



Civil Engineering  
 Surveying  
 Water Resources Management  
 Water & Wastewater Engineering  
 Supply Chain Logistics  
 Construction Management  
 Environmental Sciences  
 Landscape Architecture  
 Land Planning

October 3, 2016

Adam Molofsky  
 Humboldt County Division of Environmental Health  
 100 H Street, Suite 100  
 Eureka, CA 95501

Subject: ***SEPTIC SUITABILITY LETTER***  
 APN: 522-201-001  
 131 Flowers-McNiel Road  
 Willow Creek, CA 95573

Dear Mr. Molofsky,

At the request of Emerald Family Farms, tenant of the subject parcel with rights granted for improvement, Manhard Consulting has sampled soils for textural analysis, examined soil profiles, and identified available wastewater treatment land area at the above referenced property.

In September of this year, samples taken by this office at depths of 24 inches and 72 inches from mini excavator excavations revealed 10 YR 4/3 grey brown zone 1 sand soil in test hole (TH)#1. In test hole (TH)#2, the same investigation at 42 inches and 72 inches revealed 2.5 YR 4/3 grey orange zone 1 sand soil. There was no distinct mottling or groundwater seepage in either test hole to a depth of 10 feet. We did not perform a full septic investigation including percolation tests to confirm suitability, but based on our experience in this type of soil we are confident to reach stabilized percolation rates of no more than 2 minutes per inch. Investigation for onsite wastewater treatment has also been performed on this site for use by the Willow Creek Community Services District. Per the investigation by Josh Mcknight at Trinity Valley Engineers, soils were also described in agreement with a zone 1 classification. In addition, monitoring wells were installed in the investigation area, and a minimum distance to groundwater at 8 foot was recorded during 2003 January rain events.

The standard required leach field area to treat the effluent for a manufacturing/factory facility with 50 employees with a conservative loading rate of 0.65 GPD/sq.ft. is approximately 3500 sq.ft. (See included loading calculations and site evaluation report.)

Conditioned upon the complete septic investigation, final septic system design, and the target number of employees, the soils on this lot and available lot area appear to present the availability of a waste treatment solution for the proposed commercial project in accordance with all County

EFF, APN: 522-201-001

and State Codes for septic systems. Special consideration, such as a mounded pressure distribution system may be required to meet separation to ground water requirements. All pertinent County and State specifications and setbacks discovered during septic design must be considered and followed. Leach lines should be placed parallel to contour lines, and an appropriate design distance away from adjacent leach lines, 10 feet from structural foundations, and property lines. Additionally, they cannot be placed under driveways or parking locations and must be 25 feet setback from any slopes dropping over 30%.

Enclosed are the following items:

- Loading information
- Site evaluation report and standard system sizing
- Site map with test hole locations
- Subsurface profile logs
- Soil texture sheet for TH1, TH2

If you have any questions concerning this letter or the percolation test results, please call our office at (707) 444-3800

Sincerely,

Praj O. White  
Principal Engineer

## SYSTEM LOAD AND STORAGE SIZING

Area Served	Person/meal	# of meals	EPA flow* Unit	Co. Flow* Unit	Type	Other CA* Unit	Type	Total Load
Factory	50	-	13 x pers.	20 x pers.	shift use	20 x pers.	shift use	650 - 1000

\* Peak Gal / Unit / Day

1000 Gal / Day

**72 hr ret. Factor**

3000 Gal / 3 Day

**Tank(s): (2) 1200 gal**

# At-Grade Septic Design

(Procedure followed is from Wisconsin At-Grade Soil Absorption System: Siting, Design and Construction Manual by James C. Converse et al., University of Wisconsin at Madison, College of Agricultural and Life Sciences, January, 1990)

**Location:** 131 Flowers-McNiel Road, Willow Creek, CA  
**Project Code:** HAYWCCA

## KEY

Blue = Data Entry Fields

Orange = Calculated Cells

Red = Values used in Design of Force Main

**Calculated by:** Tim Windbigler  
**Date:** 9/30/2016

### Site Factors

Soil Profile	
Slope	3%
Distance along contour	100 ft
Distance along slope	75 ft
Number of Bedrooms	8 Rooms

### Size of the of the Soil Absorption System

#### 1. Design Flow Rate (DFR):

Flow per bedroom = 125 gal  
 DFR = 1000 gpd

#### 2. Soil Loading Rate Estimation (SLR):

Obtained from Table 2 (Based on soil horizon in contact with aggregate)  
 SLR = 0.6 gpd/sf

#### 3. Estimate Linear Loading Rate (LLR):

Based on experience and judgement between 3 - 10 gpd/linear ft.  
 Vertical flow: higher number. Horizontal flow: 3-4 gpd/linear ft.  
 LLR = 5 gpd/lf

#### 4. Absorption Width (A):

$A = LLR/SLR$   
 A = 8.3 ft  
 (NOTE: This may increase with slope)

