Appendix A – Joint Memorandum

PROVIDENCE FIRE DEPARTMENT

JOINT MEMORANDUM No. 24	SERIES: 2006
DATE: 28 MAR 06	SUBJECT: CYANIDE EXPOSURE

TO: ALL MEMBERS OF THE DEPARTMENT

A team has been established to fully evaluate the three recent incidents leading up to the cyanide exposures sustained by members.

The team will be comprised of the following:

Deputy Assistant Chief J. Curtis Varone
Battalion Chief Thomas N. Warren
Lieutenant Kevin L. Jutras
Firefighter Joseph L. Molis, Health and Safety Representative for Local 799
Arson Investigator Joseph F. Dorsey

The evaluation process has begun and firefighters that were involved with these incidents should be expected to be contacted to be interviewed.

The objectives of the team evaluation are:

1. To determine the direct and indirect causal factors which resulted in the exposure of several firefighters to cyanide and the life threatening situation that resulted to one of our firefighters, particularly those factors that could be used to prevent future occurrences of a similar nature, including:
    a. Identifying inadequacies involving apparatus, equipment, protective clothing, standard operating procedures, supervision, training, or performance.
    b. Identifying situations that involve an unacceptable risk.
    c. Identifying previously unknown or unanticipated hazards

2. To ensure that the lessons learned from the investigation are effectively communicated to prevent future occurrences of a similar nature.

3. To ensure that the incident and all related events are fully documented and evidence is preserved.

4. To provide factual information to assist those involved who are trying to understand the events they experienced.

5. To provide the information to other individuals and organizations that is involved in the cause of fire service occupational safety and health.

6. The mission of the team is to find facts and develop recommendations for changes in equipment, training, or procedures in order to prevent similar incidents. It is not a mechanism to investigate or assess blame, or to lead to discipline.

DAVID D. COSTA
Chief of Department

PAUL A. DOUGHTY
President, Local 799

Appendix B – Optic Neuritis Info

J. Curtis Varone
Attorney at Law

11 Central Avenue
North Providence, RI 02911
(401) 353-1211

September 14, 1990

Dr. Simmons Lessell
Mass Eye & Ear
243 Charles Street
Boston, MA 02114

Dear Dr. Lessell;

On behalf of the Providence Firefighters Local 799 of the International Association of Firefighters, I want to thank you for your recent assistance provided to the four members of our Local who experienced vision loss in their left eye. I believe you have permitted each of the four members involved, as well as the other 479 members of the Providence Fire Department, to rest a little easier under the circumstances.

I do have several concerns, however, which I was unable to discuss with you when we met on August 28, 1990. I would appreciate it if you could find the time to consider these questions so that we may put this entire episode behind us.

First of all, the medical reports of each of the four patients indicates that either they do, or do not, have a form of optic neuritis. However, the reports do not discuss whether or not a common exposure could have caused papillitis in one patient, retrobulbar neuritis in another patient, and retinal vein occlusion in yet another. Certainly it would not be unheard of for two people to be exposed to the same disease or chemical, and develop strikingly different symptoms depending upon a multitude of factors such as their age, physical condition, immune status, pre-existing diseases, length and type of exposure, etc. This possibility remains our primary concern more so than the correctness of a specific diagnosis.

As you may well imagine, firefighters are routinely exposed to numerous types of chemicals on a daily basis, as well as being exposed to just about every type of bacteria, fungus or virus known to man on rescue runs. All four of the affected members were assigned to the same shift, which means that they responded to many of the same incidents. There are approximately 120 firefighters per shift in Providence.

Furthermore, the onset of all four cases was within a relatively short period. All four are the same rank (Firefighter

1st Class, as opposed to Lieutenants, Captains or Chiefs). All four were assigned to the fire force, as oppose to rescue, fire prevention, fire alarm, etc. There are roughly 70 fire force firefighters per shift. Thus four firefighters out of a pool of 70 firefighters working on the same shift experienced vision loss in their left eye at approximately the same time. No other firefighter on any other shift has similarly experienced such a problem with either eye.

What limited research we have been able to do on our own to date has not been particularly enlightening. However, two items stand out that I think need to be addressed before we close the file on this matter once and for all. The first is the question of Sarcoidosis. Enclosed in an article regarding the manifestation of sarcoidosis in the eye. This article leaves no doubt that Sarcoidosis may initially (or only) present as "Papillitis", "Retrobulbar neuritis", or "Retinal perivasculitis" to mention a few. While admittedly, this may seem a little (or a lot) far fetched, let me set the stage for you.

At the present time five members of the Providence Fire Department have been diagnosed as having Sarcoidosis. Three of these have been confirmed by biopsy, the other two by clinical symptoms. The cluster of sarcoid cases appears to be associated with a particular exposure that occurred while the affected members were in training. As of yet the exact cause for the cluster has not been determined, although several leads are presently being followed up by Dr. David Kern, with whom you are acquainted.

While none of the four patients you examined fits the profile of the five sarcoidosis cases we have, I believe Sarcoidosis should be considered as a possible cause, and if appropriate, ruled out. To me it would seem no less surprising that sarcoidosis is the cause of these patients' vision problems, than it would that five other members would develop sarcoidosis in the first place. If fact, if an infectious agent is in fact found to be the cause of our sarcoidosis cluster, it could explain the eye problem.

The other concern we would like you to consider arose when we tried to hypothesize a mechanism of exposure that would: 1. expose the left eye more often than the right eye; 2. explain why firefighters but not officers were affected; 3. explain why fire force firefighters but not rescue, fire prevention or fire alarm personnel were affected; and 4. explain why only one shift out of four was affected. In doing so we were able to come up with a possible scenario using the parasite Toxocara canis as one possible causative agent that meets three of the four conditions.

The scenario would be of a fire that all four members responded to during the normal course of their shift. The fire involved a house where dogs infected with Toxocara canis resided. Fire hoses were dragged through the house during the routine

course of fighting the fire at which time they became contaminated with Toxocara canis containing feces. After the fire was extinguished, the hose was packed by hand back on the apparatus by the affected members. Officers usually do no engage in this activity, only firefighters. The affected firefighters thereafter introduced the parasite into their systems before they were able to clean up.

I use the Toxocara canis parasite only as one possible causative agent that we believe should be considered. Perhaps you know of other diseases or chemicals capable of causing such eye problems that would better fit our scenario.

While this may seem like a relatively obvious and routine set of cases to you, I assure you it is not at all obvious and routine for our members and their families. I know I speak on behalf of all 479 members of Local 799 and their families when I say that your assistance and guidance in this matter would be greatly appreciated. The general mood on the job is one of concern despite your assurance to me that the cases did not appear to be related. Whatever additional information and guidance you can provide to us would, again, be greatly appreciated.

Very truly yours;

J. Curtis Varone, Esq.
Lieutenant, Prov. F.D.
Health & Safety Rep.
Local 799, IAFF

HARVARD MEDICAL SCHOOL * MASSACHUSETTS EYE & EAR INFIRMARY
DEPARTMENT OF OPHTHALMOLOGY
243 Charles Street Boston Massachusetts 02114

Simmons Lessell, M.D.
Professor of Ophthalmology

Neuro-Ophthalmology
617-573-3412

September 19, 1990

J. Curtis Varone
Attorney at Law
11 Central Avenue
North Providence, RI 02911

Dear Mr. Varone:

Thank you very much for your letter of September 14, 1990. I reviewed it very carefully. Let me be specific about the diagnoses that were made. [redacted] had optic neuritis and the cause is not clear. There is nothing in the history to suggest that this has a toxic basis or that it reflects any underlying disease. [redacted] also appears to have optic neuritis and in his case there is also no evidence from the history that the problem was the consequence of any environmental or occupational exposure to a toxic agent or infectious organism. It is notable that these two individuals had onset at around the same time but otherwise, I see no reason to conclude that this is more than a chance occurrence. [redacted] has a central retinal vein occlusion of unknown cause and does not, or more exactly did not, have optic neuritis. There is no reason to conclude that his central vein occlusion was the consequence of any exposure to environmental or occupational toxins or infectious agents. His problem occurred in a setting of hypertension and diabetes which are known to predispose to central vein occlusions and they are the putative cause in his case. [redacted] has a maculopathy which is not optic neuritis and, in fact, involves the retina. There is no evidence it is a toxic or infectious problem.

It is impossible for me to identify a common theme among these four cases, and I cannot identify an etiologic agent that would be manifest in these patients in such disparate ways. There is no ophthalmic evidence that any of these patients have sarcoidosis.

I appreciate the concern that the members and families have but I cannot find an occupational basis for the problem and therefore can't identify measures that might protect other individuals from similar involvement.

Sincerely,

Simmons Lessell, M.D.

SL:ma

Appendix C – Follow Up Survey

Appendix D - Trace Analytics Lab Results

TRACE ANALYTICS, INC.
15768 Hamilton Pool Road • Austin, Texas 78738
Voice: 800-AIR-1024 or 512-263-0000 • Fax: 512-263-0002
E-mail: Service@AirCheckLab.com

AirCheck Report™

Customer No.: 1337
Report No.: 06-05613

Shipman's Fire Equipment Co., Inc.
Mr. Joe Martin
PO Box 257
Waterford CT 06385-0257

Date Received: Tue, March 28, 2006
Date Analyzed: Tue, March 28, 2006
Date Reported: Tue, March 28, 2006
Sampled By: Robert Warren
Date Sampled: Sat, March 25, 2006
Air Source ID: Eagle Storage Banks

Sampled for Providence F.D. Air Supply One

Results vs NFPA 1500-2002 & CGA G-7.1-2004 Grade E Gas Quality Specification

Limiting Characteristic		Concentration			QC Results, %*	
		Source	Ambient	Specification	Accuracy	Precision
Oxygen, Volume %		20.8	N/A	20-22	101	0.6
Nitrogen / Argon, Volume %		78.4 / 0.9	N/A / N/A	N/A / N/A	99	0.6
Carbon Monoxide (CO), ppmv		<0.3	N/A	10	100	0.4
Carbon Dioxide (CO_2), ppmv		224	N/A	1000	100	0.5
Water (H_2O), ppmv/Dewpoint, °F		3.9/ -89	N/A	24 / -65 (W)	99	0.6
Total Volatile Hydrocarbon Content (TVHC)	**TVHC (including CH_4), ppmv**	3.1	N/A	25	100	1.0
	Methane (CH_4), ppmv	2.0	N/A	N/A	100	0.8
	TVHC (excluding CH_4), ppmv	1.1	N/A	N/A	N/A	N/A
Oil (condensed) & Particulate, mg/m^3		<0.03	N/A	5	100	0.1
Odor (provided by customer)		None/Slight	N/A	None/Slight	N/A	N/A
Other		N/A	N/A	N/A	N/A	N/A

This sample COMPLIES with the above referenced specification.

