



St.Croix Sensory, Inc.

Service Engineering Group

Dredge Sediment

Odor Evaluation Report

Report No. 633302

11/29/06

Data Release Authorization:

Melissa McGinley
Laboratory Associate

Reviewed and Approved:

Charles M. McGinley, P.E.
Technical Director

St. Croix Sensory is a laboratory dedicated to practicing state-of-the-art sensory evaluation and to advancing the science of sensory perception.

We are a family owned and operated business providing our clients with personal customer service, flexible scheduling, timely results.

Our focus is to provide the best professional services available to help make your project or product a success.

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St. Croix Sensory, Inc.

Odor Evaluation Report

Client: Service Engineering GroupReport No.: 633302Project: Dredge SedimentEvaluation Date: 11/29/06

#	Field No.	Sample Description	ASTM E679 & EN13725		ASTM E544	PERSISTENCY	CHARACTERIZATION		Comments
			Detection Threshold	Recognition Threshold	Intensity	Dose-Response Slope	Hedonic Tone	Principal Odor Descriptors	
1	A10	5L of A1	2,700	1,700	85	-0.48	-3.8	Chemical, Tar, Petroleum	
2	A20	5L of A2	2,900	1,900	85	-0.45	-5.0	Petroleum, Offensive	
3	B10	5L of B1	2,900	1,800	230	-0.51	-6.8	Chemical, Offensive, Earthy	
4	B20	5L of B2	3,600	2,100	210	-0.49	-7.2	Chemical, Offensive, Petroleum, Solvent	
5									
6									
7									
8									
9									
10									

St. Croix Sensory, Inc.

Odor Evaluation Report

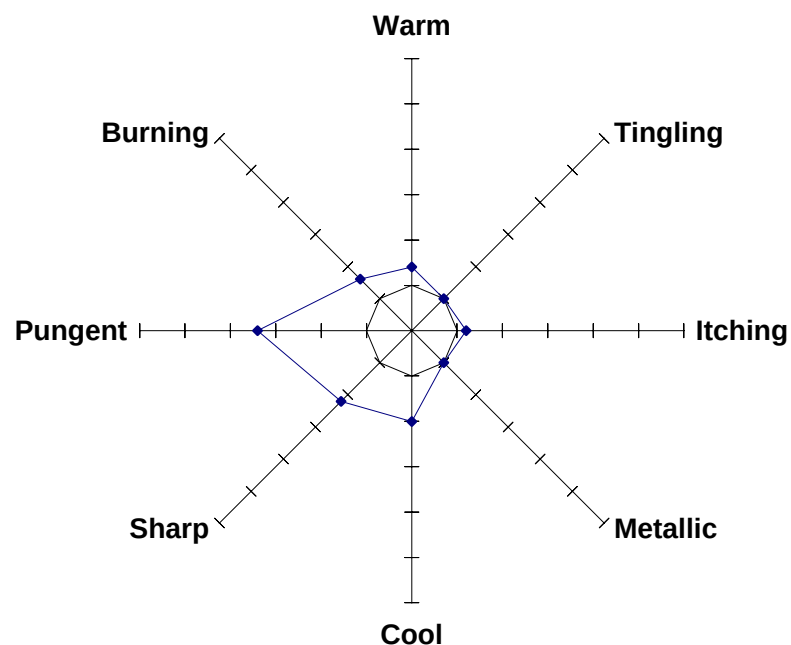
Client: Service Engineering Group

Report No.: 633302

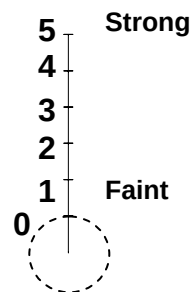
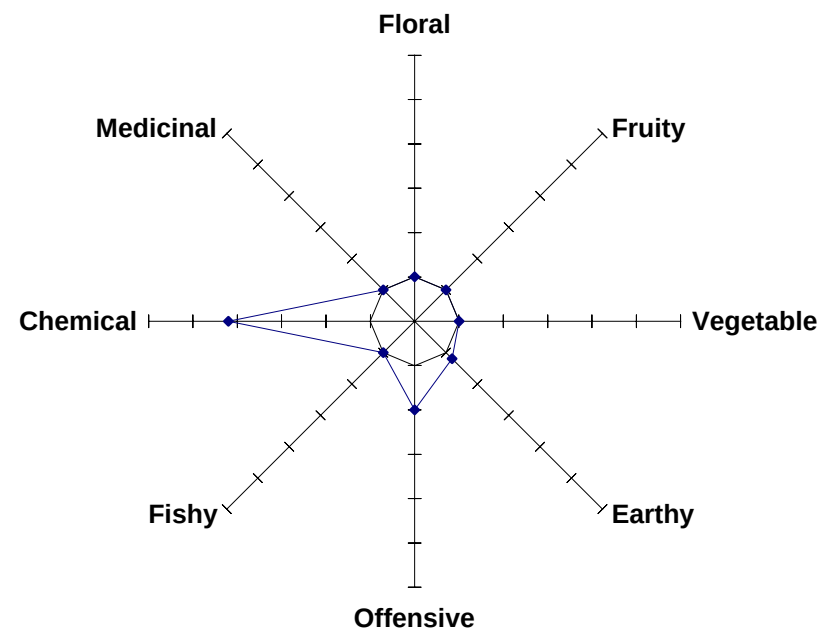
Project: Dredge Sediment

Evaluation Date: 11/29/06

#	Field No.	Sample Description	ASTM E679 & EN13725		ASTM E544	PERSISTENCY	CHARACTERIZATION		Comments
			Detection Threshold	Recognition Threshold	Intensity	Dose-Response Slope	Hedonic Tone	Principal Odor Descriptors	
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

Client: Service Engineering GroupField No.: A10Report No.: 633302Project: Dredge SedimentDescription: 5L of A1Evaluation Date: 11/29/06**Sensation Descriptor Graph**

Average Relative Strength	
Warm	0.4
Tingling	0.0
Itching	0.2
Metallic	0.0
Cool	1.0
Sharp	1.2
Pungent	2.4
Burning	0.6

KEY**Relative Strength****Odor Descriptor Graph**

Average Relative Strength	
Floral	0.0
Fruity	0.0
Vegetable	0.0
Earthy	0.2
Offensive	1.0
Fishy	0.0
Chemical	3.2
Medicinal	0.0

St. Croix Sensory, Inc.

Odor Evaluation Report

Client: Service Engineering Group Field No.: A10
Project: Dredge Sediment Description: 5L of A1

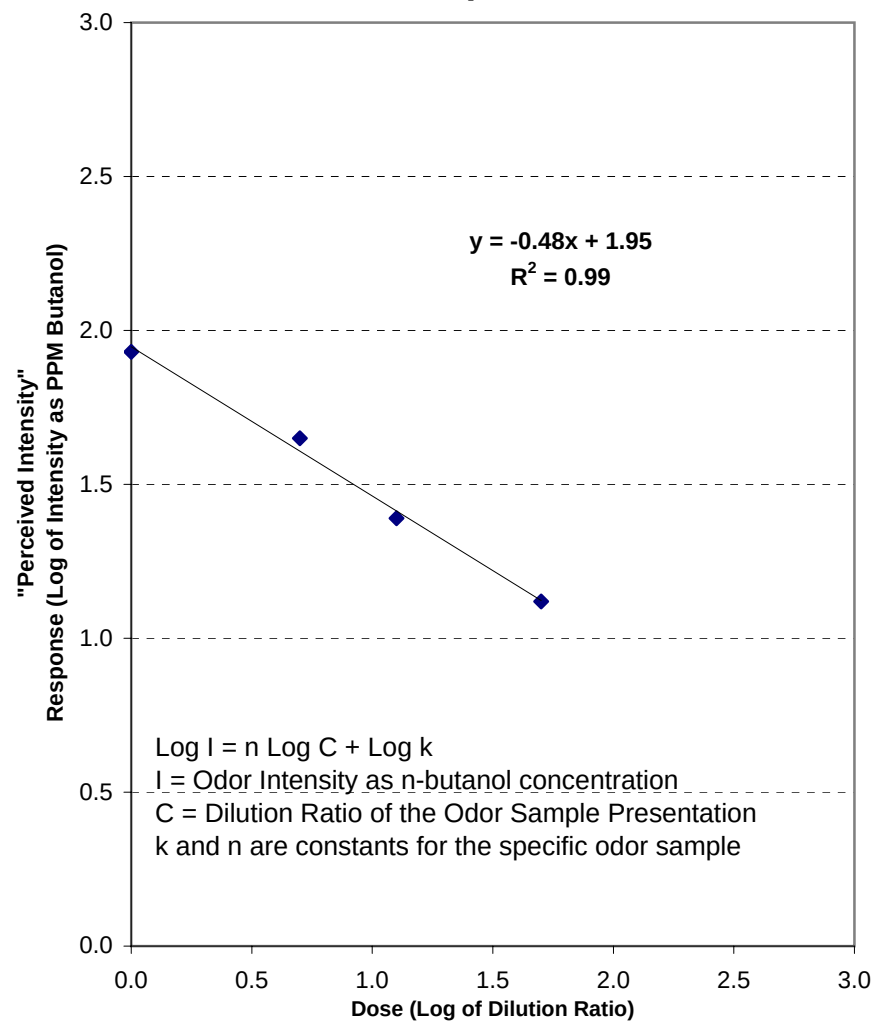
Report No.: 633302
Evaluation Date: 11/29/06

% of Assessors |*****|*****|*****|*****| 100%

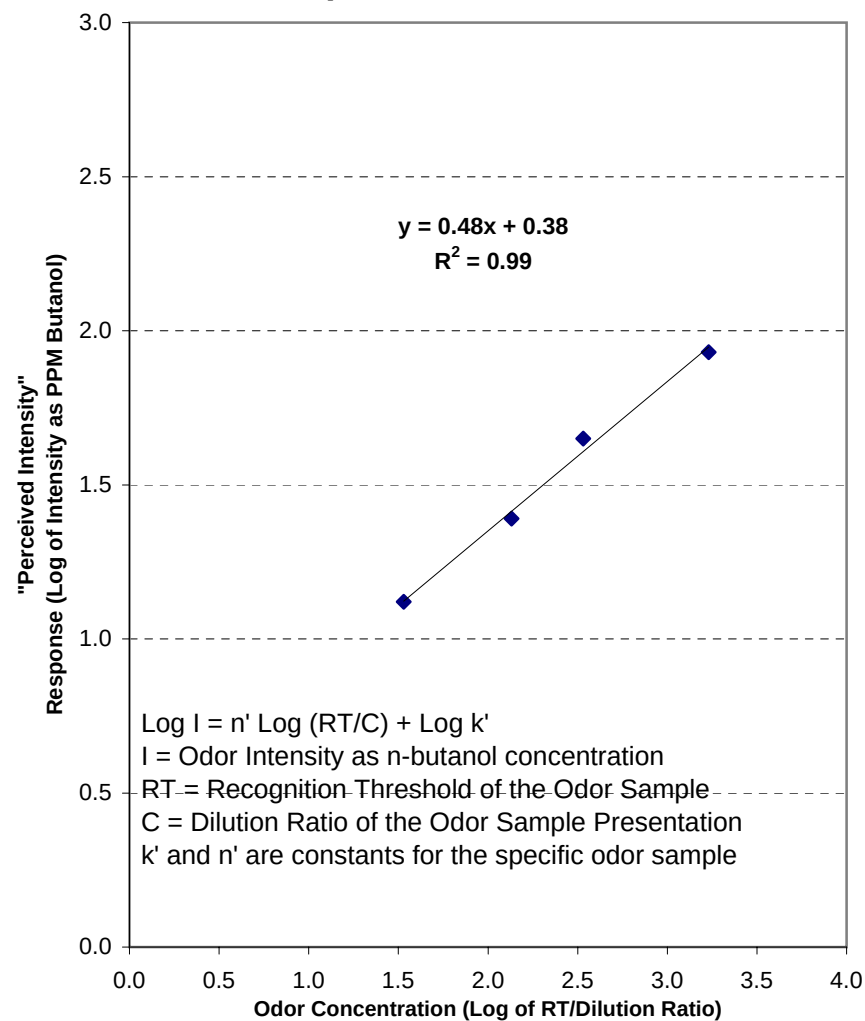
Chemical *****
Grease *****
Tar *****
Car exhaust *****
Petroleum *****
Creosote *****
Solvent *****
Oil *****
Offensive *****
Earthy *****
Musty *****

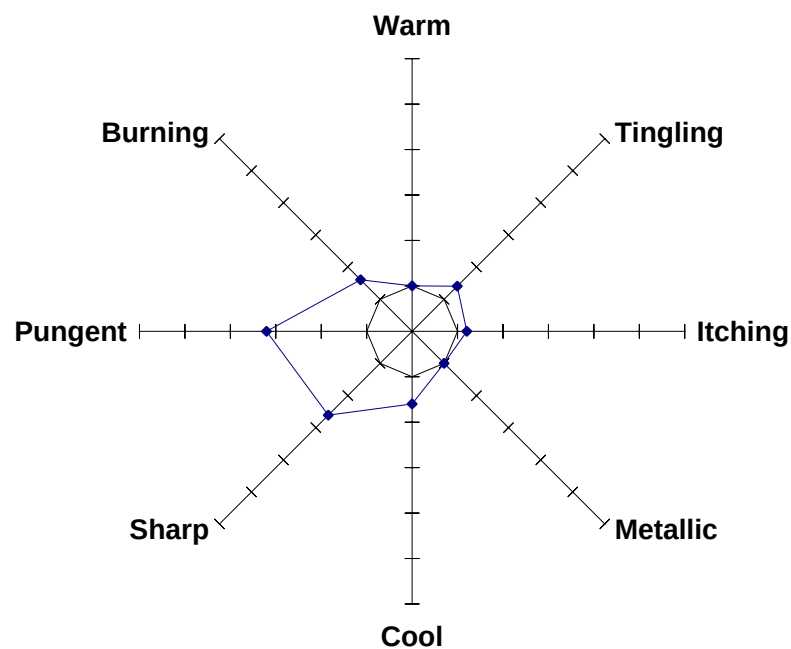
Client: Service Engineering GroupField No.: A10Report No.: 633302Project: Dredge SedimentDescription: 5L of A1Evaluation Date: 11/29/06

Dose-Response

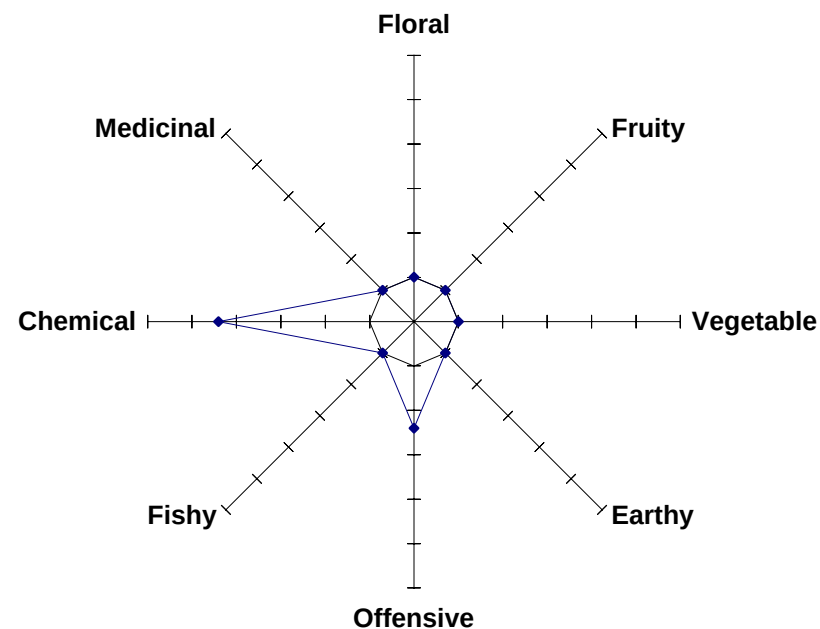


Dose-Response as Power Law

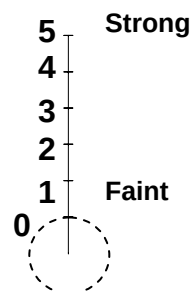


Client: Service Engineering GroupField No.: A20Report No.: **633302**Project: Dredge SedimentDescription: 5L of A2Evaluation Date: 11/29/06**Sensation Descriptor Graph****Average Relative Strength**

Warm	0.0
Tingling	0.4
Itching	0.2
Metallic	0.0
Cool	0.6
Sharp	1.6
Pungent	2.2
Burning	0.6

Odor Descriptor Graph**Average Relative Strength**

Floral	0.0
Fruity	0.0
Vegetable	0.0
Earthy	0.0
Offensive	1.4
Fishy	0.0
Chemical	3.4
Medicinal	0.0

KEY**Relative Strength**

St. Croix Sensory, Inc.

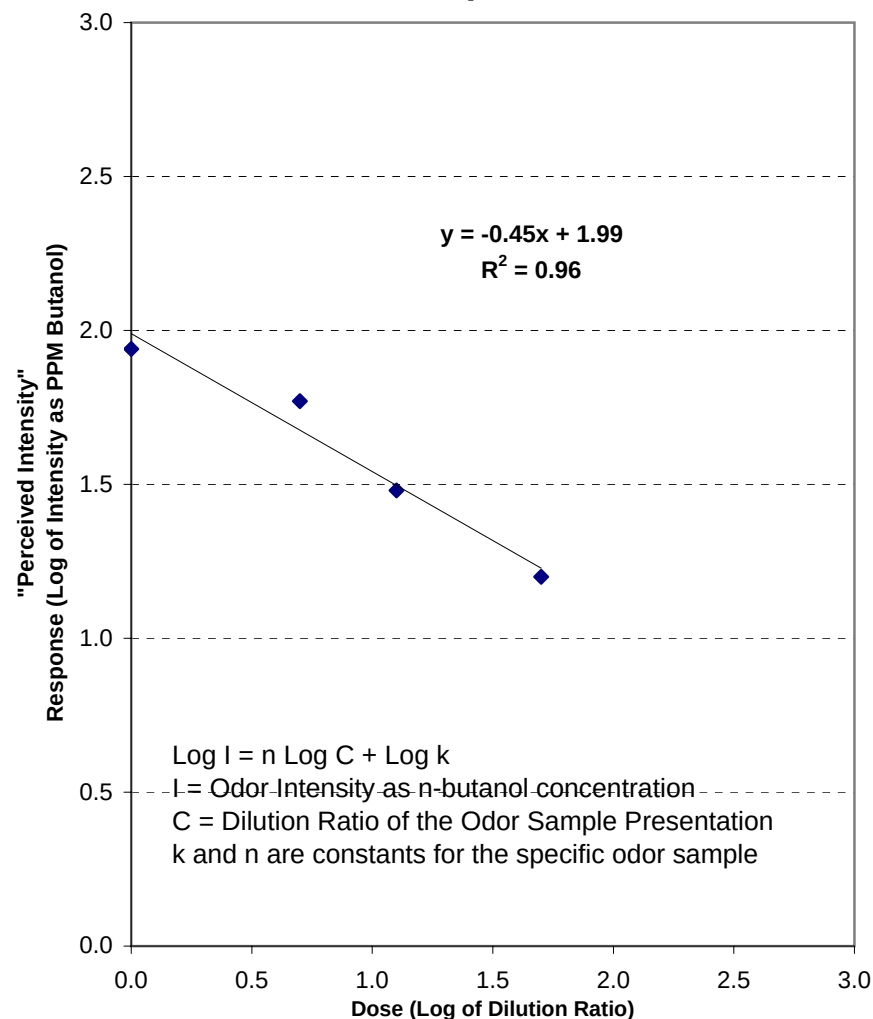
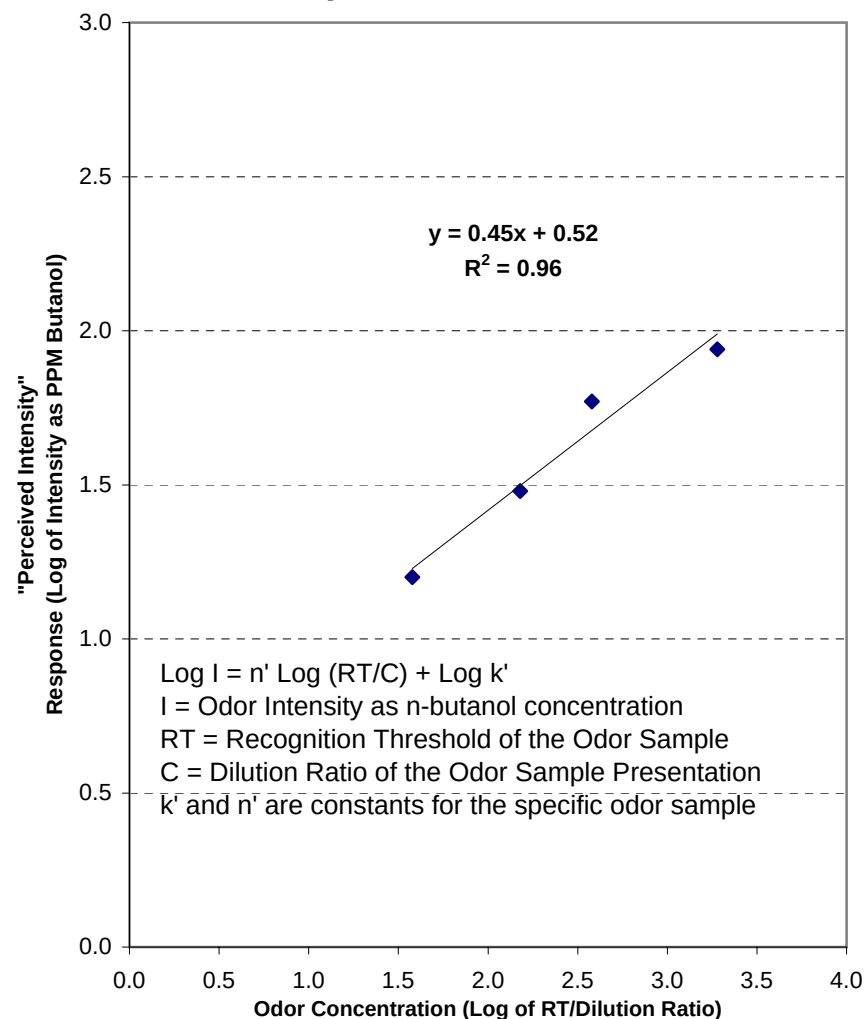
Odor Evaluation Report

Client: Service Engineering Group Field No.: A20
Project: Dredge Sediment Description: 5L of A2

Report No.: 633302
Evaluation Date: 11/29/06

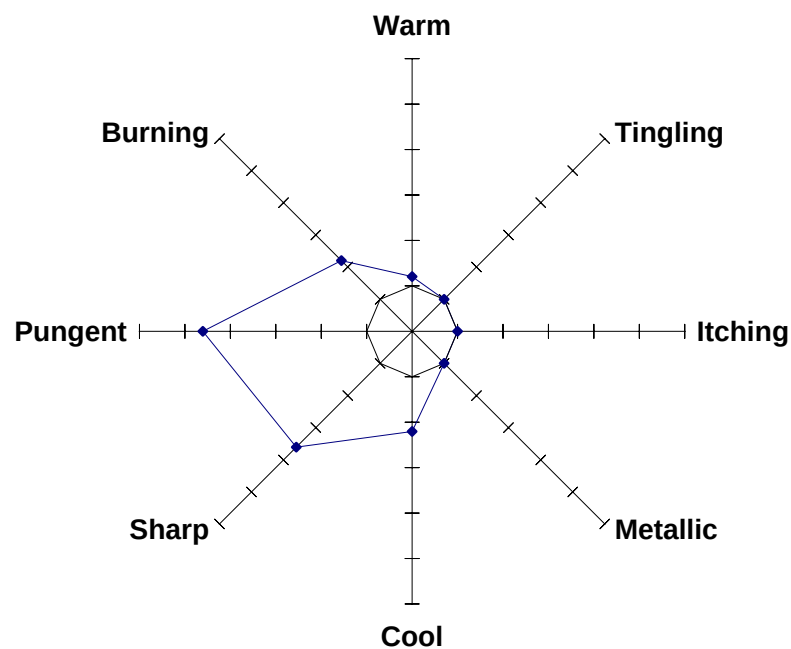
% of Assessors |*****|*****|*****|*****| 100%

Chemical *****
Car exhaust *****
Petroleum *****
Solvent *****
Gasoline *****
Oil *****
Offensive *****
Urine *****
Earthy *****
Mold *****

Client: Service Engineering GroupField No.: A20Report No.: 633302Project: Dredge SedimentDescription: 5L of A2Evaluation Date: 11/29/06**Dose-Response****Dose-Response as Power Law**

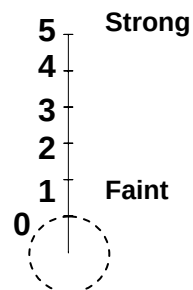
Client: Service Engineering GroupField No.: B10Report No.: 633302Project: Dredge SedimentDescription: 5L of B1Evaluation Date: 11/29/06

Sensation Descriptor Graph



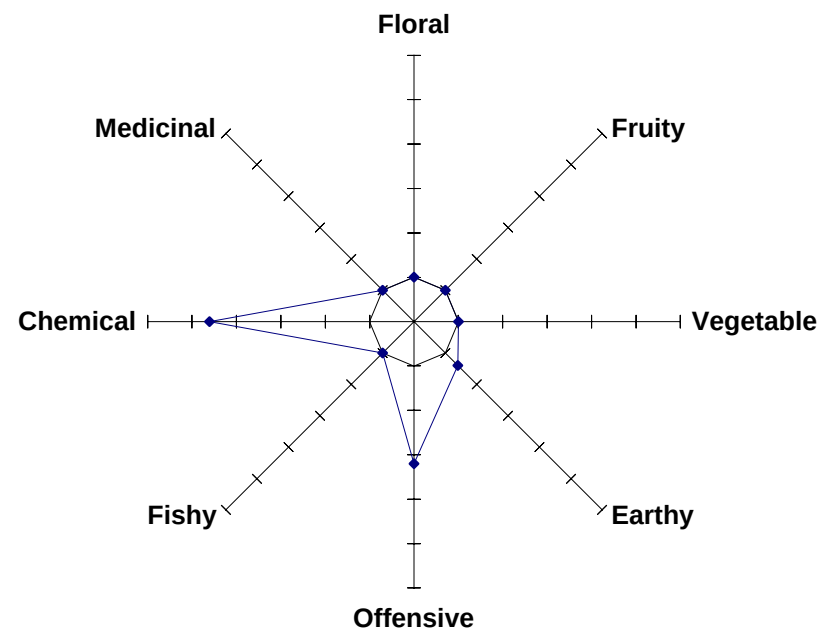
Average Relative Strength	
Warm	0.2
Tingling	0.0
Itching	0.0
Metallic	0.0
Cool	1.2
Sharp	2.6
Pungent	3.6
Burning	1.2

KEY



Relative Strength

Odor Descriptor Graph



Average Relative Strength	
Floral	0.0
Fruity	0.0
Vegetable	0.0
Earthy	0.4
Offensive	2.2
Fishy	0.0
Chemical	3.6
Medicinal	0.0

St. Croix Sensory, Inc.

Odor Evaluation Report

Client: Service Engineering Group Field No.: B10
Project: Dredge Sediment Description: 5L of B1

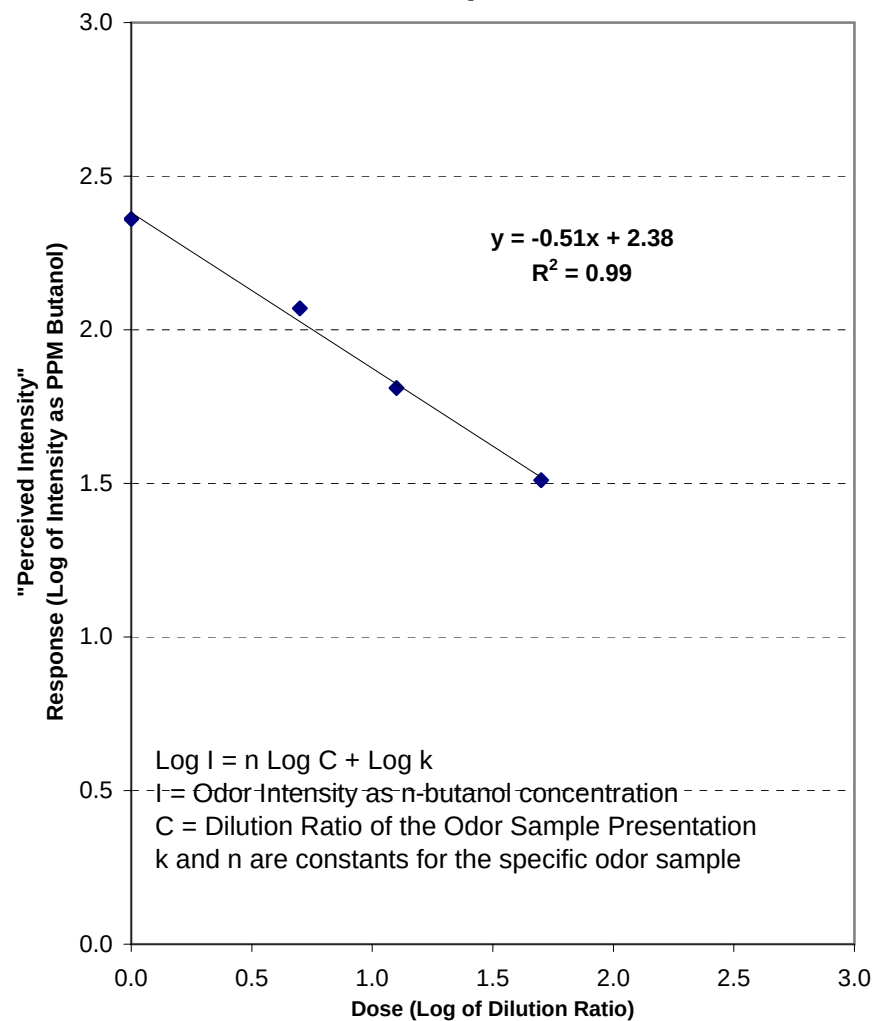
Report No.: 633302
Evaluation Date: 11/29/06

% of Assessors |*****|*****|*****|*****| 100%

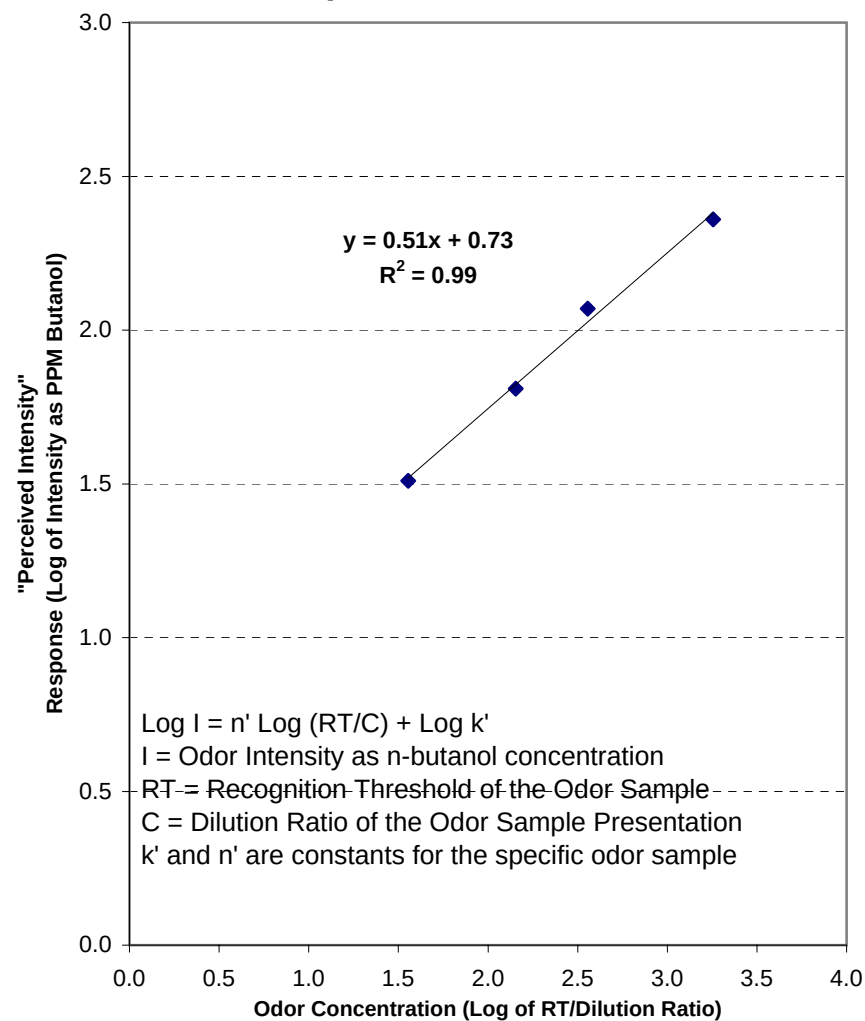
Chemical *****
Grease *****
Car exhaust *****
Petroleum *****
Cleaning fluid *****
Plastic *****
Solvent *****
Vinyl *****
Gasoline *****
Oil *****
Offensive *****
Sour *****
Urine *****
Earthy *****
Musky *****

Client: Service Engineering GroupField No.: B10Report No.: 633302Project: Dredge SedimentDescription: 5L of B1Evaluation Date: 11/29/06

Dose-Response

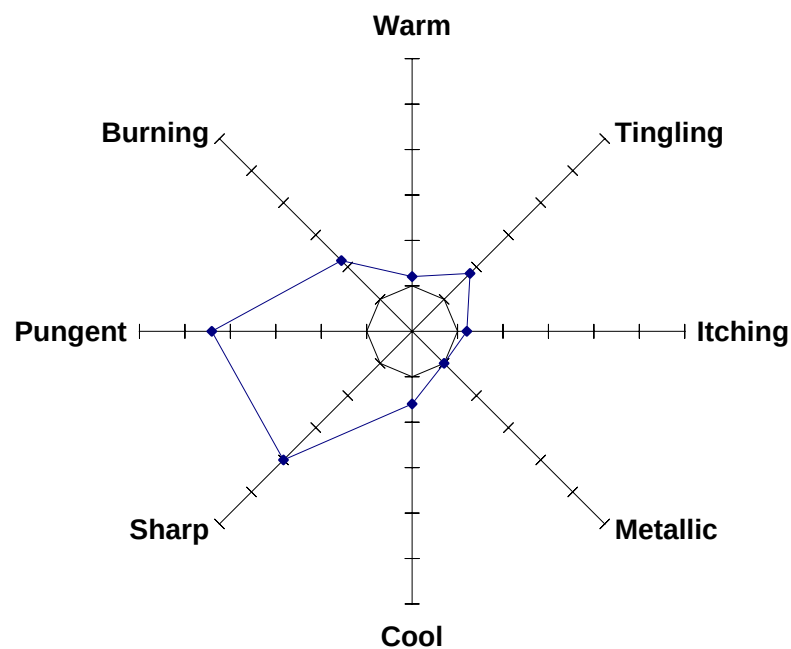


Dose-Response as Power Law



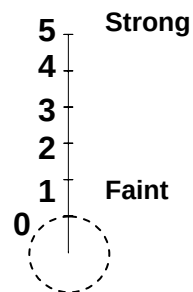
Client: Service Engineering GroupField No.: B20Report No.: 633302Project: Dredge SedimentDescription: 5L of B2Evaluation Date: 11/29/06

Sensation Descriptor Graph

Average Relative
Strength

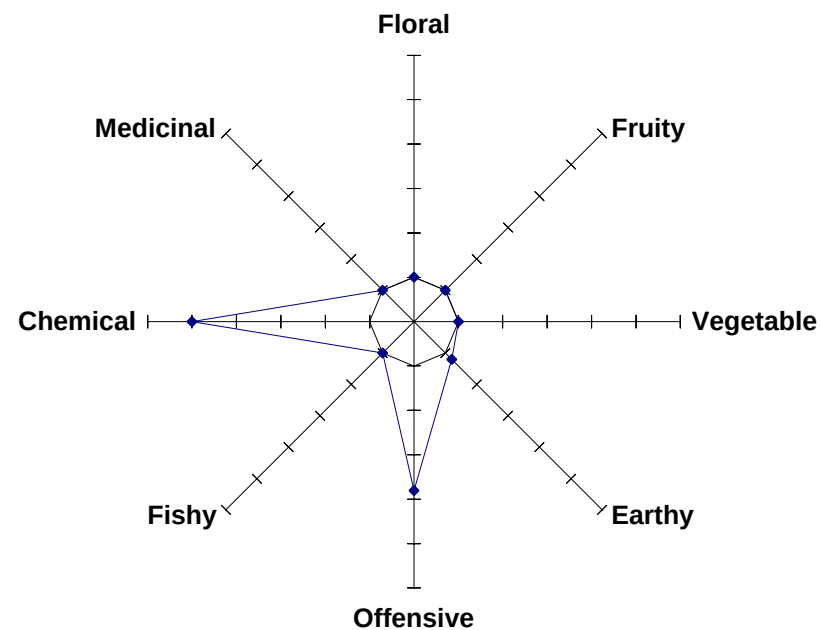
Warm	0.2
Tingling	0.8
Itching	0.2
Metallic	0.0
Cool	0.6
Sharp	3.0
Pungent	3.4
Burning	1.2

KEY



Relative Strength

Odor Descriptor Graph

Average Relative
Strength

Floral	0.0
Fruity	0.0
Vegetable	0.0
Earthy	0.2
Offensive	2.8
Fishy	0.0
Chemical	4.0
Medicinal	0.0

St. Croix Sensory, Inc.