#### 5. Absorption Length (B):

$B = DFR/LLR$   
 B = 200.0 ft

#### 6. Overall Length (L) and Width (W) of the unit:

$L = B + \text{soil cover end lengths } (S_e)$   
 $W = A + \text{upslope width of aggregate } (C) + \text{soil cover side widths } (S_s)$

$S_e$	5 ft
$C$	2 ft
$S_s$	4 ft
$L$	210.00 ft
$W$	18.3 ft

### Pressure Distribution Network Design

#### 1. Lateral Length ( $L_L$ ):

Center Feed ( $B/3 - 0.5$  ft):  
 $L_L = 66.17$  ft

#### 2. Perforation Spacing and Size:

Perforation Diameter ( $P_D$ )  
 $P_D = 0.25$  in  
 Perforation Spacing ( $P_S$ )  
 $P_S = 4$  ft

#### 3. Lateral Diameter ( $L_D$ ):

Use Figures A-1 through A-6 depending upon  $P_D$  and  $L_L$   
 $L_D = 1.25$  in

#### 4. Number of Perforations Per Lateral (n):

$n = (L_L/x) + 0.5$   
 Perforation Spacing (x) = 4 ft  
 n = 17 perforations

#### 5. Lateral Discharge Rate (LDR)

$LDR = n * \text{Discharge Rate Per Perforation } (D_p)$   
 DP Found on Table A-1  
 $D_p = 1.38$  gpm/perforation  
 $LDR = 23.5$  gpm/lateral

#### 6. Manifold Size:

Needed only where there is more than one distribution line  
 Rule of thumb: smaller systems, manifold diameter = force main

#### 7. Network Discharge Rate (NDR):

$NDR = \# \text{ of Laterals} * LDR$   
 # of Laterals = 3 laterals  
 NDR = 70.6 gpm

**SITE EVALUATION REPORT  
INDIVIDUAL SEWAGE DISPOSAL SYSTEMS DESIGN**

DATE: 09/30/16

AP#: 522-201-001

WATER SUPPLY: Private

SITE ADDRESS: 131 Flowers-McNiel Road

CITY: Willow Creek, CA 95573

OWNER: S&S Cornerstone Developments LLC

CLIENT: Emerald Family Farms

MAIL: P.O. Box 1643

CITY: Arcata CA 95521

PHONE NUMBER: (707) 572-7428

Manufacturer / Factory w/50 Employees (N): **50 (20 GPD) = 1000 GPD**

<u>LOCATION:</u>	TH#1		TH#2
<u>SLOPE:</u>	0-3%		0-3%
<u>DEPTH:</u>	24 Inches		24 Inches
<u>TEXTURE ZONE:</u>	Zone 1		Zone 1
<u>STABILIZATION RATE:</u>	2 min/inch	< <b>CONTROL</b>	2 min/inch
<u>DEPTH TO WATER TABLE:</u>	> 10 feet	(no mottling observed)	> 10 feet

**STANDARD CONVENTIONAL DESIGN, CLASS D**

DEPTH OF PIPE 24 Inches

DEPTH OF GRAVEL: 3 feet below pipe

TRENCH WIDTH (W): 1.5 feet (standard)

LOADING RATE (A<sub>T</sub>): 0.65 GPD/sq. ft (Table 4.2 of Basin Plan, conservative)

LINEAR FT. OF SYSTEM:  $N/(2 * A_T * D) = 1000 \text{ GPD} / (2*0.65*3) = \underline{\underline{278 \text{ feet}}}$

**DESIGN SUMMARY: Four 74 foot lines: Primary and Reserve**

*BASED ON TESTING RESULTS USING APPROVED PROCEDURES, THE ABOVE SAID PROPERTY COMPLIES WITH ALL STATE AND COUNTY REQUIREMENTS FOR AN ON-SITE SEPTIC SYSTEM.*



**NORTH COAST  
LABORATORIES LTD.**

October 06, 2016

Manhard Consulting, Ltd.  
611 I Street, Suite A  
Eureka, CA 95501

Attn: Tim Windbigler

RE: HAY.WCCA01

Order No.: 1610043

Invoice No.: 129724

PO No.:

ELAP No.1247-Expires July 2017

**SAMPLE IDENTIFICATION**

Fraction	Client Sample Description
01A	TH #1 24"
02A	TH #1 6ft
03A	TH #2 42"
04A	TH #2 6ft

ND = Not Detected at the Reporting Limit

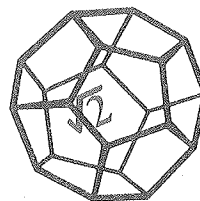
Limit = Reporting Limit

Flag = Explanation in Case Narrative

All solid results are expressed on a wet-weight basis unless otherwise noted.

