

V. EXPERIMENTAL RESULTS

Conventional Jar Test Experimentations

TABLE I Chemical Analyses of Ground Water during
Jar test
RUN No. A

Iron concentration in water 3 mg/l
Fast mixing speed 100 rpm time 1 min.
Slow mixing speed 40 " " 3 "
Settling time 20 minutes.

| Jar No. | 1 | 2 | 3 | 4 | 5 | 6 |
|--|------|------|------|------|-----------------|-----------------|
| KMnO ₄ used mg/l | 0.25 | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 |
| Alkalinity mg/l as CaCO ₃ | 74 | 73 | 73 | 74 | 74 | 74 |
| Total hardness mg/l CaCO ₃ | 82 | 80 | 83 | 80 | 81 | 82 |
| Total iron mg/l Residual | 0.21 | 0.13 | 0.04 | 0.01 | 0.01 | 0.01 |
| pH | 7.49 | 7.42 | 7.51 | 7.50 | 7.47 | 7.49 |
| Floc. Formation | poor | fair | good | good | good + heavy | good + heavy |

Expt. 1 Determination of KMnO_4 demand by Conventional Jar Test.

Iron Concentration of Raw Water 3 mg/l.

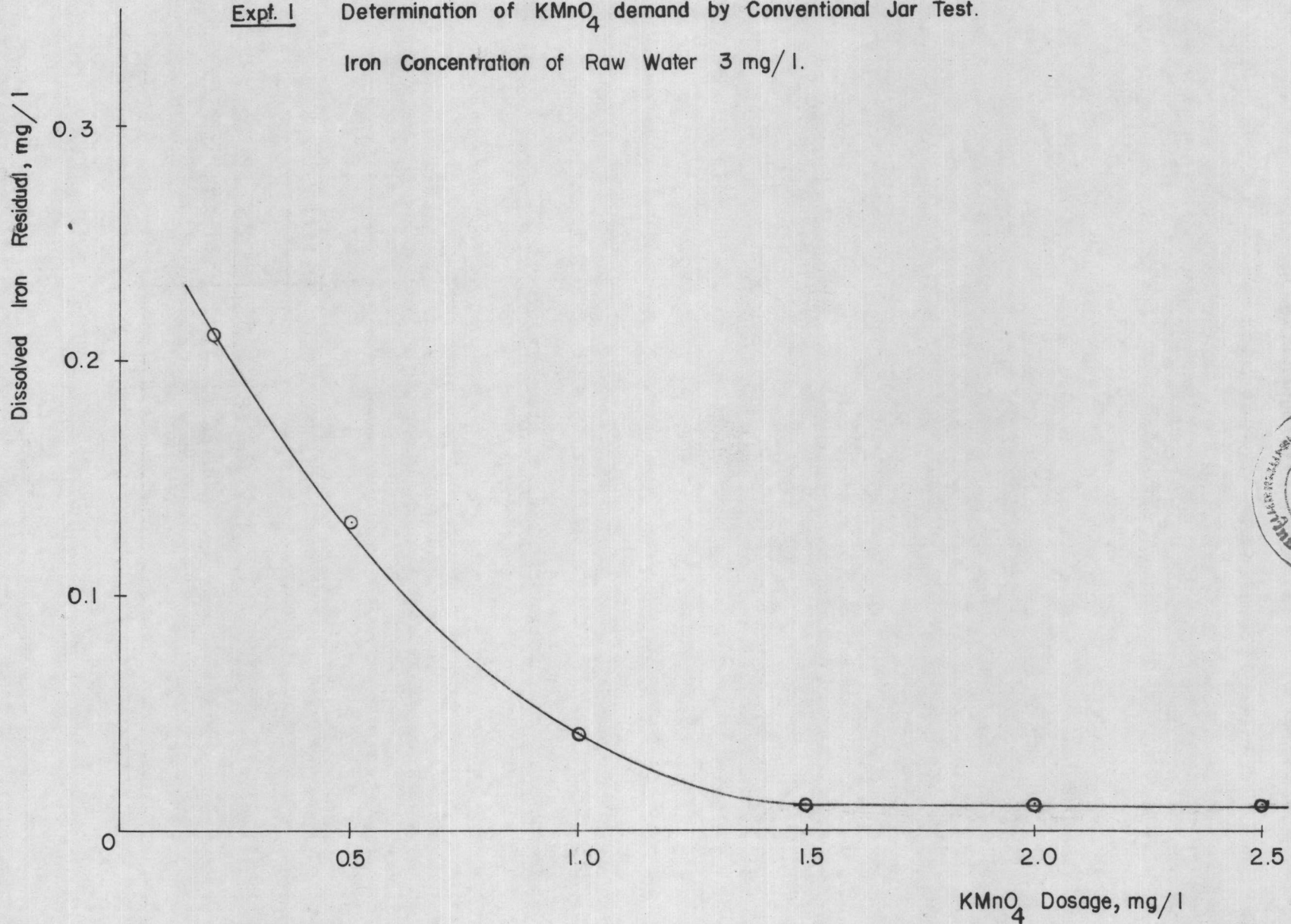


Fig. 9 Relationship between KMnO_4 Dosage and Dissolved Iron Residual in Tested Water.

TABLE 2: Chemical Analyses of Ground Water during Jar test

RUN No. B

Iron concentration in water 5 mg/l
 Fast mixing speed 100 rpm time 1 min.
 Slow mixing speed 40 " " 3 "
 Settling time 20 minutes.

| Jar No. | 1 | 2 | 3 | 4 | 5 | 6 |
|--|------|------|------|------|------|---------------|
| KMnO ₄ used mg/l | 1 | 2 | 3 | 4 | 5 | 6 |
| Alkalinity mg/l as CaCO ₃ | 72 | 74 | 73 | 73 | 74 | 74 |
| Total hardness mg/l CaCO ₃ | 81 | 82 | 81 | 81 | 82 | 82 |
| Total iron mg/l Residual | 0.12 | 0.04 | 0.02 | 0.01 | 0.01 | 0.01 |
| pH | 7.46 | 7.52 | 7.50 | 7.57 | 7.53 | 7.54 |
| Floc. Formation | poor | poor | fair | good | good | good Heavy |



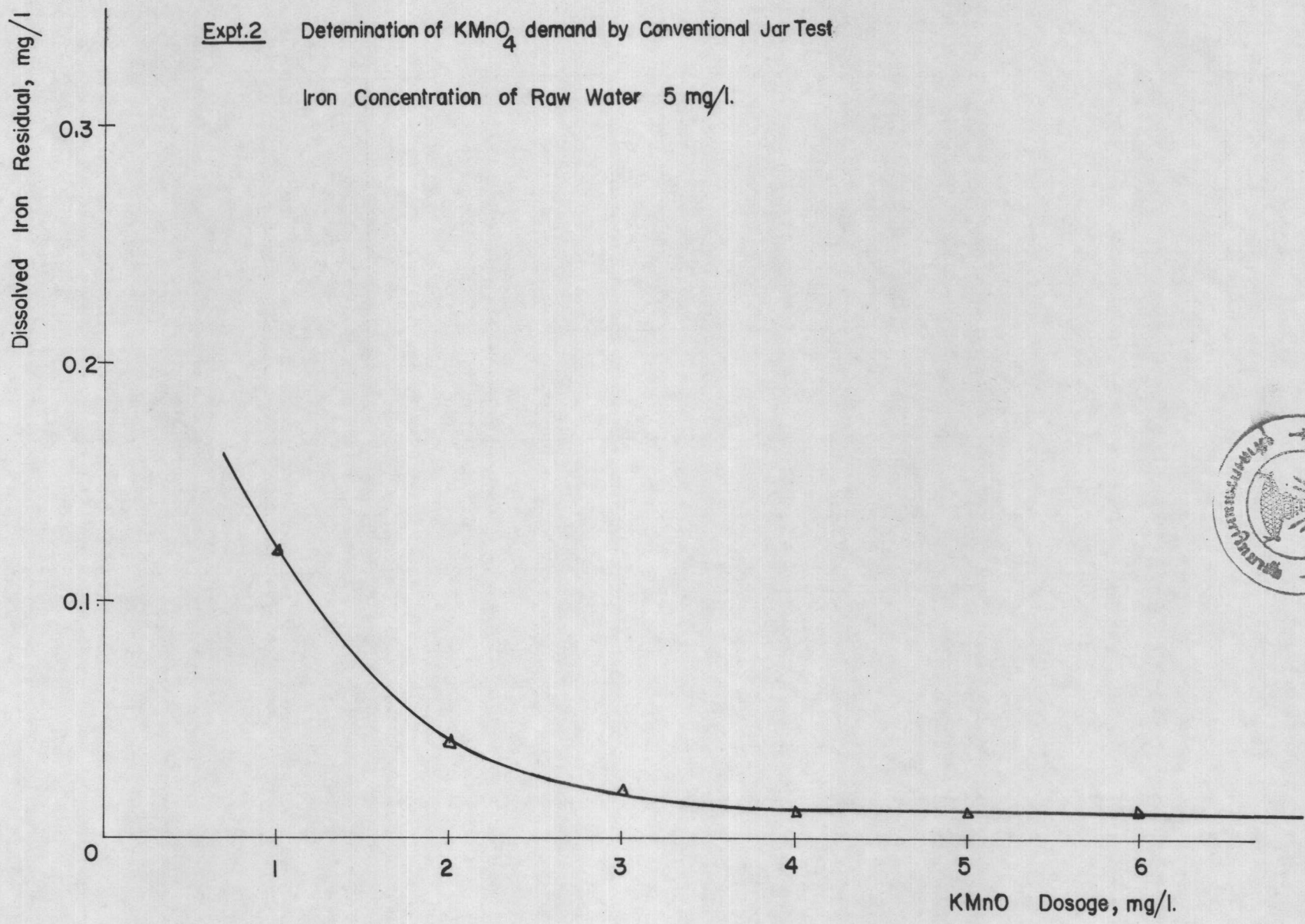


Fig 10 Relationship between KMnO_4 Dosage and Dissolved Iron Residual in Tested water.

TABLE 3 Chemical Analyses of Ground Water during Jar test

RUN No. C

Iron concentration in water 10 mg/l
 Fast mixing speed 100 rpm time 1 min.
 Slow mixing speed 40 " " 3 "
 Settling time 20 minutes.

| Jar No. | 1 | 2 | 3 | 4 | 5 | 6 |
|--|------|------|------|------|------|---------------|
| KMnO ₄ used mg/l | 2 | 3 | 4 | 5 | 6 | 8 |
| Alkalinity mg/l as CaCO ₃ | 75 | 74 | 75 | 76 | 75 | 76 |
| Total hardness mg/l CaCO ₃ | 83 | 83 | 82 | 81 | 82 | 83 |
| Total iron mg/l Residual | 0.33 | 0.24 | 0.15 | 0.07 | 0.02 | 0.02 |
| pH | 7.53 | 7.59 | 7.61 | 7.58 | 7.63 | 7.60 |
| Floc. Formation | poor | fair | fair | good | good | good Heavy |



Expt. 3

Determination of KMnO_4 demand by Conventional Jar Test
Iron Concentration of Raw Water 10 mg/l.

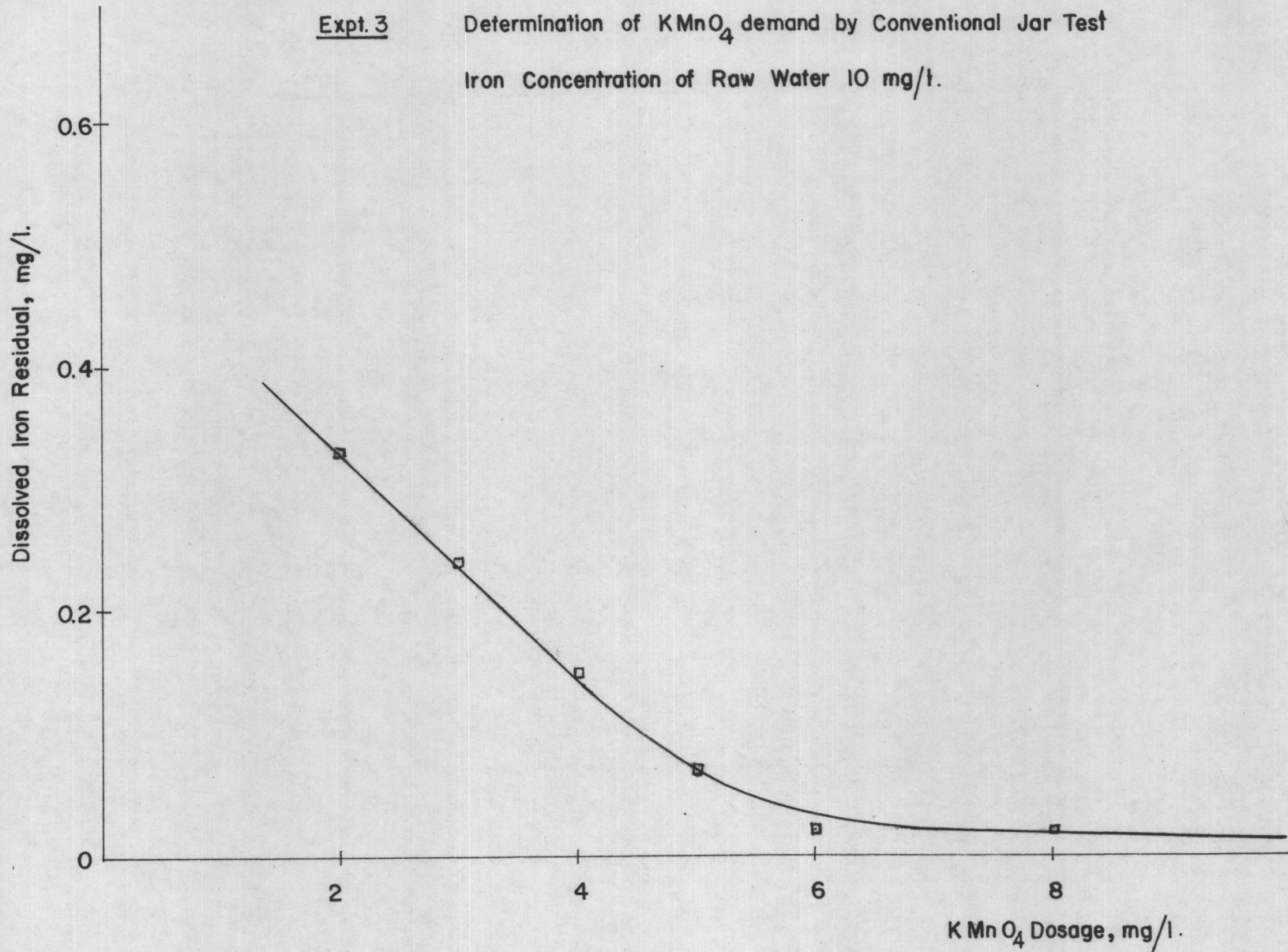


Fig. II Relationship between KMnO_4 Dosage and Dissolved Iron Residual in Tested Water.

