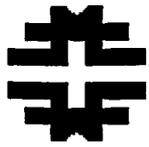


Appendix F:
Microbiological Evaluations of MI LCW After Biocide Treatment



Fermilab

Fermi National Accelerator Laboratory
P.O. Box 500, MS343
Batavia, IL 60510
Phone: (630) 840-3274
Fax: (630) 840-8032

Main Injector LCW Repair

**BTI Microbiological Evaluation of Water Samples After Biocide
Treatment**

(4-9-98)



**BioindustrialTM
Technologies
Incorporated**

40105 Industrial Park Circle
Georgetown, TX 78626
Office: (512) 869-0580
FAX: (512) 863-8097

*Specialists in
Microbial Detection
and Control*

January 19, 1998

Mr. John Satti P.E.
Fermi National Accelerator Laboratory
P.O. Box 500
Batavia, Illinois 60510

Dear Mr. Satti:

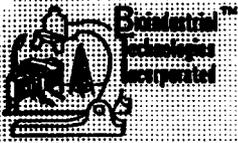
Please find the enclosed **final** report on the second set of samples received at Bioindustrial Technologies, Inc. (BTI) on December 19, 1997.

Please let us know if you have any questions about the report or if we can be of further assistance to you.

Sincerely,

Rebecca Pope
Scientist

Enclosure



40105 Industrial Park Circle
 Georgetown, Texas 78626
 (512) 869-0580

CLIENT INFORMATION:

John Satti
 Fermi National Accelerator Laboratory
 PO Box 500
 Batavia, IL 60510

Customer P.O.#: none
 Job #: FERM-A00

Report Date: January 19, 1998

SAMPLE INFORMATION:

Date Sample(s) Collected: December 12, 1997
 Date Sample(s) Received: December 19, 1997
 Collected by: Client

RESULTS:

Sample Description	MI-8 Return	MI-8 Supply	MI-60 Tank Outlet	510-1 Supply	RF 603 Supply
971 Control #	970245	970246	970247	970248	970249
Final Sample Culture (ml sample)					
Aerobic Bacteria	0	0	1-10	0	0
Acid Producing Bacteria	0	0	0	0	0
Sulfate-Reducing Bacteria	0	0	0	0	0
Iron-Related Bacteria	0	0	0	0	0
Low Nutrient Bacteria	0	0	10-100	0	0
Microscopic Analyses					
Total Bacteria/ml of Sample, FITC Method	<10,000	<10,000	10,000	<10,000	10,000

RESULTS CONT'D:

Sample Description	510-1 Return	RF-803 Return	MJ-50 Heat Exchange
PT Control #	870250	870251	870252
Final Viable Culture (per ml sample)			
Aerobic Bacteria	0	0	0
Acid-Producing Bacteria	0	0	0
Sulfate-Reducing Bacteria	0	0	0
Iron-Related Bacteria	0	0	0
Low Nutrient Bacteria	0	0	0
Microscopic Analyses			
Total Bacteria/ml of Sample, FITC Method	<10,000	<10,000	<10,000

COMMENTS:



ANALYTICAL LABORATORY REPORT

From:
Fermi Lab.
Batavia, IL

Sample Marked:
MI-60 Tank Outlet

Analysis No. MB 208567
Date Sampled 12/ 3/97
Date Received 12/ 4/97
Date Completed 12/ 8/97
Date Printed 12/ 8/97

>>> Microbiological Evaluation <<<

PHYSICAL APPEARANCE

Liquid with Floc

TOTAL AEROBIC BACTERIA

Enterobacter	<1,000
Pigmented	<1,000
Mucoids	<1,000
Pseudomonas	<1,000

TOTAL ANAEROBIC BACTERIA

Sulfate Reducers	<1
------------------	----

TOTAL FUNGI

Yeasts	<10
Molds	<10

IRON-DEPOSITING

Gallionella	None
Sphaerotilus	None

ALGAE

Filamentous	None
Nonfilamentous	None

OTHER ORGANISMS

None

Lab Comments:

All counts express colony forming units per ml.

