EPA-670/2-75-050d
June 1975

Environmental Protection Technology Series

DIRECT FILTRATION OF LAKE SUPERIOR WATER FOR ASBESTIFORM FIBER REMOVAL

Appendix D

National Environmental Research Center
Office of Research and Development
U.S. Environmental Protection Agency
Cincinnati, Ohio 45268

EPA-670/2-75-050d
June 1975

DIRECT FILTRATION OF LAKE SUPERIOR WATER FOR ASBESTIFORM FIBER REMOVAL

Appendix D

Head Loss and Turbidity Curves for Individual Filter Runs

By

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Kansas City, Missouri 64114

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USEPA, Region V and Corps of Engineers, St. Paul

Project Officer

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FOREWORD

Man and his environment must be protected from the adverse effects of pesticides, radiation, noise, and other forms of pollution, and the unwise management of solid waste. Efforts to protect the environment require a focus that recognizes the interplay between the components of our physical environment -- air, water, and land. The National Environmental Research Centers provide this multidisciplinary focus through programs engaged in

- studies on the effects of environmental contamination on man and the biosphere, and
- a search for ways to prevent contamination and to recycle valuable resources.

This report and its appendices present the results of pilot plant filtration research for the removal of asbestiform fibers from drinking water. The several appendices present detailed information on water quality, pilot plant equipment and operation, individual filter run data, asbestiform fiber and amphibole mass concentrations in raw and filtered water, and diatomite filter optimization. Appendix D is a compilation of all available graphs of filter head loss and effluent turbidity.

A. W. Breidenbach, Ph.D.
Director
National Environmental
Research Center, Cincinnati

ABSTRACT

Pilot plant research conducted in 1974 at Duluth, Minnesota demonstrated that asbestiform fiber counts in Lake Superior water could be effectively reduced by municipal filtration plants. During the study, engineering data were also obtained for making cost estimates for construction and operation of both granular and diatomaceous earth (DE) filtration plants ranging in size from 0.03 to 30 mgd.

In Appendix D, all graphs of filter headloss and effluent turbidity as functions of the number of hours of filter operation are given. These graphs and the individual filter run data presented in Appendix C could be used to evaluate filter performance under circumstances in which the production of clear, potable water is the goal, rather than the removal of asbestiform fibers.

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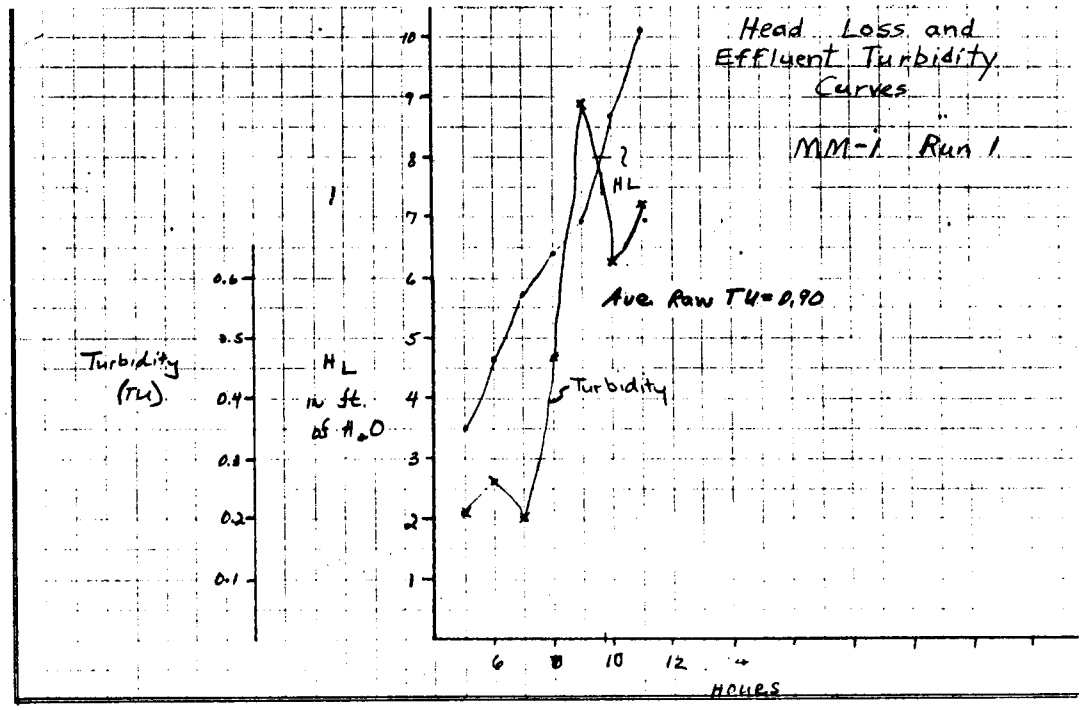
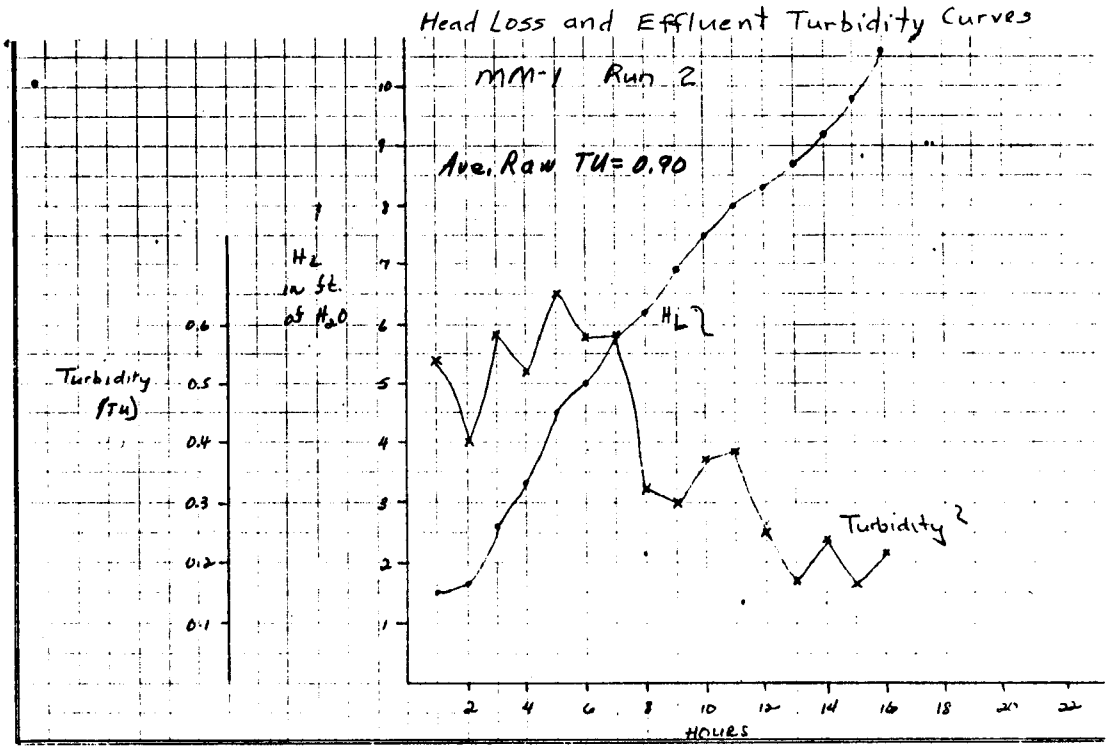
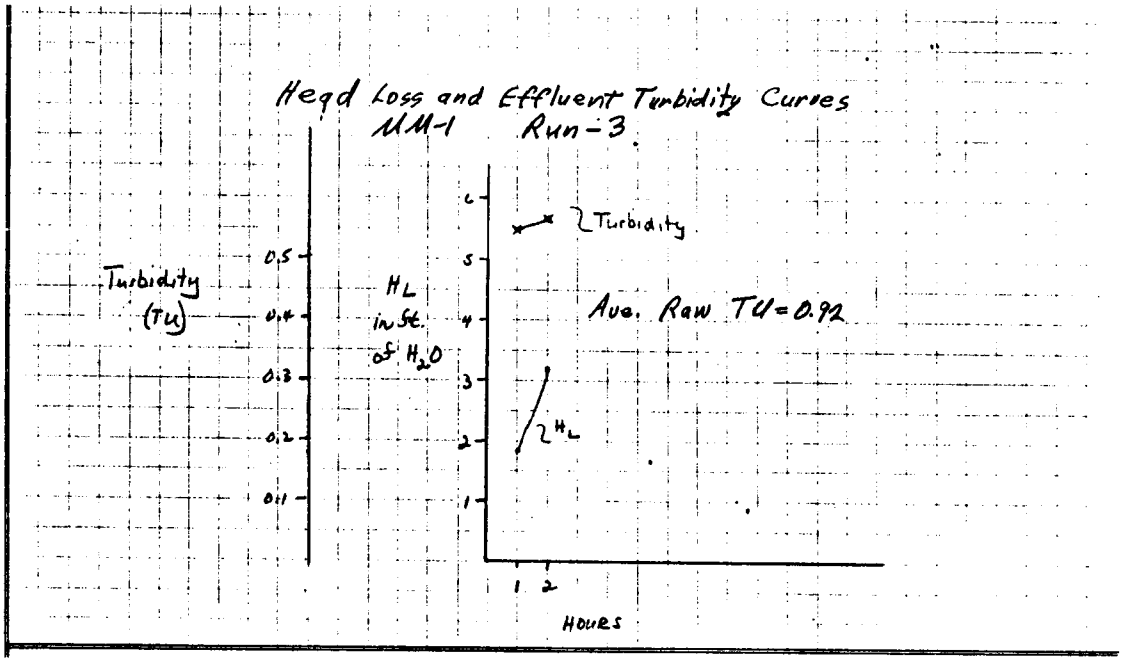
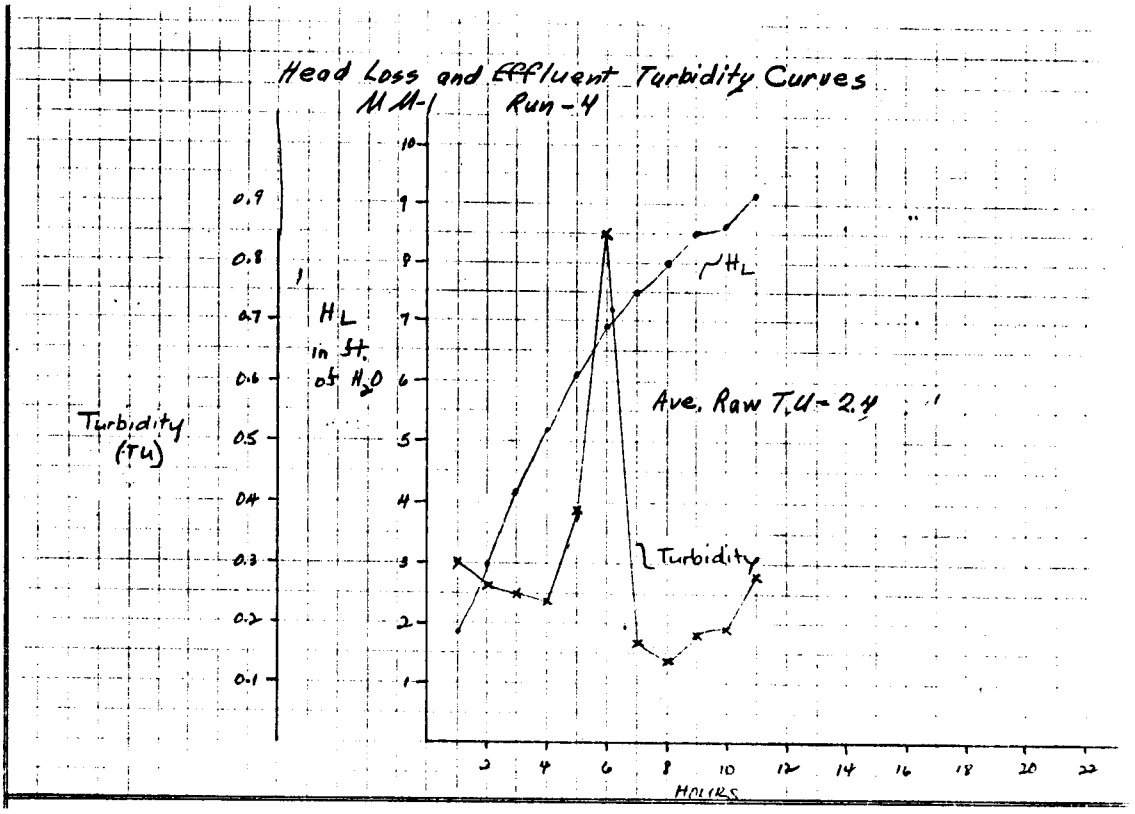
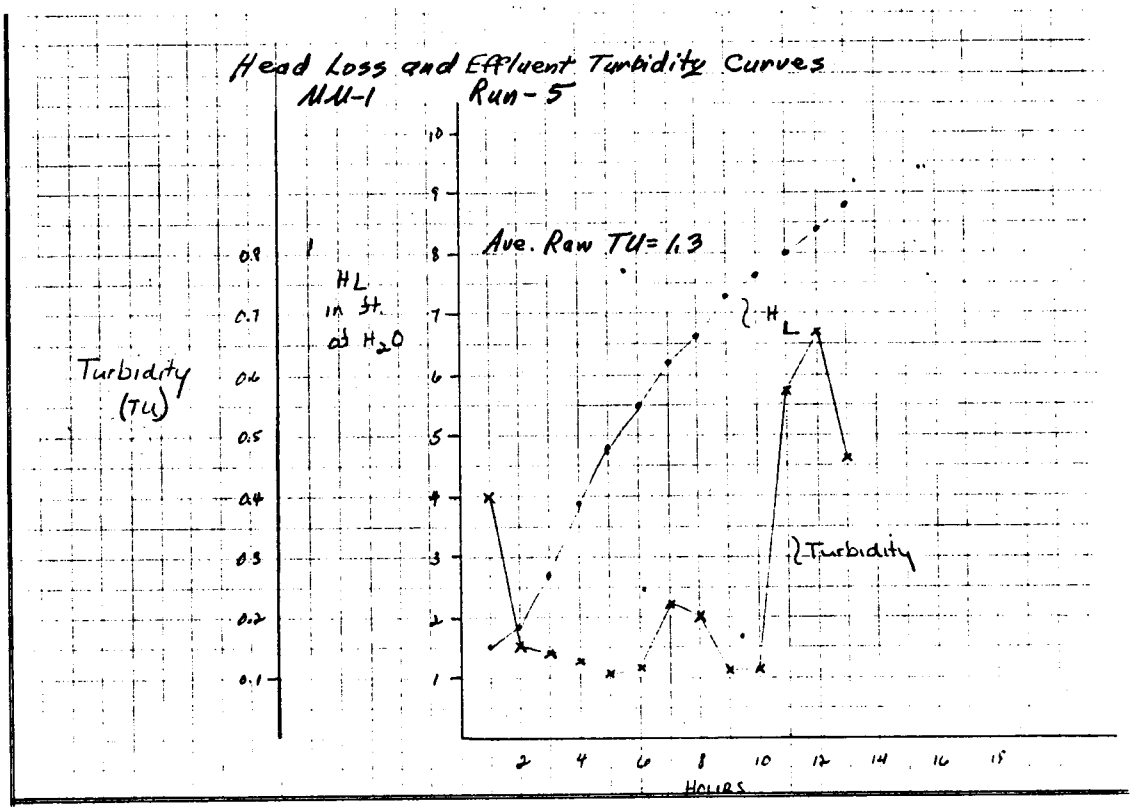
APPENDIX D-1 - GRANULAR MEDIA FILTRATION (MM-1) HEAD LOSS AND TURBIDITY CURVES

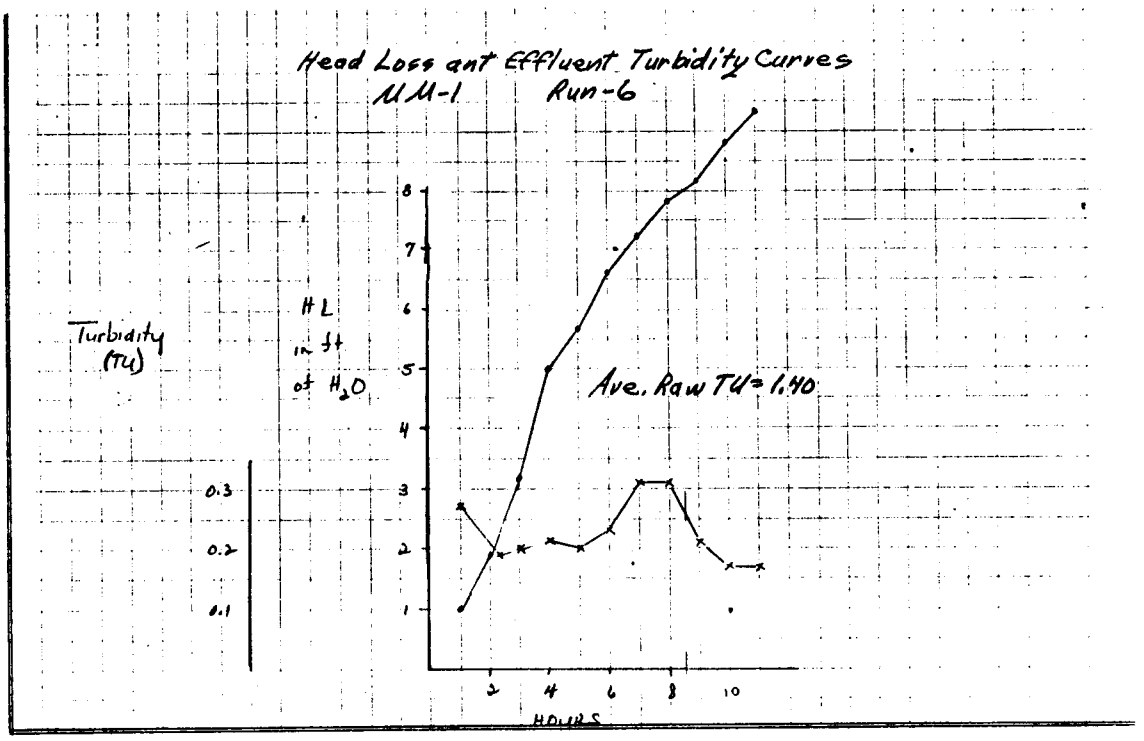


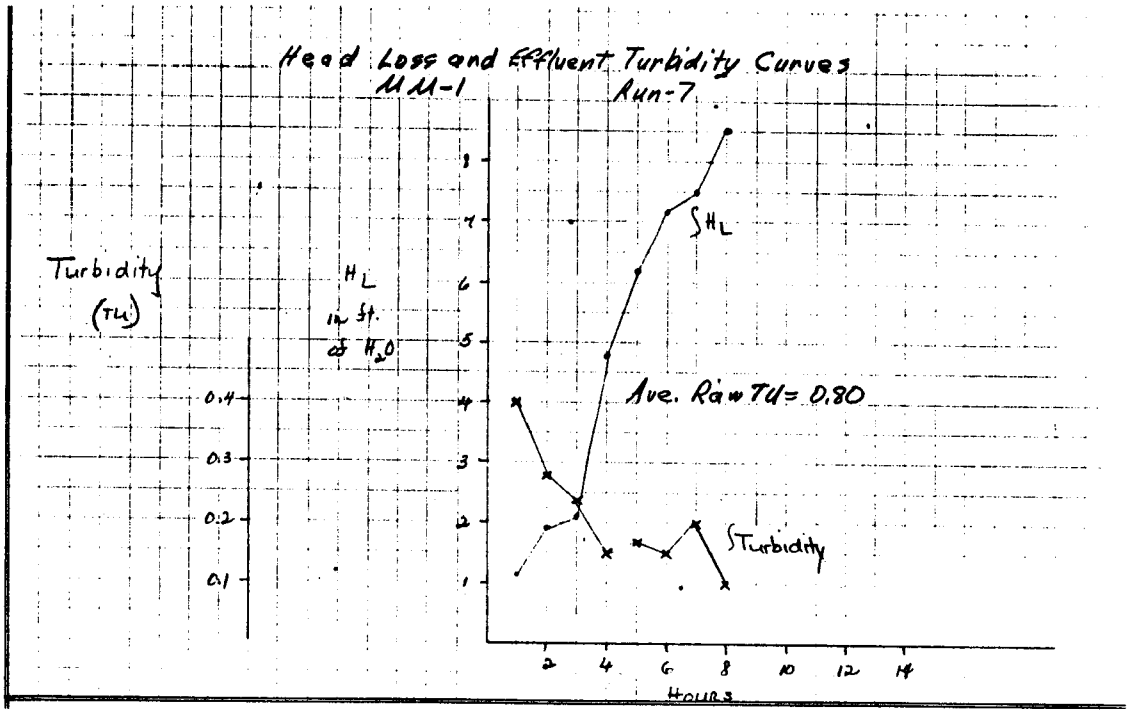


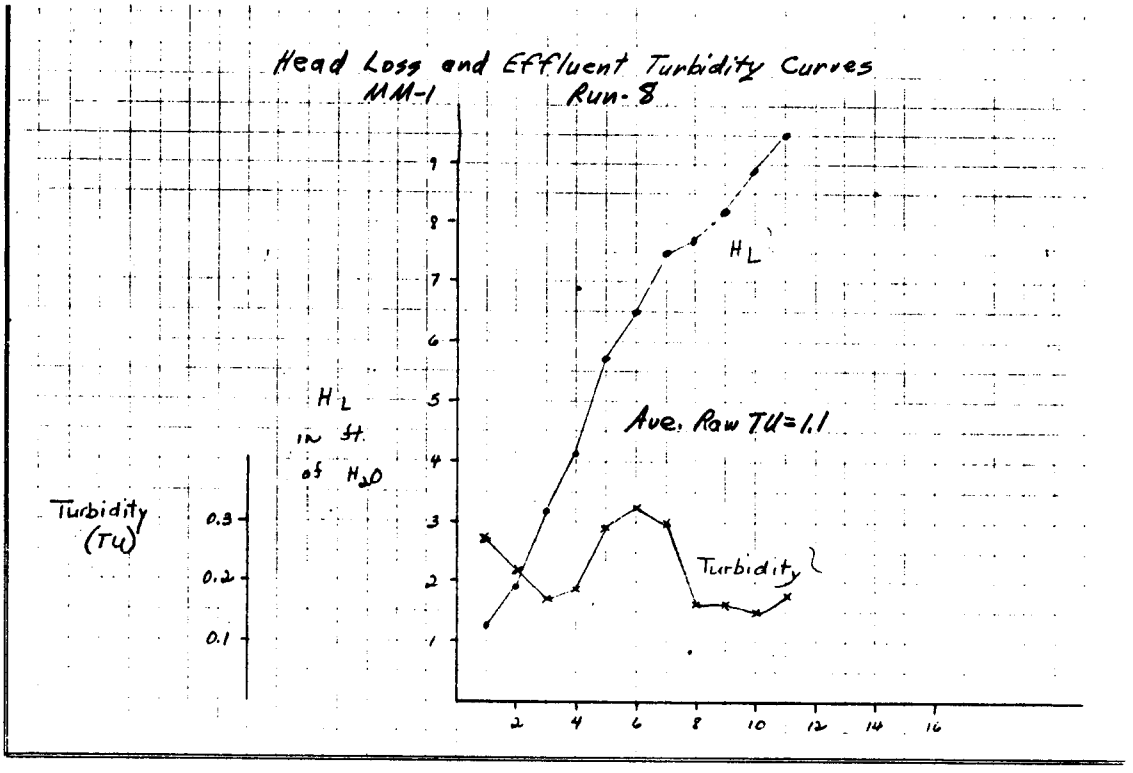

Head Loss and Effluent Turbidity Curves
MM-1 Run-3
Turbidity (TU)
0.5
0.4
0.3
0.2
0.1
HL in ft. of H2O
6
5
4
3
2
1
Turbidity
Ave. Raw TU=0.92
HL
1 2
Hours

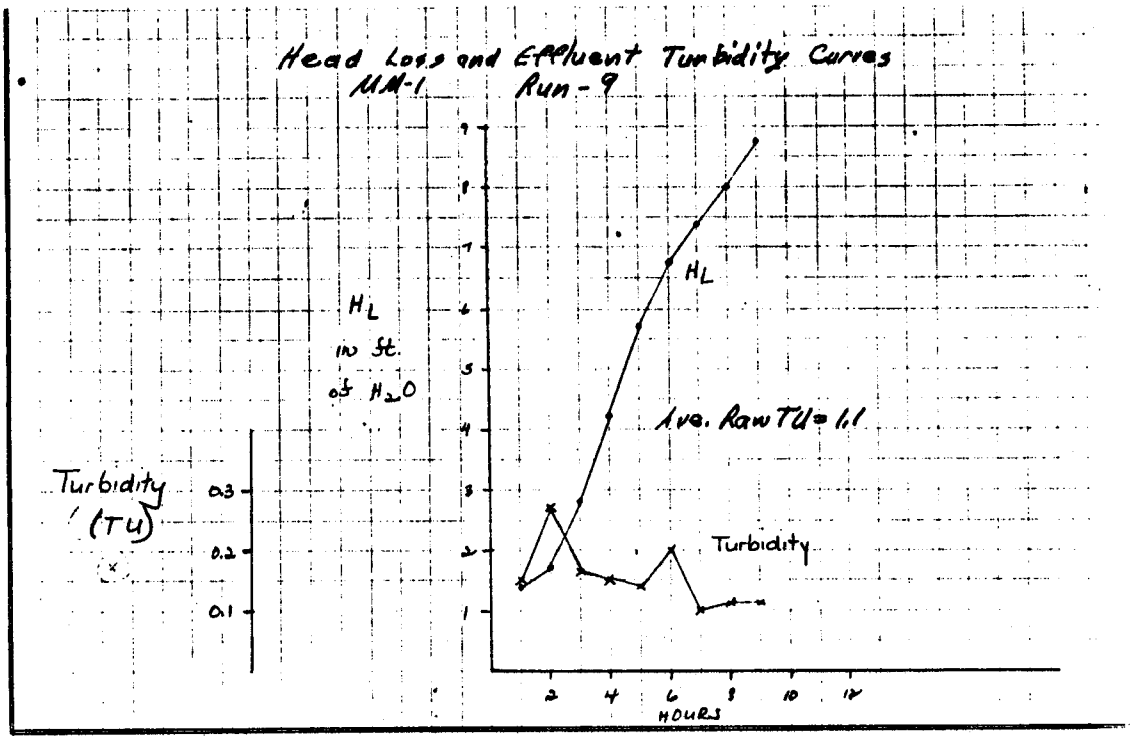

Head Loss and Effluent Turbidity Curves
MM-1 Run-4
Turbidity (TU)
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
HL in ft. of H2O
10
9
8
7
6
5
4
3
2
1
HL
Ave. Raw TU-2.4
Turbidity
2 4 6 8 10 12 14 16 18 20 22
HOURS

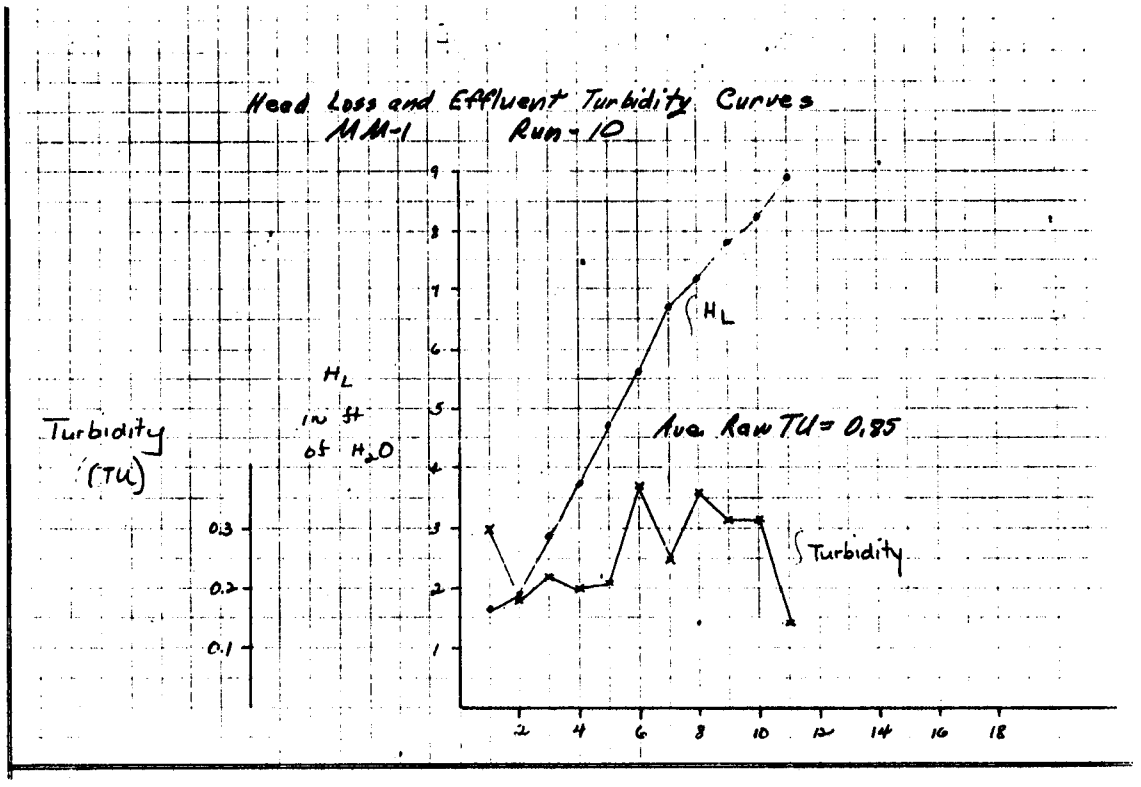

Head Loss and Effluent Turbidity Curves
MM-1 Run-5
Ave. Raw TU = 1.3
Turbidity (TU)
HL in ft. of H2O
HL
Turbidity
HOURS

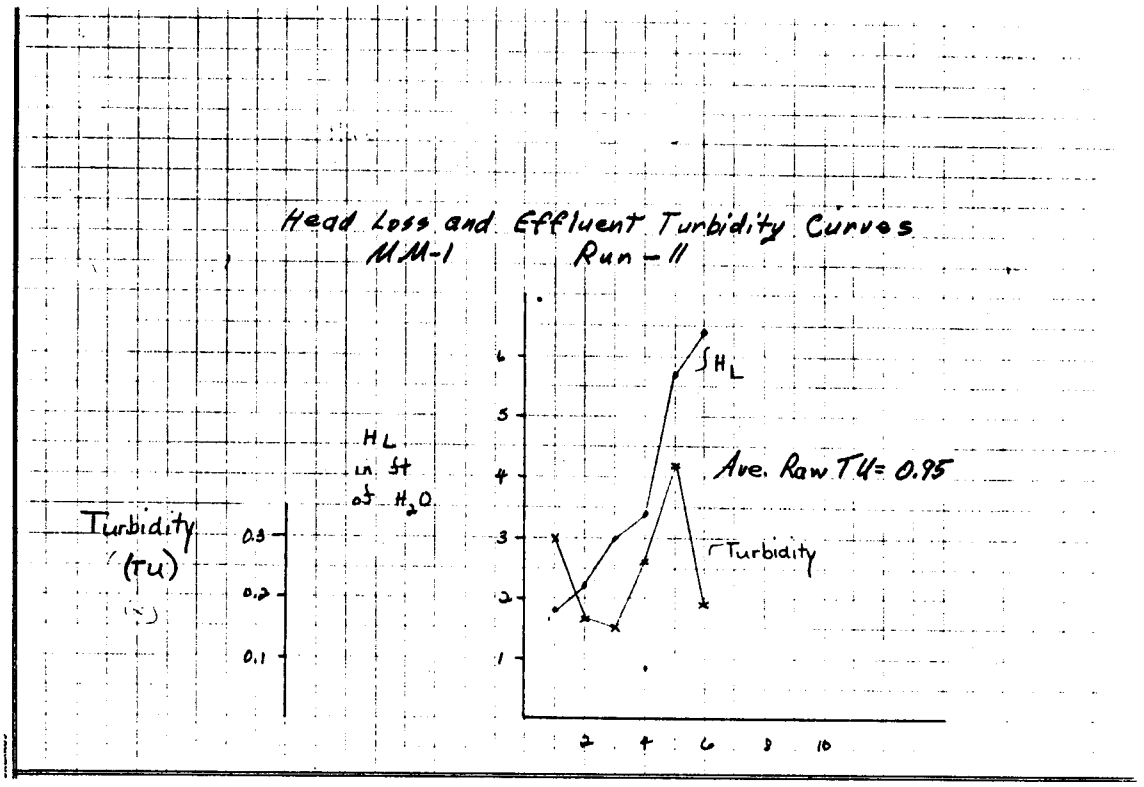

Head Loss and Effluent Turbidity Curves
MM-1 Run-6
Ave. Raw TU = 1.40
Turbidity (TU)
HL in ft of H2O
HOURS

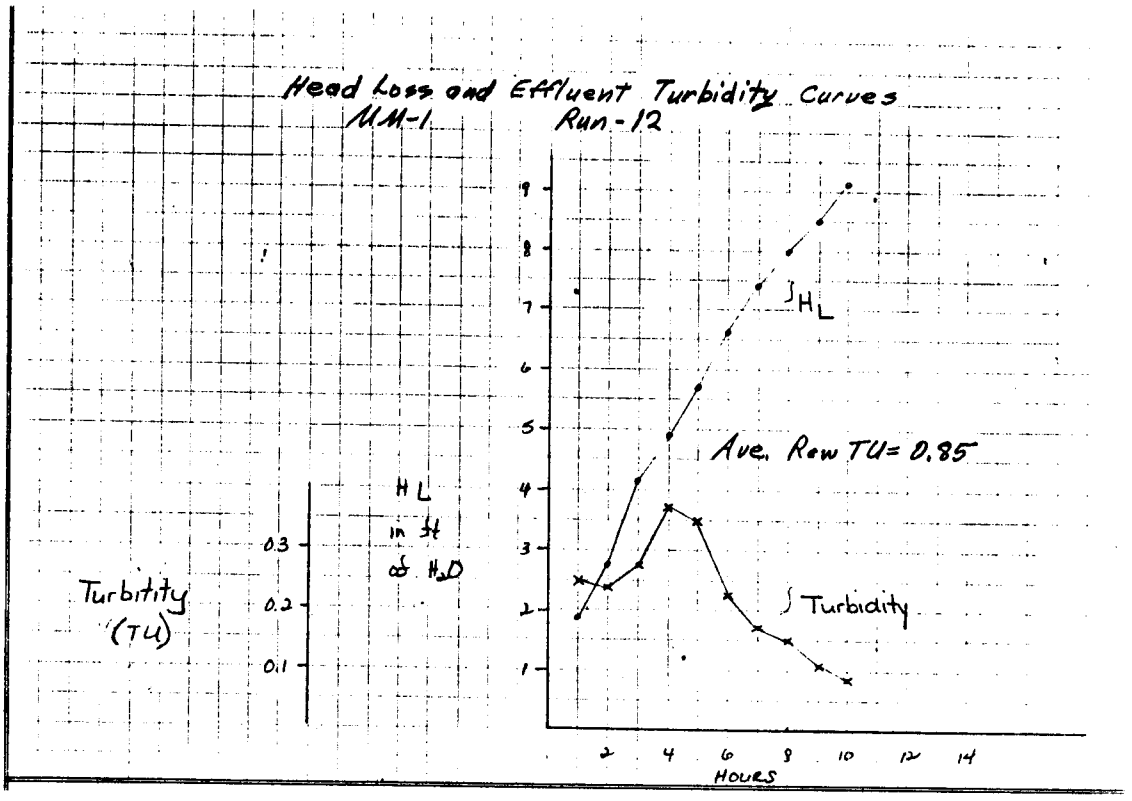

Head Loss and Effluent Turbidity Curves
MM-1
Run-7
Turbidity (TU)
H_L in ft. of H_2O
0.4
0.3
0.2
0.1
1
2
3
4
5
6
7
8
9
H_L
Ave. Raw TU = 0.80
Turbidity
2
4
6
8
10
12
14
Hours

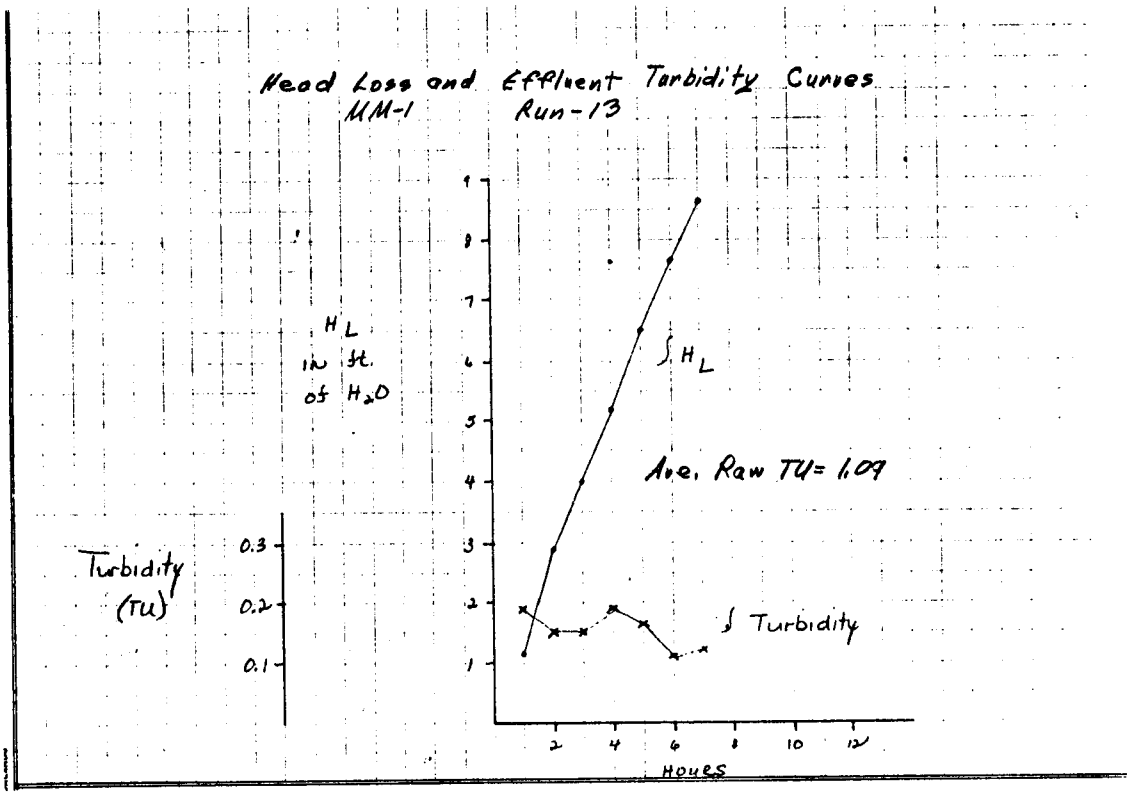

Head Loss and Effluent Turbidity Curves
MM-1
Run-8
Turbidity (TU)
H_L in ft. of H_2O
0.3
0.2
0.1
1
2
3
4
5
6
7
8
9
H_L
Ave. Raw TU = 1.1
Turbidity
2
4
6
8
10
12
14
16

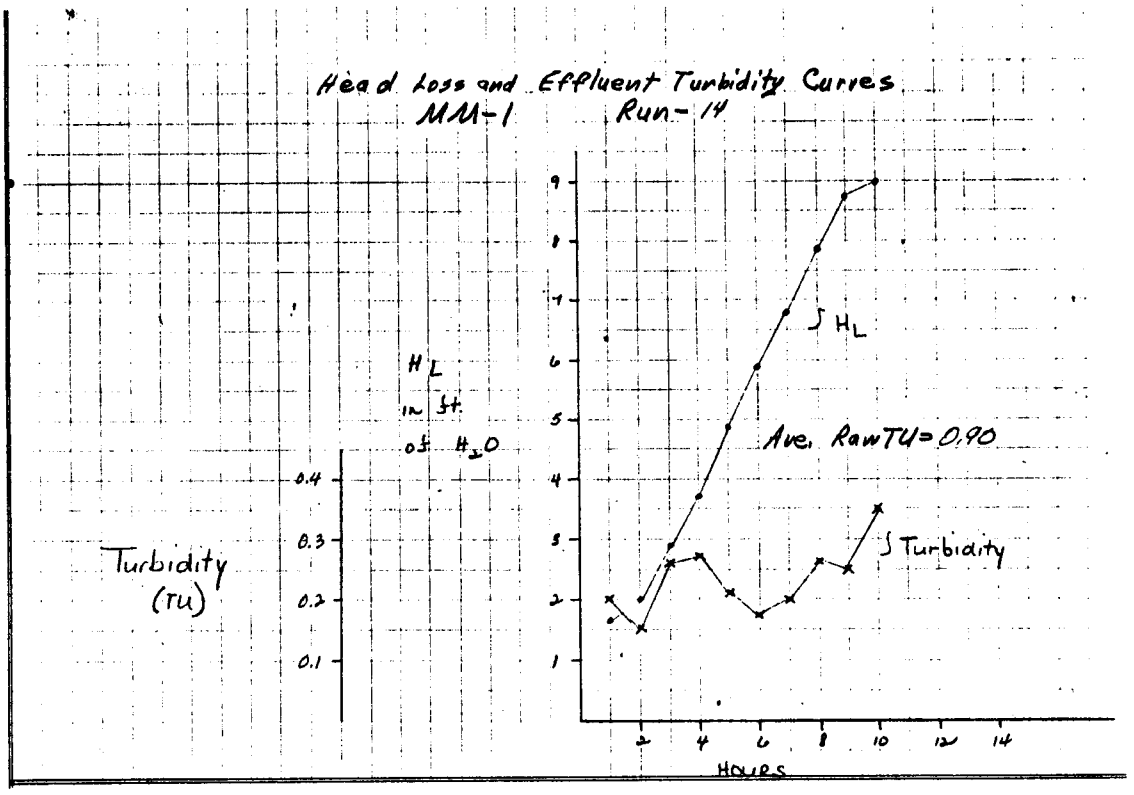

Head Loss and Effluent Turbidity Curves
MM-1 Run-9
H_L in ft of H_2O
Turbidity (TU)
0.3
0.2
0.1
H_L
Ave. Raw TU = 1.1
Turbidity
HOURS

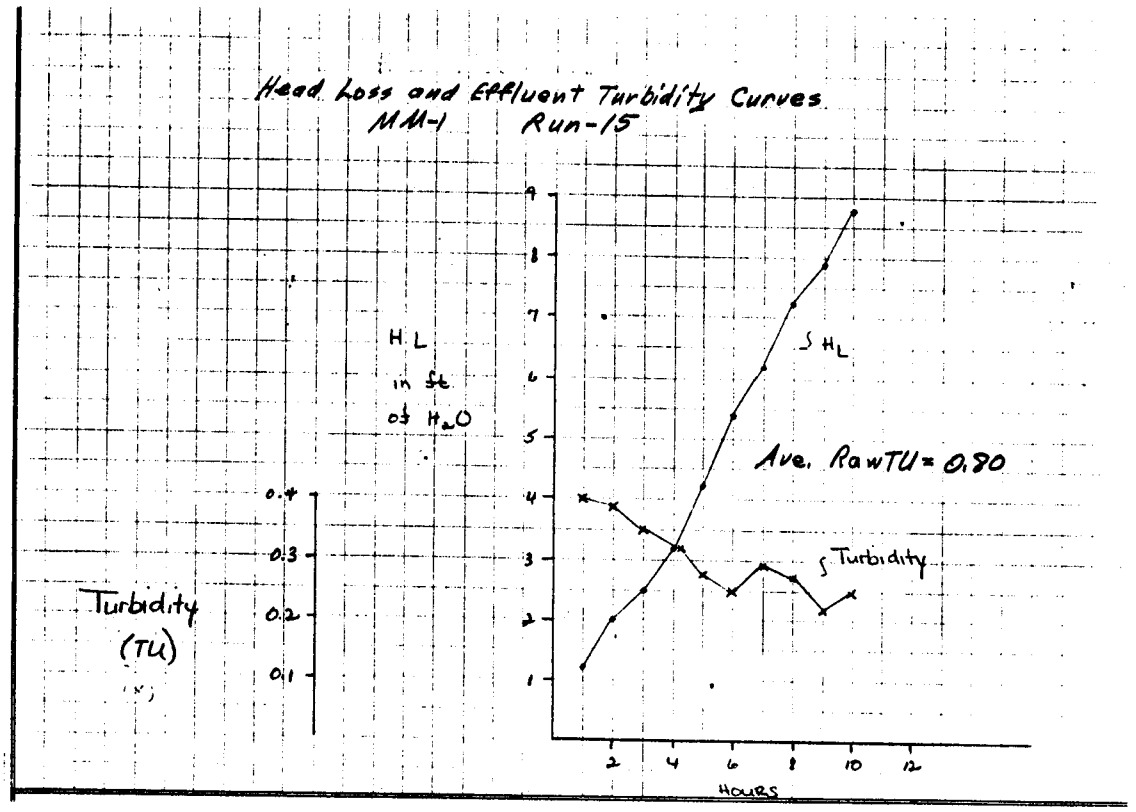

Head Loss and Effluent Turbidity Curves
MM-1 Run-10
H_L in ft of H_2O
Turbidity (TU)
0.3
0.2
0.1
H_L
Ave. Raw TU = 0.85
Turbidity

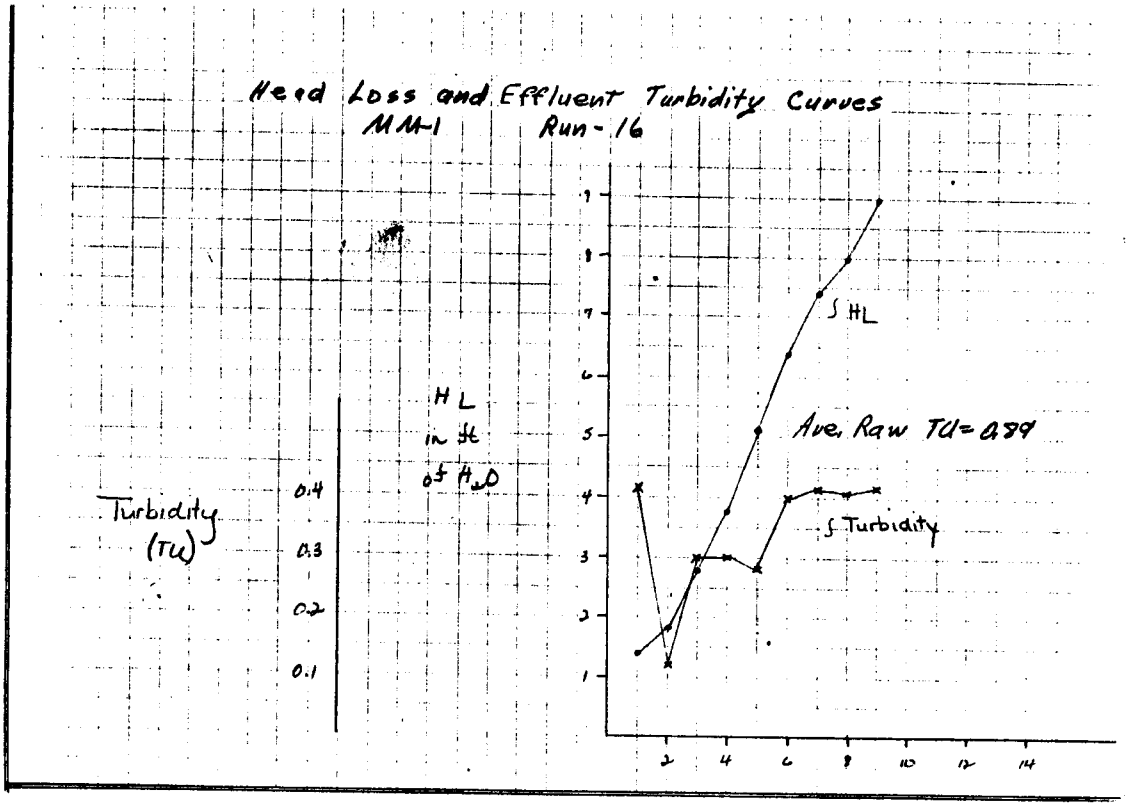

Head Loss and Effluent Turbidity Curves
MM-1 Run - 11
HL in ft of H2O
Turbidity (TU)
0.3
0.2
0.1
1
2
3
4
5
6
2
4
6
8
10
HL
Ave. Raw TU = 0.95
Turbidity

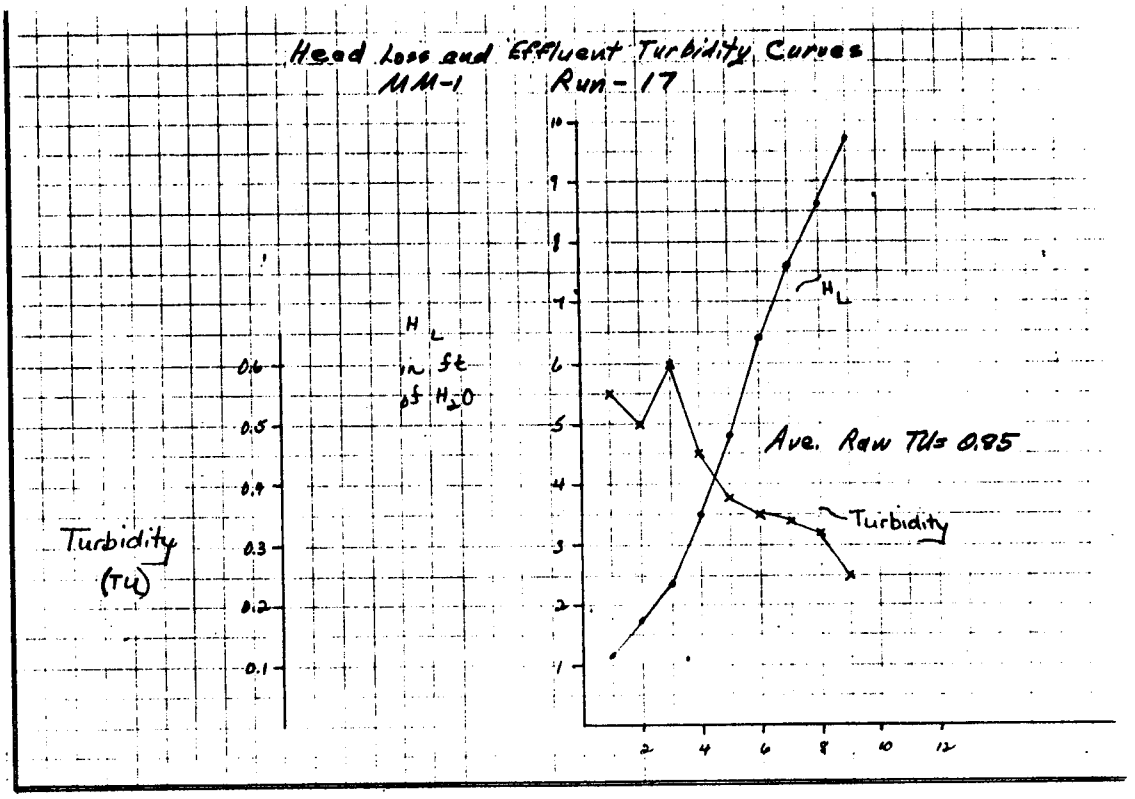

Head Loss and Effluent Turbidity Curves
MM-1 Run - 12
HL in ft of H2O
Turbidity (TU)
0.3
0.2
0.1
1
2
3
4
5
6
7
8
9
2
4
6
8
10
12
14
HOURS
HL
Ave. Raw TU = 0.85
Turbidity

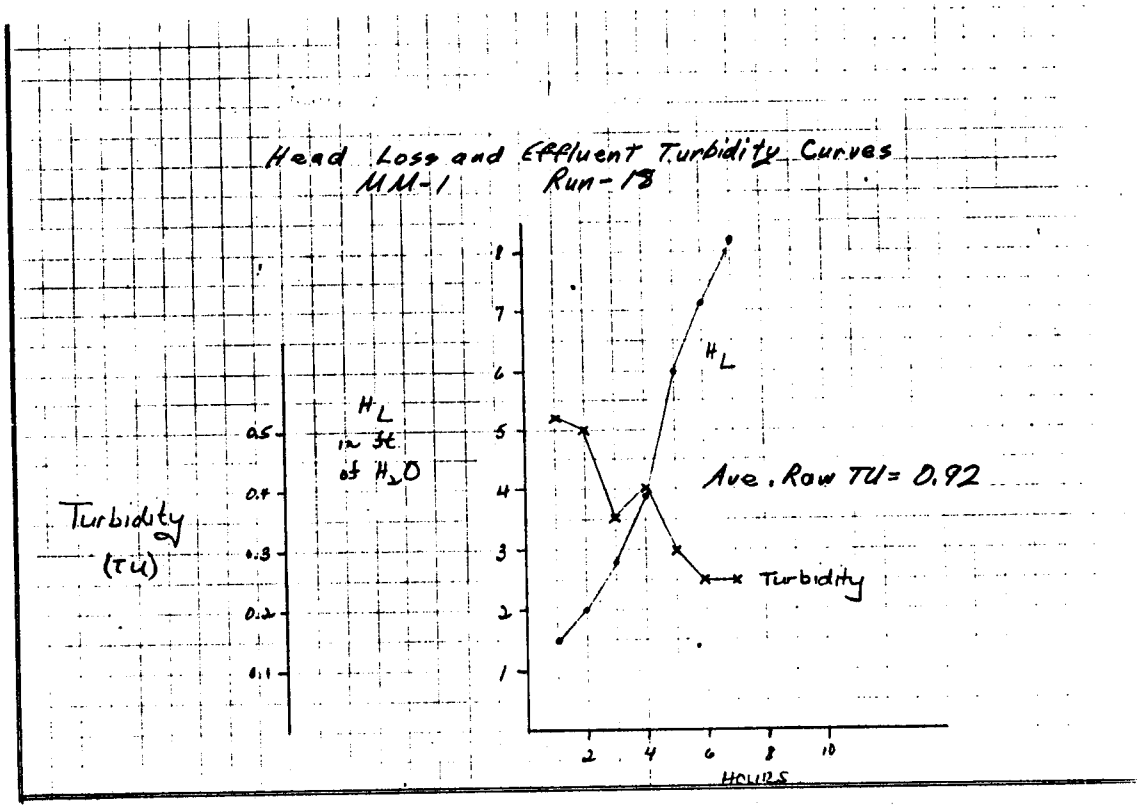

Head Loss and Effluent Turbidity Curves
MM-1 Run-13
H_L in ft. of H_2O
Turbidity (TU)
0.3
0.2
0.1
1
2
3
4
5
6
7
8
9
H_L
Ave. Raw TU= 1.09
Turbidity
2
4
6
8
10
12
HOURS

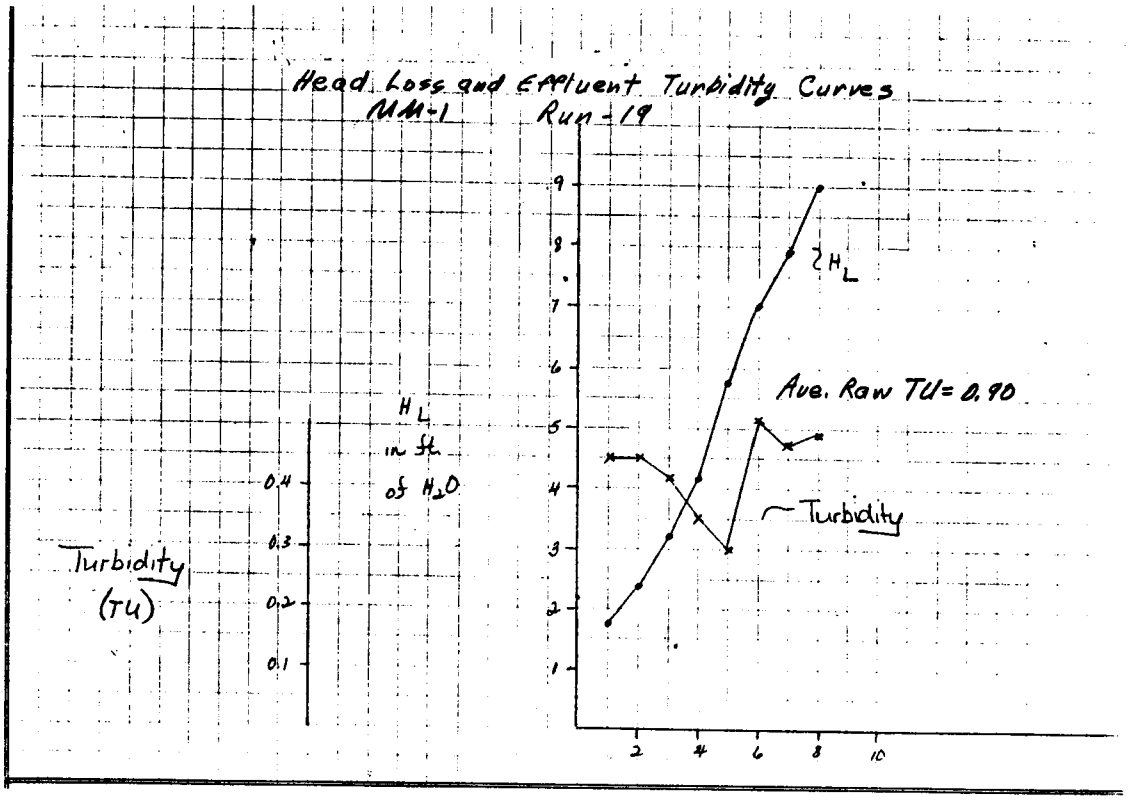

Head Loss and Effluent Turbidity Curves
MM-1 Run-14
H_L in ft. of H_2O
Turbidity (TU)
0.4
0.3
0.2
0.1
1
2
3
4
5
6
7
8
9
H_L
Ave. Raw TU= 0.90
Turbidity
2
4
6
8
10
12
14
HOURS

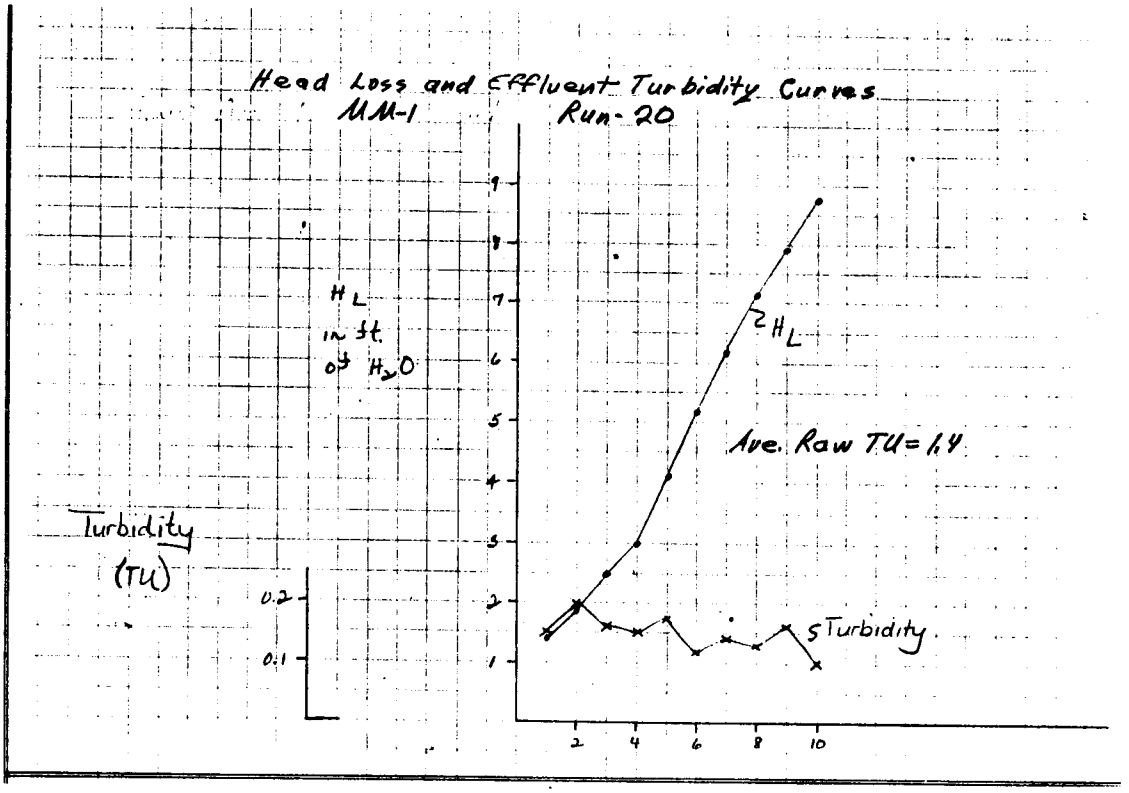

Head Loss and Effluent Turbidity Curves
MM-1 Run-15
H.L in ft of H_2O
Turbidity (TU)
0.4
0.3
0.2
0.1
1
2
3
4
5
6
7
8
9
2
4
6
8
10
12
HOURS
HL
Ave. Raw TU = 0.80
Turbidity

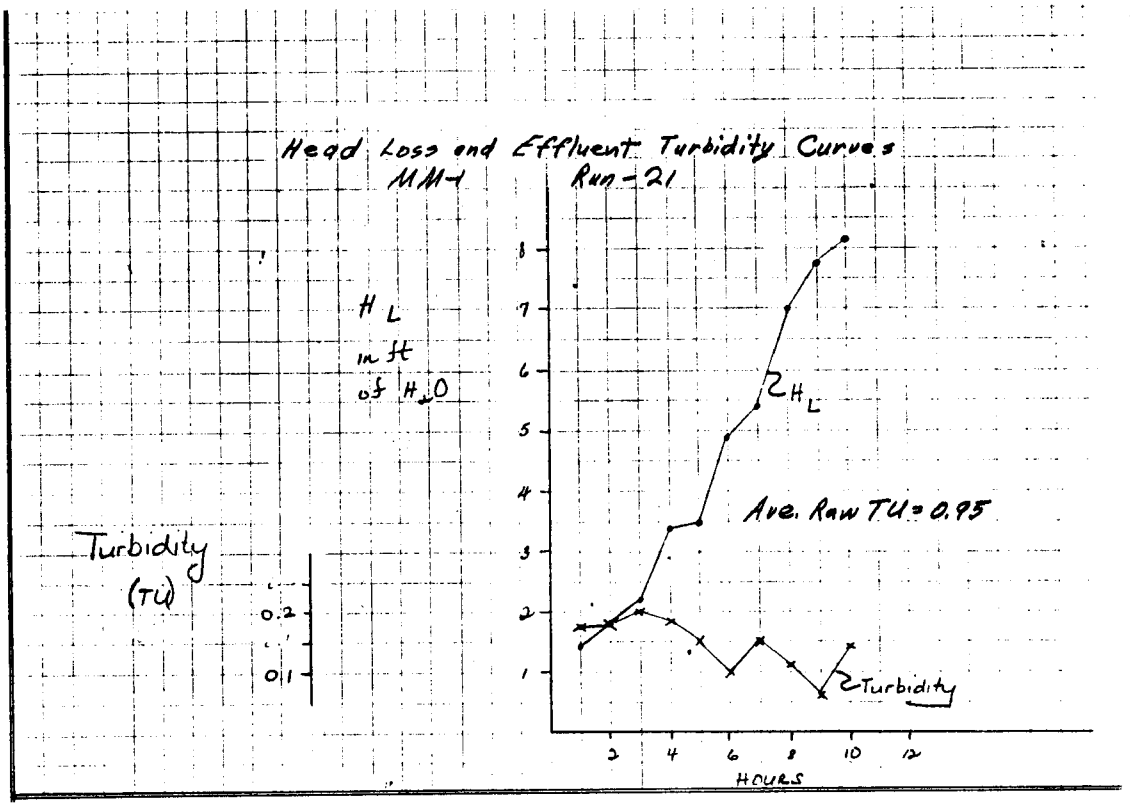

Head Loss and Effluent Turbidity Curves
MM-1 Run-16
H L in ft of H_2O
Turbidity (TU)
0.4
0.3
0.2
0.1
1
2
3
4
5
6
7
8
9
2
4
6
8
10
12
14
HL
Ave. Raw TU = 0.99
Turbidity

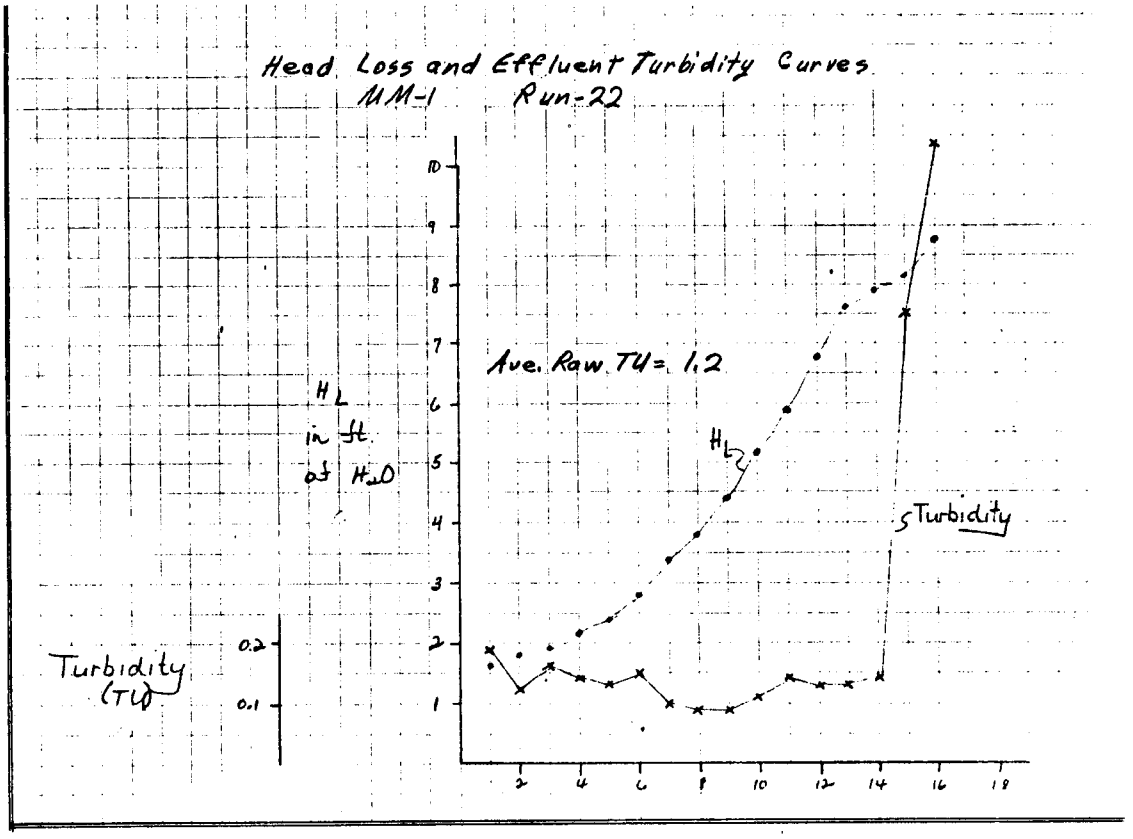

Head Loss and Effluent Turbidity Curves
MM-1 Run-17
H_L in ft of H_2O
Turbidity (TU)
H_L
Turbidity
Ave. Raw TU= 0.85

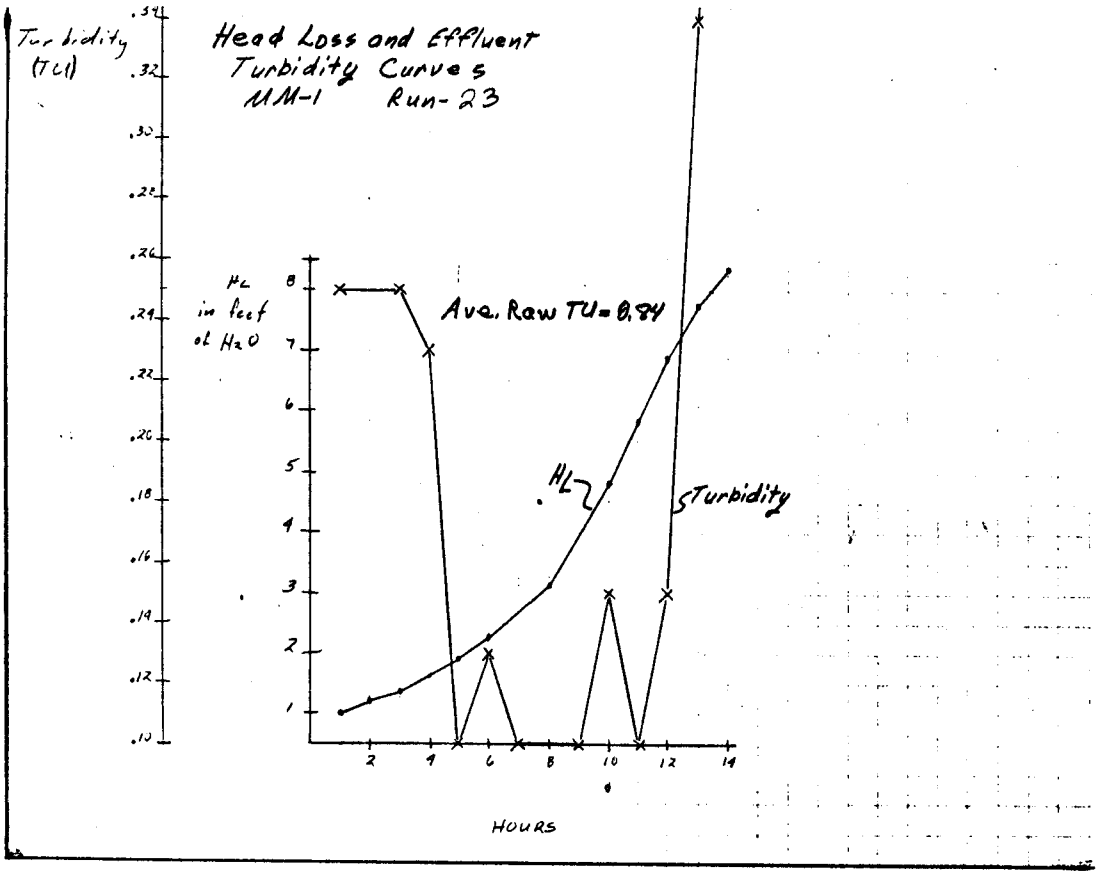

Head Loss and Effluent Turbidity Curves
MM-1 Run-18
H_L in ft of H_2O
Turbidity (TU)
H_L
Turbidity
Ave. Raw TU= 0.92
HOURS

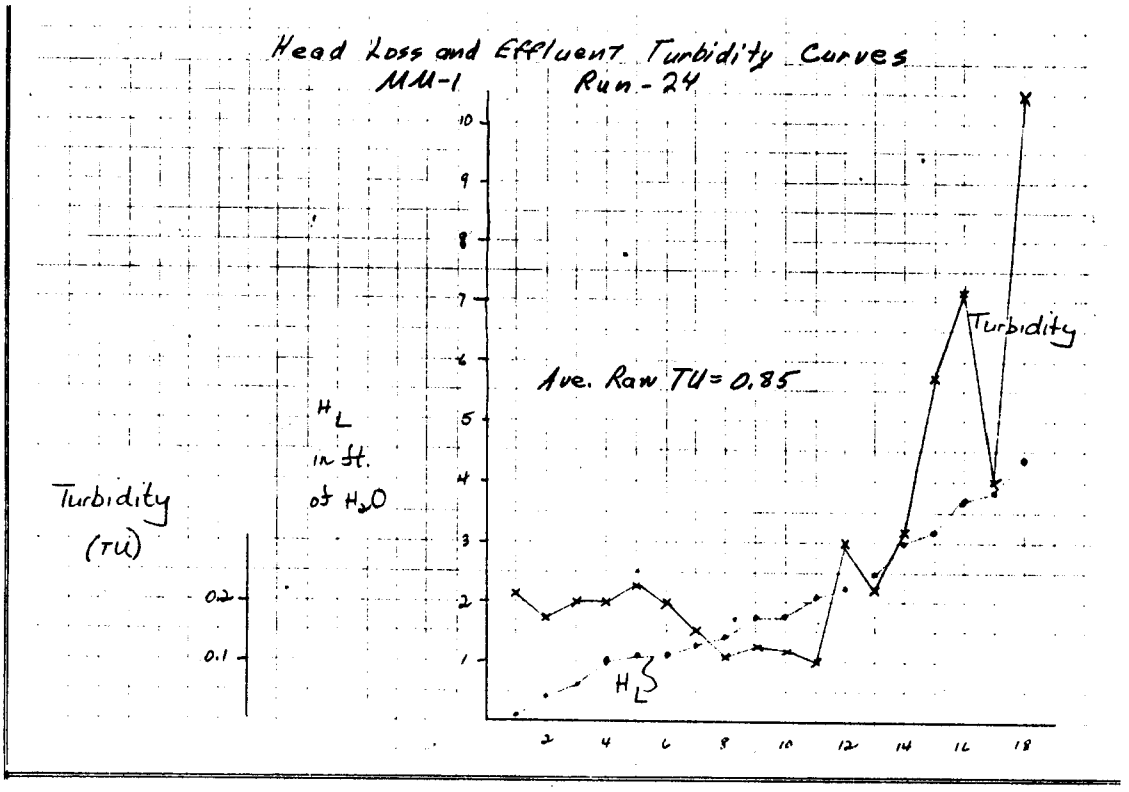

Head Loss and Effluent Turbidity Curves
MM-1 Run-19
H_L in ft. of H_2O
Turbidity (TU)
ΣH_L
Ave. Raw TU = 0.90
Turbidity

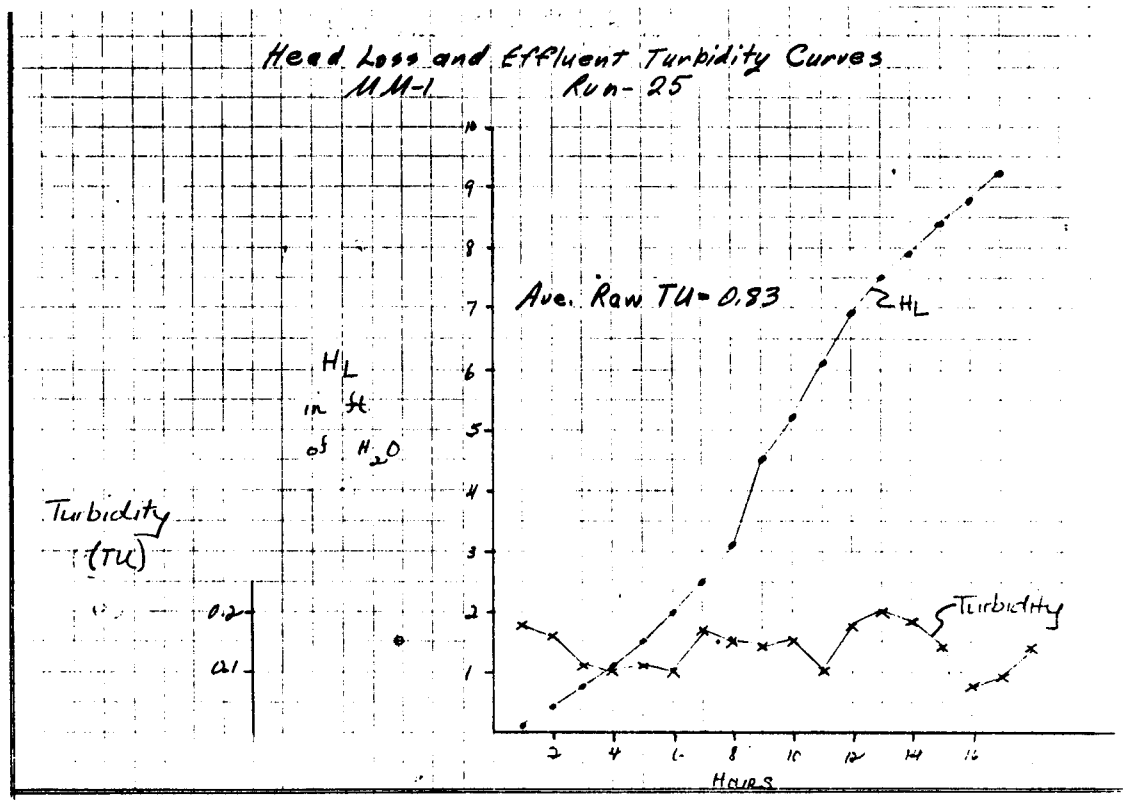

Head Loss and Effluent Turbidity Curves
MM-1 Run-20
H_L in ft. of H_2O
Turbidity (TU)
ΣH_L
Ave. Raw TU = 1.4
Turbidity

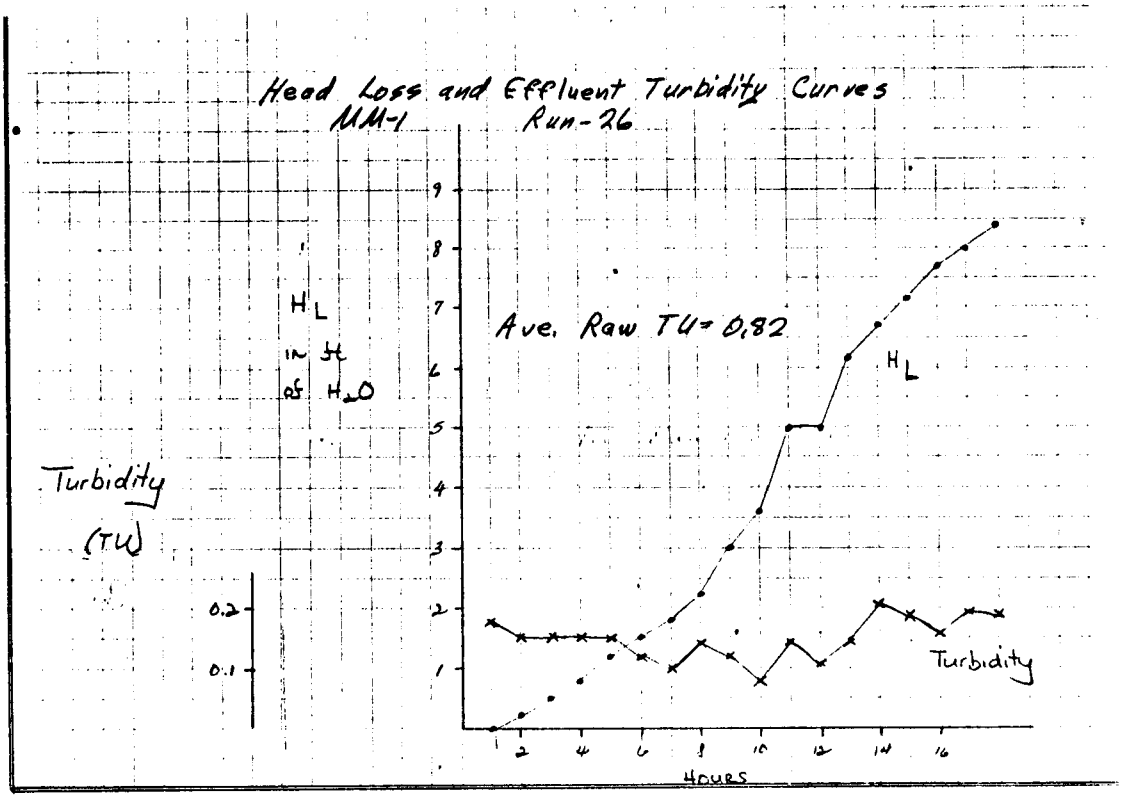

Head Loss and Effluent Turbidity Curves
MM-1 Run-21
H_L in ft of H_2O
Turbidity (TU)
0.2
0.1
Ave. Raw TU = 0.95
H_L
Turbidity
HOURS

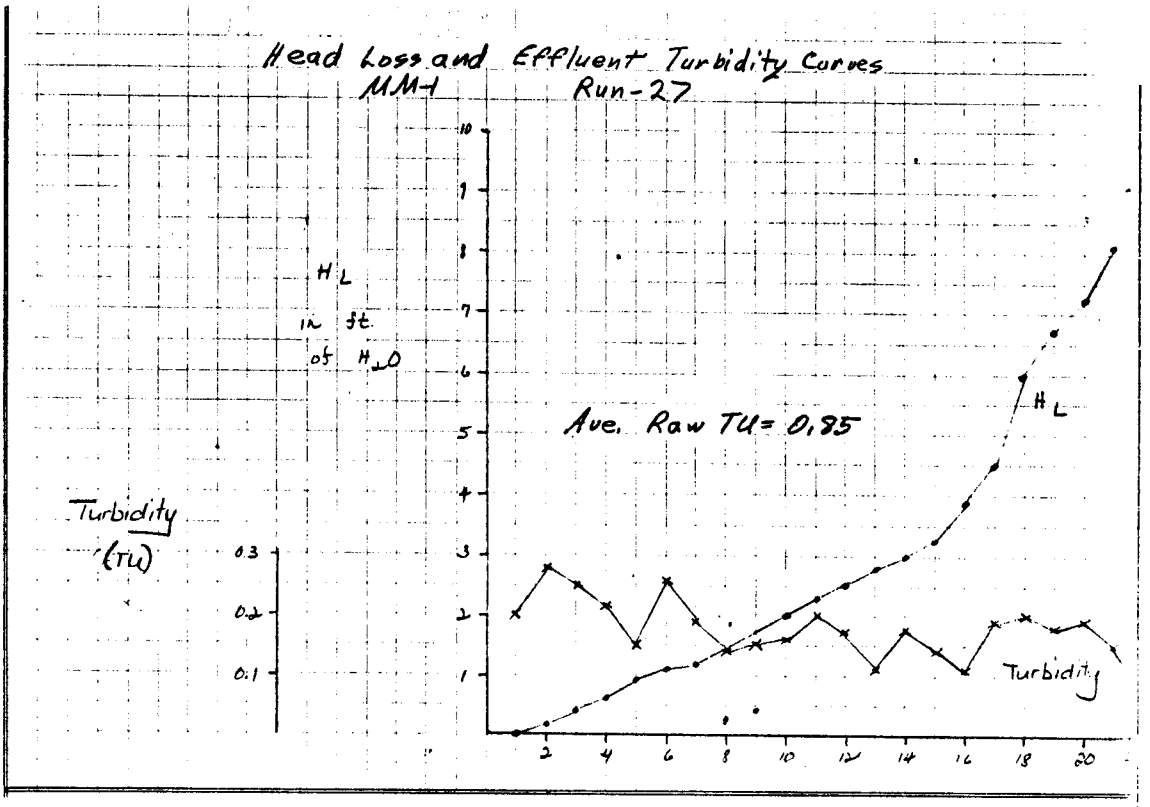

Head Loss and Effluent Turbidity Curves
MM-1 Run-22
H_L in ft of H_2O
Turbidity (TU)
0.2
0.1
Ave. Raw TU = 1.2
H_L
Turbidity

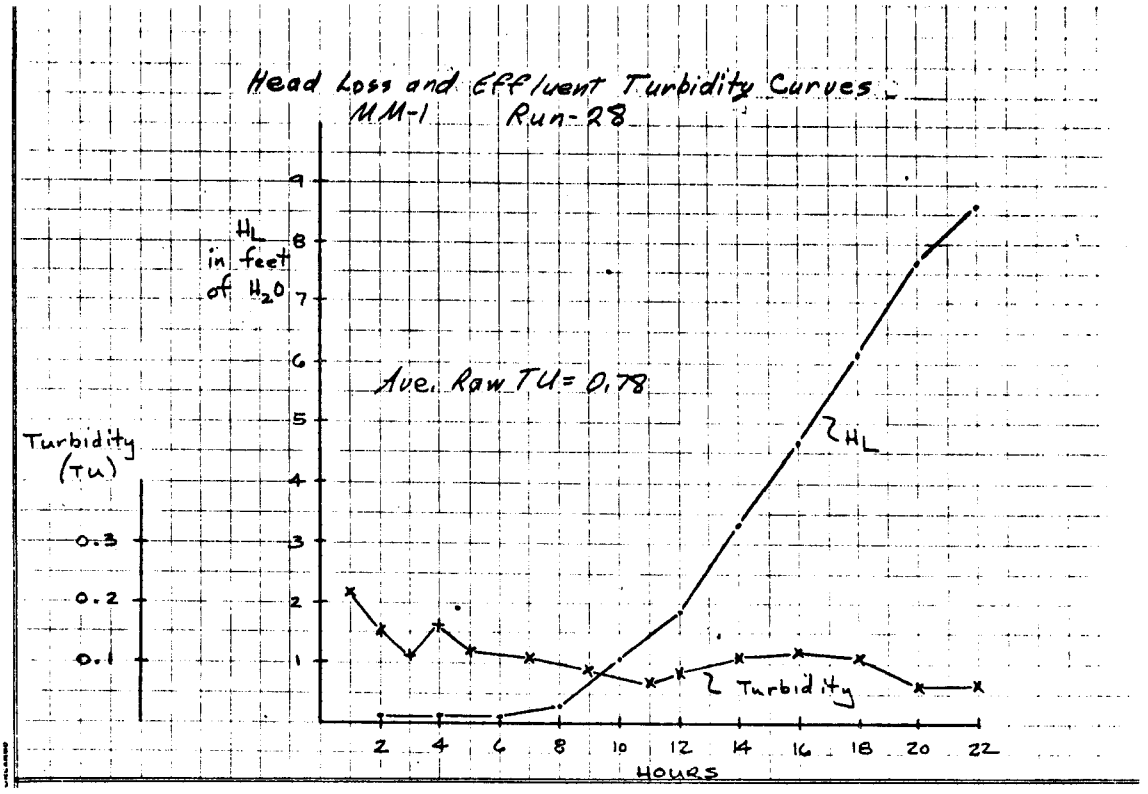

Head Loss and Effluent
Turbidity Curves
MM-1 Run-23
Turbidity
(TU)
H_L
in feet
of H_2O
Ave. Raw TU = 0.84
H_L
Turbidity
HOURS

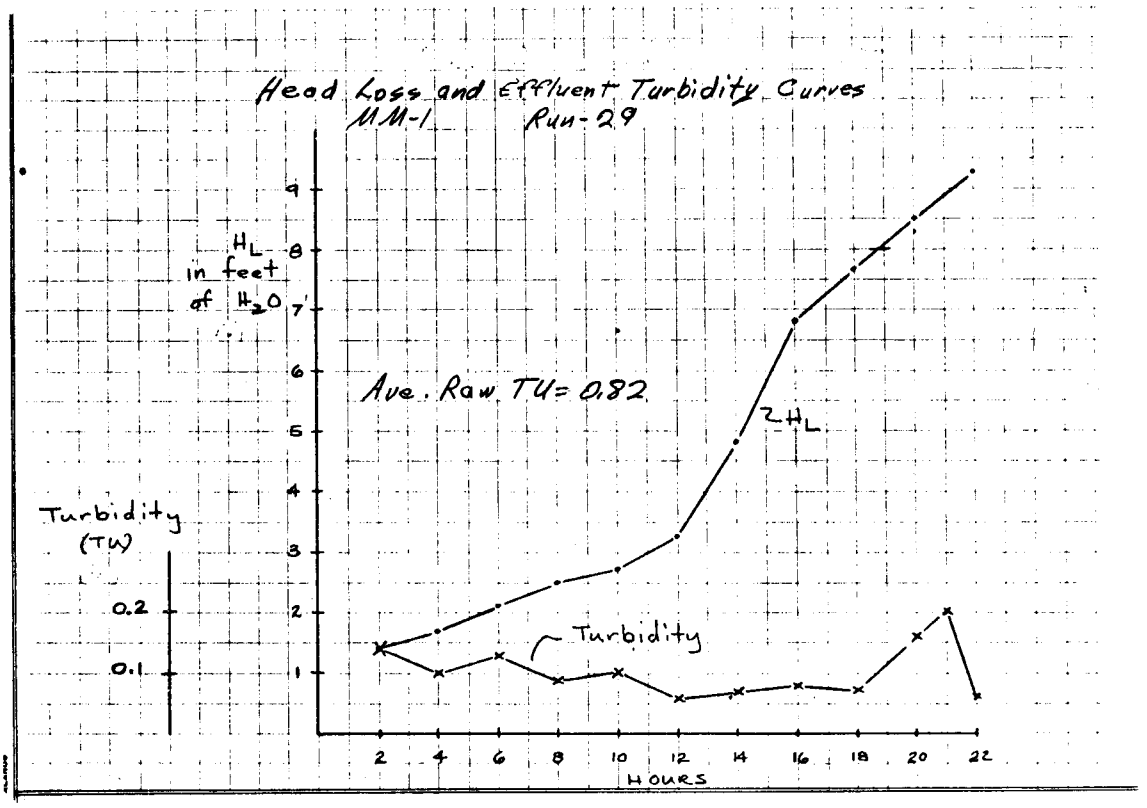

Head Loss and Effluent Turbidity Curves
MM-1 Run-24
Turbidity
(TU)
H_L
in ft.
of H_2O
Ave. Raw TU = 0.85
Turbidity
H_L

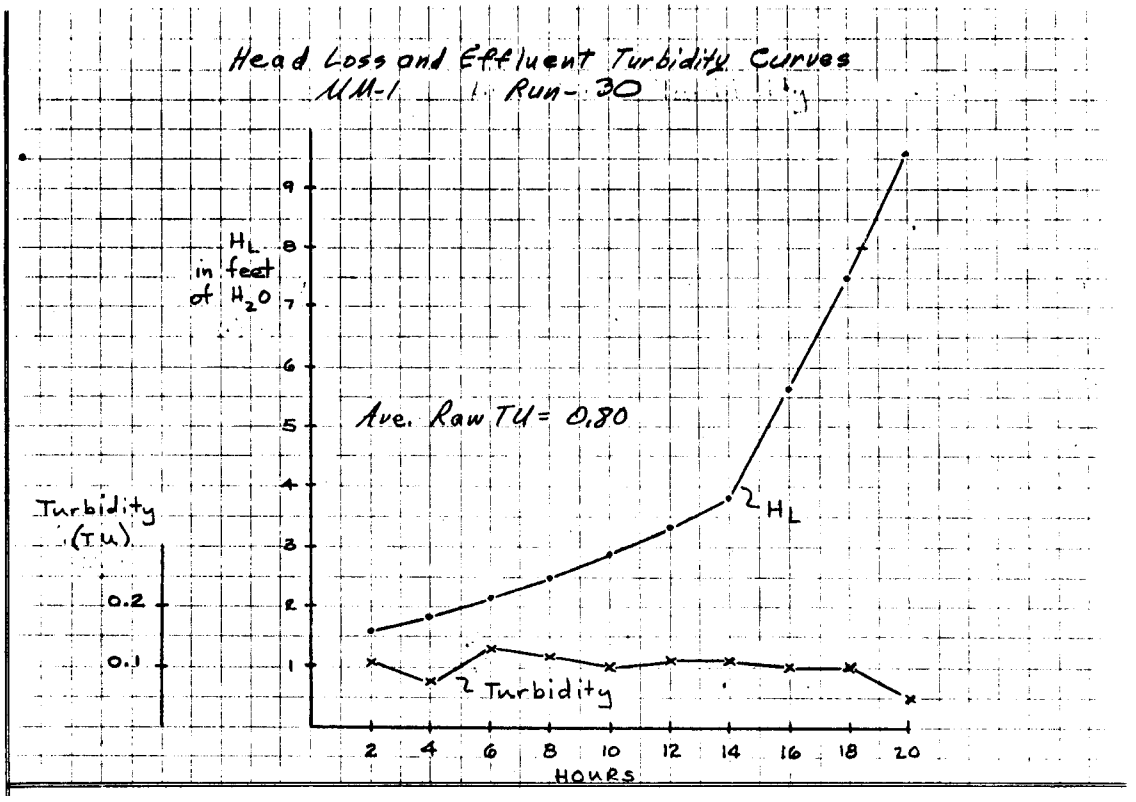

Head Loss and Effluent Turbidity Curves
MM-1 Run-25
Ave. Raw TU = 0.83
H_L
H_L in ft of H_2O
Turbidity (TU)
Turbidity
Hours

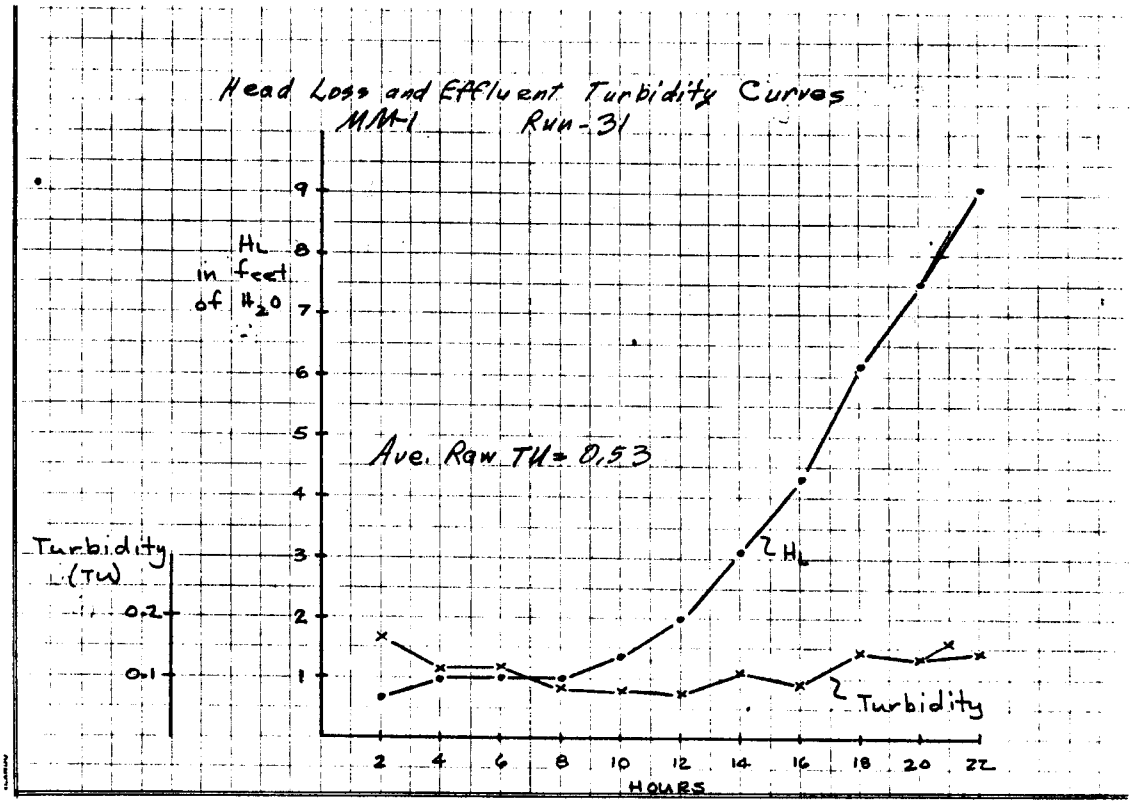

Head Loss and Effluent Turbidity Curves
MM-1 Run-26
Ave. Raw TU = 0.82
H_L
H_L in ft of H_2O
Turbidity (TU)
Turbidity
Hours

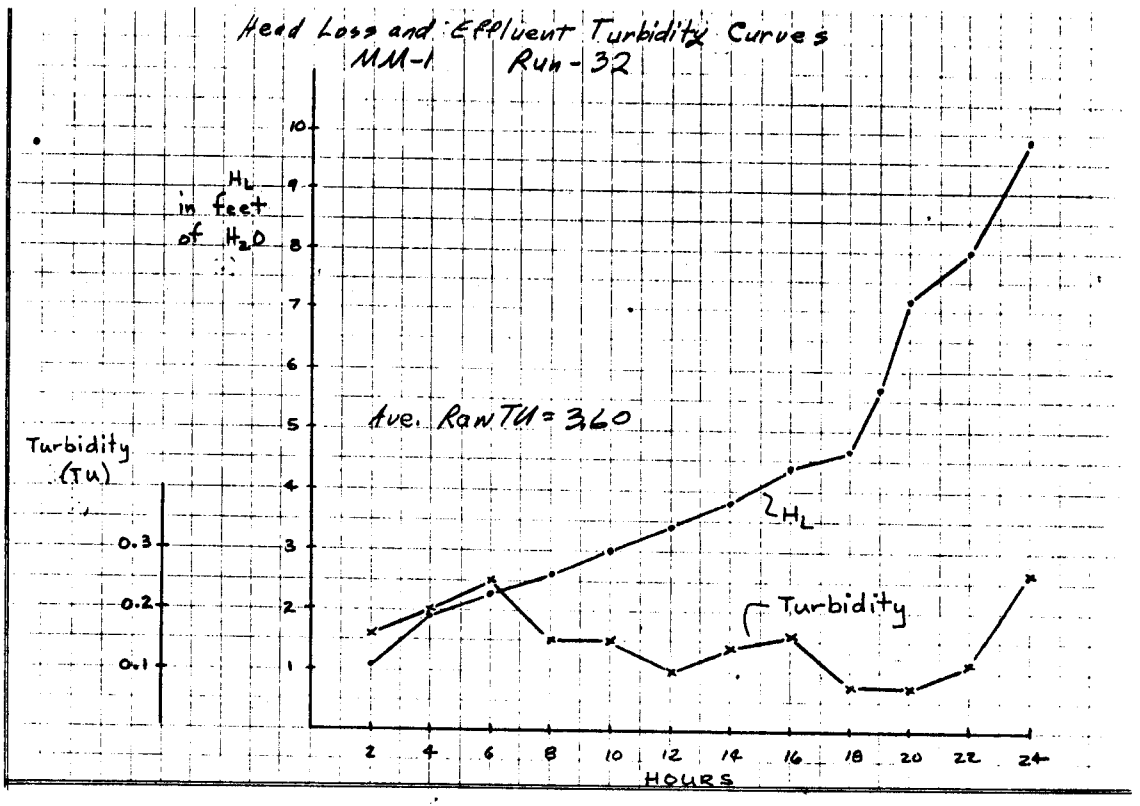

Head Loss and Effluent Turbidity Curves
MM-1 Run-27
H_L in ft. of H_2O
Ave. Raw TU = 0.85
H_L
Turbidity
Turbidity (TU)
0.3
0.2
0.1
10
9
8
7
6
5
4
3
2
1
2
4
6
8
10
12
14
16
18
20

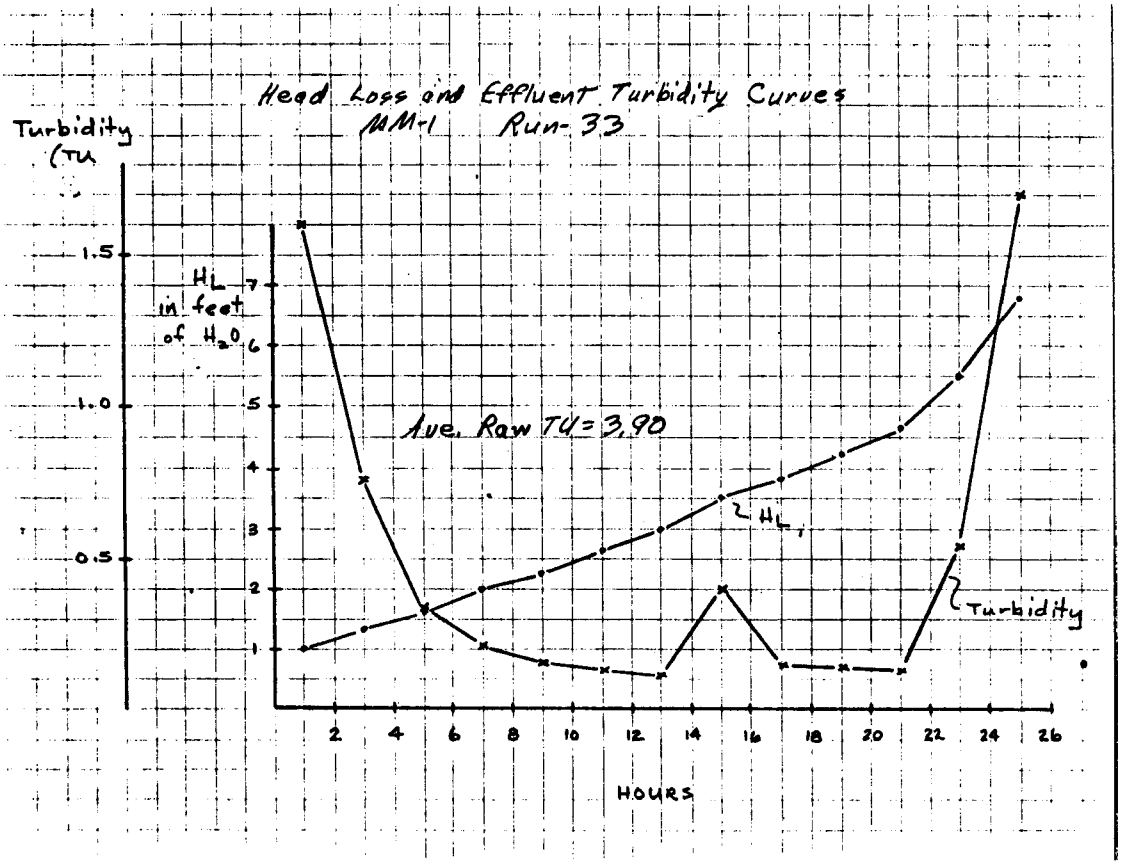

Head Loss and Effluent Turbidity Curves
MM-1 Run-28
H_L in feet of H_2O
Ave. Raw TU = 0.78
H_L
Turbidity
Turbidity (TU)
0.3
0.2
0.1
9
8
7
6
5
4
3
2
1
2
4
6
8
10
12
14
16
18
20
22
HOURS

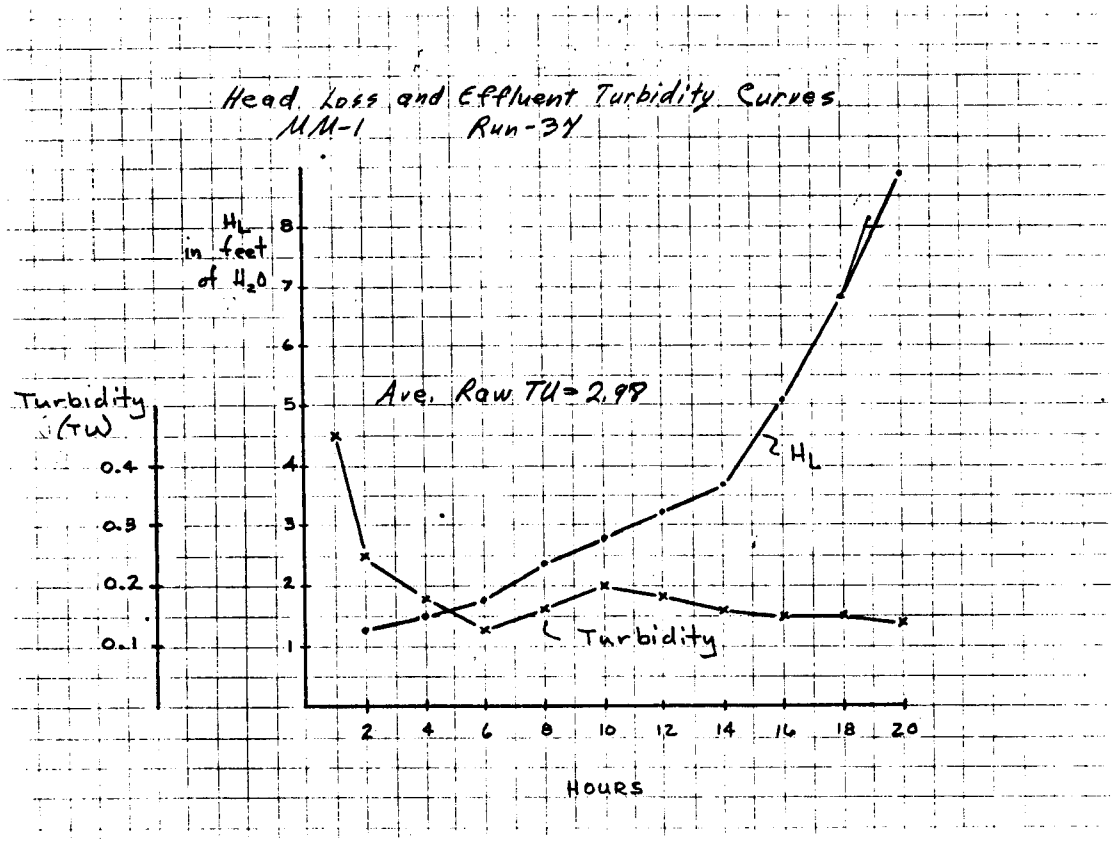

Head Loss and Effluent Turbidity Curves
MM-1 Run-29
H_L in feet of H_2O
Ave. Raw TU = 0.82
H_L
Turbidity (TU)
Turbidity
HOURS

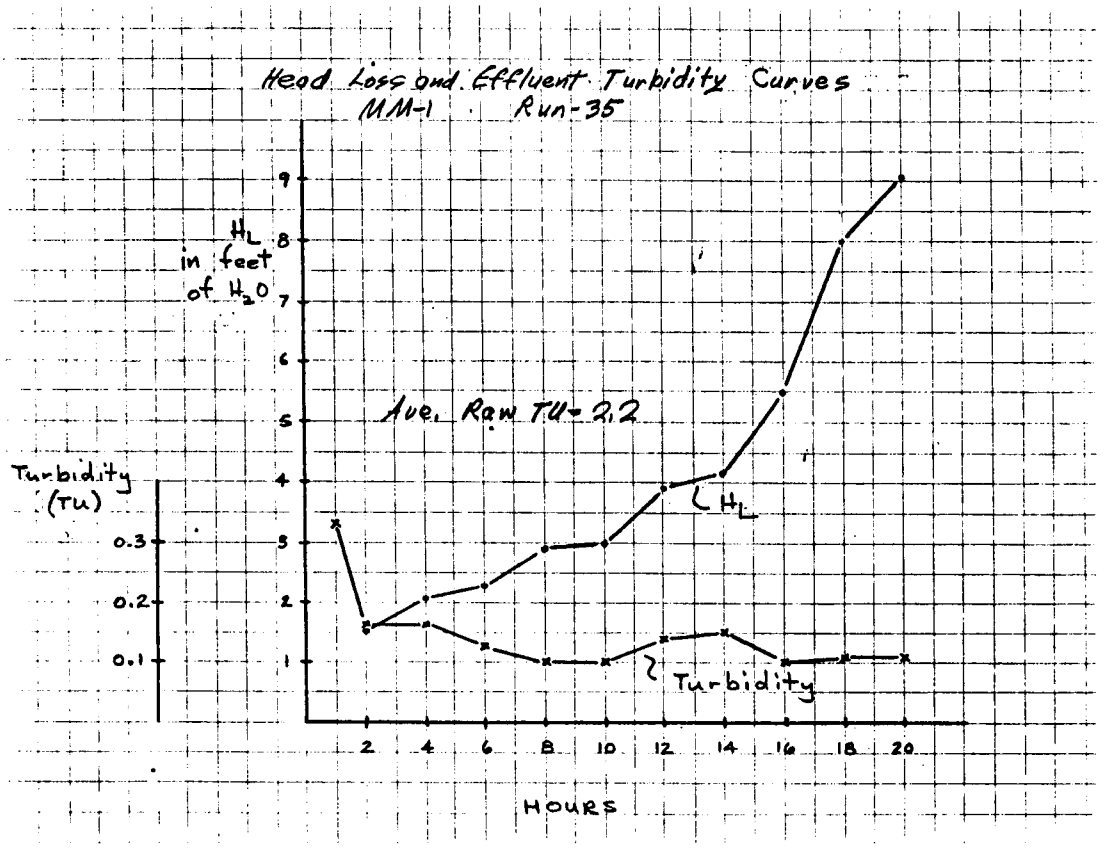

Head Loss and Effluent Turbidity Curves
MM-1 Run-30
H_L in feet of H_2O
Ave. Raw TU = 0.80
H_L
Turbidity (TU)
Turbidity
HOURS

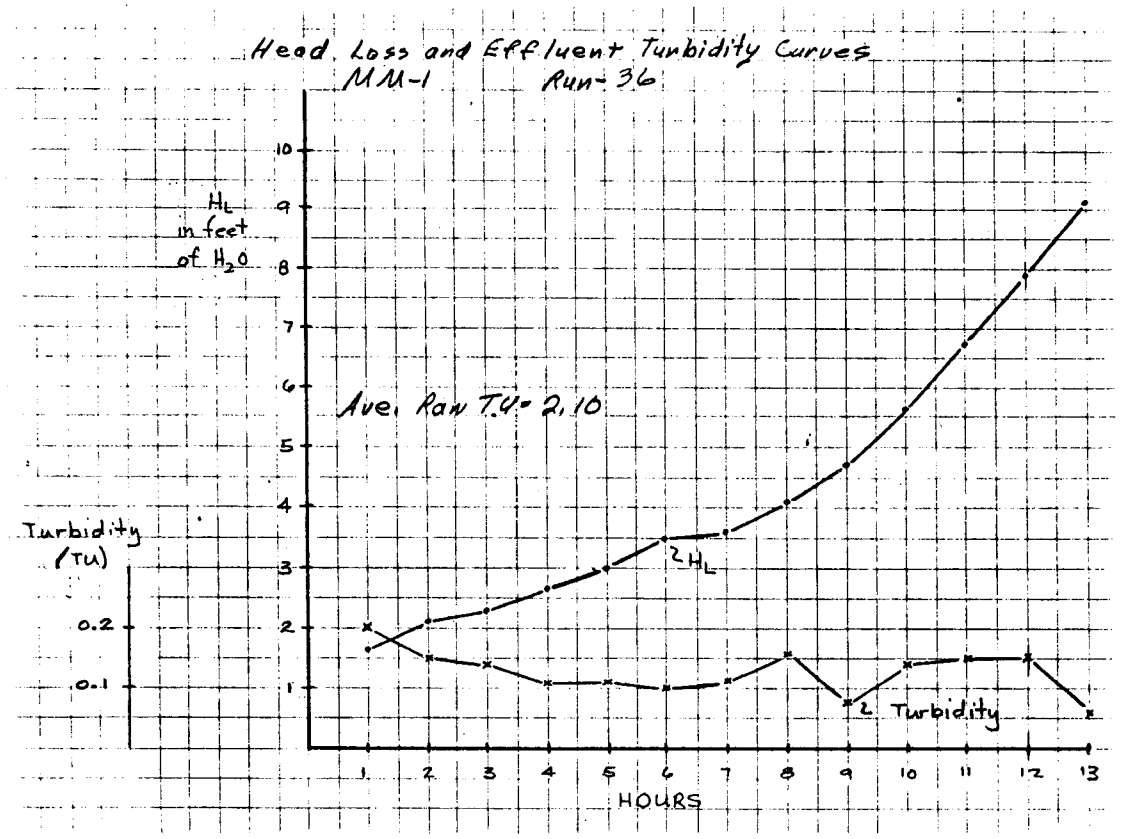

Head Loss and Effluent Turbidity Curves
MM-1 Run-31
HL in feet of H2O
Turbidity (TU)
Ave. Raw TU = 0.53
HL
Turbidity
HOURS

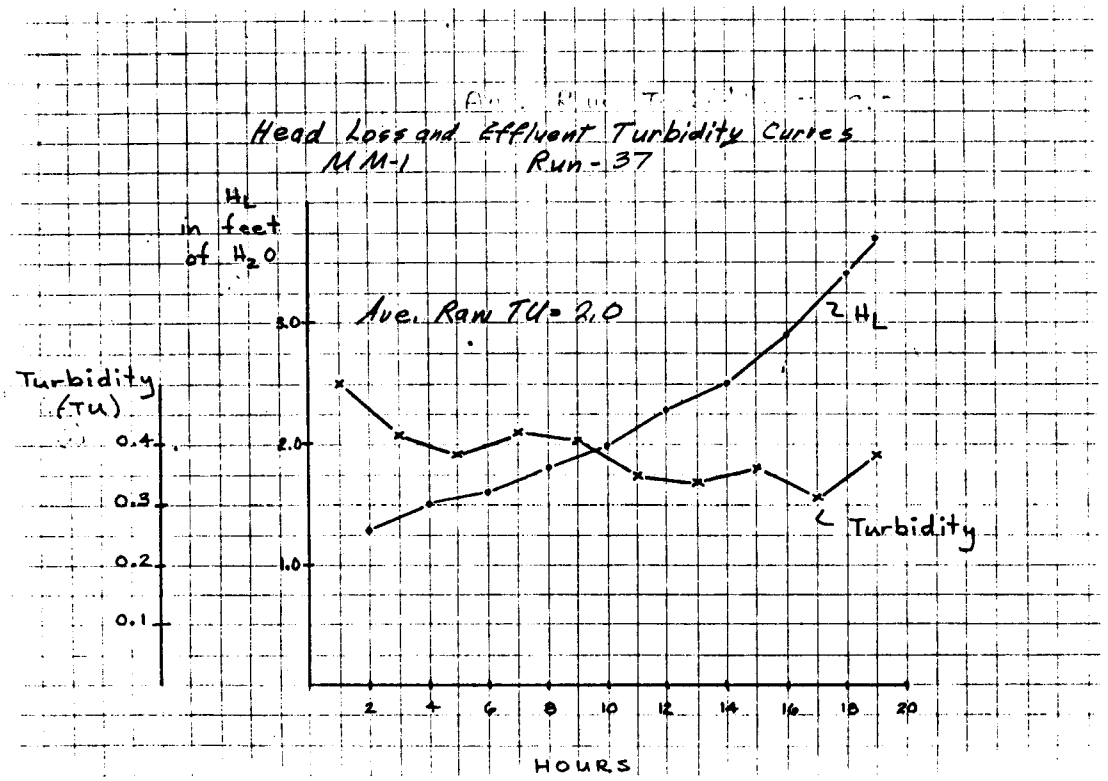

Head Loss and Effluent Turbidity Curves
MM-1 Run-32
HL in feet of H2O
Turbidity (TU)
Ave. Raw TU = 3.60
HL
Turbidity
HOURS

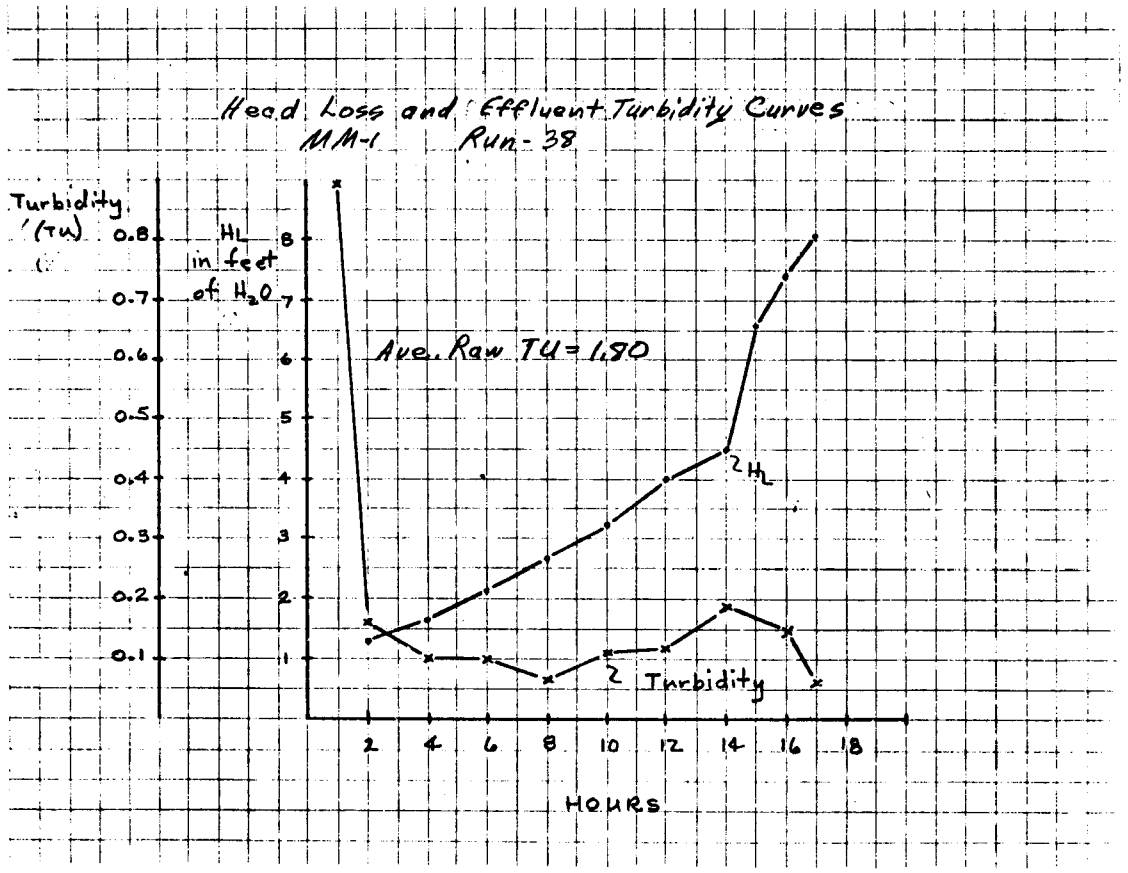

Head Loss and Effluent Turbidity Curves
MM-1 Run-33
Turbidity (TU)
1.5
1.0
0.5
H_L in feet of H_2O
7
6
5
4
3
2
1
Ave. Raw TU = 3.90
H_L
Turbidity
2 4 6 8 10 12 14 16 18 20 22 24 26
HOURS

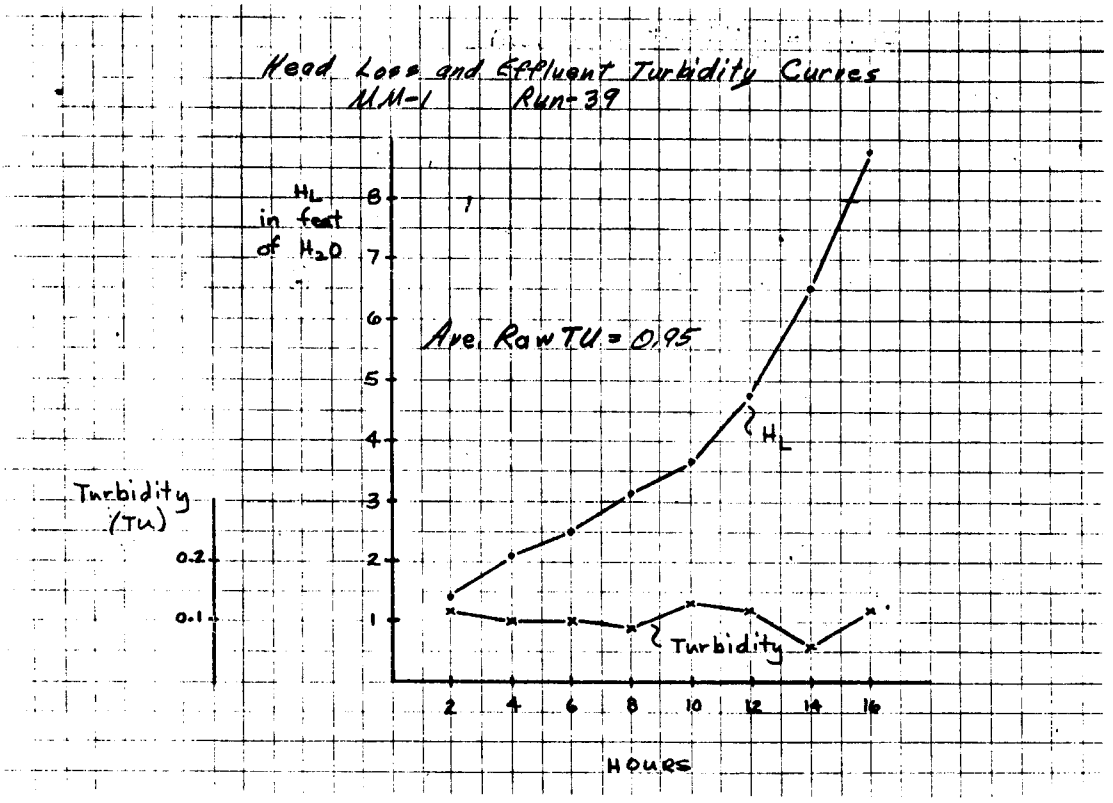

Head Loss and Effluent Turbidity Curves
MM-1 Run-34
H_L in feet of H_2O
8
7
6
5
4
3
2
1
Turbidity (TU)
0.4
0.3
0.2
0.1
Ave. Raw TU = 2.98
H_L
Turbidity
2 4 6 8 10 12 14 16 18 20
HOURS

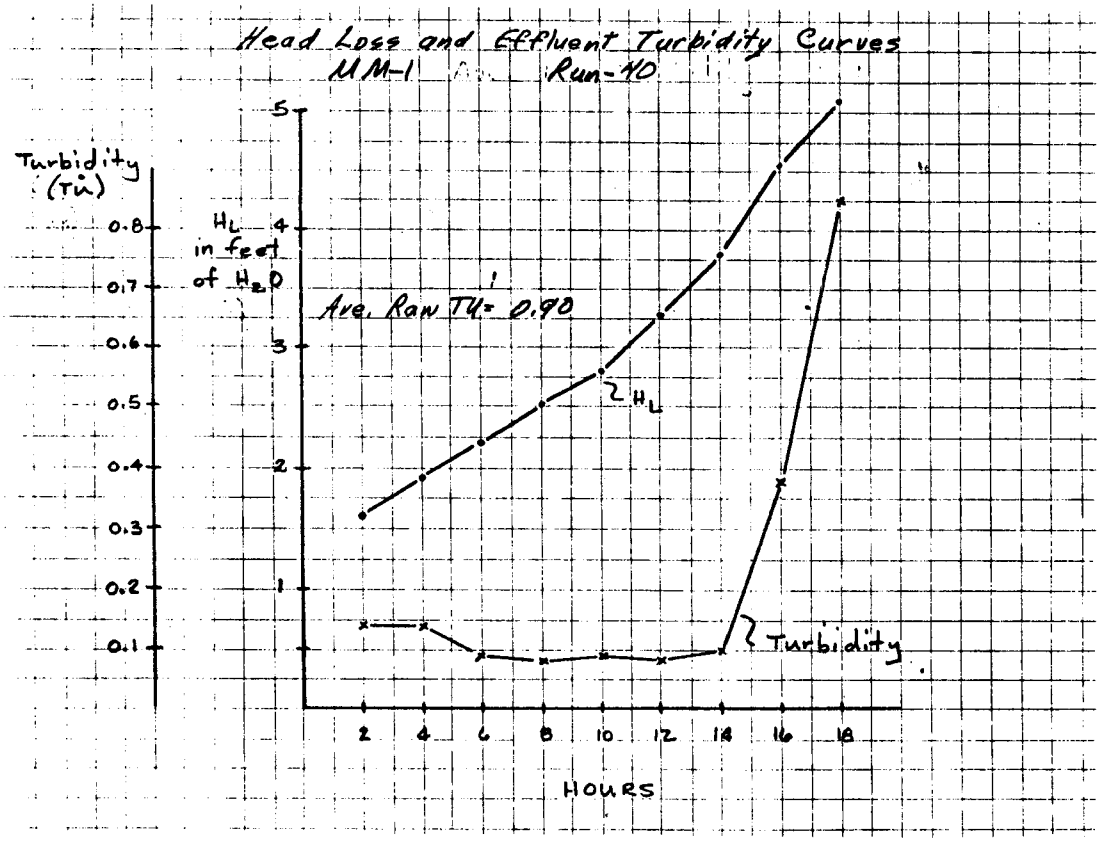

Head Loss and Effluent Turbidity Curves
MM-1 Run-35
H_L in feet of H_2O
Ave. Raw TU = 2.2
Turbidity (TU)
H_L
Turbidity
HOURS

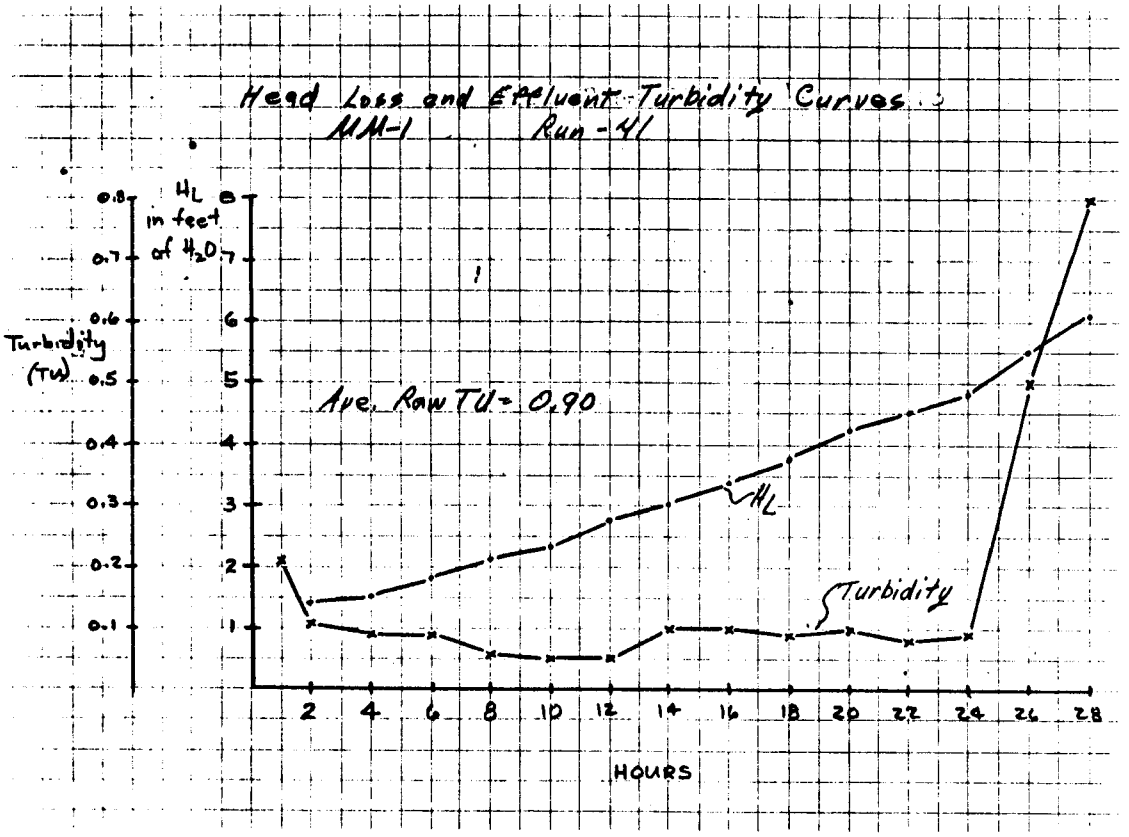

Head Loss and Effluent Turbidity Curves
MM-1 Run-36
H_L in feet of H_2O
Ave. Raw TU = 2.10
Turbidity (TU)
H_L
Turbidity
HOURS

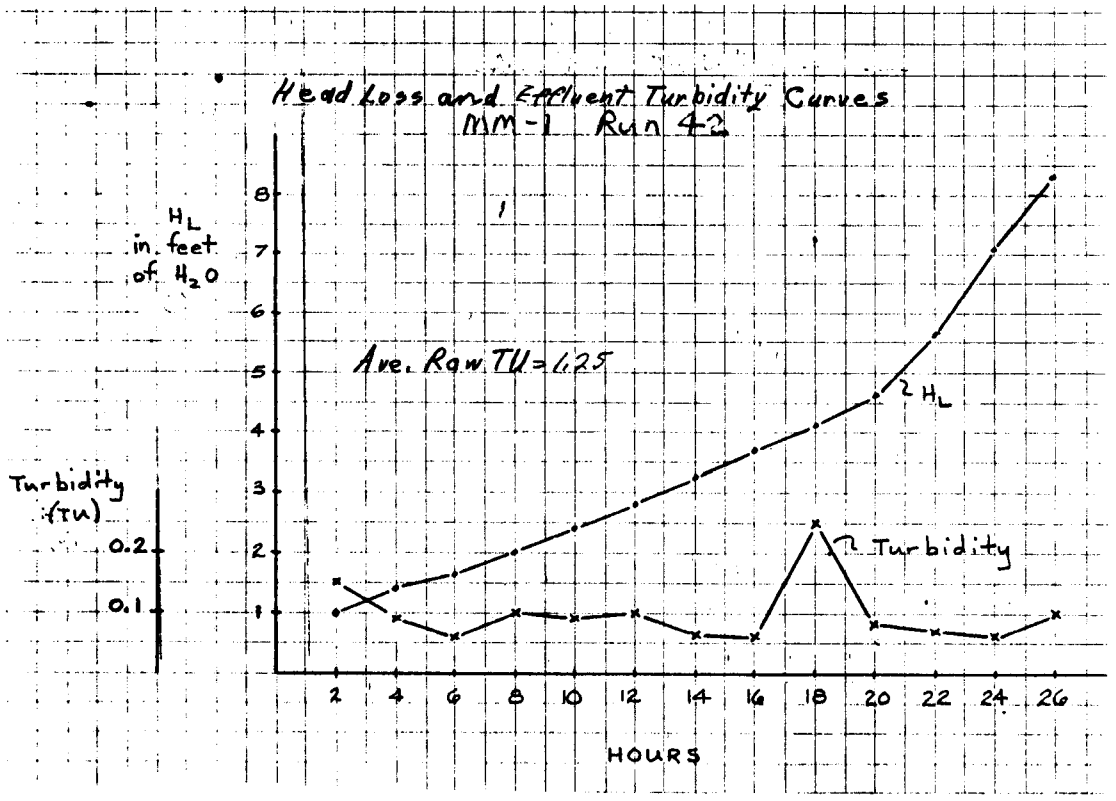

Head Loss and Effluent Turbidity Curves
MM-1 Run-37
H_L in feet of H_2O
Ave. Raw TU = 2.0
Turbidity (TU)
0.4
0.3
0.2
0.1
3.0
2.0
1.0
H_L
Turbidity
2
4
6
8
10
12
14
16
18
20
HOURS

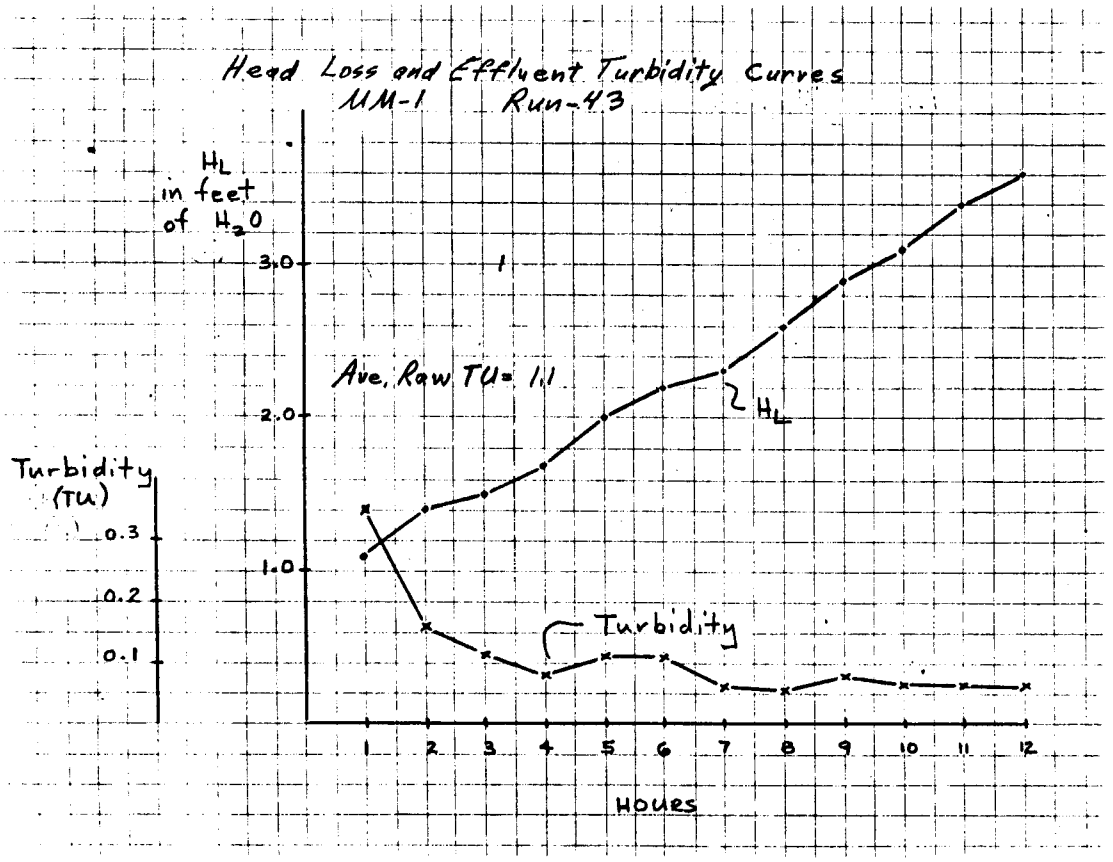

Head Loss and Effluent Turbidity Curves
MM-1 Run-38
Turbidity (TU)
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
H_L in feet of H_2O
8
7
6
5
4
3
2
1
Ave. Raw TU = 1.80
H_L
Turbidity
2
4
6
8
10
12
14
16
18
HOURS

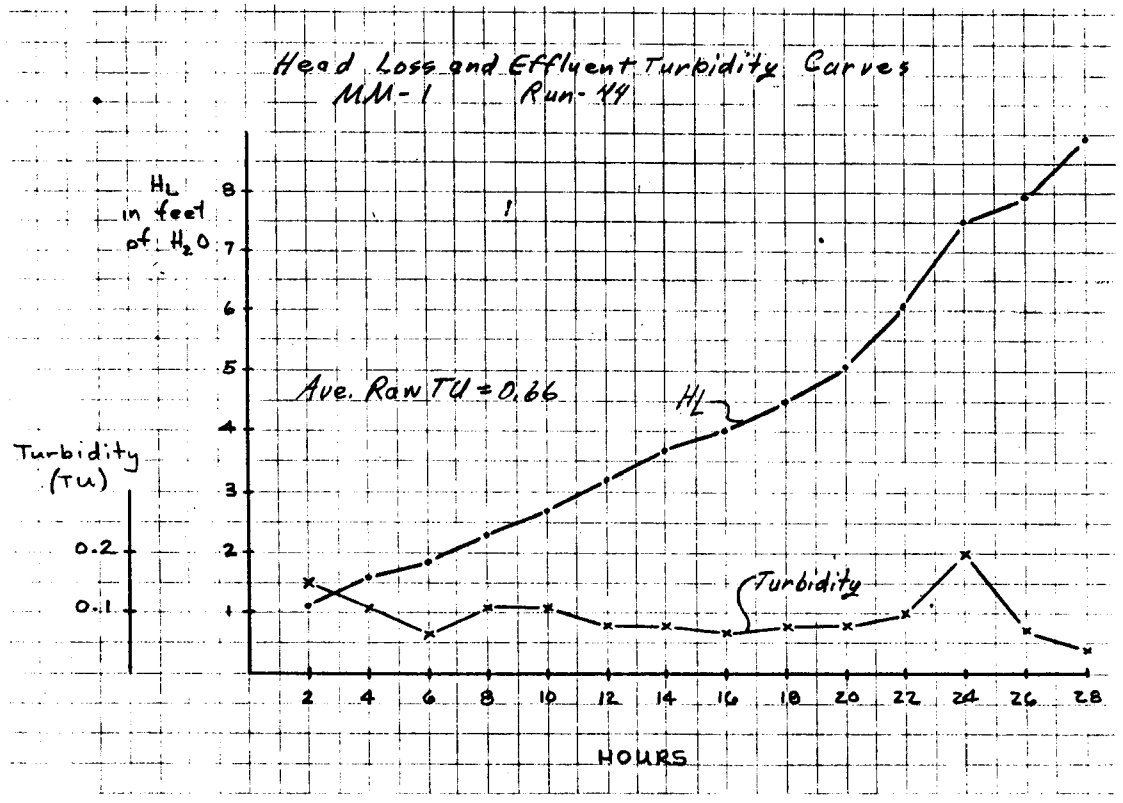

Head Loss and Effluent Turbidity Curves
MM-1 Run-39
H_L in feet of H_2O
Ave. Raw TU = 0.95
H_L
Turbidity (TU)
Turbidity
HOURS

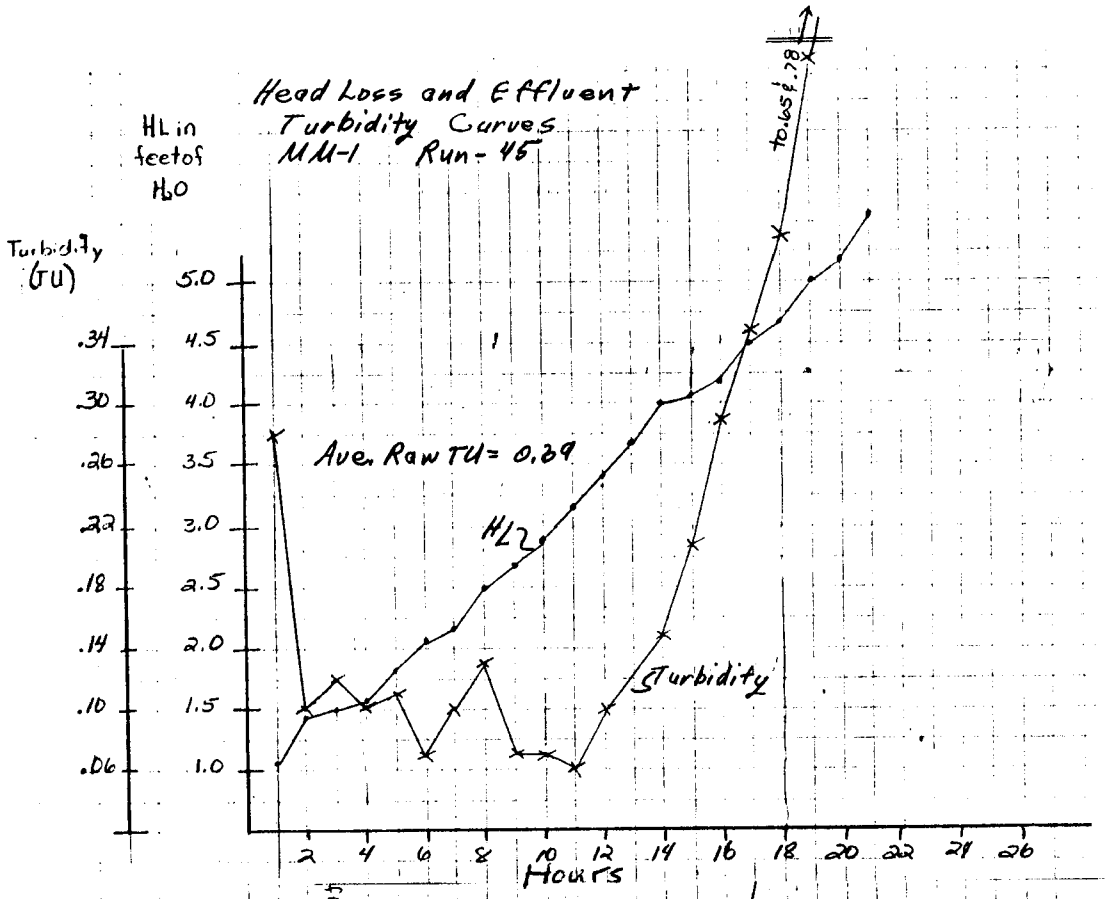

Head Loss and Effluent Turbidity Curves
MM-1 Run-40
Turbidity (TU)
H_L in feet of H_2O
Ave. Raw TU = 0.90
H_L
Turbidity
HOURS

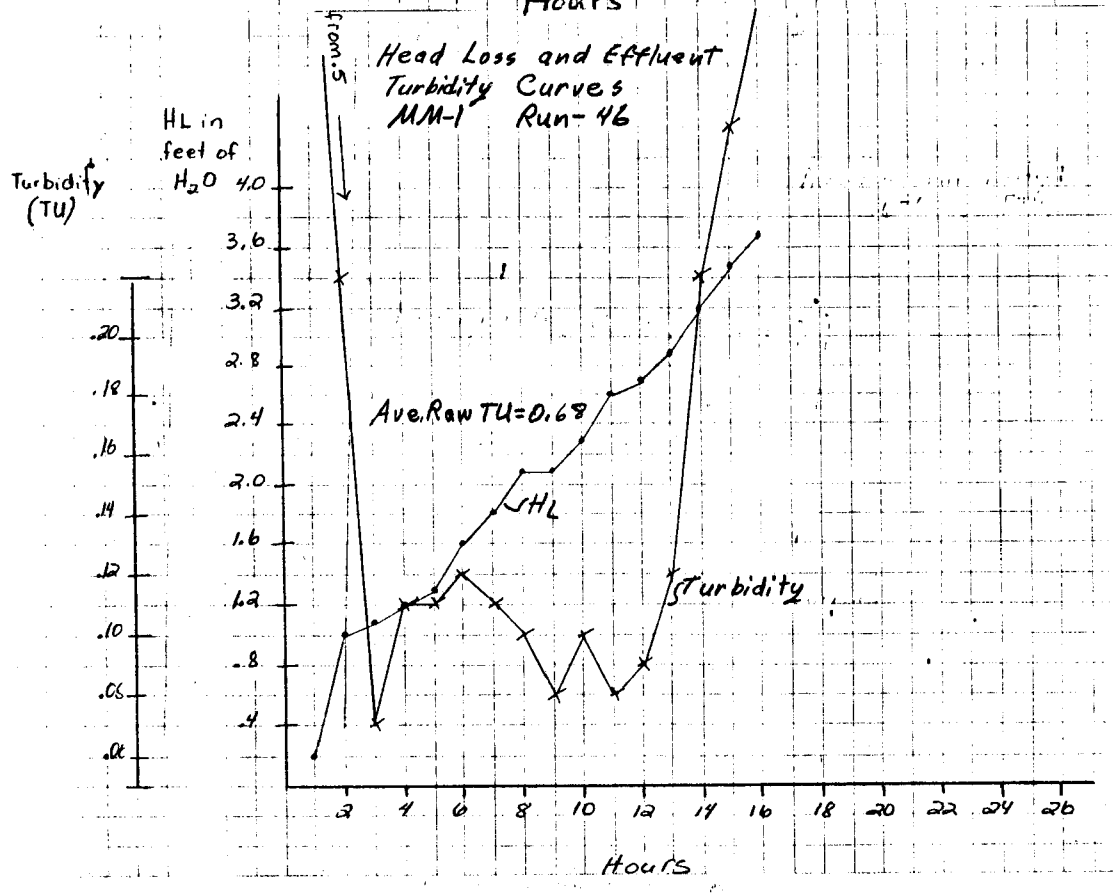

Head Loss and Effluent Turbidity Curves
MM-1 Run-41
H_L in feet of H_2O
Turbidity (TU)
Ave. Raw TU = 0.90
H_L
Turbidity
HOURS

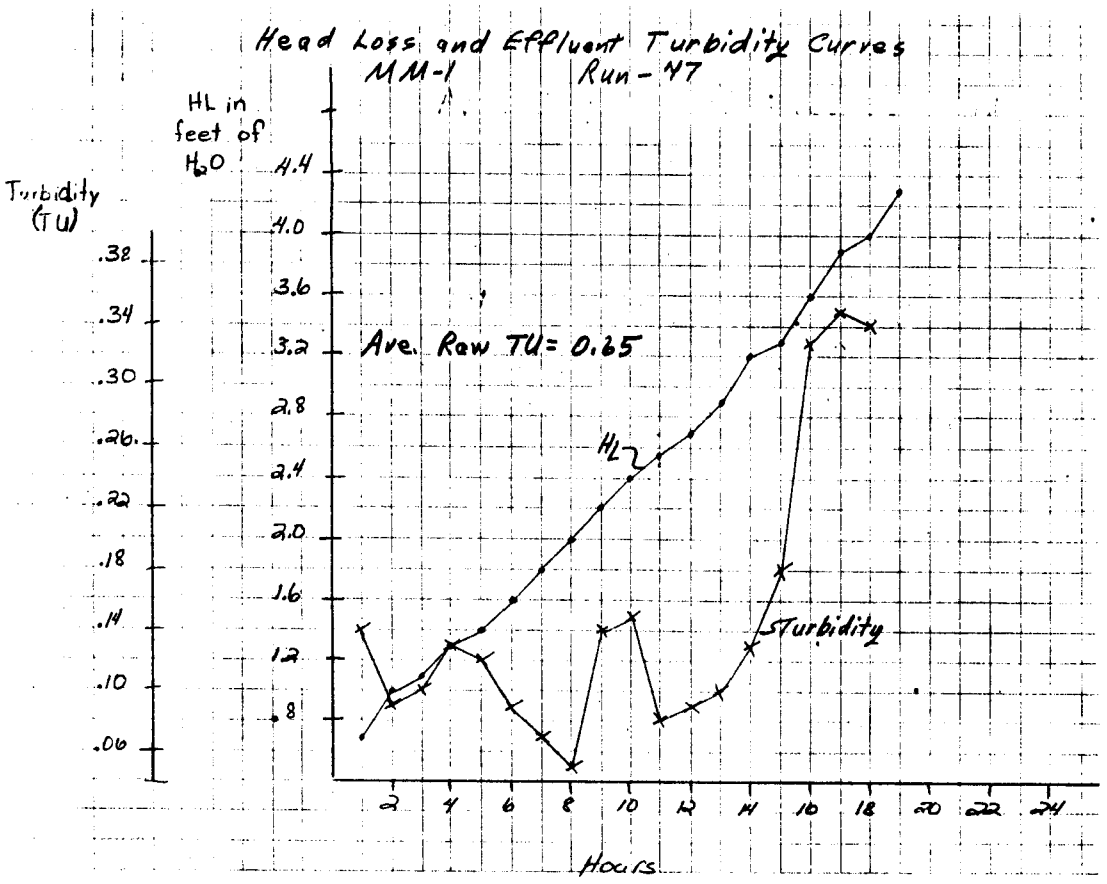

Head Loss and Effluent Turbidity Curves
MM-1 Run 42
H_L in feet of H_2O
Turbidity (TU)
Ave. Raw TU = 1.25
H_L
Turbidity
HOURS

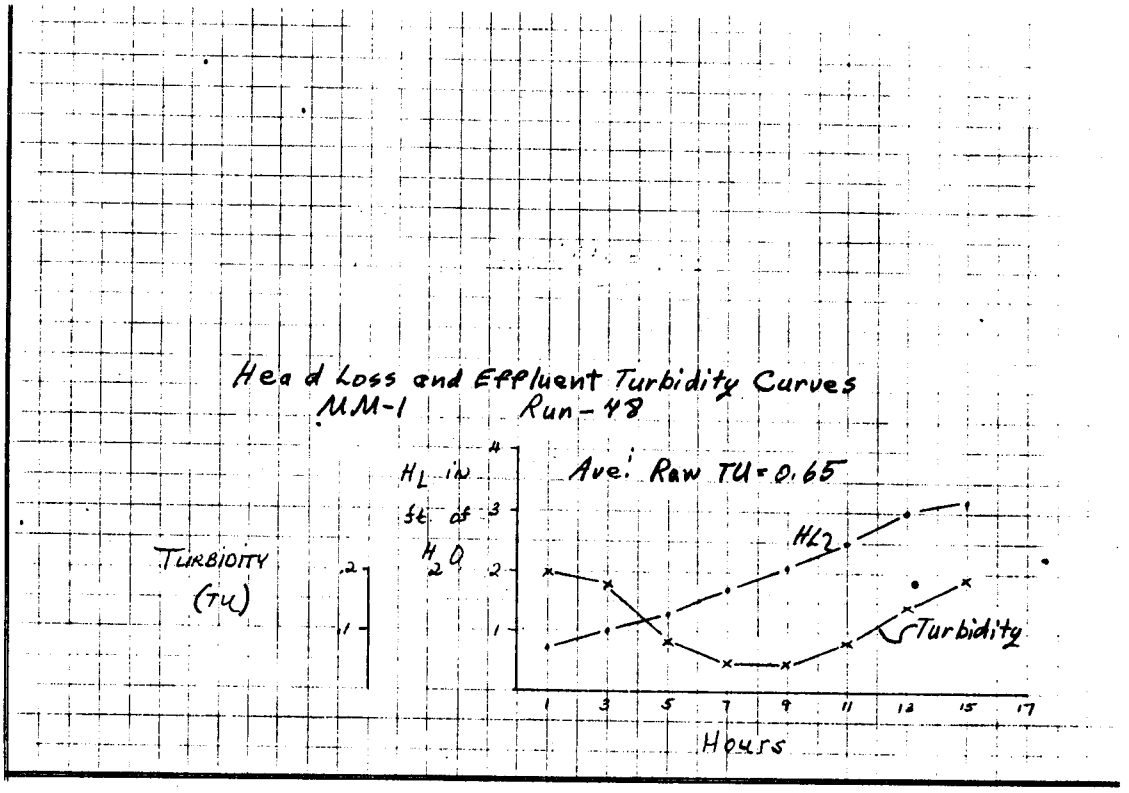

Head Loss and Effluent Turbidity Curves
MM-1 Run-43
H_L in feet of H_2O
3.0
2.0
1.0
Ave. Raw TU = 1.1
H_L
Turbidity (TU)
0.3
0.2
0.1
Turbidity
1 2 3 4 5 6 7 8 9 10 11 12
HOURS

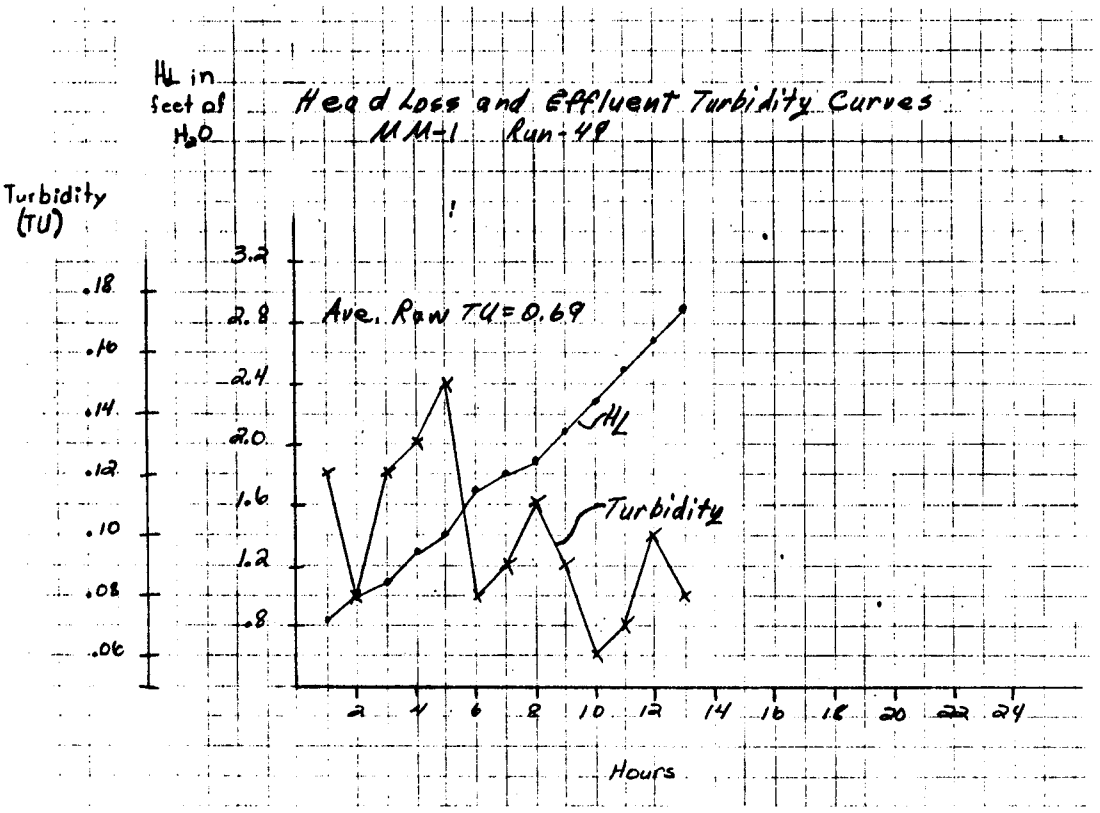

Head Loss and Effluent Turbidity Curves
MM-1 Run-44
H_L in feet of H_2O
8
7
6
5
4
3
2
1
Ave. Raw TU = 0.66
H_L
Turbidity (TU)
0.2
0.1
Turbidity
2 4 6 8 10 12 14 16 18 20 22 24 26 28
HOURS

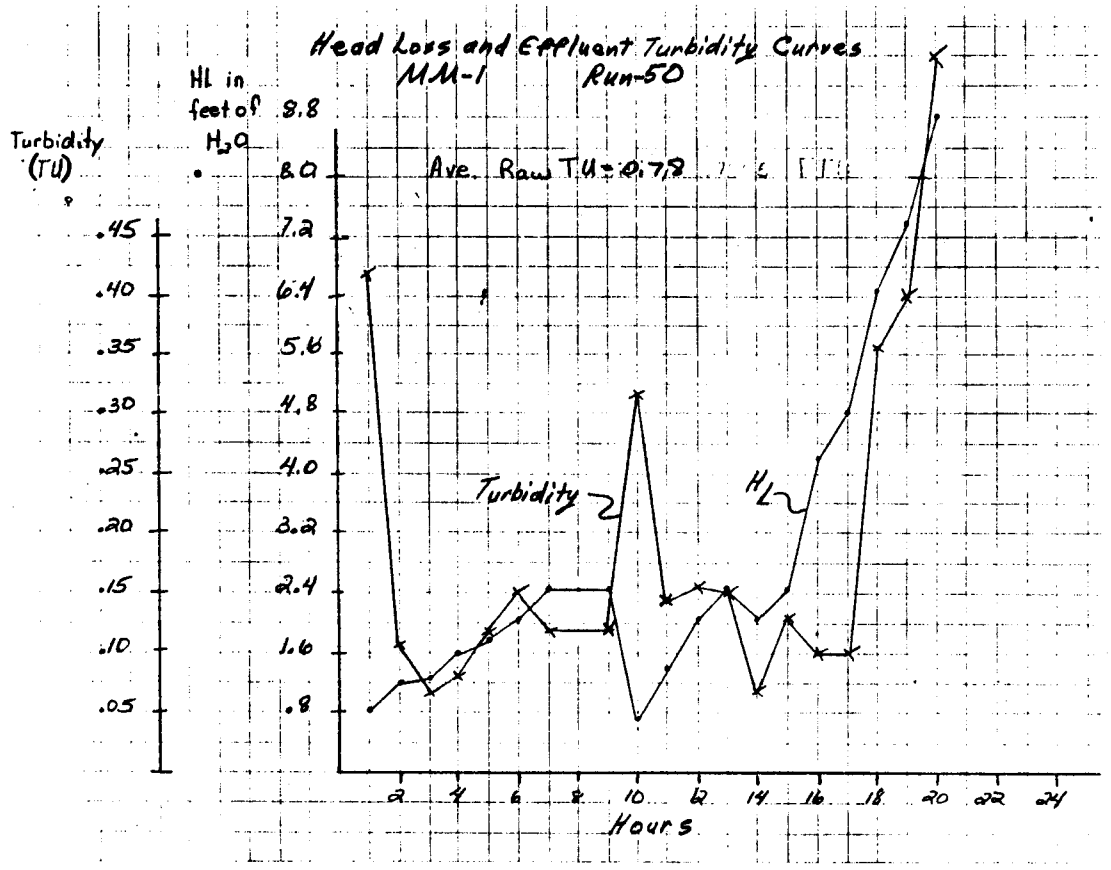

Head Loss and Effluent
Turbidity Curves
MM-1 Run-45
HL in feet of H_2O
Turbidity (TU)
to .78
Ave. Raw TU= 0.39
HL
Turbidity
Hours

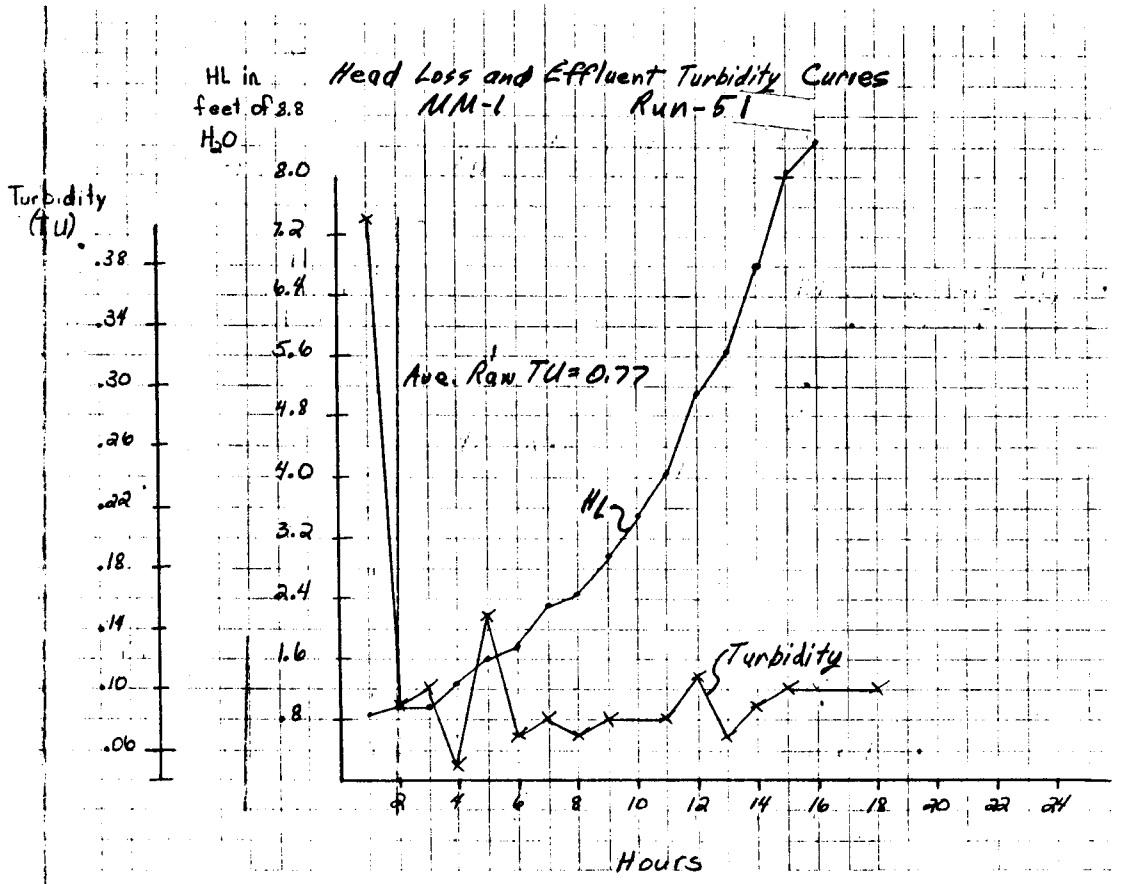

Head Loss and Effluent
Turbidity Curves
MM-1 Run-46
HL in feet of H_2O
Turbidity (TU)
from .5
Ave. Raw TU=0.68
HL
Turbidity
Hours

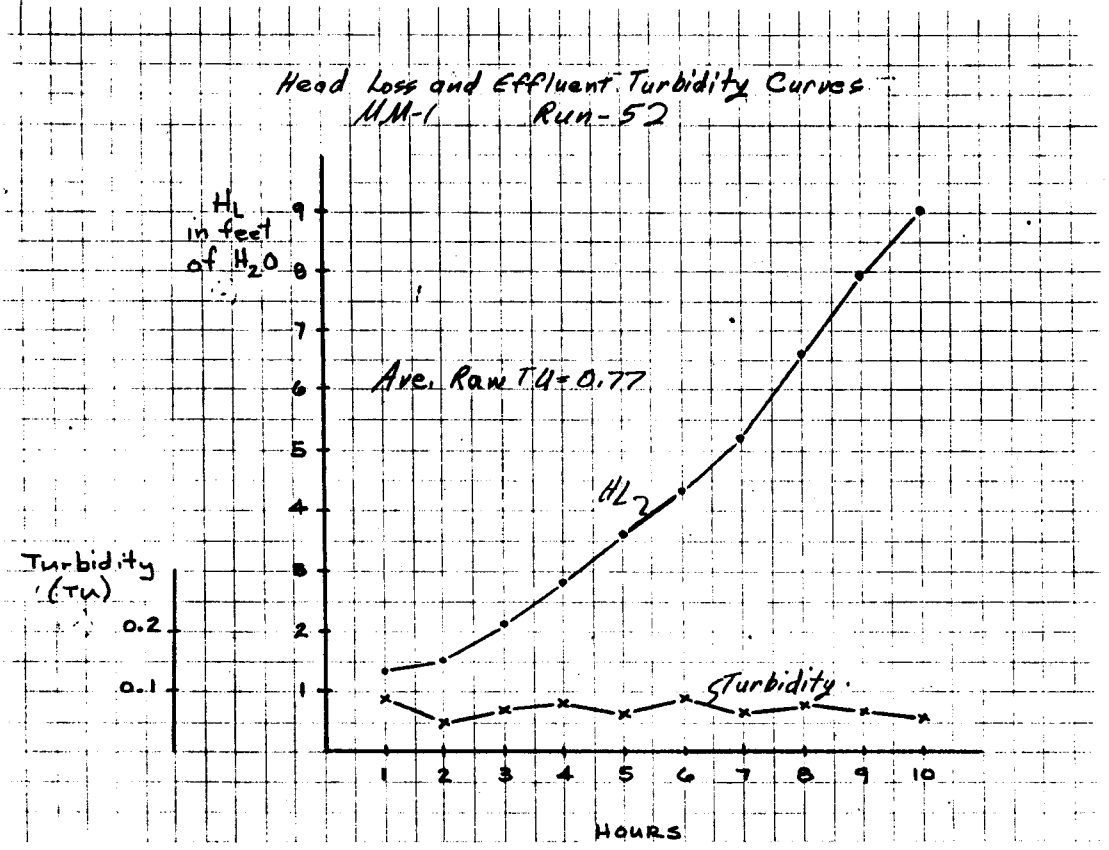

Head Loss and Effluent Turbidity Curves
MM-1 Run-47
HL in feet of H_2O
Turbidity (TU)
Ave. Raw TU = 0.65
HL
Turbidity
Hours

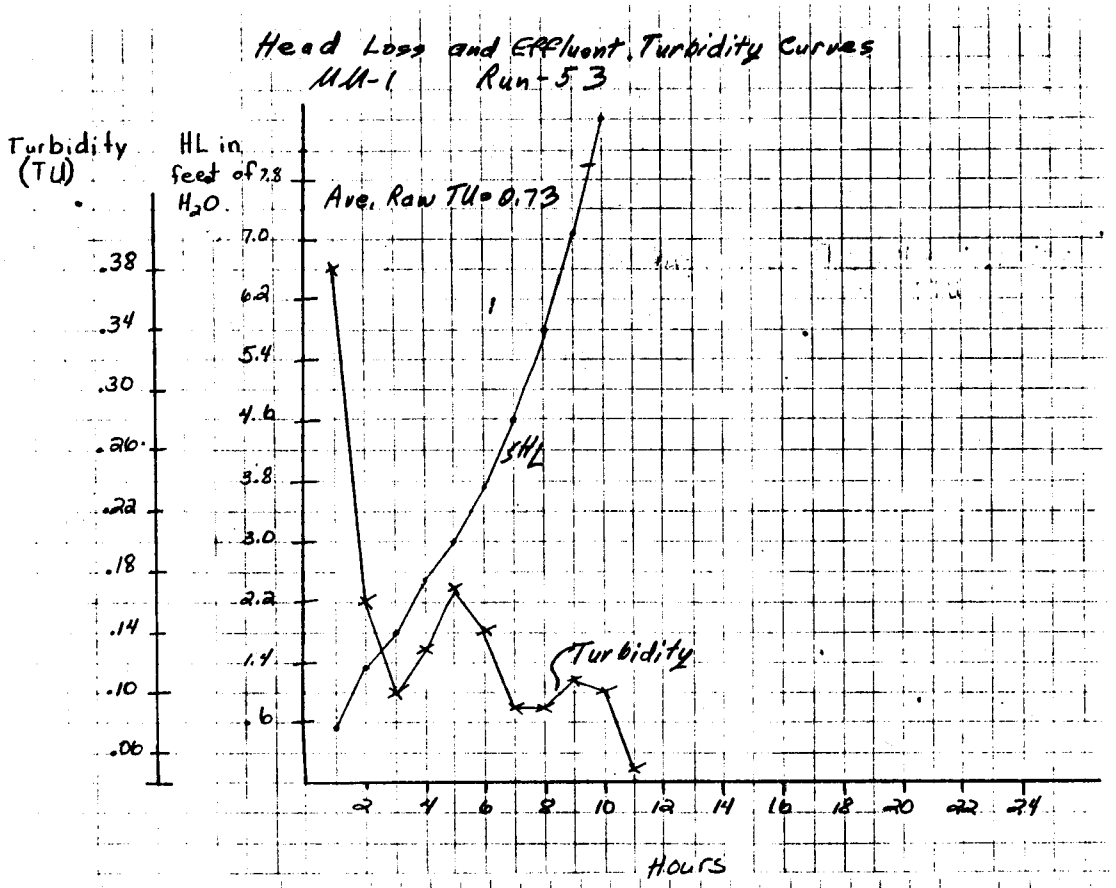

Head Loss and Effluent Turbidity Curves
MM-1 Run-48
HL in ft of H_2O
Turbidity (TU)
Ave. Raw TU = 0.65
HL
Turbidity
Hours

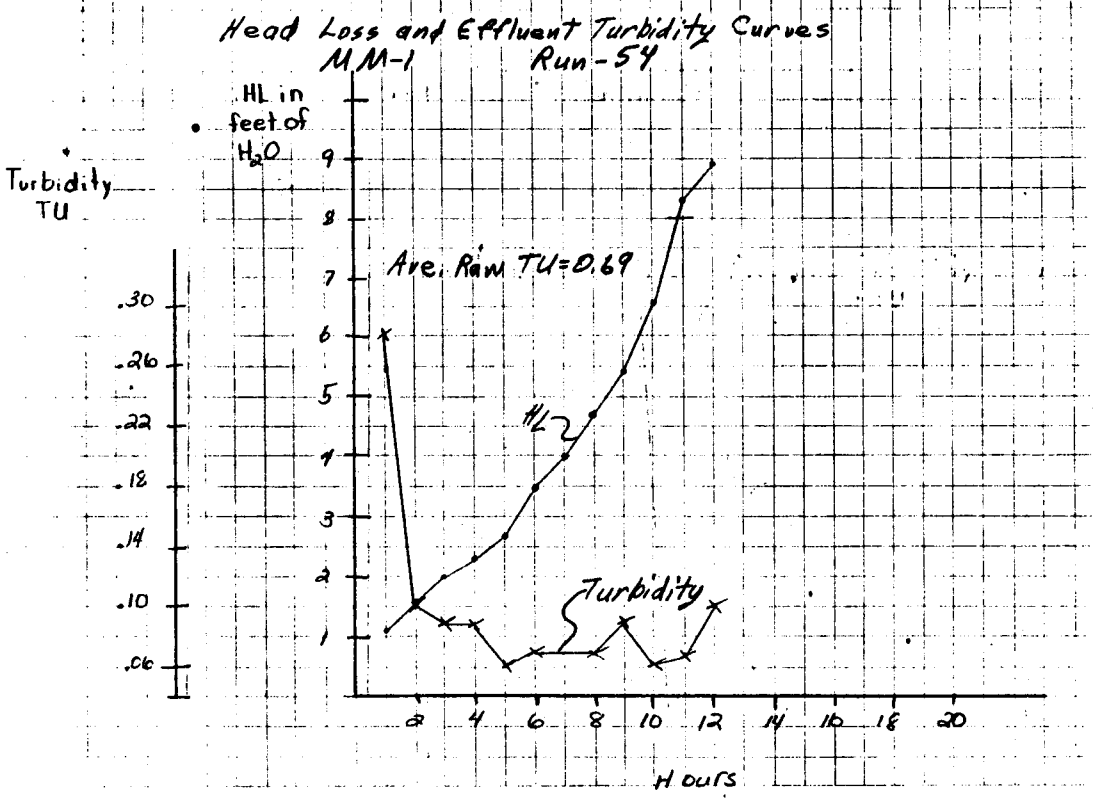

Head Loss and Effluent Turbidity Curves
MM-1 Run-49
HL in feet of H2O
Turbidity (TU)
Ave. Raw TU = 0.69
HL
Turbidity
Hours

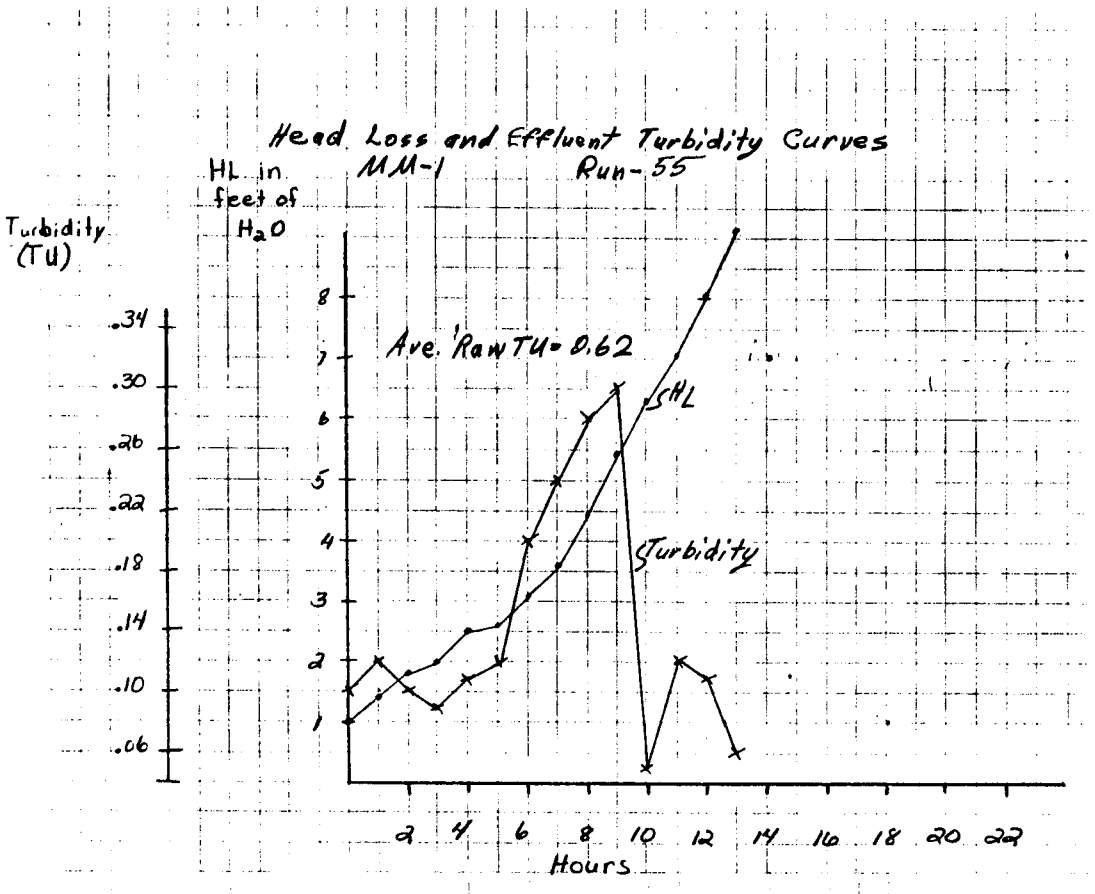

Head Loss and Effluent Turbidity Curves
MM-1 Run-50
HL in feet of H2O
Turbidity (TU)
Ave. Raw TU = 0.78
Turbidity
HL
Hours