TABLE 4 Chemical Analysis of Ground Water during Jar test
RUN No. D

Iron concentration in water 15 mg/l
Fast mixing speed 100 rpm time 1 min.
Slow mixing speed 40 " " 3 "
Settling time 20 minutes.

| Jar No. | 1 | 2 | 3 | 4 | 5 | 6 |
|--|------|------|------|------|------|--------------------|
| KMnO ₄ used mg/l | 3 | 4 | 6 | 8 | 10 | 12 |
| Alkalinity mg/l as CaCO ₃ | 73 | 74 | 75 | 76 | 75 | 75 |
| Total hardness mg/l CaCO ₃ | 83 | 84 | 82 | 84 | 84 | 83 |
| Total iron mg/l Residual | 0.59 | 0.35 | 0.13 | 0.04 | 0.04 | 0.02 |
| pH | 7.56 | 7.52 | 7.57 | 7.55 | 7.59 | 7.58 |
| Flec. Formation | poor | fair | fair | good | good | good + Heavy |



Expf. 4. Determination of KMnO_4 demand by Conventional Jar test

Iron Concentration of Raw Water 15 mg/l

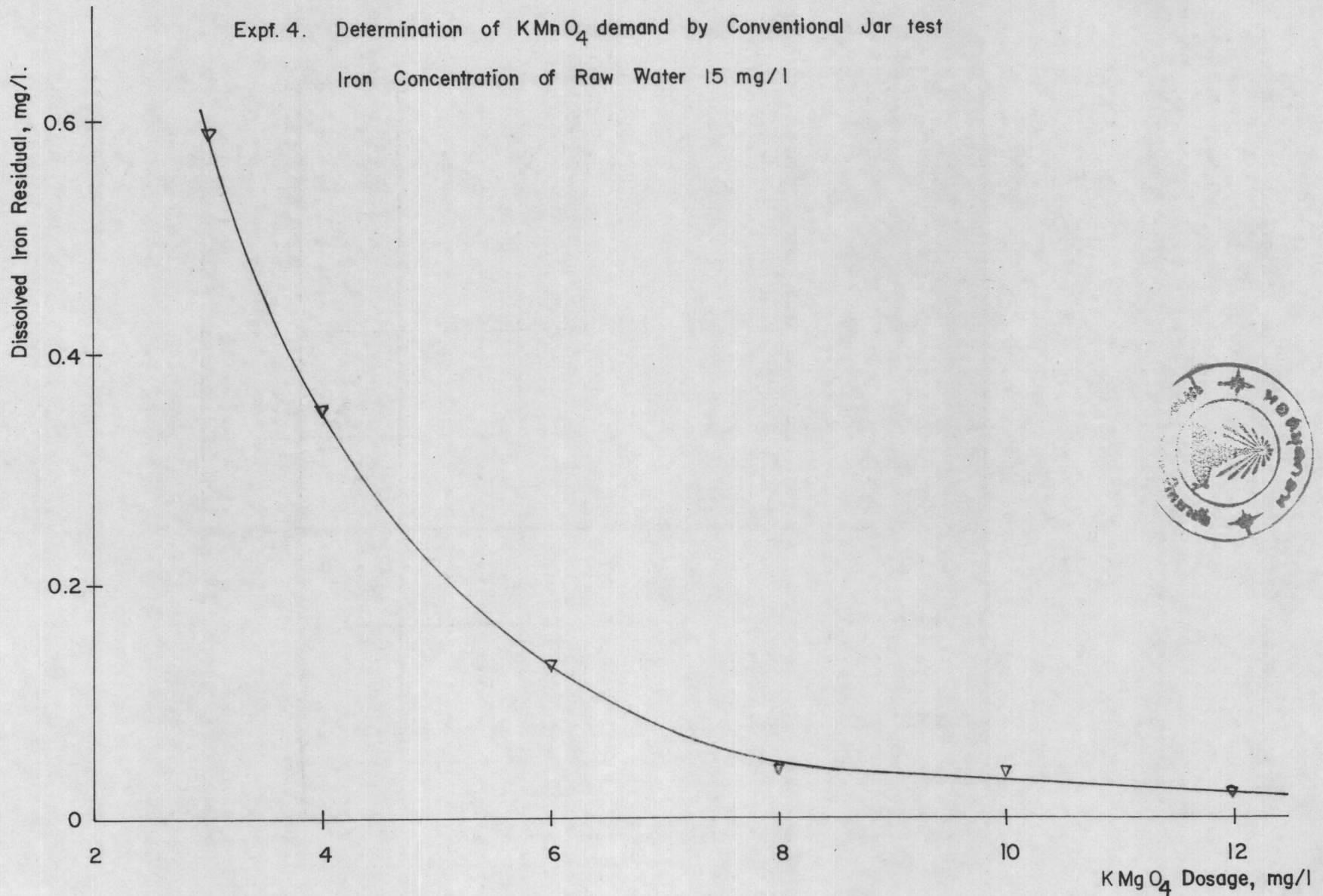


Fig.12 Relationship between KMnO_4 Dosage and Dissolve Iron Residual in Tested water.

TABLE 5 Chemical Analysis of Ground Water during Jar test

Run No. E

Iron concentration in water 20 mg/l
 Fast mixing speed 100 rpm time 1 min.
 Slow mixing speed 40 " " 3 "
 Settling time 20 minutes.

| Jar No. | 1 | 2 | 3 | 4 | 5 | 6 |
|--|------|------|------|------|---------------|---------------|
| KMnO ₄ used mg/l | 7 | 8 | 9 | 10 | 12 | 14 |
| Alkalinity mg/l as CaCO ₃ | 74 | 75 | 73 | 74 | 74 | 75 |
| Total hardness mg/l CaCO ₃ | 82 | 82 | 81 | 83 | 80 | 82 |
| Total iron mg/l Residual | 0.39 | 0.24 | 0.14 | 0.09 | 0.03 | 0.02 |
| pH | 7.52 | 7.48 | 7.57 | 7.60 | 7.59 | 7.61 |
| Floc. Formation | poor | fair | fair | good | good Heavy | good Heavy |



Expt. 5

Determination of KMnO_4 demand by Conventiend Jar Test.

Iron Concentration of Raw Water 20 mg/l.

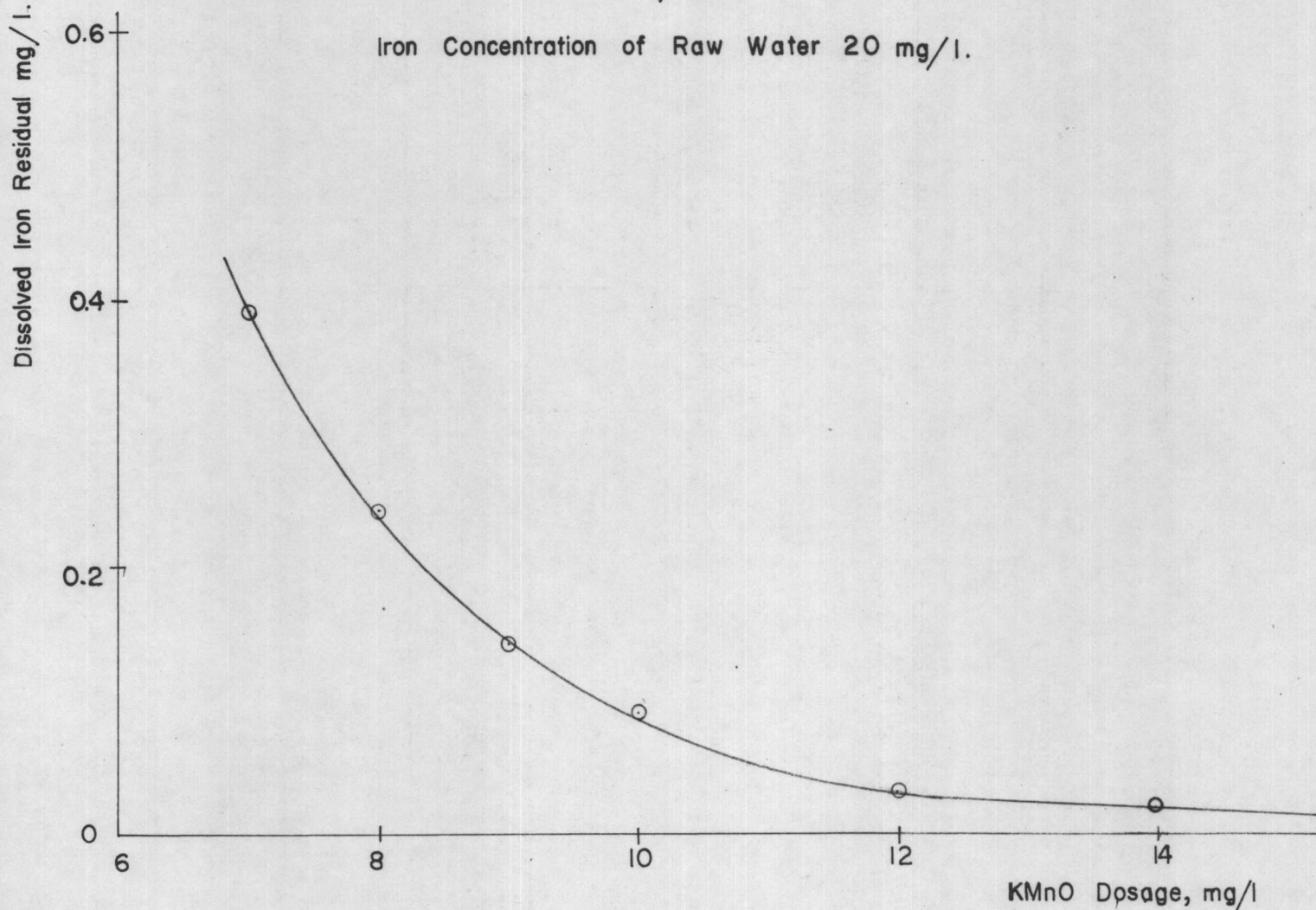


Fig.13 Relationship between KMnO_4 Dosage and Dissolved Iron Residual in Tested Water.

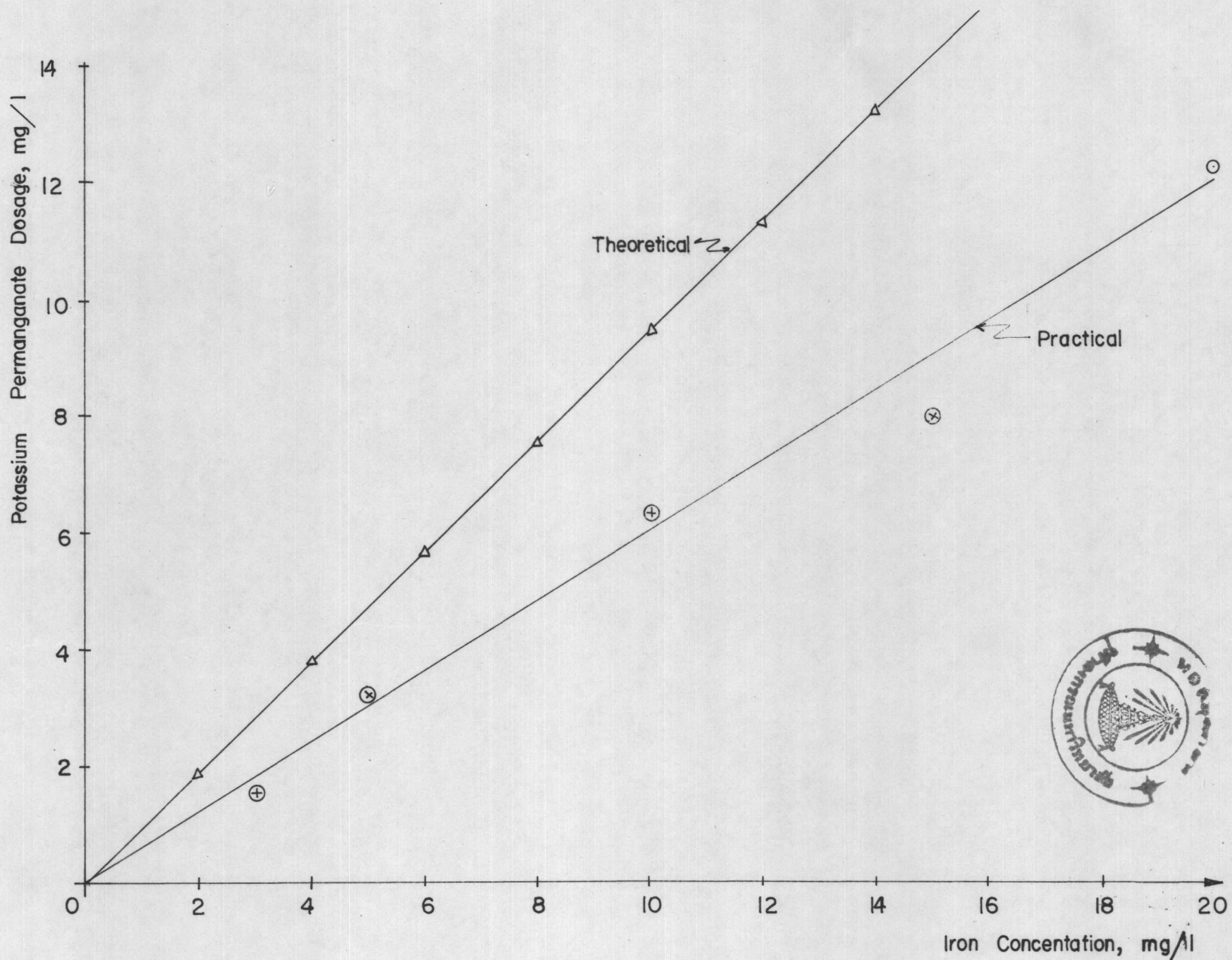


Fig.14 Comparison of Theoretical and Practical Potassium Permanganate Demand Curve for Oxidation of Ferrous Iron.

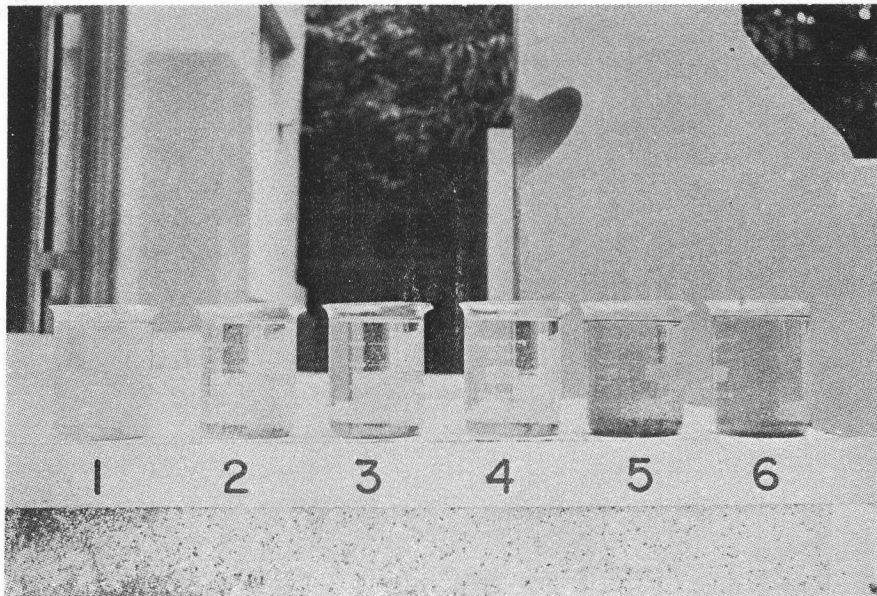
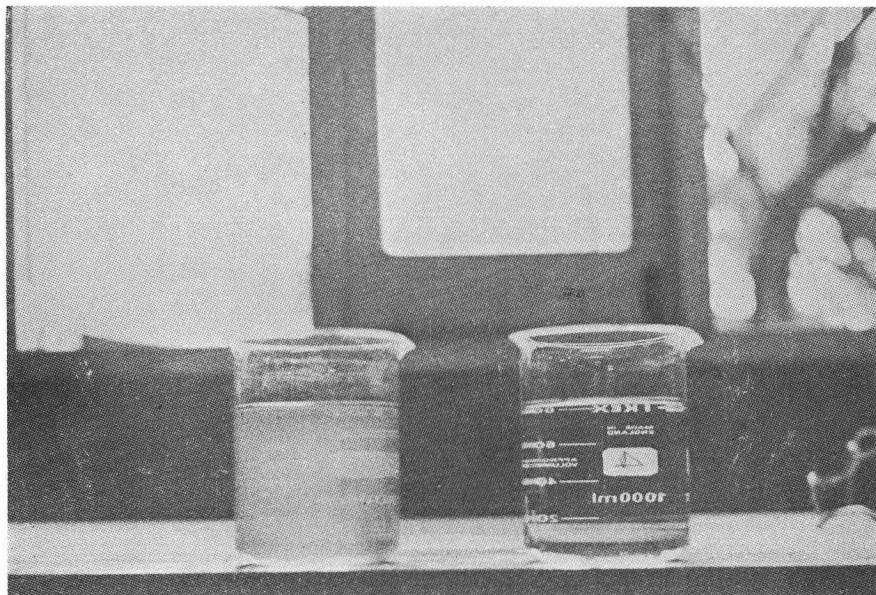


Fig. 15 Result after Jar Test Experiment.