**Approved for release by:**

Roxanne Moore, Project Manager



**NORTH COAST  
LABORATORIES LTD.**

Page 1 of 4

Date: October 6, 2016

**Report to:** Manhard Consulting, Ltd.  
611 I Street, Suite A  
Eureka, CA 95501

**Attn:** Tim Windbigler

**NCL#:** 1610043-01A

**AP#:** NA                      **Hole#:** TH #1                      **Depth:** 24"

**Project Name/Number:** HAYES / HAY.WCCA01                      **Sampled by:** Tim Windbigler

**Date Received:** 10/3/16                      **Date Sampled:** 09/30/16

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**SOIL EXAMINATION FOR SOIL PERCOLATION SUITABILITY**

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Textural Analysis	86 %	Sand
(2 sig. figs.)	5.7 %	Clay
	7.9 %	Silt
	37 %	Coarse Fragments by Volume
Bulk density    N/A* g/cc		Zone Classification: 1

**Comments:**

**Zone 1** - Soils in this zone are very high in sand content. They readily accept effluent, but because of their low silt and clay content they provide minimal filtration. These soils demand greater separation distances from ground water.

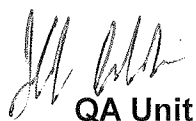
**Zone 2** - Soils in this zone provide adequate percolation rates and filtration to effluent. They are suitable for use of a conventional system without further testing.

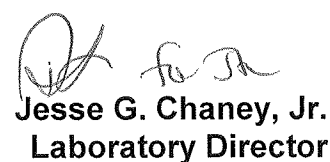
**Zone 3** - Soils in this zone are expected to provide filtration of effluent, but their ability to accept effluent at a suitable rate is questionable. These soils require wet-weather percolation tests to verify their suitability for effluent disposal by conventional leach field methods.

**Zone 4** - Soils in this zone are unsuitable for a conventional leach field because of their severe limitations for accepting effluent.

\* - There were no naturally occurring clods in this sample.