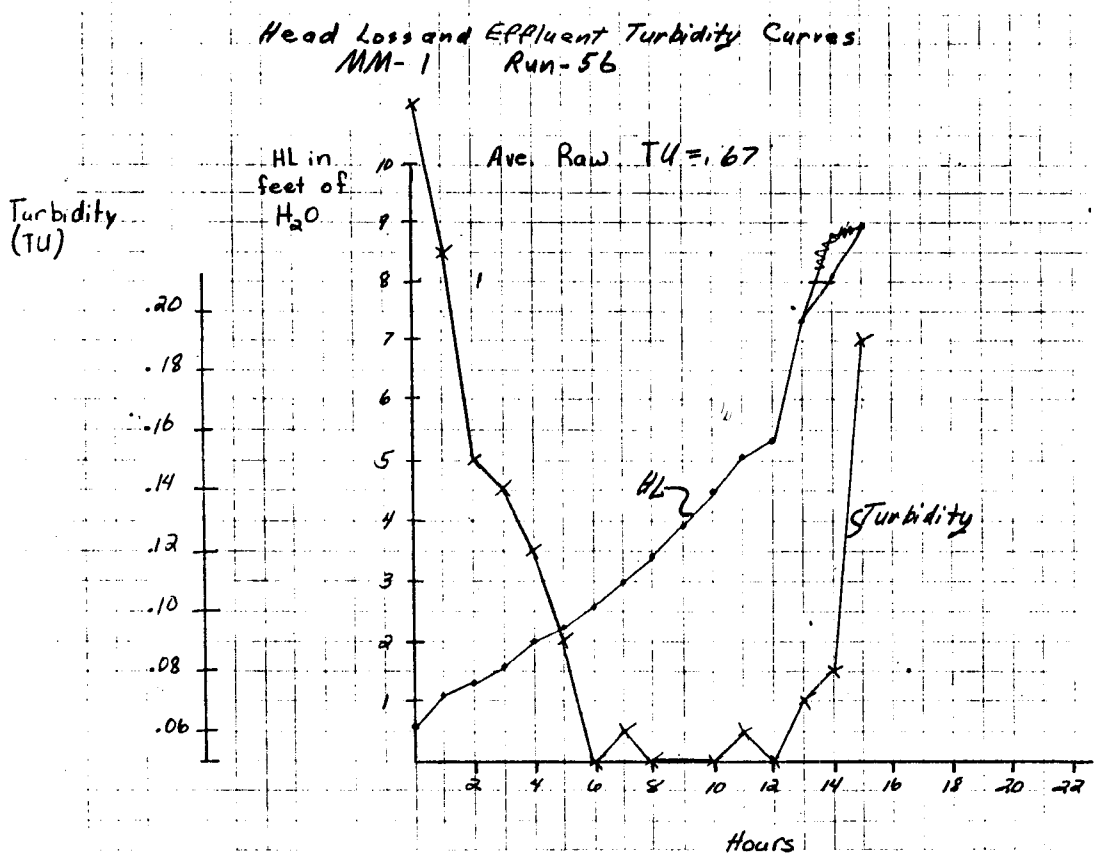

Head Loss and Effluent Turbidity Curves
MM-1 Run-51
HL in feet of H2O
Turbidity (TU)
Ave. Raw TU=0.77
HL
Turbidity
Hours

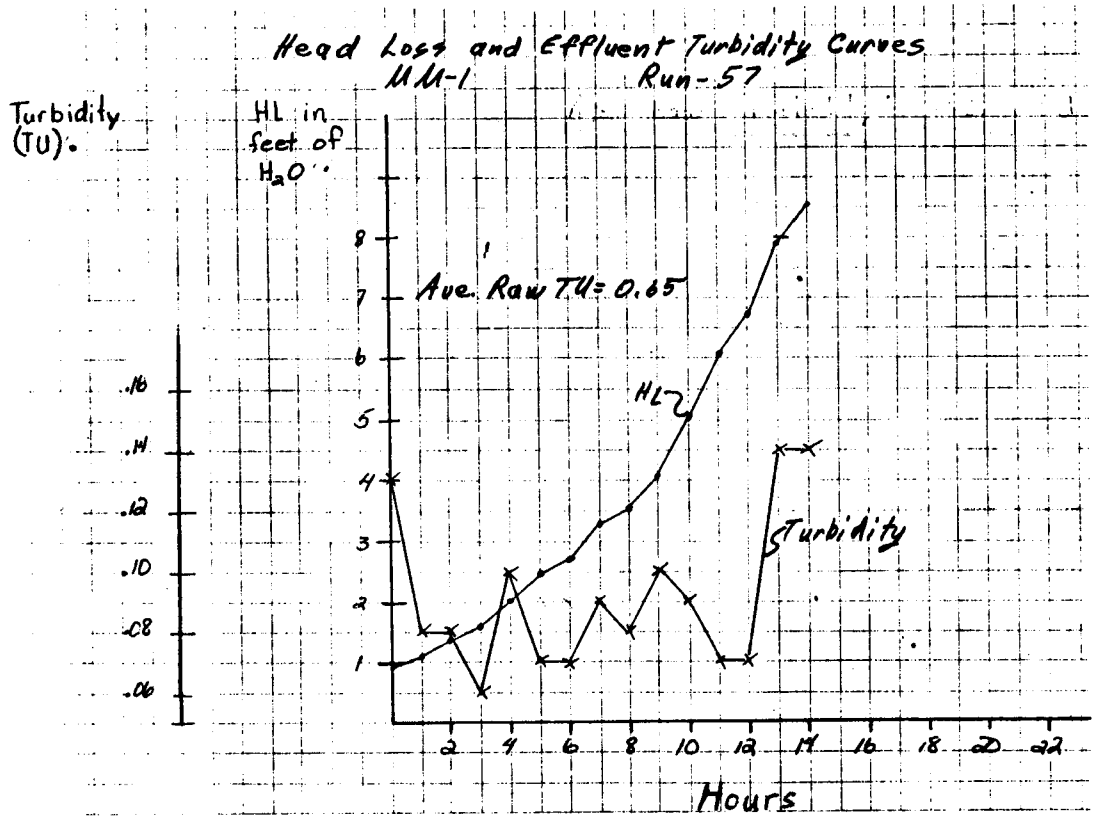

Head Loss and Effluent Turbidity Curves
MM-1 Run-52
HL in feet of H2O
Turbidity (TU)
Ave. Raw TU=0.77
HL
Turbidity
HOURS

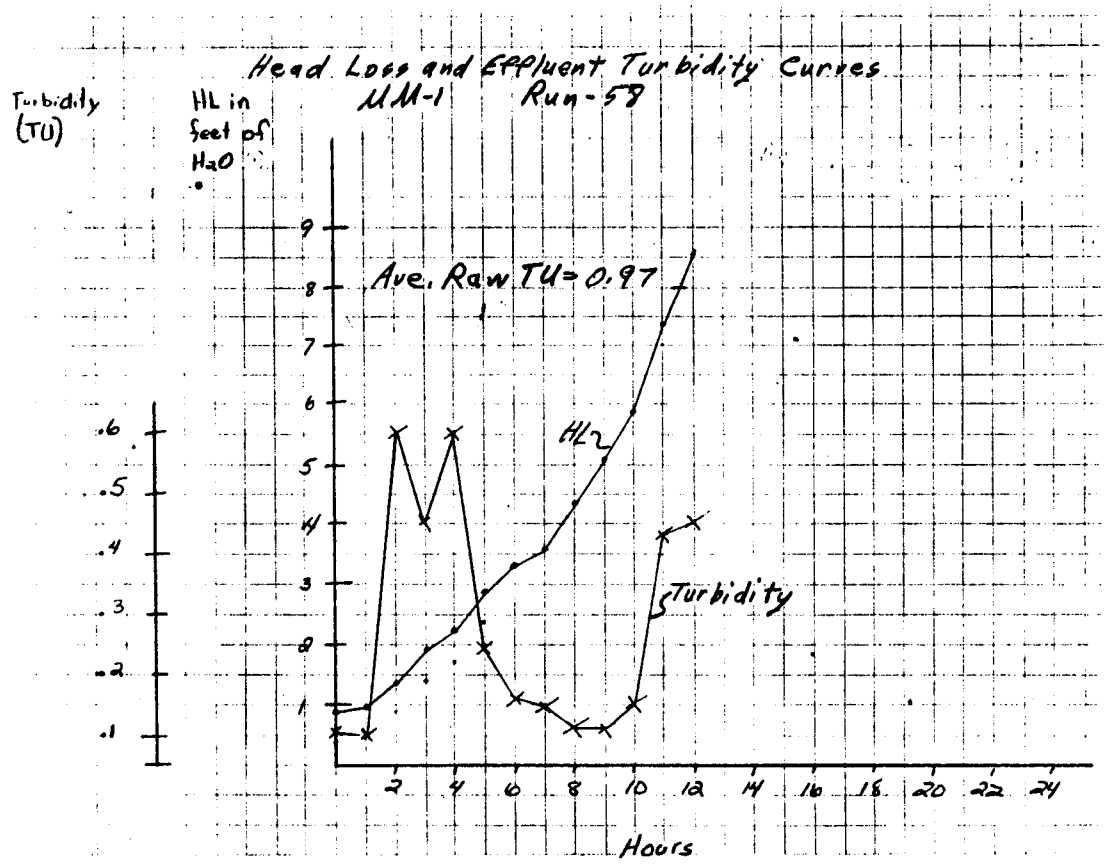

Head Loss and Effluent Turbidity Curves
MM-1 Run-53
Turbidity (TU)
HL in feet of H_2O
Ave. Raw TU=0.73
HL
Turbidity
Hours

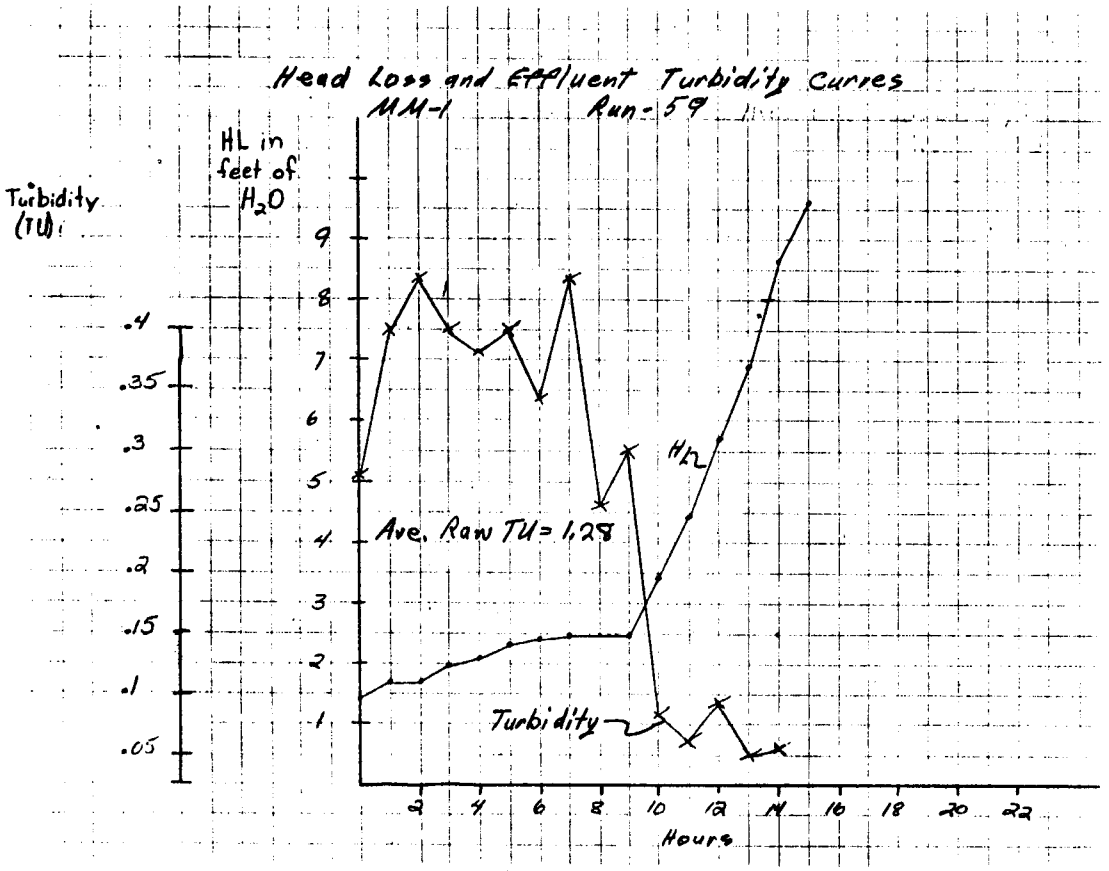

Head Loss and Effluent Turbidity Curves
MM-1 Run-54
HL in feet of H_2O
Turbidity TU
Ave. Raw TU=0.69
HL
Turbidity
Hours

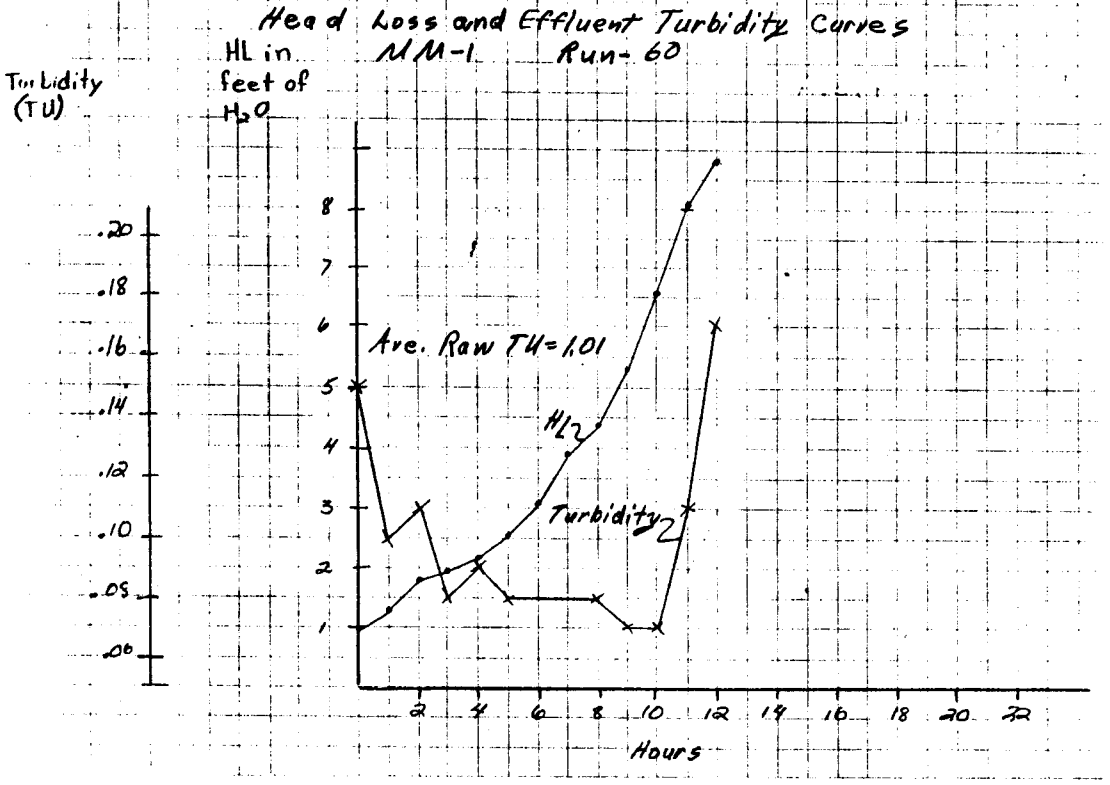

Head Loss and Effluent Turbidity Curves
MM-1 Run-55
HL in feet of H_2O
Turbidity (TU)
Ave. Raw TU = 0.62
HL
Turbidity
Hours

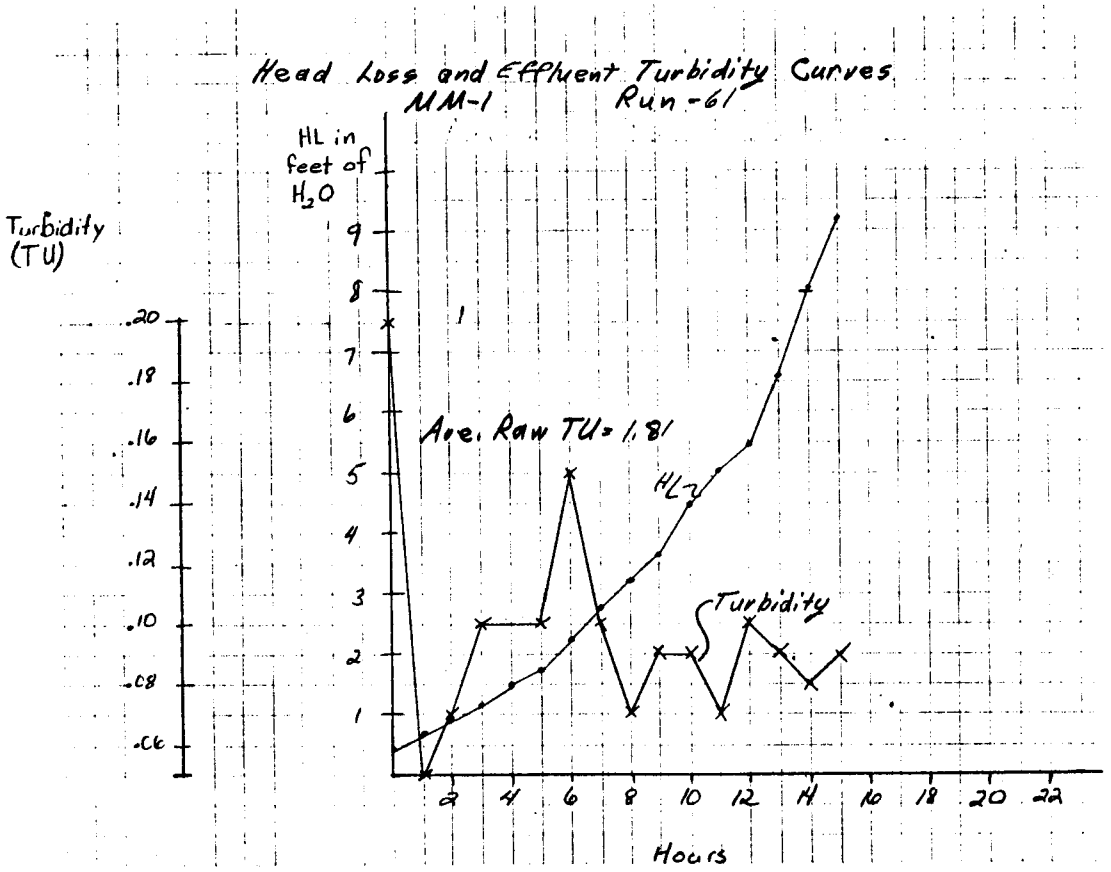

Head Loss and Effluent Turbidity Curves
MM-1 Run-56
HL in feet of H_2O
Turbidity (TU)
Ave. Raw TU = .67
HL
Turbidity
Hours

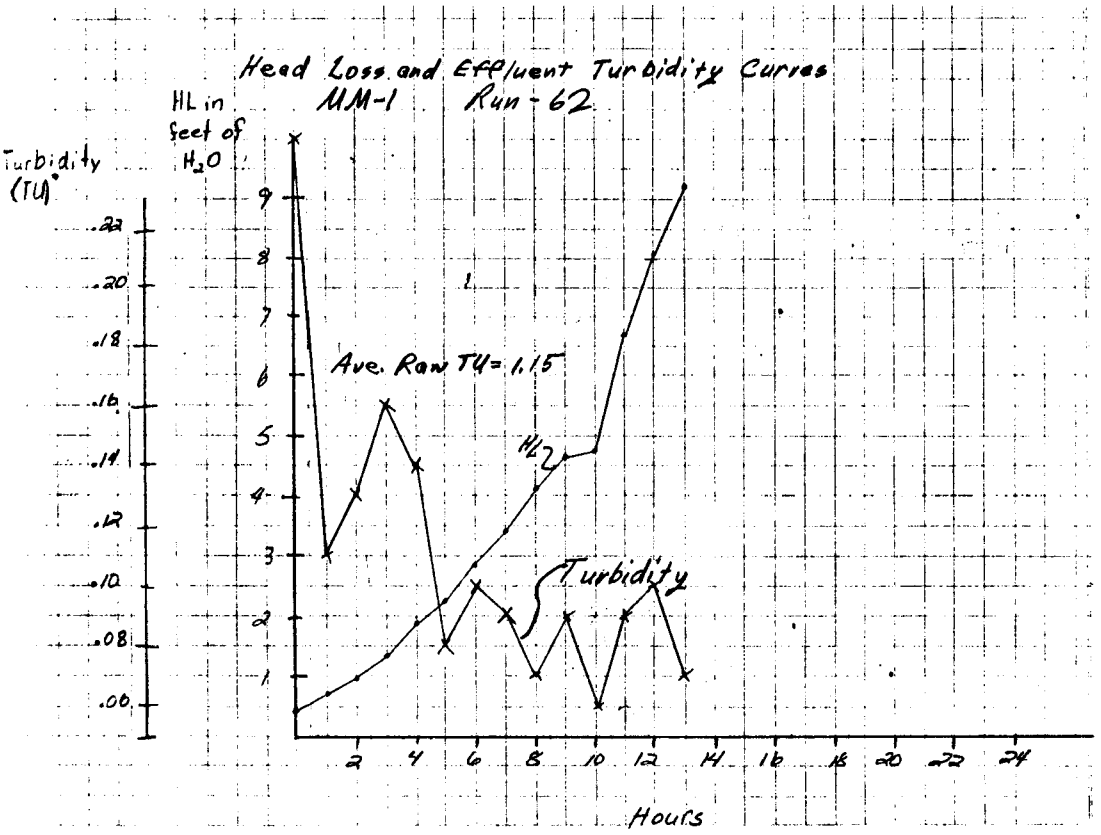

Head Loss and Effluent Turbidity Curves
MM-1 Run-57
Turbidity (TU)
HL in feet of H_2O
Ave. Raw TU = 0.65
HL
Turbidity
Hours

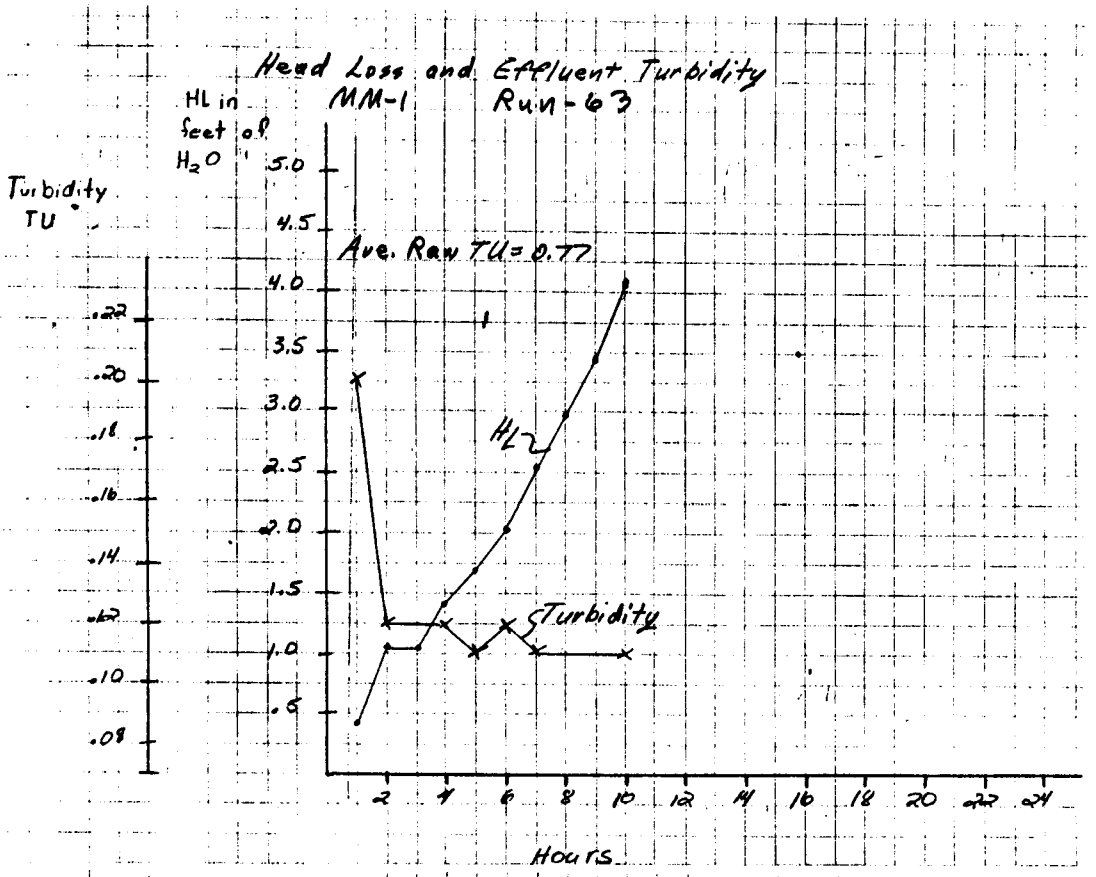

Head Loss and Effluent Turbidity Curves
MM-1 Run-58
Turbidity (TU)
HL in feet of H_2O
Ave. Raw TU = 0.97
HL
Turbidity
Hours

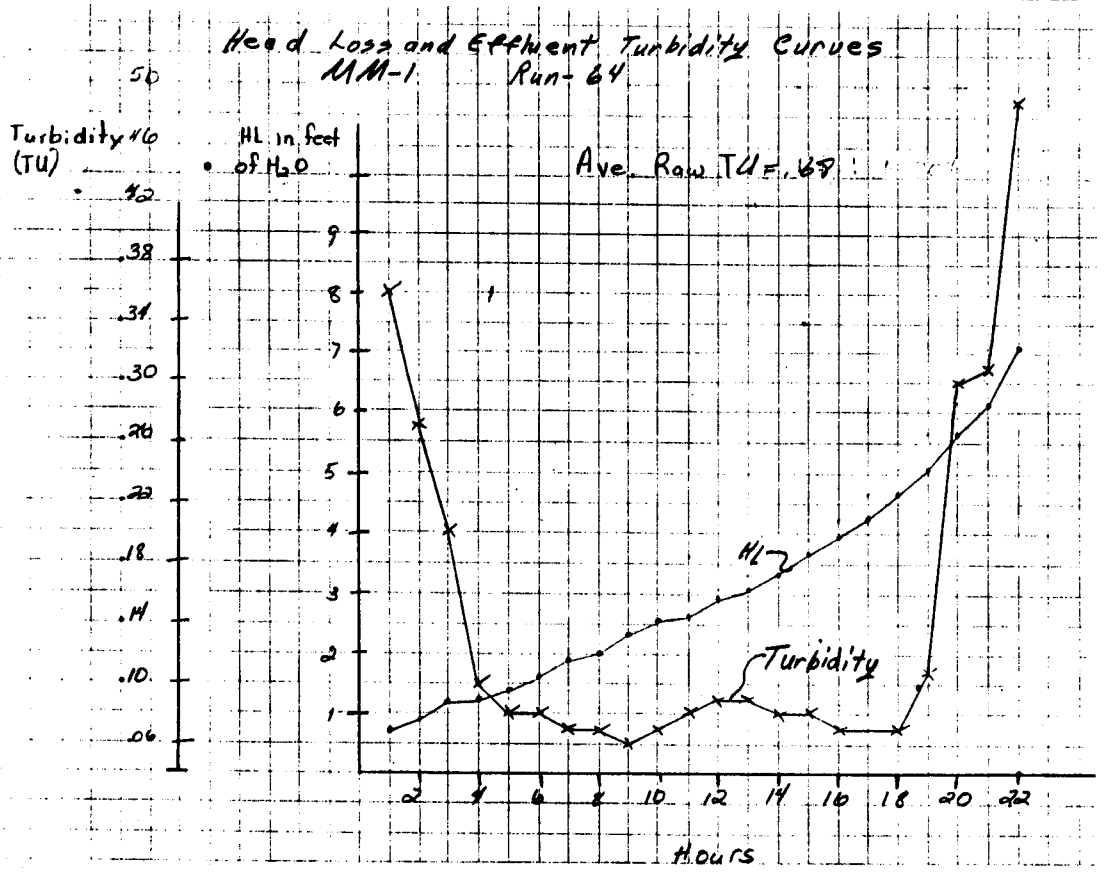

Head Loss and Effluent Turbidity Curves
MM-1 Run-59
HL in feet of H_2O
Turbidity (TU)
Ave. Raw TU = 1.28
HL
Turbidity
Hours

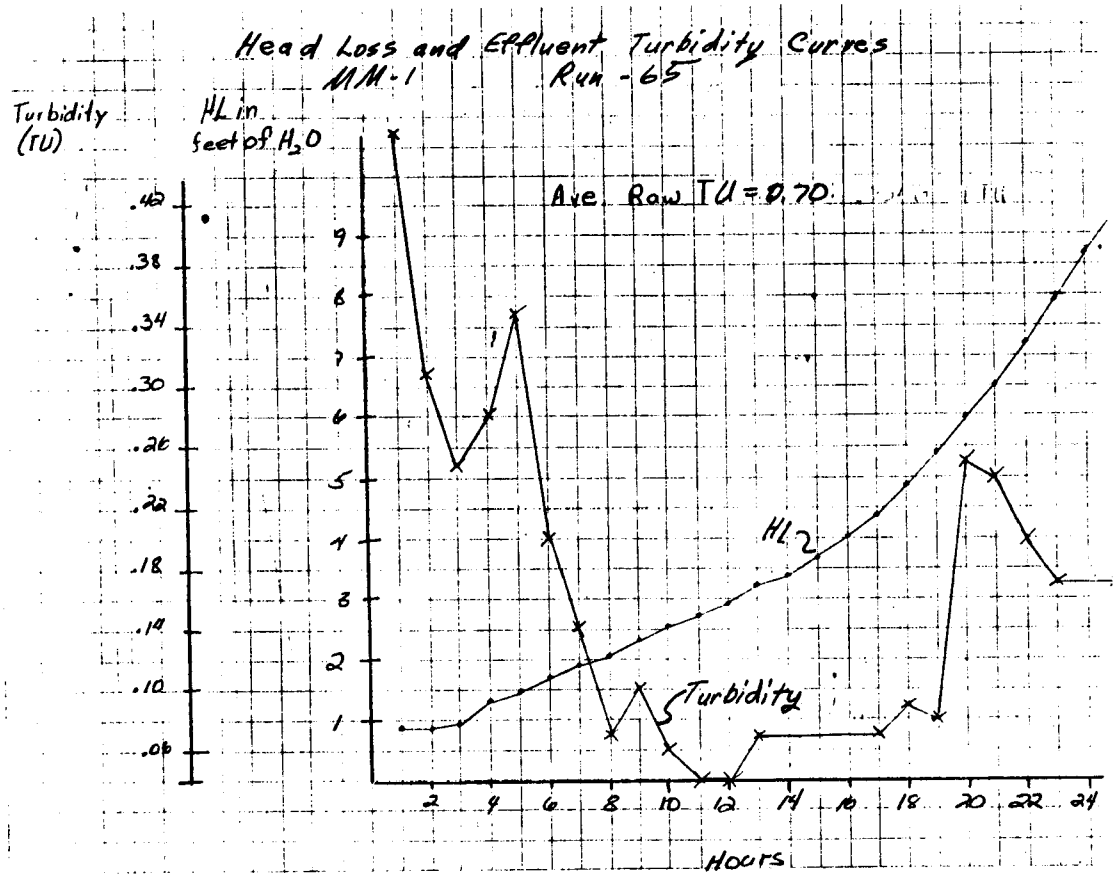

Head Loss and Effluent Turbidity Curves
MM-1 Run-60
HL in feet of H_2O
Turbidity (TU)
Ave. Raw TU = 1.01
HL
Turbidity
Hours

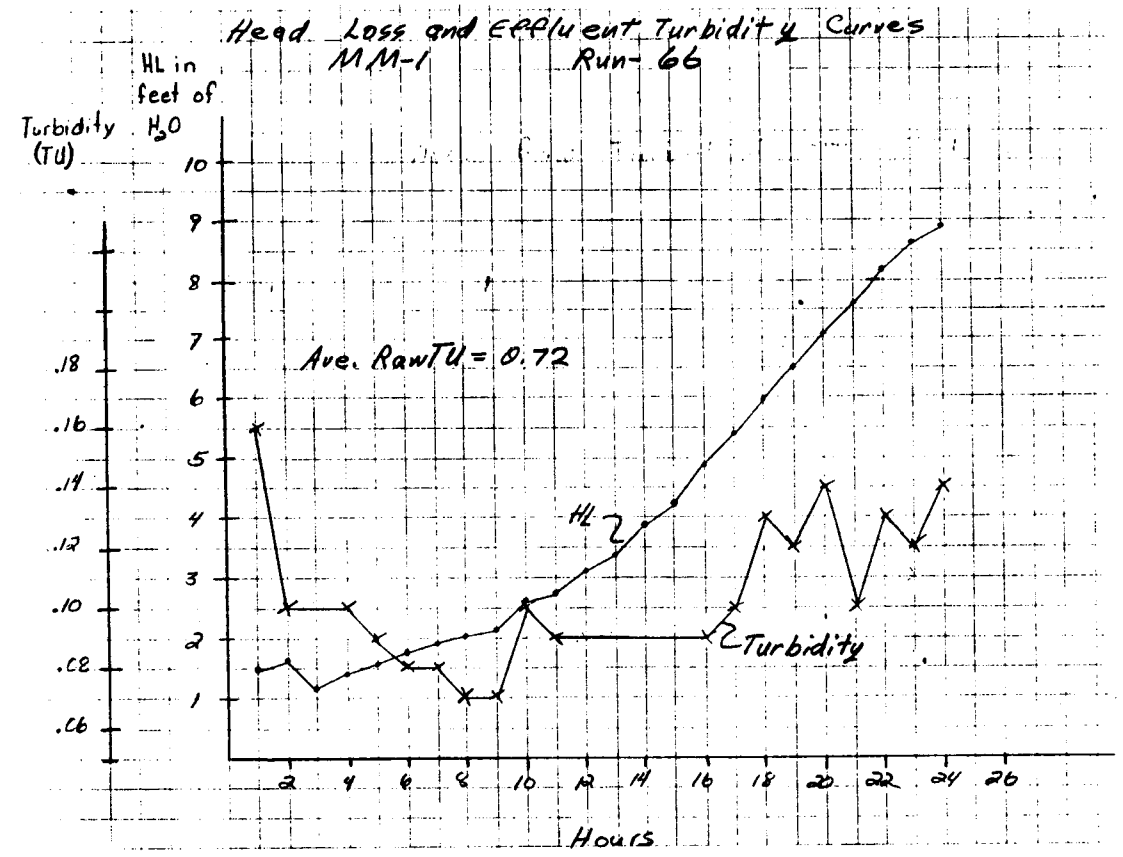

Head Loss and Effluent Turbidity Curves
MM-1 Run-61
HL in feet of H_2O
Turbidity (TU)
Ave. Raw TU = 1.81
HL
Turbidity
Hours

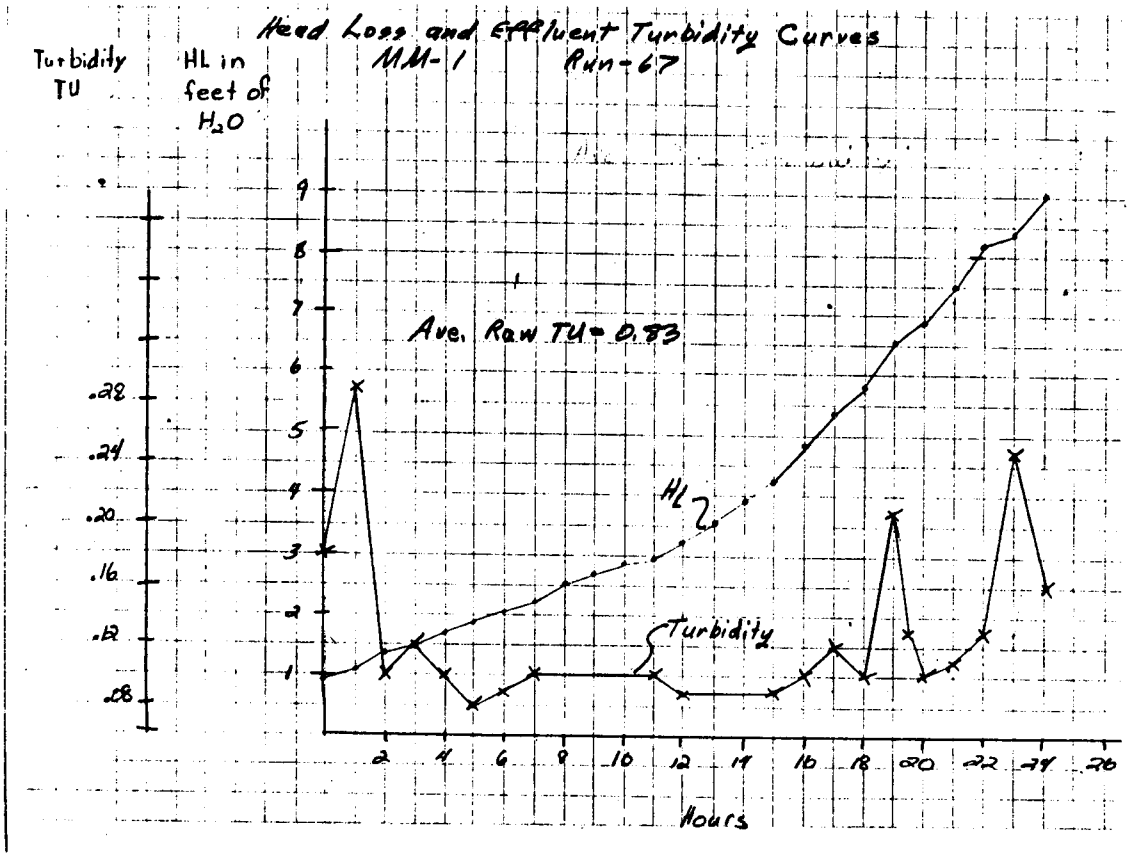

Head Loss and Effluent Turbidity Curves
MM-1 Run-62
HL in feet of H_2O
Turbidity (TU)
Ave. Raw TU = 1.15
HL
Turbidity
Hours

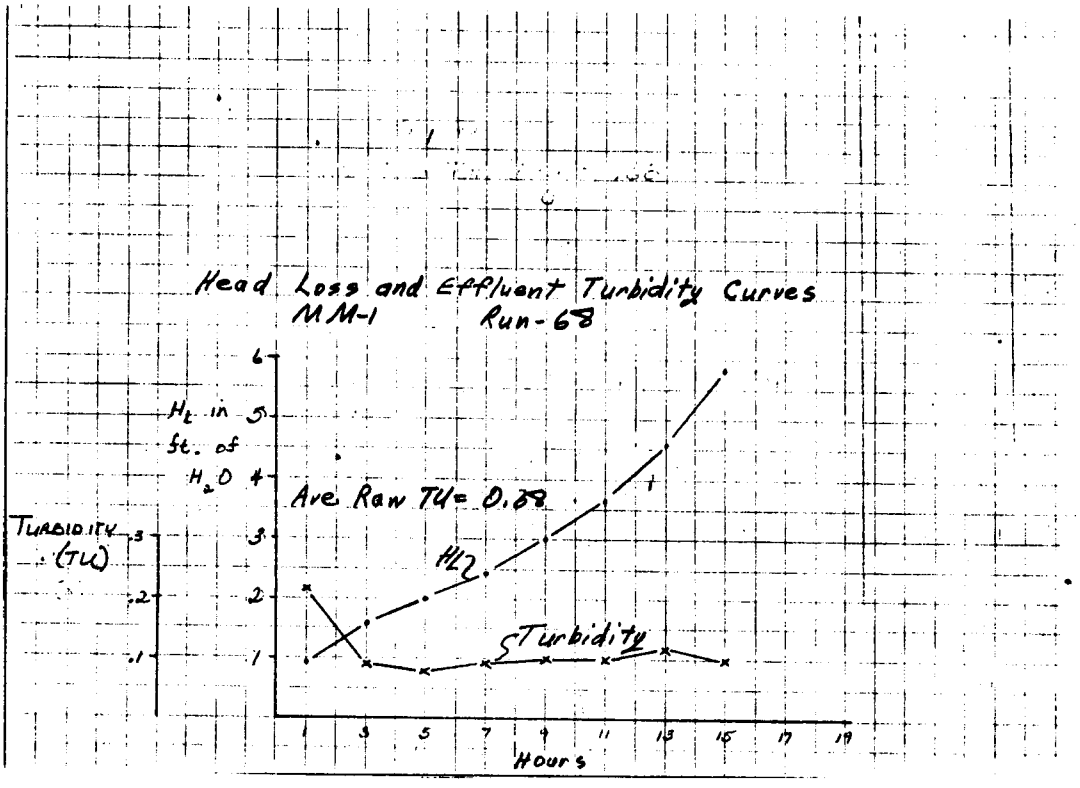

Head Loss and Effluent Turbidity
MM-1 Run-63
HL in feet of H_2O
Turbidity TU
Ave. Raw TU = 0.77
HL
Turbidity
Hours

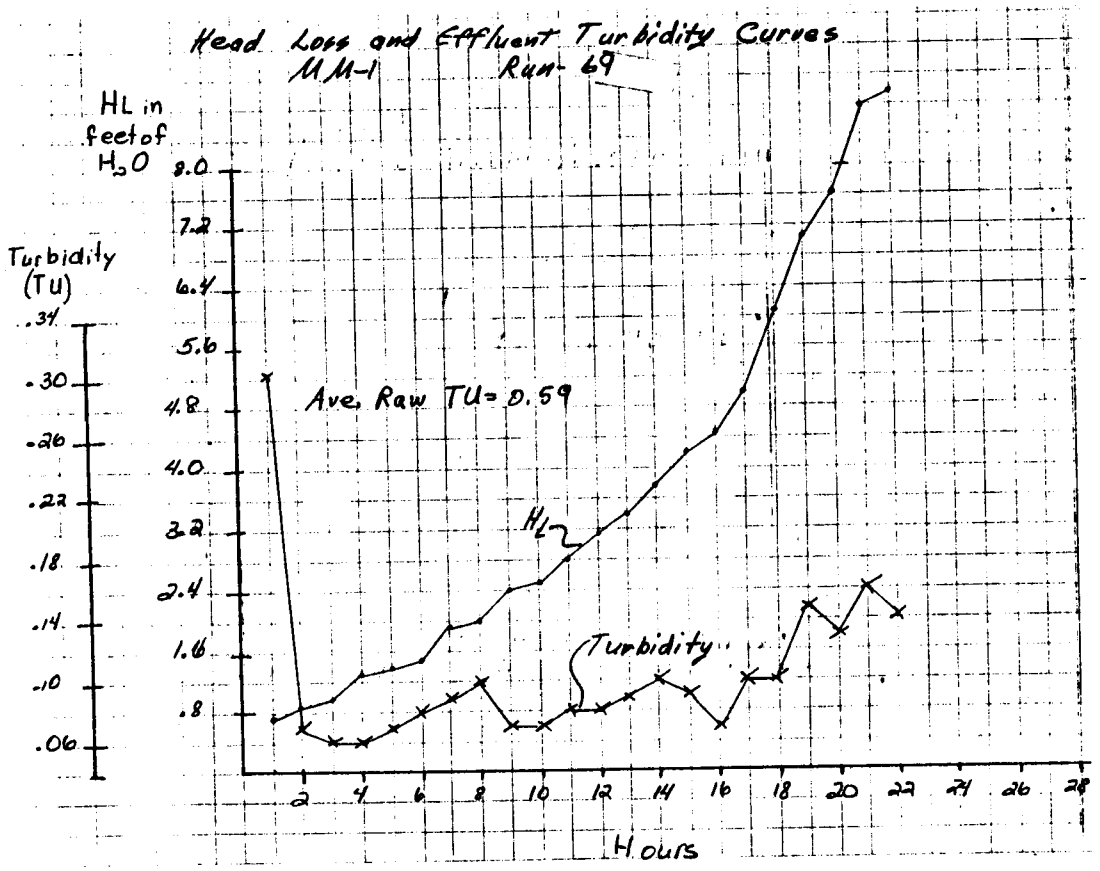

Head Loss and Effluent Turbidity Curves
MM-1 Run-64
Turbidity (TU)
HL in feet of H_2O
Ave. Raw TU = .68
HL
Turbidity
Hours

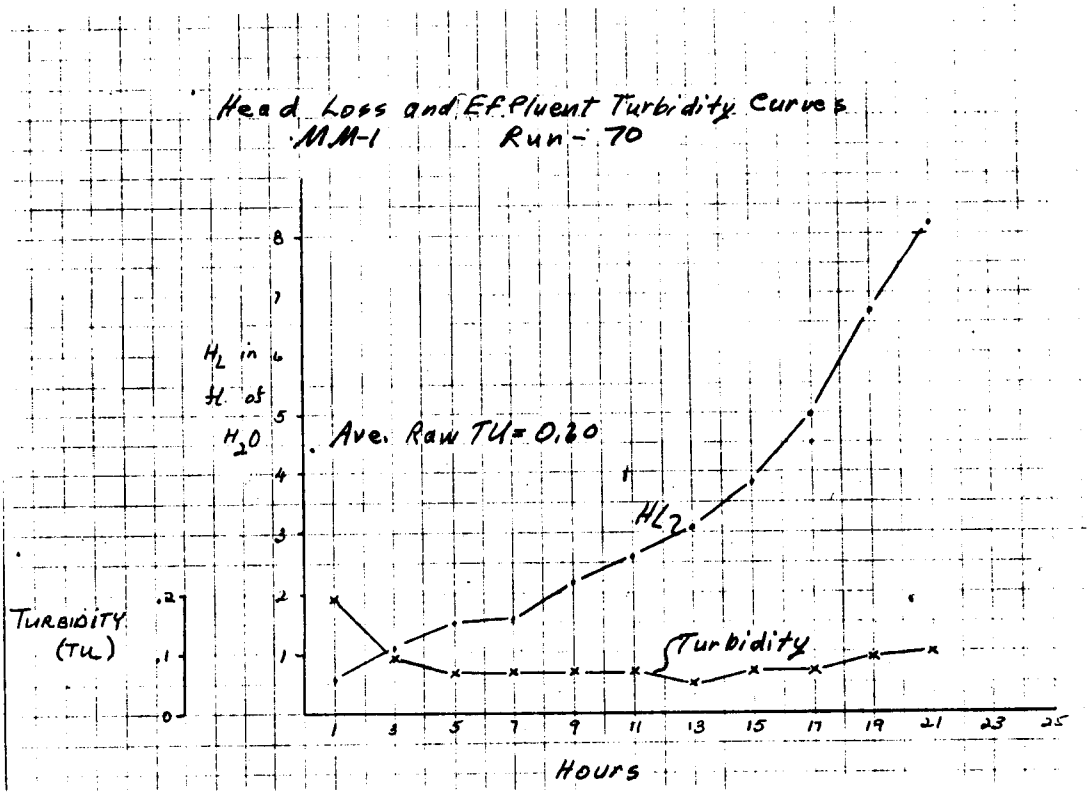

Head Loss and Effluent Turbidity Curves
MM-1 Run -65
Turbidity (TU)
HL in feet of H_2O
Ave. Raw TU = 0.70
HL
Turbidity
Hours

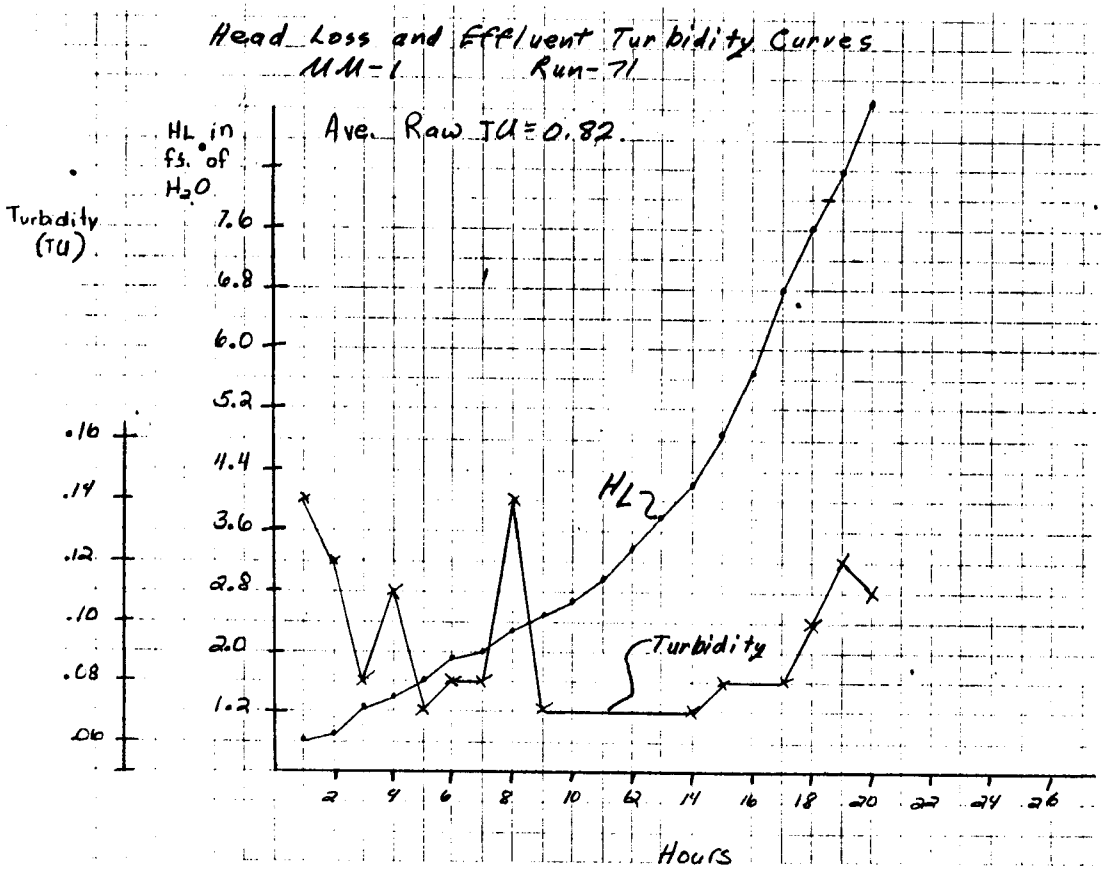

Head Loss and Effluent Turbidity Curves
MM-1 Run- 66
HL in feet of H_2O
Turbidity (TU)
Ave. Raw TU = 0.72
HL
Turbidity
Hours

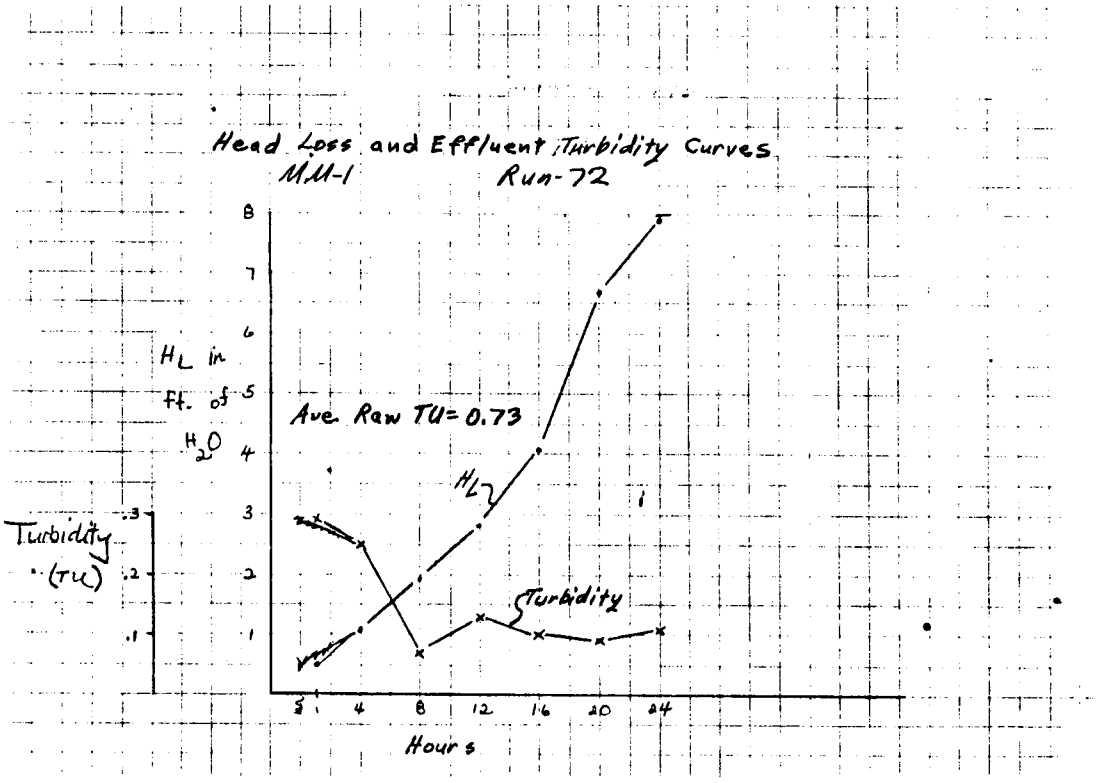

Head Loss and Effluent Turbidity Curves
MM-1 Run-67
Turbidity TU
HL in feet of H_2O
Ave. Raw TU = 0.83
HL
Turbidity
Hours

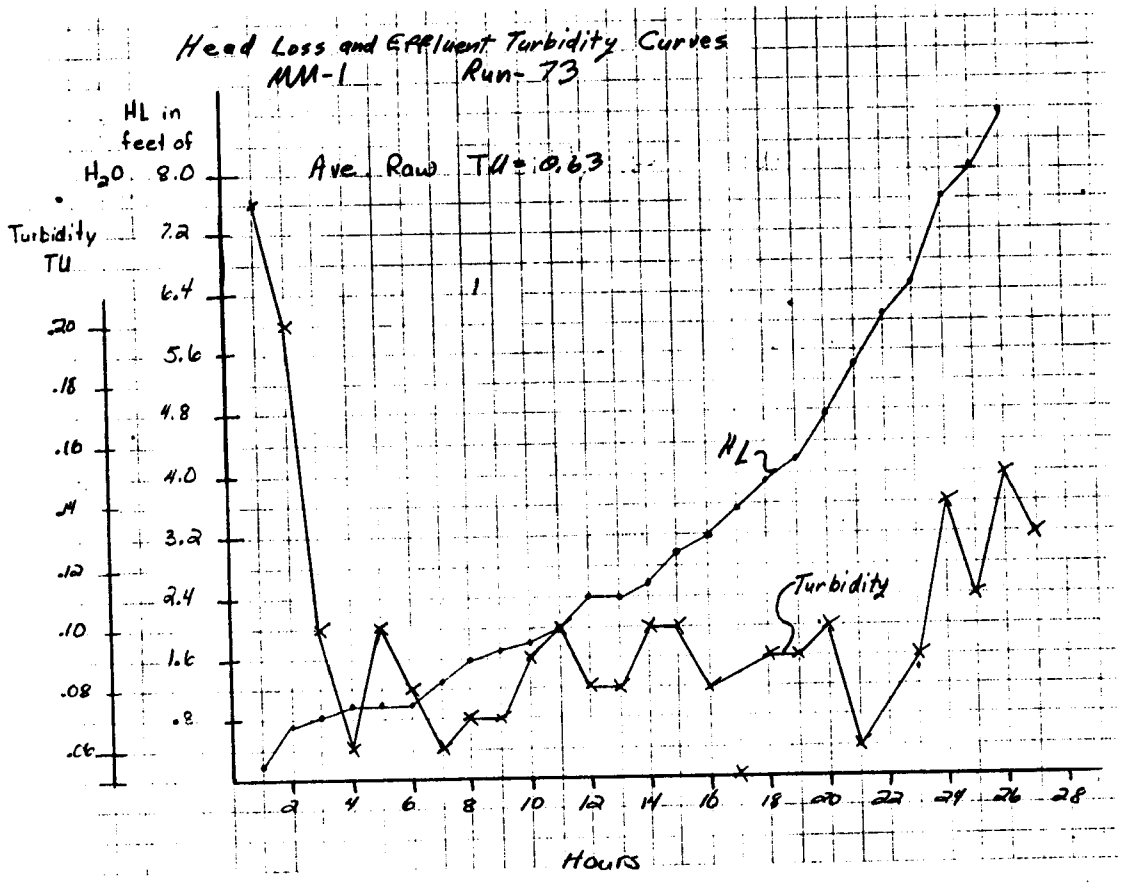

Head Loss and Effluent Turbidity Curves
MM-1 Run-68
H_L in ft. of H_2O
Ave. Raw TU = 0.88
TURBIDITY (TU)
HL
Turbidity
Hours

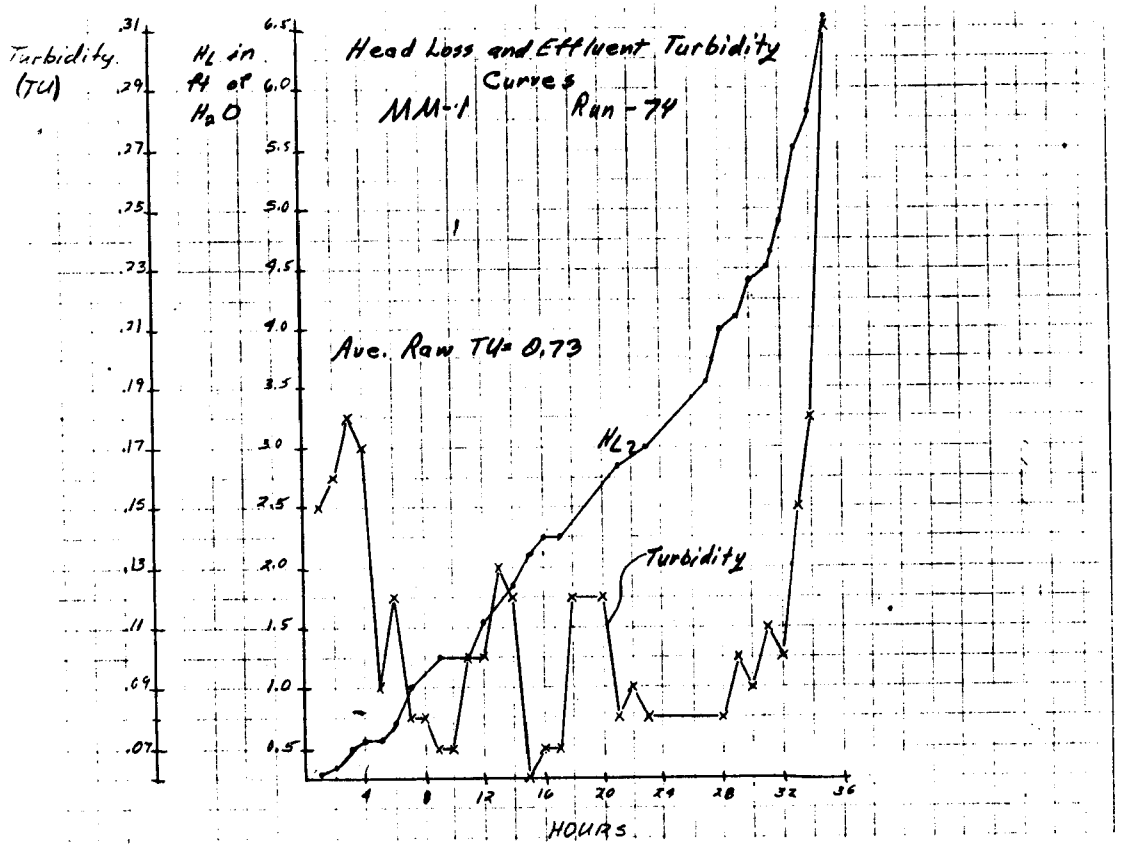

Head Loss and Effluent Turbidity Curves
MM-1 Run-69
HL in feet of H2O
Turbidity (TU)
Ave. Raw TU = 0.59
HL
Turbidity
Hours

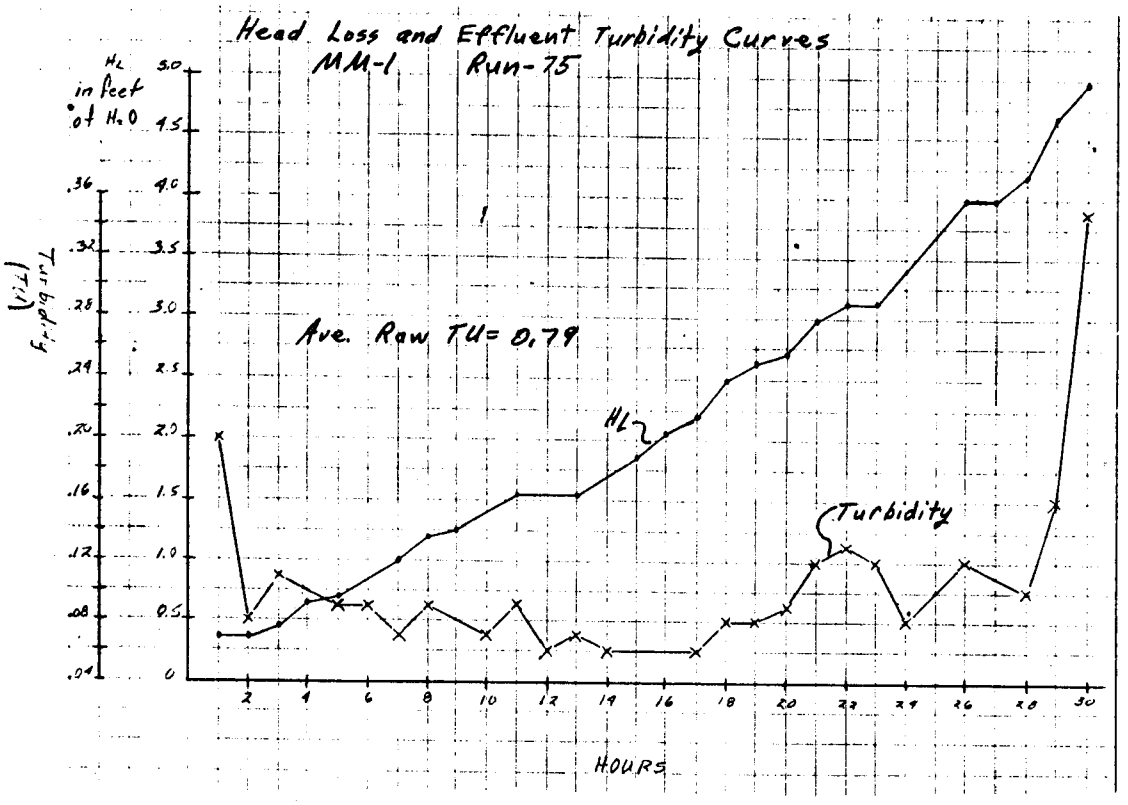

Head Loss and Effluent Turbidity Curves
MM-1 Run-70
HL in ft. of H2O
Ave. Raw TU = 0.60
HL
Turbidity
TURBIDITY (TU)
Hours

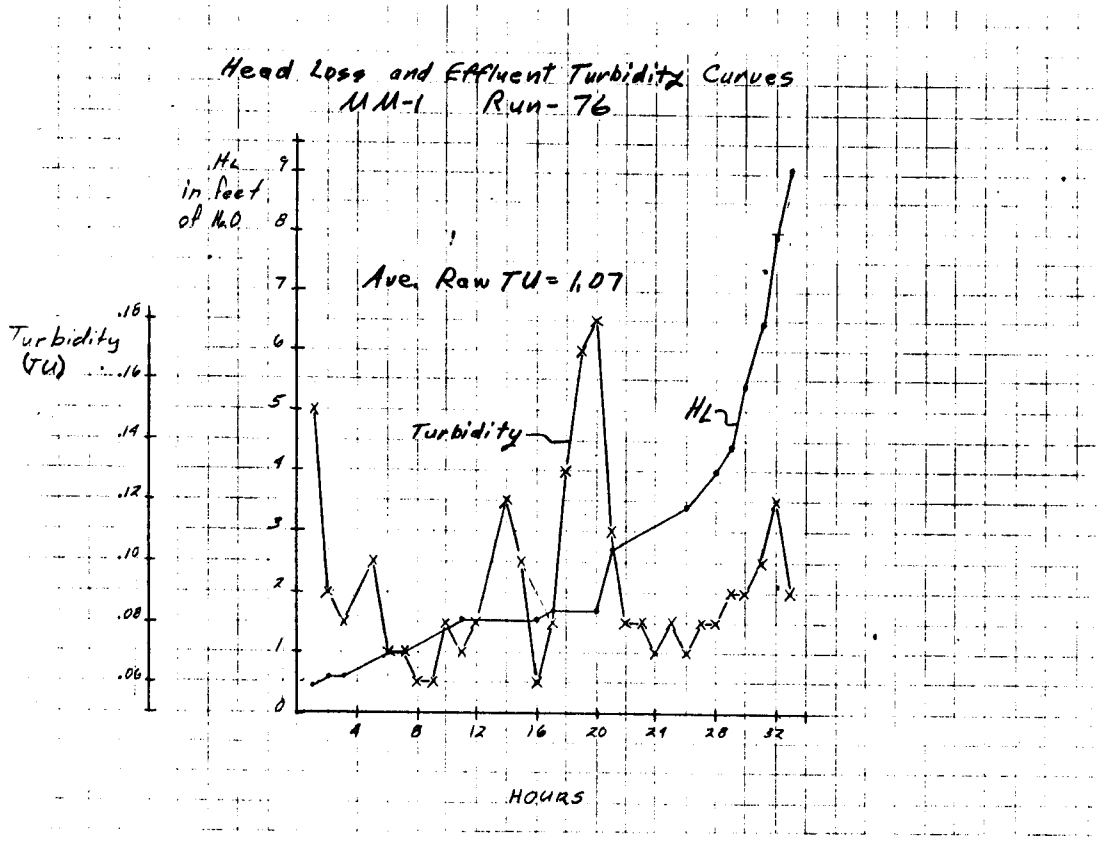

Head Loss and Effluent Turbidity Curves
MM-1 Run-71
Ave. Raw TU=0.82
HL in ft. of H2O
Turbidity (TU)
7.6
6.8
6.0
5.2
4.4
3.6
2.8
2.0
1.2
.16
.14
.12
.10
.08
.06
HL
Turbidity
2 4 6 8 10 12 14 16 18 20 22 24 26
Hours

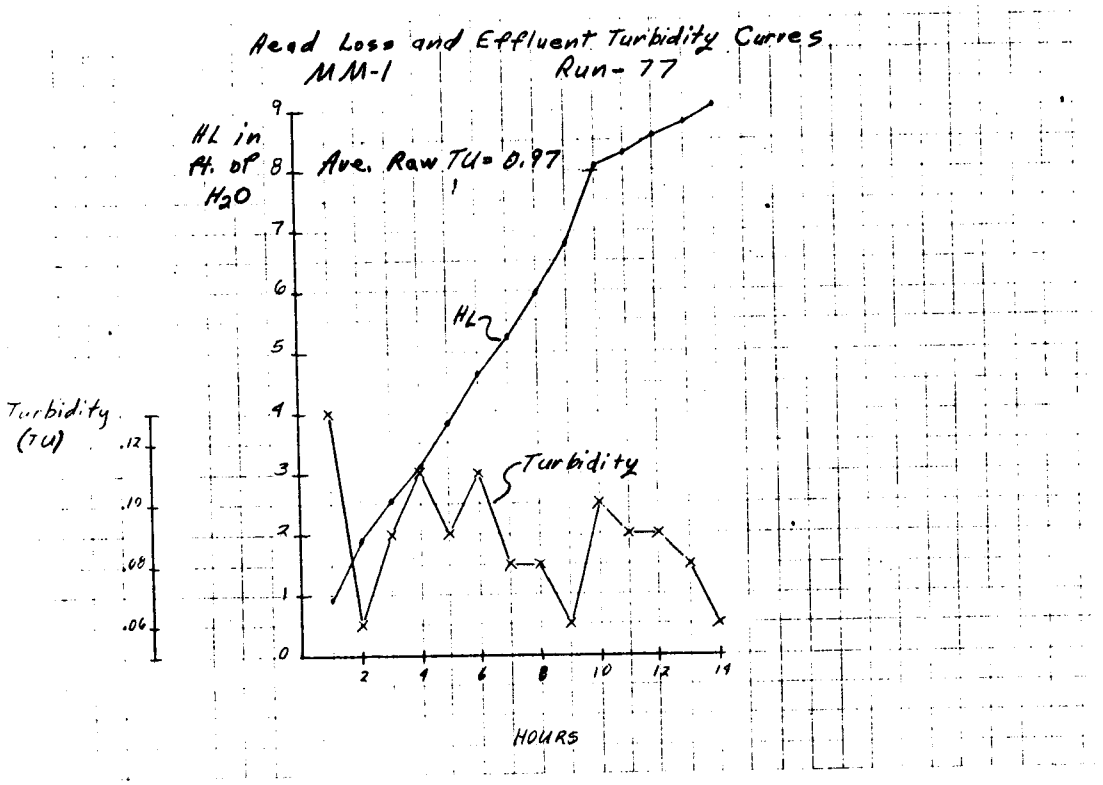

Head Loss and Effluent Turbidity Curves
MM-1 Run-72
Ave. Raw TU=0.73
HL in ft. of H2O
Turbidity (TU)
8
7
6
5
4
3
2
1
.3
.2
.1
HL
Turbidity
4 8 12 16 20 24
Hours

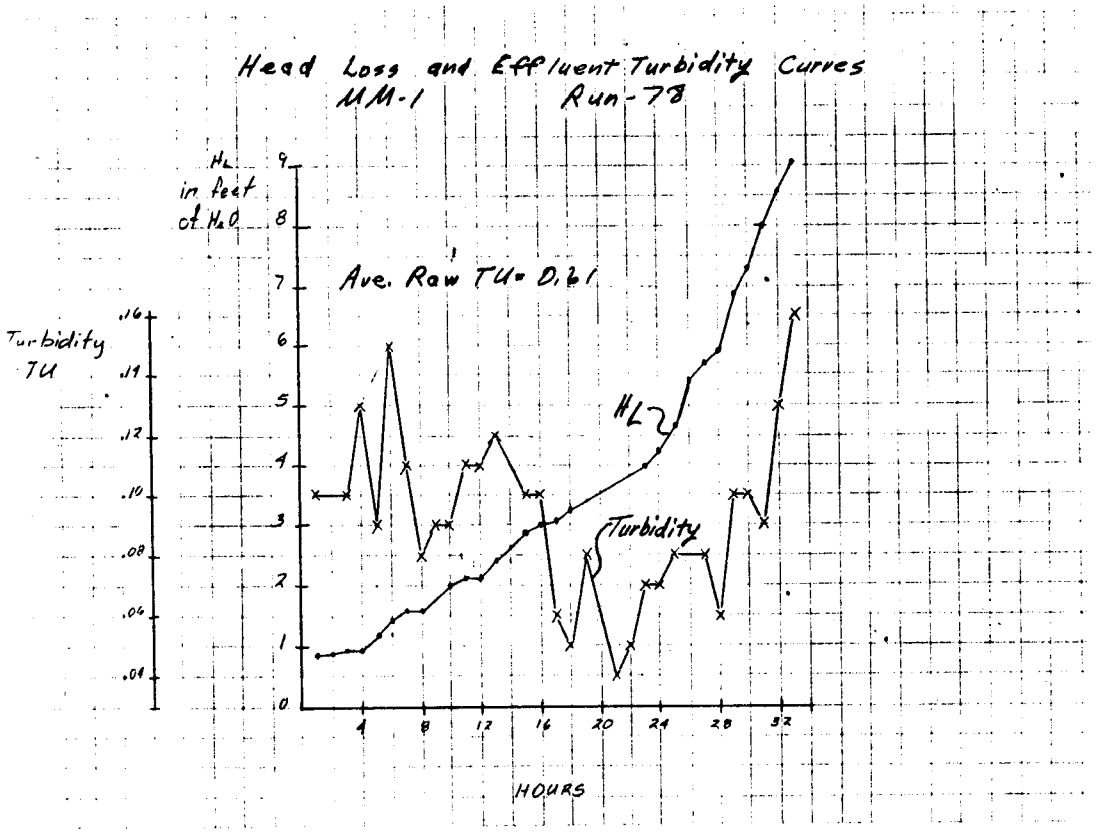

Head Loss and Effluent Turbidity Curves
MM-1 Run-73
HL in feet of H_2O
Turbidity TU
Ave. Raw TU = 0.63
HL
Turbidity
Hours

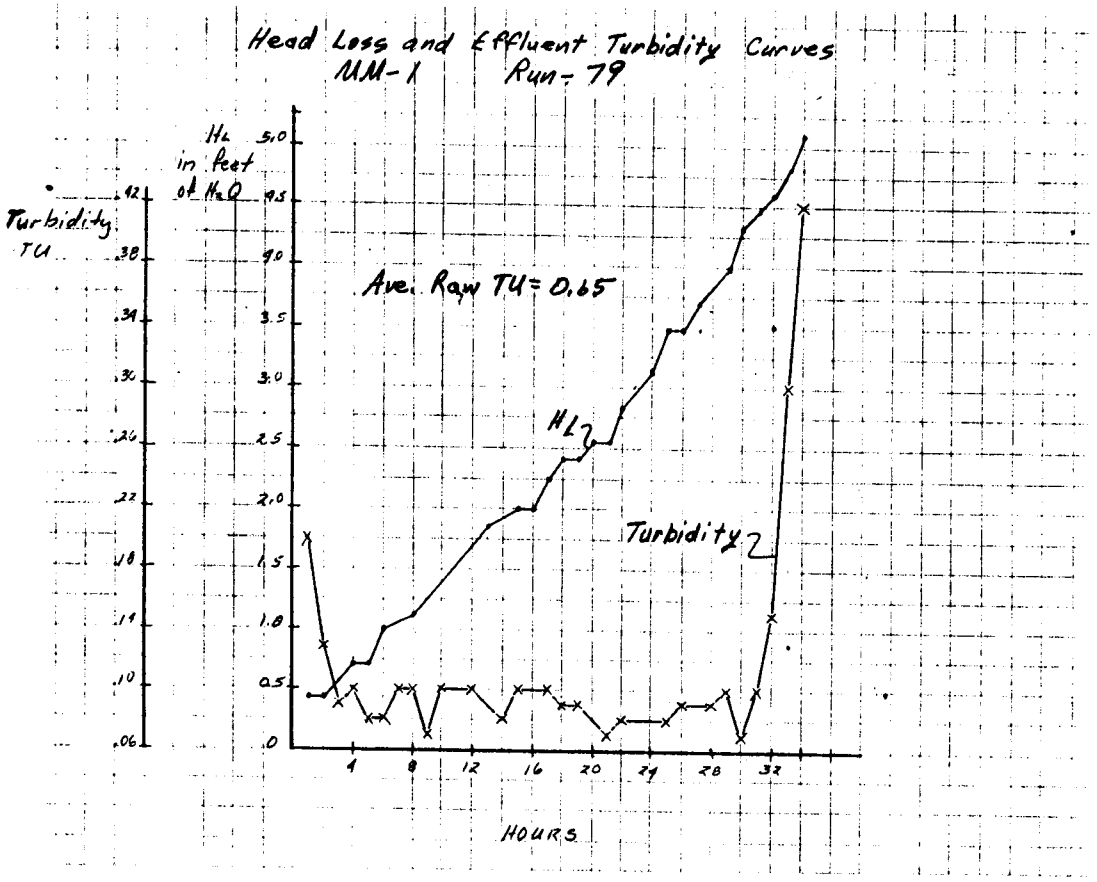

Turbidity (TU)
HL in ft of H_2O
Head Loss and Effluent Turbidity Curves
MM-1 Run-74
Ave. Raw TU = 0.73
HL
Turbidity
HOURS

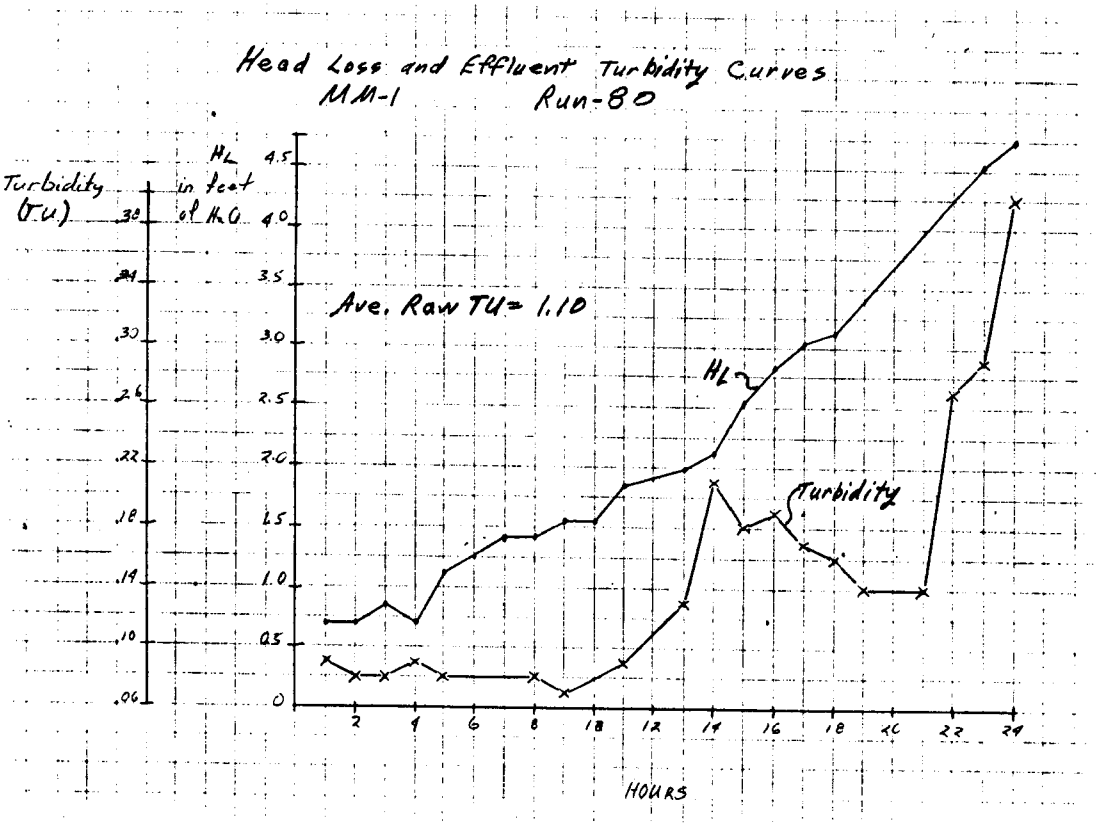

Head Loss and Effluent Turbidity Curves
MM-1 Run-75
HL in feet of H2O
Turbidity (TU)
Ave. Raw TU= 0.79
HL
Turbidity
HOURS

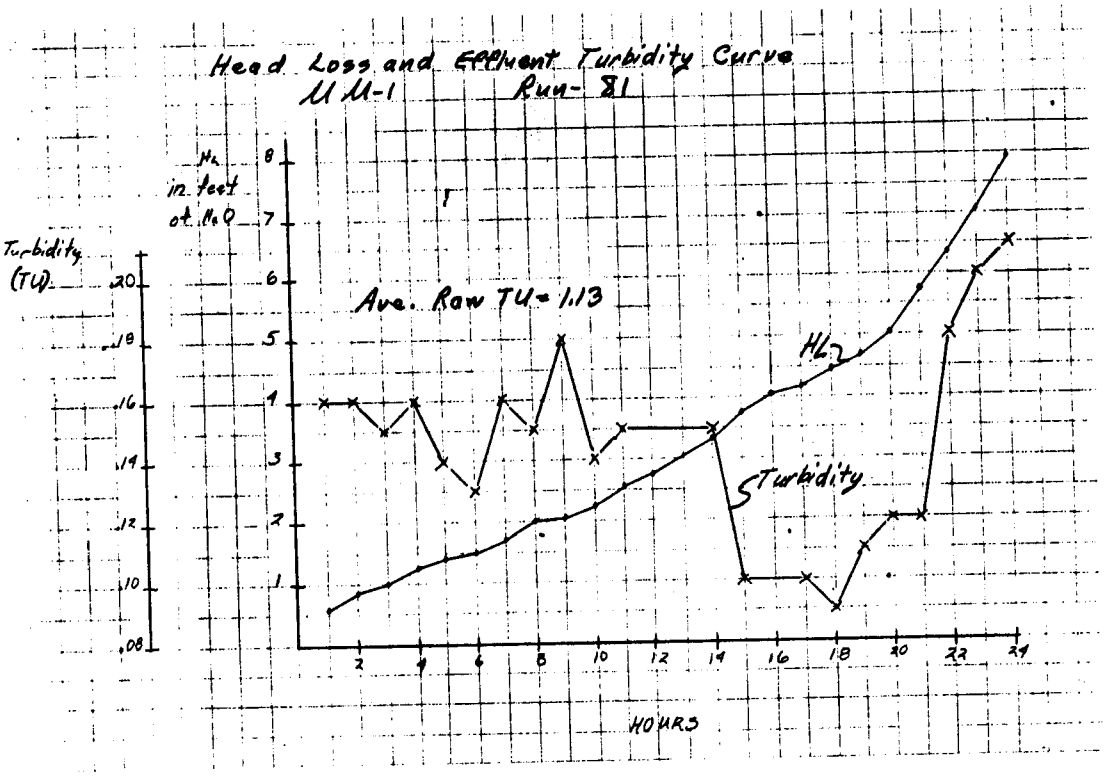

Head Loss and Effluent Turbidity Curves
MM-1 Run-76
HL in feet of H2O
Turbidity (TU)
Ave. Raw TU= 1.07
Turbidity
HL
HOURS

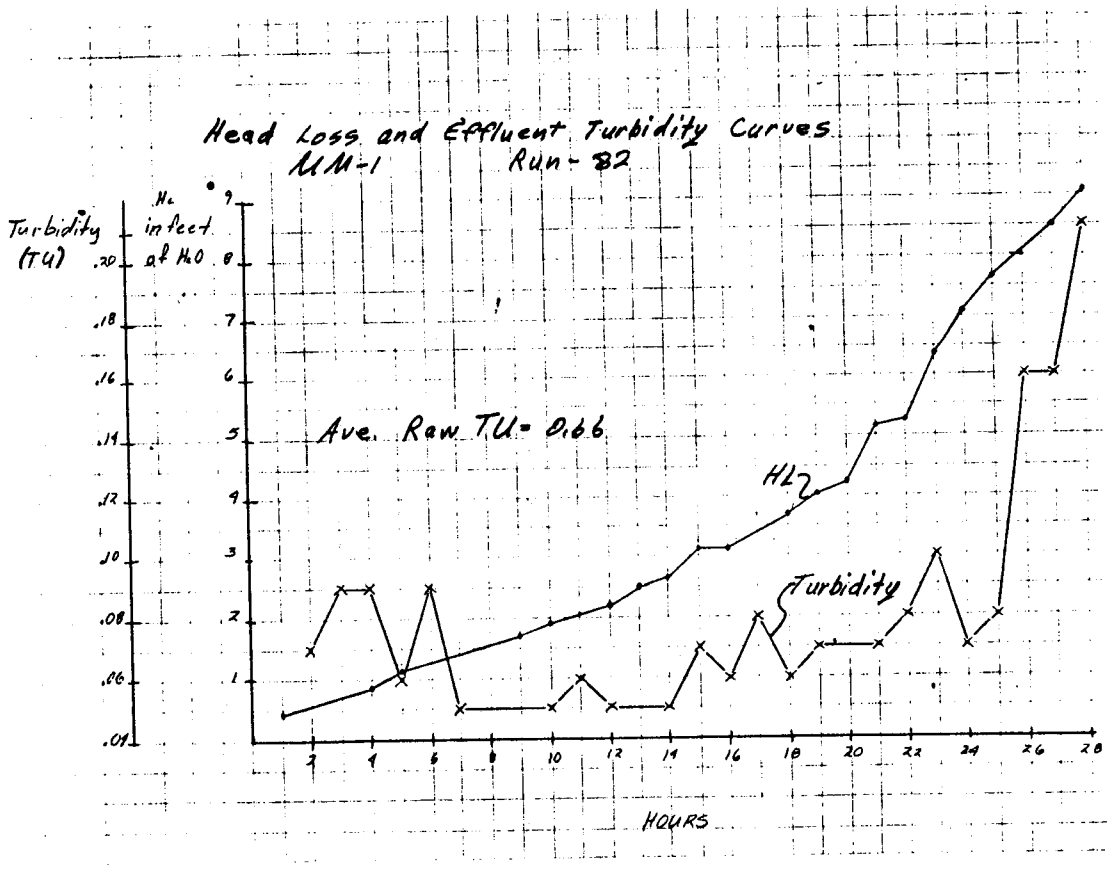

Head Loss and Effluent Turbidity Curves
MM-1
Run-77
HL in ft. of H2O
Ave. Raw TU = 0.97
HL
Turbidity
Turbidity (TU)
HOURS

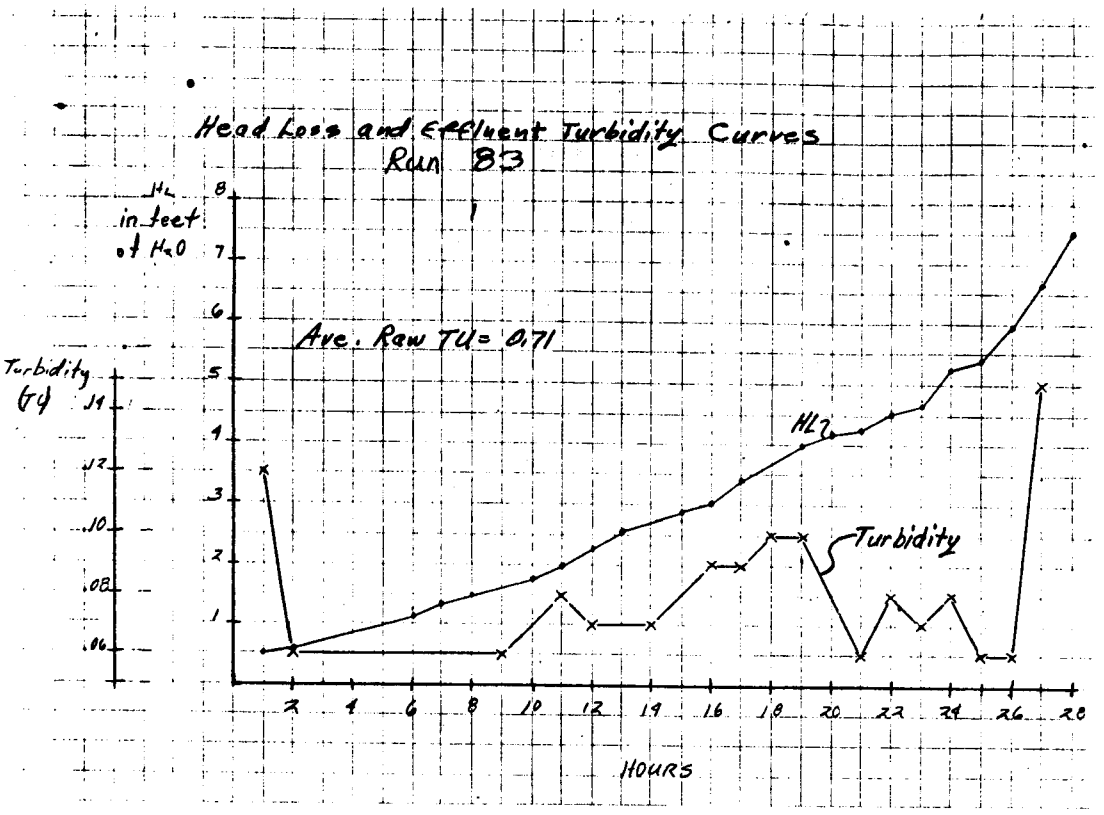

Head Loss and Effluent Turbidity Curves
MM-1
Run-78
HL in feet of H2O
Ave. Raw TU = 0.61
HL
Turbidity
Turbidity TU
HOURS

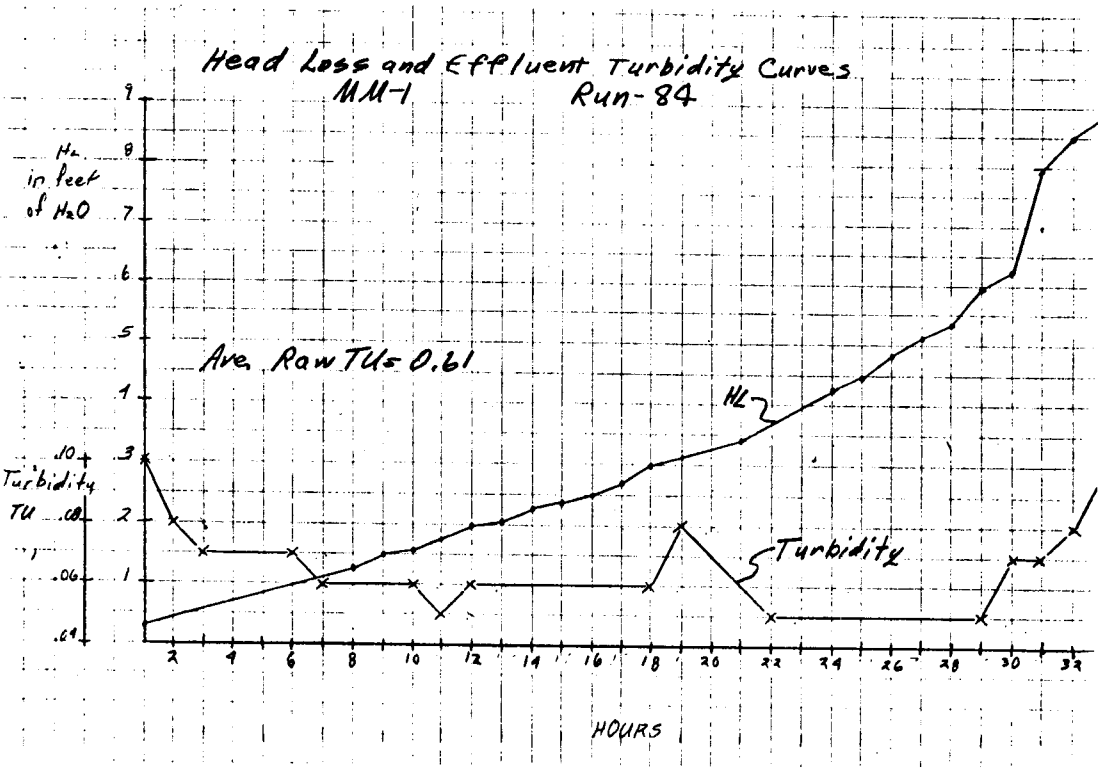

Head Loss and Effluent Turbidity Curves
MM-1 Run-79
Turbidity TU
HL in Feet of H2O
Ave. Raw TU = 0.65
HL
Turbidity
HOURS

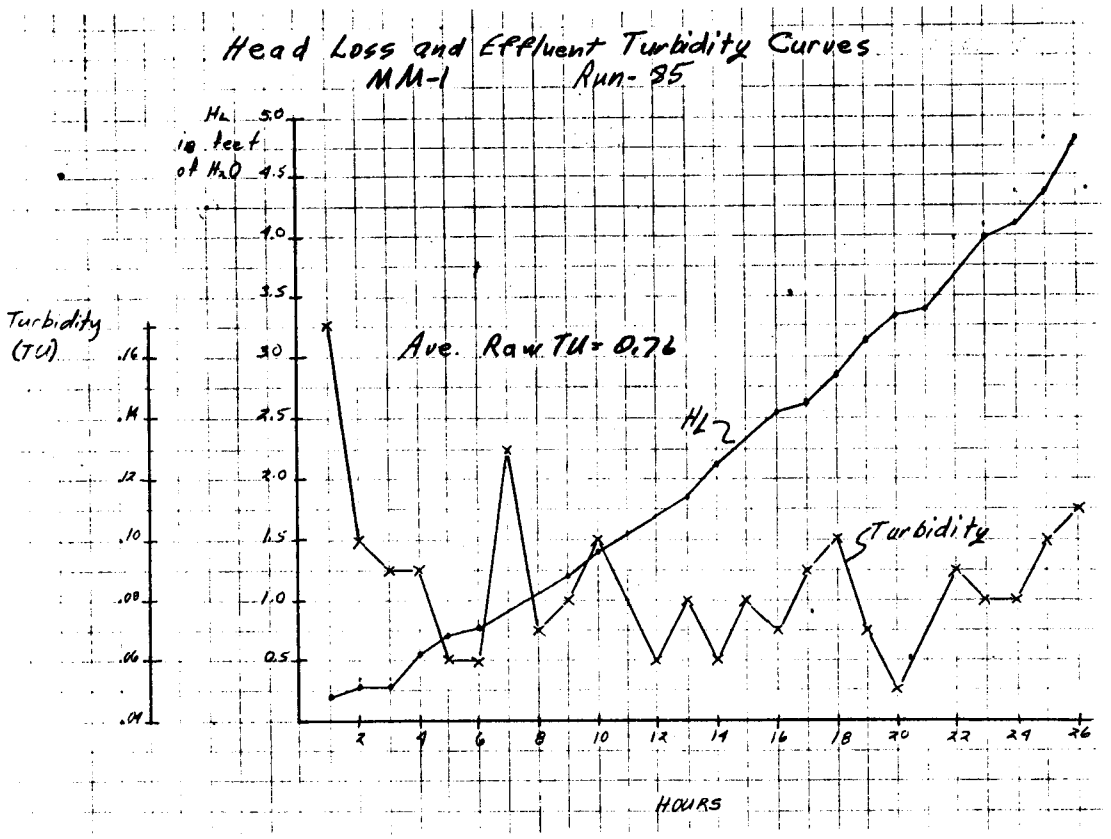

Head Loss and Effluent Turbidity Curves
MM-1 Run-80
Turbidity (TU)
HL in feet of H2O
Ave. Raw TU = 1.10
HL
Turbidity
HOURS

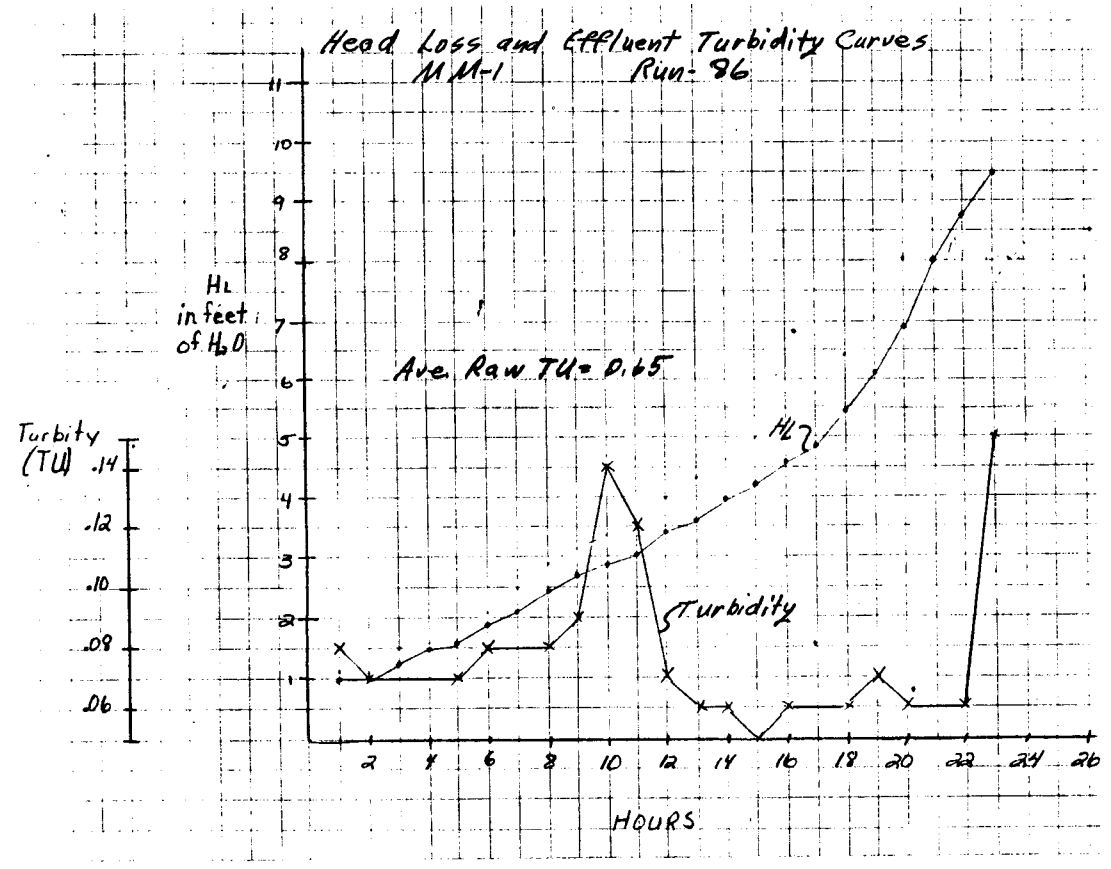

Head Loss and Effluent Turbidity Curve
MM-1 Run- 81
Hl in feet of H2O
Turbidity (TU)
Ave. Raw TU = 1.13
HL
Turbidity
HOURS

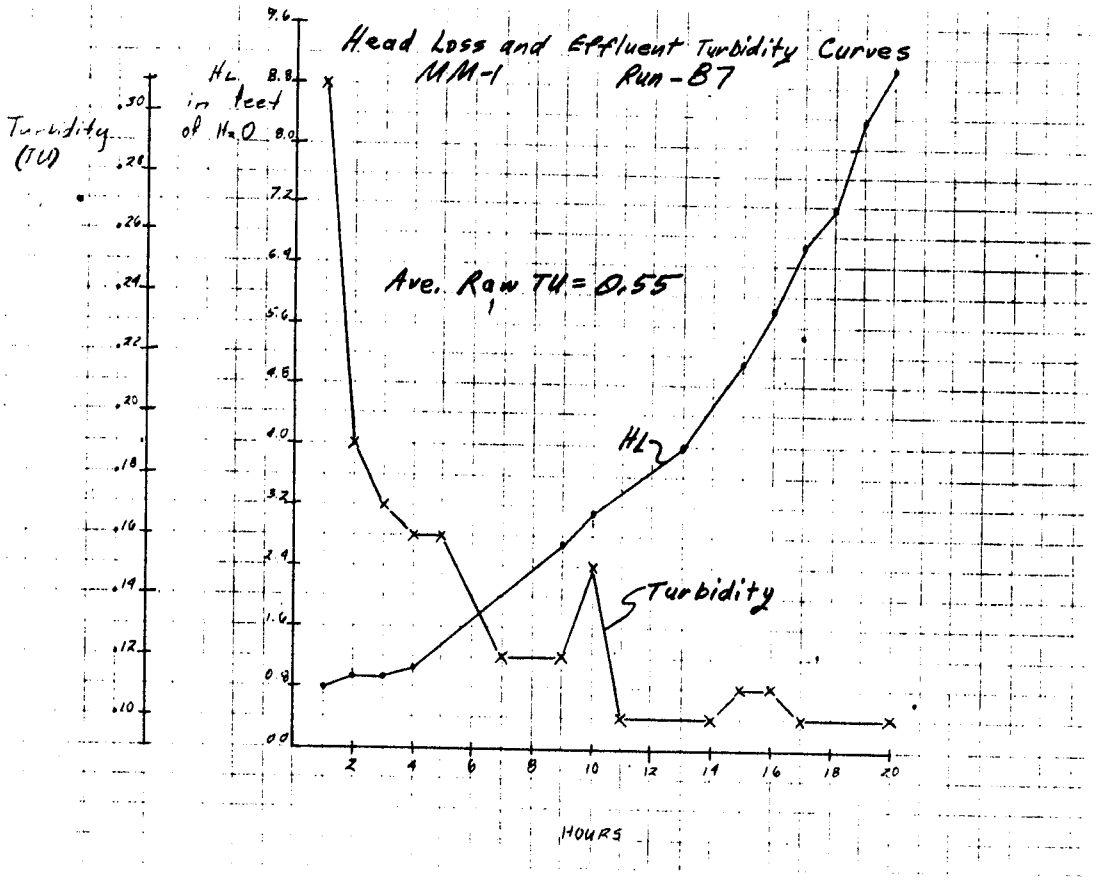

Head Loss and Effluent Turbidity Curves
MM-1 Run- 82
Hl in feet of H2O
Turbidity (TU)
Ave. Raw TU = 0.66
HL
Turbidity
HOURS


Head Loss and Effluent Turbidity Curves
Run 83
HL in feet of H2O
Turbidity (TU)
Ave. Raw TU = 0.71
HL
Turbidity
HOURS

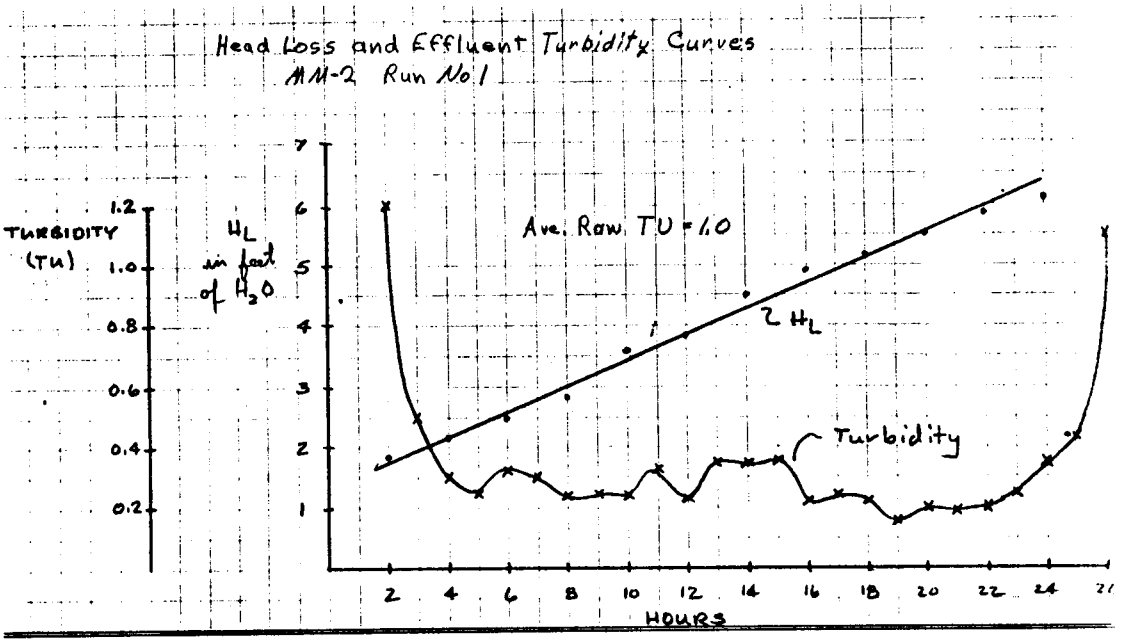

Head Loss and Effluent Turbidity Curves
MM-1
Run-84
HL in feet of H2O
Turbidity TU
Ave. Raw TU = 0.61
HL
Turbidity
HOURS

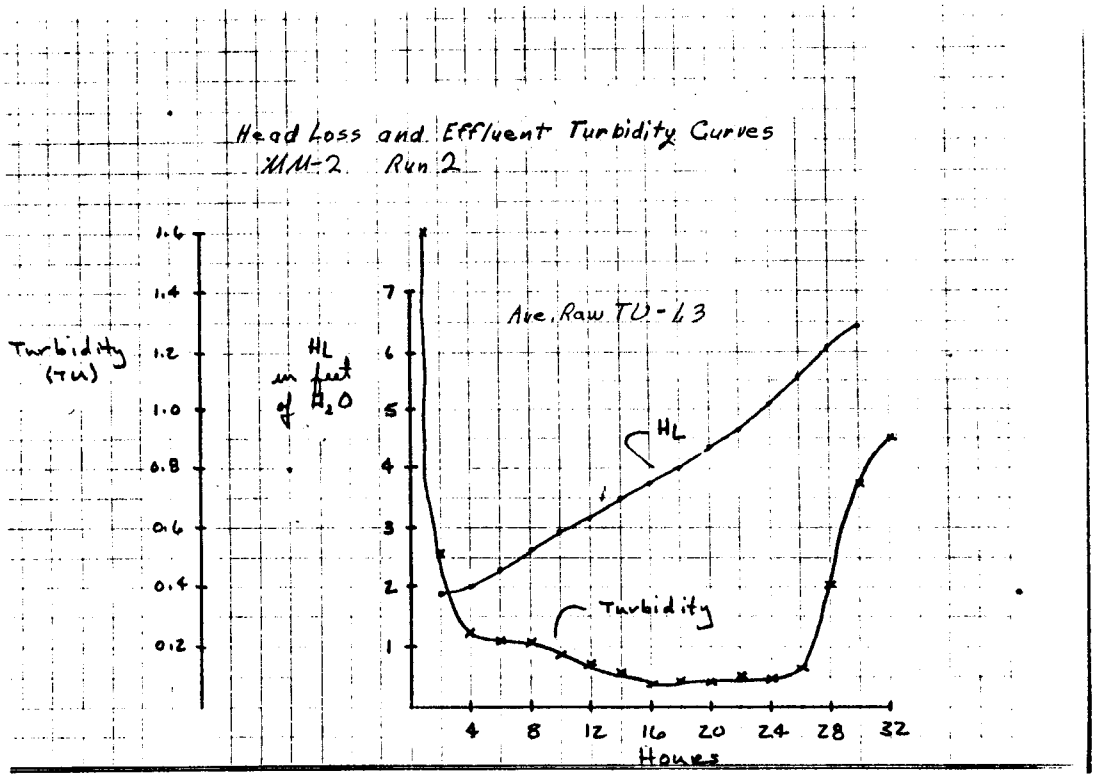

Head Loss and Effluent Turbidity Curves
MM-1 Run-85
HL in feet of H2O
Turbidity (TU)
Ave. Raw TU = 0.76
HL
Turbidity
HOURS

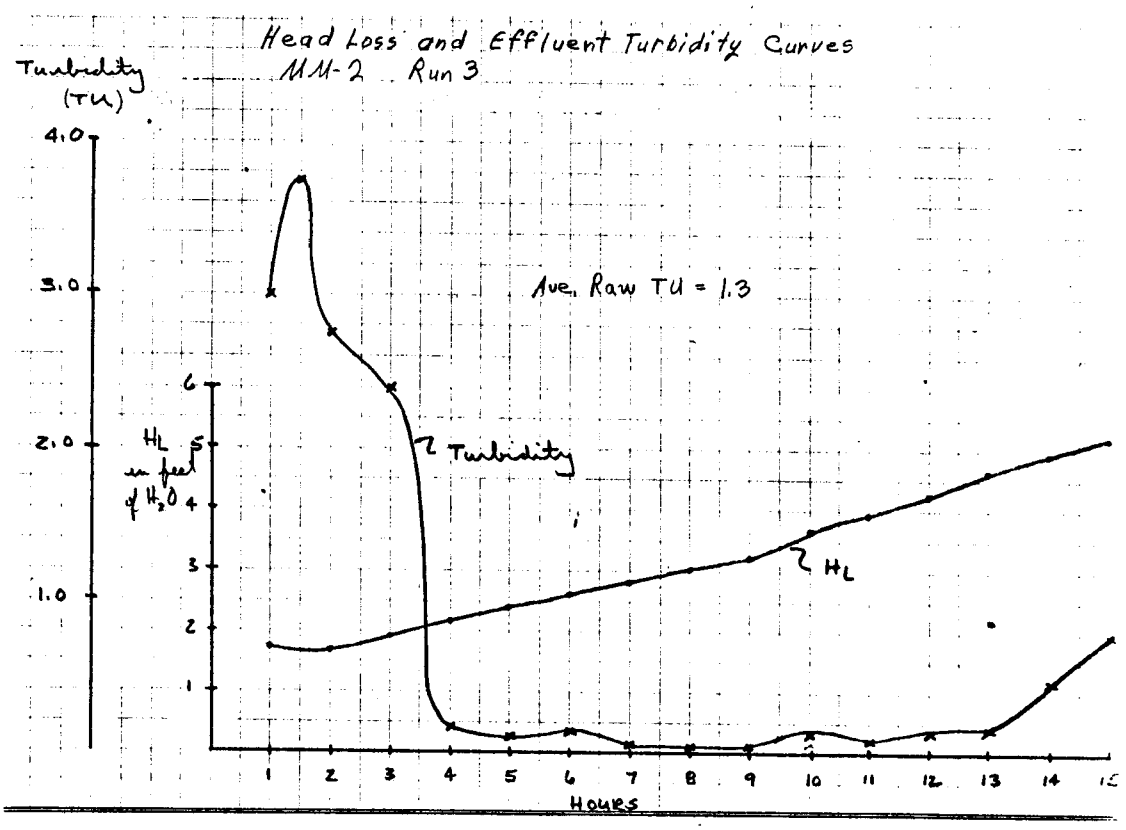

Head Loss and Effluent Turbidity Curves
MM-1 Run-86
HL in feet of H2O
Turbity (TU)
Ave. Raw TU = 0.65
HL
Turbidity
HOURS

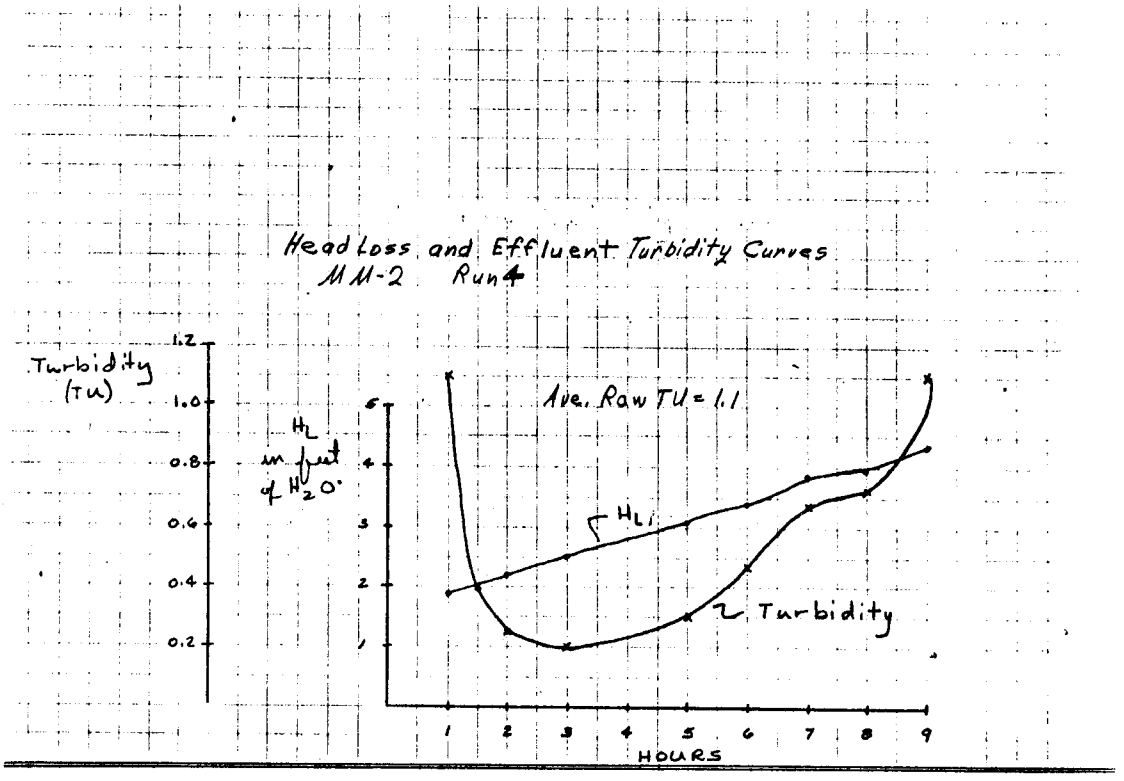

Head Loss and Effluent Turbidity Curves
MM-1
Run-B7
Ave. Raw TU = 0.55
HL
Turbidity
HL in feet of H2O
Turbidity (TU)
HOURS

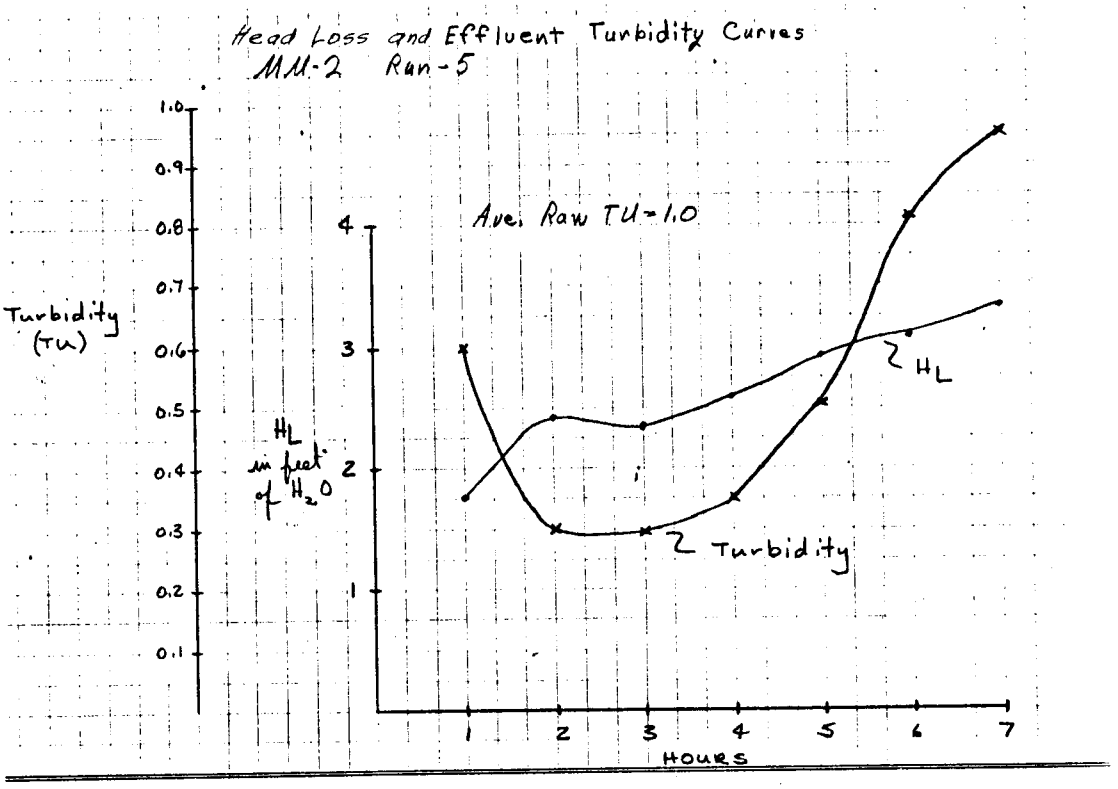
APPENDIX D-2 - GRANULAR MEDIA FILTRATION (MM-2) HEAD LOSS AND TURBIDITY CURVES

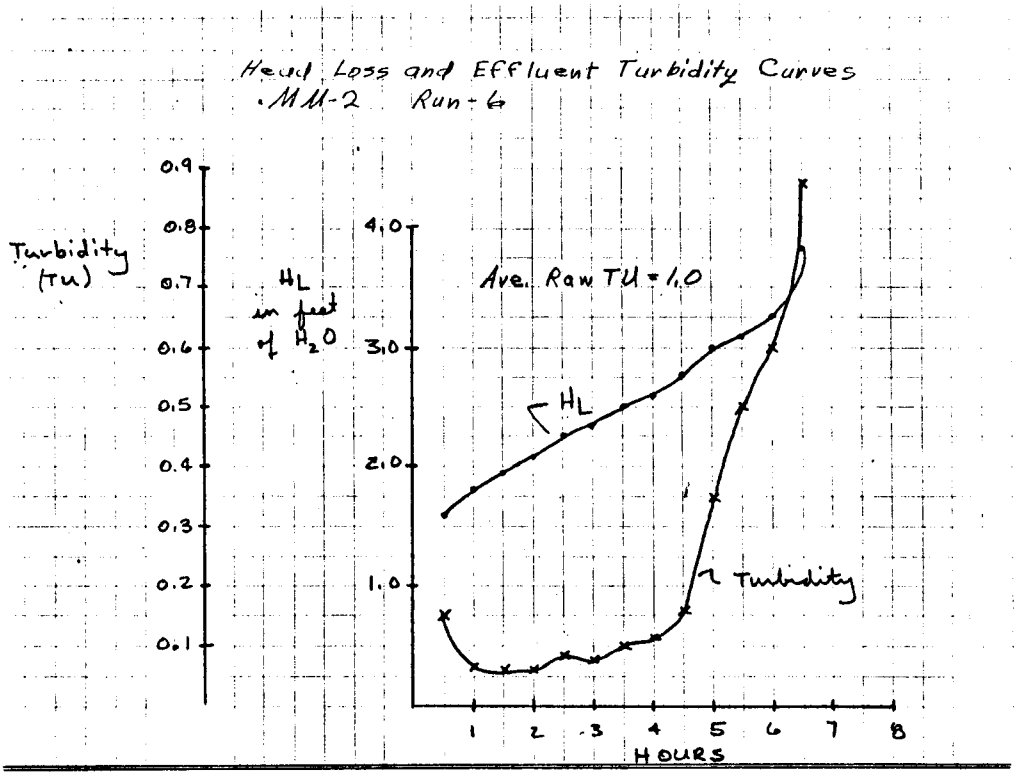


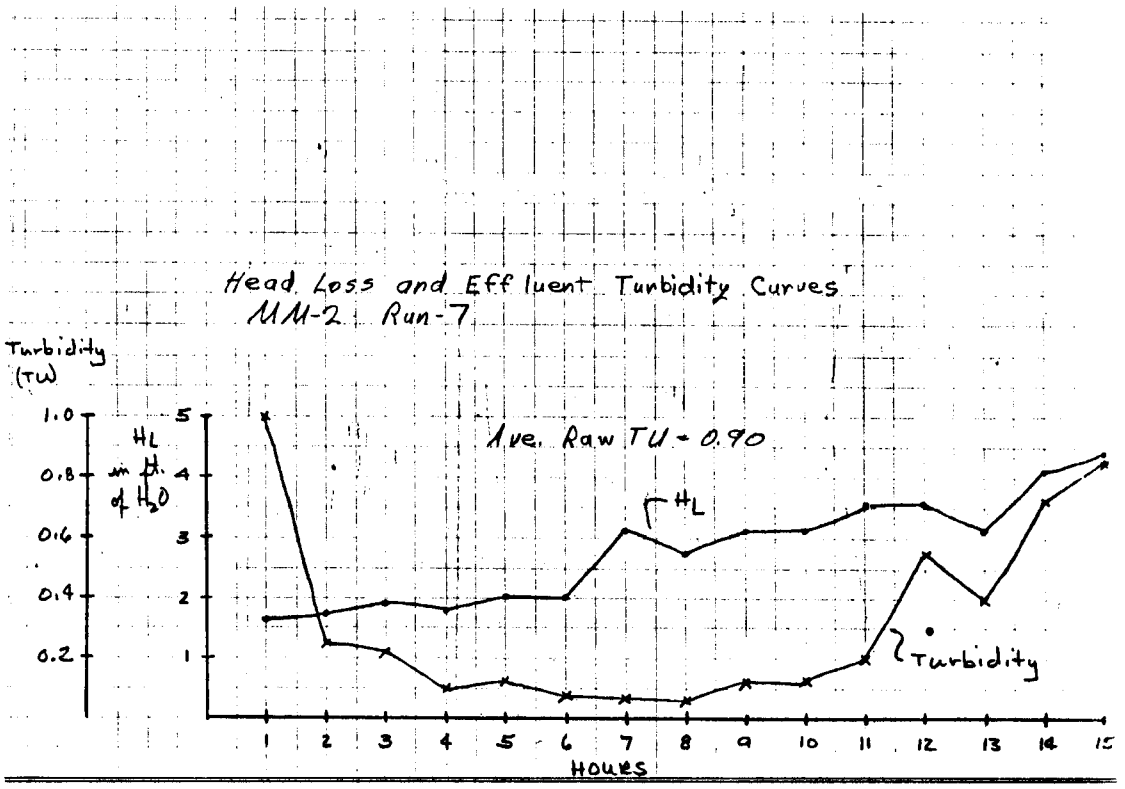


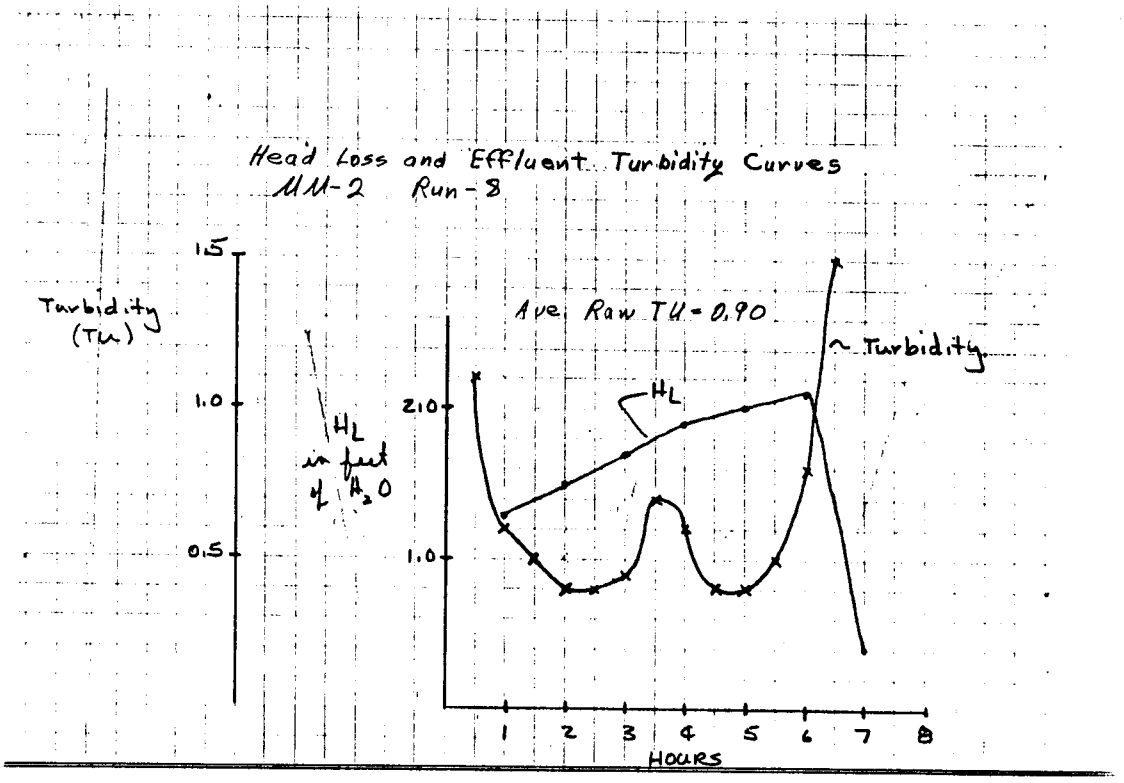

Head Loss and Effluent Turbidity Curves
MM-2 Run 3
Turbidity (TU)
4.0
3.0
2.0
1.0
Ave. Raw TU = 1.3
Turbidity
H_L in feet of H_2O
6
5
4
3
2
1
H_L
1 2 3 4 5 6 7 8 9 10 11 12 13 14
HOURS

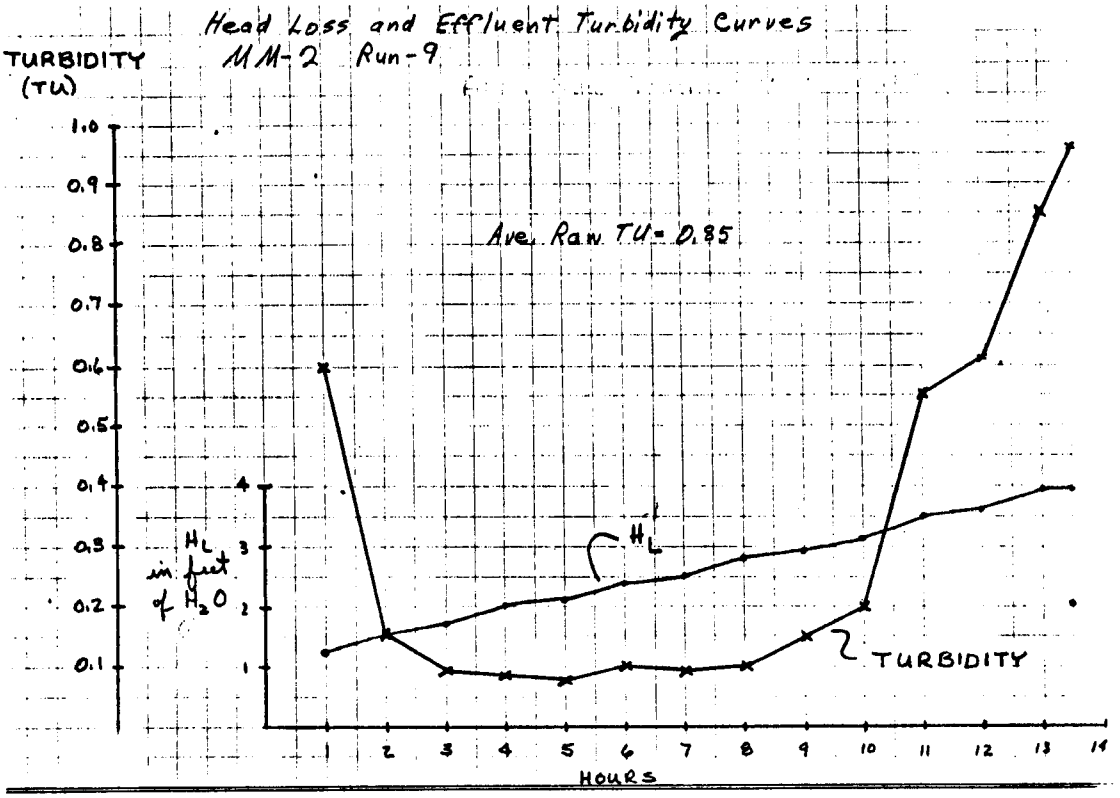

Head Loss and Effluent Turbidity Curves
MM-2 Run 4
Turbidity (TU)
1.2
1.0
0.8
0.6
0.4
0.2
H_L in feet of H_2O
6
4
3
2
1
Ave. Raw TU = 1.1
H_L
Turbidity
1 2 3 4 5 6 7 8 9
HOURS

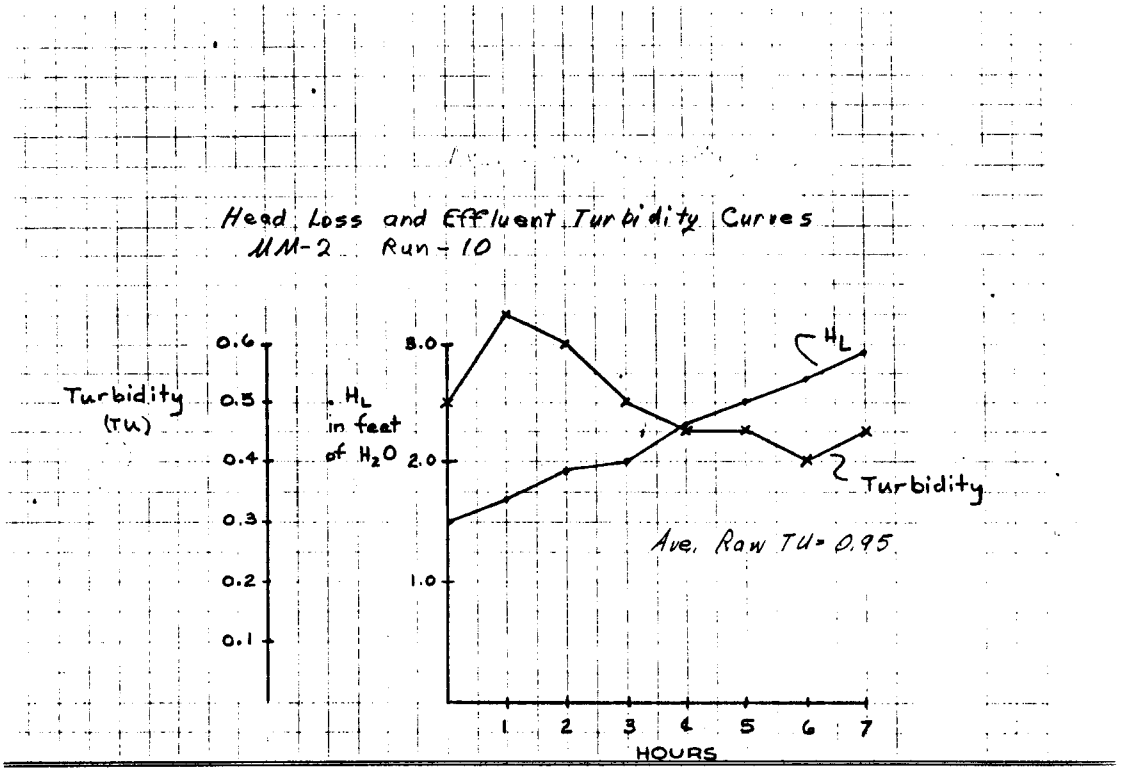

Head Loss and Effluent Turbidity Curves
MM-2 Run-5
Ave. Raw TU = 1.0
Turbidity (TU)
HL in feet of H2O
HL
Turbidity
HOURS

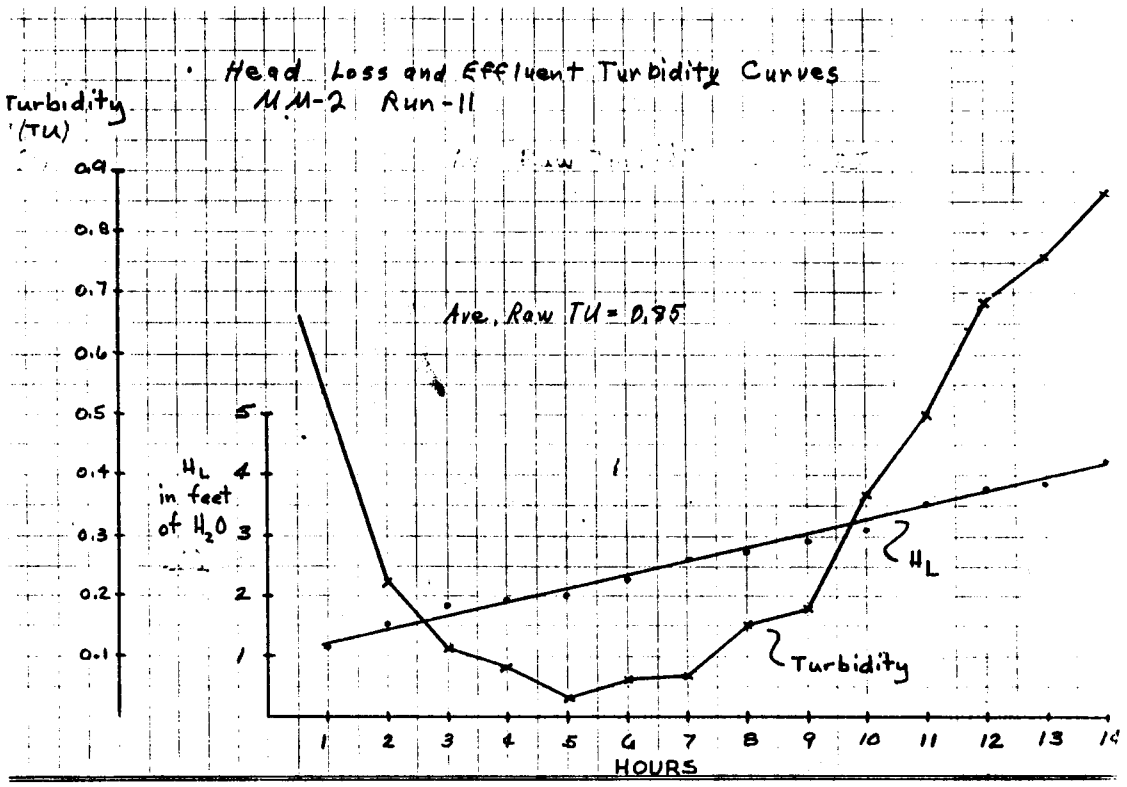

Head Loss and Effluent Turbidity Curves
MM-2 Run-6
Ave. Raw TU = 1.0
Turbidity (TU)
HL in feet of H2O
HL
Turbidity
HOURS

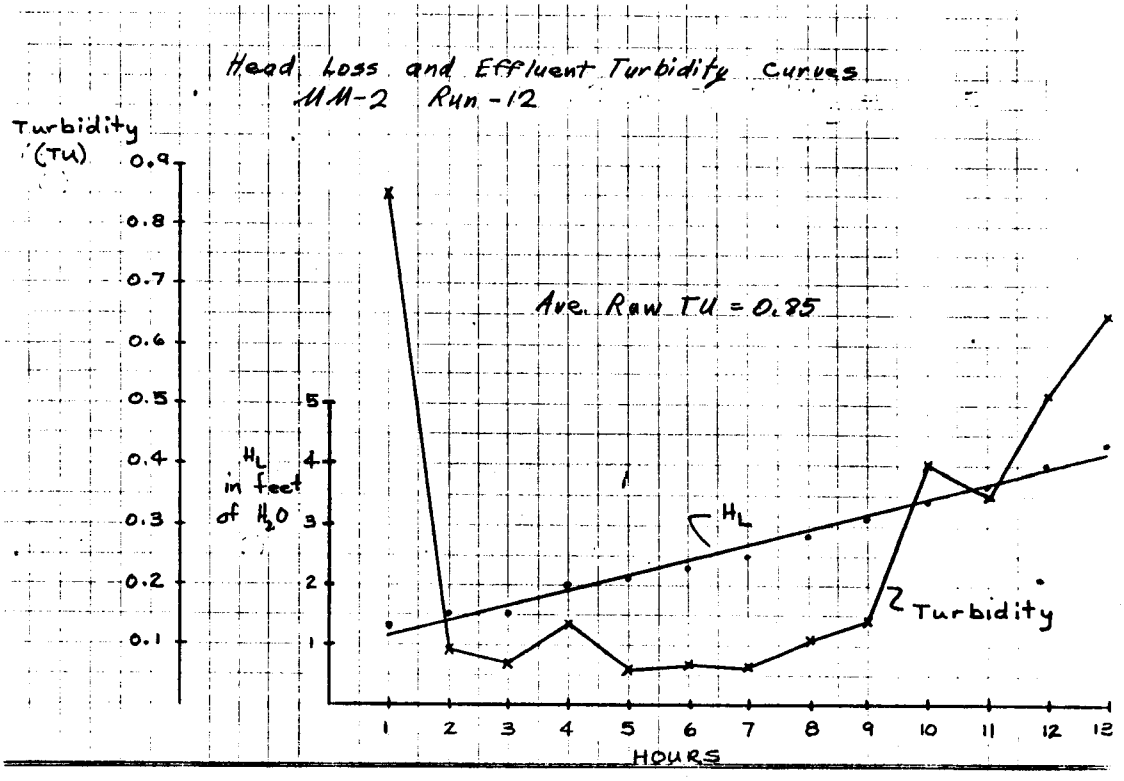

Head Loss and Effluent Turbidity Curves
MM-2 Run-7
Turbidity (TU)
1.0
0.8
0.6
0.4
0.2
HL in ft. of H2O
5
4
3
2
1
Ave. Raw TU = 0.90
HL
Turbidity
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
HOURS

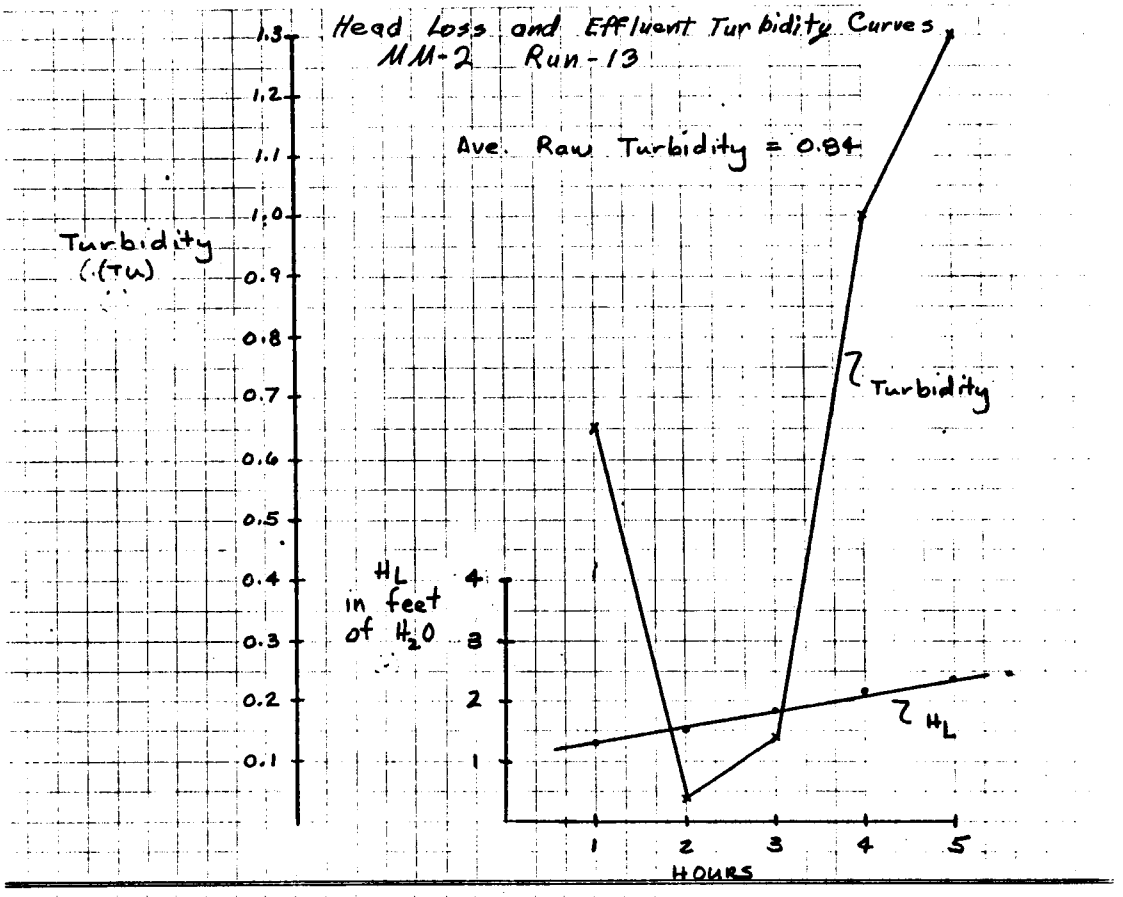

Head Loss and Effluent Turbidity Curves
MM-2 Run-8
Turbidity (TU)
1.5
1.0
0.5
HL in feet of H2O
Ave. Raw TU = 0.90
Turbidity
HL
2.0
1.0
1 2 3 4 5 6 7 8
HOURS

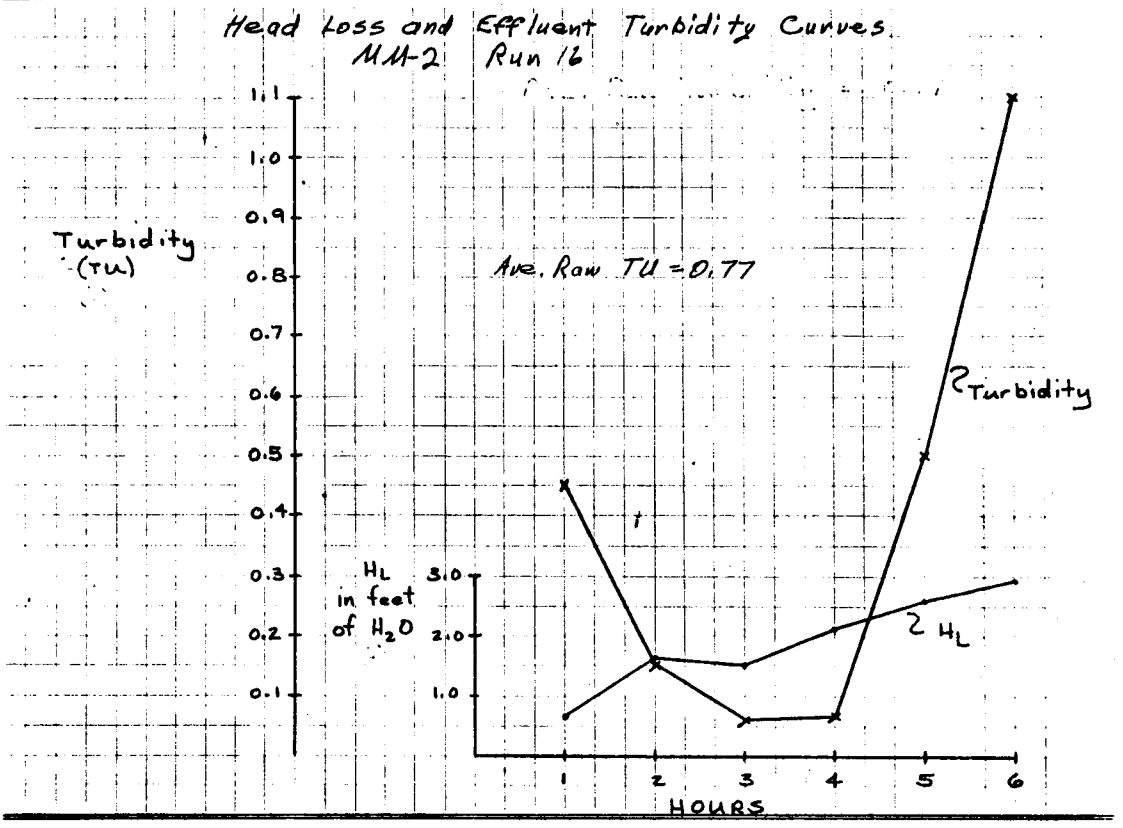

Head Loss and Effluent Turbidity Curves
MM-2 Run-9
TURBIDITY (TU)
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
Ave. Raw TU = 0.85
H_L in feet of H_2O
4
3
2
1
H_L
TURBIDITY
1 2 3 4 5 6 7 8 9 10 11 12 13 14
HOURS

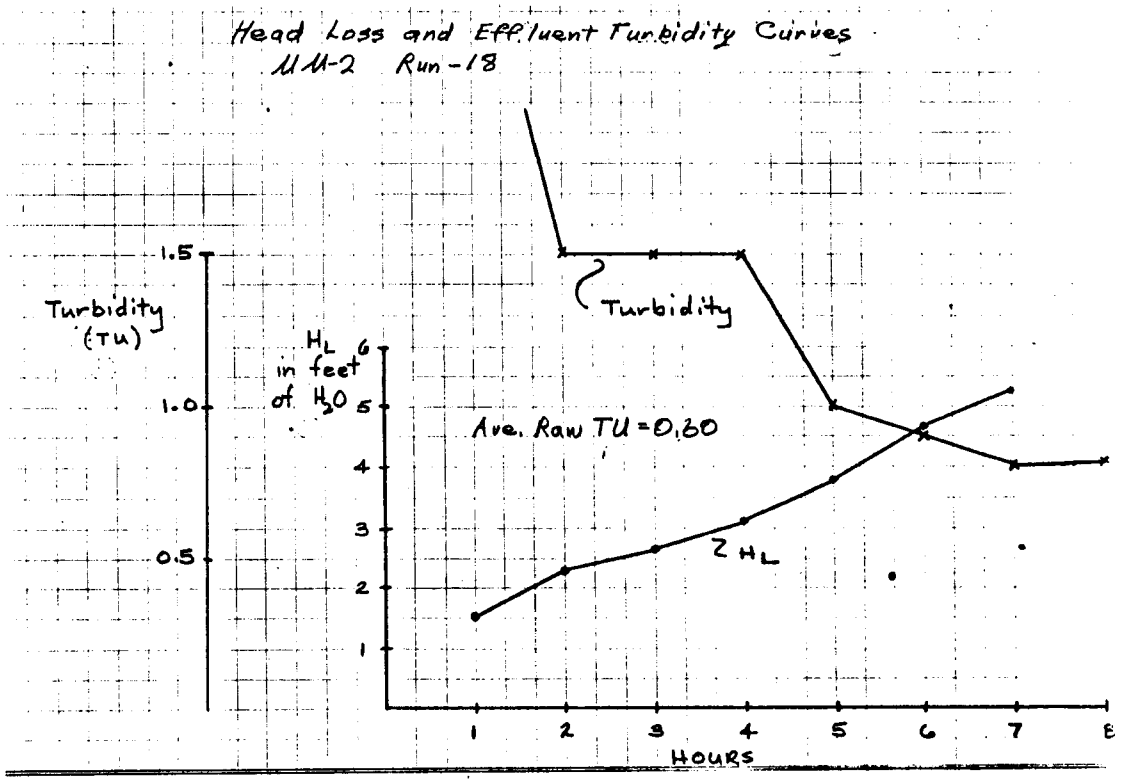

Head Loss and Effluent Turbidity Curves
MM-2 Run-10
Turbidity (TU)
0.6
0.5
0.4
0.3
0.2
0.1
H_L in feet of H_2O
3.0
2.0
1.0
H_L
Turbidity
Ave. Raw TU = 0.95
1 2 3 4 5 6 7
HOURS

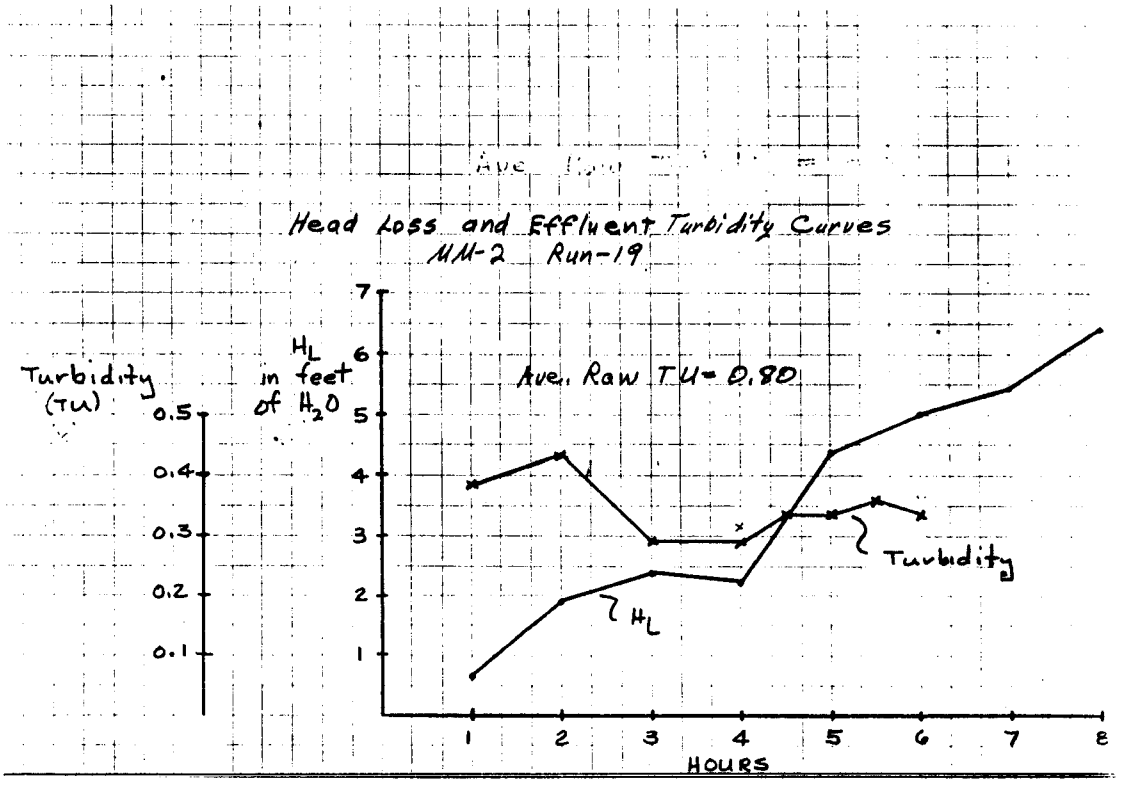

Head Loss and Effluent Turbidity Curves
MM-2 Run-11
Turbidity (TU)
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
H_L in feet of H_2O
5
4
3
2
1
Ave. Raw TU = 0.85
H_L
Turbidity
1 2 3 4 5 6 7 8 9 10 11 12 13 14
HOURS

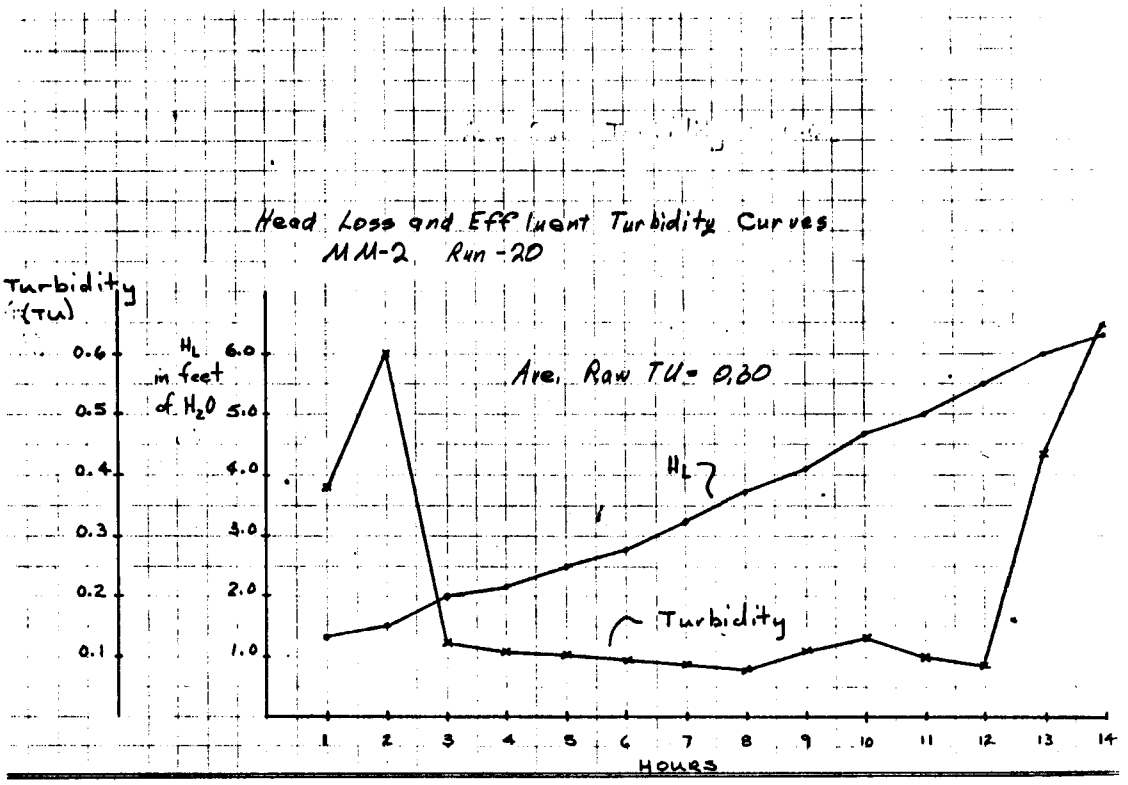

Head Loss and Effluent Turbidity Curves
MM-2 Run-12
Turbidity (TU)
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
H_L in feet of H_2O
5
4
3
2
1
Ave. Raw TU = 0.85
H_L
Turbidity
1 2 3 4 5 6 7 8 9 10 11 12 13
HOURS

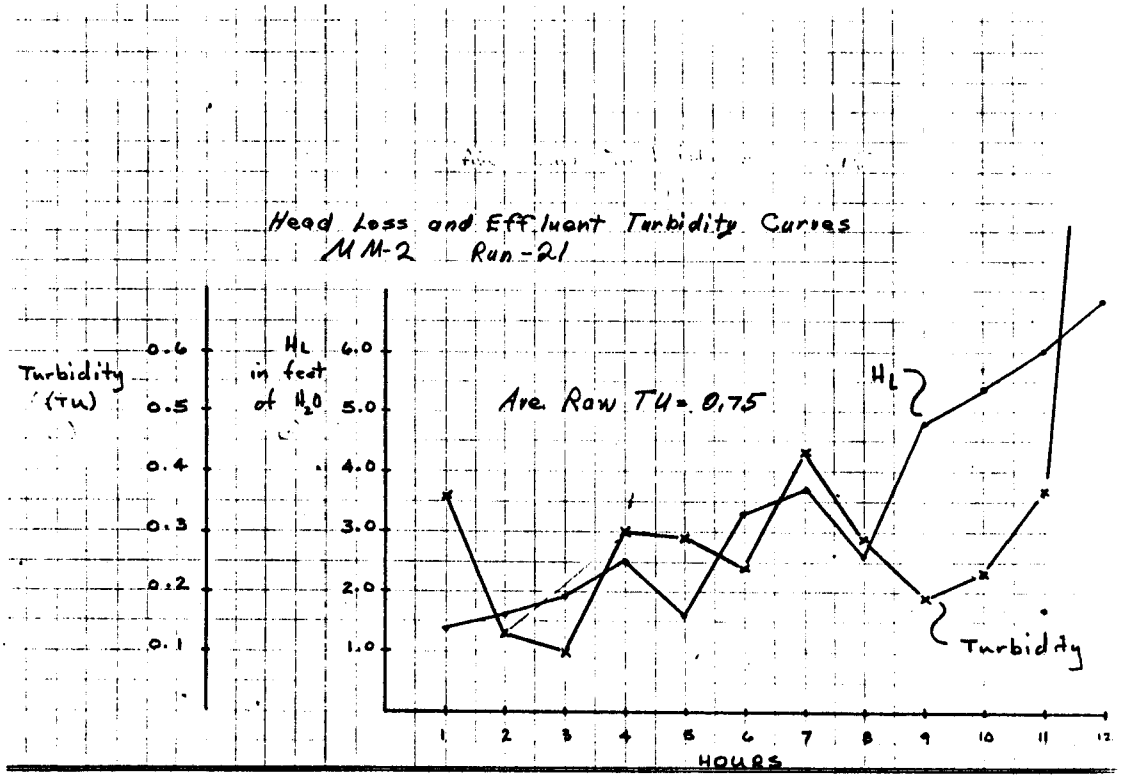

Head Loss and Effluent Turbidity Curves
MM-2 Run-13
Ave. Raw Turbidity = 0.84
Turbidity (TU)
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
Turbidity
H_L in feet of H_2O
4
3
2
1
H_L
1
2
3
4
5
HOURS

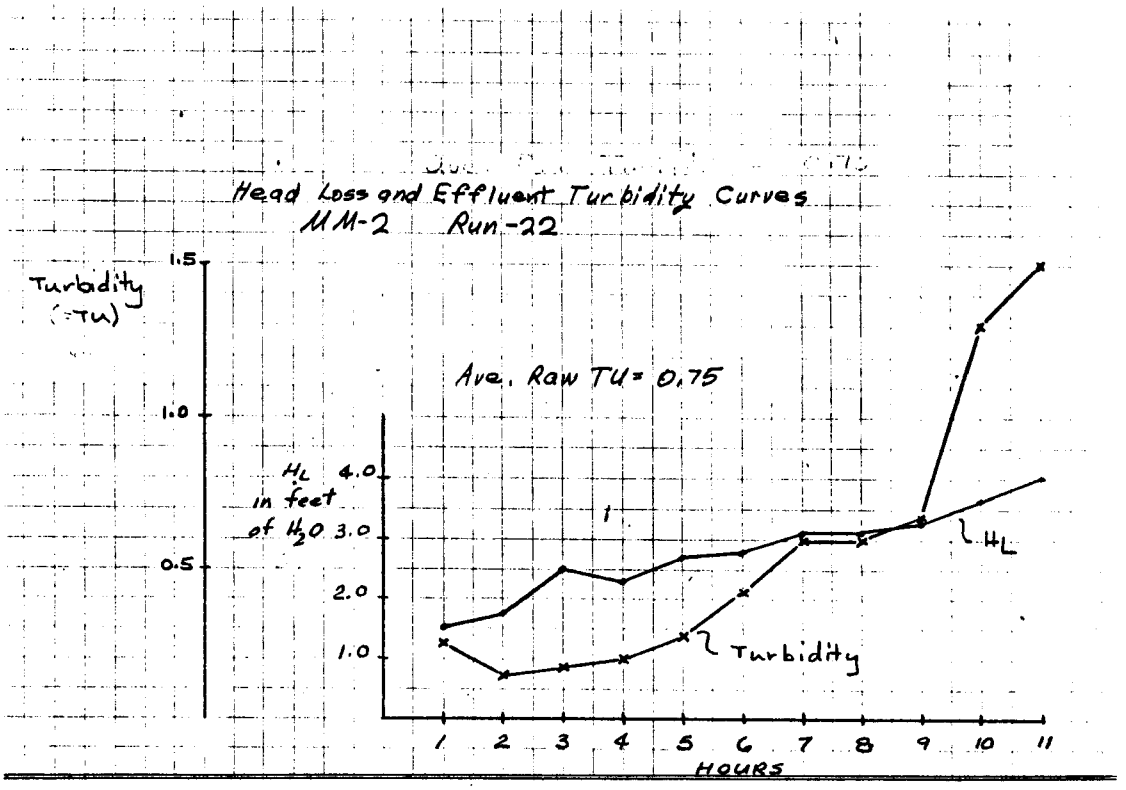

Head Loss and Effluent Turbidity Curves
MM-2 Run 16
Ave. Raw TU = 0.77
Turbidity (TU)
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
Turbidity
H_L in feet of H_2O
3.0
2.0
1.0
H_L
1
2
3
4
5
6
HOURS

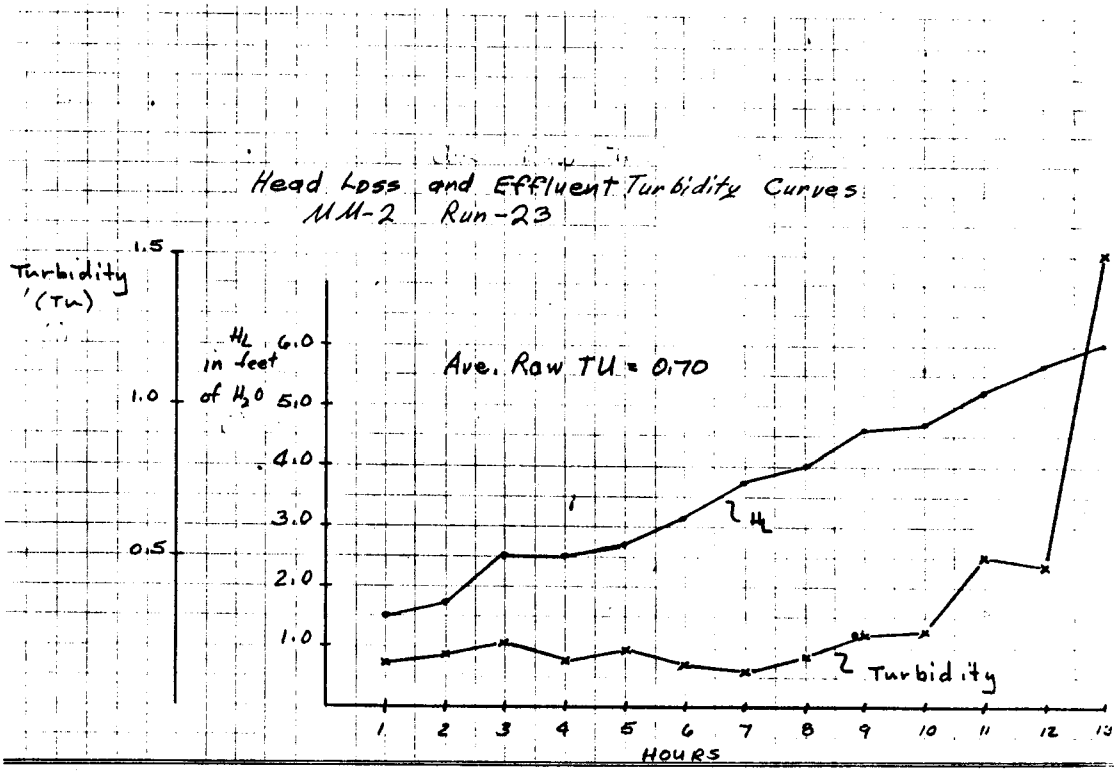

Head Loss and Effluent Turbidity Curves
MM-2 Run-18
Turbidity (TU)
1.5
1.0
0.5
H_L in feet of H_2O
6
5
4
3
2
1
Turbidity
Ave. Raw TU = 0.60
H_L
1
2
3
4
5
6
7
8
HOURS

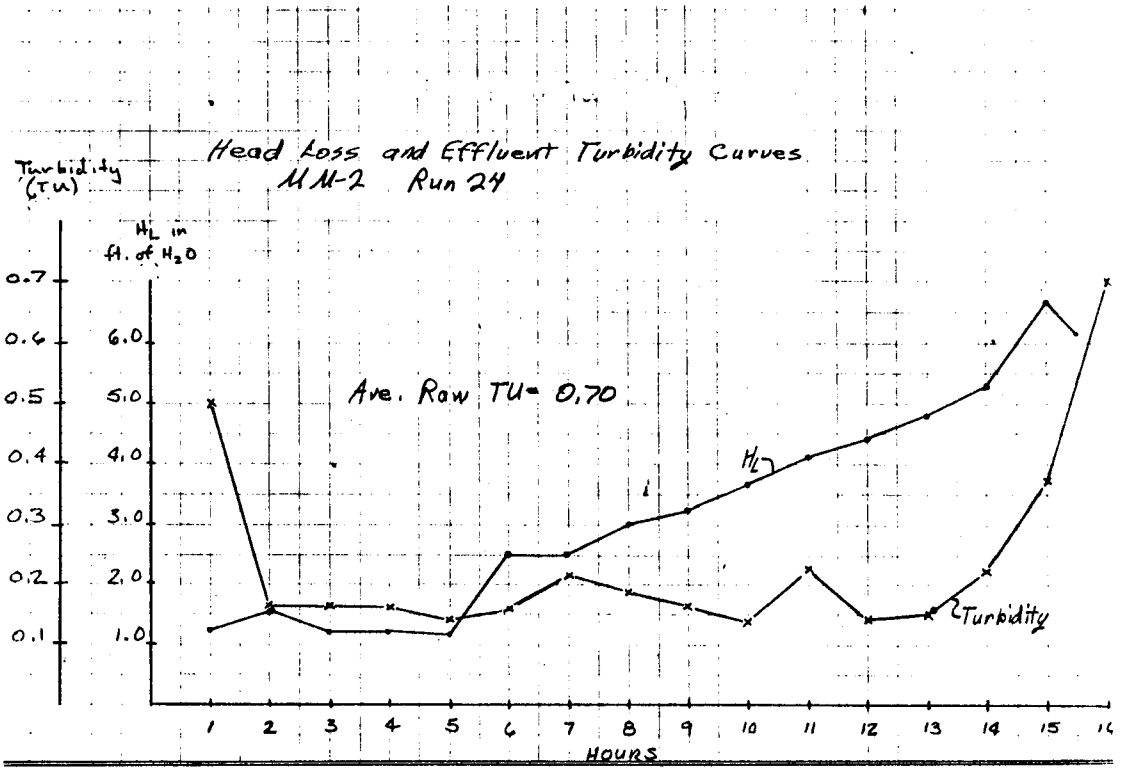

Head Loss and Effluent Turbidity Curves
MM-2 Run-19
Turbidity (TU)
0.5
0.4
0.3
0.2
0.1
H_L in feet of H_2O
7
6
5
4
3
2
1
Ave. Raw TU = 0.80
Turbidity
H_L
1
2
3
4
5
6
7
8
HOURS

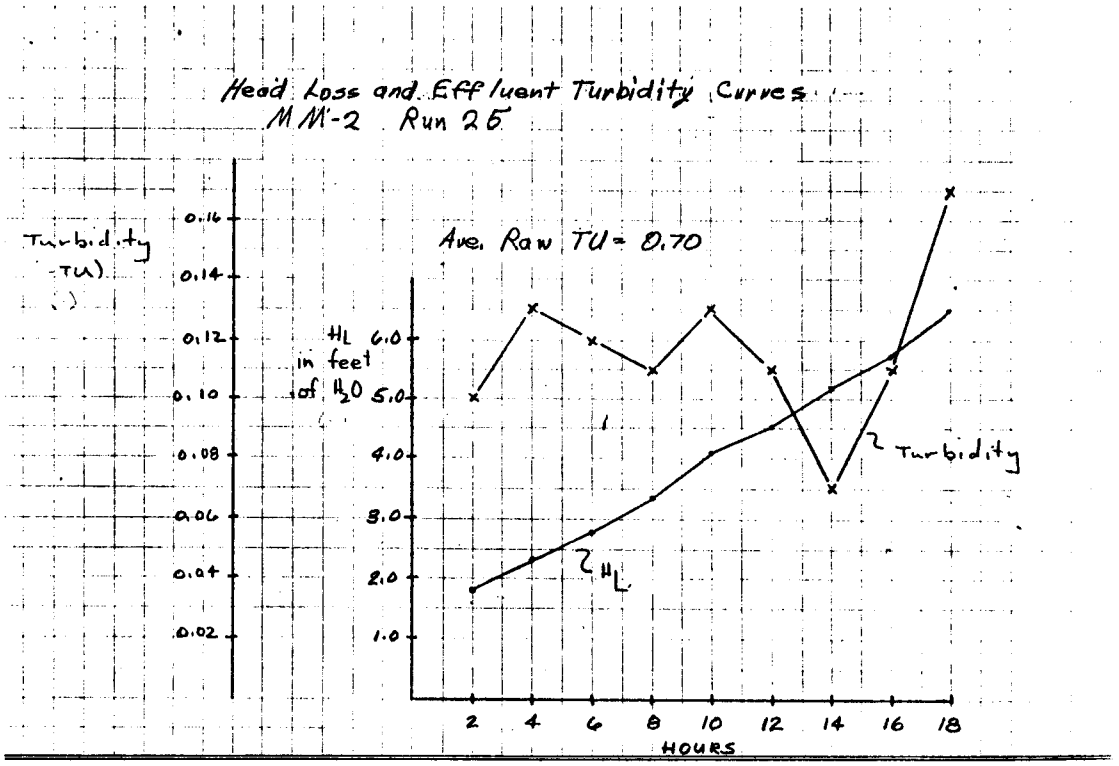

Head Loss and Effluent Turbidity Curves
MM-2 Run-20
Turbidity (TU)
H_L in feet of H_2O
Ave. Raw TU = 0.30
H_L
Turbidity
HOURS

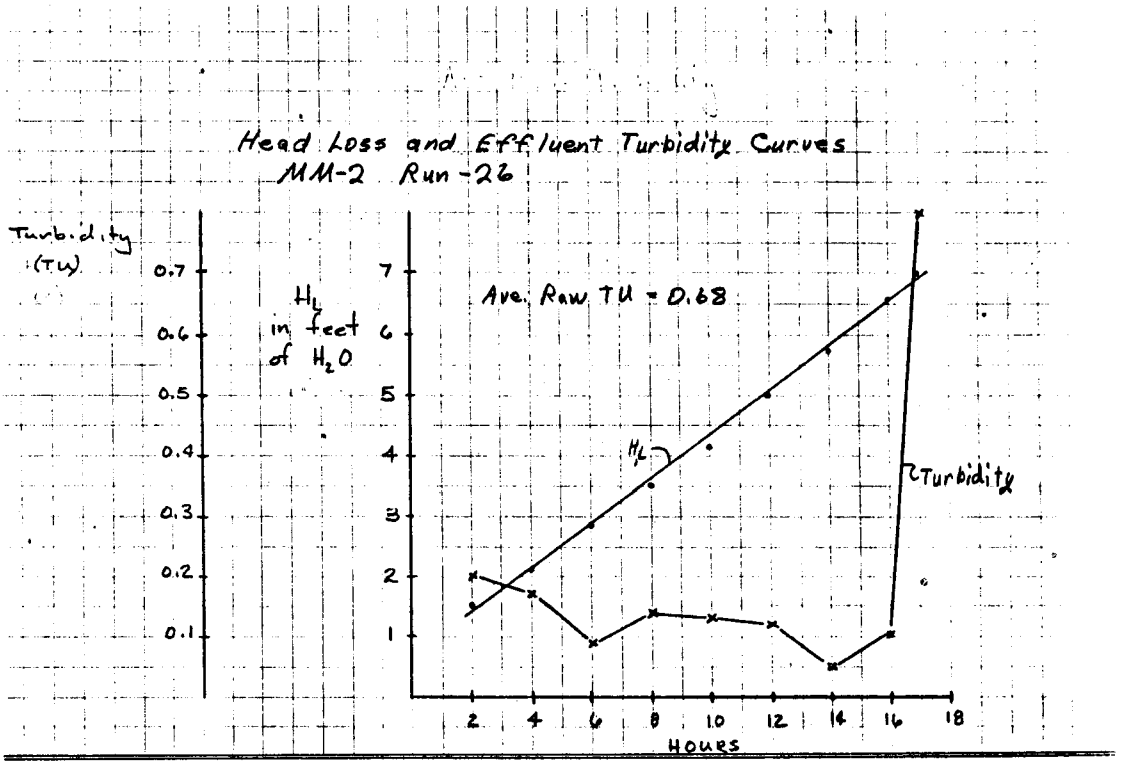

Head Loss and Effluent Turbidity Curves
MM-2 Run-21
Turbidity (TU)
H_L in feet of H_2O
Ave. Raw TU = 0.75
H_L
Turbidity
HOURS

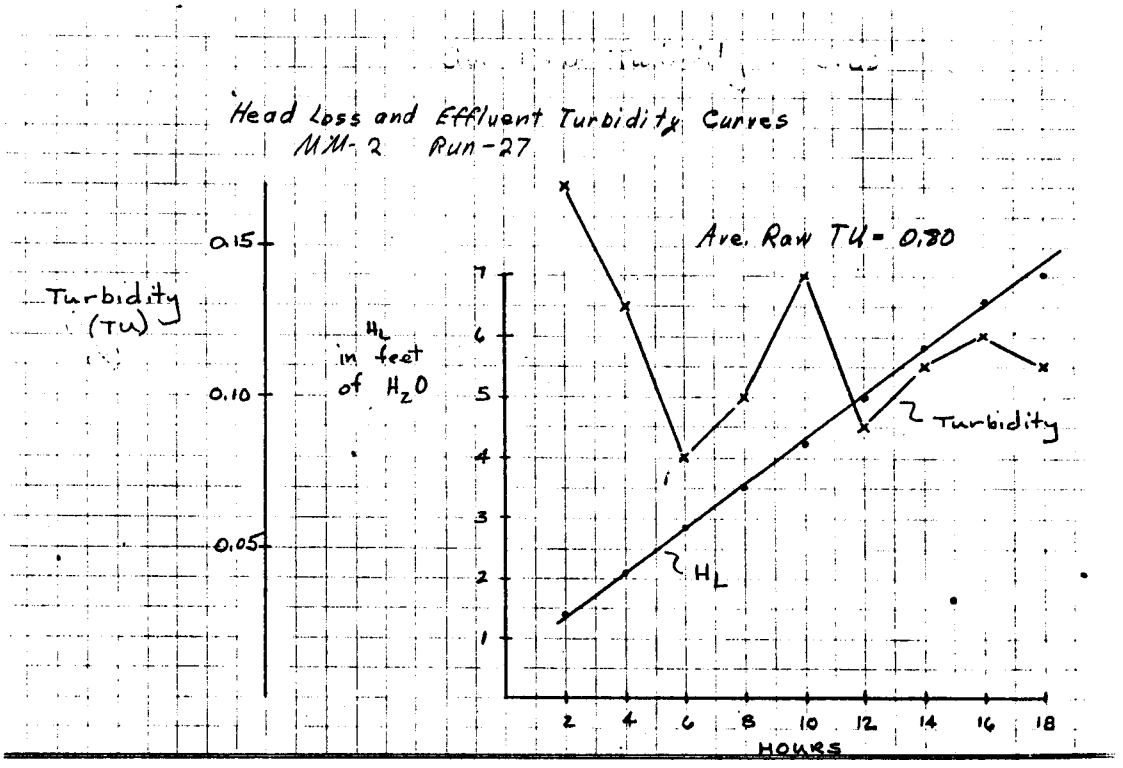

Head Loss and Effluent Turbidity Curves
MM-2 Run-22
Turbidity (TU)
1.5
1.0
0.5
Ave. Raw TU = 0.75
H_L in feet of H_2O
4.0
3.0
2.0
1.0
H_L
Turbidity
1 2 3 4 5 6 7 8 9 10 11
HOURS

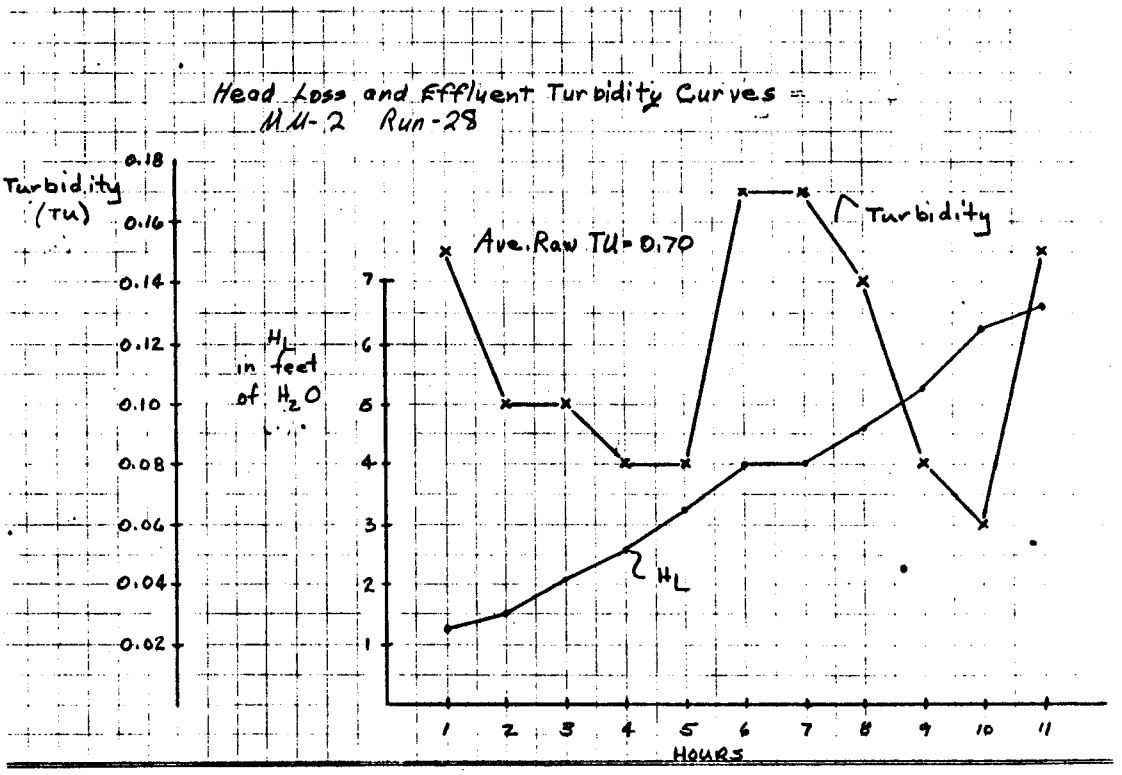

Head Loss and Effluent Turbidity Curves
MM-2 Run-23
Turbidity (TU)
1.5
1.0
0.5
H_L in feet of H_2O
6.0
5.0
4.0
3.0
2.0
1.0
Ave. Raw TU = 0.70
H_L
Turbidity
1 2 3 4 5 6 7 8 9 10 11 12 13
HOURS