Influent

Effluent

Fig. 16 Comparison of Effluent and Influent Water.

Filtration Experimentations

TABLE 6 Total Iron Concentration in Effluent Water (mg/l)
RUN No. 1 - 5 Anthracite media

| TIME Hrs. | RUN NO. | | | | |
|--------------|---------|-------|-------|-------|------|
| | 1 | 2 | 3 | 4 | 5 |
| 0 | - | - | - | - | - |
| 1 | 0.001 | 0.015 | 0.005 | 0.008 | 0.01 |
| 2 | 0.005 | 0.05 | 0.03 | 0.16 | 0.18 |
| 4 | 0.02 | 0.07 | 0.04 | 0.23 | 0.29 |
| 6 | 0.03 | 0.13 | 0.06 | 0.34 | 0.39 |
| 8 | 0.05 | 0.18 | 0.14 | 0.47 | 0.50 |
| 10 | 0.16 | 0.37 | 0.19 | 0.62 | 0.59 |
| 12 | 0.16 | - | 0.23 | - | - |
| 14 | 0.18 | - | 0.21 | - | - |
| 16 | 0.23 | - | 0.30 | - | - |
| 18 | 0.29 | - | 0.42 | - | - |
| 20 | 0.41 | - | 0.49 | - | - |
| 22 | 0.53 | - | 0.58 | - | - |
| 24 | - | - | - | - | - |
| 26 | - | - | - | - | - |
| 28 | - | - | - | - | - |
| 30 | - | - | - | - | - |
| 32 | - | - | - | - | - |
| 34 | - | - | - | - | - |
| 36 | - | - | - | - | - |
| 38 | - | - | - | - | - |
| 40 | - | - | - | - | - |

TABLE : 7 Filter Performance of Anthracite Media
at Filtration rate of 2.5 - 10.0 m³/m²/hr.



| Time | | Head loss of RUN No. (cm.) | | | | |
|------|------|----------------------------|-------|-------|-------|-------|
| Hr. | Min. | 1 | 2 | 3 | 4 | 5 |
| | 0 | - | - | - | - | - |
| 1 | 00 | - | 8.3 | 3.2 | 8.1 | 2.2 |
| 1 | 30 | - | - | - | - | - |
| 2 | 00 | 2.3 | 17.6 | 4.8 | 16.3 | 4.5 |
| 2 | 30 | - | - | - | - | - |
| 3 | 00 | - | 28.4 | 23.6 | 29.2 | 7.1 |
| 4 | 00 | 6.4 | 38.2 | 11.1 | 32.2 | 30.9 |
| 5 | | - | 53.2 | - | - | - |
| 6 | | 13.8 | 65.4 | 24.8 | 69.8 | 60.4 |
| 7 | | - | 78.0 | - | 77.3 | 79.8 |
| 8 | | 22.9 | 91.5 | 30.2 | 90.0 | 109.0 |
| 9 | | - | 105.9 | - | 109.5 | 120.0 |
| 10 | | 37.1 | 115.4 | 44.3 | 120.0 | - |
| 12 | | 53.9 | 120.0 | 59.8 | - | - |
| 14 | | 63.4 | - | 65.1 | - | - |
| 16 | | 69.4 | - | 75.2 | - | - |
| 18 | | 75.1 | - | 90.0 | - | - |
| 20 | | 91.1 | - | 109.8 | - | - |
| 22 | | 102.3 | - | 120.0 | - | - |
| 24 | | 120.0 | - | - | - | - |

TABLE 9 pH OF EFFLUENT WATER
[Anthracite Media]

| Time Hr. | Run No. | | | | |
|-------------|---------|------|------|------|------|
| | 1 | 2 | 3 | 4 | 5 |
| 0 | - | - | - | - | - |
| 1 | - | 7.3 | 7.75 | 7.38 | 7.55 |
| 2 | 7.65 | 7.35 | 7.90 | 7.45 | 7.5 |
| 4 | 7.38 | 7.5 | 7.70 | 7.43 | 7.49 |
| 6 | 7.50 | 7.6 | 7.64 | 7.4 | 7.5 |
| 8 | 7.49 | 7.58 | 7.71 | 7.5 | 7.5 |
| 10 | 7.60 | 7.61 | 7.92 | 7.51 | 7.57 |
| 12 | 7.55 | 7.65 | 7.69 | - | - |
| 14 | 7.58 | - | 7.85 | - | - |
| 16 | 7.60 | - | 7.80 | - | - |
| 18 | 7.52 | - | 7.79 | - | - |
| 20 | 7.50 | - | 7.83 | - | - |
| 22 | 7.50 | - | 7.90 | - | - |
| 24 | 7.51 | - | - | - | - |

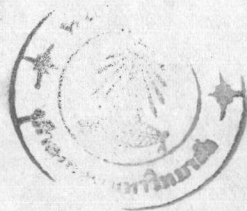


TABLE 10 ALKALINITY OF EFFLUENT WATER, mg/l as CaCO₃
[Anthracite Media]

| Time Hr. | Run No. | | | | |
|-------------|---------|----|----|----|----|
| | 1 | 2 | 3 | 4 | 5 |
| 0 | - | - | - | - | - |
| 1 | - | - | - | 67 | 66 |
| 2 | 72 | 72 | 88 | 66 | 67 |
| 4 | 68 | 66 | 80 | 64 | 65 |
| 6 | 72 | 72 | 76 | 66 | 70 |
| 8 | 72 | 68 | 78 | 65 | 70 |
| 10 | 74 | 72 | 79 | 67 | 67 |
| 12 | 74 | 70 | 80 | - | - |
| 14 | 72 | - | 80 | - | - |
| 16 | 72 | - | 82 | - | - |
| 18 | 72 | - | 80 | - | - |
| 20 | 72 | - | 81 | - | - |
| 22 | 69 | - | 81 | - | - |
| 24 | 71 | - | - | - | - |



TABLE 11 HARDNESS OF EFFLUENT WATER, mg/l as CaCO₃

[Anthracite Media]

| Time Hr. | Run No. | | | | |
|-------------|---------|----|----|----|----|
| | 1 | 2 | 3 | 4 | 5 |
| 0 | - | - | - | - | - |
| 2 | 80 | 72 | 76 | 82 | 85 |
| 4 | 82 | 90 | 84 | 84 | 86 |
| 6 | 86 | 82 | 84 | 84 | 86 |
| 8 | 82 | 82 | 80 | 85 | 85 |
| 10 | 84 | 82 | 80 | 85 | 85 |
| 12 | 84 | 84 | 84 | - | - |
| 14 | 80 | - | 84 | - | - |
| 16 | 80 | - | 82 | - | - |
| 18 | 83 | - | 80 | - | - |
| 20 | 81 | - | 80 | - | - |
| 22 | 82 | - | 82 | - | - |
| 24 | 80 | - | - | - | - |
| 26 | - | - | - | - | - |
| 28 | - | - | - | - | - |
| 30 | - | - | - | - | - |
| 32 | - | - | - | - | - |
| 34 | - | - | - | - | - |
| 36 | - | - | - | - | - |
| 38 | - | - | - | - | - |
| 40 | - | - | - | - | - |



