Waste Management
ENVIRONMENTAL QUALITY

PAT MCCRORY
Governor

DONALD R. VAN DER VAART
Secretary

LINDA CULPEPPER
Director

November 20, 2015

Mr. Steve Cockman
McGill Environmental Systems
634 Christian Chapel Church Road
New Hill, NC 27562

Re: Permit Modification to receive wastewater residuals from Mallinckrodt Pharmaceuticals, McGill Environmental Systems Compost Facility at Merry Oaks, Permit 1906-COMPOST, Chatham County

Dear Mr. Cockman:

The Division of Waste Management, Solid Waste Section, has reviewed and approved your request to add wastewater residuals from the above referenced facility to the list of feedstocks that your compost facility may accept.

The total volume of the waste received shall not exceed 1,000 wet tons per year without additional approval by the Solid Waste Section. The approved facility site capacity is 151,200 tons per year, which includes a summation of all feedstocks, amendments, and materials used in the compost process.

These changes will be incorporated into your permit.

If you have any questions please contact me at 919-707-8255 or by email donna.wilson@ncdenr.gov .

Sincerely,

Donna J. Wilson

Donna J. Wilson
Environmental Engineer
Solid Waste Section

cc: John Patrone, Solid Waste Section

Wilson, Donna

From: Steve Cockman <scockman@mcgillcompost.com>
Sent: Tuesday, November 17, 2015 3:49 PM
To: Wilson, Donna
Subject: FW: Mallinckrodt Information on Pharmaceuticals
Attachments: E Mallinckrodt IDMR-September 2015.pdf; 1560845-Semiannual PEG 5-13-2015 1.pdf

Donna,

Here is additional information about the Mallinckrodt waste residuals we are looking at for composting.

Thanks,

Steve

From: Roberts, Tim [mailto:Tim.Roberts@mallinckrodt.com]
Sent: Tuesday, November 17, 2015 9:41 AM
To: Steve Cockman <scockman@mcgillcompost.com>
Cc: Jones, Katie L. <kljones@Dewberry.com>
Subject: Mallinckrodt Information on Pharmaceuticals

The Mallinckrodt Pharmaceuticals facility located at 8801 Capital Boulevard in Raleigh, NC is a bulk chemical/pharmaceutical manufacturer and has 2 production processes. The only pharmaceutical produced at the facility is acetaminophen. Acetaminophen is not on the USEPA's proposed list of "hazardous waste" pharmaceutical. The facility also makes para-aminophenol, a pharmaceutical intermediate which is used to make the acetaminophen. Mallinckrodt also makes the following co-products from these 2 production processes: acetic acid, aniline, and ammonium sulfate.

The facility has an on-site biological wastewater treatment plant which was designed to treat process wastewaters from these specific processes to remove organics, which includes any residual acetaminophen, and to remove ammonia in the wastewaters. Therefore, acetaminophen is not expected to be present in this effluent or in the residuals generated by the wastewater treatment operations. The treated effluent is discharged directly to the City of Raleigh and it meets all permitted discharge limits including those found in the categorical standards in 40 CFR 439.36 for Pharmaceutical Synthesis. A copy of the most recent discharge report submitted to the City of Raleigh for September 2015 plus a copy of the analytical results from the Pharmaceutical Effluent sampling event in May 2015 are attached.

Let me know if you would like to discuss this further or if you need anything else.

Regards,

Tim Roberts l Environmental Manager
Mallinckrodt Pharmaceuticals
8801 Capital Boulevard l Raleigh, NC 27616 l USA
T: 919.878.2895 l M: 919.369.1721 l F: 919.878.2823
tim.roberts@mallinckrodt.com l www.mallinckrodt.com

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Analysis Report

ANALYTICAL RESULTS

Prepared by:

Eurofins Lancaster Laboratories Environmental
2425 New Holland Pike
Lancaster, PA 17601

Prepared for:

Mallinckrodt
PO 982200
El Paso TX 79998-2200

May 24, 2015

Project: PMI Wastewater Monitoring

Submittal Date: 05/13/2015
Group Number: 1560845
PO Number: 67387
Release Number: Tim Roberts
State of Sample Origin: NC

Client Sample Description	Lancaster Labs (LL) #
02 Draw Off Value Grab Water Sample	7886113

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

Regulatory agencies do not accredit laboratories for all methods, analytes, and matrices. Our scopes of accreditation can be viewed at http://www.eurofinsus.com/environment-testing/laboratories/eurofins-lancaster-laboratories-environmental/resources/certifications/ .

ELECTRONIC COPY TO Mallinckrodt Attn: Tim Roberts

Respectfully Submitted,

Angela M. Miller
Specialist

(717) 556-7260

Sample Description: 02 Draw Off Value Grab Water Sample
PMI Wastewater Monitoring

LL Sample # WW 7886113
LL Group # 1560845
Account # 06205

Project Name: PMI Wastewater Monitoring

Collected: 05/12/2015 07:00 by DS

Submitted: 05/13/2015 09:15
Reported: 05/24/2015 16:57

Mallinckrodt
PO 982200
El Paso TX 79998-2200

02DOV

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**EPA 1666**		**ug/l**	**ug/l**	
02394	n-Amyl acetate	628-63-7	< 500	500	100
02394	n-Butyl acetate	123-86-4	< 500	500	100
02394	Ethyl acetate	141-78-6	< 1,000	1,000	100
02394	Heptane	142-82-5	< 1,000	1,000	100
02394	Hexane	110-54-3	< 1,000	1,000	100
02394	Isobutyraldehyde	78-84-2	< 1,000	1,000	100
02394	Isopropyl acetate	108-21-4	< 1,000	1,000	100
02394	Isopropylether	108-20-3	< 500	500	100
02394	Methyl formate	107-31-3	< 10,000	10,000	100
02394	4-Methyl-2-pentanone	108-10-1	< 1,000	1,000	100
02394	Tetrahydrofuran	109-99-9	< 2,000	2,000	100
02394	m+p-Xylene	179601-23-1	< 1,000	1,000	100
02394	o-Xylene	95-47-6	< 500	500	100

Reporting limits were raised due to sample foaming.

GC/MS Volatiles	**EPA 524.2**		**ug/l**	**ug/l**	
03648	Acetone	67-64-1	< 500	500	100
03648	Benzene	71-43-2	< 50	50	100
03648	Chlorobenzene	108-90-7	< 50	50	100
03648	Chloroform	67-66-3	< 50	50	100
03648	1,2-Dichlorobenzene	95-50-1	< 50	50	100
03648	1,2-Dichloroethane	107-06-2	< 50	50	100
03648	Methylene Chloride	75-09-2	< 50	50	100
03648	Toluene	108-88-3	< 50	50	100

Reporting limits were raised due to sample foaming.

A preserved vial was submitted for analysis. However, the pH at the time of analysis was 4.

GC Miscellaneous	**EPA 1671 Rev A**		**ug/l**	**ug/l**	
02366	diethylamine	109-89-7	< 500,000	500,000	10
02366	methyl cellosolve	109-86-4	< 200,000	200,000	10
02366	triethylamine	121-44-8	< 500,000	500,000	10

Reporting limits were raised due to interference from the sample matrix.

Wet Chemistry	**EPA 335.4**		**mg/l**	**mg/l**	
00237	Total Cyanide (water)	57-12-5	0.014	0.010	1

General Sample Comments

State of North Carolina Lab Certification No. 521
Preservation requirements were not met. The pH was out of range upon receipt at the laboratory and after adding the maximum amount of preservative, the pH was still out of range for cyanide.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Sample Description: 02 Draw Off Value Grab Water Sample
PMI Wastewater Monitoring

LL Sample # WW 7886113
LL Group # 1560845
Account # 06205

Project Name: PMI Wastewater Monitoring

Collected: 05/12/2015 07:00 by DS

Submitted: 05/13/2015 09:15
Reported: 05/24/2015 16:57

Mallinckrodt
PO 982200
El Paso TX 79998-2200

02DOV

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02394	EPA 1666 VOCs	EPA 1666	1	O151351AA	05/15/2015 16:29	Chelsea B Stong	100
03648	EPA 524.2 VOCs	EPA 524.2	1	S151401AA	05/20/2015 15:40	Jason M Long	100
02366	EPA 1671 VOCs	EPA 1671 Rev A	1	151340032A	05/15/2015 20:27	Tyler O Griffin	10
00237	Total Cyanide (water)	EPA 335.4	1	15140102101B	05/20/2015 14:21	Venia B McFadden	1
00492	Cyanide Water Distillation	EPA 335.4	1	15140102101B	05/20/2015 11:10	Joseph E McKenzie	1

Quality Control Summary

Client Name: Mallinckrodt Group Number: 1560845
Reported: 05/24/2015 16:57

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Laboratory Compliance Quality Control

Analysis Name	Blank Result	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: O151351AA	Sample number(s): 7886113							
n-Amyl acetate	< 5.00	5.00	ug/l	118		70-130		
n-Butyl acetate	< 5.00	5.00	ug/l	115		70-130		
Ethyl acetate	< 10.0	10.0	ug/l	108		57-160		
Heptane	< 10.0	10.0	ug/l	103		70-164		
Hexane	< 10.0	10.0	ug/l	97		70-157		
Isobutyraldehyde	< 10.0	10.0	ug/l	103		63-180		
Isopropyl acetate	< 10.0	10.0	ug/l	118		70-150		
Isopropylether	< 5.00	5.00	ug/l	107		70-129		
Methyl formate	< 100	100.	ug/l	114		14-171		
4-Methyl-2-pentanone	< 10.0	10.0	ug/l	119		70-165		
Tetrahydrofuran	< 20.0	20.0	ug/l	100		28-221		
m+p-Xylene	< 10.0	10.0	ug/l	100		70-130		
o-Xylene	< 5.00	5.00	ug/l	99		70-130		
Batch number: S151401AA	Sample number(s): 7886113							
Acetone	< 5.0	5.0	ug/l	92		70-130		
Benzene	< 0.5	0.5	ug/l	98		70-130		
Chlorobenzene	< 0.5	0.5	ug/l	103		70-130		
Chloroform	< 0.5	0.5	ug/l	108		70-130		
1,2-Dichlorobenzene	< 0.5	0.5	ug/l	103		70-130		
1,2-Dichloroethane	< 0.5	0.5	ug/l	101		70-130		
Methylene Chloride	< 0.5	0.5	ug/l	106		70-130		
Toluene	< 0.5	0.5	ug/l	100		70-130		
Batch number: 151340032A	Sample number(s): 7886113							
diethylamine	< 50,000	50,000.	ug/l	92	88	70-130	5	30
methyl cellosolve	< 20,000	20,000.	ug/l	119	80	64-130	39*	30
triethylamine	< 50,000	50,000.	ug/l	119	116	68-168	2	30
Batch number: 15140102101B	Sample number(s): 7886113							
Total Cyanide (water)	< 0.010	0.010	mg/l	99		90-110		

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Batch number: 151340032A	Sample number(s): 7886113 UNSPK: P879043								

*- Outside of specification
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Mallinckrodt Group Number: 1560845
Reported: 05/24/2015 16:57

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
diethylamine	102	103	70-130	1	30				
methyl cellosolve	108	148*	64-130	31*	30				
triethylamine	120	122	68-168	2	30				
Batch number: 15140102101B	Sample number(s): 7886113 UNSPK: P881256 BKG: P881256								
Total Cyanide (water)	97		90-110			< 0.010	< 0.010	0 (1)	20

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: EPA 524.2 VOCs
Batch number: S151401AA

	4-Bromofluorobenzene	1,2-Dichlorobenzene-d4
7886113	88	89
Blank	95	97
LCS	107	107
Limits:	80-120	80-120

Analysis Name: EPA 1671 VOCs
Batch number: 151340032A

	Amyl Alcohol
7886113	112
Blank	94
LCS	100
LCSD	90
MS	103
MSD	99
Limits:	52-144

*- Outside of specification
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Environmental Analysis Request/Chain of Custody

377702

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Acct. # 6205 For Eurofins Lancaster Laboratories Environmental use only Group # 1560845 Sample # 7656115-14
Instructions on reverse side correspond with circled numbers.

1 Client Information

Client: Mallinckrodt	Acct. #:
Project Name/#: T.M.Roberts@mallinckrodt.com	PWSID #:
Project Manager: Tim Roberts	P.O. #:
Sampler: Dennis Scott	Quote #:
Name of state where samples were collected:	

4 Matrix: Sediment ☐ Soil ☐ | Ground ☐ Potable ☐ Water IMP | Surface ☐ NPDES ☐ Other: ____

5 Analysis Requested — Preservation Codes

For Lab Use Only
FSC:
SCR#: 171125

Preservation Codes
H=HCl T=Thiosulfate
N=HNO_3 B=NaOH
S=H_2SO_4 O=Other

6 Remarks

2 Sample Identification	Collected Date	Collected Time	3 Grab	Composite	Total # of Containers	Total Cyanide	EPA 1666 VOCs	EPA 524.2 Master	EPA 1671 VOCs
02 Draw Off Valve	5.12.15	7AM	X		9	X	X	X	X

7 Turnaround Time (TAT) Requested (please circle)
Standard Rush
(Rush TAT is subject to laboratory approval and surcharge.)

Date results are needed: _____

E-mail address: _____

8 Data Package Options (circle if required)
Type I (EPA Level 3 Equivalent/non-CLP) Type VI (Raw Data Only)
Type III (Reduced non-CLP) TX TRRP-13
NYSDEC Category A or B MA MCP CT RCP

Relinquished by	Date	Time	Received by	Date	Time
Angela S. Montgomery	5/12/15	1140	[signature]	5.12.15	10AM
[signature]	5.12.15	10:30AM			
			Branch Davis	5.13.15	915

EDD Required? Yes No
If yes, format: _____

Site-Specific QC (MS/MSD/Dup)? Yes No
(If yes, indicate QC sample and submit triplicate sample volume.)

Relinquished by Commercial Carrier:
UPS _____ FedEx X Other _____

Temperature upon receipt 0.4 °C

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Sample Administration Receipt Documentation Log

Doc Log ID: 69157

Group Number(s): 1560845

Client: Mallinckrodt

Delivery and Receipt Information

Delivery Method:	Fed Ex	Arrival Timestamp:	05/13/2015 9:15
Number of Packages:	1	Number of Projects:	1

Arrival Condition Summary

Shipping Container Sealed:	Yes	Sample IDs on COC match Containers:	Yes
Custody Seal Present:	Yes	Sample Date/Times match COC:	No
Custody Seal Intact:	Yes	VOA Vial Headspace ≥ 6mm:	No
Samples Chilled:	Yes	Total Trip Blank Qty:	2
Paperwork Enclosed:	Yes	Trip Blank Type:	HCL
Samples Intact:	Yes	Air Quality Samples Present:	No
Missing Samples:	No		
Extra Samples:	No		
Discrepancy in Container Qty on COC:	No		

Unpacked by Brandy Barclay (2299) at 12:13 on 05/13/2015

Samples Chilled Details

Thermometer Types: DT = Digital (Temp. Bottle) IR = Infrared (Surface Temp) All Temperatures in °C.

Cooler #	Thermometer ID	Corrected Temp	Therm. Type	Ice Type	Ice Present?	Ice Container	Elevated Temp?
1	DT121	0.4	DT	Wet	Y	Bagged	N

Sample Date/Time Discrepancy Details

Sample ID on COC	Date/Time on Label	Comments
02 Draw Off Valve	5/12/2015 09:00	

2425 New Holland Pike
Lancaster, PA 17605-2425

T | 717-656-2300
F | 717-656-2681
www.LancasterLabs.com

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Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

RL	Reporting Limit	**BMQL**	Below Minimum Quantitation Level
N.D.	none detected	**MPN**	Most Probable Number
TNTC	Too Numerous To Count	**CP Units**	cobalt-chloroplatinate units
IU	International Units	**NTU**	nephelometric turbidity units
umhos/cm	micromhos/cm	**ng**	nanogram(s)
C	degrees Celsius	**F**	degrees Fahrenheit
meq	milliequivalents	**lb.**	pound(s)
g	gram(s)	**kg**	kilogram(s)
µg	microgram(s)	**mg**	milligram(s)
mL	milliliter(s)	**L**	liter(s)
m3	cubic meter(s)	**µL**	microliter(s)
		pg/L	picogram/liter

<	less than
>	greater than
ppm	parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg) or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.
ppb	parts per billion
Dry weight basis	Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

Laboratory Data Qualifiers:

B - Analyte detected in the blank
C - Result confirmed by reanalysis
E - Concentration exceeds the calibration range
J (or G, I, X) - estimated value ≥ the Method Detection Limit (MDL or DL) and the < Limit of Quantitation (LOQ or RL)
P - Concentration difference between the primary and confirmation column >40%. The lower result is reported.
U - Analyte was not detected at the value indicated
V - Concentration difference between the primary and confirmation column >100%. The reporting limit is raised due to this disparity and evident interference…

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods.
Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.

Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, ISO17025) unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as “analyze immediately” are not performed within 15 minutes.

WARRANTY AND LIMITS OF LIABILITY - In accepting analytical work, we warrant the accuracy of test results for the sample as submitted. THE FOREGOING EXPRESS WARRANTY IS EXCLUSIVE AND IS GIVEN IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. WE DISCLAIM ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING A WARRANTY OF FITNESS FOR PARTICULAR PURPOSE AND WARRANTY OF MERCHANTABILITY. IN NO EVENT SHALL EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL, LLC BE LIABLE FOR INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF PROFIT OR GOODWILL REGARDLESS OF (A) THE NEGLIGENCE (EITHER SOLE OR CONCURRENT) OF EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL AND (B) WHETHER EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL HAS BEEN INFORMED OF THE POSSIBILITY OF SUCH DAMAGES. We accept no legal responsibility for the purposes for which the client uses the test results. No purchase order or other order for work shall be accepted by Eurofins Lancaster Laboratories Environmental which includes any conditions that vary from the Standard Terms and Conditions, and Eurofins Lancaster Laboratories Environmental hereby objects to any conflicting terms contained in any acceptance or order submitted by client.

Mallinckrodt LLC

CITY OF RALEIGH INDUSTRIAL PRETREATMENT MONITORING REPORT

MONTHLY FACILITY STATUS SHEET Effective January 1, 2007

All monitoring data and sampling frequencies meet permit requirements. [X] Compliant

All monitoring data and sampling frequencies DO NOT meet permit requirements. [ ] Noncompliant

If non-compliant, did you notify control authority within 24 hours of becoming aware of violations? [ ] Yes [ ] No

If non-compliant, did you resample within one week of becoming aware of the violation? [ ] Yes [ ] No

All required monitoring has been conducted. [X] Yes [ ] No

Are copies of laboratory report, chain of custody form(s), and Industrial Data Summary Form attached?

[X] Yes [ ] No

If facility is noncompliant or did not resample within one week, please comment on corrective actions being taken in respect to equipment, operation, maintenance, etc., and a time table for improvements to be made and/or why re-sampling did not occur within one week of becoming aware of the violation(s).

I certify, under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

Furthermore, based on my inquiry of the person or persons directly responsible for managing compliance with the permit limitation for Locally Regulated Organic Compounds (LROC) or Total Toxic Organics(TTO), I certify that, to the best of my knowledge, no dumping of concentrated toxic organics into the wastewaters has occurred since filing of the last discharge monitoring report. I further certify that this facility is implementing the toxic organic management plan submitted to the City of Raleigh Industrial Pretreatment Program.

Dave Baran
Permittee (Please type or print name of permittee)

Timothy D. Roberts 10/13/15
Signature of Permittee or Delegated Person Date

*If signed by other than permittee, delegation of signatory authority must be on file with the City."
Note: Do not sign this report unless the City has a letter of signatory authority on file noting authority has been delegated.

Submitted via Email to ryan.faw@raleighnc.gov

Mallinckrodt LLC								
Raleigh Plant City Effluent Compliance Data								
Month	September							
Year	2015							
	Flow	pH	Chemical Oxygen Demand		Total Suspended Solids		Total Nitrogen	
	MGD	s.u.	mg/L	lbs/day	mg/L	lbs/day	mg/L	lbs/day
	Continuous	Daily Grab	2/WK-COMP	2/WK-COMP	2/WK-COMP	2/WK-COMP	2/WK-COMP	2/WK-COMP
Limit	0.700	6.0 - 11.0	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Date								
1	0.327	8.2						
2	0.323	8.2	1500	4041	1300	3502	150	404
3	0.282	8.6						
4	0.314	8.2						
5	0.276	8.9						
6	0.291	8.5						
7	0.203	8.5	1400	2370	1200	2032	140	237
8	0.290	7.9						
9	0.326	8.2	1000	2719	830	2257	110	299
10	0.326	8.3						
11	0.322	8.4						
12	0.332	8.3						
13	0.313	8.4						
14	0.313	8.8	970	2532	1300	3394	34	89
15	0.329	8.9						
16	0.330	8.2	750	2064	720	1982	71	195
17	0.315	8.2						
18	0.320	8.4						
19	0.324	8.4						
20	0.325	8.3						
21	0.322	8.3	160	430	94	252	41	110
22	0.308	8.4						
23	0.321	8.5	470	1258	330	883	70	187
24	0.317	8.5						
25	0.377	8.3						
26	0.412	8.5						
27	0.378	8.7						
28	0.361	8.9	1000	3011	1000	3011	120	361
29	0.369	8.6						
30	0.372	8.8	100	310	35	109	59.1	183

Mallinckrodt LLC								
City Effluent - Confidential								
Month	September							
Year	2015							
	Chemical Oxygen Demand	Total Suspended Solids	Total Phophorus	PAP	APAP	Aniline	Acetanilide	Nitrobenzene
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
Date								
1	246	100	2	4	0	0	0	0
2								
3	203	100		3	0	0	0	0
4								
5								
6								
7								
8	118	10		2	0	0	0	0
9								
10	105	1260		166	0	0	0	0
11								
12								
13								
14								
15	132	50	3	3	0	0	0	0
16								
17	170	0		0	0	0	0	0
18								
19								
20								
21								
22	79	1590	3	1	1	0	0	0
23								
24	131	70		5	0	0	0	0
25								
26								
27								
28								
29								
30								

ENCO Laboratories

Accurate. Timely. Responsive. Innovative.

102-A Woodwinds Industrial Court
Cary NC, 27511
Phone: 919.467.3090 FAX: 919.467.3515

Wednesday, September 16, 2015
Mallinckrodt, LLC (MA026)
Attn: Tim Roberts
8801 Capital Blvd.
Raleigh, NC 27616-

RE: Laboratory Results for
Project Number: [none], Project Name/Desc: City Effluent - Twice Weekly
ENCO Workorder(s): C510596

Dear Tim Roberts,

Enclosed is a copy of your laboratory report for test samples received by our laboratory on Thursday, September 3, 2015.

Unless otherwise noted in an attached project narrative, all samples were received in acceptable condition and processed in accordance with the referenced methods/procedures. Results for these procedures apply only to the samples as submitted.

The analytical results contained in this report are in compliance with NELAC standards, except as noted in the project narrative. This report shall not be reproduced except in full, without the written approval of the Laboratory.

This report contains only those analyses performed by Environmental Conservation Laboratories. Unless otherwise noted, all analyses were performed at ENCO Cary. Data from outside organizations will be reported under separate cover.

If you have any questions or require further information, please do not hesitate to contact me.

Sincerely,

Stephanie Franz

Project Manager

Enclosure(s)

SAMPLE SUMMARY/LABORATORY CHRONICLE

Client ID: City Effluent **Lab ID: C510596-01** **Sampled: 09/02/15 08:00** **Received: 09/03/15 13:10**

Parameter	Hold Date/Time(s)	Prep Date/Time(s)	Analysis Date/Time(s)
CALC	05/28/18	09/16/15 15:47	09/16/15 15:47
EPA 353.2	09/30/15	09/11/15 08:23	09/11/15 13:00
SM 2540D-1997	09/09/15	09/04/15 10:22	09/04/15 10:22
SM 5220D-1997	09/30/15	09/06/15 13:26	09/06/15 16:30

Client ID: City Effluent **Lab ID: C510596-01RE1** **Sampled: 09/02/15 08:00** **Received: 09/03/15 13:10**

Parameter	Hold Date/Time(s)	Prep Date/Time(s)	Analysis Date/Time(s)
EPA 351.2	09/30/15	09/11/15 13:22	09/15/15 13:37

SAMPLE DETECTION SUMMARY

Client ID: City Effluent **Lab ID:** C510596-01

Analyte	Results	Flag	MDL	PQL	Units	Method	Notes
Chemical Oxygen Demand	1500		20	20	mg/L	SM 5220D-1997	
Nitrate/Nitrite as N	33	D	4.0	9.8	mg/L	EPA 353.2	
Total Nitrogen	150		0.02	0.10	mg/L	CALC	
Total Suspended Solids	1300		250	250	mg/L	SM 2540D-1997	

Client ID: City Effluent **Lab ID:** C510596-01RE1

Analyte	Results	Flag	MDL	PQL	Units	Method	Notes
Total Kjeldahl Nitrogen	120	D	1.3	2.4	mg/L	EPA 351.2	

ANALYTICAL RESULTS

Description: City Effluent
Matrix: Waste Water
Project: City Effluent - Twice Weekly

Lab Sample ID: C510596-01
Sampled: 09/02/15 08:00
Sampled By: Tony Smith

Received: 09/03/15 13:10
Work Order: C510596

Classical Chemistry Parameters

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	Results	Flag	Units	DF	MDL	PQL	Batch	Method	Analyzed	By	Notes
Chemical Oxygen Demand^	**1500**		mg/L	2	20	20	5I06002	SM 5220D-1997	09/06/15 16:30	JOC	
Nitrate/Nitrite as N^	**33**	D	mg/L	97.5	4.0	9.8	5I09002	EPA 353.2	09/11/15 13:00	JLJ	
Total Kjeldahl Nitrogen^	**120**	D	mg/L	5	1.3	2.4	5I11007	EPA 351.2	09/15/15 13:37	JLJ	
Total Nitrogen [17778-88-0]	**150**		mg/L	1	0.02	0.10	5I16036	CALC	09/16/15 15:47	MKS	
Total Suspended Solids^	**1300**		mg/L	100	250	250	5I04013	SM 2540D-1997	09/04/15 10:22	MKS	

QUALITY CONTROL DATA

Classical Chemistry Parameters - Quality Control

Batch 5I04013 - NO PREP

Blank (5I04013-BLK1) Prepared & Analyzed: 09/04/2015 10:22

Analyte	Result	Flag	POL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Suspended Solids	2.5	U	2.5	mg/L							

LCS (5I04013-BS1) Prepared & Analyzed: 09/04/2015 10:22

Analyte	Result	Flag	POL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Suspended Solids	93		2.5	mg/L	100		93	80-120			

Duplicate (5I04013-DUP1) Prepared & Analyzed: 09/04/2015 10:22

Source: C510405-01

Analyte	Result	Flag	POL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Suspended Solids	220		50	mg/L		200			9	20	

Duplicate (5I04013-DUP2) Prepared & Analyzed: 09/04/2015 10:22

Source: C510596-01

Analyte	Result	Flag	POL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Suspended Solids	1300		250	mg/L		1300			0.8	20	

Batch 5I06002 - Same

Blank (5I06002-BLK1) Prepared: 09/06/2015 13:26 Analyzed: 09/06/2015 16:30

Analyte	Result	Flag	POL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Chemical Oxygen Demand	10	U	10	mg/L							

LCS (5I06002-BS1) Prepared: 09/06/2015 13:26 Analyzed: 09/06/2015 16:30

Analyte	Result	Flag	POL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Chemical Oxygen Demand	510		10	mg/L	500		103	90-110			

Matrix Spike (5I06002-MS1) Prepared: 09/06/2015 13:26 Analyzed: 09/06/2015 16:30

Source: C508971-01

Analyte	Result	Flag	POL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Chemical Oxygen Demand	560		10	mg/L	526	25	102	90-110			

Matrix Spike Dup (5I06002-MSD1) Prepared: 09/06/2015 13:26 Analyzed: 09/06/2015 16:30

Source: C508971-01

Analyte	Result	Flag	POL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Chemical Oxygen Demand	550		10	mg/L	526	25	100	90-110	2	10	

Batch 5I09002 - NO PREP

Blank (5I09002-BLK1) Prepared: 09/11/2015 08:23 Analyzed: 09/11/2015 12:45

Analyte	Result	Flag	POL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Nitrate/Nitrite as N	0.041	U	0.10	mg/L							

QUALITY CONTROL DATA

Classical Chemistry Parameters - Quality Control

Batch 5I09002 - NO PREP - Continued

LCS (5I09002-BS1) Prepared: 09/11/2015 08:23 Analyzed: 09/11/2015 12:38

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Nitrate/Nitrite as N	1.2		0.10	mg/L	1.25		99	90-110			

Matrix Spike (5I09002-MS1) Prepared: 09/11/2015 08:23 Analyzed: 09/11/2015 12:47

Source: C416992-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Nitrate/Nitrite as N	5.9		1.0	mg/L	5.00	0.87	100	90-110			

Matrix Spike (5I09002-MS2) Prepared: 09/11/2015 08:23 Analyzed: 09/11/2015 12:56

Source: C416992-02

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Nitrate/Nitrite as N	5.6		1.0	mg/L	5.00	0.41 U	112	90-110			QM-05

Matrix Spike Dup (5I09002-MSD1) Prepared: 09/11/2015 08:23 Analyzed: 09/11/2015 12:52

Source: C416992-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Nitrate/Nitrite as N	5.8		1.0	mg/L	5.00	0.87	99	90-110	0.9	10	

Batch 5I11007 - Same

Blank (5I11007-BLK1) Prepared: 09/11/2015 13:22 Analyzed: 09/15/2015 09:51

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Kjeldahl Nitrogen	0.26	U	0.48	mg/L							

LCS (5I11007-BS1) Prepared: 09/11/2015 13:22 Analyzed: 09/15/2015 09:53

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Kjeldahl Nitrogen	12		0.48	mg/L	12.0		102	90-110			

Matrix Spike (5I11007-MS1) Prepared: 09/11/2015 13:22 Analyzed: 09/15/2015 09:55

Source: C416992-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Kjeldahl Nitrogen	5.5		0.48	mg/L	4.80	0.84	97	90-110			

Matrix Spike (5I11007-MS2) Prepared: 09/11/2015 13:22 Analyzed: 09/15/2015 09:57

Source: C505193-01RE1

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Kjeldahl Nitrogen	6.6		0.48	mg/L	4.80	2.8	79	90-110			QM-05

Matrix Spike Dup (5I11007-MSD1) Prepared: 09/11/2015 13:22 Analyzed: 09/15/2015 09:59

Source: C416992-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Kjeldahl Nitrogen	5.7		0.48	mg/L	4.80	0.84	102	90-110	4	10	

FLAGS/NOTES AND DEFINITIONS

B	The analyte was detected in the associated method blank.
D	The sample was analyzed at dilution.
J	The reported value is between the laboratory method detection limit (MDL) and the laboratory method reporting limit (MRL), adjusted for actual sample preparation data and moisture content, where applicable.
U	The analyte was analyzed for but not detected to the level shown, adjusted for actual sample preparation data and moisture content, where applicable.
E	The concentration indicated for this analyte is an estimated value above the calibration range of the instrument. This value is considered an estimate.
MRL	Method Reporting Limit. The MRL is roughly equivalent to the practical quantitation limit (PQL) and is based on the low point of the calibration curve, when applicable, sample preparation factor, dilution factor, and, in the case of soil samples, moisture content.
N	The analysis indicates the presence of an analyte for which there is presumptive evidence (85% or greater confidence) to make a "tentative identification".
P	Greater than 25% concentration difference was observed between the primary and secondary GC column. The lower concentration is reported.
QM-05	The spike recovery was outside acceptance limits for the MS and/or MSD due to matrix interference. The LCS and/or LCSD were within acceptance limits showing that the laboratory is in control and the data is acceptable.

ENVIRONMENTAL CONSERVATION LABORATORIES CHAIN-OF-CUSTODY RECORD

www.encolabs.com

10775 Central Port Dr.
Orlando, FL 32824
(407) 826-5314 Fax (407) 850-6945

4810 Executive Park Court, Suite 111
Jacksonville, FL 32216-6069
(904) 296-3007 Fax (904) 296-6210

102-A Woodwinds Industrial Ct.
Cary, NC 27511
(919) 467-3090 Fax (919) 467-3515

Client Name: Mallinckrodt, LLC (MA026)	Project Number: [none]
Address: 8801 Capital Blvd.	Project Name/Desc: City Effluent - Twice Weekly
City/ST/Zip: Raleigh, NC 27616-	PO # / Billing Info: R-B43004
Tel: (919) 878-2885 Fax: () -	Reporting Contact: Tim Roberts
Sampler(s) Name, Affiliation (Print): Tony Smith Mallinckrodt	Billing Contact: Accounts Payable
Sampler(s) Signature: Tony Smith	Site Location / Time Zone: Raleigh new Treatment plant

Requested Analyses

Requested Turnaround Times

Note : Rush requests subject to acceptance by the facility

___ Standard

___ Expedited

Due ___/___/___

Lab Workorder: C510596

Item #	Sample ID (Field Identification)	Collection Date	Collection Time	Comp / Grab	Matrix (see codes)	Total # of Containers	COD SM5220D	Nitrogen Total 353 Calc	NOX 353.2,TKN 351.2	TSS SM2540D	Sample Comments
	City Effluent	9-2-15	8:00	comp	WW	2	X	X	X	X	

Preservation (See Codes) (Combine as necessary)

<-- Total # of Containers

Sample Kit Prepared By	Date/Time	Relinquished By: Tony Smith	Date/Time: 9-2-15 8:00	Received By	Date/Time: 9/3/15 1200
Comments/Special Reporting Requirements		Relinquished By	Date/Time	Received By	Date/Time
		Relinquished By	Date/Time	Received By	Date/Time: 9/3/15 1:10
		Cooler #'s & Temps on Receipt: 3.1°C		Condition Upon Receipt: Acceptable ___ Unacceptable	

Matrix : **GW**-Groundwater **SO**-Soil **DW**-Drinking Water **SE**-Sediment **SW**-Surface Water **WW**-Wastewater **A**-Air **O**-Other (detail in comments)

Preservation: **I**-Ice **H**-HCl **N**-HNO3 **S**-H2SO4 **NO**-NaOH **O**-Other (detail in comments)

Note : All samples submitted to ENCO Labs are in accordance with the terms and conditions listed on the reverse of this form, unless prior written agreements exist

Sample Preservation Verification

ENCO Cary

Work Order:	C510596	Project:	City Effluent - Twice Weekly
Client:	Mallinckrodt, LLC (MA026)	Project #:	[none]
Logged In:	03-Sep-15 14:07	Logged By:	Andrew S Coons

C510596-01

Cont	Type	Pres (pH) Requirement	pH Checked / In Control	pH Adjusted	Date/Time Adjusted	Reagent Used/Comments
A	250mLP+H2SO4	<2	Y / N / NA	Y / N / NA		

	Reagent Name	ID		Reagent Name	ID		Reagent Name	ID
1			3			5		
2			4			6		

ENCO Laboratories

Accurate. Timely. Responsive. Innovative.