Odor Evaluation Report

Client: Service Engineering Group Field No.: B20
Project: Dredge Sediment Description: 5L of B2

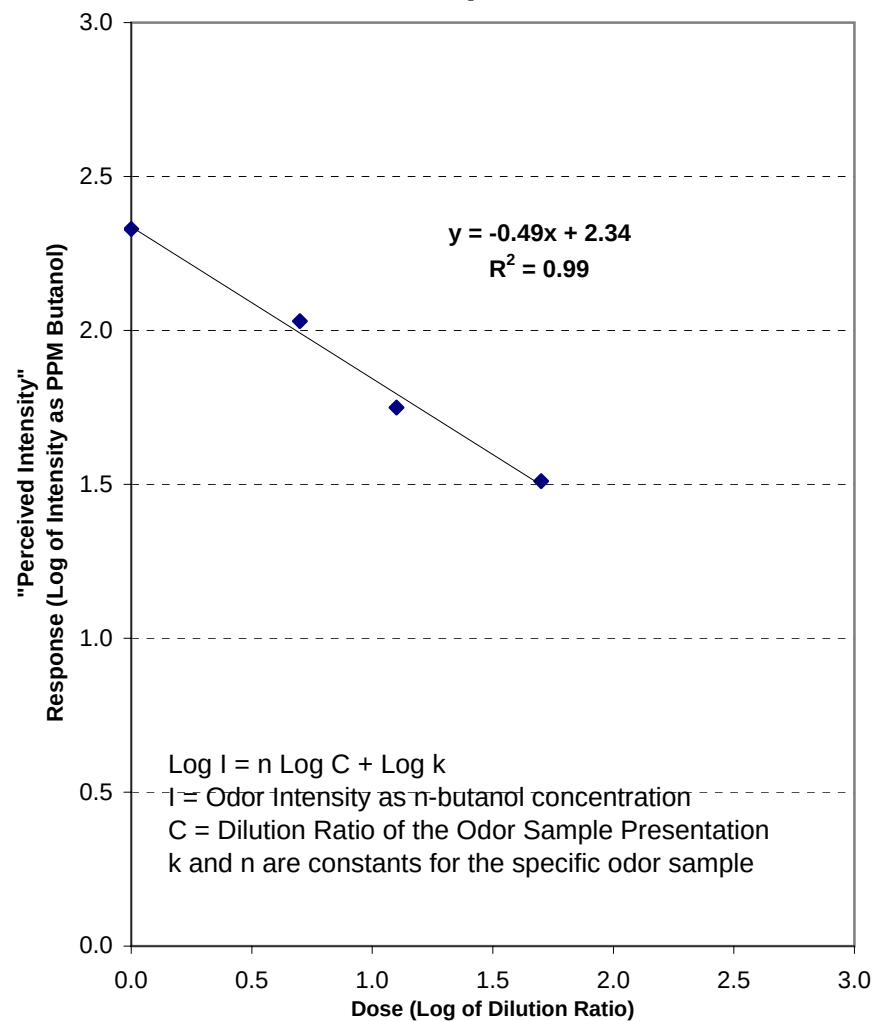
Report No.: 633302
Evaluation Date: 11/29/06

% of Assessors |*****|*****|*****|*****| 100%

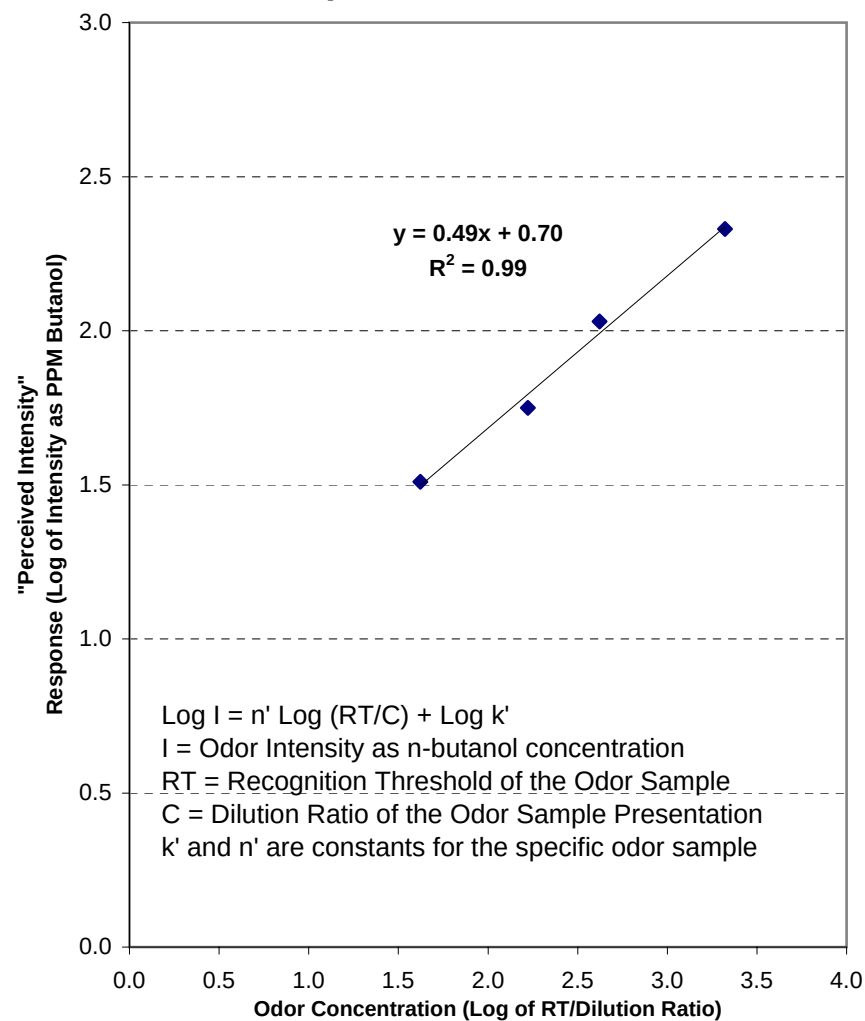
Chemical *****
Grease *****
Tar *****
Car exhaust *****
Kerosine *****
Petroleum *****
Cleaning fluid *****
Varnish *****
Solvent *****
Gasoline *****
Oil *****
Offensive *****
Urine *****
Septic *****
Vomit *****

Client: Service Engineering GroupField No.: B20Report No.: 633302Project: Dredge SedimentDescription: 5L of B2Evaluation Date: 11/29/06

Dose-Response



Dose-Response as Power Law



St. Croix Sensory, Inc.

CHAIN OF CUSTODY RECORD FOR ODOR SAMPLES

Client: <u>SCS</u>		Sampled By: <u>AML</u>		Odor Evaluations Requested: (X)				Page <u>L</u> of <u>L</u>	
Project Name: <u>Dredge Sediment</u>		Sampling Date: <u>11-29-06</u>		Odor Concentration* (Detection & Recognition Threshold) Odor Intensity* (PPM 1-Butanol) Odor Characterization (Hedonic Tone & Descriptors) Odor Persistence (“Dose-Response”)				For Laboratory use Only	
Comments:								Odor Evaluation Report No. <u>633302</u>	
Line No.	Field No.	Sample Description	Sample Time	Field H ₂ S (ppm)					
1	<u>A10</u>	<u>5L of A1</u>	<u>10:00A</u>		X	X	X	X	
2	<u>A20</u>	<u>5L of A2</u>	<u>10:10A</u>		↓	↓	↓	↓	
3	<u>B10</u>	<u>5L of B1</u>	<u>10:15A</u>						
4	<u>B20</u>	<u>5L of B2</u>	<u>10:25A</u>		↓	↓	↓	↓	
5									
6									
7									
8									
9									
10									
11									
12									

Transmittal

Number of Shipping Boxes _____

Relinquished By	Date	Time	Accepted By	Date	Time	Comments & Exceptions Noted
<u>Chin Lay</u>	<u>11-29-06</u>	<u>10:30</u>	<u>Antonia S. Lox</u>	<u>11/29/06</u>	<u>12:10</u>	
Received at St. Croix Sensory Laboratory						

*Odor Concentration: ASTM E679-04 and EN13725:2003 and Odor Intensity: ASTM E544-99(2004)

St. Croix Sensory, Inc. ♦ 3549 Lake Elmo Avenue North ♦ Lake Elmo, MN 55042 U.S.A. ♦ Tel:800-879-9231 ♦ Fax:651-439-1065 ♦ Email:reports@fivesenses.com ♦ Web:www.fivesenses.com

LAB COPIES WHITE & YELLOW

CLIENT COPY PINK



St.Croix Sensory, Inc.

Service Engineering Group

Dredge Sediment

Odor Evaluation Report

Report No. 633401

11/30/06

Data Release Authorization:

Melissa McGinley
Laboratory Associate

Reviewed and Approved:

Michael A. McGinley, P.E.
Laboratory Director

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St.Croix Sensory, Inc.

Service Engineering Group

Dredge Sediment

Odor Evaluation Report

Report No. 633401

11/30/06

Data Release Authorization:

Melissa McGinley
Laboratory Associate

Reviewed and Approved:

Michael A. McGinley, P.E.
Laboratory Director

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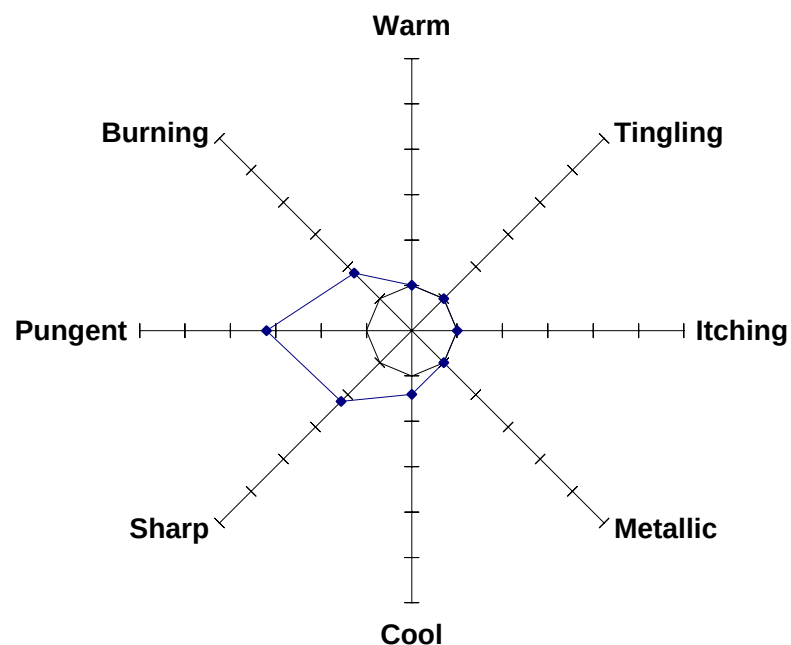
3549 Lake Elmo Avenue North
P.O. Box 313
Lake Elmo, Minnesota 55042 U.S.A.

Tel: 800-879-9231
Fax: 651-439-1065

Email: stcroix@fivesenses.com

Client: Service Engineering GroupField No.: C10Report No.: 633401Project: Dredge SedimentDescription: 5L from 100L TedlarEvaluation Date: 11/30/06

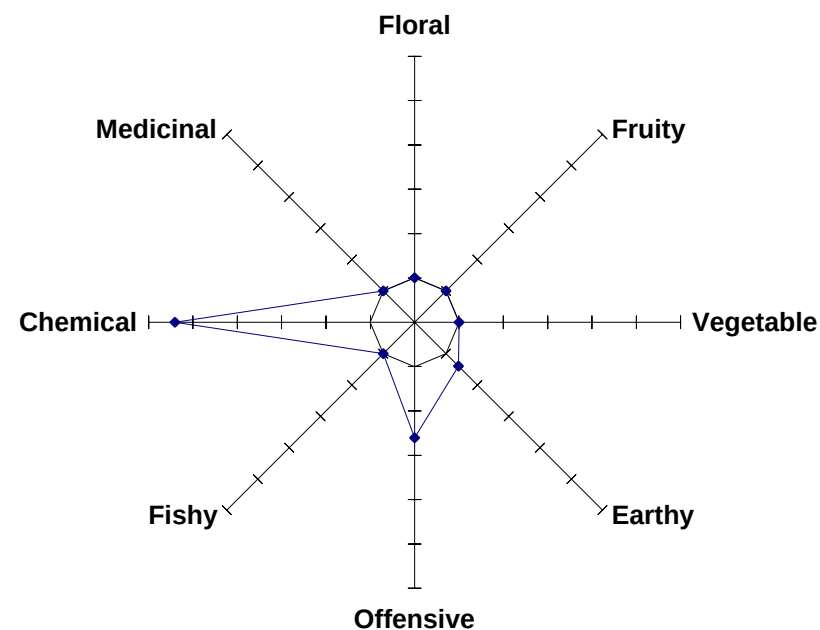
Sensation Descriptor Graph



Average Relative Strength

Warm	0.0
Tingling	0.0
Itching	0.0
Metallic	0.0
Cool	0.4
Sharp	1.2
Pungent	2.2
Burning	0.8

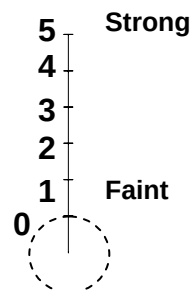
Odor Descriptor Graph



Average Relative Strength

Floral	0.0
Fruity	0.0
Vegetable	0.0
Earthy	0.4
Offensive	1.6
Fishy	0.0
Chemical	4.4
Medicinal	0.0

KEY



Relative Strength

St. Croix Sensory, Inc.

Odor Evaluation Report

Client: Service Engineering Group Field No.: C10
Project: Dredge Sediment Description: 5L from 100L Tedlar

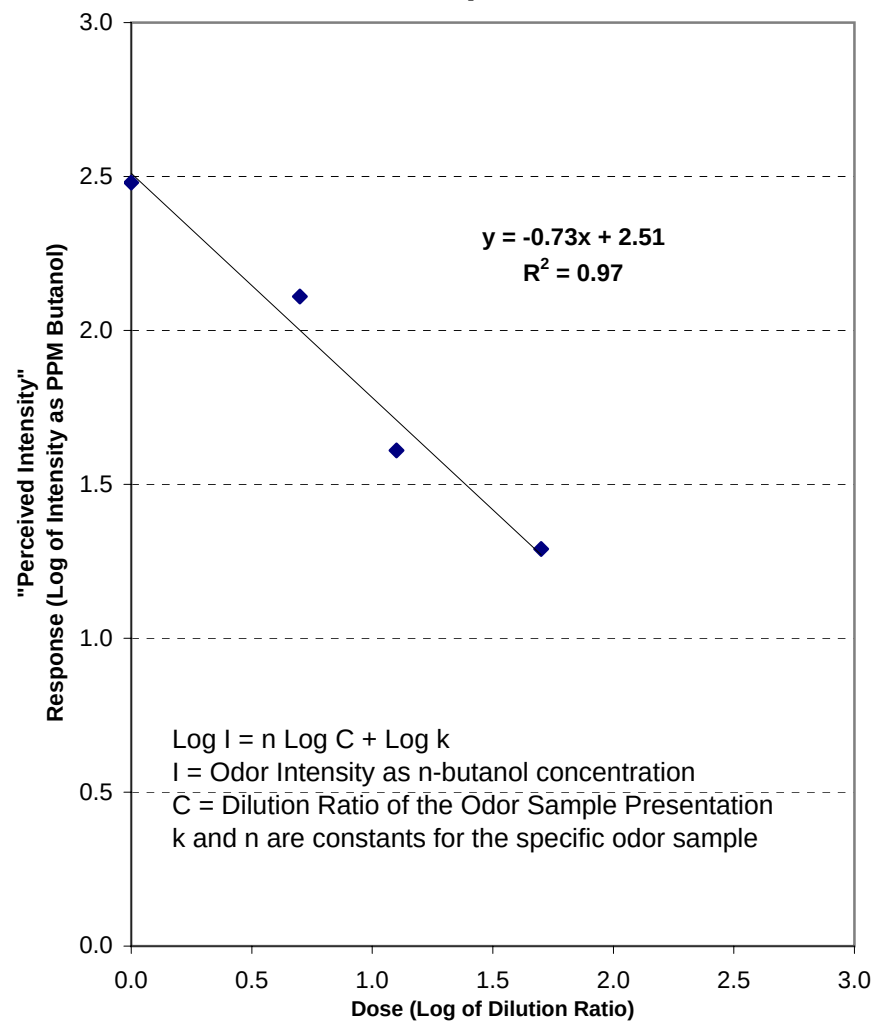
Report No.: 633401
Evaluation Date: 11/30/06

% of Assessors |*****|*****|*****|*****| 100%

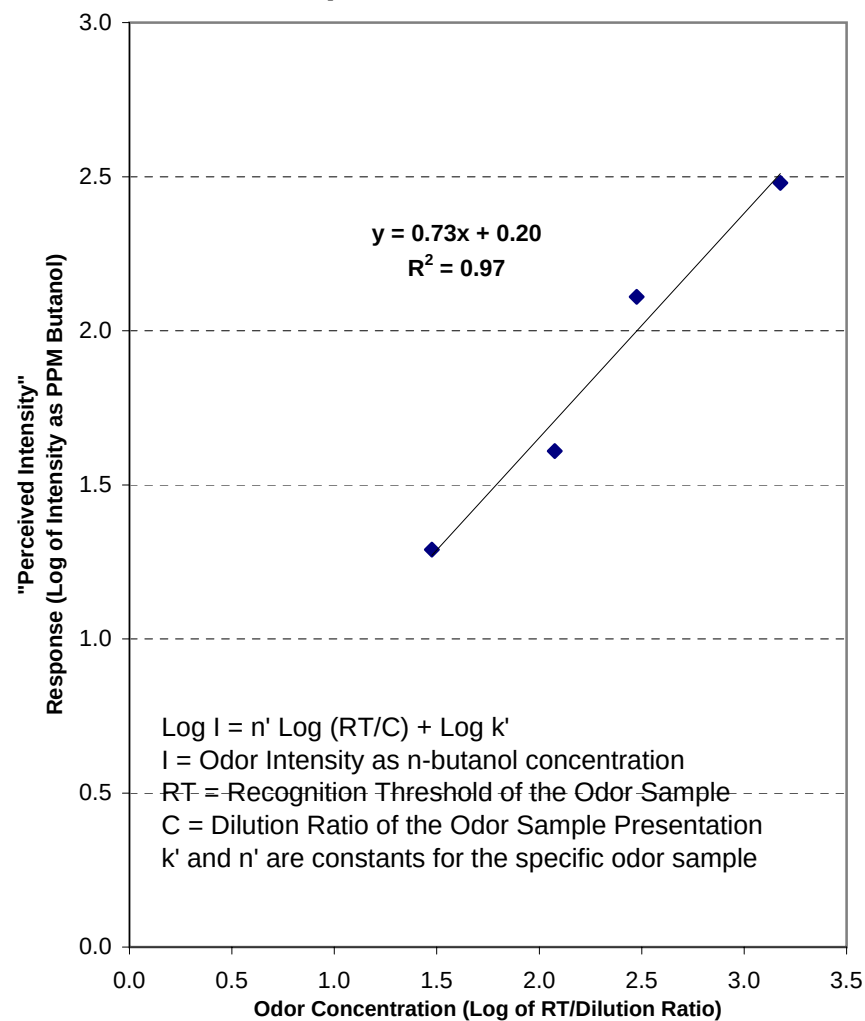
Chemical *****
Paint *****
Tar *****
Car exhaust *****
Kerosine *****
Petroleum *****
Cleaning fluid *****
Plastic *****
Creosote *****
Mothball *****
Vinyl *****
Gasoline *****
Oil *****
Offensive *****
Sewer *****
Septic *****
Earthy *****

Client: Service Engineering GroupField No.: C10Report No.: 633401Project: Dredge SedimentDescription: 5L from 100L TedlarEvaluation Date: 11/30/06

Dose-Response

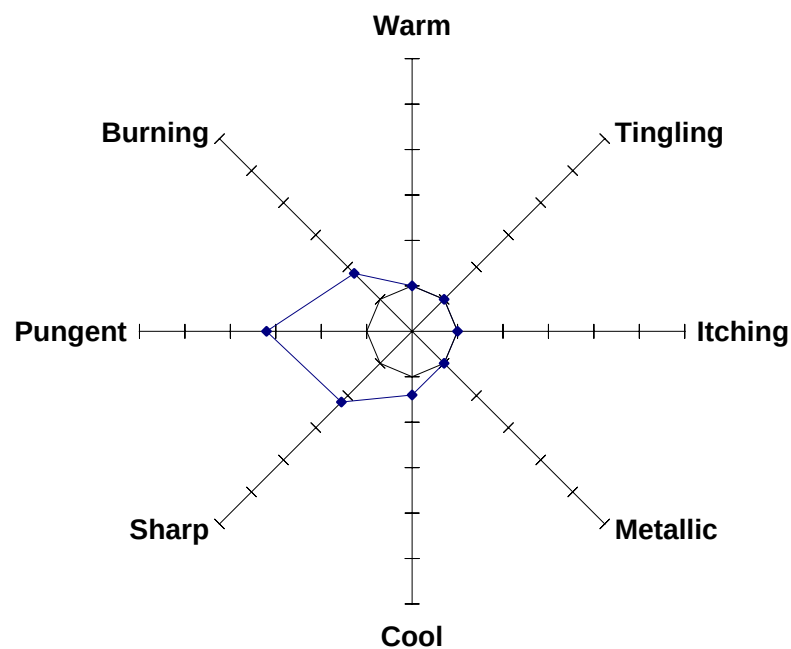


Dose-Response as Power Law



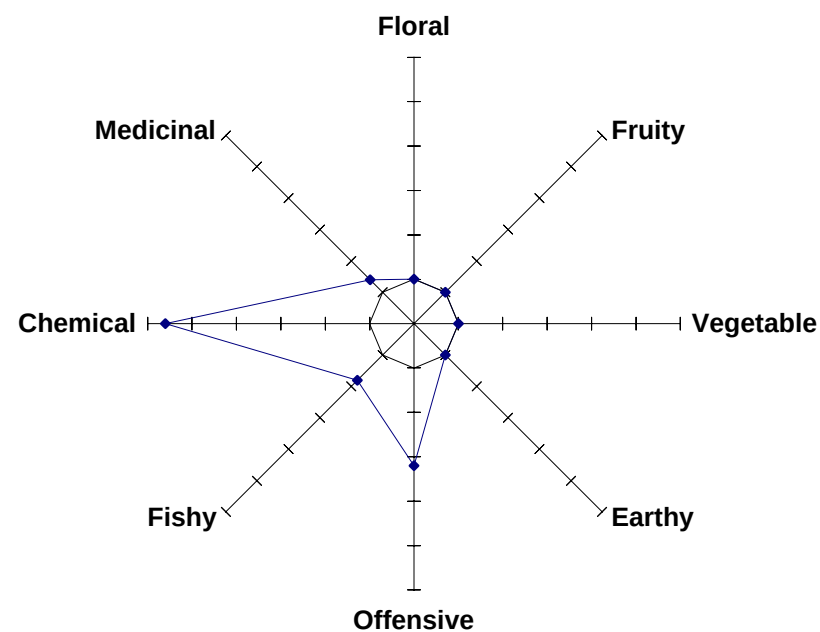
Client: Service Engineering GroupField No.: C20Report No.: **633401**Project: Dredge SedimentDescription: 5L from 100L TedlarEvaluation Date: 11/30/06

Sensation Descriptor Graph



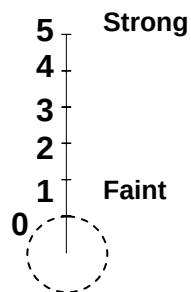
Average Relative Strength	
Warm	0.0
Tingling	0.0
Itching	0.0
Metallic	0.0
Cool	0.4
Sharp	1.2
Pungent	2.2
Burning	0.8

Odor Descriptor Graph



Average Relative Strength	
Floral	0.0
Fruity	0.0
Vegetable	0.0
Earthy	0.0
Offensive	2.2
Fishy	0.8
Chemical	4.6
Medicinal	0.4

KEY



Relative Strength

St. Croix Sensory, Inc.

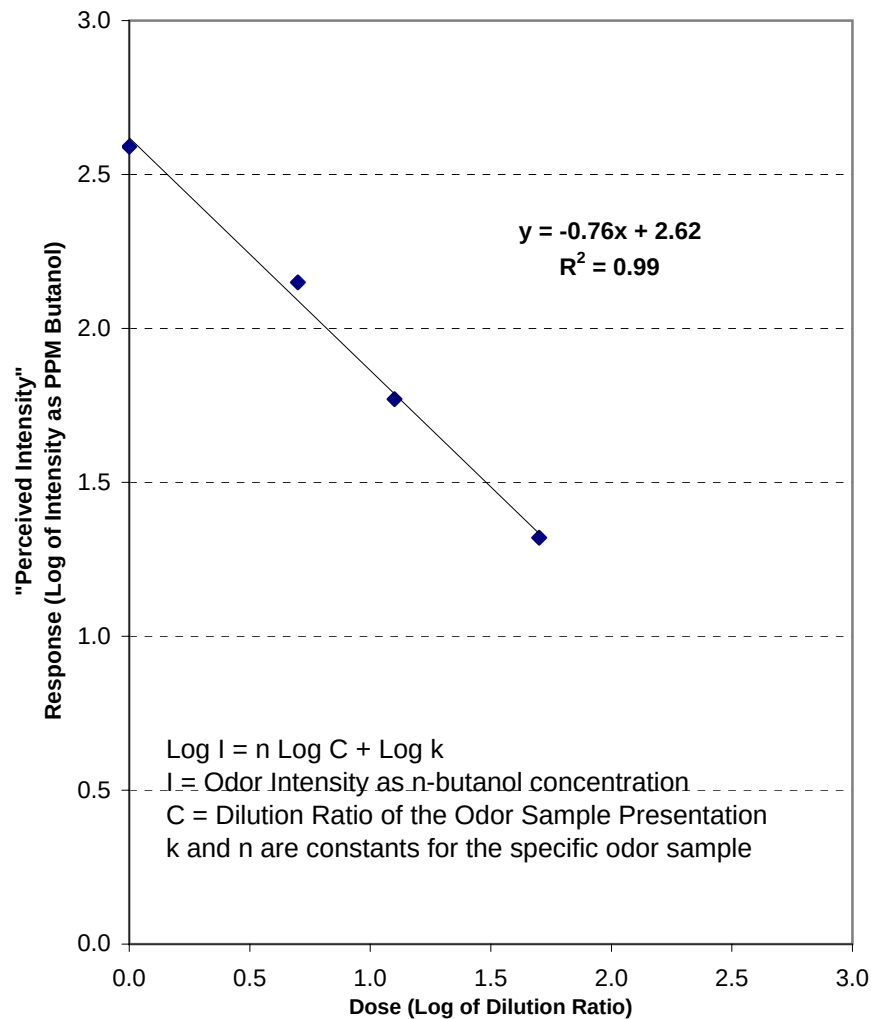
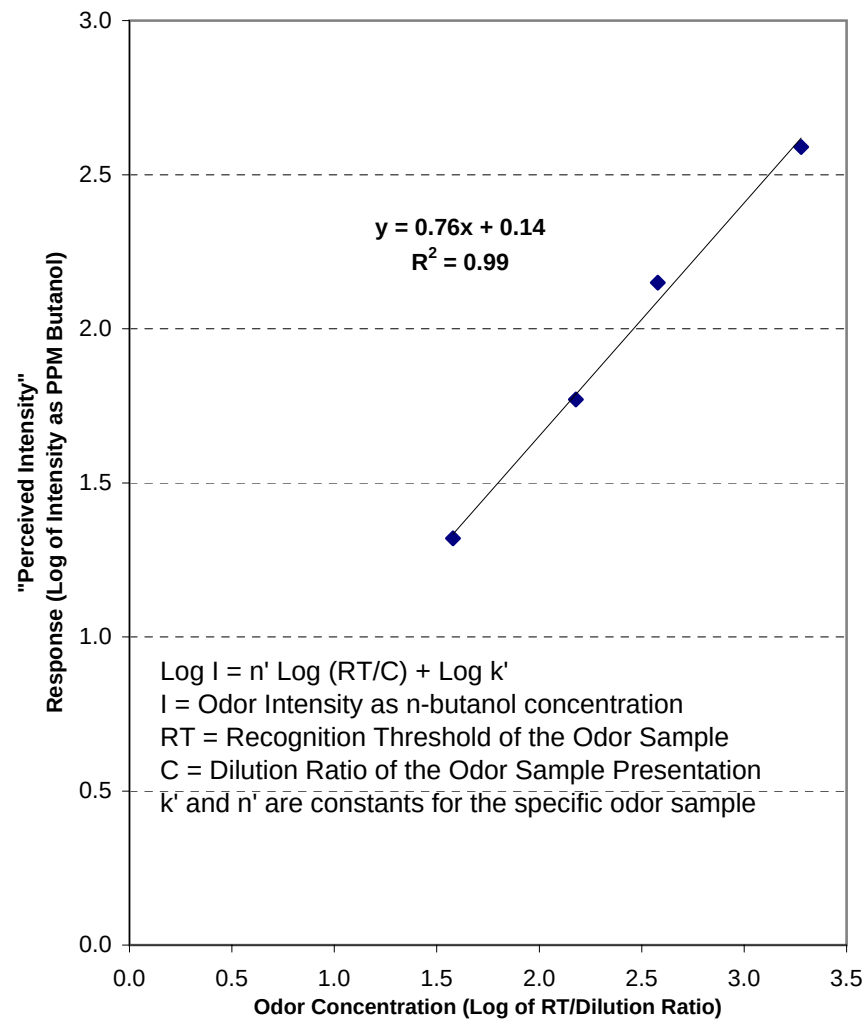
Odor Evaluation Report

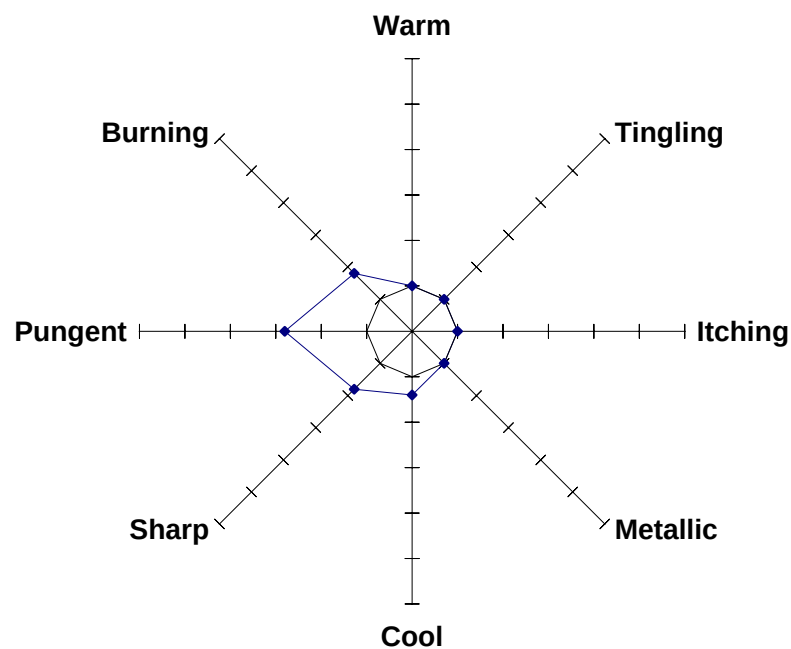
Client: Service Engineering Group Field No.: C20
Project: Dredge Sediment Description: 5L from 100L Tedlar

Report No.: 633401
Evaluation Date: 11/30/06

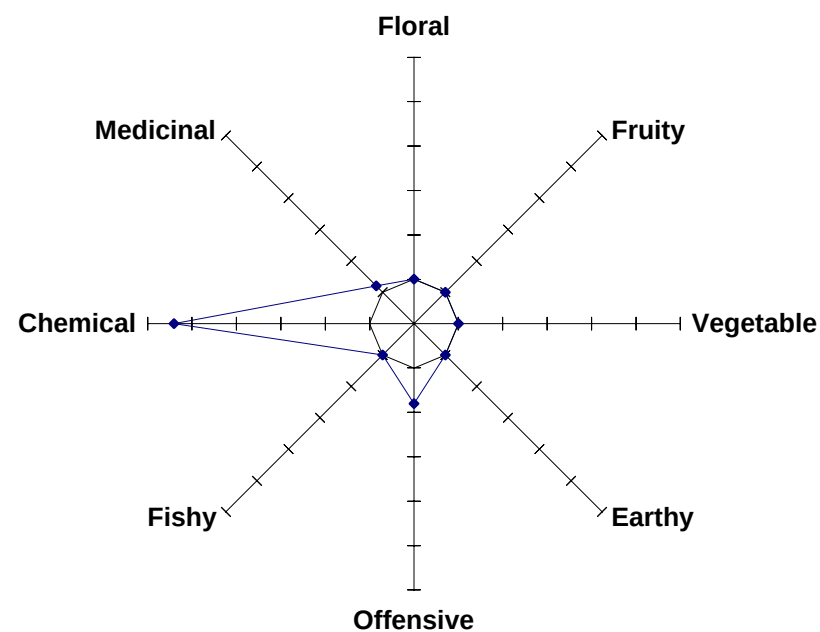
% of Assessors |*****|*****|*****|*****| 100%

Medicinal *****
Menthol *****
Chemical *****
Tar *****
Kerosine *****
Petroleum *****
Cleaning fluid *****
Creosote *****
Mothball *****
Solvent *****
Vinyl *****
Gasoline *****
Oil *****
Sulfur *****
Fishy *****
Amine *****
Offensive *****
Sewer *****
Urine *****
Septic *****

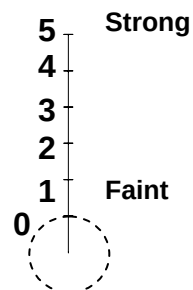
Client: Service Engineering GroupField No.: C20Report No.: 633401Project: Dredge SedimentDescription: 5L from 100L TedlarEvaluation Date: 11/30/06**Dose-Response****Dose-Response as Power Law**

Client: Service Engineering GroupField No.: D10Report No.: **633401**Project: Dredge SedimentDescription: 5L from 100L TedlarEvaluation Date: 11/30/06**Sensation Descriptor Graph**

Average Relative Strength	
Warm	0.0
Tingling	0.0
Itching	0.0
Metallic	0.0
Cool	0.4
Sharp	0.8
Pungent	1.8
Burning	0.8

Odor Descriptor Graph

Average Relative Strength	
Floral	0.0
Fruity	0.0
Vegetable	0.0
Earthy	0.0
Offensive	0.8
Fishy	0.0
Chemical	4.4
Medicinal	0.2

KEY**Relative Strength**

St. Croix Sensory, Inc.