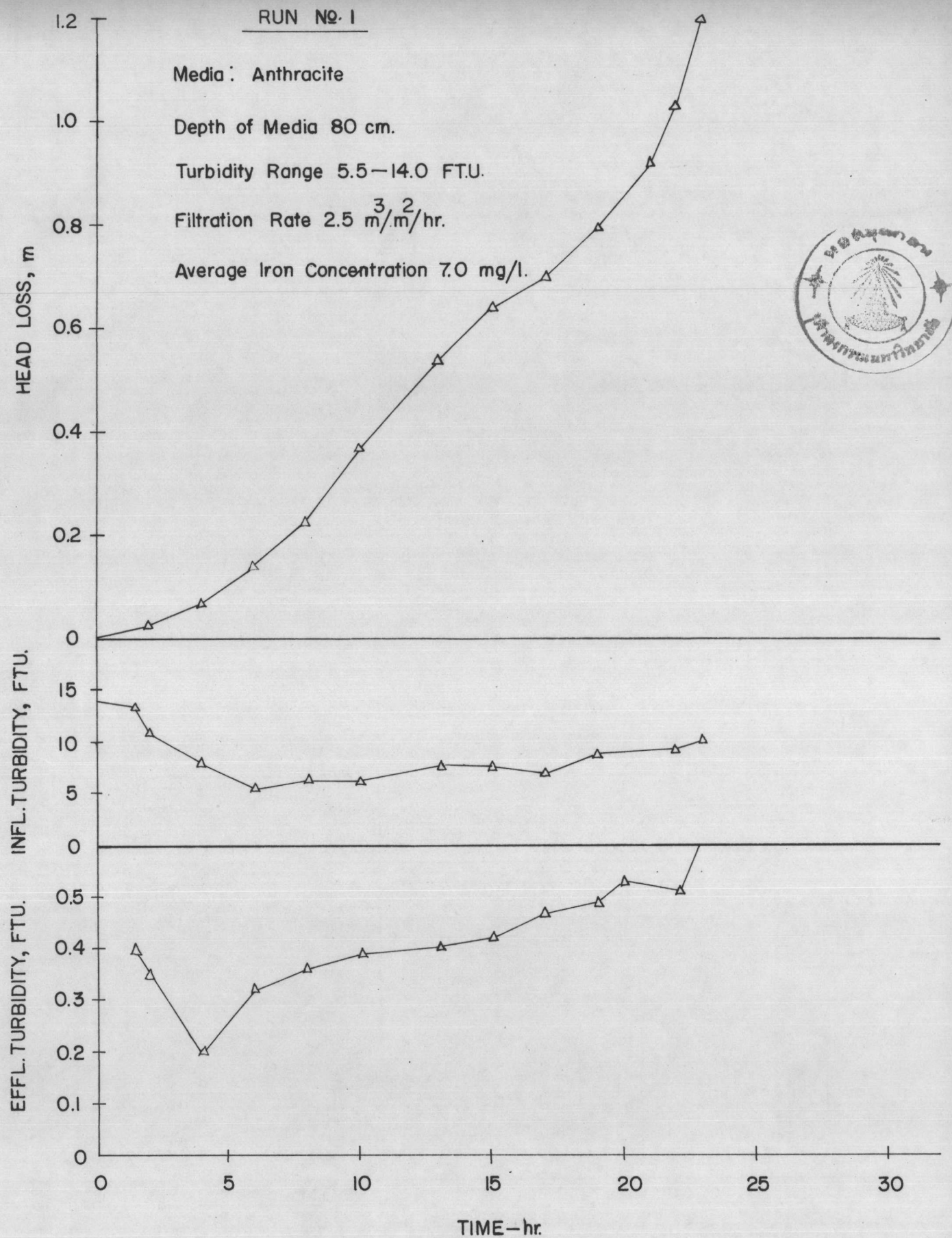


Fig. 18 Filter Performance of Anthracite Media

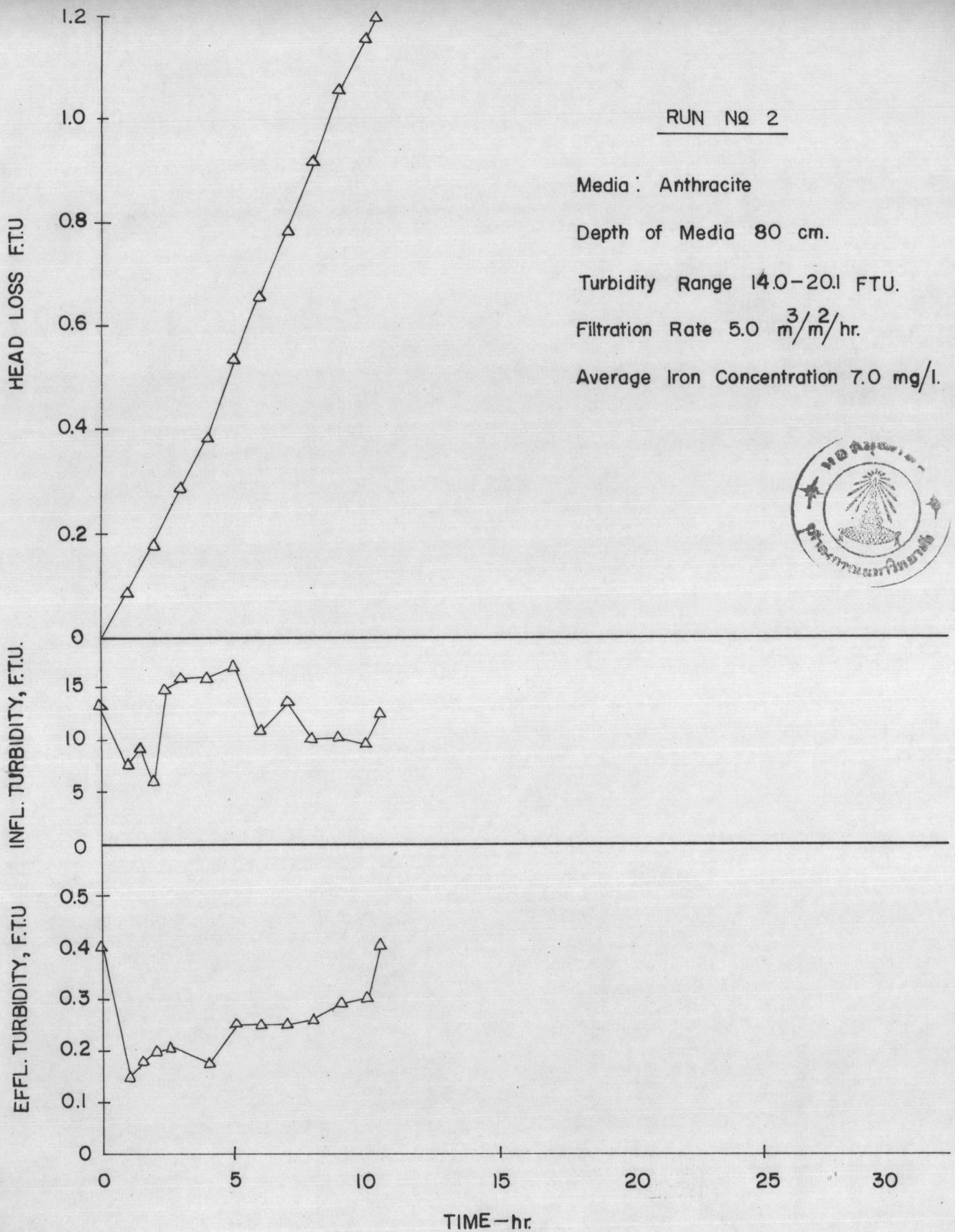


Fig.19 Filter Performance of Anthracite Media

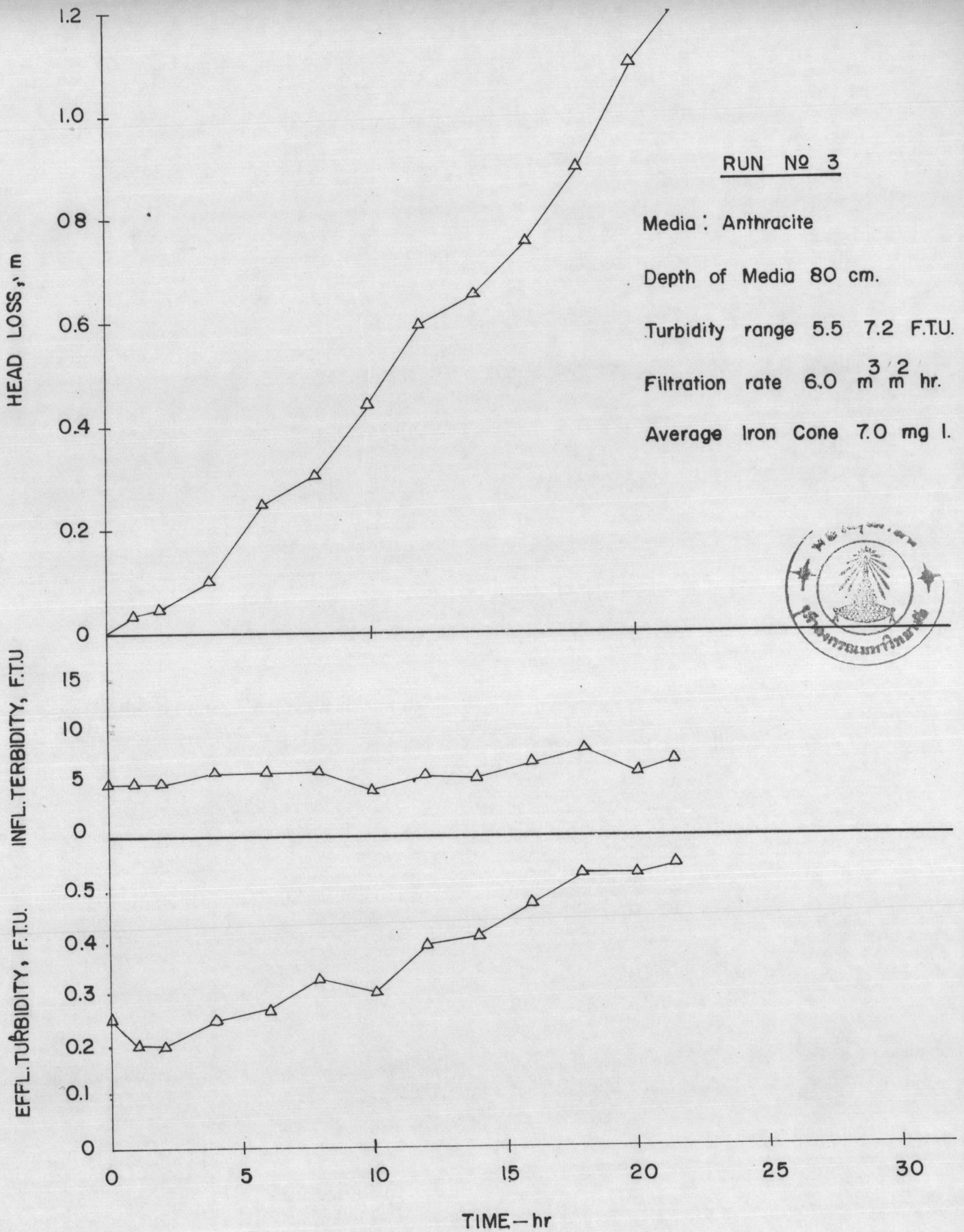


Fig. 20 Filter Performance of Anthracite Media

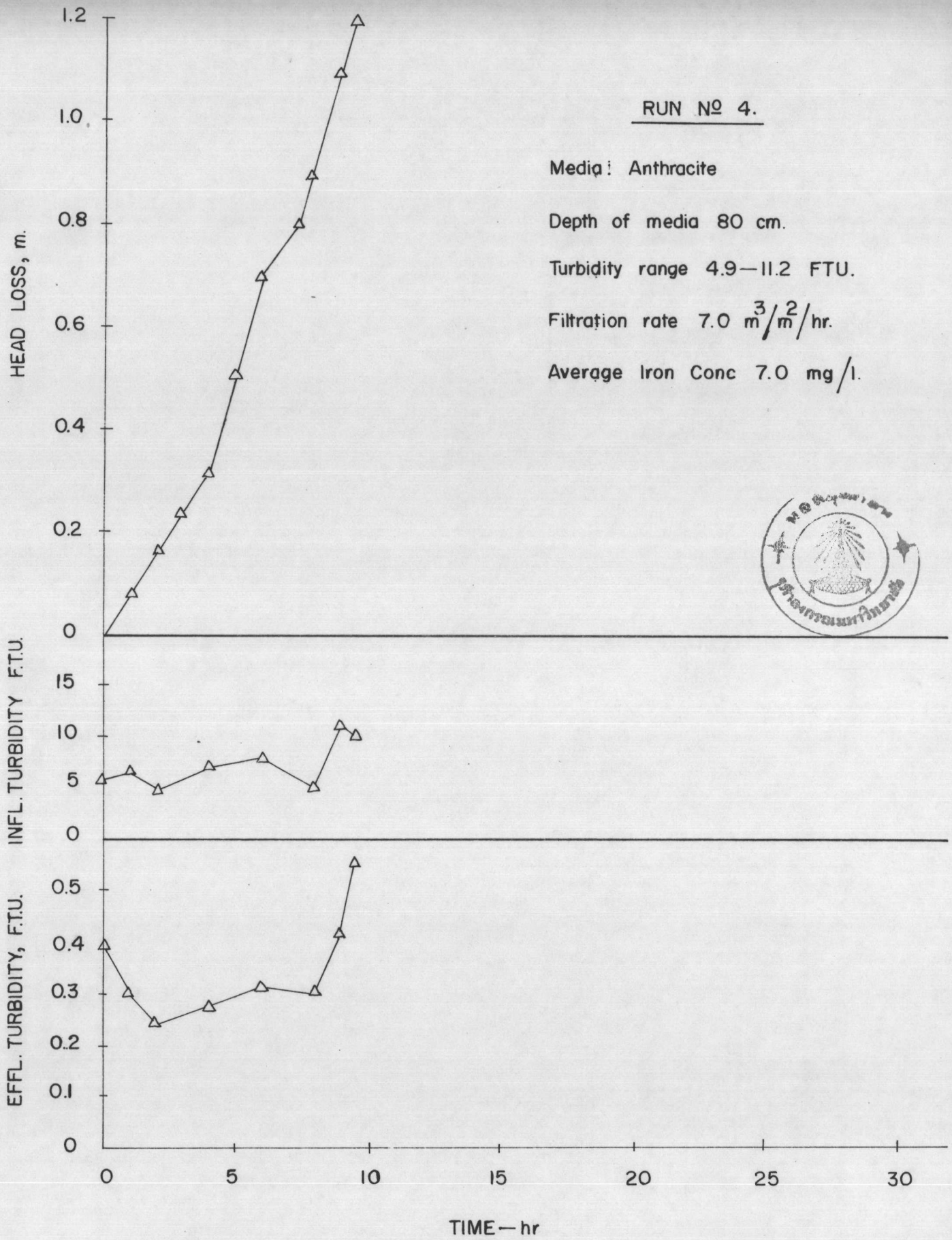


Fig. 21 Filter Performance of Anthracite Media.

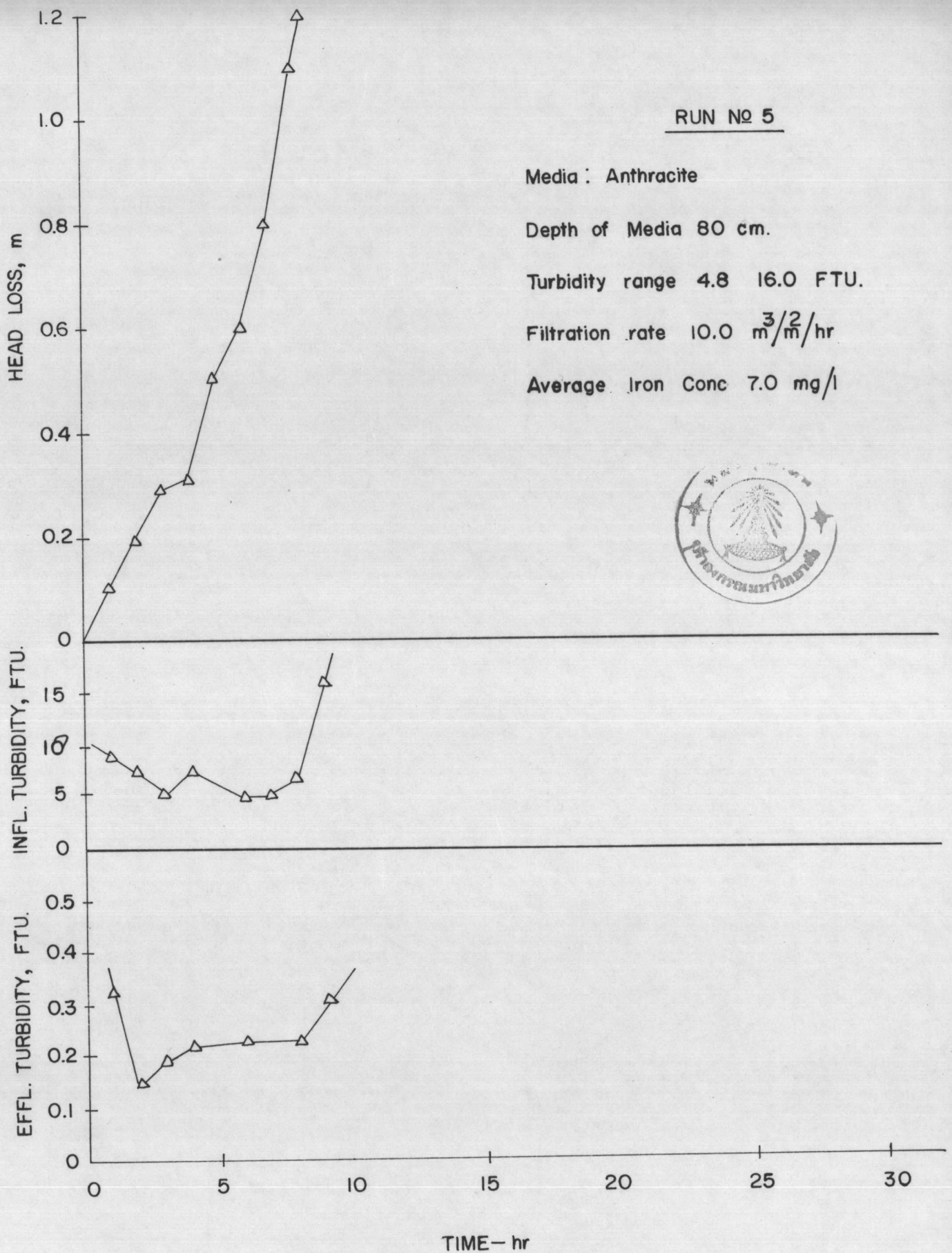


Fig. 22 Filter Reformance of Anthracite Media

TABLE 12 Total Iron Concentration in Effluent Water (mg/l)

[Run No. 6 - 10 Burnt Rice Husk Media]

| TIME hr. | Run No. | | | | |
|-------------|---------|-------|-------|-------|------|
| | No. 6 | 7 | 8 | 9 | 10 |
| 0 | - | - | - | - | - |
| 1 | TRACE | TRACE | 0.003 | 0.009 | 0.01 |
| 2 | TRACE | TRACE | 0.005 | 0.03 | 0.02 |
| 4 | 0.001 | 0.003 | 0.02 | 0.04 | 0.07 |
| 6 | 0.09 | 0.07 | 0.04 | 0.06 | 0.13 |
| 8 | 0.18 | 0.16 | 0.07 | 0.11 | 0.24 |
| 10 | 0.19 | 0.20 | 0.09 | 0.14 | 0.32 |
| 12 | 0.23 | 0.21 | 0.12 | 0.15 | 0.37 |
| 14 | 0.27 | 0.28 | 0.15 | 0.19 | 0.42 |
| 16 | 0.27 | 0.29 | 0.18 | 0.22 | - |
| 18 | 0.30 | 0.32 | 0.24 | 0.31 | - |
| 20 | 0.31 | 0.34 | 0.30 | 0.39 | - |
| 22 | 0.33 | 0.32 | 0.32 | - | - |
| 24 | 0.35 | 0.36 | 0.34 | - | - |
| 26 | 0.34 | 0.35 | 0.37 | - | - |
| 28 | 0.38 | 0.39 | - | - | - |
| 30 | 0.39 | 0.40 | - | - | - |
| 32 | 0.41 | 0.43 | - | - | - |
| 34 | 0.44 | 0.46 | - | - | - |
| 36 | 0.45 | 0.48 | - | - | - |
| 38 | 0.47 | 0.50 | - | - | - |
| 40 | 0.46 | 0.50 | - | - | - |

Medium: Burnt Rice Husk.

Average Concentration in Raw Water 7.0 mg/l.

Depth of Medium 80 cm.

- Run No. 6 Filtration Rate 2.5 $\frac{m^3}{m^2/hr}$
- ▽— Run No. 7 Filtration Rate 5.0 $\frac{m^3}{m^2/hr}$
- △— Run No. 8 Filtration Rate 6.0 $\frac{m^3}{m^2/hr}$
- Run No. 9 Filtration Rate 7.0 $\frac{m^3}{m^2/hr}$
- ◇— Run No. 10 Filtration Rate 10.0 $\frac{m^3}{m^2/hr}$

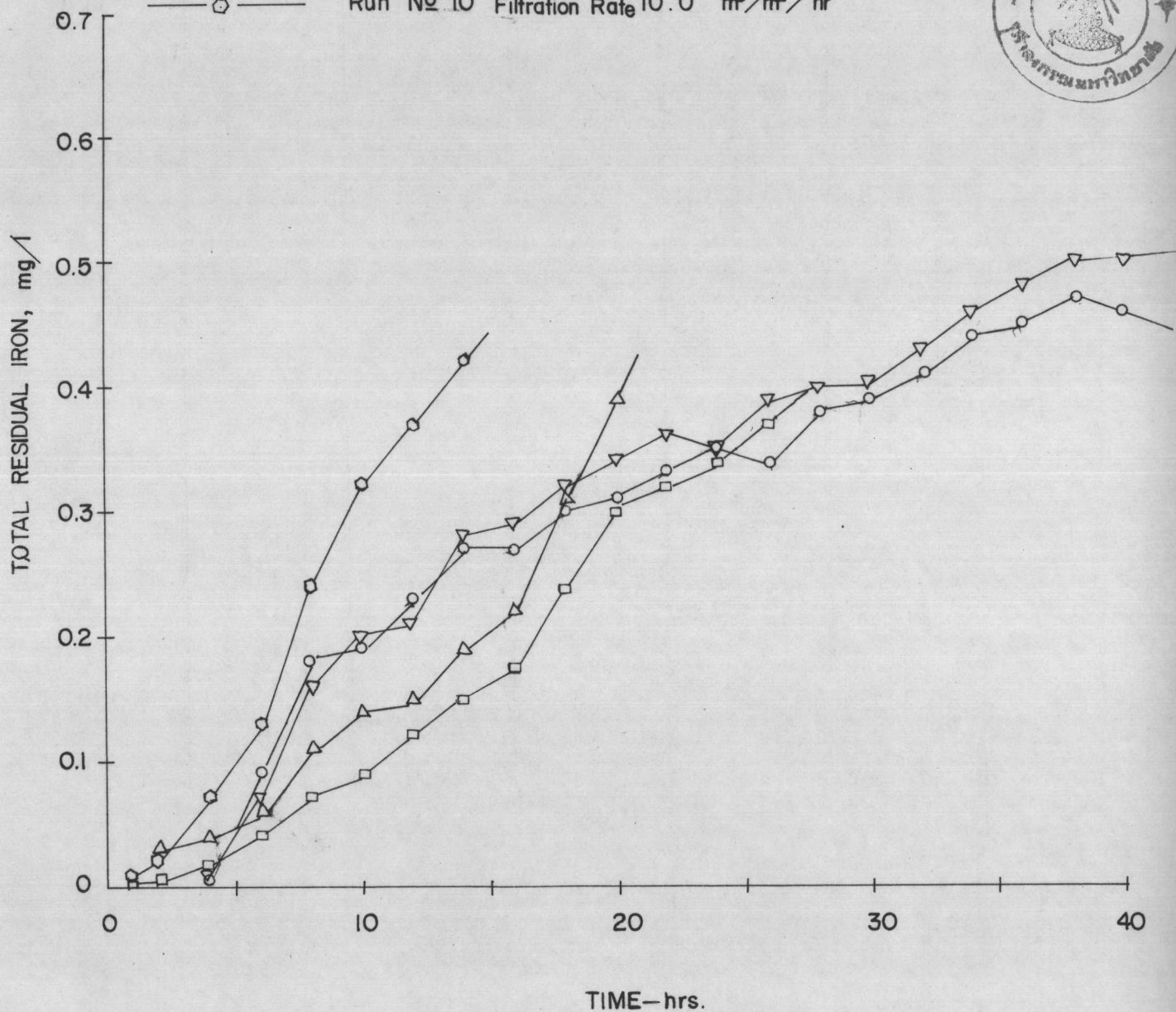


Fig. 23 Iron Concentrations in Effluent Water at Various Filtration Time.

