

Project Design Information

Project No. AMD 65(2533)101.1

Monastery Run

Wetland No. 1 Passive Mine Drainage Treatment System

Unity Township

Westmoreland County

October 1995

PROJECT AMD 65(2533)102.1

DESIGN SUMMARY

- **CONSTRUCTED WETLAND TREATMENT CELLS**
 - Cell No. 1 - Limestone Pond - 0.8 Acres
 - Cell No. 2 - Aerobic Wetland - 2.4 Acres
 - Cell No. 3 - Aerobic Wetland - 3.1 Acres
 - Cell No. 4 - Aerobic Wetland - 1.8 Acres

Total **8.1 Acres**
- **Hydraulic Retention Times (theoretical)**
 - Peak Flow Conditions - 25.2 hours
 - Average Flow Conditions - 63.9 hours
 - Minimum Flow Conditions - 463.1 hours
- **Surface Loading Rates (Iron - (Fe))**
 - Peak Loading Conditions - 18.9 gm/sq.m/day
 - Avg. Loading Conditions - 7.8 gm/sq.m/day
 - Min. Loading Conditions - 1.2 gm/sq.m/day
- **Flow Control/Aeration Structures**
 - Four ft. (4') Concrete U-channels
w/ Stop Log Weir & Riprap Splashpads
- **Design Life**

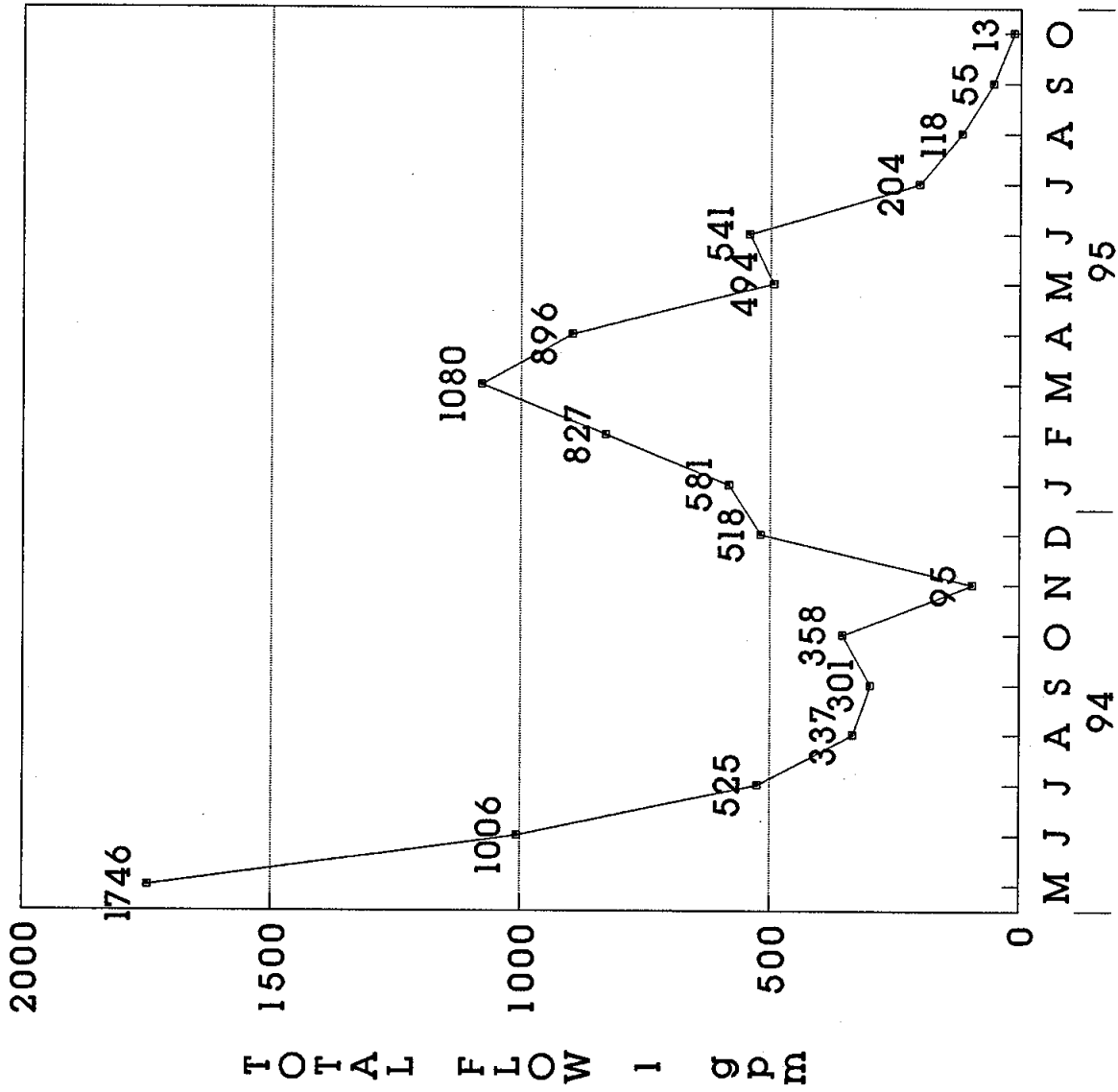
Accumulation estimated at 0.75 - 1.5 in/yr
Life: 24 - 48 years (90-95% Fe Removal)