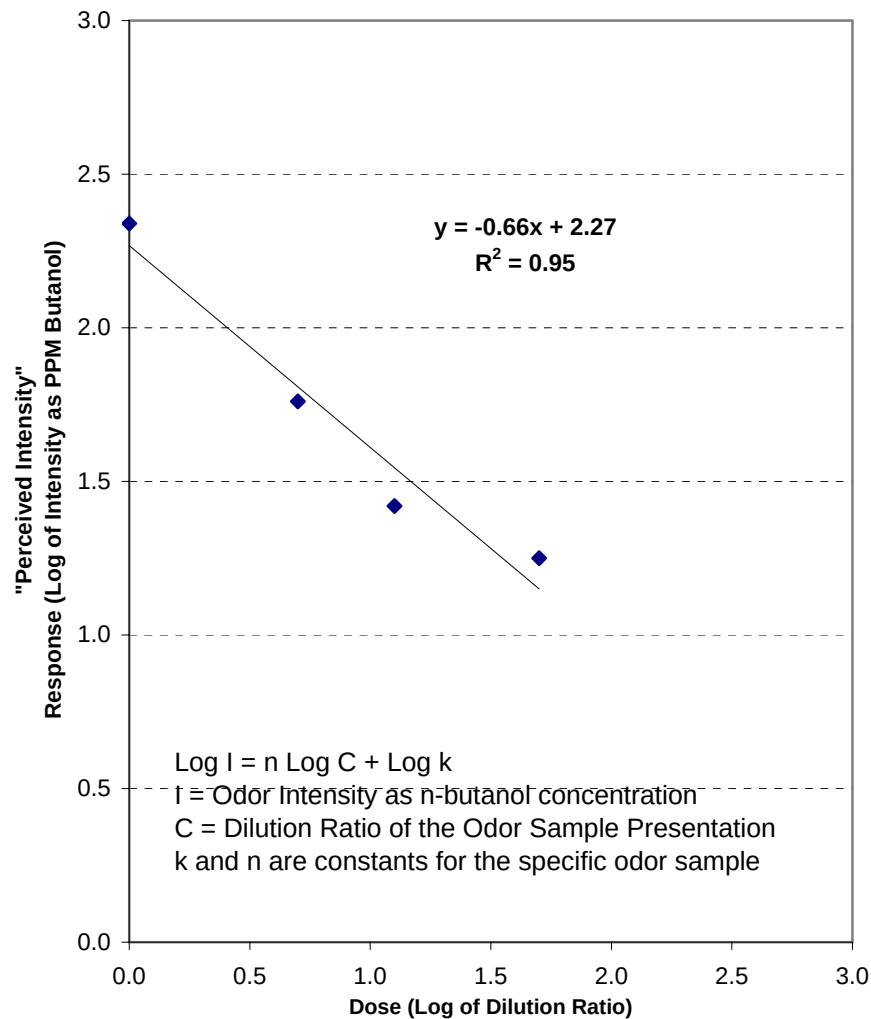
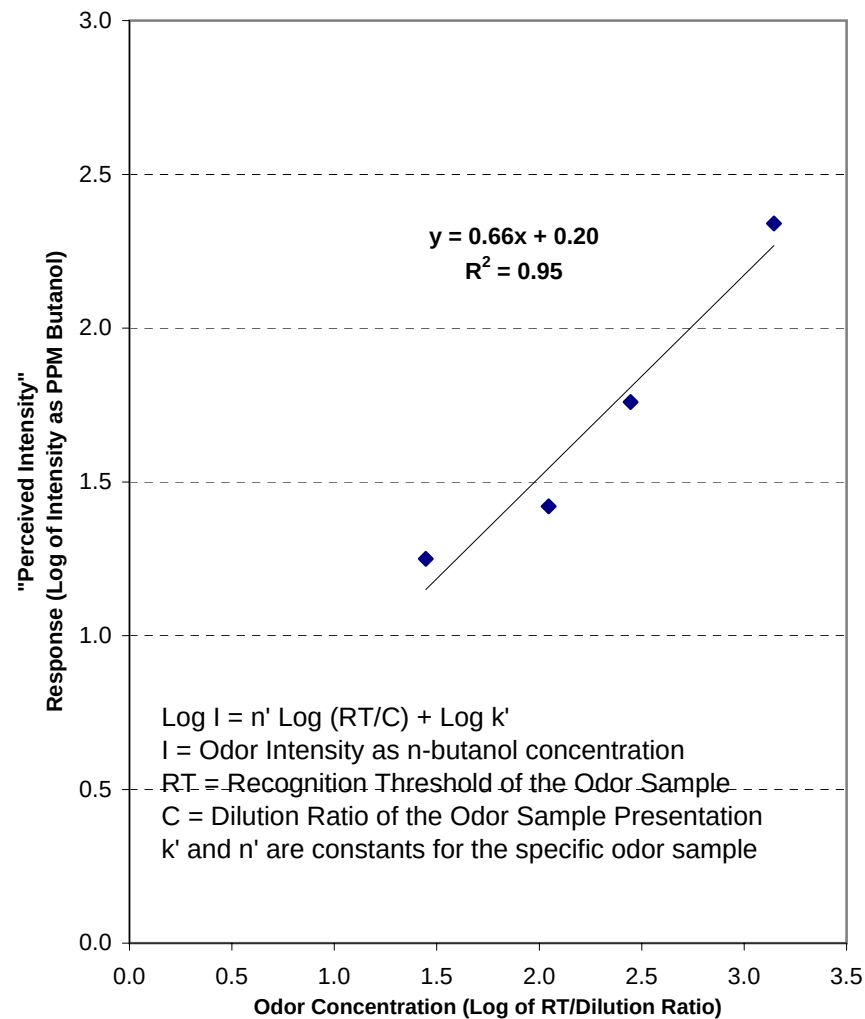
Odor Evaluation Report

Client: Service Engineering Group Field No.: D10
Project: Dredge Sediment Description: 5L from 100L Tedlar

Report No.: 633401
Evaluation Date: 11/30/06

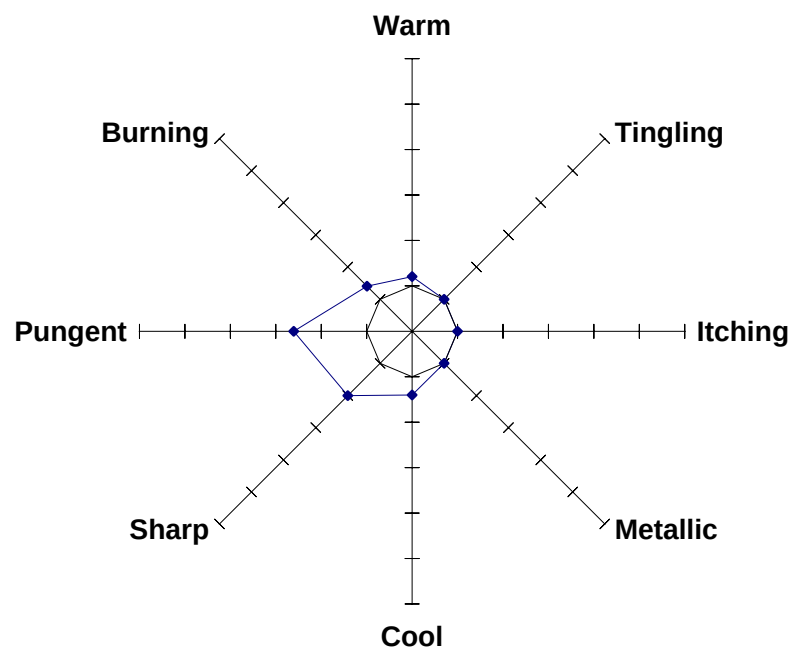
% of Assessors |*****|*****|*****|*****| 100%

Medicinal *****
Chemical *****
Paint *****
Tar *****
Kerosine *****
Petroleum *****
Turpentine *****
Cleaning fluid *****
Creosote *****
Gasoline *****
Oil *****

Client: Service Engineering GroupField No.: D10Report No.: 633401Project: Dredge SedimentDescription: 5L from 100L TedlarEvaluation Date: 11/30/06**Dose-Response****Dose-Response as Power Law**

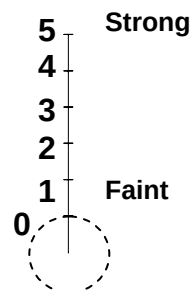
Client: Service Engineering GroupField No.: D20Report No.: 633401Project: Dredge SedimentDescription: 5L from 100L TedlarEvaluation Date: 11/30/06

Sensation Descriptor Graph



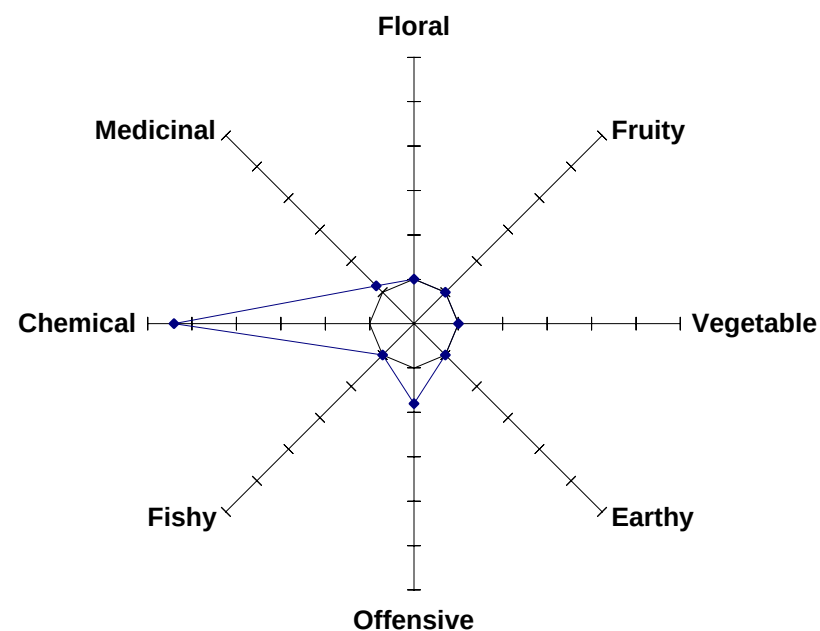
	Average Relative Strength
Warm	0.2
Tingling	0.0
Itching	0.0
Metallic	0.0
Cool	0.4
Sharp	1.0
Pungent	1.6
Burning	0.4

KEY



Relative Strength

Odor Descriptor Graph



	Average Relative Strength
Floral	0.0
Fruity	0.0
Vegetable	0.0
Earthy	0.0
Offensive	0.8
Fishy	0.0
Chemical	4.4
Medicinal	0.2

St. Croix Sensory, Inc.

Odor Evaluation Report

Client: Service Engineering Group Field No.: D20
Project: Dredge Sediment Description: 5L from 100L Tedlar

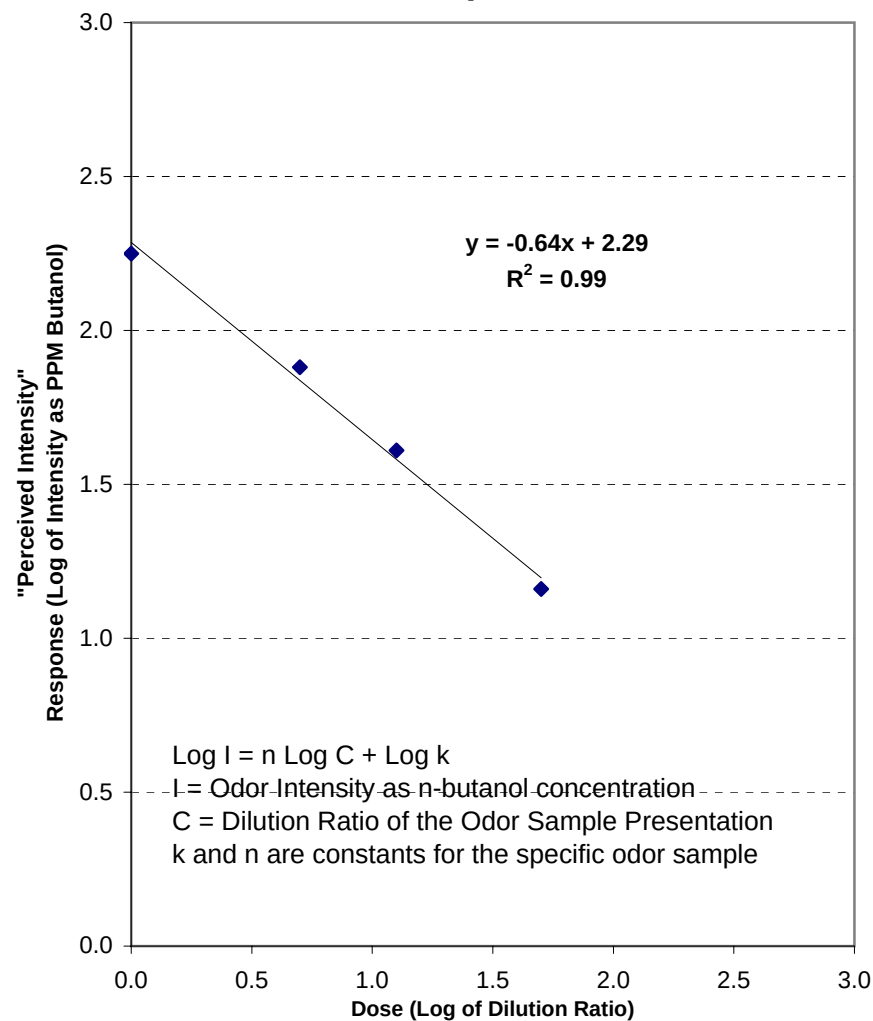
Report No.: 633401
Evaluation Date: 11/30/06

% of Assessors |*****|*****|*****|*****| 100%

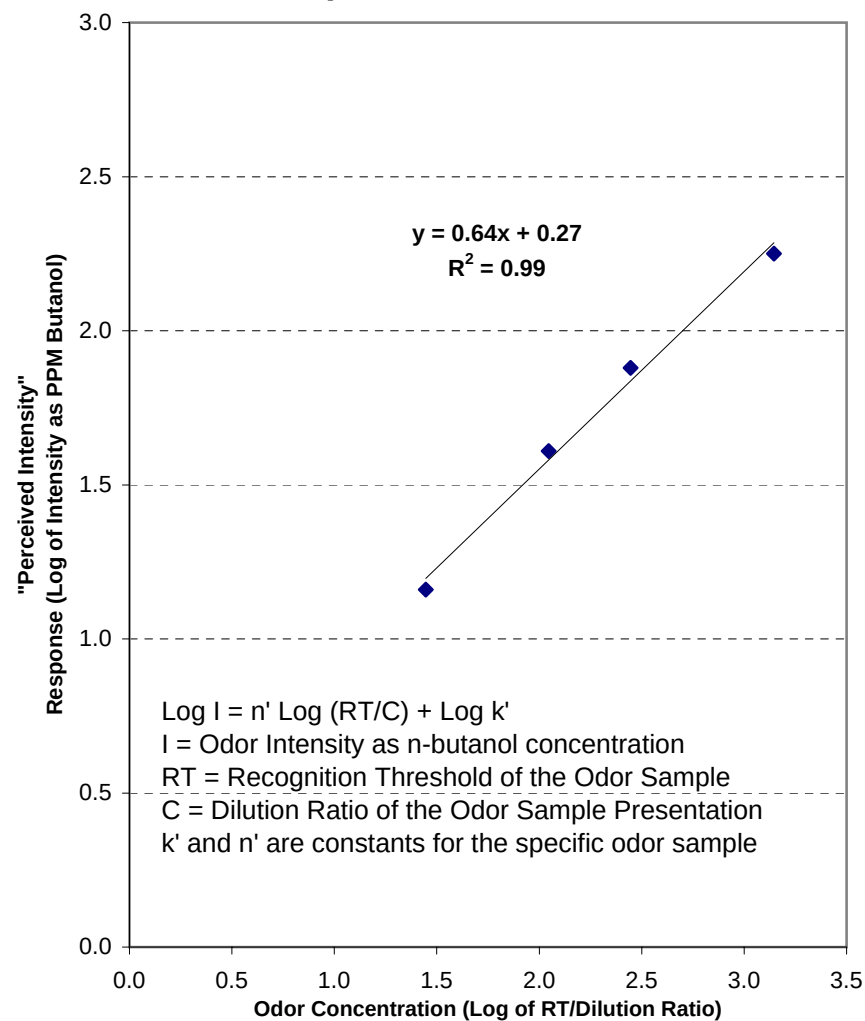
Medicinal *****
Menthol *****
Chemical *****
Grease *****
Paint *****
Tar *****
Car exhaust *****
Kerosine *****
Petroleum *****
Cleaning fluid *****
Creosote *****
Solvent *****
Gasoline *****
Oil *****
Offensive *****

Client: Service Engineering GroupField No.: D20Report No.: 633401Project: Dredge SedimentDescription: 5L from 100L TedlarEvaluation Date: 11/30/06

Dose-Response



Dose-Response as Power Law



CHAIN OF CUSTODY RECORD FOR ODOR SAMPLES



Client: <u>SEG</u>		Sampled By: <u>AML</u>		Odor Evaluations Requested: (X)				Page <u>1</u> of <u>1</u>	
Project Name: <u>Dredge Sediment</u>		Sampling Date: <u>11-30-06</u>		Odor Concentration* (Detection & Recognition Threshold) Odor Intensity* (PPM 1-Balanced) Odor Characterization (Hedonic Tone & Descriptors) Odor Persistence (Dose-Response*)				For Laboratory use Only	
Comments:								Odor Evaluation Report No.	
								Laboratory Sample No.	
Line No.	Field No.	Sample Description	Sample Time	Field H ₂ S (ppm)					
1	<u>C10</u>	<u>5L from 100L Tedlar</u>	<u>11:00</u>		X	X	X	X	
2	<u>C20</u>	<u>5L from 100L Tedlar</u>	<u>11:05</u>		↓	↓	↓	↓	
3	<u>D10</u>	<u>5L from 100L Tedlar</u>	<u>11:20</u>		↓	↓	↓	↓	
4	<u>D20</u>	<u>5L from 100L Tedlar</u>	<u>11:30</u>		↓	↓	↓	↓	
5									
6									
7									
8									
9									
10									
11									
12									

Transmittal		Relinquished By	Date	Time	Accepted By	Date	Time	Comments & Exceptions Noted
Number of Shipping Boxes _____		<u>McIntyre</u>	<u>11/30/06</u>	<u>11:30</u>	<u>Natcha Klot</u>	<u>11/30/06</u>	<u>12:40</u>	
		Received at St. Croix Sensory Laboratory						

*Odor Concentration: ASTM E679-04 and EN13725:2003 and Odor Intensity: ASTM E544-99(2004)

St. Croix Sensory, Inc. ♦ 3549 Lake Elmo Avenue North ♦ Lake Elmo, MN 55042 U.S.A. ♦ Tel:800-879-9231 ♦ Fax:651-439-1065 ♦ Email:reports@fivesenses.com ♦ Web:www.fivesenses.com

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St.Croix Sensory, Inc.

Service Engineering Group

Dredge Sediment Headspace

Odor Evaluation Report

Report No. 633502

12/01/06

Data Release Authorization:

Melissa McGinley
Laboratory Associate

Reviewed and Approved:

Michael A. McGinley, P.E.
Laboratory Director

St. Croix Sensory is a laboratory dedicated to practicing state-of-the-art sensory evaluation and to advancing the science of sensory perception.

We are a family owned and operated business providing our clients with personal customer service, flexible scheduling, timely results.

Our focus is to provide the best professional services available to help make your project or product a success.

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Lake Elmo, Minnesota 55042 U.S.A.

Tel: 800-879-9231
Fax: 651-439-1065

Email: stcroix@fivesenses.com

St. Croix Sensory, Inc.

Odor Evaluation Report

Client: Service Engineering Group

Report No.: 633502

Project: Dredge Sediment Headspace

Evaluation Date: 12/01/06

#	Field No.	Sample Description	ASTM E679 & EN13725		ASTM E544	PERSISTENCY	CHARACTERIZATION		Comments
			Detection Threshold	Recognition Threshold	Intensity	Dose-Response Slope	Hedonic Tone	Principal Odor Descriptors	
1	F10	5L from 100L Tedlar	1,100	730	70	-0.40	-1.4	Chemical, Paint, Tar, Creosote, Oil	
2	F20	5L from 100L Tedlar	1,000	830	75	-0.43	-1.2	Chemical, Grease, Tar, Kerosine, Turpentine, Oil	
3	E10	5L from 100L Tedlar	2,500	1,800	110	-0.38	-3.6	Paint, Chemical, Turpentine, Fishy	
4	E20	5L from 100L Tedlar	2,500	1,800	90	-0.43	-2.4	Chemical, Paint, Turpentine, Oil, Offensive	
5									
6									
7									
8									
9									
10									

St. Croix Sensory, Inc.

Odor Evaluation Report

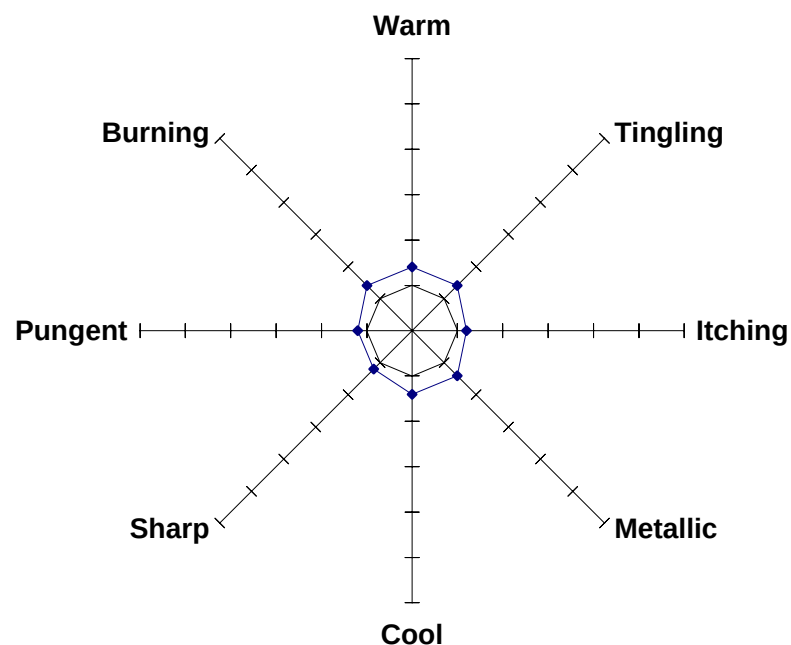
Client: Service Engineering Group

Report No.: 633502

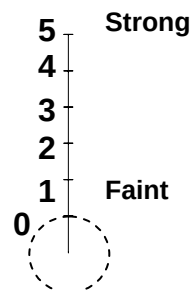
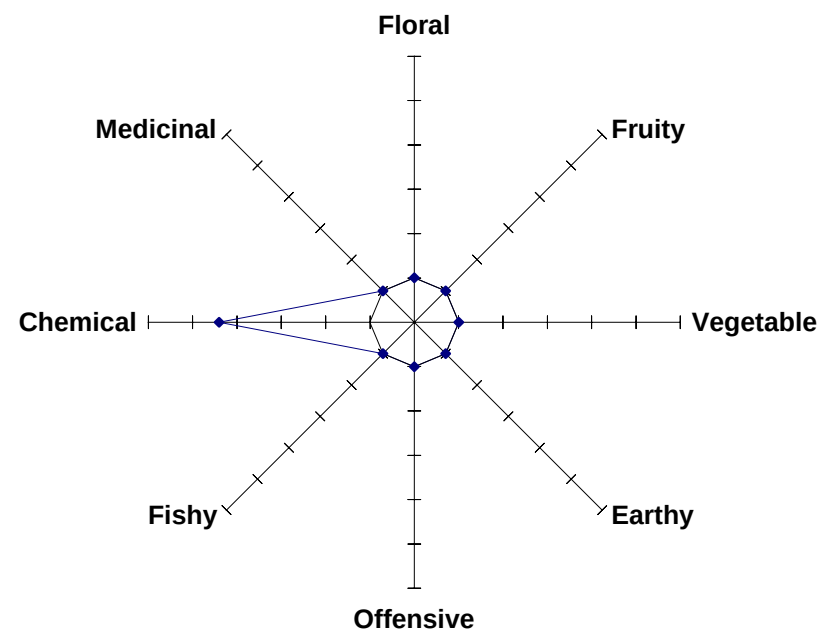
Project: Dredge Sediment Headspace

Evaluation Date: 12/01/06

#	Field No.	Sample Description	ASTM E679 & EN13725		ASTM E544	PERSISTENCY	CHARACTERIZATION		Comments
			Detection Threshold	Recognition Threshold	Intensity	Dose-Response Slope	Hedonic Tone	Principal Odor Descriptors	
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

Client: Service Engineering GroupField No.: F10Report No.: **633502**Project: Dredge Sediment HeadspaceDescription: 5L form 100L TedlarEvaluation Date: 12/01/06**Sensation Descriptor Graph**

Average Relative Strength	
Warm	0.4
Tingling	0.4
Itching	0.2
Metallic	0.4
Cool	0.4
Sharp	0.2
Pungent	0.2
Burning	0.4

KEY**Relative Strength****Odor Descriptor Graph**

Average Relative Strength	
Floral	0.0
Fruity	0.0
Vegetable	0.0
Earthy	0.0
Offensive	0.0
Fishy	0.0
Chemical	3.4
Medicinal	0.0

St. Croix Sensory, Inc.

Odor Evaluation Report

Client: Service Engineering Group Field No.: F10
Project: Dredge Sediment Headspace Description: 5L form 100L Tedlar

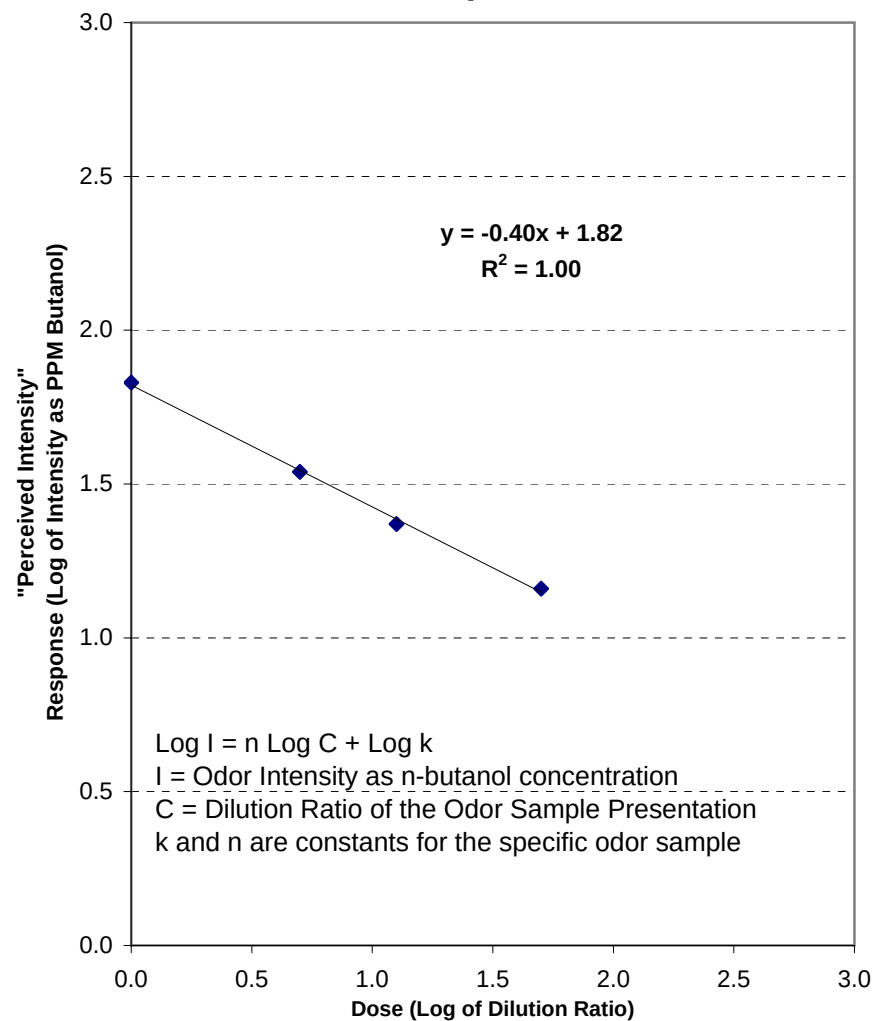
Report No.: 633502
Evaluation Date: 12/01/06

% of Assessors |*****|*****|*****|*****| 100%

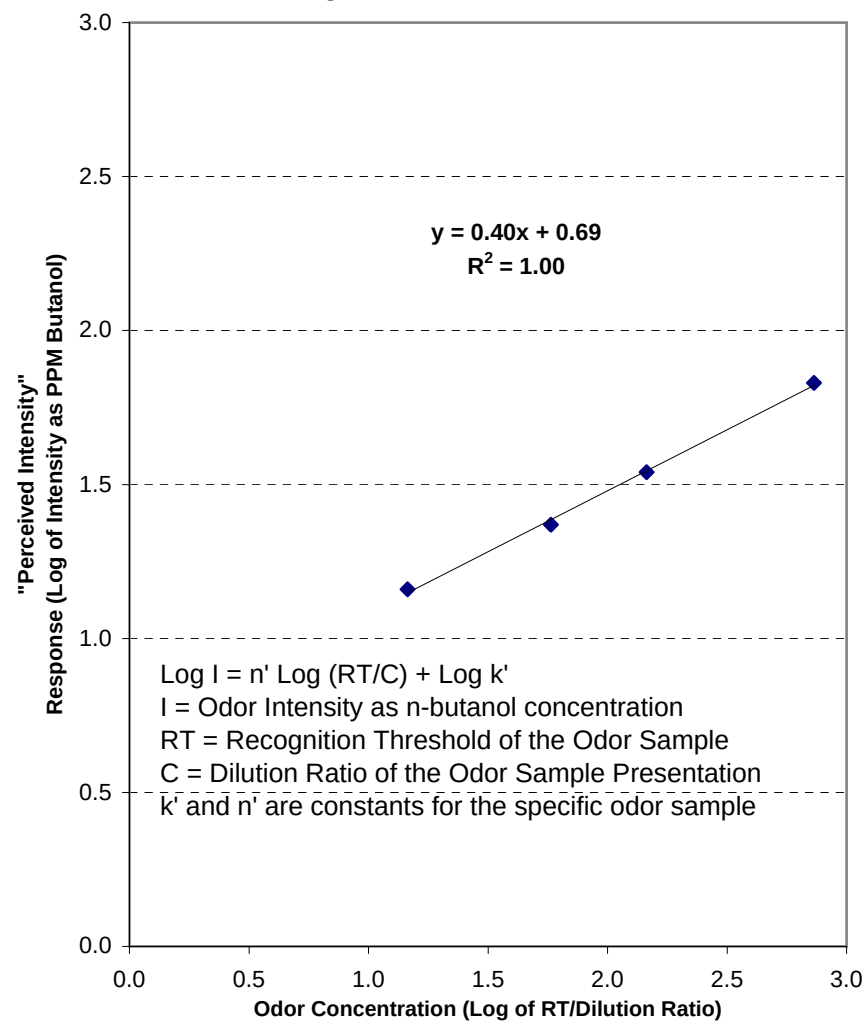
Chemical *****
Grease *****
Paint *****
Tar *****
Petroleum *****
Turpentine *****
Creosote *****
Vinyl *****
Oil *****

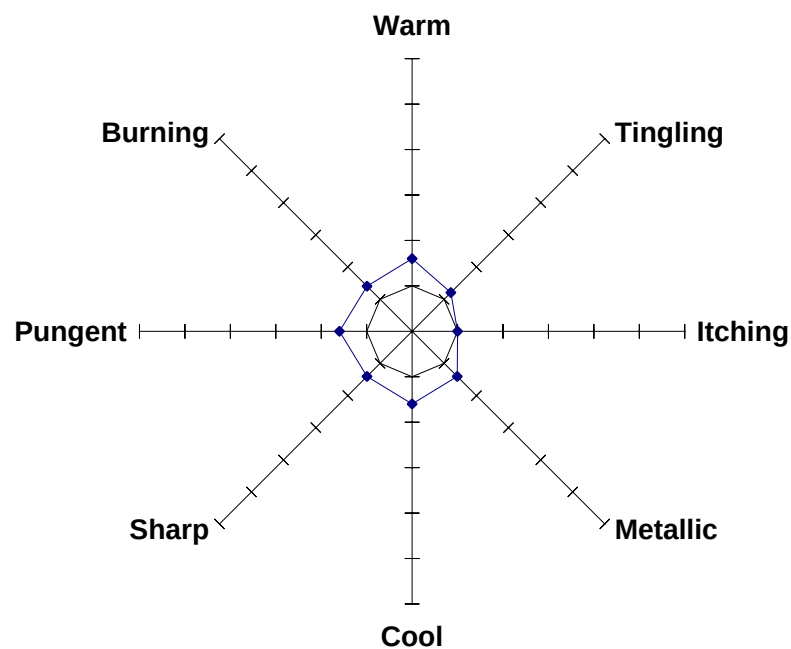
Client: Service Engineering GroupField No.: F10Report No.: 633502Project: Dredge Sediment HeadspaceDescription: 5L form 100L TedlarEvaluation Date: 12/01/06

Dose-Response

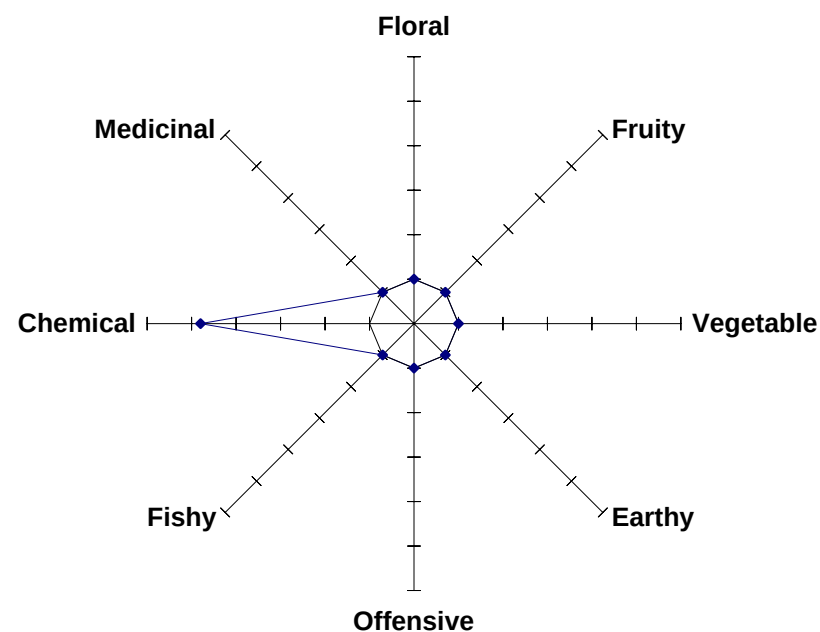


Dose-Response as Power Law

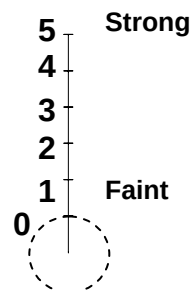


Client: Service Engineering GroupField No.: F20Report No.: **633502**Project: Dredge Sediment HeadspaceDescription: 5L from 100L TedlarEvaluation Date: 12/01/06**Sensation Descriptor Graph**

Average Relative Strength	
Warm	0.6
Tingling	0.2
Itching	0.0
Metallic	0.4
Cool	0.6
Sharp	0.4
Pungent	0.6
Burning	0.4

Odor Descriptor Graph

Average Relative Strength	
Floral	0.0
Fruity	0.0
Vegetable	0.0
Earthy	0.0
Offensive	0.0
Fishy	0.0
Chemical	3.8
Medicinal	0.0

KEY**Relative Strength**

St. Croix Sensory, Inc.

