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June 30, 2008

Department of Ecology
Water Quality Program
PO Box 47696
Olympia, WA 98504-7696

Attention: Joyce M. Smith, Industrial Stormwater Permit Coordinator

Reference: Industrial Stormwater General Permit No. SO3-000566D (Selah Facilities)
Level Three Update

Dear Ms. Smith:

Enclosed is a **Level Three Response Report** dated June 30, 2008. This report summarizes monitoring results for the recently-constructed treatment BMP and outlines a course of action for further study.

Sincerely,

Jeff W. Davis
Civil Projects Engineer

Copies with enclosure: $WDOE_{CRO}$ – Ray Latham
Tree Top – Vaughan Bulfinch, Jerry Kobes, file

TREE TOP, INC. – SELAH OPERATIONS
INDUSTRIAL STORM WATER GENERAL PERMIT SO3-000566D

LEVEL 3 RESPONSE
JUNE 30, 2008 UPDATE

1. BACKGROUND

Tree Top has made significant progress in reducing stormwater quantity and improving stormwater quality since Washington's ISWGP went into effect. Most significantly, runoff from areas likely to be affected by industrial activity has been diverted to process water treatment facilities.

The remaining pavement includes City streets, employee parking, and small portions of empty apple bin storage areas. These were not considered likely to contribute significantly to stormwater contamination and did not receive early attention.

When monitoring of runoff was initiated in 2004 it became apparent that tire wear was a significant source of zinc and turbidity. This obviously applies to all paved areas and is not unique to industrial activity.

Monitoring data have indicated that zinc, turbidity, and BOD have each exceeded the Action Levels established in the Industrial Stormwater General Permit (ISWGP) more than four times. As a result, an iterative Level 3 response has been underway since early 2006. A number of progress reports have been submitted to WDOE[1].

Tree Top began experimenting with drop-in filters at a catch basin that receives runoff from a combination of city street, employee parking, and bin storage areas. It became apparent from these experiments that simple filters are not capable of significantly reducing zinc or turbidity.

[1] Response reports dated January 16, 2006, May 2, 2006, and July 24, 2006.

As a result, Tree Top installed a wet vault/*StormFilter*[2] system in late 2007. This system serves the drainage area of a single catch basin and was expected to reduce zinc, turbidity, and BOD. The total project cost was $54,500. This project was intended to be an experimental installation that would allow performance to be evaluated, beginning with the 2007/2008 rainy season.

A report to DOE to describe the results of this experimental installation was proposed for the end of the Second Quarter of 2008; this update constitutes that report.

2. MONITORING SINCE INSTALLATION OF TREATMENT BMP

2.1 MONITORING AT CATCH BASIN DØ7 (formerly D1Ø)

Construction of the treatment system was completed on November 16, 2007. There have been three storm events[3] since then. Two were sampled; one was missed since the person assigned to sampling was out of town at the time. The following table summarizes results for zinc and turbidity.

Table 2.1

Turbidity, NTU (benchmark = 25; action level = 50)			
Sampled	Raw Stormwater	Sedimentation Tank Effluent	Filter Effluent
3/13/2008	464	130	74
6/3/2008	130	73	34
Total Zinc, µg/l (benchmark = 117; action level = 372)			
Sampled	Raw Stormwater	Sedimentation Tank Effluent	Filter Effluent
3/13/2008	592	316	160
6/3/2008	468	292	250
Dissolved Zinc, µg/l (no benchmark or action level in permit)			
Sampled	Raw Stormwater	Sedimentation Tank Effluent	Filter Effluent
3/13/2008	246	98	72
6/3/2008	252	240	190
Zinc, percent dissolved			
Sampled	Raw Stormwater	Sedimentation Tank Effluent	Filter Effluent
3/13/2008	42%	31%	45%
6/3/2008	54%	82%	76%

[2] *StormFilter* is a Contech Stormwater Systems product. This filtration system is identified in the **Stormwater Management Manual for Eastern Washington** as a treatment BMP for metals removal when used in combination with a Wet Vault. These units contain *Metal* R_X - a proprietary media developed by Contech from composted hardwood leaves. This media removes metals by adsorption and filtration, so some reduction in dissolved zinc was expected (in addition to removal of suspended zinc by filtration).