  
Laboratory Supervisor

  
QA Unit

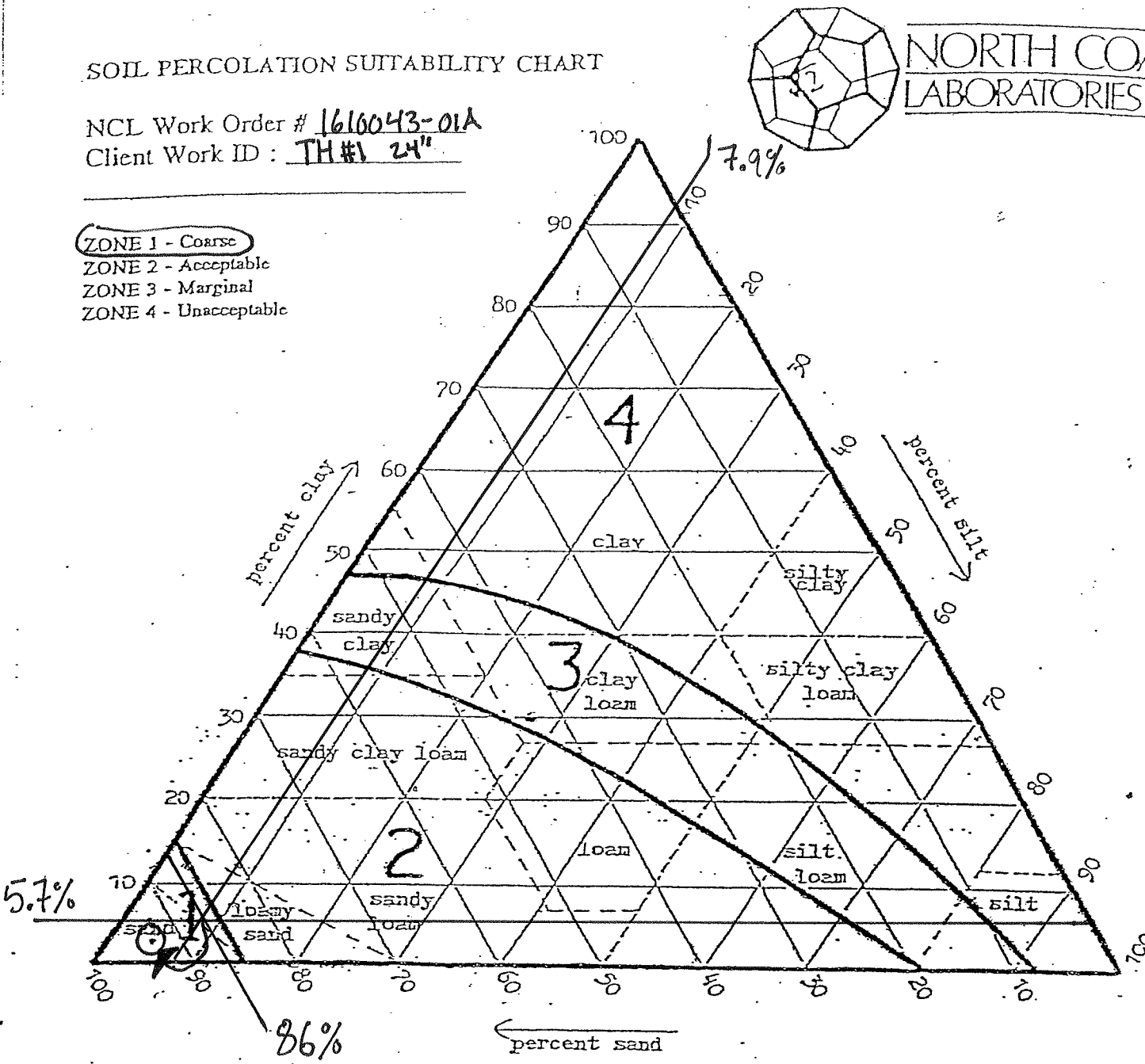
  
Jesse G. Chaney, Jr.  
Laboratory Director

SOIL PERCOLATION SUITABILITY CHART

NORTH COAST LABORATORIES LTD.

NCL Work Order # 1616043-01A  
 Client Work ID : TH#1 24"

- ZONE 1 - Coarse
- ZONE 2 - Acceptable
- ZONE 3 - Marginal
- ZONE 4 - Unacceptable



1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse fragments by moving the plotted point in the sand direction an additional 2% for each 10% (by volume) of fragments greater than 2mm in diameter.
3. Adjust for compactness of soil by moving the plotted point in the clay direction an additional 15% for soils having a bulk density greater than 1.7 gm/cc.
4. For soils falling in sand, loamy sand or sandy loam classification bulk density analysis will generally not affect suitability and analysis will not be necessary.

RESULTS

86 % Sand    5.7 % Clay    7.9 % Silt    37 % Coarse Fragments    Bulk Density: NA g/cc



Date: October 6, 2016

Page 2 of 4

**Report to:** Manhard Consulting, Ltd.  
611 I Street, Suite A  
Eureka, CA 95501

**Attn:** Tim Windbigler

**NCL#:** 1610043-02A

**AP#:** NA                      **Hole#:** TH #1                      **Depth:** 6'

**Project Name/Number:** HAYES / HAY.WCCA01                      **Sampled by:** Tim Windbigler

**Date Received:** 10/3/16

**Date Sampled:** 09/30/16

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**SOIL EXAMINATION FOR SOIL PERCOLATION SUITABILITY**

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Textural Analysis	91 %	Sand
(2 sig. figs.)	4.4 %	Clay
	4.6 %	Silt
	31 %	Coarse Fragments by Volume
Bulk density	N/A* g/cc	Zone Classification: 1

**Comments:**

**Zone 1** - Soils in this zone are very high in sand content. They readily accept effluent, but because of their low silt and clay content they provide minimal filtration. These soils demand greater separation distances from ground water.

**Zone 2** - Soils in this zone provide adequate percolation rates and filtration to effluent. They are suitable for use of a conventional system without further testing.

**Zone 3** - Soils in this zone are expected to provide filtration of effluent, but their ability to accept effluent at a suitable rate is questionable. These soils require wet-weather percolation tests to verify their suitability for effluent disposal by conventional leach field methods.

**Zone 4** - Soils in this zone are unsuitable for a conventional leach field because of their severe limitations for accepting effluent.