PROJECT AMD 65(2533)102.1

Monastery Run AMD Set Aside Project

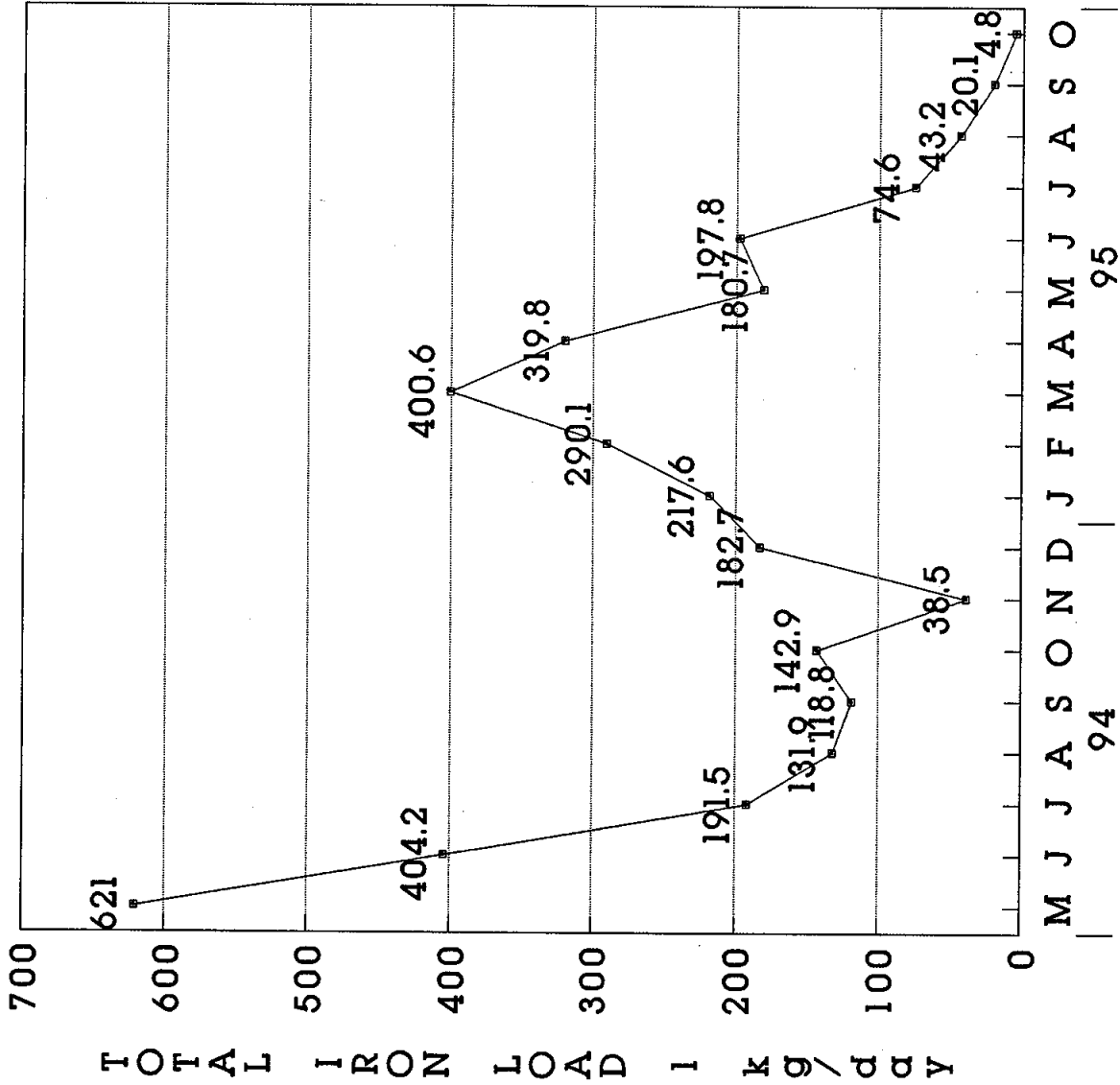
- **Primary Design Considerations**
 - * **Contaminant Loading Rate per Unit Surface Area of Constructed Wetlands**
 - 20 g/sq.m/day for Fe
 - 7 g/sq.m/day for Acidity
 - * **Aeration of the Mine Drainage (Hydraulic Gradient)**
 - 50-70 mg/L of DO per Aeration Structure
 - * **Hydraulic Retention Time within the System**
 - 12 hr. Minimum for oxidation/hydrolysis/precipitation reactions to occur
 - * **Sufficient Storage Volume for Accumulation of Metal Precipitates throughout the Design Life of the System**
- **Other Design Considerations**
 - * **Project Access**
 - * **Flow Control and Measurement**
 - * **Landowner Consent**
 - * **Site Topography and Geology**
 - * **Soils**
 - * **Permit Requirements**
 - * **Site Hydrology**
 - * **Utility Relocations**