TABLE 13 Filter Performance of Burnt Rice Husk at Filtration rate of 2.5 - 10.0 m³/m²/hr.

| Time | | Head loss of Run No. (cm) | | | | |
|------|------|---------------------------|------|-------|-------|-----|
| Hr. | Min. | 6 | 7 | 8 | 9 | 10 |
| | 0 | - | - | - | - | - |
| 1 | 00 | 2.2 | 3.2 | 5.9 | 8.7 | 6 |
| 1 | 30 | - | - | - | - | - |
| 2 | 00 | 4.5 | 6.7 | 5.3 | 16.5 | 5 |
| 2 | 30 | - | - | - | - | - |
| 3 | 00 | 7.1 | - | 9.4 | - | - |
| 4 | 00 | - | 10.8 | 17.6 | 27.3 | 20 |
| 5 | | 8.8 | - | - | - | - |
| 6 | | - | - | 20.3 | 32.7 | 33 |
| 7 | | - | - | - | - | - |
| 8 | | 12.6 | 16.3 | 27.9 | 35.8 | 61 |
| 9 | | - | - | - | - | - |
| 10 | | 23.9 | 25.2 | 33.2 | 40.2 | 63 |
| 12 | | - | - | - | - | 81 |
| 14 | | 38.4 | 39.7 | 44.1 | 63.5 | 120 |
| 16 | | - | - | 65.7 | 85.9 | - |
| 18 | | - | - | - | 107.0 | - |
| 20 | | 50.1 | 56.8 | 75.8 | 120.0 | - |
| 22 | | - | - | 89.3 | - | - |
| 24 | | 52.3 | 75.7 | 108.0 | - | - |

TABLE 13 (CONTINUED)

| Time | | Head loss of Run No. (cm) | | | | |
|------|------|---------------------------|-------|-------|---|----|
| Hr. | Min. | 6 | 7 | 8 | 9 | 10 |
| 26 | | - | - | 120.0 | - | - |
| 28 | | 66.2 | 82.5 | - | - | - |
| 30 | | - | 94.3 | - | - | - |
| 32 | | 85.4 | 108.0 | - | - | - |
| 34 | | - | - | - | - | - |
| 36 | | 96.9 | 120.0 | - | - | - |
| 38 | | - | - | - | - | - |
| 40 | | 126.0 | - | - | - | - |

TABLE 14 TURBIDITY (in FTU) OF INFLUENT AND EFFLUENT WATER
Before and After entering the filter Column.

[Burnt Rice Husk Media]

| Time | | RUN 6 | | RUN 7 | | RUN 8 | | RUN 9 | | RUN 10 | |
|-------|------|-------|------|-------|------|-------|------|-------|------|--------|------|
| HOURL | MIN. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. |
| | 0 | 8.7 | 0.37 | 9.4 | 0.32 | 7.9 | 0.42 | 12.2 | 0.29 | 16.5 | 0.30 |
| 1 | 00 | 8.0 | 0.35 | - | - | 10.1 | 0.19 | 17.3 | 0.22 | 13.7 | 0.29 |
| 1 | 30 | - | - | - | - | - | - | - | - | - | - |
| 2 | 00 | 7.3 | 0.21 | 10.6 | 0.20 | 9.7 | 0.22 | 11.2 | 0.21 | 12.1 | 0.29 |
| 2 | 30 | - | - | - | - | - | - | - | - | - | - |
| 3 | 00 | - | - | - | - | - | - | - | - | - | - |
| 4 | | 6.1 | 0.23 | 11.2 | 0.25 | 12.4 | 0.24 | 15.6 | 0.30 | 15.2 | 0.31 |
| 6 | | 9.7 | 0.27 | 10.5 | 0.36 | 10.3 | 0.24 | 14.7 | 0.32 | 10.4 | 0.34 |
| 8 | | 6.4 | 0.28 | 14.4 | 0.38 | 12.2 | 0.29 | 11.5 | 0.37 | 12.3 | 0.38 |
| 10 | | 9.5 | 0.33 | 13.9 | 0.36 | 8.2 | 0.23 | 12.6 | 0.35 | 14.7 | 0.35 |
| 12 | | 9.1 | 0.37 | 17.0 | 0.40 | 6.3 | 0.24 | 12.8 | 0.44 | 15.0 | 0.42 |
| 14 | | - | - | - | - | - | - | - | - | 11.2 | 0.51 |
| 16 | | 6.7 | 0.32 | 12.6 | 0.30 | 8.5 | 0.35 | 13.7 | 0.47 | - | - |
| 20 | | 10.3 | 0.38 | 16.8 | 0.42 | 8.7 | 0.29 | 17.6 | 0.56 | - | - |
| 24 | | 7.2 | 0.38 | 11.3 | 0.47 | 9.9 | 0.41 | - | - | - | - |
| 26 | | - | - | - | - | 7.2 | 0.43 | - | - | - | - |
| 28 | | 8.4 | 0.42 | 14.3 | 0.53 | - | - | - | - | - | - |
| 32 | | 7.4 | 0.45 | 12.1 | 0.55 | - | - | - | - | - | - |
| 36 | | 8.8 | 0.51 | 15.4 | 0.56 | - | - | - | - | - | - |
| 38 | | 6.4 | 0.58 | 15.3 | 0.60 | - | - | - | - | - | - |

TABLE 15 ALKALINITY OF EFFLUENT WATER, mg/l as CaCO₃

[Burnt Rice Husk Media]

| Time Hr. | Run No. | | | | |
|-------------|---------|----|----|----|----|
| | 6 | 7 | 8 | 9 | 10 |
| 0 | - | - | - | - | - |
| 1 | - | - | - | - | - |
| 2 | 75 | 73 | 81 | 69 | 74 |
| 4 | 73 | 78 | 83 | 71 | 74 |
| 6 | 74 | 67 | 82 | 72 | 73 |
| 8 | 68 | 66 | 81 | 71 | 76 |
| 10 | 70 | 64 | 81 | 73 | 70 |
| 12 | 71 | 68 | 79 | 74 | 72 |
| 14 | 75 | 64 | 78 | 72 | 71 |
| 16 | 71 | 60 | 81 | 71 | - |
| 18 | 74 | 64 | 83 | 70 | - |
| 20 | 75 | 64 | 80 | 73 | - |
| 22 | 74 | 63 | 82 | - | - |
| 24 | 71 | 61 | 81 | - | - |
| 26 | 72 | 65 | 80 | - | - |
| 28 | 73 | 64 | - | - | - |
| 30 | 73 | 68 | - | - | - |
| 32 | 71 | 68 | - | - | - |
| 34 | 69 | 67 | - | - | - |
| 36 | 73 | 69 | - | - | - |
| 38 | 72 | 65 | - | - | - |
| 40 | 74 | 68 | - | - | - |

TABLE 16 pH OF EFFLUENT WATER

[Burnt Rice Husk Media]

| Time Hr. | Run No. | | | | |
|-------------|---------|------|------|------|------|
| | 6 | 7 | 8 | 9 | 10 |
| 0 | - | - | - | - | - |
| 1 | 7.39 | 7.53 | 7.60 | 7.44 | 7.63 |
| 2 | 7.37 | 7.58 | 7.69 | 7.47 | 7.57 |
| 4 | 7.45 | 7.59 | 7.51 | 7.51 | 7.72 |
| 6 | 7.48 | 7.55 | 7.54 | 7.42 | 7.60 |
| 8 | 7.42 | 7.63 | 7.42 | 7.40 | 7.68 |
| 10 | 7.40 | 7.76 | 7.63 | 7.53 | 7.53 |
| 12 | 7.49 | 7.75 | 7.50 | 7.50 | 7.59 |
| 14 | 7.50 | 7.78 | 7.50 | 7.58 | 7.61 |
| 16 | 7.48 | 7.73 | 7.49 | 7.61 | - |
| 18 | 7.52 | 7.57 | 7.58 | 7.62 | - |
| 20 | 7.52 | 7.63 | 7.59 | 7.56 | - |
| 22 | 7.50 | 7.61 | 7.52 | - | - |
| 24 | 7.48 | 7.55 | 7.51 | - | - |
| 26 | 7.47 | 7.50 | 7.62 | - | - |
| 28 | 7.49 | 7.64 | - | - | - |
| 30 | 7.40 | 7.79 | - | - | - |
| 34 | 7.51 | 7.51 | - | - | - |
| 36 | 7.49 | 7.75 | - | - | - |
| 38 | 7.52 | 7.74 | - | - | - |
| 40 | 7.50 | 7.72 | - | - | - |

TABLE 17 HARDNESS OF EFFLUENT mg/l as CaCO₃

[Burnt Rice Husk Media]

| Time Hr. | Run No. | | | | |
|-------------|---------|----|----|----|----|
| | 6 | 7 | 8 | 9 | 10 |
| 0 | - | - | - | - | - |
| 2 | 86 | 81 | 77 | 82 | 81 |
| 4 | 80 | 82 | 82 | 84 | 82 |
| 6 | 82 | 81 | 80 | 82 | 80 |
| 8 | 86 | 81 | 80 | 85 | 83 |
| 10 | 82 | 82 | 82 | 85 | 82 |
| 12 | 90 | 84 | 81 | 84 | 82 |
| 14 | 86 | 83 | 82 | 83 | 80 |
| 16 | 86 | 81 | 82 | 85 | - |
| 18 | 86 | 81 | 82 | 84 | - |
| 20 | 85 | 82 | 82 | 84 | - |
| 22 | 84 | 84 | 83 | - | - |
| 24 | 86 | 85 | 82 | - | - |
| 26 | - | - | - | - | - |
| 28 | 87 | 82 | 81 | - | - |
| 30 | 85 | 82 | - | - | - |
| 32 | 84 | 84 | - | - | - |
| 34 | 86 | 83 | - | - | - |
| 36 | 84 | 83 | - | - | - |
| 38 | 87 | 82 | - | - | - |
| 40 | 84 | 82 | - | - | - |

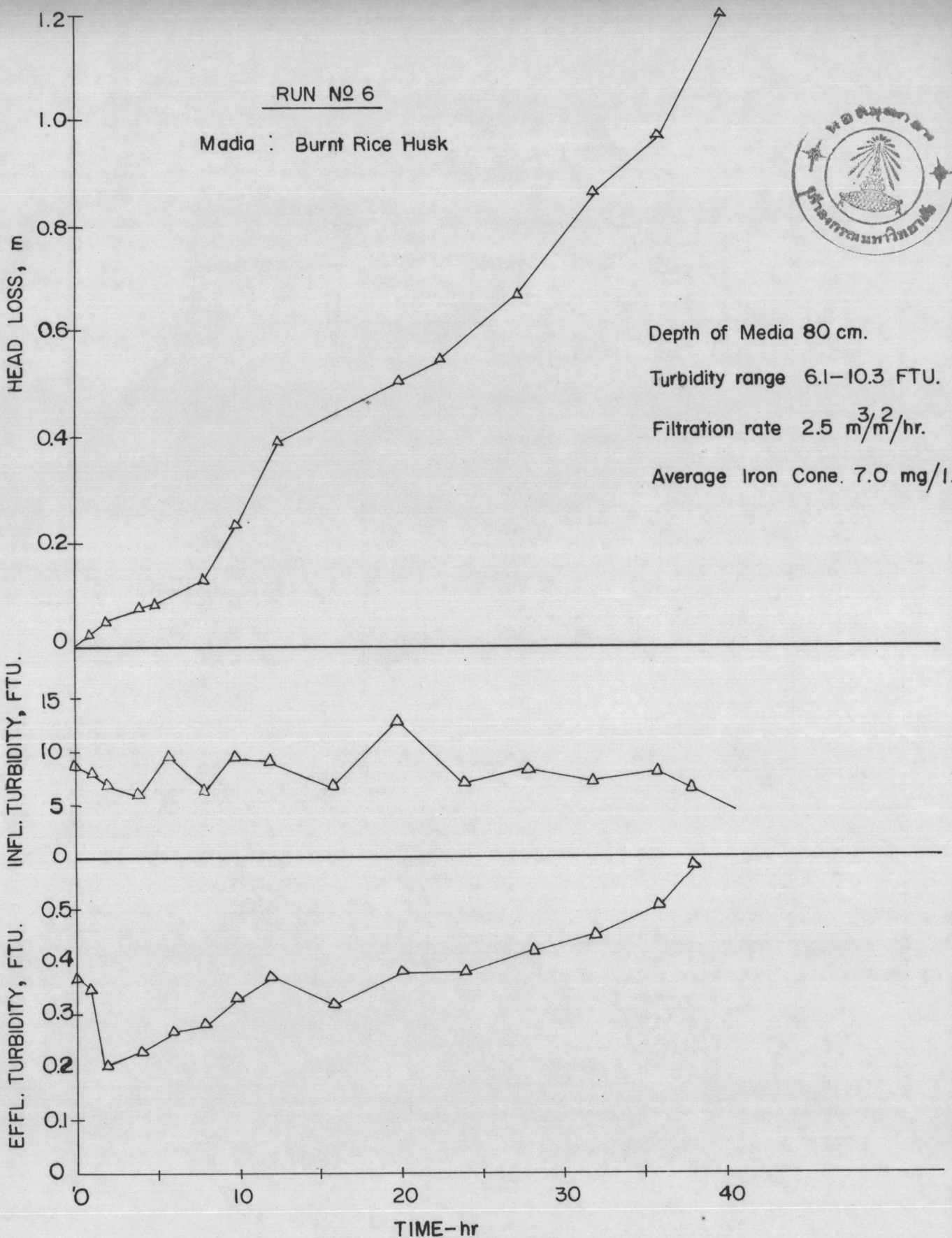


Fig.24 Filter Performance of Burnt Rice Husk Media.

