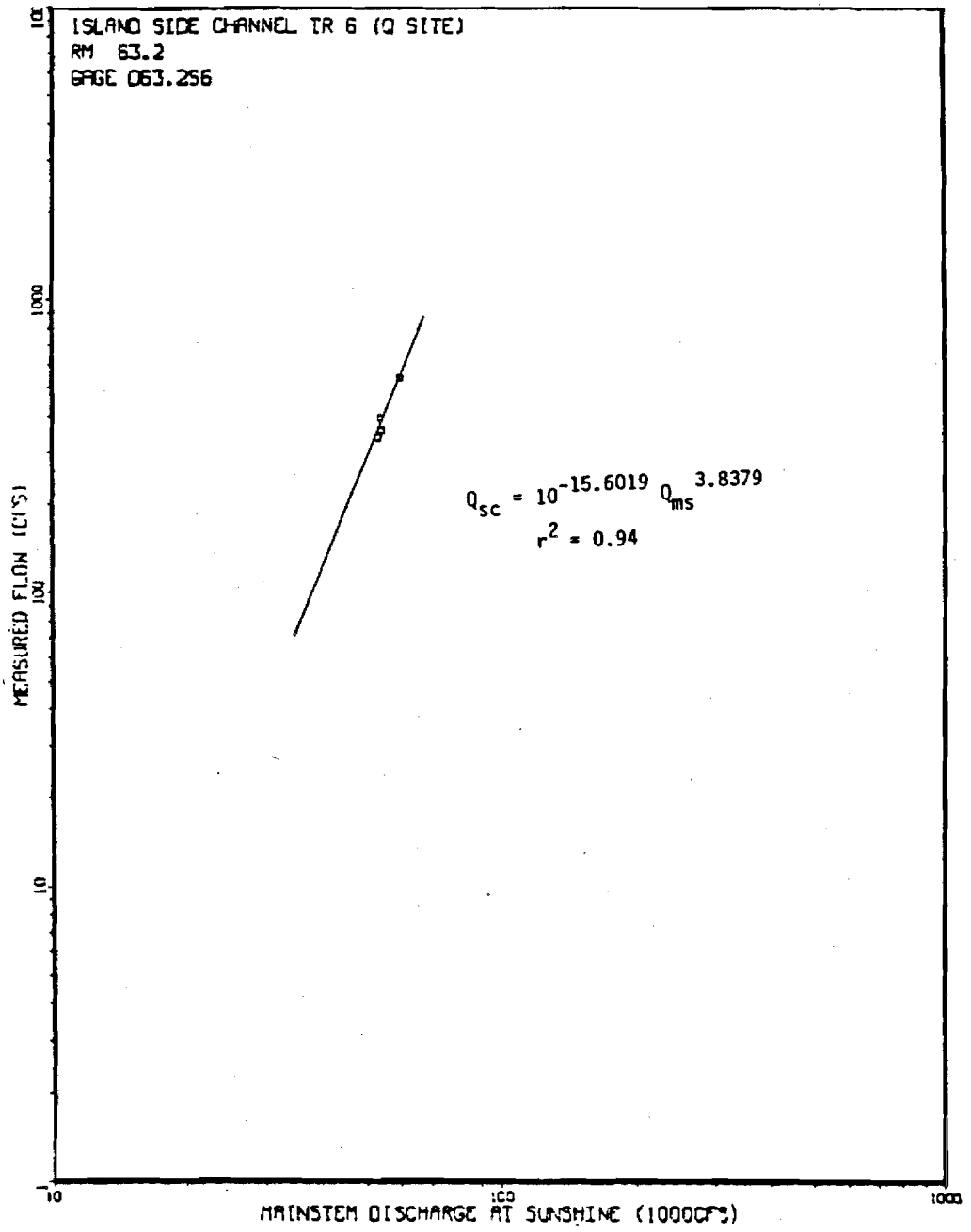


Figure 7. Island Side Channel transect 6 (Q Site) streamflow vs mainstem discharge (cfs) at Sunshine Station (USGS 15292780).

3.1.3 Mainstem Breaching and Controlling Discharges

Breaching of Island Side Channel is the result of overtopping of the head by an adjoining side channel. Based on aerial photograph interpretation (Table 2), the lowest mainstem discharge that has been observed to breach this side channel is 36,600 cfs (USGS 15292780).

Based on a review of Attachment Figure E-8, it has been determined that at mainstem discharges exceeding 35,000 cfs the hydraulics within this side channel are directly controlled by mainstem discharge. Following 35,000 cfs the water surface elevation at transect 6 increases dramatically with corresponding increases in mainstem discharge. The controlling discharge of 35,000 cfs is lower than the observed breaching discharge of 36,600 cfs as determined from aerial photography indicating that this side channel initially breaches below a mainstem discharge of 35,000 cfs. Insufficient field data is available to determine precisely the initial breaching discharge for Island Side Channel. The initial breaching discharge for this side channel has been estimated as occurring approximately 1,000 cfs below the controlling discharge, or at 34,000 cfs. To evaluate the influence mainstem discharge has on the hydraulic conditions of this side channel, a comparison of the rating curves for transect 6 (Figure 8) was performed. Transect 6 is one of the two streamflow stations located at this side channel with the other being transect 1. Transect 6 was used for this comparison as the stage versus streamflow relationship is better defined for this transect than it is at transect 1 under both the breached and unbreached conditions.

Table 2. A comparison of 1984 observations used to determine the initial breaching mainstem discharage at Task 36 study sites.

Location	RM	Date	Head Condition	USGS Mean, Daily Discharge at Sunshine (cfs)	Source of Observation
Island					
Side Channel	63.2	840915	Dry	22,300	Field observation
		840831	Breached	38,000[1]	Field observation
		830906	Barely Breached	36,600[1]	Aerial photograph
Mainstem					
West Bank					
Side Channel	74.4	840930	Dry	17,800	Field observation
		840926	Barely Breached	19,000[1]	Field observation
		830916	Breached	22,100[1]	Aerial photograph
		841001	Dry	18,700	Field observation
Circular					
Side Channel	75.3	840830	Breached	40,800	Field observation
		840902	Dry	32,000[1]	Field observation
		830906	Breached	36,600[1]	Aerial photograph
		830916	Dry	22,100[1]	Aerial photograph
Sauna					
Side Channel	79.8	840830	Barely Breached	40,800	Field observation
		840914	Dry	24,000[1]	Field observation
		830906	Almost Breached	36,600[1]	Aerial photograph
Sunset					
Side Channel	86.9	840902	Barely Breached	32,000[1]	Field observation
		830906	Breached	36,600[1]	Aerial photograph
		830916	Dry	22,100[1]	Aerial photograph
Trapper					
Side Channel	91.6	840822	Breached	54,300	Field observation
		840911	Dry	23,500[1]	Field observation
		830906	Breached	36,600[1]	Aerial photograph
		830916	Dry	22,100[1]	Aerial photograph

[1] Mean, daily discharge at Sunshine during this period of aerial photography (R & M Consultants 1/28/85).

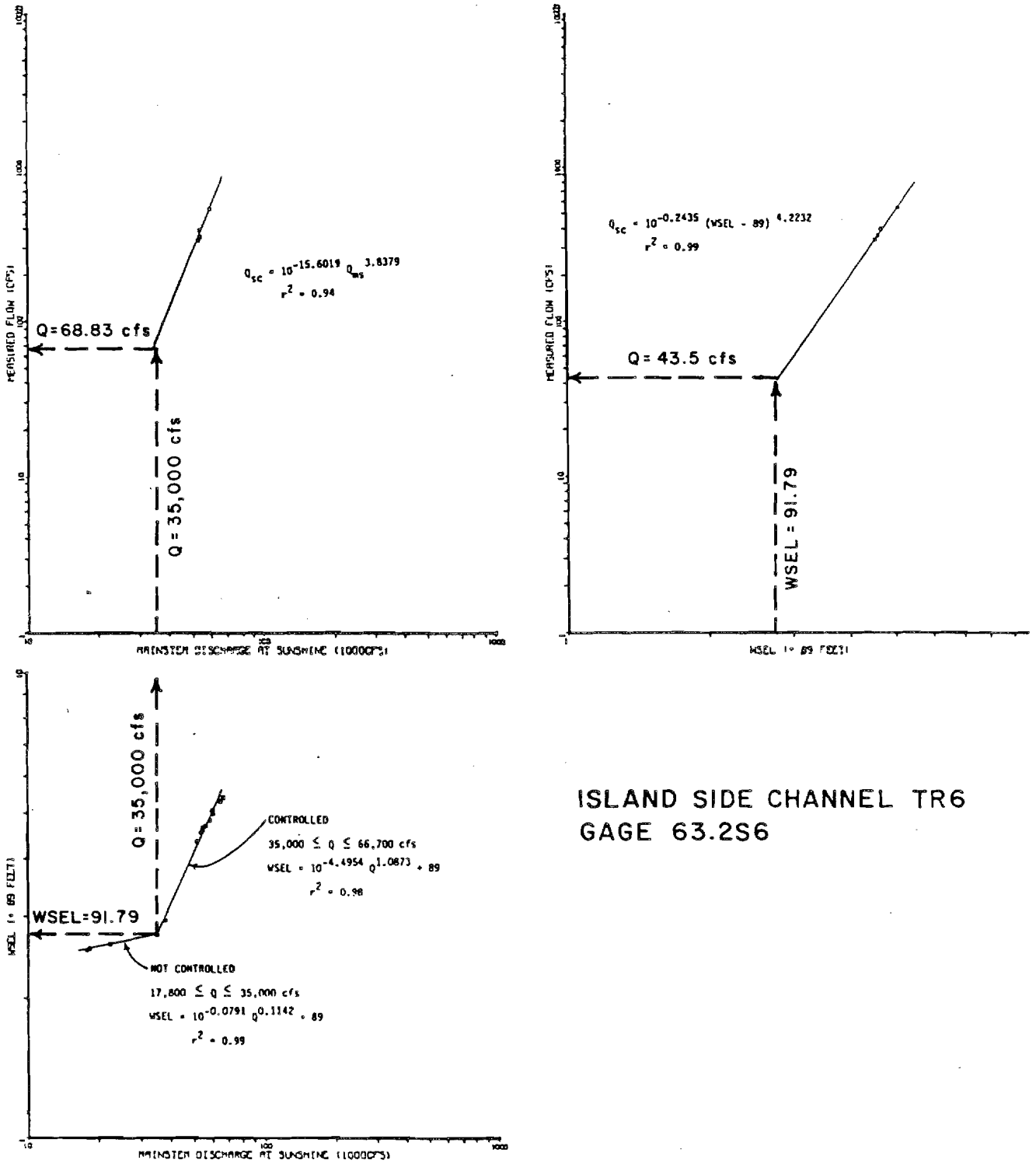


Figure 8 Comparison of rating curves for Island Side Channel transect 6 (Q Site).

A side channel streamflow estimate of 43.5 cfs has been estimated to occur at the controlling discharge of 35,000 cfs at transect 6 as determined from the stage versus streamflow rating curve (Figure 5). This estimated flow is lower than the streamflow estimate derived from the Transect 6 streamflow versus mainstem discharge rating curve (68.8 cfs) presented in Figure 7 for the mainstem discharge of 35,000 cfs. A similar comparison between flow estimates at transect 1 shows the stage versus streamflow rating curve to yield 47.3 cfs and the streamflow versus mainstem discharge rating to yield 61.4 cfs. Measurements of streamflow in the 30,000-41,000 cfs range of mainstem discharge are necessary to validate this relationship.

Table 3 summarizes the estimates of flow as determined from the rating curves for controlling mainstem discharges.

3.1.4 Channel Geometry

3.1.4.1 Thalweg Profile

Survey data for the development of a thalweg profile were obtained at Island Side Channel during a non-breaching mainstem discharge of 17,800 cfs when the side channel flow was estimated to be less than 1.0 cfs. The survey data are presented in Attachment Table C-1 with the resultant thalweg profile being presented in Attachment Figure 1. The thalweg profile extends from the mouth of the side channel to a point approximately 100 feet beyond the first hydraulic control upstream of

Table 3. A comparison of flow estimates determined from equations developed from rating curves for controlling mainstem discharges.

Site	Controlling[1] Discharge	Rating Curve Flow Estimate (cfs) WSEL vs. Flow	Rating Curve Flow Estimate (cfs) Flow vs. MSQ
Island Side Channel (TR1)	35,000	47.3	61.4
Island Side Channel (TR6)	35,000	43.5	68.8
Mainstem West Bank Side Channel (TR 1)	19,600	5.7[2]	5.7[2]
Circular Side Channel (TR1)	36,000	23.6	25.4
Circular Side Channel (TR4)	36,000	26.8	26.8
Sauna Side Channel (TR 2)	38,000	22.5	19.8
Sunset Side Channel (TR 1)	32,000	45.8	41.1
Trapper Creek Side Channel (TR 4)	44,000	31.4[2]	31.4[2]

[1] The controlling discharge is the mean, daily mainstem discharge at Sunshine (USGS 15292780) required to govern the hydraulic characteristics of side channel and side slough habitats.

[2] These stream flow values are actual measurements of discharge and are not estimated values.

the study site, approximately 1,500 feet upstream of the mouth of the side channel. Based on the thalweg profile, the gradient within the thalweg profile is 15.6 feet/mile.

3.1.4.2 Cross Section Profile

Cross sectional data were recorded at each of the eight transects located in Island Side Channel during the 1984 open water season. The cross sectional data are presented in Attachment Table D-1 with the resulting cross section profiles presented in Attachment Figures D-1 to D-8.

3.1.5 Backwater

Based on a comparison of available 1984 stage (Table 4) and channel geometry data (Attachment Figure _____), an area of backwater extends through the study site to a point at least 1,100 feet upstream from the mouth of Island Side Channel at a mainstem discharge of 35,000 cfs. During mainstem discharges of 38,000 to 66,700 cfs, a large area of backwater occurs throughout the study site as evidenced by similar water surface elevations over transects 1 to 3 and 4A to 6. This area of backwater effect results from a hydraulic plug formed by the large side channel located at the mouth of Island Side Channel.

Table 4. A comparison of water surface elevations from Task 36 transects located within Island Side Channel.

Date	TR 1	TR 1A	TR 2	TR 3	TR 4	TR 4A	TR 5	TR 6	Mainstem Discharge
840930	90.86	90.93	90.88	91.23	91.56	91.56	91.57	91.54	17,800
840927	---	---	---	---	---	---	91.57	91.56	18,300
840915	---	---	---	---	---	---	91.59	91.62	22,300
840919	---	91.37	91.33	---	---	---	---	---	28,400
840901	---	91.69	91.68	91.70	91.71	91.77	91.73	91.75	35,000
840831	91.90	91.93	91.89	91.90	91.90	91.94	91.94	91.95	38,000
840719	93.13	---	---	---	---	---	---	93.36	51,600
840712	93.33	---	---	---	---	---	---	93.67	54,100
840725	93.33	93.46	93.41	93.44	93.62	93.52	93.56	93.55	56,100
840725	93.54	93.56	93.52	93.48	---	93.66	---	93.61	56,100
840725	---	---	---	93.55	---	---	---	93.70	56,100
840704	93.55	---	---	---	---	---	---	93.84	58,600
840811	93.77	---	---	---	---	---	---	94.08	60,000
840811	---	---	---	---	---	---	---	94.08	60,000
840801	93.73	93.75	93.74	93.79	93.89	93.93	93.98	94.00	60,300
840626	93.95	---	---	---	---	---	---	94.30	64,800
840626	---	---	---	---	---	---	---	94.31	64,800
840807	94.17	94.16	94.16	94.24	94.34	94.31	94.44	94.40	66,700

3.2 Mainstem West Bank Side Channel (RM 74.4)

3.2.1 Site Description

Mainstem West Bank Side Channel is located on the west bank of the main channel Susitna River at river mile 74.4 (Figure 9). This side channel is approximately 2.2 miles in length with both the mouth and head of the side channel directly connected to the Susitna River. Two heads are located approximately 1.5 miles upstream of the study site which connect this side channel to the mainstem. At the study site, the side channel is confined on the west by a steep bank and on the east by a well vegetated island which separates it from the mainstem. The upper portion of the side channel above the study site is separated from the mainstem by a network of side channels and well vegetated islands. Within the study site, a minor channel is located on the east bank of the side channel. During nonbreached conditions, the side channel primarily consists of series of pools and small riffles. Groundwater provides the major contribution of flow prior to breaching of the head.

During the 1984 open water field season, the study site within this side channel was approximately 950 feet in length and was located in the lower portion of the side channel. Stage was monitored at seven locations, with streamflow measurements collected at only one of these stage monitoring stations (Figure 10). Cross section survey data were collected at each stage monitoring station. In addition, survey data for the development of a thalweg profile were collected from the first

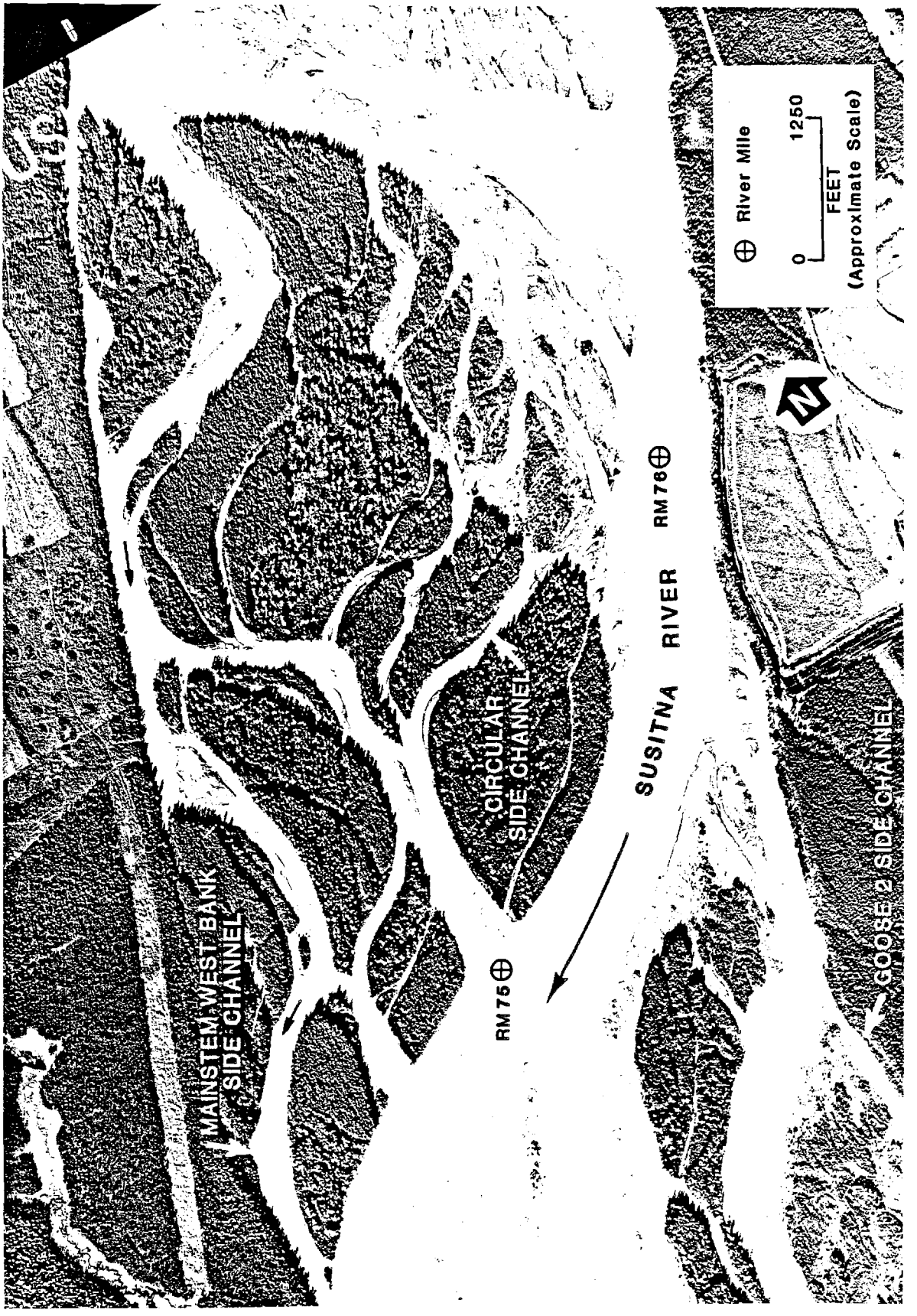


Figure 9. Overview of Mainstem West Bank Side Channel (RM 74.4) and Circular Side Channel (RM

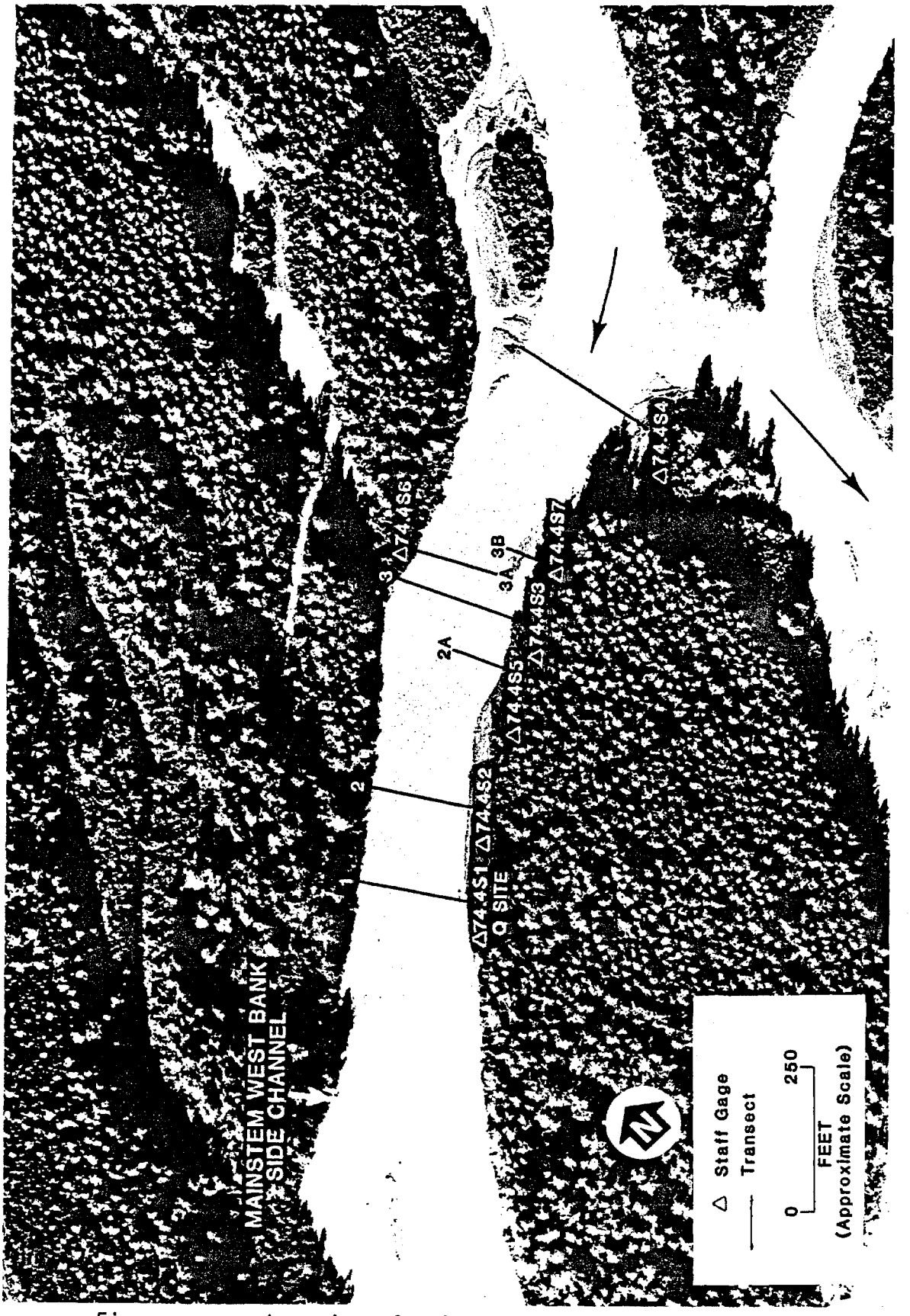


Figure 10. Location of Mainstem West Bank Side Channel study site (RM 74.4).

hydraulic control downstream of the study site to the first hydraulic control above the study site and through a portion of a minor channel on the east bank.

3.2.2 Stage/Discharge Relationship

Measurements of water surface elevation obtained at each stage monitoring station located in Mainstem West Bank Side Channel along with the mean daily mainstem discharges (USGS 15292780) corresponding to the date of the stage measurements are presented in Attachment Table B-1. Plots of these water surface elevations versus mainstem discharge are presented in Attachment Figures E-9 to E-15.

Measurements of streamflow were obtained at one stage monitoring station located on transect 1. The streamflow measurements and corresponding water surface elevations and mainstem discharges at Sunshine (USGS 15292780) are presented in Attachment Table B-1.

A rating curve of the streamflow measurements and water surface elevations is presented in Figure 11. A rating curve of the streamflow data plotted against mean daily mainstem discharge is presented in Figure 12.

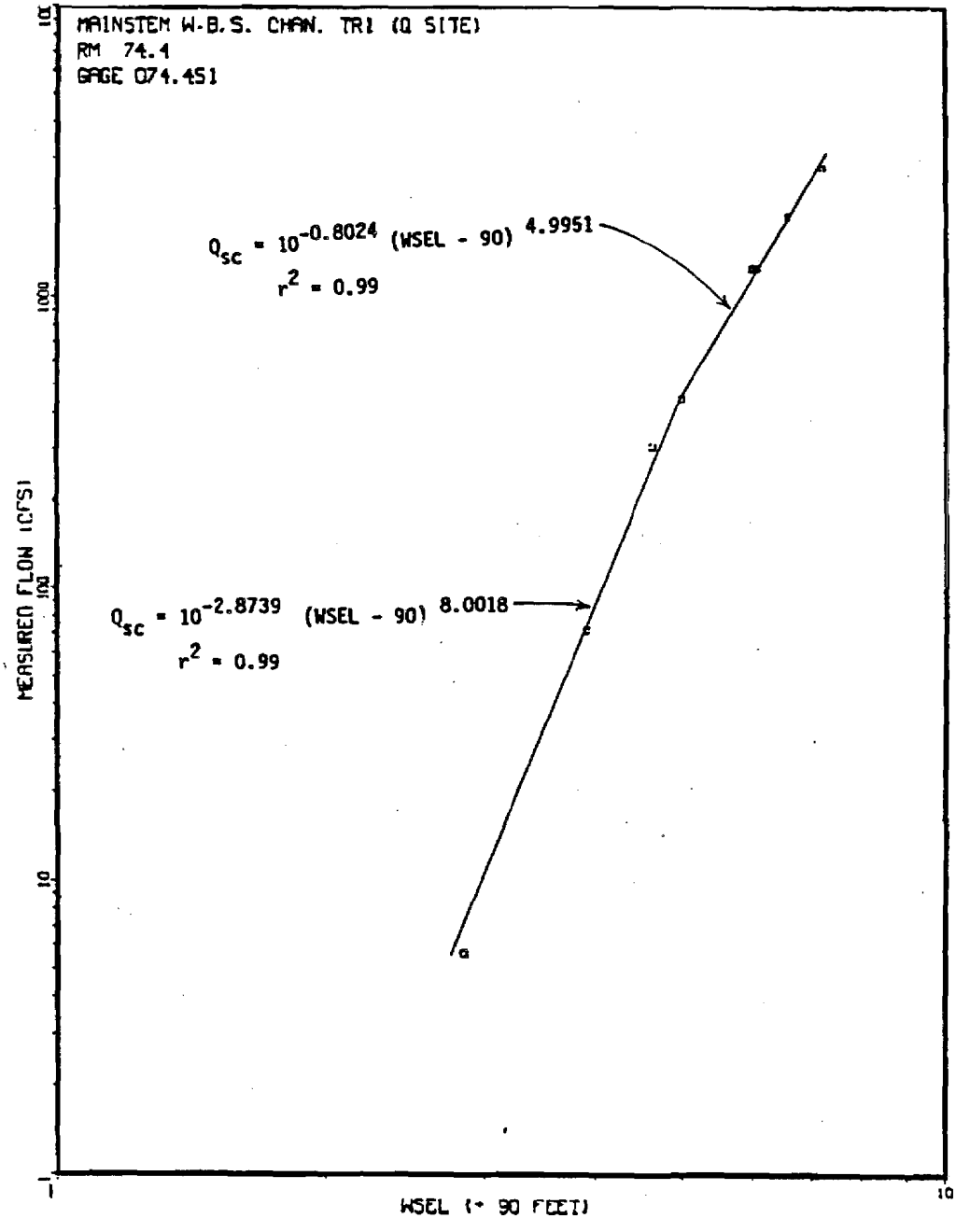


Figure 11. Mainstem West Bank Side Channel streamflow vs WSEL at transect 1 (Q Site).

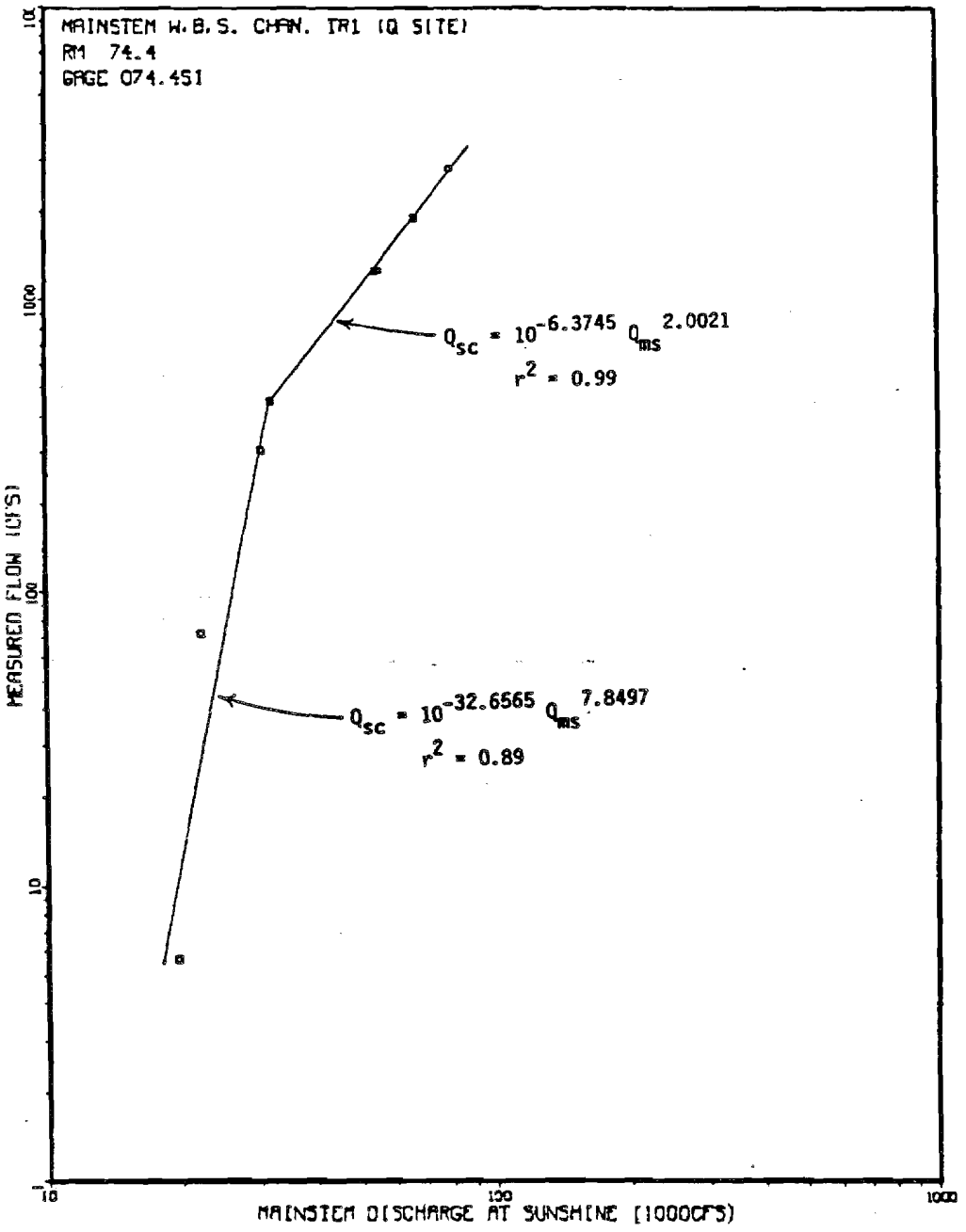


Figure 12. Mainstem West Bank transect 1 (Q Site) streamflow vs mainstem discharge (cfs) at Sunshine Station (USGS 15292780).

3.2.3 Mainstem Controlling and Breaching Discharges

Breaching of Mainstem West Bank Side Channel occurs as the result of the mainstem Susitna River overtopping at least one of the two side channel heads located approximately 1.5 miles upstream of the study site. Based on field observations, the side channel has been observed to be barely breached at a mainstem discharge of 19,000 cfs and dry at 18,700 cfs (Table 2). Based on these field observations an initial breaching discharge of 19,000 cfs has been selected for this side channel.

To evaluate the influence mainstem discharge has on the hydraulic condition of this side channel, a comparison of the rating curves for transect 1 was performed (Figure 13). Based on a review of the stage versus mainstem discharge rating curve presented in Figure 11, it has been determined that at mainstem discharges greater than 19,600 cfs the hydraulics within this side channel are directly controlled by mainstem discharge. This results from the breaching of one of the two heads of the side channel. The site flow that occurs at 19,600 cfs was measured to be 5.7 cfs (Attachment Table B-1). Table 3 summarizes the comparison of flow estimates determined from rating curve equations for the controlling mainstem discharge of 19,600 cfs.

At mainstem discharges of both 22,000 cfs and 32,000 cfs, the stage versus streamflow relationship for transect 1 and several of the remaining transects was determined to change. These changes are illustrated by changes in the slope of the line in each of the stage

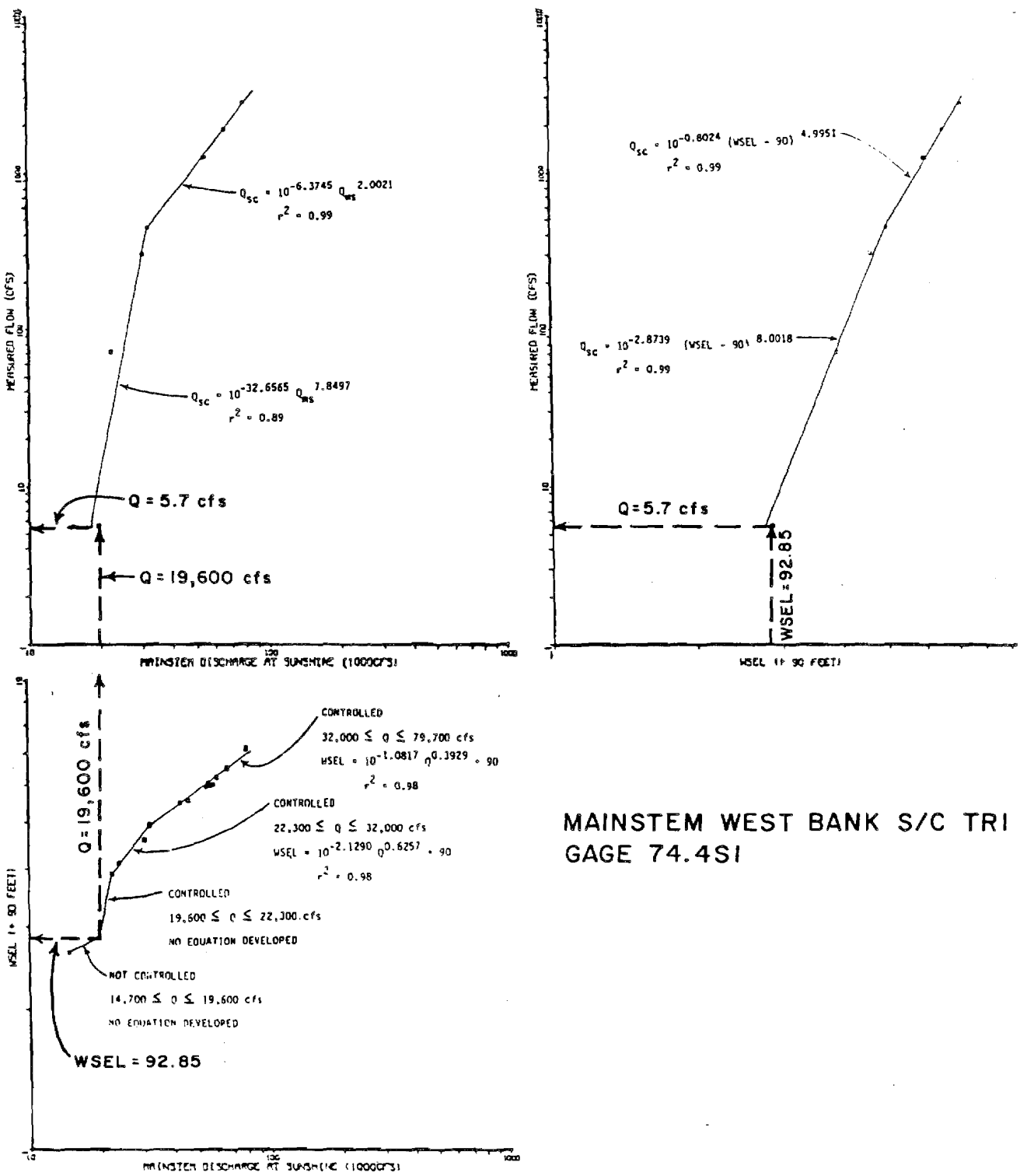


Figure 13 Comparison of rating curves from Mainstem West Bank Side Channel transect 1 (Q Site).

versus mainstem discharge rating curves for these transects (Attachment Figures E-9 to E-15). Based on field observations these changes are assumed to result from channel geometry and the diversion of flow through a small side channel, located upstream of transect 4, away from Mainstem West Bank side channel.

3.2.4 Channel Geometry

3.2.4.1 Thalweg Profile

The thalweg profile of Mainstem West Bank was surveyed during a non-breaching mainstem discharge of 14,700 cfs while the site flow was measured to be less than 1.0 cfs. Two channels were surveyed; the main side channel and a smaller channel located on the east bank near the upper portion of the study site. The thalweg of the main channel was surveyed from a pool located approximately 329 ft downstream of transect 1 and continued through the study site to a point approximately 210 ft above transect 4. The survey data for the main channel thalweg profile are presented in Attachment Table C-2 with the resultant thalweg profile being presented in Attachment Figure C-2. The gradient within the thalweg profile was 12.3 feet/mile.

The smaller channel thalweg survey began on transect 2 and continued upstream approximately 600 (ft) including transects 2A, 3, and 3B. The survey data for this thalweg profile are presented in Attachment Table C-3 with the resultant thalweg profile presented in Attachment Figure C-2.

3.2.4.2 Cross Section Profile

Cross sectional profiles were determined at each of the seven staff gage locations in Mainstem West Bank Side Channel. Four of these cross sections extended across the entire study site (transects 1, 2, 3 and 4) whereas two of the transects (transects 2A and 3B) crossed only the east bank minor channel and one (transect 3A) crossed only the main channel of the study site. The data obtained for these cross sections are presented in Attachment Tables D-9 to D-15. These resultant cross section profiles are presented in Attachment Figures D-9 to D-15.

3.2.5 Backwater

Based on Table 5 and field observations, backwater did not occur in the main channel of the study site throughout the 1984 sampling period. From field observation and a review of the water surface elevations presented in Table 5, it was determined that a backwater area of approximately 350 feet was observed in a minor channel adjacent to the east bank over mainstem discharges ranging from 29,000 to 32,000 cfs (USGS 15292780). The upstream end of this backwater was separated from the main channel by a gravel bar, whereas the downstream end was separated from the main channel by an eddy. Water surface elevations in this backwater area were obtained at transects 2A and 3B.

Table 5. A comparison of water surface elevations from Task 36 transects located within Mainstem West Bank Side Channel.

Date	TR 1	TR 2	TR 2A	TR 3	TR 3A	TR 3B	TR 4	Mainstem Discharge
841010	92.64	92.63	---	93.03	93.05	---	94.63	14,700
841001	---	---	---	---	93.37	---	---	18,700
840925	92.85	---	---	---	93.51	---	---	19,600
840915	93.90	93.74	---	93.80	94.04	---	---	22,300
840914	94.12	94.13	---	94.18	94.44	---	95.83	24,000
840903	---	---	94.90	94.97	95.21	95.06	96.39	29,000
840920	94.62	94.64	94.67	94.70	94.93	---	96.16	30,500
840902	94.94	94.98	94.99	95.04	95.29	---	96.46	32,000
840902	94.97	95.00	---	95.08	95.32	---	96.54	32,000
840817	95.49	95.60	---	---	---	---	97.22	42,500
840815	95.56	95.64	---	95.92	---	---	97.30	46,000
840724	96.02	---	---	---	---	---	---	55,200
840723	95.98	96.07	---	96.36	---	---	97.67	56,100
840712	95.96	---	---	---	---	---	---	54,100
840711	96.01	96.06	---	96.39	---	---	97.50	55,100
840711	96.08	96.09	---	---	---	---	97.70	55,100
840721	96.02	96.09	---	96.44	---	---	97.62	57,700
840721	96.03	96.14	---	---	---	---	---	57,700

Table 5 (Continued).

Date	TR 1	TR 2	TR 2A	TR 3	TR 3A	TR 3B	TR 4	Mainstem Discharge
840801	96.22	96.31	---	96.67	---	---	97.90	60,300
840801	96.24	96.32	---	---	---	---	---	60,300
840810	96.49	96.54	---	96.81	---	---	97.86	66,400
840810	96.54	96.62	---	96.94	---	---	98.19	66,400
840807	96.49	96.51	---	96.81	---	---	97.97	66,700
840827	97.14	---	---	---	---	---	---	79,700
840827	97.19	---	---	---	---	---	---	79,700

3.3 Circular Side Channel (RM 75.3)

3.3.1 Site Description

Circular Side Channel is located on the west bank of the Susitna River at river mile 75.3 (Figure 9) . It is approximately 0.9 miles long and is separated from the mainstem by a large well vegetated island. Both the mouth and head of this side channel are connected to the mainstem Susitna River. An extensive backwater area has been observed to occur in the lower portion of the study site. A network of small channels at the head provide mainstem flow into the site after breaching. Prior to breaching, flow is greatly reduced and the channel is composed of large pools connected by small riffles.

During the 1984 open water field season, the study site within Circular Side Channel was approximately 850 feet in length and was located in the upper half of the side channel. Stage was monitored at six locations within the study site with streamflow measurements being collected at two of these stage monitoring stations (Figure 14). Stage was also monitored at the head of the side channel. Cross section survey data were collected at each of the stage monitoring stations except the stage monitoring station at the head. Survey data for the development of a thalweg profile were collected beginning at the first hydraulic control located downstream of the study site and was continued to the head of the side channel.

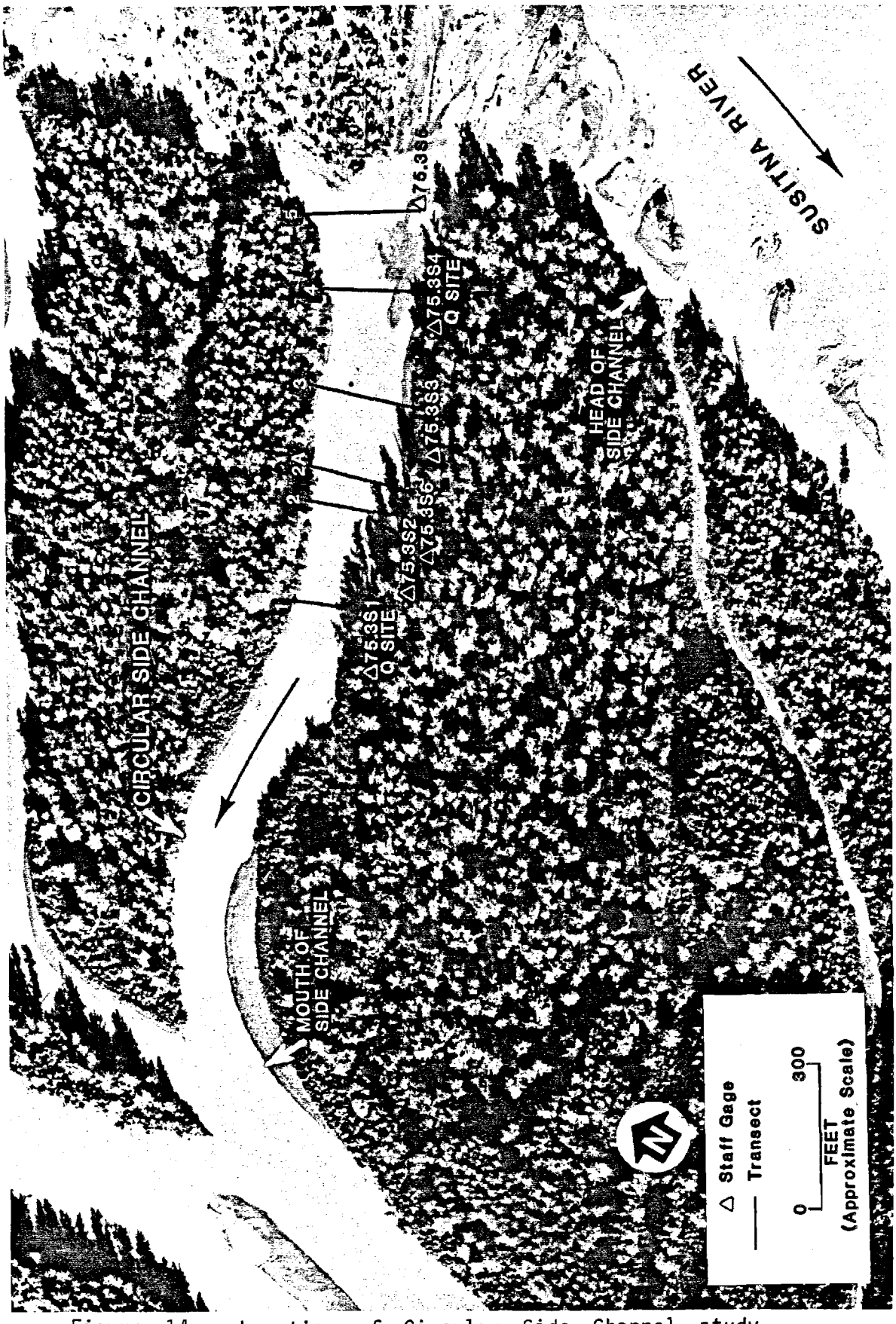


Figure 14. Location of Circular Side Channel study site (RM 75.3).

3.3.2 Stage/Discharge Relationship

Measurements of water surface elevations at each stage monitoring station located in Circular Side Channel along with the mean daily mainstem discharges (USGS 15292780) corresponding to the date of the stage measurements are presented in Attachment Table B-1. Plots of these water surface elevations versus mainstem discharges are presented in Attachment Figures E-16 to E-22. For transect 4 a gap exists between the lines depicting the nonbreached and breached condition. This gap is assumed to be the result of channel scour from the August 26 flood event.

Measurements of streamflow in Circular Side Channel were obtained at two stage monitoring stations located on transects 1 and 4 (Figure 14). These measurements of streamflows and the corresponding water surface elevations and mainstem discharges (USGS 15292780) are presented in Attachment Table B-1. Plots of streamflows versus water surface elevations developed as rating curves are presented in Figures 15 and 17. Rating curves of the streamflow data plotted against mainstem discharge are presented in Figures 16 and 18.

3.3.3 Mainstem Breaching and Controlling Discharge

Breaching of Circular Side Channel is the result of direct overtopping of the head by the mainstem Susitna River. Insufficient field data is available to determine precisely the initial breaching and controlling discharge for Circular Side Channel. Field observatins and a review of

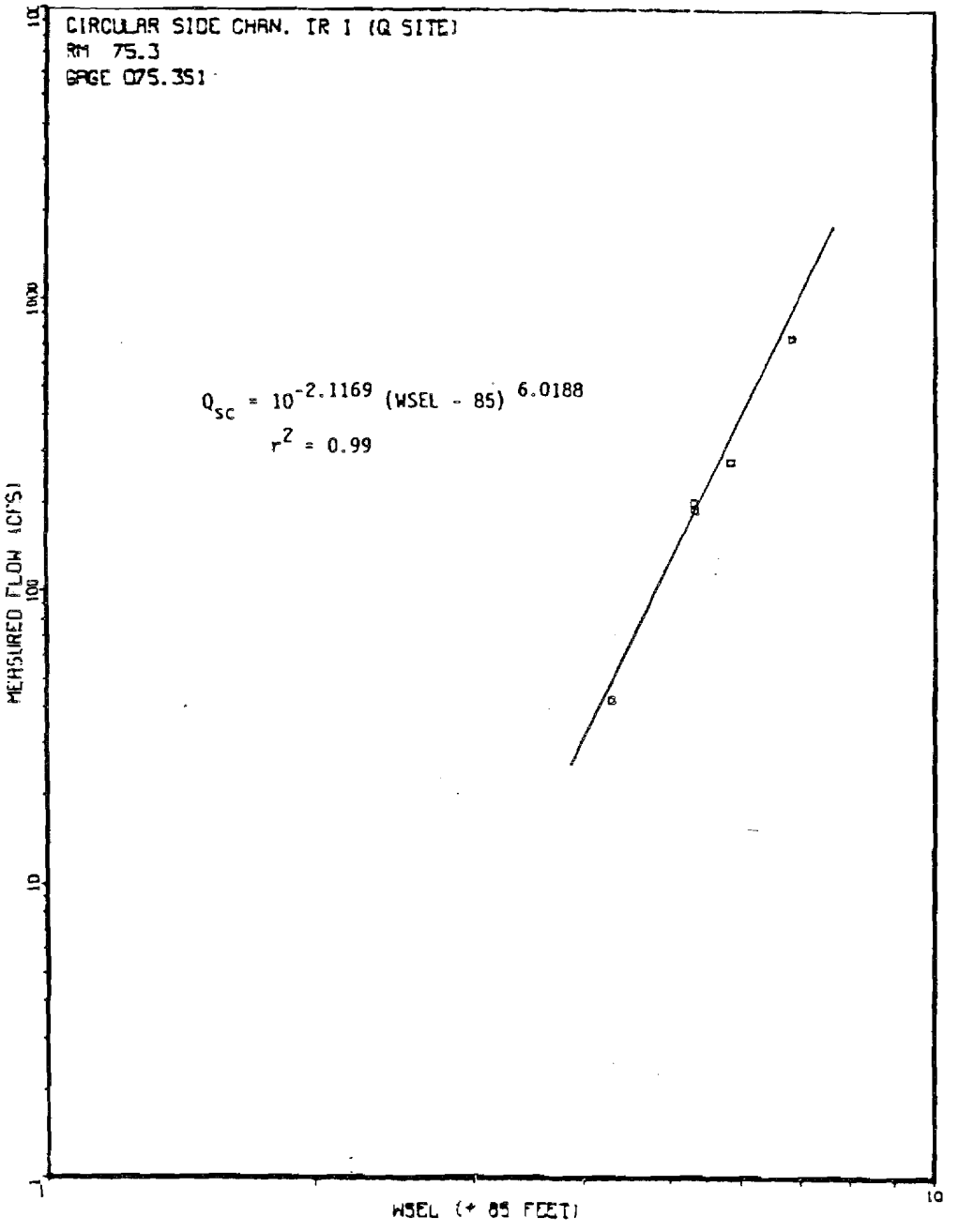


Figure 15 Circular Side Channel streamflow vs WSEL at transect 1 (Q Site).

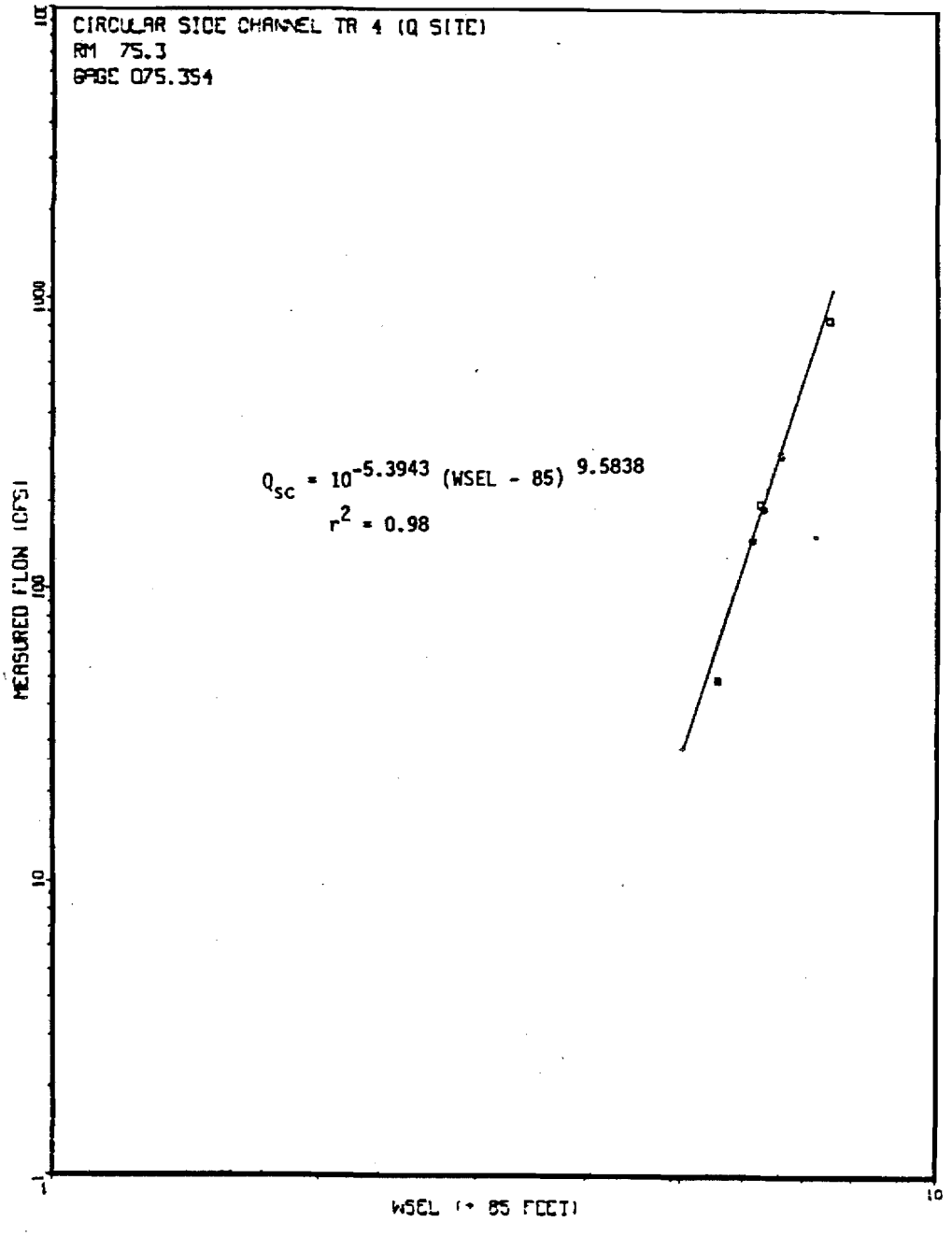


Figure 16 Circular Side Channel streamflow vs WSEL at transect 4 (Q Site).

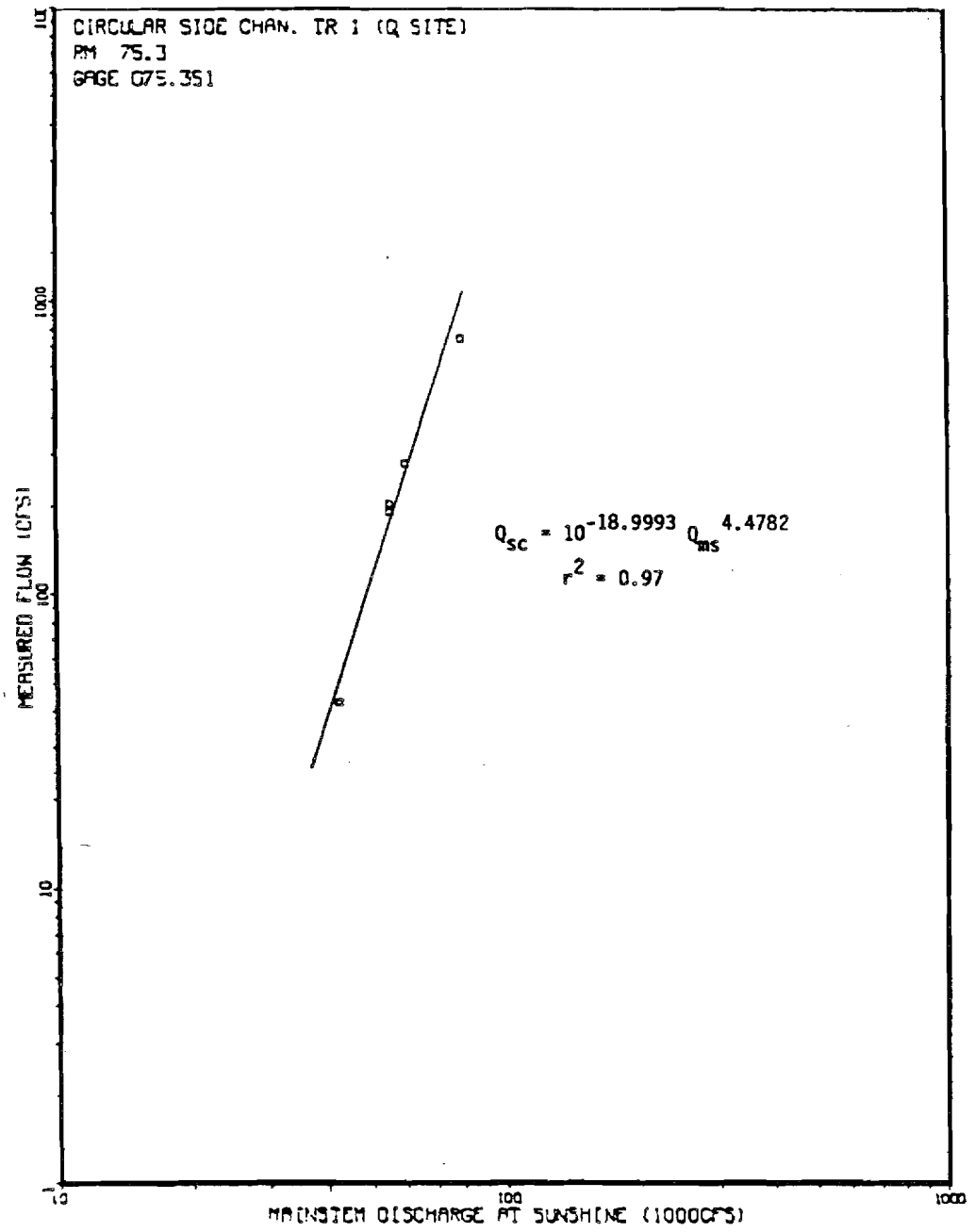


Figure 17 Circular Side Channel transect 1 (Q Site) streamflow vs mainstem discharge (cfs) at Sunshine Station (USGS 15292780).

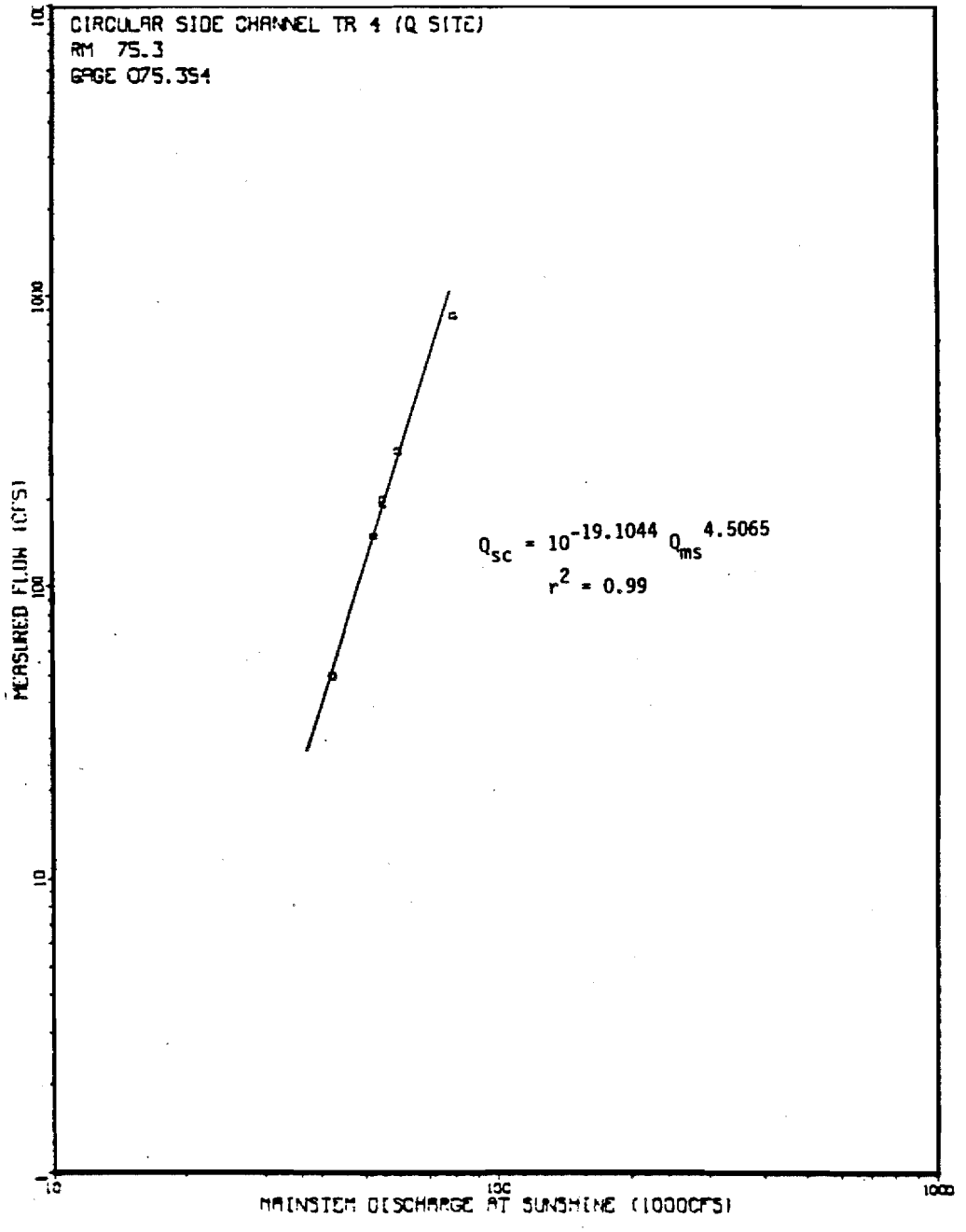


Figure 18 Circular Side Channel transect 4 (Q Site) streamflow vs mainstem discharge (cfs) at Sunshine Station (15292780).

aerial photographs indicate the head of the side channel to be breached at 36,600 cfs and dry at 32,000 cfs (Table 2). A field observation at 35,000 cfs found the side channel flowing clear indicating a nonbreached condition although the side channel head was not observed at the time. Upon close inspection of the aerial photograph at a breaching discharge of 36,600 cfs the side channel was observed flowing turbid (Pers. Comm. 1984 Bill Ashton; R&M Consultants) indicating a controlled hydraulic condition. Based on this information a controlling discharge of 36,000 cfs is estimated for Circular Side Channel. The initial breaching discharge of the site is estimated to also be 36,000 cfs based on the field observations.

To evaluate the influence mainstem discharge has on the hydraulic condition of this side channel, a comparison of the rating curves for transect 4 was performed (Figure 19). Although two streamflow stations were located in Circular Side Channel (transects 1 and 4), transect 4 was selected for this comparison as it had a greater range of stage observations than transect 1 and was a better defined rating curve. The site flow that occurs at a mainstem discharge of 36,000 cfs has been estimated to be 26.8 cfs based on stage versus streamflow rating curve for transect 4 (Figure 17). The estimate of 26.8 cfs is the same as the estimate of streamflow derived from the transect 4 streamflow versus mainstem discharge rating curve (Figure 18). Table 3 summarizes a comparison of streamflow estimates determined from equations developed from both rating curves for controlling mainstem discharges for transects 1 and 4.

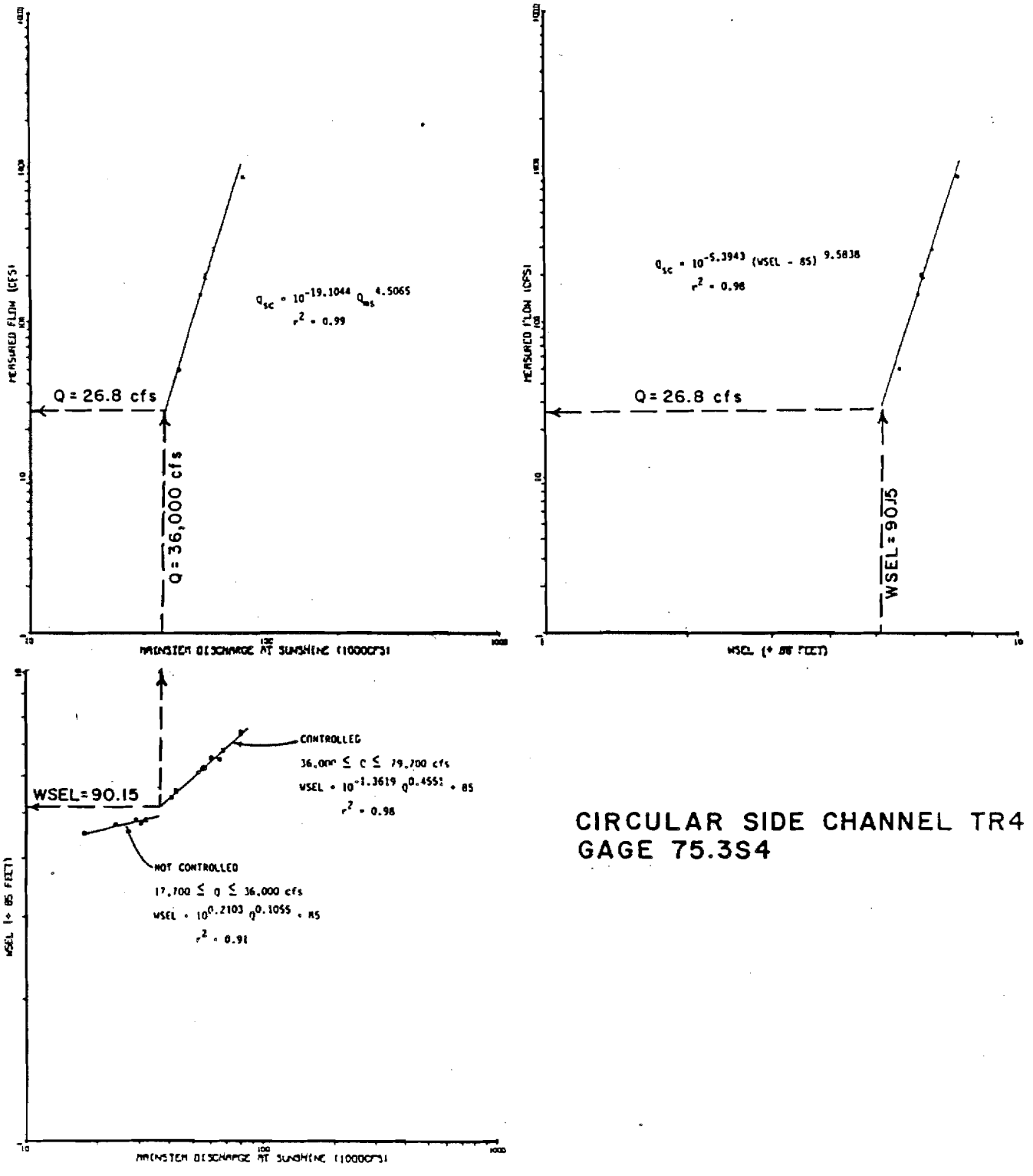


Figure 19. Comparison of rating curves from Circular Side Channel transect 4.