102-A Woodwinds Industrial Court
Cary NC, 27511
Phone: 919.467.3090 FAX: 919.467.3515

Monday, September 21, 2015
Mallinckrodt, LLC (MA026)
Attn: Tim Roberts
8801 Capital Blvd.
Raleigh, NC 27616-

RE: Laboratory Results for
Project Number: [none], Project Name/Desc: City Effluent - Twice Weekly
ENCO Workorder(s): C510731

Dear Tim Roberts,

Enclosed is a copy of your laboratory report for test samples received by our laboratory on Tuesday, September 8, 2015.

Unless otherwise noted in an attached project narrative, all samples were received in acceptable condition and processed in accordance with the referenced methods/procedures. Results for these procedures apply only to the samples as submitted.

The analytical results contained in this report are in compliance with NELAC standards, except as noted in the project narrative. This report shall not be reproduced except in full, without the written approval of the Laboratory.

This report contains only those analyses performed by Environmental Conservation Laboratories. Unless otherwise noted, all analyses were performed at ENCO Cary. Data from outside organizations will be reported under separate cover.

If you have any questions or require further information, please do not hesitate to contact me.

Sincerely,

Stephanie Franz

Project Manager

Enclosure(s)

SAMPLE SUMMARY/LABORATORY CHRONICLE

Client ID: City Effluent **Lab ID: C510731-01** **Sampled: 09/07/15 11:00** **Received: 09/08/15 12:48**

Parameter	Hold Date/Time(s)	Prep Date/Time(s)	Analysis Date/Time(s)
CALC	06/02/18	09/21/15 10:01	09/21/15 10:20
EPA 353.2	10/05/15	09/18/15 08:34	09/18/15 12:14
SM 2540D-1997	09/14/15	09/10/15 15:08	09/10/15 15:08
SM 5220D-1997	10/05/15	09/14/15 17:31	09/15/15 10:54

Client ID: City Effluent **Lab ID: C510731-01RE1** **Sampled: 09/07/15 11:00** **Received: 09/08/15 12:48**

Parameter	Hold Date/Time(s)	Prep Date/Time(s)	Analysis Date/Time(s)
EPA 351.2	10/05/15	09/11/15 11:11	09/15/15 14:00

SAMPLE DETECTION SUMMARY

Client ID: City Effluent **Lab ID:** C510731-01

Analyte	Results	Flag	MDL	PQL	Units	Method	Notes
Chemical Oxygen Demand	1400		20	20	mg/L	SM 5220D-1997	
Nitrate/Nitrite as N	33	D	4.0	9.8	mg/L	EPA 353.2	
Total Nitrogen	140		0.02	0.10	mg/L	CALC	
Total Suspended Solids	1200		100	100	mg/L	SM 2540D-1997	

Client ID: City Effluent **Lab ID:** C510731-01RE1

Analyte	Results	Flag	MDL	PQL	Units	Method	Notes
Total Kjeldahl Nitrogen	110	D	1.3	2.4	mg/L	EPA 351.2	

ANALYTICAL RESULTS

Description: City Effluent
Matrix: Waste Water
Project: City Effluent - Twice Weekly

Lab Sample ID: C510731-01
Sampled: 09/07/15 11:00
Sampled By: Wayne Sharron

Received: 09/08/15 12:48
Work Order: C510731

Classical Chemistry Parameters

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	Results	Flag	Units	DF	MDL	PQL	Batch	Method	Analyzed	By	Notes
Chemical Oxygen Demand^	**1400**		mg/L	2	20	20	5I14033	SM 5220D-1997	09/15/15 10:54	JOC	
Nitrate/Nitrite as N^	**33**	D	mg/L	97.5	4.0	9.8	5I18009	EPA 353.2	09/18/15 12:14	JLJ	
Total Kjeldahl Nitrogen^	**110**	D	mg/L	5	1.3	2.4	5I11014	EPA 351.2	09/15/15 14:00	JLJ	
Total Nitrogen [17778-88-0]	**140**		mg/L	1	0.02	0.10	5I21017	CALC	09/21/15 10:20	JLJ	
Total Suspended Solids^	**1200**		mg/L	40	100	100	5I10032	SM 2540D-1997	09/10/15 15:08	MKS	

QUALITY CONTROL DATA

Classical Chemistry Parameters - Quality Control

Batch 5I10032 - NO PREP

Blank (5I10032-BLK1) Prepared & Analyzed: 09/10/2015 15:08

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Suspended Solids	2.5	U	2.5	mg/L							

LCS (5I10032-BS1) Prepared & Analyzed: 09/10/2015 15:08

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Suspended Solids	91		2.5	mg/L	100		91	80-120			

Duplicate (5I10032-DUP1) Prepared & Analyzed: 09/10/2015 15:08

Source: C509993-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Suspended Solids	240		120	mg/L		250			6	20	

Duplicate (5I10032-DUP2) Prepared & Analyzed: 09/10/2015 15:08

Source: C510392-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Suspended Solids	270		50	mg/L		270			0.7	20	

Batch 5I11014 - Same

Blank (5I11014-BLK1) Prepared: 09/11/2015 11:11 Analyzed: 09/15/2015 10:52

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Kjeldahl Nitrogen	0.26	U	0.48	mg/L							

LCS (5I11014-BS1) Prepared: 09/11/2015 11:11 Analyzed: 09/15/2015 10:54

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Kjeldahl Nitrogen	13		0.48	mg/L	12.0		106	90-110			

Matrix Spike (5I11014-MS1) Prepared: 09/11/2015 11:11 Analyzed: 09/15/2015 10:56

Source: C506564-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Kjeldahl Nitrogen	49	D	2.7	mg/L	4.80	58	NR	90-110			QM-17

Matrix Spike (5I11014-MS2) Prepared: 09/11/2015 11:11 Analyzed: 09/15/2015 10:59

Source: C506686-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Kjeldahl Nitrogen	5.5		0.48	mg/L	4.80	0.55	103	90-110			

Matrix Spike Dup (5I11014-MSD1) Prepared: 09/11/2015 11:11 Analyzed: 09/15/2015 11:01

Source: C506564-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Kjeldahl Nitrogen	61	D	2.7	mg/L	4.80	58	55	90-110	22	10	QM-17

Batch 5I14033 - Same

QUALITY CONTROL DATA

Classical Chemistry Parameters - Quality Control

Batch 5I14033 - Same - Continued

Blank (5I14033-BLK1) Prepared: 09/14/2015 17:31 Analyzed: 09/15/2015 10:54

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Chemical Oxygen Demand	10	U	10	mg/L							

LCS (5I14033-BS1) Prepared: 09/14/2015 17:31 Analyzed: 09/15/2015 10:54

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Chemical Oxygen Demand	520		10	mg/L	500		103	90-110			

Matrix Spike (5I14033-MS1) Prepared: 09/14/2015 17:31 Analyzed: 09/15/2015 10:54

Source: C506564-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Chemical Oxygen Demand	1300		20	mg/L	1000	340	95	90-110			

Matrix Spike Dup (5I14033-MSD1) Prepared: 09/14/2015 17:31 Analyzed: 09/15/2015 10:54

Source: C506564-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Chemical Oxygen Demand	1300		20	mg/L	1000	340	95	90-110	0.3	10	

Batch 5I18009 - NO PREP

Blank (5I18009-BLK1) Prepared: 09/18/2015 08:34 Analyzed: 09/18/2015 11:24

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Nitrate/Nitrite as N	0.041	U	0.10	mg/L							

LCS (5I18009-BS1) Prepared: 09/18/2015 08:34 Analyzed: 09/18/2015 11:26

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Nitrate/Nitrite as N	1.3		0.10	mg/L	1.25		101	90-110			

Matrix Spike (5I18009-MS1) Prepared: 09/18/2015 08:34 Analyzed: 09/18/2015 11:29

Source: C506686-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Nitrate/Nitrite as N	0.81		0.10	mg/L	0.513	0.28	104	90-110			

Matrix Spike (5I18009-MS2) Prepared: 09/18/2015 08:34 Analyzed: 09/18/2015 11:42

Source: C510004-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Nitrate/Nitrite as N	5.5		1.0	mg/L	5.00	3.0	51	90-110			QM-05

Matrix Spike Dup (5I18009-MSD1) Prepared: 09/18/2015 08:34 Analyzed: 09/18/2015 11:33

Source: C506686-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Nitrate/Nitrite as N	0.74		0.10	mg/L	0.513	0.28	90	90-110	9	10	

FLAGS/NOTES AND DEFINITIONS

B	The analyte was detected in the associated method blank.
D	The sample was analyzed at dilution.
J	The reported value is between the laboratory method detection limit (MDL) and the laboratory method reporting limit (MRL), adjusted for actual sample preparation data and moisture content, where applicable.
U	The analyte was analyzed for but not detected to the level shown, adjusted for actual sample preparation data and moisture content, where applicable.
E	The concentration indicated for this analyte is an estimated value above the calibration range of the instrument. This value is considered an estimate.
MRL	Method Reporting Limit. The MRL is roughly equivalent to the practical quantitation limit (PQL) and is based on the low point of the calibration curve, when applicable, sample preparation factor, dilution factor, and, in the case of soil samples, moisture content.
N	The analysis indicates the presence of an analyte for which there is presumptive evidence (85% or greater confidence) to make a "tentative identification".
P	Greater than 25% concentration difference was observed between the primary and secondary GC column. The lower concentration is reported.
QM-05	The spike recovery was outside acceptance limits for the MS and/or MSD due to matrix interference. The LCS and/or LCSD were within acceptance limits showing that the laboratory is in control and the data is acceptable.
QM-17	Matrix spike recovery was outside acceptance limits due to high concentrations of analyte in source sample.

ENVIRONMENTAL CONSERVATION LABORATORIES CHAIN-OF-CUSTODY RECORD

10775 Central Port Dr.
Orlando, FL 32824
(407) 826-5314 Fax (407) 850-6945

4810 Executive Park Court, Suite 111
Jacksonville, FL 32216-6069
(904) 296-3007 Fax (904) 296-6210

102-A Woodwinds Industrial Ct.
Cary, NC 27511
(919) 467-3090 Fax (919) 467-3515

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Client Name: Mallinckrodt, LLC (MA026)	Project Number: [none]
Address: 8801 Capital Blvd.	Project Name/Desc: City Effluent - Twice Weekly
City/ST/Zip: Raleigh, NC 27616-	PO # / Billing Info: R-B43004
Tel: (919) 878-2885 Fax: () -	Reporting Contact: Tim Roberts
Sampler(s) Name, Affiliation (Print): WAYNE Sherron Mallinckrodt	Billing Contact: Accounts Payable
Sampler(s) Signature: Wayne Sherron	Site Location / Time Zone: Raleigh WW Treatment plant

Requested Analyses

Preservation (See Codes) (Combine as necessary)

Item #	Sample ID (Field Identification)	Collection Date	Collection Time	Comp / Grab	Matrix (see codes)	Total # of Containers	COD SM5220D	Nitrogen Total 353 Calc	NOX 353.2,TKN 351.2	TSS SM2540D	Sample Comments
	City Effluent	9-7-15	11:00AM	Comp	WW	2	X	X	X	X	
						<-- Total # of Containers					

Requested Turnaround Times

Note : Rush requests subject to acceptance by the facility

X Standard

___ Expedited

Due ___/___/___

Lab Workorder: C510731

Sample Kit Prepared By	Date/Time	Relinquished By: Wayne Sherron	Date/Time: 9-7-15 11:00 AM	Received By	Date/Time: 9/8/15 1200
Comments/Special Reporting Requirements		Relinquished By	Date/Time	Received By	Date/Time
		Relinquished By	Date/Time	Received By	Date/Time: 9/8/15 1248
		Cooler #'s & Temps on Receipt: 1, 6°C		Condition Upon Receipt: √ Acceptable ___ Unacceptable	

Matrix : **GW**-Groundwater **SO**-Soil **DW**-Drinking Water **SE**-Sediment **SW**-Surface Water **WW**-Wastewater **A**-Air **O**-Other (detail in comments)

Preservation: **I**-Ice **H**-HCl **N**-HNO3 **S**-H2SO4 **NO**-NaOH **O**-Other (detail in comments)

Note : All samples submitted to ENCO Labs are in accordance with the terms and conditions listed on the reverse of this form, unless prior written agreements exist

Sample Preservation Verification

ENCO Cary

Work Order:	C510731	Project:	City Effluent - Twice Weekly
Client:	Mallinckrodt, LLC (MA026)	Project #:	[none]
Logged In:	08-Sep-15 13:30	Logged By:	John C King

C510731-01

Cont	Type	Pres (pH) Requirement	pH Checked / In Control	pH Adjusted	Date/Time Adjusted	Reagent Used/Comments
A	250mLP+H2SO4	<2	(Y) / N / NA	Y / (N) / NA		

	Reagent Name	ID		Reagent Name	ID		Reagent Name	ID
1			3			5		
2			4			6		

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102-A Woodwinds Industrial Court
Cary NC, 27511
Phone: 919.467.3090 FAX: 919.467.3515

Wednesday, September 23, 2015
Mallinckrodt, LLC (MA026)
Attn: Tim Roberts
8801 Capital Blvd.
Raleigh, NC 27616-

RE: Laboratory Results for
Project Number: [none], Project Name/Desc: City Effluent - Twice Weekly
ENCO Workorder(s): C510730

Dear Tim Roberts,

Enclosed is a copy of your laboratory report for test samples received by our laboratory on Thursday, September 10, 2015.

Unless otherwise noted in an attached project narrative, all samples were received in acceptable condition and processed in accordance with the referenced methods/procedures. Results for these procedures apply only to the samples as submitted.

The analytical results contained in this report are in compliance with NELAC standards, except as noted in the project narrative. This report shall not be reproduced except in full, without the written approval of the Laboratory.

This report contains only those analyses performed by Environmental Conservation Laboratories. Unless otherwise noted, all analyses were performed at ENCO Cary. Data from outside organizations will be reported under separate cover.

If you have any questions or require further information, please do not hesitate to contact me.