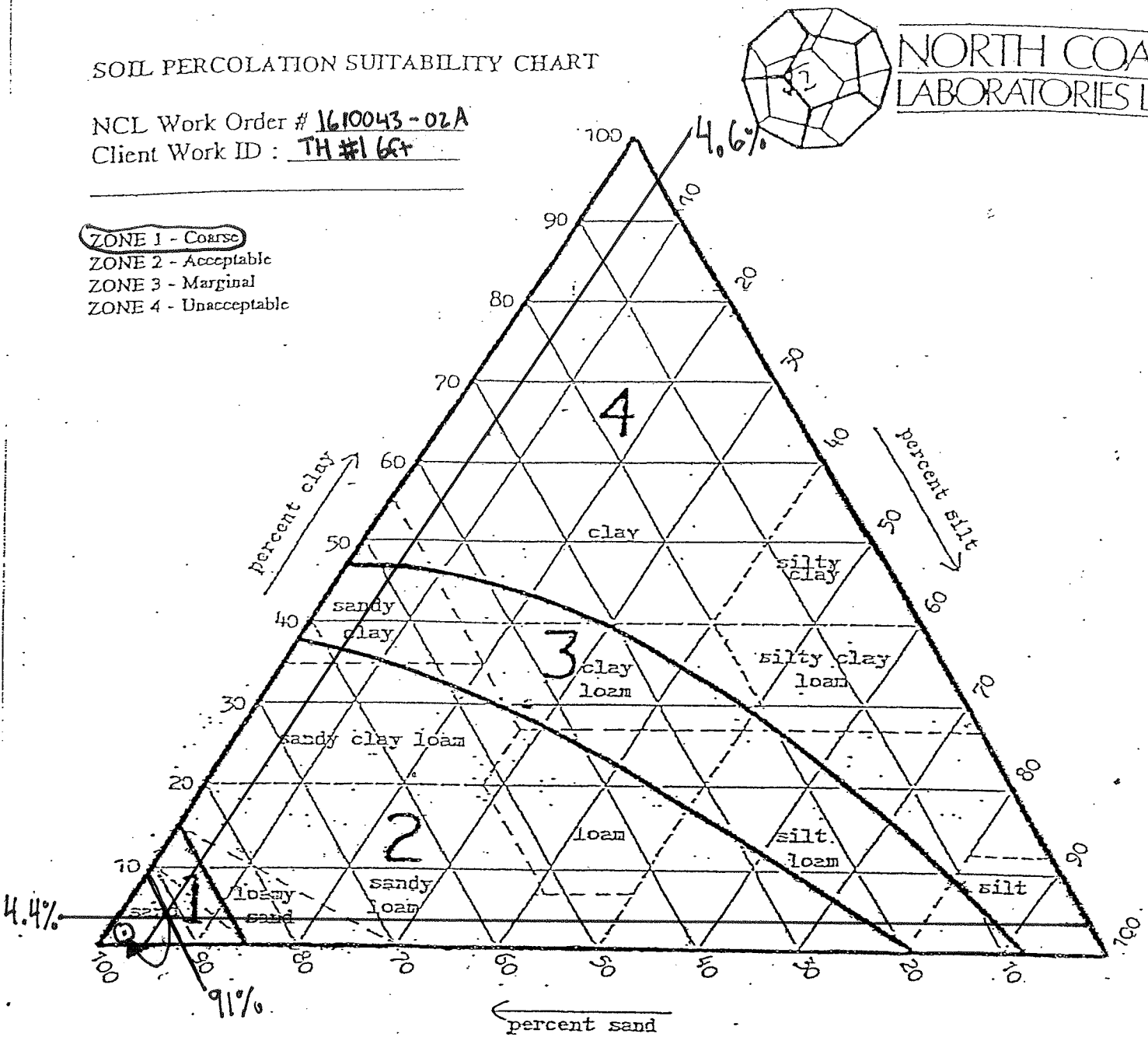
\* - There were no naturally occurring clods in this sample.

SOIL PERCOLATION SUITABILITY CHART

NORTH COAST LABORATORIES LTD.

NCL Work Order # 1610043-02A  
 Client Work ID : TH #16+

- ZONE 1 - Coarse
- ZONE 2 - Acceptable
- ZONE 3 - Marginal
- ZONE 4 - Unacceptable



1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse fragments by moving the plotted point in the sand direction an additional 2% for each 10% (by volume) of fragments greater than 2mm in diameter.
3. Adjust for compactness of soil by moving the plotted point in the clay direction an additional 15% for soils having a bulk density greater than 1.7 gm/cc.
4. For soils falling in sand, loamy sand or sandy loam classification bulk density analysis will generally not affect suitability and analysis will not be necessary.

RESULTS

91 % Sand    4.4 % Clay    4.6 % Silt    31 % Coarse Fragments    Bulk Density: NA g/cc

Date: October 6, 2016

Page 3 of 4

**Report to:** Manhard Consulting, Ltd.  
611 I Street, Suite A  
Eureka, CA 95501

**Attn:** Tim Windbigler

**NCL#:** 1610043-03A

**AP#:** NA                      **Hole#:** TH #2                      **Depth:** 42"

**Project Name/Number:** HAYES / HAY.WCCA01                      **Sampled by:** Tim Windbigler

**Date Received:** 10/3/16                      **Date Sampled:** 09/30/16

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**SOIL EXAMINATION FOR SOIL PERCOLATION SUITABILITY**

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Textural Analysis	92 %	Sand
(2 sig. figs.)	5.7 %	Clay
	1.9 %	Silt
	44 %	Coarse Fragments by Volume
Bulk density	N/A* g/cc	Zone Classification: 1

**Comments:**

**Zone 1** - Soils in this zone are very high in sand content. They readily accept effluent, but because of their low silt and clay content they provide minimal filtration. These soils demand greater separation distances from ground water.

**Zone 2** - Soils in this zone provide adequate percolation rates and filtration to effluent. They are suitable for use of a conventional system without further testing.

**Zone 3** - Soils in this zone are expected to provide filtration of effluent, but their ability to accept effluent at a suitable rate is questionable. These soils require wet-weather percolation tests to verify their suitability for effluent disposal by conventional leach field methods.

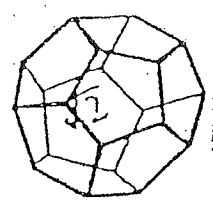
**Zone 4** - Soils in this zone are unsuitable for a conventional leach field because of their severe limitations for accepting effluent.