Customer Comments

TNRO ATCE ES

(W) Dew point is expressed in °F at one atmosphere pressure absolute.

*Accuracy relates observed to expected results (100% is complete agreement). Precision relates to reproducibility (0.0% is complete agreement).

Analytical Test Methods	Gases & Vapors	CAT-A-01	Gas Chromatography/Mass Spectrometry	Media Sample Numbers	Source Bottle: 704898
	Oil (condensed) & Particulate	CAT-A-03	Analytical Gravimetry		Source Filter: 125718
	Particle Size	CAT-A-04	Optical Microscopy		Ambient Bottle: N/A

ACCREDITED LABORATORY

Accredited Since 1991 By
American Association for Laboratory Accreditation
A2LA Certificate No. 322.01
Accredited In The **Chemical** Field of Testing

Richard A. Smith, C.I.H., Laboratory Director

TRACE ANALYTICS, INC.
15768 Hamilton Pool Road • Austin, Texas 78738
Voice: 800-AIR-1024 or 512-263-0000 • Fax: 512-263-0002
E-mail: Service@AirCheckLab.com

AirCheck Report™

Customer No.: 1337
Report No.: 06-05614

Shipman's Fire Equipment Co., Inc.
Mr. Joe Martin
PO Box 257
Waterford CT 06385-0257

Date Received: Tue, March 28, 2006
Date Analyzed: Tue, March 28, 2006
Date Reported: Tue, March 28, 2006
Sampled By: Robert Warren
Date Sampled: Sat, March 25, 2006
Air Source ID: Eagle Storage Banks

Sampled for Providence F.D.

Results vs NFPA 1500-2002 & CGA G-7.1-2004 Grade E Gas Quality Specification

Limiting Characteristic		Concentration			QC Results, %*	
		Source	Ambient	Specification	Accuracy	Precision
Oxygen, Volume %		20.9	N/A	20-22	101	0.6
Nitrogen / Argon, Volume %		78.2 / 0.9	N/A / N/A	N/A / N/A	99	0.6
Carbon Monoxide (CO), ppmv		<0.3	N/A	10	100	0.4
Carbon Dioxide (CO_2), ppmv		366	N/A	1000	100	0.5
Water (H_2O), ppmv/Dewpoint, °F		<3.4/ <-91	N/A	24 / -65 (W)	99	0.6
Total Volatile Hydrocarbon Content (TVHC)	**TVHC (including CH_4), ppmv**	3.3	N/A	25	100	1.0
	Methane (CH_4), ppmv	2.0	N/A	N/A	100	0.8
	TVHC (excluding CH_4), ppmv	1.3	N/A	N/A	N/A	N/A
Oil (condensed) & Particulate, mg/m^3		<0.03	N/A	5	100	0.1
Odor (provided by customer)		None/Slight	N/A	None/Slight	N/A	N/A
Other		N/A	N/A	N/A	N/A	N/A

This sample COMPLIES with the above referenced specification.

Customer Comments

NOTATES

(W) Dew point is expressed in °F at one atmosphere pressure absolute.

*Accuracy relates observed to expected results (100% is complete agreement). Precision relates to reproducibility (0.0% is complete agreement).

Analytical Test Methods	Gases & Vapors	CAT-A-01	Gas Chromatography/Mass Spectrometry	Media Sample Numbers	Source Bottle: 723531
	Oil (condensed) & Particulate	CAT-A-03	Analytical Gravimetry		Source Filter: 125747
	Particle Size	CAT-A-04	Optical Microscopy		Ambient Bottle: N/A

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Trace Analytics, Inc.
15768 Hamilton Pool Road • Austin, Texas 78738
Voice: 800-AIR-1024 or 512-263-0000 • Fax: 512-263-0002
E-mail: Service@AirCheckLab.com

AirCheck Report™

Customer No.: 1540
Report No.: 05-22027

Hope Air Systems
Ms. Melissa Waskiewicz
PO Box 840
Northboro MA 01532

Date Received: Thu, December 29, 2005
Date Analyzed: Tue, January 3, 2006
Date Reported: Wed, January 4, 2006
Sampled By: Mark Tesson
Date Sampled: Thu, December 15, 2005
Air Source ID: Model RA015G3C4E, S/N 53526101, Air Supply #2 Truck

Sampled for Providence Fire Dept.

Results vs NFPA 1500-2002 & CGA G-7.1-2004 Grade D Gas Quality Specification

Limiting Characteristic		Concentration			QC Results, %*	
		Source	Ambient	Specification	Accuracy	Precision
Oxygen, Volume %		21.1	20.9	19.5-23.5	100	0.4
Nitrogen / Argon, Volume %		77.9 / 0.9	78.2 / 0.9	N/A - N/A	100	0.4
Carbon Monoxide (CO), ppmv		<0.3	<0.3	10	99	1.1
Carbon Dioxide (CO_2), ppmv		291	501	1000	100	0.9
Water (H_2O), ppmv/Dewpoint, °F		<3.4 / <-91	N/A	24/-65 (W)	101	1.2
Total Volatile Hydrocarbon Content (TVHC)	TVHC (Including CH_4), ppmv	3.9	4.6	N/A	100	0.2
	Methane (CH_4), ppmv	1.9	1.8	N/A	100	0.7
	TVHC (Excluding CH_4), ppmv	2.0	2.8	N/A	100	0.2
Oil (condensed) & Particulate, mg/m^3		0.09	N/A	5	100	0.1
Odor (provided by customer)		None/Slight	N/A	None/Slight	N/A	N/A
Other		N/A	N/A	N/A	N/A	N/A

This sample COMPLIES with the above referenced specification.

Customer Comments

NOTATIONS
(W) Dew point is expressed in °F at one atmosphere pressure absolute.

*Accuracy relates observed to expected results (100% is complete agreement). Precision relates to reproducibility (0.0% is complete agreement).

Analytical Test Methods	Gases & Vapors	CAT-A-01	Gas Chromatography/Mass Spectrometry	Media Sample Numbers	Source Bottle: 719990
	Oil & Particulate	CAT-A-03	Analytical Gravimetry		Source Filter: 117631
	Particle Size	CAT-A-04	Optical Microscopy		Ambient Bottle: 409547

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Trace Analytics, Inc.
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Voice: 800-AIR-1024 or 512-263-0000 • Fax: 512-263-0002
E-mail: Service@AirCheckLab.com

AirCheck Report™

Customer No.: 1540
Report No.: 05-22026

Hope Air Systems
Ms. Melissa Waskiewicz
PO Box 840
Northboro MA 01532

Date Received: Thu, December 29, 2005
Date Analyzed: Tue, January 3, 2006
Date Reported: Wed, January 4, 2006
Sampled By: Mark Tesson
Date Sampled: Thu, December 15, 2005
Air Source ID: Model BAP15TH3, S/N 42050101

Sampled for Providence Fire Dept.

Results vs NFPA 1500-2002 & CGA G-7.1-2004 Grade D Gas Quality Specification

Limiting Characteristic		Concentration			QC Results, %*	
		Source	Ambient	Specification	Accuracy	Precision
Oxygen, Volume %		21.1	N/A	19.5-23.5	100	0.4
Nitrogen / Argon, Volume %		78.0 / 0.9	N/A / N/A	N/A - N/A	100	0.4
Carbon Monoxide (CO), ppmv		<0.3	N/A	10	99	1.1
Carbon Dioxide (CO_2), ppmv		9	N/A	1000	100	0.9
Water (H_2O), ppmv/Dewpoint, °F		<3.4 / <-91	N/A	24/-65 (W)	101	1.2
Total Volatile Hydrocarbon Content (TVHC)	TVHC (including CH_4), ppmv	4.4	N/A	N/A	100	0.2
	Methane (CH_4), ppmv	2.1	N/A	N/A	100	0.7
	TVHC (excluding CH_4), ppmv	2.3	N/A	N/A	100	0.2
Oil (condensed) & Particulate, mg/m^3		0.05	N/A	5	100	0.1
Odor (provided by customer)		None/Slight	N/A	None/Slight	N/A	N/A
Other		N/A	N/A	N/A	N/A	N/A

This sample COMPLIES with the above referenced specification.

Customer Comments

TNRO ATCE ES

(W) Dew point is expressed in °F at one atmosphere pressure absolute.

*Accuracy relates observed to expected results (100% is complete agreement). Precision relates to reproducibility (0.0% is complete agreement).

Analytical Test Methods	Gases & Vapors	CAT-A-01	Gas Chromatography/Mass Spectrometry	Media Sample Numbers	Source Bottle: 719560
	Oil & Particulate	CAT-A-03	Analytical Gravimetry		Source Filter: 117684
	Particle Size	CAT-A-04	Optical Microscopy		Ambient Bottle: N/A

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Richard A. Smith, C.I.H., Laboratory Director

TRACE ANALYTICS, INC.
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E-mail: Service@AirCheckLab.com

AirCheck Report™

Customer No.: 1337
Report No.: 05-21964

Shipman's Fire Equipment Co., Inc.
Mr. Joe Martin
PO Box 257
Waterford CT 06385-0257

Date Received: Thu, December 29, 2005
Date Analyzed: Mon, January 2, 2006
Date Reported: Tue, January 3, 2006
Sampled By: Robert Warren
Date Sampled: Tue, December 20, 2005
Air Source ID: IR, S/N: 966574

Sampled for Providence F.D.