Sincerely,

Stephanie Franz

Project Manager

Enclosure(s)

SAMPLE SUMMARY/LABORATORY CHRONICLE

Client ID: City Effluent **Lab ID: C510730-01** **Sampled: 09/09/15 10:45** **Received: 09/10/15 12:55**

Parameter	Hold Date/Time(s)	Prep Date/Time(s)	Analysis Date/Time(s)
CALC	06/04/18	09/23/15 09:33	09/23/15 09:38
EPA 353.2	10/07/15	09/22/15 07:24	09/22/15 10:27
SM 2540D-1997	09/16/15	09/15/15 16:40	09/15/15 16:40
SM 5220D-1997	10/07/15	09/18/15 09:50	09/18/15 12:20

Client ID: City Effluent **Lab ID: C510730-01RE1** **Sampled: 09/09/15 10:45** **Received: 09/10/15 12:55**

Parameter	Hold Date/Time(s)	Prep Date/Time(s)	Analysis Date/Time(s)
EPA 351.2	10/07/15	09/15/15 11:04	09/21/15 13:48

SAMPLE DETECTION SUMMARY

Client ID: City Effluent **Lab ID:** C510730-01

Analyte	Results	Flag	MDL	PQL	Units	Method	Notes
Chemical Oxygen Demand	1000		20	20	mg/L	SM 5220D-1997	
Nitrate/Nitrite as N	38	D	4.0	9.8	mg/L	EPA 353.2	
Total Nitrogen	110		0.02	0.10	mg/L	CALC	
Total Suspended Solids	830		250	250	mg/L	SM 2540D-1997	

Client ID: City Effluent **Lab ID:** C510730-01RE1

Analyte	Results	Flag	MDL	PQL	Units	Method	Notes
Total Kjeldahl Nitrogen	74	D	1.0	1.9	mg/L	EPA 351.2	

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ANALYTICAL RESULTS

Description: City Effluent
Matrix: Waste Water
Project: City Effluent - Twice Weekly

Lab Sample ID: C510730-01
Sampled: 09/09/15 10:45
Sampled By: Wayne sherron

Received: 09/10/15 12:55
Work Order: C510730

Classical Chemistry Parameters

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	Results	Flag	Units	DF	MDL	PQL	Batch	Method	Analyzed	By	Notes
Chemical Oxygen Demand^	**1000**		mg/L	2	20	20	5I18008	SM 5220D-1997	09/18/15 12:20	JOC	
Nitrate/Nitrite as N^	**38**	D	mg/L	97.5	4.0	9.8	5I22002	EPA 353.2	09/22/15 10:27	JLJ	
Total Kjeldahl Nitrogen^	**74**	D	mg/L	4	1.0	1.9	5I15003	EPA 351.2	09/21/15 13:48	JLJ	
Total Nitrogen [17778-88-0]	**110**		mg/L	1	0.02	0.10	5I23013	CALC	09/23/15 09:38	JLJ	
Total Suspended Solids^	**830**		mg/L	100	250	250	5I15018	SM 2540D-1997	09/15/15 16:40	MMR	

QUALITY CONTROL DATA

Classical Chemistry Parameters - Quality Control

Batch 5I15003 - Same

Blank (5I15003-BLK1) Prepared: 09/15/2015 11:04 Analyzed: 09/21/2015 10:18

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Kjeldahl Nitrogen	0.26	U	0.48	mg/L							

LCS (5I15003-BS1) Prepared: 09/15/2015 11:04 Analyzed: 09/21/2015 10:20

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Kjeldahl Nitrogen	12		0.48	mg/L	12.0		103	90-110			

Matrix Spike (5I15003-MS1) Prepared: 09/15/2015 11:04 Analyzed: 09/21/2015 10:22

Source: C510707-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Kjeldahl Nitrogen	8.0		0.48	mg/L	4.80	2.9	105	90-110			

Matrix Spike (5I15003-MS2) Prepared: 09/15/2015 11:04 Analyzed: 09/21/2015 14:54

Source: C510002-01RE2

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Kjeldahl Nitrogen	90	D	15	mg/L	4.80	93	NR	90-110			QM-17

Matrix Spike Dup (5I15003-MSD1) Prepared: 09/15/2015 11:04 Analyzed: 09/21/2015 10:26

Source: C510707-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Kjeldahl Nitrogen	7.6		0.48	mg/L	4.80	2.9	98	90-110	4	10	

Batch 5I15018 - NO PREP

Blank (5I15018-BLK1) Prepared & Analyzed: 09/15/2015 16:40

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Suspended Solids	2.5	U	2.5	mg/L							

LCS (5I15018-BS1) Prepared & Analyzed: 09/15/2015 16:40

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Suspended Solids	110		2.5	mg/L	100		106	80-120			

Duplicate (5I15018-DUP1) Prepared & Analyzed: 09/15/2015 16:40

Source: C510353-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Suspended Solids	520		100	mg/L		510			2	20	

Duplicate (5I15018-DUP2) Prepared & Analyzed: 09/15/2015 16:40

Source: C510397-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Suspended Solids	230		50	mg/L		220			5	20	

Batch 5I18008 - Same

QUALITY CONTROL DATA

Classical Chemistry Parameters - Quality Control

Batch 5I18008 - Same - Continued

Blank (5I18008-BLK1) Prepared: 09/18/2015 09:50 Analyzed: 09/18/2015 12:20

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Chemical Oxygen Demand	10	U	10	mg/L							

LCS (5I18008-BS1) Prepared: 09/18/2015 09:50 Analyzed: 09/18/2015 12:20

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Chemical Oxygen Demand	500		10	mg/L	500		101	90-110			

Matrix Spike (5I18008-MS1) Prepared: 09/18/2015 09:50 Analyzed: 09/18/2015 12:20

Source: C510432-02

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Chemical Oxygen Demand	600		10	mg/L	526	64	102	90-110			

Matrix Spike Dup (5I18008-MSD1) Prepared: 09/18/2015 09:50 Analyzed: 09/18/2015 12:20

Source: C510432-02

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Chemical Oxygen Demand	590		10	mg/L	526	64	100	90-110	1	10	

Batch 5I22002 - NO PREP

Blank (5I22002-BLK1) Prepared: 09/22/2015 07:24 Analyzed: 09/22/2015 09:50

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Nitrate/Nitrite as N	0.041	U	0.10	mg/L							

LCS (5I22002-BS1) Prepared: 09/22/2015 07:24 Analyzed: 09/22/2015 09:48

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Nitrate/Nitrite as N	1.3		0.10	mg/L	1.25		107	90-110			

Matrix Spike (5I22002-MS1) Prepared: 09/22/2015 07:24 Analyzed: 09/22/2015 09:52

Source: C510002-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Nitrate/Nitrite as N	0.55		0.10	mg/L	0.513	0.060	96	90-110			

Matrix Spike (5I22002-MS2) Prepared: 09/22/2015 07:24 Analyzed: 09/22/2015 10:05

Source: C510014-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Nitrate/Nitrite as N	76		4.0	mg/L	20.0	52	122	90-110			QM-05

Matrix Spike Dup (5I22002-MSD1) Prepared: 09/22/2015 07:24 Analyzed: 09/22/2015 10:01

Source: C510002-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Nitrate/Nitrite as N	0.57		0.10	mg/L	0.513	0.060	99	90-110	2	10	

FLAGS/NOTES AND DEFINITIONS

B	The analyte was detected in the associated method blank.
D	The sample was analyzed at dilution.
J	The reported value is between the laboratory method detection limit (MDL) and the laboratory method reporting limit (MRL), adjusted for actual sample preparation data and moisture content, where applicable.
U	The analyte was analyzed for but not detected to the level shown, adjusted for actual sample preparation data and moisture content, where applicable.
E	The concentration indicated for this analyte is an estimated value above the calibration range of the instrument. This value is considered an estimate.
MRL	Method Reporting Limit. The MRL is roughly equivalent to the practical quantitation limit (PQL) and is based on the low point of the calibration curve, when applicable, sample preparation factor, dilution factor, and, in the case of soil samples, moisture content.
N	The analysis indicates the presence of an analyte for which there is presumptive evidence (85% or greater confidence) to make a "tentative identification".
P	Greater than 25% concentration difference was observed between the primary and secondary GC column. The lower concentration is reported.
QM-05	The spike recovery was outside acceptance limits for the MS and/or MSD due to matrix interference. The LCS and/or LCSD were within acceptance limits showing that the laboratory is in control and the data is acceptable.
QM-17	Matrix spike recovery was outside acceptance limits due to high concentrations of analyte in source sample.

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Page ____ of ____

Client Name	Project Number
Mallinckrodt, LLC (MA026)	[none]
Address	**Project Name/Desc**
8801 Capital Blvd.	City Effluent - Twice Weekly
City/ST/Zip	**PO # / Billing Info**
Raleigh, NC 27616-	R-B43004
Tel / **Fax**	**Reporting Contact**
(919) 878-2885 / () -	Tim Roberts
Sampler(s) Name, Affiliation (Print)	**Billing Contact**
Wayne Sherron Mallinckrodt	Accounts Payable
Sampler(s) Signature	**Site Location / Time Zone**
Wayne Sherron	Raleigh WW Treatment plant

Requested Analyses

Item #	Sample ID (Field Identification)	Collection Date	Collection Time	Comp / Grab	Matrix (see codes)	Total # of Containers	COD SM5220D	Nitrogen Total 353 Calc	NOX 353.2, TKN 351.2	TSS SM2540D	Sample Comments
	City Effluent	9-9-15	10:45AM	comp	WW	2	X	X	X	X	

Preservation (See Codes) (Combine as necessary)

<-- Total # of Containers

Requested Turnaround Times

Note : Rush requests subject to acceptance by the facility

X Standard

___ Expedited

Due ___/___/___

Lab Workorder

C510730

Sample Kit Prepared By	Date/Time	Relinquished By	Date/Time	Received By	Date/Time
		Wayne Sherron	9-9-15 10:45AM		9/10/15 1200
Comments/Special Reporting Requirements		**Relinquished By**	**Date/Time**	**Received By**	**Date/Time**
		Relinquished By	**Date/Time**	**Received By**	**Date/Time**
					9/10/15 1255
		Cooler #'s & Temps on Receipt	2-7°C	**Condition Upon Receipt**	X Acceptable ___ Unacceptable

Matrix : **GW**-Groundwater **SO**-Soil **DW**-Drinking Water **SE**-Sediment **SW**-Surface Water **WW**-Wastewater **A**-Air **O**-Other (detail in comments)

Preservation: **I**-Ice **H**-HCl **N**-HNO3 **S**-H2SO4 **NO**-NaOH **O**-Other (detail in comments)

Note : All samples submitted to ENCO Labs are in accordance with the terms and conditions listed on the reverse of this form, unless prior written agreements exist

Sample Preservation Verification

ENCO Cary

Work Order:	C510730	Project:	City Effluent - Twice Weekly
Client:	Mallinckrodt, LLC (MA026)	Project #:	[none]
Logged In:	10-Sep-15 13:16	Logged By:	Andrew S Coons

C510730-01

Cont	Type	Pres (pH) Requirement	pH Checked / In Control	pH Adjusted	Date/Time Adjusted	Reagent Used/Comments
A	250mLP+H2SO4	<2	Y / N / NA	Y / N / NA		

	Reagent Name	ID
1		
2		

	Reagent Name	ID
3		
4		

	Reagent Name	ID
5		
6		

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Cary NC, 27511
Phone: 919.467.3090 FAX: 919.467.3515

Thursday, September 24, 2015
Mallinckrodt, LLC (MA026)
Attn: Tim Roberts
8801 Capital Blvd.
Raleigh, NC 27616-

RE: Laboratory Results for
Project Number: [none], Project Name/Desc: City Effluent - Twice Weekly
ENCO Workorder(s): C511588

Dear Tim Roberts,

Enclosed is a copy of your laboratory report for test samples received by our laboratory on Tuesday, September 15, 2015.

Unless otherwise noted in an attached project narrative, all samples were received in acceptable condition and processed in accordance with the referenced methods/procedures. Results for these procedures apply only to the samples as submitted.

The analytical results contained in this report are in compliance with NELAC standards, except as noted in the project narrative. This report shall not be reproduced except in full, without the written approval of the Laboratory.

This report contains only those analyses performed by Environmental Conservation Laboratories. Unless otherwise noted, all analyses were performed at ENCO Cary. Data from outside organizations will be reported under separate cover.

If you have any questions or require further information, please do not hesitate to contact me.

Sincerely,

Stephanie Franz

Project Manager

Enclosure(s)

SAMPLE SUMMARY/LABORATORY CHRONICLE

Client ID: City Effluent **Lab ID:** C511588-01 **Sampled:** 09/14/15 07:00 **Received:** 09/15/15 12:50

Parameter	Hold Date/Time(s)	Prep Date/Time(s)	Analysis Date/Time(s)
CALC	06/09/18	09/23/15 12:56	09/23/15 13:00
EPA 351.2	10/12/15	09/18/15 10:25	09/23/15 09:01
EPA 353.2	10/12/15	09/22/15 09:36	09/22/15 12:08
SM 2540D-1997	09/21/15	09/17/15 14:42	09/17/15 14:42
SM 5220D-1997	10/12/15	09/18/15 09:50	09/18/15 12:20

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SAMPLE DETECTION SUMMARY

Client ID: City Effluent **Lab ID:** C511588-01

Analyte	Results	Flag	MDL	PQL	Units	Method	Notes
Chemical Oxygen Demand	970		20	20	mg/L	SM 5220D-1997	
Nitrate/Nitrite as N	24	D	4.0	9.8	mg/L	EPA 353.2	
Total Kjeldahl Nitrogen	10		0.26	0.48	mg/L	EPA 351.2	
Total Nitrogen	34		0.02	0.10	mg/L	CALC	
Total Suspended Solids	1300		500	500	mg/L	SM 2540D-1997	

ANALYTICAL RESULTS

Description: City Effluent
Matrix: Waste Water
Project: City Effluent - Twice Weekly

Lab Sample ID: C511588-01
Sampled: 09/14/15 07:00
Sampled By: Michael Buchanan

Received: 09/15/15 12:50
Work Order: C511588

Classical Chemistry Parameters

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	Results	Flag	Units	DF	MDL	PQL	Batch	Method	Analyzed	By	Notes
Chemical Oxygen Demand^	**970**		mg/L	2	20	20	5I18008	SM 5220D-1997	09/18/15 12:20	JOC	
Nitrate/Nitrite as N^	**24**	D	mg/L	97.5	4.0	9.8	5I22010	EPA 353.2	09/22/15 12:08	JLJ	
Total Kjeldahl Nitrogen^	**10**		mg/L	1	0.26	0.48	5I18005	EPA 351.2	09/23/15 09:01	JLJ	
Total Nitrogen [17778-88-0]	**34**		mg/L	1	0.02	0.10	5I23022	CALC	09/23/15 13:00	JLJ	
Total Suspended Solids^	**1300**		mg/L	200	500	500	5I17014	SM 2540D-1997	09/17/15 14:42	MMR	

QUALITY CONTROL DATA

Classical Chemistry Parameters - Quality Control

Batch 5I17014 - NO PREP

Blank (5I17014-BLK1) Prepared & Analyzed: 09/17/2015 14:42

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Suspended Solids	2.5	U	2.5	mg/L							

LCS (5I17014-BS1) Prepared & Analyzed: 09/17/2015 14:42

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Suspended Solids	97		2.5	mg/L	100		97	80-120			

Duplicate (5I17014-DUP1) Prepared & Analyzed: 09/17/2015 14:42

Source: C510393-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Suspended Solids	260		50	mg/L		250			5	20	

Duplicate (5I17014-DUP2) Prepared & Analyzed: 09/17/2015 14:42

Source: C511588-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Suspended Solids	1000		500	mg/L		1300			24	20	QM-12

Batch 5I18005 - Same

Blank (5I18005-BLK1) Prepared: 09/18/2015 10:25 Analyzed: 09/23/2015 08:30

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Kjeldahl Nitrogen	0.26	U	0.48	mg/L							

LCS (5I18005-BS1) Prepared: 09/18/2015 10:25 Analyzed: 09/23/2015 08:32

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Kjeldahl Nitrogen	12		0.48	mg/L	12.0		97	90-110			

Matrix Spike (5I18005-MS1) Prepared: 09/18/2015 10:25 Analyzed: 09/23/2015 08:35

Source: C510355-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Kjeldahl Nitrogen	68	D	2.7	mg/L	4.80	60	156	90-110			QM-17

Matrix Spike (5I18005-MS2) Prepared: 09/18/2015 10:25 Analyzed: 09/23/2015 08:37

Source: C510393-02

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Kjeldahl Nitrogen	4.9		0.48	mg/L	4.80	1.5	71	90-110			QM-05

Matrix Spike Dup (5I18005-MSD1) Prepared: 09/18/2015 10:25 Analyzed: 09/23/2015 08:39

Source: C510355-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Kjeldahl Nitrogen	69	D	2.7	mg/L	4.80	60	184	90-110	2	10	QM-17

Batch 5I18008 - Same

QUALITY CONTROL DATA

Classical Chemistry Parameters - Quality Control

Batch 5I18008 - Same - Continued

Blank (5I18008-BLK1) Prepared: 09/18/2015 09:50 Analyzed: 09/18/2015 12:20

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Chemical Oxygen Demand	10	U	10	mg/L							

LCS (5I18008-BS1) Prepared: 09/18/2015 09:50 Analyzed: 09/18/2015 12:20

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Chemical Oxygen Demand	500		10	mg/L	500		101	90-110			

Matrix Spike (5I18008-MS1) Prepared: 09/18/2015 09:50 Analyzed: 09/18/2015 12:20

Source: C510432-02

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Chemical Oxygen Demand	600		10	mg/L	526	64	102	90-110			

Matrix Spike Dup (5I18008-MSD1) Prepared: 09/18/2015 09:50 Analyzed: 09/18/2015 12:20

Source: C510432-02

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Chemical Oxygen Demand	590		10	mg/L	526	64	100	90-110	1	10	

Batch 5I22010 - NO PREP

Blank (5I22010-BLK1) Prepared: 09/22/2015 09:36 Analyzed: 09/22/2015 11:33

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Nitrate/Nitrite as N	0.041	U	0.10	mg/L							

LCS (5I22010-BS1) Prepared: 09/22/2015 09:36 Analyzed: 09/22/2015 11:35

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Nitrate/Nitrite as N	1.2		0.10	mg/L	1.25		99	90-110			

Matrix Spike (5I22010-MS1) Prepared: 09/22/2015 09:36 Analyzed: 09/22/2015 11:37

Source: C510244-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Nitrate/Nitrite as N	0.46		0.10	mg/L	0.513	0.070	77	90-110			QM-05

Matrix Spike (5I22010-MS2) Prepared: 09/22/2015 09:36 Analyzed: 09/22/2015 11:46

Source: C510244-02

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Nitrate/Nitrite as N	0.54		0.10	mg/L	0.513	0.041 U	104	90-110			

Matrix Spike Dup (5I22010-MSD1) Prepared: 09/22/2015 09:36 Analyzed: 09/22/2015 11:42

Source: C510244-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Nitrate/Nitrite as N	0.53		0.10	mg/L	0.513	0.070	89	90-110	13	10	QM-05, QM-11

FLAGS/NOTES AND DEFINITIONS

B	The analyte was detected in the associated method blank.
D	The sample was analyzed at dilution.
J	The reported value is between the laboratory method detection limit (MDL) and the laboratory method reporting limit (MRL), adjusted for actual sample preparation data and moisture content, where applicable.
U	The analyte was analyzed for but not detected to the level shown, adjusted for actual sample preparation data and moisture content, where applicable.
E	The concentration indicated for this analyte is an estimated value above the calibration range of the instrument. This value is considered an estimate.
MRL	Method Reporting Limit. The MRL is roughly equivalent to the practical quantitation limit (PQL) and is based on the low point of the calibration curve, when applicable, sample preparation factor, dilution factor, and, in the case of soil samples, moisture content.
N	The analysis indicates the presence of an analyte for which there is presumptive evidence (85% or greater confidence) to make a "tentative identification".
P	Greater than 25% concentration difference was observed between the primary and secondary GC column. The lower concentration is reported.
QM-05	The spike recovery was outside acceptance limits for the MS and/or MSD due to matrix interference. The LCS and/or LCSD were within acceptance limits showing that the laboratory is in control and the data is acceptable.
QM-11	Precision between duplicate matrix spikes of the same sample was outside acceptance limits.
QM-12	Precision between duplicate samples was outside acceptance limits.
QM-17	Matrix spike recovery was outside acceptance limits due to high concentrations of analyte in source sample.