[3] Qualifying storm events occurring during normal working hours.

BOD concentrations in filter effluent were 171 and 134 mg/l on March 13 and June 3, respectively.

The results of all stormwater monitoring at this location are summarized in the attached tables and graphs.

The results are not conclusive. BOD and turbidity exceeded action levels in both samples. Zinc was reduced below the action level, but not below the benchmark.

Further testing is needed to confirm performance. Also, composite sampling over the duration of entire storm events is needed to better represent overall average quality.

2.2 MONITORING AT OTHER LOCATIONS

The June 3, 2008 storm event lasted long enough that grab samples at other catch basins in Railroad Avenue could be obtained. Data are summarized in the following table. DØ3, DØ4, and DØ8 are catch basins located in Railroad Avenue, which provides access to processing plants and fruit storage areas.

Table 2.2

Catch Basin	Turbidity, NTU	Total Zinc, µg/l	Dissolved Zinc, µg/l	BOD, mg/l
DØ3	101	146	134	not tested*
DØ4	183	229	196	not tested*
DØ8	107	180	135	not tested*

*The BOD of these samples was inadvertently not determined; BOD will be included in future testing.

All of the turbidity but none of the total zinc concentrations in these samples exceeded action levels. These discharges may require treatment in order to meet ISWGP requirements.

3. TREATMENT OPTIONS

Two options are available for stormwater treatment:

1. divert to off-site treatment at Tree Top's process water treatment facilities, or
2. treat on-site and discharge to dry wells or to the City storm sewer.

Option 1 would meet ISWGP requirements, but the flow capacity of Tree Top's process water facilities is completely utilized at present and additional diversions would require major changes to the existing pipeline and storage lagoon facilities.

To reduce the impact on flow capacity, stormwater storage and delayed discharge could be utilized to allow the additional volumes to be handled without additional piping[4] for transportation to the lagoon/sprayfield system.

Option 2 should be significantly less expensive and would also meet ISWGP requirements, but only if the level of treatment is adequate. It is not yet clear whether or not the wet vault/Contech StormFilter system is capable of producing an effluent with concentrations that are consistently below Action Levels. Additional testing is needed.

4. PROPOSED NEXT STEPS

4.1 ADDITIONAL TESTING

System performance will be monitored through at least two additional qualifying storm events. Composite samples will be obtained throughout the storms' durations for raw stormwater, wet vault effluent, and filter effluent.

Summer storms in the Yakima area are infrequent. It cannot be reasonably anticipated that two suitable storms will occur during the third quarter. Accordingly, the evaluation period for the new treatment system should be extended to the end of 2008.

4.2 EVALUATION OF TREATMENT BMPS

It is apparent that treatment will be required under the current ISWGP. The new treatment system at DØ7 handles the largest area of material handling equipment (empty bins) that discharges[5] to the City storm sewer. Since this treatment BMP conforms to the **Stormwater Management Manual for Eastern Washington** no further treatment is planned.

However, not all discharges to the storm sewer are currently treated. With regard to these sources the remaining questions are:

- Which, if any, additional discharges must be treated?
- What treatment BMPs will adequately and consistently reduce BOD, turbidity, and zinc below Action Levels?
- What is the most cost-effective treatment alternative?

Tree Top will provide an updated response report to describe the results of additional testing, a determination of drainage areas requiring treatment, and an evaluation of treatment alternatives. The report will also propose a schedule for implementation of additional BMPs, if any are required.

This report will be submitted to WDOE on or before January 31, 2009.

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[4] Approximately 7,500 feet of pipe would be required. Additional winter storage capacity in the form of a new aerated lagoon may also be required.

[5] Since the new treatment BMP discharges to a new dry well, the discharge to surface waters has been eliminated.