Microscopic examination: very few crystals.

Analytical Laboratory Location:

NALCO CHEMICAL COMPANY
ONE NALCO CENTER □ NAPERVILLE, ILLINOIS 60563-1198





ANALYTICAL LABORATORY REPORT

From:
Fermi Lab.
Batavia, IL

Analysis No. MB 208568
Date Sampled 12/ 3/97
Date Received 12/ 4/97
Date Completed 12/ 8/97
Date Printed 12/ 8/97

Sample Marked:
MI-60 Raw Domestic Supply

>>> Microbiological Evaluation <<<

PHYSICAL APPEARANCE

Liquid with Floc

TOTAL AEROBIC BACTERIA

2,000

Enterobacter

<1,000

Pigmented

<1,000

Mucoids

<1,000

Pseudomonas

<1,000

TOTAL ANAEROBIC BACTERIA

Sulfate Reducers

<1

TOTAL FUNGI

Yeasts

<10

Molds

<10

IRON-DEPOSITING

Gallionella

None

Sphaerotilus

None

ALGAE

Filamentous

None

Nonfilamentous

None

OTHER ORGANISMS

None

Lab Comments:

All counts express colony forming units per ml.

Microscopic examination: few aggregates of particles.

Analytical Laboratory Location:

NALCO CHEMICAL COMPANY
ONE NALCO CENTER □ NAPERVILLE, ILLINOIS 60563-1198





ANALYTICAL LABORATORY REPORT

From:
Fermi Lab.
Batavia, IL

Sample Marked:
RF-603 Supply

Analysis No. MB 208569
Date Sampled 12/ 3/97
Date Received 12/ 4/97
Date Completed 12/ 8/97
Date Printed 12/ 8/97

>>> Microbiological Evaluation <<<

PHYSICAL APPEARANCE

Liquid with Brown
Sediment

TOTAL AEROBIC BACTERIA

Enterobacter	<1,000
Pigmented	<1,000
Mucoids	<1,000
Pseudomonas	<1,000

TOTAL ANAEROBIC BACTERIA

Sulfate Reducers	<1
------------------	----

TOTAL FUNGI

Yeasts	<10
Molds	<10

IRON-DEPOSITING

Gallionella	None
Sphaerotilus	None

ALGAE

Filamentous	None
Nonfilamentous	None

OTHER ORGANISMS

None

Lab Comments:

All counts express colony forming units per ml.

Microscopic examination: very few clusters of crystalline particles.

Analytical Laboratory Location:

NALCO CHEMICAL COMPANY
1E NALCO CENTER □ NAPERVILLE, ILLINOIS 60569-1198





ANALYTICAL LABORATORY REPORT

From:
Fermi Lab.
Batavia, IL

Analysis No. MB 208570
Date Sampled 12/ 3/97
Date Received 12/ 4/97
Date Completed 12/ 8/97
Date Printed 12/ 8/97

Sample Marked:
MI-60 Post DI Bottle

>>> Microbiological Evaluation <<<

PHYSICAL APPEARANCE	Liquid with Floc
TOTAL AEROBIC BACTERIA	<1,000
Enterobacter	<1,000
Pigmented	<1,000
Mucoids	<1,000
Pseudomonas	<1,000
TOTAL ANAEROBIC BACTERIA	
Sulfate Reducers	<1
TOTAL FUNGI	
Yeasts	<10
Molds	<10
IRON-DEPOSITING	
Gallionella	None
Sphaerotilus	None
ALGAE	
Filamentous	None
Nonfilamentous	None
OTHER ORGANISMS	None

Lab Comments:

All counts express colony forming units per ml.

Microscopic examination: very few crystals.