ENVIRONMENTAL CONSERVATION LABORATORIES CHAIN-OF-CUSTODY RECORD

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Orlando, FL 32824
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Jacksonville, FL 32216-6069
(904) 296-3007 Fax (904) 296-6210

102-A Woodwinds Industrial Ct.
Cary, NC 27511
(919) 467-3090 Fax (919) 467-3515

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Client Name: Mallinckrodt, LLC (MA026)	Project Number: [none]
Address: 8801 Capital Blvd.	Project Name/Desc: City Effluent - Twice Weekly
City/ST/Zip: Raleigh, NC 27616-	PO # / Billing Info: R-B43004
Tel: (919) 878-2885 Fax: () -	Reporting Contact: Tim Roberts
Sampler(s) Name, Affiliation (Print): Michael Buckmaster/Mallinckrodt	Billing Contact: Accounts Payable
Sampler(s) Signature: Michael Buckmaster	Site Location / Time Zone: Raleigh WWTP/Mallinckrodt

Requested Analyses: COD SM5220D; Nitrogen Total 353 Calc; NOX 353.2,TKN 351.2; TSS SM2540D

Requested Turnaround Times

Note : Rush requests subject to acceptance by the facility

X Standard

___ Expedited

Due ___/___/___

Lab Workorder: C511588

Item #	Sample ID (Field Identification)	Collection Date	Collection Time	Comp / Grab	Matrix (see codes)	Total # of Containers	Preservation (See Codes) (Combine as necessary)										Sample Comments
	City Effluent	9-14-15	07:00 AM	Comp	WW	2	X	X	X	X							
						2	<-- Total # of Containers										

Sample Kit Prepared By	Date/Time	Relinquished By: Michael Buckmaster	Date/Time: 9-14-15 07:00 AM	Received By	Date/Time: 9/15/15 1200
Comments/Special Reporting Requirements		Relinquished By	Date/Time	Received By	Date/Time
		Relinquished By	Date/Time	Received By	Date/Time: 9/15/15 1250
		Cooler #'s & Temps on Receipt: 2 - 2 °C		Condition Upon Receipt: ✓ Acceptable ___ Unacceptable	

Matrix : GW-Groundwater SO-Soil DW-Drinking Water SE-Sediment SW-Surface Water WW-Wastewater A-Air O-Other (detail in comments)

Preservation: I-Ice H-HCl N-HNO3 S-H2SO4 NO-NaOH O-Other (detail in comments)

Note : All samples submitted to ENCO Labs are in accordance with the terms and conditions listed on the reverse of this form, unless prior written agreements exist

Sample Preservation Verification

ENCO Cary

Work Order:	C511588	Project:	City Effluent - Twice Weekly
Client:	Mallinckrodt, LLC (MA026)	Project #:	[none]
Logged In:	15-Sep-15 13:32	Logged By:	Rachel Ann Yonish

C511588-01

Cont	Type	Pres (pH) Requirement	pH Checked / In Control	pH Adjusted	Date/Time Adjusted	Reagent Used/Comments
A	250mLP+H2SO4	<2	(Y) / N / NA	Y / (N) / NA		

	Reagent Name	ID		Reagent Name	ID		Reagent Name	ID
1			3			5		
2			4			6		

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102-A Woodwinds Industrial Court
Cary NC, 27511
Phone: 919.467.3090 FAX: 919.467.3515

Monday, September 28, 2015
Mallinckrodt, LLC (MA026)
Attn: Tim Roberts
8801 Capital Blvd.
Raleigh, NC 27616-

RE: Laboratory Results for
Project Number: [none], Project Name/Desc: City Effluent - Twice Weekly
ENCO Workorder(s): C511589

Dear Tim Roberts,

Enclosed is a copy of your laboratory report for test samples received by our laboratory on Thursday, September 17, 2015.

Unless otherwise noted in an attached project narrative, all samples were received in acceptable condition and processed in accordance with the referenced methods/procedures. Results for these procedures apply only to the samples as submitted.

The analytical results contained in this report are in compliance with NELAC standards, except as noted in the project narrative. This report shall not be reproduced except in full, without the written approval of the Laboratory.

This report contains only those analyses performed by Environmental Conservation Laboratories. Unless otherwise noted, all analyses were performed at ENCO Cary. Data from outside organizations will be reported under separate cover.

If you have any questions or require further information, please do not hesitate to contact me.

Sincerely,

Stephanie Franz

Project Manager

Enclosure(s)

SAMPLE SUMMARY/LABORATORY CHRONICLE

Client ID: City Effluent **Lab ID: C511589-01** **Sampled: 09/16/15 07:00** **Received: 09/17/15 13:00**

Parameter	Hold Date/Time(s)	Prep Date/Time(s)	Analysis Date/Time(s)
CALC	06/11/18	09/28/15 10:15	09/28/15 10:18
EPA 353.2	10/14/15	09/25/15 08:11	09/25/15 13:23
SM 2540D-1997	09/23/15	09/21/15 15:40	09/21/15 15:40
SM 5220D-1997	10/14/15	09/18/15 09:50	09/18/15 12:20

Client ID: City Effluent **Lab ID: C511589-01RE1** **Sampled: 09/16/15 07:00** **Received: 09/17/15 13:00**

Parameter	Hold Date/Time(s)	Prep Date/Time(s)	Analysis Date/Time(s)
EPA 351.2	10/14/15	09/18/15 10:25	09/23/15 11:07

SAMPLE DETECTION SUMMARY

Client ID: City Effluent **Lab ID:** C511589-01

Analyte	Results	Flag	MDL	PQL	Units	Method	Notes
Chemical Oxygen Demand	750		20	20	mg/L	SM 5220D-1997	
Nitrate/Nitrite as N	13		4.1	10	mg/L	EPA 353.2	
Total Nitrogen	71		0.02	0.10	mg/L	CALC	
Total Suspended Solids	720		250	250	mg/L	SM 2540D-1997	

Client ID: City Effluent **Lab ID:** C511589-01RE1

Analyte	Results	Flag	MDL	PQL	Units	Method	Notes
Total Kjeldahl Nitrogen	58	D	1.3	2.4	mg/L	EPA 351.2	

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ANALYTICAL RESULTS

Description: City Effluent
Matrix: Waste Water
Project: City Effluent - Twice Weekly

Lab Sample ID: C511589-01
Sampled: 09/16/15 07:00
Sampled By: Michael Buchanan

Received: 09/17/15 13:00
Work Order: C511589

Classical Chemistry Parameters

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	Results	Flag	Units	DF	MDL	PQL	Batch	Method	Analyzed	By	Notes
Chemical Oxygen Demand^	**750**		mg/L	2	20	20	5I18008	SM 5220D-1997	09/18/15 12:20	JOC	
Nitrate/Nitrite as N^	**13**		mg/L	100	4.1	10	5I25006	EPA 353.2	09/25/15 13:23	JLJ	
Total Kjeldahl Nitrogen^	**58**	D	mg/L	5	1.3	2.4	5I18005	EPA 351.2	09/23/15 11:07	JLJ	
Total Nitrogen [17778-88-0]	**71**		mg/L	1	0.02	0.10	5I28016	CALC	09/28/15 10:18	JLJ	
Total Suspended Solids^	**720**		mg/L	100	250	250	5I21028	SM 2540D-1997	09/21/15 15:40	MMR	

QUALITY CONTROL DATA

Classical Chemistry Parameters - Quality Control

Batch 5I18005 - Same

Blank (5I18005-BLK1) Prepared: 09/18/2015 10:25 Analyzed: 09/23/2015 08:30

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Kjeldahl Nitrogen	0.26	U	0.48	mg/L							

LCS (5I18005-BS1) Prepared: 09/18/2015 10:25 Analyzed: 09/23/2015 08:32

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Kjeldahl Nitrogen	12		0.48	mg/L	12.0		97	90-110			

Matrix Spike (5I18005-MS1) Prepared: 09/18/2015 10:25 Analyzed: 09/23/2015 08:35

Source: C510355-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Kjeldahl Nitrogen	68	D	2.7	mg/L	4.80	60	156	90-110			QM-17

Matrix Spike (5I18005-MS2) Prepared: 09/18/2015 10:25 Analyzed: 09/23/2015 08:37

Source: C510393-02

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Kjeldahl Nitrogen	4.9		0.48	mg/L	4.80	1.5	71	90-110			QM-05

Matrix Spike Dup (5I18005-MSD1) Prepared: 09/18/2015 10:25 Analyzed: 09/23/2015 08:39

Source: C510355-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Kjeldahl Nitrogen	69	D	2.7	mg/L	4.80	60	184	90-110	2	10	QM-17

Batch 5I18008 - Same

Blank (5I18008-BLK1) Prepared: 09/18/2015 09:50 Analyzed: 09/18/2015 12:20

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Chemical Oxygen Demand	10	U	10	mg/L							

LCS (5I18008-BS1) Prepared: 09/18/2015 09:50 Analyzed: 09/18/2015 12:20

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Chemical Oxygen Demand	500		10	mg/L	500		101	90-110			

Matrix Spike (5I18008-MS1) Prepared: 09/18/2015 09:50 Analyzed: 09/18/2015 12:20

Source: C510432-02

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Chemical Oxygen Demand	600		10	mg/L	526	64	102	90-110			

Matrix Spike Dup (5I18008-MSD1) Prepared: 09/18/2015 09:50 Analyzed: 09/18/2015 12:20

Source: C510432-02

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Chemical Oxygen Demand	590		10	mg/L	526	64	100	90-110	1	10	

Batch 5I21028 - NO PREP

QUALITY CONTROL DATA

Classical Chemistry Parameters - Quality Control

Batch 5I21028 - NO PREP - Continued

Blank (5I21028-BLK1) Prepared & Analyzed: 09/21/2015 15:40

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Suspended Solids	2.5	U	2.5	mg/L							

LCS (5I21028-BS1) Prepared & Analyzed: 09/21/2015 15:40

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Suspended Solids	100		2.5	mg/L	100		102	80-120			

Duplicate (5I21028-DUP1) Prepared & Analyzed: 09/21/2015 15:40

Source: C510402-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Suspended Solids	220		50	mg/L		210			3	20	

Batch 5I25006 - NO PREP

Blank (5I25006-BLK1) Prepared: 09/25/2015 08:11 Analyzed: 09/25/2015 13:15

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Nitrate/Nitrite as N	0.041	U	0.10	mg/L							

LCS (5I25006-BS1) Prepared: 09/25/2015 08:11 Analyzed: 09/25/2015 13:12

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Nitrate/Nitrite as N	1.2		0.10	mg/L	1.25		99	90-110			

Matrix Spike (5I25006-MS1) Prepared: 09/25/2015 08:11 Analyzed: 09/25/2015 13:17

Source: C511575-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Nitrate/Nitrite as N	13		1.0	mg/L	5.00	9.0	83	90-110			QM-05

Matrix Spike (5I25006-MS2) Prepared: 09/25/2015 08:11 Analyzed: 09/25/2015 13:25

Source: C511589-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Nitrate/Nitrite as N	58		10	mg/L	50.0	13	90	90-110			

Matrix Spike Dup (5I25006-MSD1) Prepared: 09/25/2015 08:11 Analyzed: 09/25/2015 13:21

Source: C511575-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Nitrate/Nitrite as N	12		1.0	mg/L	5.00	9.0	67	90-110	6	10	QM-05

FLAGS/NOTES AND DEFINITIONS

B	The analyte was detected in the associated method blank.
D	The sample was analyzed at dilution.
J	The reported value is between the laboratory method detection limit (MDL) and the laboratory method reporting limit (MRL), adjusted for actual sample preparation data and moisture content, where applicable.
U	The analyte was analyzed for but not detected to the level shown, adjusted for actual sample preparation data and moisture content, where applicable.
E	The concentration indicated for this analyte is an estimated value above the calibration range of the instrument. This value is considered an estimate.
MRL	Method Reporting Limit. The MRL is roughly equivalent to the practical quantitation limit (PQL) and is based on the low point of the calibration curve, when applicable, sample preparation factor, dilution factor, and, in the case of soil samples, moisture content.
N	The analysis indicates the presence of an analyte for which there is presumptive evidence (85% or greater confidence) to make a "tentative identification".
P	Greater than 25% concentration difference was observed between the primary and secondary GC column. The lower concentration is reported.
QM-05	The spike recovery was outside acceptance limits for the MS and/or MSD due to matrix interference. The LCS and/or LCSD were within acceptance limits showing that the laboratory is in control and the data is acceptable.
QM-17	Matrix spike recovery was outside acceptance limits due to high concentrations of analyte in source sample.

ENVIRONMENTAL CONSERVATION LABORATORIES CHAIN-OF-CUSTODY RECORD

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Cary, NC 27511
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Client Name: Mallinckrodt, LLC (MA026)	Project Number: [none]
Address: 8801 Capital Blvd.	Project Name/Desc: City Effluent - Twice Weekly
City/ST/Zip: Raleigh, NC 27616-	PO # / Billing Info: R-B43004
Tel: (919) 878-2885 Fax: () -	Reporting Contact: Tim Roberts
Sampler(s) Name, Affiliation (Print): Michael Buchanan / Mallinckrodt	Billing Contact: Accounts Payable
Sampler(s) Signature: Michael Buchanan	Site Location / Time Zone: Raleigh WWTP / Mallinckrodt

Requested Analyses

Preservation (See Codes) (Combine as necessary)

Item #	Sample ID (Field Identification)	Collection Date	Collection Time	Comp / Grab	Matrix (see codes)	Total # of Containers	COD SM5220D	Nitrogen Total 353 Calc	NOX 353.2, TKN 351.2	TSS SM2540D	Sample Comments
	City Effluent	9-16-15	07:00 AM	comp	WW	2	X	X	X	X	
						2	<-- Total # of Containers				

Requested Turnaround Times

Note : Rush requests subject to acceptance by the facility

X Standard

___ Expedited

Due ___/___/___

Lab Workorder: C511589

Sample Kit Prepared By	Date/Time	Relinquished By: Michael Buchanan	Date/Time: 9-16-15 - 07:00 AM	Received By	Date/Time: 9/17/15 1200
Comments/Special Reporting Requirements		Relinquished By	Date/Time	Received By	Date/Time
		Relinquished By	Date/Time	Received By	Date/Time: 9/17/15 100
		Cooler #'s & Temps on Receipt: 1, 9°C		Condition Upon Receipt: ✓ Acceptable ___ Unacceptable	

Matrix : **GW**-Groundwater **SO**-Soil **DW**-Drinking Water **SE**-Sediment **SW**-Surface Water **WW**-Wastewater **A**-Air **O**-Other (detail in comments)

Preservation: **I**-Ice **H**-HCl **N**-HNO3 **S**-H2SO4 **NO**-NaOH **O**-Other (detail in comments)

Note : All samples submitted to ENCO Labs are in accordance with the terms and conditions listed on the reverse of this form, unless prior written agreements exist

Sample Preservation Verification

ENCO Cary

Work Order:	C511589	Project:	City Effluent - Twice Weekly
Client:	Mallinckrodt, LLC (MA026)	Project #:	[none]
Logged In:	17-Sep-15 15:18	Logged By:	Rachel Ann Yonish

C511589-01

Cont	Type	Pres (pH) Requirement	pH Checked / In Control	pH Adjusted	Date/Time Adjusted	Reagent Used/Comments
A	250mLP+H2SO4	<2	(Y) / N / NA	Y / (N) / NA		

	Reagent Name	ID		Reagent Name	ID		Reagent Name	ID
1			3			5		
2			4			6		

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Phone: 919.467.3090 FAX: 919.467.3515

Wednesday, September 30, 2015
Mallinckrodt, LLC (MA026)
Attn: Tim Roberts
8801 Capital Blvd.
Raleigh, NC 27616-

RE: Laboratory Results for
Project Number: [none], Project Name/Desc: City Effluent - Twice Weekly
ENCO Workorder(s): C511907

Dear Tim Roberts,

Enclosed is a copy of your laboratory report for test samples received by our laboratory on Tuesday, September 22, 2015.