3.3.4 Channel Geometry

3.3.4.1 Thalweg Profile

Survey data for the development of the thalweg profile of Circular Side Channel was determined during a mainstem discharge of 14,700 cfs (USGS 15292780) when the side channel flow was measured to be less than 1.0 cfs. The thalweg survey extended approximately 2,800 feet beginning from the confluence of Circular Side Channel with another side channel and continuing to the head of the side channel (Figure 14). Survey data used to develop the thalweg profile are presented in Attachment Table C-4 with the resultant thalweg profile being presented in Attachment Figure C-3. The gradient within the thalweg profile is 14.3 feet/mile.

3.3.4.2 Cross Section Profile

Cross section data were obtained at each of the six transect locations within the study site. Survey data from these cross sections are presented in Attachment Table D-16 to D-21 with the resultant cross sectional profiles being presented in Attachment Figures D-16 to D-21.

3.3.5 Backwater

Based on available stage data (Table 6) and a review of the thalweg profile for Circular Side Channel, backwater has not been observed to occur during non-breaching mainstem discharges.

Table 6. A comparison of water surface elevations from Task 36 transects located within Circular Side Channel.

Date	TR 1	TR 2	TR 2A	TR 3	TR 4	TR 5	Mainstem Discharge
841010	---	---	88.06	---	---	89.04	14,700
841009	---	---	---	---	---	89.10	15,000
840928	---	---	---	---	89.54	89.55	17,700
840914	---	---	---	89.45	89.72	89.73	24,000
840903	---	---	88.69	89.55	89.85	89.84	29,000
940920	87.87	---	88.67	89.50	89.77	89.76	30,500
940902	---	---	88.70	89.56	89.84	---	32,000
840830	89.10	89.27	89.33	90.06	90.40	---	40,800
840817	89.25	89.27	89.41	90.17	90.57	---	42,500
840817	89.28	89.30	---	90.20	90.60	---	42,500
840724	90.26	90.26	90.28	90.60	91.25	91.32	55,200
840724	90.26	---	90.31	90.67	91.26	91.32	55,200
840724	90.29	---	---	---	91.26	---	55,200
840724	90.30	---	---	---	91.29	---	55,200
840724	90.30	---	---	---	91.30	---	55,200
840710	---	---	---	90.51	91.13	---	52,500
840803	90.23	90.21	90.26	90.62	91.24	---	54,700
840803	90.24	---	---	---	---	---	54,700
840723	90.31	---	---	90.64	91.26	---	56,100
840811	90.81	90.77	---	91.01	91.58	---	60,000
840811	---	---	---	---	91.59	---	60,000

Table 6 (Continued).

Date	TR 1	TR 2	TR 2A	TR 3	TR 4	TR 5	Mainstem Discharge
840706	90.70	---	---	90.92	---	---	63,600
840706	90.70	---	---	---	---	---	63,600
840706	90.72	---	---	---	---	---	63,600
840824	90.78	90.80	90.81	91.03	91.54	---	64,800
840824	90.78	---	---	---	91.56	---	64,800
840626	90.99	---	---	91.15	---	---	64,800
840626	91.00	---	---	91.21	---	---	64,800
840807	91.24	91.19	91.18	91.32	91.83	---	66,700
840827	91.75	---	---	---	92.43	---	79,700
840827	91.82	---	---	---	92.49	---	79,700

At breaching mainstem discharges of 55,200 to 66,700 cfs, an area of backwater was found to occur upstream to a point approximately 90 feet above transect 2A. Insufficient stage data is available to describe the extent of backwater for mainstem discharges exceeding 66,700 cfs. At a mainstem discharge of 42,500 cfs, backwater has been determined to extend slightly past transect 2.

3.4 Sauna Side Channel (RM 79.8)

3.4.1 Site Description

Sauna Side Channel is located on the west bank of the Susitna River at river mile 79.8 (Figure 20). It is approximately 0.2 miles long. Both the mouth and head of the side channel are connected to a larger side channel of the mainstem Susitna River. For the most part, the side channel is confined on the west by a high bank and on the east by a large sparsely vegetated gravel bar. A smaller side channel enters just below the head of Sauna Side Channel on its west bank. This side channel conducts flow to the study site during high mainstem discharges, but dewaters before the head of Sauna Side Channel becomes unbreached. Breaching flows result from overtopping of the side channel that adjoins the head on the east bank of Sauna Side Channel. Prior to breaching, the channel is composed of two large interconnected pools whose water levels are maintained from ground water seepage originating from the vicinity of the head. An extensive log jam exists at the head of Sauna Side Channel that likely influences the flow into this side channel.

During the 1984 open water field season, the study site within this side channel was approximately 500 feet in length and was located approximately 2,000 feet from where the mouth of the side channel confluences with the mainstem. Stage was monitored at four locations with streamflow being measured at one of these stage monitoring stations (Figure 21). Cross section survey data were collected at each of the stage monitoring stations. Survey data for the development of a thalweg profile were collected beginning at the mouth and ending at the head of the side channel.

3.4.2 Stage/Discharge Relationship

Water surface elevations obtained at each of the stage monitoring stations located in Sauna Side Channel along with the mean daily mainstem discharge (USGS 15292780) corresponding to the date of the stage measurement are presented in Attachment Table B-1. Plots of these water surface elevations versus mainstem discharges are presented in Attachment Figures E-23 to E-26.

Measurements of streamflow in Sauna Side Channel were obtained at one stage monitoring station located on transect 2 (Figure 21). These measurements of streamflow and the corresponding water surface elevations and mainstem discharges (USGS 15292780) are presented in Attachment Table B-1. A plot of these streamflows versus water surface elevations was developed as a rating curve and is presented in Figure 22. In addition, the streamflow data plotted against mainstem discharge is presented in Figure 23.

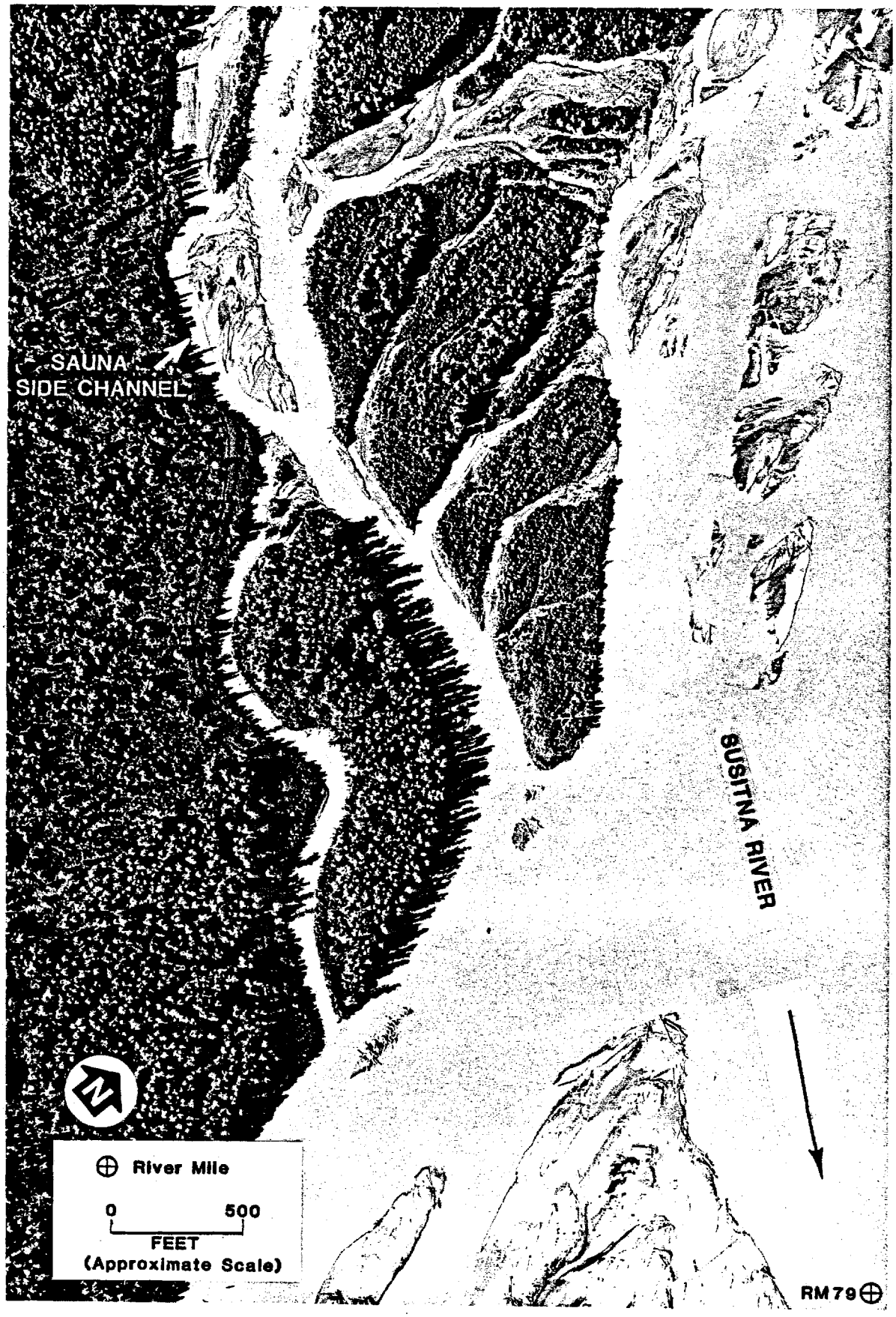


Figure 20. Overview of Sauna Side Channel (RM 79.8).

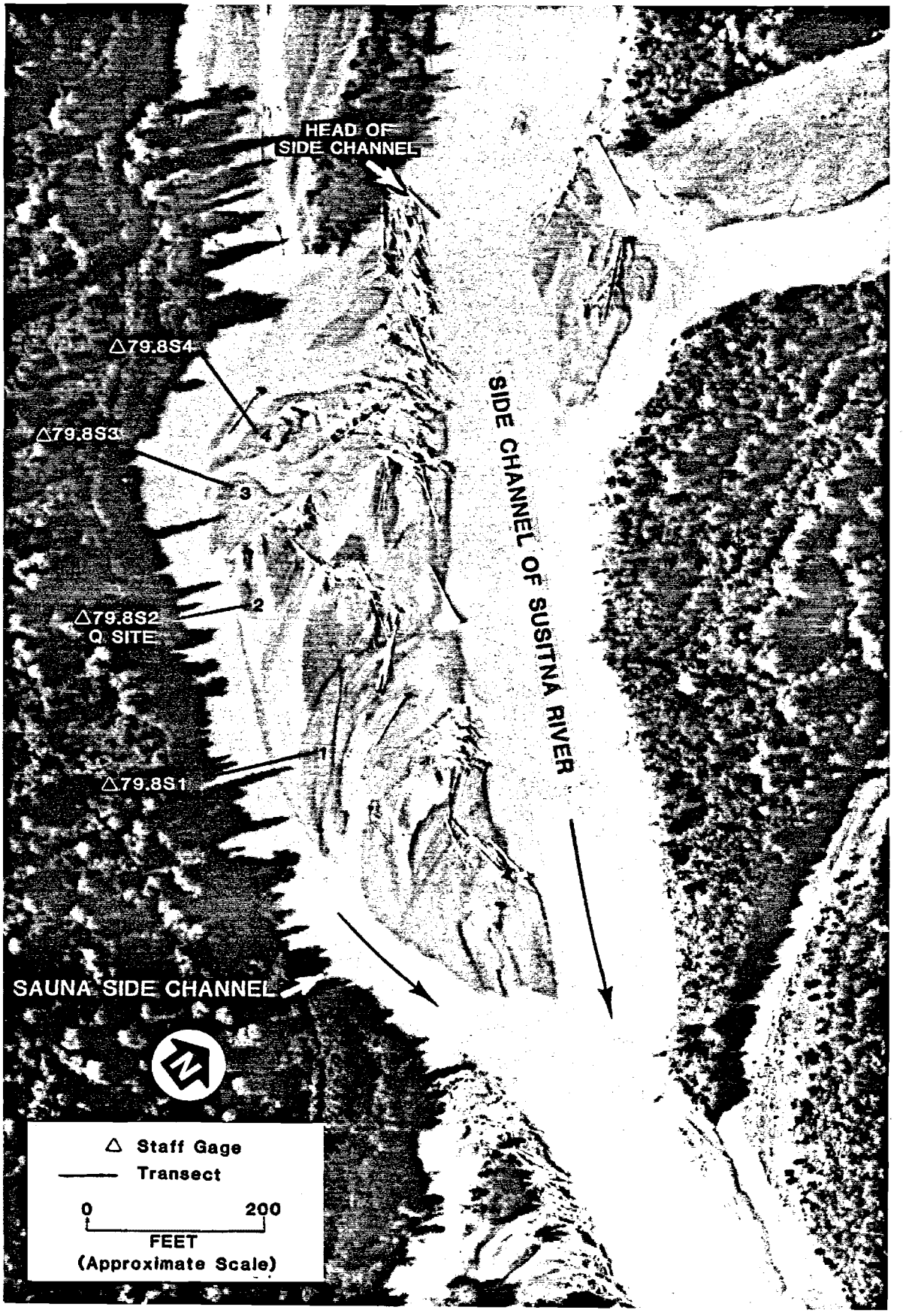


Figure 21. Location of Sauna Side Channel study site transects (RM79.8).

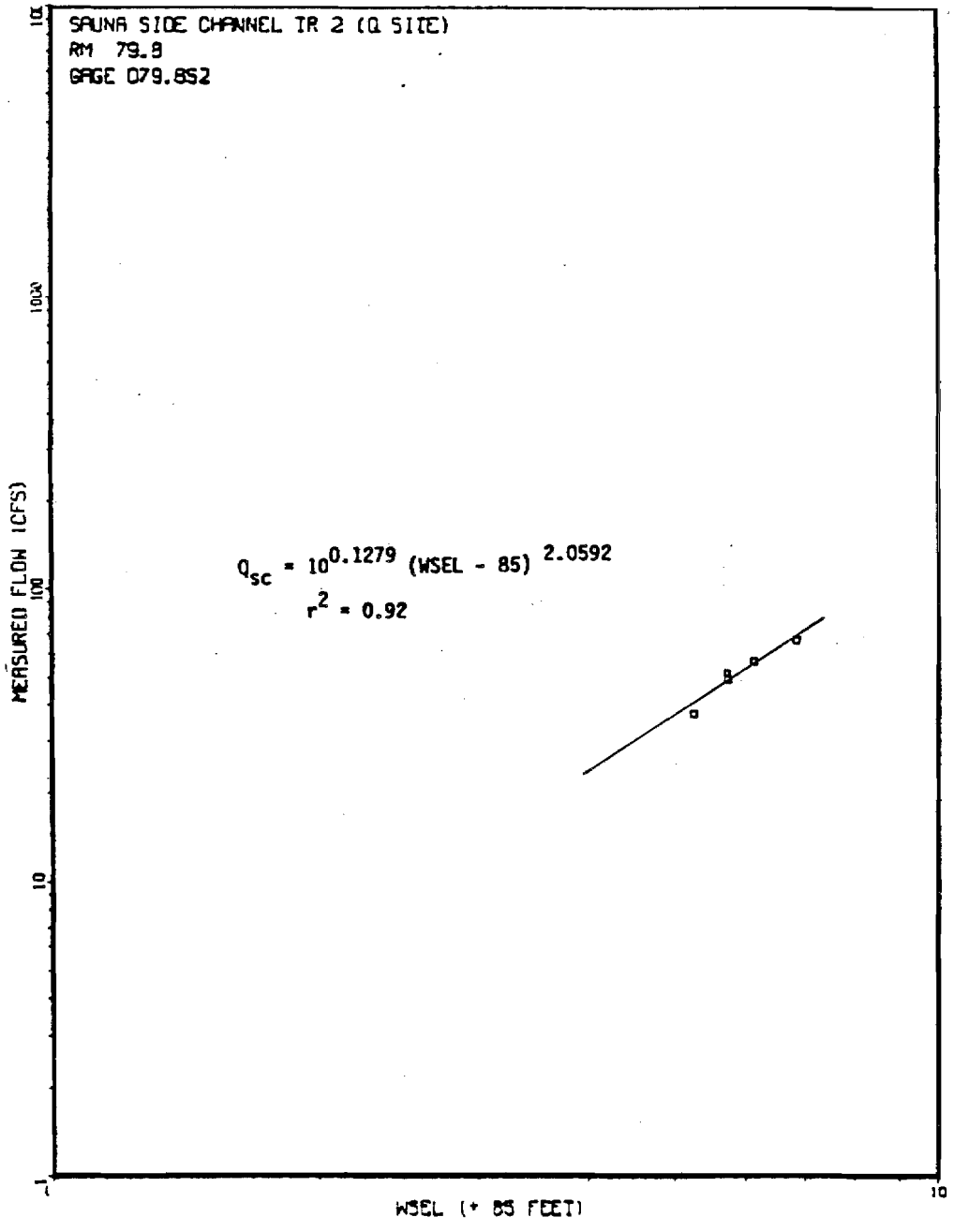


Figure 22 Sauna Side Channel streamflow vs WSEL at transect 2 (Q Site).

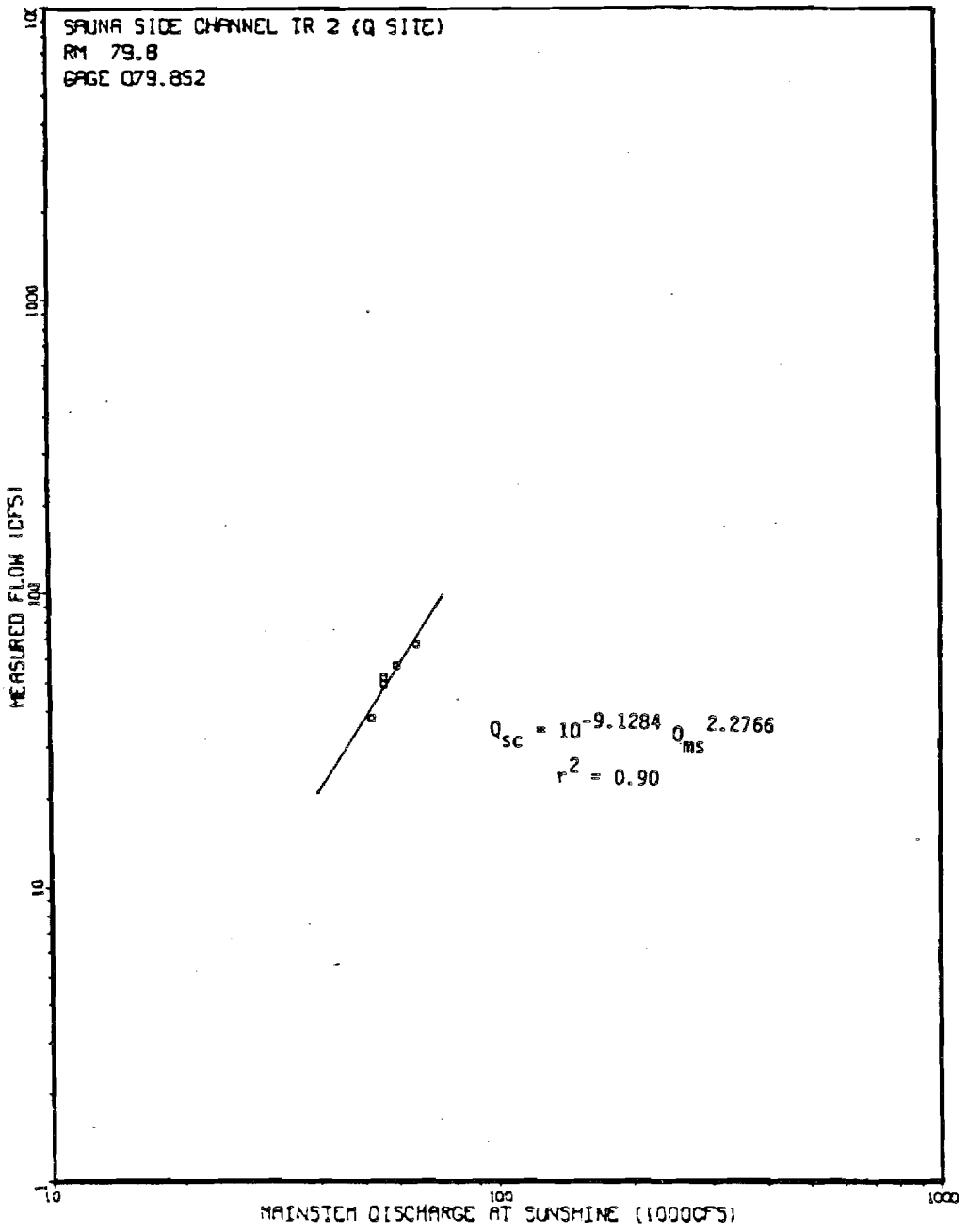


Figure 23 Sauna Side Channel Transect 2 (Q Site) streamflow vs mainstem discharge (cfs) at Sunshine Station (USGS 15292780).

3.4.3 Mainstem Controlling and Breaching Discharges

Breaching of Sauna Side Channel is the result of overtopping of the head by the adjoining side channel. Insufficient field data is available to determine precisely the initial breaching and controlling discharges for Sauna Side Channel. Field observations and a review of aerial photographs indicate the head of the side channel to be "barely" breached at 40,800 cfs and "almost" breached at 36,600 cfs (Table 2).

Although the lowest discharge at which the mainstem was observed to breach Sauna Side Channel was 40,800 cfs, a controlling discharge of 38,000 cfs is estimated for this channel. This controlling discharge was estimated by assuming that the stage/discharge relationship (Attachment Figure 24) for the nonbreached condition was nearly horizontal. This assumption is made because of the lack of nonbreached stage observations (1 observation only) and is considered reasonable based on observations and data collected at this site. The controlling discharge is scaled from the curve as the point of intersection (38,000 cfs) of the nonbreached limb of the stage/discharge relationship. The initial breaching discharge is estimated to occur at 37,000 cfs based on field observations and assuming the site initially breaches within 1,000-2,000 cfs of the controlling discharge as observed at other side channel sites.

To evaluate the influence mainstem discharge has on the hydraulics of Sauna Side Channel, a comparison of the rating curves for the streamflow

station at transect 2 was performed (Figure 24). A side channel flow of 22.5 cfs has been estimated to occur at the controlling discharge of 38,000 cfs as derived from the stage versus streamflow rating curve. This compares to a streamflow estimate of 19.9 cfs determined from the streamflow versus mainstem discharge rating curve. Table 3 summarizes comparisons of streamflow estimates determined from transect 2 rating curves for controlling mainstem discharges of Sauna Side Channel.

3.4.4 Channel Geometry

3.4.4.1 Thalweg Profile

Survey data for the development of a thalweg profile were collected at Sauna Side Channel during a mainstem discharge at Sunshine (USGS 15292780) of 15,000 cfs when the flow within the study site was estimated to be less than 1.0 cfs. The thalweg survey extended approximately 1,450 feet beginning at the mouth of the side channel continuing upstream through the study site terminating at the head of the side channel. The survey data used to develop the thalweg profile are presented in Attachment Table C-5 with the resultant thalweg profile being presented in Attachment Figure C-4. A gradient of 10.4 ft/mi was determined for the thalweg profile.

3.4.4.2 Cross Section Profile

Survey data for the development of cross sectional profiles were obtained at each of the four transects located in Sauna Side Channel.

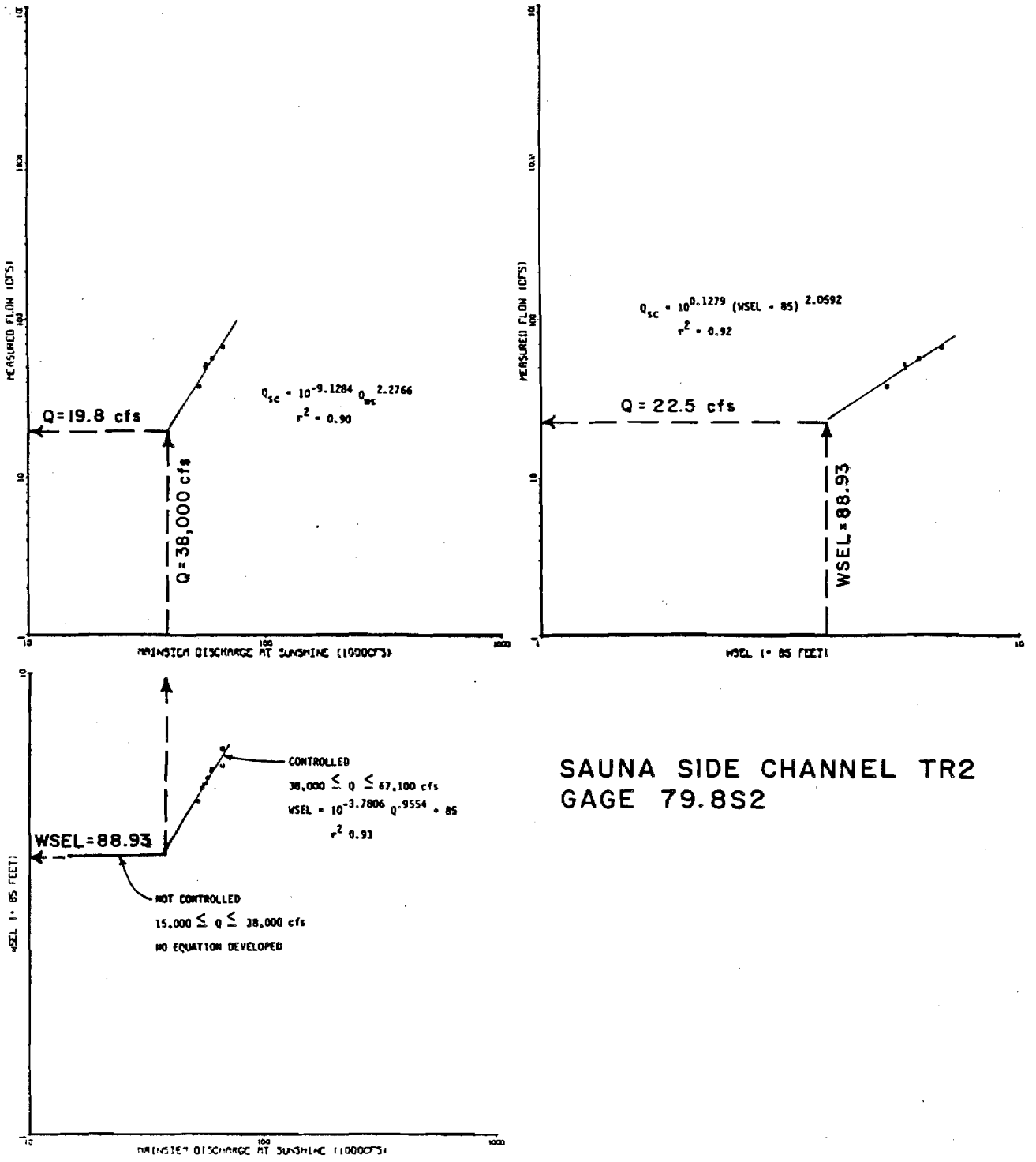


Figure 24 Comparison of rating curves from Sauna Side Channel transect 2.

The survey data are presented in Attachment Tables D-22 to D-25 with the resultant cross sectional profiles being presented in Attachment Figures D-22 to D-25.

3.4.5 Backwater

Based on a review of the 1984 stage data (Table 7) and the thalweg figure for Sauna Side Channel (Attachment Figure C-4), it has determined that backwater does not occur in Sauna Side Channel during non-breaching mainstem discharges.

During breaching discharges of 54,600 to 56,700 cfs, an area of backwater was observed to occur throughout the Sauna Side Channel study site. At mainstem discharges exceeding 56,700 cfs, insufficient stage data is available to determine the extent of backwater.

3.5 Sunset Side Channel (RM 86.9)

3.5.1 Site Description

Sunset Side Channel is located on the east bank of the Susitna River at river mile 86.9 (Figure 25). It is approximately 1.1 miles in length and is separated from the main channel Susitna River on the west by a network of vegetated islands and side channels. The channel is confined on the east by a high cut bank. Prior to breaching, the side channel is composed of a sequence of pools and riffles. During this period,

Table 7. A comparison of water surface elevations from Task 36 transects located within Sauna Side Channel.

Date	TR 1	TR 2	TR 3	TR 4	Mainstem Discharge
841009	88.75	89.00	88.90	89.02	15,000
840928	---	---	---	89.02	17,700
840914	---	---	---	89.02	24,000
840830	---	---	---	89.39	40,800
840817	89.15	---	---	89.29	42,500
840710	---	90.24	---	---	52,500
840823	90.63	90.61	90.64	90.65	54,600
840723	---	90.71	90.66	90.69	56,100
840723	90.70	90.73	90.72	90.69	56,100
840723	90.72	90.73	90.75	---	56,100
840802	90.73	90.75	90.75	90.79	56,700
840721	---	90.91	---	---	57,700
840828	---	91.09	---	---	59,900
840828	---	91.13	---	---	59,900
840706	---	91.18	---	---	63,600
840810	---	91.83	---	---	66,400
840810	---	91.85	---	---	66,400
840807	---	91.26	---	---	66,700
840625	---	91.82	---	---	67,100
840625	---	91.86	---	---	67,100

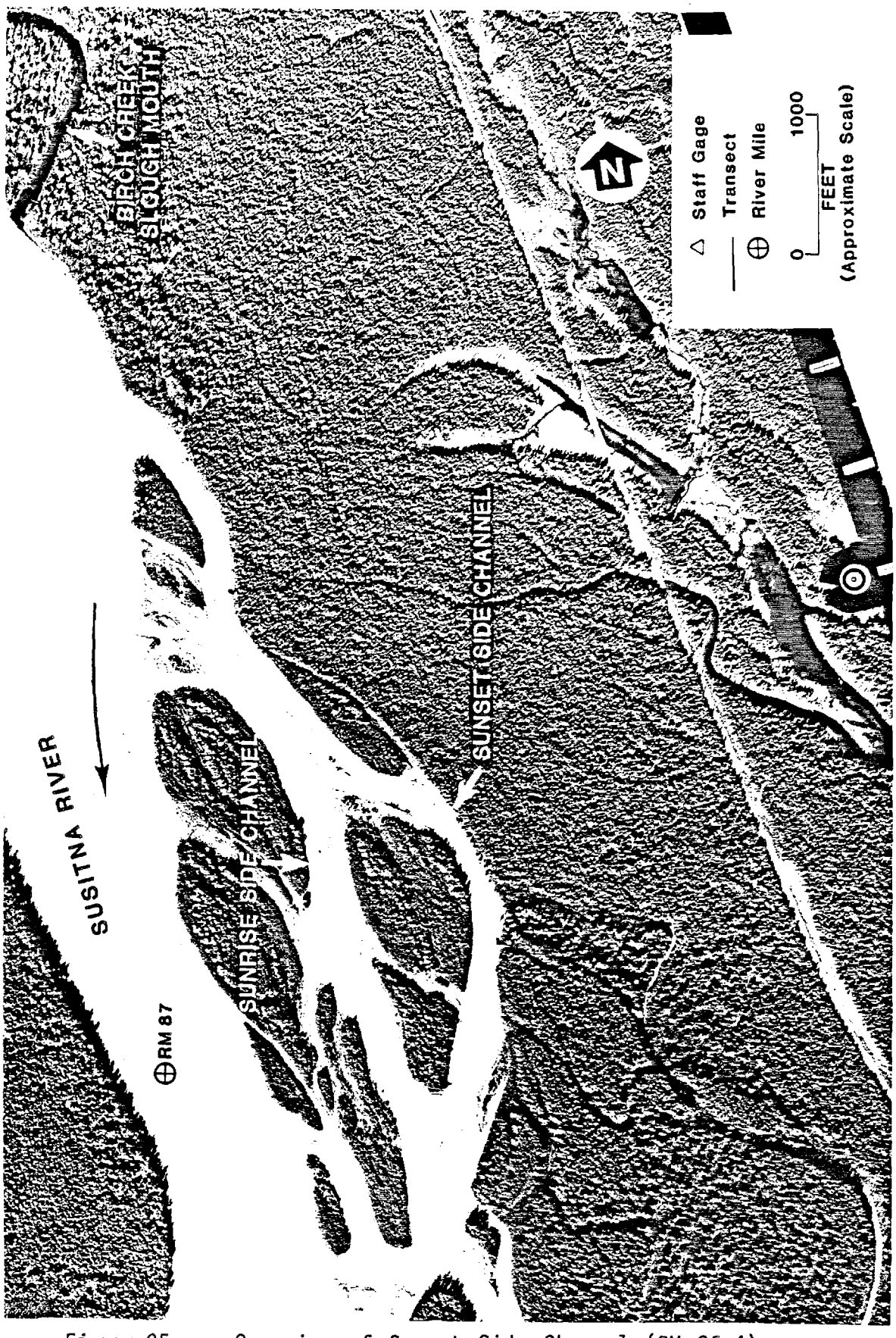


Figure 25. Overview of Sunset Side Channel (RM 86.4) and Sunrise Side Channel (RM 87.0).

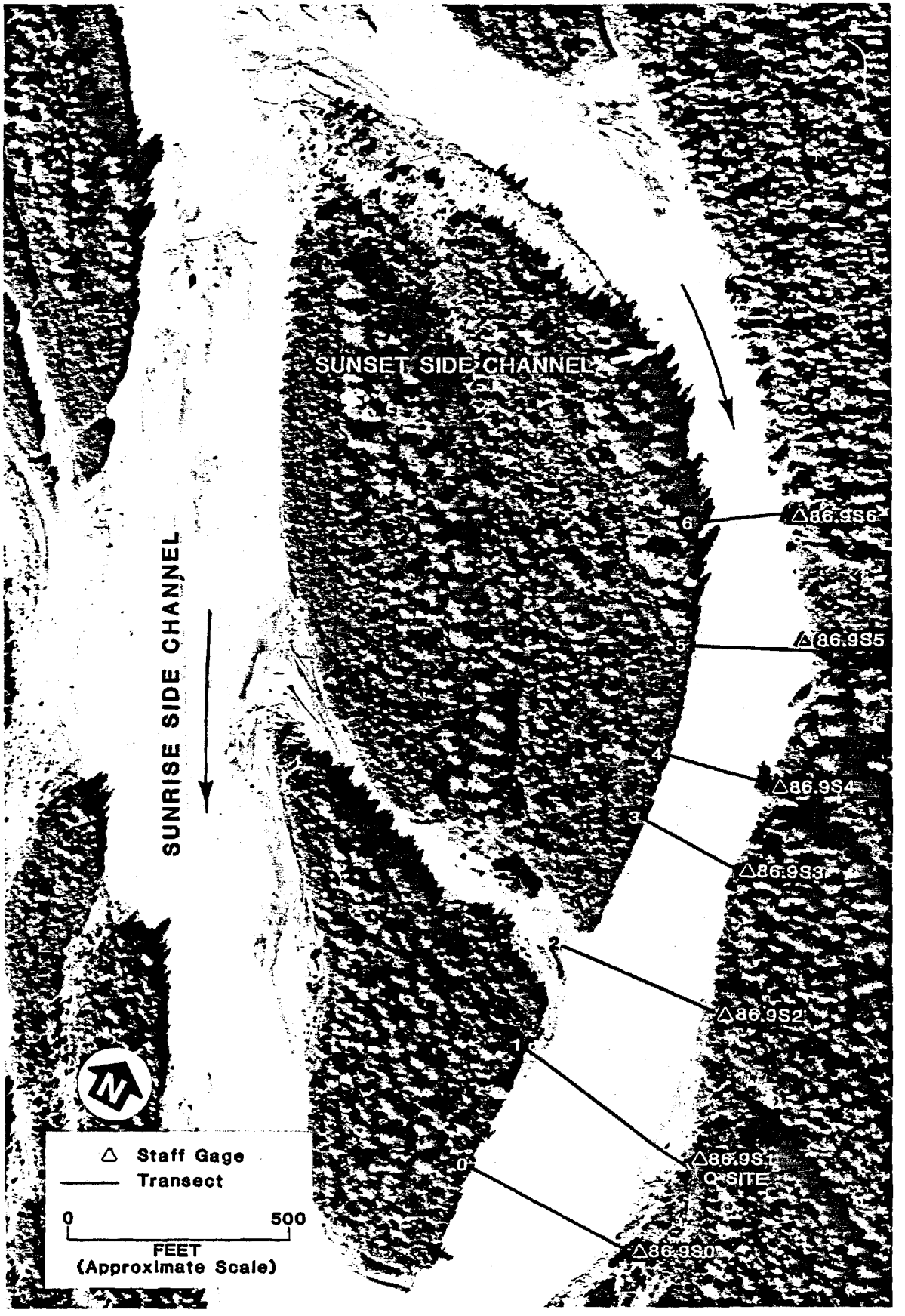


Figure 26. Location of Sunset Side Channel study site (RM 86.9).

flow is maintained by groundwater seepage and upwelling. Subsequent to breaching, flows up to 3,900 cfs have been measured.

During the 1984 open water field season, the study site within Sunset Side Channel was located in the lower portion of the side channel and was approximately 1,500 feet in length. Stage was monitored at seven locations with streamflow measurements being obtained at one of these stage monitoring stations (Figure 26). Cross section survey data were collected at all stage monitoring stations whereas survey data for the development of a thalweg profile were collected from the first control below the study site to the first control above the study site.

3.5.2 Stage/Discharge Relationship

Measurements of water surface elevations obtained at each stage monitoring station located in Sunset Side Channel along with the mean daily mainstem discharges at Sunshine (USGS 15292780) corresponding to the date of the stage measurements are presented in Attachment Table B-1. Plots of these water surface elevations versus mainstem discharges are presented in Attachment Figures E-27 to E-33.

Measurements of streamflow in Sunset Side Channel were obtained at one stage monitoring station which was located on transect 1 (Figure 26). These measurements of streamflow and the corresponding water surface elevations and mainstem discharges are presented in Attachment Table B-1. A plot of these streamflows and water surface elevations developed

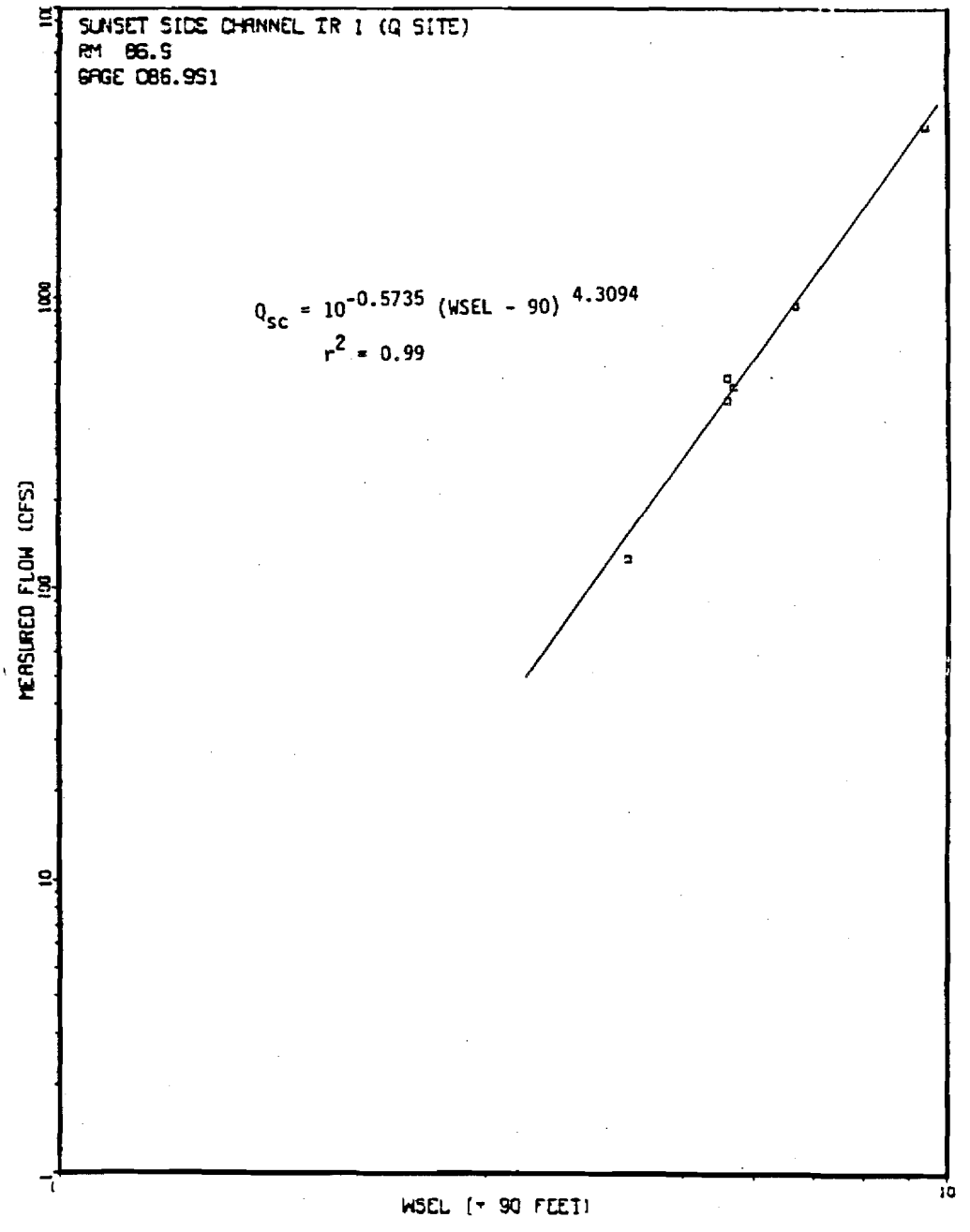


Figure 27 Sunset Side Channel streamflow vs WSEL at transect 1 (Q Site).

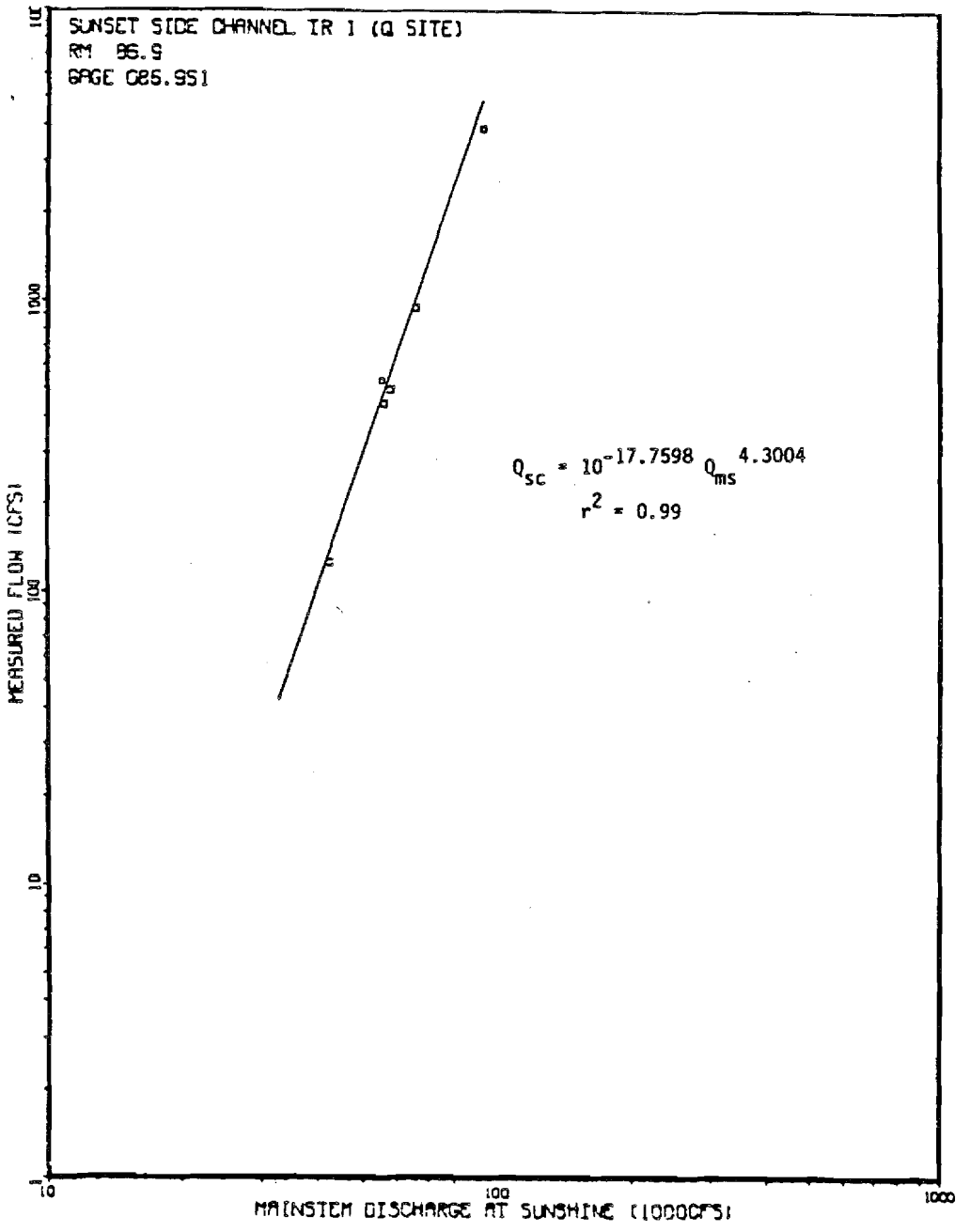


Figure 28. Sunset Side Channel transect 1 (Q Site) streamflow vs mainstem discharge (cfs) at Sunshine Station (USGS 15292780).

as a rating curve is presented in Figure 27. These streamflow data plotted against mainstem discharge as a rating curve are presented in Figure 28.

3.5.3 Mainstem Breaching and Controlling Discharges

Breaching of Sunset Side Channel results from the direct overtopping of the head of the side channel by the mainstem Susitna River. Based on field observations and aerial photography this side channel was found to be "barely" breached at 32,000 cfs and dry at 22,000 cfs. A review of the stage data presented in the transect 1 (streamflow station) WSEL versus mainstem discharge plot (Attachment Figure E-28) indicates that the hydraulics of Sunset Side Channel become controlled by the mainstem at a discharge of 32,000 cfs. Based on this controlling discharge and the limited field observations an initial breaching discharge of 31,000 cfs has been estimated for this side channel.

A comparison of the transect 1 rating curves (Figure 29) has been developed to evaluate the influence mainstem discharge has on the hydraulics of Sunset Side Channel. At the controlling discharge of 32,000 cfs, flow in this side channel has been estimated to be 45.7 cfs. This compaares to an estimated flow of 41.4 cfs derived from the flow versus mainstem discharge rating curve. Table 3 summarizes the comparisons of flow estimates determined from equations developed from rating curves for controlling mainstem discharges for transect 1.

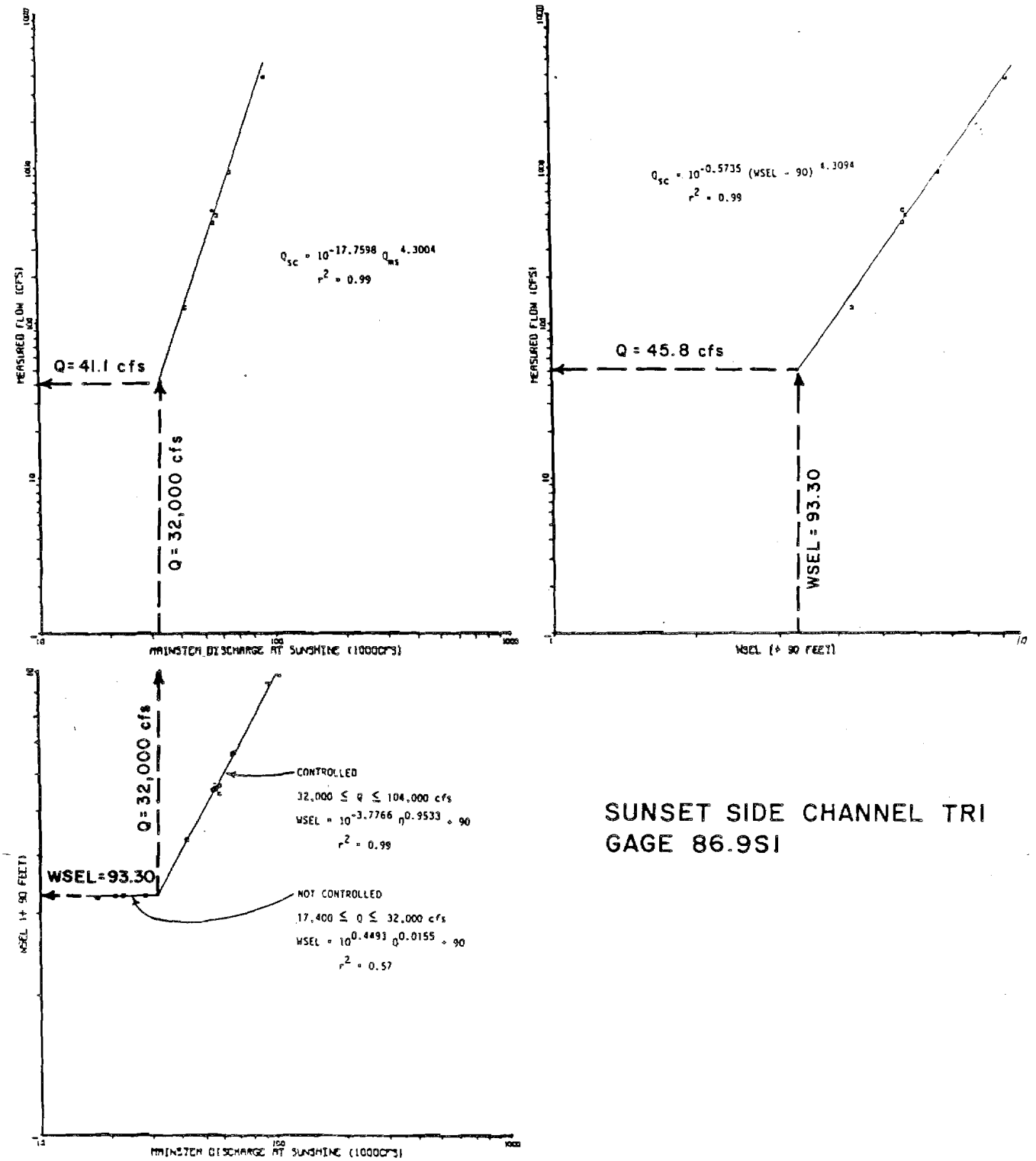


Figure 29 Comparison of rating curves from Sunset Side Channel transect 1.

3.5.4 Channel Geometry

3.5.4.1 Thalweg Profile

Survey data for the development of a thalweg profile were obtained in Sunset Side Channel at a mainstem discharge of 17,400 cfs while site flow was measured to be 1.0 cfs. The thalweg profile extended upstream from approximately 400 feet below the mouth of the side channel through the study site to a point 2,500 feet into the side channel. The survey data used to develop the thalweg profile are presented in Attachment Table C-6 with the resultant thalweg profile being presented in Attachment Figure C-5. Based on this thalweg profile, a gradient of 9.5 feet/mile was determined for the Sunset Side Channel.

3.5.4.2 Cross Section Profile

Cross section survey data were obtained at each of the seven transects located in Sunset Side Channel. The survey data are presented in Attachment Table D-26 to D-32 with the resultant cross section profiles being presented in Attachment Figures D-26 to D-32.

3.5.5 Backwater

Based on available stage data (Table 8) and channel geometry data (Attachment Figure C-5), a backwater area does not occur in the side channel during unbreached conditions.

Table 8. A comparison of water surface elevations from Task 36 transects located within Sunset Side Channel.

Date	TR 0	TR 1	TR 2	TR 3	TR 4	TR 5	TR 6	Mainstem Discharge
841005	---	---	---	93.74	---	94.75	94.74	16,500
840929	92.70	93.27	93.81	---	---	94.76	94.75	17,400
840930	---	93.27	93.79	93.69	94.11	94.75	94.75	17,800
840916	---	93.29	93.81	93.87	94.11	94.76	94.76	21,000
840912	---	93.29	93.81	93.78	94.29	94.78	---	22,700
840913	---	93.30	---	---	---	---	---	22,700
840914	---	---	93.81	93.87	94.31	---	---	24,000
840919	---	93.29	93.80	93.87	94.31	94.76	94.76	28,400
840902	---	---	---	---	---	---	94.88	32,000
840817	---	94.34	---	94.93	95.01	95.99	95.97	42,500
840816	---	---	---	95.02	95.10	96.06	96.05	44,000
840822	95.54	95.53	95.71	95.86	95.93	96.66	96.62	54,300
840803	95.60	95.58	95.68	95.95	95.93	96.72	96.69	54,700
840709	---	95.59	---	---	95.92	---	---	55,400
840709	---	95.69	95.94	96.01	96.08	96.79	---	55,400
840723	---	95.58	---	---	---	---	---	56,100
840723	95.58	95.58	95.64	95.85	95.95	96.65	---	56,100
840721	---	95.45	---	---	---	---	---	57,700
840722	95.09	95.67	95.76	95.86	95.96	96.68	96.64	57,800
840722	95.62	---	95.78	95.94	95.98	96.68	96.65	57,800

Table 8 (Continued).

Date	TR 0	TR 1	TR 2	TR 3	TR 4	TR 5	TR 6	Mainstem Discharge
840808	---	96.63	---	---	---	---	---	65,900
840808	96.67	96.67	---	96.86	96.89	97.31	97.21	65,900
840807	96.68	96.69	---	96.89	96.96	97.36	97.29	66,700
840825	---	99.42	---	---	---	---	---	93,300
840826	---	99.88	---	---	---	---	---	104,000

At breaching mainstem discharges ranging from 56,000-66,700 cfs, an area of backwater was observed to extend upstream to approximately 1,100 feet to a point between transects 1 and 2. Above 66,700 cfs, insufficient stage data is available to determine the extent of backwater in Sunset Side Channel.

3.6 Trapper Creek Side Channel (RM 91.6)

3.6.1 Site Description

Trapper Creek Side Channel is located on the west bank of the Susitna River and is approximately 5.0 miles in length. It is separated from the mainstem Susitna River by a complex of sand bars, small channels, and vegetated islands. The head portion of this side channel is located in a complex of small channels and vegetated islands making it difficult to identify the origin of breaching flows. Depending upon mainstem discharge, the mouth of Trapper Creek Side Channel is also difficult to identify due to the presence of several intersecting small channels. At low mainstem discharges, the mouth of Trapper Creek Side Channel appears to extend downstream to river mile 90.3 (Figure 30). Breaching flows in Trapper Creek Side Channel result from the overtopping of several overflow channels located throughout the upper portion of the side channel. Prior to breaching, flows into Trapper Creek Side Channel, are principally due to Cache Creek and ground water occurring in the upper reach of the side channel.

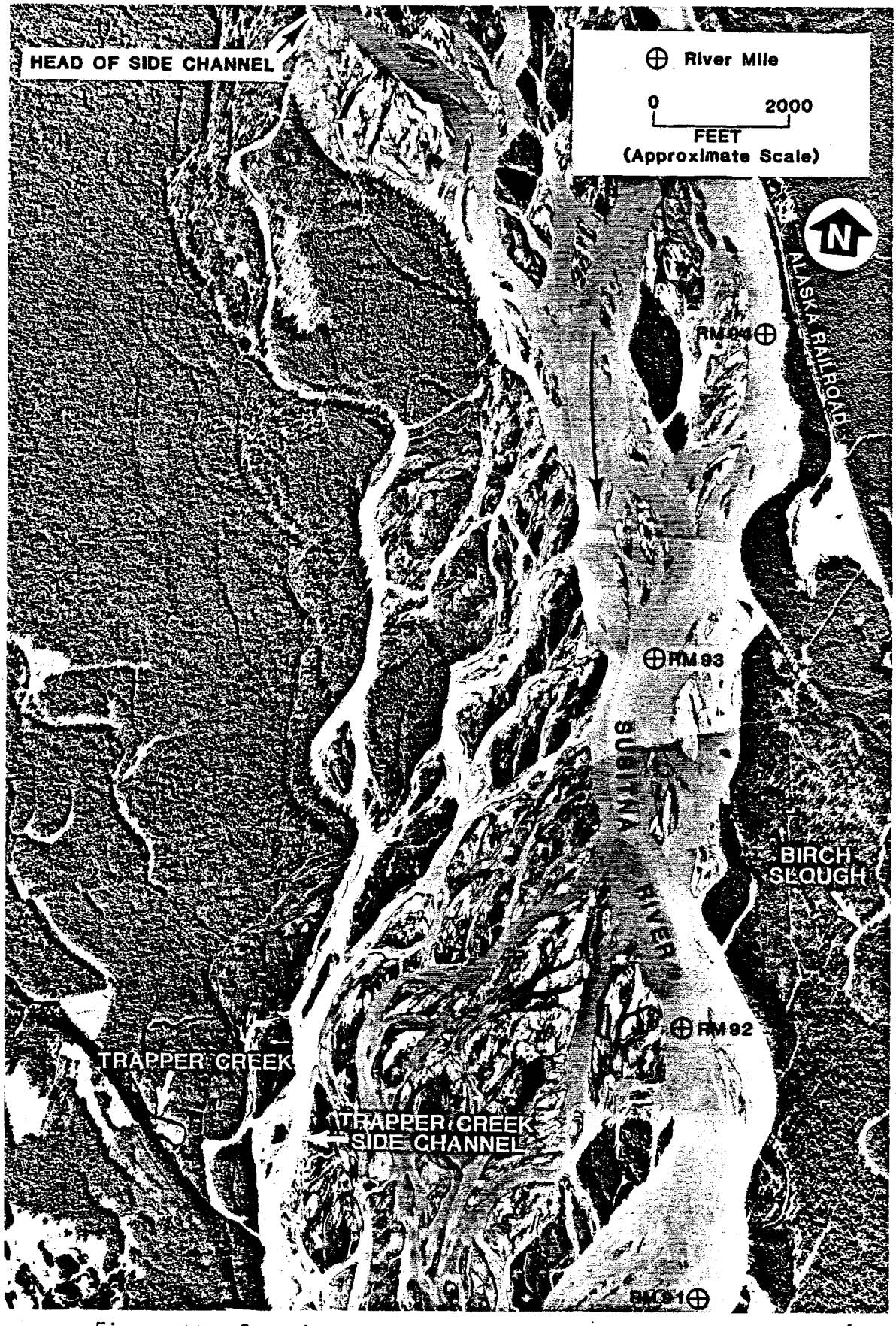


Figure 30. Overview of Trapper Creek Side Channel (RM 91.6).

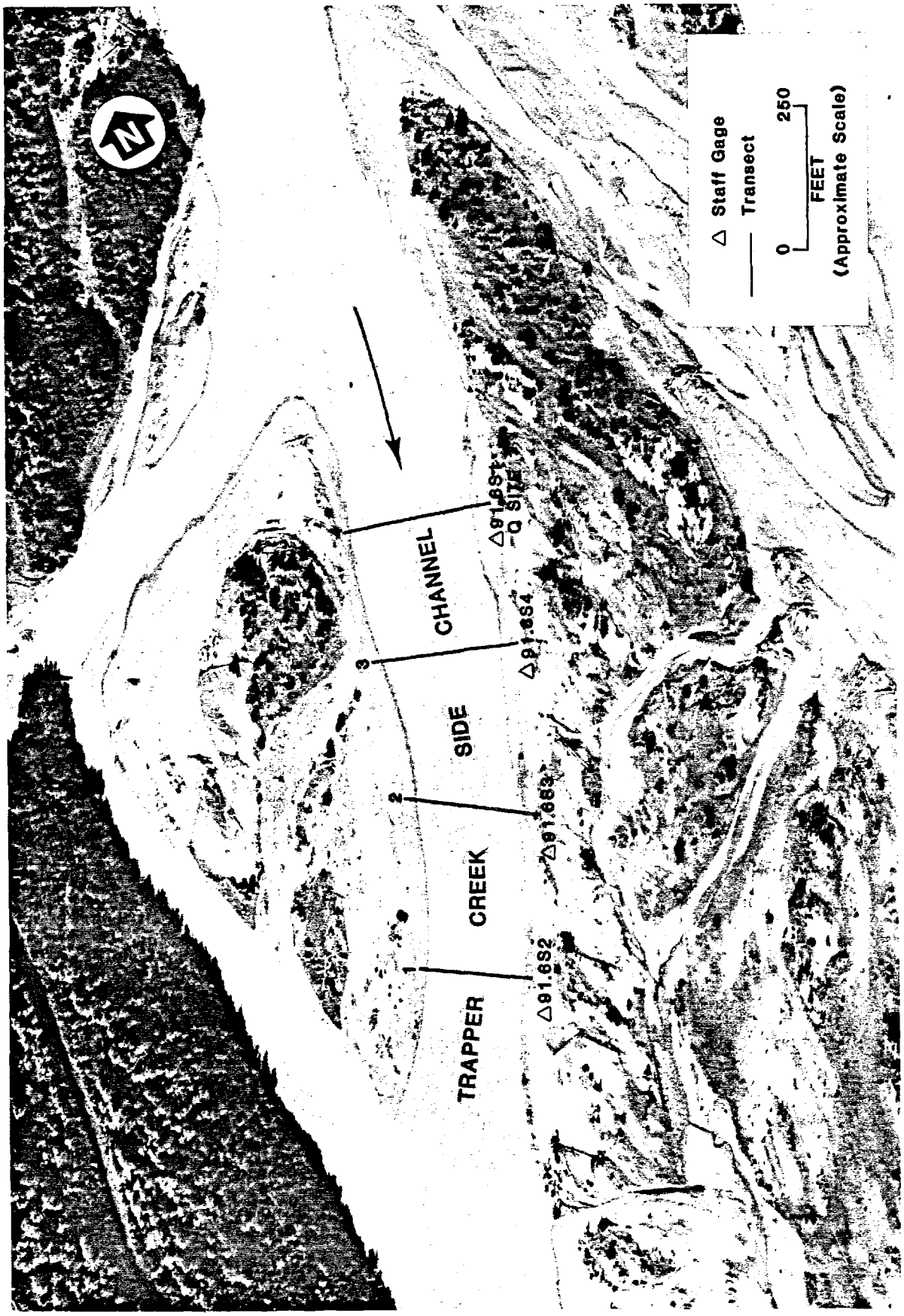


Figure 31. Location of Trapper Creek Side Channel study site (RM 91.6).

During the 1984 open water field season, the study site selected for Trapper Creek Side Channel was approximately 800 feet in length and was located in the lower portion of the side channel (Figure 31). Stage was monitored at four locations and streamflow was measured at one of these stage monitoring stations. Survey data for the development of cross section profiles was obtained from each stage monitoring station. Survey data for the development of a thalweg profile was obtained for only that portion of the side channel that included the study site.

3.6.2 Stage/Discharge Relationship

Measurements of water surface elevations obtained at each stage monitoring station located in Trapper Creek Side Channel along with mean daily mainstem discharges (USGS 15292780) corresponding to the date of the stage measurements are presented in Attachment Table B-1. Plots of these water surface elevations versus mainstem discharge are presented in Attachment Figures E-34 to E-37.

Measurements of streamflow in Trapper Creek Side Channel were obtained at one stage monitoring station located on transect 4 (Figure 31). Measurements of streamflow and corresponding water surface elevations and mainstem discharges (USGS 15292780) are presented in Attachment Table B-1. A plot of these streamflows and water surface elevations developed as a rating curve is presented in Figure 32. The streamflow data was also plotted against mainstem discharge as a rating curve and is presented in Figure 33.

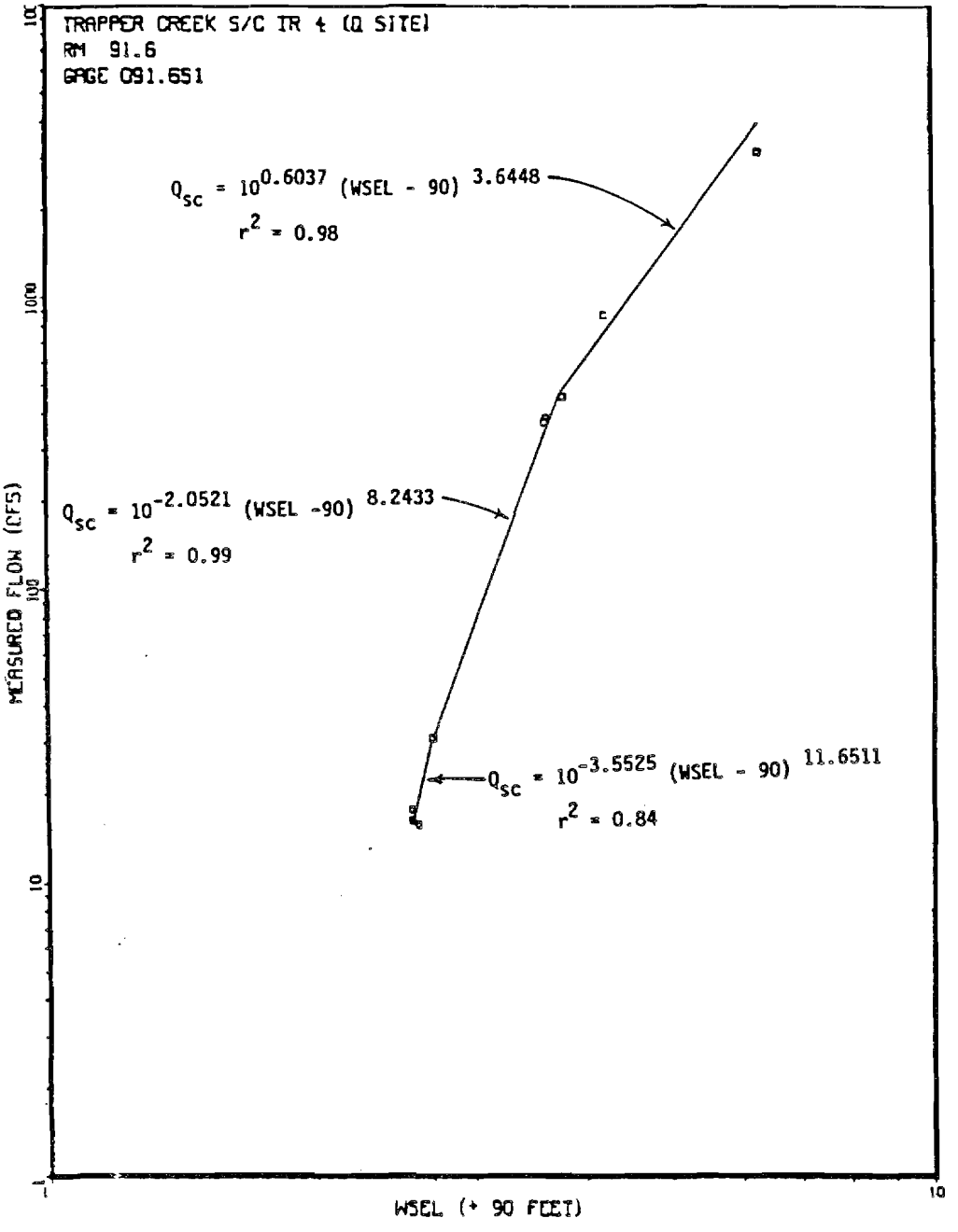


Figure 32 Trapper Creek Side Channel streamflow vs WSEL at transect 4 (Q Site).