Results vs NFPA 1500-2002 & CGA G-7.1-2004 Grade E Gas Quality Specification

Limiting Characteristic		Concentration: Source	Concentration: Ambient	Specification	QC Results, %*: Accuracy	QC Results, %*: Precision
Oxygen, Volume %		21.1	21.1	20-22	100	0.1
Nitrogen / Argon, Volume %		77.9 / 0.9	78.0 / 0.9	N/A / N/A	100	0.1
Carbon Monoxide (CO), ppmv		<0.3	<0.3	10	101	2.4
Carbon Dioxide (CO_2), ppmv		102	416	1000	99	2.8
Water (H_2O), ppmv/Dewpoint, °F		<3.4/ <-91	N/A	24 / -65 (W)	103	3.2
Total Volatile Hydrocarbon Content (TVHC)	TVHC (including CH_4), ppmv	1.9	4.1	25	98	3.5
	Methane (CH_4), ppmv	1.9	1.7	N/A	99	2.8
	TVHC (excluding CH_4), ppmv	<0.7	2.4	N/A	N/A	N/A
Oil (condensed) & Particulate, mg/m³		<0.03	N/A	5	100	0.1
Odor (provided by customer)		None/Slight	N/A	None/Slight	N/A	N/A
Other		N/A	N/A	N/A	N/A	N/A

This sample COMPLIES with the above referenced specification.

Customer Comments

TNRO ATCEES

(W) Dew point is expressed in °F at one atmosphere pressure absolute.

*Accuracy relates observed to expected results (100% is complete agreement). Precision relates to reproducibility (0.0% is complete agreement).

Analytical Test Methods	Gases & Vapors	CAT-A-01	Gas Chromatography/Mass Spectrometry	Media Sample Numbers	Source Bottle: 721469
	Oil (condensed) & Particulate	CAT-A-03	Analytical Gravimetry		Source Filter: 118456
	Particle Size	CAT-A-04	Optical Microscopy		Ambient Bottle: 416755

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Richard A. Smith, C.I.H., Laboratory Director

TRACE ANALYTICS, INC.
15768 Hamilton Pool Road • Austin, Texas 78738
Voice: 800-AIR-1024 or 512-263-0000 • Fax: 512-263-0002
E-mail: Service@AirCheckLab.com

AirCheck Report™

Customer No.: 1337
Report No.: 05-21963

Shipman's Fire Equipment Co., Inc.
Mr. Joe Martin
PO Box 257
Waterford CT 06385-0257

Date Received: Thu, December 29, 2005
Date Analyzed: Mon, January 2, 2006
Date Reported: Tue, January 3, 2006
Sampled By: Robert Warren
Date Sampled: Tue, December 20, 2005
Air Source ID: Eagle Compressor, S/N 53526101

Sampled for Providence F.D. Air Supply 1

Results vs NFPA 1989-2003 Gas Quality Specification

Limiting Characteristic		Concentration			QC Results, %*	
		Source	Ambient	Specification	Accuracy	Precision
Oxygen, Volume %		20.9	21.2	19.5-23.5	100	0.1
Nitrogen / Argon, Volume %		78.1 / 0.9	77.9 / 0.9	N/A / N/A	100	0.1
Carbon Monoxide (CO), ppmv		<0.3	<0.3	10	101	2.4
Carbon Dioxide (CO_2), ppmv		16	421	1000	99	2.8
Water (H_2O), ppmv/Dewpoint, °F		<3.4/ <-91	N/A	24 / -65 (W)	103	3.2
Total Volatile Hydrocarbon Content (TVHC)	TVHC (including CH_4), ppmv	1.7	4.3	25	98	3.5
	Methane (CH_4), ppmv	1.7	1.8	N/A	99	2.8
	TVHC (excluding CH_4), ppmv	<0.7	2.5	N/A	N/A	N/A
Oil (condensed) & Particulate, mg/m³		<0.03	N/A	5	100	0.1
Odor (provided by customer)		None/Slight	N/A	None/Slight	N/A	N/A
Other		N/A	N/A	N/A	N/A	N/A

This sample COMPLIES with the above referenced specification.

Customer Comments

NOTATES

(W) Dew point is expressed in °F at one atmosphere pressure absolute.

*Accuracy relates observed to expected results (100% is complete agreement). Precision relates to reproducibility (0.0% is complete agreement).

Analytical Test Methods	Gases & Vapors	CAT-A-01	Gas Chromatography/Mass Spectrometry	Media Sample Numbers	Source Bottle: 721619
	Oil (condensed) & Particulate	CAT-A-03	Analytical Gravimetry		Source Filter: 120996
	Particle Size	CAT-A-04	Optical Microscopy		Ambient Bottle: 417125

Accredited Since 1991 By
American Association for Laboratory Accreditation
A2LA Certificate No. 322.01
Accredited in The Chemical Field of Testing

Richard A. Smith, C.I.H., Laboratory Director

Trace Analytics, Inc.

CERTIFIES THAT

Providence Fire Dept.

is in compliance with the compressed gas specification as described by

NFPA 1500-2002 & CGA G-7.1-2004 Grade D

for a sample described as from the compressed gas source

Model RA015G3C4E, S/N 53526101, Air Supply #2 Truck

analyzed on 1/3/06 *as documented in Report No.* 05-22027 .

Richard A. Smith, C.I.H. Laboratory Director

DATE LAST SAMPLED: 12/15/2005
SAMPLING SCHEDULE: Semi-Annual
THE NEXT SAMPLE IS DUE APPROXIMATELY

6/15/2006

Trace Analytics, Inc.
15768 Hamilton Pool Rd.
Austin, TX 78738 800-AIR-1024
A2LA Certificate No. 322.01

ACCREDITED A2LA LABORATORY

Trace Analytics, Inc.

CERTIFIES THAT

Providence Fire Dept.

is in compliance with the compressed gas specification as described by

NFPA 1500-2002 & CGA G-7.1-2004 Grade D

for a sample described as from the compressed gas source

Model BAP15TH3, S/N 42050101

analyzed on 1/3/06 *as documented in Report No.* 05-22026 .

Richard A. Smith, C.I.H. Laboratory Director

DATE LAST SAMPLED: 12/15/2005
SAMPLING SCHEDULE: Semi-Annual
THE NEXT SAMPLE IS DUE APPROXIMATELY

6/15/2006

Trace Analytics, Inc.
15768 Hamilton Pool Rd.
Austin, TX 78738 800-AIR-1024
A2LA Certificate No. 322.01

ACCREDITED LABORATORY

LABORATORY ACCREDITED BY THE AMERICAN ASSOCIATION FOR LABORATORY ACCREDITATION
IN THE CHEMICAL FIELD OF TESTING
RESULTS REPORTED RELATE ONLY TO THE ITEMS TESTED.

Trace Analytics, Inc.

CERTIFIES THAT

Providence F.D.

is in compliance with the compressed breathing air specification as described by

NFPA 1500-2002 & CGA G-7.1-2004 Grade E

for a sample described as from the compressed gas source

IR, S/N: 966574

analyzed on 1/2/06 *as documented in Report No.* 05-21964 .

DATE LAST SAMPLED: 12/20/2005
SAMPLING SCHEDULE: Quarterly
YOUR NEXT SAMPLE IS DUE:

3/20/2006

Richard A. Smith, C.I.H., Laboratory Director

Trace Analytics, Inc.
15768 Hamilton Pool Rd.
Austin, TX 78738 800-AIR-1024

ACCREDITED LABORATORY

LABORATORY ACCREDITED BY THE AMERICAN ASSOCIATION FOR LABORATORY ACCREDITATION
IN THE CHEMICAL FIELD OF TESTING
RESULTS REPORTED RELATE ONLY TO THE ITEMS TESTED.

Trace Analytics, Inc.

CERTIFIES THAT

Providence F.D. Air Supply 1

is in compliance with the compressed breathing air specification as described by

NFPA 1989-2003

for a sample described as from the compressed gas source

Eagle Compressor, S/N 53526101

analyzed on 1/2/06 *as documented in Report No.* 05-21963.

DATE LAST SAMPLED: 12/20/2005
SAMPLING SCHEDULE: Quarterly
YOUR NEXT SAMPLE IS DUE:

3/20/2006

Richard A. Smith, C.I.H., Laboratory Director

Trace Analytics, Inc.
15768 Hamilton Pool Rd.
Austin, TX 78738 800-AIR-1024

ACCREDITED LABORATORY

LABORATORY ACCREDITED BY THE AMERICAN ASSOCIATION FOR LABORATORY ACCREDITATION IN THE CHEMICAL FIELD OF TESTING
RESULTS REPORTED RELATE ONLY TO THE ITEMS TESTED.

Appendix E – St. Paul Traveler's Lab Results

ST PAUL TRAVELERS

90 Lamberton Road, Windsor, CT 06095
Phone #: 1-800-842-0355
Fax#: 860-687-7430

AIHA Accredited Laboratory # 100126

Laboratory Work Order Number: 2006030712

Report Issued To:
Joe Martin
Shipman s Fire Equipment
172 Cross Rd.
Waterford, CT 06385

Date Samples Received: 3/27/2006
Report Date: 3/28/2006

Location Sampled: Shipman s Fire Equipment
Sample Submitter: Joe Martin

Sample ID	Sample Description	Results	
Hydrogen Cyanide			
		mg/m3	µg
1	Providence Air #1	LT 0.11	LT2.2
2	Providence House Comp.	LT 0.085	LT1.7
3	Cranston F. D. House	LT 0.080	LT1.6
4	Providence Scott Cylinder	LT 0.075	LT1.5
Blank			LT1.0
Blank	Results are based on an impinger volume of 10 milliliters.		

Analyte	Media type	LOQ	Reference Method	Analysis Date
Hydrogen Cyanide	NaOH Imp	1.0 µg	Ion Chromatography - OSHA ID 120	3/27/2006

Please Note: The limits of quantitation (LOQs) listed are for normally processed samples. Sample requiring special processing (i.e. dilutions) may have elevated LOQs.
N.A. = Not Applicable

WORKORDER COMMENTS:

The reported data relate only to the samples as received by the Laboratory. The reported air concentrations have been calculated using information supplied by the customer and have NOT been adjusted to represent a Time Weighted Average (TWA). "LT" indicates less than the limit of quantitation (LOQ). The contaminant may or may not be present at levels below this concentration. This report shall not be reproduced except in full, without written approval of the laboratory. The samples have not been blank corrected unless otherwise noted. Unless otherwise noted, all samples were received in satisfactory condition.