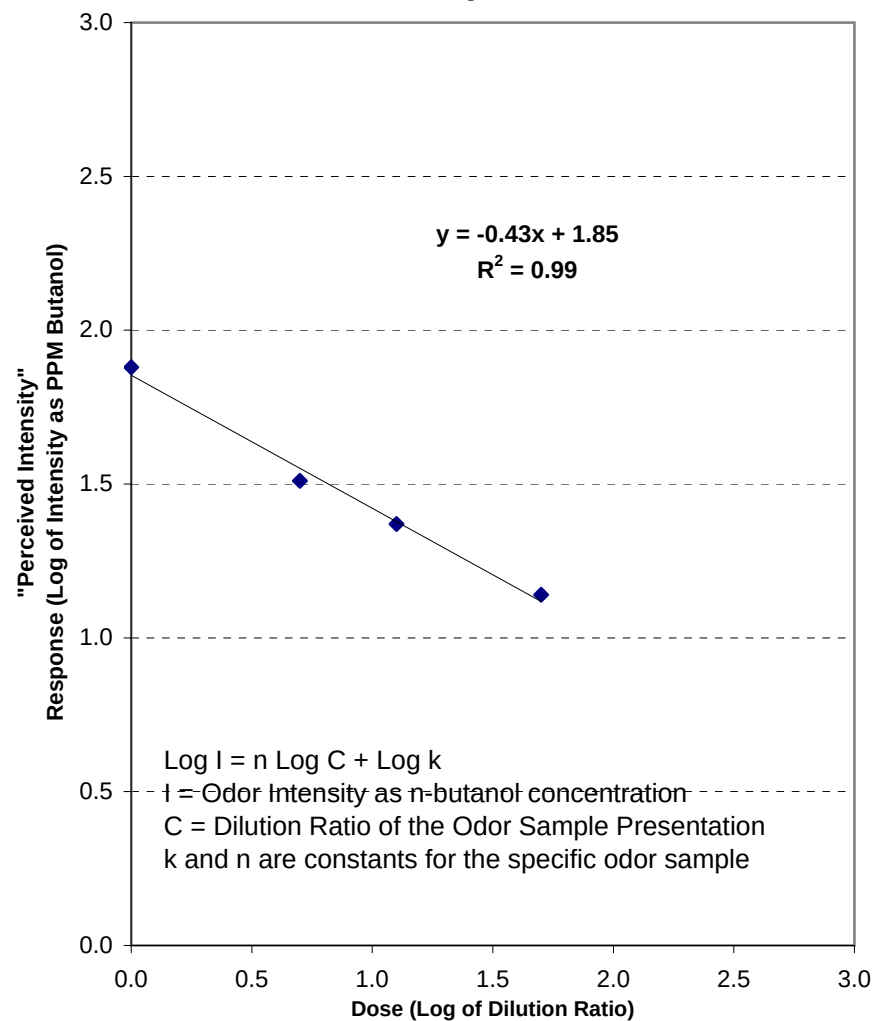
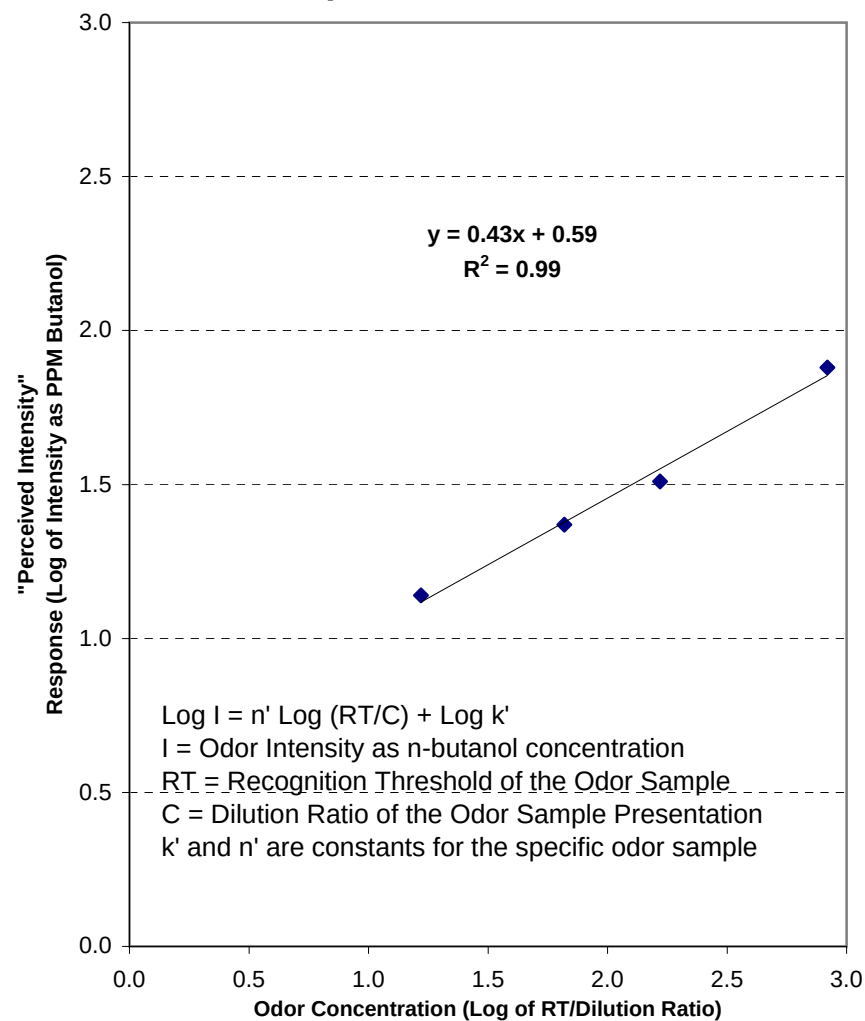
Odor Evaluation Report

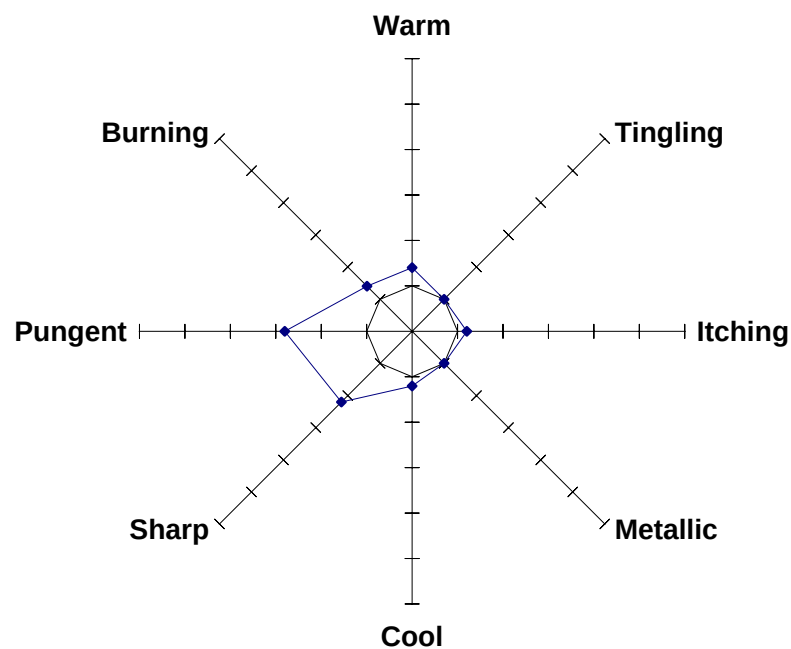
Client: Service Engineering Group Field No.: F20
Project: Dredge Sediment Headspace Description: 5L from 100L Tedlar

Report No.: 633502
Evaluation Date: 12/01/06

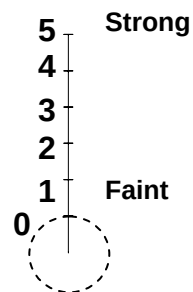
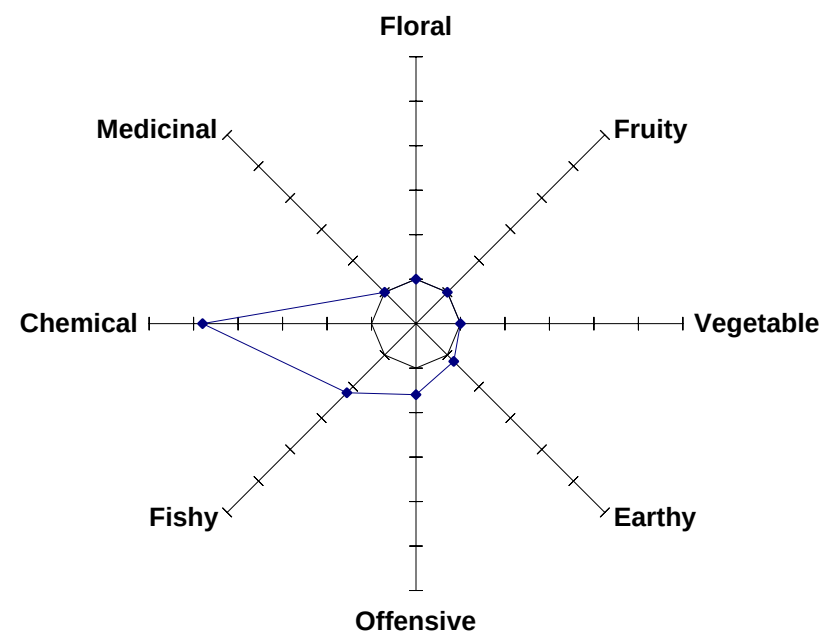
% of Assessors |*****|*****|*****|*****| 100%

Chemical *****
Grease *****
Paint *****
Tar *****
Kerosine *****
Petroleum *****
Turpentine *****
Varnish *****
Creosote *****
Gasoline *****
Oil *****

Client: Service Engineering GroupField No.: F20Report No.: 633502Project: Dredge Sediment HeadspaceDescription: 5L from 100L TedlarEvaluation Date: 12/01/06**Dose-Response****Dose-Response as Power Law**

Client: Service Engineering GroupField No.: E10Report No.: **633502**Project: Dredge Sediment HeadspaceDescription: 5L from 100L TedlarEvaluation Date: 12/01/06**Sensation Descriptor Graph**

	Average Relative Strength
Warm	0.4
Tingling	0.0
Itching	0.2
Metallic	0.0
Cool	0.2
Sharp	1.2
Pungent	1.8
Burning	0.4

KEY**Relative Strength****Odor Descriptor Graph**

	Average Relative Strength
Floral	0.0
Fruity	0.0
Vegetable	0.0
Earthy	0.2
Offensive	0.6
Fishy	1.2
Chemical	3.8
Medicinal	0.0

St. Croix Sensory, Inc.

Odor Evaluation Report

Client: Service Engineering Group Field No.: E10
Project: Dredge Sediment Headspace Description: 5L from 100L Tedlar

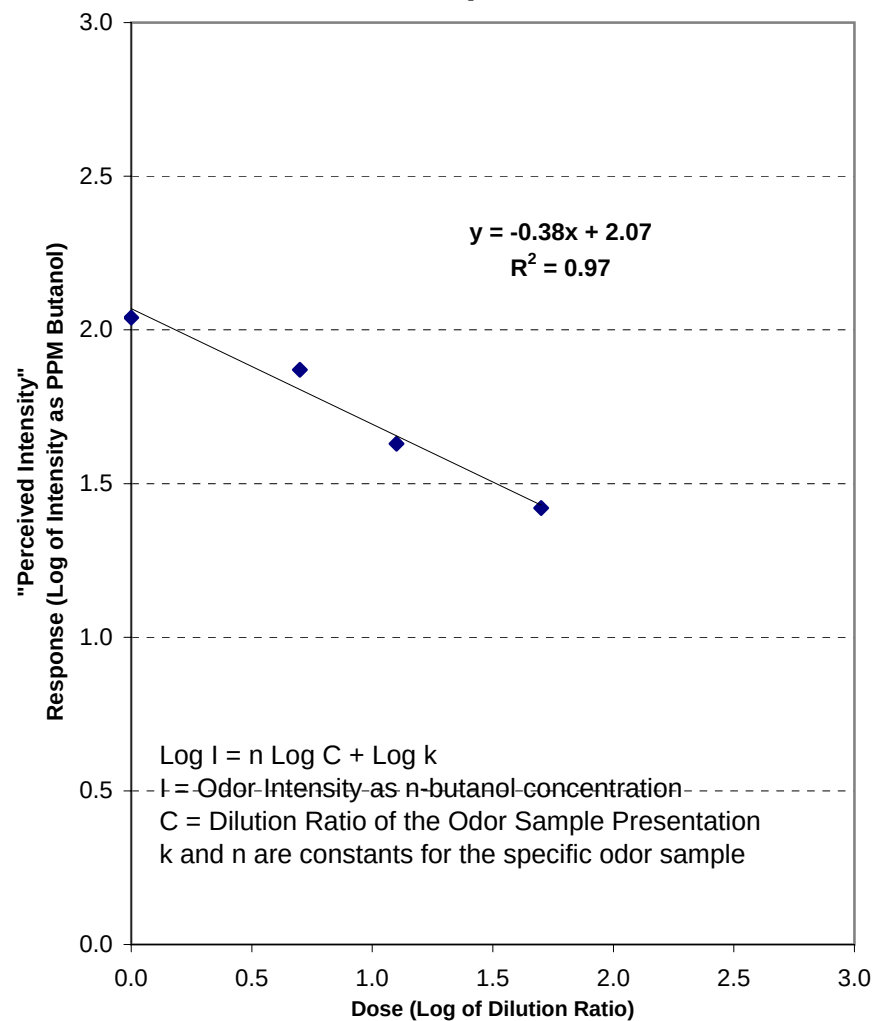
Report No.: 633502
Evaluation Date: 12/01/06

% of Assessors |*****|*****|*****|*****| 100%

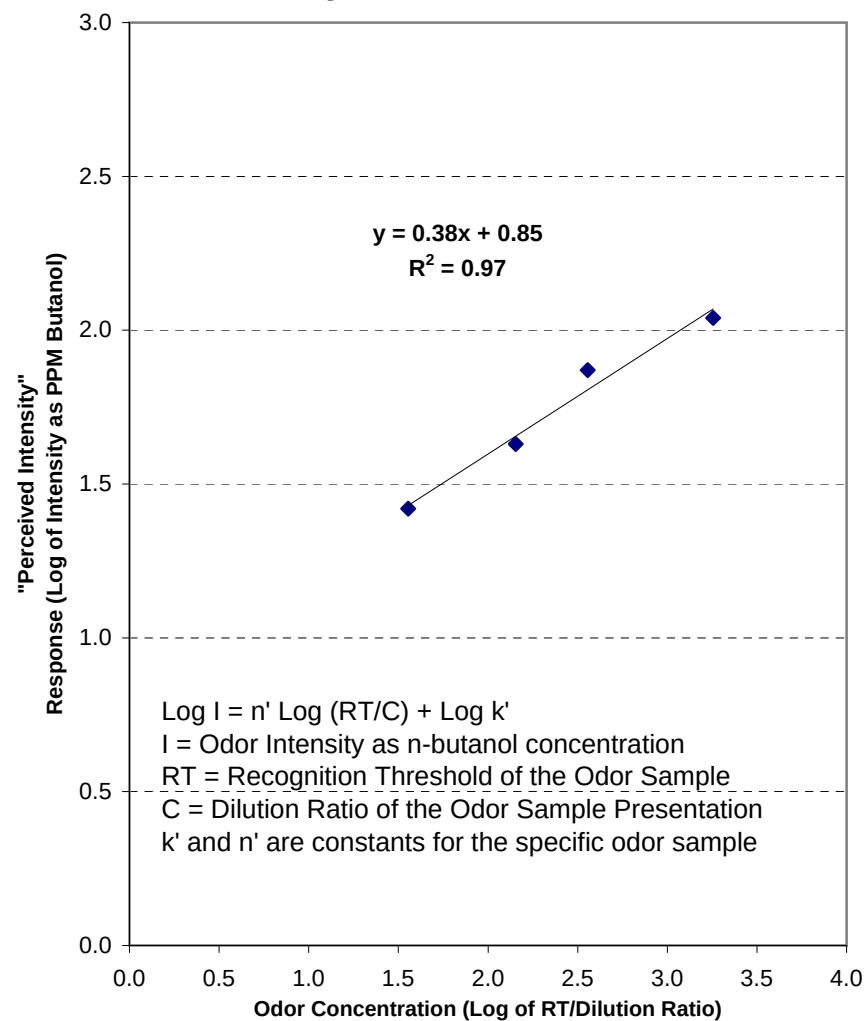
Chemical *****
Paint *****
Tar *****
Car exhaust *****
Petroleum *****
Turpentine *****
Cleaning fluid *****
Plastic *****
Varnish *****
Solvent *****
Vinyl *****
Gasoline *****
Oil *****
Fishy *****
Dead fish *****
Offensive *****
Sewer *****
Sour *****
Urine *****
Musky *****

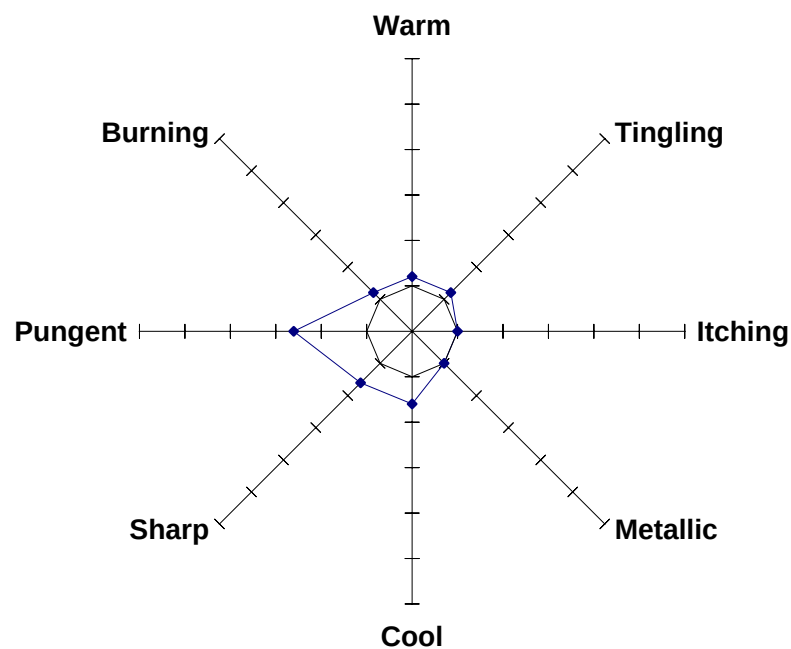
Client: Service Engineering GroupField No.: E10Report No.: 633502Project: Dredge Sediment HeadspaceDescription: 5L from 100L TedlarEvaluation Date: 12/01/06

Dose-Response

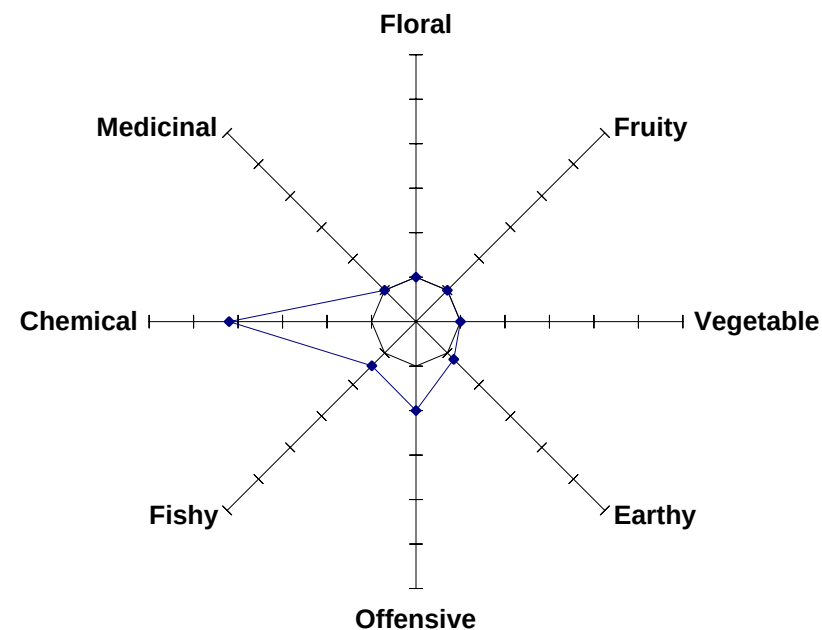


Dose-Response as Power Law

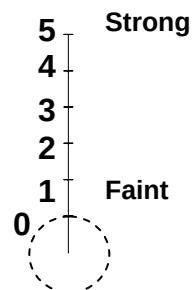


Client: Service Engineering GroupField No.: E20Report No.: **633502**Project: Dredge Sediment HeadspaceDescription: 5L from 100L TedlarEvaluation Date: 12/01/06**Sensation Descriptor Graph**

Average Relative Strength	
Warm	0.2
Tingling	0.2
Itching	0.0
Metallic	0.0
Cool	0.6
Sharp	0.6
Pungent	1.6
Burning	0.2

Odor Descriptor Graph

Average Relative Strength	
Floral	0.0
Fruity	0.0
Vegetable	0.0
Earthy	0.2
Offensive	1.0
Fishy	0.4
Chemical	3.2
Medicinal	0.0

KEY**Relative Strength**

St. Croix Sensory, Inc.

Odor Evaluation Report

Client: Service Engineering Group Field No.: E20
Project: Dredge Sediment Headspace Description: 5L from 100L Tedlar

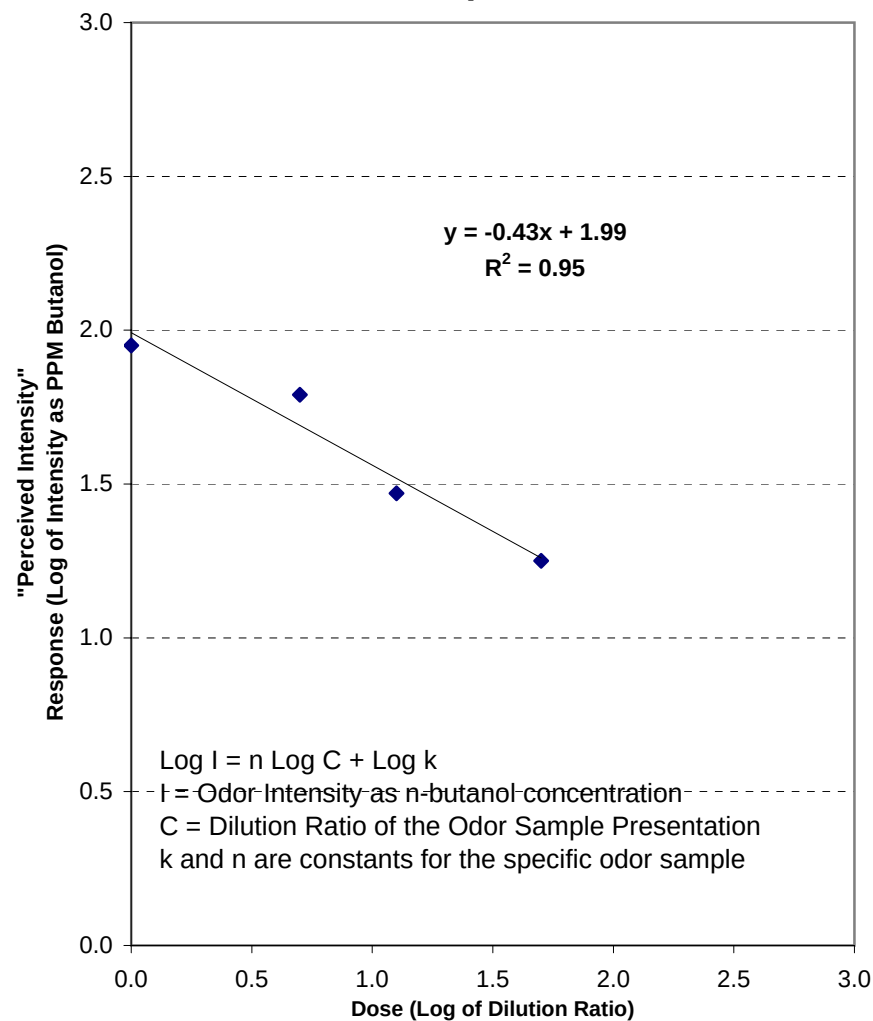
Report No.: 633502
Evaluation Date: 12/01/06

% of Assessors |*****|*****|*****|*****| 100%

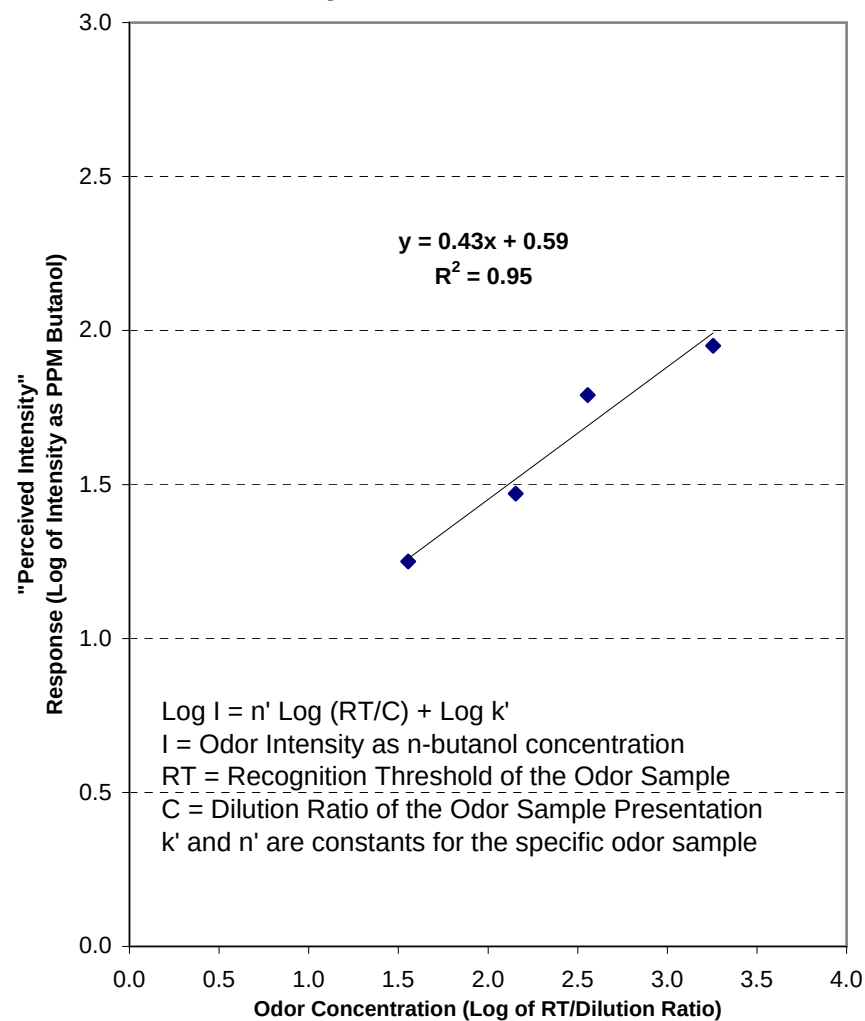
Chemical *****
Grease *****
Paint *****
Tar *****
Turpentine *****
Cleaning fluid *****
Varnish *****
Solvent *****
Vinyl *****
Oil *****
Fishy *****
Dead fish *****
Offensive *****
Sour *****
Burnt *****
Urine *****
Putrid *****

Client: Service Engineering GroupField No.: E20Report No.: 633502Project: Dredge Sediment HeadspaceDescription: 5L from 100L TedlarEvaluation Date: 12/01/06

Dose-Response



Dose-Response as Power Law



CHAIN OF CUSTODY RECORD FOR ODOR SAMPLES



Client: <u>SCS</u>		Sampled By: <u>AML</u>		Odor Evaluations Requested: (X)				Page <u>1</u> of <u>1</u>	
Project Name: <u>Dredge Sediment</u>		Sampling Date: <u>12-1-06</u>		Odor Concentration* (Detection & Recognition Threshold)	Odor Intensity* (PPM 1-Butanol)	Odor Characterization (Hedonic Tone & Descriptors)	Odor Persistence (1" Dose-Response)	For Laboratory use Only	
Comments: <u>Headspace</u>								Odor Evaluation Report No.	
Line No.	Field No.	Sample Description	Sample Time	Field H ₂ S (ppm)					Laboratory Sample No.
1	E10	5L from 100L Tedlar	10:30		X	X	X	X	
2	E20	5L from 100L Tedlar	10:35						
3	F10	5 L from 100L Tedlar	10:40						
4	F20	5 L from 100L Tedlar	10:50						
5									
6									
7									
8									
9									
10									
11									
12									

Transmittal	Relinquished By	Date	Time	Accepted By	Date	Time	Comments & Exceptions Noted
	<u>Alia Lar</u>			<u>Antisha Kolont</u>	<u>12/1/06</u>	<u>10:55</u>	
Number of Shipping Boxes	Received at St. Croix Sensory Laboratory						

*Odor Concentration: ASTM E679-04 and EN13725:2003 and Odor Intensity: ASTM E544-99(2004)

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St. Croix Sensory, Inc.

Service Engineering Group

Dredge Sediment

Odor Evaluation Report

Report No. 633901

12/05/06

Data Release Authorization:

Melissa McGinley
Laboratory Associate

Reviewed and Approved:

Michael A. McGinley, P.E.
Laboratory Director

St. Croix Sensory is a laboratory dedicated to practicing state-of-the-art sensory evaluation and to advancing the science of sensory perception.

We are a family owned and operated business providing our clients with personal customer service, flexible scheduling, timely results.

Our focus is to provide the best professional services available to help make your project or product a success.

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Lake Elmo, Minnesota 55042 U.S.A.