\* - There were no naturally occurring clods in this sample.

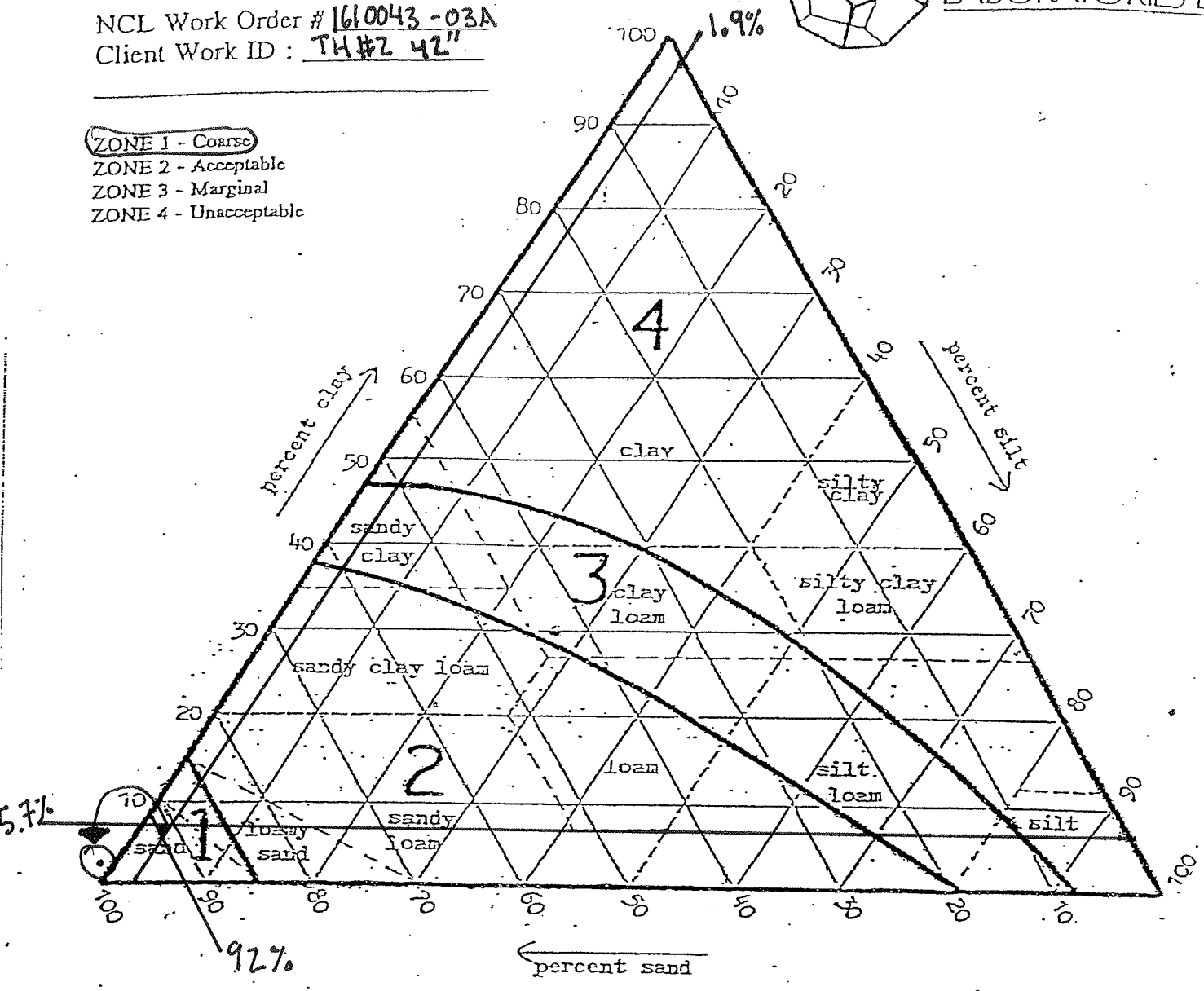
# SOIL PERCOLATION SUITABILITY CHART

NORTH COAST LABORATORIES LTD.

NCL Work Order # 1610043-03A  
Client Work ID : TH#2 42"



- ZONE 1 - Coarse
- ZONE 2 - Acceptable
- ZONE 3 - Marginal
- ZONE 4 - Unacceptable



1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse fragments by moving the plotted point in the sand direction an additional 2% for each 10% (by volume) of fragments greater than 2mm in diameter.
3. Adjust for compactness of soil by moving the plotted point in the clay direction an additional 15% for soils having a bulk density greater than 1.7 gm/cc.
4. For soils falling in sand, loamy sand or sandy loam classification bulk density analysis will generally not affect suitability and analysis will not be necessary.