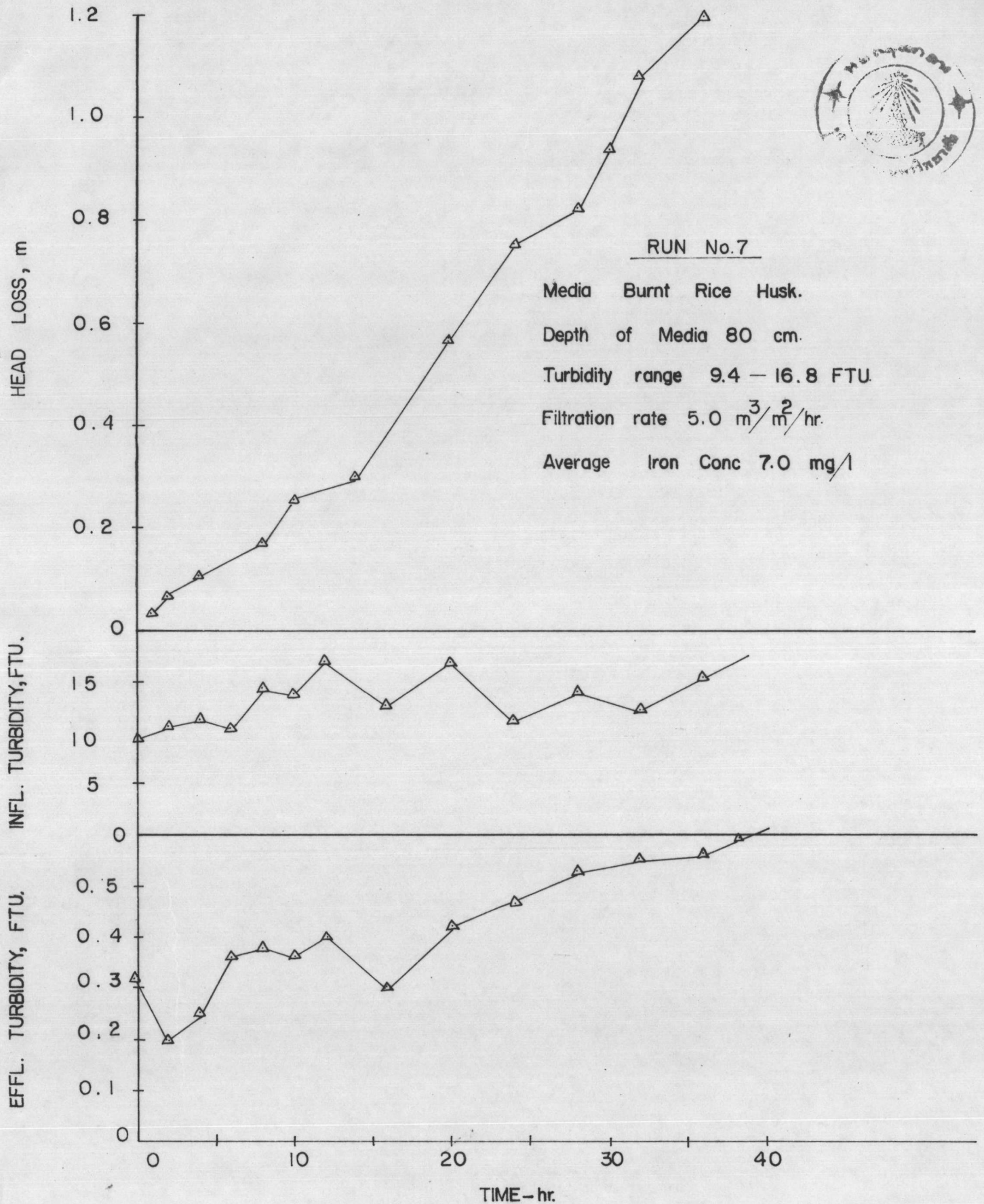


Fig.25 Filter Performance of Burnt Rice Husk Media.

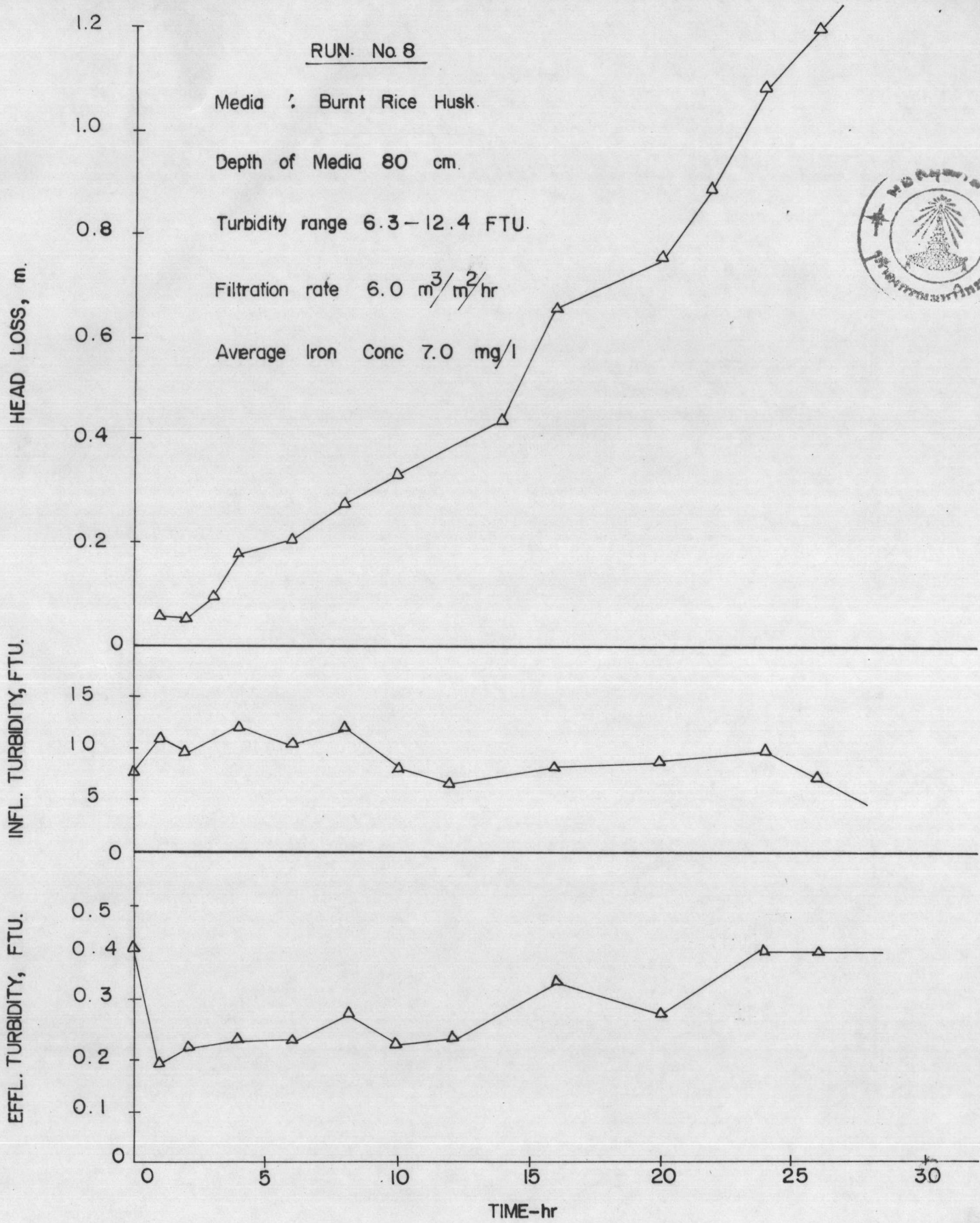


Fig.26 Filter Performance of Burnt Rice Husk Media.

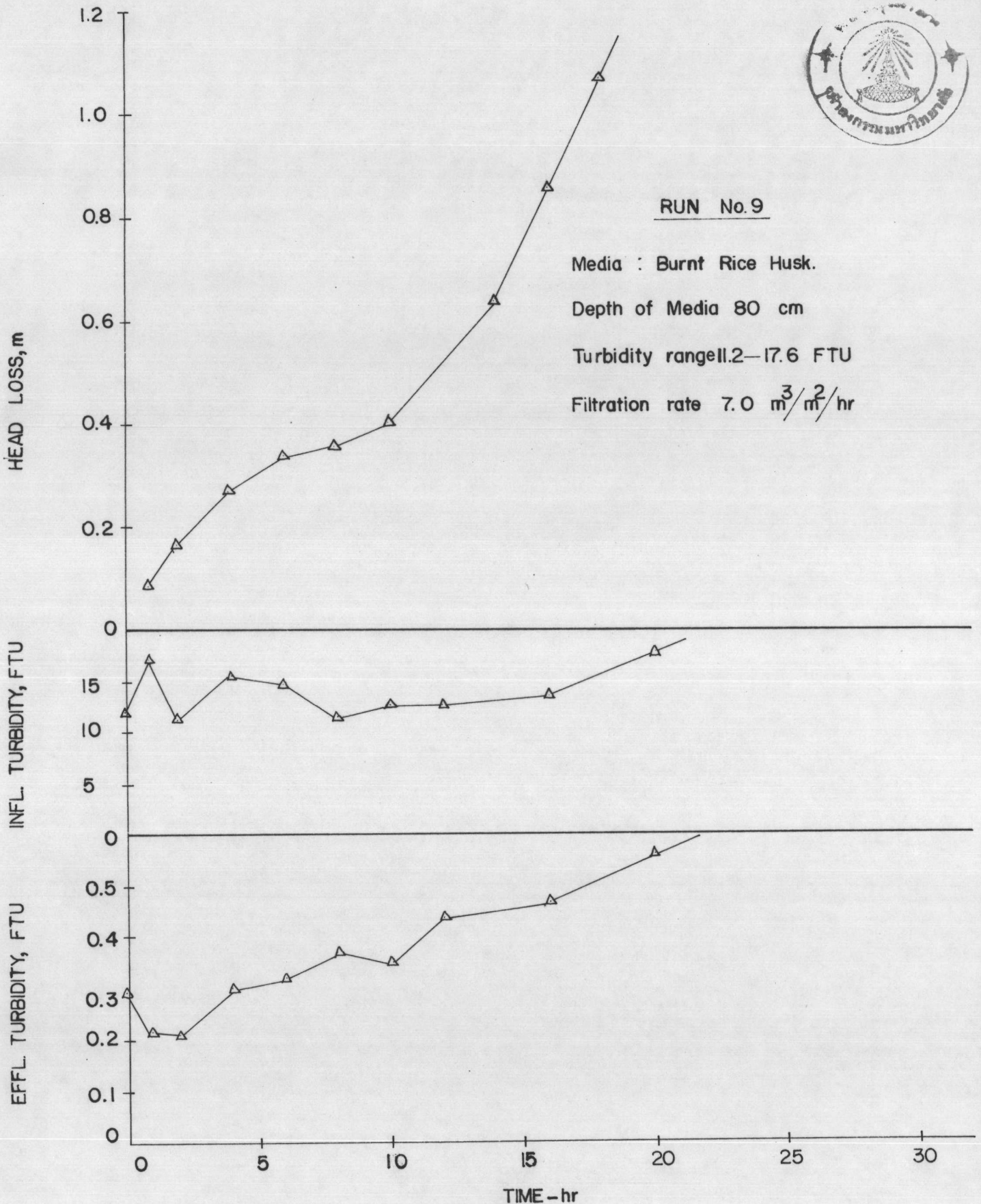


Fig. 27 Filter Performance of Burnt Rice Husk Media.



RUN No. 10

Media : Burnt Rice Husk.
Depth of Media 80 cm.
Turbidity range 10.4 - 16.5 FTU.
Filtration rate 10.0 m³/m²/hr
Average Iron Conc. 7.0 mg/l

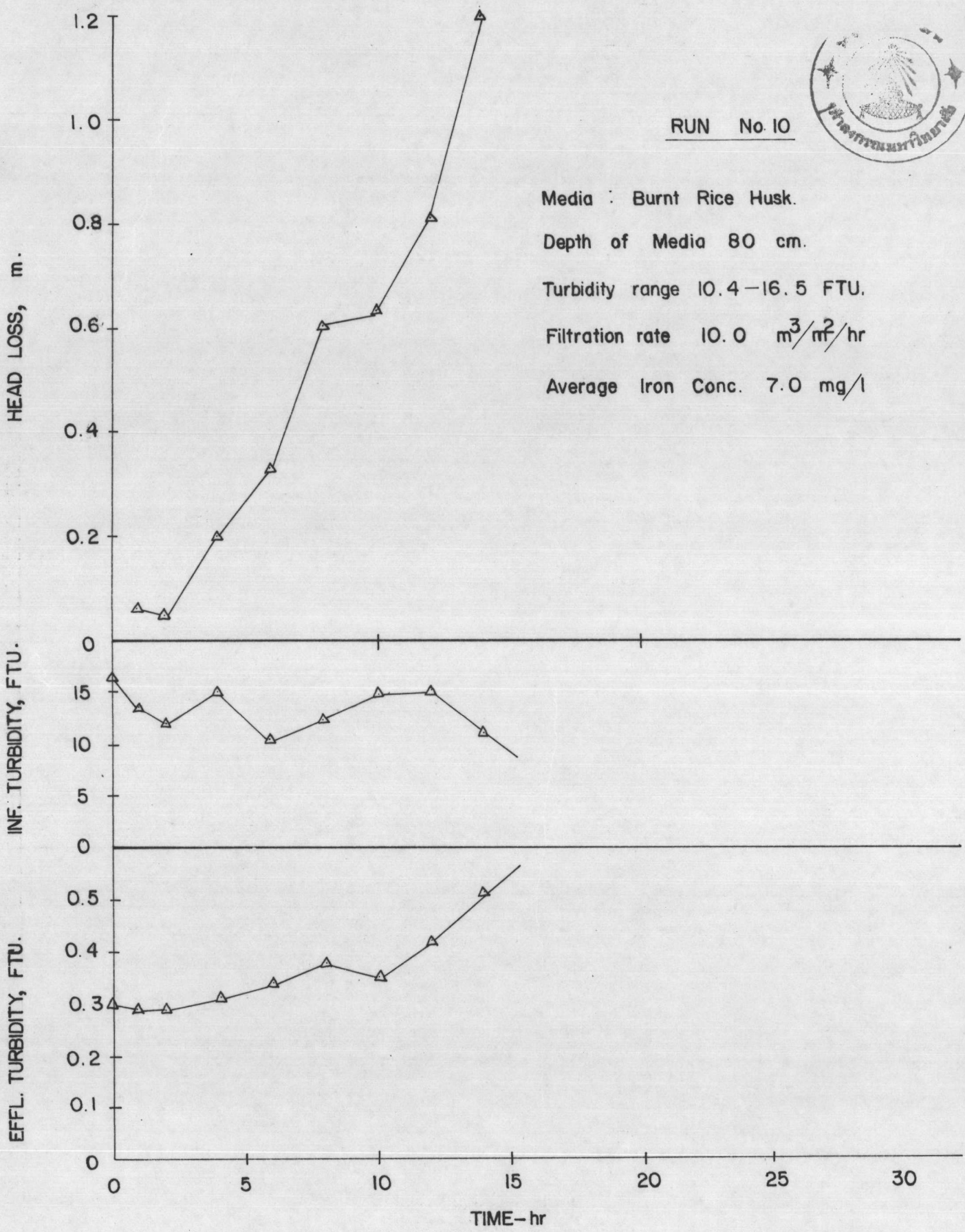


Fig. 28 Filter Performance of Bunt Rice Husk Media.