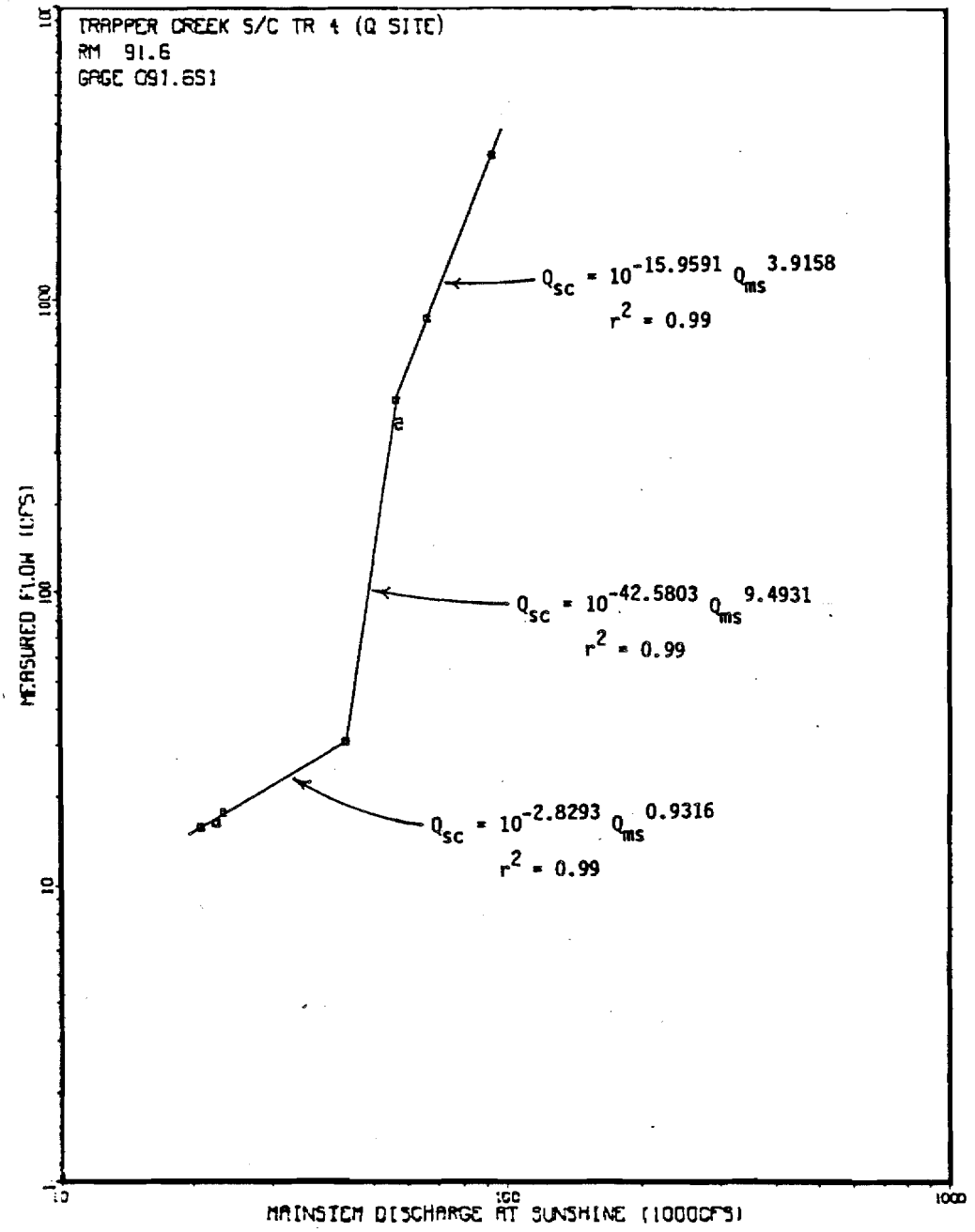


Figure 33 Trapper Creek Side Channel transect 4 (Q Site) streamflow vs mainstem discharge (cfs) at Sunshine Station (USGS 15292780).

3.6.3 Mainstem Controlling and Breaching Discharges

Breaching of Trapper Creek Side Channel is the result of the direct overtopping of the head of the side channel by the mainstem Susitna River. Based on aerial photography (Table 2), this side channel has been observed to be breached at a mainstem discharge as low as 36,600 cfs. The controlling mainstem discharge has been estimated from inspection of the stage versus mainstem discharge rating curve for transect 4 (Figure 9) to be 44,000 cfs. The mainstem discharge of 44,000 cfs was chosen because it is the point of intersection of the lines depicting the base flow unbreached condition and the breached condition observed at the streamflow station (Figure 9). This relationship is also presented in the WSEL versus MS_Q plots for transects 2 and 3 (Attachment Figures E-35 and E-36). This mainstem discharge corresponds to a streamflow measurement of 31.4 cfs.

The substantial differences in mainstem discharge between the lowest observed breaching discharge (36,600 cfs) and the estimated controlling discharge (44,000 cfs) is suspect. Based on observations from other sites the initial breaching and controlling discharge are usually similar. The breaching observation corresponding to 36,600 cfs was determined from a 1983 aerial photograph. Based on the stage/discharge relationships for the nonbreached and breached condition presented in Attachment Figures E-34 to E-37 the initial breaching and controlling discharges for this side channel appear to be similar. Assuming the initial breaching discharge is less than and occasionally equal to the

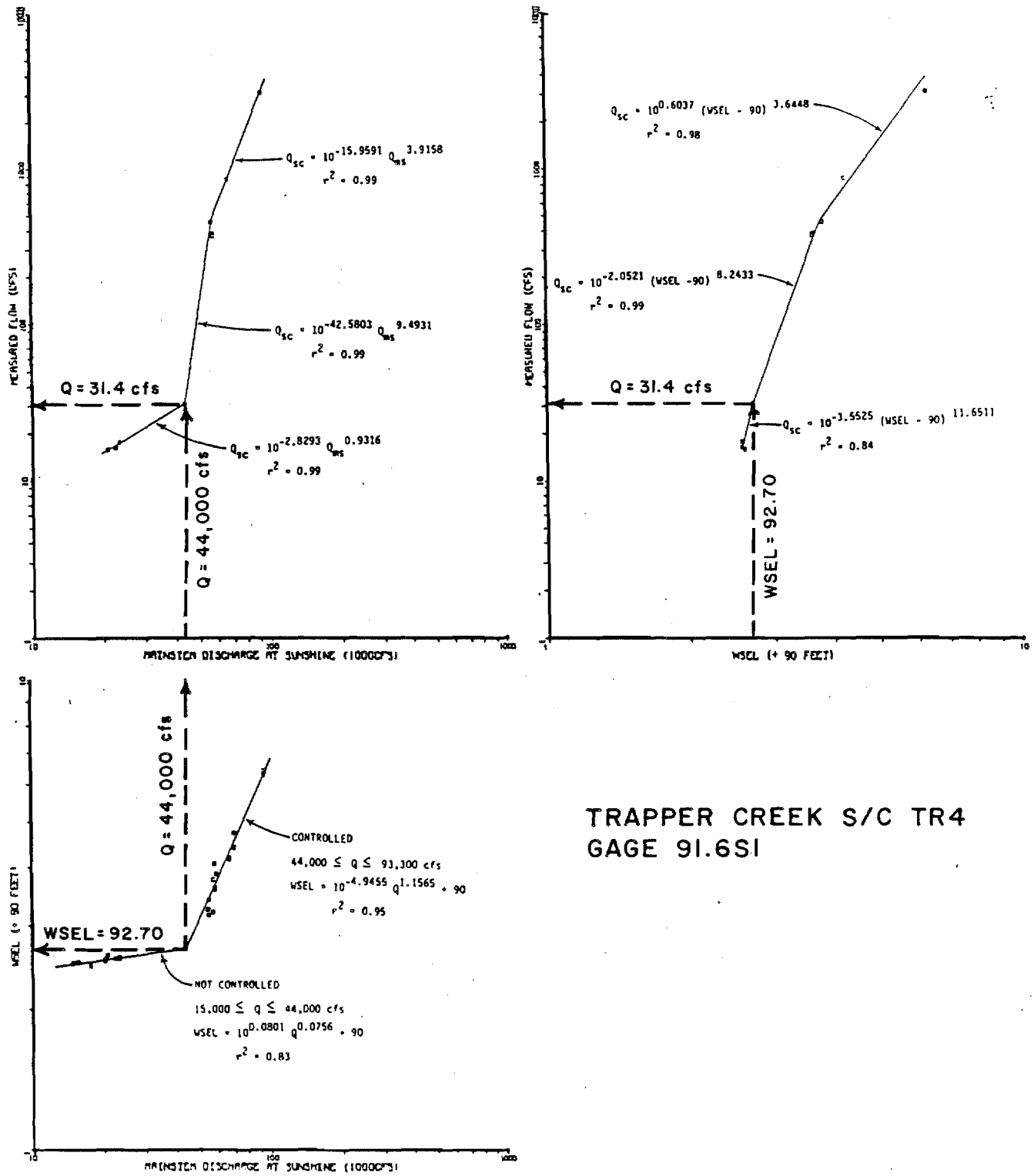


Figure 34 Comparison of rating curves from Trapper Creek Side Channel transect 4.

controlling discharge, therefore at this site initial breaching is estimated to be 43,000 cfs.

3.6.4 Channel Geometry

3.6.4.1 Thalweg Profile

Survey data for the development of a thalweg profile was obtained from Trapper Creek Side Channel during a mainstem Susitna River discharge of 22,700 cfs and a measured side channel flow of 16.4 cfs. The thalweg profile was initiated approximately 150 feet downstream of the first control below the study site and extended upstream, through the study site, approximately 1,600 feet. The survey data used to construct the thalweg profile are presented in Attachment Table C-7 with the resultant thalweg profile being presented in Attachment Figure C-6. Based on this thalweg profile, a streambed gradient of of 12.1 feet/mile was determined.

3.6.4.2 Cross Section Profile

Cross section survey data was obtained at each of the four transects located in Trapper Creek Side Channel. The survey data used to construct these cross sections are presented in Attachment Tables D-33 to D-36. The resultant cross section profiles are presented in Attachment Figures D-33 to D-36.

3.6.5 Backwater

Based on stage (Table 9) and channel geometry (Attachment Figure C-6) data, an area of backwater has not been observed during nonbreaching mainstem discharges.

At mainstem discharges ranging from 15,700 to 22,700 cfs, pooling was observed at transects 1, 2 and 3 resulting from the control located approximately 373 feet downstream from transect 1. During breached mainstem discharges, a backwater area was not observed to occur in Trapper Side Channel.

Table 9. A comparison of water surface elevations from Task 36 transects located within Trapper Creek Side Channel.

Date	TR 1	TR 2	TR 3	TR 4	Mainstem Discharge
841009	---	---	92.12	92.50	15,000
841006	91.92	91.90	92.14	92.51	15,700
840930	91.93	91.92	92.14	92.47	17,800
840917	91.95	91.93	92.19	92.53	20,400
840924	91.94	91.93	92.17	92.55	20,400
840918	91.95	91.95	92.18	92.60	20,900
840913	91.97	91.95	92.16	92.56	22,700
840911	---	---	92.14	92.56	23,500
840911	---	---	---	92.58	23,500
840816	92.34	92.00	92.15	92.70	44,000
840822	92.76	92.51	92.82	93.27	54,300
840803	92.93	92.69	93.02	93.18	54,700
840803	---	---	---	93.42	54,700
840708	---	---	---	93.78	57,100
840819	92.90	92.69	93.04	93.23	57,200
840721	93.11	92.96	93.22	93.63	57,700
840721	93.15	93.00	93.32	94.08	57,700
840722	93.06	92.89	93.26	93.61	57,800
840722	---	---	---	93.62	57,800

Table 9 (Continued).

Date	TR 1	TR 2	TR 3	TR 4	Mainstem Discharge
840707	---	---	---	93.89	58,800
840707	---	---	---	93.89	58,800
840807	93.75	93.66	94.06	94.18	66,700
840807	93.76	93.68	94.08	94.21	66,700
840624	---	---	---	94.41	70,100
840624	---	---	---	94.75	70,100
840825	---	---	---	96.28	93,300
840825	---	---	---	96.42	93,300

4.0 SUMMARY

The stage, discharge, and channel geometry data presented in this technical memorandum is the result of field investigations conducted from May to October, 1984. During this period, mean daily Susitna River discharge at the USGS Sunshine gaging station (USGS 15292780) ranged from a low of 6,000 cfs in May to a high of 104,000 cfs in August. A review of the hydrograph developed from mean daily discharges recorded at Sunshine for the period of record (Figure 35) shows that daily flow during the 1984 open water field season generally followed previous years trends with the exception that September were somewhat drier than previous years when the monthly means are compared (Table 10).

Based on evaluation of stage data collected at each study site during both the nonbreached and breached hydraulic conditions mainstem discharge was found to influence the hydraulic conditions of each of the Task 36 side channel study sites. At Island, Circular, Sunset, and Trapper Creek Side Channels sufficient data were obtained for the development of rating curves describing the relationship between mainstem discharge and study site water surface elevations during the unbreached hydraulic condition. This portion of the WSEL versus mainstem discharge rating curve is characterized by a regression line having little or no sope over incremental increases of mainstem discharge. Due to limited data, however, this portion of the rating curve has not been firmly established for any of these sites.

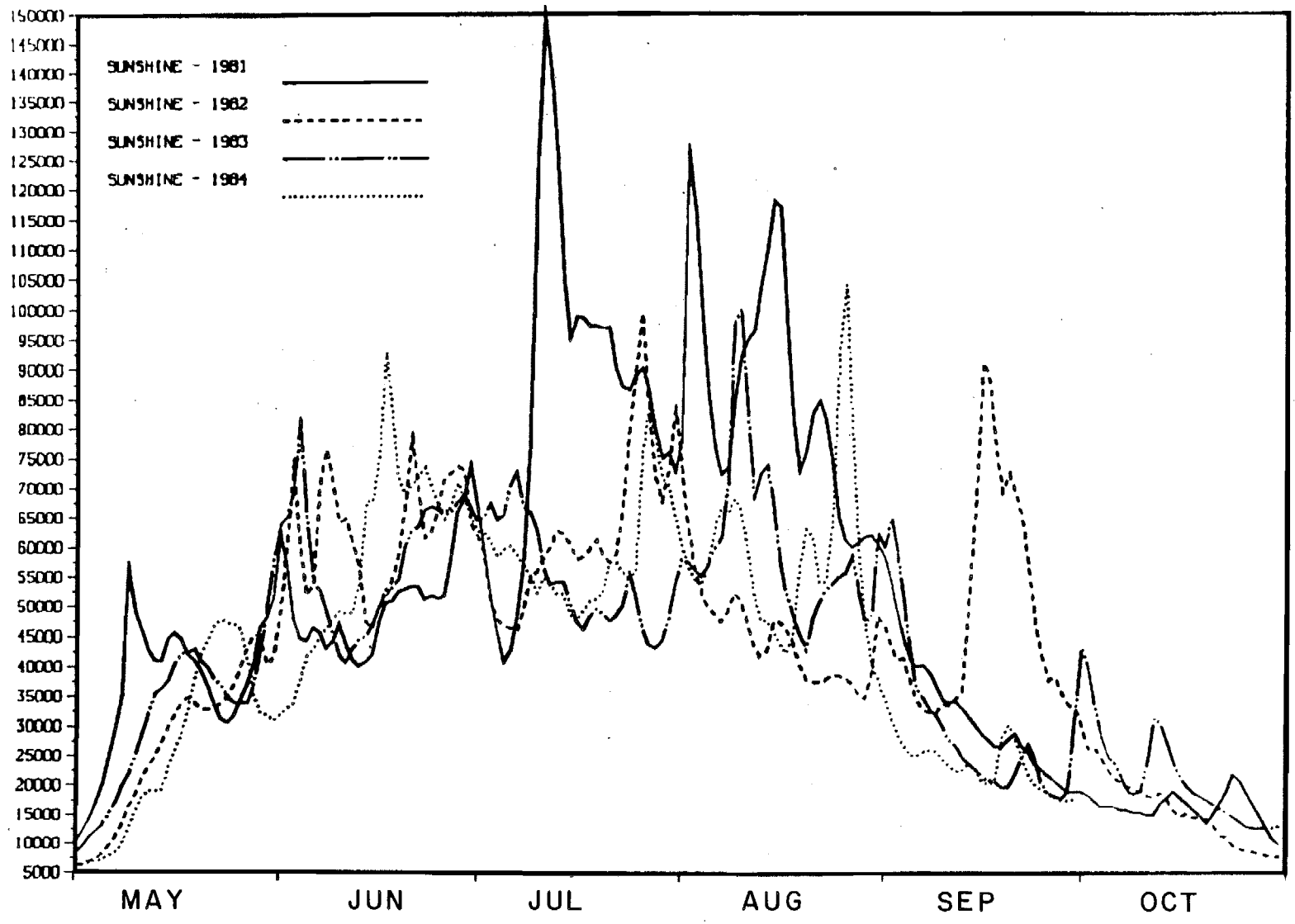


Figure 35. Susitna River hydrograph for May-October 1981,1982, 1983 and 1984 at Sunshine Station (USGS 15292780).

Table 10. Summary of monthly mean, maximum and minimum discharges at Sunshine (USGS 15292780).

		1981	1982	1983	1984*
June	Mean	50,890	62,820	58,100	59,280
	Max	74,000	78,600	80,800	93,000
	Min	40,200	46,400	40,800	32,000
July	Mean	85,600	63,030	55,380	59,140
	Max	150,000	99,300	72,800	84,500
	Min	41,000	46,100	43,500	47,900
Aug	Mean	84,940	45,590	60,580	58,720
	Max	126,000	73,500	100,000	104,000
	Min	60,200	34,900	43,000	38,000
Sept	Mean	32,460	48,830	30,010	23,950
	Max	58,800	91,300	65,200	35,000
	Min	19,000	32,500	18,000	17,400
Oct	Mean	16,450	16,180	21,340	12,350
	Max	22,000	30,600	43,300	18,600
	Min	10,000	7,800	12,800	7,800

* Provisional USGS Data.

The determination of initial breaching discharges for each study site proved to be difficult as only limited observations were available which could be used to determine when study site breaching initially occurred. The range of mainstem discharge which afforded these observations only occurred during a brief period in late August and early September during which time mainstem discharge decreased rapidly. As a result, the initial breaching discharges presented in this memorandum are a compilation of field observations and reviews of available aerial photographs. Aerial photography, however, does not always allow the resolution necessary for determining when the head of a study site is initially breached. A summary of the initial breaching discharges determined for the Task 36 study sites is presented in Table 11.

As progressively higher mainstem discharges overtop the head of the study site, the hydraulic conditions of the study site become controlled by mainstem discharge. The point at which this initially occurs is termed the controlling breaching discharge and is reflected on the WSEL versus mainstem discharge rating curves as a definite change in slope of the regression line. The nonbreached conditions are usually reflected in these curves as having regression lines which are nearly horizontal or in some instances, having a slight slope. Once the hydraulics of the study site become directly controlled by mainstem discharge the slope of the line dramatically by changes due to the influence of mainstem discharge.

Table 11. Initial breaching discharges, controlling discharges and the corresponding streamflows for the 1984 Task 36 study sites.

Location	RM	Initial Breaching Discharge (cfs)	Controlling Mainstem Discharge (cfs)	Estimated Streamflow (cfs)	
				WSEL vs Flow	Flow vs Q_{ms}
Island Side Channel	63.2	34,000	35,000	43.5	68.8
Mainstem West Bank Side Channel	74.4	19,000	19,600	5.7[1]	5.7[1]
Circular Side Channel	75.3	36,000	36,000	26.8	26.8
Sauna Side Channel	79.8	37,000	38,000	22.5	19.8
Sunset Side Channel	86.9	31,000	32,000	45.8	41.1
Trapper Side Channel	91.6	43,000	44,000	31.4[1]	31.4[1]

[1] These stream flow values are actual measurements of discharge and are not estimated values.

In most WSEL versus mainstem discharge rating curves, the lines defining the nonbreached and breached controlled conditions intersect. Several gage sites, however, exhibited a gap in elevation between the nonbreached and controlled conditions. This is speculated to result from changes in channel geometry. A high flow event (104,000 cfs) occurred on August 26 which could have caused such channel movement. Field observations have noted that the character of the side channel morphology (gravel substrate) at each study site is susceptible to movement.

The information derived from the rating curves and the initial breaching information were used to determine the controlling discharges presented in Table 11. The controlling discharges presented in Table 11 are the best determination of the controlling mainstem discharges for sites based on available data collected to date.

Because of the distances between the Sunshine gaging station and certain lower river study sites, a lag time curve was developed to analyze the travel time of a flood wave to move from Sunshine gaging station to the Susitna gaging station. Using this analysis, it was determined that it took 7 hours for the leading edge of a peak event to be experienced at Island Side Channel at a mainstem discharge of approximately 57,000 cfs (Attachment Figure A-1). A further discussion of the lag time curve development is found in Attachment A.

Mainstem discharge was found to influence the extent of backwater found at the Task 36 study sites. Table 12 provides a summary of the extent of backwater as well as the range of mainstem discharges during which backwater was determined to exist. Backwater areas controlled directly by mainstem discharge were found to exist at all sites with the exception of Mainstem West Bank Side Channel and Trapper Side Channel. Field observations, however, show an area of backwater was found to exist in the minor channel of Mainstem West Bank.

Table 12. Summary of the extent of backwater and the corresponding ranges of mainstem discharge.

Location	RM	Extent of Backwater (ft)	Range of Mainstem Discharge (cfs)	Head Condition
Island	63.2	1,100	35,000	Unbreached
Side Channel		1,100	38,000 - 66,700	Breached
Mainstem West Bank Side Channel	74.4	Isolated to minor channel	24,000 - 54,100	Breached
Circular Side Channel	75.3	1,200	55,000 - 66,700	Breached
Sauna Side Channel	79.8	1,400	56,000 - 56,700	Breached
Sunset Side Channel	86.9	1,100	56,000 - 66,700	Breached
Trapper Side Channel	91.6	None	N/A	N/A

5.0 GLOSSARY

Backwater Area - A reach of stream with reduced or no velocity and a rise in stage resulting from a hydraulic or physical barrier. Backwater areas in habitats adjacent to the Susitna River usually are due to an increase in mainstem discharge and occur at the mouth of or within a side channel or slough.

Breaching - The overtopping of the head of a side channel or side slough by the mainstem river.

Controlling Discharge - The mainstem discharge at Sunshine (USGS 15292780) required to breach the upstream end of the side channel or side slough and govern the hydraulic characteristics within a side channel or side slough.

Cross Section Profile - A survey of the vertical section of a channel bottom taken at right angles to a survey line resulting in a ground/streambed profile.

Discharge - Discharge is defined as the volume rate of flow of water passing a specific location at a specific period in time, expressed as cubic feet per second (cfs). For the purpose of this report "discharge" will refer specifically to mainstem flow.

Flow - The movement of a volume of water from place to place. See Discharge and Streamflow.

Gaging Station - A location which has been established for monitoring stage, flow and/or discharge.

Gradient - Rate of change in vertical elevation per unit horizontal distance.

Head - The upstream end or point of origin of a lotic water body.

Initial Breaching Discharge - The mainstem discharge at Gold Creek which represents the initial point when mainstem water begins to enter the head of a side channel/side slough.

Mainstem - Consists of those portions of the Susitna River that normally convey water throughout the year. Both single and multiple channel reaches are included in this habitat category. Groundwater and tributary inflow appear to be inconsequential contributors to the overall characteristics of mainstem habitat. Mainstem habitat is typically characterized by high water velocities and well armored streambeds. Substrates generally consist of boulder and cobble size materials with interstitial spaces filled with a grout-like mixture of small gravels and glacial sands. Suspended sediment concentrations and turbidity are high during summer due to the influence of glacial melt-water. Discharges recede in early fall and the mainstem clears appreciably in October. An ice cover forms on the river in late November or December.

Mean Daily Discharge - The computed mean mainstem discharge per 24 hour period for a USGS gaging station.

Mouth - The downstream confluence of a lotic water body with another water body.

Observed Data - Values derived through a visual estimate or evaluation.

Rating Curve - A curve representing a simple relation between two variables to be used to determine values of the dependent variable as a function of the independent variable. The rating curves developed using project measurements of stage and discharge consist of discharge rating curves and stage rating curves. The discharge rating curves are used to determine streamflow as a function of mainstem discharge and streamflow as a function of water surface elevation. The stage rating curves are used to determine stage, water surface elevation, as a function of mainstem discharge.

Side Channel - Consists of those portions of the Susitna River that normally convey water during the open water season but become appreciably dewatered during periods of low mainstem discharge. Side channels may exist either in well defined overflow channels or in poorly defined water courses flowing through partially submerged gravel bars and islands along the margins of the mainstem river. Side channel streambed elevations are typically lower than the mean monthly water surface elevations of the mainstem Susitna River observed during June, July, and August. Side channels are

characterized by shallower depths, lower velocities and smaller streambed materials than the adjacent mainstem river.

Side Slough - Those channels located between the edge of the floodplain and the mainstem and side channels of the Susitna River. It is usually separated from the mainstem and/or side channels by well vegetated bars. An exposed alluvial berm often separates the head of the slough from mainstem discharge or side channel flows. The controlling streambed/bank elevations at the upstream end of the side sloughs are slightly less than the water surface elevations of the mean monthly discharges of the mainstem Susitna River observed for June, July, and August. At intermediate and low-discharge periods, the side sloughs convey clear water from small tributaries and/or upwelling groundwater. These clear water inflows are essential contributors to the existence of this habitat type. The water surface elevation of the Susitna River generally causes a backwater to extend well up into the slough from its lower end. Even though this substantial backwater exists, the sloughs function hydraulically very much like small stream systems and several hundred feet of the slough channel often conveys water independent of mainstem backwater effects. At high discharges the water surface elevations of the mainstem river is sufficient to overtop the upper end of the slough. Surface water temperatures in the side sloughs during summer months are principally a function of air temperature, solar radiation, and the temperature of the local runoff.

Staff Gage - A non-recording staff, marked in graduations of hundredths of feet, used to monitor stage through observation.

Stage - The height of the water surface above an established datum plane. Stage can be converted to true water surface elevation if the observations are converted into project datum.

Streamflow - Same as discharge but refers specifically to side channel, slough and tributary flow whereas discharge denotes in the mainstem. See Discharge.

Thalweg Profile - A longitudinal profile that describes the streambed elevation of the deepest portion of mainstem, tributary, slough or other riverine habitats.

WSEL - Abbreviation for water surface elevation.

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ATTACHMENT A

TIME LAG ANALYSIS FOR THE LOWER SUSITNA RIVER BASIN

Stage and discharge values in the lower Susitna River can range considerably during a 24 hour period as evidenced by inspection of the Sunshine Station hydrograph (USGS 15292780). This is particularly true for peaking discharge periods resulting from storm events. To develop correlations for rating curves of stage and streamflow data between specific side channels and the mainstem during peaking mainstem discharge events the use of instantaneous mainstem discharge values is necessary.

To obtain instantaneous mainstem discharge values at sites that are some distance downstream from the reference gaging station requires an assessment of the basin lag time. Lag time is the time required for a flood wave to move down a drainage basin from the gaging station to the study site.

To evaluate instantaneous site specific measurements of stage and discharge at study sites during high flow events it is necessary to determine the magnitude of the flood wave and the time of day the wave influenced the site specific measurements. To determine the discharge represented by the flood wave requires an assessment of the velocity (v) of the wave;

$$v = x/t$$

where

x = distance from reference gage to site

t = time required for flood wave to travel from the reference gage to the site.

To assess the velocity of several flood waves, the hydrographs for Sunshine and Susitna Stations were analyzed (USGS 15292780 and 15294350, respectively). Four peak events of varying magnitude that could be clearly distinguished in both hydrographs were selected for analysis. The objective was to determine the time it took for each flood wave to travel the 58.1 miles between gaging stations. The following values were obtained from the USGS (Larry Leveen, pers. comm., 1/31/85).

Date	Type of Event	Sunshine Discharge	Time	Susitna Discharge	Time
July 27	Peak	86,900	0900	135,000	2330
August 19-20	Peak	64,000	2300	150,000	1600
August 26	Peak	114,000	0300	171,000	1400
September 14-15	Peak	24,500	1030	54,500	2400

From these values, flood wave velocities were calculated.

Date	Time (hrs)	Velocity (ft/sec)	Sunshine Q (cfs)
July 27	14.5	5.88	86,900
August 19-20	17.0	5.01	64,000
August 26	11.0	7.75	114,000
September 14-15	37.5	2.27	24,500

A logarithmic regression relationship was developed between flood wave velocity and discharge at Sunshine Station. This equation is as follows:

$V = 10^{-3.086} Q^{0.785}$, $r^2 = 0.996$.

Attachment Table A-1 provides a tabulation of the distance in miles that a flood wave of a given magnitude will travel in a given time interval for the lower Susitna River. Attachment Figure A-1 provides a graphic representation of the data presented in Attachment Table A-1. To determine the instantaneous mainstem discharge occurring at a study site, the following procedure was used:

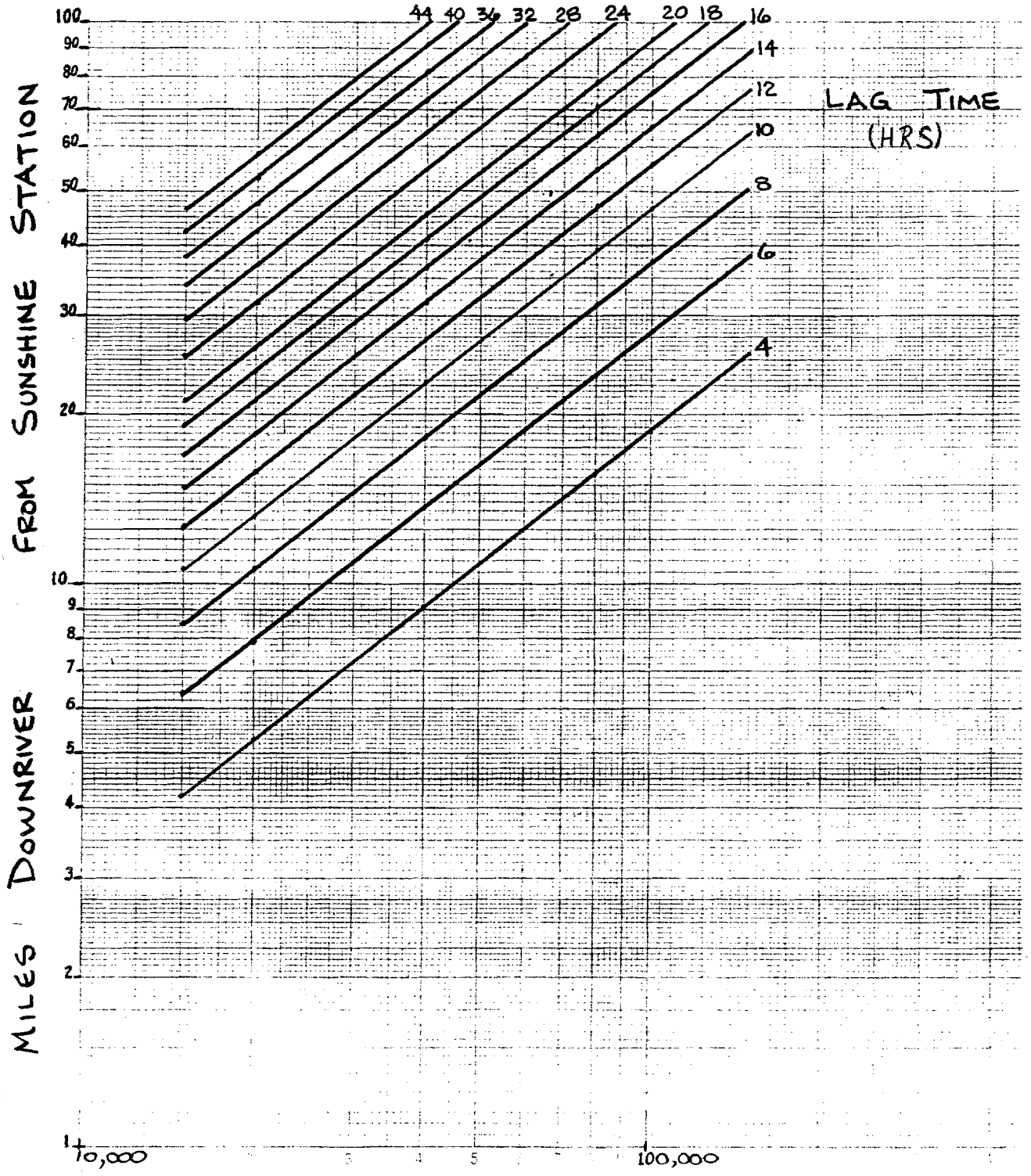
1) the instantaneous mainstem discharge at Sunshine was determined corresponding to the time of day for a site specific stage observation;

2) the distance of the study site from the Sunshine station was determined;

3) the instantaneous mainstem discharge and the distance were plotted in Attachment Figure A-1 to determine the lag time of the flood wave;

Attachment Table A-1. Distance in miles that a flood wave of a given magnitude will travel in a given time.

Lag Time (Hours)	Magnitude of Flood Wave (cfs) 15,000	20,000	30,000	40,000	60,000	80,000	90,000	100,000	150,000
4	4.2	5.3	7.3	9.1	12.5	15.7	17.2	18.7	25.7
6	6.4	7.9	10.8	13.7	18.8	23.5	25.8	28.1	38.6
8	8.5	10.6	14.5	18.2	25.0	31.4	34.4	37.4	51.4
10	10.6	13.2	18.2	22.8	31.3	39.2	43.0	46.8	64.3
12	12.7	15.9	21.8	27.3	37.6	47.1	51.6	56.1	77.1
14	14.9	18.5	25.4	31.9	43.8	54.9	60.3	65.5	90.0
16	17.0	21.2	29.1	36.4	50.1	62.8	68.9	74.8	102.8
18	19.1	23.8	32.7	41.0	56.4	70.6	77.5	84.2	115.7
20	21.2	26.4	36.4	45.6	62.6	78.5	86.1	93.5	128.5
24	25.5	31.7	43.6	54.7	75.1	94.2	103.3	112.2	154.2
28	29.7	37.0	50.9	63.8	87.7	109.9	120.5	130.9	179.9
32	34.0	42.3	58.2	72.9	100.2	125.6	137.7	149.6	205.0
36	38.2	47.6	65.4	82.0	112.7	141.3	154.9	168.3	231.3
40	42.5	52.9	72.7	91.1	125.2	157.0	172.2	187.0	257.1
44	46.7	58.2	80.8	100.2	137.8	172.7	189.4	205.7	282.8



LOWER SUSITNA RIVER BASIN LAG TIMES REFERENCED TO SUNSHINE STATION.

Attachment Figure A-1.

4) the lag time was subtracted from the time of the stage observation to yield the time of day the flow wave was measurd at the Sunshine station. The instantaneous mainstem discharge at Sunshine station for this revised time is the discharge corresponding to the site specific stage measurement.

ATTACHMENT B

Attachment Table B-1. Comparison of water surface elevations and streamflow, measured at Task 36 study sites, to mean daily mainstem discharge (cfs) at Sunshine (USGS 15292780).

Location	Date	Time	WSEL (ft)	Streamflow (cfs)	Mainstem Discharge (cfs)
Island Side Channel TR 1 (Q Site) (063.2S1 at RM 63.2)	840930		90.86		17,800
	840831	1300	91.90		38,000
	840719	1215	93.13		51,600
	840712	1530	93.33	379.0	54,100
	840725	1300	93.33	303.0	53,500[a/]
	840725	2010	93.54		56,100
	840704	1150	93.55		58,600
	840811	1630	93.77	515.0	60,000
	840801	1430	93.73		60,300
	840626	1500	93.95		64,800
	840807	1325	94.17		66,700

a/Discharge value is instantaneous and was determined using a time lag evaluation.

Attachment Table B-1. continued

Location	Date	Time	WSEL (ft)	Streamflow (cfs)	Mainstem Discharge (cfs)
Island Side Channel TR 1A (063.2S7 at RM 63.2)	840930		90.93		17,800
	840919	1200	91.37		28,400
	840901	1330	91.69		35,000
	840831		91.93		38,000
	840725	1745	93.46		56,100
	840725	1940	93.56		56,100
	840801		93.75		60,300
	840807	1325	94.16		66,700

Attachment Table B-1. continued

Location	Date	Time	WSEL (ft)	Streamflow (cfs)	Mainstem Discharge (cfs)
Island Side Channel TR 2 (063.2S2 at RM 63.2)	840930		90.88		17,800
	840919	1210	91.33		28,400
	840901		91.68		35,000
	840831		91.89		38,000
	840725	1710	93.41		56,100
	840725	1935	93.52		56,100
	840801		93.74		60,300
	840807	1325	94.16		66,700

Attachment Table B-1. continued

Location	Date	Time	WSEL (ft)	Streamflow (cfs)	Mainstem Discharge (cfs)
Island Side Channel TR 3 (063.2S3 at RM 63.2)	840930		91.23		17,800
	840901		91.70		35,000
	840831		91.90		38,000
	840725	1550	93.44		56,100
	840725	1500	93.48		56,100
	840725	1900	93.55		56,100
	840801		93.79		60,300
	840807	1325	94.24		66,700

Attachment Table B-1. continued

Location	Date	Time	WSEL (ft)	Streamflow (cfs)	Mainstem Discharge (cfs)
Island Side Channel TR 4 (063.2S4 at RM 63.2)	840930		91.56		17,800
	840901	1500	91.71		35,000
	840831		91.90		38,000
	840725	1850	93.62		56,100
	840801		93.89		60,300
	840807	1325	94.34		66,700

Attachment Table B-1. continued

Location	Date	Time	WSEL (ft)	Streamflow (cfs)	Mainstem Discharge (cfs)
Island Side Channel TR 4A (063.2S8 at RM 63.2)	840930		91.56		17,800
	840901		91.77		35,000
	840831		91.94		38,000
	840725	1400	93.52		56,100
	840725	1830	93.66		56,100
	840801		93.93		60,300
	840807	1325	94.31		66,700

Attachment Table B-1. continued

Location	Date	Time	WSEL (ft)	Streamflow (cfs)	Mainstem Discharge (cfs)
Island Side Channel TR 5 (063.2S5 at RM 63.2)	840930		91.57		17,800
	840927		91.57		18,300
	840915		91.59		22,300
	840901		91.73		35,000
	840831		91.94		38,000
	840725	1300	93.56		56,100
	840801		93.98		60,300
	840807	1325	94.44		66,700

Attachment Table B-1. continued

Location	Date	Time	WSEL (ft)	Streamflow (cfs)	Mainstem Discharge (cfs)
Island Side Channel TR 6 (Q Site) (063.2S6 at RM 63.2)	840930		91.54		17,800
	840927	1400	91.56		18,300
	840915		91.62		22,300
	840901	1300	91.75		35,000
	840831	1230	91.95		38,000
	840719		93.36		51,600
	840712	1130	93.67	394.9	54,100
	840725	1220	93.55	337.7	53,600 a/
	840725	1620	93.61	359.5	54,200 a/
	840725	1915	93.70		56,100
	840704		93.84		58,600
	840811	1150	94.08	543.0	60,000
	840811	1425	94.08		60,000
	840801		94.00		60,300
	840626	1520	94.30		64,800
	840626	1520	94.31		64,800
	840807		94.40		66,700

a/ Discharge value is instantaneous and was determined using a time lag evaluation.

Attachment Table B-1. continued

Location	Date	Time	WSEL (ft)	Streamflow (cfs)	Mainstem Discharge (cfs)
Mainstem W\B S. Chan. TR1 (Q Site) (074.4S1 at RM 74.4)	841010	1430	92.64	.5	14,700
	840925	1005	92.85	5.7	19,600
	840915	1110	93.90	73.1	22,300
	840914		94.12		24,000
	840920	1450	94.62	309.9	30,500
	840902		94.94		32,000
	840902	1231	94.97	449.6	32,000
	840817		95.49		42,500
	840815		95.56		46,000
	840712	1050	95.96	1260.0	54,100
	840711	1130	96.01		55,100
	840711	1130	96.08		55,100
	840724	1600	96.02	1267.0	55,200
	840723	1950	95.98		56,100
	840721		96.02		57,700
	840721		96.03		57,700
	840801		96.22		60,300
	840801		96.24		60,300
	840810	1745	96.49		66,400
	840810	1445	96.54	1910.0	66,400
	840807	1205	96.49		66,700
	840827	1240	97.14		79,700
	840827	1010	97.19	2814.1	79,700

Attachment Table B-1. continued

Location	Date	Time	WSEL (ft)	Streamflow (cfs)	Mainstem Discharge (cfs)
Mainstem West Bank Side Chan. TR 2 (074.4S2 at RM 74.4)	841010		92.63		14,700
	840915		93.74		22,300
	840914		94.13		24,000
	840920	1535	94.64		30,500
	840902		94.98		32,000
	840902	1503	95.00		32,000
	840817		95.60		42,500
	840815		95.64		46,000
	840711	1215	96.06		55,100
	840711	1215	96.09		55,100
	840723	1950	96.02		56,100
	840723	1950	96.07		56,100
	840721		96.09		57,700
	840721		96.14		57,700
	840801		96.31		60,300
	840801		96.32		60,300
	840810	1805	96.54		66,400
	840810	1805	96.62		66,400
	840807	1205	96.51		66,700

Attachment Table B-1. continued

Location	Date	Time	WSEL (ft)	Streamflow (cfs)	Mainstem Discharge (cfs)
Mainstem West Bank Side Chan. TR 2A (074.4S5 at RM 74.4)	840903	1230	94.90		29,000
	840920		94.67		30,500
	840902		94.99		32,000

Attachment Table B-1. continued

Location	Date	Time	WSEL (ft)	Streamflow (cfs)	Mainstem Discharge (cfs)
Mainstem West Bank Side Chan. TR 3 (074.4S3 at RM 74.4)	841010		93.03		14,700
	840915		93.80		22,300
	840914		94.18		24,000
	840903		94.97		29,000
	840920	1323	94.70		30,500
	840902	1604	95.04		32,000
	840902		95.08		32,000
	840815		95.92		46,000
	840711	1300	96.39		55,100
	840723	1950	96.36		56,100
	840721		96.44		57,700
	840801		96.67		60,300
	840810	1805	96.81		66,400
	840810	1805	96.94		66,400
	840807	1205	96.81		66,700

Attachment Table B-1. continued

Location	Date	Time	WSEL (ft)	Streamflow (cfs)	Mainstem Discharge (cfs)
Mainstem West Bank Side Chan. TR 3A (074.4S6 at RM 74.4)	841010		93.05		14,700
	841001	1120	93.37		18,700
	840925	1210	93.51		19,600
	840915		94.04		22,300
	840914		94.44		24,000
	840903	1100	95.21		29,000
	840920	1248	94.93		30,500
	840902	1628	95.29		32,000
	840902		95.32		32,000

Attachment Table B-1. continued

Location	Date	Time	WSEL (ft)	Streamflow (cfs)	Mainstem Discharge (cfs)
Mainstem West Bank Side Chan. TR 3B (074.4S7 at RM 74.4)	840903		95.06		29,000

Attachment Table B-1. continued

Location	Date	Time	WSEL (ft)	Streamflow (cfs)	Mainstem Discharge (cfs)
Mainstem West Bank Side Chan. TR 4 (074.4S4 at RM 74.4)	841010	1430	94.63		14,700
	840914	1145	95.83		24,000
	840903		96.39		29,000
	840920	1239	96.16		30,500
	840902	1845	96.49		32,000
	840902	1715	96.54		32,000
	840817		97.22		42,500
	840815		97.30		46,000
	840711	1400	97.50		55,100
	840711	1400	97.70		55,100
	840723	1950	97.67		56,100
	840721	1215	97.62		57,700
	840801	1601	97.90		60,300
	840810	1810	97.86		66,400
	840810	1810	98.19		66,400
	840807	1205	97.97		66,700

Attachment Table B-1. continued

Location	Date	Time	WSEL (ft)	Streamflow (cfs)	Mainstem Discharge (cfs)
Circular Side Chan. TR 1 (Q Site) (075.3S1 at RM 75.3)	840920	0855	87.87	.5	30,500
	840830	1700	89.10		40,800
	840817	1700	89.25		42,500
	840817	1740	89.28	43.1	42,500
	840803		90.23		54,700
	840803		90.24		54,700
	840724	1855	90.26		55,200
	840724	1855	90.26		55,200
	840724	1140	90.29	204.2	55,200
	840724	1225	90.30	191.0	55,200
	840724	1330	90.30		55,200
	840723		90.31		56,100
	840811	1250	90.81	281.4	60,000
	840706		90.70		60,400
	840706		90.70		60,400
	840706		90.72		60,400
	840824	1235	90.78		64,800
	840824	1235	90.78		64,800
	840626	1045	90.99		64,800
	840626	1045	91.00		64,800
	840807	1245	91.24		66,700
	840827	1800	91.75		79,700
	840827	1615	91.82	745.5	79,700

Attachment Table B-1. continued

Location	Date	Time	WSEL (ft)	Streamflow (cfs)	Mainstem Discharge (cfs)
Circular Side Channel TR 2 (075.3S2 at RM 75.3)	840830		89.27		40,800
	840817		89.27		42,500
	840817	1830	89.30		42,500
	840803		90.21		54,700
	840724	1905	90.26		55,200
	840811	1225	90.77		60,000
	840824	1230	90.80		64,800
	840807	1245	91.19		66,700

Attachment Table B-1. continued

Location	Date	Time	WSEL (ft)	Streamflow (cfs)	Mainstem Discharge (cfs)
Circular Side Channel TR 2A (075.3S6 at RM 75.3)	841010		88.06		14,700
	840903		88.69		29,000
	840920	0930	88.67		30,500
	840902		88.70		32,000
	840830		89.33		40,800
	840817	1940	89.41		42,500
	840803		90.26		54,700
	840724	1905	90.28		55,200
	840724	1600	90.31		55,200
	840824	1230	90.81		64,800
	840807	1245	91.18		66,700

Attachment Table B-1. continued

Location	Date	Time	WSEL (ft)	Streamflow (cfs)	Mainstem Discharge (cfs)
Circular Side Channel TR 3 (075.3S3 at RM 75.3)	840914	1330	89.45		24,000
	840903		89.55		29,000
	840920	0946	89.50		30,500
	840902	1904	89.56		32,000
	840830	1445	90.06		40,800
	840817	1545	90.17		42,500
	840817	1923	90.20		42,500
	840710	1455	90.51		52,500
	840803	1105	90.62		54,700
	840724	1200	90.67		55,200
	840724	1910	90.60		55,200
	840723	1645	90.64		56,100
	840811	1225	91.01		60,000
	840706	1100	90.92		60,400
	840824	1225	91.03		64,800
	840626	1040	91.15		64,800
	840626	1040	91.21		64,800
	840807	1245	91.32		66,700

Attachment Table B-1. continued

Location	Date	Time	WSEL (ft)	Streamflow (cfs)	Mainstem Discharge (cfs)
Circular Side Channel TR 4 (Q Site) (075.3S4 at RM 75.3)	840928	1610	89.54		17,700
	840914		89.72		24,000
	840903		89.85		29,000
	840920	1010	89.77	.5	30,500
	840902		89.84		32,000
	840830		90.40		40,800
	840817		90.57		42,500
	840817	1740	90.60	49.6	42,500
	840710	1415	91.13	150.0	52,500
	840803		91.24		54,700
	840724	1330	91.25	200.2	55,200
	840724	1910	91.26		55,200
	840724	1015	91.29	192.5	55,200
	840724	1105	91.30		55,200
	840723		91.26		56,100
	840811	1220	91.58		60,000
	840811	1105	91.59	295.0	60,000
	840824	1220	91.54		64,800
	840824	1220	91.56		64,800
	840807	1245	91.83		66,700
	840827	1555	92.43		79,700
	840827	1425	92.49	860.0	79,700

Attachment Table B-1. continued

Location	Date	Time	WSEL (ft)	Streamflow (cfs)	Mainstem Discharge (cfs)
Circular Side Channel TR 5 (075.3S5 at RM 75.3)	841010		89.04		14,700
	841009		89.10		15,000
	840928		89.55		17,700
	840914		89.73		24,000
	840903		89.84		29,000
	840920	1020	89.76		30,500
	840724	1500	91.32		55,200
	840724	1915	91.32		55,200

Attachment Table B-1. continued

Location	Date	Time	WSEL (ft)	Streamflow (cfs)	Mainstem Discharge (cfs)
Circular Side Channel Head (075.3H3 at RM 75.3)	840710	1600	91.81		52,500
	840723	1520	92.00		56,100
	840624	1515	92.99		70,100

Attachment Table B-1. continued

Location	Date	Time	WSEL (ft)	Streamflow (cfs)	Mainstem Discharge (cfs)
Sauna Side Channel TR 1	841009		88.75		15,000
(079.8S1 at RM 79.8)	840817	1030	89.15		42,500
	840823	1550	90.63		54,600
	840723		90.70	54.0	56,100
	840723	1300	90.72		56,100
	840802		90.73		56,700

Attachment Table B-1. continued

Location	Date	Time	WSEL (ft)	Streamflow (cfs)	Mainstem Discharge (cfs)
Sauna Side Channel TR 2 (Q Site) (079.8S2 at RM 79.8)	841009		89.00		15,000
	840710	1040	90.24	37.8	52,500
	840823	1500	90.61		54,600
	840723	1200	90.71	52.0	56,100
	840723	1215	90.73	50.0	56,100
	840723	1220	90.73		56,100
	840802	1645	90.75		56,700
	840721	1545	90.91		57,700
	840828	1055	91.09		59,900
	840828	0925	91.13	57.6	59,900
	840706	1515	91.18		60,400
	840810	1350	91.83		66,400
	840810	1255	91.85	67.5	66,400
	840807		91.26		66,700
	840625	1600	91.82		67,100
	840625	1600	91.86		67,100

Attachment Table B-1. continued

Location	Date	Time	WSEL (ft)	Streamflow (cfs)	Mainstem Discharge (cfs)
Sauna Side Channel TR 3 (079.8S3 at RM 79.8)	841009		88.90		15,000
	840823	1510	90.64		54,600
	840723	1540	90.66		56,100
	840723		90.72	55.0	56,100
	840723	1414	90.75		56,100
	840802		90.75		56,700

Attachment Table B-1. continued

Location	Date	Time	WSEL (ft)	Streamflow (cfs)	Mainstem Discharge (cfs)
Sauna Side Channel TR 4 (079.8S4 at RM 79.8)	841009		89.02		15,000
	840928	1045	89.02		17,700
	840914	1700	89.02		24,000
	840830		89.39		40,800
	840817		89.29		42,500
	840823	1510	90.65		54,600
	840723		90.69	45.0	56,100
	840723	1625	90.69		56,100
	840802	1510	90.79		56,700

Attachment Table B-1. continued

Location	Date	Time	WSEL (ft)	Streamflow (cfs)	Mainstem Discharge (cfs)
Sunset Side Channel TR 0 (086.9S0 at RM 86.9)	840929		92.70		17,400
	840822	1600	95.54		54,300
	840803	1535	95.60		54,700
	840723	1230	95.58		56,100
	840722	1225	95.09		57,800
	840722	1650	95.62		57,800
	840808	1655	96.67		65,900
	840807	1450	96.68		66,700

Attachment Table B-1. continued

Location	Date	Time	WSEL (ft)	Streamflow (cfs)	Mainstem Discharge (cfs)
Sunset Side Channel TR 1 (Q Site) (086.9S1 at RM 86.9)	840929	1440	93.27	1.0	17,400
	840930		93.27		17,800
	840916		93.29		21,000
	840912	1305	93.29	1.4	22,700
	840913	1440	93.30		22,700
	840919	0915	93.29		28,400
	840817		94.34	127.0	42,500
	840822	1600	95.53		54,300
	840803	1540	95.58		54,700
	840709	1705	95.59	533.0	55,400
	840709	1200	95.69		55,400
	840723	0940	95.58	446.0	56,100
	840723	1040	95.58		56,100
	840721	1205	95.45		57,700
	840722	1210	95.67	496.0	57,800
	840808	1625	96.63		65,900
	840808	1240	96.67	944.7	65,900
	840807	1450	96.69		66,700
	840825	1500	99.42	3895.0	93,300
	840826	0910	99.88		104,000

Attachment Table B-1. continued

Location	Date	Time	WSEL (ft)	Streamflow (cfs)	Mainstem Discharge (cfs)
Sunset Side Channel TR 2 (086.9S2 at RM 86.9)	840929	1140	93.81		17,400
	840930		93.79		17,800
	840916		93.81		21,000
	840912	1510	93.81		22,700
	840914	1500	93.81		24,000
	840919	0925	93.80		28,400
	840822	1510	95.71		54,300
	840803	1555	95.68		54,700
	840709	1300	95.94		55,400
	840723	1415	95.64		56,100
	840722	1450	95.76		57,800
	840722	1235	95.78		57,800

Attachment Table B-1. continued

Location	Date	Time	WSEL (ft)	Streamflow (cfs)	Mainstem Discharge (cfs)
Sunset Side Channel TR 3 (086.9S3 at RM 86.9)	841005		93.74		16,500
	840930		93.69		17,800
	840916		93.87		21,000
	840912	1510	93.78		22,700
	840914	1525	93.87		24,000
	840919	0939	93.87		28,400
	840817	1530	94.93		42,500
	840816		95.02		44,000
	840822	1440	95.86		54,300
	840803	1450	95.95		54,700
	840709	1415	96.01		55,400
	840723	1210	95.85		56,100
	840722	1950	95.86		57,800
	840722	1315	95.94		57,800
	840808	1655	96.86		65,900
	840807	1450	96.89		66,700

Attachment Table B-1. continued

Location	Date	Time	WSEL (ft)	Streamflow (cfs)	Mainstem Discharge (cfs)
Sunset Side Channel TR 4 (086.9S4 at RM 86.9)	840930		94.11		17,800
	840916		94.11		21,000
	840912	1505	94.29		22,700
	840914	1615	94.31		24,000
	840919	0948	94.31		28,400
	840817	1530	95.01		42,500
	840816		95.10		44,000
	840822		95.93		54,300
	840822	1440	95.93		54,300
	840803	1502	95.92		54,700
	840709	1500	96.08		55,400
	840723	1140	95.95		56,100
	840722	1820	95.96		57,800
	840722	1455	95.98		57,800
	840808	1650	96.89		65,900
	840807	1450	96.96		66,700

Attachment Table B-1. continued

Location	Date	Time	WSEL (ft)	Streamflow (cfs)	Mainstem Discharge (cfs)
Sunset Side Channel TR 5 (086.9S5 at RM 86.9)	841005		94.75		16,500
	840929	1140	94.76		17,400
	840930	1444	94.75		17,800
	840916	1830	94.76		21,000
	840912	1500	94.78		22,700
	840919	1000	94.76		28,400
	840817	1430	95.99		42,500
	840816	1345	96.06		44,000
	840822	1435	96.66		54,300
	840803	1545	96.72		54,700
	840709	1600	96.79		55,400
	840723	1115	96.65		56,100
	840722	1520	96.68		57,800
	840722	1930	96.68		57,800
	840808	1650	97.31		65,900
	840807	1450	97.36		66,700

Attachment Table B-1. continued

Location	Date	Time	WSEL (ft)	Streamflow (cfs)	Mainstem Discharge (cfs)
Sunset Side Channel TR 6 (086.9S6 at RM 86.9)	841005		94.74		16,500
	840929	1140	94.75		17,400
	840930		94.75		17,800
	840916		94.76		21,000
	840919	1030	94.76		28,400
	840902	1520	94.88		32,000
	840817	1330	95.97		42,500
	840816		96.05		44,000
	840822	1435	96.62		54,300
	840803	1545	96.69		54,700
	840722	1830	96.64		57,800
	840722	1605	96.65		57,800
	840808	1650	97.21		65,900
	840807	1450	97.29		66,700

Attachment Table B-1. continued

Location	Date	Time	WSEL (ft)	Streamflow (cfs)	Mainstem Discharge (cfs)
Trapper Creek S/C TR 1 (091.6S2 at RM 91.6)	841006		91.92		15,700
	840930		91.93		17,800
	840924		91.94		20,400
	840917		91.95		20,400
	840918	1710	91.95		20,900
	840913	1000	91.97		22,700
	840816	1735	92.34		44,000
	840822	1210	92.76		54,300
	840803	1600	92.93		54,700
	840819	1110	92.90		57,200
	840721	1650	93.11		57,700
	840721	1510	93.15		57,700
	840722	1135	93.06		57,800
	840807		93.75		66,700
	840807	1255	93.76		66,700

Attachment Table B-1. continued

Location	Date	Time	WSEL (ft)	Streamflow (cfs)	Mainstem Discharge (cfs)
Trapper Creek S/C TR 2 (091.6S3 at RM 91.6)	841006		91.90		15,700
	840930		91.92		17,800
	840917		91.93		20,400
	840924		91.93		20,400
	840918	1635	91.95		20,900
	840913	1000	91.95		22,700
	840816	1715	92.00		44,000
	840822	1210	92.51		54,300
	840803	1600	92.69		54,700
	840819		92.69		57,200
	840721	1445	92.96		57,700
	840721	1710	93.00		57,700
	840722	1135	92.89		57,800
	840807		93.66		66,700
	840807	1255	93.68		66,700

Attachment Table B-1. continued

Location	Date	Time	WSEL (ft)	Streamflow (cfs)	Mainstem Discharge (cfs)
Trapper Creek S/C TR 3 (091.6S4 at RM 91.6)	841009		92.12		15,000
	841006		92.14		15,700
	840930		92.14		17,800
	840924		92.17		20,400
	840917		92.19		20,400
	840918	1600	92.18		20,900
	840913	1000	92.16		22,700
	840911	1510	92.14		23,500
	840816	1625	92.15		44,000
	840822	1205	92.82		54,300
	840803	1600	93.02		54,700
	840819		93.04		57,200
	840721	1220	93.22		57,700
	840721	1530	93.32		57,700
	840722	1135	93.26		57,800
	840807		94.06		66,700
	840807	1255	94.08		66,700

Attachment Table B-1. continued

Location	Date	Time	WSEL (ft)	Streamflow (cfs)	Mainstem Discharge (cfs)
Trapper Creek S/C TR 4 (Q Site) (091.6S1 at RM 91.6)	841009		92.50		15,000
	841006		92.51		15,700
	840930		92.47		17,800
	840917		92.53		20,400
	840924		92.55		20,400
	840918	1625	92.60	15.9	20,900
	840913	1000	92.56	16.4	22,700
	840911	1150	92.56	17.8	23,500
	840911	1400	92.58		23,500
	840816	1445	92.70	31.4	44,000
	840822	0950	93.27		54,300
	840803		93.18		54,700
	840803	1500	93.42		54,700
	840708	1130	93.78	459.0	57,100
	840819		93.23		57,200
	840721	1310	93.63	389.0	57,700
	840721	1530	94.08		57,700
	840722	0935	93.61	372.0	57,800
	840722	1020	93.62		57,800
	840707	1530	93.89		58,800
	840707	1600	93.89		58,800
	840807		94.18		66,700
	840807	1115	94.21	867.8	66,700
	840624	1120	94.41		70,100
	840624	1500	94.75		70,100
	840825	1000	96.28	3158.8	93,300
	840825	1230	96.42		93,300

ATTACHMENT C

Attachment Table C-1. Data used in plotting the thalweg profile of Island Side Channel.

LOCATION OF THALWEG: ISLAND SIDE CHANNEL (RM 63.2)

GAGE NO: 63.2S6B
DATE: 84 09 30

GAGE READING START: DRY END: DRY
TIME(24 HR.) START: 1000 END: 1115

SITE FLOW: 1.0 (cfs)[1/]
USGS DISCHARGE: 17,800 (cfs)[2/]

TBM ID: ADF&G ISLAND TBM RB 1984

STATION (ft)	THALWEG ELEVATION (ft)	WSEL[3/] (ft)	DESCRIPTION
00+00	88.47	90.22	
00+73	90.27	90.73	
01+38	90.30	90.75	
02+34	90.70	90.82	
02+90	89.10	90.86	TRANSECT 1-STAFF GAGE 63.2S1
03+15	87.97	90.89	
03+54	87.30	90.93	TRANSECT 1A-STAFF GAGE 63.2S7
04+22	89.00	90.88	TRANSECT 2-STAFF GAGE 63.2S2
04+90	89.79	90.89	
05+20	90.80	90.87	
05+67	90.30	91.23	TRANSECT 3-STAFF GAGE 63.2S3
06+50	91.40	91.56	TRANSECT 4-STAFF GAGE 63.2S4
07+38	90.91	91.56	TRANSECT 4A-STAFF GAGE 63.2S8
07+97	89.22	91.56	
08+64	88.60	91.57	TRANSECT 5-STAFF GAGE 63.2S5
09+37	88.72	91.55	
10+37	89.02	91.54	TRANSECT 6-STAFF GAGE 63.2S6
11+94	91.22	91.54	
13+15	92.65	DRY	
14+13	92.64	DRY	
15+18	91.07	92.22	

1/ Estimated streamflow at time of the thalweg measurement.

2/ Mean daily mainstem discharge at Sunshine USGS gaging station (15292780) corresponding to date of thalweg measurement.

3/ Water surface elevation determined at each thalweg point during survey of thalweg profile.

Attachment Table C-2. Data used in plotting the thalweg profile of Mainstem West Bank Side Channel (Main Channel).

LOCATION OF THALWEG: MAINSTEM WEST BANK SIDE CHANNEL (MAIN CHANNEL, RM 74.4)

GAGE NO: REMOVED — GAGE READING START: DRY END: DRY

DATE: 84 10 10 — TIME(24 HR.) START: 1235 END: 1415

SITE FLOW: 1.0 (cfs)[1/] — TBM ID: ADF&G MAINSTEM WESTBANK TBM RB 840915

USGS DISCHARGE: 14,700 (cfs)[2/]

STATION (ft)	THALWEG ELEVATION (ft)	WSEL[3/] (ft)	DESCRIPTION
00+00	91.73	92.43	
00+64	91.71	92.44	
01+18	91.59	92.46	
01+46	92.43	92.61	
02+18	91.99	92.62	
03+29	91.10	92.64	TRANSECT 1 STAFF GAGE 74.4S1
03+98	91.25	92.62	
04+95	91.60	92.63	TRANSECT 2 STAFF GAGE 74.4S2
05+74	91.88	92.63	
06+58	92.25	92.62	
07+00	92.50	92.76	
07+38	92.37	92.79	
07+90	92.51	92.78	
08+06	92.78	93.04	
08+64	92.71	93.03	TRANSECT 3 STAFF GAGE 74.4S3
09+07	93.00	93.05	TRANSECT 3A ST. GAGE 74.4S6
09+84	93.08	93.29	
10+44	93.10	93.46	
11+18	93.90	94.10	
11+78	94.12	94.34	
12+19	93.74	94.34	
12+52	94.09	94.32	
12+87	94.52	94.63	TRANSECT 4 STAFF GAGE 74.4S4
13+56	94.90	95.15	
14+17	95.04	95.25	
14+97	94.32	95.28	

1/ Measured streamflow at time of the thalweg measurement.
2/ Mean daily mainstem discharge at Sunshine USGS gaging station (15292780) corresponding to date of thalweg measurement.
3/ Water surface elevation determined at each thalweg point during survey of thalweg profile.

Attachment Table C-3. Data used in plotting the thalweg profile of Mainstem West Bank (East Channel).

LOCATION OF THALWEG: MAINSTEM WESTBANK SIDE CHANNEL (EAST CHANNEL, RM 74.4)

GAGE NO: REMOVED — GAGE READING START: DRY END: DRY

DATE: 84 10 10 — TIME(24 HR.) START: 1235 END: 1415

SITE FLOW: 1.0 (cfs)[1/]
USGS DISCHARGE: 14,700 (cfs)[2/]

TBM ID: ADF&G MAINSTEM WESTBANK TBM RB 840915

STATION (ft)	THALWEG ELEVATION (ft)	WSEL[3/] (ft)	DESCRIPTION
04+95	92.64	DRY	
06+14	93.16	DRY	
07+36	94.50	DRY	TRANSECT 2A STAFF GAGE 74.4S5
07+82	94.63	DRY	
08+33	93.90	DRY	TRANSECT 3
08+56	93.86	DRY	
08+84	93.28	DRY	
09+24	93.90	DRY	TRANSECT 3B STAFF GAGE 74.4S7
09+61	94.60	DRY	
10+19	95.36	DRY	
11+02	97.16	DRY	

1/ Measured streamflow at time of the thalweg measurement.

2/ Mean daily mainstem discharge at Sunshine USGS gaging station (15292780) corresponding to date of thalweg measurement.

3/ Water surface elevation determined at each thalweg point during survey of thalweg profile.

Attachment Table C-4. Data used in plotting the thalweg profile of Circular Side Channel.

LOCATION OF THALWEG: CIRCULAR SIDE CHANNEL (RM 75.3)

GAGE NO: REMOVED
DATE: 84 10 10

GAGE READING START: DRY END: DRY
TIME(24 HR.) START: 0900 END: 1140

SITE FLOW: 0.0 (cfs)[1/]
USGS DISCHARGE: 14,500 (cfs)[2/]

TBM ID: ADF&G CIRCULAR TBM RB 840824

STATION (ft)	THALWEG ELEVATION (ft)	WSEL[3/] (ft)	DESCRIPTION
00+00	82.57	85.52	
00+53	82.52	85.51	
01+54	84.44	85.54	
02+35	83.36	85.52	
04+02	85.17	85.50	
04+50	85.64	85.66	
05+21	86.87	DRY	
06+80	87.15	DRY	
07+26	83.46	87.16	
07+97	85.12	87.16	
08+70	85.10	87.14	
09+39	87.30	DRY	TRANSECT 1 STAFF GAGE 75.3S1
10+34	87.86	DRY	
11+41	88.32	DRY	TRANSECT 2 STAFF GAGE 75.3S2
12+10	87.52	88.06	TRANSECT 2A STAFF GAGE 75.3S6
13+29	87.88	88.08	
13+95	89.30	DRY	TRANSECT 3 STAFF GAGE 75.3S3
14+90	89.48	DRY	
16+33	89.13	DRY	TRANSECT 4 STAFF GAGE 75.3S4
16+70	89.04	DRY	
17+20	88.04	89.04	
18+00	86.90	89.04	TRANSECT 5 STAFF GAGE 75.3S5
19+37	88.61	89.05	
20+65	88.00	89.17	

1/ Measured streamflow at time of the thalweg measurement.

2/ Mean daily mainstem discharge at Sunshine USGS gaging station (15292780) corresponding to date of thalweg measurement.

3/ Water surface elevation determined at each thalweg point during survey of thalweg profile.

Attachment Table C-4 (Continued).

STATION (ft)	THALWEG ELEVATION (ft)	WSEL[1/] (ft)	DESCRIPTION
21+14	88.63	89.14	
21+51	89.35	DRY	
21+82	88.85	89.06	
22+49	88.13	89.07	
22+98	88.62	89.04	
23+34	89.08	DRY	
23+84	88.53	88.93	
24+17	88.93	DRY	
24+70	87.47	88.90	
25+00	86.64	88.90	
25+32	88.84	88.94	
25+95	88.86	DRY	
26+62	88.76	DRY	
27+56	90.06	DRY	

1/ Water surface elevation determined at each thalweg point during survey of thalweg profile.

Attachment Table C-5. Data used in plotting the thalweg profile of Sauna Side Channel.

LOCATION OF THALWEG: SAUNA SIDE CHANNEL (RM 79.8)

GAGE NO: 79.8S2B GAGE READING START: DRY END: DRY

DATE: 84 10 09 TIME(24 HR.) START: 1320 END: 1500

SITE FLOW: 1.0 (cfs)[1/] TBM ID: ADF&G SAUNA TBM LB 840823
USGS DISCHARGE: 15,000 (cfs)[2/]

STATION (ft)	THALWEG ELEVATION (ft)	WSEL[3/] (ft)	DESCRIPTION
00+00	87.49	87.67	
00+79	87.68	87.87	
01+43	84.44	87.84	
02+09	87.43	87.86	
03+05	88.06	88.28	
03+99	88.31	88.51	
05+16	88.60	88.75	TRANSECT 1 STAFF GAGE 79.8S1
06+21	88.70	88.90	
06+99	88.83	89.00	TRANSECT 2 STAFF GAGE 79.8S2
07+68	88.87	89.00	
08+54	84.79	88.99	
09+09	87.48	88.90	TRANSECT 3 STAFF GAGE 79.8S3
09+68	88.57	88.92	
10+27	87.50	89.02	TRANSECT 4 STAFF GAGE 79.8S4
10+80	88.94	89.00	
11+76	89.20	DRY	
12+59	89.74	DRY	
13+25	90.00	DRY	
13+69	88.98	DRY	
14+06	87.01	89.16	
14+28	87.56	89.02	
14+45	90.33	DRY	
14+57	87.79	88.84	JUNCTION WITH SIDE CHANNEL

1/ Estimated streamflow at time of the thalweg measurement.