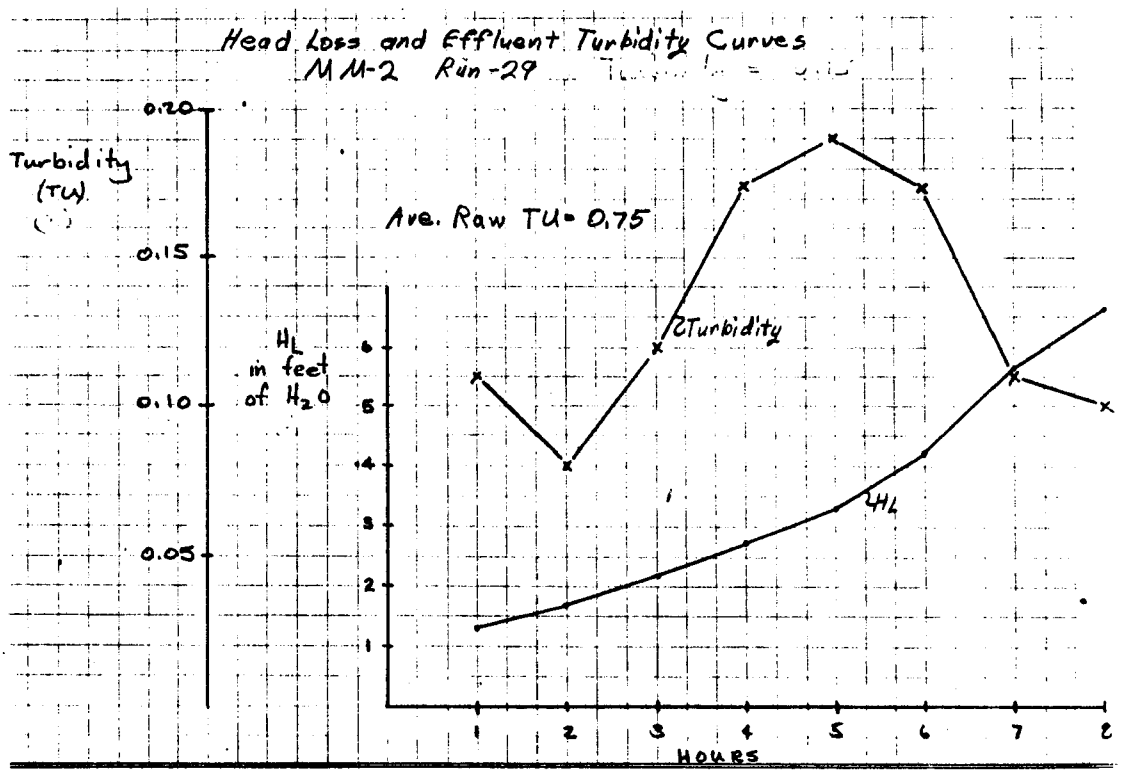

Head Loss and Effluent Turbidity Curves
MM-2 Run 24
Turbidity (TU)
H_L in ft. of H_2O
Ave. Raw TU = 0.70
H_L
Turbidity
HOURS

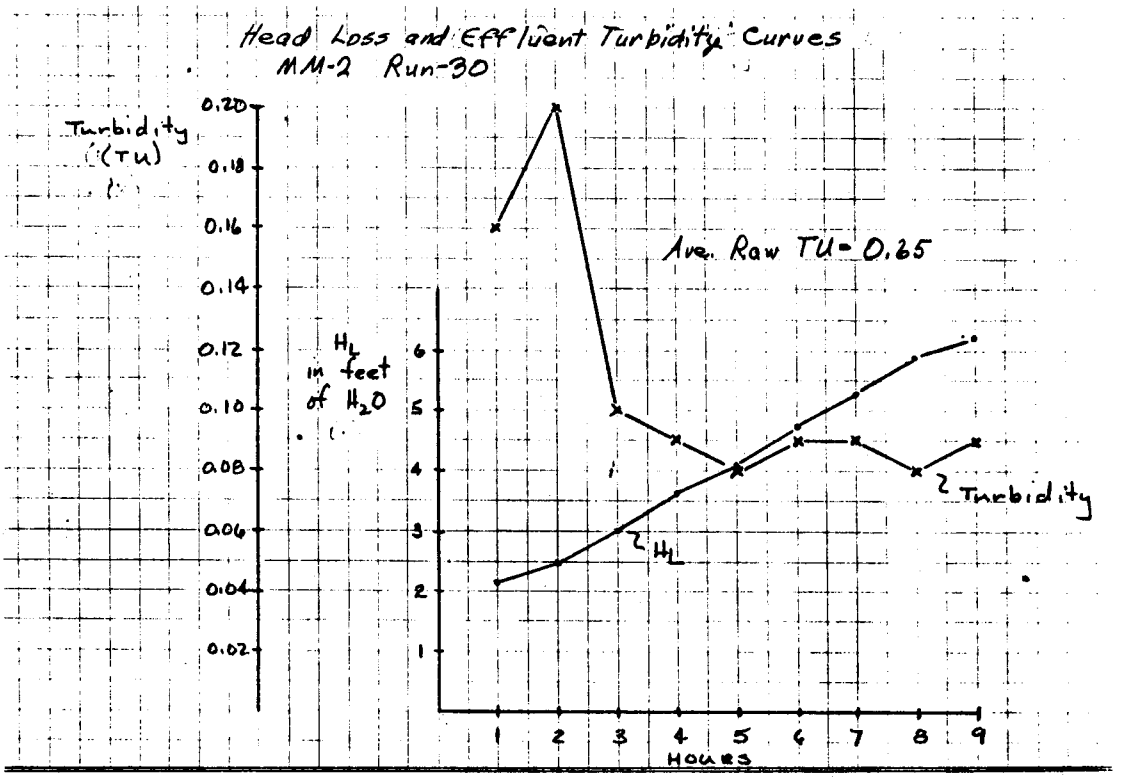

Head Loss and Effluent Turbidity Curves
MM-2 Run 25
Turbidity (TU)
H_L in feet of H_2O
Ave. Raw TU = 0.70
Turbidity
H_L
HOURS

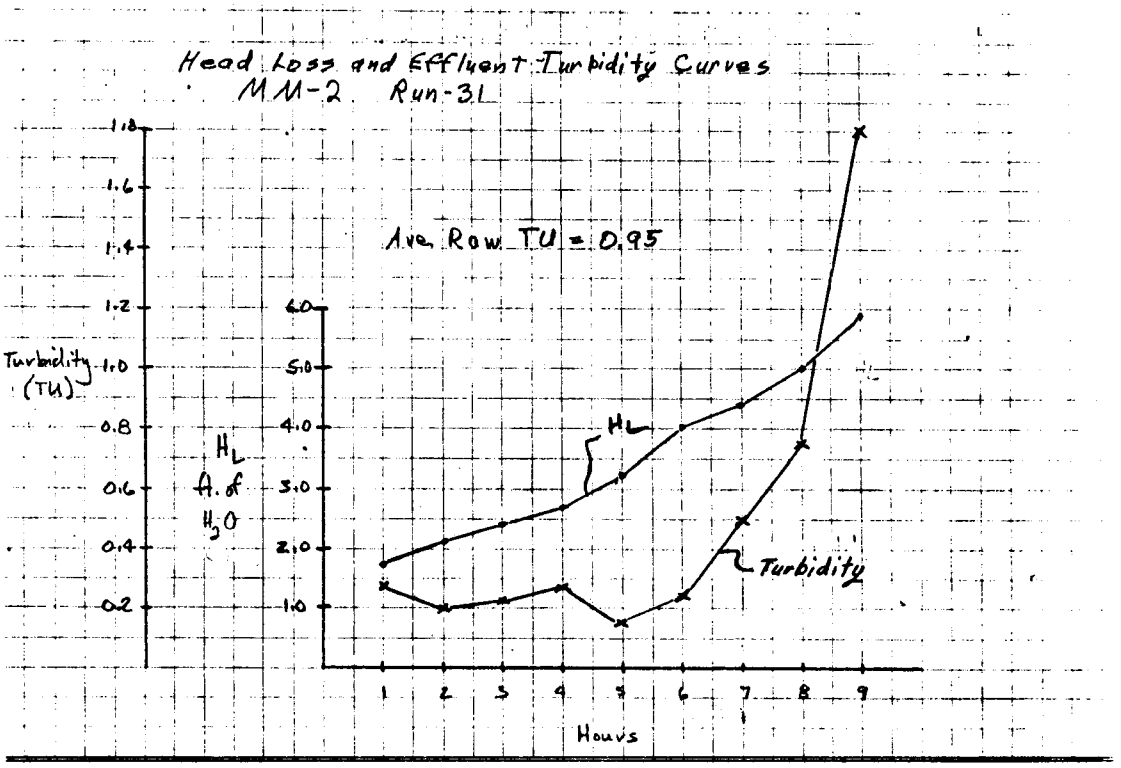

Head Loss and Effluent Turbidity Curves
MM-2 Run-26
Turbidity (TU)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
H_L in feet of H_2O
7
6
5
4
3
2
1
Ave. Raw TU = 0.68
H_L
Turbidity
2
4
6
8
10
12
14
16
18
HOURS

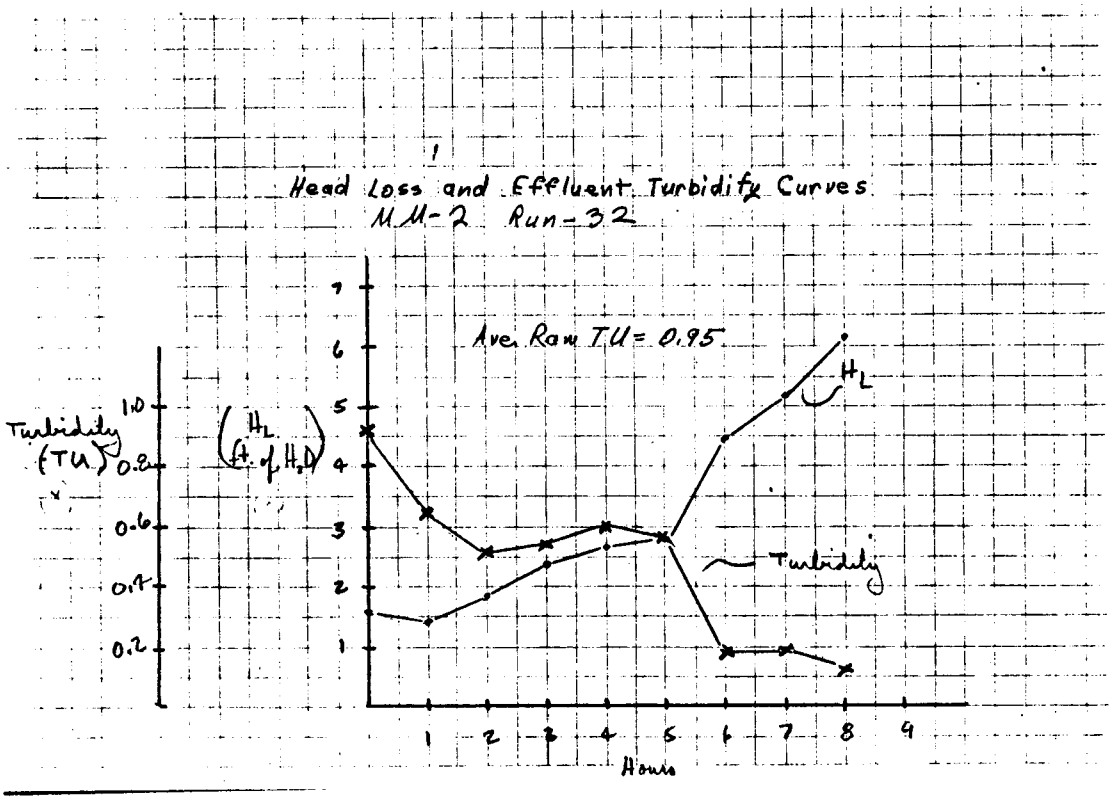

Head Loss and Effluent Turbidity Curves
MM-2 Run-27
Turbidity (TU)
0.15
0.10
0.05
H_L in feet of H_2O
7
6
5
4
3
2
1
Ave. Raw TU = 0.80
Turbidity
H_L
2
4
6
8
10
12
14
16
18
HOURS

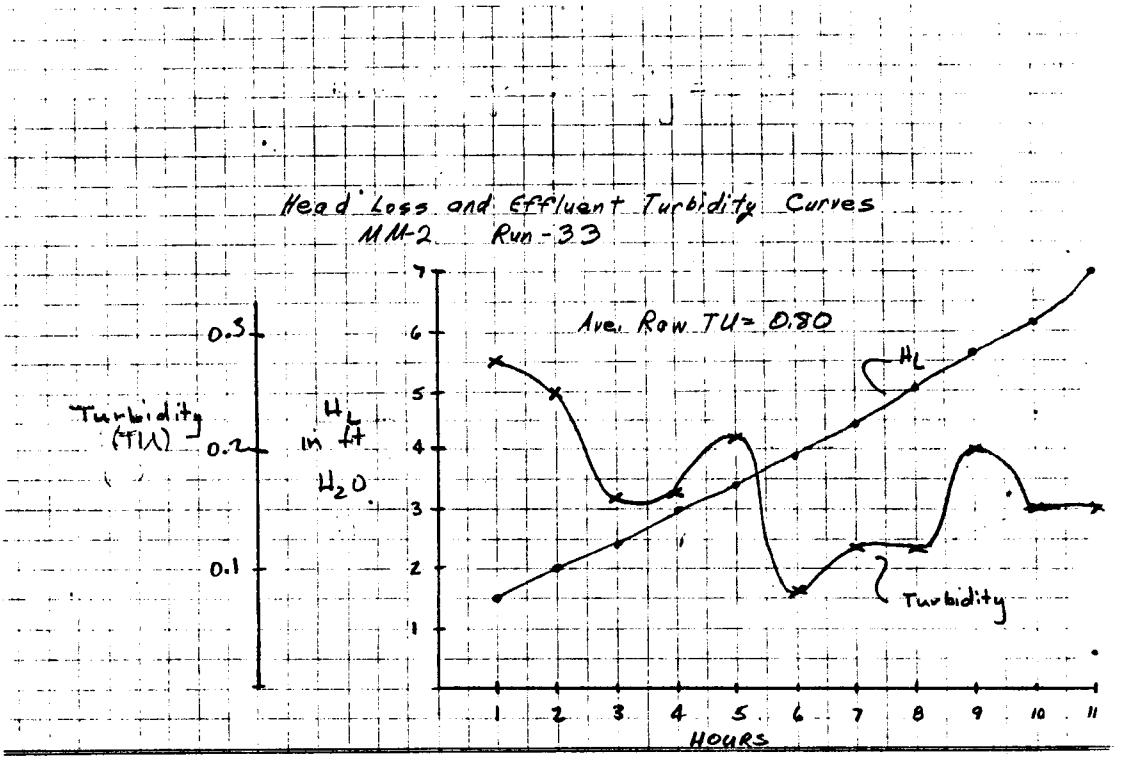

Head Loss and Effluent Turbidity Curves
MM-2 Run-28
Turbidity (TU)
0.18
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
H_L in feet of H_2O
7
6
5
4
3
2
1
Ave. Raw TU = 0.70
Turbidity
H_L
1 2 3 4 5 6 7 8 9 10 11
HOURS

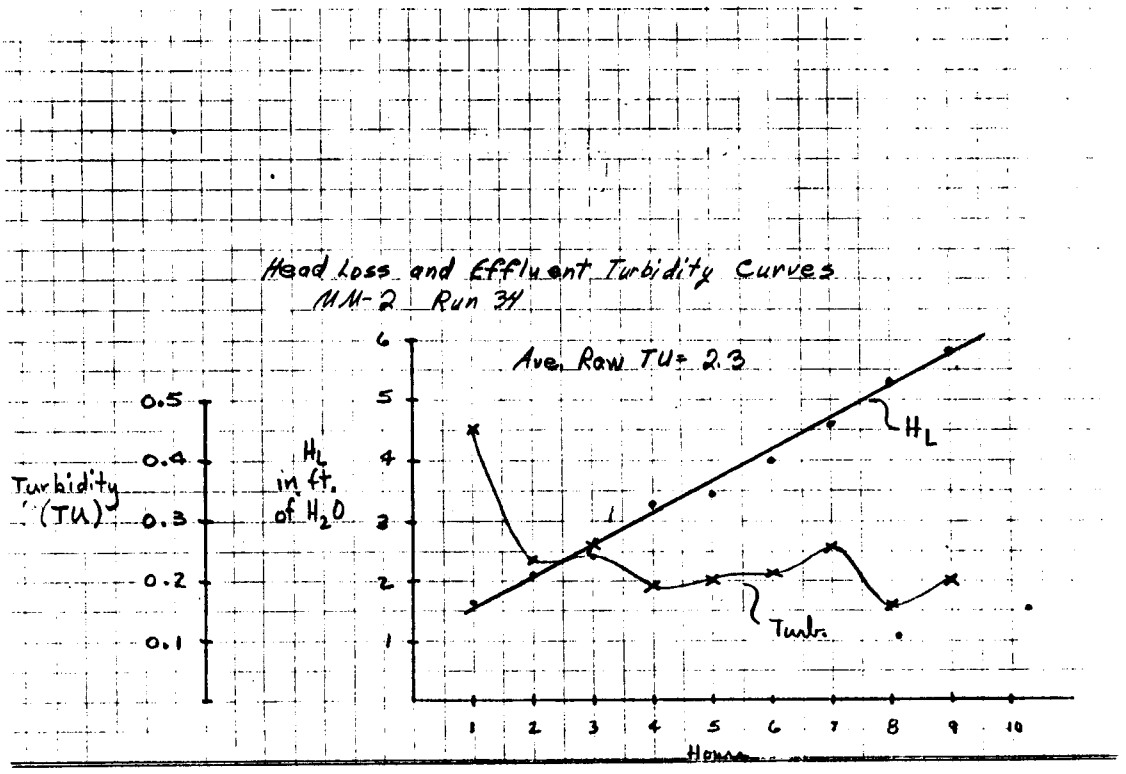

Head Loss and Effluent Turbidity Curves
MM-2 Run-29
Turbidity (TU)
0.20
0.15
0.10
0.05
H_L in feet of H_2O
6
5
4
3
2
1
Ave. Raw TU = 0.75
Turbidity
H_L
1 2 3 4 5 6 7 8
HOURS

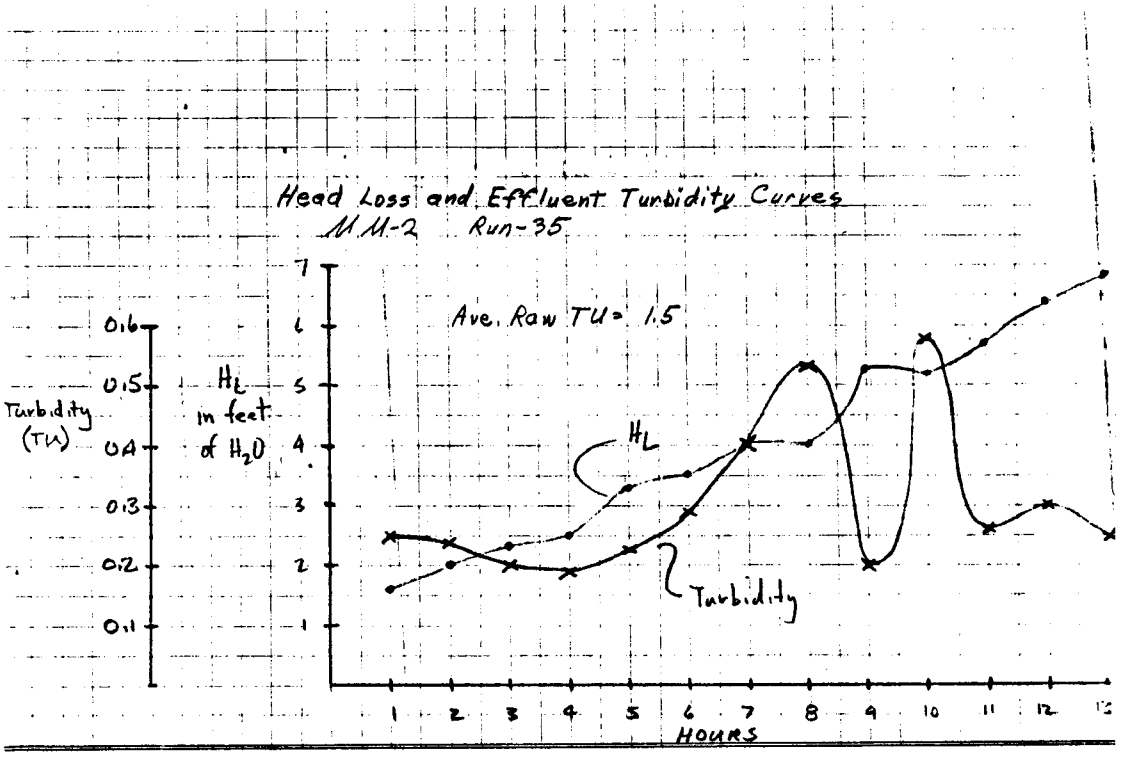

Head Loss and Effluent Turbidity Curves
MM-2 Run-30
Turbidity (TU)
0.20
0.18
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
H_L in feet of H_2O
6
5
4
3
2
1
Ave. Raw TU = 0.65
Turbidity
H_L
1 2 3 4 5 6 7 8 9
Hours

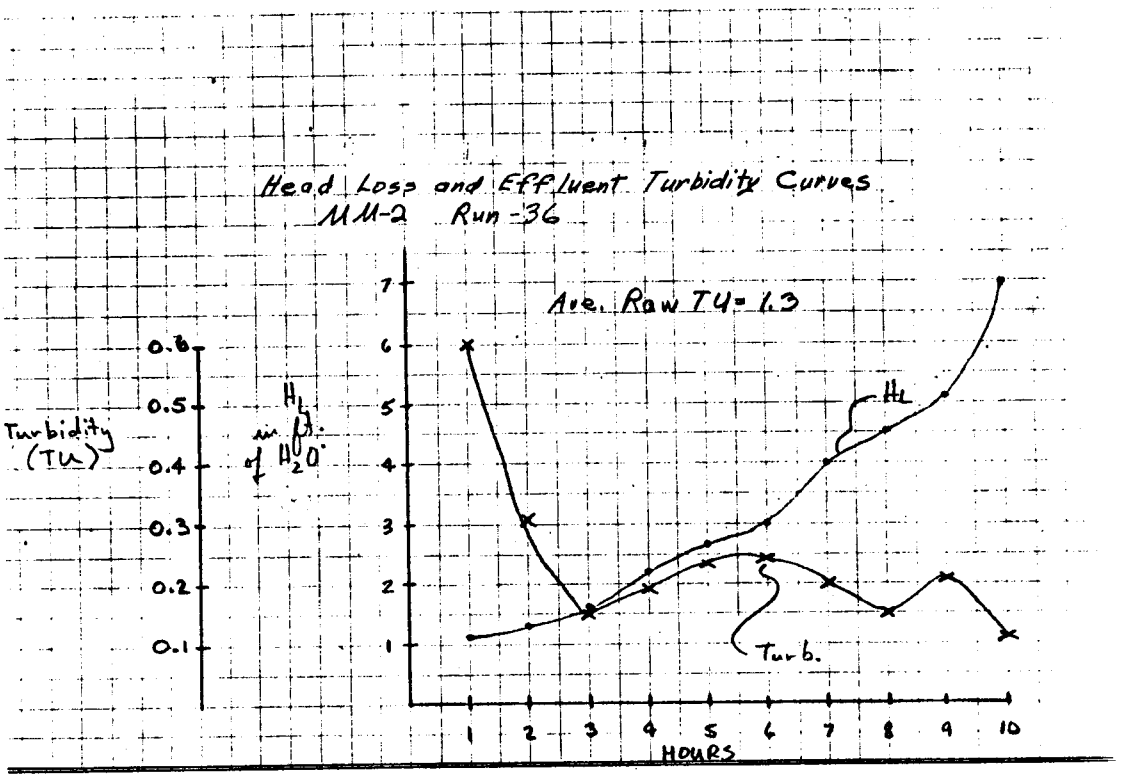

Head Loss and Effluent Turbidity Curves
MM-2 Run-31
1.8
1.6
1.4
1.2
Turbidity (TU) 1.0
0.8
0.6
0.4
0.2
H_L ft. of H_2O
6.0
5.0
4.0
3.0
2.0
1.0
Ave. Raw TU = 0.95
H_L
Turbidity
1 2 3 4 5 6 7 8 9
Hours

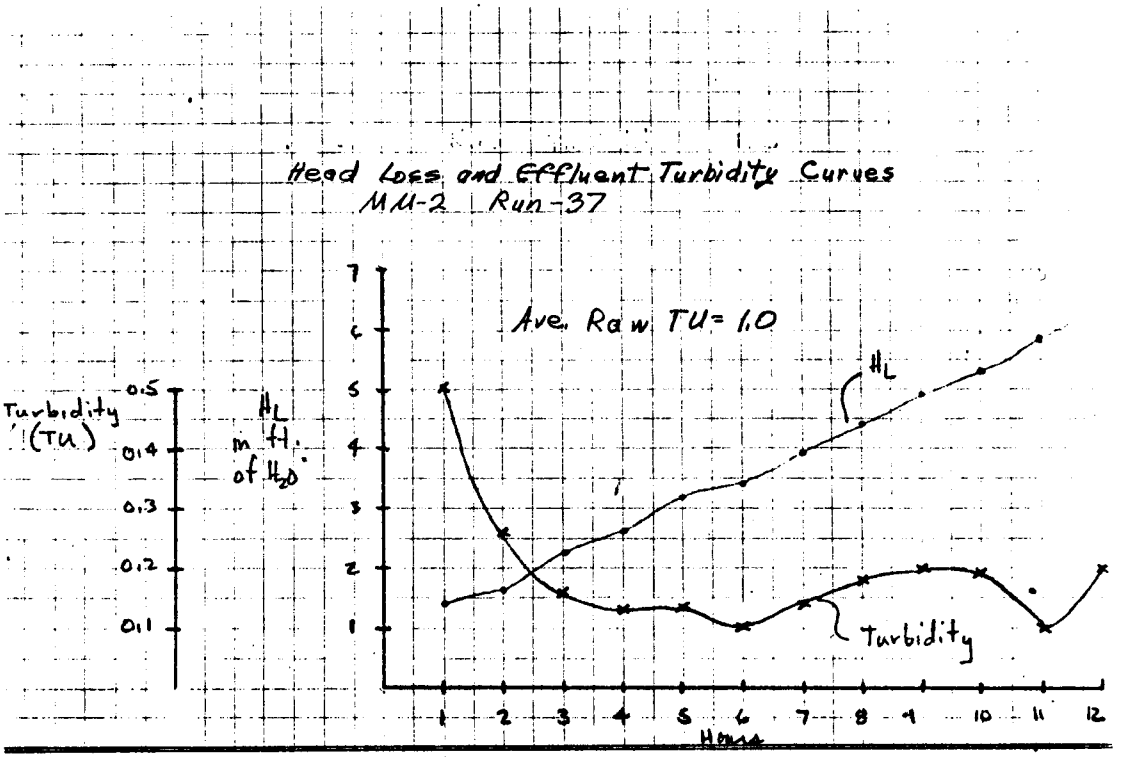

Head Loss and Effluent Turbidity Curves
MM-2 Run-32
Ave. Raw TU = 0.95
Turbidity (TU)
H_L (ft. of H_2O)
H_L
Turbidity
Hours

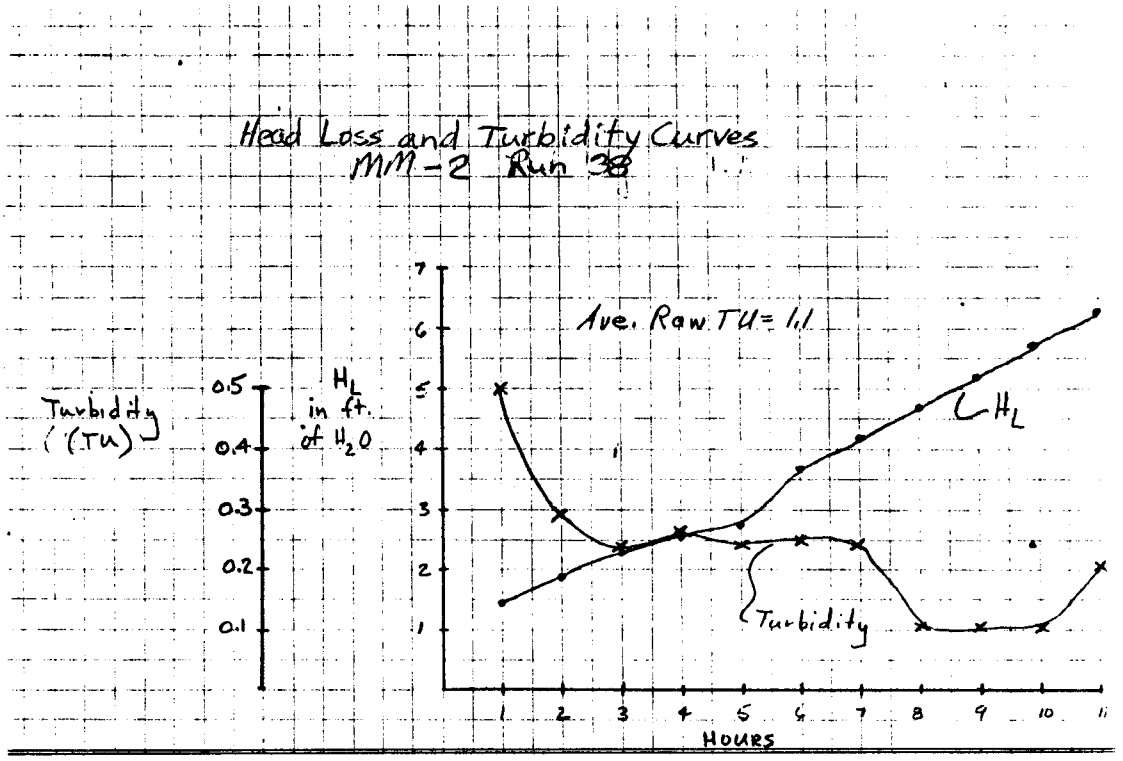

Head Loss and Effluent Turbidity Curves
MM-2 Run-33
Ave. Raw TU = 0.80
Turbidity (TU)
H_L in ft H_2O
H_L
Turbidity
HOURS

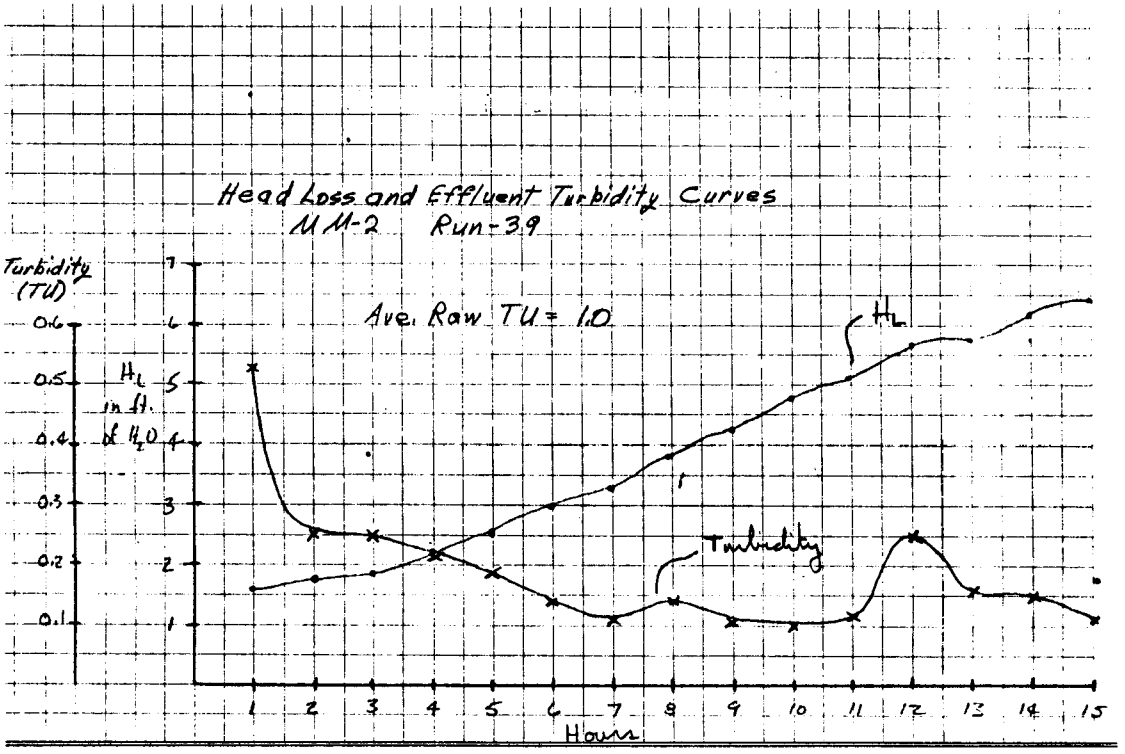

Head Loss and Effluent Turbidity Curves
MM-2 Run 34
Ave. Raw TU = 2.3
Turbidity (TU)
H_L in ft. of H_2O
H_L
Turb.
Hours

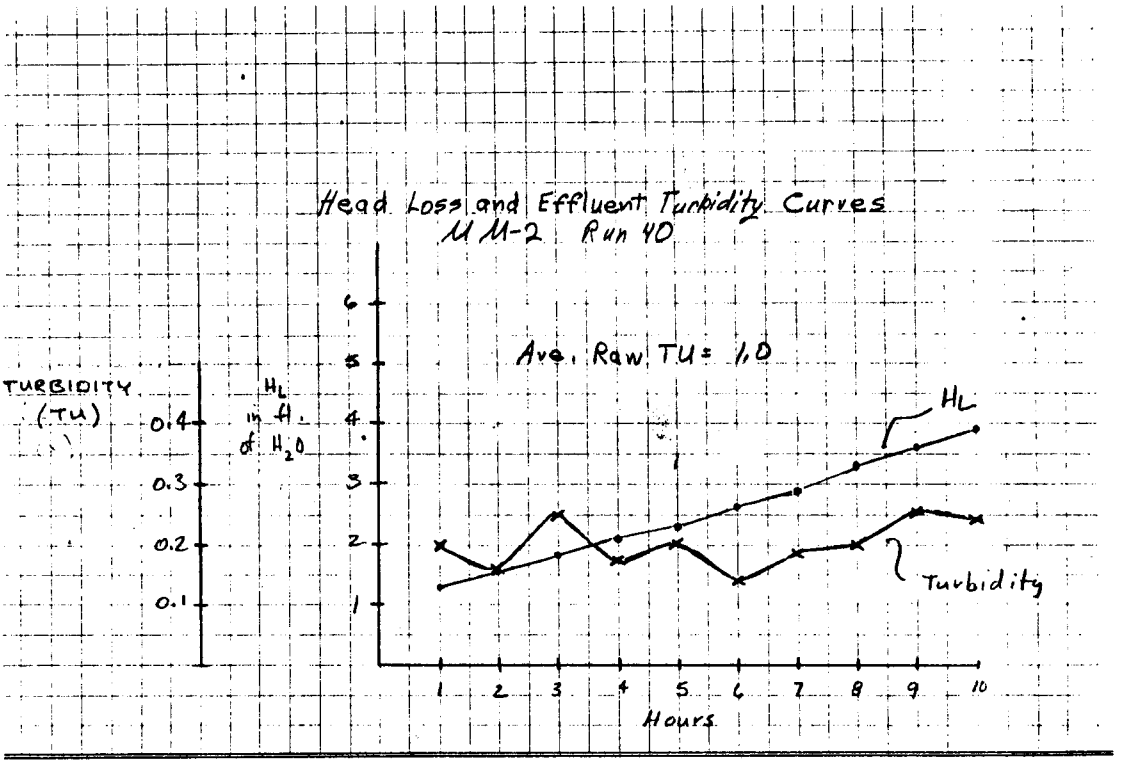

Head Loss and Effluent Turbidity Curves
MM-2 Run-35
Ave. Raw TU = 1.5
Turbidity (TU)
H_L in feet of H_2O
H_L
Turbidity
HOURS

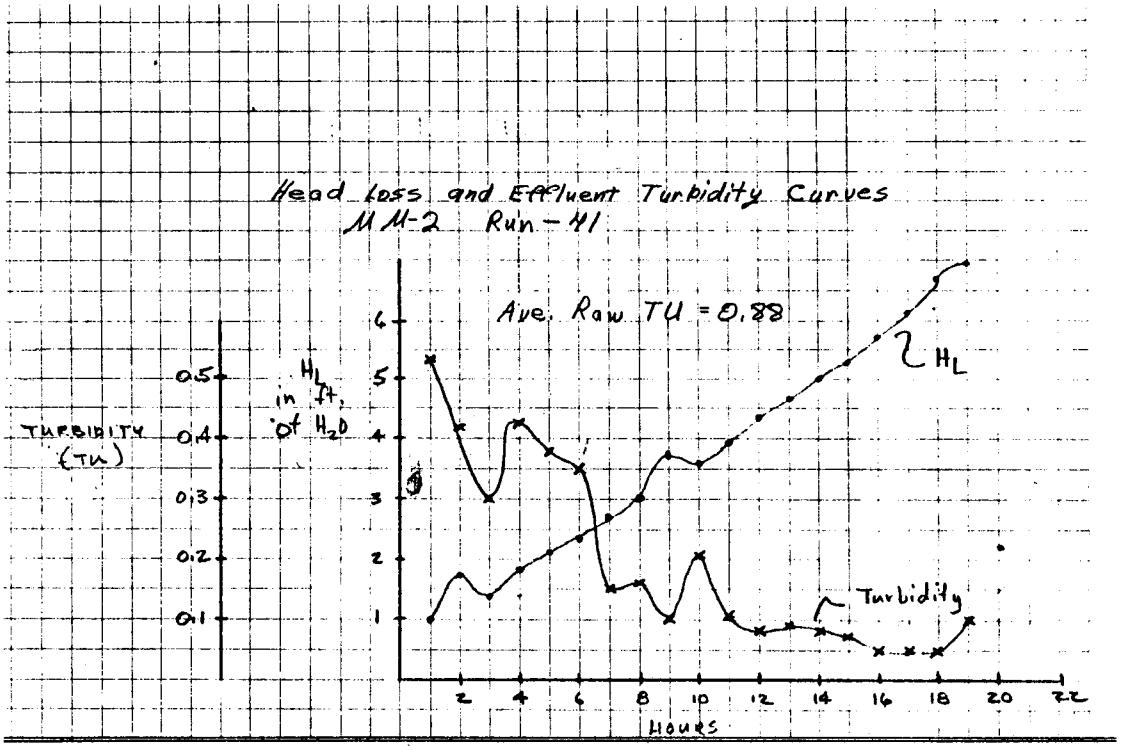

Head Loss and Effluent Turbidity Curves
MM-2 Run-36
Ave. Raw TU = 1.3
Turbidity (TU)
H_L in ft. of H_2O
H_L
Turb.
HOURS

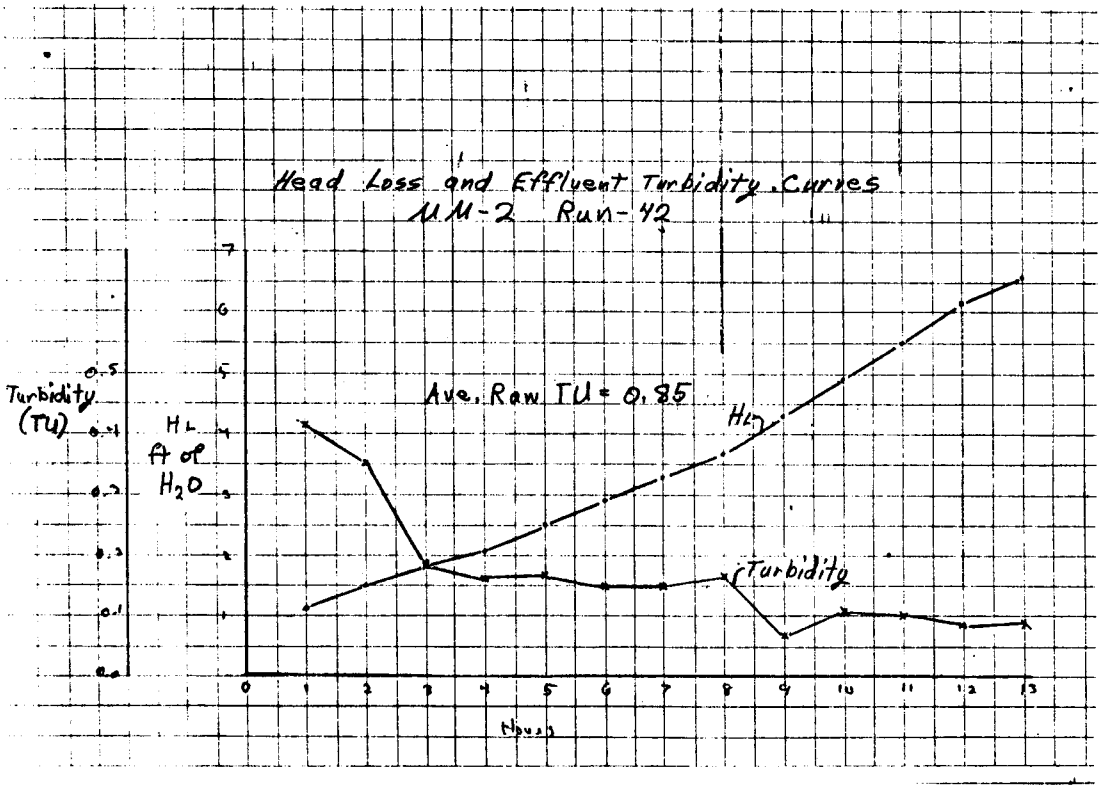

Head Loss and Effluent Turbidity Curves
MM-2 Run-37
Ave. Raw TU = 1.0
Turbidity (TU)
H_L in ft. of H_2O
H_L
Turbidity
Hours

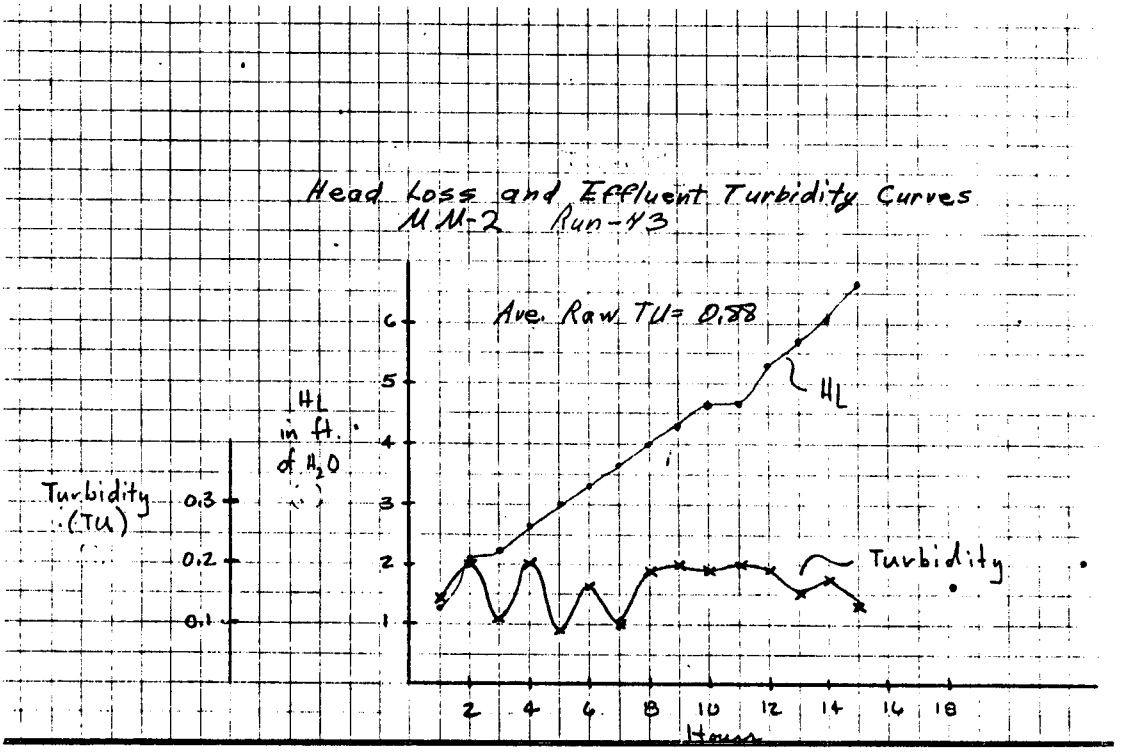

Head Loss and Turbidity Curves
MM-2 Run 38
Ave. Raw TU = 1.1
Turbidity (TU)
H_L in ft. of H_2O
H_L
Turbidity
HOURS

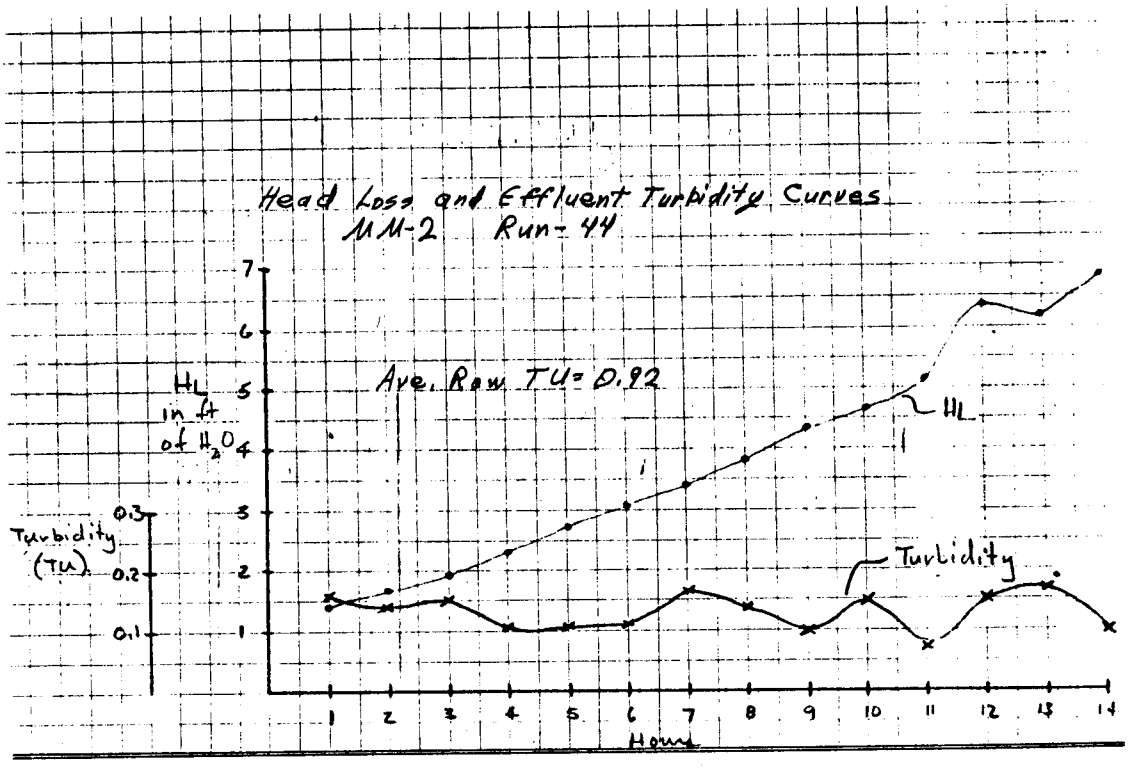

Head Loss and Effluent Turbidity Curves
MM-2 Run-39
Ave. Raw TU = 1.0
Turbidity (TU)
H_L in ft. of H_2O
H_L
Turbidity
Hours

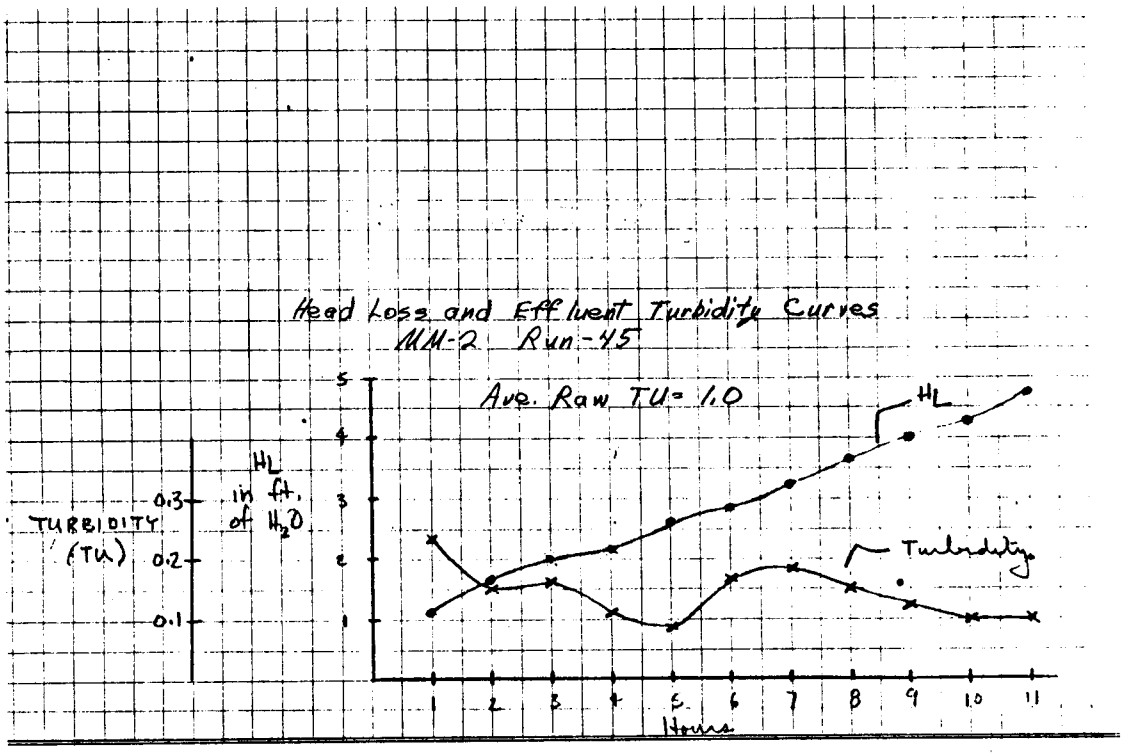

Head Loss and Effluent Turbidity Curves
MM-2 Run 40
Ave. Raw TU = 1.0
TURBIDITY (TU)
H_L in ft. of H_2O
0.4
0.3
0.2
0.1
6
5
4
3
2
1
H_L
Turbidity
1 2 3 4 5 6 7 8 9 10
Hours

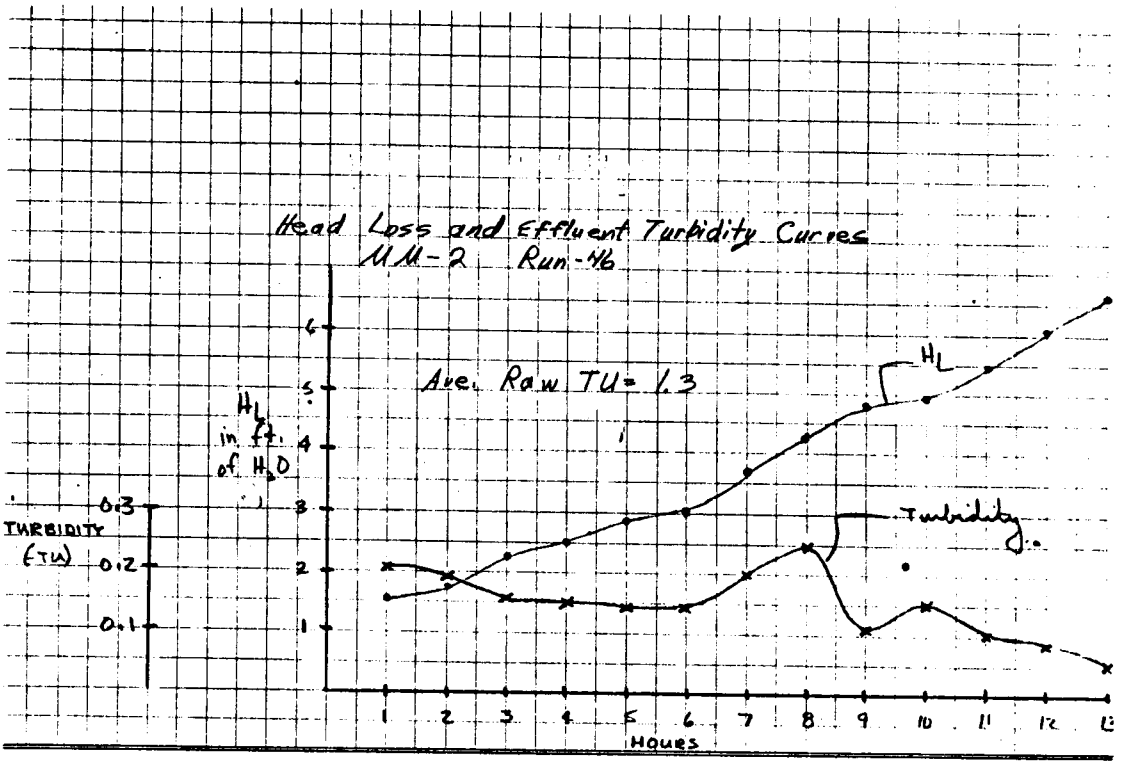

Head Loss and Effluent Turbidity Curves
MM-2 Run - 41
Ave. Raw TU = 0.88
TURBIDITY (TU)
H_L in ft. of H_2O
0.5
0.4
0.3
0.2
0.1
6
5
4
3
2
1
H_L
Turbidity
2 4 6 8 10 12 14 16 18 20 22
Hours

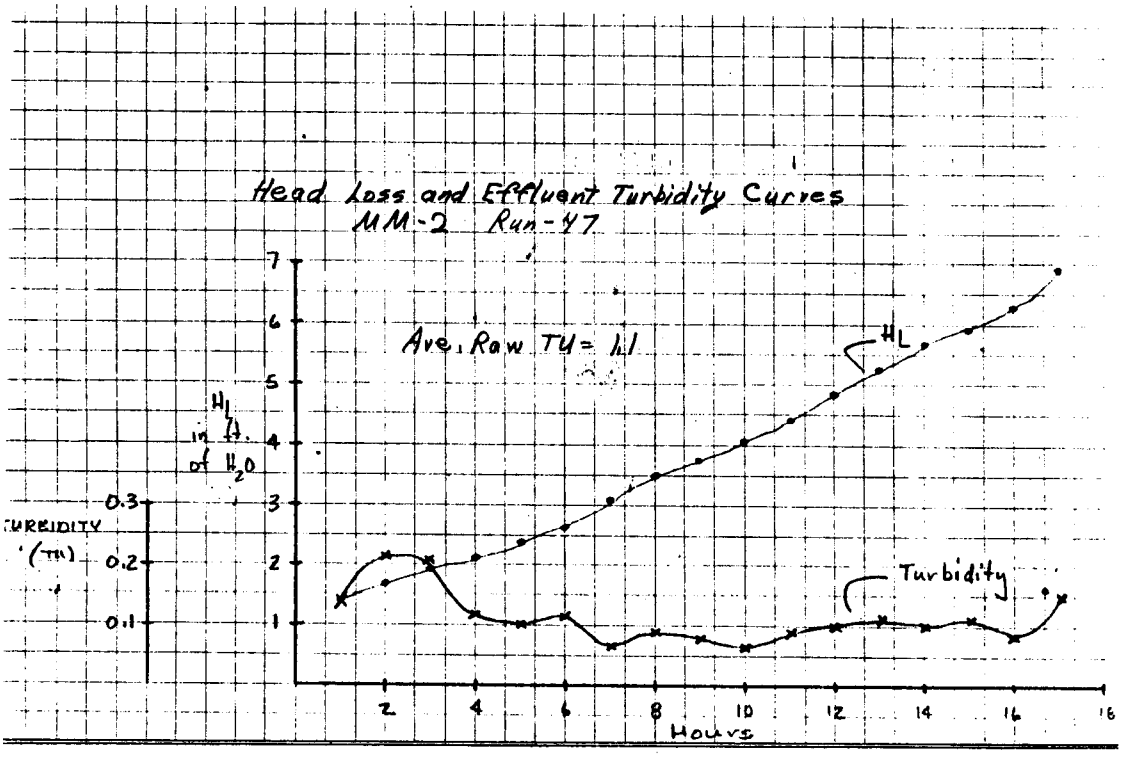

Head Loss and Effluent Turbidity Curves
MM-2 Run-42
Ave. Raw TU = 0.85
Turbidity (TU)
HL ft of H_2O
HL
Turbidity
Hours

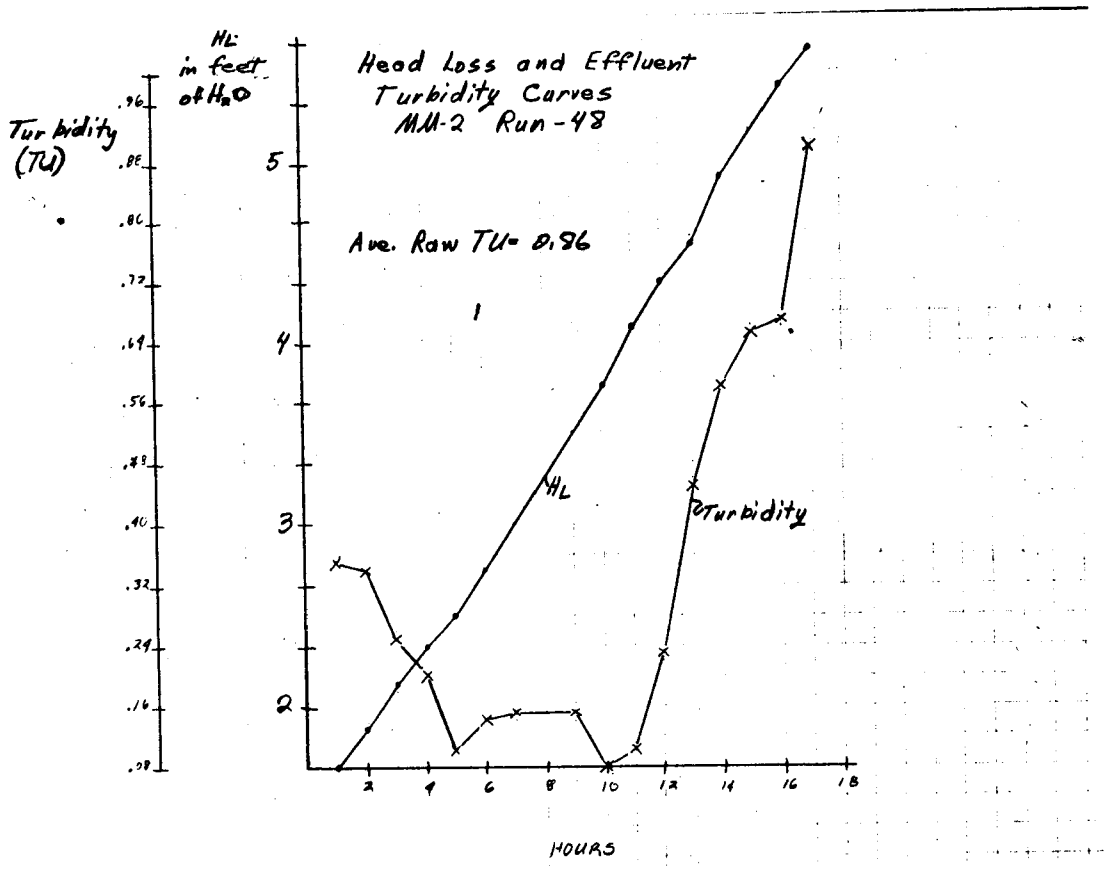

Head Loss and Effluent Turbidity Curves
MM-2 Run-43
Ave. Raw TU = 0.88
HL in ft. of H_2O
Turbidity (TU)
HL
Turbidity
Hours

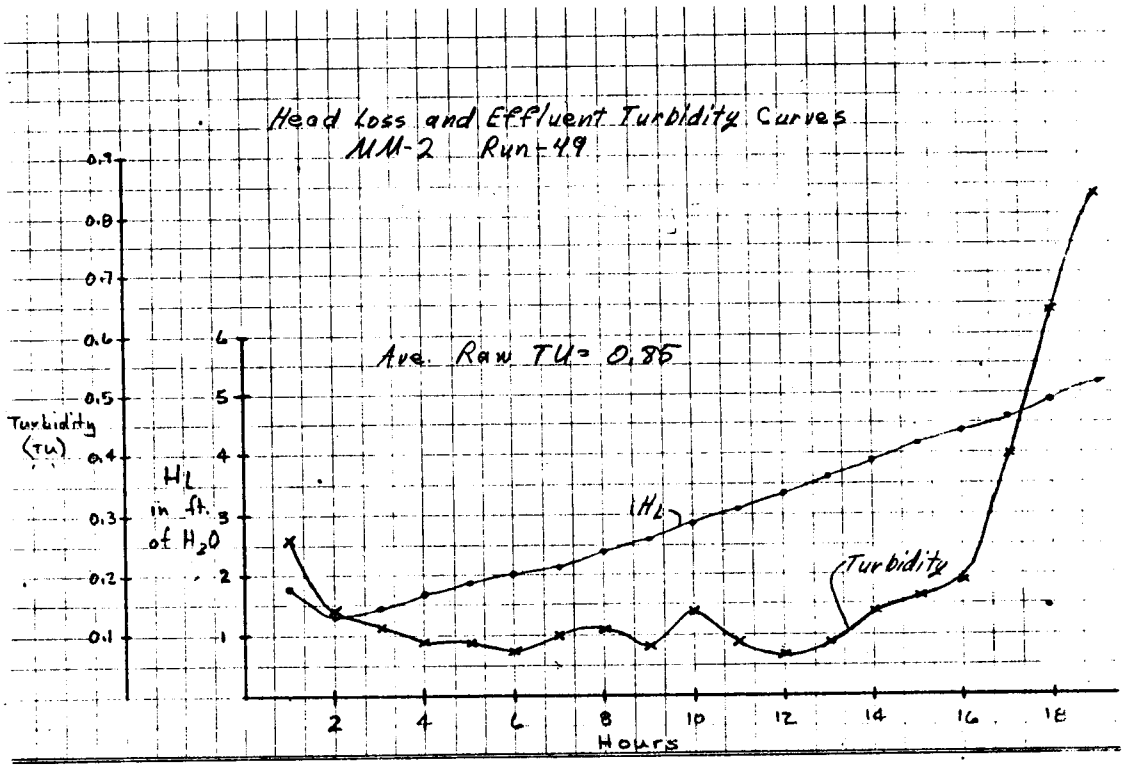

Head Loss and Effluent Turbidity Curves
MM-2 Run-44
Ave. Raw TU = 0.92
HL in ft of H_2O
Turbidity (TU)
HL
Turbidity
Hours

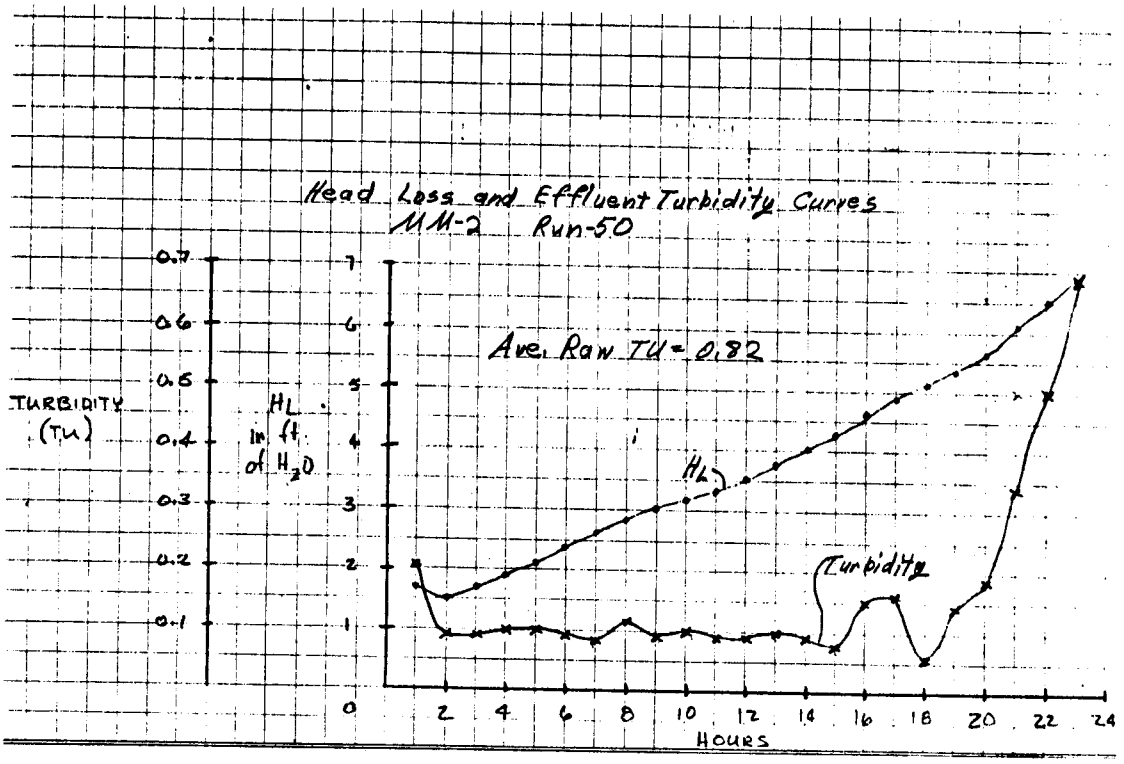

Head Loss and Effluent Turbidity Curves
MM-2 Run-45
Ave. Raw TU = 1.0
HL in ft. of H_2O
TURBIDITY (TU)
HL
Turbidity
Hours

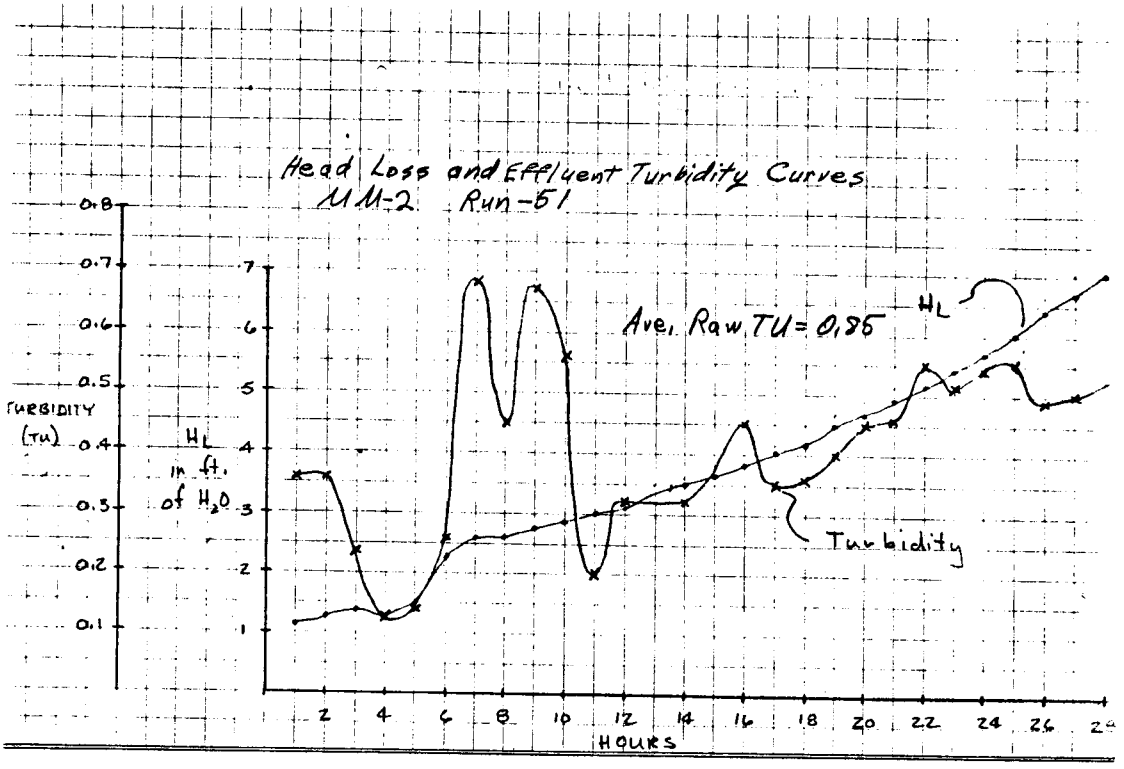

Head Loss and Effluent Turbidity Curves
MM-2 Run-46
Ave. Raw TU = 1.3
H_L in ft. of H_2O
TURBIDITY (TU)
H_L
Turbidity
Hours

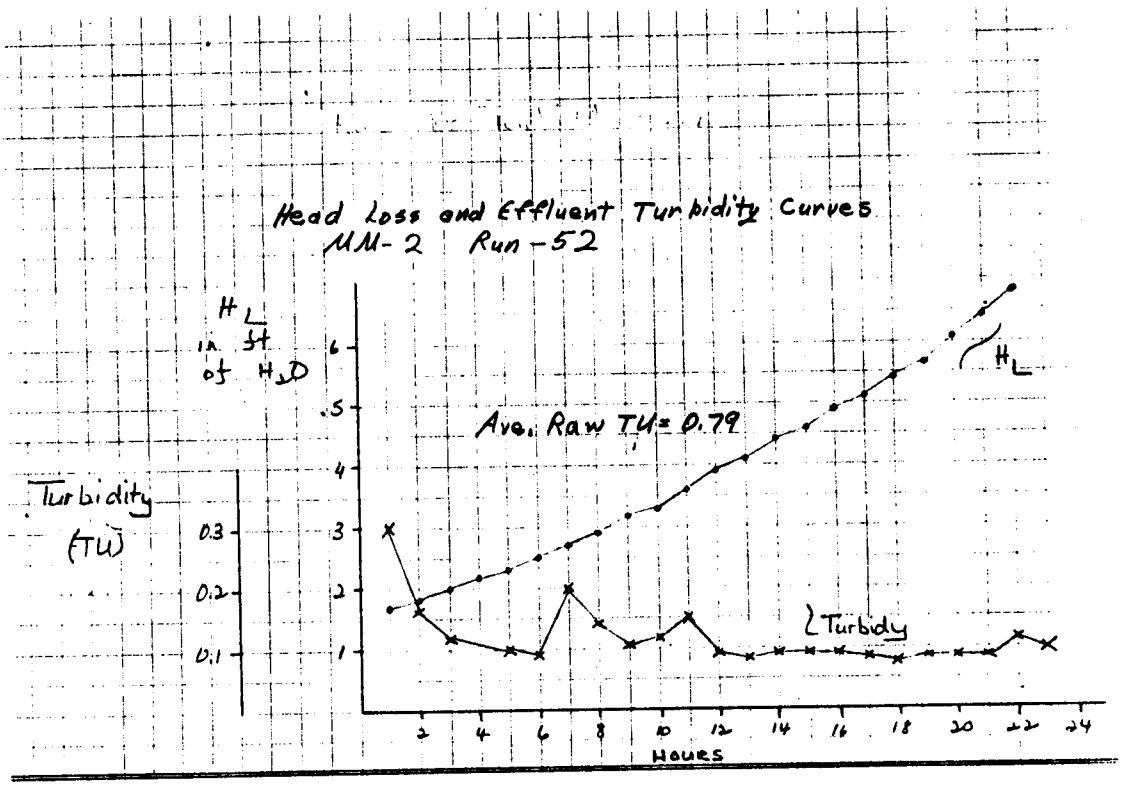

Head Loss and Effluent Turbidity Curves
MM-2 Run-47
Ave. Raw TU = 1.1
H_L in ft. of H_2O
TURBIDITY (TU)
H_L
Turbidity
Hours

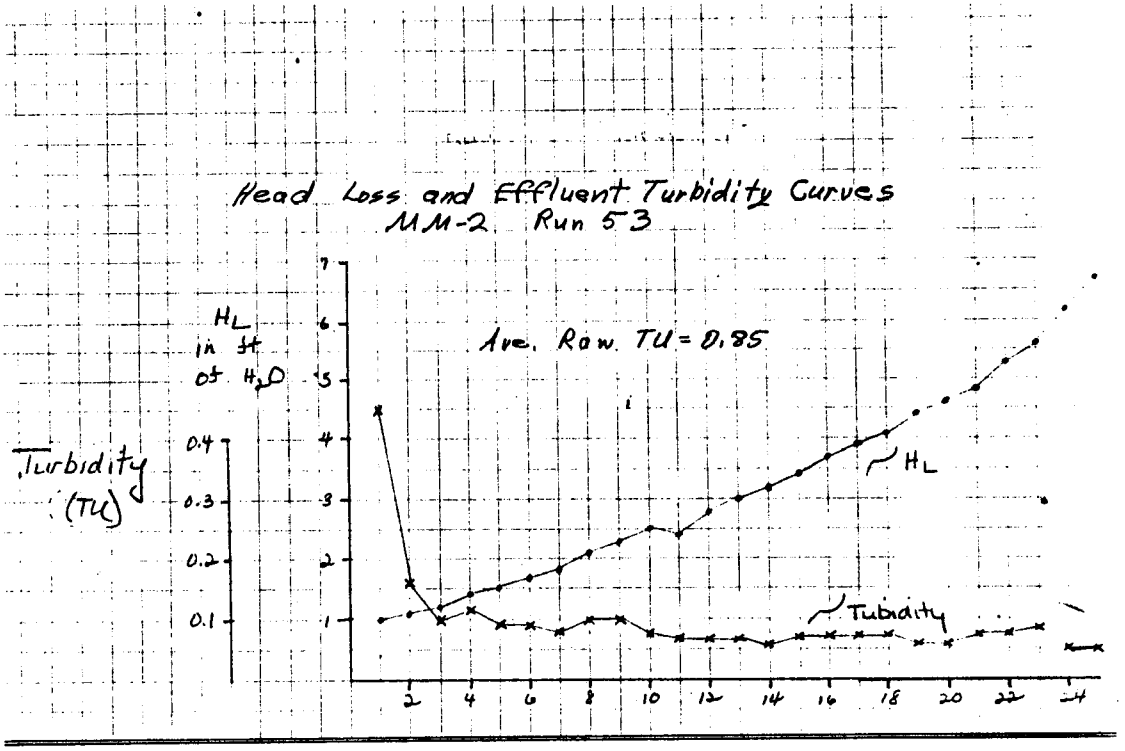

Head Loss and Effluent Turbidity Curves
MM-2 Run-48
Ave. Raw TU= 0.86
HL in feet of H2O
Turbidity (TU)
HL
Turbidity
HOURS

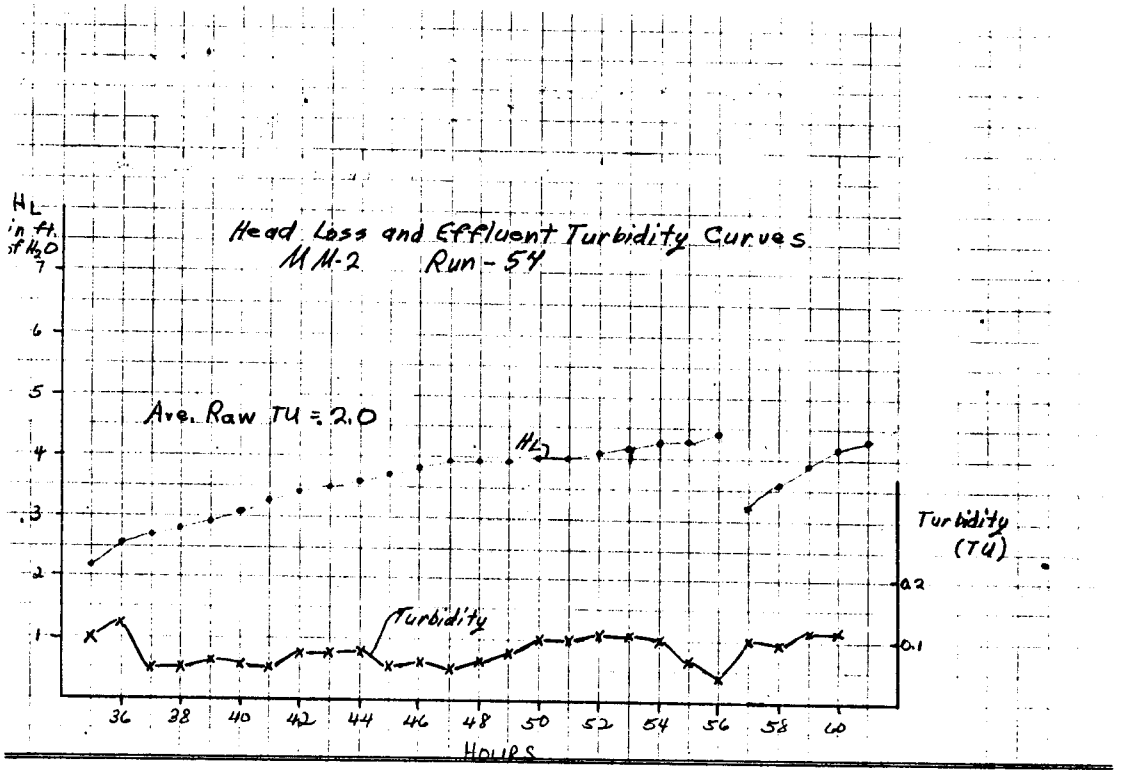

Head Loss and Effluent Turbidity Curves
MM-2 Run-49
Ave. Raw TU= 0.85
Turbidity (TU)
HL in ft. of H2O
HL
Turbidity
Hours

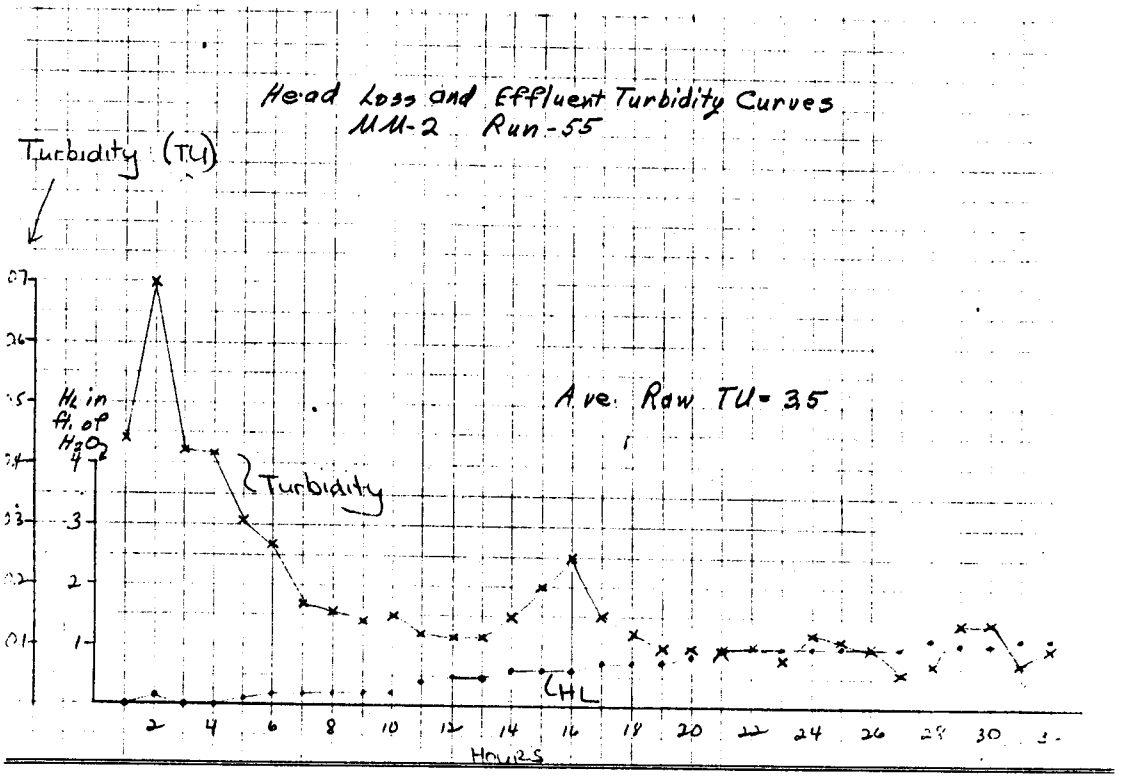

Head Loss and Effluent Turbidity Curves
MM-2 Run-50
Ave. Raw TU = 0.82
TURBIDITY (TU)
HL in ft. of H2O
HL
Turbidity
HOURS

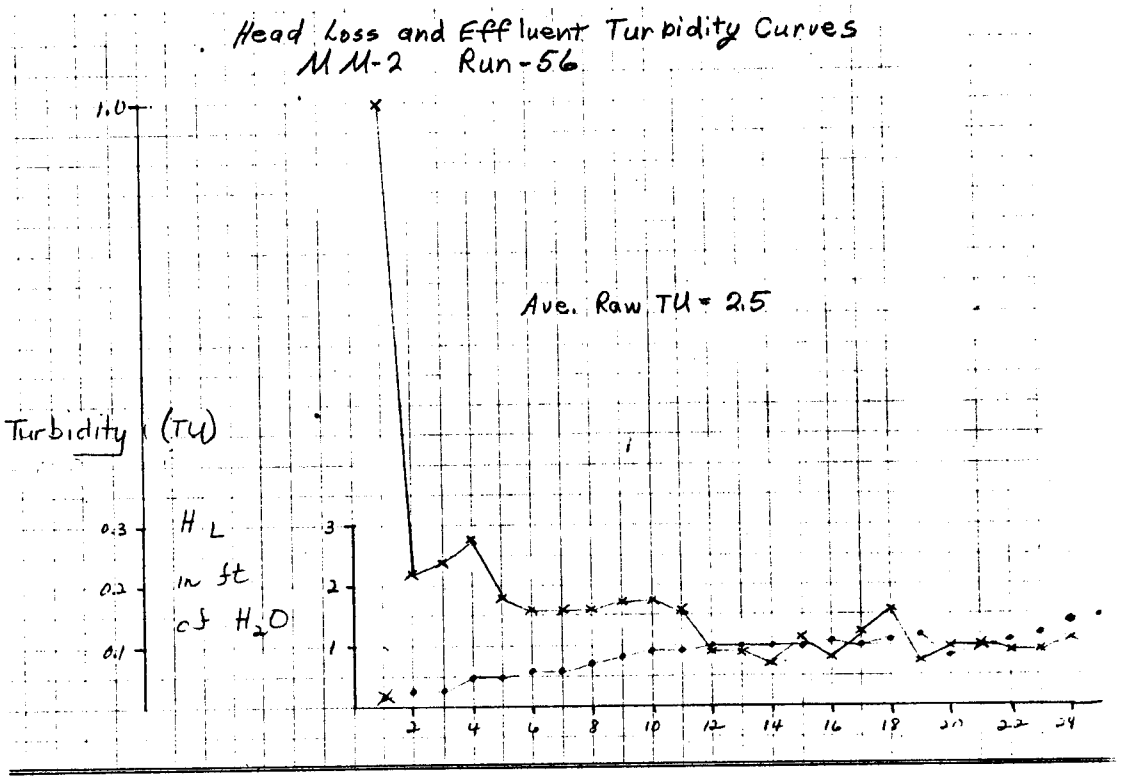

Head Loss and Effluent Turbidity Curves
MM-2 Run-51
Ave. Raw TU = 0.85
HL
TURBIDITY (TU)
HL in ft. of H2O
Turbidity
HOURS

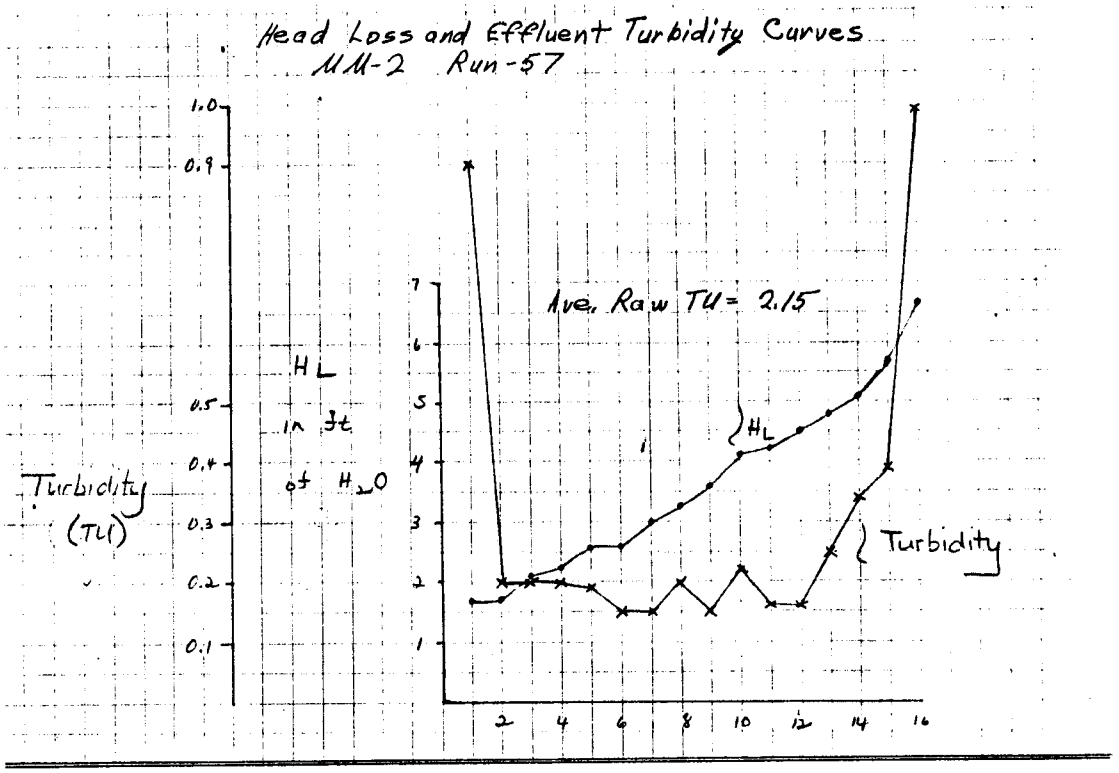

Head Loss and Effluent Turbidity Curves
MM-2 Run-52
H_L in ft of H_2O
Turbidity (TU)
Ave. Raw TU = 0.79
H_L
Turbidity
Hours

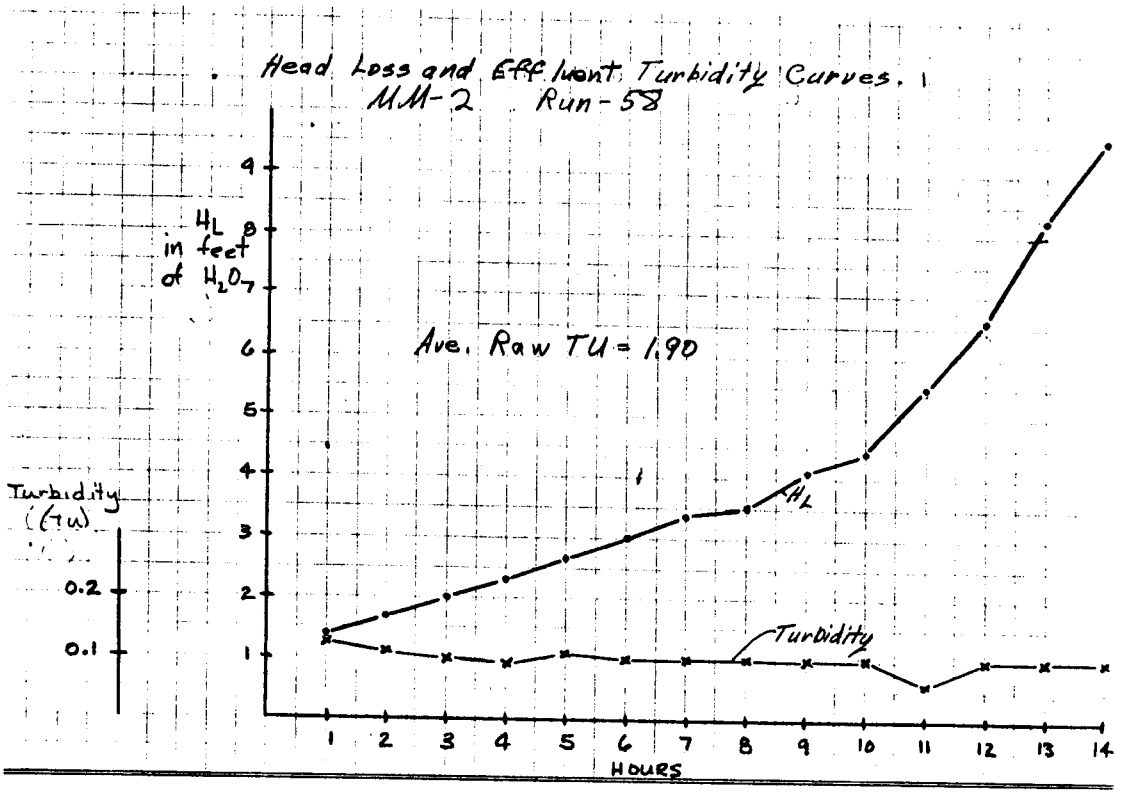

Head Loss and Effluent Turbidity Curves
MM-2 Run 53
H_L in ft of H_2O
Turbidity (TU)
Ave. Raw TU = 0.85
H_L
Turbidity

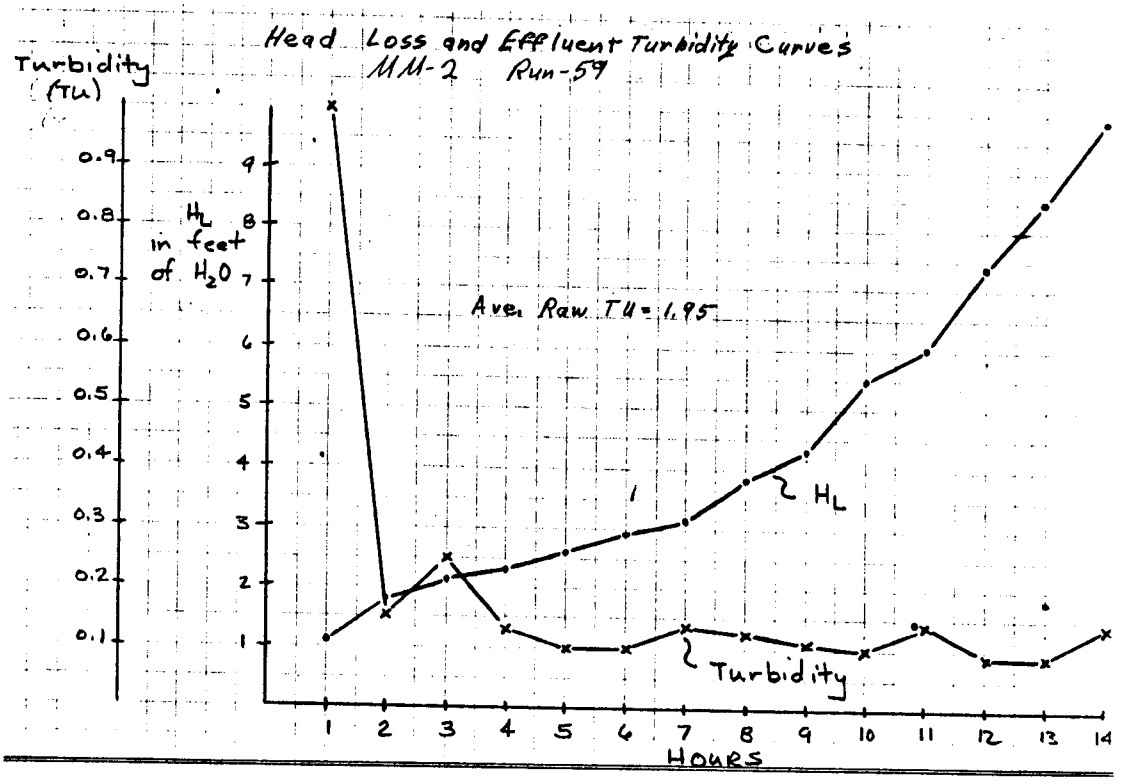

Head Loss and Effluent Turbidity Curves
MM-2 Run-54
HL in ft. of H2O
Ave. Raw TU = 2.0
HL
Turbidity
Turbidity (TU)
0.2
0.1
36 38 40 42 44 46 48 50 52 54 56 58 60
HOURS

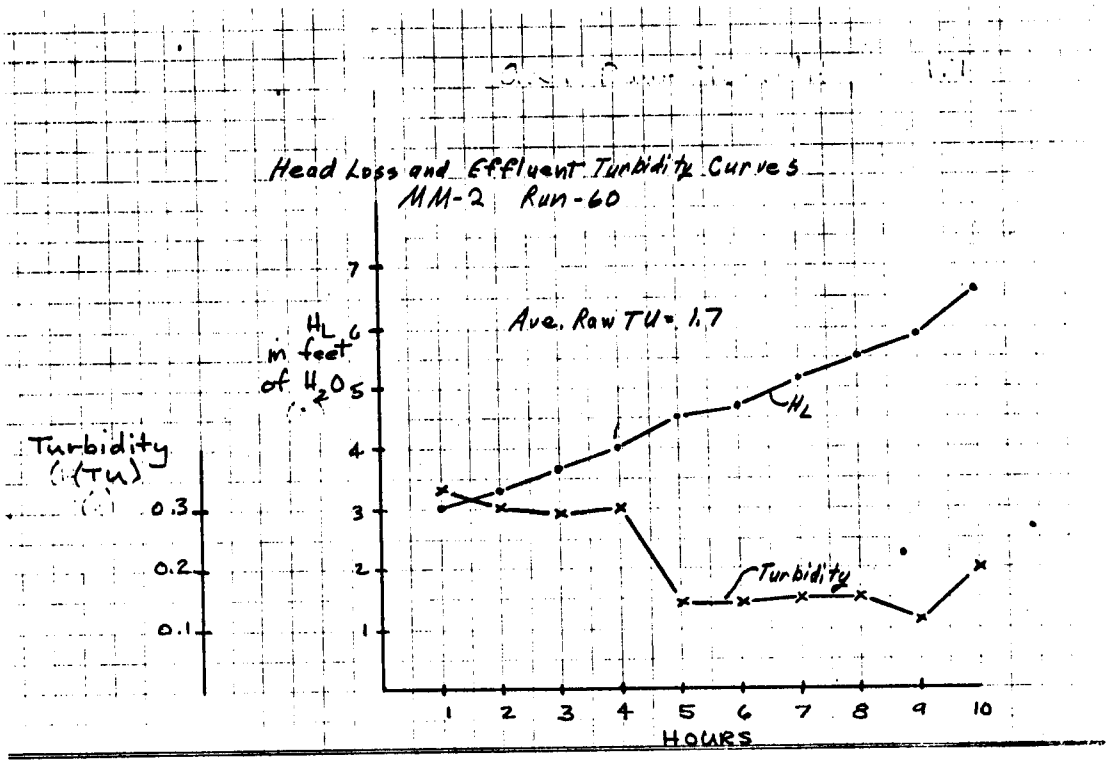

Head Loss and Effluent Turbidity Curves
MM-2 Run-55
Turbidity (TU)
HL in ft. of H2O
Ave. Raw TU = 3.5
Turbidity
HL
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
HOURS

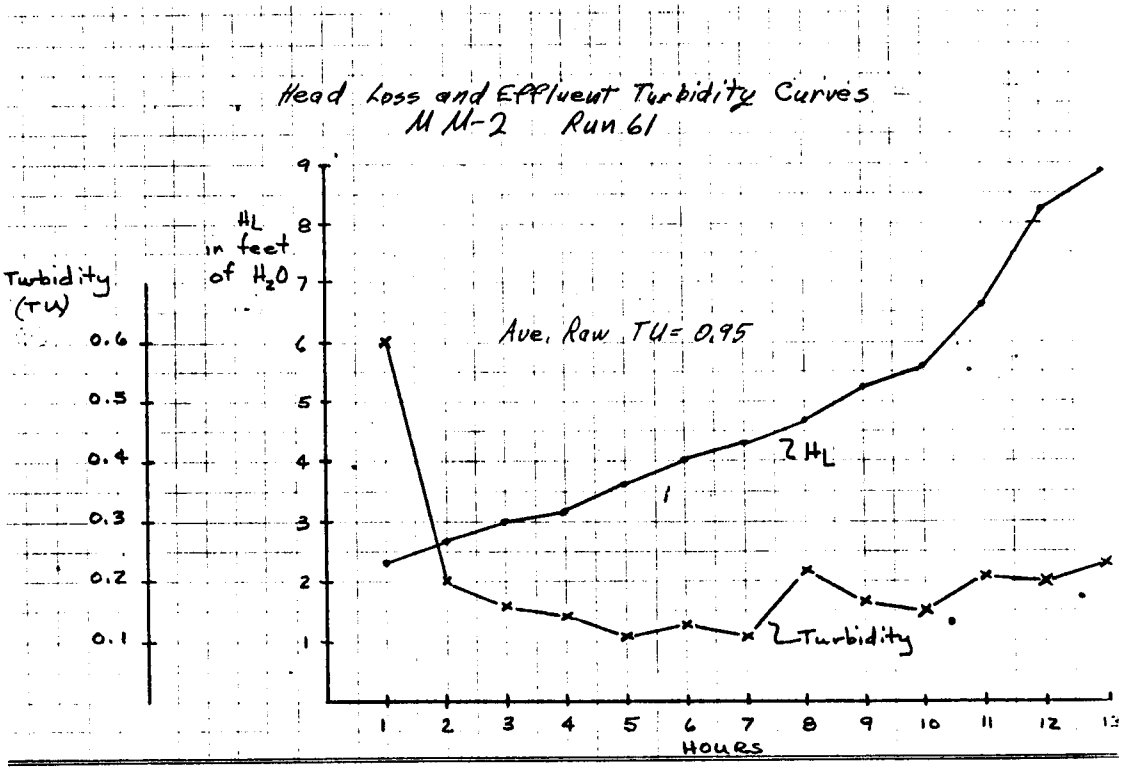

Head Loss and Effluent Turbidity Curves
MM-2 Run-56
Ave. Raw TU = 2.5
Turbidity (TU)
H L in ft of H2O
1.0
0.3
0.2
0.1
3
2
1
2
4
6
8
10
12
14
16
18
20
22
24

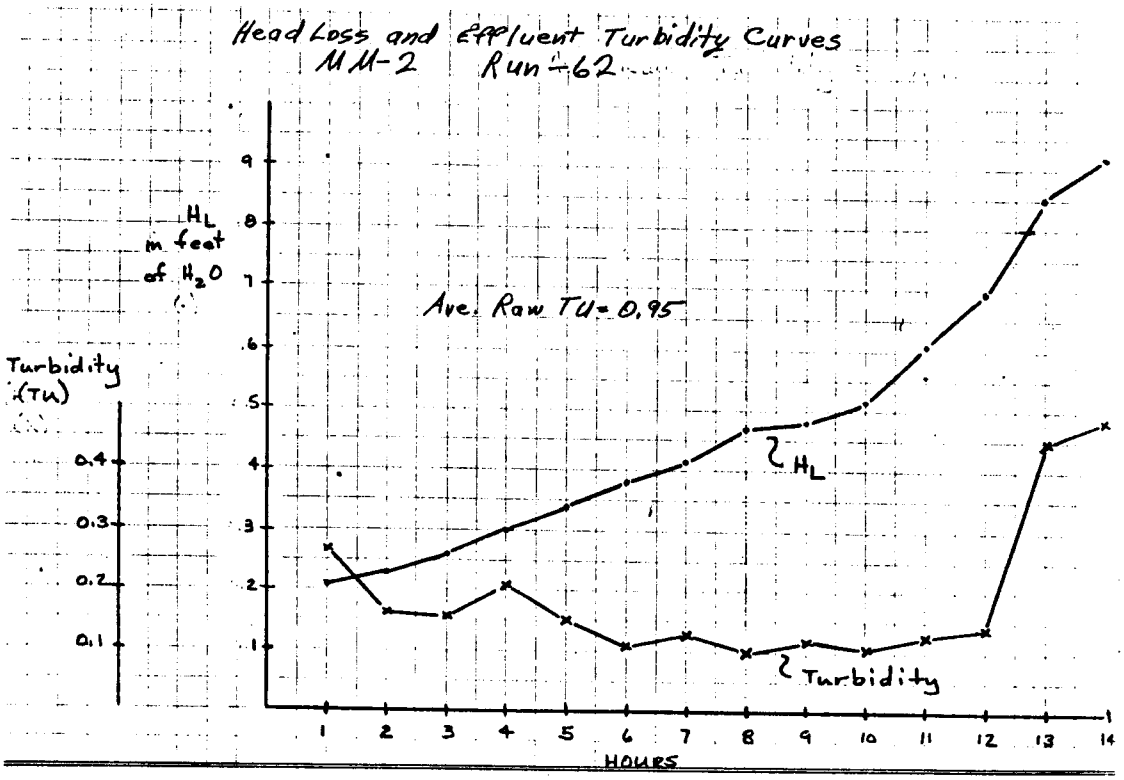

Head Loss and Effluent Turbidity Curves
MM-2 Run-57
Ave. Raw TU = 2.15
Turbidity (TU)
H L in ft of H2O
HL
Turbidity
1.0
0.9
0.5
0.4
0.3
0.2
0.1
7
6
5
4
3
2
1
2
4
6
8
10
12
14
16

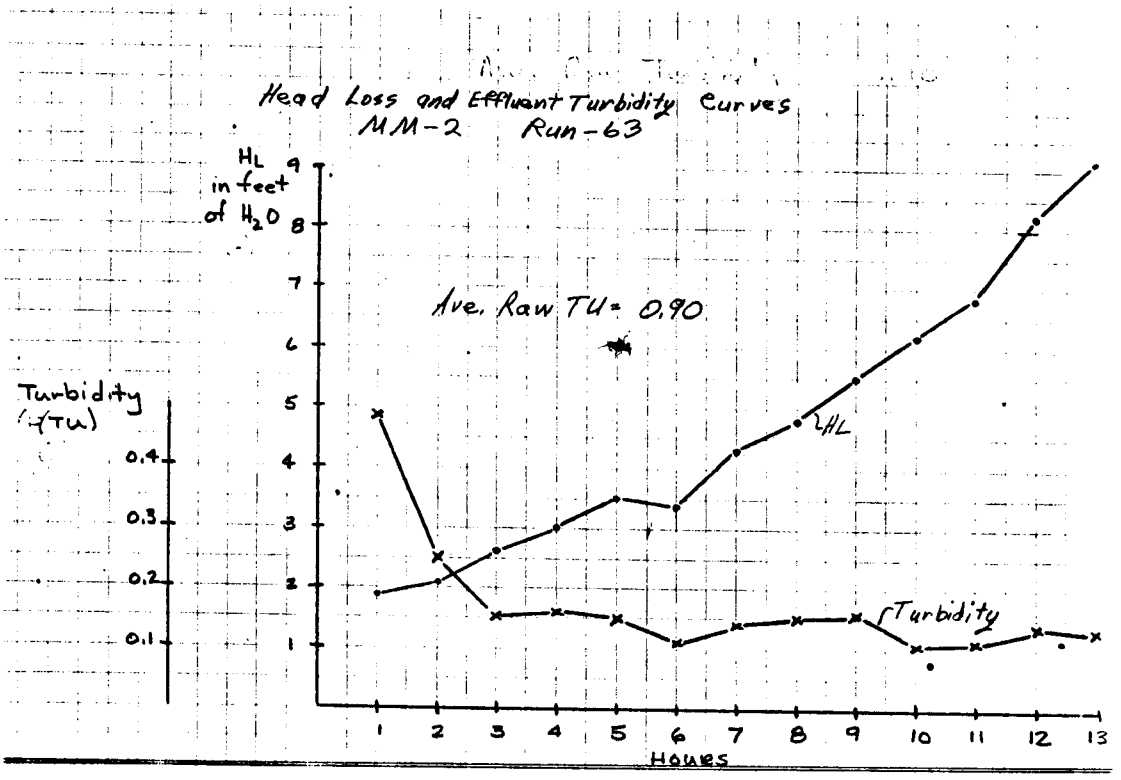

Head Loss and Effluent Turbidity Curves.
MM-2 Run-58
H_L in feet of H_2O
Turbidity (TU)
Ave. Raw TU = 1.90
H_L
Turbidity
HOURS

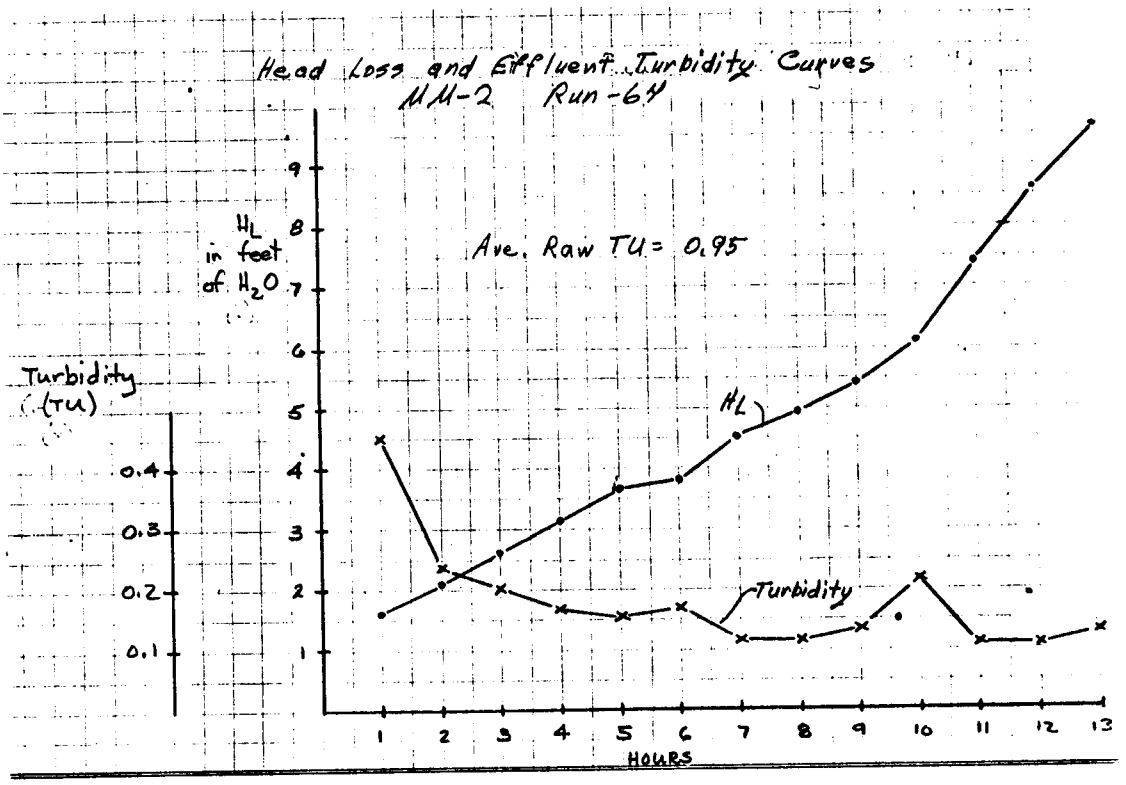

Head Loss and Effluent Turbidity Curves
MM-2 Run-59
Turbidity (TU)
H_L in feet of H_2O
Ave. Raw TU = 1.95
H_L
Turbidity
HOURS

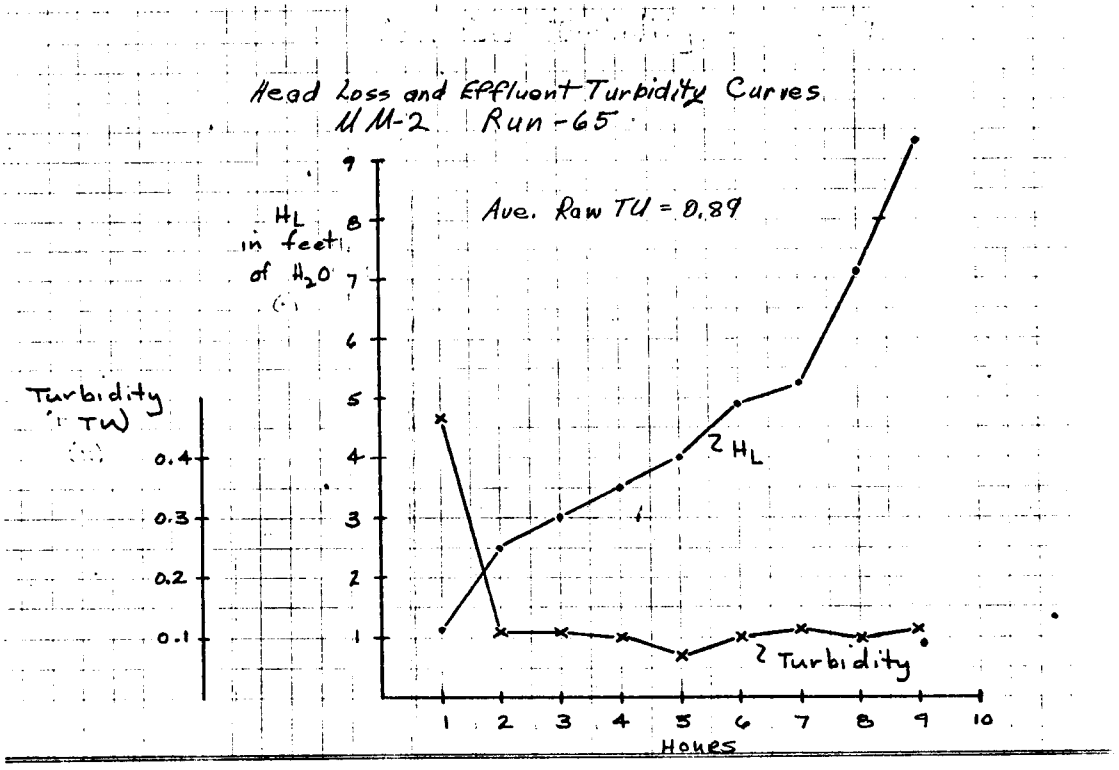

Head Loss and Effluent Turbidity Curves
MM-2 Run-60
Ave. Raw TU = 1.7
H_L in feet of H_2O
Turbidity (TU)
H_L
Turbidity
HOURS

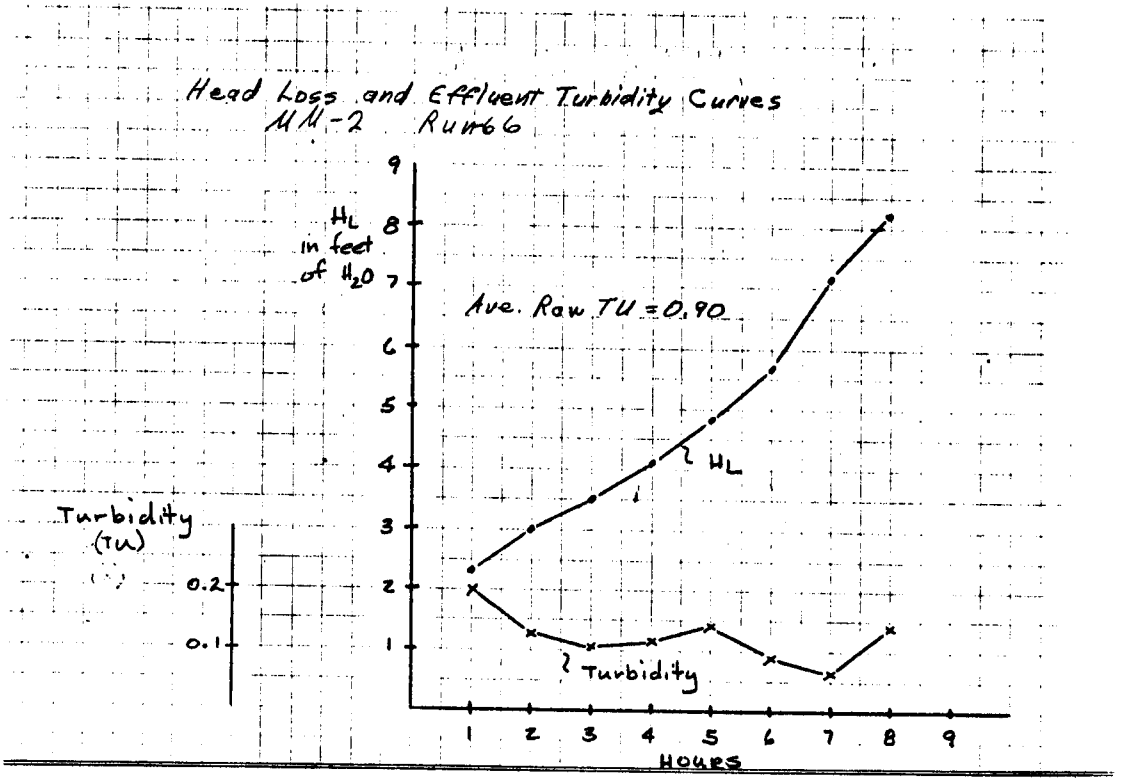

Head Loss and Effluent Turbidity Curves
MM-2 Run 61
Ave. Raw TU = 0.95
H_L in feet of H_2O
Turbidity (TU)
H_L
Turbidity
HOURS

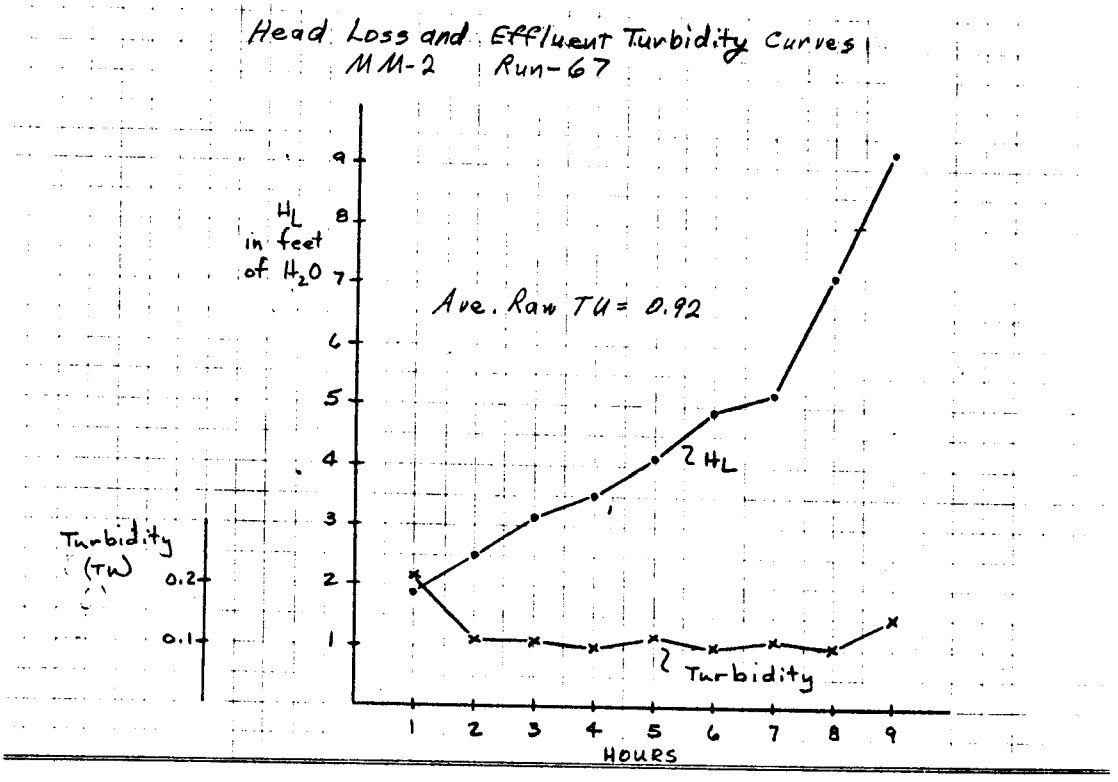

Head Loss and Effluent Turbidity Curves
MM-2 Run-62
H_L in feet of H_2O
Turbidity (TU)
Ave. Raw TU = 0.95
H_L
Turbidity
HOURS

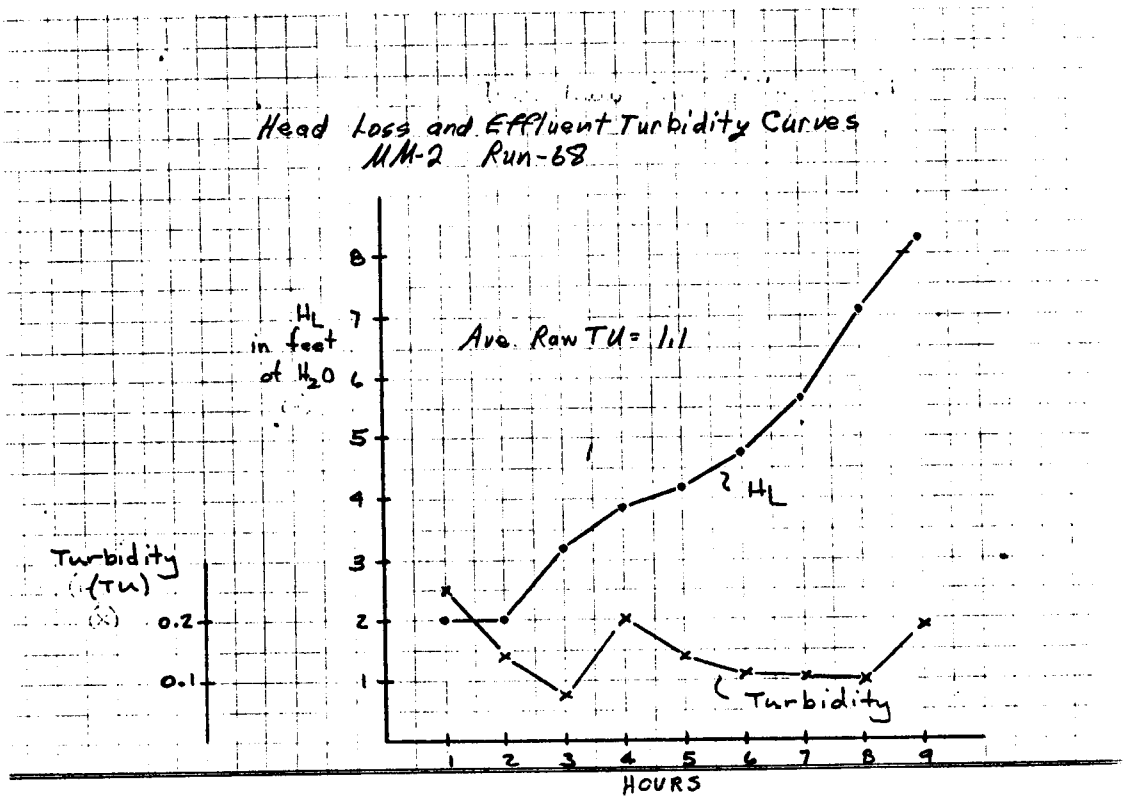

Head Loss and Effluent Turbidity Curves
MM-2 Run-63
H_L in feet of H_2O
Turbidity (TU)
Ave. Raw TU = 0.90
HL
Turbidity
Hours

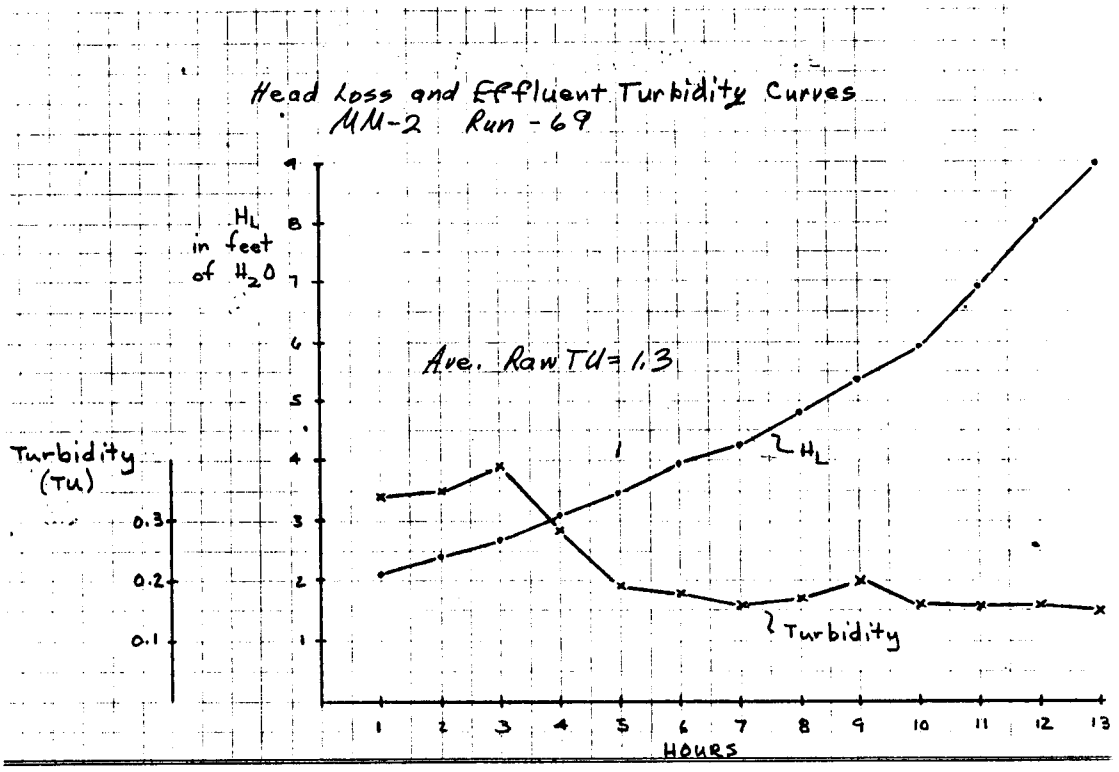

Head Loss and Effluent Turbidity Curves
MM-2 Run-64
Ave. Raw TU = 0.95
H_L in feet of H_2O
Turbidity (TU)
H_L
Turbidity
HOURS

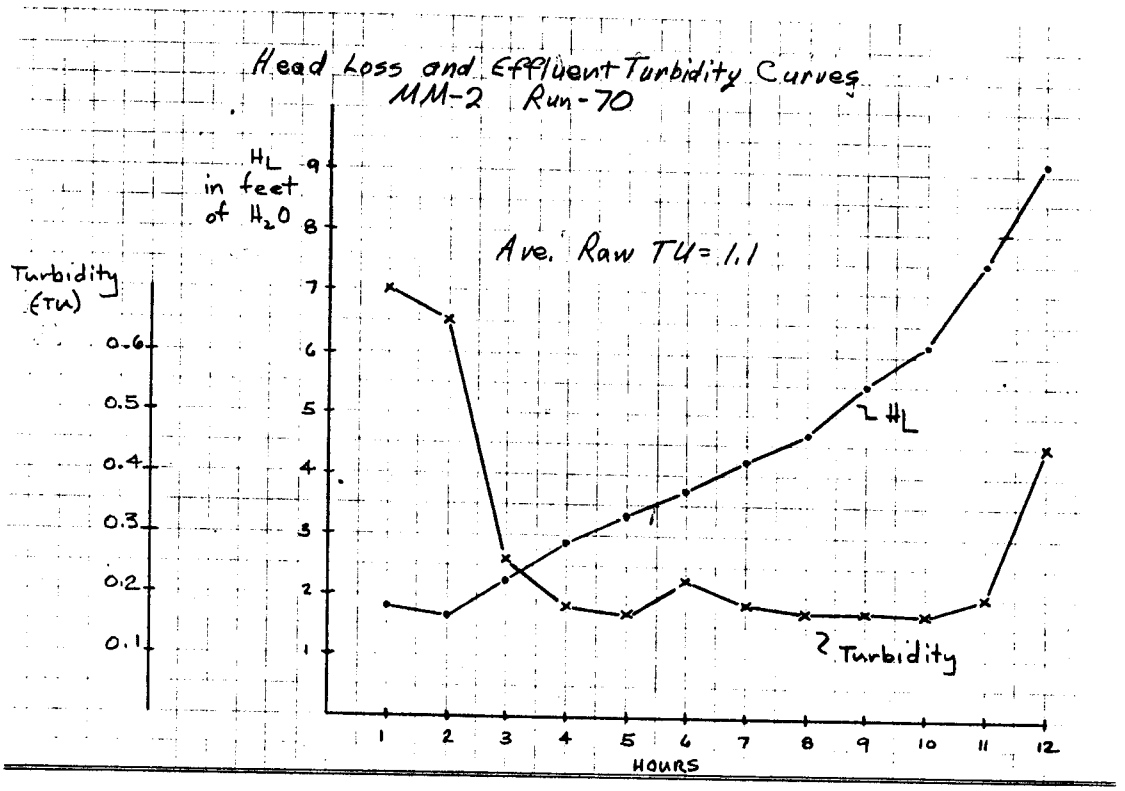

Head Loss and Effluent Turbidity Curves
MM-2 Run-65
Ave. Raw TU = 0.89
H_L in feet of H_2O
Turbidity (TU)
H_L
Turbidity
Hours

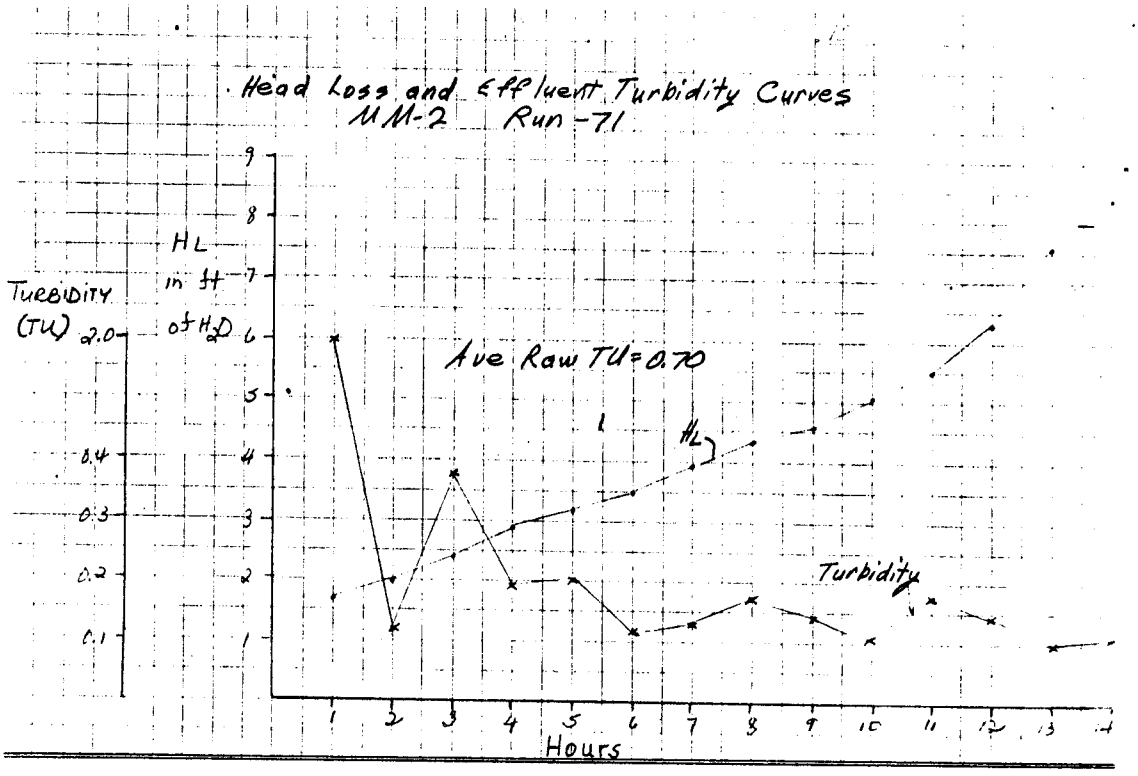

Head Loss and Effluent Turbidity Curves
MM-2 Run 66
H_L in feet of H_2O
Ave. Raw TU = 0.90
H_L
Turbidity (TU)
Turbidity
HOURS

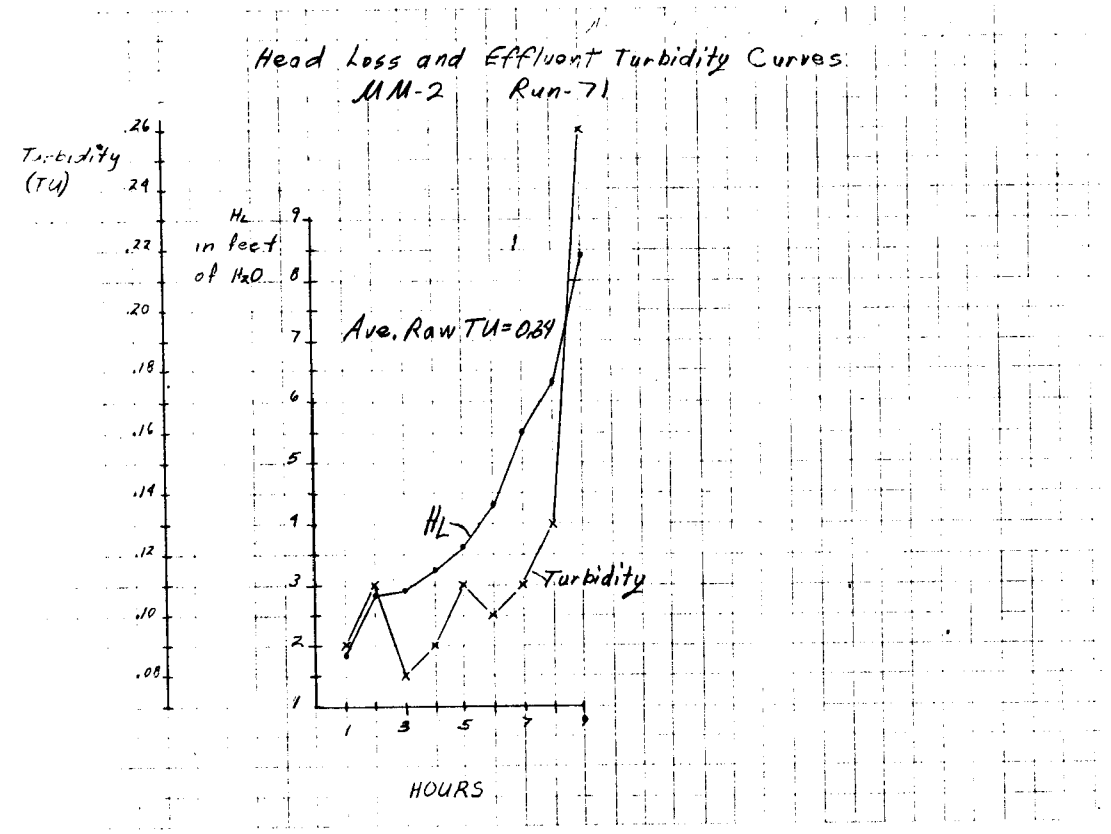

Head Loss and Effluent Turbidity Curves
MM-2 Run-67
H_L in feet of H_2O
Ave. Raw TU = 0.92
H_L
Turbidity (TU)
Turbidity
HOURS

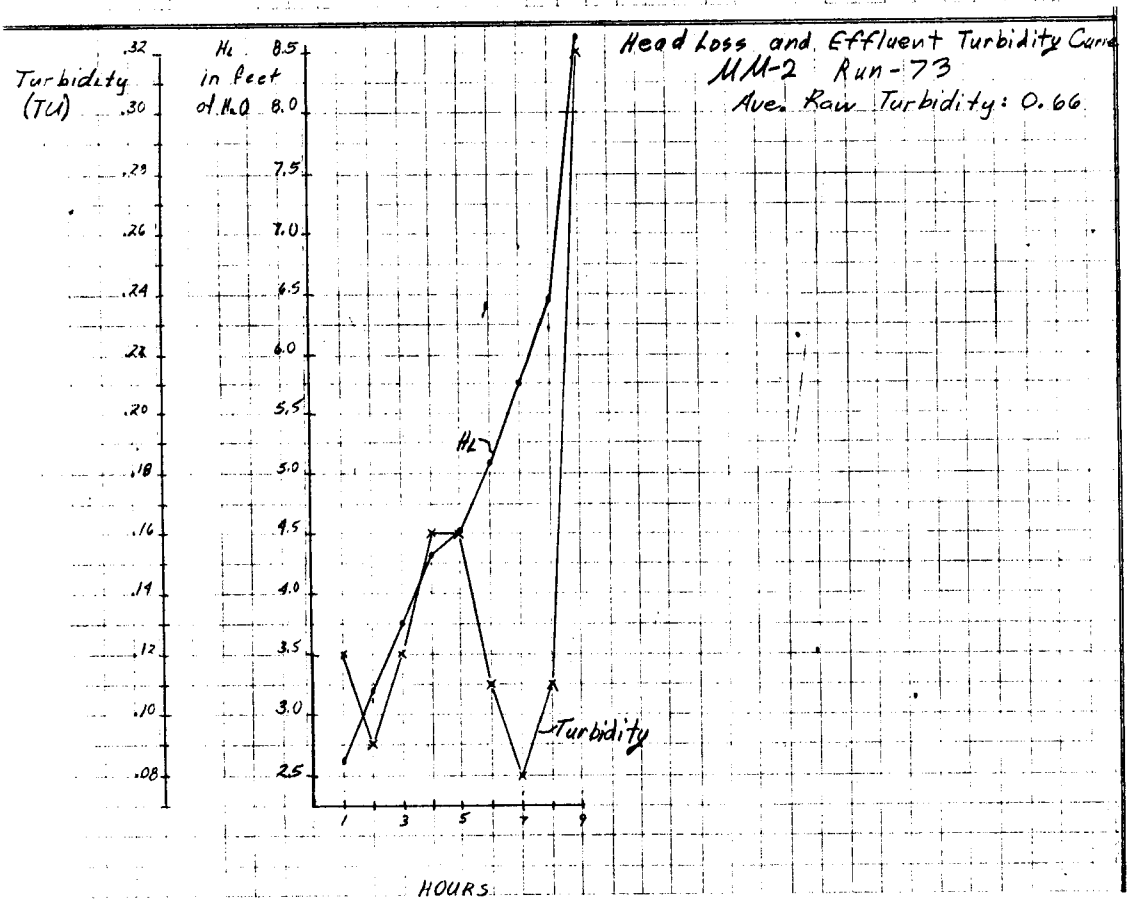

Head Loss and Effluent Turbidity Curves
MM-2 Run-68
H_L in feet of H_2O
Ave. Raw TU = 1.1
H_L
Turbidity (TU)
Turbidity
HOURS

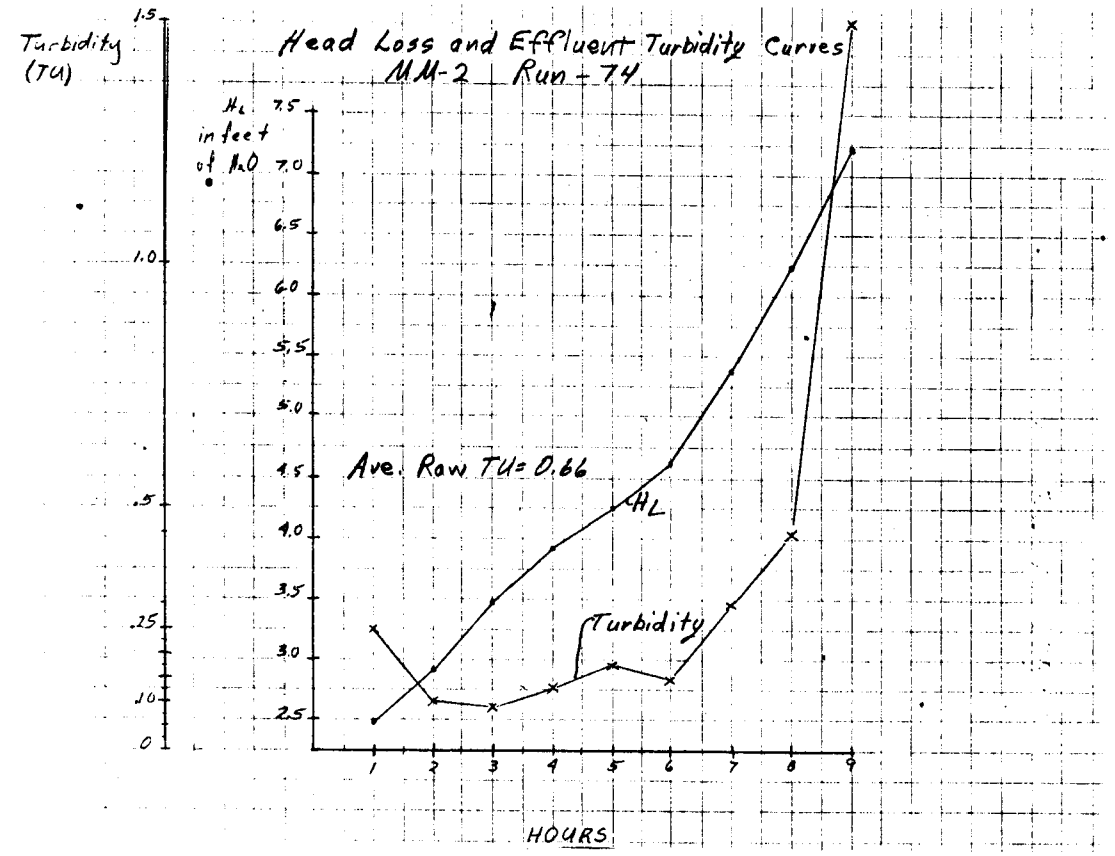

Head Loss and Effluent Turbidity Curves
MM-2 Run-69
H_L in feet of H_2O
Ave. Raw TU = 1.3
H_L
Turbidity (TU)
Turbidity
HOURS

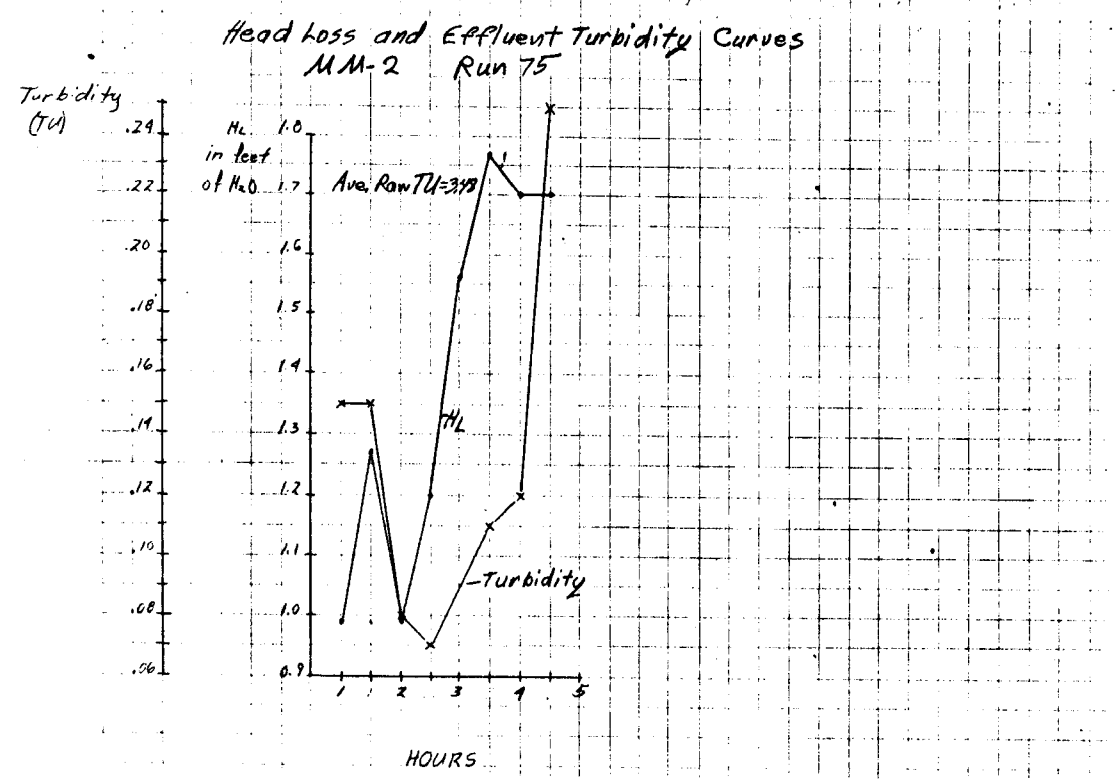

Head Loss and Effluent Turbidity Curves
MM-2 Run-70
H_L in feet of H_2O
Turbidity (TU)
Ave. Raw TU = 1.1
H_L
Turbidity
HOURS

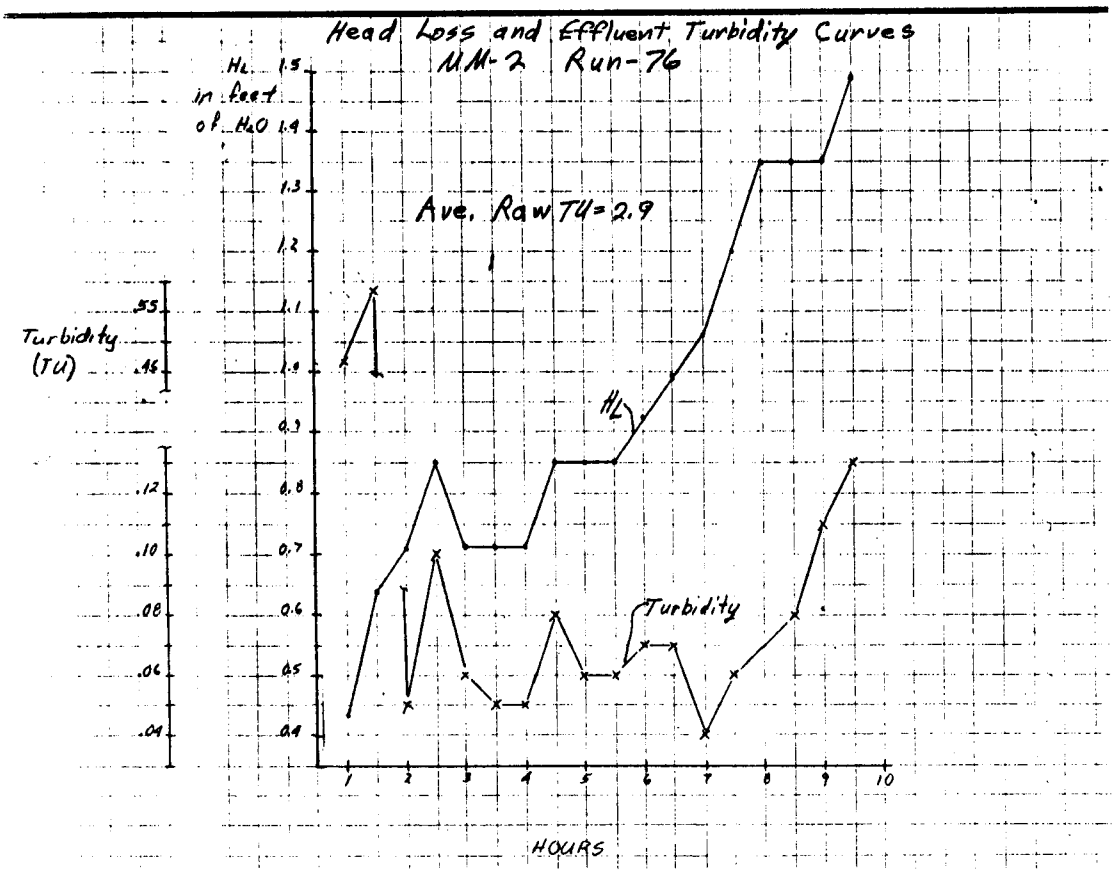

Head Loss and Effluent Turbidity Curves
MM-2 Run-71
H_L in ft of H_2O
TURBIDITY (TU)
Ave Raw TU = 0.70
H_L
Turbidity
Hours

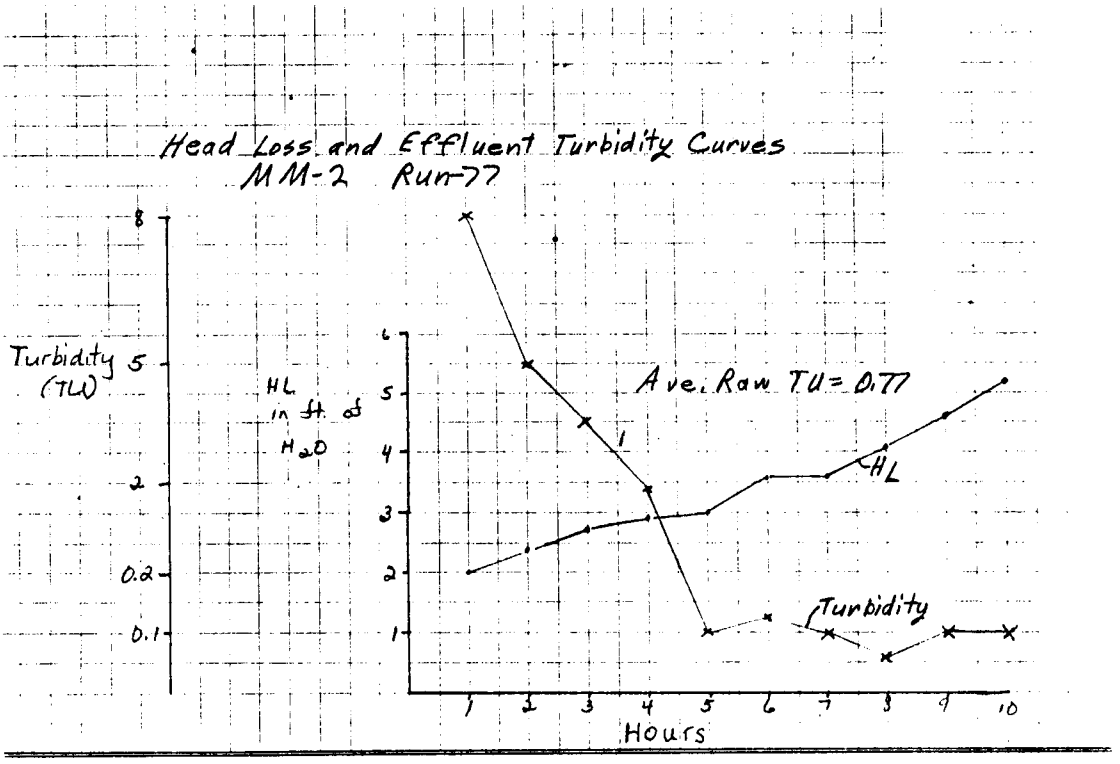

Head Loss and Effluent Turbidity Curves
MM-2 Run-71
Turbidity (TU)
HL in feet of H2O
Ave. Raw TU=0.84
HL
Turbidity
HOURS

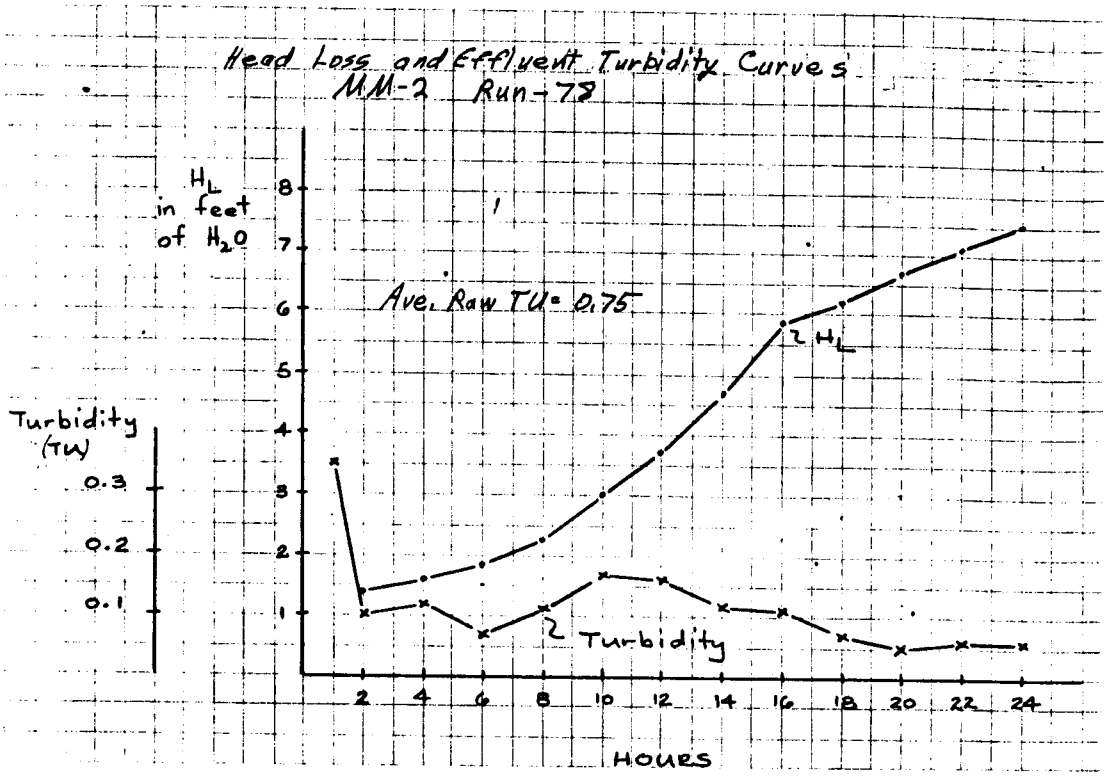

Head Loss and Effluent Turbidity Curve
MM-2 Run-73
Ave. Raw Turbidity: 0.66
Turbidity (TU)
HL in feet of H2O
HL
Turbidity
HOURS

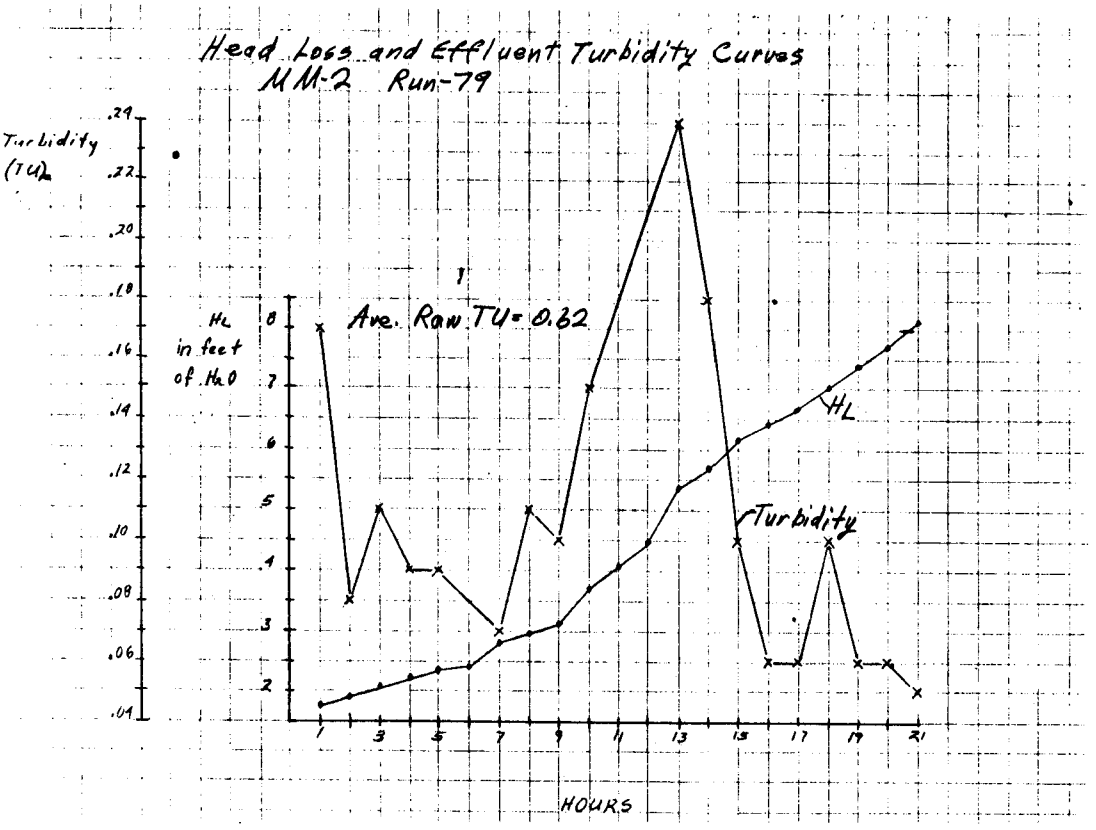

Head Loss and Effluent Turbidity Curves
MM-2 Run 74
Turbidity (TU)
H_L in feet of H_2O
Ave. Raw TU = 0.66
H_L
Turbidity
HOURS

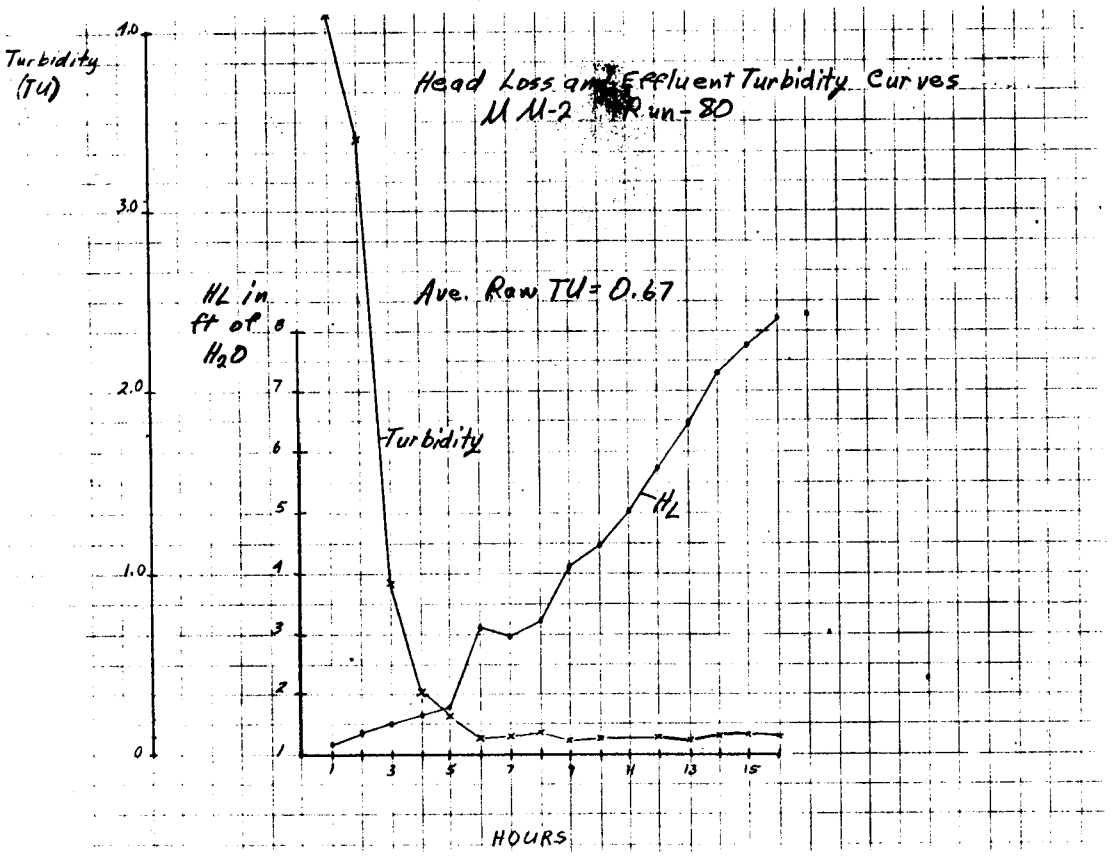

Head Loss and Effluent Turbidity Curves
MM-2 Run 75
Turbidity (TU)
H_L in feet of H_2O
Ave. Raw TU = 3.48
H_L
Turbidity
HOURS

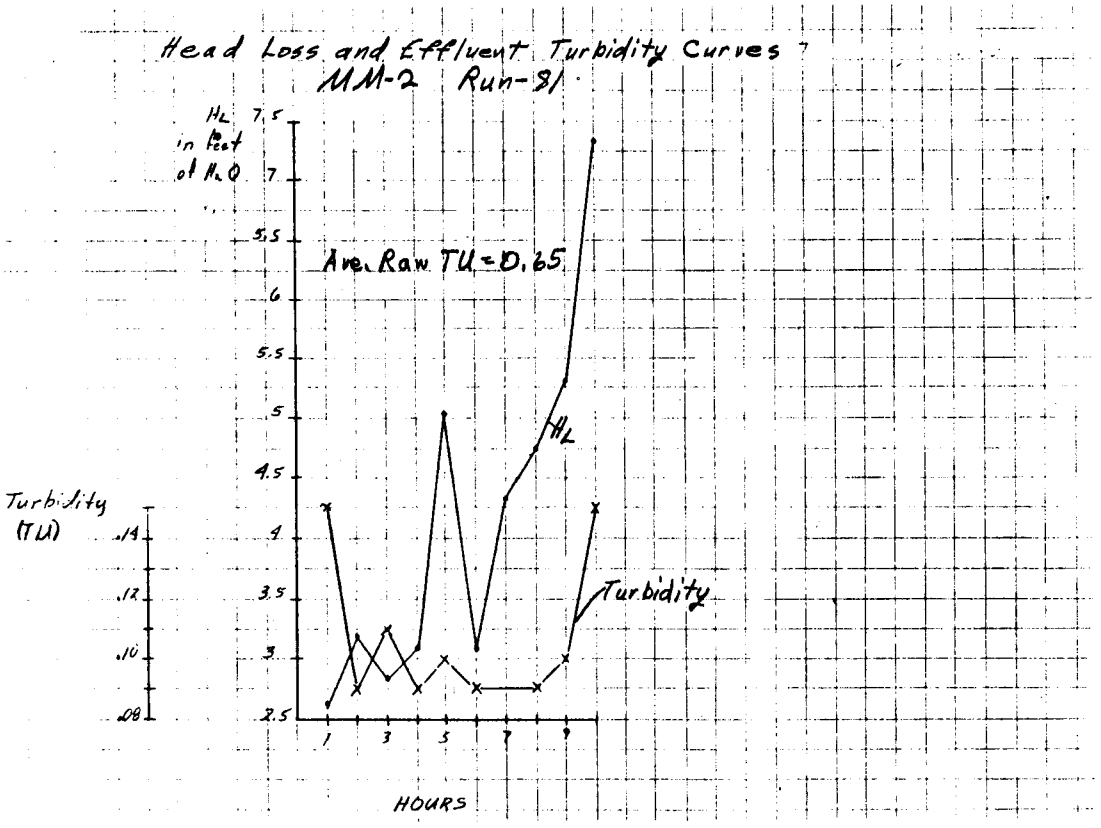

Head Loss and Effluent Turbidity Curves
MM-2 Run-76
HL in feet of H2O
Ave. Raw TU = 2.9
Turbidity (TU)
HL
Turbidity
HOURS

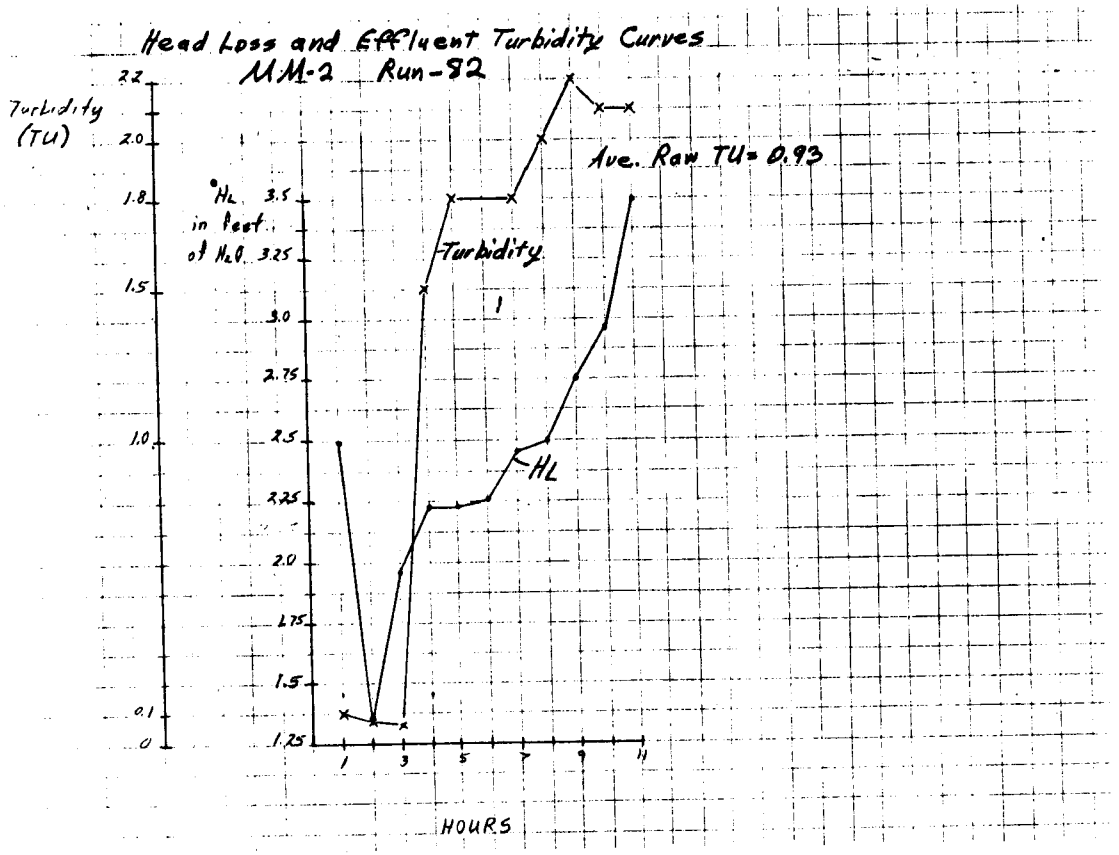

Head Loss and Effluent Turbidity Curves
MM-2 Run-77
Turbidity (TU)
HL in ft of H2O
Ave. Raw TU = 0.77
HL
Turbidity
Hours

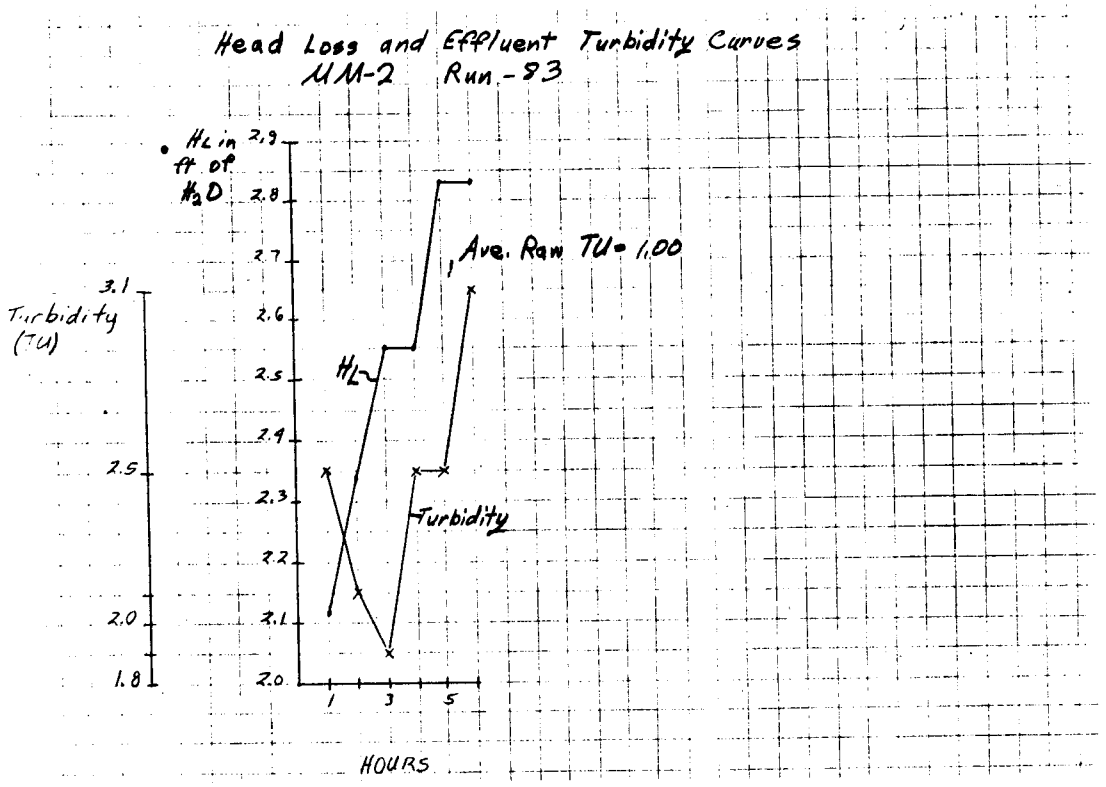

Head Loss and Effluent Turbidity Curves
MM-2 Run-78
H_L in feet of H_2O
Ave. Raw TU = 0.75
H_L
Turbidity (TU)
Turbidity
HOURS

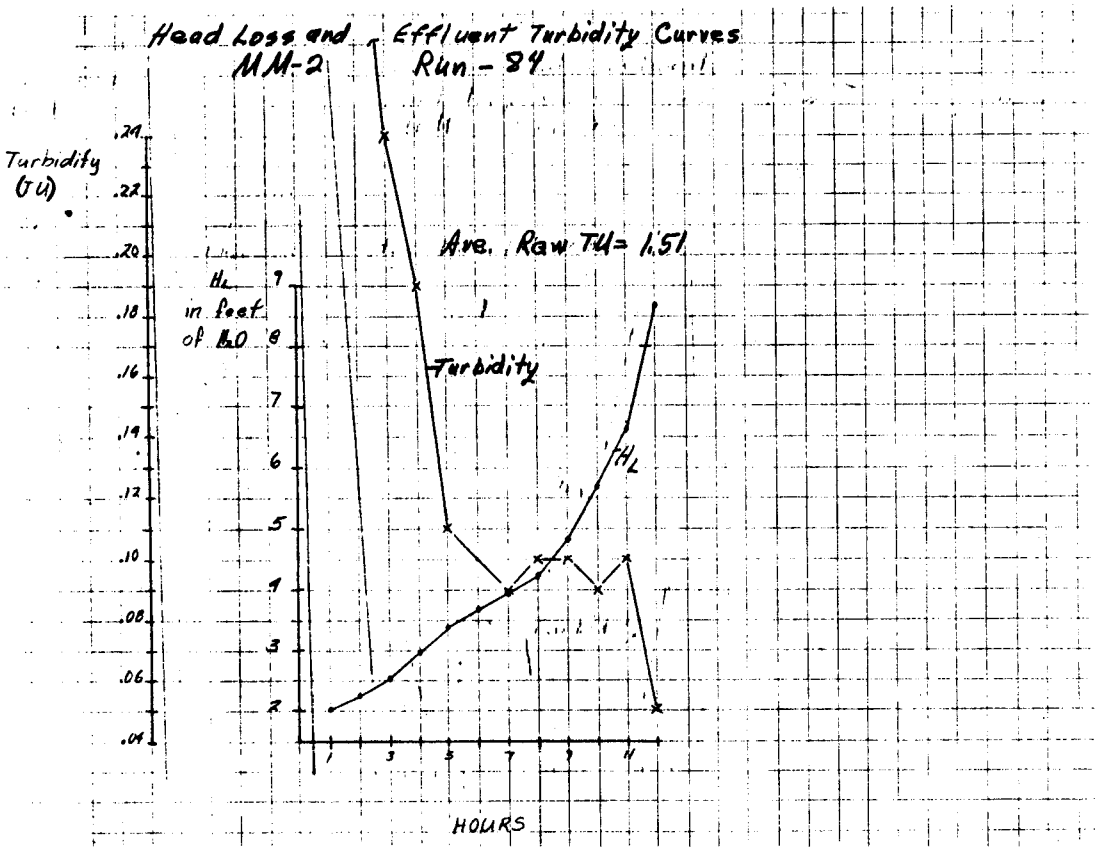

Head Loss and Effluent Turbidity Curves
MM-2 Run-79
Turbidity (TU)
H_L in feet of H_2O
Ave. Raw TU = 0.32
H_L
Turbidity
HOURS

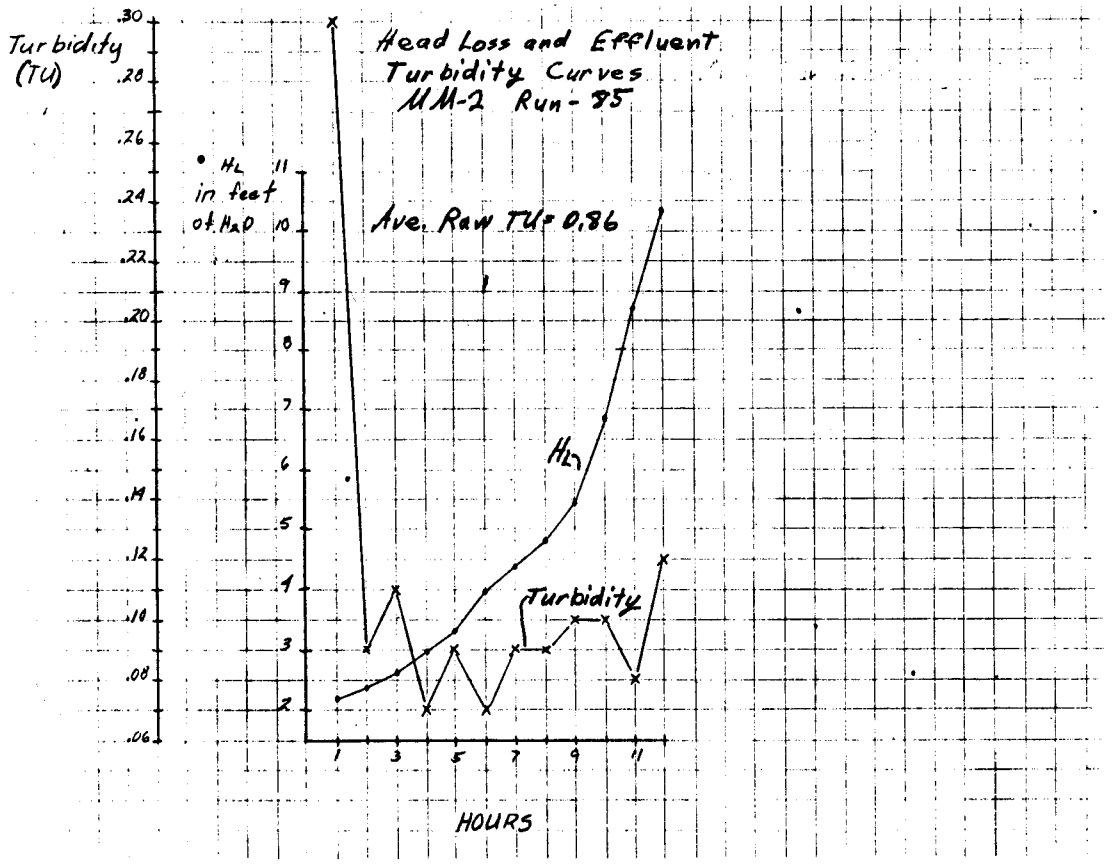

Head Loss and Effluent Turbidity Curves
MM-2 Run-80
Ave. Raw TU = 0.67
Turbidity (TU)
HL in ft of H_2O
Turbidity
HL
HOURS