Tel: 800-879-9231
Fax: 651-439-1065

Email: stcroix@fivesenses.com

St. Croix Sensory, Inc.

Odor Evaluation Report

Client: Service Engineering Group

Report No.: 633901

Project: Dredge Sediment

Evaluation Date: 12/05/06

#	Field No.	Sample Description	ASTM E679 & EN13725		ASTM E544	PERSISTENCY	CHARACTERIZATION		Comments
			Detection Threshold	Recognition Threshold	Intensity	Dose-Response Slope	Hedonic Tone	Principal Odor Descriptors	
1	G10	5L from 100L	1,100	780	95	-0.53	-3.0	Tar, Kerosine, Oil, Chemical	
2	G20	5L from 100L	830	630	100	-0.58	-3.4	Petroleum, Oil, Chemical, Solvent	
3	H10	5L from 100L	4,500	3,600	620	-0.76	-6.8	Petroleum	
4	H20	5L from 100L	3,400	2,400	350	-0.64	-6.2	Chemical, Offensive	
5									
6									
7									
8									
9									
10									

St. Croix Sensory, Inc.

Odor Evaluation Report

Client: Service Engineering Group

Report No.: 633901

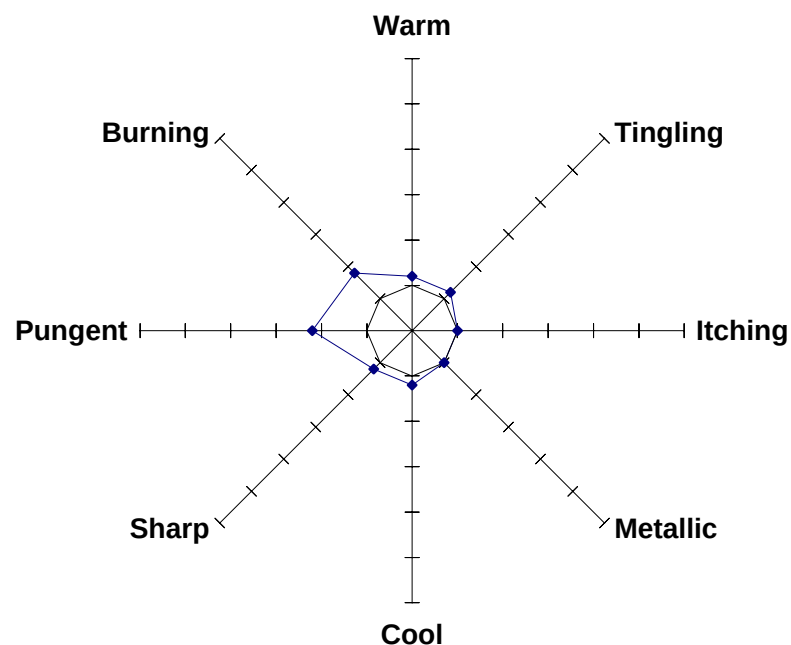
Project: Dredge Sediment

Evaluation Date: 12/05/06

#	Field No.	Sample Description	ASTM E679 & EN13725		ASTM E544	PERSISTENCY	CHARACTERIZATION		Comments
			Detection Threshold	Recognition Threshold	Intensity	Dose-Response Slope	Hedonic Tone	Principal Odor Descriptors	
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

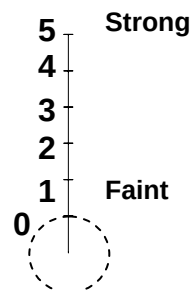
Client: Service Engineering GroupField No.: G10Report No.: 633901Project: Dredge SedimentDescription: 5L from 100LEvaluation Date: 12/05/06

Sensation Descriptor Graph



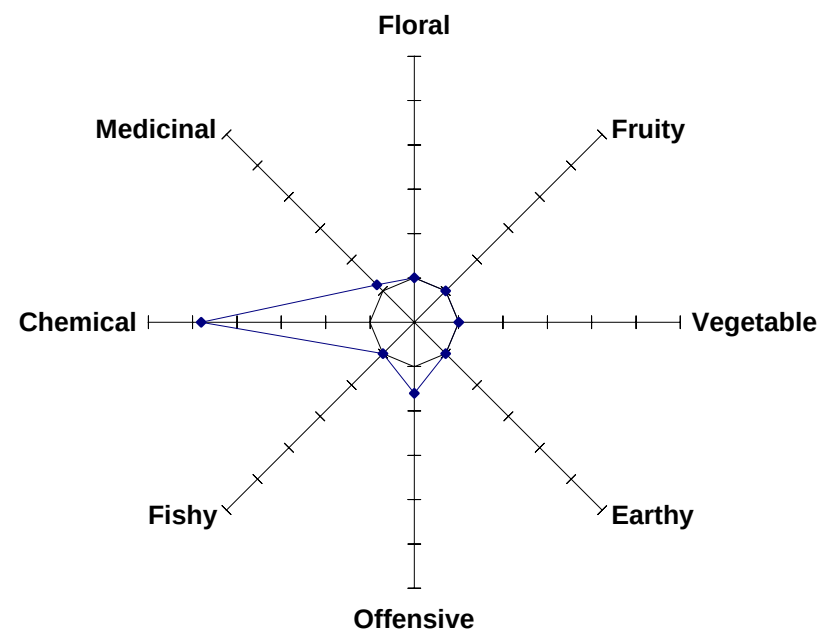
Average Relative Strength	
Warm	0.2
Tingling	0.2
Itching	0.0
Metallic	0.0
Cool	0.2
Sharp	0.2
Pungent	1.2
Burning	0.8

KEY



Relative Strength

Odor Descriptor Graph



Average Relative Strength	
Floral	0.0
Fruity	0.0
Vegetable	0.0
Earthy	0.0
Offensive	0.6
Fishy	0.0
Chemical	3.8
Medicinal	0.2

St. Croix Sensory, Inc.

Odor Evaluation Report

Client: Service Engineering Group Field No.: G10
Project: Dredge Sediment Description: 5L from 100L

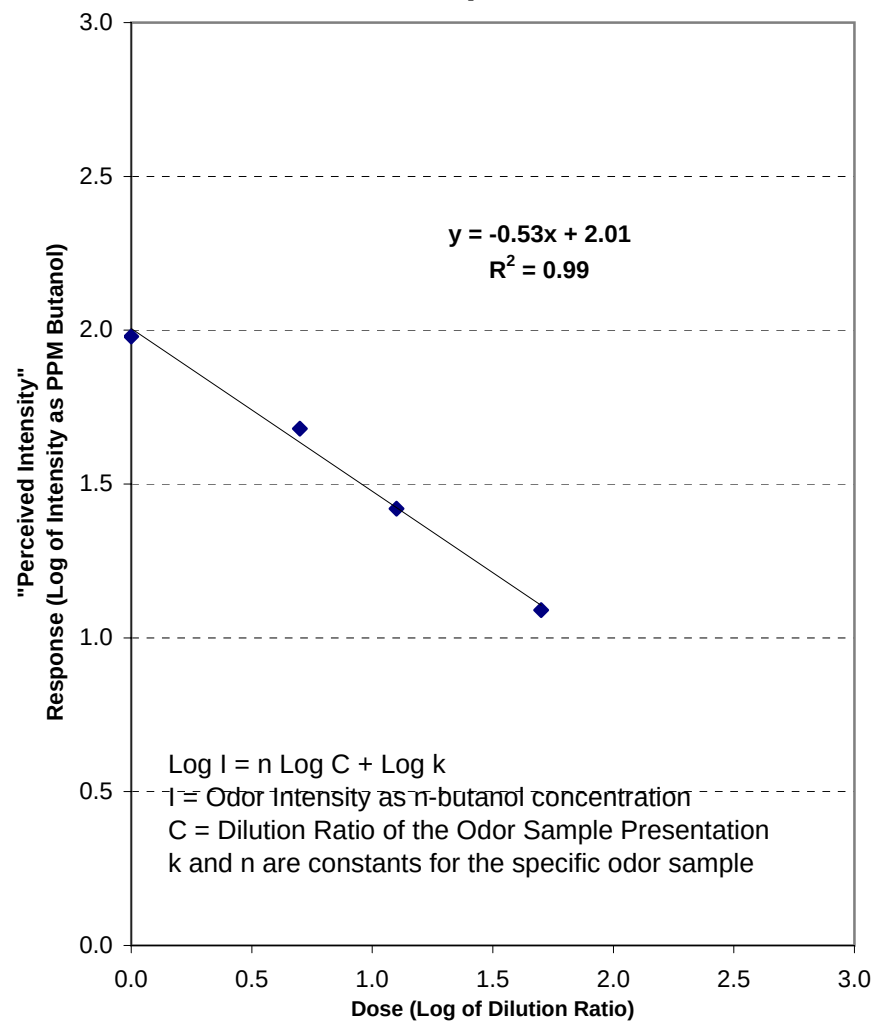
Report No.: 633901
Evaluation Date: 12/05/06

% of Assessors |*****|*****|*****|*****| 100%

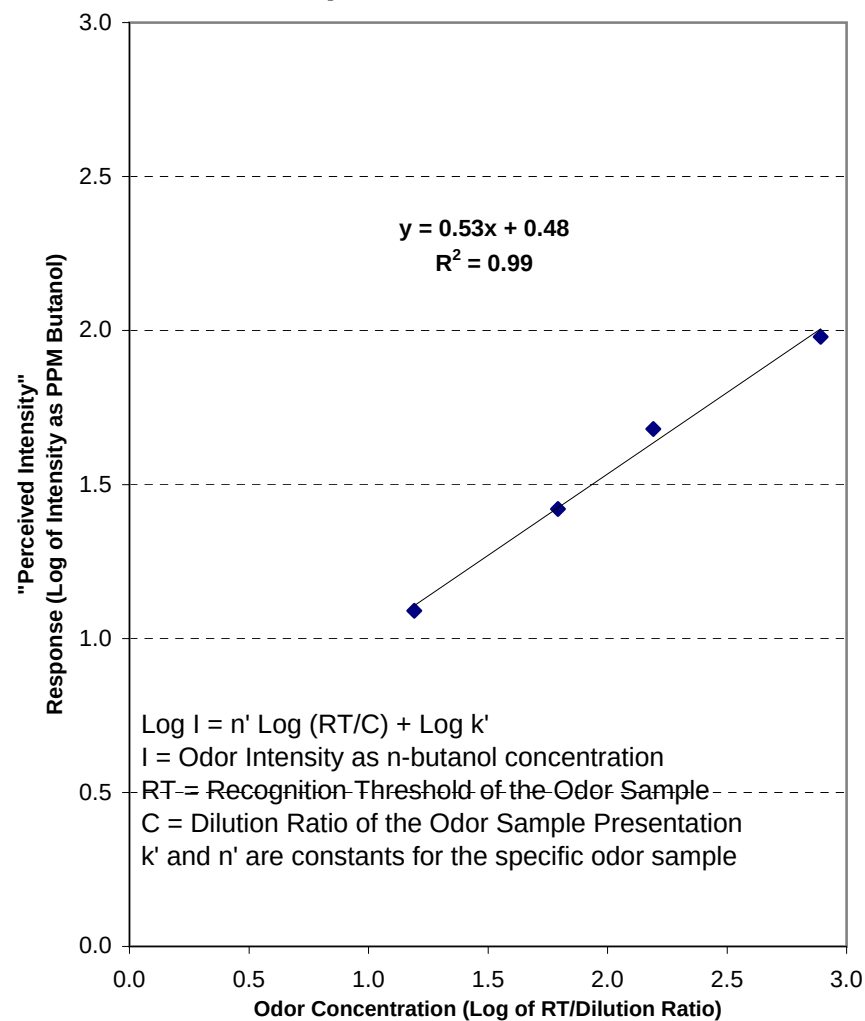
Medicinal *****
Menthol *****
Chemical *****
Tar *****
Kerosine *****
Petroleum *****
Plastic *****
Solvent *****
Vinyl *****
Gasoline *****
Oil *****
Offensive *****

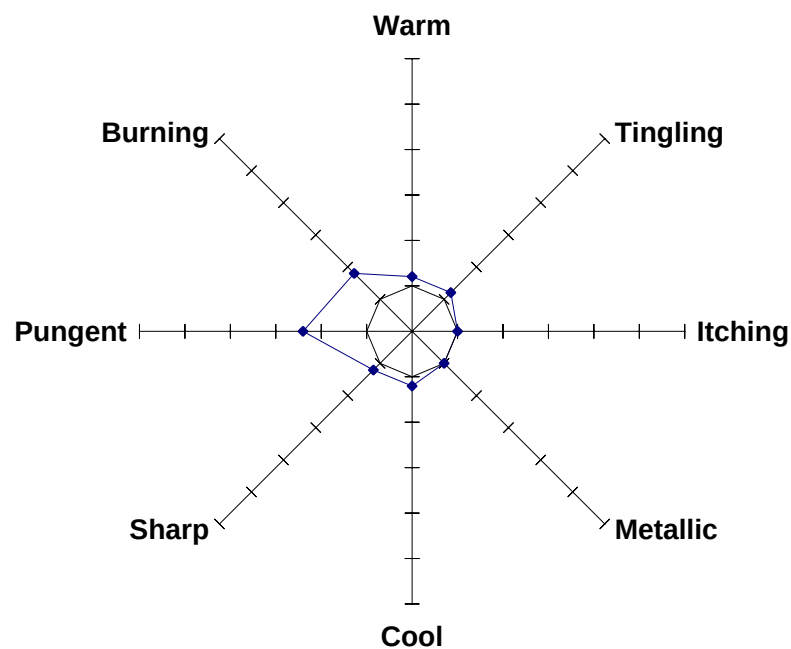
Client: Service Engineering GroupField No.: G10Report No.: 633901Project: Dredge SedimentDescription: 5L from 100LEvaluation Date: 12/05/06

Dose-Response

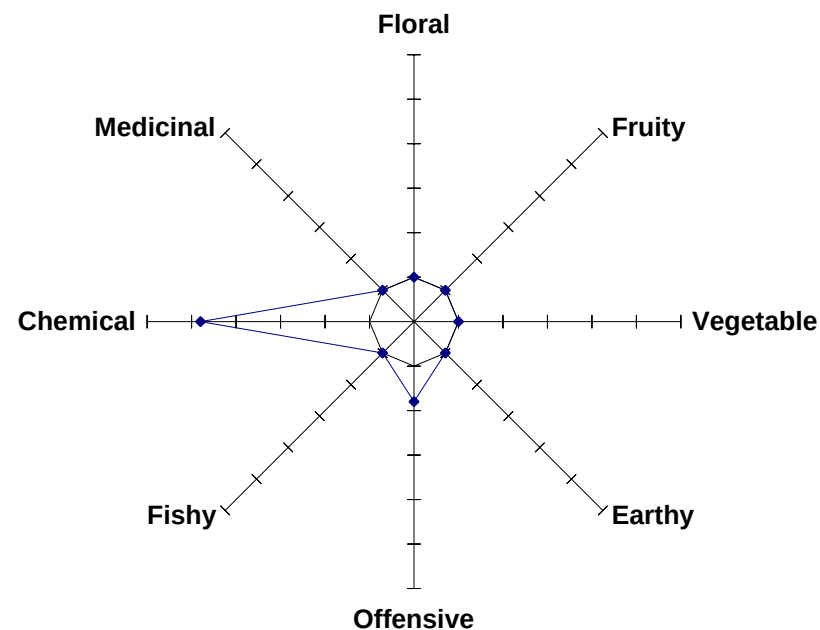


Dose-Response as Power Law

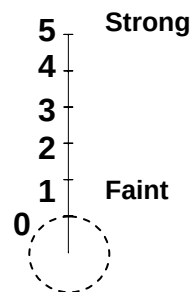


Client: Service Engineering GroupField No.: G20Report No.: 633901Project: Dredge SedimentDescription: 5L from 100LEvaluation Date: 12/05/06**Sensation Descriptor Graph**

Average Relative Strength	
Warm	0.2
Tingling	0.2
Itching	0.0
Metallic	0.0
Cool	0.2
Sharp	0.2
Pungent	1.4
Burning	0.8

Odor Descriptor Graph

Average Relative Strength	
Floral	0.0
Fruity	0.0
Vegetable	0.0
Earthy	0.0
Offensive	0.8
Fishy	0.0
Chemical	3.8
Medicinal	0.0

KEY**Relative Strength**

St. Croix Sensory, Inc.

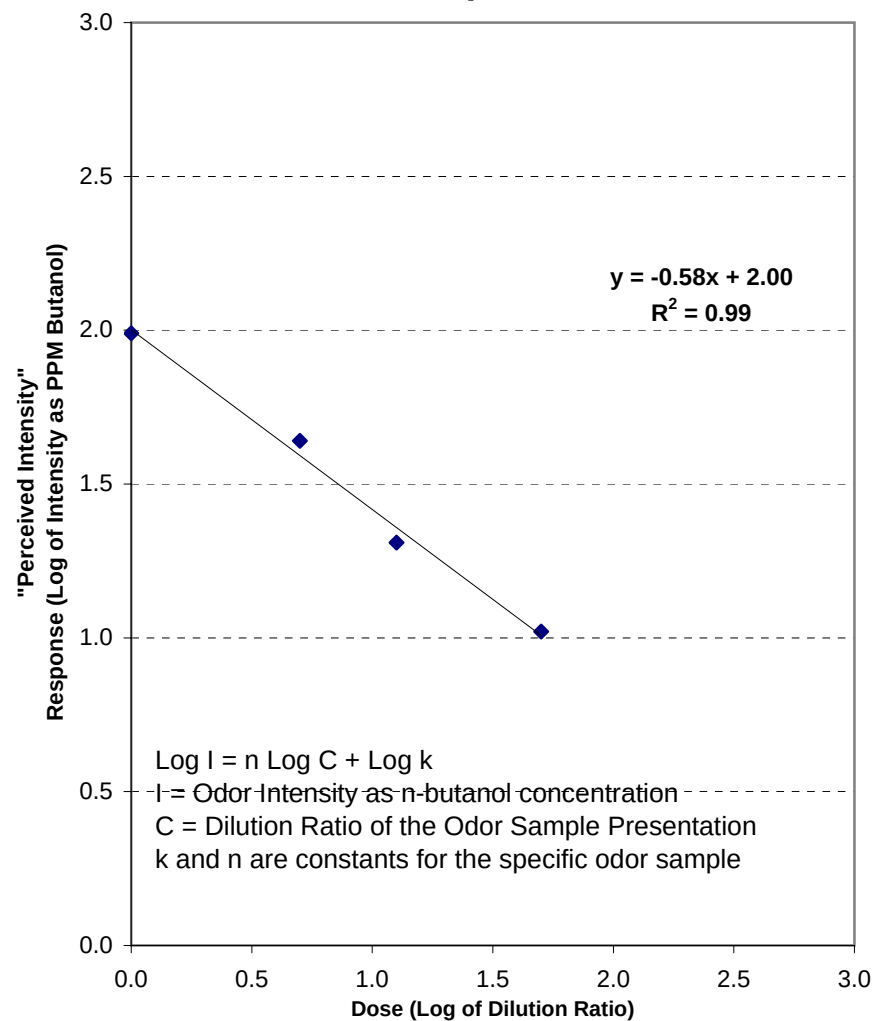
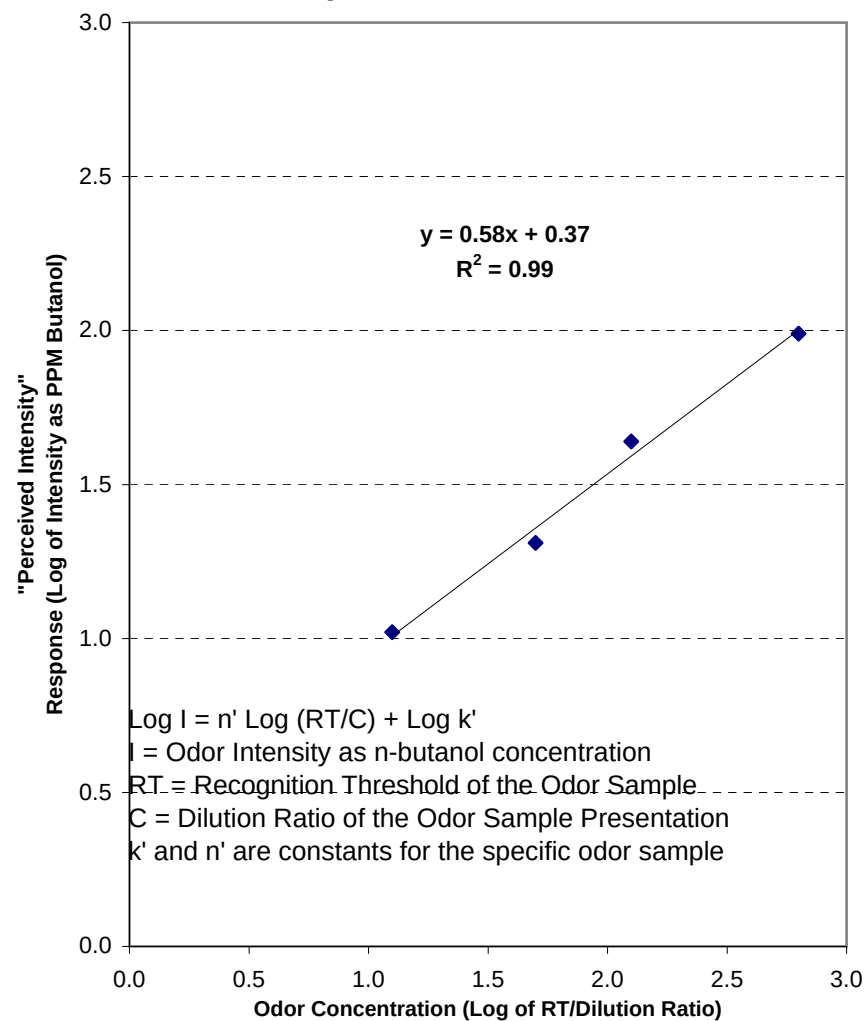
Odor Evaluation Report

Client: Service Engineering Group Field No.: G20
Project: Dredge Sediment Description: 5L from 100L

Report No.: 633901
Evaluation Date: 12/05/06

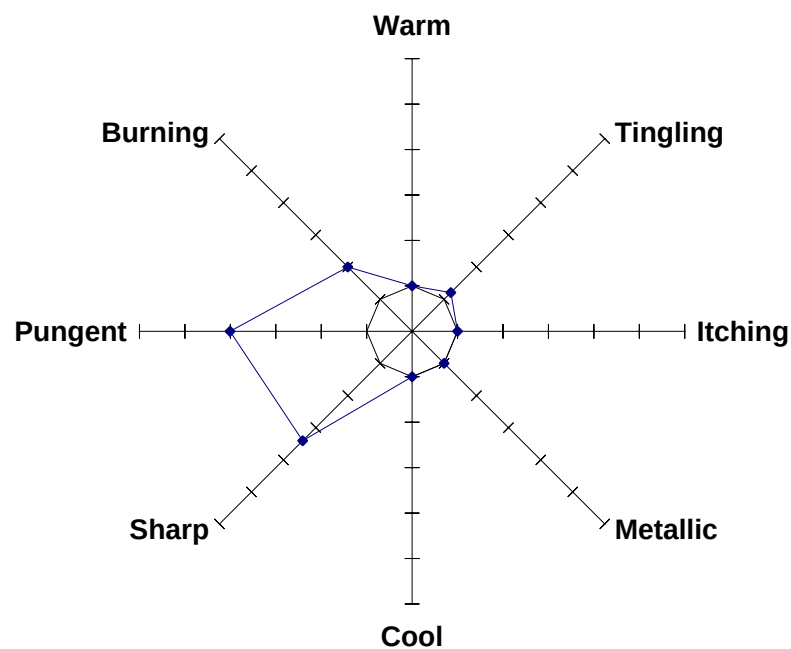
% of Assessors |*****|*****|*****|*****| 100%

Chemical *****
Tar *****
Kerosine *****
Petroleum *****
Cleaning fluid *****
Plastic *****
Varnish *****
Solvent *****
Gasoline *****
Oil *****
Offensive *****

Client: Service Engineering GroupField No.: G20Report No.: 633901Project: Dredge SedimentDescription: 5L from 100LEvaluation Date: 12/05/06**Dose-Response****Dose-Response as Power Law**

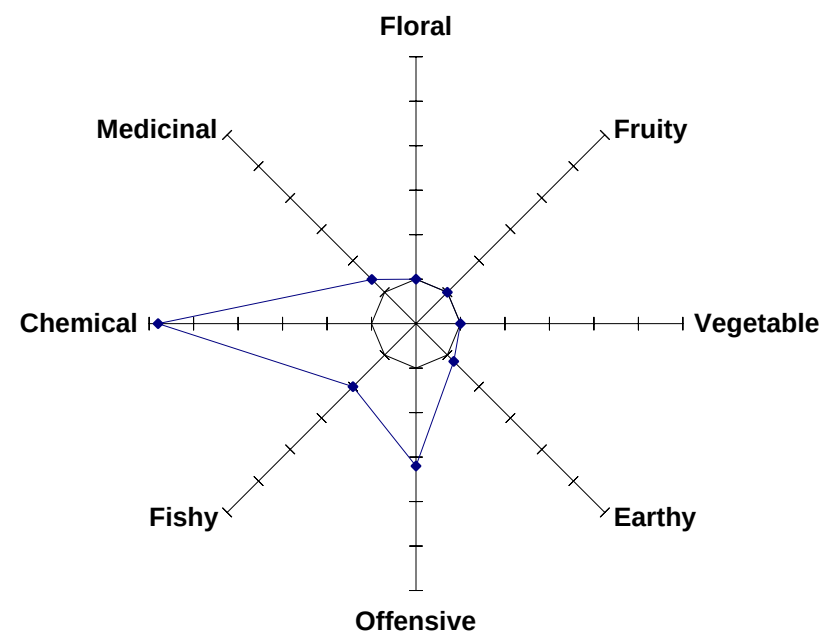
Client: Service Engineering GroupField No.: H10Report No.: 633901Project: Dredge SedimentDescription: 5L from 100LEvaluation Date: 12/05/06

Sensation Descriptor Graph

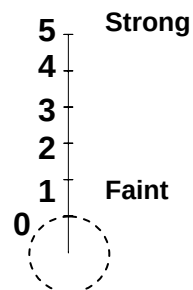


Average Relative Strength	
Warm	0.0
Tingling	0.2
Itching	0.0
Metallic	0.0
Cool	0.0
Sharp	2.4
Pungent	3.0
Burning	1.0

Odor Descriptor Graph



KEY



Relative Strength

Average Relative Strength	
Floral	0.0
Fruity	0.0
Vegetable	0.0
Earthy	0.2
Offensive	2.2
Fishy	1.0
Chemical	4.8
Medicinal	0.4

St. Croix Sensory, Inc.

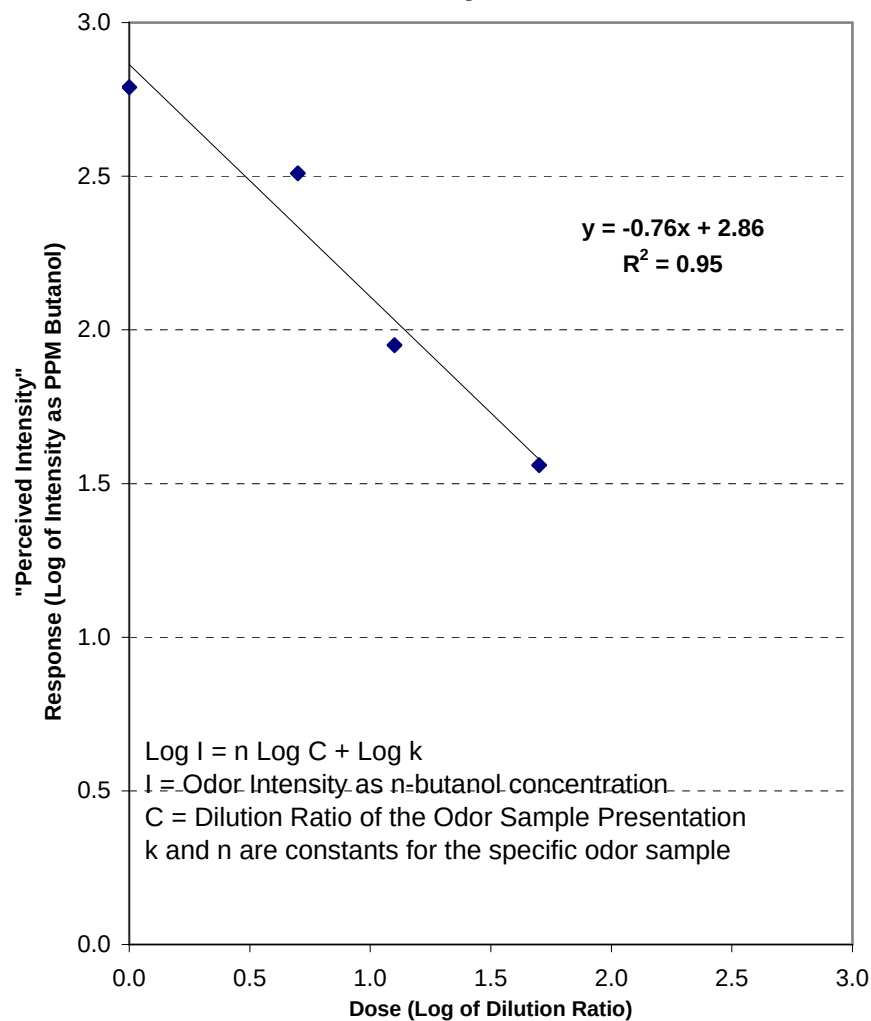
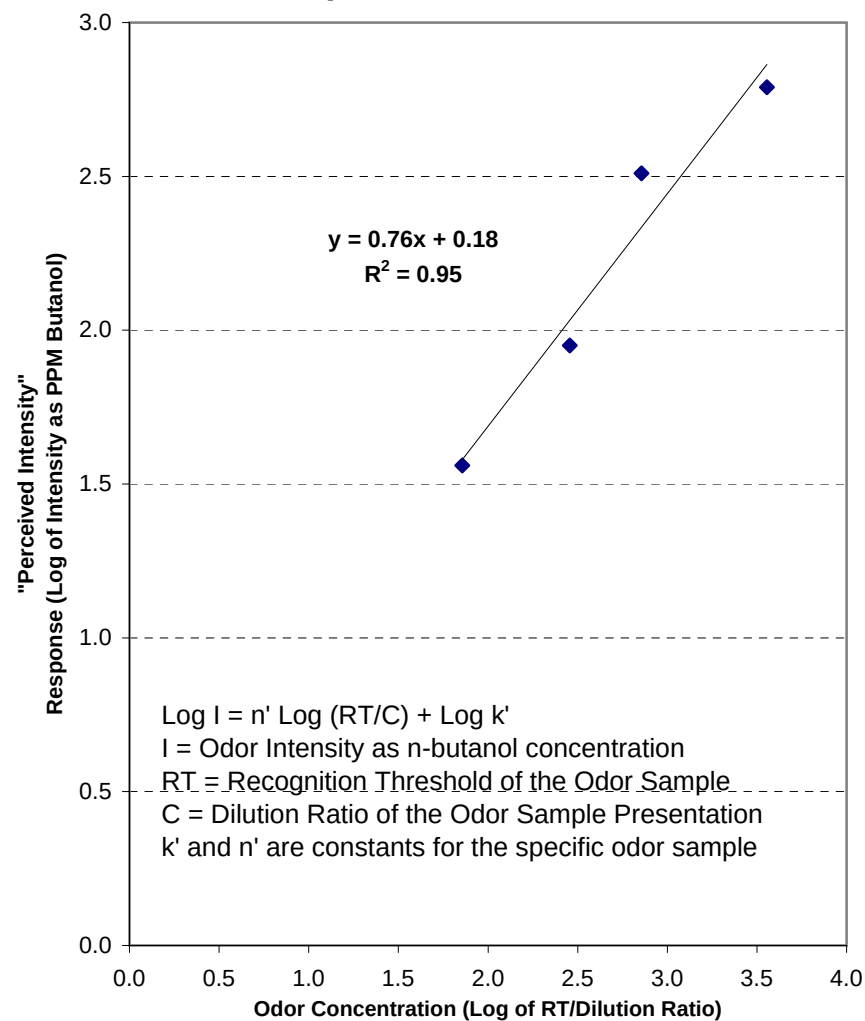
Odor Evaluation Report

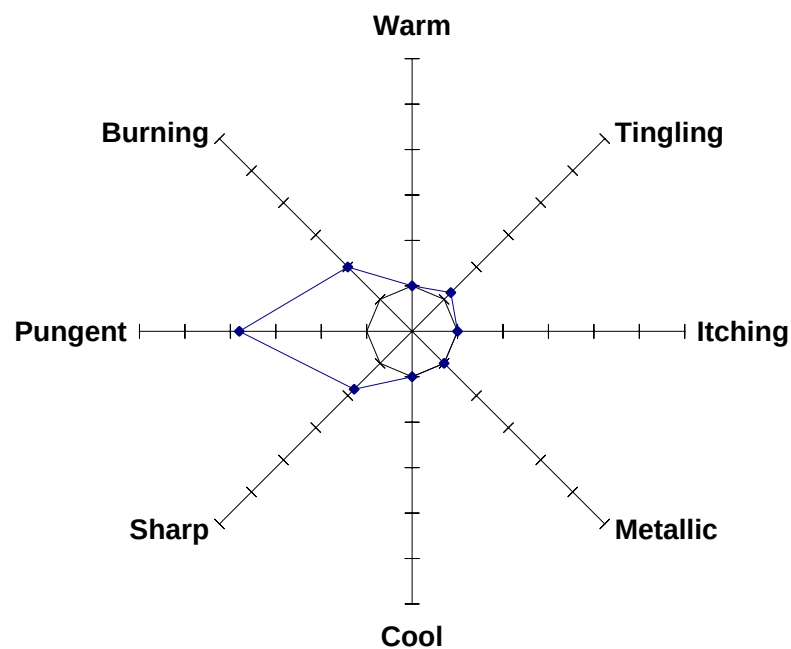
Client: Service Engineering Group Field No.: H10
Project: Dredge Sediment Description: 5L from 100L

Report No.: 633901
Evaluation Date: 12/05/06

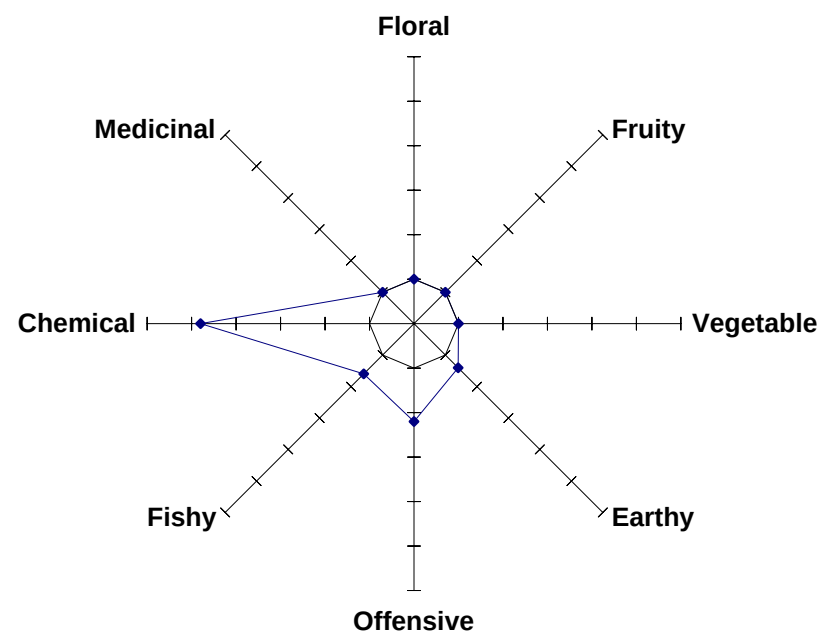
% of Assessors |*****|*****|*****|*****| 100%

Ammonia *****
Chemical *****
Grease *****
Tar *****
Kerosine *****
Petroleum *****
Creosote *****
Mothball *****
Solvent *****
Gasoline *****
Oil *****
Fishy *****
Amine *****
Offensive *****
Fecal *****
Sour *****
Urine *****
Earthy *****
Mouse-like *****

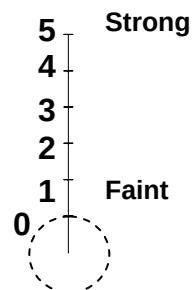
Client: Service Engineering GroupField No.: H10Report No.: 633901Project: Dredge SedimentDescription: 5L from 100LEvaluation Date: 12/05/06**Dose-Response****Dose-Response as Power Law**

Client: Service Engineering GroupField No.: H20Report No.: **633901**Project: Dredge SedimentDescription: 5L from 100LEvaluation Date: 12/05/06**Sensation Descriptor Graph**

Average Relative Strength	
Warm	0.0
Tingling	0.2
Itching	0.0
Metallic	0.0
Cool	0.0
Sharp	0.8
Pungent	2.8
Burning	1.0

Odor Descriptor Graph

Average Relative Strength	
Floral	0.0
Fruity	0.0
Vegetable	0.0
Earthy	0.4
Offensive	1.2
Fishy	0.6
Chemical	3.8
Medicinal	0.0

KEY**Relative Strength**

St. Croix Sensory, Inc.