AVERAGE MONTHLY FLOW DATA
PROJECT AMD 65(2533)101.1



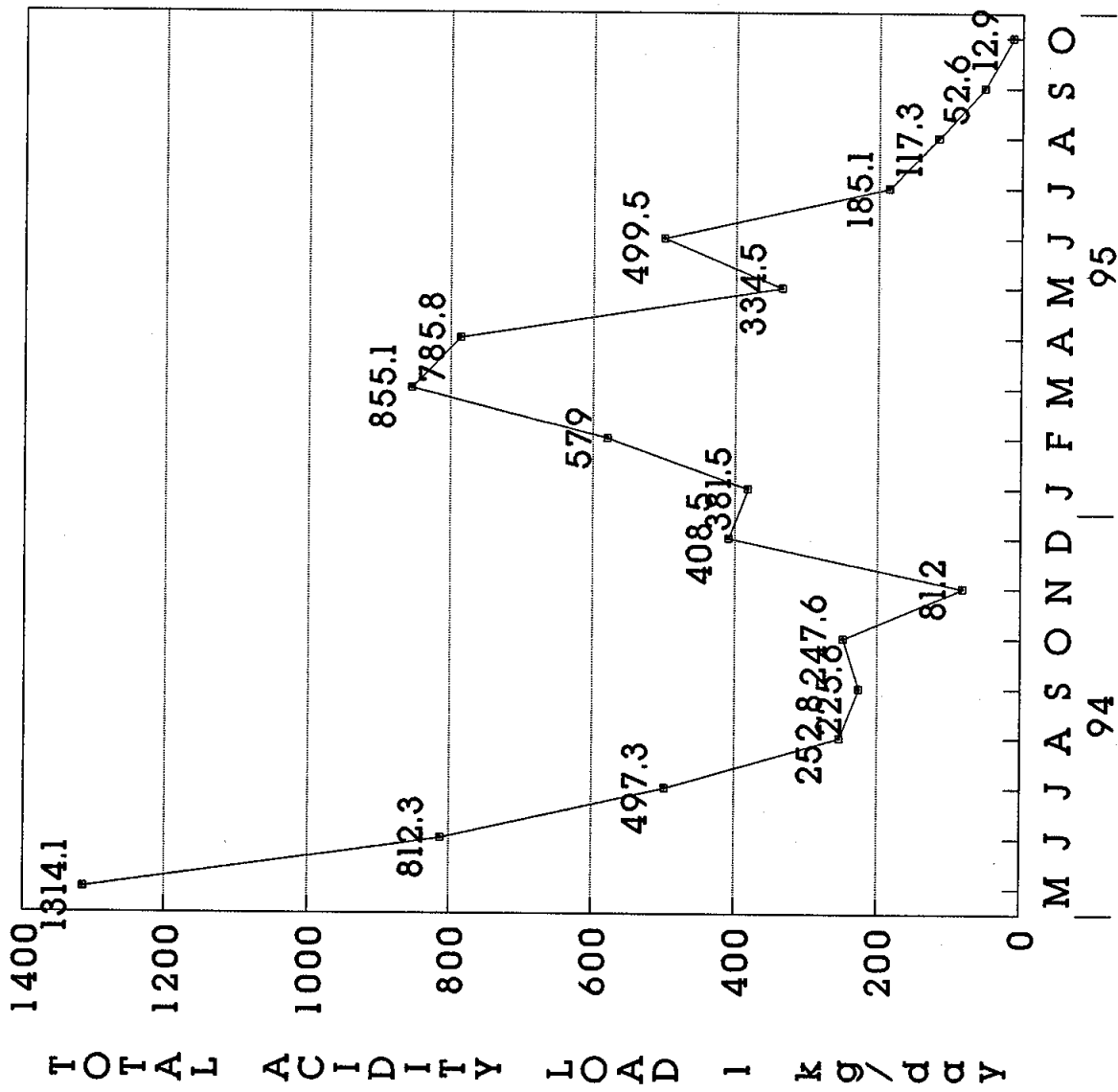
Monastery Run AMD Set Aside Project

TOTAL IRON LOADING