Approved by:

Tom Surveski	Josef Chrzanowski	George E. Johnson	Marcel F. Baril
Tom Surveski	Josef Chrzanowski	George E. Johnson	Marcel F. Baril
QA Group Leader	Production Group Leader	Group Leader	Laboratory Director

Appendix F – Rhode Island Department of Health Water Quality Lab Report

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

D E P A R T M E N T O F H E A L T H

Safe and Healthy Lives in Safe and Healthy Communities

Date Collected 02/02/06

Lab Number 717274

PROVIDENCE-CITY OF
BOYCE SPINELLI
552 ACADEMY AVENUE
PROVIDENCE, RI 02908
PWSID: 1592024

Cty/Twn: Scituate
Owner: BOYCE SPINELLI
Src: SCITUATE RES

Date Received	Date Completed	Lab Number
02/02/06	02/15/06	717274

	RESULT	STANDARD
Bromochloromethane (ppb)	<1.0	
Dichlorodifluoromethane (ppb)	<0.5	1400.0h
Hexachlorobutadiene (ppb)	<1.0	
P-Isopropyltoluene (ppb)	<0.5	
N-Propylbenzene (ppb)	<0.5	
Tert-Butylbenzene (ppb)	<0.5	
1,2,4-Trichlorobenzene (ppb)	<0.5	70m
1,3,5-Trimethylbenzene (ppb)	<0.5	
Hexane (ppb)	<0.5	
Cis-1,3-Dichloropropene (ppb)	<0.5	
O-Xylene (ppb)	<0.5	20.000s
N-Butylbenzene (ppb)	<0.5	
Trichlorofluoromethane (ppb)	<0.5	3400.0h
Isopropylbenzene (ppb)	<0.5	
Naphthalene (ppb)	<0.5	
Sec-Butylbenzene (ppb)	<0.5	
1,2,3-Trichlorobenzene (ppb)	<0.5	
1,2,4-Trimethylbenzene (ppb)	<0.5	
Methyl Tertiary Butyl Ether (pp	<1.0	40.000h
M+P-Xylene (ppb)	<1.0	
Trans-1,3-Dichloropropene (ppb)	<0.5	

BASIC CHEMISTRY

Cyanide (ppm)	<0.01	0.2m
Fluoride (ppm)	<0.20	4m
Nitrate As N (ppm)	0.06	10m

June A. Swallow, Chief, Drinking Water Quality
(401) 222-6867

Feb 16,. 2006

Appendix G – Rhode Island Analytical Lab report on FF Baker's Turnout Gear wipe tests

R.I. Analytical
Specialists in Environmental Services

CERTIFICATE OF ANALYSIS

Providence Fire Department
Attn: J. Curtis Varone
Deputy Assistant Chief
325 Washington Street
Providence, RI 02903

Date Received: 4/4/06
Date Reported: 4/12/06
P.O. #:
Work Order #: 0604-05763

DESCRIPTION: Fire fighting apparel including: helmet, coat, pants, boots, gloves, and face mask.

The above items have been analyzed by our Warwick, R.I. laboratory with the attached results.

References: *Test Methods for Evaluating Solid Waste*, US Environmental Protection Agency, SW-846, November 1986 3rd ed., Total Cyanide Method 9010A

Occupational Safety and Heath Administration, Chemical Sampling, revised 7/15/2003, Cyanide Wipe Samples

Data qualifiers (if present) are explained in full at the end of a given sample's analytical results.

Certification #: RI-033, MA-RI015, CT-PH-0508, ME-RI015, NH-253700 A & B, USDA S-41844, NY-11726

If you have any questions regarding this work, or if we can be of further assistance, please contact us at (401) 737-8500.

Approved By:

Data Reporting

41 Illinois Avenue, Warwick, RI 02888
Tel: (401) 737-8500 Fax: (401) 738-1970

ACCREDITED IN ACCORDANCE WITH

131 Coolidge Street, Bldg 2, Hudson, MA 01749
Tel: (978) 568-0041 Fax: (978) 568-0078

R.I. Analytical Laboratories, Inc.

CERTIFICATE OF ANALYSIS

Providence Fire Department
Date Received: 04/04/06
Work Order #: 0604-05763

Approved by: _____
R.I. Analytical

The following items were exposed to vapors, generated during a building fire. The following results are from wipe samples collected from each of the items.

ITEM	WIPE SAMPLE AREA	CYANIDE DETECTED	UNITS	DATE ANALYZED
HELMET	Entire outer surface	14	ug	4/5/06
COAT	4 ft^2 (back)	<0.5	ug/ ft^2	4/5/06
PANTS	1 ft^2 (left pant leg)	<2.0	ug/ ft^2	4/5/06
GLOVE	Entire outer surface (left hand)	2.2	ug	4/5/06
MASK	Entire outer surface	<0.5	ug	4/5/06
BOOT	Entire outer surface (left boot)	0.5	ug	4/5/06

Note: 1 ug is equal to one millionth of a gram.

Analytical Laboratories, Inc.
QA/QC Report

Client: **Providence Fire Department**
W.O. #: 0604-05763
Date: 04/11/06

-Method Blank Results-

Parameter	Units	Results	Date Analyzed
Cyanide	mg/l	<0.01	04/05/2006

-Laboratory Control Standard Results-

Parameter	Units	LCS Conc.	Detected Conc.	% Rec.	Date Analyzed
Cyanide	mg/l	0.10	0.097	97	04/05/2006

-Replicate Sample Results-

Parameter	Units	Sample #	Rep 1 Conc.	Rep 2 Conc.	Mean Conc.	Reported Value	RPD	Date Analyzed
Cyanide	mg/l	05450-5	<0.01	<0.01	<0.01	<0.01	0	04/05/2006

-Matrix Spike Results-

Parameter	Units	Sample #	Sample Conc.	Spike Conc.	Detected Conc.	% Rec.	Date Analyzed
Cyanide	mg/l	05301-3	<0.01	0.10	0.098	98	04/05/2006

United States
Environmental Protection
Agency

Office of Solid Waste
and Emergency Response
Washington, DC 20460

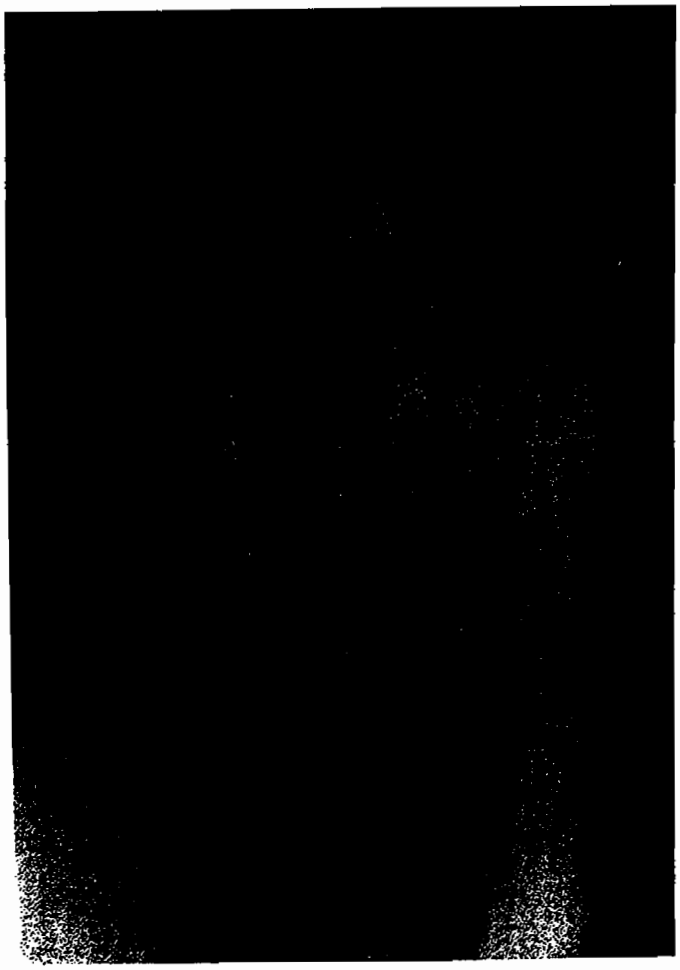
November 1986
SW-846
Third Edition

Solid Waste

EPA

Test Methods for Evaluating Solid Waste

Volume IA: Laboratory Manual Physical/Chemical Methods



TEST METHODS FOR EVALUATING SOLID WASTE, PHYSICAL/CHEMICAL METHODS, SW-846, 3RD EDITION,

FINAL UPDATE I

METHOD 9010A

TOTAL AND AMENABLE CYANIDE

1.0 SCOPE AND APPLICATION

1.1 Method 9010 is used to determine the concentration of inorganic cyanide (CAS Registry Number 57-12-5) in wastes or leachate. The method detects inorganic cyanides that are present as either soluble salts or complexes. It is used to determine values for both total cyanide and cyanide amenable to chlorination. The "reactive" cyanide content of a waste, that is, the cyanide content that could generate toxic fumes when exposed to mild acidic conditions, is not distilled by Method 9010 (refer to Chapter Seven). However, Method 9010 is used to quantify the concentration of cyanide from the reactivity test.

1.2 The titration procedure using silver nitrate with p-dimethylamino-benzal-rhodanine indicator is used for measuring concentrations of cyanide exceeding 0.1 mg/L (0.025 mg/250 mL of absorbing liquid).

1.3 The colorimetric procedure is used for concentrations below 1 mg/L of cyanide and is sensitive to about 0.02 mg/L.

1.4 This method was designed to address the problem of "trace" analyses (<1000 ppm). The method may also be used for "minor" (1000 ppm - 10,000 ppm) and "major" (>10,000 ppm) analyses by adapting the sample preparation techniques or cell path length. However, the amount of sodium hydroxide in the standards and the sample analyzed must be the same.

2.0 SUMMARY OF METHOD

2.1 The cyanide, as hydrocyanic acid (HCN), is released from samples containing cyanide by means of a reflux-distillation operation under acidic conditions and absorbed in a scrubber containing sodium hydroxide solution. The cyanide in the absorbing solution is then determined colorimetrically or titrametrically.