Odor Evaluation Report

Client: Service Engineering Group Field No.: H20
Project: Dredge Sediment Description: 5L from 100L

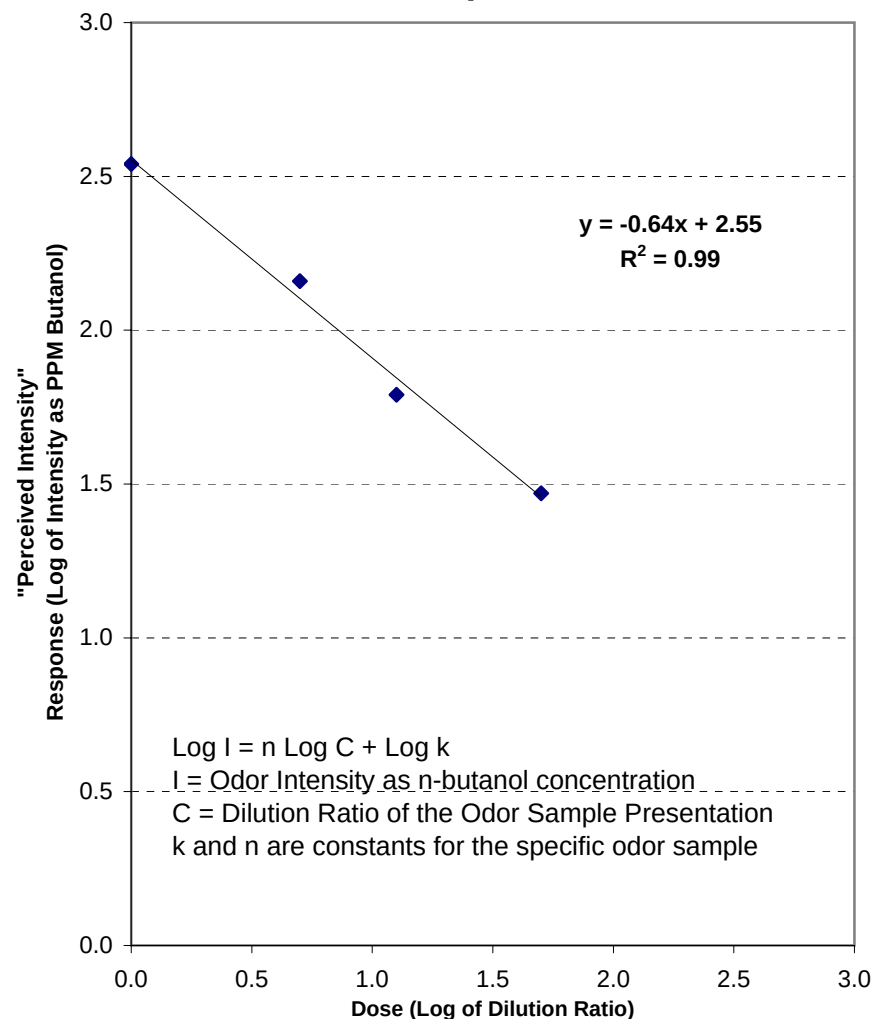
Report No.: 633901
Evaluation Date: 12/05/06

% of Assessors |*****|*****|*****|*****| 100%

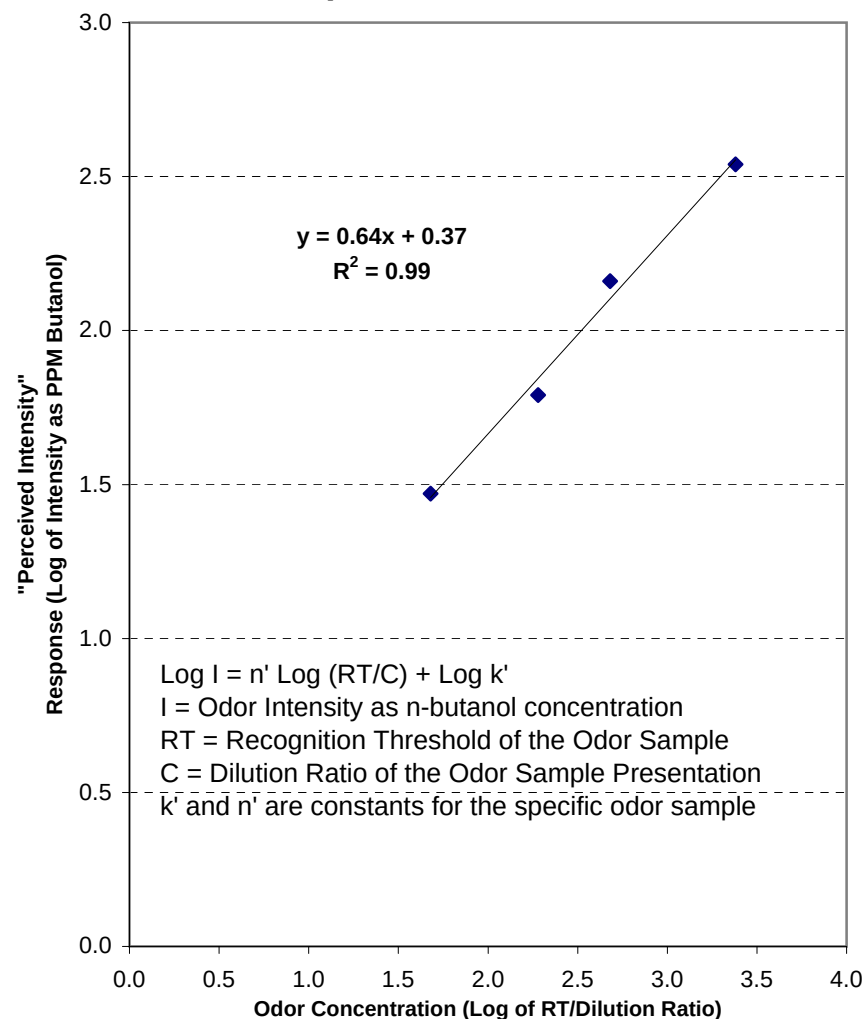
Chemical *****
Paint *****
Tar *****
Kerosine *****
Petroleum *****
Cleaning fluid *****
Plastic *****
Mothball *****
Solvent *****
Gasoline *****
Oil *****
Sulfur *****
Fishy *****
Amine *****
Offensive *****
Urine *****
Earthy *****
Stale *****
Mouse-like *****

Client: Service Engineering GroupField No.: H20Report No.: 633901Project: Dredge SedimentDescription: 5L from 100LEvaluation Date: 12/05/06

Dose-Response



Dose-Response as Power Law



St. Croix Sensory, Inc.

CHAIN OF CUSTODY RECORD FOR ODOR SAMPLES

Client: <u>SCS</u>		Sampled By: <u>AMM</u>		Odor Evaluations Requested: (X)		Page <u>1</u> of <u>1</u>	
Project Name: <u>Dredge Sediment</u>		Sampling Date: <u>12-5-06</u>		Odor Concentration* (Detection & Recognition Threshold)	Odor Intensity* (PPM 1-Butanol)	Odor Characterization (Hedonic Tone & Descriptors)	Odor Persistence (“Dose-Response”)
Comments:							
Line No.	Field No.	Sample Description	Sample Time	Field H ₂ S (ppm)			
1	G10	5L from 100L	10:00A				
2	G20	↓	10:10A				
3	H10		10:25A				
4	H20		10:30A				
5							
6							
7							
8							
9							
10							
11							
12							

Transmittal		Relinquished By	Date	Time	Accepted By	Date	Time	Comments & Exceptions Noted
Number of Shipping Boxes		<u>M. S. J.</u>	<u>12-5-06</u>	<u>10:50A</u>	<u>M. S. J.</u>	<u>12/5/06</u>	<u>11:15</u>	
		Received at St. Croix Sensory Laboratory						

*Odor Concentration: ASTM E679-04 and EN13725:2003 and Odor Intensity: ASTM E544-99(2004)

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CLIENT COPY PINK



St. Croix Sensory, Inc.

Service Engineering Group

Dredge Sediment Headspace

Odor Evaluation Report

Report No. 634001

12/06/06

Data Release Authorization:

Melissa McGinley
Laboratory Associate

Reviewed and Approved:

Michael A. McGinley, P.E.
Laboratory Director

St. Croix Sensory is a laboratory dedicated to practicing state-of-the-art sensory evaluation and to advancing the science of sensory perception.

We are a family owned and operated business providing our clients with personal customer service, flexible scheduling, timely results.

Our focus is to provide the best professional services available to help make your project or product a success.

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Tel: 800-879-9231
Fax: 651-439-1065

Email: stcroix@fivesenses.com

St. Croix Sensory, Inc.

Odor Evaluation Report

Client: Service Engineering Group

Report No.: 634001

Project: Dredge Sediment Headspace

Evaluation Date: 12/06/06

#	Field No.	Sample Description	ASTM E679 & EN13725		ASTM E544	PERSISTENCY	CHARACTERIZATION		Comments
			Detection Threshold	Recognition Threshold	Intensity	Dose-Response Slope	Hedonic Tone	Principal Odor Descriptors	
1	I10	5L from 100L	6,300	4,400	680	-0.50	-8.2	Chemical, Petroleum, Plastic, Kerosine, Creosote, Vinyl	
2	I20	5L from 100L	6,800	4,400	690	-0.51	-7.8	Chemical, Petroleum, Plastic, Kerosine, Creosote, Vinyl	
3	J10	5L from 100L	7,200	5,500	450	-0.50	-7.8	Chemical, Petroleum, Vinyl	
4	J20	5L from 100L	4,200	2,900	270	-0.46	-6.6	Petroleum, Vinyl, Chemical, Kerosine, Plastic	
5									
6									
7									
8									
9									
10									

St. Croix Sensory, Inc.

Odor Evaluation Report

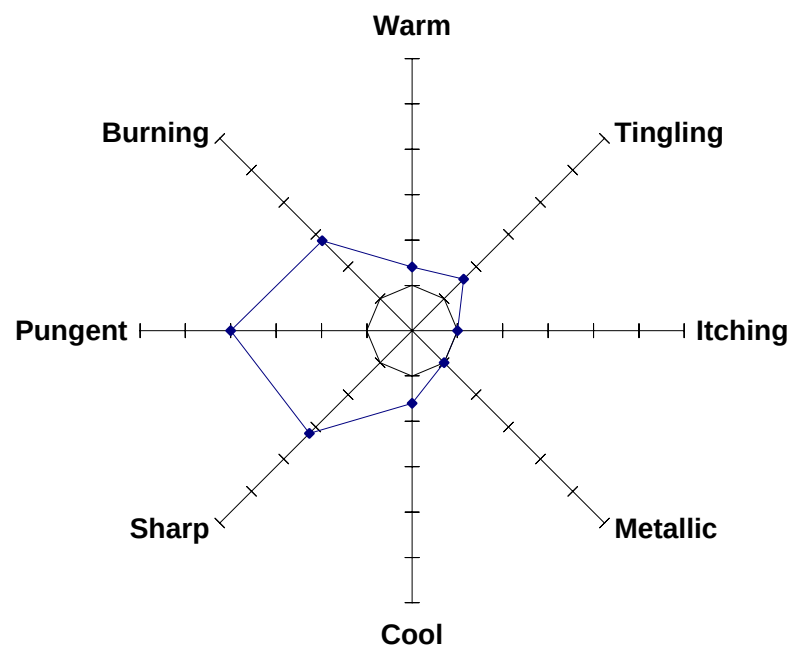
Client: Service Engineering Group

Report No.: 634001

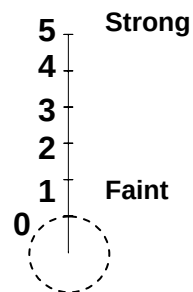
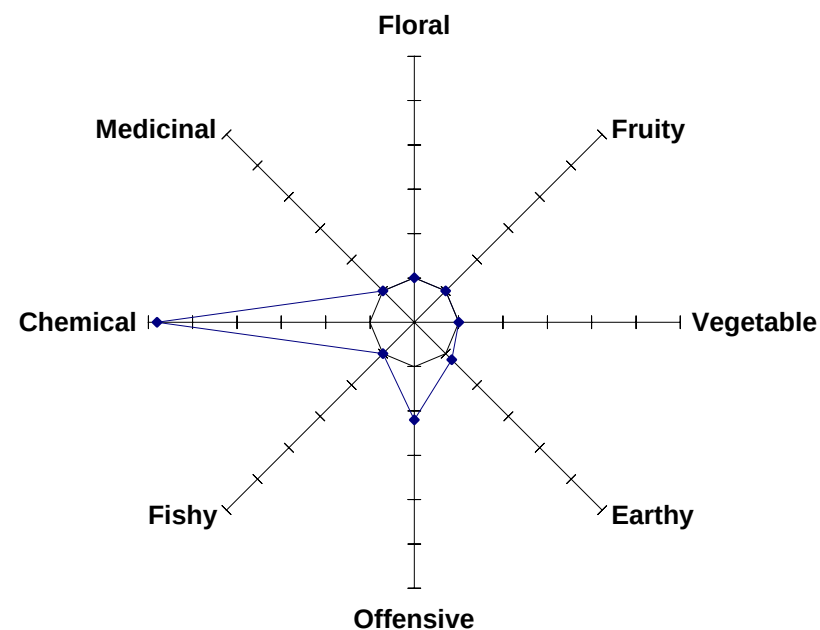
Project: Dredge Sediment Headspace

Evaluation Date: 12/06/06

#	Field No.	Sample Description	ASTM E679 & EN13725		ASTM E544	PERSISTENCY	CHARACTERIZATION		Comments
			Detection Threshold	Recognition Threshold	Intensity	Dose-Response Slope	Hedonic Tone	Principal Odor Descriptors	
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

Client: Service Engineering GroupField No.: I10Report No.: 634001Project: Dredge Sediment HeadspaceDescription: 5L from 100LEvaluation Date: 12/06/06**Sensation Descriptor Graph**

Average Relative Strength	
Warm	0.4
Tingling	0.6
Itching	0.0
Metallic	0.0
Cool	0.6
Sharp	2.2
Pungent	3.0
Burning	1.8

KEY**Relative Strength****Odor Descriptor Graph**

Average Relative Strength	
Floral	0.0
Fruity	0.0
Vegetable	0.0
Earthy	0.2
Offensive	1.2
Fishy	0.0
Chemical	4.8
Medicinal	0.0

St. Croix Sensory, Inc.

Odor Evaluation Report

Client: Service Engineering Group Field No.: I10
Project: Dredge Sediment Headspace Description: 5L from 100L

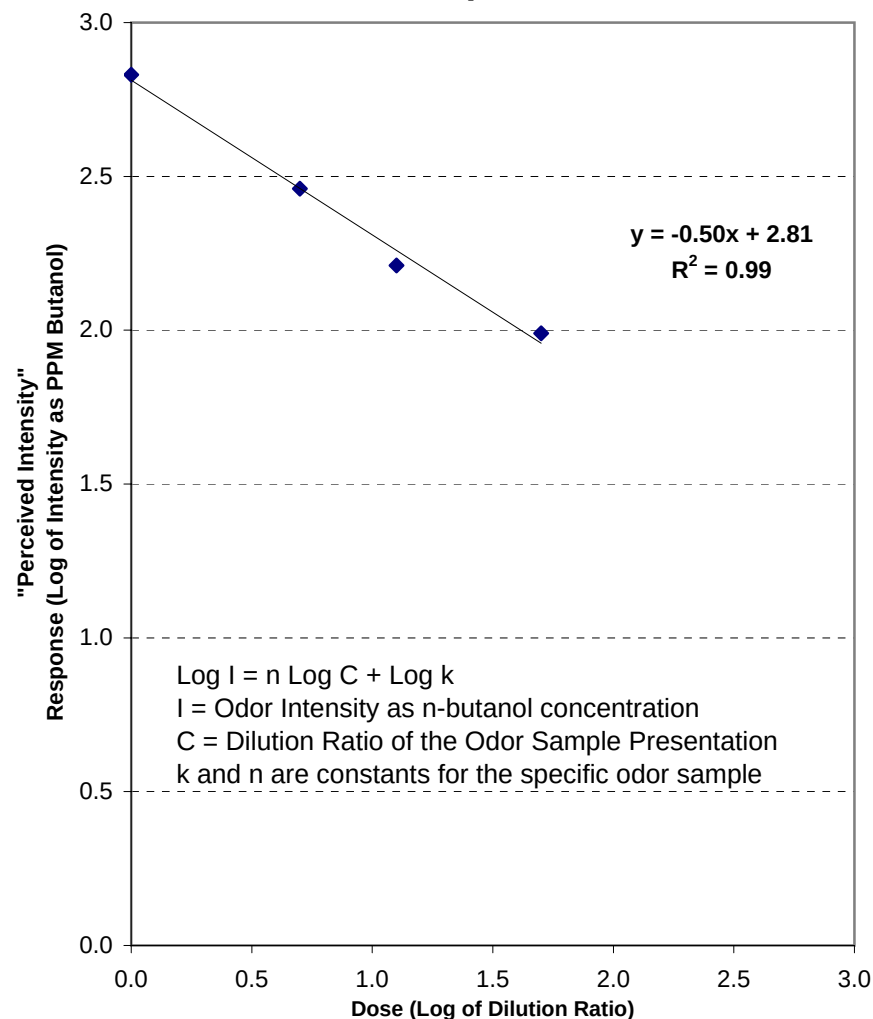
Report No.: 634001
Evaluation Date: 12/06/06

% of Assessors |*****|*****|*****|*****| 100%

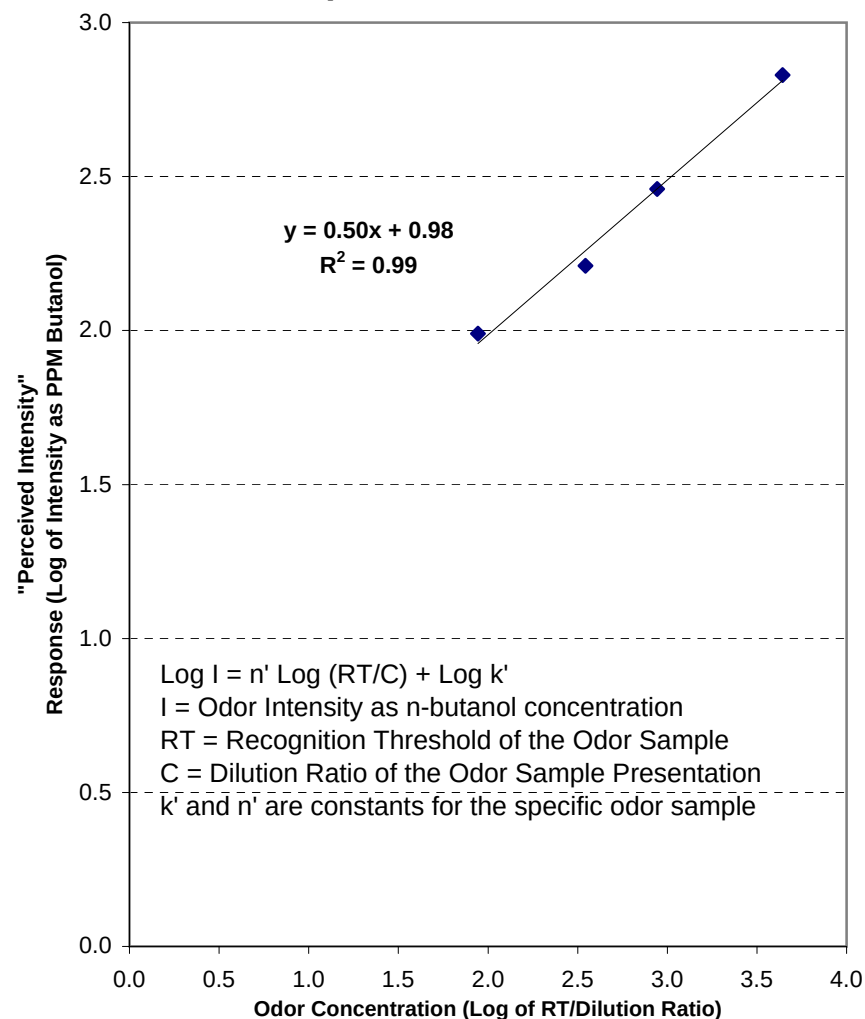
Chemical *****
Car exhaust *****
Kerosine *****
Petroleum *****
Turpentine *****
Cleaning fluid *****
Plastic *****
Creosote *****
Mothball *****
Solvent *****
Vinyl *****
Gasoline *****
Sulfur *****
Offensive *****
Urine *****
Earthy *****
Mold *****
Mouse-like *****

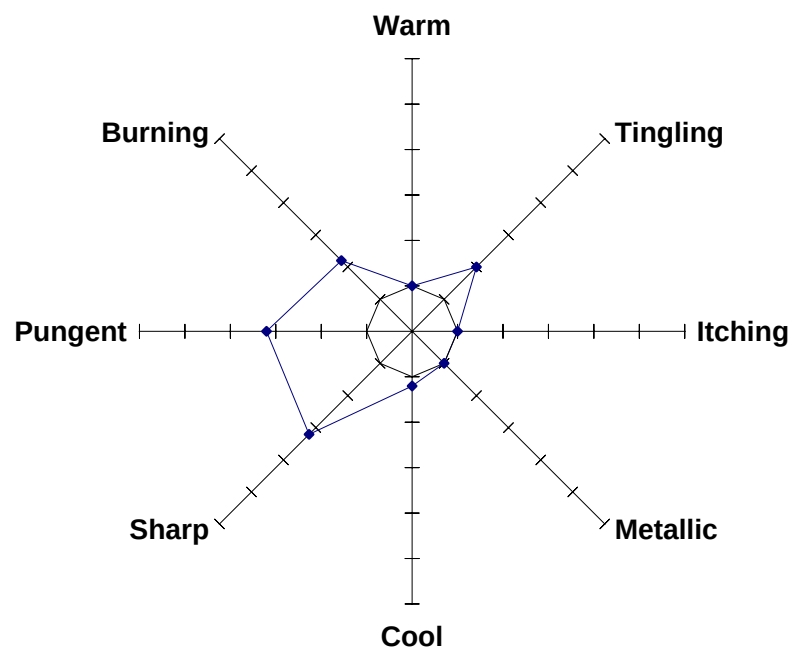
Client: Service Engineering GroupField No.: I10Report No.: 634001Project: Dredge Sediment HeadspaceDescription: 5L from 100LEvaluation Date: 12/06/06

Dose-Response

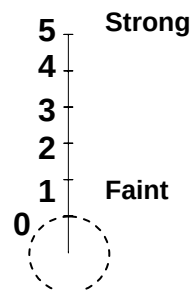
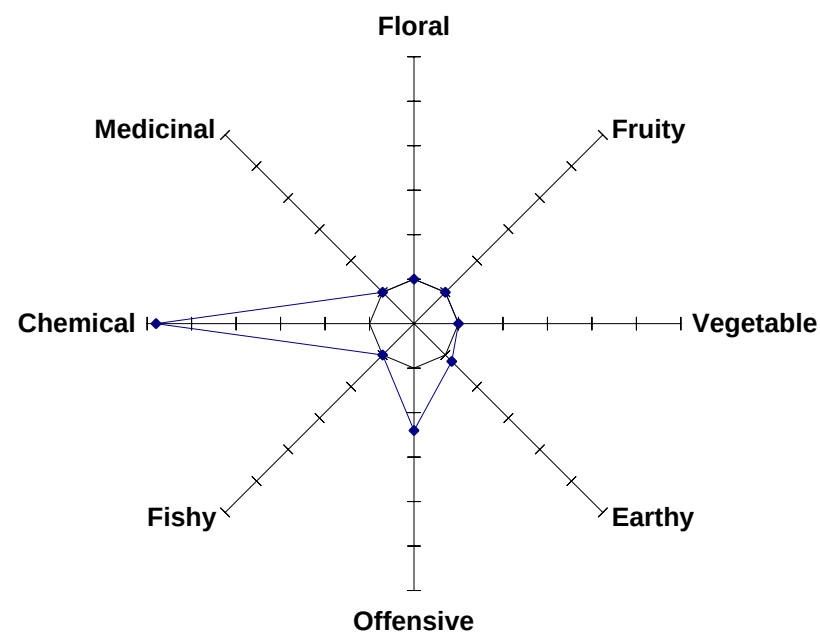


Dose-Response as Power Law



Client: Service Engineering GroupField No.: I20Report No.: **634001**Project: Dredge Sediment HeadspaceDescription: 5L from 100LEvaluation Date: 12/06/06**Sensation Descriptor Graph**

Average Relative Strength	
Warm	0.0
Tingling	1.0
Itching	0.0
Metallic	0.0
Cool	0.2
Sharp	2.2
Pungent	2.2
Burning	1.2

KEY**Relative Strength****Odor Descriptor Graph**

Average Relative Strength	
Floral	0.0
Fruity	0.0
Vegetable	0.0
Earthy	0.2
Offensive	1.4
Fishy	0.0
Chemical	4.8
Medicinal	0.0

St. Croix Sensory, Inc.

Odor Evaluation Report

Client: Service Engineering Group Field No.: I20
Project: Dredge Sediment Headspace Description: 5L from 100L

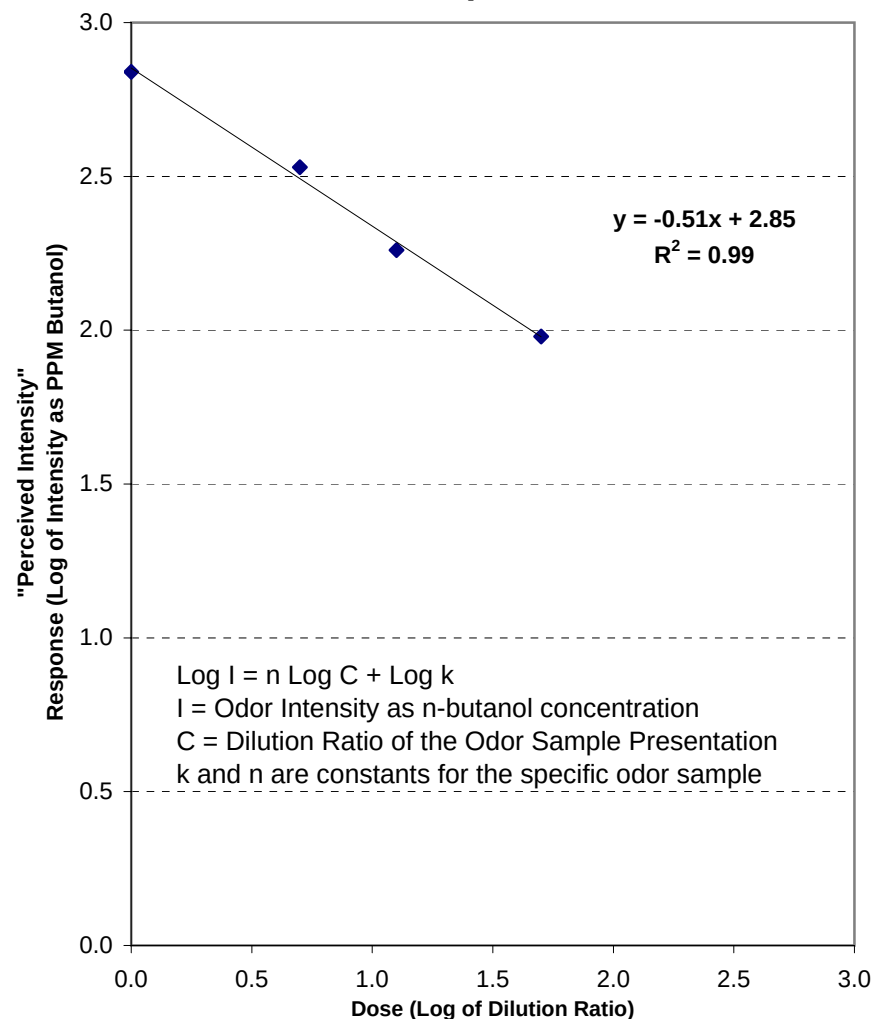
Report No.: 634001
Evaluation Date: 12/06/06

% of Assessors |*****|*****|*****|*****| 100%

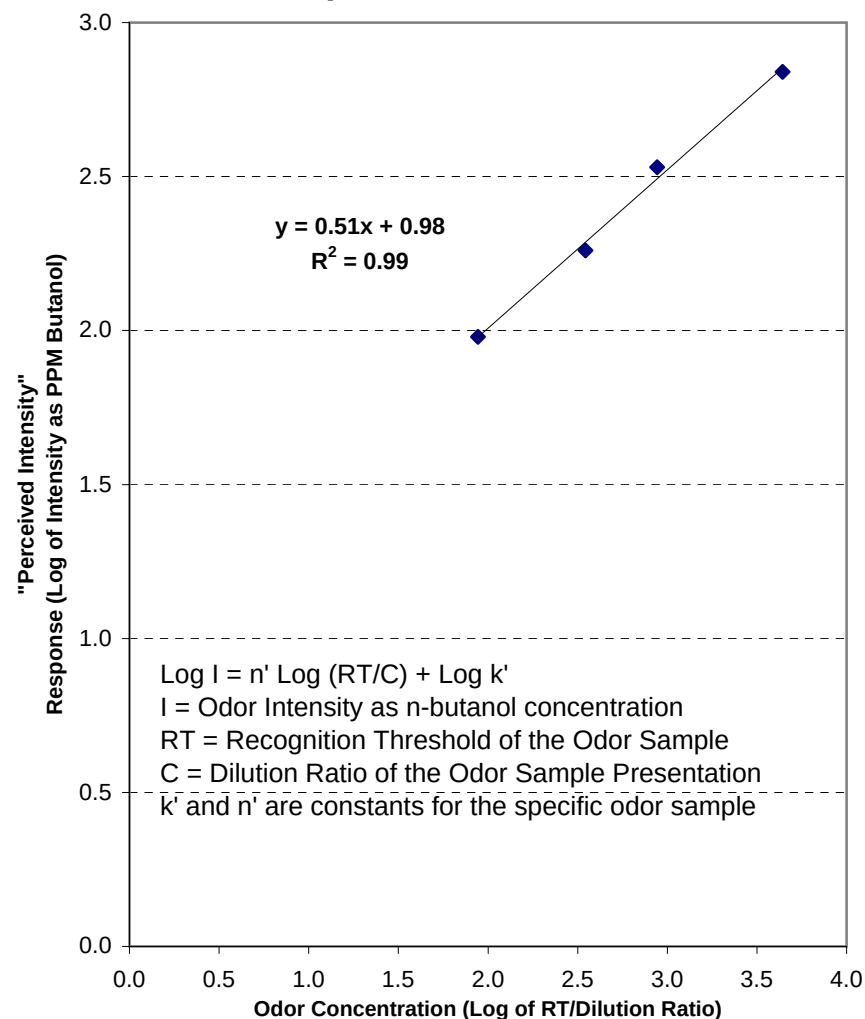
Medicinal *****
Ammonia *****
Chemical *****
Grease *****
Kerosine *****
Petroleum *****
Turpentine *****
Cleaning fluid *****
Plastic *****
Varnish *****
Creosote *****
Mothball *****
Solvent *****
Vinyl *****
Gasoline *****
Oil *****
Sulfur *****
Earthy *****
Mold *****
Mouse-like *****

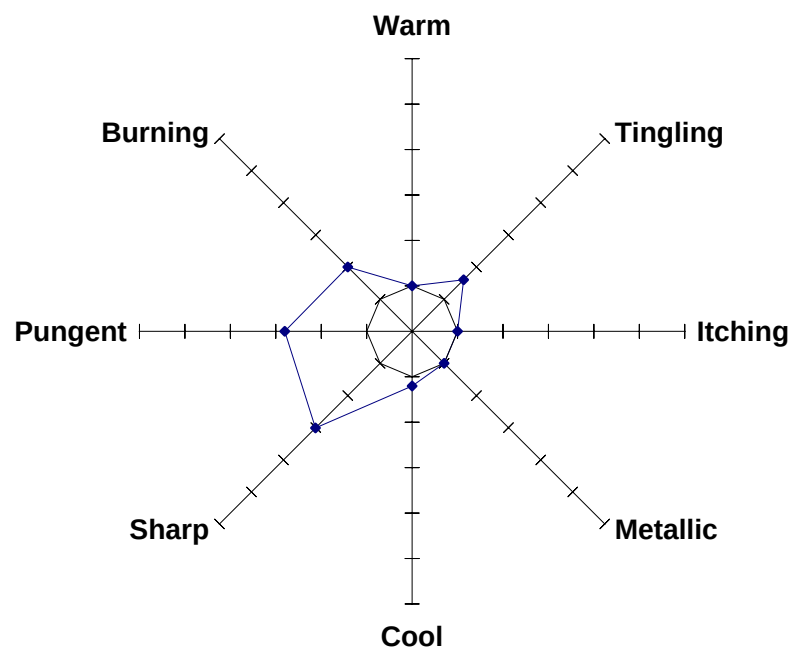
Client: Service Engineering GroupField No.: I20Report No.: 634001Project: Dredge Sediment HeadspaceDescription: 5L from 100LEvaluation Date: 12/06/06

Dose-Response

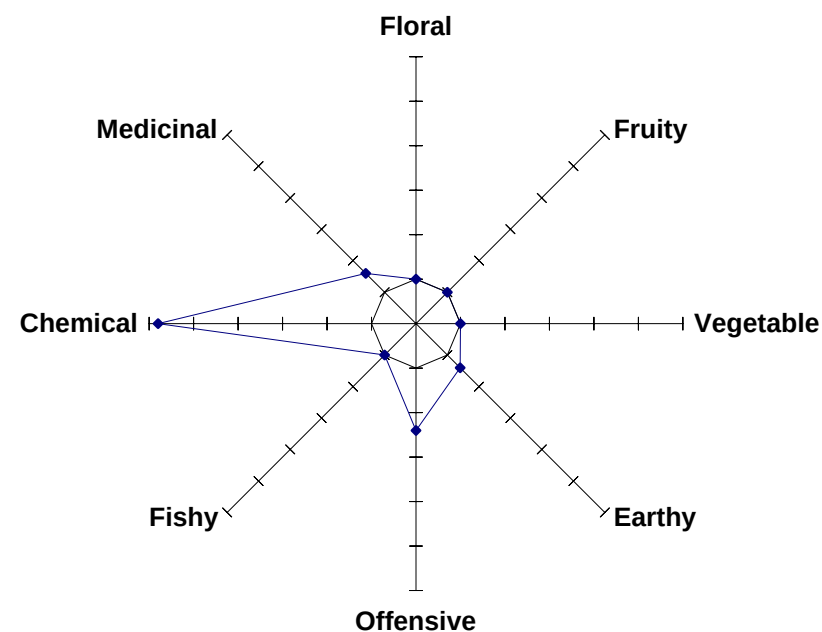


Dose-Response as Power Law

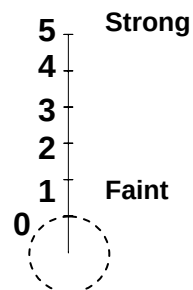


Client: Service Engineering GroupField No.: J10Report No.: **634001**Project: Dredge Sediment HeadspaceDescription: 5L from 100LEvaluation Date: 12/06/06**Sensation Descriptor Graph****Average Relative Strength**

Warm	0.0
Tingling	0.6
Itching	0.0
Metallic	0.0
Cool	0.2
Sharp	2.0
Pungent	1.8
Burning	1.0

Odor Descriptor Graph**Average Relative Strength**

Floral	0.0
Fruity	0.0
Vegetable	0.0
Earthy	0.4
Offensive	1.4
Fishy	0.0
Chemical	4.8
Medicinal	0.6

KEY**Relative Strength**

St. Croix Sensory, Inc.