Analytical Laboratory Location:

ALCO CHEMICAL COMPANY
ONE NALCO CENTER • NAPERVILLE, ILLINOIS 60563-1198





ANALYTICAL LABORATORY REPORT

From:
Fermi Lab.
Batavia, IL

Analysis No. MB 208561
Date Sampled 12/ 3/97
Date Received 12/ 4/97
Date Completed 12/ 8/97
Date Printed 12/ 8/97

Sample Marked:
510.1 Supply

>>> Microbiological Evaluation <<<

PHYSICAL APPEARANCE

• Liquid with Floc

TOTAL AEROBIC BACTERIA

Enterobacter	<1,000
Pigmented	<1,000
Mucoids	<1,000
Pseudomonas	<1,000

TOTAL ANAEROBIC BACTERIA

Sulfate Reducers	<1
------------------	----

TOTAL FUNGI

Yeasts	<10
Molds	<10

IRON-DEPOSITING

Gallionella	None
Sphaerotilus	None

ALGAE

Filamentous	None
Nonfilamentous	None

OTHER ORGANISMS

None

Lab Comments:

All counts express colony forming units per ml.

Microscopic examination: very few crystals.

Analytical Laboratory Location:

NALCO CHEMICAL COMPANY
THE NALCO CENTER • NAPERVILLE, ILLINOIS 60563-1198





ANALYTICAL LABORATORY REPORT

From:
Fermi Lab.
Batavia, IL

Sample Marked:
MI-8 Supply

Analysis No. MB 208562
Date Sampled 12/ 3/97
Date Received 12/ 4/97
Date Completed 12/ 8/97
Date Printed 12/ 8/97

>>> Microbiological Evaluation <<<

PHYSICAL APPEARANCE

Liquid with Floc

TOTAL AEROBIC BACTERIA

Enterobacter	<1,000
Pigmented	<1,000
Mucoids	<1,000
Pseudomonas	<1,000

TOTAL ANAEROBIC BACTERIA

Sulfate Reducers	<1
------------------	----

TOTAL FUNGI

Yeasts	<10
Molds	<10

IRON-DEPOSITING

Gallionella	None
Sphaerotilus	None

ALGAE

Filamentous	None
Nonfilamentous	None

OTHER ORGANISMS

None

Lab Comments:

All counts express colony forming units per ml.

Microscopic examination: few crystals.

Analytical Laboratory Location:

NALCO CHEMICAL COMPANY
THE NALCO CENTER • NAPERVILLE, ILLINOIS 60563-1198





ANALYTICAL LABORATORY REPORT

From:
Fermi Lab.
Batavia, IL

Sample Marked:
510.1 Return

Analysis No. MB 208563
Date Sampled 12/ 3/97
Date Received 12/ 4/97
Date Completed 12/ 8/97
Date Printed 12/ 8/97

>>> Microbiological Evaluation <<<

PHYSICAL APPEARANCE

Liquid with Brown
Suspended Material

TOTAL AEROBIC BACTERIA

<1,000

Enterobacter

<1,000

Pigmented

<1,000

Mucoids

<1,000

Pseudomonas

<1,000

TOTAL ANAEROBIC BACTERIA

Sulfate Reducers

<1

TOTAL FUNGI

Yeasts

<10

Molds

<10

IRON-DEPOSITING

Gallionella

None

Sphaerotilus

None

ALGAE

Filamentous

None

Nonfilamentous

None

OTHER ORGANISMS

None

Lab Comments:

All counts express colony forming units per ml.

Microscopic examination: moderate aggregates of crystalline particles.

Analytical Laboratory Location:

ALCO CHEMICAL COMPANY
NE NALCO CENTER □ NAPERVILLE, ILLINOIS 60563-1198





ANALYTICAL LABORATORY REPORT

From:
Fermi Lab.
Batavia, IL

Sample Marked:
MI-8 Return

Analysis No. MB 208564
Date Sampled 12/ 3/97
Date Received 12/ 4/97
Date Completed 12/ 8/97
Date Printed 12/ 8/97

>>> Microbiological Evaluation <<<

PHYSICAL APPEARANCE

Liquid with Black
Suspended Material

TOTAL AEROBIC BACTERIA

Enterobacter	<1,000
Pigmented	<1,000
Mucoids	<1,000
Pseudomonas	<1,000

TOTAL ANAEROBIC BACTERIA

Sulfate Reducers	<1
------------------	----

TOTAL FUNGI

Yeasts	<10
Molds	<10

IRON-DEPOSITING

Gallionella	None
Sphaerotilus	None

ALGAE

Filamentous	None
Nonfilamentous	None

OTHER ORGANISMS

None

Lab Comments:

All counts express colony forming units per ml.