2.2 In the colorimetric measurement, the cyanide is converted to cyanogen chloride (CNCl) by reaction of cyanide with chloramine-T at a pH less than 8. After the reaction is complete, color is formed on the addition of pyridine-barbituric acid reagent. The absorbance is read at 578 nm for the complex formed with pyridine-barbituric acid reagent and CNCl. To obtain colors of comparable intensity, it is essential to have the same salt content in both the sample and the standards.

2.3 The titration measurement uses a standard solution of silver nitrate to titrate cyanide in the presence of a silver sensitive indicator.

3.0 INTERFERENCES

3.1 Interferences are eliminated or reduced by using the distillation procedure. Chlorine and sulfide are interferences in Method 9010.

5.0 REAGENTS

5.1 Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available. Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

5.2 Reagent water. All references to water in this method refer to reagent water, as defined in Chapter One.

5.3 Reagents for sample collection, preservation, and handling

5.3.1 Sodium arsenite (0.1N), $NaAsO_2$. Dissolve 3.2 g $NaAsO_2$ in 250 mL water.

5.3.2 Ascorbic acid, $C_6H_8O_6$.

5.3.3 Sodium hydroxide solution (50%), NaOH. Commercially available.

5.3.4 Acetic acid (1.6M) CH_3COOH. Dilute one part of concentrated acetic acid with 9 parts of water.

5.3.5 2,2,4-Trimethylpentane, C_8H_{18}.

5.3.6 Hexane, C_6H_{14}.

5.3.7 Chloroform, $CHCl_3$.

5.4 Reagents for cyanides amenable to chlorination

5.4.1 Calcium hypochlorite solution (0.35M), $Ca(OCl)_2$. Combine 5 g of calcium hypochlorite and 100 mL of water. Shake before using.

5.4.2 Sodium hydroxide solution (1.25N), NaOH. Dissolve 50 g of NaOH in 1 liter of water.

5.4.3 Sodium arsenite (0.1N). See Step 5.3.1.

5.4.4 Potassium iodide starch paper.

5.5 Reagents for distillation

5.5.1 Sodium hydroxide (1.25N). See Step 5.4.2.

5.5.2 Bismuth nitrate (0.062M), $Bi(NO)_3 \cdot 5H_2O$. Dissolve 30 g $Bi(NO)_3 \cdot 5H_2O$ in 100 mL of water. While stirring, add 250 mL of glacial acetic acid, CH_3COOH. Stir until dissolved and dilute to 1 liter with water.

5.5.3 Sulfamic acid (0.4N), H_2NSO_3H. Dissolve 40 g H_2NSO_3H in 1 liter of water.

NOTE: Detailed procedure for $AgNO_3$ standardization is described in "Standard Methods for the Examination of Water and Wastewater", 16th Edition, (1985), Methods 412C and 407A.

6.0 SAMPLE COLLECTION, PRESERVATION AND HANDLING

6.1 All samples must be collected using a sampling plan that addresses the considerations discussed in Chapter Nine.

6.2 Samples should be collected in plastic or glass containers. All containers must be thoroughly cleaned and rinsed.

6.3 Oxidizing agents such as chlorine decompose most cyanides. To determine whether oxidizing agents are present, test a drop of the sample with potassium iodide-starch test paper. A blue color indicates the need for treatment. Add 0.1N sodium arsenite solution a few mL at a time until a drop of sample produces no color on the indicator paper. Add an additional 5 mL of sodium arsenite solution for each liter of sample. Ascorbic acid can be used as an alternative although it is not as effective as arsenite. Add a few crystals of ascorbic acid at a time until a drop of sample produces no color on the indicator paper. Then add an additional 0.6 g of ascorbic acid for each liter of sample volume.

6.4 Aqueous samples must be preserved by adding 50% sodium hydroxide until the pH is greater than or equal to 12 at the time of collection.

6.5 Samples should be chilled to 4°C.

6.6 When properly preserved, cyanide samples can be stored for up to 14 days prior to sample preparation steps.

6.7 Solid and oily wastes may be extracted prior to analysis by method 9013. It uses a dilute NaOH solution (pH = 12) as the extractant. This yields extractable cyanide.

6.8 If fatty acids, detergents, and surfactants are a problem, they may be extracted using the following procedure. Acidify the sample with acetic acid (1.6M) to pH 6.0 to 7.0.

CAUTION: This procedure can produce lethal HCN gas.

Extract with isooctane, hexane, or chloroform (preference in order named) with solvent volume equal to 20% of the sample volume. One extraction is usually adequate to reduce the compounds below the interference level. Avoid multiple extractions or a long contact time at low pH in order to keep the loss of HCN at a minimum. When the extraction is completed, immediately raise the pH of the sample to above 12 with 50% NaOH solution.

7.2.4 If samples are known or suspected to contain nitrate or nitrite, or if bismuth nitrate was added to the sample, add 50 mL of 0.4N sulfamic acid solution through the air inlet tube. Mix for three minutes.

Note: Excessive use of sulfamic acid could create method bias.

7.2.5 Slowly add 50 mL of 18N sulfuric acid through the air inlet tube. Rinse the tube with water and allow the airflow to mix the flask contents for three minutes. Add 20 mL of 2.5M magnesium chloride through the air inlet and wash the inlet tube with a stream of water.

7.2.6 Heat the solution to boiling. Reflux for one hour. Turn off heat and continue the airflow for at least 15 minutes. After cooling the boiling flask, and closing the vacuum source, disconnect the gas scrubber.

7.2.7 Transfer the solution from the scrubber into a 250-mL volumetric flask. Rinse the scrubber into the volumetric flask. Dilute to volume with water.

7.2.8 If the manual spectrophotometric determination will be performed, proceed to Step 7.3.1. If the titration procedure will be performed, proceed to Step 7.7.

7.3 Manual spectrophotometric determination

7.3.1 Pipet 50 mL of the scrubber solution into a 100-mL volumetric flask. If the sample is later found to be beyond the linear range of the colorimetric determination and redistillation of a smaller sample is not feasible, a smaller aliquot may be taken. If less than 50 mL is taken, dilute to 50 mL with 0.25N sodium hydroxide solution.

NOTE: Temperature of reagents and spiking solution can affect the response factor of the colorimetric determination. The reagents stored in the refrigerator should be warmed to ambient temperature before use. Samples should not be left in a warm instrument to develop color, but instead they should be aliquoted to a cuvette immediately prior to reading the absorbance.

7.3.2 Add 15 mL of 1M sodium phosphate solution and mix. Add 2 mL of chloramine-T and mix. Some distillates may contain compounds that have chlorine demand. One minute after the addition of chloramine-T, test for excess chlorine with KI-starch paper. If the test is negative, add 0.5 mL chloramine-T. After one minute recheck with KI-starch paper. Continue to add chloramine-T in 0.5 mL increments until an excess is maintained. After 1 to 2 minutes, add 5 mL of pyridine-barbituric acid solution and mix.

7.3.3 Dilute to 100 mL with water and mix again. Allow 8 minutes for color development and then read the absorbance at 578 nm in a 1-cm cell within 15 minutes. The sodium hydroxide concentration will be 0.125N.

where:

A = $\mu g/L$ CN^- read from standard curve.
B = mL of sample after preparation of colorimetric analysis (100 mL recommended).
C = mL of sample after distillation (250 mL recommended).
D = mL of original sample for distillation (500 mL recommended).
E = mL used for colorimetric analysis (50 mL recommended).

7.7 Titration Procedure

7.7.1 Transfer the gas scrubber solution or a suitable aliquot from the 250-mL volumetric flask to a 500-mL Erlenmeyer flask. Add 10-12 drops of the rhodanine indicator.

7.7.2 Titrate with standard 0.0192N silver nitrate to the first change in color from yellow to brownish-pink. The titration must be performed slowly with constant stirring. Titrate a water blank using the same amount of sodium hydroxide and indicator as in the sample. The analyst should be familiar with the endpoint of the titration and the amount of indicator to be used before actually titrating the samples. A 5-mL buret may be conveniently used to obtain a precise titration.

NOTE: The titration is based on the following reaction:

$$Ag^+ + 2CN \rightarrow [Ag(CN)_2]^-$$

When all of the cyanide has complexed and more silver nitrate is added, the excess silver combines with the rhodanine indicator to turn the solution yellow and then brownish-pink.

7.7.3 Calculation - If the titrimetric procedure is used, calculate concentration of CN^- in $\mu g/L$ in the original sample as follows:

$$CN^- (\mu g/L) = \frac{(A-B)}{C} \times D \times \frac{E}{F} \times \frac{2\ mole\ CN^-}{1\ eq.\ AgNO_3} \times \frac{26.02\ g\ CN^-}{1\ mole\ CN^-} \times \frac{1 \times 10^6 \mu g}{1\ g}$$

where:

A = mL of $AgNO_3$ for titration of sample.
B = mL of $AgNO_3$ for titration of blank.
C = mL of sample titrated (250 recommended).
D = actual normality of $AgNO_3$ (0.0192N recommended).
E = mL of sample after distillation (250 recommended).
F = mL of original sample before distillation (500 recommended).

10.0 REFERENCES

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2. 1982 Annual Book ASTM Standards, Part 19; "Standard Test Methods for Cyanide in Water"; ASTM: Philadelphia, PA, 1982; 2036-82.