2/ Mean daily mainstem discharge at Sunshine USGS gaging station (15292780) corresponding to date of thalweg measurement.

3/ Water surface elevation determined at each thalweg point during survey of thalweg profile.

Attachment Table C-6. Data used in plotting the thalweg profile of Sunset Side Channel.

LOCATION OF THALWEG: SUNSET SIDE CHANNEL (RM 86.9)

GAGE NO: 86.9S1C GAGE READING START: 0.47 END: 0.47

DATE: 84 09 29 TIME(24 HR.) START: 1140 END: 1430

SITE FLOW: 1.01 (cfs)[1/] TBM ID: ADF&G SUNSET TBM LB 840822
USGS DISCHARGE: 17,400 (cfs)[2/]

STATION (ft)	THALWEG ELEVATION (ft)	WSEL[3/] (ft)	DESCRIPTION
00+00	91.59	92.08	
00+52	91.99	92.31	
01+41	90.92	92.31	
02+81	91.92	92.29	
03+70	91.98	92.39	
04+43	92.15	92.57	
05+37	91.67	92.61	
06+13	90.65	92.53	
06+95	92.15[4/]	92.58	
07+48	92.30[4/]	92.70	TRANSECT 0-STAFF GAGE 86.9S0
09+12	92.92[4/]	93.18	
09+89	92.60[4/]	93.26	TRANSECT 1-STAFF GAGE 86.9S1
11+34	93.08	93.34	
12+18	93.60[4/]	93.85	
12+39	93.40[4/]	93.79	TRANSECT 2-STAFF GAGE 86.9S2
13+91	92.97	93.85	
15+24	92.01	93.83	TRANSECT 3-STAFF GAGE 86.9S3
15+90	93.60	93.86	
16+45	94.34	94.60	

1/ Measured streamflow at time of the thalweg measurement.

2/ Mean daily mainstem discharge at Sunshine USGS gaging station (15292780) corresponding to date of thalweg measurement.

3/ Water surface elevation determined at each thalweg point during survey of thalweg profile.

4/ Thalweg elevation determined at each thalweg point from cross section profiles from the hydraulic model rather than from the original thalweg survey.

Attachment Table C-6 (Continued).

STATION (ft)	THALWEG ELEVATION (ft)	WSEL[1/] (ft)	DESCRIPTION
17+40	94.20[4/]	94.62	TRANSECT 4-STAFF GAGE 86.9S4
18+06	94.40	94.69	
19+78	92.30	94.71	TRANSECT 5-STAFF GAGE 86.9S5
21+34	92.20	94.72	
22+38	90.60[4/]	94.82	TRANSECT 6-STAFF GAGE 86.9S6
23+72	92.07	94.73	
24+88	93.33	94.73	
25+21	94.57	94.74	
26+45	95.04	95.20	
28+31	95.75	95.91	
29+64	96.32	96.48	

1/ Water surface elevation determined at each thalweg point during survey of thalweg profile.

4/ Thalweg elevation determined at each thalweg point from cross section profiles from the hydraulic model rather than from the original thalweg survey.

Attachment Table C-7. Data used in plotting the thalweg profile of Trapper Creek Side Channel.

LOCATION OF THALWEG: TRAPPER CREEK SIDE CHANNEL (RM 91.6)

GAGE NO: 91.6S1C
DATE: 84 09 13

GAGE READING START: 0.72 END: 0.72
TIME(24 HR.) START: 1000 END: 1224

SITE FLOW: 16.4 (cfs)[1/]
USGS DISCHARGE: 22,700 (cfs)[2/]

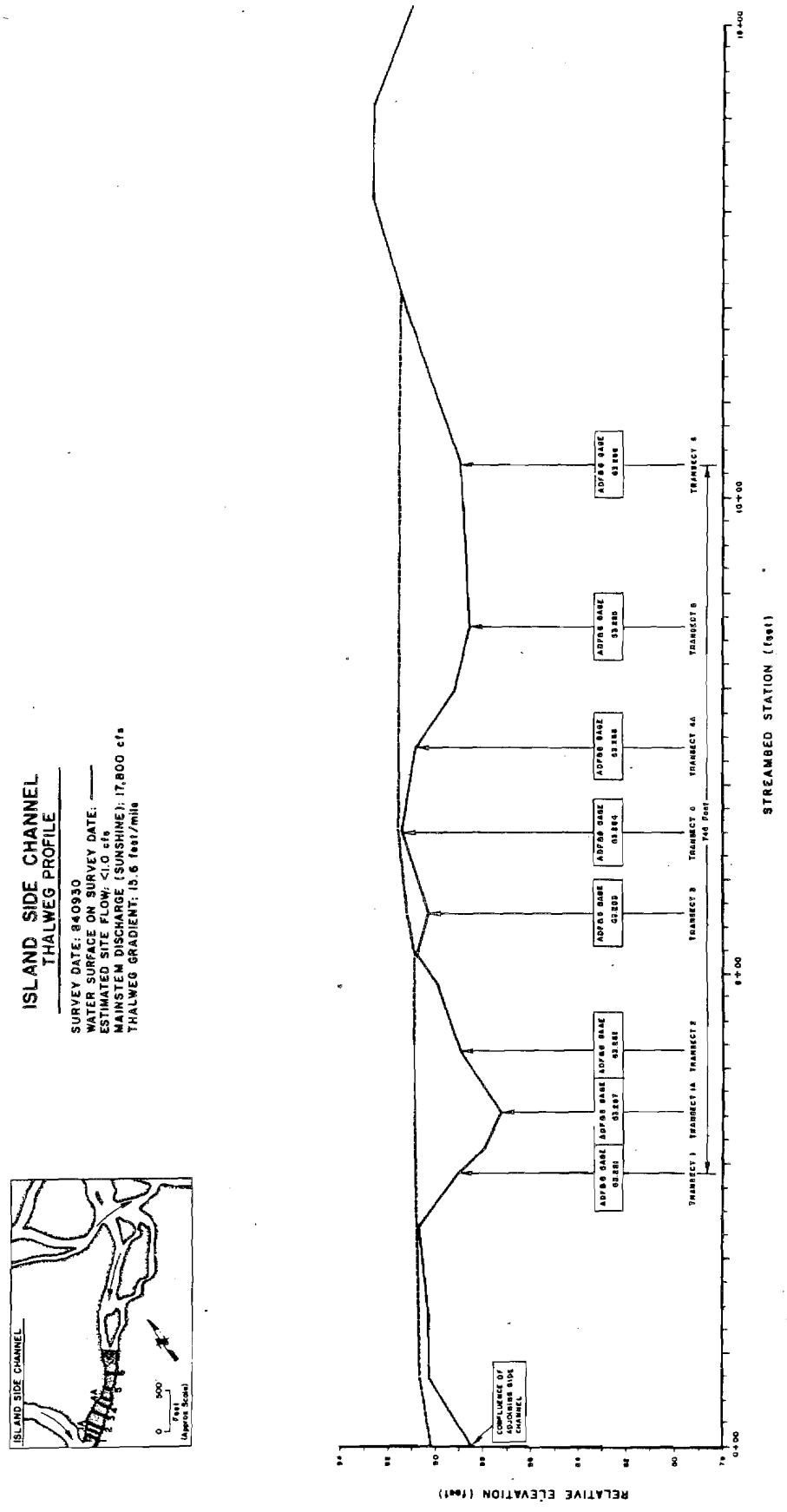
TBM ID: ADF&G TRAPPER TBM RB 840822

STATION (ft)	THALWEG ELEVATION (ft)	WSEL[3/] (ft)	DESCRIPTION
0+00	89.36	90.29	
0+55	90.07	90.62	
1+08	90.61	91.09	
1+66	91.49	91.94	
2+44	90.71	91.96	
3+32	90.39	91.96	
4+10	90.11	91.95	
4+82	89.79	91.96	
5+39	90.00	91.96	TRANSECT 1-STAFF GAGE 91.6S2
6+23	90.21	91.96	
7+23	90.42	91.95	
8+25	90.60	91.98	TRANSECT 2-STAFF GAGE 91.6S3
9+29	90.79	91.98	
10+42	91.47	91.98	
11+42	91.70	92.15	TRANSECT 3-STAFF GAGE 91.6S4
12+08	92.04	92.43	
13+17	91.80	92.54	TRANSECT 4-STAFF GAGE 91.6S1
14+01	92.25	92.62	
15+81	92.98	93.31	

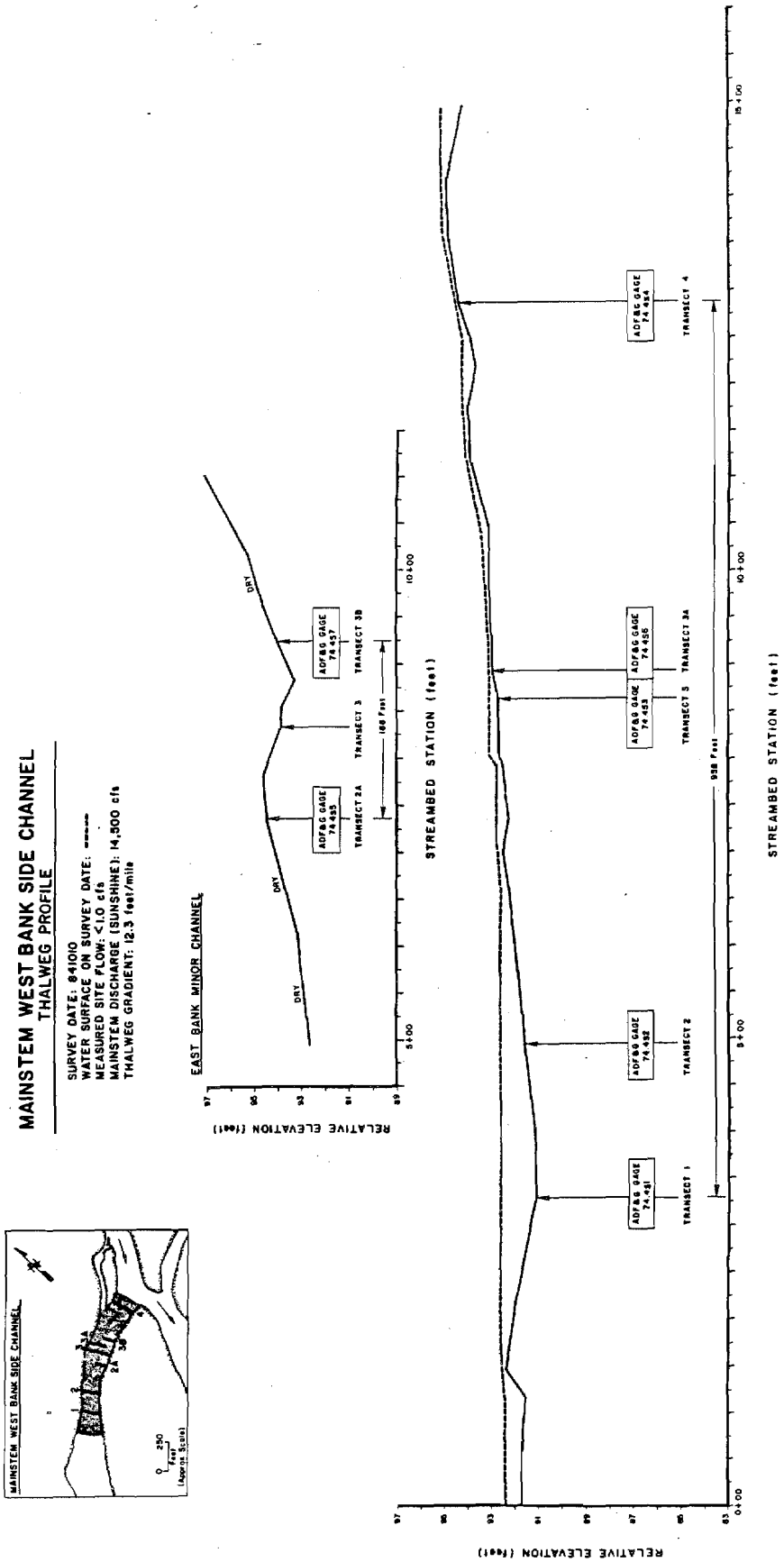
1/ Measured streamflow at time of the thalweg measurement.

2/ Mean daily mainstem discharge at Sunshine USGS gaging station (15292780) corresponding to date of thalweg measurement.

3/ Water surface elevation determined at each thalweg point during survey of thalweg profile.



Attachment Figure C-1 Thalweg profile of Island Side Channel study site.

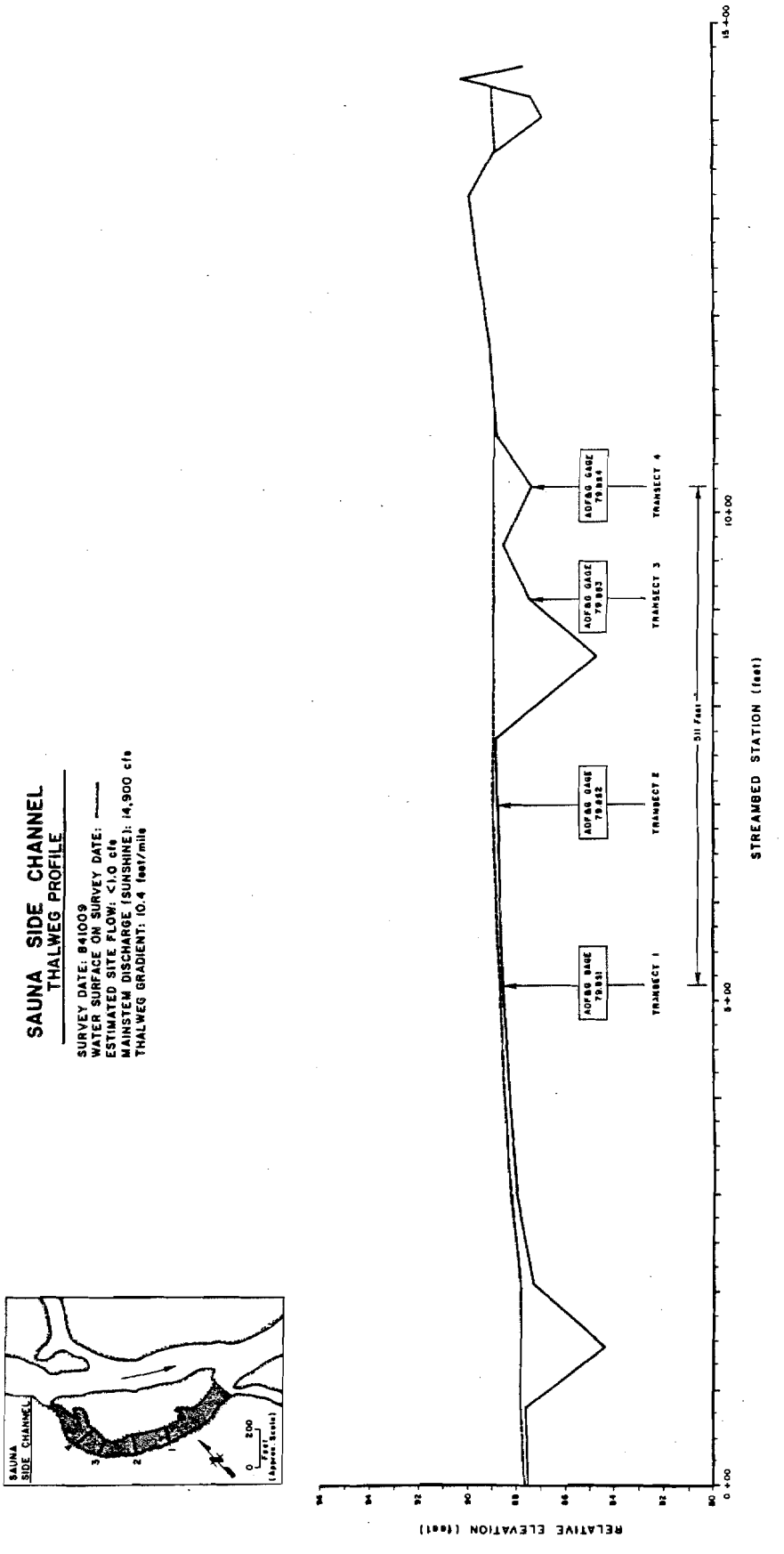


Attachment Figure C- 2 Thalweg profile of Mainstem West Bank Side Channel study site.

CIRCULAR SIDE CHANNEL
THALWEG PROFILE

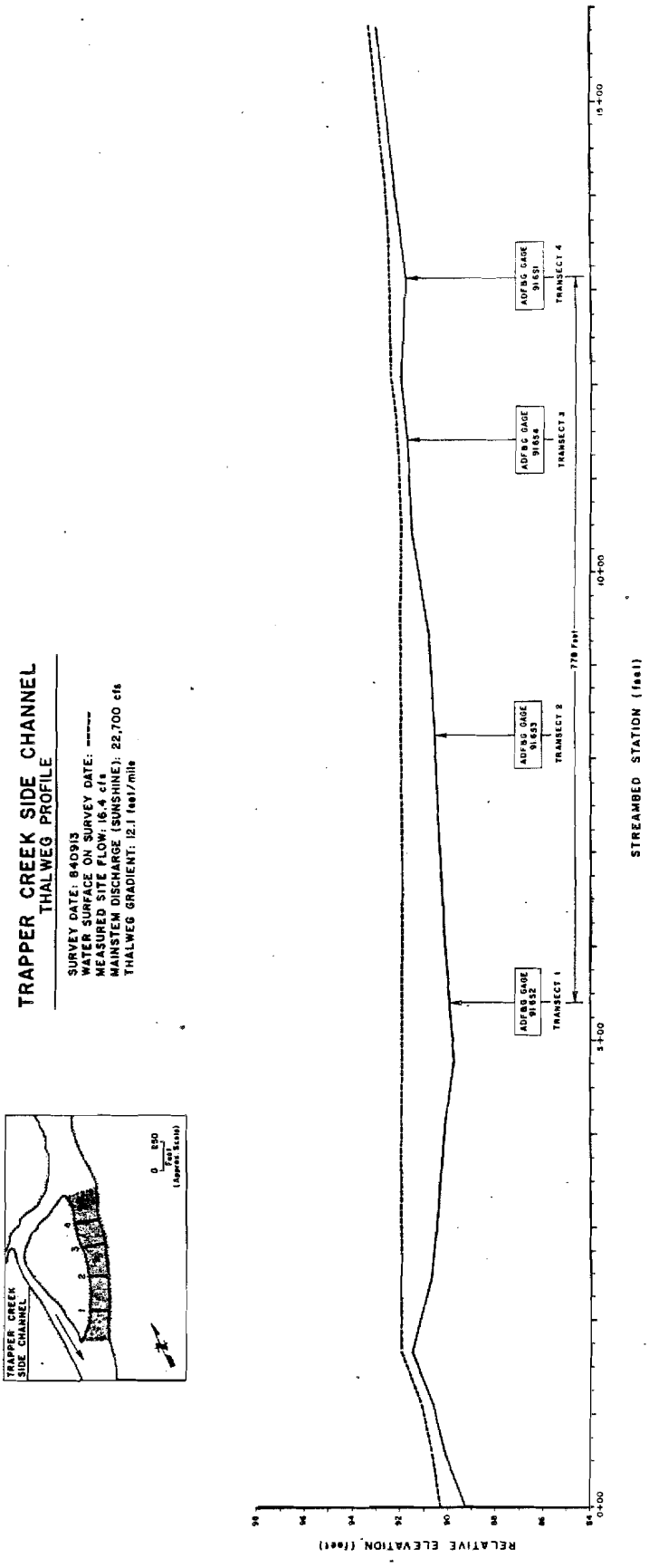
SURVEY DATE: 841010
WATER SURFACE ON SURVEY DATE: ——
MEASURED SITE FLOW: 0.0 cfs
MAINSTEM DISCHARGE (SUNSHINE): 14,500 cfs
THALWEG GRADIENT: 14.3 feet/mile

Attachment Figure C-3 Thalweg profile of Circular Side Channel study site.



Attachment Figure C-4 Thalweg profile of Sauna Side Channel study site.

Attachment Figure C-5 Thalweg profile of Sunset Side Channel study site.



Attachment Figure C-6 Thalweg profile of Trapper Creek Side Channel.

ATTACHMENT D

ATTACHMENT Table D-1 Cross sectional profile data obtained at Island Side Channel transect 1.

LOCATION OF CROSS SECTION: ISLAND SIDE CHANNEL AT TRANSECT 1.

GAGE NO: 63.2S1A

GAGE READING: DRY

DATE: 84 09 01
yr. mo. day

WSEL: 91.69

TIME: 1300

TBM ID ADF&G ISLAND TBM RB 1984 TBM ELEVATION 100.00
LBHP ID ADF&G TR1 LB 840725 LBHP ELEVATION 95.99
RBHP ID ADF&G ISLAND S.C. TR1 RB 840725 RBHP ELEVATION 98.81

STATION	RELATIVE ELEVATION /1	DESCRIPTION
00	96.00	LBHP
00	95.7	GB LBHP /2
02	95.6	
12	95.1	
14	94.8	
16	94.4	
20	94.2	
30	94.2	
40	94.0	
48	93.6	
52	93.8	
54	93.9	
60	93.5	
70	93.3	
80	93.4	
88	93.0	
92	93.0	
102	92.8	
112	92.7	
120	92.4	
126	91.9	
128	91.69	LEFT WATER SURFACE
134	91.0	
138	90.4	
142	90.3	
150	90.7	
156	90.6	
162	90.1	
168	89.1	
172	89.1	
176	89.1	

ATTACHMENT TABLE D-1 continued

180	89.4	
182	89.6	
186	90.6	
187	91.69	RIGHT WATER SURFACE
187.1	95.3	UNDERCUT
192	97.6	
194	98.2	
196.5	98.4	GB RBHP /3
196.5	98.81	RBHP

/1 Elevation relative to 100.00 ft. assigned to the study site TBM.

/2 Ground beside left bank headpin.

/3 Ground beside right bank headpin.

ATTACHMENT Table D-2 Cross sectional profile data obtained at Island Side Channel transect 1A.

LOCATION OF CROSS SECTION: ISLAND SIDE CHANNEL AT TRANSECT 1A.

GAGE NO: 63.2S7B

GAGE READING: 0.75

DATE: 84 09 01
yr. mo. day

WSEL: 91.69

TIME: 1330

TBM ID	ADF&G ISLAND TBM RB 1984	TBM ELEVATION	100.00
LBHP ID	ADF&G TR1A LB 840725	LBHP ELEVATION	96.23
RBHP ID	ADF&G ISLAND S.C. TR1A RB 840725	RBHP ELEVATION	98.74

STATION	RELATIVE ELEVATION /1	DESCRIPTION
00	96.25	LBHP
00	95.9	GB LBHP /2
02	95.9	
10	95.3	
18	94.6	
28	94.3	
32	94.4	
34	94.3	
44	94.3	
50	93.6	
52	93.3	
62	93.1	
68	93.5	
78	93.7	
84	93.6	
86	93.6	
96	93.3	
106	92.9	
116	92.6	
126	92.2	
132	91.9	
134	91.69	LEFT WATER SURFACE
140	91.0	
146	90.5	
150	90.3	
154	90.0	
160	89.8	
164	89.2	
168	88.5	

ATTACHMENT TABLE D-2, continued

170	88.3	
174	87.6	
176	87.3	
180	87.3	
184	87.6	
186	88.1	
188	88.8	
190	89.7	
192	90.7	
193	91.69	RIGHT WATER SURFACE
194	92.1	
196	92.6	
200	93.4	
202	93.6	
204	94.3	
206	94.6	
207	96.6	CUTBANK
210	98.1	
220	98.2	
220.5	98.2	GB RBHP /3
220.5	98.74	RBHP

/1 Elevation relative to 100.00 ft. assigned to the study site TBM.

/2 Ground beside left bank headpin.

/3 Ground beside right bank headpin.

ATTACHMENT Table D-3 Cross sectional profile data obtained at Island Side Channel transect 2.

LOCATION OF CROSS SECTION: ISLAND SIDE CHANNEL AT TRANSECT 2.

GAGE NO: 63.2S2B GAGE READING: 0.46

DATE: 84 09 01 (yr. mo. day) WSEL: 91.70

TIME: 1400

TBM ID ADF&G ISLAND TBM RB 1984 TBM ELEVATION 100.00
LBHP ID ADF&G TR2 LB 840725 LBHP ELEVATION 95.94
RBHP ID ADF&G ISLAND S.C. TR2 RB 840725 RBHP ELEVATION 99.05

STATION	RELATIVE ELEVATION /1	DESCRIPTION
00	95.94	LBHP
00	95.5	GB LBHP /2
02	95.5	
08	95.0	
12	94.1	
14	93.3	
22	93.4	
26	93.5	
36	93.7	
46	93.6	
56	93.7	
66	94.3	
68	94.3	
78	94.1	
88	93.4	
98	93.0	
108	92.8	
118	92.5	
128	92.1	
132	91.8	
134	91.70	LEFT WATER SURFACE
138	91.3	
142	90.7	
146	90.2	
150	90.0	
154	89.7	
160	89.6	
164	89.4	
168	89.0	
172	89.2	

ATTACHMENT TABLE D-3 .continued

176	89.8	
178	90.2	
180	90.8	
183	91.7	RIGHT WATER SURFACE
184	94.9	ROOT MASS
186	96.3	
188	97.5	
190	98.3	
193.2	98.5	GB RBHP /3
193.2	99.05	RBHP

/1 Elevation relative to 100.00 ft. assigned to the study site TBM.

/2 Ground beside left bank headpin.

/3 Ground beside right bank headpin.

ATTACHMENT Table D-4 Cross sectional profile data obtained at Island Side Channel transect 3.

LOCATION OF CROSS SECTION: ISLAND SIDE CHANNEL AT TRANSECT 3.

GAGE NO: 63.2S3B GAGE READING: 0.26

DATE: 84 09 01 WSEL: 91.68
yr. mo. day

TIME: 1430

TBM ID ADF&G ISLAND TBM RB 1984 TBM ELEVATION 100.00
LBHP ID ADF&G TR3 LB 840725 LBHP ELEVATION 96.26
RBHP ID ADF&G ISLAND S.C. TR3 RB 840725 RBHP ELEVATION 99.15

STATION	RELATIVE ELEVATION /1	DESCRIPTION
00	96.26	LBHP
00	95.7	GB LBHP /2
02	95.6	
05	95.3	
06	94.9	
14	94.3	
20	94.3	
30	94.4	
40	94.3	
50	94.3	
58	94.3	
68	93.8	
72	93.7	
82	93.2	
92	93.0	
102	92.9	
112	92.7	
122	92.4	
132	92.0	
141	91.68	LEFT WATER SURFACE
144	91.4	
154	91.2	
160	91.2	
164	91.3	
172	91.4	
182	91.4	
188	90.8	
190	90.3	

ATTACHMENT TABLE D-4 .continued

194	90.5	
196	90.9	
199	91.68	RIGHT WATER SURFACE
200	92.3	
202	94.6	
204	97.6	
208	98.9	GB RBHP /3
208	99.15	RBHP

/1 Elevation relative to 100.00 ft. assigned to the study site TBM.

/2 Ground besides left bank headpin.

/3 Ground besides right bank headpin.

ATTACHMENT Table D-5 Cross sectional profile data obtained at Island Side Channel transect 4.

LOCATION OF CROSS SECTION: ISLAND SIDE CHANNEL TRANSECT 4.

GAGE NO:63.2S4B GAGE READING: 0.29

DATE: 84 01 (yr. day) WSEL: 91.68

TIME: 1500

TBM ID ADF&G ISLAND TBM RB 1984 TBM ELEVATION 100.00
LBHP ID ADF&G TR4 LB 840725 LBHP ELEVATION 97.16
RBHP ID ADF&G ISLAND S.C. TR4 RB 840725 RBHP ELEVATION 100.02

STATION	RELATIVE ELEVATION /1	DESCRIPTION
00	97.17	LBHP
00	96.6	GB LBHP /2
02	96.5	
06	95.5	
16	94.8	
26	94.3	
30	93.6	
36	93.6	
38	93.5	
48	93.1	
50	93.0	
60	92.8	
70	92.5	
80	92.3	
86	92.1	
96	91.9	
100	91.68	LEFT WATER SURFACE
102	91.6	
112	91.6	
122	91.4	
132	91.4	
142	91.7	
145	91.68	RIGHT WATER SURFACE
154	92.2	
160	92.5	
166	92.4	
168	92.1	
176	91.8	
180	91.5	
184	92.0	

ATTACHMENT TABLE D-5 . continued

186	92.5	
188	97.3	
190	97.5	
192	98.6	
196	99.5	
198.2	99.5	GB RBHP /3
198.2	100.01	RBHP

/1 Elevation relative to 100.00 ft. assigned to the study site TBM.

/2 Ground beside left bank headpin.

/3 Ground beside right bank headpin.

ATTACHMENT Table D-6 Cross sectional profile data obtained at Island Side Channel transect 4A.

LOCATION OF CROSS SECTION: ISLAND SIDE CHANNEL AT TRANSECT 4A.

GAGE NO: 63.2S8B

GAGE READING: DRY

DATE: 84 09 19
yr. mo. day

WSEL: 91.56

TIME: 1340

TBM ID ADF&G ISLAND TBM RB 1984 TBM ELEVATION 100.00
LBHP ID ADF&G TR4A LB 840725 LBHP ELEVATION 97.77
RBHP ID ADF&G ISLAND S.C. TR4A RB 840725 RBHP ELEVATION 99.04

STATION	RELATIVE ELEVATION /1	DESCRIPTION
00	97.77	LBHP
00	97.3	GB LBHP /2
05	97.1	TOP LB
11	95.3	BOTTOM LB
14	95.1	
15	95.1	
25	94.1	
28	93.7	
29	93.7	
39	93.1	
49	92.7	
53	92.5	
54	92.4	
64	91.9	
71	91.56	LEFT WATER SURFACE
72	91.5	
76	91.3	
80	91.1	
84	91.0	
88	90.9	
92	90.9	
96	91.0	
100	91.2	
104	91.3	
108	91.3	
112	91.0	
114	91.1	
118	91.0	
122	91.0	
126	91.2	

ATTACHMENT TABLE D-6 . continued

130	91.3	
133.5	91.56	RIGHT WATER SURFACE
144	91.9	
146	92.5	
147	92.8	
152	93.8	
162	93.6	
172	93.5	
176	93.0	
178	93.3	BOTTOM RB
184	94.9	TOP RB
194	94.8	
200	95.2	
201	95.2	
215	98.0	
217	98.4	GB RBHP /3
217	99.04	RBHP

/1 Elevation relative to 100.00 ft. assigned to the study site TBM.

/2 Ground beside left bank headpin.

/3 Ground beside right bank headpin.

ATTACHMENT Table D-7 Cross sectional profile data obtained at Island Side Channel transect 5.

LOCATION OF CROSS SECTION: ISLAND SIDE CHANNEL TRANSECT 5.

GAGE NO: 63.2S5B

GAGE READING: DRY

DATE: 84 09 19
yr. mo. day

WSEL: 91.57

TIME: 1400

TBM ID ADF&G ISLAND TBM RB 1984 TBM ELEVATION 100.00
LBHP ID ADF&G TR 5 LB 840725 LBHP ELEVATION 96.82
RBHP ID ADF&G ISLAND S.C. TR 5 RB 840725 RBHP ELEVATION 99.68

STATION	RELATIVE ELEVATION /1	DESCRIPTION
00	96.82	LBHP
00	96.3	GB LBHP /2
10	96.0	
16	96.0	TOP LB
19	95.0	
22	93.8	
23	93.6	
24	93.5	
25	93.5	
35	92.6	
45	91.8	
50	91.57	LEFT WATER SURFACE
54	91.2	
58	91.1	
62	90.9	
66	90.7	
70	90.4	
74	90.1	
78	89.8	
82	89.7	
86	89.4	
90	88.9	
94	88.6	
98	89.0	
102	89.3	
106	90.0	
110	90.9	
112.5	91.57	RIGHT WATER SURFACE
113	91.7	

ATTACHMENT TABLE D-7 . continued

117	92.9	
118	93.2	
119	93.7	BOTTOM RB
125	98.6	TOP RB
133	99.1	GB RBHP /3
133	99.69	RBHP

/1 Elevation relative to 100.00 ft. assigned to the study site TBM.

/2 Ground beside left bank headpin.

/3 Ground beside right bank headpin.

ATTACHMENT Table D-8 Cross sectional profile data obtained at Island Side Channel transect 6.

LOCATION OF CROSS SECTION: ISLAND SIDE CHANNEL AT TRANSECT 6.

GAGE NO: 63.2S6B

GAGE READING: DRY

DATE: 84 09 19
yr. mo. day

WSEL: 91.57

TIME: 1425

TBM ID ADF&G ISLAND TBM RB 1984 TBM ELEVATION 100.00
LBHP ID ADF&G TR 6 LB 840725 LBHP ELEVATION 97.25
RBHP ID ADF&G ISLAND S.C. TR 6 RB 840725 RBHP ELEVATION 99.41

STATION	RELATIVE ELEVATION /1	DESCRIPTION
00	97.25	LBHP
00	96.4	GB LBHP /2
10	96.3	
20	95.9	
26	95.6	
27	95.5	
28	95.7	
29	95.8	
34	95.0	
35	94.9	
45	94.3	
55	93.7	
56	93.5	
66	92.9	
76	92.4	
86	92.3	
96	91.9	
97	91.8	
102	91.59	LEFT WATER SURFACE
104	91.4	
108	91.1	
112	90.6	
116	90.0	
120	89.3	
124	89.1	
125	89.2	
128	89.0	
132	89.3	
136	89.8	

ATTACHMENT TABLE D-8. continued

140	90.7	
143	91.54	RIGHT WATER SUFACE
144	91.9	
148	93.7	BOTTOM RB
152	98.5	TOP RB
161	98.8	GB RBHP /3
161	99.42	RBHP

/1 Elevation relative to 100.00 ft. assigned to the study site TBM.

/2 Ground beside left bank headpin.

/3 Ground beside right bank headpin.

ATTACHMENT Table D-9 Cross sectional profile data obtained at Mainstem West Bank Side Channel transect 1.

LOCATION OF CROSS SECTION: MAINSTEM WEST BANK AT TRANSECT 1.

GAGE NO: 74.4S1C GAGE READING: 1.50

DATE: 84 09 02 (yr. mo. day) WSEL: 94.96

TIME: 1230

TBM ID ADF&G MAINSTEM W/B TBM RB 840915 TBM ELEVATION 100.00
LBHP ID REBAR LBHP ELEVATION 99.47
RBHP ID ADF&G 74.4S1 TR1 RB 840711 RBHP ELEVATION 99.96

STATION	RELATIVE ELEVATION /1	DESCRIPTION
00	99.47	LBHP
00	99.3	GB LBHP /2
01	99.0	
03	98.2	
05	98.4	
06	97.9	
08	96.9	
10	96.0	
12	94.93	LEFT WATER SURFACE
16	94.2	
20	93.8	
23	93.2	
26	92.8	
28	92.2	
32	91.8	
37	91.5	
47	91.1	
57	91.5	
67	92.0	
77	92.2	
87	92.3	
97	92.4	
107	92.4	
114	92.6	
124	93.1	
132	93.7	
136	94.0	
142	94.5	

ATTACHMENT TABLE D-9 . continued

147	94.6	
152.5	94.93	RIGHT WATER SURFACE
157	95.1	
167	95.5	
171	95.6	
175	96.0	
178	96.1	
186	96.7	
193	97.5	
200	97.8	
206	98.4	HIGH WATER MARK
211	99.0	
217	98.5	
219	98.0	
221	97.7	
226	98.2	
233	98.6	
235	99.7	
236	99.7	GB RBHP /3
236	99.97	RBHP

/1 Elevation relative to 100.00 ft. assigned to the study site TBM.

/2 Ground beside left bank headpin.

/3 Ground beside right bank headpin.

ATTACHMENT Table D-10 Cross sectional profile data obtained at Mainstem West Bank Side Channel transect 2.

LOCATION OF CROSS SECTION: MAINSTEM WEST BANK AT TRANSECT 2.

GAGE NO: 74.4S2C GAGE READING: 1.46

DATE: 84 09 02 WSEL: 94.99
yr. mo. day

TIME: 1500

TBM ID ADF&G MAINSTEM W/B TBM RB 840915 TBM ELEVATION 100.00
LBHP ID REBAR LBHP ELEVATION 100.65
RBHP ID ADF&G 74.4S2 TR2 RB 840711 RBHP ELEVATION 100.03

STATION	RELATIVE ELEVATION /1	DESCRIPTION
00	100.65	LBHP
00	100.3	GB LBHP /2
01	100.3	
03	99.3	
04	98.7	
05	95.6	
08	94.97	LEFT WATER SURFACE
12	94.4	
19	93.8	
27	93.3	
37	92.4	
47	91.6	
57	91.7	
67	92.0	
77	92.5	
87	92.6	
97	92.8	
107	92.7	
117	93.1	
127	94.0	
137	94.7	
142.5	94.97	RIGHT WATER SURFACE
147	95.2	
157	96.0	
167	96.7	
171	96.9	
173	97.1	

ATTACHMENT TABLE D-10. continued

180	97.8	
187	98.3	
192	98.5	HIGH WATER MARK
197	99.1	
200	98.6	
204	98.2	
212	98.9	
216	99.8	
217	99.9	GB RBHP /3
217	100.04	RBHP TR 2

/1 Elevation relative to 100.00 ft. assigned to the study site TBM.

/2 Ground beside left bank headpin.

/3 Ground beside right bank headpin.

ATTACHMENT Table D-11 Cross sectional profile data obtained at Mainstem West Bank Side Channel transect 2A.

LOCATION OF CROSS SECTION: MAINSTEM WEST BANK AT TRANSECT 2A.

GAGE NO: 74.4S5C GAGE READING: 0.56

DATE: 84 09 03 (yr. mo. day) WSEL: 94.90

TIME: 1230

TBM ID ADF&G MAINSTEM W/B TBM RB 840915 TBM ELEVATION 100.00
LBHP ID REBAR LBHP ELEVATION 96.53
RBHP ID REBAR RBHP ELEVATION 99.38

STATION	RELATIVE ELEVATION /1	DESCRIPTION
00	96.53	LBHP
00	96.1	GB LBHP /21
01	96.1	
04	96.1	
08	95.9	
18	95.5	
28	95.4	
34	94.85	LEFT WATER SURFACE
36	94.7	
38	94.5	
40	94.5	
42	94.5	
44	94.5	
46	94.6	
48	94.6	
50	94.9	RIGHT WATER SURFACE
60	95.5	
70	95.3	
80	95.9	
88	96.4	
89	96.5	
90	96.6	
94	98.4	
96	98.5	
99	99.1	GB RBHP /3
99	99.37	RBHP

/1 Elevation relative to 100.00 ft. assigned to the study site TBM.

/2 Ground beside left bank headpin.

/3 Ground beside right bank headpin.

ATTACHMENT Table D-12 Cross sectional profile data obtained at Mainstem West Bank Side Channel transect 3.

LOCATION OF CROSS SECTION: MAINSTEM WEST BANK AT TRANSECT 3.

GAGE NO: 74.4S3C

GAGE READING: 1.50

DATE: 84 09 02
yr. mo. day

WSEL: 95.18

TIME: 1600

TBM ID ADF&G MAINSTEM W/B TBM RB 840915 TBM ELEVATION 100.00
LBHP ID REBAR LBHP ELEVATION 101.16
RBHP ID ADF&G 74.4S3 TR3 RB 840711 RBHP ELEVATION 101.03

STATION	RELATIVE ELEVATION /1	DESCRIPTION
00	101.16	LBHP
00	100.9	GB LBHP /2
01	100.8	
03	101.2	TOP LB
04	97.6	
07	97.3	
08	96.5	
11	95.18	LEFT WATER SURFACE
15	94.4	
18	93.8	
25	93.1	
32	93.1	
42	92.7	
52	92.8	
62	92.9	
72	93.3	
82	93.7	
92	94.7	
98	95.18	RIGHT WATER SURFACE
102	95.5	
112	96.1	
122	96.3	
126	96.4	
134	96.6	
138	96.99	MIDDLE, GRAVEL BAR
140	96.7	
150	96.5	
160	96.5	
165	96.7	

ATTACHMENT TABLE D-12. continued

170	96.3	
171	96.2	
181	95.5	
191	94.89	LEFT WATER SURFACE
201	94.4	
211	93.9	
217	94.3	
219	94.9	RIGHT WATER SURF. BOTTOM RB
220	99.5	
225	100.6	
229	100.9	
229.5	101.0	GB RBHP /3
229.5	101.04	RBHP

/1 Elevation relative to 100.00 ft. assigned to the study site TBM.

/2 Ground beside left bank headpin.

/3 Ground beside right bank headpin.

ATTACHMENT Table D-13 Cross ... obtained from Task 3. ...984 field season.
Mainstem ...
3A.

LOCATION OF CROSS SECTION: MAINSTEM WEST BANK AT TRANSECT 3A.

GAGE NO: 74.4S6C GAGE READING: 1.82

DATE: 84 09 03 WSEL: 95.20
yr. mo. day

TIME: 1100

TBM ID ADF&G MAINSTEM W/B TBM RB 840915 TBM ELEVATION 100.00
LBHP ID REBAR LBHP ELEVATION 101.15
RBHP ID NO REBAR RBHP ELEVATION 96.92

STATION	RELATIVE ELEVATION /1	DESCRIPTION
00	101.15	LBHP
00	100.8	GB LBHP /2
01	100.7	
03	100.4	
04	97.7	
05	98.6	
08	98.1	
10	96.9	
11	95.8	
12	95.09	LEFT WATER SURFACE
14	94.2	
24	94.0	
25	93.4	
26	93.4	
32	93.2	
35	93.3	
40	93.3	
50	93.2	
60	93.0	
66	93.0	
76	93.2	
86	93.8	
96	94.8	
100.5	95.2	RIGHT WATER SURFACE
110	95.8	
120	96.2	
130	96.4	
140	96.6	
145	96.7	
146	96.8	GB RBHP /3
146	96.93	RBHP

/1 Elevation relative to 100.00 ft. assigned to the study site TBM.

/2 Ground beside left bank headpin.

/3 Ground beside right bank headpin.

ATTACHMENT Table D-14 Cross sectional profile data obtained at Mainstem West Bank Side Channel transect 3B.

LOCATION OF CROSS SECTION: MAINSTEM WEST BANK AT TRANSECT 3B.

GAGE NO: 74.4S7C GAGE READING: 1.20

DATE: 84 09 03 WSEL: 95.06
yr. mo. day

TIME: 1220

TBM ID ADF&G MAINSTEM W/B TBM RB 840915 TBM ELEVATION 100.00
LBHP ID REBAR LBHP ELEVATION 97.91
RBHP ID REBAR RBHP ELEVATION 102.02

STATION	RELATIVE ELEVATION /1	DESCRIPTION
00	97.91	LBHP
00	97.6	GB LBHP /2
01	97.5	
08	97.2	
11	97.0	
19	97.1	
20	97.0	
30	96.7	
40	95.9	
46	95.4	
49	94.84	LEFT WATER SURFACE
51	94.6	
53	94.3	
55	94.1	
57	93.9	
59	94.0	
61	94.4	
62	94.5	RIGHT WATER SURFACE
66	101.0	
67.5	101.6	GB RBHP /3
67.5	102.02	RBHP

/1 Elevation relative to 100.00 ft. assigned to the study site TBM.

/2 Ground beside left bank headpin.

/3 Ground beside right bank headpin.

ATTACHMENT Table D-15 Cross sectional profile data obtained at Mainstem West Bank Side Channel transect 4.

LOCATION OF CROSS SECTION: MAINSTEM WEST BANK AT TRANSECT 4.

GAGE NO: 74.4S4C GAGE READING: 0.83

DATE: 84 09 02 (yr. mo. day) WSEL: 96.53

TIME: 1715

TBM ID ADF&G MAINSTEM W/B TBM RB 840915 TBM ELEVATION 100.00
LBHP ID REBAR LBHP ELEVATION 100.03
RBHP ID ADF&G 74.4S4 TR4 RB 840711 RBHP ELEVATION 100.99

STATION	RELATIVE ELEVATION /1	DESCRIPTION
00	100.03	LBHP
00	99.7	GB LBHP /2
01	99.7	
06	99.5	
10	99.1	
20	98.8	
30	98.5	
33	98.3	TOP LB
35	96.7	
35.5	96.44	LEFT WATER SURFACE
38	95.3	
41	95.0	
51	94.7	
61	94.7	
71	95.0	
81	95.0	
91	95.0	
101	95.1	
111	95.4	
121	95.6	
131	95.7	
141	95.9	
144	96.1	
148	96.0	
156	96.3	
161	96.1	
163	96.2	
168.5	96.5	RIGHT WATER SURFACE

ATTACHMENT TABLE D-15. continued

173	96.9	
183	97.0	
193	96.8	
203	97.1	
213	97.4	
223	97.6	
233	98.3	
237	98.3	
246	98.5	
248	98.3	
252	98.2	
254	97.3	
256	96.9	
261	96.8	
265	98.6	
268	98.7	
269	99.2	
271	99.5	
278	99.4	
286	99.3	
288	99.3	
297	99.1	
313	98.8	
331	100.9	GB RBHP /3
331	100.99	RBHP

/1 Elevation relative to 100.00 ft. assigned to the study site TBM.

/2 Ground beside left bank headpin.

/3 Ground beside right bank headpin.

ATTACHMENT Table D-16 Cross sectional profile data obtained at Circular Side Channel transect 1.

LOCATION OF CROSS SECTION: CIRCULAR SIDE CHANNEL AT TRANSECT 1.

GAGE NO: 75.3S1 GAGE READING: NO READING TAKEN

DATE: 84 09 05 (yr. mo. day) WSEL: 87.67

TIME: 0900

TBM ID ADF&G CIRCULAR TBM RB 840824 TBM ELEVATION 100.00
LBHP ID ADF&G TR1 LB 840724 LBHP ELEVATION 94.06
RBHP ID ADF&G CIRCULAR S.C. TR1 RB 1984 RBHP ELEVATION 94.06

STATION	RELATIVE ELEVATION /1	DESCRIPTION
00	94.06	LBHP
00	93.7	GB LBHP /2
07	94.1	
13	91.7	
15	91.3	
26	91.0	
36	90.5	
46	89.9	
56	89.3	
63	88.9	
72	88.4	
74	88.3	
84	87.9	
94	87.6	
101	87.64	LEFT WATER SURFACE
104	87.6	
114	87.4	
124	87.3	
134	87.5	
142	87.69	RIGHT WATER SURFACE
146	88.1	
150	89.2	
154	89.6	
156	90.2	
159	91.8	
160.6	93.7	GB RBHP /3
160.6	94.06	RBHP

/1 Elevation relative to 100.00 ft. assigned to the study site TBM.

/2 Ground beside left bank headpin.

/3 Ground beside right bank headpin.

ATTACHMENT Table D-17 Cross sectional profile data obtained at Circular Side Channel transect 2.

LOCATION OF CROSS SECTION: CIRCULAR SIDE CHANNEL AT TRANSECT 2.

GAGE NO: 75.3S2 GAGE READING: NO READING TAKEN

DATE: 84 09 05 WSEL: 88.45
yr. mo. day

TIME: 0930

TBM ID ADF&G CIRCULAR TBM RB 840824 TBM ELEVATION 100.00
LBHP ID ADF&G TR2 LB 840724 LBHP ELEVATION 96.50
RBHP ID ADF&G CIRCULAR S.C. TR2 RB 840724 RBHP ELEVATION 99.66

STATION	RELATIVE ELEVATION /1	DESCRIPTION
00	96.50	LBHP
00	96.1	GB LBHP /2
04	95.9	TOP LB
10	90.8	BOTTOM LB
13	89.6	
23	89.3	
24	89.4	
34	89.5	
44	89.5	
54	89.6	
64	89.9	
70	89.7	
71	89.6	
81	89.5	
90	89.3	
91	89.3	
101	88.8	
111	88.5	
114	88.45	LEFT WATER SURFACE
124	88.4	
126	88.3	
131	88.5	RIGHT WATER SURFACE
136	88.7	
145	88.7	

ATTACHMENT TABLE D-17. continued

146	88.6	
153	88.8	
154	89.0	
158	90.8	BOTTOM RB
159	93.3	
166	99.0	TOP RB
169	99.2	GB RBHP /3
169	99.66	RBHP

/1 Elevation relative to 100.00 ft. assigned to the study site TBM.

/2 Ground beside left bank headpin.

/3 Ground beside right bank headpin.

ATTACHMENT Table D-18 Cross sectional profile data obtained at Circular Side Channel transect 2A.

LOCATION OF CROSS SECTION: CIRCULAR SIDE CHANNEL AT TRANSECT 2A.

GAGE NO: 75.3S6 GAGE READING: NO READING TAKEN

DATE: 84 09 05 (yr. mo. day) WSEL: 88.65

TIME: 1000

TBM ID ADF&G CIRCULAR TBM RB 840824 TBM ELEVATION 100.00
LBHP ID ADF&G TR2A LB 840724 LBHP ELEVATION 99.46
RBHP ID ADF&G CIRCULAR S.C.TR2A RB 840724 RBHP ELEVATION 99.68

STATION	RELATIVE ELEVATION /1	DESCRIPTION
00	99.46	LBHP
00	98.9	GB LBHP /2
07	98.3	TOP LB
12	94.6	
14	90.2	BOTTOM LB UNDERCUT
16	89.5	INUNDATED LOGS
17	89.02	LEFT WATER SURFACE
19	88.6	
20	88.7	
25	89.02	RIGHT WATER SURFACE
27	89.1	
28	89.3	
38	89.2	
45	89.9	
56	89.9	
57	90.0	
67	90.5	
77	90.3	
87	90.3	
97	90.2	
107	90.3	
113	90.3	
114	90.2	
124	90.0	
125	90.0	
135	89.3	
137	89.1	
148	88.65	LEFT WATER SURF. MAIN CHANNEL
149	88.4	

ATTACHMENT TABLE D-18. continued

159	87.6	
169	88.6	
170	88.65	RIGHT WATER SURF. MAIN CHANNEL
172	88.8	
173	89.1	
175	89.6	
176	89.8	
181	92.6	
184	94.2	
187	95.5	BOTTOM OF CUT BANK
188	98.2	
190	99.2	TOP RB
192.5	99.4	GB RBHP /3
192.5	99.70	RBHP

/1 Elevation relative to 100.00 ft. assigned to the study site TBM.

/2 Ground beside left bank headpin.

/3 Ground beside right bank headpin.

ATTACHMENT Table D-19 Cross sectional profile data obtained at Circular Side Channel transect 3.

LOCATION OF CROSS SECTION: CIRCULAR SIDE CHANNEL AT TRANSECT 3.

GAGE NO: 75.3S3 GAGE READING: NO READING TAKEN

DATE: 84 09 05 WSEL: 89.50
yr. mo. day

TIME: 1030

TBM ID ADF&G CIRCULAR TBM RB 840824 TBM ELEVATION 100.00
LBHP ID ADF&G TR3 LB 840724 LBHP ELEVATION 99.08
RBHP ID ADF&G CIRCULAR S.C.TR3 RB 1984 RBHP ELEVATION 96.09

STATION	RELATIVE ELEVATION /1	DESCRIPTION
00	99.08	LBHP
00	98.6	GB LBHP /2
01	98.6	
06	97.8	TOP LB
11	93.0	
13	91.2	
16	90.4	
27	90.3	
28	90.3	
38	90.7	
48	90.7	
58	90.8	
59	90.9	
69	90.8	
79	90.6	
89	90.5	
99	90.1	
109	90.0	
119	89.9	
125	89.9	
126	89.9	
136	89.7	
139	89.51	LEFT WATER SURFACE
149	89.1	
159	89.3	
163	89.49	RIGHT WATER SURFACE
174	91.0	
178	90.9	
179	90.9	

ATTACHMENT TABLE D-19. continued

189	91.3	
199	91.7	
204	92.5	
211	93.9	HIGH WATER MARK
213	95.1	
214.5	95.8	GB RBHP /3
214.5	96.10	RBHP

/1 Elevation relative to 100.00 ft. assigned to the study site TBM.

/2 Ground beside left bank headpin.

/3 Ground beside right bank headpin.

ATTACHMENT Table D-20 Cross sectional profile data obtained at Circular Side Channel transect 4.

LOCATION OF CROSS SECTION: CIRCULAR SIDE CHANNEL AT TRANSECT 4.

GAGE NO: 75.3S4 GAGE READING: NO READING TAKEN

DATE: 84 09 05 WSEL: 89.81
yr. mo. day

TIME: 1100

TBM ID ADF&G CIRCULAR TBM RB 840824 TBM ELEVATION 100.00
LBHP ID ADF&G TR4 LB 840724 LBHP ELEVATION 97.56
RBHP ID ADF&G CIRCULAR S.C.TR4 840710 RBHP ELEVATION 97.85

STATION	RELATIVE ELEVATION /1	DESCRIPTION
00	97.56	LBHP
00	97.1	GB LBHP /2
01	96.8	
08	95.6	TOP LB
10	94.4	
14	92.2	BOTTOM LB
15	91.9	
16	91.8	
22	91.7	
24	91.7	
34	91.5	
44	91.3	
45	91.4	
55	90.9	
65	90.5	
75	90.0	
78	89.80	LEFT WATER SURFACE
88	89.4	
98	89.2	
108	89.1	
118	89.3	
122	89.5	
123	89.5	
132	89.4	
133	89.4	
142	89.81	RIGHT WATER SURFACE
152	90.9	
153	91.0	
163	91.5	

ATTACHMENT TABLE D-20. continued

168	91.6	
169	91.7	
173	92.3	BOTTOM RB
177	93.9	
178	94.01	
188	93.7	
198	93.7	
202	94.3	
209	96.5	
212	97.7	GB RBHP /3
212	97.84	RBHP

/1 Elevation relative to 100.00 ft. assigned to the study site TBM.

/2 Ground beside left bank headpin.

/3 Ground beside right bank headpin.

ATTACHMENT Table D-21 Cross sectional profile data obtained at Circular Side Channel transect 5.

LOCATION OF CROSS SECTION: CIRCULAR SIDE CHANNEL AT TRANSECT 5.

GAGE NO: 75.3S5 GAGE READING: NO READING TAKEN

DATE: 84 09 05 (yr. mo. day) WSEL: 89.77

TIME: 1130

TBM ID ADF&G CIRCULAR TBM RB 840824 TBM ELEVATION 100.00
LBHP ID ADF&G TR5 LB 840724 LBHP ELEVATION 98.00
RBHP ID ADF&G CIRCULAR S.C.TR5 RB 840724 RBHP ELEVATION 96.59

STATION	RELATIVE ELEVATION /1	DESCRIPTION
00	98.00	LBHP
00	97.4	GB LBHP /2
01	97.3	
04.5	96.9	TOP LB
06	93.8	BOTTOM LB
10	91.9	
14.5	89.76	LEFT WATER SURFACE
24	89.2	
29	89.8	RIGHT WATER SURFACE
35	90.3	TOP OF GRAVEL BAR
40	89.78	LEFT WATER SURFACE
50	89.0	
60	88.1	
68	87.0	
70	86.9	
80	88.3	
90	89.6	
95	89.7	RIGHT WATER SURFACE
105	90.7	
115	91.5	
125	91.4	
135	91.4	
145	92.8	
155	93.5	
165	93.7	
175	93.1	
185	92.0	
195	92.4	

ATTACHMENT TABLE D-21. continued

205	91.5	
211	90.7	BOTTOM OF CUT BANK, OVERHANGING
214	93.9	TOP OF CUT BANK
219	95.1	
226	95.8	
226.5	96.2	GB RBHP /3
226.5	96.57	RBHP

/1 Elevation relative to 100.00 ft. assigned to the study site TBM.

/2 Ground beside left bank headpin.

/3 Ground beside right bank headpin.

ATTACHMENT Table D-22 Cross sectional profile data obtained at Sauna Side Channel transect 1.

LOCATION OF CROSS SECTION: SAUNA SIDE CHANNEL AT TRANSECT 1.

GAGE NO: 79.8S1C GAGE READING: DRY

DATE: 84 09 15 WSEL: 88.75
yr. mo. day

TIME: 1400

TBM ID ADF&G SAUNA TBM LB 840823 TBM ELEVATION 100.00
LBHP ID ADF&G SAUNA S.C. TR1 LB 840723 LBHP ELEVATION 96.33
RBHP ID ADF&G TR1 RB 840723 RBHP ELEVATION 94.45

STATION	RELATIVE ELEVATION /1	DESCRIPTION
00	96.33	LBHP
00	95.9	GB LBHP /2, MID-BANK
03	93.9	
06	92.9	
07	90.3	BOTTOM LB
17	89.1	
22	88.75	LEFT WATER SURFACE
23	88.6	THALWEG
24	88.75	RIGHT WATER SURFACE
34	89.1	
44	89.2	
54	89.3	
64	89.6	BOTTOM RB
74	91.2	TOP RB
84	91.6	
94	91.9	
95	91.9	
105	92.0	BOTTOM OF RB
115	93.4	
123.3	94.1	GB RBHP /3
123.3	94.46	RBHP

/1 Elevation relative to 100.00 ft. assigned to the study site TBM.

/2 Ground beside left bank headpin.

/3 Ground beside right bank headpin.

ATTACHMENT Table D-23 Cross sectional profile data obtained at Sauna Side Channel transect 2.

LOCATION OF CROSS SECTION: SAUNA SIDE CHANNEL AT TRANSECT 2.

GAGE NO: 79.8S2C

GAGE READING: DRY

DATE: 84 09 15
yr. mo. day

WSEL: 89.00

TIME: 1430

TBM ID ADF&G SAUNA TBM LB 840823
LBHP ID ADF&G SAUNA S.C. TR2 LB 1984
RBHP ID ADF&G TR2 RB 840723

TBM ELEVATION 100.00
LBHP ELEVATION 92.94
RBHP ELEVATION 95.38

STATION	RELATIVE ELEVATION /1	DESCRIPTION
00	92.94	LBHP
00	92.6	GB LBHP /2
01.5	91.2	BOTTOM LB
10	89.6	
17	89.00	LEFT WATER SURFACE
19	88.9	THALWEG
23	89.00	RIGHT WATER SURFACE
33	89.2	
43	89.4	
51	89.7	
59	91.2	
69	91.5	
79	92.0	
81	92.1	BOTTOM RB
91	93.5	
96	94.4	RB-TOP
97.3	94.5	GB RBHP /3
97.3	95.40	RBHP

/1 Elevation relative to 100.00 ft. assigned to the study site TBM.

/2 Ground beside left bank headpin.

/3 Ground beside right bank headpin.

ATTACHMENT Table D-24 Cross sectional profile data obtained at Sauna Side Channel transect 3.

LOCATION OF CROSS SECTION: SAUNA SIDE CHANNEL AT TRANSECT 3.

GAGE NO: 79.8S3C GAGE READING: DRY

DATE: 84 09 05 (yr. mo. day) WSEL: 88.97

TIME: 1300

TBM ID ADF&G SAUNA TBM LB 840823 TBM ELEVATION 100.00
LBHP ID ADF&G SAUNA S.C. TR3 LB 840723 LBHP ELEVATION 99.33
RBHP ID ADF&G TR3 RB 840723 RBHP ELEVATION 93.84

STATION	RELATIVE ELEVATION /1	DESCRIPTION
00	99.33	LBHP
00	98.8	GB LBHP /2
01	98.9	
03	98.8	TOP LB
04	96.6	BOTTOM LB
07	95.1	
08	94.7	
18	91.5	
28	89.2	
30.5	88.97	LEFT WATER SURFACE
40	87.5	
50	87.4	
60	88.2	
63.5	88.6	RIGHT WATER SURFACE
73	91.4	RB
83	91.8	
93	92.0	
103	92.3	
108	92.2	
118	92.2	
128	92.4	
138	92.8	
148	93.0	
158	93.2	
168	93.1	
178	93.1	
188	93.2	
192.5	93.1	GB RBHP /3
192.5	93.87	RBHP

/1 Elevation relative to 100.00 ft. assigned to the study site TBM.

/2 Ground beside left bank headpin.

/3 Ground beside right bank headpin.

ATTACHMENT Table D-25 Cross sectional profile data obtained at Sauna Side Channel transect 4.

LOCATION OF CROSS SECTION: SAUNA SIDE CHANNEL AT TRANSECT 4.

GAGE NO: 79.8S4C

GAGE READING: 1.36

DATE: 84 09 05
yr. mo. day

WSEL: 88.99

TIME: 1330

TBM ID ADF&G SAUNA TBM LB 840823
LBHP ID ADF&G SAUNA S.C. TR4 LB 840723
RBHP ID ADF&G TR4 RB 840723

TBM ELEVATION 100.00
LBHP ELEVATION 100.57
RBHP ELEVATION 93.82

STATION	RELATIVE ELEVATION /1	DESCRIPTION
00	100.57	LBHP
00	100.0	GB LBHP /2
07	99.8	TOP LB
08	95.4	BOTTOM LB
10	93.7	
13	91.9	
18	89.6	
21	88.99	LEFT WATER SURFACE
22	88.0	
24	87.5	
27	87.8	
31	88.8	RIGHT WATER SURFACE
35	90.1	
45	90.5	
55	90.6	
65	91.3	
75	91.3	
85	91.9	
95	92.5	
98	92.3	
101	91.9	
111	91.9	
116	92.3	
117	92.4	
127	92.9	
137	93.6	
139	93.6	
141	93.5	GB RBHP /3
141	93.83	RBHP

/1 Elevation relative to 100.00 ft. assigned to the study site TBM.

/2 Ground beside left bank headpin.

/3 Ground beside right bank headpin.

ATTACHMENT Table D-26 Cross sectional profile data obtained at Sunset Side Channel transect 0.

LOCATION OF CROSS SECTION: SUNSET SIDE CHANNEL AT TRANSECT 0.

GAGE NO: 86.9S0C

GAGE READING: DRY

DATE: 84 09 14
yr. mo. day

WSEL: 92.81

TIME: 1400

TBM ID ADF&G SUNSET TBM LB 840822
LBHP ID ADF&G TR0 LB 840722
RBHP ID ADF&G 86.9S0 TR0 840722

TBM ELEVATION 100.00
LBHP ELEVATION 101.66
RBHP ELEVATION 100.47

STATION	RELATIVE ELEVATION /1	DESCRIPTION
00	101.66	LBHP
00	101.0	GB LBHP /2
07	100.4	TOP OF CUT BANK
10	96.7	BOTTOM LB
14	95.2	
24	94.5	
26	94.4	
29	92.8	
39	93.2	
49	93.5	
55	92.80	LEFT WATER SURFACE
58	92.2	THALWEG
68	92.7	
73	92.6	
74	92.6	
84	92.81	RIGHT WATER SURFACE
91	93.3	
92	93.4	
102	94.0	
112	94.2	
122	94.4	
132	94.6	
133	94.6	
143	94.6	
153	94.7	
163	94.6	
173	94.5	
183	94.6	
193	94.7	
203	94.8	

ATTACHMENT TABLE D-26. continued

213	94.9	
223	95.1	
233	95.3	
243	95.5	
244	95.5	
254	95.8	
264	96.1	
274	96.5	
284	96.6	
285	96.8	
295	97.2	
305	97.3	
315	97.5	
317	97.9	BOTTOM RB
320	98.4	TOP RB
330	99.5	
340	99.4	
341	99.4	GB RBHP /3
341	100.46	RBHP

/1 Elevation relative to 100.00 ft. assigned to the study site TBM.

/2 Ground beside left bank headpin.

/3 Ground beside right bank headpin.

ATTACHMENT Table D-27 Cross sectional profile data obtained at Sunset Side Channel transect 1.

LOCATION OF CROSS SECTION: SUNSET SIDE CHANNEL AT TRANSECT 1.

GAGE NO: 86.9S1C

GAGE READING: 0.49

DATE: 84 09 13
yr. mo. day

WSEL: 93.27

TIME: 1440

TBM ID ADF&G SUNSET TBM LB 840822
LBHP ID ADF&G TR1 LB 840722
RBHP ID ADF&G 86.9S1 TR1 840709

TBM ELEVATION 100.00
LBHP ELEVATION 100.36
RBHP ELEVATION 99.43

STATION	RELATIVE ELEVATION /1	DESCRIPTION
00	100.36	LBHP
00	100.0	GB LBHP /2
03	100.0	TOP LB
06	98.7	
07	98.6	
17	96.5	
18	96.2	BOTTOM LB
28	95.1	
38	94.8	
48	94.2	
58	93.5	
62.5	93.28	LEFT WATER SURFACE
67	92.9	THALWEG
68	93.0	
78	93.2	
88	93.3	
98	93.2	
102	93.26	RIGHT WATER SURFACE
110	93.6	
112	93.19	BACKWATER POOL LEFT WATER SURF.
122	93.17	BACKWATER POOL RIGHT WATER SURF.
132	93.9	
142	94.1	
152	94.3	
162	94.6	
172	94.8	
182	95.2	
192	95.5	
202	95.7	

ATTACHMENT TABLE D-27. continued

212	96.0	
222	96.1	
223	96.2	
233	96.3	
243	96.5	
253	96.8	
263	97.4	
273	97.7	
283	98.2	
293	98.7	
303	99.3	
304	99.4	GB RBHP /3
304	99.45	RBHP

/1 Elevation relative to 100.00 ft. assigned to the study site TBM.

/2 Ground beside left bank headpin.

/3 Ground beside right bank headpin.

ATTACHMENT Table D-28 Cross sectional profile data obtained at Sunset Side Channel transect 2.

LOCATION OF CROSS SECTION: SUNSET SIDE CHANNEL AT TRANSECT 2.

GAGE NO: 86.9S2B

GAGE READING: 0.32

DATE: 84 09 14
yr. mo. day

WSEL: 93.83

TIME: 1500

TBM ID ADF&G SUNSET TBM LB 840822
LBHP ID ADF&G TR2 LB 840722
RBHP ID ADF&G 86.9S2 TR2 840709

TBM ELEVATION 100.00
LBHP ELEVATION 100.49
RBHP ELEVATION 99.88

STATION	RELATIVE ELEVATION /1	DESCRIPTION
00	100.49	LBHP
00	100.0	GB LBHP /2
03	99.9	TOP LB
08	96.7	BOTTOM LB
15	97.2	
16	97.3	
26	96.4	
36	96.2	
46	96.4	
56	96.1	
66	95.7	
76	95.4	
77	95.3	
87	95.1	
90	95.0	
91	95.0	
95	94.7	
96	94.7	
106	94.6	
116	94.2	
126	94.0	
136	93.8	
139	93.81	LEFT WATER SURFACE
149	93.6	THALWEG
159	93.7	
164	93.8	
165	93.8	
170	93.84	RIGHT WATER SURFACE

ATTACHMENT TABLE D-28. continued

180	94.0	
190	94.4	
191	94.4	
201	94.8	
211	95.1	
221	95.6	
231	95.8	
233	95.8	
238	96.1	BOTTOM RB
242	97.2	
247.5	99.7	GB RBHP /3
247.5	99.88	RBHP

/1 Elevation relative to 100.00 ft. assigned to the study site TBM.

/2 Ground beside left bank headpin.

/3 Ground beside right bank headpin.

ATTACHMENT Table D-29 Cross sectional profile data obtained at Sunset Side Channel transect 3.

LOCATION OF CROSS SECTION: SUNSET SIDE CHANNEL AT TRANSECT 3.

GAGE NO: 86.9S3B GAGE READING: 1.12

DATE: 84 09 14 (yr. mo. day) WSEL: 93.85

TIME: 1525

TBM ID ADF&G SUNSET TBM LB 840822 TBM ELEVATION 100.00
LBHP ID ADF&G TR3 LB 840722 LBHP ELEVATION 100.32
RBHP ID ADF&G 86.9S4 TR4 840709 RBHP ELEVATION 104.29

STATION	RELATIVE ELEVATION /1	DESCRIPTION
00	100.32	LBHP
00	100.0	GB LBHP /2
05	100.0	TOP LB
08	99.1	
11	97.6	
12	97.1	
14	96.3	BOTTOM LB
18	95.6	
23	96.1	
28	95.6	
29	95.5	
39	95.6	
49	95.7	
59	95.8	
69	95.9	
79	95.8	
89	95.5	
90	95.4	
100	95.2	
110	95.1	
111	95.1	
121	94.8	
122	94.8	
132	94.6	
142	94.5	
152	94.5	
162	94.3	
165.5	93.86	LEFT WATER SURFACE

ATTACHMENT TABLE D-29. continued

175	92.8	
176	92.7	
185	92.0	THALWEG
195	92.5	
204	93.84	RIGHT WATER SURFACE
208	95.5	BOTTOM RB
217	104.2	
219	104.2	GB RBHP /3
219	104.28	RBHP

/1 Elevation relative to 100.00 ft. assigned to the study site TBM.