TREE TOP, INC., SELAH CAMPUS – STORMWATER MONITORING HISTORY

COMPARE RESULTS WITH BENCHMARKS

(results above benchmark levels are shown in red)

Parameter	Benchmark	09/13/2004	01/18/2005	05/06/2005	07/22/2005	11/01/2005	01/31/2006	05/23/2006	09/15/2006	12/11/2006	02/09/2007	05/21/2007	07/13/2007	10/18/2007	03/13/2008[1]	06/3/2008[1]
BOD_5	30 mg/L	**27.5**	43.5	**30.0**	153	**18**	**28**	**14**	236	37	58		154	46.9	171	146
Copper, total	63.6 µg/				**28**	**7.9**	**11.3**	**20**	**50**	85	66.5	**22**	**66**	**31.4**	**13.8**	**16.9**
Hardness	NA				**142**	**22**	**62**	**26**	**144**	**161**	**132**	**56**	**168**	**52**	**434**	**222**
Lead, total	81.6 µg/				**59**	**6.4**	**8.3**	**45.3**	275	**22**	166	**20.4**	156	**27.3**	**<0.5**	**<0.5**
NO_3/NO_2 as N	0.68 mg/	**0.52**	0.71	0.74	2.4	**0.35**	**0.65**	**<1**	1.5	**<0.25**	**<0.25**		1.70	**0.46**	3.33	**0.24**
Oil & Grease	15 mg/L	**3.8**	19.1	**8.3**	**6.4**	**5.6**	**8.9**	**6.7**	**5.5**	26.7	**8.9**	**4.8**	**10.4**	**8.5**	**2.4**	**6.4**
pH	6 → 9	**6.1**	**7.75**	**7.4**	**7.4**	**7.3**			**7.8**	**8.0**	**7.8**	**7.2**	**6.9**	**6.6**	**7.1**	**7.1**
Total P	2.0 mg/	**0.34**	**1.05**	**0.47**	**0.90**	**0.20**			**0.77**	**0.32**	2.23	**0.54**	**1.46**	**0.51**	**1.68**	2.18
Turbidity	25 NTU	28	2,300	182	88	189	408	228	258	>1,230	1,350	56.6	389	180	74	34.3
Zinc, total	117 µg/	**77.6**	1,020	361	1,470	181	142	314	775	1,490	1,100	384	1,810	367	160	250
Zinc, soluble	NA					**85**	**99.5**	**182**	**525**		**210**	**293**	**970**	**131**	**72**	**190**
Soluble %	NA					**47%**	**70%**	**58%**	**68%**		**19%**	**76%**	**54%**	**36%**	**45%**	**76%**

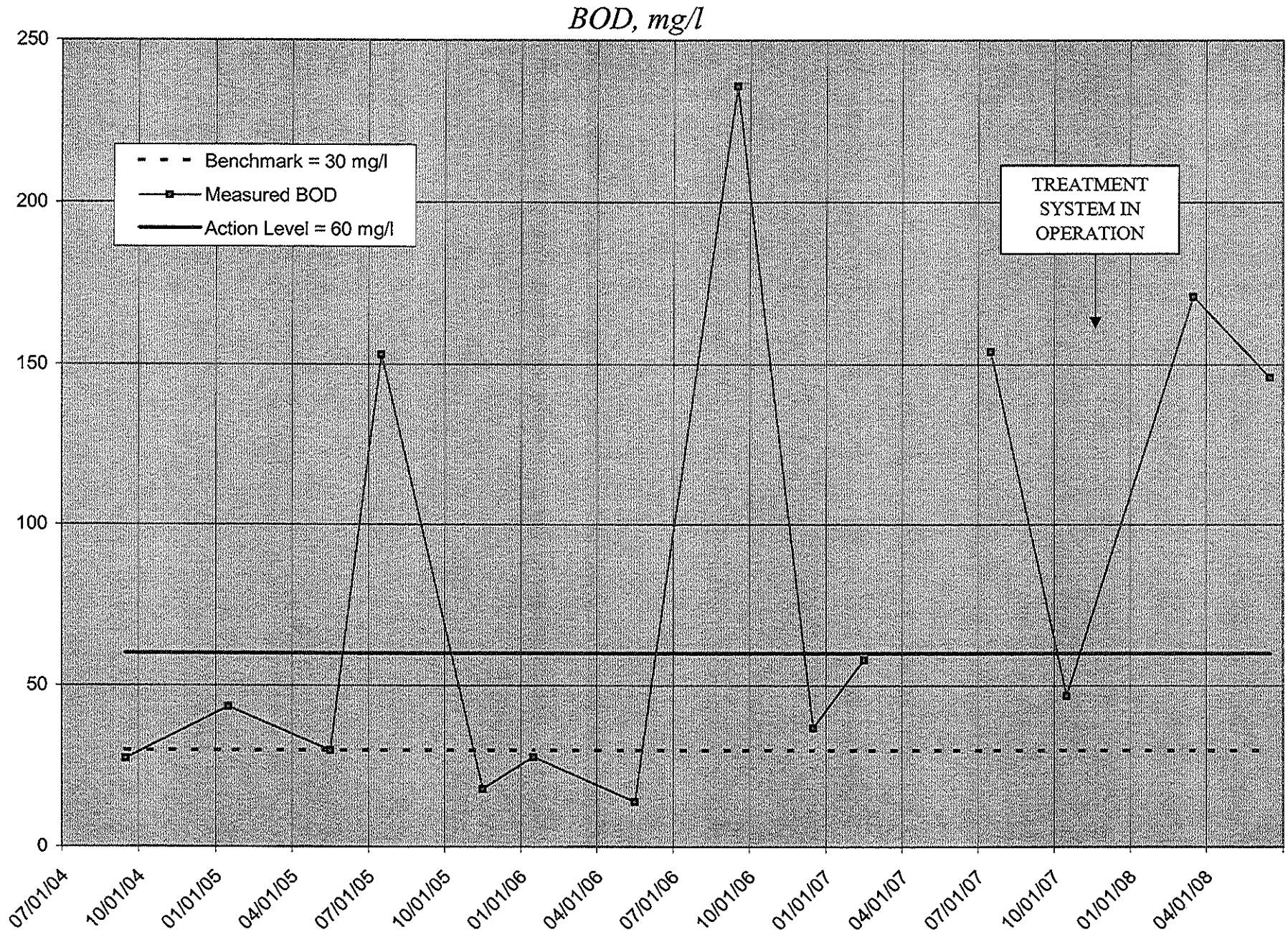
[1] **Samples following treatment through wet vault and Contech StormFilter in series.**