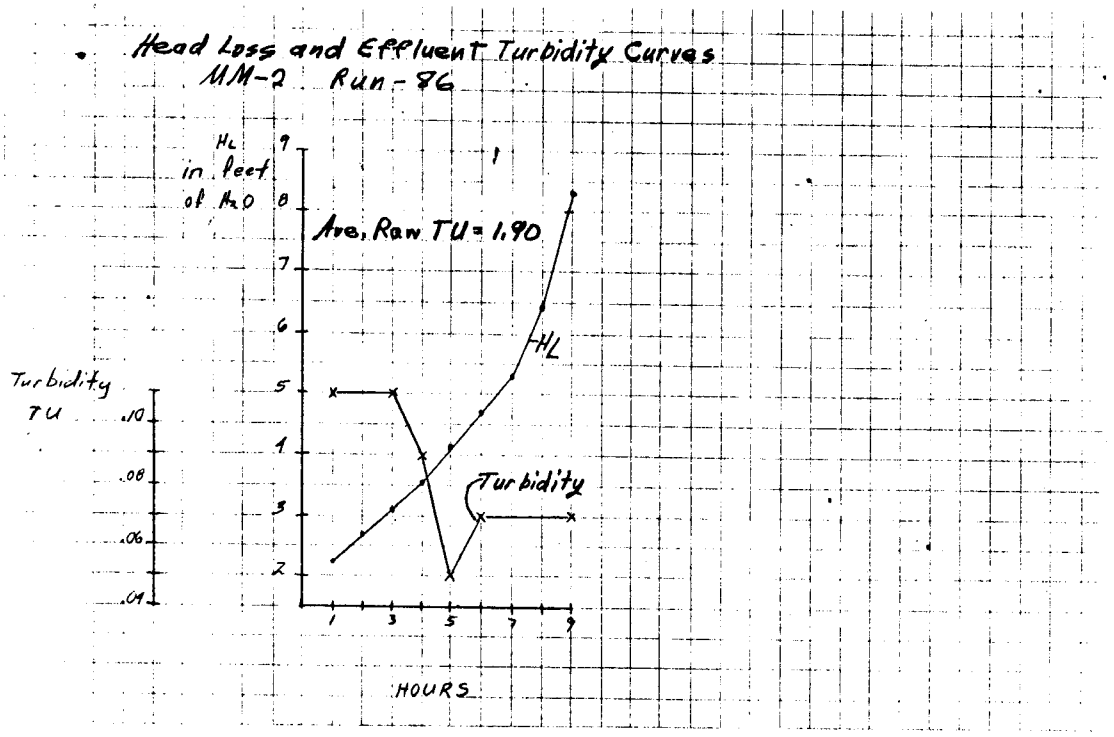

Head Loss and Effluent Turbidity Curves
MM-2 Run-81
HL in feet of H_2O
Ave. Raw TU = 0.65
Turbidity (TU)
HL
Turbidity
HOURS

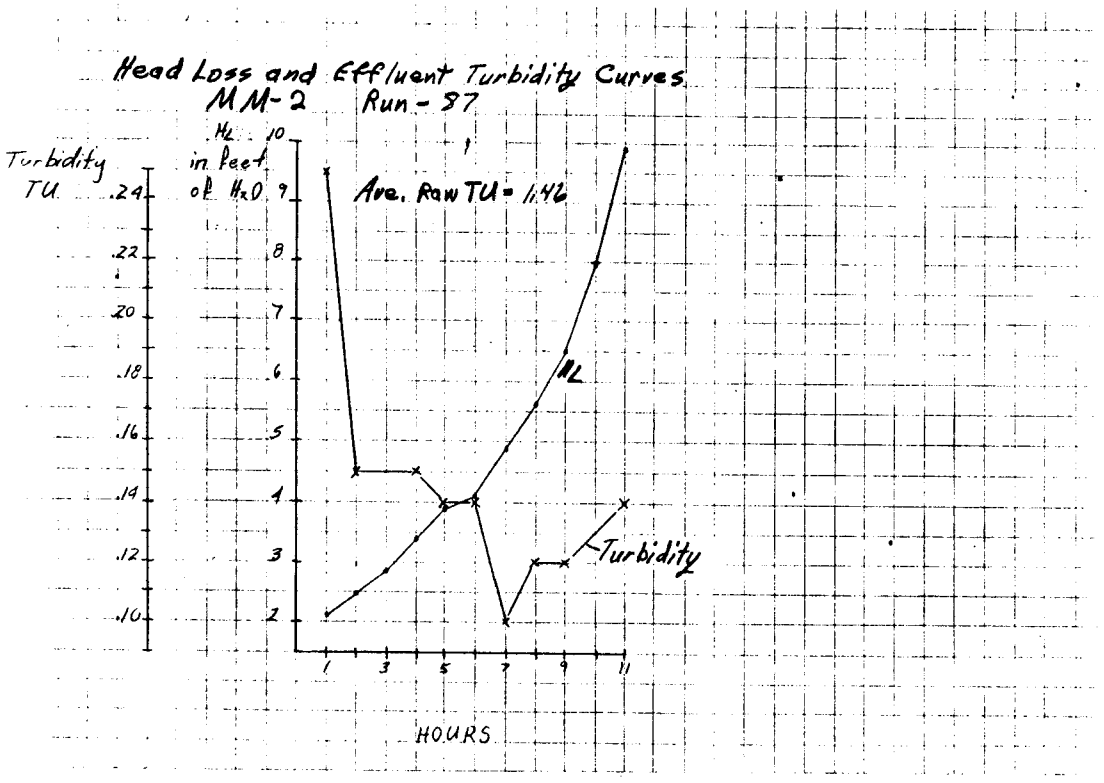

Head Loss and Effluent Turbidity Curves
MM-2 Run-82
Turbidity (TU)
HL in feet of H2O
Ave. Raw TU = 0.93
Turbidity
HL
HOURS

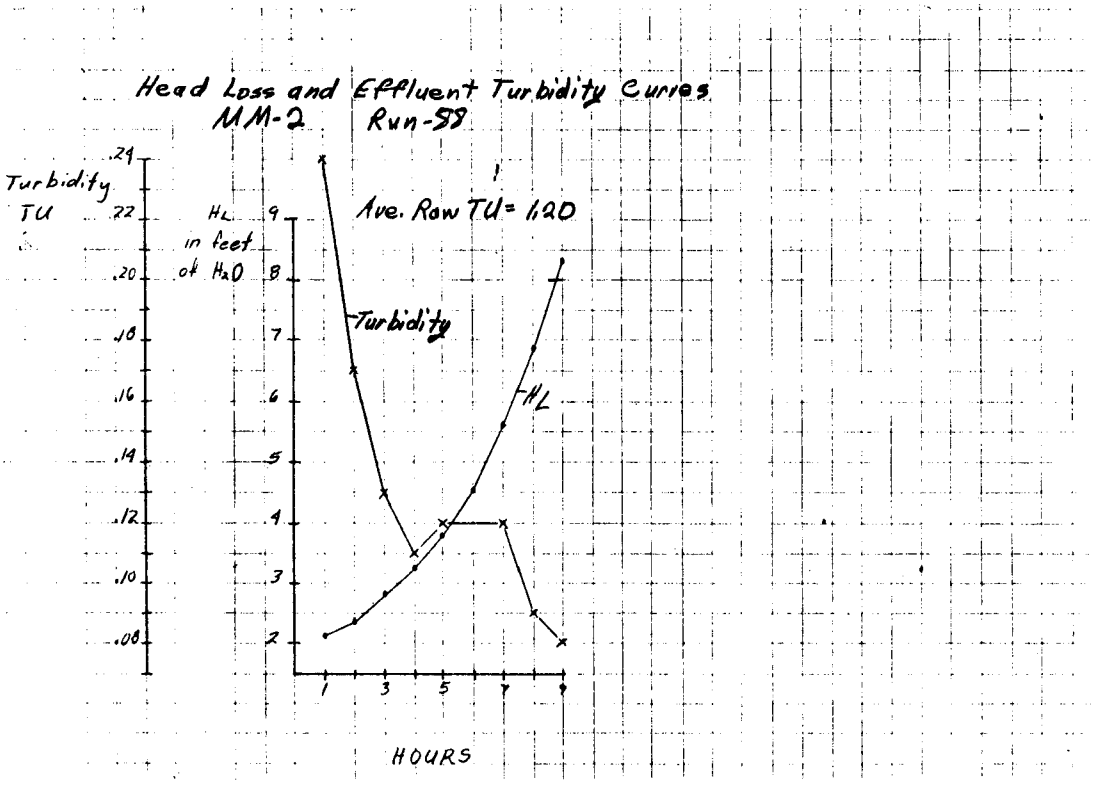

Head Loss and Effluent Turbidity Curves
MM-2 Run-83
HL in ft of H2O
Turbidity (TU)
Ave. Raw TU = 1.00
HL
Turbidity
HOURS

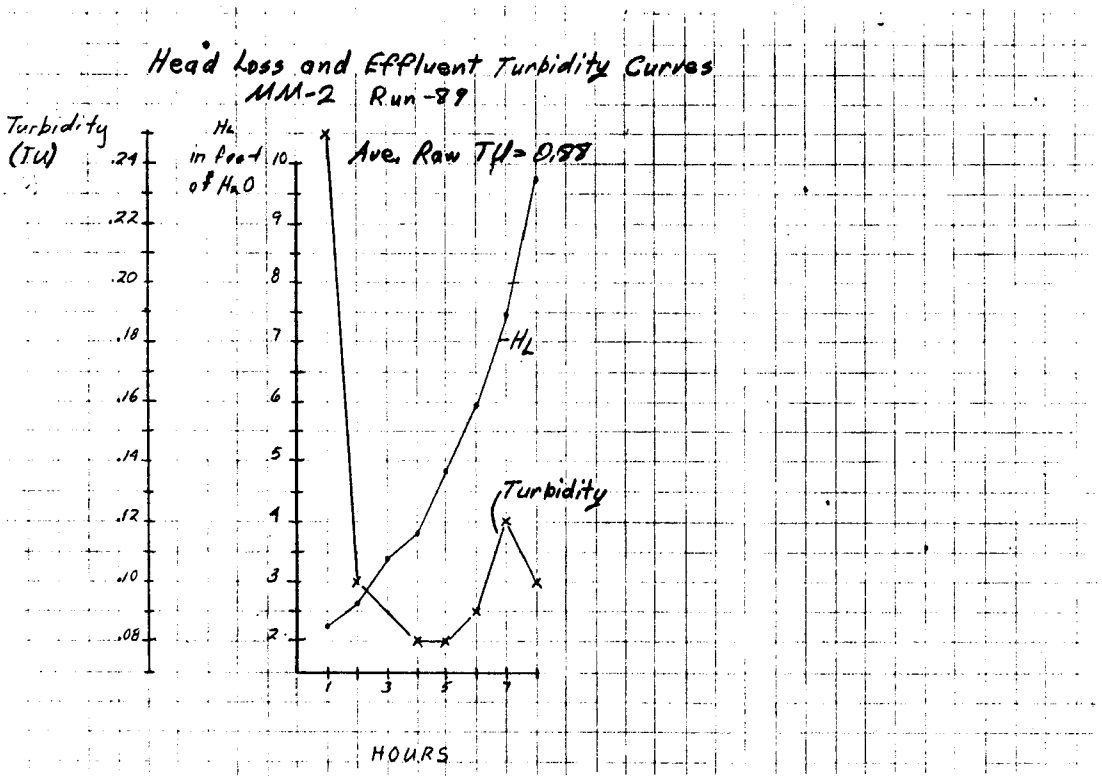

Head Loss and Effluent Turbidity Curves
MM-2 Run - 84
Turbidity (TU)
Ave. Raw TU = 1.51
H_L in feet of H_2O
Turbidity
H_L
HOURS

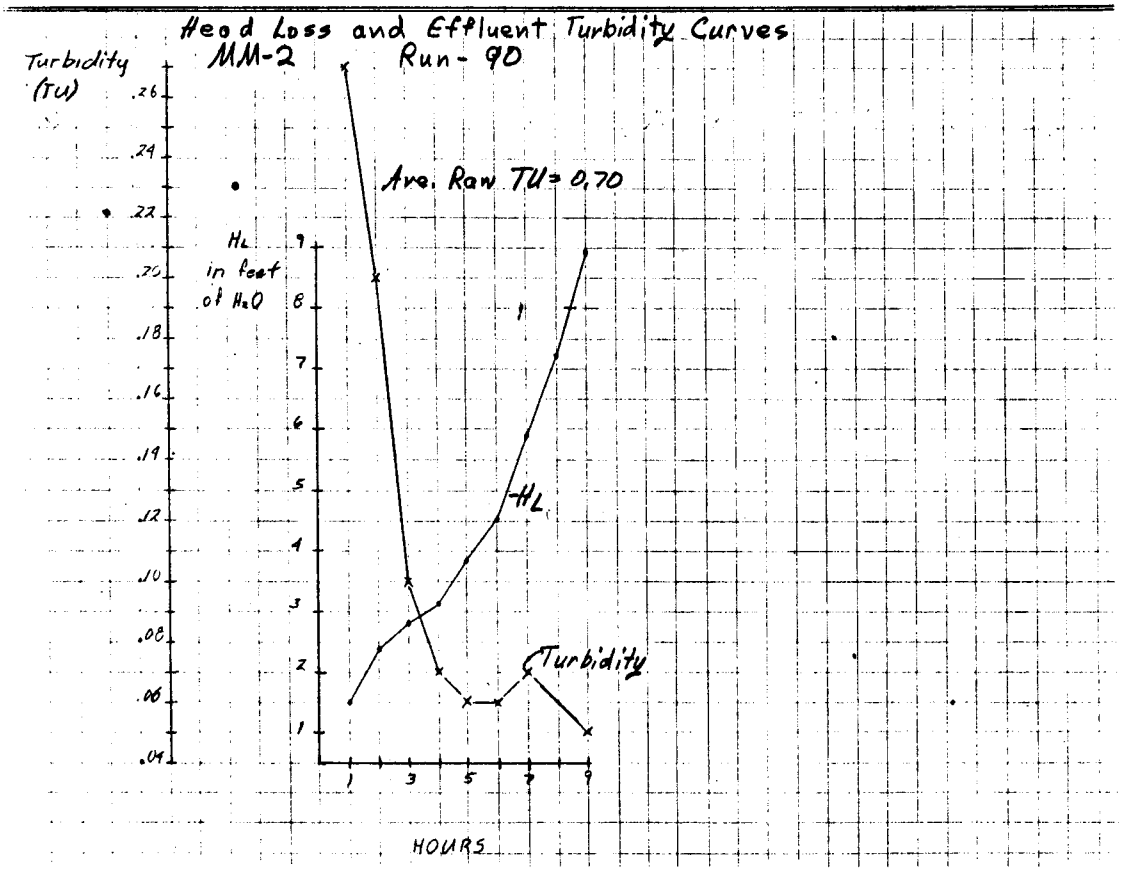

Head Loss and Effluent Turbidity Curves
MM-2 Run - 85
Turbidity (TU)
H_L in feet of H_2O
Ave. Raw TU = 0.86
H_L
Turbidity
HOURS

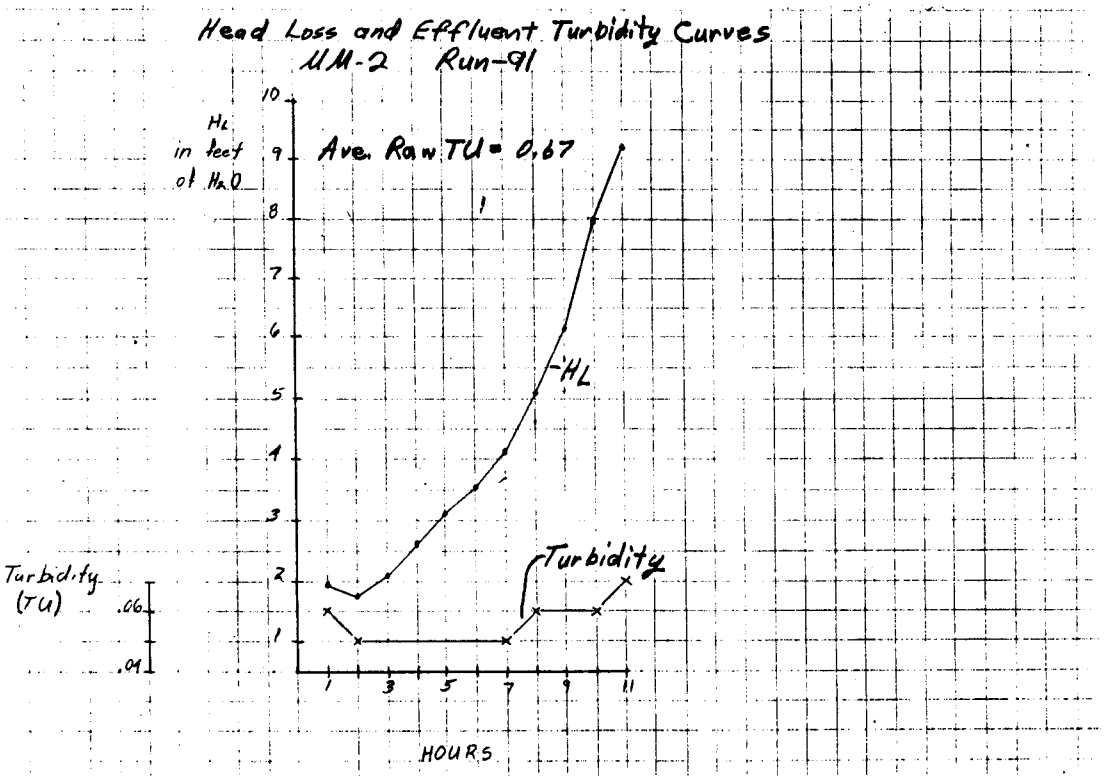

Head Loss and Effluent Turbidity Curves
MM-2 Run-86
HL in feet of H2O
Ave. Raw TU = 1.90
HL
Turbidity
Turbidity TU
HOURS

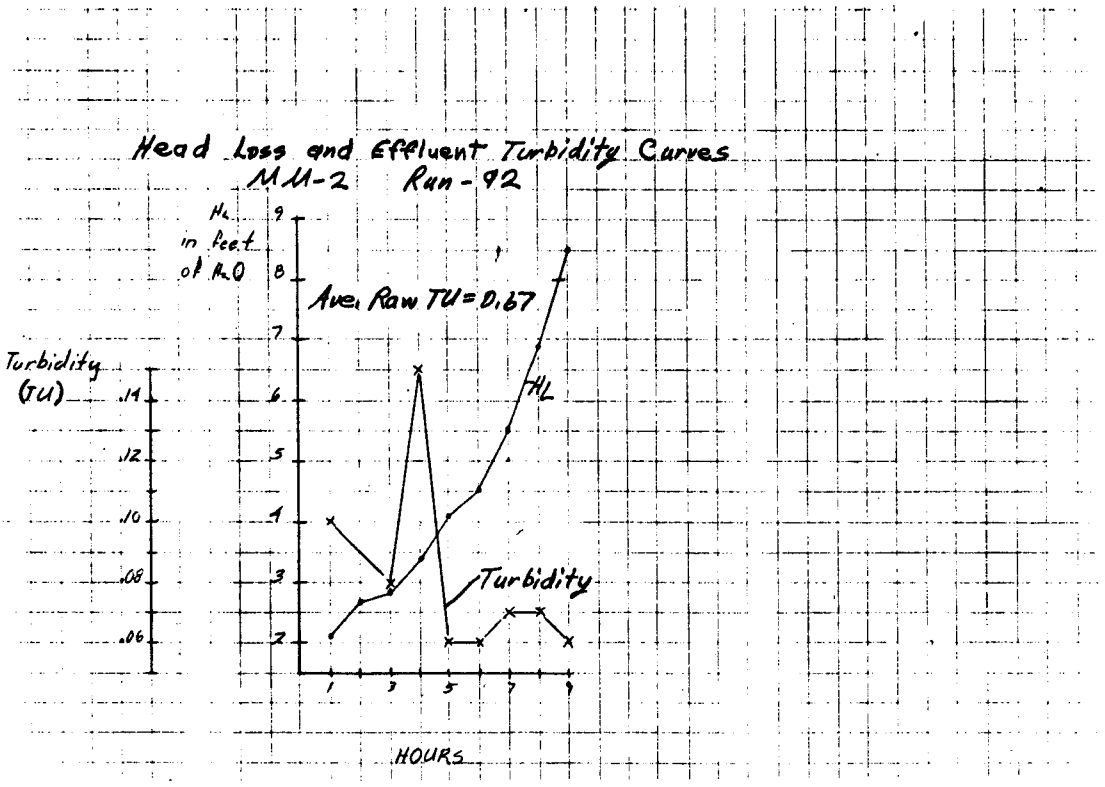

Head Loss and Effluent Turbidity Curves
MM-2 Run-87
HL in feet of H2O
Ave. Raw TU = 1.42
HL
Turbidity
Turbidity TU
HOURS

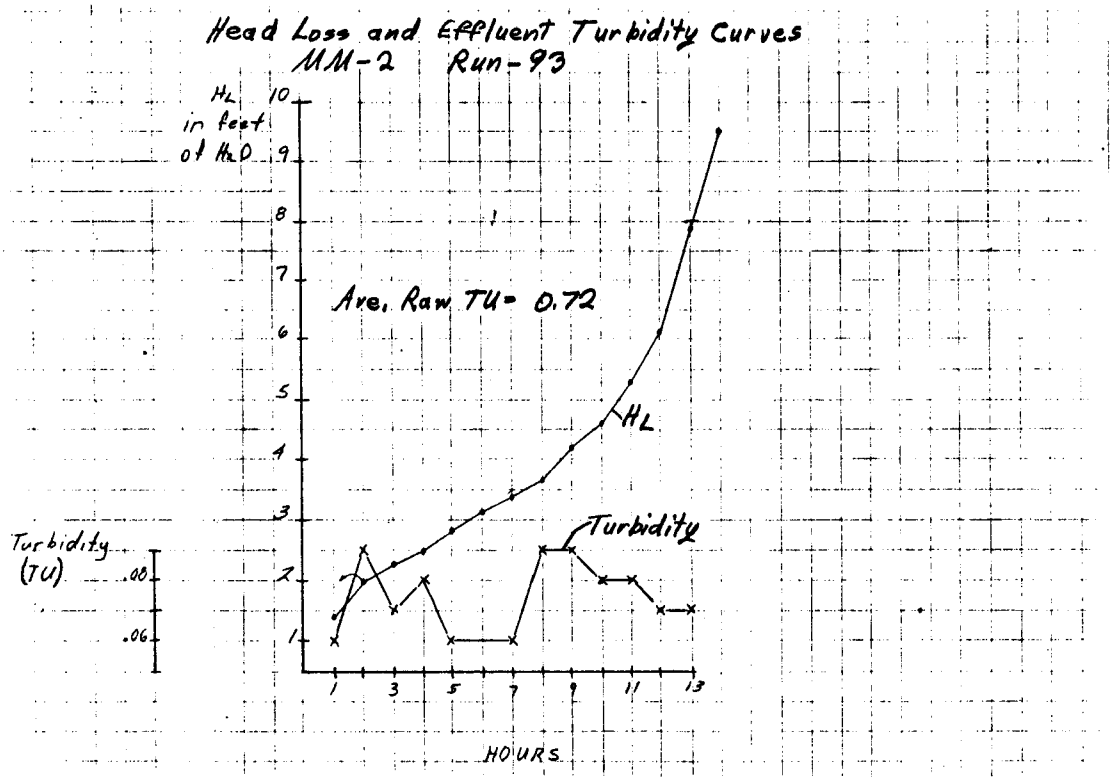

Head Loss and Effluent Turbidity Curves
MM-2 Run-88
Turbidity TU
HL in feet of H2O
Ave. Raw TU = 1.20
Turbidity
HL
HOURS

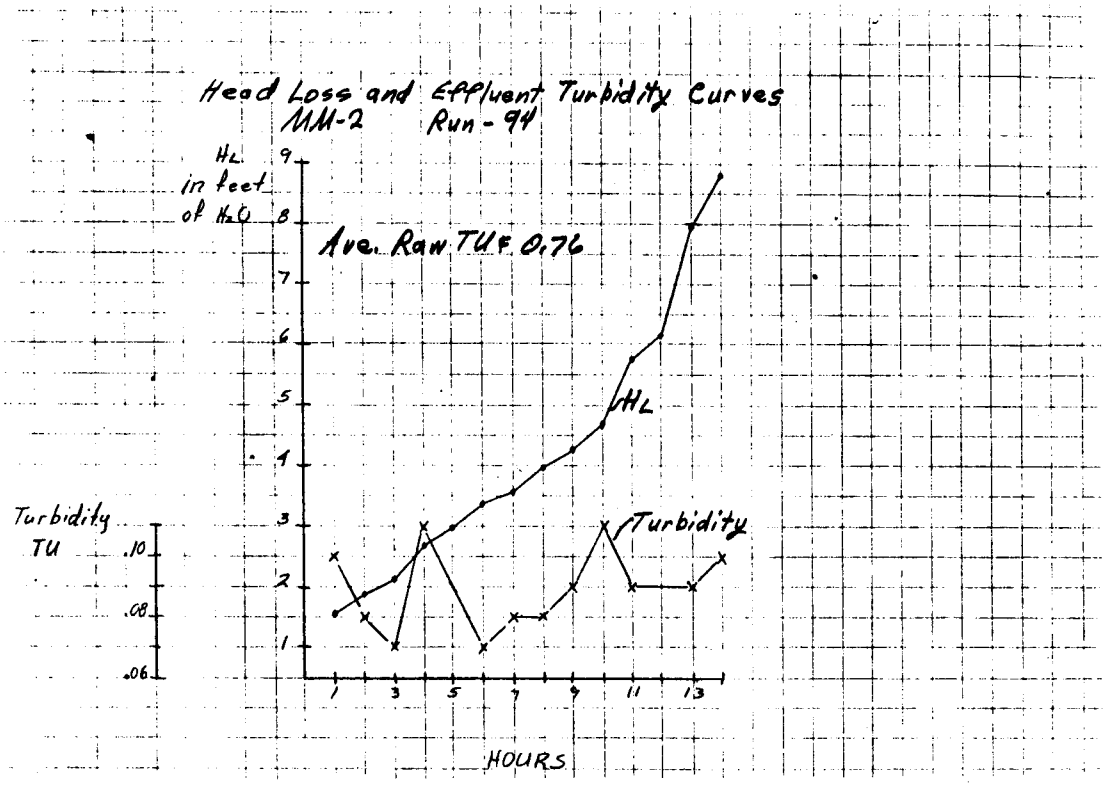

Head Loss and Effluent Turbidity Curves
MM-2 Run-89
Turbidity (TU)
HL in feet of H2O
Ave. Raw TU = 0.88
HL
Turbidity
HOURS

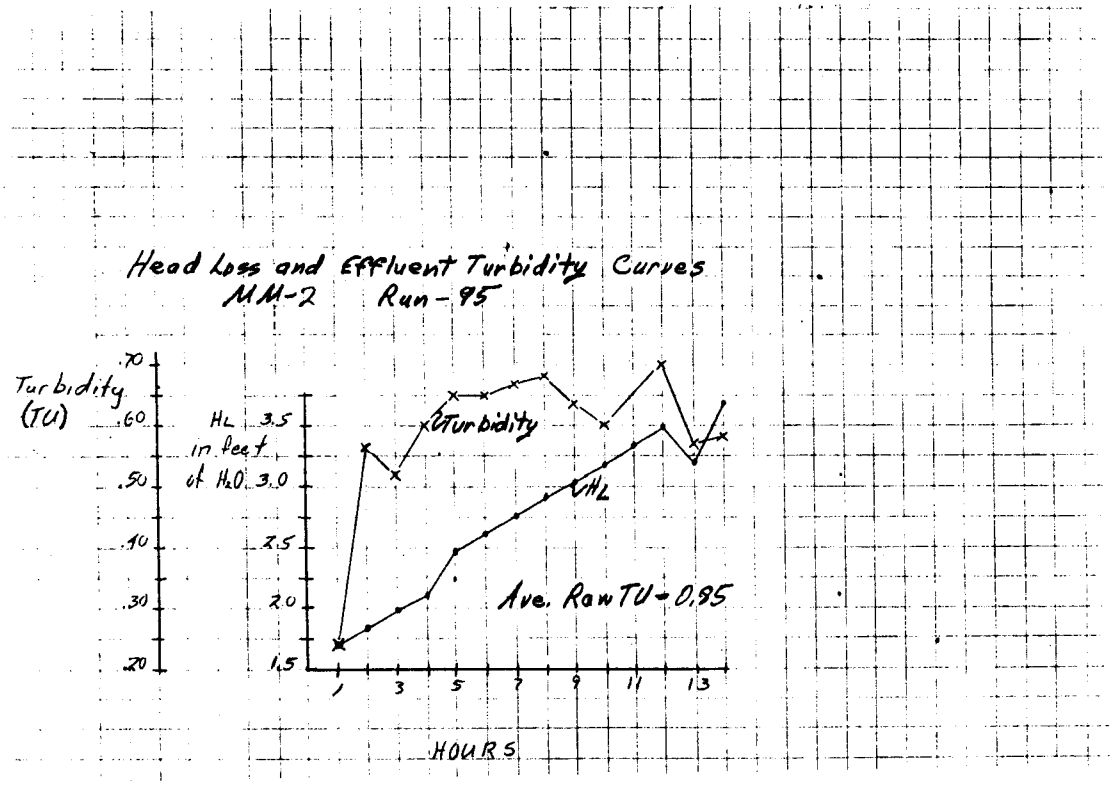

Head Loss and Effluent Turbidity Curves
MM-2 Run-90
Turbidity (TU)
Ave. Raw TU = 0.70
HL in feet of H2O
HL
Turbidity
HOURS

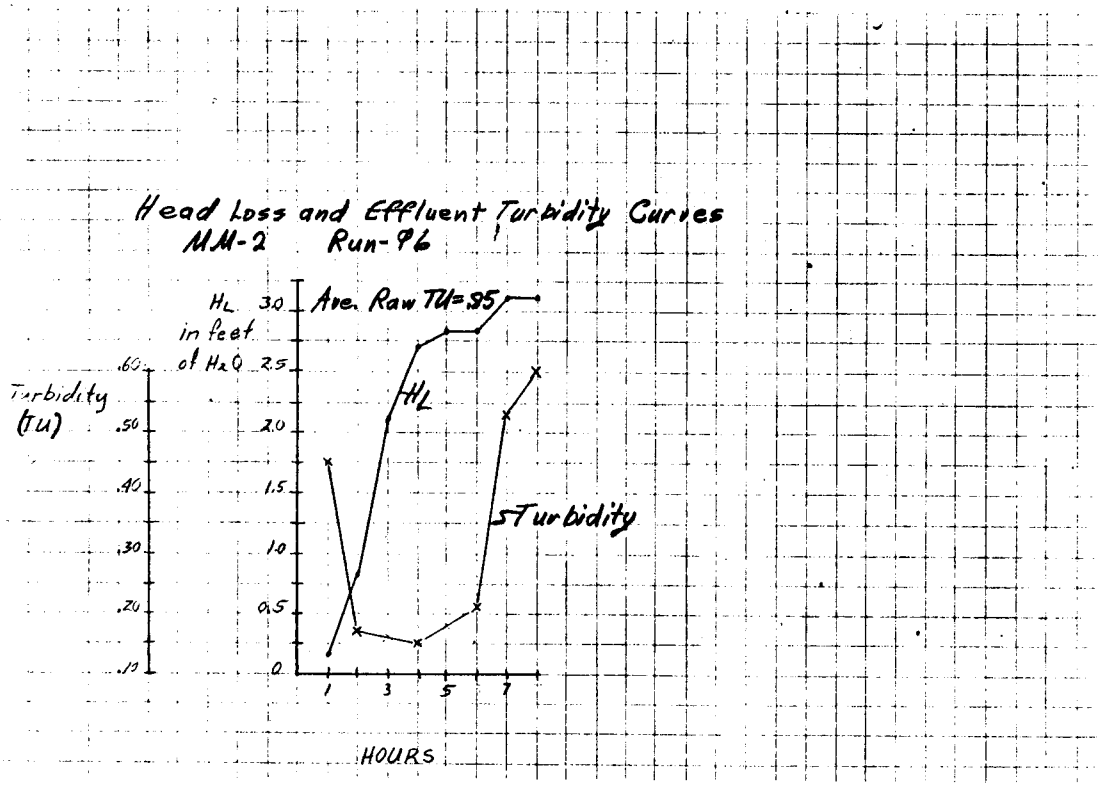

Head Loss and Effluent Turbidity Curves
MM-2 Run-91
HL in feet of H2O
Ave. Raw TU = 0.67
HL
Turbidity
Turbidity (TU)
HOURS

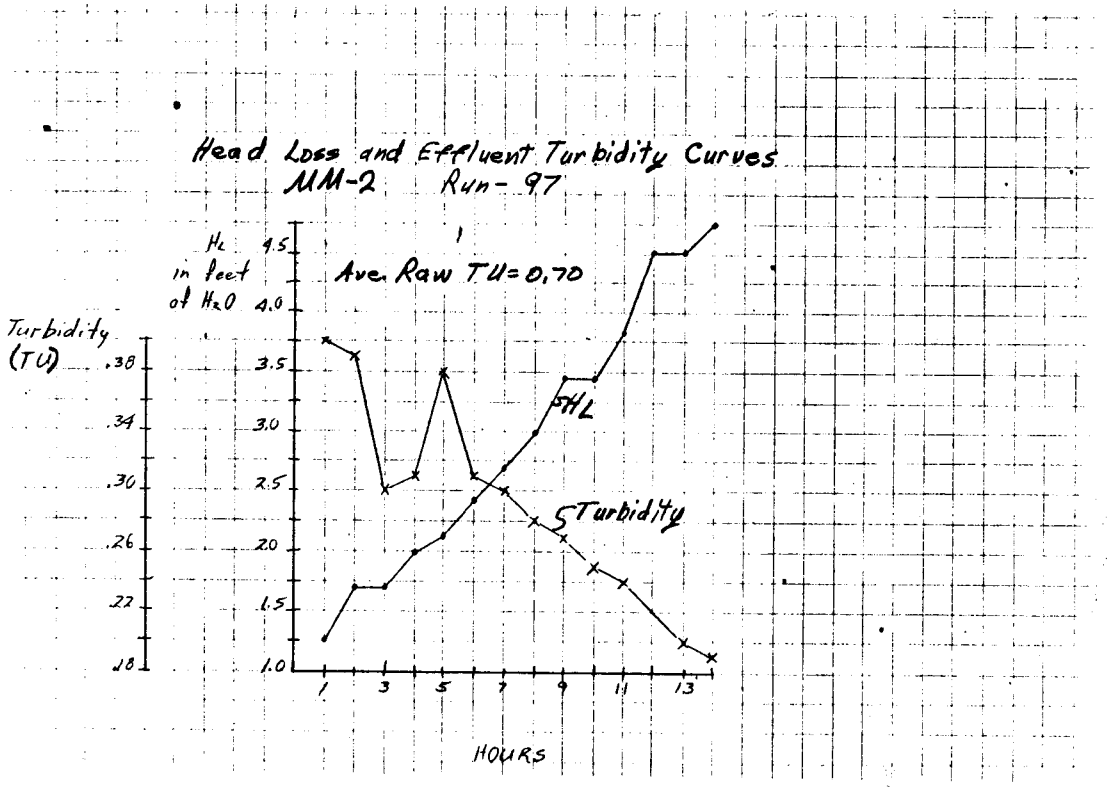

Head Loss and Effluent Turbidity Curves
MM-2 Run-92
HL in feet of H2O
Ave. Raw TU=0.67
Turbidity (TU)
HL
Turbidity
HOURS

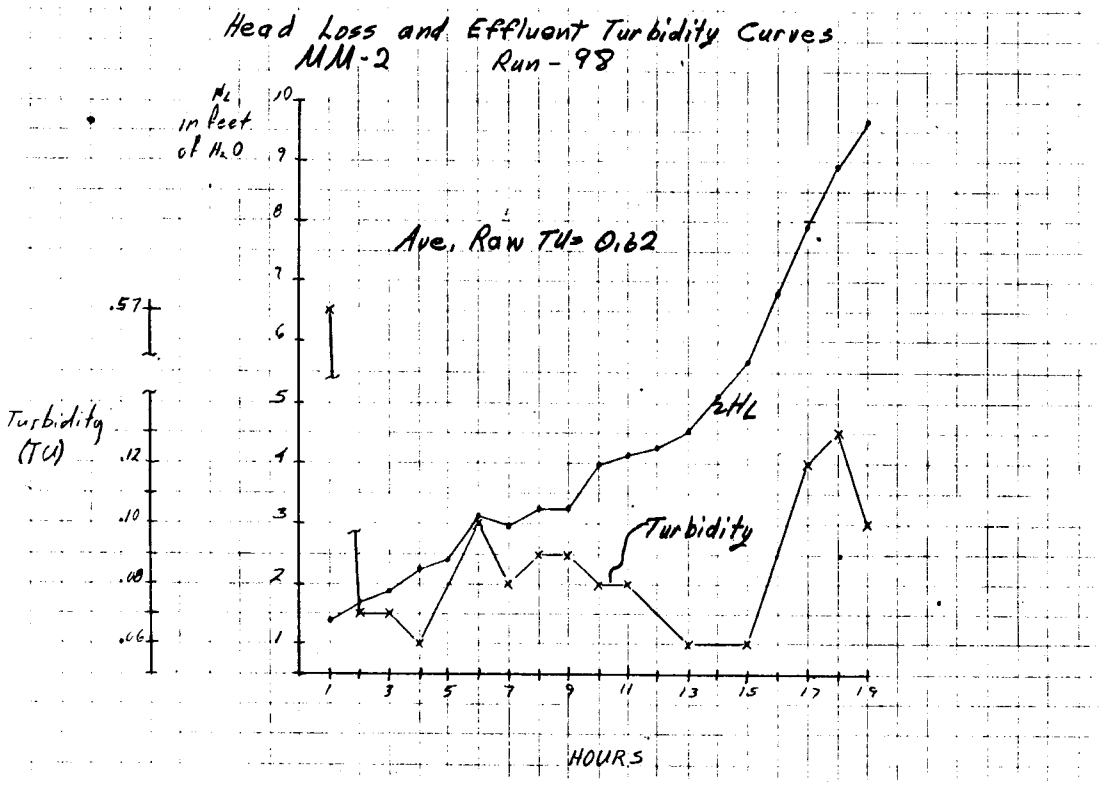

Head Loss and Effluent Turbidity Curves
MM-2 Run-93
HL in feet of H2O
Ave. Raw TU= 0.72
Turbidity (TU)
HL
Turbidity
HOURS

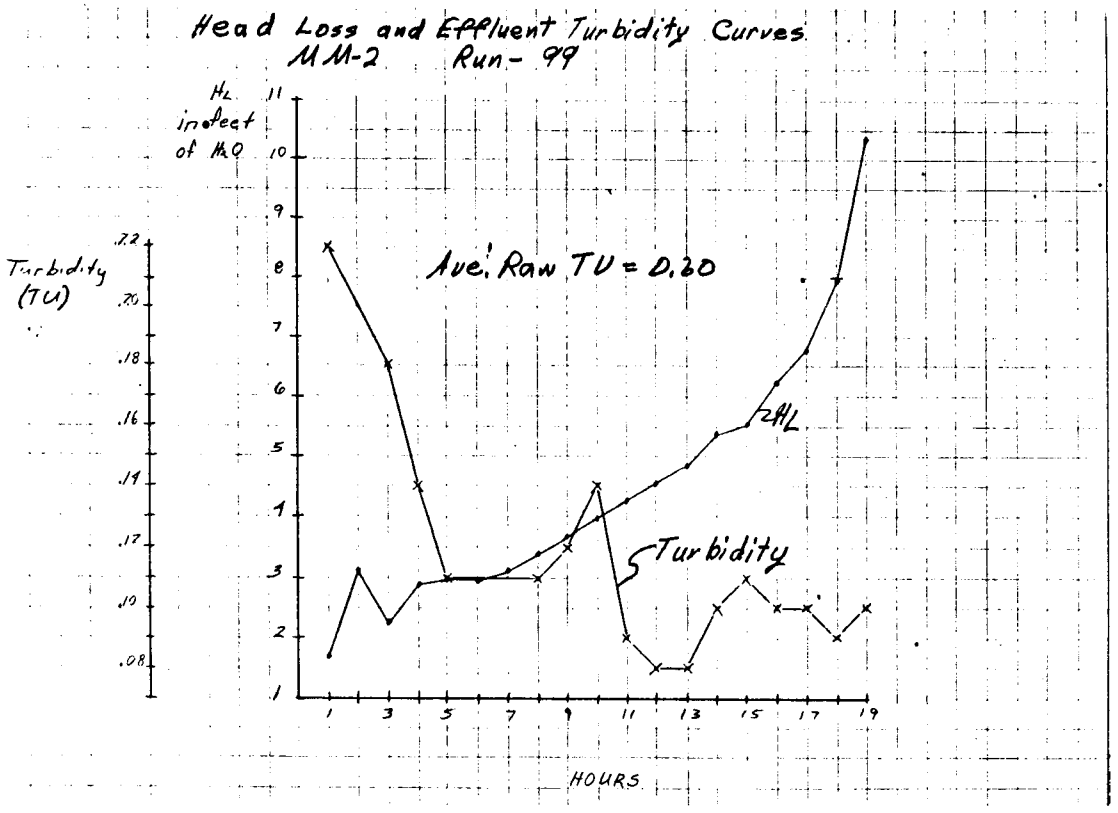

Head Loss and Effluent Turbidity Curves
MM-2 Run-94
HL in feet of H2O
Ave. Raw TU = 0.76
HL
Turbidity
Turbidity TU
HOURS

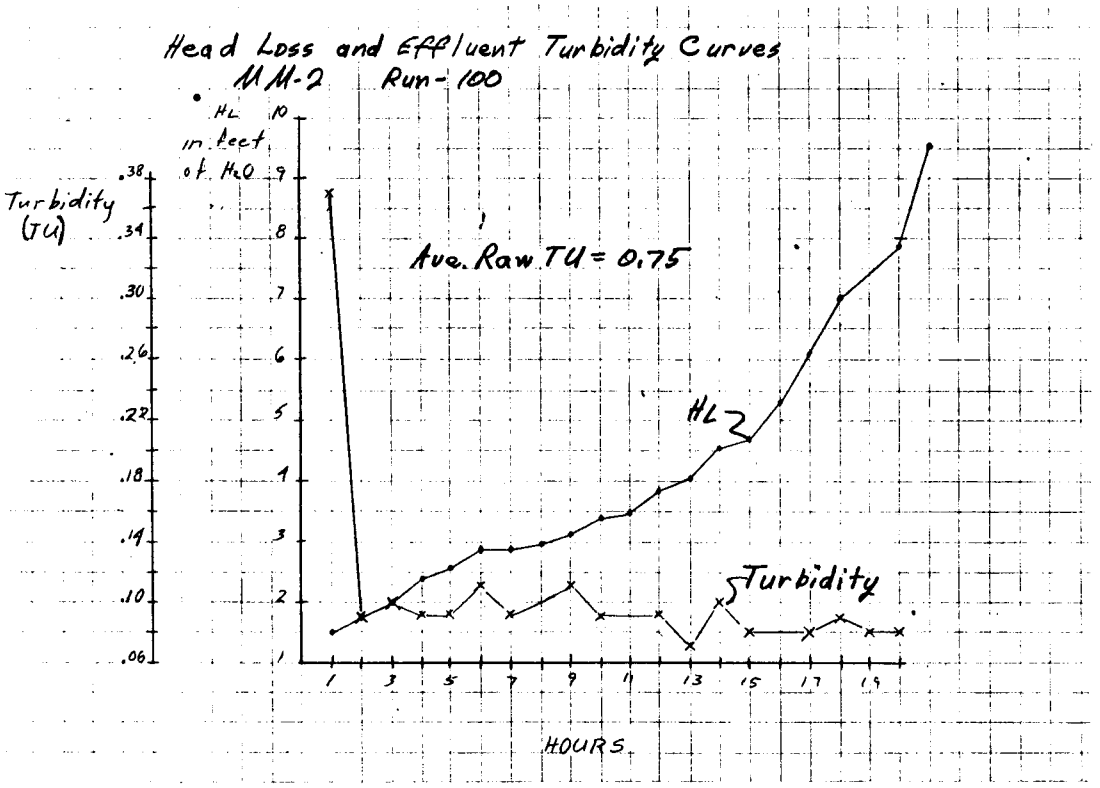

Head Loss and Effluent Turbidity Curves
MM-2 Run-95
Turbidity (TU)
HL in feet of H2O
Turbidity
HL
Ave. Raw TU = 0.95
HOURS

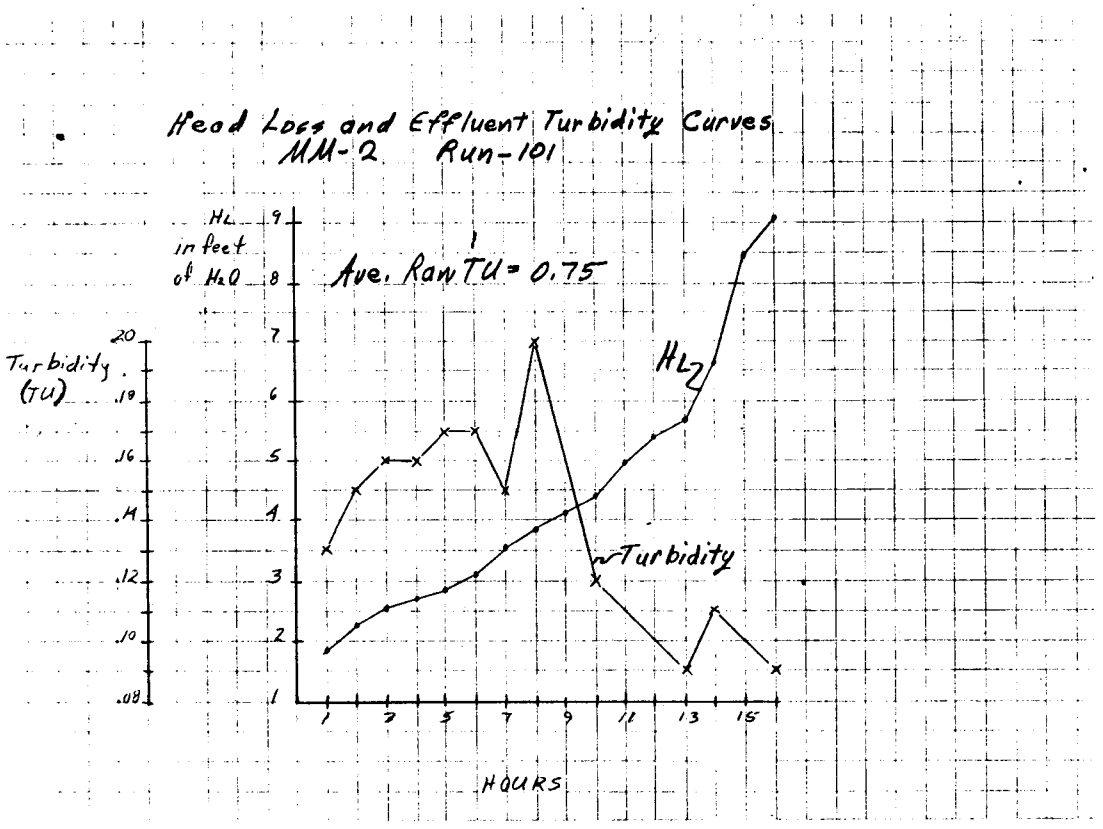

Head Loss and Effluent Turbidity Curves
MM-2 Run-96
Ave. Raw TU=.95
HL in feet of H2O
Turbidity (TU)
HL
Turbidity
HOURS

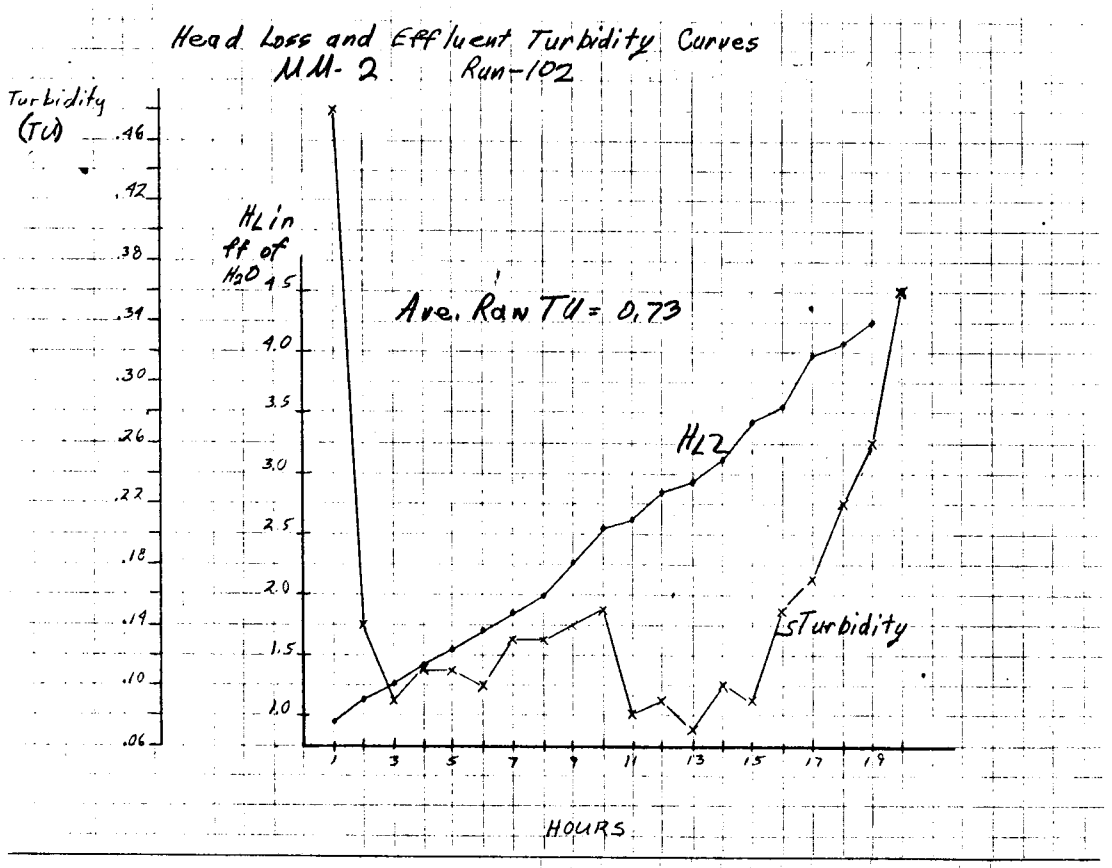

Head Loss and Effluent Turbidity Curves
MM-2 Run-97
Ave. Raw TU=0.70
HL in feet of H2O
Turbidity (TU)
HL
Turbidity
HOURS

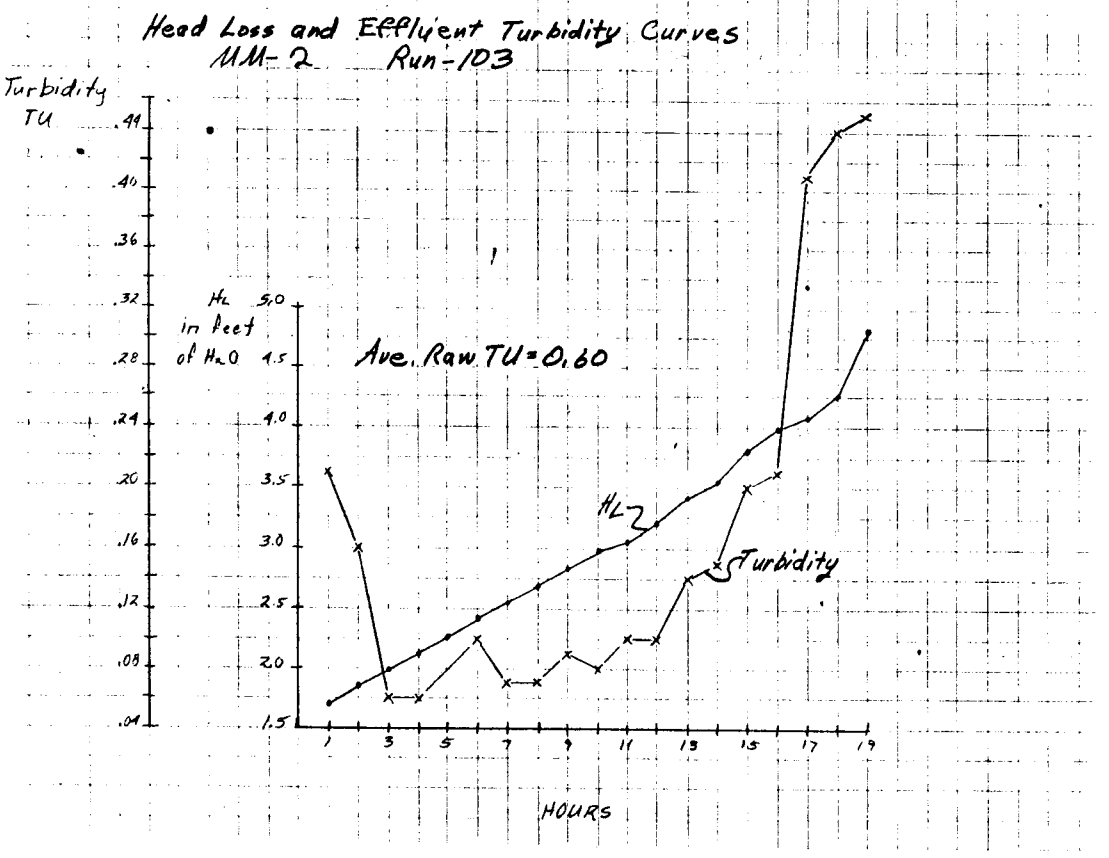

Head Loss and Effluent Turbidity Curves
MM-2 Run - 98
HL in feet of H2O
Ave. Raw TU = 0.62
2HL
Turbidity
Turbidity (TU)
HOURS

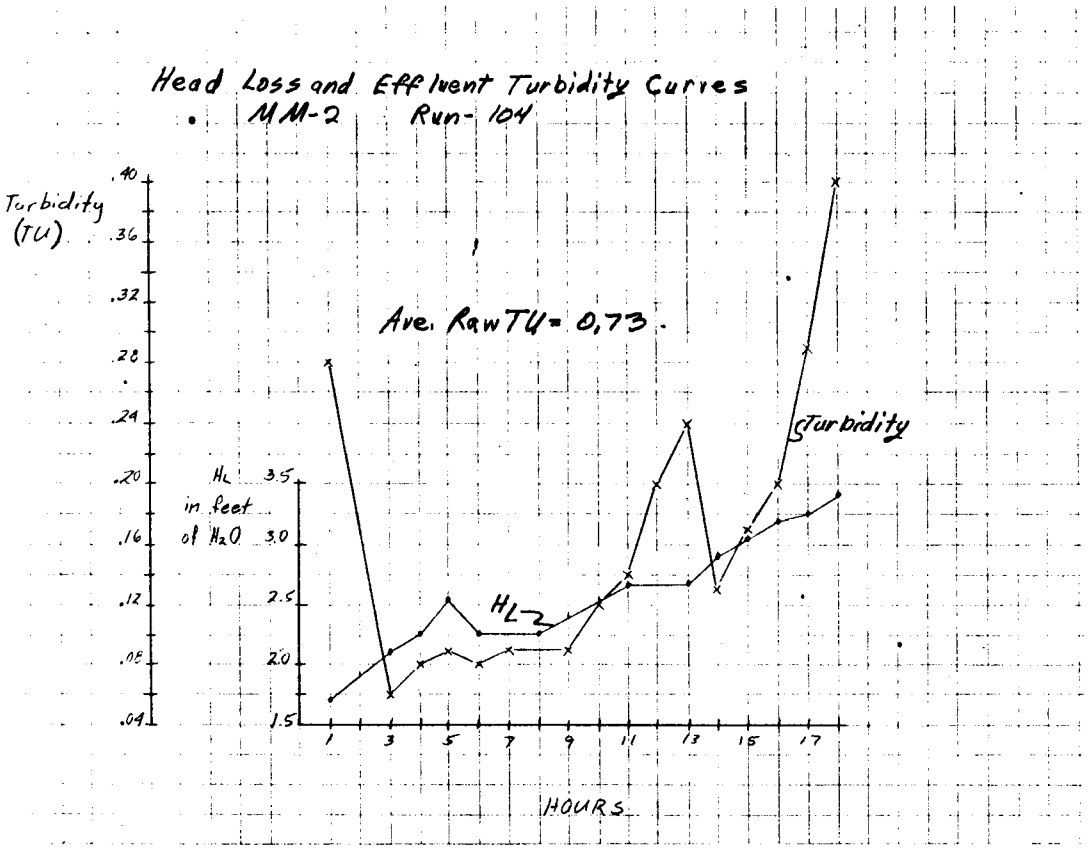

Head Loss and Effluent Turbidity Curves
MM-2 Run - 99
HL in feet of H2O
Ave. Raw TU = 0.20
2HL
Turbidity
Turbidity (TU)
HOURS

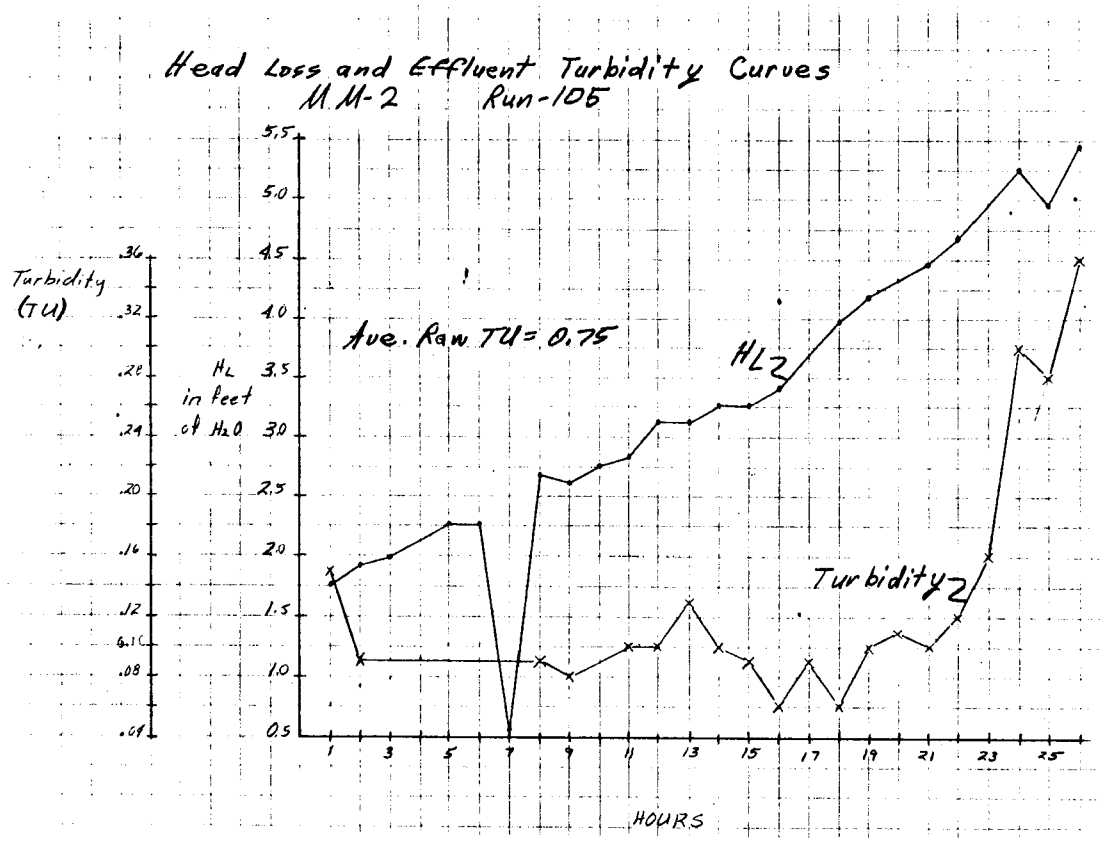

Head Loss and Effluent Turbidity Curves
MM-2 Run-100
HL in feet of H2O
Turbidity (TU)
Ave. Raw TU = 0.75
HL
Turbidity
HOURS

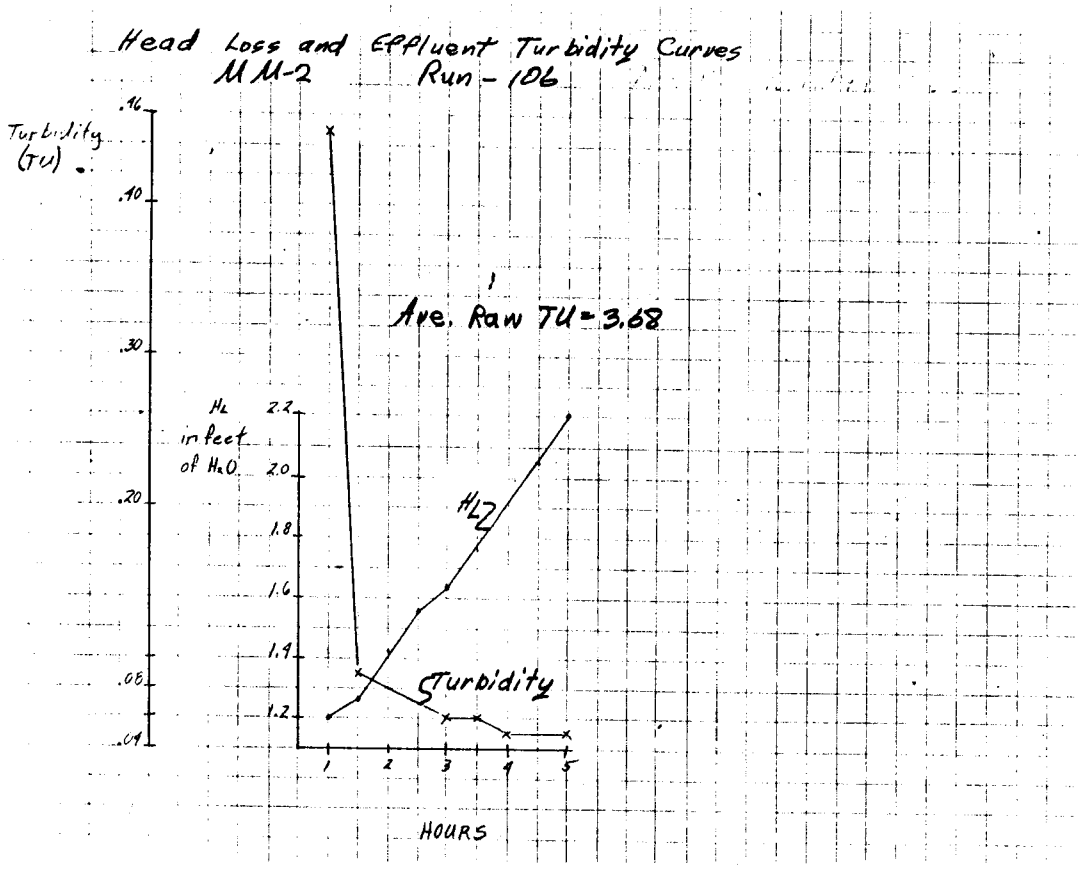

Head Loss and Effluent Turbidity Curves
MM-2 Run-101
HL in feet of H2O
Turbidity (TU)
Ave. Raw TU = 0.75
HL
Turbidity
HOURS

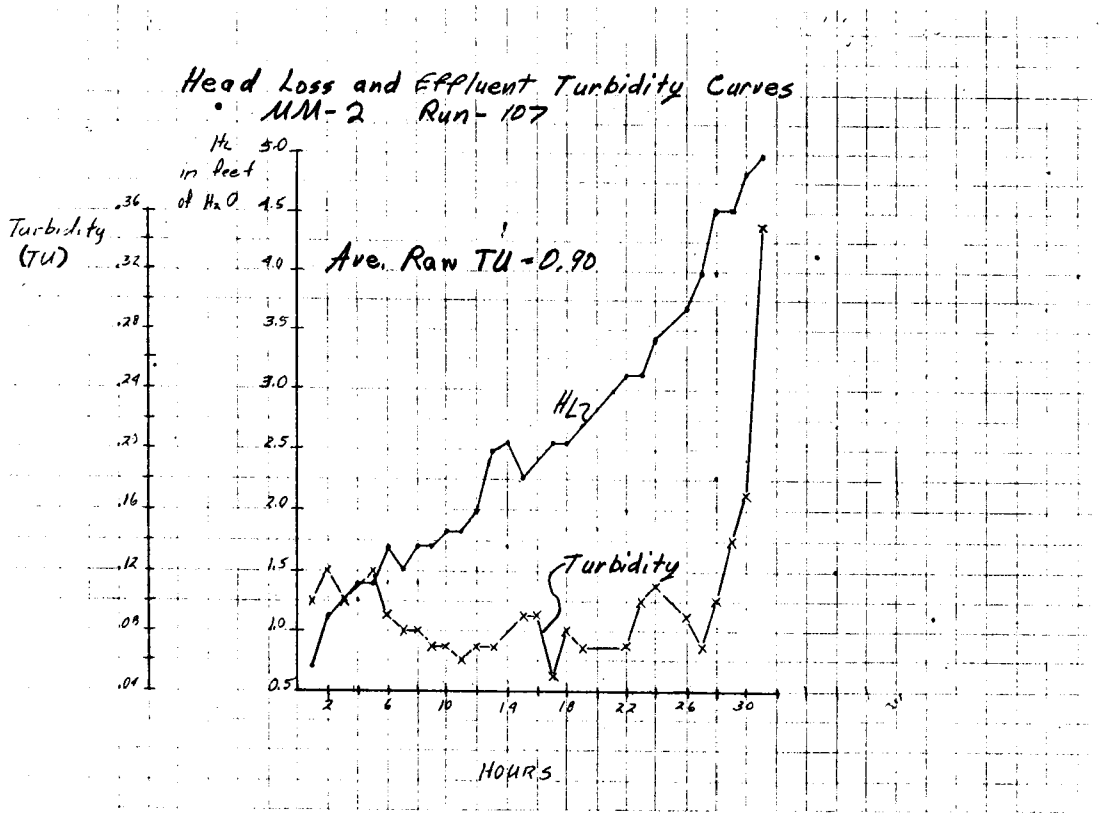

Head Loss and Effluent Turbidity Curves
MM-2 Run-102
Turbidity (TU)
.46
.42
.38
.34
.30
.26
.22
.18
.14
.10
.06
HL in ft of H2O
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
Ave. Raw TU = 0.73
HL
Turbidity
1
3
5
7
9
11
13
15
17
19
HOURS

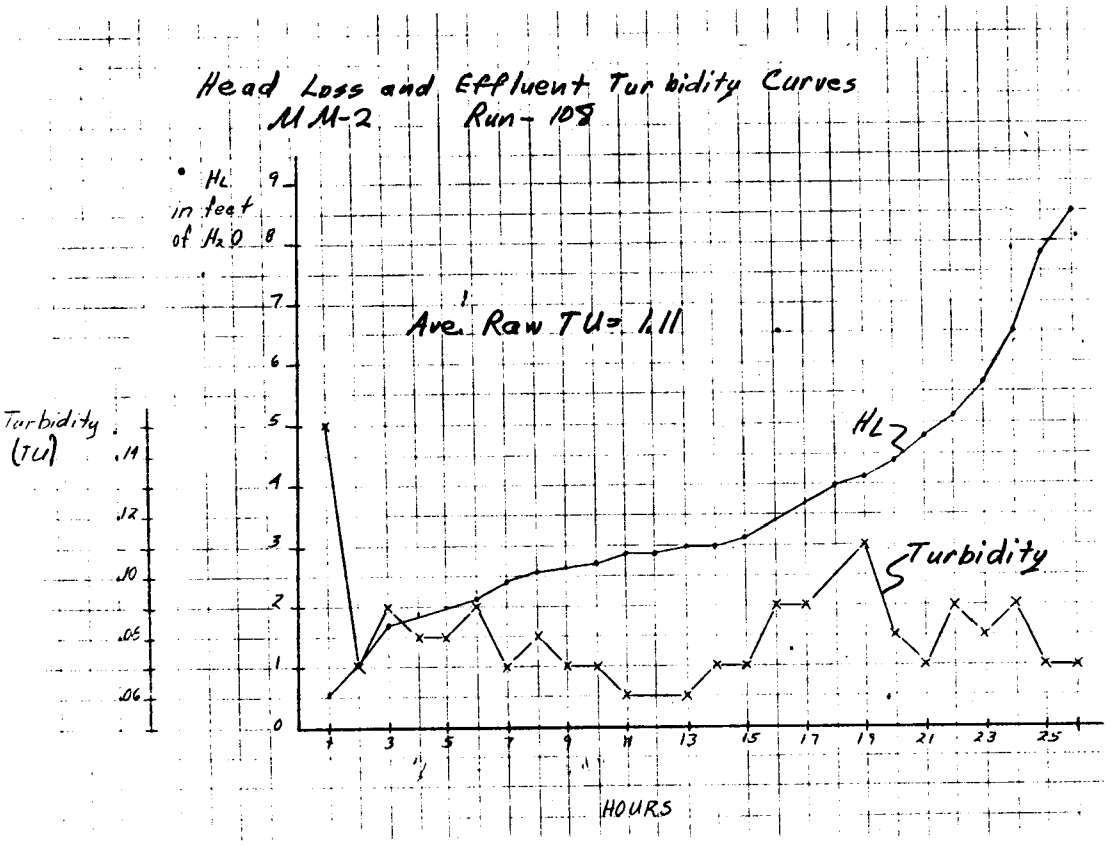

Head Loss and Effluent Turbidity Curves
MM-2 Run-103
Turbidity TU
.44
.40
.36
.32
.28
.24
.20
.16
.12
.08
.04
HL in feet of H2O
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
Ave. Raw TU = 0.60
HL
Turbidity
1
3
5
7
9
11
13
15
17
19
HOURS

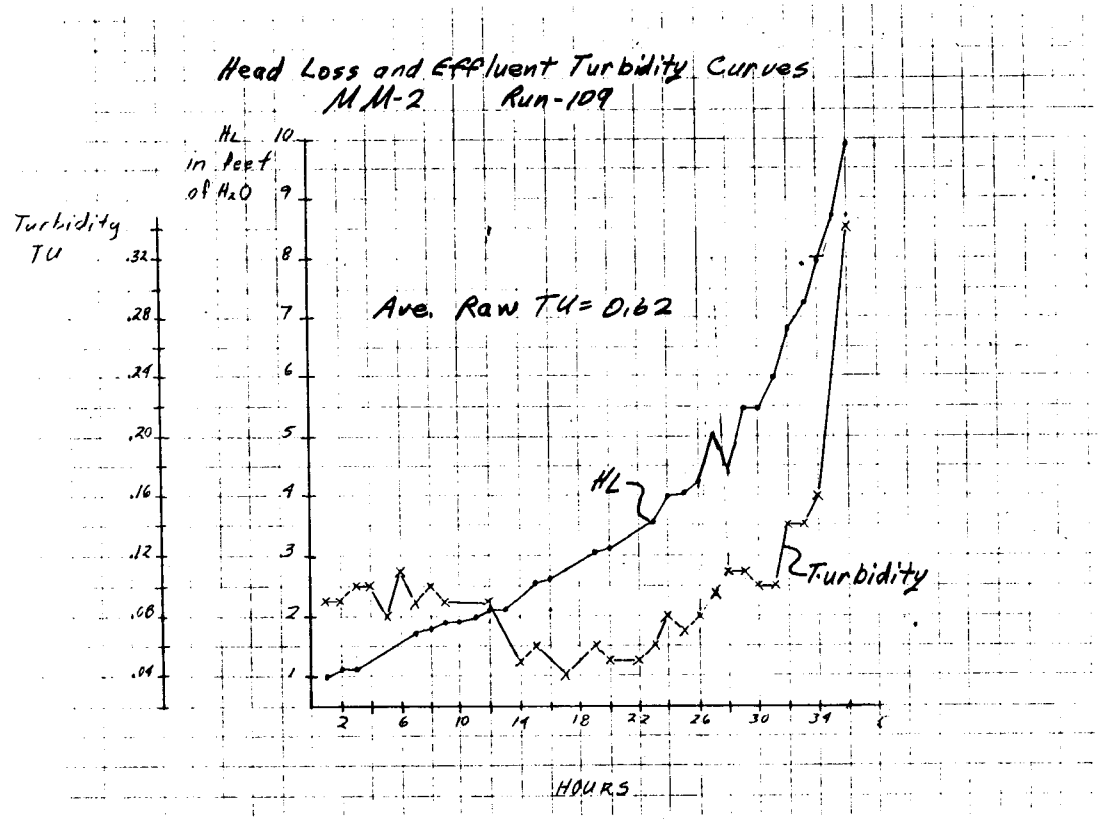

Head Loss and Effluent Turbidity Curves
MM-2 Run-104
Turbidity (TU)
Ave. Raw TU = 0.73
Turbidity
HL in feet of H2O
HL
HOURS

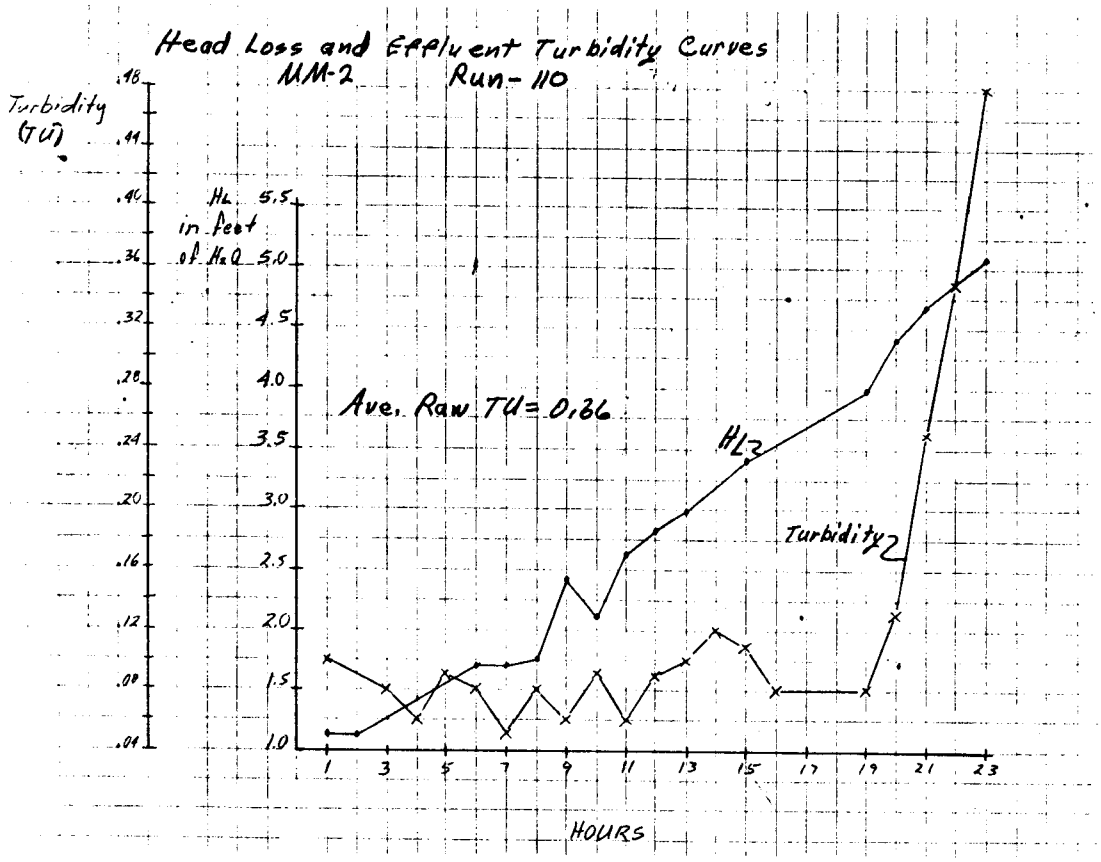

Head Loss and Effluent Turbidity Curves
MM-2 Run-105
Turbidity (TU)
Ave. Raw TU = 0.75
HL
Turbidity
HL in feet of H2O
HOURS

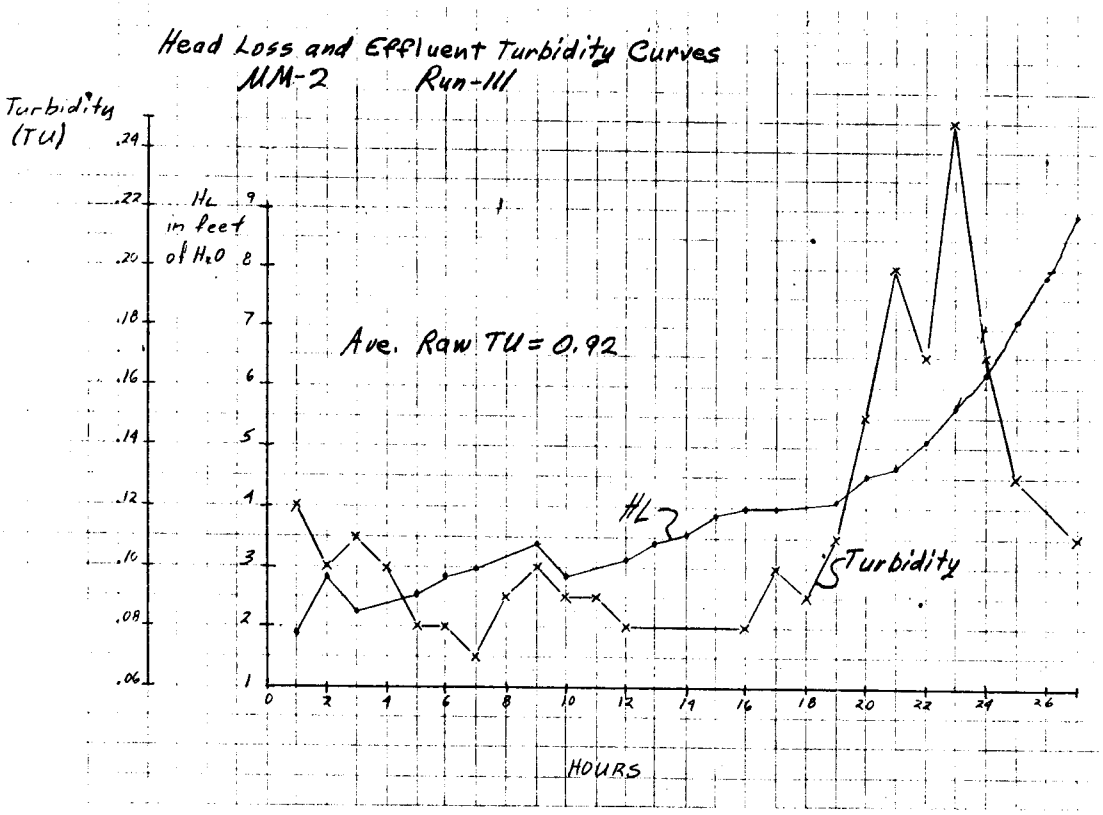

Head Loss and Effluent Turbidity Curves
MM-2 Run - 106
Turbidity (TU)
.16
.10
.30
.20
.08
.04
Ave. Raw TU = 3.68
HL in feet of H2O
2.2
2.0
1.8
1.6
1.4
1.2
HL
Turbidity
1
2
3
4
5
HOURS

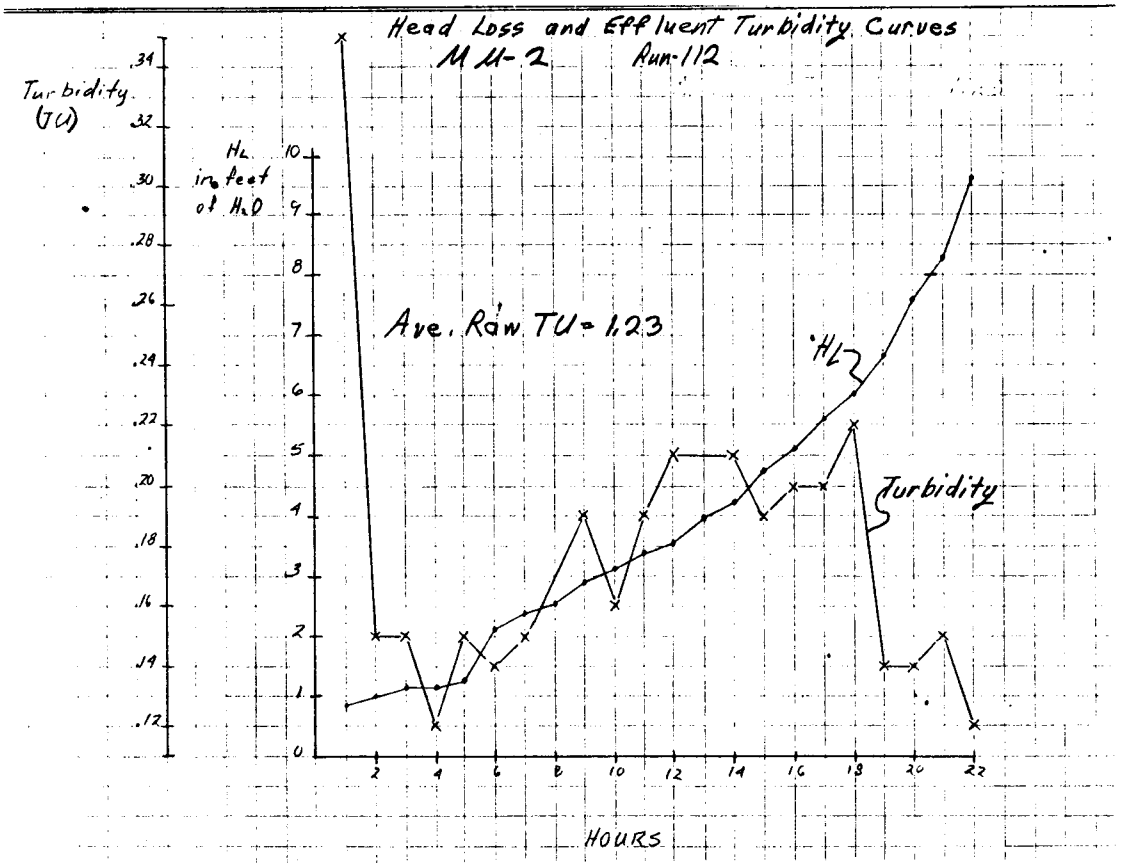

Head Loss and Effluent Turbidity Curves
MM-2 Run - 107
HL in feet of H2O
3.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
Turbidity (TU)
.36
.32
.28
.24
.20
.16
.12
.08
.04
Ave. Raw TU = 0.90
HL
Turbidity
2
6
10
14
18
22
26
30
HOURS

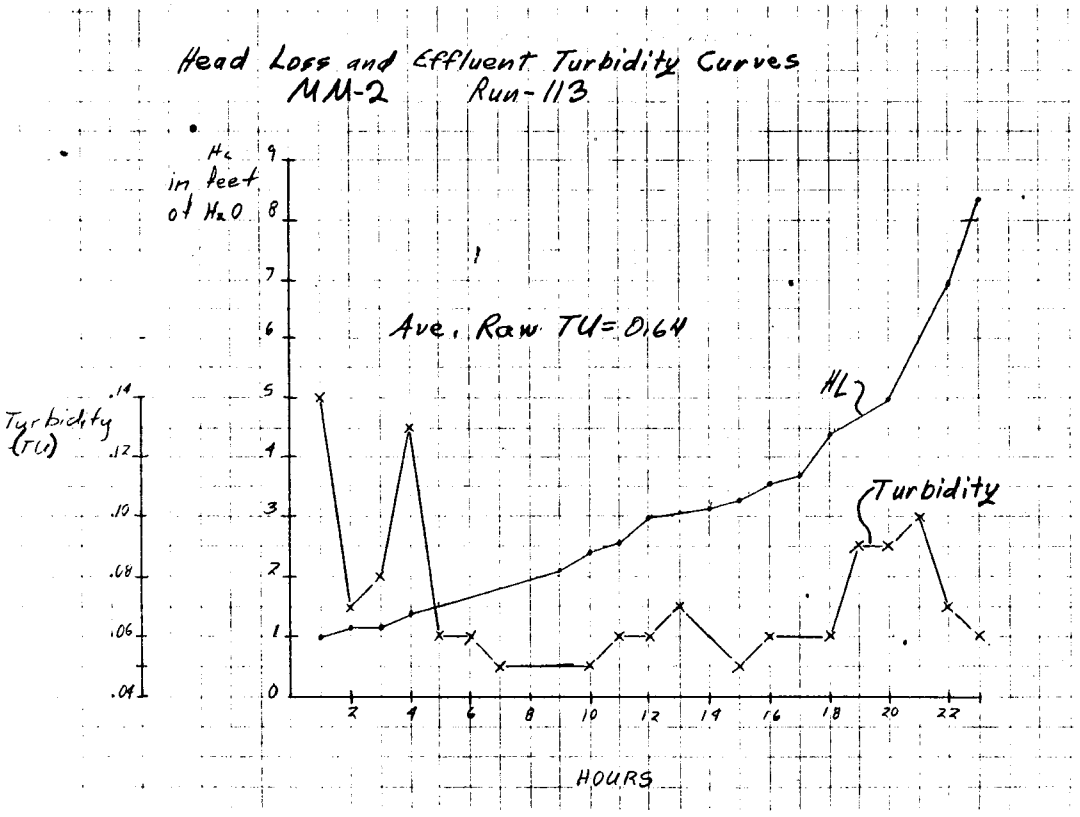

Head Loss and Effluent Turbidity Curves
MM-2 Run-108
HL in feet of H2O
Turbidity (TU)
Ave. Raw TU= 1.11
HL
Turbidity
HOURS

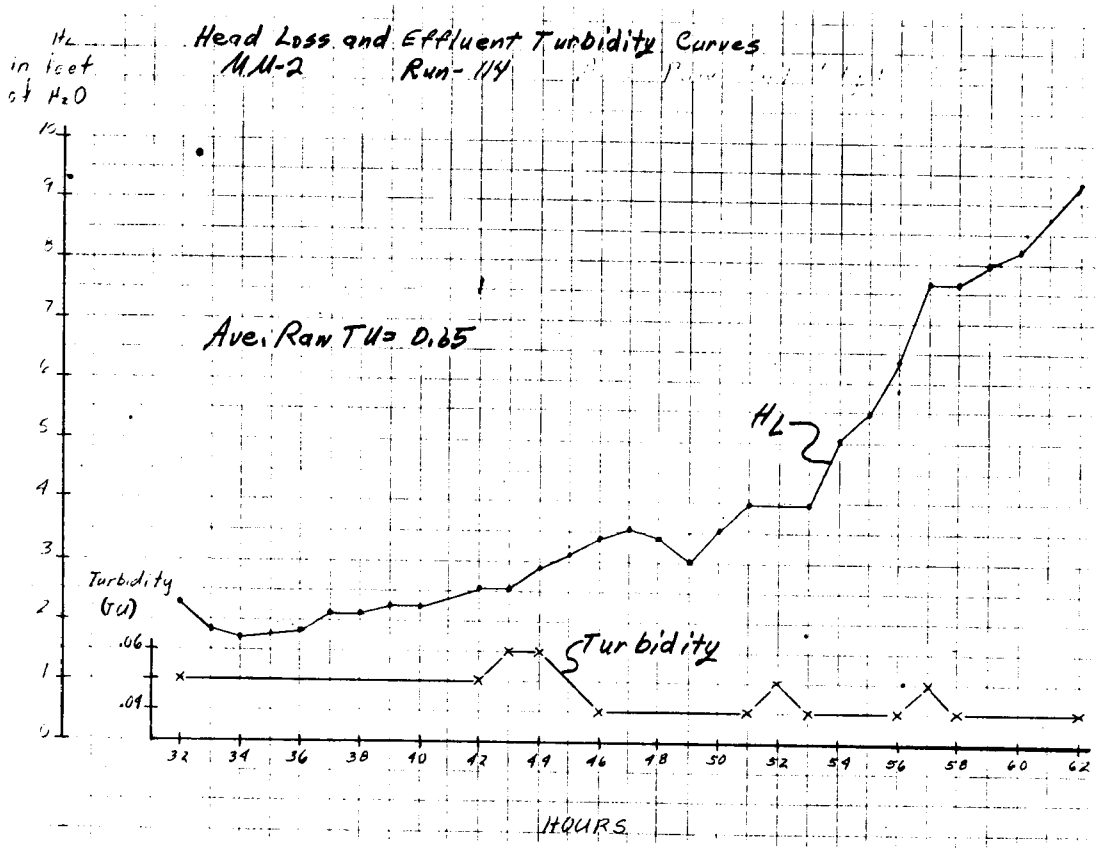

Head Loss and Effluent Turbidity Curves
MM-2 Run-109
HL in feet of H2O
Turbidity TU
Ave. Raw TU= 0.62
HL
Turbidity
HOURS

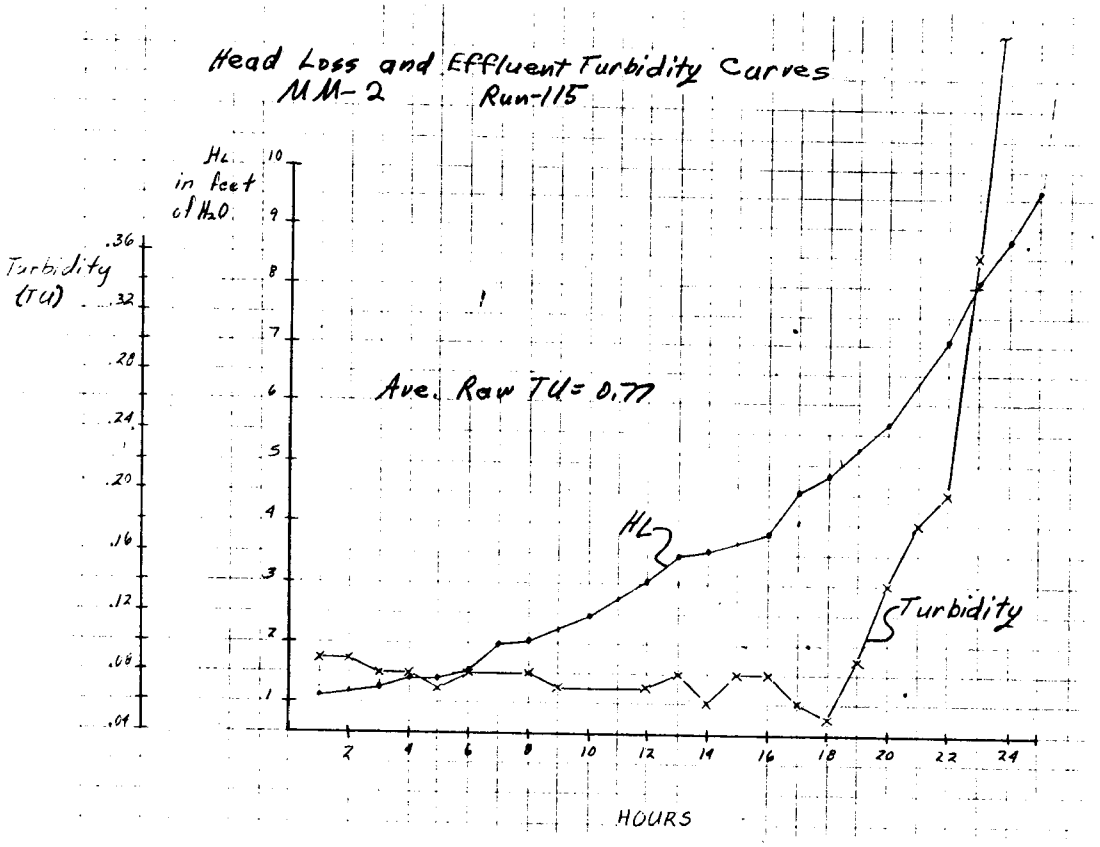

Head Loss and Effluent Turbidity Curves
MM-2 Run-110
Turbidity (TU)
HL in feet of H_2O
Ave. Raw TU = 0.36
HL
Turbidity
HOURS

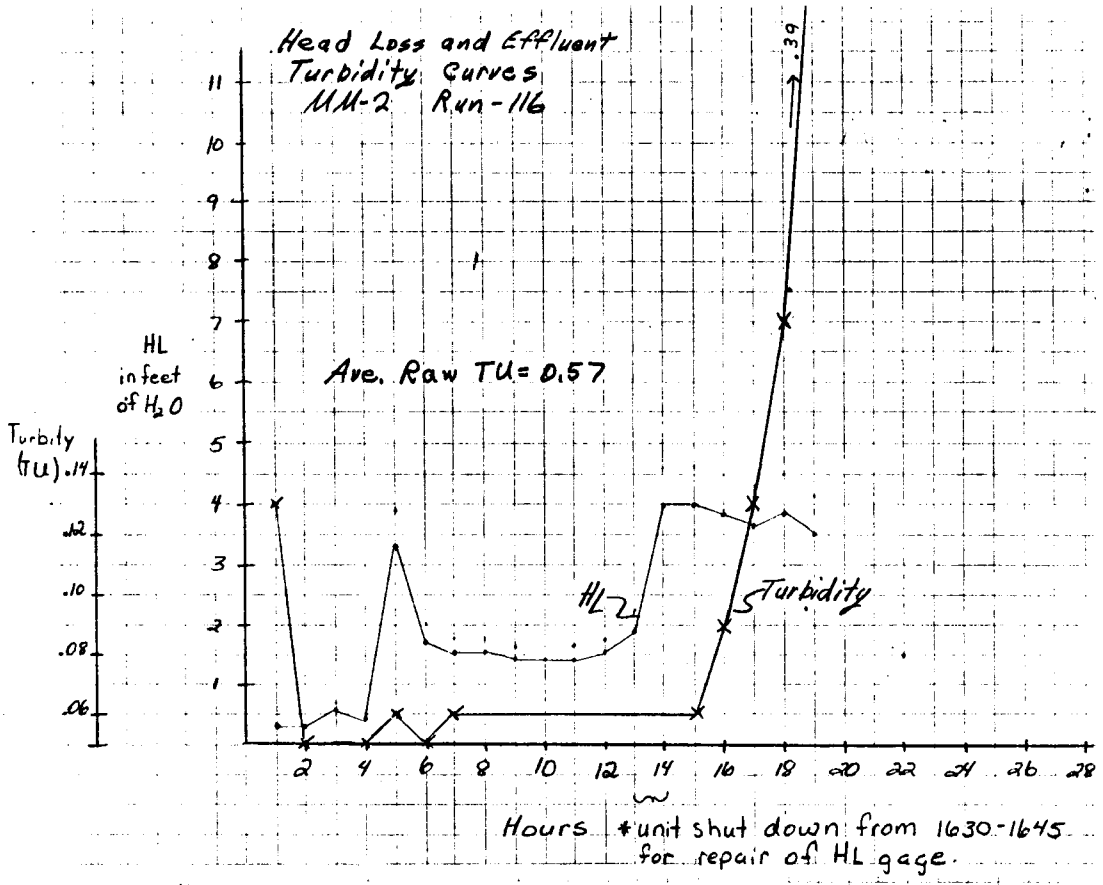

Head Loss and Effluent Turbidity Curves
MM-2 Run-111
Turbidity (TU)
HL in feet of H_2O
Ave. Raw TU = 0.92
HL
Turbidity
HOURS

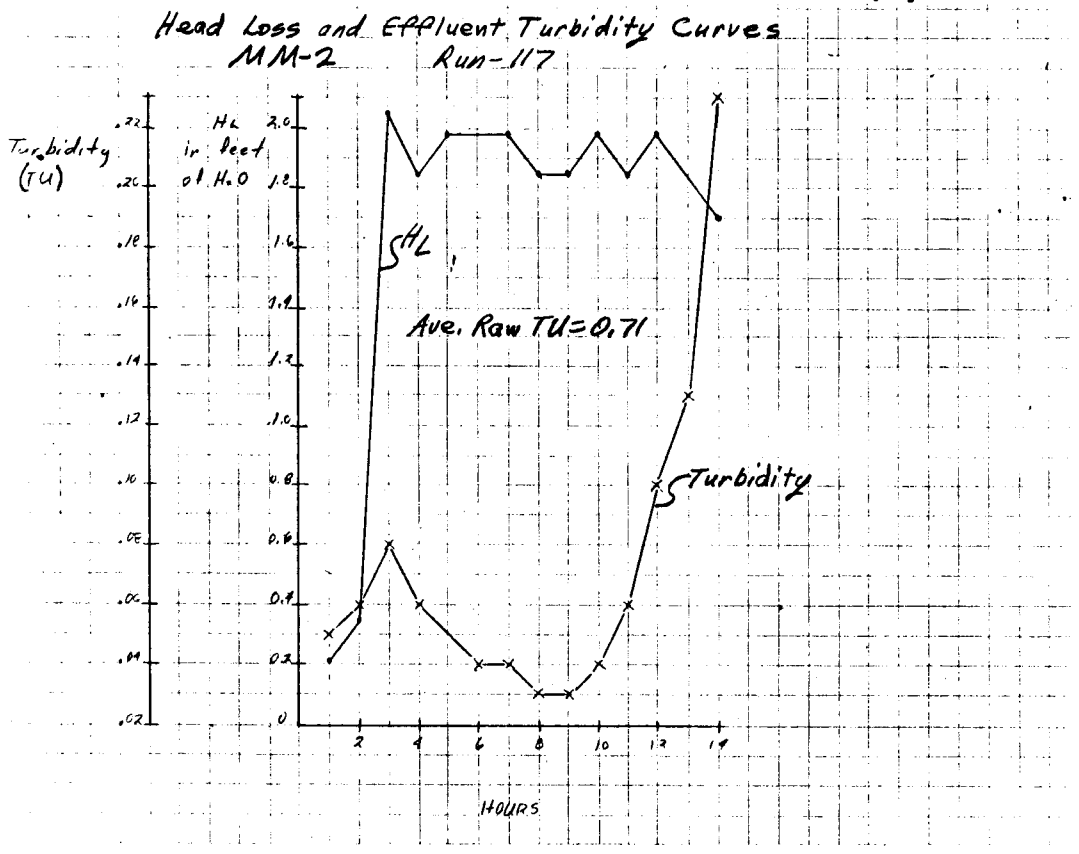

Head Loss and Effluent Turbidity Curves
MM-2 Run-112
Turbidity (TU)
HL in feet of H2O
Ave. Raw TU = 1.23
HL
Turbidity
HOURS

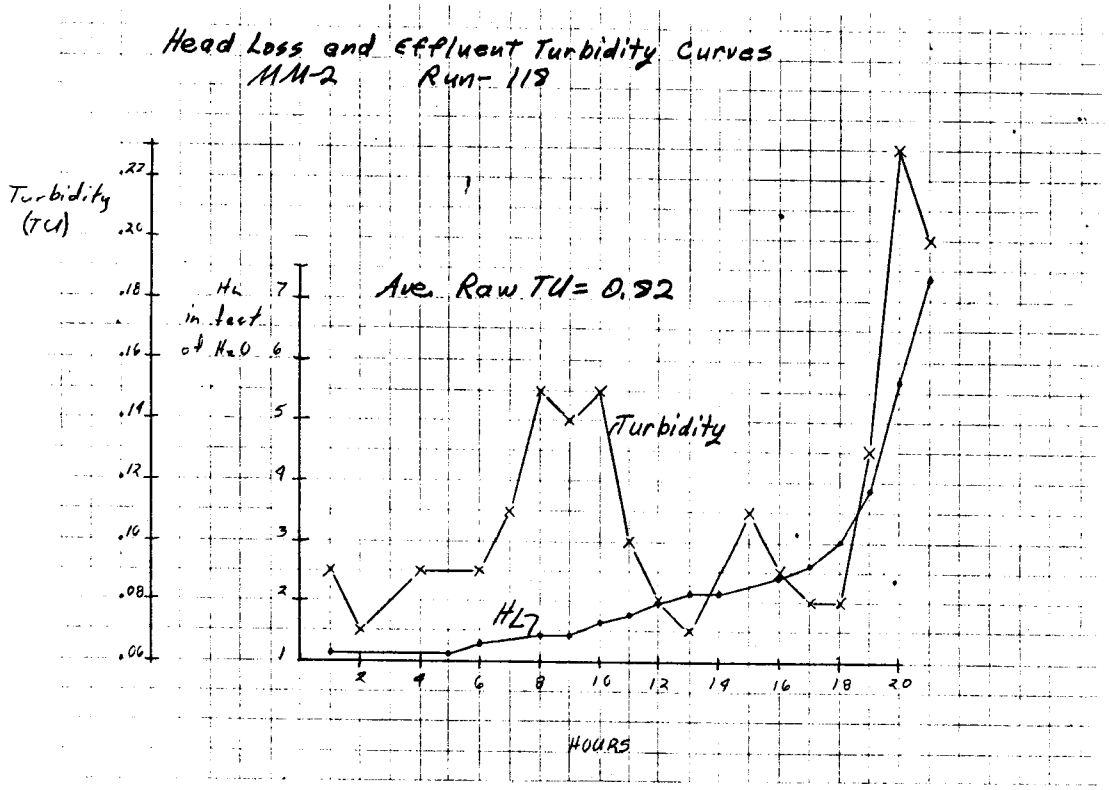

Head Loss and Effluent Turbidity Curves
MM-2 Run-113
HL in feet of H2O
Ave. Raw TU = 0.64
Turbidity (TU)
HL
Turbidity
HOURS

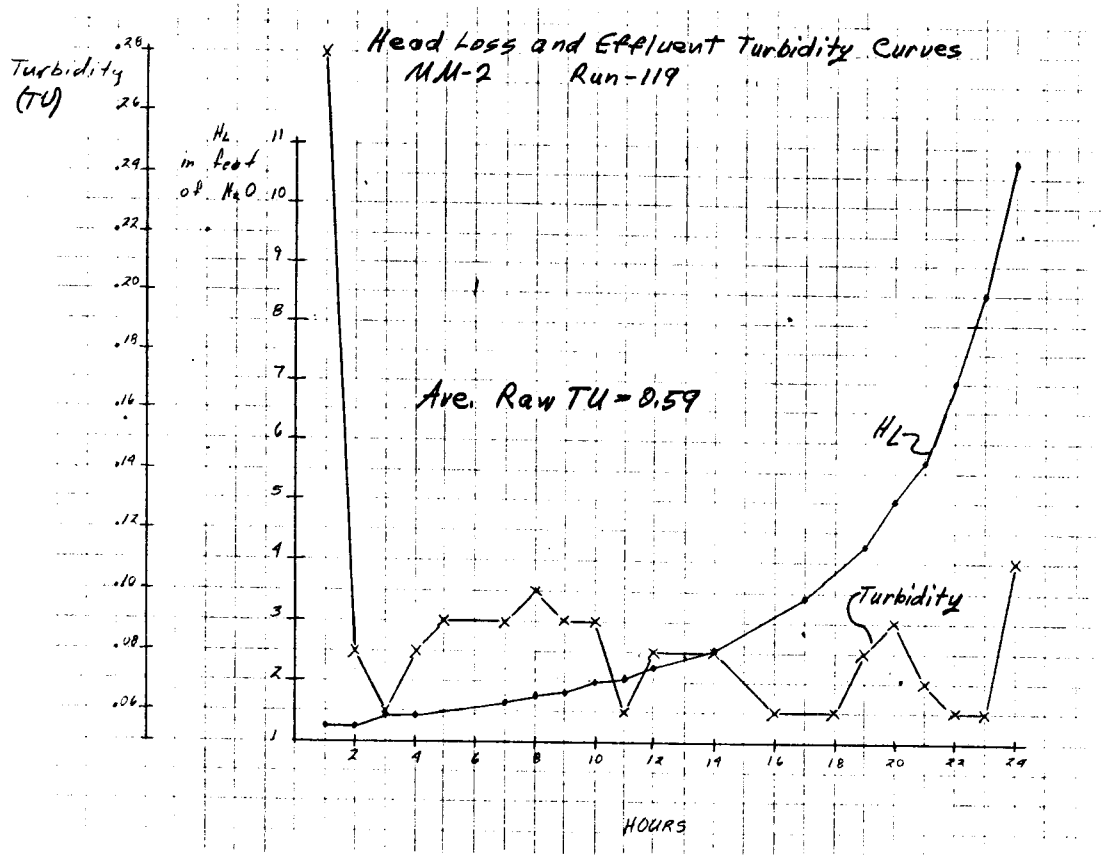

Head Loss and Effluent Turbidity Curves
MM-2 Run-114
HL in feet of H2O
Ave. Raw TU = 0.65
HL
Turbidity (TU)
Turbidity
HOURS

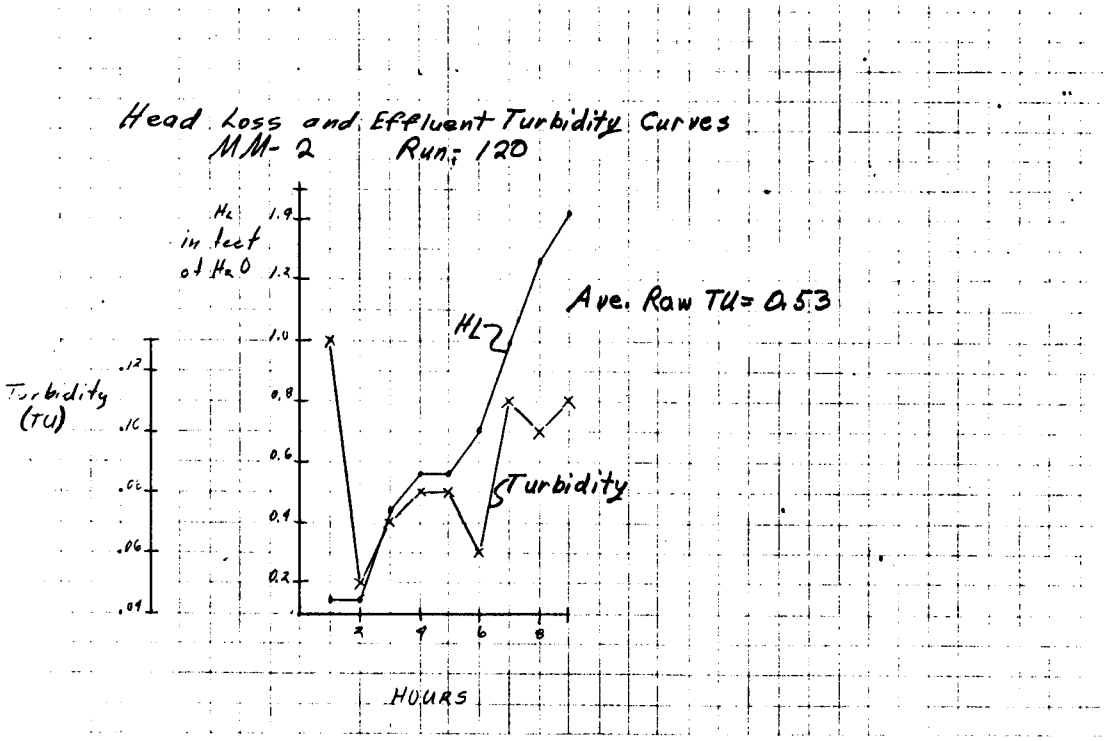

Head Loss and Effluent Turbidity Curves
MM-2 Run-115
HL in feet of H2O
Turbidity (TU)
Ave. Raw TU = 0.77
HL
Turbidity
HOURS

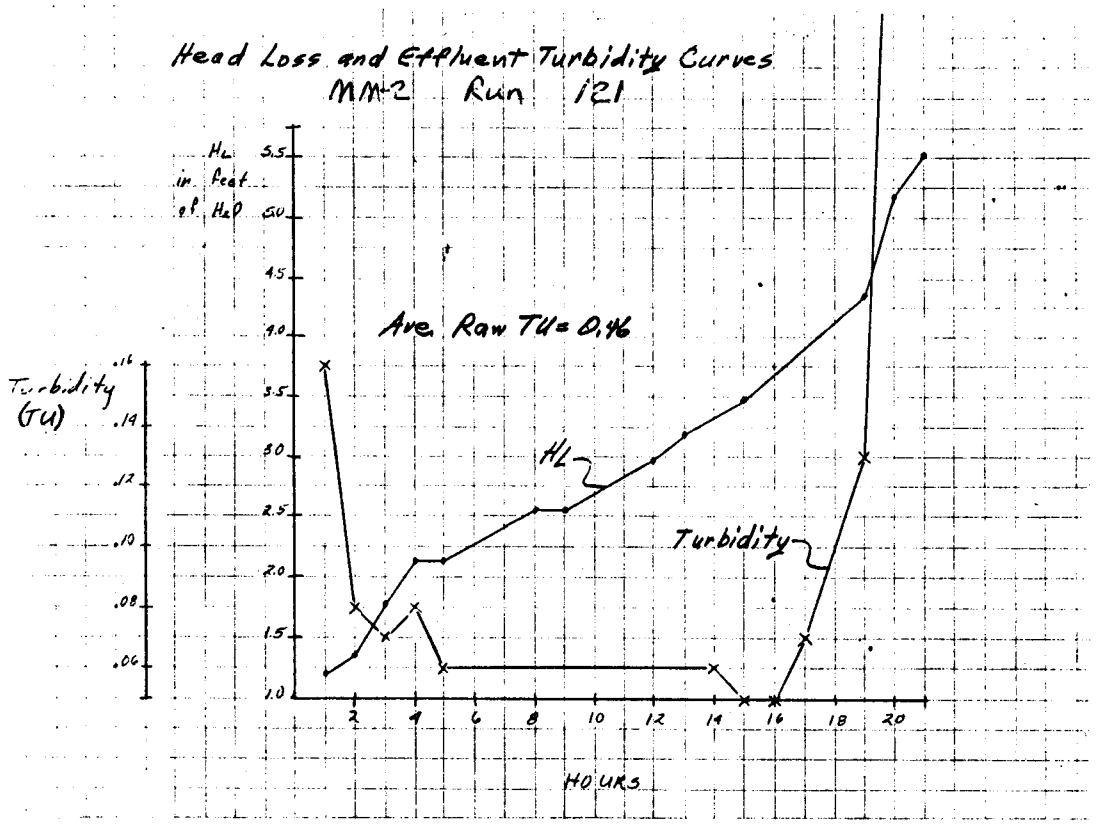

Head Loss and Effluent Turbidity Curves
MM-2 Run-116
HL in feet of H_2O
Turbidity (TU)
Ave. Raw TU = 0.57
HL
Turbidity
.39
Hours
*unit shut down from 1630-1645 for repair of HL gage.

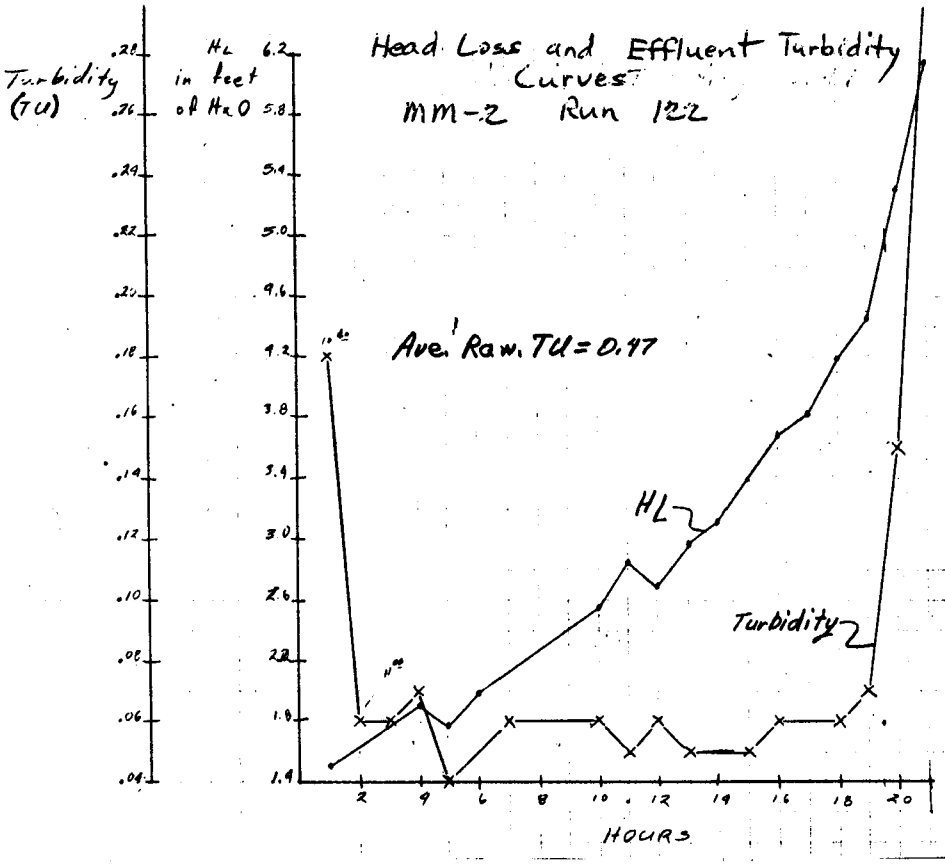

Head Loss and Effluent Turbidity Curves
MM-2 Run-117
Turbidity (TU)
HL in feet of H_2O
HL
Ave. Raw TU = 0.71
Turbidity
HOURS

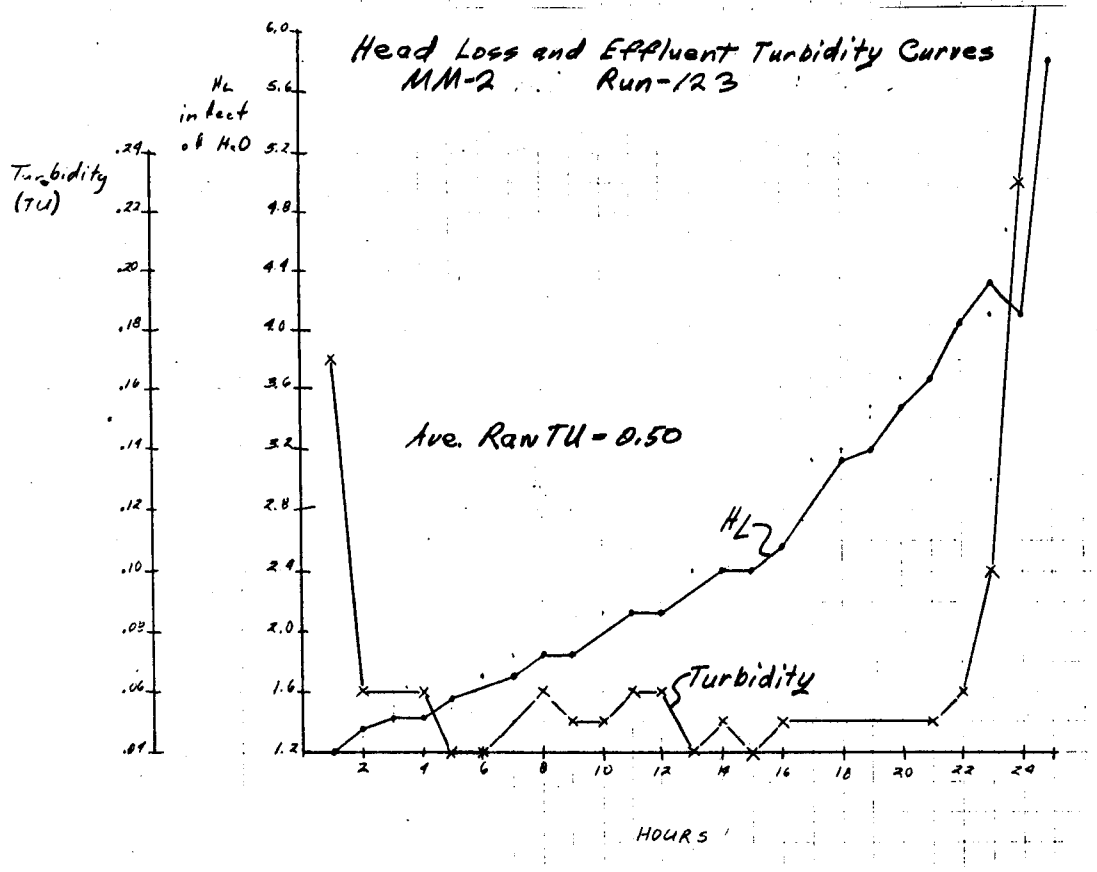

Head Loss and Effluent Turbidity Curves
MM-2 Run-118
Turbidity (TU)
HL in feet of H2O
Ave. Raw TU = 0.52
Turbidity
HL
HOURS

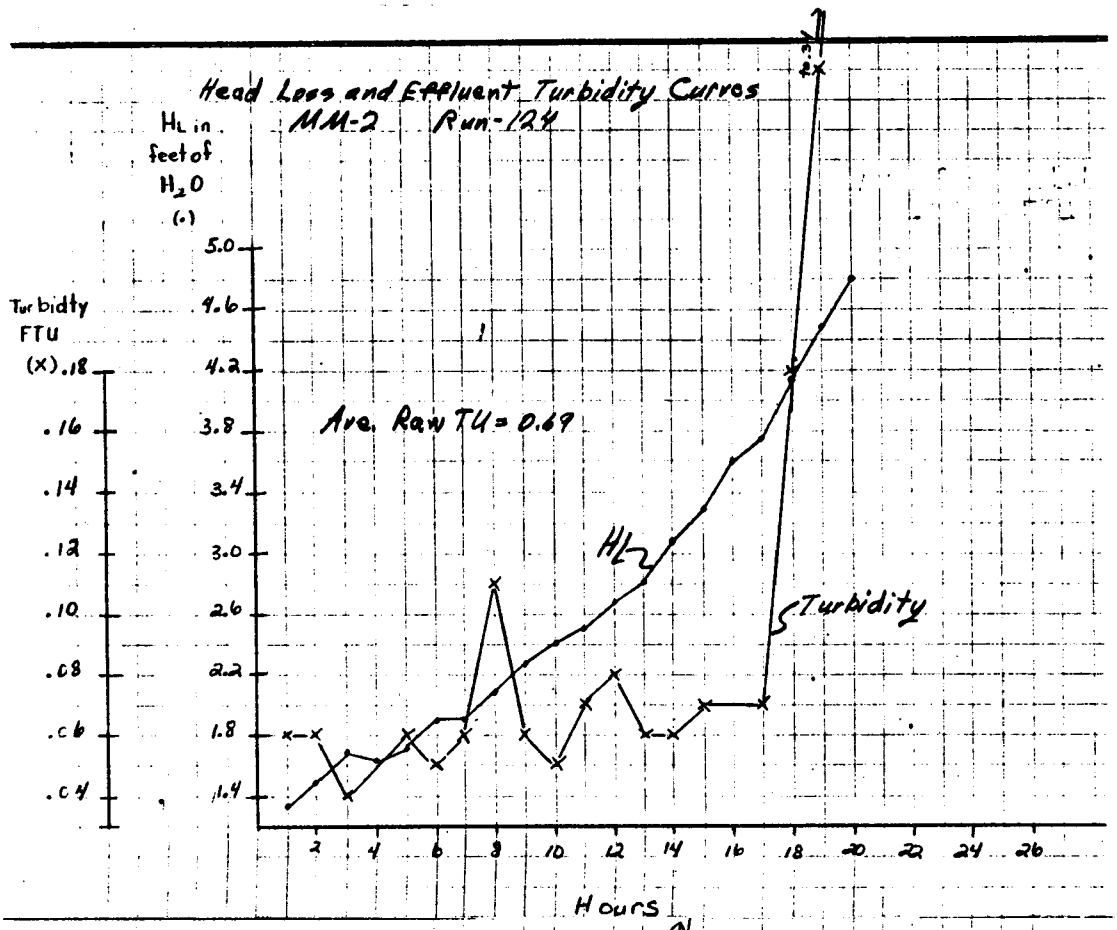

Head Loss and Effluent Turbidity Curves
MM-2 Run-119
Turbidity (TU)
HL in feet of H2O
Ave. Raw TU = 0.59
HL
Turbidity
HOURS

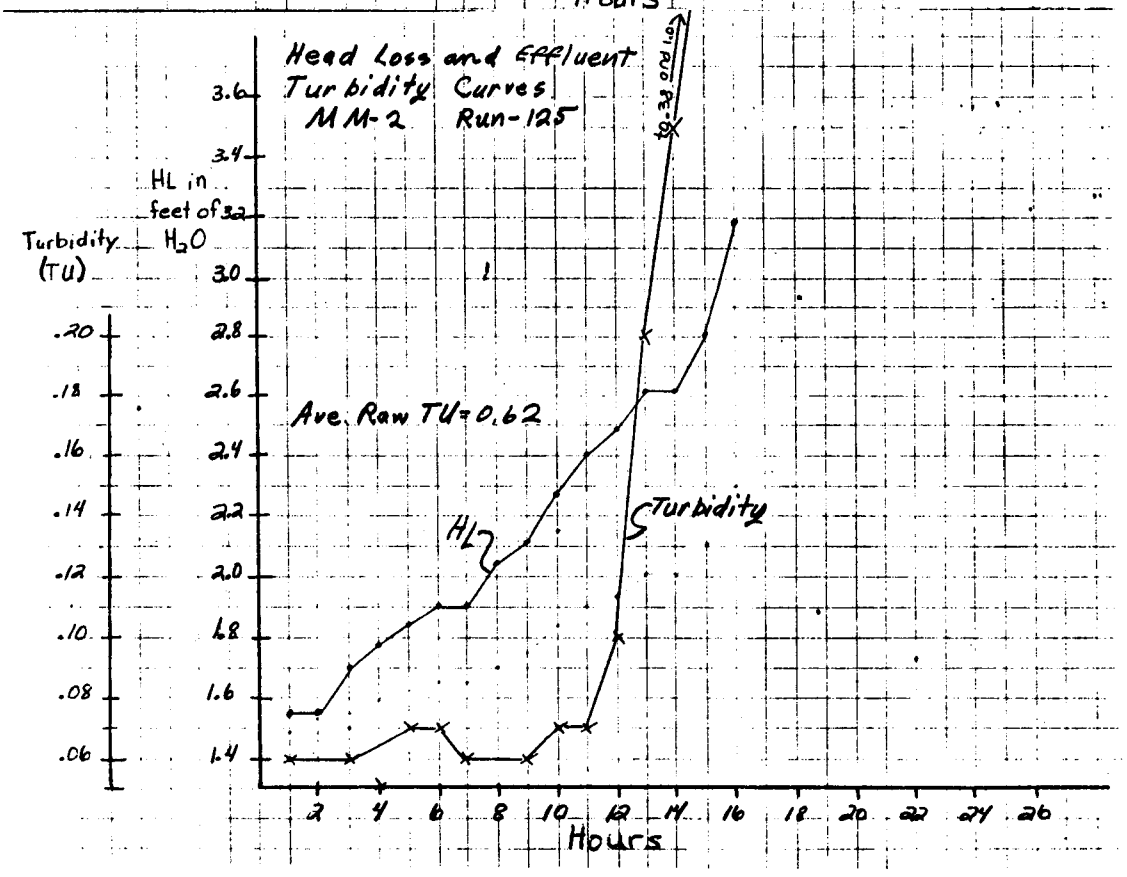

Head Loss and Effluent Turbidity Curves
MM-2 Run: 120
HL in feet of H2O
Turbidity (TU)
Ave. Raw TU= 0.53
HL
Turbidity
HOURS

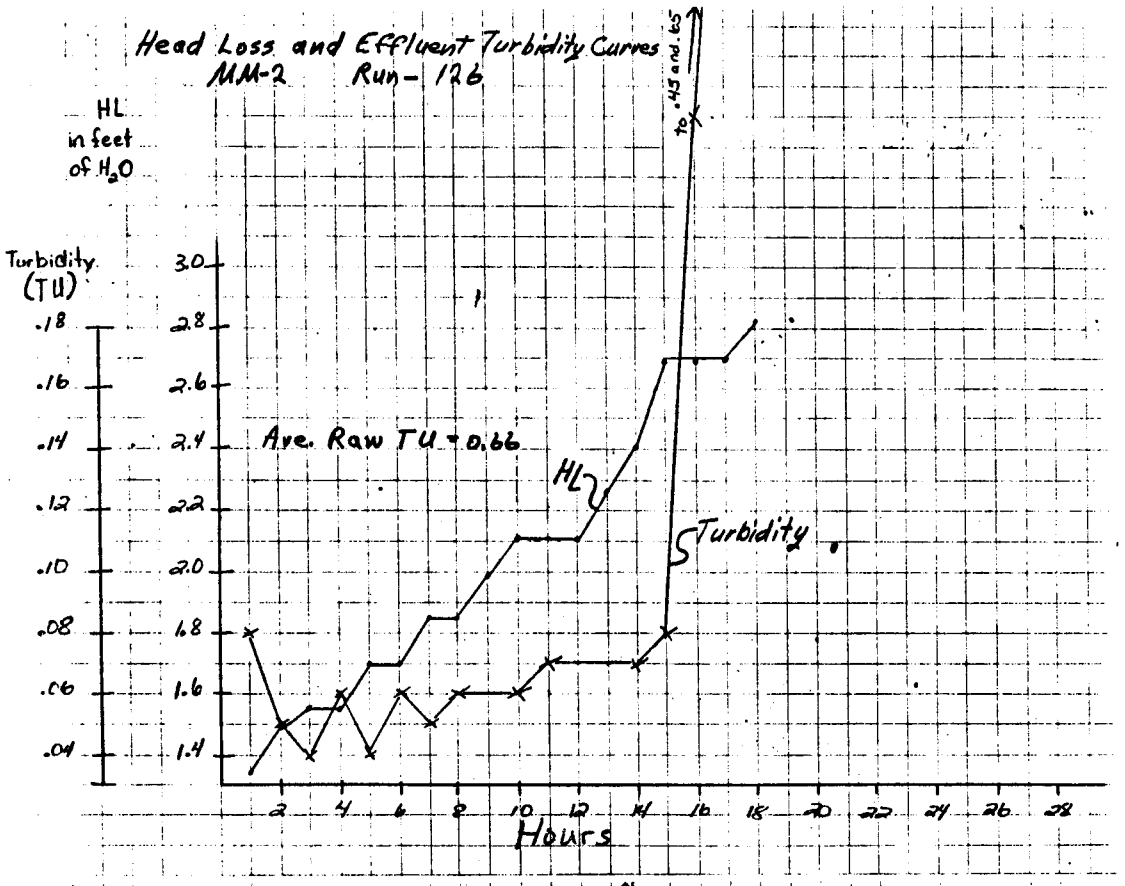

Head Loss and Effluent Turbidity Curves
MM-2 Run 121
HL in feet of H2O
Turbidity (TU)
Ave. Raw TU= 0.46
HL
Turbidity
HOURS

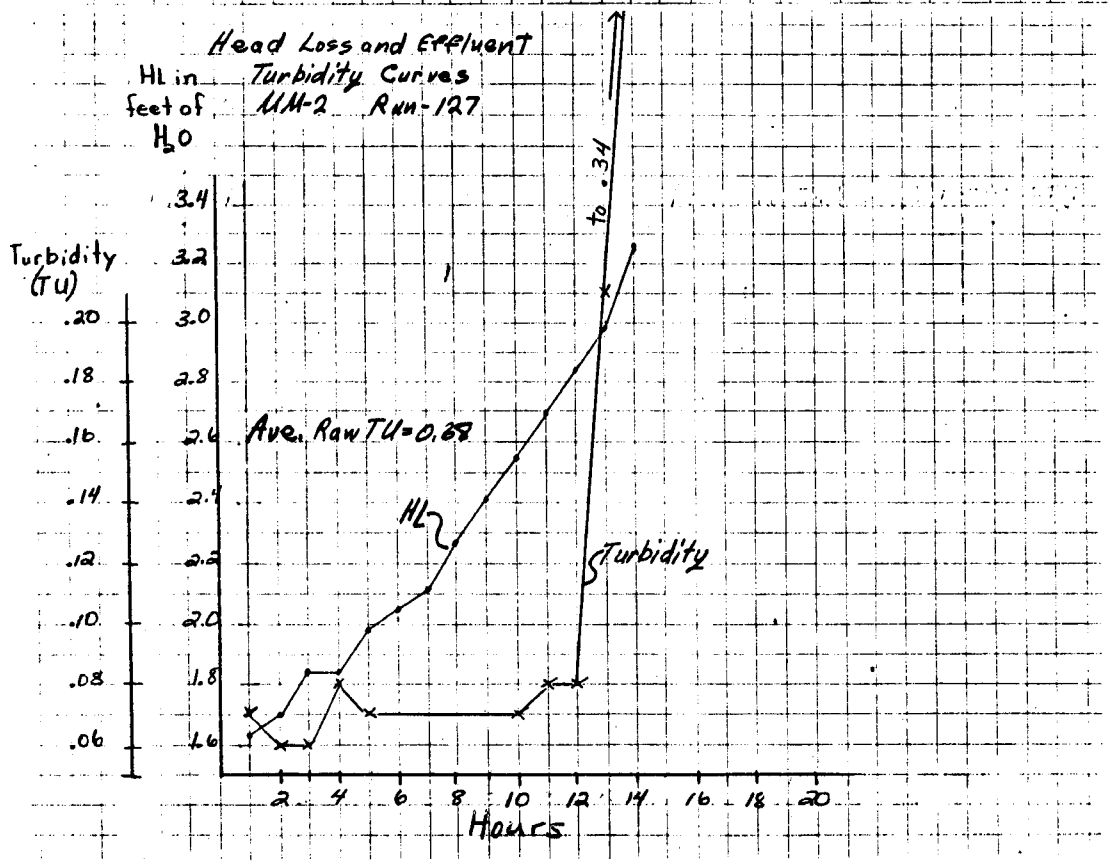

Head Loss and Effluent Turbidity Curves
MM-2 Run 122
Turbidity (TU)
HL in feet of H2O
Ave. Raw. TU = 0.47
HL
Turbidity
HOURS

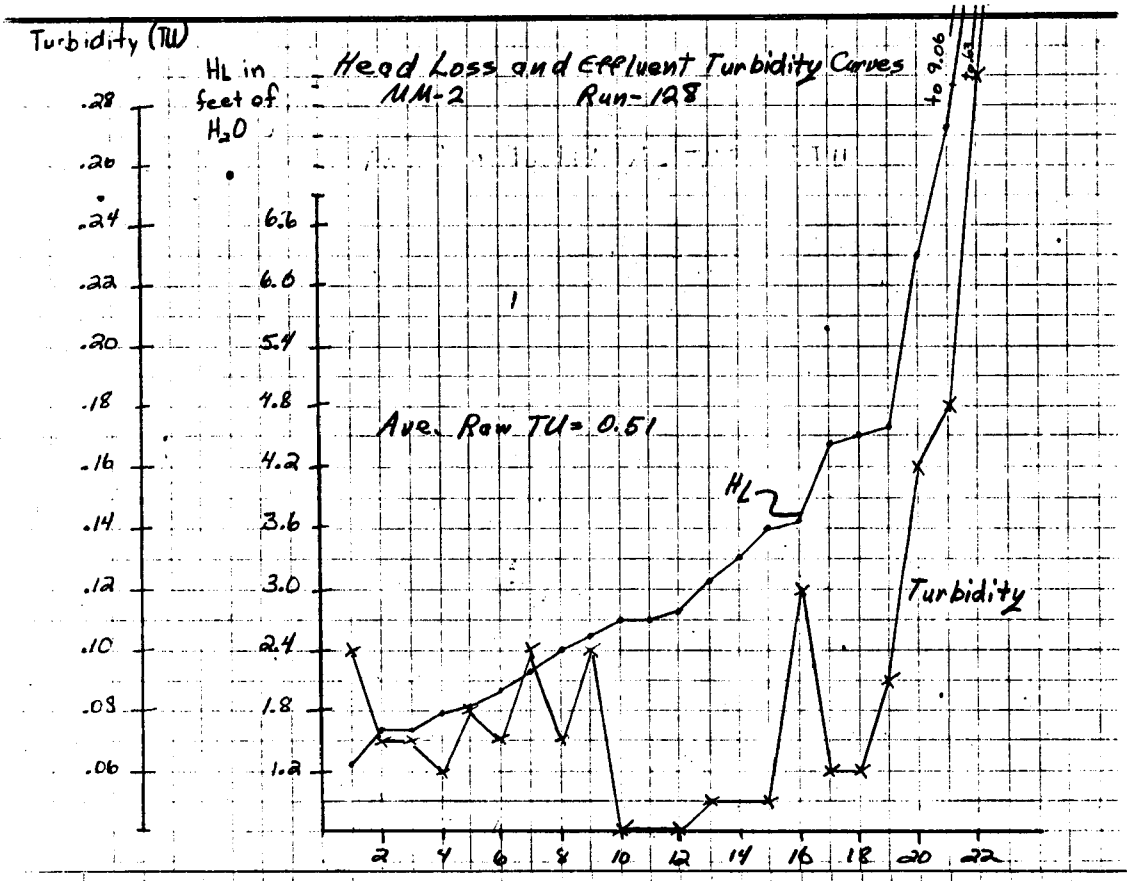

Head Loss and Effluent Turbidity Curves
MM-2 Run-123
Turbidity (TU)
HL in feet of H2O
Ave. Raw TU = 0.50
HL
Turbidity
HOURS

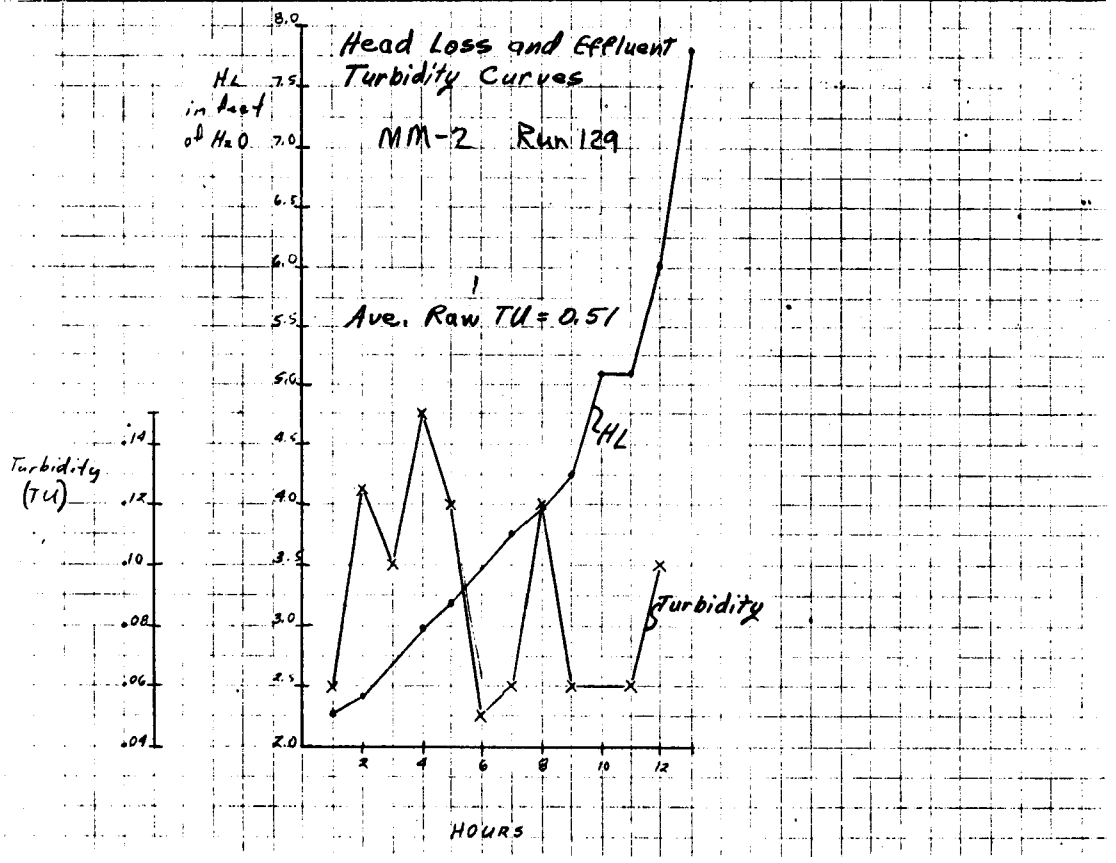

Head Loss and Effluent Turbidity Curves
MM-2 Run-124
HL in feet of H2O (•)
Turbidty FTU (X)
Ave. Raw TU = 0.69
HL
Turbidity
Hours

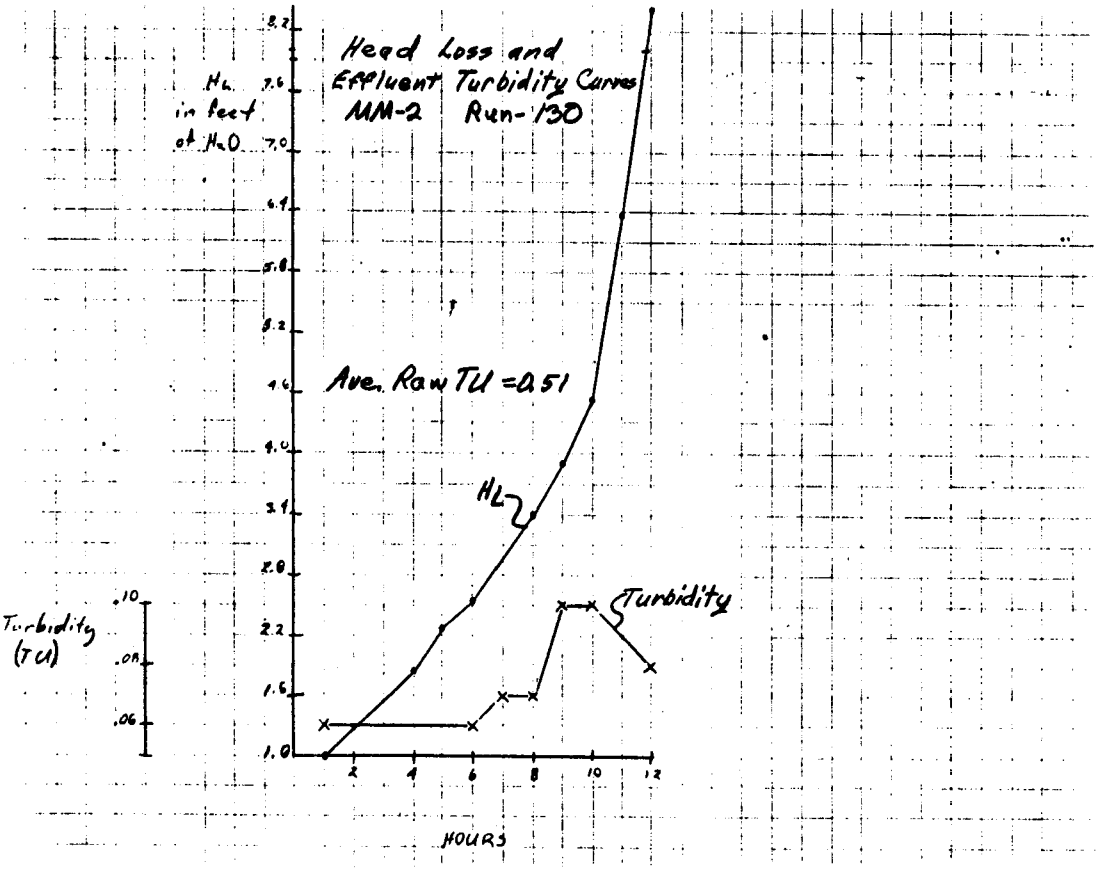

Head Loss and Effluent Turbidity Curves
MM-2 Run-125
HL in feet of H2O
Turbidity (TU)
Ave. Raw TU = 0.62
HL
Turbidity
Hours

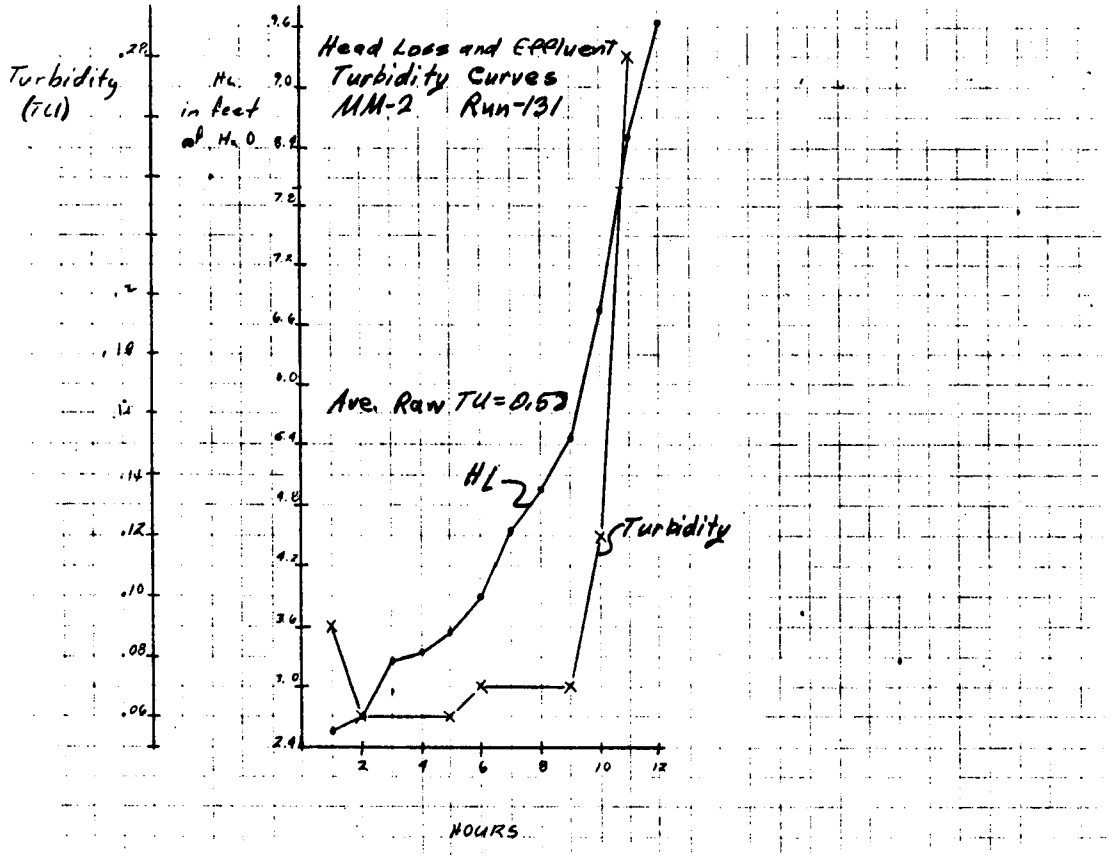

Head Loss and Effluent Turbidity Curves
MM-2 Run-126
HL in feet of H_2O
Turbidity (TU)
Ave. Raw TU = 0.66
HL
Turbidity
to .45 and .65
Hours

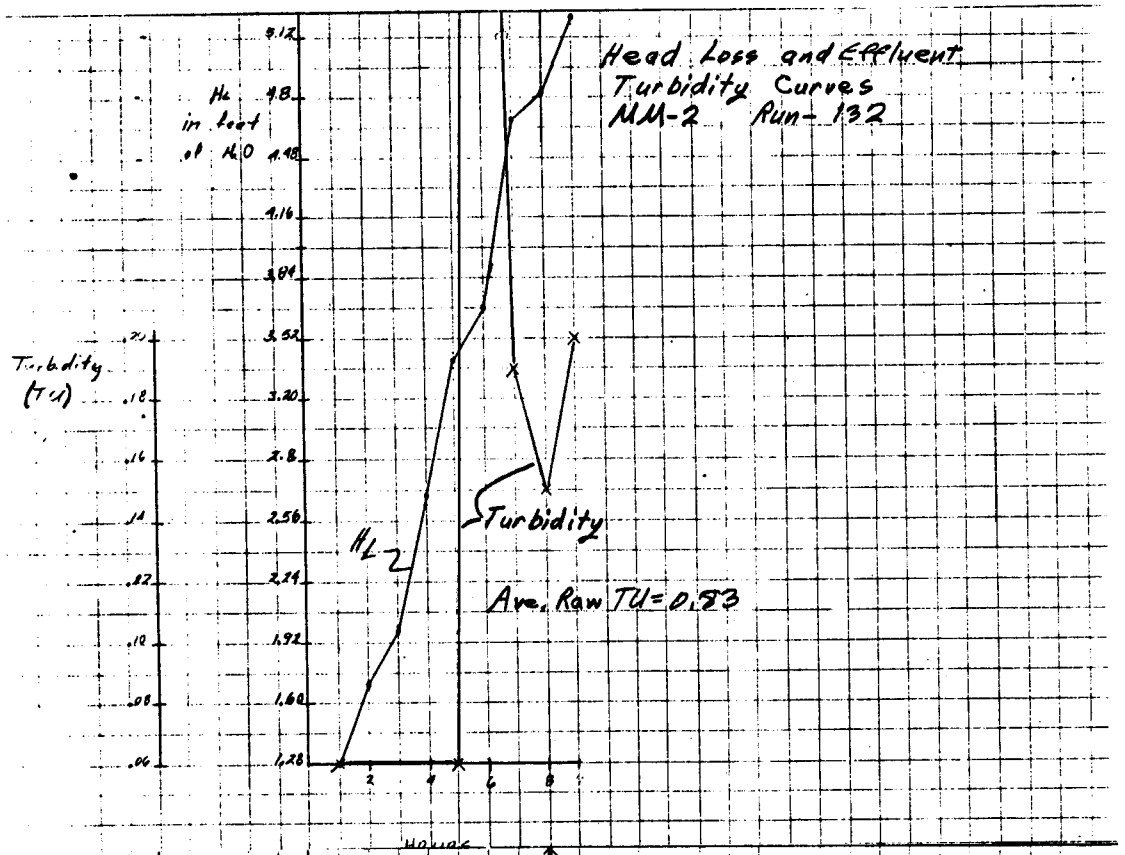

Head Loss and Effluent Turbidity Curves
MM-2 Run-127
HL in feet of H_2O
Turbidity (TU)
Ave. Raw TU = 0.68
HL
Turbidity
to .34
Hours

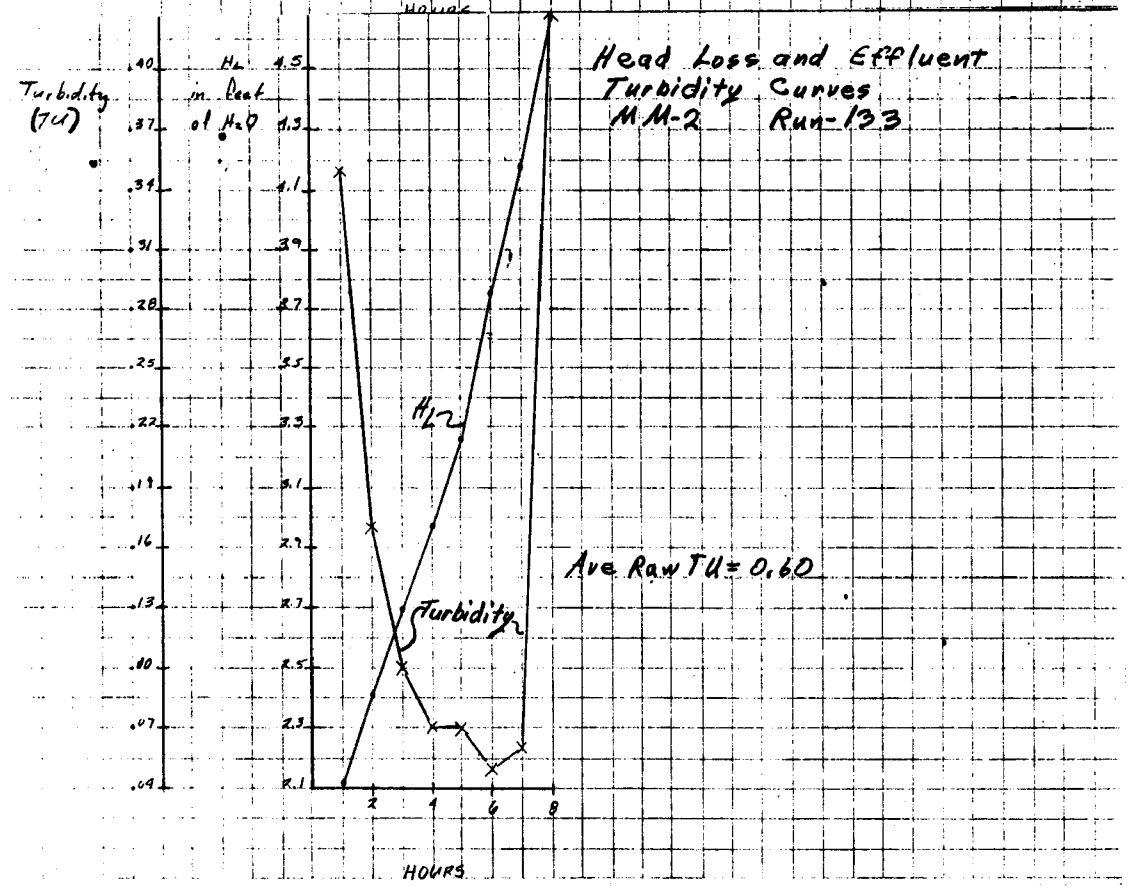

Turbidity (TU)
HL in feet of H2O
Head Loss and Effluent Turbidity Curves
MM-2
Run-128
Ave. Raw TU = 0.51
HL
Turbidity
.28
.26
.24
.22
.20
.18
.16
.14
.12
.10
.08
.06
6.6
6.0
5.4
4.8
4.2
3.6
3.0
2.4
1.8
1.2
2
4
6
8
10
12
14
16
18
20
22

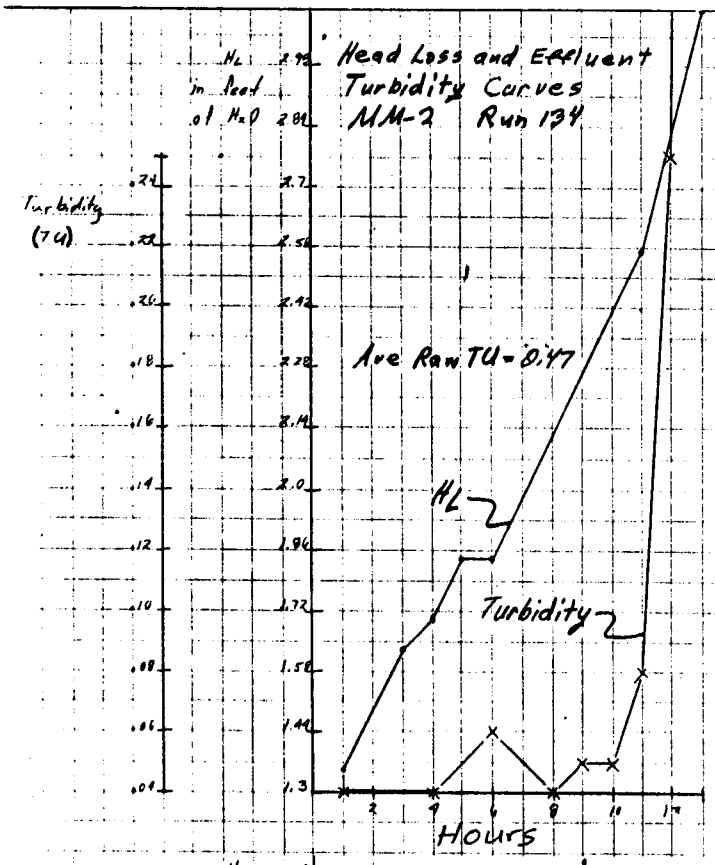

Head Loss and Effluent Turbidity Curves
MM-2 Run 129
HL in feet of H2O
Ave. Raw TU = 0.51
HL
Turbidity
Turbidity (TU)
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
.14
.12
.10
.08
.06
.04
2
4
6
8
10
12
HOURS

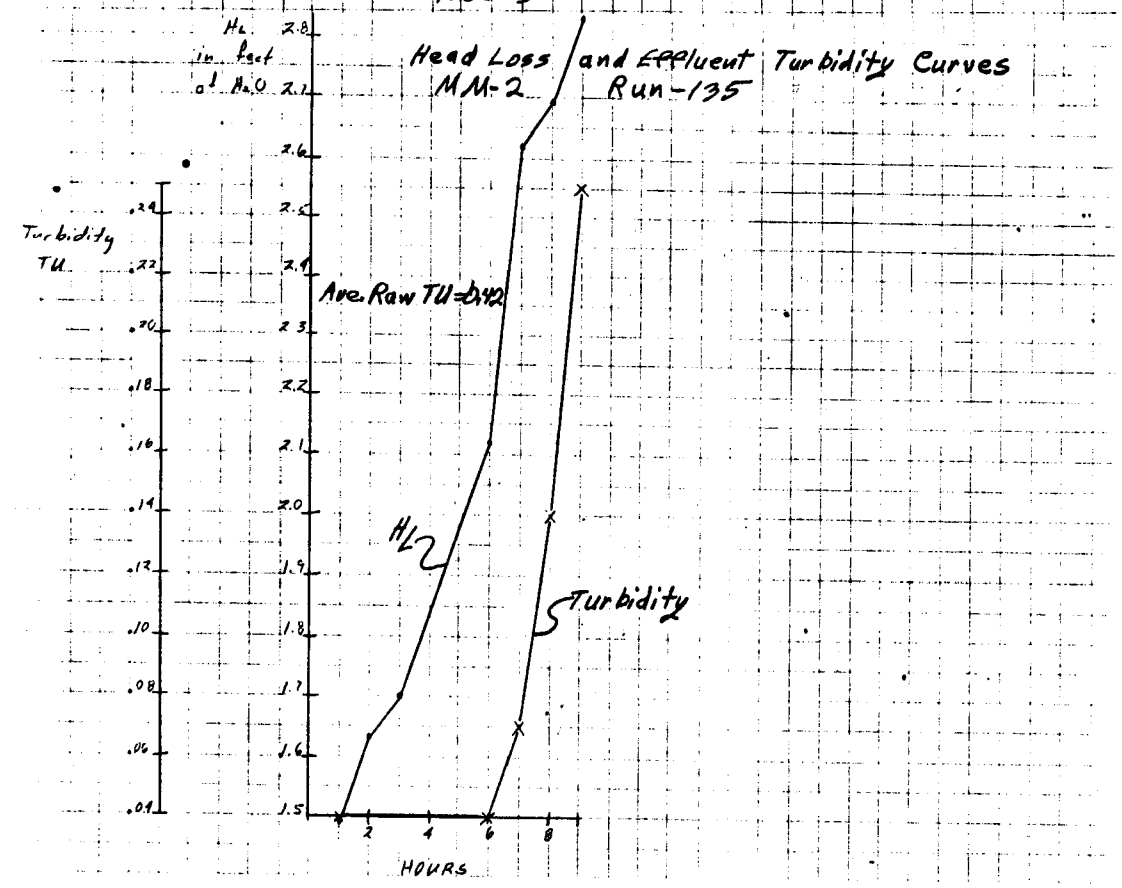

Head Loss and
Effluent Turbidity Curves
MM-2 Run-130
HL in feet of H2O
Ave. Raw TU = 0.51
HL
Turbidity
Turbidity (TU)
HOURS

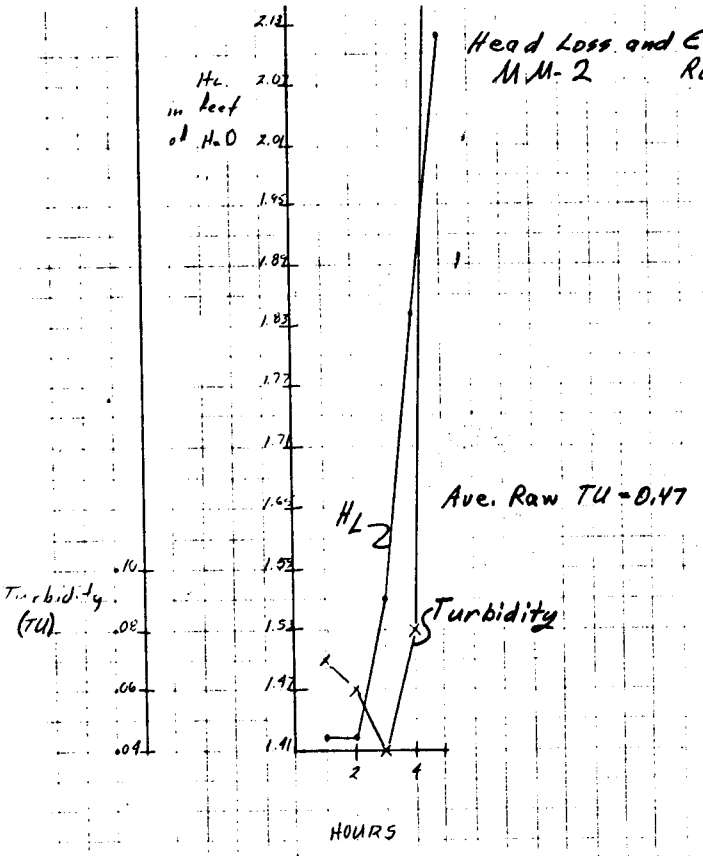

Head Loss and Effluent
Turbidity Curves
MM-2 Run-131
HL in feet of H2O
Turbidity (TU)
Ave. Raw TU = 0.52
HL
Turbidity
HOURS

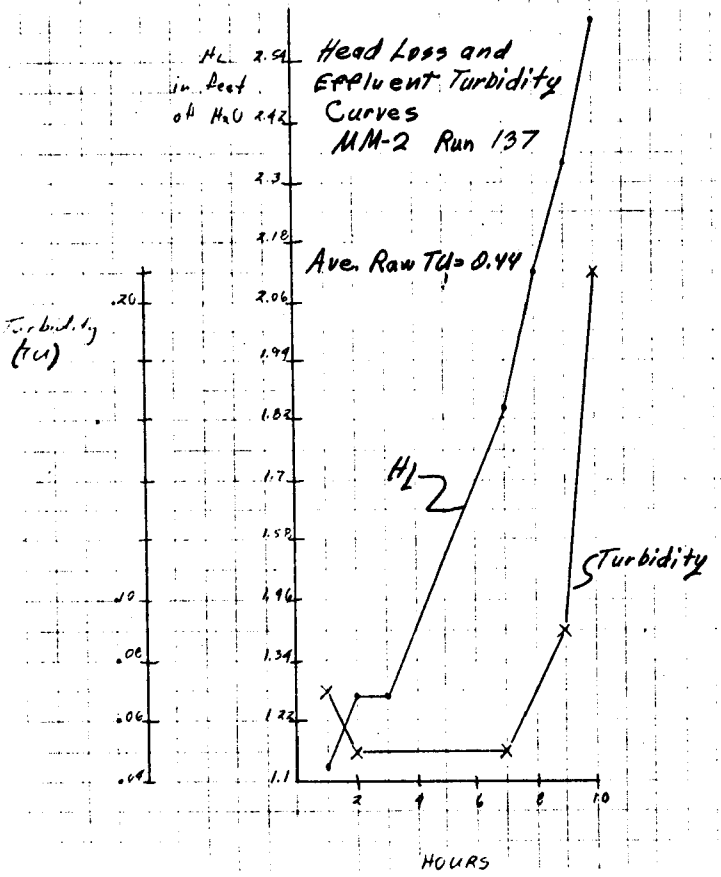

Head Loss and Effluent
Turbidity Curves
MM-2 Run-132
HL in feet of H2O
Turbidity (TU)
HL
Turbidity
Ave. Raw TU = 0.83
HOURS

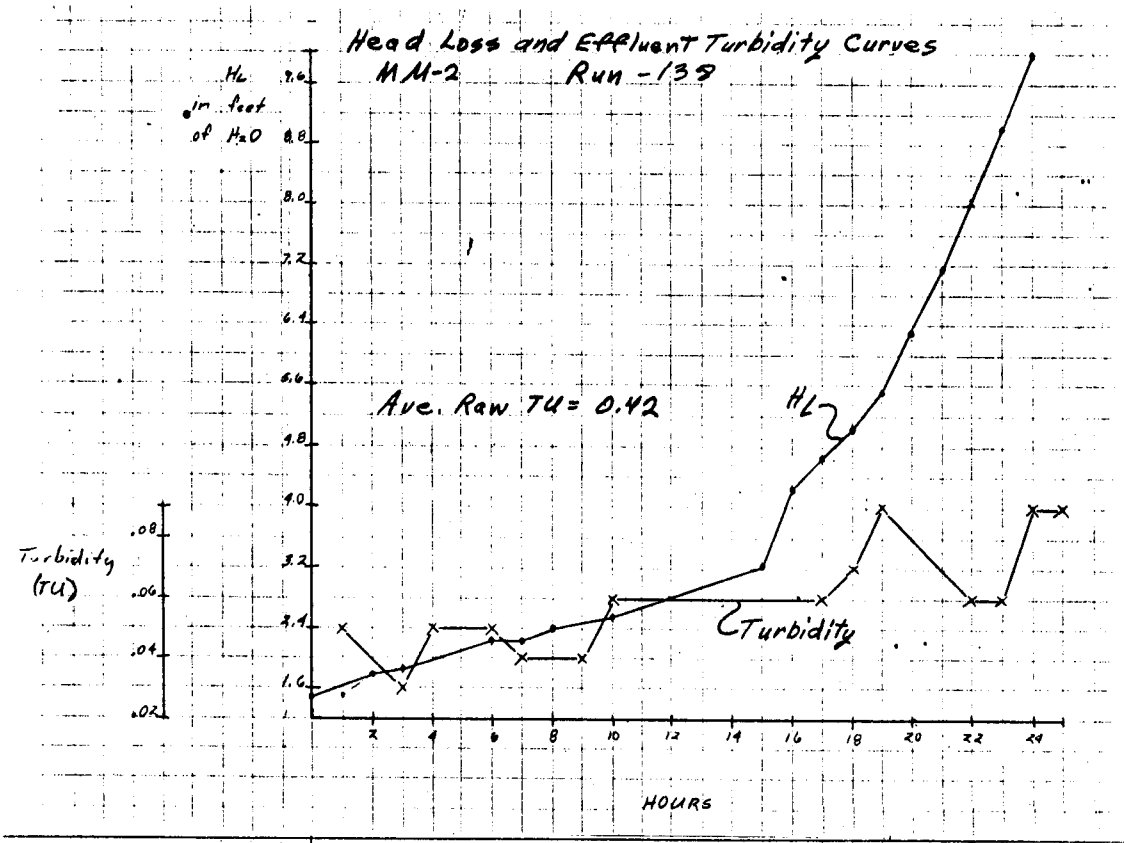

Head Loss and Effluent
Turbidity Curves
MM-2 Run-133
HL in feet of H2O
Turbidity (TU)
HL
Turbidity
Ave. Raw TU = 0.60
HOURS

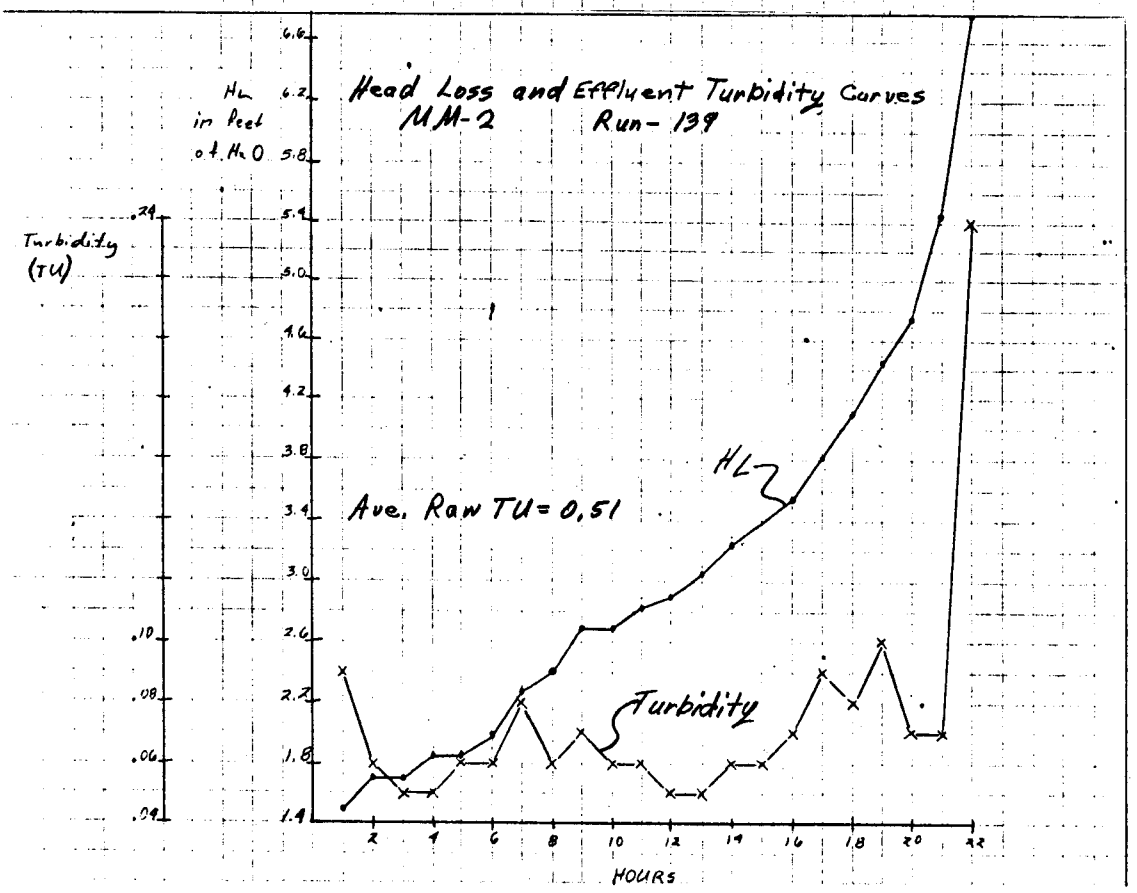

Head Loss and Effluent Turbidity Curves
MM-2 Run 134
HL in feet of H2O
Turbidity (TU)
Ave Raw TU = 0.47
HL
Turbidity
Hours

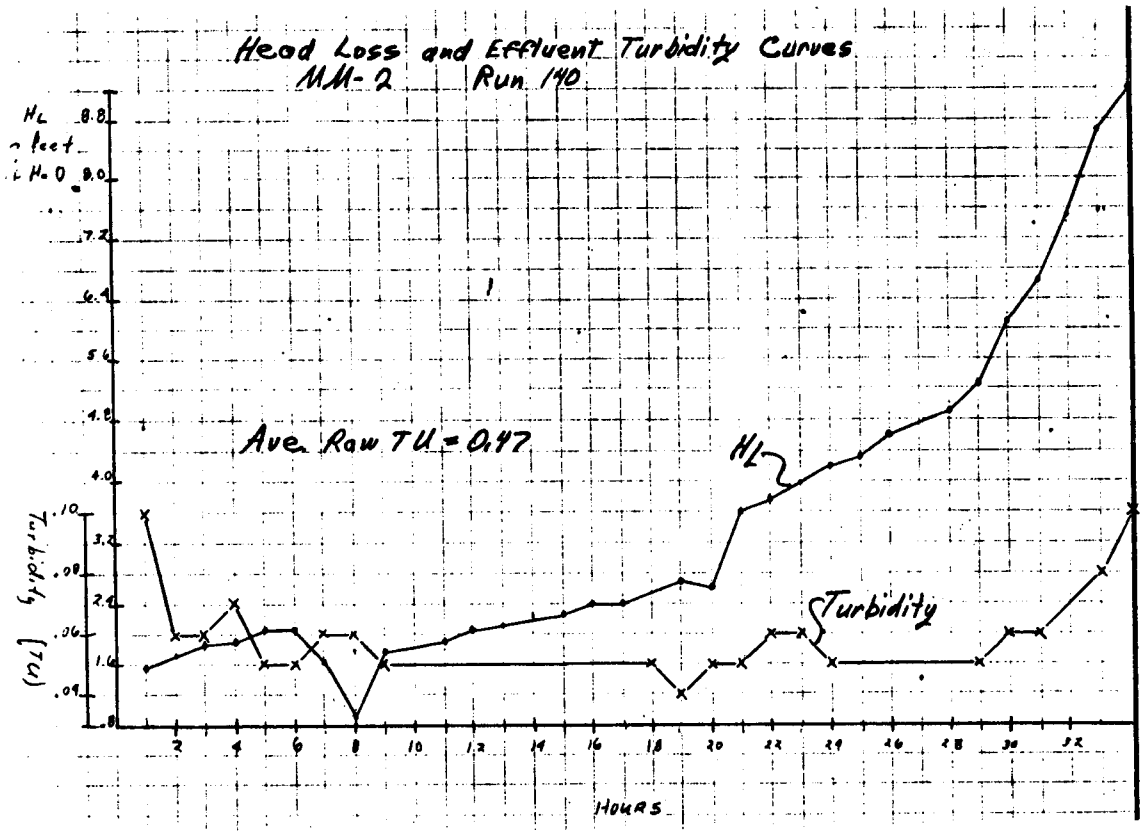

Head Loss and Effluent Turbidity Curves
MM-2 Run-135
HL in feet of H2O
Turbidity TU
Ave. Raw TU = 0.42
HL
Turbidity
HOURS


Head Loss and Effluent Turbidity Curves
MM-2 Run 136
HL in feet of H2O
Turbidity (TU)
Ave. Raw TU = 0.47
HL
Turbidity
HOURS

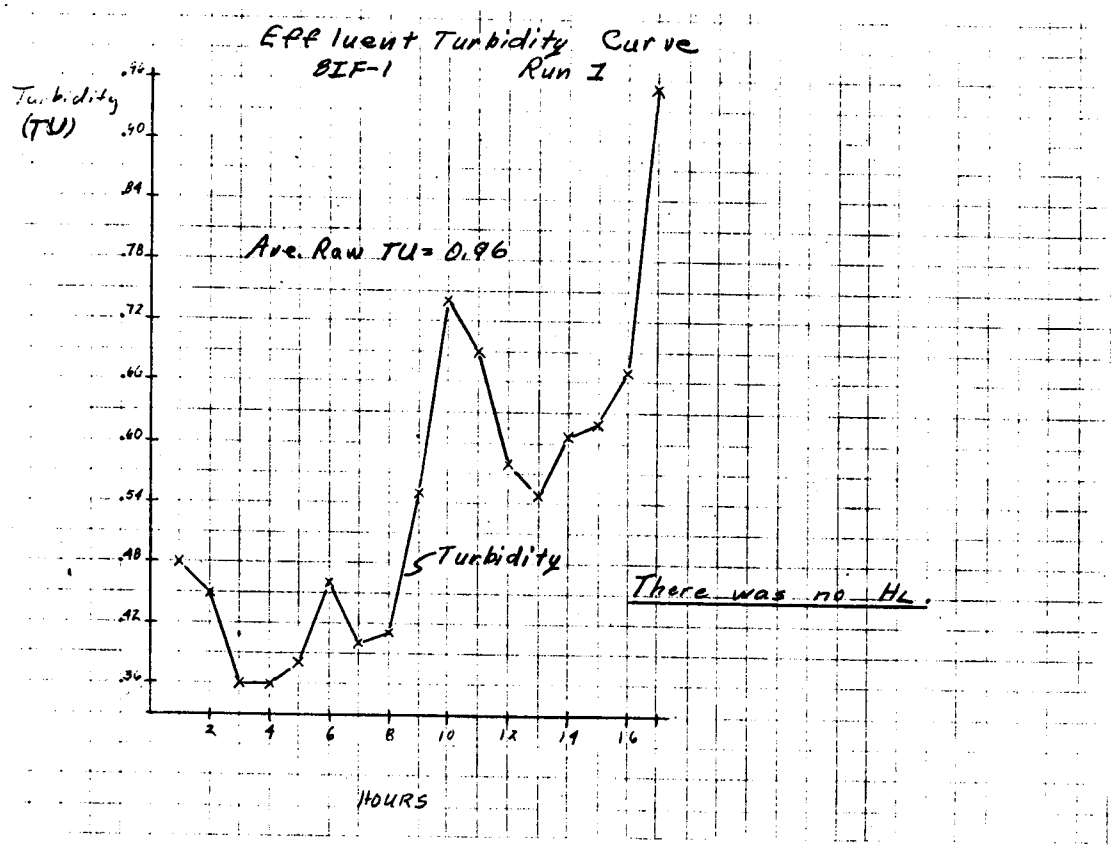

Head Loss and Effluent Turbidity Curves
MM-2 Run 137
HL in feet of H2O
Turbidity (TU)
Ave. Raw TU = 0.44
HL
Turbidity
HOURS