/2 Ground beside left bank headpin.

/3 Ground beside right bank headpin.

ATTACHMENT Table D-30 Cross sectional profile data obtained at Sunset Side Channel transect 4.

LOCATION OF CROSS SECTION: SUNSET SIDE CHANNEL AT TRANSECT 4.

GAGE NO: 86.9S4B

GAGE READING: 0.74

DATE: 84 09 14
yr. mo. day

WSEL: 94.55

TIME: 1615

TBM ID ADF&G SUNSET TBM LB 840822
LBHP ID ADF&G TR4 LB 840722
RBHP ID ADF&G 86.9S4 TR4 840709

TBM ELEVATION 100.00
LBHP ELEVATION 101.62
RBHP ELEVATION 104.26

STATION	RELATIVE ELEVATION /1	DESCRIPTION
00	101.62	LBHP
00	101.3	GB LBHP /2
06	100.5	TOP LB
10	98.1	
12	96.4	BOTTOM LB
14	95.9	
18	95.5	
28	95.6	
31	95.5	
32	95.5	
42	95.8	
52	96.0	
62	96.0	
67	96.0	
68	96.0	
78	95.8	
83	95.6	
93	95.2	
103	94.9	
113	94.57	LEFT WATER SURFACE
120	94.4	THALWEG
123	94.4	
124	94.4	
134	94.4	
137	94.53	RIGHT WATER SURFACE
142	94.7	
143	94.8	
153	95.3	
163	95.4	
173	95.4	

ATTACHMENT TABLE D-30. continued

183	95.4	
193	95.1	
200	94.9	
201	94.8	
204	94.9	
205	94.8	
207	94.7	
208	95.0	
212	95.0	
213	94.7	
218	94.7	
221	94.4	
222	94.4	
224	94.28	LEFT WATER SURFACE
229	93.8	
230	94.27	
231	94.6	
234	95.9	BOTTOM RB
238	102.3	TOP RB
243	103.9	GB RBHP /3
243	104.26	RBHP

/1 Elevation relative to 100.00 ft. assigned to the study site TBM.

/2 Ground beside left bank headpin.

/3 Ground beside right bank headpin.

ATTACHMENT Table D-31 Cross sectional profile data obtained at Sunset Side Channel transect 5.

LOCATION OF CROSS SECTION: SUNSET SIDE CHANNEL AT TRANSECT 5.

GAGE NO: 86.9S5B

GAGE READING: 1.14

DATE: 84 09 14
yr. mo. day

WSEL: 94.74

TIME: 1710

TBM ID ADF&G SUNSET TBM LB 840822
LBHP ID ADF&G TR5 LB 840722
RBHP ID ADF&G 86.9S5 TR5 840709

TBM ELEVATION 100.00
LBHP ELEVATION 100.61
RBHP ELEVATION 102.42

STATION	RELATIVE ELEVATION /1	DESCRIPTION
00	100.61	LBHP
00	100.1	GB LBHP /2
03	99.7	TOP LB
08	98.7	
11	97.7	BOTTOM LB
13	98.0	
23	97.6	
30	96.8	
31	96.7	
35	96.6	
36	96.6	
37	96.6	
38	96.5	
39	96.6	
45	96.5	
46	96.4	
51	96.4	
52	96.4	
62	96.3	
72	96.0	
79	95.7	
80	95.6	
90	95.3	
100	94.8	
102	94.74	LEFT WATER SURFACE
112	94.2	
122	93.6	
132	93.1	
137	92.8	
138	92.8	

ATTACHMENT TABLE D-31. continued

148	92.6	
157	92.4	
158	92.3	
162	92.3	THALWEG
165	92.4	
166	92.4	
172	93.0	
175	92.8	
176	92.8	
181	93.5	
182	93.6	
186	93.7	
187	94.1	
191	94.73	RIGHT WATER SURFACE
195	95.3	
196	95.7	
201	96.9	BOTTOM RB
202	100.0	TOP RB
205	101.7	
210	102.3	GB RBHP /3
210	-----	RBHP ELEVATION NOT SHOT

/1 Elevation relative to 100.00 ft. assigned to the study site TBM.

/2 Ground beside left bank headpin.

/3 Ground beside right bank headpin.

ATTACHMENT Table D-32 Cross sectional profile data obtained at Sunset Side Channel transect 6.

LOCATION OF CROSS SECTION: SUNSET SIDE CHANNEL AT TRANSECT 6.

GAGE NO: 86.9S6C

GAGE READING: 0.45

DATE: 84 09 14
yr. mo. day

WSEL: 94.77

TIME: 1800

TBM ID ADF&G SUNSET TBM LB 840822
LBHP ID ADF&G TR6 LB 840722
RBHP ID ADF&G 86.9S6 TR6 840722

TBM ELEVATION 100.00
LBHP ELEVATION 100.71
RBHP ELEVATION 103.13

STATION	RELATIVE ELEVATION /1	DESCRIPTION
00	100.71	LBHP
00	100.5	GB LBHP /2
02	99.8	
09	100.3	TOP LB
11	99.6	
12	99.1	BOTTOM LB
21	98.7	
22	98.6	
32	98.2	
42	97.7	
52	96.9	
62	96.1	
72	95.3	
80	94.74	LEFT WATER SURFACE
90	93.9	
100	93.2	
110	92.5	
113	92.3	
114	92.2	
118	91.9	
124	91.7	
130	91.2	
131	91.1	
134	90.8	
139	90.7	THALWEG
145	90.9	

ATTACHMENT TABLE D-32. continued

150	91.2	
156	91.5	
160	92.1	
164	92.7	BOTTOM RB
165	94.75	RIGHT WATER SURFACE
166	95.2	
169	96.1	
171	99.2	
177	102.6	GB RBHP /3
177	103.14	RBHP

/1 Elevation relative to 100.00 ft. assigned to the study site TBM.

/2 Ground beside left bank headpin.

/3 Ground beside right bank headpin.

ATTACHMENT Table D-33 Cross sectional profile data obtained at Trapper Creek Side Channel transect 1.

LOCATION OF CROSS SECTION: TRAPPER SIDE CHANNEL AT TRANSECT 1.

GAGE NO: 91.6S2D

GAGE READING: NOT READ

DATE: 84 09 04
yr. mo. day

WSEL: 91.98

TIME: 1300

TBM ID ADF&G TRAPPER TBM RB 840822
LBHP ID ADF&G TR1 LB 840721
RBHP ID ADF&G TR1 RB 84 07 21

TBM ELEVATION 100.00
LBHP ELEVATION 96.74
RBHP ELEVATION 99.02

STATION	RELATIVE ELEVATION /1	DESCRIPTION
00	96.74	LBHP
00	96.2	GB LBHP /2
01	96.1	
10	96.0	
20	96.2	
30	96.3	
40	96.0	
50	95.6	
54	95.5	
55	95.4	
64	95.0	
65	94.9	
75	94.0	
76	93.9	
86	93.2	
89	93.1	
90	93.0	
100	92.6	
110	92.4	
118	92.2	
119	92.1	
123.5	91.99	LEFT WATER SURFACE
132	91.5	
133	91.4	
143	91.0	
150	90.8	
151	90.7	
161	90.5	
168	90.4	
169	90.4	

ATTACHMENT TABLE D-33. continued

179	90.1	
184	90.0	
185	90.0	
193	90.0	
194	90.0	
204	90.1	
205	90.2	
213	90.5	
214	90.5	
222	91.4	
223	91.6	
226	91.97	RIGHT WATER SURFACE
234	92.93	
235	93.2	
245	94.7	
247	95.1	
253	95.6	
263	96.0	
273	96.1	
274	96.1	
284	96.4	
294	96.5	
298	96.9	
301	97.8	
309	97.2	
310	97.3	
314	97.5	
315	97.8	
317	98.1	
318	99.02	RBHP
318	98.2	GB RBHP /3

/1 Elevation relative to 100.00 ft. assigned to the study site TBM.

/2 Ground beside left bank headpin.

/3 Ground beside right bank headpin.

ATTACHMENT Table D-34 Cross sectional profile data obtained at Trapper Creek Side Channel transect 2.

LOCATION OF CROSS SECTION: TRAPPER SIDE CHANNEL AT TRANSECT 2.

GAGE NO: 91.6S3C

GAGE READING: NOT READ

DATE: 84 09 04
yr. mo. day

WSEL: 92.00

TIME: 1330

TBM ID ADF&G TRAPPER TBM RB 840822
LBHP ID ADF&G TR2 LB 840721
RBHP ID ADF&G TR2 RB 84 07 21

TBM ELEVATION 100.00
LBHP ELEVATION 97.21
RBHP ELEVATION 97.21

STATION	RELATIVE ELEVATION /1	DESCRIPTION
00	97.21	LBHP
00	96.7	GB LBHP /2
01	96.6	
10	96.2	
20	95.7	
30	95.9	
39	96.3	
40	96.4	
50	96.5	
60	96.7	
70	96.8	
80	96.8	
90	96.6	
99	96.4	
100	96.3	
110	96.0	
120	95.5	
130	95.1	
131	95.1	
137	94.8	
138	94.7	
148	94.1	
158	93.6	
168	93.2	
178	92.8	
179	92.7	
189	92.4	
198	92.00	LEFT WATER SURFACE
208	91.6	
218	91.1	

ATTACHMENT TABLE D-34. continued

228	90.8	
238	90.7	
248	90.6	
258	90.7	
267	90.9	
268	91.0	
276	91.3	
277	91.4	
287	91.7	
293	91.99	RIGHT WATER SURFACE
303	92.4	
312	93.2	
313	93.5	
322	94.8	
323	94.9	
333	95.6	
343	96.5	
344	97.21	RBHP
344	96.7	GB RBHP /3

/1 Elevation relative to 100.00 ft. assigned to the study site TBM.

/2 Ground beside left bank headpin.

/3 Ground beside right bank headpin.

ATTACHMENT Table D-35 Cross sectional profile data obtained at Trapper Creek Side Channel transect 3.

LOCATION OF CROSS SECTION: TRAPPER SIDE CHANNEL AT TRANSECT 3.

GAGE NO: 91.6S4D

GAGE READING: NOT READ

DATE: 84 09 04
yr. mo. day

WSEL: 92.18

TIME: 1400

TBM ID ADF&G TRAPPER TBM RB 840822
LBHP ID ADF&G TR3 LB 840721
RBHP ID ADF&G TR3 RB 840721

TBM ELEVATION 100.00
LBHP ELEVATION 98.21
RBHP ELEVATION 98.51

STATION	RELATIVE ELEVATION /1	DESCRIPTION
00	98.21	LBHP
00	97.9	GB LBHP /2
01	98.0	
11	98.2	
18	97.6	
19	97.2	
26	96.5	
27	96.4	
37	96.1	
47	95.8	
52	95.8	
53	95.8	
63	95.7	
73	95.2	
83	94.6	
93	94.2	
103	94.1	
113	93.8	
123	93.5	
133	93.2	
134	93.2	
144	92.8	
154	92.5	
164	92.3	
171	92.18	LEFT WATER SURFACE
178	92.1	

ATTACHMENT TABLE D-35. continued

179	92.0	
189	91.8	
199	91.8	
209	91.7	
219	91.8	
231	92.0	
232	92.0	
238.5	92.17	RIGHT WATER SURFACE
248	92.3	
251	92.3	
252	92.2	
259	92.2	
260	92.1	
265	92.1	
274	92.6	
275	92.6	
285	93.5	
294	94.4	
295	94.5	
305	95.5	
308	95.8	
318	96.4	
328	97.1	
338	97.5	
343	98.0	
344	98.0	
354	98.4	
364	98.6	
374	98.2	
375	98.1	
377.5	98.52	RBHP
377.5	98.2	GB RBHP /3

/1 Elevation relative to 100.00 ft. assigned to the study site TBM.

/2 Ground beside left bank headpin.

/3 Ground beside right bank headpin.

ATTACHMENT Table D-36 Cross sectional profile data obtained at Trapper Creek Side Channel transect 4.

LOCATION OF CROSS SECTION: TRAPPER SIDE CHANNEL AT TRANSECT 4.

GAGE NO: 91.6S1D

GAGE READING: NOT READ

DATE: 84 09 04
yr. mo. day

WSEL: 92.61

TIME: 1430

TBM ID ADF&G TRAPPER TBM RB 840822
LBHP ID ADF&G TR4 LB 840721
RBHP ID ADF&G TR4 RB 840721

TBM ELEVATION 100.00
LBHP ELEVATION 98.21
RBHP ELEVATION 96.64

STATION	RELATIVE ELEVATION /1	DESCRIPTION
00	98.21	LBHP
00	97.8	GB LBHP /2
01	97.9	
03	97.6	
04	97.3	
10	95.7	
12	95.4	
13	95.0	
14	95.0	
24	94.7	
34	94.5	
44	94.3	
51	94.2	
52	94.2	
62	94.1	
70	93.9	
71	93.9	
81	93.6	
91	93.4	
101	93.0	
110.5	92.61	LEFT WATER SURFACE
114	92.6	
124	92.3	
129	92.0	
139	91.9	
149	91.8	
157	91.8	
167	92.3	
175	92.61	RIGHT WATER SURFACE
182	92.7	

ATTACHMENT TABLE D-36. continued

183	92.9	
193	92.9	
203	93.1	
213	93.1	
223	93.4	
233	94.6	
243	95.4	
253	95.7	
263	96.2	
273	96.2	
278	96.0	
279	95.8	
282	95.3	
283	96.64	RBHP
283	96.4	GB RBHP /3

/1 Elevation relative to 100.00 ft. assigned to the study site TBM.

/2 Ground beside left bank headpin.

/3 Ground beside right bank headpin.

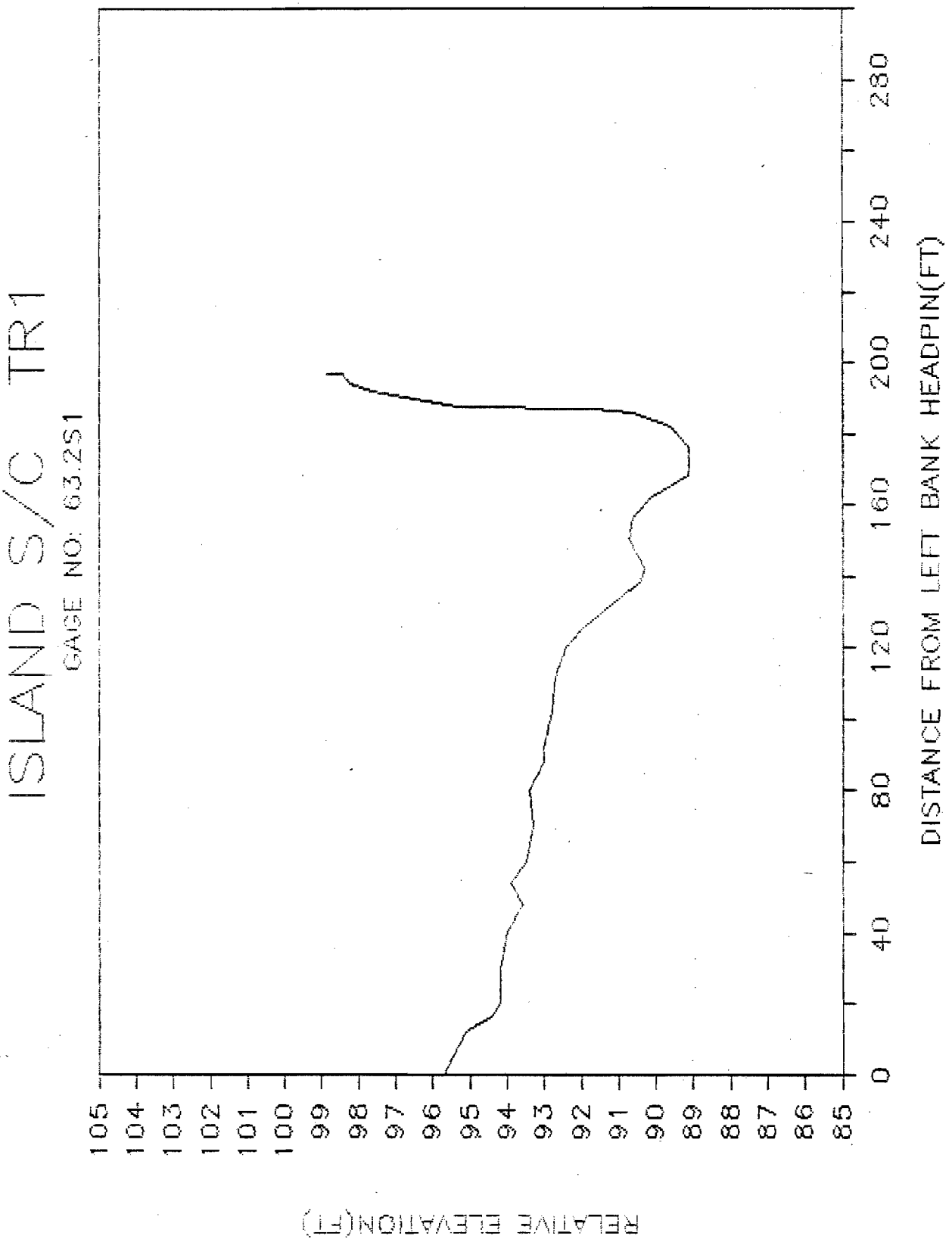


Figure D-1 Cross sectional profile obtained at Island Side Channel transect 1.

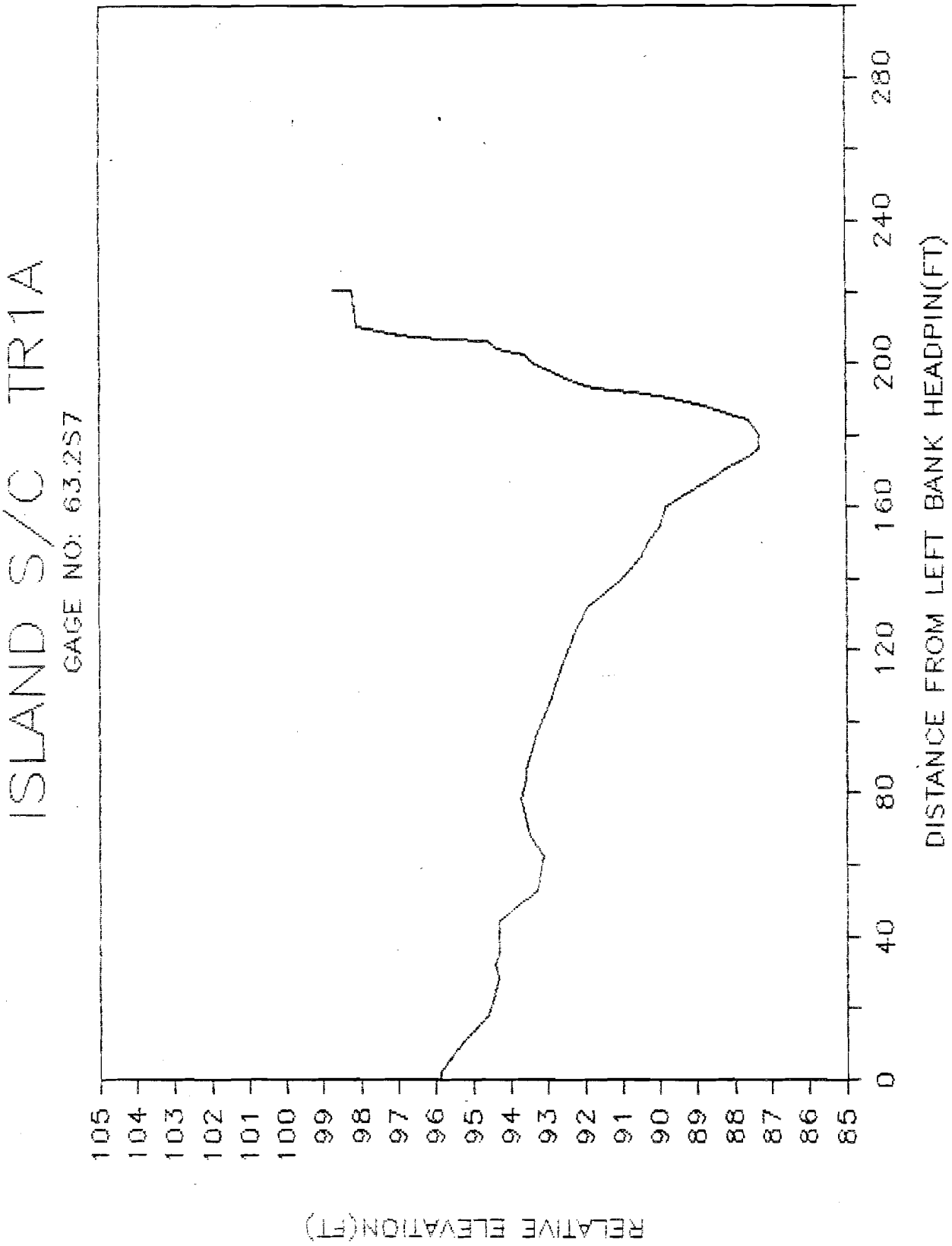


Figure D-2 Cross sectional profile obtained at Island Side Channel transect 1A.

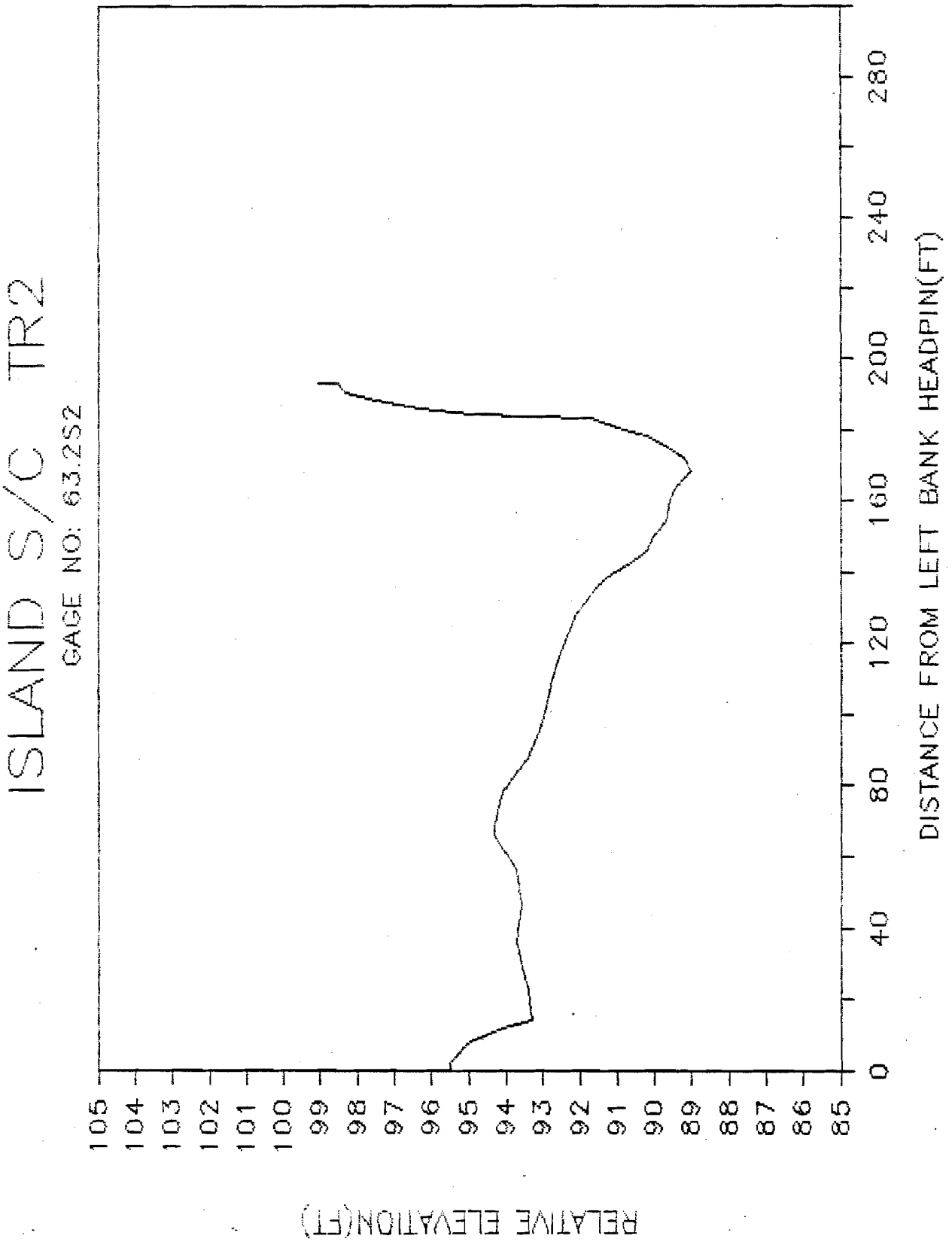


Figure D-3 Cross sectional profile obtained at Island Side Channel transect 2.

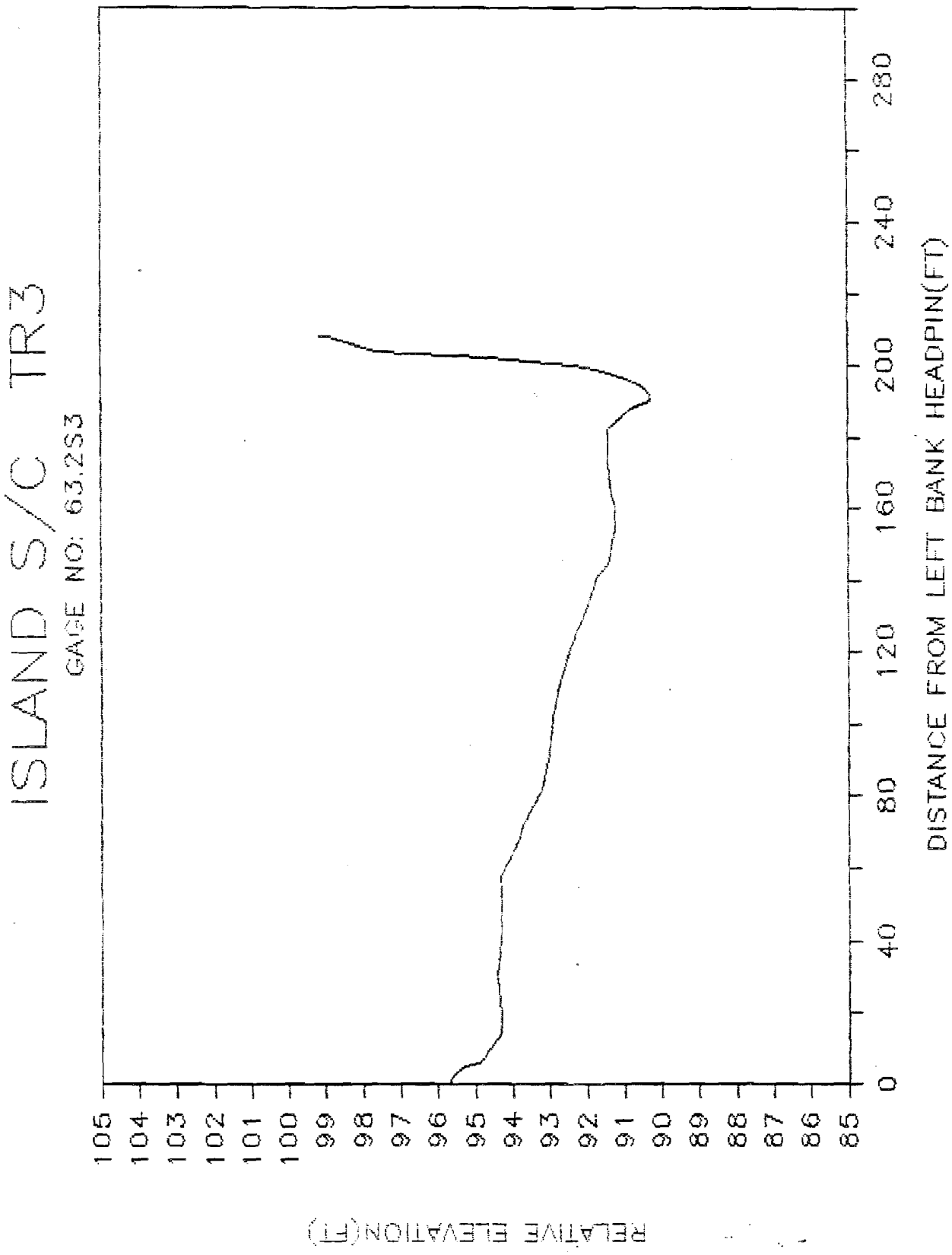


Figure D-4 Cross sectional profile obtained at Island Side Channel transect 3.

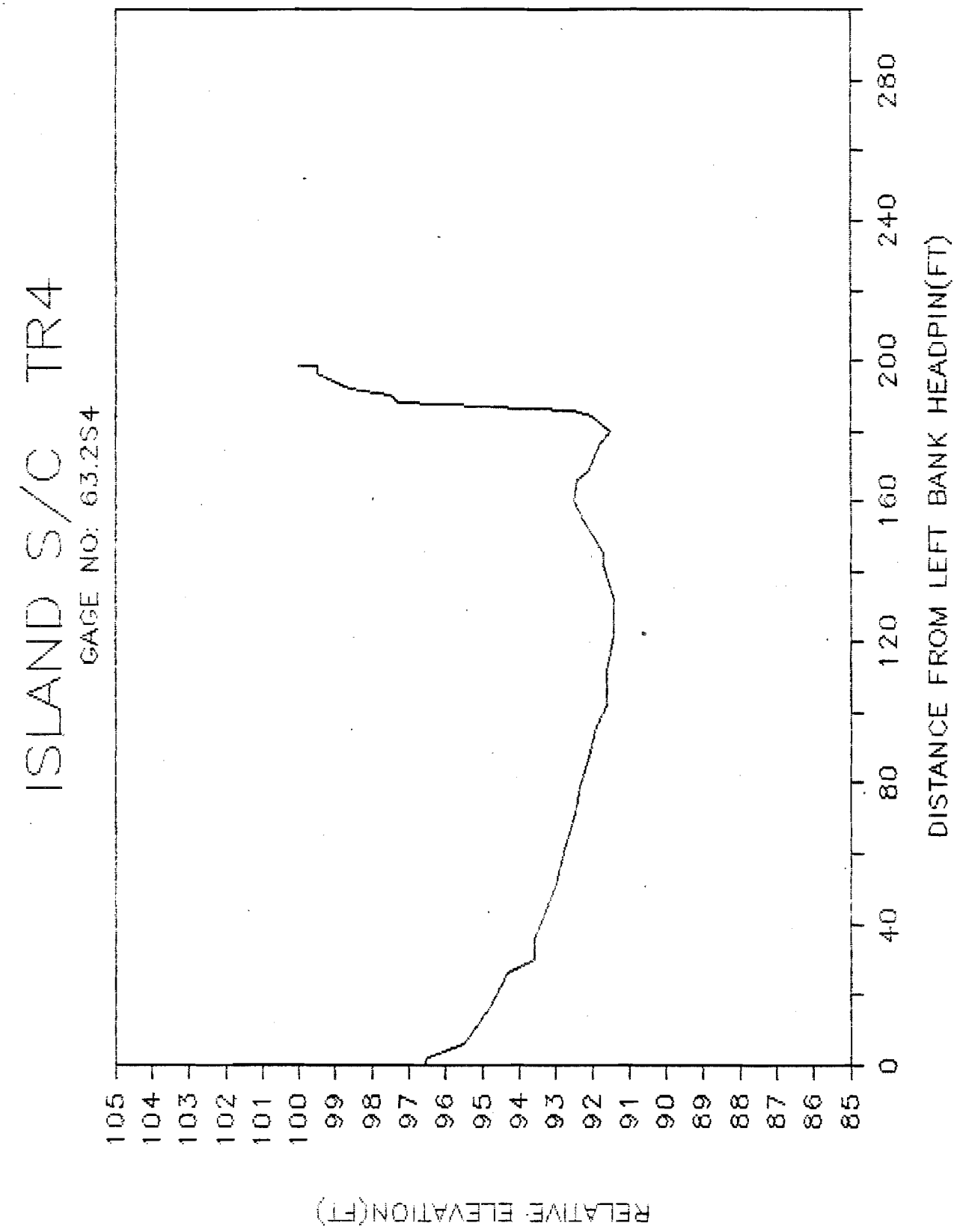


Figure D-5 Cross sectional profile obtained at Island Side Channel transect 4.

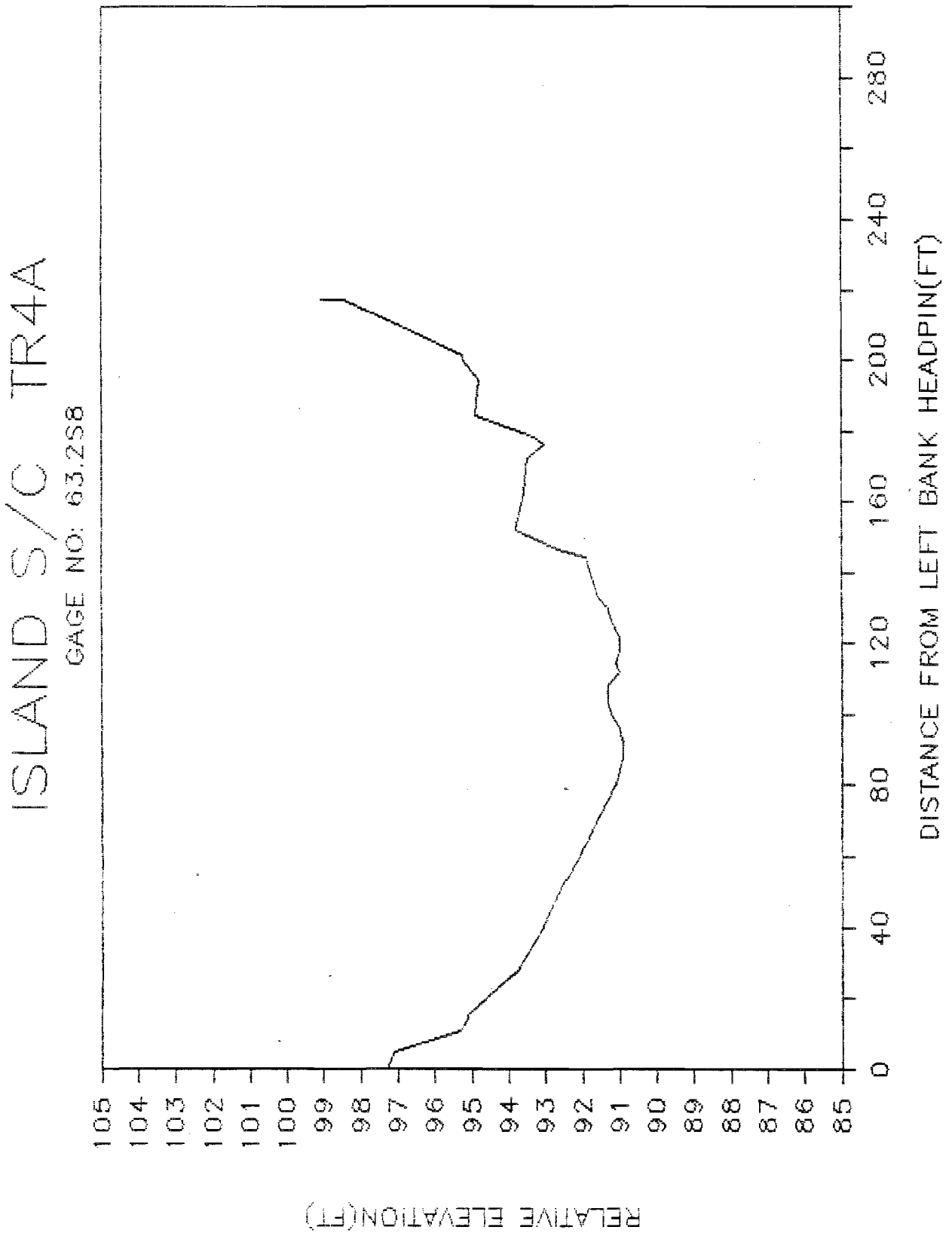


Figure D-6 Cross sectional profile obtained at Island Side Channel transect 4A.

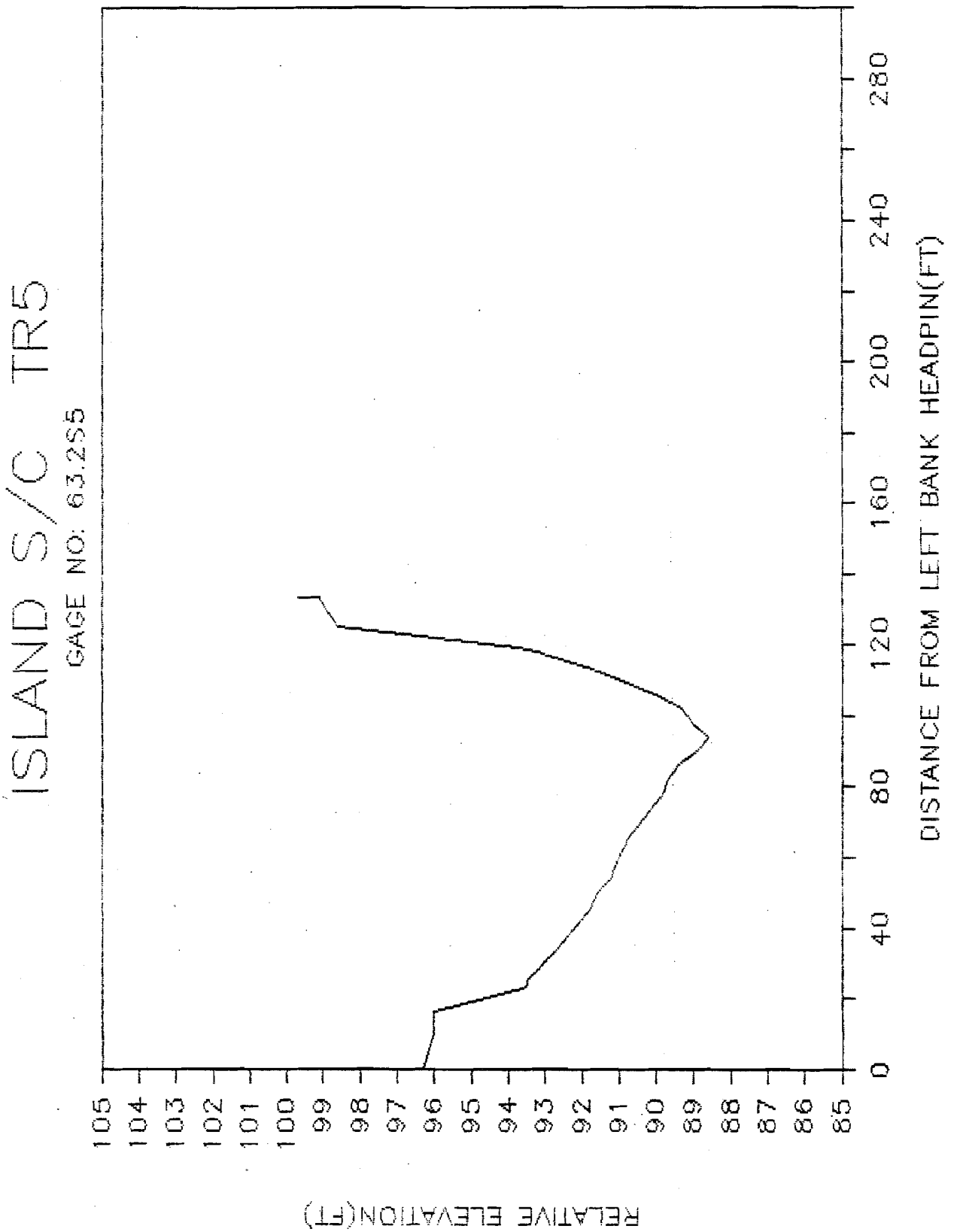


Figure D-7 Cross sectional profile obtained at Island Side Channel transect 5.

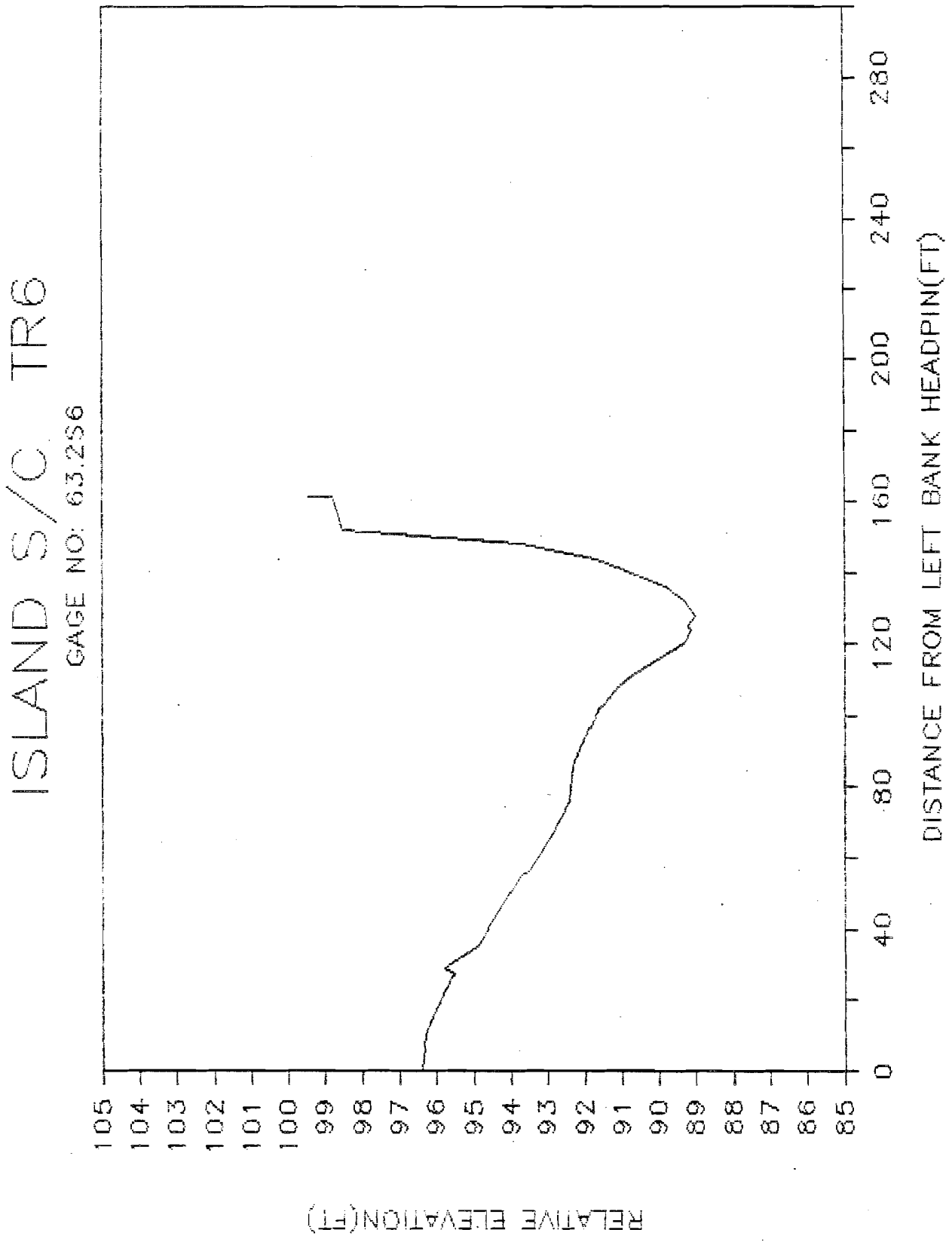


Figure D-8 Cross sectional profile obtained at Island Side Channel transect 6.

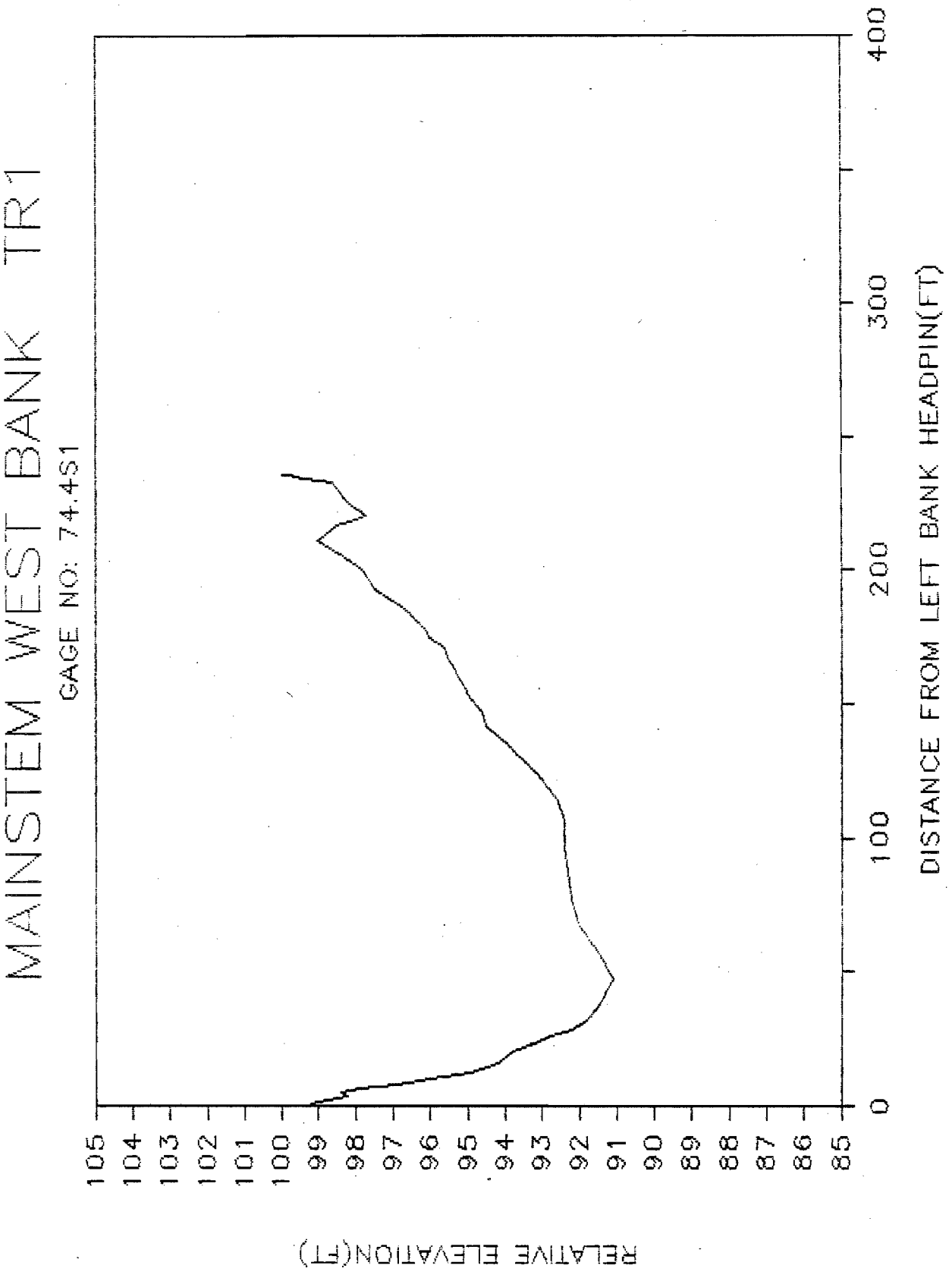


Figure D-9 Cross sectional profile obtained at Mainstem West Bank Side Channel transect 1.

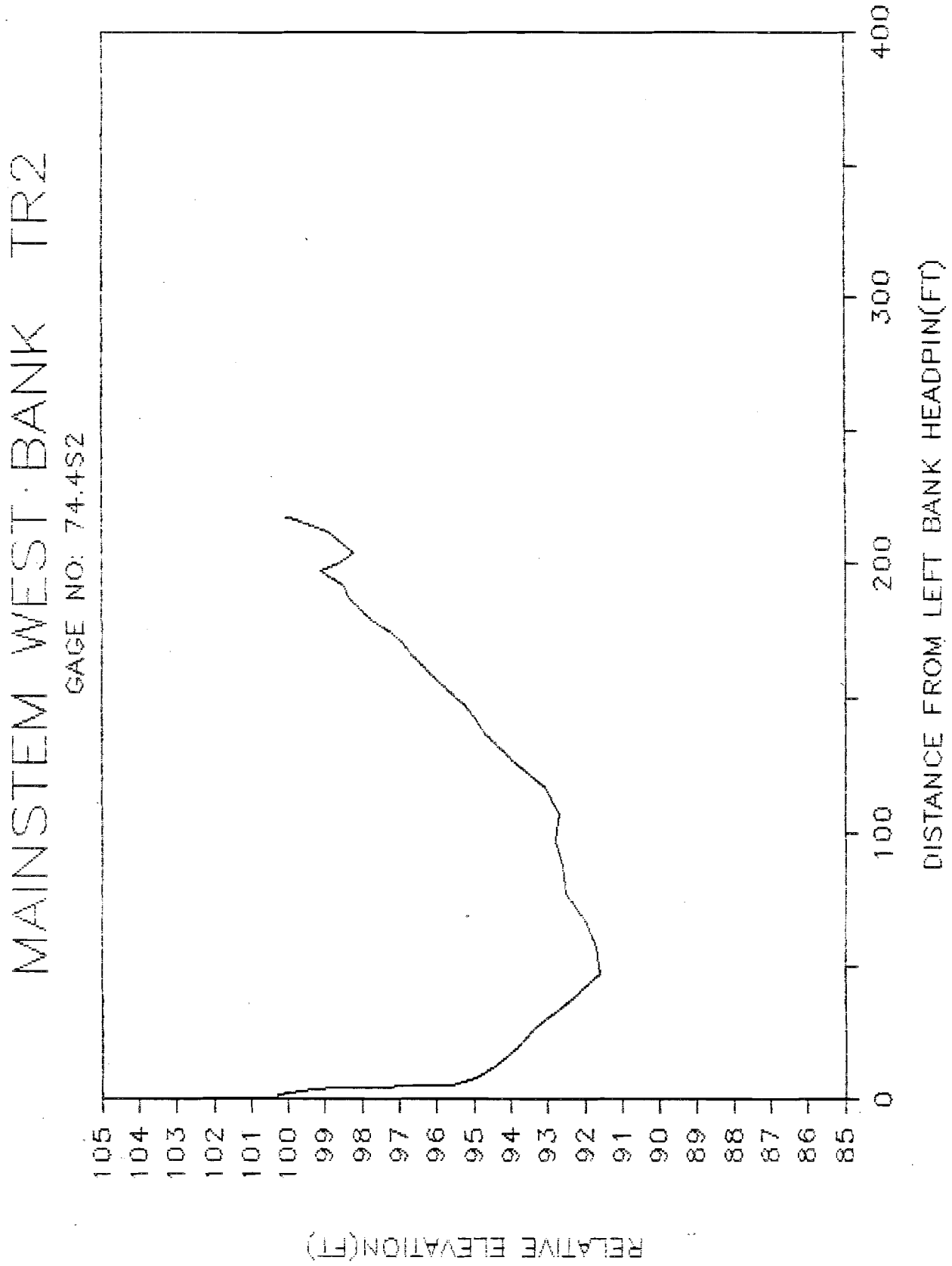


Figure D-10 Cross sectional profile obtained at Mainstem West Bank Side Channel transect 2.

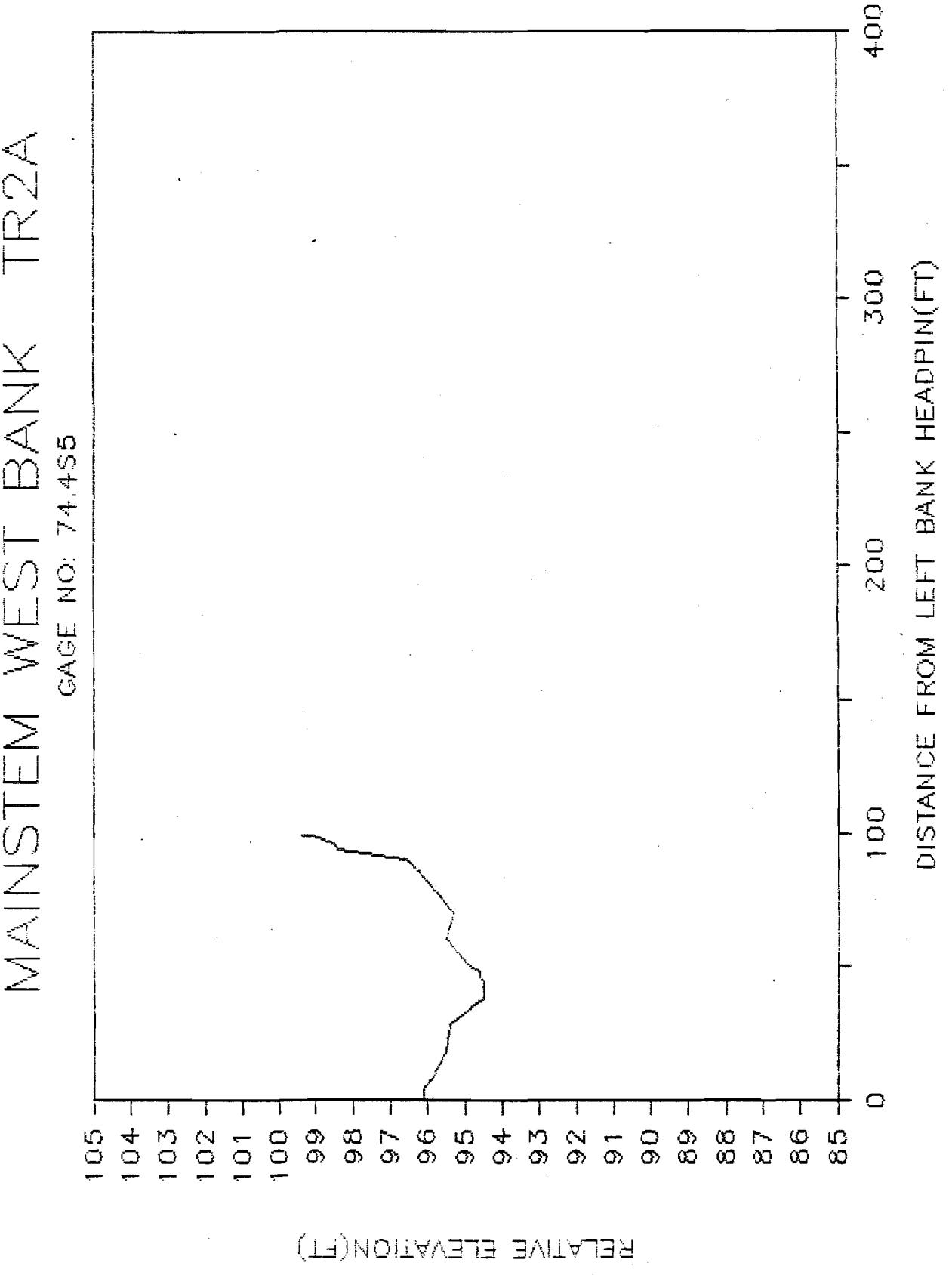


Figure D-11 Cross sectional profile obtained at Mainstem West Bank Side Channel transect 2A.

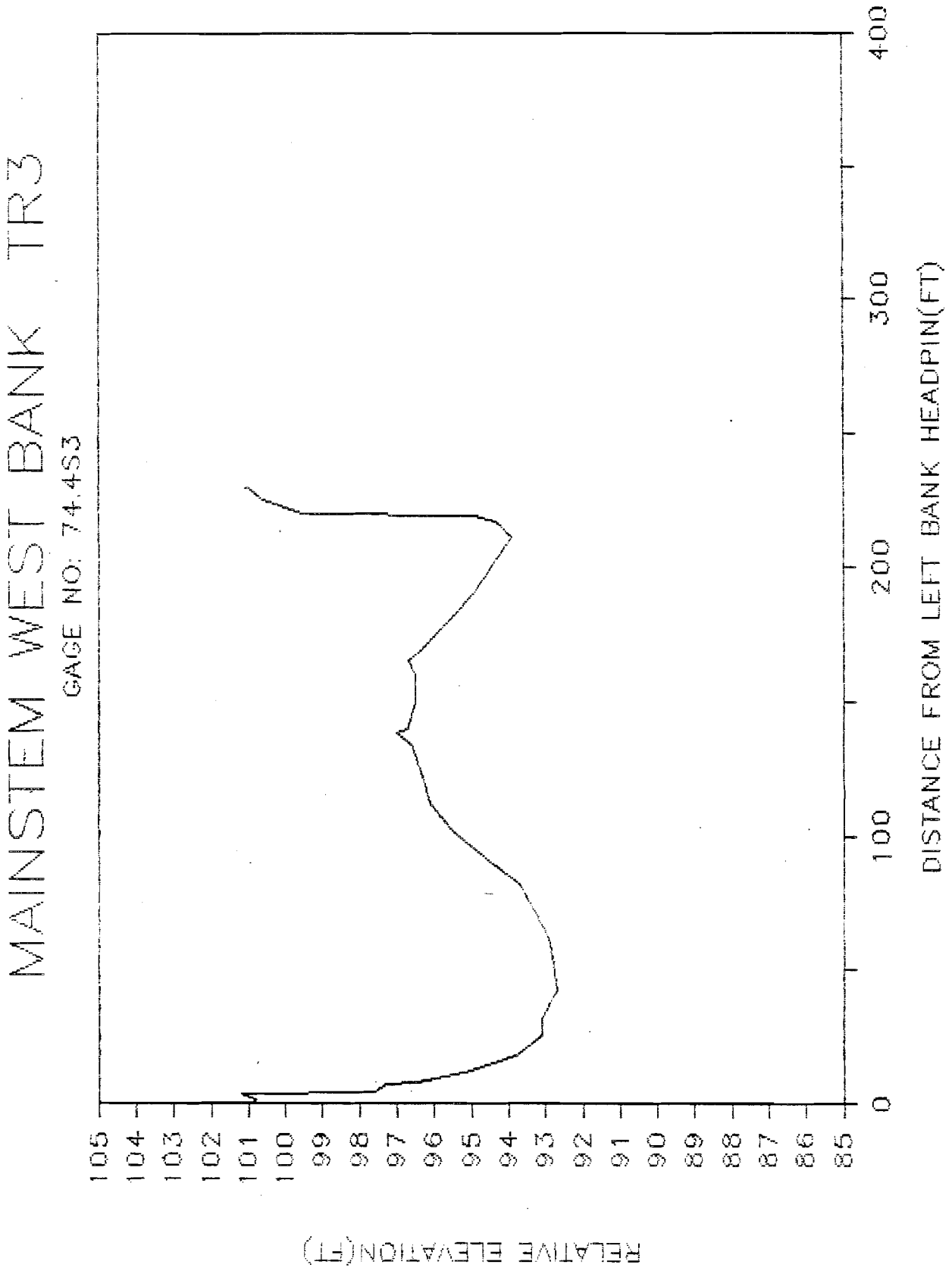


Figure D-12 Cross sectional profile obtained at Mainstem West Bank Side Channel transect 3.

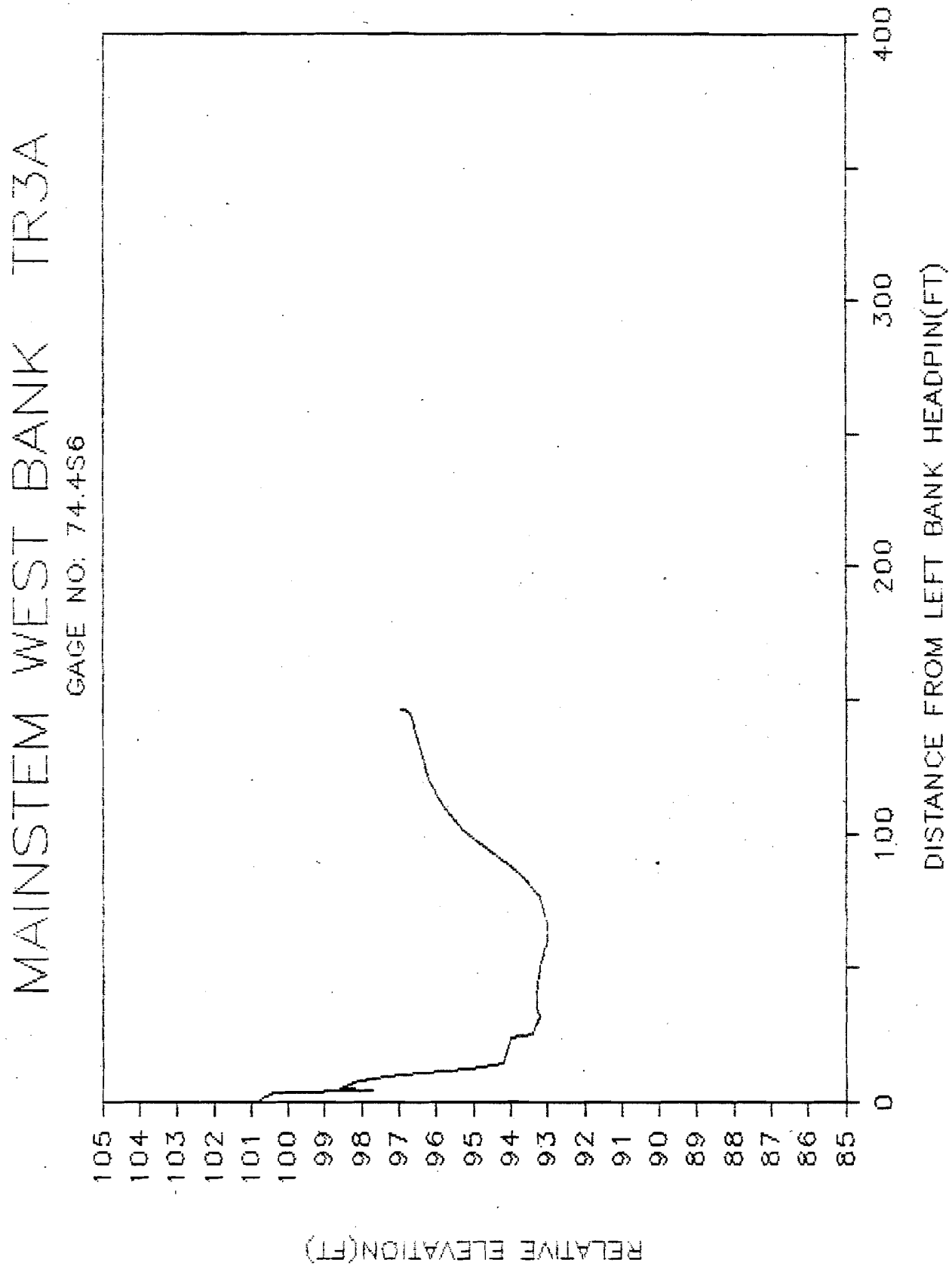


Figure D-13 Cross sectional profile obtained at Mainstem West Bank Side Channel transect 3A.

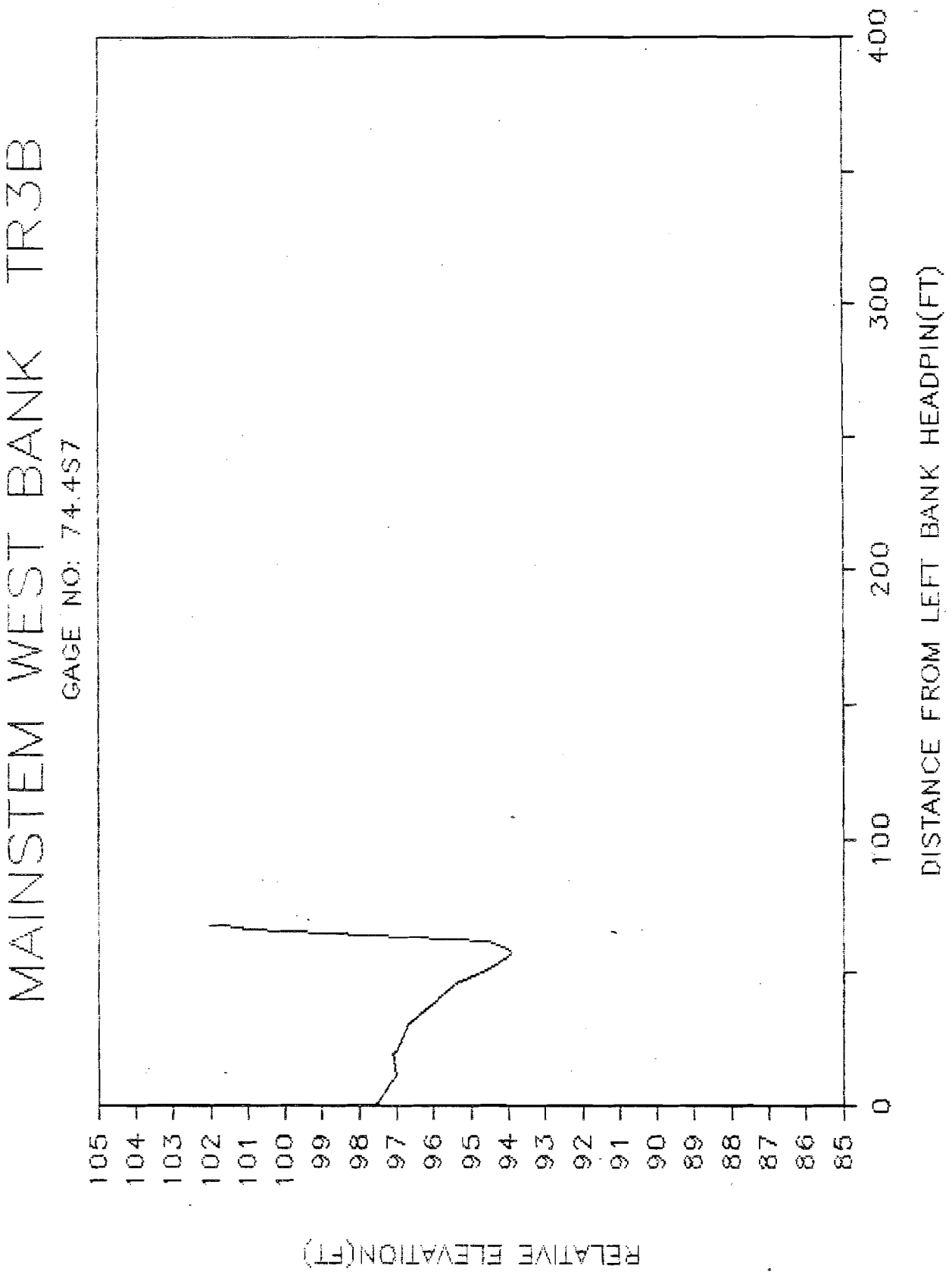


Figure D-14 Cross sectional profile obtained at Mainstem West Bank Side Channel transect 3B.