COMPARE RESULTS WITH ACTION LEVELS

(results above action levels are shown in red)

Parameter	Action Level	09/13/2004	01/18/2005	05/05/2005	07/22/2005	11/01/2005	01/31/2006	05/23/2006	09/15/2006	12/11/2006	02/09/2007	05/21/2007	07/13/2007	10/18/2007	03/13/2008	06/3/2008
BOD_5	60 mg/L	27.5	43.5	30.0	153	18	28	14	236	37	58		154	46.9	171	143
Copper, total	149 µg/L				28	7.9	11.3	20	50	85	66.5	22	66	31.4	13.8	16.9
Lead, total	159 µg/L				59	6.4	8.3	45.3	275	22	166	20.4	156	27.3	<0.5	<0.5
NO_3/NO_2 as N	1.36 mg/L	0.52	0.71	0.74	2.4	0.35	0.65	<1	1.5	<0.25	<0.25		1.70	0.46	3.33	0.24
Oil & Grease	30 mg/L	3.8	19.1	8.3	6.4	5.6	8.9	6.7	5.5	26.7	8.9	4.8	10.4	8.5	2.4	6.4
pH	5 → 10	6.1	7.75	7.4	7.4	7.3			7.8	8.0	7.8	7.2	6.9	6.6	7.1	7.1
Total P	4.0 mg/L	0.34	1.05	0.47	0.90	0.20			0.77	0.32	2.23	0.54	1.46	0.51	1.68	2.18
Turbidity	50 NTU	28	2,300	182	88	189	408	228	258	>1,230	1,350	56.6	389	180	74	34.3
Zinc, total	372 µg/L	77.6	1,020	361	1,470	181	142	314	775	1,490	1,100	384	1,810	367	160	250

(1) Samples following treatment through wet vault and Contech StormFilter in series.