Unless otherwise noted in an attached project narrative, all samples were received in acceptable condition and processed in accordance with the referenced methods/procedures. Results for these procedures apply only to the samples as submitted.

The analytical results contained in this report are in compliance with NELAC standards, except as noted in the project narrative. This report shall not be reproduced except in full, without the written approval of the Laboratory.

This report contains only those analyses performed by Environmental Conservation Laboratories. Unless otherwise noted, all analyses were performed at ENCO Cary. Data from outside organizations will be reported under separate cover.

If you have any questions or require further information, please do not hesitate to contact me.

Sincerely,

Stephanie Franz

Project Manager

Enclosure(s)

SAMPLE SUMMARY/LABORATORY CHRONICLE

Client ID: City Effluent **Lab ID:** C511907-01 **Sampled:** 09/21/15 07:00 **Received:** 09/22/15 13:10

Parameter	Hold Date/Time(s)	Prep Date/Time(s)	Analysis Date/Time(s)
CALC	06/16/18	09/30/15 10:12	09/30/15 10:17
EPA 351.2	10/19/15	09/25/15 10:49	09/28/15 11:07
EPA 353.2	10/19/15	09/29/15 09:16	09/29/15 13:54
SM 2540D-1997	09/28/15	09/23/15 13:07	09/23/15 13:07
SM 5220D-1997	10/19/15	09/28/15 11:40	09/28/15 15:25

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SAMPLE DETECTION SUMMARY

Client ID: City Effluent **Lab ID:** C511907-01

Analyte	Results	Flag	MDL	PQL	Units	Method	Notes
Chemical Oxygen Demand	160		10	10	mg/L	SM 5220D-1997	
Nitrate/Nitrite as N	28	D	4.0	9.8	mg/L	EPA 353.2	
Total Kjeldahl Nitrogen	13		0.26	0.48	mg/L	EPA 351.2	
Total Nitrogen	41		0.02	0.10	mg/L	CALC	
Total Suspended Solids	94		50	50	mg/L	SM 2540D-1997	

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ANALYTICAL RESULTS

Description: City Effluent
Matrix: Waste Water
Project: City Effluent - Twice Weekly

Lab Sample ID: C511907-01
Sampled: 09/21/15 07:00
Sampled By: Leon Bridges

Received: 09/22/15 13:10
Work Order: C511907

Classical Chemistry Parameters

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	Results	Flag	Units	DF	MDL	PQL	Batch	Method	Analyzed	By	Notes
Chemical Oxygen Demand^	**160**		mg/L	1	10	10	5I28015	SM 5220D-1997	09/28/15 15:25	JOC	
Nitrate/Nitrite as N^	**28**	D	mg/L	97.5	4.0	9.8	5I28028	EPA 353.2	09/29/15 13:54	JLJ	
Total Kjeldahl Nitrogen^	**13**		mg/L	1	0.26	0.48	5I25005	EPA 351.2	09/28/15 11:07	JLJ	
Total Nitrogen [17778-88-0]	**41**		mg/L	1	0.02	0.10	5I30009	CALC	09/30/15 10:17	JLJ	
Total Suspended Solids^	**94**		mg/L	20	50	50	5I23019	SM 2540D-1997	09/23/15 13:07	MMR	

QUALITY CONTROL DATA

Classical Chemistry Parameters - Quality Control

Batch 5I23019 - NO PREP

Blank (5I23019-BLK1) Prepared & Analyzed: 09/23/2015 13:07

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Suspended Solids	2.5	U	2.5	mg/L							

LCS (5I23019-BS1) Prepared & Analyzed: 09/23/2015 13:07

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Suspended Solids	110		2.5	mg/L	100		111	80-120			

Duplicate (5I23019-DUP1) Prepared & Analyzed: 09/23/2015 13:07

Source: C510354-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Suspended Solids	350		100	mg/L		340			2	20	

Duplicate (5I23019-DUP2) Prepared & Analyzed: 09/23/2015 13:07

Source: C510394-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Suspended Solids	390		100	mg/L		400			1	20	

Batch 5I25005 - Same

Blank (5I25005-BLK1) Prepared: 09/25/2015 10:49 Analyzed: 09/28/2015 10:39

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Kjeldahl Nitrogen	0.26	U	0.48	mg/L							

LCS (5I25005-BS1) Prepared: 09/25/2015 10:49 Analyzed: 09/28/2015 10:41

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Kjeldahl Nitrogen	13		0.48	mg/L	12.0		107	90-110			

Matrix Spike (5I25005-MS1) Prepared: 09/25/2015 10:49 Analyzed: 09/28/2015 10:43

Source: C512048-02

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Kjeldahl Nitrogen	15	D	0.96	mg/L	4.80	7.3	160	90-110			QM-17

Matrix Spike (5I25005-MS2) Prepared: 09/25/2015 10:49 Analyzed: 09/28/2015 10:45

Source: C510535-03

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Kjeldahl Nitrogen	590	D	19	mg/L	4.80	630	NR	90-110			QM-17

Matrix Spike Dup (5I25005-MSD1) Prepared: 09/25/2015 10:49 Analyzed: 09/28/2015 10:47

Source: C512048-02

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Kjeldahl Nitrogen	13	D	0.96	mg/L	4.80	7.3	114	90-110	16	10	QM-11, QM-17

Batch 5I28015 - Same

QUALITY CONTROL DATA

Classical Chemistry Parameters - Quality Control

Batch 5I28015 - Same - Continued

Blank (5I28015-BLK1) Prepared: 09/28/2015 11:40 Analyzed: 09/28/2015 15:25

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Chemical Oxygen Demand	10	U	10	mg/L							

LCS (5I28015-BS1) Prepared: 09/28/2015 11:40 Analyzed: 09/28/2015 15:25

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Chemical Oxygen Demand	520		10	mg/L	500		103	90-110			

Matrix Spike (5I28015-MS1) Prepared: 09/28/2015 11:40 Analyzed: 09/28/2015 15:25

Source: C500134-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Chemical Oxygen Demand	560		10	mg/L	526	21	102	90-110			

Matrix Spike Dup (5I28015-MSD1) Prepared: 09/28/2015 11:40 Analyzed: 09/28/2015 15:25

Source: C500134-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Chemical Oxygen Demand	560		10	mg/L	526	21	103	90-110	0.8	10	

Batch 5I28028 - NO PREP

Blank (5I28028-BLK1) Prepared: 09/29/2015 09:16 Analyzed: 09/29/2015 11:31

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Nitrate/Nitrite as N	0.041	U	0.10	mg/L							

LCS (5I28028-BS1) Prepared: 09/29/2015 09:16 Analyzed: 09/29/2015 11:33

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Nitrate/Nitrite as N	1.2		0.10	mg/L	1.25		98	90-110			

Matrix Spike (5I28028-MS1) Prepared: 09/29/2015 09:16 Analyzed: 09/29/2015 11:35

Source: C509650-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Nitrate/Nitrite as N	2.5		0.10	mg/L	0.513	1.9	111	90-110			QM-05

Matrix Spike (5I28028-MS2) Prepared: 09/29/2015 09:16 Analyzed: 09/29/2015 13:21

Source: C510354-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Nitrate/Nitrite as N	0.61		0.10	mg/L	0.513	0.11	98	90-110			

Matrix Spike Dup (5I28028-MSD1) Prepared: 09/29/2015 09:16 Analyzed: 09/29/2015 11:40

Source: C509650-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Nitrate/Nitrite as N	2.2		0.10	mg/L	0.513	1.9	60	90-110	11	10	QM-05, QM-11

FLAGS/NOTES AND DEFINITIONS

B	The analyte was detected in the associated method blank.
D	The sample was analyzed at dilution.
J	The reported value is between the laboratory method detection limit (MDL) and the laboratory method reporting limit (MRL), adjusted for actual sample preparation data and moisture content, where applicable.
U	The analyte was analyzed for but not detected to the level shown, adjusted for actual sample preparation data and moisture content, where applicable.
E	The concentration indicated for this analyte is an estimated value above the calibration range of the instrument. This value is considered an estimate.
MRL	Method Reporting Limit. The MRL is roughly equivalent to the practical quantitation limit (PQL) and is based on the low point of the calibration curve, when applicable, sample preparation factor, dilution factor, and, in the case of soil samples, moisture content.
N	The analysis indicates the presence of an analyte for which there is presumptive evidence (85% or greater confidence) to make a "tentative identification".
P	Greater than 25% concentration difference was observed between the primary and secondary GC column. The lower concentration is reported.
QM-05	The spike recovery was outside acceptance limits for the MS and/or MSD due to matrix interference. The LCS and/or LCSD were within acceptance limits showing that the laboratory is in control and the data is acceptable.
QM-11	Precision between duplicate matrix spikes of the same sample was outside acceptance limits.
QM-17	Matrix spike recovery was outside acceptance limits due to high concentrations of analyte in source sample.

ENVIRONMENTAL CONSERVATION LABORATORIES CHAIN-OF-CUSTODY RECORD

10775 Central Port Dr.
Orlando, FL 32824
(407) 826-5314 Fax (407) 850-6945

4810 Executive Park Court, Suite 111
Jacksonville, FL 32216-6069
(904) 296-3007 Fax (904) 296-6210

102-A Woodwinds Industrial Ct.
Cary, NC 27511
(919) 467-3090 Fax (919) 467-3515

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Client Name: Mallinckrodt, LLC (MA026)	Project Number: [none]
Address: 8801 Capital Blvd.	Project Name/Desc: City Effluent - Twice Weekly
City/ST/Zip: Raleigh, NC 27616-	PO # / Billing Info: R-B43004
Tel: (919) 878-2885 Fax: () -	Reporting Contact: Tim Roberts
Sampler(s) Name, Affiliation (Print): Leon Bridges Mallinckrodt	Billing Contact: Accounts Payable
Sampler(s) Signature: Leon Bridges	Site Location / Time Zone: Raleigh, NC, Wastetreatment 7:00 Am

Requested Turnaround Times

Note : Rush requests subject to acceptance by the facility

___ Standard

___ Expedited

Due ___/___/___

Lab Workorder: C511907

Item #	Sample ID (Field Identification)	Collection Date	Collection Time	Comp / Grab	Matrix (see codes)	Total # of Containers	COD SM5220D	Nitrogen Total 353 Calc	NOX 353.2, TKN 351.2	TSS SM2540D	Sample Comments
	City Effluent	9-21-15	7:00 Am	Comp	WW	2	X	X	X	X	
						2	<-- Total # of Containers				

Requested Analyses

Preservation (See Codes) (Combine as necessary)

Sample Kit Prepared By	Date/Time	Relinquished By: Leon Bridges	Date/Time: 9-21-15 7:Am
Comments/Special Reporting Requirements		Relinquished By	Date/Time
		Relinquished By	Date/Time
		Cooler #'s & Temps on Receipt: 2 - 1°C	

		Received By	Date/Time: 9/22/15 1200
		Received By	Date/Time
		Received By	Date/Time: 9/22/15 1:10

Condition Upon Receipt: ✓ Acceptable ___ Unacceptable

Matrix : **GW**-Groundwater **SO**-Soil **DW**-Drinking Water **SE**-Sediment **SW**-Surface Water **WW**-Wastewater **A**-Air **O**-Other (detail in comments)

Preservation: **I**-Ice **H**-HCl **N**-HNO3 **S**-H2SO4 **NO**-NaOH **O**-Other (detail in comments)

Note : All samples submitted to ENCO Labs are in accordance with the terms and conditions listed on the reverse of this form, unless prior written agreements exist

Sample Preservation Verification

ENCO Cary

Work Order:	C511907	Project:	City Effluent - Twice Weekly
Client:	Mallinckrodt, LLC (MA026)	Project #:	[none]
Logged In:	22-Sep-15 14:47	Logged By:	Rachel Ann Yonish

C511907-01

Cont	Type	Pres (pH) Requirement	pH Checked / In Control	pH Adjusted	Date/Time Adjusted	Reagent Used/Comments
A	250mLP+H2SO4	<2	Y / N / NA	Y / N / NA		

	Reagent Name	ID		Reagent Name	ID		Reagent Name	ID
1			3			5		
2			4			6		

ENCO Laboratories

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102-A Woodwinds Industrial Court
Cary NC, 27511
Phone: 919.467.3090 FAX: 919.467.3515

Tuesday, October 6, 2015
Mallinckrodt, LLC (MA026)
Attn: Tim Roberts
8801 Capital Blvd.
Raleigh, NC 27616-

RE: Laboratory Results for
Project Number: [none], Project Name/Desc: City Effluent - Twice Weekly
ENCO Workorder(s): C511908

Dear Tim Roberts,

Enclosed is a copy of your laboratory report for test samples received by our laboratory on Thursday, September 24, 2015.

Unless otherwise noted in an attached project narrative, all samples were received in acceptable condition and processed in accordance with the referenced methods/procedures. Results for these procedures apply only to the samples as submitted.

The analytical results contained in this report are in compliance with NELAC standards, except as noted in the project narrative. This report shall not be reproduced except in full, without the written approval of the Laboratory.

This report contains only those analyses performed by Environmental Conservation Laboratories. Unless otherwise noted, all analyses were performed at ENCO Cary. Data from outside organizations will be reported under separate cover.

If you have any questions or require further information, please do not hesitate to contact me.