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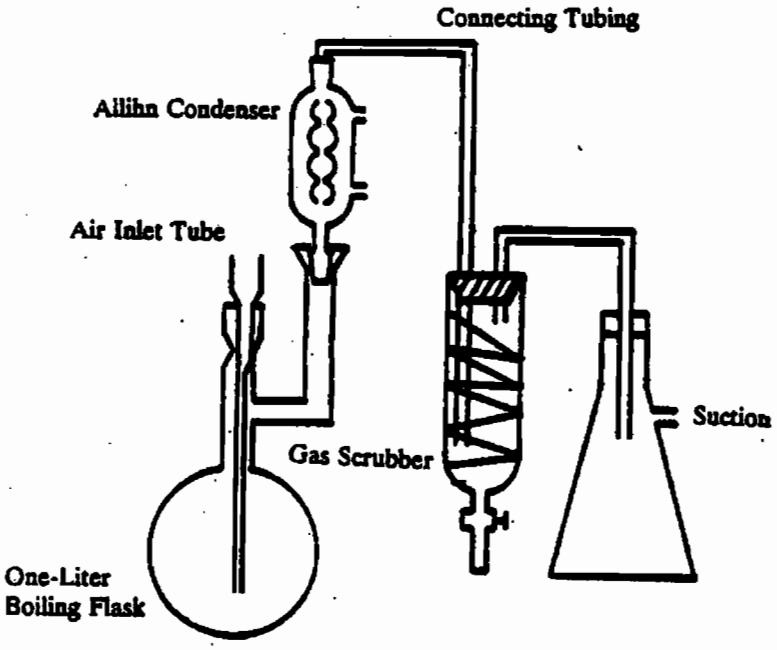
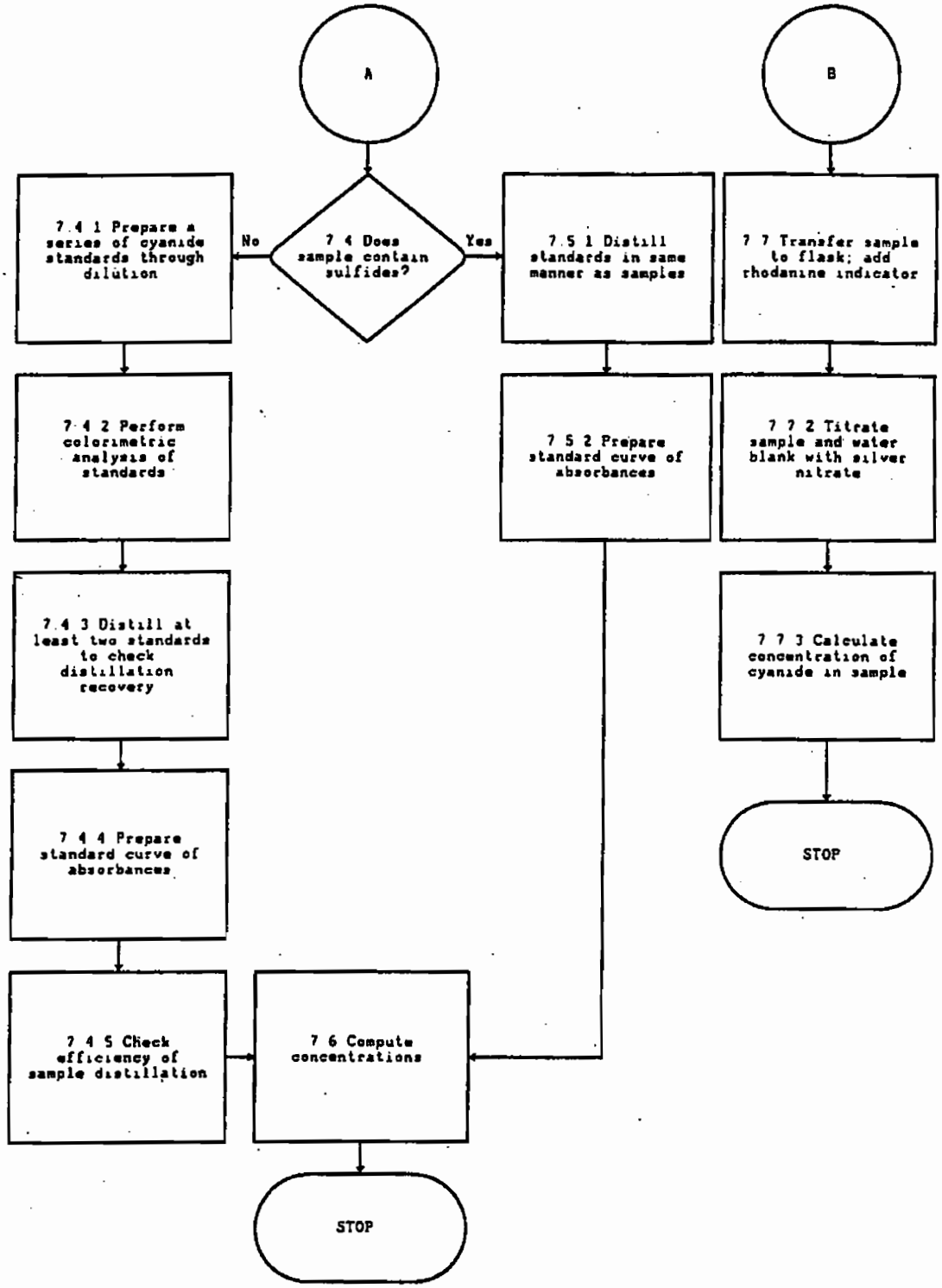
12. Standard Methods for the Examination of Water and Wastewater, 16th ed.; Greenberg, A.E.; Trussell, R.R.; Clesceri, L.S., Eds.; American Water Works Association, Water Pollution Control Federation, American Public Health Association: Washington, DC, 1985.

13. Umaña, M.; Beach, J.; Sheldon, L. "Revisions to Method 9010"; final report to the U.S. Environmental Protection Agency. Office of Solid Waste. Research Triangle Institute: Research Triangle Park, NC, 1986.

14. Umaña, M.; Sheldon, L. "Interim Report: Literature Review"; interim report to the U.S. Environmental Protection Agency. Office of Solid Waste. Research Triangle Institute: Research Triangle Park, NC, 1986.

FIGURE 2.
APPARATUS FOR CYANIDE DISTILLATION




A
B
7.4.1 Prepare a series of cyanide standards through dilution
No
7.4 Does sample contain sulfides?
Yes
7.5.1 Distill standards in same manner as samples
7.7 Transfer sample to flask; add rhodanine indicator
7.4.2 Perform colorimetric analysis of standards
7.5.2 Prepare standard curve of absorbances
7.7.2 Titrate sample and water blank with silver nitrate
7.4.3 Distill at least two standards to check distillation recovery
7.7.3 Calculate concentration of cyanide in sample
7.4.4 Prepare standard curve of absorbances
STOP
7.4.5 Check efficiency of sample distillation
7.6 Compute concentrations
STOP

CHAIN OF CUSTODY RECORD

R.I. Analytical Laboratories, Inc.

41 Illinois Avenue
Warwick, RI 02888-3007
Tel: 800-937-2580
Fax: 401-738-1970

131 Coolidge St, Suite 105
Hudson, MA 01749-1331
Tel: 800-937-2580
Fax: 978-568-0078

02-16-06

Date Collected	Time Collected	Field Sample Identification	Grab or Composite	# of Containers & Type [C]	Preservation Code [P]	Matrix Code [M]	Cylinder
3/24		Fireman's Hat	X				X
		Firemans Coat	X				X
		Firemans Pants	X				X
		Firemans Mask	X				X
		Firemans Boots	X				X
"		" Gloves	X				X

Client Information		Project Information	
Company Name:	Providence Fire Dept.	Project Name:	Providence Fire Dept CW Investigation
Address:	325 Washington Street	P.O. Number:	Project Number:
City / State / Zip:	Providence, RI 02903	Report To:	Kurt Varone Phone: 527-9111 (cell) Fax:
Telephone:	Fax:	Sampled by:	Email report to these addresses:
Contact Person:	Kurt Varone	Quote No:	

Relinquished By	Date	Time	Received By	Date	Time
J. Curtis Varone	4/4/06	3:45pm		4/4/06	3:45pm

Turn Around Time	
Normal	EMAIL Report
5 Business days. Possible surcharge	
Rush _____ (business days)	

Project Comments

Circle if applicable: GW-1, GW-2, GW-3, S-1, S-2, S-3 MCP Data Enhancement QC Package? Yes No

Temp. Upon Receipt °C

Lab Use Only	
	Sample Pick Up Only
	RIAL sampled; attach field hours
	Shipped on ice
Workorder No:	

Containers: P=Poly, G=Glass, AG=Amber Glass, V=Vial, St=Sterile Preservatives: A=Ascorbic Acid, NH4=NH_4Cl, H=HCl, M=MeOH, N=HNO_3, NP=None, S=H_2SO_4, SB=$NaHSO_4$, SH=NaOH, T=$Na_2S_2O_3$, Z=ZnOAc
Matrix Codes: GW=Groundwater, SW=Surface Water, WW=Wastewater, DW=Drinking Water, S=Soil, SL=Sludge, A=Air, B=Bulk/Solid, O=_____

Appendix H – Tests on FF Baker's SCBA and mask

SCOTT®
A Scott Technologies Company

FUNCTIONAL TESTING WORKSHEET FOR SCOTT AIR-PAK® E-Z FLO® REGULATOR (2216 & 4500 psi)

SERVICE CENTER NAME: PA) E-6 DATE: 05 oct 05

ADDRESS: _____
No. and Street/P.O. Box City State Or Province Country Zip or Postal Code

TECHNICIAN'S NAME: MOFFAT, ALAT PHONE NUMBER: _____

REGULATOR OWNER: PA)

ADDRESS: _____
No. and Street/P.O. Box City State Or Province Country Zip or Postal Code