BOD, mg/l
250
200
150
100
50
0
Benchmark = 30 mg/l
Measured BOD
Action Level = 60 mg/l
TREATMENT SYSTEM IN OPERATION
07/01/04
10/01/04
01/01/05
04/01/05
07/01/05
10/01/05
01/01/06
04/01/06
07/01/06
10/01/06
01/01/07
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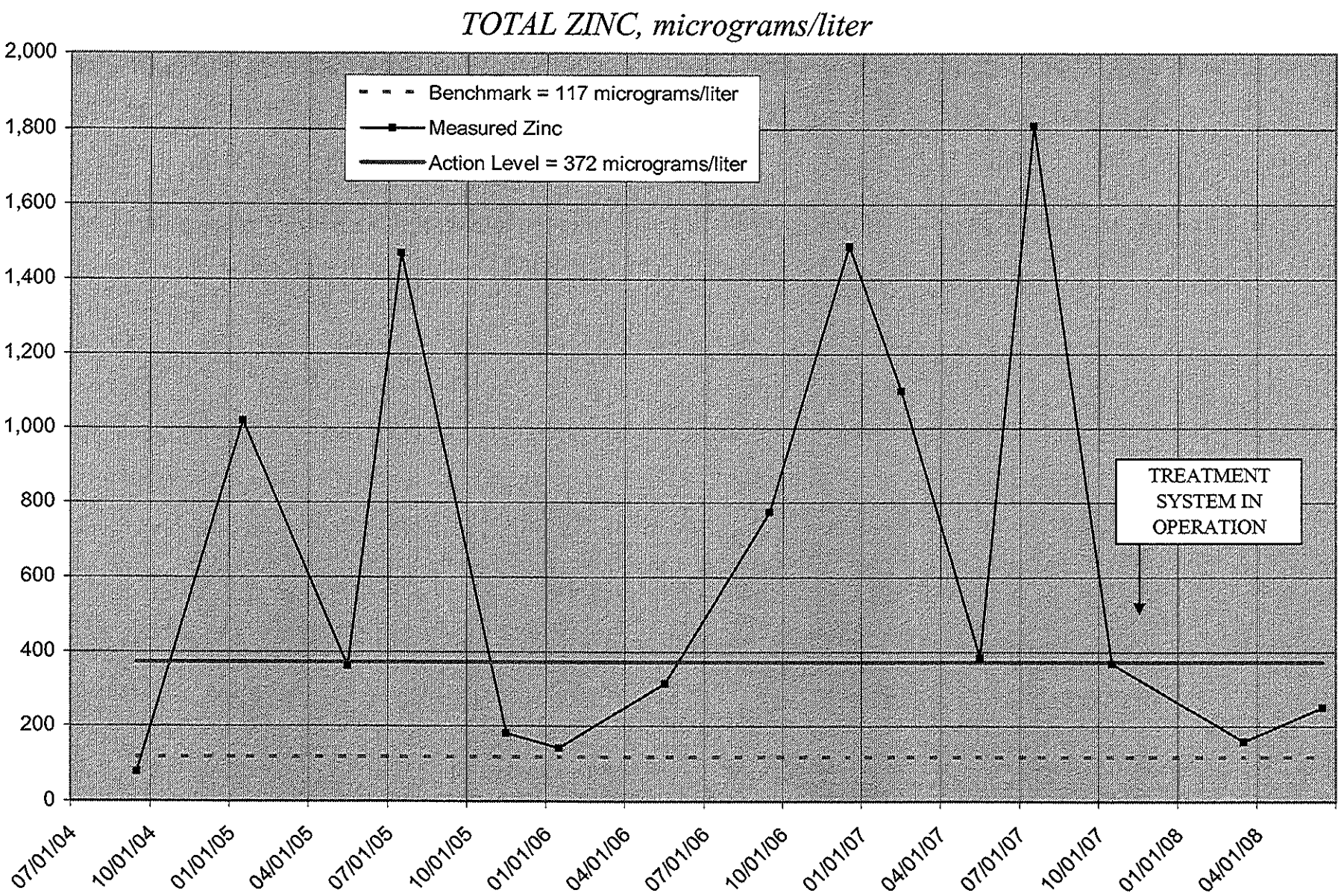
TOTAL ZINC, micrograms/liter
2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
Benchmark = 117 micrograms/liter
Measured Zinc
Action Level = 372 micrograms/liter