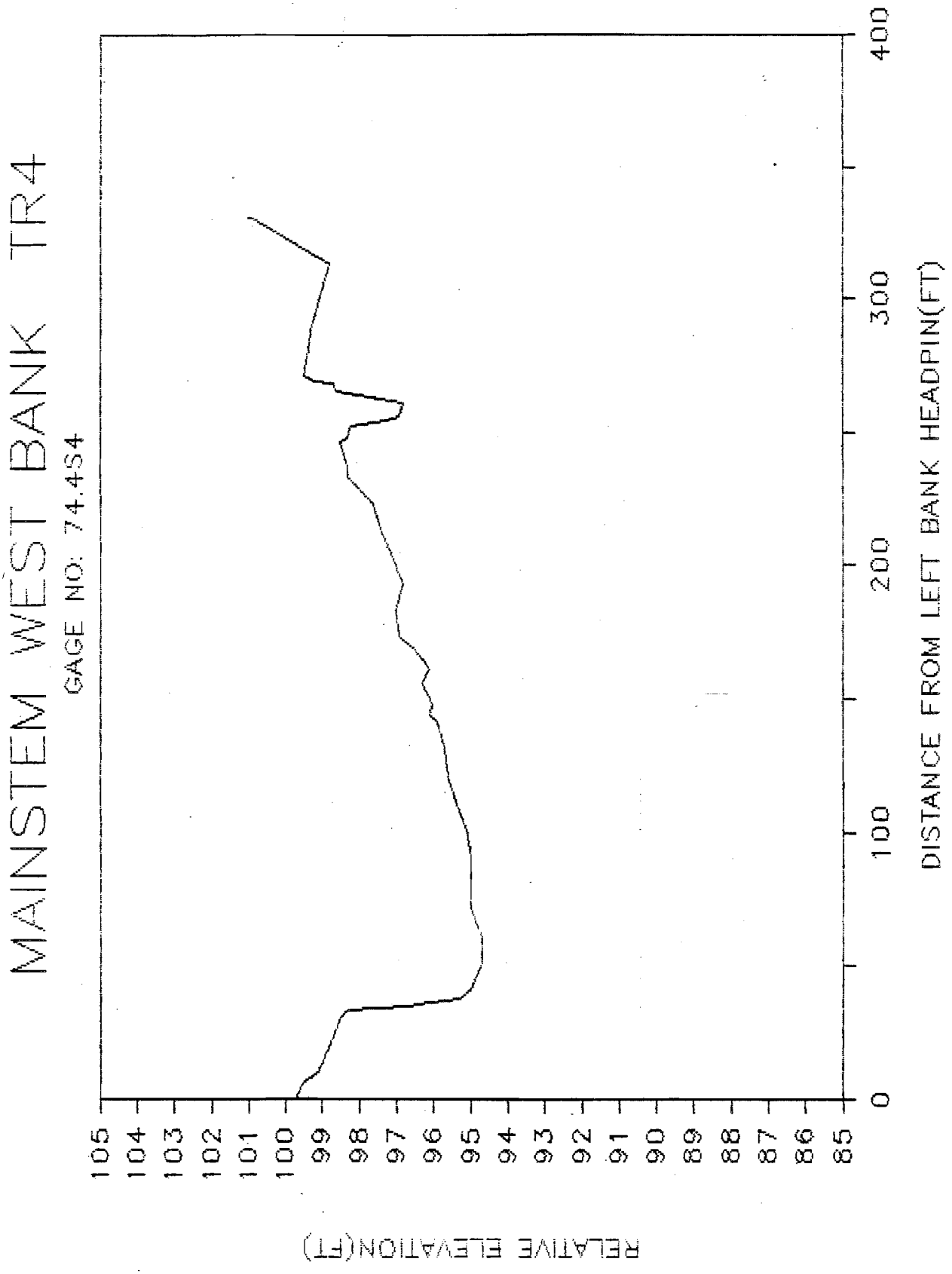


Figure D-15 Cross sectional profile obtained at Mainstem West Bank Side Channel transect 4.

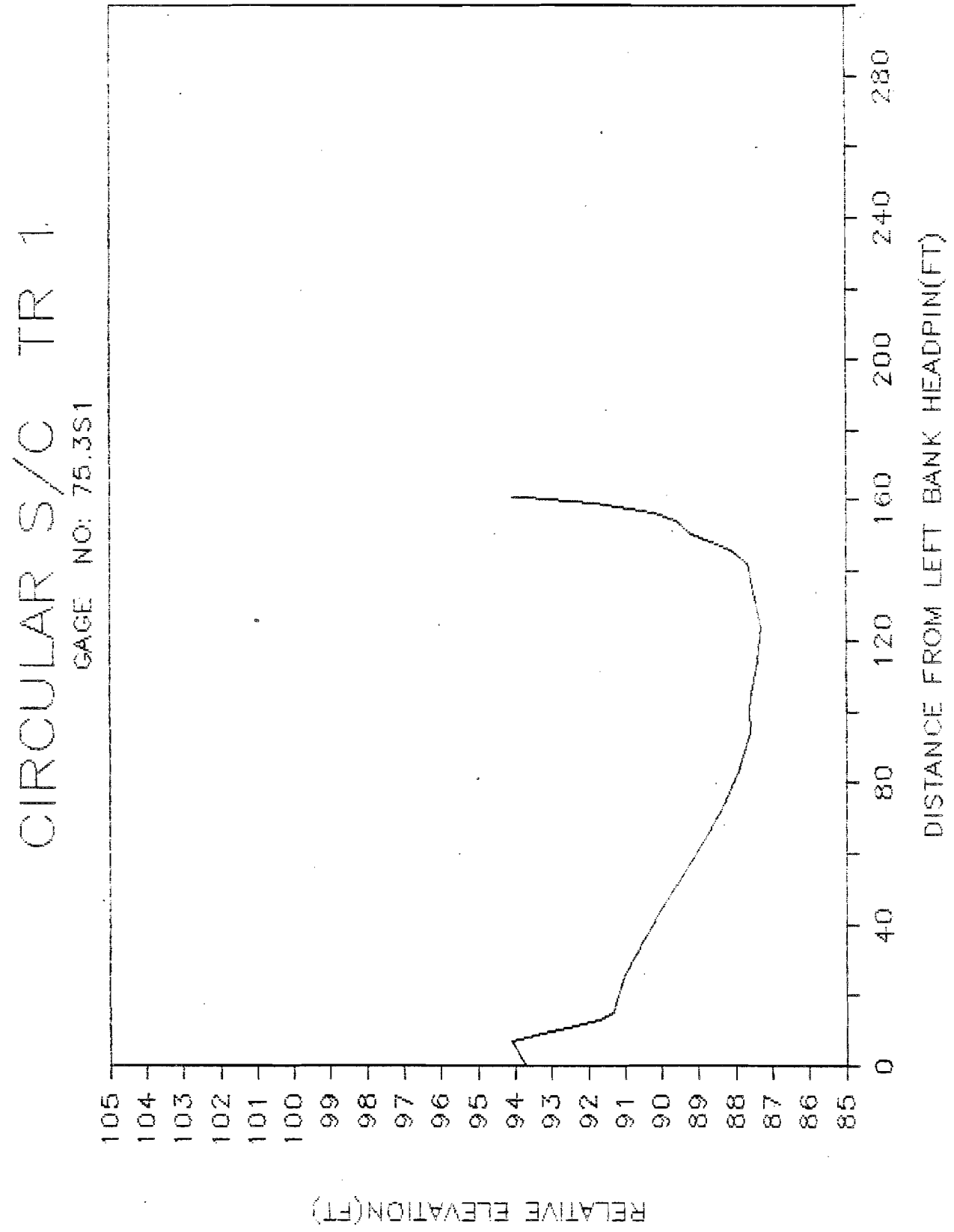


Figure D-16 Cross sectional profile obtained at Circular Side Channel transect 1.

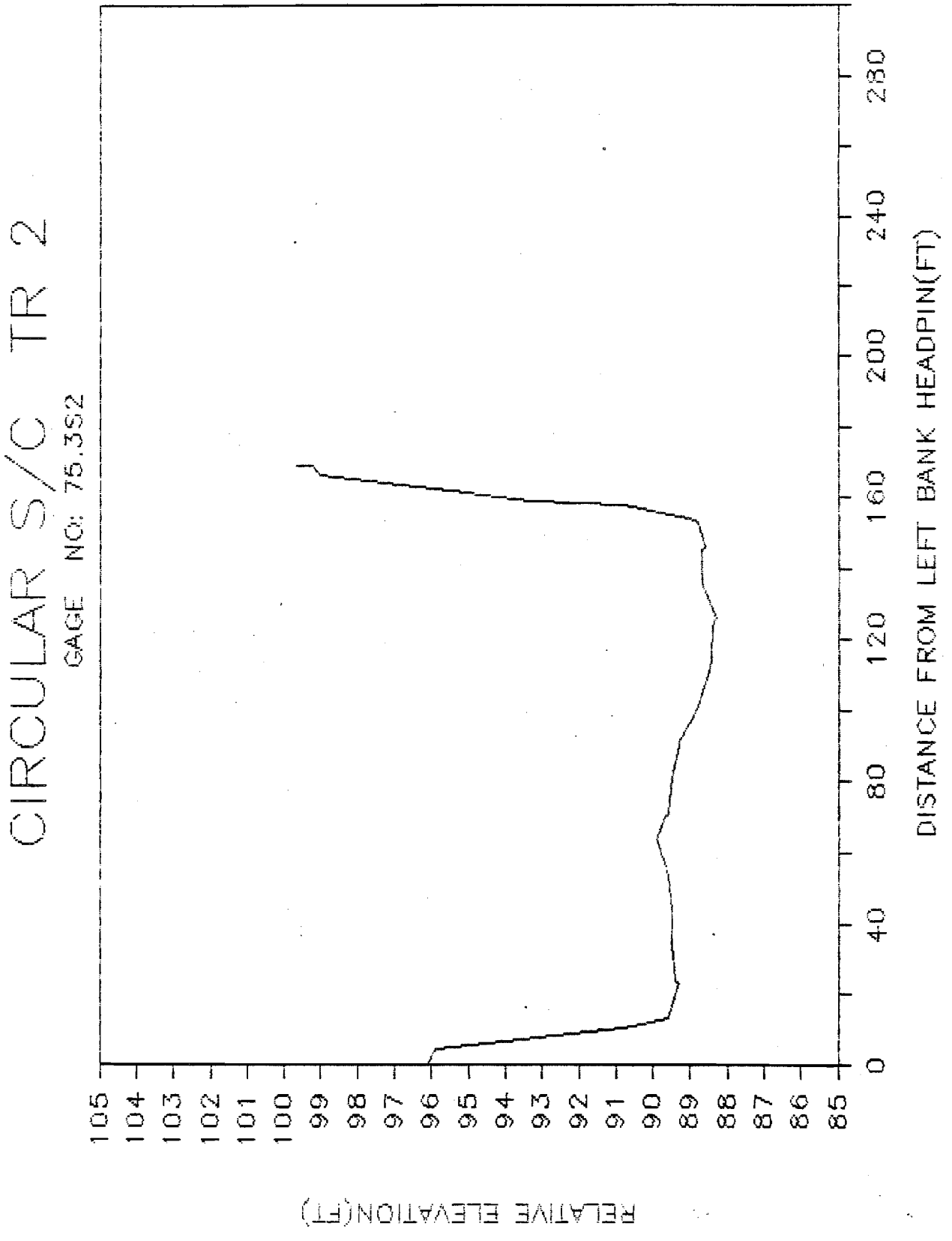


Figure D-17 Cross sectional profile obtained at Circular Side Channel transect 2.

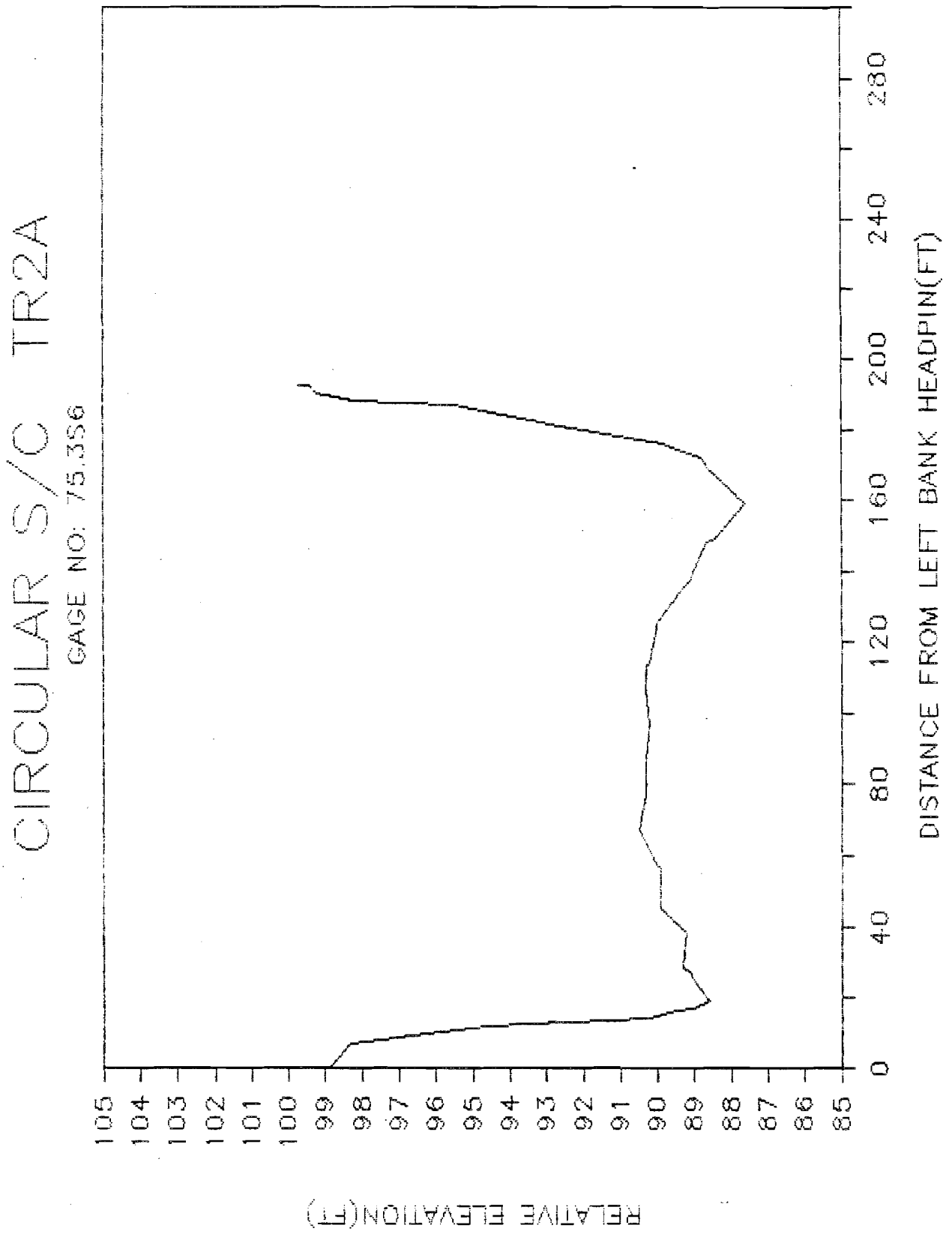


Figure D-18 Cross sectional profile obtained at Circular Side Channel transect 2A.

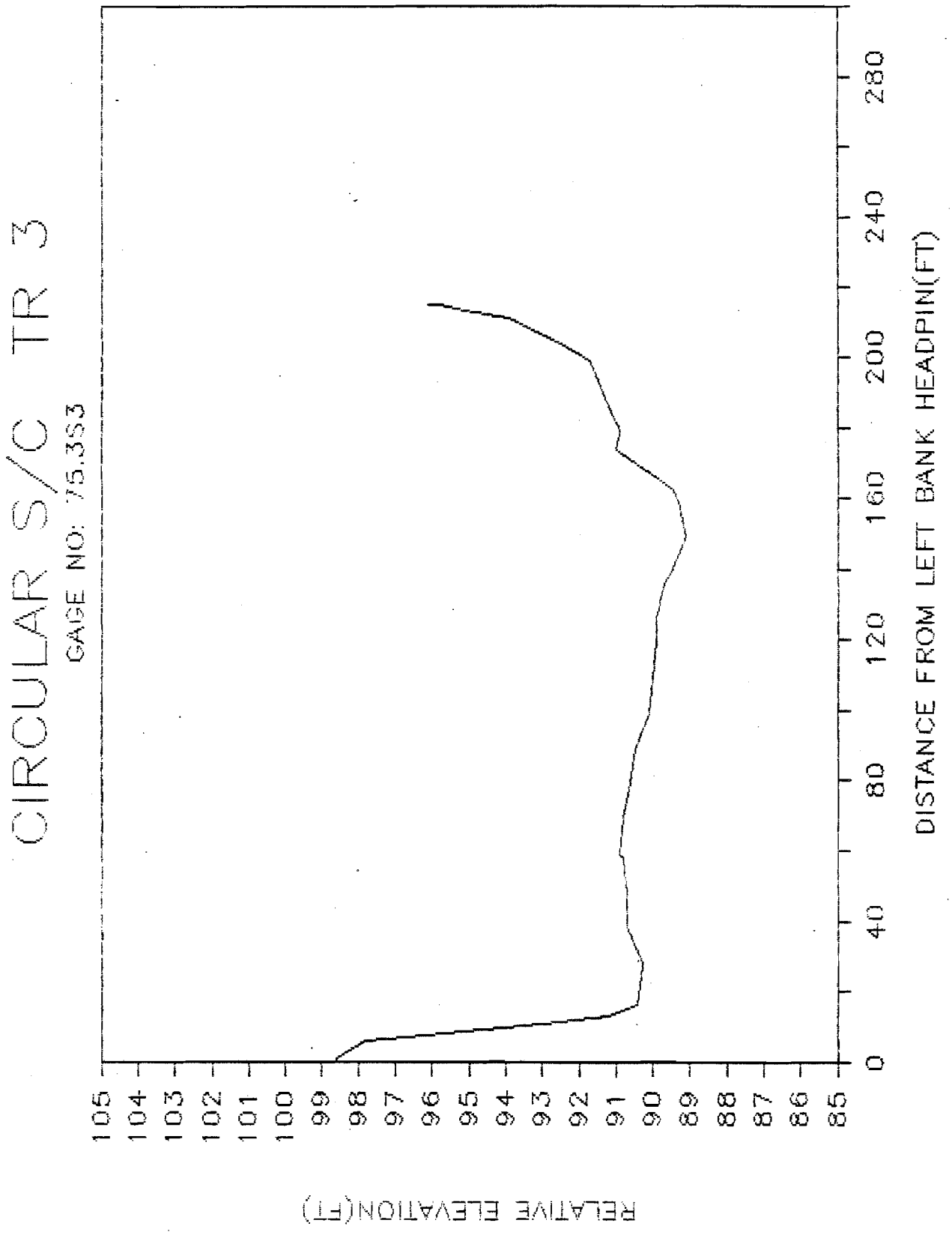


Figure D-19 Cross sectional profile obtained at Circular Side Channel transect 3.

Figure D-20 Cross sectional profile obtained at Circular Side Channel transect 4.

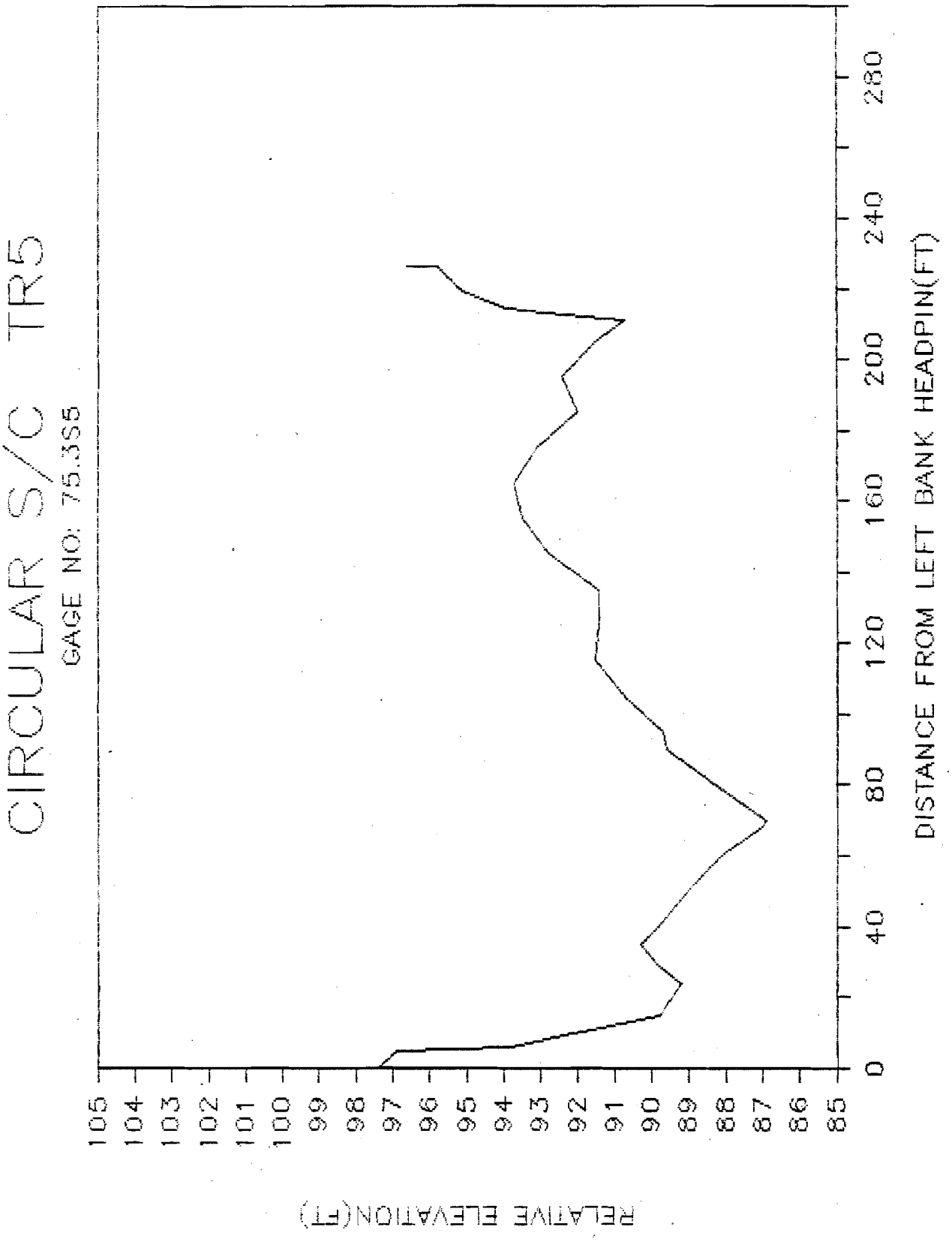


Figure D-21 Cross sectional profile obtained at Circular Side Channel transect 5.

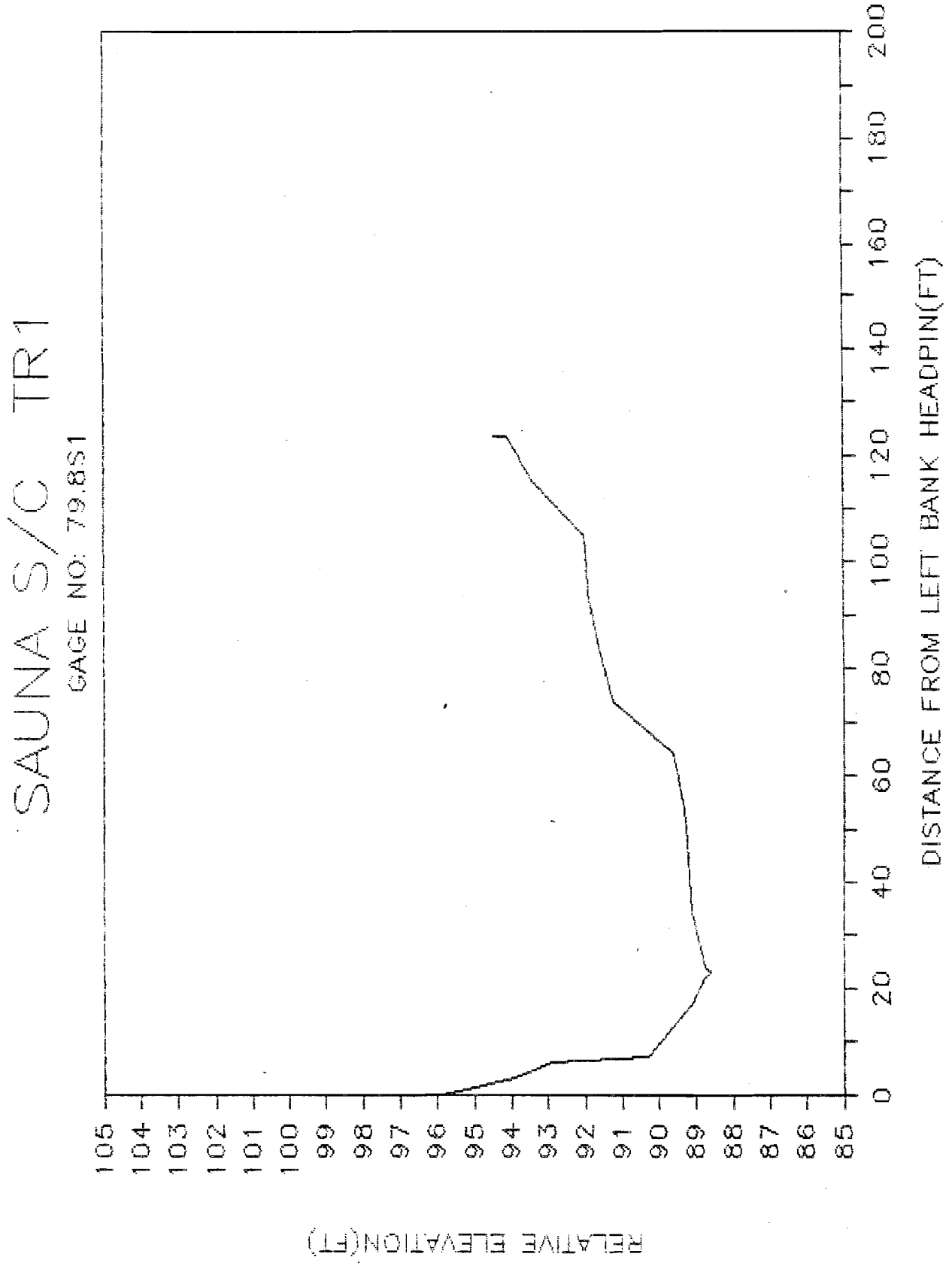


Figure D-22 Cross sectional profile obtained at Sauna Side Channel transect 1.

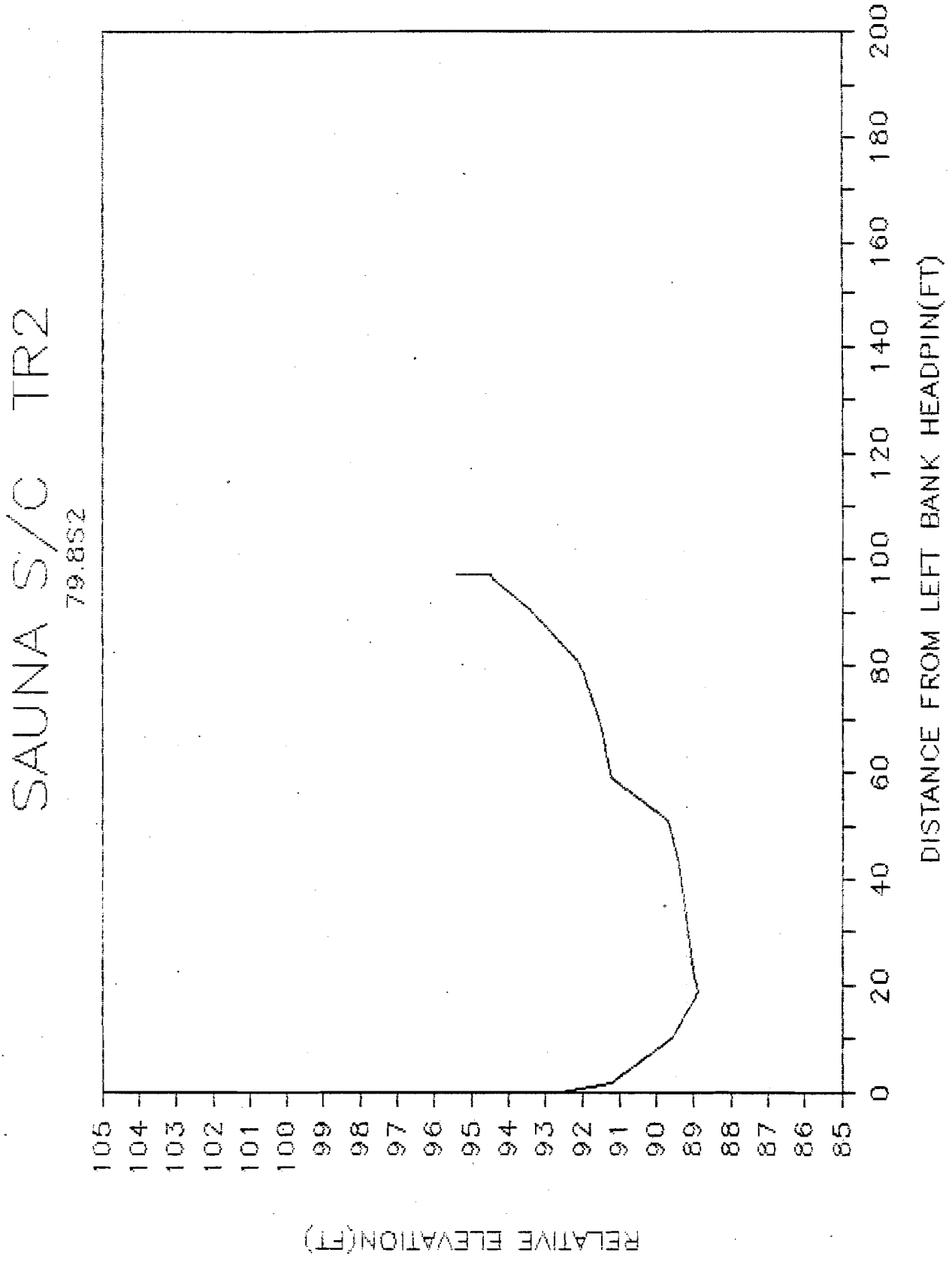


Figure D-23 Cross sectional profile obtained at Sauna Side Channel transect 2.

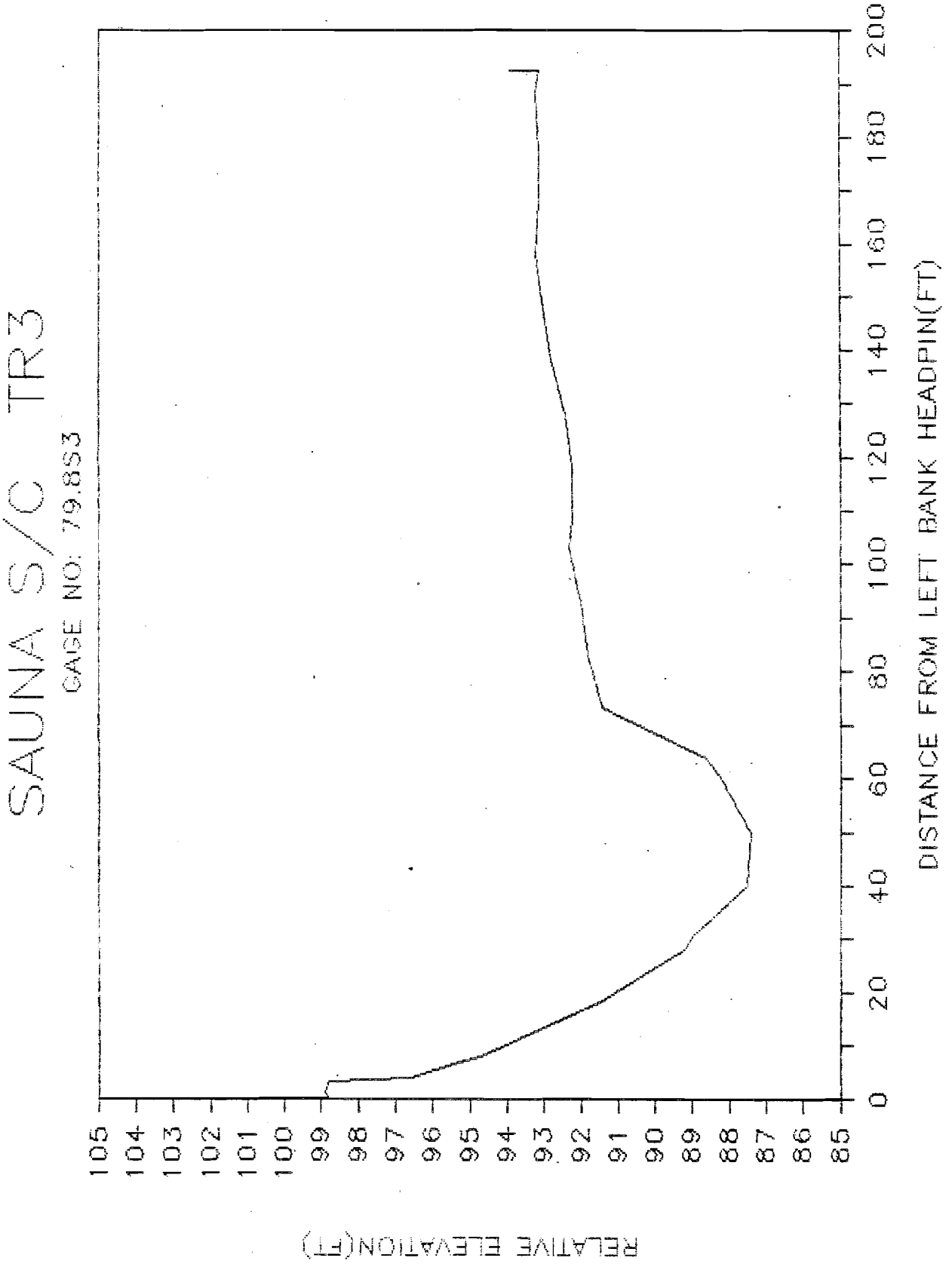


Figure D-24 Cross sectional profile obtained at Sauna Side Channel transect 3.

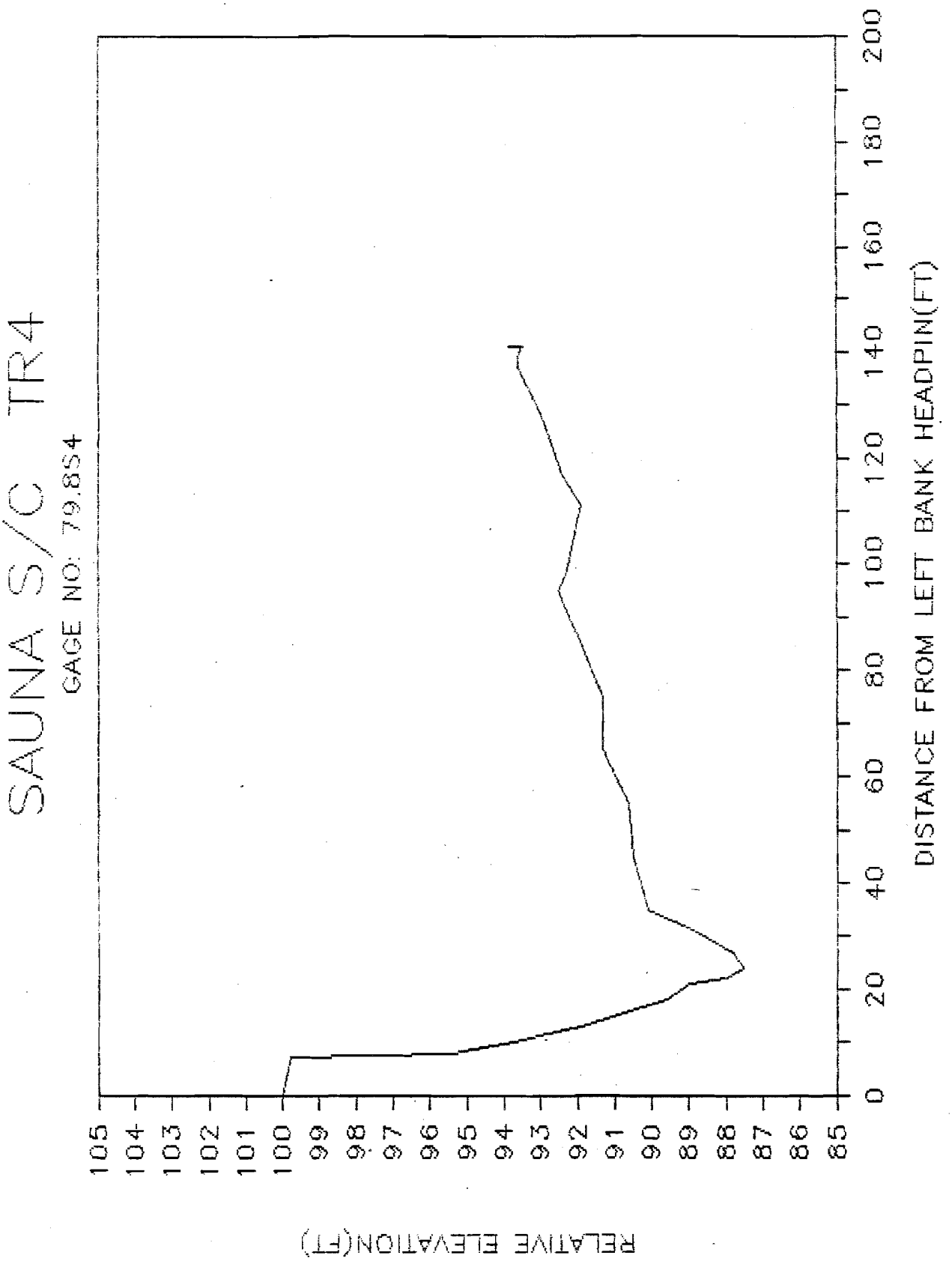


Figure D-25 Cross sectional profile obtained at Sauna Side Channel transect 4.

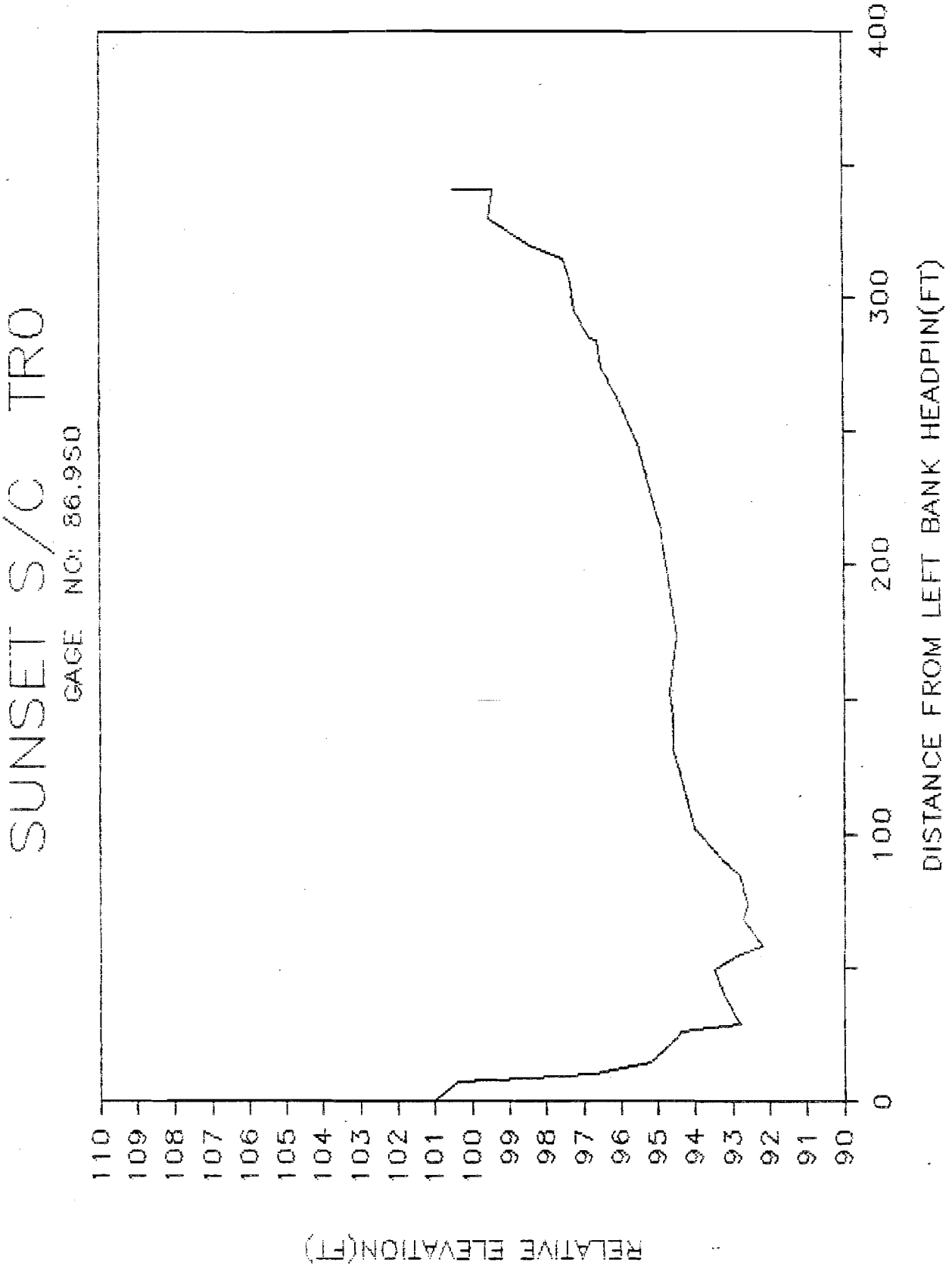


Figure D-26 Cross sectional profile obtained at Sunset Side Channel transect 0.

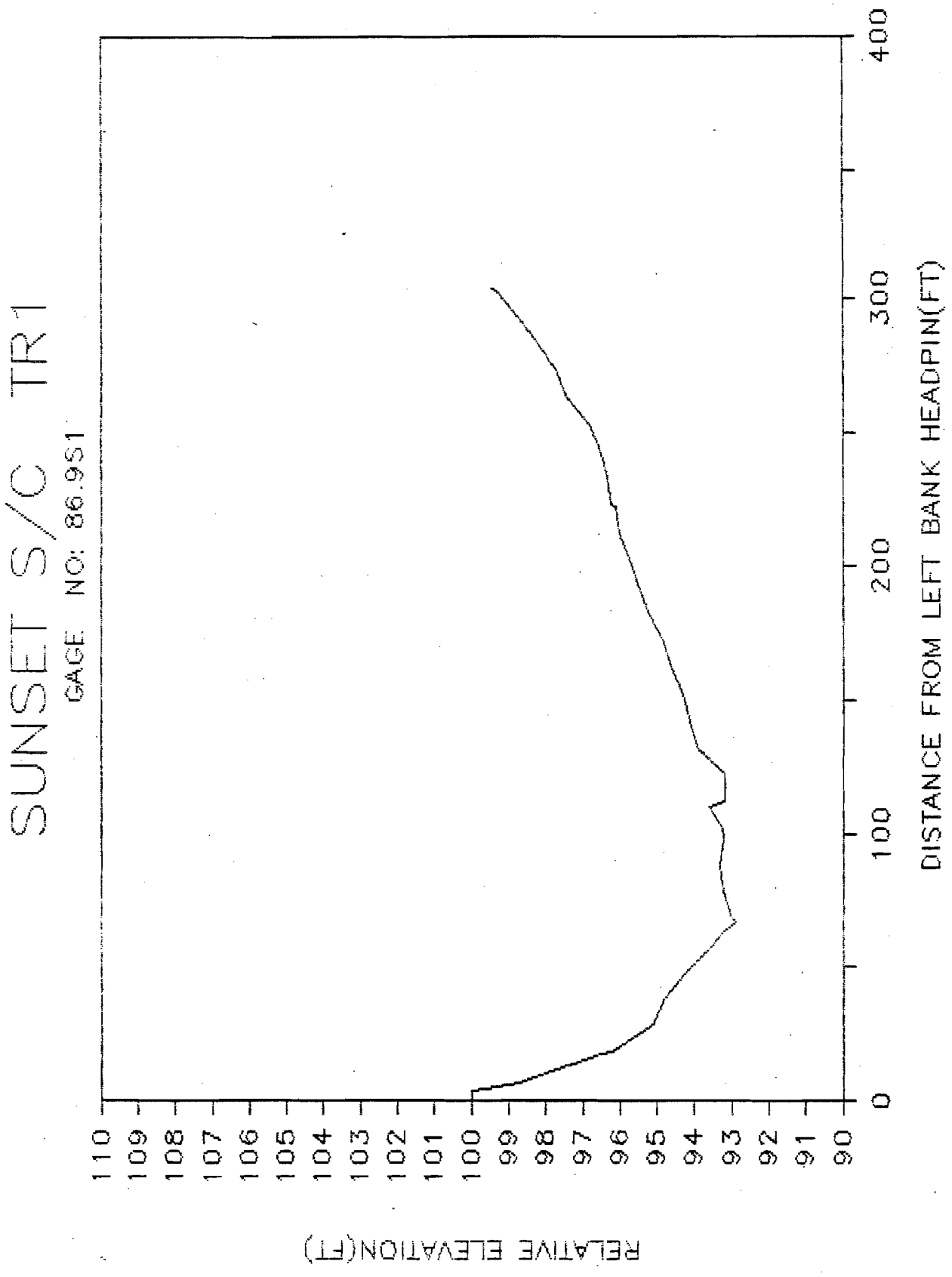


Figure D-27 Cross sectional profile obtained at Sunset Side Channel transect 1.

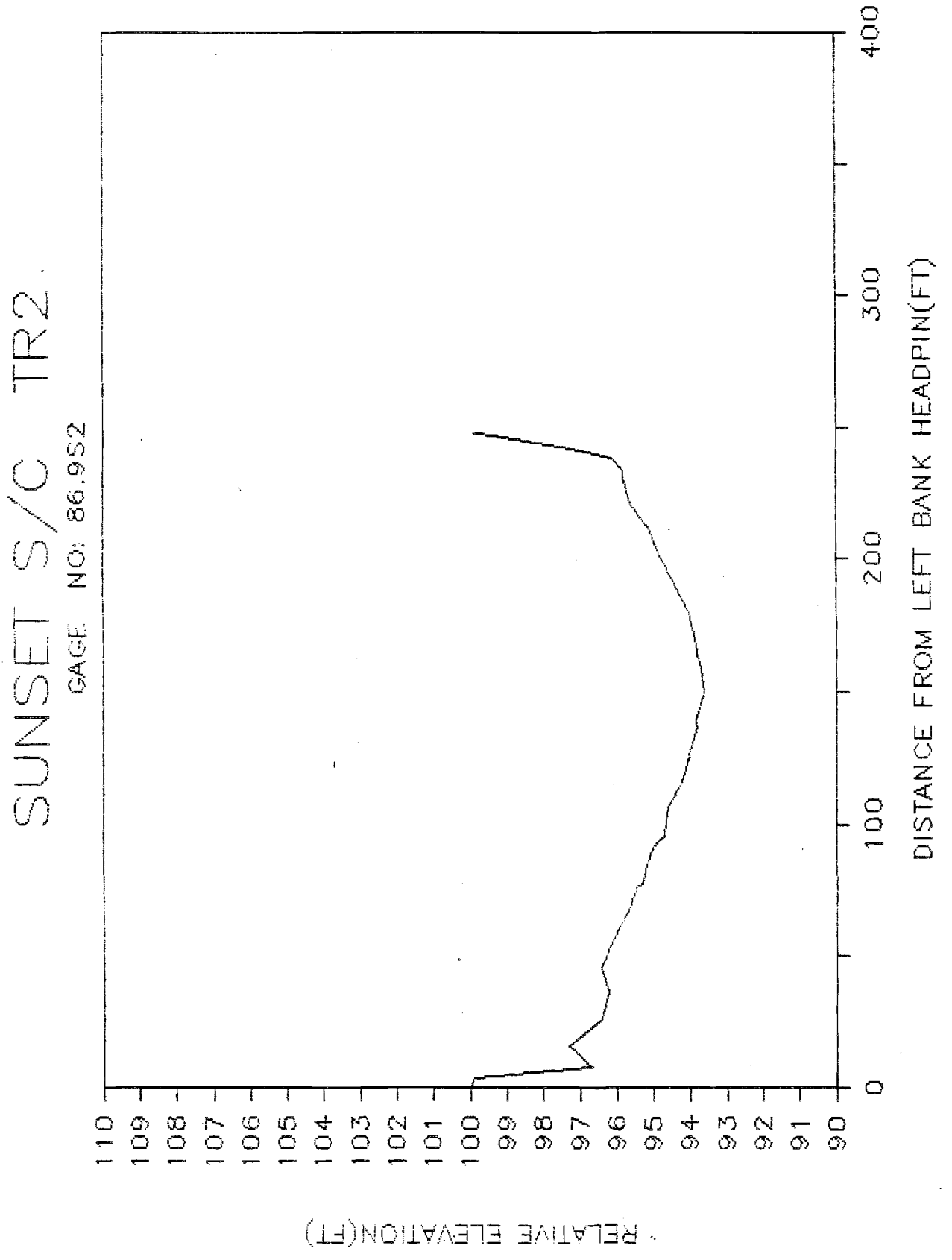


Figure D-28 Cross sectional profile obtained at Sunset Side Channel transect 2.

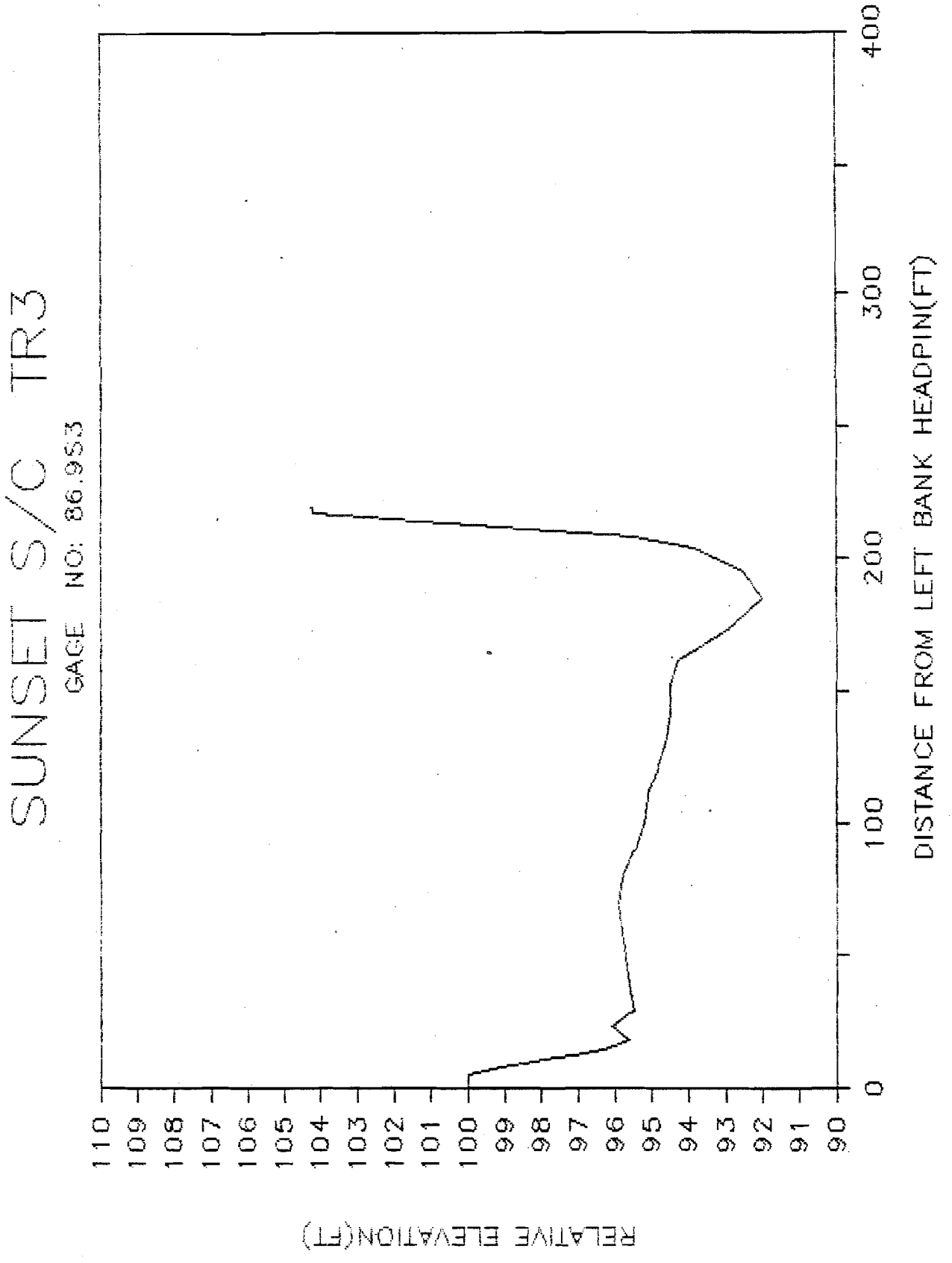


Figure D-29 Cross sectional profile obtained at Sunset Side Channel transect 3.

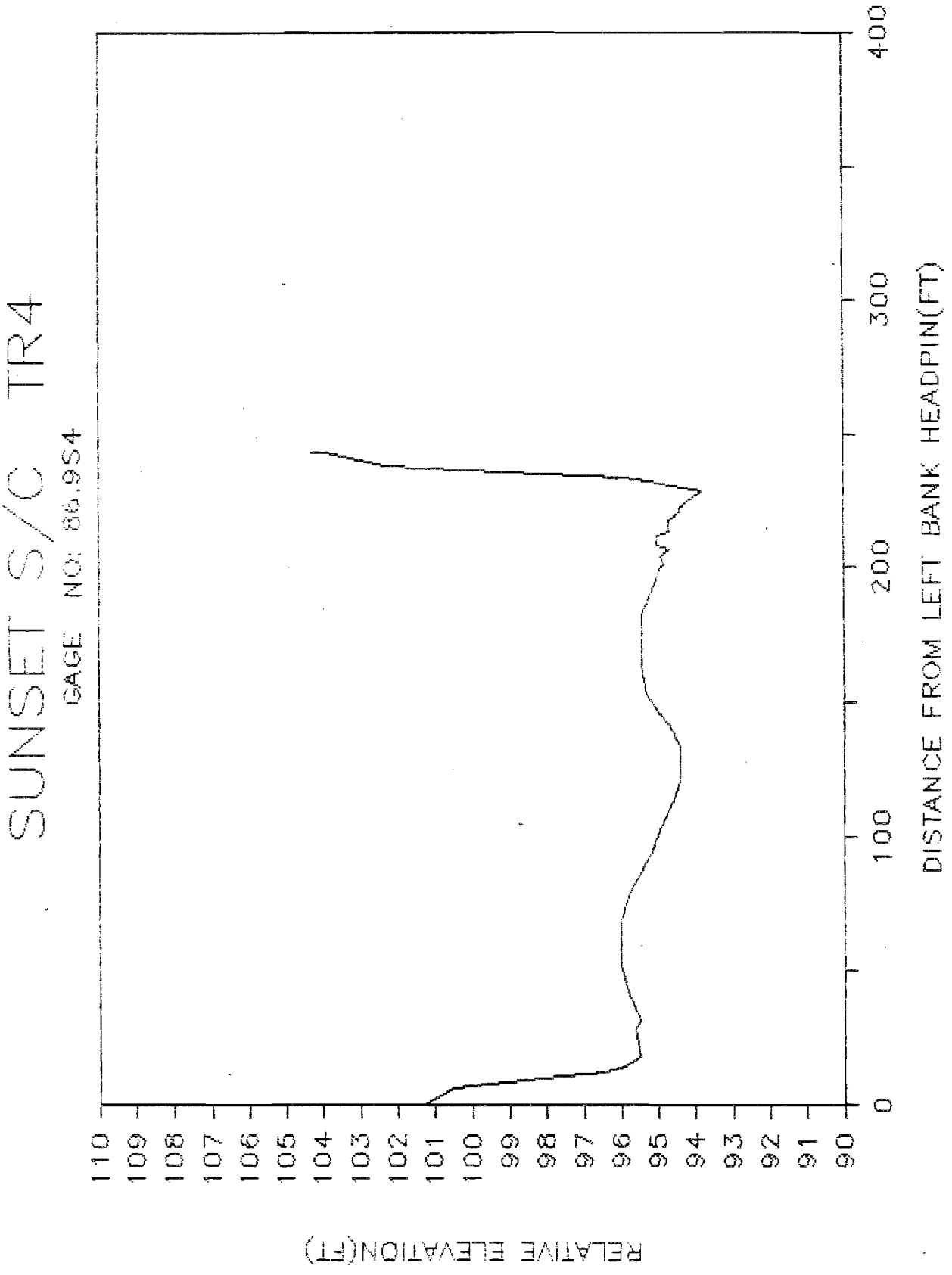


Figure D-30 Cross sectional profile obtained at Sunset Side Channel transect 4.

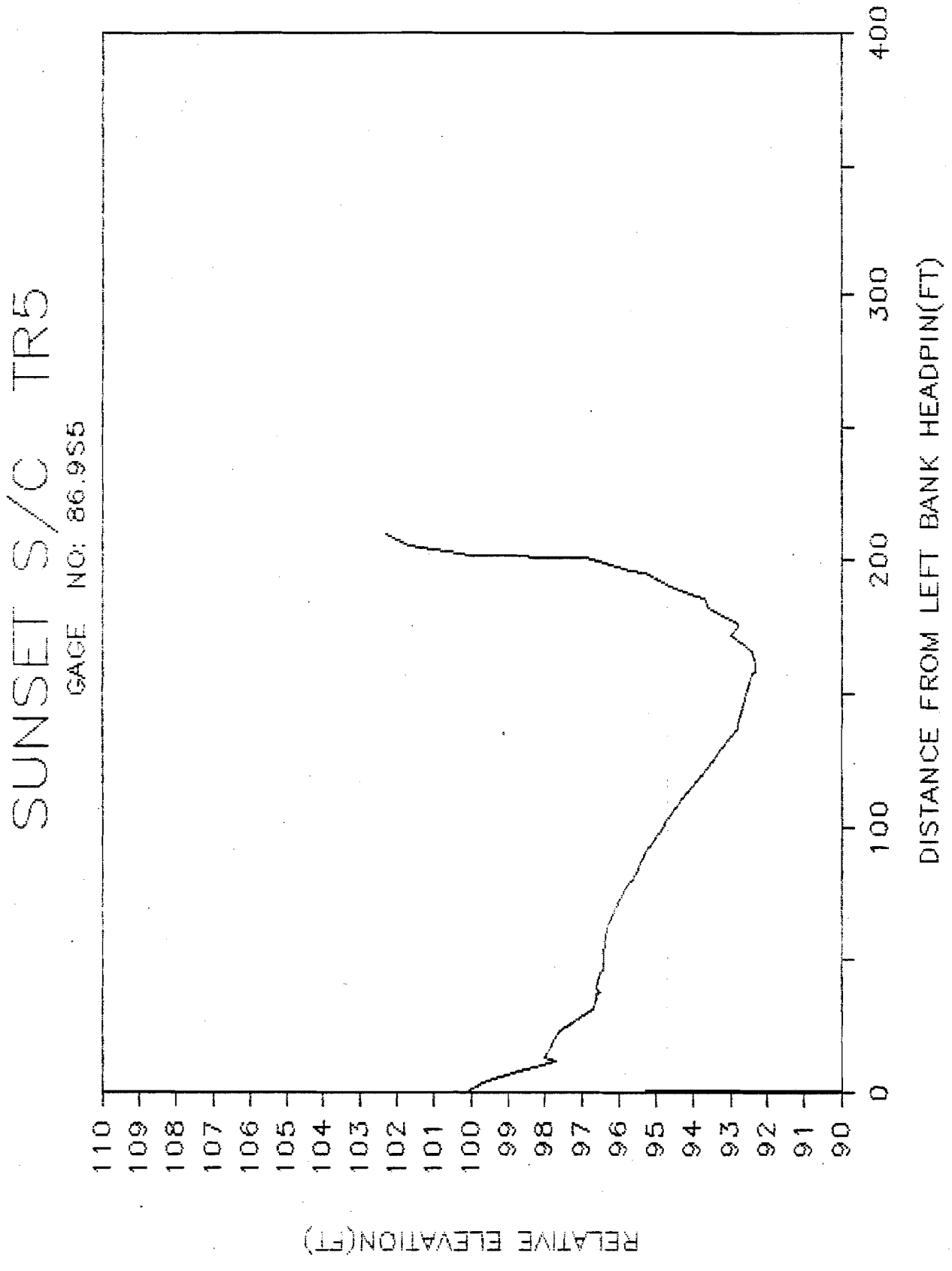


Figure D-31 Cross sectional profile obtained at Sunset Side Channel transect 5.

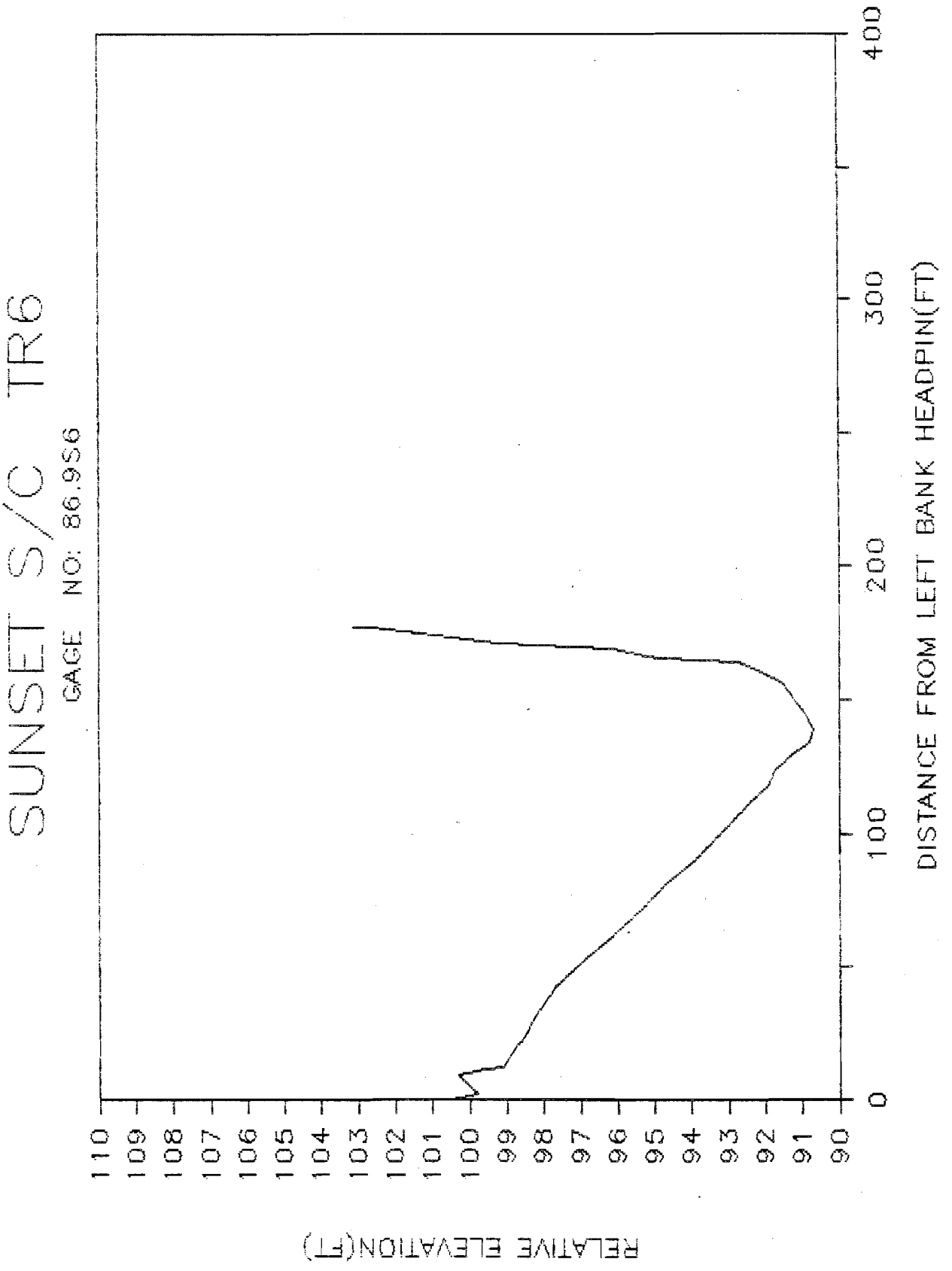


Figure D-32 Cross sectional profile obtained at Sunset Side Channel transect 6.

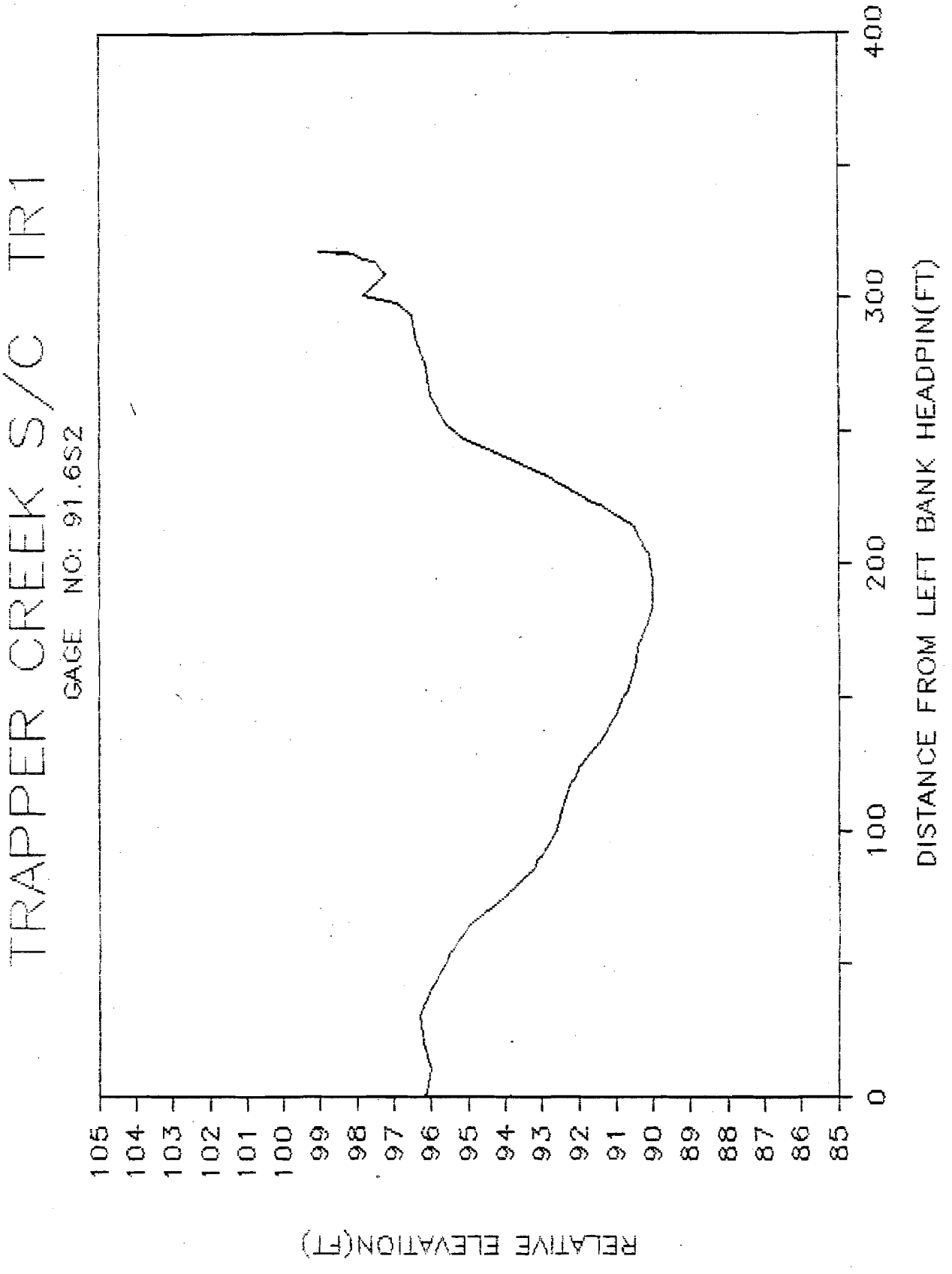


Figure D-33 Cross sectional profile obtained at Trapper Creek Side Channel transect 1.