### RESULTS

92 % Sand    5.7 % Clay    1.9 % Silt    44 % Coarse Fragments    Bulk Density: NA g/cc

Date: October 6, 2016

Page 4 of 4

**Report to:** Manhard Consulting, Ltd.  
611 I Street, Suite A  
Eureka, CA 95501

**Attn:** Tim Windbigler

**NCL#:** 1610043-04A

**AP#:** NA                      **Hole#:** TH #2                      **Depth:** 6'

**Project Name/Number:** HAYES / HAY.WCCA01                      **Sampled by:** Tim Windbigler

**Date Received:** 10/3/16

**Date Sampled:** 09/30/16

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**SOIL EXAMINATION FOR SOIL PERCOLATION SUITABILITY**

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Textural Analysis	88 %	Sand
(2 sig. figs.)	5.7 %	Clay
	6.0 %	Silt
	46 %	Coarse Fragments by Volume
Bulk density	N/A* g/cc	Zone Classification: 1

**Comments:**

**Zone 1** - Soils in this zone are very high in sand content. They readily accept effluent, but because of their low silt and clay content they provide minimal filtration. These soils demand greater separation distances from ground water.

**Zone 2** - Soils in this zone provide adequate percolation rates and filtration to effluent. They are suitable for use of a conventional system without further testing.

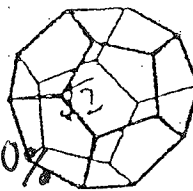
**Zone 3** - Soils in this zone are expected to provide filtration of effluent, but their ability to accept effluent at a suitable rate is questionable. These soils require wet-weather percolation tests to verify their suitability for effluent disposal by conventional leach field methods.

**Zone 4** - Soils in this zone are unsuitable for a conventional leach field because of their severe limitations for accepting effluent.

\* - There were no naturally occurring clods in this sample.