TREATMENT SYSTEM IN OPERATION
07/01/04
10/01/04
01/01/05
04/01/05
07/01/05
10/01/05
01/01/06
04/01/06
07/01/06
10/01/06
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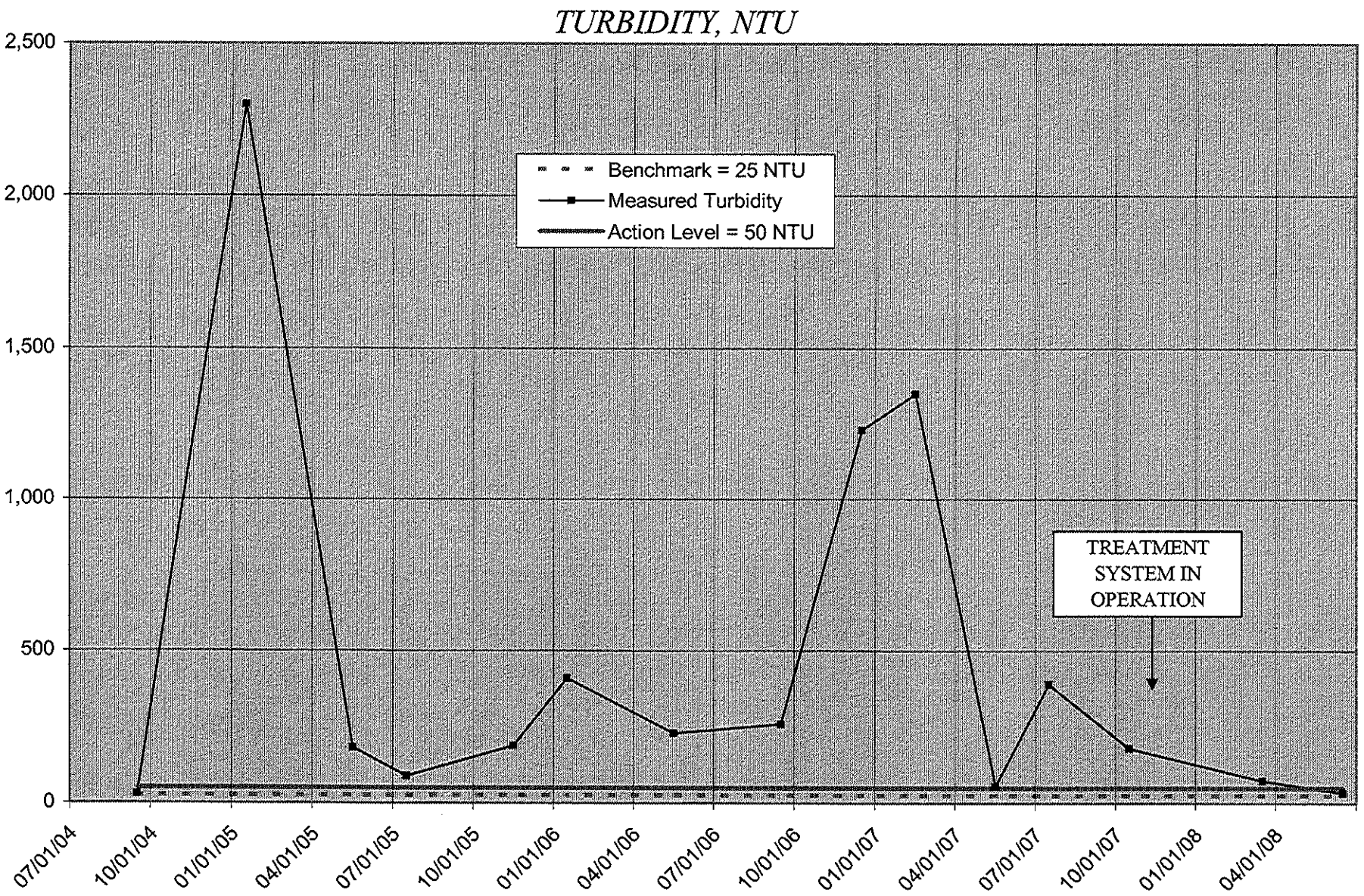
TURBIDITY, NTU
2,500
2,000
1,500
1,000
500
0
Benchmark = 25 NTU
Measured Turbidity
Action Level = 50 NTU
TREATMENT SYSTEM IN OPERATION
07/01/04
10/01/04
01/01/05
04/01/05
07/01/05
10/01/05
01/01/06
04/01/06
07/01/06
10/01/06
01/01/07
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