Odor Evaluation Report

Client: Service Engineering Group Field No.: J10
Project: Dredge Sediment Headspace Description: 5L from 100L

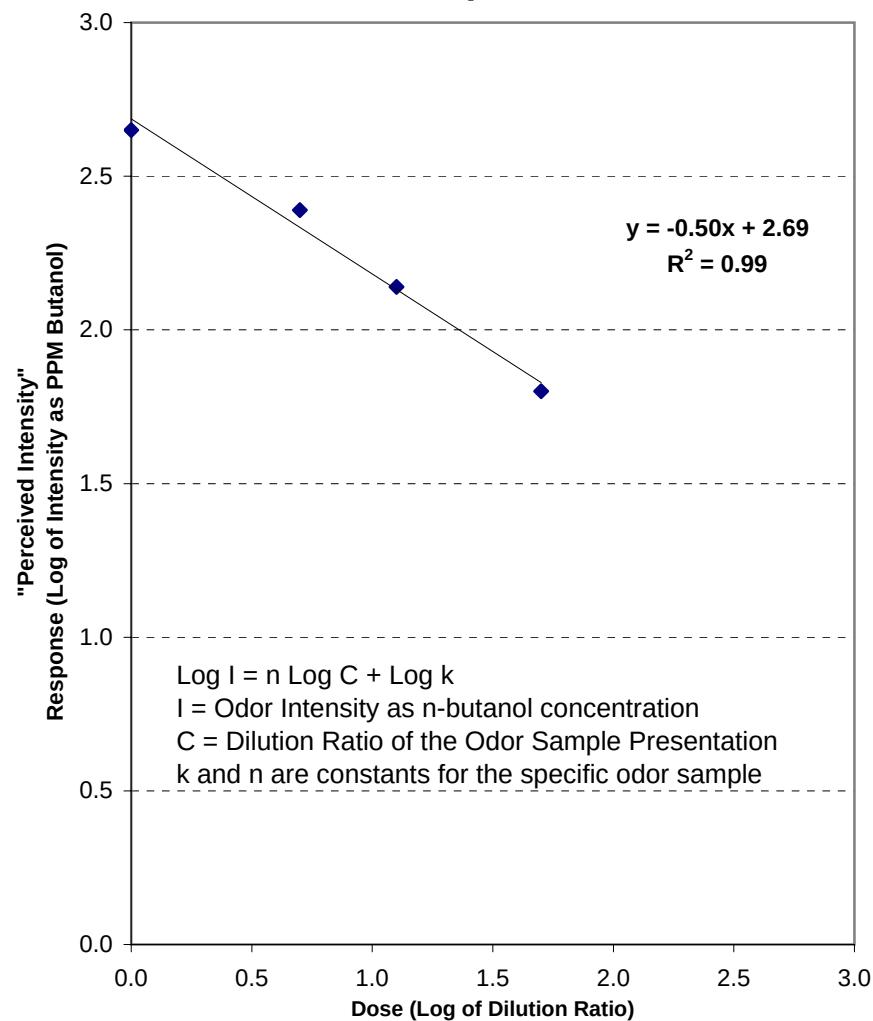
Report No.: 634001
Evaluation Date: 12/06/06

% of Assessors |*****|*****|*****|*****| 100%

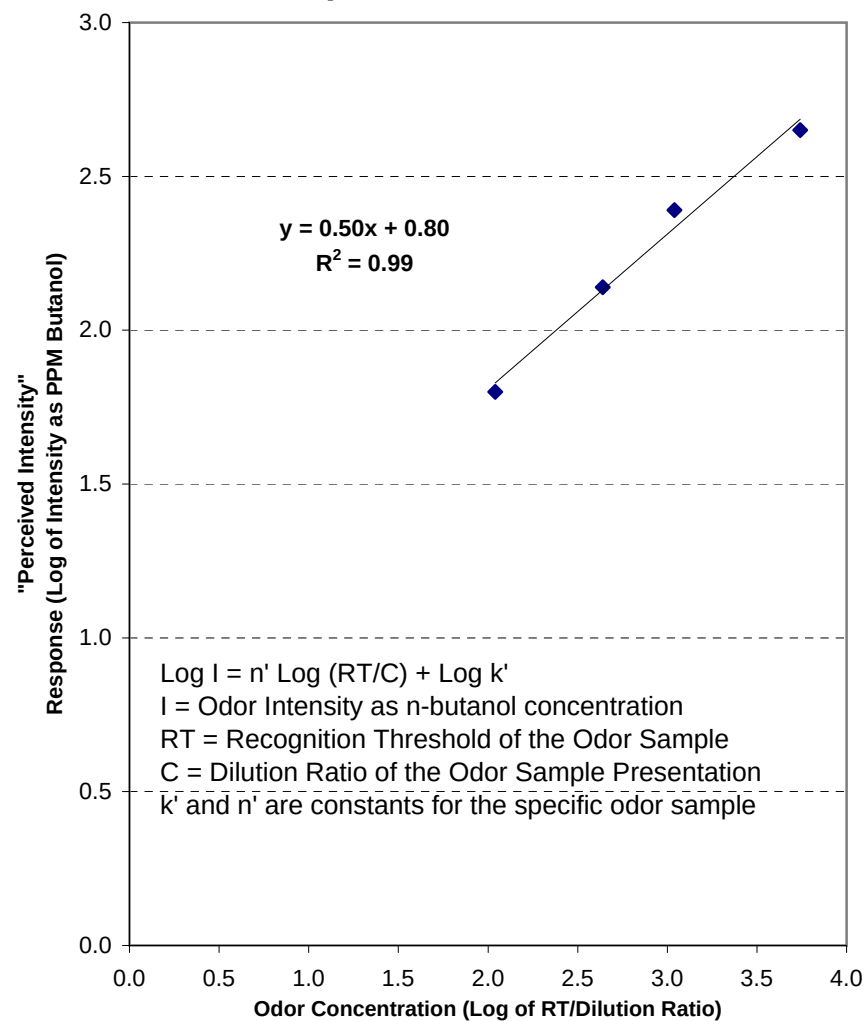
Disinfectant *****
Chemical *****
Grease *****
Kerosine *****
Petroleum *****
Turpentine *****
Cleaning fluid *****
Plastic *****
Varnish *****
Creosote *****
Mothball *****
Solvent *****
Vinyl *****
Gasoline *****
Oil *****
Earthy *****
Mold *****
Mouse-like *****

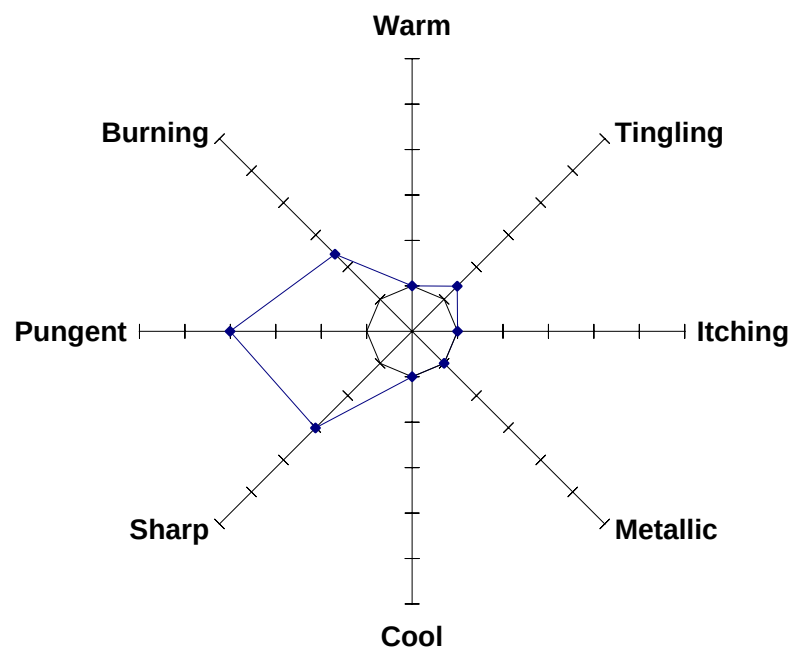
Client: Service Engineering GroupField No.: J10Report No.: 634001Project: Dredge Sediment HeadspaceDescription: 5L from 100LEvaluation Date: 12/06/06

Dose-Response

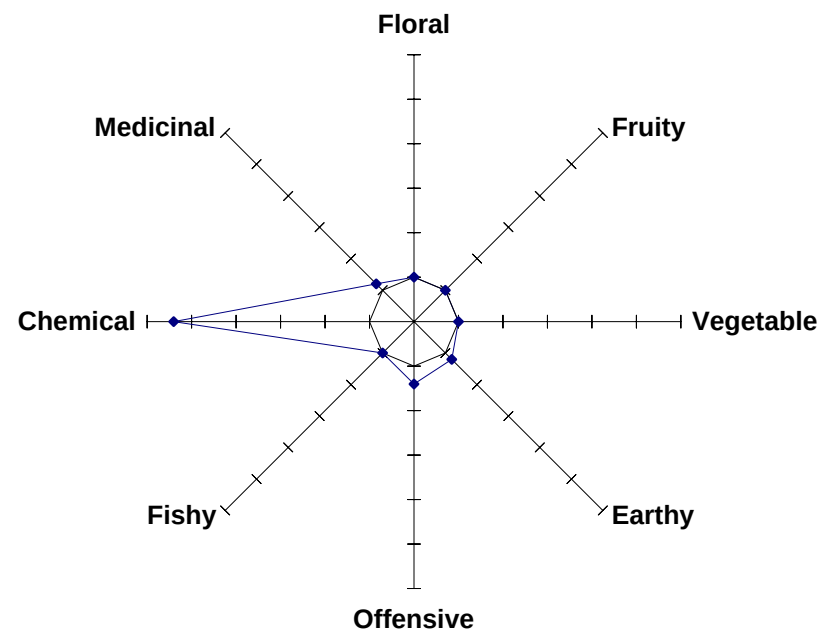
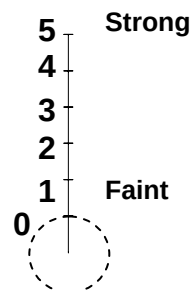


Dose-Response as Power Law



Client: Service Engineering GroupField No.: J20Report No.: **634001**Project: Dredge Sediment HeadspaceDescription: 5L from 100LEvaluation Date: 12/06/06**Sensation Descriptor Graph**

	Average Relative Strength
Warm	0.0
Tingling	0.4
Itching	0.0
Metallic	0.0
Cool	0.0
Sharp	2.0
Pungent	3.0
Burning	1.4

Odor Descriptor Graph**KEY****Relative Strength**

	Average Relative Strength
Floral	0.0
Fruity	0.0
Vegetable	0.0
Earthy	0.2
Offensive	0.4
Fishy	0.0
Chemical	4.4
Medicinal	0.2

St. Croix Sensory, Inc.

Odor Evaluation Report

Client: Service Engineering Group Field No.: J20
Project: Dredge Sediment Headspace Description: 5L from 100L

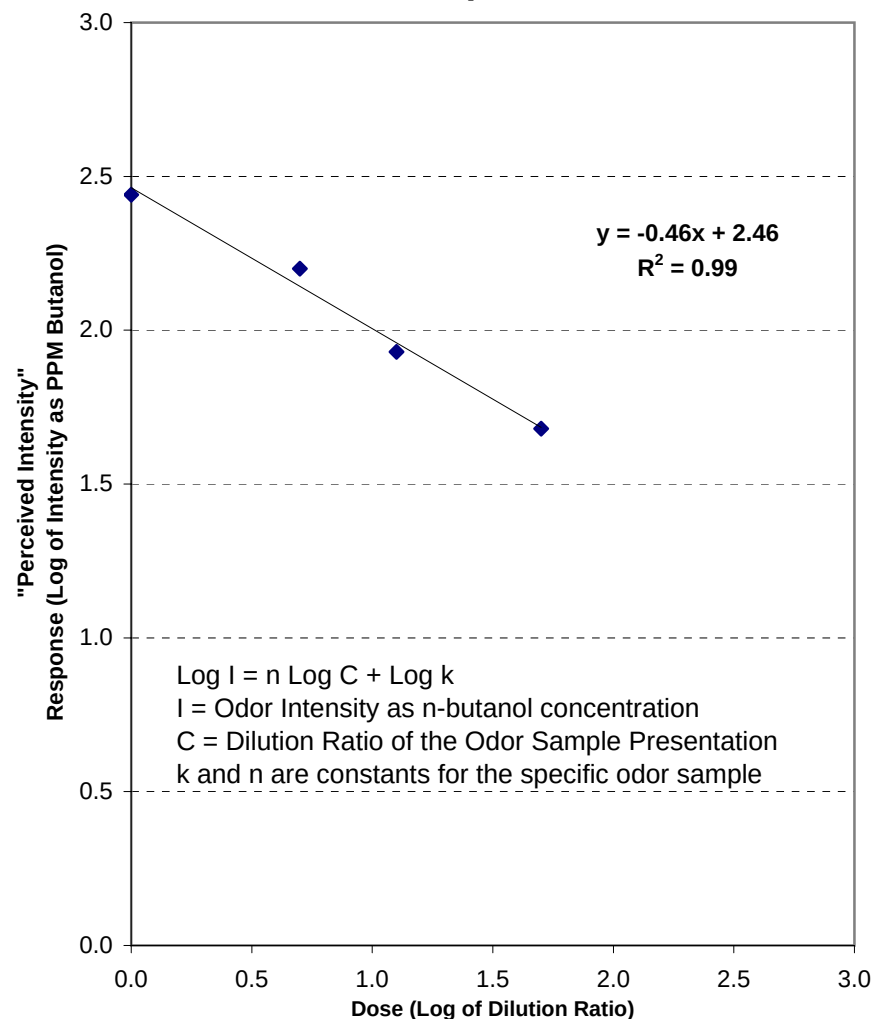
Report No.: 634001
Evaluation Date: 12/06/06

% of Assessors |*****|*****|*****|*****| 100%

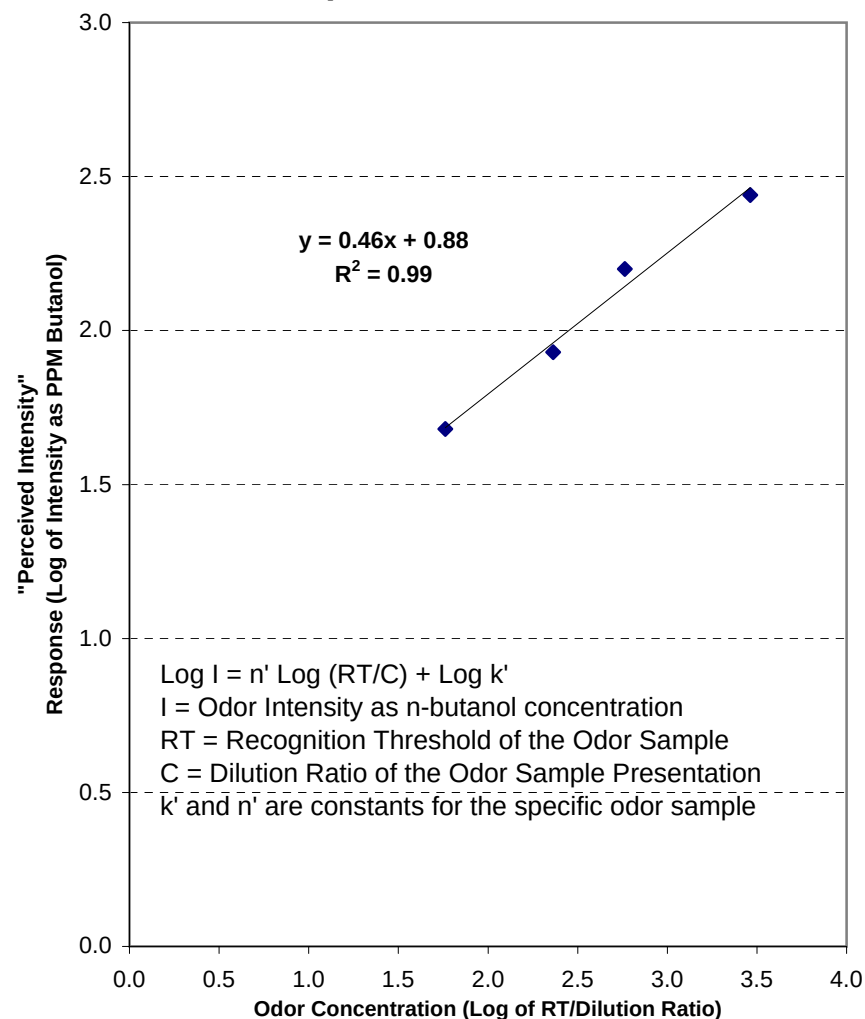
Medicinal *****
Chemical *****
Grease *****
Kerosine *****
Petroleum *****
Turpentine *****
Cleaning fluid *****
Plastic *****
Varnish *****
Mothball *****
Solvent *****
Vinyl *****
Gasoline *****
Oil *****
Earthy *****
Mouse-like *****

Client: Service Engineering GroupField No.: J20Report No.: 634001Project: Dredge Sediment HeadspaceDescription: 5L from 100LEvaluation Date: 12/06/06

Dose-Response



Dose-Response as Power Law



St. Croix Sensory, Inc.

CHAIN OF CUSTODY RECORD FOR ODOR SAMPLES

Page 1 of 1

Client: <u>SCS</u>		Sampled By: <u>AmL</u>		Odor Evaluations Requested: (X)				
Project Name: <u>Dredge Sediment</u>		Sampling Date: <u>12-6-06</u>						
Comments:								
Line No.	Field No.	Sample Description	Sample Time	Field H ₂ S (ppm)	Odor Concentration* (Detection & Recognition Threshold)	Odor Intensity* (PPM 1-Butanol)	Odor Characterization (Hedonic Tone & Descriptors)	Odor Persistence ("Dose-Response")
1	I10	5 L from 100 L	10:15A					
2	I20		10:25A					
3	J10		10:45A					
4	J20		10:50A					
5								
6								
7								
8								
9								
10								
11								
12								

For Laboratory use Only	
Odor Evaluation Report No.	
Laboratory Sample No.	
LN	FN

Transmittal Number of Shipping Boxes	Relinquished By <u>Alvin Jay</u>	Date	Time	Accepted By <u>Antonia Delano</u>	Date	Time	Comments & Exceptions Noted
	Received at St. Croix Sensory Laboratory				<u>12/6/06</u>	<u>11:20</u>	

*Odor Concentration: ASTM E679-04 and EN13725:2003 and Odor Intensity: ASTM E544-99(2004)
 St. Croix Sensory, Inc. ♦ 3549 Lake Elmo Avenue North ♦ Lake Elmo, MN 55042 U.S.A. ♦ Tel: 800-879-9231 ♦ Fax: 651-439-1065 ♦ Email: reports@livesenses.com ♦ Web: www.livesenses.com

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CLIENT COPY PINK



St. Croix Sensory, Inc.

Service Engineering Group

Dredge Sediment Headspace

Odor Evaluation Report

Report No. 634101

12/07/06

Data Release Authorization:

Melissa McGinley
Laboratory Associate

Reviewed and Approved:

Michael A. McGinley, P.E.
Laboratory Director

St. Croix Sensory is a laboratory dedicated to practicing state-of-the-art sensory evaluation and to advancing the science of sensory perception.

We are a family owned and operated business providing our clients with personal customer service, flexible scheduling, timely results.

Our focus is to provide the best professional services available to help make your project or product a success.

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P.O. Box 313
Lake Elmo, Minnesota 55042 U.S.A.

Tel: 800-879-9231
Fax: 651-439-1065

Email: stcroix@fivesenses.com

St. Croix Sensory, Inc.

Odor Evaluation Report

Client: Service Engineering Group

Report No.: 634101

Project: Dredge Sediment Headspace

Evaluation Date: 12/07/06

#	Field No.	Sample Description	ASTM E679 & EN13725		ASTM E544	PERSISTENCY	CHARACTERIZATION		Comments
			Detection Threshold	Recognition Threshold	Intensity	Dose-Response Slope	Hedonic Tone	Principal Odor Descriptors	
1	K10	5L from 100L	720	480	170	-0.66	-3.4	Petroleum, Cleaning Fluid, Solvent, Chemical, Gasoline, Oil	
2	K20	5L from 100L	550	280	160	-0.63	-3.4	Petroleum, Solvent, Cleaning Fluid, Chemical	
3	L10	5L from 100L	340	200	80	-0.47	-0.4	Petroleum, Cleaning Fluid, Solvent, Chemical, Oil	
4	L20	5L from 100L	250	140	95	-0.49	-1.0	Solvent, Petroleum, Chemical, Varnish, Gasoline, Oil	
5									
6									
7									
8									
9									
10									

St. Croix Sensory, Inc.

Odor Evaluation Report

Client: Service Engineering Group

Report No.: 634101

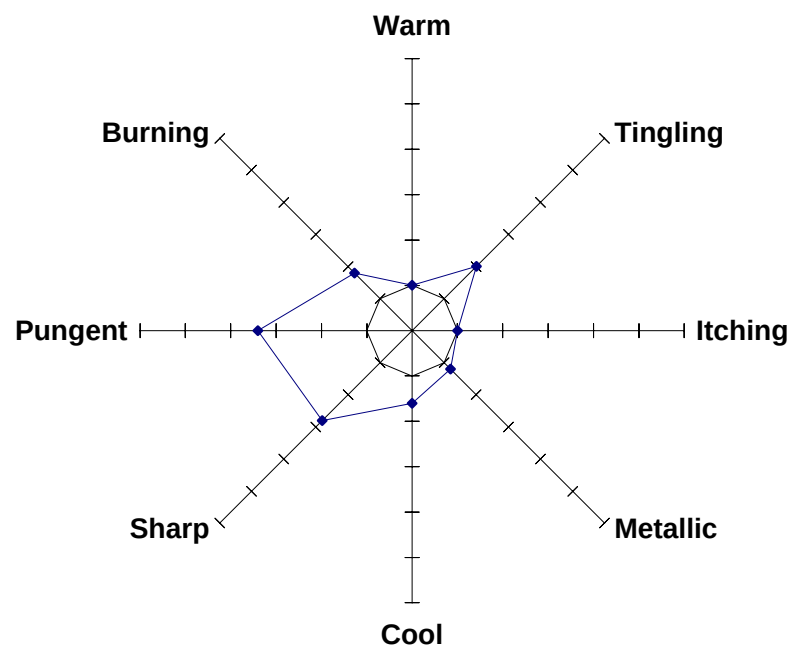
Project: Dredge Sediment Headspace

Evaluation Date: 12/07/06

#	Field No.	Sample Description	ASTM E679 & EN13725		ASTM E544	PERSISTENCY	CHARACTERIZATION		Comments
			Detection Threshold	Recognition Threshold	Intensity	Dose-Response Slope	Hedonic Tone	Principal Odor Descriptors	
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

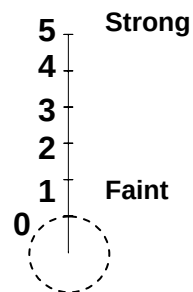
Client: Service Engineering GroupField No.: K10Report No.: 634101Project: Dredge Sediment HeadspaceDescription: 5L from 100LEvaluation Date: 12/07/06

Sensation Descriptor Graph



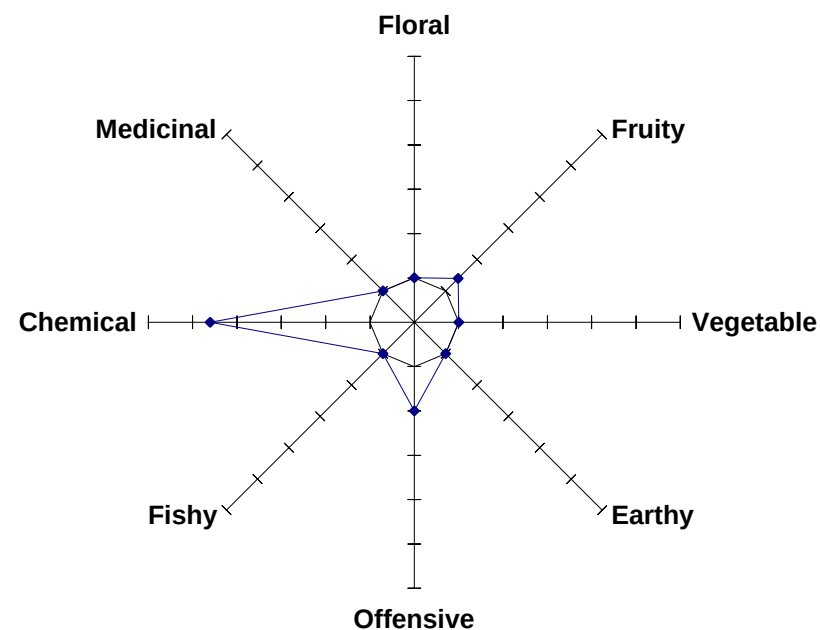
Average Relative Strength	
Warm	0.0
Tingling	1.0
Itching	0.0
Metallic	0.2
Cool	0.6
Sharp	1.8
Pungent	2.4
Burning	0.8

KEY



Relative Strength

Odor Descriptor Graph



Average Relative Strength	
Floral	0.0
Fruity	0.4
Vegetable	0.0
Earthy	0.0
Offensive	1.0
Fishy	0.0
Chemical	3.6
Medicinal	0.0

St. Croix Sensory, Inc.

Odor Evaluation Report

Client: Service Engineering Group Field No.: K10
Project: Dredge Sediment Headspace Description: 5L from 100L

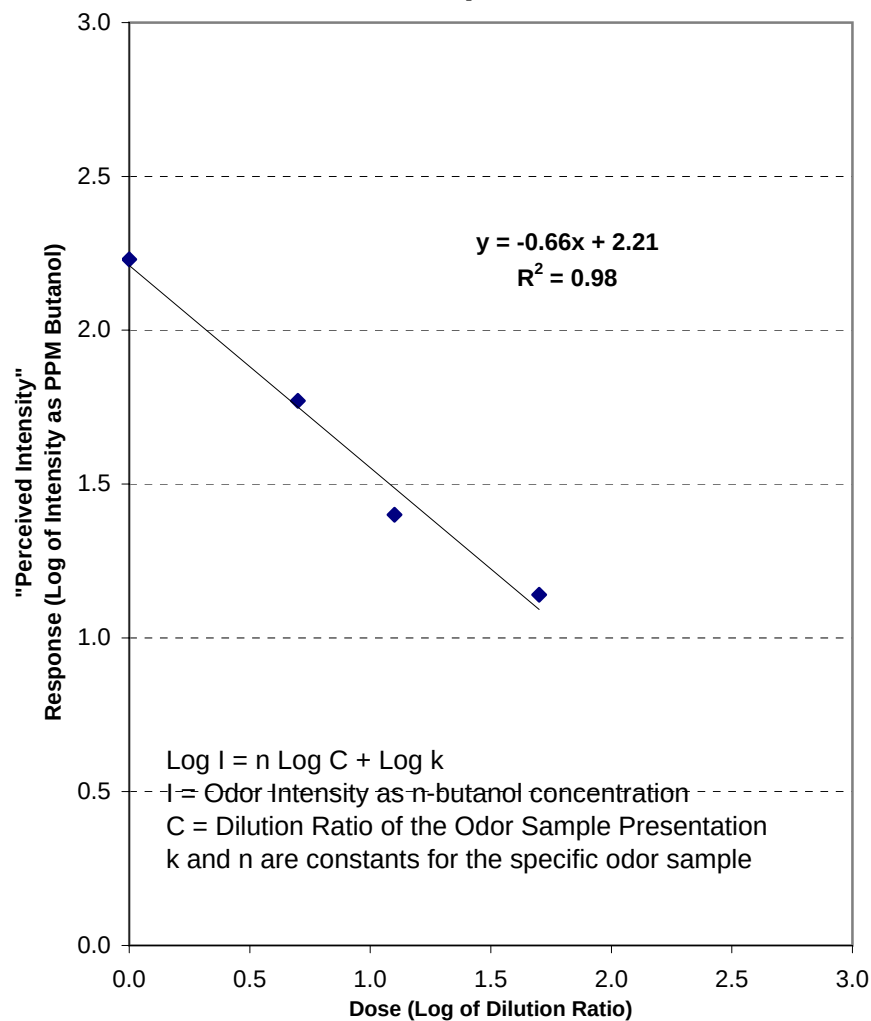
Report No.: 634101
Evaluation Date: 12/07/06

% of Assessors |*****|*****|*****|*****| 100%

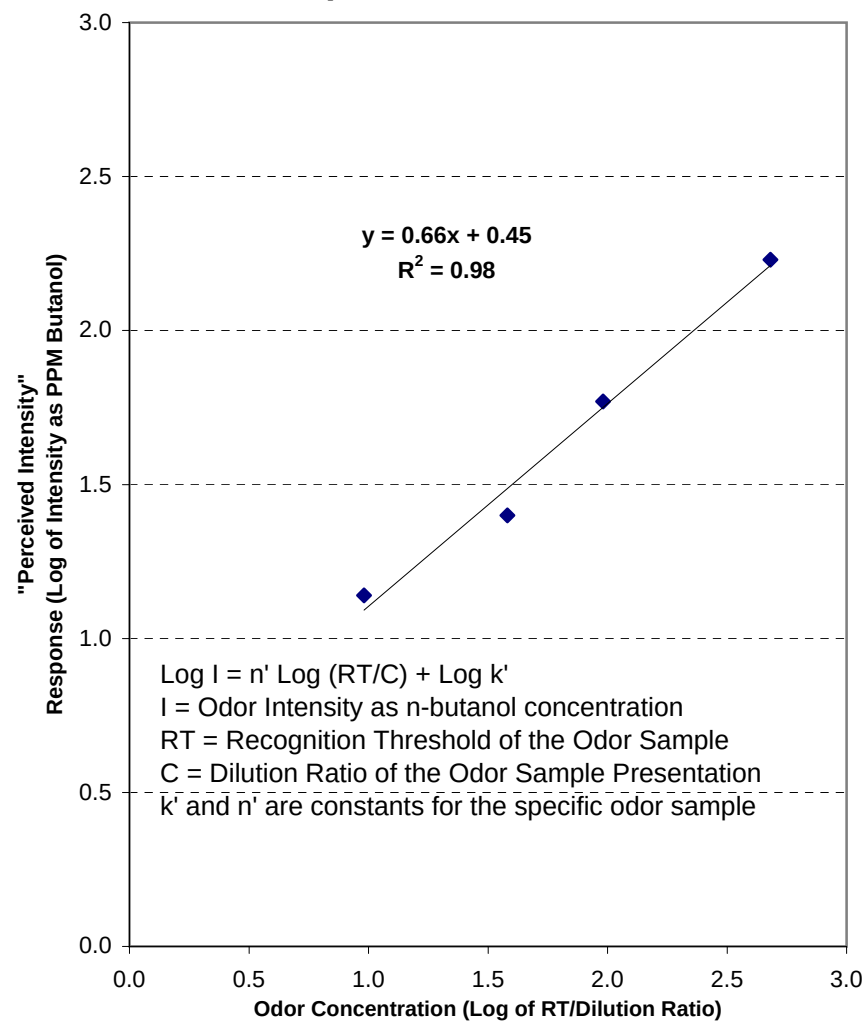
Cherry *****
Chemical *****
Grease *****
Car exhaust *****
Kerosine *****
Petroleum *****
Cleaning fluid *****
Varnish *****
Solvent *****
Vinyl *****
Gasoline *****
Oil *****
Offensive *****

Client: Service Engineering GroupField No.: K10Report No.: 634101Project: Dredge Sediment HeadspaceDescription: 5L from 100LEvaluation Date: 12/07/06

Dose-Response

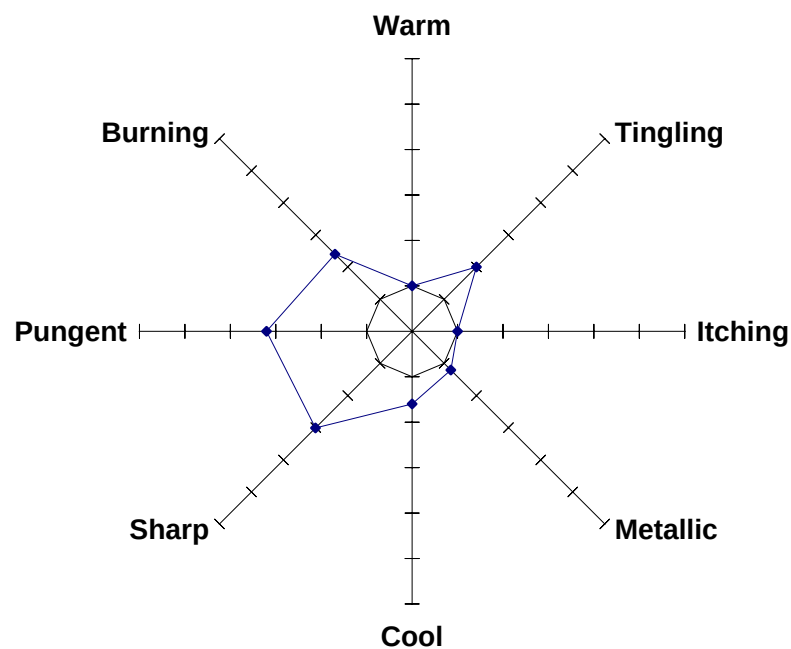


Dose-Response as Power Law



Client: Service Engineering GroupField No.: K20Report No.: 634101Project: Dredge Sediment HeadspaceDescription: 5L from 100LEvaluation Date: 12/07/06

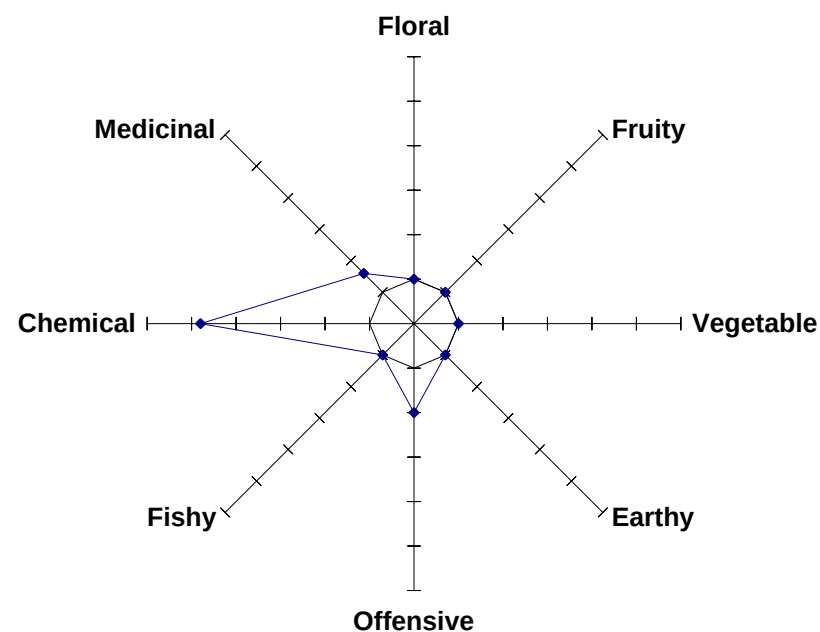
Sensation Descriptor Graph



Average Relative Strength

Warm	0.0
Tingling	1.0
Itching	0.0
Metallic	0.2
Cool	0.6
Sharp	2.0
Pungent	2.2
Burning	1.4

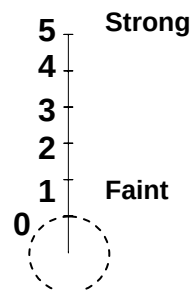
Odor Descriptor Graph



Average Relative Strength

Floral	0.0
Fruity	0.0
Vegetable	0.0
Earthy	0.0
Offensive	1.0
Fishy	0.0
Chemical	3.8
Medicinal	0.6

KEY



Relative Strength

St. Croix Sensory, Inc.