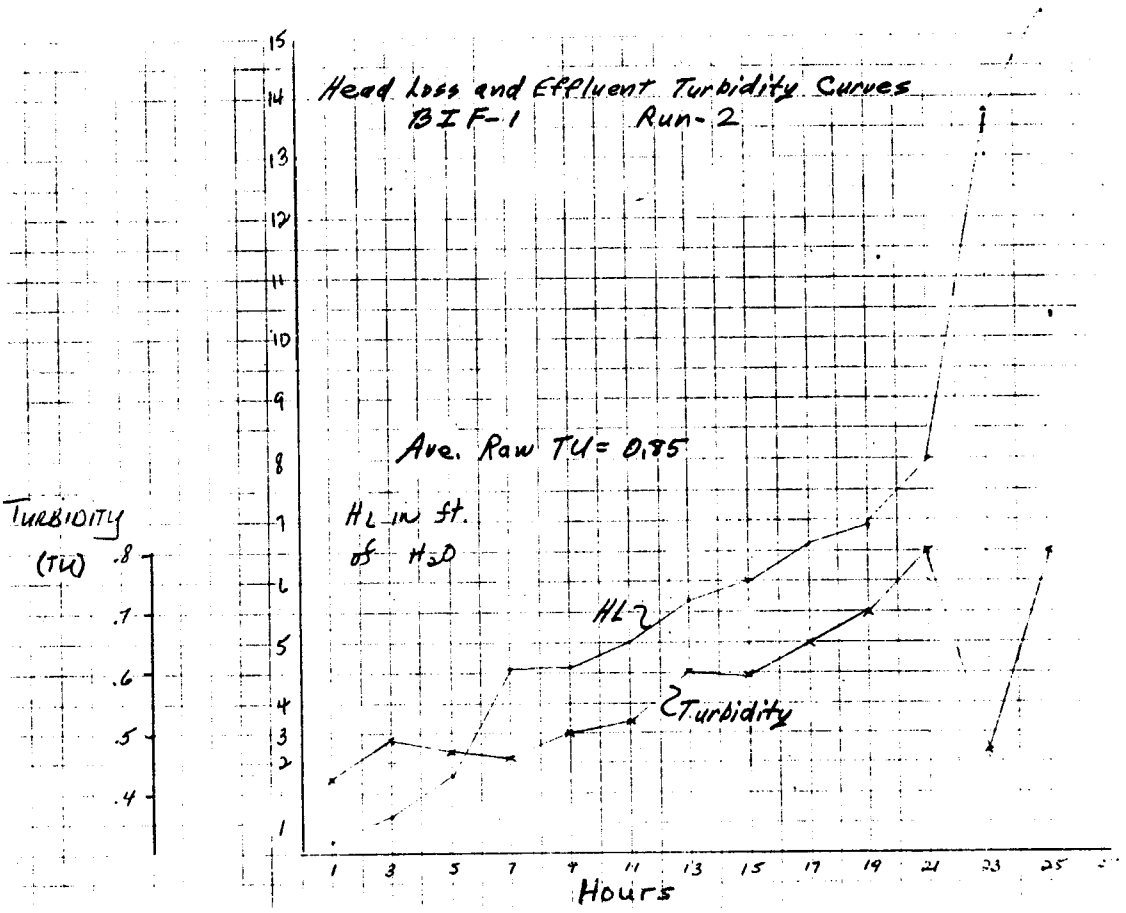

Head Loss and Effluent Turbidity Curves
MM-2 Run -139
HL in feet of H2O
Ave. Raw TU = 0.42
HL
Turbidity
Turbidity (TU)
HOURS

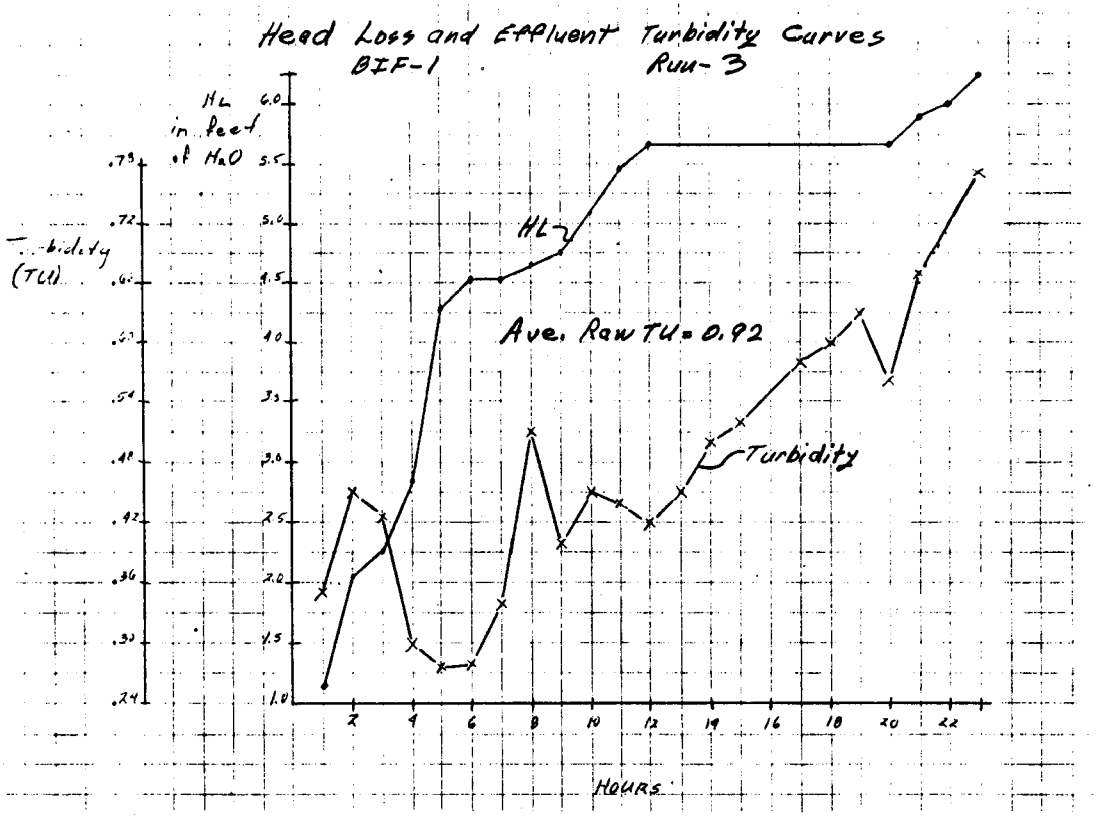

Head Loss and Effluent Turbidity Curves
MM-2 Run- 139
HL in feet of H2O
Ave. Raw TU = 0.51
HL
Turbidity
Turbidity (TU)
HOURS

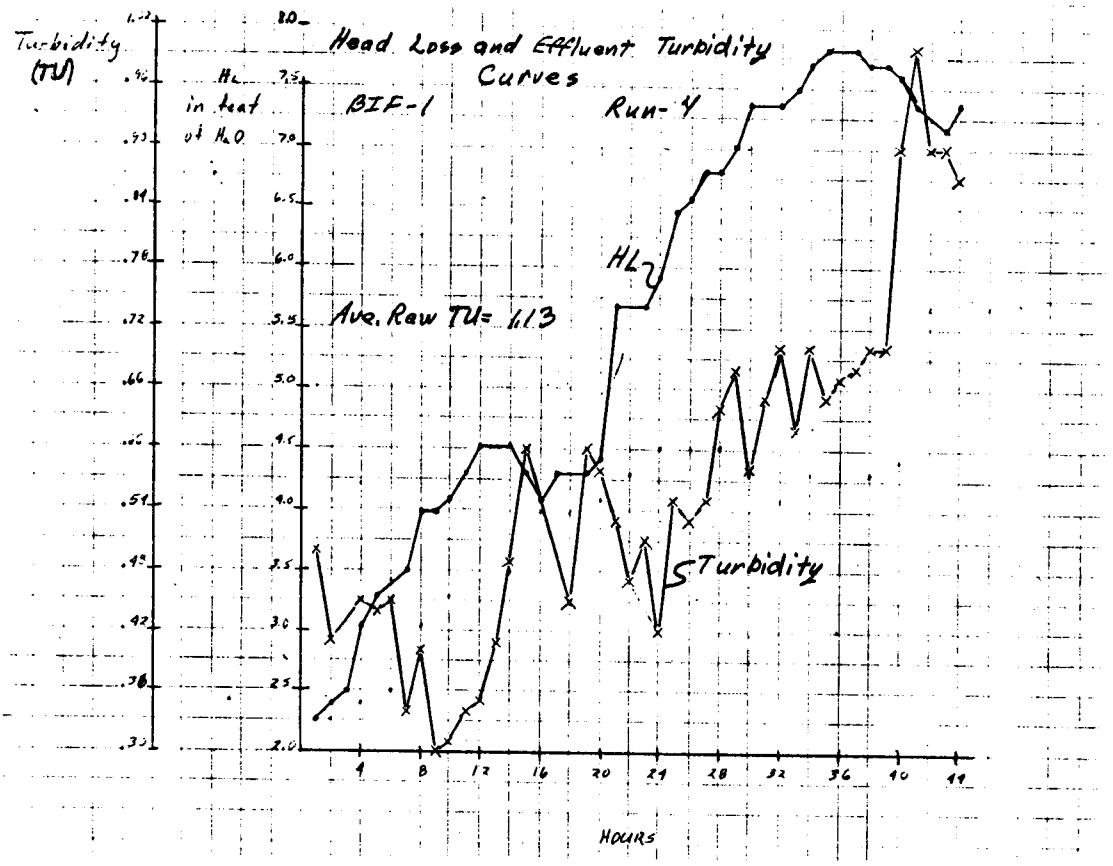

Head Loss and Effluent Turbidity Curves
MM-2 Run 140
HL feet H2O
Ave. Raw TU = 0.47
HL
Turbidity
Turbidity (TU)
HOURS

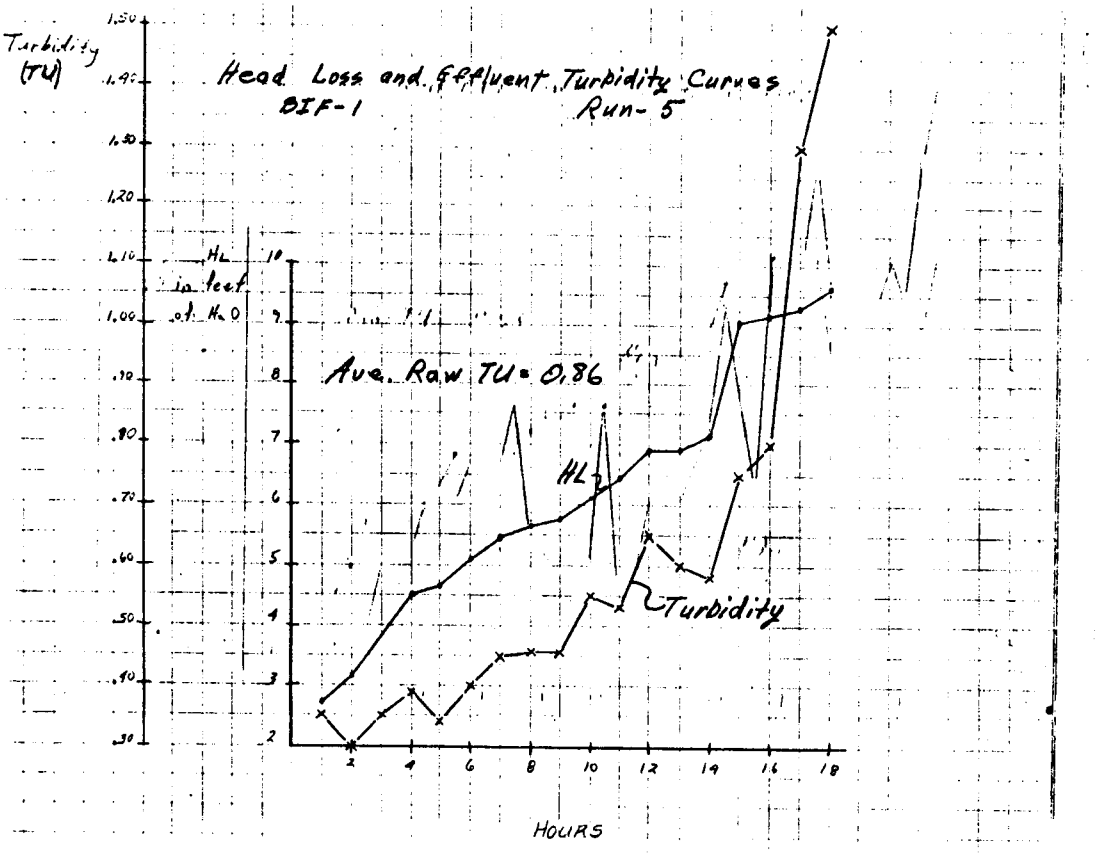
APPENDIX D-3 - VACUUM DIATOMACEOUS EARTH FILTRATION (BIF) HEAD LOSS AND TURBIDITY CURVES

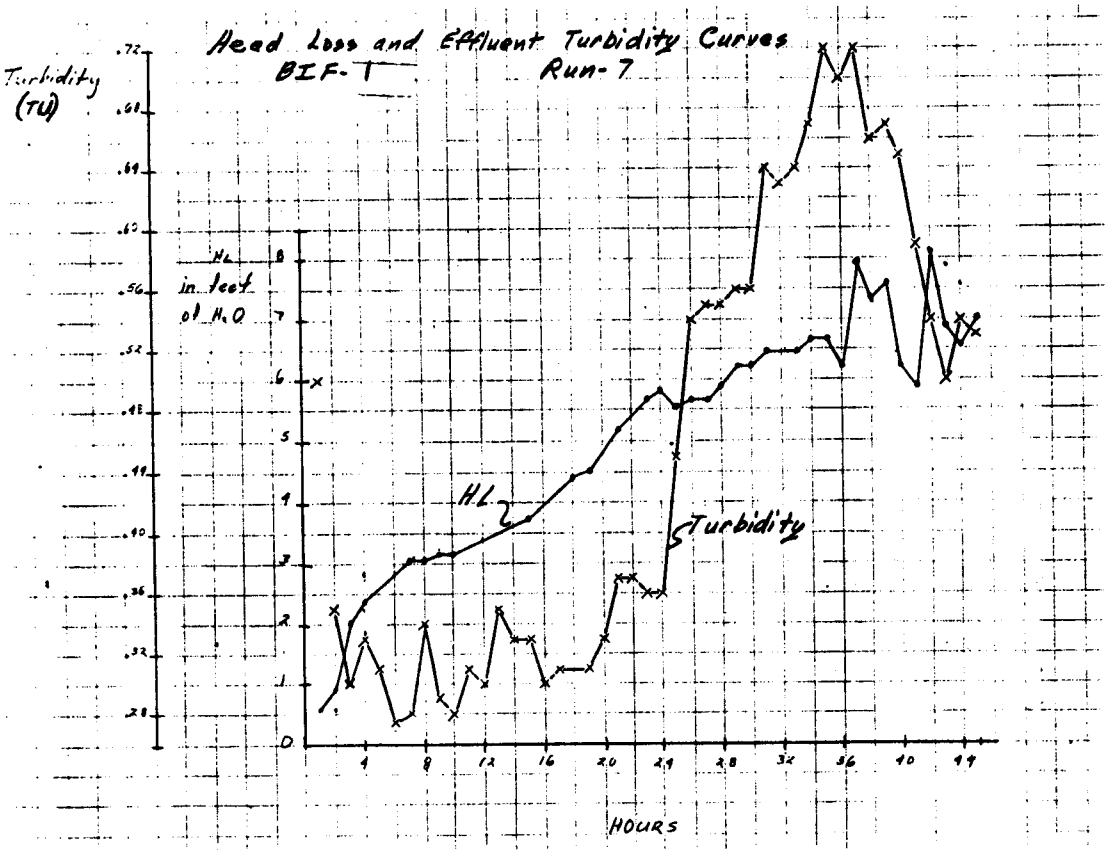


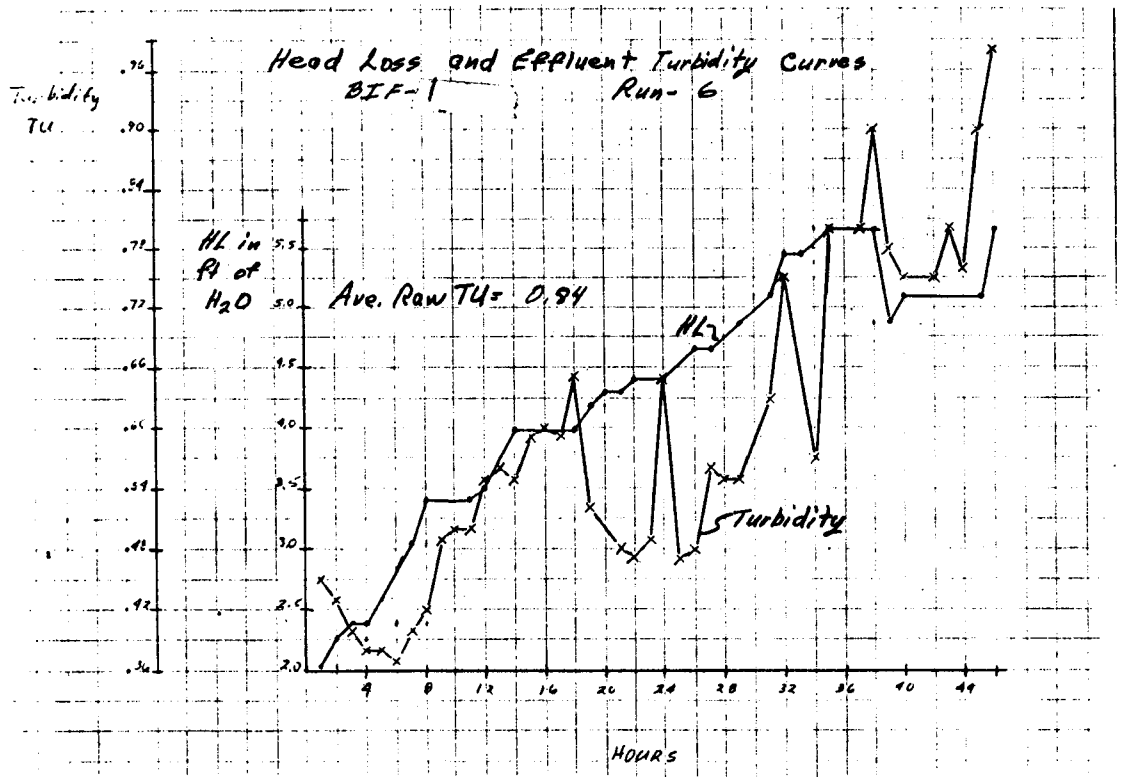

Head Loss and Effluent Turbidity Curves
BIF-1 Run-2
Ave. Raw TU = 0.85
HL in ft. of H2O
HL
Turbidity
TURBIDITY (TU)
Hours

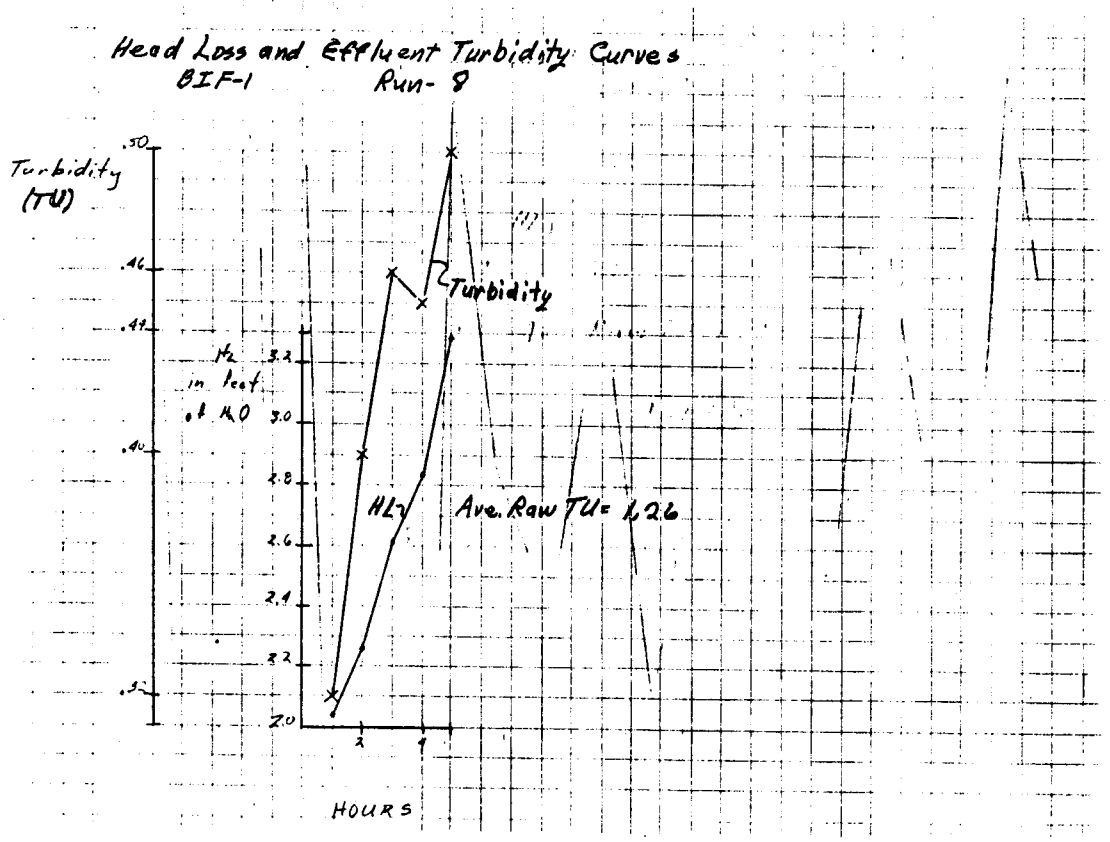

Head Loss and Effluent Turbidity Curves
BIF-1 Run-3
HL in feet of H2O
Turbidity (TU)
HL
Ave. Raw TU = 0.92
Turbidity
HOURS

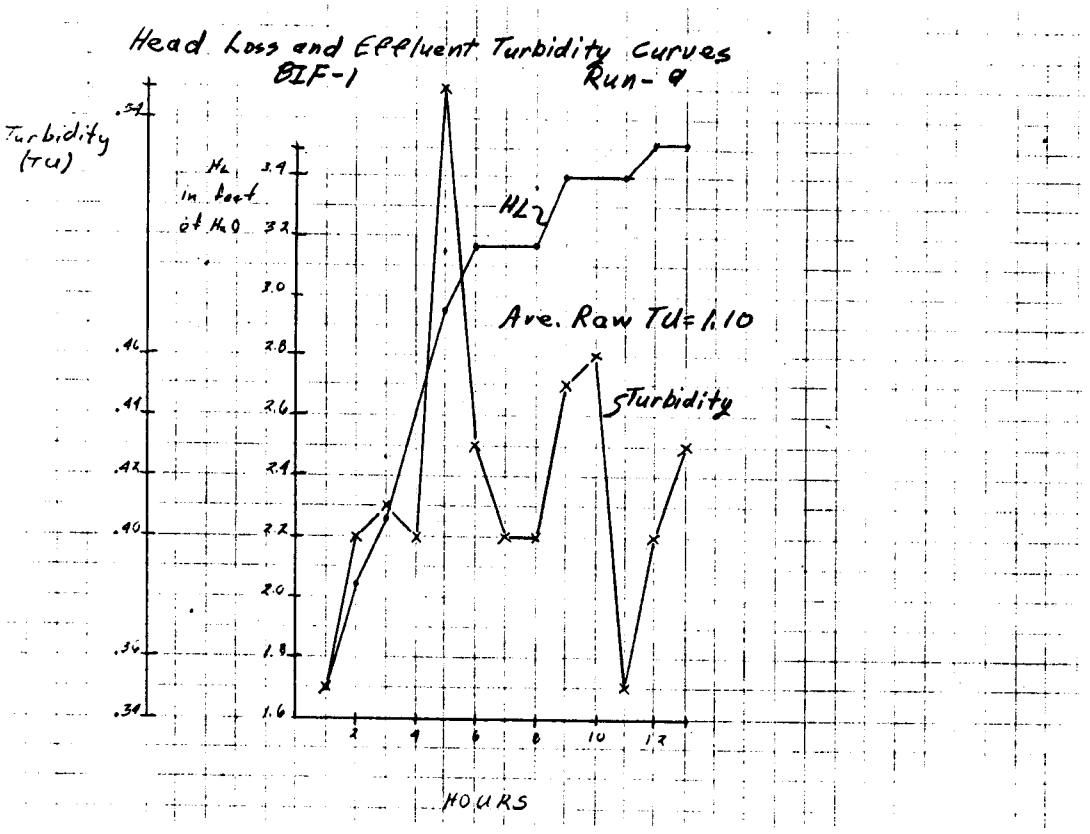

Head Loss and Effluent Turbidity Curves
BIF-1
Run-4
Turbidity (TU)
HL in feet of H2O
Ave. Raw TU= 1.13
HL
Turbidity
HOURS

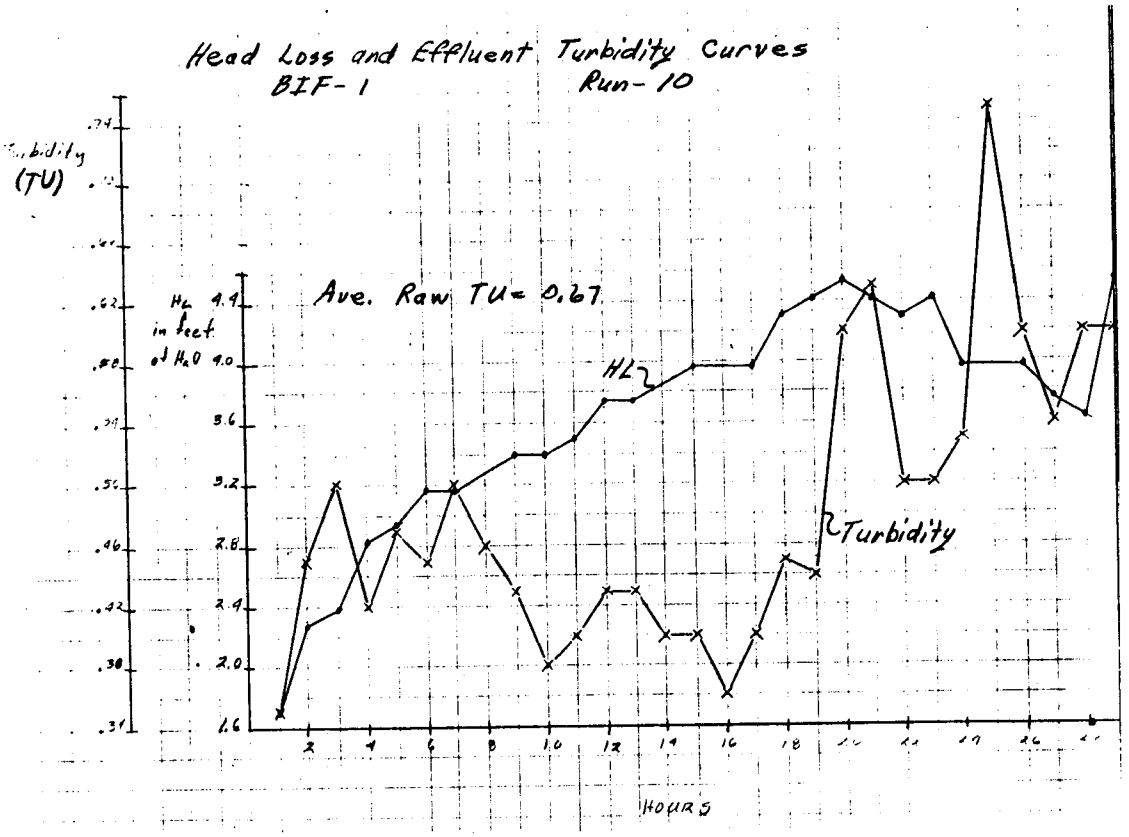

Head Loss and Effluent Turbidity Curves
BIF-1
Run-5
Turbidity (TU)
HL in feet of H2O
Ave. Raw TU= 0.86
HL
Turbidity
HOURS

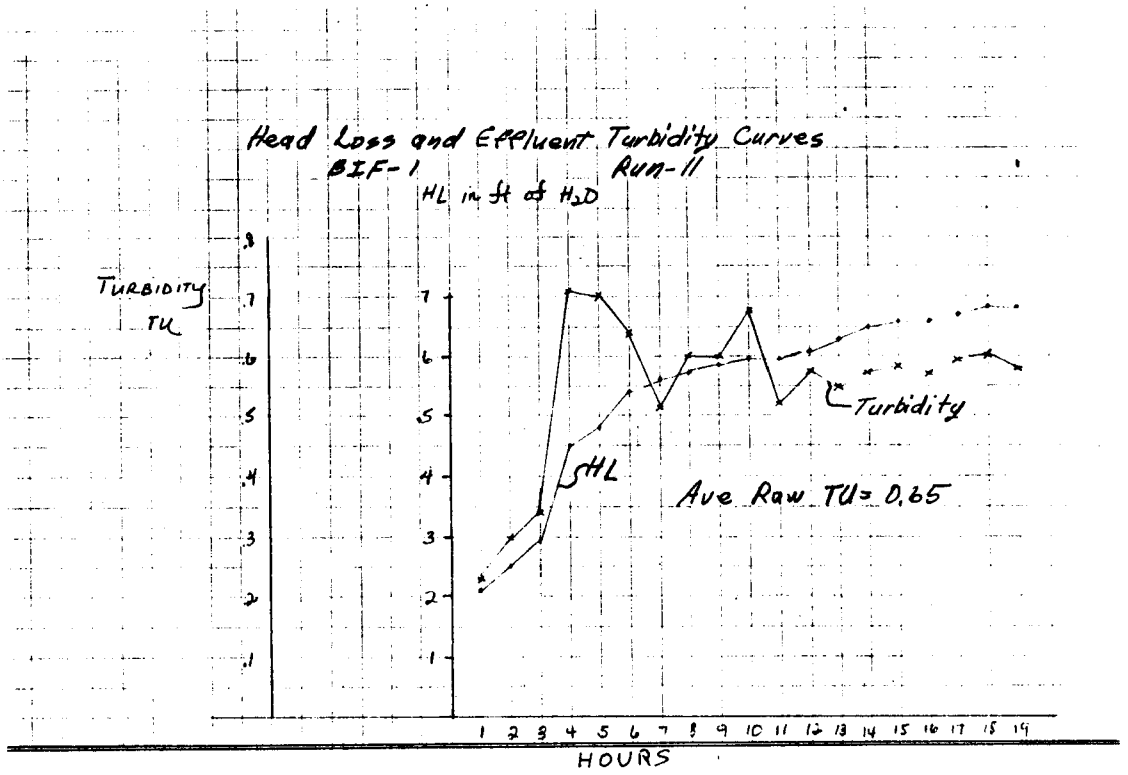

Head Loss and Effluent Turbidity Curves
BIF-1
Run-7
Turbidity (TU)
HL in feet of H2O
HL
Turbidity
HOURS

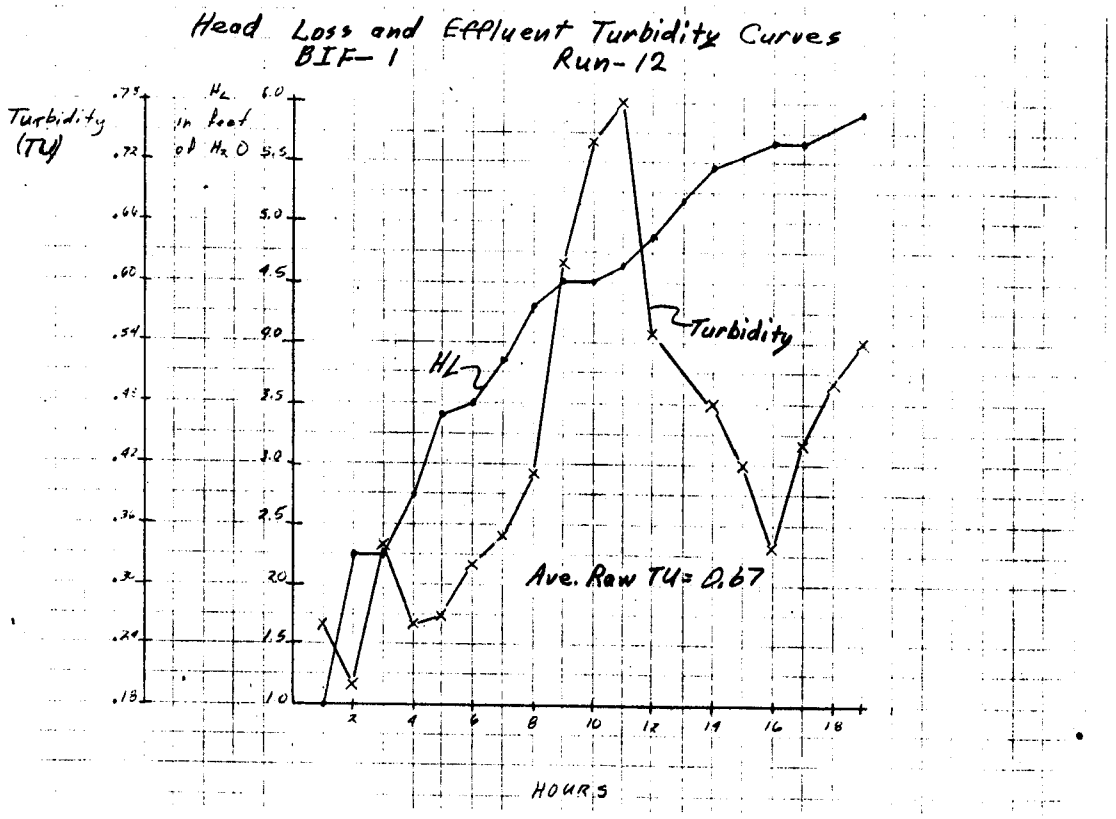

Head Loss and Effluent Turbidity Curves
BIF-1
Run-6
Turbidity TU
HL in ft of H2O
Ave. Raw TU = 0.94
HL
Turbidity
HOURS

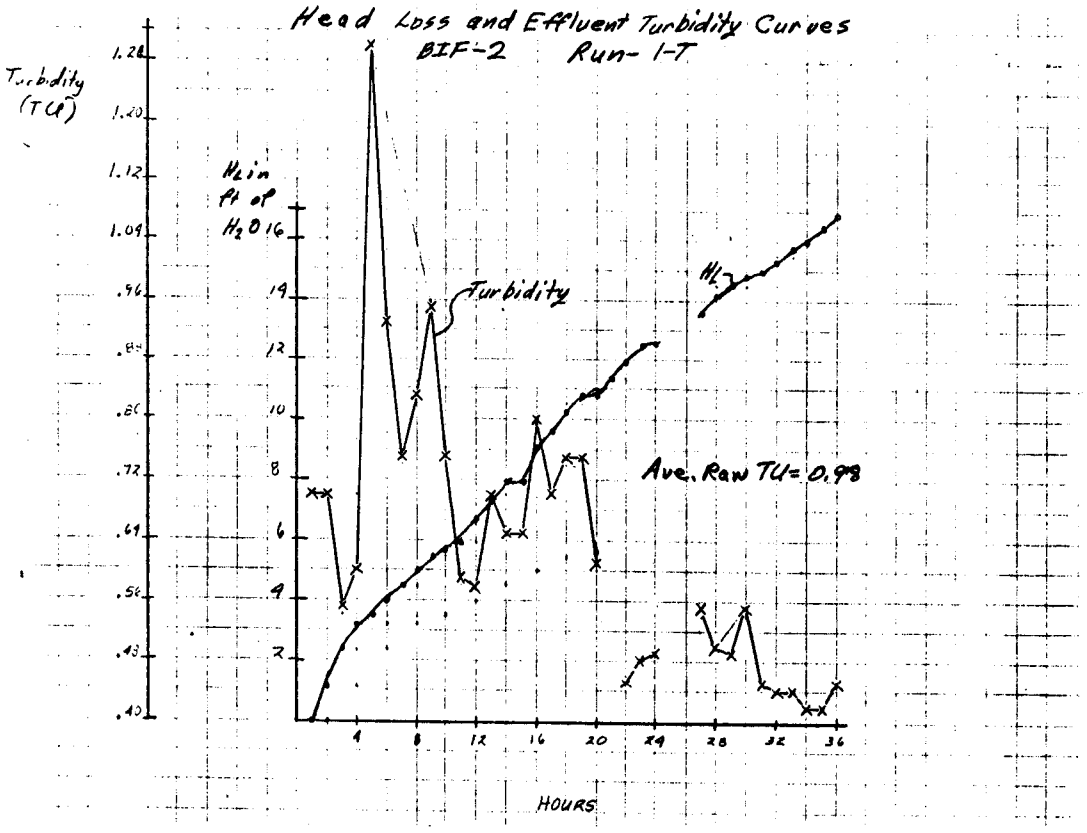

Head Loss and Effluent Turbidity Curves
BIF-1
Run- 8
Turbidity (TU)
.50
.46
.44
.40
.32
Hz in feet of H2O
3.2
3.0
2.8
2.6
2.4
2.2
2.0
Turbidity
HL
Ave. Raw TU= 1.26
2
4
HOURS

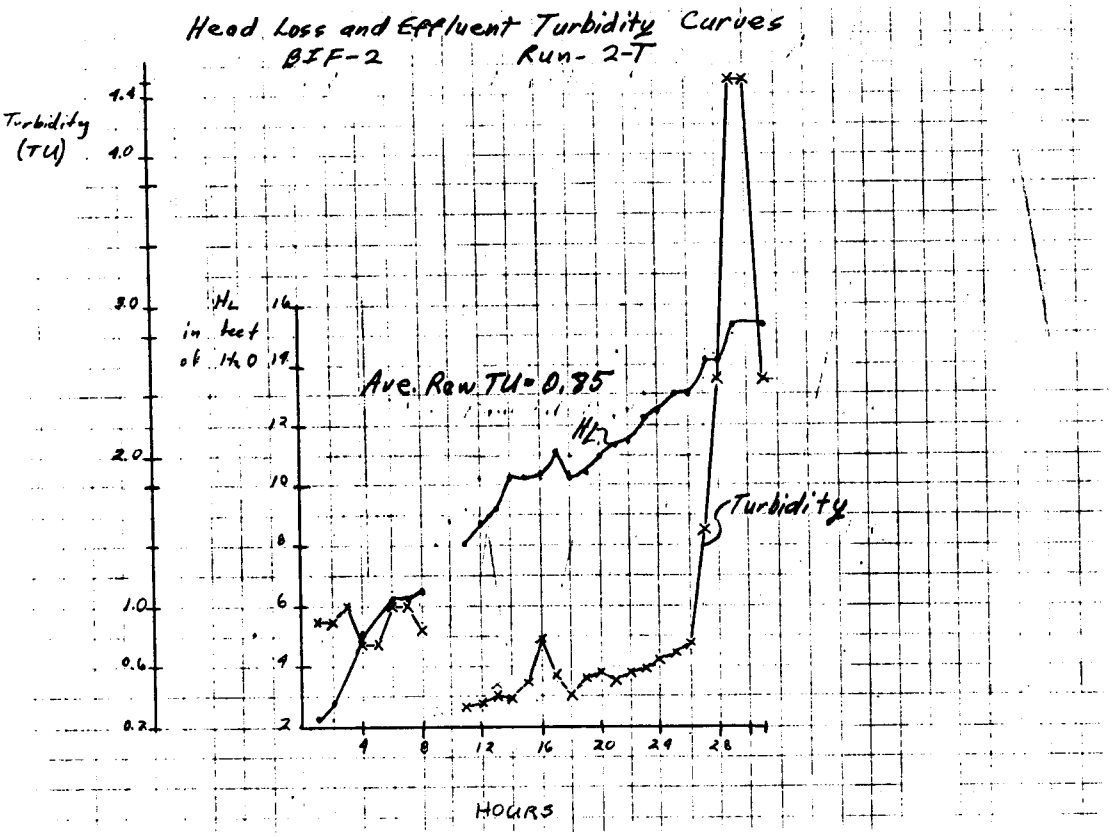

Head Loss and Effluent Turbidity Curves
BIF-1
Run- 9
Turbidity (TU)
.54
.46
.44
.42
.40
.36
.34
Hz in feet of H2O
3.4
3.2
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
HL
Ave. Raw TU= 1.10
Turbidity
2
4
6
8
10
12
HOURS

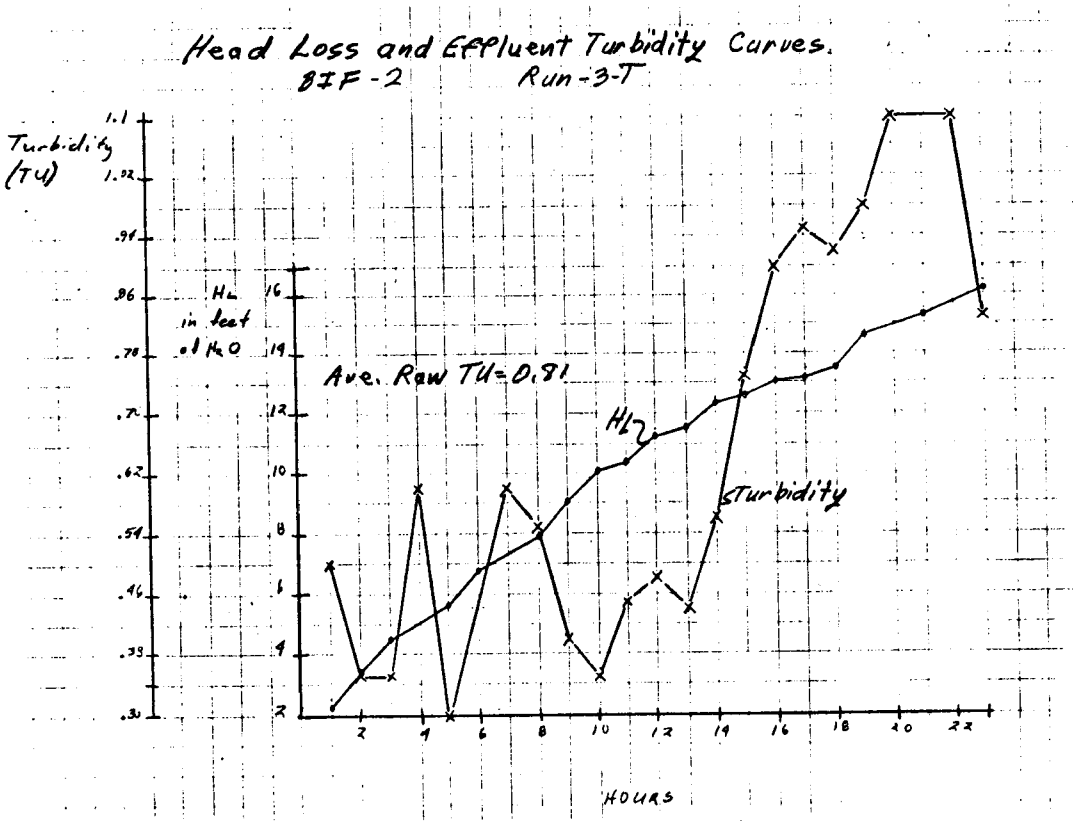

Head Loss and Effluent Turbidity Curves
BIF-1
Run-10
Turbidity (TU)
HL in feet of H2O
Ave. Raw TU = 0.67
HL
Turbidity
HOURS

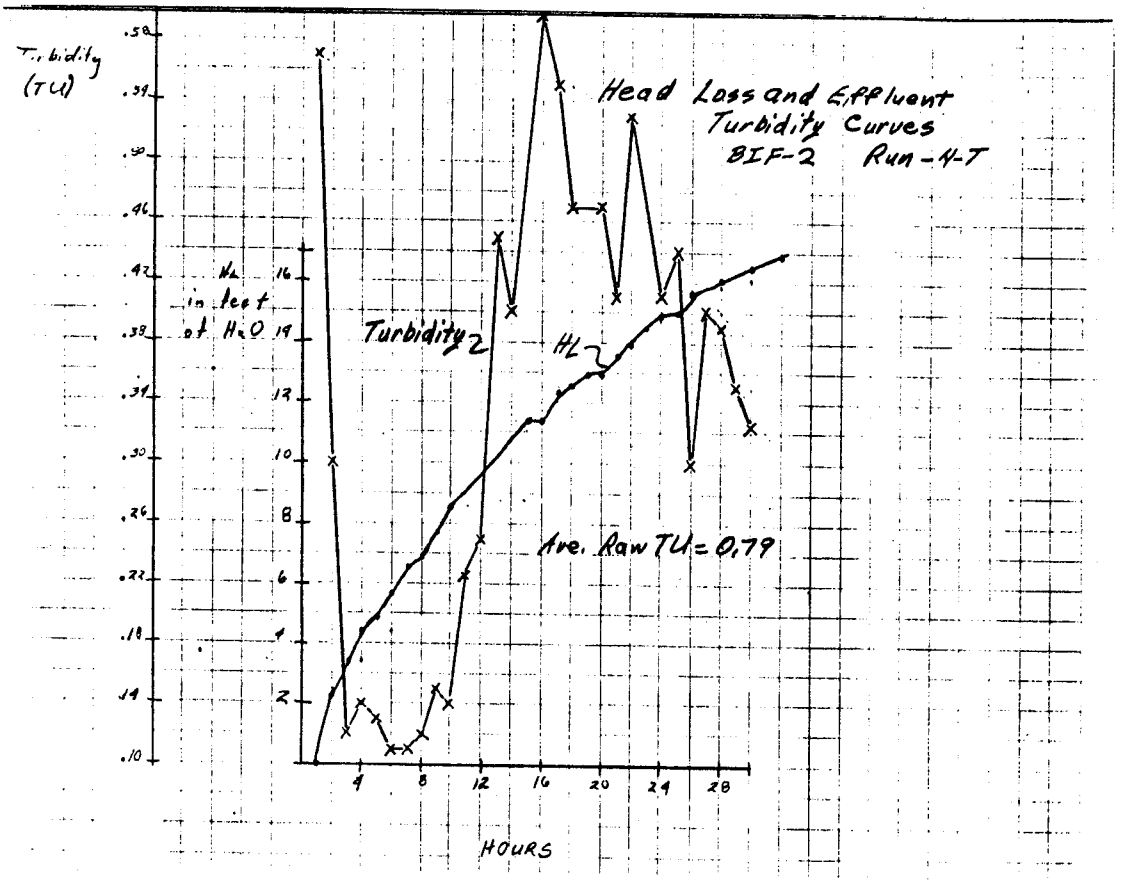

Head Loss and Effluent Turbidity Curves
BIF-1
Run-11
HL in ft of H2O
TURBIDITY TU
Turbidity
HL
Ave Raw TU = 0.65
HOURS

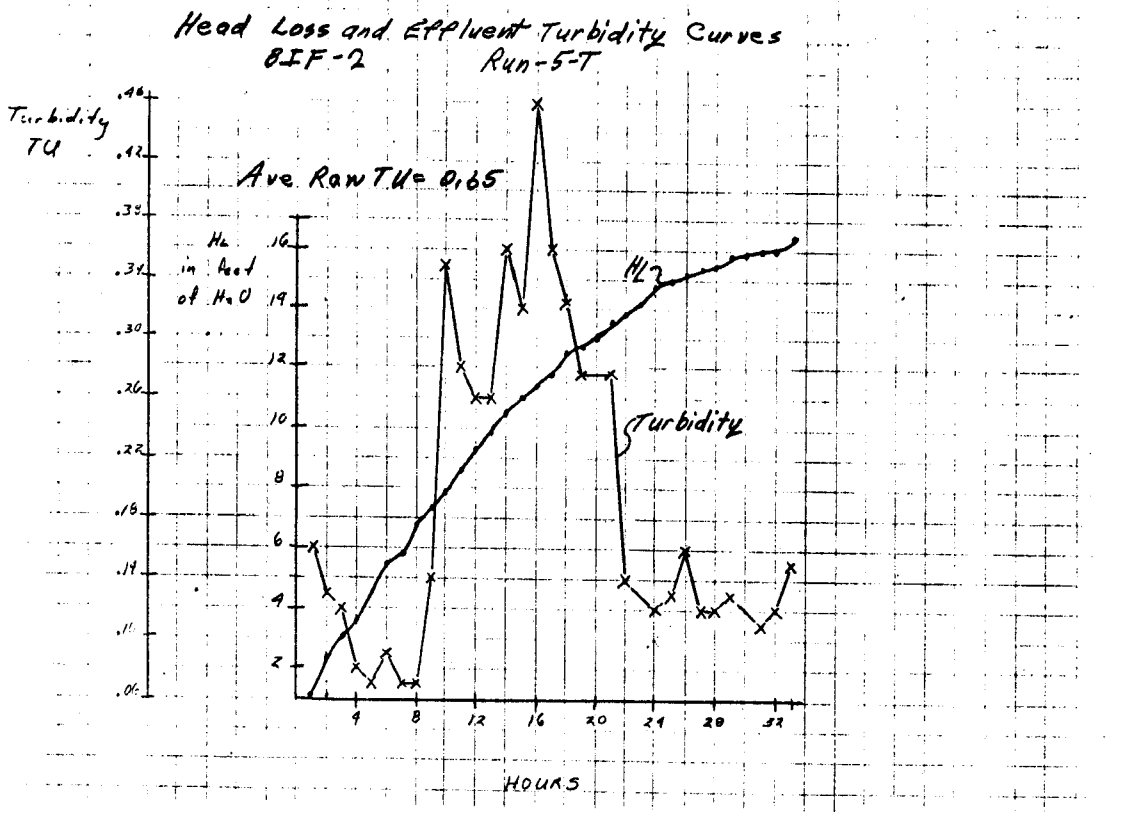

Head Loss and Effluent Turbidity Curves
BIF-1 Run-12
Turbidity (TU)
HL in feet of H2O
HL
Turbidity
Ave. Raw TU= 0.67
HOURS

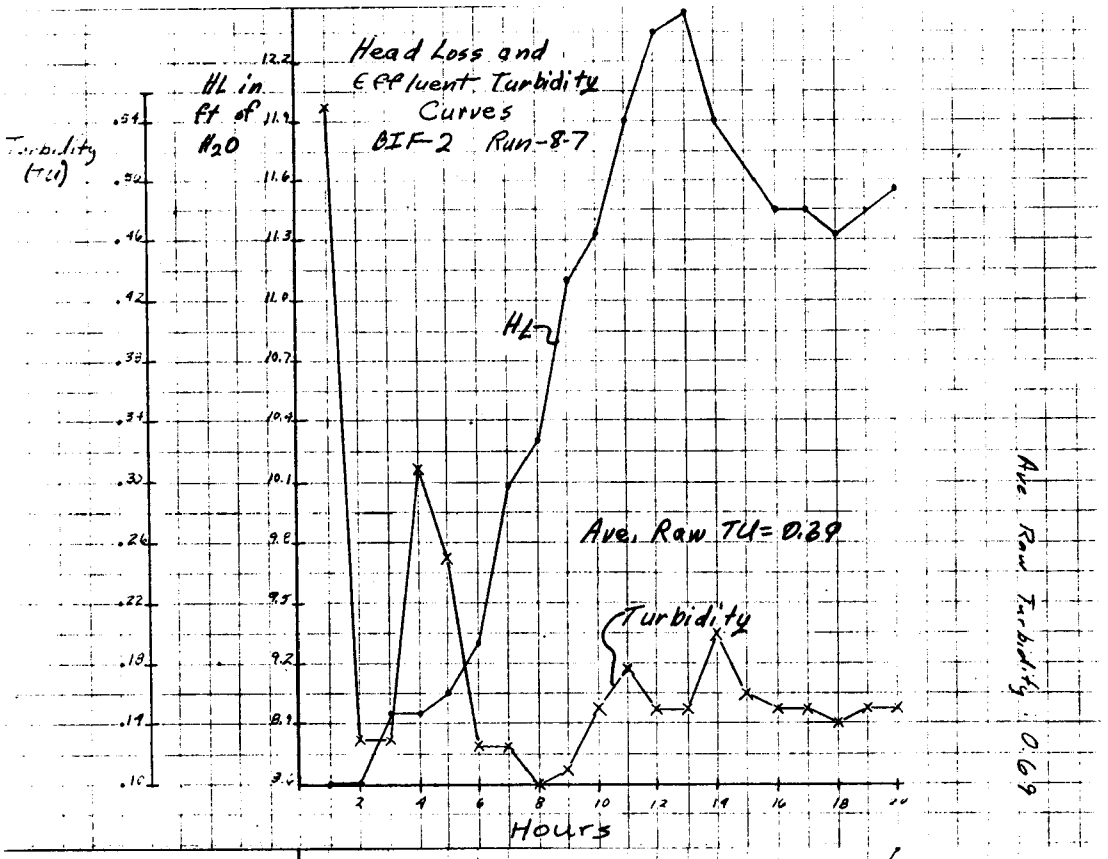

Head Loss and Effluent Turbidity Curves
BIF-2 Run-1-T
Turbidity (TU)
HL in ft of H2O
Turbidity
HL
Ave. Raw TU= 0.98
HOURS

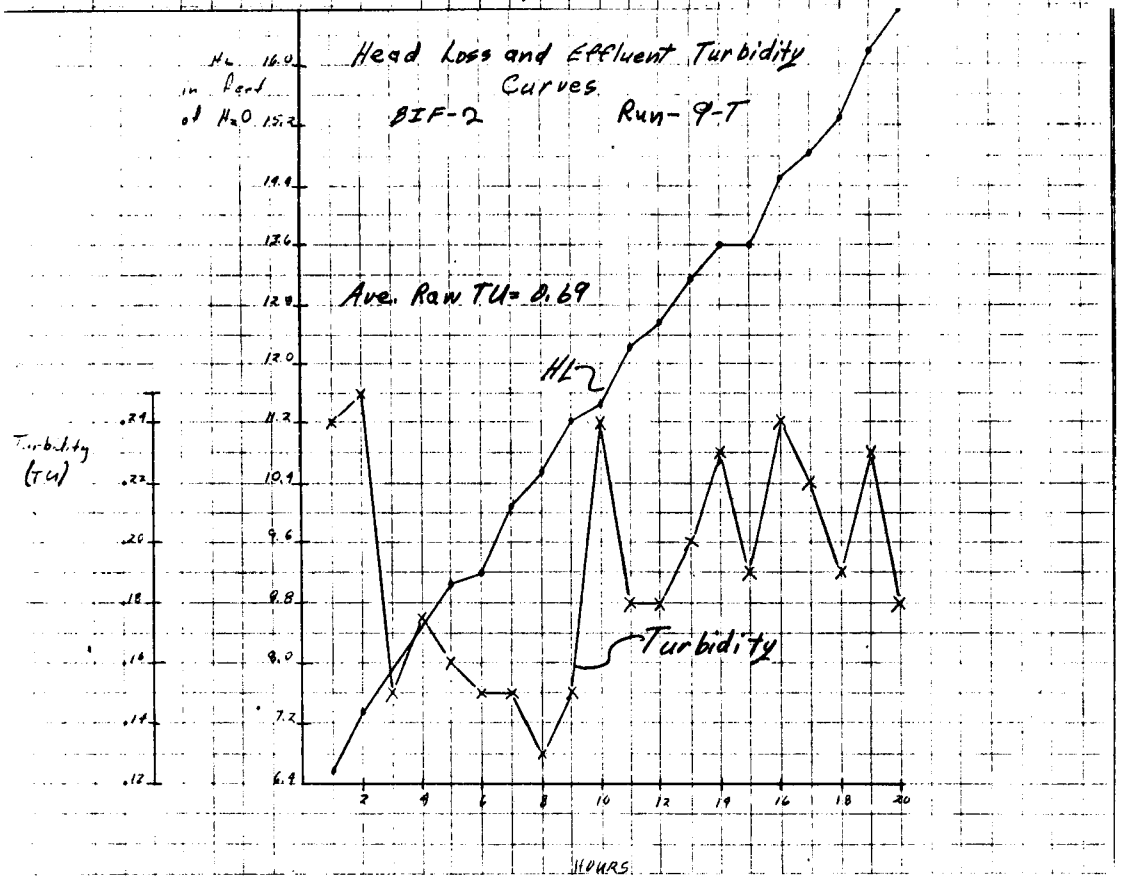

Head Loss and Effluent Turbidity Curves
BIF-2 Run- 2-T
Turbidity (TU)
HL in feet of H2O
Ave. Raw TU = 0.85
HL
Turbidity
HOURS

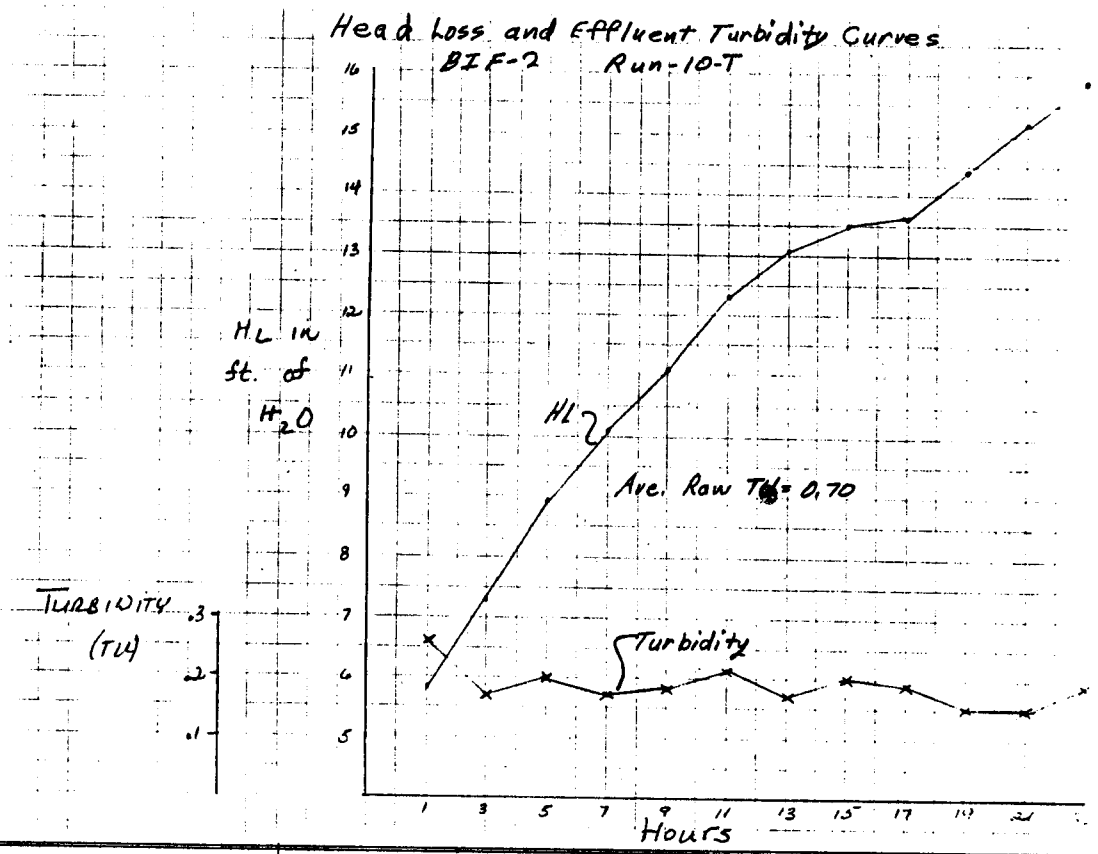

Head Loss and Effluent Turbidity Curves.
BIF-2 Run-3-T
Turbidity (TU)
HL in feet of H2O
Ave. Raw TU = 0.81
HL
Turbidity
HOURS

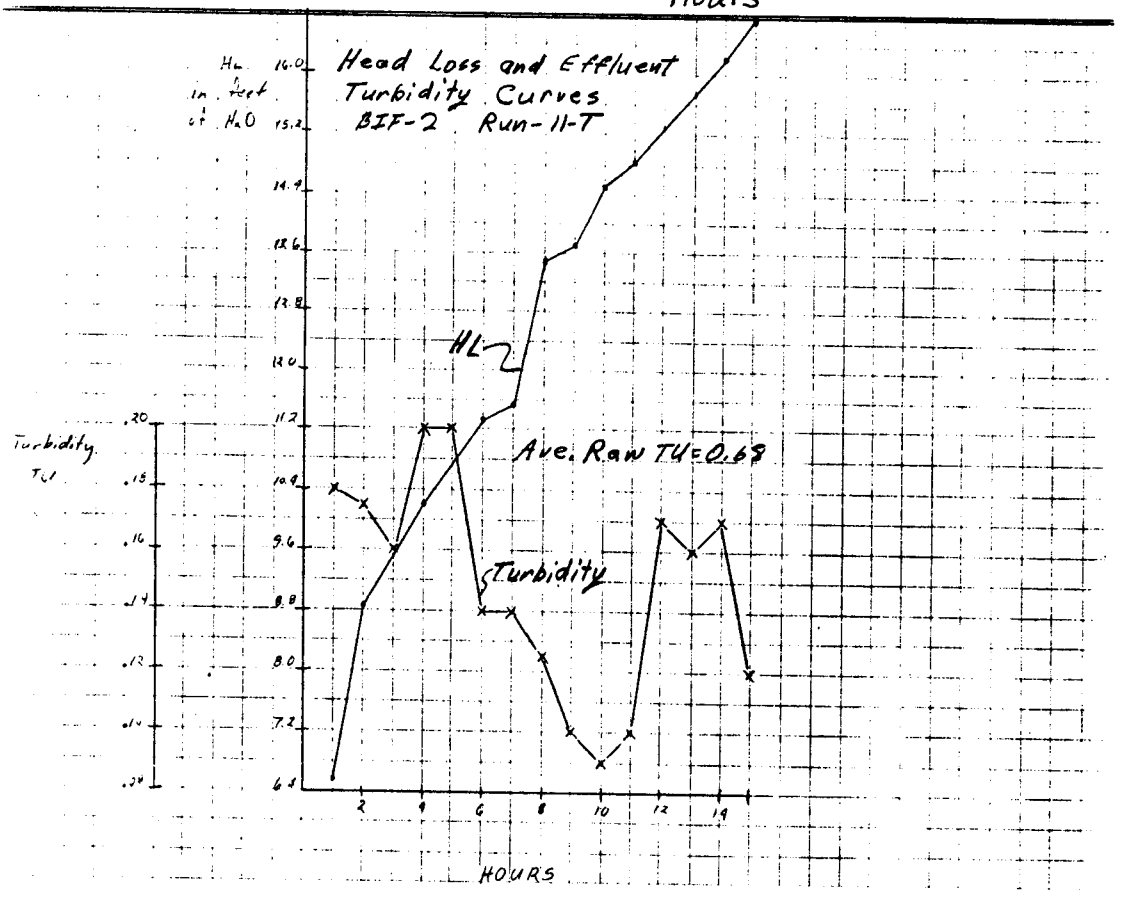

Turbidity (TU)
Head Loss and Effluent Turbidity Curves
BIF-2 Run-4-T
HL in feet of H2O
Turbidity
HL
Ave. Raw TU = 0.79
HOURS

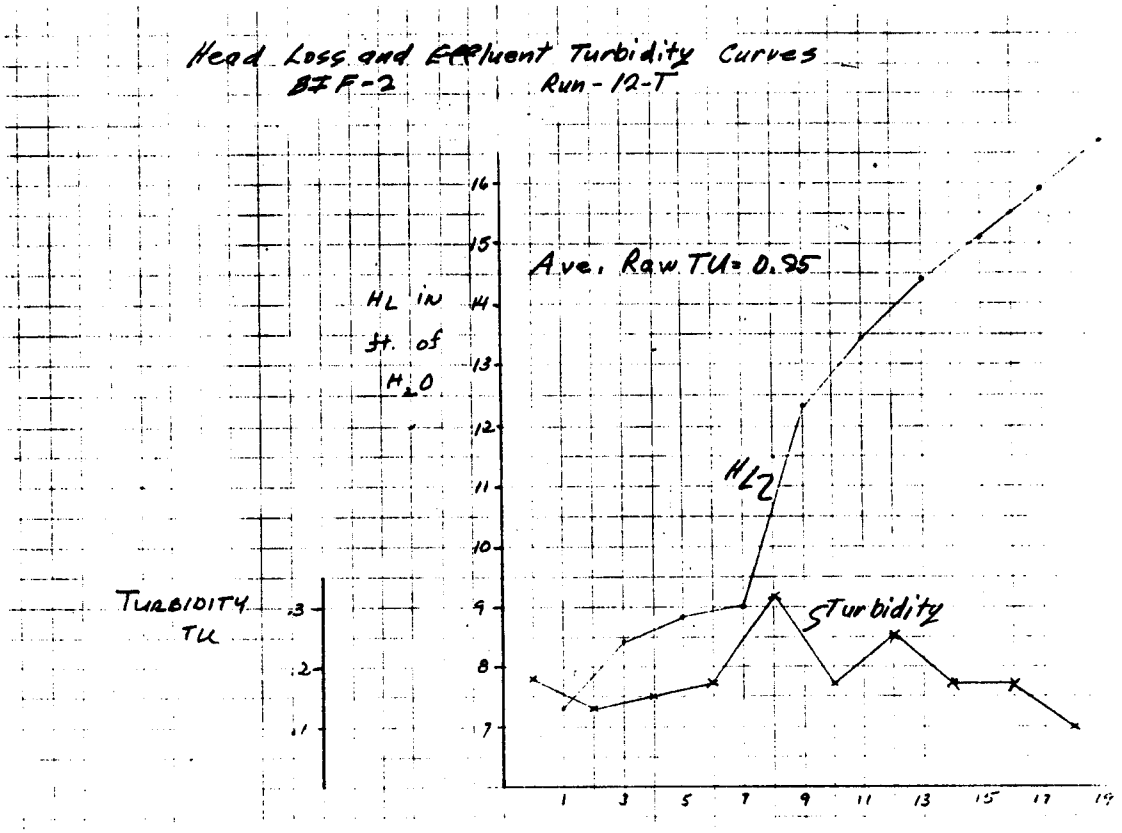

Head Loss and Effluent Turbidity Curves
BIF-2 Run-5-T
Turbidity TU
Ave. Raw TU = 0.65
HL in feet of H2O
HL
Turbidity
HOURS

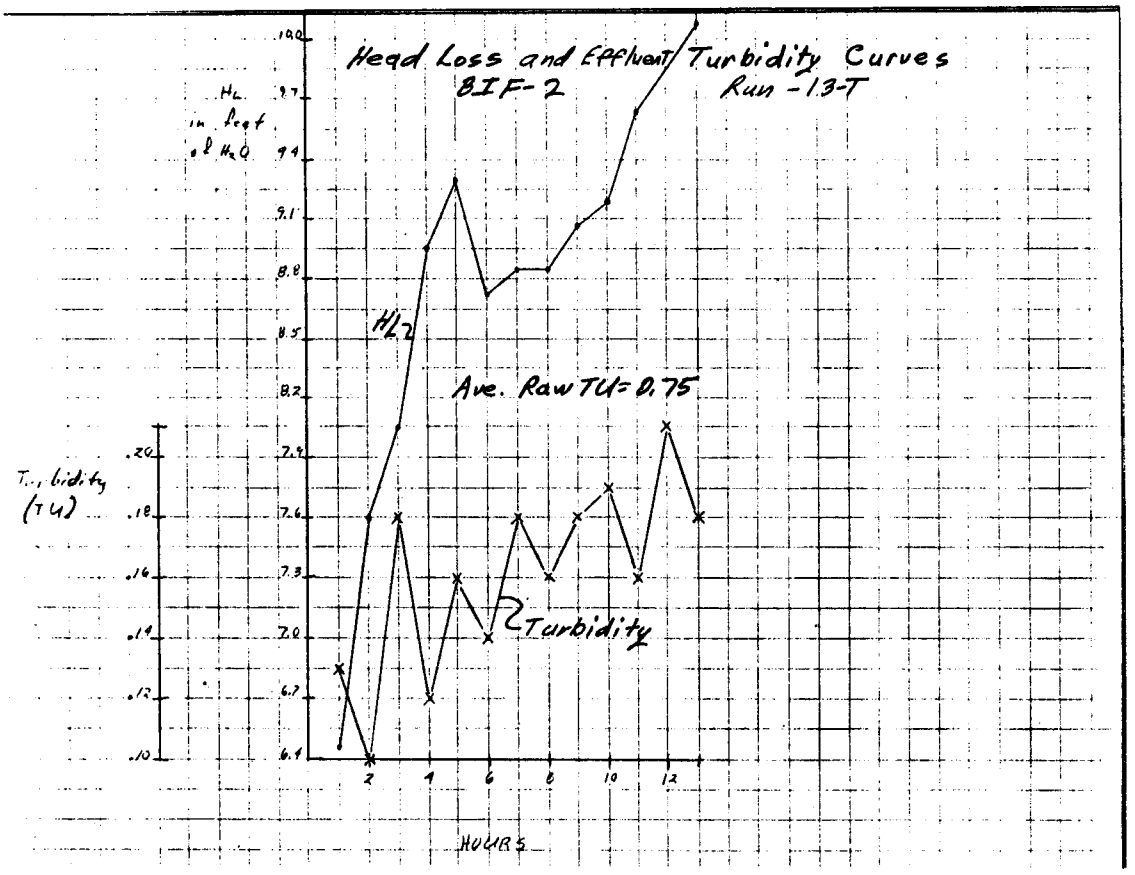

Head Loss and
Effluent Turbidity
Curves
BIF-2 Run-8-7
HL in
ft of
H_2O
Turbidity
(TU)
HL
Turbidity
Ave. Raw TU= 0.39
Ave. Raw Turbidity = 0.69
Hours

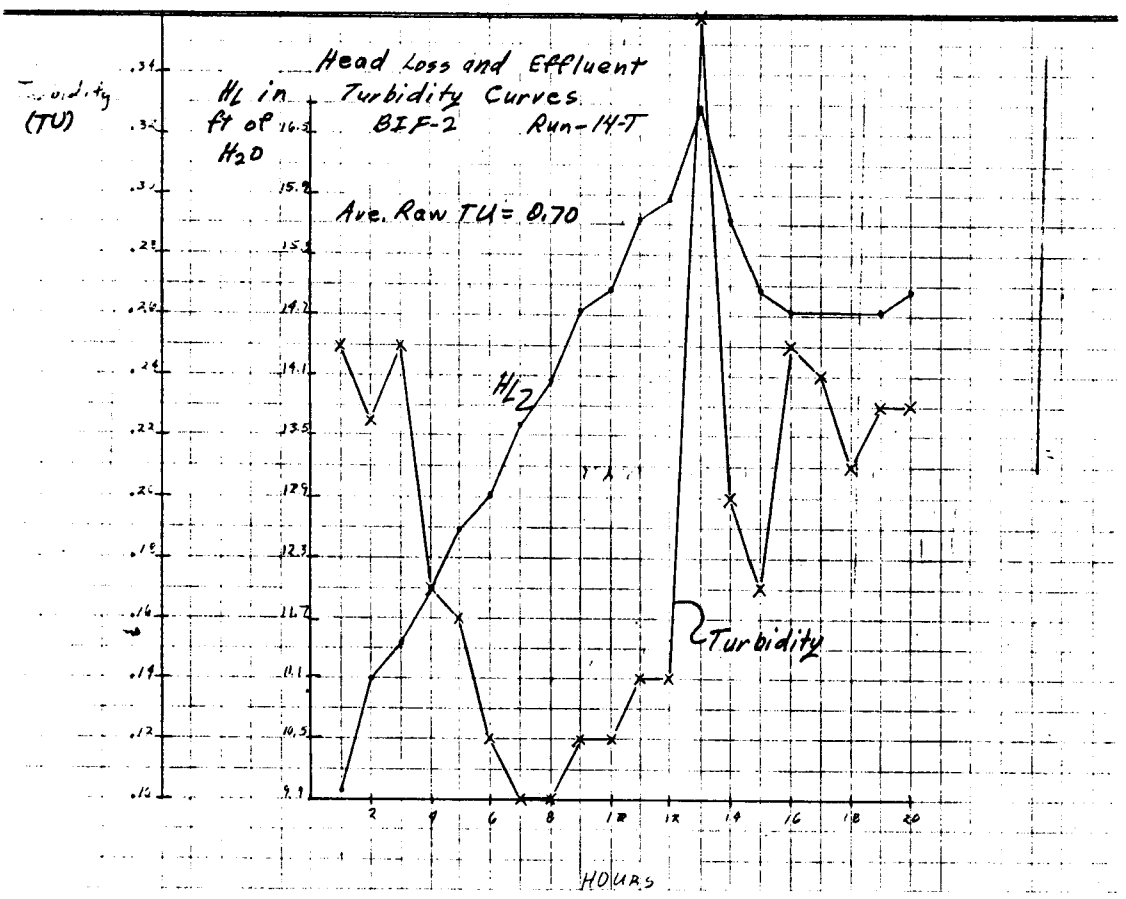

Head Loss and Effluent Turbidity
Curves
BIF-2 Run-9-7
HL
in feet
of H_2O
Ave. Raw TU= 0.69
HL
Turbidity
Turbidity
(TU)
HOURS

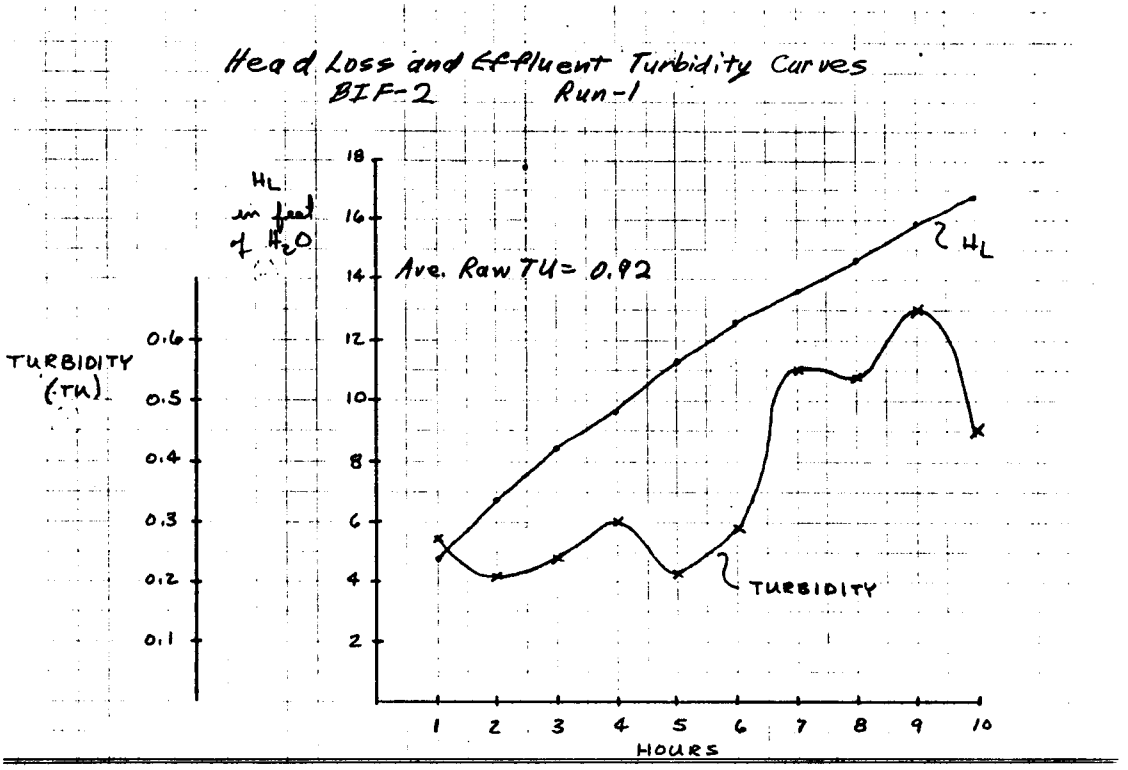

Head Loss and Effluent Turbidity Curves
BIF-2 Run-10-T
HL in ft. of H2O
HL
Ave. Raw TU = 0.70
Turbidity
TURBIDITY (TU)
Hours

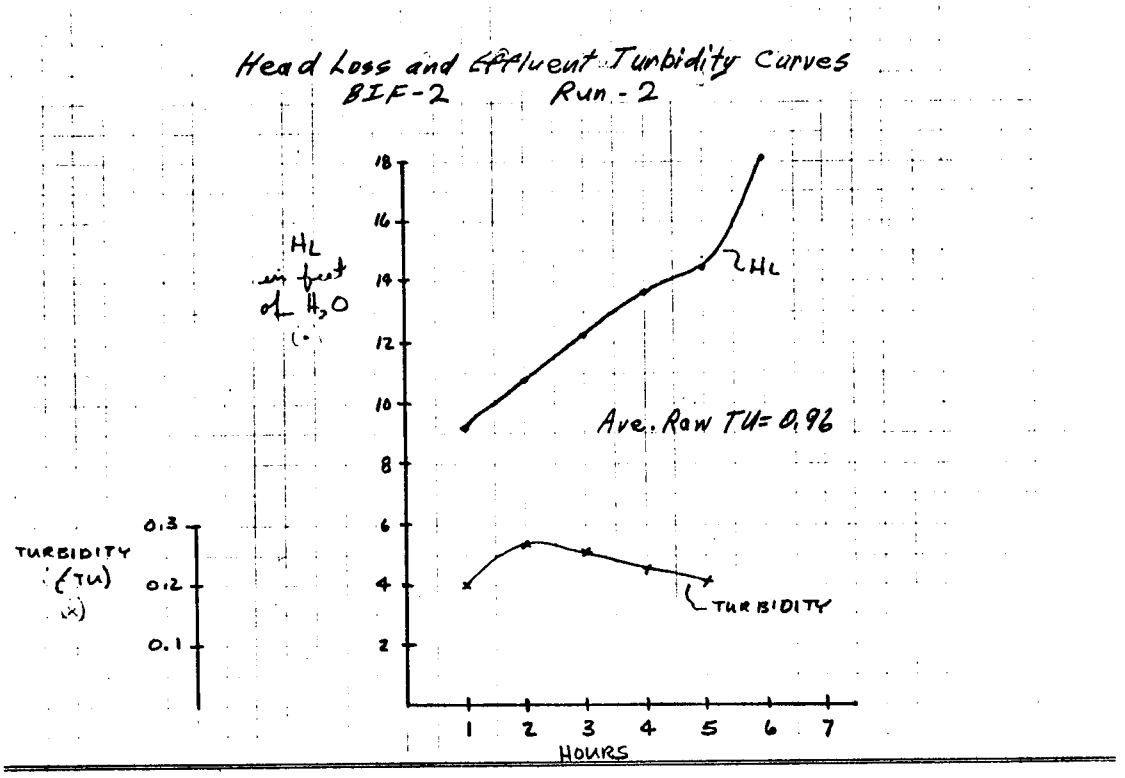

Head Loss and Effluent Turbidity Curves
BIF-2 Run-11-T
HL in feet of H2O
HL
Ave. Raw TU = 0.68
Turbidity
Turbidity TU
HOURS

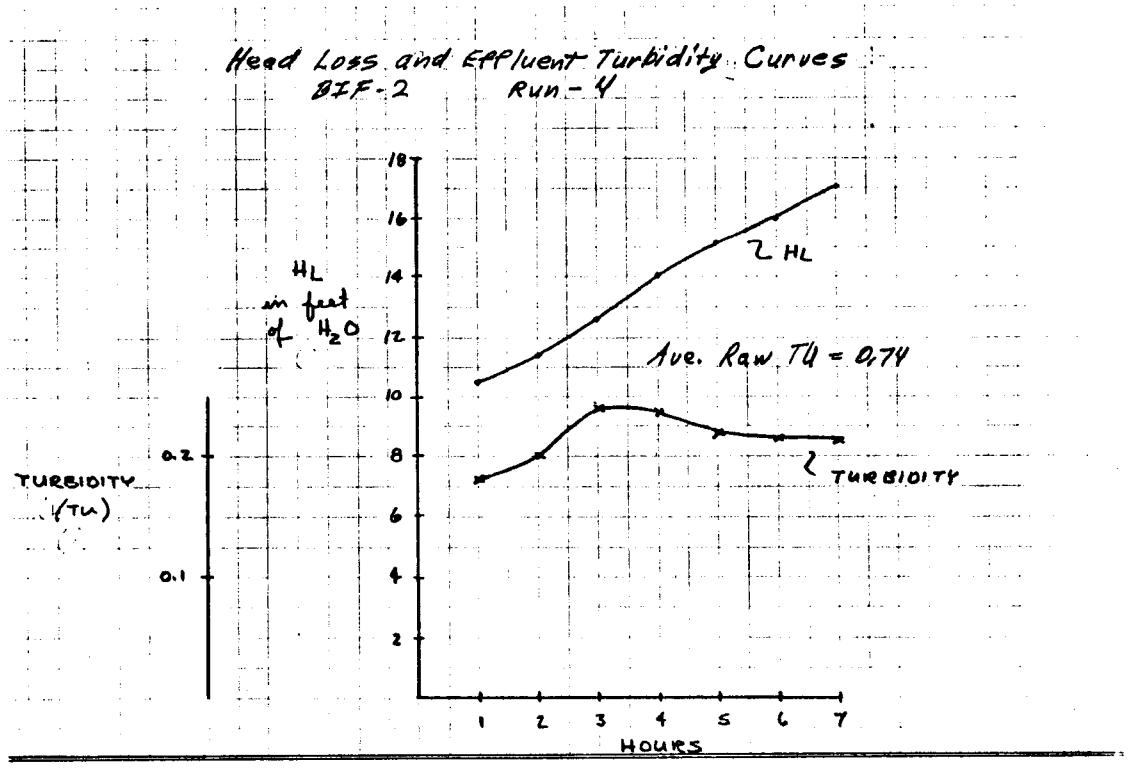

Head Loss and Effluent Turbidity Curves
BIF-2
Run-12-T
Ave. Raw TU = 0.85
HL in ft. of H2O
HL
Turbidity
TURBIDITY TU

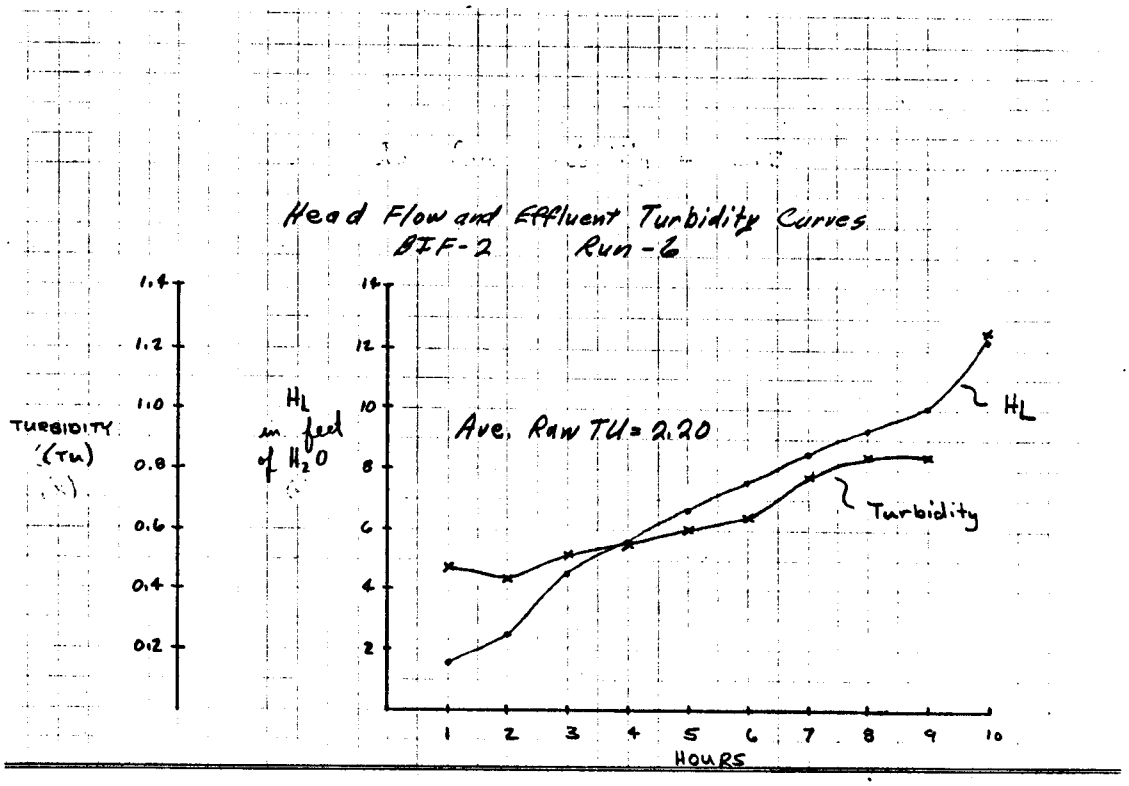

Head Loss and Effluent Turbidity Curves
BIF-2
Run-13-T
HL in feet of H2O
HL
Ave. Raw TU = 0.75
Turbidity
Turbidity (TU)
HOURS

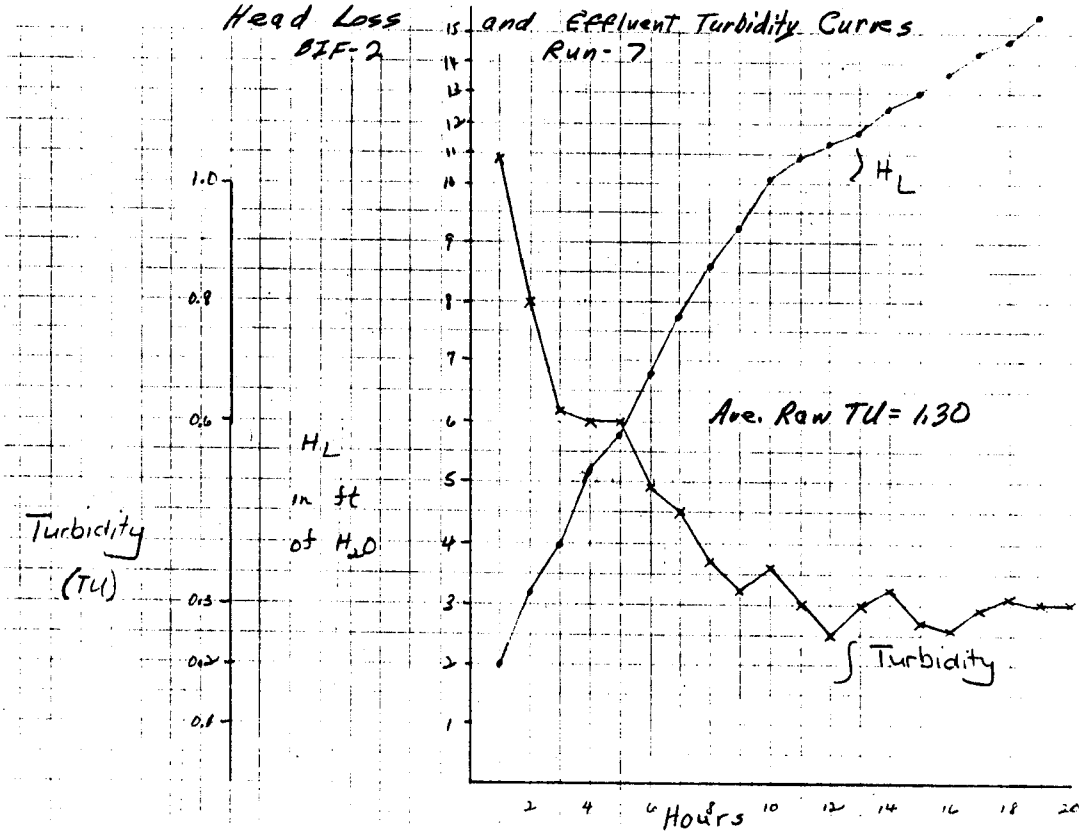

Head Loss and Effluent Turbidity Curves
BIF-2 Run-14-T
Ave. Raw TU = 0.70
Turbidity (TU)
H_L in ft of H_2O
H_L
Turbidity
HOURS

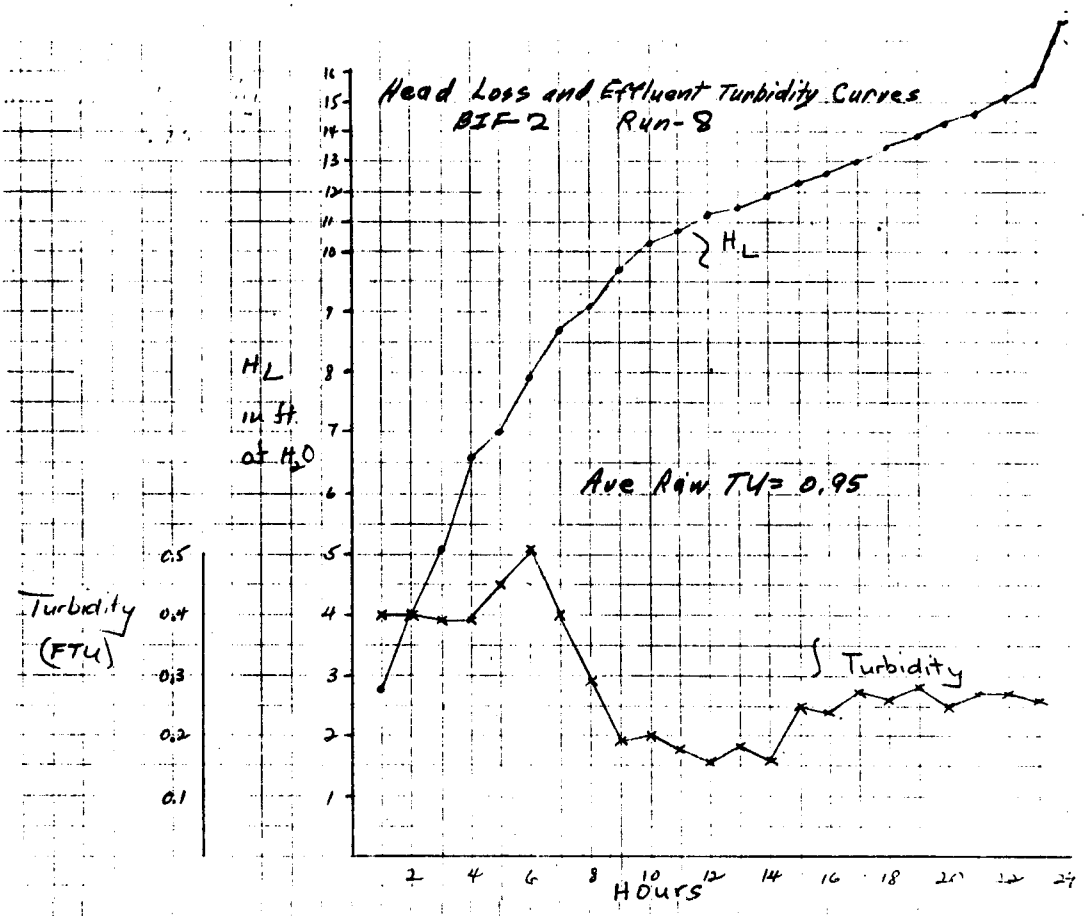

Head Loss and Effluent Turbidity Curves
BIF-2 Run-1
Ave. Raw TU = 0.92
H_L in feet of H_2O
TURBIDITY (TU)
H_L
TURBIDITY
HOURS

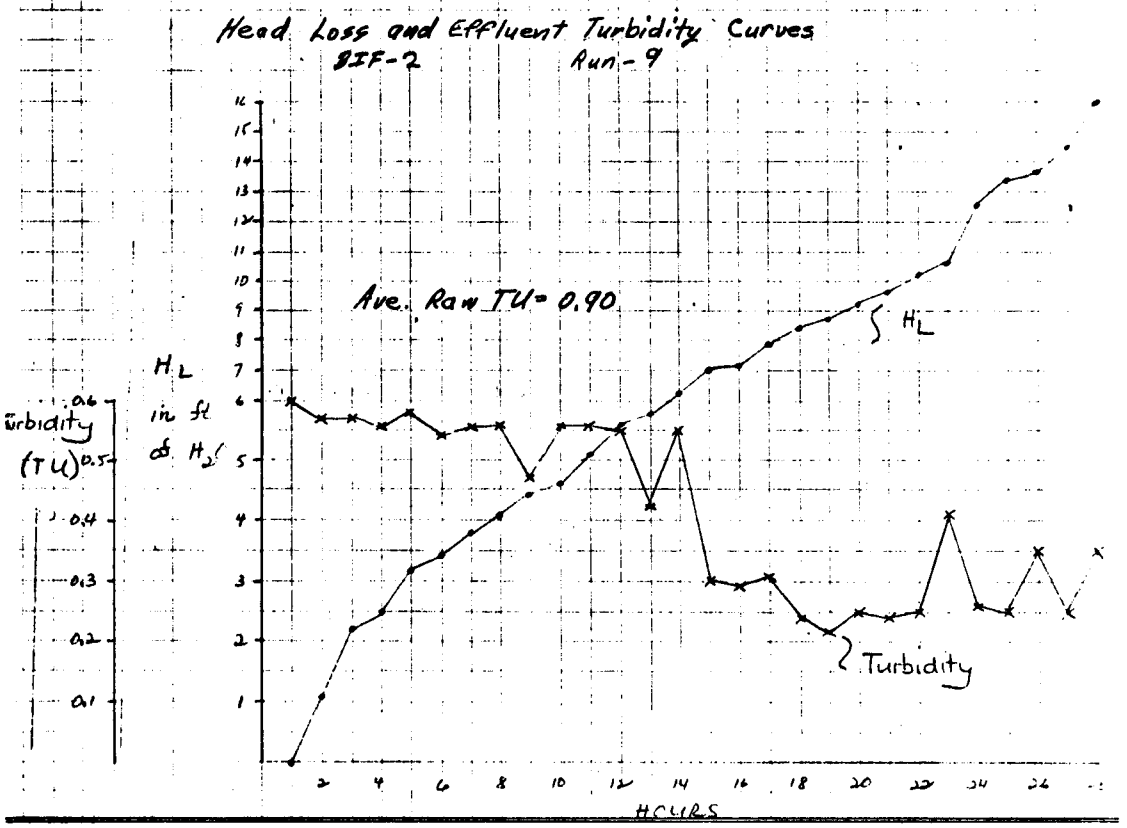

Head Loss and Effluent Turbidity Curves
BIF-2 Run - 2
HL in feet of H2O
HL
Ave. Raw TU = 0.96
TURBIDITY (TU)
TURBIDITY
HOURS

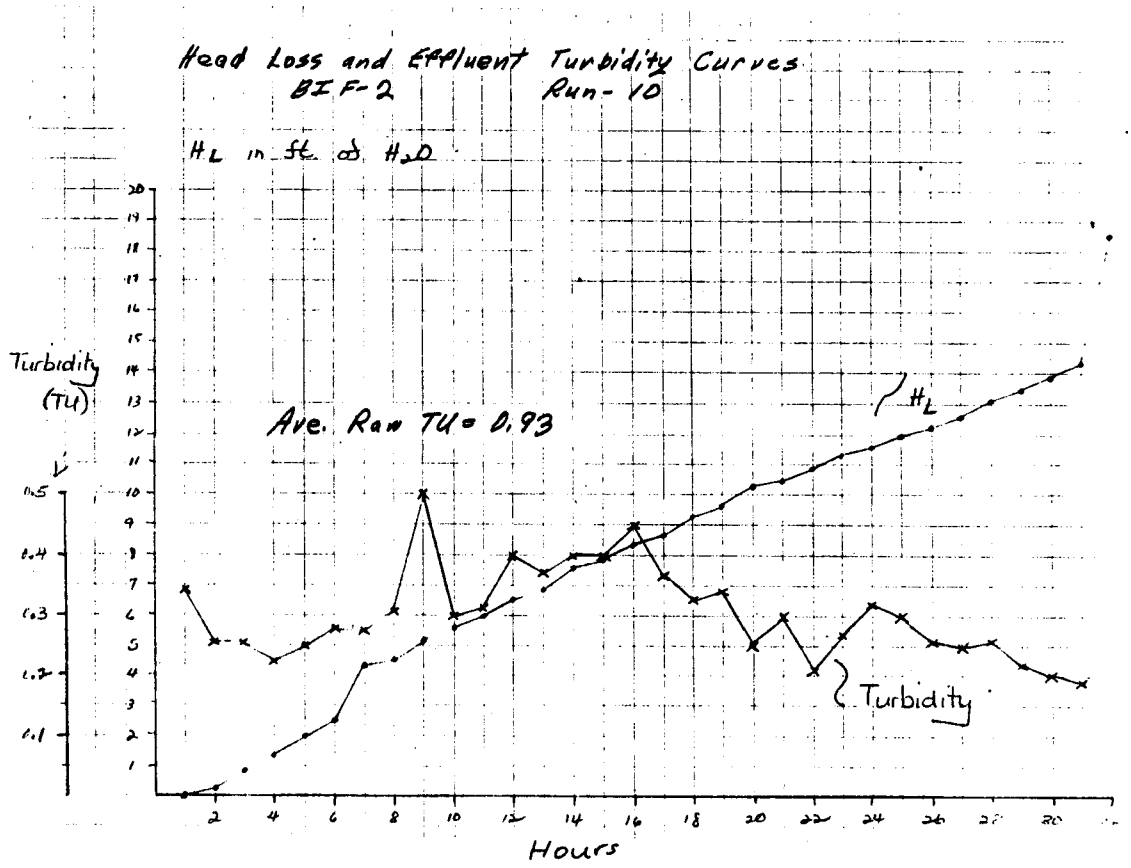

Head Loss and Effluent Turbidity Curves
BIF-2 Run - 4
HL in feet of H2O
HL
Ave. Raw TU = 0.74
TURBIDITY (TU)
TURBIDITY
HOURS

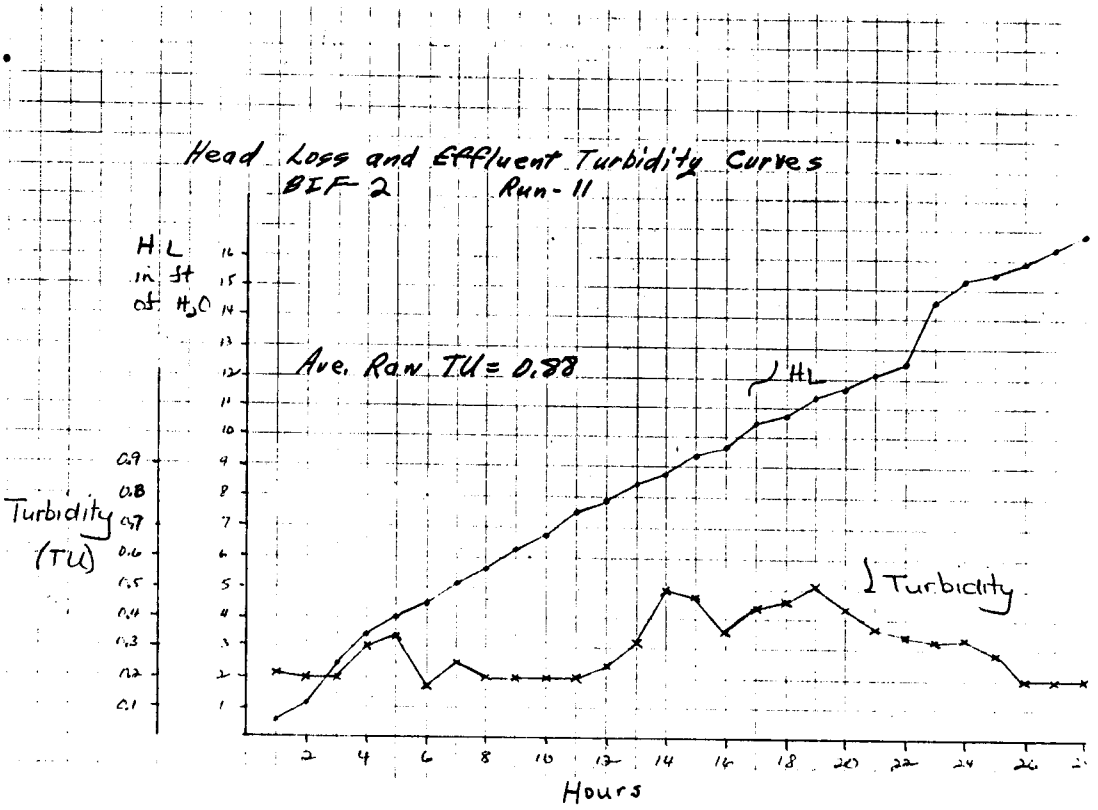

Head Flow and Effluent Turbidity Curves
BIF-2 Run-6
TURBIDITY (TU)
H_L in feet of H_2O
Ave. Raw TU = 2.20
H_L
Turbidity
HOURS

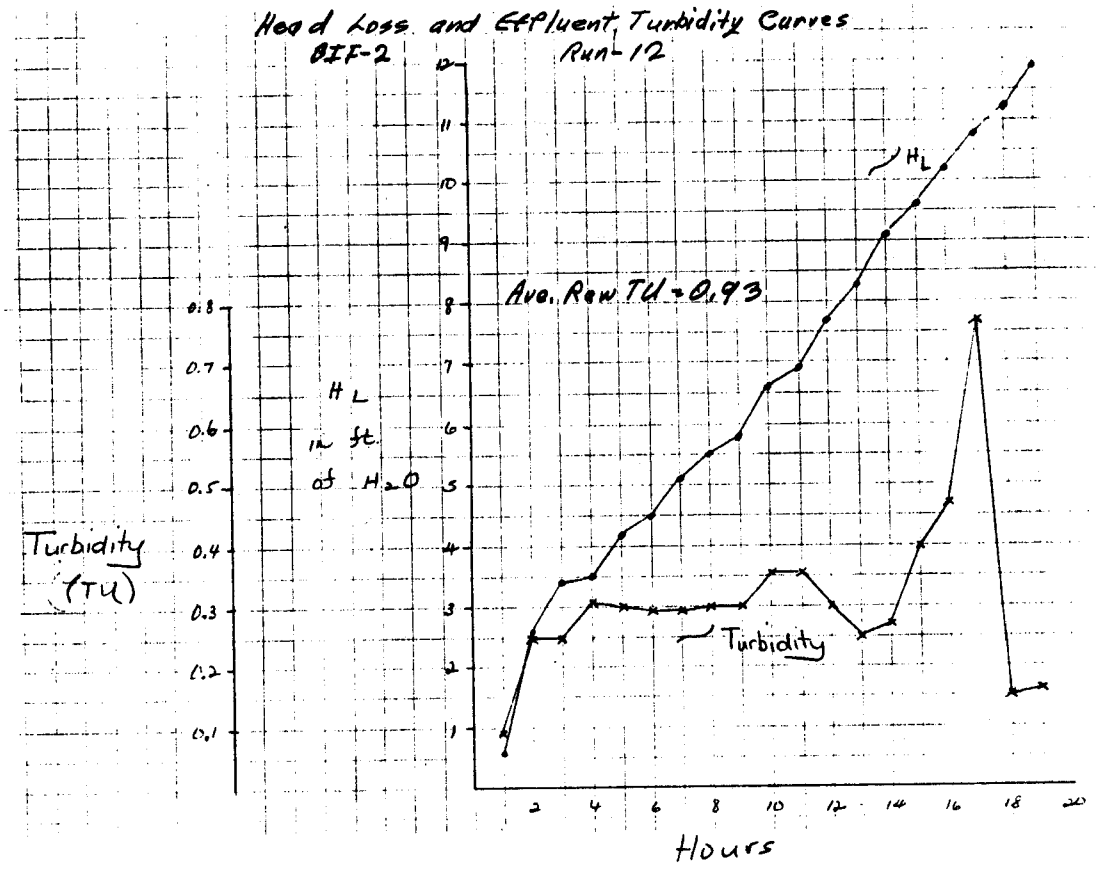

Head Loss and Effluent Turbidity Curves
BIF-2 Run-7
Turbidity (TU)
H_L in ft of H_2O
Ave. Raw TU = 1.30
H_L
Turbidity
Hours

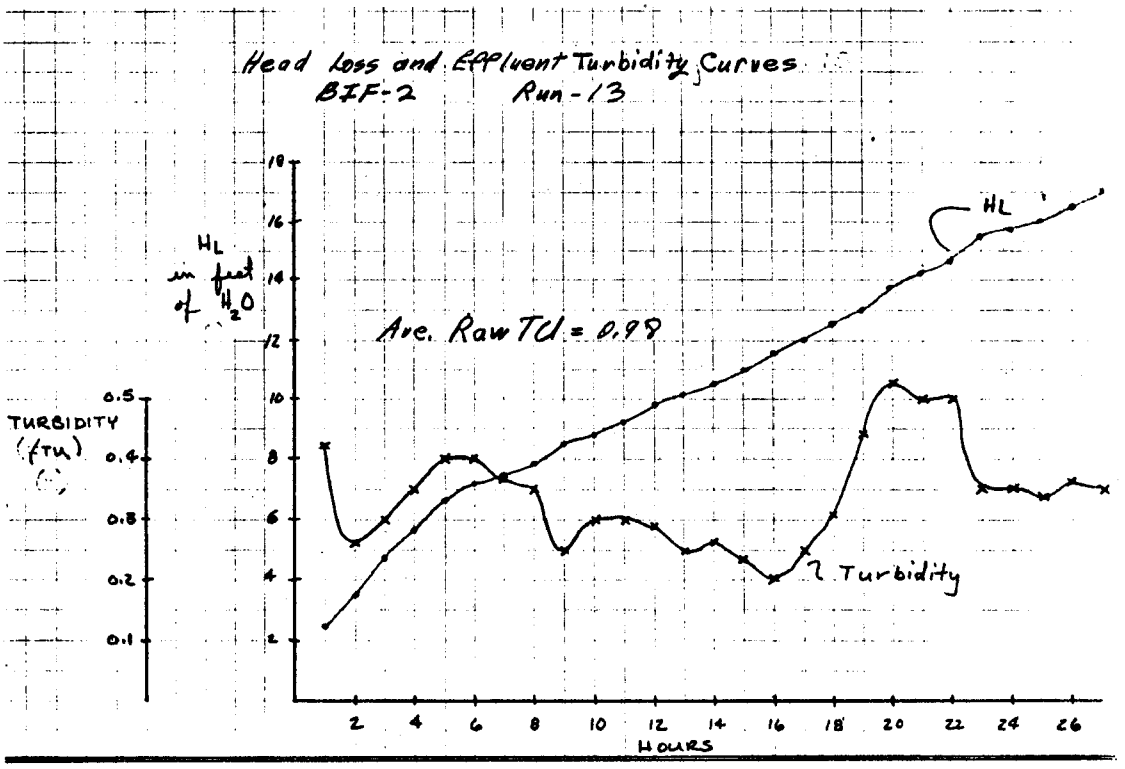

Head Loss and Effluent Turbidity Curves
BIF-2 Run-8
H_L
Ave Raw TU = 0.95
Turbidity
H_L in ft. of H_2O
Turbidity (FTU)
Hours

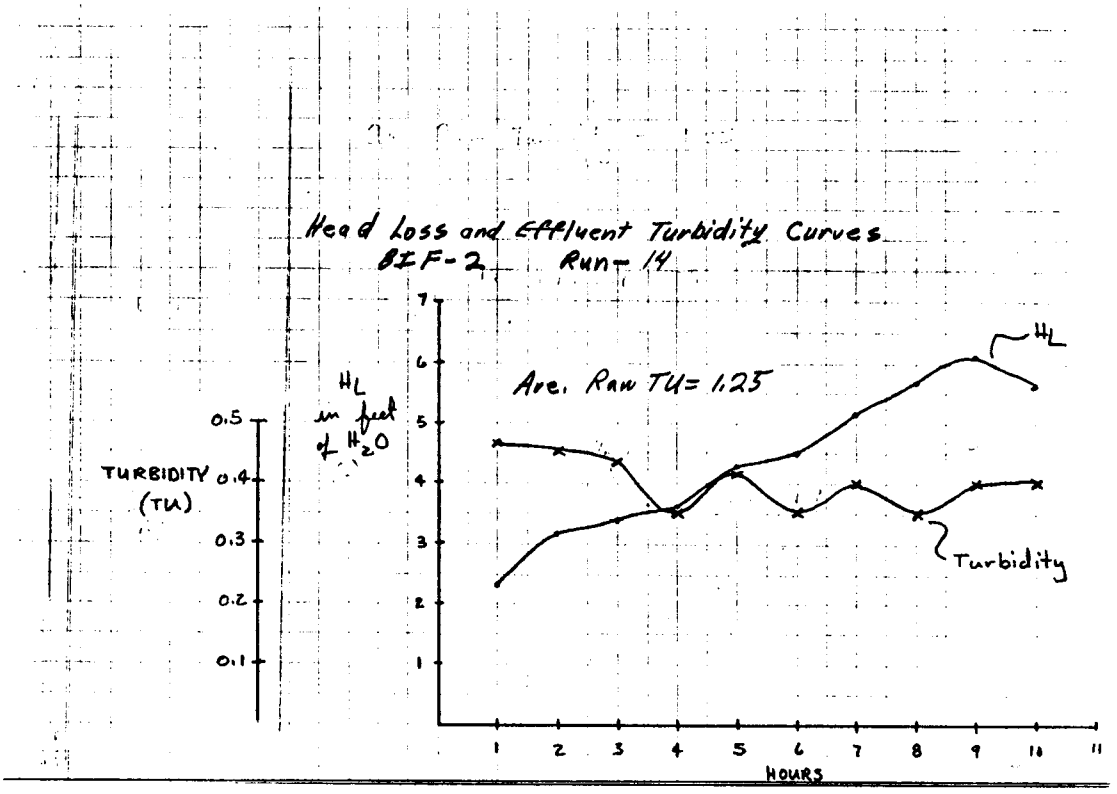

Head Loss and Effluent Turbidity Curves
BIF-2 Run-9
Ave. Raw TU = 0.90
H_L
Turbidity
H_L in ft of H_2O
Turbidity (TU)
HOURS

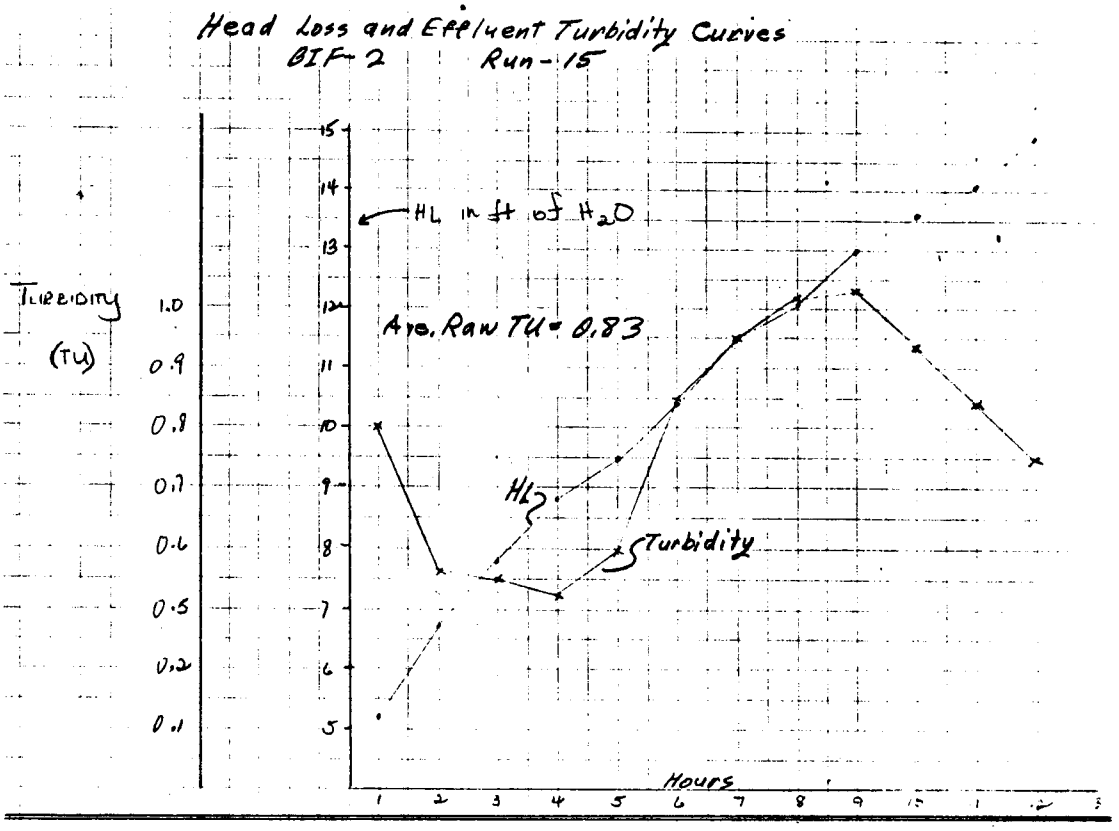

Head Loss and Effluent Turbidity Curves
BIF-2 Run-10
H_L in ft of H_2O
Turbidity (TU)
Ave. Raw TU = 0.93
H_L
Turbidity
Hours

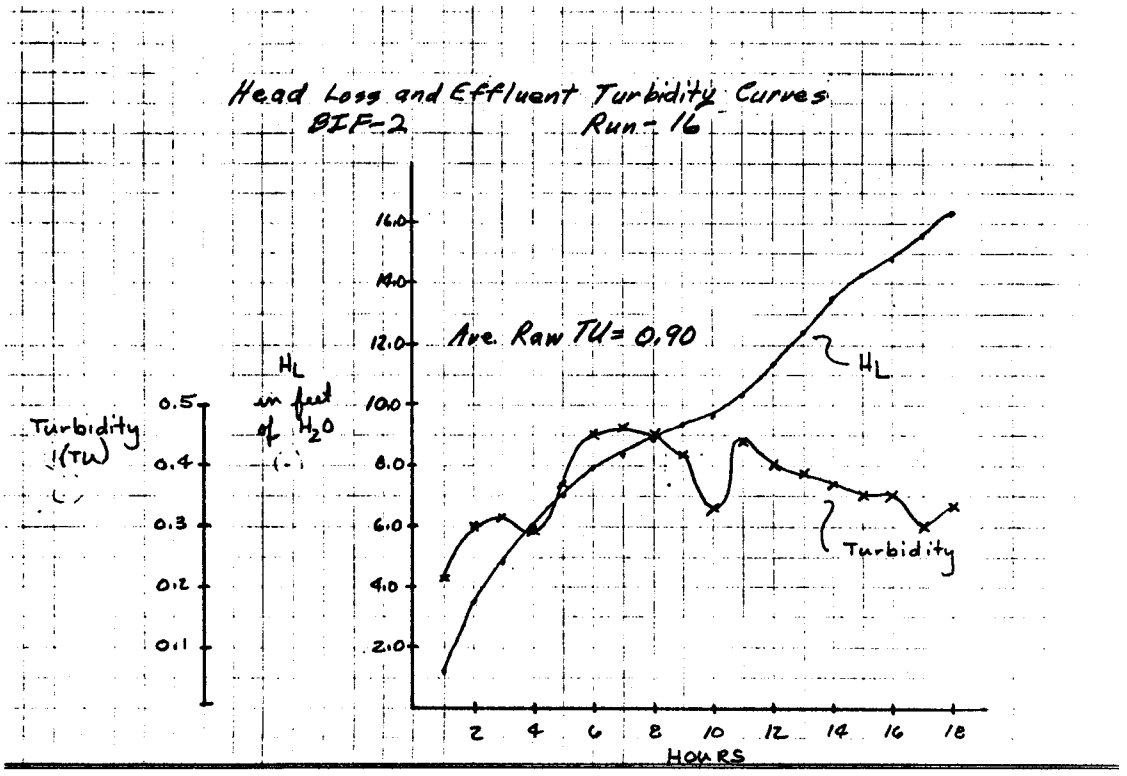

Head Loss and Effluent Turbidity Curves
BIF-2 Run-11
H_L in ft of H_2O
Turbidity (TU)
Ave. Raw TU = 0.88
H_L
Turbidity
Hours

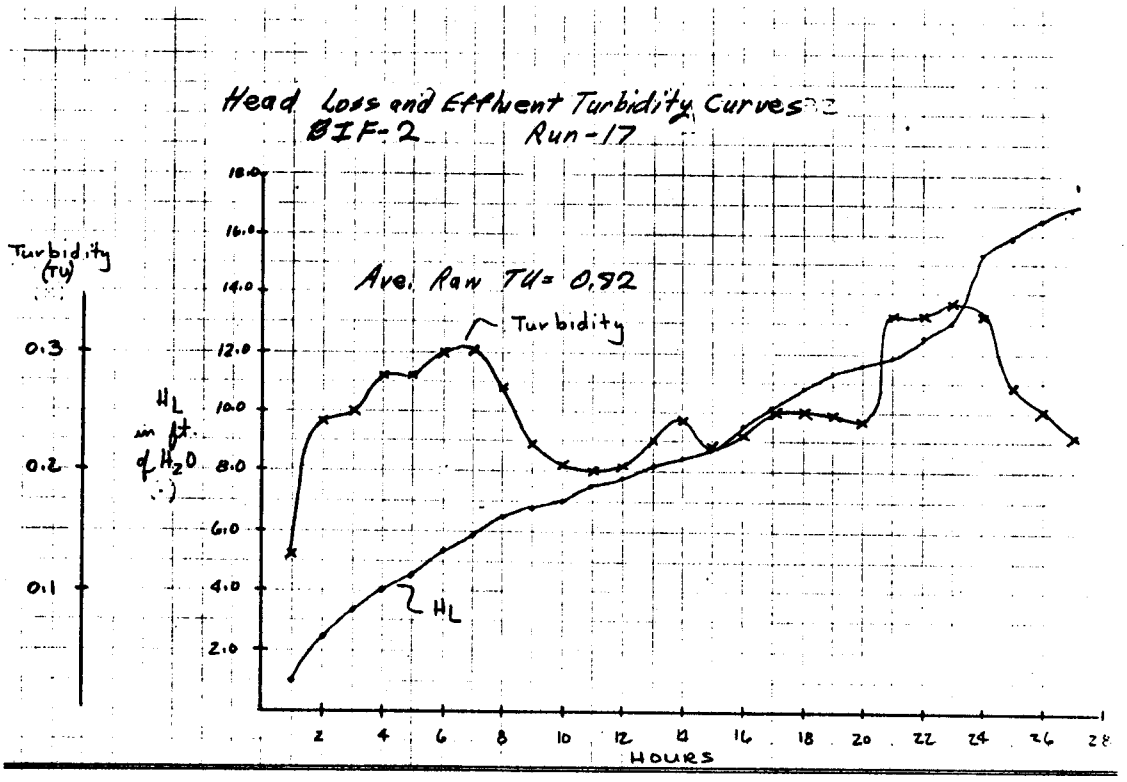

Head Loss and Effluent Turbidity Curves
BIF-2
Run-12
Ave. Raw TU = 0.93
HL
Turbidity
HL in ft. of H2O
Turbidity (TU)
Hours

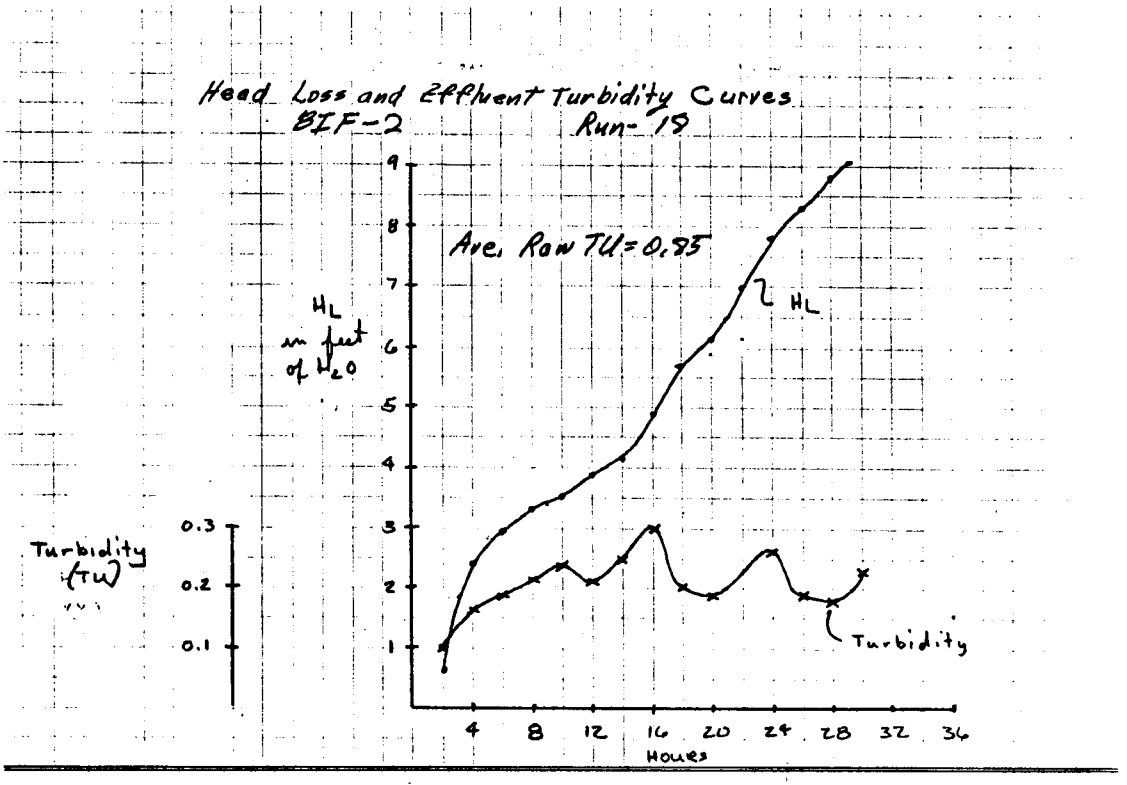

Head Loss and Effluent Turbidity Curves
BIF-2
Run-13
Ave. Raw TU = 0.98
HL
Turbidity
HL in feet of H2O
TURBIDITY (TU)
HOURS

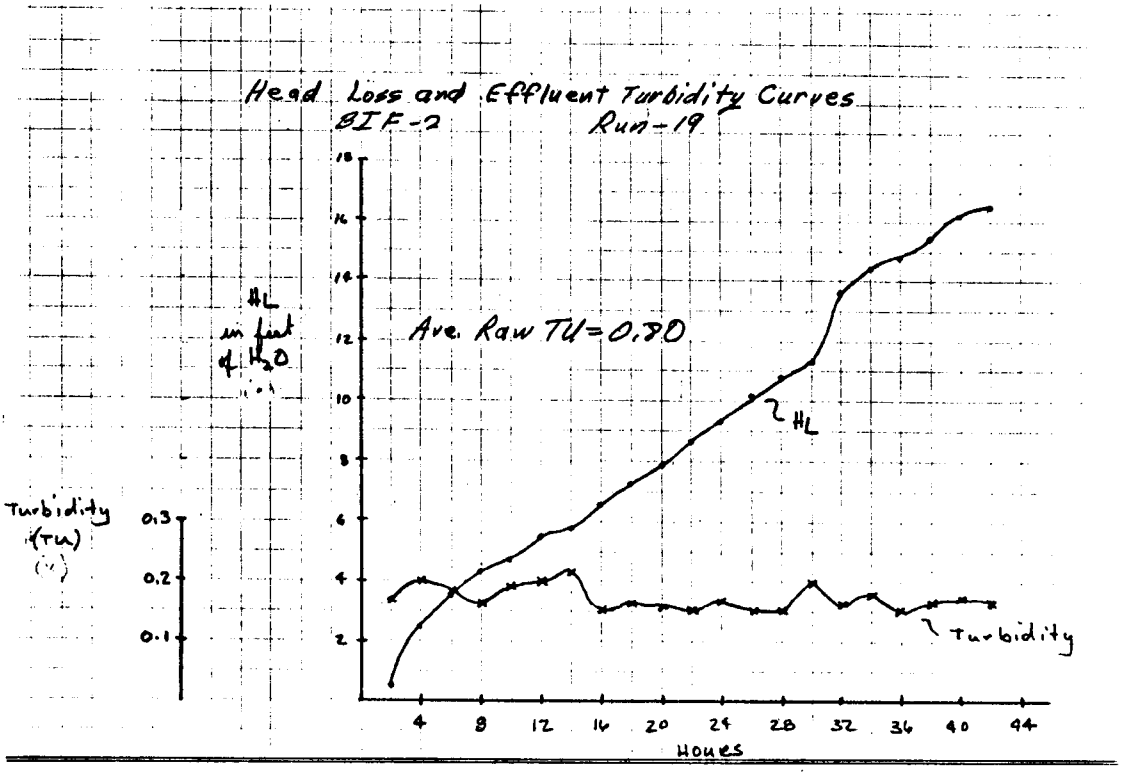

Head Loss and Effluent Turbidity Curves
BIF-2 Run-14
Ave. Raw TU= 1.25
HL in feet of H2O
TURBIDITY (TU)
0.5
0.4
0.3
0.2
0.1
7
6
5
4
3
2
1
HL
Turbidity
1 2 3 4 5 6 7 8 9 10 11
HOURS

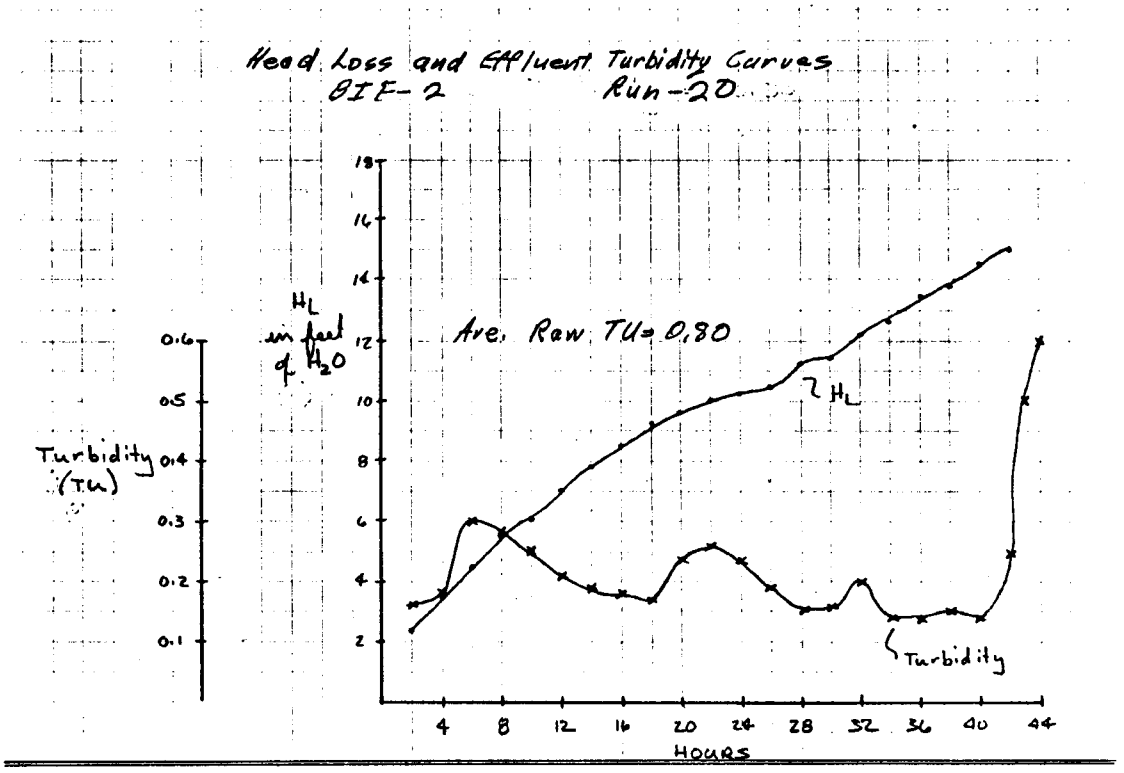

Head Loss and Effluent Turbidity Curves
BIF-2 Run-15
HL in ft of H2O
Ave. Raw TU= 0.83
TURBIDITY (TU)
1.0
0.9
0.8
0.7
0.6
0.5
0.2
0.1
15
14
13
12
11
10
9
8
7
6
5
HL
Turbidity
Hours
1 2 3 4 5 6 7 8 9

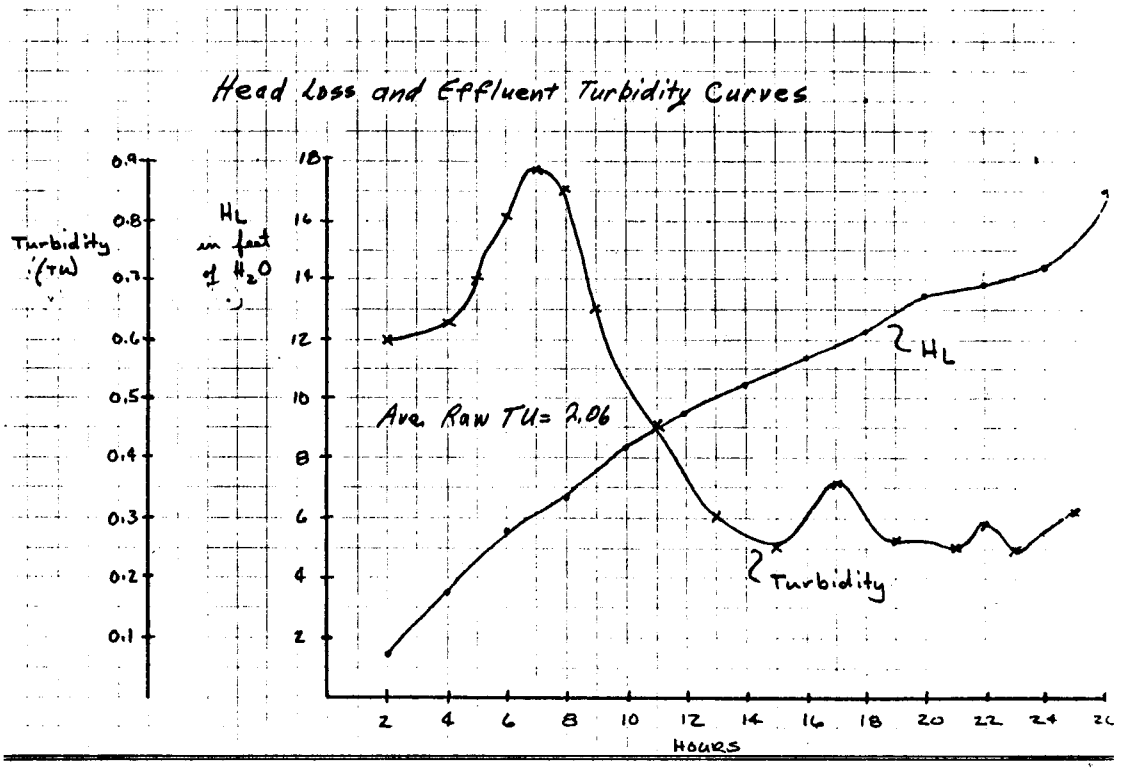

Head Loss and Effluent Turbidity Curves
BIF-2 Run-16
Ave. Raw TU = 0.90
Turbidity (TU)
H_L in feet of H_2O
H_L
Turbidity
HOURS

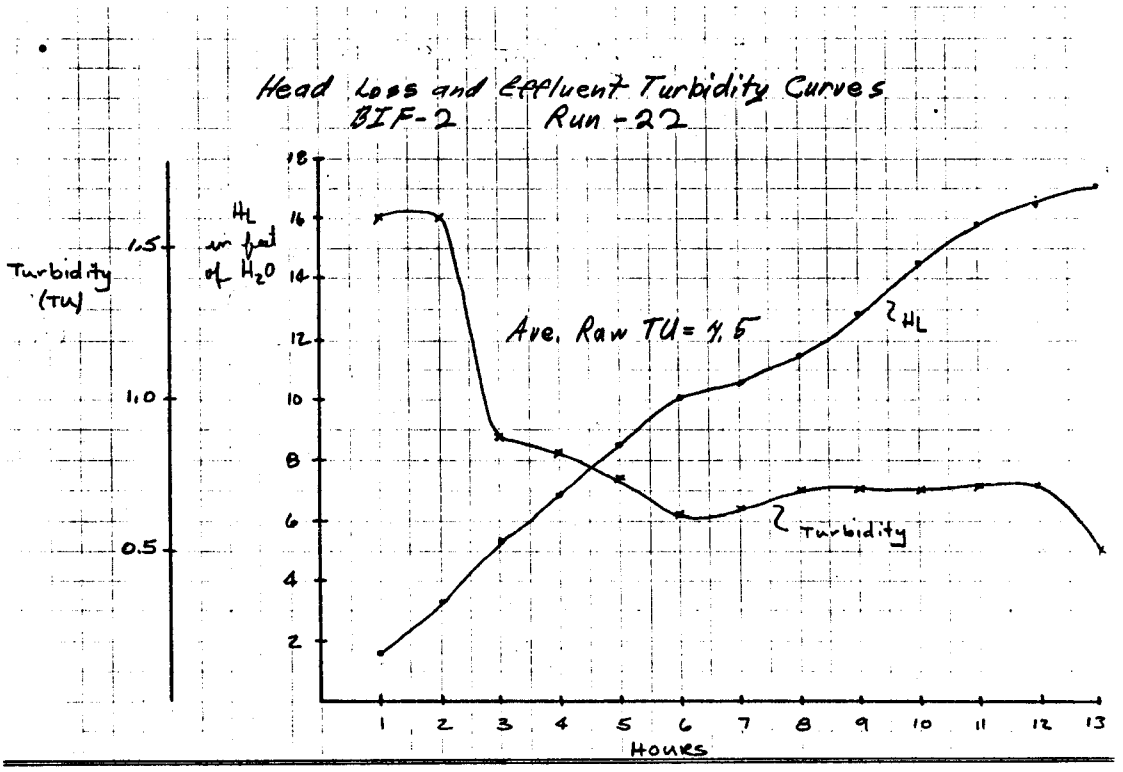

Head Loss and Effluent Turbidity Curves
BIF-2 Run-17
Ave. Raw TU = 0.92
Turbidity (TU)
H_L in ft. of H_2O
Turbidity
H_L
HOURS

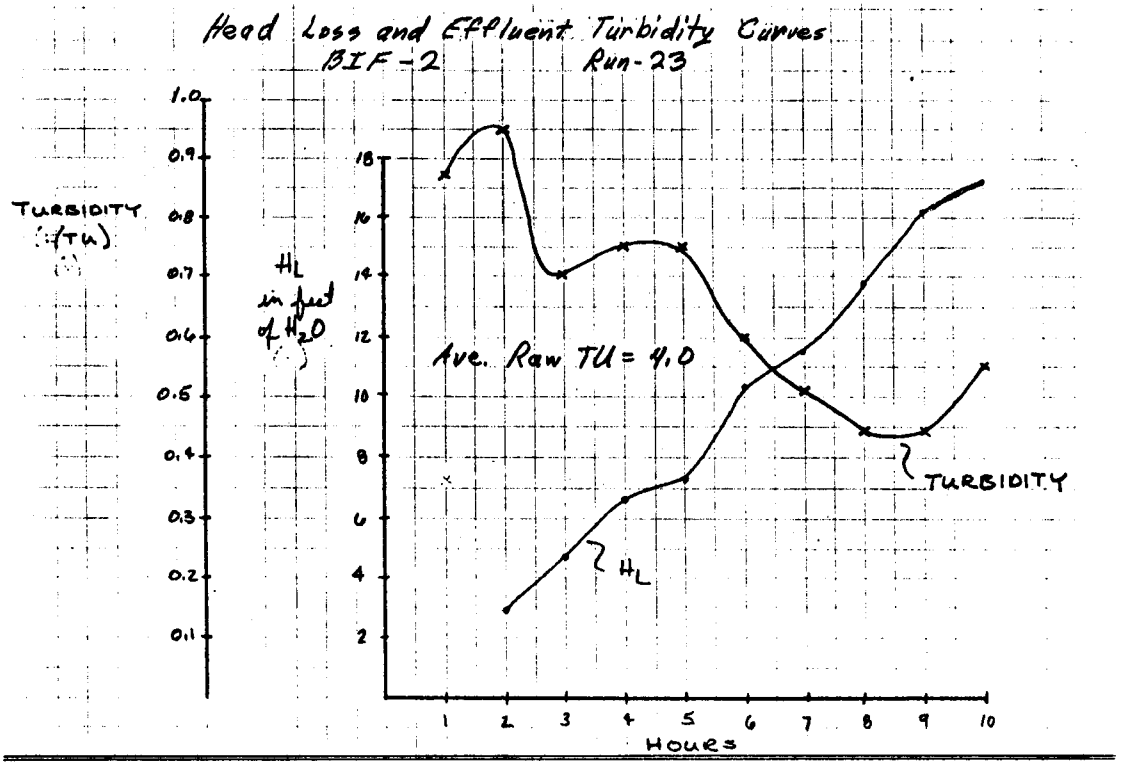

Head Loss and Effluent Turbidity Curves
BIF-2 Run-19
Ave. Raw TU=0.85
HL in feet of H2O
Turbidity (TU)
HL
Turbidity
Hours

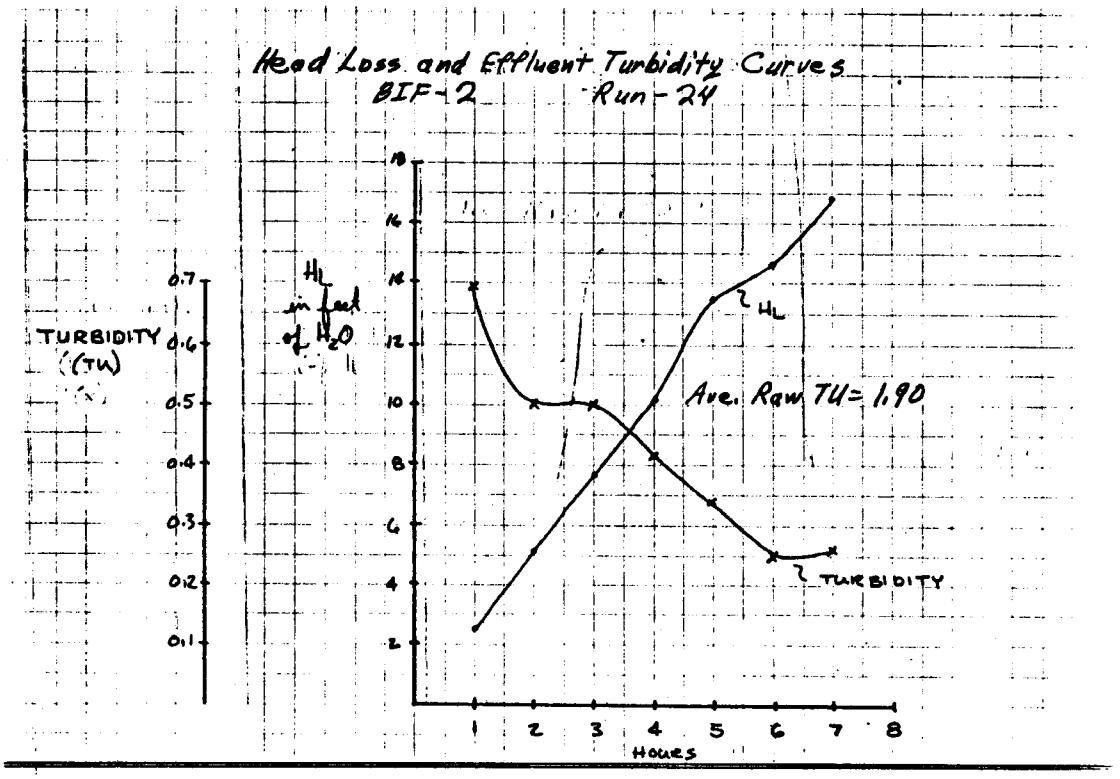

Head Loss and Effluent Turbidity Curves
BIF-2 Run-19
Ave. Raw TU=0.80
HL in feet of H2O
Turbidity (TU)
HL
Turbidity
Hours

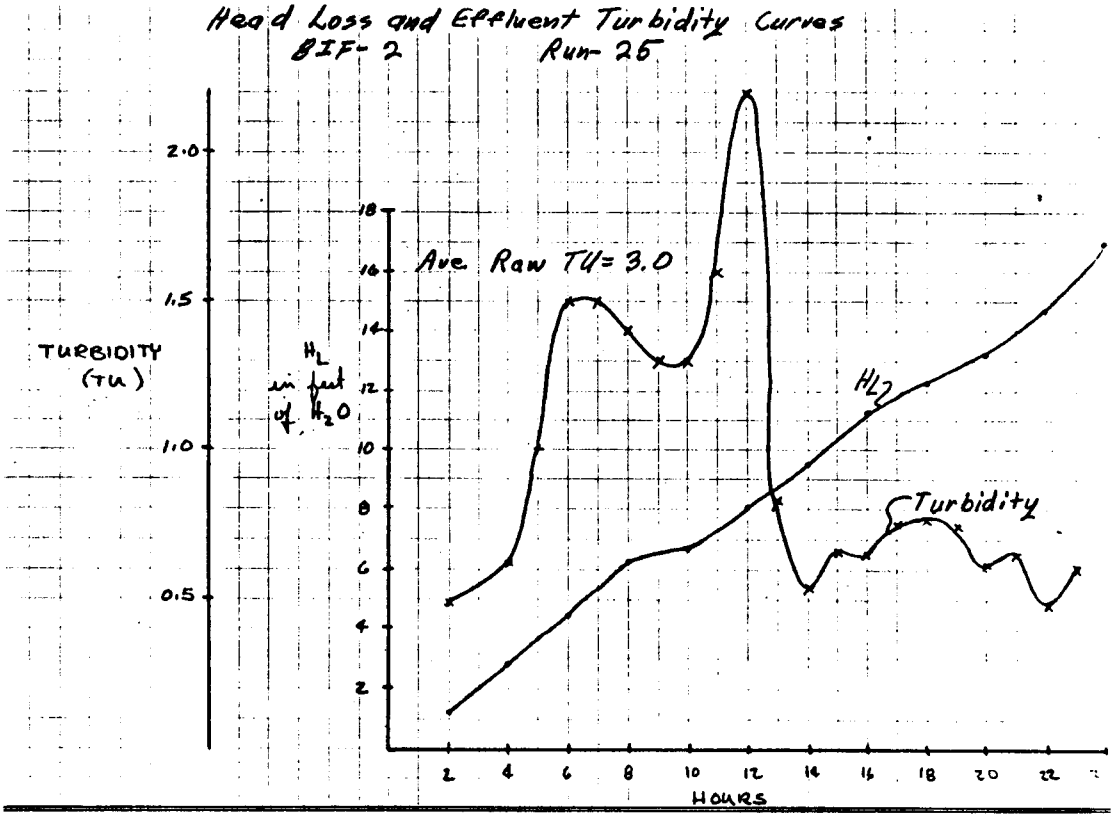

Head Loss and Effluent Turbidity Curves
BIE-2
Run-20
Ave. Raw TU= 0.80
H_L in feet of H_2O
Turbidity (TU)
H_L
Turbidity
HOURS

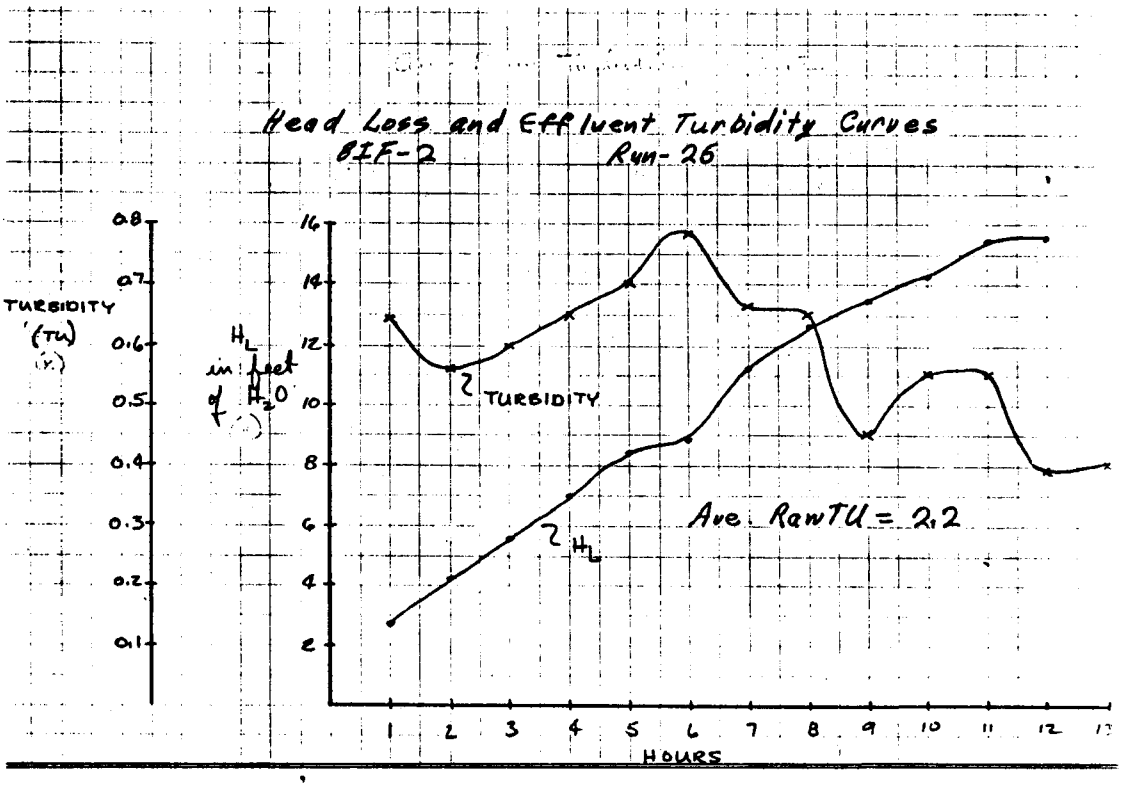

Head Loss and Effluent Turbidity Curves
Ave. Raw TU= 2.06
H_L in feet of H_2O
Turbidity (TU)
H_L
Turbidity
HOURS

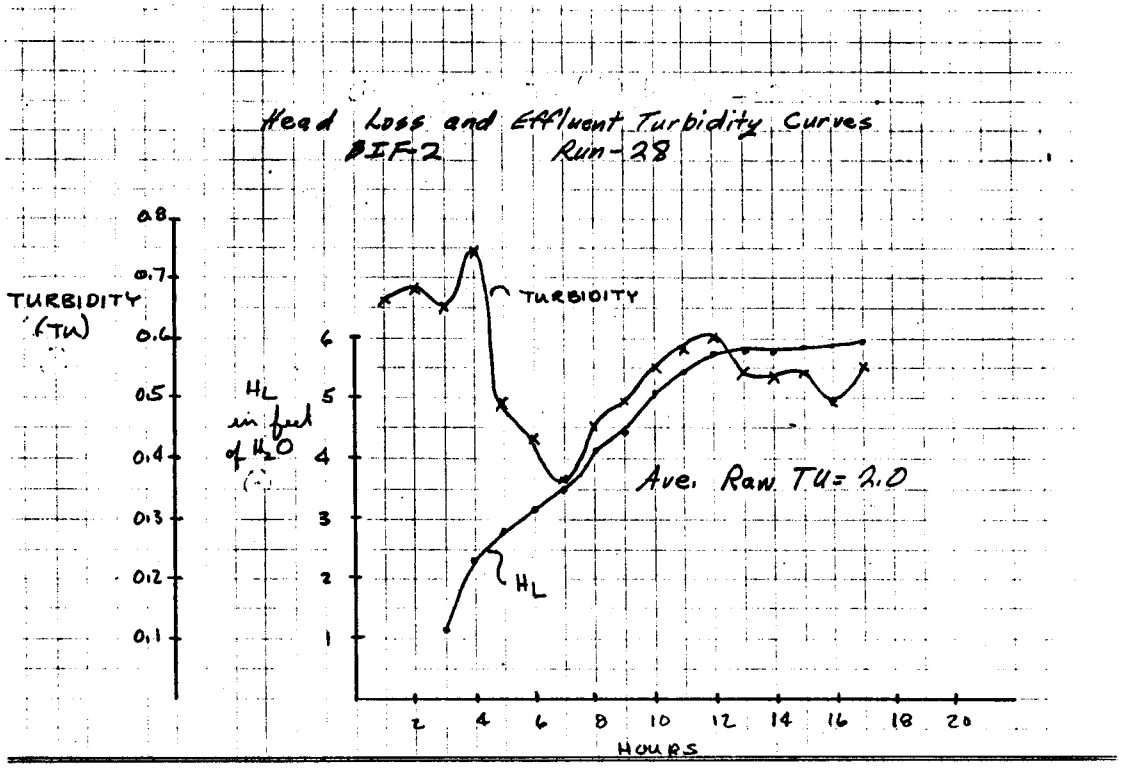

Head Loss and Effluent Turbidity Curves
BIF-2 Run-22
Turbidity (TU)
H_L in feet of H_2O
Ave. Raw TU = 4.5
H_L
Turbidity
Hours

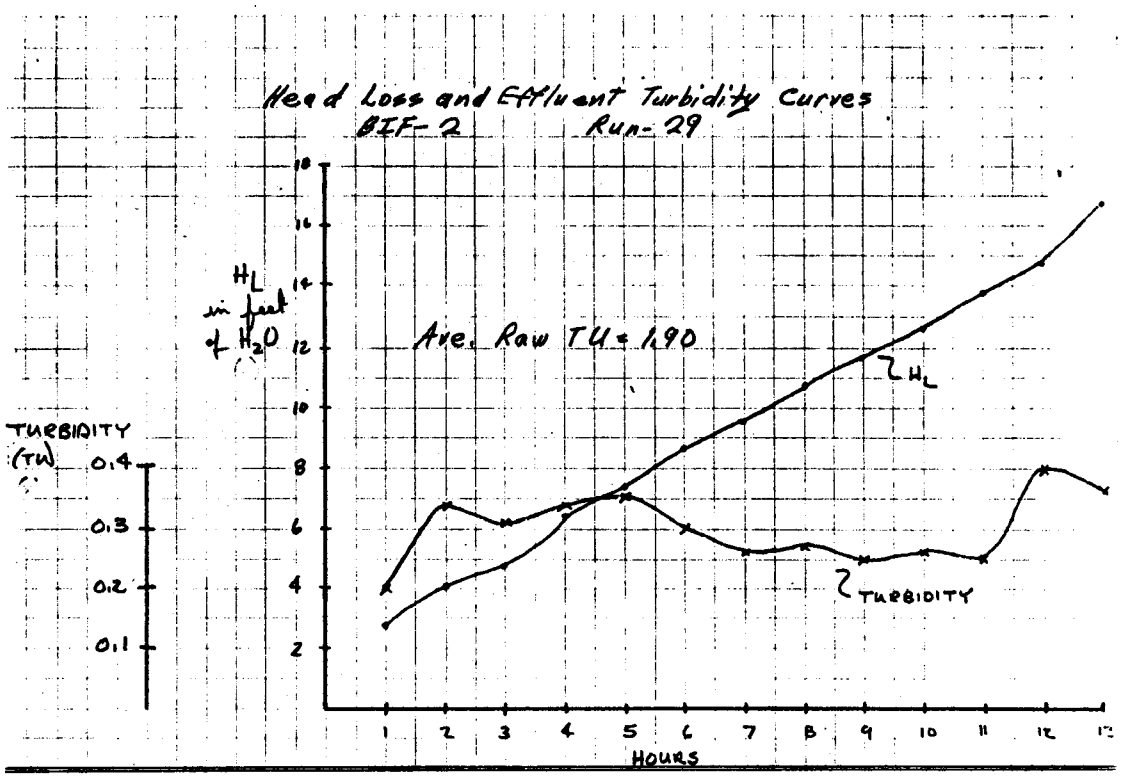

Head Loss and Effluent Turbidity Curves
BIF-2 Run-23
TURBIDITY (TU)
H_L in feet of H_2O
Ave. Raw TU = 4.0
TURBIDITY
H_L
Hours

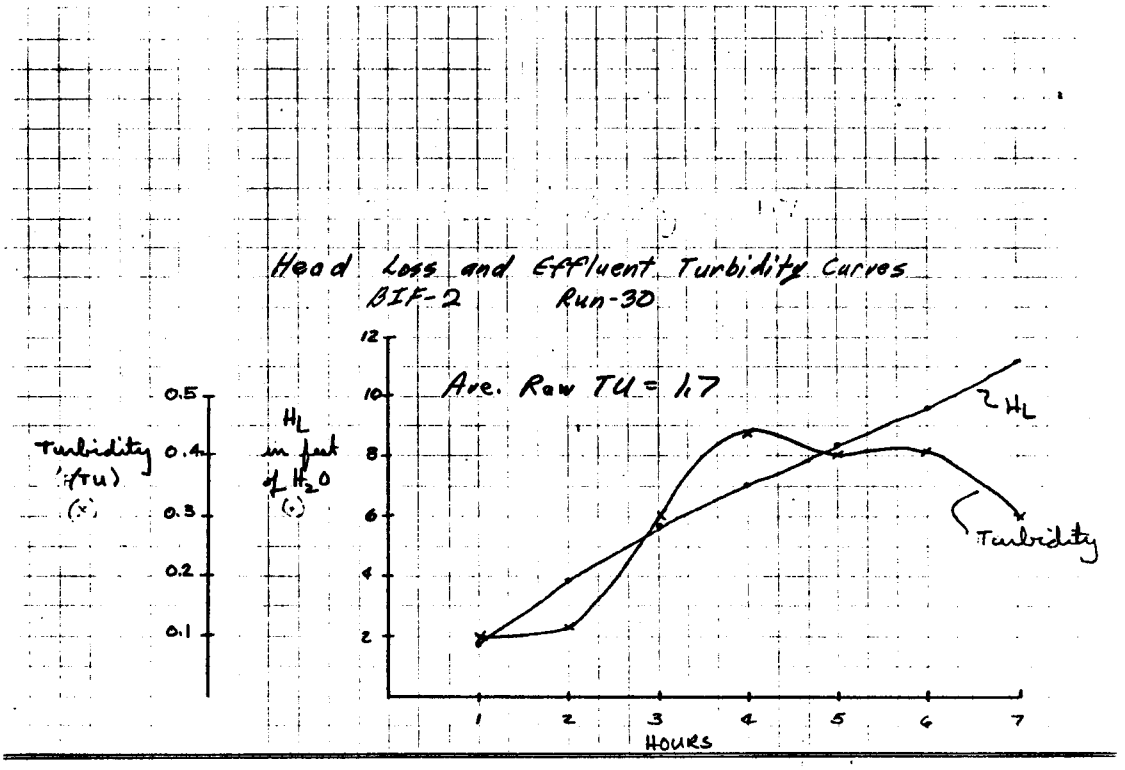

Head Loss and Effluent Turbidity Curves
BIF-2 Run-24
TURBIDITY (TU)
H_L in feet of H_2O
Ave. Raw TU= 1.90
H_L
TURBIDITY
HOURS

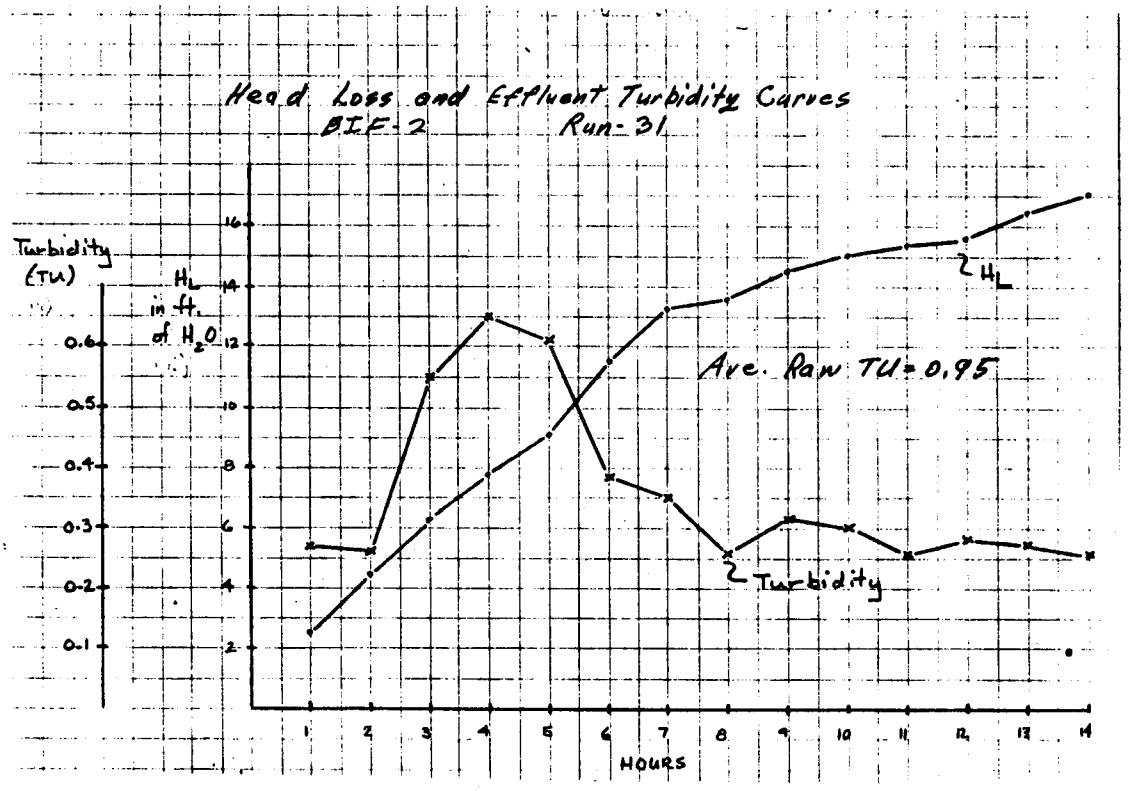

Head Loss and Effluent Turbidity Curves
BIF-2 Run-25
TURBIDITY (TU)
H_L in feet of H_2O
Ave. Raw TU= 3.0
H_L
Turbidity
HOURS

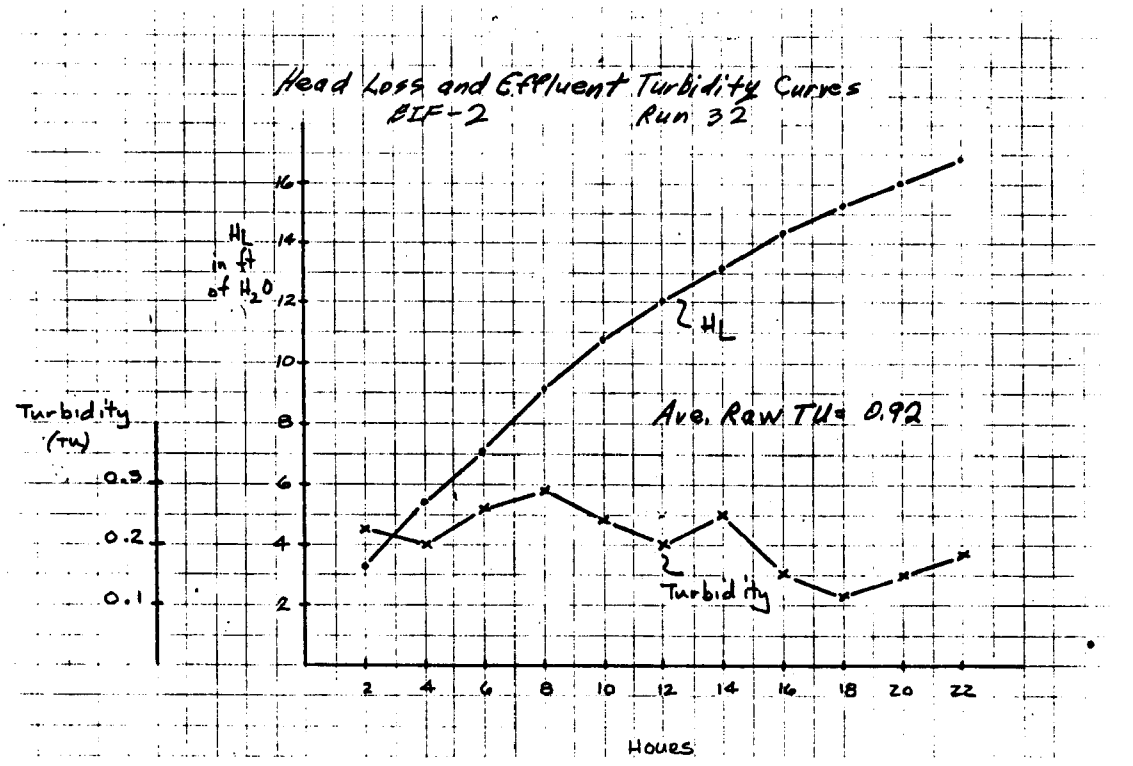

Head Loss and Effluent Turbidity Curves
BIF-2 Run-26
TURBIDITY (TU)
H_L in feet of H_2O
TURBIDITY
H_L
Ave. RawTU = 2.2
HOURS

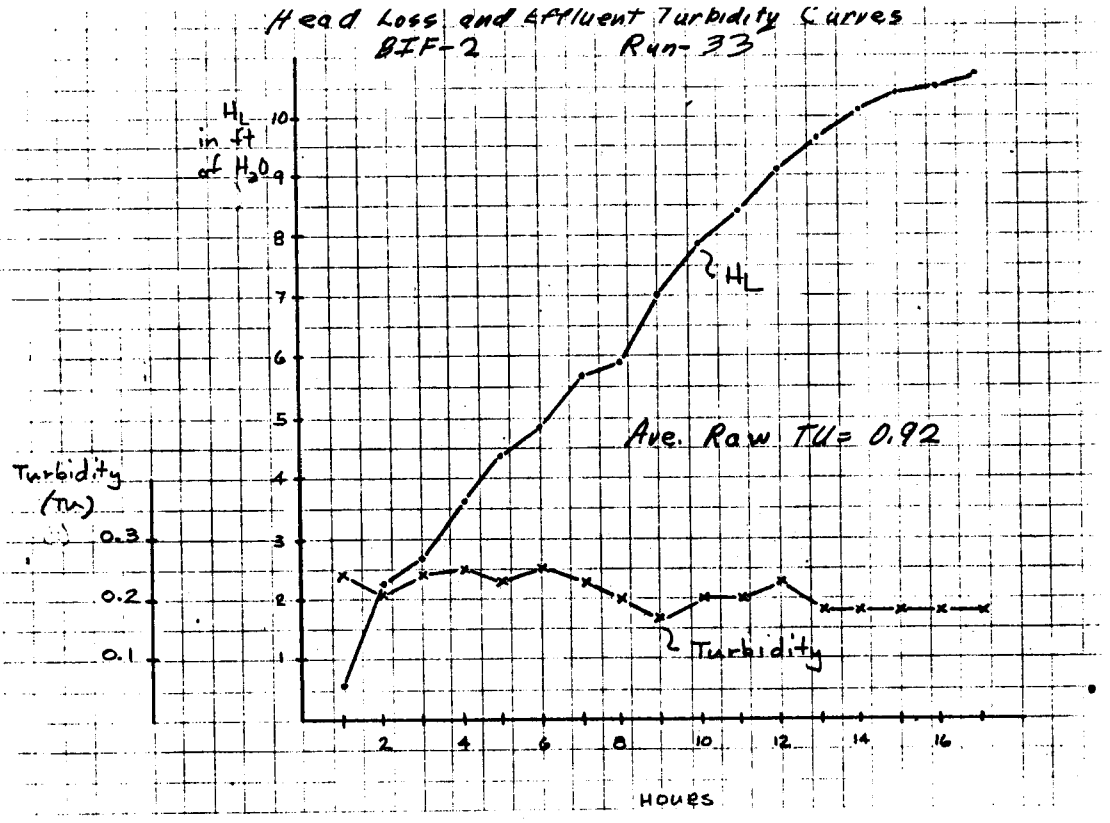

Head Loss and Effluent Turbidity Curves
BIF-2 Run-28
TURBIDITY (TU)
H_L in feet of H_2O
TURBIDITY
H_L
Ave. Raw TU = 2.0
HOURS

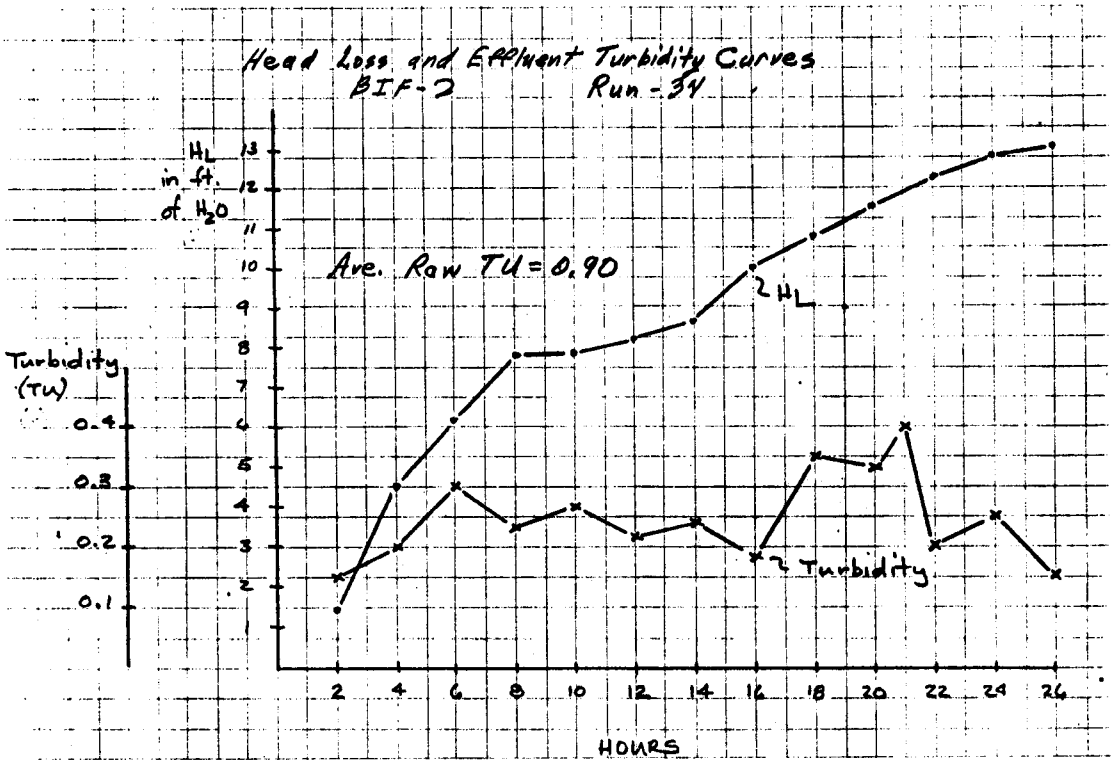

Head Loss and Effluent Turbidity Curves
BIF-2 Run-29
Ave. Raw TU = 1.90
H_L in feet of H_2O
TURBIDITY (TU)
H_L
TURBIDITY
HOURS

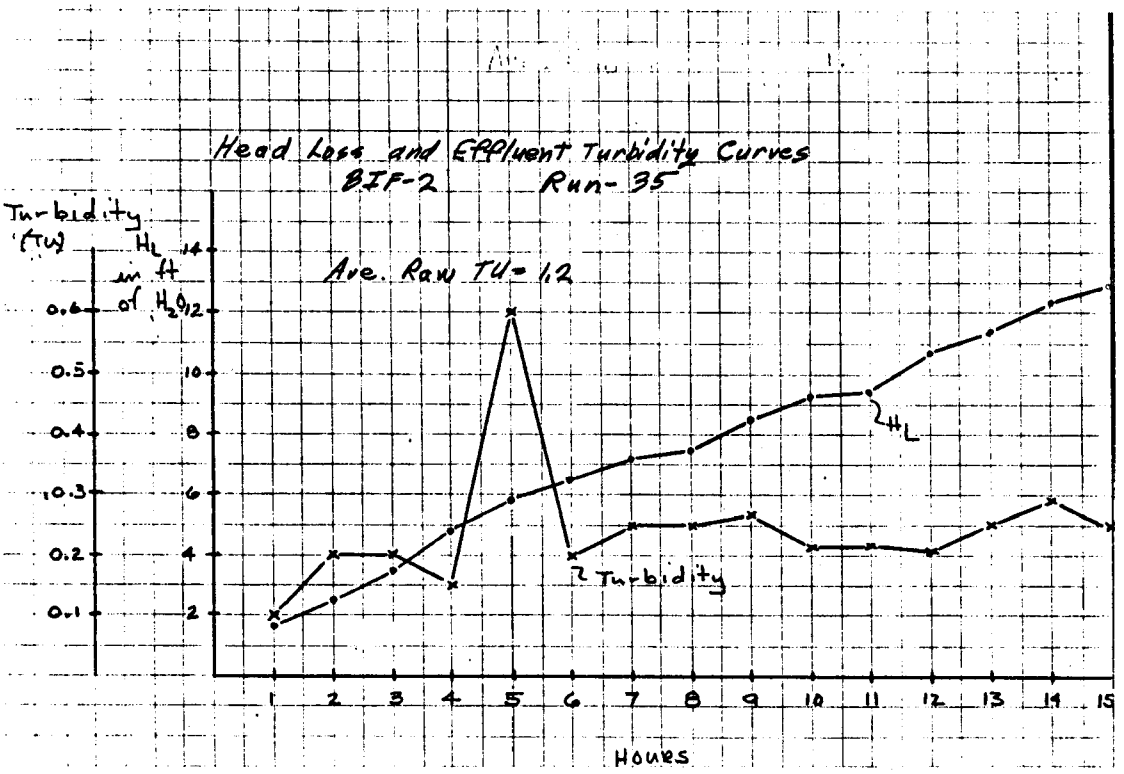

Head Loss and Effluent Turbidity Curves
BIF-2 Run-30
Ave. Raw TU = 1.7
Turbidity (TU) (x)
H_L in feet of H_2O (·)
H_L
Turbidity
HOURS

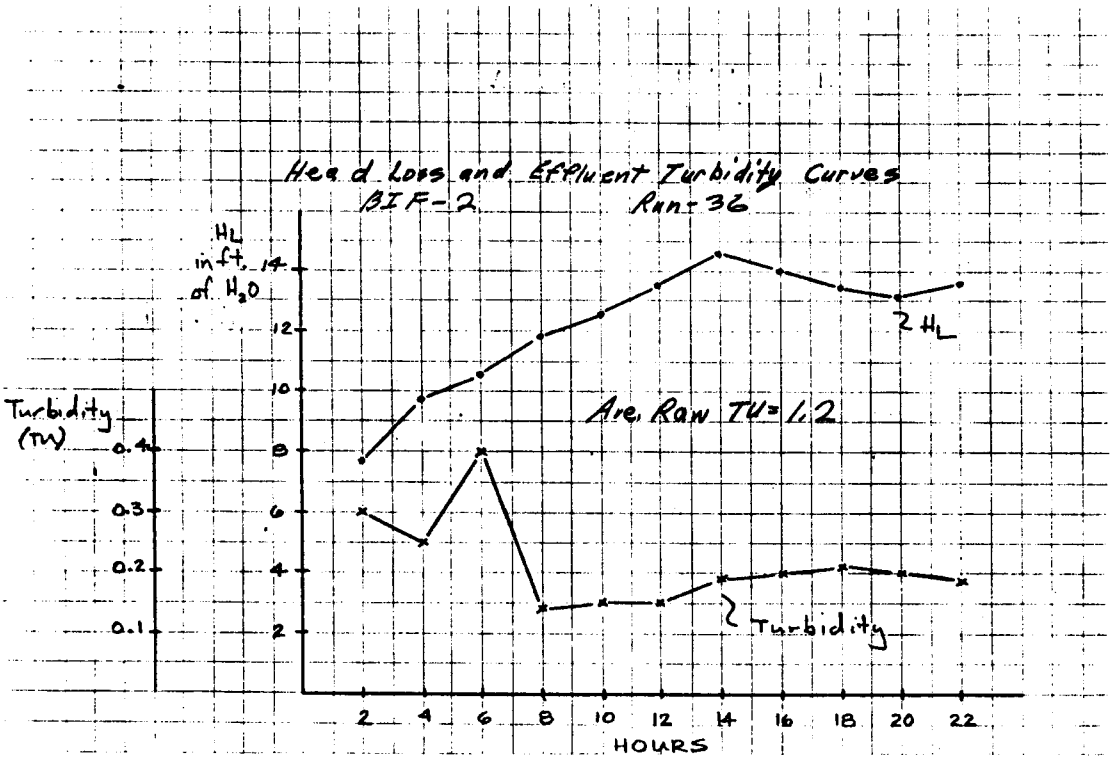

Head Loss and Effluent Turbidity Curves
BIF-2 Run-31
Turbidity (TU)
H_L in ft. of H_2O
Ave. Raw TU = 0.95
H_L
Turbidity
HOURS

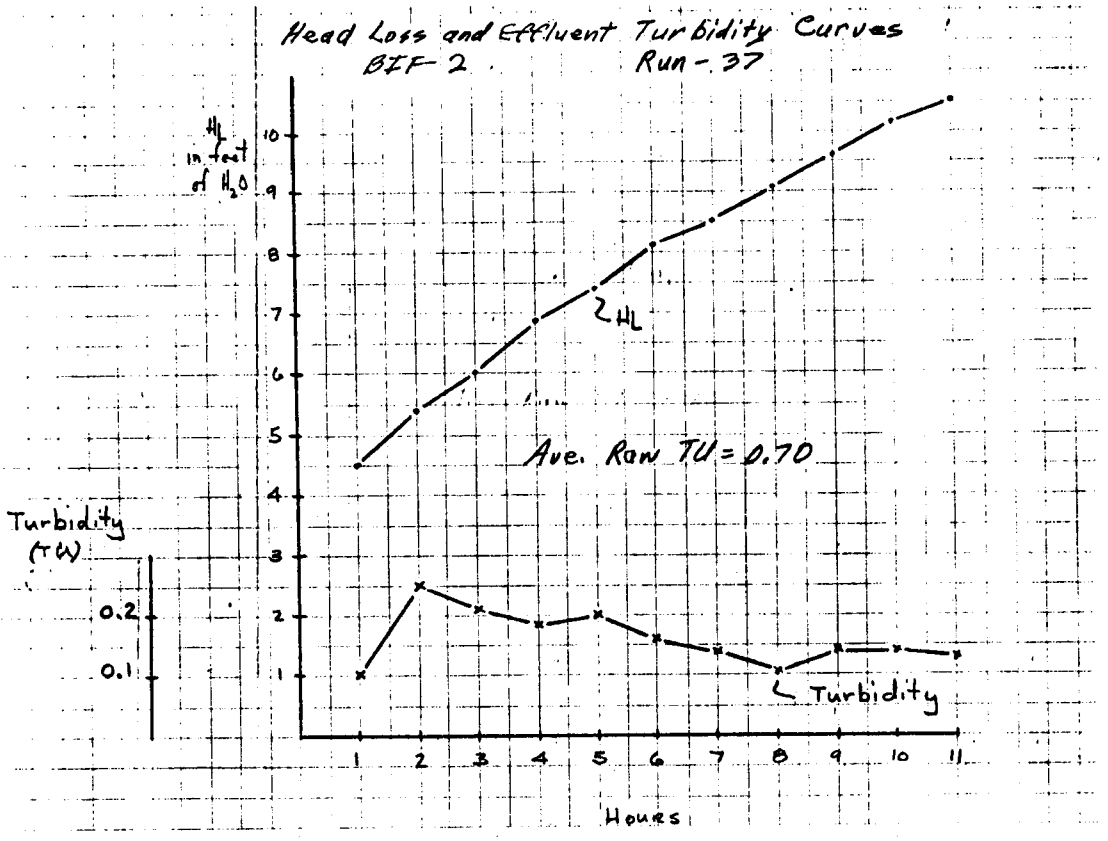

Head Loss and Effluent Turbidity Curves
BIF-2 Run 32
H_L in ft of H_2O
Turbidity (TU)
Ave. Raw TU = 0.92
H_L
Turbidity
Hours