Analytical Laboratory Location:

NALCO CHEMICAL COMPANY
ONE NALCO CENTER □ NAPERVILLE, ILLINOIS 60563-1198





ANALYTICAL LABORATORY REPORT

From:
Fermi Lab.
Batavia, IL

Analysis No. MB 208565
Date Sampled 12/ 3/97
Date Received 12/ 4/97
Date Completed 12/ 8/97
Date Printed 12/ 8/97

Sample Marked:
MI-60 Post Charcoal Filter

>>> Microbiological Evaluation <<<

PHYSICAL APPEARANCE

Light Gray Liquid with
Floc

TOTAL AEROBIC BACTERIA

Enterobacter	7,000
Pigmented	<1,000
Mucoids	6,000
Pseudomonas	<1,000

TOTAL ANAEROBIC BACTERIA

Sulfate Reducers	<1
------------------	----

TOTAL FUNGI

Yeasts	<10
Molds	<10

IRON-DEPOSITING

Gallionella	None
Sphaerotilus	None

ALGAE

Filamentous	None
Nonfilamentous	None

OTHER ORGANISMS

None

Lab Comments:

All counts express colony forming units per ml.

Microscopic examination: few crystals.

Analytical Laboratory Location:

ALCO CHEMICAL COMPANY
ONE NALCO CENTER □ NAPERVILLE, ILLINOIS 60563-1198





ANALYTICAL LABORATORY REPORT

From:
Fermi Lab.
Batavia, IL

Sample Marked:
RF-603 Return

Analysis No. MB 208566
Date Sampled 12/ 3/97
Date Received 12/ 4/97
Date Completed 12/ 8/97
Date Printed 12/ 8/97

>>> Microbiological Evaluation <<<

PHYSICAL APPEARANCE	Liquid with Floc
TOTAL AEROBIC BACTERIA	<1,000
Enterobacter	<1,000
Pigmented	<1,000
Mucoids	<1,000
Pseudomonas	<1,000
TOTAL ANAEROBIC BACTERIA	
Sulfate Reducers	<1
TOTAL FUNGI	
Yeasts	<10
Molds	<10
IRON-DEPOSITING	
Gallionella	None
Sphaerotilus	None
ALGAE	
Filamentous	None
Nonfilamentous	None
OTHER ORGANISMS	None

Lab Comments:
All counts express colony forming units per ml.
Microscopic examination: very few crystals.

Analytical Laboratory Location:

NALCO CHEMICAL COMPANY
ONE NALCO CENTER □ NAPERVILLE, ILLINOIS 60563-1198





ANALYTICAL LABORATORY REPORT

From:
Fermi Lab.
Batavia, IL

Sample Marked:
RF-603 Return

Analysis No. MB 208566
Date Sampled 12/ 3/97
Date Received 12/ 4/97
Date Completed 12/ 8/97
Date Printed 12/ 8/97

>>> Microbiological Evaluation <<<

PHYSICAL APPEARANCE

Liquid with Floc

TOTAL AEROBIC BACTERIA

<1,000

Enterobacter

<1,000

Pigmented

<1,000

Mucoids

<1,000

Pseudomonas

<1,000

TOTAL ANAEROBIC BACTERIA

Sulfate Reducers

<1

TOTAL FUNGI

Yeasts

<10

Molds

<10

IRON-DEPOSITING

Gallionella

None

Sphaerotilus

None

ALGAE

Filamentous

None

Nonfilamentous

None

OTHER ORGANISMS

None

Lab Comments:

All counts express colony forming units per ml.

Microscopic examination: very few crystals.

Analytical Laboratory Location:

ALCO CHEMICAL COMPANY
ONE NALCO CENTER □ NAPERVILLE, ILLINOIS 60563-1198