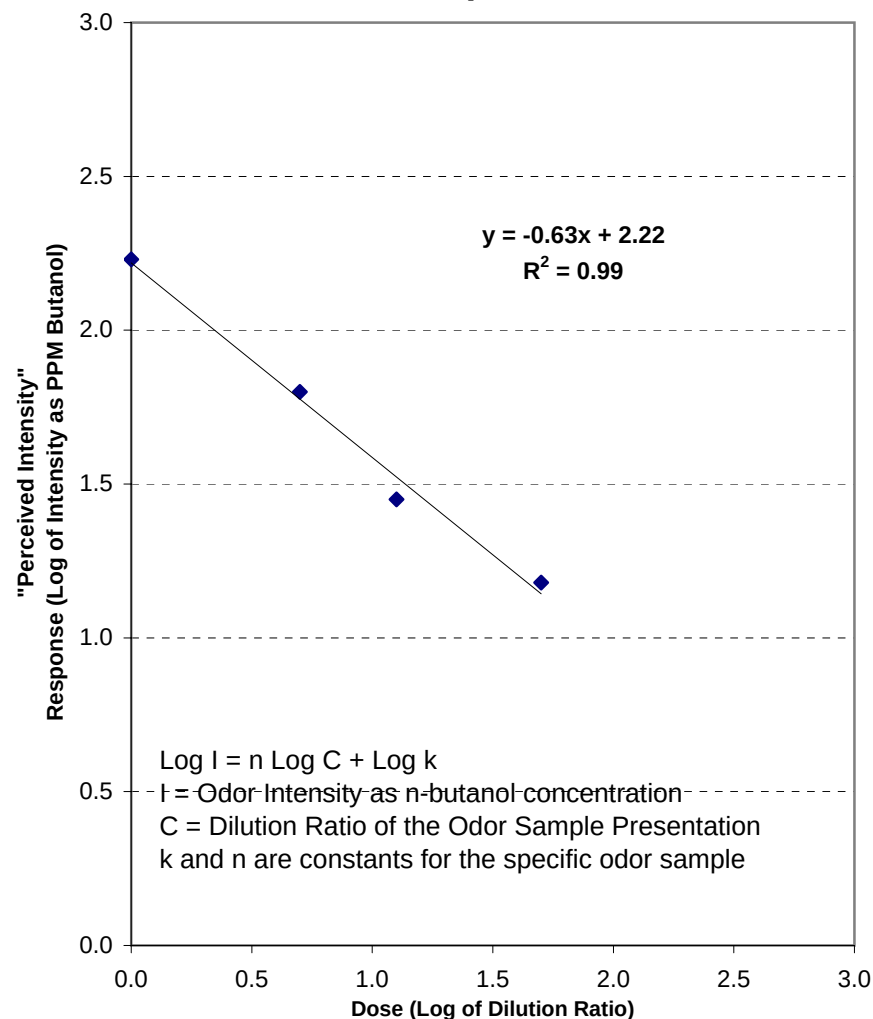
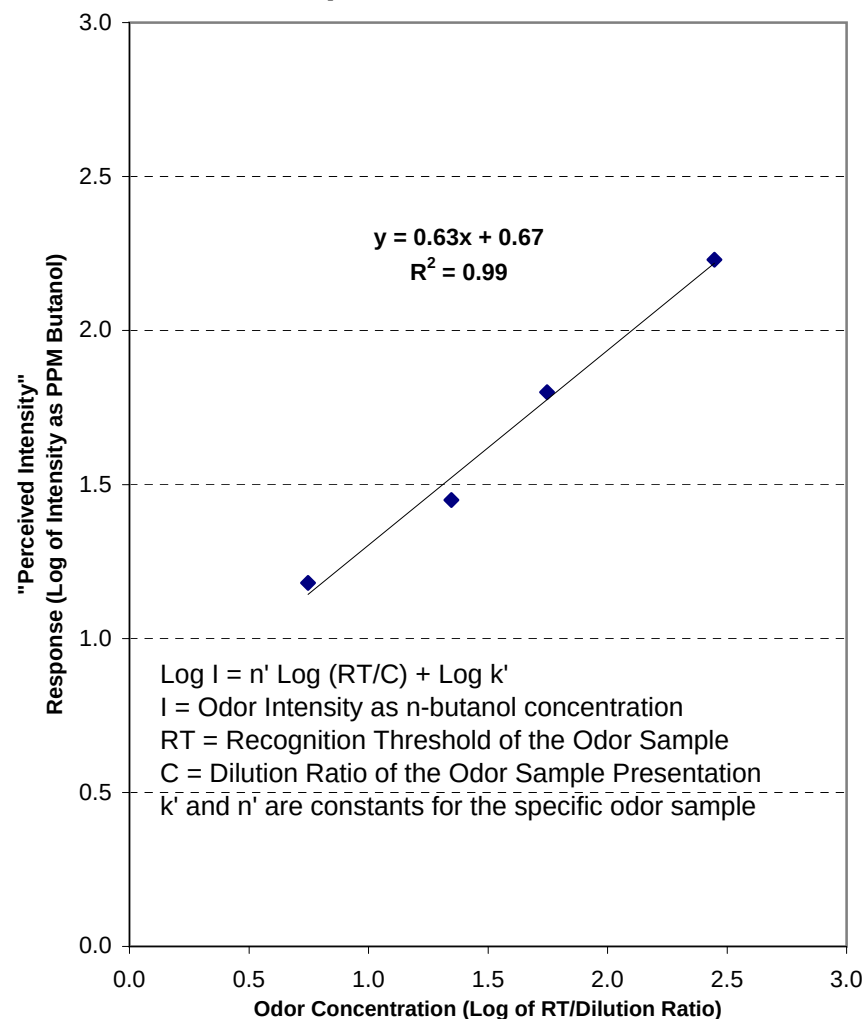
Odor Evaluation Report

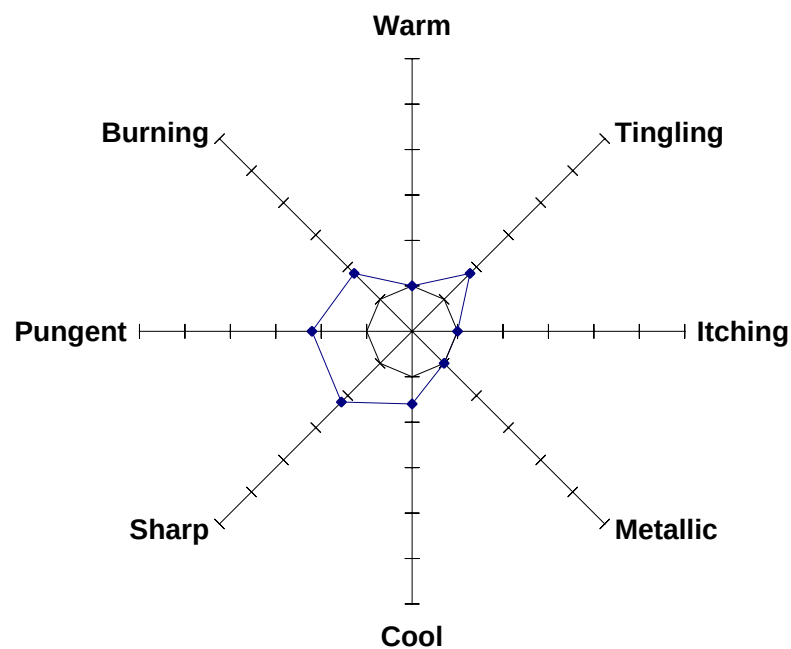
Client: Service Engineering Group Field No.: K20
Project: Dredge Sediment Headspace Description: 5L from 100L

Report No.: 634101
Evaluation Date: 12/07/06

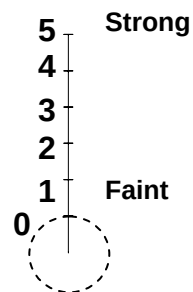
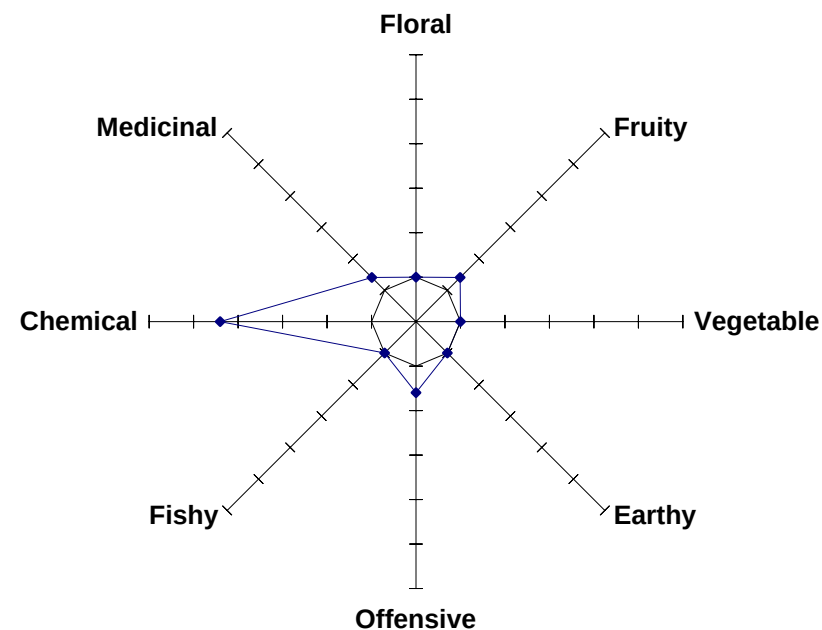
% of Assessors |*****|*****|*****|*****| 100%

Medicinal *****
Chlorinous *****
Chemical *****
Grease *****
Tar *****
Car exhaust *****
Kerosine *****
Petroleum *****
Turpentine *****
Cleaning fluid *****
Varnish *****
Solvent *****
Vinyl *****
Gasoline *****
Oil *****
Offensive *****

Client: Service Engineering GroupField No.: K20Report No.: 634101Project: Dredge Sediment HeadspaceDescription: 5L from 100LEvaluation Date: 12/07/06**Dose-Response****Dose-Response as Power Law**

Client: Service Engineering GroupField No.: L10Report No.: **634101**Project: Dredge Sediment HeadspaceDescription: 5L from 100LEvaluation Date: 12/07/06**Sensation Descriptor Graph**

Average Relative Strength	
Warm	0.0
Tingling	0.8
Itching	0.0
Metallic	0.0
Cool	0.6
Sharp	1.2
Pungent	1.2
Burning	0.8

KEY**Relative Strength****Odor Descriptor Graph**

Average Relative Strength	
Floral	0.0
Fruity	0.4
Vegetable	0.0
Earthy	0.0
Offensive	0.6
Fishy	0.0
Chemical	3.4
Medicinal	0.4

St. Croix Sensory, Inc.

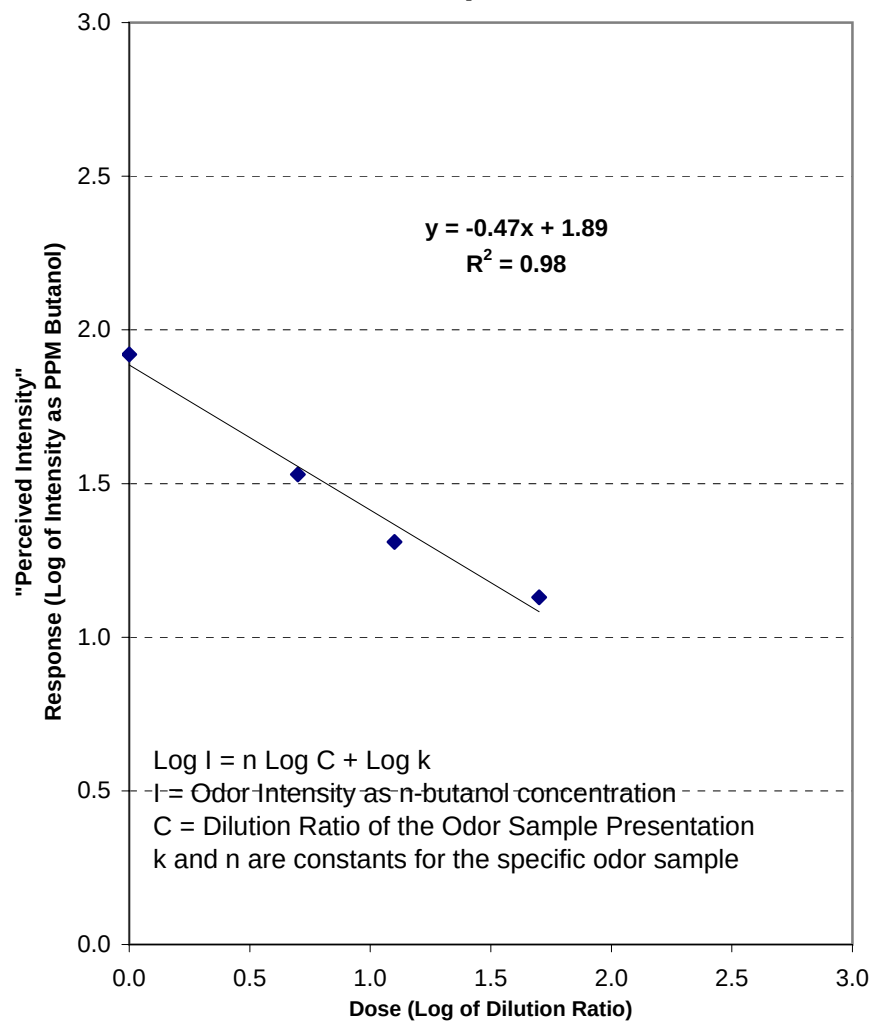
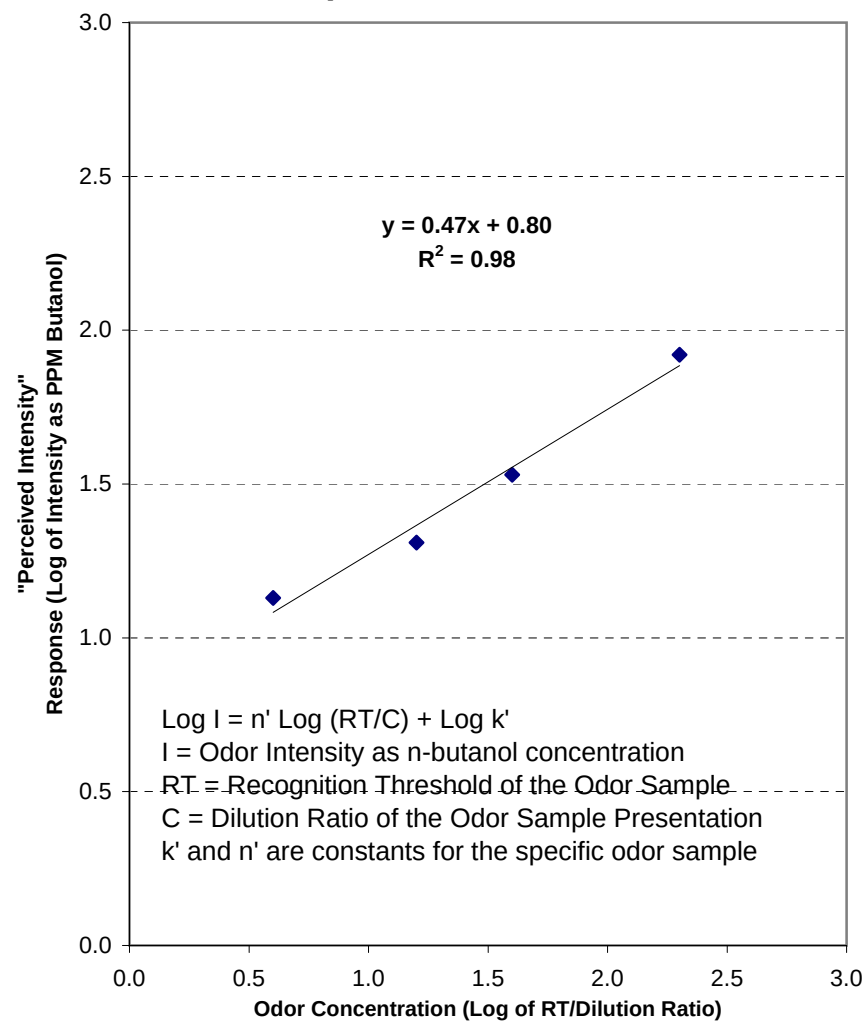
Odor Evaluation Report

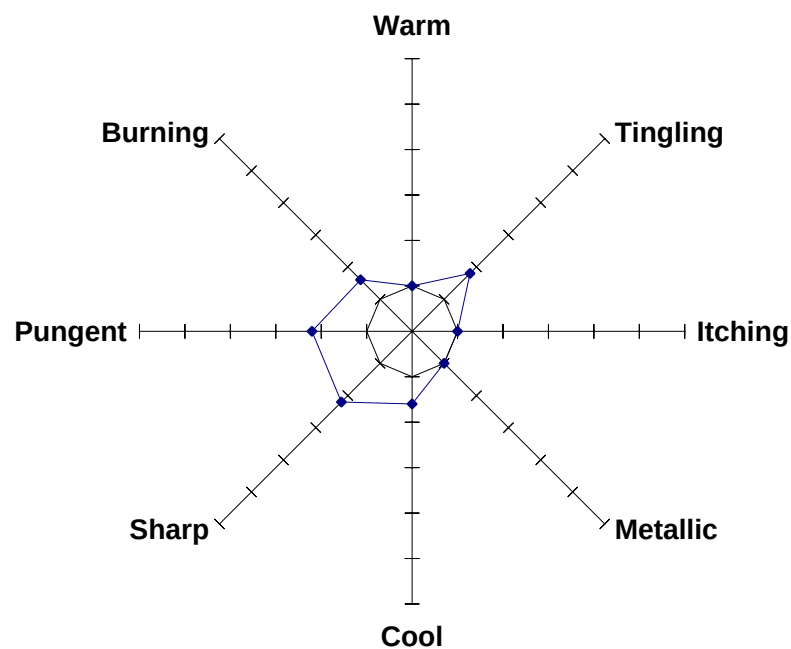
Client: Service Engineering Group Field No.: L10
Project: Dredge Sediment Headspace Description: 5L from 100L

Report No.: 634101
Evaluation Date: 12/07/06

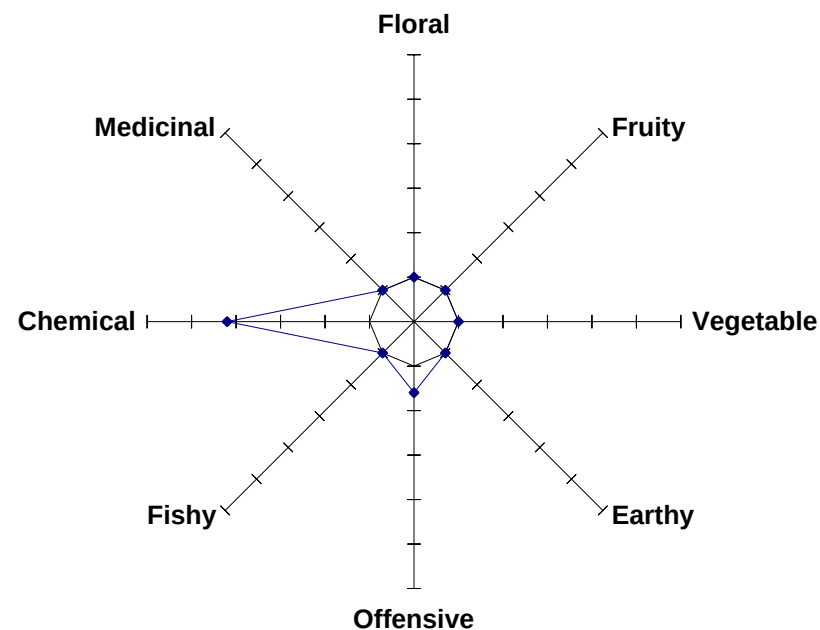
% of Assessors |*****|*****|*****|*****| 100%

Cherry *****
Medicinal *****
Disinfectant *****
Chemical *****
Grease *****
Car exhaust *****
Kerosine *****
Petroleum *****
Cleaning fluid *****
Varnish *****
Solvent *****
Vinyl *****
Gasoline *****
Oil *****
Offensive *****

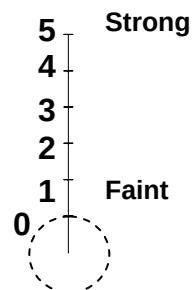
Client: Service Engineering GroupField No.: L10Report No.: 634101Project: Dredge Sediment HeadspaceDescription: 5L from 100LEvaluation Date: 12/07/06**Dose-Response****Dose-Response as Power Law**

Client: Service Engineering GroupField No.: L20Report No.: **634101**Project: Dredge Sediment HeadspaceDescription: 5L from 100LEvaluation Date: 12/07/06**Sensation Descriptor Graph**

Average Relative Strength	
Warm	0.0
Tingling	0.8
Itching	0.0
Metallic	0.0
Cool	0.6
Sharp	1.2
Pungent	1.2
Burning	0.6

Odor Descriptor Graph

Average Relative Strength	
Floral	0.0
Fruity	0.0
Vegetable	0.0
Earthy	0.0
Offensive	0.6
Fishy	0.0
Chemical	3.2
Medicinal	0.0

KEY**Relative Strength**

St. Croix Sensory, Inc.

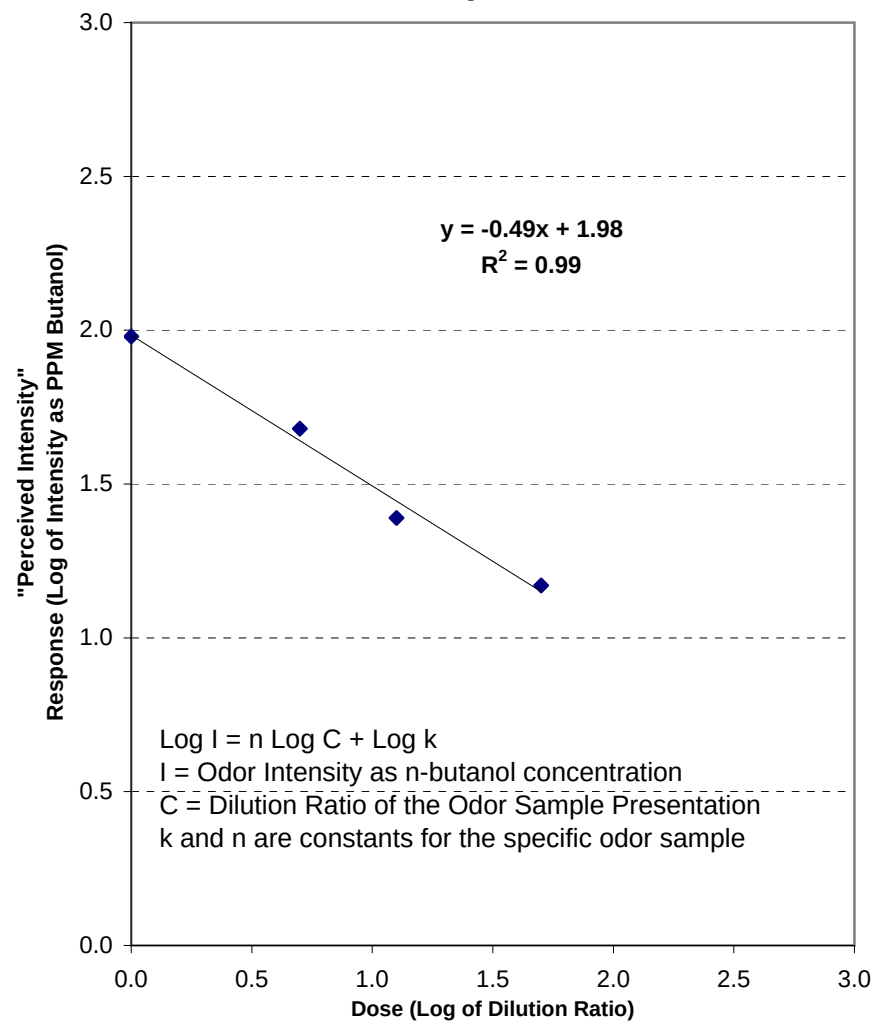
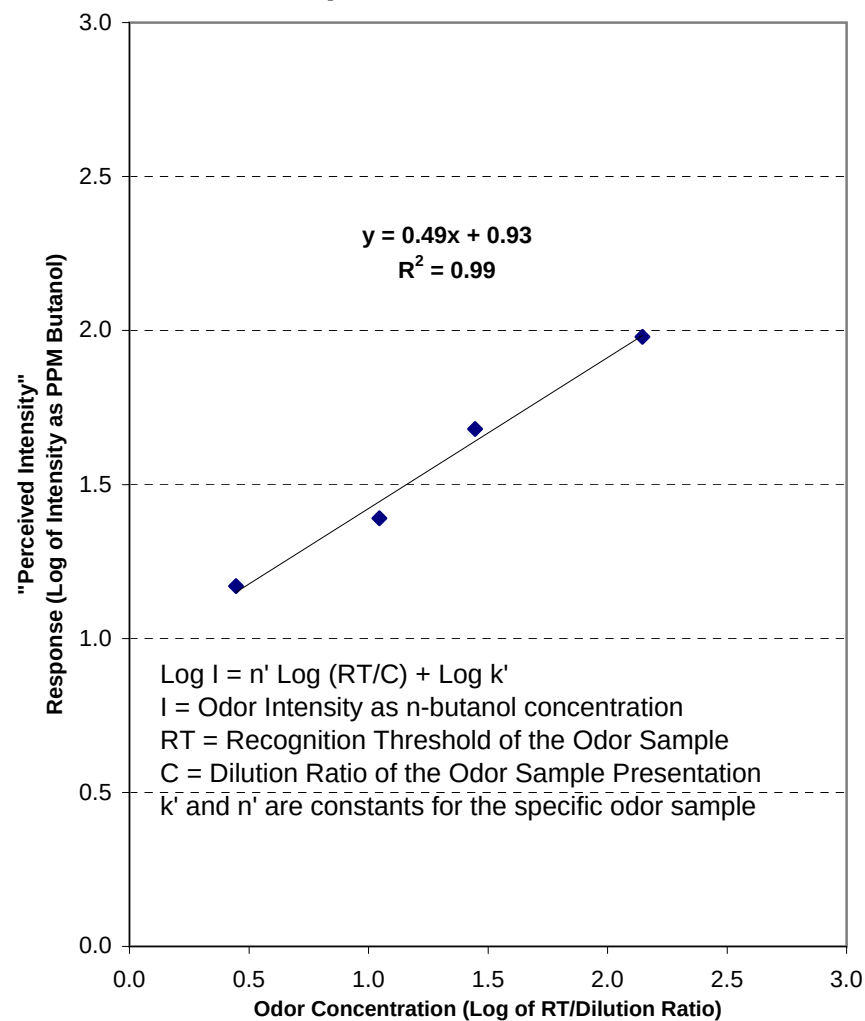
Odor Evaluation Report

Client: Service Engineering Group Field No.: L20
Project: Dredge Sediment Headspace Description: 5L from 100L

Report No.: 634101
Evaluation Date: 12/07/06

% of Assessors |*****|*****|*****|*****| 100%

Chemical *****
Grease *****
Car exhaust *****
Kerosine *****
Petroleum *****
Turpentine *****
Cleaning fluid *****
Plastic *****
Varnish *****
Solvent *****
Vinyl *****
Gasoline *****
Oil *****
Offensive *****

Client: Service Engineering GroupField No.: L20Report No.: 634101Project: Dredge Sediment HeadspaceDescription: 5L from 100LEvaluation Date: 12/07/06**Dose-Response****Dose-Response as Power Law**

St. Croix Sensory, Inc.

CHAIN OF CUSTODY RECORD FOR ODOR SAMPLES

Client: <u>SCS</u>		Sampled By: <u>AML</u>			Odor Evaluations Requested: (X)				Page <u> </u> of <u> </u>	
Project Name: <u>Dredge Sediment Headspace</u>		Sampling Date: <u>12-7-06</u>			Odor Concentration* (Detection & Recognition Threshold)	Odor Intensity* (PPM 1-Butanol)	Odor Characterization (Hedonic Tone & Descriptors)	Odor Persistence (“Dose-Response”)	For Laboratory use Only	
Comments:									Odor Evaluation Report No.	
Line No.	Field No.	Sample Description	Sample Time	Field H ₂ S (ppm)					LN	FN
1	K10	5L from 100L	10:00A		X	X	X	X		
2	K20	↓	10:10A		↓	→	→	→		
3	L10		10:30A							
4	L20		10:40A							
5										
6										
7										
8										
9										
10										
11										
12										

TransmittalNumber of Shipping Boxes

Relinquished By	Date	Time	Accepted By	Date	Time	Comments & Exceptions Noted
<u>Alicia Lay</u>	<u>12-7-06</u>	<u>10:45</u>	<u>Alicia Lay</u>	<u>12/7/06</u>	<u>11:25</u>	
Received at St. Croix Sensory Laboratory						

*Odor Concentration: ASTM E679-04 and EN13725:2003 and Odor Intensity: ASTM E544-99(2004)

St. Croix Sensory, Inc. ♦ 3549 Lake Elmo Avenue North ♦ Lake Elmo, MN 55042 U.S.A. ♦ Tel:800-879-9231 ♦ Fax:651-439-1065 ♦ Email:reports@fivesenses.com ♦ Web:www.fivesenses.com

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CLIENT COPY PINK