TABLE 13 Summary of Results in Filter Performance

| RUN | MEDIA | DEPTH OF MEDIA (cm.) | FILTRATION RATE ($m^3/m^2/hr$) | INFLUENT TURBIDITY (F.T.U.) | AVG. (FTU) | EFFLUENT TURBIDITY (F.T.U.) | AVG. (FTU) | AVG. TUR. REM. EFF. (%) | AMOUNT OF WATER FILTERED (m^3/m^2 of BED) | DURATION OF RUN FOR HEADLOSS (1.2m) | RATE OF HEADLOSS (cm./hr.) |
|-----|-------|----------------------|----------------------------------|-----------------------------|------------|-----------------------------|------------|-------------------------|--|-------------------------------------|----------------------------|
| 1 | ATC* | 80 | 2.5 | 5.5-14 | 8.85 | 0.20-1.4 | 0.49 | 94.5 | 57.2 | 22.9 | 5.23 |
| 2 | ATC | 80 | 5.0 | 6.2-16 | 11.95 | 0.15-0.43 | 0.30 | 97.5 | 52.0 | 10.4 | 11.53 |
| 3 | ATC | 80 | 6.0 | 5.5-7.2 | 6.25 | 0.20-0.55 | 0.36 | 94.2 | 12.9 | 21.15 | 5.58 |
| 4 | ATC | 80 | 7.0 | 4.9-11.2 | 7.49 | 0.24-0.57 | 0.35 | 89.2 | 66.5 | 9.5 | 12.60 |
| 5 | ATC | 80 | 10.0 | 4.8-16.0 | 8.31 | 0.19-0.58 | 0.28 | 96.6 | 83.0 | 8.3 | 14.49 |
| 6 | BRH* | 80 | 2.5 | 6.1-10.3 | 8.0 | 0.21-0.58 | 0.36 | 95.5 | 98.2 | 39.3 | 3.05 |
| 7 | BRH | 80 | 5.0 | 9.4-16.8 | 13.2 | 0.20-0.60 | 0.41 | 96.9 | 187.5 | 37.5 | 3.22 |
| 8 | BRH | 80 | 6.0 | 6.3-12.4 | 9.28 | 0.19-0.43 | 0.30 | 96.8 | 150 | 25.0 | 4.80 |
| 9 | BRH | 80 | 7.0 | 11.2-17.6 | 13.90 | 0.21-0.56 | 0.35 | 97.5 | 137.2 | 19.6 | 6.12 |
| 10 | BRH | 80 | 10.0 | 10.4-16.5 | 13.45 | 0.29-0.51 | 0.32 | 97.6 | 136 | 13.6 | 8.79 |

Note: ATC* = ANTRACITE COAL

BRH* = BURNT RICE HUSK

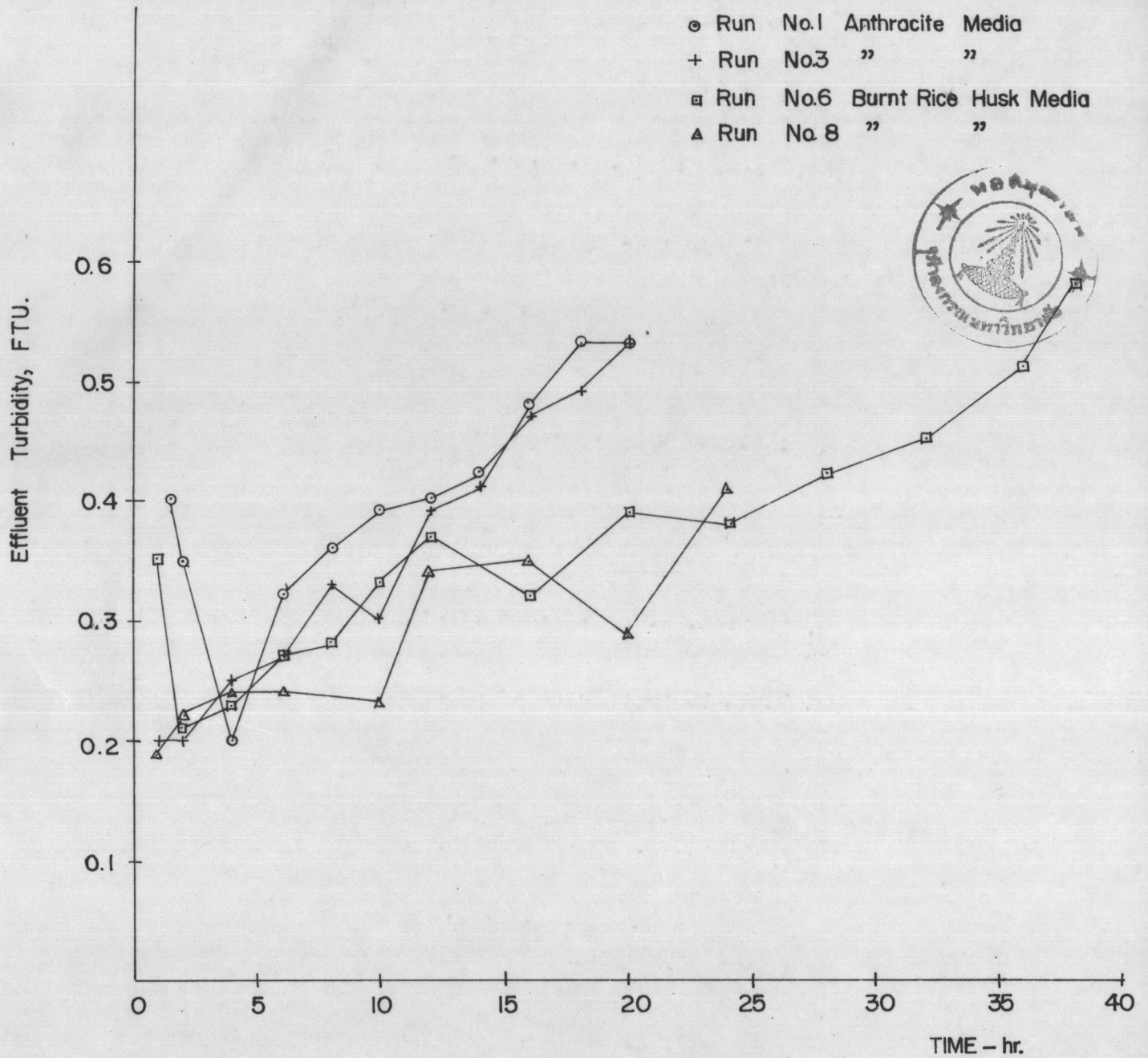


Fig. 29 Comparison of Effluent Turbidity between Anthracite and Burnt Rice Husk.

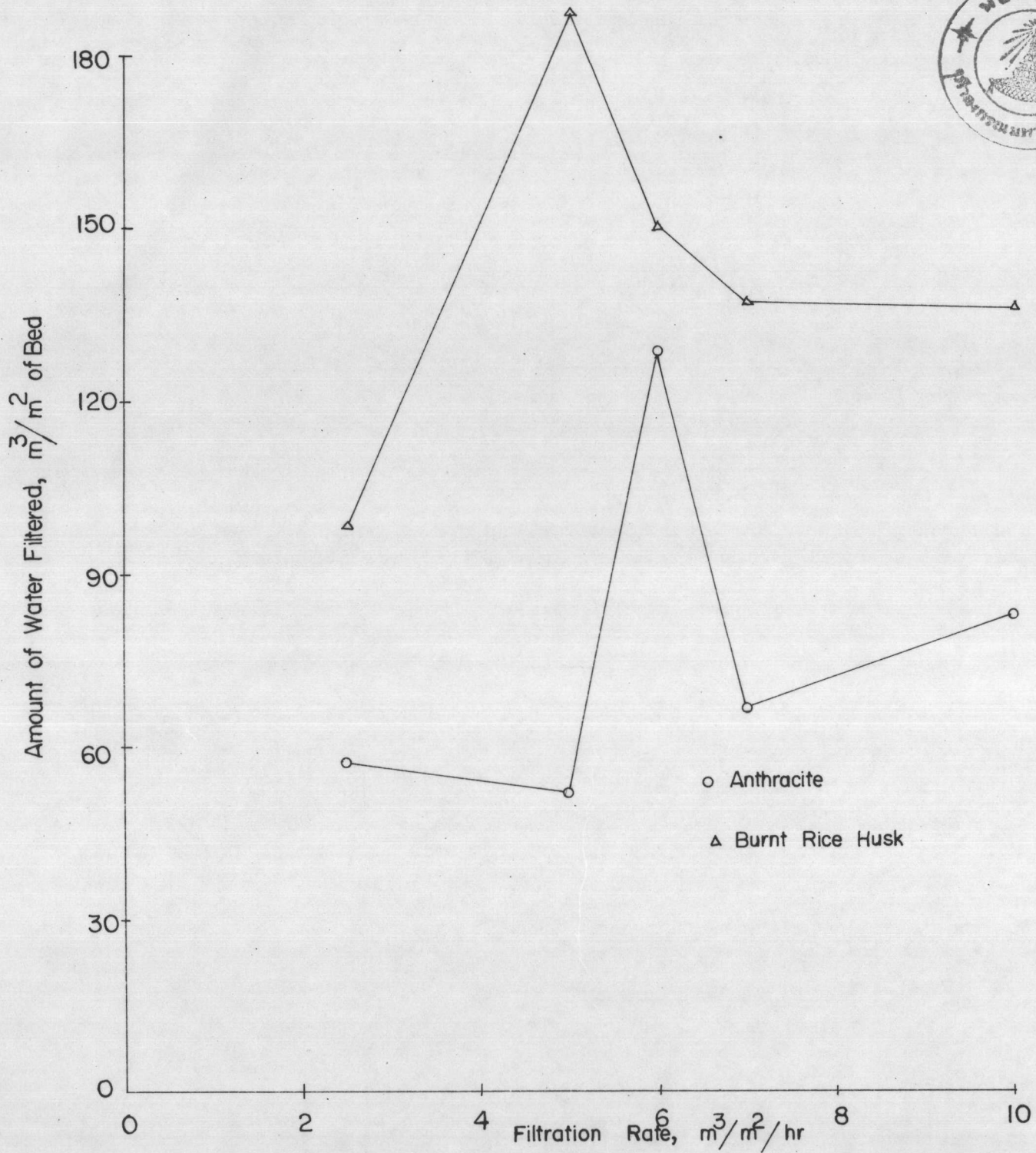


Fig.30 Relation of Amount of Water Filtered versus Filtration Rates of Anthracite and Burnt Rice Husk.

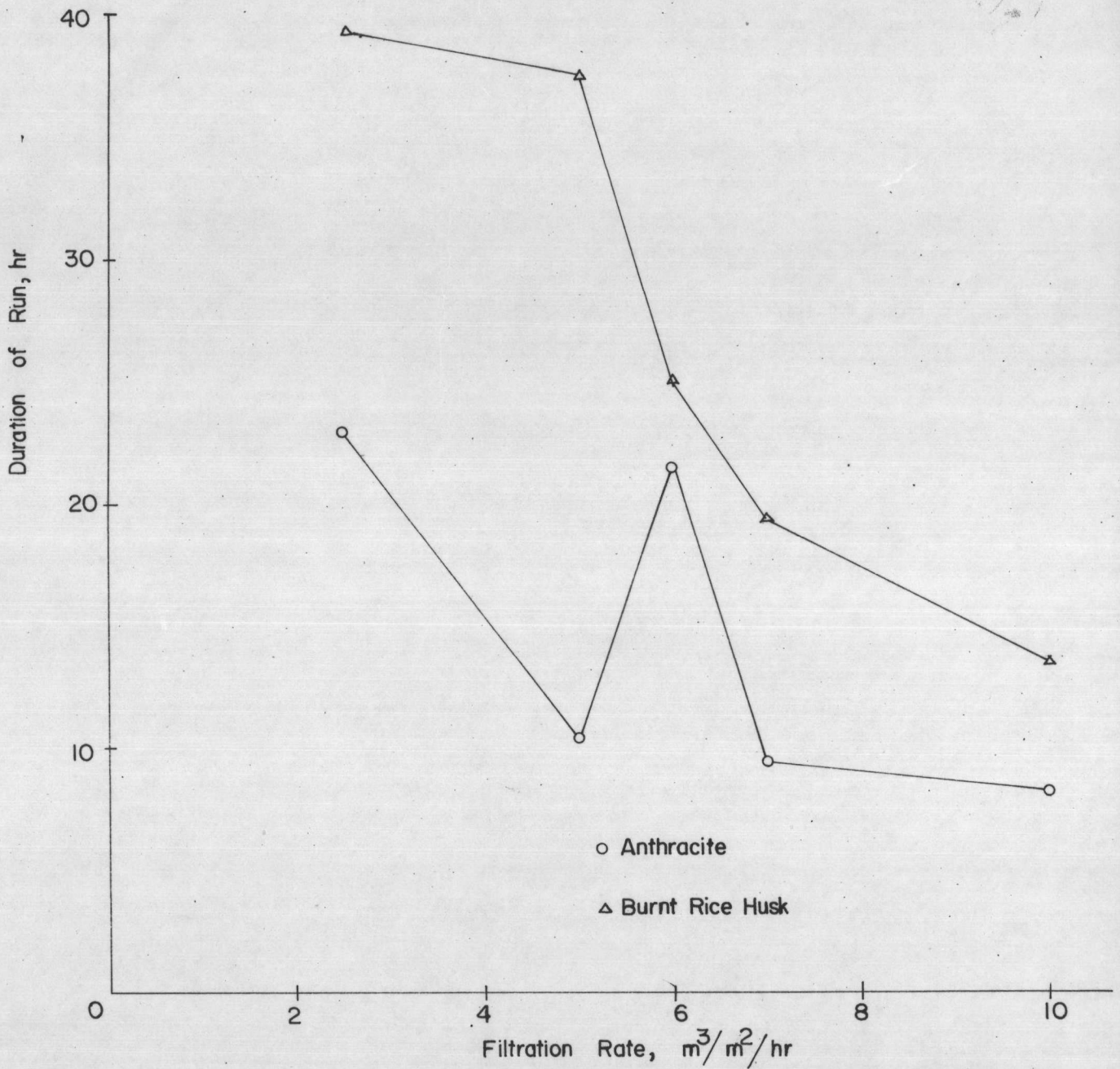


Fig. 31 Comparison of Duration of Run between Anthracite and Burnt Rice Husk.

TABLE 19 Comparison of Coliform Removal of Anthracite and Burnt Rice Husk at 2.5 and 6.0 m³/m²/hr.

| Time Hr. | Run No.1 (Anthracite media) | | Run No.2 (Anthracite media) | |
|-------------|--|-------------------------------------|--|-------------------------------------|
| | Influent Coliform Count 2650 MPN/100 ml | | Influent Coliform Count 1980 MPN/100 ml | |
| | Effluent Coliform Count | Coliform Removal Efficiency % | Effluent Coliform MPN/100 ml | Coliform Removal Efficiency % |
| 1 | 100 | 96.23 | 70 | 96.46 |
| 3 | 20 | 99.25 | 15 | 99.24 |
| 5 | 16 | 99.40 | 21 | 98.94 |
| 7 | 25 | 99.06 | 6 | 99.70 |
| 9 | 8 | 99.70 | 5 | 99.75 |
| 12 | 6 | 99.77 | - | - |
| 16 | 8 | 99.70 | - | - |
| 20 | 7 | 99.74 | - | - |
| 24 | - | - | - | - |
| 28 | - | - | - | - |
| 32 | - | - | - | - |
| 36 | - | - | - | - |
| 40 | - | - | - | - |

TABLE 19 (Cont'd)

| Time Hr. | Run No. 6 (Burnt Rice Husk) Influent Coliform Count 2010 MPN/100 ml | | Run No. 7 (Burnt Rice Husk) Influent Coliform Count 1798 MPN/100 ml | |
|-------------|---|------------------------------------|---|------------------------------------|
| | Effluent Coliform MPN/100ml | Coliform Removal Efficiency% | Effluent Coliform MPN/100ml | Coliform Removal Efficiency% |
| 1 | 96 | 95.22 | 112 | 93.77 |
| 3 | 19 | 99.06 | 21 | 98.83 |
| 5 | 18 | 99.11 | 17 | 99.06 |
| 7 | 22 | 98.91 | 20 | 98.89 |
| 9 | 10 | 99.50 | 12 | 99.33 |
| 12 | 9 | 99.55 | 10 | 99.44 |
| 16 | 7 | 99.65 | 8 | 99.56 |
| 20 | 9 | 99.55 | 10 | 99.44 |
| 24 | 9 | 99.55 | 7 | 99.61 |
| 28 | 7 | 99.65 | 9 | 99.50 |
| 32 | 5 | 99.75 | 7 | 99.61 |
| 36 | 6 | 99.70 | 6 | 99.72 |
| 40 | 6 | 99.70 | - | - |

Anthracite Media.