CONTACT PERSON: _____ PHONE NUMBER: _____

REGULATOR PART NUMBER: 803572-01 SERIAL NUMBER: 9700343/9700112

Cover dented

REGULATOR SET-UP AND FUNCTIONAL TEST	Initial Inspection	Final Inspection
Manual Shut-Off Functional Test (For donning switch and E-Z Flo regulators)		
• Was breathing normal with manual shut-off deactivated? (Must be free and unrestricted):	☑ YES ☐ NO	☑ YES ☐ N
• Did all flow stop with manual shut-off activated? (no flow allowed):	☐ YES ☑ NO	☑ YES ☐ N
• Did manual shut-off operate properly? (must move smoothly when depressed and return fully when released):	☐ YES ☑ NO	☑ YES ☐ N
• Manual shut-off reset pressure (must be between -2.5 and -5.0 in. H_2O for donning switch regulators and -3.0 and -5.0 in. H_2O for E-Z Flo regulators):	-1.6 in. H_2O	-3.8 in. H_2
Static Pressure Test		
• Chamber pressure indication (must be between +0.8 and +1.5 in. H_2O):	+1.1 in. H_2O	+1.0 in. H_2
Regulator Flow Test		
• Was the regulator able to produce the required flow at 65 psig inlet pressure? (minimum flow 400 lpm):	☑ YES ☐ NO	☑ YES ☐ N
Purge Flow Test		
• Purge flow indicator halfway between the 125 and 225 indication on gauge 12? (Purge knob fully open):	☑ YES ☐ NO	☑ YES ☐ N
• Did all flow stop with purge knob turned fully "OFF"? (no flow allowed):	☐ YES ☑ NO	☑ YES ☐ N
Alarm Test		
• Did Vibralert® alarm actuate at 135 psig inlet pressure? (Vibralert alarm shall actuate):	☑ YES ☐ NO	☑ YES ☐ N
• Did (Optional) Beacon Alarm™ actuate at 145 psig inlet pressure? (Beacon Alarm shall actuate):	~~☐ YES ☐ NO~~	~~☐ YES ☐ N~~
• Did Vibralert and (Optional) Beacon Alarms continue to actuate at 160 psig inlet pressure? (Vibralert and (Optional) Beacon Alarms shall continue to actuate):	☑ YES ☐ NO	☑ YES ☐ N
• Did Vibralert and (Optional) Beacon Alarms stop actuating at 110 psig inlet pressure? (Vibralert and (Optional) Beacon Alarms shall stop actuating):	☑ YES ☐ NO	☑ YES ☐ N
External Leakage Test		
• Did leakage occur at 100 psig inlet pressure without cap assembly installed? (pressure must remain above 80 psig for 30 seconds):	☑ YES ☐ NO	☐ YES ☑ N
• Did leakage occur at 100 psig inlet pressure with cap assembly installed? (pressure must remain above 80 psig for 30 seconds):	☑ YES ☐ NO	☐ YES ☑ N
Breathing Test		
• Was breathing normal at 85-110 psig inlet pressure? (must be free and unrestricted):	☐ YES ☐ NO	☑ YES ☐ N
• Did breathing remain normal at 145-165 psig inlet pressure? (must remain free and unrestricted):	☐ YES ☐ NO	☑ YES ☐ N
• Did alarm actuate at 145-165 psig inlet pressure? (alarm shall actuate; beacon shall be visible):	☐ YES ☐ NO	☑ YES ☐ N
• Did alarm stop actuating at 85-110 psig inlet pressure? (alarm shall not actuate; beacon shall not be visible):	☐ YES ☐ NO	☑ YES ☐ N
• Did a free flow of air occur with purge knob turned fully "ON"? (a free flow of air shall occur):	☐ YES ☐ NO	☑ YES ☐ N
• Did the free flow of air stop with purge knob turned fully "OFF"? (no flow allowed):	☐ YES ☐ NO	☑ YES ☐ N

NOTE: This form is intended to be used in conjunction with "Air-Pak Overhaul Manual, H/S 5445."

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SCOTT

SCOTT PosiChek3

Visual / Functional Test Results

PFD

4/27/2006 12:52:32 PM

PosiChek3 calibration was up to date when this test was performed.

Scott
Air-Pak 4.5
E-6

L04416

Apparatus Tested

Location : AIR SUPPLY ROOM
Other ID :

Auxiliary IDs

Facepiece / Head Har	AV-2000(CS) SCOTT
Regulator	19700343
Reducer	19700110
Low Pressure Alarm	VIBRALERT
Cylinder	30/SCI/CARBON
Airline Attachment	NO
Harness	WIRE/KEVLAR

Visual Inspection

Facepiece / Head Harness	Pass
Backframe/Harness	Pass
Cylinder	Pass
Alarms	Pass
Hoses	Pass

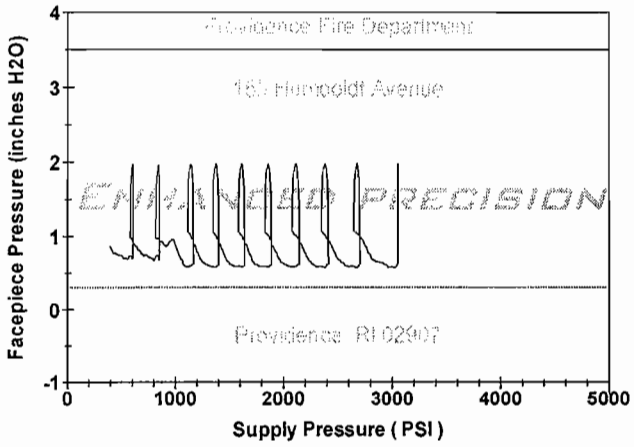
Functional Tests

Facepiece Leak Test	Pass	0.1 in. H2O
Exhalation Pressure :	Pass	1.9 in. H2O
Remote Pressure Gauge	Pass	

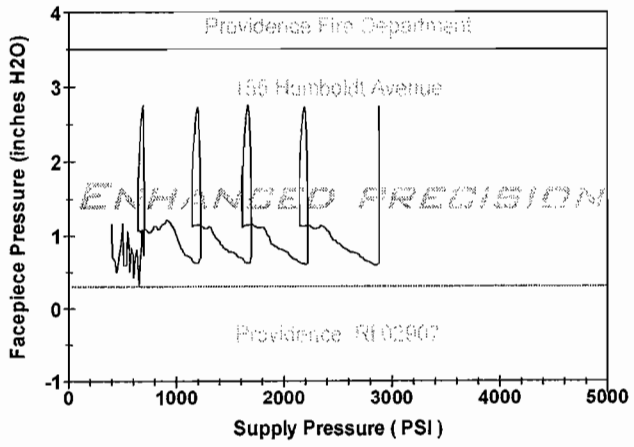
1000 PSI	2000 PSI	3000 PSI
Pass 981	Pass 1945	Pass 2844

Alarm(s) Activation :	Pass	1146 PSI
Air Saver Switch	Pass	-4.0 in. H2O
Static Facepiece Pressure	Pass	0.9 in. H2O
Primary Reducer Lockup	Pass	89 PSI
Primary Creep	Pass	-7 PSI
Low Cylinder Transfer Pr :	Pass	1146 PSI
Secondary Reducer Lockup	Pass	158 PSI
Secondary Reducer Creep	Pass	-5 PSI
Purge Flow Test	Pass	173 L/min
High Pressure Leakage	Pass	22 PSI
Secondary Pr. at High Cyl.	Pass	146 PSI

Scott Air-Pak 4.5 - E-6 4/27/2006 12:52:32 PM
Standard Work Rate



Scott Air-Pak 4.5 - E-6 4/27/2006 12:52:32 PM
Maximum Work Rate (102 Liter Minute Vol.)



Minimum	Maximum		Breathing Results	Minimum	Maximum	
0.6 in. H2O	2.0 in. H2O	Pass	Facepiece Pressure	0.3 in. H2O	2.8 in. H2O	Pass

4/27/2006 2:01:04 PM ALAN R MOFFAT : Sanitized regulator,facepiece provided with SCBA was used in test.

Tested by : ALAN R MOFFAT
Service Center : AIR SUPPLY/PROVIDENCE FIRE
EP

Signature

Version 3.22

REPLACEMENT PARTS LOG:

PART NUMBER	DESCRIPTION	COST	LABOR
802218-02	Cover + 3 labels		
1000 5449	Conical spring		
1000 7763	retaining ring		
803652-01	Diaphragm + Valve assembly		
1000 6455	Oring on piston		

Comments:

Regulator Cover dented, diaphragm torn, retaining ring cracked

SCOTT®
A Scott Technologies Company

FUNCTIONAL TESTING WORKSHEET FOR SCOTT AIR-PAK® 2.2/3.0/4.5 PRESSURE REDUCER

SERVICE CENTER NAME: PFD E-6 DATE: 05 oct 05

ADDRESS: ____ (No. and Street/P.O. Box / City / State Or Province / Country / Zip or Postal Code)

TECHNICIAN'S NAME: MOFFAT, ALAN PHONE NUMBER: ____

PRESSURE REDUCER OWNER: PFD

ADDRESS: ____ (No. and Street/P.O. Box / City / State Or Province / Country / Zip or Postal Code)