PROJECT AMD 65(2533)101.1



Monastery Run AMD Set Aside Project

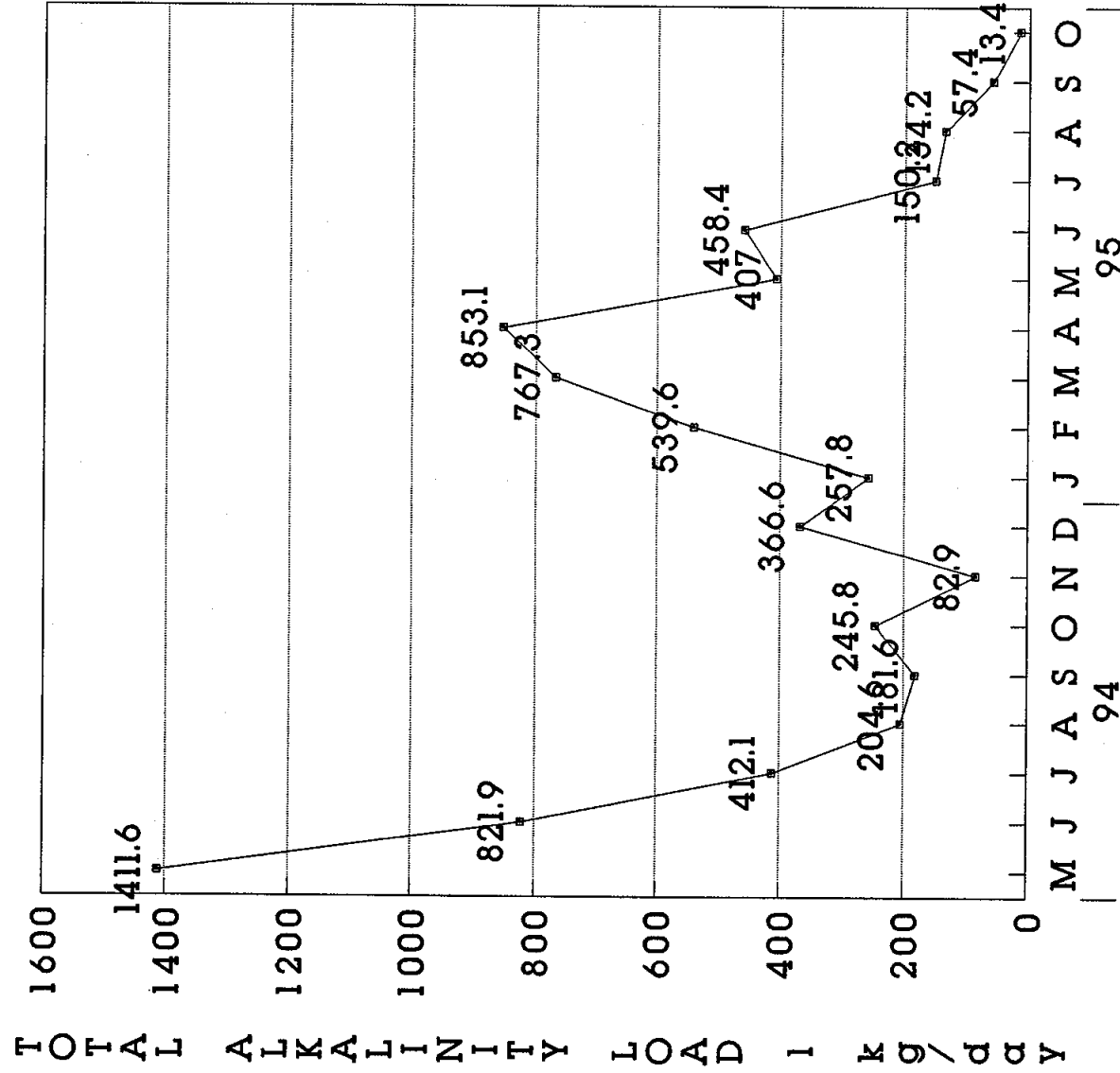
TOTAL ACIDITY LOADING PROJECT AMD 65(2533)101.1