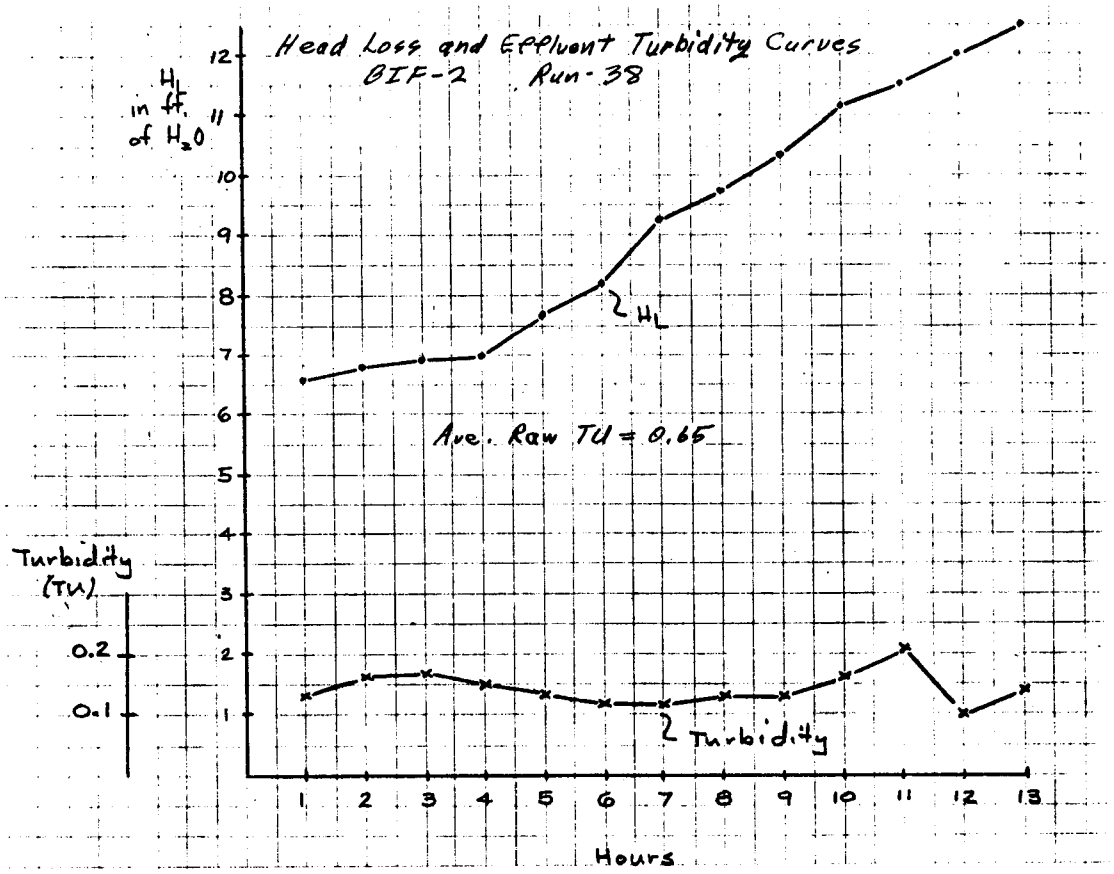

Head Loss and Effluent Turbidity Curves
BIF-2 Run-33
H_L in ft of H_2O
Turbidity (TU)
Ave. Raw TU = 0.92
H_L
Turbidity
HOURS

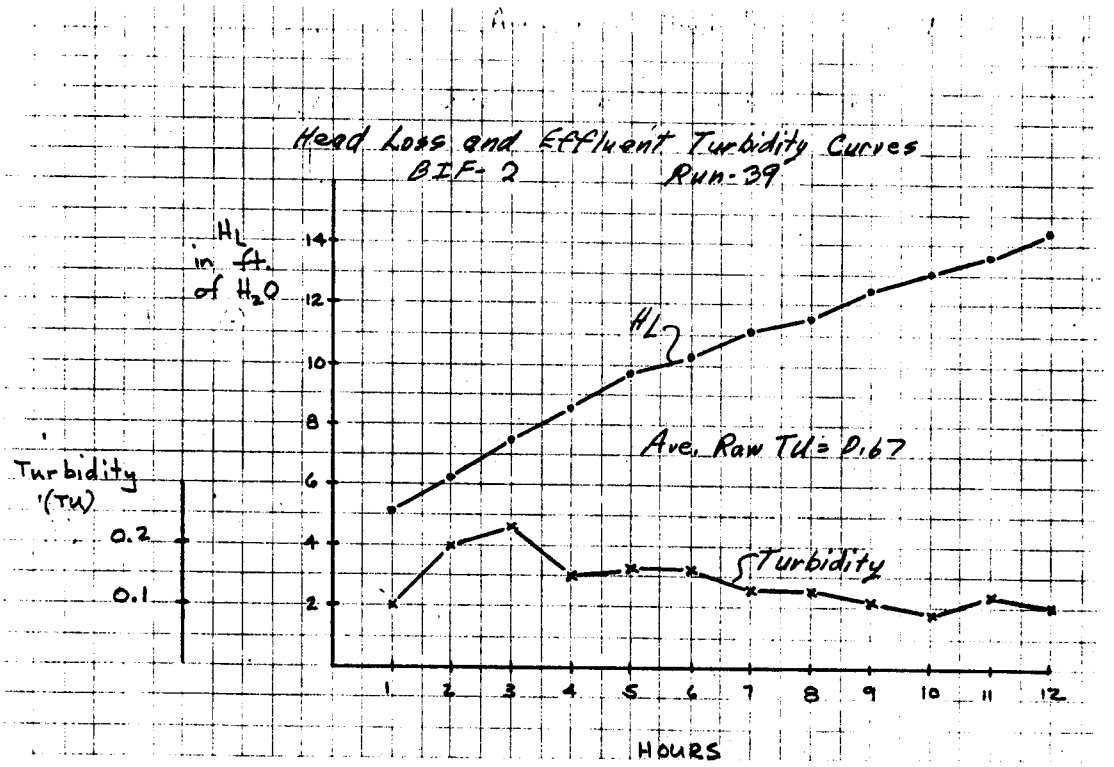

Head Loss and Effluent Turbidity Curves
BIF-2 Run-34
H_L in ft. of H_2O
Turbidity (TU)
Ave. Raw TU = 0.90
H_L
Turbidity
HOURS

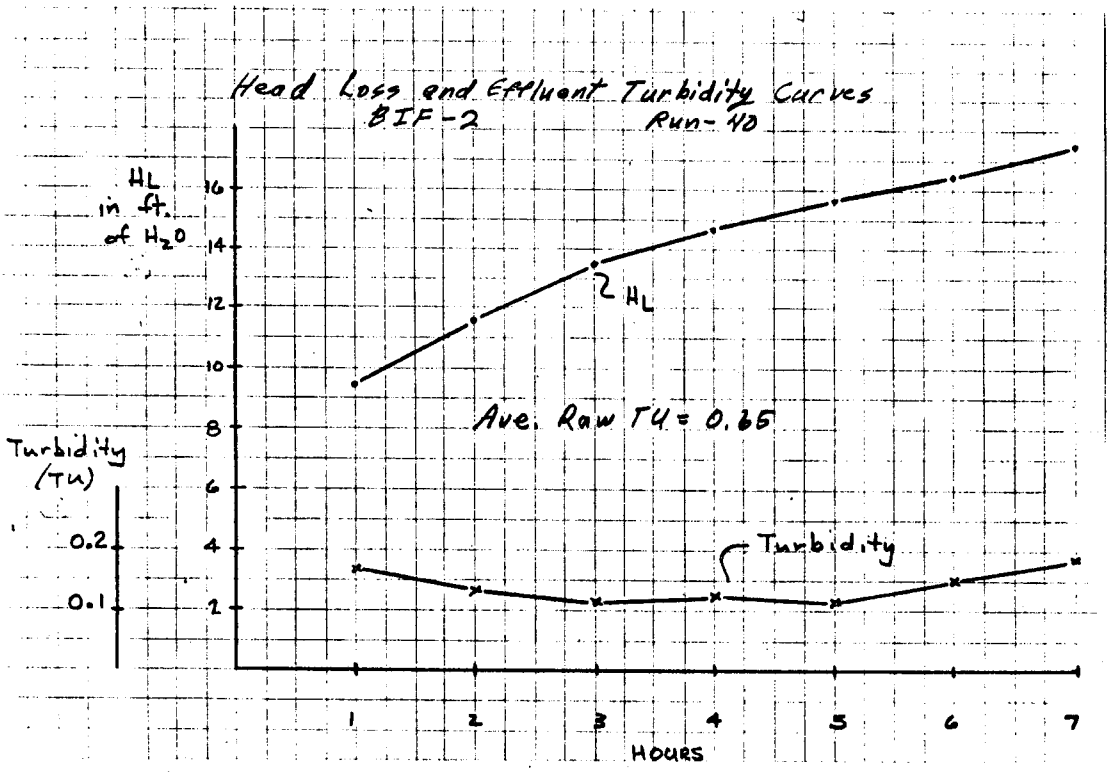

Head Loss and Effluent Turbidity Curves
BIF-2 Run-35
Turbidity (TU)
H_L in ft of H_2O
Ave. Raw TU = 1.2
H_L
Turbidity
Hours

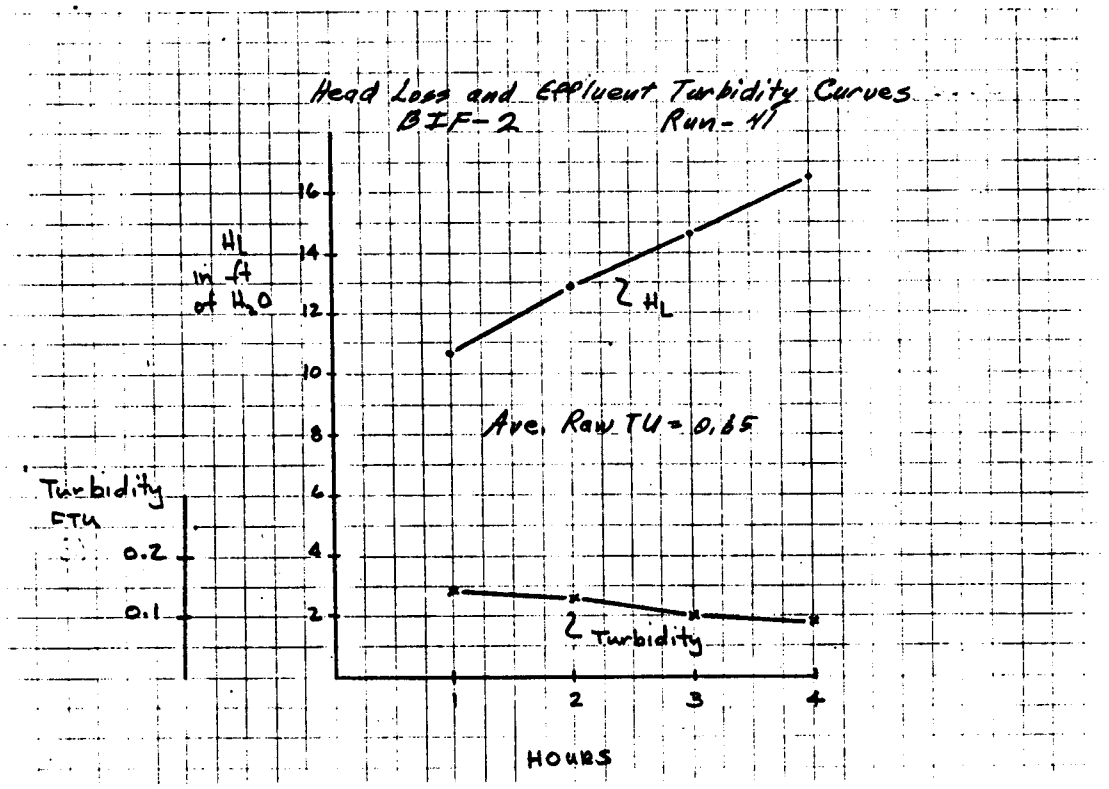

Head Loss and Effluent Turbidity Curves
BIF-2 Run-36
H_L in ft. of H_2O
Turbidity (TU)
Ave. Raw TU = 1.2
H_L
Turbidity
HOURS

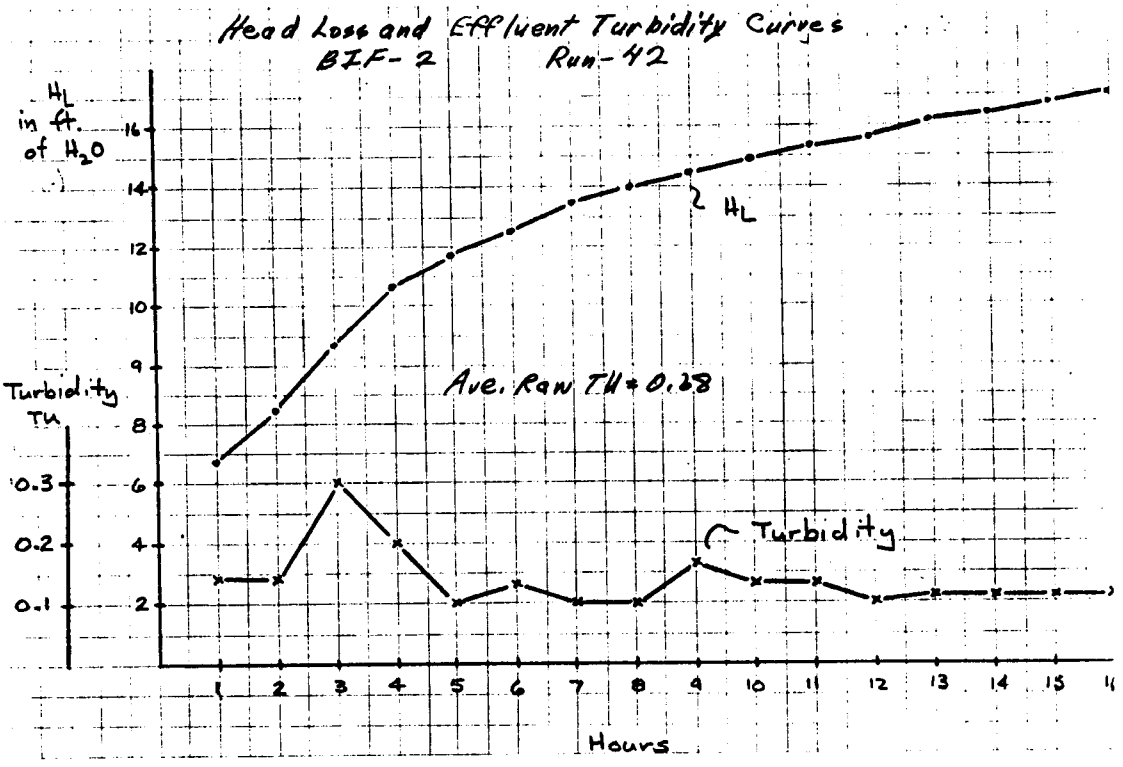

Head Loss and Effluent Turbidity Curves
BIF-2 Run-37
H_L in feet of H_2O
Ave. Raw TU = 0.70
Turbidity (TU)
H_L
Turbidity
Hours

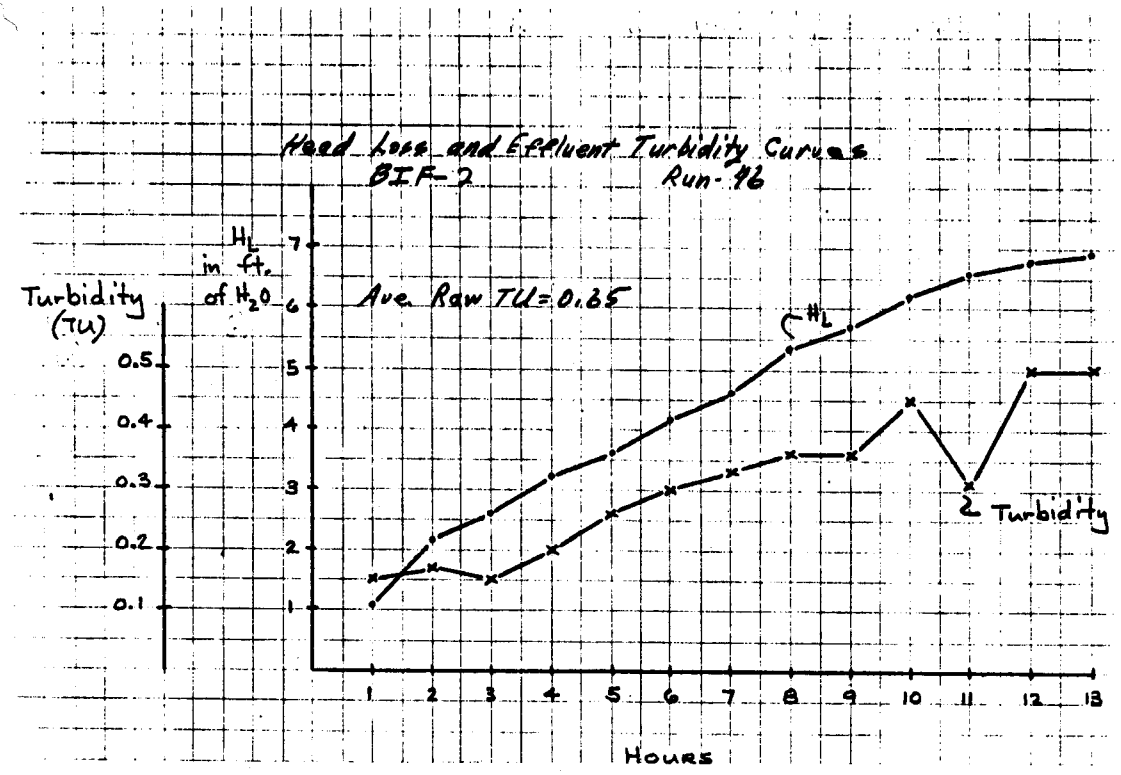

Head Loss and Effluent Turbidity Curves
BIF-2 Run-38
H_L in ft. of H_2O
Ave. Raw TU = 0.65
Turbidity (TU)
H_L
Turbidity
Hours

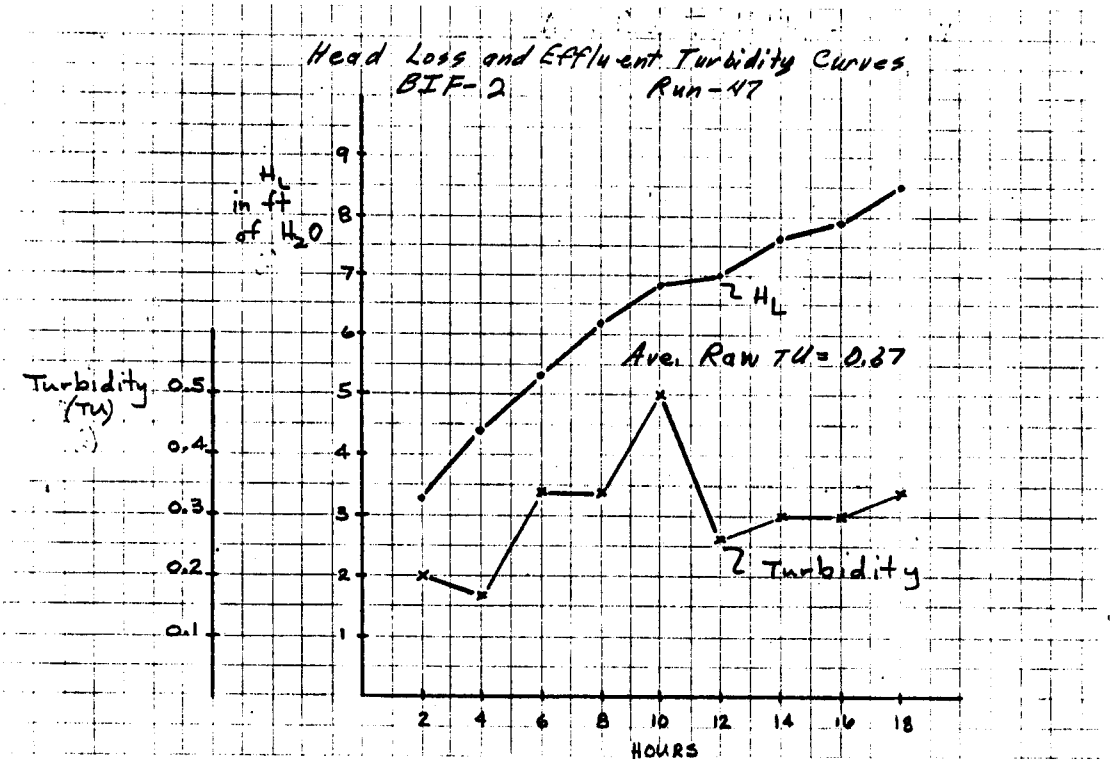

Head Loss and Effluent Turbidity Curves
BIF-2
Run-39
HL in ft. of H2O
Turbidity (TU)
HL
Ave. Raw TU = 0.67
Turbidity
HOURS

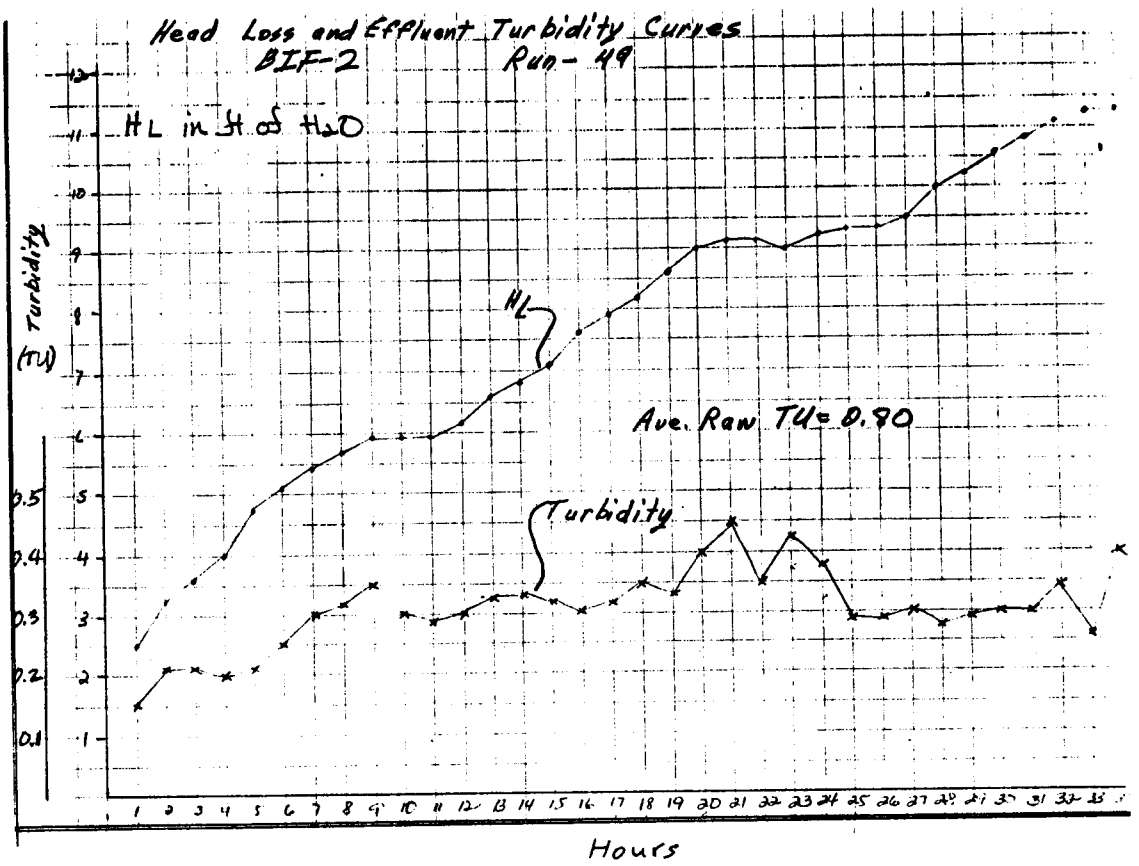

Head Loss and Effluent Turbidity Curves
BIF-2
Run-40
HL in ft. of H2O
Turbidity (TU)
HL
Ave. Raw TU = 0.65
Turbidity
HOURS

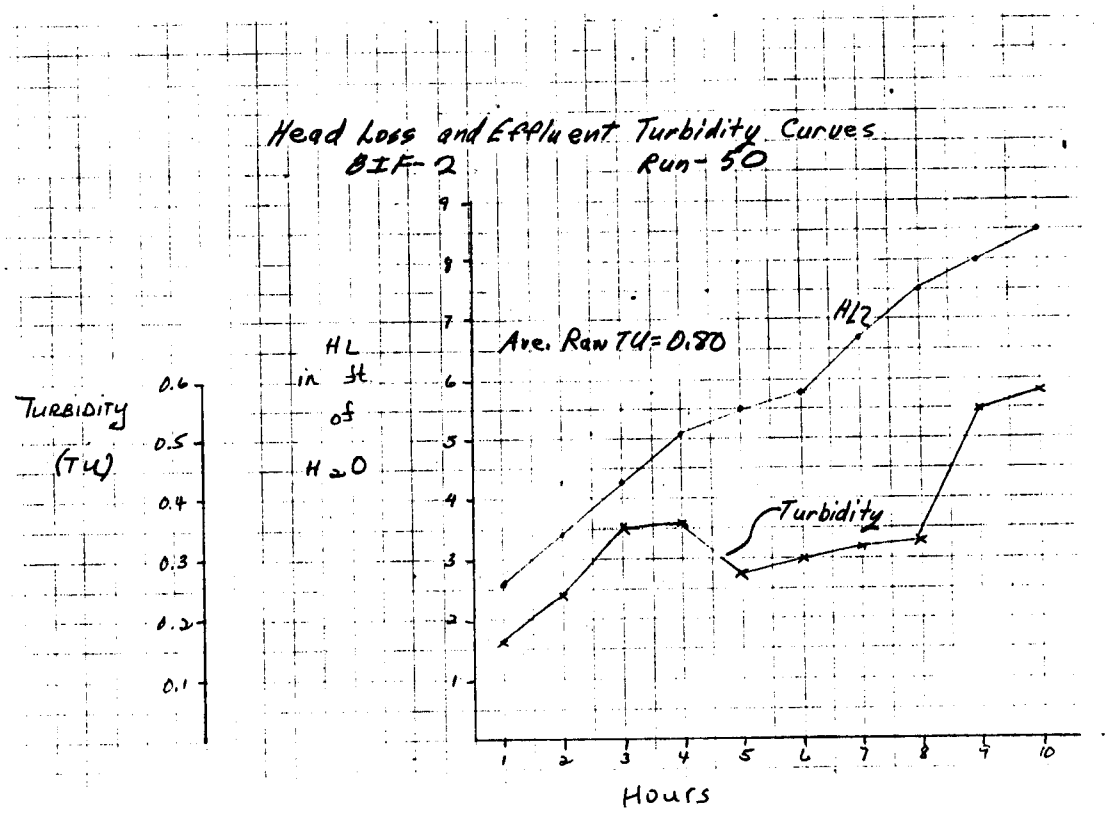

Head Loss and Effluent Turbidity Curves
BIF-2 Run-41
H_L in ft of H_2O
16
14
12
10
8
6
4
2
H_L
Ave. Raw TU = 0.65
Turbidity FTU
0.2
0.1
Turbidity
1
2
3
4
HOURS

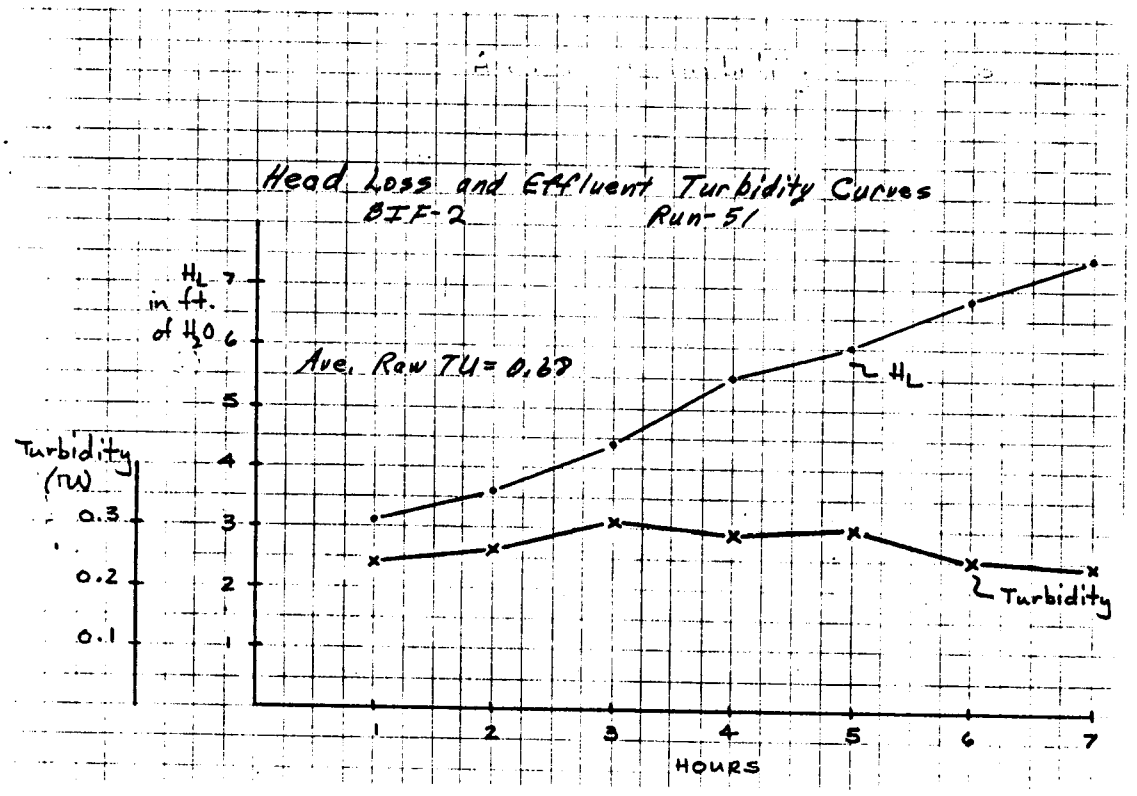

Head Loss and Effluent Turbidity Curves
BIF-2 Run-42
H_L in ft. of H_2O
16
14
12
10
9
8
6
4
2
H_L
Ave. Raw TU = 0.28
Turbidity TU
0.3
0.2
0.1
Turbidity
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
Hours

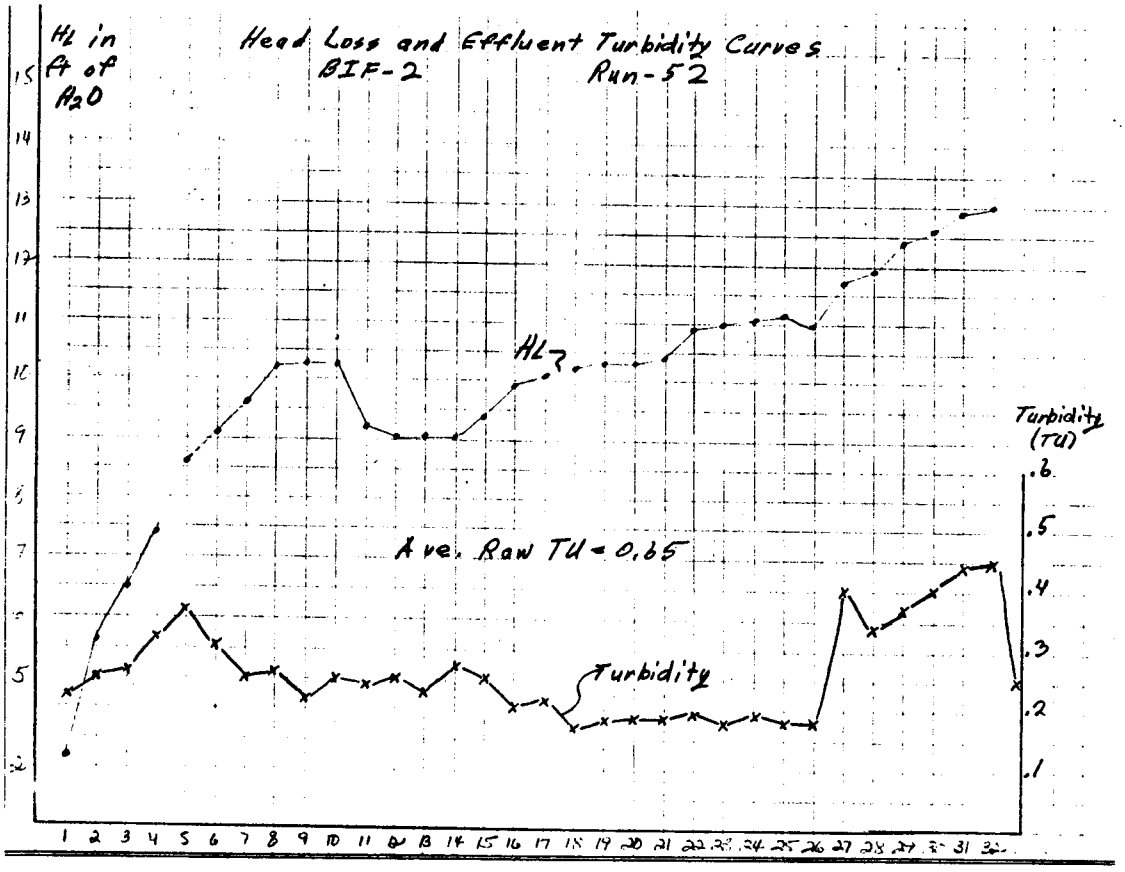

Head Loss and Effluent Turbidity Curves
BIF-2
Run-46
Ave. Raw TU=0.85
H_L in ft. of H_2O
Turbidity (TU)
H_L
Turbidity
HOURS

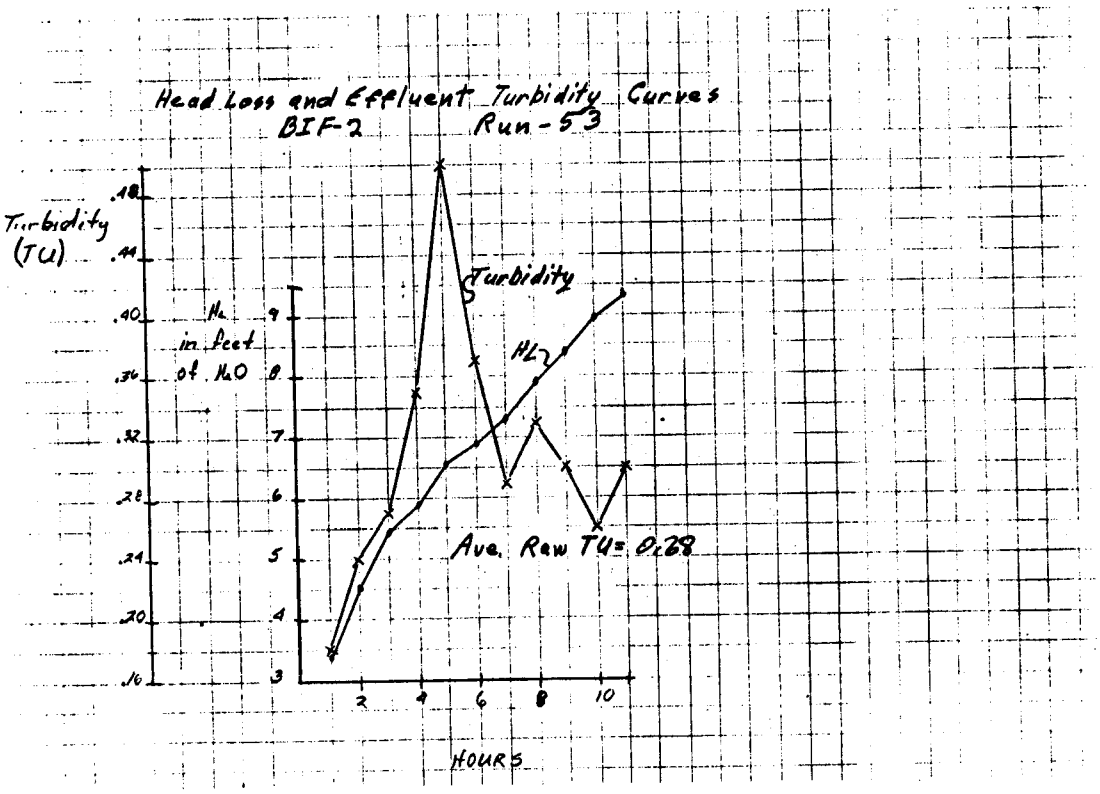

Head Loss and Effluent Turbidity Curves
BIF-2
Run-47
Ave. Raw TU=0.87
H_L in ft of H_2O
Turbidity (TU)
H_L
Turbidity
HOURS

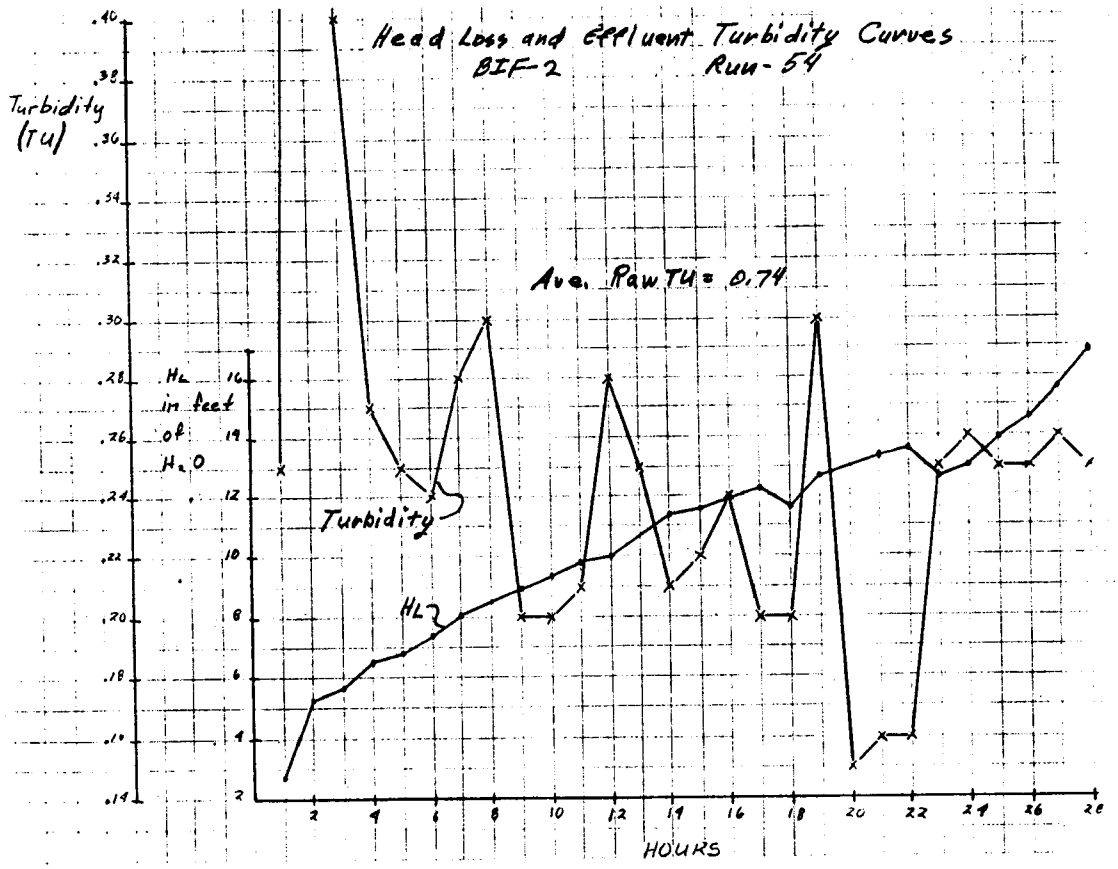

Head Loss and Effluent Turbidity Curves
BIF-2
Run-49
HL in ft of H2O
Turbidity (TU)
HL
Ave. Raw TU=0.90
Turbidity
Hours

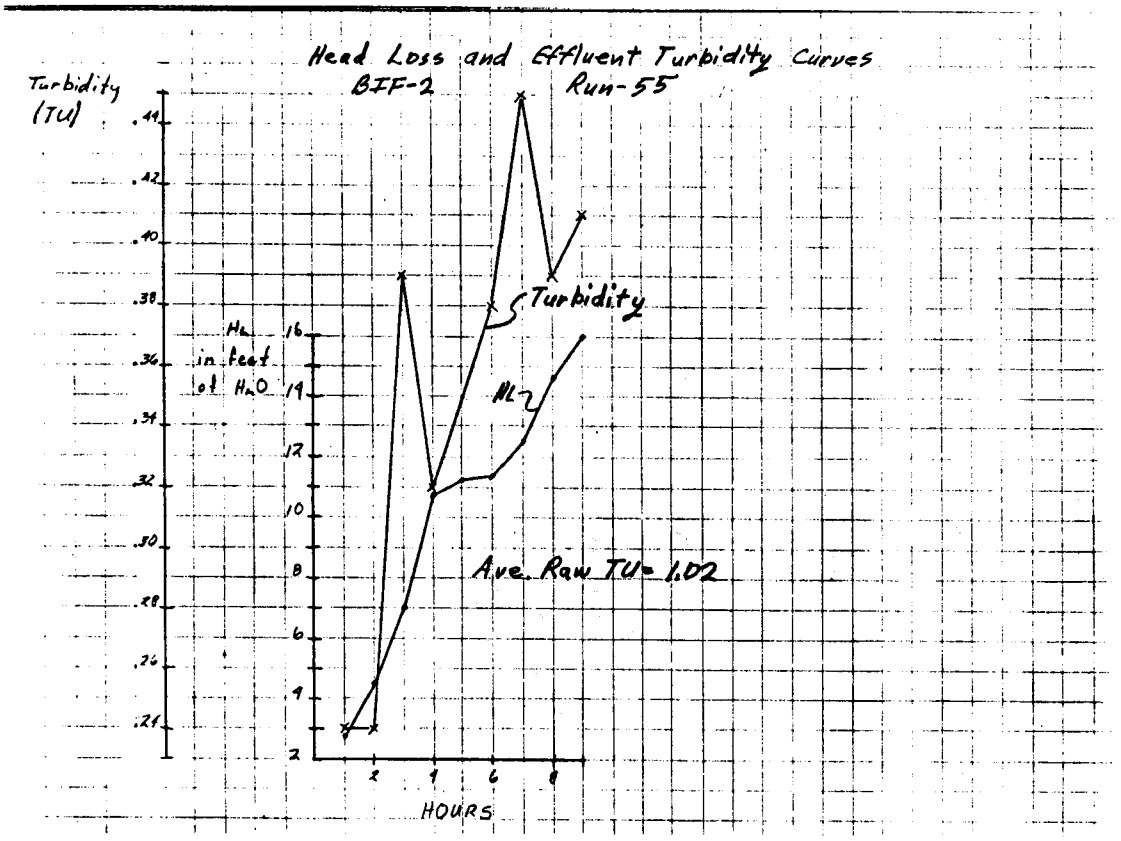

Head Loss and Effluent Turbidity Curves
BIF-2
Run-50
HL in ft of H2O
Turbidity (TU)
Ave. Raw TU=0.80
HL
Turbidity
Hours

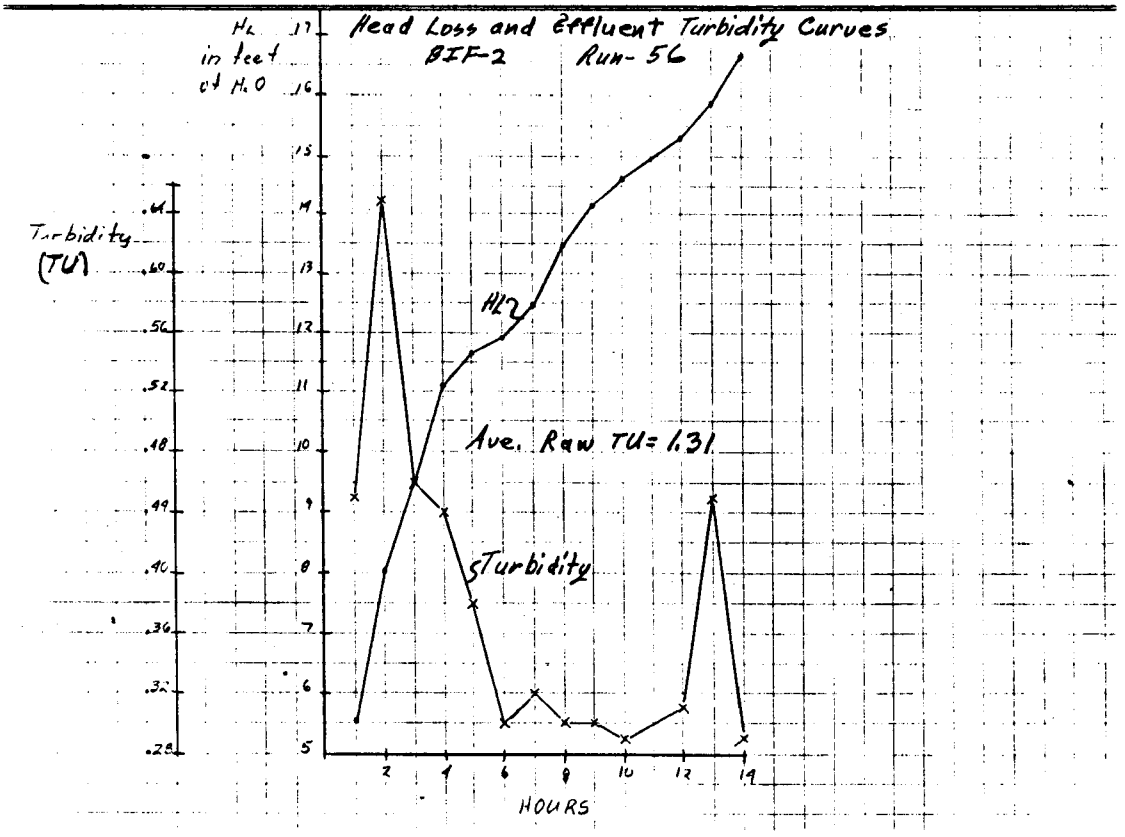

Head Loss and Effluent Turbidity Curves
BIF-2
Run-51
H_L in ft. of H_2O
Ave. Raw TU = 0.68
H_L
Turbidity (TU)
Turbidity
HOURS

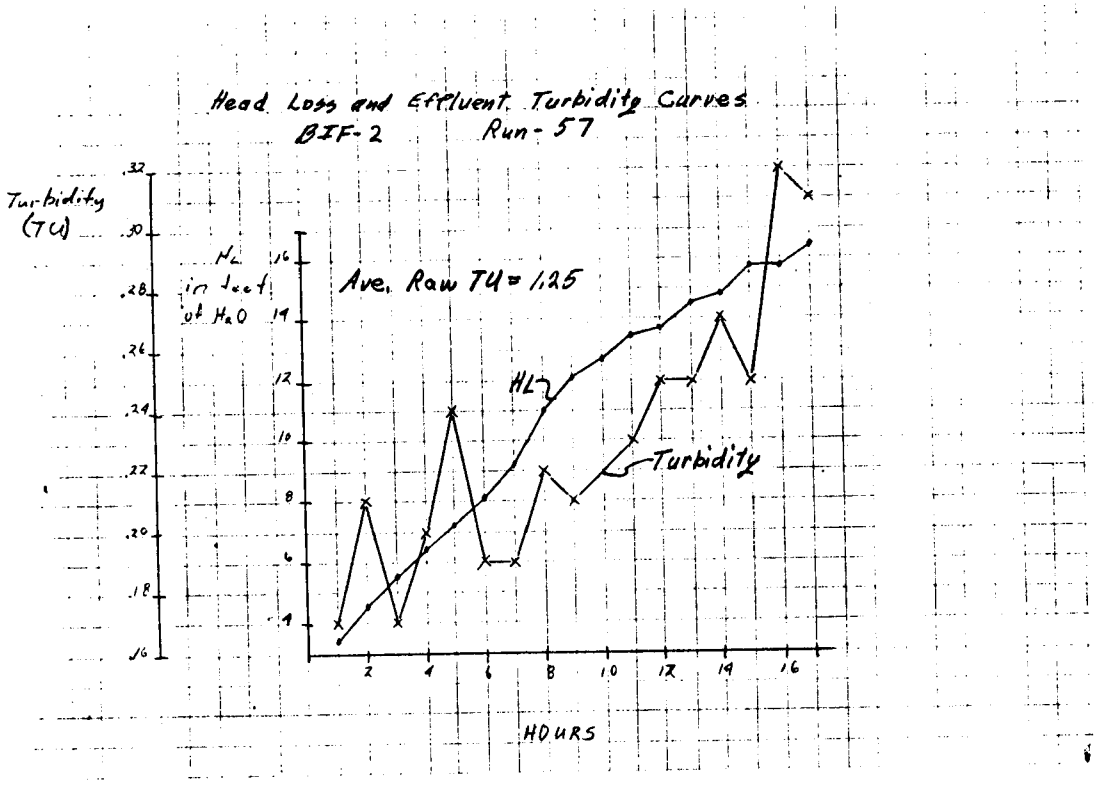

Head Loss and Effluent Turbidity Curves
BIF-2
Run-52
H_L in ft of H_2O
H_L
Turbidity (TU)
Ave. Raw TU = 0.65
Turbidity
Hours

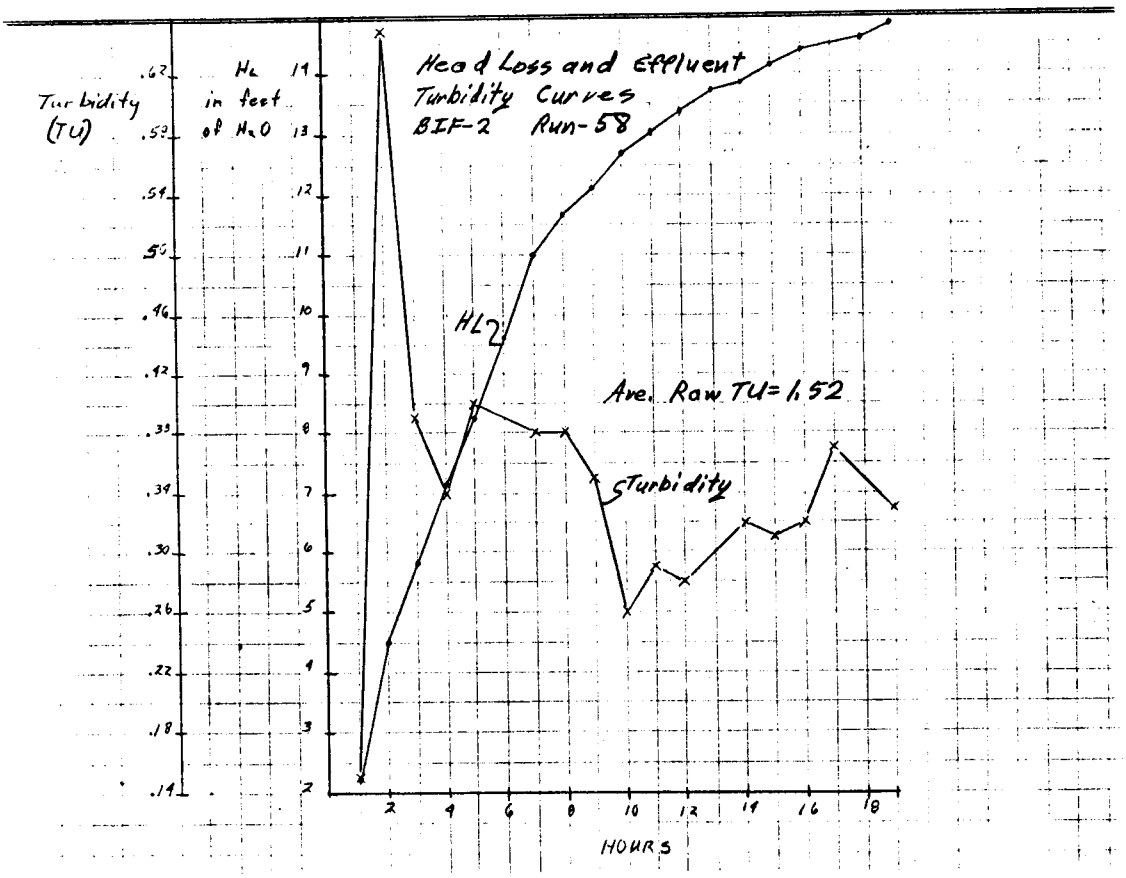

Head Loss and Effluent Turbidity Curves
BIF-2 Run-53
Turbidity (TU)
HL in feet of H2O
Turbidity
HL
Ave. Raw TU = 0.28
HOURS

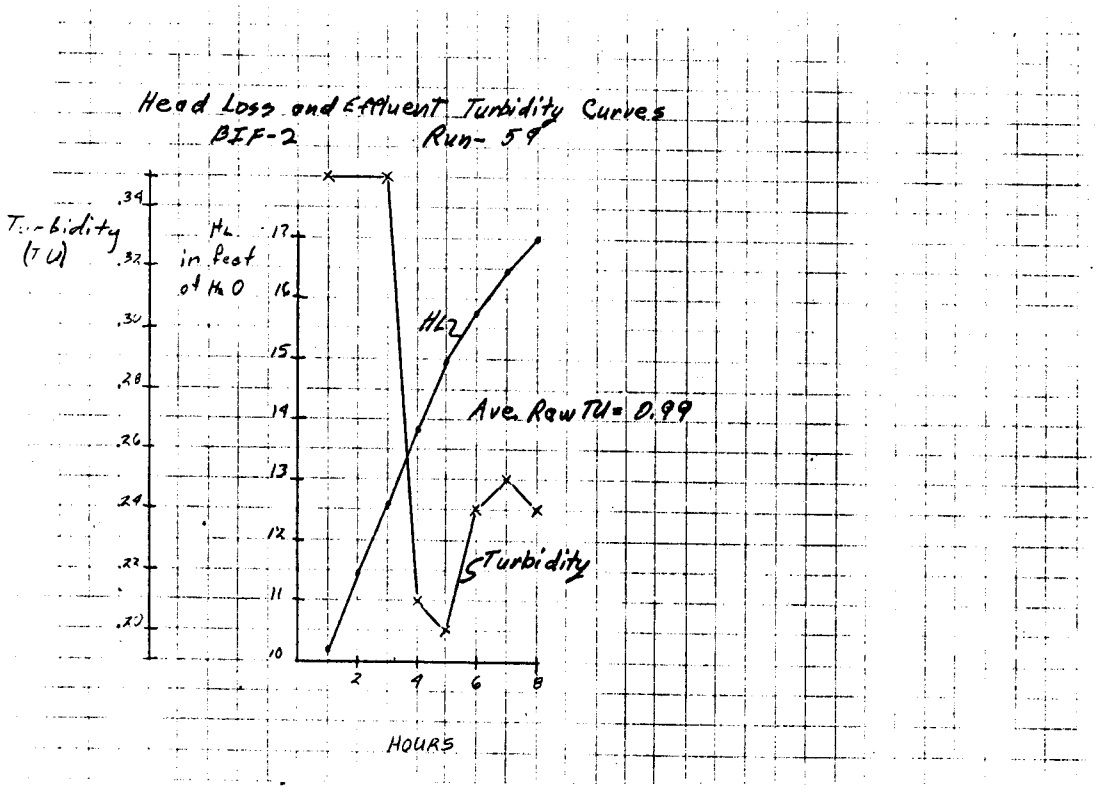

Head Loss and Effluent Turbidity Curves
BIF-2 Run-54
Turbidity (TU)
HL in feet of H2O
Ave. Raw TU = 0.74
Turbidity
HL
HOURS

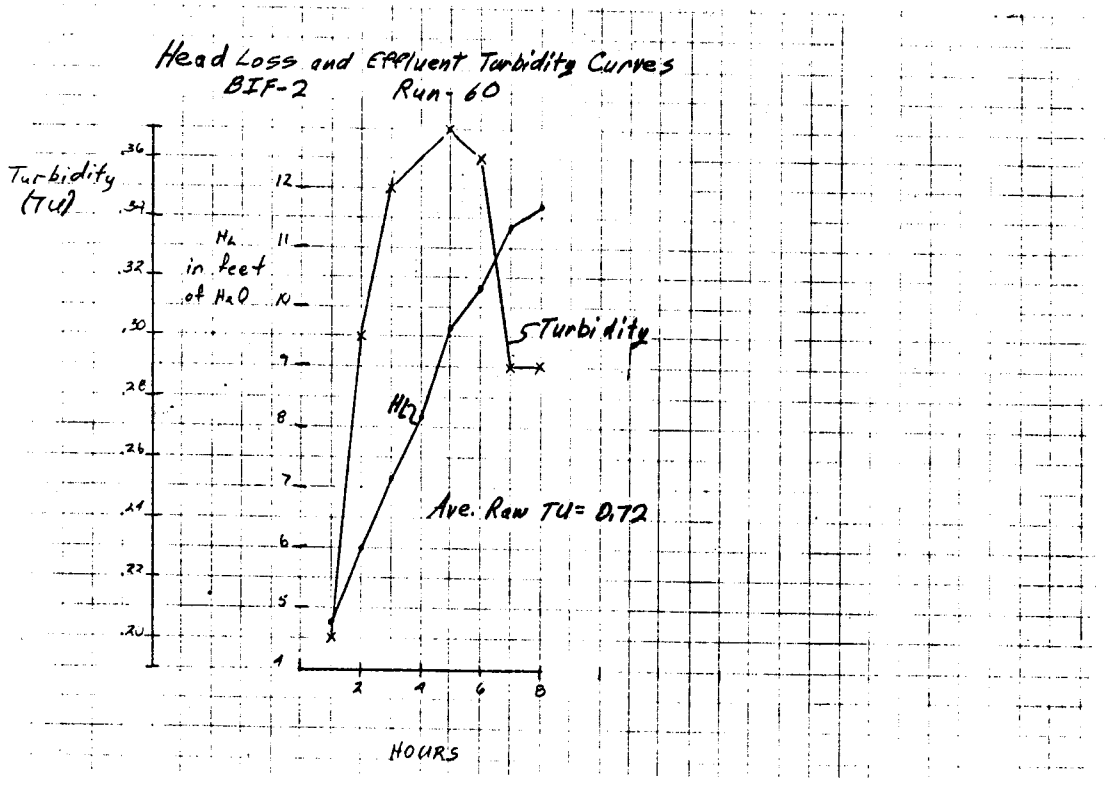

Head Loss and Effluent Turbidity Curves
BIF-2 Run-55
Turbidity (TU)
HL in feet of H2O
Turbidity
HL
Ave. Raw TU = 1.02
HOURS

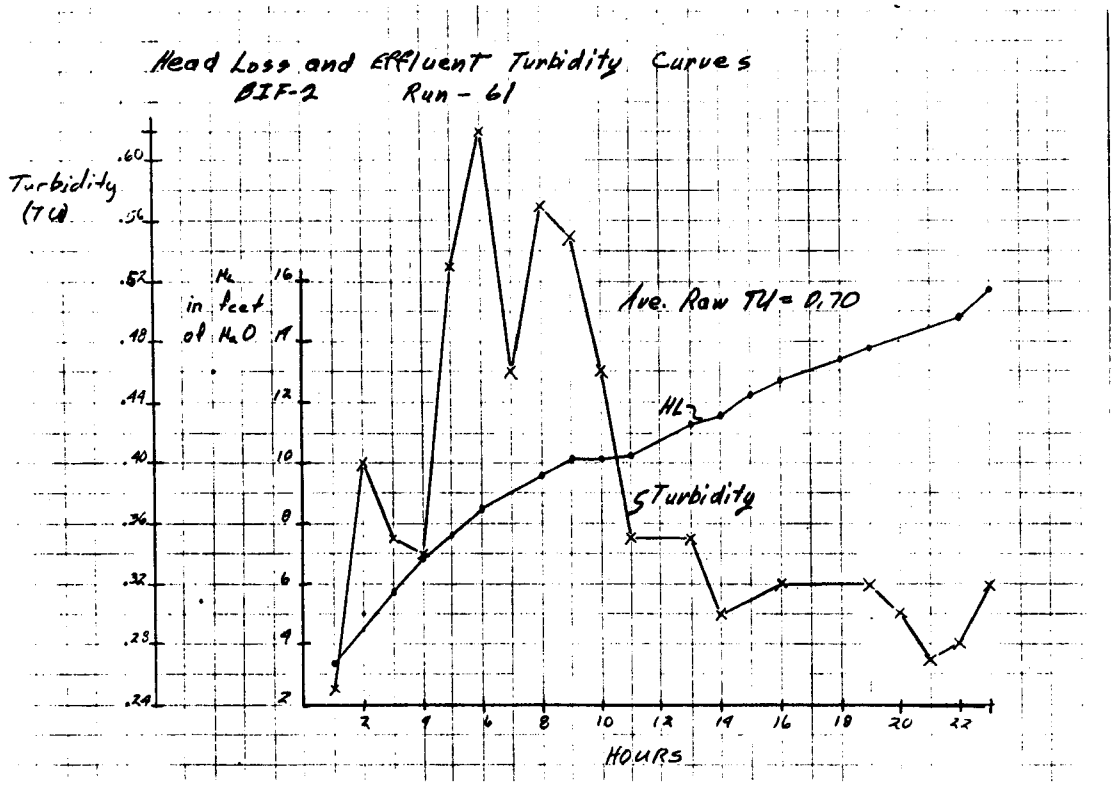

Head Loss and Effluent Turbidity Curves
BIF-2 Run-56
HL in feet of H2O
Turbidity (TU)
HL
Ave. Raw TU = 1.31
Turbidity
HOURS

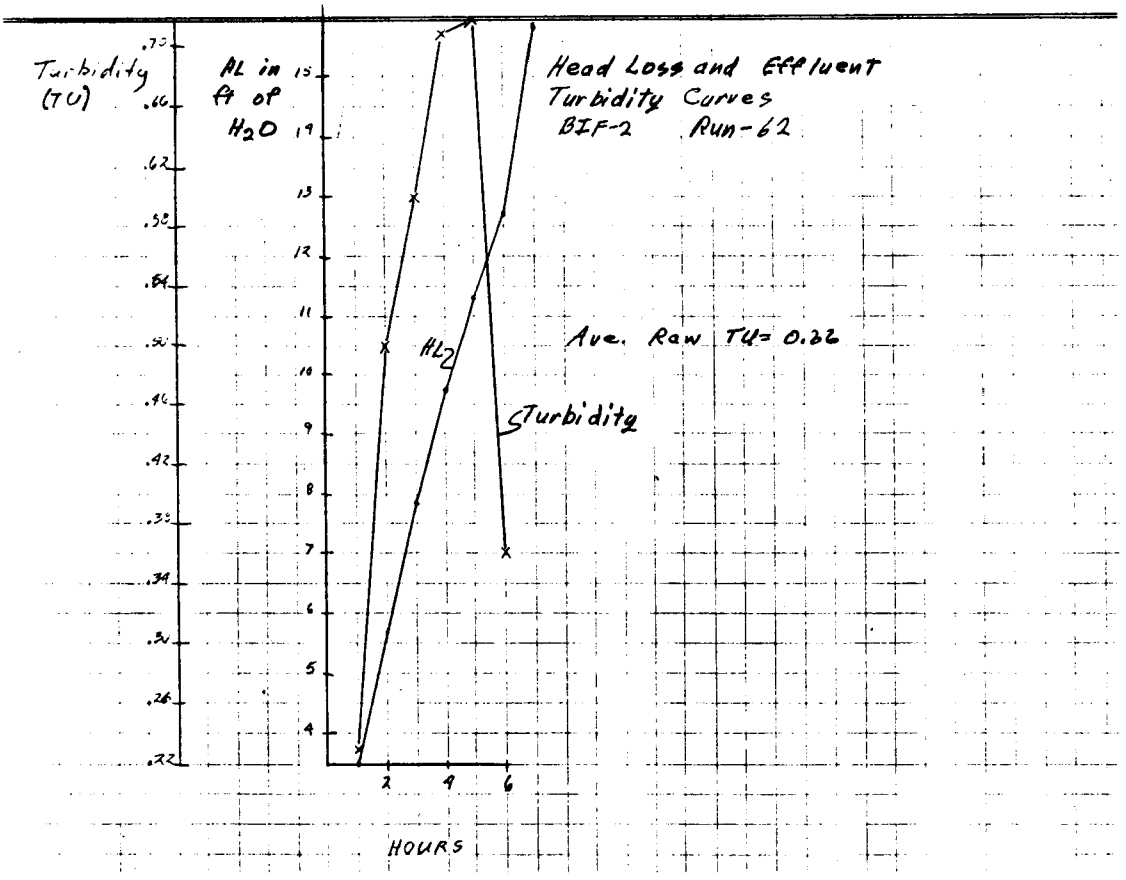

Head Loss and Effluent Turbidity Curves
BIF-2 Run-57
Turbidity (TU)
H_L in feet of H_2O
Ave. Raw TU = 1.25
HL
Turbidity
HOURS

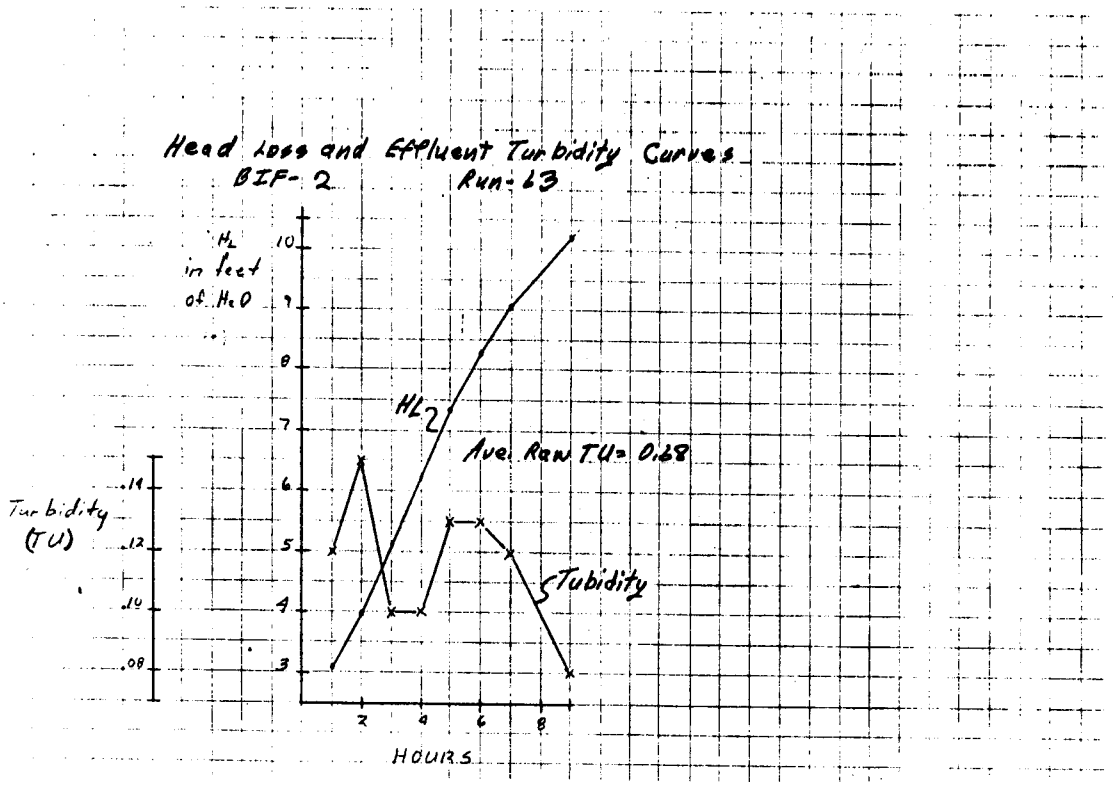

Head Loss and Effluent Turbidity Curves
BIF-2 Run-58
Turbidity (TU)
H_L in feet of H_2O
HL
Ave. Raw TU = 1.52
Turbidity
HOURS

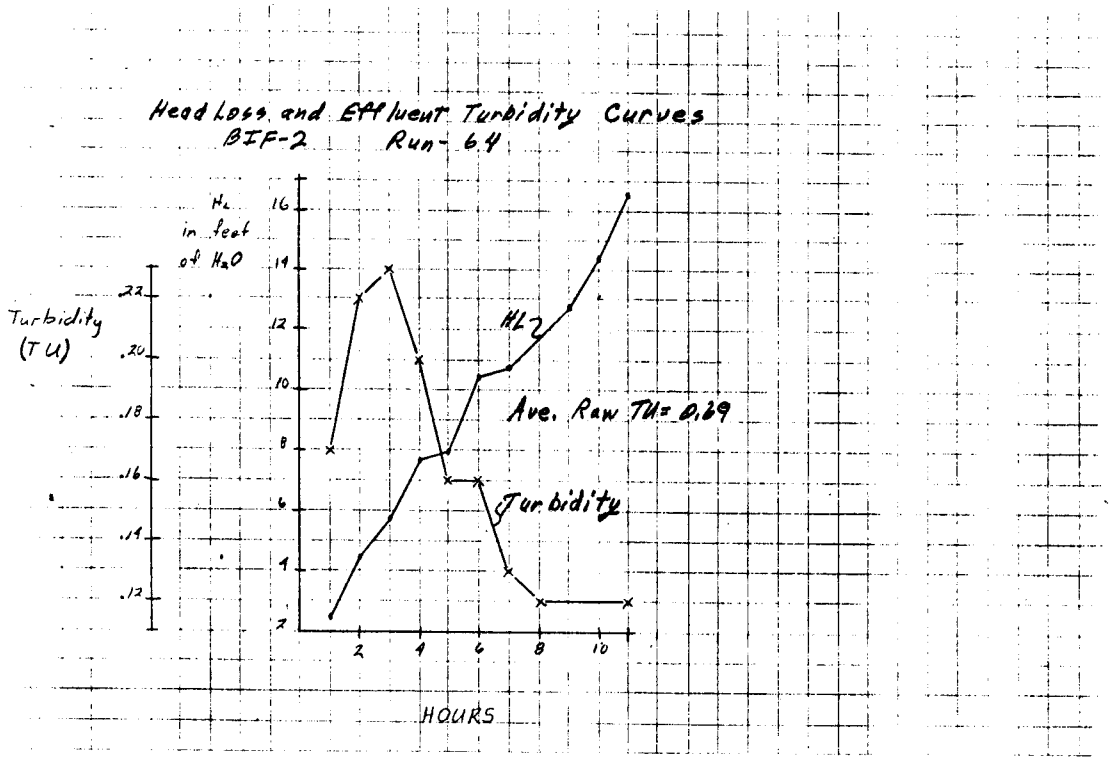

Head Loss and Effluent Turbidity Curves
BIF-2 Run- 59
Turbidity (TU)
HL in feet of H2O
HL
Ave. Raw TU= 0.99
Turbidity
HOURS

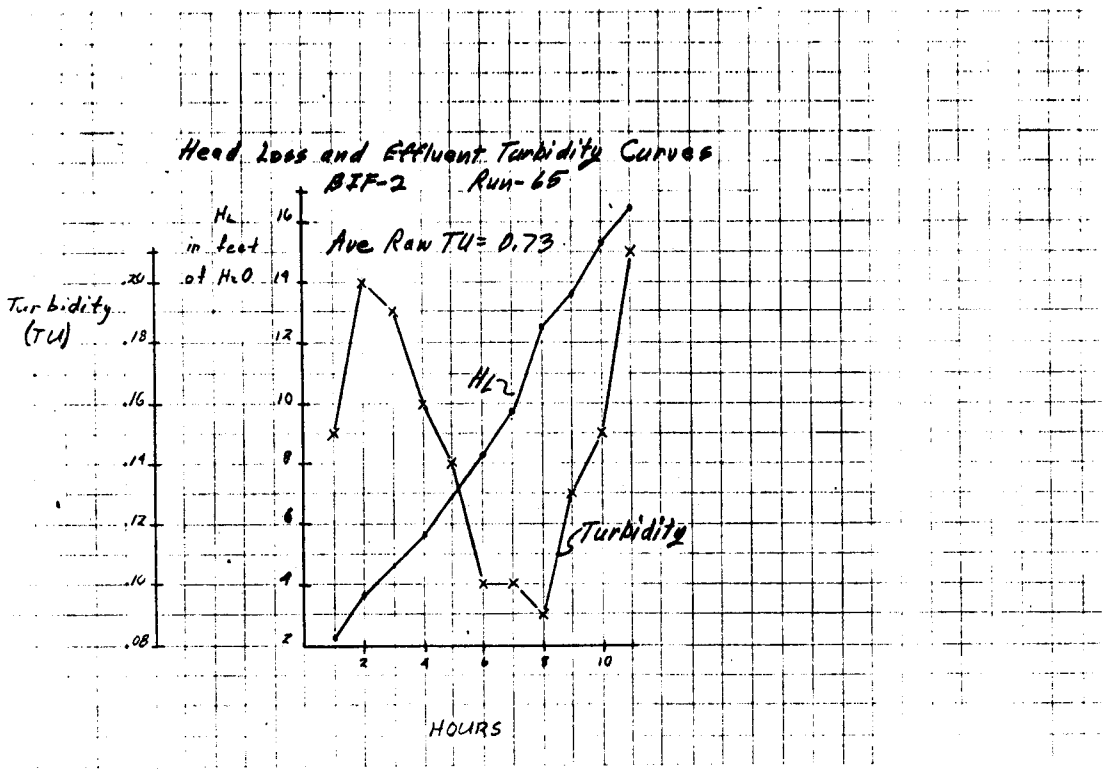

Head Loss and Effluent Turbidity Curves
BIF-2 Run- 60
Turbidity (TU)
HL in feet of H2O
Turbidity
HL
Ave. Raw TU= 0.72
HOURS

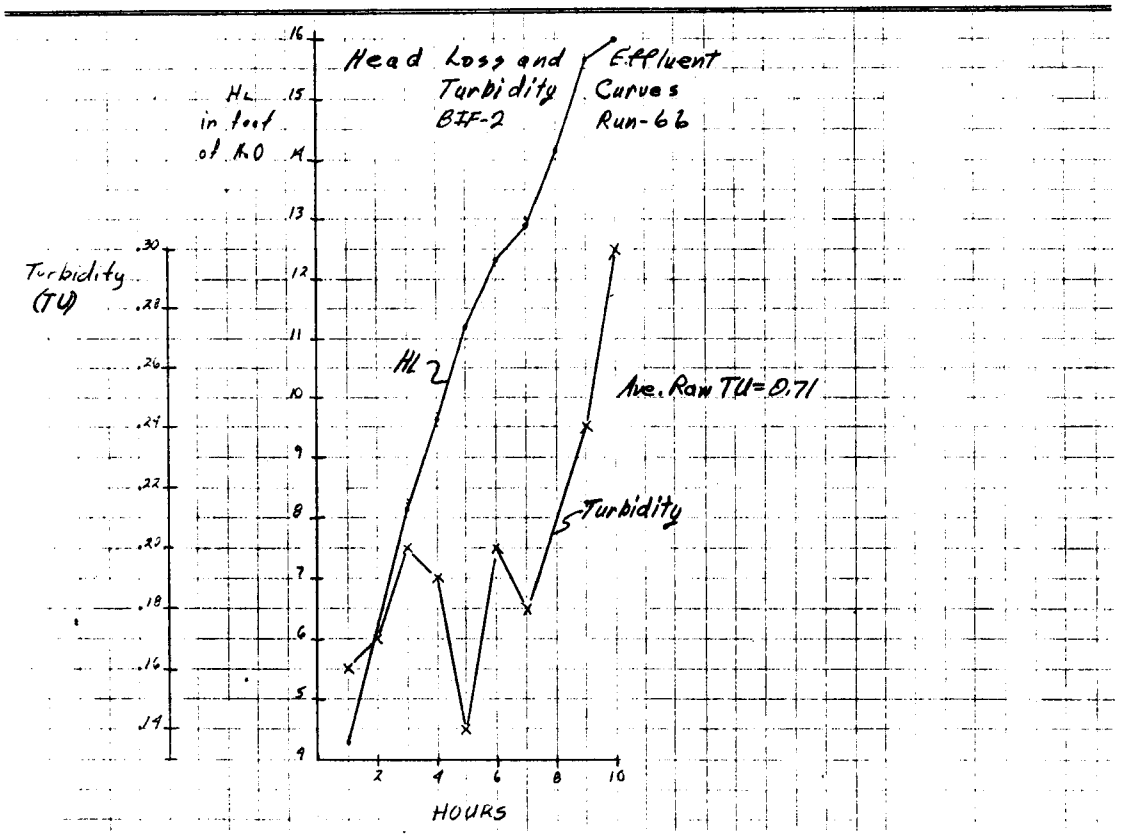

Head Loss and Effluent Turbidity Curves
BIF-2 Run - 61
Turbidity (TU)
HL in feet of H2O
Ave. Raw TU = 0.70
HL
Turbidity
HOURS

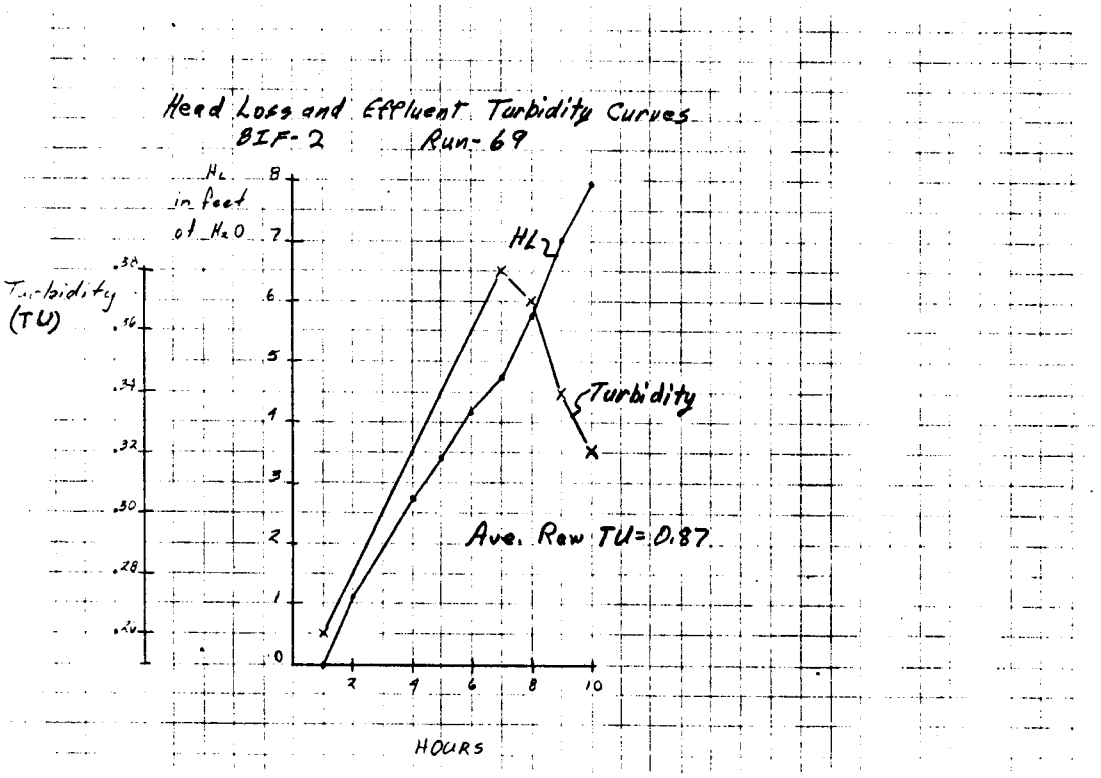

Turbidity (TU)
HL in ft of H2O
Head Loss and Effluent Turbidity Curves
BIF-2 Run-62
Ave. Raw TU = 0.22
HL
Turbidity
HOURS

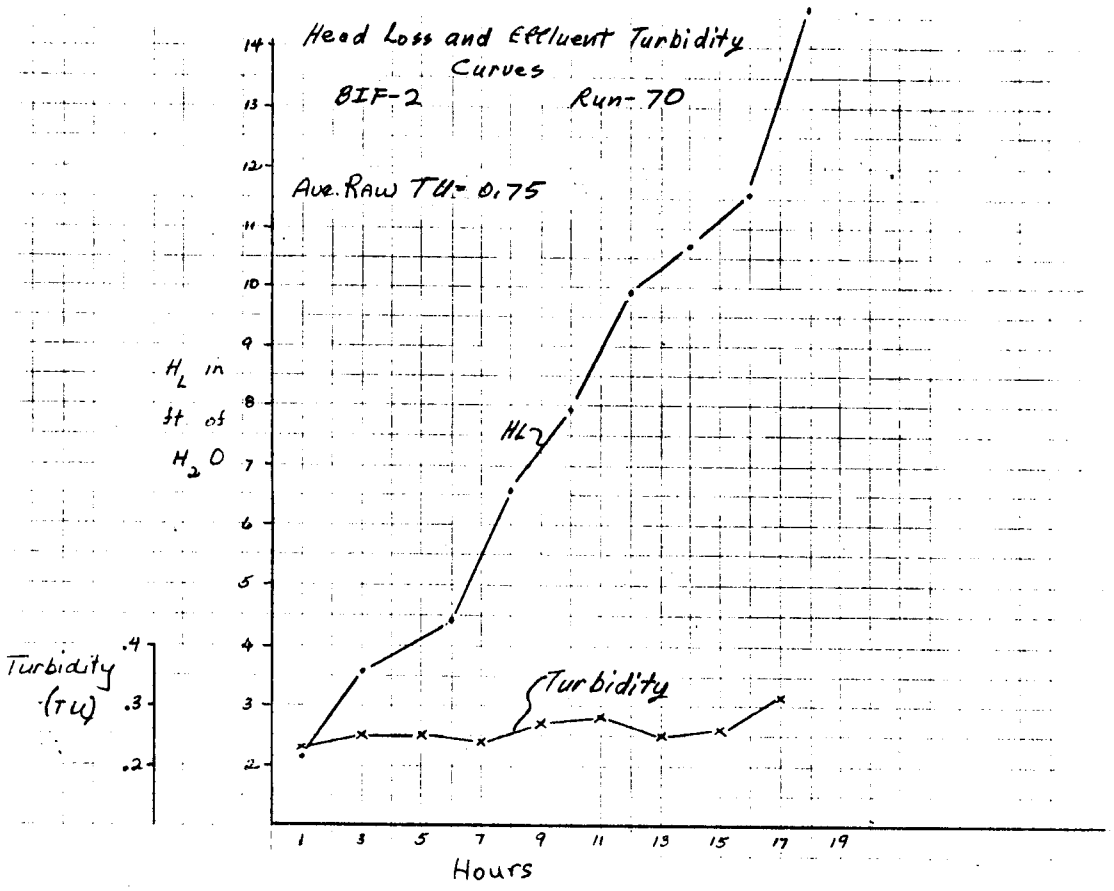

Head Loss and Effluent Turbidity Curves
BIF-2 Run-63
HL in feet of H2O
Turbidity (TU)
HL
Ave. Raw TU= 0.68
Tubidity
HOURS

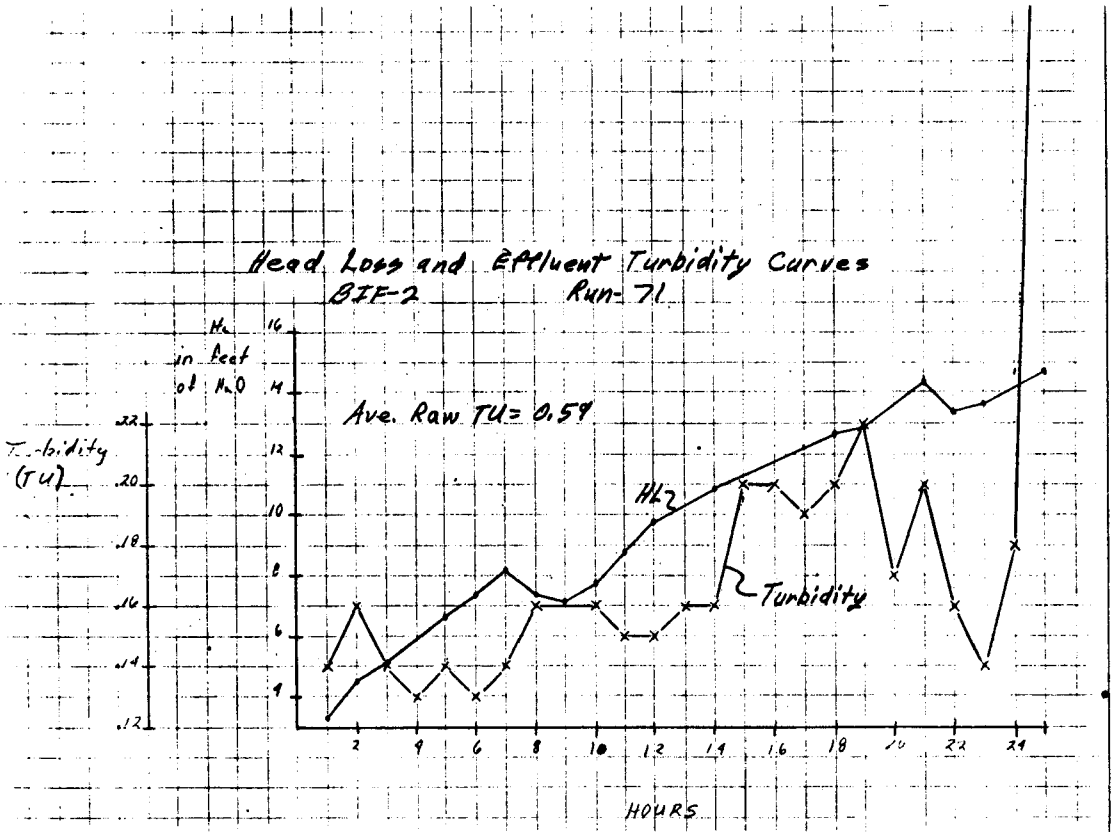

Head Loss and Effluent Turbidity Curves
BIF-2 Run-64
HL in feet of H2O
Turbidity (TU)
HL
Ave. Raw TU= 0.69
Turbidity
HOURS

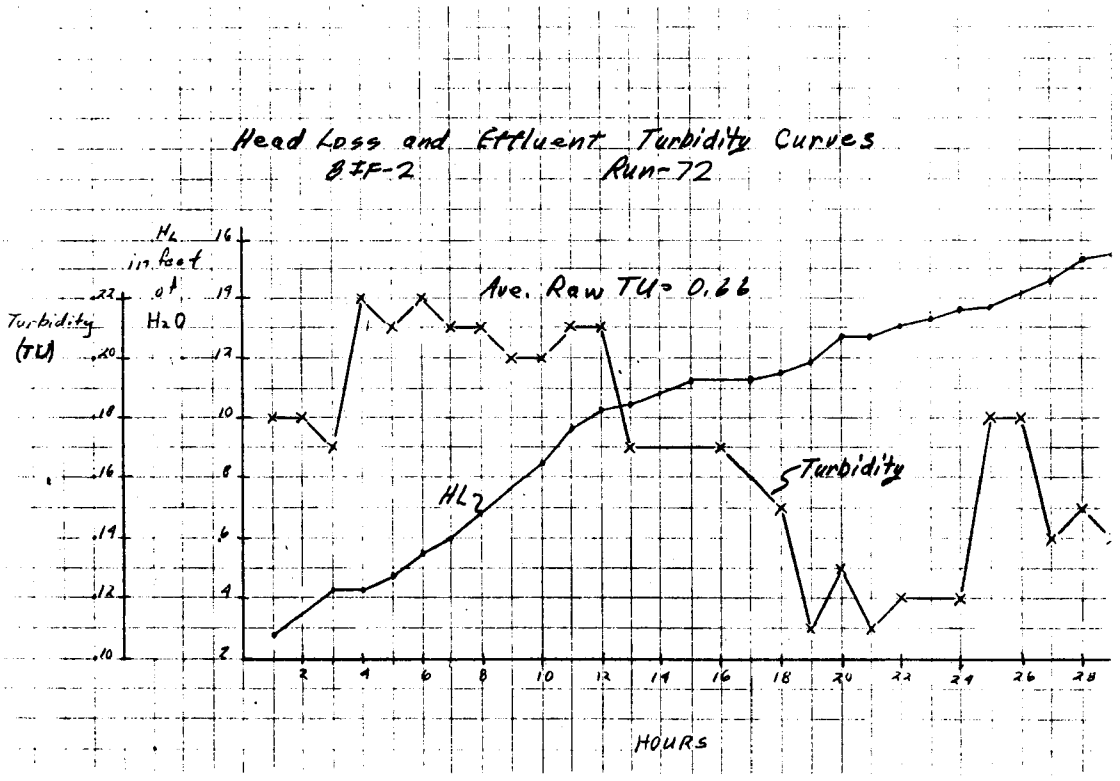

Head Loss and Effluent Turbidity Curves
BIF-2 Run-65
Ave Raw TU = 0.73
HL in feet of H2O
Turbidity (TU)
HL
Turbidity
HOURS

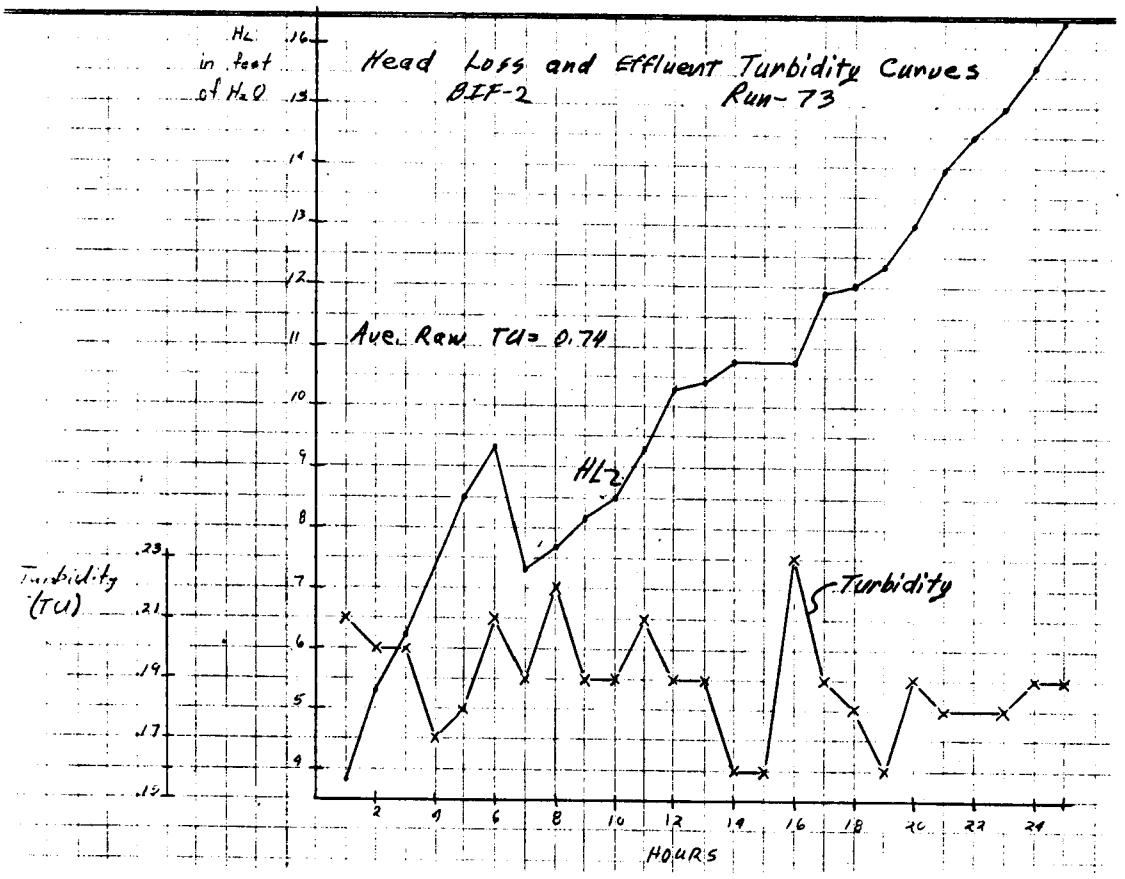

Head Loss and Effluent Turbidity Curves
BIF-2 Run-66
HL in feet of H2O
Turbidity (TU)
HL
Ave. Raw TU = 0.71
Turbidity
HOURS

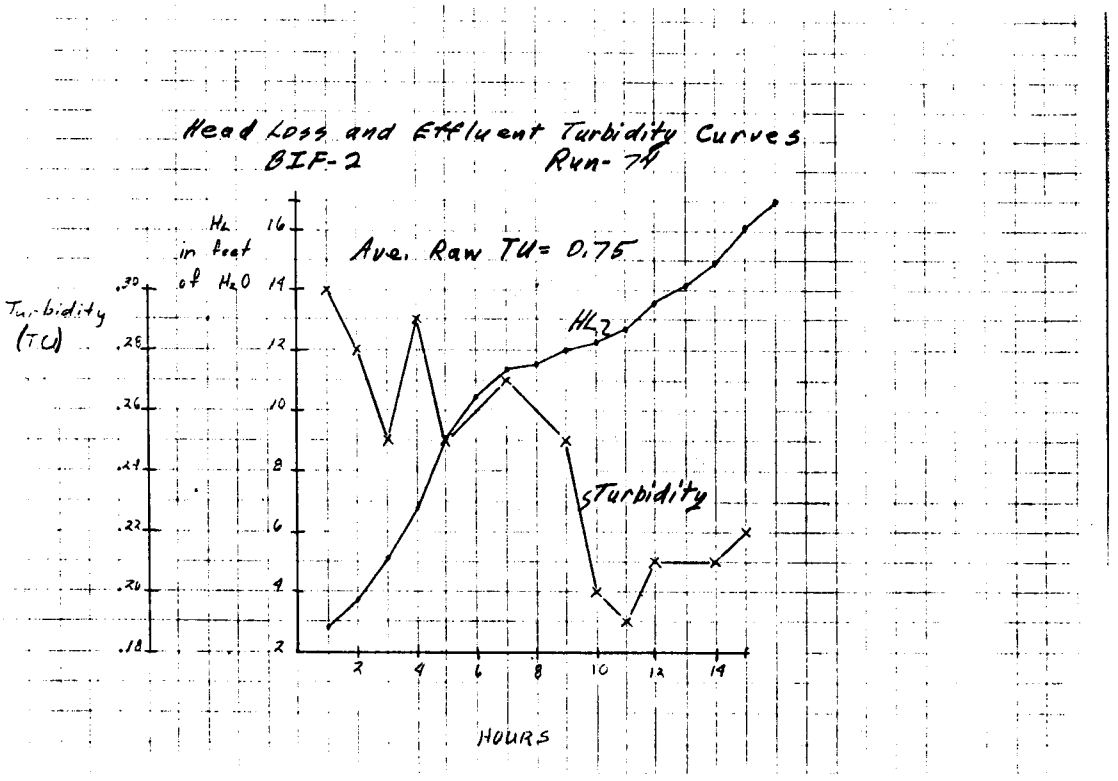

Head Loss and Effluent Turbidity Curves
BIF-2 Run-69
H_L in feet of H_2O
Turbidity (TU)
HL
Turbidity
Ave. Raw TU = 0.87
HOURS

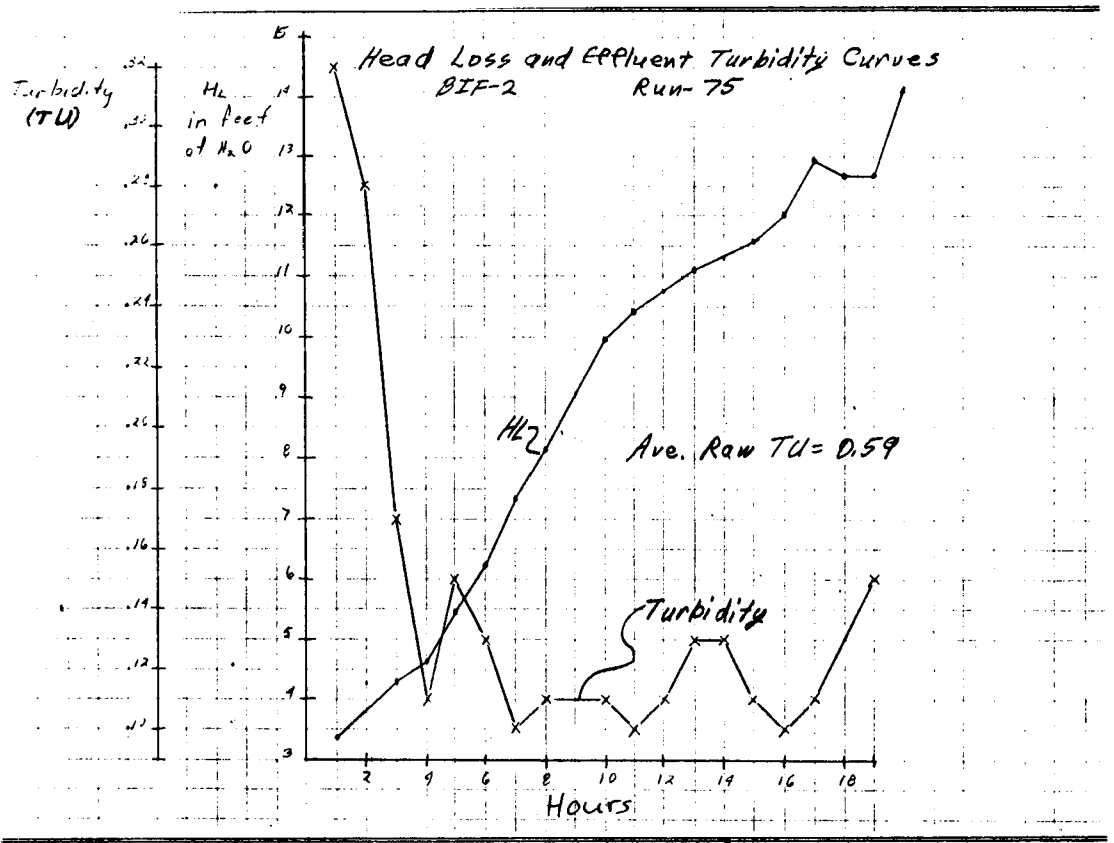

Head Loss and Effluent Turbidity Curves
BIF-2 Run-70
Ave. Raw TU = 0.75
H_L in ft of H_2O
HL
Turbidity
Turbidity (TU)
Hours

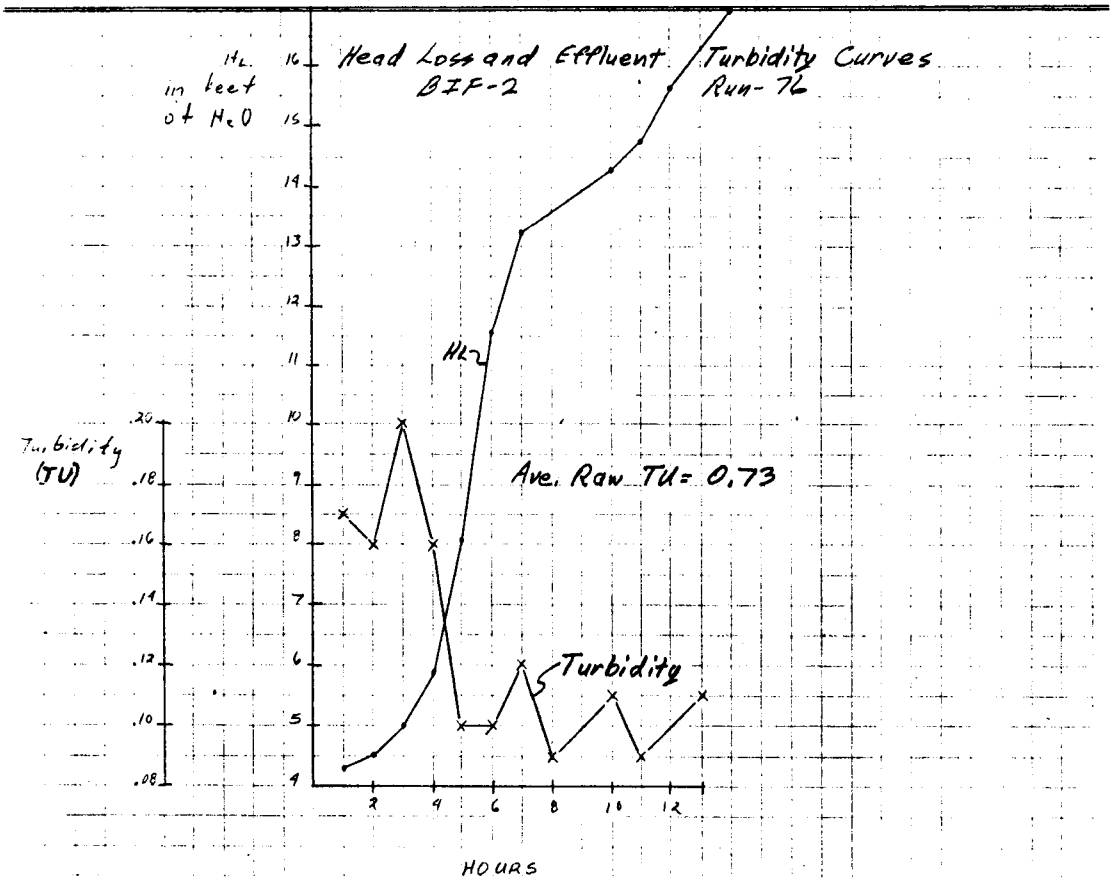

Head Loss and Effluent Turbidity Curves
BIF-2 Run-71
HL in feet of H2O
Turbidity (TU)
Ave. Raw TU= 0.59
HL
Turbidity
HOURS

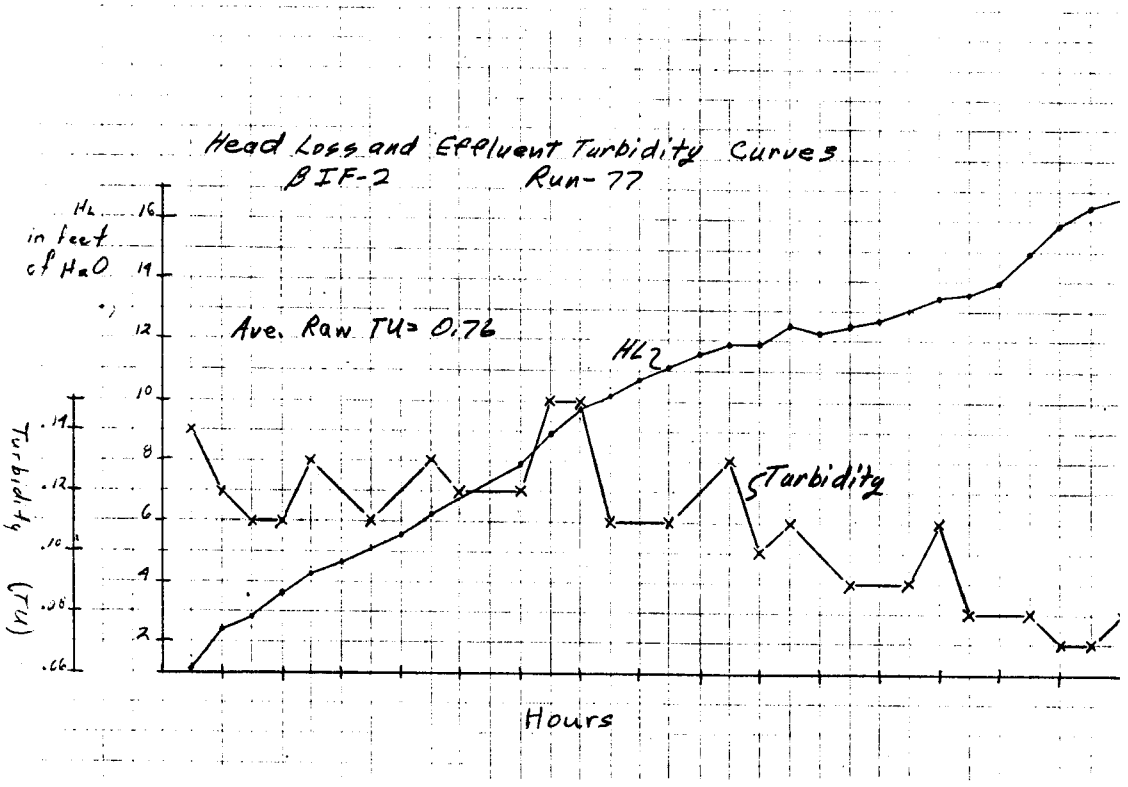

Head Loss and Effluent Turbidity Curves
BIF-2 Run-72
HL in feet of H2O
Turbidity (TU)
Ave. Raw TU= 0.66
HL
Turbidity
HOURS

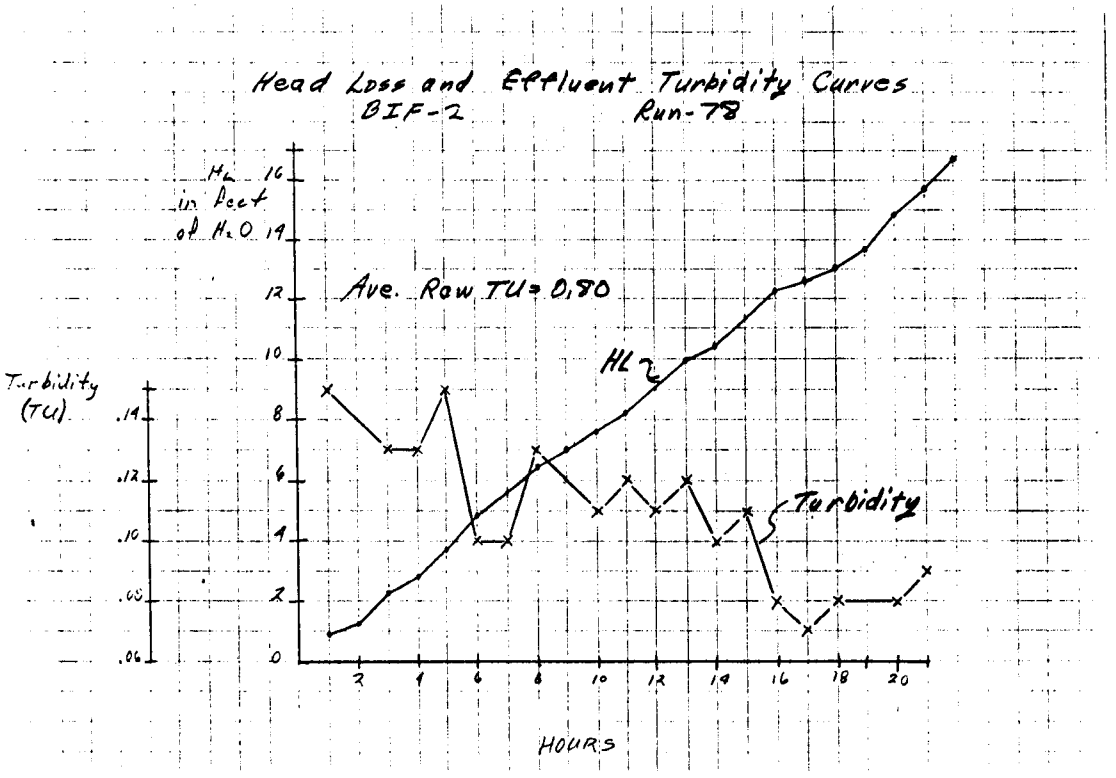

Head Loss and Effluent Turbidity Curves
BIF-2
Run-73
HL in feet of H2O
Ave. Raw TU = 0.74
HL2
Turbidity
Turbidity (TU)
HOURS

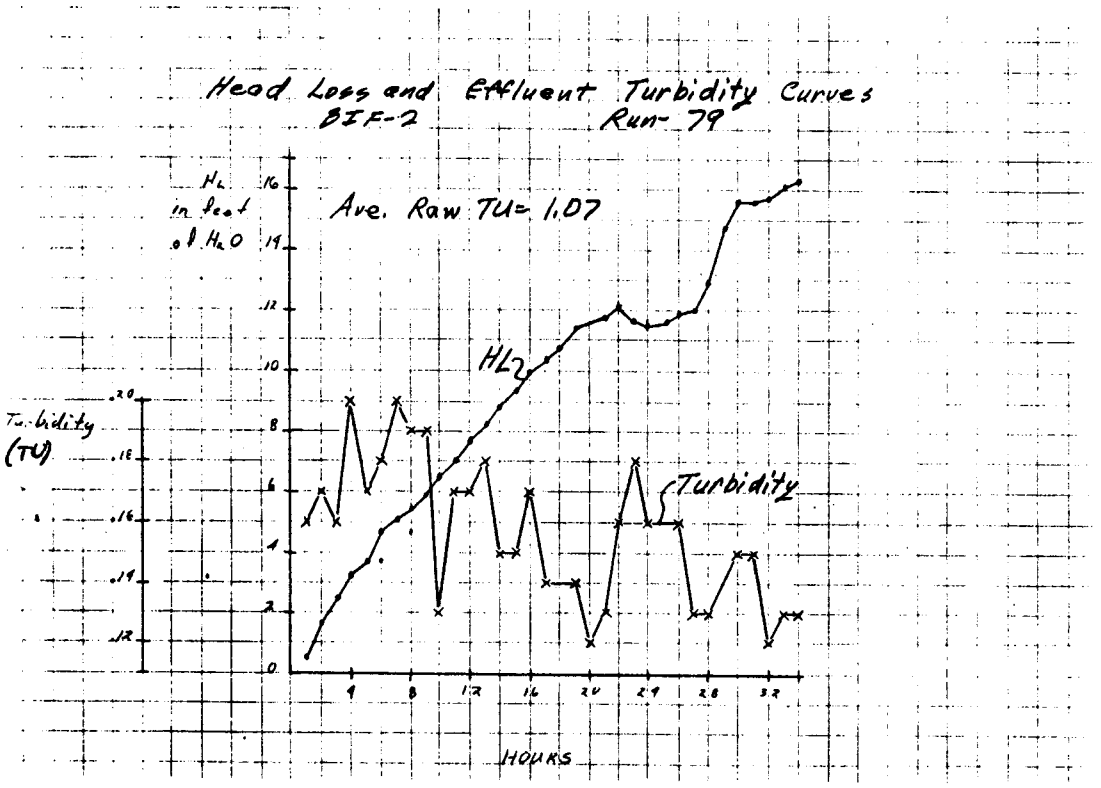

Head Loss and Effluent Turbidity Curves
BIF-2
Run-74
HL in feet of H2O
Ave. Raw TU = 0.75
HL2
Turbidity
Turbidity (TU)
HOURS

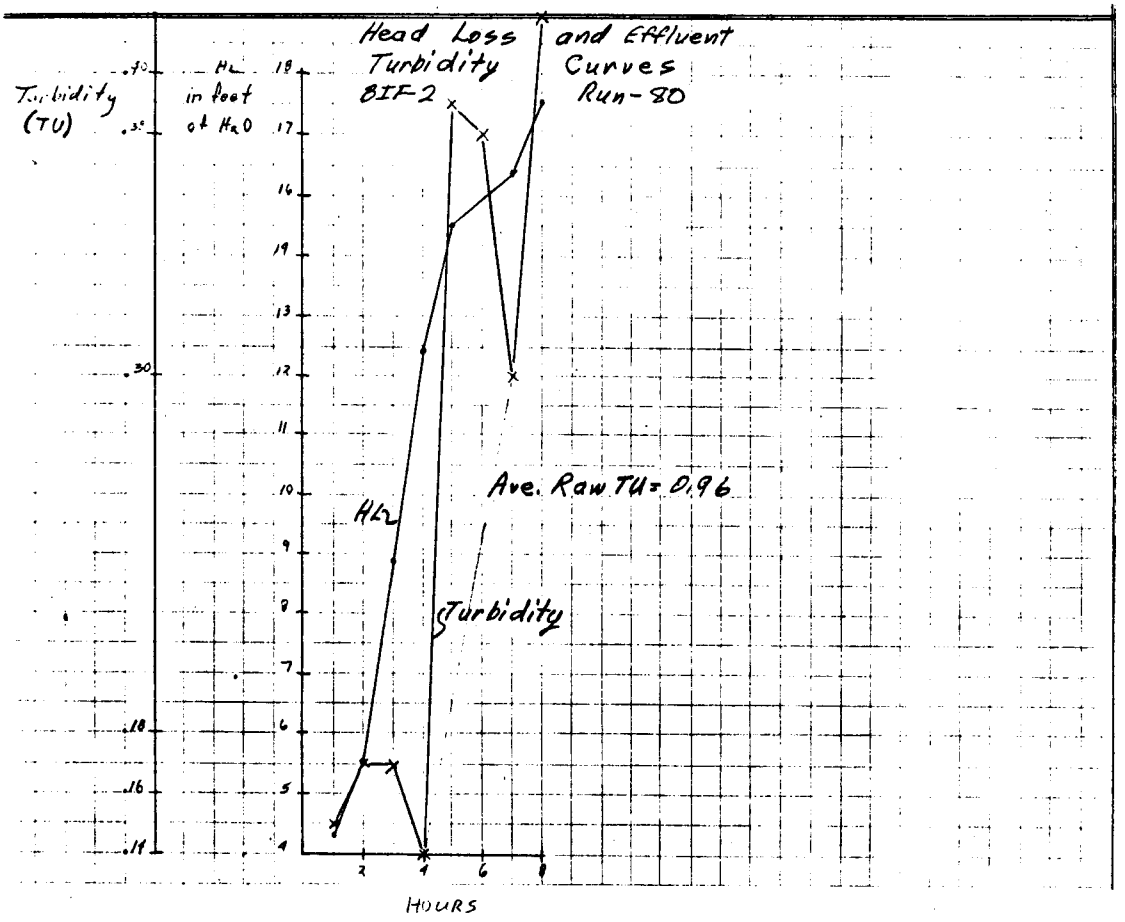

Head Loss and Effluent Turbidity Curves
BIF-2
Run-75
Turbidity (TU)
HL in feet of H2O
HL
Ave. Raw TU = 0.59
Turbidity
Hours

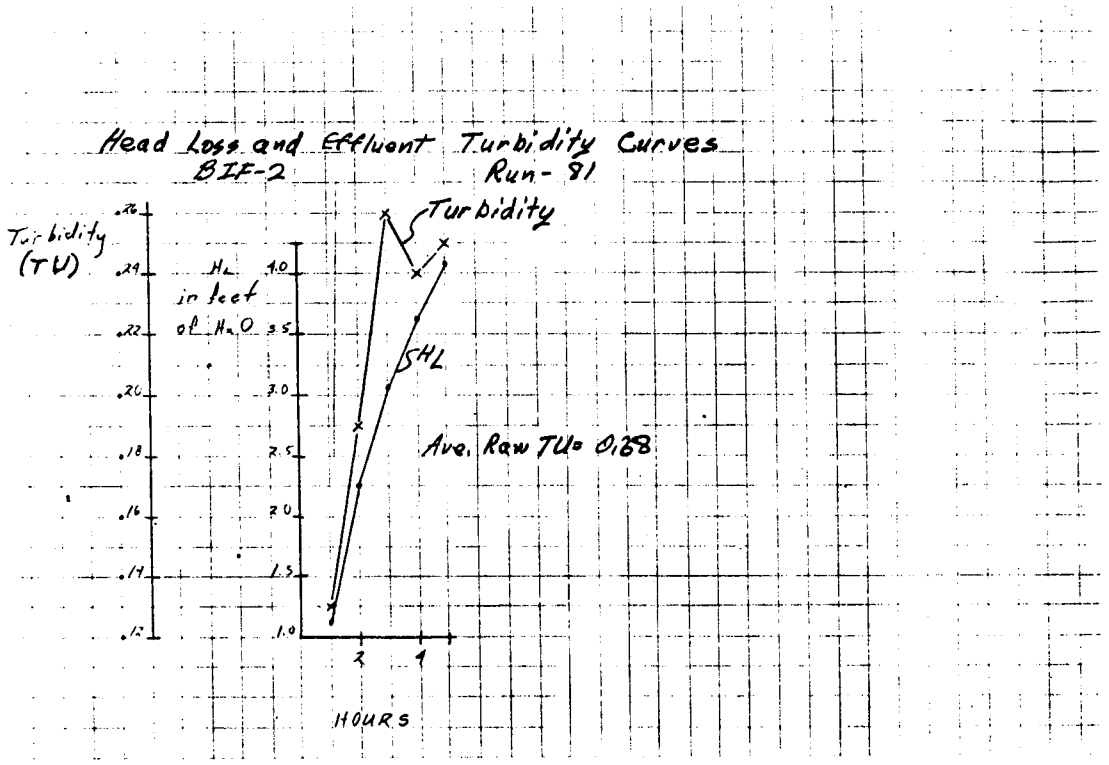

Head Loss and Effluent Turbidity Curves
BIF-2
Run-76
HL in feet of H2O
HL
Turbidity (TU)
Ave. Raw TU = 0.73
Turbidity
HOURS

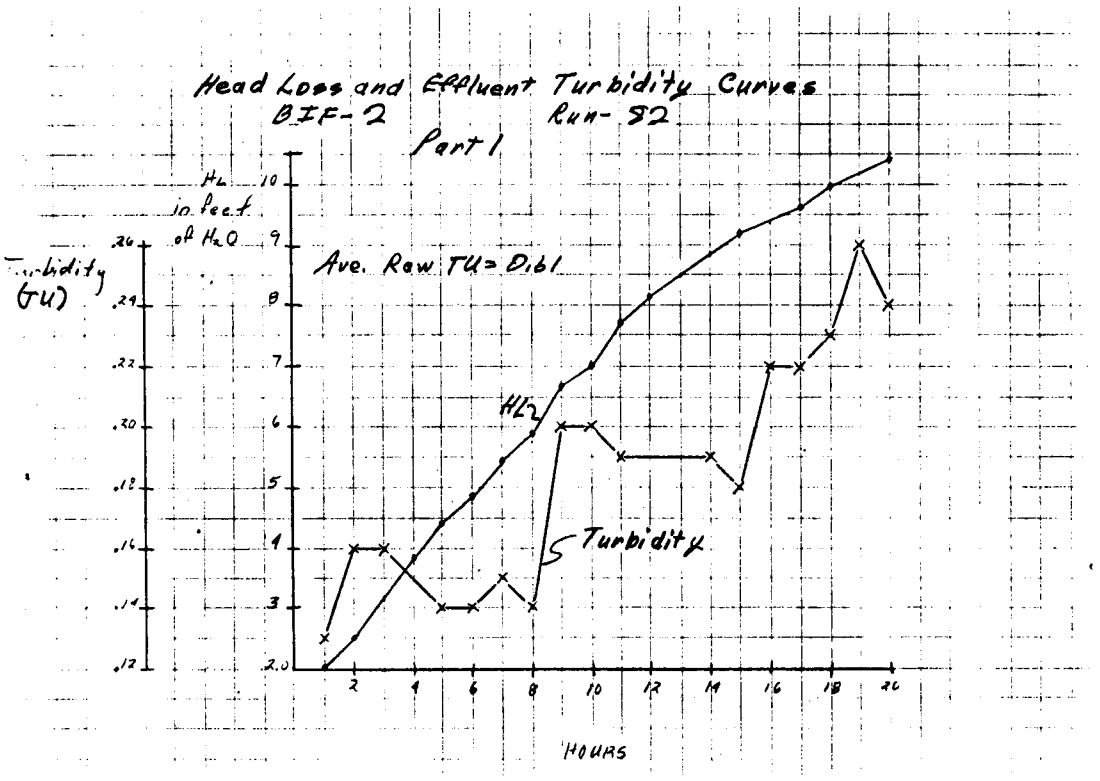

Head Loss and Effluent Turbidity Curves
BIF-2 Run-77
HL in feet of H2O
Ave. Raw TU = 0.76
HL
Turbidity
Turbidity (TU)
Hours

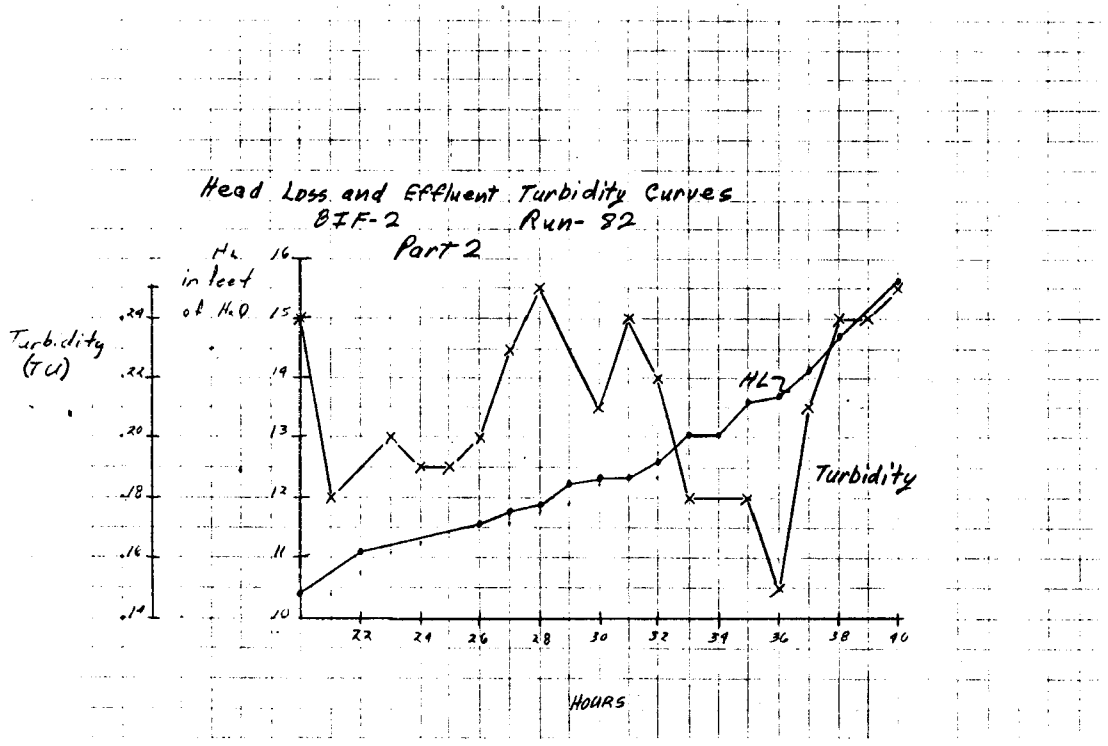

Head Loss and Effluent Turbidity Curves
BIF-2 Run-78
HL in feet of H2O
Ave. Raw TU = 0.80
HL
Turbidity
Turbidity (TU)
HOURS

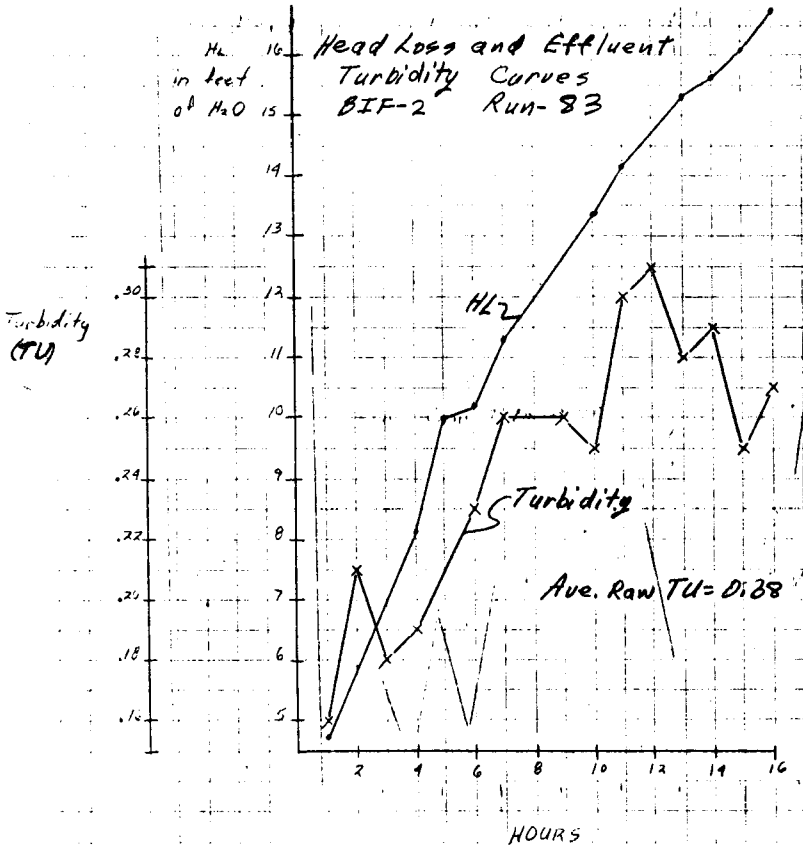

Head Loss and Effluent Turbidity Curves
BIF-2
Run-79
HL in feet of H2O
Ave. Raw TU= 1.07
HL
Turbidity
Turbidity (TU)
HOURS

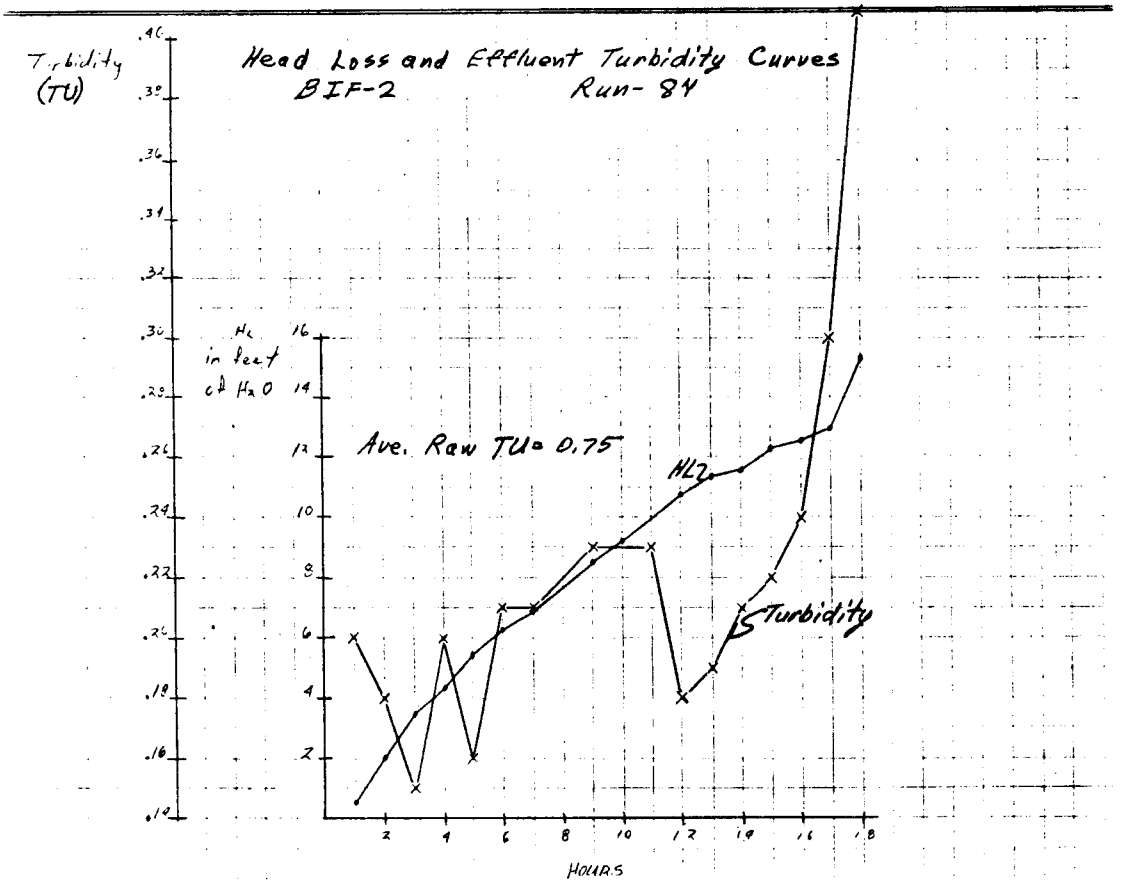

Head Loss and Effluent Turbidity Curves
BIF-2
Run-80
Turbidity (TU)
HL in feet of H2O
Ave. Raw TU= 0.96
HL
Turbidity
HOURS

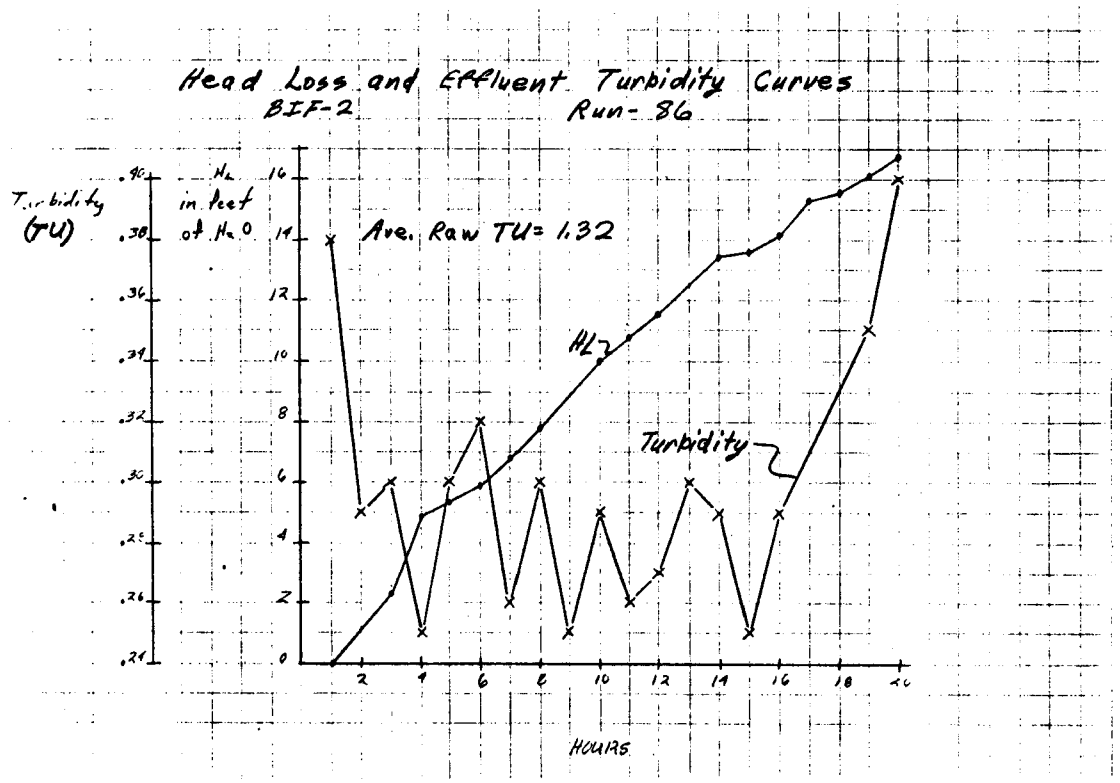

Head Loss and Effluent Turbidity Curves
BIF-2
Run- 81
Turbidity
(TU)
HL
in feet
of H_2O
Turbidity
HL
Ave. Raw TU= 0.68
HOURS

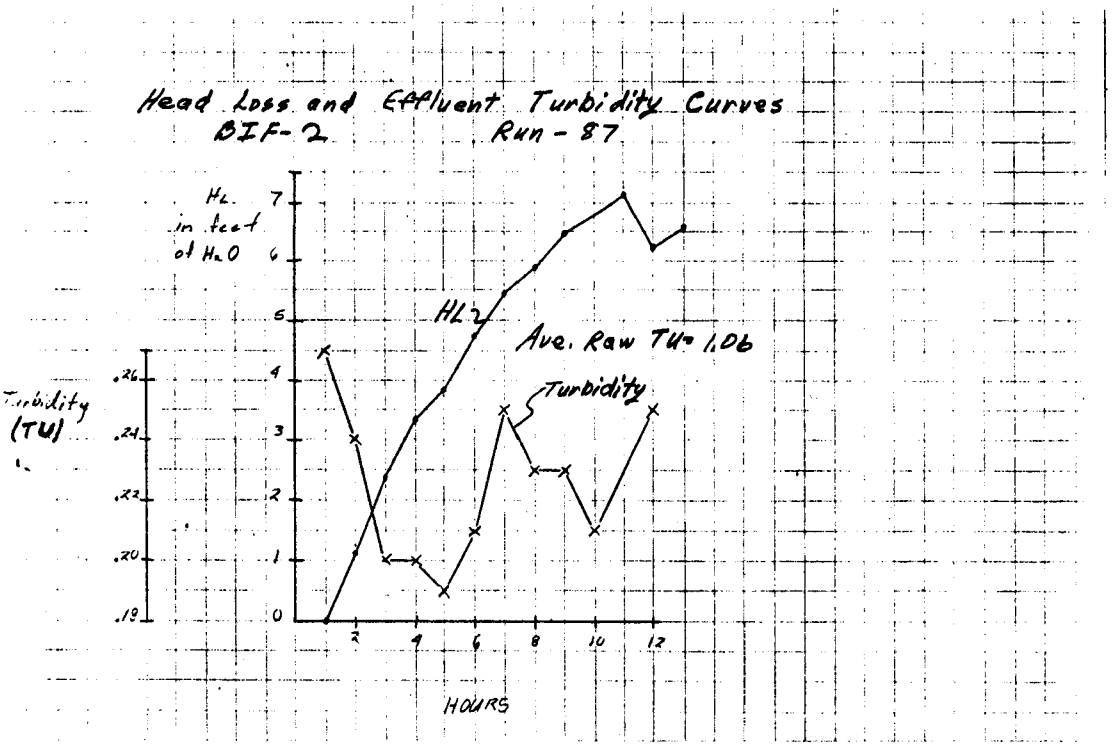

Head Loss and Effluent Turbidity Curves
BIF-2 Run-82
Part 1
HL in feet of H2O
Turbidity (TU)
Ave. Raw TU = 0.61
HL
Turbidity
HOURS

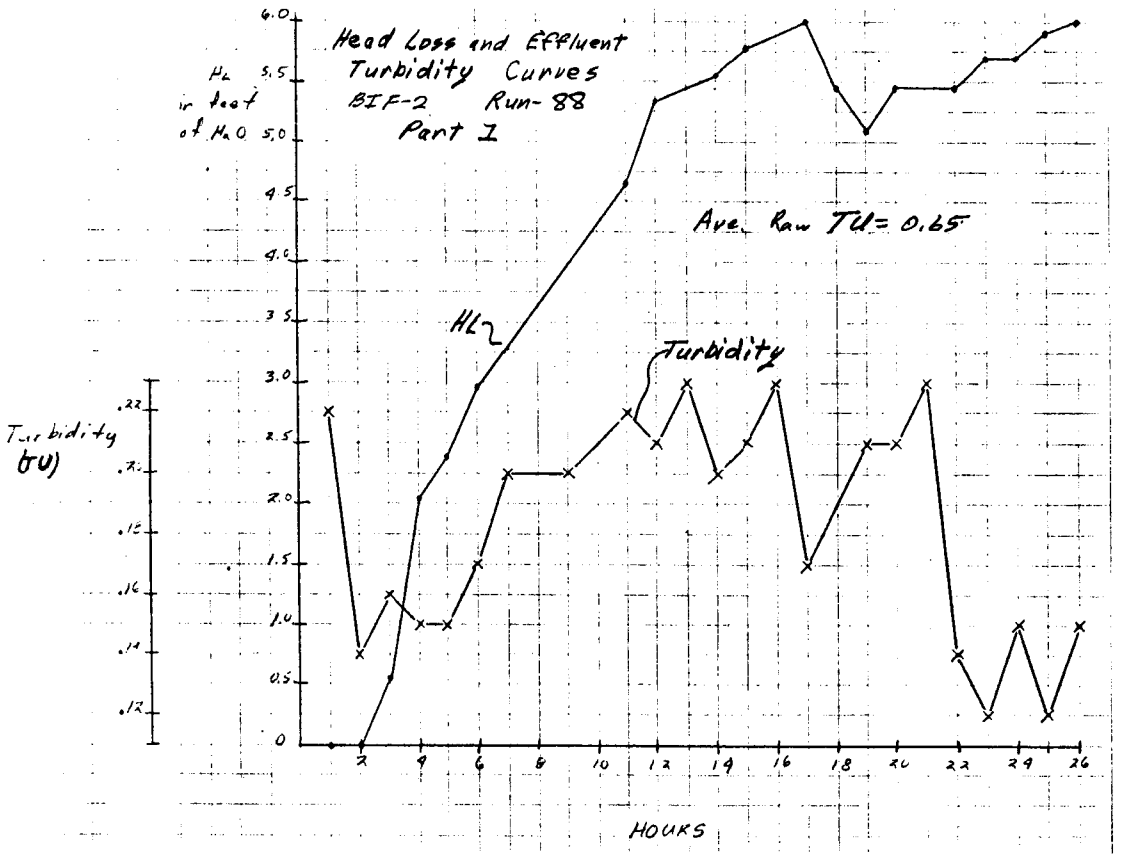

Head Loss and Effluent Turbidity Curves
BIF-2 Run-82
Part 2
HL in feet of H2O
Turbidity (TU)
HL
Turbidity
HOURS

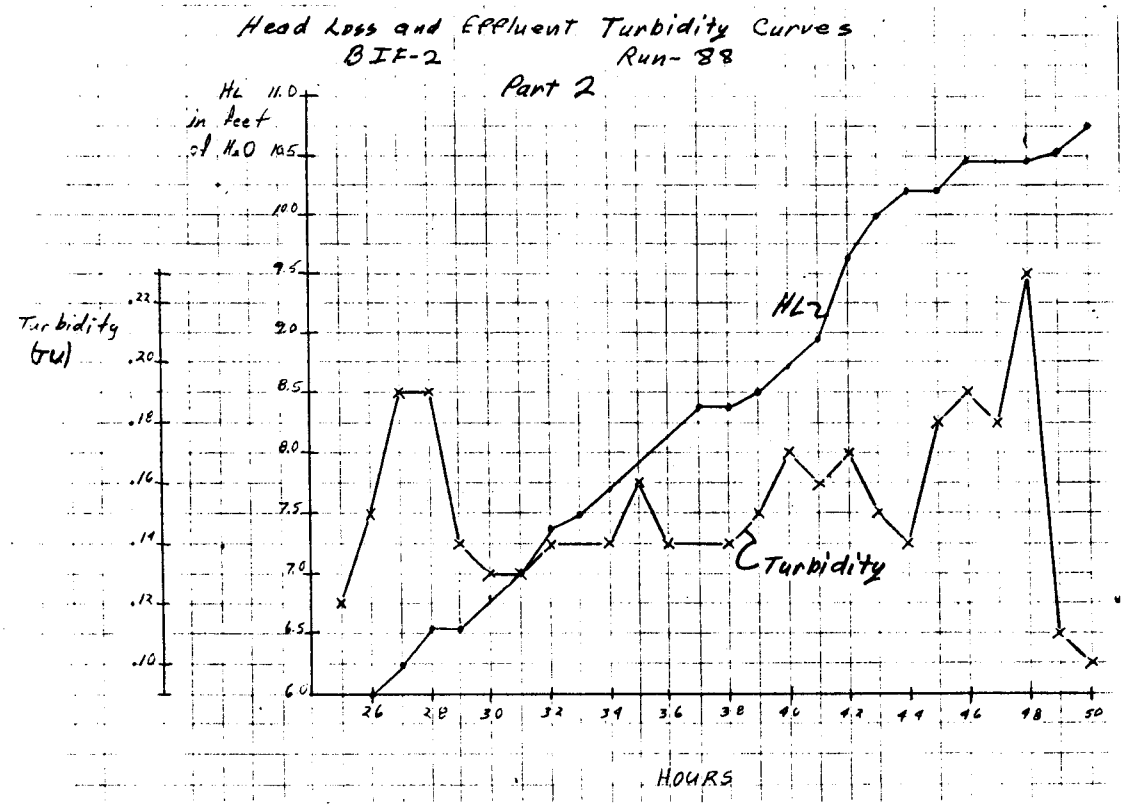

Head Loss and Effluent Turbidity Curves
BIF-2 Run-83
HL in feet of H2O
Turbidity (TU)
HL
Turbidity
Ave. Raw TU= 0.38
HOURS

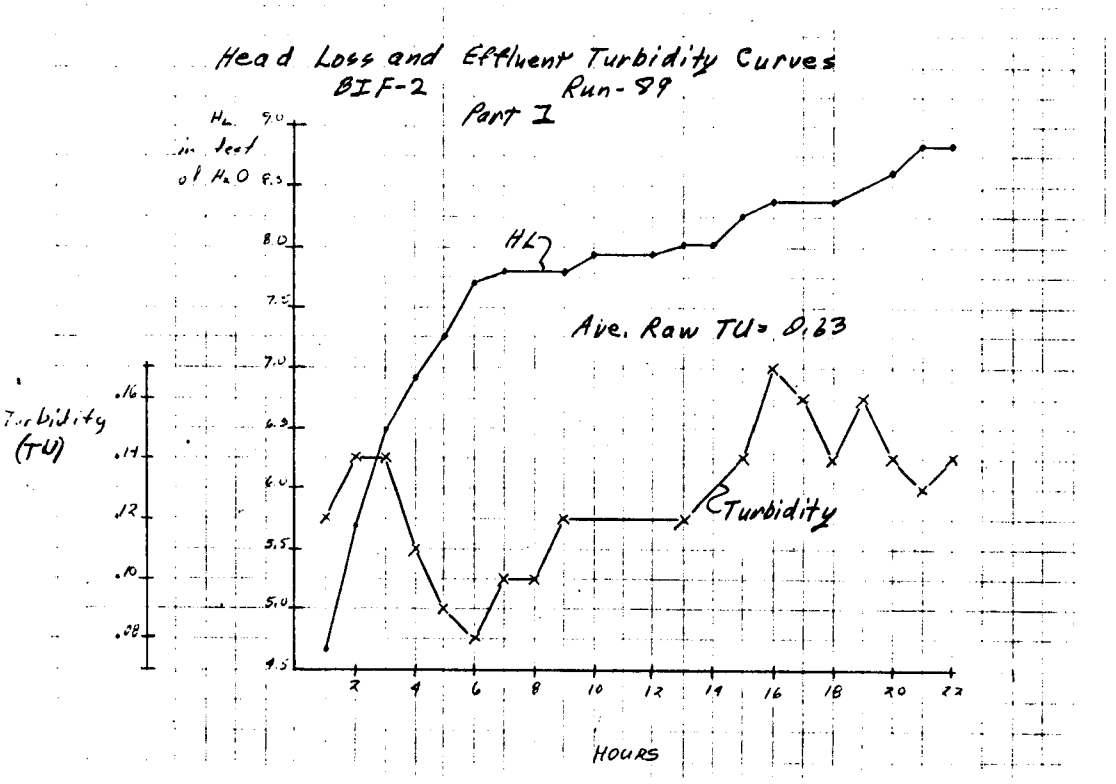

Head Loss and Effluent Turbidity Curves
BIF-2 Run-84
Turbidity (TU)
HL in feet of H2O
Ave. Raw TU= 0.75
HL
Turbidity
HOURS

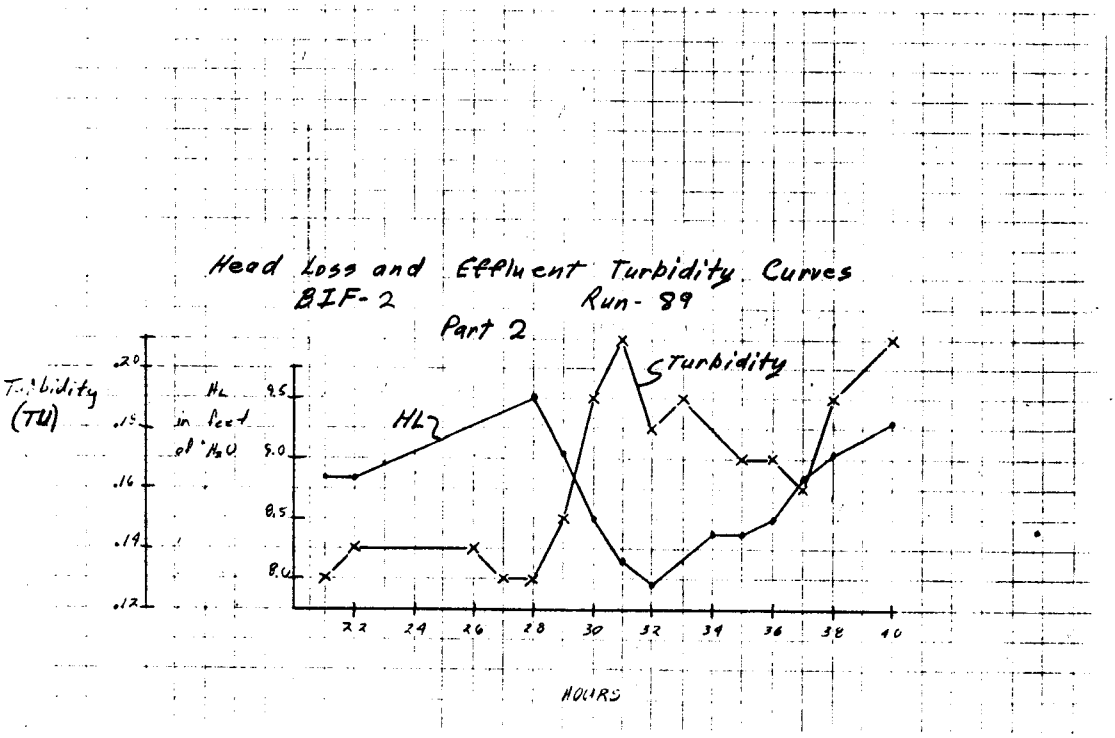

Head Loss and Effluent Turbidity Curves
BIF-2
Run-86
Turbidity (TU)
HL in feet of H2O
Ave. Raw TU= 1.32
HL
Turbidity
HOURS

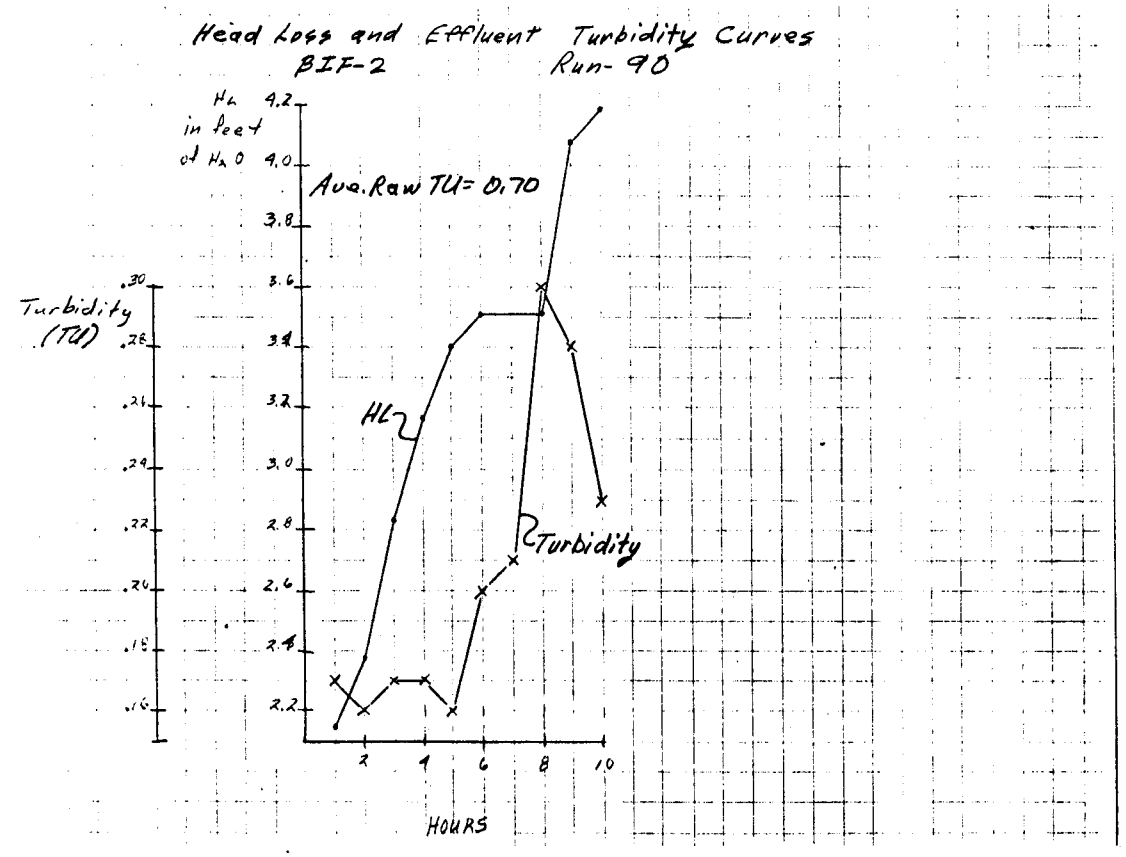

Head Loss and Effluent Turbidity Curves
BIF-2
Run-87
HL in feet of H2O
Turbidity (TU)
HL
Ave. Raw TU= 1.06
Turbidity
HOURS

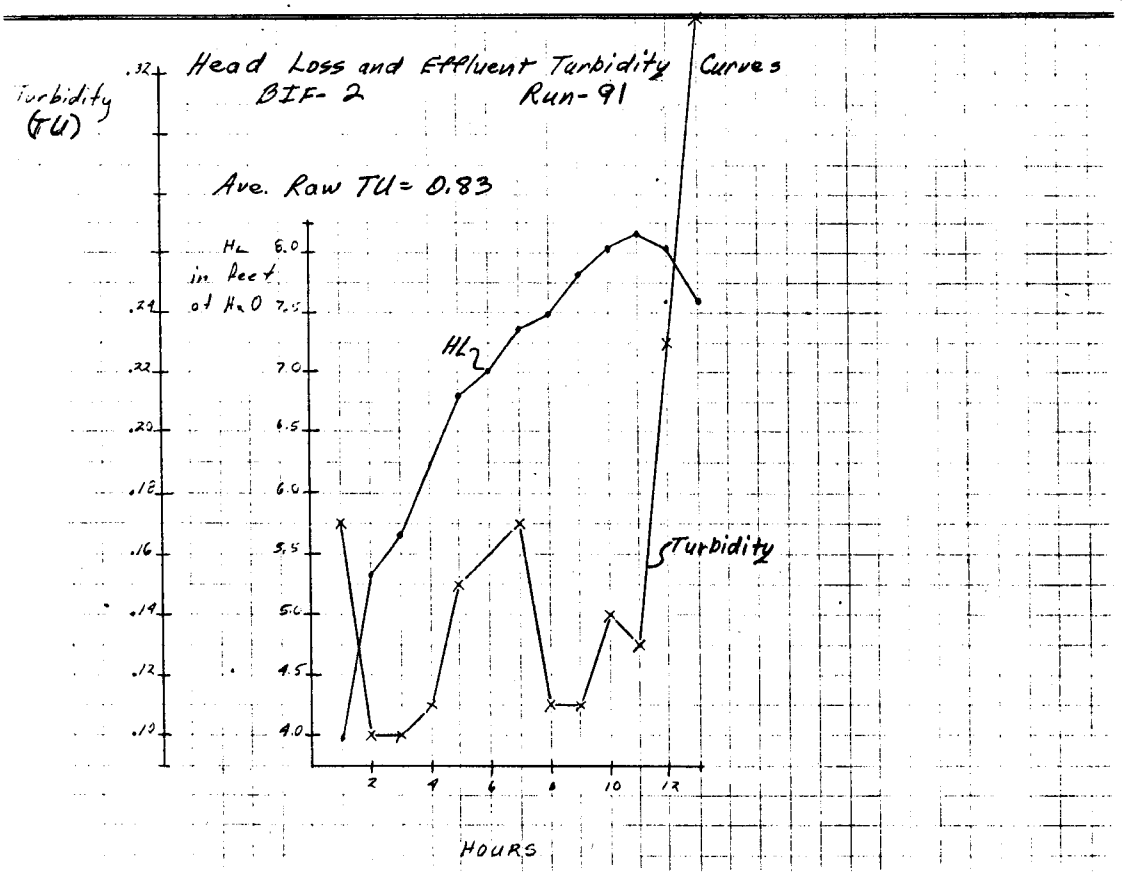

Head Loss and Effluent Turbidity Curves
BIF-2 Run-88
Part I
HL in feet of H2O
Turbidity (TU)
Ave. Raw TU = 0.65
HL
Turbidity
HOURS

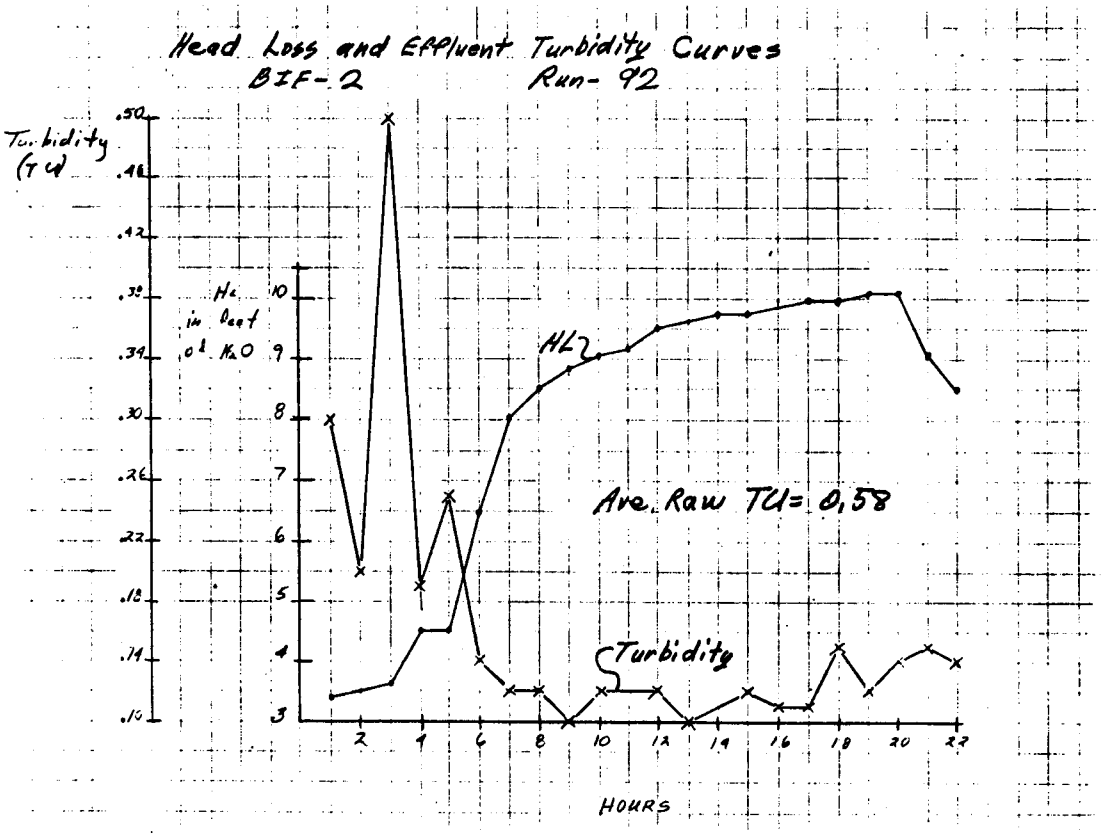

Head Loss and Effluent Turbidity Curves
BIF-2 Run-88
Part 2
HL in feet of H2O
Turbidity (TU)
HL
Turbidity
HOURS

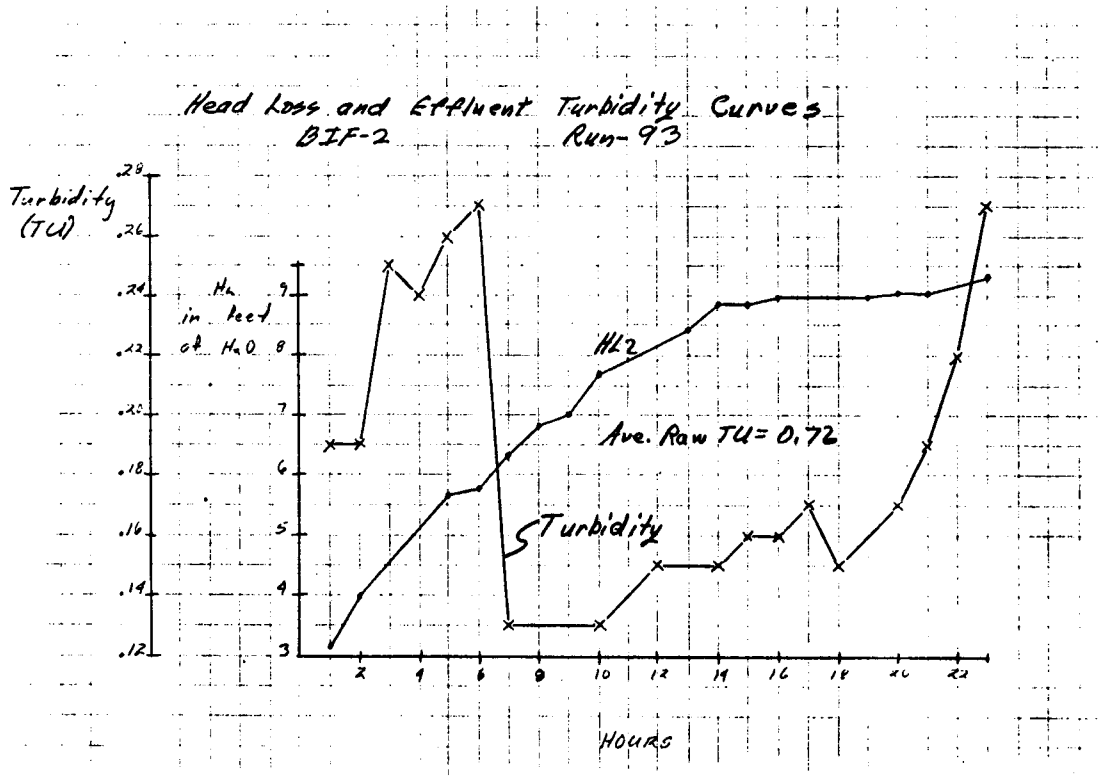

Head Loss and Effluent Turbidity Curves
BIF-2
Run-89
Part I
HL in feet of H2O
Turbidity (TU)
HL
Ave. Raw TU = 0.63
Turbidity
HOURS

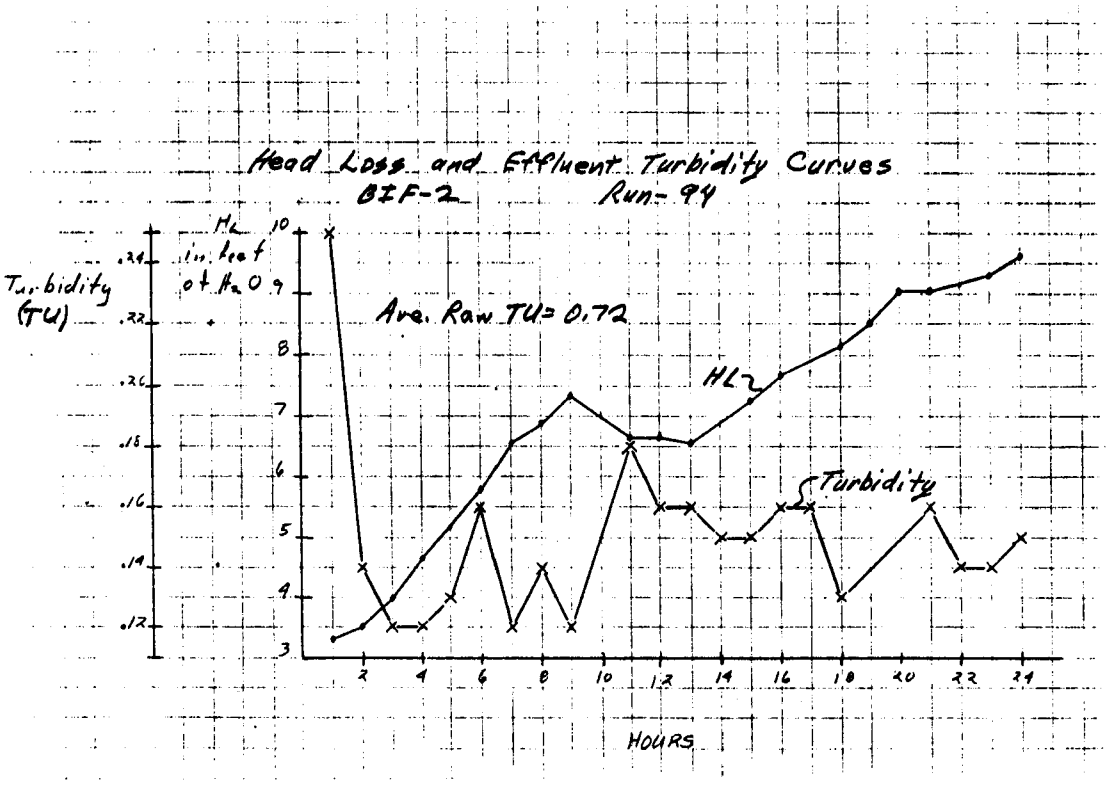

Head Loss and Effluent Turbidity Curves
BIF-2
Run-89
Part 2
Turbidity (TU)
HL in feet of H2O
HL
Turbidity
HOURS

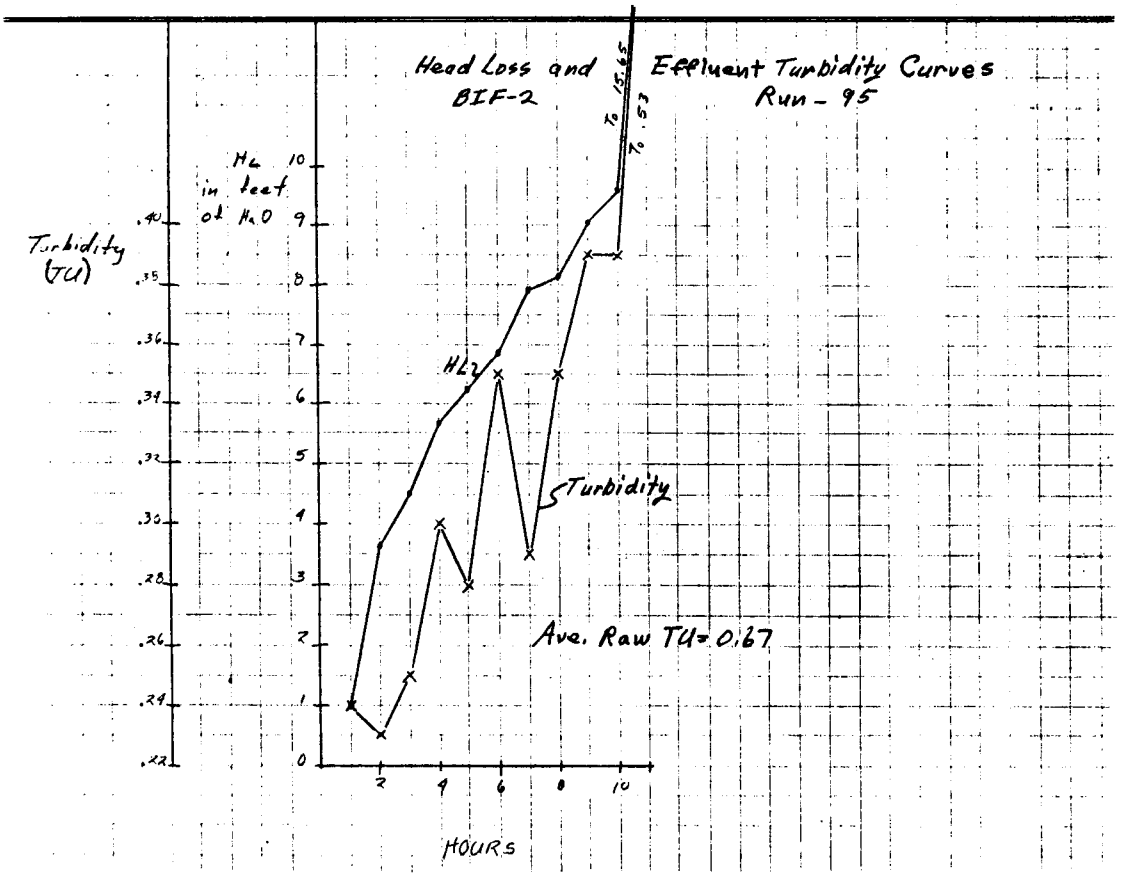

Head Loss and Effluent Turbidity Curves
BIF-2
Run-90
HL in feet of H2O
Turbidity (TU)
Ave. Raw TU = 0.70
HL
Turbidity
HOURS

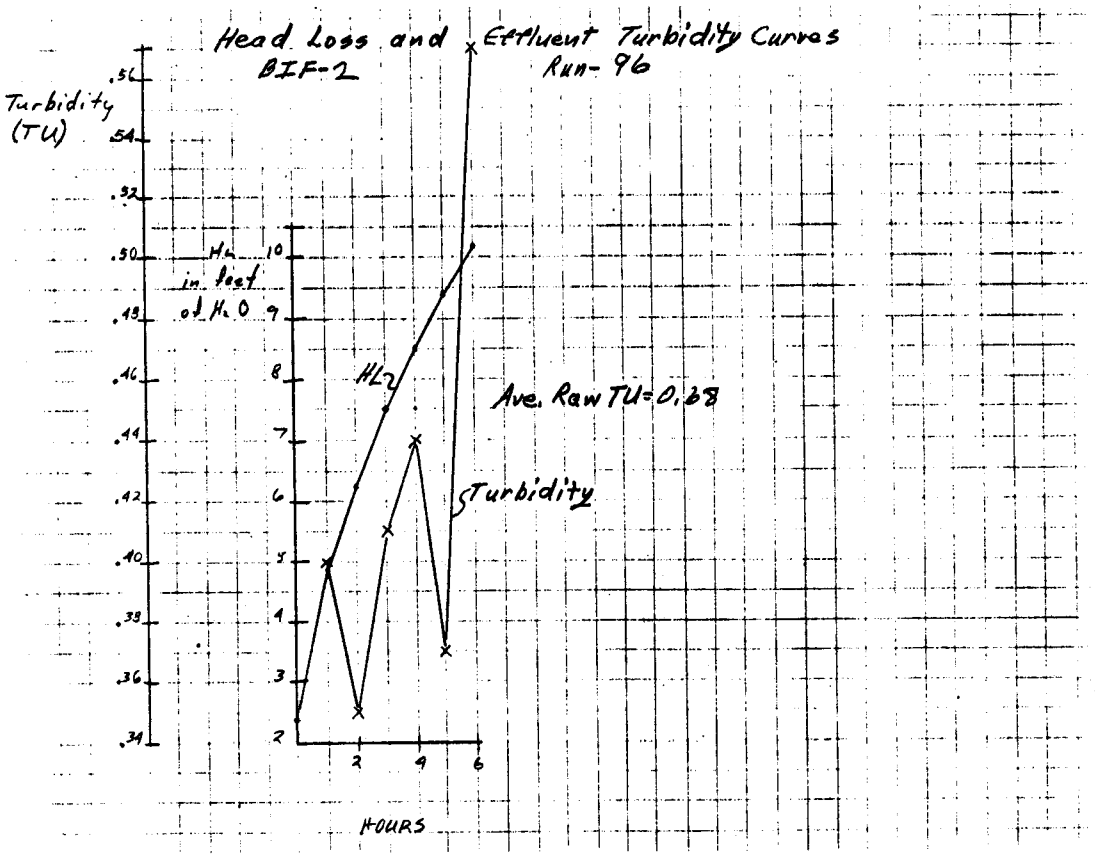

Head Loss and Effluent Turbidity Curves
BIF-2
Run-91
Turbidity (TU)
Ave. Raw TU = 0.83
HL in feet of H2O
HL
Turbidity
HOURS

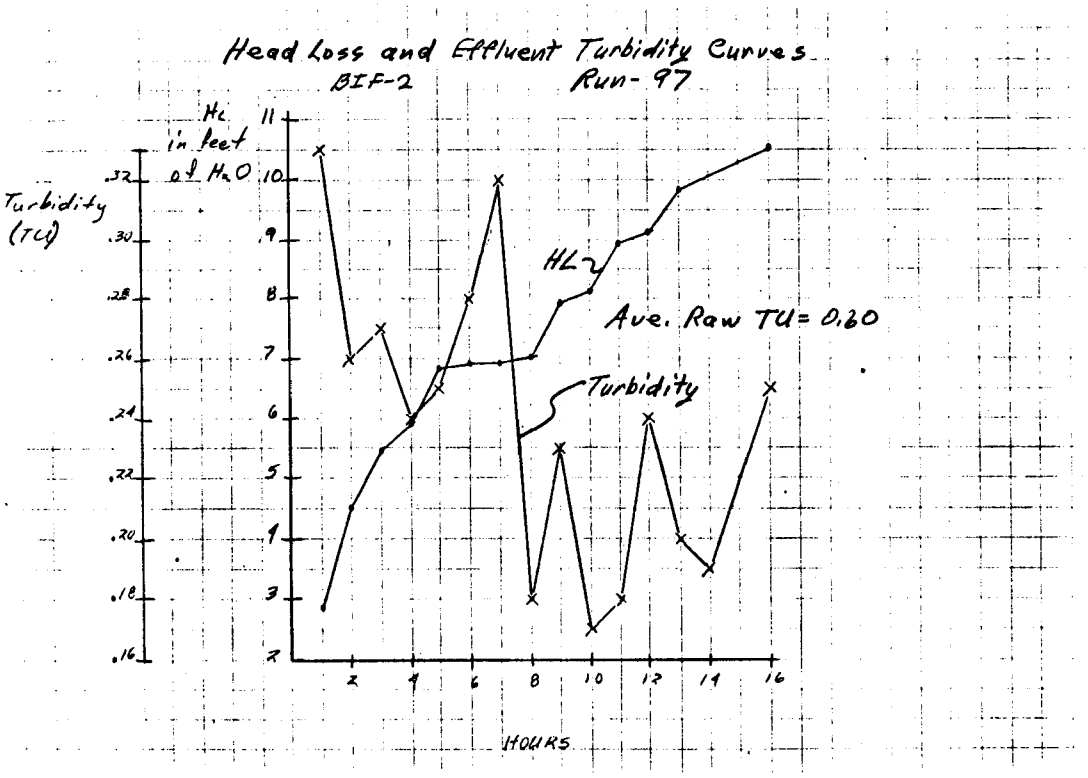

Head Loss and Effluent Turbidity Curves
BIF-2 Run-92
Turbidity (TU)
Ht in feet of H2O
HL2
Ave. Raw TU= 0.58
Turbidity
HOURS