CONTACT PERSON: ____ PHONE NUMBER: ____

PRESSURE REDUCER PART NUMBER: 802220-02 TYPE OF REDUCER: ☐ 2.2 ☐ 3.0 ☑ 4.5

SERIAL NUMBER 19700110 / 19700343

PRESSURE REDUCER SET-UP AND FUNCTIONAL TEST	Initial Inspection	Final Inspection
Primary and Secondary Set-Up and Adjustment		
• Secondary pressure at 200 psi inlet pressure (should be between 145-165 psi with no increase above 165 psi within 30 seconds after lock-up):	N/A	160 psi
• Secondary pressure at 400 psi (for 2.2), 550 psi (for 3.0) or 900 psi (for 4.5) inlet pressure (Should be between 145 and 165 psi with no increase above 165 psi within 30 seconds after lock-up):	N/A	159 psi
• Primary pressure at 900 psi (for 2.2), 950 psi (for 3.0) or 1500 psi (for 4.5) inlet pressure (Should be between 85 and 110 psi with no increase above 110 psi within 30 seconds after lock-up):	N/A	106 psi
Primary Pressure at High Cylinder Pressure		
• Primary pressure at 2216 psi (for 2.2), 3000 psi (for 3.0) or 4500 psi (for 4.5) inlet pressure (must be between 85 and 110 psi with no increase above 110 psi within 30 seconds after lock-up):	107 psi	107 ps
Automatic Transfer and Secondary Pressure at High Cylinder Pressure		
• Did the automatic transfer occur? (Automatic transfer shall occur):	☑ YES ☐ NO	☑ YES ☐ NO
• Secondary pressure after transfer at 2216 psi (for 2.2), 3000 psi (for 3.0) or 4500 psi (for 4.5) inlet pressure (Must be between 140 and 165 psi with no increase above 165 psi within 30 seconds after lock-up):	157 psi	157 ps
• Primary pressure after return from transfer (must be between 85 and 110 psi with no increase above 110 psi within 30 seconds after lock-up):	107 psi	107 ps
External Leakage		
• Was external leakage present? (No leakage allowed):	☐ YES ☑ NO	☐ YES ☑ NO
• If yes, indicate the location with a check-mark in the appropriate box below:		
☐ High Pressure Hose/Inlet Sea ☐ Weep Hole(s) ☐ Outlet Manifold/Body Seal		
☐ Top Cover ☐ Seat Retainer Seal(s) ☐ Relief Valve		
☐ Top Cover/Body Seal ☐ Gaugeline Block/Body Seal ☐ Low Pressure Hose/Outlet Seal		
☐ Press-To-Test Probe Seal ☐ Outlet Manifold		
Primary Lock-up at Low Cylinder Pressure		
• Primary pressure at 900 psi (for 2.2), 950 psi (for 3.0) or 1500 psi (for 4.5) inlet pressure (Must be between 85 and 110 psi with no increase above 110 psi within 30 seconds after lock-up):	105 psi	105 ps
Primary Flow Test		
• Did primary produce the required flow at 900 psi (for 2.2), 950 psi (for 3.0) or 1500 psi (for 4.5) inlet pressure? (minimum flow 400 lpm):	☑ YES ☐ NO	☑ YES ☐ NO
• Primary pressure during flow test (must remain above 40 psi):	60 psi	60 ps
Low Cylinder Transfer Pressure		
• Did the low cylinder transfer occur? (low cylinder transfer shall occur):	☑ YES ☐ NO	☑ YES ☐ NO
• Inlet pressure when transfer occurs [must be between 510 and 600 psi (for 2.2), 690 and 810 psi (for 3.0) or 1000 and 1250 psi (for 4.5)]	1100 psi	1100 ps
• Secondary pressure after transfer (must be above 135 psi):	159 psi	159 ps
Secondary Alarm Test (Optional with Bell Alarm)		
• Did alarm activate? (secondary alarm must activate)	~~☐ YES ☐ NO~~	~~☐ YES ☐ NO~~
• Inlet pressure when alarm activates [must be between 510 and 600 psi (for 2.2), 690 and 810 psi (for 3.0), 1000 and 1250 psi (for 4.5)]	~~ / ~~ psi	~~ / ~~ ps
Secondary Pressure at Low Cylinder Pressure		
• Secondary pressure during 4 lpm flow test at 400 psi (for 2.2), 550 psi (for 3.0) or 900 psi (for 4.5) inlet pressure (must be between 140 and 160 psi):	154 psi	154 ps
Secondary Flow Test		
• Secondary pressure during 25 lpm flow test at 400 psi (for 2.2), 550 psi (for 3.0) or 900 psi (for 4.5) inlet pressure (must be between 135 and 160 psi):	153 psi	153 ps
• Did secondary produce the required flow at 400 psi (for 2.2), 550 psi (for 3.0) or 900 psi (for 4.5) inlet pressure? (minimum flow 400 lpm):	☑ YES ☐ NO	☑ YES ☐ NO
• Secondary pressure during flow test (must remain above 105 psi)	129 psi	129 ps
• Secondary pressure during 25 lpm flow test at 300 psi inlet pressure (must be between 135 and 160 psi):	153 psi	153 ps

NOTE: This form is intended to be used in conjunction with "Air-Pak 2.2/3.0/4.5 Overhaul Manual, H/S 5445."

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REPLACEMENT PARTS LOG:

PART NUMBER	DESCRIPTION	COST	LABOR
10008537	Vinyl tip		
804083-01	(2) 1" side straps		
57264-00	Ripple Seal Gasket		
10007331	2 Slides		
804085-01	2 Straps		

Comments:

Straps frayed

Appendix I - Rhode Island Hospital Lab Procedures for whole blood cyanide testing

CYANIDE--WHOLE BLOOD

Adopted		
Reviewed	WEB	12/1/96
Reviewed	[signature]	6/9/98
Reviewed	WEB	10/10/99
Reviewed	[signature]	9/7/00
Supercedes		

WEB 12/12/01
[signature] 8/27/02
[signature] 10/21/03
[signature] 7/7/04
WEB 9/1/05

METHOD: Micro-Diffusion and Spectroscopy

PRINCIPLE:

Any analytical method purported to support the emergency diagnosis and treatment of cyanide poisoning must provide results on a timely basis because this toxicant acts rapidly. The laboratory can provide analytical results within a time that will allow effective therapy with specific antidotes; contrary to common belief, survival for several hours after ingestions of even supralethal amounts of cyanide, particularly with supportive treatment, is not uncommon.

Cyanide in whole blood is relatively stable for several days, even at ambient temperature, because of the tight binding of cyanhemoglobin. Cyanide in plasma is rapidly converted to thiocyanate. Hence, whereas whole blood or gastric specimens may be analyzed for cyanide, on should analyze plasma, serum, and urine specimens for thiocyanate because their cyanide content may at most be only moderately increased, even in acute posioning.

In this procedure cyanogen bromide reacts with pyridine/p-phenylenediamine to produce a colored complex. Both thiocyanate and cyanide will undergo the following reactions:

$$KSCN + 4\,Br_2 + 4\,H_20 \text{ -------> } CNBr + 6\,HBr + H_2S0_4 + KBr$$

$$HCN + Br_2 \text{ --------> } CNBr + HBr$$

$$CNBr + \text{pyridine/p-phenylenediamine} > \text{pyridine dye}$$

SAMPLE COLLECTION

1. Whole blood containing EDTA as an anticoagulant.
2. No special storage required.

REAGENTS

1. Bromine Water, saturated.
2. Arsenic Trioxide Solution, 0.1 mol/l, pH 7.6. Dissolve 2.0 g arsenic trioxide in 100 ml of 0.1 mol/l sodium hydroxide. Heat solution briefly, cool, and adjust pH to 7.6 with concentrated hydrochloric acid.
3. Phenylenediamine, 0.2 %. To 50 ml 0.5 N hydrochloric acid, add 100 mg phenylenediamine.
4. Pyridine Reagent. Mix 30 ml of pyridine, 5 ml of concentrated hydrochloric acid, and 20 ml distilled water.
5. Chromogenic Reagent. Pyridine Reagent:Phenylenediamine (3:1) (V:V) (Prepare Fresh)
6. Hydrochloric Acid, 1 N. To 400 ml distilled water, add 41.7 ml concentrated hydrochloric acid and dilute to 500 ml with distilled water.
7. Sodium Hydroxide, 0.1 N. Into a liter mixing cylinder containing 900 ml distilled water, add 4 g sodium hydroxide and dilute to 1000 ml with distilled.

8. Sulfuric Acid, 10 Mol/L. To 40 ml distilled water, carefully add 55.6 ml concentrated sulfuric acid and mix carefully. When cooled to ambient temperature, dilute to 100 ml with distilled water.

STANDARDS

1. Stock Cyanide Standard, 1 mg/ml. To 80 ml 0.1 N sodium hydroxide, add 250 mg potassium cyanide and dilute to 100 ml with the 0.1 N sodium hydroxide.
2. Sub-Stock Cyanide Standard, 0.01 mg/ml. Into a 100 ml volumetric flask, add 1 ml stock cyanide standard and dilute to 100 ml with distilled water.
3. Working Cyanide Standards. To 2 ml cyanide free whole blood, add 100 and 200 ul sub-stock cyanide standard. These correspond to 50 and 100 ug/dl, respectively.

QUALITY CONTROL

1. Cyanide Control, 25 ug/dl. Refer to the Toxicology Quality Control Manual for control make-up.
2. Refer to the Toxicology Quality Control Manual for control tolerances.

INSTRUMENTAL PARAMETERS

1. Wavelength -- 490 nm
2. Heat Source,40-50 °C

PROCEDURE

1. Label Conway diffusion cells as working standards, control, and unknown samples.
2. Place a layer of vacuum grease along the entire lip of cell cover.
3. Pipet 0.5 ml of 0.1 N sodium hydroxide into the center well of each diffusion cell.
4. Pipet 2.0 ml of the working standards, control, and unknown samples into the outer ring of the appropriate diffusion cells.
5. Add 0.5 ml 10 Mol/l sulfuric acid to the outer ring of each diffusion cell, and position the cell cover without delay
6. Briefly tilt and rotate the diffusion cells to mix the sulfuric acid with the whole blood, being careful that none of the samples spills over into the center well.
7. Position the diffusion cells in a uniformly heated environment of 40-50°C and incubate for ten minutes.
8. Remove the diffusion cells to ambient temperature and remove the cell covers.
9. Into 10 X 75 mm test tubes, add 0.1 ml of the sodium hydroxide from the center well. Prepare a blank with 0.1 N sodium hydroxide.
10. Add 0.5 ml 1 N hydrochloric acid and mix.
11. Add 50 ul of saturated bromine water and mix.
12. Add 200 ul arsenic trioxide and mix.
13. Add 0.8 ml of chromogenic reagent and mix. Let stand for at least three minutes.
14. Measure absorbances on a spectrophotomer at 490 nm within twelve minutes.

CALCULATIONS

Construct a standard curve on linear graph paper by plotting the absorbances of the working standards versus the concentrations. The plot should yield a straight line. Determine the concentration of the unknown from this standard curve.

CALCULATIONS

Construct a standard curve on linear graph paper by plotting the absorbances of the working standards versus the concentrations. The plot should yield a straight line. Determine the concentration of the unknown from this standard curve.

LIMITATION OF PROCEDURE

1. Minimum Detectable Level -- 1 ug/dl
2. Interferences -- no interferences have been identified.
3. Linearity - up to ~~400~~ 100 ug/dl.

REPORTING RESULTS

1. Normal Values -- cyanide is normally present in the blood of healthy individuals at concentrations up to 20 ug/dl, the result of vitamin B 12 metabolism and of environmental factors such as cigarette smoking and ingestion of plants and plant products containing cyanide glucoside, and amygdalin.
2. Toxicity -- anything greater than 20 ug/dl will show some signs of mild toxicity.
3. For Critical Results, refer to "Critical Values" section of the procedure manual.

REFERENCE

Selected Methods of Emergency Toxicology, Vol. 11, 1986, p57-62.

AUTHOR: William C. Bastan, Ph.D.