Sincerely,

Stephanie Franz

Project Manager

Enclosure(s)

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SAMPLE SUMMARY/LABORATORY CHRONICLE

Client ID: City Effluent **Lab ID: C511908-01** **Sampled: 09/23/15 07:00** **Received: 09/24/15 12:00**

Parameter	Hold Date/Time(s)	Prep Date/Time(s)	Analysis Date/Time(s)
CALC	06/18/18	10/06/15 08:45	10/06/15 09:55
EPA 353.2	10/21/15	10/01/15 08:16	10/01/15 12:18
SM 2540D-1997	09/30/15	09/28/15 08:56	09/28/15 08:56
SM 5220D-1997	10/21/15	09/28/15 11:40	09/28/15 15:25

Client ID: City Effluent **Lab ID: C511908-01RE1** **Sampled: 09/23/15 07:00** **Received: 09/24/15 12:00**

Parameter	Hold Date/Time(s)	Prep Date/Time(s)	Analysis Date/Time(s)
EPA 351.2	10/21/15	10/02/15 09:59	10/05/15 12:53

SAMPLE DETECTION SUMMARY

Client ID: City Effluent **Lab ID:** C511908-01

Analyte	Results	Flag	MDL	PQL	Units	Method	Notes
Chemical Oxygen Demand	470		20	20	mg/L	SM 5220D-1997	
Nitrate/Nitrite as N	42	D	4.0	9.8	mg/L	EPA 353.2	
Total Nitrogen	70		0.02	0.10	mg/L	CALC	
Total Suspended Solids	330		170	170	mg/L	SM 2540D-1997	

Client ID: City Effluent **Lab ID:** C511908-01RE1

Analyte	Results	Flag	MDL	PQL	Units	Method	Notes
Total Kjeldahl Nitrogen	28	D	0.52	0.96	mg/L	EPA 351.2	

ANALYTICAL RESULTS

Description: City Effluent
Matrix: Waste Water
Project: City Effluent - Twice Weekly

Lab Sample ID: C511908-01
Sampled: 09/23/15 07:00
Sampled By: Leon Bridges

Received: 09/24/15 12:00
Work Order: C511908

Classical Chemistry Parameters

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	Results	Flag	Units	DF	MDL	PQL	Batch	Method	Analyzed	By	Notes
Chemical Oxygen Demand^	**470**		mg/L	2	20	20	5I28015	SM 5220D-1997	09/28/15 15:25	JOC	
Nitrate/Nitrite as N^	**42**	D	mg/L	97.5	4.0	9.8	5J01004	EPA 353.2	10/01/15 12:18	JLJ	
Total Kjeldahl Nitrogen^	**28**	D	mg/L	2	0.52	0.96	5J02002	EPA 351.2	10/05/15 12:53	JLJ	
Total Nitrogen [17778-88-0]	**70**		mg/L	1	0.02	0.10	5J06003	CALC	10/06/15 09:55	JLJ	
Total Suspended Solids^	**330**		mg/L	66.7	170	170	5I28002	SM 2540D-1997	09/28/15 08:56	MMR	

QUALITY CONTROL DATA

Classical Chemistry Parameters - Quality Control

Batch 5I28002 - NO PREP

Blank (5I28002-BLK1) Prepared & Analyzed: 09/28/2015 08:56

Analyte	Result	Flag	POL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Suspended Solids	2.5	U	2.5	mg/L							

LCS (5I28002-BS1) Prepared & Analyzed: 09/28/2015 08:56

Analyte	Result	Flag	POL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Suspended Solids	94		2.5	mg/L	100		94	80-120			

Duplicate (5I28002-DUP1) Prepared & Analyzed: 09/28/2015 08:56

Source: C511908-01

Analyte	Result	Flag	POL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Suspended Solids	360		170	mg/L		330			8	20	

Duplicate (5I28002-DUP2) Prepared & Analyzed: 09/28/2015 08:56

Source: C512045-01

Analyte	Result	Flag	POL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Suspended Solids	1200		420	mg/L		1200			1	20	

Batch 5I28015 - Same

Blank (5I28015-BLK1) Prepared: 09/28/2015 11:40 Analyzed: 09/28/2015 15:25

Analyte	Result	Flag	POL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Chemical Oxygen Demand	10	U	10	mg/L							

LCS (5I28015-BS1) Prepared: 09/28/2015 11:40 Analyzed: 09/28/2015 15:25

Analyte	Result	Flag	POL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Chemical Oxygen Demand	520		10	mg/L	500		103	90-110			

Matrix Spike (5I28015-MS1) Prepared: 09/28/2015 11:40 Analyzed: 09/28/2015 15:25

Source: C500134-01

Analyte	Result	Flag	POL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Chemical Oxygen Demand	560		10	mg/L	526	21	102	90-110			

Matrix Spike Dup (5I28015-MSD1) Prepared: 09/28/2015 11:40 Analyzed: 09/28/2015 15:25

Source: C500134-01

Analyte	Result	Flag	POL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Chemical Oxygen Demand	560		10	mg/L	526	21	103	90-110	0.8	10	

Batch 5J01004 - NO PREP

Blank (5J01004-BLK1) Prepared: 10/01/2015 08:16 Analyzed: 10/01/2015 11:48

Analyte	Result	Flag	POL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Nitrate/Nitrite as N	0.041	U	0.10	mg/L							

QUALITY CONTROL DATA

Classical Chemistry Parameters - Quality Control

Batch 5J01004 - NO PREP - Continued

LCS (5J01004-BS1) Prepared: 10/01/2015 08:16 Analyzed: 10/01/2015 11:46

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Nitrate/Nitrite as N	1.1		0.10	mg/L	1.25		92	90-110			

Matrix Spike (5J01004-MS1) Prepared: 10/01/2015 08:16 Analyzed: 10/01/2015 13:33

Source: C509294-02

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Nitrate/Nitrite as N	0.58		0.10	mg/L	0.513	0.14	87	90-110			QM-05

Matrix Spike (5J01004-MS2) Prepared: 10/01/2015 08:16 Analyzed: 10/01/2015 11:59

Source: C509294-03

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Nitrate/Nitrite as N	0.54		0.10	mg/L	0.513	0.084	89	90-110			QM-05

Matrix Spike Dup (5J01004-MSD1) Prepared: 10/01/2015 08:16 Analyzed: 10/01/2015 13:34

Source: C509294-02

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Nitrate/Nitrite as N	0.63		0.10	mg/L	0.513	0.14	97	90-110	8	10	

Batch 5J02002 - Same

Blank (5J02002-BLK1) Prepared: 10/02/2015 09:59 Analyzed: 10/05/2015 09:20

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Kjeldahl Nitrogen	0.26	U	0.48	mg/L							

LCS (5J02002-BS1) Prepared: 10/02/2015 09:59 Analyzed: 10/05/2015 09:22

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Kjeldahl Nitrogen	12		0.48	mg/L	12.0		98	90-110			

Matrix Spike (5J02002-MS1) Prepared: 10/02/2015 09:59 Analyzed: 10/05/2015 09:25

Source: C509294-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Kjeldahl Nitrogen	5.5		0.48	mg/L	4.80	0.62	102	90-110			

Matrix Spike (5J02002-MS2) Prepared: 10/02/2015 09:59 Analyzed: 10/05/2015 09:27

Source: C509294-02

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Kjeldahl Nitrogen	6.0		0.48	mg/L	4.80	0.79	108	90-110			

Matrix Spike Dup (5J02002-MSD1) Prepared: 10/02/2015 09:59 Analyzed: 10/05/2015 09:29

Source: C509294-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Kjeldahl Nitrogen	5.5		0.48	mg/L	4.80	0.62	102	90-110	0.5	10	

FLAGS/NOTES AND DEFINITIONS

B	The analyte was detected in the associated method blank.
D	The sample was analyzed at dilution.
J	The reported value is between the laboratory method detection limit (MDL) and the laboratory method reporting limit (MRL), adjusted for actual sample preparation data and moisture content, where applicable.
U	The analyte was analyzed for but not detected to the level shown, adjusted for actual sample preparation data and moisture content, where applicable.
E	The concentration indicated for this analyte is an estimated value above the calibration range of the instrument. This value is considered an estimate.
MRL	Method Reporting Limit. The MRL is roughly equivalent to the practical quantitation limit (PQL) and is based on the low point of the calibration curve, when applicable, sample preparation factor, dilution factor, and, in the case of soil samples, moisture content.
N	The analysis indicates the presence of an analyte for which there is presumptive evidence (85% or greater confidence) to make a "tentative identification".
P	Greater than 25% concentration difference was observed between the primary and secondary GC column. The lower concentration is reported.
QM-05	The spike recovery was outside acceptance limits for the MS and/or MSD due to matrix interference. The LCS and/or LCSD were within acceptance limits showing that the laboratory is in control and the data is acceptable.

ENVIRONMENTAL CONSERVATION LABORATORIES CHAIN-OF-CUSTODY RECORD

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Cary, NC 27511
(919) 467-3090 Fax (919) 467-3515

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Page ____ of ____

Client Name: Mallinckrodt, LLC (MA026)	Project Number: [none]
Address: 8801 Capital Blvd.	Project Name/Desc: City Effluent - Twice Weekly
City/ST/Zip: Raleigh, NC 27616-	PO # / Billing Info: R-B43004
Tel: (919) 878-2885 Fax: () -	Reporting Contact: Tim Roberts
Sampler(s) Name, Affiliation (Print): Leon Bridges	Billing Contact: Accounts Payable
Sampler(s) Signature: Leon Bridges	Site Location / Time Zone: Raleigh Wastetreatment plant

Requested Turnaround Times

Note : Rush requests subject to acceptance by the facility

___ Standard

___ Expedited

Due ___/___/___

Lab Workorder: C511908

Item #	Sample ID (Field Identification)	Collection Date	Collection Time	Comp / Grab	Matrix (see codes)	Total # of Containers	COD SM5220D	Nitrogen Total 353 Calc	NOX 353.2, TKN 351.2	TSS SM2540D	Sample Comments
	City Effluent	09-23-15	7:00 am	Comp	WW	2	X	X	X	X	
						2	<-- Total # of Containers				

Preservation (See Codes) (Combine as necessary)

Sample Kit Prepared By	Date/Time	Relinquished By	Date/Time	Received By	Date/Time
		Leon Bridges	09-23-15 7:00am		9/24/15 1200
Comments/Special Reporting Requirements		Relinquished By	Date/Time	Received By	Date/Time
		Relinquished By	Date/Time	Received By	9/24/15 1250
		Cooler #'s & Temps on Receipt: 3.3°C		Condition Upon Receipt: X Acceptable ___ Unacceptable	

Matrix : **GW**-Groundwater **SO**-Soil **DW**-Drinking Water **SE**-Sediment **SW**-Surface Water **WW**-Wastewater **A**-Air **O**-Other (detail in comments)

Preservation: **I**-Ice **H**-HCl **N**-HNO3 **S**-H2SO4 **NO**-NaOH **O**-Other (detail in comments)

Note : All samples submitted to ENCO Labs are in accordance with the terms and conditions listed on the reverse of this form, unless prior written agreements exist

Sample Preservation Verification

ENCO Cary

Work Order:	C511908	Project:	City Effluent - Twice Weekly
Client:	Mallinckrodt, LLC (MA026)	Project #:	[none]
Logged In:	24-Sep-15 13:03	Logged By:	Andrew S Coons

C511908-01

Cont	Type	Pres (pH) Requirement	pH Checked / In Control	pH Adjusted	Date/Time Adjusted	Reagent Used/Comments
A	250mLP+H2SO4	<2	(Y) / N / NA	Y / (N) / NA		

	Reagent Name	ID		Reagent Name	ID		Reagent Name	ID
1			3			5		
2			4			6		

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Cary NC, 27511
Phone: 919.467.3090 FAX: 919.467.3515

Thursday, October 8, 2015
Mallinckrodt, LLC (MA026)
Attn: Tim Roberts
8801 Capital Blvd.
Raleigh, NC 27616-

RE: Laboratory Results for
Project Number: [none], Project Name/Desc: City Effluent - Twice Weekly
ENCO Workorder(s): C512202

Dear Tim Roberts,

Enclosed is a copy of your laboratory report for test samples received by our laboratory on Tuesday, September 29, 2015.

Unless otherwise noted in an attached project narrative, all samples were received in acceptable condition and processed in accordance with the referenced methods/procedures. Results for these procedures apply only to the samples as submitted.

The analytical results contained in this report are in compliance with NELAC standards, except as noted in the project narrative. This report shall not be reproduced except in full, without the written approval of the Laboratory.

This report contains only those analyses performed by Environmental Conservation Laboratories. Unless otherwise noted, all analyses were performed at ENCO Cary. Data from outside organizations will be reported under separate cover.

If you have any questions or require further information, please do not hesitate to contact me.

Sincerely,

Stephanie Franz

Project Manager

Enclosure(s)

SAMPLE SUMMARY/LABORATORY CHRONICLE

Client ID: City Effluent **Lab ID: C512202-01** **Sampled: 09/28/15 08:00** **Received: 09/29/15 13:00**

Parameter	Hold Date/Time(s)	Prep Date/Time(s)	Analysis Date/Time(s)
CALC	06/23/18	10/06/15 08:45	10/06/15 09:55
EPA 353.2	10/26/15	10/02/15 08:43	10/02/15 11:34
SM 2540D-1997	10/05/15	09/30/15 13:12	09/30/15 13:12
SM 5220D-1997	10/26/15	10/02/15 12:09	10/02/15 16:01

Client ID: City Effluent **Lab ID: C512202-01RE1** **Sampled: 09/28/15 08:00** **Received: 09/29/15 13:00**

Parameter	Hold Date/Time(s)	Prep Date/Time(s)	Analysis Date/Time(s)
EPA 351.2	10/26/15	10/02/15 09:59	10/05/15 12:55

SAMPLE DETECTION SUMMARY

Client ID: City Effluent **Lab ID:** C512202-01

Analyte	Results	Flag	MDL	PQL	Units	Method	Notes
Chemical Oxygen Demand	1000		20	20	mg/L	SM 5220D-1997	
Nitrate/Nitrite as N	50	D	4.0	9.8	mg/L	EPA 353.2	
Total Nitrogen	120		0.02	0.10	mg/L	CALC	
Total Suspended Solids	1000		360	360	mg/L	SM 2540D-1997	

Client ID: City Effluent **Lab ID:** C512202-01RE1

Analyte	Results	Flag	MDL	PQL	Units	Method	Notes
Total Kjeldahl Nitrogen	74	D	1.3	2.4	mg/L	EPA 351.2	

ANALYTICAL RESULTS

Description: City Effluent
Matrix: Waste Water
Project: City Effluent - Twice Weekly

Lab Sample ID: C512202-01
Sampled: 09/28/15 08:00
Sampled By: Tony Smith

Received: 09/29/15 13:00
Work Order: C512202

Classical Chemistry Parameters

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	Results	Flag	Units	DF	MDL	PQL	Batch	Method	Analyzed	By	Notes
Chemical Oxygen Demand^	**1000**		mg/L	2	20	20	5J02014	SM 5220D-1997	10/02/15 16:01	JOC	
Nitrate/Nitrite as N^	**50**	D	mg/L	97.5	4.0	9.8	5J02009	EPA 353.2	10/02/15 11:34	JLJ	
Total Kjeldahl Nitrogen^	**74**	D	mg/L	5	1.3	2.4	5J02002	EPA 351.2	10/05/15 12:55	JLJ	
Total Nitrogen [17778-88-0]	**120**		mg/L	1	0.02	0.10	5J06003	CALC	10/06/15 09:55	JLJ	
Total Suspended Solids^	**1000**		mg/L	143	360	360	5I30025	SM 2540D-1997	09/30/15 13:12	MMR	

QUALITY CONTROL DATA

Classical Chemistry Parameters - Quality Control

Batch 5I30025 - NO PREP

Blank (5I30025-BLK1) Prepared & Analyzed: 09/30/2015 13:12

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Suspended Solids	2.5	U	2.5	mg/L							

LCS (5I30025-BS1) Prepared & Analyzed: 09/30/2015 13:12

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Suspended Solids	100		2.5	mg/L	100		101	80-120			

Duplicate (5I30025-DUP1) Prepared & Analyzed: 09/30/2015 13:12

Source: C512202-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Suspended Solids	940		360	mg/L		1000			7	20	

Duplicate (5I30025-DUP2) Prepared & Analyzed: 09/30/2015 13:12

Source: C509294-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Suspended Solids	11		6.2	mg/L		11			2	20	

Batch 5J02002 - Same

Blank (5J02002-BLK1) Prepared: 10/02/2015 09:59 Analyzed: 10/05/2015 09:20

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Kjeldahl Nitrogen	0.26	U	0.48	mg/L							

LCS (5J02002-BS1) Prepared: 10/02/2015 09:59 Analyzed: 10/05/2015 09:22

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Kjeldahl Nitrogen	12		0.48	mg/L	12.0		98	90-110			

Matrix Spike (5J02002-MS1) Prepared: 10/02/2015 09:59 Analyzed: 10/05/2015 09:25

Source: C509294-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Kjeldahl Nitrogen	5.5		0.48	mg/L	4.80	0.62	102	90-110			

Matrix Spike (5J02002-MS2) Prepared: 10/02/2015 09:59 Analyzed: 10/05/2015 09:27

Source: C509294-02

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Kjeldahl Nitrogen	6.0		0.48	mg/L	4.80	0.79	108	90-110			

Matrix Spike Dup (5J02002-MSD1) Prepared: 10/02/2015 09:59 Analyzed: 10/05/2015 09:29

Source: C509294-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Kjeldahl Nitrogen	5.5		0.48	mg/L	4.80	0.62	102	90-110	0.5	10	

Batch 5J02009 - NO PREP

QUALITY CONTROL DATA

Classical Chemistry Parameters - Quality Control

Batch 5J02009 - NO PREP - Continued

Blank (5J02009-BLK1) Prepared: 10/02/2015 08:43 Analyzed: 10/02/2015 11:06

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Nitrate/Nitrite as N	0.041	U	0.10	mg/L							

LCS (5J02009-BS1) Prepared: 10/02/2015 08:43 Analyzed: 10/02/2015 11:08

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Nitrate/Nitrite as N	1.1		0.10	mg/L	1.25		90	90-110			

Matrix Spike (5J02009-MS1) Prepared: 10/02/2015 08:43 Analyzed: 10/02/2015 12:42

Source: C509294-01RE1

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Nitrate/Nitrite as N	0.60		0.10	mg/L	0.513	0.10	97	90-110			

Matrix Spike (5J02009-MS2) Prepared: 10/02/2015 08:43 Analyzed: 10/02/2015 11:23

Source: C510395-02

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Nitrate/Nitrite as N	38		2.5	mg/L	12.5	25	99	90-110			

Matrix Spike Dup (5J02009-MSD1) Prepared: 10/02/2015 08:43 Analyzed: 10/02/2015 12:44

Source: C509294-01RE1

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Nitrate/Nitrite as N	0.64		0.10	mg/L	0.513	0.10	104	90-110	6	10	

Batch 5J02014 - Same

Blank (5J02014-BLK1) Prepared: 10/02/2015 12:09 Analyzed: 10/02/2015 16:01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Chemical Oxygen Demand	10	U	10	mg/L							

LCS (5J02014-BS1) Prepared: 10/02/2015 12:09 Analyzed: 10/02/2015 16:01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Chemical Oxygen Demand	510		10	mg/L	500		102	90-110			

Matrix Spike (5J02014-MS1) Prepared: 10/02/2015 12:09 Analyzed: 10/02/2015 16:01

Source: C511221-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Chemical Oxygen Demand	2400		40	mg/L	2000	420	101	90-110			

Matrix Spike Dup (5J02014-MSD1) Prepared: 10/02/2015 12:09 Analyzed: 10/02/2015 16:01

Source: C511221-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Chemical Oxygen Demand	2500		40	mg/L	2000	420	104	90-110	3	10	

FLAGS/NOTES AND DEFINITIONS

B	The analyte was detected in the associated method blank.
D	The sample was analyzed at dilution.
J	The reported value is between the laboratory method detection limit (MDL) and the laboratory method reporting limit (MRL), adjusted for actual sample preparation data and moisture content, where applicable.
U	The analyte was analyzed for but not detected to the level shown, adjusted for actual sample preparation data and moisture content, where applicable.
E	The concentration indicated for this analyte is an estimated value above the calibration range of the instrument. This value is considered an estimate.
MRL	Method Reporting Limit. The MRL is roughly equivalent to the practical quantitation limit (PQL) and is based on the low point of the calibration curve, when applicable, sample preparation factor, dilution factor, and, in the case of soil samples, moisture content.
N	The analysis indicates the presence of an analyte for which there is presumptive evidence (85% or greater confidence) to make a "tentative identification".
P	Greater than 25% concentration difference was observed between the primary and secondary GC column. The lower concentration is reported.