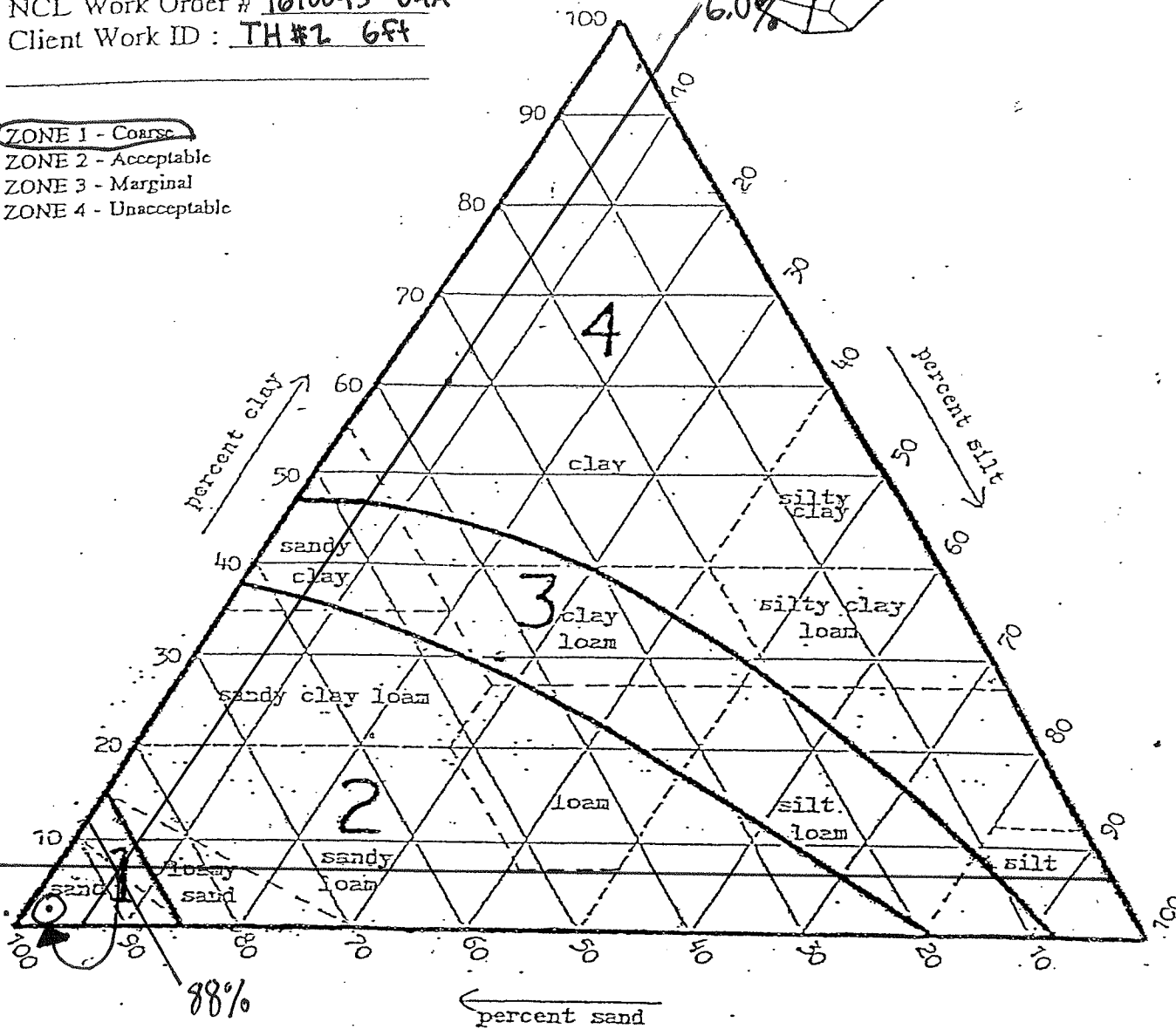
SOIL PERCOLATION SUITABILITY CHART

NCL Work Order # 1610043-04A  
 Client Work ID : TH#2 6ft



NORTH COAST  
 LABORATORIES LTD.

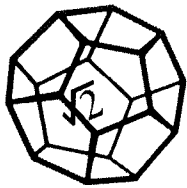
- ZONE 1 - Coarse
- ZONE 2 - Acceptable
- ZONE 3 - Marginal
- ZONE 4 - Unacceptable



1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse fragments by moving the plotted point in the sand direction an additional 2% for each 10% (by volume) of fragments greater than 2mm in diameter.
3. Adjust for compactness of soil by moving the plotted point in the clay direction an additional 15% for soils having a bulk density greater than 1.7 gm/cc.
4. For soils falling in sand, loamy sand or sandy loam classification bulk density analysis will generally not affect suitability and analysis will not be necessary.

RESULTS

88 % Sand    5.7 % Clay    6.0 % Silt    46 % Coarse Fragments    Bulk Density: NA g/cc



# NORTH COAST LABORATORIES LTD.

5680 West End Road • Arcata • CA 95521-9202  
707-822-4649 Fax 707-822-6831

## Chain of Custody

Attention: BDRSA

Results & Invoice to: Manhard Consulting, Ltd.

Address: 611 I Street, Suite A  
Eureka, CA 95501

Phone: (707) 444-3800

Copies of Report to: Tim Windbigler  
twindbigler@manhard.com

Sampler (Sign & Print): Tim Windbigler Tim Windbigler

**PROJECT INFORMATION**

Project Number: HAY. WCCAO1

Project Name: HAYES

Purchase Order Number: \_\_\_\_\_

LAB ID	SAMPLE ID	DATE	TIME	MATRIX*
	TH#1 @ 24"	9/30/2016		
	TH#1 @ 6 FT	9/30/2016		
	TH#2 @ 42"	9/30/2016		
	TH#2 @ 6 FT	9/30/2016		

ANALYSIS	CONTAINER PRESERVATIVE	Bulk density/particle size															
		1	2	3	4	5	6	7	8	9	10	11	12				

**LABORATORY NUMBER:** 1610043

TAT:  STD (2-3 Wk)  Other:  
PRIOR AUTHORIZATION IS REQUIRED FOR RUSH SAMPLES.

**REPORTING REQUIREMENTS:**  
 State Forms  
 Geotracker  SWAMP  Other EDD:  
 Final Report PDF  FAX By:

**CONTAINER CODES:** 1—½ gal. pl; 2—250 ml pl; 3—500 ml pl; 4—1 L Nalgene; 5—250 ml BG; 6—500 ml BG; 7—1 L BG; 8—40 ml VOA; 9—60 ml VOA; 10—125 ml VOA; 11—4 oz glass jar; 12—8 oz glass jar; 13—brass tube; 14—other  
**PRESERVATIVE CODES:** a—HNO<sub>3</sub>; b—HCl; c—H<sub>2</sub>SO<sub>4</sub>; d—Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub>; e—NaOH; f—C<sub>2</sub>H<sub>3</sub>O<sub>2</sub>Cl; g—other

**SAMPLE CONDITION/SPECIAL INSTRUCTIONS**

Temperature: 21.0°C

Received On Ice? (N)

Samples Intact? (Y)

Preserved? (N)

Preserved @ NCL? (N/NA)

RELINQUISHED BY (Sign & Print)	DATE/TIME	RECEIVED BY (Sign)	DATE/TIME
<u>Hayes Tanager</u>	<u>10/3/16</u> 5:00PM	<u>RCO</u>	<u>10/3/16</u> 1700

**SAMPLE DISPOSAL**  
 NCL Disposal of Non-Contaminated  
 Return  Pickup

**CHAIN OF CUSTODY SEALS Y/N/NA** [ ]  
**SHIPPED VIA:** UPS Fed-Ex Hand

\***MATRIX:** DW=Drinking Water; Eff=Effluent; Inf=Influent; SW=Surface Water; GW=Ground Water; WW= Waste Water; S= Soil; O= Other.

**ALL CONTAMINATED NON-AQUEOUS SAMPLES WILL BE RETURNED TO CLIENT**