Depth 80 cm.

Flow 2.5 and 5.0

Coliform Range 1798 - 2010 MPN/100ml.

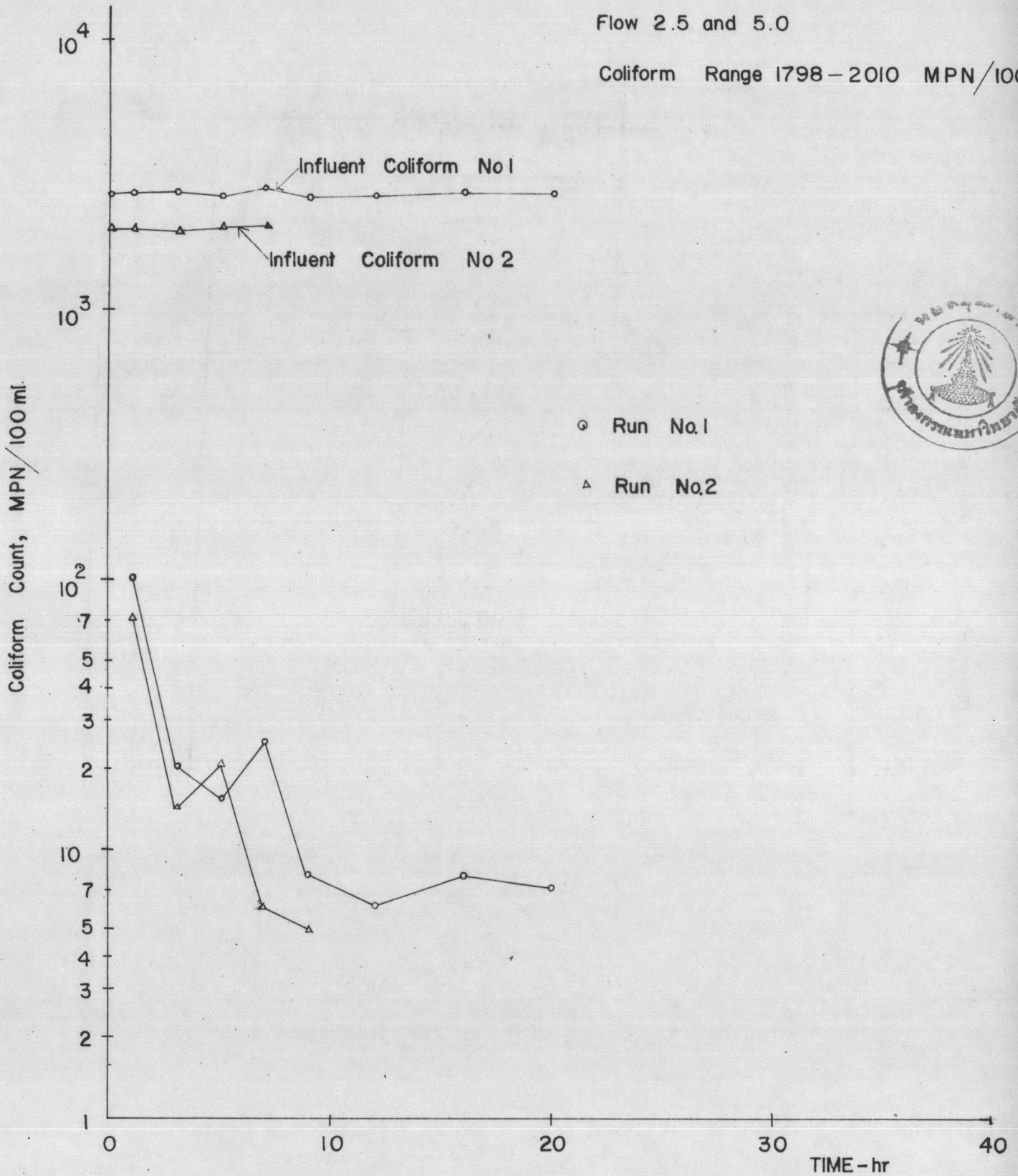


Fig. 32 Comparison of Effluent Coliform of Anthracite Media.

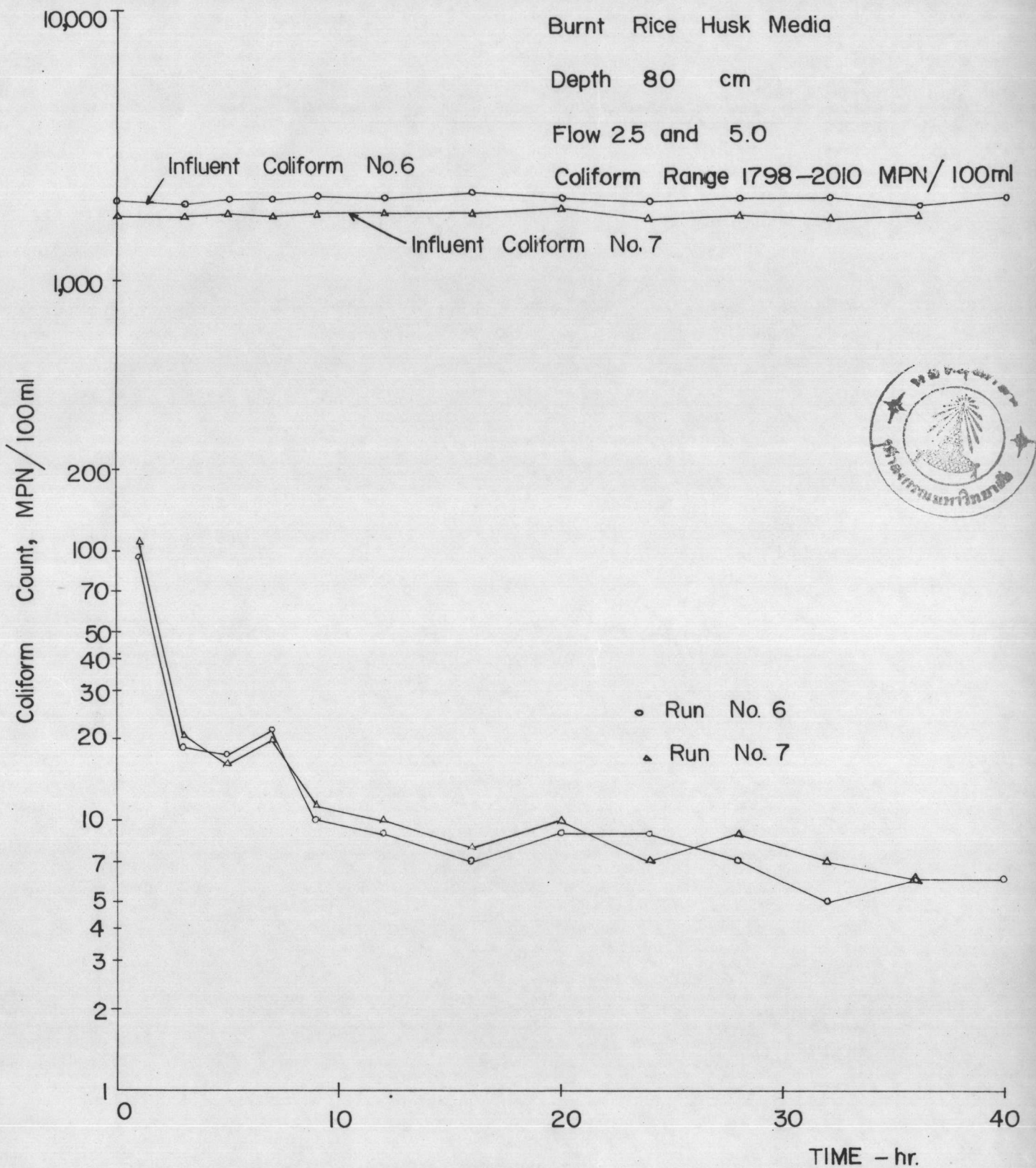


Fig.33 Comparison of Effluent Coliform of Burnt Rice Hust Media.

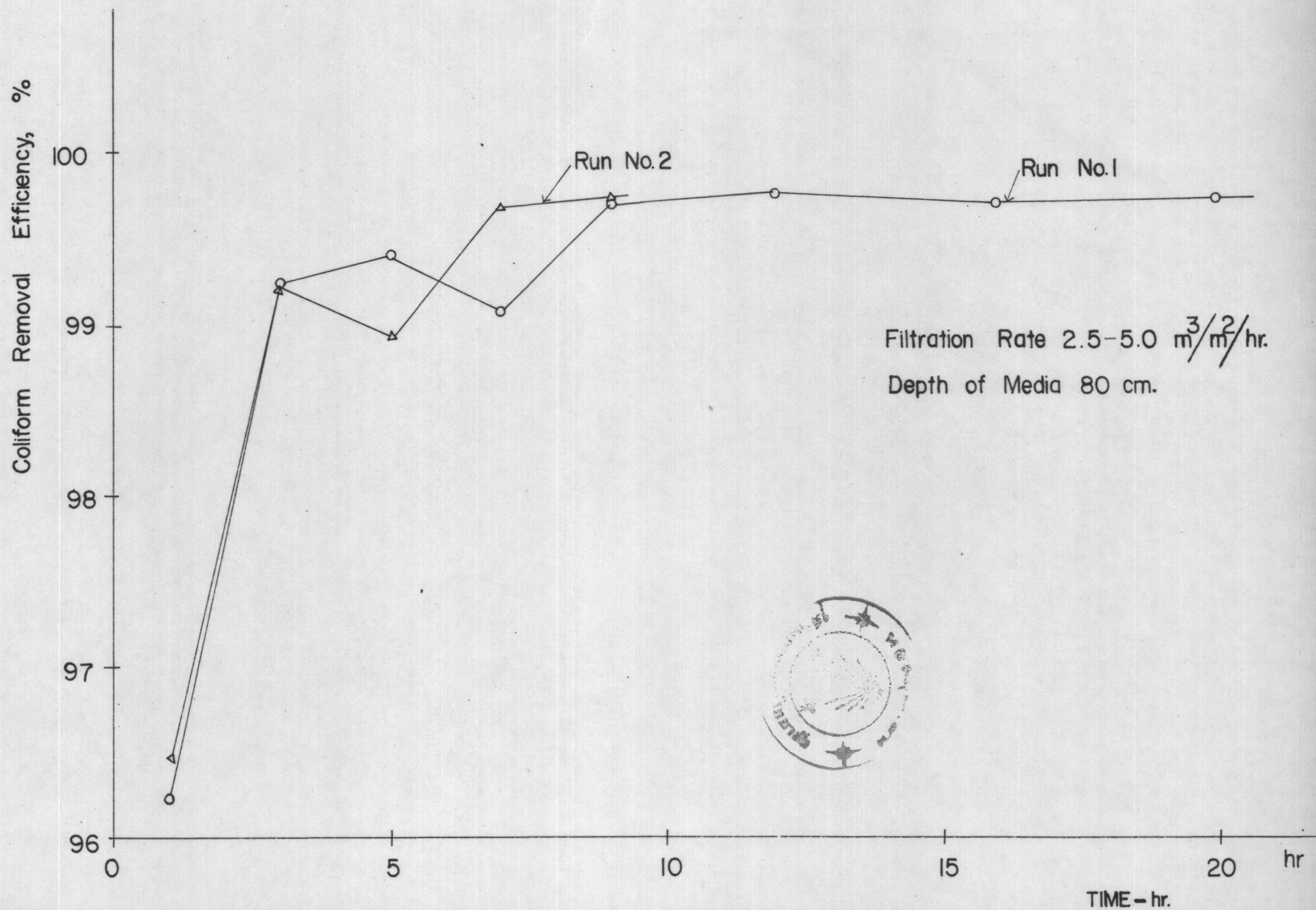


Fig. 34 Coliform Removal Efficiency of Anthracite Media.

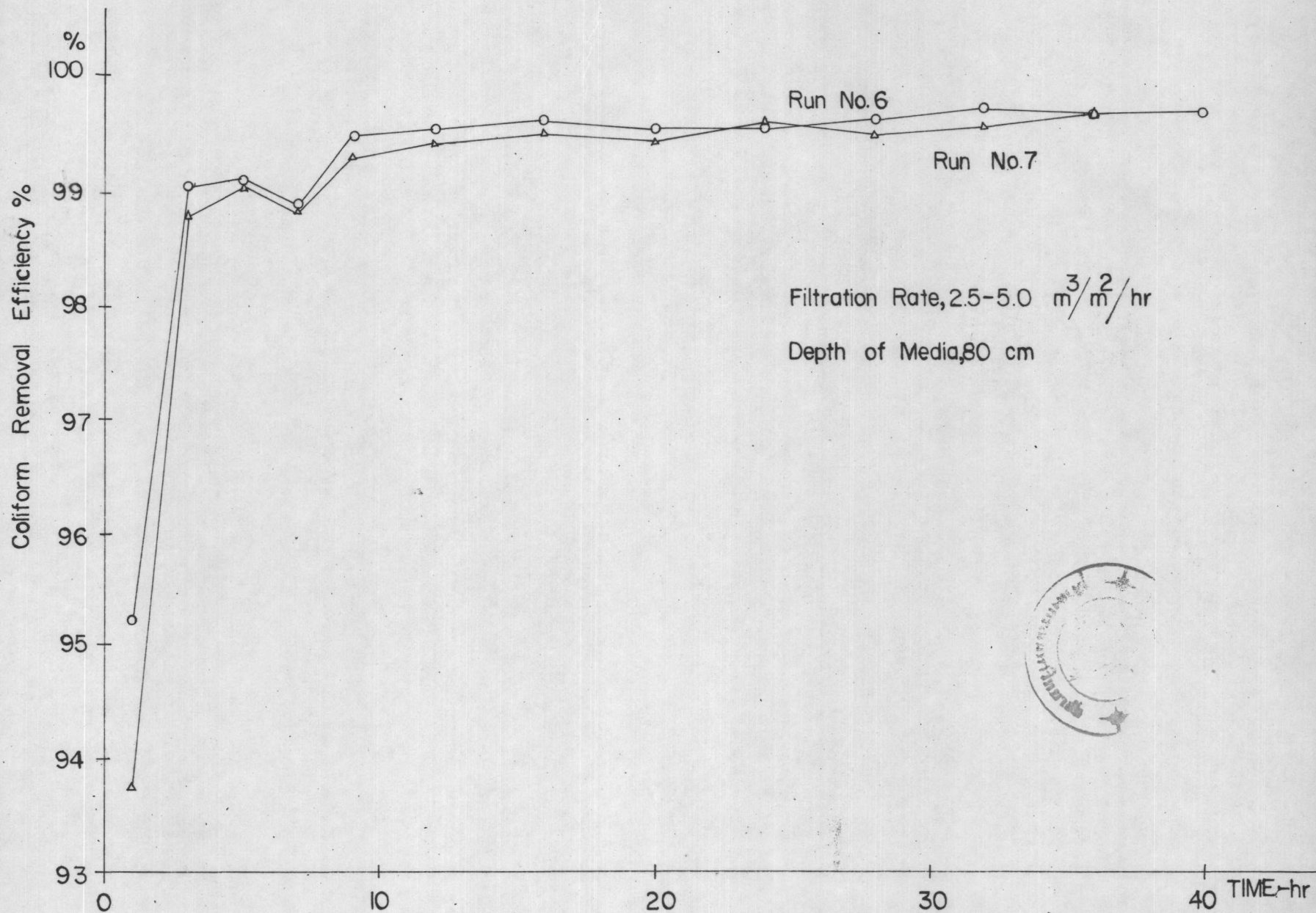


Fig.35 Coliform Removal Efficiency of Burnt Rice Husk Media