DATE

Monastery Run AMD Set Aside Project

TOTAL ALKALINITY LOADING PROJECT AMD 65(2533)101.1

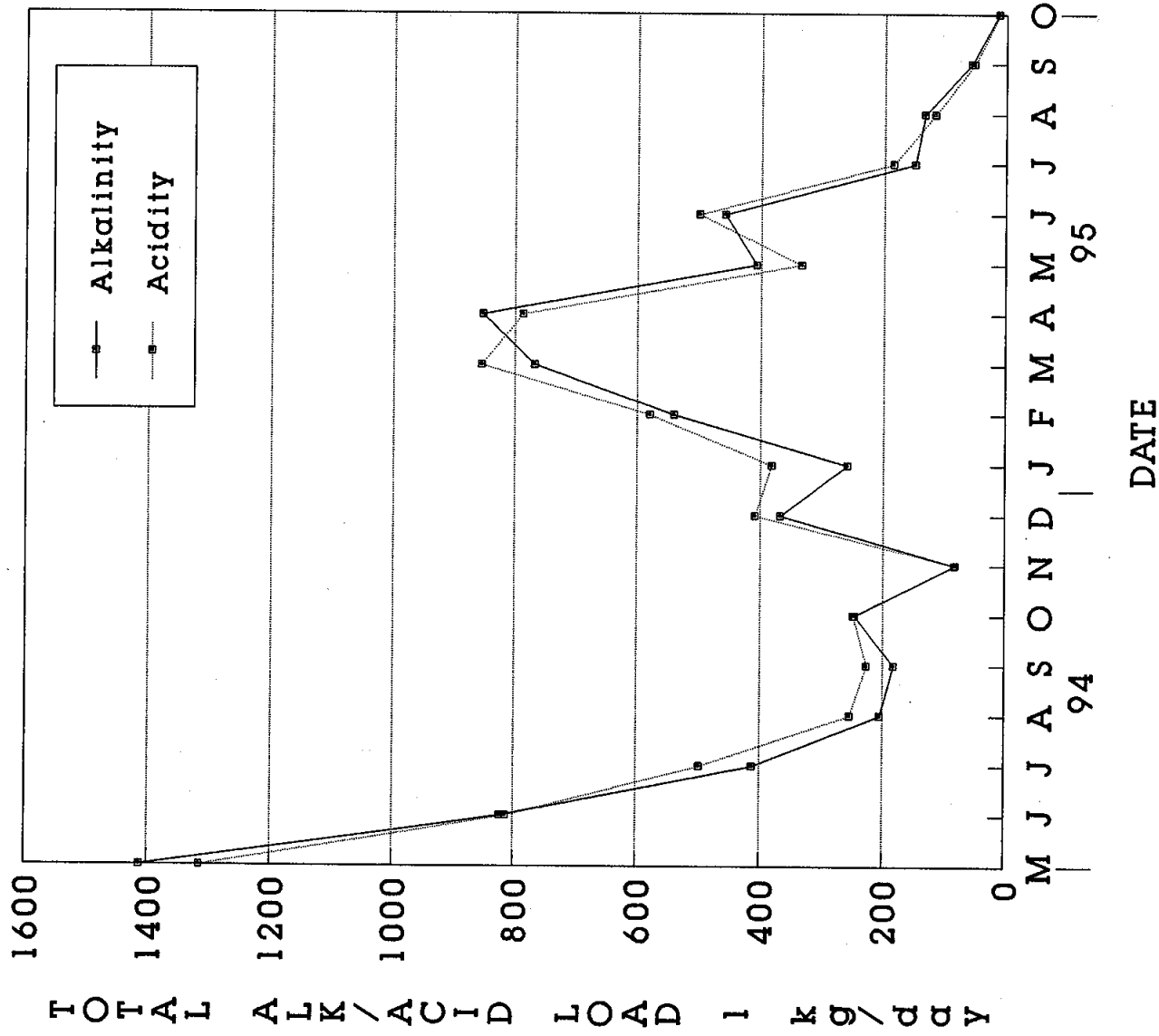


DATE

Monastery Run AMD Set Aside Project

ACIDITY vs. ALKALINITY LOADING

PROJECT AMD 65(2533)101.1



Monastery Run AMD Set Aside Project

SUMMARY OF DESIGN DATA

Design Water Year: May '94 - Apr '95

PROJECT AMD 65(2533)101.1 Monastery Run AMD Set Aside Project

PARAMETER	MAXIMUM LOAD OF VALUE	MINIMUM LOAD OF VALUE	AVERAGE LOAD OF VALUE
pH (Standard pH Units)	6.3	5.4	6.1
Total Acidity* (kg/day)	1314.1	81.2	536.7 (142.7 mg/L)
Total Alkalinity* (kg/day)	1411.6	82.9	512.1 (136.2 mg/L)
Total Sulfates (kg/day)	6702.8	371.0	2604.2 (692.5 mg/L)
Total Manganese (kg/day)	43.7	2.6	16.9 (4.5 mg/L)
Total Aluminum (kg/day)	11.4	0.5	4.3 (1.1 mg/L)
Ferrous Iron (kg/day)	608.0	37.9	244.2 (64.9 mg/L)
Total Iron (kg/day)	621.0	38.5	255.2 (67.9 mg/L)
Flow Rate (gpm)	1746	95	689

* - Value reported as equivalent kg/day of CaCO₃

mg/L = ((Load in kg/day) x 1000) / [(5.45) x (Flow in gpm)]

lb/day = (kg/day) x (2.205)