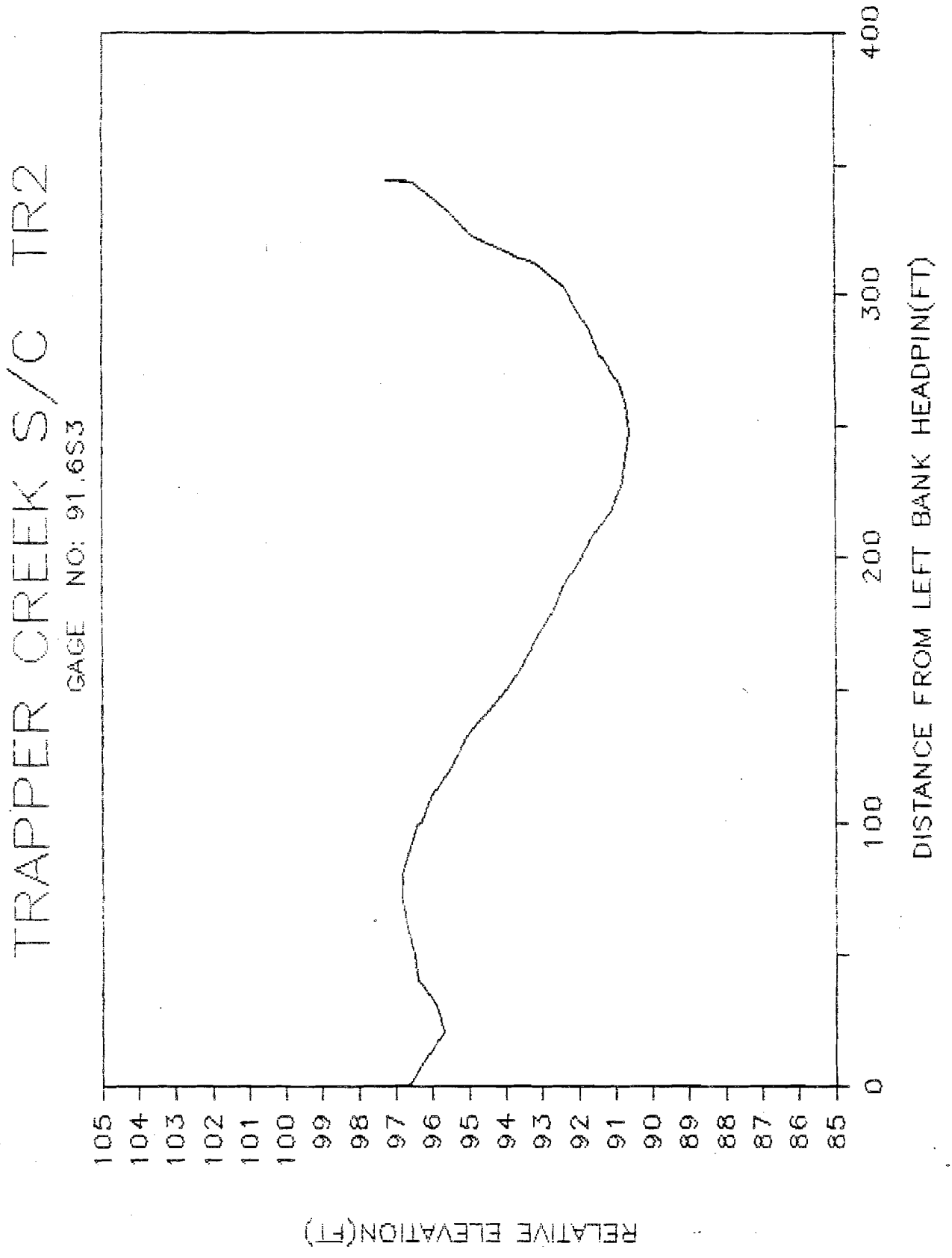


Figure D-34 Cross sectional profile obtained at Trapper Creek Side Channel transect 2.

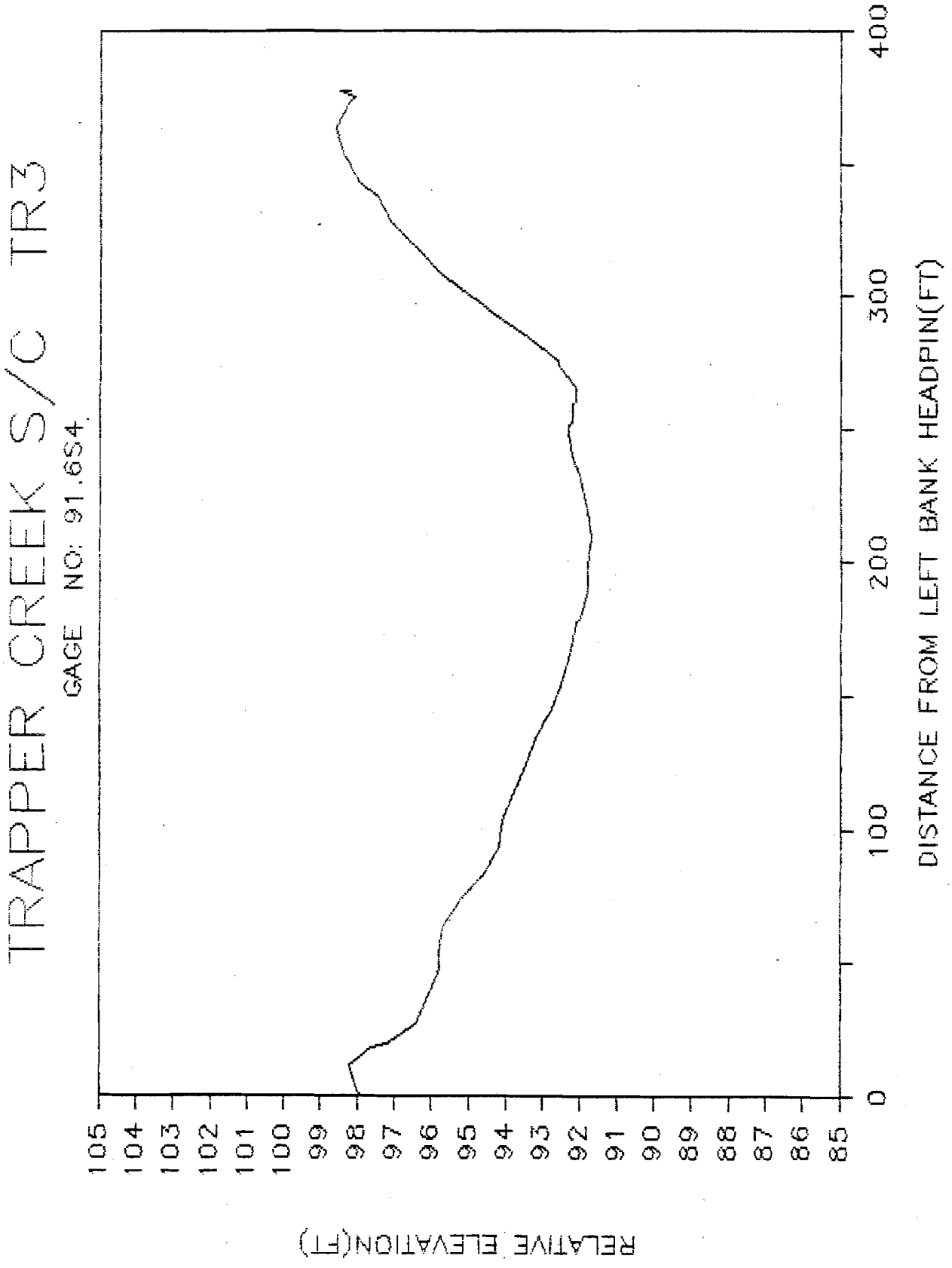


Figure D-35 Cross sectional profile obtained at Trapper Creek Side Channel transect 3.

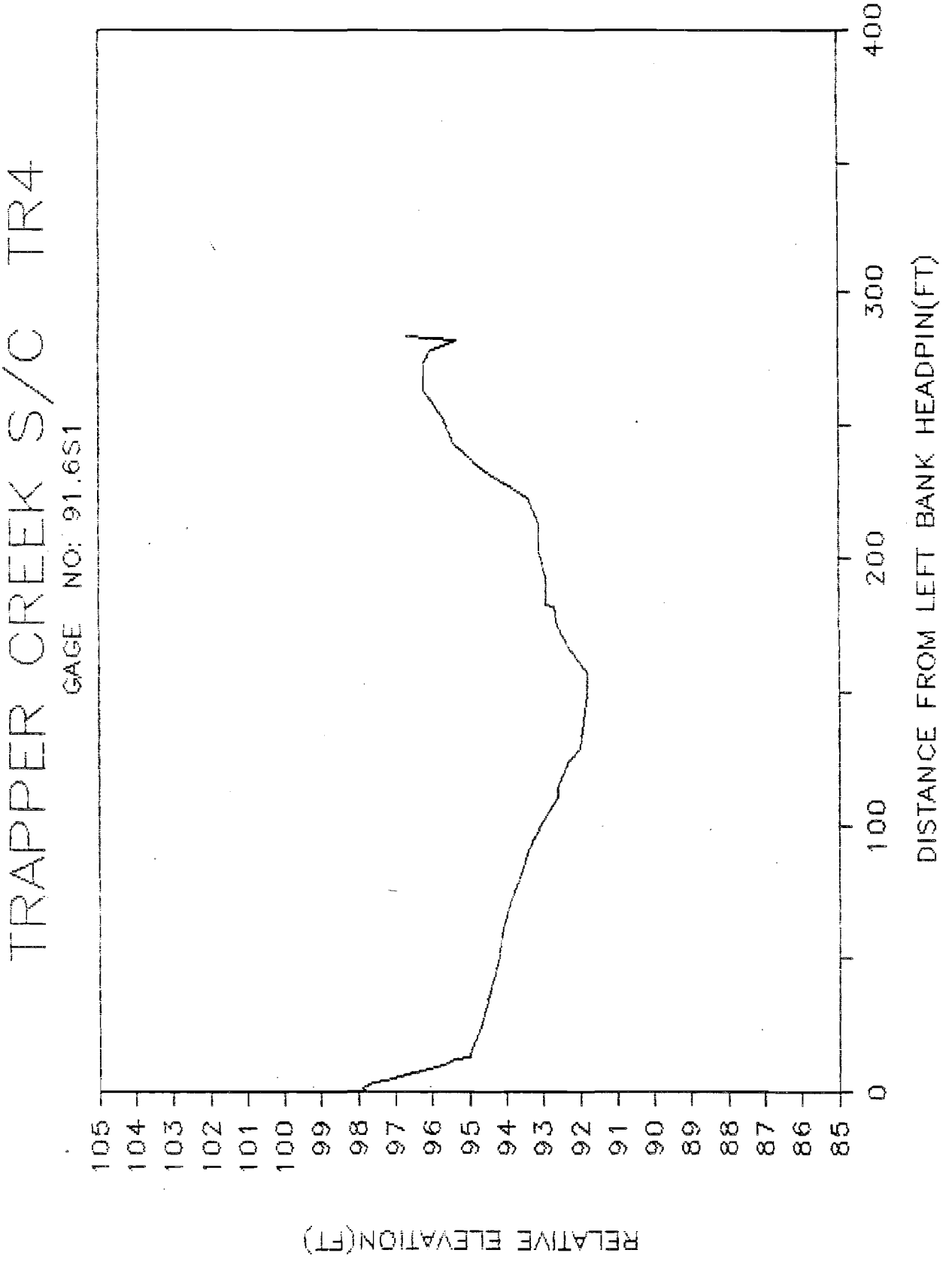
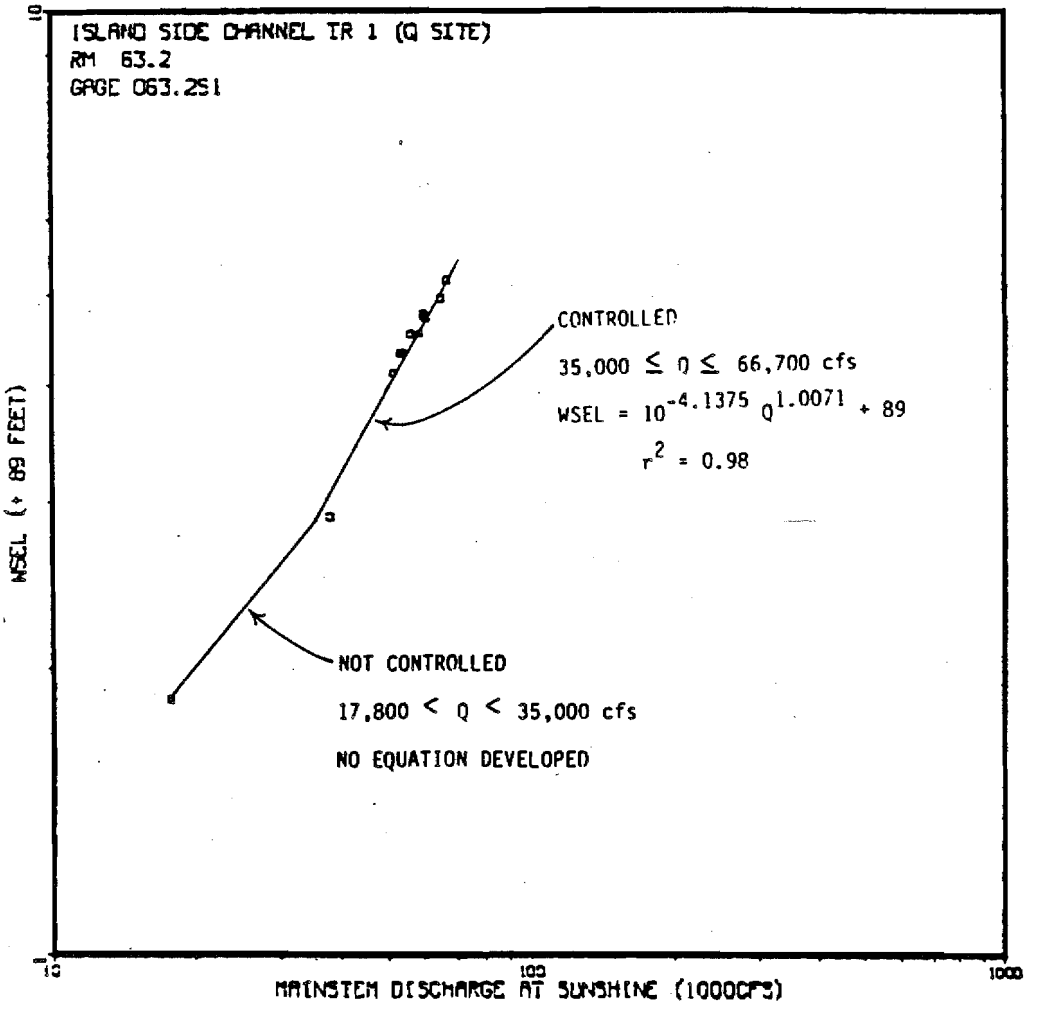
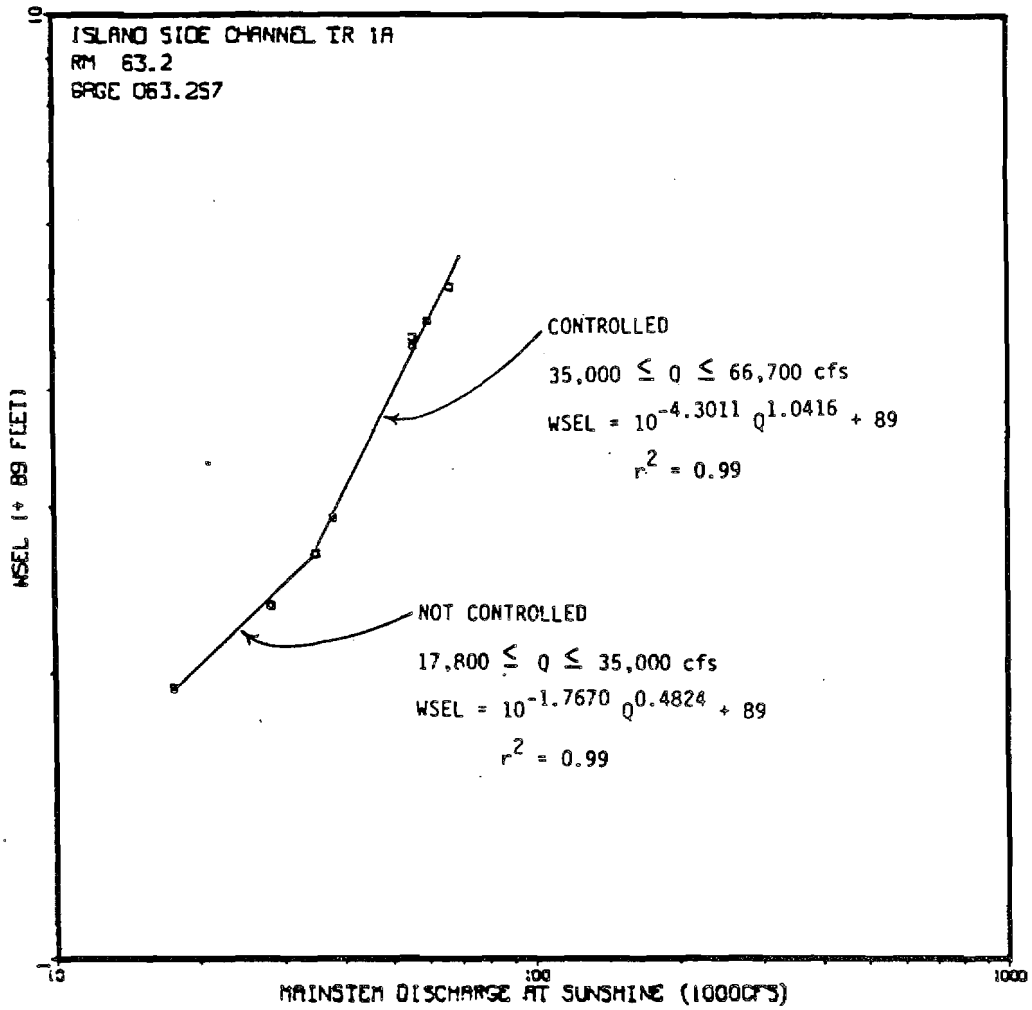


Figure D-36 Cross sectional profile obtained at Trapper Creek Side Channel transect 4.

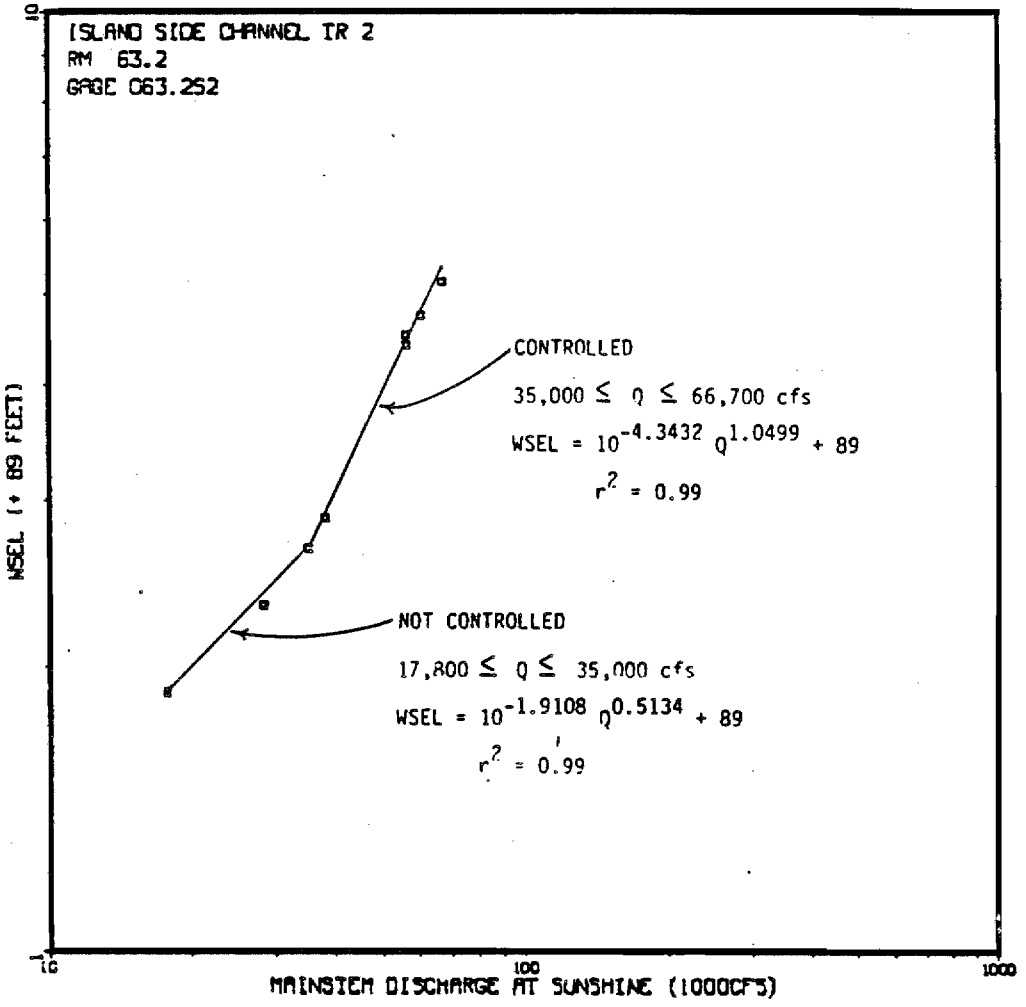
ATTACHMENT E



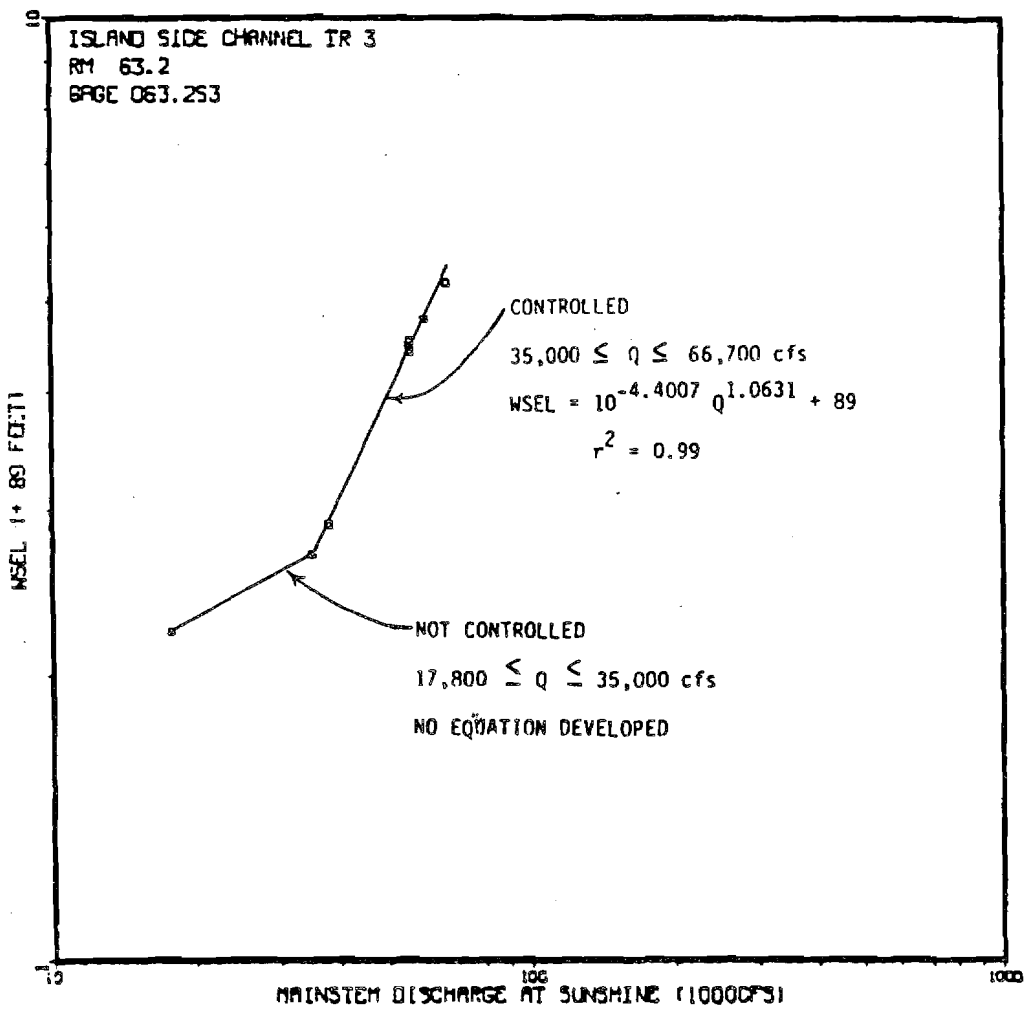
Attachment Figure E-1 WSEL versus mainstem discharge (USGS 15292780) at Island Side Channel transect 1 (Q Site).



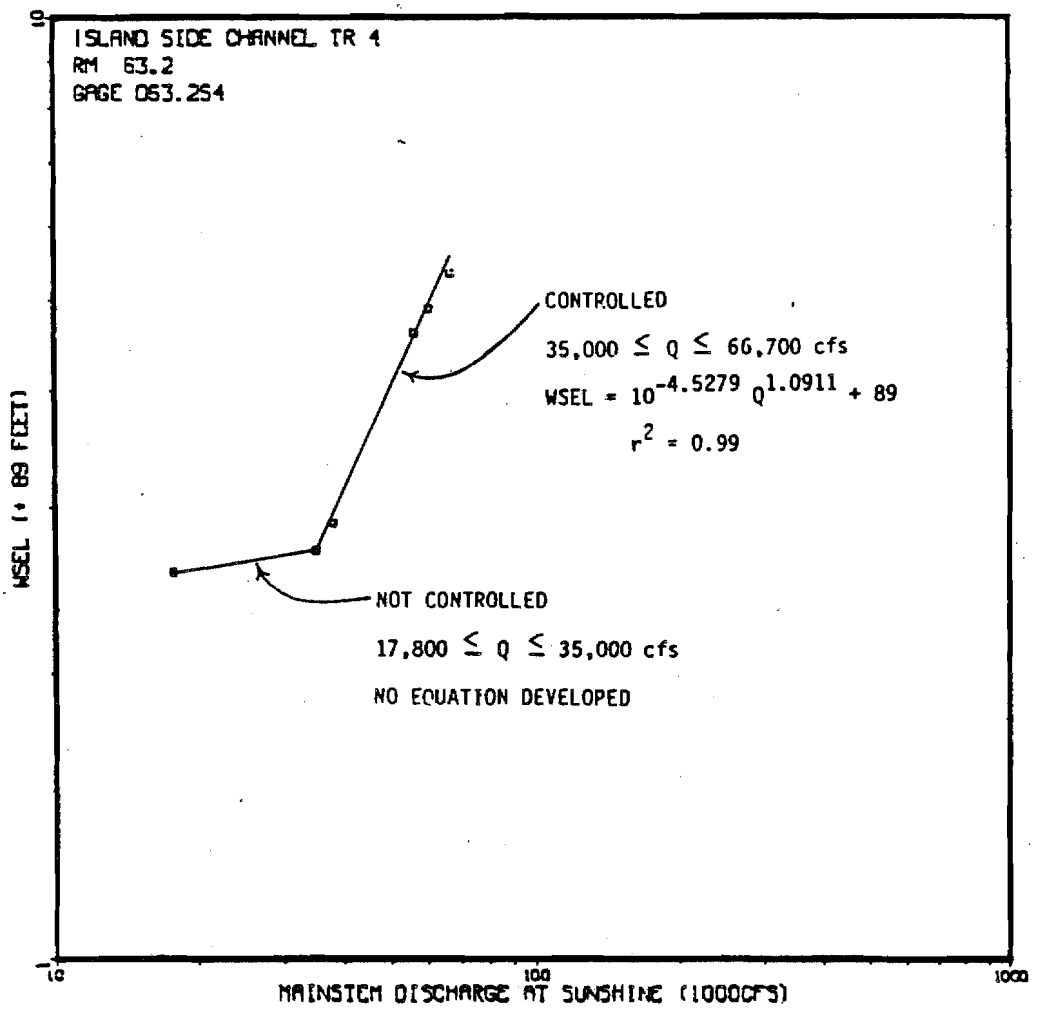
Attachment Figure E-2 WSEL versus mainstem discharge (USGS 15292780) at Island Side Channel transect 1A (Q Site).



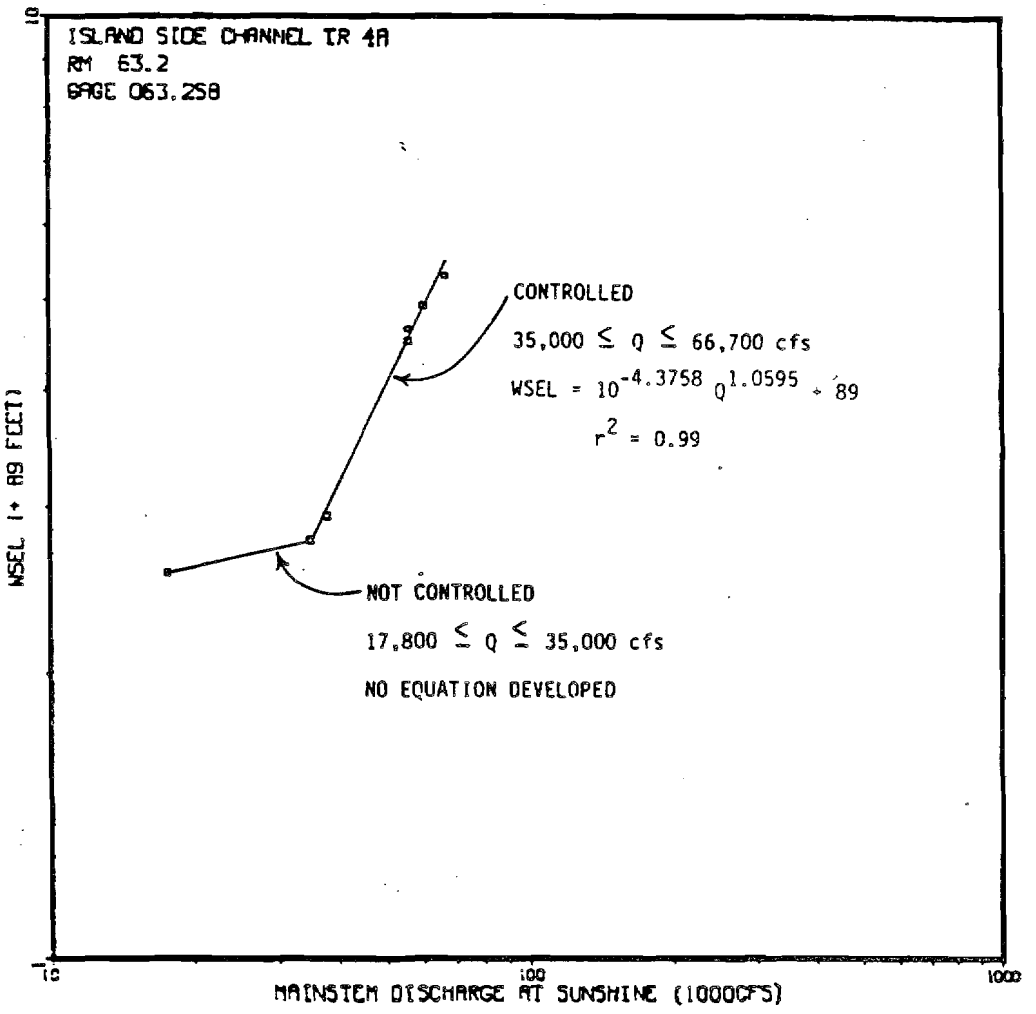
Attachment Figure E-3 WSEL versus mainstem discharge (USGS 15292780) at Island Side Channel transect 2 (Q Site).



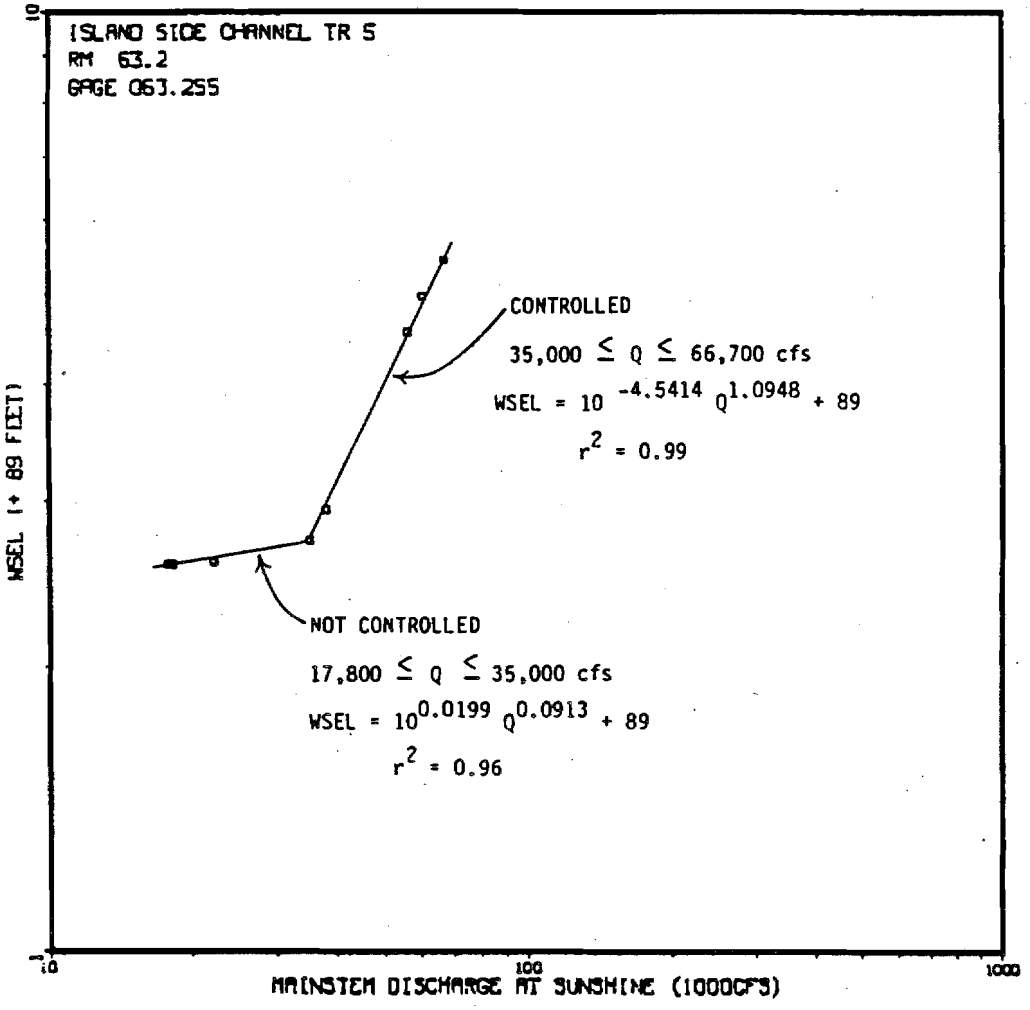
Attachment Figure E-4 WSEL versus mainstem discharge (USGS 15292780) at Island Side Channel transect 3 (Q Site).



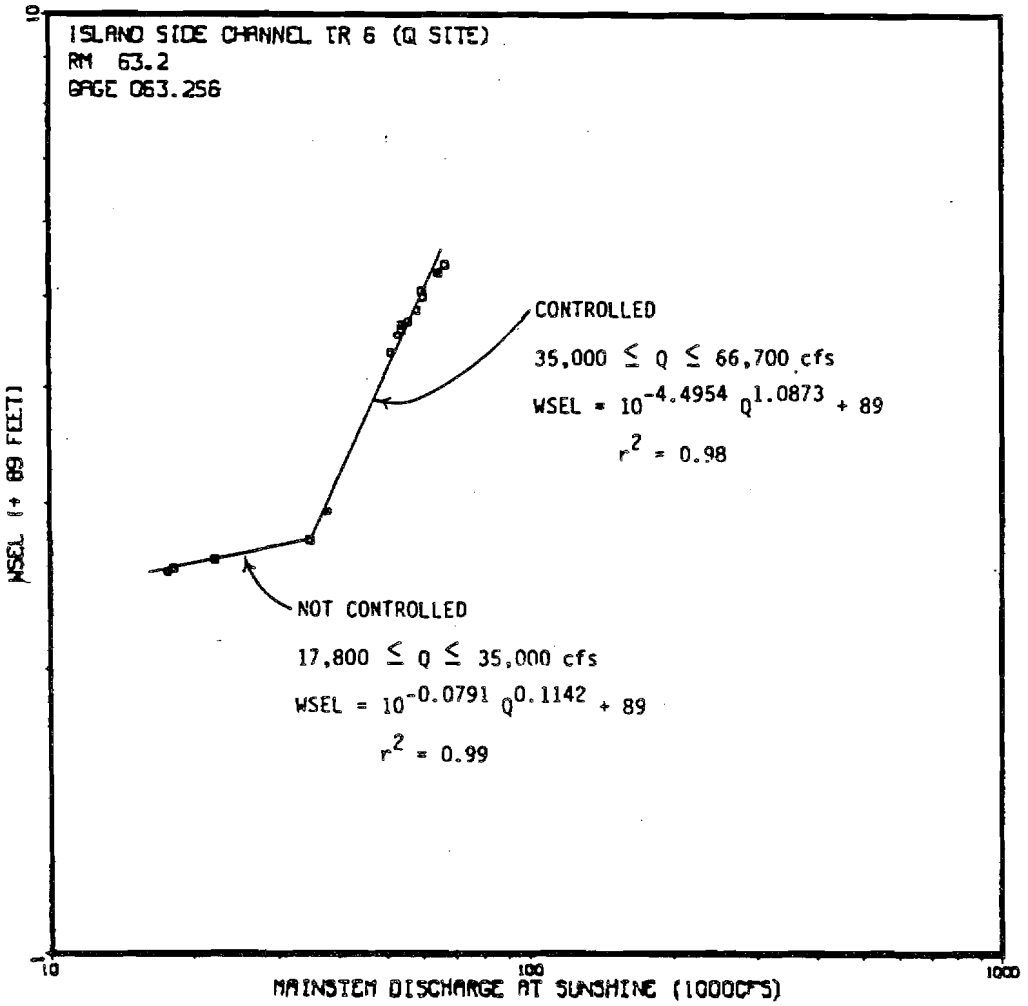
Attachment Figure E-5 WSEL versus mainstem discharge (USGS 15292780) at Island Side Channel transect 4 (Q Site).



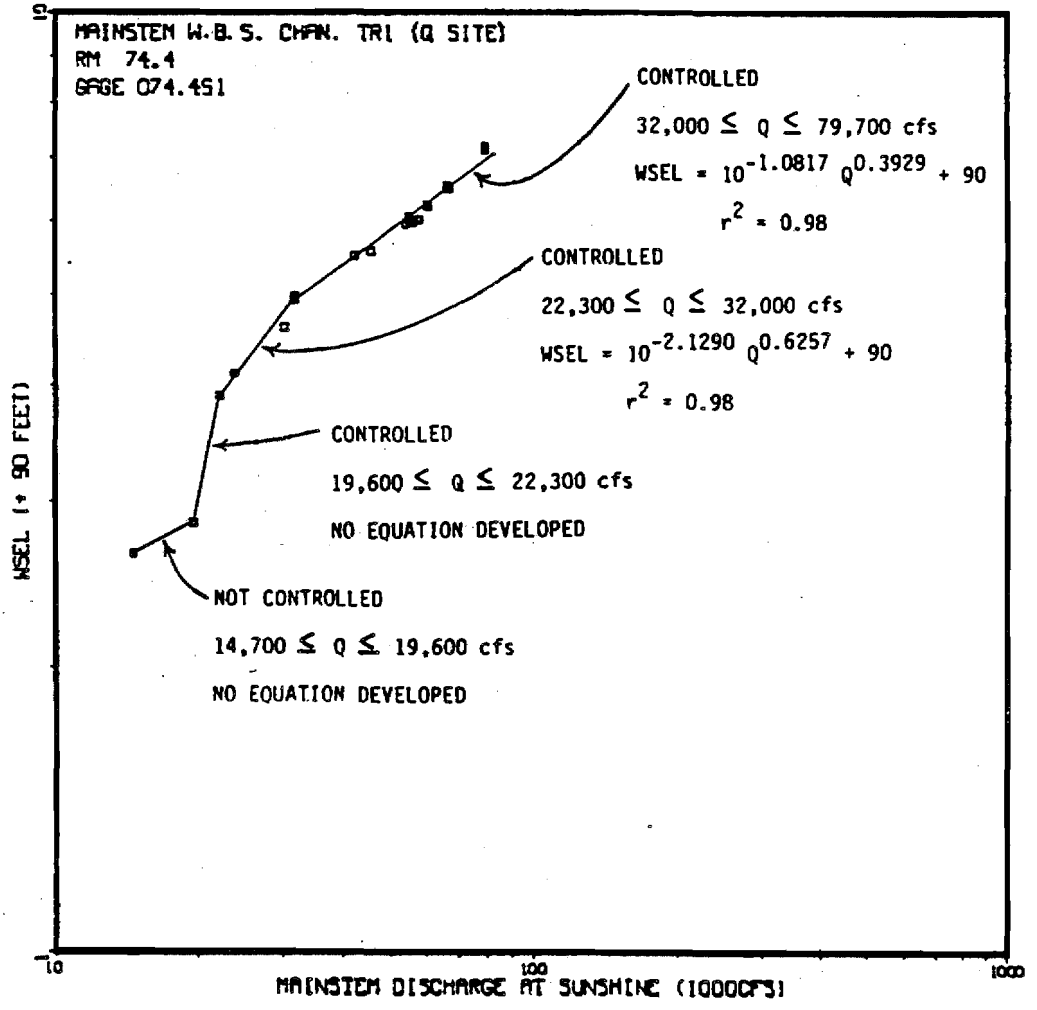
Attachment Figure E-6 WSEL versus mainstem discharge (USGS 15292780) at Island Side Channel transect 4A (Q Site).



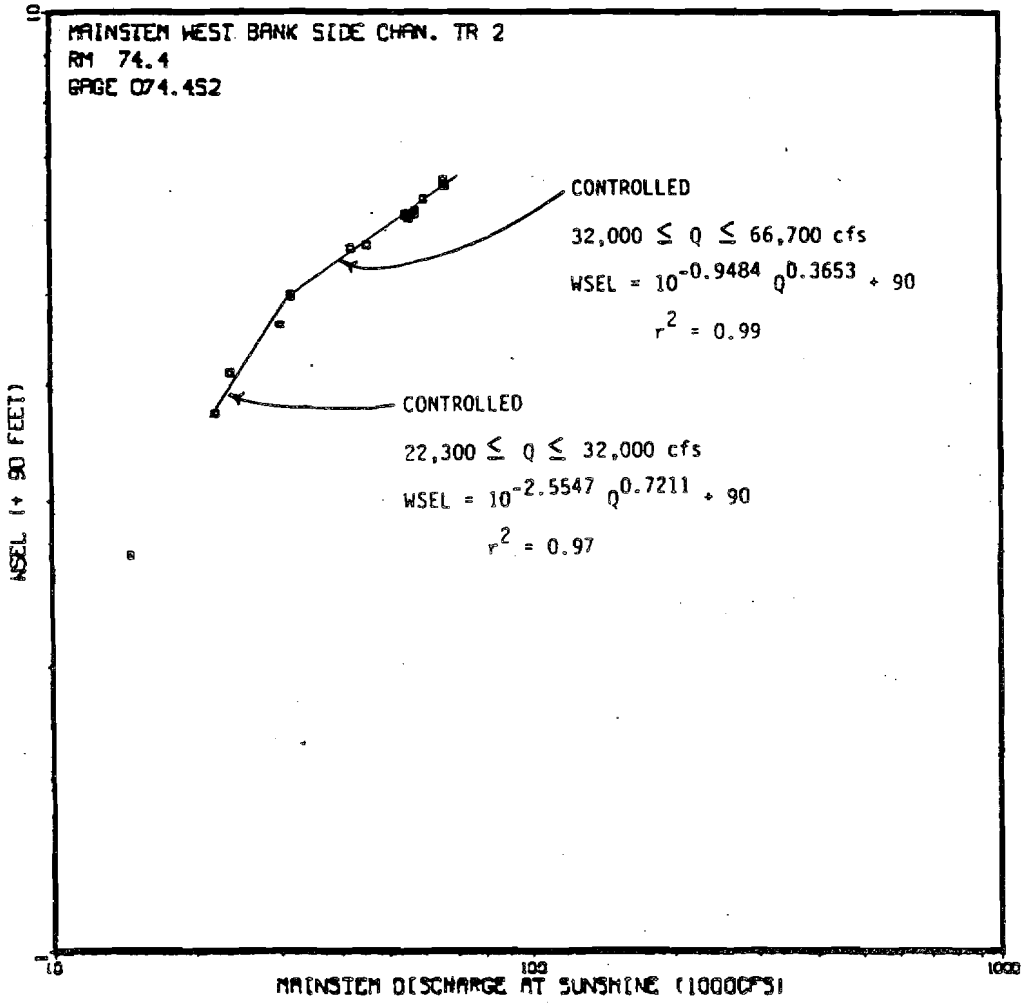
Attachment Figure E-7 WSEL versus mainstem discharge (USGS 15292780) at Island Side Channel transect 5 (Q Site).



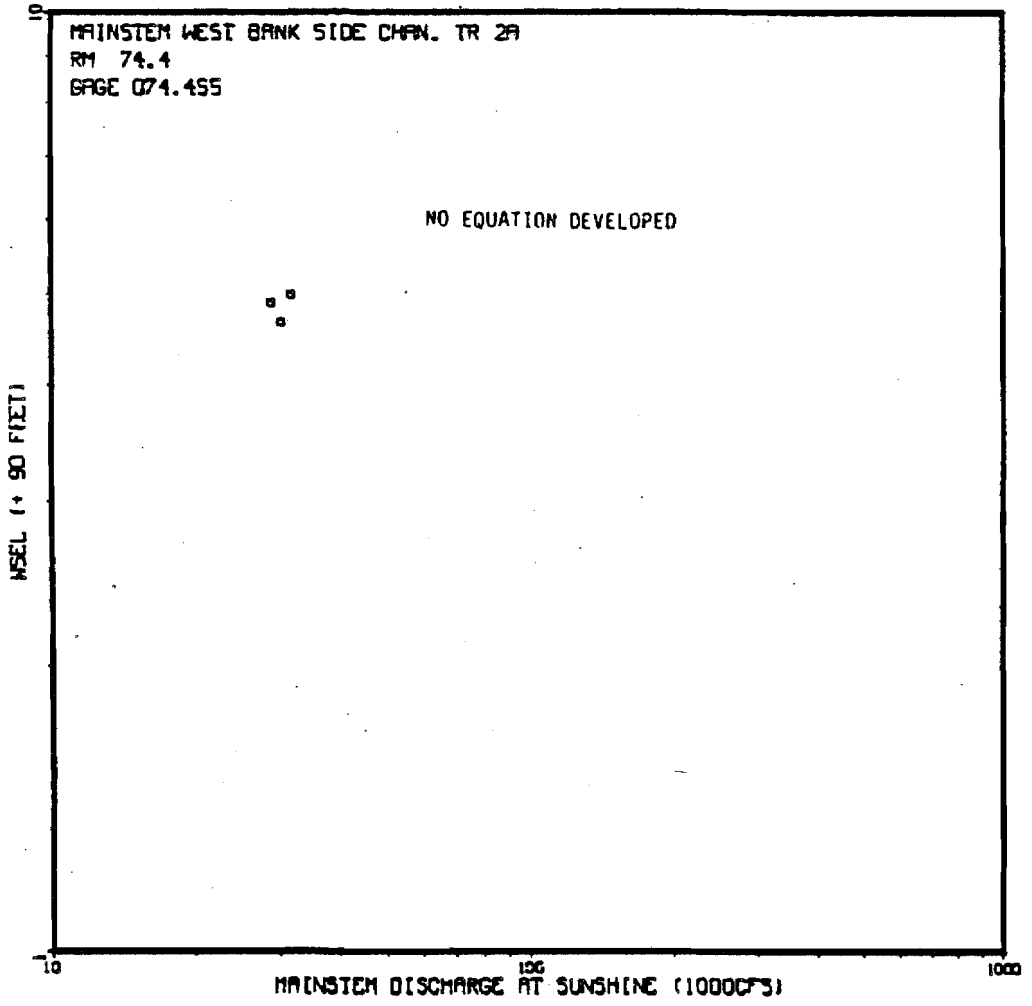
Attachment Figure E-8 WSEL versus mainstem discharge (USGS 15292780) at Island Side Channel transect 6 (Q Site).



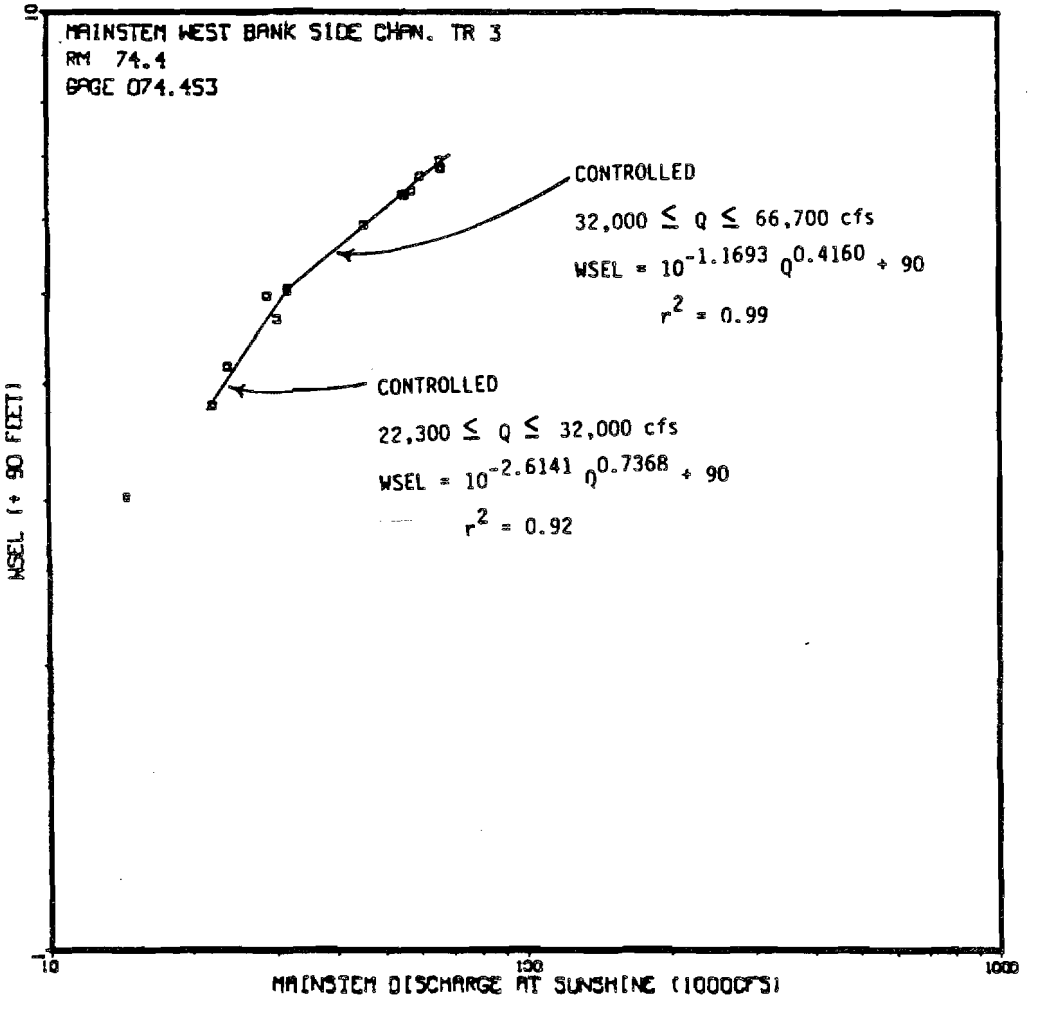
Attachment Figure E-9 WSEL versus mainstem discharge (USGS 15292780) at Mainstem West Bank Side Channel transect 1.



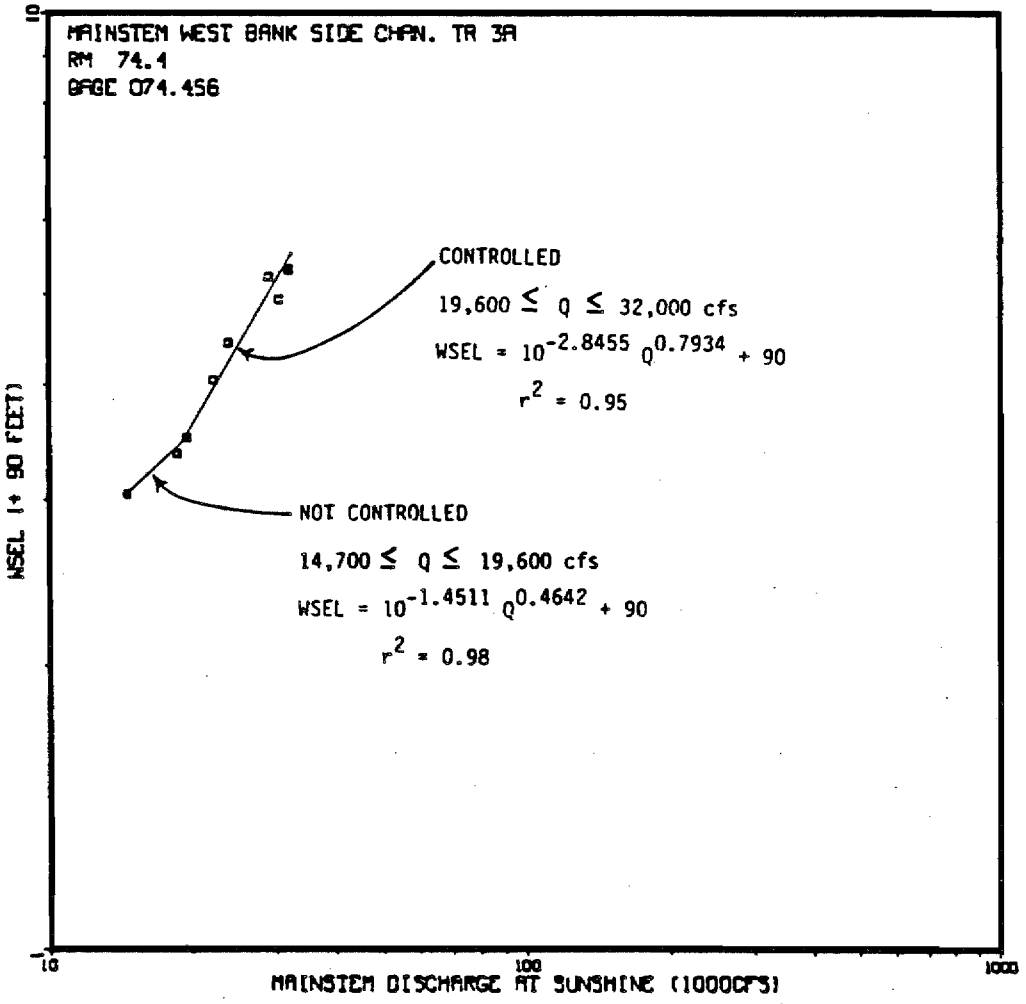
Attachment Figure E-10 WSEL versus mainstem discharge (USGS 15292780) at Mainstem West Bank Side Channel transect 2.



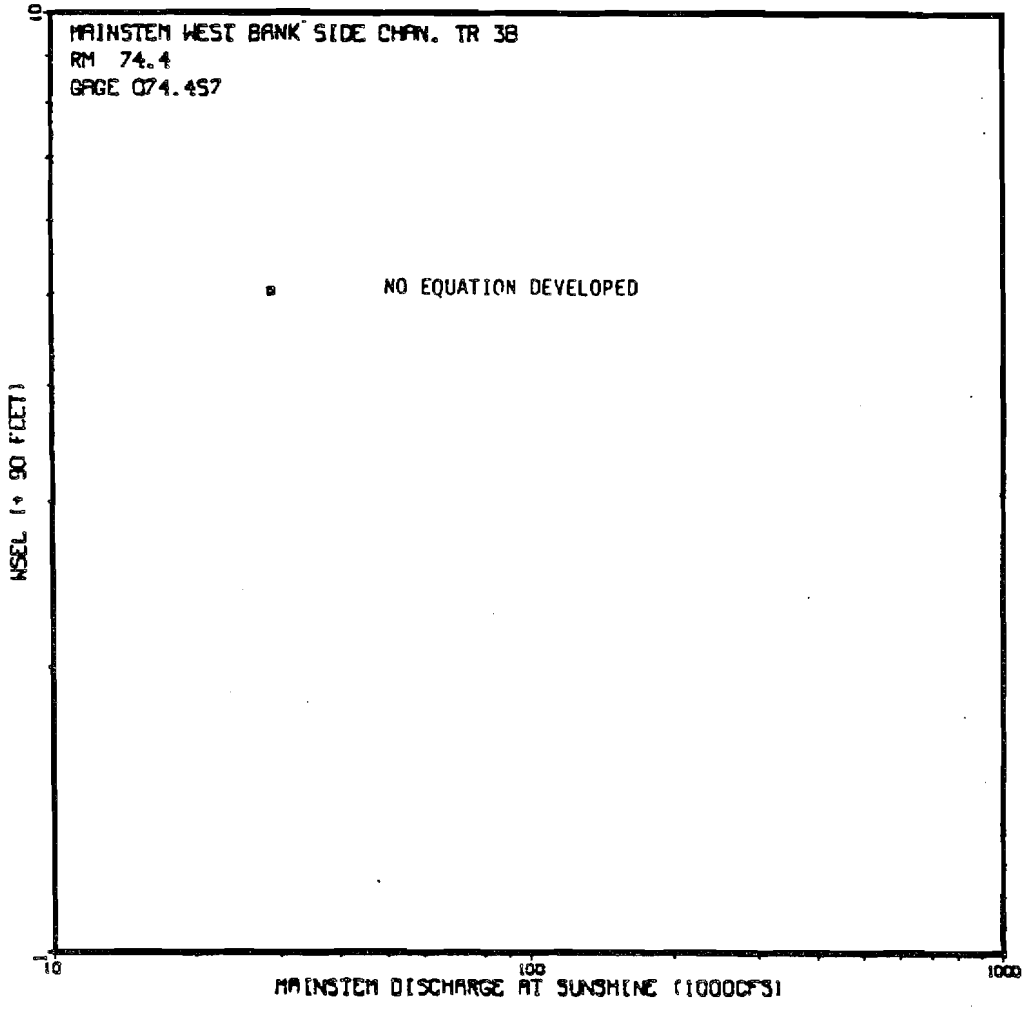
Attachment Figure E-11 WSEL versus mainstem discharge (USGS 15292780) at Mainstem West Bank Side Channel transect 2A.



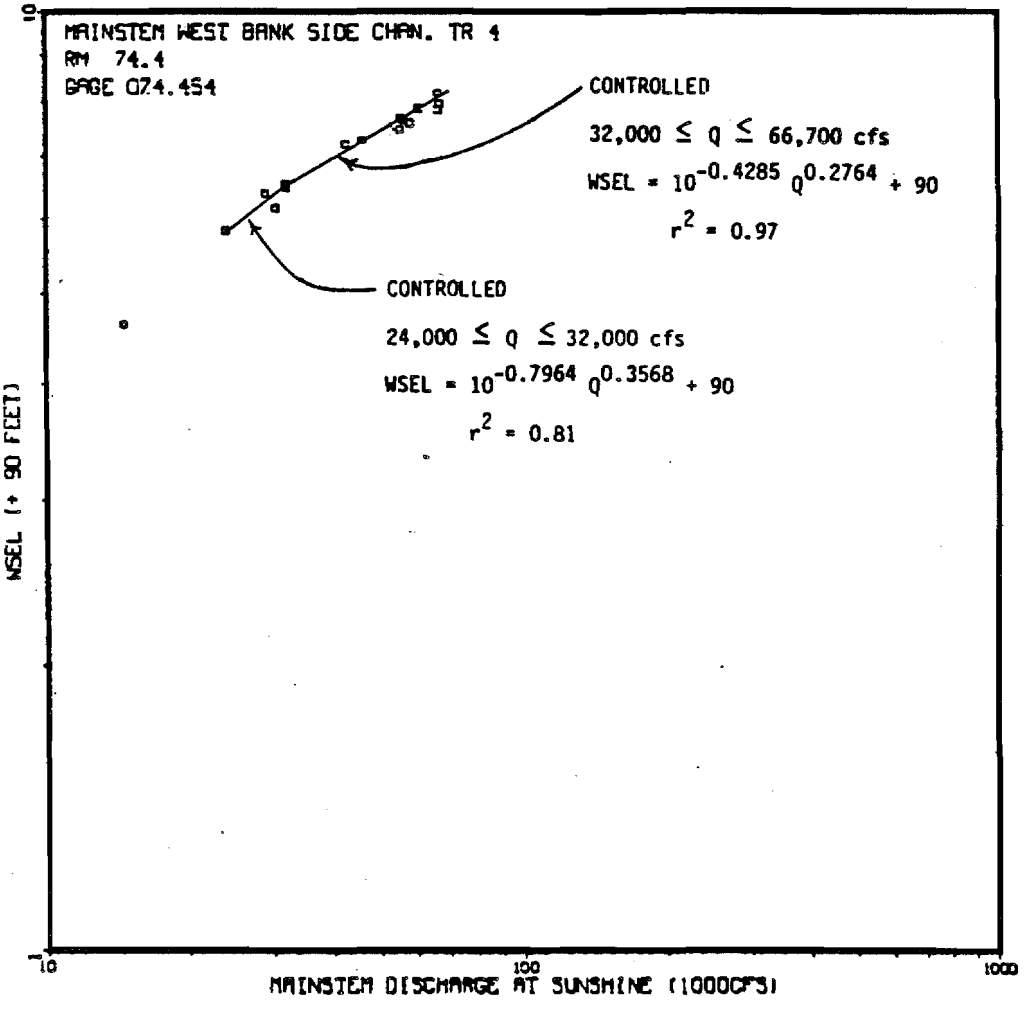
Attachment Figure E-12 WSEL versus mainstem discharge (USGS 15292780) at Mainstem West Bank Side Channel transect 3.



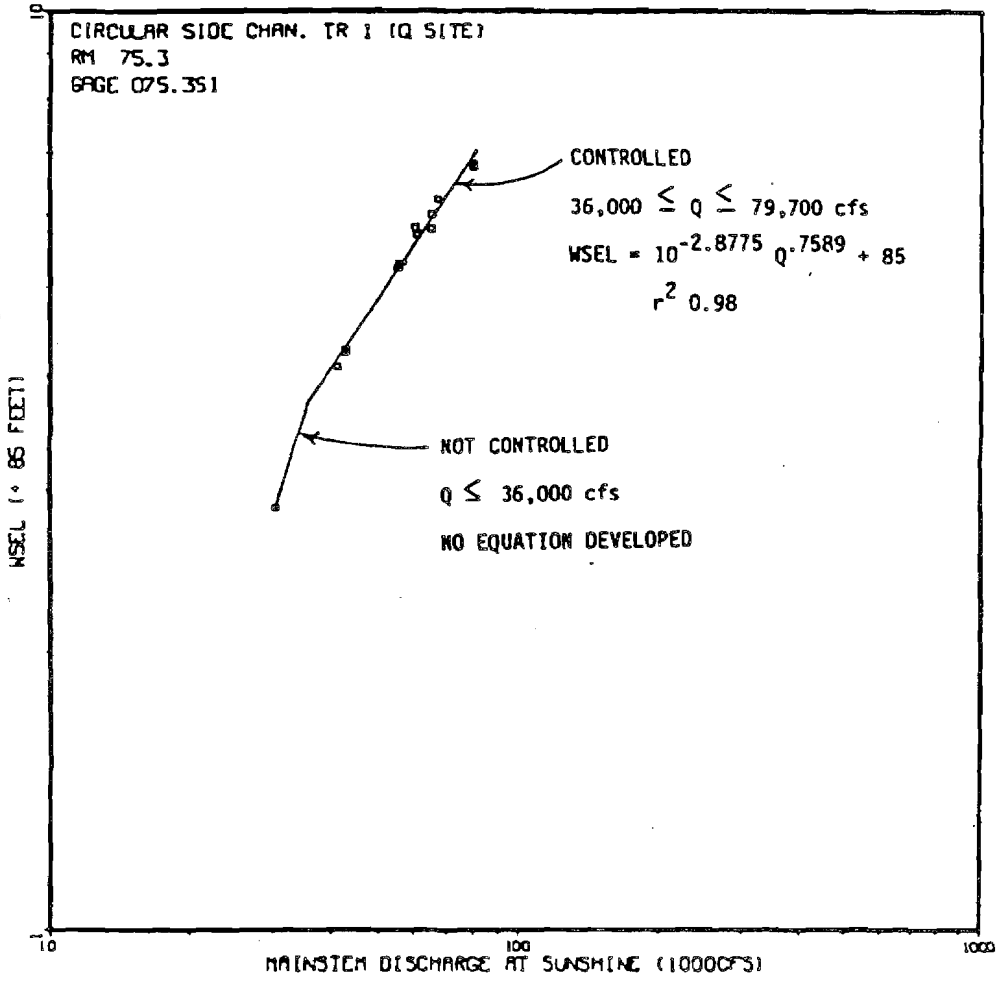
Attachment Figure E-13 WSEL versus mainstem discharge (USGS 15292780) at Mainstem West Bank Side Channel transect 3A.



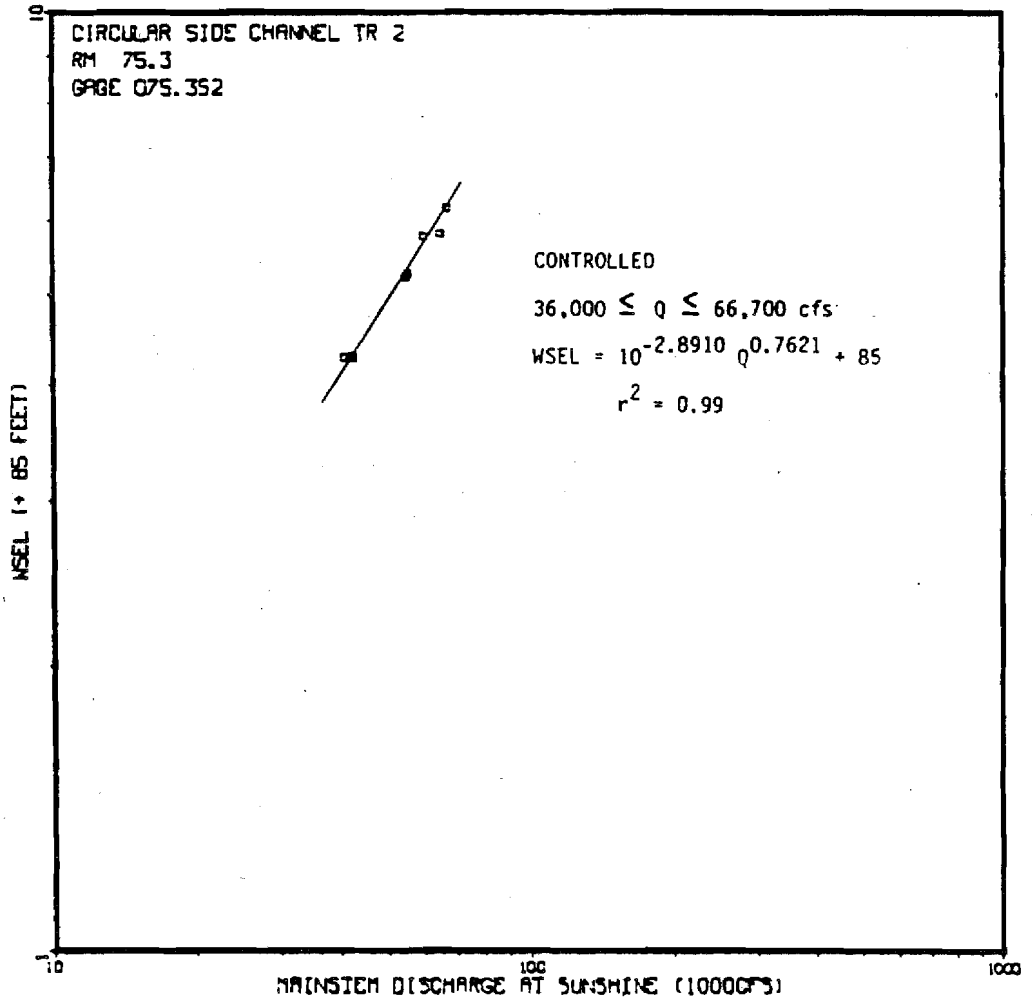
Attachment Figure E-14 WSEL versus mainstem discharge (USGS 15292780) at Mainstem West Bank Side Channel transect 3B.