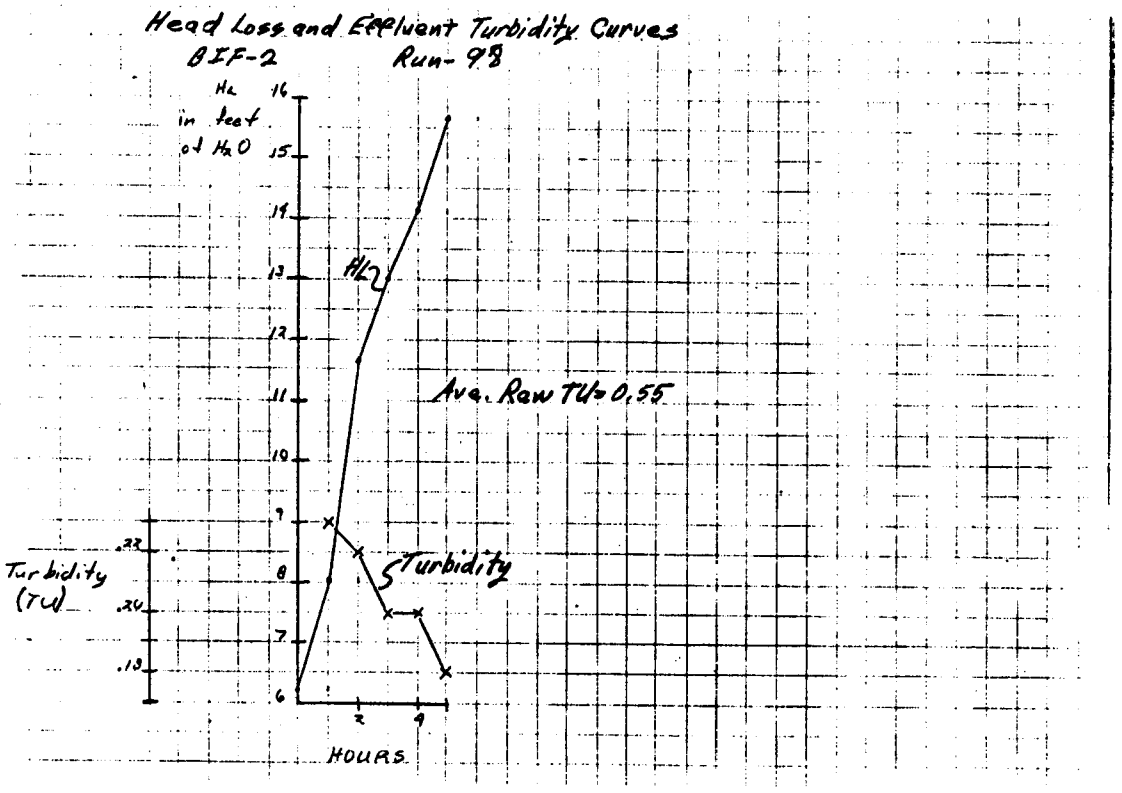

Head Loss and Effluent Turbidity Curves
BIF-2 Run-93
Turbidity (TU)
Ht in feet of H2O
HL2
Ave. Raw TU= 0.72
Turbidity
HOURS

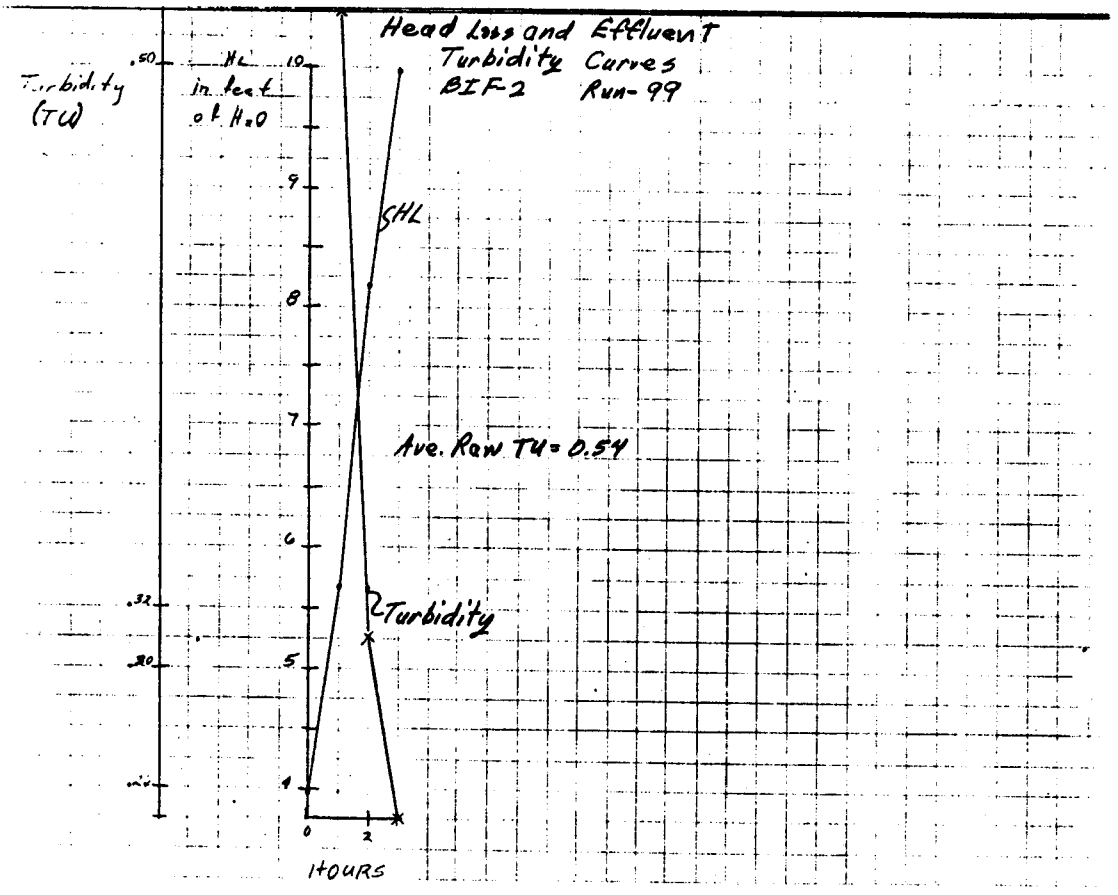

Head Loss and Effluent Turbidity Curves
BIF-2
Run-94
Turbidity (TU)
HL in feet of H_2O
Ave. Raw TU= 0.72
HL
Turbidity
HOURS

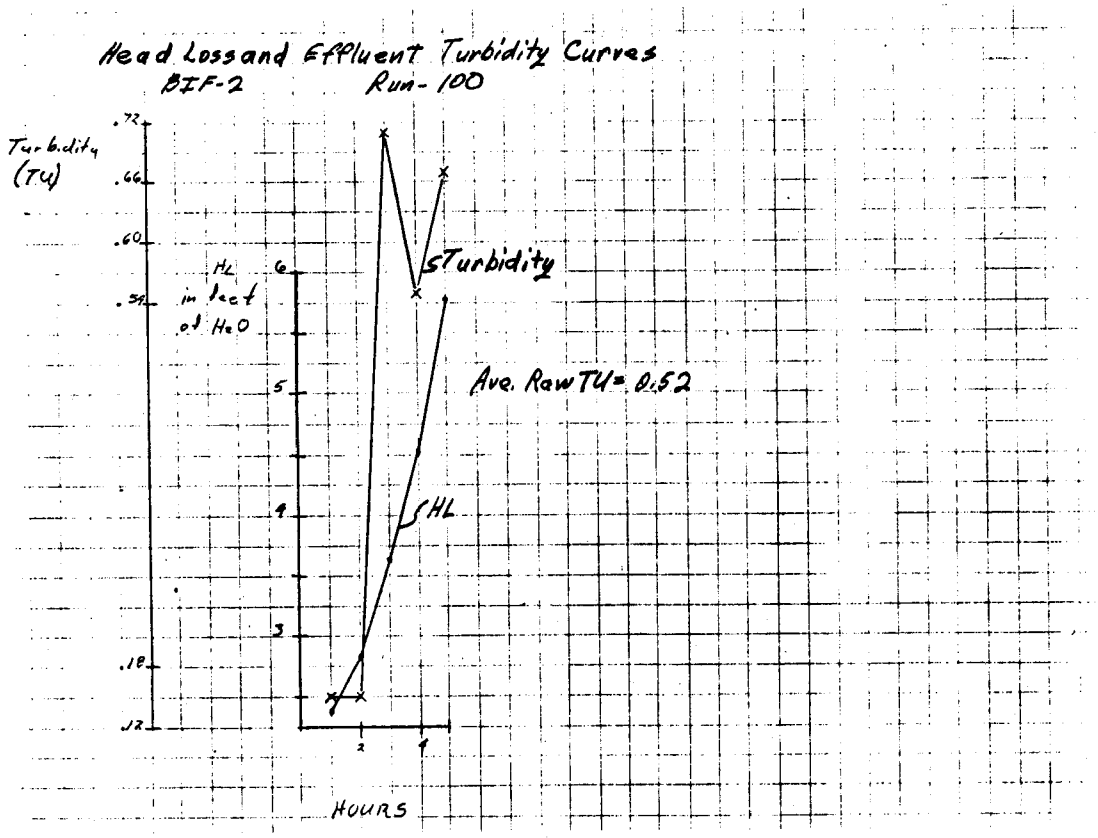

Head Loss and Effluent Turbidity Curves
BIF-2
Run - 95
To 15.65
To .53
Turbidity (TU)
HL in feet of H_2O
HL
Turbidity
Ave. Raw TU= 0.67
HOURS

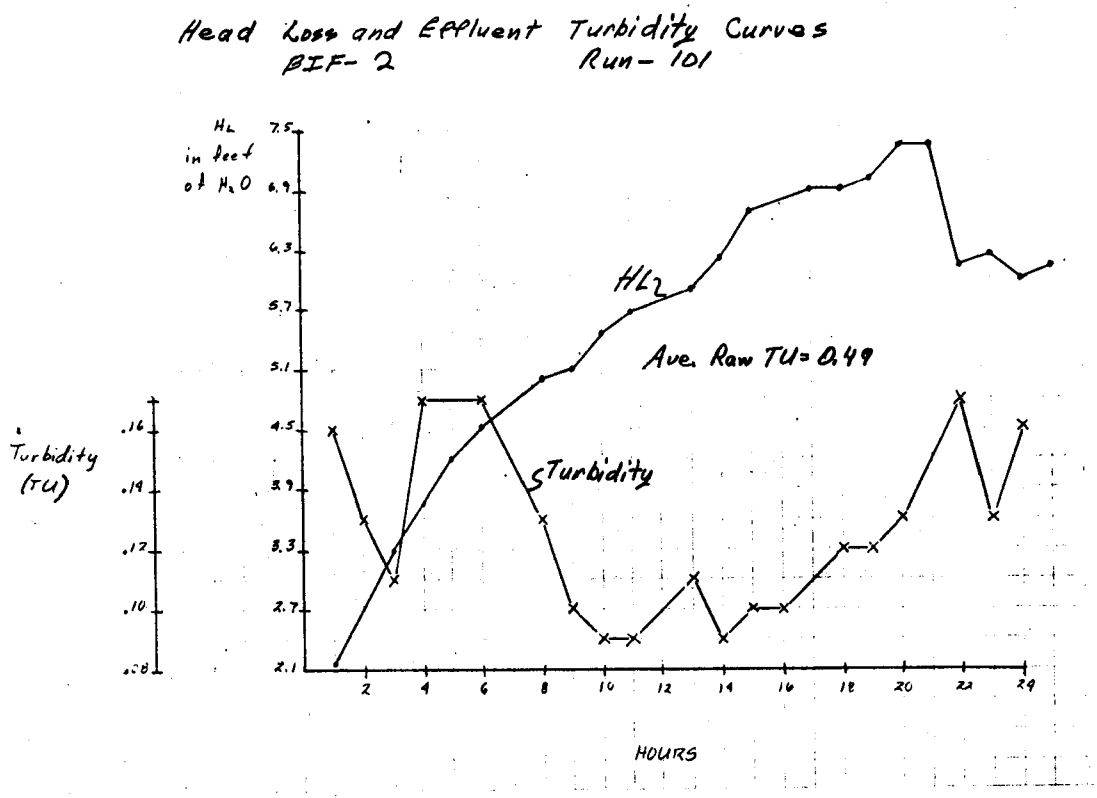

Head Loss and Effluent Turbidity Curves
BIF-2
Run-96
Turbidity (TU)
HL in feet of H2O
HL
Ave. Raw TU=0.28
Turbidity
HOURS


Head Loss and Effluent Turbidity Curves
BIF-2
Run-97
Turbidity (TU)
HL in feet of H2O
HL
Ave. Raw TU= 0.60
Turbidity
HOURS

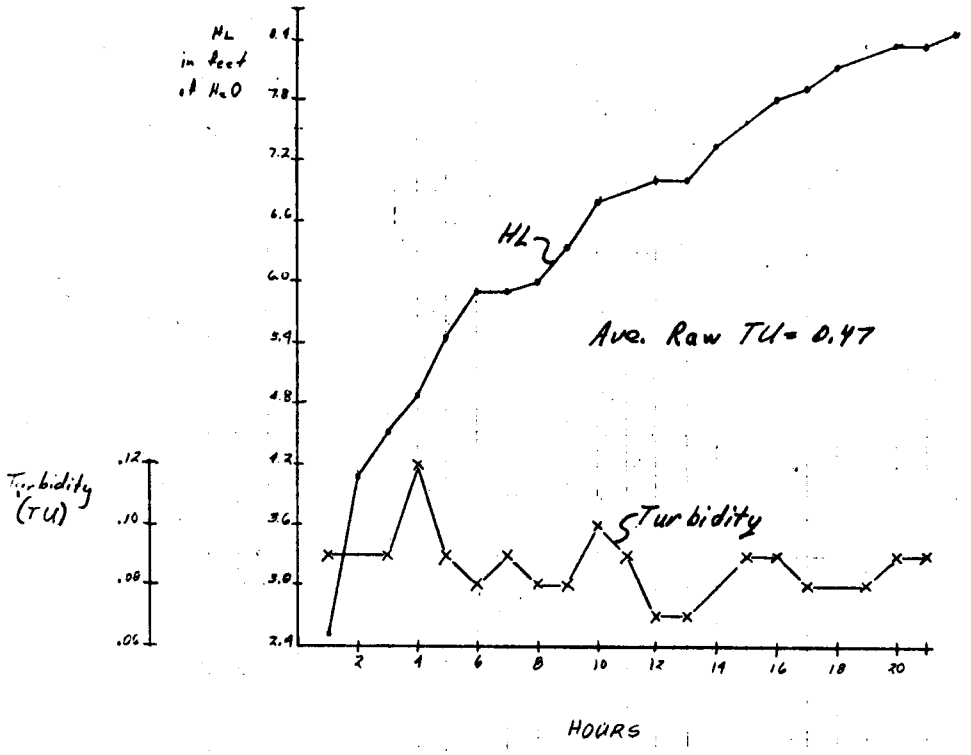

Head Loss and Effluent Turbidity Curves
BIF-2 Run-98
HL in feet of H2O
16
15
14
13
12
11
10
9
8
7
6
HL
Ave. Raw TU = 0.55
Turbidity
Turbidity (TU)
.32
.24
.16
2
4
HOURS


Head Loss and Effluent Turbidity Curves
BIF-2 Run-99
Turbidity (TU)
.50
HL in feet of H2O
10
9
8
7
6
5
4
HL
Ave. Raw TU = 0.54
Turbidity
.32
.20
0
2
HOURS

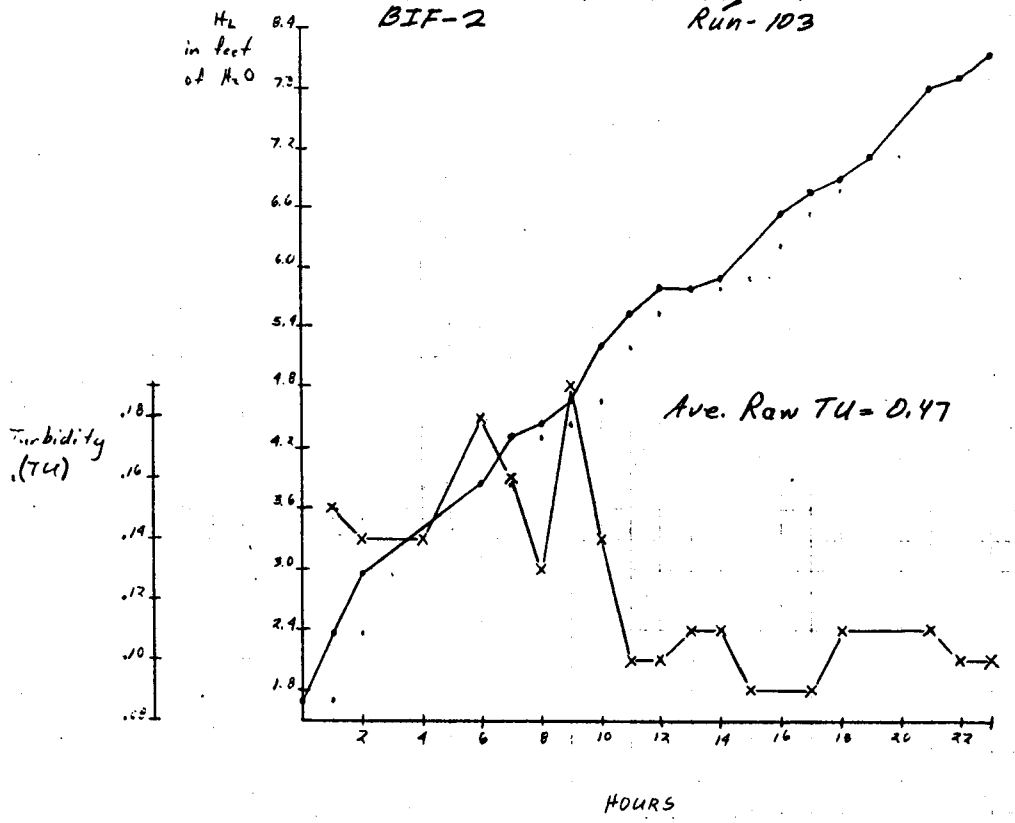

Head Loss and Effluent Turbidity Curves
BIF-2 Run-100
Turbidity (TU)
HL in feet of H2O
Turbidity
Ave. Raw TU = 0.52
HL
HOURS

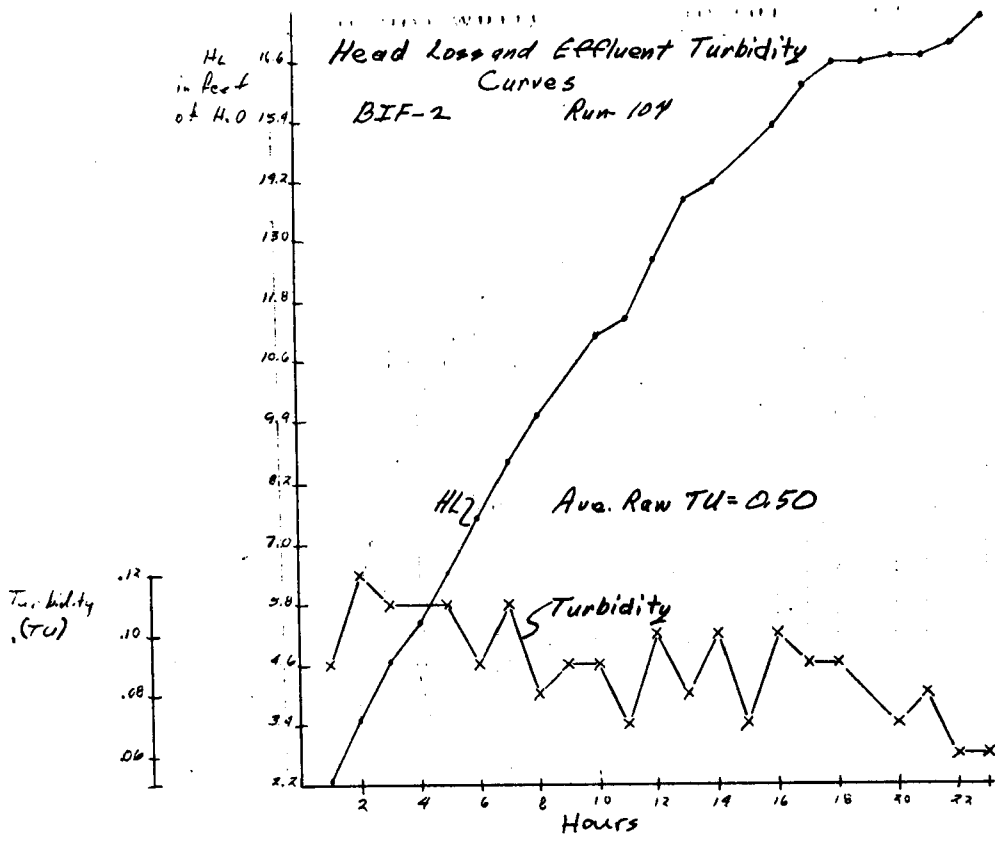

Head Loss and Effluent Turbidity Curves
BIF-2 Run-101
HL in feet of H2O
Turbidity (TU)
HL
Ave. Raw TU = 0.49
Turbidity
HOURS

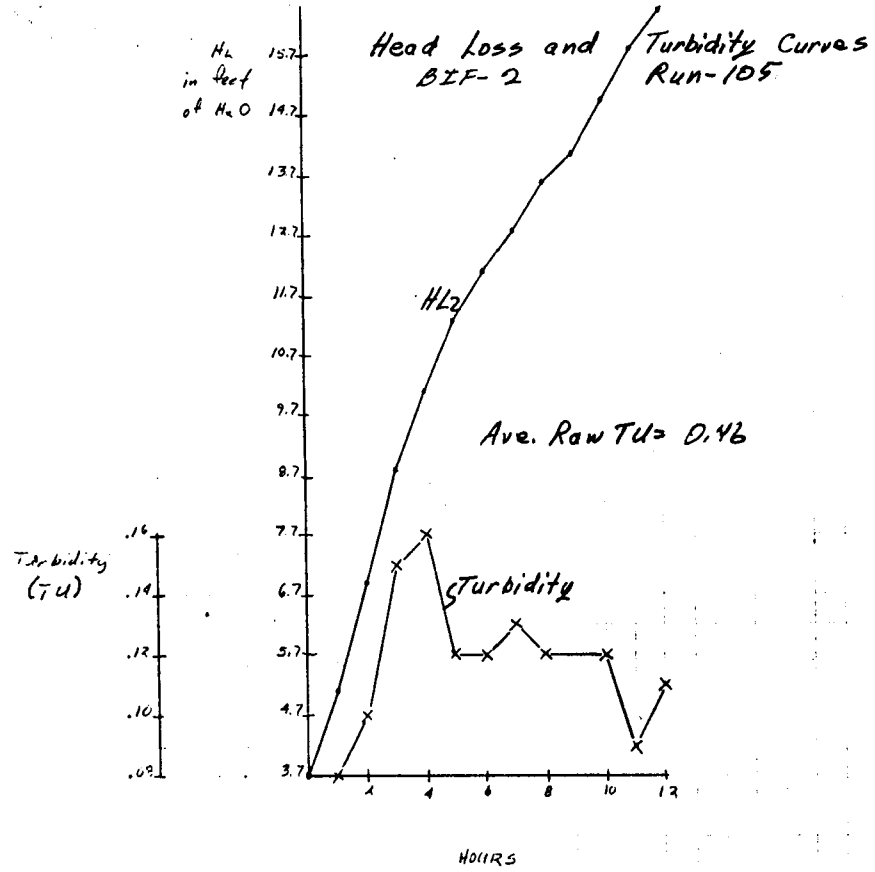
Head Loss and Effluent Turbidity Curves
BIF-2 Run-102

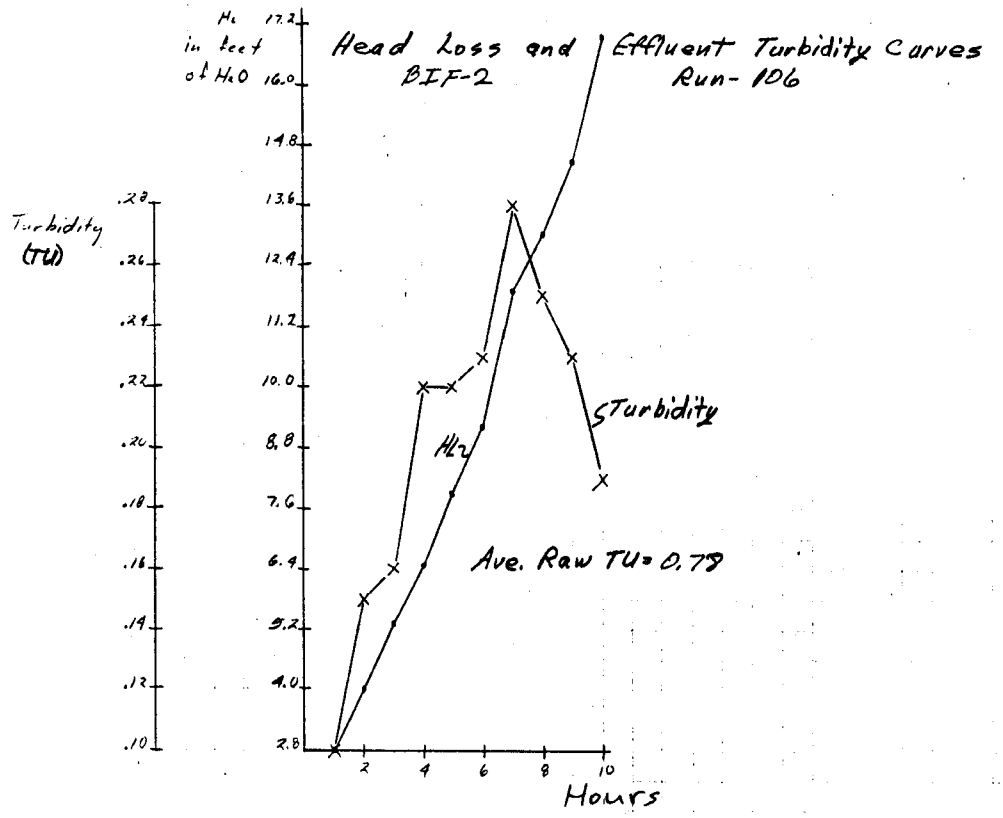


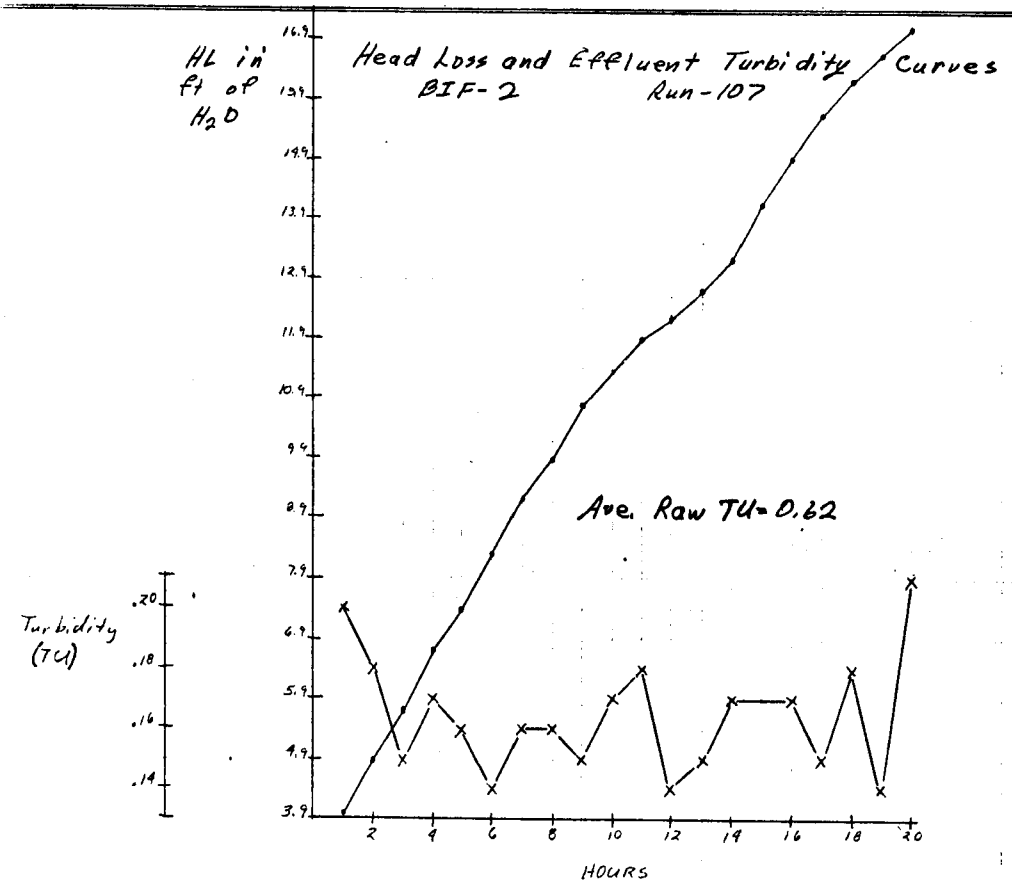
Head Loss and Effluent Turbidity Curves
BIF-2 Run-103

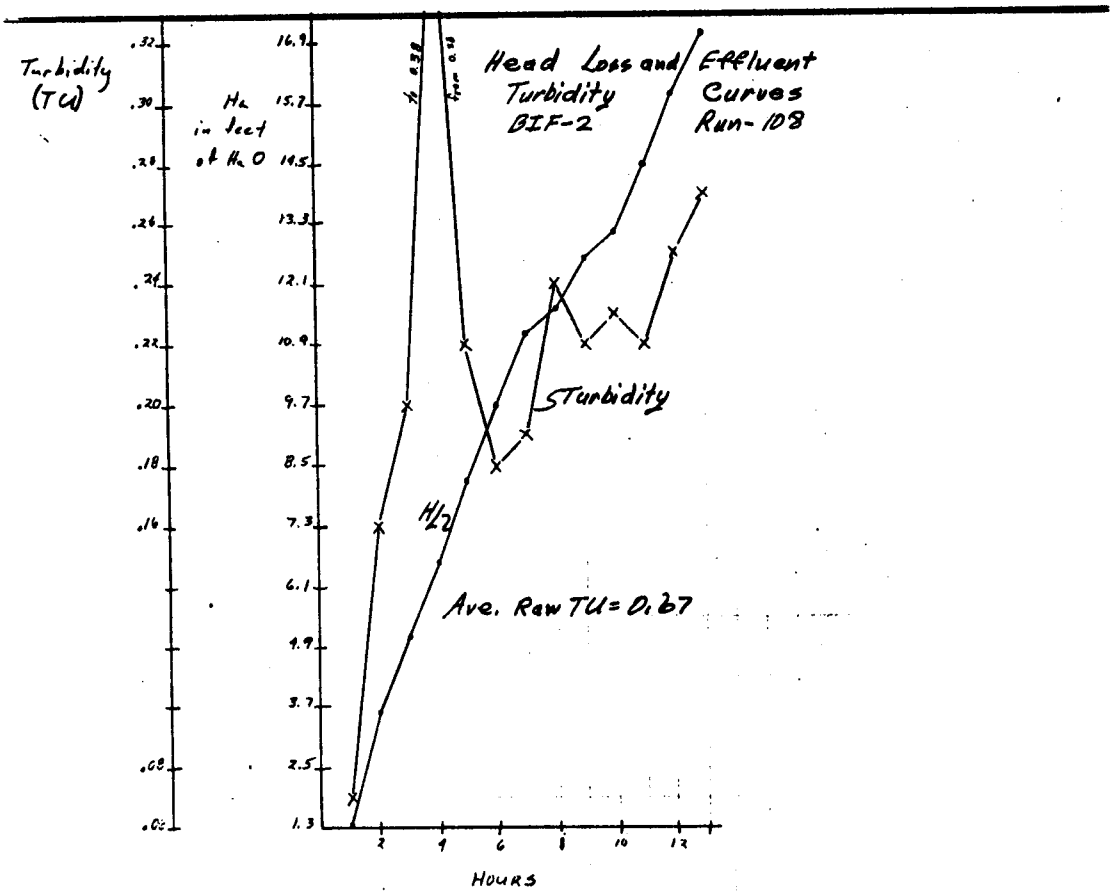


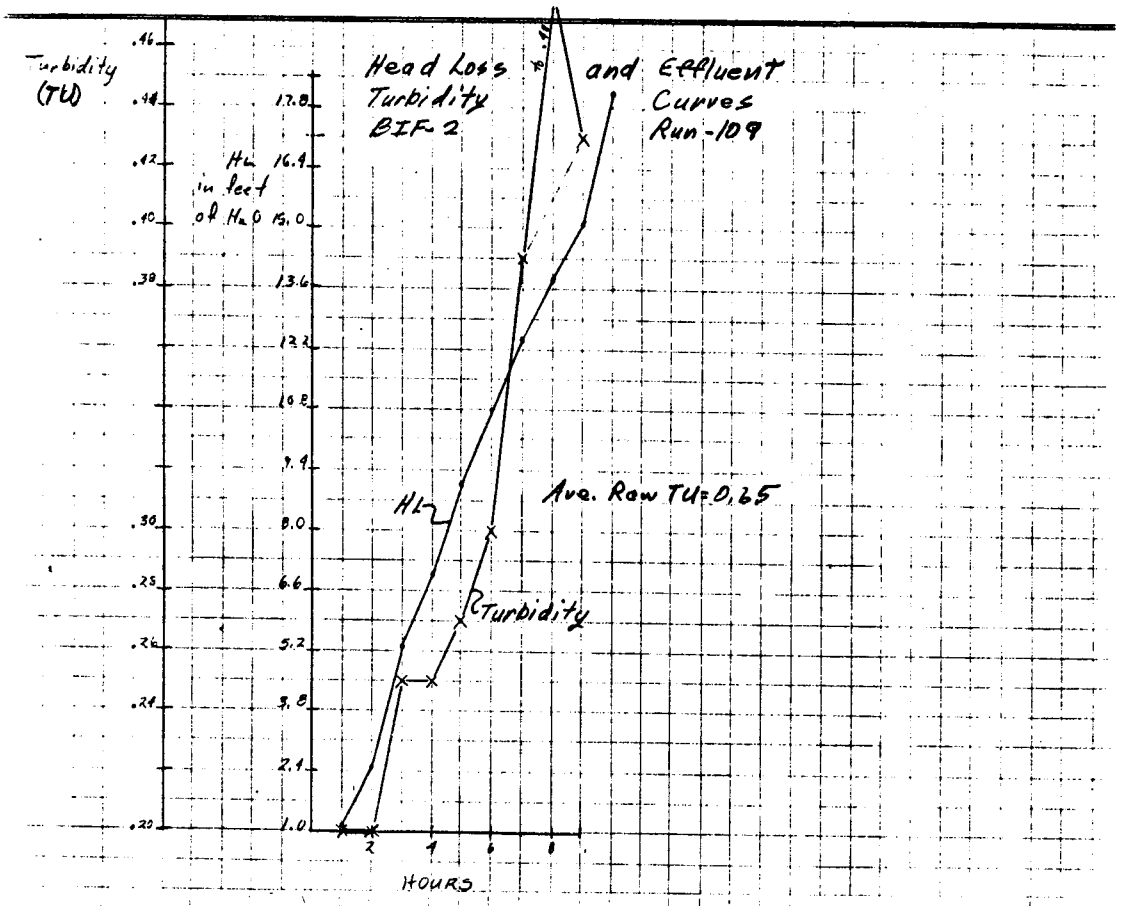

Head Loss and Effluent Turbidity Curves
BIF-2
Run 104
HL in feet of H2O
Turbidity (TU)
HL
Turbidity
Ave. Raw TU = 0.50
Hours

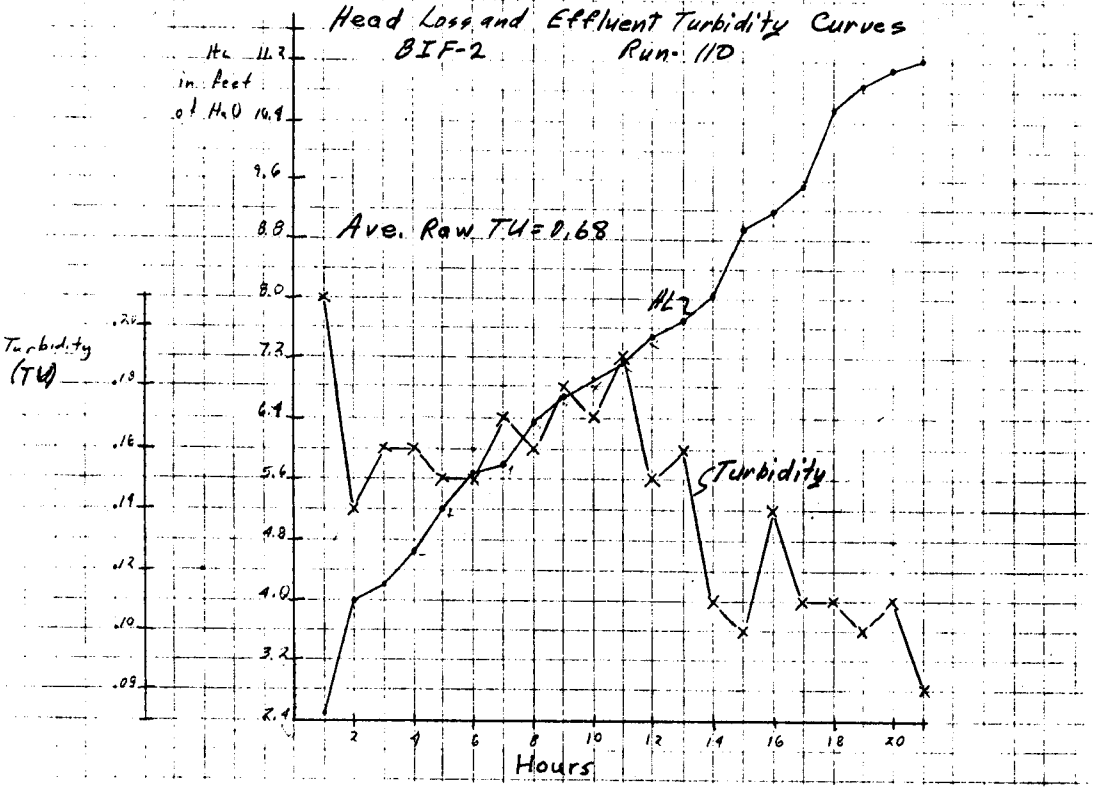

Head Loss and Turbidity Curves
BIF-2
Run-105
HL in feet of H2O
Turbidity (TU)
HL
Turbidity
Ave. Raw TU = 0.46
HOURS

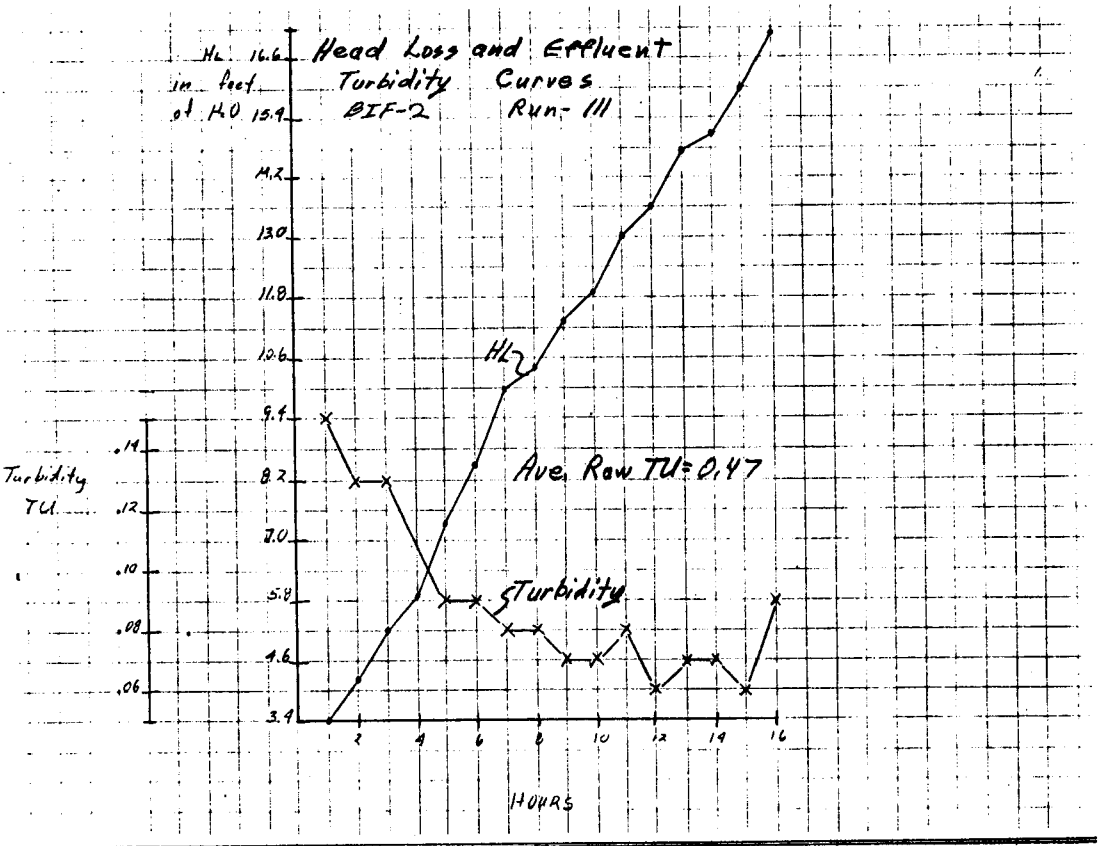

Head Loss and Effluent Turbidity Curves
BIF-2
Run-106
HL in feet of H2O
Turbidity (TU)
Turbidity
HL
Ave. Raw TU = 0.79
Hours

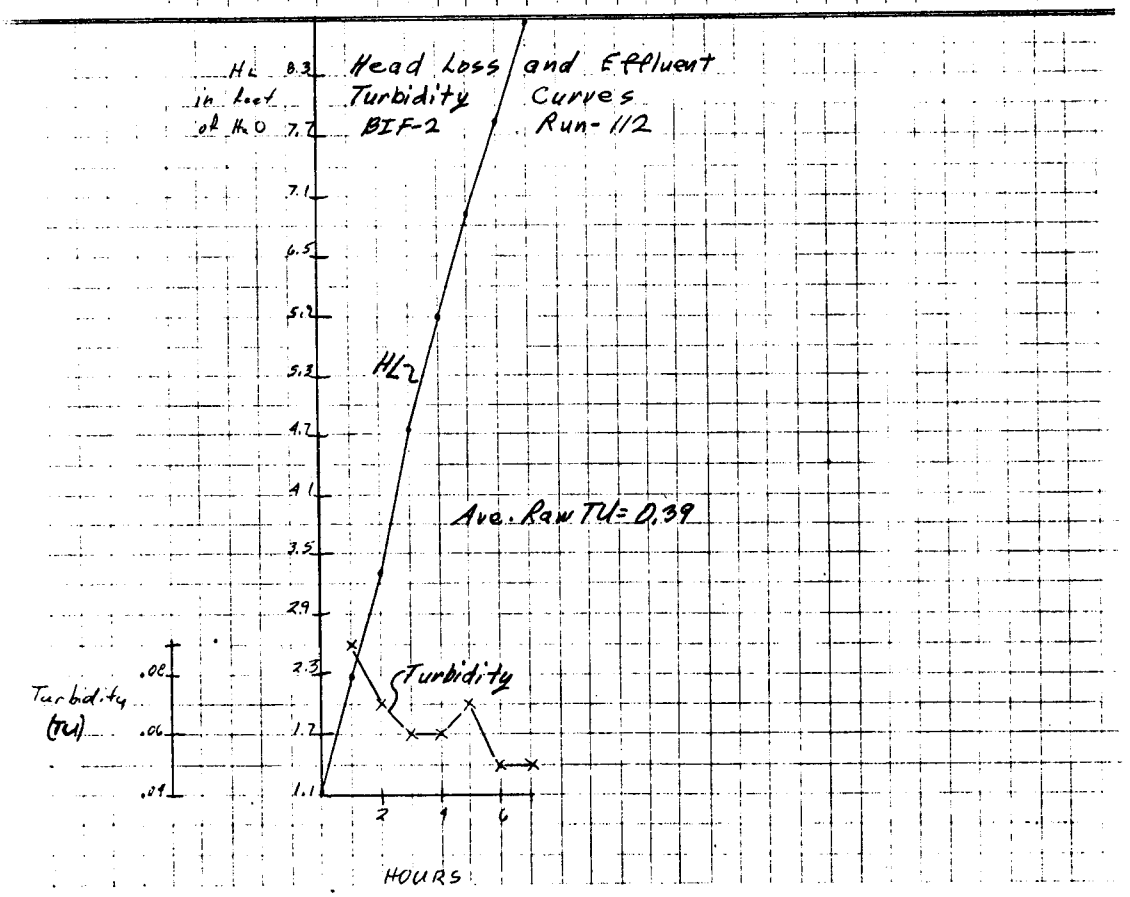

Head Loss and Effluent Turbidity Curves
BIF-2
Run-107
HL in ft of H2O
Turbidity (TU)
Ave. Raw TU = 0.62
HOURS

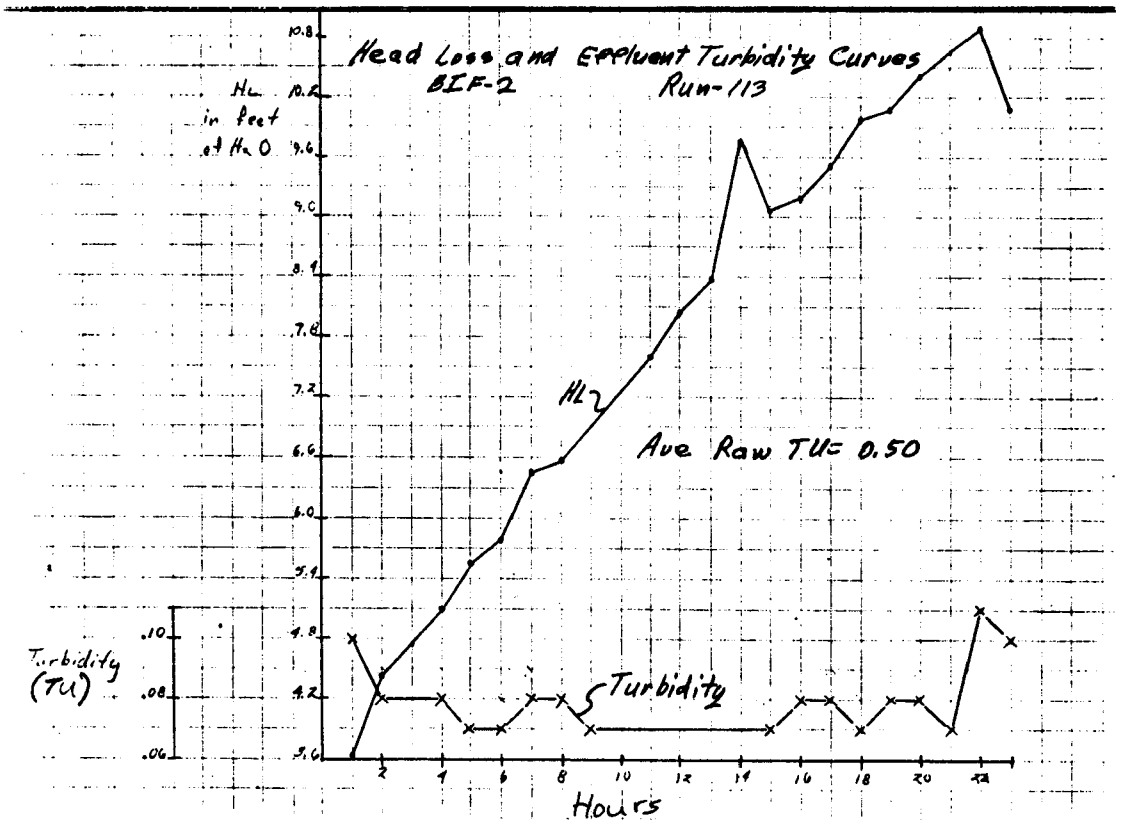

Turbidity (TU)
Ha in feet of Ha O
Head Loss and Effluent Turbidity Curves
DIF-2
Run-108
Turbidity
H/2
Ave. Raw TU = 0.67
HOURS

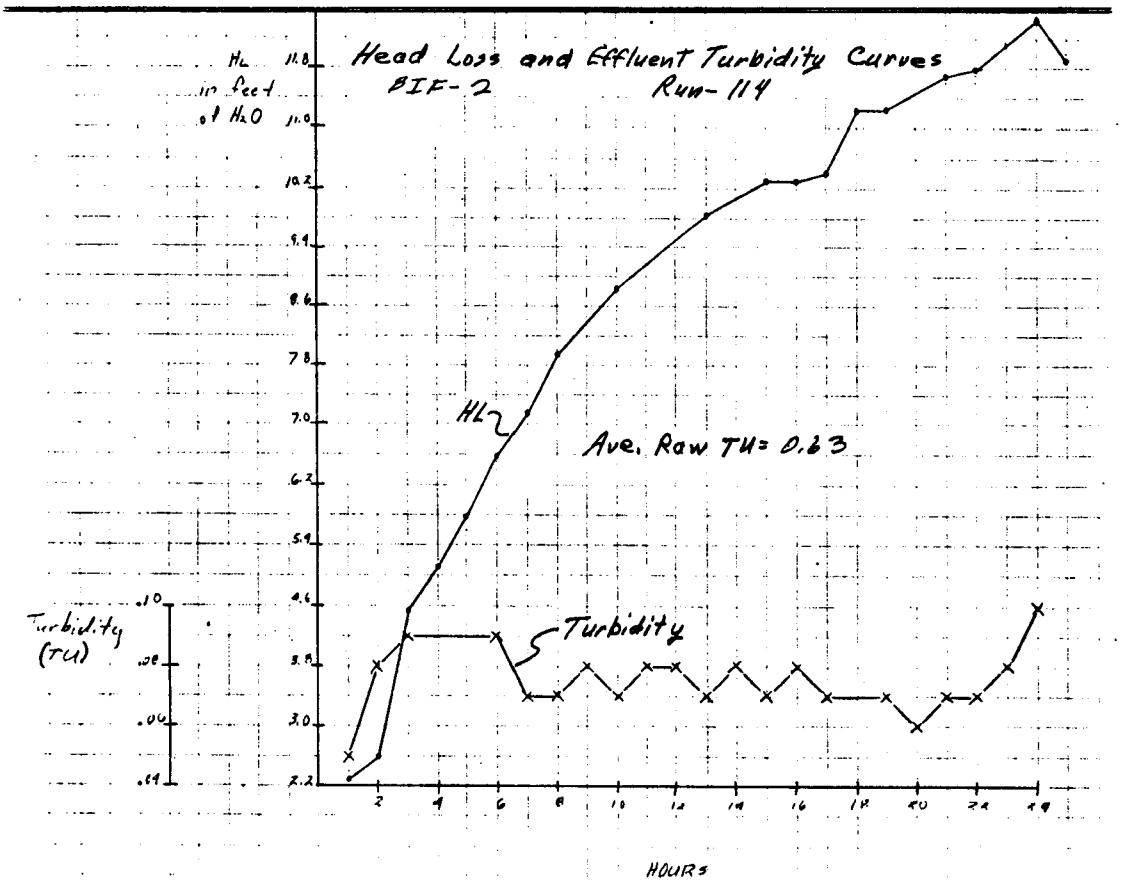

Head Loss and Effluent
Turbidity Curves
BIF-2 Run-109
Turbidity (TU)
HL in feet of H2O
HL
Turbidity
Ave. Raw TU=0.65
HOURS

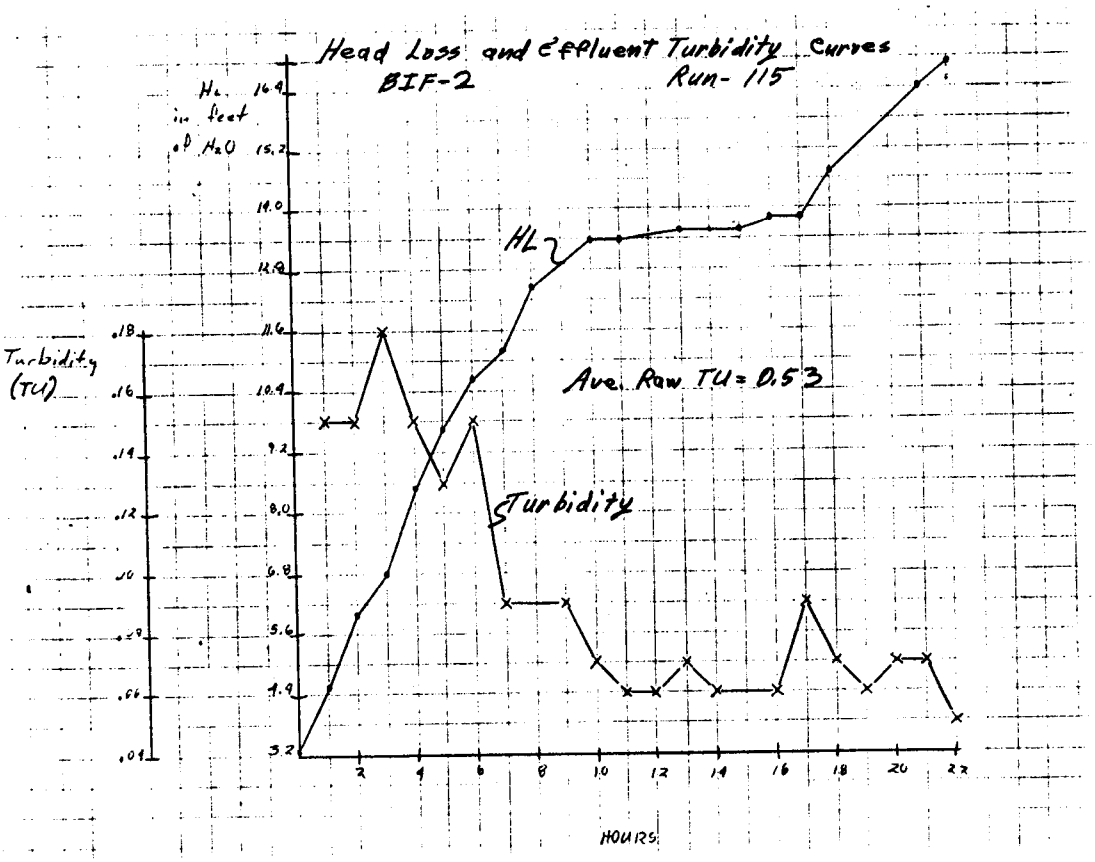

Head Loss and Effluent Turbidity Curves
BIF-2 Run-110
HL in feet of H2O
Ave. Raw TU=0.68
HL
Turbidity
Turbidity (TU)
Hours

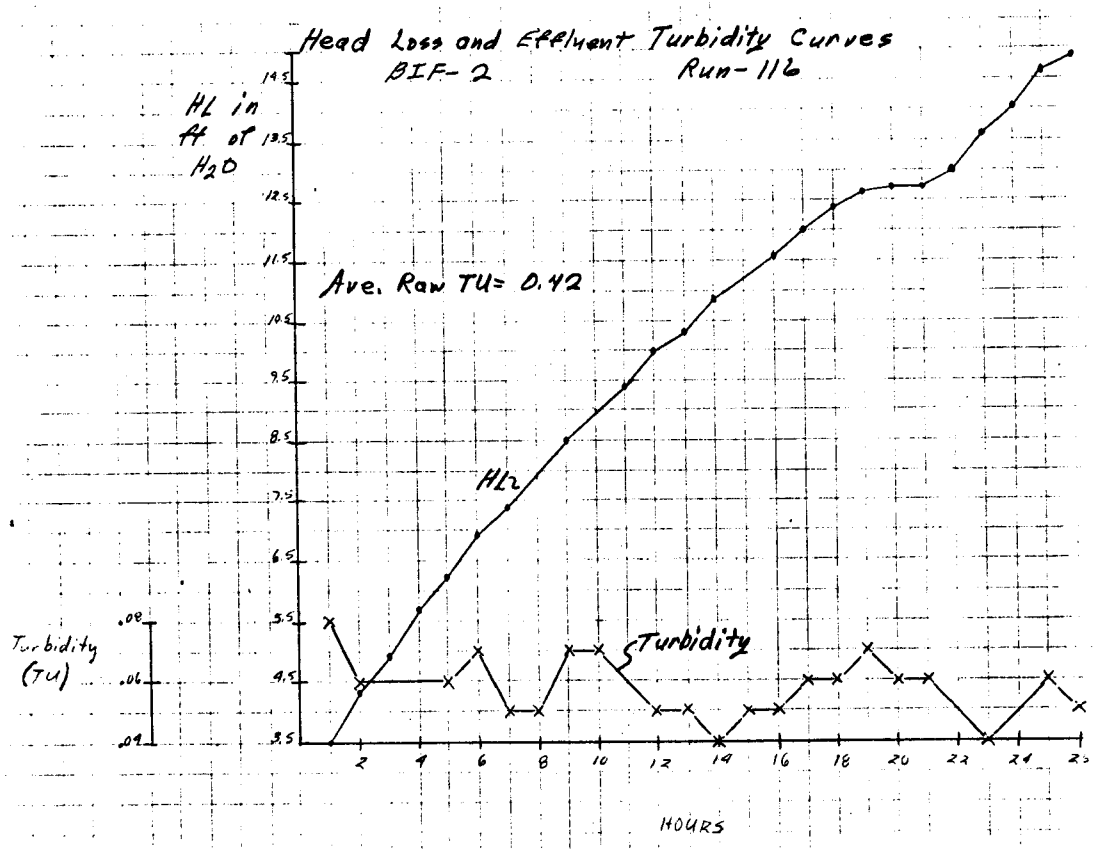

Head Loss and Effluent
Turbidity Curves
BIF-2 Run-111
HL in feet of H2O
16.6
15.4
14.2
13.0
11.8
10.6
9.4
8.2
7.0
5.8
4.6
3.4
HL
Ave. Raw TU=0.47
Turbidity
Turbidity TU
.14
.12
.10
.08
.06
2
4
6
8
10
12
14
16
HOURS

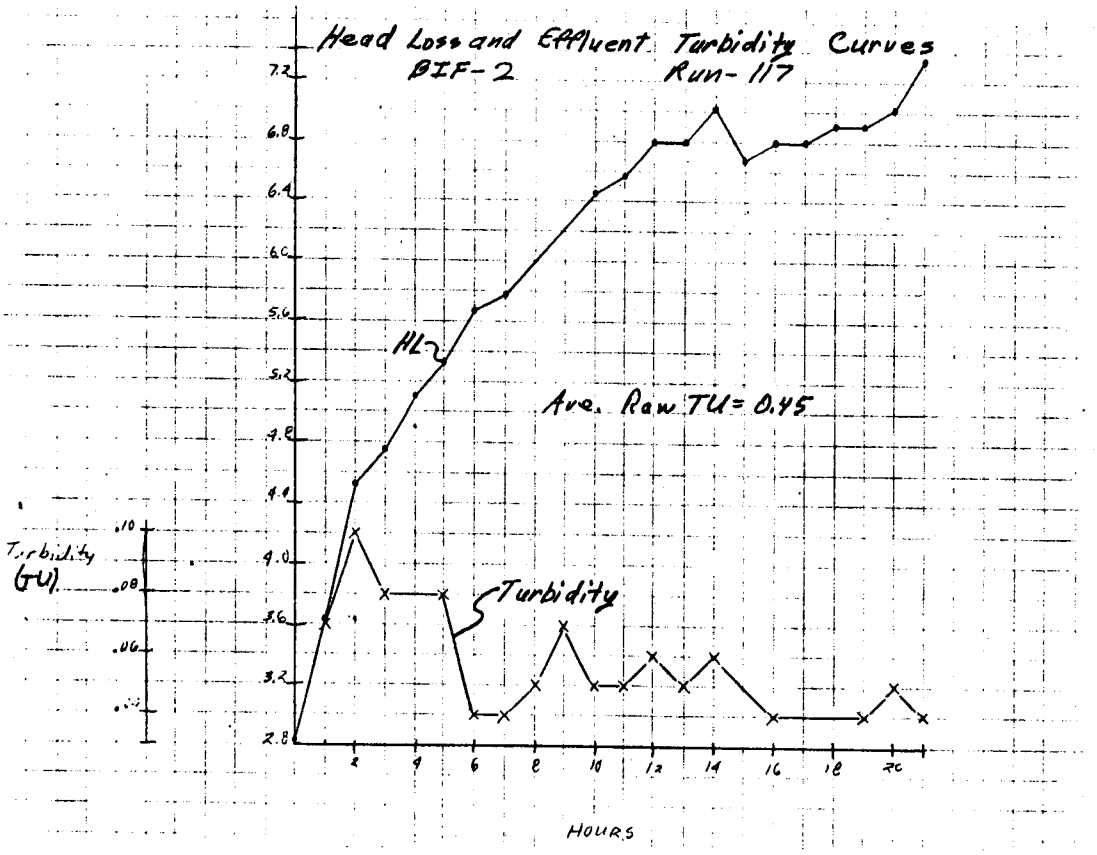

Head Loss and Effluent
Turbidity Curves
BIF-2 Run-112
HL in feet of H2O
8.3
7.7
7.1
6.5
5.9
5.3
4.7
4.1
3.5
2.9
2.3
1.7
1.1
HL
Ave. Raw TU=0.39
Turbidity
Turbidity (TU)
.08
.06
.04
2
4
6
HOURS

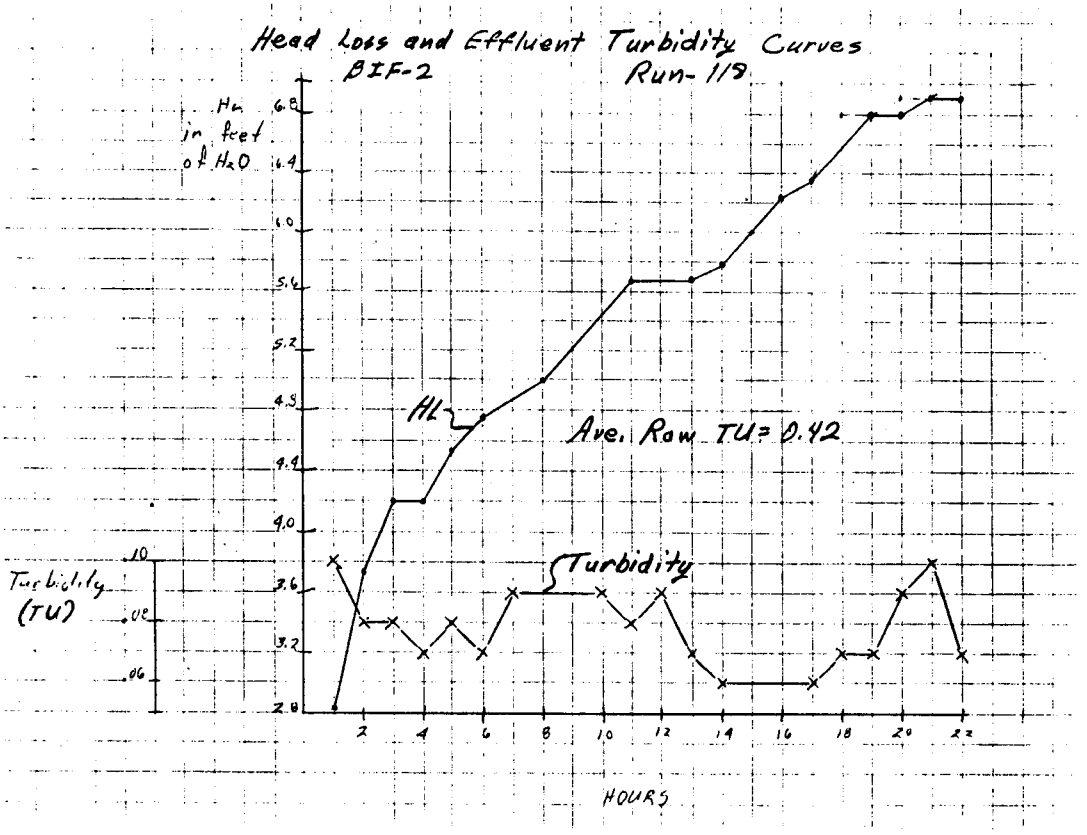

Head Loss and Effluent Turbidity Curves
BIF-2
Run-113
HL in feet of H2O
HL
Ave Raw TU= 0.50
Turbidity
Turbidity (TU)
Hours

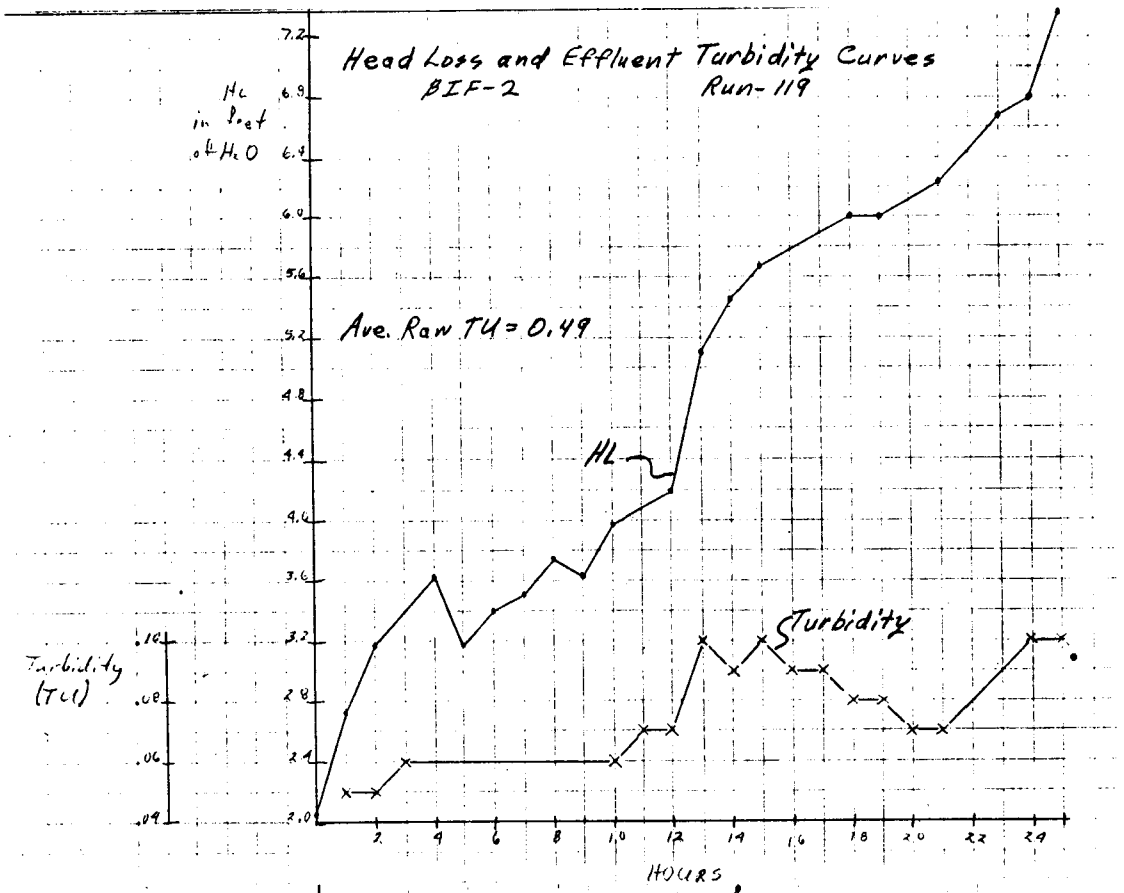

Head Loss and Effluent Turbidity Curves
BIF-2
Run-114
HL in feet of H2O
HL
Ave. Raw TU= 0.63
Turbidity
Turbidity (TU)
HOURS

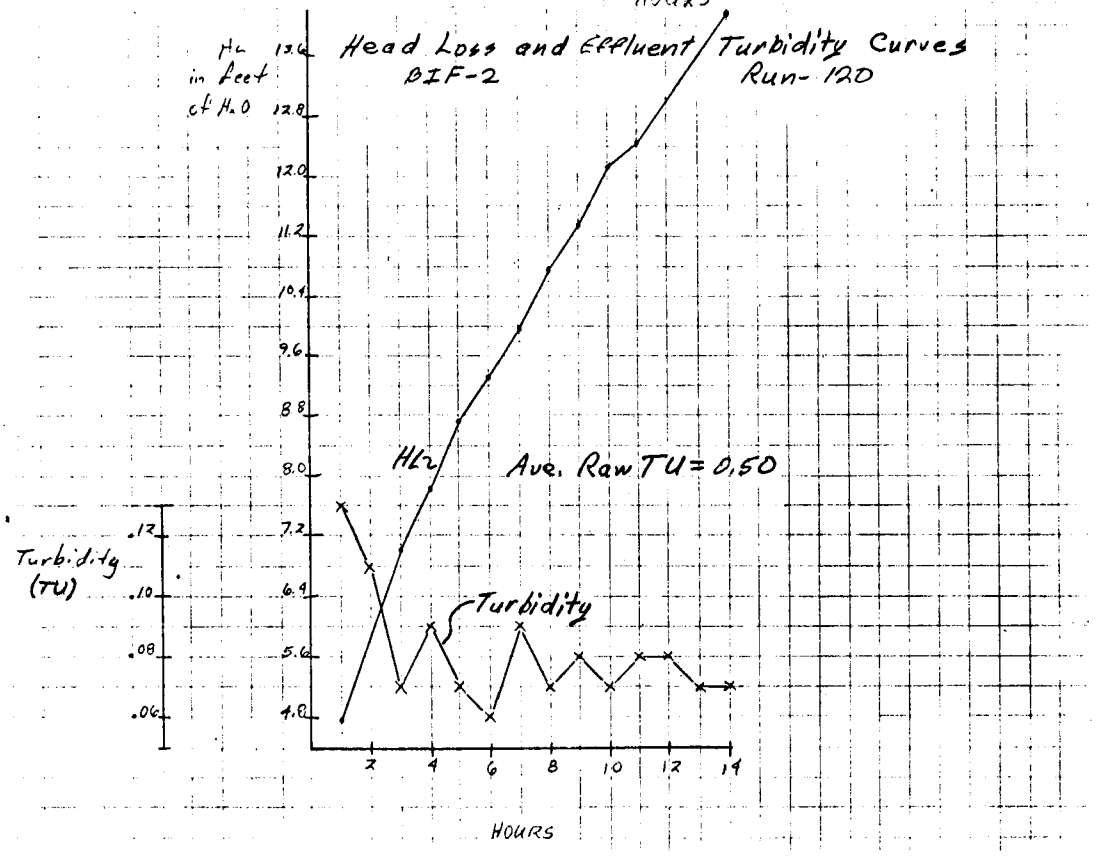

Head Loss and Effluent Turbidity Curves
BIF-2
Run- 115
HL in feet of H2O
Turbidity (TU)
HL
Turbidity
Ave. Raw TU = 0.53
HOURS

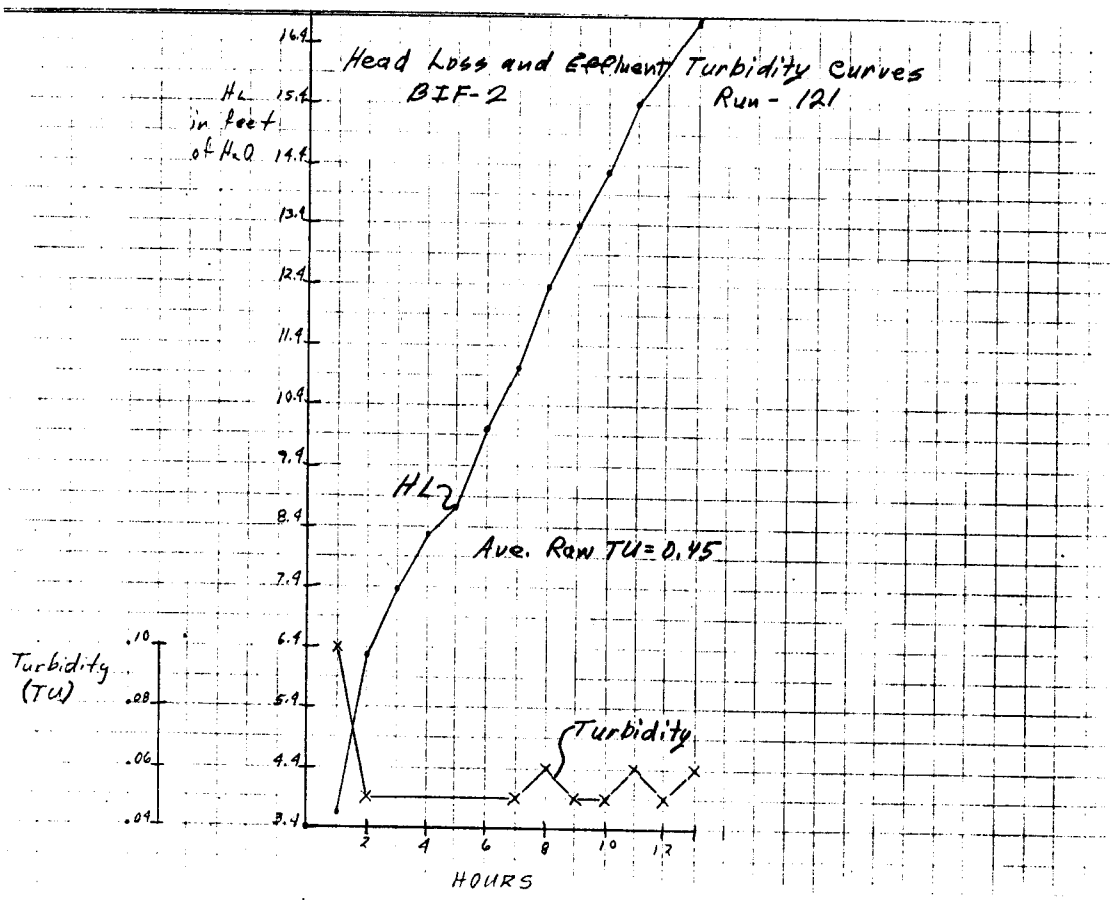

Head Loss and Effluent Turbidity Curves
BIF-2
Run-116
HL in ft of H2O
Turbidity (TU)
HL
Turbidity
Ave. Raw TU= 0.42
HOURS

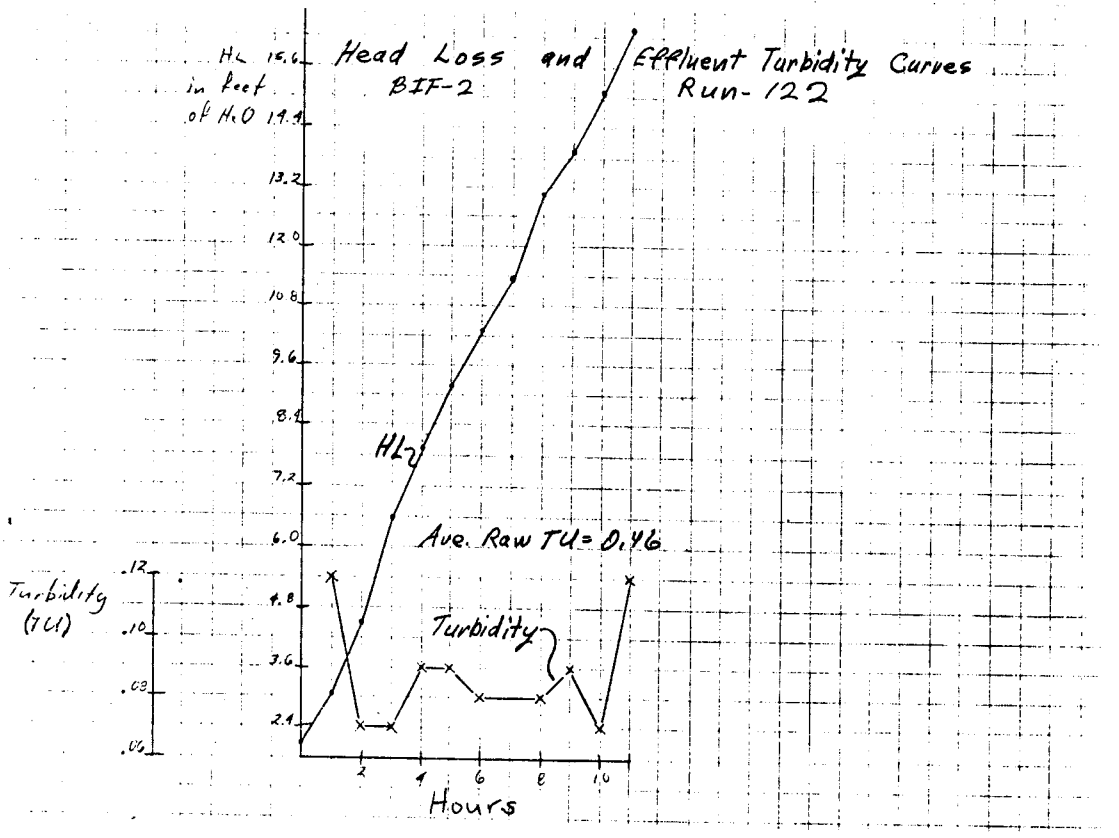

Head Loss and Effluent Turbidity Curves
BIF-2
Run-117
HL
Ave. Raw TU = 0.45
Turbidity
Turbidity (TU)
HOURS


Head Loss and Effluent Turbidity Curves
BIF-2
Run-118
Hu in feet of H2O
HL
Ave. Raw TU = 0.42
Turbidity
Turbidity (TU)
HOURS

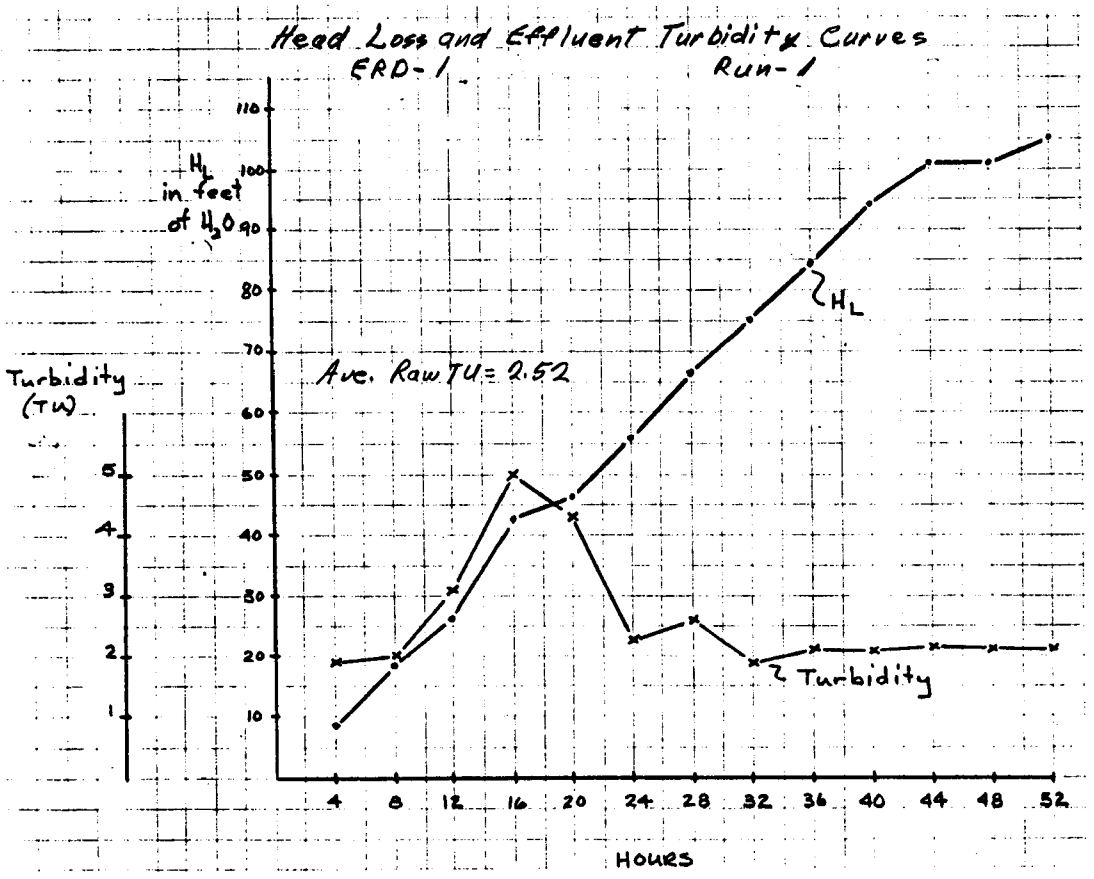

Head Loss and Effluent Turbidity Curves
BIF-2
Run-119
HL in feet of H2O
Ave. Raw TU = 0.49
HL
Turbidity
Turbidity (TU)
HOURS

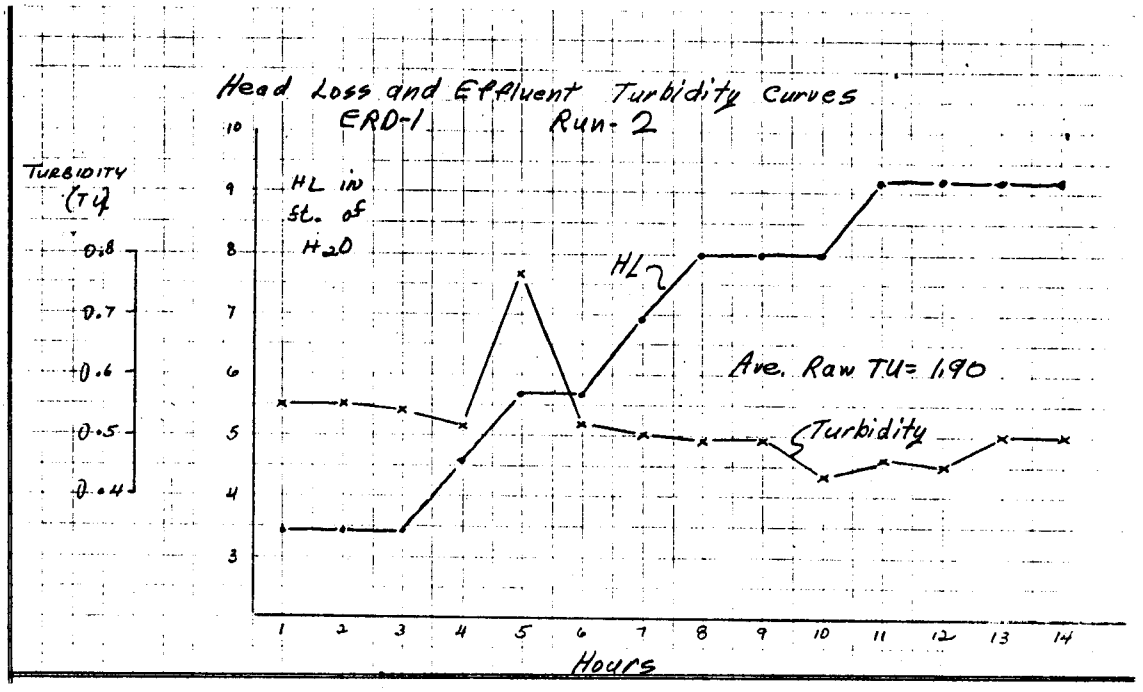

Head Loss and Effluent Turbidity Curves
BIF-2
Run-120
HL in feet of H2O
HL
Ave. Raw TU = 0.50
Turbidity
Turbidity (TU)
HOURS

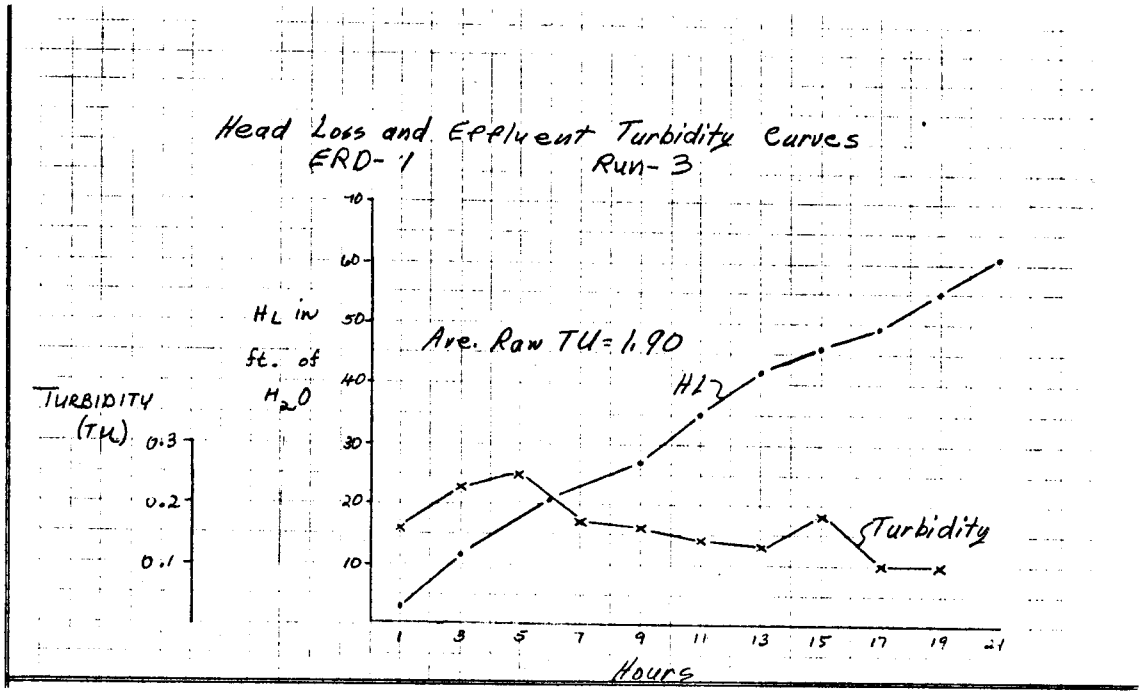

Head Loss and Effluent Turbidity Curves
BIF-2
Run - 121
HL in feet of H_2O
16.4
15.4
14.4
13.4
12.4
11.4
10.4
9.4
8.4
7.4
6.4
5.4
4.4
3.4
HL
Ave. Raw TU = 0.45
Turbidity (TU)
.10
.08
.06
.04
Turbidity
2
4
6
8
10
12
HOURS

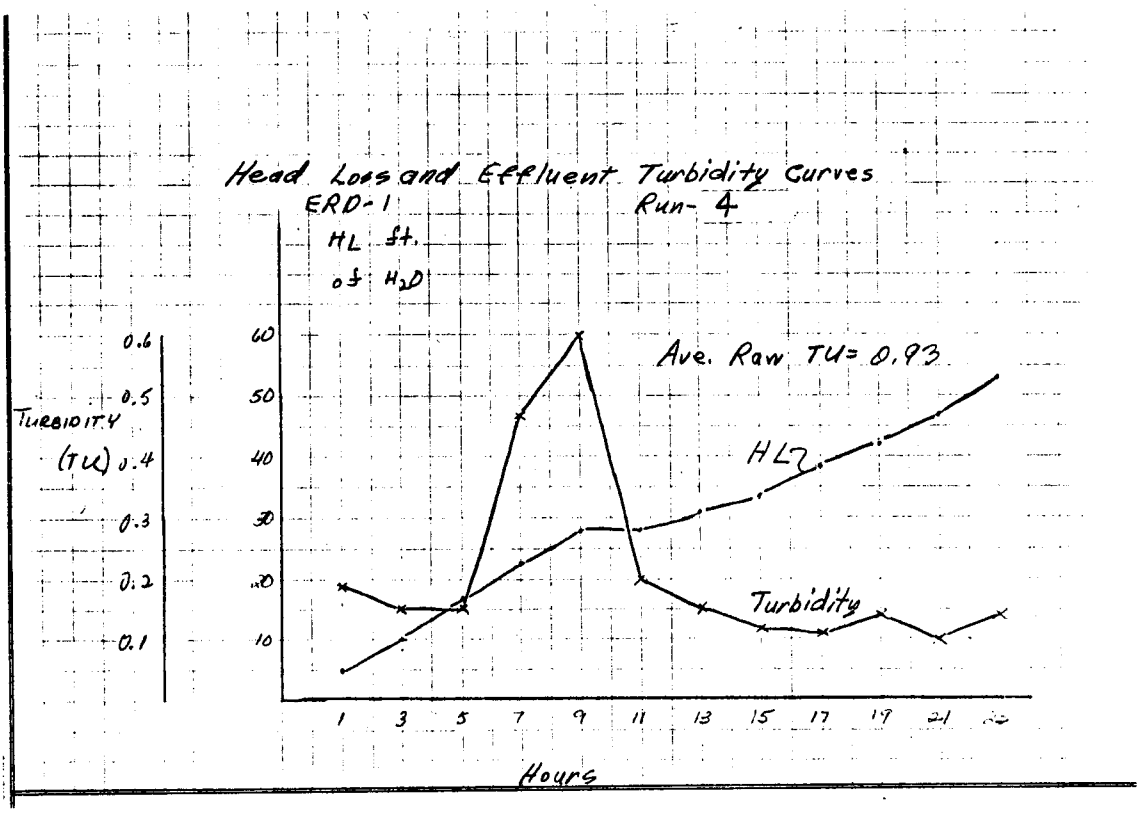

Head Loss and Effluent Turbidity Curves
BIF-2
Run- 122
HL in feet of H_2O
15.6
14.4
13.2
12.0
10.8
9.6
8.4
7.2
6.0
4.8
3.6
2.4
HL
Ave. Raw TU = 0.46
Turbidity (TU)
.12
.10
.08
.06
Turbidity
2
4
6
8
10
Hours

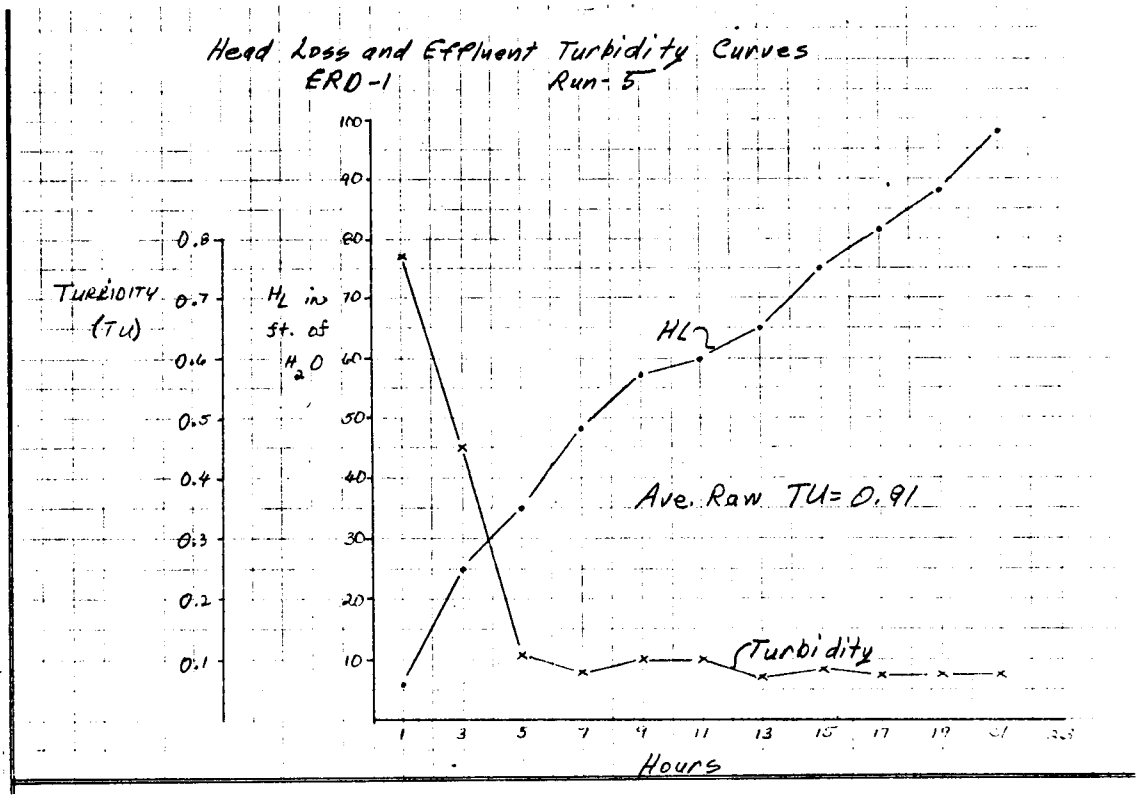
APPENDIX D-4 - PRESSURE DIATOMACEOUS EARTH FILTRATION (ERD)
HEAD LOSS AND TURBIDITY CURVES

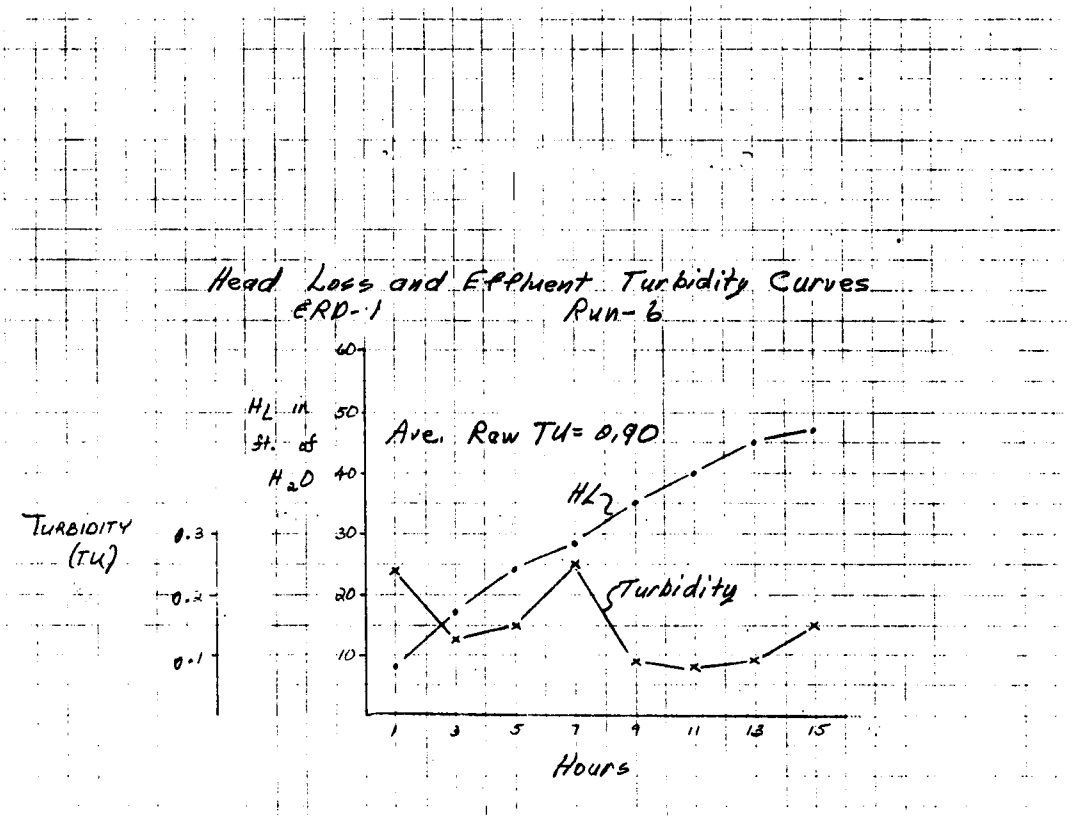


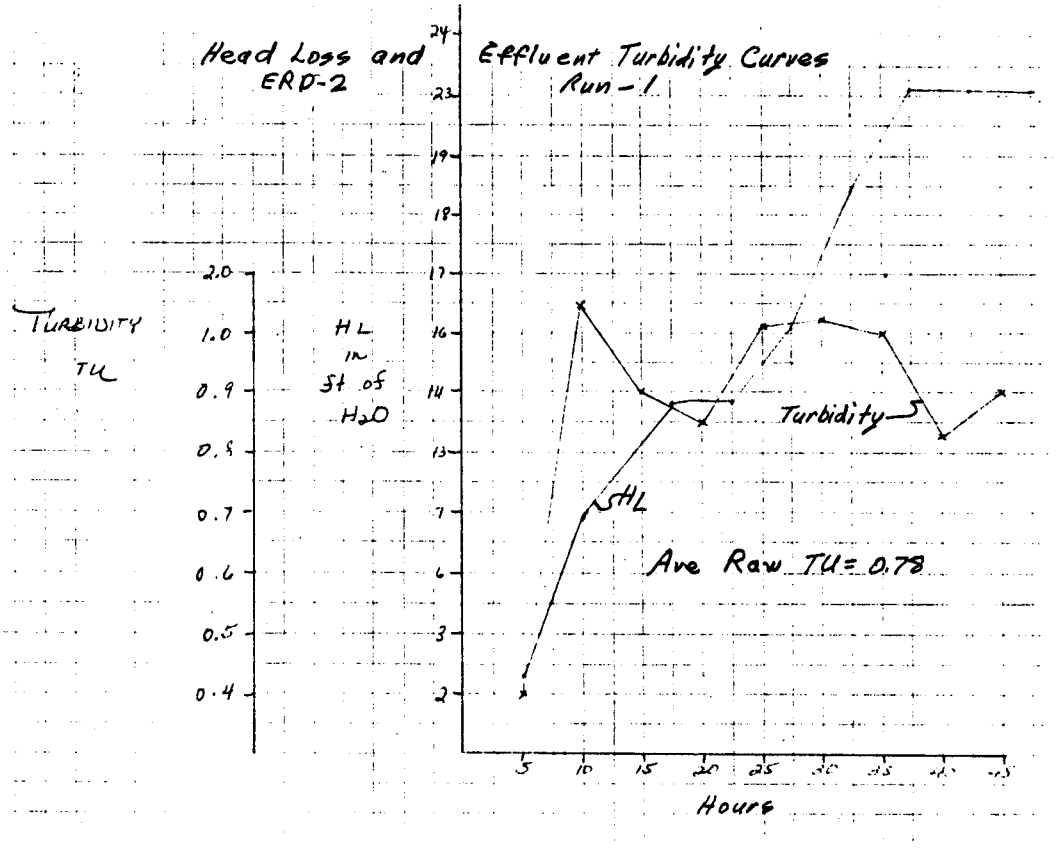

Head Loss and Effluent Turbidity Curves
ERD-1 Run-2
TURBIDITY (TU)
HL in ft. of H2O
HL
Ave. Raw TU= 1.90
Turbidity
Hours

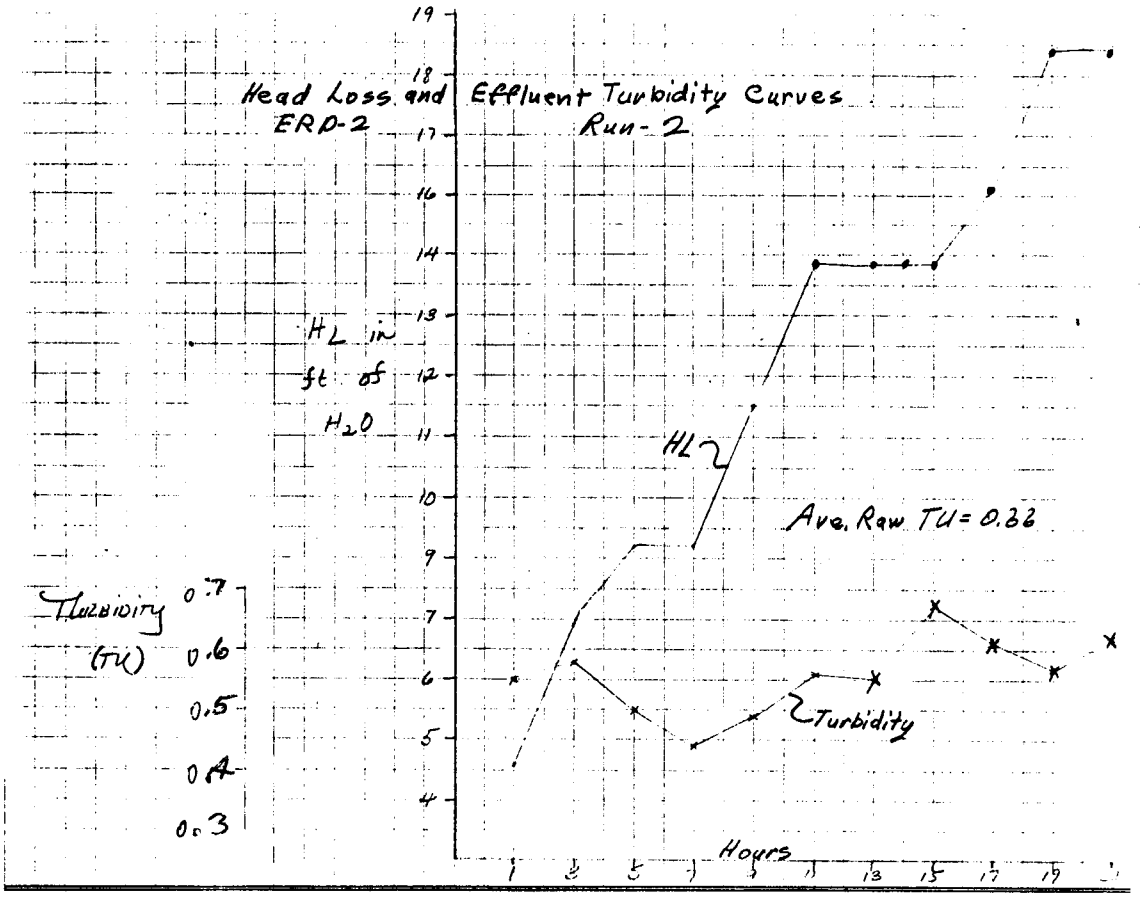

Head Loss and Effluent Turbidity Curves
ERD-1 Run-3
HL in ft. of H2O
Ave. Raw TU= 1.90
HL
TURBIDITY (TU)
Turbidity
Hours

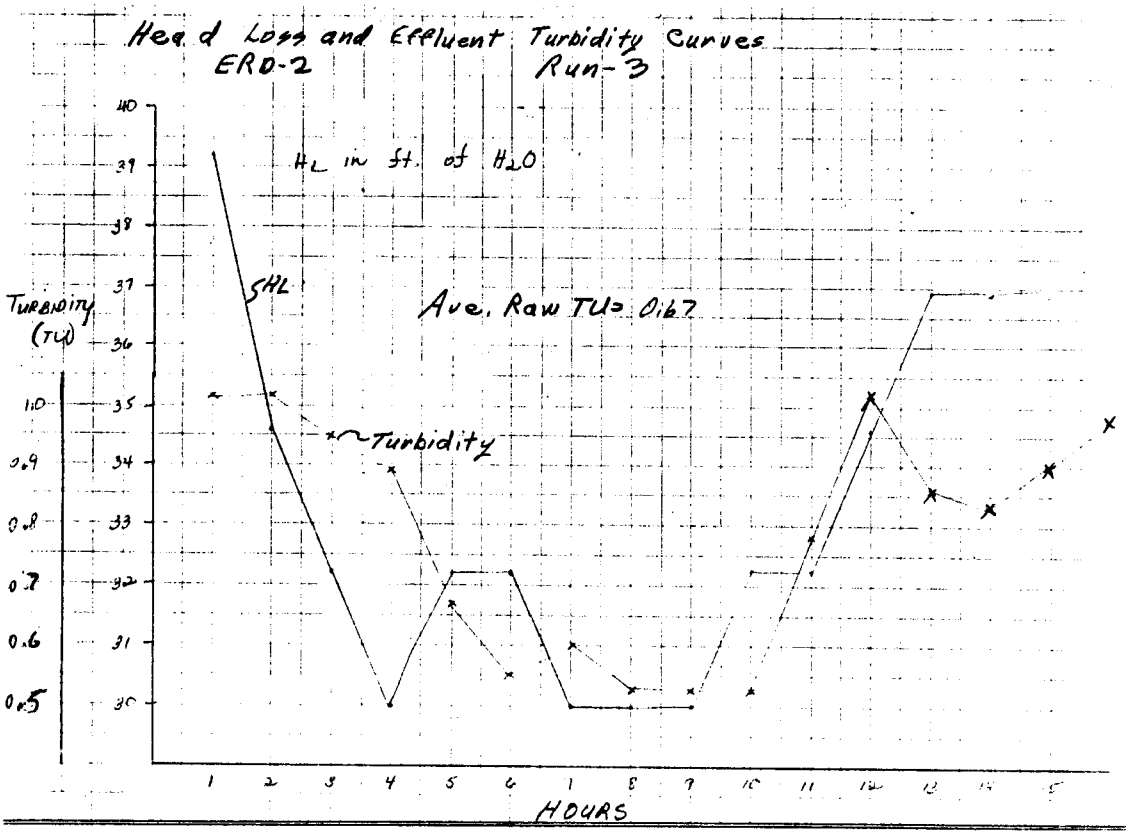

Head Loss and Effluent Turbidity Curves
ERD-1
Run- 4
HL ft. of H_2O
Turbidity (TU)
Ave. Raw TU= 0.93
HL
Turbidity
Hours

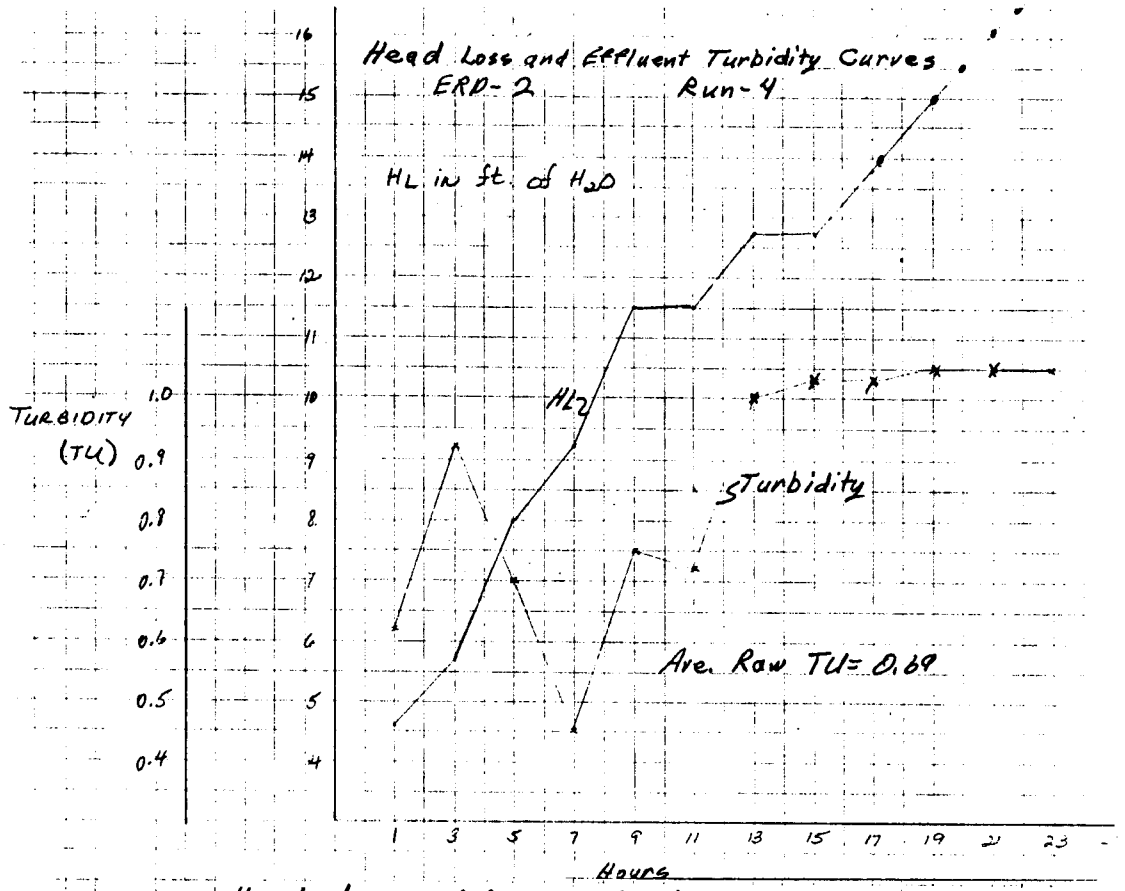

Head Loss and Effluent Turbidity Curves
ERD-1
Run- 5
Turbidity (TU)
H_L in ft. of H_2O
HL
Ave. Raw TU= 0.91
Turbidity
Hours

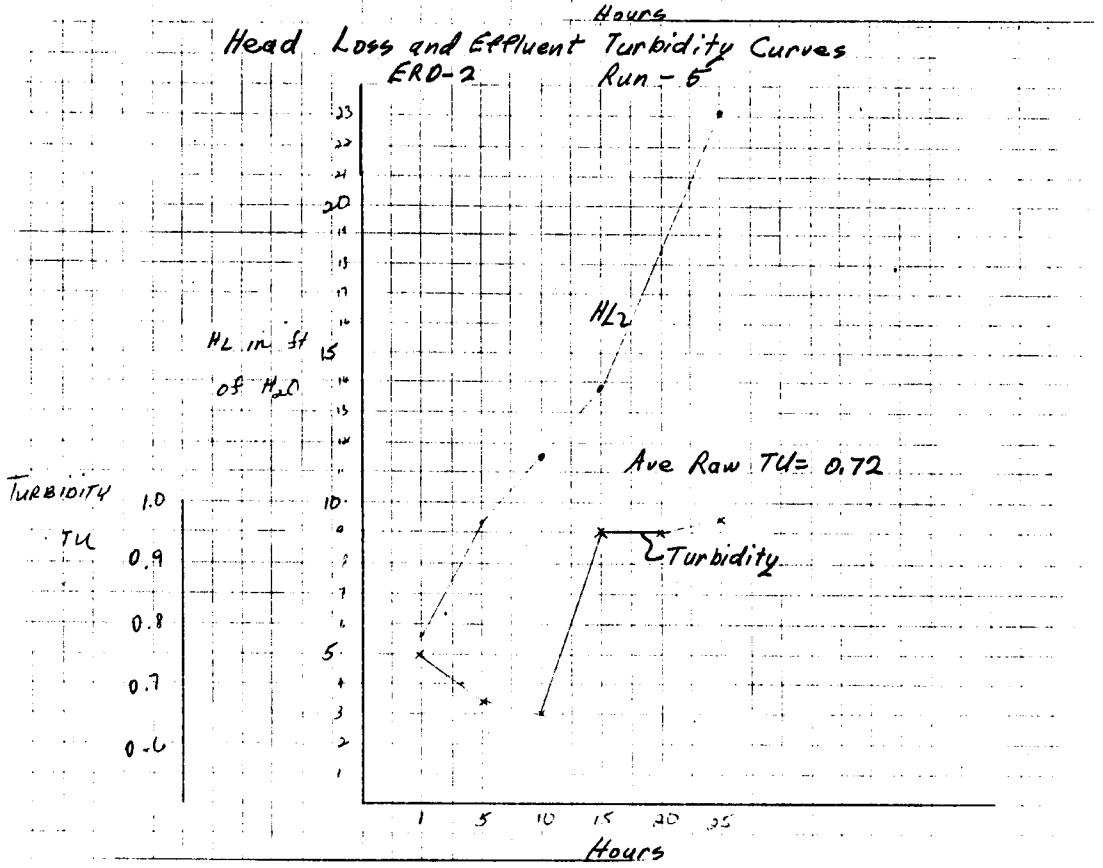

Head Loss and Effluent Turbidity Curves
ERD-1
Run-6
HL in ft. of H2O
Turbidity (TU)
Ave. Raw TU= 0.90
HL
Turbidity
Hours

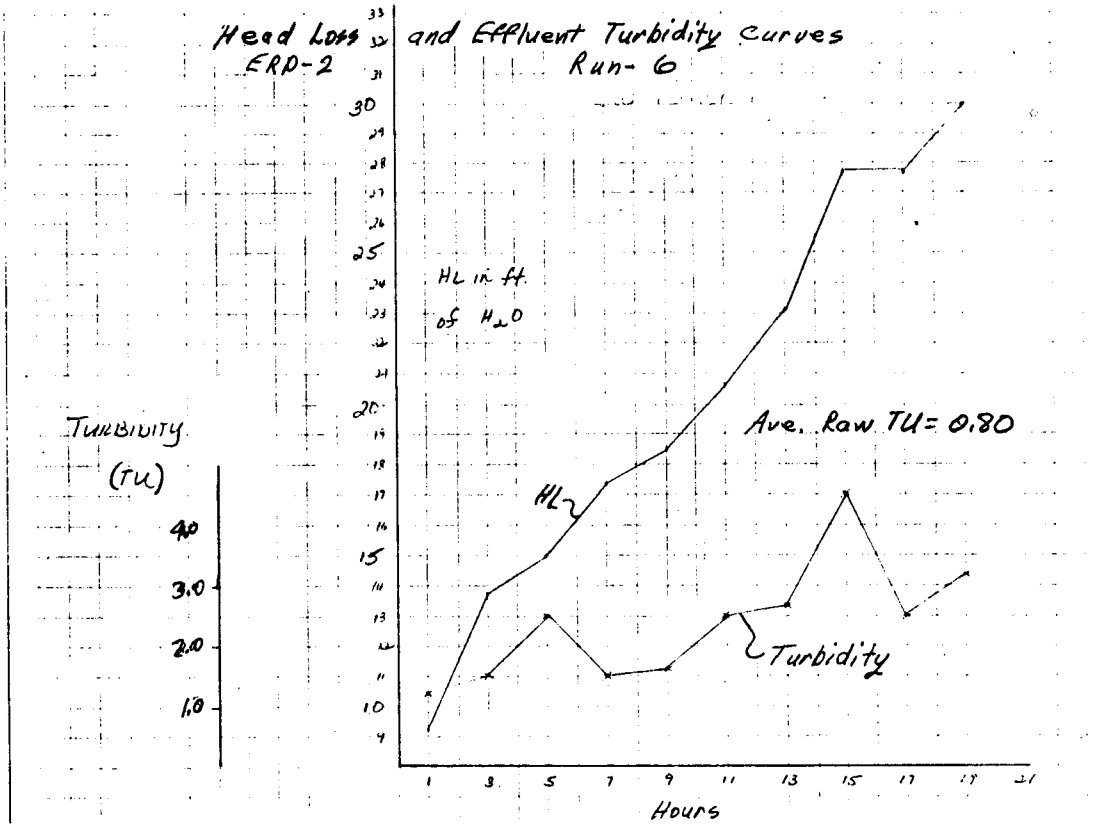

Head Loss and Effluent Turbidity Curves
ERD-2
Run-1
Turbidity TU
HL in ft of H2O
Turbidity
HL
Ave Raw TU= 0.78
Hours

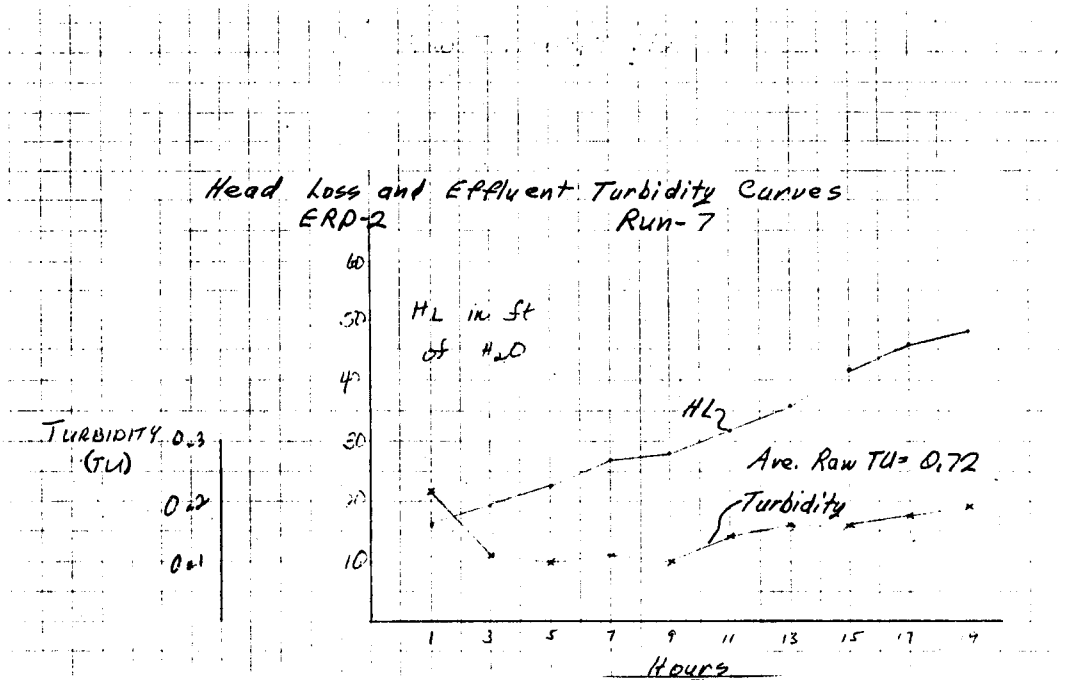

Head Loss and Effluent Turbidity Curves
ERD-2
Run-2
HL in ft of H2O
HL
Ave. Raw TU = 0.66
Turbidity (TU)
Turbidity
Hours

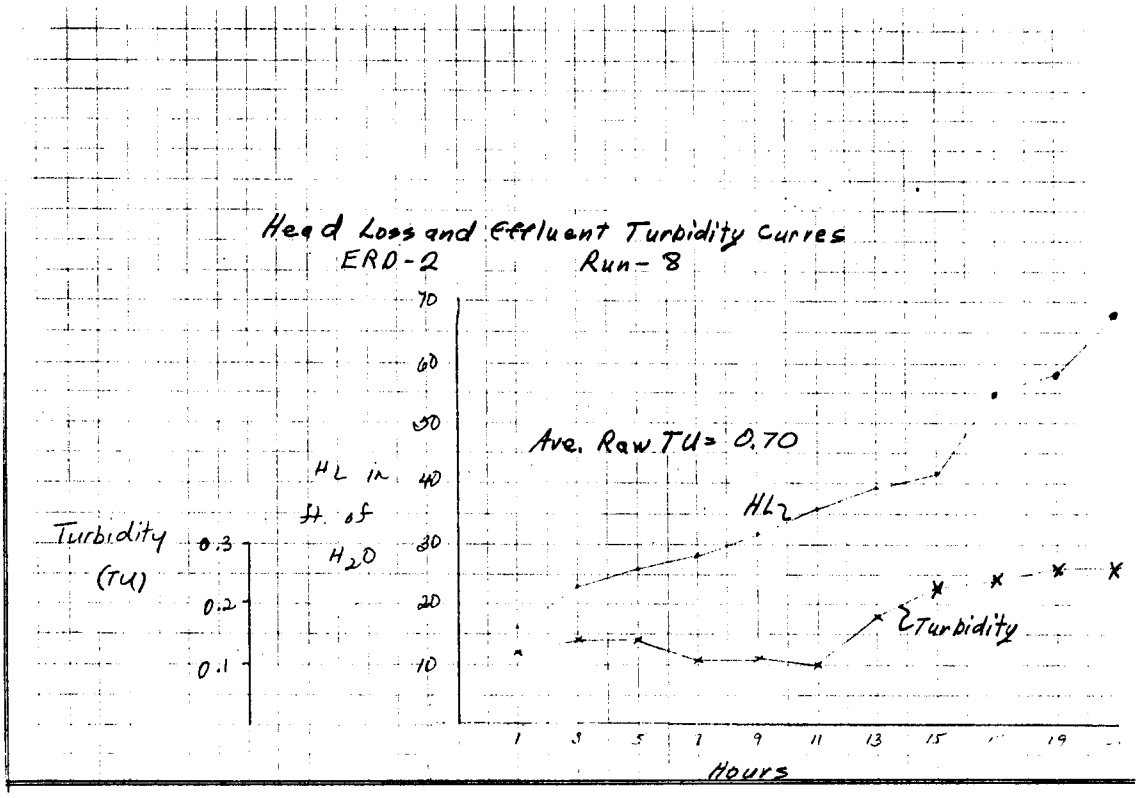

Head Loss and Effluent Turbidity Curves
ERD-2
Run-3
HL in ft. of H2O
HL
Ave. Raw TU = 0.67
Turbidity (TU)
Turbidity
HOURS

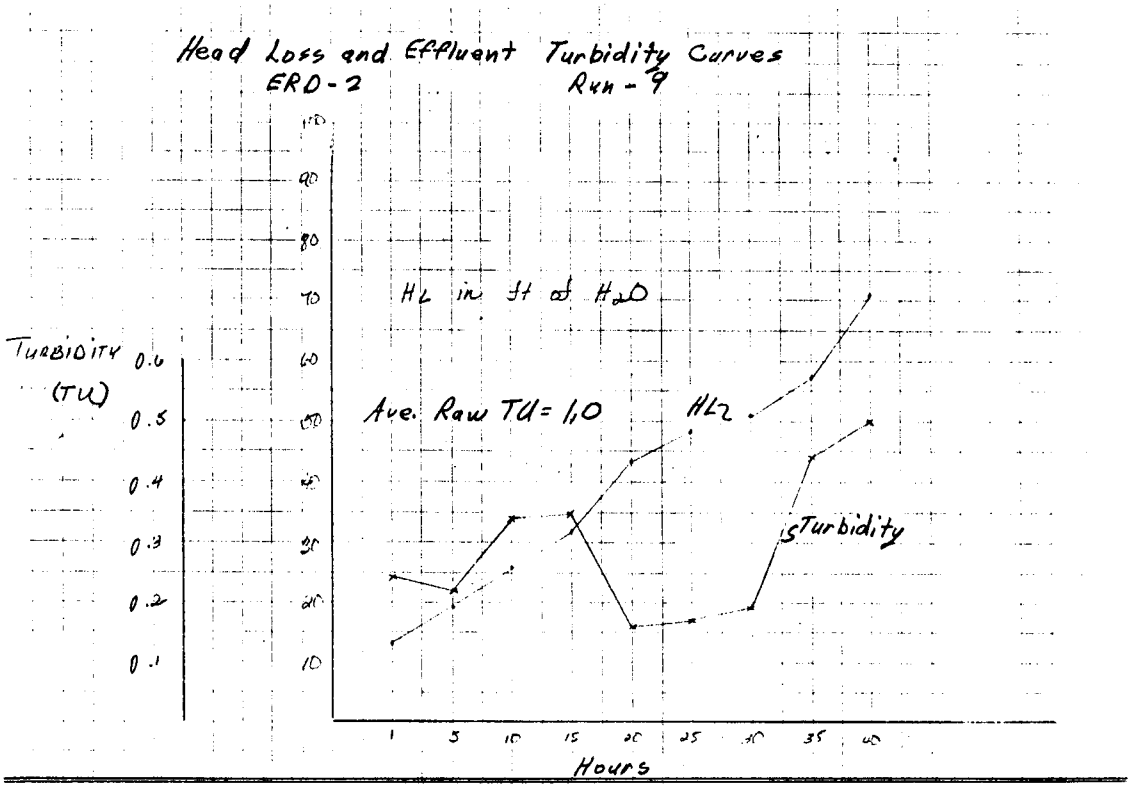

Head Loss and Effluent Turbidity Curves
ERD-2 Run-4
HL in ft. of H2O
HL2
Turbidity
Ave. Raw TU= 0.69
TURBIDITY (TU)
Hours

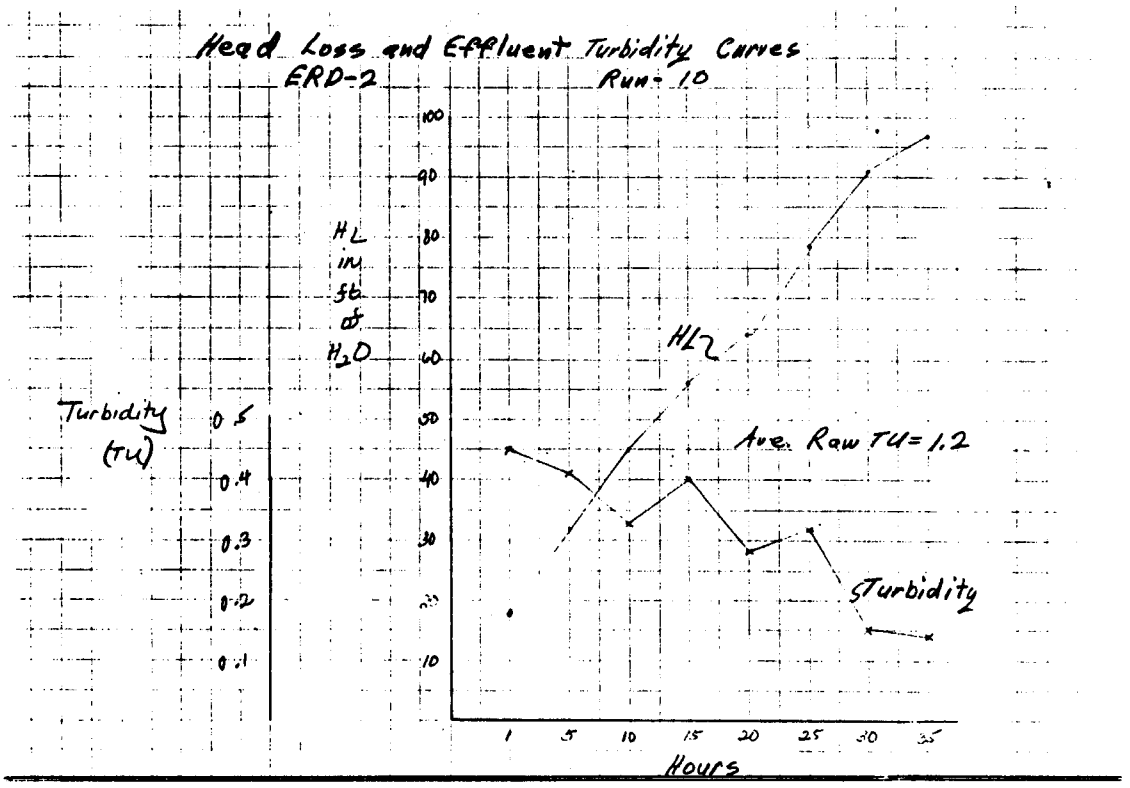

Head Loss and Effluent Turbidity Curves
ERD-2 Run-5
HL in ft of H2O
HL2
Ave Raw TU= 0.72
Turbidity
TURBIDITY TU
Hours

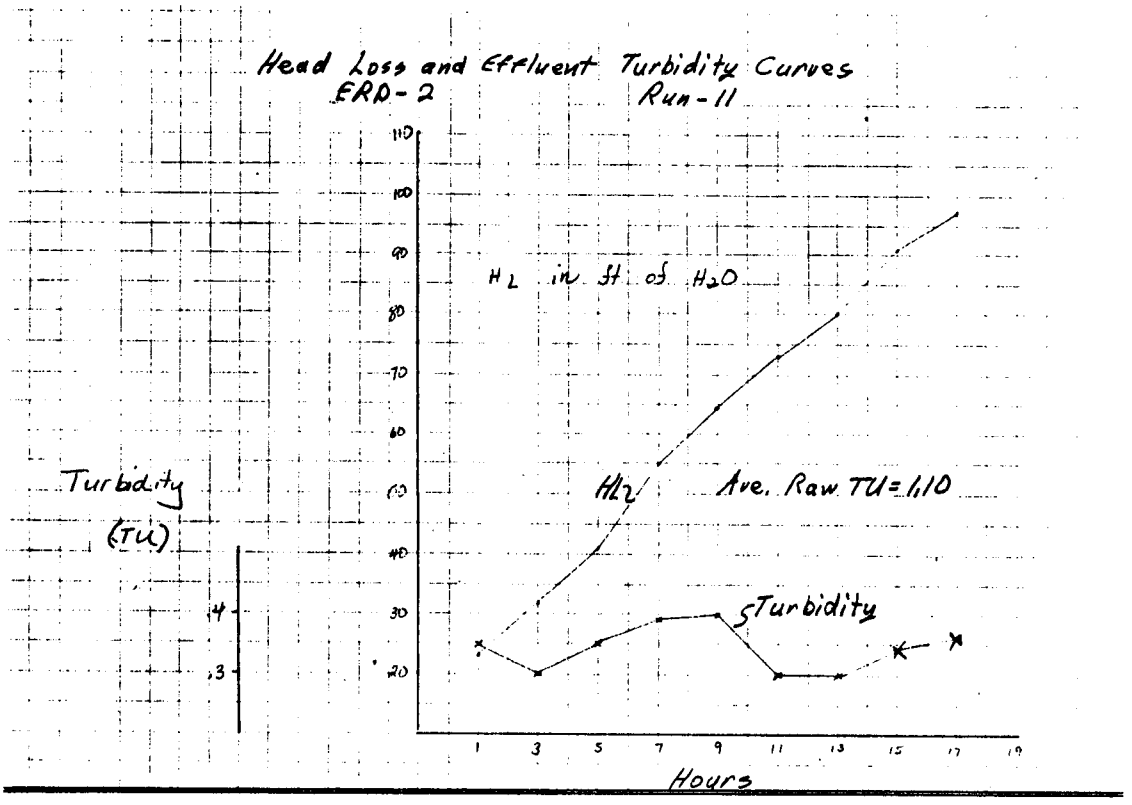

Head Loss and Effluent Turbidity Curves
ERD-2
Run-6
HL in ft of H_2O
Turbidity (TU)
Ave. Raw TU = 0.80
HL
Turbidity
Hours

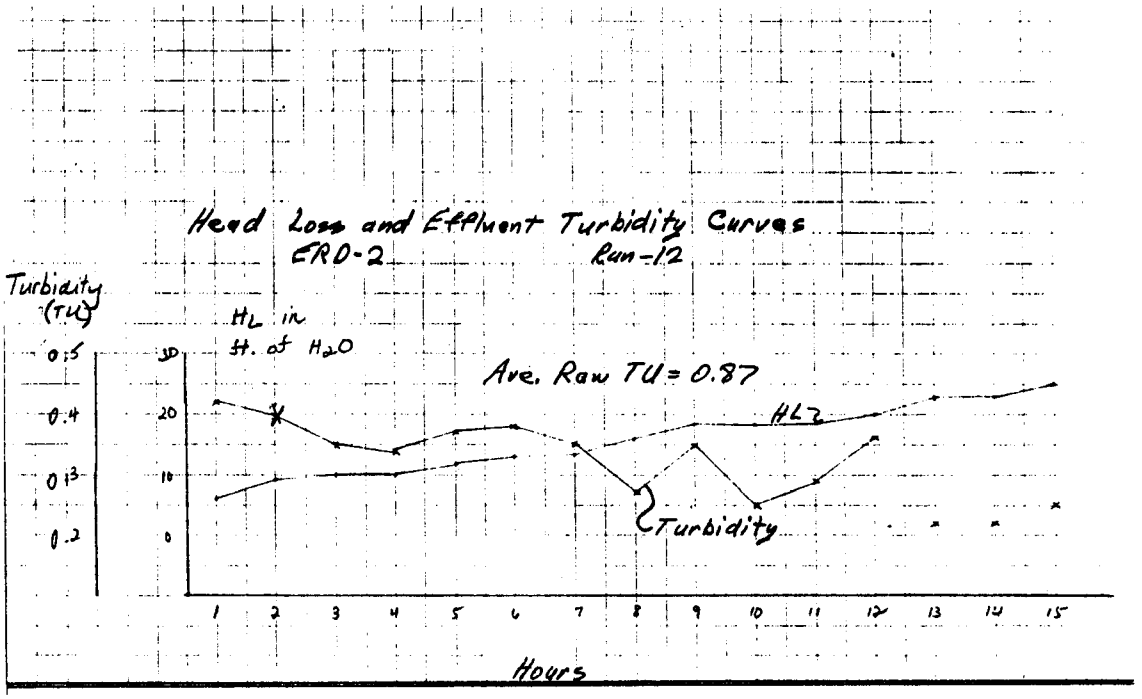

Head Loss and Effluent Turbidity Curves
ERD-2
Run-7
HL in ft of H_2O
Turbidity (TU)
Ave. Raw TU = 0.72
HL
Turbidity
Hours

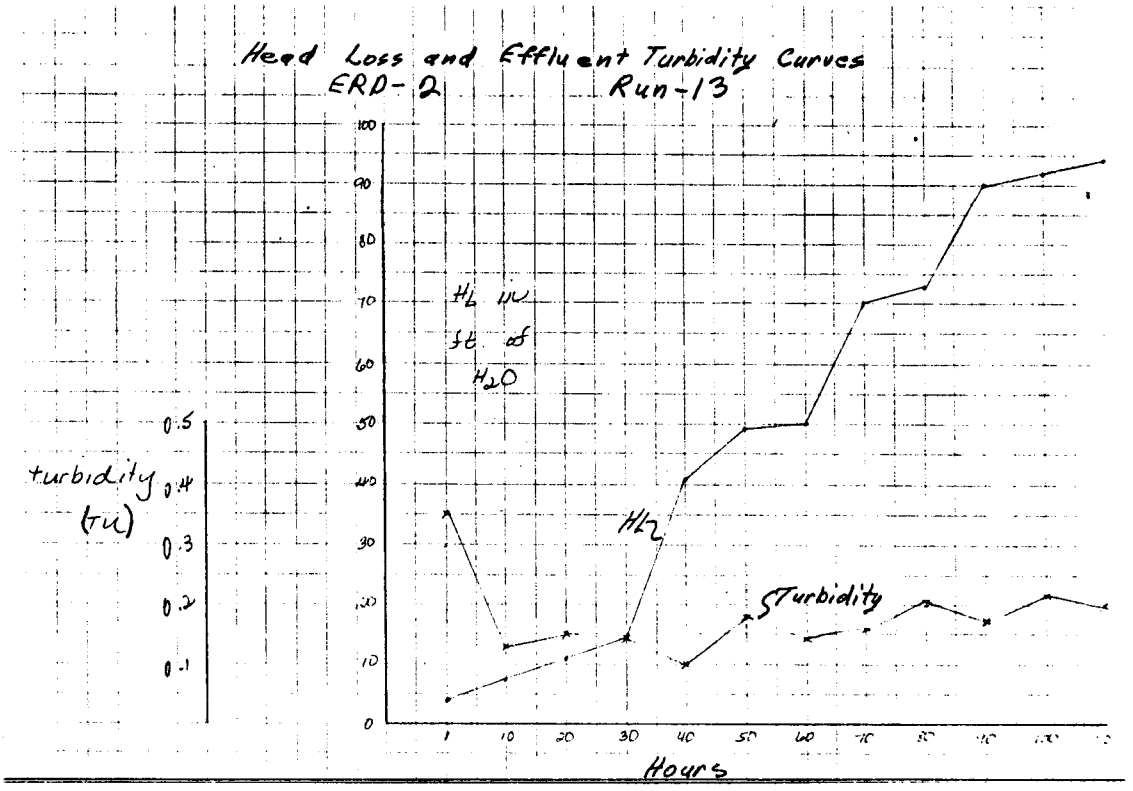

Head Loss and Effluent Turbidity Curves
ERD-2
Run-8
Ave. Raw TU = 0.70
HL in ft of H2O
Turbidity (TU)
HL
Turbidity
Hours

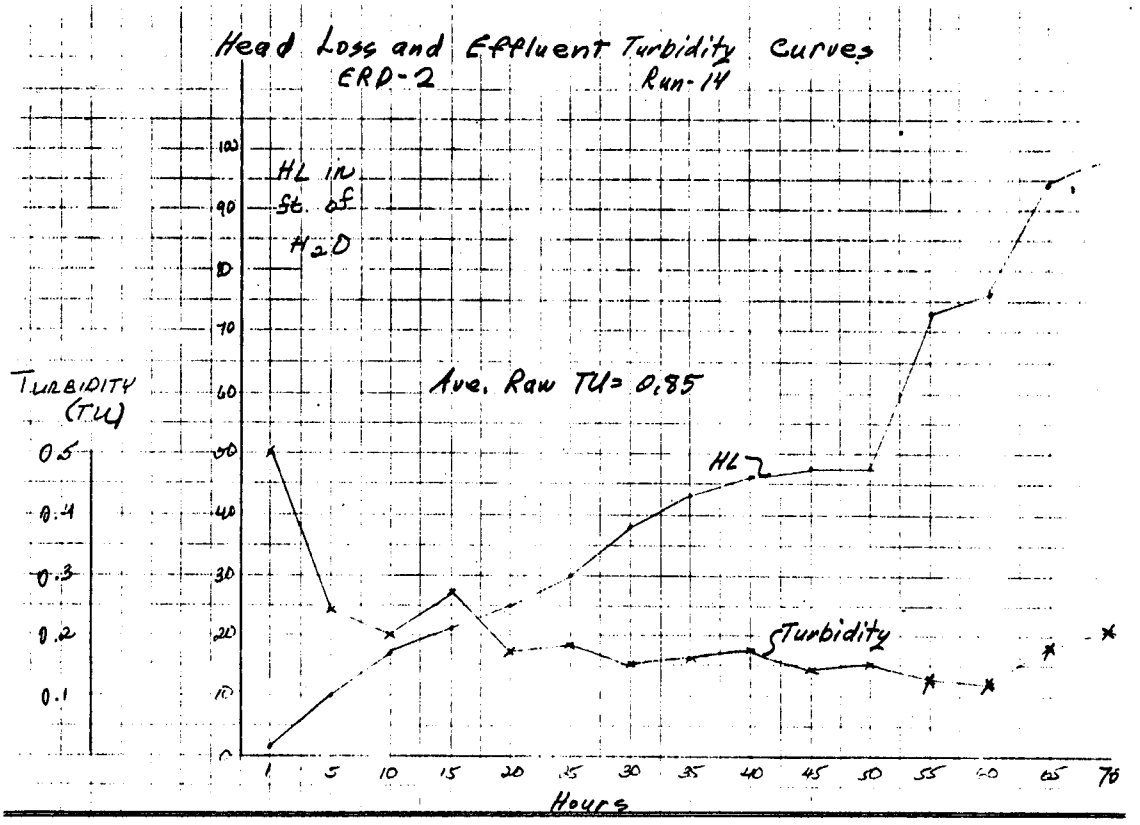

Head Loss and Effluent Turbidity Curves
ERD-2
Run-9
HL in ft of H2O
Turbidity (TU)
Ave. Raw TU = 1.0
HL
Turbidity
Hours

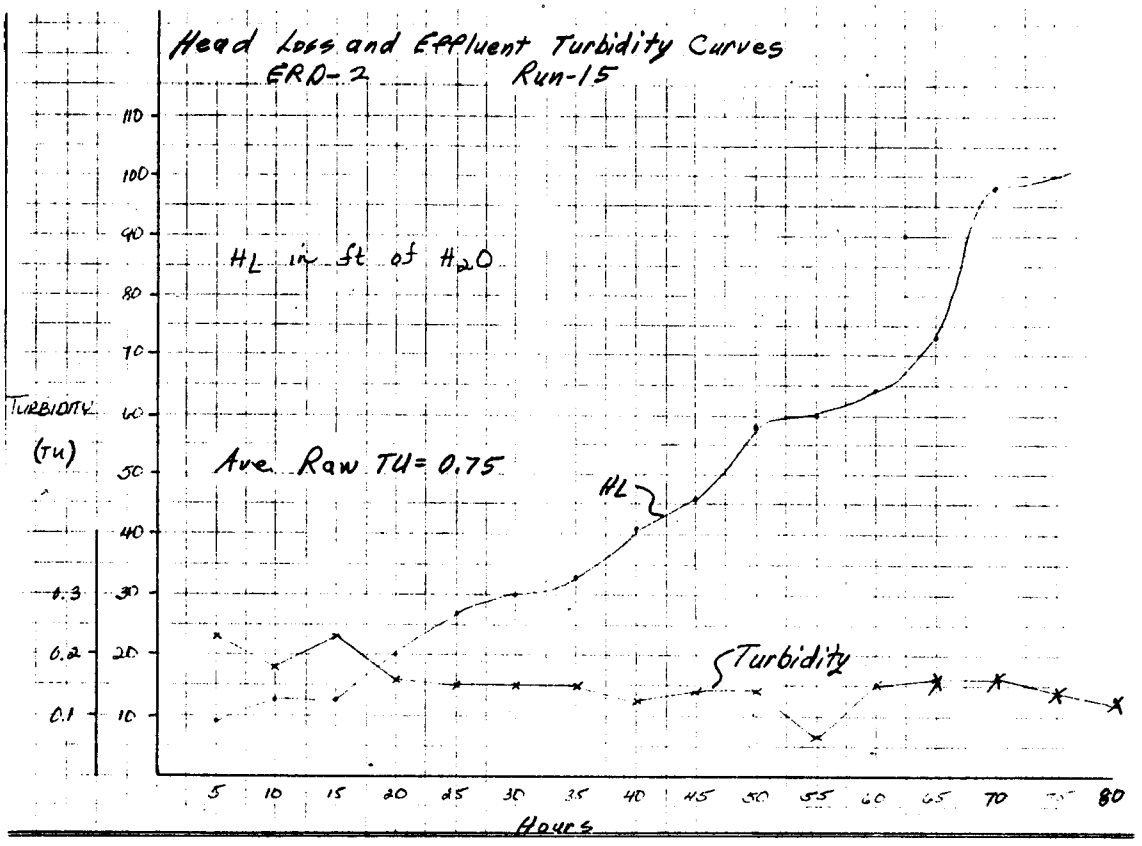

Head Loss and Effluent Turbidity Curves
ERD-2
Run-10
HL in ft of H2O
Turbidity (TU)
HL
Ave. Raw TU=1.2
Turbidity
Hours

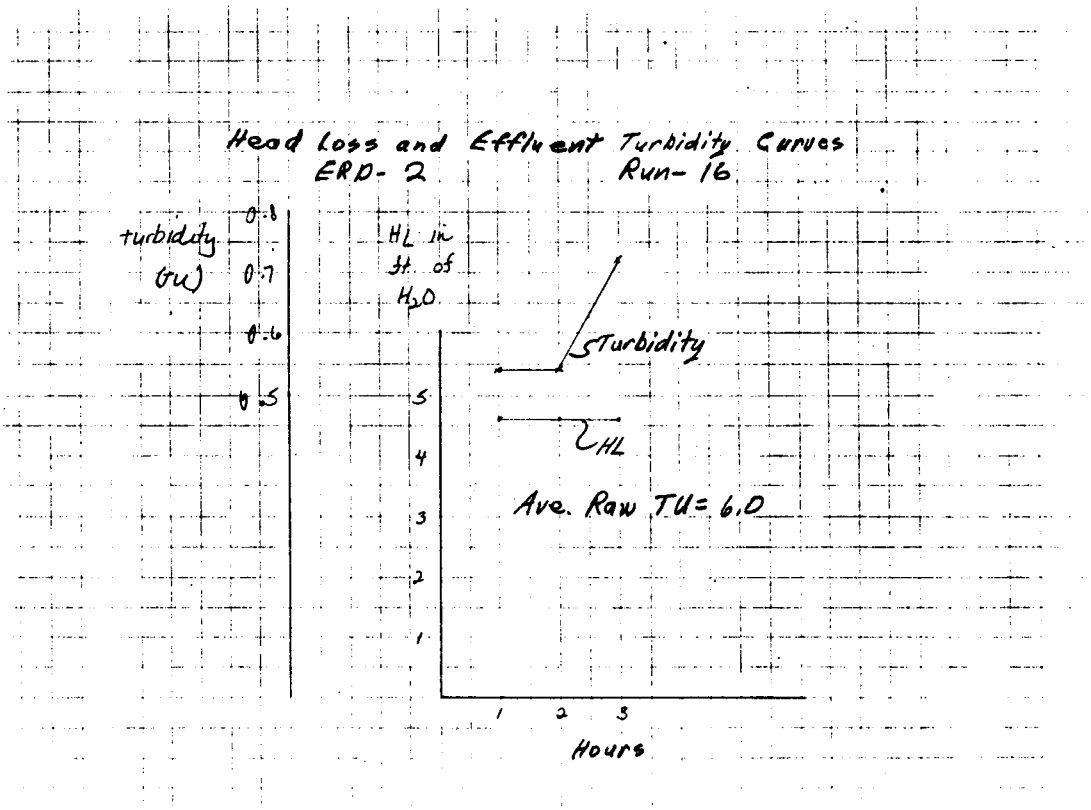

Head Loss and Effluent Turbidity Curves
ERD-2
Run-11
HL in ft of H2O
Turbidity (TU)
HL
Ave. Raw TU=1.10
Turbidity
Hours

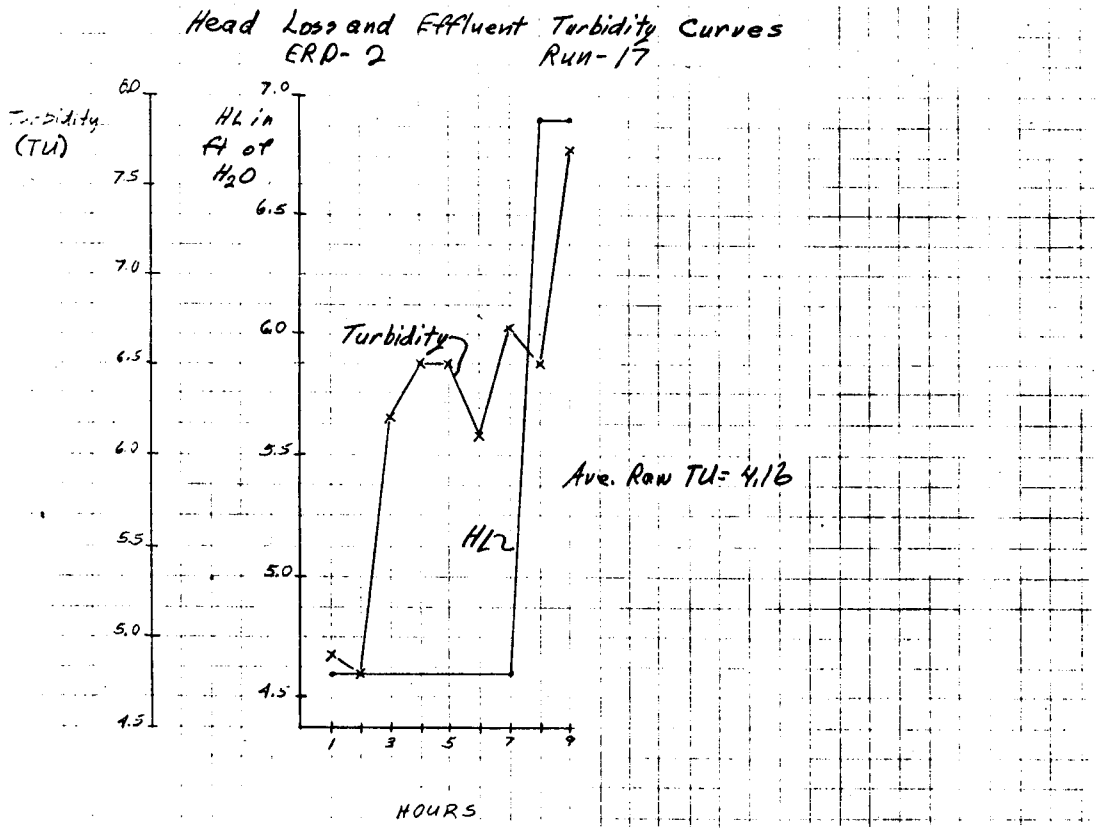

Head Loss and Effluent Turbidity Curves
ERD-2
Run-12
Turbidity (TU)
HL in ft. of H2O
Ave. Raw TU = 0.87
HL
Turbidity
Hours

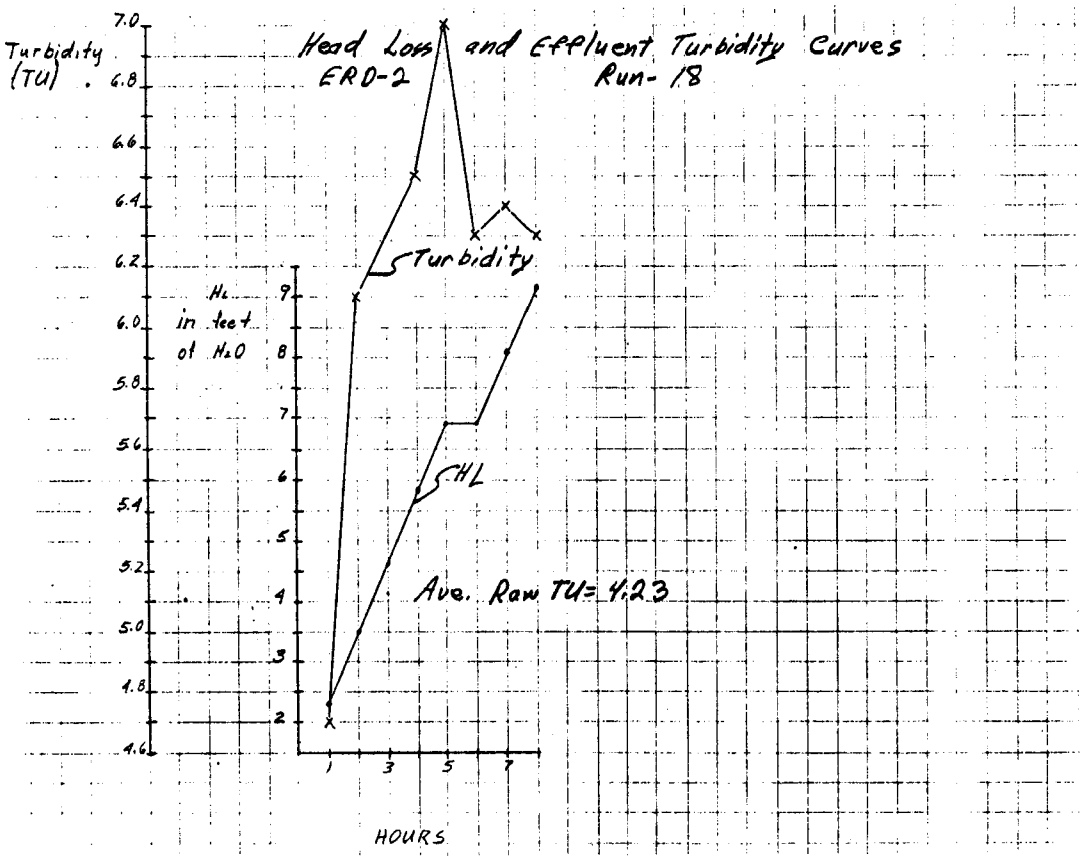

Head Loss and Effluent Turbidity Curves
ERD-2
Run-13
HL in ft of H2O
turbidity (TU)
HL
Turbidity
Hours

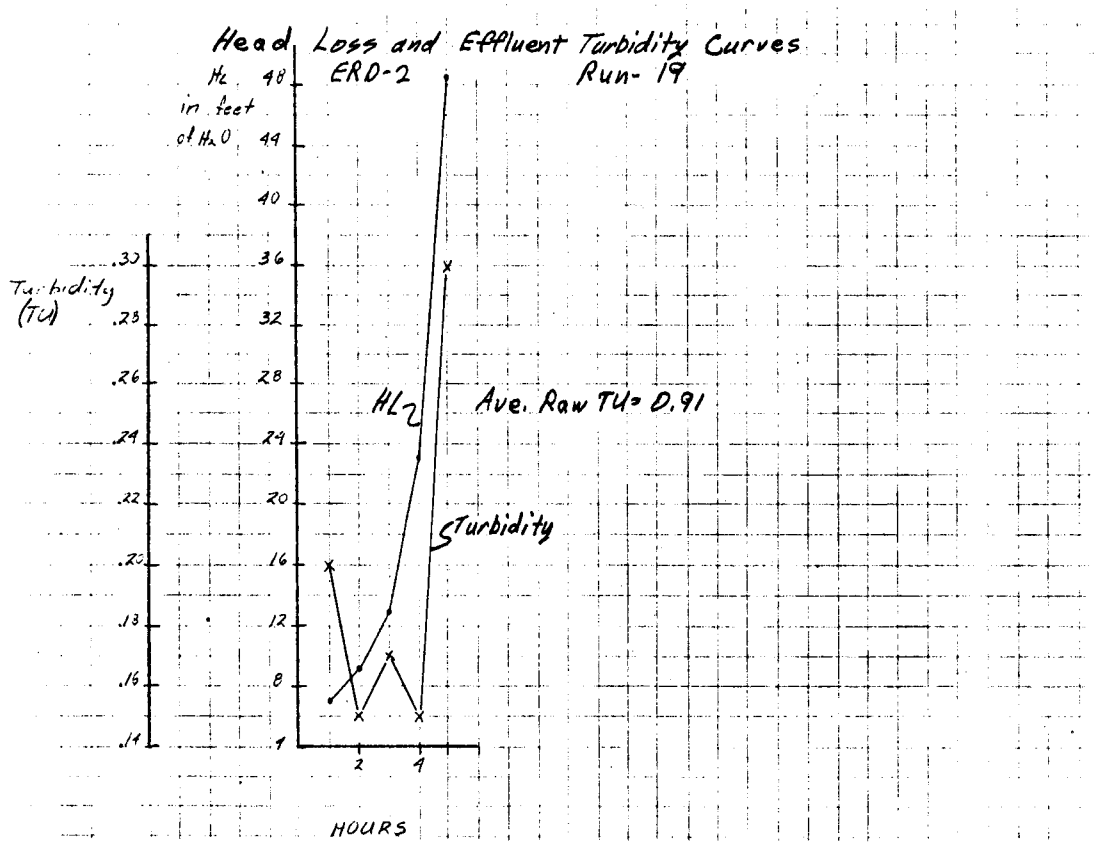

Head Loss and Effluent Turbidity Curves
ERD-2
Run-14
HL in ft. of H2O
Ave. Raw TU= 0.85
HL
Turbidity
TURBIDITY (TU)
Hours

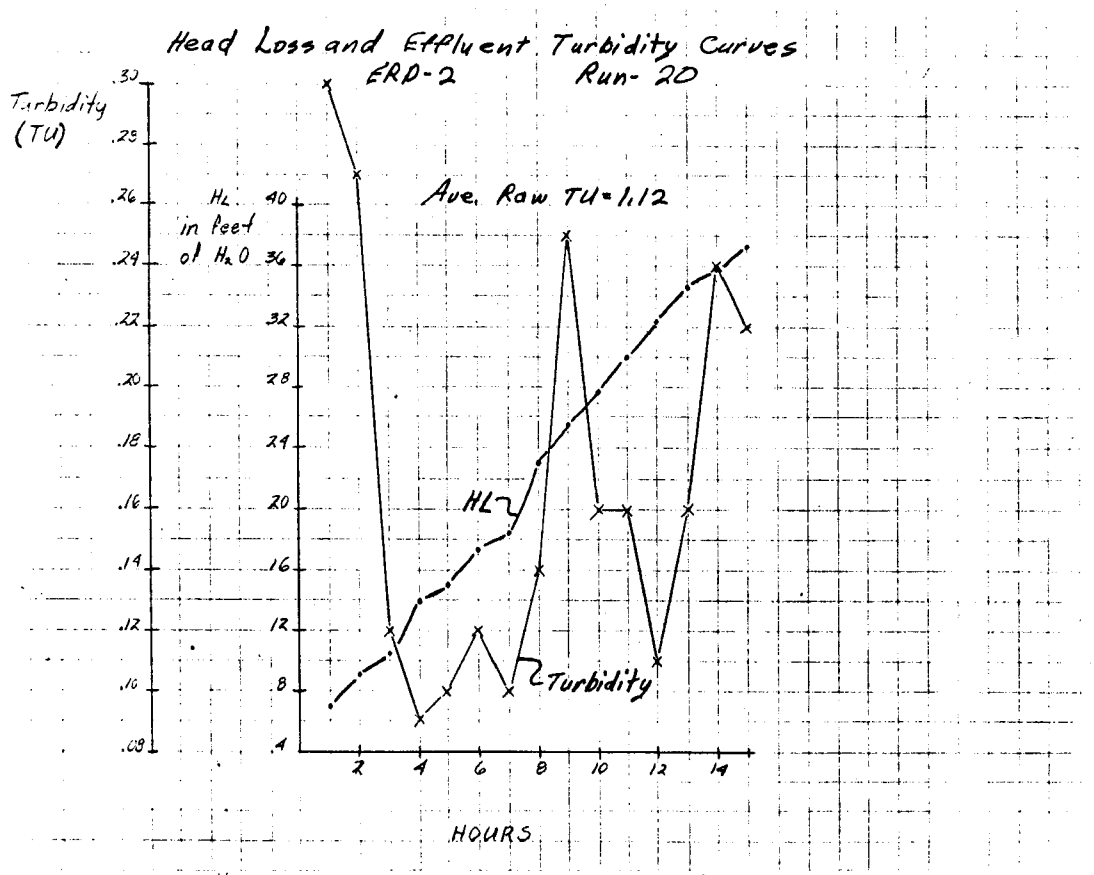

Head Loss and Effluent Turbidity Curves
ERD-2
Run-15
HL in ft of H2O
Ave. Raw TU= 0.75
HL
Turbidity
TURBIDITY (TU)
Hours

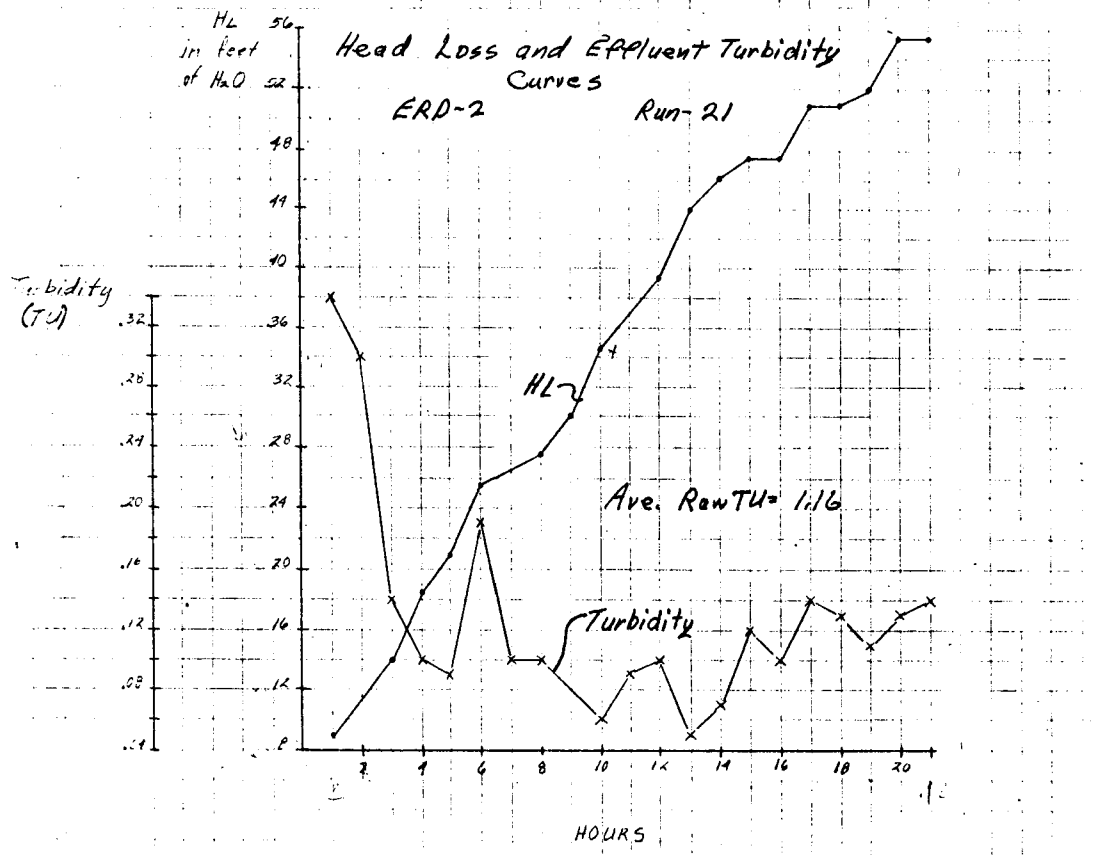

Head Loss and Effluent Turbidity Curves
ERD- 2
Run- 16
turbidity (TU)
0.8
0.7
0.6
0.5
HL in ft. of H_2O
5
4
3
2
1
Turbidity
HL
Ave. Raw TU= 6.0
1
2
3
Hours

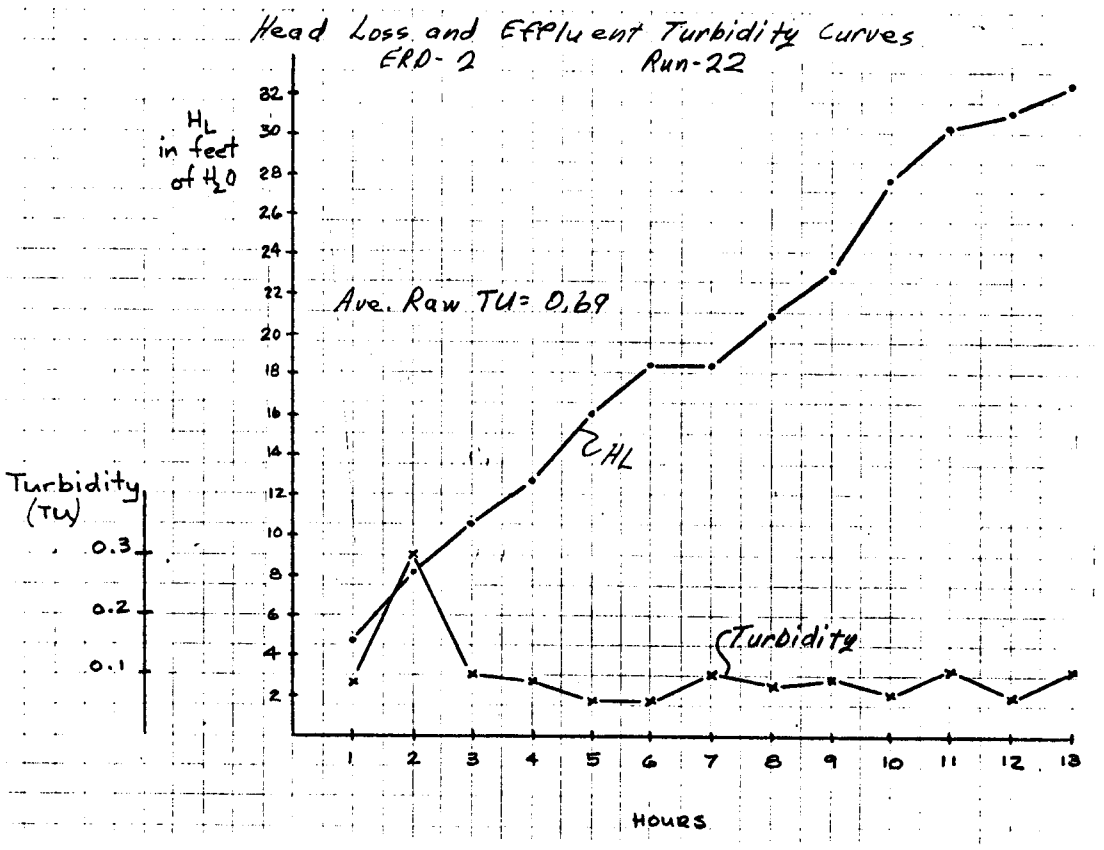

Head Loss and Effluent Turbidity Curves
ERD- 2
Run- 17
Turbidity (TU)
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
HL in ft of H_2O
7.0
6.5
6.0
5.5
5.0
4.5
Turbidity
HL
Ave. Raw TU= 4.16
1
3
5
7
9
HOURS

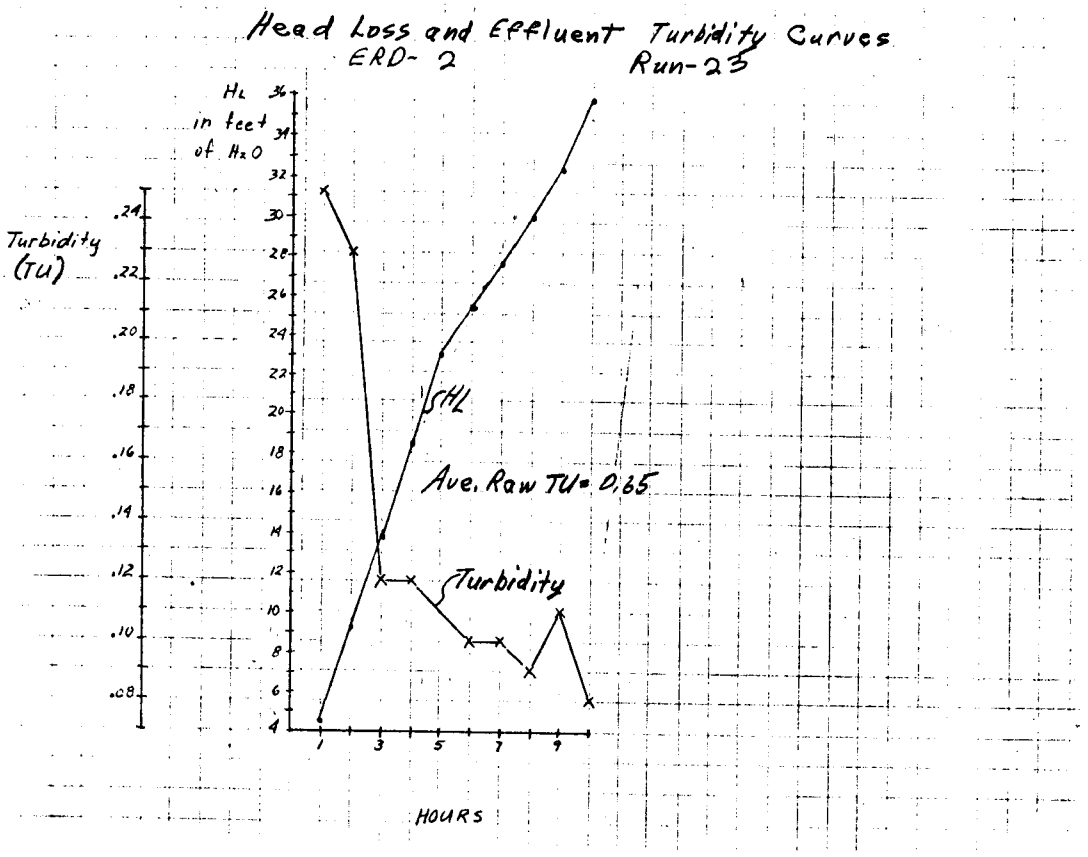

Head Loss and Effluent Turbidity Curves
ERD-2
Run- 18
Turbidity (TU)
7.0
6.8
6.6
6.4
6.2
6.0
5.8
5.6
5.4
5.2
5.0
4.8
4.6
HL in feet of H2O
9
8
7
6
5
4
3
2
Turbidity
HL
Ave. Raw TU= 4.23
1
3
5
7
HOURS

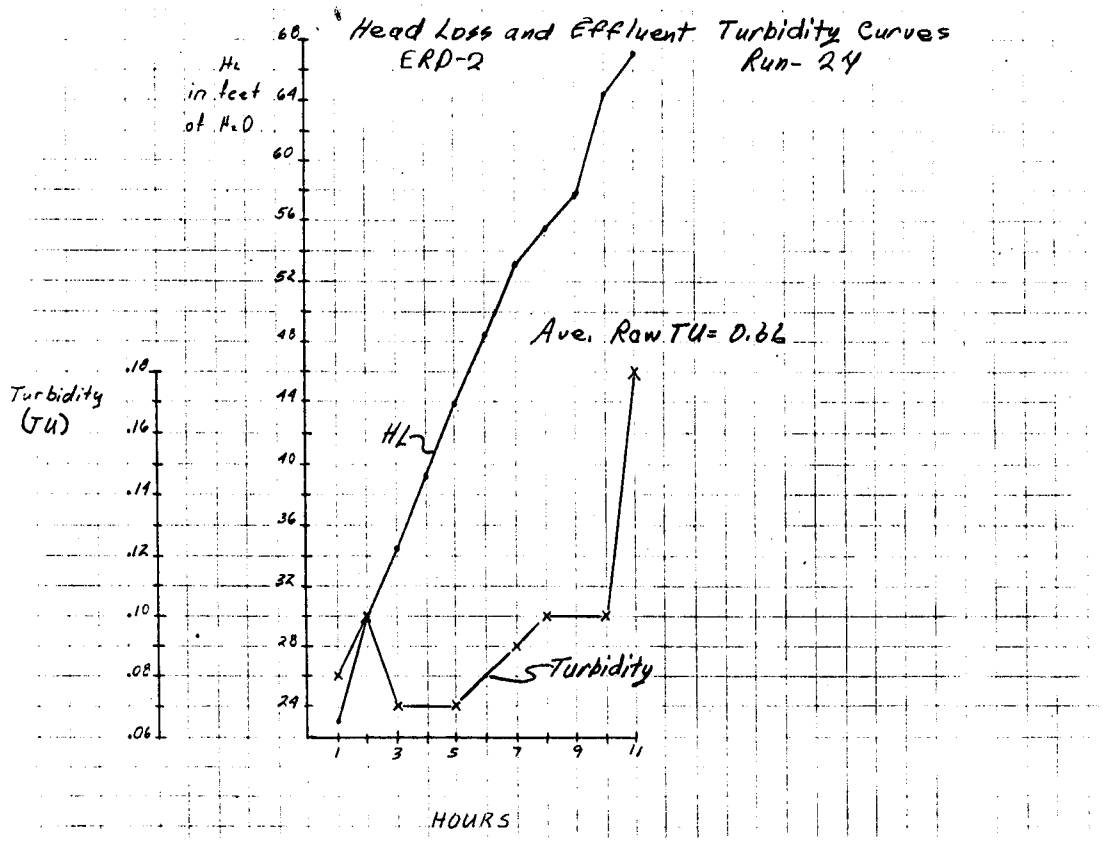

Head Loss and Effluent Turbidity Curves
ERD-2
Run- 19
HL in feet of H2O
48
44
40
36
32
28
24
20
16
12
8
4
Turbidity (TU)
.30
.28
.26
.24
.22
.20
.18
.16
.14
HL
Ave. Raw TU= 0.91
Turbidity
2
4
HOURS

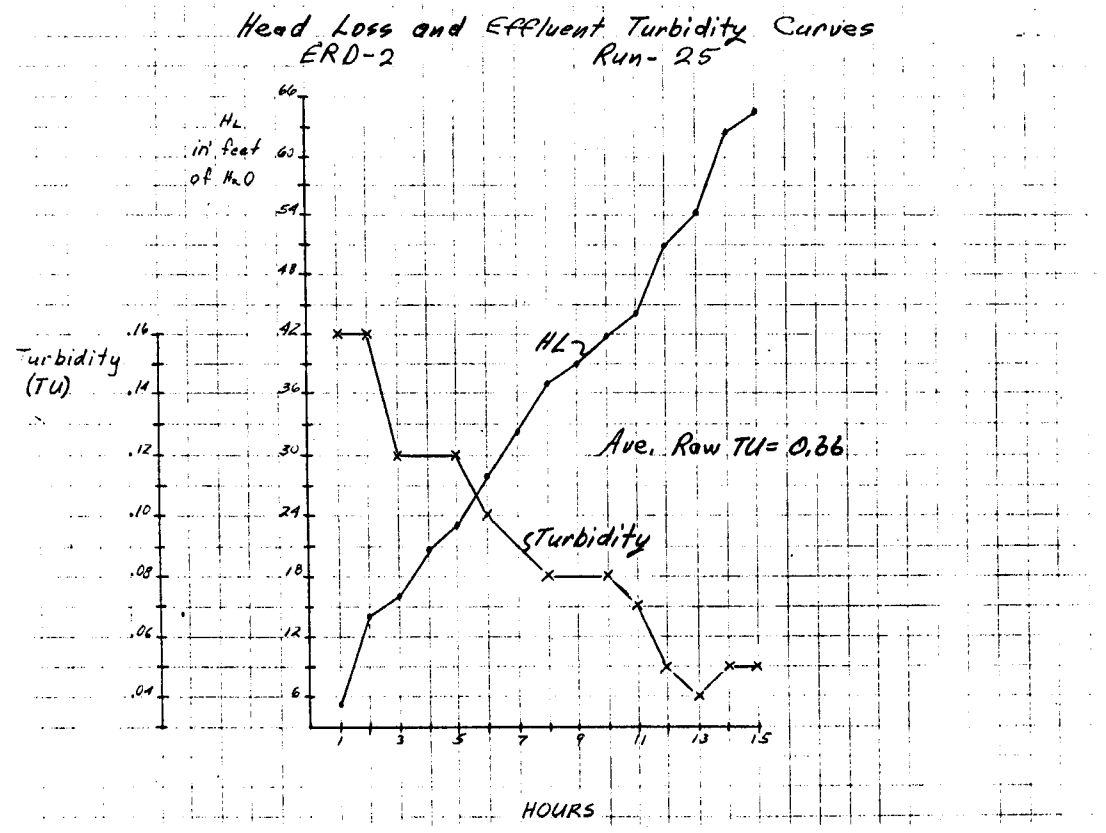

Head Loss and Effluent Turbidity Curves
ERD-2
Run- 20
Turbidity (TU)
HL in feet of H2O
Ave. Raw TU = 1.12
HL
Turbidity
HOURS