ENVIRONMENTAL CONSERVATION LABORATORIES CHAIN-OF-CUSTODY RECORD

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Orlando, FL 32824
(407) 826-5314 Fax (407) 850-6945

4810 Executive Park Court, Suite 111
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(904) 296-3007 Fax (904) 296-6210

102-A Woodwinds Industrial Ct.
Cary, NC 27511
(919) 467-3090 Fax (919) 467-3515

www.encolabs.com

Client Name: Mallinckrodt, LLC (MA026)	Project Number: [none]
Address: 8801 Capital Blvd.	Project Name/Desc: City Effluent - Twice Weekly
City/ST/Zip: Raleigh, NC 27616-	PO # / Billing Info: R-B43004
Tel: (919) 878-2885 Fax: () -	Reporting Contact: Tim Roberts
Sampler(s) Name, Affiliation (Print): Tony Smith Mallinckrodt	Billing Contact: Accounts Payable
Sampler(s) Signature: Tony Smith	Site Location / Time Zone: Raleigh WW treatment plant

Requested Analyses

Preservation (See Codes) (Combine as necessary)

Requested Turnaround Times

Note : Rush requests subject to acceptance by the facility

___ Standard

___ Expedited

Due ___/___/___

Lab Workorder: C512202

Item #	Sample ID (Field Identification)	Collection Date	Collection Time	Comp / Grab	Matrix (see codes)	Total # of Containers	COD SM5220D	Nitrogen Total 353 Calc	NOX 353.2, TKN 351.2	TSS SM2540D	Sample Comments
	City Effluent	9-28-15	8:00	Comp	WW	2	X	X	X	X	

<-- Total # of Containers

Sample Kit Prepared By	Date/Time	Relinquished By: Tony Smith	Date/Time: 9-28-15 8:00	Received By	Date/Time: 9/29/15 1200
Comments/Special Reporting Requirements		Relinquished By	Date/Time	Received By	Date/Time
		Relinquished By	Date/Time	Received By	Date/Time: 9/29/15 1:00
		Cooler #'s & Temps on Receipt: 2.1°C		Condition Upon Receipt: Acceptable ___ Unacceptable	

Matrix : **GW**-Groundwater **SO**-Soil **DW**-Drinking Water **SE**-Sediment **SW**-Surface Water **WW**-Wastewater **A**-Air **O**-Other (detail in comments)

Preservation: **I**-Ice **H**-HCl **N**-HNO3 **S**-H2SO4 **NO**-NaOH **O**-Other (detail in comments)

Note : All samples submitted to ENCO Labs are in accordance with the terms and conditions listed on the reverse of this form, unless prior written agreements exist

Sample Preservation Verification

ENCO Cary

Work Order:	C512202	Project:	City Effluent - Twice Weekly
Client:	Mallinckrodt, LLC (MA026)	Project #:	[none]
Logged In:	29-Sep-15 09:58	Logged By:	Andrew S Coons

C512202-01

Cont	Type	Pres (pH) Requirement	pH Checked / In Control	pH Adjusted	Date/Time Adjusted	Reagent Used/Comments
A	250mLP+H2SO4	<2	Y / N / NA	Y / N / NA		

	Reagent Name	ID
1		
2		

	Reagent Name	ID
3		
4		

	Reagent Name	ID
5		
6		

ENCO Laboratories

Accurate. Timely. Responsive. Innovative.

102-A Woodwinds Industrial Court
Cary NC, 27511
Phone: 919.467.3090 FAX: 919.467.3515

Monday, October 12, 2015
Mallinckrodt, LLC (MA026)
Attn: Tim Roberts
8801 Capital Blvd.
Raleigh, NC 27616-

RE: Laboratory Results for
Project Number: [none], Project Name/Desc: City Effluent - Twice Weekly
ENCO Workorder(s): C512201

Dear Tim Roberts,

Enclosed is a copy of your laboratory report for test samples received by our laboratory on Thursday, October 1, 2015.

Unless otherwise noted in an attached project narrative, all samples were received in acceptable condition and processed in accordance with the referenced methods/procedures. Results for these procedures apply only to the samples as submitted.

The analytical results contained in this report are in compliance with NELAC standards, except as noted in the project narrative. This report shall not be reproduced except in full, without the written approval of the Laboratory.

This report contains only those analyses performed by Environmental Conservation Laboratories. Unless otherwise noted, all analyses were performed at ENCO Cary. Data from outside organizations will be reported under separate cover.

If you have any questions or require further information, please do not hesitate to contact me.

Sincerely,

Stephanie Franz

Project Manager

Enclosure(s)

SAMPLE SUMMARY/LABORATORY CHRONICLE

Client ID: City Effluent **Lab ID:** C512201-01 **Sampled:** 09/30/15 08:00 **Received:** 10/01/15 13:05

Parameter	Hold Date/Time(s)	Prep Date/Time(s)	Analysis Date/Time(s)
CALC	06/25/18	10/08/15 12:45	10/08/15 12:50
EPA 351.2	10/28/15	10/05/15 09:04	10/07/15 12:54
EPA 353.2	10/28/15	10/06/15 09:09	10/06/15 12:20
SM 2540D-1997	10/07/15	10/02/15 14:00	10/02/15 14:00
SM 5220D-1997	10/28/15	10/02/15 12:09	10/02/15 16:01

SAMPLE DETECTION SUMMARY

Client ID: City Effluent **Lab ID:** C512201-01

Analyte	Results	Flag	MDL	PQL	Units	Method	Notes
Chemical Oxygen Demand	100		10	10	mg/L	SM 5220D-1997	
Nitrate/Nitrite as N	54	D	4.0	9.8	mg/L	EPA 353.2	
Total Kjeldahl Nitrogen	5.1	D	1.0	1.9	mg/L	EPA 351.2	
Total Nitrogen	59		0.02	0.10	mg/L	CALC	
Total Suspended Solids	35		17	17	mg/L	SM 2540D-1997	

ANALYTICAL RESULTS

Description: City Effluent
Matrix: Waste Water
Project: City Effluent - Twice Weekly

Lab Sample ID: C512201-01
Sampled: 09/30/15 08:00
Sampled By: Tony Smith

Received: 10/01/15 13:05
Work Order: C512201

Classical Chemistry Parameters

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	Results	Flag	Units	DF	MDL	PQL	Batch	Method	Analyzed	By	Notes
Chemical Oxygen Demand^	**100**		mg/L	1	10	10	5J02014	SM 5220D-1997	10/02/15 16:01	JOC	
Nitrate/Nitrite as N^	**54**	D	mg/L	97.5	4.0	9.8	5J06005	EPA 353.2	10/06/15 12:20	JLJ	
Total Kjeldahl Nitrogen^	**5.1**	D	mg/L	4	1.0	1.9	5J05005	EPA 351.2	10/07/15 12:54	JLJ	
Total Nitrogen [17778-88-0]	**59**		mg/L	1	0.02	0.10	5J08033	CALC	10/08/15 12:50	JLJ	
Total Suspended Solids^	**35**		mg/L	6.67	17	17	5J02013	SM 2540D-1997	10/02/15 14:00	MMR	

QUALITY CONTROL DATA

Classical Chemistry Parameters - Quality Control

Batch 5J02013 - NO PREP

Blank (5J02013-BLK1) Prepared & Analyzed: 10/02/2015 14:00

Analyte	Result	Flag	POL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Suspended Solids	2.5	U	2.5	mg/L							

LCS (5J02013-BS1) Prepared & Analyzed: 10/02/2015 14:00

Analyte	Result	Flag	POL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Suspended Solids	100		2.5	mg/L	100		101	80-120			

Duplicate (5J02013-DUP1) Prepared & Analyzed: 10/02/2015 14:00

Source: C509994-01

Analyte	Result	Flag	POL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Suspended Solids	1300		500	mg/L		1200			6	20	

Duplicate (5J02013-DUP2) Prepared & Analyzed: 10/02/2015 14:00

Source: C510395-01

Analyte	Result	Flag	POL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Suspended Solids	250		100	mg/L		210			16	20	

Batch 5J02014 - Same

Blank (5J02014-BLK1) Prepared: 10/02/2015 12:09 Analyzed: 10/02/2015 16:01

Analyte	Result	Flag	POL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Chemical Oxygen Demand	10	U	10	mg/L							

LCS (5J02014-BS1) Prepared: 10/02/2015 12:09 Analyzed: 10/02/2015 16:01

Analyte	Result	Flag	POL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Chemical Oxygen Demand	510		10	mg/L	500		102	90-110			

Matrix Spike (5J02014-MS1) Prepared: 10/02/2015 12:09 Analyzed: 10/02/2015 16:01

Source: C511221-01

Analyte	Result	Flag	POL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Chemical Oxygen Demand	2400		40	mg/L	2000	420	101	90-110			

Matrix Spike Dup (5J02014-MSD1) Prepared: 10/02/2015 12:09 Analyzed: 10/02/2015 16:01

Source: C511221-01

Analyte	Result	Flag	POL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Chemical Oxygen Demand	2500		40	mg/L	2000	420	104	90-110	3	10	

Batch 5J05005 - Same

Blank (5J05005-BLK1) Prepared: 10/05/2015 09:04 Analyzed: 10/07/2015 12:29

Analyte	Result	Flag	POL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Kjeldahl Nitrogen	0.26	U	0.48	mg/L							

QUALITY CONTROL DATA

Classical Chemistry Parameters - Quality Control

Batch 5J05005 - Same - Continued

LCS (5J05005-BS1) Prepared: 10/05/2015 09:04 Analyzed: 10/07/2015 12:31

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Kjeldahl Nitrogen	12		0.48	mg/L	12.0		101	90-110			

Matrix Spike (5J05005-MS1) Prepared: 10/05/2015 09:04 Analyzed: 10/07/2015 12:33

Source: C510126-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Kjeldahl Nitrogen	5.2		0.48	mg/L	4.80	0.46	99	90-110			

Matrix Spike Dup (5J05005-MSD1) Prepared: 10/05/2015 09:04 Analyzed: 10/07/2015 12:35

Source: C510126-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Kjeldahl Nitrogen	5.2		0.48	mg/L	4.80	0.46	99	90-110	0.3	10	

Batch 5J06005 - NO PREP

Blank (5J06005-BLK1) Prepared: 10/06/2015 09:09 Analyzed: 10/06/2015 11:54

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Nitrate/Nitrite as N	0.041	U	0.10	mg/L							

LCS (5J06005-BS1) Prepared: 10/06/2015 09:09 Analyzed: 10/06/2015 11:52

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Nitrate/Nitrite as N	1.3		0.10	mg/L	1.25		101	90-110			

Matrix Spike (5J06005-MS1) Prepared: 10/06/2015 09:09 Analyzed: 10/06/2015 11:56

Source: C510126-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Nitrate/Nitrite as N	0.52		0.10	mg/L	0.513	0.041 U	102	90-110			

Matrix Spike Dup (5J06005-MSD1) Prepared: 10/06/2015 09:09 Analyzed: 10/06/2015 12:00

Source: C510126-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Nitrate/Nitrite as N	0.52		0.10	mg/L	0.513	0.041 U	102	90-110	0.2	10	

FLAGS/NOTES AND DEFINITIONS

B	The analyte was detected in the associated method blank.
D	The sample was analyzed at dilution.
J	The reported value is between the laboratory method detection limit (MDL) and the laboratory method reporting limit (MRL), adjusted for actual sample preparation data and moisture content, where applicable.
U	The analyte was analyzed for but not detected to the level shown, adjusted for actual sample preparation data and moisture content, where applicable.
E	The concentration indicated for this analyte is an estimated value above the calibration range of the instrument. This value is considered an estimate.
MRL	Method Reporting Limit. The MRL is roughly equivalent to the practical quantitation limit (PQL) and is based on the low point of the calibration curve, when applicable, sample preparation factor, dilution factor, and, in the case of soil samples, moisture content.
N	The analysis indicates the presence of an analyte for which there is presumptive evidence (85% or greater confidence) to make a "tentative identification".
P	Greater than 25% concentration difference was observed between the primary and secondary GC column. The lower concentration is reported.

ENVIRONMENTAL CONSERVATION LABORATORIES — CHAIN-OF-CUSTODY RECORD

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102-A Woodwinds Industrial Ct. Cary, NC 27511 (919) 467-3090 Fax (919) 467-3515

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Client Name: Mallinckrodt, LLC (MA026)	Project Number: [none]
Address: 8801 Capital Blvd.	Project Name/Desc: City Effluent - Twice Weekly
City/ST/Zip: Raleigh, NC 27616-	PO # / Billing Info: R-B43004
Tel: (919) 878-2885 Fax: () -	Reporting Contact: Tim Roberts
Sampler(s) Name, Affiliation (Print): Tony Smith Mallinckrodt	Billing Contact: Accounts Payable
Sampler(s) Signature: Tony Smith	Site Location / Time Zone: Raleigh WW Treatment plant

Requested Analyses

Requested Turnaround Times

Note : Rush requests subject to acceptance by the facility

___ Standard

___ Expedited

Due ___/___/___

Lab Workorder: C512201

Item #	Sample ID (Field Identification)	Collection Date	Collection Time	Comp / Grab	Matrix (see codes)	Total # of Containers	COD SM5220D	Nitrogen Total 353 Calc	NOX 353.2, TKN 351.2	TSS SM2540D	Sample Comments
	City Effluent	9-30-15	8:00am	Comp	WW	2	X	X	X	X	

Preservation (See Codes) (Combine as necessary)

<-- Total # of Containers

Sample Kit Prepared By	Date/Time	Relinquished By: Tony Smith	Date/Time: 9-30-15 8:00am	Received By	Date/Time: 10/1/15 1200
Comments/Special Reporting Requirements		Relinquished By	Date/Time	Received By	Date/Time
		Relinquished By	Date/Time	Received By	Date/Time: 10/1/15 165
		Cooler #'s & Temps on Receipt: 2.1°C		Condition Upon Receipt: X Acceptable ___ Unacceptable	

Matrix : **GW**-Groundwater **SO**-Soil **DW**-Drinking Water **SE**-Sediment **SW**-Surface Water **WW**-Wastewater **A**-Air **O**-Other (detail in comments)

Preservation: **I**-Ice **H**-HCl **N**-HNO3 **S**-H2SO4 **NO**-NaOH **O**-Other (detail in comments)

Note : All samples submitted to ENCO Labs are in accordance with the terms and conditions listed on the reverse of this form, unless prior written agreements exist

Sample Preservation Verification

ENCO Cary

Work Order:	C512201	Project:	City Effluent - Twice Weekly
Client:	Mallinckrodt, LLC (MA026)	Project #:	[none]
Logged In:	01-Oct-15 14:00	Logged By:	Andrew S Coons

C512201-01

Cont	Type	Pres (pH) Requirement	pH Checked / In Control	pH Adjusted	Date/Time Adjusted	Reagent Used/Comments
A	250mLP+H2SO4	<2	(Y) / N / NA	Y (N) / NA		

	Reagent Name	ID		Reagent Name	ID		Reagent Name	ID
1			3			5		
2			4			6		