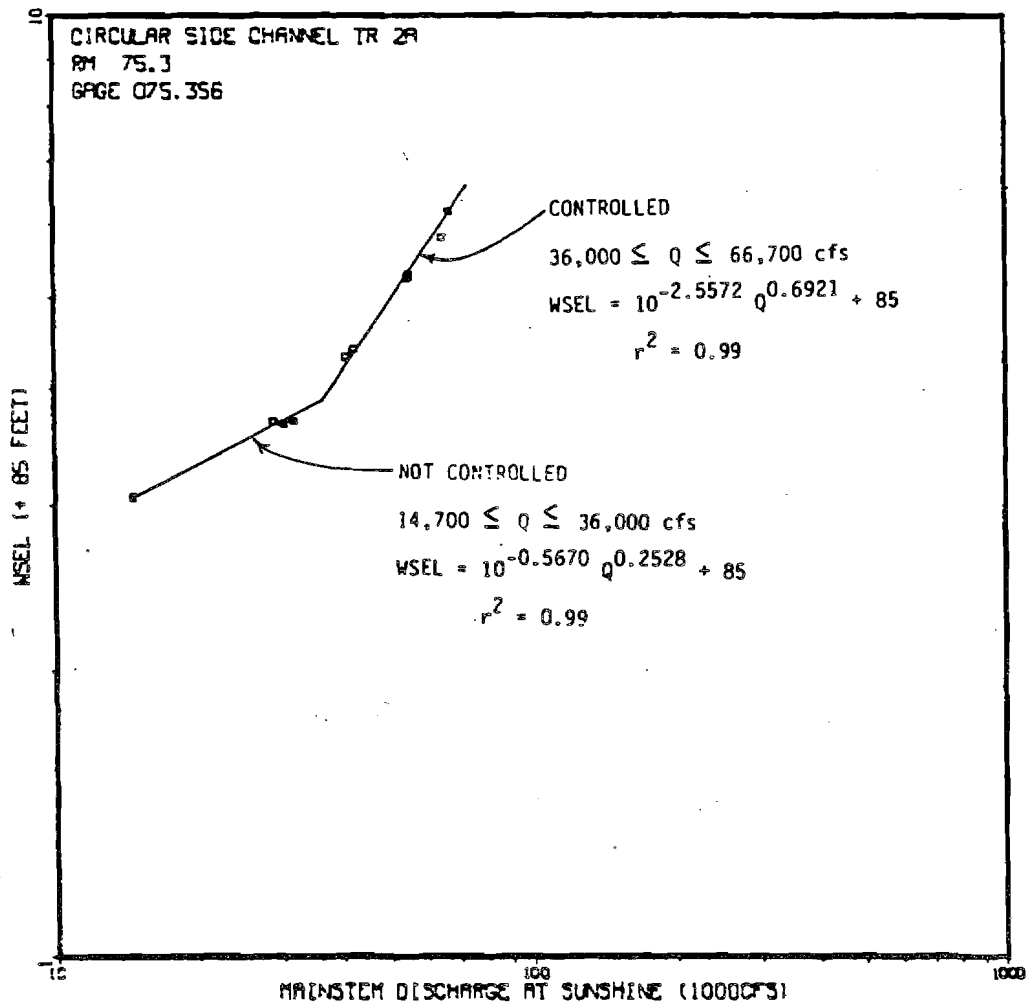
Attachment Figure E-15 WSEL versus mainstem discharge (USGS 15292780) at Mainstem West Bank Side Channel transect 4.



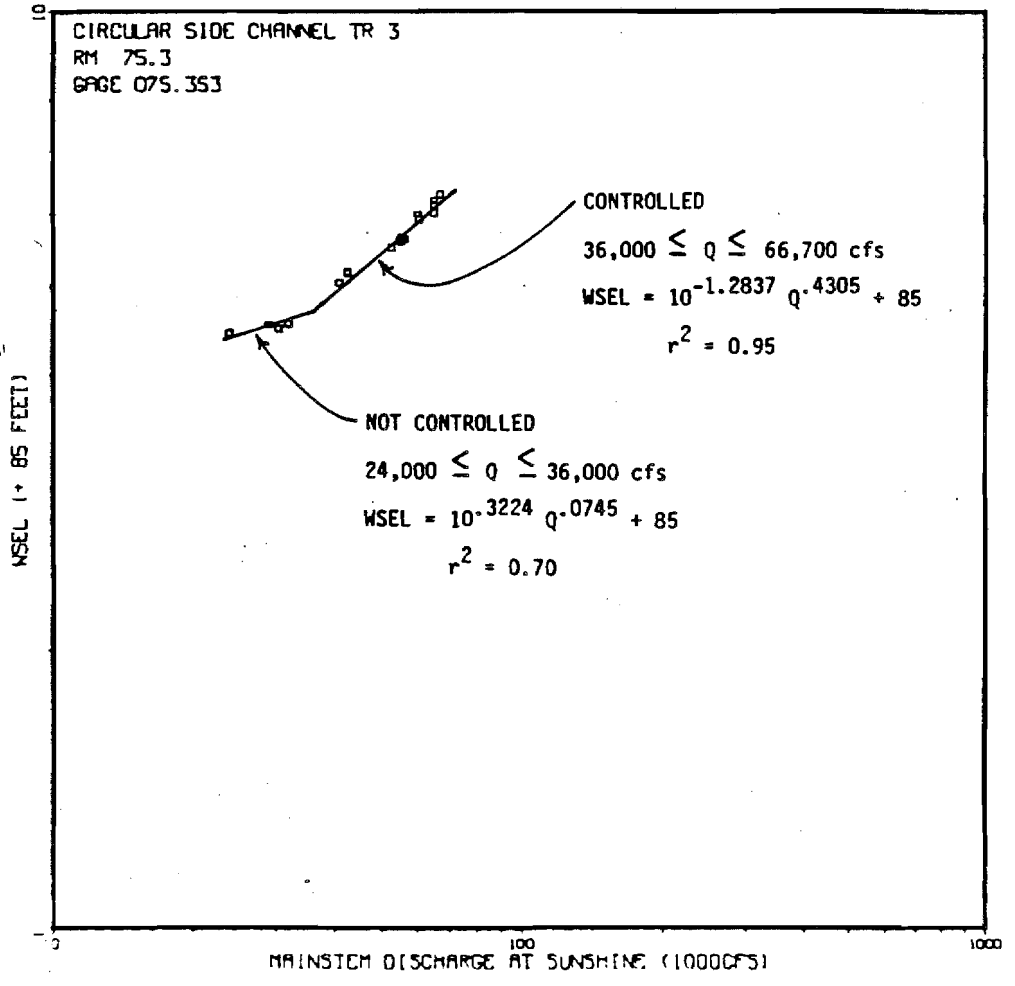
Attachment Figure E-16 WSEL versus mainstem discharge (USGS 15292780) at Circular Side Channel transect 1 (Q Site).



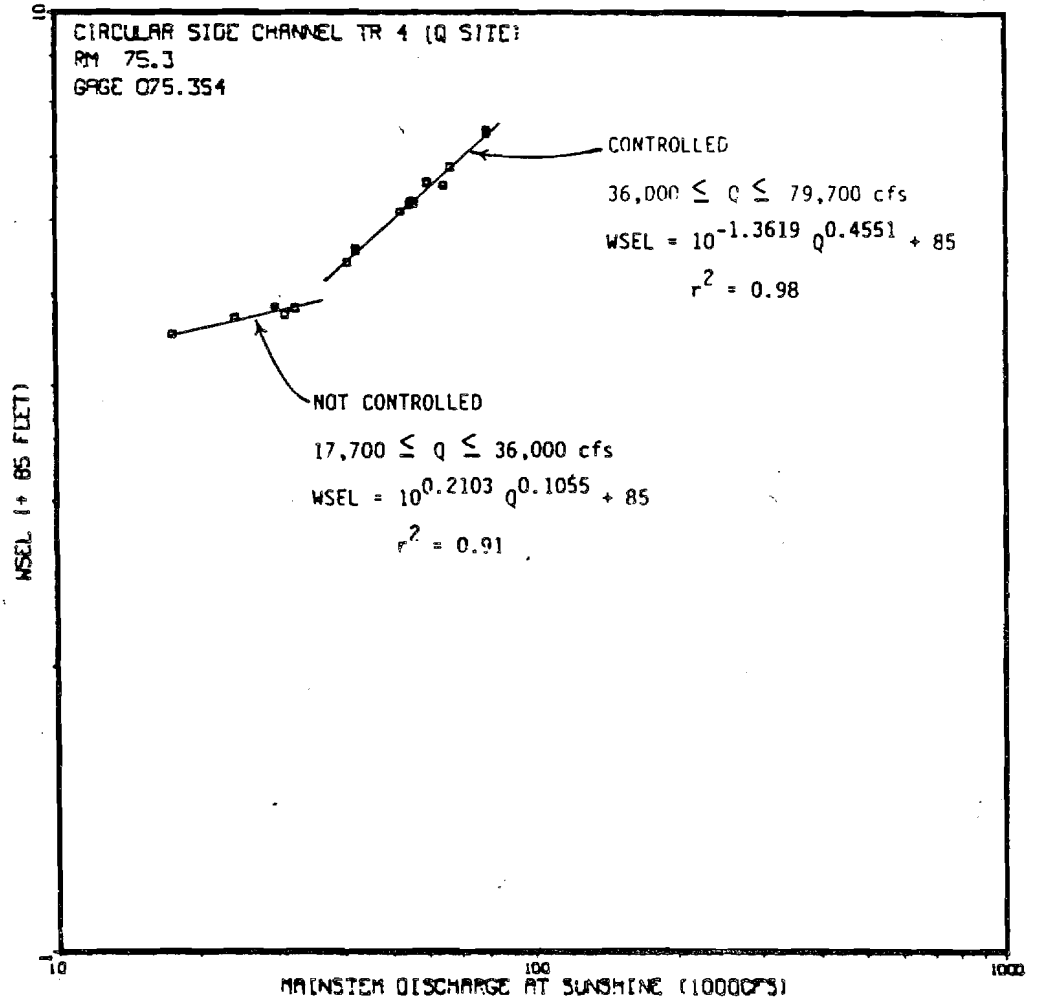
Attachment Figure E-17 WSEL versus mainstem discharge (USGS 15292780) at Circular Side Channel transect 2.



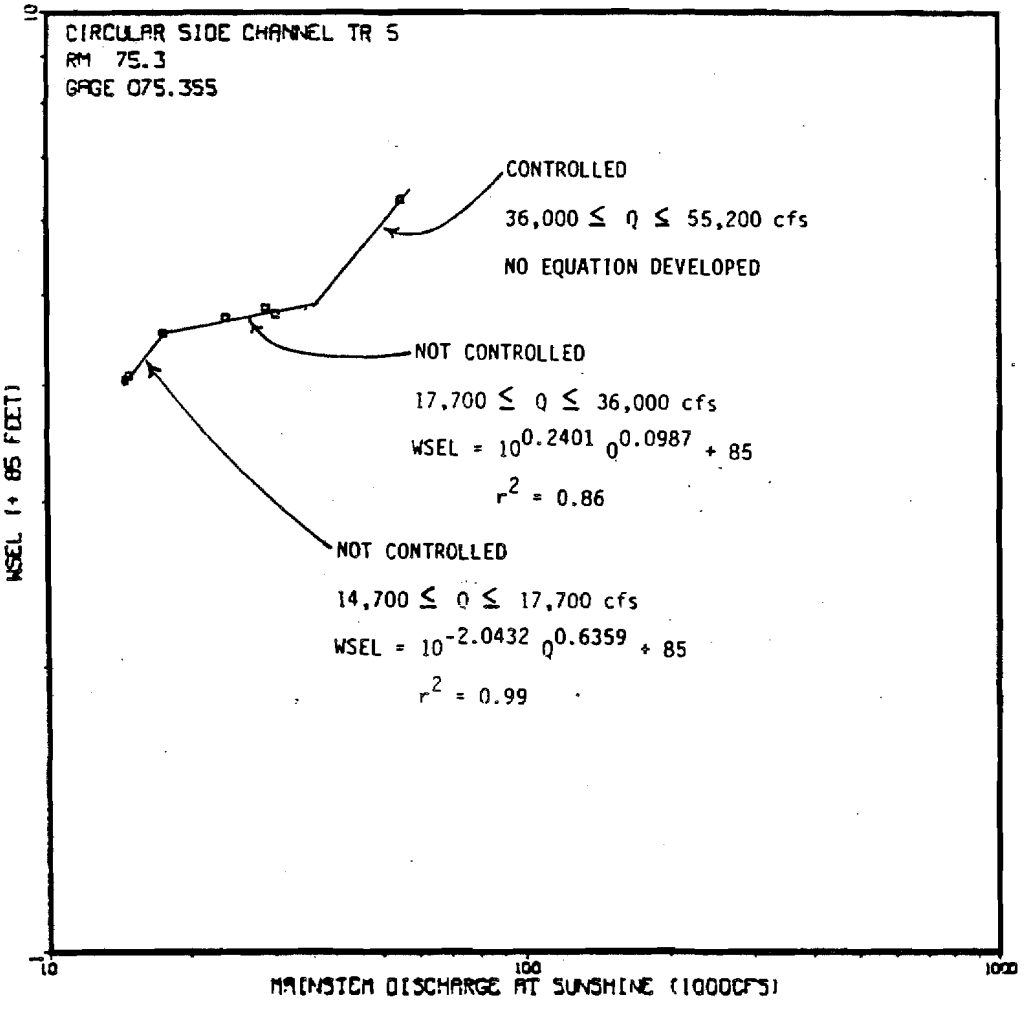
Attachment Figure E-18 WSEL versus mainstem discharge (USGS 15292780) at Circular Side Channel transect 2A.



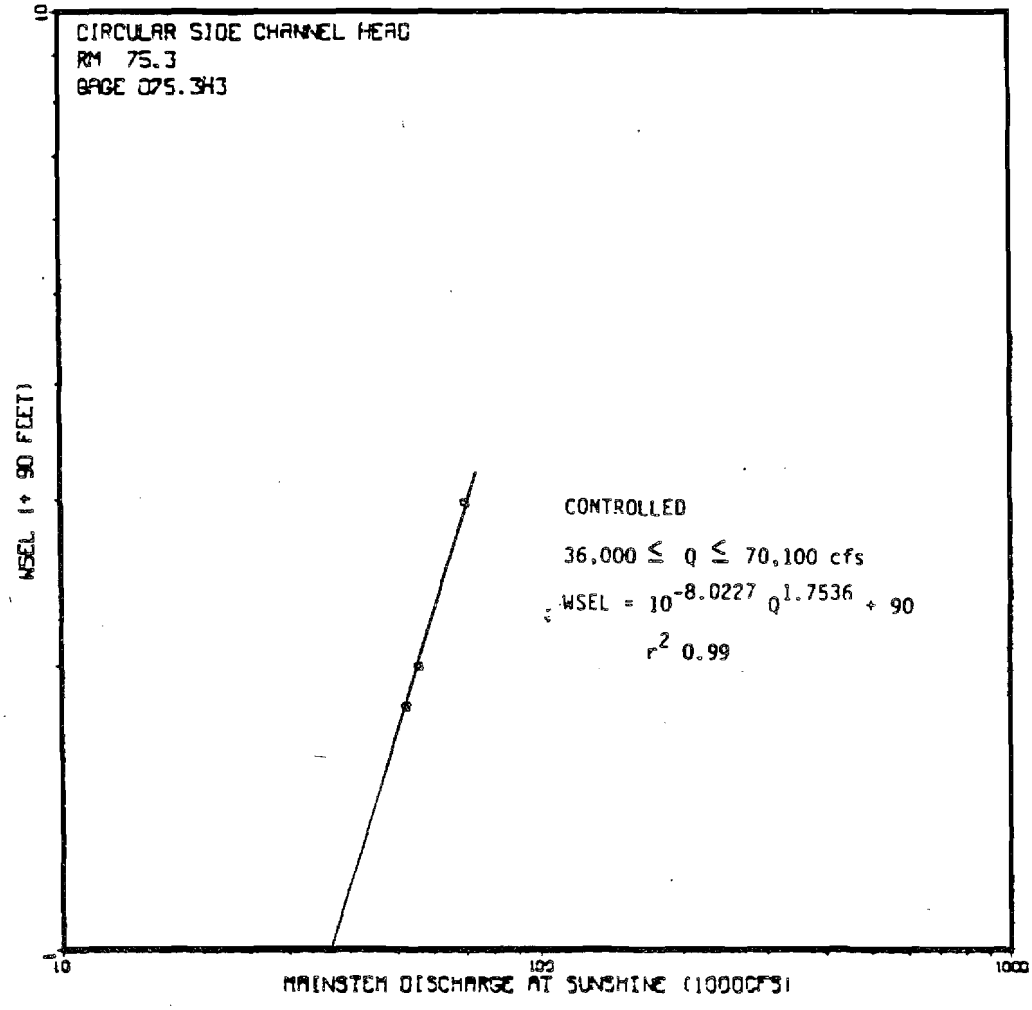
Attachment Figure E-19 WSEL versus mainstem discharge (USGS 15292780) at Circular Side Channel transect 3.



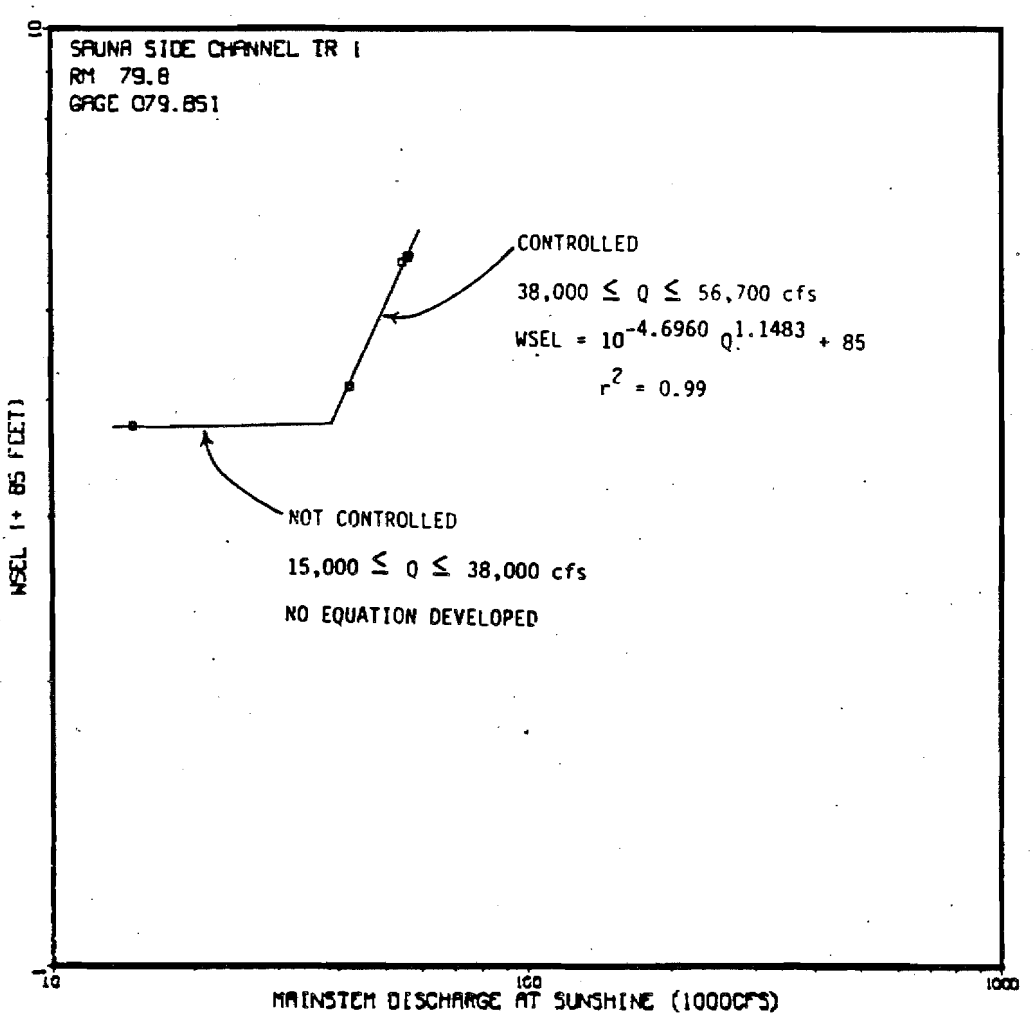
Attachment Figure E-20 WSEL versus mainstem discharge (USGS 15292780) at Circular Side Channel transect 4 (Q Site).



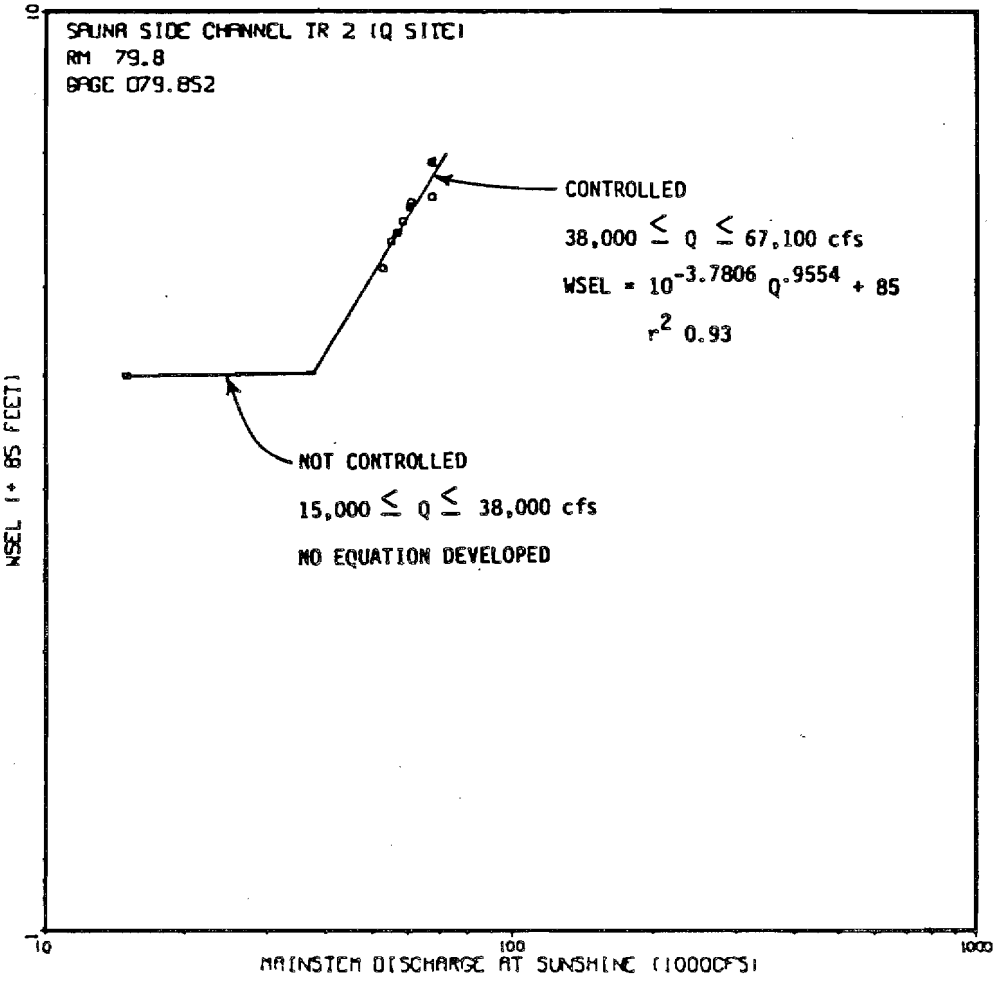
Attachment Figure E-21 WSEL versus mainstem discharge (USGS 15292780) at Circular Side Channel transect 5.



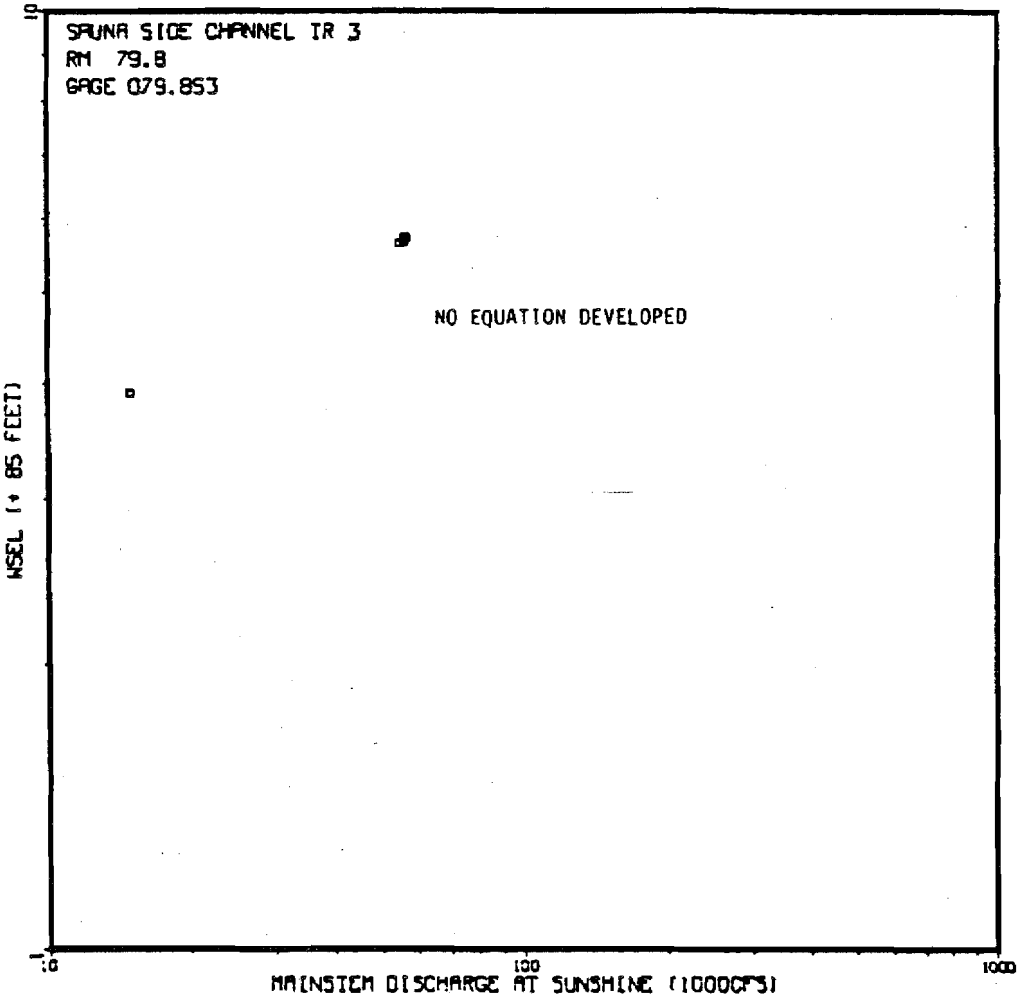
Attachment Figure E- 22 WSEL versus mainstem discharge (USGS 15292780) at Circular Side Channel head.



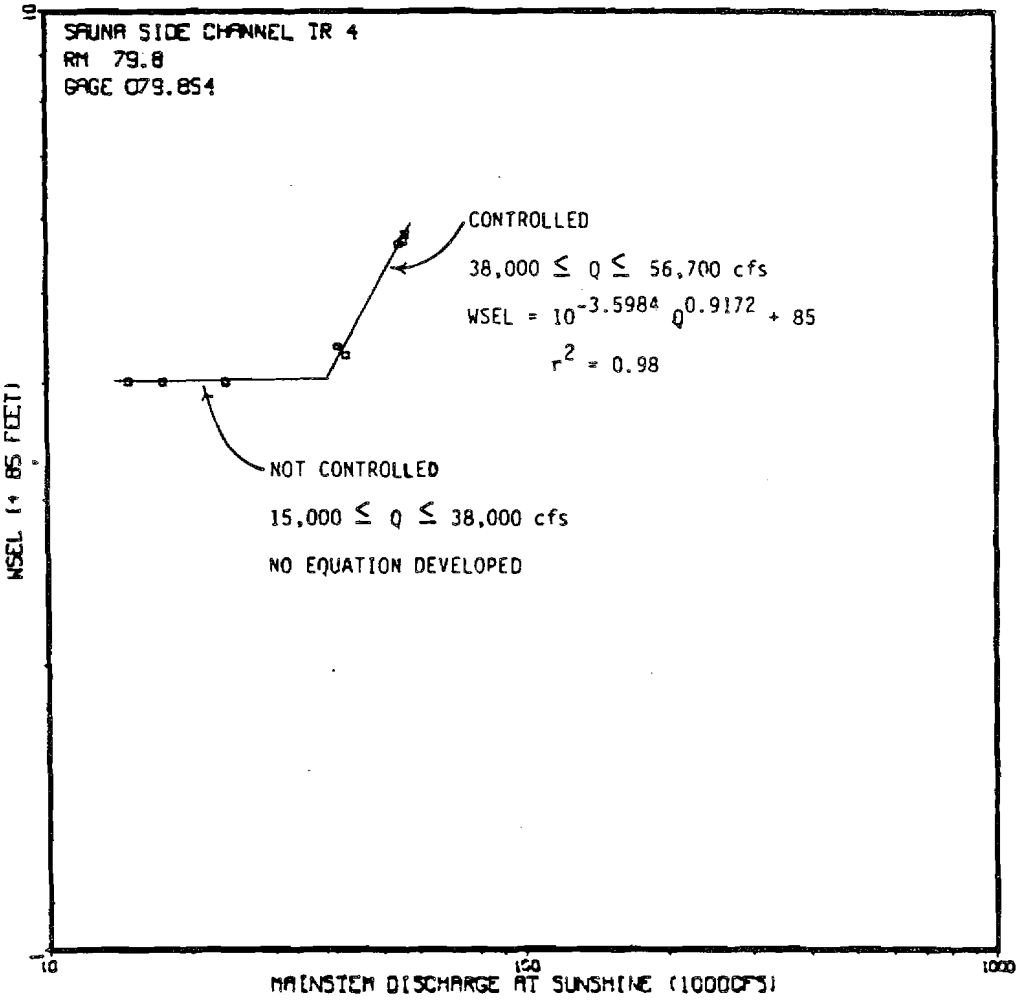
Attachment Figure E-23 WSEL versus mainstem discharge (USGS 15292780) at Sauna Side Channel transect 1.



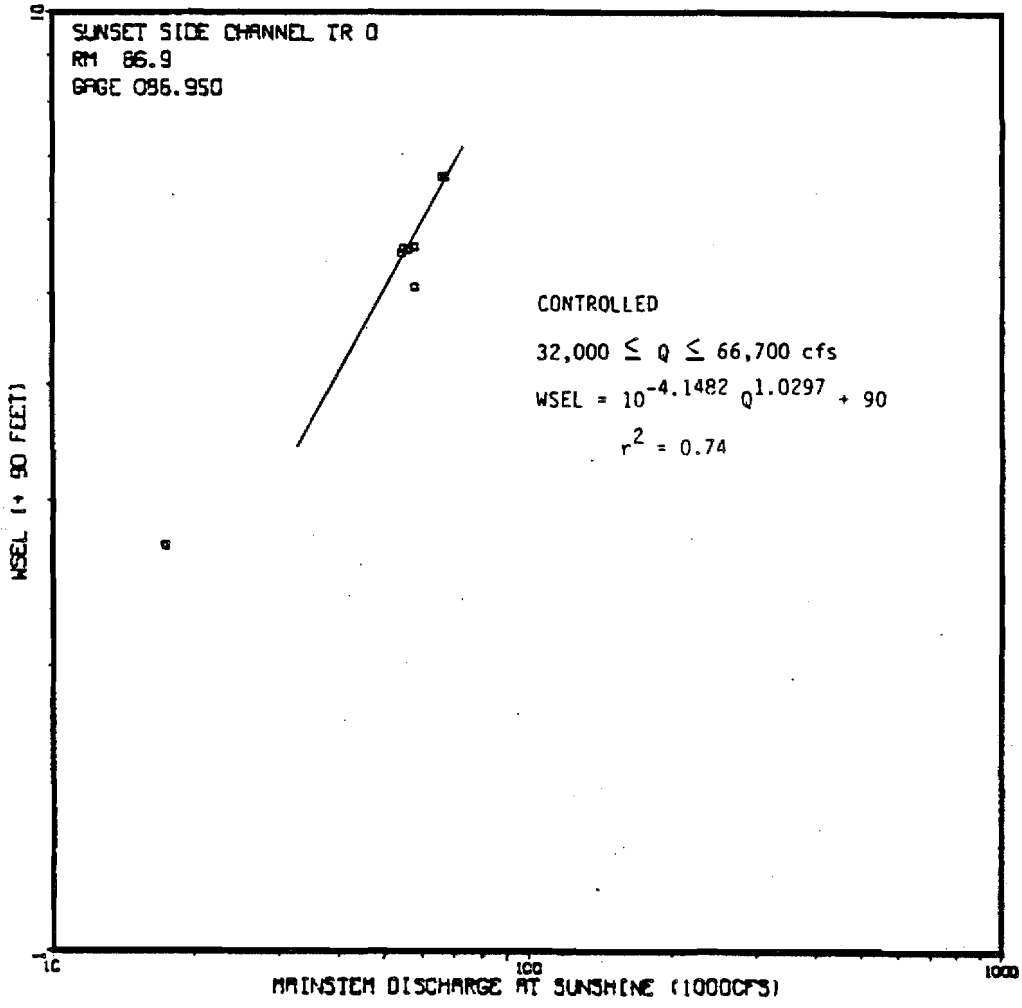
Attachment Figure E-24 WSEL versus mainstem discharge (USGS 15292780) at Sauna Side Channel transect 2 (Q Site).



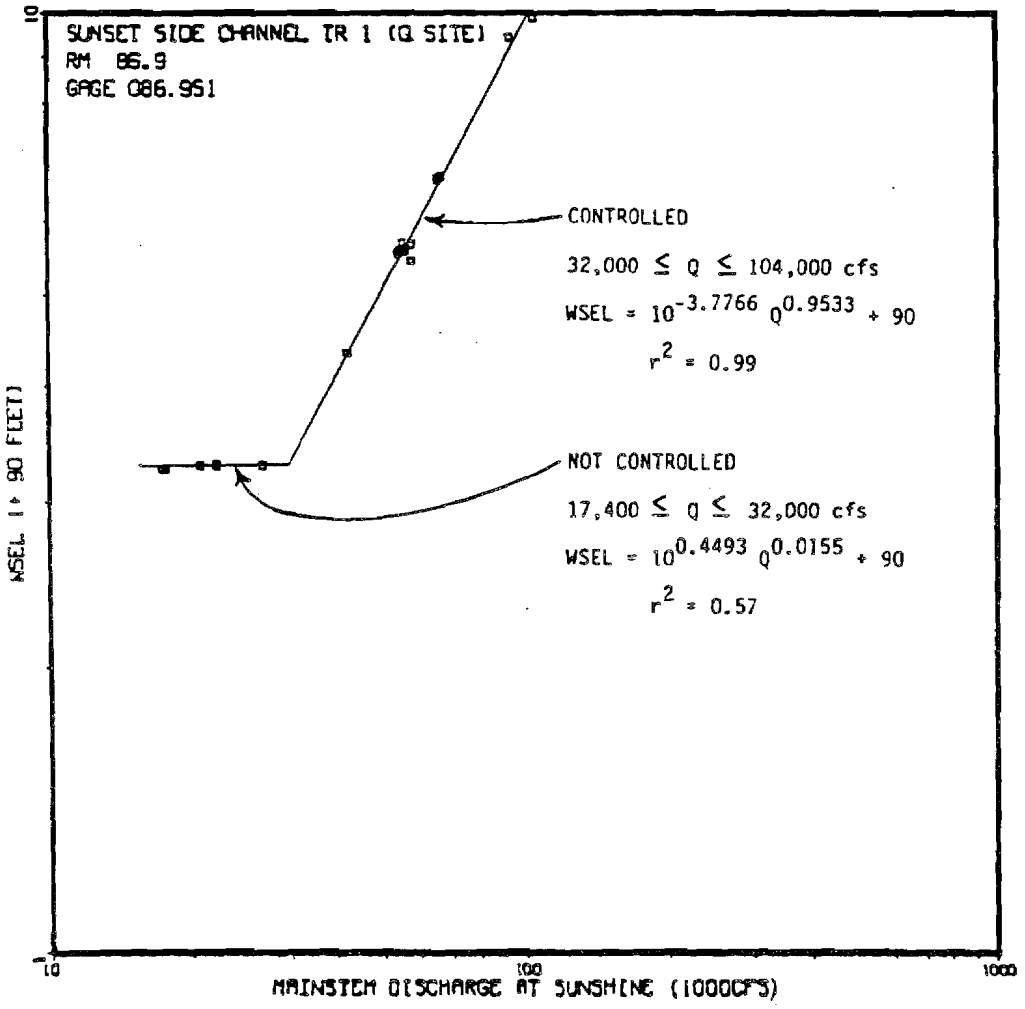
Attachment Figure E-25 WSEL versus mainstem discharge (USGS 15292780) at Sauna Side Channel transect 3.



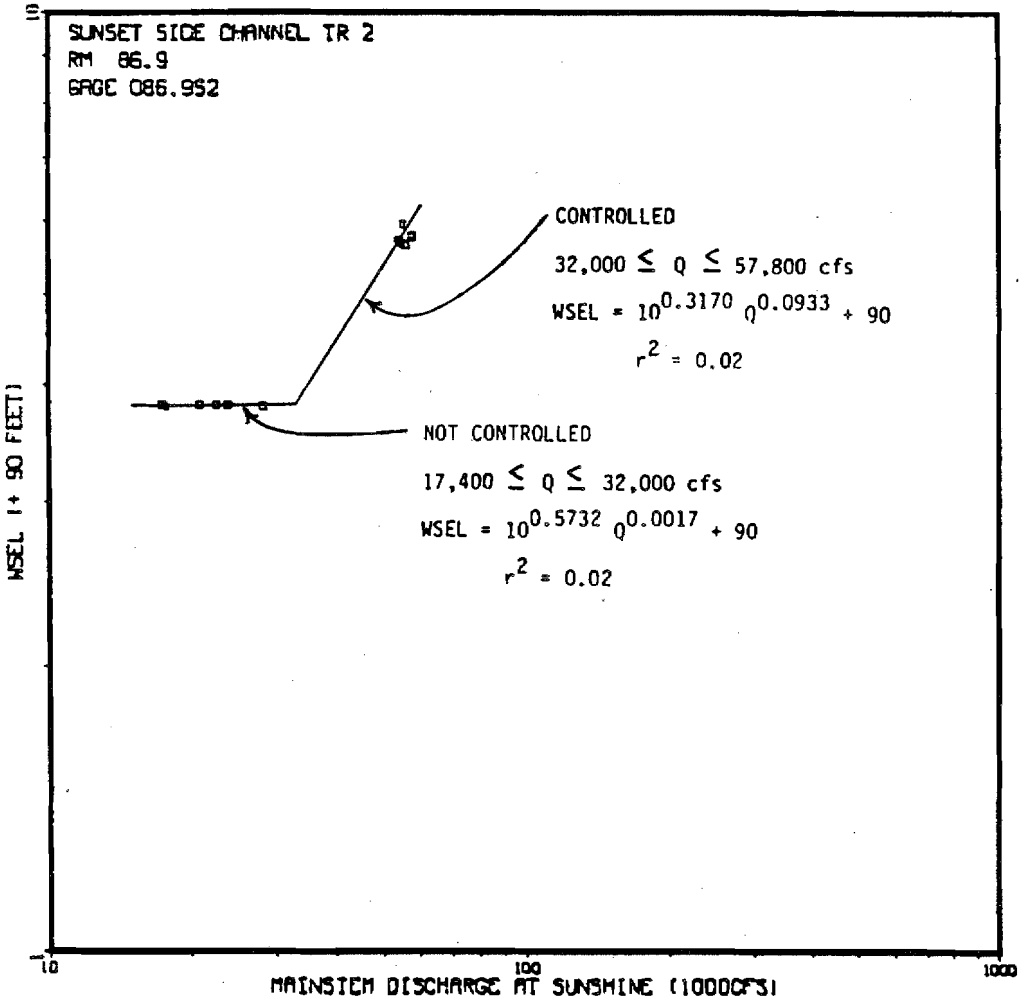
Attachment Figure E-26 WSEL versus mainstem discharge (USGS 15292780) at Sauna Side Channel transect 4.



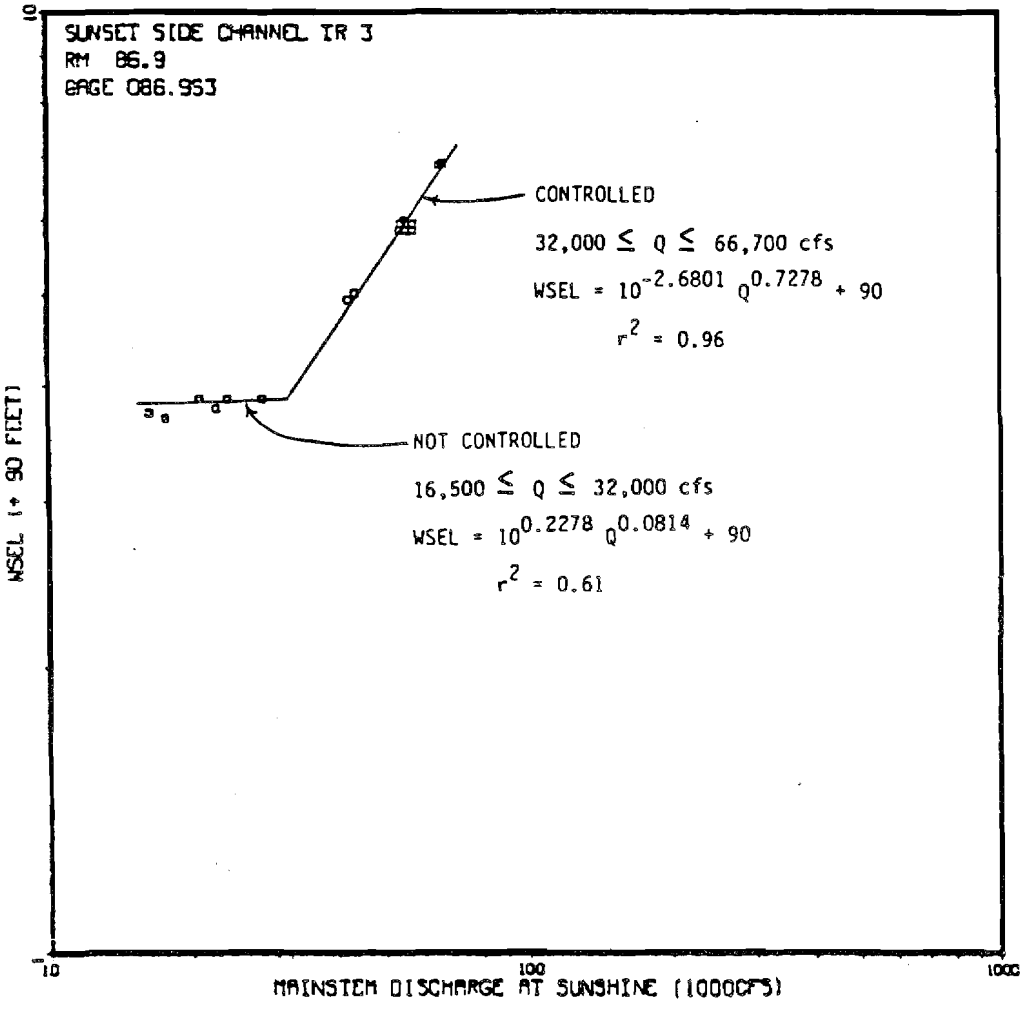
Attachment Figure E-27 WSEL versus mainstem discharge (USGS 15292780) at Sunset Side Channel transect 0.



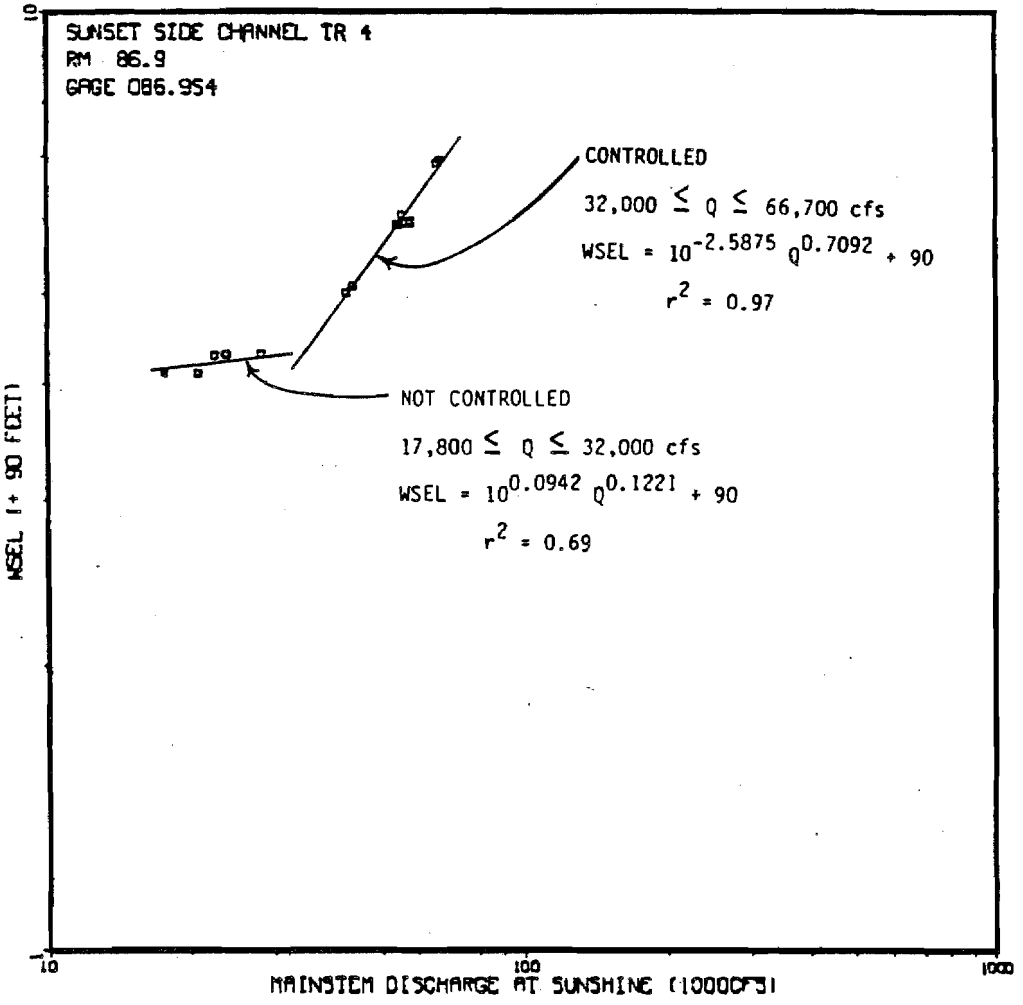
Attachment Figure E-28 WSEL versus mainstem discharge (USGS 15292780) at Sunset Side Channel transect 1 (Q Site).



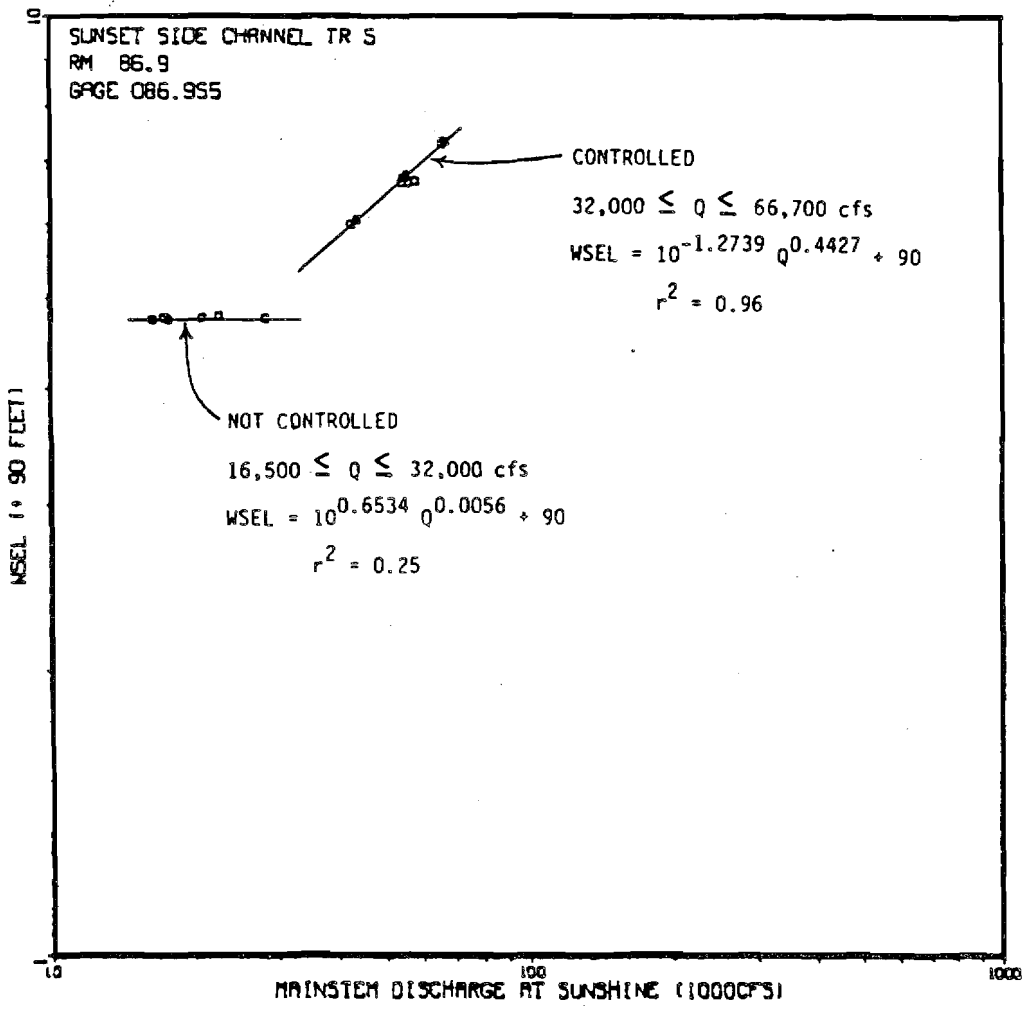
Attachment Figure E-29 WSEL versus mainstem discharge (USGS 15292780) at Sunset Side Channel transect 2.



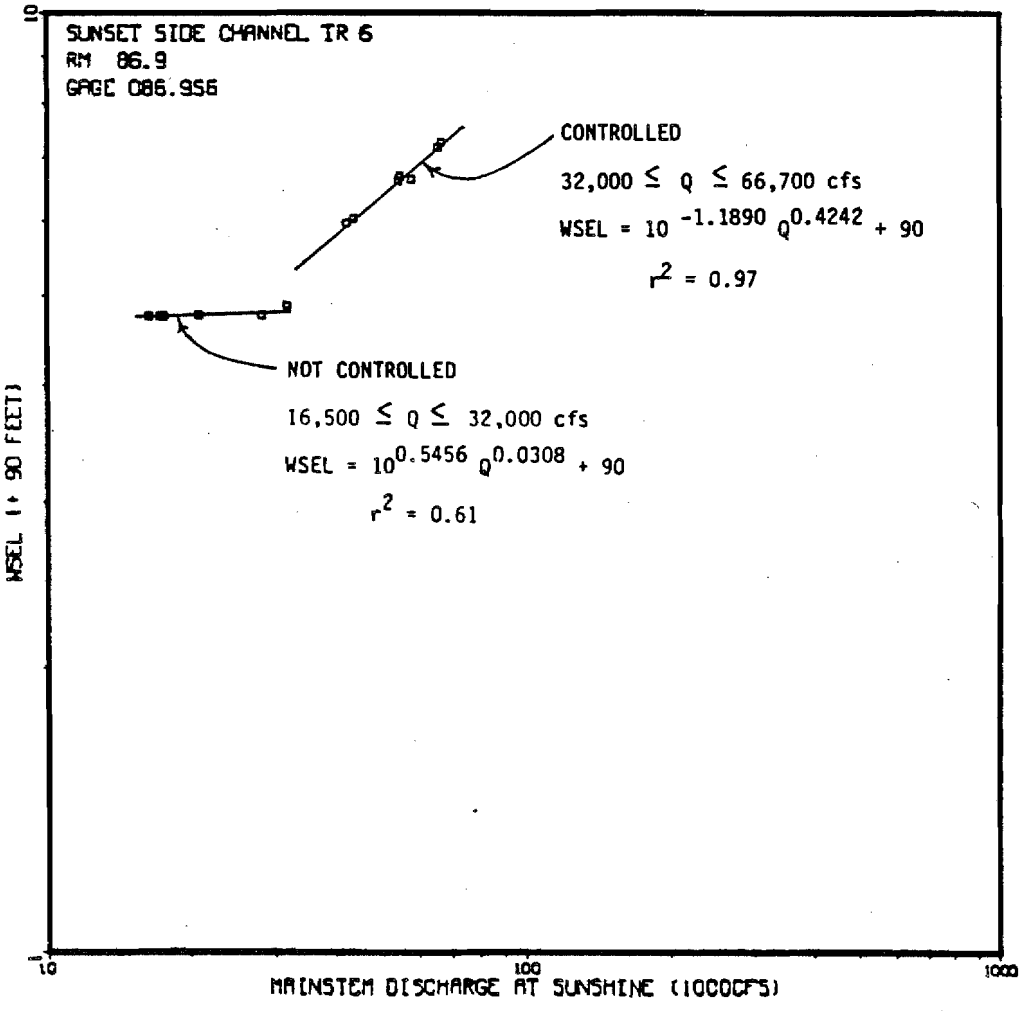
Attachment Figure E-30 WSEL versus mainstem discharge (USGS 15292780) at Sunset Side Channel transect 3.



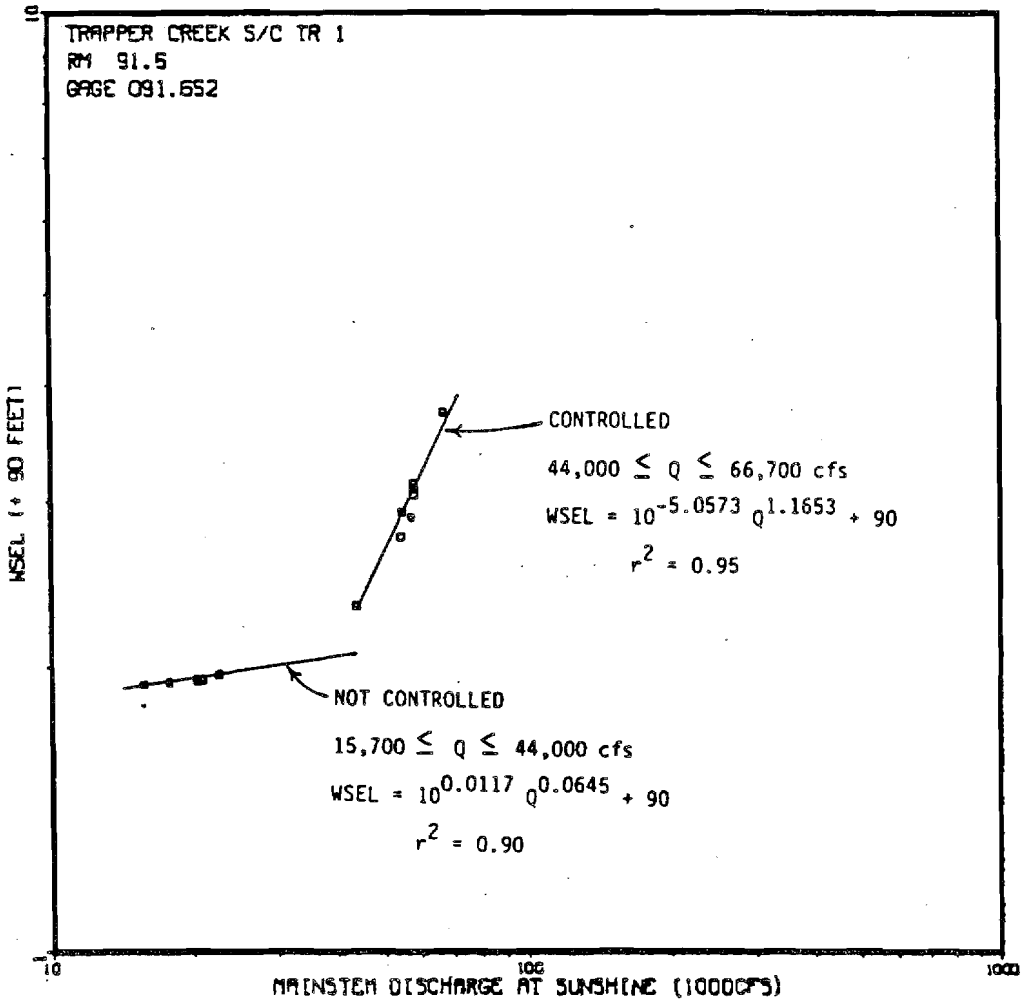
Attachment Figure E-31 WSEL versus mainstem discharge (USGS 15292780) at Sunset Side Channel transect 4.



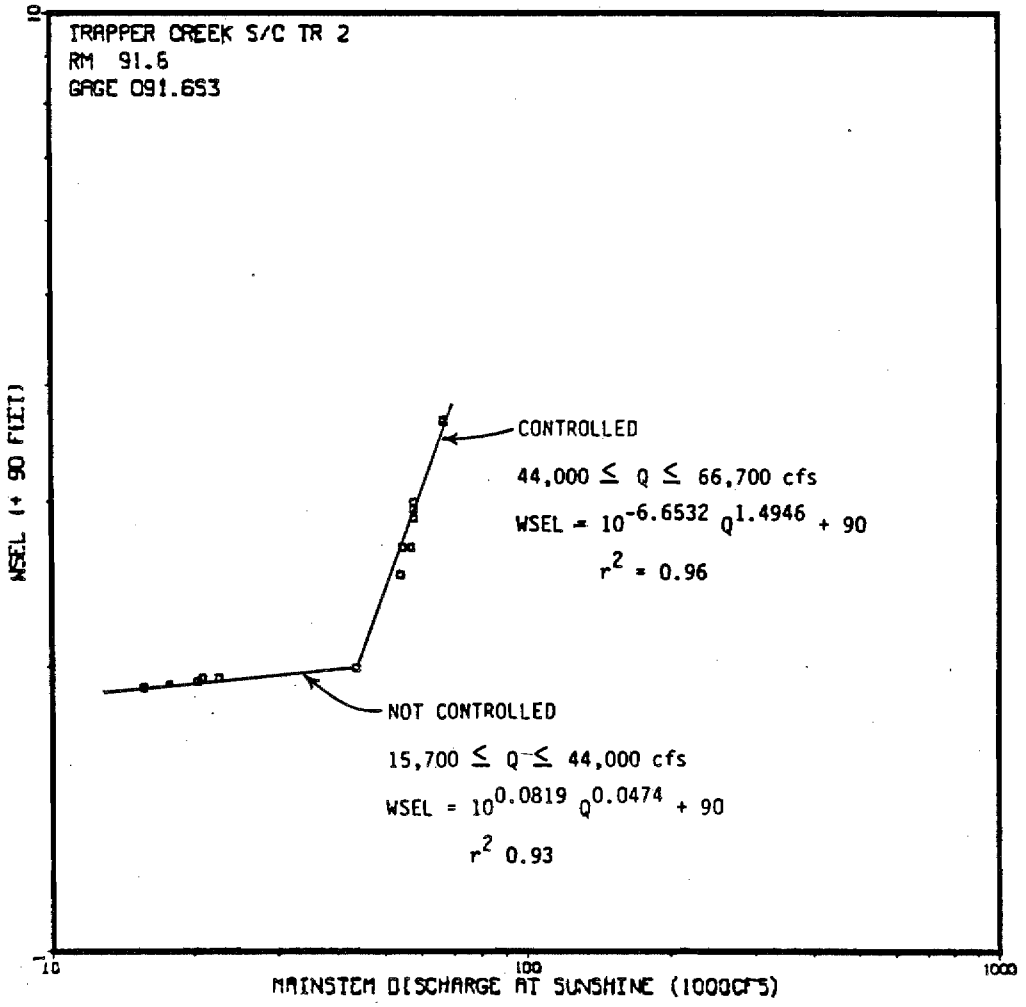
Attachment Figure E-32 WSEL versus mainstem discharge (USGS 15292780) at Sunset Side Channel transect 5.



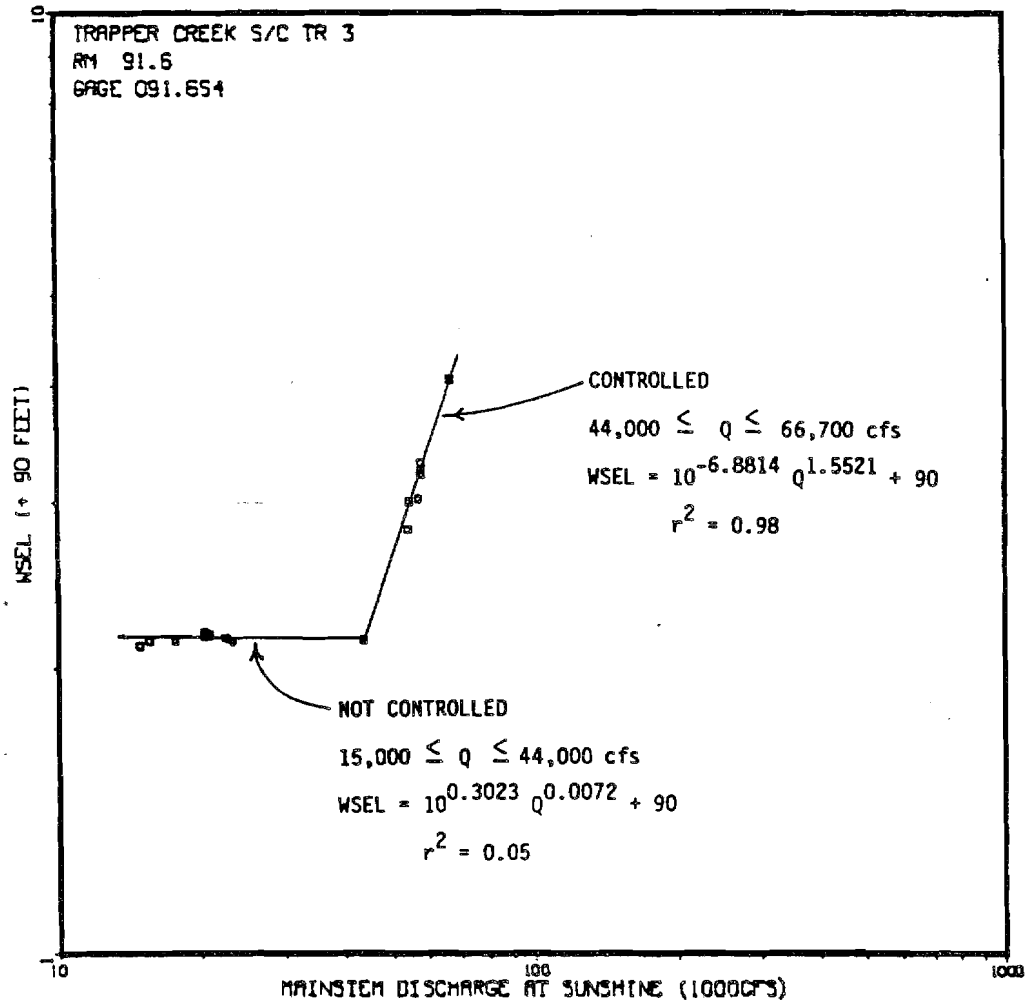
Attachment Figure E-33 WSEL versus mainstem discharge (USGS 15292780) at Sunset Side Channel transect 6.



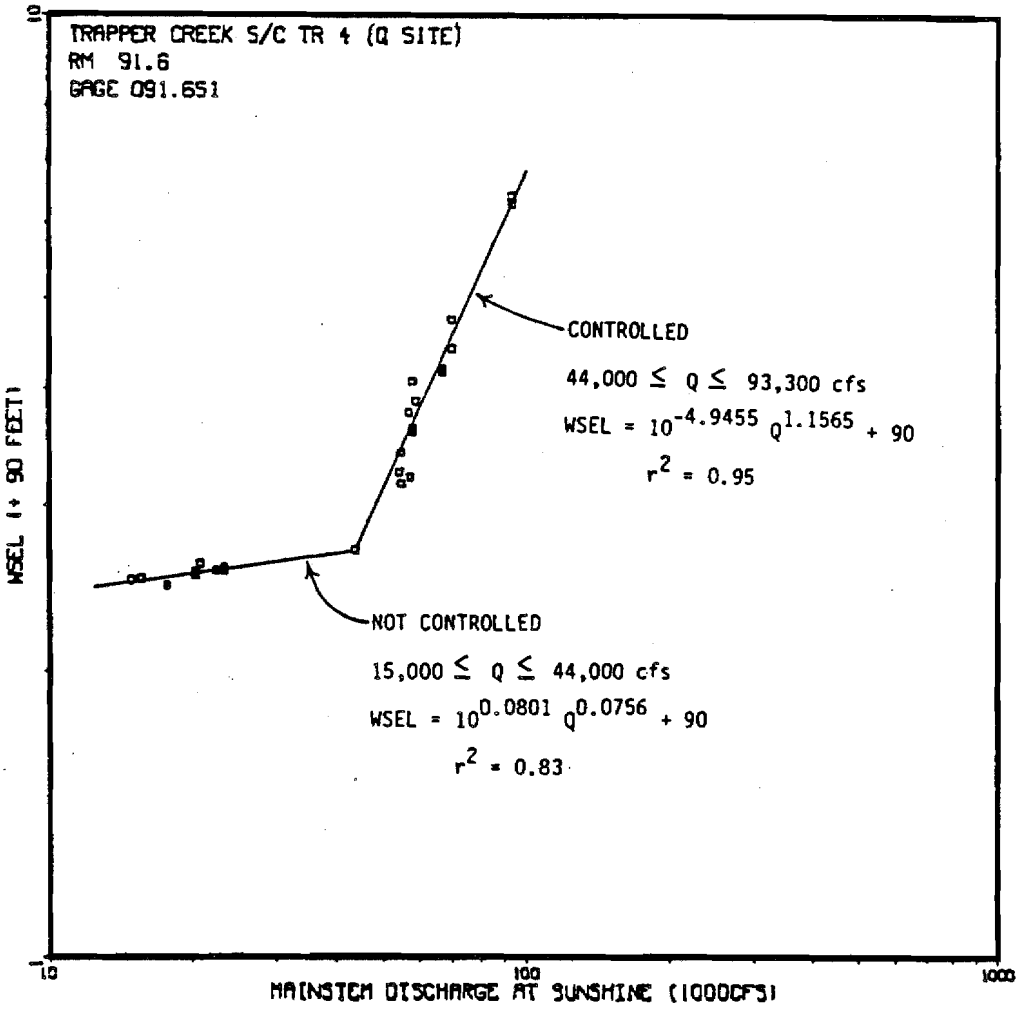
Attachment Figure E-34 WSEL versus mainstem discharge (USGS 15292780) at Trapper Creek Side Channel transect 1.



Attachment Figure E-35 WSEL versus mainstem discharge (USGS 15292780) at Trapper Creek Side Channel transect 2.



Attachment Figure E-36 WSEL versus mainstem discharge (USGS 15292780) at Trapper Creek Side Channel transect 3.



Attachment Figure E-37 WSEL versus mainstem discharge (USGS 15292780) at Trapper Creek Side Channel transect 4 (Q Site).