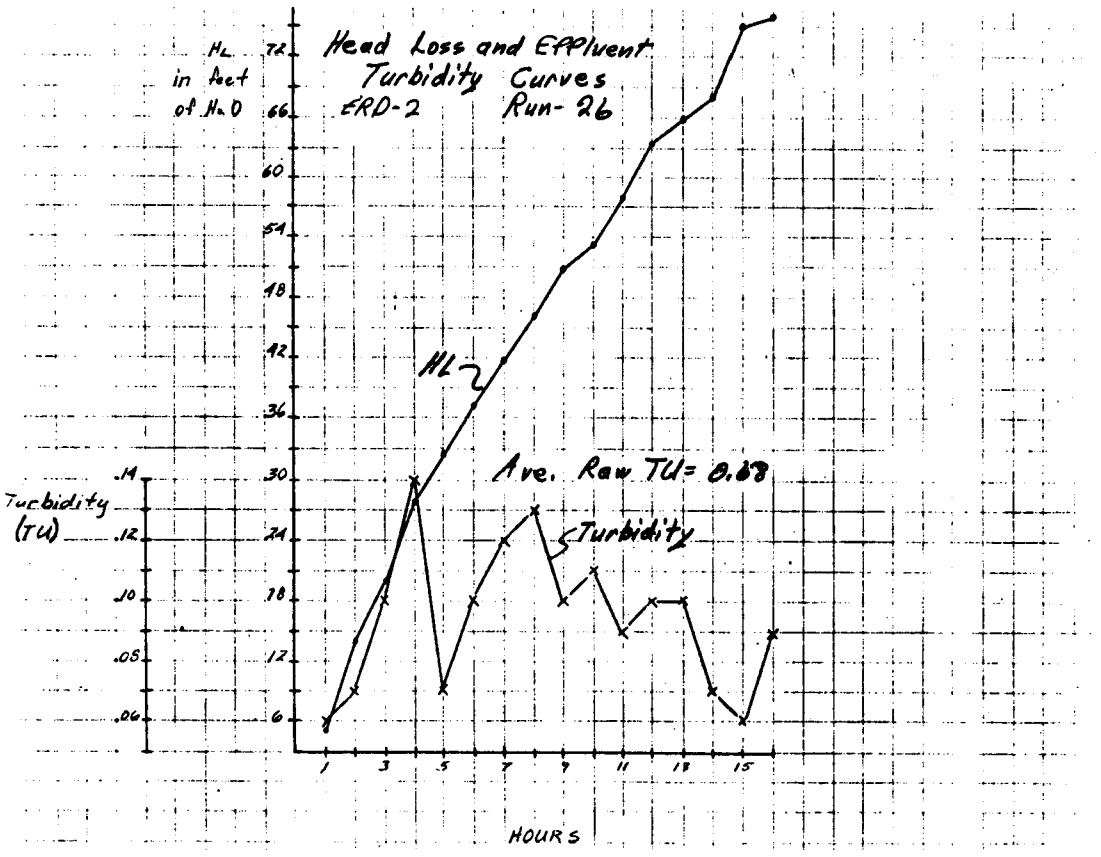

Head Loss and Effluent Turbidity Curves
ERD-2
Run- 21
HL in feet of H2O
Turbidity (TU)
HL
Ave. Raw TU = 1.16
Turbidity
HOURS

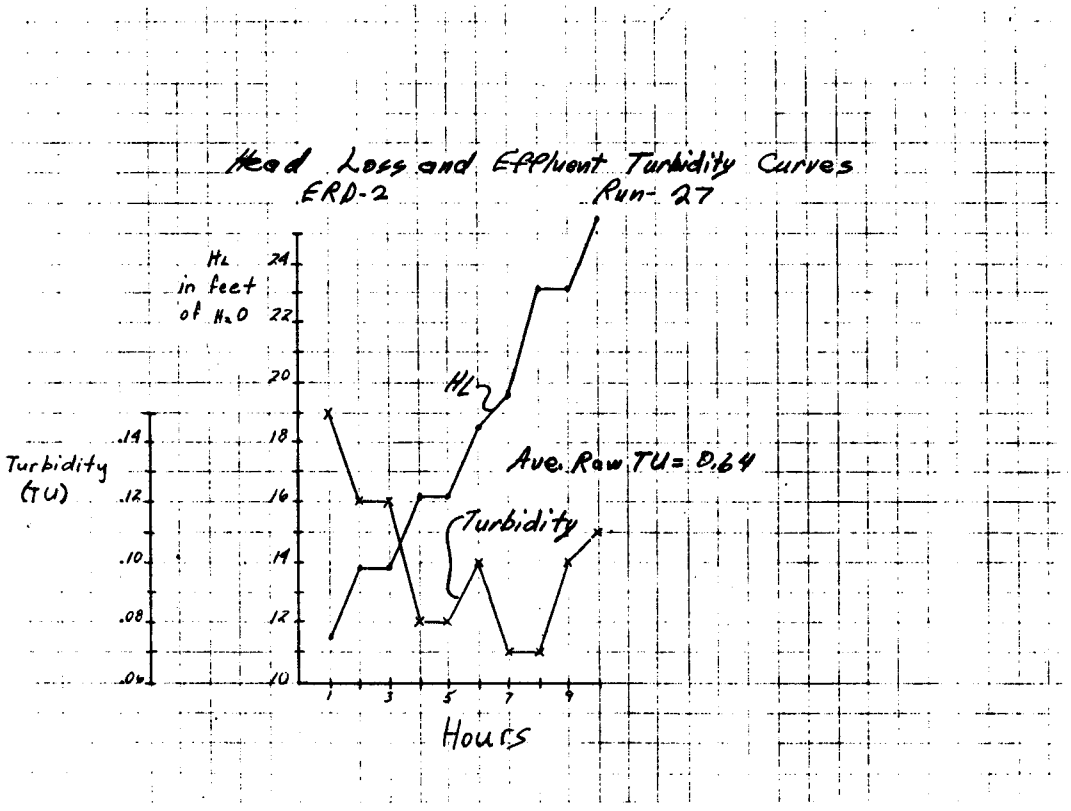

Head Loss and Effluent Turbidity Curves
ERD-2
Run-22
H_L in feet of H_2O
Ave. Raw TU = 0.69
HL
Turbidity
Turbidity (TU)
HOURS

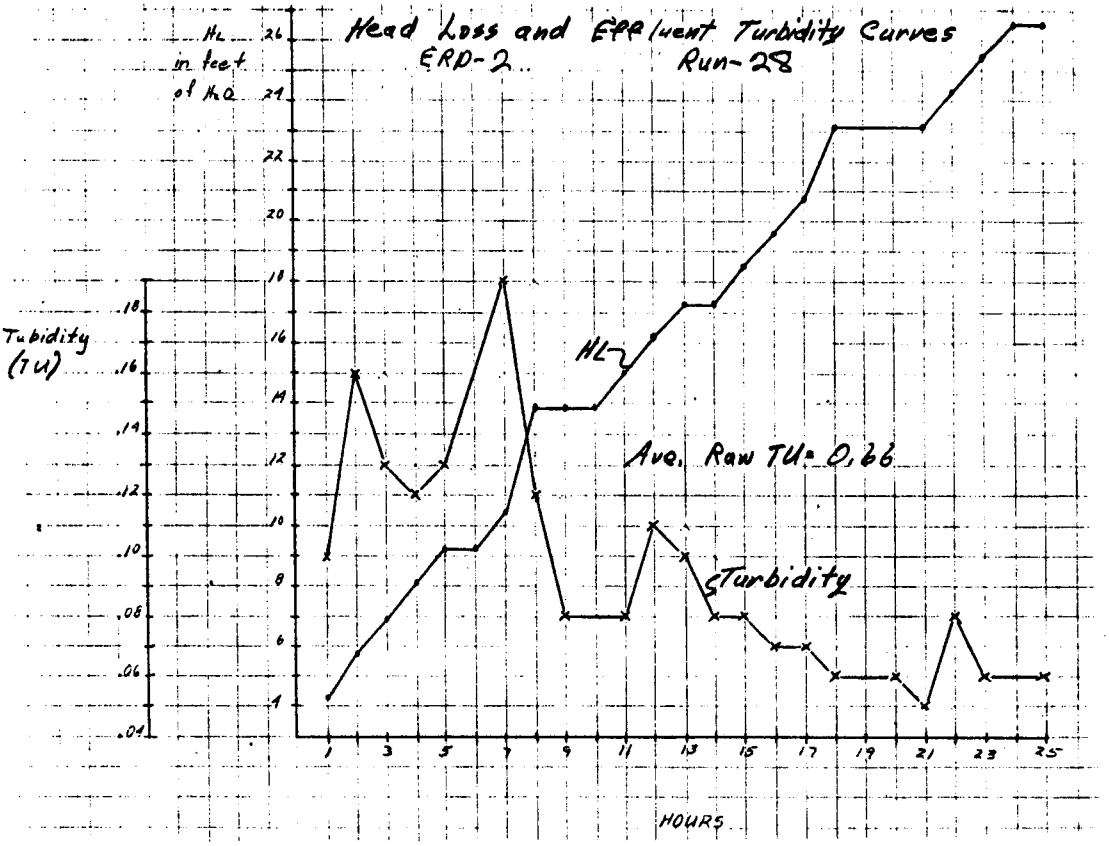

Head Loss and Effluent Turbidity Curves
ERD-2
Run-23
H_L in feet of H_2O
Turbidity (TU)
HL
Ave. Raw TU = 0.65
Turbidity
HOURS

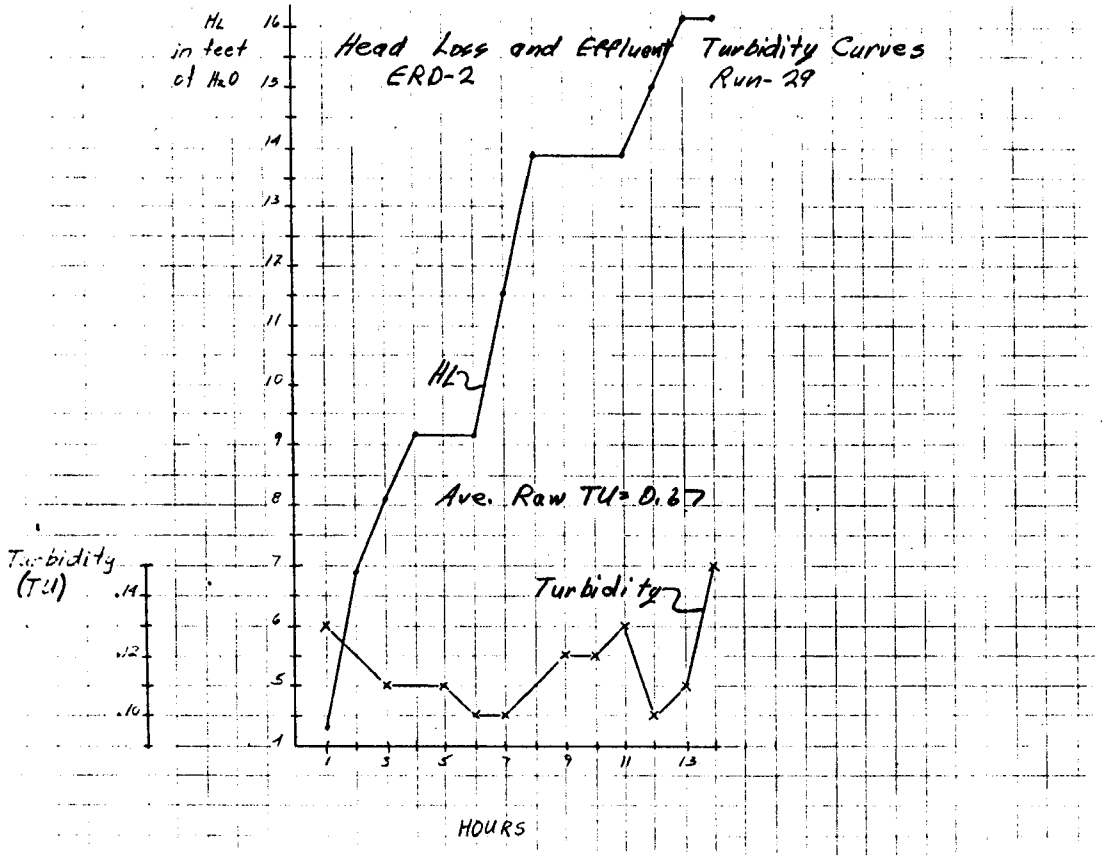

Head Loss and Effluent Turbidity Curves
ERD-2
Run- 24
H_L in feet of H_2O
Turbidity (TU)
Ave. Raw TU= 0.66
HL
Turbidity
HOURS

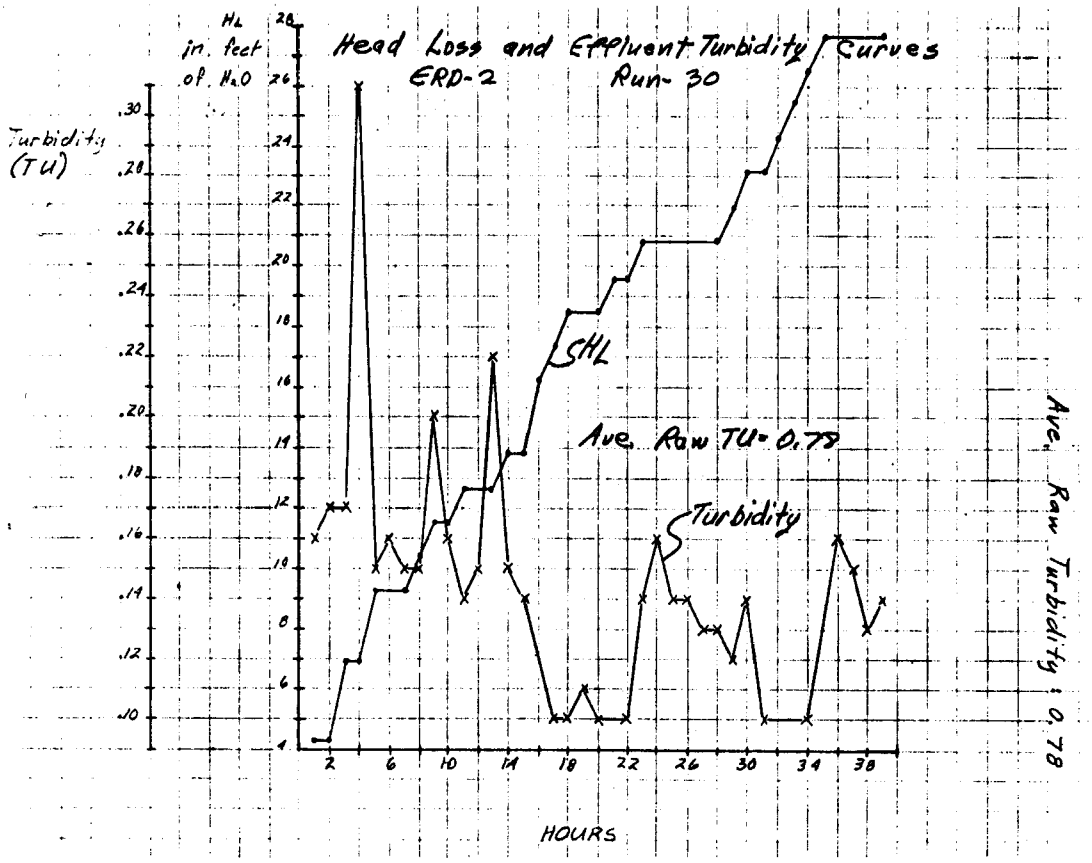

Head Loss and Effluent Turbidity Curves
ERD-2
Run- 25
H_L in feet of H_2O
Turbidity (TU)
HL
Ave. Raw TU= 0.66
Turbidity
HOURS

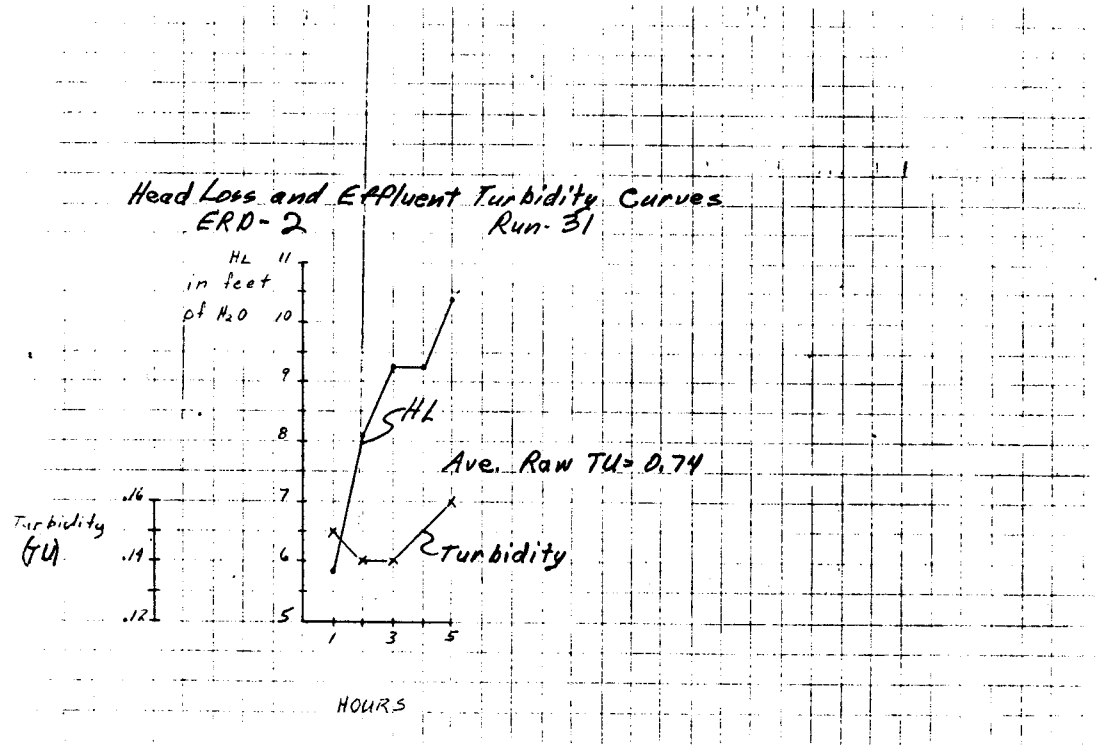

Head Loss and Effluent Turbidity Curves
ERD-2 Run- 26
HL in feet of H2O
Turbidity (TU)
HL
Ave. Raw TU= 0.08
Turbidity
HOURS

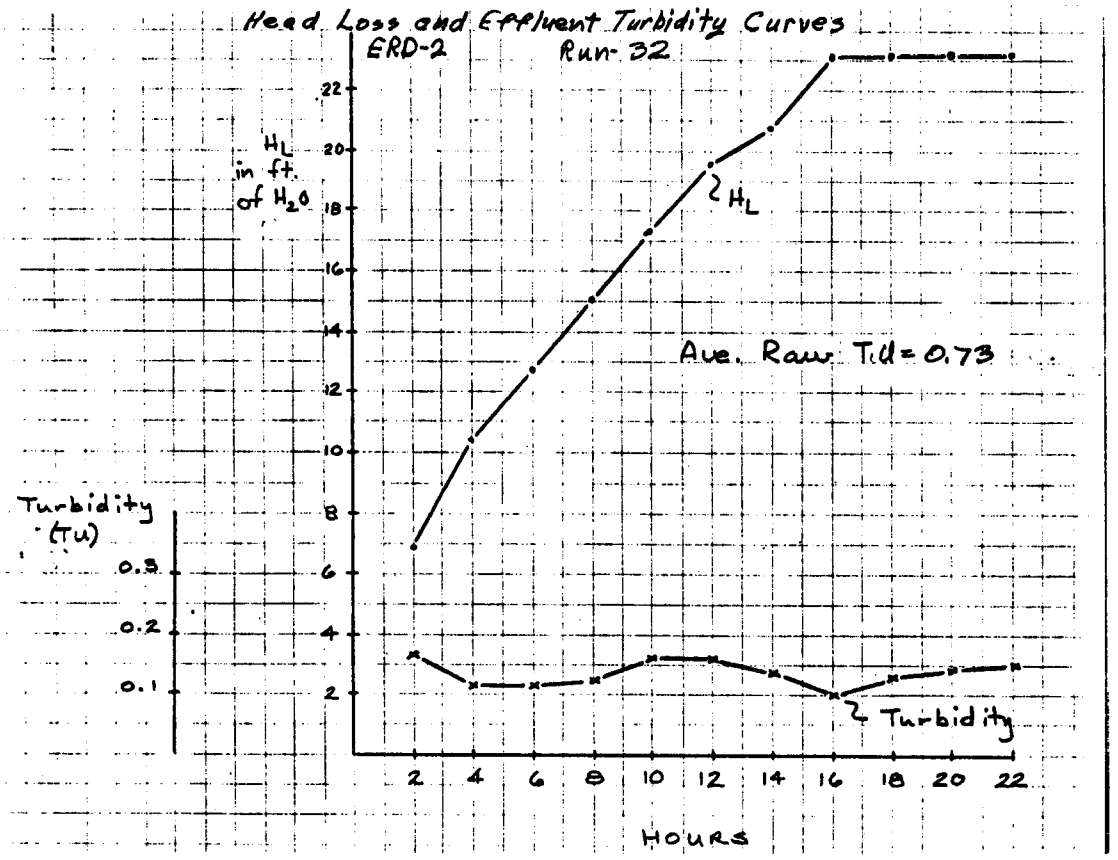

Head Loss and Effluent Turbidity Curves
ERD-2 Run- 27
HL in feet of H2O
Turbidity (TU)
HL
Ave. Raw TU= 0.64
Turbidity
Hours

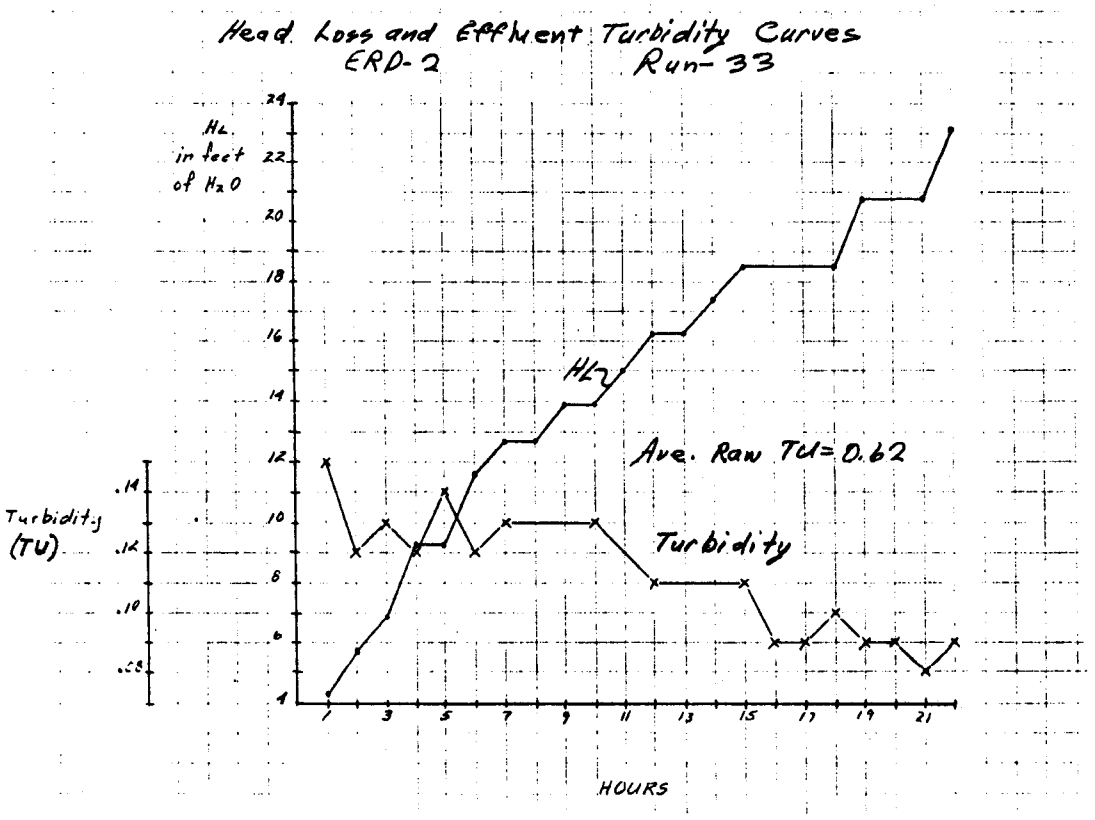

Head Loss and Effluent Turbidity Curves
ERD-2
Run-28
HL in feet of H2O
Tubidity (TU)
HL
Ave. Raw TU = 0.66
Turbidity
HOURS

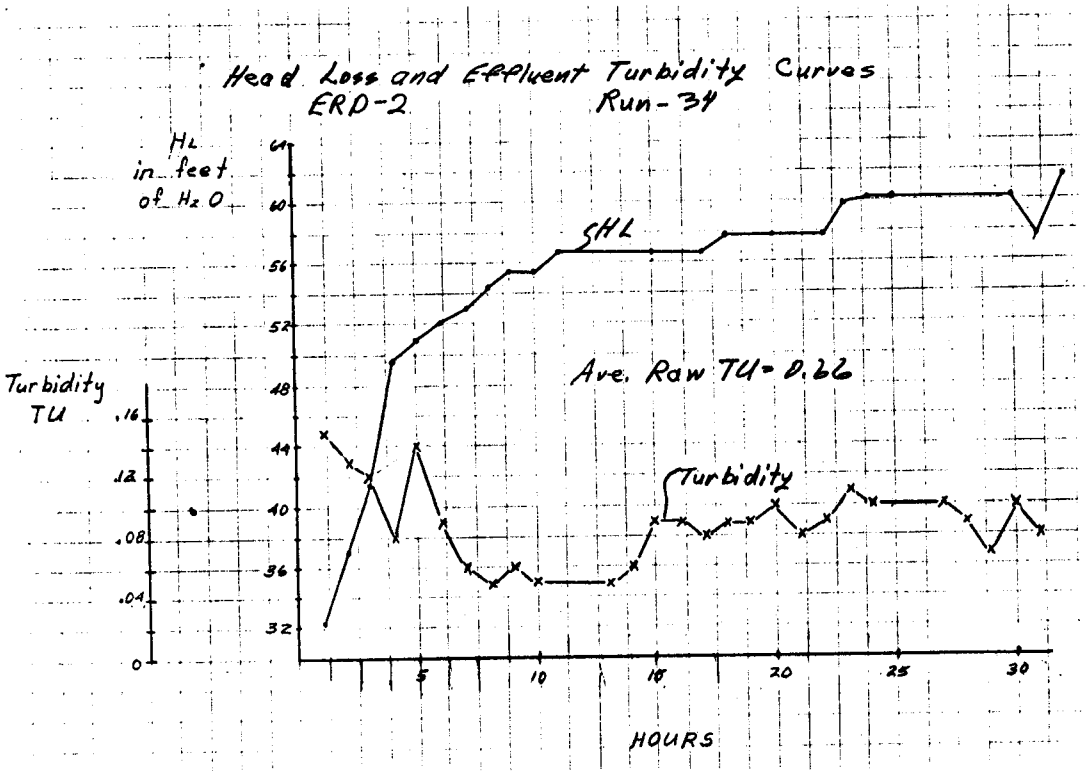

Head Loss and Effluent Turbidity Curves
ERD-2
Run-29
HL in feet of H2O
Turbidity (TU)
HL
Ave. Raw TU = 0.67
Turbidity
HOURS

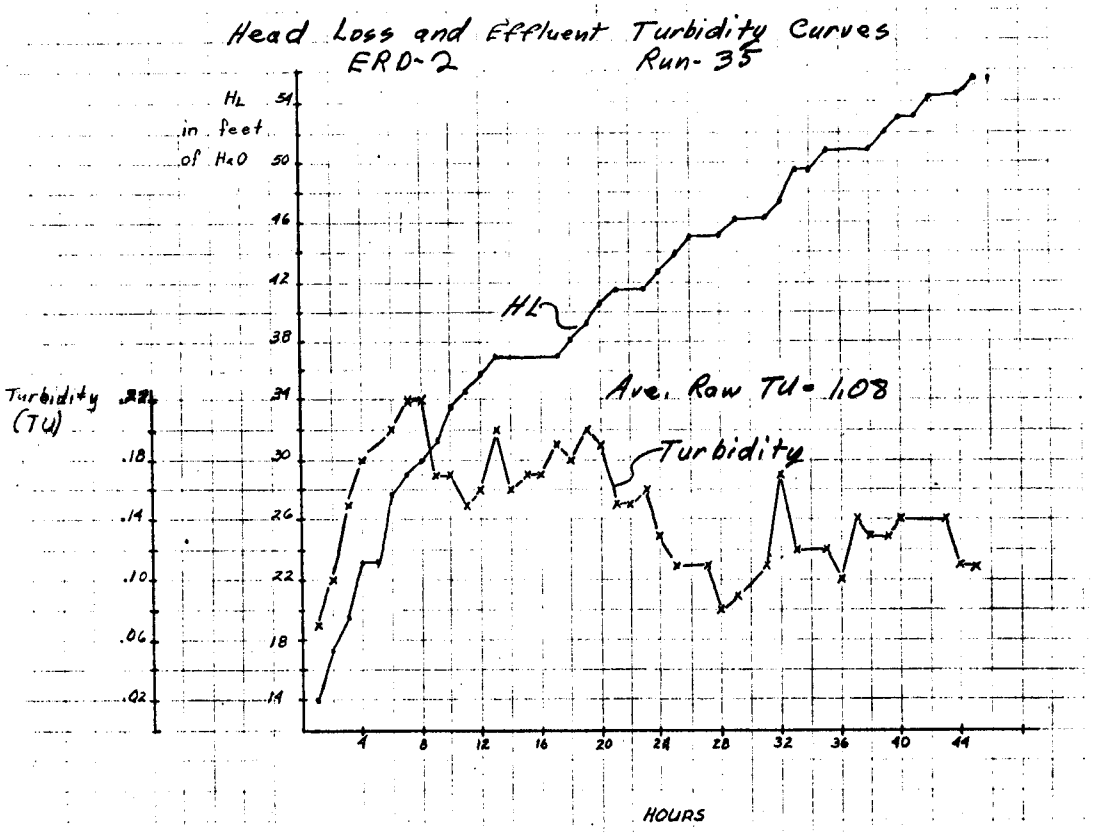

Head Loss and Effluent Turbidity Curves
ERD-2
Run-30
HL in feet of H_2O
Turbidity (TU)
SHL
Ave. Raw TU = 0.79
Turbidity
Ave. Raw Turbidity = 0.78
HOURS

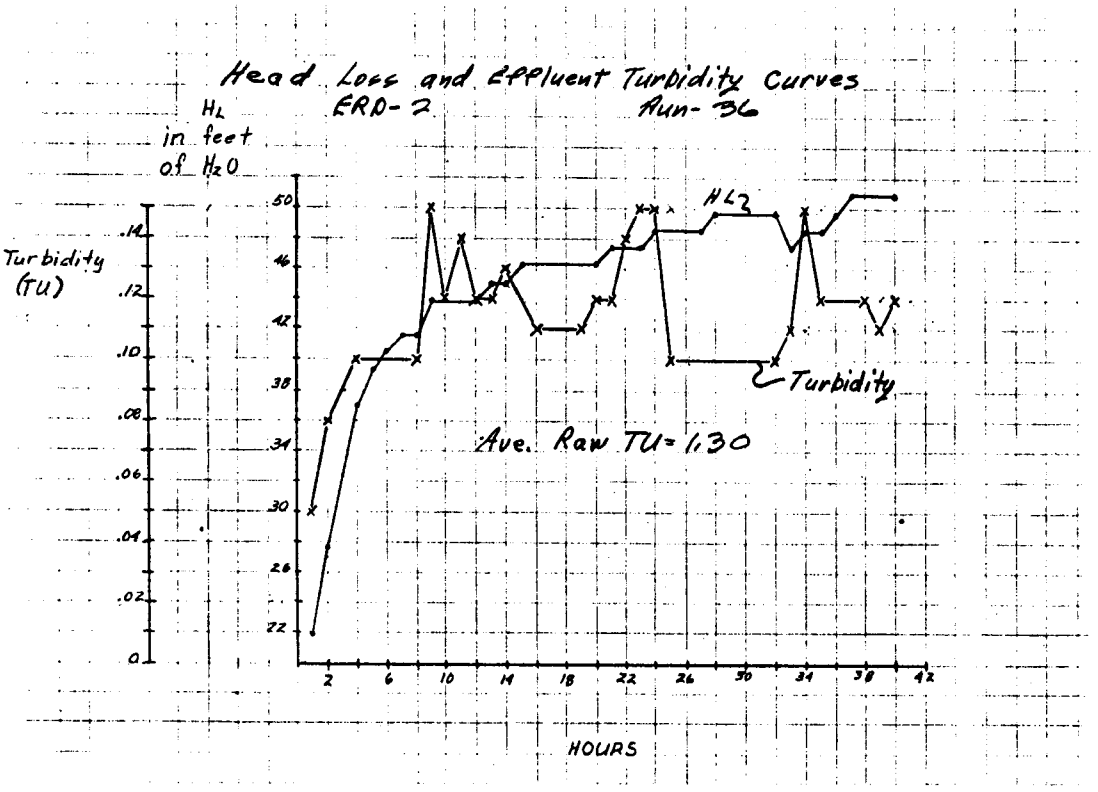

Head Loss and Effluent Turbidity Curves
ERD-2
Run-31
HL in feet of H_2O
Turbidity (TU)
SHL
Ave. Raw TU = 0.74
Turbidity
HOURS

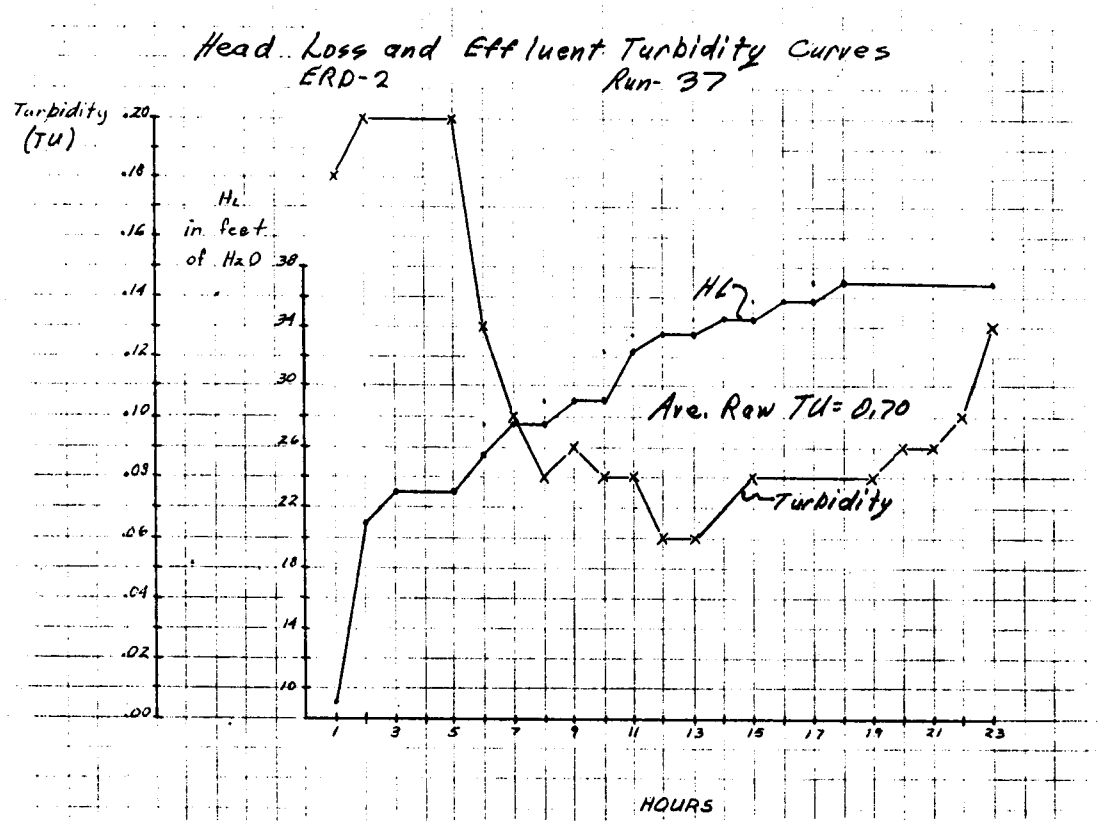

Head Loss and Effluent Turbidity Curves
ERD-2
Run-32
H_L in ft. of H_2O
H_L
Ave. Raw T.U = 0.73
Turbidity (TU)
Turbidity
HOURS

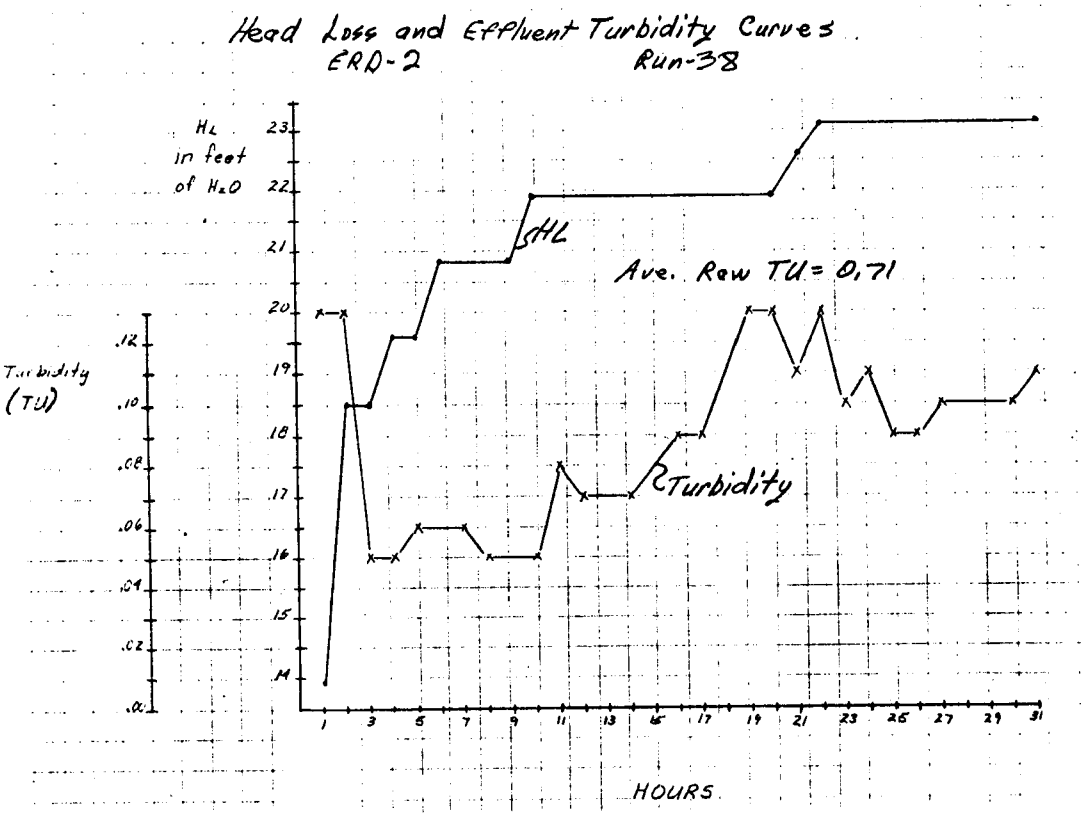

Head Loss and Effluent Turbidity Curves
ERD-2
Run-33
H_L in feet of H_2O
H_L
Ave. Raw TU = 0.62
Turbidity
Turbidity (TU)
HOURS

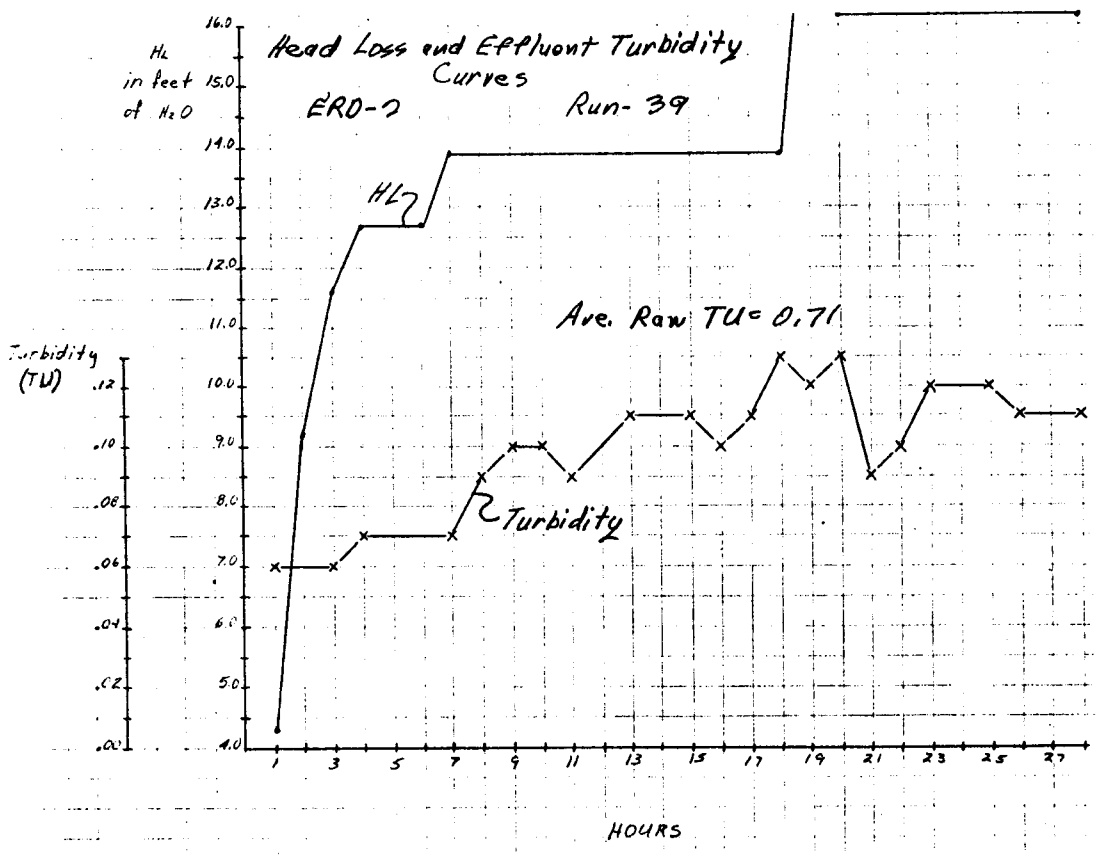

Head Loss and Effluent Turbidity Curves
ERD-2
Run-34
HL in feet of H2O
Turbidity TU
SHL
Ave. Raw TU = 0.26
Turbidity
HOURS

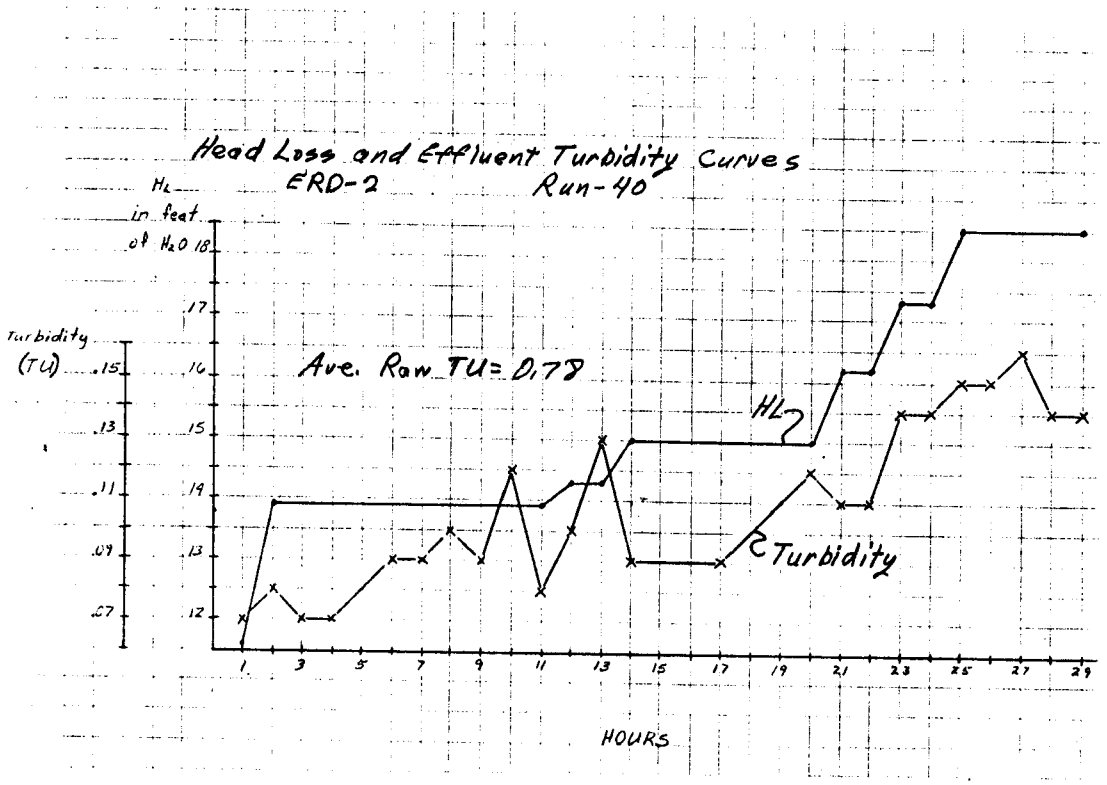

Head Loss and Effluent Turbidity Curves
ERD-2
Run-35
HL in feet of H2O
Turbidity (TU)
HL
Ave. Raw TU = 1.08
Turbidity
HOURS

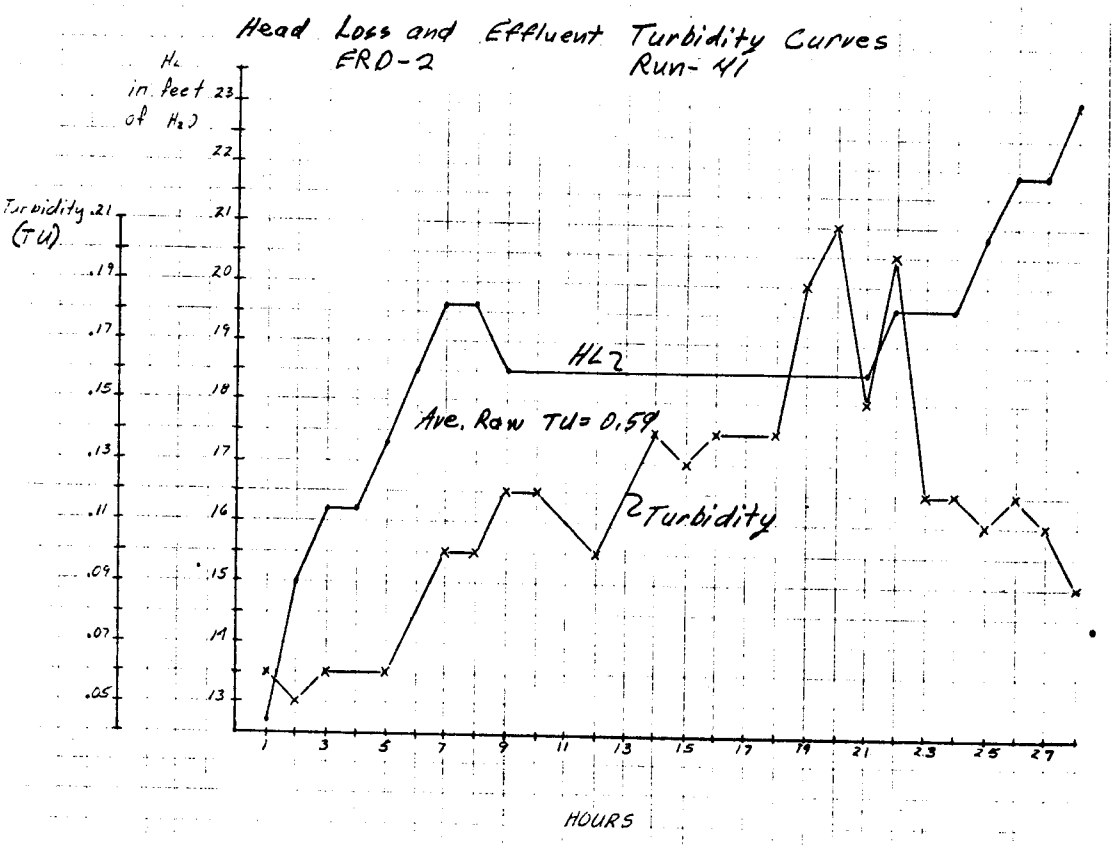

Head Loss and Effluent Turbidity Curves
ERD-2
Run-36
HL in feet of H2O
Turbidity (TU)
HL
Turbidity
Ave. Raw TU= 1.30
HOURS

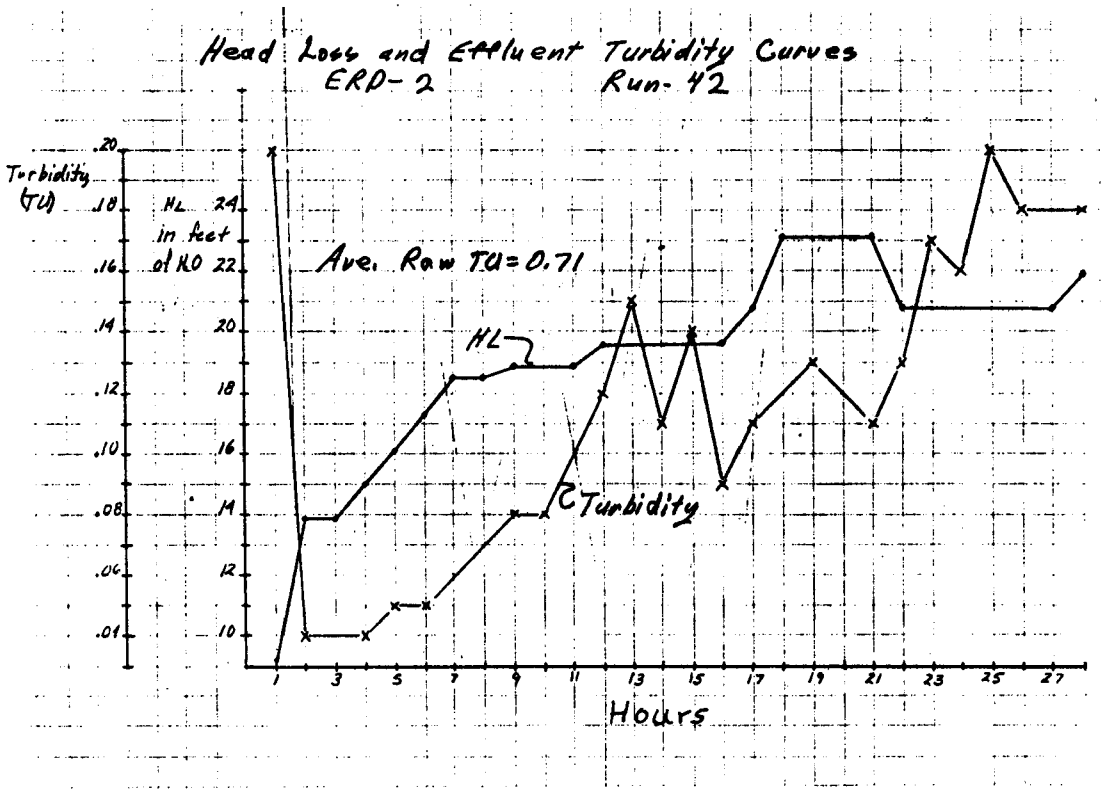

Head Loss and Effluent Turbidity Curves
ERD-2
Run-37
Turbidity (TU)
HL in feet of H2O
HL
Ave. Raw TU= 0.70
Turbidity
HOURS

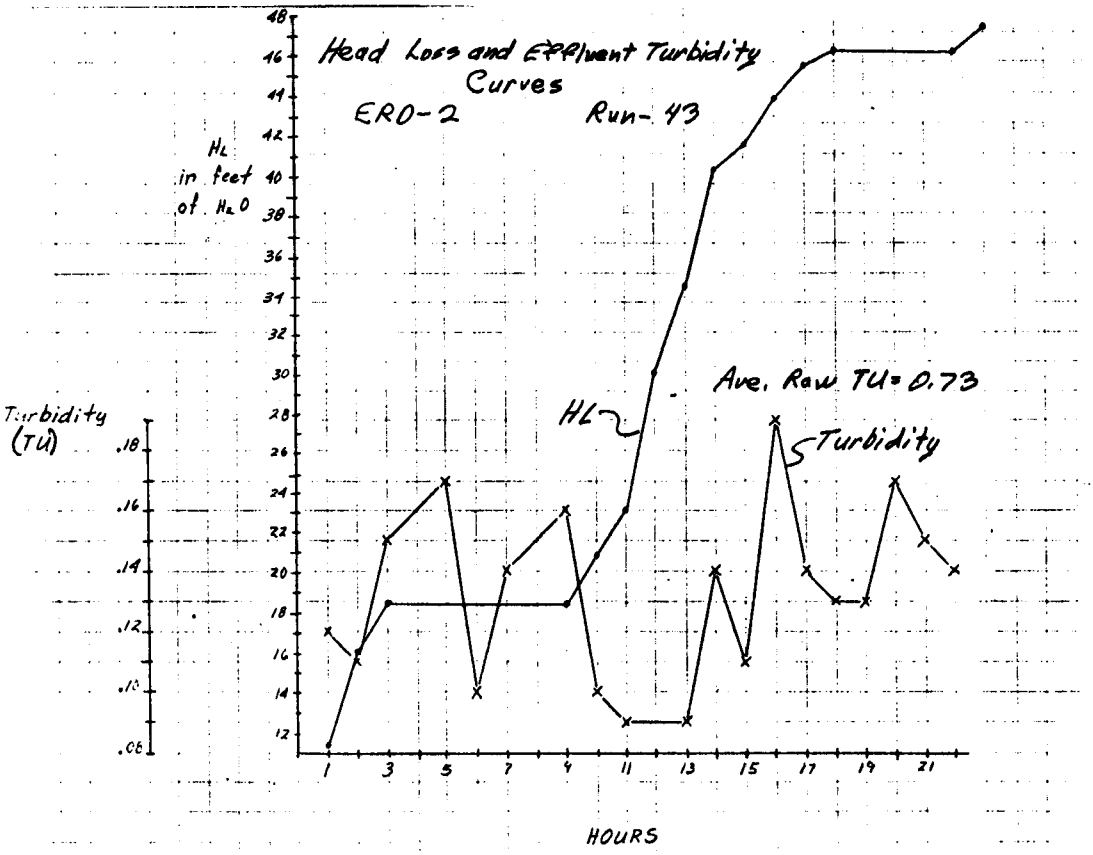

Head Loss and Effluent Turbidity Curves
ERD-2
Run-38
HL in feet of H2O
Turbidity (TU)
HL
Ave. Raw TU = 0.71
Turbidity
HOURS

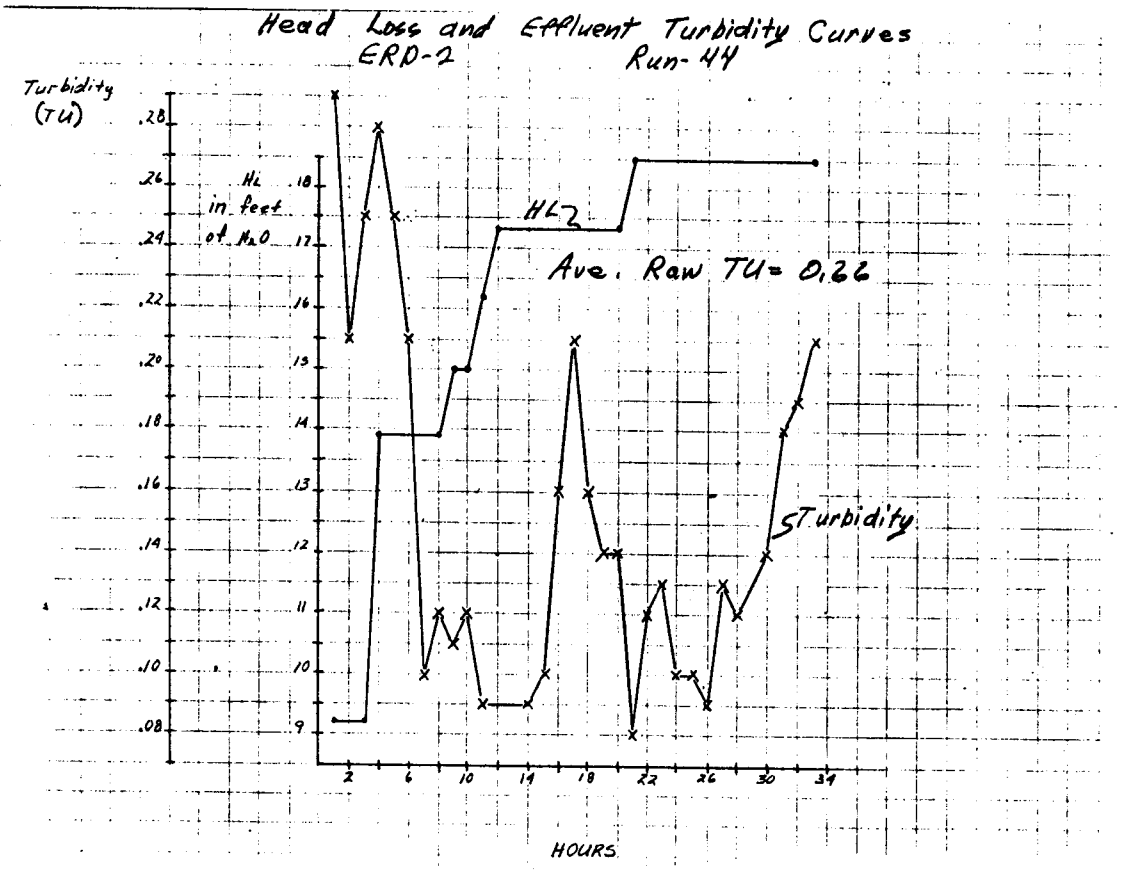

Head Loss and Effluent Turbidity Curves
ERD-2
Run-39
HL in feet of H2O
Turbidity (TU)
HL
Ave. Raw TU = 0.71
Turbidity
HOURS

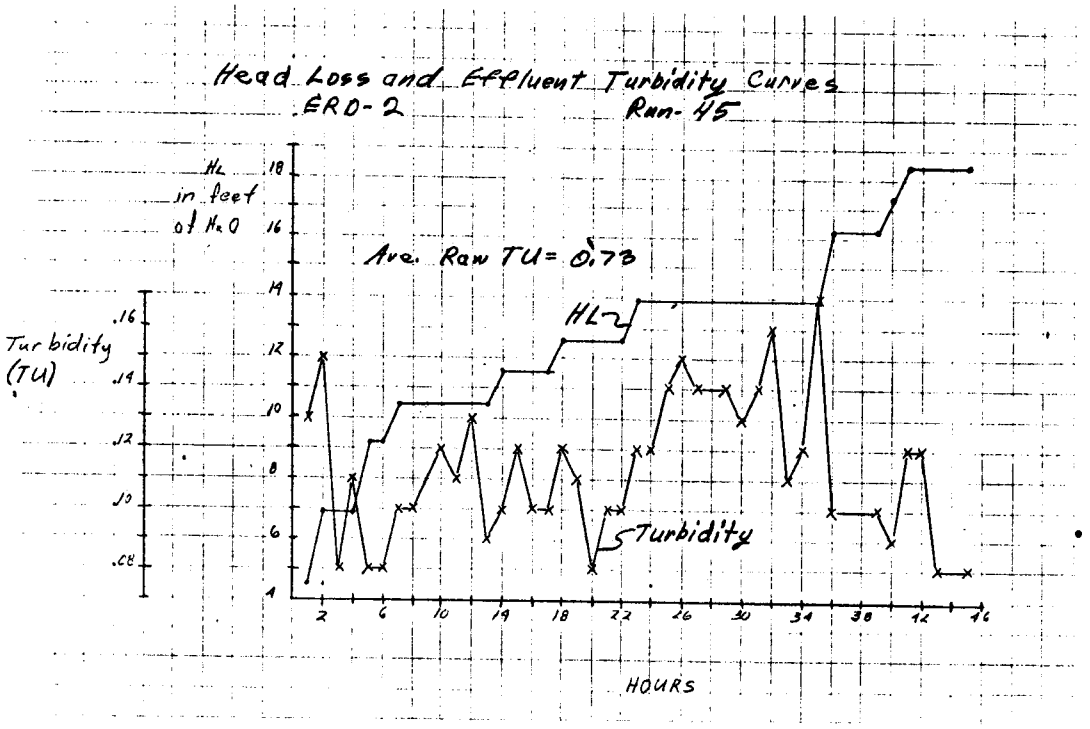

Head Loss and Effluent Turbidity Curves
ERD-2
Run-40
HL in feet of H2O
Turbidity (TU)
Ave. Raw TU= 0.78
HL
Turbidity
HOURS

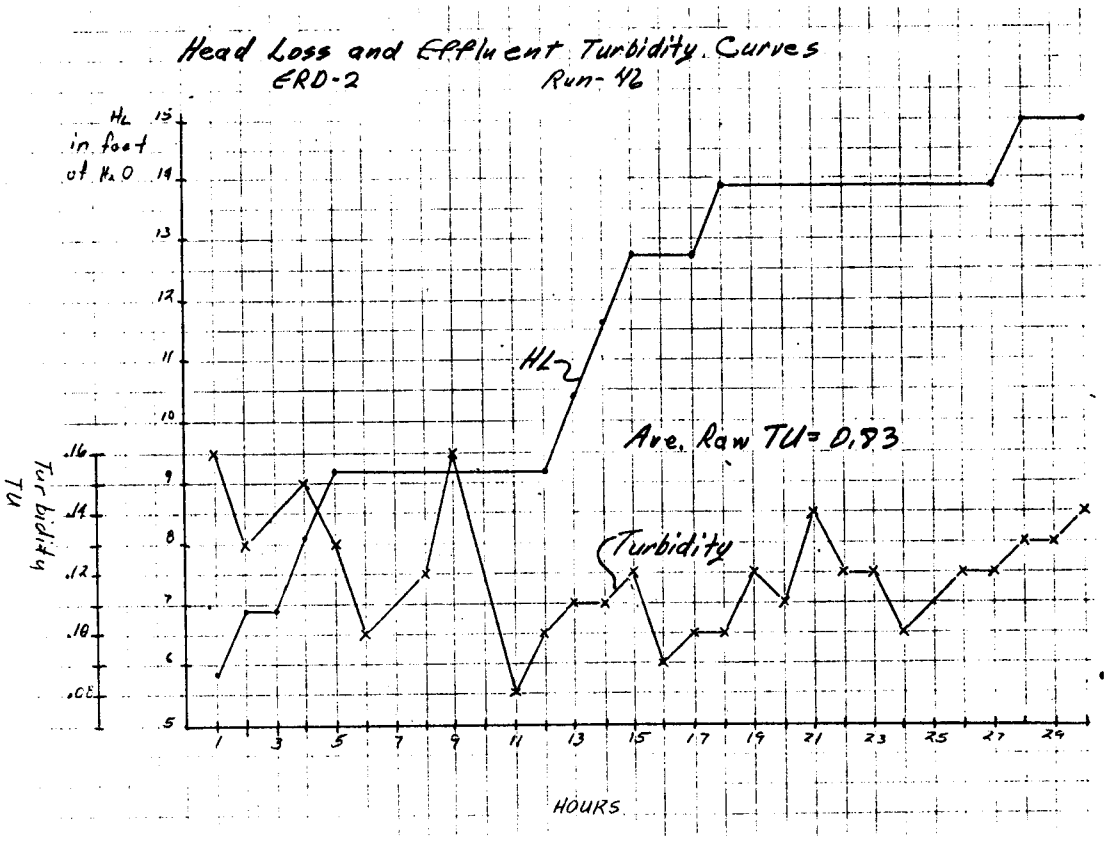

Head Loss and Effluent Turbidity Curves
ERD-2
Run-41
HL in feet of H2O
Turbidity (TU)
HL
Ave. Raw TU= 0.59
Turbidity
HOURS

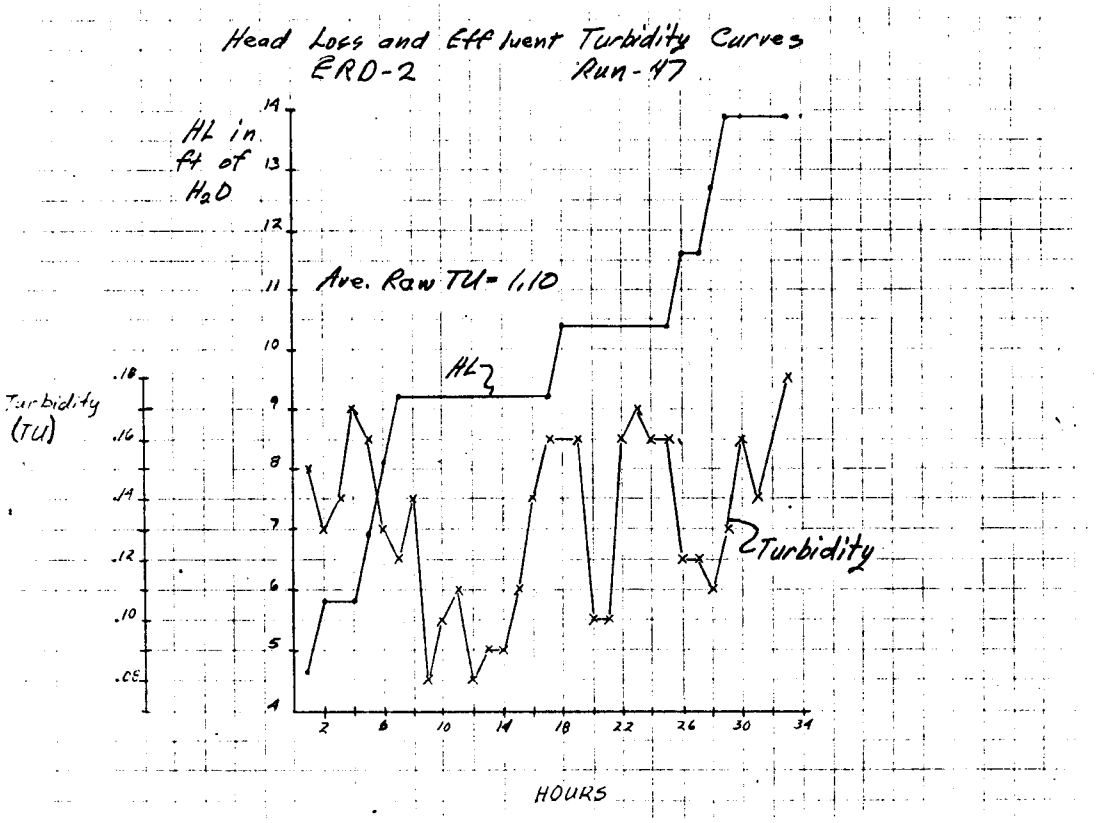

Head Loss and Effluent Turbidity Curves
ERD-2
Run-42
Turbidity (TU)
HL in feet of H2O
Ave. Raw TU=0.71
HL
Turbidity
Hours

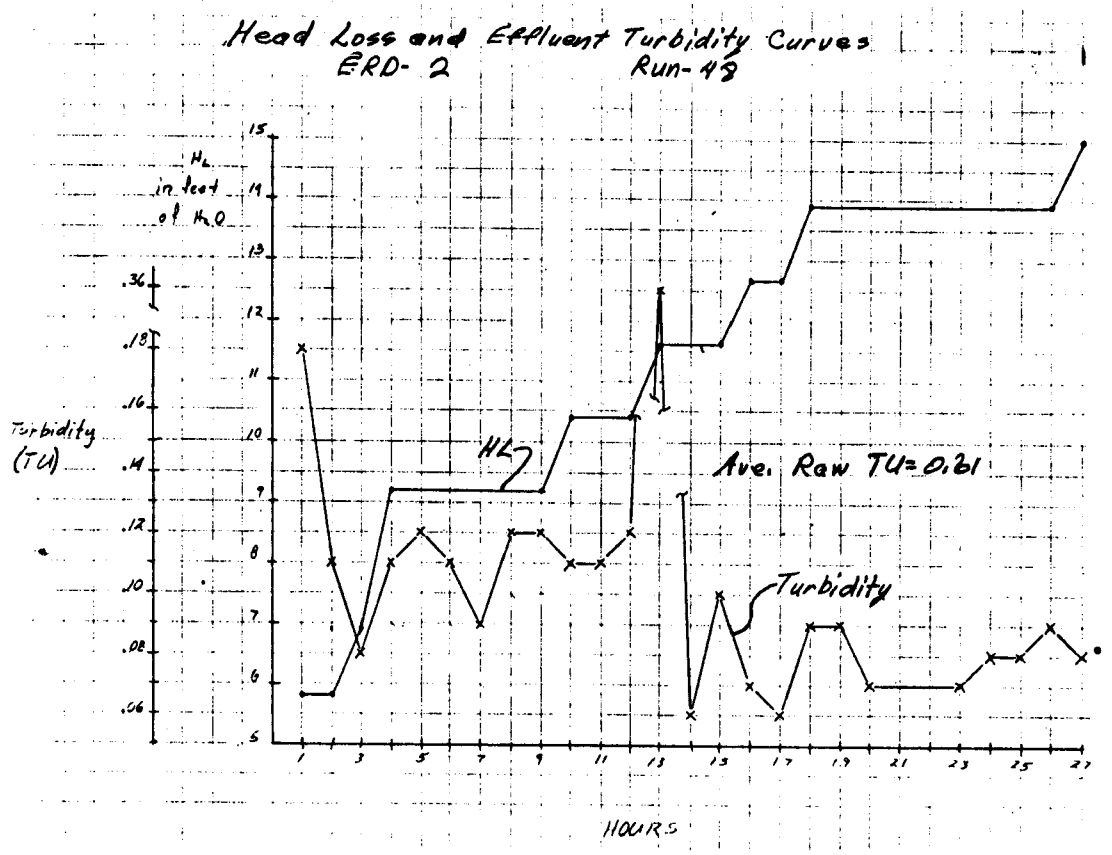

Head Loss and Effluent Turbidity Curves
ERD-2
Run-43
HL in feet of H2O
Turbidity (TU)
Ave. Raw TU=0.73
HL
Turbidity
HOURS

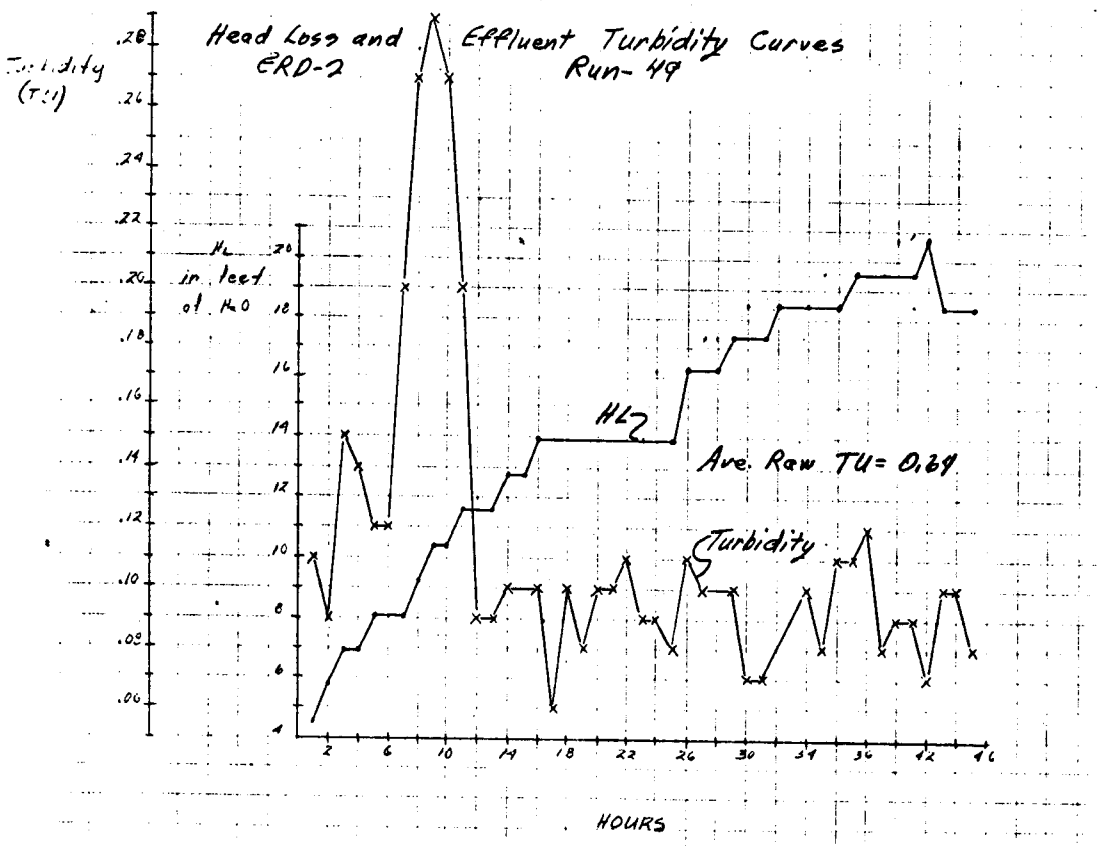

Head Loss and Effluent Turbidity Curves
ERD-2
Run-44
Turbidity (TU)
HL in feet of H_2O
HL
Ave. Raw TU = 0.26
Turbidity
HOURS

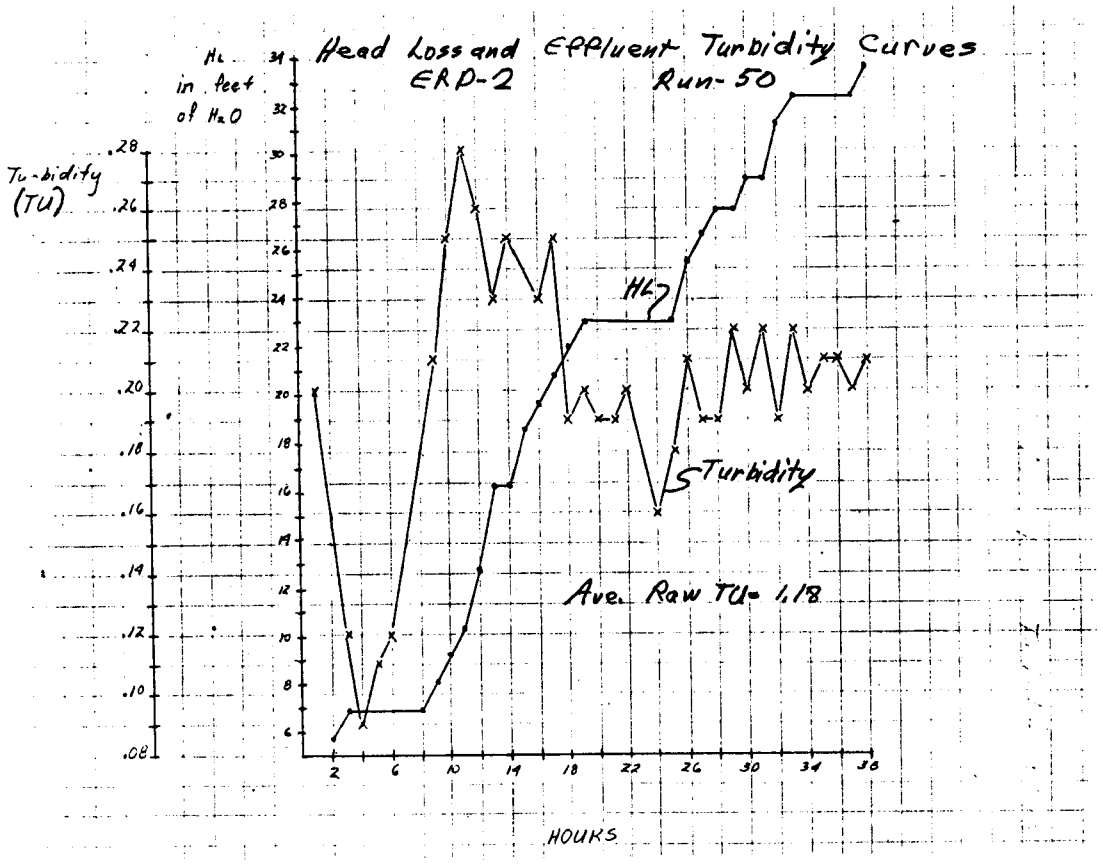

Head Loss and Effluent Turbidity Curves
ERD-2
Run-45
HL in feet of H_2O
Ave. Raw TU = 0.73
HL
Turbidity (TU)
Turbidity
HOURS

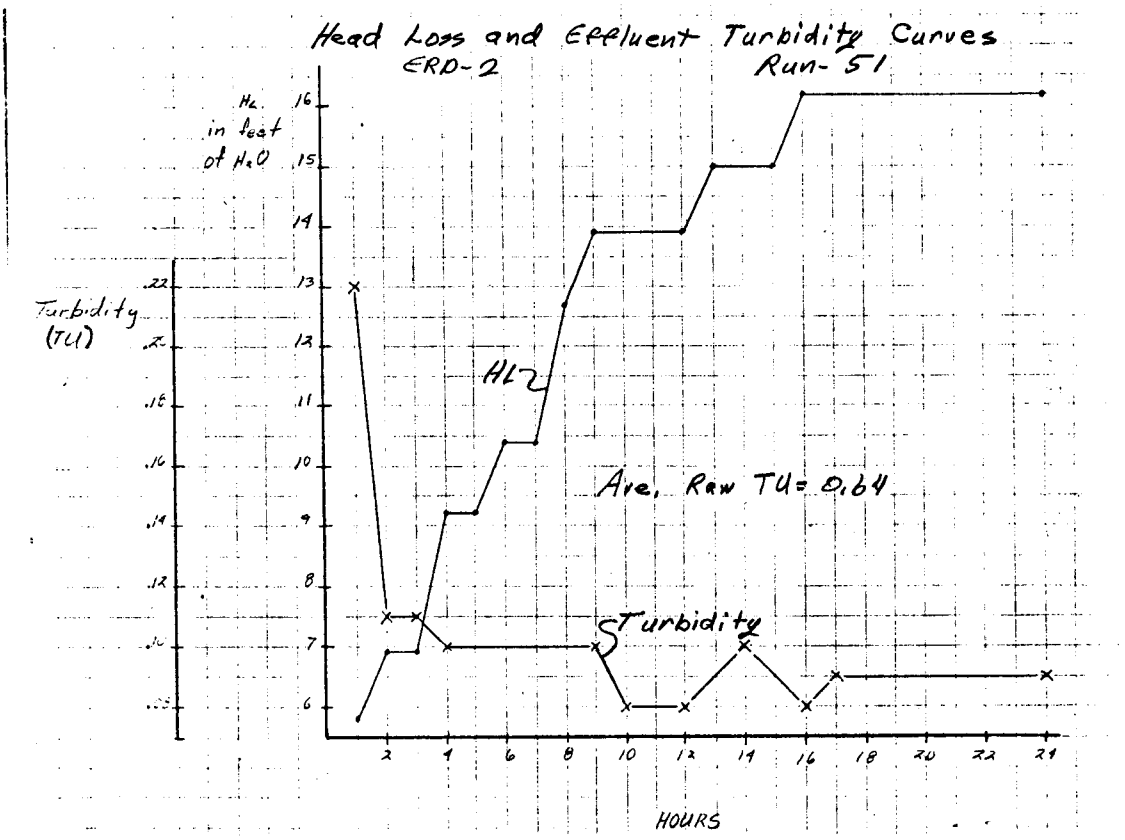

Head Loss and Effluent Turbidity Curves
ERD-2
Run-46
HL in feet of H2O
Turbidity TU
HL
Ave. Raw TU = 0.93
Turbidity
HOURS

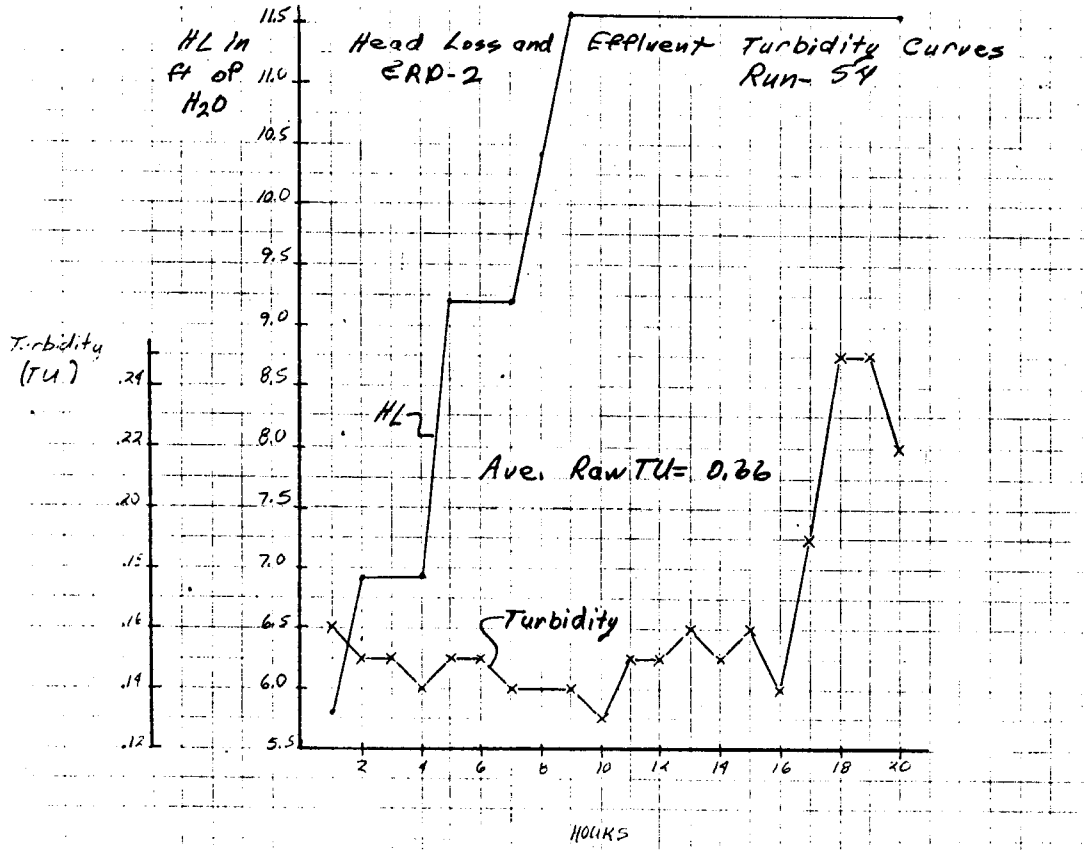

Head Loss and Effluent Turbidity Curves
ERD-2
Run-47
HL in ft of H2O
Turbidity (TU)
Ave. Raw TU = 1.10
HL
Turbidity
HOURS

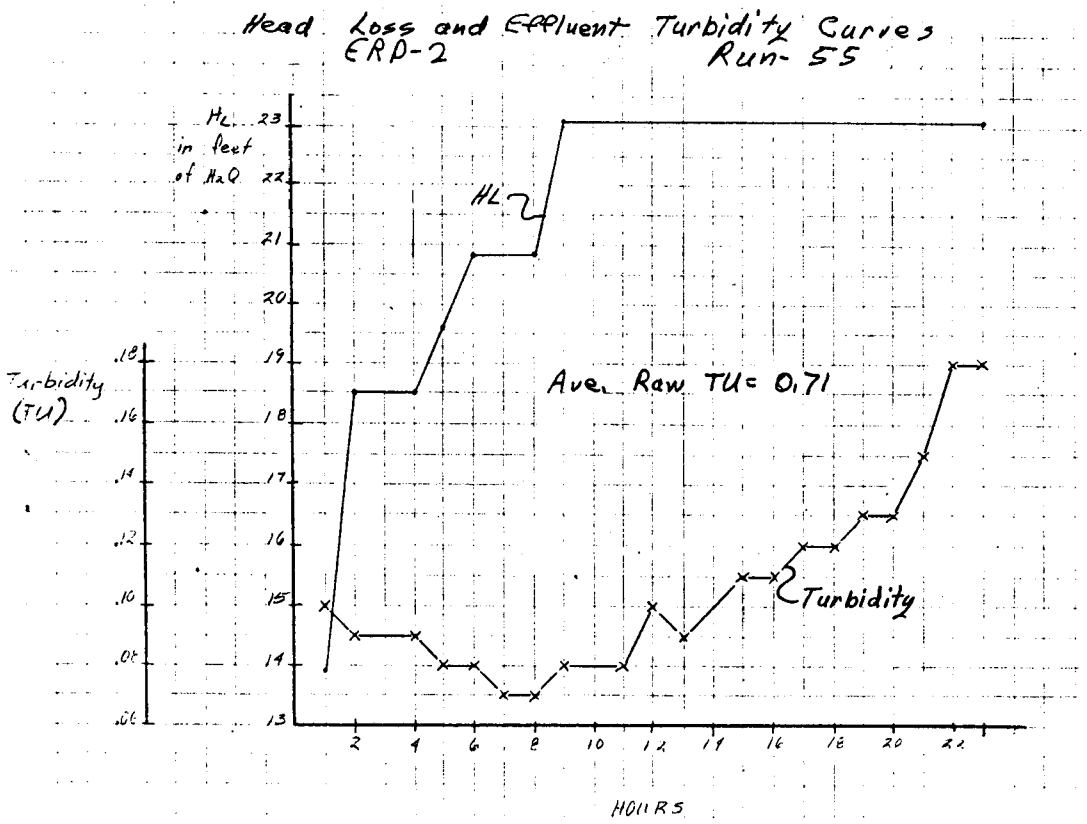

Head Loss and Effluent Turbidity Curves
ERD- 2
Run- 48
HL in feet of H2O
Turbidity (TU)
HL
Ave. Raw TU= 0.61
Turbidity
HOURS

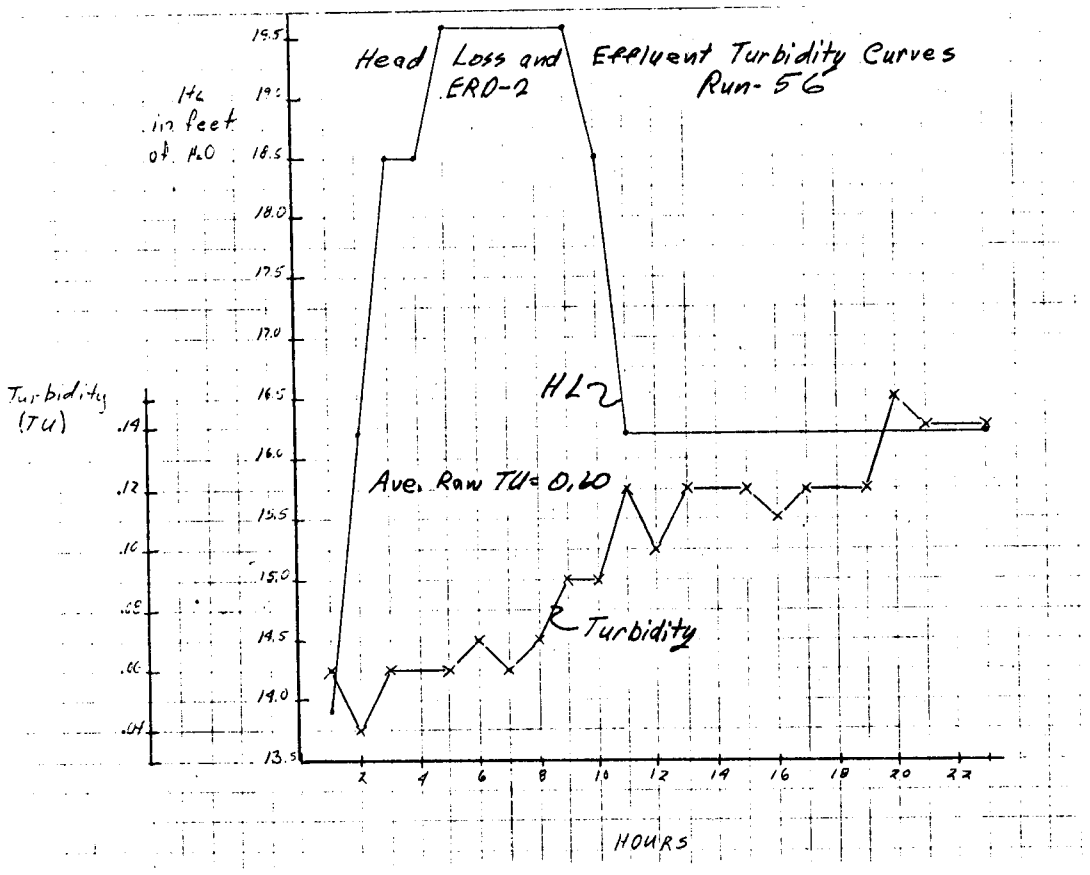

Head Loss and Effluent Turbidity Curves
ERD-2
Run- 49
Turbidity (TU)
HL in feet of H2O
HL
Ave. Raw TU= 0.69
Turbidity
HOURS

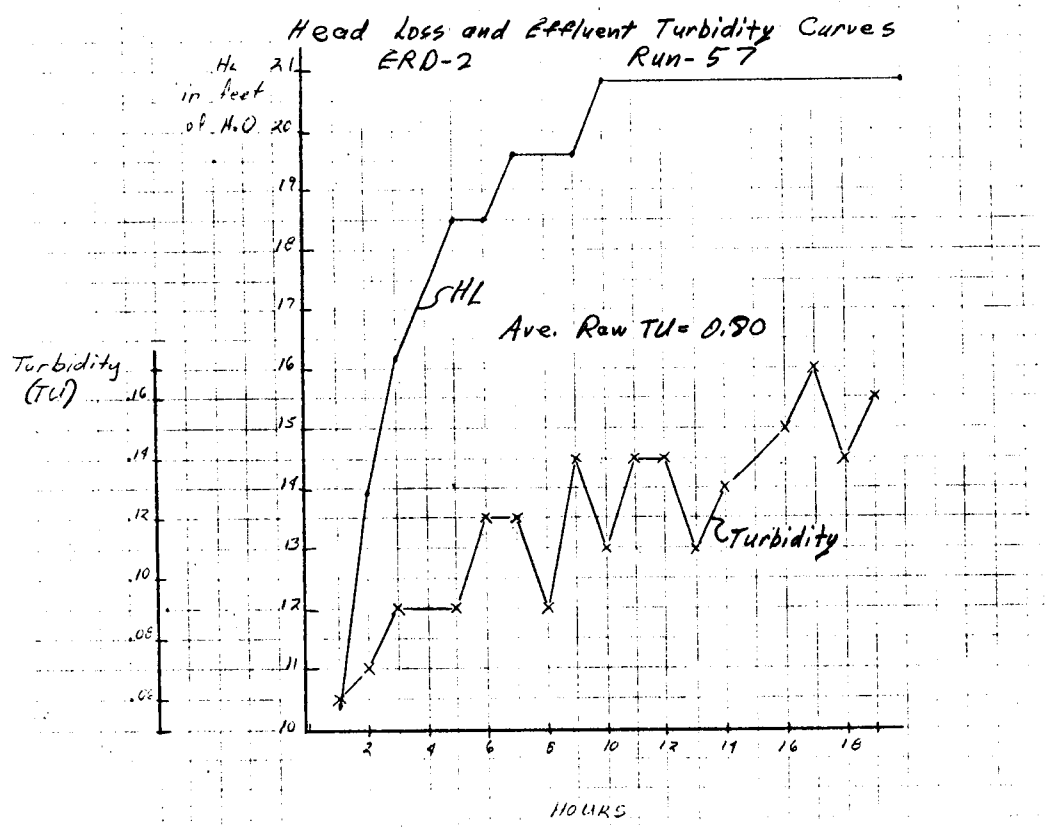

Head Loss and Effluent Turbidity Curves
ERD-2
Run-50
HL in feet of H2O
Turbidity (TU)
HL
Turbidity
Ave. Raw TU= 1.18
HOURS

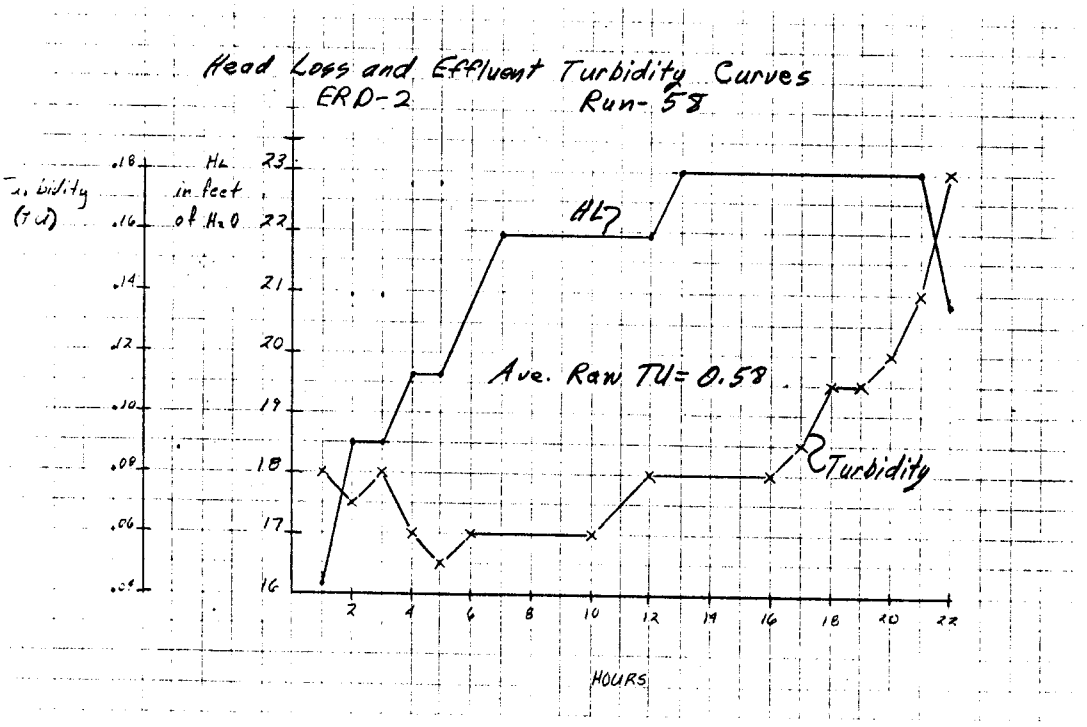

Head Loss and Effluent Turbidity Curves
ERD-2
Run-51
HL in feet of H2O
Turbidity (TU)
HL
Ave. Raw TU= 0.64
Turbidity
HOURS

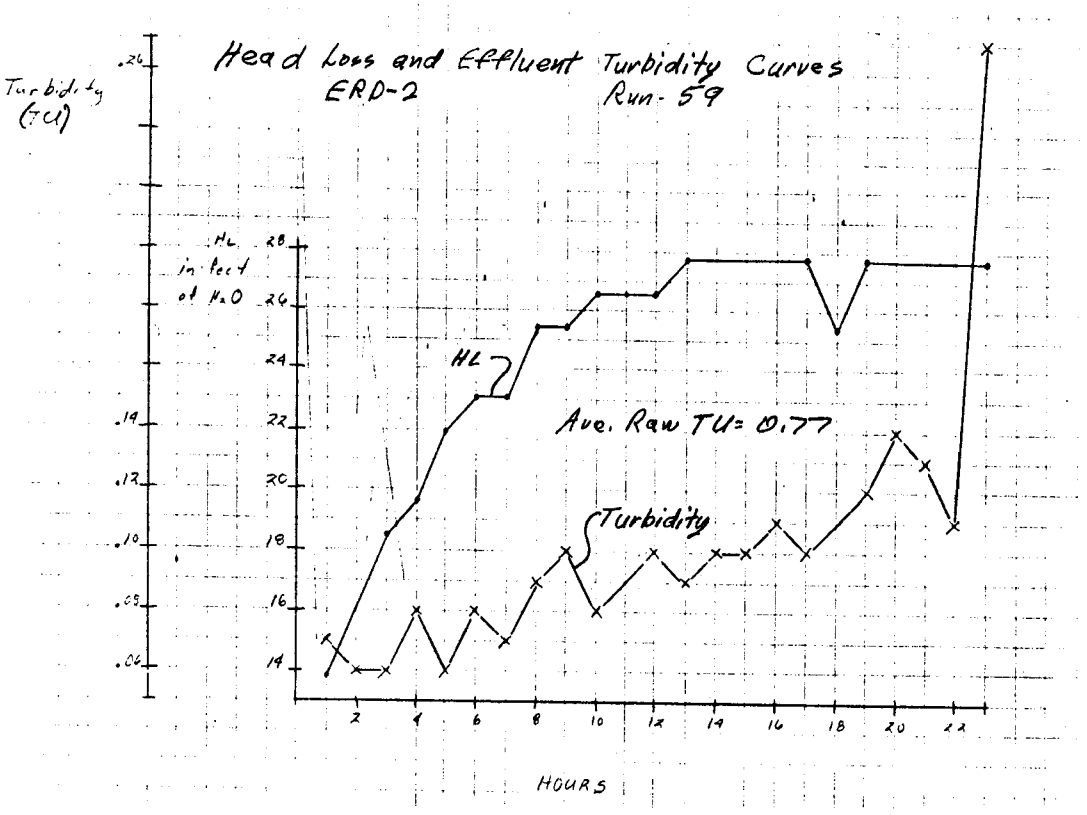

Head Loss and Effluent Turbidity Curves
ERD-2
Run- 54
HL in ft of H_2O
Turbidity (TU)
HL
Turbidity
Ave. Raw TU= 0.66
HOURS

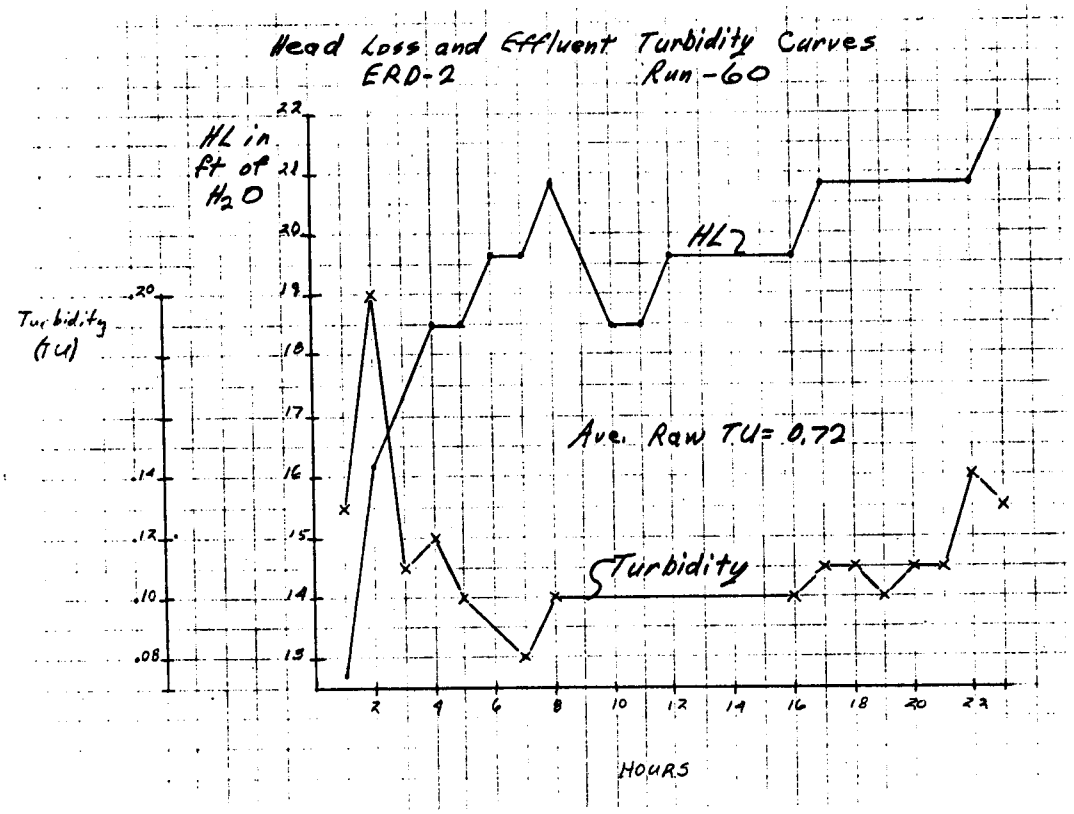

Head Loss and Effluent Turbidity Curves
ERD-2
Run- 55
HL in feet of H_2O
Turbidity (TU)
HL
Turbidity
Ave. Raw TU= 0.71
HOURS

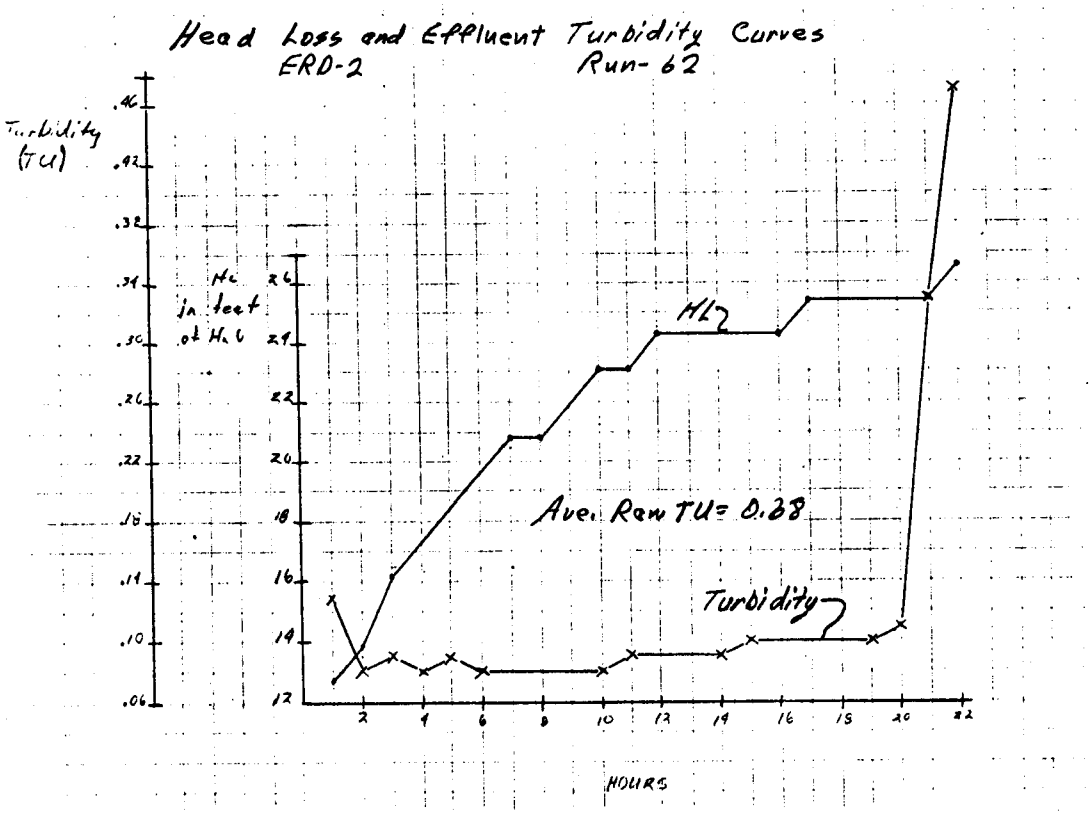

Head Loss and Effluent Turbidity Curves
ERD-2
Run-56
H_L in feet of H_2O
Turbidity (TU)
HL
Ave. Raw TU= 0.60
Turbidity
HOURS

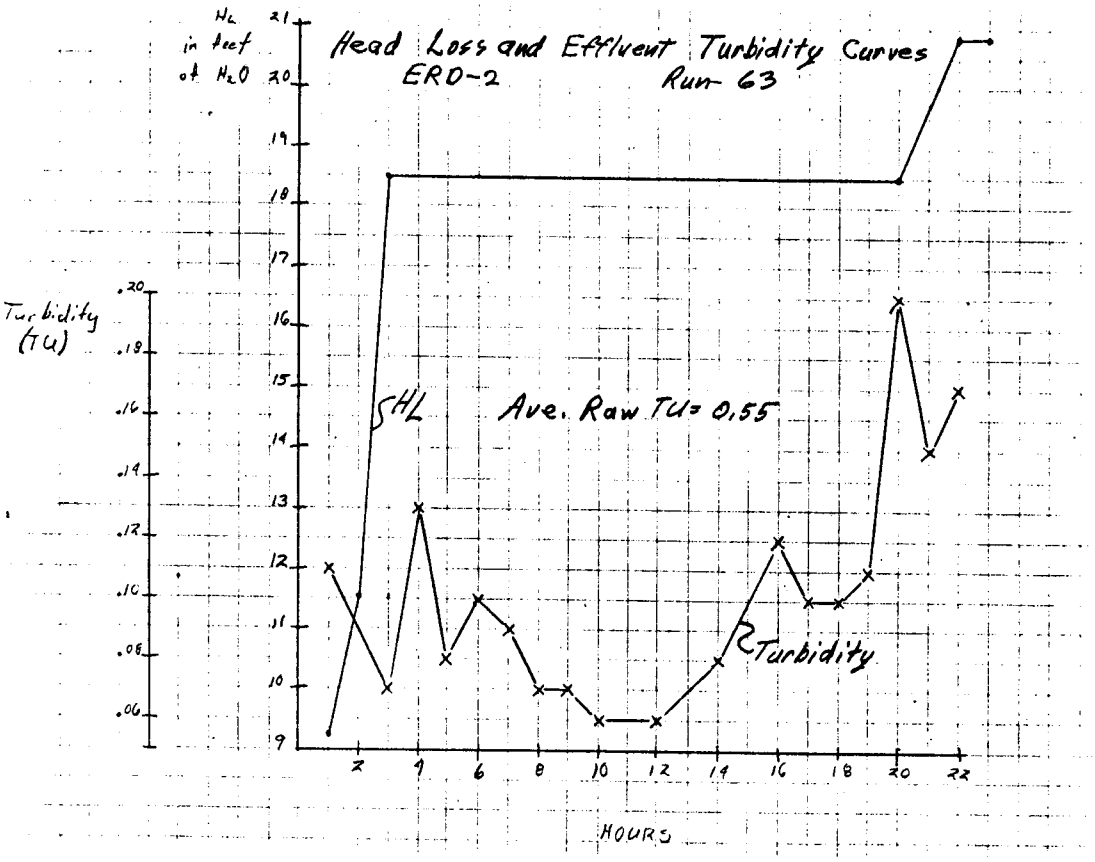

Head Loss and Effluent Turbidity Curves
ERD-2
Run-57
H_L in feet of H_2O
Turbidity (TU)
HL
Ave. Raw TU= 0.80
Turbidity
HOURS

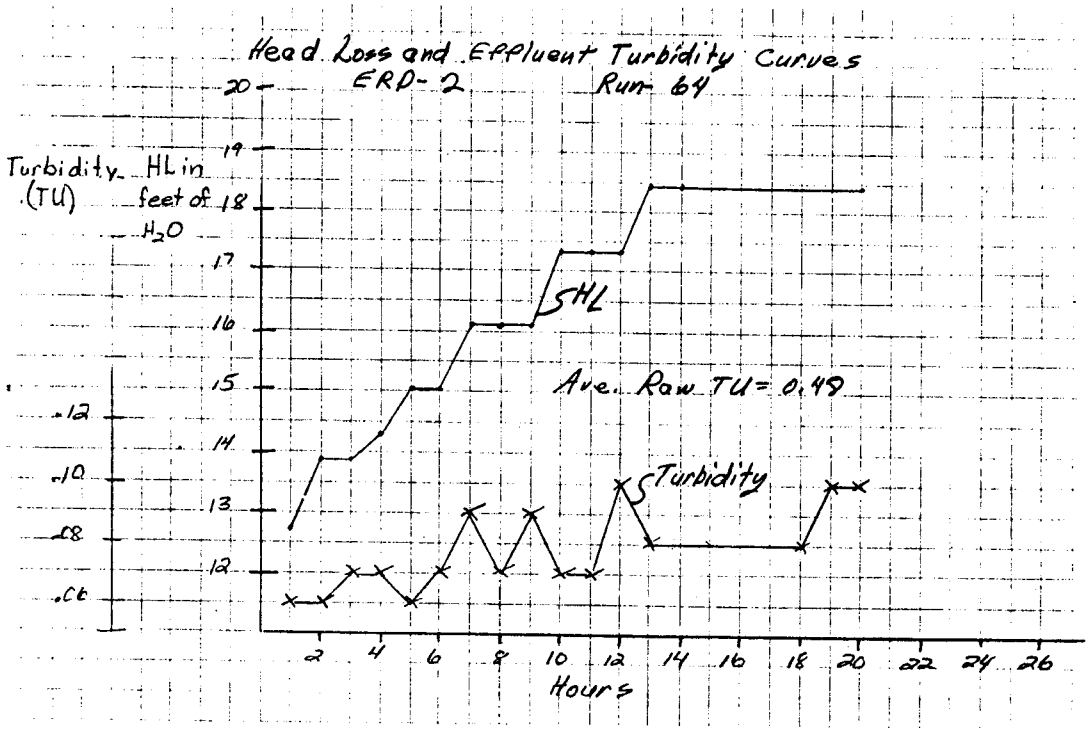

Head Loss and Effluent Turbidity Curves
ERD-2
Run-58
Turbidity (TU)
HL in feet of H2O
HL
Ave. Raw TU= 0.58
Turbidity
HOURS

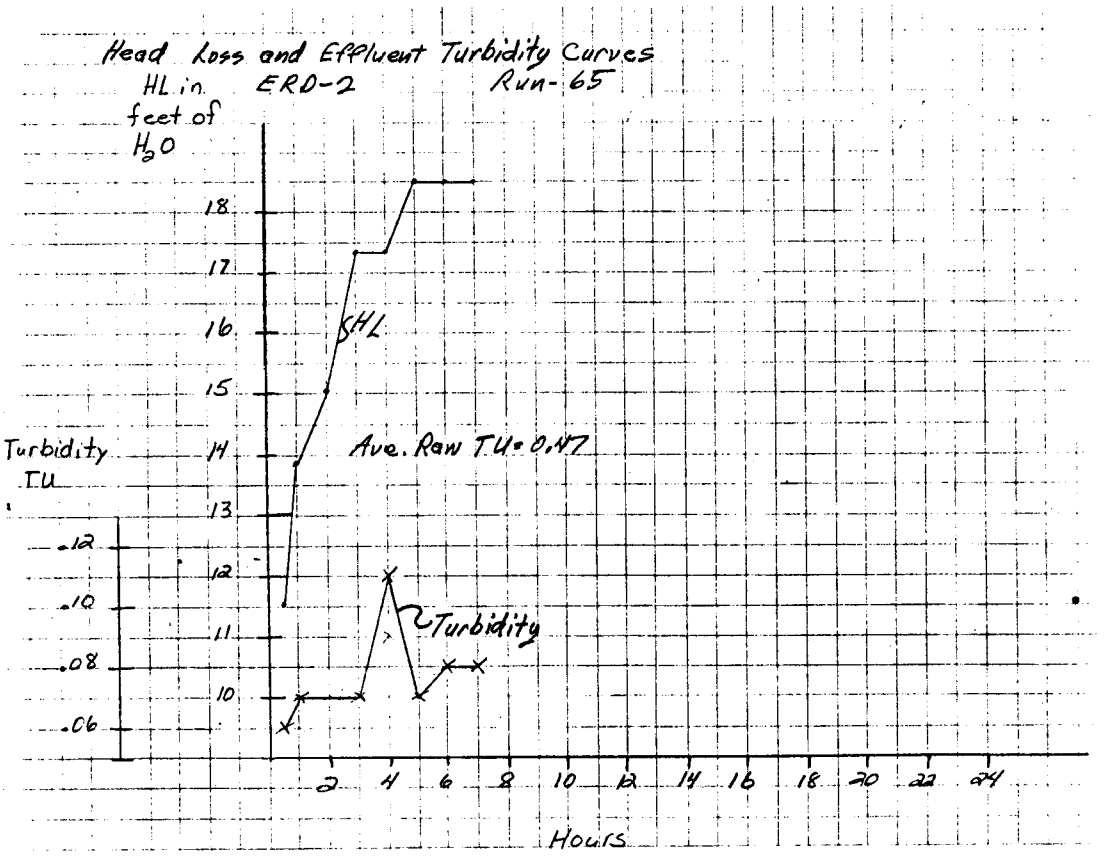

Head Loss and Effluent Turbidity Curves
ERD-2
Run-59
Turbidity (TU)
HL in feet of H2O
HL
Ave. Raw TU= 0.77
Turbidity
HOURS

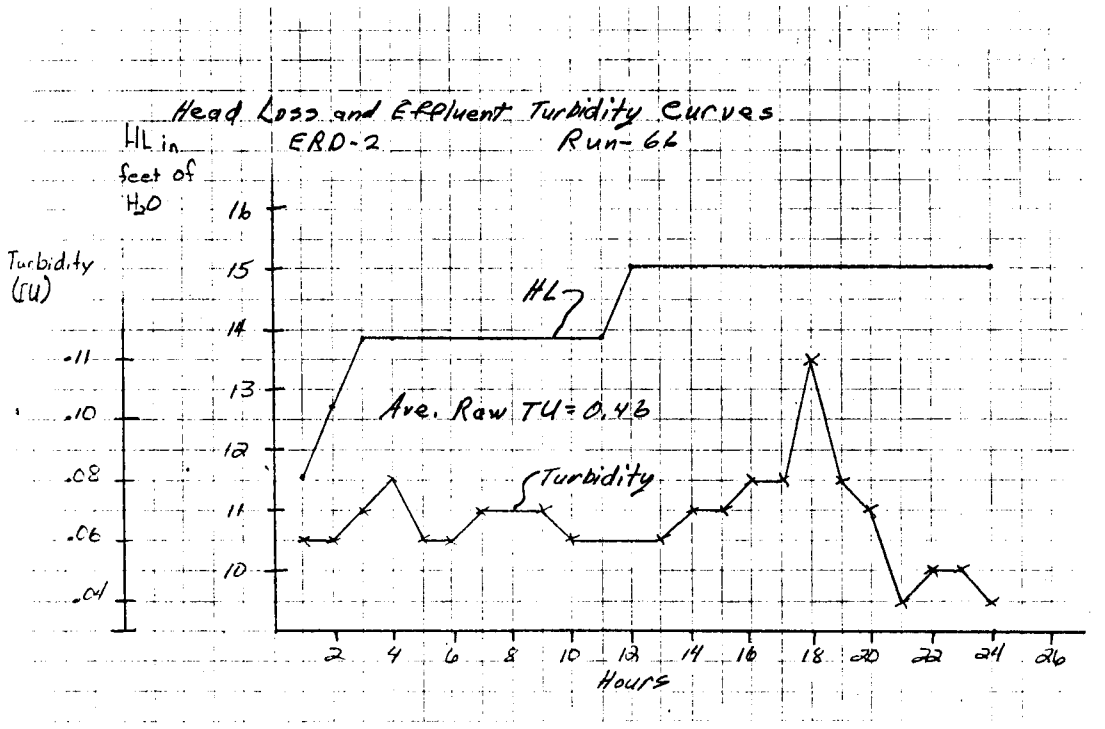

Head Loss and Effluent Turbidity Curves
ERD-2
Run-60
HL in ft of H_2O
Turbidity (TU)
HL
Ave. Raw TU= 0.72
Turbidity
HOURS

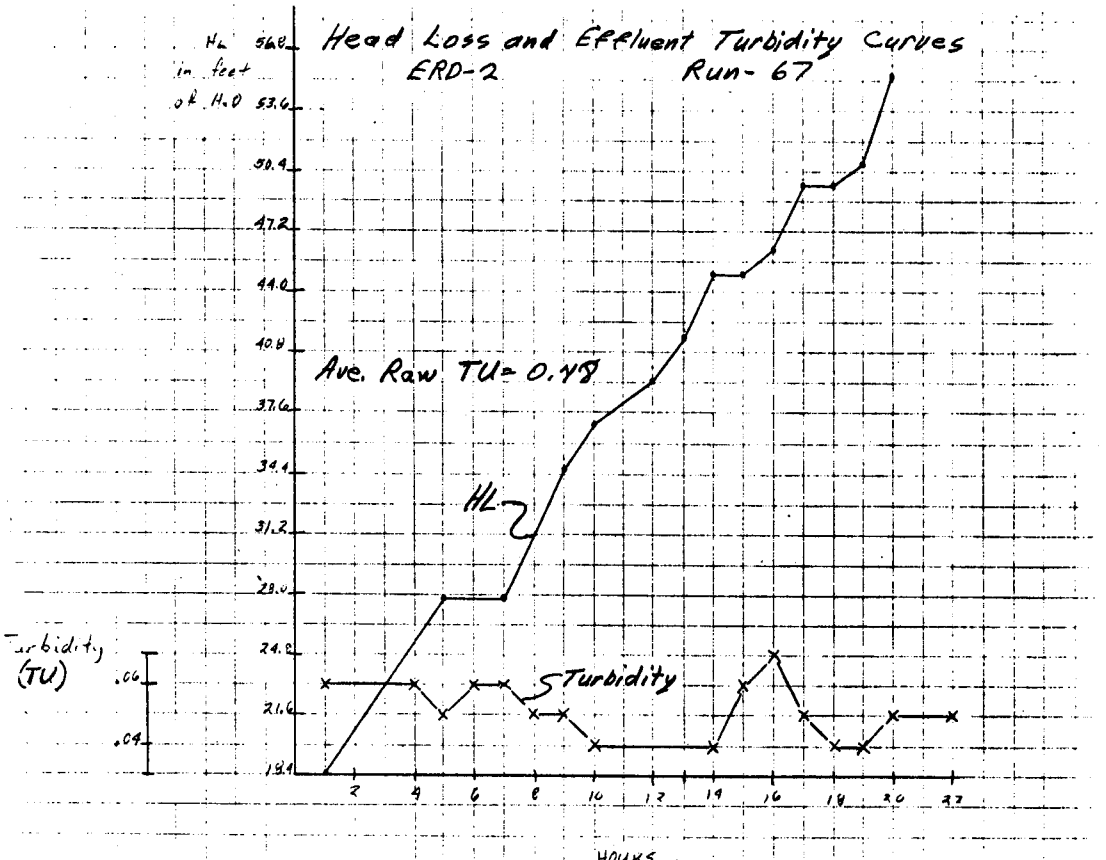

Head Loss and Effluent Turbidity Curves
ERD-2
Run-62
Turbidity (TU)
HL in feet of H_2O
HL
Ave. Raw TU= 0.38
Turbidity
HOURS

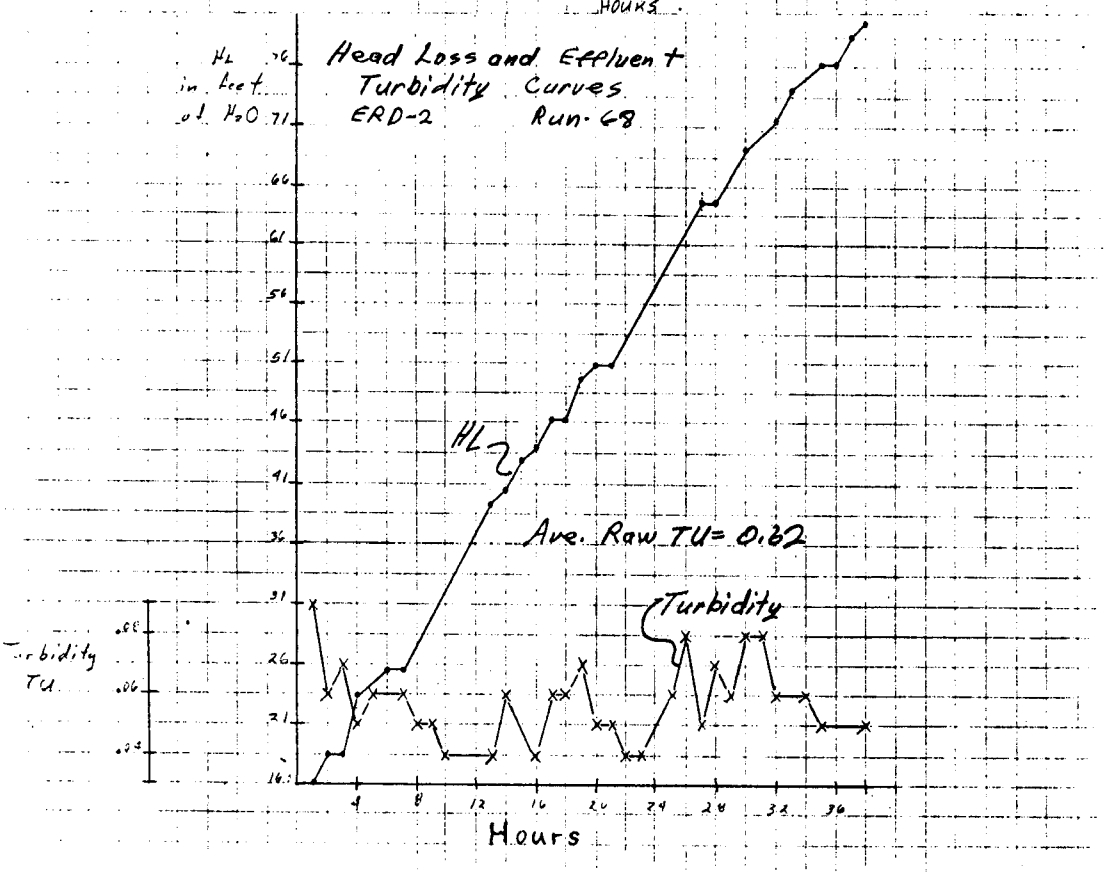

Head Loss and Effluent Turbidity Curves
ERD-2
Run 63
HL in feet of H2O
Turbidity (TU)
HL
Ave. Raw TU = 0.55
Turbidity
HOURS

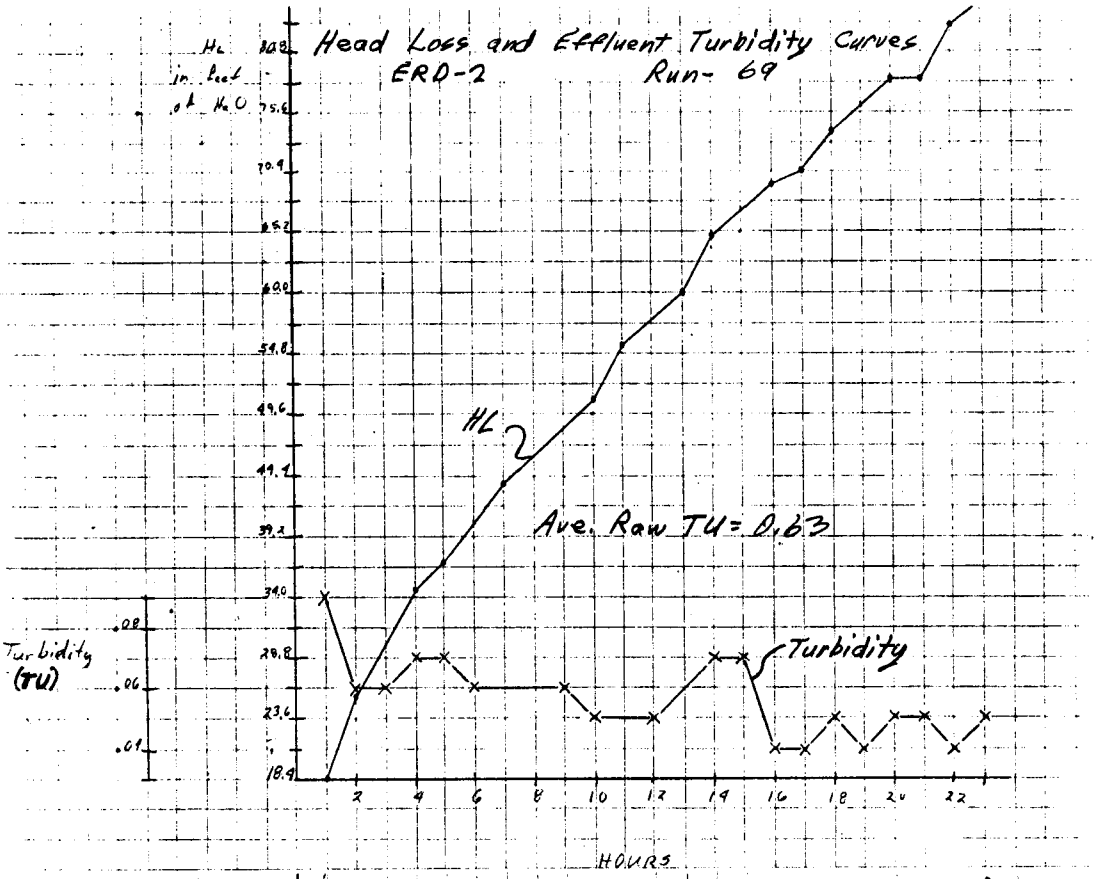

Head Loss and Effluent Turbidity Curves
ERD-2
Run 64
Turbidity (TU)
HL in feet of H2O
HL
Ave. Raw TU = 0.49
Turbidity
Hours

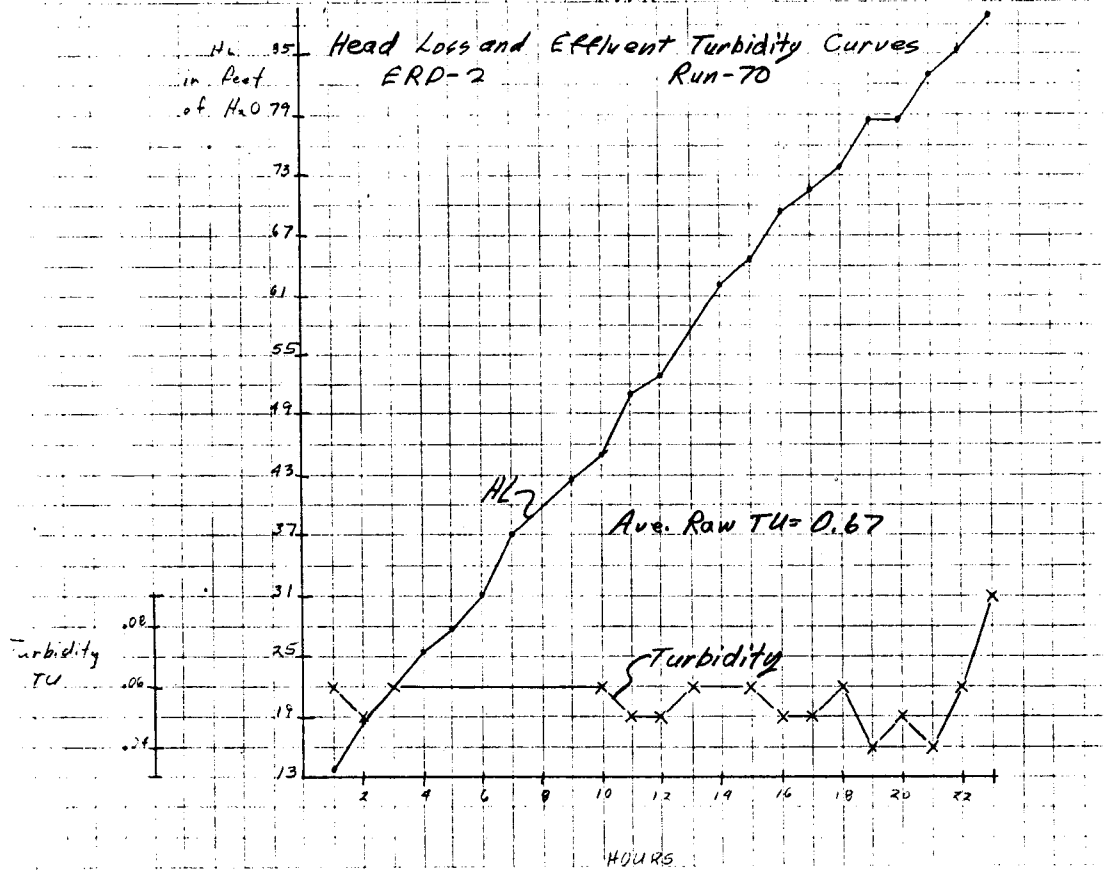

Head Loss and Effluent Turbidity Curves
HL in feet of H_2O
ERD-2
Run-65
Turbidity TU
HL
Ave. Raw TU = 0.47
Turbidity
Hours

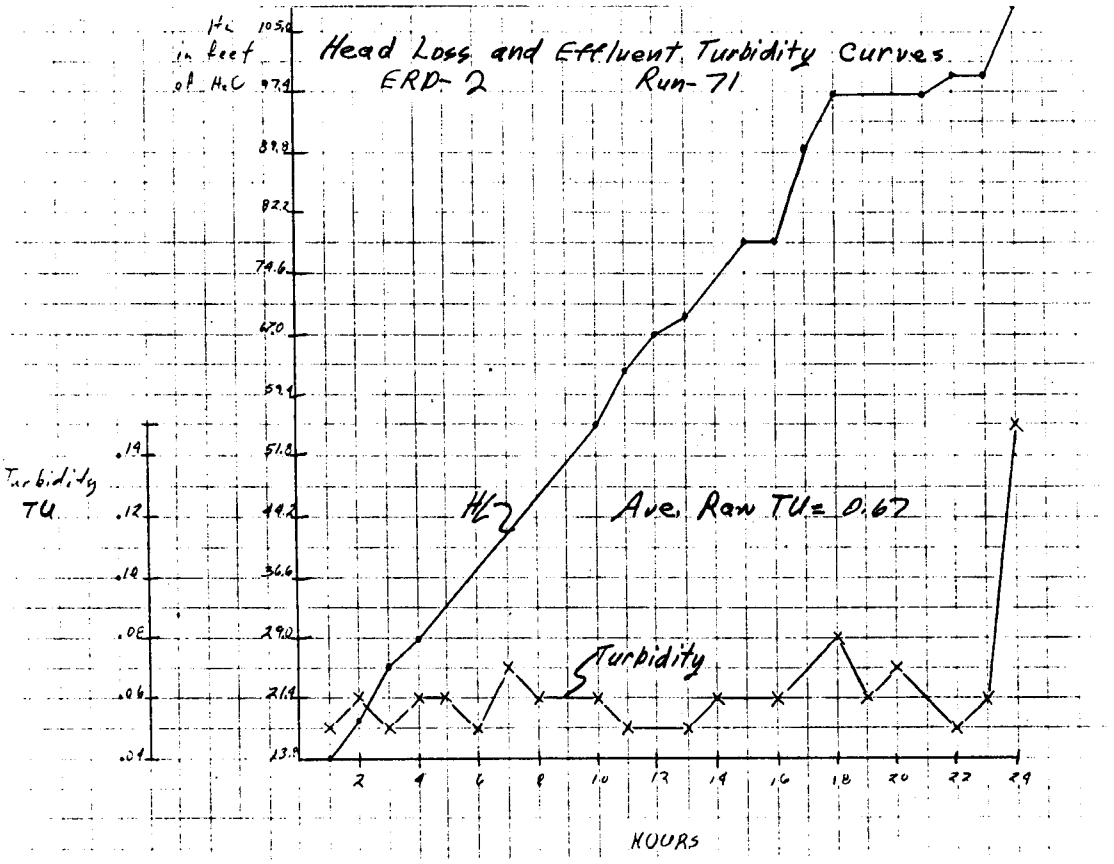

Head Loss and Effluent Turbidity Curves
HL in feet of H_2O
ERD-2
Run-66
Turbidity (TU)
HL
Ave. Raw TU = 0.46
Turbidity
Hours

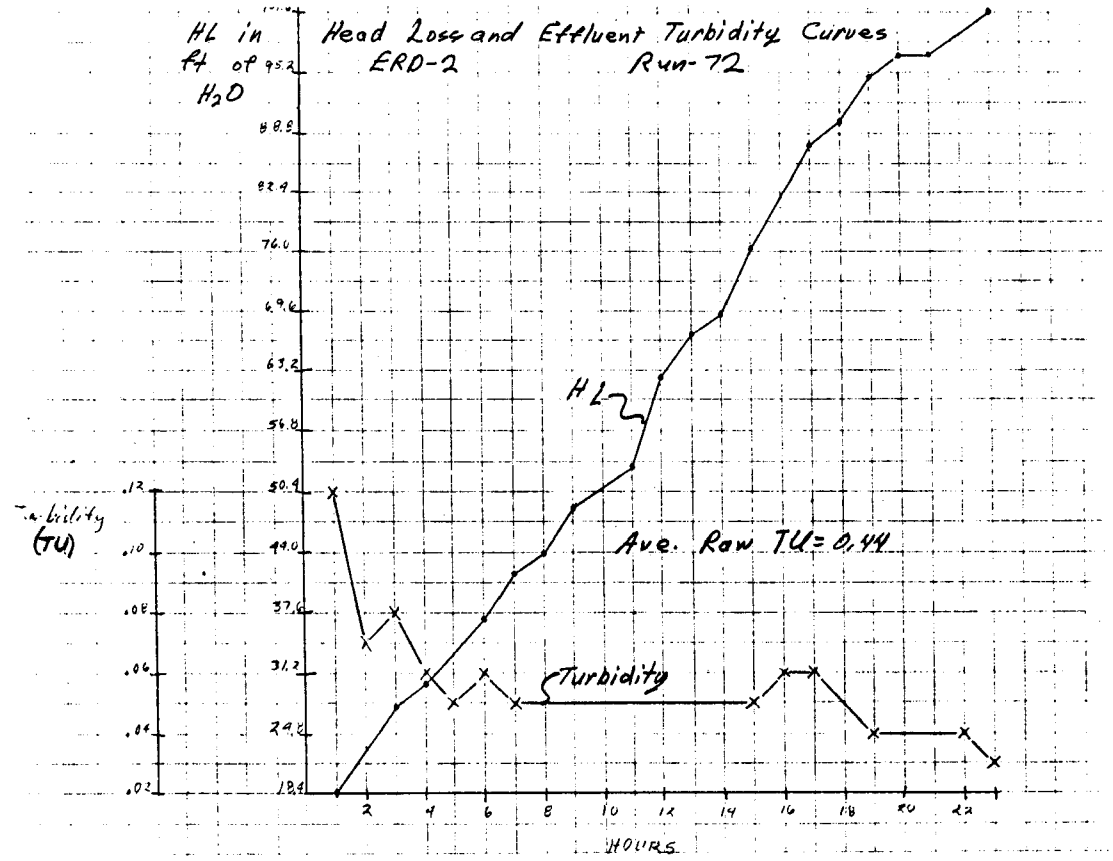

Head Loss and Effluent Turbidity Curves
ERD-2
Run- 67
HL in feet of H2O
Ave. Raw TU= 0.48
HL
Turbidity
Turbidity (TU)
HOURS

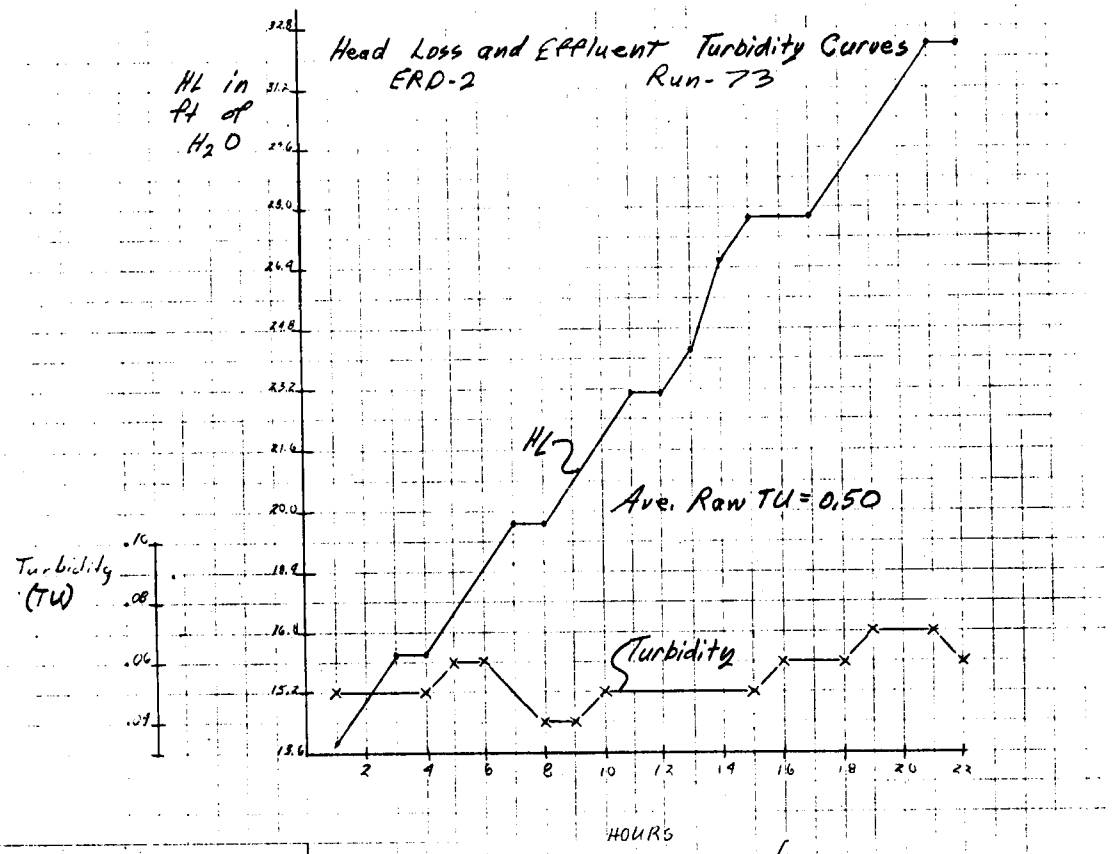

Head Loss and Effluent Turbidity Curves
ERD-2
Run- 68
HL in feet of H2O
HL
Ave. Raw TU= 0.62
Turbidity
Turbidity TU
Hours

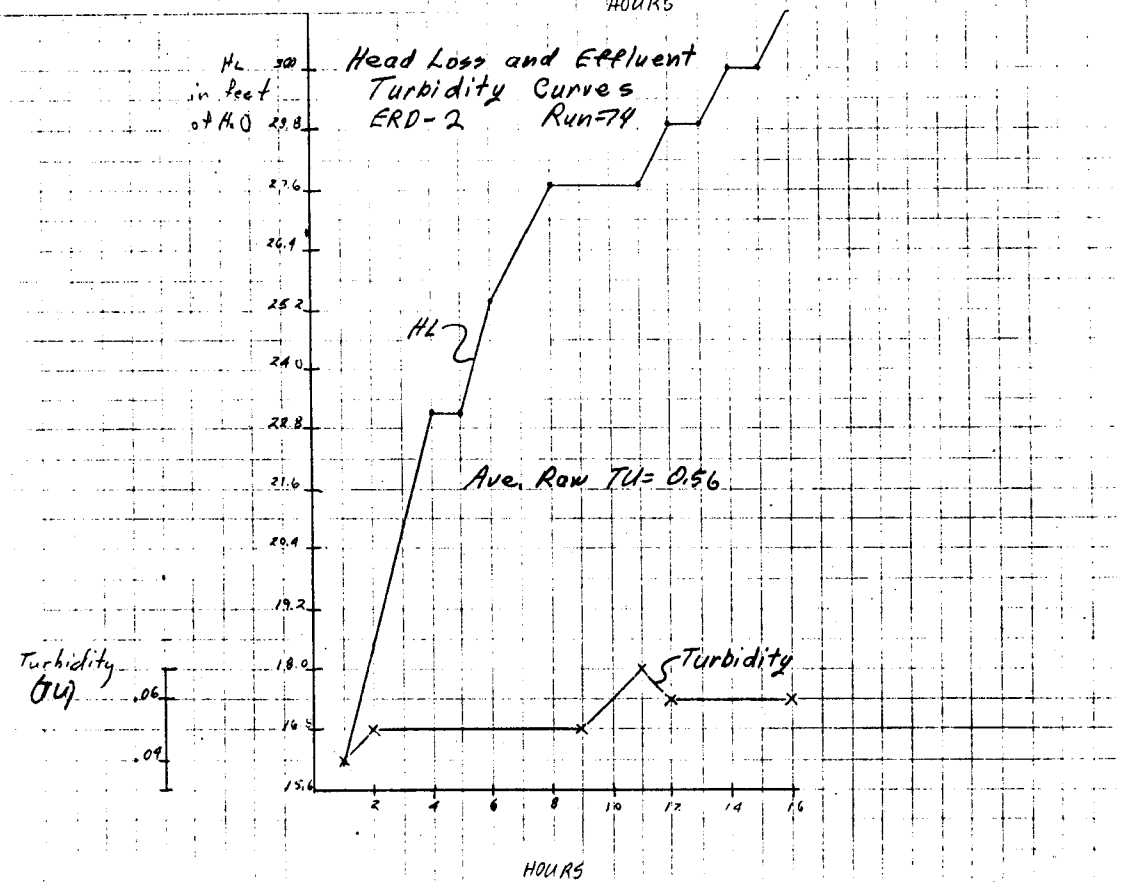

Head Loss and Effluent Turbidity Curves
ERD-2
Run- 69
HL in feet of H_2O
Ave. Raw TU = 0.63
HL
Turbidity
Turbidity (TU)
HOURS

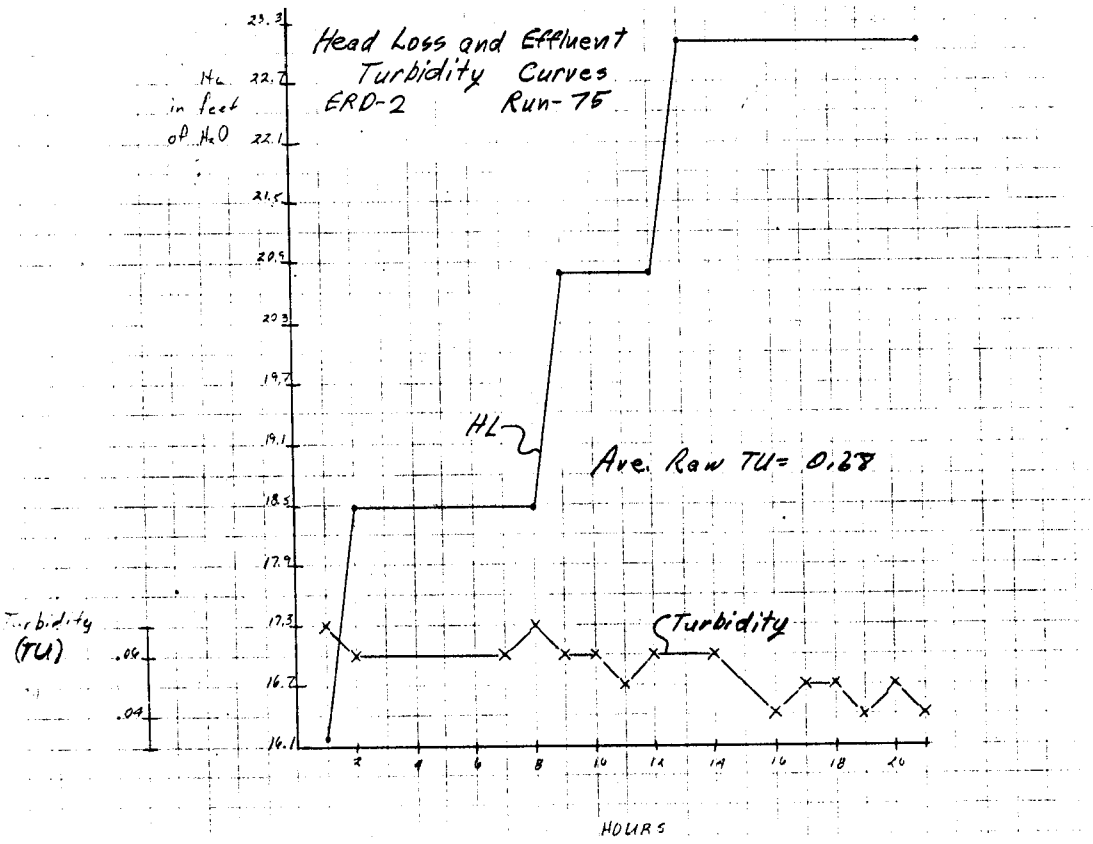

Head Loss and Effluent Turbidity Curves
ERD-2
Run-70
HL in feet of H_2O
Ave. Raw TU = 0.67
HL
Turbidity
Turbidity TU
HOURS

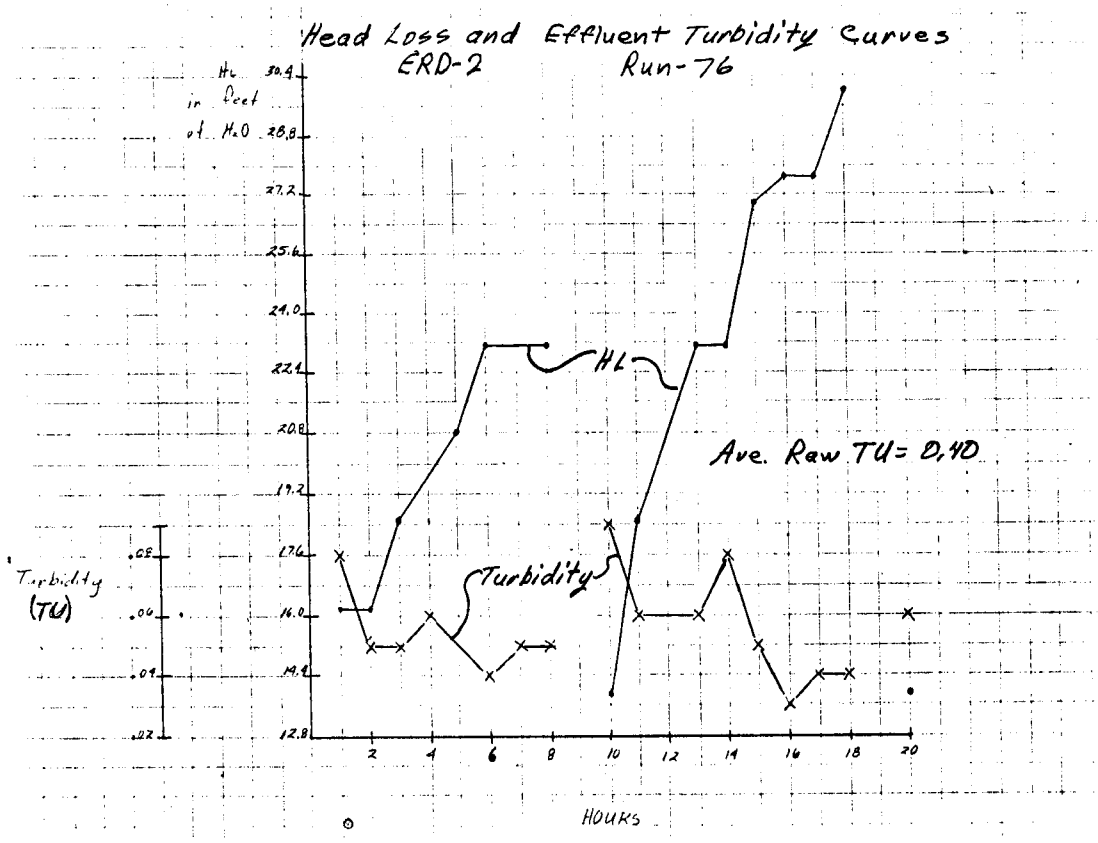

Head Loss and Effluent Turbidity Curves
ERD-2
Run-71
HL in feet of H2O
Turbidity TU
HL
Ave. Raw TU = 0.67
Turbidity
HOURS

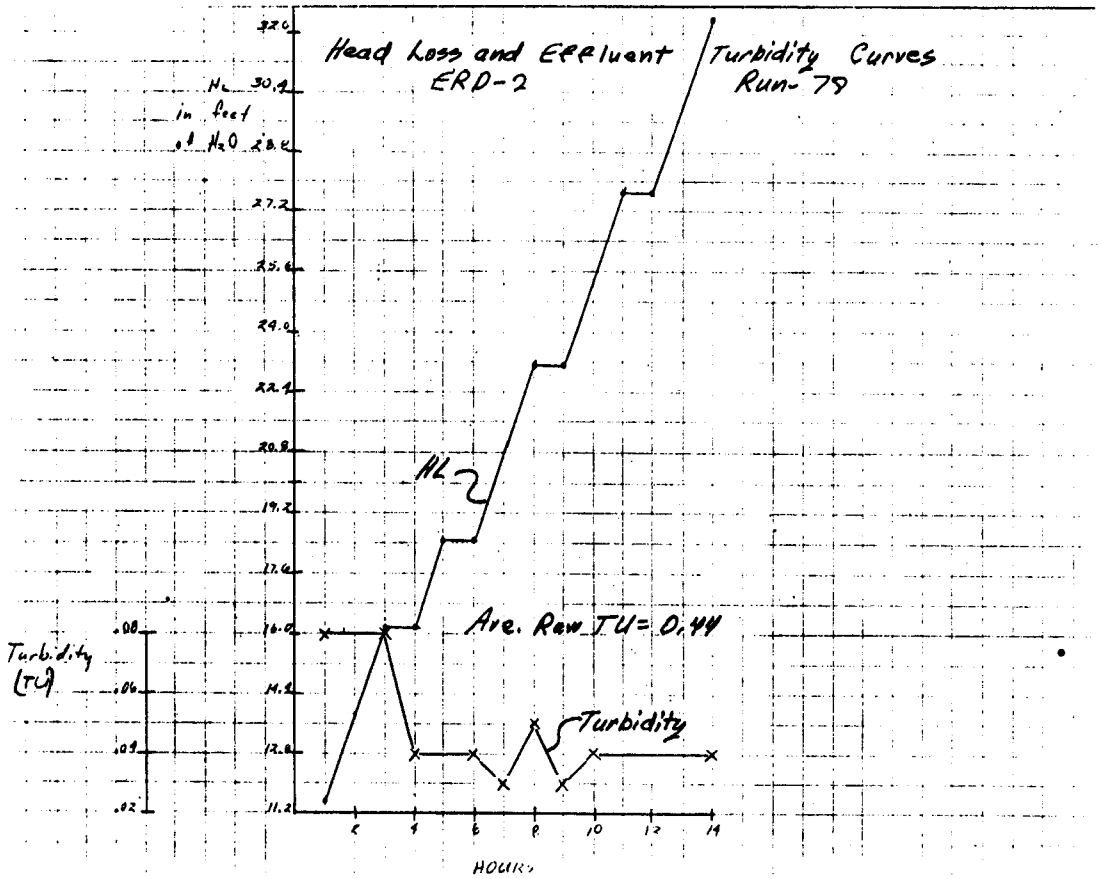

Head Loss and Effluent Turbidity Curves
ERD-2
Run-72
HL in ft of H2O
Turbidity (TU)
HL
Ave. Raw TU = 0.44
Turbidity
HOURS

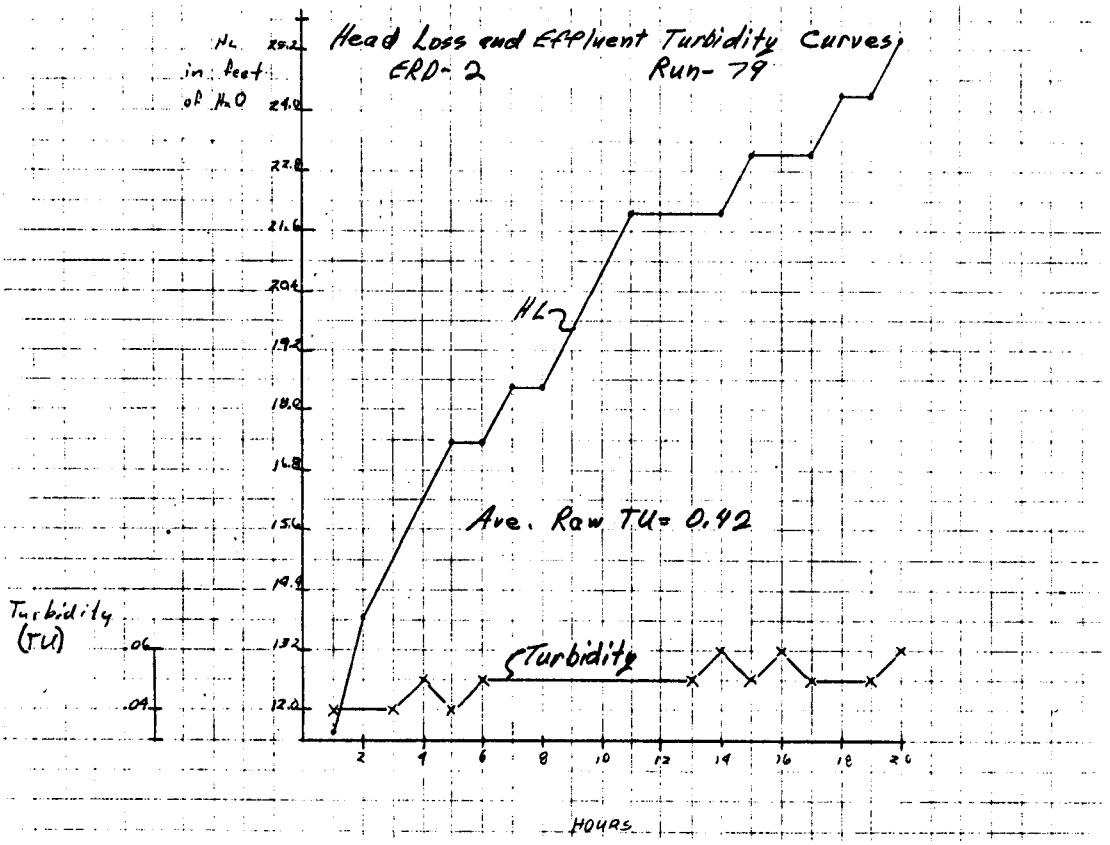

Head Loss and Effluent Turbidity Curves
ERD-2
Run-73
HL in ft of H_2O
HL
Ave. Raw TU = 0.50
Turbidity (TU)
Turbidity
HOURS

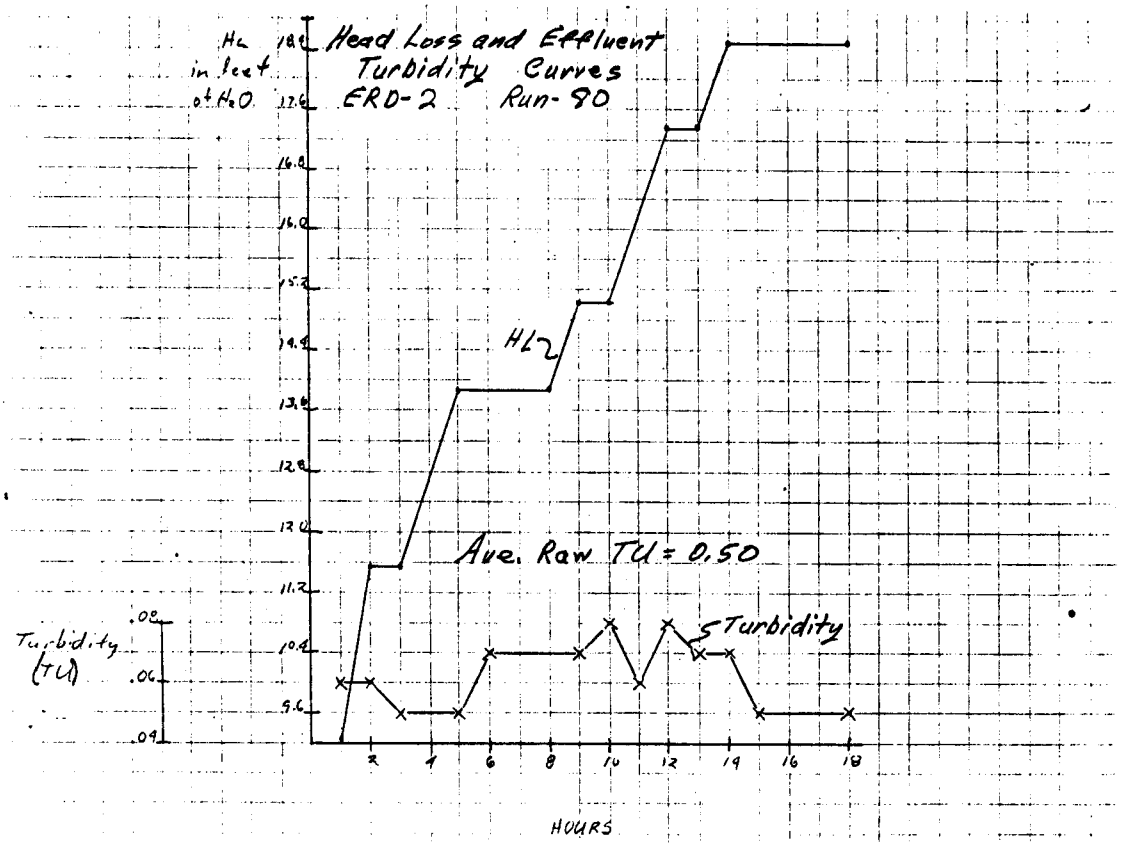

Head Loss and Effluent Turbidity Curves
ERD-2
Run-74
HL in feet of H_2O
HL
Ave. Raw TU = 0.56
Turbidity (TU)
Turbidity
HOURS

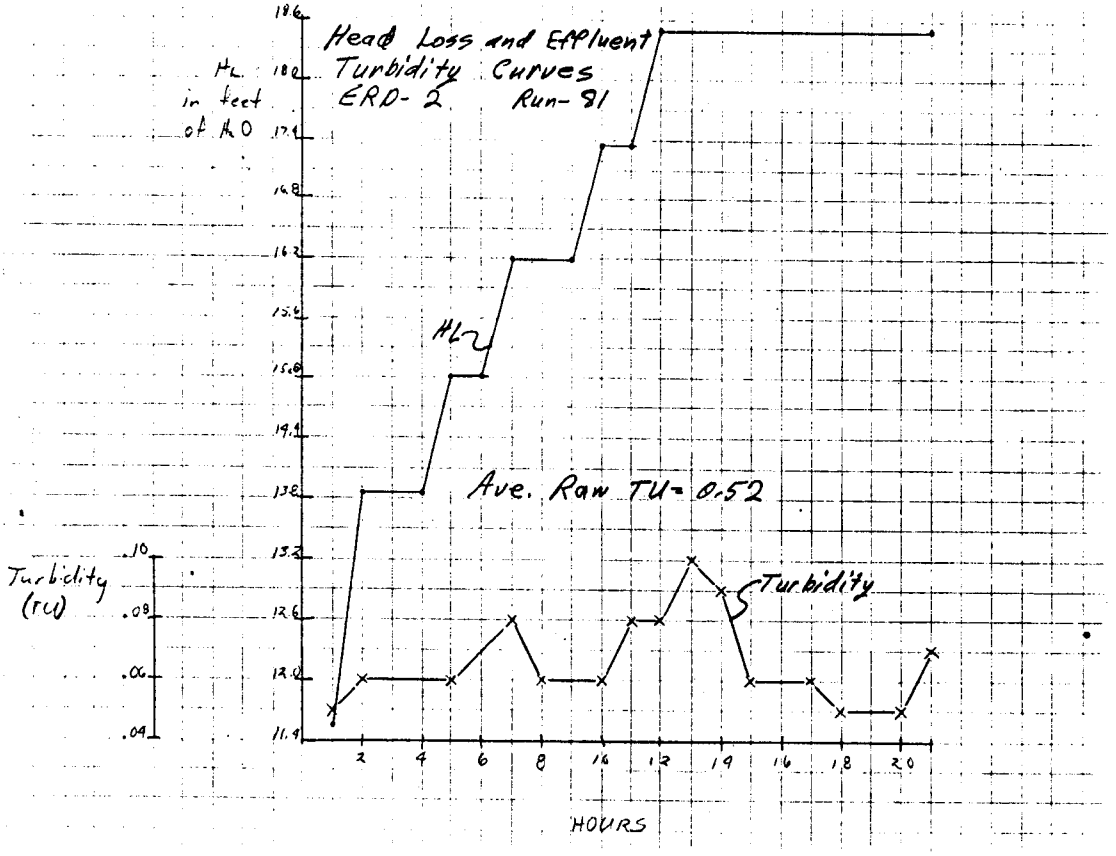

Head Loss and Effluent Turbidity Curves
ERD-2 Run-75
Hc in feet of H2O
23.3
22.7
22.1
21.5
20.9
20.3
19.7
19.1
18.5
17.9
17.3
16.7
16.1
HL
Ave. Raw TU= 0.28
Turbidity
Turbidity (TU)
.06
.04
2
4
6
8
10
12
14
16
18
20
HOURS

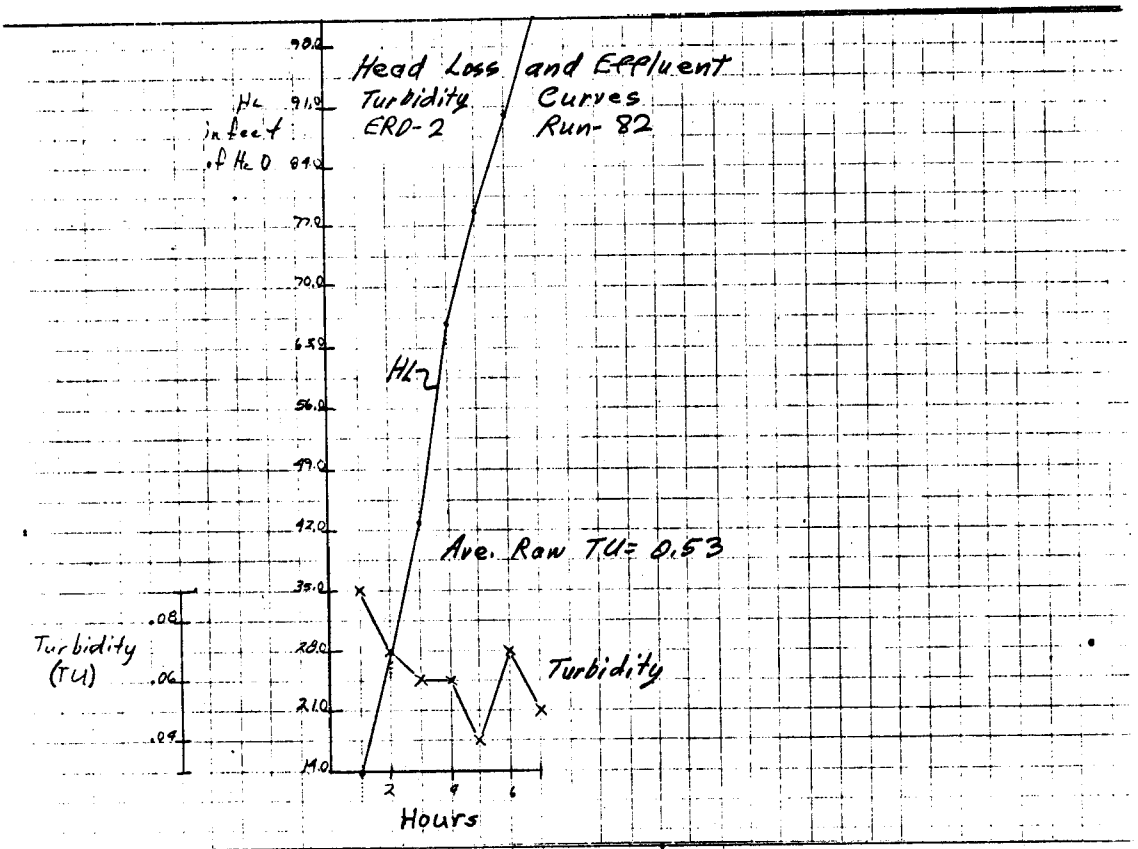

Head Loss and Effluent Turbidity Curves
ERD-2 Run-76
Hc in feet of H2O
30.4
28.8
27.2
25.6
24.0
22.4
20.8
19.2
17.6
16.0
14.4
12.8
HL
Ave. Raw TU= 0.40
Turbidity
Turbidity (TU)
.08
.06
.04
.02
2
4
6
8
10
12
14
16
18
20
HOURS

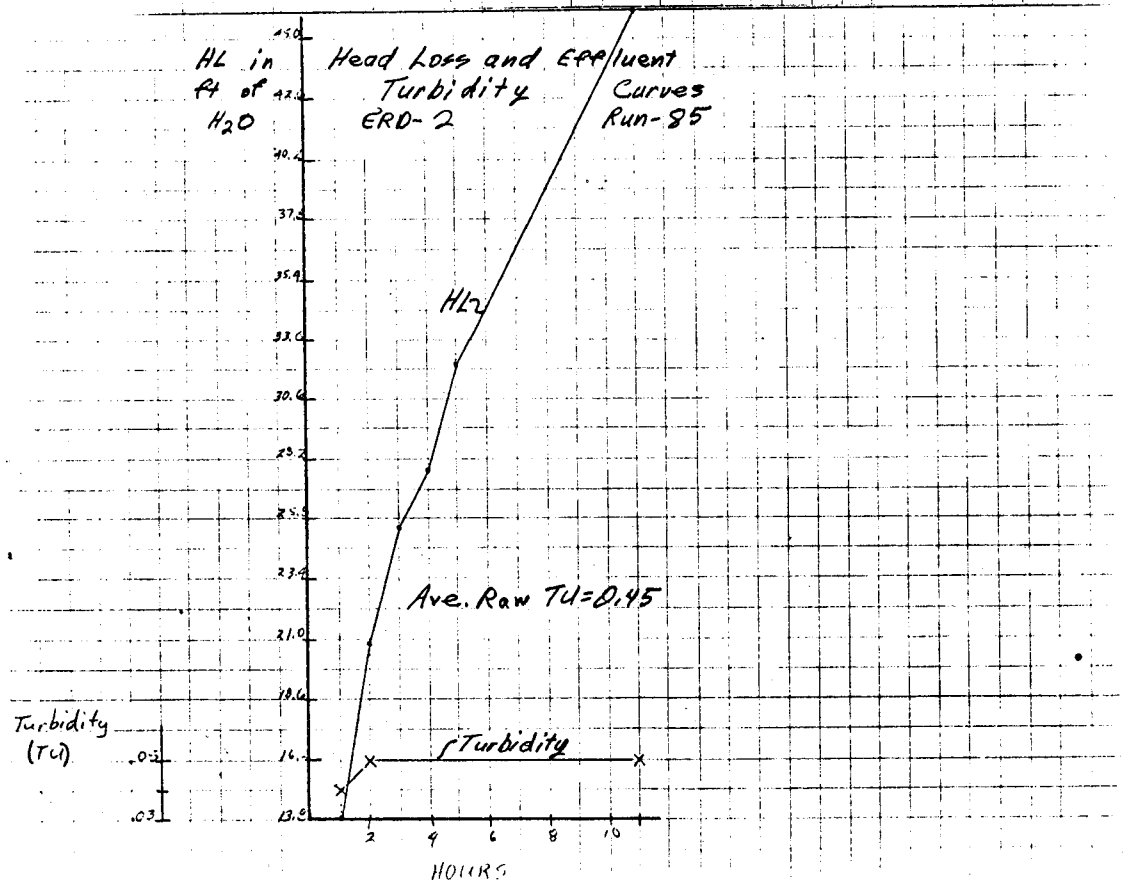

Head Loss and Effluent Turbidity Curves
ERD-2
Run-79
HL in feet of H_2O
HL
Ave. Raw TU = 0.44
Turbidity
Turbidity (TU)
HOURS

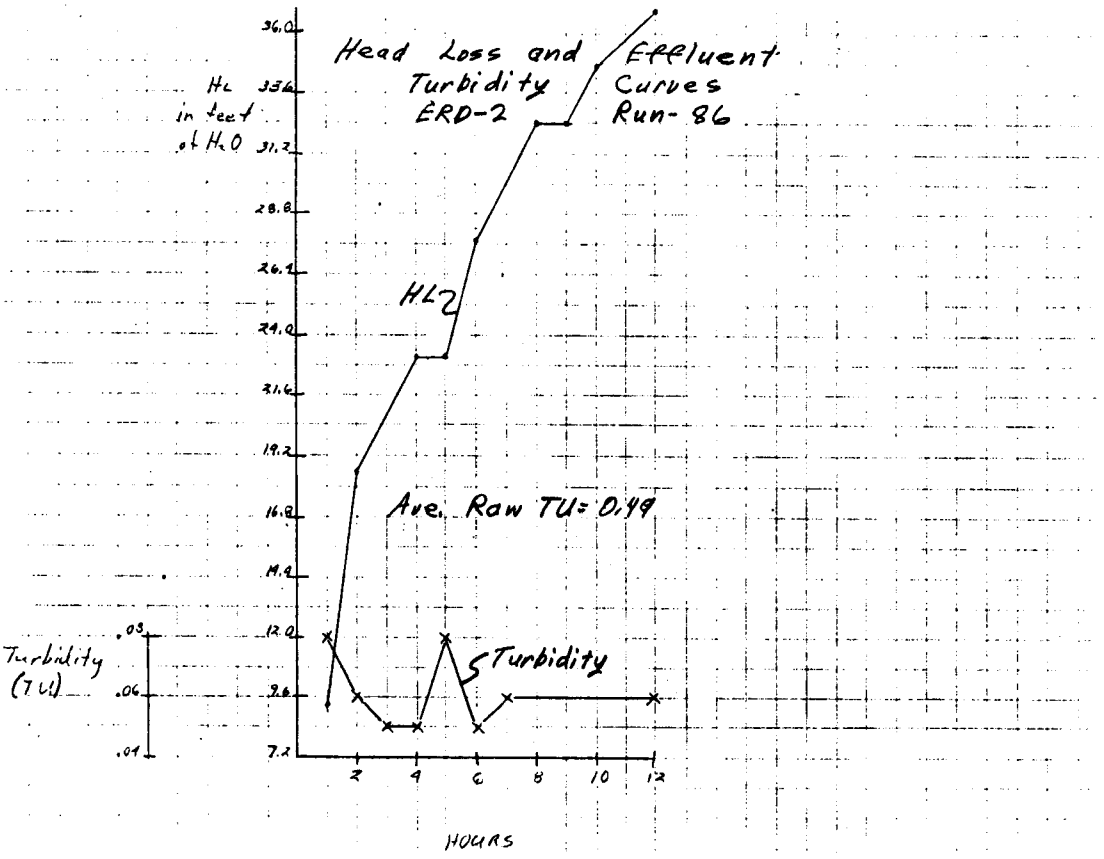

Head Loss and Effluent Turbidity Curves
ERD-2
Run-79
HL in feet of H_2O
HL
Ave. Raw TU = 0.42
Turbidity
Turbidity (TU)
HOURS


Head Loss and Effluent
Turbidity Curves
ERD-2 Run-80
HL in feet of H2O
HL
Ave. Raw TU = 0.50
Turbidity
Turbidity (TU)
HOURS


Head Loss and Effluent
Turbidity Curves
ERD-2 Run-81
HL in feet of H2O
HL
Ave. Raw TU = 0.52
Turbidity
Turbidity (TU)
HOURS


Head Loss and Effluent
Turbidity Curves
ERD-2 Run-82
HL in feet of H2O
HL
Ave. Raw TU= 0.53
Turbidity
Turbidity (TU)
Hours


Head Loss and Effluent
Turbidity Curves
ERD-2 Run-85
HL in ft of H2O
HL
Ave. Raw TU=0.45
Turbidity
Turbidity (TU)
HOURS


Head Loss and Turbidity ERD-2
Effluent Curves Run-86
HL in feet of H2O
36.0
33.6
31.2
28.8
26.4
24.0
21.6
19.2
16.8
14.4
12.0
9.6
7.2
HL
Ave. Raw TU = 0.49
Turbidity
Turbidity (TU)
.08
.06
.04
2
4
6
8
10
12
HOURS

TECHNICAL REPORT DATA
(Please read Instructions on the reverse before completing)

1. REPORT NO. EPA-670/2-75-050d	2.	3. RECIPIENT'S ACCESSION NO.
4. TITLE AND SUBTITLE DIRECT FILTRATION OF LAKE SUPERIOR WATER FOR ASBESTIFORM FIBER REMOVAL Appendix D		5. REPORT DATE June 1975; Issuing Date
		6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S) Black & Veatch, Consulting Engineers		8. PERFORMING ORGANIZATION REPORT NO.
9. PERFORMING ORGANIZATION NAME AND ADDRESS Black & Veatch, Consulting Engineers 1500 Meadow Lake Parkway Kansas City, Missouri 64114		10. PROGRAM ELEMENT NO. 1CB047; ROAP 21AQB; Task 024
		11. CONTRACT/GRANT NO. DACW 37-74-C-0079 IAG #EPA-IAG-D4-0388
12. SPONSORING AGENCY NAME AND ADDRESS National Environmental Research Center Office of Research and Development U.S. Environmental Protection Agency Cincinnati, Ohio 45268		13. TYPE OF REPORT AND PERIOD COVERED Final
		14. SPONSORING AGENCY CODE

15. SUPPLEMENTARY NOTES

This work conducted through interagency agreement between EPA Region V and the Corps of Engineers, St. Paul District. See also EPA-670/2-75-050a, b, c, e, f, and g.

16. ABSTRACT

Pilot plant research conducted in 1974 at Duluth, Minnesota, demonstrated that asbestiform fiber counts in Lake Superior water could be effectvely reduced by municipal filtration plants. During the study, engineering data were also obtained for making cost estimates for construction and operation of both granular and diatomaceous earth (DE) filtration plants ranging in size from 0.03 to 30 mgd. In Appendix D, all graphs of filter head loss and effluent turbidity as functions of the number of hours of filter operation are given. These graphs and the individual filter run data presented in Appendix C could be used to evaluate filter performance under circumstances in which the production of clear, potable water is the goal, rather than the removal of asbestiform fibers.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Asbestos Amphiboles Serpentine Water supply Filtration Water treatment Pilot plants	Mixed media filtration Diatomaceous earth filtration Asbestiform Chrysotile Fiber removal Duluth (Minnesota) Lake Superior	13B

18. DISTRIBUTION STATEMENT RELEASE TO PUBLIC	19. SECURITY CLASS (This Report) UNCLASSIFIED	21. NO. OF PAGES 235
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